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FINAL
ENVIRONMENTAL IMPACT STATEMENT

PAWAA REDEVELOPMENT PROJECT

VOLUME II
Appendices

PREPARED FOR:
CITY & COUNTY OF HONOLULU
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

STATE OF HAWAII
HOUSING FINANCE AND DEVELOPMENT CORPORATION

PREPARED BY:
WILSON OKAMOTO & ASSOCIATES, INC.

NOVEMBER 1993

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APPENDIX A
MARKET ASSESSMENT

JOHN CHILD & COMPANY
REAL ESTATE CONSULTANTS & APPRAISERS

November 1, 1993

Telecopied

Mr. James Turse
Director
Department of Housing and Community Development
650 South King Street, 5th Floor
Honolulu, Hawaii 96813

Dear Mr. Turse:

Re: Revised Draft EIS for the Pawaa Redevelopment Project

At your request, John Child & Company, Inc. is pleased to assist you in responding to comments received in relation to the revised EIS for the Pawaa Redevelopment Project. This letter presents our responses to comments regarding the market assessments and financial feasibility of the proposed Pawaa Redevelopment Project.

COMMENTS

The comments to the revised EIS regarding the market assessments and financial feasibility of the proposed Pawaa Redevelopment Project generally express the following concerns:

- Does the revised EIS appropriately assess changes in market conditions for the residential and commercial components of the project?

- Does the current financial assessment of the project reflect current "soft" market conditions? Under assumed rents and bond financing assumptions, the project would not be feasible.

RESPONSES

Responses to these concerns are summarized as follows:

John Child & Company, Inc.
[illegible]
Honolulu, Hawaii [illegible]
Telephone [illegible]
Telecopier [illegible]

Residential Component

As part of the revised EIS, the market support for market-priced residential uses in the Pawaa Redevelopment Project was updated. The assessment reviewed current market data including prices, sales volumes and competing inventory.

The market for market-priced residential condominium units has declined since the 1991 market assessment included in the original EIS and as a result, the sizes of the market-priced residential condominium units were reduced as part of the development program. The declining market condition is also reflected in the reduction of the selling prices (premiums) estimated for the development sites to be sold to the market-priced condominium developers.

Commercial Component

The revised master plan has eliminated almost all of the commercial office space originally included as part of the project. The retail component has been redesigned. As part of the revised EIS, the market support for retail uses in the Pawaa Redevelopment Project was updated. The assessment reviewed current market data including rents, sales volumes, required yields and capitalization rates and competing inventory.

The market for retail developments has declined since the 1991 market assessment included in the original EIS. To reflect the changes in the market, the retail space rents were reduced and the capitalization rates estimated to be required to attract an investor to the project were increased. The result of these changes was a reduction in the estimated premium for the retail component.

No separate assessment was made for a movie theater for the project. However, the consultants have discussed the design and location of the theater with local movie theater operators and their response has been positive.

Financial Assessments

The financial assessments for the project were updated as the project design changed in response to community concerns and market conditions. The revised assessments included updated construction cost estimates from a professional cost estimator, updated rents for the affordable rental units, revised retail space inventory, updated retail rents and capitalization rates, updated land acquisition cost estimates and refinements in bond financing assumptions.

These revisions and updates were made to provide a reasonable assessment of the equity that would be required of the City and State for the proposed project. One respondent questioned the economic feasibility of the project under assumed rents and bond financing rates. The assumptions used by the respondent were not correct, and did not reflect the estimates used in the revised EIS.

* * * * *

We appreciate having the opportunity to respond to coments on the revised EIS covering the market and financial assessments. Please call if you have any questions.

Sincerely,

JOHN CHILD & COMPANY, INC.

Uson Y. Ewart

Uson Y. Ewart, MAI
Vice President

UYE/paf

JOHN CHILD & COMPANY
REAL ESTATE CONSULTANTS & APPRAISERS

[redacted]

Report to

Kober/Hanssen/Mitchell Architects and
Daniel Mann Johnson Mendenhall Hawaii

Covering Market Assessments and
Development Program for

PAWAA REDEVELOPMENT
MASTER PLAN

as of October 1991

[redacted]

JOHN CHILD & COMPANY
REAL ESTATE CONSULTANTS & APPRAISERS

July 15, 1992

Clifford E. Hanssen, AIA
Principal in Charge
Kober/Hanssen/Mitchell Architects
1585 Kapiolani Boulevard, Suite 1504
Honolulu, Hawaii 96814-4532

Dear Mr. Hanssen:

Re: Market Analysis Covering the Pawaa Redevelopment Master Plan

At your request, we have estimated the market support and recommended a development program for the Pawaa Redevelopment Master Plan, a proposed mixed-use development covering the Pawaa Annex police headquarters and adjoining properties. This letter summarizes our study background and approach. The market assessments and recommendations are presented in the accompanying report, effective as of October 1, 1991.

BACKGROUND

Kober/Hanssen/Mitchell Architects and Daniel Mann Johnson Mendenhall Hawaii (KHMA/DMJMH) are leading the team of consultants (Consulting Team) selected to develop the Pawaa Redevelopment Master Plan for the City & County of Honolulu and State of Hawaii (Client). The Pawaa Master Plan covers a two-block area bounded by Keeaumoku, King and Beretania Streets and Kalakaua Avenue, Honolulu, Hawaii (Pawaa Redevelopment site). The two-block area includes the Pawaa Annex police headquarters and adjoining properties. The City & County of Honolulu (City) owns three parcels (tax map keys 2-4-5:14, 21 and 23) and the State of Hawaii (State) owns two parcels (tax map keys 2-4-5:18 and 19). The remaining parcels are privately owned.

The objective of the master plan is to develop residential uses subject to the following requirements:

- 10% to 20% of all dwelling units are for elderly housing.
- A minimum of 60% of the dwelling units are rental units:
  - 1/2 of the rental units are affordable to households earning less than 120% of the median income.

  - 1/2 of the rental units are affordable to households earning less than 80% of the median income.
- The remaining 40% of the dwelling units may be sold or rented at market rates.
- Unit types are to accommodate a range of household sizes.

A key element in preparing master development plans for alternative site scenarios is the market opportunities and constraints that impact the development. In this regard you asked John Child & Company, Inc. to provide market assessments and recommend development programs for the four alternative site scenarios. The Consulting Team's overall study was divided into three phases:

Phase I - Site Assessment and Market Analysis
Phase II - Design and Financial Analysis
Phase III - Draft Environmental Impact Statement

This report summarizes the market analysis in Phase I.

STUDY OBJECTIVES

The objectives of our assistance for the market analysis in Phase I are to:

- Assess the market support for mixed-use residential and commercial development of the property including:
  - Residential rental and condominium units
  - Commercial office and retail space.
- Recommend appropriate development programs for alternative Pawaa Redevelopment site scenarios in terms of:
  - Residential unit types
  - Unit mix
  - Unit size
  - Retail commercial, office and community service space
  - Parking requirements.

EFFECTIVE DATE OF REPORT

The effective date of this report is October 1, 1991.

STUDY APPROACH

The study approach to provide assessments of the market support for various land uses on the site focused on residential and commercial development. The market assessments assisted the Consulting Team to identify alternative development concepts for the site. As the development concepts were refined, the market assessments focused on the market support and preliminary financial considerations for specific mix of uses.

The work plan to complete the market analysis in Phase I is outlined as follows:

Orientations

1. Met with KHMA/DMJMH to review the objectives and timing of our assistance and our study approach.
2. Met with the City and State to review master plan objectives in terms of land uses and community input.
3. Reviewed BMX-3 guidelines, preliminary design concepts prepared by the Consulting Team and other physical planning considerations for the site.
4. Visited the site and the surrounding community.
5. Met with the ad hoc committee comprised of community organizations and solicited and reviewed community concerns and input.

Overview of Market Conditions

1. Reviewed and evaluated Honolulu's resident population and economic trends as they relate to the local and real estate market:
   - Population trends and growth projections
   - Labor force characteristics and projections
   - Economic trends
   - Impacts of foreign investment

   - Trends in commercial and condominium properties
   - Other demographic and economic indicators.

2. Focus on recent development and pricing trends within the immediate environs of the Pawaa redevelopment site.

Residential Condominium
Market Assessment

1. Evaluated the residential condominium market in Honolulu in terms of:
   - Buyer profile
   - Market demand
   - Unit characteristics
   - Unit sale prices
   - Historical sales patterns.

2. Projected the residential condominium requirements for the Honolulu urban district in terms of:
   - Buyer profile
   - Number and types of units
   - Unit prices.

3. Evaluated and projected the market support for the residential condominium development in Honolulu in terms of:
   - Physical characteristics
   - Market orientation
   - Sales prices
   - Historical sales
   - Market share.

4. Surveyed current and projected inventory of comparable residential condominium projects.

5. Evaluated the market support for residential condominium development on the Pawaa Redevelopment site in terms of:

   - Target markets
   - Market share.
   - Physical characteristics
   - Sales prices
   - Projected absorption.

Residential Rental
Market Assessment

1. Identified and reviewed the market performance of subsidized and market oriented rental apartment projects in Honolulu in terms of:

   - Location
   - Physical characteristics
   - Market orientation
   - Rental rates
   - Occupancy levels
   - Lease-up rates.

2. Surveyed the current and projected inventory of competing projects.

3. Projected the market support for residential rental uses on the Pawaa Redevelopment site in terms of:

   - Number and type of units
   - Rental rates
   - Lease-up rate-occupancy levels.

Commercial Market Assessment

1. Identified and reviewed the market performance of commercial retail and office space in Honolulu in terms of:

   - Location (frontage, access, prestige, pedestrian and vehicular traffic)
   - Physical characteristics (design, size, finish, floor location and access)
   - Rental rates

   - Lease-up rates
   - Occupancy levels.

2. Surveyed the current and projected inventory of competing projects.

3. Projected market support for commercial uses on the Pawaa Redevelopment site in terms of:

   - Amount and type of commercial space
   - Tenant mix
   - Rental rates.

Reporting

1. Met with the Consulting Team, City and State to review market assessments on to review market assessments covering specific land uses.

2. Provided a development program to the Consulting Team for use as a basis for preliminary site analysis, site selection, massing and height studies.

3. Prepared a draft report summarizing our methodology and findings.

4. Prepared a final report based on the market analysis completed in the draft report. The final report could be incorporated in the Phase III Environmental Impact Statement (EIS).

REPORT FORMAT

The report is organized as follows:

Section I - Executive Summary
Section II - Residential Rental Market Assessment
Section III - Luxury Residential Condominium Market Assessment
Section IV - Market-rate Residential Condominium Market Assessment
Section V - Office Market Assessment
Section VI - Retail Market Assessment

We appreciate having the opportunity to assist you on this interesting assignment. Please call us if you have any questions.

Very truly yours,

JOHN CHILD & COMPANY, INC.

Karen Char, MAI, CRE
Chief Executive Officer

Uson Y. Ewart, MAI
Vice President

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I - EXECUTIVE SUMMARY

This section summarizes the market assessments and recommended development program. The market assessments for the Pawaa Redevelopment site covered residential and commercial uses categorized as follows:

- Residential
  - Affordable rental units
  - Luxury condominium units
  - Market-rate condominium units.
- Commercial
  - Office and ancillary retail space
  - Convenience retail shopping space.

The development program provides the Consulting Team with the mix of uses that would be appropriate for the Pawaa Redevelopment site.

MARKET ASSESSMENTS

The market support for the planned residential and commercial uses are summarized in terms of the current demand and recommended unit mix.

Affordable Rental Units

Current and projected demand for affordable rental units exceeds current and projected supply. Therefore, there is estimated to be strong market support for all of the affordable rental units developed on the site.

The mix of apartment types in terms of bedroom count and unit sizes is based on the existing demand for City and State affordable rental units. The current and projected demand would support a majority of 1- and 2-bedroom units and a smaller number of studio and 3-bedroom units in the Pawaa Redevelopment projects.

Luxury Condominium Units

Luxury condominium units are typically priced over $400 per square foot of net living floor area. Many units in the luxury projects have ocean views.

The current and projected supply of luxury condominium units is anticipated to exceed demand over the next four to six years. Competition for the limited number of buyers that can afford luxury units would favor the projects in the most desirable locations with the best views.

The Pawaa Redevelopment site is well located in relation to transportation systems and proximity to employment, shopping and recreation. Its location has potential constraints that may reduce its competitiveness in relation to other luxury condominium sites. Additional constraints include:

- Restricted ocean views
- Leasehold land tenure
- Affordable housing orientation.

Higher height limits and appropriate design solutions could mitigate some of these constraints. However, luxury condominium unit buyers can afford to be very selective in their purchase decision, especially with the variety of planned and proposed luxury projects anticipated. As such, these project constraints would limit the competitiveness of the Pawaa Redevelopment site for luxury condominium development.

The annual demand for luxury units in Honolulu is estimated to be between 250 and 350 units. Projects on the Pawaa Redevelopment site could capture a relatively small share of the annual demand. The annual absorption of luxury units in the Pawaa Redevelopment site could range from about 20 to 30 units.

Market-Rate Condominium Units

Market-rate condominium units are typically priced between $250 and $400 per square foot of net living floor area. Market-rate condominium projects are typically conveniently located in relation to employment, shopping, recreation and schools; these projects do not necessarily include ocean views.

The projected demand for market-rate condominium units is anticipated to exceed supply over the next four to six years because few of the planned condominium projects are targeted to this segment of the market. Almost all of the planned, large-scale condominium projects are oriented to the luxury condominium market.

The Pawaa Redevelopment project has significant competitive advantages if planned for market-rate condominium units because the site is well located in relation to transportation systems, employment, shopping, schools and recreation, and the project would include community service and day-care facilities.

The annual demand for market-rate units in Honolulu is estimated to be between 400 and 500 units. Projects on the Pawaa Redevelopment site could capture about 30% of the annual demand. The annual absorption of market-rate units in the Pawaa Redevelopment site could range from about 120 to 250 units.

Commercial Office and Ancillary Retail Space

Current and proposed additions of commercial office space are projected to exceed demand over the next eight years based on the inventory of proposed projects with definite time schedules. The planned inventory of commercial office space in Honolulu is projected to keep occupancy levels

in Class A office buildings below 90% for the next eight years assuming no other projects are constructed. Therefore, competition among new office projects to attract tenants could result in escalating rental concessions and lower short-term returns on investment.

Commercial office development in the Pawaa Redevelopment site could be attractive to selected tenants as compared to projects in the Kapiolani and Downtown Honolulu area because of the location and the mix of uses available in this master-planned development. For example, the City and State anticipate a need for about 50,000$ of office space in the project. An additional 15,000$ of office space is needed for community service and day care facilities in the project resulting in a minimum office space requirement of 65,000$ in the project.

In the initial development at least 65,000$ could be supported. Assuming the entire two-block area is redeveloped, the project is estimated to support an additional 50,000$ of office and ancillary retail space.

Convenience Shopping Center

Grocery Store

The long-term lease for the existing 27,000$ Foodland Store located across Beretania Street from the Pawaa Redevelopment site has ended; the property owner plans to redevelop the site without a grocery market when the market for luxury residential condominium units improves. An interim lease arrangement provides for continued use of the property by Foodland. Either party can cancel the lease with one-year notice.

The existing store provides about 50% of the grocery floor area supported by primary trade area households. The current market supports a minimum of about 30,000$ to 40,000$ of retail grocery space. Foodland is interested in operating a 40,000$ store in the Pawaa Redevelopment.

Total Retail Space

In addition to retail grocery space, the market supports development of other convenience retail space on the site. After review of the quality and quantity of competing convenience shopping centers in the trade area, a Pawaa Redevelopment convenience shopping center could capture about 50% of the other retail sales from the primary trade area households and much smaller percentage shares of grocery and other retail sales from the secondary and tertiary trade areas.

Based on a current annual sales volumes and projected trade area retail expenditures, about 119,000$ of retail floor area could currently be supported on the Pawaa Redevelopment site. Because of the physical constraints of the site and the need to have the convenience shopping center predominantly at road grade, the amount of floor area in the convenience shopping center could vary with the overall project size. A minimum of about 65,000$ could be supported on the Pawaa Redevelopment site. By the year 2000, the site could support about 140,000$ of retail space with the majority in grocery and other convenience goods.

Other

Interest by movie theatre operators to develop a multi-plex cinema would support demand for an additional 35,000$ to 40,000$ of retail and entertainment space.

RECOMMENDED DEVELOPMENT PROGRAMS

Development programs are recommended for four site configuration alternatives. The development programs recommend:

- Number of residential units in terms of market-priced condominium units and affordable rental units, including elderly rental units as a subcategory.
- Retail commercial space (convenience shopping center), office commercial space, and community services/day-care space that could be supported on the Pawaa Redevelopment sites.

The study approach to evaluate and recommend each development programs is outlined as follows:

1. Estimated the potential development density based on the site area and a maximum floor area ratio of 3.5.
2. Estimated the amount of retail, commercial and community service space appropriate to the developments.
3. Estimated the number and mix of residential units that would result in an overall building efficiency of about 85%. (The 85% factor allows for non-salable and non-leasable space for circulation and common areas.
4. Estimated the number of parking stalls required for each development program based on the mix of uses, Land Use Ordinance requirements and City and State provisions.

The recommended residential unit mix includes studios, 1-, 2- and 3-bedroom units. The unit mix, sizes and required parking varies by target market, as shown in Exhibit I-A.

Addendum A includes maps showing the site configurations for the four alternative site scenarios. The four alternative site scenarios include land areas from about 365,000$ to 600,800$ and could include over 1,050,000$ to almost 1,800,000$ of usable floor area. The recommended development programs are shown in Exhibit I-B. The recommended market, affordable and elderly residential units are shown in Exhibit I-C.

Exhibit I-A

PAWAA REDEVELOPMENT
Unit Mix, Size and Parking Requirements

	Market units	Affordable units
Unit mix [1]		
Studios	0%	15%
1-Bedroom	35	45
2-Bedroom	50	35
3-Bedroom	15	5
Average unit size (sf)		
Studios	500	375
1-Bedroom	700	575
2-Bedroom	1,000	750
3-Bedroom	1,200	850
Weighted unit size	925	620
Parking stall requirements [2]		
Studios	1	1
1-Bedroom	1	1
2-Bedroom	2	1
3-Bedroom	2	1
Average per unit	1.65	1

[1] Elderly unit mix is estimated to be 50% studios, 30% 1-bedroom and 20% 2-bedroom.
[2] Parking stalls will be less than LUO requirements and assumes the project would obtain 201H exemptions.

Exhibit I-B

PAWAA REDEVELOPMENT
Recommended Development Programs
for Alternative Site Scenarios

	Scenario A	Scenario B	Scenario B-1	Scenario C
Site area (sf)	364,961 [1]	459,917 [2]	532,193 [3]	600,793
Floor area ratio (FAR)	3.5	3.5	3.5	3.5
Development density (sf)	1,277,364	1,609,710	1,862,676	2,102,776
Projected residential units				
Market priced condos	530	660	770	860
Affordable Rental	662	825	962	1,075
Elderly rental	133	165	193	215
Total units	1,325	1,650	1,925	2,150
Usable floor area allocation (sf)				
Residential (Market)	490,250	610,500	712,250	795,500
Residential (Affordable)	492,900	613,800	716,100	799,800
Retail commercial	65,000	85,000	85,000	130,000
Commercial office	25,000	50,000	50,000	50,000
Community services/day-care	10,000	10,000	10,000	10,000
	1,083,150	1,369,300	1,573,350	1,785,300
Building efficiency	84.8%	85.1%	84.5%	84.9%
Parking requirements (Stalls)				
Residential (Market)	875	1,089	1,271	1,419
Residential (Affordable) [4]	695	866	1,010	1,129
Retail commercial [5]	163	142	142	217
Commercial office [5]	63	125	125	125
Community services/day-care [5	25	25	25	25
Total parking stalls	1,821	2,247	2,573	2,915

[1] Includes site A, increments 1 and 4 and a portion of Young Street.
[2] Includes Kaheka Lane, portion of Young Street and all but increments 3, 7 and 8.
[3] Includes Kaheka Lane, portion of Young Street and all but increment 3.
[4] Parking requirements based on one stall per unit for affordable and one stall per four elderly units.
[5] Parking requirements based on one stall per 400sf of retail and office space.

Source: John Child & Company, Inc.

PAWAA REDEVELOPMENT
Recommended Residential Units for
Alternative Site Scenarios

	Scenario A	Scenario B	Scenario B-1	Scenario C
Market priced condos				
Studios	0	0	0	0
1-Bedroom	185	231	270	301
2-Bedroom	265	330	385	430
3-Bedroom	80	99	115	129
Subtotal market units	530	660	770	860
Affordable Rental				
Studios	53	67	76	87
1-Bedroom	318	395	463	515
2-Bedroom	251	313	365	408
3-Bedroom	40	50	58	65
Subtotal rental units	662	825	962	1,075
Elderly rental				
Studios	66	82	97	107
1-Bedroom	40	50	57	65
2-Bedroom	27	33	39	43
3-Bedroom	0	0	0	0
Subtotal elderly units	133	165	193	215
Total residential units	1,325	1,650	1,925	2,150

Source: John Child & Company, Inc.

Exhibit I-C

II - RESIDENTIAL RENTAL MARKET ASSESSMENT

This section presents the assessment of market support for residential rental development on the Pawaa Redevelopment site in terms of unit mix, unit size and estimated rents.

OVERVIEW OF THE RESIDENTIAL RENTAL MARKET ON OAHU

Most residential multi-family construction on Oahu over the past decade has been oriented towards the condominium apartment purchaser. Although a portion of the purchasers have been investors who rented their units on long-term leases, the majority of the recent purchasers have been owner occupants.

There has been a lack of conventional rental projects built by private developers because the development and sale of multi-family residential projects as condominium projects has offered more profit than conventional rental development. Therefore, with the exception of governmental projects, virtually no large scale rental projects have been developed in Honolulu over the past decade. Demolitions of existing rental apartment projects and conversion to condominium units has added to the acute shortage of rental apartment units.

Demand for rental apartments continues to grow because of population growth and new household formations. Because of the shortage of rental apartment inventory, apartment rents have increased by as much as 20% to 25% per annum over the recent past. This has further aggravated the problem of affordable rental units for households earning less than 120% of the median household income.

Supply and Demand Relationship and Projected Absorption Rate

Current demand for affordable housing is conservatively estimated at 30,000 households on Oahu. City, State and private sectors are developing single- and multi-family projects oriented to providing purchase opportunities for these households. However, even if all proposed housing projects were to be completed as proposed, less than 10,000 units will be added over the next five years. The majority of these projects are located in Central Oahu and Ewa, outside of the primary urban center. The supply and demand imbalance for the affordable priced homes has typically resulted in 10 times that the number of applicants for a project in relation to the number of housing units available for sale. Lotteries are typically held to determine which of the applicants have the opportunity to purchase a home.

Many of the households seeking affordable housing cannot afford to purchase homes or will not be lucky enough to be selected in the purchase lotteries. Affordable rental apartments would provide a housing solution for these households. In addition, most of the new projects are located outside of the primary urban area. For the elderly and others who desire to live in urban Honolulu, these suburban projects do not represent a reasonable housing alternative. Therefore, a significant demand exists for affordable rental apartment units in urban Honolulu.

The demand for this type of rental project is evident in the response to recently developed City and State rental projects. Typically these high-rise rental projects have also required a lottery because of the overwhelming number of prospective tenants seeking rental apartments at affordable rents.

Because of the significant demand for affordable rental projects and the relatively few rental units being developed to accommodate this demand, the analysis assumes that sufficient market support exists to absorb any number of affordable rental apartment units developed on the Pawaa Redevelopment site.

PROJECT ORIENTATION FOR PAWAA REDEVELOPMENT SITE

The primary goal of the State of Hawaii (State) and City and County of Honolulu (City) for the Pawaa Redevelopment project is to provide rental apartment units that would be affordable for households earning less than 120% of the median household income. This group also includes elderly households. The emphasis on affordable rental units is clearly stated in the program requirements provided by the City and State summarized as follows:

- 10% to 20% of all dwelling units are for elderly housing.
- A minimum of 60% of the dwelling units are rental units:
  - 1/2 of the rental units are affordable to households earning less than 120% of the median income.
  - 1/2 of the rental units are affordable to households earning less than 80% of the median income.
- The remaining 40% of the dwelling units may be sold or rented at market rates.
- Unit types are to accommodate a range of household sizes.

MIX OF UNITS

The City and State indicate a need for a variety of unit types to accommodate a range of households. Existing affordable rental projects were reviewed to determine a reasonable mix of unit types.

Exhibit II-A

PAWAA REDEVELOPMENT
Unit Mix of Hawaii Housing Authority Rental Projects
by Area

Location	Area	Number of Bedrooms 0	1	2	3	Other	Total
Managed by HHA							
Leeward [1]	I	24	118	184	209	58	593
Kalihi [2]	II	0	80	182	239	203	704
Downtown	III	0	86	353	240	58	737
Punchbowl	IV	356	640	117	40	0	1,153
Palolo	V	0	33	163	141	104	441
Subtotal		380	957	999	869	423	3,628
Distribution		10.5%	26.4%	27.5%	24.0%	11.7%	100.0%
Section 8 projects							
Various [3]	VI	351	279	690	423	75	1,818
Subtotal		351	279	690	423	75	1,818
Distribution		19.3%	15.3%	38.0%	23.3%	4.1%	100.0%
Privately managed							
Walanae	17	0	10	50	0	0	60
Kalihi	40	0	68	350	243	87	748
Kaneohe	41	0	60	79	71	0	210
Palama	43	80	126	0	0	0	206
Subtotal		80	264	479	314	87	1,224
Distribution		6.5%	21.6%	39.1%	25.7%	7.1%	100.0%
Total		811	1,500	2,168	1,606	585	6,670
Distribution		12.2%	22.5%	32.5%	24.1%	8.8%	100.0%

[1] Includes Waipahu, Nahiawa, Haile, Nanakuli, Waialua, Pearl City, Aiea and Salt Lake.
[2] Includes Kalihi Valley, Liliha, Waimanalo and Kaneohe.
[3] This area is not geographic, all projects are individually approved by HHA based on availability and other criteria.

Source: Hawaii Housing Authority and the Hawaii Housing Authority Composite Report, July 1, 1989 - June 30, 1990.

State Projects

Hawaii Housing Authority (HHA) owns, manages and administers programs covering over 6,600 affordable rental units. Exhibit II-A summarizes the current inventory and shows the relative distribution of units by bedroom count. As shown, 2-bedroom units comprise the largest group with 32.5% of the inventory. The 1- and 3-bedroom units represent the next largest groups with 22.5% and 24.1%, respectively. The 3-bedroom units and other larger units represent a relatively large portion of the inventory because single-family units are included.

The mix of units in selected high-rise rental projects controlled by HHA is more indicative of the relative mix that would be appropriate for the rental projects developed on the Pawaa Redevelopment site. Exhibit II-B summarizes the inventory of selected high-rise projects. As shown, 1-bedroom units represent the largest group with 51.0% of the inventory. The 2-bedroom units represent 21.8% or less than one-half of the 1-bedroom inventory. The studios and 3-bedroom units represent 14.8% and 12.4%, respectively.

The relative mix from the selected HHA projects is skewed towards the studio and 1-bedroom units because of the number of elderly projects included in the selected inventory. As shown in Exhibit II-B, elderly projects account for 796 of the 1,681 units in the selected projects, and all the studio units and about 60% of the 1-bedroom units inventoried are in elderly projects.

City Projects

The City Department of Housing and Community Development has recently developed four high-rise rental projects in urban Honolulu. These projects are generally oriented to the same households as the Pawaa Redevelopment projects would be oriented. Exhibit II-C summarizes the mix of units in the four City projects. As shown, 1-bedroom units represent the largest group with 51.7%, followed by 2-bedroom units with 38.1%. The 3-bedroom and studio units combined only represent about 10% of the inventory of these four projects.

Recommended Unit Mix

Because the Pawaa Redevelopment affordable rental projects would have a minimum of 10% of the residential units allocated for elderly households, more studio and 1-bedroom units are needed than typical affordable rental projects. Based on a review of the unit mix in the State and City affordable rental projects, about 15% of the affordable rental units should be studio units and 1-bedroom units should be the largest group of the affordable rental units. The significant share of 2-bedroom units in the City projects indicates a need for larger units to accommodate households with children and other dependents. For larger households, a small number of 3-bedroom units should be provided.

PAWAA REDEVELOPMENT
Unit Mix of Selected State of Hawaii High-Rise Rental Projects

Project	Housing type [1]	Agency	No. of stories	Unit Mix: Studio	1-bdrm.	2-bdrm.	3-bdrm.	Total no. of units
Salt Lake Apts.	F	HHA	8	0	28	0	0	28
Kuhio Park Terrace								
Building A	F	HHA	17	0	0	180	94	274
Building B	F	HHA	17	0	48	138	112	298
Kalakaua Homes (High Rise)	F	HHA	10	0	123	0	0	123
Subtotal				0	199	318	206	723
Distribution				0.0%	27.5%	44.0%	28.5%	100.0%
Kalanihuia	F,E	HHA	15	60	90	0	1 [2]	151
Makua Alii	F,E	HHA	20	0	210	0	1 [2]	211
Paoakalani	F,E	HHA	16	90	60	0	1 [2]	151
Pumehana	F,E	HHA	21	98	40	1 [2]	0	139
Punchbowl Homes	F,E	HHA	7	0	96	48	0	144
Subtotal				248	496	49	3	796
Distribution				31.2%	62.3%	6.2%	0.4%	100.0%
Kapuna	Sect. 8	Private	10	0	162	0	0	162
Distribution				0.0%	100.0%	0.0%	0.0%	100.0%
Total				248	857	367	209	1,681
Distribution				14.8%	51.0%	21.8%	12.4%	100.0%

[1] F = Federal Low Rent Public Housing; E = Elderly Project
[2] For student interns.

Source: State of Hawaii, Department of Human Services, Hawaii Housing Authority.

Exhibit II-C

PAWAA REDEVELOPMENT
Unit Mix of City & County of Honolulu Rental Projects

Project	No. of stories	Unit Mix: Studio	1-bdrm.	2-bdrm.	3-bdrm.	Total no. of units
River-Nimitz	10	0	60	30	0	90
Distribution		0.0%	66.7%	33.3%	0.0%	100.0%
Hale Pauahi	19	0	110	214	72	396
Distribution		0.0%	27.8%	54.0%	18.2%	100.0%
Chinatown Gateway Plaza	27	0	200	0	0	200
Distribution		0.0%	100.0%	0.0%	0.0%	100.0%
Smith-Maunakea Housing	28	22	108	108	0	238
Total		22	478	352	72	924
Distribution		2.4%	51.7%	38.1%	7.8%	100.0%

Source: City & County of Honolulu, Department of Housing and Community Development.

The recommended mix of units is summarized as follows:

Unit type	Share
Studio	15%
1-Bedroom	45
2-Bedroom	35
3-Bedroom	5

In addition to mix of units by bedroom count, the large scale of the Pawaa Redevelopment project affords an opportunity to provide a mix of unit types in terms of building type. An effort should be made to provide a variety of housing types including low-, medium- and high-rise buildings.

UNIT SIZES

The estimated size of each unit in terms of enclosed apartment floor area is based on comparison with selected State and City mid- and high-rise projects. The unit sizes of the selected State and City projects are summarized in Exhibits II-D and II-E, respectively.

Studio Units

Studio units range from about 300f to 420f for one City project and from 345f to 383f for the three State projects. More reliability is placed on the State projects because of their elderly orientation and because the unit sizes fall within the range of City unit sizes. Studio units are estimated to average about 375f for the Pawaa Redevelopment projects.

1-Bedroom Units

One-Bedroom units range from about 575f to 610f and average about 588f for the City projects. The 1-Bedroom units in State projects are smaller, from 419f to 701f with an average of about 538f. Because the majority of the 1-Bedroom units will not be limited to the elderly households, the larger City units would be more indicative of the size of the 1-Bedroom apartments. The 1-Bedroom units are estimated to average about 575f for the Pawaa Redevelopment projects.

2-Bedroom Units

Two-Bedroom units range from about 675f to 800f and average about 740f for the City projects and from 703f to 721f for the State projects. The 2-Bedroom units in State projects are smaller with an average of about 715f. The more recently developed City projects would be more indicative of the size of the 2-Bedroom apartments. The 2-Bedroom units are estimated to average about 750f for the Pawaa Redevelopment projects.

PAWAA REDEVELOPMENT
Unit Sizes of Selected State of Hawaii High-Rise Rental Projects

Project	Housing type [1]	Total no. of units	Unit Sizes (#) Studio Min.	Studio Max.	1-bdrm. Min.	1-bdrm. Max.	2-bdrm. Min.	2-bdrm. Max.	3-bdrm. Min.	3-bdrm. Max.
Salt Lake Apts.	F	28	0	0	0	701	0	0	0	0
Kuhio Park Terrace	F	274	0	0	0	0	0	721	894	899
Building A	F	298	0	0	0	515	0	721	894	899
Building B	F	123	0	0	665	670	0	0	0	0
Kalakaua Homes (High Rise)	F,E	151	0	357	0	477	0	0	0	N/A
Kalanihuia	F,E	211	0	0	0	419	0	0	0	N/A
Makua Alii	F,E	151	0	345	0	480	0	0	0	N/A
Paoakalani	F,E	139	0	383	0	514	0	N/A	0	0
Pumehana	F,E	144	0	0	0	540	0	703	0	0
Punchbowl Homes	Sect. 8	162	0	0	0	530	0	0	0	0
Kapuna			0	362	N/A	538	0	715	894	899
Average unit size										

[1] F = Federal Low Rent Public Housing; E = Elderly Project.

Source: State of Hawaii, Department of Human Services, Hawaii Housing Authority.

Exhibit II-D

Exhibit II-E

PAWAA REDEVELOPMENT
Unit Sizes of City & County of Honolulu Rental Projects

Project	Total no. of units	Unit Sizes (ft²) Studio Min.	Studio Max.	1-bdrm. Min.	1-bdrm. Max.	2-bdrm. Min.	2-bdrm. Max.	3-bdrm. Min.	3-bdrm. Max.
River-Nimitz	90	0	0	0	575	0	675	0	0
Hale Pauahi	396	0	0	0	560	729	745	737	959
Chinatown Gateway Plaza	200	0	0	0	610	0	0	0	0
Smith-Hauraken Housing	238	300	420	560	605	760	800	0	0
Average unit size		300	420	560	588	745	740	737	959

Source: City & County of Honolulu, Department of Housing and Community Development.

3-Bedroom Units

Three-Bedroom units range from about 737ft² to 959ft² for one City project and from 894ft² to 899ft² for two State projects. The midpoint of the 2-Bedroom unit size in the City project is 848ft². The 3-Bedroom units are estimated to average about 850ft² for the Pawaa Redevelopment projects.

The estimated enclosed floor areas appropriate for the affordable rental units to be developed on the Pawaa Redevelopment site are summarized as follows:

Unit type	Size (ft²)
Studio	375
1-Bedroom	575
2-Bedroom	750
3-Bedroom	850

AFFORDABLE RENTS

The monthly rent for the affordable rental units will be based on the income of the tenant. Because of the qualification criteria provided by the City and State, for projection purposes, the average rent for each unit type is based on a household earning 100% of median household income.

Median Household Income

Affordability guidelines for the City and State are based on the median household income estimated by the U.S. Department of Housing and Urban Development. The household income is based on household size and is updated annually. Exhibit II-F shows the current income levels used as the basis for determining housing affordability.

Based on a family of four persons, the exhibit indicates lower income households (80% of median) could not be earning more than $34,950. The median income for a 4-person household is $43,700. Therefore, the maximum annual income for a 4-person household that would qualify for an affordable rental unit would be $52,440 (120% of median).

Bedroom Size Limits

The City and State generally follow the same guideline for the number of persons in a household that would be appropriate for different unit types. As also shown in Exhibit I-F, a maximum of two persons is permitted in a studio, three persons in a 1-Bedroom, five persons in a 2-Bedroom and seven persons in a 3-Bedroom unit. Because there is a range of household sizes permitted to occupy each type of unit, there is latitude in establishing the guidelines for the rents by unit type.

PAWAA REDEVELOPMENT
Household Income Limits
City & County of Honolulu
1990

Income category	Percent of median income	Household Size (Persons) 1	2	3	4	5	6	7	8
Very low income	50%	$15,300	$17,500	$19,650	$21,850	$23,600	$25,350	$27,100	$28,850
Lower income	80	$24,450	$27,950	$31,450	$34,950	$37,750	$40,550	$43,350	$46,150
Median income	100	$30,590	$34,960	$39,330	$43,700	$47,200	$50,690	$54,190	$57,680
Gap income	120	$36,710	$41,950	$47,200	$52,440	$56,640	$60,830	$65,030	$69,220

Bedroom size guidelines

No. of bedrooms	Minimum	Maximum
0	1	2
1	1	3
2	2	5
3	3	7
4	4	9
5	8	11
6	10	13

Source: City & County of Honolulu, Department of Housing and Community Development, revised 10/91.

Exhibit II-F

Affordable Rent Formula

The monthly rent for an affordable unit is typically based on an amount not to exceed 30% of the monthly household income, after adjustment for monthly utility costs. Based on a review of rents in comparable affordable rental projects and application of the affordable rent formula, the average monthly rental rate for each unit type estimated for the Pawaa Redevelopment projects is estimated as follows:

Unit type	Monthly rent
Studio	$635
1-Bedroom	786
2-Bedroom	932
3-Bedroom	1,111

MARKET ASSESSMENT FOR PAWAA REDEVELOPMENT SITE

Because of the significant demand for affordable rental projects and the relatively few rental units being developed to accommodate this demand, the analysis assumes that sufficient market support exists to absorb any number of affordable rental apartment units developed on the Pawaa Redevelopment site.

III - LUXURY RESIDENTIAL CONDOMINIUM MARKET ASSESSMENT

The luxury residential condominium market on Oahu is reviewed in terms of market area definition, general real estate trends, comparable condominium inventory, sales prices, luxury condominium demand, future luxury condominium supply, and buyer profile.

LUXURY CONDOMINIUM DEMAND

All types of housing, including rentals, condominiums and single-family residences, continued to be in demand through 1990. The market for condominium apartments is strong; the velocity of sales and resales has escalated during the past two years, and sales prices have increased.

Virtually all the inventory in the newest developments has been or will be marketed during the construction term. In most instances, units have been sold as quickly as they were offered.

One Kalakaua is the exception with less than one-half of the offered units reserved after three months of marketing. This is probably due in part to the negative impact of the Persian Gulf war. The leasehold land tenure, restricted views and price range may also have been factors influencing market acceptance to the project.

The market for new luxury residential condominium units in urban Honolulu has also been very strong. About 1,274 new luxury condominium units in urban Honolulu have been sold over the past four years. Annual sales have ranged from about 350 to over 400 units, as shown in Exhibit III-A. The 1990 totals excludes the 331 units sold in Royal Ko Olina, an ultra luxury project outside of urban Honolulu at the Ko Olina resort in Ewa.

Resales activity in the comparable projects have increased since the early 1980s. About 1,160 units have resold in the existing condominium comparables between 1980 and 1990. About 840 or 72% of these resales occurred since 1986. As a result, the annual resales in these developments has averaged nearly 170 units since 1986.

LUXURY CONDOMINIUM SUPPLY

Over a dozen luxury condominium projects are planned in urban Honolulu. These projects include at least 4,600 units that are to be marketed within the next four to six years, as shown in Exhibit III-B.

BUYER PROFILE

In the past, the largest segment of buyers in the existing comparable projects have been Hawaii residents. About 66% of all units in the existing luxury projects are owned by Hawaii residents. Japanese buyers have been another significant market segment, with ownership of almost 20% of the units.

Exhibit III-A

PAHAA REDEVELOPMENT
Original Sales in Luxury Condominium Projects

Project	1987	1988	1989	1990	1991	Total
One Waterfront Towers	68	204	34	0	0	306
Uraku Tower	0	0	85	0	0	85
Nauru Tower	0	152	126	0	0	278
Queen Victoria	0	0	0	51	0	51
Waterpark Tower	0	0	158	157	0	315
Waikiki Landmark	0	0	0	N/A	0	188
Imperial Plaza	0	0	0	39	12	51
Total	68	356	403	247	12	1,274

Source: John Child & Company, Inc. based on interviews with developers, real estate brokers and others.

Exhibit III-B

PAWAA REDEVELOPMENT
Proposed Condominium Units

Project	Location	Land tenure	Estimated year of completion	Total units
Majestic Plaza	Kakaako	FS	1993	158
Universe Plaza	Pensacola/Piikoi	FS	1995	348
Waikiki Landmark	Waikiki	LH	1993	190
Bingham School Site	Beretania Street	FS	1993	45
Harbor Court Tower	Downtown	LH	1993	122
Tusitala Superblock	Waikiki	N/A	1993	147
Aloha Tower	Downtown	LH	1994	270
Symphony Park	Kapiolani/Ward	FS	1994	306
Honolulu Convention Center	Kapiolani	FS	1994	800
Nauru Tower Phase II	Ala Moana	LH	1995	412
Pflueger Acura Site	Beretania Street	LH	N/A	300 [1]
Birch Street Site	King Street	FS	N/A	30
State Convention Center	Waikiki	LH	N/A	400
Borthwick's Site Project	Vineyard	FS	N/A	640
Hasegawa Superblock	Keeaumoku Street	LH	N/A	440
Mark's Garage Site Project	Downtown	FS	N/A	N/A
Queen Emmalani Tower	Kakaako	LH	N/A	N/A
Total				4,608

[1] Based on a maximum FAR of 3.5 with an 85% efficiency and typical unit size of 1,200].

Source: John Child & Company, Inc.

Up through 1990, Japanese buyers had been a growing market segment for luxury condominiums. Of the luxury units sold between 1988 and 1990 about 37% were purchased by Japanese buyers. Hawaii residents accounted for the majority of unit sales with 54%. However, since the beginning of 1991, Japanese buyers have stopped making purchases of luxury condominiums in Hawaii because of changes in the Japanese economy and financing practices.

OAHU'S LUXURY CONDOMINIUM MARKET SUMMARY

All types of housing, including rentals, condominiums and single-family residences, were in strong demand through 1990. The market for luxury condominium apartments is expected to weaken because of anticipated impacts from the softer U.S. mainland and Japanese economies. The velocity of sales and resales has escalated during the past two years, and sales prices have increased. However, sales volumes will decline and prices are anticipated to stabilize with the weaker market.

The demand for luxury condominium units is also expected to weaken and prices are anticipated to stabilize at or near current levels. Prospective buyers, both local and foreign, are anticipated to evaluate their investment decisions more cautiously. As a result, sales volume is also expected to moderate over the next two to three years.

Physical Characteristics

The major factors that distinguish luxury developments from other condominium developments on Oahu are:

- Price
- Desirable location
- Ocean views
- High quality of construction and finishings
- Architectural design.

The newest luxury condominium projects typically include a majority of two-bedroom units, with net areas over 1,200#. The higher quality developments have larger apartment areas. Additionally, these developments may include large custom-designed penthouse apartments.

Sales Prices

Current prices for two-bedroom units in the selected developments typically range from about $600,000 to $1,000,000, or about $450 to $1,200 per square foot of net area. Significant price variations result primarily from location, floor height and view planes. Other factors influencing the typical price ranges include:

- Apartment sizes
- Design and quality
- Land tenure.

Absorption Rate

The market for new luxury residential condominium units in urban Honolulu has been very strong. About 1,554 new luxury condominium units in urban Honolulu have been sold over the past four years. Annual demand has ranged from about 350 to over 500 units.

Virtually all the inventory in the newest developments has been or will be marketed during the construction term. In most instances, units have been sold within the first days of being offered.

At least 4,600 units in 12 condominium projects are planned for development in Honolulu over the next four to six years.

The annual demand for luxury condominiums on Oahu is expected to decline to between 250 and 350 units over the next four to six years because of current weakness in the continental U.S. economy and changes in the Japanese Banking practices that are anticipated to reduce the number of Japanese purchases of luxury condominiums. The supply of luxury condominiums is anticipated to exceed demand over the near-term. As a result, the highest quality developments in the most desirable locations are anticipated to command the highest prices, largest market share and shortest marketing periods. The remaining developments could be expected to reduce prices or experience extended marketing periods.

MARKET ASSESSMENT FOR PAWAA REDEVELOPMENT SITE

Because of the supply of luxury condominium units is expected to exceed demand over the near term, competition for the limited number of buyers that can afford luxury units will favor projects in the most desirable locations.

Although the Pawaa Redevelopment site is well located in relation to transportation systems and proximity to employment, shopping and recreation, the ocean views available from the site are restricted by surrounding buildings. Unless projects in the Pawaa Redevelopment can be assured unobstructed ocean views, the market for luxury condominium units may be limited.

Concern over lease rent escalations being vocalized and addressed by the State legislature may have an adverse affect on the marketability of luxury condominiums on leasehold land. The prospective purchasers of luxury condominium units can afford to be very selective in their purchase decisions especially during a period of oversupply. As such, the fee simple tenure of the Pawaa

Redevelopment projects may increase their competitiveness in relation to the luxury condominium market.

The predominance of affordable rental housing in the Pawaa Redevelopment may adversely impact the competitiveness of luxury condominium projects. While there is no market evidence to indicate affordable housing and luxury condominium projects are incompatible, because of the importance of project location for luxury condominium projects, competing projects that are located in areas with more comparable unit types would probably have a competitive advantage over the Pawaa Redevelopment projects.

With an annual demand of between 250 and 300 luxury units in Honolulu, it is probable that projects in the Pawaa Redevelopment site could capture a relatively small share (10%) of the annual demand. The annual absorption of luxury units in the Pawaa Redevelopment site is estimated to range from about 20 to 30 units per year.

IV - MARKET-RATE RESIDENTIAL CONDOMINIUM MARKET ASSESSMENT

The market-rate residential condominium market on Oahu is reviewed in terms of market area definition, general real estate trends, comparable condominium inventory, sales prices, market-rate condominium demand, future market-rate condominium supply, and buyer profile under the following subheadings.

MARKET-RATE CONDOMINIUM UNITS

Market-rate condominium units are typically priced between $250 and $400 per square foot of net living floor area. While conveniently located in relation to employment, shopping, recreation and schools, market-rate condominium projects do not typically afford the units with unobstructed ocean views.

GENERAL REAL ESTATE TRENDS

A majority of the condominium sales activity on Oahu has been concentrated in urban Honolulu, an area that extends from downtown Honolulu eastward to Kapahulu Avenue. Urban Honolulu is defined as tax map zone 2 and is shown on the map in Exhibit IV-A.

Urban Honolulu is a desirable area because of its close proximity to existing employment, educational, retail and recreational areas. Major neighborhoods that are in urban Honolulu include Makiki, Kaimuki, Manoa, University and Waikiki.

The condominium market in Waikiki has historically been oriented towards the visitor industry, with a significant number of units used as visitor accommodations. By contrast, the other neighborhoods in urban Honolulu have been a source of primary housing for the resident population.

The demand for condominium units in Honolulu has been strong since 1986. Increasing sales volume, rising prices and shorter marketing periods have been experienced through 1990. A weakening of the market for condominiums is evidenced in 1991. These trends are discussed in terms of condominium resales volume, prices and days on market.

Resales Volume

The annual condominium resales volume on Oahu from 1987 through 1990 has remained at relatively high levels of between about 6,000 and 6,600 units. Similarly, resales volume in urban Honolulu has remained relatively level at between about 2,600 and 3,200 units for the same period, as shown in Exhibit IV-B. However, 1991 data indicates that resale volume has dropped significantly on Oahu and within Urban Honolulu. The 1991 volumes are only about 30% to 50% of the 1990 volumes in Urban Honolulu.

Condominium resales in Waikiki have typically accounted for 19% to 23% of the total resales on Oahu; resales in other areas in urban Honolulu comprise an additional 22% to 28% of Oahu's total resales, as shown in Exhibit IV-B. The withdrawal of Japanese buyers in late 1990 and 1991 has resulted in a decrease in the share of Oahu resales occurring in Waikiki.

PAWAA REDEVELOPMENT
Map of Urban Honolulu

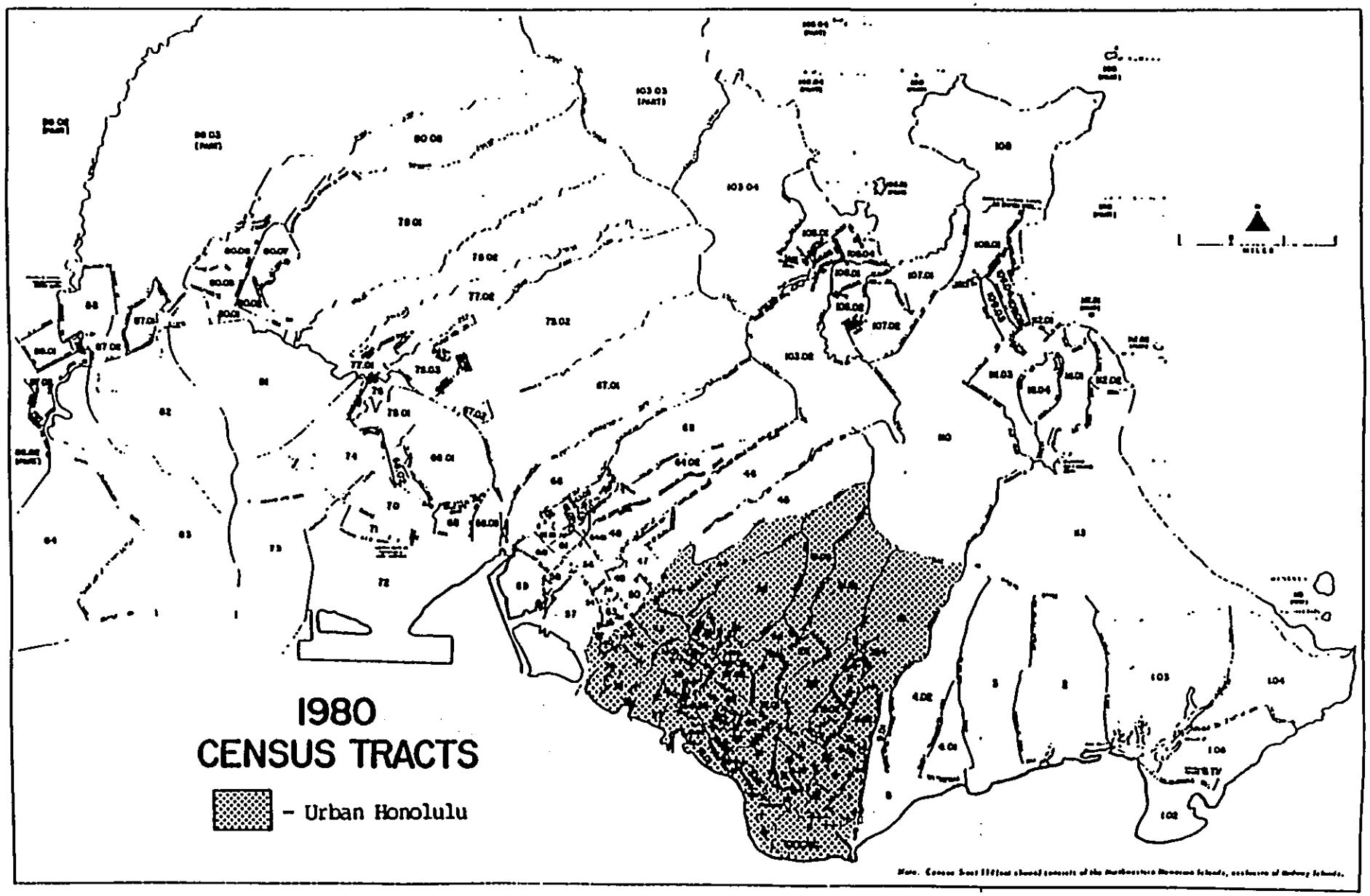

Exhibit IV-A

Exhibit IV-B

PAWAA REDEVELOPMENT
Condominium Resales Activity
1986-1990

Year	Urban Honolulu: Waikiki	Urban Honolulu: Other areas [1]	Urban Honolulu: Total	Oahu
1986	837	993	1,830	3,600
1987	1,534	1,214	2,748	4,848
1988	1,494	1,753	3,247	6,562
1989	1,242	1,517	2,759	6,546
1990	1,227	1,340	2,567	6,028
1991	404	752	1,156	3,372
Market share:				
1986	23.3%	27.6%	50.8%	100.0%
1987	31.6	25.0	56.7	100.0
1988	22.8	26.7	49.5	100.0
1989	19.0	23.2	42.1	100.0
1990	20.4	22.2	42.6	100.0
1991	12.0	22.3	34.3	100.0

[1] Includes tax map key zone 2, excluding Waikiki.

Source: Honolulu Board of Realtors Multiple Listing Service.

Resales Prices

Average resales prices on Oahu have increased from about $107,700 in 1986 to almost $220,000 in 1991, reflecting an annual compound increase of about 15%. The largest price increase occurred between 1989 and 1990, when prices increased 42%. As shown in Exhibit IV-C, condominium prices have declined between 1990 and 1991. Prices since mid-1990 have been lower due to soft economic conditions in the continental U.S. and a reduction in real estate investments by Japanese.

The average resale price in Waikiki increased at a constant annual rate of about 25% from $101,600 in 1986 to $247,900 in 1990 and declined slightly in 1991. Prices elsewhere in urban Honolulu have increased at a similar average annual rate since 1986; however, the largest increase occurred between 1989 and 1990, when prices increased by 55%, as shown in Exhibit IV-C.

Over 30% of the condominium units sold in urban Honolulu during 1991 were priced over $300,000. The proportion of apartment sales priced over $400,000 has increased from about 5% in 1987 to over 20% in 1991, as shown in Exhibit IV-D.

The proportion of apartments priced below $100,000 has steadily declined from 46.7% in 1987 to 6.2% in 1991, as also shown in the exhibit.

Resales Marketing Period

The resales marketing period for Oahu condominiums, measured in terms of the average days on market, steadily declined from 115 days in 1986 to 53 days in 1990. Similarly, the marketing period for condominium resales in urban Honolulu has declined from 125 days to 66 days during the same period, as shown in Exhibit IV-E. However, marketing times for condominiums in 1991 have increased significantly, indicating a reduction in the current demand for condominium apartments. In 1991, the marketing period for Urban Honolulu condominium resales has increased by 68% from 66 days to 101 days.

MARKET-PRICED CONDOMINIUM INVENTORY

The market performance of market-rate condominium developments was reviewed. The selection of the comparable projects and their design characteristics are presented under the following subheadings.

Comparable Developments

A total of 18 market-rate condominium developments were identified, including 16 that are existing and two that are proposed, as shown in Exhibit IV-F. The major factors that distinguish these market-rate developments from other condominium developments on Oahu include:

- Convenient urban locations
- Relatively high quality of construction and finishings
- Innovative architectural design.

Exhibit IV-C

PAWAA REDEVELOPMENT
Average Condominium Resale Prices
1986-1990

Year	Urban Honolulu: Waikiki	Urban Honolulu: Other areas [1]	Urban Honolulu: Total	Oahu
1986	101,600	106,400	104,200	107,700
1987	130,700	130,500	130,600	124,700
1988	162,000	147,000	153,900	138,300
1989	197,800	174,000	184,700	164,400
1990	247,900	270,000	259,400	233,700
1991	246,900	244,900	245,600	219,300
Compound annual percentage increase:				
1986-1987	28.6%	22.7%	25.3%	15.8%
1987-1988	23.9	12.6	17.8	10.9
1988-1989	22.1	18.4	20.0	18.9
1989-1990	25.3	55.2	40.4	42.2
1990-1991	(0.4)	(9.3)	(5.3)	(6.2)
1986-1991	19.4%	18.1%	18.7%	15.3%

[1] Includes tax map key zone 2, excluding Waikiki.

Source: Honolulu Board of Realtors Multiple Listing Service.

Exhibit IV-D

PAWAA REDEVELOPMENT
Price Distribution of Condominium
Sales in Urban Honolulu

Price range	1987	1988	1989	1990	1991
Under $100,000	46.7%	41.0%	24.8%	7.6%	6.2%
$ 100,000 - 199,999	37.6	41.3	46.5	42.6	35.9
200,000 - 299,999	8.3	10.9	18.4	25.2	25.9
300,000 - 399,999	2.5	3.3	5.2	9.9	11.3
400,000 and over	4.9	3.5	5.1	14.7	20.7
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Multiple Listing Service Hawaii, REsearch/TMK, January 1992.

PAWAA REDEVELOPMENT
Average Condominium Resale Marketing Period
(Days on the market)
1986-1990

Year	Urban Honolulu: Waikiki	Urban Honolulu: Other areas [1]	Urban Honolulu: Total	Oahu
1986	124	125	125	115
1987	88	106	96	103
1988	72	70	71	74
1989	100	58	77	61
1990	78	56	66	53
1991	111	96	101	91

[1] Includes tax map key zone 2, excluding Waikiki.

Source: Honolulu Board of Realtors Multiple Listing Service.

Exhibit IV-E

PAWAA REDEVELOPMENT
Selected Market-Priced Condominium Projects

Map no.	Project	Tax map	Tenure	Year built	Total units
Existing:					
1	1001 Wilder	2-4-16:046	Fee simple	1964	69
2	999 Wilder	2-4-16:045	Fee simple	1966	82
3	King Manor	2-1-42:001	Leasehold [1]	1969	115
4	Harbor Square	2-1-16:015	Leasehold	1971	360
5	Punahou Tower	2-8-12:036	Fee simple	1973	95
6	Banyan Tree Plaza	2-4-07:002	Leasehold	1974	240
7	Mott-Smith Laniloa	2-4-28:005	Leasehold [1]	1976	428
8	Makiki Park Place	2-4-09:003	Fee simple	1978	97
9	Nuuanu Brookside	2-2-10:035	Leasehold	1979	191
10	Admiral Thomas	2-4-13:019	Leasehold	1980	148
11	Punahou Regency	2-4-06:001	Fee simple	1980	33
12	Craigside	2-2-20:002	Leasehold [1]	1981 [2]	242
13	Hale Kaheka	2-3-18:017	Leasehold	1982	175
14	Honolulu Tower	1-7-05:011	Fee simple	1982	395
15	Royal Capital Plaza	2-1-47:008	Leasehold	1987	297
16	Honolulu Park Place	1-7-05:001	Fee simple	1991	437
Proposed:					
17	Nuuanu Parkside	2-2-10:024	Fee simple	1992 [4]	78
18	Fountains at Makiki	2-4-21:032 [3]	Fee simple	1992 [4]	72

[1] Some units have been converted to fee simple tenure.
[2] Towers I & II completed in 1981 and Tower III in 1965.
[3] Property includes tax map key 2-4-21-32,33,35-38.
[4] Estimated

Source: John Child & Company, Inc.

Exhibit IV-G

Unit Mix

The 18 projects include about 7,100 units. Over 3,500 units or 49% are two-bedroom units. About 2,600 or about 36% of the units are one bedroom units. About 772 or 11% include three bedrooms, penthouse units and commercial units, as shown in Exhibit IV-G.

Historically, the unit mix in the majority of developments in Honolulu has emphasized one- and two-bedroom units. Of the 1,459 apartments in the existing comparable developments, about 29% are one-bedroom units while about 65% are two-bedroom units. Studio, three-bedroom and commercial units comprise the remaining 6%.

By contrast, nearly 79% of the 1,193 units in the developments under construction are two-bedroom units. One-bedroom units comprise only about 17% of this inventory while three-bedroom, specialty penthouse and commercial units represent about 4%.

Unit Size

Unit sizes of one-bedroom apartments in the selected projects typically range between about 600$ and 850$, as shown in Exhibit IV-H. Unit sizes of the two-bedroom apartments in the selected developments typically range between about 900$ and 1,300$. Three bedroom units typically range from about 1,300$ to 1,500$ in size.

Typically, the larger apartment sizes are found in the higher-quality developments. Additionally, the newer developments include larger two- and three-bedroom and specialty penthouse apartments compared to the unit sizes in the older developments.

SALES PRICES

Sale prices are discussed in terms of current and asking prices for the two-bedroom units in the comparable condominium projects under the following subheadings.

Current Prices

Current prices for two-bedroom units in the selected projects vary broadly from about $175,000 to $900,000, with the majority of the sales ranging from about $300,000 to $500,000. Typical prices per square foot of net enclosed unit area range between about $250 and $400, as shown in Exhibit IV-I.

Significant price variations result primarily from location, floor height and view planes. Other factors influencing the typical price ranges include:

- Apartment sizes
- Design and quality
- Land tenure
- Project and unit condition.

PAHUA REDEVELOPMENT
Unit Mix of Selected Market-Rate Condominium Projects

Project	Unit Mix					
	Studio	1-bdrm.	2-bdrm.	3-bdrm.	Other	Total
Existing:						
1001 Wilder	0	11	47	11	0	69
999 Wilder	2	16	48	16	0	82
King Manor	52	46	16	1	0	115
Harbor Square	0	119	241	0	0	360
Punahou Tower	0	0	95	0	0	95
Banyan Tree Plaza	0	75	120	30	15 [1]	240
Mott-Smith Laniloa	30	182	185	31	0	428
Makiki Park Place	0	16	71	10	0	97
Nuuanu Brookside	34	120	35	2	0	191
Admiral Thomas	0	60	75	13	0	148
Punahou Regency	0	0	0	33	0	33
Craigside	0	108	56	78	0	242
Hale Kaheka	0	100	72	3	0	175
Honolulu Tower	0	158	158	79	0	395
Royal Capital Plaza	0	136	160	-1	0	297
Honolulu Park Place	0	145	292	0	0	437
Subtotal	118	1,292	1,671	308	15	3,404
Proposed:						
Nuuanu Parkside	0	0	58	20	0	78
Fountains at Makiki	0	1	28	43	0	72
Subtotal	0	1	86	63	0	150
Total	236	2,586	3,514	742	30	7,108
Distributions:						
Existing	3.5%	38.0%	49.1%	9.0%	0.4%	100.0%
Proposed	0.0%	0.7%	57.3%	42.0%	0.0%	100.0%
Total	3.3%	36.4%	49.4%	10.4%	0.4%	100.0%

[1] 4-bedrooms

Source: John Child & Company, Inc.

PAWAA REDEVELOPMENT
Unit Sizes of Selected Market-Rate Condominium Apartments

Map no.	Project	Unit Sizes				
		Studio	1-bdrm.	2-bdrm.	3-bdrm.	Other
Existing:						
1	1001 Wilder	—	895 - 1,092	1,187 - 2,983	1,674 - 2,116	—
2	999 Wilder	486	866	1,369 - 1,382	1,993	—
3	King Manor	406 - 537	598 - 678	813 - 1,124	1,749	—
4	Harbor Square	—	590 - 1,025	725 - 1,180	—	—
5	Punahou Tower	—	—	807	—	—
6	Banyan Tree Plaza		514 - 715	981 - 1,398	1,356 - 1,420	1,762 [1]
7	Mott-Smith Laniloa	355	644	873 - 947	1,167	—
8	Makiki Park Place	—	563 - 815	1,166 - 1,233	1,522 - 1,576	—
9	Nuuanu Brookside	460 - 462	628 - 678	1,021 - 1,290	1,442 - 1,459	—
10	Admiral Thomas	—	813 - 1,638	1,586 - 1,634	1,937 - 2,657	—
11	Punahou Regency	—	—	—	1,032 - 1,037	2,285 [2]
12	Craigside	798 - 4,734	798 - 817	1,195 - 1,243	1,450 - 1,489	—
13	Hale Kaheka	—	605 - 685	877 - 902	1,166	—
14	Honolulu Tower	—	716 - 815	993 - 1,064	1,403	—
15	Royal Capital Plaza	—	542 - 701	829 - 1,091	1,091	—
16	Honolulu Park Place	—	612 - 772	875 - 1,218	—	—
Proposed:						
17	Nuuanu Parkside	—	—	1,014 - 1,018	1,170	—
16	Fountains at Makiki	—	433	906 - 1,051	1,095	—

[1] 4-bedrooms
[2] Extra large 3-bedroom penthouse units.

Source: John Child & Company, Inc.

Exhibit IV-H

PAWAA REDEVELOPMENT

Current Sales Prices for Market-Rate Condominium Units

Map no.	Project	Land tenure	Studio				1-Bdrm.				2-Bdrm.				3-Bdrm.			
			Total Price		Per SF Net Area		Total Price		Per SF Net Area		Total Price		Per SF Net Area		Total Price		Per SF Net Area	
			Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Leasehold:																		
4	Harbor Square	LH					$140,000	$265,000	$150	$310	$155,000	$409,000	$120	$370				
6	Banyan Tree Plaza	LH					200,000	275,000	280	380	250,000	540,000	250	400	$400,000	$500,000	$280	$350
7	Mott-Smith Laniloa	LH	$138,000	$165,000	$390	$460	252,000	280,000	390	430	375,000	465,000	430	530				
9	Nuuanu Brookside	LH	150,000	187,000	320	410	195,000	239,000	310	380	340,000	350,000	330	340				
10	Admiral Thomas	LH					330,000	450,000	410	550	515,000	900,000	320	570	825,000	1,175,000	420	590
12	Craigside	LH					200,000	297,500	250	370	320,000	438,000	270	360	380,000	450,000	260	310
13	Hale Kaheka	LH					185,000	260,000	310	430	250,000	360,000	290	410				
15	Royal Capital Plaza	LH					152,000	285,000	220	490	175,000	450,000	200	480				
Fee simple:																		
1	1001 Wilder	FS									333,000	350,000	240	260				
2	999 Wilder	FS									380,000	450,000	280	320	750,000	925,000	380	460
3	King Manor	FS	145,000	155,000	310	320												
5	Punahou Tower	FS									227,500	315,000	280	390				
7	Mott-Smith Laniloa	FS	170,000	180,000	480	510	286,000	295,000	440	460	400,000	475,000	450	540				
8	Makiki Park Place	FS									370,000	470,000	320	400				
11	Punahou Regency	FS									350,000	420,000	340	410				
14	Honolulu Tower	FS					172,000	295,000	240	410	252,300	385,000	250	380	425,000	624,000	300	440
	Honolulu Park Place	FS					275,000	359,000	430	470	330,000	470,000	360	520				

Source: John Child & Company, Inc. based on MLS Hawaii, REsearch/TMK, March and April 1991.

Exhibit IV-1

Asking Prices

Typical asking prices for two-bedroom units are between about $300,000 and $700,000 or about $300 to over $600 per square foot, as shown in Exhibit IV-J.

MARKET-RATE CONDOMINIUM DEMAND

The market-rate condominium demand is discussed in terms of new sales and resales.

New Sales

All types of housing, including rentals, condominiums and single-family residences, continued to be in demand through 1990. The market for condominium apartments is strong; the velocity of sales and resales has escalated during the past two years, and sales prices have increased.

Most of the recent residential condominium developments have been oriented to the luxury market because of strong market support and the potential for higher profit margins. The luxury projects have typically been developed on sites that offer unobstructed ocean views.

Virtually all the inventory in the newest market-rate projects has been or will be marketed during the construction term. Examples of this trend are shown in Exhibit IV-K. In most instances, units have been sold as quickly as they were offered. Examples of this pattern are shown in Exhibit IV-L. One project that has not met with strong market support is Fountains at Makiki, a mid-rise development in the Makiki. The project is not well located and has little opportunity for views.

The market for new market-rate residential condominium units in urban Honolulu has also been very strong since 1987. Although most recent condominium projects have been oriented to the luxury market. About 970 new market-rate condominium units in urban Honolulu have been sold over the past four years. Annual sales have ranged from about 230 to over 420 units, as shown in Exhibit IV-M.

Resales

Resales activity in the selected market-rate condominium projects have increased since the early 1980s. About 2,090 units have resold in the selected market-rate condominium projects between 1980 and 1990, as shown in Exhibit IV-N. About 1,260 or 60% of these resales occurred since 1986. As a result, the annual resales in these developments has averaged nearly 250 units since 1986.

Of the apartments that resold between 1986 and 1990, about 610 or 45% included two bedrooms, as shown in Exhibit IV-O. Another 42% of the resales were of one-bedroom units.

PAWAA REDEVELOPMENT

Current Asking Prices for Selected Market-Rate Condominium Units

Project	Land tenure	Studio				1-Bdrm.				2-Bdrm.				3-Bdrm.			
		Total Price		Per SF Net Area		Total Price		Per SF Net Area		Total Price		Per SF Net Area		Total Price		Per SF Net Area	
		Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
chkl:																	
Harbor Square	LH					$169,000	$449,000	$200	$410	$197,500	$450,000	$230	$410				
Banyan Tree Plaza	LH					218,500	285,000	370	430	389,000	650,000	400	460	$450,000	$650,000	$330	$460
Mott-Smith Laniloa	LH									429,500	499,000	490	570				
Nuuanu Brookside	LH	$183,000	$219,000	$400	$480	232,500	249,000	370	400								
Admiral Thomas	LH					420,000	479,000	520	560	890,000	1,100,000	560	690	1,275,000	1,475,000	640	750
Craigside	LH					259,000	342,000	320	430	369,000	435,000	310	360	399,000	565,000	270	380
Hale Kabeka	LH					225,000	289,000	370	470	309,000	339,500	350	380				
Royal Capital Plaza	LH					245,000	360,000	390	620	339,000	599,000	390	610				
imple:																	
1001 Wilder	FS																
999 Wilder	FS									535,000	570,000	390	410				
King Manor	FS					209,000	219,000	330	370								
Punahou Tower	FS																
Mott-Smith Laniloa	FS	199,500	250,000	560	700	295,000	330,000	460	510	429,000	550,000	450	630	525,000	795,000	450	680
Makiki Park Place	FS									449,000	505,000	390	430				
Punahou Regency [1]	FS																
Craigside	FS					335,000	342,500	420	430								
Honolulu Tower	FS					245,000	350,000	300	480	339,000	475,000	340	450	550,000	695,000	390	500
Honolulu Park Place	FS					354,500	395,000	490	610	389,000	775,000	440	660				

Only one asking price shown.

ce: John Child & Company, Inc. based on Multiple Listing Service, Oahu, March 1991.

Exhibit IV-1

Exhibit IV-K

PAWAA REDEVELOPMENT
Sale Status of Selected Market-Rate Condominium Developments

Project name	Land tenure	No. Residential Units Total	Offered	Market experience
Other projects:				
Existing -				
Iolani Palms	FS	31	31	Marketing began in July 1988. All units sold within a 14-month period.
Prospect Estates	FS	11	11	Marketing began in April 1988. All units were sold within a 2-month period.
1015 Wilder	FS	58	58	Marketing began in August 1988. All units were sold within a 13-month period.
Honolulu Park Place	FS	437	437	Marketing began in November 1988. All units were sold within a 10-month period.
Under construction/planned -				
Nuuanu Parkside	FS	77	67	Marketing began in June 1990. First offering of 40 units in November 1990. Second offering of 27 units in March 1991. Currently, 27 units remain unsold.
Fountains at Makiki	FS	72	36	Marketing began in September 1990. All units are unsold.
Waialae Residence	FS	24	24	Marketing began in November 1989. All units were sold within a 7-month period.

Source: John Child & Company, Inc.

Exhibit IV-L

PAWAA REDEVELOPMENT
First Offering Reservation Experience
of Selected Market-Rate Condominium Developments

Project	Land tenure	First Offering Total units	Date	Units offered	Reservations Received Total	%	Time frame
Other projects:							
Existing -							
Iolani Palms	FS	31	Jul-88	31	N/A	N/A	14 months
Prospect Estates	FS	11	Apr-88	11	N/A	N/A	2 months
1015 Wilder	FS	58	Aug-88	58	35	60	1 day
Honolulu Park Place	FS	437	Nov-88	219	250	114	1 day
Under construction/planned -							
Fountains at Makiki	FS	72	Sep-90	36	7	19 [1]	1 day
Nuuanu Parkside	FS	77	Jun-90	40	200	500	1 day
Waialae Residence	FS	24	Nov-89	24	N/A	N/A	7 months

[1] Developer is restudying the project concept because of poor market response.

Source: John Child & Company, Inc. based on newspaper reports and interviews with developing managers and sales agents.

PAWAA REDEVELOPMENT
Original Sales in Selected Market-Rate Condominium Projects

Project	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Total salable units
Existing:															
Admiral Thomas	148	0	0	0	0	0	0	0	0	0	0	0	0	0	148
Punahou Regency	0	33	0	0	0	0	0	0	0	0	0	0	0	0	33
Craigside	0	0	0	25	28	46	32	1	3	16	90	0	1	0	242
Hale Kaheka	0	0	0	0	26	59	52	6	4	5	22	0	0	0	174
Honolulu Tower	0	0	0	0	118	175	59	13	2	25	2	0	1	0	395
Royal Capital Plaza	0	0	0	0	0	0	0	0	75	217	4	0	1	0	297
Iolani Palms	0	0	0	0	0	0	0	0	0	0	21	10	0	0	31
Prospect Estates	0	0	0	0	0	0	0	0	0	0	11	0	0	0	11
1015 Wilder	0	0	0	0	0	0	0	0	0	0	38	20	0	0	58
Honolulu Park Place	0	0	0	0	0	0	0	0	0	0	44	393	0	0	437
Nuuanu Parkside	0	0	0	0	0	0	0	0	0	0	0	0	40	9	76
Total	148	33	0	25	172	280	143	20	84	263	232	423	43	9	1,902

Source: John Child & Co., Inc. based on MLS Hawaii, REsearch/TMK, March and April 1991 and interviews with development managers and project sales agents, newsclippings and others.

Exhibit IV-M

PAWAA REDEVELOPMENT
Resales in Selected Market-Rate Condominium Projects
1980-1990

Project	Land tenure	Total units	Year built	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991 [1]	Total	Average Annual Resales [2] Units	%
Existing:																		
King Manor	FS/LH	115	1969	11	6	7	4	4	13	13	8	10	16	3	2	97	9	7.5%
Harbor Square	LH	360	1971	21	17	13	18	10	23	26	49	32	42	28	4	283	25	7.0%
Banyan Tree Plaza	LH	240	1974	10	4	7	7	9	10	11	20	12	13	16	2	121	11	4.5%
Mott-Smith Laniloa	FS/LH	428	1976	26	26	17	25	24	27	32	41	44	42	26	--	330	30	7.0%
Admiral Thomas	LH	148	1980	12	9	6	3	7	6	16	40	34	11	20	--	164	15	10.1%
Punahou Regency	FS	33	1980	--	2	3	--	--	--	3	7	4	3	5	--	27	2	7.4%
Craigside	FS/LH	242	1981 [4]	--	--	--	1	4	3	7 [3]	20	32	45	26	3	141	13	5.2%
Hale Kaheka	LH	175	1982	--	--	--	-- [3]	--	1	3 [3]	18	51	41	16	2	132	12	6.8%
Honolulu Tower	FS	395	1982	--	--	1	2 [3]	1	5	9 [3]	28	73	72	53	3	247	22	5.6%
Royal Capital Plaza	LH	297	1987	--	--	--	--	--	--	--	5	40	34	28	--	107	10	3.3%
Honolulu Park Place	FS	437	1991	--	--	--	--	--	--	--	--	--	--	--	13	437	0	0.0%
Total				80	64	54	60	59	88	120	236	332	319	221	29	2,086		

[1] 1991 sales recorded in MLS Hawaii, REsearch/TMK as of March 1991.
[2] Average annual resales for years 1980-1990.
[3] Excludes bulk sales.
[4] Tower I & II completed in 1981 and Tower III in 1965.

Source: John Child & Co., Inc. based on MLS Hawaii, REsearch/TMK, March and April 1991.

Exhibit IV-N

PAHAA REDEVELOPMENT
Resale by Unit Type in Selected Market-Rate Condominium Projects

Unit type	1986 Total	1986 Percent	1987 Total	1987 Percent	1988 Total	1988 Percent	1989 Total	1989 Percent	1990 Total	1990 Percent	1991 [1] Total	1991 [1] Percent	1986-1990 Total	1986-1990 Percent
Studio	12	10.0	2	0.8	7	2.1	7	2.1	7	2.1	2	6.9	35	2.6
1-Bedroom	48	40.0	93	39.4	144	43.4	144	43.4	144	43.4	10	34.5	573	42.4
2-Bedroom	48	40.0	111	47.0	149	44.9	149	44.9	149	44.9	14	48.3	606	44.8
3-Bedroom	12	10.0	28	11.9	32	9.6	32	9.6	32	9.6	3	10.3	136	10.1
4-Bedroom	0	0.0	2	0.8	0	0.0	0	0.0	0	0.0	0	0.0	2	0.1
	120	100.0%	236	100.0%	332	100.0%	332	100.0%	332	100.0%	29	100.0%	1,352	100.0%

[1] 1991 sales recorded in MLS Hawaii, REsearch/TMK as of March 1991.

Source: John Child & Company, Inc. based on MLS Hawaii, REsearch/TMK, March and April 1991.

Exhibit IV-Q

FUTURE MARKET-RATE CONDOMINIUM SUPPLY

The majority of residential condominium projects planned in urban Honolulu are oriented to the luxury market at prices in excess of $400 per square foot of enclosed floor area. These projects include at least 4,600 units that are to be marketed within the next four to six years, as shown in Exhibit IV-P. Few of the proposed projects would be affordable to the market-rate market.

Projects developed on well-located urban sites that do not offer unobstructed ocean views have typically been oriented to the affluent resident purchaser. These market-rate condominium projects have generally met with strong market support.

BUYER PROFILE

In the past, the largest segment of buyers in the existing market-rate projects have been Oahu residents. About 87% of all units in the existing market-rate projects are owned by Hawaii residents, as shown in Exhibit IV-Q. Mainland buyers from the west coast and Japanese buyers have been significant market segments, with ownership of 4.0% and 5.8% of the units, respectively.

Japanese buyers have been a growing market segment for the market-rate condominiums. Of the market-rate units that have sold since 1988 about 9% have been purchased by Japanese buyers. Oahu residents account for the majority of unit sales with 86%, as shown in Exhibit IV-R.

This trend has continued in the newly marketed market-rate projects. Hawaii residents remain the largest market segment followed by Japanese buyers, as shown in Exhibit IV-S.

Because of weakness in the Japanese economy and changes in Japanese lending practices and overseas investment policies, it is probable that the number of Japanese buyers will decline over the near-term.

MARKET ASSESSMENT FOR MARKET-RATE CONDOMINIUM DEVELOPMENT

The market demand for market-rate condominium units is expected to remain strong; however, prices are anticipated to stabilize at or near current levels. Prospective buyers, both local and foreign, are anticipated to cautiously evaluate their investment decisions. As a result, sales volume is also expected to moderate over the next two to three years.

Market-rate condominium units are primarily purchased by Hawaii residents. Honolulu's real estate prices and household incomes are expected to continue to increase the resident market for market-rate apartments.

PAWAA REDEVELOPMENT
Proposed Condominium Units

Project	Location	Land tenure	Estimated year of completion	Total units
Majestic Plaza	Kakaako	FS	1993	158
Universe Plaza	Pensacola/Piikoi	FS	1995	348
Waikiki Landmark	Waikiki	LH	1993	190
Bingham School Site	Beretania Street	FS	1993	45
Harbor Court Tower	Downtown	LH	1993	122
Tusitala Superblock	Waikiki	N/A	1993	147
Aloha Tower	Downtown	LH	1994	270
Symphony Park	Kapiolani/Ward	FS	1994	306
Honolulu Convention Center	Kapiolani	FS	1994	800
Nauru Tower Phase II	Ala Moana	LH	1995	412
Pflueger Acura Site	Beretania Street	LH	N/A	300 [1]
Birch Street Site	King Street	FS	N/A	30
State Convention Center	Waikiki	LH	N/A	400
Borthwick's Site Project	Vineyard	FS	N/A	640
Haseko Superblock	Koeaumoku Street	LH	N/A	440
Mark's Garage Site Project	Downtown	FS	N/A	N/A
Queen Emmalani Tower	Kakaako	LH	N/A	N/A
Total				4,608

[1] Based on a maximum FAR of 3.5 with an 85% efficiency and typical unit size of 1,200}.

Source: John Child & Company, Inc.

PAWAA REDEVELOPMENT
Buyer Origin for Selected
Condominium Projects

Project	Tenure	Total salable units	Oahu	Other Hawaii	Mainland West Coast	Other Mainland	Japan		Canada	Other foreign	Total
Existing:											
King Manor	FS/LH	115	89.6%	1.7%	6.1%	0.9%	1.7%		0.0%	0.0%	100.0%
Harbor Square	LH	360	89.4	3.1	5.0	1.9	0.6		0.0	0.0	100.0
Banyan Tree Plaza	LH	240	91.3	0.4	1.7	3.3	3.3		0.0	0.0	100.0
Motts-Smith Laniloa	FS/LH	428	90.0	0.9	3.0	2.6	2.3		0.0	1.2	100.0
Admiral Thomas	LH	148	83.1	0.0	4.1	2.7	9.5		0.0	0.7	100.0
Punahou Regency	FS	33	87.9	0.0	6.1	0.0	3.0		0.0	3.0	100.0
Craigside	FS/LH	242	98.3	0.0	1.7	0.0	0.0		0.0	0.0	100.0
Hale Kaheka	LH	174	76.4	1.1	9.2	1.7	11.5		0.0	0.0	100.0
Honolulu Tower	FS	395	90.9	1.8	4.1	1.8	0.3		0.0	1.3	100.0
Royal Capital Plaza	LH	297	82.8	0.7	3.4	0.7	11.8		0.7	0.0	100.0
Honolulu Park Place	FS	437	80.0	0.0	0.0	0.0	20.0	[3]	0.0	0.0	100.0
Average			87.3%	0.9%	4.0%	1.4%	5.8%		0.1%	0.6%	100.0%

[1] Developing manager indicates mostly Japanese.

Source: MLS Hawaii, REsearch/TMK, March and April 1991 and interviews with developing managers and sales agents.

Exhibit IV-Q

PAWAA REDEVELOPMENT
Buyer Origin of Selected Condominium Units
Sold Since January 1988

Project	Tenure	Year built	Total salable units	Oahu	Other Hawaii	Mainland West Coast	Other Mainland	Japan	Canada	Other foreign	Total
Existing:											
King Manor	FS/LH	1969	115	94.1%	0.0%	2.9%	1.0%	2.0%	0.0%	0.0%	100.0%
Harbor Square	LH	1971	358	85.1	4.3	7.4	1.1	2.1	0.0	0.0	100.0
Banyan Tree Plaza	LH	1974	240	88.6	0.0	0.0	0.0	11.4	0.0	0.0	100.0
Motts-Smith Laniloa	FS/LH	1976	427	92.7	0.0	1.5	1.0	3.9	0.0	1.0	100.0
Admiral Thomas	LH	1980	147	71.7	0.0	4.3	2.2	21.7	0.0	0.0	100.0
Punahou Regency	FS	1980	33	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Craigside	FS/LH	[1]	242	96.3	0.6	1.9	1.2	0.0	0.0	0.0	100.0
Hale Kaheka	LH	1982	174	76.1	0.9	4.6	1.8	16.5	0.0	0.0	100.0
Honolulu Tower	FS	1982	395	92.4	1.2	1.7	1.7	0.6	0.0	2.3	100.0
Royal Capital Plaza	LH	1987	293	73.3	1.2	3.5	1.2	20.9	0.0	0.0	100.0
Honolulu Park Place	FS	1987	437	80.0	0.0	0.0	0.0	20.0 [1]	0.0	0.0	100.0
Average				86.4%	0.7%	2.5%	1.0%	9.0%	0.0%	0.3%	100.0%

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[1] Developing manager indicates mostly Japanese.

Source: MLS Hawaii, REsearch/TMK, March and April 1991 and interviews with developing managers and sales agent.

Exhibit IV-R

PAWAA REDEVELOPMENT
Buyer Origin of Under Construction and Planned Condominium Projects
(Percentage of Current Sales)

Project	Land tenure	Japan	Other foreign	Hawaii resident	Mainland West Coast	Other Mainland	Unknown	Total
Under construction/planned:								
Nuuanu Parkside [1]	FS	20%	--	80%	--	--	--	100%
Waialae Residence [1]	FS	20	--	80	--	--	--	100

[1] Estimated buyer origin.

Source: Interview with development managers and sales agents.

Exhibit IV-5

Physical Characteristics

The major factors that distinguish market-rate developments from the luxury condominium developments on Oahu are:

- Price
- Convenient location without required ocean views
- Quality of construction and finishings.

The newest market-rate condominium projects typically include a majority of two-bedroom units, with net areas ranging from 900f to 1,200f. The higher quality developments have larger apartment areas. Additionally, these developments may include multiple floors of larger penthouse apartments.

Sales Prices

Current prices for two-bedroom units in the selected developments typically range from about $300,000 to $500,000, or about $250 to $400 per square foot of net area. Significant price variations result primarily from location, floor height and view planes. Other factors influencing the typical price ranges include:

- Apartment sizes
- Design and quality
- Land tenure
- Project and unit condition.

Absorption Rate

The market for new market-rate residential condominium units in urban Honolulu has been very strong. About 970 new market-rate condominium units in urban Honolulu have been sold over the past four years. Annual demand has ranged from about 230 to over 420 units.

Virtually all the inventory in the newest developments has been or will be marketed during the construction term. In many instances, units have been sold within the first month of being offered.

At least 2,800 units in 10 condominium projects are planned for development in Honolulu over the next four to six years. However, virtually all of the planned projects are oriented to the luxury condominium market. Less than 100 units are proposed for the market-rate condominium market.

The annual demand for market-rate condominiums on Oahu is projected at between 400 and 500 units. Although recent market-rate projects have indicated annual demand for 230 to 420 units per year, these demand indications are conservative because of the market emphasis on luxury condominium development during the recent past. Most condominium development was oriented to the housing projects because of higher profits and a similar market potential.

Buyer Profile

In the past, the largest segment of buyers in the existing comparable projects has been Hawaii residents. About 87% of all units in the existing market-rate projects are owned by Hawaii residents.

Japanese buyers are a much smaller but growing market segment, having purchased about 9% of the market-rate units marketed since 1988.

MARKET ASSESSMENT FOR PAWAA REDEVELOPMENT SITE

Because of demand for market-rate condominium units is expected to exceed anticipated supply over the near term, the market for well located market-rate condominium projects is projected to be strong over the next four to six years.

The Pawaa Redevelopment site is well located in relation to transportation systems and proximity to employment, shopping and recreation to compete with other market-rate projects. The mix of convenience retailing and community service facilities available in the Pawaa Redevelopment project would add to the desirability of the site for market-rate residential condominiums because the majority of the buyers would be Island residents.

Although unrestricted ocean views are not available from the site, mountain and restricted ocean view opportunities are available. Because projects in the Pawaa Redevelopment cannot be assured unobstructed ocean views, the market for luxury condominium units may be limited.

The predominance of affordable rental housing in the Pawaa Redevelopment projects would not be a significant factor affecting the marketability of the market-rate condominium units because the majority of the renters would be comprised of households earning near the median household income. These households represent the majority of the resident population and no market evidence indicates affordable housing and market-rate condominium projects are incompatible.

With an annual demand of between 400 and 500 market-rate condominium units in Honolulu, it is probable that projects in the Pawaa Redevelopment site could capture between 30% and 50% of the annual demand because of its excellent location and the lack of competing projects. The annual absorption of market-rate units in the Pawaa Redevelopment site is estimated to range from about 120 to 250 units per year.

V - OFFICE MARKET ASSESSMENT

This section presents an assessment of the market support for commercial office and ancillary retail space on the Pawaa Redevelopment site in terms of the existing and planned supply of office space, current and projected demand, and assessment of the competition.

All building areas are expressed in terms of usable area, unless otherwise noted. In Honolulu, usable area is synonymous with net rentable area and includes only those actual tenant-occupied areas.

MARKET AREA DEFINITION

The existing Class A office space in Honolulu extends from the Chinatown district of downtown Honolulu to Waikiki. The primary market area includes three segments of the Honolulu office market; the districts are defined as follows:

- Financial district, including expansion into Chinatown
- Kapiolani district
- Waikiki.

Similar to other major cities across the United States, office development in Honolulu began in its financial district. Location in the financial district offered tenants convenient proximity to major financial, legal and other professional businesses as well as the various State and County government agencies.

As land prices and rents increased, office development began to extend eastward outside the financial district to the Kapiolani district.

Developments in the Kapiolani district initially appealed to tenants who did not need to be in the financial district and those who preferred a convenient location to a variety of wholesalers and retailers, particularly those servicing stores in the regional Ala Moana Shopping Center and Waikiki.

Today, the financial and Kapiolani districts are no longer insulated from one another. Land prices and rent levels are relatively comparable as the two districts compete for the same market segments.

Other smaller, less competitive sectors of the Honolulu office market include the Capitol and Waikiki districts. The Capitol district includes government buildings and has no privately-owned office buildings. The Waikiki office market is supported largely by users associated with the visitor industry.

OFFICE SPACE DEMAND

The demand for office space in Honolulu is discussed in terms of historical and projected demand under the following subheadings.

Historical Demand

The historical demand for office space in Honolulu has typically ranged between about 175,000$ to over 300,000$ annually since 1978. Since 1986, however, the demand for office space is estimated to have averaged about 240,000$ annually, as shown in Exhibit V-A.

Demand for office space has grown in relation to increases in employment. The demand analysis focuses on three employment sectors that generate the majority of jobs requiring office space, including:

- Banking, finance, real estate and insurance
- Services (excluding hotels)
- Government.

These employment sectors and related service-oriented businesses have generated most of the recent demand for new office space. The primary factors which account for the demand for new office space include:

- Expansion of existing businesses
- Establishment of new local businesses
- Expansion of existing firms into new cities
- Movement into the central business district from suburban locations.

Employment opportunities in government, legal and professional services has increased from about 157,000 jobs in 1978 to about 213,000 in 1990. As a result, a total of about 56,400 new jobs were created in these selected employment categories, as shown in Exhibit V-B.

During the same 12-year period, the demand for office space in Honolulu increased by about 2,780,000$. Since 1978, the office space requirement for each new job has averaged about 49$, as also shown in Exhibit V-B.

Projected Demand

The Department of Business & Economic Development and Tourism (DBEDT) projects continued growth in both the population and economy of the State, although at rates below those of past 25 years.

Two of today's major industries, sugar and pineapple, are expected to decline in employment, while manufacturing and Federal government are expected to achieve only modest gains. Employment in trade, services and diversified agriculture, however, are expected to show large increases.

Exhibit V-A

PAHAA REDEVELOPMENT
Historical Absorption of Office and
Ancillary Retail Space in Honolulu
(#)
1978-1990

Year	Supply		Occupancy (1)	Demand	
	Office	Retail		Office	Retail
1978	2,858,831	343,612	98.0% E	2,800,000	337,000
1980	3,473,064	404,871	98.6	3,420,000	399,000
1982	3,748,064	413,371	92.2	3,460,000	381,000
1984	4,665,068	476,394	86.4	4,030,000	412,000
1986	4,665,068	476,394	93.9	4,380,000	447,000
1988	5,177,968	568,194	94.7	4,900,000	538,000
1989	5,567,914	618,882	96.3	5,360,000	596,000
1990	5,756,698	659,472	96.9	5,580,000	639,000
Average annual:					
1978-1980	307,000	31,000		310,000	31,000
1980-1982	138,000	4,000		20,000	(9,000)
1982-1984	459,000	32,000		285,000	16,000
1984-1986	0	0		175,000	18,000
1986-1988	256,000	46,000		260,000	46,000
1988-1990	289,000	46,000		340,000	51,000
1978-1990	241,000	26,000		232,000	25,000

E = Estimated

(1) Based on 3rd or 4th quarter occupancy levels, as reported by HOHA for periods from 1980 through 1986. The 1988, 1989 and 1990 occupancy data from Coldwell Banker.

Source: John Child & Company, Inc. based on interviews with building owners or their agents and public records.

Exhibit V-B

PAHAA REDEVELOPMENT
Office and Ancillary Retail Space Requirements
1978-1990

	Additional Space (#)		Job count change	Additional Space Per Job	
	Office	Retail		Office	Retail
1978-1980	620,000	62,000	12,400	50	5
1980-1982	40,000	(18,000)	(1,100)	(36)	16
1982-1984	570,000	31,000	6,500	88	5
1984-1986	350,000	35,000	8,400	42	4
1986-1988	520,000	91,000	11,500	45	8
1988-1990	680,000	101,000	18,800	36	5
1978-1990	2,780,000	302,000	56,400	49	5

Source: John Child & Company, Inc.

DBEDT projects job formations in the selected industry sectors. DBEDT projections between 1980 and 1990 show an annual compound increase in job formations of about 1.6%. Historically between 1980 and 1990 the annual compound rate of change was about 2.3%. The actual increase in job formations was about 44% greater than projected. By applying this 44% to DBEDT projections for 1990 to 2005, the rate of increase in employment in the selected industries is projected as follows:

	Annual Compound Rate of Increase		
Period	DBED projections (M:K series)	Adjustment	Projection
1990-1995	1.8%	1.44	2.6%
1995-2000	1.3		1.9
2000-2005	0.9		1.3

Based on these projected rates of increase, the number of jobs in the selected industries are projected as follows:

Year	Growth rate	Projected Job count
1990		213,000
1995	2.6%	242,000
2000	1.9	266,000
2005	1.3	284,000

Assuming each new job in the selected employment sectors resulted in a demand for about 49# of office space, the additional demand for office space could average about 232,000# annually and total about 3,480,000# by 2005, as shown in Exhibit V-C. Demand for ancillary retail space could total about 355,000# by 2005 or about 10% of the office demand, as also shown in Exhibit V-C.

OFFICE SUPPLY

The supply of office space is reviewed in terms of existing, planned and proposed developments under the following subheadings.

Exhibit V-C

PAWAA REDEVELOPMENT
Projected Office and Ancillary Retail Space Requirements
1991-2005

	Job count change	Additional Space Per Job		Total Additional Space Requirement (SF)	
		Office	Retail	Office	Retail
1991-1995	29,000	49	5	1,420,000	145,000
1996-2000	24,000	49	5	1,180,000	120,000
2001-2005	18,000	49	5	880,000	90,000
Total	71,000			3,480,000	355,000

Source: John Child & Company, Inc.

Existing Supply

About 5,760,000ß of office space in Honolulu is distributed among 30 Class A office buildings, as follows:

Class A Office Space Inventory by District

District	Net rentable area (ß)	Percent of total
Financial	3,325,783	58%
Kapiolani	1,906,382	33
Waikiki	524,533	9
Total	5,756,698	100%

Under Construction

Seven office developments with about 1,140,000ß of net rentable office area are currently under construction, as shown in Exhibit V-D. The inventory includes about 908,000ß in three projects in downtown Honolulu expected to be completed by 1992, including:

Project	Net rentable area (ß)
Alii Place	305,190
Pan Pacific Plaza	427,150
1100 Alakea	176,022
Total	908,362

About 557,000ß or 61% of the net rentable area in these projects has been leased.

Planned and Proposed Developments

Twenty projects in Honolulu are in various stages of planning and could add about 3,250,000ß of Class A office space to the office inventory, as also shown in Exhibit V-D. Based on available data, about 2,190,000ß, or about 67% of the inventory, would be in twelve buildings within ten projects in downtown Honolulu.

FHSA REDEVELOPMENT
Available Class A Office and Ancillary Retail Space

Project	Year of completion	Commercial Office Space (ß) Total	Pre-leased	Available	Ancillary Retail Space (ß) Total	Pre-leased	Available
Under construction:							
Harbour Tower	1991	167,300	66,241	36,127	10,164	10,164	0
Pūwāloa Elderly Housing	1992	25,700 [1]	0	25,700	0	0	0
Kamakee Vista	1992	25,300 [2]	0	25,300	0	0	0
Alii Place	1992	305,190	219,870	85,320	10,050	0	10,050
Pan Pacific Plaza	1992	427,150	337,150	90,000	40,000	20,000	20,000
1100 Alakea	1992	176,022	0	176,022	19,554 [3]	0	19,554
Victoria Station site	1992	72,000	0	72,000	8,000 [3]	0	8,000
Total - under construction		1,143,630	633,201	530,549	80,572	30,164	50,604
Planned:							
Harbor Court	1993	190,000	0	190,000	21,700	0	21,700
Aloha Tower site	1993	135,000	0	135,000	15,000 [4]	0	15,000
Aloha Tower -							
Maritime Building	1994	291,300	0	291,300	0	0	0
Aloha Marketplace Offices	1995	144,000	0	144,000	0	0	0
Harbor Center	1996	450,000	0	450,000	0	0	0
Kaka'ako Superblock	1995	225,000	0	225,000	25,000 [5]	0	25,000
Kakaako	N/A	0	0	0	13,600 [6]	0	13,600
Kakaako-Gulick	N/A	0	0	0	14,027 [6]	0	14,027
Total - planned		1,435,300	0	1,435,300	89,327	0	89,327
Proposed:							
Waikiki Entertainment Center	1996 [7]	230,000 [8]	0	230,000	59,500 [9]	0	59,500
604 Pilkoi, Phase IV	N/A	195,625	0	195,625	20,625 [3]	0	20,625
Alexander & Baldwin Tower	N/A	315,000	0	315,000	15,000 [3]	0	15,000
Campbell Estate Office Tower	N/A	234,000	0	234,000	24,000 [3]	0	24,000
Liberty House Block	N/A	190,000	0	190,000	20,000 [3]	0	20,000
YWCA Development	N/A	175,000	0	175,000	15,000 [3]	0	15,000
AAIL Small Inc./C. Brewer	N/A	315,000	0	315,000	35,000 [3]	0	35,000
Toreon Building (Kapiolani)	N/A	84,000 [10]	0	84,000	9,000 [3]	0	9,000
Varsity Theatre Redevelopment	N/A	199,000 [10]	0	199,000	22,000 [3]	0	22,000
King Theater	N/A	64,000 [10]	0	64,000	7,000 [3]	0	7,000
Liberty Theater	N/A	185,000 [10]	0	185,000	21,000 [3]	0	21,000
Pacific Marine Center	N/A	N/A			N/A		
Honolulu Electric Power Plant	N/A	N/A			N/A		
Total - proposed		2,134,625	0	2,134,625	270,125	0	270,125

[1] Estimated 95% of gross area allocated to net rentable office space.
[2] Estimated 90% of gross area allocated to net rentable office space.
[3] Estimated 10% of leasable area for ancillary retail space.
[4] Estimated 10% of leasable area for ancillary retail space; project will have about 81,000 square feet of shopping center space.
[5] Estimated 10% of leasable area for ancillary retail space; project will have about 600,000 square feet of shopping center space.
[6] Gross area.
[7] Estimated start date 1996 and two years to complete.
[8] Estimated maximum space to develop based on maximum FAR and 85% efficiency. Sixteen floor office tower proposed.
[9] Estimated maximum space to develop based on maximum FAR and 85% efficiency. Three floor retail complex and one floor of theaters proposed.
[10] Estimated maximum space to develop based on maximum FAR and 85% efficiency.

Sources: John Child & Co., Inc., projects' developers, leasing agents and others; "Convention Center: Idea whose time may come," Honolulu Star-Bulletin, February 6, 1989; "Development popping up throughout Downtown Honolulu," Pacific Business News, June 26, 1989; The Downtowner, September 1989. "Office Guide" Hawaii Business, February 1991.

