Waikikian Development Plan

November 2001

Final Environmental Impact Statement

Volume II (Appendices)

Hilton Hawaiian Village Beach Resort & Spa

Waikikian Development Plan

Final Environmental Impact Statement

Volume II (Appendices)

Prepared for:
Hilton Hotels Corporation

Prepared by:
Belt Collins Hawaii Ltd.

November 2001

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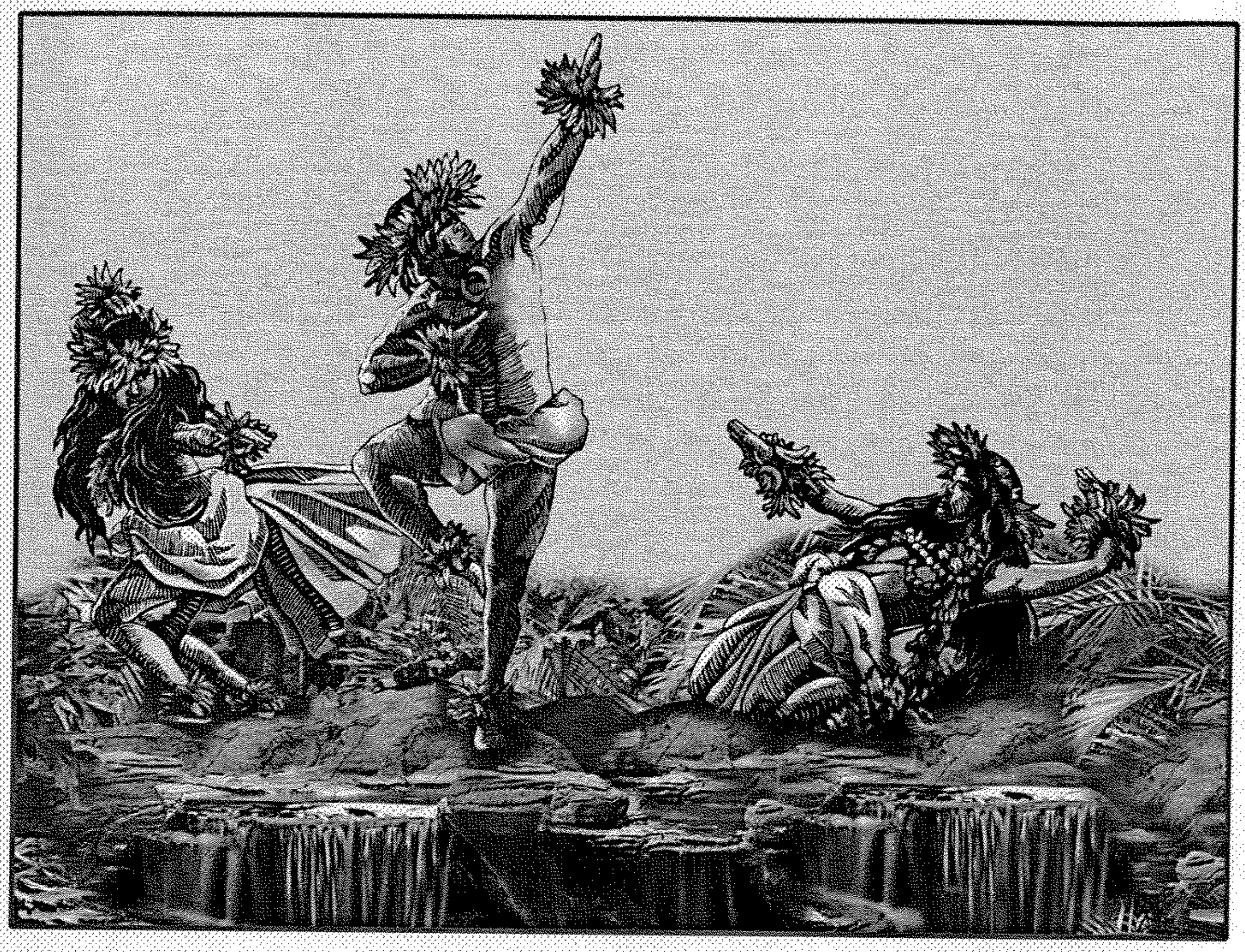
APPENDICES

Hilton Hawaiian Village – Waikikian Development Plan
Revisions to the Draft Environmental Impact Statement Volume II (Appendices)

SECTION	CHANGE
Appendix A	Changed architectural plans from Preferred Alternative to Mitigative Alternative. Revised title accordingly.
Appendix B	Added Hilton Waikikian Site Traffic Impact Study Supplement Final Report.
Appendix F	Provided additional information based on air quality modeling.
Appendix G	Revised Shadow Analysis to Assess Mitigative Alternative.
Appendix H	Included new Supplementary Pedestrian Wind Assessment for the Mitigative Alternative.
Appendix I	Included additional research with regard to two socio-economic issues.



Appendix A
Architectural Plans for the Mitigative Alternative

AREA SUMMARY - MITIGATIVE ALTERNATIVE

November 1, 2001

COST CENTER	NOS.	DESCRIPTION	NO. OF. MODS	NET SF	BUILDING AREA	F.A.R. SF	NON F.A.R SF
A		**TOWER**					
		GUEST UNITS & BALCONIES					
	103	1-BR UNITS (@2 MODS) 30%	357.5 X 206	715.00	73,645.00	73,645.00	0.00
	228	2-BR UNITS (@3 MODS) 67%	344.5 X 684	1,033.50	235,638.00	235,638.00	0.00
	10	3-BR UNITS (@4 MODS) 3%	344.5 X 40	1,378.00	13,780.00	13,780.00	0.00
		SUB TOTAL			**323,063.0**	**323,063.00**	**0.00**
	341	TOTAL GUEST UNITS					
		BALCONIES			32,463	0	32,463
		ELEVATOR SHAFTS			23,300	23,300	
		GROUND FLOOR ELEVATOR SHAFTS			700	700	0
		MAID/SERVICE/CIRCULATION (tower only)			70,154	70,154	0
		STAIRS (Tower,lobby & parking levels)			15,763	15,763	0
		LOBBY/LOUNGE (incl. Concierge, Circ. & Parking Elev lobbies)			7,605	7,605	0
		GROUND PUBLIC CIRCULATION Incl. Exit Stairs			5,187	5,187	0
		MECHANICAL (at roof)			2,080	2,080	0
		BOH/ STORAGE AT PARKING LEVELS			20,134	20,134	0
		ADMIN OFFICES			2,313	2,313	0
		GENERATOR			403	403	0
		MECHANICAL (Assumes Stand Alone Plant)			4,979	4,979	0
		LOADING/TRUCK DOCK			1,487	1,487	0
		BOH /SERVICE CIRCULATION			1,681	1,681	0
		SERVICE DRIVEWAY			7,987	0	7,987
		TOWER SUB TOTAL			**519,299**		
B		**PARKING**			**49,884**	0	49,884
C		**COMMON PORTE COCHERE/ARRIVAL PLAZA**					
		PORTE COCHERE			2,051	0	2,051
		COVERED WALKWAY			7,384	7,384	0
		FRONT DESK/OFFICE			1,357	1,357	0
		PORTE COCHERE SUBTOTAL			**10,792**		
D		**RETAIL SHOPS**					0
		RETAIL SHOPS (Excl. Sundry Shop)			8,889	8,889	0
		SUNDRY SHOP (at lobby level)			1,571	1,571	0
		RETAIL SHOPS SUBTOTAL			**10,460**		
E		**RESTAURANT**					0
		RESTAURANT (Incl Pool Bar)			**2,500**	2,500	0
F		**SITEWORK**					0
		WEDDING CHAPEL			**1,200**	1,200	0
		SUBTOTAL			**594,135**	***501,750***	**92,385**
		Undefined Area (10%)				***50,175***	
		TOTAL				***551,925***	

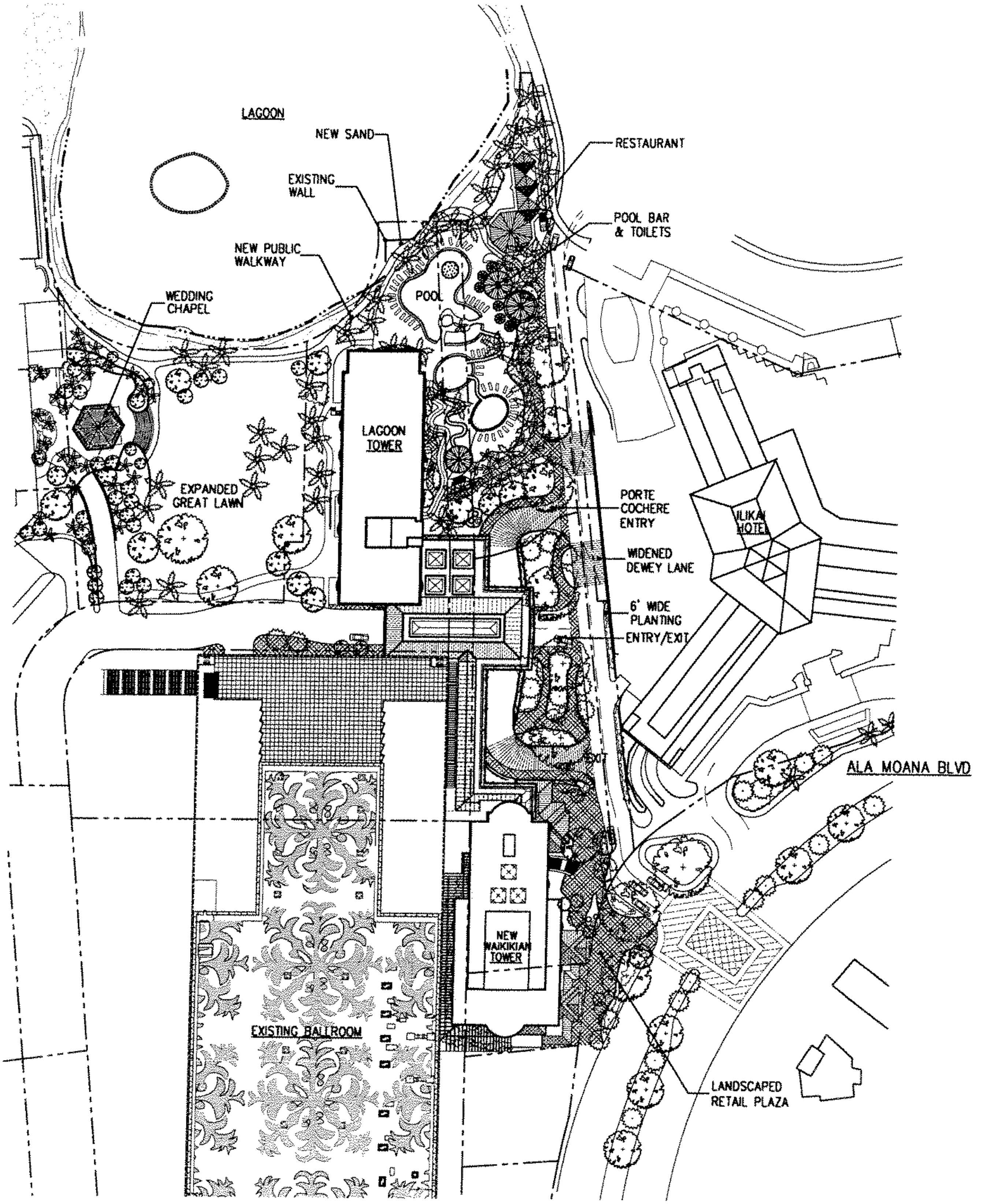
REQUIRED PARKING

Units (0.25 stall per unit)	341	0.25	85.25
Retail (1 stall per 800sf)	10,460	800	13.08
Restaurant (1stall per 800sf)	2,500	800	3.13
Admin Office (1 stall per 800 sf	2,313	800	2.89
Front Office (1 stall per 800sf)	1,357	800	1.70
Total Required Parking			106.04 ***say 106 stalls***
NEW PARKING	**120**		

Waikikian + HHV Parcels TMK 2-6-09: 01,09,11,12 & 2-6-08;34 FAR

November 2001

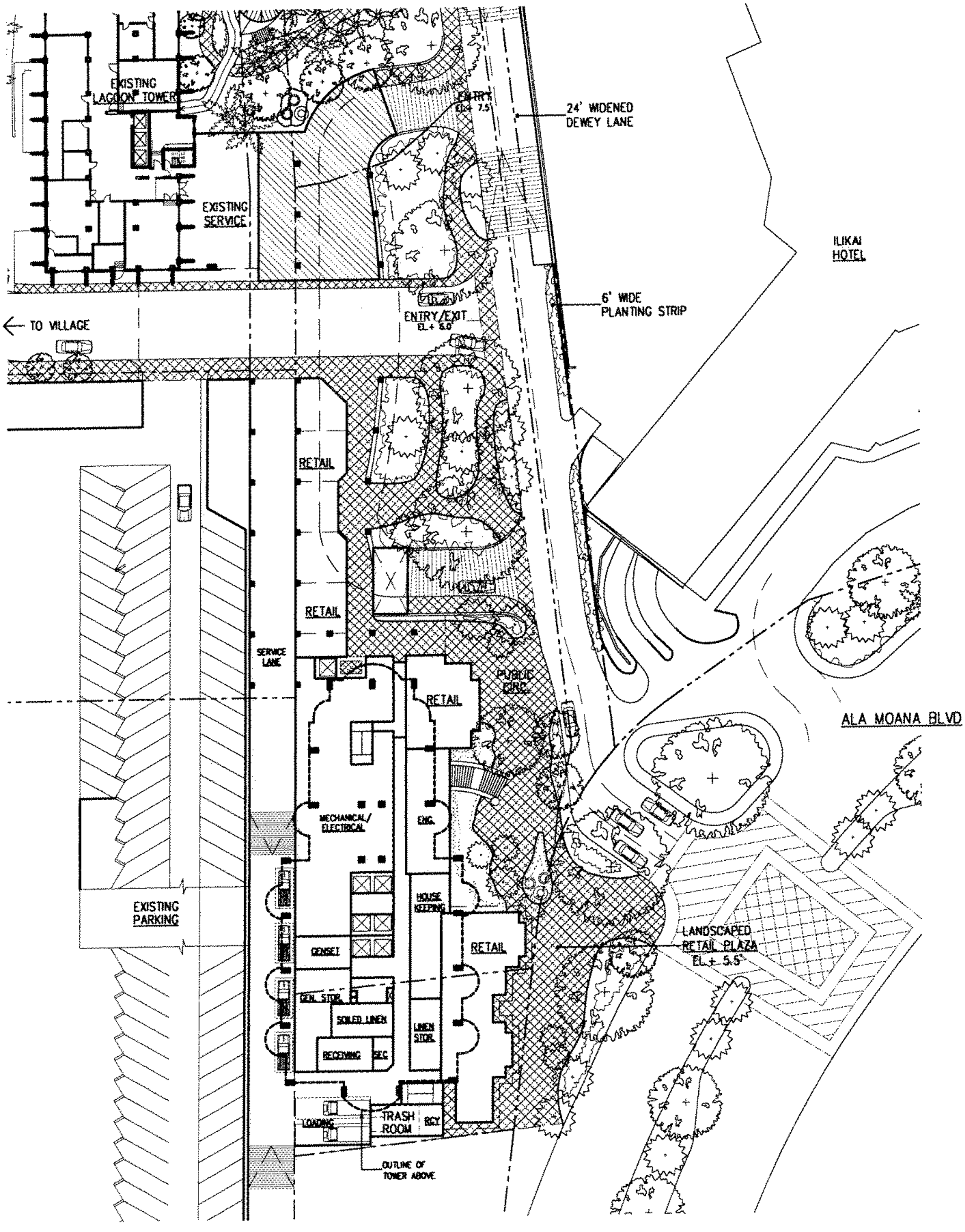
Description	TMK	Land Area (sf)	Existing LUO floor area
Lagoon Tower	2-6-09:01	70,000	286,110
Parking/CB & Rainbow Bazaar	2-6-09:09	131,645	137,754
Parking/CB	2-6-09:09		93,992
Rainbow Bazaar	2-6-09:09		43,762
Parking/CB & Rainbow Bazaar	2-6-09:12	56,428	0
Roadway	2-6-09:11	37,984	0
Tapa Tower, Rainbow Tower, Entry Bldg., Louis Vitton, & Retail Shops		394,518	1,350,575
Tapa Tower	2-6-08:34	394,518	947,364
Rainbow Tower	2-6-08:34		370,301
Entry Building	2-6-08:34		26,000
Louis Vitton	2-6-08:34		3,502
Retail Shops	2-6-08:34		3,408
Subtotal		690,575	1,774,439
Waikikian	2-6-9:10	29,374	551,925
	2-6-9:2	45,105	
	2-6-9:3	8,080	
Subtotal		82,559	551,925
Total (Waikikian)		82,559	
TOTAL		773,134	2,326,364
FAR Multiplier			**3.0090**
1/2 ROW Kalia Bonus		69,580	0
1/2 ROW Ala Moana, Dewy, Holomoana Bonus		31,000	0
GRAND TOTAL		873,714	2,326,364
FAR Mutiplier w/ ROW Bonus			***2.6626***



SITE/ROOF PLAN

SCALE: 1/128" : 1'-0"

WAIKIKIAN

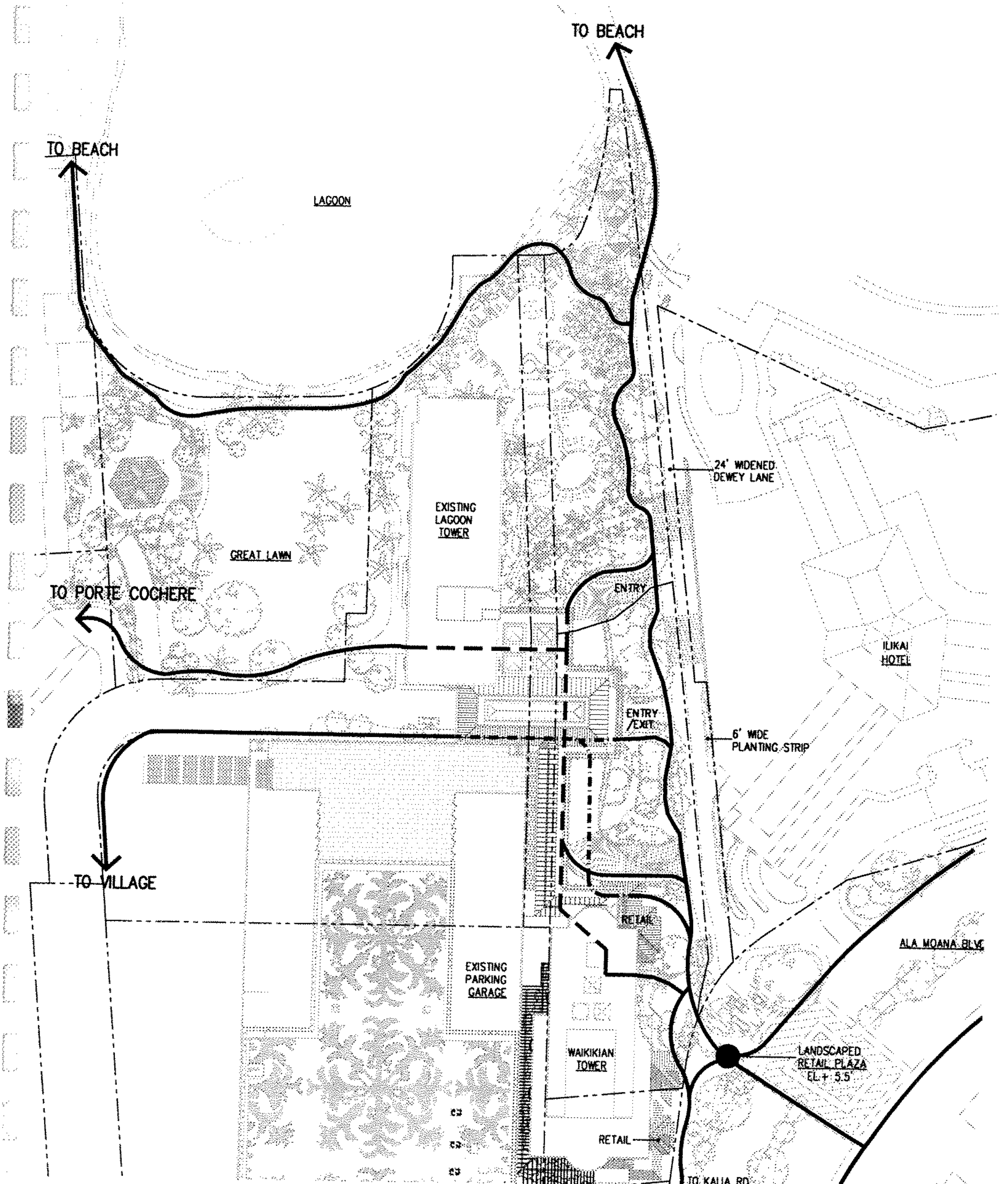


GROUND LEVEL PLAN EL.+4.5'/6.0'