PAHAA REDEVELOPMENT
Projected Office Supply and Demand
1991-2005

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Potential office space [4]
Demand:																	
Existing	5,360,000	5,580,000	5,864,000	6,148,000	6,432,000	6,716,000	7,000,000	7,236,000	7,472,000	7,708,000	7,944,000	8,180,000	8,356,000	8,532,000	8,708,000	8,884,000	
Annual addition	220,000	284,000 [2]	284,000	284,000	284,000	284,000	236,000	236,000	236,000	236,000	236,000	176,000	176,000	176,000	176,000	176,000	
Total - demand	5,580,000 [1]	5,864,000	6,148,000	6,432,000	6,716,000	7,000,000	7,236,000	7,472,000	7,708,000	7,944,000	8,180,000	8,356,000	8,532,000	8,708,000	8,884,000	9,060,000	
Supply:																	
Existing	5,760,000 [3]	5,760,000	5,862,000	6,903,000	7,228,000	7,519,000	7,888,000	8,338,000	8,338,000	8,576,000	8,576,000	8,576,000	8,576,000	8,576,000	8,576,000	8,576,000	
Planned/proposed:																	
Harvest Tower		102,308															
Pohulani Elderly Housing			35,700														
Kamakee Vista			25,380														
Alii Place			305,190														
Pan Pacific Plaza			427,150														
1100 Alakea Street			176,022														
Victoria Station site			72,000														
Harbor Court				190,000													
Aloha Motors site				135,000													
Aloha Tower:																	
Maritime Building					291,300												
Aloha Marketplace Offices						144,000											
Harbor Center							450,000										
Waseda Superblock						225,000											
Waikiki Entertainment Center									238,000								
404 Piikoi, Phase IV																	185,625
Campbell Estate Office Tower																	216,000
Liberty House Block																	180,000
YWCA Development																	135,000
AALL Hawaii Inc./C. Brewer																	315,000
Tomson Kapiolani Building																	84,000
Varsity Theatre Redevelopment																	139,000
King Theater																	64,000
Liberty Theater																	105,000
Pacific Nations Center																	N/A
Hawaiian Electric Power Plant																	N/A
Subtotal - planned, rounded	0	102,000	1,041,000	325,000	291,000	369,000	450,000	0	238,000	0	0	0	0	0	0	0	1,897,000
Total	5,760,000	5,862,000	6,903,000	7,228,000	7,519,000	7,888,000	8,338,000	8,338,000	8,576,000	8,576,000	8,576,000	8,576,000	8,576,000	8,576,000	8,576,000	8,576,000	
Projected occupancy	96.9%	100.0%	89.1%	89.0%	89.3%	88.7%	86.8%	89.6%	89.9%	92.6%	95.4	97.4%	99.5%	101.5%	103.4%	105.6%	

[1] Total demand ($) from Exhibit II-B.
[2] Total additional space requirement ($) from Exhibit II-E.
[3] Existing Class A Office Buildings from Exhibit II-F.
[4] Potential supply with undetermined time frame.

Source: John Child & Company, Inc.

Exhibit V-E

PAHRA REDEVELOPMENT
Projected Ancillary Retail Supply and Demand
1991-2005

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Potential ancillary retail space [4]
Demand:																	
Existing	596,000	639,000	668,000	697,000	726,000	755,000	784,000	808,000	832,000	856,000	880,000	904,000	922,000	940,000	958,000	976,000	
Annual addition	43,000	29,000 [2]	29,000	29,000	29,000	29,000	24,000	24,000	24,000	24,000	24,000	18,000	18,000	18,000	18,000	18,000	
Total - demand	639,000 [1]	668,000	697,000	726,000	755,000	784,000	808,000	832,000	856,000	880,000	904,000	922,000	940,000	958,000	976,000	994,000	
Supply:																	
Existing	659,000 [3]	659,000	669,000	747,000	784,000	784,000	809,000	809,000	809,000	869,000	869,000	869,000	869,000	869,000	869,000	869,000	
Planned/proposed:																	
Honvest Tower		10,164															
Alii Place			10,850														
Pan Pacific Plaza			40,000														
1100 Alakea Street			19,550														
Victoria Station site			8,000														
Harbor Court				21,700													
Aloha Motors site				15,000													
Waseda Superblock						25,000											
Waikiki Entertainment Center									59,500								
Kewalike																	
Kaumakea-Smith																	
404 Pilkoi, Phase IV																	13,600
Campbell Estate Office Tower																	14,027
Liberty House Block																	20,625
YWCA Development																	26,000
AAIL Hawaii Inc./C. Brewer																	20,000
Tucson Kapiolani Building																	15,000
Varsity Theatre Redevelopment																	35,000
King Theater																	9,000
Liberty Theater																	27,000
Pacific Nations Center																	7,000
Hawaiian Electric Power Plant																	21,000
																	N/A
Subtotal - planned, rounded	0	10,000	78,000	37,000	0	25,000	0	0	60,000	0	0	0	0	0	0	0	N/A
Total	659,000	669,000	747,000	784,000	784,000	809,000	809,000	809,000	869,000	869,000	869,000	869,000	869,000	869,000	869,000	869,000	238,000
Projected occupancy	97.0%	99.9%	93.3%	92.6%	96.3%	96.9%	99.9%	100.0%	98.5%	100.0%	100.0%	106.1%	108.2%	110.2%	112.3%	114.4%	

[1] Total demand ($) from Exhibit II-B.
[2] Total additional space requirement ($) from Exhibit II-E.
[3] Existing ancillary retail space from Exhibit II-F.
[4] Potential supply with undetermined time frame.

Exhibit V-F

Assuming completion of the known office developments, the total inventory of Class A office space could increase from about 5,760,000ℊ to about 10,160,000ℊ, shown as follows:

Projected Office Inventory

	Net rentable area (ℊ)
Existing	5,760,000
Projected:	
1991	102,000
1992	1,041,000
1993	325,000
1994	291,000
1995	369,000
After 1995	2,270,000
Subtotal	4,398,000
Total	10,158,000

EXISTING AND PROJECTED OCCUPANCY LEVELS

The existing and projected relationship between demand and supply for office and retail space is evidenced in occupancy rates. High occupancy rates indicate a strong commercial market with demand equal to or greater than available supply of commercial space. Conversely, a lower occupancy rate indicates a weaker commercial market with an oversupply of space in relation to demand.

Office Space

Downtown Honolulu's occupancy rate was reported at 96.9% based on a national survey conducted by Coldwell Banker Commercial Group in December 1990. The survey described the downtown Honolulu office occupancy rate as the highest in the nation for that period. By comparison, the national average for U.S. downtown areas is about 82.9%.

Construction of new office space could amount to about 2,580,000ℊ between 1991 and 1996, assuming completion of the known office developments. As a result, the total inventory of Class A office space could increase from about 5,760,000ℊ to about 8,340,000ℊ as shown in Exhibit V-E.

Office space demand over the next 15 years is projected to average about 213,000ℊ annually.

Based on the projected supply and demand, the average office occupancy rate is projected to decline to about 87% by 1996 as the proposed developments are completed. Thereafter, the occupancy rate is projected to be about 90% or higher to 2005, as previously shown in Exhibit V-H. It is probable that several of the proposed projects will be deferred or dropped when average occupancy levels decline to 85%. Mortgage lenders are normally cautious in providing construction financing under such conditions.

Based on the foregoing analysis of the projected supply and demand, the office market is expected to be strongly competitive over the next 15 years. Well located, professionally managed Class A office buildings are anticipated to remain attractive to existing and new tenants and continue to achieve above-average rents and occupancy rates.

Ancillary Retail Space

In addition to the office space, Class A office developments in Honolulu have typically allocated between 5% and 15% of the net rentable area for ancillary retail uses. Exhibit V-F shows the ancillary retail space in existing Class A office building. Ancillary retail areas are usually occupied by tenants who service the needs of the office users in and immediately around the development. Typical retail users in Class A office developments include:

- Restaurants
- Convenience shops
- Florists
- Hair stylists
- Jewelry shops.

There is about 659,000$ of ancillary retail space in the existing Class A office buildings. An estimated 413,000$ of ancillary retail space will be available within the next 15 years as the new Class A office buildings are completed, as shown in Exhibit V-D. Assuming the completion of the known office developments, occupancy of ancillary retail space is expected to be very high. Occupancy rates average about 96% from 1991 to 1996 and are projected to remain at these high levels from 1997 to 2005 as shown in Exhibit V-F.

HONOLULU OFFICE MARKET SUMMARY

The office market is expected to be relatively competitive over the next 15 years.. Well located, professionally managed Class A office buildings are anticipated to remain attractive to existing and new tenants and continus to achieve high average rents and occupancy rates. Older offices in secondary locations in Honolulu would experience lower rents and occupancy rates.

Office occupancy, rental rates and sales prices are projected under the following subheadings.

Projected Occupancy

Historical demand for additional office space in Honolulu has averaged about 240,000f annually since 1986. During the next 15 years, annual demand for additional office space is projected to average about 213,000f and total over 2,000,000f by 2005.

About 5,760,000f of existing office space in Honolulu is distributed among 30 Class A office buildings.

Seven office developments with about 1,140,000f of net rentable office area are currently under construction. The inventory includes about 908,000f in three projects expected to be completed by 1992.

Twenty projects in Honolulu are in various stages of planning and could add about 3,250,000f of Class A office space to the office inventory. About 2,190,000f or about 67% of the inventory, would be in downtown Honolulu.

Assuming completion of the known office developments, the total inventory of Class A office space could increase from nearly 5,760,000f to nearly 10,160,000f.

Honolulu's occupancy rate was reported at 96.9% in December 1990. Based on the projected supply and demand, the average office occupancy rate is projected to decline to about 87% by 1996 assuming the proposed developments are completed. From 1997 to 2005, the occupancy rate is projected to be about 90% or higher. Occupancy rates could drop to the 85% range if multiple projects was delivered at the same time. However, it is probable that some projects would be deferred when average occupancy levels decline to 85% because of the difficulty of obtaining financing under such market conditions.

The projected oversupply of commercial office space in Honolulu is projected to keep occupancy levels in Class A office buildings below 90% for the next eight years assuming no other projects are constructed. Therefore, high levels of competition will exist among new office projects to attract tenants. This higher level of competition could result in escalating rental concessions and lower short-term returns on investment.

A commercial office building in the Pawaa Redevelopment site could effectively compete with other projects in the Kapiolani and Downtown Honolulu area because of convenient location and the unique mix of uses available in this master-planned development. However, because of the projected oversupply of office space, extensive office development is not recommended for the Pawaa Redevelopment site.

The City and State will retain first right to lease about 50,000f of office space in the project for their related uses. An additional 15,000f of office space may be used for community service and day care facilities in the project. Therefore, a minimum office space requirement of 65,000f is needed in the project. Assuming the entire two-block area is ultimately redeveloped, the project could support about 100,000f of office space in addition to the 15,000f of community service and day care facilities.

VI - RETAIL MARKET ASSESSMENT

This section describes the methodology, analysis and projected market support for retail space in the Pawaa Redevelopment site.

TRADE AREA

Three trade areas are designated for the Pawaa Redevelopment retail site based on travel time, distance, and location of competing projects. The primary, secondary and tertiary trade areas include portions of the Makiki/Lower Punchbowl/Tantalus, McCully/Moiliili, Ala Moana/Kaheako and Manoa Neighborhoods. These neighborhoods are within urban Honolulu.

Primary Trade Area

The primary trade area represents the highest potential capture rate of consumer expenditures. This trade area is defined as an area where residents would walk to the Pawaa Redevelopment site. The primary trade area includes a three to four block area surrounding the site as shown in Exhibit VI-A.

Secondary Trade Area

The secondary trade area represents a moderate potential capture rate of consumer expenditures. This trade area includes an area where the residents would drive to the Pawaa Redevelopment retail site because of its convenient location and proximity to their home or business. The secondary trade area boundaries are Pensacola Street on the west, Kapiolani Boulevard on the south, McCully Street on the east and most of the Makiki/Tantalus Neighborhood on the north, as also shown in Exhibit VI-A.

Tertiary Trade Area

The tertiary trade area represents a much larger area. This trade area represents the least potential capture rate of consumer expenditures from a defined area. The tertiary trade area is an area where the residents live or work farther away from the site, but find the Pawaa Redevelopment retail site to be within a reasonable travel time and distance from their home or business. However, competing convenience retailers would be located in closer proximity to homes or businesses than the Pawaa Redevelopment site. The tertiary trade area includes parts of Lower Punchbowl and McCully and most of Manoa, as also shown in Exhibit VI-A.

DEMOGRAPHIC REVIEW

Of primary importance in the retail market assessment is the characteristics of the residents in the trade area. Recent demographic trends in the trade areas are discussed in terms of population, households, household sizes, and income characteristics under the following subheadings.

PAWAA REDEVELOPMENT
Retail Trade Area Map
(1980 Census Map)

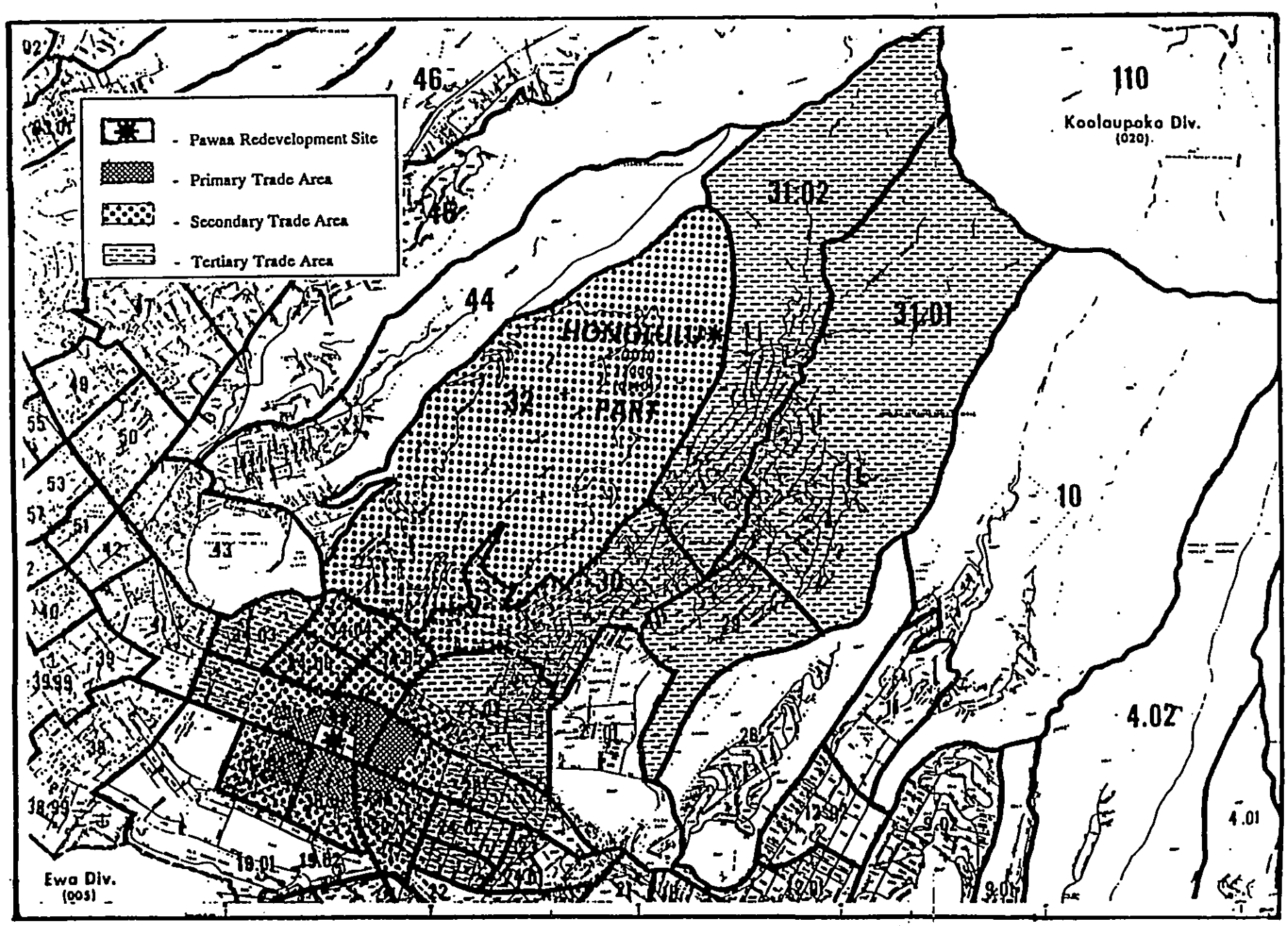


Exhibit VI-A

Exhibit VI-B

PAHAA REDEVELOPMENT
Population Trends

Year	Oahu	Honolulu (CDP) [1]	Trade area
1970	630,528	324,871	61,632
1980	762,565	365,048	64,356
1990	836,231	377,059	66,664
Growth rate:			
1970-1980	1.9%	1.2%	0.4%
1980-1990	0.9	0.3	0.4

[1] CDP = Census Designated Place (Hawaii Kai to Red Hill).

Source: U.S. Department of Commerce, Bureau of the Census, "Census of Population and Housing," 1970 and 1980; 1990 Census of Population P.L. 94-171, U.S. Bureau of the Census.

Population

The trade area has grown slightly since 1970. Between 1970 and 1980, the resident population in the trade area increased at a rate of about 0.4% per year, from about 61,600 to about 64,400. Between 1980 and 1990 the resident population has increased at about the same rate from 64,300 people to about 66,700 as shown in Exhibit VI-B. The rate of population growth also slowed in the Honolulu (CDP) from about 1.2% per year between 1970 and 1980 to 0.3% over the past decade. By comparison, the island-wide population increased by about 1.9% per year between 1970 and 1980 and by about .9% between 1980 and 1990.

Households

The slowdown in the number of occupied housing units in the trade area has paralleled the population growth. Between 1970 and 1980, the number of occupied housing units in the trade area increased by about 2.5% per year, from about 22,400 in 1970 to about 28,800 in 1980, as shown in Exhibit VI-C. Between 1980 and 1990 the growth in occupied housing units slowed even more. The number of occupied housing units increased at .6% per year from 28,800 to about 30,600. Honolulu (CDP) households increased by about the same rate as the trade areas occupied housing units.

The rate of expansion in the trade area and the Honolulu (CDP) were lower than that experienced on Oahu as a whole over the same period, which averaged 3.5% per year between 1970 and 1980 and 1.4% per year between 1980 and 1990 as shown in Exhibit VI-C.

Household Size

Influenced by new household formations, and following the national trend towards smaller household size, the trade area household size has declined at about 1.2% per year, from 2.75 persons in 1970 to 2.18 persons in 1990, as shown in Exhibit VI-D.

The average household size on Oahu declined by about 0.9% per year over the same period, from 3.60 to 3.02 persons per household. Similarly, the household size in Honolulu (CDP) decreased by about 1.0% per year from 3.24 persons in 1970 to 2.63 persons in 1990, as also shown in Exhibit VI-D.

Median Household Income

Median household incomes in Honolulu have increased at about 6.5% per year from an estimated $22,000 in 1980 to $41,200 in 1990. However, after adjustment to constant 1980 dollars based on the consumer price index, a real growth of 1.2% per year is indicated. The change in household income is shown in Exhibit VI-E.

Exhibit VI-C

PAHAA REDEVELOPMENT
Household Trends

Year	Oahu	Honolulu (CDP) [1]	Trade area [2]
1970	164,763	97,228	22,402
1980	230,214	127,139	28,755
1990	265,304	134,563	30,637
Growth rate:			
1970-1980	3.5%	2.7%	2.5%
1980-1990	1.4	.6	.6

[1] CDP = Census Designated Place (Hawaii Kai to Red Hill).
[2] Based on occupied housing units.

Source: U.S. Department of Commerce, Bureau of the Census, "Census of Population and Housing," 1970 and 1980. 1990 Summary Tape File 1A, U.S. Bureau of the Census.

Exhibit VI-D

PAHAA REDEVELOPMENT
Household Size Trend

Year	Oahu	Honolulu (CDP) [1]	Trade area [2]
1970	3.60	3.24	2.75
1980	3.15	2.79	2.24
1990	3.02	2.63	2.18

[1] CDP = Census Designated Place (Hawaii Kai to Red Hill).

[2] Occupied housing unit size.

Source: U.S. Department of Commerce, Bureau of the Census, Census of Population and Housing, 1970 and 1980; 1990 Summary Tape File 1A, U.S. Bureau of the Census.

Exhibit VI-E

PAHAA REDEVELOPMENT
Oahu Median Household Income
1980-1990

Year	Changing dollars	Constant 1980 dollars
1980 E	$22,000	$22,000
1981	23,300	21,000
1982	27,200	23,200
1983	30,400	25,400
1984 E	30,900	24,800
1985	31,300	24,300
1986 E	32,700	24,800
1987	34,100	24,600
1988	36,500	24,900
1989	39,100	25,200
1990	41,200	24,800
Growth rate:		
1980-1990	6.5%	1.2%

E = Estimate based on the interpolation.

Source: Department of Housing and Community Development, Housing Division, City and County of Honolulu and John Child & Company, Inc. based on 1964-1989 from U.S. Bureau of Labor Statistics, CPI Detailed Report (monthly) and BLS tapes tabulated by Hawaii State Data Center.

PROJECTED HOUSEHOLDS AND INCOMES

Future retail expenditures are based on the number of households in the primary, secondary and tertiary trade areas and their household incomes over the projection period. Projections of the number of households and household incomes in the three trade areas are discussed as follows.

Projected Households

Historically, the number of households and the number of occupied housing units have been about the same. Because the 1990 household counts by census tracts and blocks are not available, the number of occupied housing units in the trade area is used as the basis for projecting household counts.

As of 1990, there are about 3,147 occupied housing units in the primary trade area. About 245 additional units are planned for development by 1995 and an additional 1,200 units could be added by 2000. The secondary trade area is estimated to add an additional 348 housing units by 1995 and about 470 units by 2000. Within the tertiary trade area, there are no projected increases at this time. Exhibit VI-F projects occupied housing units in the trade area through 2010.

Projected Median Household Incomes

The Hawaii State Department of Business and Economic Development and Tourism projects per capita personal income to increase at a growth rate of between .8% and 1.5% per year through 2010. [1]

Based on the State projections, historical data and considering the long-term relationship between personal and household incomes, the trade area median household incomes are projected to increase at a real growth rate of about 1.0% per year in constant 1990 dollars. Trade area household incomes by census tract are projected in Exhibit VI-G.

As a result of the projected population growth and increases in household incomes, the total household income in the primary trade area is projected to increase from about $85 million in 1990 to about $146 million in 2010, in constant 1990 dollars. The secondary trade area's total household income is projected to increase from about $526 million in 1990 to about $673 million in 2010, in constant 1990 dollars. The total household income for the tertiary trade area is projected to increase from about $498 million in 1990 to about $609 million in 2010, in constant 1990 dollars, as shown in Exhibit VI-H. The primary trade area households currently represent 7.7% of the total household income in the trade area, and is projected to increase to 10.2% by 2000.

[1] John Child & Company, Inc. based on Hawaii State Department of Business and Economic Development, Population and Economic Projections for the State of Hawaii to 2010 (Series M-K), November 1988.

Exhibit VI-F

PAHAA REDEVELOPMENT
Projected Occupied Housing Counts
(1995-2010)

	1990	1995	2000	2005	2010
Primary [1]	3,147	3,392	4,392	4,392	4,392
Secondary [2]	15,673	16,021	16,491	16,491	16,491
Tertiary [3]	10,856	10,856	10,856	10,856	10,856
Total	29,676	30,269	31,739	31,739	31,739

[1] Redevelopment of the subject property is estimated to add an additional 200 housing units by 1995 and 1,200 housing units by 2000. The Haseko Bingham Tract site is estimated to add an additional 45 housing units by 1995.

[2] Universe Plaza is estimated to add an additional 348 housing units by 1995. An estimated 470 additional housing units will be added by 2000 by the Haseko Superblock and the Birch King Tower Condo.

[3] No increase in housing inventory is projected other than the impact of proposed projects.

Source: John Child & Company, Inc.

Exhibit VI-G

PAHAA REDEVELOPMENT
Median Household Income Projections
(1990 Dollars)

Census tract	1990 [1]	1995 [2]	2000 [2]	2005 [2]	2010 [2]
Primary:					
25.00	$30,200	$31,700	$33,300	$35,000	$36,800
26.00	29,700	31,200	32,800	34,500	36,300
35.00	28,000	29,400	30,900	32,500	34,200
36.97	31,600	33,200	34,900	36,700	38,600
36.98	24,300	25,500	26,800	28,200	29,600
Secondary:					
25.00	30,200	31,700	33,300	35,000	36,800
26.00	29,700	31,200	32,800	34,500	36,300
27.02	37,800	39,700	41,700	43,800	46,000
30.00	57,500	60,400	63,500	66,700	70,100
32.00	57,300	60,200	63,300	66,500	69,900
33.00	87,500	92,000	96,700	101,600	106,800
34.04	36,700	38,600	40,600	42,700	44,900
34.05	31,900	33,500	35,200	37,000	38,900
34.06	30,700	32,300	33,900	35,600	37,400
34.07	30,400	32,000	33,600	35,300	37,100
35.00	28,000	29,400	30,900	32,500	34,200
36.97	31,600	33,200	34,900	36,700	38,600
36.98	24,300	25,500	26,800	28,200	29,600
Tertiary:					
24.01	28,900	30,400	32,000	33,600	35,300
24.02	32,000	33,600	35,300	37,100	39,000
26.00	29,700	31,200	32,800	34,500	36,300
29.00	65,900	69,300	72,800	76,500	80,400
30.00	57,500	60,400	63,500	66,700	70,100
31.01	70,400	74,000	77,800	81,800	86,000
31.02	70,500	74,100	77,900	81,900	86,100
34.03	38,400	40,400	42,500	44,700	47,000
35.00	28,000	29,400	30,900	32,500	34,200

[1] Estimated figures based on 1980 census data adjusted to current on Oahu 1990 median household income.

[2] Projected on 1% compound annual increase.

Source: John Child & Company, Inc.

Exhibit VI-H

PAHAA REDEVELOPMENT
Projected Total Household Income
(1990 Dollars, in Millions)

Year	Total Income (Million)			Primary as a % of trade area
	Primary	Secondary	Tertiary	
1990	$ 84.9	$525.8	$498.4	7.7%
1995	96.4	564.1	523.8	8.1
2000	132.3	609.2	550.8	10.2
2005	139.1	640.3	579.0	10.2
2010	146.3	673.0	608.7	10.2

Source: John Child & Company, Inc.

PROJECTED RETAIL EXPENDITURES

Based on the U.S. Bureau of Labor Statistics, "Autumn 1981 Urban Family Budgets and Comparative Indexes for Selected Urban Areas," Paul Brewbaker from the Economics Department of Bank of Hawaii estimated the annual intermediate budgets for a four-person family on Oahu in 1989. His study suggests that:

- Between 35% and 40% of a family's total household income is spent on retail expenditures.
- About 50% of total retail expenditure is spent on food at home.

About 75% of the household expenditures are for grocery and other goods offered by the existing neighborhood shopping facilities. The remaining 25% are for clothing, home furnishings and other shopper's goods, which currently have not been serviced by the immediate neighborhood facilities but instead are satisfied to a large degree by Ala Moana Shopping Center, a regional shopping center. The composition of retail expenses is shown in Exhibit VI-I.

Based on the percentage allocations shown in Exhibit VI-I, retail expenditures are projected for the trade area in Exhibit VI-J. Total retail expenditures by the primary trade area residents are projected to increase from about $31 million in 1990 to about $53 million by 2010, as shown in Exhibit VI-J.

PROJECTED RETAIL SPACE REQUIREMENTS

A review of Oahu and Hawaii's convenience shopping centers indicates typical annual retail sales volumes ranging from $250 to $350 per square foot of floor area. Based on an average annual sales volume of $300 per square foot of retail space, the total trade area retail expenditures could currently support about 720,000 sf of grocery space. Exhibit VI-K shows the estimated area of retail space currently supported by trade area retail expenditures.

Over the next ten years, the amount of additional retail space required in the total trade area could increase by about 220,000 sf based on a projected increase of about $66 million in retail expenditures.

PAHAA REDEVELOPMENT
Annual Intermediate Budgets for a
Four-Person Family on Oahu
1989

	Average annual expenditure	Percent of consumer expenditures
Food:	$9,229	53.8%
Food at home	1,349	7.9
Food away	1,581	9.2
Clothing	823	4.8
Personal care	1,704	9.9
Household furnishings and equipment	2,469	14.4
Other retail [1]		
Total retail expenditures	$17,155	100.0%
Income before taxes	$47,361	
Retail expense as a percent of household income	36.2%	

[1] Includes reading, tobacco products, alcoholic beverages, education, and miscellaneous expenditures.

Source: Paul Brewbaker, Economics Department of Bank of Hawaii, 1989 estimates based on U.S. Bureau of Labor Statistics, "Autumn 1981 Urban Family Budgets and Comparative Indexes for Selected Urban Areas."

Exhibit VI-I

PAHAA REDEVELOPMENT
Retail Expenditures by Category
(1990 Dollars in Millions)

Year	Grocery	Other retail [1]	Shopper's goods [2]	Total
Primary:				
1990	$16.5	$8.3	$5.9	$30.8
1995	18.8	9.4	6.7	34.9
2000	25.8	13.0	9.2	47.9
2005	27.1	13.6	9.6	50.4
2010	28.5	14.3	10.1	53.0
Secondary:				
1990	102.5	51.5	36.5	190.5
1995	109.9	55.3	39.1	204.3
2000	118.7	59.7	42.3	220.7
2005	124.8	62.7	44.4	231.9
2010	131.1	65.9	46.7	243.8
Tertiary:				
1990	97.1	48.8	34.6	180.5
1995	102.1	51.3	36.3	189.7
2000	107.3	54.0	38.2	199.5
2005	112.8	56.7	40.2	209.7
2010	118.6	59.6	42.2	220.5

[1] Includes food consumed away from-home, personal care, entertainment and other retail.
[2] Includes clothing and household furnishings.

Source: John Child & Company, Inc.

Exhibit VI-K

PAWAA REDEVELOPMENT
Potential Supportable Retail Space
1990

	Potential Supportable Space ($)			
	Grocery	Other retail [1]	Shopper's goods [2]	Total
Primary	55,000	27,667	19,667	102,667
Secondary	341,667	171,667	121,667	635,000
Tertiary	323,667	162,667	115,333	601,667
Total	720,334	362,001	256,667	1,339,334

[1] Includes food consumed away from home, personal care, entertainment and other retail.
[2] Includes clothing and household furnishings.

Source: John Child & Company, Inc.

EXISTING GROCERY FACILITIES

There are seven grocery shopping facilities servicing the trade area. The existing facilities include:

- Foodland (Beretania)
- Times (King & Beretania)
- Safeway (Beretania & Manoa)
- Holiday Mart (Kaheka)
- Star Market (King)

In the primary trade area, there is one grocery store which has about 27,000$^{\#}$ of enclosed floor area. In the secondary trade area, there are four grocery stores totaling about 158,000$^{\#}$ of enclosed floor area and in the tertiary trade area, there are two grocery stores with a total enclosed floor area of about 57,000$^{\#}$, as shown in Exhibit VI-L.

EXISTING GROCERY CAPTURE RATES

The relationship between existing shopping facilities and supportable retail space indicates the primary trade area is capturing about 50% (27,000$^{\#}$ existing vs. 55,000$^{\#}$ supported) of the potential grocery sales supported by area households. The secondary trade area is also capturing about 50% and the tertiary trade area has only about a 20% capture rate by existing facilities within the tertiary trade area.

MARKET ASSESSMENTS FOR PAWAA REDEVELOPMENT

The long-term lease for the Foodland Store located across Beretania Street from the Pawaa Redevelopment site has ended and the property owner anticipates redeveloping the site without a grocery market. An interim lease arrangement provides for continued use of the property by Foodland on and interim basis. Either party can cancel the lease with one-year's notice. Therefore, it is probable that the only grocery market in the primary trade area will be eliminated in the near future.

Exhibit VI-L

PAWAA REDEVELOPMENT
Existing Grocery Retail Space

	Location	Enclosed floor area (sf)	Total
Primary:			
Foodland	Beretania	26,969	26,969
Secondary:			
Times	King	19,317	
Times	Beretania	24,800	
Safeway	Beretania	28,230	
Holiday Mart	Kaheka	85,933	158,280
Tertiary:			
Star Market	King	19,497	
Safeway	Manoa	37,038	56,535
Total			241,784

Source: John Child & Company, Inc. based on REDI Real Estate Information Service, Realty Directory, State of Hawaii, First Tax Division, Real Estate Handbook, Volume 2, 1990.

Projected Capture Rate

The analysis indicates that the existing Foodland is capturing about 50% of the grocery floor area supported by primary trade area households. With the loss of the existing Foodland, there is market support for a minimum of about 30,000sf to 40,000sf of retail grocery space. Foodland has expressed interest in operating a 40,000sf store in the Pawaa Redevelopment.

In addition to grocery floor area, there is support for other convenience retail on the site. The Pawaa Redevelopment project is well suited to intercept other retail sales because of its convenient location and access and the projected traffic volume related to grocery sales. With the exception of the Manoa Marketplace in the tertiary trade area, the Pawaa Redevelopment would be the only neighborhood/community shopping center serving the trade area. The majority of the other grocery stores are stand-alone stores. Other retailing is typically from strip retail space with limited parking. Because of these factors, the retail component of Pawaa Redevelopment would have competitive advantages over the other retail spaces in the trade area.

After review of the quality and quantity of competing convenience shopping centers in the trade area, a Pawaa Redevelopment convenience shopping center could capture about 50% of the other retail sales from the primary trade area households and a much smaller percentage of grocery and other retail sales from the secondary and tertiary trade areas. The Pawaa Redevelopment project would be primarily oriented to groceries and other retail convenience goods. As such, it would capture a relatively small portion of the demand for shopper's goods. A 5.0% capture rate is used to reflect the project's orientation and competitiveness of Ala Moana Shopping Center and other retail projects like the Haselco Superdock that would capture most of the trade area sales in shopper's goods.

Exhibit VI-M summarizes the estimated capture rates for a convenience shopping center in the Pawaa Redevelopment site. The projected trade area retail expenditures available to the proposed center based on these capture rates are shown in Exhibit VI-N. As shown, the proposed center could capture about $35 million of the 1990 trade area expenditures and this could grow to about $46 million by the year 2000.

Supportable Floor Area

Based on a current annual sales volume of $300 per square foot of floor area, the projected shares of trade area retail expenditures indicate about 119,000sf of retail floor area could currently be supported on the Pawaa Redevelopment site, assuming the closure of the existing Foodland store across Beretania Street. By the year 2000, the site could support about 140,000sf of retail space with the majority in grocery and other convenience goods. Exhibit VI-O projects the amount of retail floor area supported in a convenience shopping center as part of the Pawaa Redevelopment project.

Exhibit VI-M

PAWAA REDEVELOPMENT
Projected Capture Rate by Pawaa Redevelopment
Convenience Shopping Center

Trade area	Potential Capture Rates		
	Grocery	Other retail [1]	Shopper's goods [2]
Primary	50.0%	50.0%	5.0%
Secondary	10.0	10.0	0.0
Tertiary	5.0	5.0	0.0

[1] Includes food consumed away from home, personal care, entertainment and other retail.
[2] Includes clothing and household furnishings.

Source: John Child & Company, Inc.

Exhibit VI-N

PAWAA REDEVELOPMENT
Potential Retail Expenditures Available
to Pawaa Redevelopment Convenience
Shopping Center
(1990 Dollars in Millions)

Year	Grocery	Other retail [1]	Shopper's goods [2]	Total
Primary:				
1990	$8.3	$4.2	$0.3	$12.7
1995	9.4	4.7	0.3	14.4
2000	12.9	6.5	0.5	19.9
2005	13.6	6.8	0.5	20.8
2010	14.3	7.2	0.5	21.9
Secondary:				
1990	10.3	5.2	0.0	15.4
1995	11.0	5.5	0.0	16.5
2000	11.9	6.0	0.0	17.8
2005	12.5	6.3	0.0	18.8
2010	13.1	6.6	0.0	19.7
Tertiary:				
1990	4.9	2.4	0.0	7.3
1995	5.1	2.6	0.0	7.7
2000	5.4	2.7	0.0	8.1
2005	5.6	2.8	0.0	8.5
2010	5.9	3.0	0.0	8.9
Total Trade Area:				
1990	23.4	11.7	0.3	35.4
1995	25.5	12.8	0.3	38.6
2000	30.1	15.2	0.5	45.8
2005	31.7	15.9	0.5	48.1
2010	33.3	16.7	0.5	50.5

[1] Includes food consumed away from home, personal care, entertainment and other retail.
[2] Includes clothing and household furnishings.

Source: John Child & Company, Inc.

Exhibit VI-Q

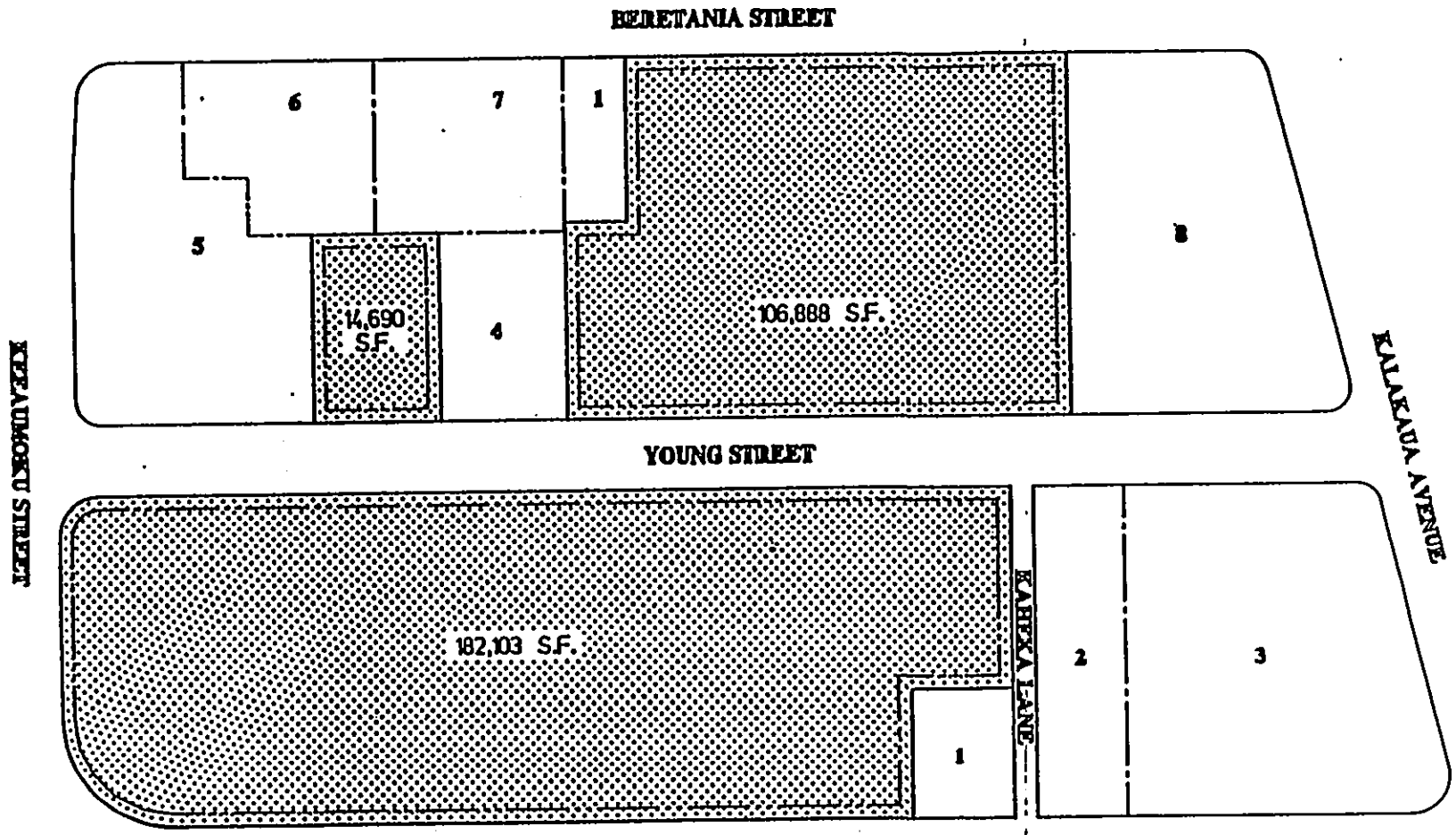
PAHAA REDEVELOPMENT
Estimated Retail Space Supportable at
Pahaa Redevelopment Convenience Shopping Center

Year	Potential Supportable Space (#)			
	Grocery	Other retail [1]	Shopper's goods [2]	Total
1990				
Primary	27,700	14,000	1,000	42,700
Secondary	34,300	17,300	0	51,600
Tertiary	16,300	8,000	0	24,300
Total	78,300	39,300	1,000	118,600
1995				
Primary	29,800	14,900	1,000	45,700
Secondary	34,900	17,400	0	52,300
Tertiary	16,200	8,200	0	24,400
Total	80,900	40,500	1,000	122,400
2000				
Primary	38,900	19,600	1,500	60,000
Secondary	35,900	18,100	0	54,000
Tertiary	16,300	8,100	0	24,400
Total	91,100	45,800	1,500	138,400
2005				
Primary	39,000	19,500	1,400	59,900
Secondary	35,900	18,100	0	54,000
Tertiary	16,100	8,000	0	24,100
Total	91,000	45,600	1,400	138,000
2010				
Primary	39,100	19,700	1,400	60,200
Secondary	35,800	18,000	0	53,800
Tertiary	16,100	8,200	0	24,300
Total	91,000	45,900	1,400	138,300

[1] Includes food consumed away from home, personal care, entertainment and other retail.
[2] Includes clothing and household furnishings.

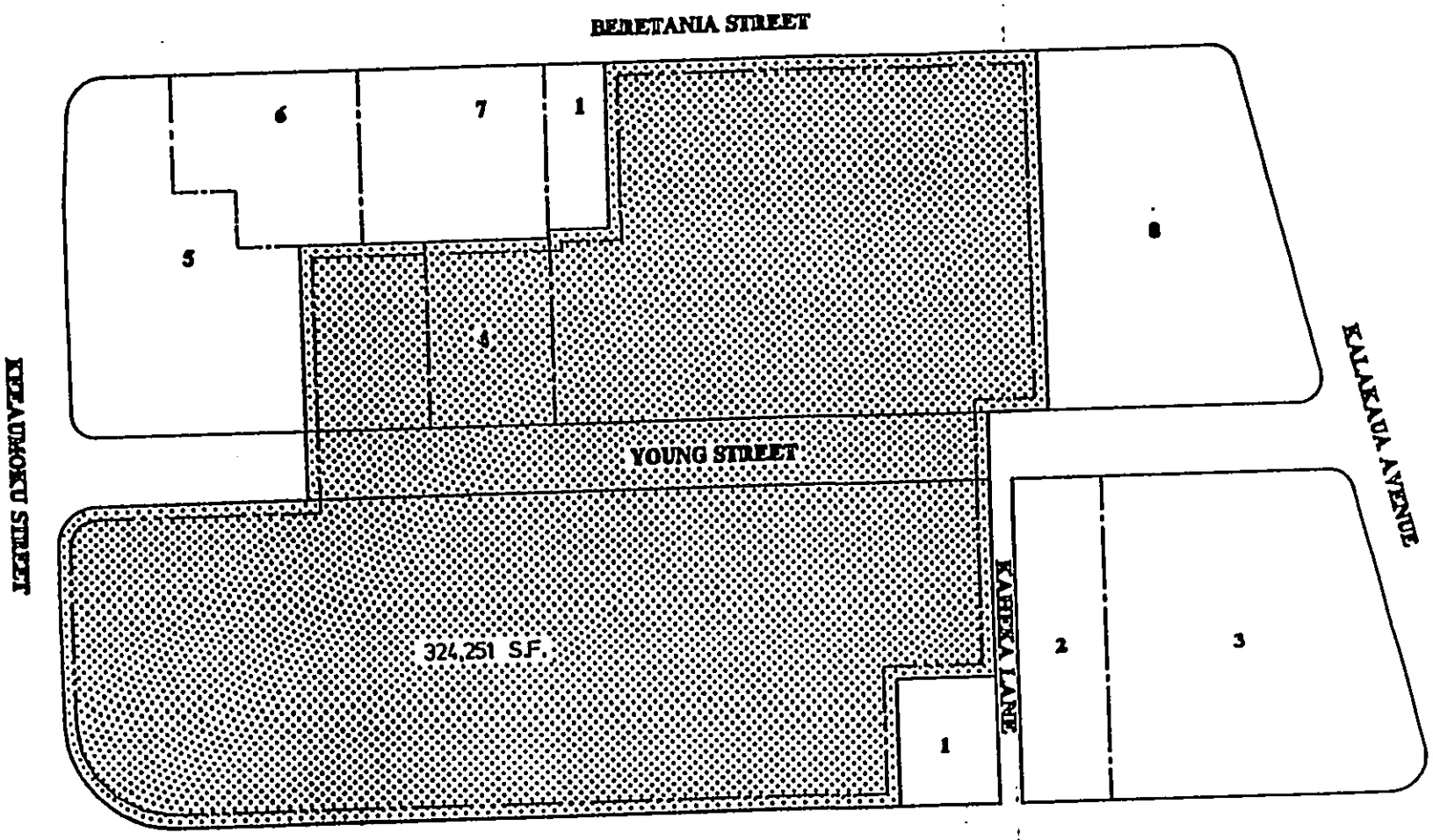
Source: John Child & Company, Inc.

MAPS SHOWING ALTERNATIVE DEVELOPMENT SITE SCENARIOS



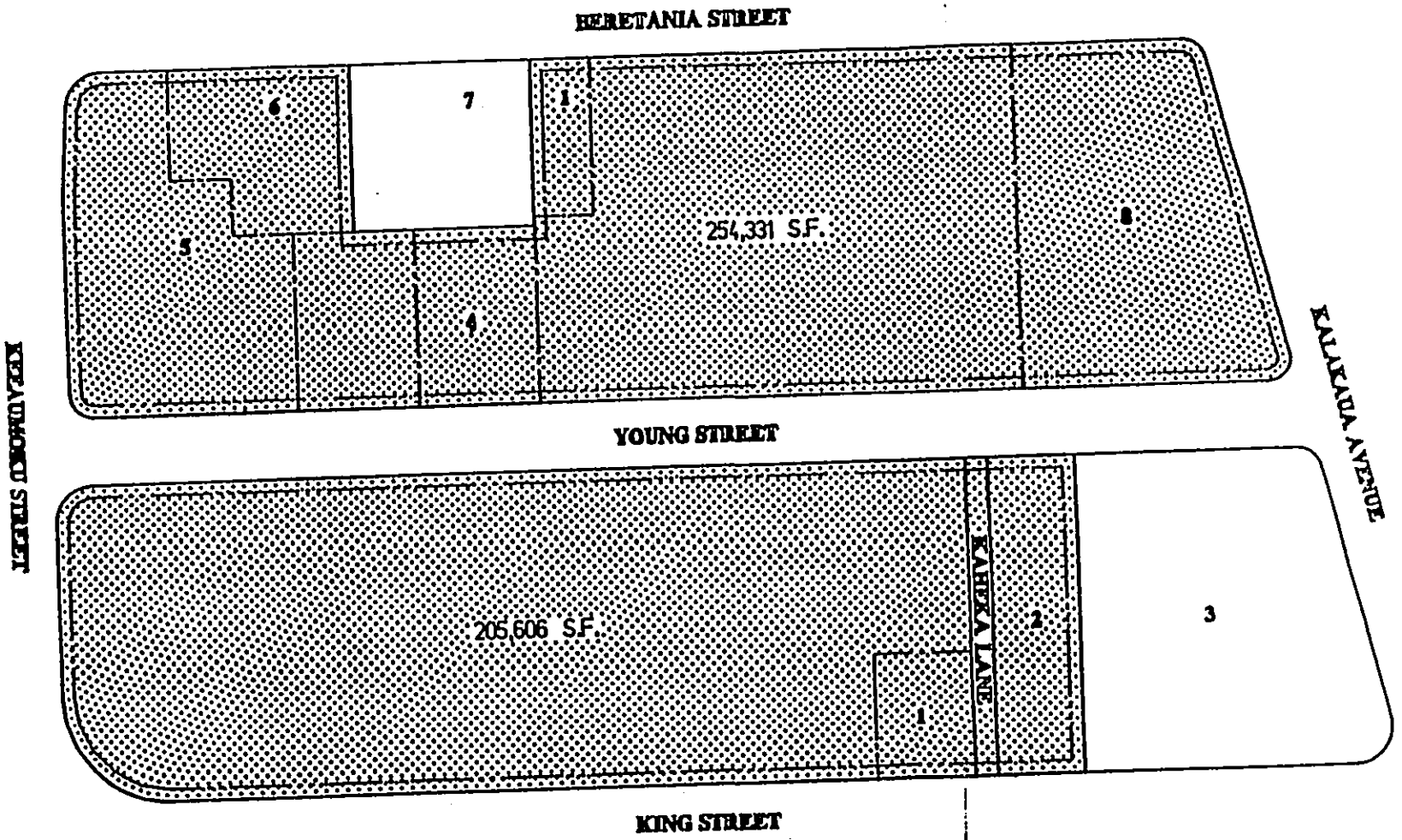
PAWAA MASTER PLAN
APPROXIMATE GROSS SITE AREA
OPTION -A

303,681 SQUARE FEET



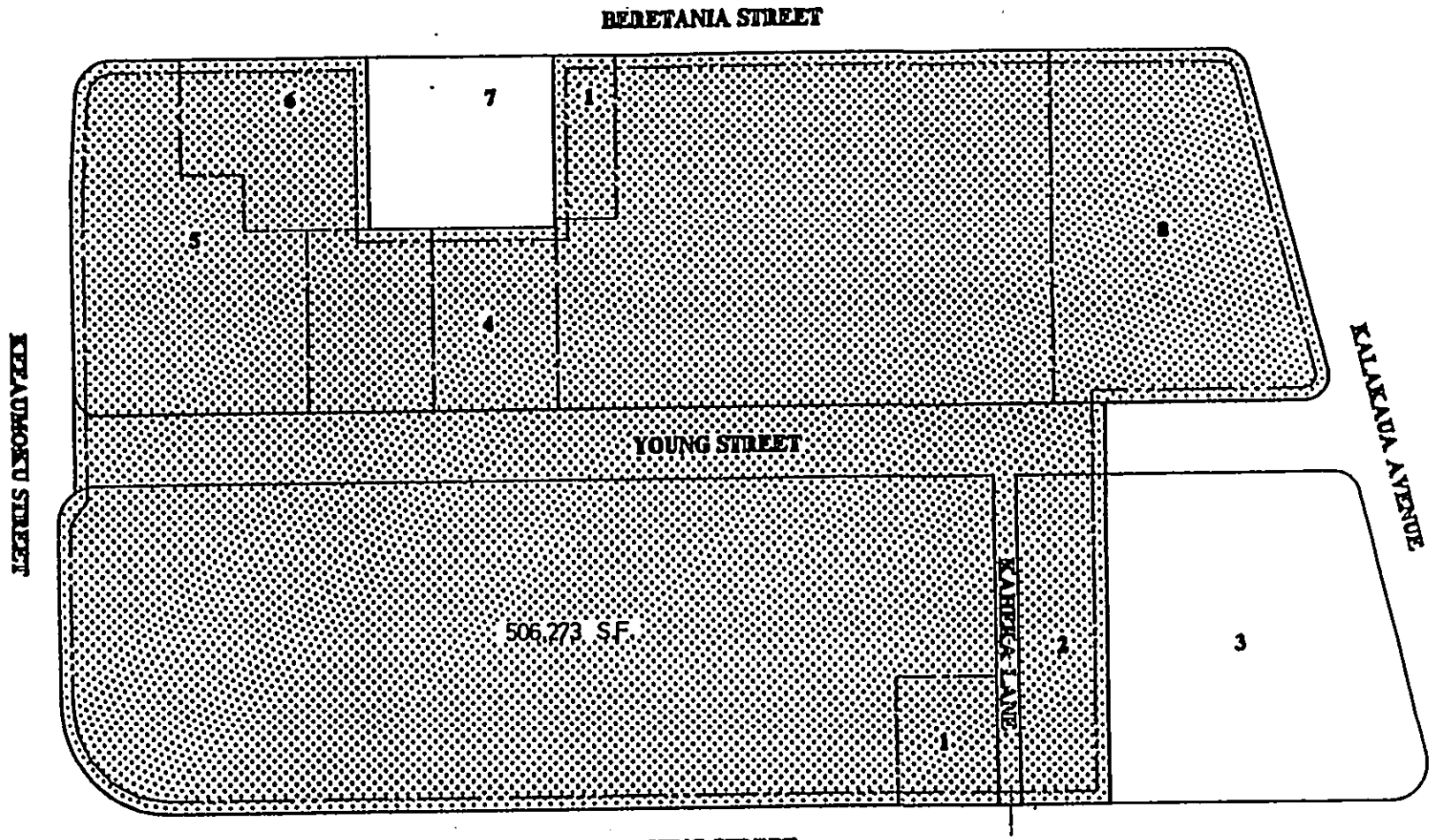
PAWAA MASTER PLAN
APPROXIMATE GROSS SITE AREA
OPTION -A1

324,251 SQUARE FEET



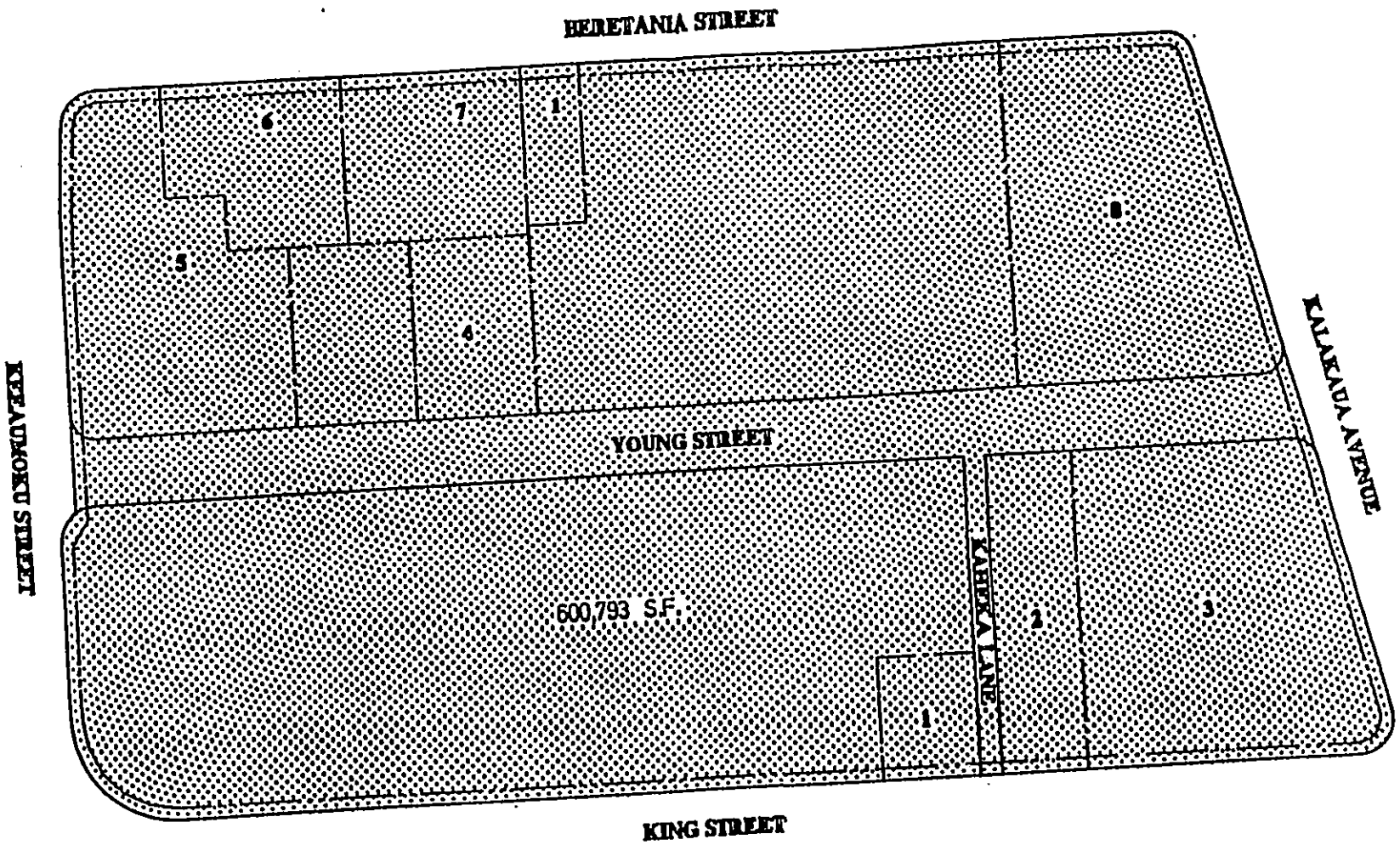
PAWAA MASTER PLAN
APPROXIMATE GROSS SITE AREA
OPTION -B

464,473 SQUARE FEET



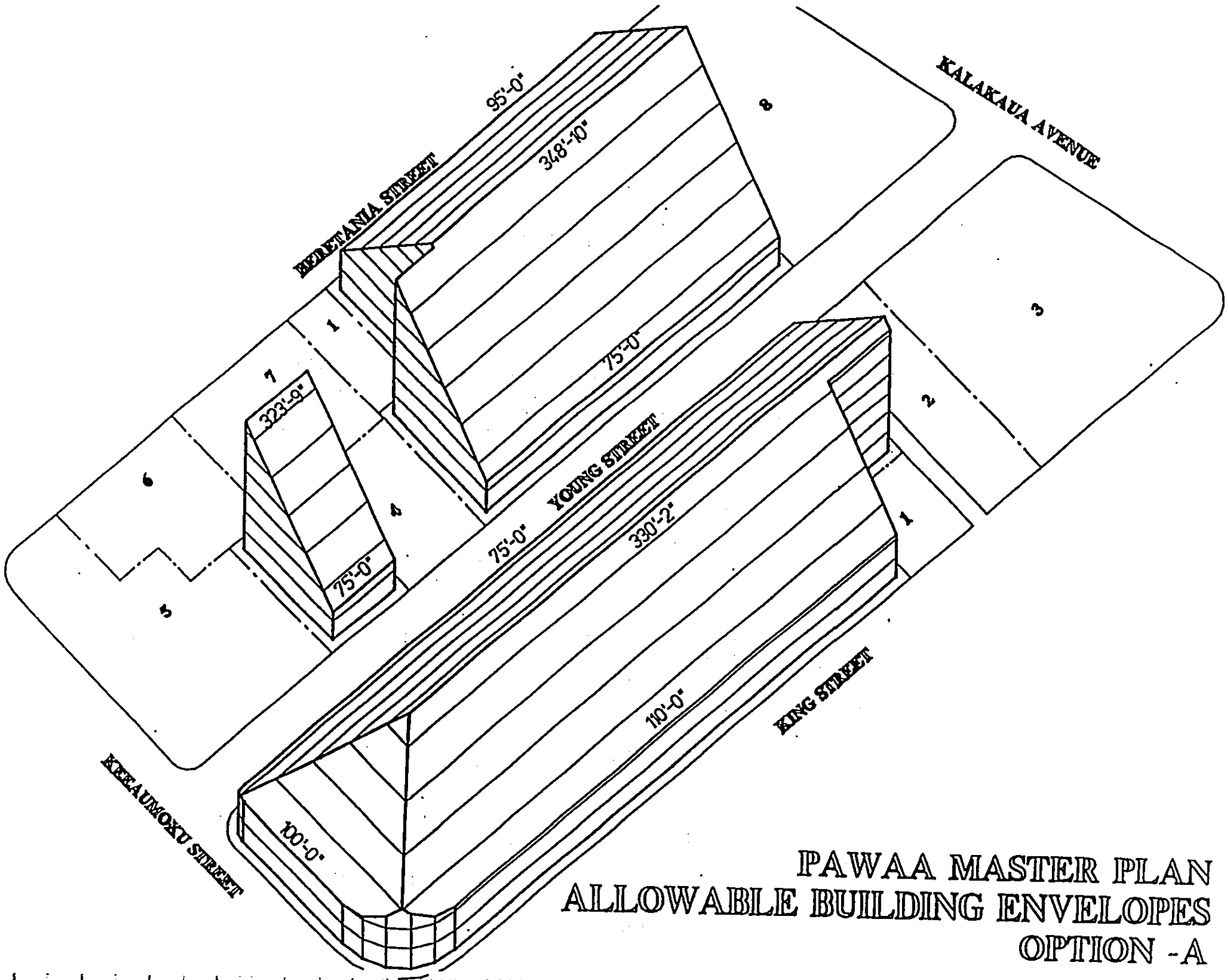
PAWAA MASTER PLAN
APPROXIMATE GROSS SITE AREA
OPTION -B1

506,273 SQUARE-FEET

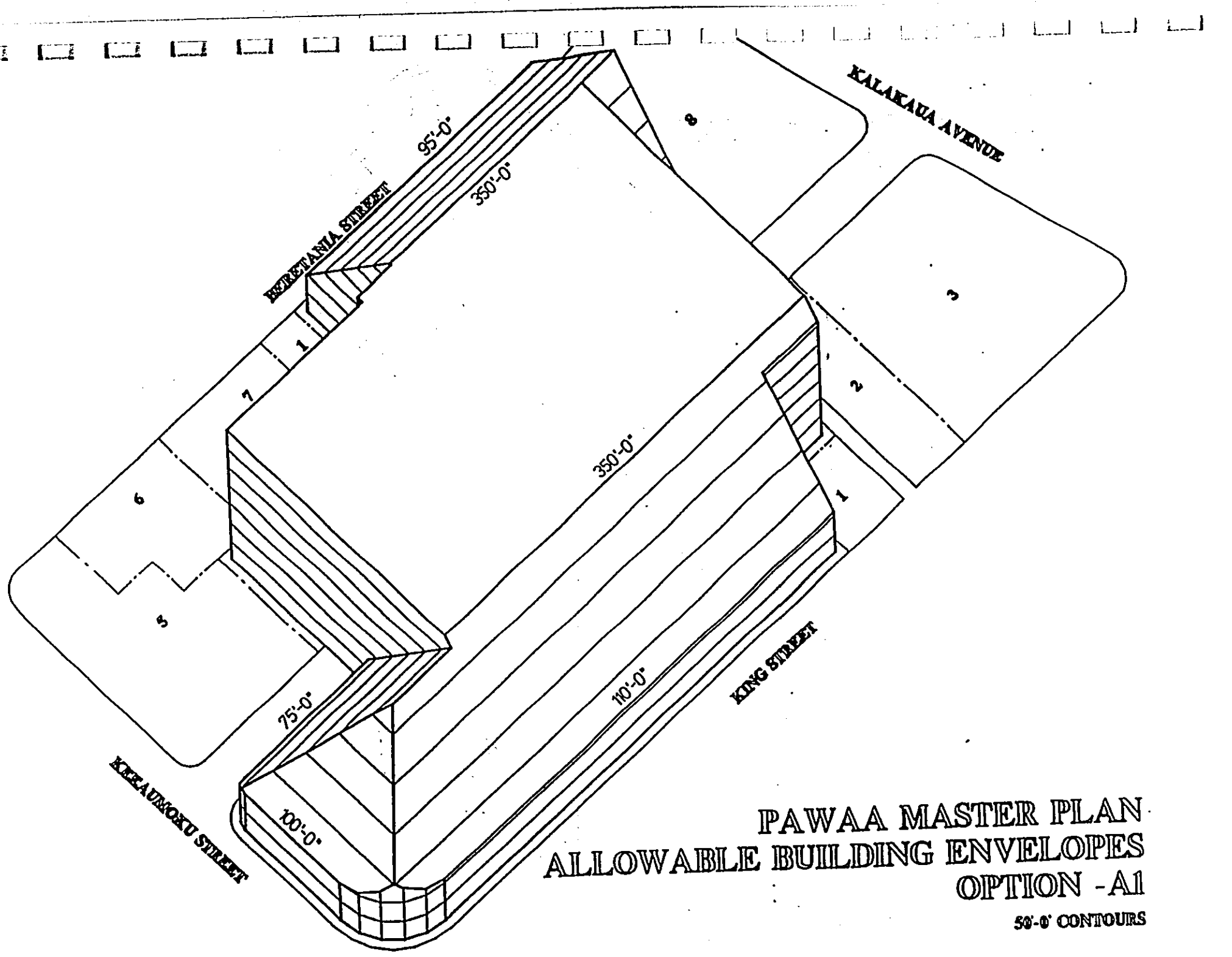


PAWAA MASTER PLAN
APPROXIMATE GROSS SITE AREA
OPTION -C

600,793 SQUARE FEET

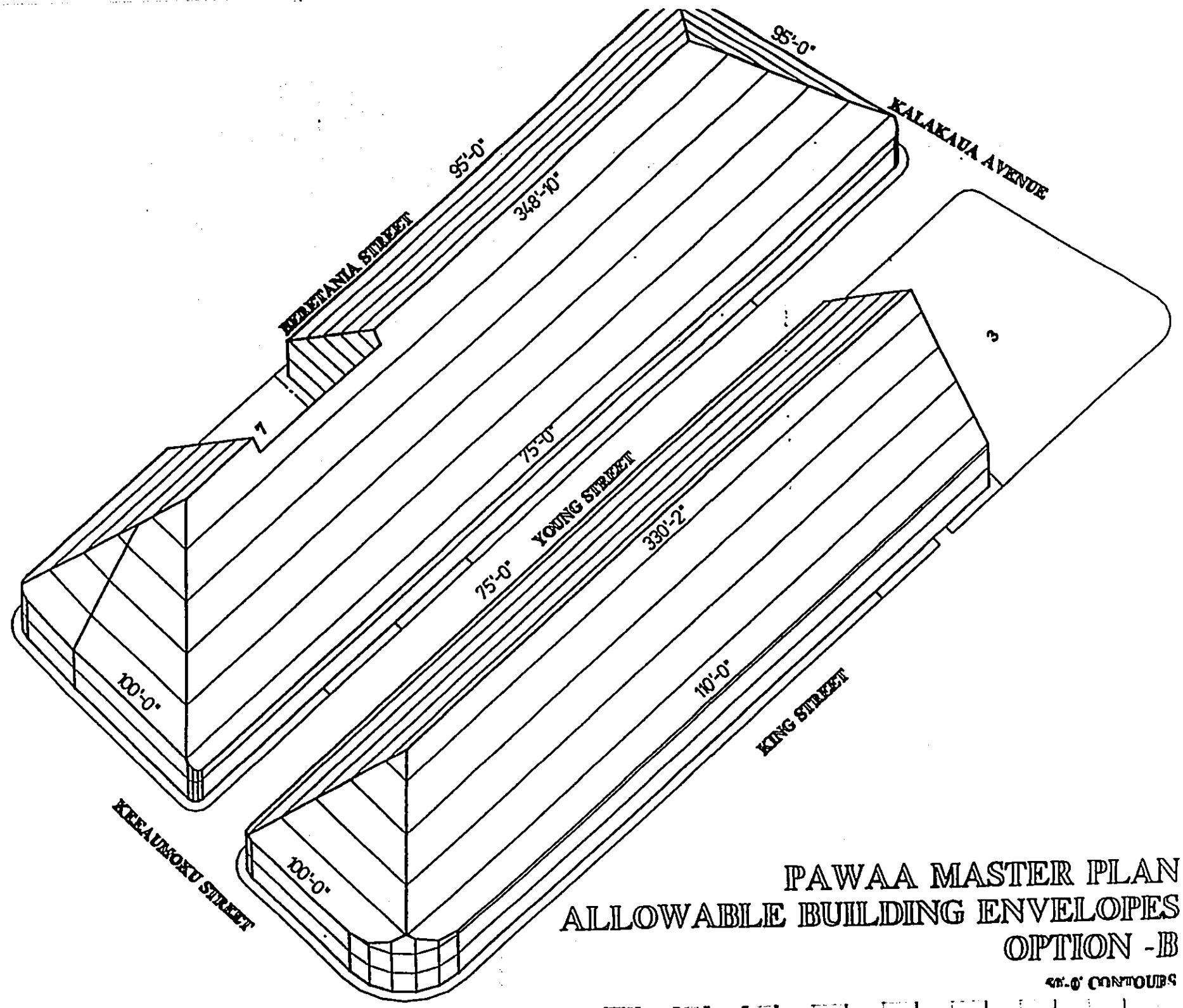


PAWAA MASTER PLAN
ALLOWABLE BUILDING ENVELOPES
OPTION -A



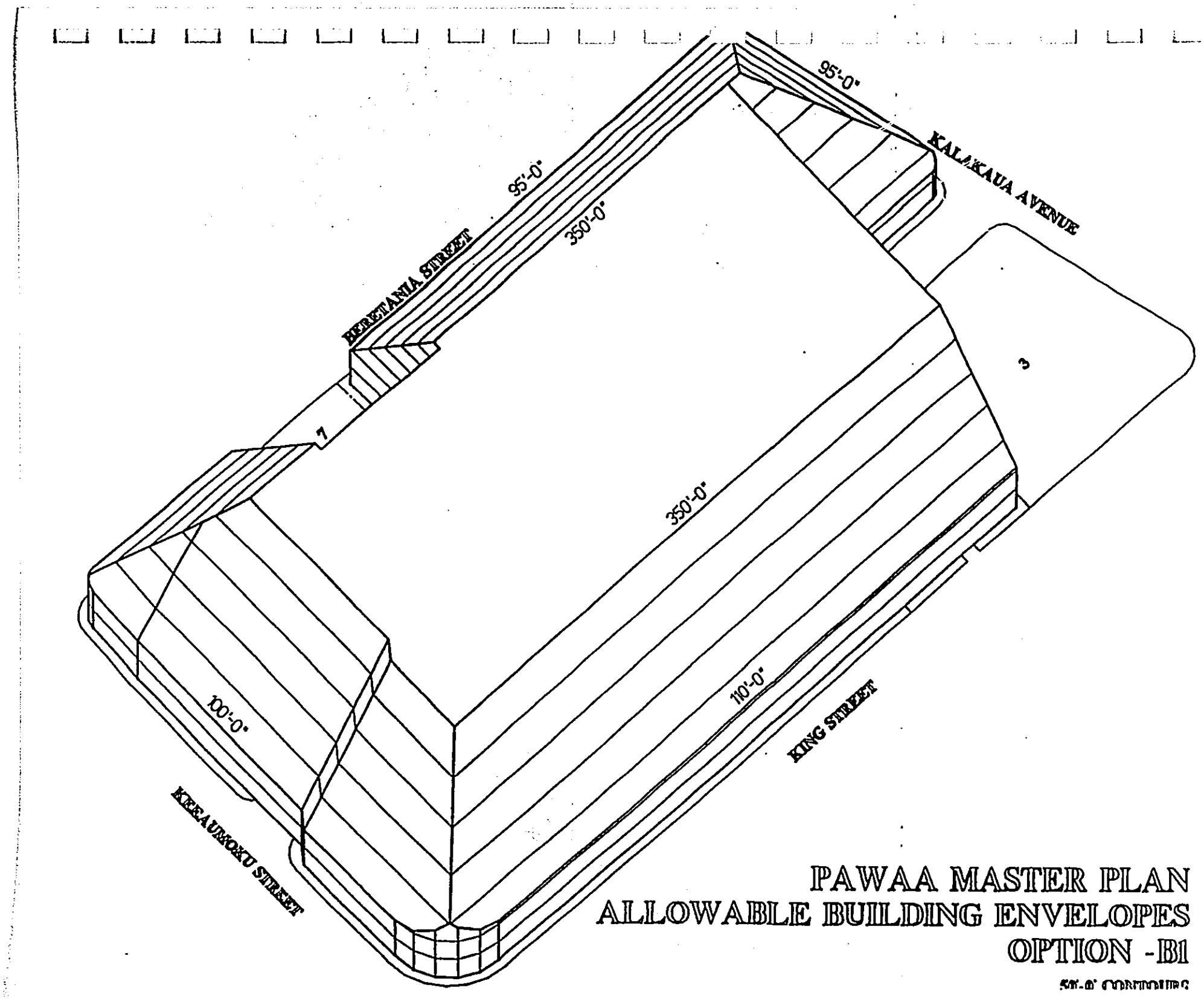
PAWAA MASTER PLAN
ALLOWABLE BUILDING ENVELOPES
OPTION - A1

50'-0" CONTOURS



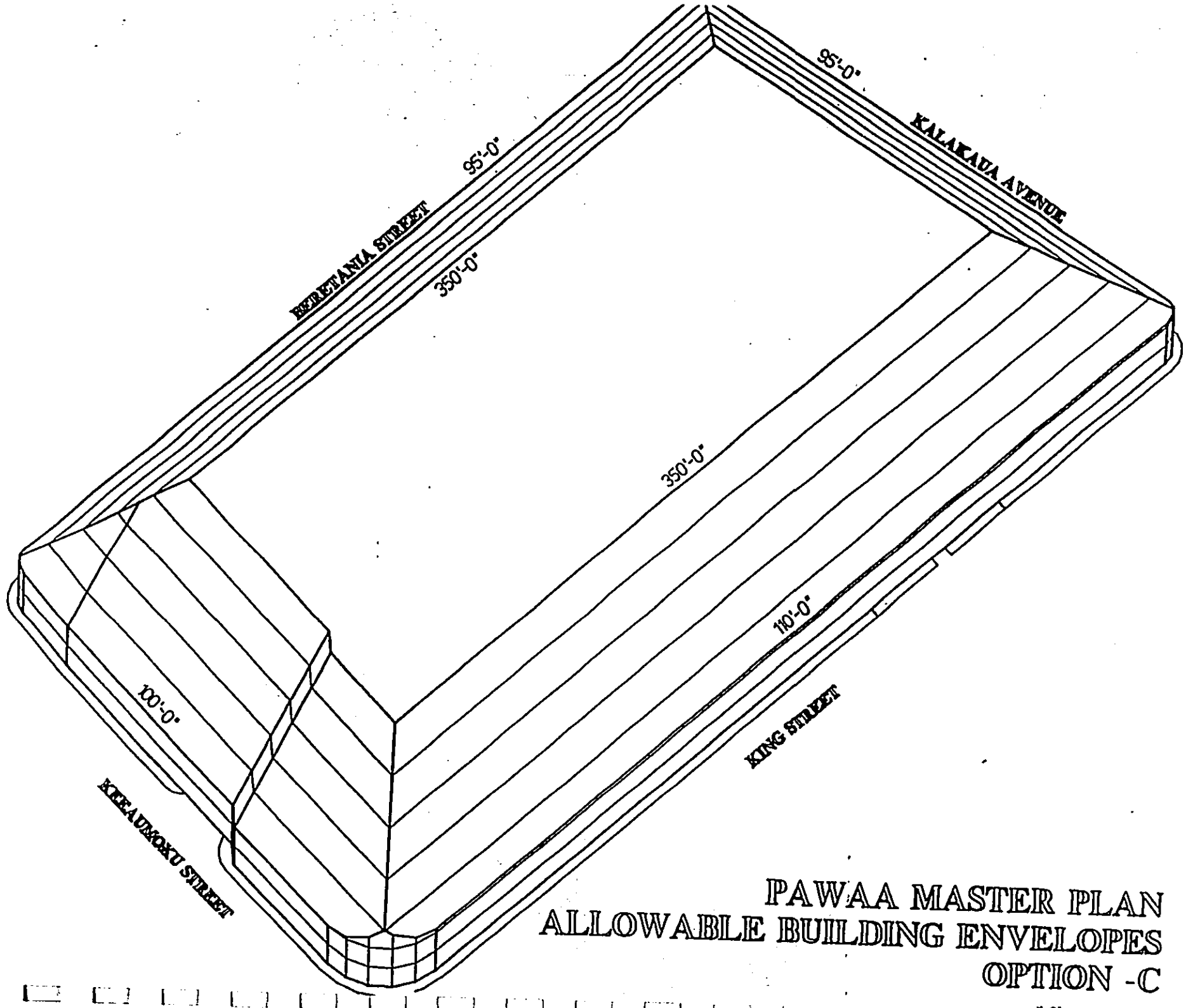
PAWAA MASTER PLAN
ALLOWABLE BUILDING ENVELOPES
OPTION -B

20'-0" CONTOURS



PAWAA MASTER PLAN
ALLOWABLE BUILDING ENVELOPES
OPTION -B1

50'-0" SETBACK



PAWAA MASTER PLAN
ALLOWABLE BUILDING ENVELOPES
OPTION -C

CERTIFICATION

We certify, to the best of our knowledge and belief:

- Reported statements of fact are true and correct.
- Reported analyses, opinions and conclusions are limited only by the reported assumptions and limiting conditions and are our unbiased professional analyses, opinions and conclusions.
- We have no present or prospective interest in the property that is the subject of this report, and we have no personal interest or bias with respect to the parties involved.
- Our compensation is not contingent on an action or event resulting from the analyses, opinions or conclusions in, or use of, this report.
- Reported analyses, opinions and conclusions were developed, and this report conforms with the requirements of the Standards of Professional Appraisal Practice and Code of Professional Ethics of the Appraisal Institute and American Society of Appraisers (ASA), and the use of this report is subject to the requirements of these professional organizations relating to review by its duly authorized representatives.
- As of the date of this report, Karen Char, MAI and Uson Y. Ewart, MAI have completed the requirements of the continuing education program of the Appraisal Institute. ASA has a mandatory recertification program. Uson Y. Ewart is currently certified under this program.
- The undersigned made a personal visit to the real estate that is the subject of this report.
- No one other than the undersigned prepared the analysis, opinions and conclusions in this report.

JOHN CHILD & COMPANY, INC.

Karen Char, MAI, CRE
Chief Executive Officer

Uson Y. Ewart, MAI
Vice President

QUALIFICATIONS

JOHN CHILD & COMPANY, INC.

John Child & Company, Inc. is a professional corporation that specializes in real estate appraisal and consulting. Founded in 1937, it is one of the largest and oldest real estate appraisal companies in Hawaii. The firm's established reputation for quality work and professional service is based on its ability to identify and use appropriate and current valuation techniques, its in depth knowledge and analysis of local market conditions and trends, and the extensive training, education and experience of its professional staff.

PROFESSIONAL STAFF

The Company's professional staff has a wide range of real estate experience gained through a range of field experience, professional accomplishments, training and education. As a result, staff members hold designations earned from the major professional organizations.

Our staff members have earned their reputation for quality work and professional service. They qualify as expert witnesses in the courts of Hawaii, California and Massachusetts; instruct and lecture at the University of Hawaii and for various business and professional organizations; serve as review appraisers and arbitrators; and continue to attend courses, seminars and workshops to strengthen their own specialized appraisal skills and education. Our professional staff members include:

- Karen Char, MAI, CRE, ASA, Chief Executive Officer
- Robert J. Vernon, MAI, CRE, ASA, President
- Paul D. Cool, Vice President
- Uson Y. Ewart, MAI, ASA, Vice President
- May M.S. Wong-Tsui, Appraiser
- Cynthia C. Nakamura, Appraiser
- Cora A. Wakatsuki, Senior Real Estate Analyst
- Geary Chun, Real Estate Analyst
- John S. Crimmins, Real Estate Analyst
- Andrew Furuta, Real Estate Analyst

The education and professional experiences of our staff members are outlined in their accompanying resumes.

SCOPE OF PROFESSIONAL SERVICES

The Company's real estate appraisal and consulting practice includes:

- Valuation of real estate
- Highest and best use studies
- Market and financial feasibility analyses
- Economic and fiscal impact assessments
- Arbitration
- Litigation support.

Our studies cover a variety of real estate interests including fee simple, leasehold, leased fee and other partial interest or rights. Our extensive experience includes a variety of properties such as:

Redevelopment
- Aloha Tower
- Honolulu Waterfront Master Development Plan
- Kakaako Redevelopment Plan
- Kakaako Waterfront Park
- Pawaa Redevelopment Masterplan

Resorts
- Kaanapali North Beach
- Kauai Lagoons
- Mauna Kea
- Turtle Bay
- Waikoloa Beach Resort
- Wailea Resort
- Hawaiian Riviera (proposed)
- Kaupulehu (proposed)
- Princeville (expansion)
- Regents International (proposed)

Hotels
- Ala Moana Hotel
- Coco Palms
- Embassy Suites Kaanapali
- Hotel Intercontinental Wailea
- Hyatt Regency Waikiki
- Hyatt Regency Maui
- Kahala Hilton
- Kea Lani Hotel (proposed)
- Maui Marriott
- Maui Wailea Inter-Continental Hotel
- Sheraton Poipu Beach
- Stouffers Wailea Beach Resort
- Waikiki Beachcomber

Shopping Centers
- Enchanted Lakes
- Hawaii Kai
- Koko Marina
- Mililani
- Pearlridge
- Prince Kuhio Mall
- Royal Hawaiian
- Wailea Towne Center
- Windward Mall

Golf Courses
- Asahi Kanko Olomana Course
- Hawaii Country Club
- Kauai Lagoons (Kiele and Lagoons)
- Ko Olina
- Maui Lani (proposed)
- Mid-Pac Country Club
- Pearl Country Club
- Waikapu Country Club (Sandalwood)
- Waikele (proposed)
- Waikoloa (Kings)
- Waikoloa Village (two proposed)
- Wailea (Blue, Orange, Gold-proposed)

Office Buildings
- 1164 Bishop
- Ala Moana Building
- Ala Moana Pacific Center
- ANA Kalakaua Center
- Davies Pacific Center
- Financial Plaza of the Pacific
- Harbor Court (proposed)
- Hawaiian Life Building
- HMSA Building Hawaii National Bank
- Pan Am Building
- Waialae Building
- Waikiki Bank of Hawaii Building
- Waikiki Trade Center

Industrial Properties
- Airport Trade Center
- Bougainville Commercial Center
- Halawa Business Center
- Lihue Industrial Park
- Panasonic/Technics Center
- Robinson Industrial Tract

Residential
- Ewa by Gentry
- Harbor Court (proposed)
- Honolulu Park Place
- Imperial Plaza
- Kamehame Ridge
- Makakilo
- Mawaena Kai
- Mililani
- Nauru Tower
- Royal Capitol Plaza
- Victoria Towers

Special Purpose
- Chinese Cultural Plaza
- Condominium Lease to Fee Conversions
- Hawaii Newspaper Agency Building
- Hawaiian Home Land Claims
- Kapaa Land Fill
- Kealia Pond
- Residential Lease to Fee Conversions

SELECTED CLIENTS

Our clients represent a variety of private and public interests. Selected clients include:

Attorneys and Accountants
- Ashford & Wriston
- Cades Schutte Fleming & Wright
- Carlsmith Ball Wichman Murray Case Mukai & Ichiki
- Case & Lynch
- Goodsill Anderson Quinn & Stifel
- Hong Iwai & Hulbert
- KPMG Peat Marwick
- O'Conner Moon Tam & Yuen
- Paul Johnson Alston & Hunt
- Rush Moore Craven Sutton Morry & Beh
- Torkildson Katz Jossem Fonseca Jaffe & Moore

Architects and Planners
- AM Partners, Inc.
- Belt Collins & Associates
- Helber, Hastert & Fee Planners
- Kober/Hanssen/Mitchell Architects
- Leo H. Daley/Alfred A. Yee Division
- PBR Hawaii
- RM Towill Corp.

Banks and Lenders
- Bank of America
- Bank of Hawaii
- Bank of Tokyo
- Citibank, N.A.
- Continental Bank, Chicago
- First Federal Savings and Loan Association
- First Hawaiian Bank
- GECC Financial
- Hawaii National Bank
- Honolulu Federal Savings Bank
- Liberty Bank
- Mitsui Trust & Banking Co., Ltd.
- Nippon Credit Bank
- Orix Corporation
- The Kyowa-Saitama Bank
- Wells Fargo Bank

Bank Regulatory Agencies
- Federal Depository Insurance Corporation (FDIC)
- Federal Home Loan Bank Board (FHLBB)

Major Corporations
- Amfac/JMB Hawaii, Inc.
  - Amfac Property Development Co.
- Azabu USA Corporation
- Dole Foods (fka Castle & Cooke, Inc.)
  - Castle & Cooke Retail
  - Mililani Town, Inc
  - Oceanic Properties, Inc.
- Kitano Indo Gaisa Co., Ltd.
- Kokusai-Motorcars Co., Ltd.
- Nissho Iwai Corporation
- Shimizu Corporation
- Shinwa Golf Kabushiki Kaisha

Closely Held Corporations/Limited Partnerships/Family Trusts
- Akala Partners (Twigg-Smith family)
- JLP Robinson Limited Partners (Robinson family)
- KJL Associates (Luke family)
- Loyalty Developments, Loyalty Investments (Ching family)
- Palani Trust (Greenwell family)
- Sen Plex Corp. (Sen family)

Developers/Landowners
- Aloha Towers Associates
- B. P. Bishop Estate/Kamehameha Schools
- Bedford Properties, Inc. (fka Kaiser Development Company)
- Bradley Holdings
- Central Pacific Realty
- Chiyoda Hawaii Corporation
- Finance Realty
- Haseko (Hawaii), Inc.
- Hemmeter/Tokyu Waterfront Joint Venture
- Kaneohe Ranch
- McCormack Properties
- MDA, Inc. (Mills/Dowling Associates)
- Meyer Corporation
- Nansay Hawaii
- Niu Pia Farms
- O. G. Hawaii Corporation
- The Estate of James Campbell
- Toyo Real Estate Co., Ltd.

Investors/Investment Bankers/Insurance Companies
- C. Itoh & Co., Ltd.
- IDG Realty, Ltd.
- Meridian Pacific
- The Equitable Life Assurance Society of the United States of America

Not For Profit Organizations/Colleges/Schools/Hospitals
- Chaminade College
- Nature Conservancy
- Punahou School
- Straub Hospital
- Young Women's Christian Association (YWCA)

Public Agencies
- Internal Revenue Service
- U.S. Attorney General
- U.S. Department of the Army
- U.S. Department of the Navy
- U.S. Department of Interior, Fish & Wildlife Service

State of Hawaii
- Attorney General
- Department of Hawaiian Home Lands
- Department of Land and Natural Resources
- Department of Transportation
- Housing Finance Development Corporation
- Office of State Planning

City & County of Honolulu
- Department of Housing and Community Development
- Department of Public Works
- Department of the Corporation Counsel

Public Utilities
- GTE Hawaiian Telephone Company
- Hawaiian Electric Industries (HEI, Inc.)
- Pacific Resources, Inc.

Resorts:
- Alpha U.S.A., Inc.
- Kapalua Land Company, Ltd.
- Princeville Development Company
- Shinwa International
- Wailea Resort Company, Ltd.

Trust Companies
- Bishop Trust Co., Ltd.
- First Hawaiian Trust
- Hawaiian Trust Co., Ltd.

Builders:
- Charles Pankow Builders
- Pacific Construction Co., Ltd

Retailers:
- City Mill Co., Ltd.
- Louis Vuitton Hawaii, Inc.

QUALIFICATIONS

KAREN CHAR, MAI, CRE, ASA
Chief Executive Officer

Education

M.B.A., University of Hawaii, 1972.
B.B.A., University of Hawaii, 1970.
Punahou School, 1967.
Various courses sponsored by the Appraisal Institute and its predecessor, the American Institute of Real Estate Appraisers.

Professional Associations

Member, Appraisal Institute (MAI designation)

- Vice Chair, National Admissions Committee of the General Appraisal Board (1991)
- Governing Councillor (1986-1988)
- Vice Chairman, National ByLaws Committee (1986-1989)
- Member, National ByLaws Committee (1985); National Admissions Committee (1982-1990)
- Chairman, National Evaluation Report Subcommittee (1982)
- President (1986), Vice President (1985), Secretary (1984), Honolulu Chapter No. 15
- Grader, National Board of Examiners (1982-1983)
- Admissions Chairman, Southwest Region (1983)
- Vice Chairman, Thirteenth Pan Pacific Congress of Real Estate Appraisers, Valuers and Counselors (1985-1986).

Member, American Society of Real Estate Counselors (CRE designation).

- Chair, Honolulu Convention Committee (1992)

Senior Member, American Society of Appraisers, (ASA designation, specializing in business valuation).

Professional Experience

Chief Executive Officer, John Child & Company, Inc. (1984 to present).
Senior Manager, Peat, Marwick, Mitchell & Co. (1979-1984).
Appraiser, John Child & Company, Inc. (1972-1978).

Professional Certification

The Appraisal Institute conducts a voluntary program of continuing education for its designated members. Members who meet the minimum standards of this program are awarded periodic educational certification. Karen Char, MAI is certified under this program.

State Certification

Certified General Appraiser, State of Hawaii, License Number REA-184, expiring December 31, 1993.

Court Testimony

Qualified as an expert witness in the valuation of real property and businesses in the Courts of the State of Hawaii.

QUALIFICATIONS

USON Y. EWART, MAI, ASA
Vice President

Education

Bachelor of Architecture, Cornell University, 1972

Punahou School, 1967

Certificate in Advanced Real Estate, University of Hawaii Small Business Management Program

Various courses, workshops, seminars, and examinations sponsored by the Appraisal Institute and its predecessor, American Institute of Real Estate Appraisers and the Society of Real Estate Appraisers

Professional Associations

Member, Appraisal Institute (MAI designation)

Senior Member, American Society of Appraisers in the Real Property Discipline (ASA designation)

- Past President, Vice President, and Secretary, Honolulu Chapter

Professional Experience

Vice President, John Child & Company, Inc. (1977 to present)

Certification

The American Society of Appraisers conducts a mandatory program of recertification through continuing education and/or participation in professional activities each five years. Uson Y. Ewart, ASA, has been recertified through April 10, 1994.

State Certification

Certified General Appraiser, State of Hawaii, License Number REA-77, expiring December 31, 1993.

Court Testimony

Qualified as an expert witness in the valuation of real property in the Courts of the State of Hawaii and the United States District Courts in Massachusetts and California.

APPENDIX B
AIR QUALITY STUDY

AIR QUALITY STUDY
FOR THE PROPOSED
PAWAA REDEVELOPMENT PROJECT (REVISED)

HONOLULU, OAHU, HAWAII

Prepared for:

Wilson Okamoto & Associates, Inc.

July 1993

B. D. NEAL & ASSOCIATES
Applied Meteorology • Air Quality • Computer Science
P.O. BOX 6229, CAPTAIN COOK, HAWAII 96704-6229
TELEPHONE (808) 929-9317 • FAX (808) 929-7290

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FIGURES

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TABLES (cont.)

Table

1.0 SUMMARY

The City and County of Honolulu and the State of Hawaii are proposing to jointly redevelop a 10.6-acre area in the Pawaa section of central Honolulu that is bounded by Beretania Street, Keeaumoku Street, King Street and Kaheka Lane. Young Street, which currently bisects the project site, would be reconstructed partially below grade between Kaheka Lane and Keeaumoku Street, and most of the structures currently occupying the site would be removed and replaced with approximately 1,768 residential units, 145,000 square feet of retail/commercial space, 10,000 square feet of community recreation space, a kindergarten through grade 2 public elementary school, and approximately 2,897 on-site parking spaces. Project construction is expected to begin within the next year and be completed in two phases by the year 2004. This study examines the present air quality of the project area and the potential air quality impacts that could result from construction and use of the proposed facilities. Mitigative measures to lessen project impacts are suggested where possible and appropriate.

Both federal and state standards have been established to control ambient air quality. At the present time, six parameters are regulated including: particulate matter, sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone and lead. Hawaii state air quality standards are more stringent than the comparable national limits except for the standards for sulfur dioxide. State and national standards for sulfur dioxide are the same.

Regional and local climate together with the amount and type of human activity generally dictate the air quality of a given location. The climate of central Honolulu is very much affected by its leeward and coastal situation. Winds are predominantly trade winds from the northeast or east except for occasional periods when

Kona storms may generate strong winds from the south or when the trade winds are weak and landbreeze-seabreeze circulations may develop. Wind speeds typically vary between about 5 and 15 miles per hour providing relatively good ventilation much of the time. Temperatures on this area of Oahu are generally very moderate with average daily temperatures ranging from about 70°F to 84°F. The extreme minimum temperature recorded at nearby Honolulu International Airport is 53°F, while the extreme maximum temperature is 94°F. Rainfall in the Honolulu area can be highly variable in both space and time. Monthly rainfall at the airport has been measured to vary from as little as a trace to as much as 20 inches. Average annual rainfall amounts to about 24 inches with summer months being the driest.

Air quality in the vicinity of the project is currently mostly affected by emissions from motor vehicles. Distant industrial, agricultural or natural sources of air pollution may also affect the air quality of the site on occasion.

The state Department of Health operates a network of air quality monitoring stations located at various places around Oahu and elsewhere in the state. Based on data from these stations, it appears likely that both state and national ambient air quality standards are currently being met in the project area except possibly for occasional exceedances of the more stringent state regulations pertaining to ambient ozone and carbon monoxide concentrations.

If the proposed project is given the necessary approvals to proceed, it is inevitable that some short- and long-term impacts on air quality will occur either directly or indirectly as a consequence of project construction and use. Short-term impacts from

fugitive dust will likely occur during the project construction phase. To a lesser extent, exhaust emissions from stationary and mobile construction equipment, from the disruption of traffic, and from workers' vehicles may also affect air quality during the period of construction. State air pollution control regulations require that there be no visible fugitive dust emissions at the property line. Hence, an effective dust control plan must be implemented to ensure compliance with state regulations. Fugitive dust emissions can be controlled to a large extent by watering of active work areas, use of wind screens, preventing trucks from tracking dirt onto paved roads, and by covering of open-bodied trucks. Paving and landscaping early in the construction schedule will also reduce dust emissions. Exhaust emissions can be mitigated by moving construction equipment and workers to and from the project site during off-peak traffic hours.

After construction, long-term impacts on air quality in the project area could potentially occur as a result of emissions emanating from vehicular traffic coming to and from the development. To assess the impact of emissions from these vehicles, an air quality modeling study was undertaken to estimate current ambient concentrations of carbon monoxide along roadways leading to and from the project area and to predict future levels of air pollution both with and without the proposed project. Based on the modeling results, present carbon monoxide concentrations were estimated to be within the national 1-hour ambient air quality standard but may occasionally exceed the 8-hour national limit as well as the more stringent 1-hour and 8-hour state standards during coincident adverse traffic and meteorological conditions. Because the state standards are set at such stringent levels, it is likely that they are currently exceeded at many locations in the state that have even moderate traffic volumes. In the year 2004 without the project, concentrations were predicted to decrease somewhat even though traffic volumes are expected to increase; this is due to the

effects of newer motor vehicles equipped with more efficient emission control devices. Worst-case concentration levels would likely continue to occasionally exceed the state 1-hour and 8-hour standards and the national 8-hour standard in small "hot spot" areas near congested intersections. In the 2004 with project scenario with either the planned or the additional roadway improvements described in the project traffic study, maximum concentrations at most locations would likely be only slightly higher or remain about the same compared to the without project case. Thus, the proposed roadway improvements should adequately mitigate traffic-related air quality impacts of the project. Due to the many uncertainties involved in the projections of the air quality model, it may be advisable to monitor carbon monoxide concentrations in the project area from time-to-time to verify model predictions and to initiate corrective action if necessary.

Carbon monoxide within underground parking areas will be controlled by mechanical ventilation equipment. Calculations indicate that the minimum 1.5 cubic feet per minute of mechanical ventilation per square foot of floor space required by state design guidelines for enclosed parking garages will be more than adequate to sufficiently dilute motor vehicle emissions within most areas of the underground parking levels. Higher ventilation capacity may be appropriate within high-volume traffic areas. To conserve energy and if approved by government officials, it is suggested that a carbon monoxide sensing system be considered for installation within the garage to monitor contaminant levels and to appropriately regulate the flow of ventilation equipment. Fresh air intakes should be located away from outdoor traffic-congested areas so as to avoid intaking already contaminated air. Exhaust vents should be located as far away from pedestrian areas as is practicable and so as to obtain a dilution factor of at least five to ten. Sufficient ingress/egress capacity will help to minimize air pollution from queued vehicles entering and leaving parking facilities. Emergency

procedures and equipment should be provided to counter any potential problems arising from power outages and/or ventilation failure.

Depending on the demand levels, long-term impacts on air quality are also possible due to indirect emissions associated with a development's electrical power and solid waste disposal requirements. Quantitative estimates of these potential impacts were not made, but based on the estimated demand levels and emission rates involved, any significant impacts are unlikely. Nevertheless, incorporating energy conservation design features and promoting conservation and recycling programs within the proposed development could serve to further reduce any associated impacts.

2.0 INTRODUCTION AND PROJECT DESCRIPTION

The Department of Housing and Community Development of the City and County of Honolulu and the Housing Finance and Development Corporation of the State of Hawaii are proposing to redevelop a 10.6-acre site located within the Pawaa section of central Honolulu. As indicated in Figure 1, the project site is bounded by Beretania, King and Keeaumoku Streets, Kaheka Lane and the Pawaa Annex. The portion of Young Street traversing the project site will be kept open to through traffic by reconstructing a portion of it below grade.

Presently, the site is occupied by the former Honolulu Police Headquarters Building, Meadow Gold Dairies, the state Department of Agriculture, and the former Honolulu Police Department's Juvenile Crime Prevention Department. Several other retail and commercial establishments also currently occupy the site. Redevelopment of the site will result in the removal of most of the existing

facilities and the construction of approximately 1,768 residential units, 145,000 square feet of retail/commercial space, 10,000 square feet of community recreation space, a K-2 school, and 2,897 on-site parking spaces. Current plans call for construction work to begin during 1994/1995 and for the project to be completed in two phases within 10 years.

The purpose of this study is to describe existing air quality in the project area and to assess the potential short- and long-term direct and indirect air quality impacts that could result from the removal of the existing facilities and the subsequent construction and use of the proposed development. Measures to mitigate these impacts are suggested where possible and appropriate.

3.0 AMBIENT AIR QUALITY STANDARDS

Ambient concentrations of air pollution are regulated by both national and state ambient air quality standards (AAQS). National AAQS are specified in Section 40, Part 50 of the Code of Federal Regulations (CFR), while State of Hawaii AAQS are defined in Chapter 11-59 of the Hawaii Administrative Rules. Table 1 summarizes both the national and the state AAQS that are specified in the cited documents. As indicated in the table, AAQS have been established for six air pollutants. These regulated air pollutants include: particulate matter, sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone and lead. National AAQS are stated in terms of primary and secondary standards. National primary standards are designed to protect the public health with an "adequate margin of safety". National secondary standards, on the other hand, define levels of air quality necessary to protect the public welfare from "any known or anticipated adverse effects of a pollutant". Secondary public welfare impacts may include such effects as decreased visibility, diminished comfort levels, or other potential

injury to the natural or man-made environment, e.g., soiling of materials, damage to vegetation or other economic damage. In contrast to the national AAQS, Hawaii state AAQS are given in terms of a single standard that is designed "to protect public health and welfare and to prevent the significant deterioration of air quality".

Each of the regulated air pollutants has the potential to create or exacerbate some form of adverse health effect or to produce environmental degradation when present in sufficiently high concentration for prolonged periods of time. The AAQS specify a maximum allowable concentration for a given air pollutant for one or more averaging times to prevent harmful effects. Averaging times vary from one hour to one year depending on the pollutant and type of exposure necessary to cause adverse effects. In the case of the short-term (i.e., 1- to 24-hour) AAQS, both national and state standards allow one exceedance per year.

State of Hawaii AAQS are in some cases considerably more stringent than comparable national AAQS. In particular, the State of Hawaii 1-hour AAQS for carbon monoxide is four times more stringent than the comparable national limit.

Under the provisions of the Federal Clean Air Act [1], the U.S. Environmental Protection Agency (EPA) is required to periodically review and re-evaluate national AAQS in light of research findings more recent than those which were available at the time the standards were originally set. Occasionally new standards are created as well. Most recently, the national standard for particulate matter has been revised to include specific limits for particulates 10 microns or less in diameter (PM-10) [2]. The State of Hawaii has not explicitly addressed the question of whether to

set limits for this category of air pollutant, but national AAQS prevail where states have not set their own more stringent levels.

Hawaii AAQS for sulfur dioxide were relaxed in 1986 to make them essentially the same as national limits. It has been proposed in various forums that the state also relax its carbon monoxide standards to the national levels, but at present there are no indications that such a change is being considered.

4.0 REGIONAL AND LOCAL CLIMATOLOGY

Regional and local climatology significantly affect the air quality of a given location. Wind, temperature, atmospheric turbulence, mixing height and rainfall all influence air quality. Although the climate of Hawaii is relatively moderate throughout most of the state and most of the year, significant differences in these parameters may occur from one location to another. Most differences in regional and local climates within the state are caused by the mountainous topography.

Hawaii lies well within the belt of northeasterly trade winds generated by the semi-permanent Pacific high pressure cell to the north and east. On the island of Oahu, the Koolau and Waianae Mountain Ranges are oriented almost perpendicular to the trade winds, which accounts for much of the variation in the local climatology of the island. The Pawaa section of Honolulu, the site of the proposed project, is located in a near-coastal area leeward of the Koolau Mountains. Although large urban areas may create their own microclimates to some extent, long-term weather data available from the Honolulu International Airport, located about 5 miles to the west, is at least semi-representative of the project site.

Wind frequency data given in Table 2 for Honolulu International Airport show that the annual prevailing wind direction for this area of Oahu is east northeast. On an annual basis, 34.7 percent of the time the wind is from this direction, and nearly 75 percent of the time the wind is in the northeast quadrant. Winds from the south are infrequent occurring only a few days during the year and mostly in winter in association with Kona storms. Wind speeds average about 10 knots (12 mph) and mostly vary between about 5 and 15 knots (6 and 17 mph). Surface winds within Honolulu's central urban areas are similar to those recorded at the airport but are undoubtedly daviated and channeled at some locations by the many high-rise buildings.

Air pollution emissions from motor vehicles, the formation of photochemical smog and smoke plume rise all depend in part on air temperature. Colder temperatures tend to result in higher emissions of contaminants from automobiles but lower concentrations of photochemical smog and ground-level concentrations of air pollution from elevated plumes. In Hawaii, the annual and daily variation of temperature depend to a large degree on elevation above sea level, distance inland and exposure to the trade winds. Average temperatures at locations near sea level generally are warmer than those at higher elevations. Areas exposed to the trade wind tend to have the least temperature variation, while inland and leeward areas often have the most. Honolulu's coastal, leeward location results in a relatively moderate temperature profile compared to other locations around Oahu and the state. At the airport, average annual daily minimum and maximum temperatures are 70°F and 84°F, respectively [3]. The extreme minimum temperature was 53°F during February 1983, and the extreme maximum was 94°F during September 1988. Temperatures in the project area may be slightly higher compared to the airport due to urban effects.

Small scale, random motions in the atmosphere (turbulence) cause air pollutants to be dispersed as a function of distance or time from the point of emission. Turbulence is caused by both mechanical and thermal forces in the atmosphere. It is often measured and described in terms of Pasquill-Gifford stability class. Stability class 1 is the most turbulent and class 6 the least. Thus, air pollution dissipates best during stability class 1 conditions and worst when stability class 6 prevails. In urbanized areas like central Honolulu, stability class 4 is generally the highest stability class that occurs, developing during the night time and/or during cloudy or windy daytime conditions.

Mixing height is defined as the height above the surface through which relatively vigorous vertical mixing occurs. Low mixing heights can result in high ground-level air pollution concentrations because contaminants emitted from or near the surface can become trapped within the mixing layer. In Hawaii, minimum mixing heights tend to be high because of mechanical mixing caused by the trade winds and because of the temperature moderating effect of the surrounding ocean. Low mixing heights may sometimes occur, however, at inland locations and even at times along coastal areas early in the morning following a clear, cool, windless night. Coastal areas also may experience low mixing levels during sea breeze conditions when cooler ocean air rushes in over warmer land. Mixing heights in the state typically are above 3000 feet (1000 meters). Low mixing heights within the central Honolulu area will tend to be inhibited by urban effects but may occur on occasion.

Rainfall can have a beneficial effect on the air quality of an area in that it helps to suppress fugitive dust emissions, and it also may "washout" gaseous contaminants that are water soluble. Rainfall in Hawaii is highly variable depending on elevation and on location with respect to the trade wind. Even within Honolulu,

rainfall amounts may vary substantially from one neighborhood to another. On the whole, Honolulu being a leeward location and near sea level experiences a relatively dry climate. Average annual rainfall amounts to about 24 inches at the airport with summer months being the driest. Monthly rainfall may vary from as little as a trace to more than 20 inches.

5.0 PRESENT AIR QUALITY

The air quality of a given area is a function of both local meteorological conditions and the amount and type of air pollutants that are locally emitted. Table 3 presents an air pollutant emission summary for the City and County of Honolulu that was compiled in 1980. These are the latest data that are available. Emissions are undoubtedly higher at this time, but the proportional relationships may continue to be about the same. The mineral products industry was the most significant source category for emissions of particulate matter. Sulfur dioxide emissions originated mainly from power plants, while motor vehicles accounted for much of the emissions of nitrogen oxides, carbon monoxide and hydrocarbons. Present air quality in the project area is mostly affected by air pollutants emitted by motor vehicles and perhaps to a lesser and occasional extent from emissions originating from distant industrial, natural and/or agricultural sources.

The state Department of Health operates a network of air quality monitoring stations at various locations on Oahu. Each station, however, typically does not monitor the full complement of air quality parameters. Table 4 shows annual summaries of air quality measurements that were made nearest to the project site for each of the regulated air pollutants for the period 1986 through 1990. These are the most current data available.

Sulfur dioxide was monitored by the state Department of Health at an air quality station located in Campbell Industrial Park at Barbers Point, several miles west of the project site. Monitoring consisted of measurements of 24-hour average sulfur dioxide concentration every sixth day. There were no exceedances of the state/national 24-hour AAQS for sulfur dioxide during the 5-year period from 1986 to 1990. Concentrations monitored during the last 5 years reported were consistently low with daily mean values for each year at or below 5 $\mu g/m^3$.

Total suspended particulate concentrations were monitored at the Department of Health Building in downtown Honolulu, about 1 mile northwest of the project site. During the 1986-90 reporting period, the highest 24-hour average total suspended particulate concentration measured was 61 $\mu g/m^3$. Average daily concentrations were about 25 to 30 $\mu g/m^3$. No exceedances of the state AAQS for this parameter were recorded.

The nearest PM-10 monitoring station is located about 2 miles northwest of the project site at Kauluwela School. Twenty-four hour average PM-10 concentrations monitored at this location ranged from 7 to 36 $\mu g/m^3$ between 1986 and 1990. The average daily concentrations each year were 18 $\mu g/m^3$ or lower. All values reported were within the national AAQS.

The nearest carbon monoxide measurements were made at the Department of Health building in downtown Honolulu. The average daily maximum 1-hour concentration measured at this location was about 1.8 mg/m^3 for the five-year period between 1986 and 1990. During the most recent year reported, 1990, the daily maximum 1-hour concentration ranged from 0.1 to 7.1 mg/m^3, and no exceedances of the state 1-hour AAQS were recorded. During previous years (1986-

89), maximum 1-hour concentrations were higher, and one to three exceedances of the state 1-hour AAQS were measured each year. Daily maximum 8-hour values for 1988-90 have not been reported at this writing, but concentrations for the 1986-87 period ranged from 0.3 to 4.7 mg/m^3. The average of the daily maximum 8-hour values was about 1.3 mg/m^3. No exceedances of the state 8-hour AAQS were recorded. In general, measured carbon monoxide concentrations have had a downward trend for the past several years.

Spot-check measurements of carbon monoxide concentrations were made in the project vicinity near traffic-congested areas during the morning and afternoon peak traffic hours during April 1992. Instantaneous concentrations measured ranged between about 1 and 12 mg/m^3. Prevailing meteorological conditions at the time of these measurements were typical gusty tradewind conditions, and thus the measurements likely do not represent maximum concentrations that occur in the area. Worst-case present concentrations of carbon monoxide in the project area are estimated later in this study based on air quality modeling of vehicular emissions.

The nearest available ozone measurements were obtained by the Department of Health at Sand Island (about 2.5 miles west of the project site). Except for 1990, the maximum 1-hour concentration each year during the past few years has averaged about 90 $\mu g/m^3$. During 1990, a maximum concentration of 116 $\mu g/m^3$ was measured. Two exceedances of the state AAQS were recorded in 1990 while none were measured during the previous four years.

The closest and most recent measurements of ambient lead concentrations that have been reported were made at the downtown Honolulu monitoring station between 1986 and 1987. Lead concentrations at this location had a downward trend, most probably reflecting the

increased use of unleaded gasoline. Average quarterly concentrations were near or below the detection limit. No exceedances of the state AAQS have ever been recorded.

Nitrogen dioxide is no longer monitored by the Department of Health anywhere in the state. Concentrations of this pollutant were measured from 1971 through 1976 at Barbers Point, and annual mean values were found to vary from 11 to 29 $\mu g/m^3$, safely inside the state and national AAQS.

Based on the data and discussion presented above, it appears likely that the State of Hawaii AAQS for particulate matter, sulfur dioxide, nitrogen dioxide and lead are currently being met at the project site. Carbon monoxide readings from urban Honolulu indicate that the state AAQS for carbon monoxide may be exceeded at a rate of one to three times per year in traffic congested areas. Ozone concentrations may also occasionally exceed the state standard.

6.0 SHORT-TERM IMPACTS OF PROJECT

Short-term direct and indirect impacts on air quality could potentially occur due to project construction. For a project of this nature, there are two potential types of air pollution emissions that could directly result in short-term air quality impacts during project construction: (1) fugitive dust from demolition work and from vehicle movement and soil excavation; and (2) exhaust emissions from on-site construction equipment. Indirectly, there also could be short-term impacts from slow-moving construction equipment traveling to and from the project site and from a temporary increase in local traffic caused by commuting construction workers.

Fugitive dust emissions may arise from the demolition and removal of existing structures on the site and from the grading and dirt-moving activities associated with site preparation once the area is cleared. The emission rate for fugitive dust emissions from construction activities is difficult to estimate accurately because of its elusive nature of emission and because the potential for its generation varies greatly depending upon the type of soil at the construction site, the amount and type of dirt-disturbing activity taking place, the moisture content of exposed soil in work areas, and the wind speed. The EPA [4] has provided a rough estimate for uncontrolled fugitive dust emissions from construction activity of 1.2 tons per acre per month under conditions of "medium" activity, moderate soil silt content (30%), and precipitation/evaporation (P/E) index of 50. Uncontrolled fugitive dust emissions in the project area would likely be somewhat higher because the PE index for the central Honolulu area is probably less than 50 due to the relatively dry climate. In any case, State of Hawaii Air Pollution Control Regulations [5] prohibit visible emissions of fugitive dust from construction activities at the property line. Thus, an effective dust control plan for the project construction phase is essential.

Adequate fugitive dust control can usually be accomplished by the establishment of a frequent watering program to keep demolition areas and bare-dirt surfaces in construction areas from becoming significant dust generators. Using wind screens may also be required. Control regulations further stipulate that open-bodied trucks be covered at all times when in motion if they are transporting materials likely to give rise to airborne dust. Haul trucks tracking dirt onto paved streets from unpaved areas is oftentimes a significant source of dust in construction areas. Some means to alleviate this problem, such as tire washing or road cleaning, may be appropriate. Paving of parking areas and/or

establishment of landscaping as early in the construction process as possible can also lower the potential for fugitive dust emissions.

On-site mobile and stationary construction equipment also will emit air pollutants from engine exhausts. The largest of this equipment is usually diesel-powered. Nitrogen oxides emissions from diesel engines can be relatively high compared to gasoline-powered equipment, but the standard for nitrogen dioxide is set on an annual basis and is not likely to be violated by short-term construction equipment emissions. Carbon monoxide emissions from diesel engines, on the other hand, are low and should be relatively insignificant compared to vehicular emissions on nearby roadways.

Indirectly, slow-moving construction vehicles on roadways leading to and from the project site could obstruct the normal flow of traffic to such an extent that overall vehicular emissions are increased, but this impact can be mitigated by moving heavy construction equipment during periods of low traffic volume. Likewise, the schedules of commuting construction workers can be adjusted to avoid peak hours in the project vicinity. Thus, most potential short-term air quality impacts from project construction can be mitigated.

7.0 LONG-TERM IMPACTS OF PROJECT

7.1 Roadway Traffic

After construction is completed, use of the proposed facilities may result in increased motor vehicle traffic on nearby roadways, potentially causing long-term impacts on ambient air quality in the project vicinity. Motor vehicles with gasoline-powered engines are

significant sources of carbon monoxide. They also emit nitrogen oxides, and those burning leaded gasoline contribute lead to the atmosphere. The use of leaded gasoline in new automobiles is now prohibited. As older vehicles continue to disappear from the numbers of those currently operating on the state's roadways, lead emissions are approaching zero. Nationally, so few vehicles now require leaded gasoline that the EPA is proposing a total ban on leaded gasoline to take effect immediately. Even without such a ban, reported quarterly averages of lead in air samples collected in urban Honolulu have been near zero since early 1986. Thus, lead in the atmosphere is not considered to be a problem anywhere in the state.

Federal air pollution control regulations require that new motor vehicles be equipped with emission control devices that reduce emissions significantly compared to a few years ago. In 1990, the President signed into law the Clean Air Act Amendments. This new legislation requires further emission reductions be phased in beginning in 1994. The combination of current and new restrictions on emissions from new motor vehicles will lower average emissions each year as more and more older vehicles leave the state's roadways. Carbon monoxide emissions, for example, will go down by about 15 percent on the average during the next 10 years due to the replacement of older vehicles with newer models.

To evaluate the potential long-term indirect ambient air quality impact of increased roadway traffic associated with a project such as this, computerized emission and atmospheric dispersion models can be used to estimate ambient carbon monoxide concentrations along roadways leading to and from the project. Carbon monoxide is selected for modeling because it is both the most stable and the most abundant of the pollutants generated by motor vehicles.

Furthermore, carbon monoxide air pollution is generally considered to be a microscale problem that can be addressed locally to some extent, whereas nitrogen oxides air pollution (also emitted by motor vehicles) most often is a regional issue that cannot be addressed by a single new development.

For this project, four scenarios were selected for the carbon monoxide modeling study: year 1993 with present conditions, year 2004 without the project, year 2004 assuming the project is built and completely occupied and the planned roadway improvements are implemented, and year 2004 with the project and with the planned roadway improvements plus additional roadway improvements. To begin the modeling study, critical receptor areas in the vicinity of the project were identified for analysis. Generally speaking, roadway intersections are the primary concern because of traffic congestion and because of the increase in vehicular emissions associated with traffic queuing. For this study, the nine key intersections identified in the traffic study [6] were also selected for air quality analysis. These include: Beretania Street at Kalakaua Avenue, Beretania Street at Keeaumoku Street, King Street at Kalakaua Avenue, King Street at Keeaumoku Street, Young Street at Kalakaua Avenue, Young Street at Keeaumoku Street, and Punahou Street at the intersections of King, Young and Beretania Streets. The traffic impact assessment report for the project describes the present and future conditions and configurations of these intersections in detail.

The main objectives of the air quality modeling study were to estimate both current and projected levels of maximum 1-hour average carbon monoxide concentrations that could then be compared to the national and state AAQS to determine their significance. The traffic impact assessment report indicates that traffic volumes generally are or will be higher during the afternoon peak hour than

during the morning peak period at most locations within the project area. Worst-case emission and meteorological dispersion conditions typically occur during the morning hours at many locations. Hence, both morning and afternoon peak traffic hours were examined to ensure that worst-case concentrations were identified.

The EPA computer models MOBILE5A and MOBILE4.1 [7] were used to calculate vehicular carbon monoxide emissions for each year studied. MOBILE5A was used to estimate cruise emissions while MOBILE4.1 provided estimates of idle emissions. MOBILE5A is the most recently released version of the EPA mobile emission models. Emission estimates provided by the MOBILE5A model have been updated based on EPA's recent testing of on-road vehicles. This latest series of testing has indicated that emission control equipment deteriorates more rapidly than had been previously thought. Hence, MOBILE5A emission estimates are higher compared to earlier versions of the model.

One of the key inputs to the MOBILE emission models is vehicle mix. Based on recent vehicle registration figures, the present and projected vehicle mix in the project area is estimated to be 91.9% light-duty gasoline-powered vehicles, 5% light-duty gasoline-powered trucks and vans, 0.5% heavy-duty gasoline-powered vehicles, 0.6% light-duty diesel-powered vehicles, 1% heavy-duty diesel-powered trucks and buses, and 1% motorcycles.

Other key inputs to the MOBILE emission models are the cold/hot start fractions. Motor vehicles operating in a cold- or hot-start modes emit excess air pollution until reaching stabilized operating temperatures. Typically, motor vehicles reach stabilized operating temperatures after about 4 miles of driving. For traffic operating within the project area, it was assumed that during both morning

and afternoon peak traffic hours about 25 percent of all vehicles would be operating in the cold-start mode and that about 5 percent would be operating in the hot-start mode. These operational mode values were estimated based on a report from the California Department of Transportation [8] and taking into consideration the likely origins of morning/afternoon traffic in the project area.

Ambient temperatures of 59 and 68 degrees Fahrenheit were used for morning and afternoon peak-hour emission computations, respectively. These are conservative assumptions since morning/afternoon ambient temperatures will generally be warmer than this and emission estimates given by MOBILE5A/MOBILE4.1 are inversely proportional to the ambient temperature.

After computing vehicular carbon monoxide emissions through the use of the MOBILE emission models, these data were then input to the latest version of the computer model CALINE4 [9]. CALINE4 was developed by the California Transportation Department to simulate vehicular movement and atmospheric dispersion of vehicular emissions. This model is designed to predict 1-hour average pollutant concentrations along roadways based on input traffic and emission data, roadway/receptor geometry and meteorological conditions.

Input peak-hour traffic volumes were obtained from the traffic study cited previously. Traffic queuing estimates were made based on the project traffic study, Transportation Research Board procedures [10], U.S. EPA guidelines [11], and traffic observations at the subject intersections. Vehicle speeds on Keeaumoku Street, Kalakaua Avenue, Young Street and Punahou Street were assumed to be limited to 25 mph either due to posted speed limits or to congested traffic conditions. Deceleration and acceleration times of 10 and

12 seconds, respectively, were assumed. Traffic on both King and Beretania Streets was assumed to move at 30 mph with an acceleration time of 15 seconds and a deceleration time of 12 seconds.

Model roadways were set up to reflect roadway geometry, physical dimensions and operating characteristics. Presently, pedestrian walkways exist very close to most of the roadways within the project area.. Concentrations predicted by air quality models generally are not considered valid within the roadway mixing zone. The roadway mixing zone is usually taken to include 3 meters on either side of the traveled portion of the roadway and the turbulent area within 10 meters of a cross street. Model receptor sites were thus located at the edges of the mixing zones near all intersections that were studied. All receptor heights were placed at 1.8 meters above ground to simulate levels within the normal human breathing zone.

Input meteorological conditions for this study were defined to provide "worst-case" results. One of the key meteorological inputs is atmospheric stability category. For these analyses, atmospheric stability category 4 was assumed for both morning and afternoon cases. This is the most conservative stability category that is normally used for estimating pollutant dispersion within urban areas. A surface roughness length of 100 cm was assumed with a mixing height of 300 meters. Worst-case wind conditions were defined as a wind speed of 1 meter per second with a wind direction resulting in the highest predicted concentration.

Existing background concentrations of carbon monoxide in the project vicinity are believed to be at moderate levels. Hence, background contributions of carbon monoxide from sources or distant roadways not directly considered in the analysis were accounted for

by adding a background concentration of 1 ppm to all predicted concentrations for both the 1993 and the 2004 scenarios.

Predicted Worst-Case 1-Hour Concentrations

Table 5 summarizes the final results of the modeling study in the form of the estimated worst-case 1-hour morning and afternoon ambient carbon monoxide concentrations. These results can be compared directly to the state and the national AAQS. Estimated worst-case carbon monoxide concentrations are presented in the table for four cases: year 1993 with existing traffic, year 2004 without project traffic (2004/Case A), year 2004 with project traffic and with planned roadway improvements (2004/Case B) and year 2004 with project traffic and with additional roadway improvements (2004/Case C). Both planned and additional roadway improvements are described in the project traffic study referenced previously. The locations of these estimated worst-case 1-hour concentrations all occurred at or very near the indicated intersections.

As indicated in the table, the highest estimated 1-hour concentration during 1993 within the project vicinity was 30.8 mg/m^3. This was projected to occur during the morning peak traffic hour near the intersection of Beretania Street and Keeaumoku Street. The next highest value, 29.8 mg/m^3, was estimated to occur during the afternoon peak traffic hour near King Street at Keeaumoku Street. Concentrations at other locations and times studied ranged from 29.6 mg/m^3 during the afternoon near King Street at Punahou Street to 9.2 mg/m^3 during the morning near Young Street at Kalakaua Avenue.

In the year 2004 without the proposed project (2004/Case A), a worst-case 1-hour concentration of 26.9 mg/m^3 was predicted to occur during the afternoon peak-traffic hour near the intersection of King Street and Kalakaua Avenue. Peak morning and afternoon worst-case values at the other locations studied for the 2004 without project scenario ranged between about 9 and 25 mg/m^3. Compared to the 1993 scenario, concentrations are estimated to decrease somewhat at most locations in the project area even though traffic volumes are expected to increase and no roadway improvements were assumed. The projected reduced concentrations are due to the effects of older, more-polluting vehicles leaving the state's roadways during the intervening 11 years.

Predicted 1-hour worst-case concentrations for the 2004 with project scenario including planned roadway improvements (2004/Case B) ranged from 28.1 mg/m^3 during the afternoon at King and Keeaumoku Streets down to 9.0 mg/m^3 during the morning at Young Street and Kalakaua Avenue. Compared to the without project case, predicted worst-case concentrations were generally only slightly higher and in some cases slightly lower. Compared to the existing case, predicted concentrations with the project and with the planned roadway improvements range from somewhat lower to slightly higher.

Air quality impacts of the additional roadway improvements suggested in the project traffic study were also investigated (2004/Case C). Compared to the planned roadway improvements only scenario (2004/Case B), the results indicate that maximum 1-hour concentrations would remain mostly unchanged or decrease slightly at most locations.

All estimated worst-case 1-hour carbon monoxide levels for all scenarios are within the national AAQS of 40 mg/m^3. It appears likely, however, that existing concentrations of carbon monoxide as well as future concentrations either without or with the project may exceed the State of Hawaii 1-hour AAQS of 10 mg/m^3 on occasion at several locations in the project area.

Predicted Worst-Case 8-Hour Concentrations

Worst-case 8-hour carbon monoxide concentrations were estimated by multiplying the worst-case 1-hour values by a persistence factor of 0.5. This accounts for two factors: (1) traffic volumes averaged over eight hours are lower than peak 1-hour values, and (2) meteorological dispersion conditions are more variable (and hence more favorable) over an 8-hour period than they are for a single hour. Based on monitoring data, 1-hour to 8-hour persistence factors for most locations generally vary from 0.4 to 0.8 with 0.6 being the most typical. One recent study based on modeling [12] concluded that 1-hour to 8-hour persistence factors could typically be expected to range from 0.4 to 0.5. EPA guidelines [11] recommend using a value of 0.6 to 0.7 unless a locally derived persistence factor is available. Recent monitoring data for Honolulu reported by the Department of Health [13] suggests that this factor may range between about 0.35 and 0.55 depending on location and traffic variability. Considering the location of the project and the traffic pattern for the area, a 1-hour to 8-hour persistence factor of 0.5 is probably most appropriate for this application.

The resulting estimated worst-case 8-hour concentrations are indicated in Table 6. For the 1993 scenario, the estimated highest worst-case 8-hour carbon monoxide concentration was 15.4 mg/m^3 at the intersection of Beretania Street and Keeaumoku Street. Other

locations ranged downward from 14.9 mg/m^3 near King Street at Keeaumoku Street to 5.6 mg/m^3 near Young Street at Kalakaua Avenue. The predicted maximum values for the year 2004 without and with project scenarios (Cases A and B, respectively) were 13.4 mg/m^3 (King Street at Kalakaua Avenue) and 14.0 mg/m^3 (King Street at Keeaumoku Street). Other locations studied were generally in the 5 to 13 mg/m^3 range with or without the project. With the additional roadway improvements (2004/Case C), the highest 8-hour concentrations in the project vicinity would remain about the same or decrease slightly.

Without the project, 2004 concentrations would likely decrease somewhat compared to existing concentrations. With the project, concentrations would probably remain at about their present levels. Comparing the predicted values for the existing case to the AAQS, it appears that both the state and the national 8-hour standard may presently be exceeded occasionally at several locations in the project vicinity. In 2004 with or without the project, worst-case concentrations will likely continue to exceed both state and federal 8-hour standards on occasion.

Conservativeness of Estimates

The results of this study reflect several assumptions that must be made concerning traffic movement and worst-case meteorological conditions. One such assumption concerning worst-case meteorological conditions is that a wind speed of 1 meter per second with a steady direction for 1 hour will occur. A steady wind of 1 meter per second blowing from a single direction for an hour is not very likely and may occur only once a year or less. With wind speeds of 2 meters per second, for example, computed carbon monoxide concentrations would be only about one-half the values given above.

7.2 Parking Facilities

Project plans call for a total of approximately 2,897 parking stalls to be provided onsite. A portion of these stalls will be accommodated at or above street level, but the majority of the parking facilities will be provided on three levels of underground parking. Traffic ingress/egress for various sections of the parking areas will be provided primarily via Young Street.

Although there are no specific air pollution standards pertaining to underground parking structures, the state Department of Health specifies ventilation design guidelines for enclosed parking garages in Chapter 11-39 of the Hawaii Administrative Rules. These guidelines require that each level of an enclosed parking structure be mechanically vented unless: (1) more than half the wall area is open along at least 40 percent of the perimeter; (2) there are no employees who normally work in the space; and (3) there is adequate natural ventilation. Mechanical ventilation equipment, either supply or exhaust, must provide a minimum of 1.50 cubic feet per minute (cfm) of outdoor air per square foot of space over the entire floor area. (These are the design criteria also currently recommended by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) for ventilating parking garages [14].) At locations where traffic congestion may occur, such as at exits, more ventilation capacity is required.

The state design guidelines referenced above also specify that an engineered system may be employed using the formula:

$$Q = K n / C$$

where,

Q = exhaust ventilation rate (cfm)
K = 1,380,000

n = number of cars running at one instant
C = allowable concentration (ppm)

For engineered systems, C must be selected with regard to the "threshold limit value" for carbon monoxide and as approved by the Director of the Department of Health.

Threshold Limit Values (TLVs) are set by the American Conference of Governmental Industrial Hygienists (ACGIH) and pertain to the air within the industrial workplace [15]. The ACGIH TLV for carbon monoxide is currently stated in terms of a time-weighted average (TWA) concentration of 29 mg/m^3 (25 ppm) for an 8-hour period (40 hours per week). Thus, compared to the state and the national AAQS (see Table 1), the ACGIH TLV for carbon monoxide is much less restrictive than the 8-hour AAQS. Normally, users of parking garages can be expected to enter and leave such facilities in a matter of a few minutes.

The Occupational Health and Safety Administration (OSHA) also defines limits of air pollution in the workplace which are applicable to indoor air. For carbon monoxide, a TWA concentration of 40 mg/m^3 (35 ppm) is specified and a ceiling concentration of 229 mg/m^3 (200 ppm) is stipulated [16]. A ceiling concentration generally defines the concentration which must not be exceeded at any time.

The formula given above pertaining to the design of ventilation systems for enclosed parking facilities was promulgated in January 1983 when the state rule for air conditioning and ventilating was established. Motor vehicles in the 1990's emit less carbon monoxide on the average than they did during the early 1980's when this rule was adopted. Thus, use of this formula for designing

parking garage ventilation systems for today's or future facilities probably will result in overly conservative ventilation requirements.

In 2004 when the proposed project will be complete, motor vehicles will emit an average of about 6 grams per minute each of carbon monoxide while idling or operating at low speeds in the parking garage in the cold-start mode. This assumes an ambient temperature of 59°F. Because Honolulu's average minimum temperature is 70°F and since emissions are inversely proportional to ambient temperature, cold-start emissions will usually be lower. Motor vehicles typically reach stabilized operating temperatures within about 7 to 8 minutes after a cold start. After reaching stabilized temperatures, emissions will amount to less than 3 grams per minute per vehicle on the average.

Parking facilities typically require a minimum of about 350 square feet per parking stall. Thus, assuming 1.5 cfm of outdoor air per square foot of space is provided within enclosed parking areas of the project, each stall will generate approximately 525 cfm of ventilation. Assuming uniform distribution of air within the garage and that 25 percent of the parking capacity of the garage operates continuously with 100 percent of these vehicles in the cold-start mode, a ceiling concentration of approximately 100 mg/m^3 will occur within the structure. In all probability, fewer vehicles would be operating in the garage at any given time and a portion of these would emit at lower emission rates. Hence, concentrations would likely be substantially less than 100 mg/m^3. This is well within OSHA's ceiling concentration limit of 229 mg/m^3 even with the minimum required ventilation.

To comply with the state design guidelines as well as to provide an adequate margin of safety, a minimum ventilation capacity of 1.50 cubic feet per minute per square foot of floor space should be provided within the proposed enclosed parking facilities. However, as suggested by ASHRAE and if approved by the Department of Health, carbon monoxide sensors could be used to appropriately reduce actual ventilation rates and thereby decrease energy consumption while maintaining carbon monoxide concentrations below accepted limits. Sensor-controlled ventilation rates could also adjust for different activity rates within the parking structure. The first underground parking level will likely be more active and thus require more ventilation than the second underground level, especially if vehicles must pass through the first level to reach the second.

Fresh air intake vents should be located away from congested outdoor traffic areas. Any air vented from the underground parking garage that impacts public areas will be subject to state and national AAQS. Exhaust vents should be located as far away from pedestrian areas as is practicable and so as to obtain a dilution factor of at least five to ten.

7.3 Electrical Demand

The proposed project also will cause indirect air pollution emissions from power generating facilities as a consequence of electrical power usage. The annual electrical demand of the project when fully developed is not expected to exceed about 100 million kilowatt-hours, some of which will be offset by the existing electrical demand of facilities currently located on the project site. Electrical power for the project will most probably be provided mainly by oil-fired generating facilities located on Oahu. However, with H-Power and a coal-fired power plant now

online at Campbell Industrial Park, some of the project power may well come from sources burning other fuels. In order to meet the electrical power needs of the proposed project, power generating facilities will be required to burn more fuel and hence more air pollution will be emitted at these facilities. Given in Table 7 are estimates of the indirect air pollution emissions that would result from the project electrical demand assuming all power is provided by burning more fuel oil at Oahu's power plants. If power is supplied instead or in part by coal or solid waste burning facilities, emissions will likely be higher than the values given in the table.

7.4 Solid Waste Disposal

Solid waste generated by the project when fully completed is expected to amount to about 18 tons of refuse per day (about three 6-ton truckloads per day). Presently, the refuse district has a capacity to handle about 500 tons per day. Most project refuse will likely be hauled away and burned at the H-Power facility at Campbell Industrial Park to generate electricity. Burning of the waste to generate electricity will result in emissions of particulates, carbon monoxide and other contaminants, but these will be offset to some extent by reducing the amount of fuel oil that would be required to generate electricity for the project. Table 8 gives emission estimates assuming all project solid waste is burned at H-Power. With the high level of particulate emission control achieved at H-Power, emission quantities from the burning of project solid waste would be relatively small.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The major potential short-term air quality impact of the project will occur from the emission of fugitive dust during construction.

Uncontrolled fugitive dust emissions from construction activities are estimated to amount to about 1.2 tons per acre per month or more, depending on rainfall. To control dust, active work areas and any temporary unpaved work roads should be watered at least twice daily on days without rainfall. Use of wind screens and/or limiting the area that is disturbed at any given time will also help to contain fugitive dust emissions. Wind erosion of inactive areas of the site that have been disturbed could be controlled by mulching or by the use of chemical soil stabilizers. Dirt-hauling trucks should be covered when traveling on roadways to prevent windage. A routine road cleaning and/or tire washing program will also help to reduce fugitive dust emissions that may occur as a result of trucks tracking dirt onto paved roadways in the project area. Paving of parking areas and establishment of landscaping early in the construction schedule will also help to control dust.

During construction phases, emissions from engine exhausts (primarily consisting of carbon monoxide and nitrogen oxides) will also occur both from on-site construction equipment and from vehicles used by construction workers and from trucks traveling to and from the project. Increased vehicular emissions due to disruption of traffic by construction equipment and/or commuting construction workers can be alleviated by moving equipment and personnel to the site during off-peak traffic hours.

After the proposed development is constructed, potential long-term air pollution impacts from the project will arise from the increased motor vehicle traffic associated with project operations. Potential increased levels of carbon monoxide concentrations along roadways leading to and from the proposed development and from and within the underground parking areas will be the primary concerns. Based on mathematical modeling of vehicular traffic in the area and on atmospheric dispersion estimates of vehicular emissions, it is

concluded that existing concentrations along sidewalks in the project vicinity may occasionally exceed both state and national AAQS due to congested traffic conditions. Without the project in 2004, worst-case air pollution concentrations will decrease somewhat compared to the current year due to the retirement of older model motor vehicles between 1993 and 2004. If the project is built and the planned roadway improvements are implemented, maximum concentrations in 2004 will be little different from the without project scenario. Additional roadway improvements suggested in the project traffic study would result in slightly lower maximum concentrations at most locations. With or without the project, 2004 worst-case carbon monoxide concentrations will likely continue to exceed the national 8-hour standard and the state 1-hour and 8-hour standards on occasion. The state standards are set so low, however, they are probably currently exceeded at many intersections in the state that have even moderate traffic volumes. It is worth noting here that, although the national AAQS allow higher levels of carbon monoxide, the national standards were developed after extensive research with the objective of defining levels of air quality that would protect the public health with an adequate margin of safety. It should also be noted that the projected 8-hour concentration estimates given herein have a greater degree of uncertainty than the 1-hour values.

Options available to mitigate long-term, traffic-related air pollution from increased project motor vehicle traffic are to improve roadways, reduce traffic or reduce individual vehicular emissions. With the proposed roadway improvements, it appears any additional traffic generated by the project will not have any significant impact on air quality. Other mitigation measures to reduce traffic-related air quality impacts from this development are probably either unnecessary or beyond the control of the developer. It is recommended that carbon monoxide concentrations in the project area be monitored from time-to-time to determine if

any remedial action is warranted. If such is indicated, many other traffic-congested areas of the city will likely be similarly affected, and any corrective action would probably have to take the form of a county- or state-wide inspection and maintenance program for automotive emission control equipment.

Carbon monoxide concentrations within the enclosed parking facilities will be well within safe levels if 1.5 cubic feet per minute of mechanical ventilation per square foot of floor space is provided as prescribed by state rules and recommended by ASHRAE, although higher ventilation capacity may be appropriate for high-volume traffic areas. Use of carbon monoxide sensors within the parking garage to monitor air pollution concentrations and to control ventilation equipment will lessen the potential for air quality problems and at the same time will conserve energy. Intakes for the ventilation system should be located away from congested outdoor traffic areas to avoid intaking already contaminated air. Air circulated through the parking garage should be exhausted away from public areas so as to obtain a dilution factor of at least five to ten. Sufficient ingress/egress capacity to permit rapid entry and exit will further lessen air pollution impacts both within and adjacent to the facility. As an extra mitigative measure, emergency procedures and equipment should be provided to counter potential problems arising from power outages and/or ventilation failure.

Any long-term impacts on air quality due to indirect emissions from supplying the project with electricity and from the disposal of waste materials generated by the project will likely be modest based on the relatively small magnitudes of both the estimated demands and the indirect emissions. Even though these emissions will be relatively small, indirect emissions from project electrical demand could likely be reduced somewhat by incorporating

energy-saving features into project design requirements. As mentioned above, use of a sensor-controlled garage ventilation would likely provide significant energy savings. Other measures might include the use of solar water heaters; designing building space so that window positions maximize indoor light without unduly increasing indoor heat; using landscaping where feasible to provide afternoon shade to cut down on the use of air conditioning; installation of insulation and double-glazed doors to reduce the effects of the sun and heat; movable, controlled openings for ventilation at opportune times; and possibly automated room occupancy sensors. Solid waste related air pollution could likely be reduced somewhat by the promotion of conservation and recycling programs within the proposed development.

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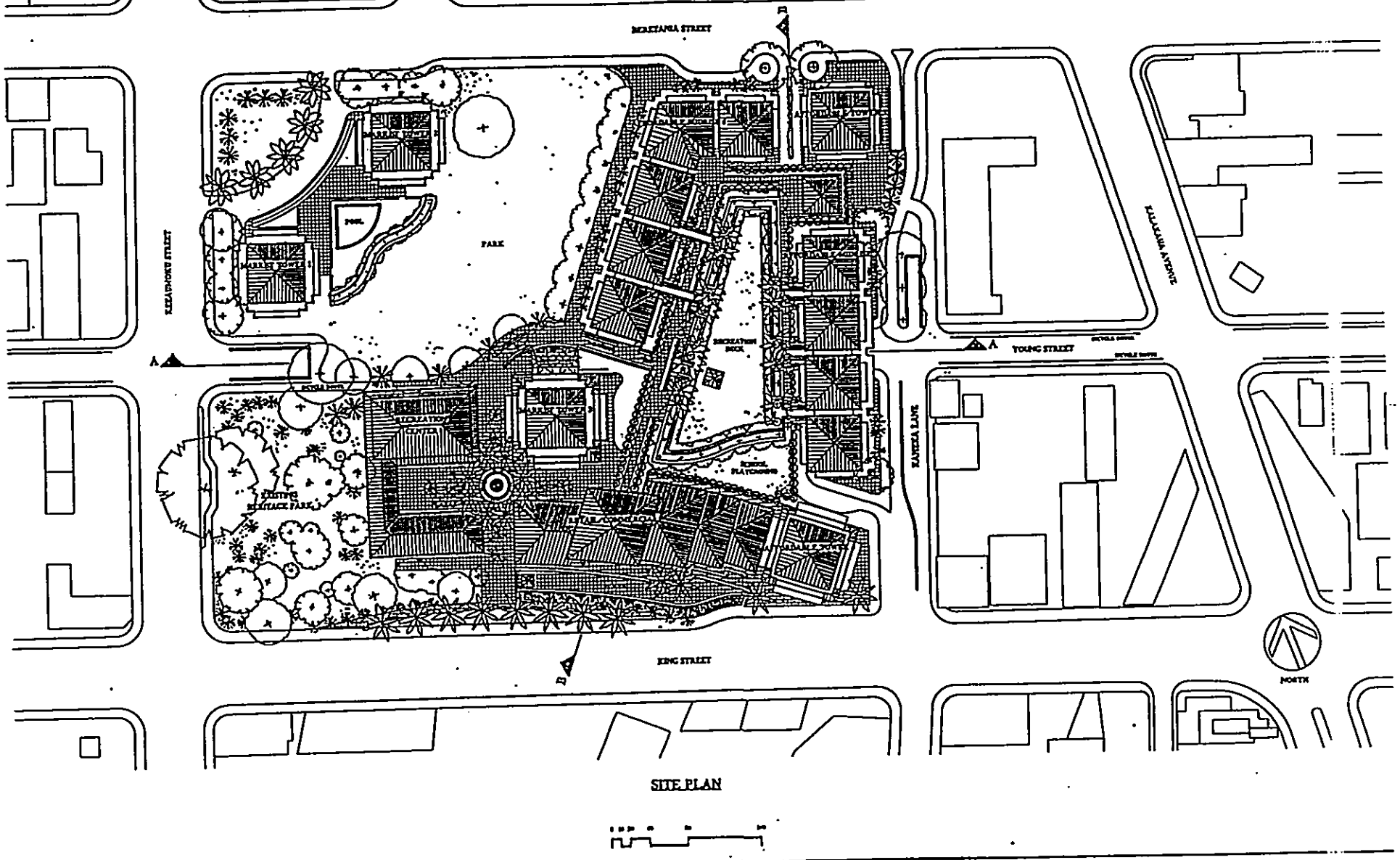

SITE PLAN

COUNTY OF HONOLULU
CITY OF HOUSING AND COMMUNITY DEVELOPMENT

HAWAII
FINANCE AND DEVELOPMENT CORPORATION

PAWAA REDEVELOPMENT PROJECT

H O N O L U L U, H A W A I I

Figure 1

Table 1

SUMMARY OF STATE OF HAWAII AND NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Units	Averaging Time	Maximum Allowable Concentration: National Primary	National Secondary	State of Hawaii
Suspended Particulate Matter	$\mu g/m^3$	Annual	-	-	60[a]
		24 Hours	-	-	150[b]
Particulate Matter[c]	$\mu g/m^3$	Annual	50	50	-
		24 Hours	150[b]	150[b]	-
Sulfur Dioxide	$\mu g/m^3$	Annual	80	-	80
		24 Hours	365[b]	-	365[b]
		3 Hours	-	1300[b]	1300[b]
Nitrogen Dioxide	$\mu g/m^3$	Annual	100	100	70
Carbon Monoxide	mg/m^3	8 Hours	10[b]	-	5[b]
		1 Hour	40[b]	-	10[b]
Ozone	$\mu g/m^3$	1 Hour	235[b]	235[b]	100[b]
Lead	$\mu g/m^3$	Calendar Quarter	1.5	1.5	1.5

[a]Geometric mean

[b]Not to be exceeded more than once per year

[c]Particles less than or equal to 10 microns aerodynamic diameter

Table 2

ANNUAL WIND FREQUENCY FOR HONOLULU INTERNATIONAL AIRPORT (%)

Wind Direction	Wind Speed (knots) 0-3	4-6	7-10	11-16	17-21	22-27	28-33	34-40	>40	Total
N	0.5	2.5	1.3	0.5						4.8
NNE	0.3	1.2	1.6	1.5	0.2					4.7
NE	0.3	2.1	6.1	11.0	3.2	0.3				23.0
ENE	0.2	2.5	10.9	16.6	4.1	0.3				34.7
E	0.1	1.0	2.5	2.8	0.5					7.0
ESE	0.0	0.3	0.4	0.3						1.1
SE	0.0	0.3	0.8	1.0	0.1					2.2
SSE	0.1	0.4	1.2	0.7	0.1					2.4
S	0.1	0.5	1.4	0.6	0.1					2.7
SSW	0.0	0.3	0.8	0.3						1.5
SW	0.0	0.2	0.8	0.4						1.5
WSW	0.0	0.3	0.5	0.4						1.2
W	0.1	0.5	0.2	0.2						1.1
WNW	0.2	1.4	0.3	0.1						2.0
NW	0.4	2.3	0.8	0.1						3.8
NNW	0.5	2.3	0.8	0.2						3.8
CALM	2.5									2.5
TOTAL	5.4	18.3	30.6	36.5	8.5	0.7				100.0

Source: Climatography of the United States No. 90 (1965-1974), Airport Climatological Summary, Honolulu International Airport, Honolulu, Hawaii, U.S. Department of Commerce, National Climatic Center, Asheville, NC, August 1978.

Table 3

AIR POLLUTION EMISSIONS INVENTORY FOR
CITY AND COUNTY OF HONOLULU, 1980

Source Category	Emissions (tons/year)				
	Particulate	Sulfur Oxides	Nitrogen Oxides	Carbon Monoxide	Hydrocarbons
Steam Electric Power Plants	2,092	36,736	12,455	1,065	184
Gas Utilities	14	0	199	0	0
Fuel Combustion in Agricultural Industry	1,088	579	358	0	31
Refinery Industry	622	7,096	2,149	266	2,584
Petroleum Storage	0	0	0	0	1,261
Metallurgical Industries	28	96	40	0	0
Mineral Products Industry	6,884	1,883	597	0	31
Municipal Incineration	42	145	2,029	0	184
Motor Vehicles	1,413	1,014	17,270	239,198	22,853
Construction, Farm and Industrial Vehicles	184	193	2,507	3,729	338
Aircraft	382	145	1,751	5,594	1,476
Vessels	42	386	438	533	123
Agricultural Field Burning	1,399	0	0	15,982	1,692
Totals	14,190	48,273	39,793	266,367	30,757

Source: State of Hawaii, Department of Health

Table 4

ANNUAL SUMMARIES OF AIR QUALITY MEASUREMENTS FOR
MONITORING STATIONS NEAREST PAUMA REDEVELOPMENT PROJECT

Parameter / Location	1986	1987	1988	1989	1990
Sulfur Dioxide / Barbers Point					
No. of 24-Hr Samples	57	53	60	54	57
Range of 24-Hr Values (µg/m3)	<5-10	<5-13	<5-19	<5-20	<5-<5
Average Daily Value (µg/m3)	<5	5	<5	<5	<5
No. of State AAQS Exceedances	0	0	0	0	0
Particulate / Downtown Honolulu					
No. of 24-Hr Samples	57	53	59	59	53
Range of 24-Hr Values (µg/m3)	11-61	14-59	15-45	16-48	13-47
Average Daily Value (µg/m3)	25	25	26	29	30
No. of State AAQS Exceedances	0	0	0	0	0
PM-10 / Liliha					
No. of 24-Hr Samples	51	42	53	55	54
Range of 24-Hr Values (µg/m3)	7-35	10-33	9-25	10-33	8-36
Average Daily Value (µg/m3)	18	17	17	16	15
No. of State AAQS Exceedances	NA	NA	NA	NA	NA
Carbon Monoxide / Downtown Honolulu					
No. of Days of 1-Hr Samples	348	345	328	323	362
Range of Daily Max. 1-Hr Values (mg/m3)	0.2-13.5	0.3-11.1	0.2-10.3	0.3-9.7	0.1-7.1
Avg. Daily Maximum 1-Hr Value (mg/m3)	2.2	1.7	1.7	1.9	1.5
No. of State 1-Hr AAQS Exceedances	3	1	1	0	0
No. of Days of 8-Hr Samples	213	228	-	-	-
Range of Daily Max. 8-Hr Values (mg/m3)	0.3-4.7	0.3-3.9	-	-	-
Avg. Daily Maximum 8-Hr Value (mg/m3)	1.4	1.2	-	-	-
No. of State 8-Hr AAQS Exceedances	0	0	-	-	-
Ozone / Sand Island					
No. of Days of 1-Hr Samples	346	342	362	342	340
Range of Daily Max. 1-Hr Values (µg/m3)	10-88	4-84	0-92	0-94	4-116
Avg. Daily Maximum 1-hr Value (µg/m3)	39	38	14	15	36
No. of State AAQS Exceedances	0	0	0	0	2
Lead / Downtown Honolulu					
No. of 24-Hr Samples	57	57	-	-	-
Range of 24-Hr Values (µg/m3)	0.0-0.2	0.0-0.2	-	-	-
Average Quarterly Value (µg/m3)	0.0	0.0	-	-	-
No. of State AAQS Exceedances	0	0	-	-	-

Source: State of Hawaii Department of Health

Table 5

ESTIMATED WORST-CASE 1-HOUR CARBON MONOXIDE CONCENTRATIONS
ALONG ROADWAYS NEAR PAWAA REDEVELOPMENT PROJECT
(milligrams per cubic meter)

Roadway Intersection	Year/Scenario[a]/Period							
	1993/ Present/		2004/ Case A/		2004/ Case B/		2004/ Case C/	
	AM	PM	AM	PM	AM	PM	AM	PM
King Street at Keeaumoku Street	25.0	29.8	21.5	25.6	20.1	28.1	20.4	27.4
Beretania Street at Keeaumoku Street	30.8	27.4	23.2	23.4	25.2	24.4	23.4	22.4
Beretania Street at Kalakaua Avenue	20.6	20.6	17.0	17.7	16.8	18.5	-	-
King Street at Kalakaua Avenue	22.4	26.7	15.1	26.9	15.3	27.1	14.5	24.7
Young Street at Keeaumoku Street	17.0	16.9	14.6	15.3	12.9	16.2	12.8	16.4
Young Street at Kalakaua Avenue	9.2	11.2	9.0	9.9	9.0	10.7	-	-
King Street at Punahou Street	21.8	29.6	15.8	24.0	16.1	24.4	15.9	24.5
Young Street at Punahou Street	12.2	12.4	9.8	10.9	9.9	10.9	-	-
Beretania Street at Punahou Street	28.4	22.5	21.3	18.9	21.4	18.8	21.4	20.2

Hawaii State AAQS: 10
National AAQS: 40

[a]2004/Case A pertains to without project scenario. 2004/Case B assumes with project with planned roadway improvements. 2004/Case C assumes with project with additional roadway improvements suggested in project traffic study.

Table 6

ESTIMATED WORST-CASE 8-HOUR CARBON MONOXIDE CONCENTRATIONS
ALONG ROADWAYS NEAR PAWAA REDEVELOPMENT PROJECT
(milligrams per cubic meter)

Roadway Intersection	Year/Scenario[a]			
	1993/ Present/	2004/ Case A/	2004/ Case B/	2004/ Case C/
King Street at Keeaumoku Street	14.9	12.8	14.0	13.7
Beretania Street at Keeaumoku Street	15.4	11.7	12.6	11.7
Beretania Street at Kalakaua Avenue	10.3	8.8	9.2	-
King Street at Kalakaua Avenue	13.4	13.4	13.6	12.4
Young Street at Keeaumoku Street	8.5	7.6	8.1	8.2
Young Street at Kalakaua Avenue	5.6	5.0	5.4	-
King Street at Punahou Street	14.8	12.0	12.2	12.2
Young Street at Punahou Street	6.2	5.4	5.4	-
Beretania Street at Punahou Street	14.2	10.6	10.7	10.7

Hawaii State AAQS: 5
National AAQS: 10

[a]2004/Case A pertains to without project scenario. 2004/Case B assumes with project with planned roadway improvements. 2004/Case C assumes with project with additional roadway improvements suggested in project traffic study.

Table 7

ESTIMATED INDIRECT AIR POLLUTION EMISSIONS FROM PAWAA REDEVELOPMENT PROJECT ELECTRICAL DEMAND*

Air Pollutant	Emission Rate (tons/year)
Particulate	30
Sulfur Dioxide	250
Carbon Monoxide	20
Volatile Organics	2
Nitrogen Oxides	110

*Based on U.S. EPA emission-factors for utility boilers [4]. Assumes electrical demand of 100 million kw-hrs per year and low-sulfur oil used to generate power.

Table 8

ESTIMATED INDIRECT AIR POLLUTION EMISSIONS FROM PAWAA REDEVELOPMENT PROJECT SOLID WASTE DISPOSAL DEMAND*

Air Pollutant	Emission Rate (tons/year)
Particulate	1
Lead	<1
Sulfur Dioxide	4
Carbon Monoxide	7
Volatile Organics	<1
Nitrogen Oxides	12

*Based on U.S. EPA emission factors for municipal waste incinerators [4]. Assumes mass burn unit with 99 percent control of particulate emissions and solid waste disposal demand of 18 tons per day.

APPENDIX C
NOISE STUDY

NOISE STUDY
FOR THE
PAWAA REDEVELOPMENT PROJECT
HONOLULU, OAHU, HAWAII

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CHAPTER I. SUMMARY

The existing and future traffic noise levels in the vicinity of the proposed Pawaa Redevelopment Project in Honolulu were evaluated for their potential impacts and their relationship to current FHA/HUD noise standards. The traffic noise level increases along four access roadways to the project site were calculated. These four roadways were: King Street; Beretania Street; Keeaumoku Street; and Kalakaua Avenue. Following project build-out by CY 2004, increases in traffic noise of 0.2 to 1.4 Ldn units are predicted to occur as a result of project plus non-project traffic.

Along King Street, traffic noise levels are expected to increase by 0.2 Ldn, as a result of both project and non-project traffic. Along Beretania Street, traffic noise levels are expected to increase by 0.7 Ldn, with none of this increase attributable to project traffic. Along Keeaumoku Street and along the section of Kalakaua Avenue north of Young Street, traffic noise levels are expected to increase by approximately 0.5 to 1.2 Ldn by CY 2004 as a result of non-project traffic. Project traffic will add approximately 0.0 to 0.2 Ldn additional units of noise along Keeaumoku Street and along the section of Kalakaua Avenue north of Young Street. These levels of traffic noise increases resulting from project generated traffic are not considered to be significant. In addition, because of the business/commercial character of the project area, the predicted moderate increases in traffic noise levels are not expected to generate adverse noise impacts.

It will not be possible to obtain adequate setback of all of the project's Market and Affordable Towers and Affordable Mid-Rise units from the centerlines of the four access roadways so as to meet the 65 Ldn FHA/HUD noise standard. Because of this, impacts from traffic noise are possible at the proposed project dwelling units. Mitigation of high traffic noise levels through the use of closure and air conditioning or the use of sound attenuating windows are recommended for those units which are expected to be exposed to traffic noise levels greater than 65 Ldn.

The planned location of the K-2 School does not have adequate setback distance from King Street to meet existing noise criteria for naturally ventilated classroom use. The location of the proposed Recreation Center may cause adverse noise impacts at the project's Market Tower 3. Closure and air conditioning or partial closure and mechanical ventilation of the school and Recreational Center facilities may be required to mitigate future noise impacts.

Unavoidable, but temporary, noise impacts will occur during the construction of the proposed project, particularly during the excavation and pile driving activities on the project site. Because construction activities are predicted to be audible within the project and at adjoining properties, the quality of the acoustic environment may be degraded to unacceptable levels during periods of construction. Mitigation measures to reduce construction noise to inaudible levels will not be practical in all cases, but the use of quiet equipment and the implementation of the State Department of Health construction noise permit procedures are recommended as mitigation measures.

Because of the presence of the existing buildings adjacent to or within 250 FT of the project site and the potential for damage to these buildings from vibration during pile driving operations, vibration monitoring is recommended during close-in pile driving operations where vibration levels are expected to exceed 0.2 inches/second. In addition, it is expected that the design of the supporting piles and construction methods for the project buildings will be optimized to minimize risks of damage to adjacent structures from settling or heaving. A vibration limit of 2.0 inches/second should not be exceeded at adjacent buildings, and modifications to the project's foundation and pile driving plans prior to design and construction are recommended if these limits are expected to be exceeded.

CHAPTER II. PURPOSE

The primary objective of this study was to describe the existing and future traffic noise environment in the environs of the proposed Pawaa Redevelopment Project in Downtown Honolulu on the island of Oahu. Traffic noise level increases and impacts associated with the proposed development were to be determined within the project site as well as along the public roadways expected to service the project traffic. A specific objective was to determine future traffic noise level increases associated with both project and non-project traffic, and the potential noise impacts associated with these increases. Assessments of possible future impacts from short term construction noise and vibration at the project site were also included as noise study objectives. Specifically, the potential risks of structural damage to nearby buildings from pile driving operations on the project site were included in the noise and vibration impact assessment. Recommendations for minimizing identified noise and vibration impacts were also to be provided as required.

CHAPTER III. NOISE DESCRIPTORS AND THEIR RELATIONSHIP TO LAND USE COMPATIBILITY

The noise descriptor currently used by federal agencies (such as FHA/HUD) to assess environmental noise is the Day-Night Average Sound Level (Ldn). This descriptor incorporates a 24-hour average of instantaneous A-Weighted Sound Levels as read on a standard Sound Level Meter. By definition, the minimum averaging period for the Ldn descriptor is 24 hours. Additionally, sound levels which occur during the nighttime hours of 10:00 PM to 7:00 AM are increased by 10 decibels (dB) prior to computing the 24-hour average by the Ldn descriptor. A more complete list of noise descriptors is provided in APPENDIX B to this report.

TABLE 1, derived from Reference 1, presents current federal noise standards and acceptability criteria for residential land uses. Land use compatibility guidelines for various levels of environmental noise as measured by the Ldn descriptor system are shown in FIGURE 1. As a general rule, noise levels of 55 Ldn or less occur in rural areas, or in areas which are removed from high volume roadways. In urbanized areas which are shielded from high volume streets, Ldn levels generally range from 55 to 65 Ldn, and are usually controlled by motor vehicle traffic noise. Residences which front major roadways are generally exposed to levels of 65 Ldn, and as high as 75 Ldn when the roadway is a high speed freeway. In the project area, traffic noise levels are typically greater than 65 Ldn along the Right-of-Way due to the large volume of traffic on the primary access roadways to the project site. The ranges of background ambient noise levels at other urbanized areas on Oahu are shown in FIGURE 2.

For the purposes of determining noise acceptability for funding assistance from federal agencies (FHA/HUD and VA), an exterior noise level of 65 Ldn or lower is considered acceptable. This standard is applied nationally (Reference 2), including Hawaii. Because of our open-living conditions, the predominant use of nat-

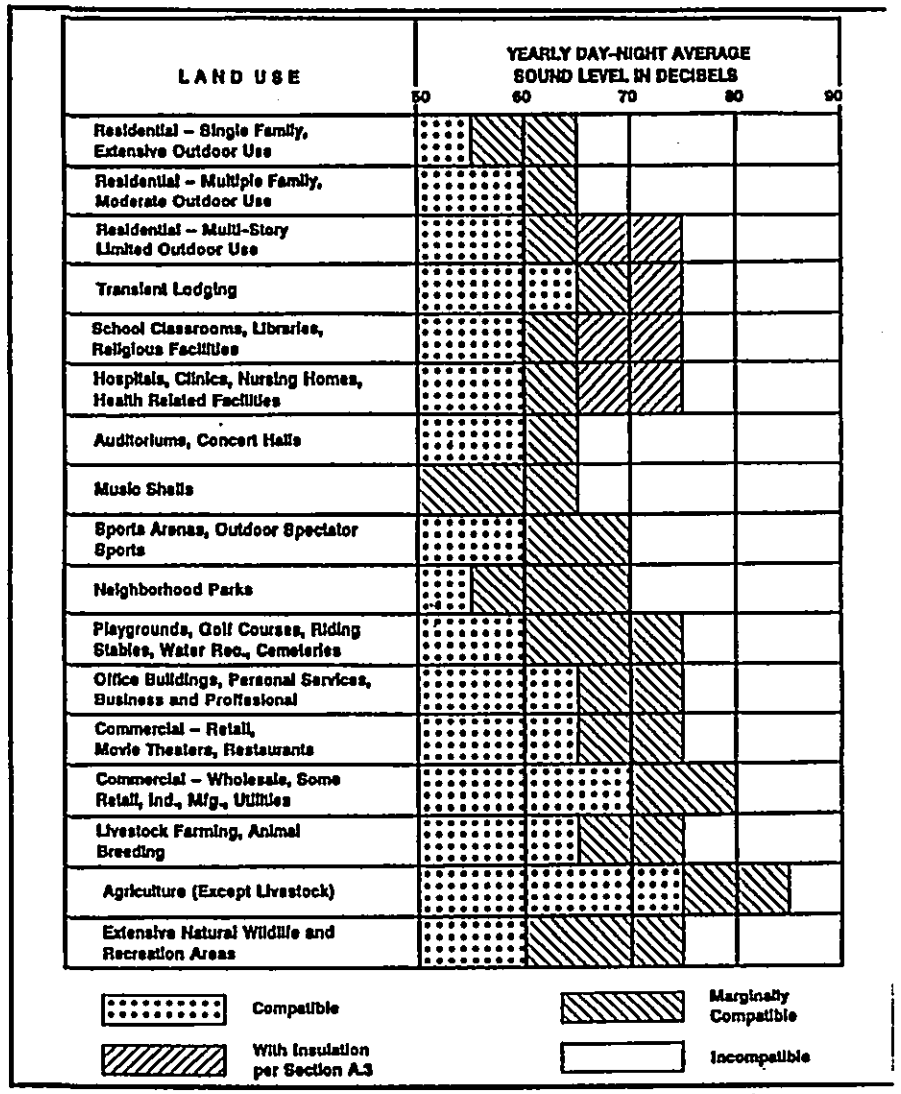
TABLE 1

EXTERIOR NOISE EXPOSURE CLASSIFICATION (RESIDENTIAL LAND USE)

NOISE EXPOSURE CLASS	DAY-NIGHT SOUND LEVEL	EQUIVALENT SOUND LEVEL	FEDERAL[1] STANDARD
Minimal Exposure	Not Exceeding 55 L_{dn}	Not Exceeding 55 L_{eq}	Unconditionally Acceptable
Moderate Exposure	Above 55 L_{dn} But Not Above 65 L_{dn}	Above 55 L_{eq} But Not Above 65 L_{eq}	Acceptable[2]
Significant Exposure	Above 65 L_{dn} But Not Above 75 L_{dn}	Above 65 L_{eq} But Not Above 75 L_{eq}	Normally Unacceptable
Severe Exposure	Above 75 L_{dn}	Above 75 L_{eq}	Unacceptable

Notes: (1) Federal Housing Administration, Veterans Administration, Department of Defense, and Department of Transportation.

(2) FHWA uses the L_{eq} instead of the L_{dn} descriptor. For planning purposes, both are equivalent if: (a) heavy trucks do not exceed 10 percent of total traffic flow in vehicles per 24 hours, and (b) traffic between 10:00 PM and 7:00 AM does not exceed 15 percent of average daily traffic flow in vehicles per 24 hours. The noise mitigation threshold used by FHWA for residences is 67 L_{eq}.

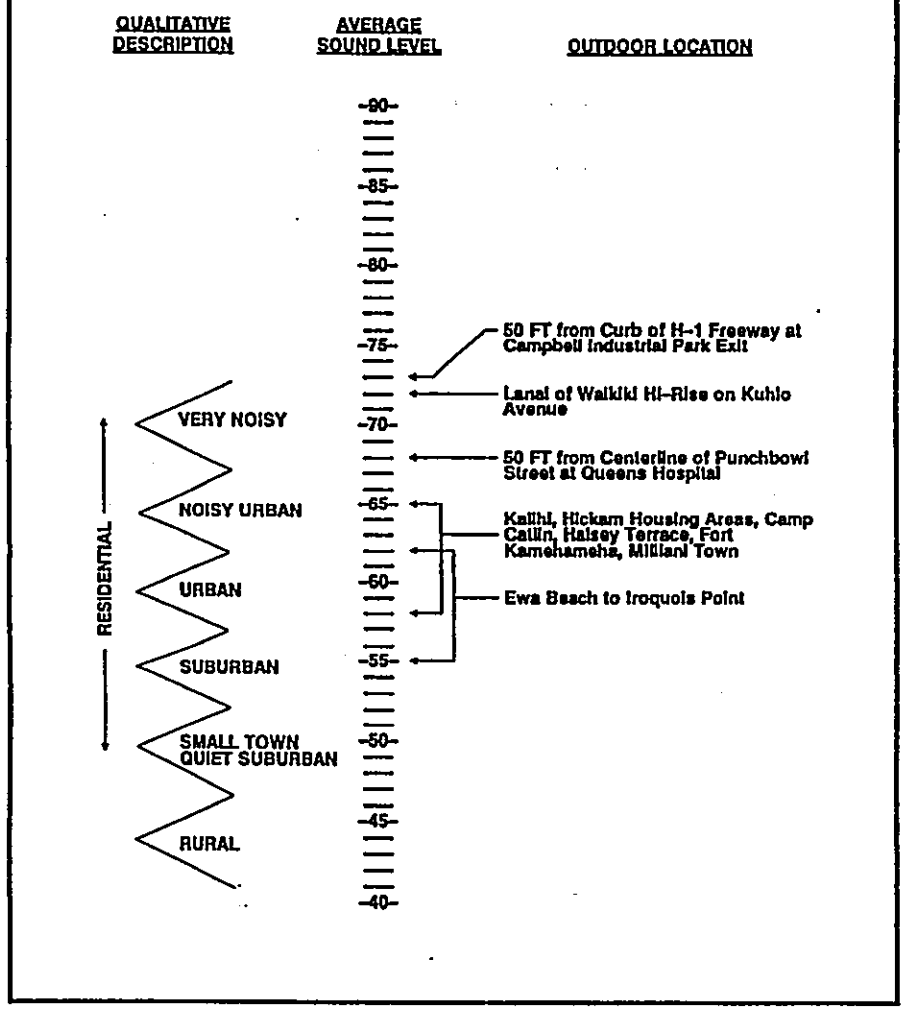


LAND USE COMPATIBILITY
WITH YEARLY DAY–NIGHT AVERAGE SOUND LEVEL
AT A SITE FOR BUILDINGS AS COMMONLY CONSTRUCTED
(Source: American National Standards Institute S12.40–1990)

FIGURE 1

FIGURE 2

RANGE OF EXTERIOR BACKGROUND AMBIENT NOISE LEVELS



urally ventilated dwellings, and the relatively low exterior-to-interior sound attenuation afforded by these naturally ventilated structures, an exterior noise level of 65 Ldn does not eliminate all risks of noise impacts. Because of these factors, and as recommended in Reference 3, a lower level of 55 Ldn is considered as the "Unconditionally Acceptable" (or "Near-Zero Risk") level of exterior noise. However, after considering the cost and feasibility of applying the lower level of 55 Ldn, government agencies such as FHA/HUD and VA have selected 65 Ldn as a more appropriate regulatory standard.

For commercial, industrial, and other non-noise sensitive land uses, exterior noise levels as high as 75 Ldn are generally considered acceptable. Exceptions to this occur when naturally ventilated office and other commercial establishments are exposed to exterior levels which exceed 65 Ldn.

On the island of Oahu, the State Department of Health (DOH) regulates noise from construction activities, through the issuance of permits for allowing excessive noise during limited time periods. State DOH noise regulations are expressed in maximum allowable property line noise limits rather than Ldn (see Reference 4). Although they are not directly comparable to noise criteria expressed in Ldn, State DOH noise limits for residential, commercial, and industrial lands equate to approximately 55, 60, and 76 Ldn, respectively.

It should be noted that the noise compatibility guidelines and relationships to the Ldn noise descriptor may not be applicable to impulsive noise sources such as pile drivers. The use of penalty factors (such as adding 10 dB to measured sound levels or the use of C-Weighting filters) have been proposed. However, the relationships between levels of impulsive noise sources and land use compatibility have not been as firmly established as have the relationships for non-impulsive sources. The State DOH limits for impulsive sounds which exceed 120 impulses in any 20 minute period are 10 dB above the limits for non-impulsive sounds. If impulsive

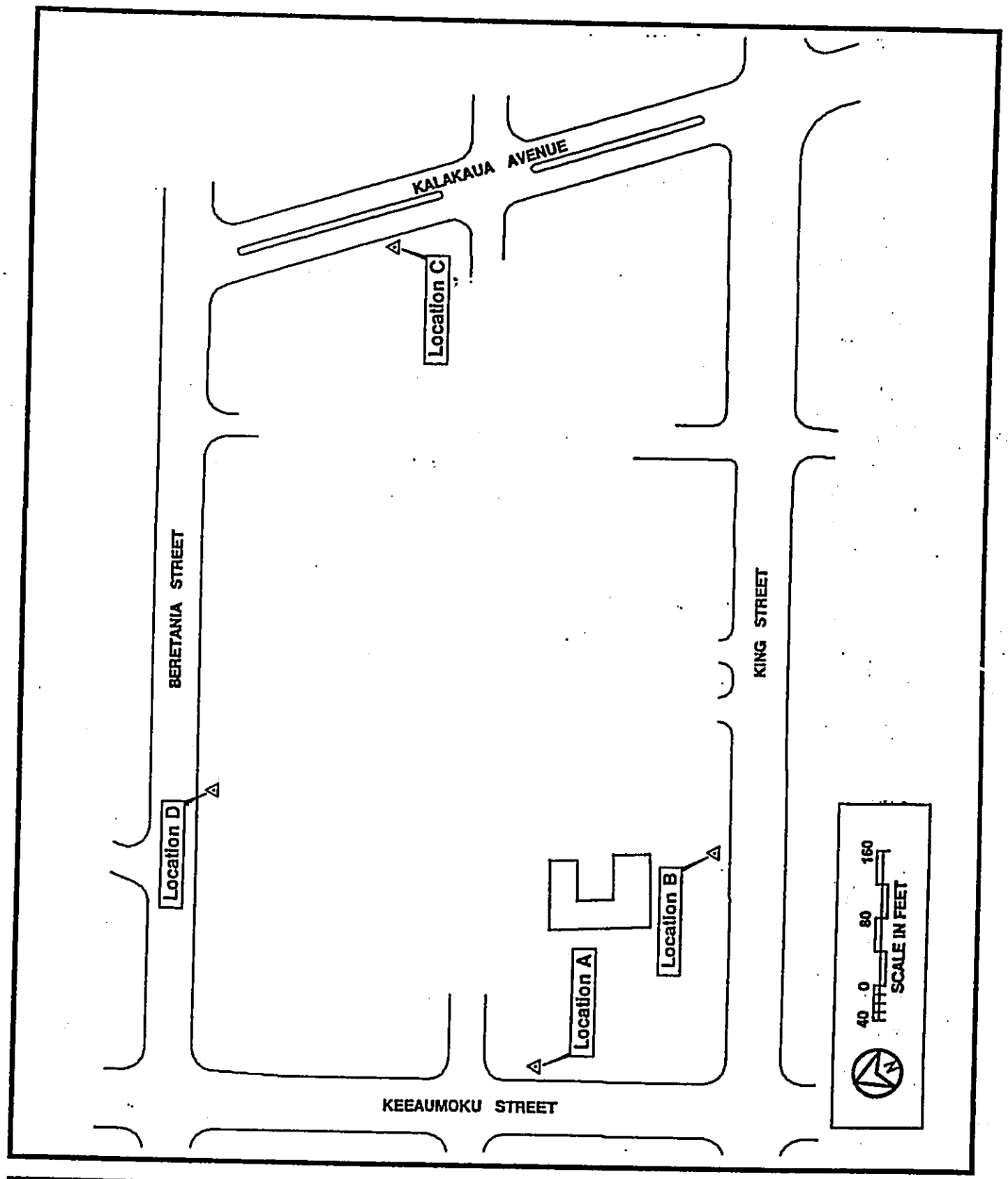
sounds do not exceed 120 impulses in any 20 minute time period, there are no regulatory limits on their sound levels under the State DOH regulations.

CHAPTER IV. GENERAL STUDY METHODOLOGY

Existing traffic noise levels were measured at four locations in the project environs to provide a basis for developing the project's traffic noise contributions along the roadways which will service the proposed development. The locations of the measurement sites are shown in FIGURE 3. Noise measurements were performed during the month of April 1992 following the school spring vacation. The results of the traffic noise measurements were compared with calculations of existing traffic noise levels to validate the computer model used. The traffic noise measurement results, and their comparisons with computer model predictions of existing traffic noise levels are summarized in TABLE 2.

Traffic noise calculations for the existing conditions as well as noise predictions for the Year 2004 were performed using the Federal Highway Administration (FHWA) Noise Prediction Model (Reference 5). Traffic data entered into the noise prediction model were: hourly traffic volumes, average vehicle speeds, estimates of traffic mix, and hard ground propagation loss factor. The traffic assignments for the project (Reference 6), Honolulu Department of Transportation Services traffic counts on Kalakaua Avenue, Beretania Street, King Street, and Keeaumoku Street (References 7 thru 12) were the primary sources of data inputs to the model. For existing and future traffic on King Street, it was assumed that the average noise levels, or Leq(h), during the PM peak hour were 1.0 dB greater than the 24-hour Ldn along the highway. For the other primary access roadways to the project, it was assumed the average noise levels during the PM peak hour were 0.5 to 1.5 dB less than the 24-hour Ldn. These assumptions were based on computations of both the hourly Leq and the 24-hour Ldn of traffic noise on the four access roadways to the project site (see FIGURES 4 thru 7).

Traffic noise calculations for both the existing and future conditions in the project environs were developed for ground level



LOCATIONS OF NOISE MEASUREMENT SITES

FIGURE 3

TABLE 2

RESULTS OF NOISE MEASUREMENTS

LOCATION	Time of Day (HRS)	Ave. Speed (MPH)	--Hourly Traffic Volume -- AUTO	M.TRUCK	H.TRUCK	Measured Leq (dB)	Predicted Leq (dB)
A. 50 FT from the Center–line of Keeaumoku Street at Young Street. (4/6/92)	1515 TO 1615	20	2,299	30	16	67.2	65.2
B. 50 FT from the Center–line of King Street Ewa of Kaheka Street. (4/6/92)	1630 TO 1730	30	3,678	37	31	69.3	69.1
C. 50 FT from the Center–line of Kalakaua Avenue at Young Street. (4/7/92)	1515 TO 1615	25	1,574	37	29	66.1	65.8
D. 50 FT from the Center–line of Beretania Street at Makiki Street. (4/7/92)	1630 TO 1730	27	2,243	22	36	67.6	67.6

FIGURE 4

HOURLY VARIATIONS OF TRAFFIC NOISE AT 50 FT SETBACK DISTANCE FROM THE CENTERLINE OF KING STREET WEST OF KALAKAUA AVENUE (JANUARY 17–18, 1991)

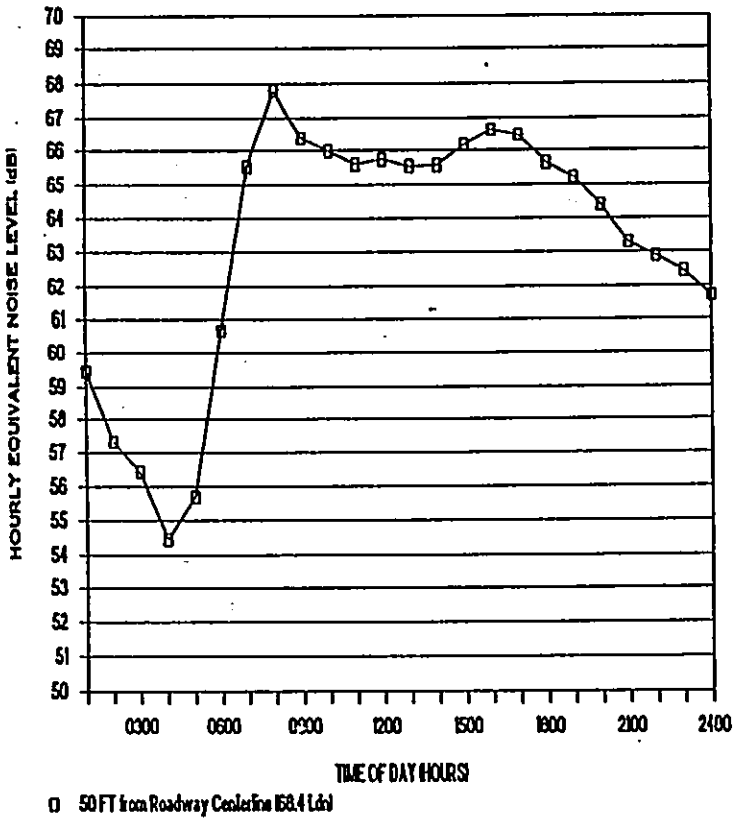


FIGURE 5

HOURLY VARIATIONS OF TRAFFIC NOISE AT 50 FT SETBACK DISTANCE FROM THE CENTERLINE OF BERETANIA STREET WEST OF KALAKAUA AVENUE (JANUARY 16–17 & OCTOBER 4–5, 1991)

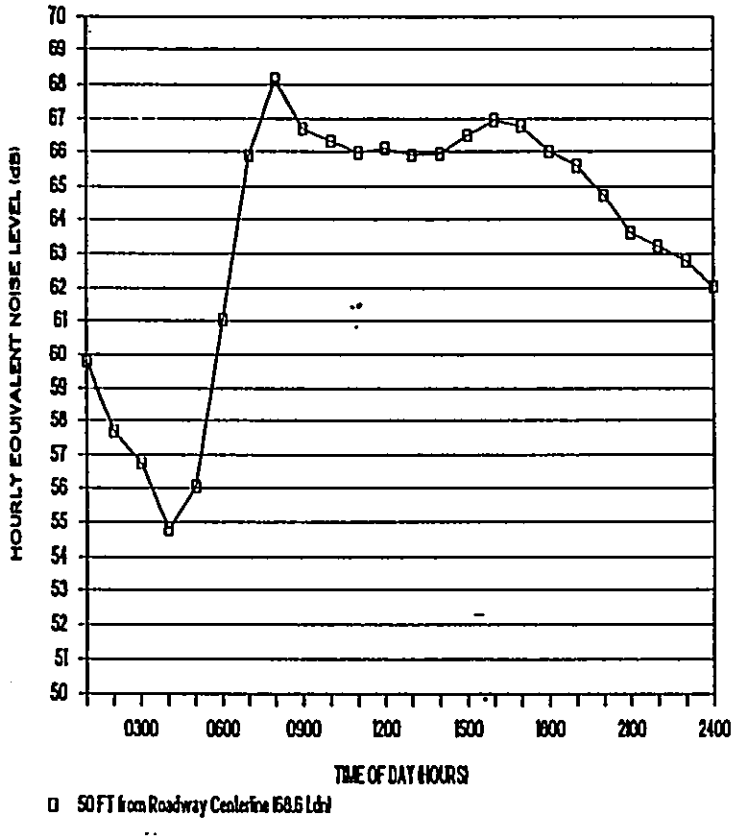


FIGURE 6

HOURLY VARIATIONS OF TRAFFIC NOISE AT 50 FT SETBACK DISTANCE FROM THE CENTERLINE OF KALAKAUA AVENUE AT YOUNG STREET (JANUARY 16-17 & OCTOBER 4-5, 1991)

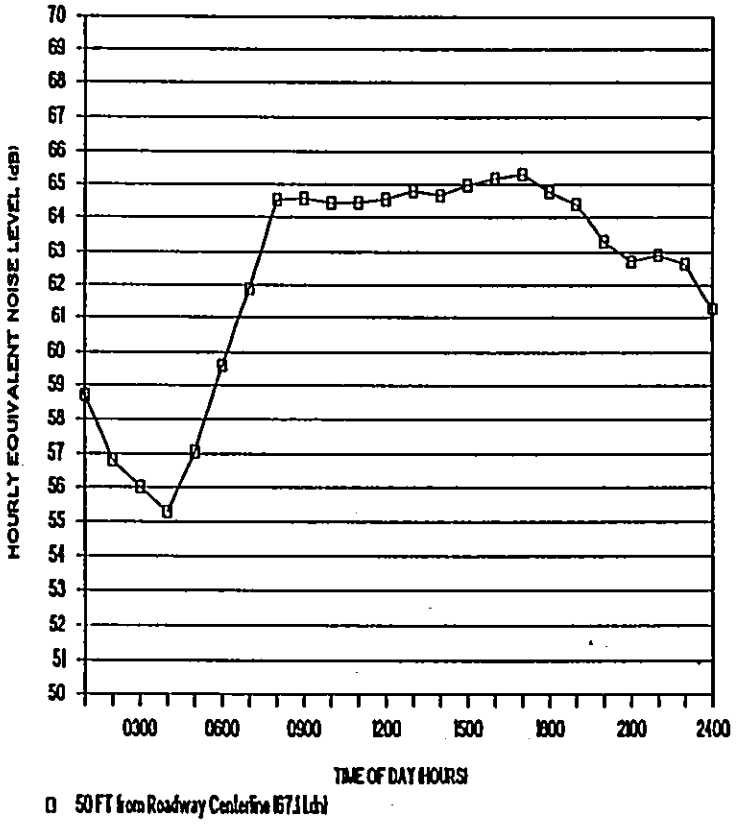
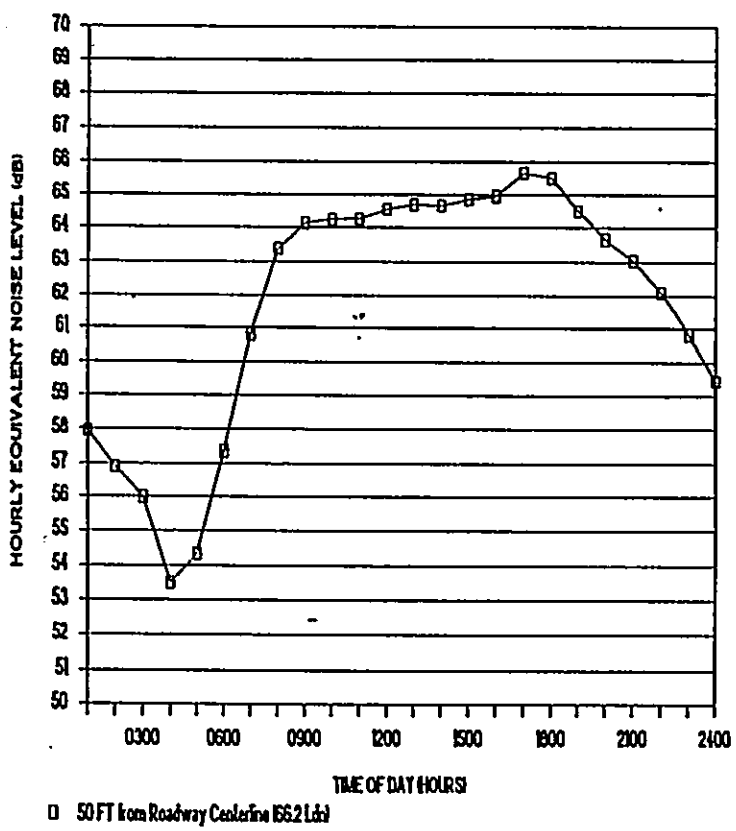


FIGURE 7

HOURLY VARIATIONS OF TRAFFIC NOISE AT 50 FT SETBACK DISTANCE FROM THE CENTERLINE OF KEEAUMOKU STREET AT YOUNG STREET (JANUARY 24-25 & MAY 20-21, 1991)



and elevated receptors without the benefit of shielding effects. Traffic noise levels were calculated for future conditions with and without the proposed mixed use project. The forecasted changes in traffic noise levels over existing levels were calculated for both future scenarios, and noise impact risks evaluated. The relative contributions of non-project and project traffic to the total noise levels were also calculated, and an evaluation of possible traffic noise impacts was made.

Calculations of average exterior and interior noise levels from construction activities were performed for typical naturally ventilated and air conditioned dwellings. Predicted noise levels were compared with existing background ambient noise levels, and the potential for noise impacts was assessed. Potential noise and vibration impacts from pile driving operations were also discussed, and mitigation measures recommended.

CHAPTER V. EXISTING NOISE ENVIRONMENT

The existing traffic noise levels along the four primary access roadways to the project site are in the "Significant Exposure, Normally Unacceptable" category at 65 to 70 Ldn.

The results of the April 1992 traffic and background ambient noise measurements are summarized in TABLE 2, with measurement locations identified in FIGURE 3. Sites "A" thru "D" were all located at street level. As shown in TABLE 2, correlation between measured and predicted traffic noise levels was good except at Site "A", where traffic noise from King Street contaminated the Keaumoku Street noise measurement data.

Results of calculations of existing (CY 1993) traffic noise levels during the PM peak hour period are shown in TABLE 3. The results of the calculations apply at 50 FT distances from the centerlines of the roadway sections in the project environs. Calculated setback distances from these roadways to the existing 60, 65, and 70 Ldn contours are shown in TABLE 4. Existing traffic noise contours over the project site for ground level and elevated receptors are shown in FIGURES 8 and 9. As indicated in the figures, the existing noise levels along the four access roadways to the project site are relatively high. The FHA/HUD standard of 65 Ldn is currently exceeded at the bases of Affordable Mid-Rise 6, Market Towers 1 and 2, and Affordable Towers 4 and 5. At higher elevations of 100 FT, the 65 Ldn contour moves toward the interior portion of the project site, and may affect all or portions of Market Tower 3, and Affordable Mid-Rise 7 locations. The traffic noise levels shown in the tables and figures only apply when unobstructed line-of-sight conditions exist to the roadways. These conditions would generally occur at short (50 to 100 FT) distances to a roadway, within any flat, open space along the roadway, and at distant, but elevated locations above the roadway. The existing traffic noise levels shown in the tables and figures should be reduced by 3 to 5 dB (or Ldn) if partial shielding (line-of-sight

TABLE 3

COMPARISONS OF EXISTING AND CY 2004 TRAFFIC NOISE LEVELS
ALONG ACCESS ROADS TO PROJECT SITE
(PM PEAK HOUR AND 50 FT FROM ROADWAY CENTERLINES)

LOCATION	SPEED (MPH)	VPH	****** HOURLY LEQ IN dB ****** AUTO	MT	HT	ALL VEH
EXISTING (CY 1993) PM PEAK HR. TRAFFIC:						
King St. Fronting Project	30	3,516	66.4	58.4	64.8	69.1
Beretania St. Fronting Project	27	2,178	63.6	55.7	64.4	67.3
N. Keeaumoku St. Fronting Project	25	2,781	63.4	57.4	61.6	66.2
S. Keeaumoku St. Fronting Project	25	2,643	63.1	57.2	61.4	66.0
Kalakaua Ave. N. of Young St.	25	1,701	61.1	57.2	63.3	66.0
Kalakaua Ave. S. of Young St.	25	1,847	61.5	57.5	63.8	66.3
CY 2004 PM PEAK HR. TRAFFIC WITH THE PROJECT:						
King St. Fronting Project	30	3,683	66.6	58.6	65.0	69.3
Beretania St. Fronting Project	27	2,573	64.3	56.5	65.1	68.0
N. Keeaumoku St. Fronting Project	25	3,682	64.6	58.7	62.8	67.4
S. Keeaumoku St. Fronting Project	25	3,649	64.5	58.6	62.8	67.4
Kalakaua Ave. N. of Young St.	25	1,891	61.6	57.6	63.7	66.4
Kalakaua Ave. S. of Young St.	25	2,124	62.1	58.1	64.2	66.9

Note:

The following assumed traffic mixes of autos, medium trucks, and heavy vehicles were used for existing and future conditions:

(a) Beretania Street: 97.5% autos, 1% medium trucks, and 1.5% heavy trucks and buses.
(b) King Street: 98% autos, 1% medium trucks, and 1% heavy trucks and buses.
(c) Kalakaua Avenue: 95.9% autos, 2.3% medium trucks, and 1.8% heavy trucks and buses.
(d) Keeaumoku Street: 97.75% autos, 1.5% medium trucks, and 0.75% heavy trucks and buses.

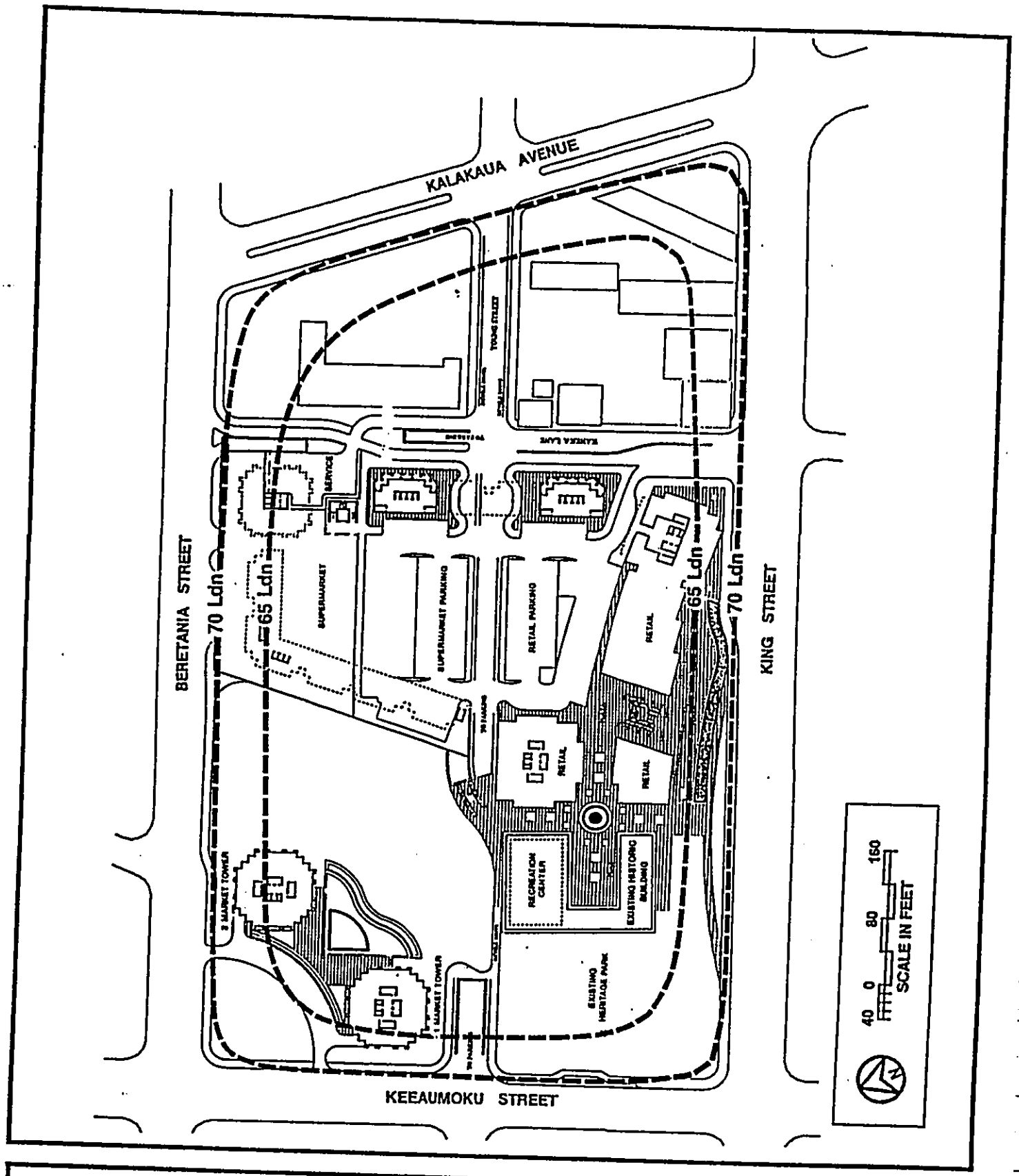
TABLE 4

EXISTING AND CY 2004 DISTANCES TO 60, 65, AND 70 Ldn CONTOURS

STREET SECTION	60 Ldn SETBACK (FT) EXISTING	60 Ldn SETBACK (FT) CY 2004	65 Ldn SETBACK (FT) EXISTING	65 Ldn SETBACK (FT) CY 2004	70 Ldn SETBACK (FT) EXISTING	70 Ldn SETBACK (FT) CY 2004
King St. Fronting Project	173	178	80	83	37	38
Beretania St. Fronting Project	194	216	90	100	42	47
N. Keeaumoku St. Fronting Project	140	169	65	78	30	36
S. Keeaumoku St. Fronting Project	135	168	63	78	29	36
Kalakaua Ave. N. of Young St.	165	177	76	82	35	38
Kalakaua Ave. S. of Young St.	174	191	81	89	37	41

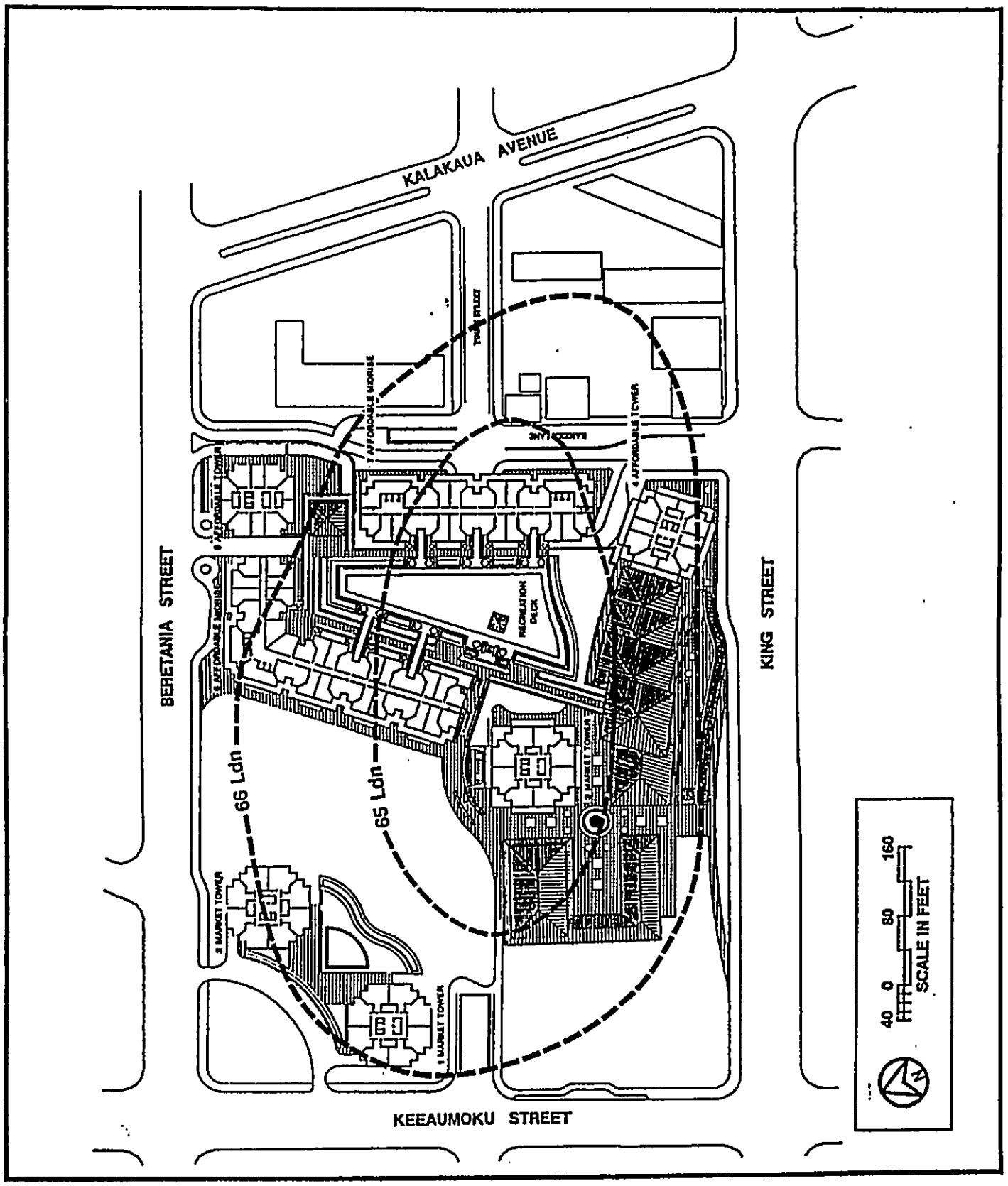
Notes:

(1) All setback distances are from the roadways' centerlines.
(2) See TABLE 3 for traffic volume, speed, and mix assumptions.
(3) Ldn assumed to be equal to PM Peak Hour Leq plus 1.5 dB along Beretania Street.
(4) Ldn assumed to be equal to PM Peak Hour Leq minus 1.0 dB along King Street.
(5) Ldn assumed to be equal to PM Peak Hour Leq plus 1.8 dB along Kalakaua Avenue.
(6) Ldn assumed to be equal to PM Peak Hour Leq plus 0.5 dB along Keeaumouku Street.
(7) Setback distances are for unobstructed line-of-sight conditions.
(8) Soft ground conditions assumed along all roadways.



EXISTING TRAFFIC NOISE CONTOURS OVER PROJECT SITE (5 FT RECEPTOR ELEVATION)

FIGURE 8



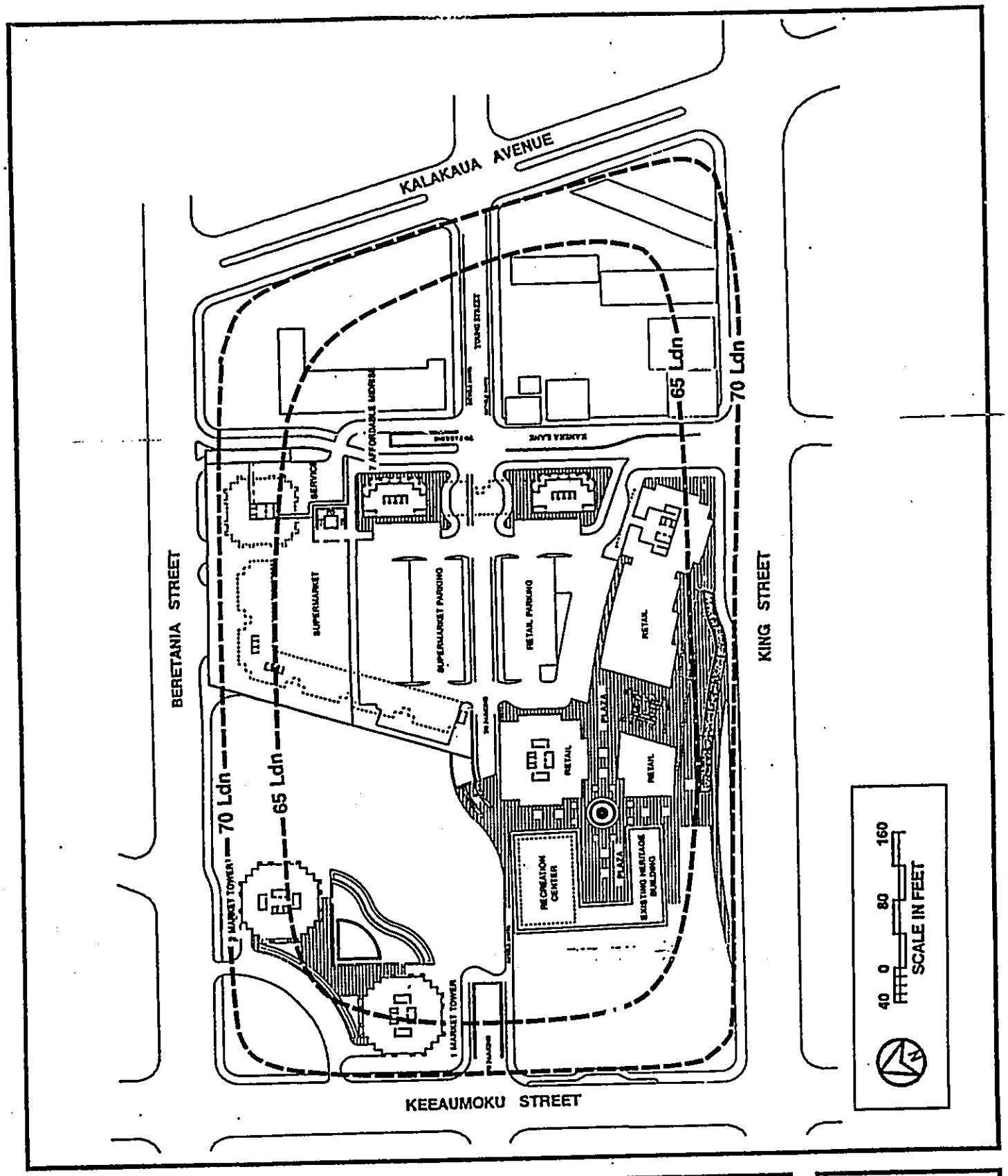
EXISTING TRAFFIC NOISE CONTOURS OVER PROJECT SITE (100 FT RECEPTOR ELEVATION)

FIGURE 9

obstruction) exists between the roadway and the receptor location. If the receptor is located behind a major obstruction (large building), the noise levels in the tables and figures should be reduced by 5 to 10 dB.