SCALE: 1/64" : 1'-0"

WATG

WAIKIKIAN



PEDESTRIAN CIRCULATION DIAGRAM

NOT TO SCALE

A-2

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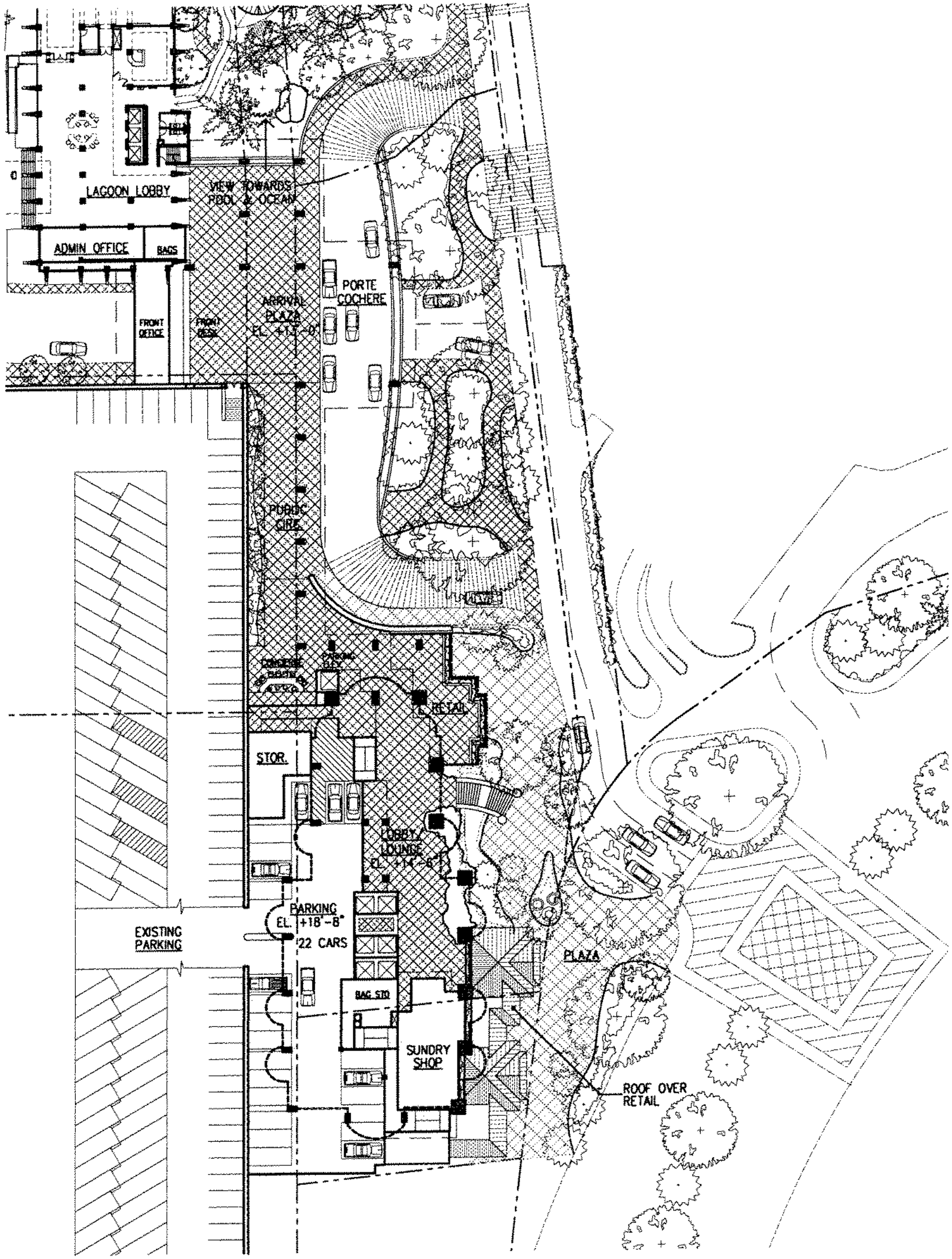
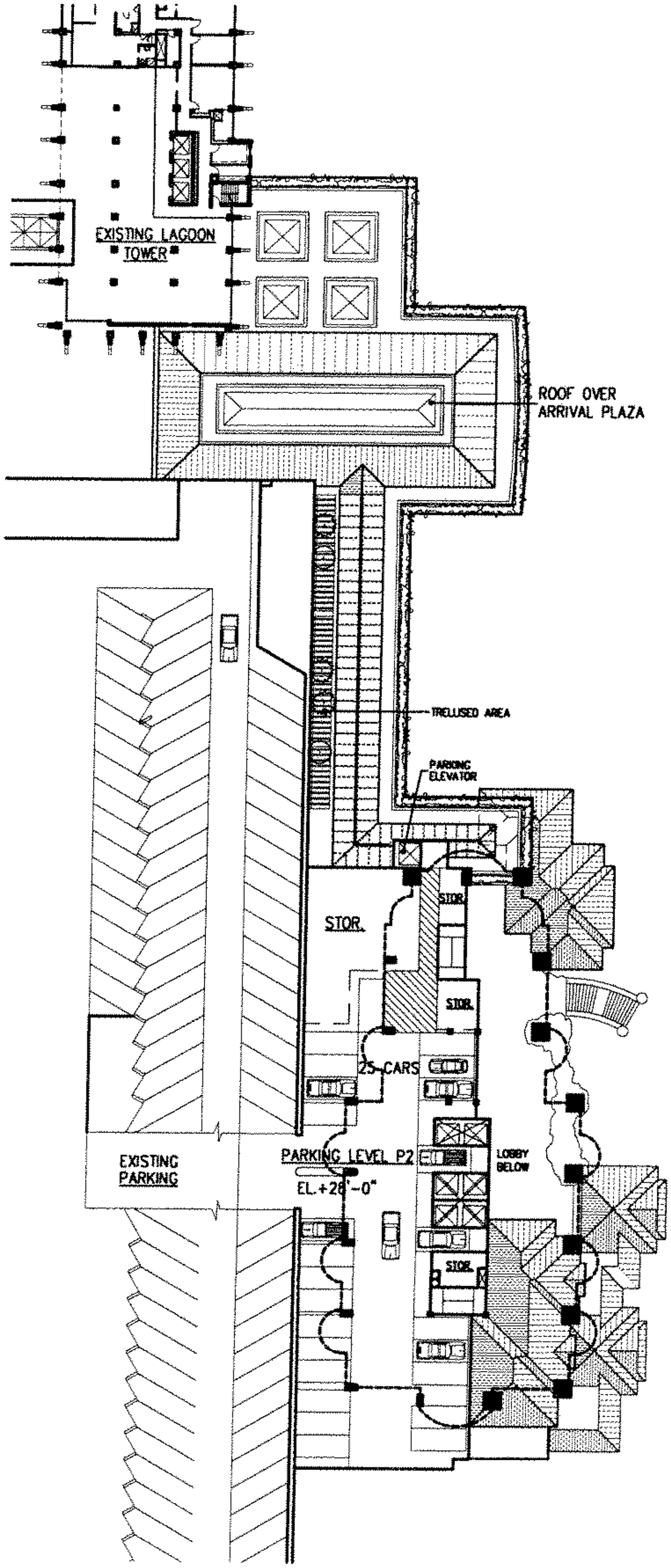


LOBBY LEVEL PLAN/P1

SCALE: 1/64" : 1'-0"



PARKING LEVEL P2 EL.+28'-0"

SCALE: 1/64" : 1'-0"

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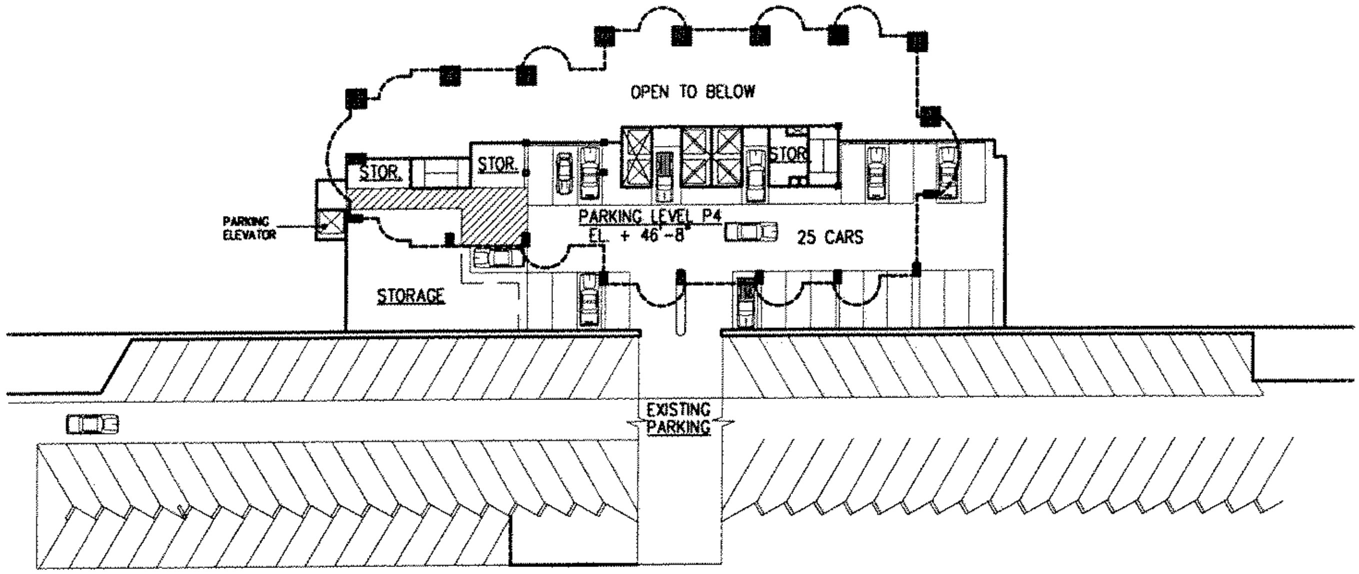

PARKING LEVEL P4 EL.+46'-8"

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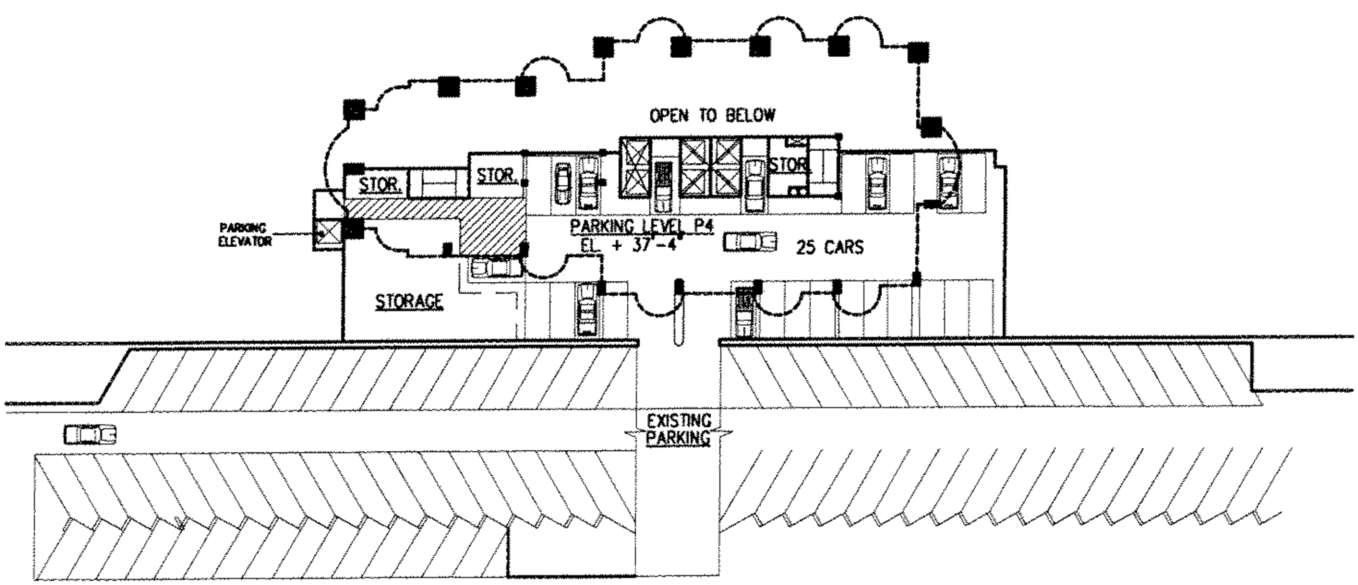
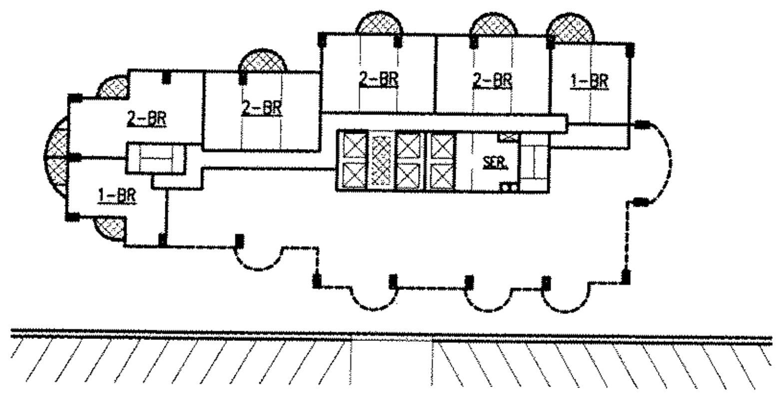


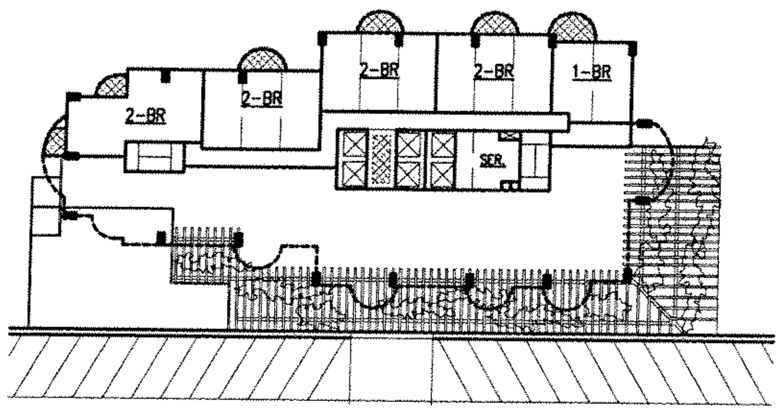
PARKING LEVEL P3 EL.+37'-4"

SCALE: 1/64" : 1'-0"



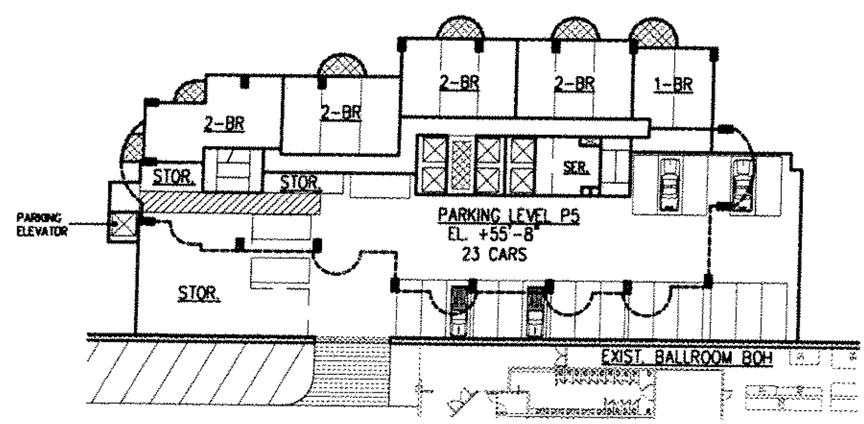
TOWER LEVEL 3

SCALE: 1/64" : 1'-0"



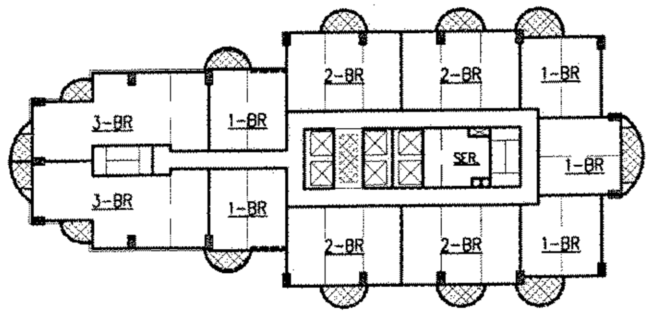
TOWER LEVEL 2

SCALE: 1/64" : 1'-0"



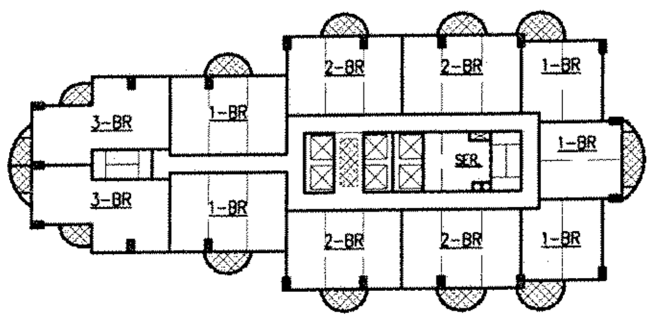
TOWER LEVEL 1

SCALE: 1/64" : 1'-0"



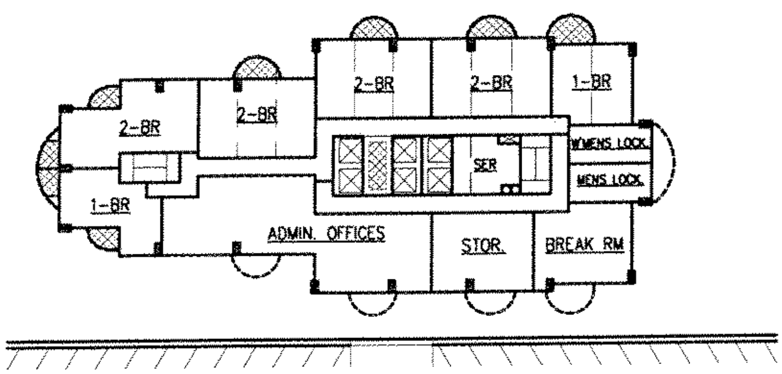
TOWER LEVELS 29-33

SCALE: 1/64" : 1'-0"