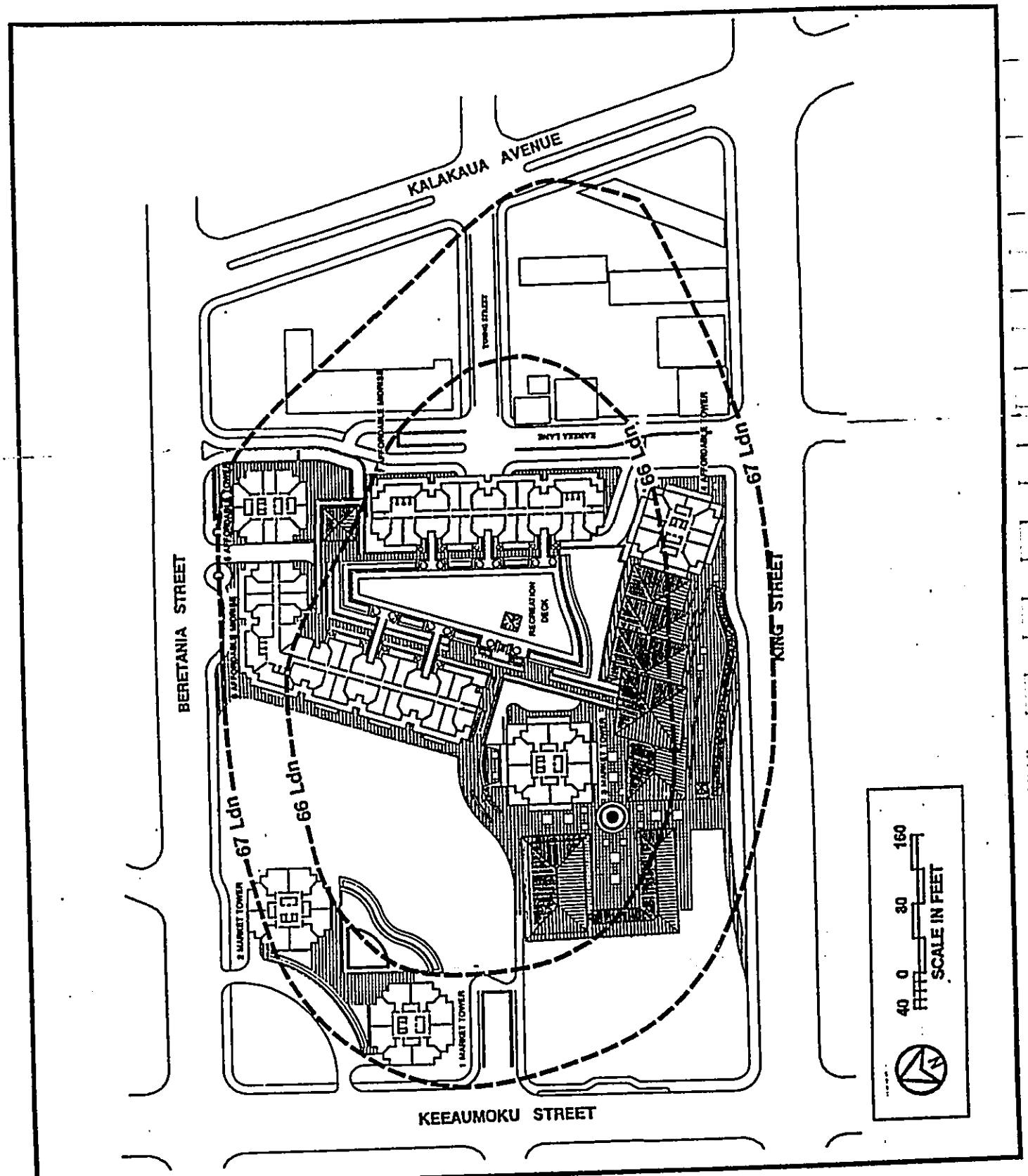
CHAPTER VI. FUTURE TRAFFIC NOISE ENVIRONMENT

Predictions of future traffic noise levels were made using the traffic volume assignments of Reference 6 for CY 2004 with and without the proposed project. The future projections of project plus non-project traffic noise levels on the roadways which would service the project are shown in TABLE 3 for the PM peak hour of traffic. As indicated in TABLE 3, traffic noise levels are predicted to increase by 0.2 to 1.4 dB during the PM peak hour, with the largest increase expected along the south section of Keeaumoku Street fronting the project site. These predictions assume that average vehicle speeds and traffic mix will not change from current conditions. The dominant traffic noise source in the project area will continue to be traffic noise from all four access roadways to the project site. TABLE 4 summarizes the predicted setback distances to the 60, 65, and 70 Ldn traffic noise contour lines along the roadways servicing the project and attributable to both project plus non-project traffic by CY 2004. The setback distances in TABLE 4 do not include the beneficial effects of noise shielding from buildings, or the detrimental effects of additive contributions of noise from intersecting streets or reflections from building walls. As indicated in TABLE 4, setback distances of 78 to 100 FT to the 65 Ldn contour from the centerlines of the roadways are predicted to occur in CY 2004. FIGURES 10 thru 12 depict the predicted traffic noise contours over the project site following project build-out in CY 2004 for ground level and elevated receptors. The beneficial effects of shielding from the proposed mid- and high-rise structures are not included in the figures, but the additive noise contributions from the adjoining streets are included in the noise contours. As indicated in FIGURE 10, ground level receptors within the central portion of the project site should be clear (or outside) of the future 65 Ldn traffic noise contour, and should be in the "Moderate Exposure, Acceptable" category. At 100 FT elevation, the entire project



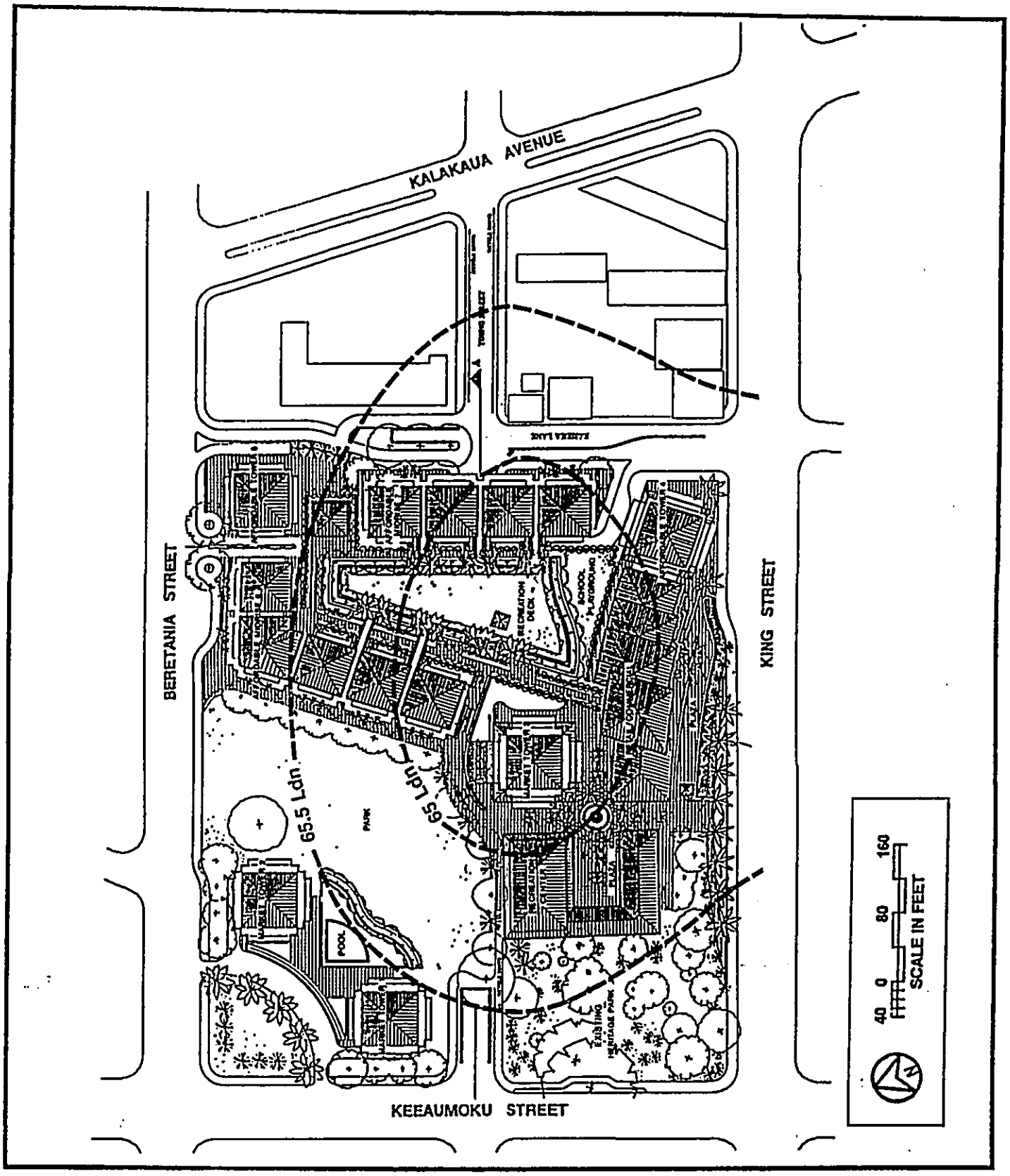
FUTURE TRAFFIC NOISE CONTOURS
OVER PROJECT SITE (5 FT RECEPTOR ELEVATION)

FIGURE
10



FUTURE TRAFFIC NOISE CONTOURS
OVER PROJECT SITE (100 FT RECEPTOR ELEVATION)

FIGURE
11



FUTURE TRAFFIC NOISE CONTOURS OVER PROJECT SITE (200 FT RECEPTOR ELEVATION)

FIGURE 12

site may be exposed to traffic noise levels greater than 65 Ldn (see FIGURE 11). At 200 FT elevation, only the central and southeast portions of the project site are clear of the 65 Ldn contour (see FIGURE 12), and at 300 FT elevation, the entire project site is clear of the 65 Ldn traffic noise contour.

TABLE 5 presents the predicted increases in traffic noise levels associated with non-project and project traffic by CY 2004, and as measured by the Ldn descriptor system. As indicated in TABLE 5, the increases in traffic noise along the four primary access roadways to the project are predicted to be associated with non-project traffic rather than project traffic. Minimal increases ranging from 0.0 to 0.2 Ldn in traffic noise levels are expected to result from project traffic along King Street, Beretania Street, Kalakaua Avenue, and Keeaumoku Street. These changes will be difficult to measure and are considered to be insignificant.

TABLE 5

CALCULATIONS OF PROJECT AND NON-PROJECT TRAFFIC NOISE CONTRIBUTIONS (CY 2004)

STREET SECTION	NOISE LEVEL INCREASE (Ldn) DUE TO NON-PROJECT TRAFFIC	PROJECT TRAFFIC
King St. Fronting Project	0.1	0.1
Beretania St. Fronting Project	0.7	0.0
N. Keeaumoku St. Fronting Project	1.1	0.1
S. Keeaumoku St. Fronting Project	1.2	0.2
Kalakaua Ave. N. of Young St.	0.5	-0.1
Kalakaua Ave. S. of Young St.	0.5	0.1

CHAPTER VII. DISCUSSION OF PROJECT RELATED NOISE AND VIBRATION IMPACTS AND POSSIBLE MITIGATION MEASURES

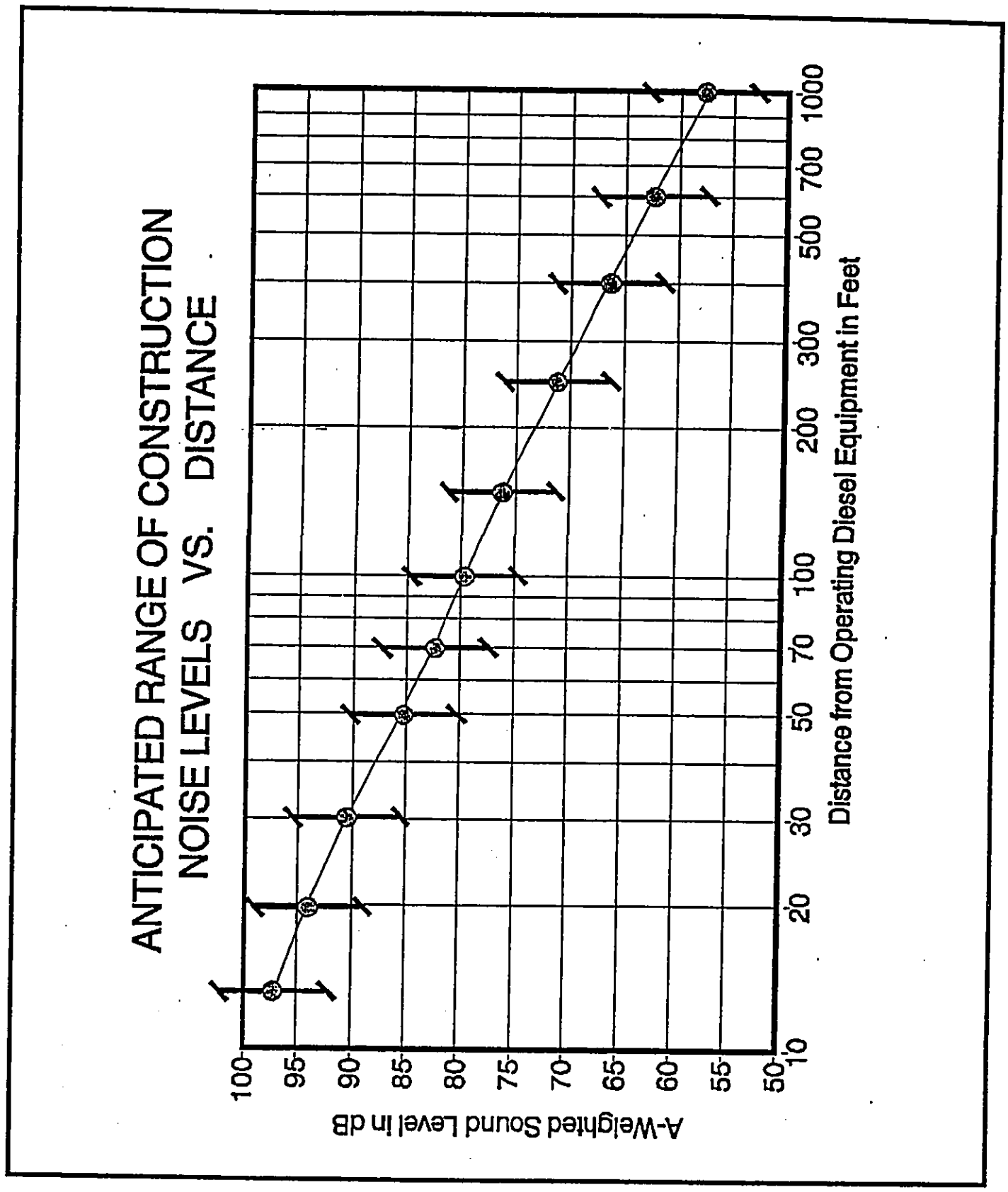
Traffic Noise. Impacts from traffic noise are possible at the proposed project dwelling units in all of the Affordable Mid-Rise, Market Tower, and Affordable Tower Buildings, and particularly those units which front Beretania Street, King Street, or Keeaumoku Street. Some of the upper floor units of Affordable Mid-Rise 7 which face Kalakaua Avenue may also be exposed to traffic noise levels greater than 65 Ldn. The upper and lower floor units whose windows or lanai doors face toward the interior of the project site may not be exposed to traffic noise levels greater than 65 Ldn since these units are expected to have limited field-of-views to the four primary access roadways to the project site.

Mitigation of high traffic noise levels is recommended for those units which are expected to be exposed to traffic noise levels greater than 65 Ldn. The use of sound attenuating windows, or total closure and air conditioning are possible means of mitigating high traffic noise levels. FHA/HUD standards require a minimum exterior-to-interior noise reduction of approximately 15 dB, which is achievable through the use of sound attenuating windows. Minimum exterior-to-interior noise reductions of approximately 25 dB are required to achieve an interior noise level of 45 Ldn, which is the recommended level of interior noise which minimizes risks of adverse health and welfare effects. This level of exterior-to-interior noise reduction is not difficult to obtain with standard construction materials and methods if total closure and air conditioning is used. Because of the relatively high levels of exterior noise associated with King, Keeaumoku, and Beretania Streets, it is suggested that glazing and exterior wall components with minimum STC 25 rating be used for the dwelling units which front these streets at setback distances less than 100 FT to minimize risks of occupant dissatisfaction.

General Construction Noise. Audible construction noise will

probably be unavoidable during the entire project construction period. The total time period for construction is unknown, but it is anticipated that the actual work will be moving from one location on the project site to another during that period. Actual length of exposure to construction noise at any receptor location will probably be less than the total construction period for the entire project. Typical levels of exterior noise from construction activity (excluding pile driving activity) are shown in FIGURE 13. The impulsive noise levels of impact pile drivers are approximately 15 dB higher than the levels shown in FIGURE 13, while the intermittent noise levels of vibratory pile drivers are at the upper end of the noise level ranges depicted in the figure. Typical levels of construction noise inside naturally ventilated and air conditioned structures are approximately 10 and 20 dB less, respectively, than the levels shown in FIGURE 13. The existing one-story State Department of Agriculture Building and other business offices and apartments within the neighboring buildings surrounding the project site are predicted to experience the highest noise levels during construction activities due to their close proximity to the construction site. Adverse impacts from construction noise are not expected to be in the "public health and welfare" category due to the temporary nature of the work, the business/commercial character of the neighborhood, the prevalent use of air conditioning within the adjoining buildings, and due to the administrative controls available for regulation of construction noise. Instead, these impacts will probably be limited to the temporary degradation of the quality of the acoustic environment in the immediate vicinity of the project site.

Mitigation of construction noise to inaudible levels will not be practical in all cases due to the intensity of construction noise sources (80 to 90+ dB at 50 FT distance), and due to the exterior nature of the work (pile driving, grading and earth moving, trenching, concrete pouring, hammering, etc.). The use of properly muffled construction equipment should be required on the job



CONSTRUCTION NOISE LEVELS VS. DISTANCE

FIGURE 13

site.

The incorporation of State Department of Health construction noise limits and curfew times, which are applicable on the island of Oahu (Reference 4), is another noise mitigation measure which is normally applied to construction activities, primarily to minimize construction noise impacts on residences. TABLE 6 depicts the allowed hours of construction for normal construction noise (levels which do not exceed 95 dB at the project's property line) and for construction noise which exceeds 95 dB at the project's property line. Noisy construction activities are not allowed on holidays, Saturdays, Sundays, during the early morning, and during the late evening periods under the DOH permit procedures.

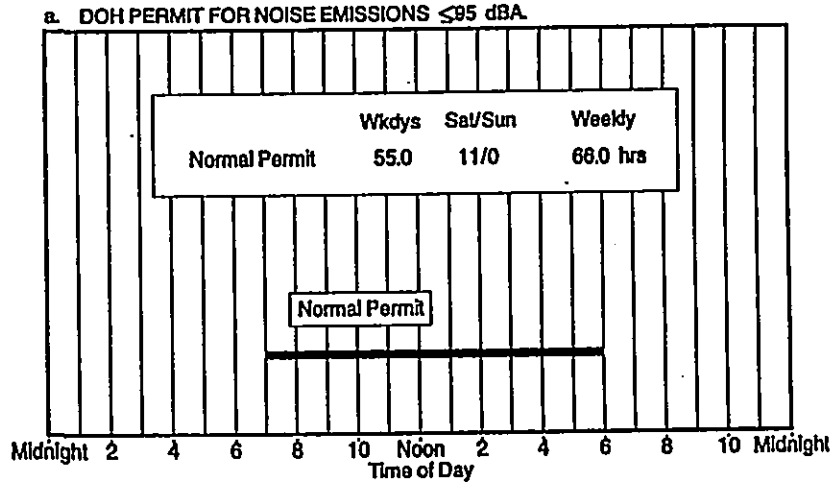
Vibration from Pile Driving. Pile driving will probably be necessary to implant sheet and concrete piles into the ground over the project site. Induced ground vibrations from these pile driving operations have the potential to cause architectural and structural damage to structures. The one-story stone building located on the adjacent State Department of Agriculture parcel is listed on the State Register of Historic Places and has been recommended for listing on the National Register of Historic Places. Because of the potential for vibration induced damage to the neighboring buildings, an attempt was made to evaluate the potential for damage using available literature on the subject. The foundation plans for the proposed project structures, the soils report, or structural integrity reports on the historic building were not available for review prior to the formulation of this vibration impact assessment.

Ground vibrations generated during pile driving operations are generally described in terms of peak particle (or ground) velocity in units of inches/second. The human being is very sensitive to ground vibrations, which are perceptible at relatively low particle velocities of 0.01 to 0.04 inches/second. Damage to structures, however, occur at even higher levels of vibration as indicated in TABLE 7. The most commonly used damage criteria for

TABLE 6

AVAILABLE WORK HOURS UNDER DOH PERMIT PROCEDURES FOR CONSTRUCTION NOISE

a. DOH PERMIT FOR NOISE EMISSIONS ≤95 dBA.



b. DOH PERMIT FOR NOISE EMISSIONS >95 dBA.

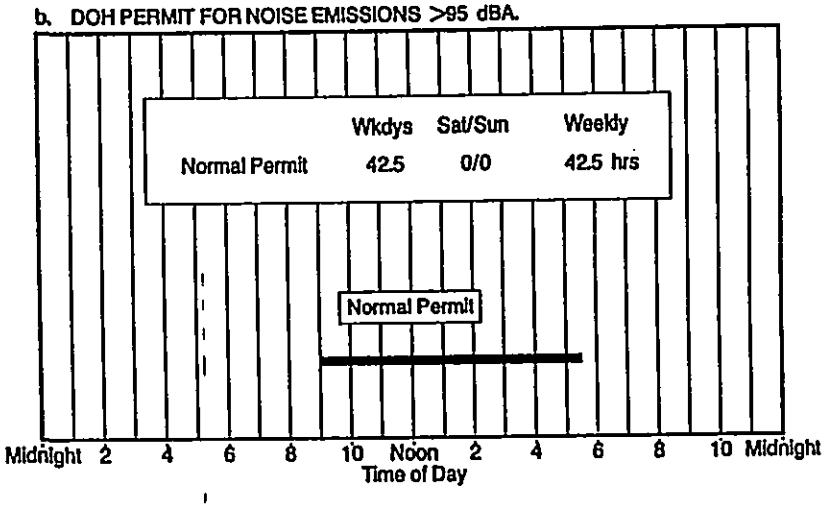


TABLE 7

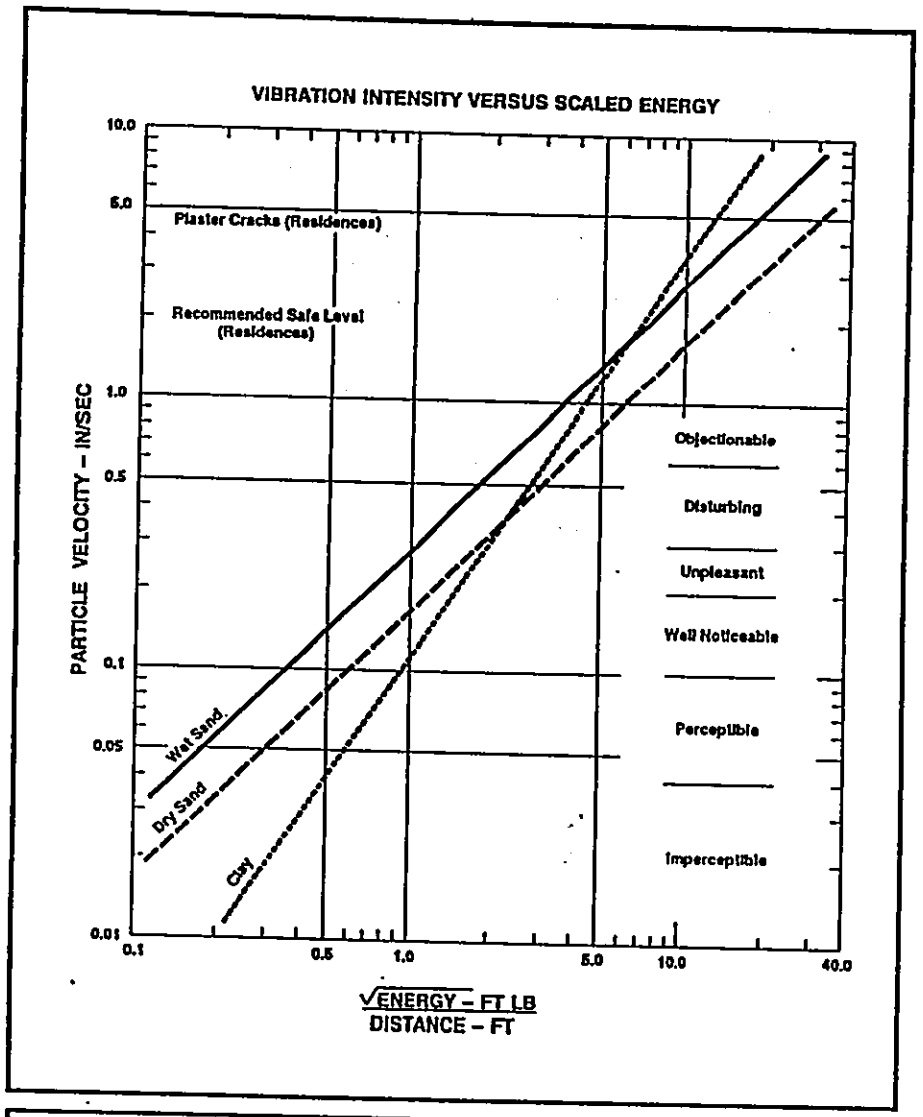
SUMMARY OF BUILDING DAMAGE CRITERIA

PEAK GROUND VELOCITY (mm/sec)	PEAK GROUND VELOCITY (in/sec)	COMMENT
193.04	7.6	Major damage to buildings (mean of data).
137.72	5.4	Minor damage to buildings (mean of data).
101.16	4.0	'Engineer structures' safe from damage.
50.8	2.0	Safe from damage limit (probability of damage <5%).
		No structural damage.
33.02	1.3	Threshold of risk of 'architectural' damage for houses.
25.4	1.0	No data showing damage to structures for vibration <1 in./sec.
15.24	0.6	No risk of 'architectural' damage to normal buildings.
10.16	0.4	Threshold of damage in older homes.
5.08	0.2	Statistically significant percentage of structures may experience minor damage (including earthquake, nuclear event, and blast data for old and new structures).
		No 'architectural' damage.
3.81	0.5 to 0.15	Upper limits for ruins and ancient monuments.
1.0	0.04	Vertical vibration clearly perceptible to humans.
0.32	0.01	Vertical vibration just perceptible to humans.

Source: 'State-of-the-Art Review: Prediction and Control of Groundborne Noise and Vibration from Rail Transit Trains'; U.S. Department of Transportation; December 1983.

structures is the 2.0 inches/second limit derived from work by the U.S. Bureau of Mines. A more conservative limit of 0.2 inches/second is also used, and is suggested for planning purposes on this project because of the repetitive nature of pile driving operations which can increase risks of damage due to fatiguing, plus the potential historic classification of the adjacent one-story stone building.

Based on measured vibration levels during pile driving operations under various soil conditions and at various distances, estimates of ground vibration levels vs. distance from the pile driver have been made for various soil conditions and for various energy ratings of the pile drivers. FIGURE 14, which was extracted from Reference 13, may be used to predict vibration levels for the soil conditions indicated. When coral layers must be penetrated, vibration levels can be expected to be higher than those shown in FIGURE 14, particularly if the adjacent structures are supported by the common coral layer. From FIGURE 14, and for wet sand soil conditions, the 0.2 inches/second vibration damage criteria will be exceeded at a scaled energy distance factor of approximately 0.7. The scaled energy distance factor is equal to the square root of the energy (in foot-pounds) per blow of the hammer divided by the distance (in feet) between the pile tip and the monitoring location. For a 30,000 foot-pound pile driver, a scaled energy distance of 0.7 equates to a separation distance of 247 FT. Under clay soil conditions, and using the prediction procedures contained in FIGURE 14, a shorter separation distance of 115 FT is required to not exceed the 0.2 inches/second criteria when using a 30,000 foot-pound pile driver. It should be noted that 0.2 inches/second vibration levels were measured from a 22,400 foot-pound pile driver at even shorter separation distances of approximately 30 FT in sandy, layered soil (Reference 14). The measurement data reported in Reference 14 are significantly lower than the vibration levels predicted by the methodology of Reference 13.



MAXIMUM VIBRATION INTENSITIES EXPECTED FROM PILE DRIVING

FIGURE 14

As indicated above, predictions of peak ground vibration levels vs. scaled energy distance factor from the driven pile are not precise, with initial uncertainty factor for a given location in the order of 10:1. For this reason, it is standard practice to employ seismograph monitoring of ground vibrations during pile driving operations with a 3-axis geophone or accelerometer. If pile drivers of approximately 30,000 foot-pounds or larger ratings are anticipated to be used on the job site, the initial vibration predictions indicate that there is some risk of exceeding the 0.2 inches/second vibration damage criteria at 100 to 250 FT separation distances, and monitoring during pile driving operations is warranted. Monitoring alone, however, may not be a practical mitigation measure unless there are alternative pile driving methods or foundation plans which can be employed if the damage criteria is exceeded. For these reasons, the following preventative measures are recommended for implementation during the planning and design phases of the project:

- In addition to the normal planning and design concerns regarding potential damage due to settling and heaving during construction, consideration should also be given to risks of damage due to vibration from pile driving. A damage criteria of 0.2 inches/second should be used in conjunction with the vibration prediction method of Reference 13 to identify the potential damage risk distances to the driven piles.

- If predicted vibration levels from pile driving exceed 0.2 inches/second at the one-story stone building, and predicted levels cannot be reduced by sizing of the pile driver or through the use of alternate types of piles (bored or non-displacement types), test piles should be driven and its vibrations monitored and recorded prior to completion of the foundation design. The monitoring of the test piles should be designed to measure the expected peak, 3-axis vibration

levels at the one-story stone building. The results of the monitoring should be used to define the empirical distance from the driven pile to the 0.2 inches/second damage risk location, and to evaluate the risks of structural damage to the adjacent structure during actual construction.

- o If predicted vibration levels from pile driving exceed 2.0 inches/second at the one-story stone building, the use of alternate types of piles should be considered for implementation during the design phase.

Parking Garage and Other On-Site Sources. The parking garage and retail/commercial areas are expected to be separated from the residential units by the recreation deck and by buffer space. This vertical or horizontal separation should be adequate to minimize potential noise conflicts within this mixed use project. Audible tire squeal noise from the circulation and parking areas of the project are possible. Tire squeal noise can usually be controlled though the use of a brushed or other coarse finish on the circulation driveways, and this type of treatment is recommended as a mitigation measure.

The proposed location of the K-2 School may result in interior classroom noise levels which exceed State Department of Education standards due to relatively high traffic noise levels along King Street. If so, closure and air conditioning of the classrooms may be required at the school.

The proposed location of the Recreation Center may result in complaints from nearby residents of the Market Tower 3 and possibly the Market Tower 1 complexes. If so, closure and air conditioning or partial closure and mechanical ventilation of the Recreation Center may be required.

Mechanical equipment, such as air conditioning chillers or cooling towers, kitchen exhaust fans, and garage ventilation fans are the primary on-site noise sources expected to be located on

the project site. This equipment, singly or together, has the potential of exceeding the allowable property line noise limits of the State DOH noise regulations (Reference 4). The State DOH noise limits which apply along the property boundaries of apartment or business districts are 60 dB and 50 dB during the daytime and nighttime periods, respectively. Typical noise levels of untreated mechanical equipment are significantly higher (by at least 10 dB) than the allowable DOH noise limits, such that sound attenuation treatment of the mechanical equipment will probably be required for compliance with DOH regulations. Compliance with the DOH noise limits should minimize risks of adverse noise impacts on neighboring properites and within the project area.

APPENDIX A. REFERENCES

(1) "Guidelines for Considering Noise in Land Use Planning and Control"; Federal Interagency Committee on Urban Noise; June 1980.

(2) "Environmental Criteria and Standards, Noise Abatement and Control, 24 CFR, Part 51, Subpart B"; U.S. Department of Housing and Urban Development; July 12, 1979.

(3) "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety"; Environmental Protection Agency (EPA 550/9-74-004); March 1974.

(4) "Title 11, Administrative Rules, Chapter 43, Community Noise Control for Oahu"; Hawaii State Department of Health; November 6, 1981.

(5) Barry, T. and J. Reagan, "FHWA Highway Traffic Noise Prediction Model"; FHWA-RD-77-108, Federal Highway Administration; Washington, D.C.; December 1978.

(6) Existing and Future Traffic Assignments in the Pawaa Redevelopment Project Environs; Transmittals from Wilbur Smith Associates, Inc.; June 15 and 16, 1993.

(7) January 17-18 and 22-23, 1991, 24-Hour Traffic Counts; Meter #331, King Street West of Kalakaua Avenue; Honolulu Department of Transportation Services.

(8) October 4-5, 1990, 24-Hour Traffic Counts; Meter #113, Kalakaua Avenue South of Beretania Street; Honolulu Department of Transportation Services.

(9) October 4-5, 1990, 24-Hour Traffic Counts; Meter #1066, Beretania Street East of Kalakaua Avenue; Honolulu Department of Transportation Services.

(10) January 16-17, 1991, 24-Hour Traffic Counts; Meters #110 and #330, Kalakaua Avenue at King Street; Honolulu Department of Transportation Services.

(11) January 24-25, 1991, 24-Hour Traffic Counts; Meters #330 and #109, Keeaumoku Street at King Street; Honolulu Department of Transportation Services.

(12) May 20-21, 1991, 24-Hour Traffic Counts; Meters #330 and #331, Keeaumoku Street at Beretania Street; Honolulu Department of Transportation Services.

(13) Wiss, John F., Janney, Elstner and Assoc.; "Damage of Pile Driving Vibration;" Highway Research Record, Number 155.

APPENDIX A (CONTINUED). REFERENCES

(14) Gutowski, T.G. and Dym, C.L.; "Propagation of Ground Vibration: A Review;" Journal of Sound and Vibration; July 1976.

APPENDIX B

EXCERPTS FROM EPA'S ACOUSTIC TERMINOLOGY GUIDE

Descriptor Symbol Usage

The recommended symbols for the commonly used acoustic descriptors based on A-weighting are contained in Table I. As most acoustic criteria and standards used by EPA are derived from the A-weighted sound level, almost all descriptor symbol usage guidance is contained in Table I.

Since acoustic nomenclature includes weighting networks other than "A" and measurements other than pressure, an expansion of Table I was developed (Table II). The group adopted the ANSI descriptor-symbol scheme which is structured into three stages. The first stage indicates that the descriptor is a level (i.e., based upon the logarithm of a ratio), the second stage indicates the type of quantity (power, pressure, or sound exposure), and the third stage indicates the weighting network (A, B, C, D, E.....). If no weighting network is specified, "A" weighting is understood. Exceptions are the A-weighted sound level and the A-weighted peak sound level which require that the "A" be specified. For convenience in those situations in which an A-weighted descriptor is being compared to that of another weighting, the alternative column in Table II permits the inclusion of the "A". For example, a report on blast noise might wish to contrast the LCdn with the LAdn.

Although not included in the tables, it is also recommended that "Lpn" and "LepN" be used as symbols for perceived noise levels and effective perceived noise levels, respectively.

It is recommended that in their initial use within a report, such terms be written in full, rather than abbreviated. An example of preferred usage is as follows:

The A-weighted sound level (LA) was measured before and after the installation of acoustical treatment. The measured LA values were 85 and 75 dB respectively.

Descriptor Nomenclature

With regard to energy averaging over time, the term "average" should be discouraged in favor of the term "equivalent". Hence, Leq, is designated the "equivalent sound level". For Ld, Ln, and Ldn, "equivalent" need not be stated since the concept of day, night, or day-night averaging is by definition understood. Therefore, the designations are "day sound level", "night sound level", and "day-night sound level", respectively.

The peak sound level is the logarithmic ratio of peak sound pressure to a reference pressure and not the maximum root mean square pressure. While the latter is the maximum sound pressure level, it is often incorrectly labelled peak. In that sound level meters have "peak" settings, this distinction is most important.

"Background ambient" should be used in lieu of "background", "ambient", "residual", or "indigenous" to describe the level characteristics of the general background noise due to the contribution of many unidentifiable noise sources near and far.

With regard to units, it is recommended that the unit decibel (abbreviated dB) be used without modification. Hence, DBA, PNDB, and EPNDB are not to be used. Examples of this preferred usage are the Perceived Noise Level (Lpn was found to be 75 dB. Lpn = 75 dB). This decision was based upon the recommendation of the National Bureau of Standards, and the policies of ANSI and the Acoustical Society of America, all of which disallow any modification of bel except for prefixes indicating its multiples or submultiples (e.g., deci).

Noise Impact

In discussing noise impact, it is recommended that "Level Weighted Population" (LWP) replace "Equivalent Noise Impact" (ENI). The term "Relative Change of Impact" (RCI) shall be used for comparing the relative differences in LWP between two alternatives.

Further, when appropriate, "Noise Impact Index" (NII) and "Population Weighed Loss of Hearing" (PWL) shall be used consistent with CHABA Working Group 69 Report Guidelines for Preparing Environmental Impact Statements (1977).

APPENDIX B (CONTINUED)

TABLE I

A-WEIGHTED RECOMMENDED DESCRIPTOR LIST

TERM	SYMBOL
1. A-Weighted Sound Level	L_A
2. A-Weighted Sound Power Level	L_{WA}
3. Maximum A-Weighted Sound Level	L_{max}
4. Peak A-Weighted Sound Level	L_{Apk}
5. Level Exceeded x% of the Time	L_x
6. Equivalent Sound Level	L_{eq}
7. Equivalent Sound Level over Time (T) (1)	$L_{eq(T)}$
8. Day Sound Level	L_d
9. Night Sound Level	L_n
10. Day-Night Sound Level	L_{dn}
11. Yearly Day-Night Sound Level	$L_{dn(Y)}$
12. Sound Exposure Level	L_{SE}

(1) Unless otherwise specified, time is in hours (e.g. the hourly equivalent level is $L_{eq(1)}$). Time may be specified in non-quantitative terms (e.g., could be specified a $L_{eq(WASH)}$ to mean the washing cycle noise for a washing machine).

SOURCE: EPA ACOUSTIC TERMINOLOGY GUIDE, BNA 8-14-78, NOISE REGULATION REPORTER.

APPENDIX B (CONTINUED)

TABLE II

RECOMMENDED DESCRIPTOR LIST

TERM	A-WEIGHTING	ALTERNATIVE[1] A-WEIGHTING	OTHER[2] WEIGHTING	UNWEIGHTED
1. Sound (Pressure)[3] Level	L_A	L_{pA}	L_B, L_{pB}	L_p
2. Sound Power Level	L_{WA}		L_{WB}	L_W
3. Max. Sound Level	L_{max}	L_{Amax}	L_{Bmax}	L_{pmax}
4. Peak Sound (Pressure) Level	L_{Apk}		L_{Bpk}	L_{pk}
5. Level Exceeded x% of the time	L_x	L_{Ax}	L_{Bx}	L_{px}
6. Equivalent Sound Level	L_{eq}	L_{Aeq}	L_{Beq}	L_{peq}
7. Equivalent Sound Level[4] Over Time(T)	$L_{eq(T)}$	$L_{Aeq(T)}$	$L_{Beq(T)}$	$L_{peq(T)}$
8. Day Sound Level	L_d	L_{Ad}	L_{Bd}	L_{pd}
9. Night Sound Level	L_n	L_{An}	L_{Bn}	L_{pn}
10. Day-Night Sound Level	L_{dn}	L_{Adn}	L_{Bdn}	L_{pdn}
11. Yearly Day-Night Sound Level	$L_{dn(Y)}$	$L_{Adn(Y)}$	$L_{Bdn(Y)}$	$L_{pdn(Y)}$
12. Sound Exposure Level	L_S	L_{SA}	L_{SB}	L_{Sp}
13. Energy Average value over (non-time domain) set of observations	$L_{eq(e)}$	$L_{Aeq(e)}$	$L_{Beq(e)}$	$L_{peq(e)}$
14. Level exceeded x% of the total set of (non-time domain) observations	$L_{x(e)}$	$L_{Ax(e)}$	$L_{Bx(e)}$	$L_{px(e)}$
15. Average L_x value	L_x	L_{Ax}	L_{Bx}	L_{px}

(1) "Alternative" symbols may be used to assure clarity or consistency.

(2) Only B-weighting shown. Applies also to C,D,E,.....weighting.

(3) The term "pressure" is used only for the unweighted level.

(4) Unless otherwise specified, time is in hours (e.g., the hourly equivalent level is Leq(1). Time may be specified in non-quantitative terms (e.g., could be specified as Leq(WASH) to mean the washing cycle noise for a washing machine.

APPENDIX D
TRAFFIC STUDY

PAWAA REDEVELOPMENT PROJECT

TRAFFIC STUDY

Prepared by

Wilbur Smith Associates

July 20, 1993

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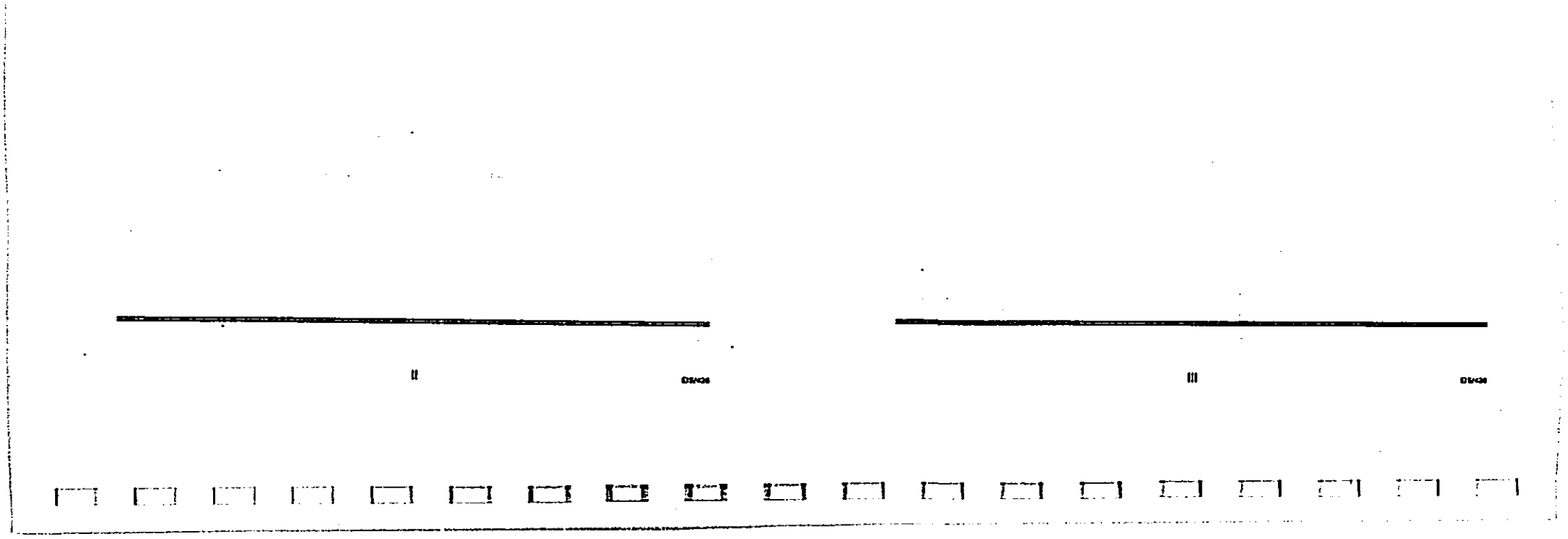
TABULATIONS

WSA WILBUR SMITH ASSOCIATES
PAWAA REDEVELOPMENT PROJECT TRAFFIC STUDY

ILLUSTRATIONS



INTRODUCTION

The Pawaa Redevelopment Project is planned as a mixed-use development with an emphasis on provision of affordable housing for Honolulu residents. The project site is located on a portion of two blocks bounded by King Street, Kaheka Lane, Beretania Street, and Keeaumoku Street. The 10.6-acre site is bisected by Young Street.

The project, sponsored by the housing agencies of the City and County of Honolulu and the State of Hawaii, will include "affordable" housing units, "market rate" housing units, a retail commercial center, community recreation center and a kindergarten through grade 2 public elementary school. The master plan for the project envisions the consolidation of the existing public and privately owned parcels into this mixed-use development. Incremental development of the project is expected to occur over a 10 to 12-year period, dependent upon market conditions.

This study documents existing traffic conditions in the vicinity of the Pawaa project site, and assesses future conditions both with and without the planned project. The analysis focuses on conditions at eleven key traffic signal-controlled intersections in the project site area. These intersections will be most directly affected by the traffic generated by the planned project. The analysis reflects project buildout by the Year 2004.

EXISTING CONDITIONS

The two-block project site, as depicted in Figure 1, is occupied by a broad range of public and private uses. Until recently, the most widely known occupant of the site was the City's Pawaa Annex, which included the Police Department headquarters and the Motor Vehicle and Licensing Division main offices for vehicle registration and driver's licensing. These activities were relocated to other sites, although the Police Department motorpool remains at the project site. The State Department of Agriculture's offices are located along King Street, including the park-like open space at the corner of King and Keeaumoku Streets.

The major private land use is the Meadow Gold Dairies packaging plant adjacent to Keeaumoku Street. Also included are several financial and retail service buildings, and a small apartment building.

The land uses adjacent to the project site include a mix of low-rise commercial activities ranging from small shops and restaurants to a supermarket and car dealership.

Present Roadway System and Traffic Volumes

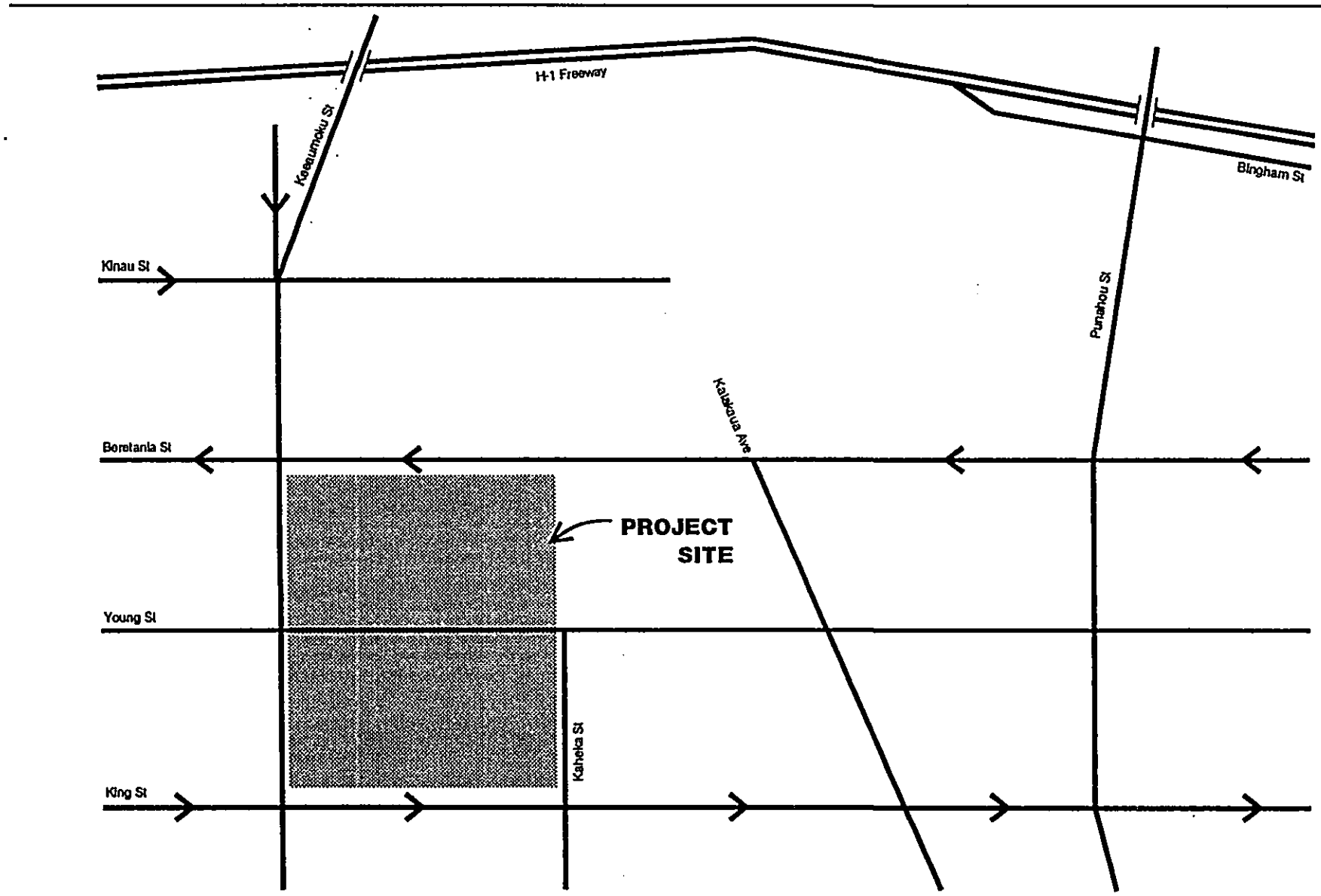
The project site is bounded by the following streets:

- King Street;
- Beretania Street;
- Keeaumoku Street; and
- Kaheka Street.

Other key streets include Young Street, Kalakaua Avenue, Kinau and Punahou Streets. Key project vicinity streets are described in detail below:

- King Street and Beretania Street form a one-way street couplet. King Street is six lanes wide and operates as a one-way street in the Diamond Head direction. Recent weekday traffic volumes on King Street approximate 38,000 vehicles. During the AM peak hour, King Street carries about 1,900 vehicles and accommodates between 3,100 and 3,300 vehicles during the PM peak hour.

- Beretania Street is five lanes wide adjacent to the project site. It is one-way in the Ewa direction and carries a weekday volume of about 30,000 vehicles near the project site. Beretania Street carries about 2,500 vehicles and 2,100 vehicles during the AM and PM peak hours, respectively, in the vicinity of the project.



WILBUR SMITH ASSOCIATES

Figure 1
PROJECT LOCATION

- Keeaumoku Street extends from the Ala Moana Shopping Center past the project site to the Makiki area and provides a connection to the major east/west streets serving this area of Honolulu. Near the project site, Keeaumoku Street provides two through lanes in each direction, plus turn lanes for the left or right turn movements at the cross streets. This road carries about 2,700 vehicles during the PM peak hour and about 2,000 vehicles during the AM peak hour.

- Kaheka Street is a two-way, two-lane street makai of King Street. Mauka of King Street, Kaheka Street extends to Young Street as a narrow, one-way maukabound street with a single traffic lane. The AM peak hour volume on the one-way segment approximates 30 vehicles, while the PM peak hour increases to about 200 vehicles.

- Young Street is a two-lane street that carries about 700 vehicles per hour during both the AM and PM peak hours. Daily traffic volumes on Young Street range between 8,000 and 10,000 vehicles near the project site.

- Kalakaua Avenue is a two-way, four-lane major roadway with left-turn pockets at intersections. The weekday daily traffic volume totals approximately 19,000 vehicles for both directions in the vicinity of the project site. This road carries 1,200 to 1,300 vehicles during the AM peak hour adjacent to the site and 1,700 to 1,800 vehicles during the PM peak hour.

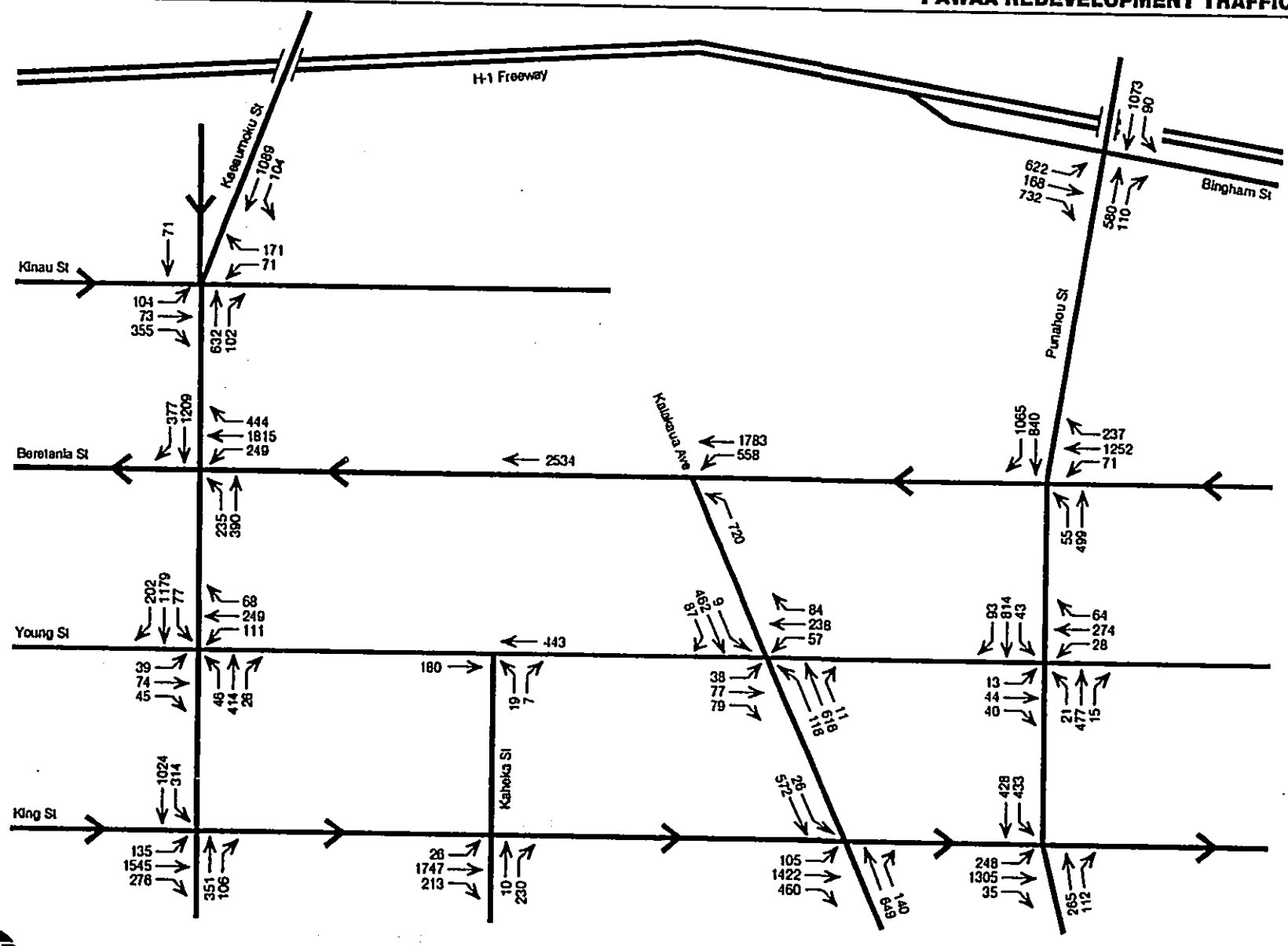
- Kinau Street is a one-way, two-lane street with a left-turn pocket at the intersection with Keeaumoku Street. This road carries 520 vehicles during the AM peak hour and 570 vehicles during the PM peak hour in the vicinity of the project site.

- Punahou Street is a two-way, four-lane arterial with left-turn pockets at intersections. This road carries about 1,370 vehicles during the AM peak hour and 1,820 vehicles during the PM peak hour in the vicinity of the project site.

Peak hour traffic counts are shown for each intersection near the project site during the AM peak hour in Figure 2, and for the PM peak hour in Figure 3. For the Punahou Street intersections new counts were conducted in May of 1993. At other locations, May 1991 counts were adjusted to reflect the relocation of the Pawaa Annex.

The Level of Service Concept

The Transportation Research Board (TRB) has developed standard procedures to provide qualitative descriptors of traffic operating conditions. The TRB evaluation method uses a concept known as level-of-service (LOS), which involves assigning a letter designation (from LOS A to LOS F) to indicate operational conditions of an intersection, or for the various street approaches or lanes at an intersection. LOS A represents the best of conditions, while LOS F represents severe congestion. These qualitative measures are illustrated in Figure 4. Each level of service category corresponds to a range of anticipated delay encountered by the average driver passing through the intersection. Another measure encountered



One-Way Street Segment

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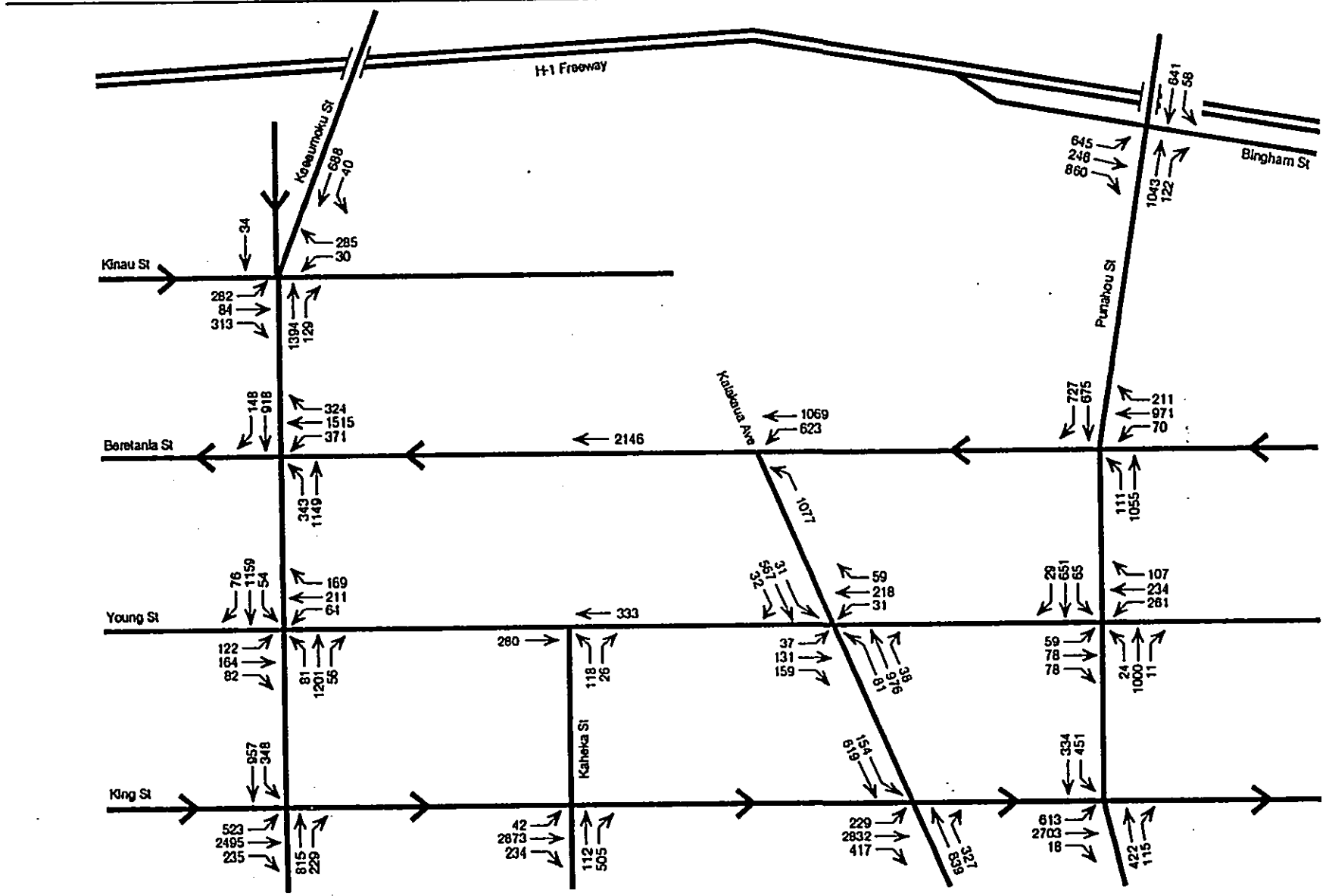
WILBUR SMITH ASSOCIATES

Figure 2

EXISTING (1993) AM PEAK HOUR TRAFFIC VOLUMES



One-Way Street Segment

Figure 3
EXISTING (1993) PM PEAK HOUR TRAFFIC VOLUMES

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WILBUR SMITH ASSOCIATES

The **OPERATIONS LEVEL METHODOLOGY**, which is described in the Transportation Research Board's Highway Capacity Manual, defines Level of Service (LOS) for signalized intersections in terms of delay. Technically, delay is the amount of time an average vehicle must wait at an intersection before being able to pass through the intersection. For signalized intersections, the relationship between LOS and delay is based on the average stopped delay per vehicle for a fifteen minute period.

LEVEL OF SERVICE 'A' - Delay 0.0 to 5.0 seconds

Describes operations with very low delay, i.e., less than 5 seconds per vehicle. This occurs when signal progression is extremely favorable. Most vehicles arrive during the green phase and are not required to stop at all.

Corresponding V/C ratios usually range from 0.00 to 0.60.

LEVEL OF SERVICE 'B' - Delay 5.1 to 15.0 seconds

Describes operations with delay in the range of 5 to 15 seconds per vehicle generally characterized by good signal progression and/or short cycle lengths. More vehicles are required to stop than for LOS 'A' causing higher levels of average delay.

Corresponding V/C ratios usually range from 0.61 to 0.70.

LEVEL OF SERVICE 'C' - Delay 15.1 to 25.0 seconds

Describes operations with delay in the range of 15 to 25 seconds per vehicle. Occasionally, vehicles may be required to wait more than one red signal phase. The number of vehicles stopping at this level is significant although many still pass through the intersection without stopping.

Corresponding V/C ratios usually range from 0.71 to 0.80.

LEVEL OF SERVICE 'D' - Delay 25.1 to 40.0 seconds

Describes operations with delay in the range of 25 of 40 seconds per vehicle. At LOS 'D', the influence of congestion becomes more noticeable. Many vehicles stop, and the proportion of vehicles not stopping declines. The number of vehicles failing to clear the signal during the first green phase is noticeable.

Corresponding V/C ratios usually range from 0.81 to 0.90.

LEVEL OF SERVICE 'E' - Delay 40.1 to 60.0 seconds

Describes operations with delay in the range of 40 to 60 seconds per vehicle. These high delay values generally indicate poor signal progression, long cycle lengths and high V/C ratios. Vehicles frequently fail to clear the intersection during the first green phase.

Corresponding V/C ratios usually range from 0.91 to 1.00.

LEVEL OF SERVICE 'F' - Delay 60.1 seconds plus

Describes operations with delay in excess of 60 seconds per vehicle. This condition often occurs with oversaturation, i.e., when arrival flow rates exceed the capacity of the intersection.

Corresponding V/C ratios of over 1.00 are usually associated.

SOURCE: Transportation Research Board, "Operations Level Methodology-Signalized Intersections", Highway Capacity Manual, Special Report 209, 1985.

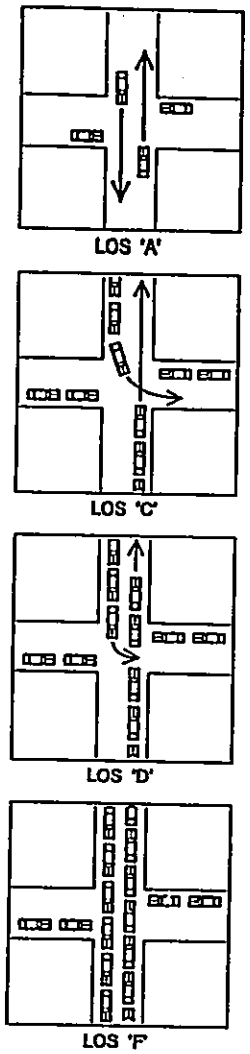

Figure 4
LEVEL OF SERVICE DIAGRAM

in these calculations is the volume-capacity ratio. This ratio is a measure of the critical lane flows compared to the overall theoretical capacity of an intersection. The operations and design methodology as presented in the *1985 Highway Capacity Manual* (Transportation Research Board, 1985) formed the basis for calculating the intersection levels of service found in this document.

Existing Levels of Service

Table 1 summarizes the calculated average delay per vehicle, the volume-capacity ratio, and the level of service for each of the eleven key study intersections. As shown in Table 1, three of the project area intersections experience operational problems, due in most cases to heavy peak hour through traffic.

Actual conditions on Keeaumoku Street are not fully described by the theoretical level of service calculations alone. On Keeaumoku Street, the traffic signal offsets are such that traffic flows are not efficiently handled in the mauka direction. This traffic signal timing results in queues forming at the Young Street intersection which stack back through the King Street intersection. Observed delay on Keeaumoku Street at the intersection of King Street exceeded the calculated delay on the maukabound approach during the PM peak hour. The observed average delay of about 60 seconds per vehicle for the maukabound through movement at the height of the PM peak hour was substantially greater than the calculated delay of 40 seconds. Since traffic was not able to consistently clear each intersection on Keeaumoku Street during the PM peak hour in the mauka direction, the observed characteristics of this street correspond to what is characteristic of LOS F.

At the intersection of Keeaumoku Street with Beretania Street, the conflict between the heavy Ewabound traffic versus the makai-bound through traffic and the left-turn movements on Keeaumoku Street results in the failure of the intersection during the AM peak hour. For the maukabound left-turn movement, which has a permitted/protected phase, vehicles were observed to stack and were required to sit through multiple signal cycles before clearing the intersection. This condition also prevailed during the PM peak hour.

At the intersection of Punahou Street/Beretania Street, a similar condition occurs with the maukabound left-turn movement during the PM peak hour. Although other movements of the intersection were observed to function adequately, the condition on the maukabound left-turn results in the intersection operation of LOS E/F.

Existing Transit Service

The project site is presently served by a number of TheBus routes. Figure 5 depicts transit routes currently serving the project site area. TheBus provides service in the vicinity of the site along King and Beretania Streets (Routes 1, 2, 5 and 6), Keeaumoku Street (Routes 5, 6, 17 and 18), Kalakaua Avenue (Route 2) and Punahou Street (Route 5).

Table 1
Existing Intersection Operating Conditions
Pawaa Redevelopment Project Traffic Study

	AM Peak Hour			PM Peak Hour		
INTERSECTION	V/C Ratio	Delay	LOS	V/C Ratio	Delay	LOS
Keeaumoku Street/King Street	0.849	12.9	B	0.966	N/A	E/F
Keeaumoku Street/Young Street	0.653	13.2	B	0.641	11.3	B
Keeaumoku Street/Beretania Street	1.048	N/A	F	0.963	N/A	E/F
Keeaumoku Street/Kinau Street	0.775	11.9	B	0.746	12.6	B
Kaheka Street/King Street	0.460	7.5	B	0.739	11.3	B
Kalakaua Avenue/King Street	0.591	12.4	B	0.901	23.5	C
Kalakaua Avenue/Young Street	0.482	8.3	B	0.575	8.2	B
Kalakaua Avenue/Beretania Street	0.813	10.1	B	0.749	24.4	C
Punahou Street/King Street	0.528	15.4	C	0.860	26.6	D
Punahou Street/Young Street	0.562	9.1	B	0.600	9.7	B
Punahou Street/Beretania Street	0.704	17.5	C	0.768	N/A[1]	E/F

N/A indicates that delay values cannot be estimated at these locations.

EDITAOR

Source: Wilbur Smith Associates, July, 1993.

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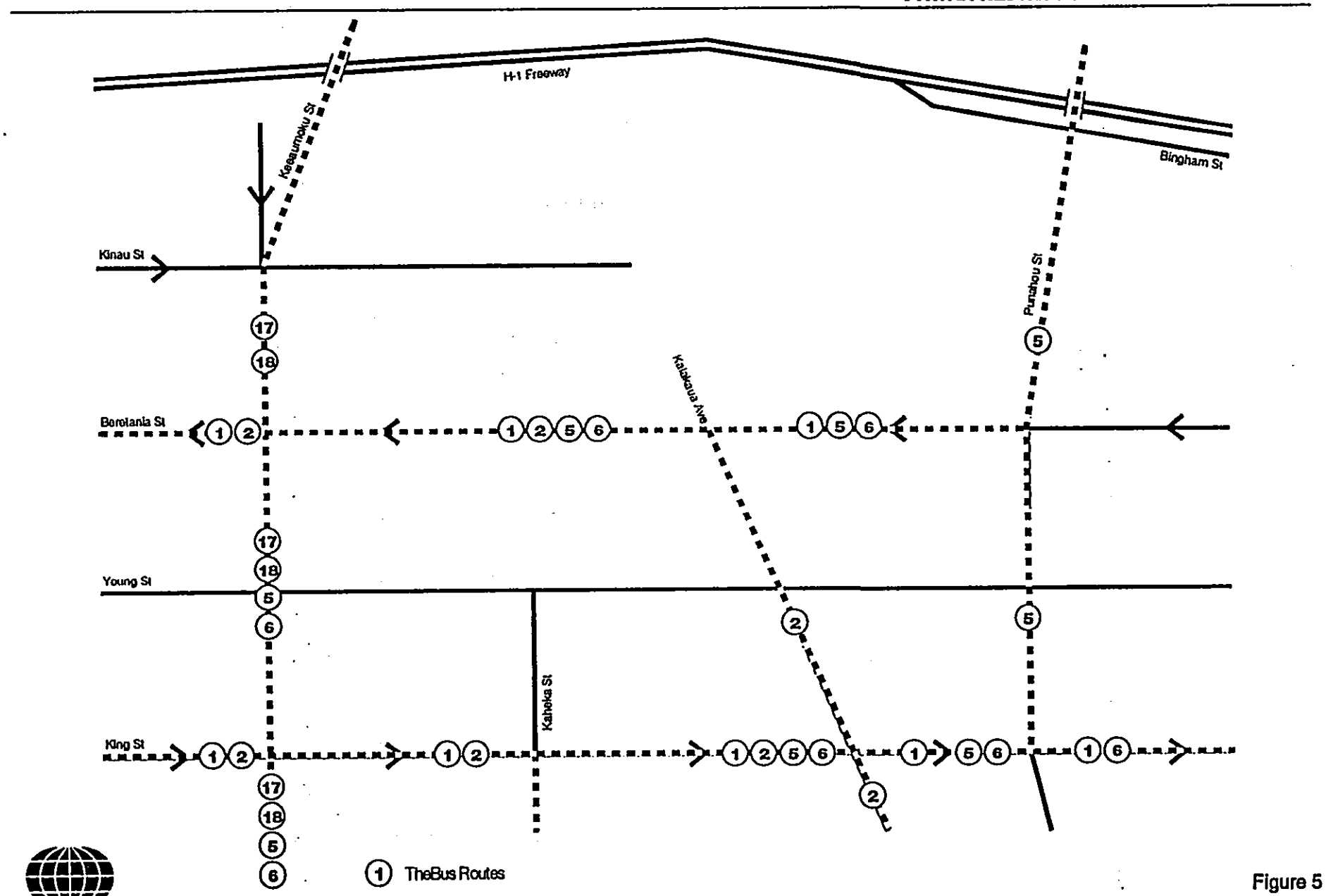

(1) TheBus Routes

Figure 5
EXISTING TRANSIT SERVICE

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- Route 1 provides service between the Kalihi and Hawaii Kai areas, and operates between the hours of 4:00 AM and 2:00 AM daily. This route operates with average daily headways of seven minutes. It provides direct service to the Civic Center, Downtown Financial District, Kalihi, and Kahala areas.

- Route 2 provides service between Waikiki and Kalihi-Liliha areas. It operates between 5:00 AM and 1:30 AM, with average headways of ten minutes or less throughout most of the day. The route provides service to the Civic Center and Downtown Financial District, as well as to the Waikiki, Kalihi Valley and Liliha areas. Route 2 also provides a transfer connection to TheBus routes operating along Kapiolani Boulevard.

- Route 5 provides service between Ala Moana Center and the Manoa Valley. It operates between 5:30 AM and 10:00 PM daily. Buses operate on average headways of 20 to 25 minutes throughout the day. This route provides service to points such as Paradise Park, Punahou School and the Holiday Mart area.

- Route 6 is a long, circuitous route providing service between the Pauoa area and Manoa Valley. It operates between 5:00 AM and 12:00 AM daily with average headways of 15 to 20 minutes throughout the day. Route 6 buses serve Ala Moana Center, the University of Hawaii Downtown Honolulu, and the Kakaako area.

- Route 17 provides service along a larger counter clockwise loop between the Makiki area and Ala Moana Center. It operates between 6:00 AM and 9:30 PM daily. Buses operate on average headways of 30 to 40 minutes throughout the day.

- Route 18 provides service between the University of Hawaii and Ala Moana Center between 7:00 AM and 9:30 PM daily. Buses operate on average headways of 50 to 60 minutes throughout the day and provide service to the University of Hawaii and the Ala Moana Shopping Center. The route operates only in the mauka-bound direction past the project site.

YEAR 2004 TRAFFIC CONDITIONS WITHOUT THE PROJECT

This section presents an assessment of future traffic conditions if no development occurs on the project site. The purpose of this analysis is to provide a baseline from which to assess future impacts of the planned Pawaa Redevelopment Project.

For the purposes of this analysis, traffic associated with the Police Department Headquarters and the Motor Vehicle and Licensing Division activities at the Pawaa Street Annex is included. Although these activities have been relocated, in the event that the Pawaa Redevelopment Project is not constructed, these buildings would be re-occupied by similar types of uses.

In recent years, area streets have experienced relatively low levels of traffic increases, with the average increases typically amounting to about one percent per year or less. It was assumed that this traffic growth rate would represent future increases that result from general increases in area activity. Area traffic volumes were also increased to reflect the planned Keeaumoku Superblock development (Haseko Hawaii, Inc.), the Hawaii Medical Service Association (HMSA) expansion, the Hale Kewalo housing development, the Nauru Project Phases I and II, the Aloha Motors Convention Center project, the Waikiki Landmark development, the Ala Moana Shopping Center expansion, and the One Kalakaua project. Each of these projects is expected to be developed by the Year 2004, and to contribute traffic to the streets within the study area.

Roadway Improvements

No roadway improvements are anticipated to occur on the streets adjacent to the Pawaa site without development of the project. As part of the Keeaumoku Superblock project, the section of Keeaumoku Street adjacent to that project's site (Makaloa to Rycroft Streets) will be widened to provide exclusive left-turn lanes.

Traffic Growth

Based upon recent trends in the area, it was assumed that general background traffic would increase by an average compounded rate of 1 percent per year, or by about 11.5 percent over the next 11 years. In addition to this background growth, traffic generated by the projects listed above was also incorporated into the estimate of future traffic flows. The resulting future traffic flows in the vicinity of the proposed Pawaa Redevelopment project are illustrated in Figure 6 for the AM peak hour and in Figure 7 for the PM peak hour.

The combined traffic increases from both the planned nearby projects and general area growth would result in significant increases in peak hour traffic on the major streets adjacent to the Pawaa Project site. Examples of these increases include the following:

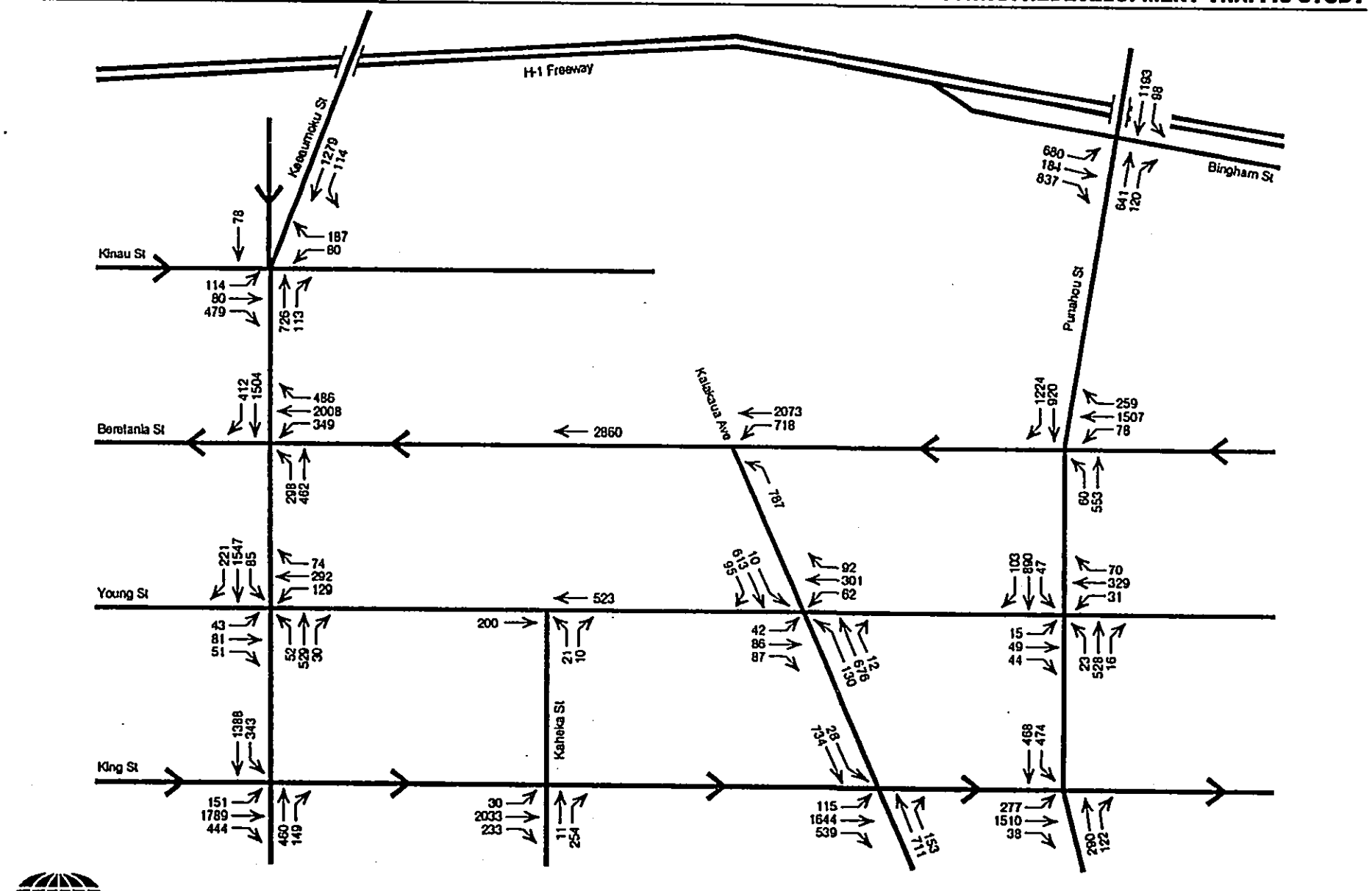

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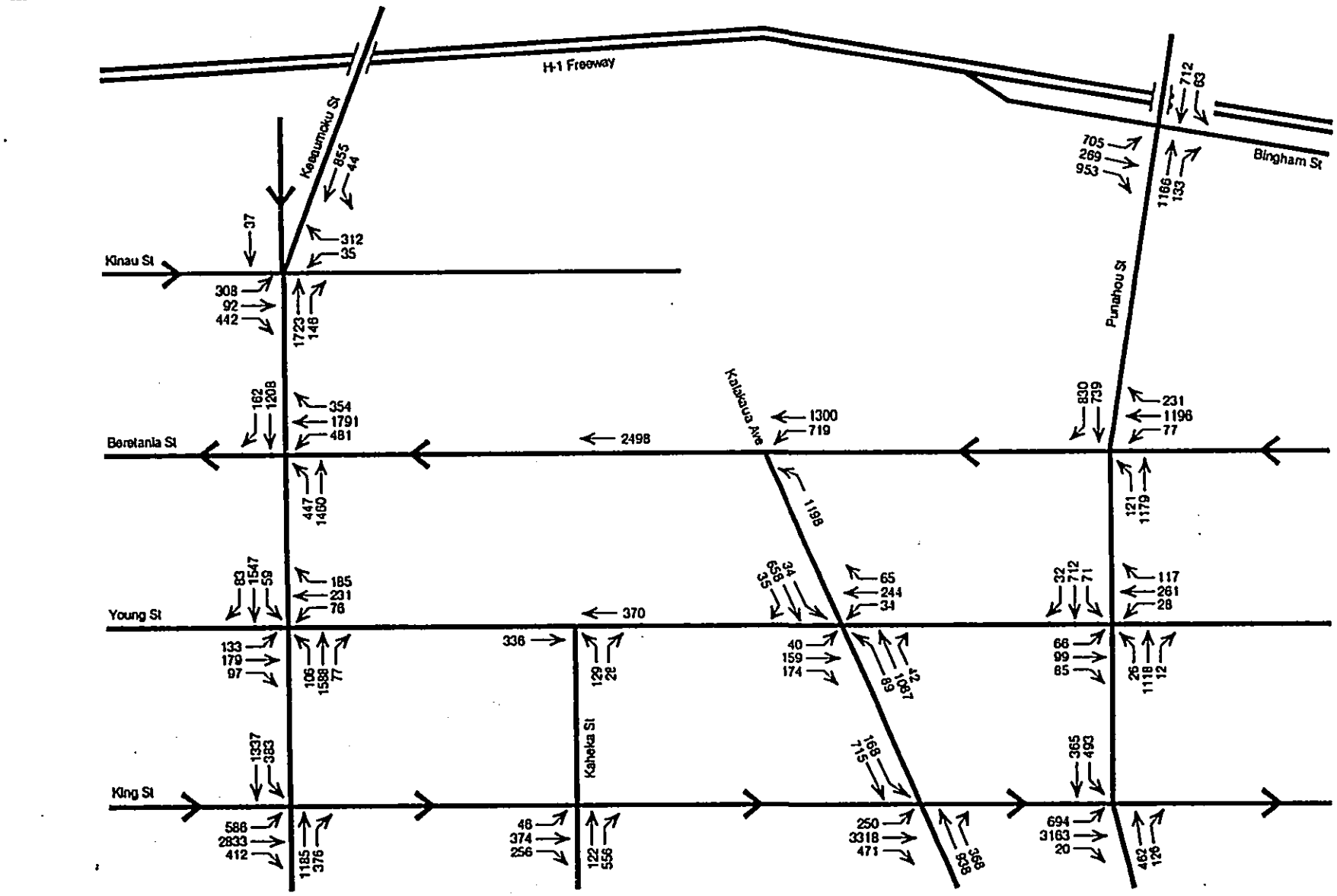
Figure 6

YEAR 2004 WITHOUT PROJECT AM PEAK HOUR TRAFFIC VOLUMES



One-Way Street Segment

Figure 7

YEAR 2004 WITHOUT PROJECT PM PEAK HOUR TRAFFIC VOLUMES

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Location	Peak Hour	Existing	Year 2004 Without Project	Percent Increase
Keeaumoku Street at Young Street	AM	1,824	2,342	28%
	PM	2,643	3,491	32%
King Street	AM	1,956	2,384	22%
	PM	3,253	3,831	18%
Beretania Street	AM	2,518	2,843	13%
	PM	2,230	2,626	18%
Young Street	AM	623	695	12%
	PM	718	807	12%

Levels-of-Service With No Project

As shown in Table 2, with the large traffic increases projected for the area, future intersection levels of service would deteriorate by a significant degree by year 2004 even if the Pawaa Redevelopment project is not built. Most notable are the projected levels of service at intersections along Keeaumoku Street. These four intersections would continue to deteriorate in terms of V/C ratio, vehicle delay and level of service without the project. At the intersection of King Street/Kalakaua Avenue, afternoon peak hour conditions were forecast to deteriorate from the present calculated V/C ratios of 0.901 to 1.027 by year 2004, while at the intersection of King Street/Punahou Street, afternoon peak hour conditions would deteriorate from the existing V/C ratios of 0.840 to 0.943 (LOS E/F) by 2004 without the project. The intersection of Punahou Street/Beretania Street would also deteriorate during the PM peak hour.

It is also important to note that the significant delays currently encountered in the maukabound direction on Keeaumoku Street would continue to grow worse under conditions without the project. These delays are related to the traffic signal off-sets, and the level of service calculation methodology does not accurately reflect this condition. Afternoon maukabound traffic on Keeaumoku Street would experience LOS F conditions at the King Street intersection with longer average vehicle delays than at present.

Table 2
Year 2004 Without the Project Intersection Operating Conditions
Pawaa Redevelopment Project Traffic Study

	AM Peak Hour			PM Peak Hour		
INTERSECTION	V/C Ratio	Delay	LOS	V/C Ratio	Delay	LOS
Keeaumoku Street/King Street	0.821	15.5	C	1.205	N/A	F
Keeaumoku Street/Young Street	0.814	41.2	E	1.031	N/A	F
Keeaumoku Street/Beretania Street	1.182	N/A	F	1.149	N/A	F
Keeaumoku Street/Kinau Street	0.987	23.4	C	0.965	21.8	C
Kaheka Street/King Street	0.532	8.0	B	0.844	14.9	B
Kalakaua Avenue/King Street	0.679	13.4	B	1.027	68.8	F
Kalakaua Avenue/Young Street	0.568	9.6	B	0.643	8.7	B
Kalakaua Avenue/Beretania Street	0.696	11.1	B	0.847	43.6	E
Punahou Street/King Street	0.589	18.0	C	0.960	31.4	D
Punahou Street/Young Street	0.635	10.3	B	0.668	11.0	B
Punahou Street/Beretania Street	0.818	31.3	D	0.860	N/A	E/F

N/A indicates that delay values cannot be estimated at these locations.

LOS300AMOR

Source: Wilbur Smith Associates, June, 1993.

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YEAR 2004 TRAFFIC CONDITIONS WITH THE PROJECT

The Pawaa Redevelopment Project is planned to occupy the two-block area bounded by King Street, Kaheka Lane, Beretania Street, and Keeaumoku Street. The planned project envisions a depressed Young Street between Kaheka Lane and Keeaumoku Street to create a single "superblock" for the planned mixed-use project. The planned Pawaa Redevelopment Project would include affordable and market-rate residential units, plus retail uses and several public facilities and uses.

Project Description

The planned Pawaa redevelopment project is a mixed-use development, consisting of residential units, retail space, a school facility, and public and recreational uses. The residential portion includes both market-rate condominiums (707 units) and affordable and elderly rental dwellings (1,061 units). The retail/commercial portion of the development encompasses about 145,000 square feet and includes a supermarket, a multi-plex cinema, and a retail center.

Young Street would remain open to through traffic within the project site. On the Ewa side of Kaheka Lane, Young Street would descend to one level below ground level at midblock, and then return to ground level just Diamond Head of Keeaumoku Street. The street would be built to City standards as a two-way, two-lane street with turn lanes. No on-street parking would be allowed between Keheka and Keeaumoku Streets.

Kaheka Lane would be converted to two-way traffic flow between King and Young Streets. It would be widened to provide at least a three-lane cross section, including turn lanes at King and Young Streets.

Parking for the commercial area, as well as some residential parking, would be located at the same level as the depressed section of Young Street (Level 3). Two lower levels of parking (Levels 1 and 2) would provide the majority of parking for residents. A smaller parking lot would be provided on Level 5 for the school, as well as use by persons visiting residents and by persons using the public recreational facilities.

Driveway access to the project would be primarily located along Young Street, with accesses also provided along Beretania Street and at Kaheka Lane. Key driveway features include:

- Entry/exit to the commercial area parking (Level 3) would be primarily via one or two driveways located along the depressed segment of Young Street. Residents may also access Levels 1 and 2 parking via these driveways;
- A direct entry ramp down to Level 2 resident parking would be located from Young Street opposite of Kaheka Lane;

- A direct exit ramp up from Level 1/2 resident parking would be connected to Beretania Street at the mauka-Diamond Head corner of the project;
- A one-way makai-direction circulation driveway would be provided from Beretania Street to Young Street along the Diamond Head boundary of the project;
- A two-way driveway connection would be provided to Beretania Street for the Level 5 parking area; and
- A one-way mauka direction driveway would be provided from Young Street, opposite Kaheka Lane, to the supermarket delivery/loading area. Exit would be via the one-way Beretania-to-Young Street circulation driveway.

Roadway Improvements With the Project

To accommodate the projected increase in traffic flow with the project, a number of roadway geometric improvements are proposed. These improvements include:

1. Remove parking along the mauka side of King Street to provide an additional lane adjacent to the project which would be used as a left-turn/deceleration lane to the project (Kaheka Lane). At present, use of this parking is restricted only in the PM peak hour.
2. Widen Beretania Street (by 10 feet) at the approach to its intersection with Keeaumoku Street to add a new left-turn lane for the left-turn movement from Beretania Street to Keeaumoku Street.
3. Widen Keeaumoku Street by 10 feet from Young Street to Beretania Street to accommodate a second maukabound left-turn lane from Keeaumoku Street onto Beretania Street.
4. Re-stripe Keeaumoku Street between Young Street and King Street to accommodate a second makaibound left-turn lane for the left-turn from Keeaumoku Street onto King Street.

Trip Generation

The amount of traffic generated by the proposed project was estimated by applying standard trip generation equations found in the Institute of Transportation Engineers' (ITE) publication, *Trip Generation* (Fifth Edition). These rates are summarized for each land use in Table 3.

For the entire project, the application of these equations resulted in an estimated 1,385 PM peak hour trips, 763 AM peak hour trips, and 15,063 daily trips. These are broken down by land use type and development phase in Table 4.

YEAR 2004 TRAFFIC CONDITIONS WITH THE PROJECT

The Pawaa Redevelopment Project is planned to occupy the two-block area bounded by King Street, Kaheka Lane, Beretania Street, and Keeaumoku Street. The planned project envisions a depressed Young Street between Kaheka Lane and Keeaumoku Street to create a single "superblock" for the planned mixed-use project. The planned Pawaa Redevelopment Project would include affordable and market-rate residential units, plus retail uses and several public facilities and uses.

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Table 3
Trip Generation Rates
Pawaa Redevelopment Project Traffic Study

Land Use	Unit/Size(S)	Daily Trip Generation Rate/Equation	Time Period: AM Peak Hour Rate/Equation	In %	Out %	PM Peak Hour Rate/Equation	In %	Out %
High Rise Condominiums	Unit	T = 4.18(X)	T = 0.34(X)	19	81	T = 0.37(X)	62	38
High Rise Rental	Unit	T = 4.2(X)	LN(T) = 0.967LN(X) - 1.136	31	69	LN(T) = 0.937LN(X) - 0.693	61	39
Mid Rise Rental	Unit	T = 4.2(X)	LN(T) = 0.967LN(X) - 1.136	31	69	LN(T) = 0.937LN(X) - 0.693	61	39
Elderly Rental	Unit	*T = 10(PM Peak Hour)	T = 0.05(X)	50	50	T = 0.06(X)	62	38
Retail/Commercial	1000 sq ft	LN(T) = 0.825LN(X) + 5.985	LN(T) = 0.689LN(X) + 2.378	63	37	LN(T) = 0.637LN(X) + 3.553	50	50
Supermarket	1000 sq ft	*T = 10(PM Peak Hour)	T = 2.01(X)	70	30	T = 10.34(X)	51	49
Cinema	1000 sq ft	*T = 10(PM Peak Hour)	NA	NA	NA	T = 3.06(X)	64	36
Office Use	1000 sq ft	LN(T) = 0.756LN(X) + 3.765	T = 1.90(X)	89	11	T = 1.87(X)	17	83
K-2 School	1000 sq ft	T = 10.72(X)	T = 2.74(X)	60	40	T = 2.49(X)	56	44
Community Recreation	1000 sq. ft.	*T = 10(PM Peak Hour)	T = 1.06(X)	62	38	T = 1.36(X)	28	72

Source: Wilbur Smith Associates, July, 1993.

Table 4
Project Site Trip Generation
Pawaa Redevelopment Project Traffic Study

LAND USE	SIZE	DAILY TRIPS	TIME PERIOD: AM PEAK HOUR TRIPS	IN	OUT	PM PEAK HOUR TRIPS	IN	OUT
High Rise Condominiums	707 Units	2,955	240	46	195	262	162	99
Affordable Rental	884 Units	3,713	259	80	179	288	176	112
Elderly Rental	177 Units	142	9	4	4	14	9	5
Retail/Commercial	40 k sq ft	2,640	60	38	22	246	123	123
Supermarket	40 k sq ft	4,136	80	56	24	414	211	203
Cinema	40 k sq ft	1,232	76	38	38	123	79	44
K-2 School	10 k sq ft	107	27	16	11	25	14	11
Community Recreation	10 k sq ft	138	11	7	4	14	4	10
Total:		15,063	763	286	478	1,385	777	608

Source: Wilbur Smith Associates, July, 1993.

Before assigning the trips to the roadway system, the trip generation estimates were reduced to account for several factors. First, trip generation estimates are derived from surveys of freestanding developments. Because this is a mixed use project, some trips do not require the use of a vehicle. For example, residents would be able to shop for groceries without leaving the project site. Second, peak hour trip rates represent the highest one-hour trip generation over a two-hour period. Usually, the highest one-hour for each land use does not occur at the same time. Also, some of the retail oriented trips would be captured from other existing retail markets; thus, they would be on the area's roadway system, traveling to a different retail center if the project were not constructed. The residential trip generation was reduced by a conservative five percent to account for these occurrences. The whole number of residential reductions was then subtracted from the other uses in proportion to their generation. The resulting number of new trips assigned to the roadway system amounted to 1,329 PM peak hour trips and 713 AM peak hour trips.

Finally, some of the vehicle trips stopping at the project retail areas would be passing the site as part of their trip to/from another destination. These "pass-by" trips are not new trips on the adjacent roadways, although they would introduce additional turning movements at the project driveways. The retail and supermarket generations were reduced by 41.5 percent to account for these "pass-by" trips. This percentage was derived from the ITE *Trip Generation Manual* based on the number of vehicle trips past the project site (76,000 daily trips accomplished on King Street, Young Street, and Beretania Street in an average weekday) and the size of the retail uses on the project site.

Traffic Distribution and Assignment

Vehicle trips generated by the Pawaa Redevelopment Project were distributed to the adjacent roadway system as follows:

- 34 percent to and from the Ewa direction;
- 14 percent in the mauka direction (8 percent on Keeaumoku Street and 6 percent on Punahou Street);
- 14 percent in the Diamond Head direction; and,
- 38 percent in the makai direction (Waikiki, Kapiolani, Ala Moana Center, and Kakaako areas).

The project concept plan encourages vehicle trips to/from particular project components to use specific parking locations and driveways. Accordingly, all trips generated by the residential units were assumed to use the driveways on Kaheka Lane and on Young Street (Level 3). Trips generated by the retail and cinema portions of the project were assigned to driveways along Young Street, and trips to/from the school and Community Recreation Center were all assumed to use the driveway on Beretania Street.

The resulting traffic assignment with these changes plus project traffic is illustrated in Figure 8 for the AM peak hour and in Figure 9 for the PM peak hour. The largest increases would occur in the PM peak hour. The estimated increases resulted in the following approximate increases in PM peak hour traffic flows as compared to conditions without the project:

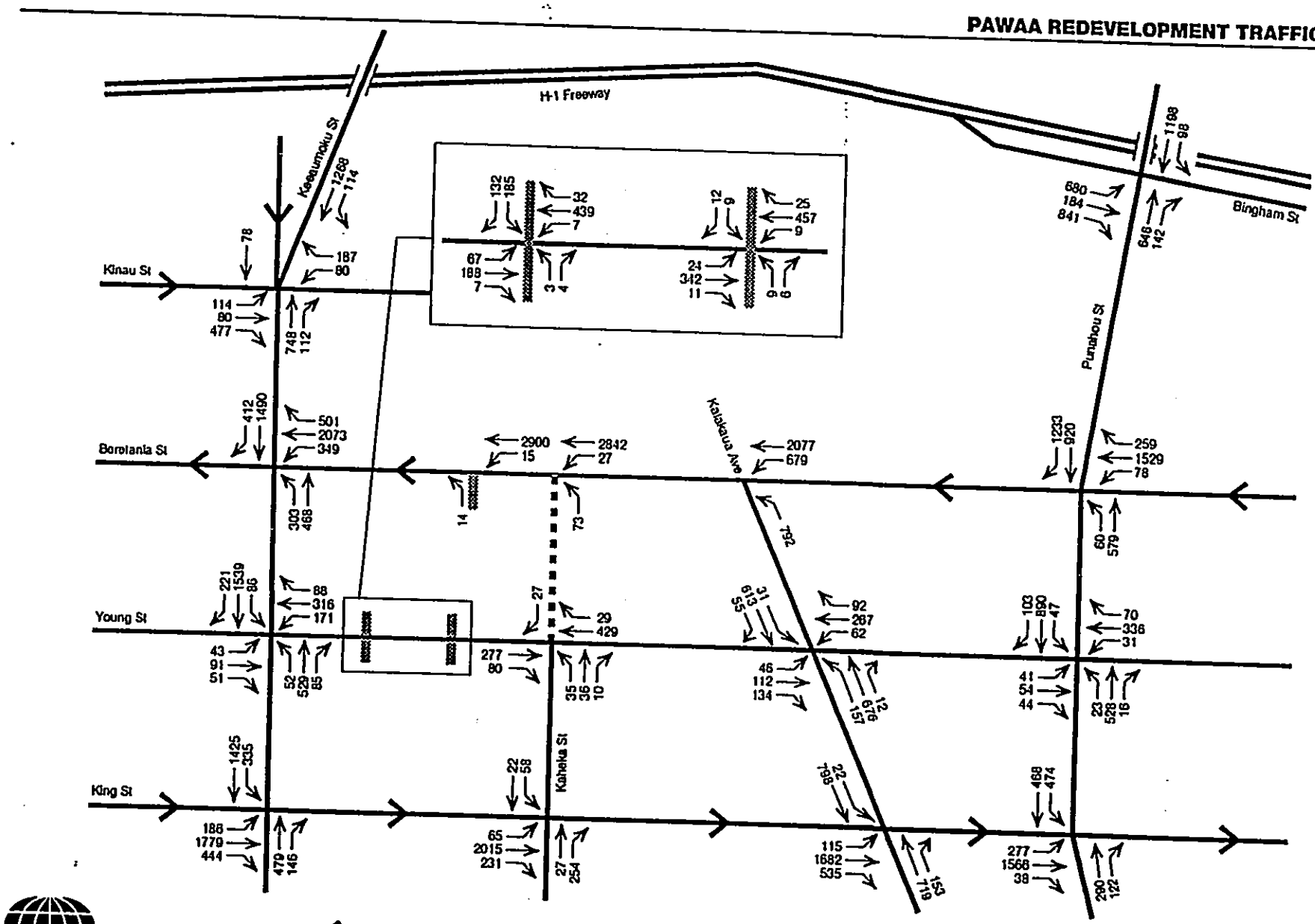
- King Street (Ewa of Keeaumoku Street): Up from about 3,800 vph to 4,000 vph (a 5 percent increase);
- Keeaumoku Street (between Young Street and Beretania Street): Up from 3,600 vph to 3,700 vph (a 3 percent increase);
- Beretania Street (Ewa of Keeaumoku Street): Up from 2,400 vph to 2,500 vph (a 4 percent increase);
- Kalakaua Avenue (between King Street and Young Street): Up from 2,100 vph to 2,300 vph (a 9 percent increase);
- Punahou Street (mauka of Beretania Street): Up from 2,900 vph to 2,950 vph (a 2 percent increase); and
- Young Street (between Keeaumoku Street and Kaheka Lane): Little change, with the street continuing to carry about 800 vph.

Intersection Service Levels With the Project

The Year 2004 levels of service are listed in Table 5 for 11 key intersections adjacent to the project site. The calculated service levels reflect both the increased background and project traffic, and the planned roadway modifications listed previously in this section.

During the AM peak hour, 10 of the 11 study intersections are expected to operate within intersection capacities. The intersection of Keeaumoku Street/Beretania Street would be over capacity, but the V/C ratio of 1.055 with the project would be an improvement over the 1.182 V/C ratio without the project. The two proposed turn lanes at this location would more than offset the estimated increase in traffic. The intersection of Keeaumoku Street/Young Street would also experience an operational improvement.

On Keeaumoku Street adjacent to the project site, the project is expected to result in similar or improved intersection conditions, when compared to the future conditions without the project, in the PM peak hour. However, at the intersection of Keeaumoku Street/Kinau Street, an increase in Diamond Head bound right-turns from Kinau Street would result in an increase in the overall intersection volume-to-capacity ratio from 0.965 without the project to 1.006 with the project. Also in the PM peak hour, the project generated traffic would result in slight worsening of conditions at the intersections of Kalakaua Avenue/King Street and Punahou Street/Beretania Street, where conditions would be at LOS E/F or LOS F, both with and without the addition of the project traffic.



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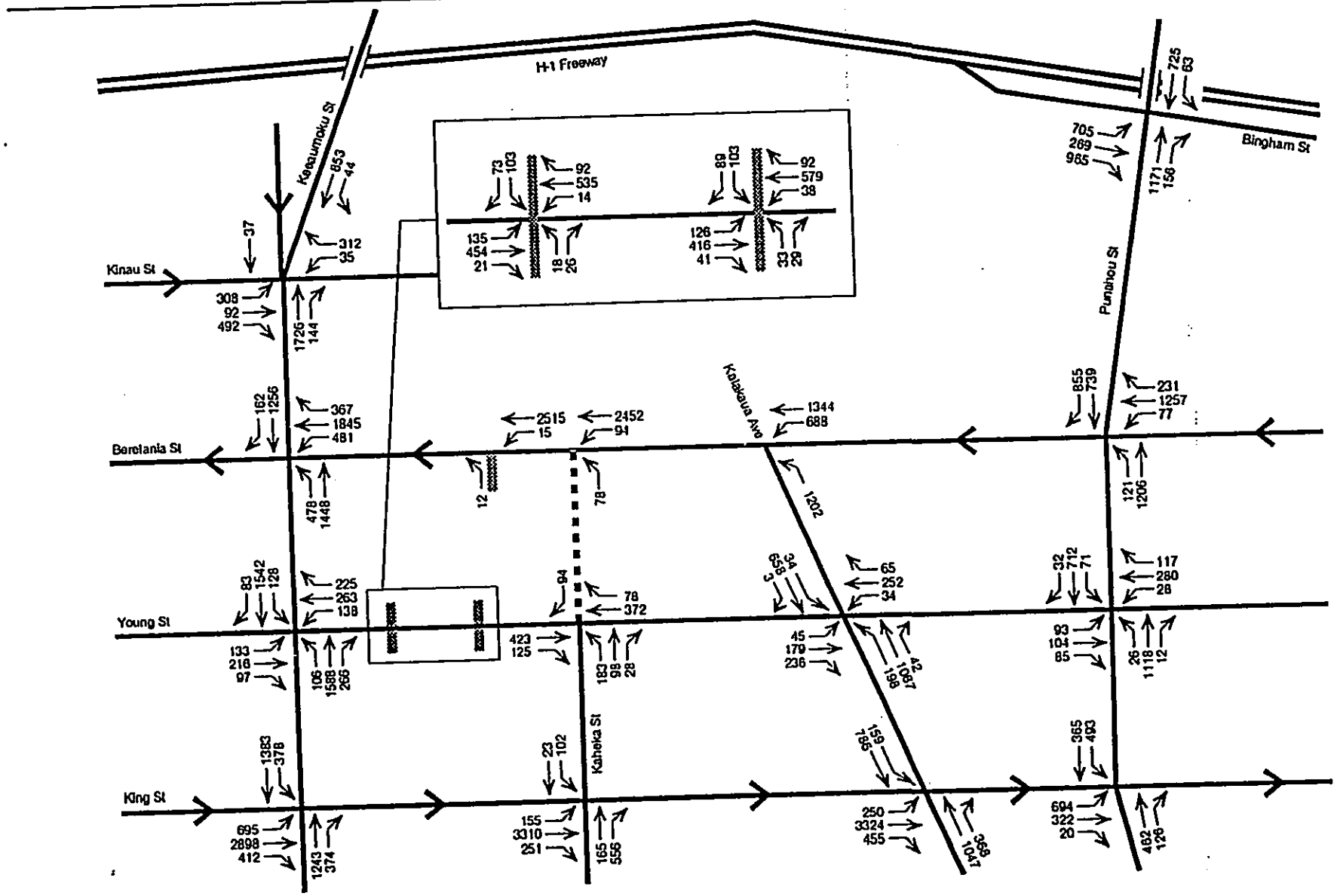
WILBUR SMITH ASSOCIATES

Figure 8

YEAR 2004 WITH PROJECT AM PEAK HOUR TRAFFIC VOLUMES



One-Way Street Segment New Road Project Driveways

Figure 9

YEAR 2004 WITH PROJECT PM PEAK HOUR TRAFFIC VOLUMES

PAWAA2.HWI\BASE\WITHPM 6/16/93CRL

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Table 5
Year 2004 With the Project Intersection Operating Conditions
Pawaa Redevelopment Project Traffic Study

	AM Peak Hour			PM Peak Hour		
INTERSECTION	V/C Ratio	Delay	LOS	V/C Ratio	Delay	LOS
Keeaumoku Street/King Street	0.828	16.0	C	1.098	81.6	F
Keeaumoku Street/Young Street	0.848	39.0	D	1.280	N/A	F
Keeaumoku Street/Beretania Street	1.055	71.9	F	0.976	33.5	D
Keeaumoku Street/Kinau Street	0.991	23.9	C	1.006	25.7	D
Kaheka Street/King Street	0.528	8.1	B	0.884	17.9	C
Kalakaua Avenue/King Street	0.699	13.5	B	1.056	75.3	F
Kalakaua Avenue/Young Street	0.575	9.8	B	0.655	9.2	B
Kalakaua Avenue/Beretania Street	0.698	11.1	B	0.915	44.9	E
Punahou Street/King Street	0.597	17.9	C	0.969	30.6	D
Punahou Street/Young Street	0.640	10.7	B	0.745	14.7	B
Punahou Street/Beretania Street	0.826	32.2	D	0.871	N/A	E/F

N/A indicates that delay values cannot be estimated at these locations.

LOS2004P/AOR

Source: Wilbur Smith Associates, July, 1993.

TP/438

Project Traffic Increases on Freeway Ramps

Approximately 15 percent of the project trips are forecast to use the H-1 Freeway for travel to or from the project. Given this distribution of these trips between several on- and off-ramps, the number of trips generated by the project would not be large enough to result in a substantial increase on any individual freeway ramp. Table 6 shows the increase in the number of vehicle trips and the resulting percentage increase in ramp traffic as a result of the project. As the table shows, most freeway ramps would experience an increase of about one percent or less. The H-1 Freeway eastbound off-ramp to Kinau Street would experience a 3.4 percent increase during the PM peak hour.

With the relatively low levels of traffic increases at these ramps, no measurable degradation of the operations of these facilities would be expected.

Access Point Operating Conditions

The analyses of the expected traffic volumes and roadway characteristics indicate that the intersection of Young Street with Kaheka Lane and with the access driveway in the depressed segment of Young Street could potentially experience operational problems. None of the other access points would be expected to experience operational problems because of comparatively low levels of traffic.

Based on unsignalized intersection analysis, all of the movements at the Young Street intersections with the access points and with Kaheka Lane would operate at LOS E or better, with most functioning at LOS C or better. Table 7 provides a summary of the projected intersection operating conditions at the depressed Young Street access driveway and at Kaheka Lane based on STOP sign control of Kaheka Lane and the driveway. As Table 7 shows, both of these intersections would experience LOS E conditions for one left-turn movement. These conditions indicate that traffic volumes at one or both locations may reach levels necessitating installation of traffic signal controls.

Recent research in the area of Two-Way-Stop-Controlled (TWSC) intersections indicates that the current analysis technique used in the analysis of TWSC intersections makes overly conservative estimates of movement operations. The Transportation Research Board (TRB) is currently in the process of revising Chapter 10 of the *Highway Capacity Manual* to correct this and other anomalies discovered about current unsignalized intersection analysis techniques.

Introduction of new traffic signals, when not warranted, can introduce longer average intersection delays, require more vehicles to slow or stop impacting air quality and noise levels, and can result in increased incidents of traffic accidents. It is recommended that conditions at these intersections be monitored to determine if signalization would be appropriate in the future. If monitoring reveals that signalization would be warranted, one or both of the intersections should be signalized.

The intersection of the Cinema-Retail-Residential Access Driveway with Young Street would be located in the depressed section of Young Street. Grades on either side of this intersection could limit sight distance, which could represent a problem whether the intersection is STOP-sign or traffic signal controlled. Careful consideration should be given to sight distance requirements during the design of this intersection and adjacent roadway segments.

Table 6
Project Traffic Increases on Freeway Ramps
Pawaa Redevelopment Project Traffic Study

Ramp	Morning Peak Hour Existing	Year 2004 W/out the Project	Year 2004 With the Project	Project Trips	Project Increase	Afternoon Peak Hour Existing	Year 2004 W/out the Project	Year 2004 With the Project	Project Trips	Project Increase
Eastbound Ramps										
Kinau Street Off-Ramp	1,743	2,072	2,097	25	1.2%	1,858	1,954	2,022	68	3.4%
Pakoi Street On-Ramp	694	787	791	4	0.5%	1,111	1,290	1,295	5	0.4%
Punahou Street Off-Ramp	2,096	2,374	2,379	5	0.2%	1,904	2,136	2,148	12	0.6%
Westbound Ramps										
Lunalilo Street On-Ramp	2,454	2,802	2,832	30	1.1%	2,533	2,864	2,896	32	1.1%
Lunalilo Street Off-Ramp	968	1,078	1,078	0	0.0%	716	799	799	0	0.0%
Punahou Street On-Ramp	1,045	1,158	1,177	9	0.8%	787	955	964	9	0.9%
Alexander Street On-Ramp	1,301	1,458	1,467	9	0.6%	1,551	1,745	1,754	9	0.5%
Wilder Street Off-Ramp	956	1,117	1,123	5	0.4%	849	991	1,003	12	1.2%

Source: Wilbur Smith Associates, June, 1993.

Table 7
Project Access Point Operating Conditions
Pawaa Redevelopment Project Traffic Study

INTERSECTION	AM Peak Hour Reserve Capacity	AM Peak Hour LOS	PM Peak Hour Reserve Capacity	PM Peak Hour LOS
Kaheka Street/Young Street				
NB Kaheka Street Left-Turn	265	C	1	E
NB Kaheka Street Shared Through/Right-Turn	376	B	206	C
SB Kaheka Shared Left/Through/Right-Turn	652	A	597	A
EB Young Street Left	753	A	753	A
WB Young Street Left	841	A	689	A
Cinema-Retail-Residential Access/Young Street (1)				
NB Retail Access Shared Left/Through/Right-Turn	391	B	164	D
SB Cinema-Residential Access Shared Left-Turn	127	D	17	E
SB Cinema-Residential Access Shared Right-Turn	517	A	488	A
EB Young Street Left	679	A	452	A
WB Young Street Left	992	A	716	A

ABBREVIATIONS:
NB = Northbound
SB = Southbound
EB = Eastbound
WB = Westbound

NOTE:
(1) This access would be located on Young Street in its depressed section and sight distance may be issue.

Source: Wilbur Smith Associates, July, 199:

In order to accommodate project inbound turning movement traffic, Young Street should provide left-turn bays at the access points. Young Street could accommodate this lane within its proposed 40-foot width.

Traffic Progression Through Keeaumoku Street Traffic Signals

Throughout this report intersections have been evaluated individually as if they were isolated from one another. In actuality, however, traffic signals in close proximity to one another often act as a system. Ideally, traffic signals are phased and timed such that through movements on arterials are facilitated along a corridor of traffic signals. This coordination of traffic signals is called progression. Progression can be measured in a number of ways, but one of the most commonly applied analysis techniques is PASSER II-90.

PASSER II-90 is a microcomputer program that can assist traffic engineers in analyzing both individual signalized intersections and progression operations along an arterial street. The program can simulate timings or optimize a signalization problem having a wide range of user-specified options.

For the segment of Keeaumoku Street between Rycroft Street and Kinau Street, a progression analysis using PASSER II 90 was run. This was done primarily because of poor existing progression and to determine what impact the project would have on the progression.

The measures of effectiveness for progression analysis are efficiency and attainability. Efficiency refers to the how well traffic is served, and is expressed as follows:

0.00 - 0.12 - "poor progression"
0.13 - 0.24 - "fair progression"
0.25 - 0.36 - "good progression"
0.37 - 1.00 - "great progression"

Attainability refers to the magnitude of improvements necessary in order to realize better progression, and is expressed as follows:

1.00 - 0.99 - "increase minimum through phase"
0.99 - 0.70 - "fine-tuning needed"
0.69 - 0.00 - "major changes needed"

For Year 2004 conditions, progression analysis revealed the following relationships:

	AM		PM	
	No Project	Project	No Project	Project
Efficiency	0.28	0.31	0.29	0.30
Attainability	0.80	0.74	0.84	0.73

During both peak hours, Keeaumoku Street would experience better efficiency with the project and the proposed roadway improvements than it would for Year 2004 conditions without the project and proposed roadway improvements. This indicates that the band widths, the time duration (in seconds) during which arriving vehicles can flow freely through all five intersections along Keeaumoku Street, are larger with the project than without the project.

Attainability values decrease as a result of the project. Attainability is the measure of how much of the signal green time on Keeaumoku Street is within the progression band (or band width). The reduction in attainability despite the increase in band widths on Keeaumoku Street, indicates that although the signal green time is increased on Keeaumoku Street, a larger portion of the green time falls outside of the progression band within which traffic flows non-stop through all five intersections.

Perhaps the most useful value for comparison in this analysis is the Total System Delay. Total System Delay, expressed in vehicle-hours per hour, is the cumulative delay experienced by all vehicles travelling through these intersections. The Total System Delay values are shown below for project and no project conditions.

	AM		PM	
	No Project	Project	No Project	Project
Total System Delay	3157.7	2212.1	2319.7	2378.8

The Total System Delay values are lower with the project for the AM peak hour and about equal for the PM peak hour.

Based on this analysis, overall traffic flow through Keeaumoku Street would be better with the project and proposed roadway improvements than without the project and improvements.

Mitigation Actions

AM and PM peak hour operating conditions on Keeaumoku Street could be improved with minor widening and operational modifications. These would include the following:

- Cycle lengths along Keeaumoku Street could be extended to 90 seconds with the bulk of the additional time allocated to Keeaumoku Street movements;
- At the intersection of Keeaumoku Street/Young Street, a mauka/makai left-turn phase could be added;
- Young Street, on the Diamond Head side approach to Keeaumoku Street, could be widened to a 44-foot width in order to accommodate a westbound left-turn lane; and
- At the intersection of Keeaumoku Street/Kinau Street, the existing Diamond Head-bound through lane should be converted to a shared through/right-turn lane.

With these modifications, the Keeaumoku Street intersections would function as follows:

Keeaumoku Street Intersection	AM V/C	PM V/C
King Street	0.826	1.093
Young Street	0.848	1.000
Beretania Street	1.020	0.976
Kinau Street	0.991	0.866

With these modifications, the King Street, Young Street, and Beretania Street intersections with Keeaumoku Street would continue to experience operational problems, but all of the intersections would experience some improvement and all would function more efficiently than the projected conditions without the project.

At the intersection of Kalakaua Avenue/King Street, the conversion of the Diamond Head-bound left-turn lane to a shared through/left-turn lane would improve the PM peak hour V/C ratio to 0.993.

At the intersection of Punahou Street/Beretania Street, the provision of a maukabound protected left-turn phase would improve the intersection to a V/C ratio of 0.709 during the PM peak hour.

Potential Long-Range Improvements to Keeaumoku Street

The improvements addressed in the previous section would mitigate project impacts by improving intersection operating conditions relative to the conditions estimated for the Year 2004 without the project. However, projected Year 2004 conditions at the Keeaumoku Street intersections adjacent to the project site would still operate at undesirable service levels due to the traffic increases from other projects. Further improvements would likely be necessary to improve conditions along Keeaumoku Street. Description of these improvements and resulting intersection operating conditions is provided for informational purposes and should not be viewed as mitigation for the Pawaa Redevelopment Project.

In order to address future capacity needs along Keeaumoku Street, the City should secure right-of-way for an eventual widening of Keeaumoku Street to provide three maukabound through lanes between Liona Street and Young Street and three makaibound through lanes between Kinau Street and Young Street. In order to accomplish this, it would be necessary to obtain 10 feet of right-of-way on the Diamond Head side of the street between Liona Street and King Street, and on either side between King Street and Young Street, and on the Ewa side of the street between Beretania Street and Kinau Street.

With these additional lanes, the estimated volume-to-capacity ratios for the Keeaumoku Street intersections would be as follows:

Keeaumoku Street Intersection	AM V/C	PM V/C
King Street	0.850	0.993
Young Street	0.615	0.787
Beretania Street	0.890	0.882
Kinau Street	0.913	0.936

As this indicates, all of the Keeaumoku Street intersections would function within capacity. Delay values would also be significantly reduced with most of the intersections functioning at LOS C or better conditions, except for Keeaumoku Street/King Street, which would function at LOS D during the PM peak hour.

Prior to acquiring the additional right-of-way needed to facilitate the improved operation along Keeaumoku Street, it would be possible to accommodate the lane additions discussed within the existing roadway widths. However, it would require narrowing Keeaumoku Street lanes to nine feet between King Street and Young Street and a nine-foot lane would be required on the maukabound approach of Keeaumoku Street to King Street. While ten-foot lane widths are usually considered the minimum acceptable lane width, the City may want to consider the allowance of nine-foot lanes as an interim improvement on Keeaumoku Street.

Effect of Increased Retail Space

The analyses presented in the preceding sections were based upon 120,000 square feet of retail space within the project. Subsequent to the traffic analyses, the project's total retail square footage was increased to 145,000 square feet. Accordingly, a supplemental traffic analysis was performed to estimate the traffic generated by the additional 25,000 square feet of retail space, and whether these vehicle trips would affect traffic conditions or necessitate any additional traffic mitigation measures.

The additional 25,000 square feet of retail area would increase PM peak hour vehicle trips to or from the project by about 11 percent. The estimated traffic increases, before accounting for passer-by trips, are as follows:

	Daily Vehicle Trips	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Initial Project Estimate	15,063	286	476	763	777	608	1,385
Increased Retail Area	17,252	310	492	801	854	685	1,539
Revised Project Trips	2,189	24	14	38	77	77	154

The key intersections most directly affected by the additional traffic would be the Keeaumoku Street intersection with Young Street, as well as with King and Beretania Streets. These intersections were analyzed for the afternoon peak traffic period since the retail space would add a much larger number of trips during the afternoon, and traffic conditions are generally worse at these intersections than during the morning. The analysis assumes the mitigation described previously in this section. The results are summarized in the following table for Year 2004 conditions.

Keeaumoku Street Intersection	Initial Estimate			With Additional Retail Space		
	V/C	DPV	LOS	V/C	DPV	LOS
King Street	1.093	71.2	F	1.096	72.6	F
Young Street	1.000	54.0	E	1.021	56.6	E
Beretania Street	0.976	33.5	D	0.979	34.3	D
DPV = Delay per Vehicle (in seconds).						

At each location, the increased traffic to/from the additional retail space would result in a slight worsening of traffic conditions during the afternoon peak hour. However, the conditions with these increases and the planned project mitigation actions would still be better than the conditions projected for Year 2004 without the project. Given these results, no additional mitigation measures appear necessary with the increased retail space.

CONCLUSIONS AND RECOMMENDATIONS

The roadways and key intersections adjacent to the project site generally operate at acceptable levels of service during weekday peak traffic periods. Significant problems do occur along Keeaumoku Street during the afternoon peak hour, most notably involving the left-turn movement from Keeaumoku Street to Beretania Street, and the makaibound through movement from King Street to Beretania Street. The queuing and delays for the through movement occur as a result of the traffic signal offsets in the green signal intervals at the King Street and Young Street intersections, and the limited amount of green time available to the mauka bound traffic. The intersection of Keeaumoku Street/Beretania Street also experiences operational problems during the morning peak hour. Conditions at these Keeaumoku Street intersections are expected to deteriorate significantly with increased development in the study area, even if the Pawaa Redevelopment Project is not implemented.

Conditions With the Project

Field counts indicated that the existing land uses on the project site generate 403 and 358 vehicle trips to or from the site during the AM and PM peak hours, respectively. The planned Pawaa Redevelopment project would generate an estimated total of 713 and 1,329 vehicle trips, for a net increase of about 310 and 971 vehicle trips during the AM and PM peak hours, respectively.

To accommodate the project traffic, the following street modifications are planned:

- Add a left-turn/deceleration lane on the King Street approach to Kaheka Lane;
- Add a left-turn lane on the Beretania Street approach to Keeaumoku Street;
- Add a second left-turn lane on Keeaumoku Street at its intersection with Beretania Street; and
- Re-stripe Keeaumoku Street between Young Street and King Street to provide a second left-turn lane for turns from Keeaumoku Street onto King Street.

With these modifications, the traffic analyses for the Year 2004 with the project indicate:

- Keeaumoku Street intersections would continue to experience operational problems;
- Kalakaua Avenue/King Street would deteriorate to a slightly worse level-of-service; and

- Other study intersections including Kalakaua Avenue/Beretania Street, Punahou Street/King Street, and Punahou Street/Beretania Street would be expected to operate at or near capacity.

Mitigation Actions

The following actions are recommended for consideration in improving anticipated or potential traffic problem locations:

1. Modify signals at the intersections along Keeaumoku Street by increasing the cycle lengths, adding phases where necessary, and increasing the green time allocated to Keeaumoku Street.

   Also, the City should review the traffic signal timing offsets along Keeaumoku Street to see if a more efficient progression can be obtained. The signal offsets on Keeaumoku Street in the mauka direction do not currently provide a good progression in this direction and result in excessive delays during the PM peak period.

2. Provide a 44-foot width for the Diamond Head leg of Young Street at Keeaumoku Street. This width would accommodate a total of three Ewabound lanes on Young Street at this intersection, with the added lane used as a left-turn lane.

3. Convert the Diamond Head bound through lane on Kinau Street at Keeaumoku Street to a shared through/right-turn lane.

4. Convert the Diamond Head bound left-turn lane on King Street at Kalakaua Avenue to a shared through/left-turn lane.

5. Add a makaibound protected left-turn phase to the traffic signal at the intersection of Punahou Street and Beretania Street.

APPENDIX E
ARCHAEOLOGICAL STUDY

MS 050391
PROJECT #462

HISTORICAL LITERATURE AND DOCUMENTS SEARCH FOR THE PROPOSED REDEVELOPMENT OF THE PĀWA'A HOUSING DEVELOPMENT HONOLULU, O'AHU

PART 1
HISTORICAL LITERATURE AND DOCUMENTS SURVEY

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Revised
April 1992

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INTRODUCTION

The Public Archaeology Division of the Bishop Museum Applied Research Group completed a prefield literature and documents search for the proposed Pawa'a affordable housing development under contract to Wilson Okamoto & Associates of Honolulu. The following report summarizes the findings of this first increment of preliminary archaeological assessment. The objectives of this data search were two-fold:

1) To assess historical land use, activity, and development impacts on the project area.

2) To facilitate recommendations for archaeological testing and monitoring through the identification of potentially sensitive sites within the project area.

DESCRIPTION OF PROJECT AREA

The proposed project site is located in the Pāwa'a Ahupua'a, in the Kona district, on the island of O'ahu (Figure 1). Composed of two major sections of two blocks, the areas are currently used for the Honolulu Police Headquarters, offices and grounds of the Hawai'i Department of Agriculture, Meadow Gold Dairies, financial institutions, small businesses, and parking lots. The section that includes the police headquarters and the Meadow Gold Dairy complex is situated toward the *mauka* direction of the city block bounded *mauka* by South Beretania Street, *ewa* by Keeaumoku Street, and *makai* by Young Street. The Meadow Gold Dairy complex occupies the *ewa* end of this block. The second section of the proposed project area includes the State of Hawai'i Department of Agriculture administrative buildings and park grounds, with the police automobile maintenance structure and parking lots flanking Aloha Lane toward Diamond Head. This block is bordered by Young Street *mauka*, Keeaumoku Street *ewa*, South King Street *makai*, and Aloha Lane. The area is fully developed and no previous archaeological surveys have been conducted.

Figure 1: SITE LOCATION

RESULTS

Sources consulted to obtain a history of the project area land use, activities, and impacts include government land record documents, survey maps, and tax records. Hawai'i state documents were supplemented by fire insurance maps, city directories, newspaper articles, and published histories. The content of land ownership focused on land claim award records from the late 1840s and early 1850s that revealed early land use, the presence of structures, and land modifications such as walls, roads, fences, and streams.

LAND CLAIM AWARDS/GRANTS

The *mauka* and *ewa* sides of the proposed project area, originally known as "Kulaokahua Plains" in Waikiki, were Crown lands set aside for the Hawaiian Government by King Kamehameha III on 8 March 1848 (Chinen 1961:54). Land record documents indicate that these Crown lands were leased to a private individual until the *mauka* section was divided into lots and sold to private individuals between 1877 and 1882. The *ewa* section of these Crown lands was then designated, by executive order, as a government nursery (Figure 2) in 1882.

In the Diamond Head direction, three plots of land were awarded by royal patents to private individuals in the 1850s and one land grant (Grant 2011), was sold in 1856 to a native, Kaea (Robert Kelly). Two *alanui* (roads), "Alanui Mawaena" and "Alanui Makai," and a creek on the Kulaokahu'a site property are shown on the land claim survey for Land Claim Award (L.C.A.) 529.

L.C.A. 3727, Manuwa

Shown in Figure 2 as a wedge-shaped piece of property abutting the Department of Agriculture grounds, L.C.A. 3727 (a house site) was awarded to a

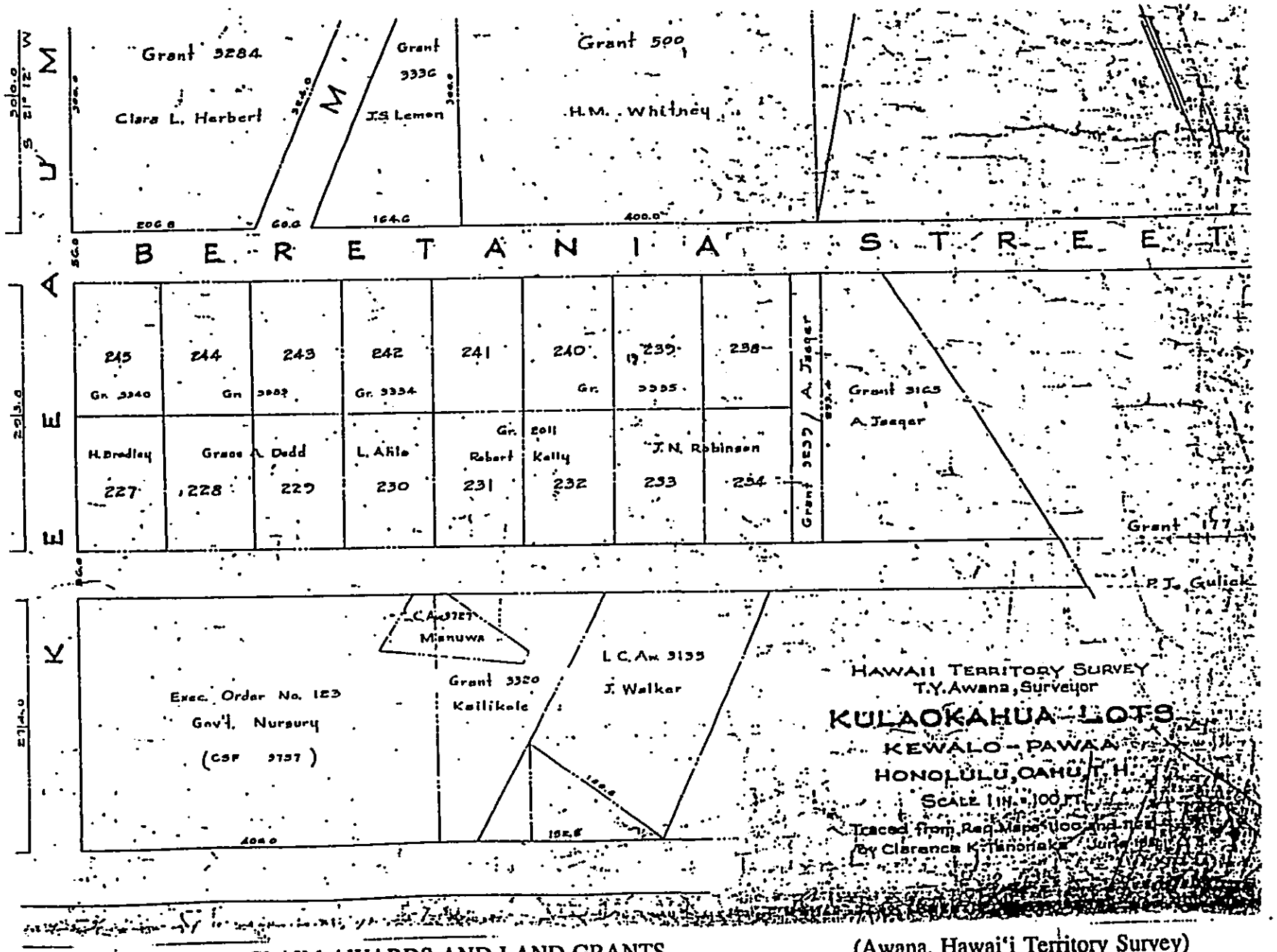


Figure 2: LAND CLAIM AWARDS AND LAND GRANTS (Awana, Hawai'i Territory Survey)

Hawaiian native Manuwa. Native testimony by witnesses on 30 August 1850 as to the description of the property states:

> "Maleana sworn: I have seen his place in Pawaa close to the Ewa side of our lot just outside of the cow corral; makai of his place is the government road and the government lot; Ewa, for the government; mauka, Kele's (the foreigner) place.
>
> I had given him this place at the time Manuia was living on Oahu here. That was in the year 1828 probably and he has lived comfortable to the present time. Now it has been three months perhaps since his house has fallen apart. I have not known any person who has protested" (Commissioner of Public Lands, Native Testimony 3:667).

Manuwa's house lot was deeded from Kuhaulua, heir of Manuwa, to Kailikole on 11 September 1865 (Bureau of Land Conveyances 20:139). This house site was conveyed to W. W. Armstrong, Minister of the Interior, on 25 February 1882[1] and the property became part of the government nursery, which is now the Department of Agriculture grounds. Kailikole obtained the adjoining property *makai* through Grant 3320 in 1881 (see Figure 2).

L.C.A. 3135, James Walker

Diamond Head of the Manuwa land claim award, a house lot enclosed by an "old adobie wall" (L.C.A. 1315; Parcel 14) was granted to James Walker in August 1850. Native testimony describes Walker's claim as follows:

> "Lewis Rees sworn. I know this lot it is in Pawaa Waititi it's a *Kula* [dry pasture] ground. Claimant first got this lot in about the year 1828 from Manuia for his services as carpenter for his vessel & boats & he soon built a house on it & has occupied it ever since. I do not know the precise bounds, but I heard Manuia gave him authority to take as much land as he desires. Manuia W. confirmed the above testimony and the survey of Mr. Turner as far as it described the lot within the old adobie wall -

[1]Cited in later Hawai'i state documents as 27 February 1882.

on the Govt side of that Manawa lived and a Cold man named Jerry and claimed that section - & the alanui makai outside of that wall belonged to the Govt" (Commissioner of Public Lands, Native Testimony 3:266-297).

In native testimony (3:666), taken on 30 August 1850, Lewis Reis again sworn, states that he is living at the place of Walker in Pāwa'a, Waikiki, which is pasture land. The testimony of Reis adds "there are three houses standing there" (Commissioner of Public Lands 3:666). L.C.A. 3135 was deeded from James Walker et al. to William G. Irwin on 7 March 1884 (Bureau of Land Conveyances 83:337).

L.C.A. 529, George Hyatt (Kaiaka)

Native testimony as to the claim of a house site owned by George Hyatt (the King's musician), through L.C.A. 529 in Waikiki was objected to by a witness, and was counterobjected to by *ali'i* John Ii:

> "Keoni Kiwini sworn by the hand of God and stated, 'I have seen this place; it is at Waikiki. George Kaiaka (Hyatt) had received this place by my asking the chief to let him live with the chief and do the hula without any compensation, but George Hyatt did not do that and is not doing it now because he has grown. It was in the year 1839 or forty perhaps that this property had been given to George Hyatt. That was given to him to live permanently with us and do the hula without any pay. He had lived there in the year 1845 and the place has been enclosed, although we have not surveyed his property properly. There was a house but it has fallen."
>
> "John Ii: 'I am objecting'."
> (Commissioner of Public Lands, Native Testimony 2:490).

This claim was subsequently awarded to George Hyatt on 26 August 1850. The award document is quoted in its entirety regarding its content on land gifts to foreigners from the king, its ethnicity, and for its land description:

"This is a claim for a small piece of land in Waitiri, Island of Oahu. The claimant is a colored man, and professes to have derived his right from a grant made by the King in the year 1833 for his services.

From the testimony on record, it appears that the claimant acted as the King's musician, and received the the present grant direct from his majesty through Colonel John Stevenson, who acted as agent in the transfer. He has ever since the gift, occupied the place in peace, and no counter claimant or opponent has appeared to the present time.

We therefore award to the present claimant George Hyatt a freehold title to the same, less than allodial, subject to commutation according to law - and as described in the annexed survey of A. J. Turner.

Commencing at the creek, near the edge of the makai Road and running N. 77 W 9 ch. 41 1/2 lks along the makai Road, then N. 38 E. 4 ch. 75 lks along James Walker's land to the Mawaena road. Then S. 77 E. 2 ch. 82 lks along the Mawaena road, to a small stream; thence by the stream to the point of commencement.

In the ile of Pawaa, Waitiri.
26 August 1850, Acres 3. 1 Rood - 11 perches."
(Commissioner of Public Lands, Awards 3:65).

GRANTS

Following the land claim awards, seven lots constituting the *mauka* side of the Crown lands (bounded by Aloha Lane and Beretania, Keeaumoku, and Young Streets), were sold to private individuals. One land grant was sold in 1856, and the remaining grants were sold between 1879 and 1882. These grants, as listed below, currently are the sites of Meadow Gold Dairy, financial businesses, the police headquarters, and small businesses fronting on Beretania Street.

GRANT	GRANTEE	YEAR	PARCEL(S) NUMBERS
2011	Robert Kelly (Kaea)	1856	21, 31, 43-45
	Conveyed to Albert Jaeger on 26 November 1877 by heirs Samuel Kelly, James Kelly, Kaliikimua and husband Vala		

(Bureau of Land Conveyances 52:443). James Kelly is listed at this address in 1880 as an upholsterer (Browser 1880:85).

3239 Albert Jaeger 1879 20 (Aloha Lane)
Agriculturalist Albert Jaeger arrived in the islands from Hideshein, Germany, in 1862. A. Jaeger died in Honolulu on 22 March 1900 (The Friend 1900 30:3). Property sales of A. Jaeger through 1910 were not located.

3320 Kailikole 1881 19
Deeded to Elizabeth P. Cushingham on 4 March 1884 (Bureau of Land Conveyances 87:286).

3333 Grace A. Dodd 1882 23-25, 27-29, (46?)
Grace A. Dodd is listed as residing at this address from 1892 through 1897 in the Honolulu City directories. The property was deeded to Sarah E. Austin (died 21 June 1893) on 21 April 1888 (Bureau of Land Conveyances 107:439).

3334 L. Ahlo 1882 22, 30
Deeded 31 December 1890 to Minnie H. Gilman (Bureau of Land Conveyances 183:332). Minnie and Carrie Gilman, teachers at Punahou Prep School, are listed at this address: Minnie 1884-1897; Carrie 1884-1906. The property was deeded to Tom You et al. on 1 May 1912 (Bureau of Land Conveyances 355:438).

3335 John N. Robinson 1882 33-42
Deeded to Sears, Roebuck, and Company 15 January 1940 (Tax Assessment records).

3340 Henry Bradley 1882 26
Deeded to Maggie G. Cowes, guardian of John Joseph Perry, on 12 March 1890 (Bureau of Land Conveyances 135:83-84). Leased to Anin Young from John J. Perry on 3 November 1900 (Bureau of Land Conveyances 212:281).

MODERN DEVELOPMENT

Two sections of the proposed redevelopment properties currently function as two separate governmental entities with parking facilities provided on portions of the site. The Robinson Estate, acquired and redeveloped by Sears, Roebuck, and

Company in 1940, is now the site of the City and County of Honolulu's police headquarters building. The State of Hawai'i's Department of Agriculture occupies Crown lands allocated in 1848 and was enlarged with the acquisition of adjoining properties along South King Street after 1940. Three additional areas within the site reflect diverse economic, ethnic, social, and religious land uses, and show the development of the proposed project area through 1950. These properties include the Honolulu Dairymen's Association, the Susannah Wesley Home, and the Hawai'i Shinshu Kyorai (Buddhist) Mission.

Robinson Estate

A large section of property upon which the current police headquarters building and parking facility are located is composed of original Crown lands that were sold by grants and were developed into the Robinson Estate in the 1880s.
The property includes a portion of Robert Kelly's Land Grant 2011 acquired in 1856, Albert Jaeger's strip of land (Grant 3239), acquired in 1872, and John N. Robinson's Grant 3335 acquired in 1882 (see Figure 2). John Robinson, a capitalist and artist, married Caroline Kapuainanahula Johnson (descendant of John Davis) in 1884 (The Honolulu Star Bulletin 1937, 1:4), and died at the age of 29 years on 25 March 1890 (Daily Pacific Commercial Advertiser 1890, 3:3). The Robinsons are first listed as residing on this property in 1887 (Lane 1887:334), and Caroline Robinson resided here, until her death on 1 December 1937 (The Honolulu Star Bulletin, 1937:1, 4). The estate appears mapped in 1914, with servants' quarters occupying the *ewa* corner of the property facing Young Street (Figure 3).

Sears, Roebuck, and Company acquired the deed to the Robinson Estate on 15 January 1940 (Tax Assessment records). Figure 4 portrays the J. N. Robinson Estate in 1939 shortly before it was demolished to make space for the Sears, Roebuck, and Company (police headquarters), structure. The Sears building, designed and built by architect Guy Rothwell in 1941, was originally a one-story building; the second and third floors were added in 1945/46. *Makai*, across Young Street, Sears provided a parking lot (Figure 5), and a Sears Garden and Supply building was subsequently

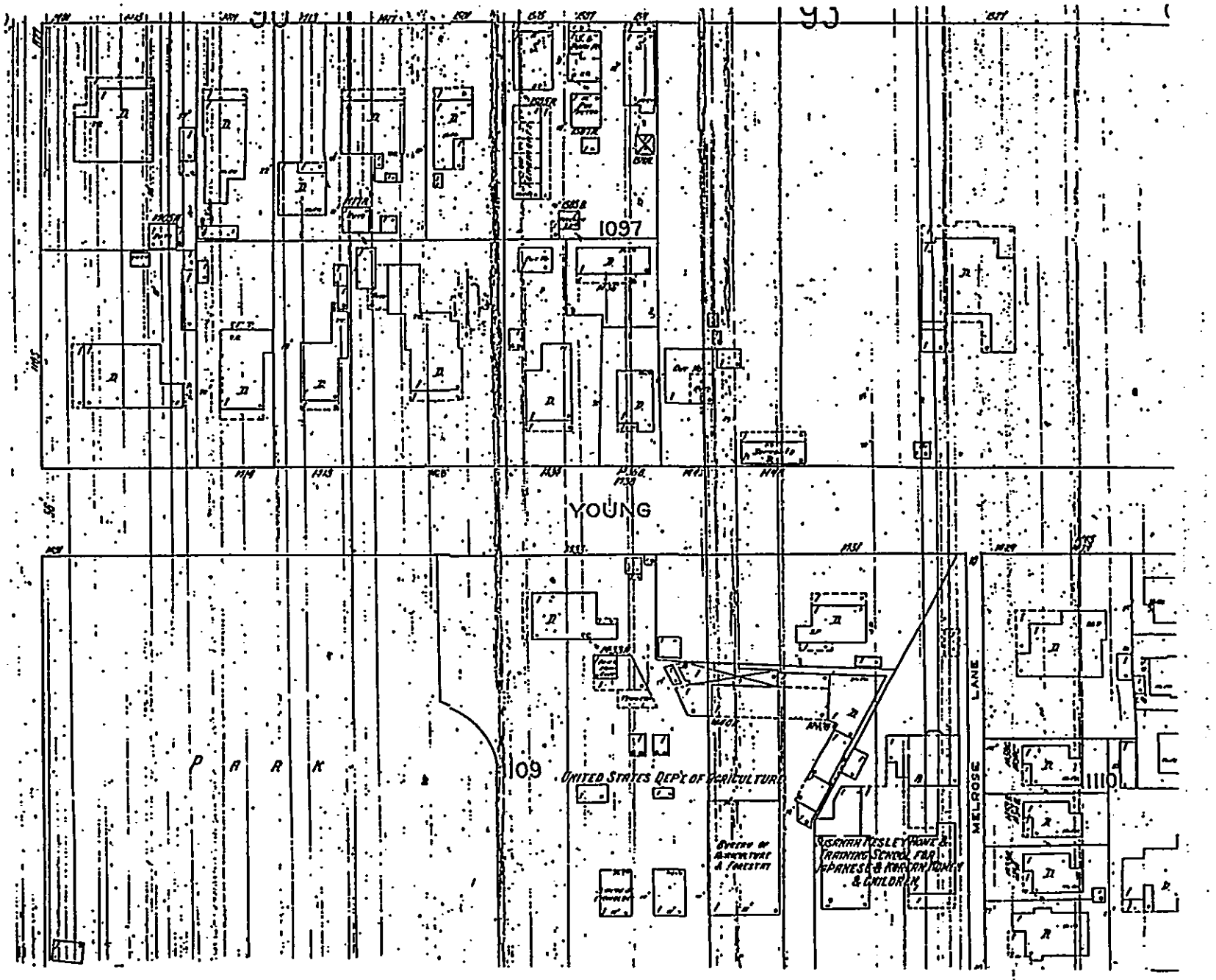


Figure 3: SITE AREA IN 1914 (Sanborn Map Company)

Figure 4: J. N. ROBINSON ESTATE 1939 (Hawai'i State Archives)

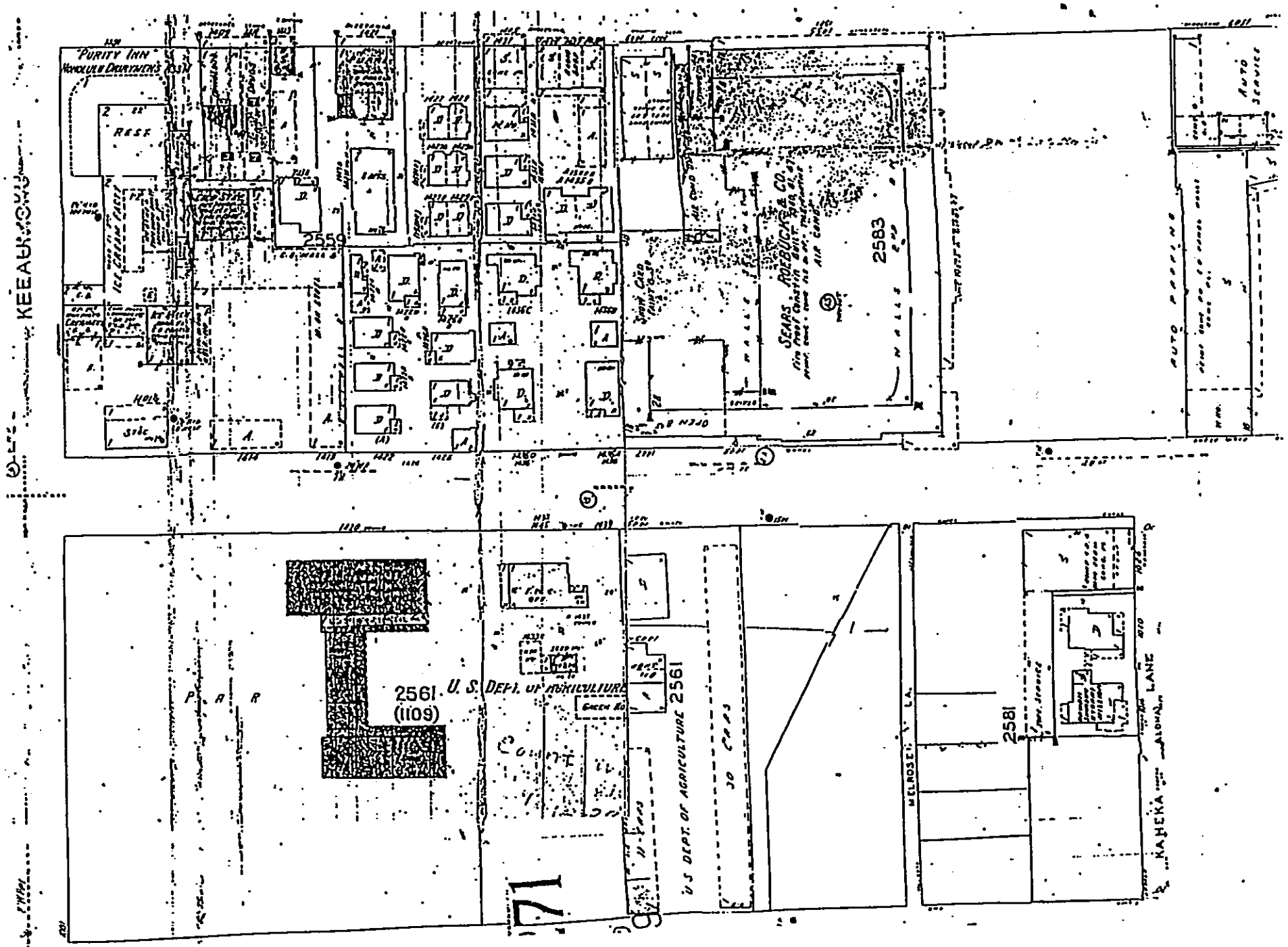


Figure 5: SITE AREA (1927-1951) (Sanborn Map Company)

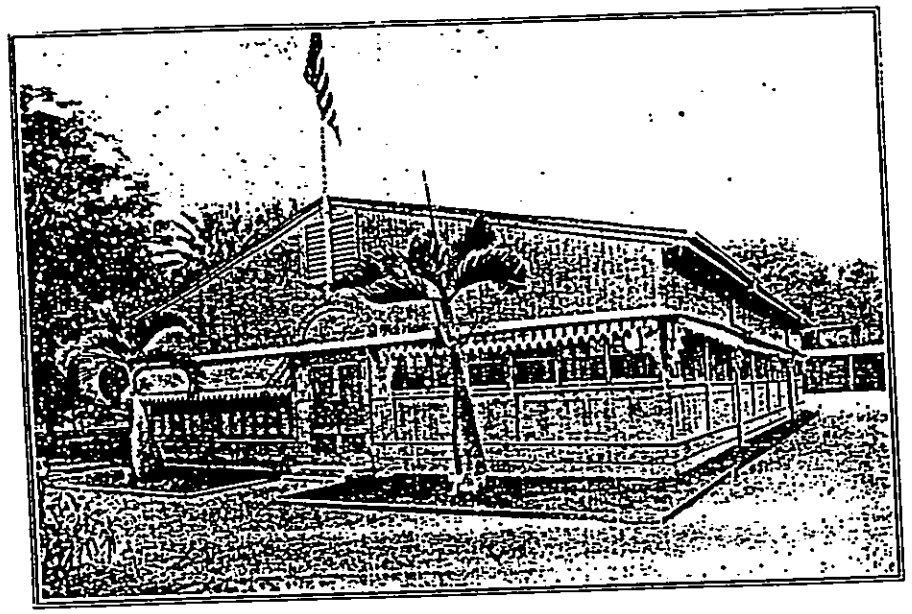
constructed in the parking lot. The City and County of Honolulu exchanged and purchased the Sears building and properties from the Dillingham-owned Hawaiian Land Company in 1958. The building was remodeled and became the headquarters for various Honolulu governmental departments on 6 February 1961, and "the former Sears Garden Center" was remodeled for the use of the Juvenile Crime Prevention Division (The Honolulu Star Bulletin 1950, 3:1; 1960, 11; 1961, 11:5).

Hawai'i Department of Agriculture

The Minister of the Interior notified one Sam Kaanaana on 10 July 1882: "To vacate the premises now occupied by him at the corner of Keeaumoku and King Streets, said premises being government land intended for a government nursery" (Interior Department 21:36). The government nursery was under the supervision of Albert Jaeger to "test and acclimate foreign fruit trees" (Thrum 1886:64). The government nursery also provided free distribution of trees to the public and for use on school grounds until 1904 (Hawaiian Forester and Agriculturalist 1904:120-124).

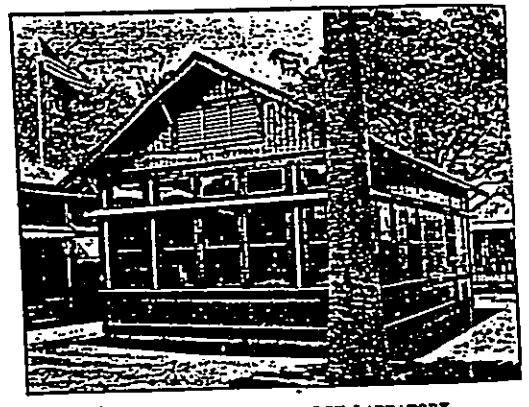
A "notice of intent" to introduce an act to establish a Bureau of Agriculture and Forestry was filed with the Interior Department on 19 June 1886 (28:68), and this office was established in 1893 (Thrum 1894:92). On 18 May 1903 the bureau was re-established as the Board of Commissioners of Agriculture and Forestry of the Territory of Hawai'i (Hawaiian Forester and Agriculturalist 1923/24:135). Executive Order 123 on 29 August 1922 "set aside (the grounds of the site) for a government nursery and arboretum under the control and management of the Board of Agriculture and Forestry."

A contract to erect a frame building at the government nursery was awarded to S. Kanahele on 19 November 1891 (Department of the Interior 52:163). Following widening and extension of Young Street in 1900, "considerable improvement has been made at the Government Nursery on King Street. A new fence has been built entirely around the grounds and necessary repairs have been made to the house" (Commission of Agriculture and Forestry, 1901:5). Figures 6a and 6b show a "new" office building (in a remodeled warehouse) and also show the Research Laboratory of the Board of



OFFICE BUILDING.

Figure 6a: BOARD OF AGRICULTURE AND FORESTRY OFFICE BUILDING (1904) (Commission of Agriculture and Forestry)



EXTERIOR OF NEW RESEARCH LABRATORY.

Figure 6b: BOARD OF AGRICULTURE AND FORESTRY LABORATORY (1904) (Commission of Agriculture and Forestry)

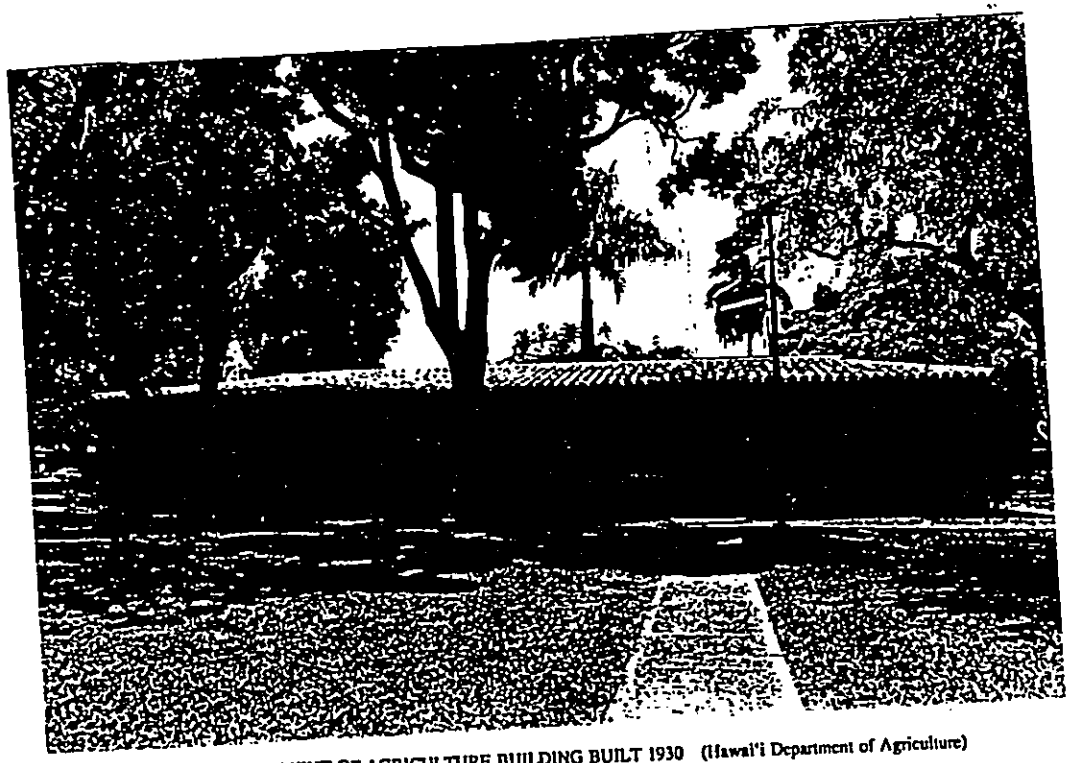


Figure 7: DEPARTMENT OF AGRICULTURE BUILDING BUILT 1930 (Hawai'i Department of Agriculture)

Agriculture and Forestry that was first occupied in 1904. The Board of Agriculture and Forestry buildings and the park grounds, fronting South King and Keeaumoku Streets are shown, as they appeared in 1914 (see Figure 3).

A new three-unit stone building (Figure 7), in a "modified Mediterranean" style, currently on the proposed project redevelopment site, was formally opened on 9 August 1930. Designed by Louis Davis, a Honolulu architect, the architecture of the structure included a patio, and lanai, or courtyard (Honolulu Advertiser, 9 August 1930:6, 7). Requests for additional lands on Young and Keeaumoku Streets to be used for repair shops and office buildings were published in The Honolulu Star Bulletin on 5 March 1946 (4:4), and a site for office buildings, was designated by Executive Order 1254 on 14 April 1948. The stone building located on a section of the park grounds, adjacent office buildings, a seed house, and a green house are all shown in Figure 6, along with the Pāwa'a parking lot. Sections of R.P. 6797 and L.C.A. 3727 were allocated for additional parking on the grounds on 16 November 1964 (Executive Order 2175).

Four trees on the grounds of the Department of Agriculture are listed in the Register of Exceptional Trees and are protected by State of Hawai'i Legislative Act 105 (Outdoor Circle 1982:8-10). A "Jamaica Wood" or "Elephant's Ear" (*Enterolobium cyclocarpum*), was planted in the park ground in 1885 and is located near Keeaumoku Street[2]. Three other trees in the register are: a "Mammee Apple"(*Mammea americana*), a "Kapok" or "Silk-Cotton" tree (*Ceiba pentandra*), and a "West Indian Elm" (*Guazuma ulmifolia*), these trees are located on the park grounds *ewa* of the Hawai'i Department of Agriculture main office building. A total of 34 mature trees currently are located on the park grounds and in the courtyard of the Hawai'i State Department of Agriculture (Hawai'i State Department of Agriculture 1986).

[2]A "West Indies Mohogany" (*Swietenia Mohogani*) located next to the "Elephant's Ear" tree was also planted in 1885, but is not in the Register of Exceptional Trees.

Honolulu Dairymen's Association

Prior to being developed for the Honolulu Dairymen's Association in 1924, the proposed project site, at the corner of Keeaumoku and Beretania Streets was an area of residential houses. Figure 3, mapped in 1914, shows nine dwellings on the site area. In 1917, Rawley's Ice Cream & Dairy Products Company, Ltd., began operations on the site area, which later became the site of The Honolulu Dairymen's Association (now Meadow Gold Dairies).

The Honolulu Dairymen's Association, founded in 1900 by Benjamin F. Dillingham and Samuel Damon at Fort and Pauahi Streets in Honolulu, was moved to Sheridan and Elm Streets in 1904 (The Honolulu Star Bulletin 1964, 19:2), and has been listed since 1924 in Waikiki (Polk-Husted 1900-1937/38). The "Purity Inn" restaurant (located on the corner of Keeaumoku and Beretania Streets) along with an ice cream factory, cold storage building, ice machine shed, creamery, other storage buildings, and parking areas of the Honolulu Dairymen's Association (extending to Young Street) are all shown in Figure 5.

Following a merger with Creameries of America, Inc., in 1929 (The Honolulu Star Bulletin 1930, 1:7), the Honolulu Dairymen's Association became the Dairymen's Association, Ltd., in 1937 (Polk-Husted 1937/38). A subsequent merger with Beatrice Foods in 1953 resulted in the change of the Association name to Meadow Gold Dairies in 1962 (The Honolulu Star Bulletin 1964, 19:2-4).

Susannah Wesley Home

Founded in 1903 at 70 N. School Street in honor of Susannah Wesley, the "mother of Methodism" (The Honolulu Star Bulletin 1949, 28:30), the "Susannah Wesley Home & Training School for Japanese & Korean Women & Children" is shown in Figure 3 as occupying an irregular-shaped lot abutting the Hawai'i Department of Agriculture grounds that front on South King Street.

> "The Susannah Wesley Home was operated by the River Street Methodist Church Women's Association, with the help of the Board of Missions. Girls from broken families were taken in, or

students whose parents lived on faraway plantations. The home also served as a refuge for Japanese women fleeing their husbands or enforced prostitution" (Odo and Sinoto 1985:192).

The Home and Training School was listed from 1907 through 1918 at 1444 South King Street (Polk-Husted 1900-1920). A photograph taken of the exterior of the Susannah Wesley Home in 1908 shows a two-story, wood-framed structure (B. P. Bishop Museum Negative 24117). Mapped in 1923 on the north side of the "Chinese Farmers' Territory - common[ly] known as 'Pake Patch'," a restaurant is shown in this location (Tatsuguchi and Suzuki 1985:Map 3) that, since 1951 has been converted to a 30-car parking lot (see Figure 5).

Shinshu Kyokai Mission

Fronting Kaheka (Aloha), Lane (*mauka* of South King Street and Diamond Head of the Department of Agriculture), a permanent lot for a Buddhist temple was purchased for the Shinshu Kyokai Mission (founded 1914), in 1916. The single-story temple was completed in late 1916, and in 1920 a second story was added to the temple. Diagrammed in 1930 (Tatsuguchi and Suzuki 1985:30), the Mission premises included two lots with a stone wall fronting the lots on Kaheka Lane, and the mission structure itself with a work area, bath, and a kitchen in the rear. Attached on the *mauka* side of the temple by a covered walkway the parsonage is noted as having been a "purchased one-story residence formerly owned by the Cravahlo family." Throughout its history in this area of the proposed project, the Shinshu Kyokai Mission was only closed from 7 December 1941 through 1945, when the Reverend Goki Tatsuguchi was interred at the Immigration Station at Sand Island near Honolulu under (Martial law during the Second World War). On 19 March 1951, these lots were sold to Sears, Roebuck, and Company, and the mission was moved to a new temple site in 1952 (Tatsuguchi and Suzuki 1985:21,56,78). Currently, the area is used by the Honolulu Police Department for parking and automobile maintenance facilities.

SUMMARY

Prior to 1850, land records for the proposed project site indicate that the Diamond Head side of the proposed site consisted of fenced pasturage, and walled house sites in the "Kulaokahu'a Plains" of Waikiki. Native and foreign land claims to these properties also indicate that the house lots were provided during the 1830s by the King to favored retainers. Between the 1850s and 1882, the Crown lands *ewa* of the site appear to have been leased for agricultural use until they were developed as a government nursery, and the *mauka* Crown lands on the site were sold as houselots.

Beginning in the early part of the 1900s, these residential dwellings and estates bordered by Beretania, Keeaumoku, and Young Streets were replaced by local developing businesses, with the first major impact resulting from the construction of the Honolulu Dairymen's Association buildings. Fronting King Street and Diamond Head of the Department of Agriculture grounds, the *mauka* fringes of the Chinese area (termed "Pake Patch"), consisting of small stores and social service buildings associated with the banana farms and rice paddies of Waikiki, existed until the development of Sears, Roebuck, and Company from 1940-1954.

Minimal development impacts on the Department of Agriculture premises have occurred since its construction in 1882. Architect Louis Davis's Mediterranean-style administrative building (used by this department since 1930) and the trees existing on the property since 1885 are near-pristine examples of the few remaining sites of "old Waikiki."

RECOMMENDATIONS

Potential subsurface archaeological features and remains in two areas of the proposed project site are likely to be encountered during redevelopment. These archaeological resources include early house site outline features, remains of adobe walls or fences, artifactual depositions in activity or disposal areas, *hale li'ili i* ("Little House"/privies), and the 1840s stream bed associated with the house sites. The police

headquarters three-story structure has a basement. *Ewa* of this structure is an adjoining financial institution structure and underground parking facilities. Archaeological remains and resources in this area of the site are determined to have been removed and are nonexistent. Four trees on the grounds of the Department of Agriculture are protected by state legislation, and the stone building on the same grounds is being considered for nomination to the National Register of Historic Places (Department of Land and Natural Resources: Tom Dye, personal communication). No other structures on the proposed site appear to meet the criteria of the National Register of Historic Places (see the Addendum to this report).

Initial archaeological testing to determine the nature and integrity of archaeological resources in the remaining two areas of the proposed project site is recommended. Testing of potentially sensitive areas, indicated by historical research, should be conducted following the removal of existing structures and parking lot pavement. These areas are:

1) diagonally oriented, backhoe-assisted test trenches on the *ewa* end of the site currently covered by Meadow Gold Dairies and bordered by Beretania, Keeaumoku, and Young Streets;

2) backhoe-assisted test trenches on the Diamond Head side of the site currently covered by parking lots and bordered by Young Street, Kaheka Lane, and South King Street.

Existing subsurface foundations (piers) and public utility service water and sewerage pipes should be left *in situ* until after archaeological testing and mitigation measures are completed. Disturbance and destruction of archaeological resources by amateur artifact collecting activities, such as bottle hunting, make it necessary to protect the site areas by fencing and/or guards.

ADDENDUM

Section 106 of the Historic Preservation Act protects properties over 50 years old that meet one or more of four specific criteria for preservation. "A property may possess significance for:

(1) its prehistoric or historic association with events or persons (Criteria A and B);

(2) its illustration of a type or form of construction or for aesthetic values (Criterion C); or

(3) its important information potential (Criterion D)."[3]

In addition to the modified Mediterranean-style Department of Agriculture building constructed in 1930, several buildings in the project area, which were constructed prior to 1940, have either been recently demolished or have been extensively remodeled. An example of extensive remodeling is the building on Parcel 27 of the project site (1409 S. Beretania) that experienced storefront alterations in 1956, demolition of the marquee in 1967, and application of new wood trim in 1972. Recent impacts on the buildings on the proposed project site are listed below. The records of these impacts are filed with the Hawai'i State Department of Taxation Tax Office and appear in the building permits issued by the Hawai'i State Building Department.

PARCEL	LOCATION	DATE	IMPACT
04	Kaheka Lane	09-28-1955	New concrete building.
05	1506 S. King	11-03-1954	"The Shack," alterations.
06	S. King/Kaheka Lane	1987	Buildings demolished.

[3]The Advisory Council on Historic Preservation. *Introduction to Federal Projects and Historic Preservation Law*, 1990:III-169.

07	1021 Kaheka Lane	05-21-1956	Remodeling.
07	1021 Kaheka Lane	12-17-1957	Alterations.
08	1505 Young Street	04-27-1960	Floorboard/window repairs.
08	1505 Young Street	05-12-1971	Repair termite damage.
08	1505 Young Street	06-17-1974	Repair exterior walls--termite damage.
08	1505 Young Street	08-02-1979	Remodeling--fast-food restaurant.
09	1509 Young Street	05-14-1963	Renovations.
10	1513 Young Street	07-07-1971	New two-story building with parking.
13	1499 S. King	03-22-1956	Remodeling existing building.
13	King & Kaheka Lane	03-28-1957	Alterations.
13	1486 S. King	06-24-1977	Remodel restaurant.
15/18		09-12-1966	Reconstruct garage of State Office Building.
18	King & Keeaumoku	03-10-1953	New 24x16 building.
18	King & Keeaumoku	10-09-1953	Alterations on 14x16 building.
18	King & Keeaumoku	12-01-1954	Addition.
18	1445 Young Street	08-17-1962	Convert garage to dwelling. Alterations, repairs.
18/19	1428 S. King	07-18-1980	Additions to, renovation of two story building for Department of Agriculture.

18	1428 S. King	04-24-1984	Demolished for parking lot
19		1963	New garage.
20	Kalakaua & Young	06-10-1964	New parking shed.
20	Kalakaua & Young	11-30-1966	Renovation of bar and restaurant.
21	1455 S. Beretania	09-22-1952	New one-story building.
22	1436 Young Street	02-05-1974	Demolish building/house.
22	1436 Young Street	09-19-1978	Construct new building.
26	1401 S. Beretania	01-23-1959	Addition to building.
27	1409 S. Beretania	10-19-1956	Storefront alterations.
27	1409 S. Beretania	05-10-1967	Demolition of marquee.
27	1409 S. Beretania	03-08-1972	New wood trim for storefront.
27	1409 S. Beretania	04-28-1983	Alterations to existing buildings; removal of partial storefront.
28/46	1413A S. Beretania	04-23-1954	Demolition of 30x30 wood-frame family dwelling.
28	1413A S. Beretania	03-14-1956	New building.
28	1415 S. Beretania	07-08-1963	New apartment building.
29	1431 S. Beretania	06-21-1960	New office building.
30/29	1431 S. Beretania	1966	Dropped into Parcel 29.
31		1949	New steel-frame building.

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ASC91-6

HISTORICAL LITERATURE AND DOCUMENTS SEARCH FOR THE PROPOSED PĀWA'A REDEVELOPMENT HONOLULU, O'AHU

ADDENDUM
TMK 2-4-05: 1, 2, 4-8, 10, 20, 47, and 48

by

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INTRODUCTION

The proposed Pāwa'a Redevelopment Project is located in the *ahupua'a* of Makiki in the Kona District, O'ahu. The project area covers a two block area bounded to the west (*ewa*) by Keeaumoku Street; to the north (*mauka*) by South Beretania Street; to the east (Diamond Head) by Kalakaua Avenue; and to the south (*makai*) by South King Street. Young Street divides the proposed Pāwa'a project area, running parallel with South Beretania and South King Streets from Keeaumoku Street to Kalakaua Avenue.

Pāwa'a is an *'ili* (subdivision) within the ahupua'a of Makiki and its literal meaning in Hawaiian is "canoe enclosure or the touching of canoes" (Pukui and Elbert 1957:296). The entry in the book, Place Names of Hawaii (Pukui; Elbert, and Mo'okini 1974:182) reads in part: "(It is said that canoes were brought here from the sea by canal.)" The same source also attributes the name to a Mānoa chief (ibid. 1974:62).

An initial literature search project was completed by the Bishop Museum in May 1991. Since then, several parcels on the east, or Diamond Head side of the project area were added to the original redevelopment plan. The purpose of this addendum is to address these additional areas that include parcels 1, 2, 4-8, 10, 20, 47, and 48 of TMK 2-4-05 (Figure 1A) currently occupied by the Midtown Shopping Center, the Diamond Head Parking Lot, the UNOCAL Gasoline Station, Diner's Drive In, the Motosue Building, Shiseido Cosmetics, and a group of about 10 small businesses that front Kaheka and Young Streets including bail bonds, tailors, piano shop, restaurant, and a gun shop.

This additional area includes one parcel of land originally owned by the Hawaiian Government as "Crown Land" and one parcel of land owned by a private individual since 1833. Two lanes are located within the southern portion of the expanded project area. Kaheka Lane (Aloha Lane) runs from South King Street to Young Street and borders the *ewa* side of TMK parcels 5-8, and Zen Lane runs from South King Street towards Young Street dividing TMK parcels 2 and 4, and terminates at parcel 10 fronting Young Street.

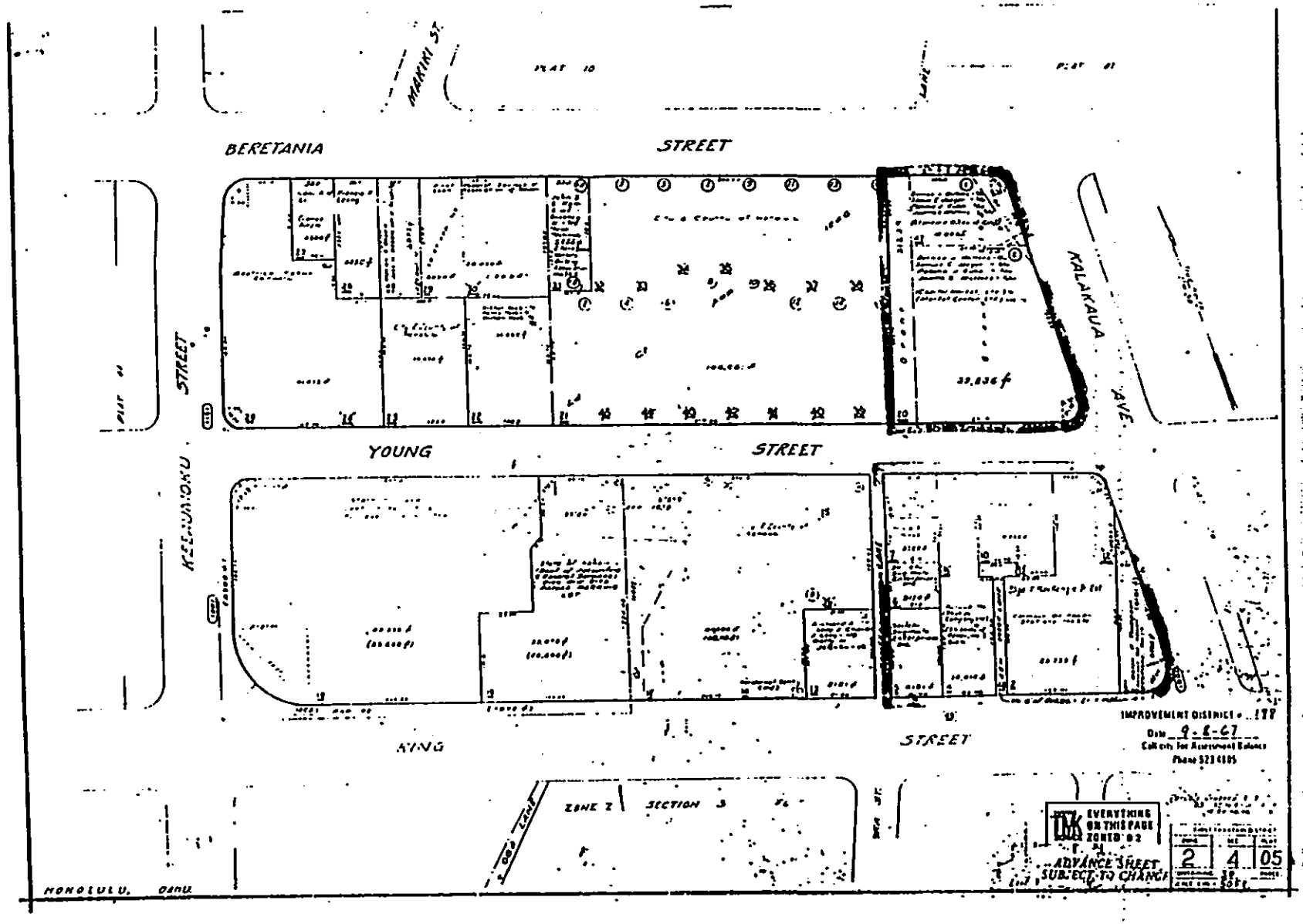

Figure 1A: THK 2-4-05 (Hawaii Department of Taxation)

HISTORICAL BACKGROUND

In 1833, the southern portion of the proposed Pāwa'a project area was granted to George W. Hyatt, a favored foreign retainer of King Kamehameha III. During the "Great Mahele", or the division of Hawaiian lands among the government, the royalty, and the Hawaiian people in 1848; George Hyatt secured private ownership of the southern portion of the proposed site by Land Claim Award 529. The northern portion of the site area was set aside as "Crown Government Land" and was sold in 1877 by Grant 3165 to Albert Jaeger, a Honolulu businessman.

LAND CLAIM AWARD 529

George Washington Hyatt, born 1805 in Petersburg, Virginia of African ancestry, arrived in the Hawaiian Islands in 1823. Described as amiable, and a "great favorite" of the people, he was locally known as "Black George" (The Honolulu Advertiser 1940:14.4), and by the Hawaiian name of "Kaiaka". A talented musician on the flute and clarinet, George Hyatt became the King's musician; services for which he was granted in 1833 the plot of land at the southern portion of the proposed Pāwa'a project site. By general agreement among the members of the King's band, George Hyatt was appointed leader of the King's band on 26 May 1845 (Department of the Interior 1845). "Hyatt with his clarionet [sic] and Indian Oliver with his trombone playing *God Save the King*...greeted King Kamehameha III and Premier John Young at the opening of the Thespian Theater (11 September 1848)", located in an adobe building on the southwest corner of Maunakea and King Streets in downtown Honolulu (Thrum 1881:34-35).

Land Claim Award 529 was awarded to George W. Hyatt by Royal Patent 4422 affirmed on 22 August 1850. The survey of Hyatt's property (Figure 2A), containing "acres 2, 1 rood, 11 perches" is shown as bounded *ewa* by James Walker's land (a housesite enclosed by an adobe wall); *mauka* by *Alanui Hawaena* (Young Street); *makai* by *Alanui Makai* (Pearl Road, later South King Street); and bordered on the Diamond Head side by a creek (Makiki Stream) (Board of Land Commissioners, Awards 3:65). Kahae, the native wife of George Hyatt with whom he had several children, died at the age of 44 on 15 January 1859 (Pacific Commercial Advertiser 1859:1.2), and George Hyatt died 13 February 1870 at the Queen's Hospital in Honolulu (The Honolulu Advertiser 1940:14.4). Abraham Hyatt, and heirs of George Hyatt, sold George Hyatt's

property for $600.00 the following year, 10 October 1871 to James I. Dowsett (Bureau of Land Conveyances 34:58). The property was deeded from Dowsett to Louisa B. Brickwood in 1894 (Bureau of Land Conveyances 145:227).

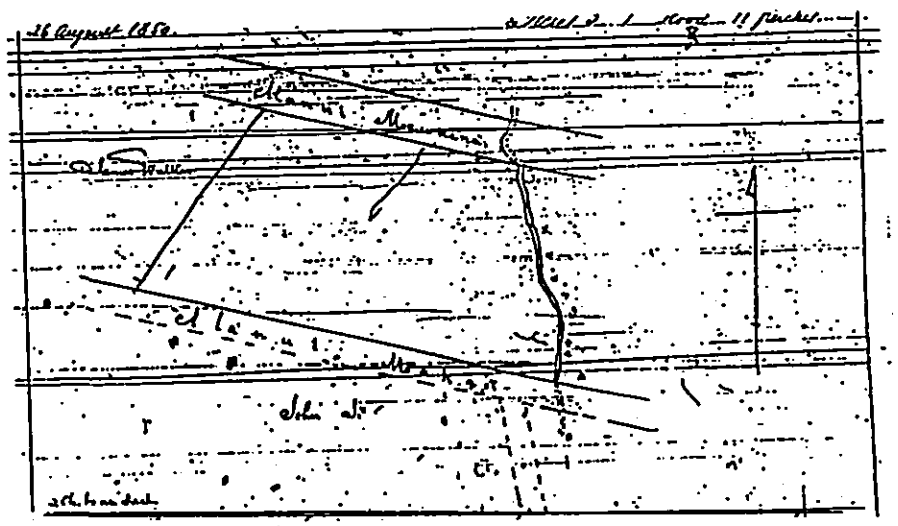

Figure 2A: LCA 529/ROYAL PATENT 4422, 1850 (Board of Land Commissioners)

Desiring to improve the Waikiki Road (Kalakaua Avenue) from "King Street *makai*", the Hawaiian government submitted a request to the Hawaii Department of the Interior in 1879 to "dig a ditch from the corner of the bullocks pen [situated at the southeast corner of the site] to the marsh", and "to fill the old ditch from that point along the road" (Department of the Interior 16:388 1/2). A map of the Pāwa'a area in 1912 (Figure 3A) shows a structure on the site of the bullocks pen. Makiki Stream in 1912 is shown bordering the Diamond Head side of the proposed Pāwa'a Project area with Kalakaua Avenue terminating at South King Street. Between 1912 and 1920, Kalakaua Avenue was extended from South King Street to South Beretania Street (Honsarrat 1920).

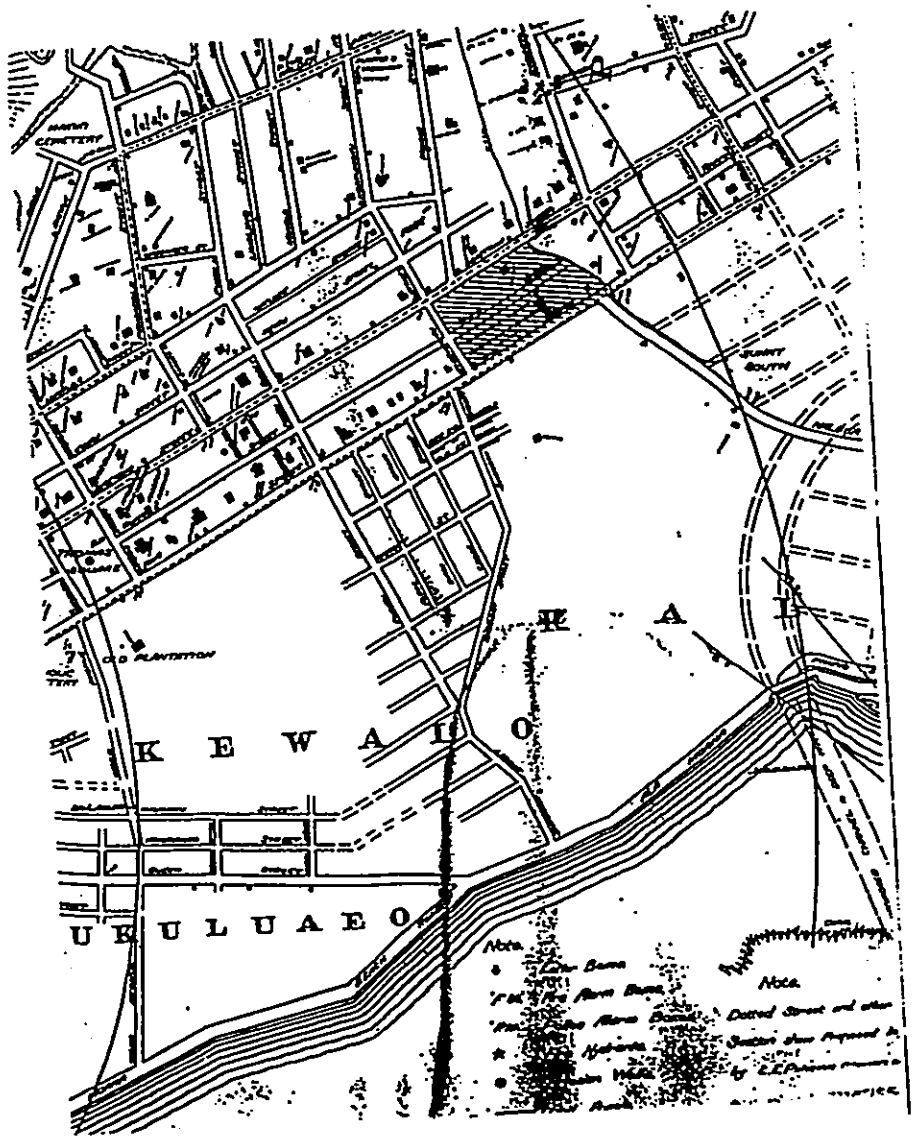

Figure 3A: PROJECT SITE 1912. (Rowell - Hawaii State Archives)
(Screened area indicates site area).

By the turn of the century, an immigrant Japanese community of "camps" bordering "Pah-ke [Pake] Patch;" Chinese farmer territory of banana fields, rice paddies, rice mill, taro patches, and duck and fish ponds from Aloha Lane to Ala Hoana Road; had been established *makai* of South King Street and along both sides of Aloha Lane (changed by 1916 to Kaheka Lane).

The Shinshu Kyokai Mission, built in 1915 on the *ewa* side of Aloha (Kaheka) Lane on the southern portion of the site area was initiated to serve the permanent Japanese residents that had initially settled as a transient population. Between 1923 and 1950, in the area from Kaheka Lane to Kalakaua Avenue, four businesses fronted South King Street, with the interior of the site area occupied by residential cottages of the Japanese (Tatsuguchi and Suzuki 1985:1-9) (Figure 4A).

Diamond Head of Ien Lane, the "Ogata Service Station", opened at 1488 (1522) South King Street by Kumaichi Ogata in 1924 (Husted 1924:374) remained in business at this location until 1951 (Honolulu City Directories). The "Pawa'a Auto Company, Ltd.", established by G. Tamura and M. Yamada at 1496 (1542) South King Street (corner of South King Street and Kalakaua Avenue), was in business from 1923 through 1930 (Honolulu City Directories). "Masaichi Auto Repair" appears listed at the former Pawa'a Auto Company location for only one year in 1933 (Husted 1933:490). The Ogata Service Station advertised "gas and oil and auto repair" and Pawa'a Auto Company "auto repairing" (Figure 5A).

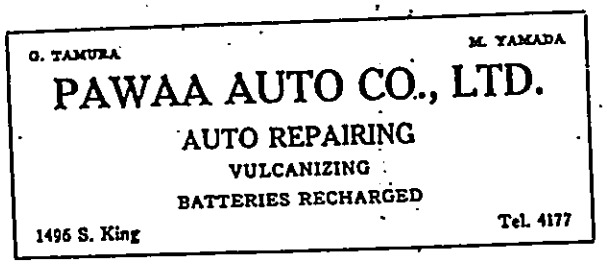

Figure 5A: ADVERTISING FOR THE PAWA'A AUTO CO. LTD., 1924. (Husted)

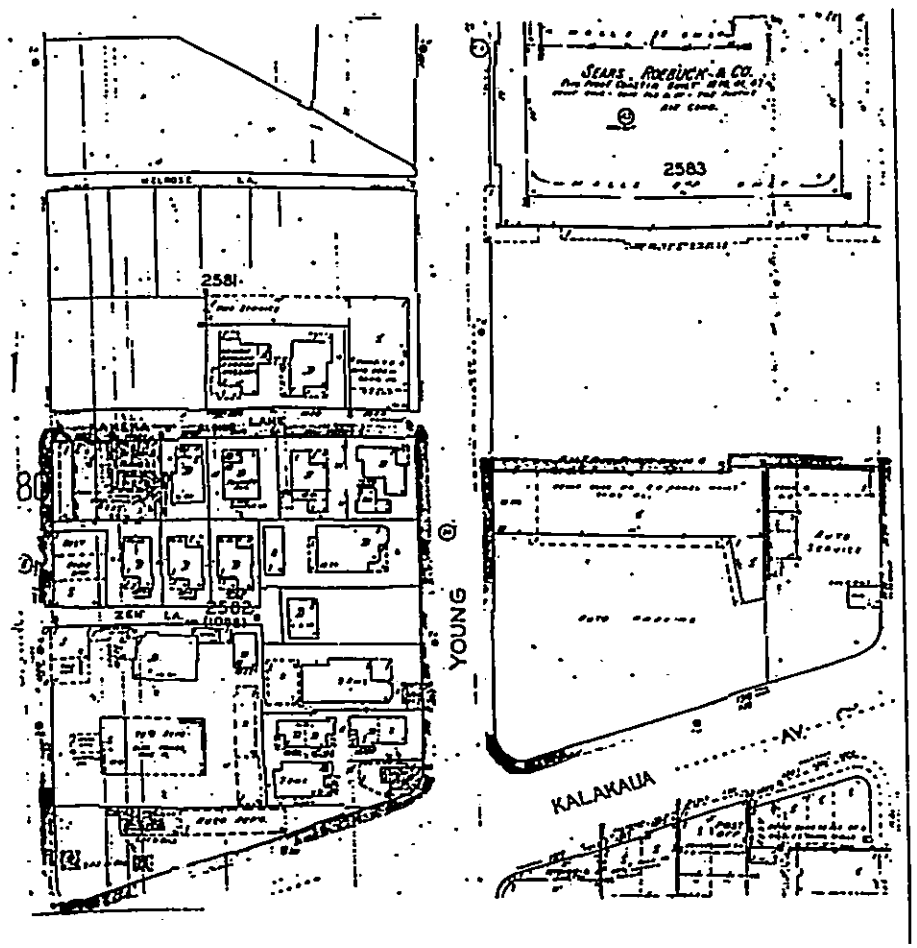

Figure 4A: PAWA'A PROJECT SITE AREA 1927-1951. (Sanborn Map Company)

At 1512 South King Street, between Kaheka Lane and Kalakaua Avenue, a Chinese store by the name of "Pawa'a Grocery" offering "groceries, fruit, pastry, ice cream, and confections" was established by Young Yit Hoy in 1932 (Husted 1932:396) and was in business at this location until 1941 (Honolulu City Directories). Teiko Chinna's "Pawa'a Grill," offering breakfast, lunch, and dinner occupied the Pawa'a Grocery store location in 1949. On the Diamond Head side of Pawa'a Grill in 1949 was the "Pawa'a Radio Shop" (1514 South King) owned by Thomas I. Kobashikawa, "dealers in Philco, RCA, and Zenith radios and parts. Also electric appliances." On the *ewa* side of the Pawa'a Grill (1506 South King), the "Pawa'a Center Restaurant" was run by Shozo and Mrs. Matsumo (Polk 1949:823).

GRANT 3165

Albert Jaeger, a native of Hideshien, Germany, arrived in Hawaii in 1862 at the age of 16 (The Friend 1900:30.3). On 7 July 1874, he married Annie Robinson, daughter of John N. and Caroline Robinson (see Robinson Estate). In 1877, Grant 3165, a wedge-shaped plot of land extending *mauka* of George Hyatt's property on South King Street, and Diamond Head of Makiki Stream (Kalakaua Avenue) to Beretania Street, was sold to Jaeger (Commissioner of Public Lands 1916:77). The adjoining property on the *ewa* side was sold by Grant 3335 to Albert Jager's father-in-law, John N. Robinson, in 1882. Albert Jaeger is listed between 1880 and 1900 as an insurance agent, importer, and general commission agent, with an office on Ka'ahumanu Street. The Jaeger residence is listed in the Honolulu City directories from 1880 through 1900 as located "near the corner of King and Punahou". Although listed as an insurance agent, Albert Jaeger was in charge of the Government Nursery, located on the northwest area of the site, now the Department of Agriculture grounds. On 24 July 1890, Albert Jaeger was appointed president of the Board of Commissioners of Agriculture for the Port and Collections District of Honolulu (Department of the Interior 21:386; 25:383; 27:387; 34:296; 46:66), an office he filled until his death on 22 March 1900 (The Friend 1900:30.3). Grant 3165 was released from the James E. Jaeger (son) trust to Rebecca A. Stone on 8 December 1910 (Bureau of Land Conveyances 344:42). The 1912 map of Honolulu (Figure 3A) verifies the location of the Jaeger residence near Punahou Street on South King Street (Diamond Head of the project area), and the Robinson Estate occupying Jaeger's portion of Grant 3165 on the northern portion of the site area between Young and South Beretania Streets.

From 1927 to 1951, fire insurance maps (Figure 4A), periodically updated by the Sanborn Map Company, shows this area of the proposed site as an auto parking lot associated with Sears, Roebuck and Company. An "auto service" with gas and oil was located on the northeast corner of the site on the corner of Kalakaua Avenue and South Beretania Street.

SUMMARY

Historic period development in the southern portion of the proposed Pāwa'a redevelopment project area commenced as early as 1833, with the adobe wall enclosed housesite occupied by George Hyatt. By 1848, the enclosed house of Hyatt had "fallen" (Board of Land Commissioners, Native Testimony 1848:2.490). Little more is known of the utilization and activities in this portion of the project area except for a bullock pen located on the property in 1879.

At the turn of the century, the southern portion of the project area was developed as a Japanese community. The northern area, owned by Albert Jaeger, appears to have had little development impacts, existing as an extension of the Robinson Estate grounds from 1882-1939. Both the southern and northern portions of the subject Pāwa'a Project area had service stations/auto repair business installations as major impacts after 1923/1939.

City Ordinance Number 91-38, based on Bill Number 40 (1991) introduced by council member Leigh Wai Doo on April 10, 1991 revised Section 13-36.7 of the Revised Ordinances of Honolulu dated 1978 and designated 105 trees located on O'ahu to the Register of Exceptional Trees. Several large trees located in the park area on the Ewa side of the Department of Agriculture complex are listed as well as the mahogany trees along Kalakaua Avenue between Beretania and Kapiolani Boulevard. Seven of these mahogany trees are located in the current project area; four fronting Kalakaua Avenue between Beretania and Young Streets between the sidewalk and the Diamond Parking Lot and three fronting Kalakaua Avenue between Young and King Streets between the sidewalk and the Unocal Gas Station. City Council approval is required for relocation or removal of any tree listed on this register.

RECOMMENDATIONS

A Japanese residential community existed in the interior of the southern portion of the proposed project area by the turn of the century. Lost or disposed artifacts and structural features that reflect traditional Japanese activities of that era may still remain as intact subsurface deposits to be encountered during redevelopment. Remains of an earlier adobe wall which stood in this area may underlie the Japanese occupation of the site. A series of selectively placed backhoe-assisted trenches or probes to determine the nature, integrity, and extent of deposits in the interior of the southern area are recommended.

Historical records indicate that the northern area of the proposed project has had few land use activities occurring until developed as a parking lot and service station about 1940. Archaeological data recovery in this area of the site is therefore predicted to be minimal.

Three service stations were located in the project area, one along South King Street, another at the corner of South King Street and Kalakaua, and the third at the corner of South Beretania Street and Kalakaua Avenue. Three or more subsurface fuel tanks in the area of these service stations are indicated by fire insurance maps (Figure 4A) and are likely to be encountered during redevelopment. These areas as well as the current Police Headquarters building (not included in the current expansion area) which incorporates a basement have undergone extensive prior subsurface disturbance and are not anticipated to be archaeologically sensitive.

In other areas, archaeological monitoring of all demolition or construction related, ground-disturbing activities is necessary to mitigate potential adverse impact on new and unanticipated discoveries not predicted by the historical literature and documents search.

During demolition and any excavations; security measures, such as guards, barricades, and lighting may be necessary, especially at night to deter vandalism of sensitive cultural data.

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APPENDIX F
HAZARDOUS WASTE STUDY

ENVIRONMENTAL ASSESSMENT

AT

PAWAA REDEVELOPMENT SITE
HONOLULU, HAWAII 96814

prepared for

WILSON OKAMOTO & ASSOCIATES, INC.
1150 SOUTH KING STREET
HONOLULU, HAWAII 96814
(808) 531-5261

PRELIMINARY SITE SURVEY

FOR

ASBESTOS-CONTAINING BUILDING MATERIALS
PCB ELECTRICAL EQUIPMENT
HAZARDOUS CHEMICAL MATERIALS
HAZARDOUS CHEMICAL WASTES
UNDERGROUND STORAGE TANK SYSTEMS
SURFACE/SUBSURFACE CONTAMINATION

April 17, 1992

prepared by

UNITEK ENVIRONMENTAL CONSULTANTS, INC.
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PROJECT 9103

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EXECUTIVE SUMMARY

The following is a summary of the findings of the property enclosed by Keeaumoku Street, Beretania Street, Kalakaua Avenue, and King Street, Honolulu, Hawaii. The subject site is designated by the following tax map key numbers (TMKs) (TMKs 2-4-5: 1, 2, 4, 5, 6, 7, 8, 10, 13, 14, 18, 19, 20, 21, 22, 23, 26, 27, 28, 29, 31, 46, 47, and 48 which is referred to as the Pawaa Redevelopment Site. The subject site covers over 600,000 square feet and is currently occupied by the City and County of Honolulu Police Headquarters, the State of Hawaii Department of Agriculture and surrounding businesses including restaurants, retail shops, a gasoline station, apartment units and a Meadow Gold Dairies ice cream plant.

Suspect asbestos-containing building materials were identified throughout many of the buildings inspected.

Fourteen Hawaiian Electric Company (HECO) owned transformers and one customer owned transformer were observed on site. The dielectric fluid in the customer owned transformer was replaced with a non-PCB oil in February 1989. The HECO owned transformers are considered PCB suspect.

Hazardous chemical materials and wastes, such as drums containing transmission fluid, motor oil, and waste oil were observed in the two garage areas of the property. Soil and asphalt in these areas appeared to be stained with oil. Smaller quantities of various cleaning agents and paint materials appeared to be properly stored in several rooms with the buildings. The Police Motorpool Facility also has three solvent parts washers and is identified by the EPA as a hazardous waste generator.

Numerous underground storage tanks exist on the subject site. One waste oil tank and three gasoline tanks are located at the Police Motorpool Facility. Records of a tank tightness test conducted on the waste oil tank indicated a slight leak that is within EPA's criteria for tank tightness. No test records could be obtained for the gasoline tanks. One gasoline tank was observed near the garage at the Department of Agriculture. Records of a tank tightness test indicated a leak that is within EPA's

criteria for tank tightness. Additional underground storage tank systems are privately owned and associated with the gasoline distributorship. No test records were available for review. A gas station was formerly located at the corner of Kalakaua Avenue and Beretania Street. Further investigation is required to determine if the underground storage tank system associated with that business was properly closed. One underground storage tank system was identified on the Meadow Gold Dairies ice cream plant site.

On-site sources of potential surface or subsurface contamination included leaking waste oil drums and underground storage tanks near the garages, and three double piston type hydraulic lifts in the maintenance area of the Honolulu Police Department Motorpool Facility. Underground storage tanks located at the Meadow Gold facility, the Unocal 76 gas station, and the former gasoline station at Beretania Street and Kalakaua Avenue and numerous adjacent underground storage tank systems within a one-half mile radius of the site are also of concern because they could contribute to subsurface site contamination from product release.

SCOPE OF THE ASSESSMENT

Unitek Environmental Consultants, Inc. (UEC) was retained by Wilson Okamoto and Associates, Inc. to conduct a limited environmental assessment, preliminary site survey of the Pawaa Redevelopment Site. This property is enclosed by Keeaumoku Street, Beretania Street, Kalakaua Avenue, and King Street, Honolulu, Hawaii and includes the following tax map keys (TMK): 2-4-5: 1, 2, 4, 5, 6, 7, 8, 10, 13, 14, 18, 19, 20, 21, 22, 23, 26, 27, 28, 29, 31, 46, 47 and 48.

The purpose of this preliminary survey was to identify the immediate and most recognizable environmental concerns relative to asbestos-containing building materials, PCB (polychlorinated biphenyl)-containing electrical equipment, hazardous chemical materials, hazardous chemical wastes, underground storage tank systems, and potential surface/subsurface contamination. This survey was not intended to address other environmental issues including, but not limited to: fire/explosion hazards (which would be addressed by an insurance loss control survey), biological concerns (such as disease or infectious waste), public health/safety issues, community/worker right-to-know regulations, radiation hazards, or other environmental regulatory compliance requirements.

This preliminary site survey consisted of a cursory review of accessible documentation, interviews with people having knowledge of the property, and a visual inspection of the property/facility as it existed on the days of the site visits. Although this report provides an initial screening for potential environmental liability, it should not be construed as a comprehensive evaluation of all possible environmental impairment associated with the site.

SITE DESCRIPTION AND HISTORY

Site Description:

The Pawaa Redevelopment Site is enclosed by Keeaumoku Street, Beretania Street, Kalakaua Avenue, and King Street, Honolulu, Hawaii and includes the following TMKs: 2-4-5: 1, 2, 4, 5, 6, 7, 8, 10, 13, 14, 18, 19, 20, 21, 22, 23, 26, 27, 28, 29, 31, 46, 47 and 48. Parcels 14, 21 and 23 are occupied by the City and County of Honolulu Police Headquarters and total 186,474 square feet of area.

Parcel 21 supports the main Police Headquarters Building and a metered parking area. Parcel 14 supports two single story buildings, one which serves as the Juvenile Crime Prevention Department and the other which serves as a maintenance area for police vehicles. The center of the lot is open parking. Parcel 23 serves as an overflow parking lot for police vehicles.

Parcels 18 and 19 are occupied by the State of Hawaii Department of Agriculture and includes 117,207 square feet in area. The west half of parcel 18, utilized by the Department of Agriculture, is an open botanical park area covered with grass, shrubbery, and trees. Two single story buildings, serving as insectaries, occupy the northeast edge of the lot. The adjoining one-story Hale Waiolama building lies on the southeast edge of the parcel and extends into parcel 19. Hale Waiolama previously served as a laboratory, but now functions as a board meeting room. Parcel 19 supports two other buildings and a parking area for the Department of Agriculture though the parcel is leased to the Department of Accounting and General Services. One of the buildings on parcel 19 is the quarantine laboratory and greenhouse. The second building is used as an auto workshop.

The remaining parcels are occupied by a composite of commercial businesses and residential units. Additional information on these parcels is provided in Table 1. Since these parcels are privately owned, access was not obtained and observations were limited to publicly accessible areas to minimize disruption of current occupants.