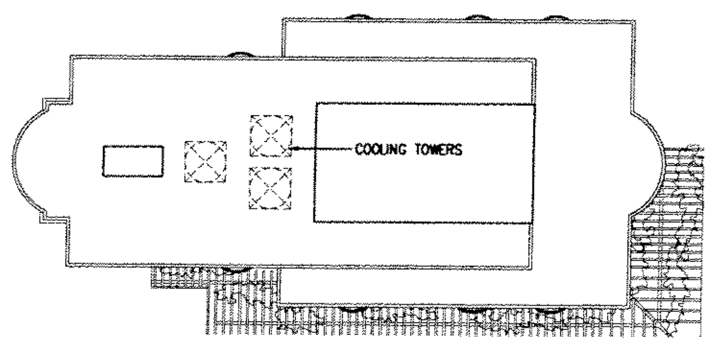
TOWER LEVELS 5-28

SCALE: 1/64" : 1'-0"



TOWER LEVEL 4

SCALE: 1/64" : 1'-0"



MECHANICAL LEVEL

SCALE: 1/64" : 1'-0"

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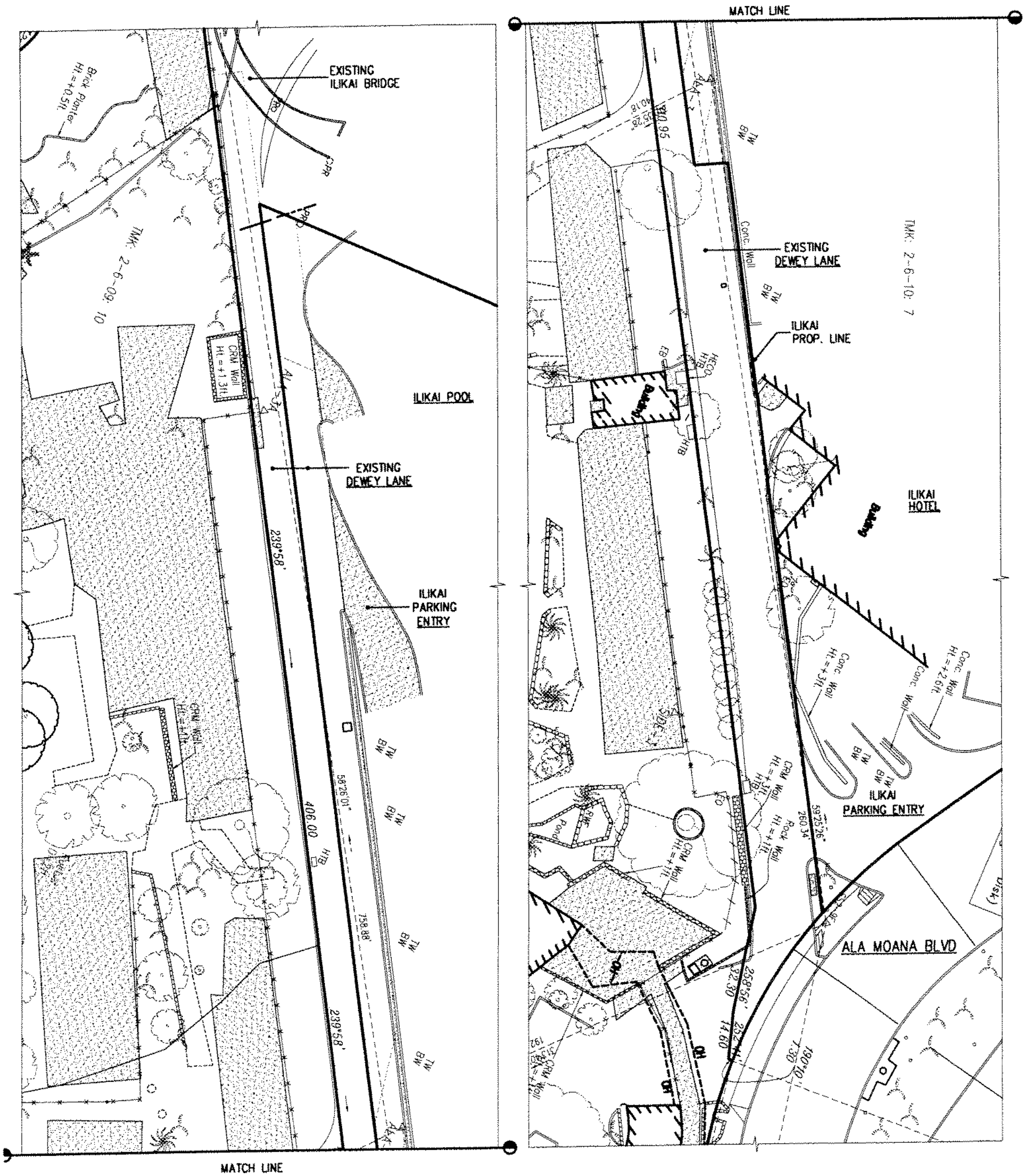

DEWEY LANE PLAN SURVEY

SCALE: 1"=40'

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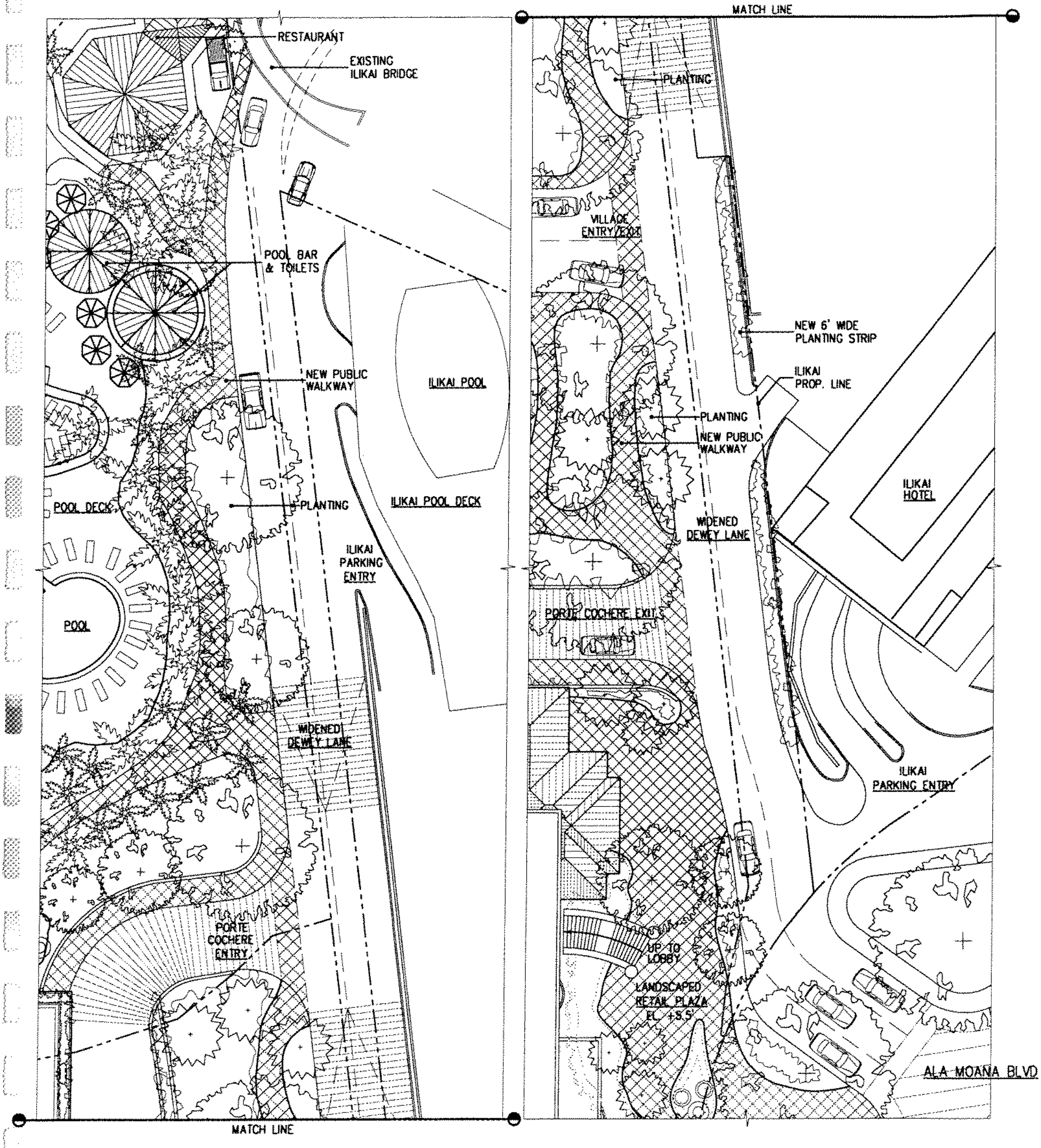
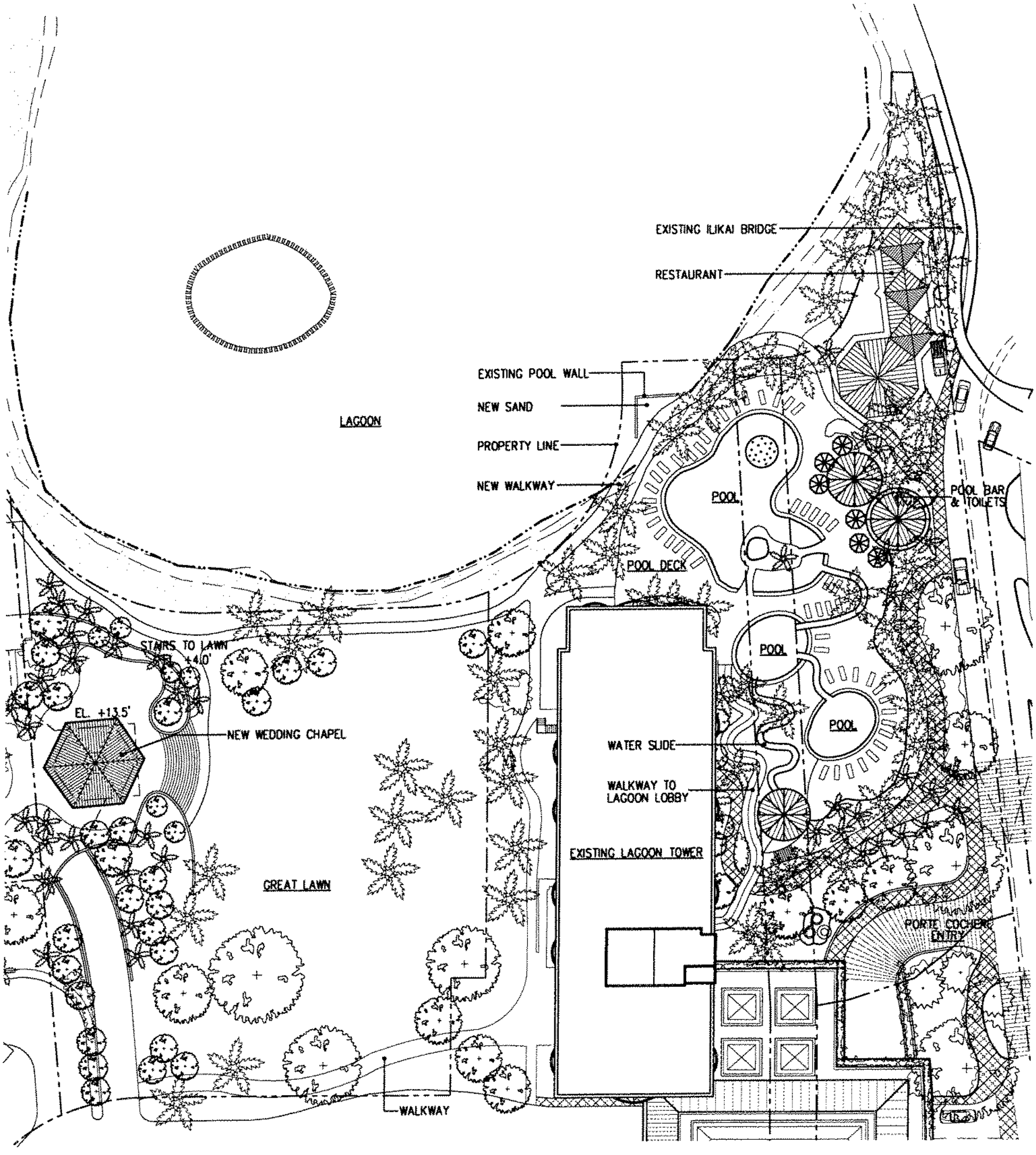


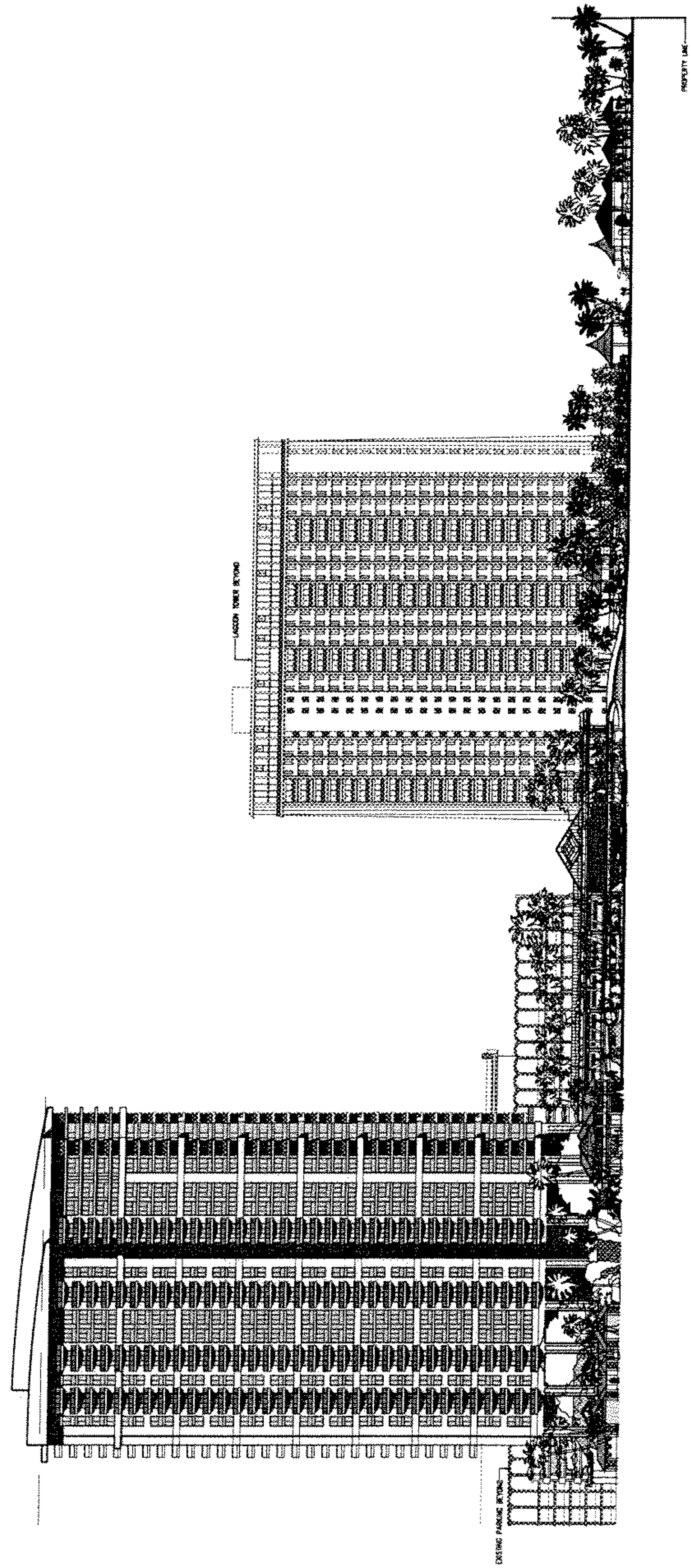
NEW DEWEY LANE PLAN

SCALE: 1"=40'



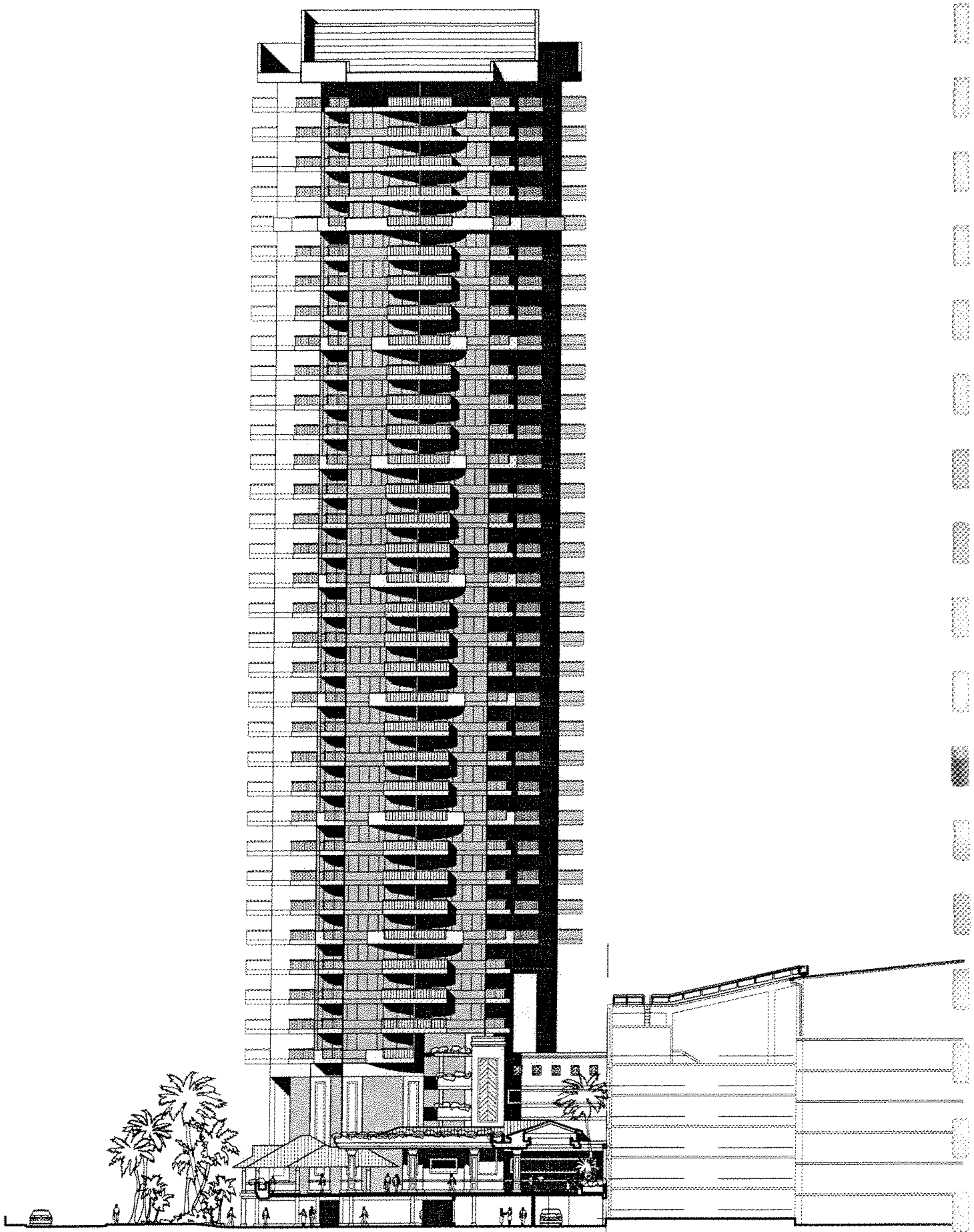
ENLARGED MAKAI PLAN

SCALE: 1"=40'