TABLE 1
SUBJECT SITE DESCRIPTION

Parcel	Area (in square ft.)	Occupant	Structure
1	6,786	gas station/parking lot	single-story
2	25,753	gas station/ restaurant/parking lot	single-story
4	14,014	commercial-multi tenant/parking lot	two-story
5	6,132	commercial-multi tenant/parking lot	two-story
6	3,076	vacant	
7	3,099	commercial-multi tenant/parking lot	two-story
8	3,007	commercial-multi tenant/parking lot	single-story
10	10,028	commercial-multi tenant/parking lot	two-story
13	8,181	commercial-multi tenant/parking lot	two-story
20	39,836	commercial-multi tenant/parking lot	two-story
22	14,733	commercial-multi tenant/parking structure	three-story
23	14,690	parking lot	
26	41,413	light industrial-single tenant/parking lot	one and two-story
27	4,580	vacant-commercial/ parking lot	single-story
28	6,850	vacant-commercial/ residential/parking lot	one and two-story
29	20,465	commercial single-tenant/parking lot	two-story

TABLE 1 CONTINUED
SUBJECT SITE DESCRIPTION

Parcel	Area (in square ft.)	Occupant	Structure
31	6,466	commercial-single tenant/parking lot	single-story
46	6,850	commercial-residential multi-tenant/parking lot	two and three-story
47	12,025	parking lot	

North of the subject property are three gasoline stations, Beretania Chevron, Don's Makiki Station (Unocal 76), and Makiki Shell, and the Pflueger Acura car dealership. East of the site is a Unocal 76 and the 7-Eleven Young Street location, which has an Aloha Petroleum service. All of these locations support underground fuel storage tank systems.

Site History:

Records indicate that during 1910 the subject site supported several dwellings. Parcels 18 and 19 supported the U. S. Department of Agriculture and a school. Ownership of parcels 14, 19, 21, and 23 went to Sears Roebuck and Company in the 1940s and 1950s. At that time, parcel 18 was owned by the Territory of Hawaii and leased to the Board of Commissions of Agriculture and Forestry. During the 1950's, a small maintenance shop also existed on the Department of Agriculture property. The Sears Roebuck Company building was built on parcel 21 in the 1940s. In 1958, the City and County of Honolulu took over parcel 21. In 1965, parcels 18 and 19 were owned by the State of Hawaii. Parcel 19 was leased to the Department of Agriculture and then the Department of Accounting and General Services as the Pawaa parking lot.

Historical records from 1914 indicate that parcels 22, 27, 28, 29 and 30 supported dwellings and commercial businesses including a poi factory on former parcel 30 (now a portion of parcel 29). By the 1940s or 1950s records indicate

that an ice cream factory, creamery and restaurant were situated on parcel 26. Parcels 31 and 46 supported dwellings or commercial enterprises including upholstery, radio, and furniture stores.

The east end of the north block, defined by Beretania Street, Kalakaua Avenue and Young Street (parcel 47), supported an auto repair shop and gasoline station during the 1940s and 50s. A Chevron gas station was demolished on this lot in the early 1980s. South of this area, at the east end of the south block defined by Young Street, Kalakaua Avenue and King Street (parcels 1 and 2), was another auto repair shop and gasoline station. Parcels 4, 5, and 6 supported businesses including a restaurant. Residential dwellings were sited on portions of parcels 4 and 6 and parcels 7, 8, and 10. (Sanborn, 1947).

Several gasoline stations were identified adjacent to the subject site along Beretania Street, in the 1940s and 1950s including one at the corner of Keeaumoku and Beretania Streets, another at the corner of Makiki and Beretania Streets and an auto sales and repair business adjacent to the gas station on Beretania and Makiki Streets. Southeast of the subject site, at the corner of King Street and Kalakaua Avenue, was another gas station (Sanborn 1947).

ASBESTOS-CONTAINING BUILDING MATERIALS

Observations:

A visual inspection was conducted of accessible parcels at the subject site to identify easily accessible building materials suspected of containing asbestos. To perform the site assessment, a systematic approach was utilized and consisted of the following elements:

1. A walk-through survey to visually evaluate readily accessible areas of the buildings for materials of construction suspected to contain asbestos.

2. An assessment of present conditions of suspect materials and a hazard evaluation of suspect materials to determine potential friability.

3. An evaluation of the general condition and hazard potential of the suspect asbestos-containing materials identified, with recommendations.

The client should note that a limited survey such as this is not intended to identify all asbestos-containing material (ACM) present. It should, however, provide the owner with a means to recognize obvious potential liabilities resulting from asbestos on the property. A preliminary survey can also provide information which may assist with selecting response actions or making prudent decisions for response actions related to asbestos.

Pursuant to the scope of this project, there were no bulk samples collected during this survey.

Suspect materials were identified through visual means only and assessed at the time of the survey according to the use and population exposed to each separate functional space. Non-friable miscellaneous materials were classified in either good condition or damaged condition. Friable materials were classified into one of three groups; good, damaged, or significantly damaged condition.

A hazard evaluation of suspect asbestos-containing materials was then made using two criteria: estimating friability and estimating the potential for exposure under normal use conditions.

Discussion:

Material Classification:

Materials suspected of containing asbestos are classified in one of the following categories (U.S. EPA, 1985):

1. Surfacing Materials - Examples of surfacing materials include, but are not limited to, ACM sprayed or troweled onto surfaces (decorative plaster on ceilings or acoustic ceiling spray), or fire proofing materials on structural members.

2. Thermal System Insulation - Examples include, but are not limited to, ACM applied to pipes, boilers, tanks, and ducts to prevent heat loss or gain, or condensation.

3. Miscellaneous ACM - Examples include, but are not limited to, asbestos-containing ceiling or floor tiles, transite siding, and roofing material.

Material Assessment:

Each asbestos-containing material identified will be evaluated using the following criteria (U.S. EPA, 1985):

1. Friability - A determination will be made with reference to the materials friability. A friable material is any material that can be crumbled, pulverized, or reduced to powder when dry by hand pressure. Non-friable materials are generally bonded and present no immediate

health hazard provided they remain in good condition and are not sanded, pounded, sawn, drilled, pulverized, or demolished.

2. Condition of Materials - Factors which aid in assessing the materials condition are:

   A. Evidence of deterioration or delamination.
   B. Evidence of physical damage (e.g., presence of debris).
   C. Evidence of water damage.

   Each material will be classified as being either in good condition, displaying minor damage or deterioration, or being in poor condition.

3. Potential for Future Damage, Disturbance, or Erosion of ACM - Factors which assist in determining this category are:

   A. Proximity to air-plenums or direct air stream.
   B. Visibility, accessibility to building occupants, and degree of activity (air movement, vibration, noise).
   C. Change in building use.

   Each material will receive either a high or low potential rating for this category.

Response Actions:

UEC will recommend one of five response actions once asbestos-containing materials have been identified. A brief description of each follows (U.S. EPA AHERA, 1987a):

1. Operations and Maintenance (O&M) Program - The principle purpose of an O&M Program is to minimize exposure of all building occupants to asbestos fibers. To accomplish this, an O&M Program must include work practices to:

   A. Maintain ACM in good condition.
   B. Ensure proper cleanup of asbestos fibers previously released.
   C. Prevent future release of asbestos fibers.
   D. Monitor the condition of ACM.

2. Repairs - Returning damaged ACM to an undamaged condition or to an intact state through limited replacement and patching.

3. Encapsulation - Treating ACM with a liquid that, after proper application, surrounds or embeds asbestos fibers in an adhesive matrix to prevent fiber release. The liquid may be a penetrant, which will add cohesion by penetrating the asbestos material, or a bridging encapsulant, which covers the surface of the material with a protective coating.

   Encapsulation is initially less expensive than other response actions but has serious limitations such as:

   A. The asbestos material may be pulled from its supporting substrate by the weight of the encapsulant.

   B. Encapsulants are not effective on highly friable or extensive damaged materials.

   C. The material must still be treated as asbestos-containing material.

   Encapsulation does not alleviate the need for an O&M Program and removal may be more difficult later because of the encapsulant.

4. Enclosure - Refers to the construction of airtight chambers, i.e., false walls and ceilings, around the asbestos materials to prevent fiber

release into the ambient environment. Enclosures simply cover up the problem and postpone removal until a later time.

5. Removal - Complete removal is initially a very costly alternative but the only one which provides a permanent solution. Removal operations must be conducted under very controlled conditions in accordance with state and/or federal standards.

Regulatory Review:

Building owners are governed by a variety of federal, state, and local regulations which influence the way they must handle ACM in their facilities. The following is a brief overview of regulations which facility owners should be aware of:

1. Occupational Safety and Health Administration (OSHA) - OSHA has developed regulations designed to protect workers which contain specific requirements concerning worker protection and procedures used to control ACM.

   A. 29 CFR 1926.58 "Construction Industry Standard"

   This regulation generally applies to workers who perform asbestos removal and encapsulation, as well as repair, maintenance, alteration, or renovation if ACM is involved.

   B. 29 CFR 1910.1001 "General Industry Standard"

   The General Industry Standard covers all other operations where exposure to asbestos is possible, including exposure to occupants of buildings which contain ACM. This regulation requires medical examinations for workers who exceed OSHA's permissible exposure limit (PEL) or excursion limit.

   C. 29 CFR 1910.134 "Respiratory Protection Standard"

   This regulation covers elements for a written respiratory protection program, respirator selection, and respirator maintenance.

2. State of Hawaii - Title 12 Department of Labor and Industrial Relations Subtitle 8 - Division of Occupational Safety and Health (DOSH)

   The State of Hawaii DOSH has regulations which differ slightly from OSHA regulations.

   A. DOSH 12-202-13 "Health Standards-Asbestos"

   This regulation is similar to 29 CFR 1910.1001 in that medical examinations are required for workers who exceed the PEL.

   B. DOSH 12-145 "Construction Standards-Asbestos"

   This regulation applies to all construction work, including but not limited to, demolition projects where ACM is present and removal or encapsulating of materials containing asbestos.

3. United States Environmental Protection Agency (U.S. EPA)

   A. U.S. EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR 61 Subpart M)

   This is the EPA's rules concerning the application, removal, and disposal of ACM. The asbestos NESHAP regulation governs asbestos renovation and demolition projects in all facilities. This regulation requires the removal of certain types of

regulated asbestos-containing material (RACM) prior to renovation or demolition activities.

There are also certain notification requirements that apply in these instances. The latest update of this rule was published in the Federal Register on November 20, 1990.

B. U.S. EPA Asbestos Hazard Emergency Response Action (AHERA) (40 CFR 763 Subpart E)

In October 1987, EPA issued final regulations to carry out AHERA. This requirement only applies to public and private elementary and secondary school buildings. Schools were required to conduct facility inspections, develop management plans to deal with ACM identified, and select response options. The AHERA rules do not require schools to remove ACM.

C. U.S. EPA Worker Protection Rule (40 CFR 763 Subpart G)

This regulation extends the OSHA standards to state and local employees who perform asbestos work, and who are not covered by the OSHA Asbestos Standards, or by a State OSHA plan. The rule parallels OSHA requirements and covers medical examinations, air monitoring and reporting, protective equipment, work practices, and recordkeeping.

Survey Results:

No bulk samples were collected during the site inspection of the accessible buildings, but suspect asbestos-containing building materials observed in the accessible buildings are identified in this report. Table 2 provides a list of suspect asbestos-containing building materials observed. Photographs are included in the appendix to this report. Table 3 is a list of businesses that were not readily accessible and therefore incompletely visually evaluated. In general, older

buildings built prior to 1980 have a greater likelihood of containing asbestos building materials. Understandably, based on this limited information, it would be difficult to make prudent decisions regarding asbestos hazard potential and the execution of an effective asbestos management program. Further investigation including bulk sampling and analysis by optical microscopy is recommended.

TABLE 2
ASBESTOS SURVEY: SUSPECT BUILDING MATERIALS

	Location	Description	Condition	Approx Sq Ft
		Police Headquarters		
1	Throughout the Building	Non-friable, Plaster on Metal Latho, with Friable Acoustic Spray-on Ceiling Material Surfacing	Good	50,000
2	Throughout the Building	Cement Ceiling/Floor Structure. Above all of the dropped ceilings	Good	
3	Elevator	Possible materials used as insulation and fire retardant	Unsoen	
4	Escalator Area, 3 Floors	Non-Friable 12" x 12" Floor Tile, white with black streaks	Good	150
5	Roof	Various Roofing Materials, Coatings Membranes Etc.	Good	5,000
6	Communications Office Area	Friable, 12" x 12" Canec Wall Tile	Good	500
7	Communications Area, Hall	Friable, 2' x 4' T-Bar Ceiling Panels, fiberglass matting texture	Good	200
8	Mechanical Room, 3rd Floor	HVAC Materials, Thermal Pipe Insulation, Including Lagging and Joint Coatings	Good, with a few exceptions	1,000 linear ft
		Police Headquarters, Basement		
9	Receiving Desk	Non-Friable, 9" x 9" Floor Tile, white with black specks	Good	200
10	Captain's Office	Non-Friable, 12" x 12" Floor Tile, white marble	Good	200

TABLE 2 CONTINUED
ASBESTOS SURVEY: SUSPECT BUILDING MATERIALS

	Location	Description	Condition	Approx Sq Ft
11	Open Offices, Receiving Desk	Non-Friable, 12" x 12" Floor Tile, white marble	Good	2,000
12	Pink Padded Cells	Non-Friable, 6" Strips-Linoleum Sheet vinyl, blue	Good	200
13	Sr. Locker Room	Non-Friable, Plaster on Metal Lathe, with Acoustic Spray-on Ceiling Material Surfacing	Good, Except for this area	
14	Sr. Locker Room	Friable, HVAC Pipe Insulation	Good	200 Linear Ft.
15	Sr. Locker Room Shower	Non-Friable, Wall Plaster	Good	200
16	Sr. Locker Room	Non-Friable, 12" x 12" Floor Tile under 9" x 9" Floor Tile, white with black spots	Good, Except for this area	2,000
17	Interrogation Room	Friable, 1' x 3' Acoustic Canec Wall Tile	Good	300
18	CID	Non-Friable, 30" x 30" Imitation Terrazzino, black with white flecks	Good	500
		Juvenile Crime Prevention		
19	Entry Office	Non-Friable, 12" x 12" Floor Tile, white with blue streaks	Good	8,000
		Department of Agriculture, One-Story Office		
20	Open Offices, First Floor	Non-Friable, 9" x 9" Floor Tile, tan with mono-cap. White streaks	Good	1,600
21	Loan Offices	Non-Friable, 12" x 12" Floor Tile, cream with tan flecks	Good	1,600
22	Loan Offices	Friable, 12" x 12" Acoustic Canec Wall Tile	Good	1,000

TABLE 2 CONTINUED
ASBESTOS SURVEY: SUSPECT BUILDING MATERIALS

	Location	Description	Condition	Approx Sq Ft
		Department of Agriculture, Two-Story Office		
23	Office Area, First Floor	Non-Friable, 9" x 9" Floor Tile, brown with 3 colors of flecks	Good	2,000
23	Office Area, First Floor	Non-Friable, 12" x 12" Floor Tile, cream with tan flecks	Good	1,000
24	Janitors Area, First Floor	Non Friable, Dropped Ceiling, Cementitious Plaster on Metal Lathe	Good	200
25	Janitors Area, First Floor	Water Heater, Suspect Insulation Materials	Good	1 Ea
26	Office Area, Second Floor	Non-Friable, 9" x 9" Floor Tile, 3 Colors, 1) brown with cream and reddish streaks 2) brown with blue and white flecks 3) black with white flecks	Good	2,000
		Department of Agriculture, Three Story Office		
27	Entomology, First Floor	Friable 1' x 2' Acoustic ceiling tile	Good	2,000
28	Entomology, First Floor	Friable 9" x 9" Floor Tile, gray with white and black streaks	Good	4,000
29	Office Area, Second Floor	Friable 12" x 12" Acoustic ceiling tile	Good	2,000
30	Hallway, Above Closets, Second Floor	Friable Canec Sheeting, painted	Good	150
31	Roof	Various Roofing Materials, Coatings, Membranes, Etc.	Good	4,000
		Department of Agriculture, Hale Waiolama		
32	Board Room	Friable 12" x 12" Acoustic ceiling tile	Good	500
32	Board Room	Non-Friable, 12" x 12" Floor Tile, cream with tan flecks	Good	500

TABLE 3
ASBESTOS SURVEY
INACCESSIBLE BUILDINGS

Location	Business	Sq. Ft.	Comments
1503 Young Street	- A-1 Bail Bonds - Myongs (Takeouts) - Danny's Barber Shop	2,200	one story older structure built prior to 1980.
Shed Residence	- private	600	
1025 Kaheka Street	1st Floor - Aloha bail bonds - OK Fashions -The Armory - Hunting Supplies	2,550	Two story apartment style building. Some spray on acoustic. Built in 1955.
	2nd Floor - Apartments	2,350	
1550 - 1502 South King Street	1st Floor - Baldwin Sanders Piano and Organ Center	3,800	Two story commercial building, with basement (1,696 sq. ft.). Built in approximately 1953.
	2nd Floor - BM Royal Hawaiian Jewelry - Fashion Concentration Kau Wallor Piano Studio - School of Performing Arts - Sooks Dress Shop - Wahine Builders - Walters S. Organ House		
1486, 1488, 1490 South King Street	1st Floor - Keo's Thai Cuisine Bar and Grill - Electric Shaver Shop - Eve Boutique	4,224	Two story commercial building with driveway and marque. Built in 1960.
	2nd Floor	4,800	
1516 South King Street	1st Floor - Shiseido of Hawaii, Inc.	4,716	Two story commercial building with ground level loading dock. Built in 1970.

TABLE 3 CONTINUED
ASBESTOS SURVEY
INACCESSIBLE BUILDINGS

Location	Business	Sq. Ft.	Comments
1524 A South King Street	- Diners Restaurant	6,000	One-story
1513 Young Street	The Motosuo Building 1st Floor - La Lunch Box - Prestige Travel Unlimited, Inc.	4,000	
	2nd Floor - Investment Properties Pacific, Inc. - Norpac Group, Inc. - Realty Trade Center - Charles Uh Imann, AIA Architect - Steven Wong, AIA	4,000	
1314 Young Street	Midtown Center - Subway - La Video - Worlds of Fun - Ryuken Bookstore Hibachi House - Midtown Fashion - TCBY Yogurt - Fantastic Sams - Biogime Skincare	13,000	Remodeled 1989
1449 South Beretania Street	- Davidson International Photo - International Association of Machinists and Aerospace Workers	2,239	One-story built in 1949
1431 South Beretania Street	First Federal Building - First Federal Savings and Loan	7,000	Newer
1421 South Beretania Street	- Sign of the Crab Nauticals	2,500	Older two-story

TABLE 3 CONTINUED
ASBESTOS SURVEY
INACCESSIBLE BUILDINGS

Location	Business	Sq. Ft.	Comments
1417 South Beretania Street	Apartments - 7-units	4,000	Two-story, tin roof
	Empty unit	2,500	Acoustic spray ceiling
	Apartments 1st Floor - 4-units	4,000	Three-story
	2nd Floor - 4-units		
	Garage Area	4,000	
	Empty unit	3,434	One floor, acoustic spray ceilings. Built 1960
1436 Young Street	1st Floor - The Associates Financial Services - Japanese Restaurant - Tropicolor Photo Laboratory	4,082	Three-story, built 1983 with parking deck and covered parking.
	2nd Floor	4,961	
	3rd Floor	4,961	

Recommendations:

It is recommended that all suspect asbestos-containing building materials (ACBM) be sampled and analyzed for asbestos content. Based on these findings, a determination should be made regarding removal prior to renovation or demolition. Non-friable asbestos-containing materials may be rendered friable during renovation or demolition activities. Once ACBM has been identified, contract specifications should be prepared, prior to contractor bidding.

It should be noted that the scope of this asbestos evaluation is limited and the observations should not be interpreted to imply that no other asbestos-containing materials exist in the buildings. Inaccessible asbestos-containing materials, for example, could be present behind walls, beneath carpeting, in hidden crawl spaces, in inaccessible roofing material, or as part of the sewer system in the form of transite piping.

Although only building materials were addressed in this survey, other products may also contain asbestos such as automobile brake shoes, engine gaskets, heat resistant gloves/pads, cement, and various roofing and siding materials. These products are not normally fibrous unless damaged. It is recommended that all fibrous materials be considered as potentially containing asbestos and handled accordingly until laboratory analysis proves otherwise.

PCB ELECTRICAL EQUIPMENT

Observations:

A total of fifteen transformers, two vault type and thirteen utility pole mounted, type were observed on the subject property during the site inspection. Vault transformer 26373 (Vault 1871) and pole mounted transformers 16951; 16954, and 16955 are owned by Hawaiian Electric Company (HECO) and are located on Honolulu Police Headquarters property. Vault transformer 42022 (Vault 92), also located on Honolulu Police Headquarters property, is customer owned. This transformer had formerly been determined to contain PCBs and the transformer was replaced by Westinghouse Electric Company in February 1989. A completion report is provided in the Appendix to this report. Pole mounted transformers 32266, 20134, 20141, and 20143 are owned by HECO and are located on the Department of Agriculture property. HECO owned pole mounted transformers 29176, 47303, 47495, 50963, 49071, and 49063 are located above the sidewalk fronting 1513 Young Street.

Fluorescent lights were observed in use in all the accessible buildings.

Table 4 is a listing of the dielectric fluid filled transformers observed during the site reconnaissance.

TABLE 4
TRANSFORMER DATA

Transformer Type	Transformer ID #	Purchase Date	Service Date	PCB Status
Vault 92	42022	6/29	12/75	Non-PCB
Vault 1871	26373	1/68	2/73	No Data
3 Pole Mounted	16951, 16954, 16955	1/60	2/73	No Data
1 Pole Mounted	32266	5/73	10/74	No Data

TABLE 4 CONTINUED
TRANSFORMER DATA

Transformer Type	Transformer ID #	Purchase Date	Service Date	PCB Status
3 Pole Mounted	20134, 20141, 20143	1/63	9/73	No Data
3 Pole Mounted	49071, 49063, 50963	1986	2/88	Non-PCB
3 Pole Mounted	47303, 47495, 29176	1985 1971	10/85 2/73	No Data

Piston type hydraulic lifts were observed in the Honolulu Police Department Motorpool. Hydraulic fluids may contain PCBs. Motorpool operations at the Honolulu Police Department have been in effect prior to the 1979 ban on distribution in commerce of PCBs.

Discussion:

Polychlorinated biphenyls (PCBs) is the common name for a family of chemicals introduced in 1929. PCBs have been widely used and distributed because of their excellent chemical stability, superior electrical insulation properties, heat transfer capabilities, and fire resistance. Major applications and uses of PCBs have been as insulating fluids in heat exchangers, transformers, and capacitors, and as high temperature hydraulic fluids. PCBs have also been used in carbonless copy paper, paint pigments, synthetic rubber, wire insulation, adhesives, and protective coatings (Harbison, 1989).

The distribution in commerce of PCB containing items was banned in 1979 (40 CFR 761.20). The U.S. Environmental Protection Agency aggressively enforces regulations concerning PCB manufacturing, use, distribution, release and disposal under the Toxic Substances Control Act (TSCA). This federal agency extensively regulates the use, servicing, and disposal of PCBs in electrical equipment by enforcing marking, notification, inspection, and record keeping requirements.

Seemingly minor discrepancies in any of these requirements may result in significant liability to the owner (Harbison, 1989).

As of March 1990, analytical data indicated 94 percent of the tested transformers are non-PCB (less than 50 parts per million PCB) and 5 percent are PCB contaminated (50-499 ppm) as defined in 40 CFR § 761.30.

Due to federal prohibition against distribution in commerce of PCBs in 1979, units purchased after 1979 are not considered by HECO to be suspect of contamination. Untested mineral oil-filled transformers purchased prior to July 1, 1979 must, by law, be considered PCB-contaminated. EPA rules for PCBs regulating manufacturing, processing, distribution in commerce, and use (40 CFR § 761.30) state of the following: "PCBs at any concentration may be used in transformers... for the remainder of their useful lives subject to... condition." (HECO, 1991a). However, PCBs in concentrations of less than 50 ppm may pose a risk of property contamination since spills of PCBs from unknown sources must be cleaned up to a level of at least 25 ppm as defined in 40 CFR § 761.125.

Fluorescent light ballasts may contain PCBs. Ballasts and transformers can overheat and rupture, thereby contaminating the immediate area. If this should occur, and the ballast is not known to be PCB free, the area should be immediately vacated and barricaded. Cleanup should only be conducted by trained and experienced chemical incident response personnel and be completed within 48 hours of the release. If analysis determines that the ballast contained PCBs, disposal should be in a EPA approved PCB incinerator or chemical waste landfill, in accordance with the PCB Article disposal rules in 40 CFR § 761.60(b) (U.S. EPA, 1991c).

Before any new or additional electrical equipment, including transformers, capacitors, or fluorescent light ballasts, are bought or installed at the subject property, certification from the manufacturer that the equipment does not contain PCBs should be obtained, or the purchase specifications should state "No PCBs".

Recommendations:

Some of the HECO transformers on-site are considered to be PCB-suspect due to their purchase dates. It is recommended HECO be petitioned to test these transformers for PCBs and if necessary take responsibility for proper removal of the devices from the site if required by renovation or change in site use.

HECO's current policy may require sharing analytical expenses with the client if the transformers are determined PCB-free. There is no charge currently if the transformers are determined to contain PCBs and if they are near facilities that handle food or feed.

The hydraulic fluid in the piston type lifts located the Honolulu Police Department motorpool facility should be sampled and analyzed for PCBs. Additional recommendations are provided in the surface/subsurface section of this report.

HAZARDOUS CHEMICAL MATERIALS

Observations:

Small quantities of cleaners, paint materials, and insecticides and related building maintenance products were observed in the custodian closets throughout the Police Headquarters building. All materials appeared to be stored properly and no spills were evident. A photo laboratory and an X-ray room, both which contain small quantities of processing chemicals, also exist within the main headquarters building.

In the Honolulu Police Department motorpool area, various solvents and lubricants associated with automobile maintenance were observed to be in use. Approximately five 55-gallon drums containing transmission fluid, one 55-gallon drum containing motorcycle oil, one 55-gallon drum containing degreaser/tar remover, three 55-gallon drums containing wash and wax, and one 55-gallon drum labeled waste oil were stored. Of particular concern, this potentially combustible material was stored adjacent to an incoming electrical circuit breaker and electrical junction equipment. Oil stains were observed on the asphalt in the area of the stored drums. Additionally, one 1,000-gallon underground storage tank for used oil was observed. Safety-Kleen removes used oil from the drums and storage tank three or four times a year. Reportedly, Material Safety Data Sheets (MSDS) are kept on file at the Police Headquarters site for the hazardous materials used in their operations.

Adjacent to the service garage operated by the Department of Agriculture, seven 55-gallon used oil drums were observed. Soil and asphalt in the area of the stored drums appeared to be stained heavily with oil. Reportedly, Safety-Kleen removes the contents of these drums from the subject site. Approximately four 55-gallon drums containing various quantities of transmission fluid, grease and oil were observed inside the garage. Three portable liquified petroleum gas tanks were observed adjacent to the quarantine laboratory. Two 55-gallon underground storage tanks are reportedly used to mix sodium hypochlorite with effluent water for the wastewater treatment program established for the insectary. Small

quantities of paint materials were stored in a metal case in the propagation insectary. In a janitor's room in the basement of the office building, approximately 15 gallons of cleaner, 15 gallons of seal and finisher, and 40 small cans of pesticides and furniture polish were observed. These materials appeared to be stored properly. In the basement printing room, several bottles of solvents, developer, and inks were observed. Additionally two locked, metal cases containing pesticides were observed in the covered walkway area of the building.

Due to the nature of the inaccessible businesses located on site, several of them are assumed to store and use hazardous chemical materials on site, although none were observed. The Unocal 76 gasoline station most likely keeps containers of automotive oil and other petroleum products on site, Meadow Gold Dairies may store small quantities of oils and lubricants to maintain their equipment, and Tropicolor Photo Laboratories and Davidson International Photo Shop probably use small quantities of processing chemicals in their operations. The remaining inaccessible businesses did not appear likely to store or use significant quantities of hazardous chemical materials on site.

The Department of Agriculture uses several herbicides and fertilizers to maintain the surrounding grounds. A list of these herbicides and fertilizers is provided in the Appendix section of this report (Department of Agriculture, 1991).

Discussion:

Hazardous materials used on site should be substituted with non-hazardous materials whenever possible. A detailed list of commonly used hazardous materials and corresponding non-hazardous alternatives is available upon request from the State of Hawaii Office of Environmental Quality Control at telephone number (808) 586-4185.

Material Safety Data Sheets (MSDSs) should be obtained from the manufacturer or distributor of hazardous materials and the information provided used to establish a worker and community right-to-know program and emergency programs for

employees and the public as required by state and federal regulations. MSDSs should be kept in the area of use and be available for employee review.

Stored products on site should be limited to quantities that can be readily used.

Expired shelf life, excess, spilled and adulterated products that are no longer suitable for their original intended use could require disposal as a hazardous waste under the Resource Conservation and Recovery Act (RCRA) depending on ignitability, corrosivity, reactivity, toxicity characteristics, chemical composition and quantity as defined in 40 CFR § Part 261.

Additionally, care should be taken to avoid storing chemically incompatible products in proximity to one other. Many non-hazardous materials could form hazardous compounds if incorrectly or accidentally combined. Compatibility information should be available on container labels or MSDSs.

In addition to state and federal environmental and occupational health requirements, local regulations may also apply to hazardous chemical materials. Fire codes require the proper storage of flammable and combustible compounds such as petroleum naphtha, paint, paint thinner and/or solvent. The Fire Prevention Bureau should be contacted for guidance pertaining to proper storage.

Recommendations

The site tenants should, at a minimum, comply with the above general recommendations. Secondary containment should be utilized around hazardous materials storage areas to prevent site contamination in the event of leakage or spillage from primary containment. Additionally, documentation of the recycling plan for used oil and spent solvent should be maintained by the tenants at each site. It is imperative that tenants be required to remove their hazardous materials when vacating the site. Remaining hazardous materials may require costly disposal as regulated hazardous waste.

HAZARDOUS CHEMICAL WASTES

Observations:

During the site inspection, approximately nine 55-gallon drums and several smaller drums were observed in the Honolulu Police Department motorpool. Among these were one drum labeled waste oil. Spillage onto the asphalt in this area was visually evident. Outside, along the west wall of the motorpool building, nine used car batteries were observed discarded. Three solvents parts washers (80 gallons total) were used in the maintenance area of the motorpool. Reportedly, Safety-Kleen services the parts washers at least every four weeks and provides uniform hazardous waste manifests (UHWM) and land disposal restriction notifications for the motorpool's use. Site copies were not made available for review at the time of the inspection.

The Department of Agriculture generates small quantities of chemical wastes. These include the disposal of diluted chemicals into the public sewer system by the commodities lab, seed lab, insectary and insect quarantine department, and the plant pathology department. Chemical wastes generated by the garage and printshop, reportedly, are disposed by Unitek Environmental Services, Inc. (State Department of Agriculture, 1991). A complete listing of these chemical wastes is provided in the Appendix.

One rusted 55-gallon drum was observed near the site structure at the Unocal 76 gasoline station. The drum was full and unlabeled. No stains were evident on the asphalt surrounding the drum.

No hazardous chemical wastes were observed in the area of the remaining inaccessible buildings.

The Honolulu Police Department Headquarters site is listed as having an EPA identification number (HID 982495871) for hazardous waste generation.

No ID number has been assigned to the Department of Agriculture site.

The subject site is not listed on the 1990 Superfund CERCLIS Site/Event Listing.

Table 5 contains a listing of additional registered hazardous waste generators located within a one-half mile radius of the subject site and identified by the EPA RCRA database.

TABLE 5
EPA HAZARDOUS WASTE GENERATORS NEAR THE SITE LISTED ON THE EPA REGION IX DATABASE

Notification Date	Facility	EPA ID #	Type
9/19/86	BMW of Honolulu, Ltd. 1080 Young Street Honolulu, Hawaii 96814	HID981653546	Small Quantity
9/9/86	Dennis Chevron SVC 1201 South King Street Honolulu, Hawaii 96814	HID981573652	Small Quantity
1/21/87	Dollar Rent A Car 1801 Kalakaua Avenue Honolulu, Hawaii 96814	HID981633647	Small Quantity
9/15/86	Firestone Holiday Mart 801 Kaheka Street Honolulu, Hawaii 96814	HID981577265	Unknown
9/7/85	Hakuyosha Hawaii, Inc. 730 Sheridan Street Honolulu, Hawaii 96814	HID050340850	Small Quantity
8/2/89	Kalakaua Transmission, Inc. 1665 Kalakaua Avenue Honolulu, Hawaii 96814	HID981637564	Small Quantity
3/6/87	Masas Foreign Car Service, Inc. 706 Sheridan Street Honolulu, Hawaii 96814	HID981651706	Small Quantity
8/18/80	Maui Divers of Hawaii, Ltd. 1520 Liona Street Honolulu, Hawaii 96814	HID009116757	Large Quantity

TABLE 5 CONTINUED
EPA HAZARDOUS WASTE GENERATORS NEAR THE SITE LISTED ON THE EPA REGION IX DATABASE

Notification Date	Facility	EPA ID #	Type
4/19/90	Meadow Gold Dairies, Inc. 824 Sheridan Street Honolulu, Hawaii 96814	HID982428997	Small Quantity
9/10/86	Meadow Gold Dairies, Inc. 925 Cedar Street Honolulu, Hawaii 96814	HID981653058	Small Quantity
1/26/86	Midas 1335 S. Beretania Street Honolulu, Hawaii 96814	HID981638778	Small Quantity
1/26/86	Midas 1335 S. Beretania Street Honolulu, Hawaii 96814	HID981638778	Small Quantity
8/3/89	Pflueger Acura 1450 South Beretania Street Honolulu, Hawaii 96814	HID981630700	Small Quantity
9/24/86	Punahou Repair Shop 1558 South King Street Honolulu, Hawaii 96814	HID981657208	Small Quantity
11/17/86	Roger's Repair, Inc. 1687 Kalakaua Avenue Honolulu, Hawaii 96814	HID981615222	Small Quantity
10/23/86	Schuman Carriage Co. Ltd. 1234 South Beretania Street Honolulu, Hawaii 96814	HID981663750	Small Quantity
10/14/86	SJD Radiator Service 1218 Makiki Street Honolulu, Hawaii 96814	HID981664634	Small Quantity

Discussion:

Hazardous chemical waste generation, accumulation, transportation, storage, and disposal are highly regulated activities. Congress enacted the Resource Conservation and Recovery Act (RCRA) in 1976 and the Hazardous and Solid Waste

Amendments of 1984 (HSWA), which provide specific guidelines for these activities and severe penalties for noncompliance. Regulations pertinent to hazardous waste management are promulgated by the U.S. Environmental Protection Agency (EPA) in Title 40 of the Code of Federal Regulations (CFR), by the U.S. Department of Transportation (DOT) in Title 49 CFR, and by the Occupational Safety and Health Administration (OSHA) in Title 29 CFR.

Any business that generates hazardous waste is regulated to some extent, with larger generators (those that produce more than 1,000 kilograms in any calendar month) regulated to a greater degree. Hazardous waste is defined as any waste which is specifically listed in Title 40 CFR Part 261 Subpart D, which meets the characteristics of ignitability, corrosivity, reactivity, or toxicity identified in Title 40 CFR Part 261 Subpart C, or contains a mixture of hazardous and non-hazardous wastes. It is the generator's responsibility to determine which wastes are hazardous and if they are land disposal restricted. This can be accomplished by analytical testing, review of MSDSs, or a thorough knowledge of product constituents or characteristics.

Additionally, the generator may store hazardous waste on-site only in limited quantities and only for limited periods of time. Hazardous waste must be properly labeled, packaged, and marked. Transportation must be performed only by an EPA-listed transporter and only to an EPA-permitted treatment, storage, and disposal facility. A Uniform Hazardous Waste Manifest must accompany all off-site shipments and copies must be retained by the generator, transporter and disposer for a minimum of three years. Large and small quantity generators must apply for and obtain a USEPA identification number (U.S. EPA, 1991a). Form 8700-12 may be acquired at the EPA Pacific Contact office in the Prince Kuhio Federal Building located in downtown Honolulu or by calling the office at (808) 541-2710.

The State of Hawaii Department of Health Solid and Hazardous Waste Branch, Underground Storage Tank (UST) Section maintains a generator file on the Honolulu Police Department Headquarters. No violations were reported. The solid and Hazardous Waste Branch has been requested to review its records for any

environmental permits or violations pertaining to the remainder of the subject site. Information received is included in the appendix to this report.

Recommendations

As a hazardous waste generator, the Honolulu Police Department Headquarters must adhere to the specific storage, transportation, and disposal requirements for hazardous wastes set forth in Title 40 CFR Part 262.

If the items previously described in the hazardous materials section are not used in their entirety or recycled, they may also require handling as a hazardous waste. Records, including notifications and hazardous waste manifests for hazardous waste transported off the subject site must be kept on file for a minimum of three years. These records were not available during the site inspection and should be reviewed to confirm off-site disposal. Secondary containment for the area of the stored drums in the Honolulu Police Department Motorpool Facility is recommended to prevent site contamination in the event of a leak or spill.

It is recommended that the contents of the drum at the Unocal 76 gasoline station be sampled and analyzed to determine if its contents exhibit any of the characteristics of a RCRA regulated hazardous waste. The contents of the drum must be disposed of as a regulated hazardous waste if it exhibits one or more of the RCRA characteristics. If the drum is to be stored for a period of time, secondary containment should be provided and the Unocal Station should notify the EPA they are a generator of hazardous waste depending on the quantity generated monthly. The drum should be appropriately labeled.

UNDERGROUND STORAGE TANK SYSTEMS

Observations:

Indicators of nine underground storage tanks were located on the subject property during the site inspection. Three fuel tanks are located in the Honolulu Police Department Motorpool Facility, associated with two dispenser pumps. An additional used oil tank, exists on the police motorpool site. One tank was observed in the garage area of the Department of Agriculture. Three vent pipes and fill pipes were observed against the site structure at the Unocal 76 gas station, indicating the probable existence of at least three underground tanks. Sixteen dispenser pumps were observed in use at this location. A diesel tank is reported to exist on the Meadow Gold Dairy property. Underground storage tanks were used by the former gas station on TMK 2-4-05:47. It was not determined if these tanks were removed during site demolition.

The State of Hawaii Department of Health reports three 5,000 gallon underground storage tanks at the Honolulu Police Department Motorpool Facility store gasoline. Two of the tanks were reported to be 21 years old and the other 9 years old. Precision leak testing previously conducted by Unitek Environmental Consultants indicates a fourth used oil tank has a 1,000-gallon capacity. UEC tested this tank system for tightness in October 1989 and again in January 1991 and found that it met the EPA Title 40 CFR 280.43 (c) criteria for tank tightness, however, test results did indicate slight leak of approximately 1/20 gallon per day or approximately 19 gallons per year. As test results do not account for overfill or spillage, potential surface/subsurface contamination is of concern. A copy of the precision leak testing results for this tank is provided in the Appendix to this report. Reportedly, one of the gasoline tanks was tested for leaks in 1987 or 1988, however, documents regarding the test requested by UEC were not made available for review.

Department of Health records indicate that the tank on the Department of Agriculture property has a capacity of 2,000 gallons and is 11 years old. The tank is used to store gasoline. A tank test performed in July 1990 by Harry Nakai, Inc.

indicated a slight leak less than EPA criteria but equal to 1/3 gallons per day or approximately 121 gallons per year. Also, there was no indication of a line test since only a low level tank test was performed. Surface/subsurface contamination is of concern. A copy of the tank test results for this tank is provided in the Appendix to this report.

Three underground storage tanks in the police motorpool area and one at the Department of Agriculture were registered with the State of Hawaii. Three tanks at the Unocal 76 station are also registered with the State of Hawaii Underground Storage Tank Program under the name of the former operator, Gas Plus. The Department of Health reports these gasoline tanks to be five years old one with a capacity of 10,000, and two with capacities of 12,000. Four vent pipes were observed at the Unocal 76 station, suggesting the presence of an additional fourth underground storage tank system. Additionally one underground storage tank at the Meadow Gold Dairies ice cream plant is registered with the Department of Health. This tank reportedly holds diesel and has a 7,000 gallon capacity. There are approximately 81 underground storage tanks registered with the State of Hawaii Department of Health within a one-half mile radius of the subject site. These tanks are listed in Table 6.

TABLE 6
UNDERGROUND STORAGE TANKS IN VICINITY
LISTED WITH THE STATE OF HAWAII

Company	Number of Tanks	TotalCapacity (gallons)	Use
7-11 Young Street 1323 Kalakaua Avenue	3	8,000	Gasoline
Beretania Chevron - 0423 1378 Beretania Street	3	10,000	Gasoline
Dennis Chevron Service 1201 South King Street	6	31,060	Gasoline, Used Oil, GST 46
Don's Makiki Union, L-0344 1406 South Beretania Street	5	19,670	Gas, Diesel, Used Oil, Hydraulic

TABLE 6 CONTINUED
UNDERGROUND STORAGE TANKS IN VICINITY
LISTED WITH THE STATE OF HAWAII

Company	Number of Tanks	Total Capacity (gallons)	Use
Downtown Honda 1450 South Beretania Street	5	13,000	Gas, New & Used Oil
Firestone Store #3571 801 Kaheka Street	1	300	Used Oil
Gas Express Station #18 1549 South King Street	3	30,000	Gasoline
Kalakaua Transmission Inc. 1665 Kalakaua Avenue	2		
Kapiolani Women's & Children Medical Center 1319 Punahou Street	3	3,000	Diesel
Meadow Gold Dairies Milk Plant 910 Sheridan Street	1	10,000	Diesel
Meadow Gold Dairies - Shop Area 910 Sheridan Street	4	25,000	Diesel, Gas, Used Oil
Mike's Pilkol Service, L-3667 1160 South King Street	6	12,360	Gas, Used Oil, Hydraulic
Morikawa's Union Service, L-3943 1505 South King Street	6	13,170	Gas, Used Oil, Hydraulic
Pflueger Lincoln Mercury Inc. 1450 South Beretania Street	2	7,000	Gas, Used Oil
Punahou Repair Shop 1550 South King Street	2	5,000	Used Oil, Gasoline
Richard's Chevron 1509 South Beretania Street	7	31,090	Gas, Used Oil, GST 46

TABLE 6 CONTINUED
UNDERGROUND STORAGE TANKS IN VICINITY
LISTED WITH THE STATE OF HAWAII

Company	Number of Tanks	Total Capacity (gallons)	Use
Schuman Carriage Co., Ltd. 1234 South Beretania Street	6	6,150	Gas, Transmission Oil, Engine Oil, Used Oil, Solvent
Shell Service Station 1436 Beretania Street	1	24,550	Gas Used Oil
Texaco Station 1239 South King Street	5	40,550	Gas, Used Oil
Wens Life Co., Inc. 808 Sheridan Street	4	7,000	Gasoline, Alcohol
Yajima Oil of USA, Inc. 1375 South King Street	3	24,000	Gasoline
Unregistered Tropical Paradise Lounge 1315 Kalakaua Avenue Honolulu, Hawaii	1	Unknown	Fuel Oil
Status Unknown Former Gas Station on corner of Kalakaua and Beretania (parcel 47)	Unknown		

Discussion:

All underground storage tanks are to be registered (U.S. EPA, 1991b) with the State of Hawaii Department of Health and City and County of Honolulu, Fire Department. Section 342-62 of the Hawaii Revised Statutes requires that the owner of an existing underground storage tank system notify the Department of Health by December 31, 1986 of the existence of the subsurface system and specify the age, size, type, location, and uses. Notification of the tank system should be made to the Department of Health using EPA Form 7530-1. The form is to be returned to Administrator, Solid and Hazardous Waste Branch, Hawaii Department of Health, Five Waterfront Plaza, 500 Ala Moana Boulevard, Suite

250, Honolulu, Hawaii 96813. Notification to the Fire Prevention Bureau can be completed by sending a letter containing tank system information to the City and County of Honolulu Fire Department, 1455 South Beretania Street, Honolulu, Hawaii 96814.

Underground fuel storage tank regulations promulgated by EPA (effective December 22, 1988) prescribed stringent requirements for owners and operators of underground storage tanks. Regulations govern leak detection, corrosion protection, and spill/overfill prevention for both tanks and associated piping. The Federal regulations also require tank owners to demonstrate financial responsibility (U.S. EPA, 1991b).

Leak detection requirements provide three options for tank owners and operators:

- Monthly monitoring (automatic tank gauging, interstitial monitoring, groundwater monitoring, or other approved methods).
- Monthly inventory control and annual tightness testing (can be used until December 1998).
- Monthly inventory control and tightness testing every 5 years (can be used until the later of 10 years after installation of corrosion protection and spill/overfill prevention or until December 1998).

Leak detection for suction piping must conform to:

- Monthly monitoring (as above, except for automatic tank gauging).
- Line testing every 3 years.
- No requirements (under specific conditions).

Deadlines for leak detection implementation are staggered, with older or unknown age tanks requiring earliest compliance. Additional requirements exist for pressurized piping.

Corrosion protection for both tanks and piping must be in place by December 1998.

- Fiberglass construction.
- Cathodic protection.
- Interior lining (tanks only).
- Interior lining and cathodic protection (tanks only).

Spill/overspill prevention measures, required by December 1998 for all tanks, specify installation of a catchment system plus one of the following:

- Automatic shut off device.
- Overfill alarms.
- Ball float valves.

New tanks must meet all these requirements at the time of installation.

Soon to be effective, EPA will also require all owners or operators of underground fuel storage tanks to demonstrate financial responsibility for corrective action and compensation of third parties for bodily injury and property damage caused by sudden and nonsudden accidental releases from their tanks. Owners or operators of no more than 100 underground fuel tanks must maintain coverage of $1 million annual aggregate. If the owner or operator has more than 100 underground fuel tanks, the annual aggregate increases to $2 million. Additionally, if monthly throughput of the stored material is 10,000 gallons or less, the owner or operator must maintain $500,000 of per occurrence coverage. If greater than 10,000 gallons, this required coverage increases to $1 million (U.S. EPA, 1991b).

Section 280.71 of Title 40 of the Code of Federal Regulations (1991) states that when an underground storage tank system is temporarily closed for more than 12 months, owners and operators must permanently close the system. Local fire department policy requires that the closed tank and piping be removed from the ground. The preferred method for decommissioning an underground tank is to empty, excavate, degas, and remove the tank and associated piping. Tanks should be removed carefully to prevent damage during removal. Soil and/or water from

around the tank must be sampled and analyzed for any contamination by the tank product. Associated piping should be cut several feet back from the tank so that the bulkhead fittings can also be inspected after removal. The condition of the tank, fittings, and exposed piping should be noted and documented adequately to preserve for future reference any useful information regarding the integrity of the tank system. These procedures are obviously important where there is reason to believe a leak has occurred or where there has been no previous verification of tank integrity. It may also be important to help eliminate the tank as a source of contamination if a problem is reported in the vicinity at a later date.

After removing any residual product, the interior of the tank should be cleaned with an appropriate solvent. Residual sludge and any solvent rinsate should be contained in DOT specification drums and recycled or disposed of as hazardous waste. The cleaned and empty tank should be cut up, crushed, or otherwise rendered unusable as a tank. A certificate of destruction should be obtained from the disposal site to ensure the tank is not reused. Reuse could extend the liability of the original owner (U.S. EPA, 1991b).

Federal regulations, 40 CFR 280.72 (1991), require assessment of the immediate environment around the tank for soil/water contamination upon removal. Results of the excavation zone assessment must be maintained on file for a minimum of three years after completion of permanent closure. Unitek recommends that a minimum of two soil samples be collected from beneath the tank, one from directly beneath the fill pipe, the other from a similar position at the opposite end of the tank. If obviously stained or contaminated areas exist in locations other than the two above locations, then additional soil samples should be collected from these areas. Initial laboratory analysis should focus on constituents of the product previously stored in the tank.

For example, analysis for total petroleum hydrocarbon as diesel, as well as benzene, toluene, xylene, and ethylbenzene would be appropriate for a diesel or oil storage tank, while total petroleum hydrocarbons as gasoline, benzene, toluene, xylene, ethyl benzene, total lead, and organic lead would be appropriate for a gasoline tank.

The State of Hawaii Department of Health and the City and County of Honolulu Fire Department must be notified at least 30 days prior to the tank system removal or closure.

Recommendations:

Since a slight leak was observed in both the Honolulu Police Department Motorpool Facility wastes oil tank and the Department of Agriculture gasoline tank, consideration should be given to retesting each tank regularly or discontinuing its use. Tank testing documents should be kept on site and readily available. In addition to tank tightness testing, federal regulations require that inventory records be maintained.

If four underground storage tanks exist at the Unocal 76 station, the fourth tank must be registered with the State of Hawaii Department of Health and City and County of Honolulu Fire Department immediately.

If future plans for the subject site do not include the use of the underground storage tanks, the tank systems should be decommissioned following the permanent closure procedures briefly outlined above.

SURFACE/SUBSURFACE CONTAMINATION

Observations:

The subject property is located on Makiki series soil type which is almost entirely in urban use. This series consists of well drained soils on alluvial fans and terraces. This soil type is further classified as Makiki clay loam, exhibiting moderately rapid permeability, slow run off and only slight erosion hazard. In a representative profile, the surface layer, about 20 inches thick, is dark brown clay loam. The subsoil is dark brown clay loam with subangular blocky structure about 10 inches thick which consists of cinders and rock fragments. Similar material underlay the subsoil, about 24 inches thick. Beneath this are volcanic cinders. The soil is strongly acid to medium acid. The site elevation is 28 feet above sea level. The subject site is flat and does not currently possess any significant hydrogeological features.

Groundwater beneath the subject property is classified as basal water floating on salt water. Five wells are registered with State of Hawaii Department of Land and Natural Resources near the site corresponding to well number 1850-16, 1850-20, 1850-21, 1850-22, and 1850-26, with drill dates 1886, 1891, 1894, 1894 and 1910, respectively. All five wells have been sealed and no information on groundwater quality was available for review.

Multiple underground storage tanks exist under the subject property. A tank test performed in January 1991 by UEC on the waste oil storage tank at the Honolulu Police Department Motorpool Facility indicated a slight leak of approximately 1/20 gallons per day or approximately 19 gallons per year. Used oil from the, tank is removed by Safety-Kleen three or four times a year. Reportedly, the tank was contaminated with solvent approximately 7 months ago and has since been cleaned. No test data on the three Honolulu Police Department Motorpool Facility tanks containing gasoline was available for review. An underground storage tank containing gasoline was observed in the garage area of the Department of Agriculture. A tank test performed by Harry Nakai, Inc. in July 1990 indicated a leak of approximately 1/3 gallons per day or approximately 121 gallons per year.

At least three underground storage tanks are located on the Unocal 76 gas station property and one at the Meadow Gold Dairies property. No data regarding tank tightness was available for these tanks.

Several 55-gallon drums containing transmission fluid and used oil exist in the Honolulu Police Department Motorpool Facility area and the Department of Agriculture garage area. Soil and asphalt in these areas appeared to be stained. One rusted 55-gallon drum of unknown contents was observed at the Unocal 76 gasoline station, formerly the Gas Plus station. The drum was full, but no stains were evident on the surrounding asphalt that would suggest a release from the drum.

Three double-piston type hydraulic lifts were observed in the maintenance area of the motorpool facility. One single-piston type hydraulic lift appeared to have been removed and is no longer in use. No piston type hydraulic lifts were observed in the Department of Agriculture garage. Piston type hydraulic lifts used hydraulic fluid stored in the piston below grade. This fluid has the potential to leak undetected into the surrounding soil. Hydraulic fluids sometimes contain PCBs.

Discussion:

Only a comprehensive subsurface and groundwater investigation can accurately assess any soil or groundwater contamination at the subject property. A subsurface investigation would consist of soil borings and, if warranted, the installation of monitoring wells to facilitate groundwater sampling. Sampling analysis should focus on petroleum product constituents such as benzene, toluene, xylene, ethylbenzene, and lead. Analysis would also focus on solvents, pesticides and PCBs.

The objective of any sampling is to identify areas of environmental concern and to document the environmental quality of the site. It is therefore critical to evaluate all areas of potential environmental concern. Areas of concern may additionally include areas outside of the immediate location involved in the management of

hazardous substances or wastes. This includes areas where residual contaminants may be expected to migrate and accumulate (e.g., drainage system catch basin).

Determining appropriate sampling locations is often a matter of professional judgement based on site specific characteristics. This includes physical characteristics of the area (drainage patterns, subsurface characteristics and historical changes in site use) as well as characteristics of the potential contaminants (density, solubility, etc.). Sampling frequency is dependent on assuring that a sufficient number of samples are collected to adequately represent and characterize the environmental media under evaluation or define the extent of contamination.

Recommendations:

A subsurface investigation consisting of soil borings and monitoring wells, as well as sampling and analysis for petroleum products (benzene, toluene, xylene, ethylbenzene, lead), should be conducted at the Honolulu Police Department Motorpool Facility, and the Department of Agriculture garage to determine the extent of petroleum contamination in the areas of the leaking underground storage tanks. A subsurface investigation for petroleum products is also recommended in the vicinity of the tanks at the Unocal 76 station (formerly Gas Plus Station), Meadow Gold Dairies, site of the former USTs within parcel 47 and along the subject site's boundaries, adjacent to off-site underground storage tank locations. A subsurface investigation can be coordinated with the removal and permanent closure of the USTs. Additionally, subsurface sampling for petroleum is recommended for the used oil drum storage area of the Department of Agriculture, where heavy oil stains were observed in the soil. It is also recommended that the fluid in the underground hydraulic lifts at the Police Motorpool Facility be tested for PCBs.

SOURCES OF INFORMATION

During the course of an assessment, Unitek relies in part on readily available sources of information, such as the client, public records, historic documents, and interviews, for aid in recognizing potential environmental liabilities at a subject property/facility. Requests for information resources are made to collect relevant data on current and past practices conducted at the subject property/facility. Unitek may not receive all information requested or be able to confirm all information provided during the course of this preliminary site survey. Therefore, Unitek shall not be held responsible for errors, omissions or misrepresentations resulting from missing documentation or from inaccurate information provided by such sources.

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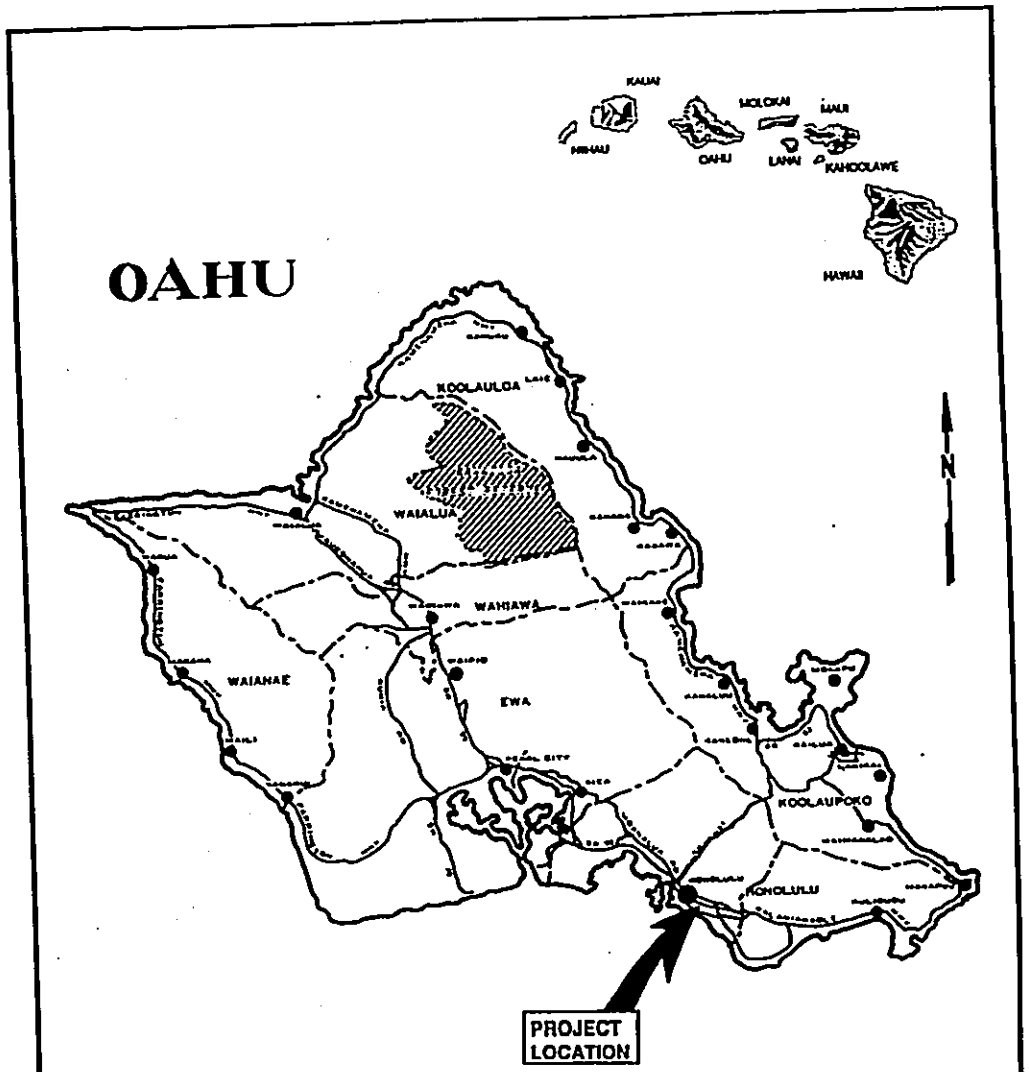
Personnel:

Mr. Robert Weber, Manager, Enviroscience Division, Mr. Michael Fitch Environmental Scientist, Mr. Joe Bruey, Industrial Hygienist, Ms. Michelle Toyofuku, Staff Assistant all with Unitek Environmental Consultants, Inc., conducted the site surveys on June 6, 1991 and January 2, 1992. A visual survey for asbestos-containing building materials, PCB-containing electrical equipment, hazardous chemical materials and wastes, underground storage tank systems, and potential surface/subsurface contamination was performed. A review of public and accessible records, and follow up telephone interviews were also conducted. Additional project research was provided by Mr. Joseph Thompson, Environmental Scientist with Unitek Environmental Consultants, Inc.

INDEMNITY

Given the often obscure and elusive nature of hazardous substances and the enormous liabilities they may represent, UEC will not provide guarantees that negative findings during this preliminary site survey confirm the absence of all environmental contamination or liability. A far more in-depth investigation involving extensive sampling and laboratory analysis would need to be requested by the client for such assurance. UEC may not receive all information requested or be able to confirm all information provided during the course of this preliminary site survey. Therefore, UEC shall not be held responsible for errors, omissions or misrepresentations resulting from missing documentation, requested documentation not received within the time constraints of the project, or from inaccurate information provided by such sources.

APPENDIX



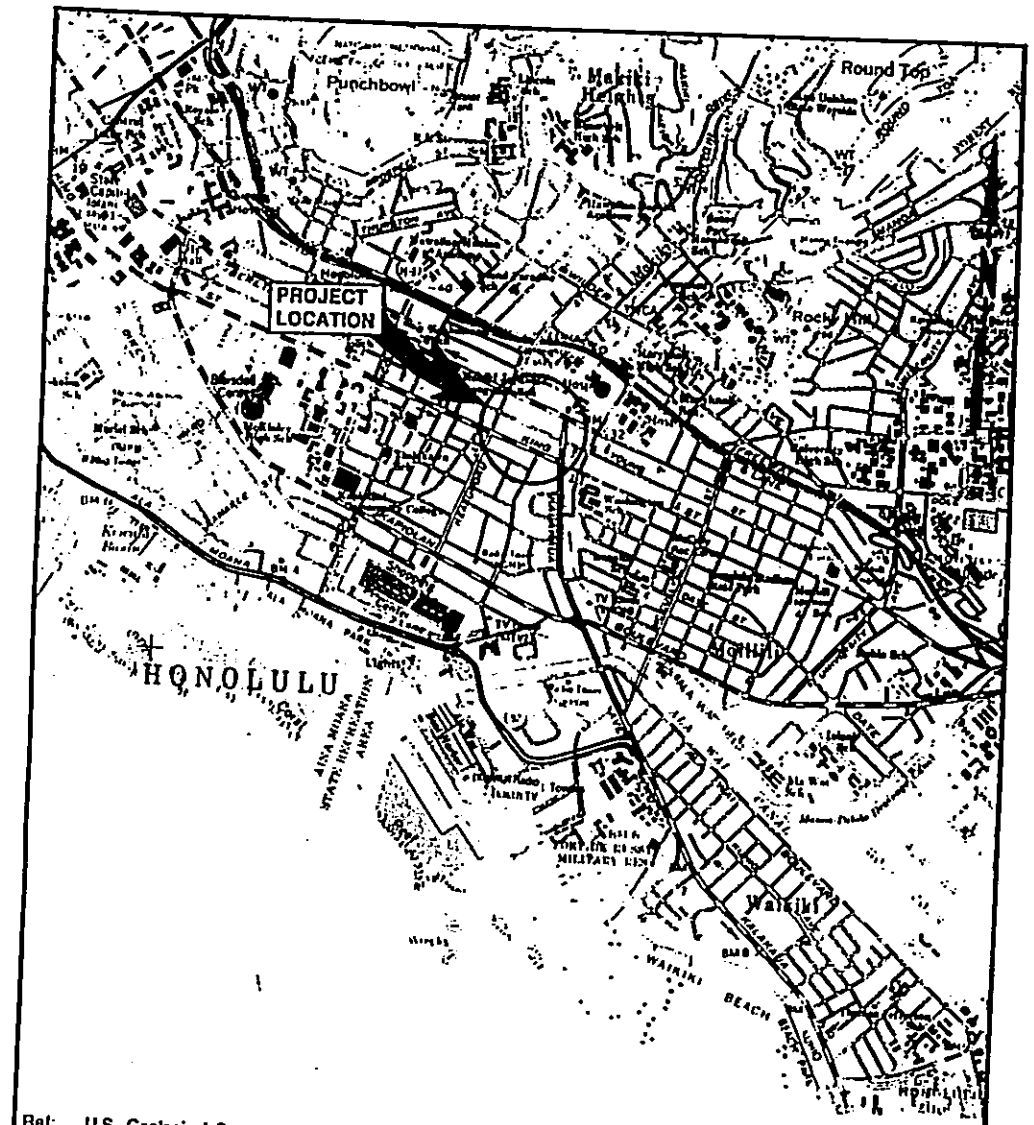
Ref: REDI Real Estate Atlas of Hawaii
First Tax Division
City and County of Honolulu
24th Edition, 1991

LOCATION MAP

Pawaa Redevelopment Site

FIGURE 1

Unitek Environmental Consultants, Inc.
930 Mapunapuna Street, Honolulu, Hawaii 96819

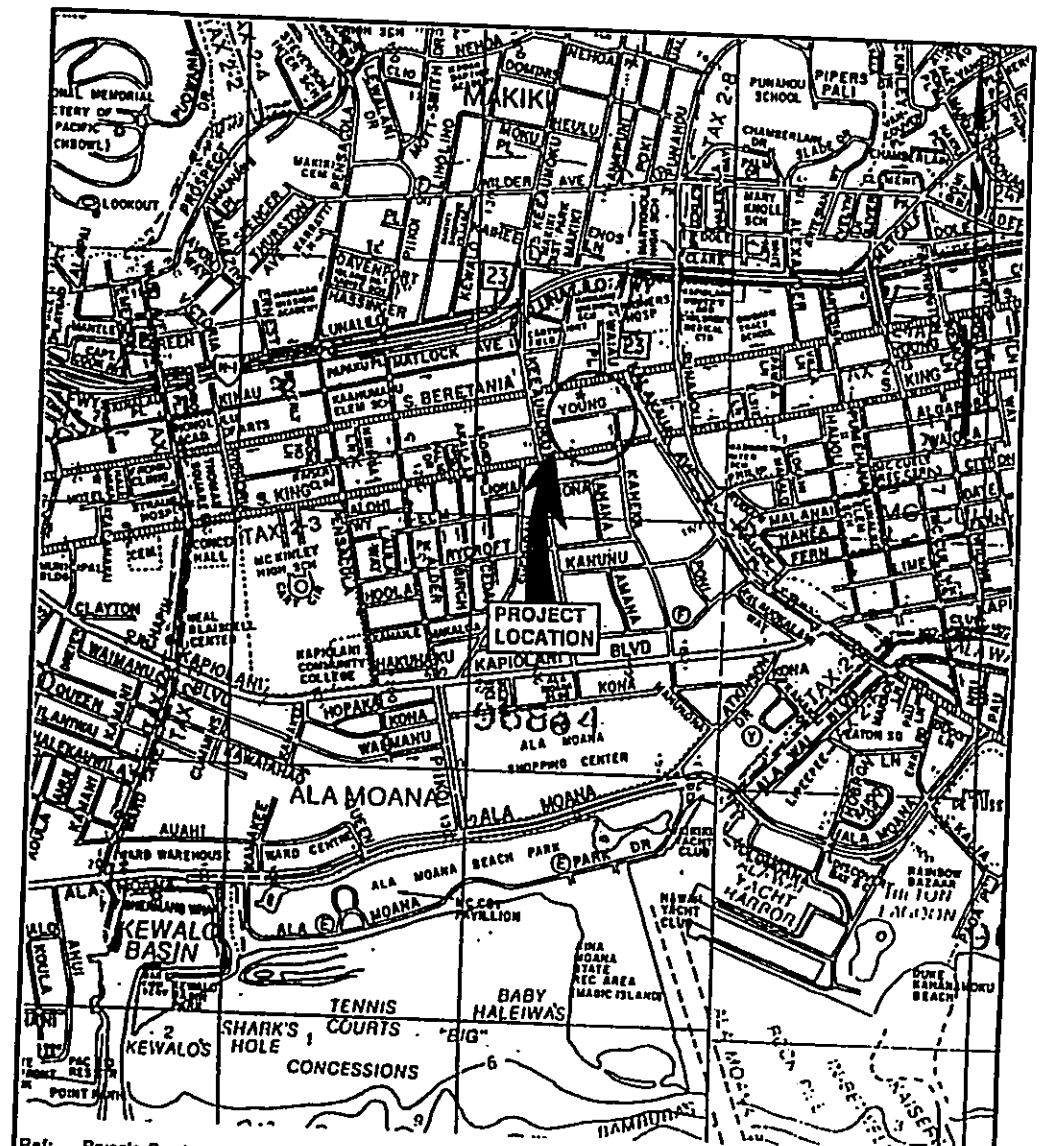


TOPOGRAPHIC MAP

Pawaa Redevelopment Site

FIGURE 2

Unitek Environmental Consultants, Inc.
930 Mapunapuna Street, Honolulu, Hawaii 96819



STREET MAP

Pawaa Redevelopment Site

FIGURE 3

Unitek Environmental Consultants, Inc.
930 Mapunapuna Street, Honolulu, Hawaii 96819

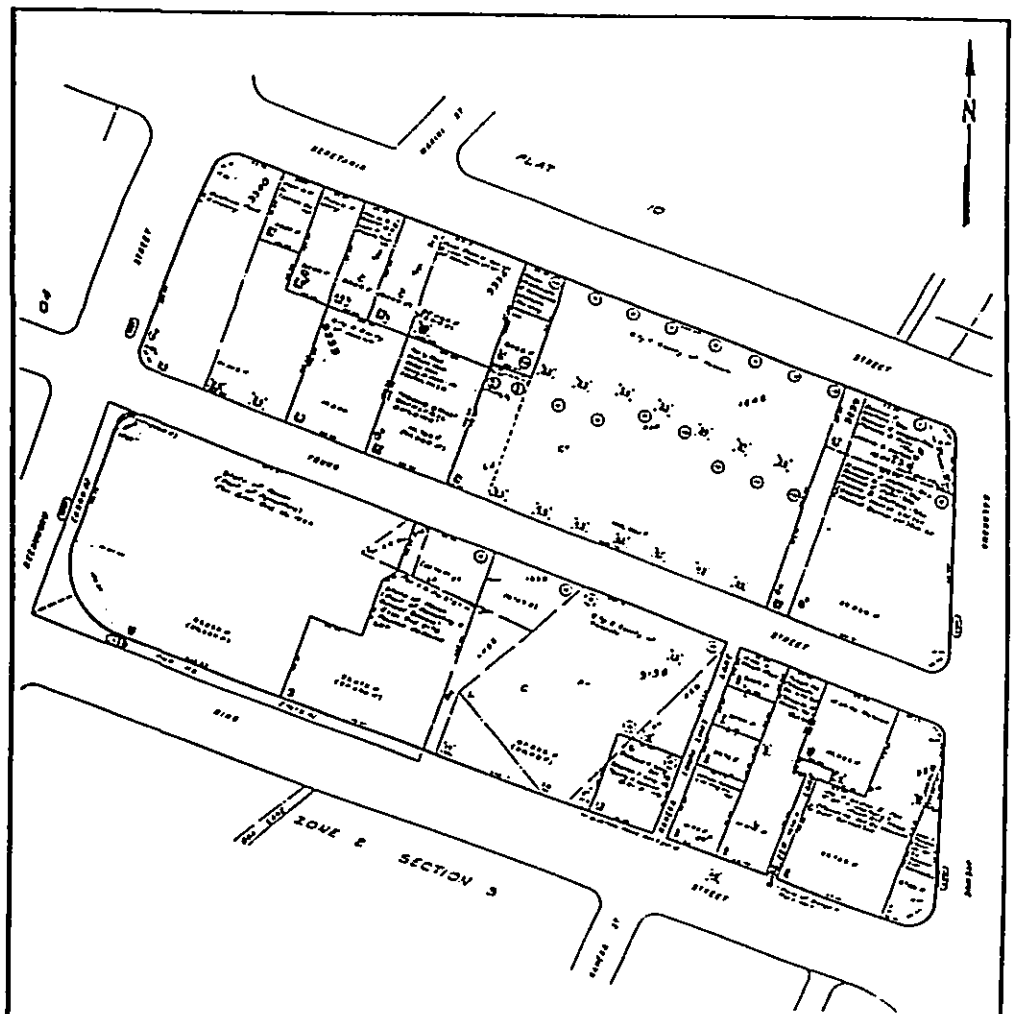
Ref: REDI Real Estate Atlas of Hawaii
Copyright, 1976

AERIAL PHOTOGRAPH (1977)

Pawaa Redevelopment Site

FIGURE 4

Unitek Environmental Consultants, Inc.
930 Mauunaouna Street, Honolulu, Hawaii 96819



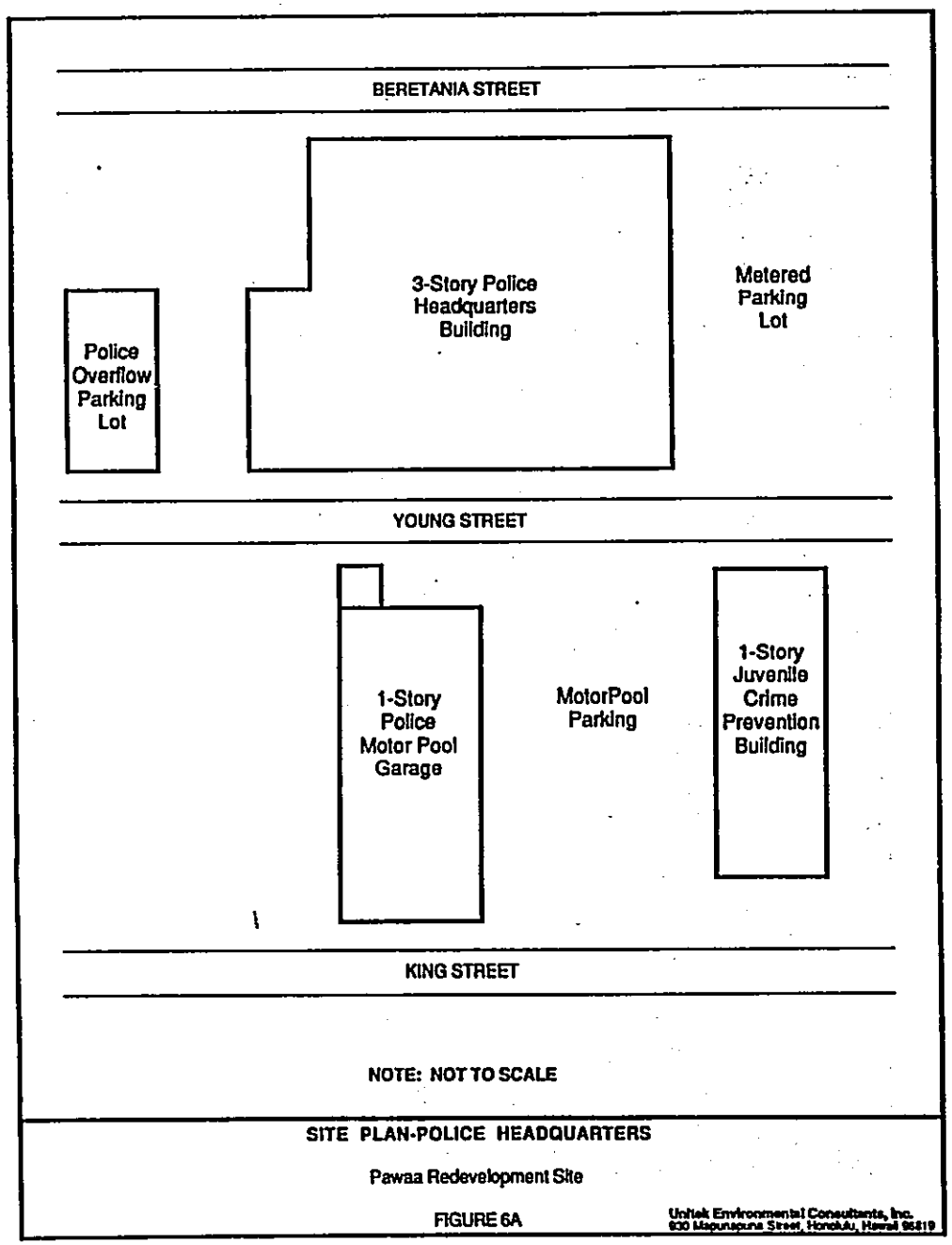
Ref: Real Estate Atlas of Hawaii
Copyright 1991 by Real Estate Data, Inc.

TAX MAP KEY

Pawaa Redevelopment Site

FIGURE 5

Unitek Environmental Consultants, Inc.
930 Mauunaouna Street, Honolulu, Hawaii 96819

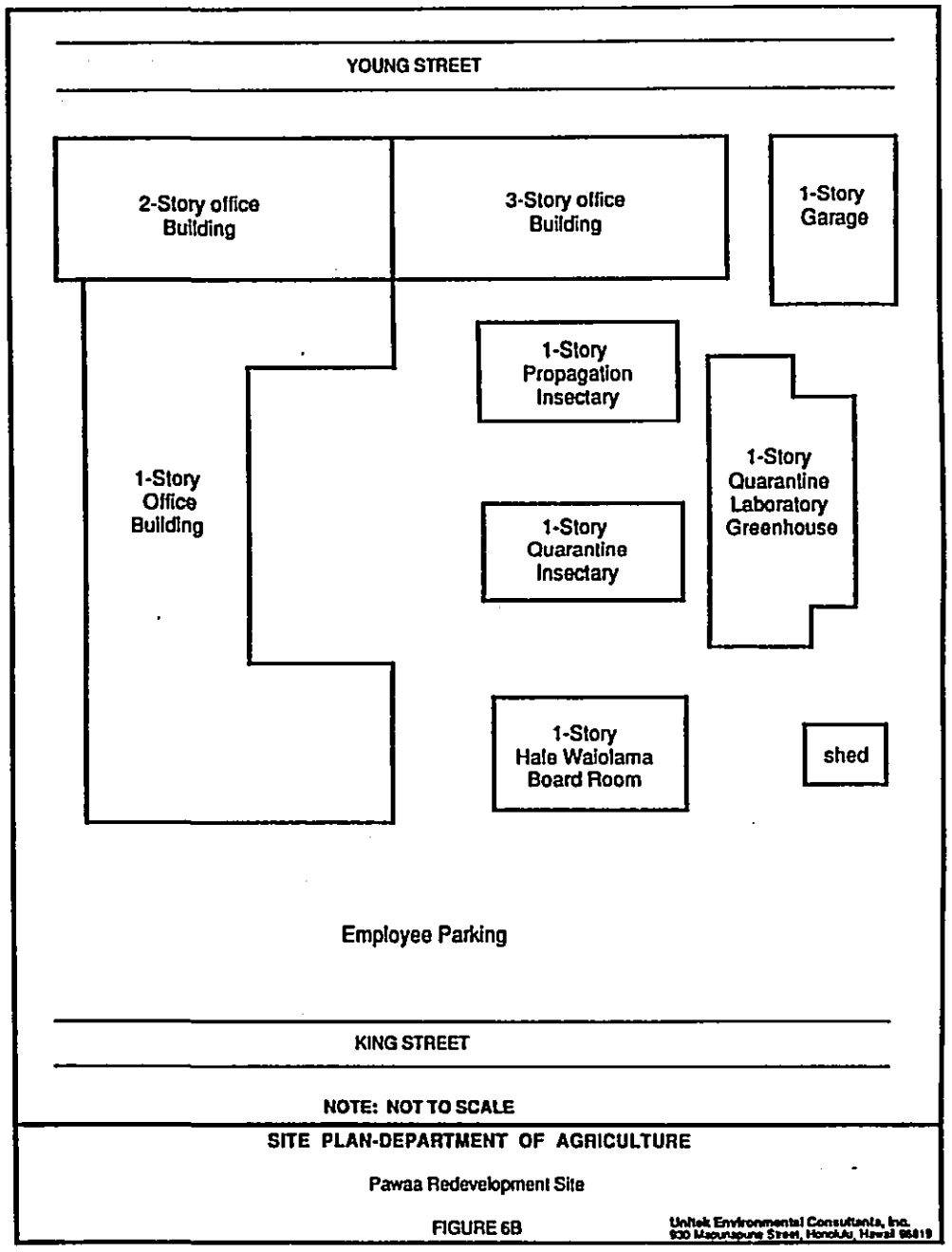


SITE PLAN-POLICE HEADQUARTERS

Pawaa Redevelopment Site

FIGURE 6A

Unitek Environmental Consultants, Inc.
930 Mapunapuna Street, Honolulu, Hawaii 96819



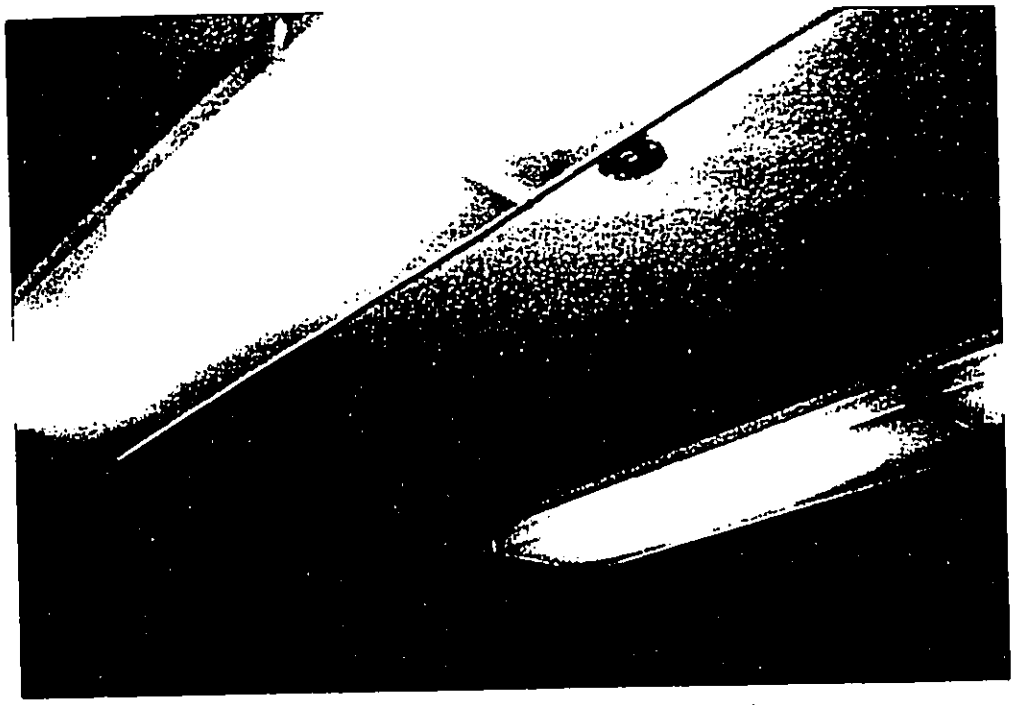
SITE PLAN-DEPARTMENT OF AGRICULTURE

Pawaa Redevelopment Site

FIGURE 6B

Unitek Environmental Consultants, Inc.
930 Mapunapuna Street, Honolulu, Hawaii 96819

Location 1.



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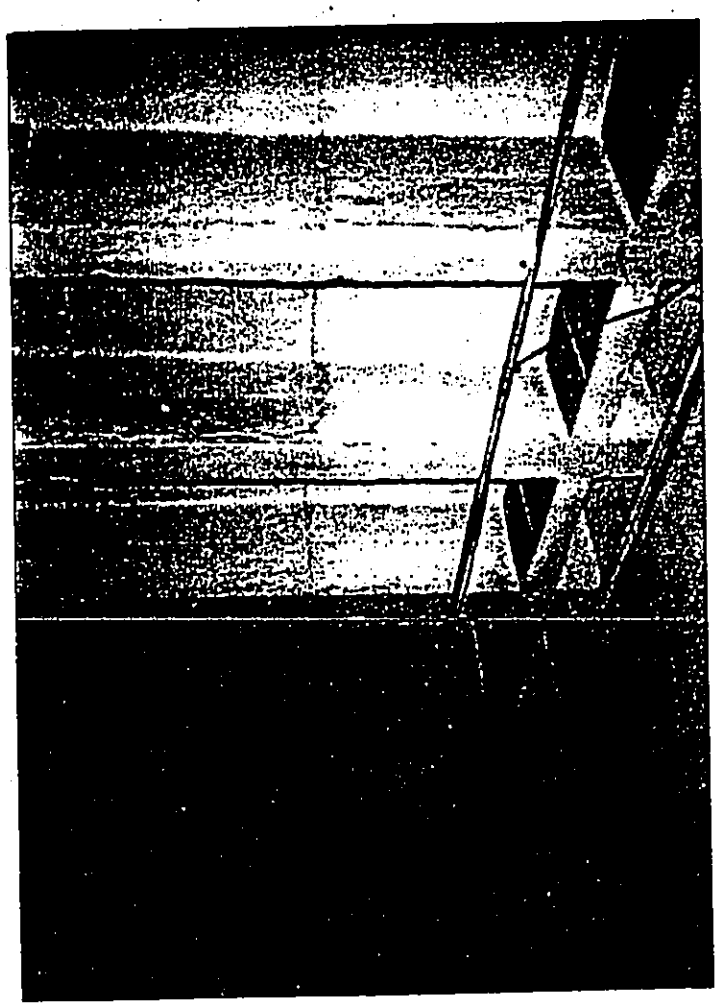

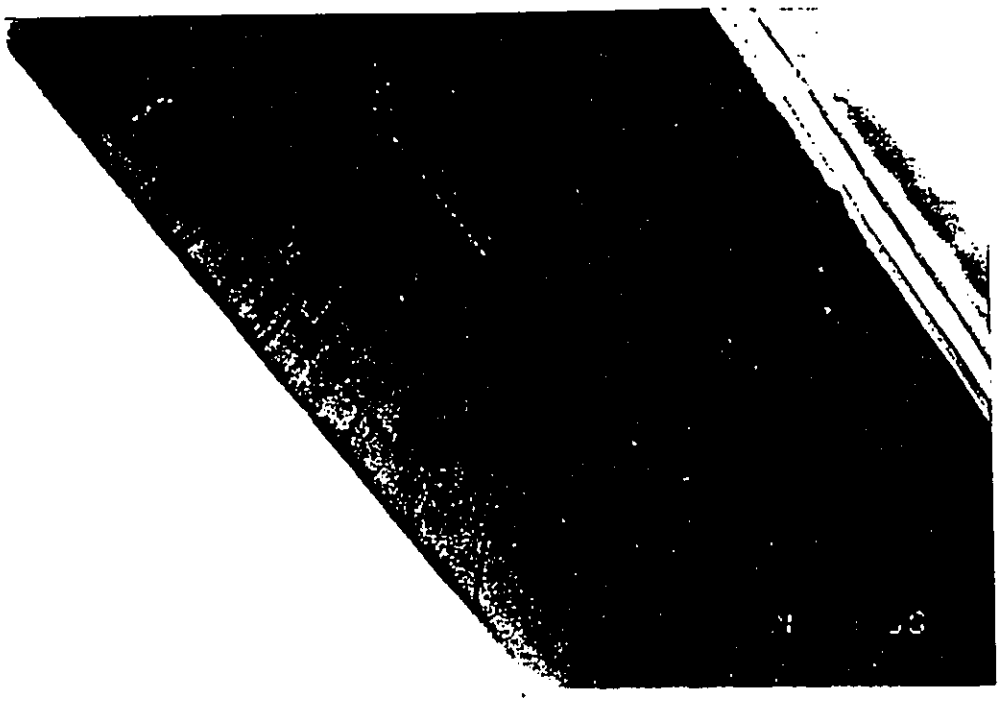

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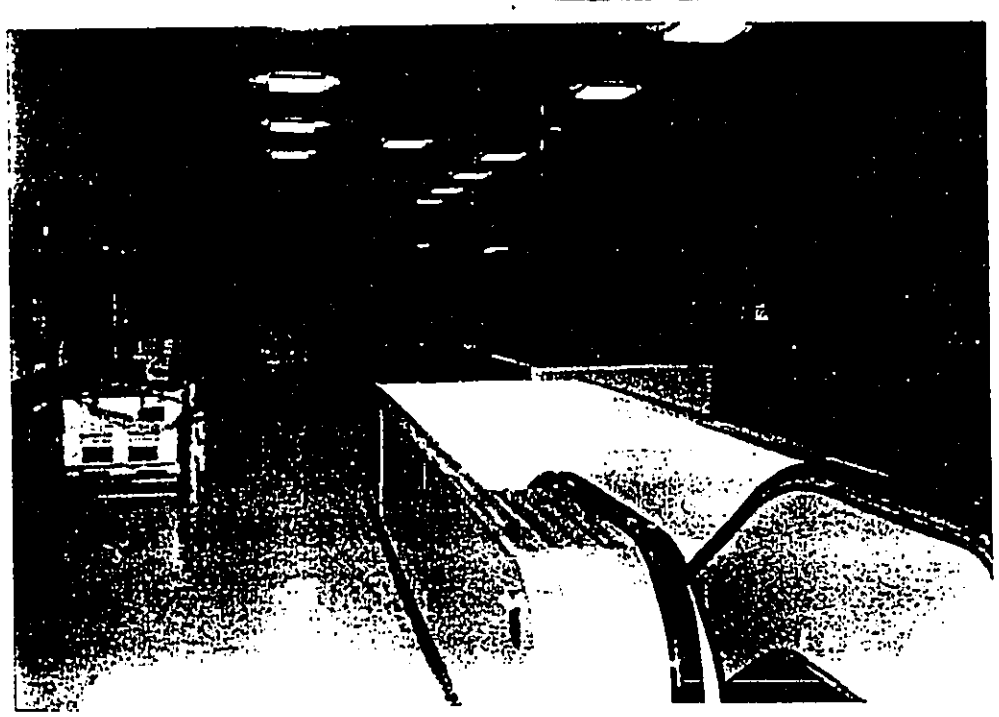

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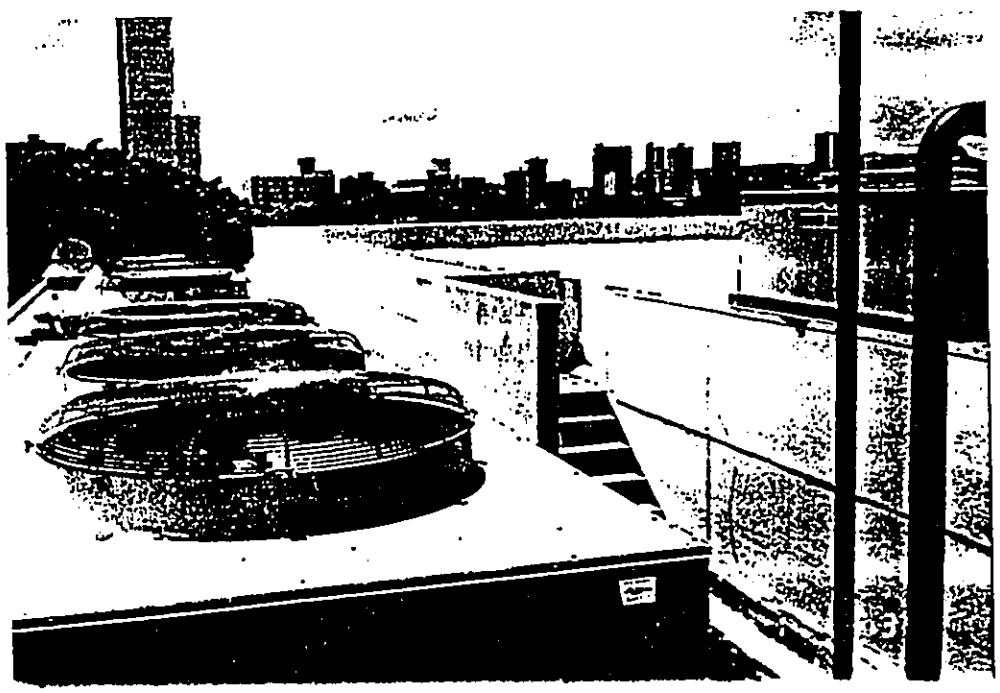
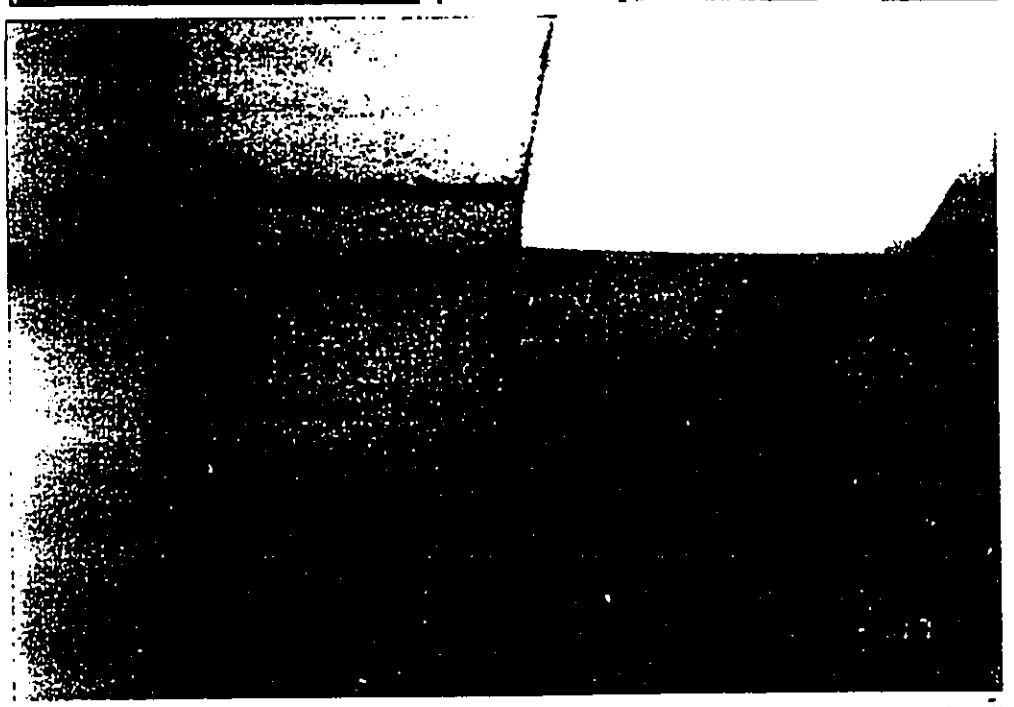


Location 5.

Location 6.

Location 7.