A EWA ELEVATION

SCALE: 1"=100'-0"

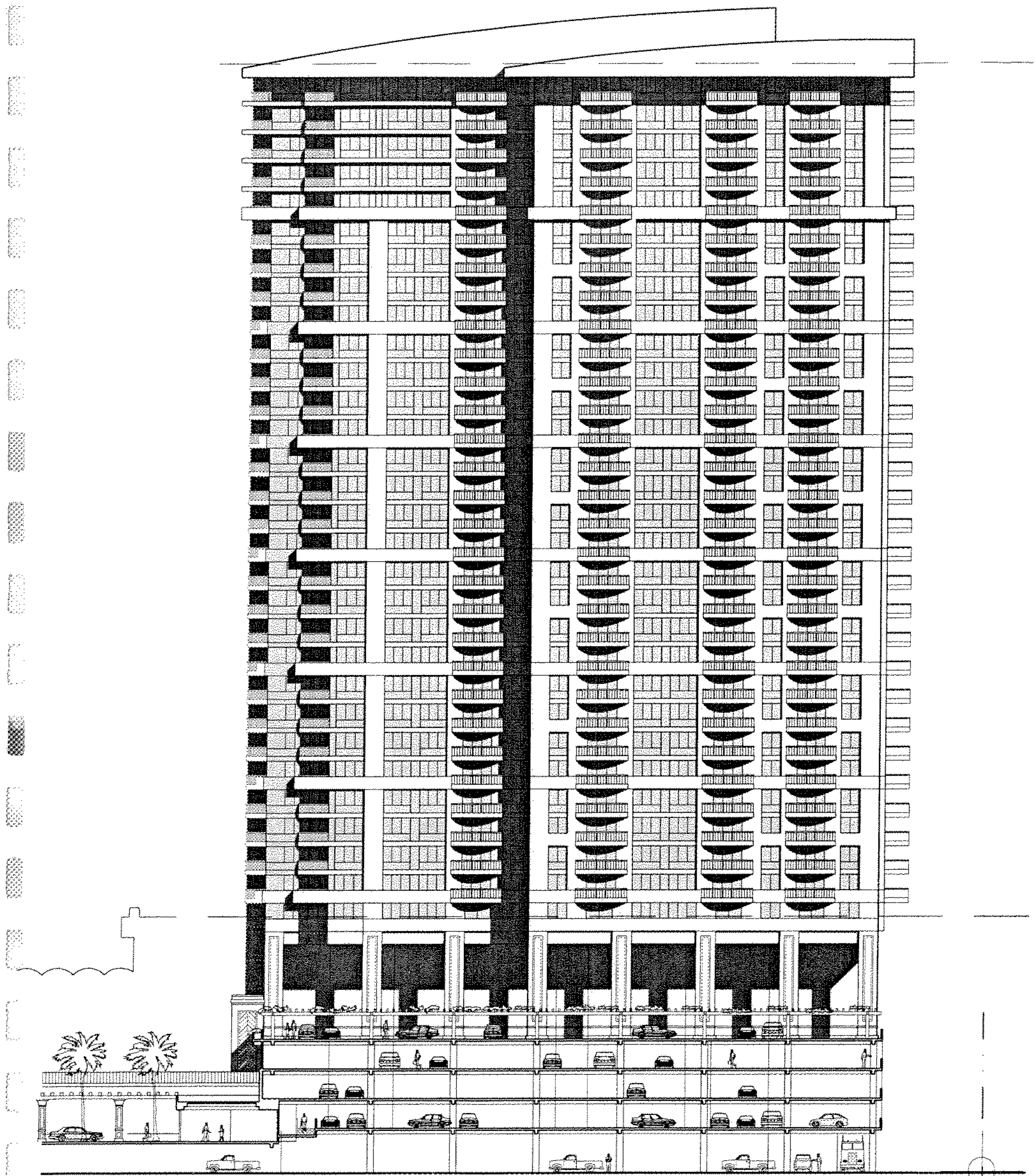


B MAKAI ELEVATION

SCALE: 1"=40'-0"

WATG

WAIKIKIAN



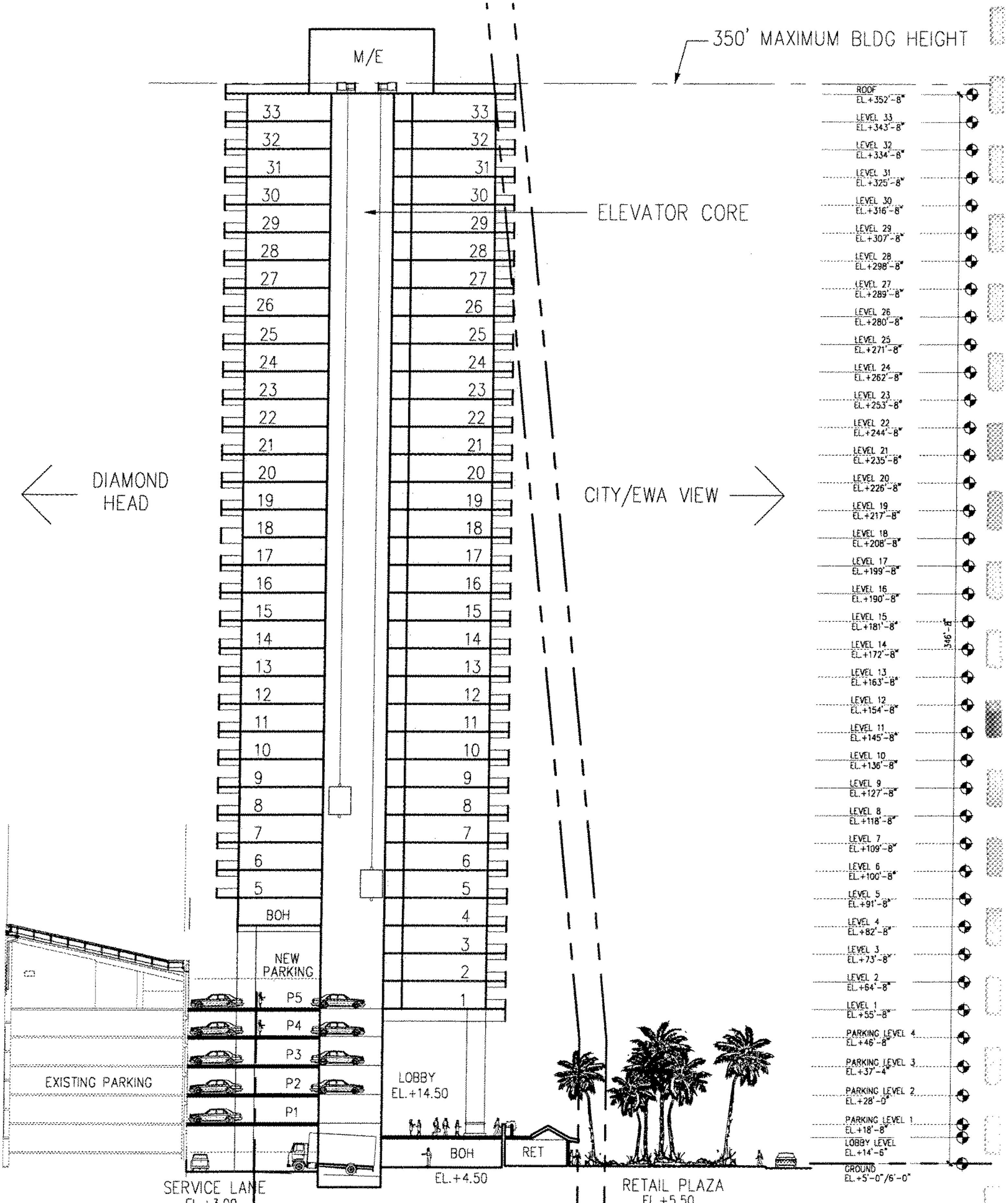
DIAMOND HEAD ELEVATION

(C) SCALE: 1"=40'-0"

WATG

A-14

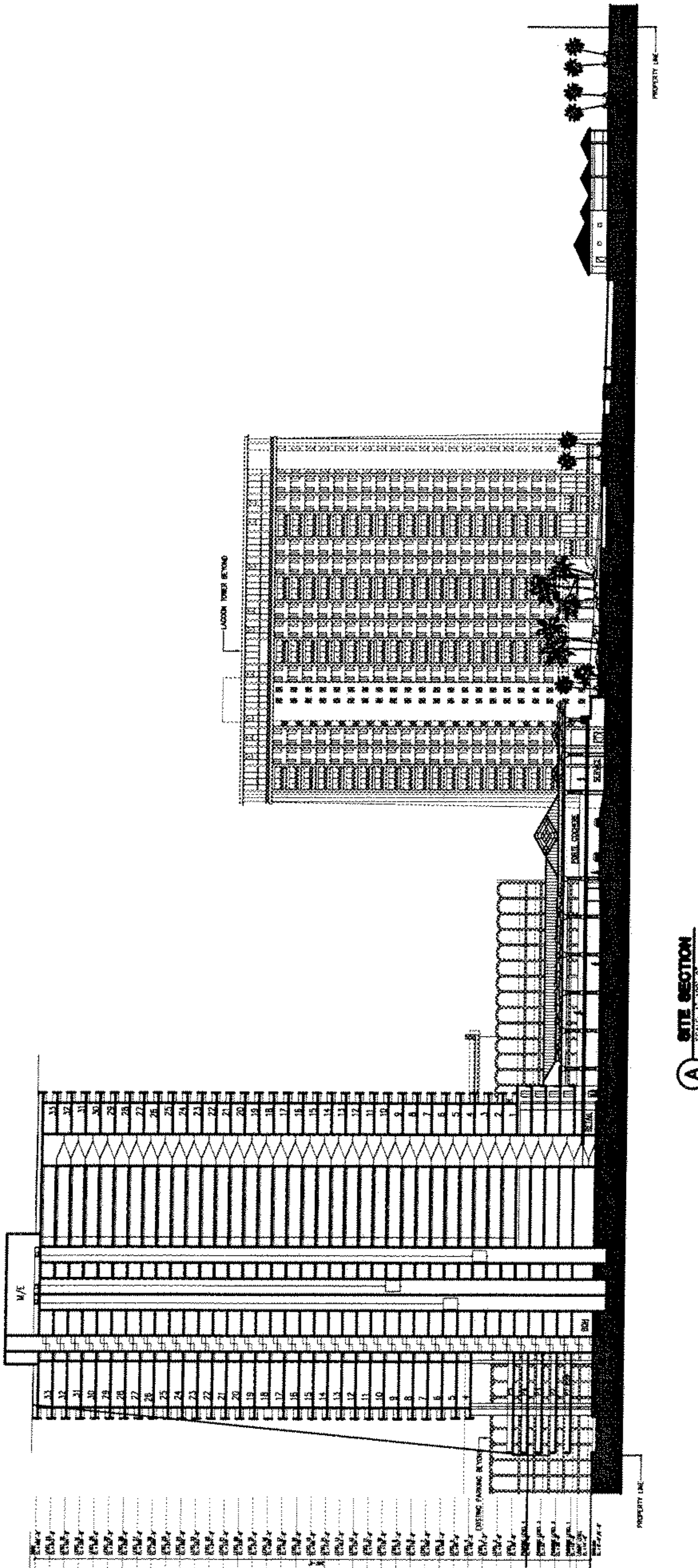
WAIKIKIAN



D **CROSS SECTION**
SCALE: 1"=40'-0"

A-15

WAIKIKIAN



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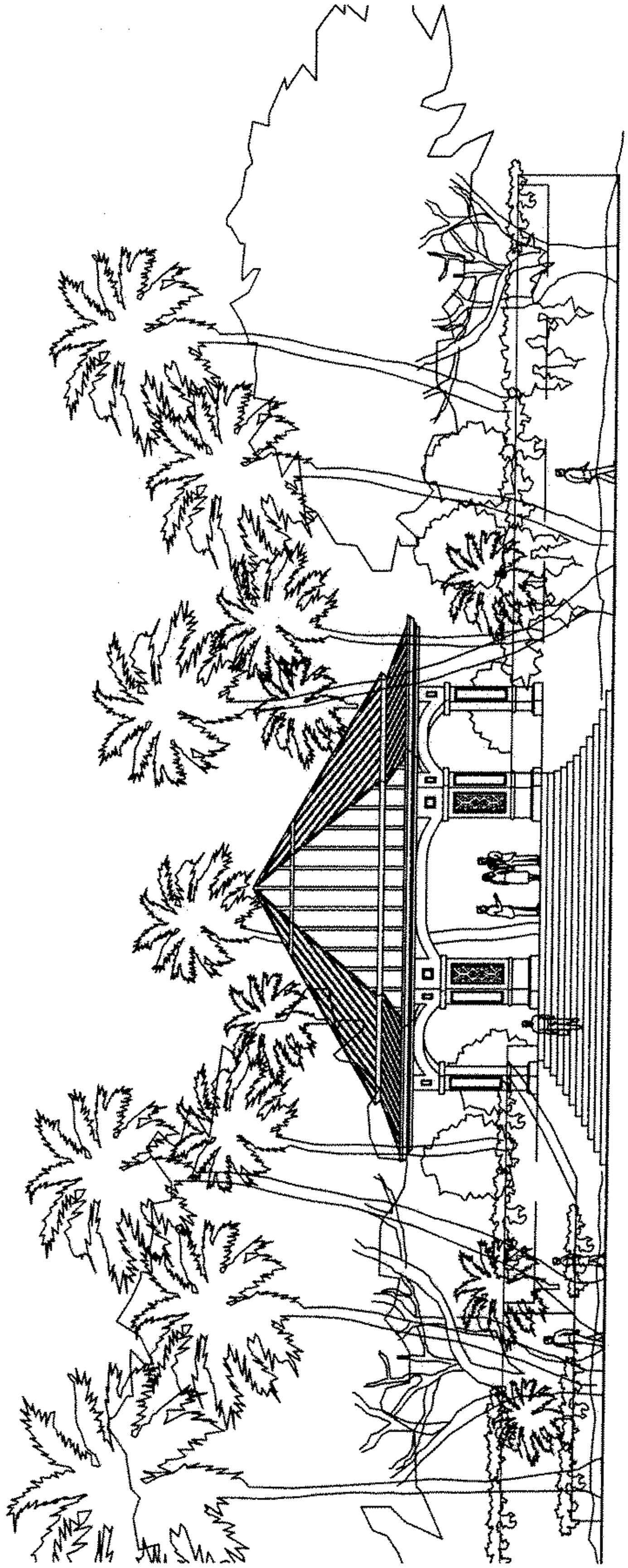
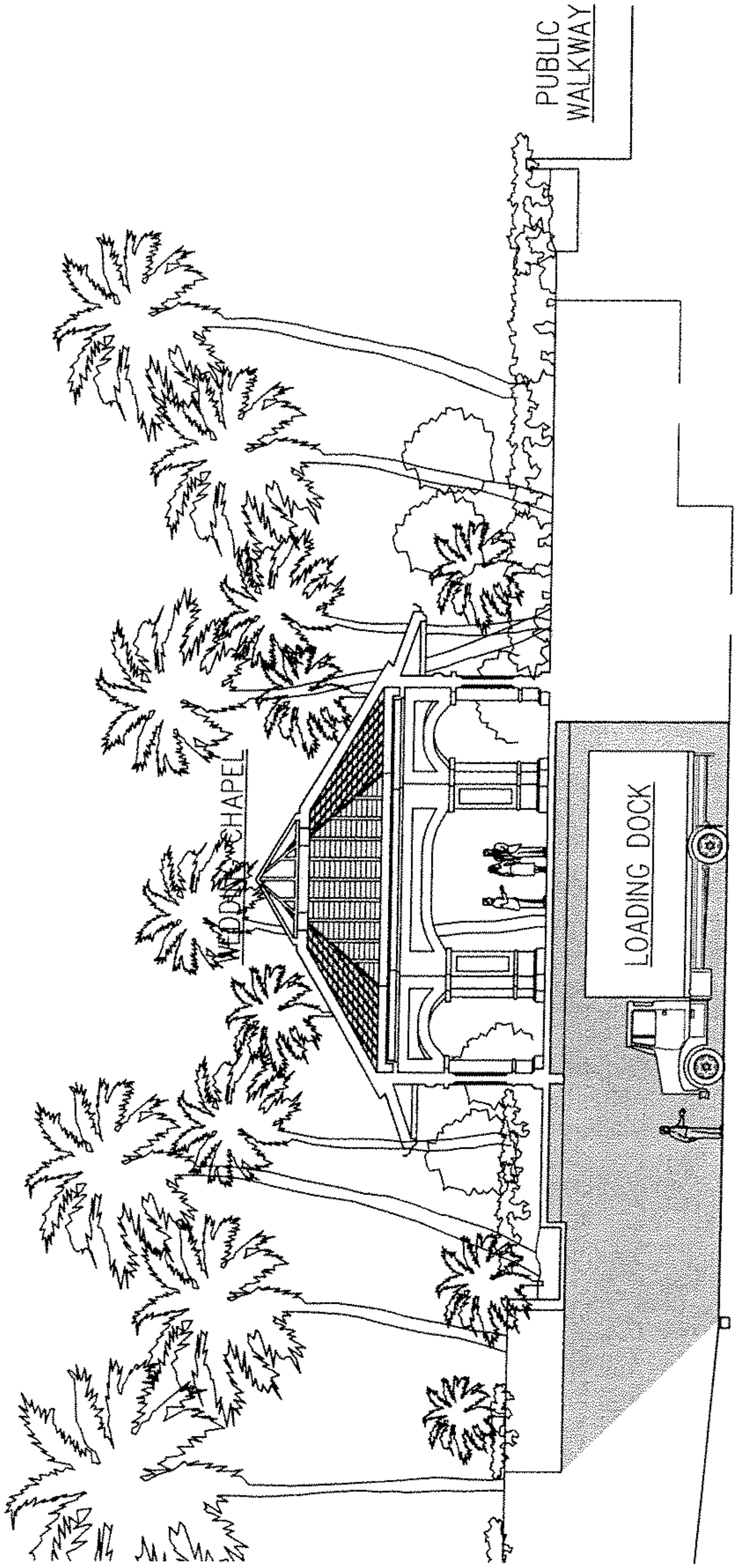
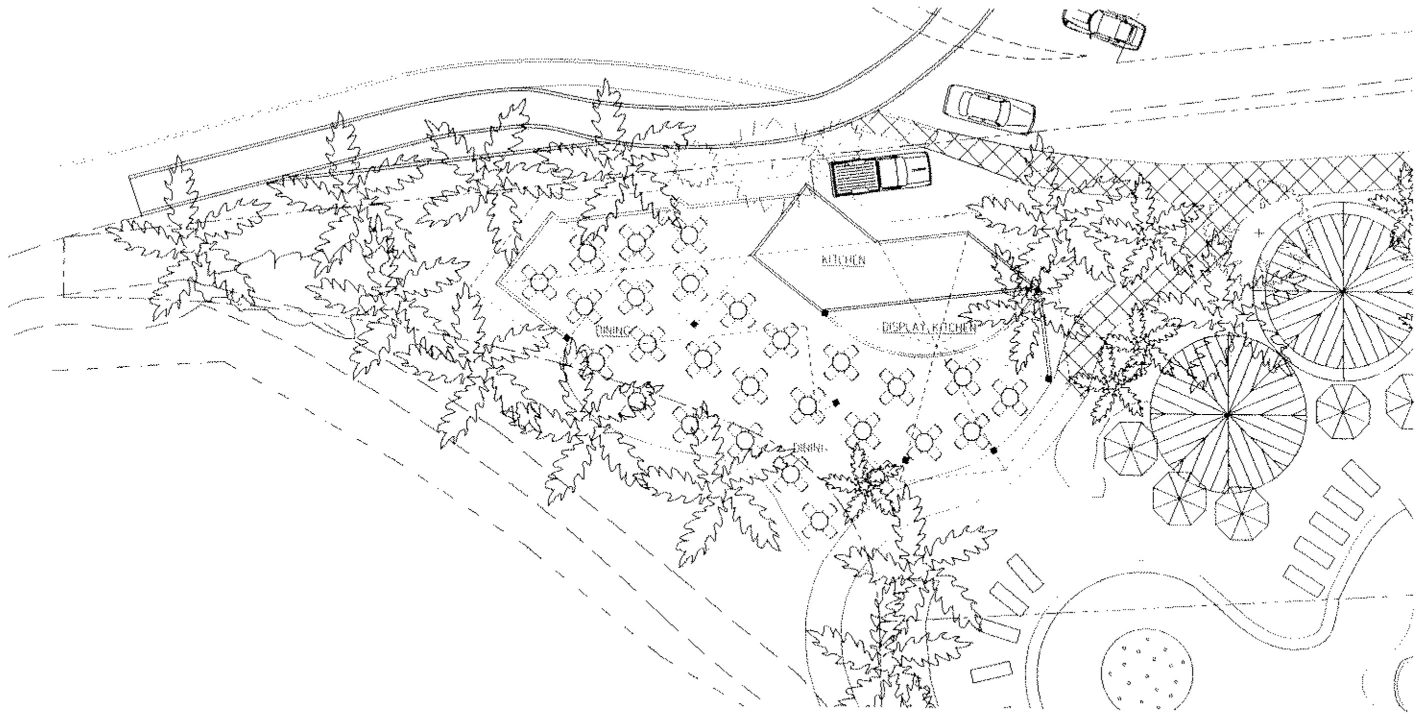