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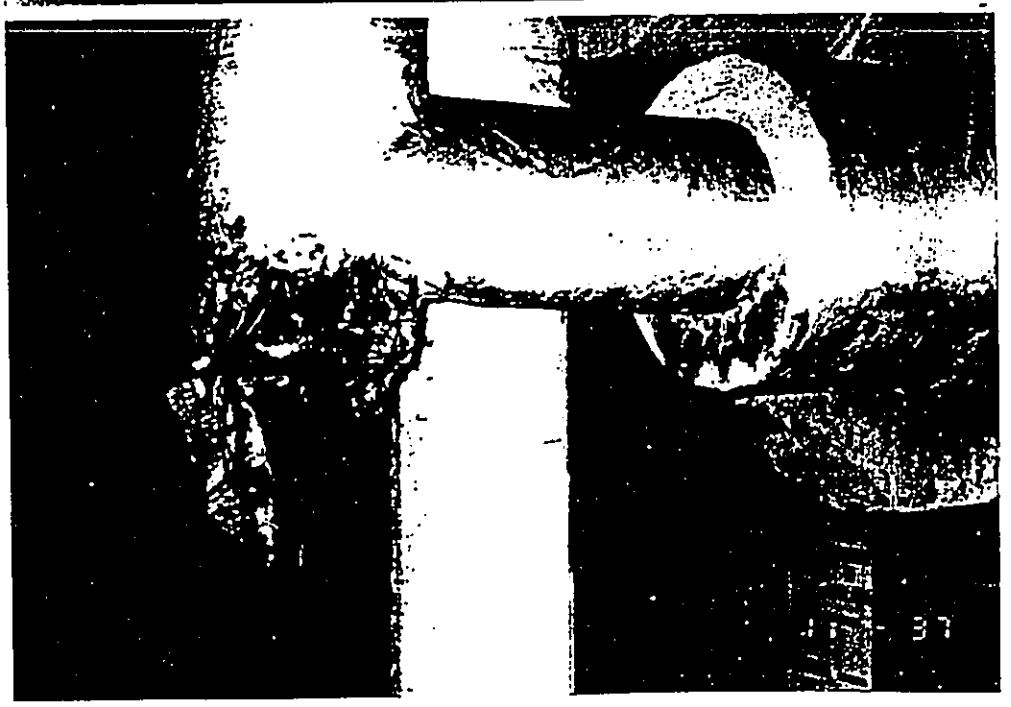

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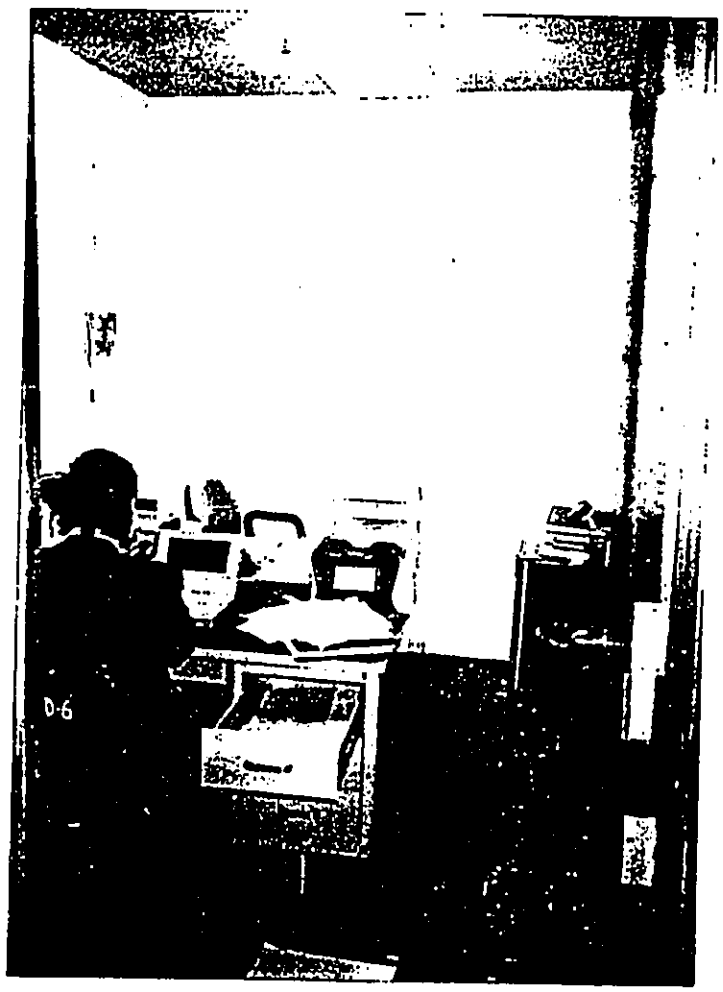

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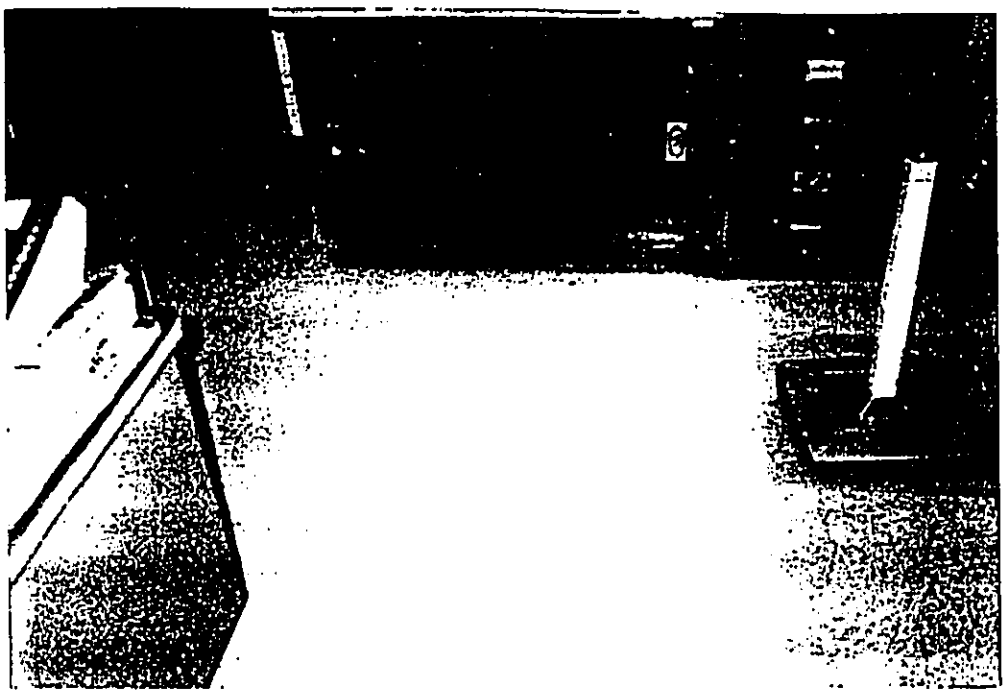

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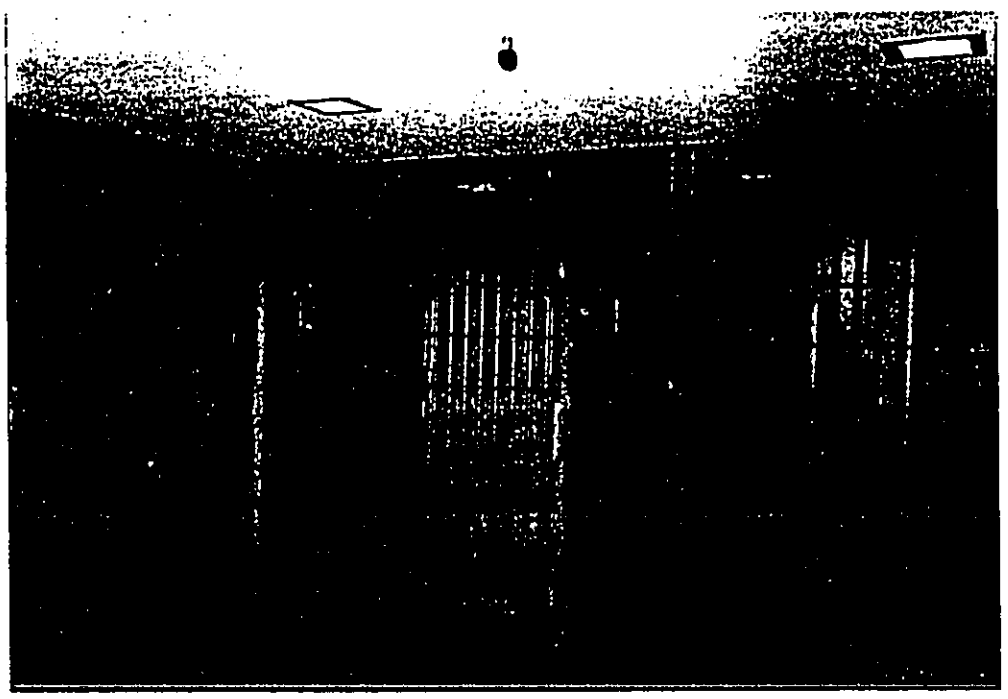

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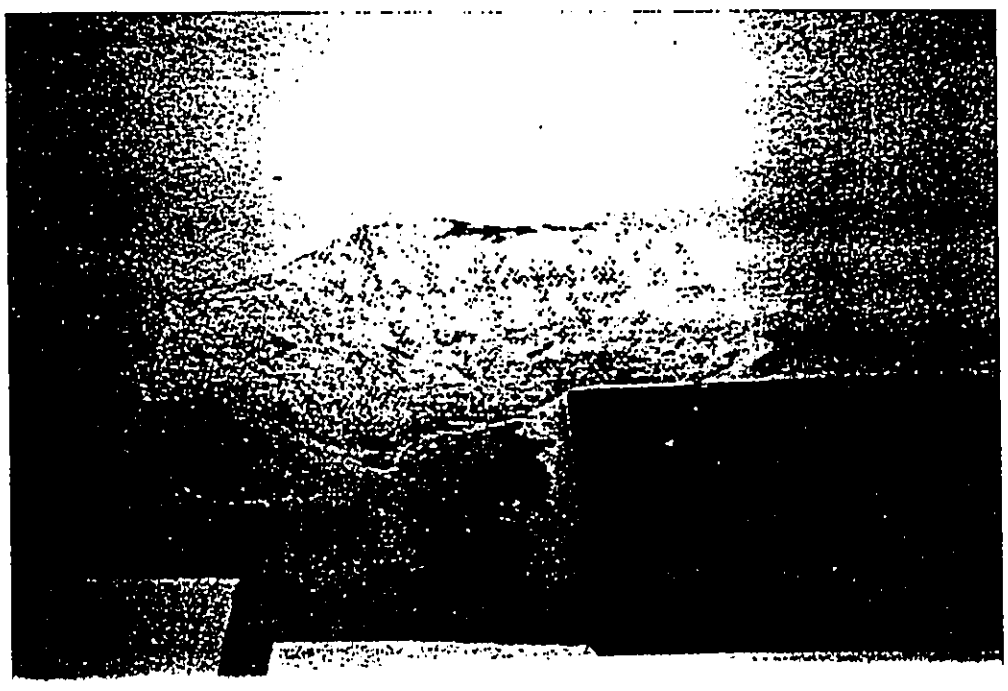

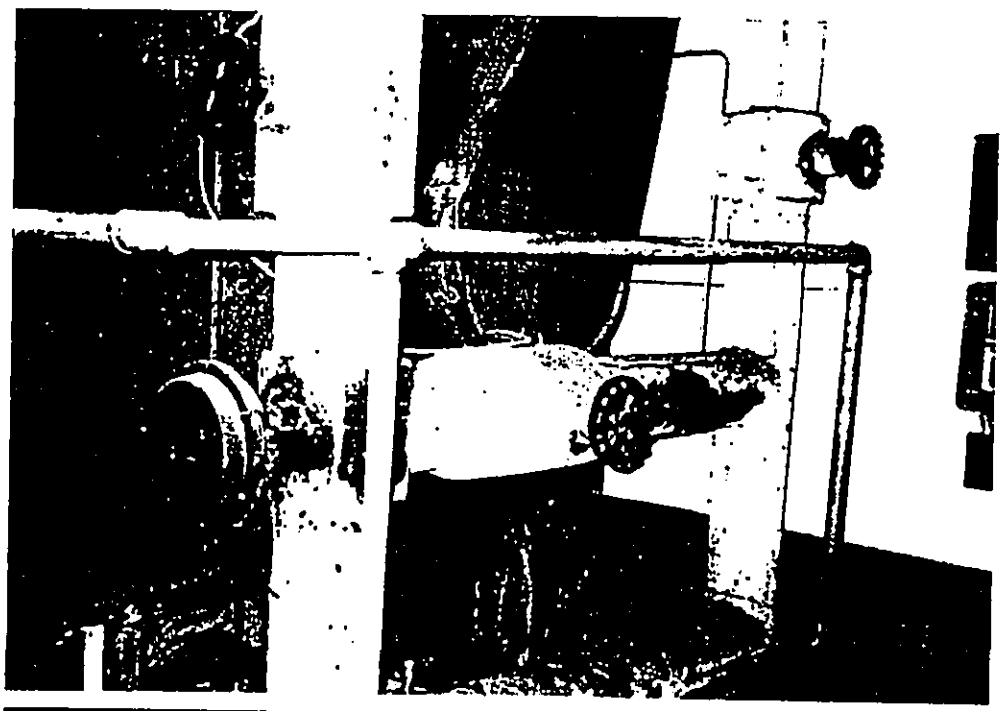

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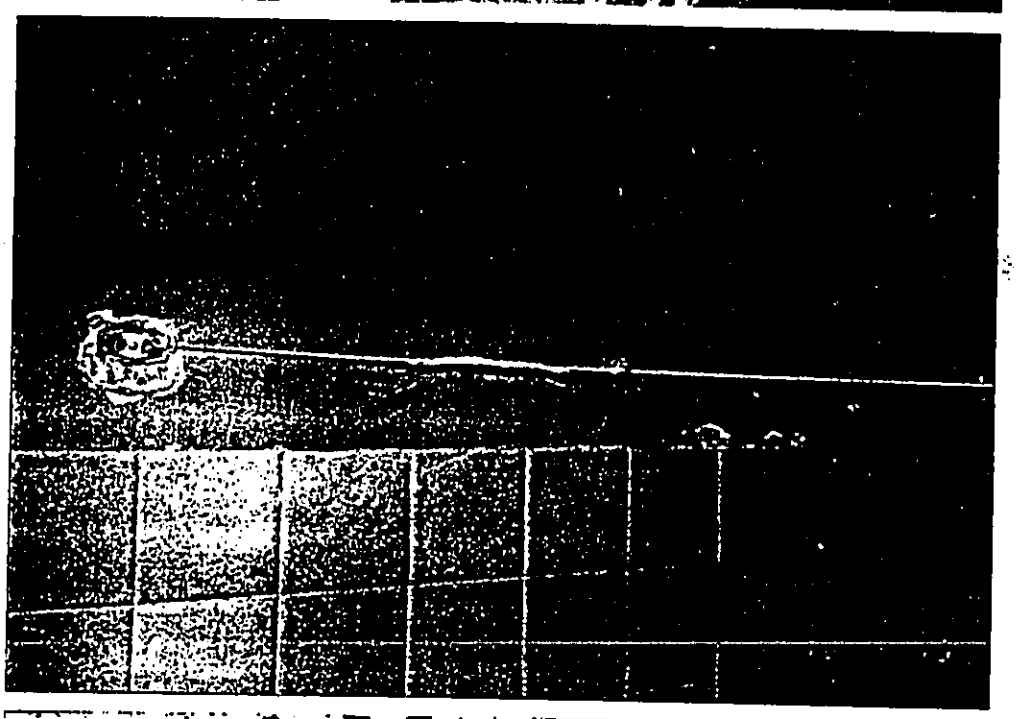

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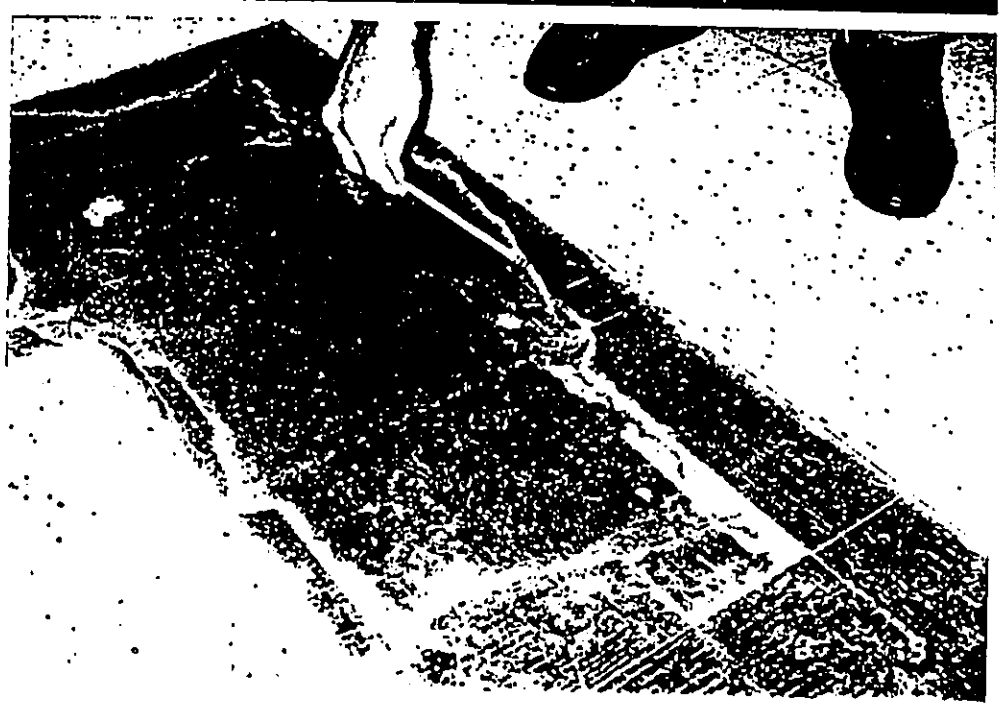
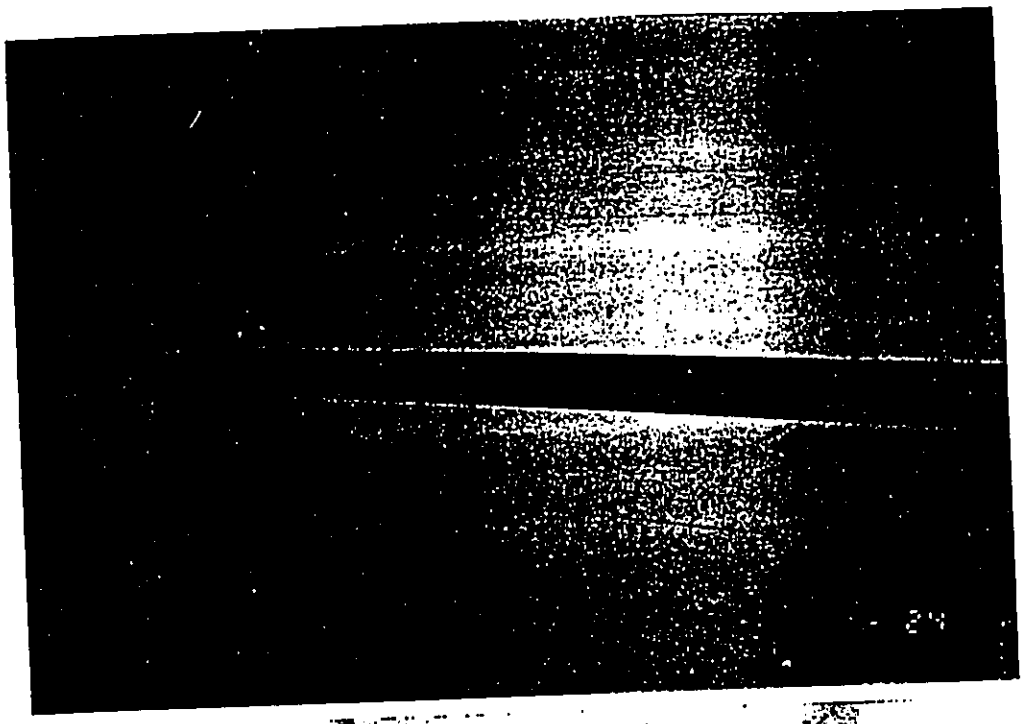


Location 16.

Location 17.



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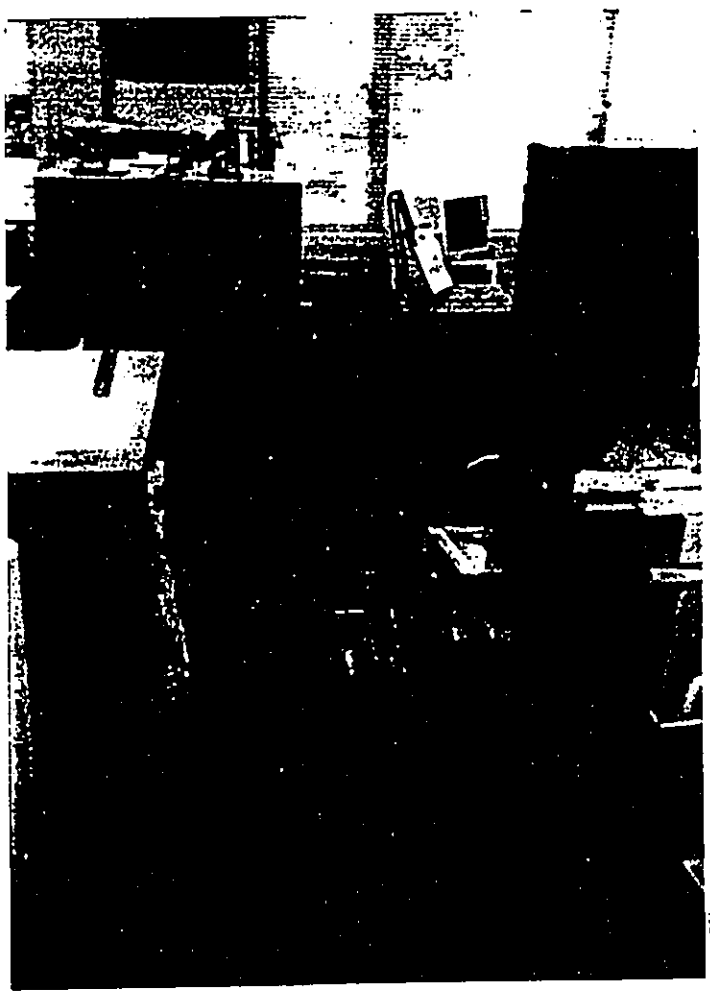
Location 19.



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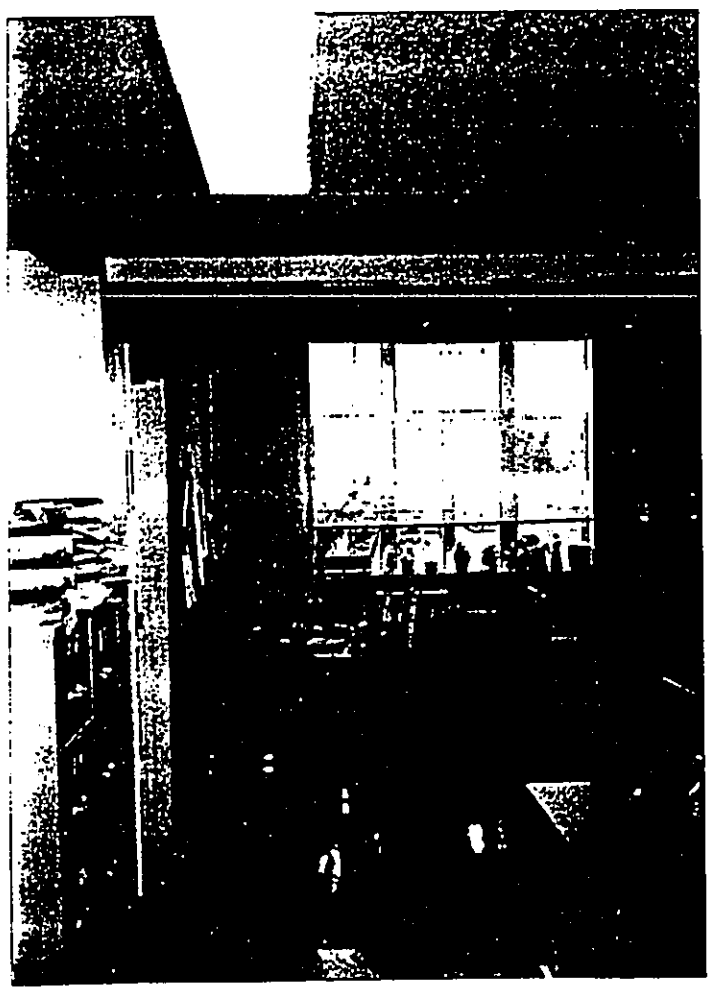
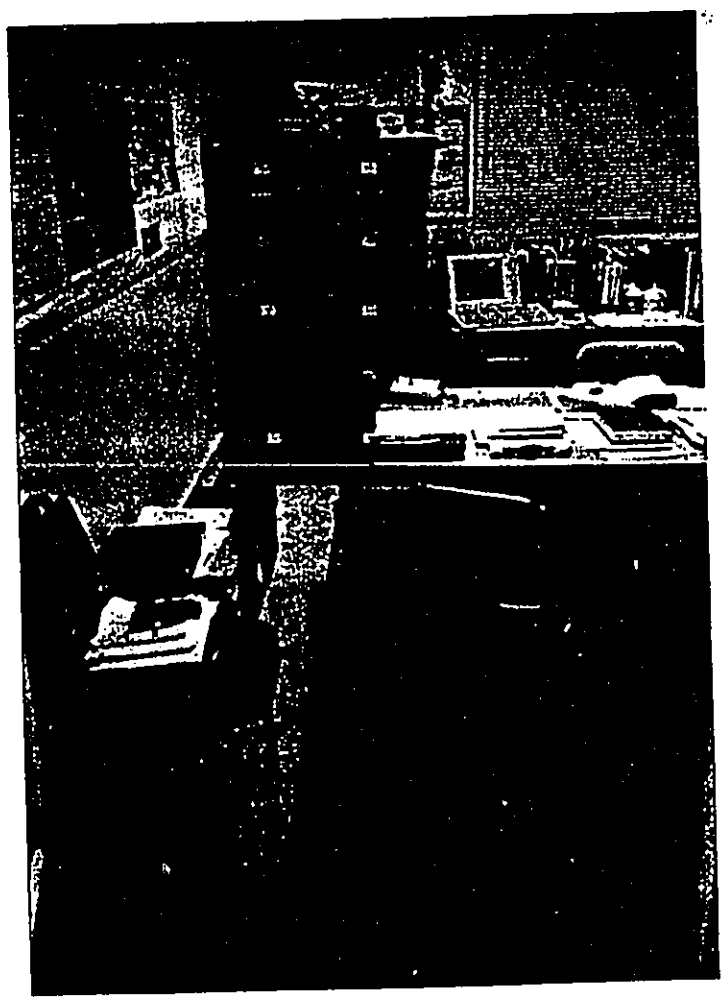
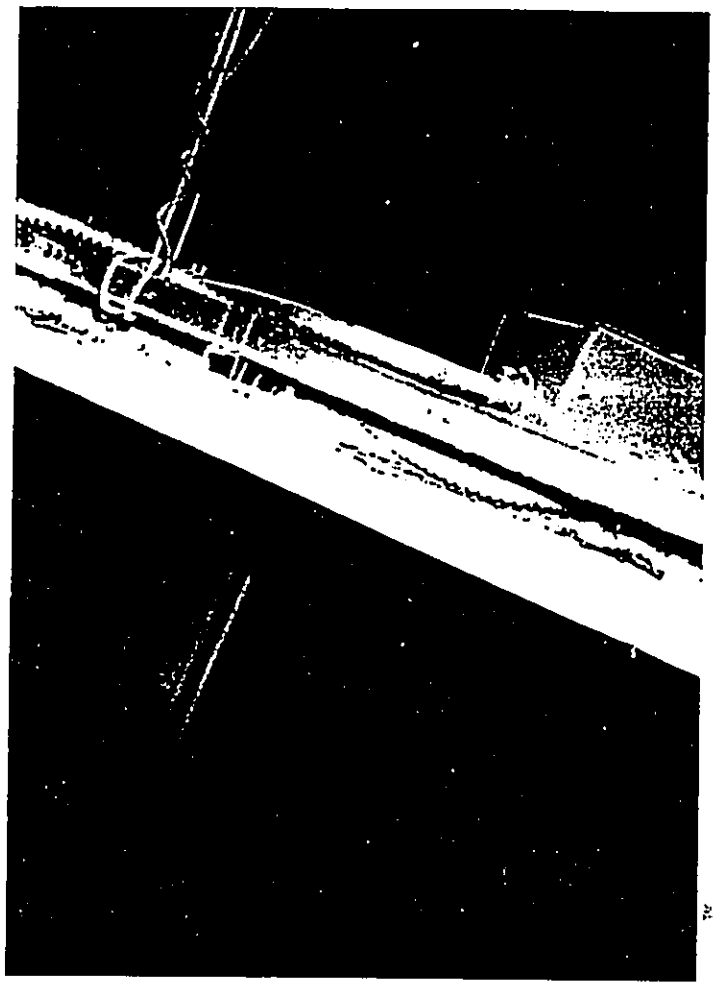


Location 21.

Location 22.

Location 23.





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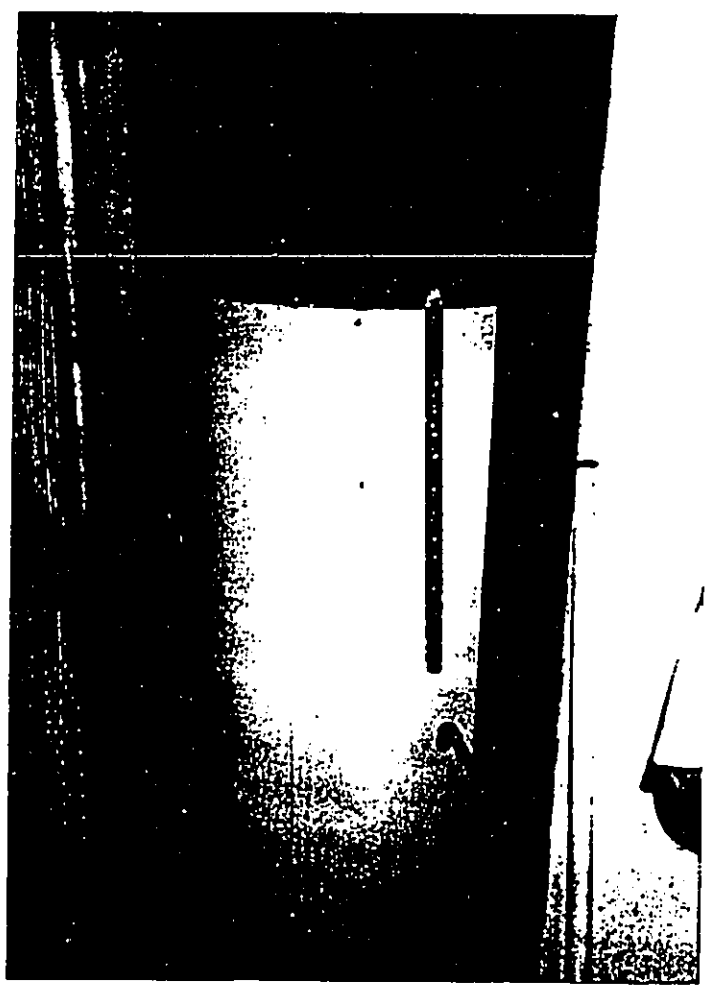
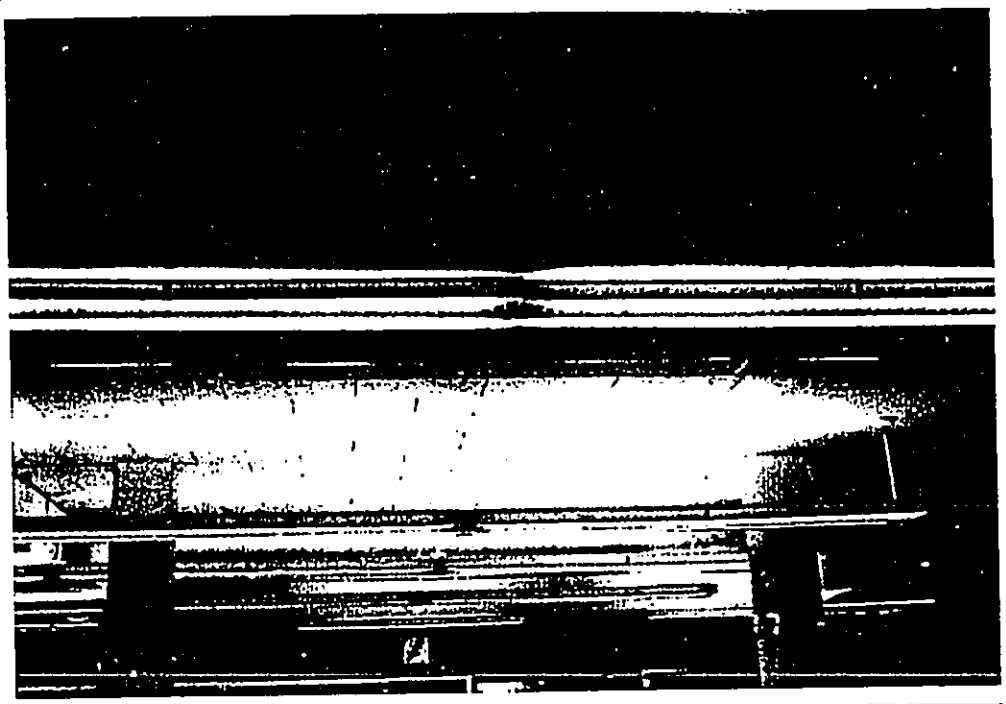


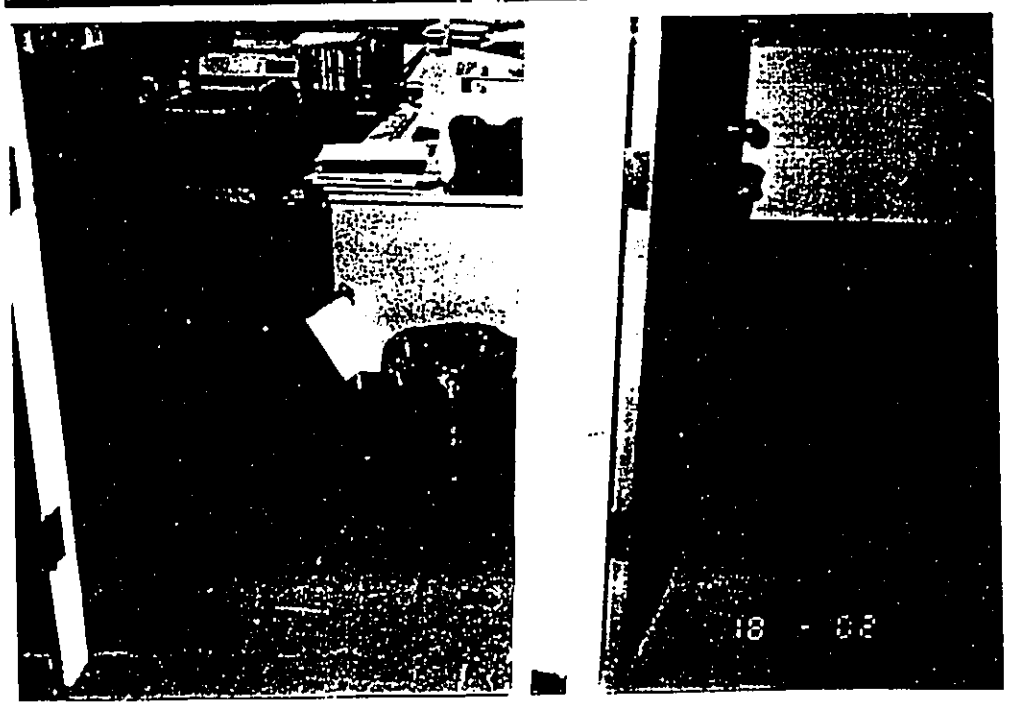
Location 25.

Location 26.

Location 27.



Location 28.



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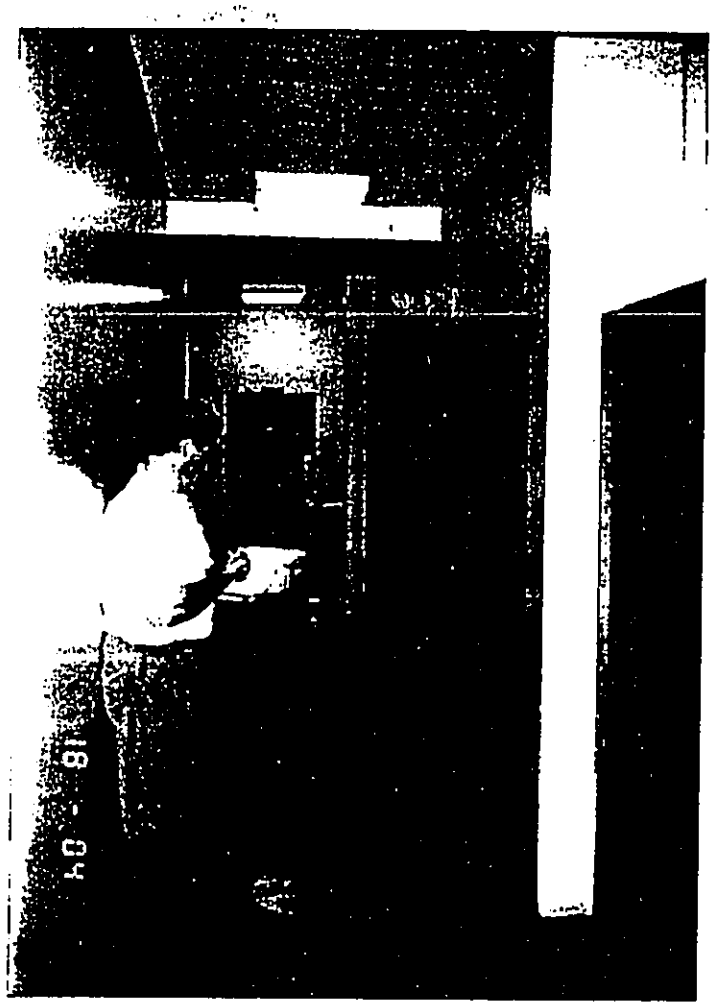
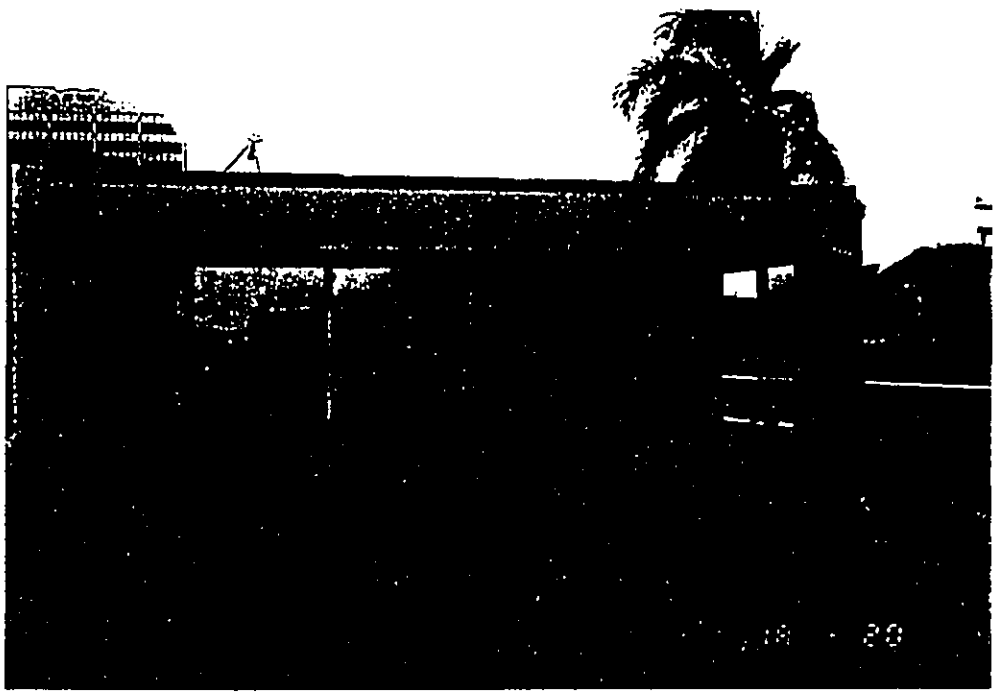
Location 29.



Location 30.

DOCUMENT CAPTURED AS RECEIVED

Location 31.



Location 32.

STATE OF HAWAII
DEPARTMENT OF HEALTH
ENVIRONMENTAL MANAGEMENT DIVISION
FIVE WATERFRONT PLAZA, SUITE 250
500 ALA MOANA BOULEVARD
HONOLULU, HAWAII 96813

In reply, please refer to:
EMD

April 26, 1991

PAD411LG

Michael Fitch
Environmental Scientist
Unitek Environmental Consultants, Inc.
2889 Mokumoa Street
Honolulu, Hawaii 96819

Dear Mr. Fitch:

Subject: Request for Public Records
UEC Project Numbers: 9103

This is in response to your letter dated March 11, 1991, and three letters dated March 22, 1991, requesting the Environmental Management Division, Department of Health for information regarding the subject sites.

We have reviewed our files, consisting of the Clean Air Branch, Clean Water Branch, Safe Drinking Water Branch, Solid and Hazardous Waste Branch, Wastewater Branch, and the Office of Hazard Evaluation and Emergency Response. The following are comments provided for each of the four sites:

1. UEC Project Number 9103: City and County of Honolulu Police Headquarters - 1455 S. Beretania Street, Honolulu, Hawaii (TMKs 2-4-5:14, 18, 19, 21, and 23. The Underground Storage Tank (UST) Section of the Solid and Hazardous Waste Branch has a file for this facility.

Please be advised that the absence of information on reports of spills or releases does not absolve the owner from future clean up liabilities under the Resource Conservation and Recovery Act (RCRA) or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Should you have questions regarding the UST files, you may contact Roxanne Kwan of the Solid and Hazardous Waste Branch at 543-8228. For your future reference, enclosed is a copy of the CERCLIS list (dated December 17, 1990) which lists potential hazardous waste sites which are undergoing or have been evaluated by the United States Environmental Protection Agency. If you need copies of any of the site-specific files from the list, you may contact Liz Galvez of the Office of Hazard Evaluation and Emergency Response at 543-8249.

Very truly yours,

Thomas E. Arizumi

THOMAS E. ARIZUMI, Chief
Environmental Management Division

TEA:lg

Enclosure: CERCLIS list

STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
July 23, 1991

To: Michelle Toyofuku
From: Lance Yamamoto

Subject: Chemicals disposed at the Department of Agriculture's King St. Complex

The following is a list of chemicals used and disposed at the Department of Agriculture's King St. Complex

Commodities Lab: The lab utilizes small amounts of chemicals during grade testing of certain commodities. The chemicals used during this testing are washed down the drain in small and diluted amounts. Attached to the commodities lab's drainage system, is a mixing tank which further dilutes the chemicals before entering the sewage system.

Chemicals used:

- Acetic Acid
- Alcohol
- Alconox
- Ascorbic Acid
- Formaldehyde
- Hydrochloric Acid
- Kerosene
- Mara Phosphoric Acid
- Methylene Blue
- Naphthalina Chloriznad
- Potassium Hydroxide
- Phenolphthalein
- Sodium Bicarbonate
- Dichloroindophenol
- Silver Nitrate
- Sulfuric Acid
- Sodium Dichromate
- Calcium Chloride
- Potassium Dichromate

Seed Lab: The seed lab uses small amounts of Potassium Nitrate which induces germination of certain seeds. Trace amounts are occasionally disposed of down the drain.

Taxonomy Lab: No chemicals are disposed of down the drain.

Insectary and Insect Quarantine: The only chemical used and disposed of on a regular basis is Sodium Hypochlorite (household Clorox).

Plant Pathology: In the Plant Pathology facility the only chemical used and disposed of on a regular basis is Sodium Hypochlorite (household Clorox). Chemicals used occasionally (weekly-monthly) are:

- standard buffer solutions: pH 4, pH 7, pH 10
- potassium phosphate buffer solution
- carbonate buffer solution
- PBS buffer
- Tween 20 (polyoxyethalyne sorbitan monolaurate)
- hydrochloric acid
- sodium carbonate

Garage: The Garage handles disposal of used oil through a contract with Unitek. The garage also uses certain solvents as cleaning agents however these chemicals are not disposed of rather are kept in the original drums and are reused until completely evaporated.

Printshop: The only chemical which requires disposal is a solvent used to clean the printshop press. Disposal of this solvent is currently being handled through a contract with Unitek.

Grounds: The grounds, maintained by DAGS is treated with several types of herbicides and fertilizers.

Herbicides: Surflan AS
Image
Tri Mech
Round up

Fertilizers: Gavlota 21714
Plant Lesco 141411

Should you have any questions regarding this list, please contact me at 548-7105.

Date August 9, 1990

Director of Finance
City and County of Honolulu
Honolulu, Hawaii

Dear Sir:

Project Pawaa Annex

Replace PCB Transformer

Contract No. F-77858

This is to inform you that work under contract with Westinghouse Electric Corporation for the subject project, Honolulu, Hawaii, Contract No. F-77858, was satisfactorily completed on February 24, 1989, and final inspection was made.

The Contract data is as follows:

Contract Signed	June 9, 1988
Commencement Date	December 19, 1988
Time of Completion	180 consecutive calendar days.
Contract Completion Date	June 16, 1989
Extension of Time Granted	-0- consecutive calendar days
New Contract Completion Date	---

The final cost as claimed by the Contractor for this completed work is as follows:

Original Bid Price	$71,300.00
Final Cost of Contract Work	$74,488.00
Less Previously Paid Contractor	$72,096.50
Balance of Claim Due Contractor	$ 2,391.50

The necessary tax clearances and release of surety have been filed by the Contractor.

It is, therefore, requested that the payment of the above balance of claim due the Contractor be paid promptly.

Very truly yours,

Director and Building Superintendent

APPROVED:

Director of Finance

cc: Inspector
Bldg. Maint.
Central Fiscal
Contractor
Police Dept.
Health Dept.
Fire Dept.
Finance Dept. (Motor Veh. & Lic. Div.)

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

ENV 3-3 - PCBs
JB/G

June 13, 1991

William A. Bonnet
Manager
Environmental Department

Ms. Michelle Toyofuku
Unitek Environmental Consultants, Inc.
2889 Mokumoa Street
Honolulu, Hawaii 96813

Dear Ms. Toyofuku:

Subject: Information on HECO Transformers Located along Young Street

In response to your June 10_, 1991 request regarding Hawaiian Electric Company (HECO) transformers serving the subject area, we are submitting the following information:

(1) Young Street
Vault 92
Transformer 42022
Purchase date is 6/29 and the service date is 12/75.
This transformer is customer owned.

Vault 1871
Transformer 26373
Purchase date is 1/68 and the service date is 2/73.
No test data available.

Tranformers 16951, 16954, 16955
Purchase date is 1/60 and the status date is 2/73 for all three tranformers.
No test data available.

Transformer 32266
Purchase date is 5/73 and the service date is 10/74.
No test data available.

Transformers 20134, 20141, 20143
Purchase date is 1/63 and the service date is 9/73 for all three tranformers.
No test data available.

Over 10,000 HECO transformers have been tested to date. These analytical data (i.e., as of March 31, 1991) indicate that 94.2% of HECO's transformers are non-PCB (<50 ppm), while about 5.3% are PCB contaminated (50-499 ppm) and less than 0.5% are PCB (>500 ppm). Because of the Federal prohibition against distribution in commerce of PCBs in 1979, units purchased after 1979 are not considered suspect of contamination. All untested mineral oil transformers, such as those used in HECO's distribution system, purchased prior to July 1, 1979 must be considered PCB-contaminated by law. However, EPA rules for PCBs, Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions (40CFR761.30) provide for the following: "PCBs at any concentration may be used in transformers...for the remainder of their useful lives subject to...conditions." With respect to the subject transformers, we are, to the best of our knowledge in compliance with the Toxic Substances Control Act (TSCA) and all applicable regulations promulgated thereunder.

For your information, HECO has a policy for testing of transformers per customer requests. Should you determine that testing is needed, please contact us.

Sincerely,

Unitek Environmental Consultants, Inc.

2889 Mokumoa Street
Honolulu, Hawaii 96819
Telephone: (808) 836-0555
Fax Phone: (808) 839-0786

REPORT OF PRECISION LEAK TESTING OF
UNDERGROUND STORAGE TANK SYSTEMS
(Unitek Project # 8461)

Client: Unitek Environmental Services
Address: Honolulu Police Department
Main Office
Jobsite: 1455 South Beretania
Honolulu, Hawaii 96814

Contact: Mr. Bill Rhodell
Telephone: 943-3267
Test Date(s): October 9, 1989
Report Date: October 24, 1989
Technician: Richard Silva

Tank No.	Capacity (gl)	Tank Type	Age (yr)	Stored Product	Test Type	Leak Rate (gl/hr)	Std. Dev.
1	1,000	Steel	10+	Used Oil	Precision	-0.017	.001

Comments: At the time this precision tank test was performed, the tank system satisfied the EPA Title 40 CFR 280.43 (c) criteria for tank tightness testing.

Precision leak testing of these underground storage tank systems (which includes each tank and its associated pipelines) was performed using a Horner Leak Detector System. This instrumentation is capable of detecting a minimum leak rate of 0.100 gallons per hour pursuant to the Title 40 CFR 280.43(c) criteria established by the U.S. Environmental Protection Agency (EPA). This 0.100 gl/hr requirement is not to be construed as a permissible leak rate but rather as an accuracy tolerance of tank testing equipment. While the information presented above is believed to be accurate, because of the many complex variables involved with such testing, Unitek disclaims any and all liability for representations, expressed or implied, contained in or omitted from, this report or any other written or oral communication which would establish the absolute integrity of the tanks and pipelines. Only a comprehensive environmental assessment of the subsurface soil/groundwater surrounding these tank systems can establish the absolute integrity of the tanks and pipelines. Therefore, Client is advised that even if all tests are within the 0.100 gl/hr detection limit specified by the EPA, one or more of these tanks or pipelines may have leaked prior to this test date, may currently be leaking, or may leak after this test date. Consequently, Unitek does not assume any responsibility whatsoever for leakage or soil/groundwater contamination. Also, surface spills can result in soil/groundwater contamination which would not be detected by this test protocol. Thus, it is expressly understood and agreed that the owner and operator of the tank systems have sole responsibility for all liability caused by past, present, or future leaks or spills, and that the owner and operator of the tank systems have sole responsibility for compliance with all leak/spill detection, governmental notification, tank closure, site assessment, and soil/groundwater remediation requirements imposed by federal, state, and local laws and regulations.

Unitek Environmental Consultants, Inc.

2889 Mokumoa Street
Honolulu, Hawaii 96819
Telephone: (808) 836-0555
Fax Phone: (808) 839-0786

REPORT OF PRECISION LEAK TESTING OF
UNDERGROUND STORAGE TANK SYSTEMS
(Unitek Project # 7137)

Client: Police Station - Pawa'a Annex
Address: 1455 S. Beretania Street
Honolulu, Hawaii 96814
Jobsite: 1455 South Beretania Street
Honolulu, Hawaii

Contact: Bill Roden
Telephone: 943-3267
Test Date(s): January 23, 1991
Report Date: January 23, 1991
Technician: Ervin D. Malalis

Tank No.	Capacity (gl)	Tank Type	Age (yr)	Stored Product	Test Type	Leak Rate (gl/hr)	Std. Dev.
1	1,000	Steel	13+	Used Oil	Precision	-0.0022	0.002

Comments: At the time this precision tank test was performed, this tank system met the EPA Title 40 CFR 280.43 (c) criteria for tank tightness testing.

Precision leak testing of these underground storage tank systems (which includes each tank and it associated pipelines) was performed using a Horner Leak Detector System. This instrumentation i capable of detecting a minimum leak rate of 0.100 gallons per hour pursuant to the Title 40 CFI 280.43(c) criteria established by the U.S. Environmental Protection Agency (EPA). This 0.100 gl/h requirement is not to be construed as a permissible leak rate but rather as an accuracy tolerance of tan testing equipment. While the information presented above is believed to be accurate, because of the man complex variables involved with such testing, Unitek disclaims any and all liability for representations expressed or implied, contained in or omitted from, this report or any other written or ora communication which would establish the absolute integrity of the tanks and pipelines. Only comprehensive environmental assessment of the subsurface soil/groundwater surrounding these tan systems can establish the absolute integrity of the tanks and pipelines. Therefore, Client is advised thi even if all tests are within the 0.100 gl/hr detection limit specified by the EPA, one or more of thes tanks or pipelines may have leaked prior to this test date, may currently be leaking, or may leak afte this test date. Consequently, Unitek does not assume any responsibility whatsoever for leakage or soi groundwater contamination. Also, surface spills can result in soil/groundwater contamination whic would not be detected by this test protocol. Thus, it is expressly understood and agreed that the owne and operator of the tank systems have sole responsibility for all liability caused by past, present, c future leaks or spills, and that the owner and operator of the tank systems have sole responsibility fc compliance with all leak/spill detection, governmental notification, tank closure, site assessment, an soil/groundwater remediation requirements imposed by federal, state, and local laws and regulations.

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

January 10, 1992

Ms. Michelle Y. Toyofuku
Unitek Environmental Consultants, Inc.
930 Mapunapuna Street
Honolulu, Hawaii 96819

Dear Toyofuku:

Subject: Information on HECO Transformers Located at 1503 and 1513 Young Street

In response to your recent request regarding Hawaiian Electric Company (HECO) transformers serving the subject area, we are submitting the following information:

Transformers 49071 and 49063 were purchased in 1986 and installed at their present location in February of 1988. These are non-PCB transformers.

Transformer 50963 was purchased in 1987 and installed at its present location in February of 1988. This is a non-PCB transformer.

Transformers 47303 and 47495 were purchased in 1985 and installed at its present location in October of 1985. These are non-PCB transformers.

Transformer 29176 was purchased in 1971 and installed at its present location in February of 1973. Test data is not available.

Over 10,000 HECO transformers have been tested to date. These analytical data (i.e., as of September 30, 1991) indicate that 94.1% of HECO's transformers are non-PCB (<50 ppm), while about 5.4% are PCB contaminated (50-499 ppm) and less than 0.5% are PCB (>500 ppm). Because of the Federal prohibition against distribution in commerce of PCBs in 1979, units purchased after 1979 are not considered suspect of contamination. All untested mineral oil transformers, such as those used in HECO's distribution system, purchased prior to July 1, 1979 must be considered PCB-contaminated by law. However, EPA rules for PCBs, Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions (40CFR761.30) provide for the following: "PCBs at any concentration may be used in transformers...for the remainder of their useful lives subject to...conditions." With respect to the subject transformers, we are, to the best of our knowledge in compliance with the Toxic Substances Control Act (TSCA) and all applicable regulations promulgated thereunder.

For your information, HECO has a policy for testing of transformers per customer requests. Should you determine that testing is needed, please contact us.

If you have any questions regarding the information submitted or need additional information, please contact Mike Choy at 543-5679.

Sincerely,

harry Nakai Inc.

1648 KAHAI STREET, HONOLULU, HAWAII 96819
B/S PHONE (808) 845-1400

July 20, 1990

Departmentment of Agriculture
Attn: Ms. Val Ahina
1428 S. King Street
Honolulu, Hawaii 96814

Subject: Tank Test Results At King St. Location

Dear Ms. Ahina:

This letter is to confirm that a precision tank test was performed at the above mentioned site using the Horner Tzy-Chek II underfill precision test system on the date of July 19, 1990.

The range that the results must fall within are as follows:

1. Environmental Protection Agency - No less than 0.10 and no greater than 0.10 gallons per hour (gph) leak rate.

2. National Fire Protection Agency - No less than 0.05 and no greater than 0.05 gallons per hour (gph) leak rate.

The reason we show two different ranges (EPA and NFPA) is that the State of Hawaii Department of Health has not yet decided which agency's criteria they are going to adopt. It is my guess that the NFPA's criteria will be adopted, but this is yet to be announced.

The results of this particular site's precision tests are as follows:

1. Unleaded: -0.014 to -0.019 gph leak rate.

As you can see, your tank has passed both agency's criteria.

If you have any further questions, please feel free to call upon us.

Respectfully Submitted,

HARRY NAKAI INC.

Neil I. Nakai

Neil I. Nakai, President

JUL-20-90 FRI 9:33 HARRY NAKAI, INC.

STATE OF HAWAII DEPT. OF AGRICULTURE
1428 SOUTH KING STREET
HONOLULU HAWAII
TANK TESTER VER 2.01
FUEL TYPE: REGULAR UNLEADED UNDERFILL
CAPACITY TANK 1: 1955 GALLONS
TEMPERATURE COEFFICIENT: 693 ppm/deg F
TEST CRITERIA: +0.000 GPH TO +0.000 GPH

07/19/90 TEST TIME FROM 16:03 TO 17:10
DATA ANALYSIS INDICATES:

A GROSS VOLUME CHANGE OF: -0.019 GALLONS
A VOLUME CHANGE DUE TO TEMPERATURE OF: +0.002 GALLONS

A LIQUID VOLUME RATE OF CHANGE OF: -0.017 GPH
WITH A 99 % CONFIDENCE INTERVAL OF: +/-0.003 GPH
(-0.016 TO -0.019 GPH)

TESTER.....Neil Nakai

CUSTOMER.....

JOHN WAIHEE
GOVERNOR OF HAWAII

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:

March 6, 1992

92-031/epo

Ms. Michelle Y. Toyofuko
Staff Assistant
Unitek Environmental Consultants, Inc.
930 Mapunapuna Street
Honolulu, Hawaii 96819

Dear Ms. Toyofuku:

Subject: Request for Public Records
Properties Enclosed by Keeaummoku St., S. Beretania St., Kalakaua Ave., and S. King St.
Honolulu, Hawaii

This is in response to your letter, dated January 17, 1992, requesting information regarding the subject sites from the Environmental Management Division, Department of Health.

We have reviewed our files in the Clean Air, Clean Water, Safe Drinking Water, Solid and Hazardous Waste, and Wastewater Branches, and the Hazard Evaluation and Emergency Response (HEER) Office. We have the following comments to offer:

Solid and Hazardous Waste Branch

Hazardous Waste Section

The Hazardous Waste Section has files for one facility located on the property cited in your request. This would be the City and County of Honolulu Police Headquarters.

Underground Storage Tank (UST) Section

This section has information on the following facilities:

1. State Department of Agriculture - 1428 King St.
2. Meadow Gold Transportation - 824 Sheridan St.
3. Meadow Gold Dairies Ice Cream - 1418 Young St.
4. Meadow Gold Dairies Milk Plant - 910 Sheridan st.
5. Gas Plus - 1524 King St.
6. Gas Station-Pacific Development Company - 666 Keeaumoku St.
7. Honolulu Stations-Paawa Annex - 1455 Beretania (City and County of Honolulu Police Department)

In the future, please try to locate and list the addresses of each site in the area of concern, as the hazardous waste database is unable to retrieve information by Tax Map Key only.

In order to view the files for these facilities, and/or obtain copies of any of the documents found in the files, the requestor should complete the attached "Request for Public Records" forms and submit it to the Hazardous Waste Branch as indicated on the attached instruction page. We will follow-up with the requestor (upon receipt of the form) to schedule a viewing of the files.

If you should have any questions, please contact Ms. Sheila Mackenzie of our UST Section at 586-4229, or Ms. Grace Simmons of our Hazardous Waste Section at 586-4226.

Please be advised that the absence of information on reports of spills, releases, or the existence of underground storage tank does not absolve the owner from future clean-up liabilities under the Resource Conservation and Recovery Act (RCRA) or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, or the Hawaii Environmental Response Law, as amended, or any other applicable state or federal regulation.

If you should need copies of the site-specific files on the CERCLIS List or the Spills Report (which your office should have previously received), you may contact Ms. Liz Galvez of the HEER Office at 586-4249.

Very truly yours,

Thomas E. Arizumi

THOMAS E. ARIZUMI, P.E.
Chief, Environmental Management Division

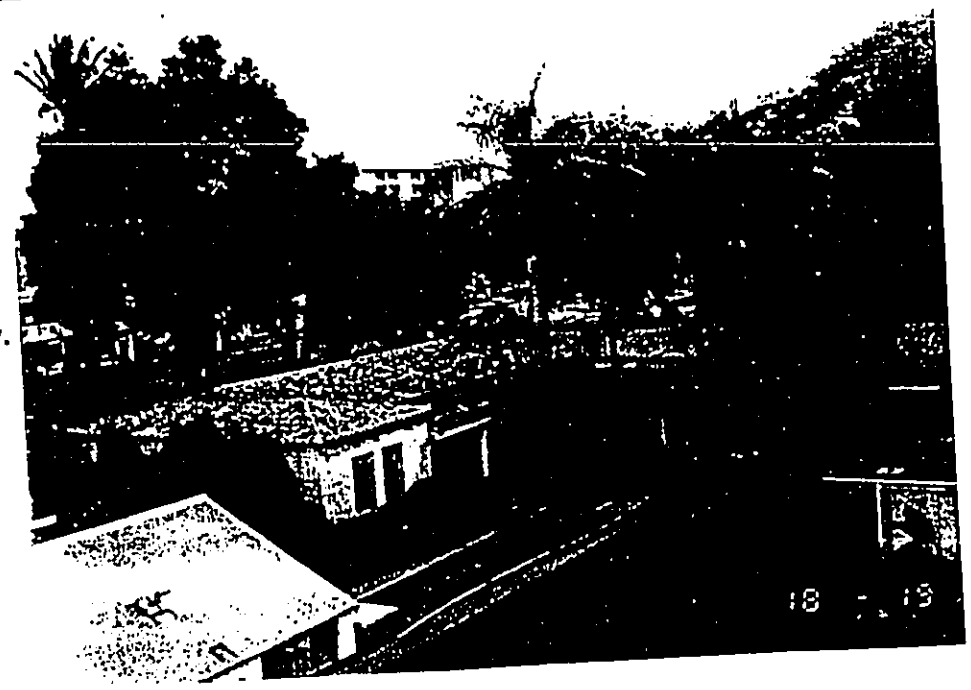
Enc.

C: Solid and Hazardous Waste Branch
Hazard Evaluation and Emergency Response Office

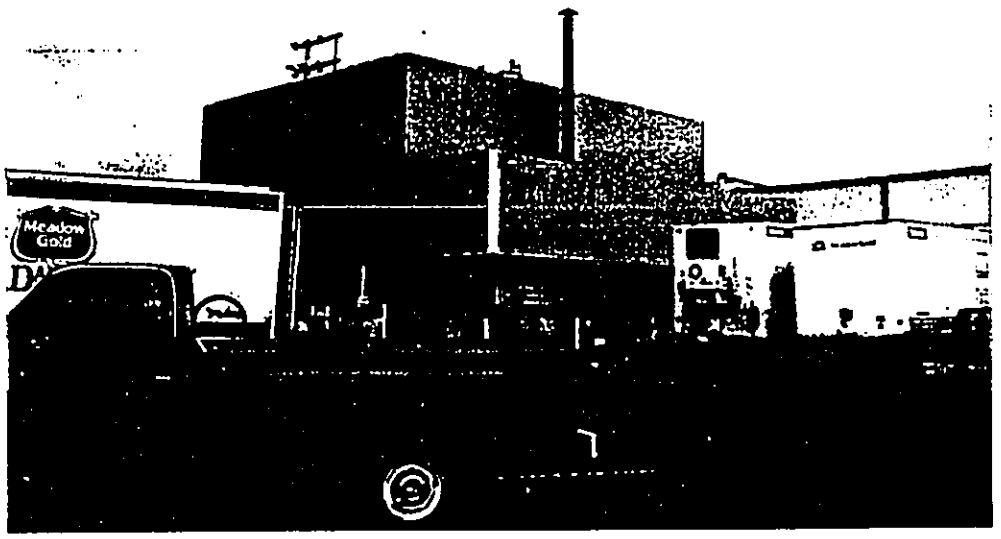
View of Police Headquarters Main Building along Young Street facing east.

Police Overflow Parking Lot. Vie faces north.

Department of Agriculture property. View faces west.



Portion of subject site viewed from Kaheka Lane. View faces toward the northeast.

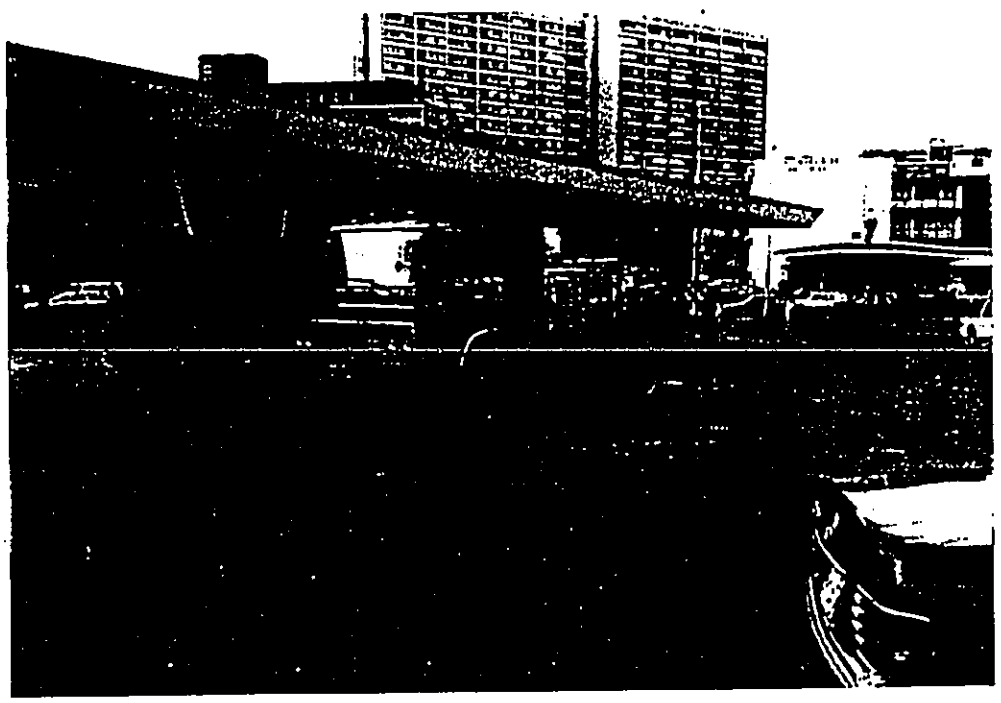


Meadow Gold Dairy property on northwest corner of subject site. One above ground storage tank was observed.

View of Midtown Center on eastern edge of subject site, facing north. Water runoff from Fewell Geotechnical's on-site drilling operations was observed at the time of the site inspection.

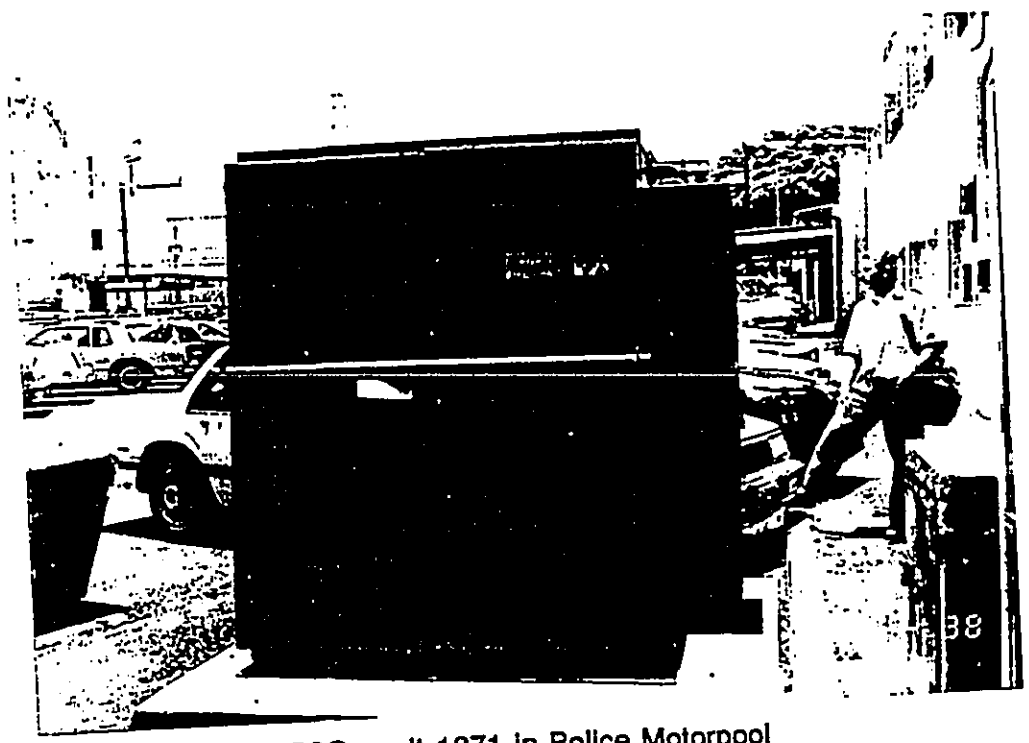
Example of residential housing on subject property.

Unocal 76 gasoline station located on southeast corner of subject site. View is from King Street facing north.

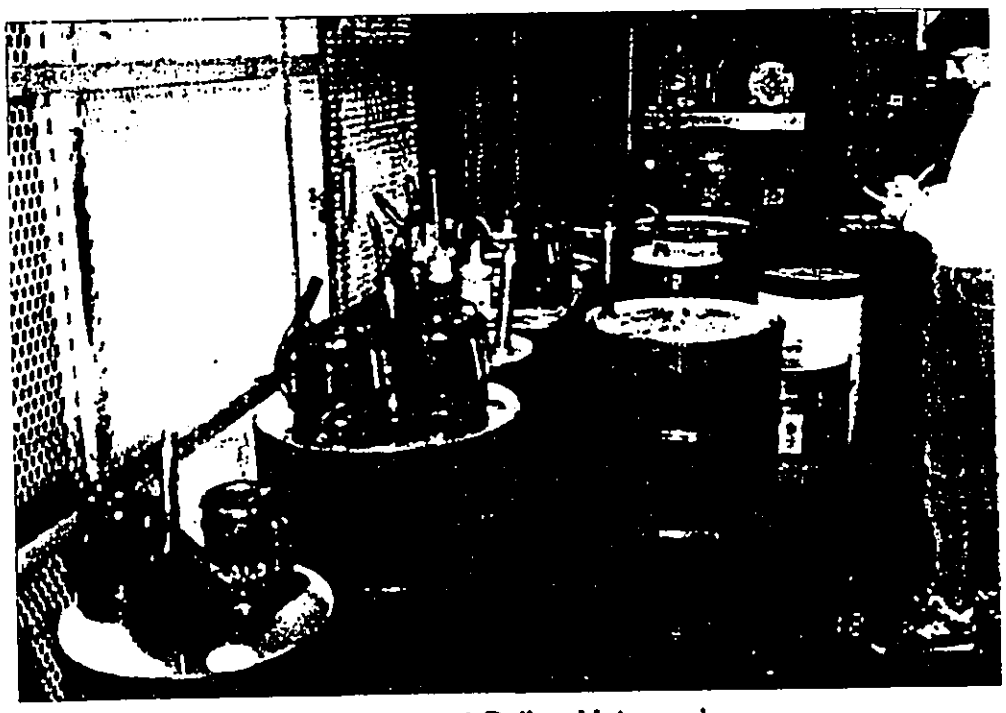


Location of underground storage tanks at Unocal 76 gasoline station. View faces south.

Example of PCB-suspect pole mounted transformers.

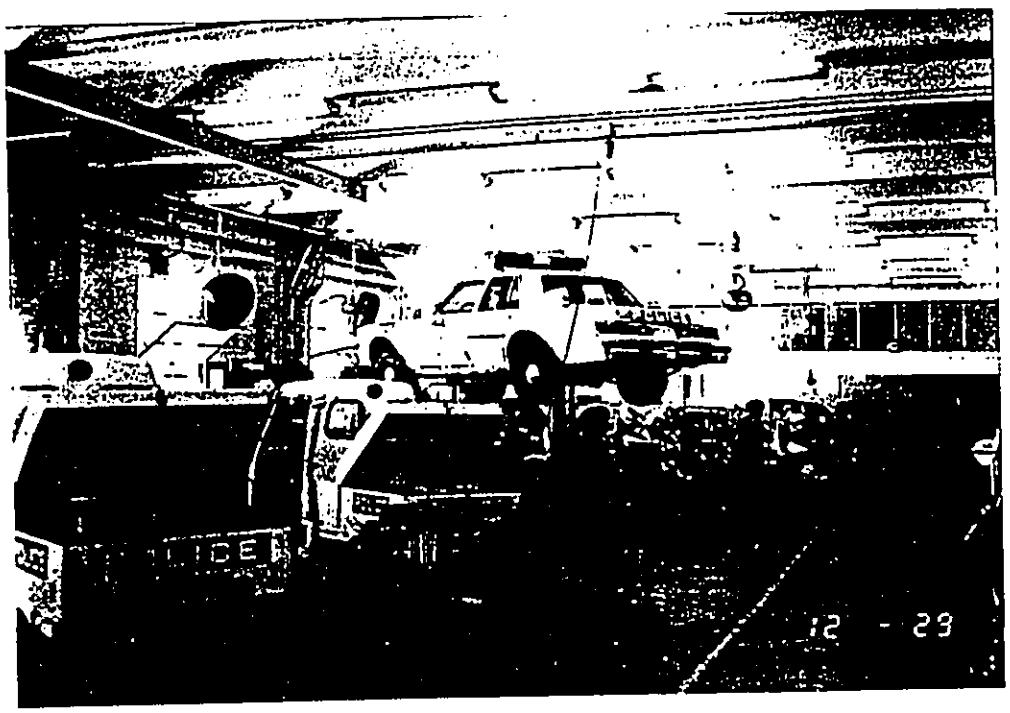


HECO vault 1871 in Police Motorpool parking area.



Drum storage at Police Motorpool Facility.

Two dispenser pumps at Police Motorpool Facility.



Example of double-piston type hydraulic lifts at Police Motorpool Facility.

Waste oil drum storage at Department of Agriculture garage.

APPENDIX G
SOCIAL IMPACT STUDY

Pawa'a Redevelopment

Social Impact Assessment

Pawa'a Redevelopment

Social Impact Assessment

Prepared for Wilson Okamoto and Associates, Inc.

by Earthplan

July 1993

Contents

Tables and Figures

Tables

Figures

1. Background and Introduction

1.1 Description of This Report

1.1.1 Report Purpose

The City and County of Honolulu Department of Housing and Community Development (DHCD) and the State Housing Finance and Development Corporation (HFDC) propose to redevelop approximately 10.6 acres in the Pawa'a area.

The City is participating in the Environmental Impact Statement (EIS) process because the project will involve public lands and funds. The first Draft EIS was published in June 1992. Earthplan prepared a social impact assessment which assessed community issues and potential social impacts resulting from the Pawa'a redevelopment effort; the report was appended to and summarized in the Draft EIS.

In response to community concerns expressed in the EIS process, the City held a series of community meetings designed to explore alternatives and mitigation. The project was subsequently revised, and the City is revising its Draft EIS. This report updates the initial social impact assessment (SIA), hereby referred to as the 1992 SIA. The major differences between the 1992 SIA and this report are as follows:

* **Update of Existing Community and Other Development Projects**

  Since the 1992 SIA was completed, the U.S. Bureau of the Census released "Summary Tape File 3-A," which contains more detailed information. Further, other projects in the Study Area, which are part of the cumulative effects, have undergone revisions. Both types of new information are included in this report.

* **Comparison of 1992 and Current Community Issues**

  In the 1992 SIA, Earthplan conducted an issues analysis which included interviews with community representatives, residents and business people. Many of the concerns raised at that time were addressed in the subsequent project revisions. This report follows up with some of those previously interviewed to assess their current perspective about the project. An analysis of events and issues subsequent to the 1992 SIA is then presented.

* **Identification of Potential Social Impacts**

  The project revisions affect the type and scale of social impacts. This report re-evaluates impacts to the residential population, neighborhood character, displacement and public services and facilities.

1.1.2 Participants in Report Preparation

This report was prepared by Earthplan, whose offices are located at 81 South Hotel Street, Suite 211, Honolulu, Hawai'i. Berna Cabacungan, principal of Earthplan, was project manager and primary researcher, interviewer and writer.

Assistance was provided by three sub-consultants. *Traver Carroll* gathered census data and interviewed business people who were previously contacted. *Michael P. Mays* interviewed on-site and nearby residents and organizational representatives. *Denine Sansom* reviewed recent Neighborhood Board minutes. [1]

1.1.3 Report Organization

The remaining portions of Section 1 describe the proposed project. Section 2 provides information on the existing community, based on 1990 census statistics on population and housing.

Section 3 discusses the factors which influence the future of the Pawa'a area. This section provides an overview of public policy directives, and presents major development projects in the area. A possible future scenario without the proposed Pawa'a redevelopment is then presented.

Potential social impacts are presented in Section 4. Population impacts are discussed, as well as project effects on neighborhood character. Displacement and future on-site social impacts are discussed, followed by a presentation of potential impacts on public services and facilities.

In Section 5, community issues related to the proposed development are discussed. This section explores neighborhood issues independent of the proposed project, presents findings of our 1992 SIA interviews, presents findings of interviews conducted for this report, and analyzes trends and differences.

1.2 Description of the Proposed Project

The project site covers approximately 461,090 square feet and encompasses a portion of two existing blocks. The site is bounded by Beretania Street on its mauka side, and King Street on the makai side. Kaheka Lane runs along the Diamond Head side of the site. It currently forms a T-intersection with Young Street; preliminary plans indicate that Kaheka Lane may be extended to Beretania Street, but this has not been determined. Ke'eaumoku Street fronts the project site on the 'ewa side.

[1] *In the 1992 SIA, assistance was provided by Nancy Gilder (interviews); Lani Nedbalek (interviews) and Community Resources, Inc. (census information).*

Currently, the most prominent features on the site are government-related. At the makai-'ewa corner is landscaped open space and the office of the State Department of Agriculture. Until recently, a major portion of the middle of the site was used for the City and County of Honolulu Police Department (HPD). Only the HPD vehicle maintenance division remains in the makai parking lot.[2] Approximately 15 Department of Health personnel are working in the structure which was formerly the police headquarters, but they are expected to leave by mid-1993. [3]

The remaining parcels contain primarily commercial and service establishments. Residential uses are located in two apartment buildings. The uses around the project site are similar to those on privately-owned on-site lands. Further detail on on-site and surrounding uses is presented in subsequent sections of this report.

Through this project, the City and State propose to achieve the following objectives:

* Optimize land uses and urban design;
* Maximize affordable housing;
* Achieve financial feasibility; and
* Conform to zoning densities.

Components of the proposed project include:

* **Residential development.**

  The major feature of the Pawa'a Redevelopment project is its residential component. A total of 1,768 units are proposed as follows:

  - Sixty percent, or 1,061 units, will be located in two high-rise and two mid-rise structures. These will be rental units, with rents targeted for low, moderate and gap group incomes, as well as elderly people.
  - The other 707 units will be located in three towers. These will be market units offered for sale.

* **Retail and commercial space.**

  A shopping complex is proposed for the Diamond Head portion of the project site fronting King Street. It is planned that King Street will retain a retail character which would be consistent with existing uses along this thoroughfare. Approximately 145,000 square feet will accommodate an

[2] *Personal communication with Judy Lum, Vehicle Maintenance Division, Honolulu Police Department, June 15, 1993.*
[3] *Personal communication with Dr. John Hall, Director of the Occupational Medicine Department, City Department of Health, June 15, 1993.*

array of shops, restaurants and a cinema complex. [4]

* **Parking.**

  To support the overall complex, approximately 2,895 spaces will be provided. The affordable units will be allocated 928 spaces, and the market units will be allocated 1,237 spaces.[5] The commercial areas will be allocated 587 spaces, and other uses will be provided 143 spaces.

* **Open space and recreational facilities.**

  A large portion of the project site will be retained and/or developed as open space. The open space near the State Department of Agriculture building will be developed into a "heritage park." There will also be open space areas fronting the diagonal affordable housing mid-rise structures. In terms of recreational facilities, a recreational center and a recreation deck will be provided. The recreational center is envisioned as a three-story multi-purpose gymnasium. The recreational deck is proposed as a general passive recreation area. This area may be accessible to the public and on-site residents, or may be restricted for resident use; this determination was not made at the time of this writing.

* **Community and public facilities.**

  The project includes a kindergarten through Grade Two public elementary school and possibly a community center. The school will be housed above grade near the makai end of Kaheka Lane in a structure encompassing approximately 10,000 square feet. A community center may be developed near the existing State Department of Agriculture office building. This building may be designated for retail or as part of the community services center, or serve as an open arcade. This determination was not made at the time of this writing.

The project represents several departures from the previous plan which was assessed in the 1992 SIA. Revisions which are particularly relevant to this social impact assessment are as follows:

* The land area for the project decreased by approximately 154,000 square feet. In decreasing the project site, the City is bypassing several privately-owned parcels and small businesses.

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[4] *This is larger than estimates provided in initial project material and news articles; those indicated that the commercial space was estimated at 80,000 square feet.*

[5] *The parking ratio for the affordable units is lower than required by the Land Use Ordinance. The City/State will therefore need to obtain exemptions from meeting parking requirements for the project pursuant to Section 201E-210, HRS.*

* The current count of residential units represents an 18 percent decrease from the previous proposal of 2,148 units.

* The office component has been eliminated.

* Young Street will remain open.

* Plans for the kindergarten through second grade public elementary school, including the school's playground, are more definitive.

* On-site recreational amenities have increased with the addition of the gymnasium, thereby allowing for on-site active recreational activities.

1.3 Characteristics of the Targeted Residential Market

The project will provide housing for individuals and families with a wide range of incomes. The 1,061 affordable units will be allocated as follows:

* **Individuals/families with low and moderate income.**
  One half, or 530 units, will be allocated for families with low and moderate incomes, which means their incomes are below 80 percent of the median income in the City and County of Honolulu. A family of four with an annual income of up to $39,700 would be able to rent an affordable unit at Pawa'a.

* **Individuals/families with gap group incomes.**
  The remaining half will be allocated for families with "gap group" incomes, which are between 81 and 120 percent of the median income for the City and County of Honolulu. This income range is so named because these families make too much money to qualify for government subsidy, yet their incomes are too low to qualify for typical market housing. To qualify for a "gap group" rental unit, a family of four may have an annual income ranging from $39,700 to $59,900.

Table 1 shows the income limits for individuals and families who will be able to rent one of Pawa'a's affordable units.

The market units will be for sale and will cater to buyers who can afford upscale residential units. Such units have typically ranged from $280,000 to $460,000. Historically, the largest segment of buyers of upscale condominium units have been O'ahu residents. In eleven upscale residential condominium projects, an average of 87 percent of the buyers were from O'ahu. Buyers originating from the mainland U.S.A bought 5.4 percent of the units, while Japanese buyers purchased 5.8 percent of the units. [6]

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[6] *John Child and Company, 1991.*

Table 1

Income Limits for Individuals and Families Who Will Be Able to Rent an Affordable Unit at Pawa'a (1)

Income Group	Percent of median	Household Size 1	2	3	4	5	6	7	8
Very low income	50%	$18,750	$21,450	$24,100	$26,800	$28,950	$31,100	$33,250	$35,400
Low income	80%	$27,800	$31,750	$35,750	$39,700	$42,900	$46,050	$49,250	$52,400
Median income (2)	100%	$34,930	$39,920	$44,910	$49,900	$53,890	$57,880	$61,880	$65,870
Gap group income (3)	120%	$41,900	$47,900	$53,900	$59,900	$64,700	$69,500	$74,300	$79,000

(1) As of May 5, 1993

(2) Median income is used as the standard by which all other incomes are measured because it is the "midway point" between the lowest and highest income.
(3) Gap group income ranges from 81 to 120 percent of the median income

Source: U.S. Department of Housing and Urban Development Income Limits, May 5, 1993.

2. Profile of the Existing Community

2.1 Study Area Definition

The project site is located in a mixed-use area which is medium to high density. The predominant use in this Pawa'a area is commercial. Service establishments are also located throughout this area but are less conspicuous than the restaurants and retail establishments. Residential uses are interspersed, and are almost all found in the form of high- and mid-rise apartment buildings.

Depicted in *Figure A*, the primary study area for this social impact assessment is bounded by the H-1 Freeway on the mauka side, and Kapi'olani Boulevard on the makai side. It extends east to west from McCully Street to Pensacola Street. This area includes three whole census tracts and a portion of two more tracts. We divided this area into four sub-areas as follows:

- **'Ewa-Mauka.**

  The project site is in *Census Tract 35*, which extends from the H-1 freeway to King Street, and from Punahou Avenue to Ward Avenue. For the purposes of this report, we selected only the portion which extends to Pensacola Street, which is represented by "Block Groups 1 and 2" of Census Tract 35.

- **'Ewa-Makai.**

  Makai of the project site are *Census Tracts 36.96, 36.97* and *36.98*. Collectively these tracts extend from King Street to Kapi'olani Boulevard, and from Kalakaua Avenue to Pensacola Street. Tract 36.96 contains no residential units or population, and is not included in the information tables.

- **Diamond Head-Mauka.**

  Census Tract 26 is located east or "Diamond Head" of the project site. It extends from the H-1 Freeway to King Street, and from Punahou Avenue to the Manoa-Palolo Drainage Canal. Because much of this census tract is far from the project site, we focus on the portion which extends to McCully Street; this is "Block Group 3."

- **Diamond Head-Makai.**

  East and makai of the project site is *Census Tract 25*, which extends from King Street to the Ala Wai Canal, and from Kalakaua Avenue to McCully Street.

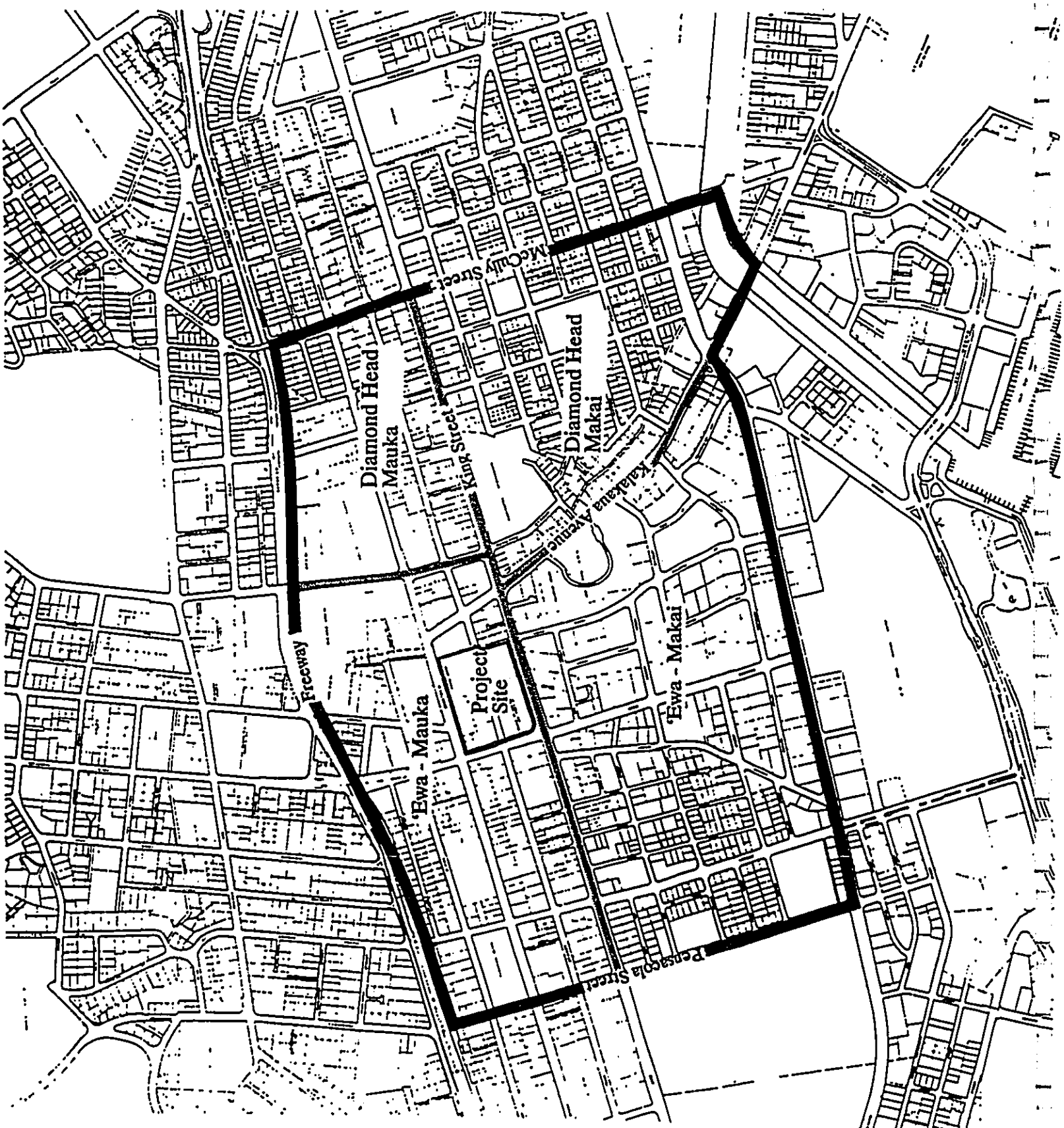
Diamond Head
Mauka
McCully Street
King Street
Diamond Head
Makai
Kalakaua Avenue
Freeway
Ewa - Mauka
Project Site
Ewa - Makai
Pensacola Street

Figure A

2.2 Population

In 1990, almost 18,000 people lived in the Study Area, as indicated in *Table 2*. The two subareas in which most of the residents lived were the *'Ewa-Makai* and *Diamond Head-Makai* subareas. Over 7,600 residents lived in the *'Ewa-Makai* area, and most of them lived in the area near Kaheka Street and Holiday Mart. This area has several high-rises, as well as elderly housing complexes. In the *Diamond Head-Makai* area, there were 4,229 residents in 1990. This area is part of the McCully area, and is made up of mostly mid-rise and single-family units.

When compared to the islandwide community, the Study Area contained proportionally more females than males, with almost 54 percent of the Study Area being female. The highest proportion of females in the Study Area was 56 percent in the *'Ewa-Makai* portion of the Study Area.

In terms of ethnicity, the Study Area has a high proportion of residents of Japanese ancestry when compared to the island of O'ahu. Islandwide, 23 percent are of Japanese ancestry. In the Study Area, over 38 percent were of Japanese ancestry. The highest proportion of ethnic Japanese was found in the *'Ewa-Makai* sub-area with almost 48 percent.

The Study Area is much older than the islandwide population. Only 4.2 percent of the population is under five years old, compared to 7.4 percent islandwide. Further, over one-fifth are elderly, whereas eleven percent of O'ahu's residents are 65 years old or older. Consistent with this age trend is the Study Area's median age which is higher than the islandwide median of 32.2 years. All of the census areas have median ages higher than that; the highest is found in *'Ewa-Mauka* subarea where the median age is 41.1 years.

Overall, Study Area residents share educational characteristics similar to that of the islandwide population, with the exception of high school completion. Almost 24 percent of the Study Area population did not receive a high school diploma, which is higher than the islandwide proportion of 19 percent.

There were major variations in educational characteristics within the different sub-areas. In a portion of the *'Ewa-Makai* sub-area, almost 68 percent of the population attended and/or completed college. In the *Diamond Head-Makai* sub-area, over 54 percent of the resident population attended and/or graduated from high school, but did not attend college.

2.3 Housing

In 1990, the Study Area contained 9,745 housing units. As indicated in *Table 3*, most of the units are found in the *'Ewa-Makai* (4,596 units) and *Diamond Head-Makai* (2,236 units) subareas.

Table 2
Demographic Characteristics of Study Area, 1990

	O'ahu	Total Study Area	'Ewa-Mauka (CT 35;BG 1)	'Ewa-Mauka (CT 35;BG 2)	'Ewa-Makai (CT 36.97)	'Ewa-Makai (CT 36.98)	Diamond Head Mauka (CT 26; BG 3)	Diamond Head Makai (CT 25)
Population	836,231	17,985	1,027	2,287	2,369	5,235	2,838	4,229
Sex								
Male	50.9%	46.2%	45.4%	48.7%	48.3%	44.4%	44.6%	47.1%
Female	49.1%	53.8%	54.6%	51.3%	51.7%	55.6%	55.4%	52.9%
Ethnicity								
Caucasian	31.6%	20.6%	22.4%	22.2%	12.9%	25.8%	18.0%	18.9%
Japanese	23.3%	38.5%	33.5%	33.0%	47.7%	31.5%	39.4%	45.8%
Filipino	14.4%	5.4%	4.0%	3.9%	5.7%	5.7%	7.3%	4.7%
Hawaiian	11.0%	5.7%	3.9%	6.1%	7.9%	4.9%	7.0%	4.7%
Other	19.7%	29.8%	36.2%	34.8%	25.7%	32.0%	28.2%	26.0%
Age								
Less than 5 years	7.4%	4.2%	4.0%	4.5%	3.9%	2.4%	8.6%	3.5%
5 to 17 years	17.1%	8.7%	10.6%	10.8%	9.7%	6.0%	9.9%	9.0%
18 to 34 years	30.6%	29.0%	23.4%	31.6%	29.8%	28.3%	29.6%	29.1%
35 to 64 years	33.9%	37.4%	42.2%	35.4%	39.3%	38.0%	34.1%	37.9%
65 or more years	11.0%	20.6%	19.9%	17.8%	17.3%	25.2%	17.8%	20.4%
Median age	32.2	N/A	41.1	36.7	38.8	43.7	36.1	40.2
Education (aged 25+)								
Less than high school	18.8%	23.6%	14.9%	25.3%	22.2%	26.9%	22.5%	21.8%
High school graduate	28.4%	27.5%	17.2%	24.7%	30.6%	26.8%	23.0%	33.5%
Some college	28.2%	27.3%	31.6%	33.3%	31.3%	25.7%	26.8%	23.2%
College 4 yrs. or more	24.6%	21.6%	36.3%	16.7%	15.9%	20.6%	27.7%	21.5%

Source: U.S. Bureau of the Census, 1991 and 1992

Table 3
Study Area Housing Vacancy and Unit Size, 1990

	O'ahu	Total Study Area	'Ewa-Mauka (CT 35; BG 1)	'Ewa-Mauka (CT 35; BG 2)	'Ewa-Makai (CT 36.97)	'Ewa-Makai (CT 36.98)	Diamond Head Mauka (CT 26; BG 3)	Diamond Head Makai (CT 25)
Total Housing Units	281,683	9,745	511	1,214	1,250	3,346	1,188	2,236
Total Vacant Units	5.8%	3.9%	6.1%	2.2%	4.4%	3.8%	4.0%	4.1%
Seasonal/recreational	1.6%	0.7%	1.2%	0.2%	0.2%	1.3%	0.3%	0.3%
For sale only	0.3%	0.2%	0.2%	0.2%	0.1%	0.4%	0.1%	0.2%
For rent	2.0%	1.7%	2.0%	0.7%	3.4%	1.5%	2.1%	1.6%
Other vacant	1.9%	1.3%	2.7%	1.1%	0.7%	0.7%	1.6%	2.1%
Rooms Per Unit								
One to three	36.5%	77.6%	56.8%	80.5%	78.3%	83.6%	72.2%	74.5%
Four to five	34.6%	19.6%	38.9%	16.7%	17.4%	15.7%	24.5%	21.2%
Six or more	28.9%	2.8%	4.3%	2.8%	4.3%	0.7%	3.3%	4.4%
Median number of rooms	4	2	N/A	N/A	2	2	3	2

U.S. Bureau of the Census, 1991, 1992

O'ahu-wide, there was a 5.8 percent vacancy rate. The only exception to the low vacancy rate was the *'Ewa-Mauka* subarea, in which the project site is located; the area near the project site had a vacancy rate of 6.1 percent.

The Study Area is a medium to high density residential area, and most of the units are small. On the average the median number of rooms per unit was two, whereas the islandwide median was four.

As indicated on *Table 4*, over three-fourths of the Study Area housing units were occupied by renters, as compared to 48 percent on O'ahu. The *'Ewa-Mauka* area had a significantly high proportion of renters at 87 percent.

Household sizes are smaller in the Study Area. On the average, there were 1.92 persons per occupied unit in the Study Area, compared to the O'ahu-wide average household size of 3.02 persons.

The median value of owner-occupied housing units on O'ahu was $283,600 in 1990. For the most part, the Study Area housing units had a higher median value than the O'ahu housing stock. In the Study Area, the median value ranged from a high of $450,000 in the *'Ewa-Makai* subarea to $237,500 in the *'Ewa-Mauka* subarea.

Rent was generally lower in the Study Area. In all of the census tracts in the Study Area, the median monthly cash rent was lower than the islandwide median of $615.

2.4 Household and Family Characteristics

As suggested by information presented in *Table 5*, the Study Area is less family-oriented than the O'ahu-wide population. On O'ahu, over three-fourths of the households were family households in 1990. In the Study Area, only 44 percent of the total households were family households. The lowest proportion was found in a portion of the *'Ewa-Makai* sub-area, in which only 34 percent were family households.

A further variation in the Study Area is the proportion of families with married couples. Approximately 69 percent of the family households in the Study Area comprise married couples, which is low compared to 81 percent islandwide. The major reason for this difference is that the Study Area contains a high proportion of households headed by a single female. Almost 24 percent of the Study Area's families are in this category, which is significantly high compared to the islandwide proportion of 13 percent.

This latter characteristic is an indicator of possible poverty and median income information reveals very low median income levels in the Study Area. Except for a portion of the *'Ewa-Mauka* sub-area, all of the sub-areas had median household and family incomes which were well below islandwide medians.

Table 4
Characteristics of Occupied Units, 1990

	O'ahu	Total Study Area	'Ewa-Mauka (CT 35; BG 1)	'Ewa-Mauka (CT 35; BG 2)	'Ewa-Makai (CT 36.97)	'Ewa-Makai (CT 36.98)	Diamond Head Mauka (CT 26; BG 3)	Diamond Head Makai (CT 25)
Total occupied units	265,304	9,366	480	1,187	1,195	3,220	1,140	2,144
Tenure								
Owner-occupied	52.0%	24.1%	41.3%	12.6%	18.5%	28.6%	26.8%	21.5%
Renter-occupied	48.0%	75.9%	58.8%	87.4%	81.5%	71.4%	73.2%	78.5%
Persons per room								
1.00 to 1.50 (1)	8.2%	5.2%	5.4%	5.9%	7.6%	2.9%	7.7%	5.6%
1.51 or more (2)	8.2%	12.7%	9.0%	12.8%	11.0%	15.7%	11.5%	10.4%
Persons per unit	3.02	N/A	2.13	1.92	1.96	1.63	2.10	1.97
Persons in Occupied Units	802,338	17,498	1,023	2,279	2,338	5,233	2,396	4,229
% of total population	95.9%	97.3%	99.6%	99.7%	98.7%	100.0%	84.4%	100.0%
Median value of owner-occupied units	$283,600	N/A	$237,500	$316,700	$306,300	$450,000	$311,500	$242,700
Median cash rent	$615	N/A	$606	$500	$482	$574	$527	$468

(1) Indicates "mildly crowded" conditions
(2) Indicates "very crowded" conditions
(3) Median values are for non-condominium housing units.

U.S. Bureau of the Census, 1991, 1992.

Table 5
Study Area Household Characteristics, 1990

	O'ahu	Total Study Area	'Ewa-Mauka (CT 35;BG 1)	'Ewa-Mauka (CT 35;BG 2)	'Ewa-Makai (CT 36.97)	'Ewa-Makai (CT 36.98)	Diamond Head Mauka (CT 26; BG 3)	Diamond Head Makai (CT 25)
Total households	265,625	9,330	457	1,215	1,239	3,229	1,068	2,122
Family households	75.1%	43.6%	63.2%	38.7%	46.0%	34.1%	56.9%	48.5%
Non-family households	24.9%	56.4%	36.8%	61.3%	54.0%	65.9%	43.1%	51.5%
Median income of total households	$40,581	N/A	$41,477	$21,997	$27,917	$20,544	$26,553	$22,618
Family households	199,597	4,069	289	470	570	1,102	608	1,030
Married-couple families	81.5%	69.4%	73.7%	55.3%	73.7%	73.8%	64.1%	70.6%
Male householder	5.4%	6.8%	9.7%	7.7%	8.6%	6.0%	6.3%	5.6%
Female householder	13.1%	23.9%	16.6%	37.0%	17.7%	20.2%	29.6%	23.8%
With children under 18	7.6%	18.4%	15.9%	27.4%	21.8%	19.2%	25.7%	7.9%
Female head	5.8%	13.8%	6.2%	19.8%	13.2%	14.8%	21.4%	7.9%
Family size	3.5	N/A	2.8	2.85	2.76	2.52	2.8	2.76
Median family income	$45,313	N/A	$47,431	$27,333	$31,061	$28,391	$34,265	$31,296

Sources, U.S. Bureau of the Census; Summary Tape Files 1A, 1991 and 3A, 1992.

2.5 Labor Force

Very few Study Area residents were in the military in 1990, as indicated in *Table 6*. Less than one percent were employed by the military, as compared to 8.2 percent islandwide.

The Study Area enjoyed a very low unemployment rate in 1990. Almost all of the sub-areas had unemployment rates well below the O'ahu-wide rate of 3.5 percent, with the lowest rate found in a portion of the *'Ewa-Mauka* sub-area at 0.9 percent. Only one area – the other portion of the *'Ewa-Mauka* sub-area – had an unemployment rate which was slightly higher than the islandwide rate.

The occupation profile was similar for the overall Study Area when compared to the islandwide profile. The sub-areas varied from each other, however. A portion of the *'Ewa-Mauka* and the *Diamond Head-Mauka* sub-areas had higher proportions of people employed in executive/professional and technical/sales jobs, when compared to the islandwide proportions. On the other hand, high proportions of people with service occupations were found in the other portion of the *'Ewa-Mauka* sub-area, as well as in a portion of the *'Ewa-Makai* sub-area and the *Diamond Head-Makai* sub-area.

Table 6
Study Area Labor Force Characteristics, 1990

	O'ahu	Total Study Area	'Ewa-Mauka (CT 35; BG 1)	'Ewa-Mauka (CT 35; BG 2)	'Ewa-Makai (CT 36.97)	'Ewa-Makai (CT 36.98)	Diamond Head Mauka (CT 26; BG 3)	Diamond Head Makai (CT 25)
Persons 16 and over	651,920	15,992	873	2,012	2,190	4,822	2,315	3,780
Civilian employed	60.7%	61.1%	60.6%	66.3%	70.8%	55.9%	59.3%	60.7%
Armed Forces	8.2%	0.6%	0.0%	0.4%	0.5%	0.8%	1.0%	0.2%
Not in labor force	28.9%	37.0%	38.8%	30.7%	27.8%	42.0%	39.1%	37.5%
Unemployed civilians	3.5%	N/A	0.9%	3.8%	1.2%	2.2%	1.0%	2.5%
Civilian employed	395,811	9,778	529	1,334	1,551	2,697	1,372	2,295
Occupations								
Executive, professional	27.7%	23.7%	31.2%	19.1%	19.1%	24.9%	25.7%	25.4%
Technical, sales	34.6%	37.8%	49.3%	37.4%	34.2%	37.2%	41.5%	36.4%
Service	16.8%	19.6%	12.3%	22.2%	15.8%	21.3%	14.9%	23.0%
Farming, fishing	1.5%	1.0%	0.0%	3.2%	1.2%	0.6%	0.9%	0.3%
Precision, craft	9.9%	9.4%	3.0%	9.6%	16.4%	8.3%	8.2%	8.1%
Operators, laborers	9.5%	8.5%	4.2%	8.5%	13.4%	7.7%	8.8%	6.8%
Mean travel time to work in minutes	24.8	N/A	16.6	18.7	18	17.2	19.9	18.3

Source, U.S. Bureau of the census, 1992; Summary Tape File 3A.

3. Major Forces for Change in the Study Area

This section explores what might happen to the Study Area without the proposed Pawa'a Redevelopment. Section 3.1 presents public policies which guide the development of the project site and the Study Area. Section 3.2 outlines current development trends in the Study Area and Section 3.3 discusses a likely scenario without the Pawa'a Redevelopment.

3.1 Public Policy

The Pawa'a Redevelopment project site is in the Primary Urban Center (PUC) Development Plan area. The PUC encompasses the portion of O'ahu from Wai'alae-Kahala to Pearl City, and is the most densely populated part of O'ahu. The **General Plan Objectives and Policies** for the City and County of Honolulu indicate the PUC should accommodate between 45.1 and 49.8 percent of O'ahu's population by the year 2010. Based on the State Department of Business and Economic Development projection for that year, the PUC population would range from 450,000 to 497,800 persons.

The project site is in the *Alapa'i-Sheridan Special Area*, as identified by the Special Provisions for the PUC in the Development Plan. The *Alapa'i-Sheridan Special Area* is bounded by Alapa'i Street on the 'ewa side and Punahou Street and the Makiki Drainage Ditch on the Diamond Head side. It runs mauka - makai from the H-1 Freeway to Kapi'olani Boulevard, and Pi'ikoi and King Streets. The PUC Development Plan calls for medium-density and high-density apartments in this area, in combination with commercial and mixed use developments. Development Plan directions for the vicinity of the project site are as follows:

- High-Density Apartment with 350-foot height limit between the project site and Rycroft and Kanunu Street;
- Height limit of 250 feet for the makai portions of the Study Area; and
- a 150-foot height limit for most of the area around the project site.

The Study Area is also near the *McCully-Mo'ili'ili Special Area*. Growth in this special area is limited to the development of medium-density apartments and, along major transit corridors, those commercial and mixed uses which support the apartment uses. There is a general height limit of 150 feet near the project site.