A WEDDING CHAPEL ELEVATION
SCALE 1/8"=1'-0"



A WEDDING CHAPEL SECTION



1 RESTAURANT FLOOR PLAN

EWA
MAKAI
MAUKA
DIAMOND HEAD

WAIKIKIAN

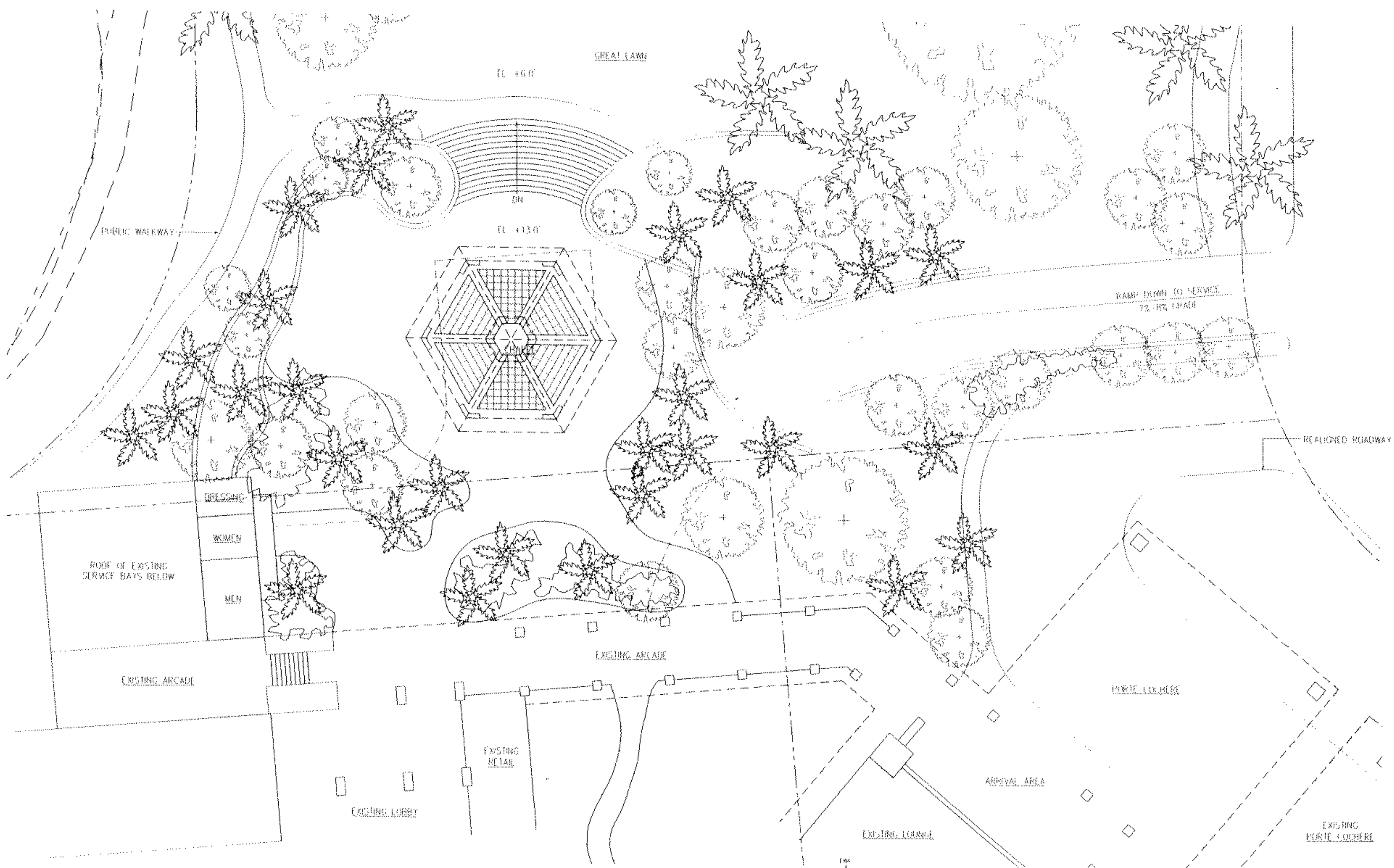
Hilton Hawaiian Village

ARCHITECTURAL

SCHEMATIC DESIGN

SHEET TITLE

Wimberly Allison Tong & Goo



1 WEDDING CHAPEL FLOOR PLAN

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

Wimberly Allison Tong & Goo

WAIKIKIAN

Hilton Hawaiian Village

ARCHITECTURAL

SCHEMATIC DESIGN

SHEET TITLE

2 WEDDING CHAPEL FLOOR PLAN
SCALE: 1/8" = 1'-0"

Wimberly Allison Tong & Goo

WAIKIKIAN

Hilton Hawaiian Village

ARCHITECTURAL

SCHEMATIC DESIGN

SHEET TITLE

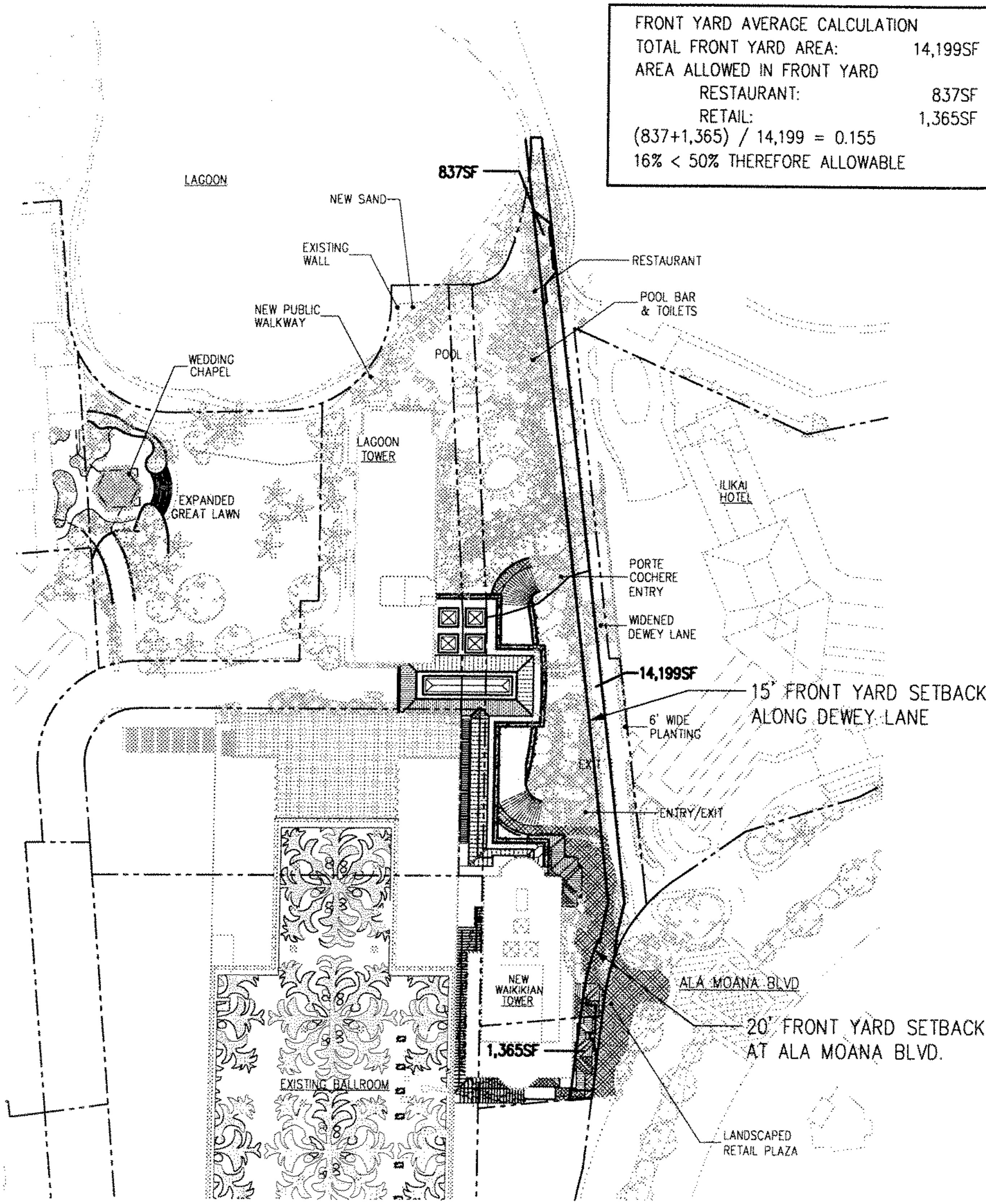
	L.U.O. Requirement PD-R	Waikikian Development
Density:	Maximum allowable FAR multiplier: 4.0 *Sec. 21-9.80-4(d)3.A*	FAR multiplier of 3.33 (includes 10% as undefined floor area)
Front Yard Setback:	20 feet along Ala Moana Boulevard. 15 feet along Dewey Lane and Holomana Street *Table 21-9.b(B)*	Please refer to Front Yard Setback Averaging Diagram.
Front Yard Averaging	50% Maximum *Table 21-9.1*	Front yard setback equals 18%. Please refer to Front Yard Setback Averaging Diagram.
Side Yard Setback	0 feet *Table 21-9.6(B)*	Varies.
Heights	Maximum building height: 350 feet not including mechanical equipment. *Sec. 21-9.80-4(d)3.C*	349'-8" to roof top plus parapet and mechanical equipment. Note: this height is measured from the plaza at elevation 6 feet
Transitional height setbacks:	Equals 1 foot for every 10 feet of height above 40 feet. *Sec. 21-9.80-6(c)2*	Proposed development transgresses transitional setback at Mauka end and Mauka / Ewa corner. Please refer to transitional setback diagram.
Open space:	50% when greater then 1.5 FAR multiplier. *Sec. 21-9.80-6(c)1*	o 52% Waikikian and HHV parcels combined
Off Street Parking:	Resort Mixed Use Precinct Hotel Use (Table 21-6.3) 1per .25 per dwelling unit 1 per 800 sq. ft. 434 units *0.25 = 85.75 12,000sf /800sf per stall = 15 stalls Total Required: 106 stalls	120 parking stalls provided
Off- Street Loading:	Hotel use 3 @ 12'Wx35'Lx14'H 3 @ 8.5'Wx19'Lx10'H *Sec. 21-6.100*	3 @ 12'Wx35'Lx14'H 3 @ 8.5'Wx19'Lx10'H
Landscaping:	*Sec. 21-9.80-4 (f)*	TBD

FRONT YARD AVERAGE CALCULATION

TOTAL FRONT YARD AREA:	14,199SF
AREA ALLOWED IN FRONT YARD	
RESTAURANT:	837SF
RETAIL:	1,365SF

(837+1,365) / 14,199 = 0.155

16% < 50% THEREFORE ALLOWABLE

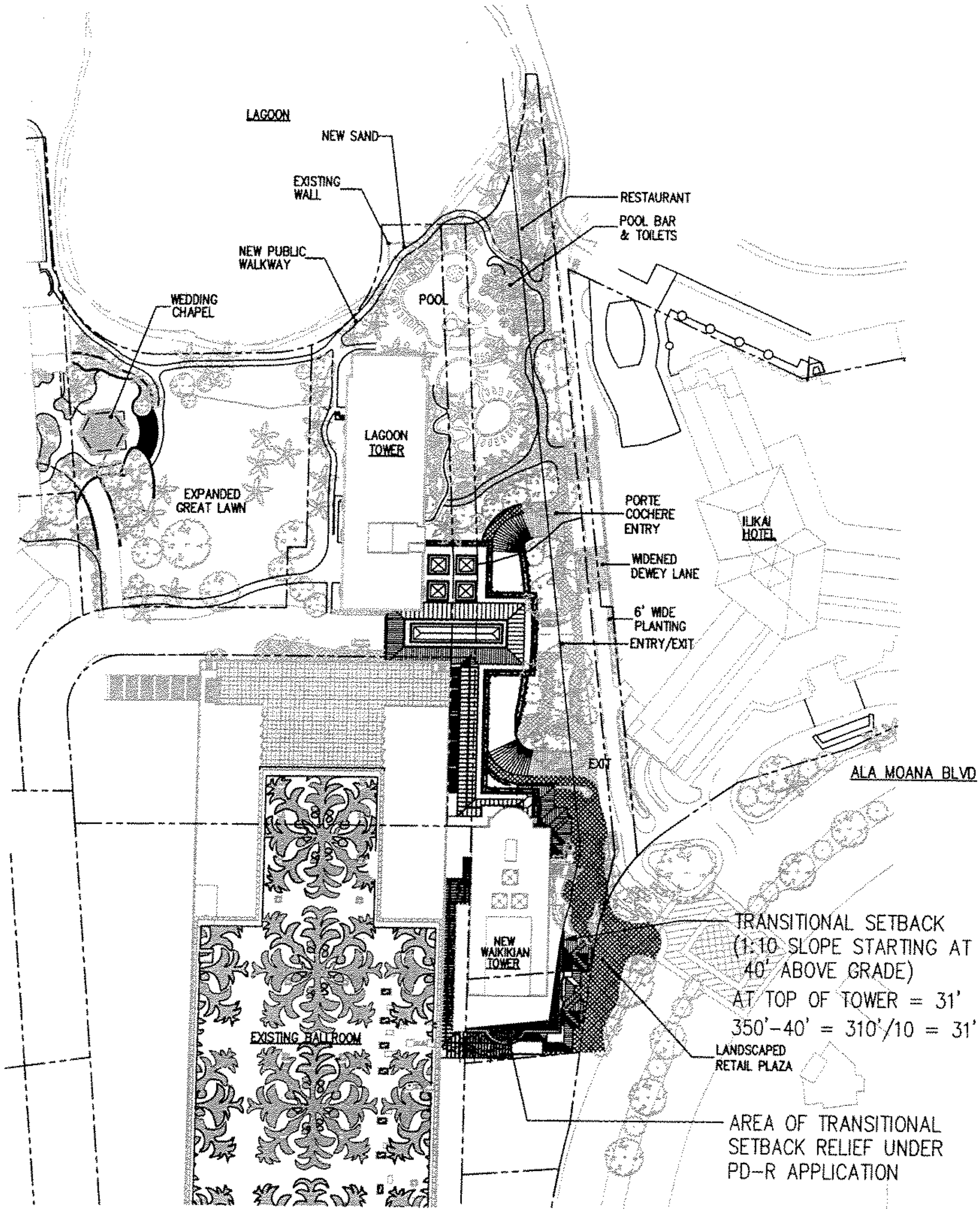


FRONT YARD SETBACK

SCALE: 1/128" : 1'-0"

WATG

WAIKIKIAN



TRANSITIONAL SETBACK

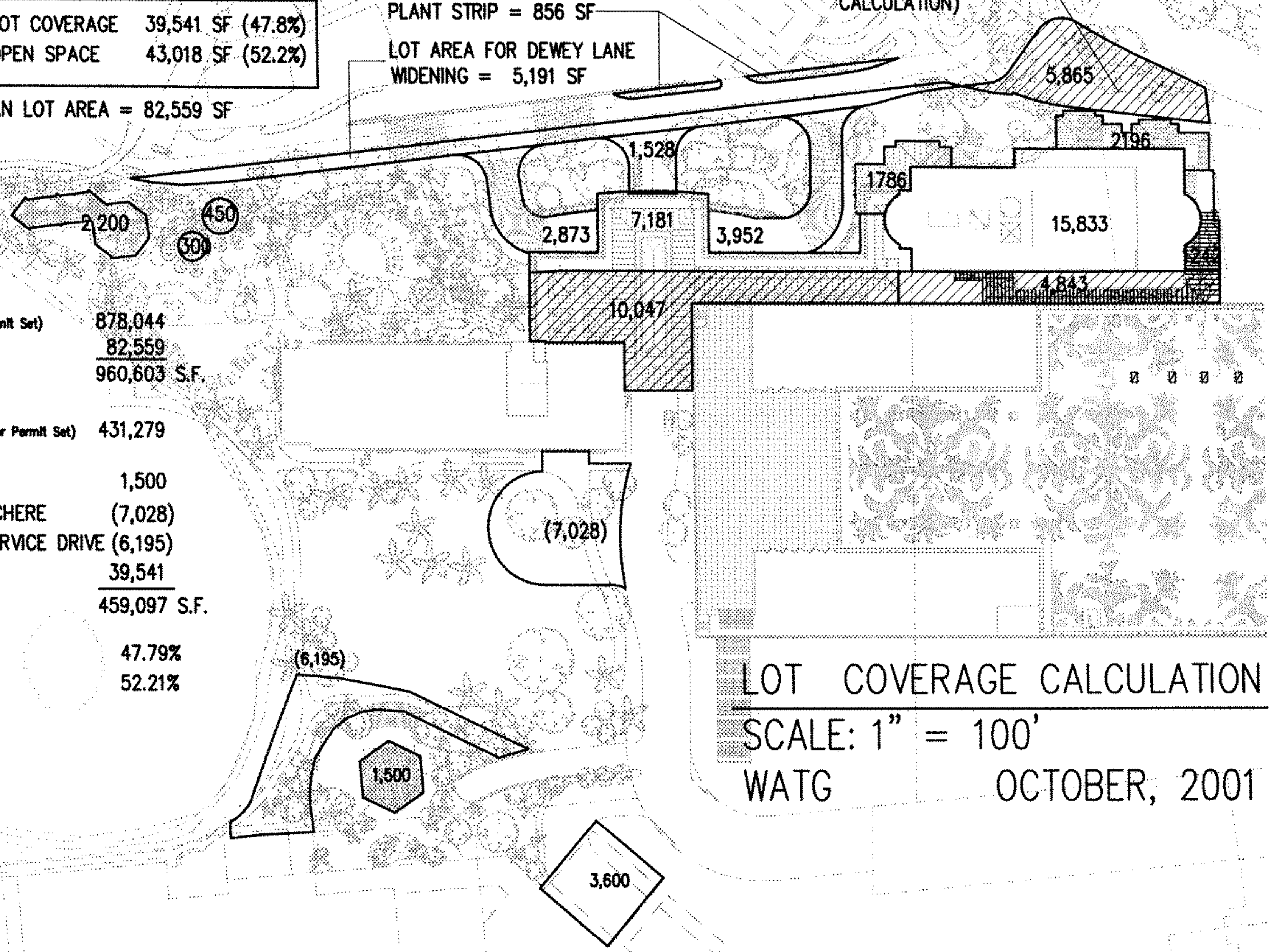
SCALE: 1/128" : 1'-0"

WAIKIKIAN

RETAIL	3,982
PORTE COCHERE/CIRC.	7,181
DRIVEWAY	8,353
RESTAURANT	2,200
PARKING	1,242
POOL BAR	300
TOILETS	450

TOTAL LOT COVERAGE	39,541 SF (47.8%)
TOTAL OPEN SPACE	43,018 SF (52.2%)

WAIKIKIAN LOT AREA = 82,559 SF



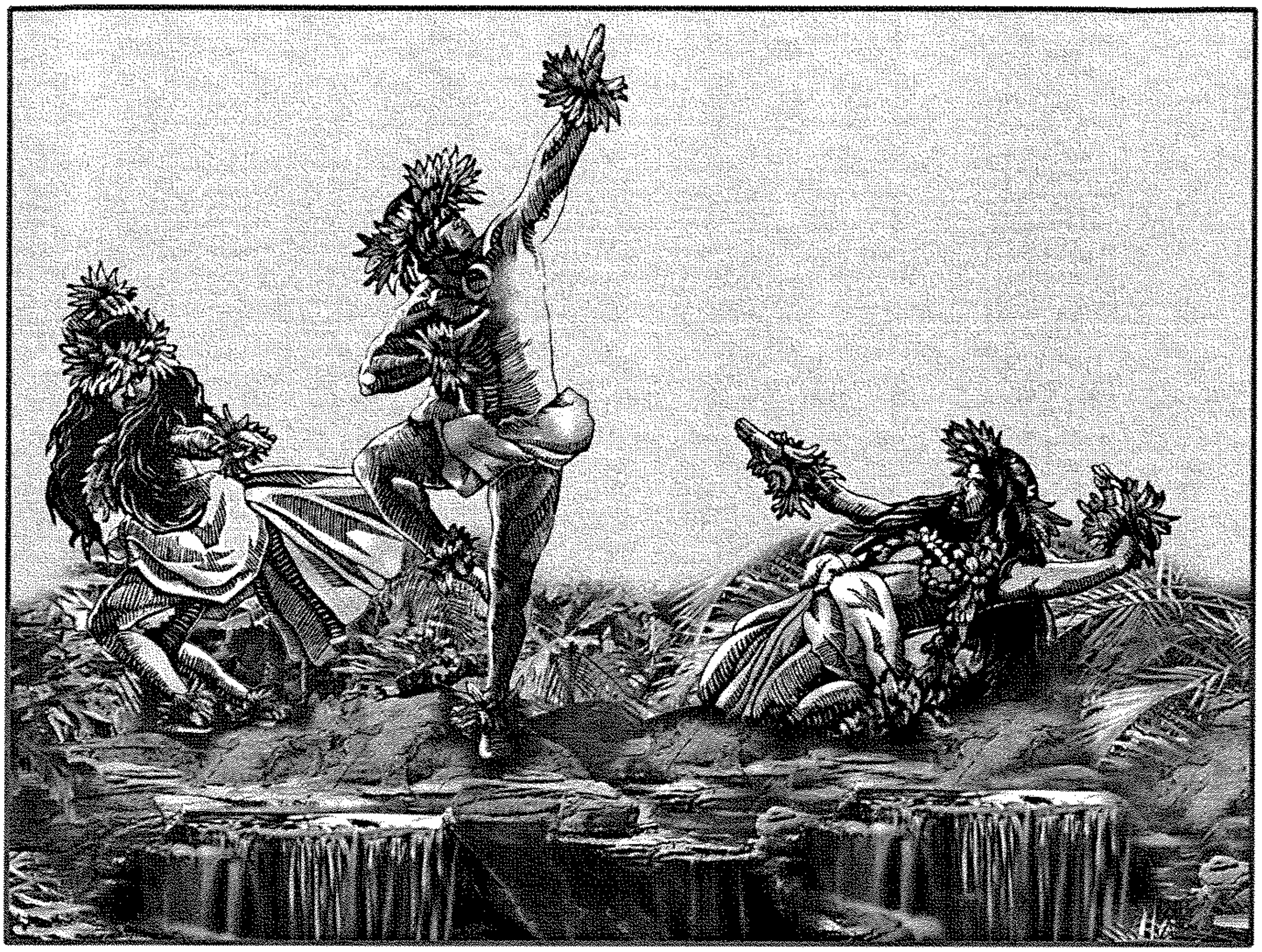
HHV & WAIKIKIAN
OPEN SPACE CALCULATION

HHV LAND AREA (From Kalia Tower Permit Set)	878,044
WAIKIKIAN LAND AREA	82,559
SUB TOTAL	960,603 S.F.
HHV LOT COVERAGE (From Kalia Tower Permit Set) (Includes Kalia Tower)	431,279
HHV WEDDING CHAPEL	1,500
HHV DEMO LAGOON PORTE COCHERE	(7,028)
HHV DEMO RAINBOW TOWER SERVICE DRIVE	(6,195)
WAIKIKIAN LOT COVERAGE	39,541
SUB TOTAL	459,097 S.F.
TOTAL LOT COVERAGE	47.79%
TOTAL OPEN SPACE	52.21%

LOT COVERAGE CALCULATION

SCALE: 1" = 100'

WATG OCTOBER, 2001



Appendix B

Hilton Waikikian Site Traffic Impact Study

Prepared by

Wilbur Smith Associates

HILTON WAIKIKIAN SITE

TRAFFIC IMPACT STUDY

Hilton Hawaiian Village, Waikiki

Prepared for

Belt Collins Hawaii

Prepared by

ENGINEERS
PLANNERS
ECONOMISTS
Wilbur Smith Associates

May 30, 2001

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ILLUSTRATIONS

TABULATIONS

EXECUTIVE SUMMARY

The new Waikikian project will be located along the ewa side of the Hilton Hawaiian Village, with the site extending from the Hilton Lagoon to the area northeast of the junction of Dewey Lane with Ala Moana Boulevard. The purpose of this traffic study is to assess the traffic impacts of the redevelopment of the Waikikian site and to assess potential effects of several potential changes to circulation near the Waikikian project.

PROJECT DESCRIPTION

The Waikikian is planned to include 350 visitor units, either hotel rooms or vacation ownership units, plus supporting uses focused on guests of the Hilton Hawaiian Village. These will include small retail shops, restaurants, a wedding chapel, and administrative and back-of-the-house uses. Access features will include:

- Guest and employee parking for the Project will be provided by a new parking structure constructed within the podium of the Waikikian tower, and by the present Hilton parking structure. The new parking structure will be accessed through the existing entrances and exits to the Hilton Garage.

- Rainbow Drive will be extended to connect to Dewey Lane in order to provide access between the Hilton Garage and the Waikikian and Lagoon Tower.

- A porte cochere and drop-off driveway will be provided for the Waikikian along the makai side of the building, with entrance from the Rainbow Drive Extension and exit onto Dewey Lane.

- Dewey Lane will be widened to 25 feet to provide an improved two-way roadway between Ala Moana Boulevard and Holomoana Street to provide access to the Waikikian.

- Deliveries will be made using the existing service driveway located along the ewa side of the Hilton parking garage.

- Tour and charter buses and vans would use the Hilton bus terminal on the Diamond Head side of Tapa Tower to serve Kalia Tower. A bus pullout bay would be provided along Dewey Lane to accommodate trolleys and shuttles.

As a separate project, the access to the Hilton parking structure will be modified to provide four entrance gates to the garage, two on the mauka end and two at the makai end. This compares to one entry gate at each end prior to the Kalia Tower construction project.

EXISTING CONDITIONS

Traffic counts were made during the 6:00-8:30 AM and 3:00-6:30 PM periods on September 23, 1999 for the intersections along Kalia Road and on June 22, 2000 for the other locations. On both days, 90% or more of the visitor units at the Hilton Hawaiian Village were occupied and there was a typical schedule of small to mid-size resident and visitor breakfast meetings, luncheons, evening functions, and all-day conferences, with between 40 and 600 attendees at each of the functions.

In the morning peak hour (7:00-8:00 AM), no problems were observed at the intersections along Ala Moana Boulevard, Kalia Road, and Rainbow Drive. Traffic volumes at the Ala Moana Boulevard intersection with Kalia Road amounted to 62% of intersection capacity, with average delays at LOS D due to the long signal cycle length and the separate signal phases for the Kalia and Ena Road approaches.

Traffic volumes in the afternoon peak hour (3:30-4:30 PM) were approximately 30% higher than the morning peak hour along Ala Moana Boulevard and up to 50% higher along Kalia Road. The traffic analyses and field observations indicate the following conditions:

- Traffic volumes at the Ala Moana Boulevard intersection with Kalia Road amounted to 77% of intersection capacity, with average delays at LOS E. The left-turn and through movements on the Kalia Road approach and the Waikiki-bound through traffic on Ala Moana Boulevard operate at LOS E with long delays. The left-turn traffic from ewa-bound Ala Moana Boulevard operates at LOS F.

- The traffic volume at the Kalia Road intersection with Rainbow Drive used 51% or less of capacity, with average delays of LOS A or B.

- Traffic volumes at the Ala Moana Boulevard-Hobron Lane intersection amounted to 68% of intersection capacity, with average delays at LOS D. The left-turn and through movements on Hobron Lane operate at LOS E or F with very long delays. The vehicles turning left from Ala Moana Boulevard also operate at LOS E or F with very long delays.

2005 CONDITIONS WITHOUT THE WAIKIKIAN PROJECT

Peak hour traffic along Ala Moana Boulevard near the Project site is expected to increase by about 14 to 18% in year 2005 above the existing volumes. Traffic volumes along Kalia Road are estimated to increase by between 21% and 27% by 2005, with this increase reflecting the relocation of the Asia-Pacific Center to Fort DeRussy, which would be accessed at Maluhia Street, as well as the occupancy of the Hilton Lagoon Tower and Kalia Tower facilities.

With this traffic growth, traffic volumes at the Ala Moana Boulevard-Kalia Road intersection would increase to 91% of intersection capacity, with average delays at LOS E in the afternoon peak hour. The afternoon peak hour volumes would amount to 89% and 87% of the capacities of the Ala Moana Boulevard intersections with Kalakaua Avenue and Atkinson Drive, respectively.

2005 CONDITIONS WITH WAIKIKIAN PROJECT

The Waikikian project would generate an estimated 95 and 111 additional vehicle trips to or from the Hilton Hawaiian Village area in the morning and afternoon peak hours, respectively. This would increase estimated traffic entering or exiting the Hilton Hawaiian Village in 2005 by about 10.8% in both the morning and afternoon peak hours.

A number of potential modifications to traffic circulation have been considered for the area roadway system in the vicinity of the Hilton Hawaiian Village that would affect access to the Waikikian site and traffic flow along Dewey Lane. These modifications include the provision of a full intersection at the Dewey Lane connection to Ala Moana Boulevard, and/or the conversion of a segment of Rainbow Drive to one-way operation within the Hilton Hawaiian Village.

The traffic impact assessment for the Waikikian Project has included these circulation alternatives to assess whether these roadway modifications would improve or adversely affect traffic conditions with the Waikikian project. The circulation alternatives considered in the Waikikian analyses are:

- A-1 Dewey Lane limited to right turns at its connection to Ala Moana Boulevard, and Rainbow Drive extended to Dewey Lane with two-way traffic flow. With the exception of the Rainbow Drive extension to Dewey Lane, this reflects the existing circulation in the area.

- A-2 Dewey Lane connection to Ala Moana Boulevard reconstructed as a full intersection that permits left turns into and out of Dewey Lane, with Rainbow Drive extended to Dewey Lane with two-way traffic flow.

- E-1 Dewey Lane limited to right turns at its connection to Ala Moana Boulevard, and Rainbow Drive extended to Dewey Lane with a short section near Rainbow Tower converted to one-way ewa-bound traffic flow.

- E-2 Dewey Lane connection to Ala Moana Boulevard reconstructed as a full intersection that permits left turns into and out of Dewey Lane, and Rainbow Drive extended to Dewey Lane with a short section near Rainbow Tower converted to one-way ewa-bound traffic flow.

The estimated proportion of intersection capacity used by the forecast traffic volumes at the key study area intersections with the Waikikian project and each circulation alternative is summarized in Table 1. The traffic impacts of the Waikikian on typical weekday conditions with each of the circulation alternatives are summarized in the following sections.

Table 1
VOLUME-TO-CAPACITY RATIOS
FOR TRAFFIC SIGNAL-CONTROLLED INTERSECTIONS

Intersections	Existing	2005 No Project	2005 With Waikikian and Circulation Alternatives			
			A-1	A-2	E-1	E-2
Morning Peak Hour						
Ala Moana Blvd. & Kalakaua Ave.	0.65	0.74	0.74	0.74	0.74	0.74
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.62	0.76	0.77	0.70	0.76	0.70
Ala Moana Blvd. & Dewey Ln.	NA	NA	NA	0.44	NA	0.47
Ala Moana Blvd. & Hobron Ln.	0.58	0.65	0.66	0.65	0.67	0.65
Ala Moana Blvd. & Atkinson Dr.	0.76	0.86	0.86	0.86	0.86	0.86
Kalia Rd. & Rainbow Dr.	0.33	0.45	0.47	0.35	0.46	0.34
Afternoon Peak Hour						
Ala Moana Blvd. & Kalakaua Ave.	0.78	0.89	0.89	0.89	0.89	0.89
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.77	0.91	0.93	0.86	0.90	0.85
Ala Moana Blvd. & Dewey Ln.	NA	NA	NA	0.59	NA	0.62
Ala Moana Blvd. & Hobron Ln.	0.68	0.77	0.78	0.76	0.79	0.76
Ala Moana Blvd. & Atkinson Dr.	0.76	0.87	0.88	0.88	0.88	0.88
Kalia Rd. & Rainbow Dr.	0.51	0.60	0.62	0.47	0.59	0.46

NA = Not controlled by traffic signal in this scenario.

Wilbur Smith Associates; May 4, 2001

With Circulation Alternative A-1

This alternative reflects the existing circulation patterns in the vicinity of the Waikikian site, with the exception of the extension of Rainbow Drive to Dewey Lane. Traffic would be able to enter and exit the Hilton Hawaiian Village via Dewey Lane. However, the present Rainbow Drive connection would continue to be signed and to function as the main entrance to the Hilton Hawaiian Village. Key effects of the Project and this circulation alternative are discussed below.

- Peak hour traffic volumes on Dewey Lane mauka of the Rainbow Drive connection are estimated to increase by 27 to 30 vehicles in each peak hour, or an increase of 31% to 43% over traffic without the Project.
- Peak hour traffic volumes on Dewey Lane makai of the Rainbow Drive connection are estimated to increase by 19 to 22 vehicles in each peak hour, or an increase of 18% to 21% over traffic without the Project.
- Peak hour traffic volumes on Hobron Lane makai of Ala Moana Boulevard are estimated to increase by 4% to 5% over traffic without the Project.
- Peak hour traffic volumes along Ala Moana Boulevard near the Project site are estimated to increase by 1% to 2%.
- Peak hour traffic volumes along Kalia Road near Ala Moana Boulevard are estimated to increase by 2% to 3%.
- The increased traffic in the afternoon peak hour would amount to 93% of capacity at the Ala Moana Boulevard-Kalia Road intersection, an increase of 2% over No Action. Average delay would increase by 2 seconds per vehicle, but remain at LOS E with or without the Project.
- The increased traffic in the afternoon peak hour would amount to 78% of capacity at the Ala Moana Boulevard-Hobron Lane intersection, an increase of 1% over No Action with an increase of one second in average vehicle delay.
- Average delay for vehicles stopping at the Stop sign-controlled intersections of Holomoana Street with Dewey Lane and Hobron Lane would increase an average of one second per vehicle, but remain at very acceptable LOS A or B conditions.
- Pedestrian safety should be improved by the provision of the walkway paralleling Dewey Lane. The number of pedestrians using Dewey Lane to travel between Ala Moana Boulevard, the Hilton Hawaiian Village, and the harbor/beach areas would likely increase with the separate walkway and improved amenities.
- The level of traffic increase along Dewey Lane should not have a significant effect on operations at the Ilikai trash dumpster and delivery areas.

These estimated impacts of the Waikikian project are not of sufficient magnitude to warrant mitigative actions for normal weekday conditions.

With Modified Circulation Alternative A-1

Dewey Lane could be extended to connect directly to the Diamond Head-bound lanes of Ala Moana Boulevard to provide a conventional intersection layout. The principal features of this modification are as follows:

- Only right turns would be allowed into and out of Dewey Lane.
- Most of the present large open paved area would be demolished and changed to a landscaped area.
- A wider, improved walkway would be provided closer along Ala Moana Boulevard for pedestrians.
- A right-turn lane would be provided on the Diamond Head bound approach to the new Dewey Lane intersection.
- The existing bus stops on Diamond Head-bound Ala Moana Boulevard in front of the Ilikai and on the Diamond Head side of Dewey Lane could be consolidated into one stop, probably located on the ewa side of Dewey Lane

The impacts of this potential modification to the existing layout of the Dewey Lane intersection with Ala Moana Boulevard would likely be limited to the operations and conditions at this junction, but would not result in any major changes in area circulation. The potential beneficial effects would include:

- Improved pedestrian safety due to fewer and more visible vehicle conflict points, as well as slower vehicle speeds.
- Improved amenities and a safer wait area for TheBus passengers.
- Improved traffic safety as a result of the more conventional roadway layout without the existing large unmarked paved areas.

The modification could have several adverse effects on local conditions at the intersection:

- The modifications would remove the curb section along the present island that is used for deliveries or by private buses waiting for passengers.
- Many vehicles entering the two parking garage ramps into the Ilikai would likely have to travel through the Ilikai porte cochere.

- Traffic turning left from the Ilikai porte cochere onto the Dewey Lane extension may be delayed by any queue of vehicles waiting to turn right onto Ala Moana Boulevard.

Some of the adverse impacts could be reduced or eliminated through the project design process. The design process should include close coordination with the Ilikai, State DOT, and City DTS to minimize any potential adverse impacts.

With Circulation Alternative A-2

Alternative A-2 modifies the existing circulation patterns by providing a full intersection for the Dewey Lane connection to Ala Moana Boulevard. The full intersection would permit both left turns out of and into Dewey Lane. Key features of the full intersection would include:

- A right-turn lane would be provided on the Diamond Head-bound approach of Ala Moana Boulevard to the intersection.

- A left-turn lane would be provided in the median of Ala Moana Boulevard for turns into Dewey Lane.

- A pedestrian crosswalk would be provided across Ala Moana Boulevard on the Diamond Head side of the intersection.

- Traffic signal control would be provided at the intersection.

Key effects of the Project and this circulation alternative, particularly regarding differences from Alternative A-1 and A-1 Modified, are discussed below.

- The full intersection would increase traffic use of Dewey Lane, both by Hilton Hawaiian Village and Ala Wai Harbor traffic. The traffic on the segment mauka of the Rainbow Drive connection is estimated at about 400 to 500 vehicles in the peak traffic hours. Peak hour volumes makai of the Rainbow Drive connection are estimated at 100 to 150 vehicles.

- Traffic volumes on Kalia Road at Ala Moana Boulevard would be reduced by about 240 to 300 vehicles in each peak hour, as compared to No Project. The traffic reduction would result in a significant improvement in traffic conditions at the Kalia Road intersection with Ala Moana Boulevard. In the afternoon peak hour, the capacity use is estimated to decline by 5% below No Action and 7% below Alternative A-1, with average delay reduced by 7 seconds per vehicle or more.