3.2 Current Development Activity In and Around the Study Area

Adjacent to the project site is the development of the **One Kalakaua** condominium project located on Kalakaua Avenue between Beretania and Young Streets. Construction is projected to begin in early 1994. The developer proposes a 15-story

senior retirement condominium which will include a 42-bed nursing wing and retail space. The living units will be sold in fee and are priced between $257,000 and $581,000. [7]

Within the Study Area, construction of **The Courtyards at Punahou** is in its final phase on the Bingham Tract School site. Thirty-four one- and two-bedroom residential units are being developed and construction is anticipated to be completed in September 1993.[8]

The largest Study Area project being planned is the **Keeaumoku Superblock**, located one-half mile southwest of the Pawa'a Redevelopment site. The Keeaumoku Superblock encompasses approximately 10.5 acres and is bounded by Keeaumoku, Rycroft, Sheridan and Makaloa Streets. Developer Keeaumoku Partners proposes to develop 400,000 square feet of retail space, 4,000 parking spaces, 460,000 square feet of office space and more than 200 residential units. The site is currently undergoing soil remediation. Construction is expected to begin in late 1994 and will occur over a three-year period. [9]

In the makai-'ewa corner of the Study Area, Asahi Jyuken proposes to develop **1230 Kapiolani**, a mixed-use high-rise complex. The project will be bounded by Pi'ikoi and Pensacola Streets, and by Kapi'olani Boulevard and Kamaile Street. The complex will offer a combination of residential units and commercial space. No date has been set for construction. [10]

Development activity along the Kapi'olani Boulevard corridor, just outside the study area, includes the recently completed **1601 Kapiolani Boulevard**, which is currently being leased. The **Honolulu Convention Center** at the old Aloha Motors site has received some City approvals, but the form and financial structure of the development continues to be discussed by the City and State.

Immediately 'Ewa of the Study Area, the Hawaii Community Development Authority is currently proposing to develop the twin tower **Hale Kewalo** at the former site of Kapiolani Community College on Pensacola Street. The project will provide 538 affordable apartments, half of which will be used as faculty housing for the University of Hawai'i.

Based on land transaction activity last year, there are indications of development interest near the project site. It is stressed that no specific plans have been publicized at the time of this writing, and that these activities are presented only to *indicate possible development interest.*

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7 *Personal communication with Russell Allen, partner's representative of One Kalakaua, June 8, 1993.*
8 *Personal communication with Suzanne Doty, realtor, HASEKO Realty, June 15, 1993.*
9 *Star Bulletin Staff, 1991 and personal communication with Miles Nishijima, Commercial Properties Manager at HASEKO, June 17, 1993.*
10 *Personal communication with Spencer Chang, Project Manager, Asahi Jyuken, June 9, 1993.*

1. Mauka of the project site, Pfleuger Acura recently entered into a year-to-year revocable agreement with lessee Foodland; this indicates a possible interest in developing the site.

2. Parcels in the vicinity of Cinerama Theater were recently purchased. Plans for the parcel are unknown.

3. A parcel located 'Ewa of Ke'eaumoku Street and near Beretania Street was purchased by a financial institution. Plans for the parcel are unknown.

3.3 Possible Future Scenario Without the Pawa'a Redevelopment

The Study Area is and will continue to undergo changes regardless of whether the project site is redeveloped. The following are possible changes which may occur:

1. **Slow pace of development along Kapi'olani Boulevard and in Kaka'ako.**

   Five years ago, Kapi'olani Boulevard was termed the "Wilshire Boulevard of Honolulu."[11] Today, some of the projects have been built, others are behind schedule and the "fevered pitch" of investor interest has cooled. If, however, proposed projects, such as the Honolulu Convention Center and the Asahi Jyuken project, proceed, they will stimulate further development interest in the Study Area. The redevelopment of Kaka'ako may also increase development interest in the Study Area. The Hawaii Community Development Authority is offering incentives to interested developers to ensure that development continues throughout the Kaka'ako Community Development District.

2. **Even slower pace of development in the interior portions of the Study Area.**

   The only major project being proposed in the interior portion of the Study Area is the Keeaumoku Superblock. As discussed earlier, there are land transactions occurring in the interior portion and near the project site, but there are no other plans which have been proposed. It is possible that, as the Keeaumoku Superblock becomes more of a reality, other developers will come forward with new proposals for the interior areas.

3. **Gradual change in community character.**

   Although the isolated pockets of development would be somewhat consistent with the current land use pattern of the area, the overall character of the area would likely evolve. As individual parcels are developed, setbacks and open space requirements would change the

[11] *Berglund, 1988.*

storefront quality of some areas. Land use density will likely increase as developers and landowners seek to increase the value of their property; more tall buildings will hence be found in the Study Area. Further, community members and public officials are trying to limit hostess bars in the area; if they are successful, the character of Ke'eaumoku would change.

4. **Change in community makeup.**

   The residential projects proposed for the area are mostly luxury and upscale condominiums. These will bring in people who are more affluent. Since most of the buyers of such units are O'ahu residents, the ethnic composition may change to be similar to the islandwide composition. Further, the overall region may "become younger" with the introduction of more residents.

4. Potential Social Impacts of the Pawa'a Redevelopment

4.1 Residential Population

The Pawa'a Redevelopment project would add 1,768 residential units to the Study Area. As indicated in *Table 7*, the project would increase the Study Area population by a range of 3,395 to 5,339 persons.[12]

In terms of the overall Primary Urban Center Development Plan area, the project would not cause a significant increase in population; the Pawa'a Redevelopment project would account for about one percent of the total 2010 population in the Primary Urban Center.

As indicated in Section 2, almost 18,000 people lived between the H-1 Freeway and Kapi'olani Boulevard from Pensacola to McCully Streets. If the project site is developed as proposed, the Study Area population would increase by 19 to 30 percent.

The project revision has lessened the population impact due to Pawa'a Redevelopment by almost 1,000 persons. This decrease is generally a positive one because there would be less demand for certain public services and facilities.

4.2 Character of the Neighborhood

The character of the neighborhood is an important social resource for people who live, work and own land in this area. The predominant uses, the impressions left on pedestrians and motorists, the physical characteristics and social networks -- all these contribute to the area's character.

This section describes the neighborhood in the vicinity and includes the Pawa'a Redevelopment project site. Section 4.2.1 describes the existing community, and Section 4.2.2 describes how the project will alter the character of the neighborhood.

12 *The low end of the population range is based on the Study Area's 1990 average household size of 1.92 persons. The high end is based on the 1990 Islandwide average household size of 3.02 persons.*

Table 7

Residential Population Impact of the Pawa'a Redevelopment

Estimated population range of the Pawa'a Redevelopment (1)	3,395	to	5,339
Estimated 2010 Population for PUC DP area (2)	469,600		
Project's share of 2010 PUC population	0.7%	to	1.1%
Estimated 1990 Study Area population (3)	17,985		
Estimated population with Pawa'a redevelopment	21,380	to	23,324
% increase in population due to project	18.9%	to	29.7%

(1) The low end of the population is based on the Study Area's 1990 average household size of 1.92 persons. The high end is based on the 1990 Islandwide average household size of 3.02 persons.

(2) Based on Table II-1 of "Development Plan Status Review" for Fiscal Year 1991, as prepared by the City Department of General Planning.

(3) Based on U.S. Department of Commerce, Bureau of the Census, 1991.

4.2.1 Existing Characteristics

The area surrounding the project site includes corresponding portions of South King Street, Kalakaua Avenue, South Beretania Street and Ke'eaumooku Street. It is an area of transition. Centered between the highrise hubs of downtown Honolulu and tourist-active Waikiki, Pawa'a is dominated by two-story buildings which vary in style from the elaborate King Kalakaua Building to the more modest wooden and concrete facades. Signs announce Ethel's Deli, Chocolate Lady, Pat's Beauty Salon, and Honolulu Hat Company. Here and there, windows on second floor walkups identify Hope Chapel, Art studio, Kumon Math. The impression here is one of small businesses, often family-run.

Overall, there is a faded quality among the older buildings located along Kalakaua Avenue and South King Street. These structures are reminiscent of a generation passing, a time of barber's chairs, of owners viewed behind store-front windows, and plate lunches wrapped with paper and held together by rubber bands. Among many of these businesses, the sense of community is not characterized by long-held knowledge of one another, but by the commonality of labor and product, of providing for one's self, for one's business.

South Beretania Street, in contrast, contains the larger, newer buildings of The Church of Jesus Christ of Latter-Day Saints, Pfleuger Acura and Foodland, while medium and small businesses occupy buildings set back from parking lots fronting Ke'eaumoku Street.

Specific uses are as follows:

- **Along Kaheka Lane and Kalakaua Avenue.**

  Mauka of Young Street is the Midtown Center. People visit this building to buy sandwiches, yogurt, and Japanese and Korean cuisine. There is a bookstore here, as well as a video store. One can also buy clothes and jewelry in this small shopping plaza.

  There are numerous buildings makai of Young Street and Diamond Head of Kalakaua Avenue. Fronting Young Street on the makai side is the Imotosue Building. Within this building is a piano studio. Architects, travel agents, investment counselors, and realtors have their offices in this building. Next to the Imotosue Building and across from the former police headquarters is two-story building which contains pawn shops and a clothing store at ground level and five residences on the second floor. Adjacent to that building is another of similar character; this one contains a barbers shop, restaurant, a bondsman office and a residence.

  At the corner of Kalakaua and King is a lot formerly used as a service station, behind of which is a local-style restaurant. Shiseido Cosmetics is located in an adjacent building. Also, fronting King Street is a store specializing in music and pianos, shops offering jewelry, clothing, and dressmaking services, and offices for a construction contractor.

On the 'ewa side of Kalakaua Avenue, there is a wide variety of service and retail establishments. A health food store has Korean restaurants, a pizza parlor and bars a few doors away. Businesses sell trains, chocolate, and flowers, and professionals offer services related to social services, accounting and design. A familiar 7-Eleven is also located here, side-by-side with a gas station.

- **Along South King Street.**

  The businesses makai of South King Street attract high levels of traffic. At ground level, one can purchase jewelry, cosmetics, cracked seed, hats, bridal gowns, gifts and hearing aids. You have your choice of restaurants offering Japanese, Korean and deli food. Along this strip, people can fill their cars with gas, do their banking, have their hair done, and make travel arrangements. Professional offices are found above ground levels, and one can find dentists, interior decorators, architects, contractors, realtors, and insurance agents.

- **Along Ke'eaumoku Street.**

  This area is dominated by two-and three-story buildings fronted by parking lots. In these buildings, there are restaurants, offices, a driving school and furniture stores. You can buy computer software in this area, as well as car stereos.

- **Along South Beretania Street.**

  Mauka of the project site there is less diversity in uses and buildings tend to look newer. There is the highrise Banyan Court Plaza. The Church of Jesus Christ of Latter-Day Saints is a prominent feature at the intersection of Kalakaua and Beretania. Foodland is a popular spot; it is adjacent to an automobile dealership. There are also two service stations along this street.

There are four residential complexes in the immediately surrounding area:

- **The Banyan Tree Plaza**, located at the corner of Punahou Avenue and Beretania Street contains 240 units, which range from studios to four-bedroom apartments. The average selling prices range from $225,000 for the studios to around $800,000 for the four-bedroom units.
- **KHB Apartments** is located at the corner of Young Street and Punahou Avenue. This building has 32 apartments ranging in rent from $500 for studios to $850 for two-bedroom units.
- **The Punahou Regency** contains 30 two-bedroom, two-bath units. The average price of these is $450,000.

- Two public housing projects operated by Hawaii Housing Authority are located on the makai side of the project site, along Kalakaua Avenue. The Makua Alii and Paoakalani structures contain a total of 432 units for elderly people. Kalakaua Homes is a family project with 221 units.

A characteristic which distinguishes the project site from most of the surrounding area is government ownership and former use of a major portion of the site. The former police station is probably the most prominent feature of the site. Most O'ahu's motorists have likely visited the site to obtain their drivers' license and register their cars. The State Department of Agriculture office building is not as well frequented by the general public, but its neighboring landscaped open space attracts the attention of passersby. Section 4.4 provides more detail about on-site uses.

4.2.2 Potential Project Impact on the Character of the Neighborhood

The City and State propose to transform an area characterized by government structures and uses, low-rise office buildings and light industrial uses into a planned community. In a planned community, buildings are deliberately placed, pathways link the different project components and open space areas are well manicured. What may now seem like a hodgepodge of land uses will become a superblock centering around a development concept which will be reflected in the architecture and design. Essentially, the planned community will bring physical orderliness to this neighborhood.

Depending on one's personal perspectives and taste, this transformation can be a social asset or a diminishing influence on this neighborhood. This section looks at the different possibilities of how people may view the project's effect on the character of the neighborhood.

Effective Revitalization

The redevelopment of Pawa'a may be welcomed by people who believe that this would be an effective way to "clean up the area." These people may feel that a superblock may be more attractive and more pleasing to the eye. They may like ground level open space, and therefore would not mind the taller buildings.

They may see the opportunity for new experiences and new facilities on the site. Further, they may want the project to be developed so that some of the undesirable elements, such as hostess bars, will be eventually be forced out of the area. They may also see this project as good business for the neighboring establishments which depends on walk-in business. Restaurants and retail establishments, for example, could benefit from the increase in residents.

Generally, people who will tend to appreciate the planned community aspect of the project will be those who are inclined to seek out orderly environments in urban settings. Progress is important to them, and they are willing to undergo change if the end product is more desirable than the present situation.

Hasten the Pace of Development

As discussed in Section 3, the development project nearest the project site which is currently underway is One Kalakaua. The largest project in the Study Area is the Keeaumoku Superblock, which is approximately one-half mile from the project site.

Land transactions are also occurring both near the project site and around the Keeaumoku Superblock area, and in the long range time frame, the surrounding community will likely change in character without the project.

The Pawa'a Redevelopment may serve to hasten the pace of development in this area. As the project proceeds through the land use approval and financing stages, nearby landowners and interested investors will likely position themselves to take advantage of increased property values and to capitalize on the economic potential.

The nearby storefront image will eventually evolve into a more modern urban setting, as developers and landowners seek to maximize the return on their investment. The one- and two-story walkups and mom-and-pop stores could be replaced by office towers and commercial franchises. The area already presents a mixture of uses, but the present arrangement seems to have occurred arbitrarily; the new mixed-use areas will seem much more formal and will have less opportunity for spontaneity.

Change in the Character of the Neighborhood

Some people have grown accustomed to the diversity of the adjacent and surrounding neighborhood. They like the storefronts and ethnic flavor. They may be accustomed to or unaware of the residences above the stores, or the apartment buildings hidden behind commercial establishments. Some people who like this place may have grown up in the area; some may be long-time customers of adjacent businesses; some may just plain prefer the low-rise informality of the present setting. To them, the area may be reminiscent of past times, when life was less hurried and mom-and-pop stores were a common sight.

Those interviewed for the 1992 SIA, including both on-site and off-site residents and business people, expressed a similar appreciation for the area's character. They spoke of neighborliness, of familiarity, of "old Honolulu."

The proposed project will affect the existing character of the neighborhood by introducing a planned development in the midst of this diverse neighborhood. This development will alter the way the area looks, and to some extent the vehicular patterns and pedestrian orientations. It will bring a contemporary focus. Further, the proposed project will increase the types of activity and intensify usage of the area.

It is stressed, however, that the project's neighborhood impacts are considerably less under the current plan than in the original proposal. The City has initiated major revisions which help mitigate impacts to the character of the area, as follows:

* In re-siting the project site, the City has bypassed numerous small businesses which contribute to the ambience of the area. These retail and service establishments will remain and continue their functions

* Project design calls for the establishment of storefront commercial establishments along South King Street. While these will obviously be different from the existing businesses, they will be designed to be harmonious with the character of the existing neighborhood.

4.3 Impacts of Specific Project Components

4.3.1 Residential

The primary social benefit of the Pawa'a Redevelopment is the provision of affordable housing units. The project will offer two types of housing – affordable rentals and market-rate condominium units.

The market study for this project indicates the current demand for affordable housing is estimated at 30,000 units. In the next five years, less than 10,000 housing units will be added to the housing stock even if all of the proposed housing projects were built. Evidence of the supply and demand imbalance is found in the number of applicants for affordable housing units for sale. Typically, there are ten times more applicants than available units. [13]

The proposed project will benefit islandwide residents by increasing the supply of affordable rentals. These rentals will be a solution for families who simply cannot afford to buy a home or have been unable to purchase an affordable unit or because of the inadequate supply of units. Further, the affordable rentals will provide housing for people who choose to live within urban Honolulu, in proximity to major transportation corridors and employment generators.

4.3.2 Parking

Parking is a major problem in this community, as found in the 1992 SIA interviews and in our analysis of Neighborhood Board minutes. The proposed project will address this problem by providing a parking structure containing 2,897 spaces. If the parking rates are comparable to current rates, the project should help alleviate the existing parking problem. Thus, existing businesses in the surrounding community may benefit from on-site parking.

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13 *Child, 1991.*

The project meets parking requirements, with the exception of the spaces for the affordable housing units, which will be allotted less spaces than that normally required by the City. According to City housing officials, this allocation was made because, in the City's Chinatown housing projects, residents have been using only 70 percent of the parking spaces allocated to them. It is noted, however, that the demographic makeup of the Chinatown facilities may differ from that of Pawa'a. In Pawa'a, 30 percent of the residential units will be allocated for families with low and moderate incomes, and another 30 percent will be for those with gap group incomes. In the Chinatown projects have a higher proportion of people with low-moderate incomes. The Pawa'a affordable units will target a higher proportion of gap group families who may be able to afford automobiles.

4.3.3 Retail and Commercial Space

The commercial component is proposed to absorb certain retail and commercial operations currently serving the district and to incorporate uses that support the anticipated increase in the population base resulting from the project. [14]

The potential social impacts of the commercial component of the project are as follows:

* Business may increase for existing commercial and retail establishments in the surrounding areas. The project will increase the population density and therefore expose these businesses to more potential clientele.

* The small business environment which prevails in the neighborhood will be diversified with the introduction of a new shopping area. The adjacent "mom-and-pop" atmosphere will remain, however.

* The scope of this study did not include a property value impact assessment. It is noted, however, that the purpose of the project is to revitalize the area. In doing so, the Pawa'a Redevelopment will likely increase the property values, or at least increase development pressures, on surrounding parcels of land. Eventually, business rents may increase, and displacement of some businesses may occur.

4.3.4 Open Space, Recreational Facilities and Educational Facilities

The open space component of the proposed project will provide an attractive, visual relief from the structural environment. The open space areas may also be used for passive recreational activities. The existing landscaped grounds of the Department of Agriculture parcel and the planned landscaped area will further serve as outdoor alternatives for people to relax and get together. Present plans call for the existing Department of Agriculture building to be used for a community center.

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14 *Wilson Okamoto and Associates, 1992.*

The recreational component of the proposed project comprises two parts. First, there is a recreational center, which centers around a three-story multi-purpose gymnasium. Second, a recreation deck will be provided to serve the affordable housing component. These facilities will benefit the on-site community by providing convenient amenities within the complex.

The new gymnasium will be a significant addition to the recreational facilities in the area. As discussed in Section 4.6.4, the Study Area has limited facilities and the proposed project will benefit the regional community. The project does not include outdoor active recreational facilities, such as ball fields and ball courts; this will therefore increase competition for such facilities in the Study Area.

The proposed kindergarten through second grade public elementary school will serve both on- and off-site residents, and will be an additional resource for the community.

4.4 Displacement

The previous section discusses project impacts on the community in which the project site is located. This section focuses on those who will be displaced by the Pawa'a Redevelopment effort -- those who are currently living or working on the project site, or who own land on the site.

4.4.1 Affected People and Uses

The former police station is probably the most prominent feature of the site, and most O'ahu motorists have visited the site to obtain their drivers' license and register their cars. The State Department of Agriculture office building is not as well frequented by the general public, but its landscaped area attracts the attention of passersby.

From Kaheka Lane to Ke'eaumoku Street, specific uses are as follows:

* **Makai of Young Street.**

  At the corner of Kaheka Lane and South King Street is a two-story building with a Thai restaurant, clothing stores, an acupuncture establishment, an electric shaver shop, and offices for an advertising agency and realtors. Just 'ewa of this building is the Vehicle Maintenance Division of the Honolulu Police Department; this is the only HPD use remaining on-site.

  The Department of Agriculture complex is situated between the HPD operations and the open space along Ke'eaumoku Street.

* **Mauka of Young Street.**

The "old Sears Building" which housed the HPD headquarters is almost totally vacated. The on-site Department of Health activities is scheduled for relocation this summer.

Immediately 'Ewa of the former police station and fronting Young Street on the mauka side is a single-story building housing a labor union office and photography establishment. Also fronting Young Street is a building containing a financial lending institution, a restaurant and a photography laboratory.

Along Ke'eaumoku Street and between Young and Beretania Streets is the Meadow Gold Building. Next to the Meadow Gold Building on Beretania Street is a vacant building, behind of which is an old apartment building containing eleven units.

Another apartment complex is located behind a nautical-oriented store which fronts Beretania Street. There are eight residences in this building.

Immediately behind the former police station on Beretania Street is a savings and loan institution.

In all, there are 35 businesses which will need to leave the area, 33 of which are scheduled for Phase 1. Nineteen residential units will be removed; an estimated 37 residents will be displaced.[15] All of the residences are scheduled for Phase 2 displacement. In addition, the State Department of Agriculture is scheduled to be displaced as part of Phase 1.

4.4.2 Potential Social Impact

Project revisions have significantly reduced the magnitude of displacement impacts. Most of the previously-affected businesses are now excluded from the project site, and will be able to continue operations. Further, six residential units are no longer part of the project site and will not be subject to demolition due to this project.

Potential social impacts on remaining displacees are as follows:

* **Moving and change of neighborhood.**

  Residents will need to plan, move, and adjust to a new neighborhood. This will cause stress and anxiety for most, particularly if they have lived in this area for many years. Moving requires time and energy, and for many, there is an unknown factor of where they will live. Even though they will receive assistance from the government, they will likely be concerned about the availability of another place to live.

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[15] *Based on a household size of 1.92 persons; this was the average household size in the Study Area in 1990.*

- **Disruption of government agencies and businesses.**

  On-site business tenants will be disrupted. In addition to experiencing economic impacts,[16] business owners and operators will need to undergo a number of activities to relocate. First and foremost, they will need to find a new place. Ideally, the new location will be comparable in rent. A major part in this process will be their clientele's preferences and convenience. Additional financing may be required by some. At least one business has special relocation needs.

  Government agencies will be inconvenienced. In addition to undergoing all of the activities of private businesses, the State Department of Agriculture will need to find ways to provide continuous service to the public.

- **Landowners and condemnation.**

  Landowners will have the option of friendly condemnation or having the court decide on a price. For some landowners, this may not be a problem in the sense that they may view this simply as another business transaction. For others, however, condemnation may mean having lands removed from the family ownership, or not being able to realize business ventures which have been planned for some time.

- **Possibility of no relocation.**

  For the residents, the City and State are obligated to find them a place to live. For the businesses, however, displacement does not necessarily mean relocation. Some business owners may find that they cannot afford another site in the same location. Others may have been paying low rent for years, and may be unable to afford current rates. Still others may choose not to relocate; they may wish to retire instead or may simply not want to do business elsewhere.

4.4.3 Relocation Benefits

The Uniform Relocation Assistance and Real Property Acquisition Policies Act entitles all displaced persons to relocation services and payments. Further, the Housing and Community Development Act of 1974, which governs all CDBG-funded relocations, requires that all low-moderate income dwelling units demolished or converted to other uses must be replaced on a one-for-one basis within three years, and must remain as low-moderate units for ten years.

Tenants and businesses who receive relocation benefits must be of record. Displaced residential tenants who lived in the unit at least 90 days before negotiation are entitled to have the City pay for moving expenses either through reimbursement or according to a

16 *Economic impacts were not included in this scope of work.*

graduated scale of payments based on the number of rooms. Such tenants can also receive down payment assistance payments or rental assistance. If a displaced tenant lived in the unit less than 90 days, he or she is entitled to moving expenses only.

Displaced businesses have two options. One option is to have the City reimburse all actually incurred and reasonable moving expenses. The other option is to be paid an amount equal to the average annual net earnings, before taxes for the last two tax years, not to exceed $20,000.

Both residents and businesses are entitled to relocation services. These include determining the relocation needs of each displacee and providing assistance such as market or rental information and referrals to replacement housing or business sites.

4.5 Considerations for On-site Social Interactions

The Pawa'a Redevelopment will target people with low, moderate and gap group incomes, as well as people who can afford market-rate condominium units. This target group is very wide and, overall, the project will create a community which will have many opportunities for social and economic integration.

It is our understanding that there will be full integration in the affordable rentals. The affordable rental buildings will contain people of various backgrounds and of different income levels; there will be no distinction based on income. For example, a family of four with an income of $50,000 may very well live next to a young couple making $30,000; their next door neighbor may be a single elderly woman on a fixed income. This means that residents within the rental units will have the opportunity to interact with people of similar backgrounds, as well as with those who may have different social interests.

Income-wise, the market unit towers will tend to be less heterogeneous. Generally these people will be in the upper income ranges. There is no evidence to indicate that there will be specific social distinctions within these high-rise structures.

Thus, within each set of towers, there does not appear to be any inherent potential for social problems. Residents will likely have a sense of community within their own buildings, and there is likely to be vertical social integration.

In the overall community -- or on a "horizontal" orientation, there is a potential for social conflict due to economic differences between the renters and the market tower residents. The market tower residents will have a number of items which will be exclusively for them. They may have more recreational amenities than the renters, and there will be less people competing for those amenities. The market unit residents will have better views, and they will be adjacent to the existing landscaped grounds. They will have more parking spaces, and will have a secured area for parking.

People may feel that these amenities are justified since the market residents are paying for these privileges. Others may resent the distinctions, however. They may not want to be excluded from the facilities, or they may envy the open space backyard of the market units. Such feelings are heightened if one is undergoing personal crisis, economic or otherwise.

Diversity in the overall housing mix is the key to working towards social integration. Currently, there are no for-sale units targeting the affordable range. Thus, there will be two categories of residents at Pawa'a -- the renters and the market unit residents. It is highly recommended that the City and State explore options to sell some of the affordable units. Owner-occupied affordable units will help bring residential stability to the affordable units, and will diversify the overall on-site housing mix.

4.6 Public Facilities and Services

4.6.1 Police Protection

The Pawa'a Redevelopment site is in District 1 of the Honolulu Police Department. District 1 extends from Kalihi to Punahou Street and comprises 21 beats. The project site is in Beat 53 of District 1.

In District 1, there are normally three patrol officers per beat, or one per eight-hour watch. Depending on the density and requirements, some beats have additional officers. For example, foot patrol is assigned to downtown Honolulu. [17]

The proposed project will increase the need for police protection services in the area because it will add a large amount of people and increase the density of people and activities. The City and State can partially mitigate this situation, as follows:

* Ease traffic during and after construction by measures, such as siting of driveways and avoid blocking intersections.
* There should be appropriate signage to ensure construction and public safety during construction.
* The project should have on-site security personnel to monitor the different areas.
* The project should be designed to minimize crime by featuring effective security devices and by avoiding secluded dark areas.[18]

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17 *Personal communication with Officer Fonolmoana of the Command Office of District 1, Honolulu Police Department.*
18 *Mitigation measures partly developed from information provided by Eugene Sathre, Research and Development, Honolulu Police Department.*

4.6.2 Fire Protection

First calls for the project site are responded to by the Pawa'a Fire Station located on Makaloa Street. Auxiliary response would be provided by the Makiki, McCully and Kaka'ako Fire Stations.

The Pawa'a Redevelopment will impact fire protection services because it will add a large amount of people, increase the density of people and activities and include extensive structural development. Impacts can be mitigated by meeting all fire code requirements.[19]

4.6.3 Educational and Park Facilities

Educational Facilities

The Pawa'a Redevelopment will impact the public education facilities by increasing the student population of nearby schools. The project is estimated to house 216 elementary school aged children who would attend grades kindergarten through six. Approximately 74 seventh and eighth graders and 115 high school aged students are estimated to live in the Pawa'a complex.

Primary and secondary schools affected by the project include Kaahumanu Elementary, Washington Intermediate and McKinley High Schools. These schools are currently operating at capacity and the highest impact will be at the elementary school level. The inclusion of a kindergarten through second grade school at Pawa'a will help alleviate the impact of the project. [20]

Previously, the Department of Education (DOE) recommended that the City and State construct classrooms to accommodate the projected secondary school enrollment.[21] The DOE will actively participate in the planning and design phases of the on-site school facilities and necessary modifications will be incorporated to the extent possible. Further, the City and State will coordinate with DOE to ensure that the needs of students generated by the proposed development will be met.

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19 *Personal communication with Captain Augie Range, Headquarters of the Honolulu Fire Department.*
20 *Personal communication with Tom Saka, Information Specialist with the State Department of Education, June 15, 1993.*
21 *Extracted from letter dated 15 November 1991 from State Department of Education Superintendent Charles Toguchi to Michael Scarfone, Director of the City Department of Housing and Community Development; and letter dated 14 May 1992 from James Turse, Director of City Department of Housing and Community Development to Superintendent Toguchi.*

Parks and Recreation

The project is in proximity to Cartwright Field (2.373 acres) and Makiki District Park (8.705 acres). Cartwright Field contains one comfort station, one basketball court, one softball field and play equipment. Makiki District Park is a major recreational resource for the Makiki community. It contains several buildings for community activities and events, a library, four tennis courts, a basketball court, playing fields and a community garden area. Both are within walking distance. One must cross King Street to reach Cartwright Field and, if one continues over the bridge over the H-1 Freeway, one can get to Makiki District Park.

Near the project site on the makai side is Washington Intermediate School. This facility contains a playing field and ball courts which are often used by the general public during non-school hours.

The project will increase the demand for recreational facilities by increasing the population by between 3,400 to 5,300 persons. A population of 5,000 persons should have a neighborhood park in the range of four to six acres. Standards of the City Department of Parks and Recreation indicate that a population of 5,000 persons should have basketball and volleyball courts, a softball field, and a comfort stations within one-half mile.

The project will partially mitigate impacts on recreational facilities by providing a multi-story gymnasium for the general public and a recreational deck for on-site residents. The project also includes large open spaces. This does not, however, alleviate pressures for the use of outdoor active recreational facilities, such as ball parks.

Analysis

The Pawa'a Redevelopment project will increase the need for public services and facilities. This section raises points which should be considered by the City and State.

1. **Implications of creating a new community.**

   The project will address a major need by adding a substantial number of affordable housing units to the housing supply. For some people, these units may even mean the difference between being homeless and having shelter. The project's housing component will therefore be a major social benefit for the State of Hawai'i.

   In providing a substantial number of housing units and other uses, the Pawa'a Redevelopment is also creating a planned community, which could have 5,000 residents. These residents will have the same social needs as residents in a planned community in 'Ewa. They will need to go to school, to play, to have spaces for leisure time, to have social services.

The analysis of schools and parks indicates that the area's services and facilities are already strained. In Section 3, it is found that major growth is anticipated in nearby Kaka'ako and along Kapi'olani Boulevard. This means that, unless existing facilities are expanded or new ones are added, the strain on such facilities will be increased.

The proposed project has made some effort to accommodate its residents' needs on-site, with the public elementary school, open space and recreational facilities. These components will only mitigate part of the impact, however. The regional cumulative impact, which is not just attributable to Pawa'a, still has yet to be addressed. From a regional perspective, crowded schools, lack of playgrounds, no place to gather and socialize – these are environmental factors which are part of how one feels about oneself and relates to others. Ideally, most people will adapt to the limitations of dense urban areas. For those who are unable to adapt, continual frustrations about these daily needs could lead to social conflict and unrest.

The project's social impacts extends beyond the provision of housing. The Pawa'a Redevelopment needs to find ways to meet the other social needs of those who will live in this new community and in the surrounding area.

2. **Coordination within government.**

   Pawa'a Redevelopment has a good opportunity to serve as an example of how a new urban community can work internally and function in the larger community. It is a government-initiated project, a joint effort of the City and State administrations.

   The project is part of regional growth planned for Kaka'ako and Kapi'olani. The impacts of individual developments, such as Pawa'a, on public facilities should not be evaluated separately but needs to be analyzed in the context of regional issues. There needs to be regional plans of how the educational and recreational needs of future residents will be met; infrastructure plans also need to be developed so that growth can occur in an orderly fashion. These plans should not be the efforts of individual departments, but should reflect the plans of the overall administration.

   The Pawa'a Redevelopment can stimulate this type of internal coordination. It is recommended that the Pawa'a Redevelopment project team evolve into an interdisciplinary group which includes not just members of State and City housing agencies, but also representatives of agencies which will eventually serve the project residents, such as police, education, parks and public works. In planning for this project, which is a catalyst for further revitalization of the area, these public officials would also be planning for the growth of the overall region.

It is understood that land prices and availability is a major deterrent in providing some public facilities. We note, however, that while land prices are high now, they will become more prohibitive as the area develops; thus planning to provide such facilities now is more cost-effective than it will be when the area is already revitalized.

5. Preliminary Community Issues

Whereas social impacts are social changes which are likely to occur, social issues are reactions to community events, changes and problems. Issues change over time, as people's priorities and values change. This section presents an overview and analysis of issues related to the Pawa'a Redevelopment as of June 1993.

Section 5.1 describes the community interview process. Section 5.2 provides a brief overview of Neighborhood Board issues. Section 5.3 presents findings of the 1992 SIA interviews, and Section 5.4 presents a summary of interviews held for this report. Section 5.5 presents an analysis of current issues related to the Pawa'a Redevelopment.

5.1 Community Interview Process

In the 1992 SIA and this report, we conducted interviews for issue identification and analysis. This type of analysis assists both the developer and policy makers in ascertaining community reaction to a project, and in assessing the need and types of mitigation which may be acceptable to the community. The emphasis of issues analysis is capturing the *range* of community reactions; the product is a broad picture of the variety of concerns.

Issues analysis is different from a statistical survey in that polls focus on frequency of reactions, rather than the nature of the issues themselves. In our analysis, the only time we make reference to the quantity of opinion is where there was a significant difference in numbers, such as "only one respondent," or "all of those interviewed."

5.1.1 1992 SIA Interviews

In the 1992 SIA, Earthplan conducted 54 interviews with people who lived or worked on or near the project site, or who were active in regional affairs. To identify a broad range of concerns on the Pawa'a Redevelopment effort, the selection of people was based on achieving a cross-section of interests. Every attempt was made to talk to people associated with different kinds of businesses both on- and off-site. Residents in all surrounding residential structures were approached. To network, interviewers asked informants for referrals, with the understanding that we were looking for a cross-section, rather than people with similar viewpoints.

The following is a breakdown of people interviewed in conjunction with this social impact assessment:

* **On-site businesses.**

  The character of the neighborhood is predominantly commercial and office oriented. Those interviewed from on-site businesses included landowners and tenants, employees and business owners. Nineteen of those interviewed had some interest in on-site businesses. Business people contacted are listed on *Table A-1* of Appendix A.

* **Off-site business.**

  Businesses around the site are very diverse in nature, and we attempted to interview a wide range of people. We contacted professionals, restaurants, banks, churches, a gas station, a bar; we spoke to managers, employees and business owners. In all, 16 off-site businesses participated in the 1992 SIA interview process. Business people contacted are listed on *Table A-1* of Appendix A.

* **On-site residents.**

  Of the on-site residents we contacted, only four agreed to participate in the full interview. The others chose to not respond or did not want us to use any part of the interview. *Table A-2* lists on-site residents interviewed for this study.

* **Nearby residents and community organization members.**

  Nine of those interviewed lived in the nearby apartment buildings. We also interviewed seven members of three Neighborhood Boards and they are identified on *Table A-2* of Appendix A.

Informants were told that their interviews would remain confidential. They were asked to respond to two areas of questions. First, they were asked to talk about the existing neighborhood and community. We asked them what they liked about this community, as well as what they felt were problems. Second, we asked project-related questions. We asked what they knew about the project, and provided information as necessary. We then asked them to discuss good things and problems about the Pawa'a Redevelopment. The basis of information shared with those interviewed was the project material released by the City and State. [22]

The 1992 SIA interviews for the Pawa'a Redevelopment are distinguished from other projects studied by Earthplan in that some of those interviewed initially expressed reluctance to participate. Some whom we contacted did not return phone calls, and some indicated that they would call back and then did not do so. Some of those interviewed wanted to see the questions before the interview; some had to get approval

[22] *At the time of the interviews (June 1993), project material indicated that the commercial space was estimated at 80,000 square feet. That was the information provided to informants.*

from upper management before talking to us. In six cases, interviewees either did not want their names and/or business identified in this report. A few simply refused to participate. The reasons for this reaction are discussed in Section 5.3.

5.1.2 Interviews Held for This Report

We modified the interview process of this report for two reasons. First, the community dialogue process subsequent to the 1992 SIA was undertaken, in part, because of issues raised in that original report. Many of the issues were addressed and/or mitigated by project revisions. Second, this report represents a reduction of scope compared to the original SIA. We therefore decided that, rather than duplicate our initial efforts, it was important to follow-up with previous interviewees to compare previous issues to concerns which related to the current plan. Hence, this report's interviews were conducted to "test" the extent to which project revisions addressed previous concerns.

We interviewed 31 people for this report, most of whom were interviewed for the 1992 SIA. These interviewees represented the same categories as in the 1992 SIA, i.e. on- and off-site businesses, on-site residents, residents of nearby apartments, and members of three Neighborhood Boards. *Table 8* lists those interviewed for this report.

Some of those interviewed were members of the Advisory Committee convened by the City to address community concerns. Some of the current off-site businesses were previously targeted for displacement; reconfiguration of the project site allows them to remain in their present location. With the on-site residents, it was difficult to contact previous interviewees. In the 1992 SIA, we visited residents at their apartments and many of these meetings were spontaneous. We were unable to contact the same people for this report; many were not at home or had moved.

For those who were previously interviewed, we asked four basis questions as follows:

* Are you familiar with the original and current plan? [23]
* What do you believe are positive features of the plan?
* What problems do you see in the current plan?
* What changes/modifications do you suggest?

[23] *Our interviewers provided project information as necessary.*

Table 8

List of People Interviewed for This Study

Those interviewed were asked to share their personal knowledge and views on the existing community and the proposed project. They were not asked to represent the official views of their respective organization or company.

Name	Affiliation
Leilani Abdul	Owner of Kay Abdul Realtors, Inc. Tenant of adjacent (previously on-site) business
Russell Allen	Representative of One Kalakaua Adjacent (previously on-site) business Member of Pawa'a Community Advisory Committee
Wallace Amioka	Public affairs consultant Nearby business
Bart Aronoff	Chair of Planning and Transportation Committee of McCully/Moiliili Neighborhood Board
Bob Ching	Consultant of Great Wall Furniture and Design Nearby business
Ruth Goldstein	President of Banyan Tree Plaza Community Association Nearby resident
Heather Hironaka	On-site resident
Randy Kauhane	Building Department Supervisor of International Association of Machinists & Aerospace Workers, AFL-CIO Owner of on-site property
Rene Kubo	Owner of Bete, Inc. On-site business; tenant
Raymond Lilly	Chair of Ala Moana - Kakaako Neighborhood Board Member of Pawa'a Community Advisory Committee
Lionel Lindo	Lionel's Unocal Nearby business

Table 8, continued

Name	Affiliation
Arlene Lodge	Owner of Arlene Lodge, Acupuncture On-site business; tenant
Beatrice Mayhew	Resident of Makua Alii (State elderly project) Nearby resident
Charles McClure	Chair of McCully/Moiliili Neighborhood Board
Wilfred Motosue	Realty Trade Center and GTH Dist. Owner of previously on-site property Spokesperson for Pawa'a Tenants Association Member of Pawa'a Community Advisory Committee
Jane Nakamishi	Employee of Restaurant Omasa On-site business; tenant
Bill Nagy	On-site resident
Martin Nolan	Property Manager, First Federal Savings & Loan Owner of on-site property Member of Pawa'a Community Advisory Committee
Steve Oishi	Owner of Electric Shaver Shop On-site business; tenant
Howard Oshiro	Partner, Allstate Insurance Company Nearby business
Steve Purnell	Resident in Study Area Spokesperson for Pawa'a Tenants Association Member of Pawa'a Community Advisory Committee
Katherine Ross	On-site resident
Irene Sadoyama	Controller, Shiseido of Hawaii, Inc. Lessee of adjacent (previously on-site) property
William Sanders	Owner of Baldwin Sanders Landowner of adjacent (previously on-site) property Member of Pawa'a Community Advisory Committee

Table 8, continued

Name	Affiliation
John Steelquist	Chair of Makiki/Lower Punchbowl/Tantalus Neighborhood Board Member of Pawa'a Community Advisory Committee
Ann Tanabe	Owner of Ann Tanabe Piano Studio Tenant of adjacent (previously on-site) business
Robert Tsuyemura	Administrative Assistant to the Chair of the Department of Agriculture On-site operation
Anne Weers	Owner of Sign of the Crab Nauticals Owner of on-site property
Bruce Williamson	President and General Manager of Meadow golf Dairies, Inc. Owner of on-site property Member of Pawa'a Community Advisory Committee
Phillip Wu	Resident of Punahou Regency Nearby resident
Wallace Yim	Owner of the King Kalakaua Building Nearby business

For residents who were not previously interviewed, the questions differed as follows:

* How would you characterize the area where you live? What changes have you witnessed in the last five years? What do you feel is the value of this area to the larger community?
* How do you feel this project will affect you and your neighbors in the short term? In the long term?
* How do you feel the project will affect the overall community?

5.2 Independent Community Issues

This study included a review and analysis of Neighborhood Board minutes to understand some of the issues and concerns addressed by the residential communities. The project site is in the area covered by the Makiki/Lower Punchbowl/Tantalus Neighborhood Board No. 10. The review included minutes of meetings from January 1991 through May 1993. Because of the project site's proximity to other Neighborhood Board areas, the same period of minutes was reviewed for the McCully/Moiliili Neighborhood Board No. 8 and the Ala Moana/Kakaako Neighborhood Board No. 11.

The Makiki/Lower Punchbowl/Tantalus Neighborhood Board must address issues which relates to both the urban and the natural environment. The Board's area extends from the urban mixed use setting of Pawa'a to the mountain range. For example, in one meeting the Board addressed noise barriers on the busy H-1 Freeway and a house on Round Top. With such a diverse range of environments, this Board tends to seek a balance between the built and natural environment. Members are supportive of change, but also stress the need to retain the neighborhood qualities of the different areas. Frequent issues covered over the last year are as follows:

* **Makiki District Park** -- The Board monitored the progress of renovations and changes at this park at almost every meeting. It encouraged City Council to retain funding for the replacement of the library and administration buildings, and requested that the City re-surface the tennis courts.
* **Development and Maintenance of Undeveloped Areas** -- The Board studied construction on State-owned land to ensure that such activities and the structure were legal. It encouraged landscaping along Nu'uanu Stream and is reviewing plans for the Makiki/Tantalus Recreation area.
* **Development Proposals** -- Pawa'a Redevelopment was a frequent topic over the last year and the Board's position is discussed in a subsequent section. The proposed Hale Kewalo project was reviewed and the Board opposed the concept of building public housing at the site and recommended that a full EIS be required.

The McCully/Moiliili Neighborhood Board deals with issues related to the region's relationship with other areas, particularly Waikiki. They focus on the proximity of this Neighborhood Board area to Waikiki and cite problems related to how Waikiki's development affects this primarily residential community. This Board has been supportive of social service efforts. It supported the Philip Street Elderly Housing and the Hale Pua complex for homeless single parents. Frequent issues covered over the last year are as follows:

* **Waikiki Development** -- The Board is very concerned that the development of Waikiki will affect neighboring communities, such as the Mo'ili'ili and McCully neighborhoods. It was noted that the Ala Wai Golf Course, Ala Wai School and Ala Wai Park were proposed for inclusion in the Waikiki Special District, and the Board requested a voice in planning this boundary. The Board also passed a resolution which stated that, as Waikiki is redeveloped, affordable housing should be retained or replaced.

* **Traffic and Circulation Patterns** -- Traffic problems are numerous in this Neighborhood Board area, and this Board often seeks ways to effectively minimize or mitigate such problems. Specific traffic problems which were frequently discussed included areas near the Ala Wai Community Center and Iolani School and the intersection of Phillip and Punahou Streets.

* **Public Projects** -- The Board supported landscaping and beautification along the Manoa/Palolo streambanks from Date Street to the Ala Wai Canal, as well as an extension of the bikeway to Kapi'olani Boulevard. It opposed the University of Hawaii Special Events Arena because of negative impacts on parking, traffic and the environment. A proposed 138 kV electrical transmission line is of major concern to this Board because of health, visual and land use compatibility impacts.

The Ala Moana/Kakaako Neighborhood Board area is a community in transition and this Board must constantly deal with change. The Hawaii Community Development Authority is on hand at almost every meeting to talk about new projects in Kaka'ako. Another major focus of this Board is the compatibility between residents and the commercial and industrial uses; hostess bars were often a source of irritation to residents. Frequent issues over the past year are as follows:

* **Ala Moana Park** -- This Board was very concerned about the park's maintenance and security. It voted to close the Magic Island parking lot at night and discussed reports of violence at the beach park. The Board also discussed the renovations at the Ala Moana Park, and suggestions included additional parking stalls for disabled persons, improved restroom facilities, closing the beachfront drive to vehicular traffic and improving jogging paths.

* **Kaka'ako Redevelopment** -- The Board heard presentations on Hale Kewalo, the Keeaumoku Superblock, Pawa'a Redevelopment, residential development on the Pohukaina School site, and the development of the American Brewery site.

* **Parking and Traffic** -- The Board discussed circulation patterns and traffic problems throughout the district. It also supported a pilot study of "subscription bus service" to see if this would increase bus ridership.

5.3 Issues Raised in the 1992 SIA

5.3.1 1992 SIA Issues Raised by Businesses and Landowners

Good Things About the Existing Community -- The most common positive aspect of the existing community is its location. On- and off-site business people appreciated Pawa'a's proximity to Ala Moana, Downtown and Waikiki, and along major transportation corridors. This means that Pawa'a is convenient for customers and employees. The area is still a relatively low-density area despite this proximity, however, and business people enjoyed this aspect of the area as well. Low rent was also cited as a present advantage of the area.

Problems in the Existing Community -- The inadequate number of parking spaces was a problem for most of the business people interviewed. Those interviewed said that much of the on-street parking in the area was used by people involved with or visiting the police station. Business customers often must drive around the block a few times looking for a parking space.

Another type of problem identified by business people was loitering in parking lots both on- and off-site. It was also felt that business rent was high because of convenience and proximity to major transportation corridors.

A problem which has concerned business people in the area has been an uncertain future. Business owners claimed that it was difficult for them to rent out space because prospective tenants heard about the Pawa'a redevelopment efforts. On-site businesses also put their own plans for improvements on hold, since they didn't know what would happen in light of the proposed project.

Pawa'a Redevelopment.

In the 1992 SIA, business people were first asked what good things, if any, they saw about the project. The on-site business tenants and landowners unanimously felt that the original project had no positive or redeeming value. Off-site businesses felt that the project might improve the appearance of the area, and possibly increase their own business. These comments were few and far between, however, and, overall, people focussed on what they felt were the negative aspects of the original Pawa'a Redevelopment plan.

Specific issues raised by business people in the 1992 SIA are as follows:

1. *Displacement and Condemnation.* -- All of the on-site business interests opposed having to leave their present location, or having to sell their land. They cited long-term ties to the property, and discussed the personal hardships which would be entailed with having to move their business. Business people also questioned the legality of the condemnation

process. They resented having their businesses and lands condemned so that other businesses in the new commercial complex can take their place.

2. *Attitude Towards Government* -- Both on- and off-site business people felt that the project symbolized the insensitivity and arrogance of "government." Basic to this negative attitude was general skepticism about the efficiency of bureaucracy and the responsiveness of elected officials. There was also underlying apprehension about possible repercussions of speaking out against the project.

3. *Community Input Process* -- On-site and surrounding business people felt that the community input process prior to the 1992 SIA had been inadequate. On-site business people claimed that, although the initial project meetings had seemed hopeful, the follow-up efforts were inadequate. Those interviewed felt that they should have been contacted more frequently, and resented that newspapers, rumors and word-of-mouth had been the primary mechanisms for information dissemination. The business people tended to believe that public officials would proceed with the original project, regardless of community input.

4. *Traffic and Parking* -- Surrounding businesses were concerned about the magnitude of the project. They felt that the shopping area and residential uses will increase traffic beyond the capacity of the roadways. They also suspected that there will be increased need for parking which may not be adequately met by on-site parking spaces.

5. *New Residents* -- Off-site business people were also concerned about what they perceived as the new residents. They were apprehensive about having "low-income people" move into this community, particularly as related to property values and crime.

6. *Need for Project Amenities* -- Because the project was perceived as a "low income" housing development, business people felt that the amenities, such as swimming pools and open space, were uncalled for. They agreed that housing was a priority, but disagreed with the extent of amenities.

7. *Increased Business Rents and Possible Increase in Business* -- Off-site businesses saw the project as a double-edged sword. On one hand, they saw the potential for more business because more people would live in the area. On the other hand, they feared that land values will increase, which implies an eventual increase in business rents.

5.3.2 1992 SIA Issues Raised by Residents and Community Organizations

Good Things About the Existing Community -- Residents generally liked living in this area. They cited convenience as a major plus; the elderly people were especially appreciative that the area is near bus lines and shopping centers. Community organization members liked the neighborhood quality of Pawa'a. They felt that the mix of uses was pleasant and that the area offered a "sense of history."

Problems in the Existing Community -- Traffic was a major problem for residents and Neighborhood Board members alike. They also pointed out that personal crime in the area is increasing, as is loitering. Residents did not like the bars in the area, and there was concern about changes in the neighborhood. Mom and pop stores are disappearing, and low rent areas are being replaced by expensive condominiums. The lack of recreational areas was also a problem.

Pawa'a Redevelopment.

In the 1992 SIA, residents and Neighborhood Board members tended to be slightly more optimistic about the project than the business people. They believed that the Pawa'a redevelopment will upgrade the overall area, and would improve the visual appearance. Nearby residents hoped that their property values would increase. Neighborhood Board members felt that the mix of housing was good, as was the provision of affordable housing in the urban core. The on-site residents did see some good in the project, by they were more apprehensive about being displaced. Three people felt that the original project had no positive value.

The following are issues raised by residents and Neighborhood Board members.

1. *Increase in Density* -- Those interviewed were very concerned about adding a shopping area and the large number of residential units to this area. They were concerned that the project would increase traffic, and crowd schools and parks. The project's impacts on sewerage and water system were also raised as a concern.

2. *Change in the Area's Character* -- For those who liked the area the way it is, the project meant the destruction of the neighborhood. They expected that the project would change the visual character, and would remove the ground level commercial. It was suggested that portions of the project site remain as is, so as to preserve the storefront character. It was also suggested that the ground levels of the on-site structures be used for stores.

3. *Community Input* -- Neighborhood Board members felt that project team members did not really work with the community, even though the City and State expressed interest in doing so. They indicated that plans have not been modified to incorporate previous Board input, nor were there follow-up responses until very recently. There was also some concern that input provided by the Neighborhood Board representatives on the advisory committee did not seem to be used.

4. *Project Design* -- Both residents and Neighborhood Board members did not want to see very tall buildings on this site. Further, it was felt that the current height limit should be enforced. More open space was suggested.

   The affordable units should be for sale, as well as for rent, according to some. This would help people who are trying to move up in the housing market.

   The City was also strongly urged to keep Young Street open.

5. *Role of Government in Development* -- These informants were not as critical of government as the business people, but they still expressed strong concern about the role of government. It was felt that, at most, government should be building affordable housing; they did not feel that government should be involved in the development of either market residential units, or a shopping center, or an office building.

   One of the perceptions expressed by those interviewed was that the City and State officials are being unfair to the on-site landowners and businesses. They felt that government should not be able to condemn land to build competitive commercial establishments. To them, government should not be able to exempt itself from regulations imposed by government on private developers.

6. *Construction* -- Nearby residents were concerned about the inconvenience and pollution associated with construction activities. They felt that dust, noise and traffic impacts over a long period of time would be bothersome and unhealthy.

7. *Effect on Property Values* -- Nearby residents hoped that the project would increase property values, but were concerned that this might not occur because of the affordable "low-mod" rentals.

5.3.3 Initial Neighborhood Board Issues

The Makiki/Lower Punchbowl/Tantalus and the McCully/Moiliili Neighborhood Boards both took positions on the project prior to the publication of the 1992 SIA. The Makiki/Lower Punchbowl/Tantalus Neighborhood Board's concerns included:

* setting precedence for increasing height limits;
* the effects of closing a portion of Young Street;
* retention of street-level business;
* the relocation of on-site businesses and residents in the new Pawa'a project;
* providing opportunities for landowners whose land will be condemned to own a condominium element in the new project;
* base appraisals on recent comparable sales and not income flow;

* the deletion of the portion of the project Diamond Head of Kaheka Street and mauka of Young Street.

Further, in 1992, the Makiki/Lower Punchbowl/Tantalus Neighborhood Board conducted a survey to ascertain community opinion about a number of issues. The redevelopment of Pawa'a was one of the issues. The majority of those interviewed (over 50 percent) wanted to see Pawa'a include commercial areas, affordable housing, rental units, extra parking, a park, and child care. They did *not* want to see leasehold units, buildings up to 450 feet, low massive buildings and the closure of Young Street to traffic.

The McCully/Moiliili Neighborhood Board wanted the EIS to disclose how the project will affect McCully and Moiliili communities, particularly in the areas of traffic, air quality and noise impacts.

5.4 Current Issues Related to the Pawa'a Redevelopment

5.4.1 Community Process Subsequent to the 1992 SIA

As Section 5.3 indicates, community groups and on-site businesses expressed strong concerns about the original plan for the redevelopment of Pawa'a. The City therefore established a Community Advisory Committee after the DEIS was published. The committee comprises 18 individuals who are landowners, tenants, legislative representatives, Neighborhood Board representatives, and public officials. Several meetings were convened and the following are project-related issues identified by the committee:

* No forced acquisition
* Reduce number of units
* Provide affordable housing
* Retain Heritage Park
* Retain Young Street
* Reduce building heights
* Preserve Department of Agriculture building
* Retain street front commercial
* Incorporate recreation space
* Incorporate Young Street bike route

The City and this committee studied three alternatives which addressed each issue to some extent. One alternative was the development of only the City- and State-owned parcels. Another was the development of City- and State-owned parcels without commercial space. The third alternative was to omit all parcels Diamond Head of the former police station and parking lot.

In April 1993, the committee strongly favored the latter alternative. It was felt that this plan, which is the plan upon which this report is based, addressed all of the committee's

issues.[24] [25]

The Neighborhood Boards are apparently taking their lead from the committee. As of this writing, the Ala Moana/Kakaako Neighborhood Board supports funding for the project. The Makiki/Lower Punchbowl/Tantalus Neighborhood Board has received a presentation on the updated plan and did not express any objection.

5.4.2 Issues Raised During This Report's Interviews

As discussed earlier, interviews conducted for this report were designed to test the effectiveness of the revised plan in addressing previous issues. Except for the on-site residents, those interviewed had been contacted in the 1992 SIA. Only five people were not familiar with the specific components of the revised plan, but they knew of the general magnitude and intent of the project.

The prevailing sentiment is that the revised plan is a major improvement over the previous proposal. There was a strong sense of satisfaction, especially among those who served on the advisory committee. Two people -- both on-site business tenants -- felt that the project has no positive value. Another person preferred the original plan. For the others, specific positive aspects of the project are as follows:

1. **Retention of some privately-owned lands.**

   Those who were previously targeted for displacement expressed great relief at not having their properties condemned. They felt that this was a definite win-win situation. The City will still do their project, the neighborhood will be allowed to continue to operate, and landowners can proceed with their own plans for development.

2. **Reduction of residential density and commercial space, and elimination of office space.** [26]

   A major issue in the 1992 SIA was the magnitude of the original residential component; reducing the number of units was therefore seen as an improvement. One person indicated that density reduction was a bottom line and that he would not have continued discussion unless this were achieved. There was also agreement, however, that affordable housing is needed, and no one wanted to see a further reduction in the residential density.

[24] *Tune, 1993.*
[25] *Media and project material at the time of this position indicated 80,000 square feet of commercial space. It is assumed that the committee was unaware of the current allocation of 145,000 square feet.*
[26] *As noted earlier, the current plan has a commercial component of 145,000 square feet, whereas project material at the time of the interviews suggested 80,000 square feet of commercial space. It is highly likely that the informants' opinions which indicated appreciation for the reduction in commercial space are currently invalid.*

   The reduction of commercial space and the elimination of office space was also viewed as a positive move. It was felt that both types of development should be left to the private sector.

3. **Keeping Young Street open.**

   Both business and resident informants liked that Young Street would remain a thoroughfare. They felt that this would lessen disruption and would continue easy access to nearby shops.

4. **Recreation and open space.**

   Organizational members and residents were impressed that the City was adding a gym and keeping open space as a major feature. It was often pointed out that the region needs more open areas.

5. **Community dialogue process.**

   All of those who were familiar with the advisory committee expressed strong appreciation for the process itself. They praised the City's willingness to look at options and continue its dialogue with the community. They suggested that a similar process be used in other projects with conflicts.

Negative reactions were few and relatively mild. Half of those interviewed felt that there were no problems with the revised plan; they felt that the plan incorporates their previous concerns to the extent possible. The remaining half expressed concerns about the current project, but did not indicate that these concerns were severe enough to stop or oppose the total project. These concerns are as follows:

1. **Security and safety of the underground portion of Young Street.**

   Two people were concerned that the underground portion of the proposed project would not be a secure area. They feared that this area would not be pedestrian-safe. Further, it was felt that the entrances to the project need to be monitored and secured since general traffic will be allowed to traverse through the middle of the project.

2. **Mixed reactions about the commercial component.**

   Although it was still felt that the City should not be developing commercial projects, those interviewed felt that the down-scaling of the original commercial portion was generally acceptable. It was suggested that the City rely on the existing adjacent commercial establishments to meet commercial needs of the new residents; in other words, the market will dictate the extent of necessary improvements. Two people preferred more commercial activities on-site.

3. **Displacement and condemnation impacts.**

   There are still concerns that government should not be condemning private lands. With the elimination of the Diamond Head privately-owned parcels, however, this concern is significantly less frequent.

   Those who will be displaced tended to be more pragmatic in their outlook. Their perspective was not so much based on principle (i.e. government has no right to condemn private land), but rather on practical matters. Fair market value was important, as was the value of any air space which could have been developed by the current landowner. Timing of relocation was also important, especially for those with perishable goods. It was also mentioned that the lack of a schedule from the City made it difficult to plan for relocation. Further, some of those to be displaced have special needs; they cannot be located in some areas or prefer fee simple property.

4. **Financial feasibility.**

   It was felt that the DEIS did not have an adequate discussion of the project's financial feasibility. Given the major changes in the revised plan, it was noted that such information is even more crucial.

5. **Other issues which are consistent with the 1992 SIA.**

   Those interviewed felt that traffic will still be worse, in spite of the density decrease. They pointed out that infrastructure and public facilities are already strained, and that the increased density resulting from the project would be a major contributor to this problem. There was both concern and anticipation regarding possible increases in land values of nearby properties. Further, two people were concerned about the addition of government-sponsored housing in this area; they feared increases in crime.

Those interviewed were also asked if they had suggestions to improve the revised plan. There was no trend or consistent area of suggestions; the following summarizes their responses:

* Go back to the original plan.
* Make sure the recreation center is accessible to the general public.
* Mix the affordable units with the market units.
* Increase the residential units.
* Increase the commercial space.
* Build on government property first, and then see if this requires expanding to privately-owned lands.

For the most part, on-site residents felt that the project was good for the overall community and they were resigned to eventually moving. They knew of some plan, but did not know of the specific proposal until our interviewer spoke with them. They did not

seem upset at the potential displacement, but rather noted that "it was a matter of time." They expressed concern about finding comparable housing with the same level of convenience, and hoped that the City would assist them in relocation.[27]

5.5 Analysis of Project-Related Issues

The Pawa'a Redevelopment project has been highly visible, one which elicited strong community reaction -- both positive and negative. This section presents an analysis of reactions and issues raised by on-site and surrounding businesses, and on-site and nearby residents.

1. **The revised plan is much more acceptable to the community.**

   The revised plan appears to address community concerns. Organizational positions and information received in interviews for this report indicate a very positive reception of the Pawa'a Redevelopment plan. There are far fewer issues, and the strength of concern has diminished greatly.

   Note that, at the time of the interviews, the informants were under the impression that the commercial component was significantly smaller than that currently proposed. It is possible that overall reaction to the plan may shift, particularly if the community believes that the lower figure was supplied merely to appease concerns.

2. **The "win-win plan" is the result of an effective cooperative planning effort.**

   Initially, there was suspicion regarding the intent and practices of public officials and government agency people on this project. There was a sense that "government will do whatever it wants" and that "there's nothing we can do about it." The controversy regarding displacement and property condemnation serves to heighten these feelings.

   The community advisory committee and the City has effectively lessened these criticisms, however, by working together to solve problems. The different committee members, City representatives and consultants spent many hours trying to reach compromise and the revised plan reflects the flexibility and openness of the various parties.

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[27] *We provided contact information for those who were not yet approached by City relocation personnel.*

3. **The needs of the remaining displacees should still be given high priority.**

   There was a strong sense among those interviewed that everything is fine, that all is well. This is particularly so with those whose properties were excluded from the project site, and also prevalent among those who participated in the advisory committee.

   We stress, however, that several businesses and residents will need to be relocated to implement the project. These people will need community support and the advisory committee and Neighborhood Boards should monitor their progress to ensure that relocation occurs in a manner acceptable to all parties.

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Table A-1

List of Businesses Interviewed for This Study

Those interviewed were asked to share their personal knowledge and views on the existing community and the proposed project. They were not asked to represent the official views of their company.

In addition to these, there were four people who did not want to be identified in any way. We have incorporated their input in this study.

On-Site Businesses

Name	Affiliation
Leilani Abdul	Owner of Kay Abdul Realtors, Inc. On-site business; tenant
Randy Kauhane	Building Department of International Association of Machinists & Aerospace Workers, AFL-CIO Owner of on-site property
Rene Kubo	Owner of Bete, Inc. On-site business; tenant
Harry Lizst	Employee at Baldwin and Sanders Owner of on-site property
Arlene Lodge	Owner of Arlene Lodge, Acupuncture On-site business; tenant
Michiko Motosue	Landowner of on-site property
Wilfred Motosue	Realty Trade Center and GTH Dist. Owner of on-site property
Sunny Muramoto	Realty Trade Center and GTH Dist. Owner of on-site property
Jane Nakamishi	Employee of Hyotan Restaurant On-site business; tenant
Carol Nakasone	Business partner, CBI, Inc. Former tenant of on-site building
Jackson Nakasone	Business partner, CBI, Inc. Former tenant of on-site building
Scott Nakasone	Realtor, CBI, Inc. Former tenant of on-site building
Martin Nolan	Property Manager, First Federal Savings & Loan Owner of on-site property
Steve Oishi	Owner of Electric Shaver Shop On-site business; tenant
Irene Sadoyama	Controller, Shiseido of Hawaii, Inc. Lessee of landowner
Ann Tanabe	Owner of Ann Tanabe Piano Studio On-site business; tenant
Stephen Weers	Owner's son, Sign of the Crab Nauticals Owner of on-site property
Bruce Williamson	President and General Manager of Meadow golf Dairies, Inc. Owner of on-site property

Nearby Businesses

Name	Affiliation
Wallace Amioka	Public Affairs Consultant
Ramona Andow	Ethel's Delicatessen
–	Great Wall Furniture and Design
Kelly Hilderbrand	Pastor, Hope Chapel
Lionel Lindo	Lionel's Unocal
Glenn Lung	Physical Facilities Department, Church of Jesus Christ Latter Day Saints
Roberto Maymi	Manager, Emilio's Pizza
Shawn Omura	Former manager of AA Car Stereo
Howard Oshiro	Partner, Allstate Insurance Company
Barry Peckham	Adams Design
–	Royal Hawaiian Mint
Russell Yagi	Manager, Tropical Paradise Lounge
Wallace Yim	Owner of the King Kalakaua Building

Table A-2

List of Residents and Community Organization Members Interviewed for The 1992 SIA

Those interviewed were asked to share their personal knowledge and views on the existing community and the proposed project. They were not asked to represent the official views of their organizations.

Name	Affiliation
Ann	On-site resident
Bart Aronoff	Chair of Planning and Transportation Committee of McCully/Moiliili Neighborhood Board
Mark Au	Member of Makiki/Lower Punchbowl/Tantalus Neighborhood Board
Sophie Beardeaux	On-site resident
Ruth Goldstein	President of Banyan Tree Plaza Community Association
Mrs. Ho	Owner and resident of KHB Apartments
Alfred Howard	On-site resident
Peggy Kramer	Resident of Paoakalani (State elderly project)
Raymond Lilly	Chair of Ala Moana - Kakaako Neighborhood Board
Al Lyman	Chair of Planning Committee of Makiki/Lower Punchbowl/Tantalus Neighborhood Board
Beatrice Mayhew	Resident of Makua Alii (State elderly project)
Charles McClure	Chair of McCully/Moiliili Neighborhood Board
Paul McCurdy	Resident manager of the Punahou Regency
Mike Nakamoto	Chair of Development Committee of Ala Moana - Kakaako Neighborhood Board

Chris Pimento	Resident in Study Area
Steve Purnell	Resident in Study Area
John Steelquist	Chair of Makiki/Lower Punchbowl/Tantalus Neighborhood Board
Kris Vilanssakdanond	Resident of Punahou Regency
Jim Will	On-Site resident
Phillip Wu	Resident of Punahou Regency

APPENDIX H
SHADOW STUDY

SHADOW STUDY

FOR THE
PAWAA REDEVELOPMENT PROJECT

PREPARED FOR
WILSON OKAMOTO & ASSOCIATES, INC.

PREPARED BY
KOBER/HANSSEN/MITCHELL ARCHITECTS
1585 KAPIOLANI BOULEVARD, SUITE 1504
HONOLULU, HAWAII 96814

JUNE 1993

CONTENTS

SUMMARY

The shadow study is integral to energy efficient buildings. Energy efficiency is a function of controlling solar radiation as an external source of heat gain, and in integrating lighting and equipment design, and people, as a source of internal heat gain. A shadow study conducted for colder climates usually illustrates that shading increases heating demand in buildings, and consequently, increases operational costs. In Hawaii 100% shade is desirable at all times, because it reduces cooling demand, and in effect, reduces the operational costs of buildings. The shadow study for the Pawaa Redevelopment Project is essentially an assessment of light intensities and shadow patterns in the context of energy conservation and management. Therefore, the analytical criteria for energy efficiency is fundamental to the building design and the development of the Pawaa project. The following criteria is referenced from "Hawaiian Design: Strategies for Energy Efficient Architecture", DBED, 1990:

1. BUILDING FORM AND ORIENTATION

   Building orientation that optimizes solar control, daylighting and ventilation provides energy efficient buildings with significant reductions in operating costs.

2. SOLAR CONTROL

   Integrating architectural elements, such as, overhangs, lanais, proportion of glazed areas, etc., minimizes heat gain.

3. DAYLIGHTING

   Ambient light is more desirable than direct light for both physical comfort and cost of operation. Integrating optimum daylighting design can produce a 50% savings in the cost of electricity consumption.

4. NATURAL VENTILATION

   Hawaii maintains a relatively constant incoming solar energy with minimal seasonal changes in temperature and day length. Continual ocean-cooled tradewinds stabilize actual and perceived temperatures. Buildings must be designed to optimize the use of natural ventilation as an element of energy efficiency.

5. BUILDING SYSTEMS AND MATERIALS

   Buildings in Hawaii receive most of their heat gain by radiant heat through windows, roofs and walls. Building systems and materials should be selected for their resistance to conductive and radiant heat transfer.

6. LANDSCAPING

   Landscaping can reduce heat and glare and direct breezes for optimum ventilation.

7. EQUIPMENT EFFICIENCY

   Equipment efficiency is a function of integrating the elements of building design with the requirements of building operations and maintenance.

An effective strategy for integrating all of the above criteria should be evaluated at the inception of all future projects. The implementation of energy goals for the Pawaa Redevelopment Project and the development of adjacent properties should be established early in the Predesign and Schematic Design phases.

PROJECT DESCRIPTION

The Pawaa Redevelopment Project is a mixed-use, affordable housing project sponsored by the City & County of Honolulu and the State of Hawaii. The project site is approximately 461,090 square feet in area and is defined by Beretania Street, Kaheka Street, South King Street and Keeaumoku Street (Refer To Figure 1) and includes the following components (Refer To Figure 2):

1. (2) Affordable Residential Highrises
2. (2) Affordable Residential Midrises
3. (3) Market Rate Residential Highrises
4. Below-Grade Residential Parking
5. Recreation Center
6. K-2 School
7. Retail/Commercial Complex With Parking
8. Open Space and Recreational Areas

PURPOSE

The purpose of this study is to determine the extent and location of shadows on the project site and adjacent properties for selected times of the year and selected times of the day; and to determine if there are any significant implications of these shadows on the proposed development of the Pawaa site and future development of adjacent sites.

METHODOLOGY

The light and shadow patterns were analyzed through a computer simulated, three dimensional model of the proposed development and adjacent sites. Sun paths were constructed for March 21/September 21 (Spring and Fall Equinoxes), June 21 (Summer Solstice) and December 21 (Winter Solstice). Photographs were taken of the computer images at two hour intervals from 6:00 AM to 6:00 PM for June 21. As a result of a shorter sunrise-to-sunset period for March, September and December, photographs were taken at two hour intervals from 8:00 AM to 4:00 PM on the 21st of each of these months. A graphic assessment was made of light intensities and shadow patterns for each of the months and times of day (Refer To Figures 3, 4 & 5).

EXISTING CONDITIONS

Pawaa Redevelopment Project and adjacent areas are comprised of a mixture of retail, commercial and residential uses. With the exception of Banyan Tree Plaza, other residential condominiums and the Church of Latter Day Saints Complex, the majority of the buildings in the Pawaa District are lowrise and midrise buildings in a "transitional" stage towards redevelopment. Most of the site and immediate adjacencies are subject to direct sun, interspersed with small "pockets" of shade created by existing buildings and landscaping. Banyan Tree Plaza, northeast of the site and Hale Kaheka, south of the site, are approximately 300 feet and 350 feet in height, respectively, and represent the buildings with the most significant shadows. The shadows from the predominantly low-to-midrise buildings comprising much of the Pawaa urban fabric, however, have no perceptible benefit to

adjacent buildings.

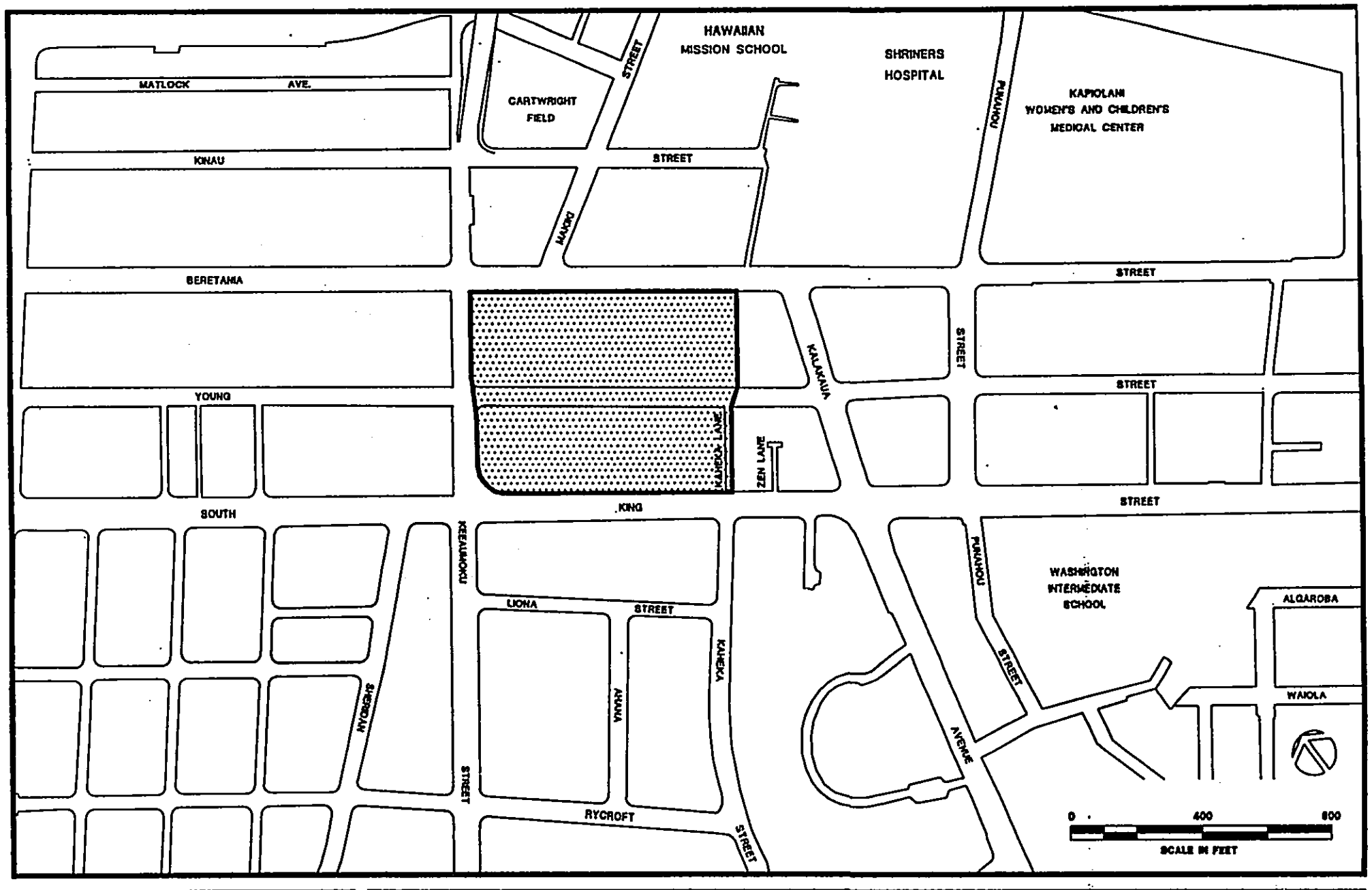
CONCLUSION

Generally, shadows for each of the months are most prevalent early and late in the day, when light and heat are least intense, and when daylight illumination requirements are less (Refer To Figure 6). For example, the most distinct shadow patterns on the site for the months of March/September occur about 8:00 AM and 4:00 PM. :As a result there is no appreciable "shading" value (for cooling) in the morning from the residential towers, however, small portions of the Recreation Center, Retail Complex, Upper Deck and Park are in shade up to mid-morning. Shading from the highrise towers become dominant at 2:00 PM. At 4:00 PM shading from the midrise towers is added to the elongated highrise shadows creating a high shading value late in the afternoon. Similarly, for the adjacent sites, shading occurs up to 8:00 AM along the Keeaumoku Street frontage and from about 3:00 - 6:00 PM for the frontages along Beretania Street and Kaheka Street (Refer To Figure 3).

For the month of June distinct shadow patterns occur from 6:00 AM to 8:00 AM and from 4:00 PM to 6:00 PM. The greatest shadows are cast either in the early morning hours, or the late afternoon, and there is minimal shading value between mid-morning and late afternoon. For the adjacent sites shading occurs up to 8:00 AM along the Keeaumoku Street/King Street frontages and from 3:00 - 6:00 PM along the Kaheka Street frontage. (Refer To Figure 4).

The month of December is similar to March and September except that the shadows are much more exaggerated due to the low sun angles. As a result there is maximum on-site shading value during the early morning and late afternoon due to the "evenly" spaced towers around the site. At 2:00 PM shading is extensive with most shadows casting on adjacent buildings. At 4:00 PM shading covers much of the built-area leaving Heritage Park and the open green space in direct sunlight. With the lower sun angles during the "Winter" months shadows are evenly cast along Keeaumoku Street, Beretania Street and Kaheka Street from about 8:00 AM through 4:00 PM. The Beretania Street frontages to the north of the site receive the greatest shading value between 10:00 AM and 4:00 PM (Refer To Figure 5).

The proposed Pawaa Redevelopment Project comprises several midrise buildings and five highrise residential towers which vary from approximately 225 feet to 300 feet in height. This project introduces shadows similar to those of the existing Banyan Tree Plaza and Hale Kaheka residential towers with a relatively even dispersement of daylight and shadow. In the context of energy conservation, any shading on adjacent buildings contributes to the reduction of heat gain and building operational costs. Shadows, themselves, either on the Pawaa site, or its adjacent sites, need to be evaluated to optimize daylight and shadow conditions and as an integral part of building energy design and management described in the preceding summary.



PAWAA
REDEVOLPMENT PROJECT

LOCATION MAP
FIGURE 1

Prepared for: DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU
HOUSING FINANCE AND DEVELOPMENT CORPORATION
STATE OF HAWAII

Prepared by : WILSON OKAMOTO & ASSOCIATES, INC

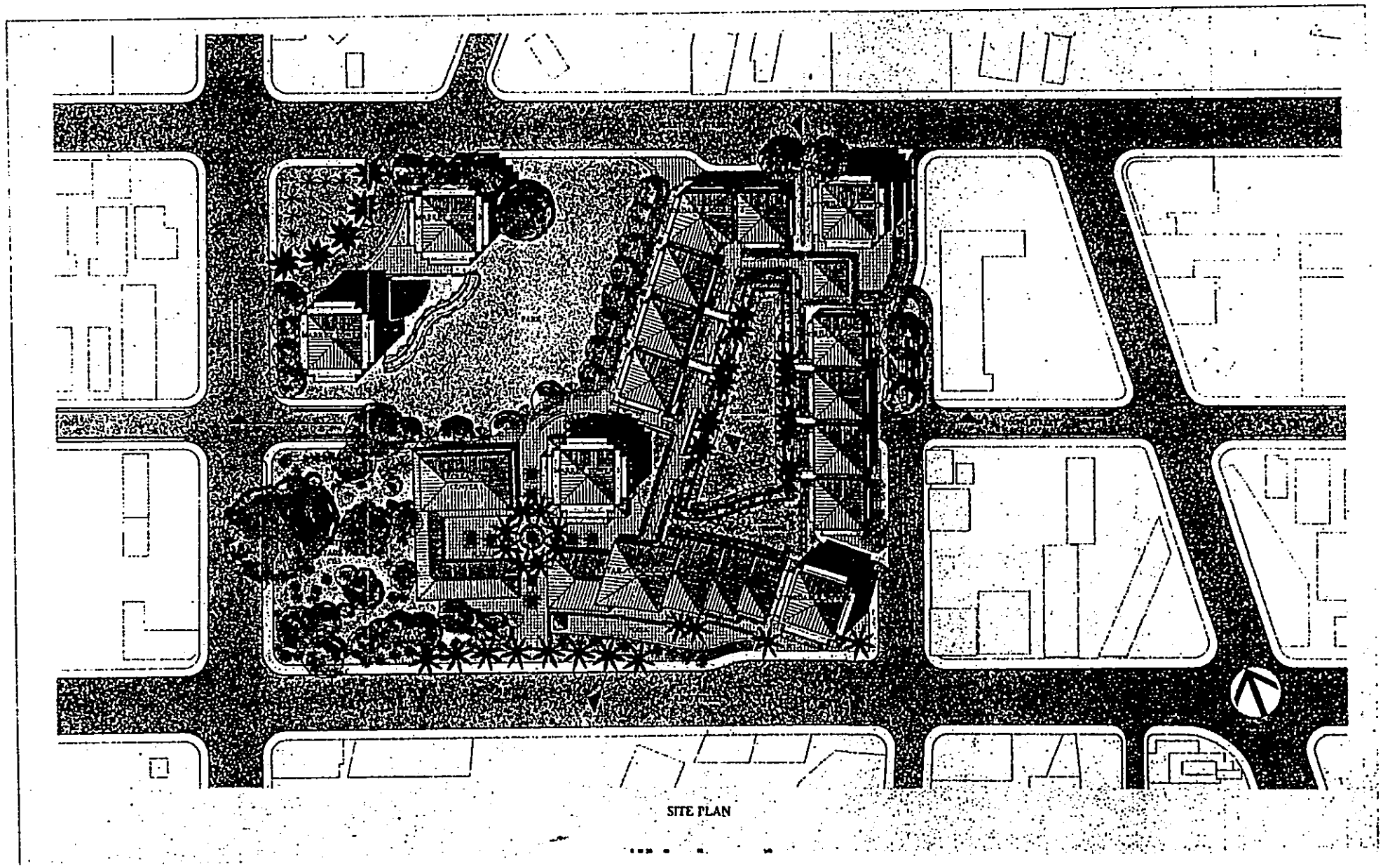
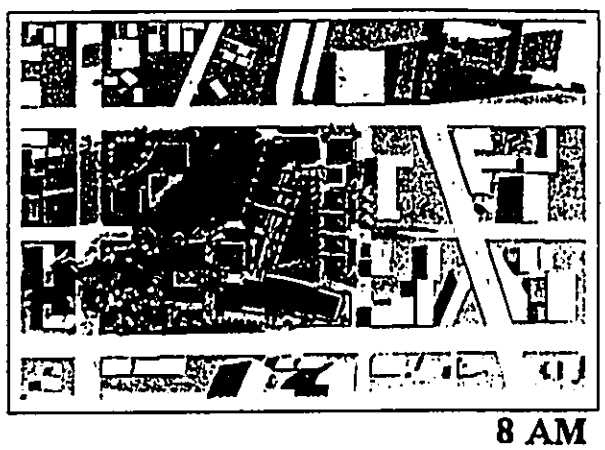


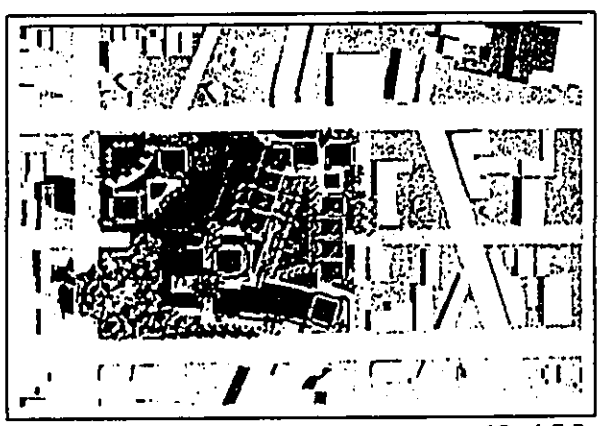
FIGURE 2

BEFORE SUNRISE

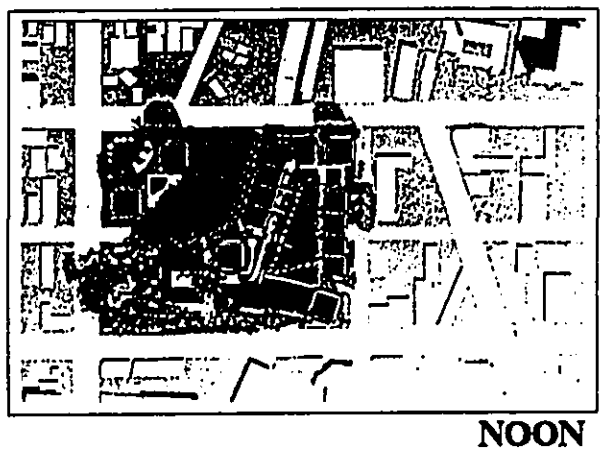
6 AM



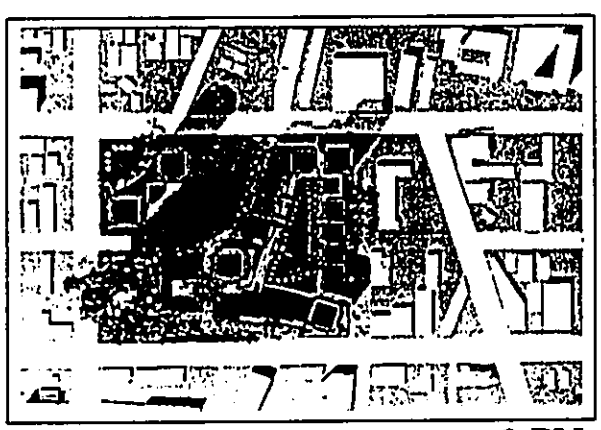
8 AM



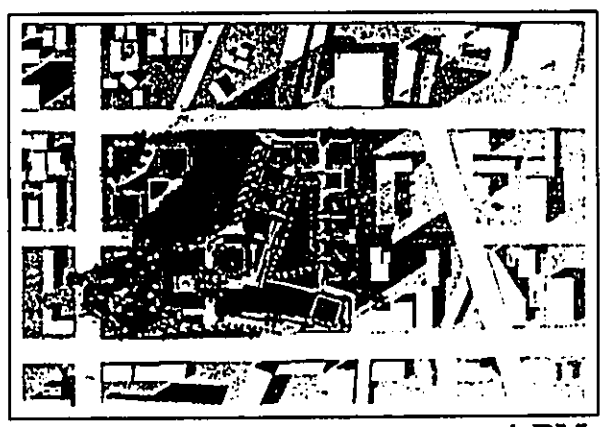
10 AM



NOON



2 PM



4 PM

AFTER SUNSET

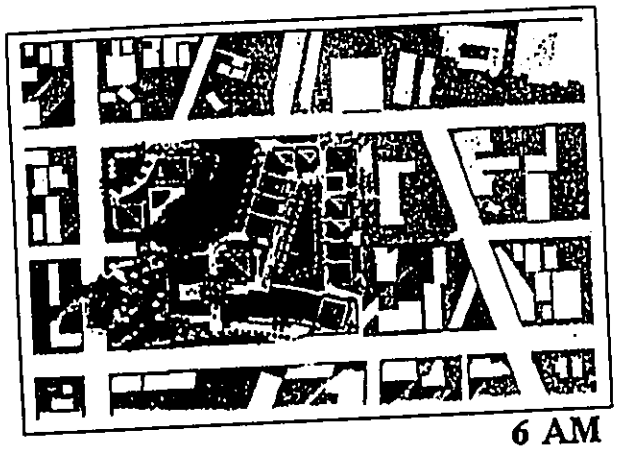
6 PM

PAWAA REDEVELOPMENT PROJECT

SHADOW STUDY

SPRING / AUTUMN
MARCH 21 / SEPTEMBER 21

FIGURE 3



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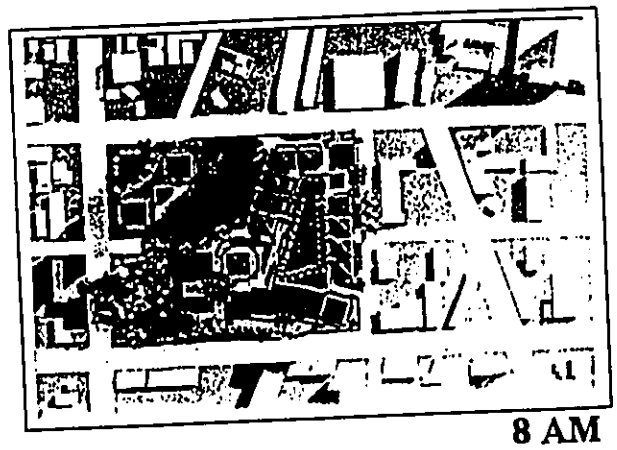

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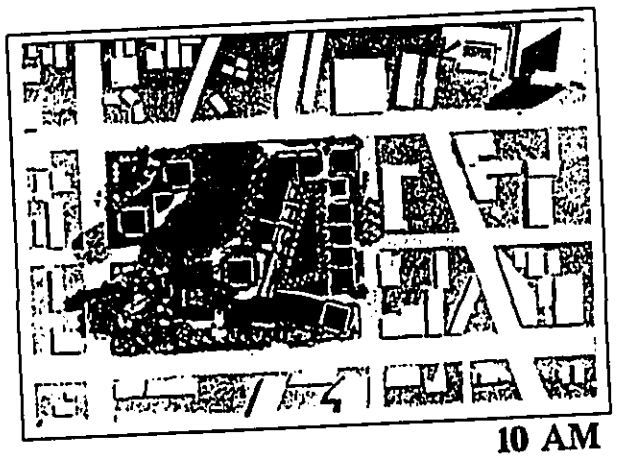

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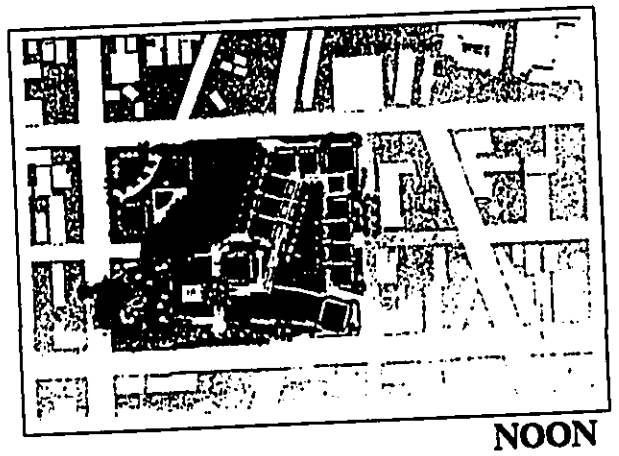
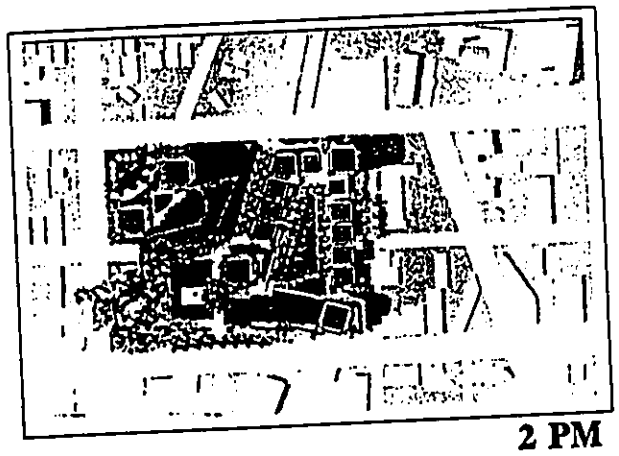


NOON



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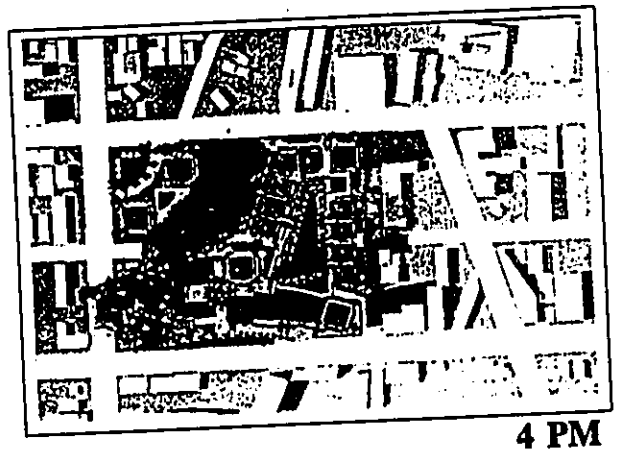

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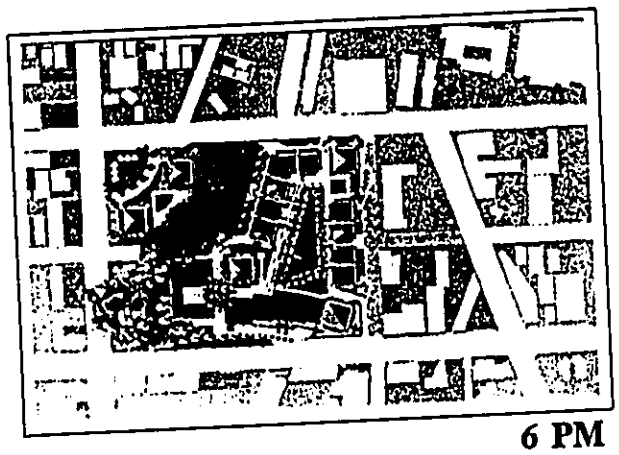


6 PM

PAWAA REDEVELOPMENT PROJECT

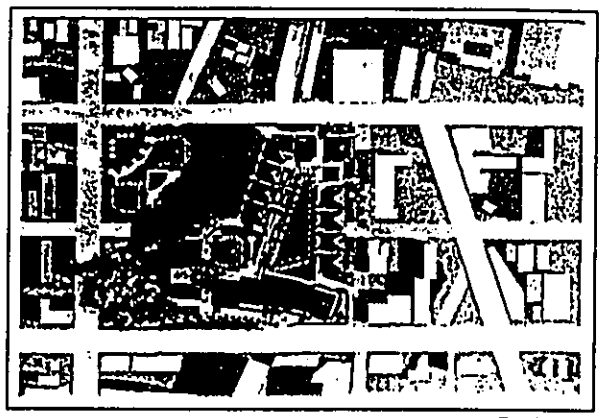
SHADOW STUDY

SUMMER
JUNE 21

FIGURE 4

BEFORE SUNRISE

6 AM



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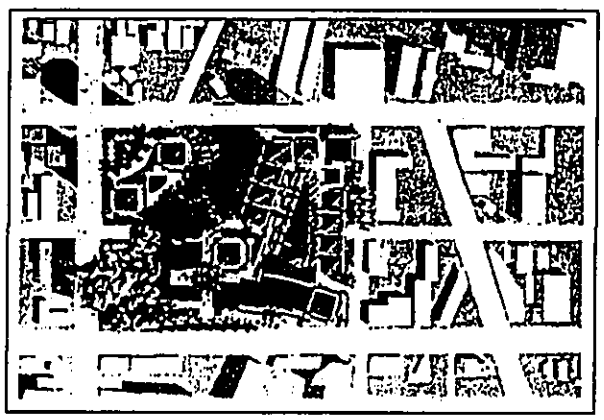
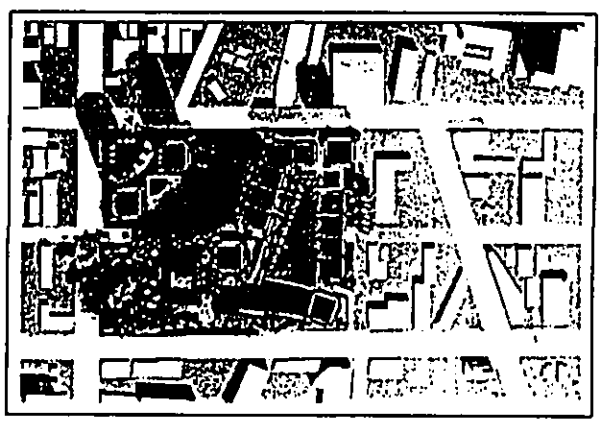
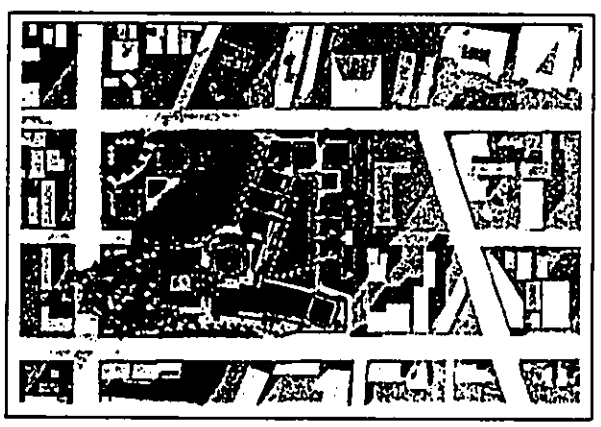


10 AM



NOON

2 PM



4 PM

AFTER SUNSET

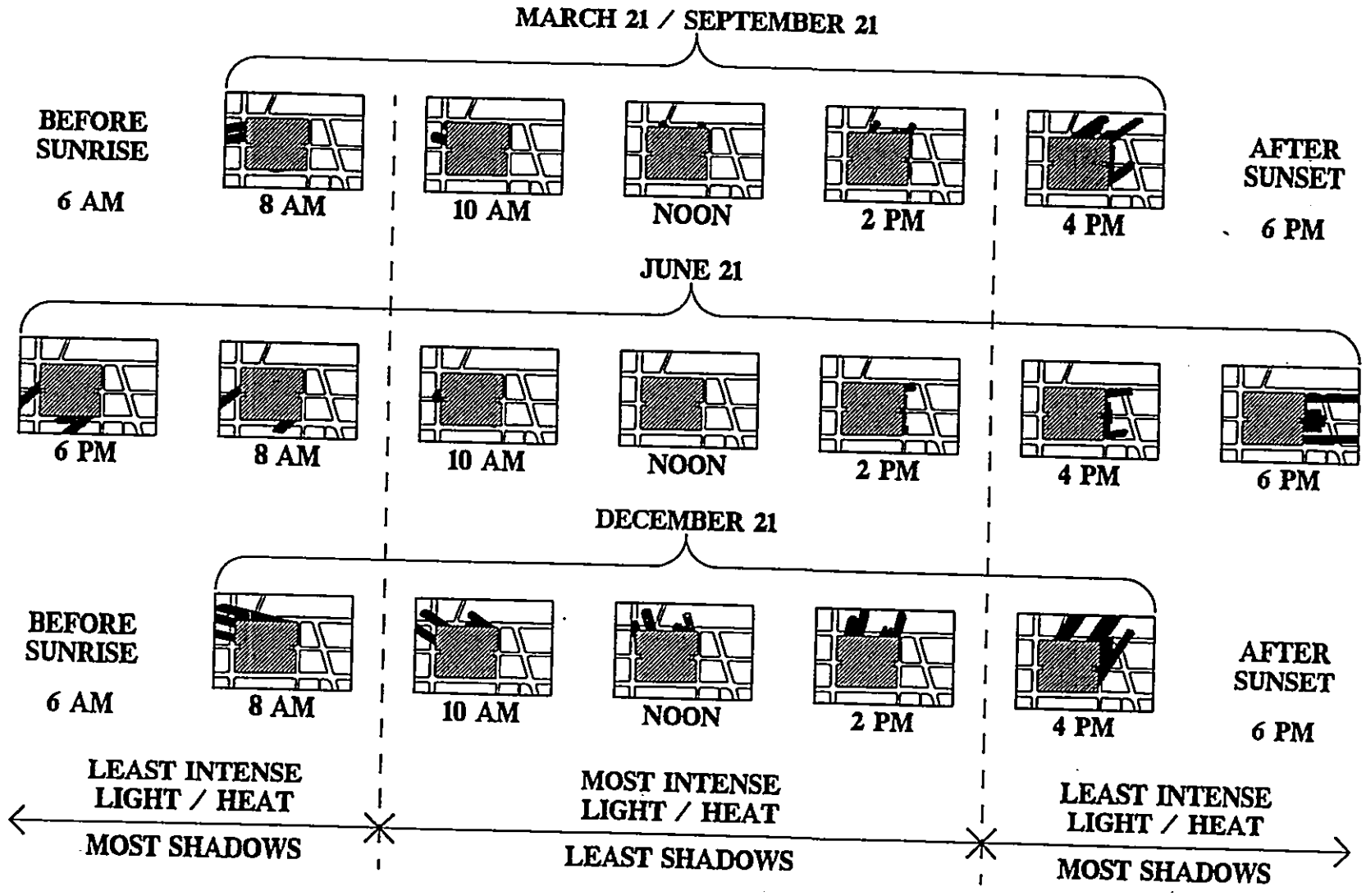
6 PM

PAWAA REDEVELOPMENT PROJECT

SHADOW STUDY

WINTER
DECEMBER 21

FIGURE 5



PAWAA REDEVELOPMENT PROJECT

LIGHT / HEAT / SHADOW INTENSITY DISTRIBUTION ON ADJACENT SITES

FIGURE 6