- Traffic volumes on Hobron Lane makai of Ala Moana Boulevard would be reduced by about 110 to 130 vehicles in each peak hour, as compared to No Project. The traffic reduction would result in a small improvement in traffic conditions at the Hobron Lane intersection with Ala Moana Boulevard. In the afternoon peak hour, the capacity use is estimated to decline by 1% below No Project and 2% below Alternative A-1, with average delay reduced by 2 to 3 seconds per vehicle.

- The full Dewey Lane intersection with Ala Moana Boulevard would operate with traffic volumes at 59% of capacity or less, and with average vehicle delays at LOS B or C.
- The installation of an additional traffic signal along Ala Moana Boulevard, with about 500 to 700 feet to the adjacent traffic signals, would likely affect traffic flow through the signal system and result in an increased number of vehicle stops.
- The additional pedestrian crossing point of Ala Moana Boulevard at Dewey Lane would improve pedestrian circulation for residents, workers, and visitors in the blocks on either side of the crosswalk, and reduce the pedestrian volumes at the heavily used Kalia Road and Hobron Lane crosswalks. The new crossing would also improve pedestrian access to the TheBus stops located near mid-block on both sides of Ala Moana Boulevard.

This full intersection would provide a second outlet for the Hilton Hawaiian Village and assist in alleviating future traffic conditions along Kalia Road. This alternative would be especially useful if the City transitway project is constructed along Kalia Road and displaces one or more of the existing traffic lanes.

With Circulation Alternative E-1

Alternative E-1 is similar to Alternative A-1 with the exception that portions of Rainbow Drive between the access driveway to the mauka Hilton Garage entrances/exits and the makai Garage entrance would be restricted to one-way operation in the makai/ewa-bound direction towards Dewey Lane. The one-way operation would require all traffic using the makai exit from the Hilton Garage and traffic exiting the Rainbow Tower main lobby porte cochere to leave Hilton Hawaiian Village via Dewey Lane. All traffic wanting to access the Rainbow Tower main lobby area would enter via Kalia Road.

- The one-way segment would shift about 40 and 70 vehicles to exiting via Dewey Lane, instead of Kalia Road, in the morning and afternoon peak hours, respectively.
- This diversion would improve conditions at the Kalia Road intersection with Ala Moana Boulevard, with intersection capacity use in the afternoon peak hour being reduced by 3% from Alternative A-1 and 1% less than with No Project. This one-way segment would offset the effect of the additional Waikikian traffic on this intersection.
- The diversion would increase traffic on Hobron Lane at the Ala Moana Boulevard intersection, with the additional traffic increasing capacity use by 1% over Alternative A-1 in the afternoon peak hour, and by 2% over that with No Project.

With Circulation Alternative E-2

Alternative E-2 is similar to Alternative A-2 with the exception that portions of Rainbow Drive would be restricted to one-way operation in the makai/ewa-bound direction as described for Alternative E-1.

- The one-way segment would shift about 40 and 55 vehicles to exiting via Dewey Lane, instead of Kalia Road, in the morning and afternoon peak hours, respectively.
- This diversion would improve conditions at the Kalia Road intersection with Ala Moana Boulevard, with intersection capacity use in the afternoon peak hour being reduced by 8% from Alternative A-1 and 6% better than with No Project.
- The traffic diverted to Dewey Lane would exit directly onto Ala Moana Boulevard with the full intersection and would not increase traffic on Hobron Lane at the Ala Moana Boulevard intersection.

EFFECT ON SPECIAL EVENTS AT HILTON HAWAIIAN VILLAGE

The Waikikian should not affect the frequency or size of special events at the Hilton Hawaiian Village. The Waikikian should only impact traffic conditions during special events through the increases to the normal daily employee and guest traffic as a result of the additional accommodation units and ancillary uses.

The extension of Rainbow Drive to connect to Dewey Lane could have a substantial effect on traffic operations and conditions during special events at the Hilton Hawaiian Village that attract a large number of Honolulu residents. Over time, many residents will become aware of Dewey Lane as a "back way" into the Hilton Hawaiian Village.

The makai entrance to the Hilton Garage is planned for modification to include two entry gates, which could accommodate approximately 740 vehicles entering per hour. When coupled with the two gates at the mauka end of the garage, the new entrances should be able to accommodate approximately 1,480 vehicles entering per hour, or almost twice the existing rate for normal operations. . The entry capacities can be increased for special events by stationing a parking attendant at each ticket dispenser to hand tickets to the entering driver, with the gate locked in the up position. With the four future entry gates, this may boost the total garage entrance rate to 1,900 to 2,000 vehicles per hour, versus approximately 1,300 vehicles per hour at present.

With the increased parking entry capacity, the existing Rainbow Drive entrance to the Village from Kalia Drive would become the capacity constraint to the rate that vehicles can enter the parking facilities. Therefore, the use of the improved Dewey Lane entrance into the Hilton Hawaiian Village by vehicles arriving on Ala Moana Boulevard would likely increase the rate at which vehicles can enter the Village and the garage. This increased entry capacity should reduce the problem of arriving traffic queuing along Rainbow Drive, Kalia Road, and along Ala Moana Boulevard while waiting to enter the parking, both due to the faster entry rate into the garage, and the additional stacking space for vehicles entering from Dewey Lane. An estimated 16 vehicles could queue between the Ala Moana Boulevard lanes at the Ilikai porte cochere and the makai garage entrance, and additional vehicles could queue along the makai segment of Dewey Lane and along Holomoana Street without blocking the Ala Moana Boulevard lanes or Holomoana Street.

After the event, vehicles leaving from the makai garage exit could be directed to use Dewey Lane.

- With Alternatives A-1 and E-1, these vehicles would use the mauka segment of Dewey Lane and Ala Moana Boulevard to reach Ena Road, Ala Wai Boulevard, or Kalakaua Avenue for travel into Waikiki or to reach the areas of central Honolulu ewa of the site and the H-1 Freeway. Hobron Lane could be used by vehicles traveling to areas ewa of Waikiki, which may increase queuing and delays on the makai-side lanes of Hobron Lane, similar to the conditions that presently occur following the end of local functions at the Ilikai.

- With the full Dewey Lane intersection of Alternatives A-2 and E-2, most vehicles exiting via Dewey Lane would use the mauka segment to exit onto Ala Moana Boulevard, instead of Hobron Lane.

Several transportation management actions could be implemented for large local events at the Hilton Hawaiian Village to improve traffic flow and minimize disruption to other traffic:

- During the arrival and exit periods for an event with a large local attendance, a traffic control officer could be stationed at the mauka end of Dewey Lane to minimize any disruption to vehicles trying to exit the Ilikai porte cochere or enter the Ilikai parking garage.

- With circulation Alternatives A-1 and E-1, vehicle parking and standing should be prohibited along the mauka curb of the old roadway alignment section of Ala Moana Boulevard during the arrival period for an event with a large local attendance. This would allow TheBus to bypass any vehicle queue waiting to enter Dewey Lane and access the bus stop.

- With circulation Alternatives A-1 and E-1, a traffic control officer could be stationed along the section of Hobron Lane makai of Ala Moana Boulevard during the arrival and departure period for events with a large local attendance to minimize delays to vehicles entering or exiting the driveways along this section.

Chapter 1
INTRODUCTION

The site of the former Waikikian Hotel, located in Waikiki along the ewa side of the existing Hilton Hawaiian Village, is being proposed for redevelopment with visitor units and ancillary uses. The project site includes the area between the Hilton Hawaiian Village and Dewey Lane that extends from just mauka of the intersection of Dewey Lane with Ala Moana Boulevard to the Hilton Lagoon. The site was previously occupied by the Waikikian Hotel and the Tahitian Lanai restaurant. The site is largely vacant except for construction management trailers and materials storage for the ongoing Lagoon Tower remodeling and Kalia Tower construction projects at the Hilton Hawaiian Village.

The proposed Waikikian Project will add approximately 350 guest units to the present total of 2,545 hotel rooms at the Hilton Hawaiian Village.[1] These units may be either vacation ownership or hotel rooms. The Project will also include several ancillary uses for the Waikikian and Hilton Hawaiian Village, which are expected to include a wedding chapel oriented towards Village guests, a restaurant, retail shops, and administrative and back-of-house uses. The site plan is depicted in Figure 1-1.

Access features of the new Waikikian development include the following:

- Guest and employee parking for the Project will be provided by a new parking structure constructed within the podium of the Waikikian tower, and by the present Hilton parking structure.
- The new parking structure will be accessed through the existing entrances and exits to the Hilton Garage. Two entry lanes will be provided at the makai entrance.
- Rainbow Drive will be extended to connect to Dewey Lane in order to provide access between the Hilton Garage and the Waikikian and Lagoon Tower.
- A porte cochere and drop-off driveway will be provided for the Waikikian along the makai side of the building, with entrance from the Rainbow Drive Extension and exit onto Dewey Lane.
- Dewey Lane will be widened to 25 feet to provide an improved two-way roadway between Ala Moana Boulevard and Holomoana Street to provide access to the Waikikian.
- A pedestrian pathway will be provided along the Diamond Head side of Dewey Lane between Ala Moana Boulevard and Holomoana Street. Pedestrians currently have to

[1] The 2,545 existing hotel rooms do not include the 235 visitor units in the Lagoon Tower and the 453 Kalia Tower units.

walk within the travel lanes or along the unimproved shoulder area. Pedestrian access to the Hilton Hawaiian Village will be provided by an improved pedestrian walkway along the Rainbow Drive Extension to Dewey Lane

Two additional roadway modifications are being considered for the area roadways within or near the Hilton Hawaiian Village. Since these potential modifications would affect access to or circulation near the Waikikian Project, the effects of these roadway modifications are also addressed in this traffic impact study. These two modifications are:

1. The provision of a full intersection with traffic signal controls at the Dewey Lane junction with Ala Moana Boulevard.

2. The potential conversion of a portion of Rainbow Drive within the Hilton Hawaiian Village to one-way operation.

The purpose of this study is to assess the traffic impacts of the planned Waikikian Project. The traffic study also addresses the potential impacts with a full intersection at the Dewey Lane intersection with Ala Moana Boulevard, and potential conversion of a portion of Rainbow Drive to one-way operation. The assessment addresses the following:

1. The number of vehicle trips generated by the new facility.

2. The magnitude of the traffic increases on area roadways providing access to the project.

3. Project impacts upon traffic conditions at the key intersections near the Project site, which include:

   - Ala Moana Boulevard with Atkinson Drive
   - Ala Moana Boulevard with Hobron Lane
   - Ala Moana Boulevard with Dewey Lane (full intersection options)
   - Ala Moana Boulevard with Kalia Road/Ena Road
   - Ala Moana Boulevard with Kalakaua Avenue
   - Kalia Road with Rainbow Drive
   - Holomoana Street with Hobron Lane
   - Holomoana Street with Dewey Lane.

1. Identification of any actions that may be appropriate to mitigate traffic impacts resulting from the development of the parcel.

The traffic assessment focuses on conditions during the morning and afternoon commute peak hours on a weekday in year 2005 when the Project is expected to be completed and fully operational.

Chapter 2
EXISTING CONDITIONS

The Waikikian project site includes the recently acquired area of the Hilton Hawaiian Village previously occupied by the Waikikian Hotel and the Tahitian Lanai restaurant. At the time of the field studies conducted by Wilbur Smith Associates for this study, the Project site was vacant except for several contractor office trailers and materials storage associated with the Kalia Tower construction project. At the time of the traffic counts, the Lagoon Apartments tower was being remodeled and refurbished for conversion to a time-share operation. The remaining hotel and commercial facilities at the Hilton Hawaiian Village, as well as other hotel, commercial, and residential uses in the area, were operating normally at the time of the surveys.

ROADWAY SYSTEM

The key roadways and intersections near the Project site are depicted in Figure 2-1. Key features on these roadways are described in the following paragraphs.

Dewey Lane – This narrow roadway serves as the boundary along the ewa side of the Waikikian site. The two-way roadway provides a pavement width of approximately 20 feet. There are no improved pedestrian facilities along Dewey Lane, so pedestrians usually walk within the paved roadway area.

Ilikai Trash Dumpster - The Ilikai trash pick-up is located between Ala Moana Boulevard and the makai exit gate for the Hilton Hawaiian Village. The trash trucks block the entire roadway during the time the trash dumpster is being loaded or off-loaded on the trucks.

Ilikai Deliveries/Loading Area - The truck loading area for the Ilikai is located between the Hilton Hawaiian Village driveway connection and Holomoana Street. The ramp up to the loading area intersects Dewey Lane at a sharp angle and maneuvering within the delivery area is limited, therefore larger trucks either back into or back out of the ramp.

Ilikai Parking Exit - A card-controlled exit out of the basement-level resident and permit parking area is located near the makai end of Dewey Lane. This is one of two exits out, with the second located at the Ilikai porte cochere near Ala Moana Boulevard.

Junction with Ala Moana Boulevard - At the mauka end, Dewey Lane connects to a section of the old roadway, rather than directly to Ala Moana Boulevard. This one-way section of roadway serves as the exit from the Ilikai porte cochere, provides entry into two ramps accessing the basement resident parking and second level public parking levels of the Ilikai, as well as providing entry-exit to Dewey Lane. The one-way section also serves as a commercial loading area and has a TheBus stop.

At the time of the traffic counts, a temporary driveway connection was open from the Hilton Hawaiian Village to allow traffic to exit onto Dewey Lane. This was being done while a portion of Rainbow Drive was being reconstructed as part of the Kalia Tower project.

Ala Moana Boulevard – This State highway links the Waikiki area to the Ala Moana Center and the Downtown Honolulu area, as well as the Airport and other areas ewa of Downtown Honolulu. In the Waikiki area, Ala Moana Boulevard is primarily a five- or six-lane roadway with a median divider strip and with separate left-turn lanes at the cross streets. At Kalia Road, the outside lane of Ala Moana Boulevard in the northbound direction ends as a right turn lane to Kalia Road, with only two Diamond Head-bound through lanes provided through the Kalia Road intersection to Kalakaua Avenue. The right-turn movement from Ala Moana Boulevard onto Kalia Road is not directly controlled by the traffic signal at the intersection, with a raised traffic island and striping allowing a continuous right-turn movement except when vehicles must yield to pedestrians crossing between the sidewalk and the island.

Kalakaua Avenue – This major street is the primary route for eastbound (Diamond Head direction) travel within or through the Waikiki area. Between Ena Road and Monsarrat Avenue, Kalakaua Avenue is a one-way street, with the exception of a westbound bus lane from Kuhio Avenue to Ena Road. The one-way segment provides four lanes for eastbound travel.

Kalia Road – Kalia Road is a two-way secondary street between Ala Moana Boulevard and Saratoga Road. Between Ala Moana Boulevard and Rainbow Drive, the street provides two through lanes in the eastbound direction and three lanes in the westbound direction. From the east side of Rainbow Drive to Saratoga Road, Kalia Road has one lane in each direction plus left-turn lanes at cross streets and major driveways.

Ena Road - This two-lane street provides a connection between Ala Moana Boulevard and Kalakaua Avenue, as well as providing access to the Hobron Lane residential area.

Hobron Lane – The two-lane segment mauka of Ala Moana Boulevard provides a connection between Ala Wai Boulevard/Kalakaua Avenue and the Ilikai, Hawaii Prince Hotel, and the Ala Wai Boat Harbor and shoreline area. The one-block segment makai of Ala Moana Boulevard provides two lanes in each direction.

Holomoana Street – This street provides access to the Hawaii Prince Hotel, Ala Wai Harbor, and the beach parking area. The street has one lane in each direction except for the section between Hobron Lane and Dewey Lane, which has two lanes plus a parking lane in each direction.

PUBLIC TRANSPORTATION

Waikiki is served by a large number of public transit routes and is also the focus of the numerous private tour and shuttle bus services on Oahu. Several of these provide service to the Project area.

Public Transit Routes

TheBus provides most of the local and express routes that service the Project area. Leeward Oahu Transportation Management Association (LOTMA) also provides several express routes. These public buses follow two routes through the Project area. Most of the routes use Ala Moana Boulevard, Kalia Road, Saratoga Road, and Kuhio Avenue. Several other routes use Kalakaua and Kuhio Avenues. Key features of these bus services are described in the following paragraphs.

TheBus Route 8 (Waikiki-Ala Moana) – This route serves as a shuttle between Waikiki and the retail areas at Ala Moana Center and Ward Warehouse. The route provides a connection to the network of suburban trunk bus routes that operate from Ala Moana Center to the Windward and Leeward areas of Oahu. Route 8 operates seven days a week with weekday and Saturday service extending from about 7:00 AM to 11:00 PM, and Sunday service from 8:30 AM to 9:00 PM. The service frequency is approximately 10 minutes during most of the day.

TheBus Routes 19 (Airport/Hickam), 20 (Pearlridge), and 47 (Waipahu) – These routes provide service from Waikiki to Ala Moana Center and Downtown Honolulu via Ala Moana Boulevard. Each route continues ewa to serve the outlying areas referred to in the route names. All three routes operate seven days a week. Routes 19 and 47 operate from about 5:00 AM until 1:00 AM, while Route 20 operates from about 7:00 AM to 7:00 PM.

TheBus Route 58 (Hawaii Kai/Sea Life Park) – This route connects Waikiki to the East Honolulu areas and also to the Kailua area. The route provides service seven days a week from about 7:00 AM to 7:30 PM with a service frequency of 30 minutes.

TheBus Express Routes 201 (Waipahu via Farrington), 202 (Waipahu via Paiwa), and 203 (Kalihi) – These three express routes serve areas that have concentrations of Waikiki workers. Each route operates seven days a week with two or three trips during both the morning and afternoon peak commute periods.

LOTMA Ewa Beach and Mililani/Waipio Express Routes – These two routes provide commute service from these outlying areas to the Downtown and Waikiki employment centers. The two routes operate on weekdays with one or two trips in both the morning and afternoon commute peak periods.

The public bus stops for TheBus routes along Kalia Drive are located east of Rainbow Drive, with the eastbound stop located between Tapa Tower and the exit driveway from the Hilton bus terminal, and the westbound stop located opposite Paoa Place. Pullouts have been constructed at these two bus stops so that stopped buses do not block traffic flow, with each stop long enough to accommodate at least two buses. Bus stops along Ala Moana Boulevard are located ewa of Ena Road and Diamond-Head of Hobron Lane for the ewa-bound travel direction, and Diamond Head side of Hobron Lane and at Dewey Lane in the Diamond Head travel direction.

Private Bus Operations

A wide range of private bus operators serves the Project area. The various types of services include the following:

- A large number of shuttle bus routes that provide visitor access to various shopping centers, retail stores and visitor attractions.
- Charter and tour coaches, minibuses, and vans for sightseeing and excursions to areas outside of Waikiki.
- Vans transferring patrons between rental car agencies and their hotels.
- Airport shuttle buses and vans.

The Hilton Hawaiian Village has an off-street bus terminal at Paoa Place and taxi and limousine areas at Paoa Place and along Rainbow Drive to accommodate these vehicles. The bus terminal has marked stalls for 5 full-size buses and 5 stalls for mini-buses, vans, and limousines.

Most private buses and trolley shuttles serving the Ilikai use a porte-cochere along the Diamond Head side of Hobron Lane, or stop in the street adjacent to the porte cochere.

WEEKDAY TRAFFIC VOLUMES

Typical total weekday volumes in both travel directions, based on the recent State DOT and City DTS counts in the area, are as follows:

Roadway	Location	Vehicles	Date
Ala Moana Boulevard	Ala Wai Bridge	45,300	5/3/99
	South of Kalia Road	39,000	5/7/98
	South of Kalakaua Avenue	26,400	5/7/98
Kalakaua Avenue	West of Niu Street	39,400	5/7/98
Kalia Road	At Ala Moana Boulevard	21,200	
	West of Saratoga Road	14,300	

Wilbur Smith Associates (WSA) conducted special turning movement counts at the study area intersections during the weekday morning and afternoon commute peak periods. The counts were made between 6:00 and 9:00 AM and between 3:00 and 6:30 PM on Thursday September 23, 1999 for the intersections along Kalia Road, with the others made on Thursday June 22, 2000. These dates were selected after consultation with Hilton management as representing a typical occupancy level for peak season, with a normal schedule of meetings and events at the Hilton facilities. These factors included:

- Guest occupancy of 90% or more of the hotel rooms.

- A typical schedule of small to mid-size resident and visitor breakfast meetings, luncheons, and all-day conferences, with the number of participants ranging between 40 and 600 attendees at each.

- The adjacent Hale Koa Hotel had nearly 100% occupancy.

On the 1999 survey day, the Lagoon Apartments, with a total of 235 units, had 35 units occupied by residents and 90 units occupied by guests. On the 2000 survey day, the Lagoon Apartments were vacant, and construction work was underway for both the Lagoon Apartments and Kalia Tower projects.

The traffic volumes for the intersections along Kalia Road near the Project site are depicted in Figures 2-2 and 2-3 for the weekday morning and afternoon commute peak hours, respectively. The peak one-hour traffic volumes were recorded between 7:00 and 8:00 AM, and between 3:30 and 4:30 PM. The major work shift changes for administrative, housekeeping, and property operations staffs occur at these times, as well as work shifts for many of the food/beverage and special function staffs.

At the Ala Moana Boulevard intersection with Kalia Road, the highest volumes occur for the through movements along Ala Moana Boulevard, the right-turn movement onto Kalia Road, and the left turn from Kalia Road. The total volume of traffic passing through the intersection during the afternoon peak hour is approximately 32% higher than in the morning peak hour, largely due to higher traffic volumes along Kalia Road in the afternoon period.

On Kalia Road, approximately one-half of the Diamond Head-bound vehicles turn right into Rainbow Drive during the morning peak hour. In the afternoon peak hour, a similar number of vehicles turned right into the Rainbow Drive, but this amounted to only one-third of the Diamond Head-bound traffic due to a much larger volume of through traffic. Traffic exiting Rainbow Drive was approximately 50% higher in the afternoon as compared to the morning peak hour, with most of this traffic turning ewa towards Ala Moana Boulevard.

The traffic volumes on Dewey Lane were slightly higher in the afternoon than in the morning, with volumes higher makai of the Hilton Hawaiian Village driveway than those mauka of the driveway. In the afternoon peak hour, about 115 and 95 vehicles used the sections makai and mauka of the driveway, respectively. With the gate open between the Hilton Hawaiian Village and Dewey Lane, 35 and 47 vehicles exited onto Dewey Lane in the morning and afternoon peak hours, respectively.

PEDESTRIAN VOLUMES

The crosswalks at each of the intersections along Kalia Road are actively used by pedestrians during both peak hour periods, with the afternoon volumes between 1½ to 2 times those in the morning peak hour. The highest volumes occur along the makai side sidewalk and crosswalks, and the ewa side crosswalk at the Maluhia Street intersection.

In the morning peak hour, the most heavily used crosswalk is the crossing of the ewa leg of Ala Moana Boulevard at Kalia Road, with 200 pedestrians. Large portions of the pedestrians using this crosswalk were walking between the Wailana Coffee Shop and the Hilton Hawaiian Village, and from the Hilton Hawaiian Village to the Hawaii Convention Center. Approximately pedestrians used the crosswalk across the ewa leg of Kalia Road at the Maluhia Street intersection. Less than 100 pedestrians used the other crosswalks during the morning peak hour.

In the afternoon peak hour, the crosswalk on the ewa leg of Ala Moana Boulevard was also the most actively used by pedestrians, with 250 pedestrians. About 140 pedestrians crossed the Ena Road leg of this intersection. High pedestrian volumes also used the two crosswalks at the Rainbow Drive intersection, with 190 crossing Rainbow Drive and 130 crossing the Diamond Head-side leg of Kalia Road. At the Maluhia Street intersection, pedestrians crossed the ewa-side leg of Kalia Street and crossed the Hale Koa Hotel driveway. The other crosswalks were each used by less than 100 pedestrians.

Approximately 100 pedestrians entered or exited the Hilton Hawaiian Village from Dewey Lane in each hour in the afternoon, not counting construction workers. Pedestrian volumes along Dewey Lane mauka of the driveway were approximately 50 per hour in the morning and 100 per hour in the afternoon. Makai of the driveway, pedestrian volumes were approximately 50 per hour throughout both peak periods.

EXISTING TRAFFIC CONDITIONS

Traffic conditions were analyzed for the key intersections for the weekday morning and afternoon peak traffic hours.

Methodology for Analyzing Levels of Service

The Transportation Research Board (TRB), a division of the National Science Foundation, has developed standardized methods for use in evaluating the effectiveness and quality of service for roadways and streets. Different methodologies are available for analyzing traffic signal-controlled intersections and other types of roadways.

The TRB evaluation methods use concepts referred to as volume-to-capacity ratio and level-of-service (LOS). The volume-to-capacity ratio (V/C) compares the existing or projected traffic volumes on a facility to the facility's theoretical capacity and, as such, indicates the relative adequacy of the facility to accommodate the traffic volumes. Capacity is estimated primarily from the facility's physical characteristics (e.g. number and widths of lanes), and to a lesser extent by the traffic characteristics (e.g. types of vehicles) and type of traffic controls. The level of service concept describes facility traffic conditions in terms of travel delays or travel speeds the service quality expressed on a letter basis from A to F, which signify excellent to unacceptable conditions, respectively.

Signal-Controlled Intersections--Traffic conditions at traffic signal-controlled intersections were evaluated using the Operations Analysis methodology described in the *1997 Highway*

Capacity Manual Update (1997 HCM Update)[1] to the *1994 Highway Capacity Manual* (1994 HCM)[2]. The methodology calculates a ratio of actual or estimated peak hour traffic volumes to the theoretical capacity of the intersection. This volume-to-capacity ratio (V/C) reflects the physical characteristics of the intersection and the traffic characteristics, and is somewhat independent of the efficiency of the traffic signal phasing/timing. This ratio indicates the proportion of available capacity being used by traffic volumes and where there is unused capacity available for future traffic increases.

With the 1997 HCM Update method, the level-of-service is based on the average delay per vehicle for the various movements within the intersection as a result of the traffic signal control. This total delay is the difference between the travel time experienced with the traffic signal and the reference travel time that would result under ideal conditions, in the absence of the traffic control and geometric delay. This delay, referred to as control delay, includes initial deceleration delay, stop delay, queue move-up delay, and final acceleration delay. Average delay time and level-of-service is estimated for the entire intersection, for each roadway approach, and for each traffic movement or lane group. A description of the criteria associated with LOS A through LOS F is provided in Table 2-1.

In the assessment of traffic signal-controlled intersections, it is usually most appropriate to relate the adequacy of the geometric design features (such as numbers and use of lanes, lane widths, etc.) to the V/C. Delay and LOS are most relevant to assessing modifications to the traffic signal controls, since these are most directly related to the signal design features, such as cycle length, number and arrangement of phases, and allocation of green time.

Unsignalized Intersections—At intersections with STOP sign controls, the level of service was calculated using the 1994 HCM procedures for intersections with STOP or YIELD signs. In this methodology, the six levels of service, A through F, are used to describe traffic conditions for those movements that must yield to other movements:

- Left-turn out of the side street or driveway;
- Through movement from the side street,
- Right-turn out of the side street or driveway; and
- Left-turn into the side street.

Through vehicles on the major streets are not required to yield to other movements at two-way STOP controlled intersections.

The general indicator of intersection delay is determined by calculating the one-hour capacity for each key movement, based on the conflicting traffic volumes, and then comparing the number of vehicles making that maneuver to the calculated capacity. The unused or "reserve" capacity for the movement is then used to identify a delay time and a level-of-service for that movement. Unlike analysis at signalized intersections, an overall intersection level-of-service is not

[1] *1997 Highway Capacity Manual Update*, Transportation Research Board, December 1997.

[2] *Highway Capacity Manual*, Special Report 209, Transportation Research Board, Third Edition. 1994.

calculated, but a level-of-service is calculated for each lane group subject to the STOP or YIELD condition.

The level-of-service criteria for unsignalized intersections with STOP or YIELD controls are defined in Table 2-2.

Table 2-1

LEVEL-OF-SERVICE CRITERIA FOR INTERSECTIONS WITH TRAFFIC SIGNAL CONTROL

LOS	Average Stopped Delay (seconds/vehicle)
A	<10.0
B	10.1 - 20.0
C	20.1 - 35.0
D	35.1 - 55.0
E	55.1 - 80.0
F	>80

Source: 1997 Highway Capacity Manual Update, Transportation Research Board, Chapter 9, 1997.

Table 2-2

LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

LOS	Average Stopped Delay (seconds/vehicle)
A	<5.0
B	5.1 - 10.0
C	10.1 - 20.0
D	20.1 - 30.0
E	30.1 - 45.0
F	>45

Source: Highway Capacity Manual, Special Report 209, Transportation Research Board, Chapter 10, 1994.

Intersection Conditions

Traffic conditions at the study intersections are summarized for the morning and afternoon peak hours in Table 2-3, based on the analyses of the existing traffic volumes, traffic lanes and traffic controls at each intersection. The service condition for each individual traffic movement is depicted in Figures 2-3 and 2-4.

Morning Peak Hour Conditions - Based on the analyses of each individual intersection, the proportion of the estimated capacity used by existing traffic volumes and the overall service level at each intersection represent acceptable conditions in the morning peak hour. The intersection of Ala Moana Boulevard with Kalia/Ena Roads operates at LOS D, although the present volumes amount to only about 65% of the intersection capacity. The LOS D condition results from the long signal cycle length and the signal phasing at this intersection, which results in long delays for traffic on the Kalia and Ena Road approaches, as well as the vehicles turning left from Ala Moana Boulevard.

Table 2-3
EXISTING CONDITIONS AT KEY INTERSECTIONS

Intersection	Morning Peak Hour			Afternoon Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Ala Moana Blvd. & Kalakaua Ave.	0.65	19.7	B	0.78	22.6	C
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.62	47.7	D	0.77	55.3	E
Ala Moana Blvd. & Hobron Ln.	0.58	38.2	D	0.68	43.1	D
Ala Moana Blvd. & Atkinson Dr.	0.76	34.1	C	0.76	45.9	D
Kalia Rd. & Rainbow Dr.	0.33	9.7	A	0.51	10.7	B
Holomoana St. & Hobron Ln.	--	8.4	A	--	13.6	B
Holomoana St. & Dewey Ln.	--	9.0	A	--	10.1	B

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; March 12, 2001

The Rainbow Drive intersection operated at an overall condition of LOS A in the morning peak hour, with traffic volumes equivalent to 33% of estimated intersection capacity. All traffic movements operated at very good service levels (LOS C or better).

The other traffic signal-controlled intersections in the study area also operate at LOS D or better, although several of the left-turn and side-street movements experience longer delays at LOS E.

The STOP sigh controlled intersections along Holomoana Street operate at LOS A.

Afternoon Peak Hour Conditions - Traffic at the Ala Moana Boulevard intersection with Kalia/Ena Roads operated at LOS E with volumes at 78% of capacity at the time of the traffic survey. As with the morning peak hour, the comparatively poor level of service at the intersection, relative to capacity, is due largely to use the long signal cycle length and phasing of the Kalia and Ena Road approaches. LOS E or F conditions were experienced by most of the traffic movements from the Kalia Road and Ena Road approaches, as well as the left-turn traffic and the Diamond Head-bound through traffic on Ala Moana Boulevard.

The afternoon peak hour volumes at the Rainbow Drive intersection approximated 51% of the estimated capacity, with overall conditions at LOS B. The analyses indicated the traffic movements along Kalia Road operated at average conditions of LOS A or B, and the vehicles exiting Rainbow Drive at LOS B or C.

Although the analyses indicate acceptable overall traffic conditions at most of the intersections, field observations during the counts identified several traffic problems that occurred for short intervals along Kalia Road. These were:

- During three separate signal phases between 3:30 and 4:00 PM, the vehicles turning left from ewa-bound Ala Moana Boulevard onto Kalia Road were observed to remain stacked from Kalia Road across the Diamond Head-bound lanes of Ala Moana Boulevard after the signal changed to provide the green indication to the Diamond Head-bound through movement, thus preventing the through vehicles from proceeding during the initial portion of the green phase. This resulted in longer queues and delays for the through traffic for the ensuing one or two signal cycles until the queue of through traffic dissipated. This problem appeared to occur when the pedestrians crossing Rainbow Drive blocked the right-turn movement into the Hilton for a sufficient period to stack vehicles in the curb lane back to the Ala Moana Boulevard intersection. Those vehicles turning left from Ala Moana Boulevard and attempting to merge into the curb lane were thus blocked from the merge. These merging vehicles stopped in the center lane with their turn signals on while waiting for the traffic in the curb lane to resume moving. During this wait, these vehicles blocking the vehicles in the lane behind them, thus queuing traffic into the intersection. This problem did not occur during observations made during the 3:30 to 4:00 PM period on three other days. Therefore, it appears to occur only during a particular combination of factors.

- On several occasions, the eastbound traffic on Kalia Road stacked from a bottleneck Diamond Head of Maluhia Street through the Maluhia Street intersection to the vicinity of Rainbow Drive. On the survey day, the queue did not affect access to Rainbow Drive. The constraint to the eastbound traffic flow appeared to be the Saratoga Road intersection.

- On several occasions, tour and shuttle buses stopped along the makai and mauka curbs of Kalia Road adjacent to the crosswalk at Rainbow Drive to load or unload passengers. This disrupted traffic flow along Kalia Road while the vehicles were stopped.

The right-turn movement from Ala Moana Boulevard to Kalia Road is not controlled by the traffic signal. Field observations indicated that this movement experiences no significant delays or disruptions due to the pedestrian conflict at the intersection. Delays did regularly occur when through traffic caught in the right-turn lane blocked the right-turn movement while waiting to merge into the adjacent through lane. If the right-turn movement were controlled by the traffic signal, the analysis indicates LOS C conditions for the lane.

The intersection of Ala Moana Boulevard with Hobron Lane operates at acceptable overall conditions of LOS D. However, the long signal cycle length and allocation of green time results in LOS E or F conditions for the Hobron Lane approaches and the left-turn movements from Ala Moana Boulevard. Field observations indicated that extensive queuing occurred on the makai leg of Hobron Lane for a 15- to 20-minute period around 4:00 PM when both hotel workers at the area hotels and construction workers at the Hilton projects were leaving work. Many of the Hilton construction workers were observed parking in the on-street parking and lots along Holomoana Street. Stops by trolley and tour buses in the street adjacent to the Ilikai bus loading area also disrupted traffic on the makai leg of the intersection several times during the traffic counts.

Overall traffic conditions are at acceptable levels at the intersection of Ala Moana Boulevard with Atkinson Drive and the Ala Moana Park Road. However, the present signal timing results in LOS E or F conditions for the vehicles turning left from Ala Moana Boulevard and exiting from Ala Moana Park.

The analyses indicate that the Stop sign controlled intersections of Holomoana Street with Hobron Lane and with Dewey Lane operate at very acceptable conditions. However, traffic operations at these intersections was disrupted around 4:00 PM when the area workers were leaving work and the traffic queue extended from Ala Moana Boulevard back to the vicinity of Dewey Lane.

TRIP GENERATION BY HILTON HAWAIIAN VILLAGE

Some 2,291 hotel units in the Hilton Hawaiian Village and 125 units in the Lagoon Apartments were occupied during the September 23, 1999 traffic counts. The total number of vehicles entering and exiting Rainbow Drive, Paoa Place, and the Hilton bus terminal driveway were combined to estimate the total vehicle trips generated by the Hilton Hawaiian Village during the morning and afternoon peak hours, as summarized in Table 2-4. This slightly overestimates the trips since the Paoa Place traffic volumes also include trips using the Hale Koa Hotel loading dock.

The numbers of peak hour trips were divided by the number of occupied units on the survey day to provide an estimated trip generation rate for each peak hour, with the resultant rates listed in Table 2-3. The facilities generate an average of 0.299 vehicle trip ends per occupied hotel unit in the morning peak hour, and 0.349 trip ends in the afternoon peak hour. These trip rates per occupied unit represent all vehicle trips associated with the hotel complex, including guest, employee, visitor and delivery trips associated with the hotel operations and the other commercial activities within the Hilton Hawaiian Village.

SPECIAL EVENTS AT HILTON HAWAIIAN VILLAGE

At present, traffic for special events at the Hilton Hawaiian Village uses Rainbow Drive to enter and exit the Hilton Hawaiian Village, with the special event traffic normally parking in the Hilton garage. For a very large special event, or a combination of several smaller events, Hilton uses the following actions to provide sufficient parking for the event attendees:

Table 2-4
EXISTING VEHICLE TRIP GENERATION RATES
FOR HILTON HAWAIIAN VILLAGE COMPLEX

Time Period	Vehicle Trip Ends (1)			Trip Ends per Occupied Unit (2)		
	Arrive	Depart	Total	Arrive	Depart	Total
7:00 - 8:00 AM	398	323	721	.165	.134	.299
3:30 - 4:30 PM	409	434	843	.169	.180	.349

(1) Trips based on traffic counts on September 23, 1999.
(2) Trip rates based on 2,291 occupied units at Hilton Hawaiian Village and 125 occupied units at the Lagoon Apartments.

Wilbur Smith Associates; September 30, 1999

1. Relocate employee parkers to the Fort DeRussy parking structure to free up additional spaces in the Hilton garage for the special event attendees. With this relocation, approximately 1,000 or more of the 1,670 spaces in the Hilton garage can be made available for attendees.

2. When the size of the planned event(s), coupled with other guest and visitor use, will exceed the available spaces in the Hilton garage, either attendees of certain events are asked to use the Fort DeRussy garage, or personnel are stationed at the Rainbow Drive entrance to divert vehicles to Fort DeRussy garage once the Hilton garage is full.

Present Hilton traffic management procedures for special event traffic includes the following actions:

1. Hilton security staff are stationed on Rainbow Drive at the driveway and crosswalk at the mauka end of the garage and at the existing main front desk/porte cochere area at the makai end of the garage to expedite traffic and pedestrian flow.

2. Hilton security and parking personnel are assigned to the parking garage entry gates to set the gates in an open position and hand the entering drivers the parking tickets to increase entry capacity into the garage.

3. For very large special events, Hilton employs and stations off-duty Honolulu Police Department (HPD) officers at the entrance to Rainbow Drive to minimize pedestrian conflicts and expedite vehicle flow.

At present, traffic arriving for very large special events or combinations of special events at the Hilton Hawaiian Village at times stacks along the curb lane on Kalia Road and Diamond Head-bound Ala Moana Boulevard. Field observations at past large events indicated that the entry gates to the Hilton garage were the traffic capacity constraints that result in the queuing of arriving vehicles.

Although the Waikikian Project should not affect the frequency or size of special events at the Hilton Hawaiian Village, the Waikikian may impact traffic conditions during special events through the increases to the normal daily employee and guest traffic as a result of the additional accommodation units and ancillary uses.

Chapter 3
2005 TRAFFIC CONDITIONS WITHOUT PROJECT

Construction of the Waikikian Project is planned for completion in mid 2005, with initial occupancy in Summer of 2005. The travel forecasts and conditions for mid-2005 without the Waikikian Project are presented as a baseline from which to identify the effects of the project.

ROADWAY IMPROVEMENTS

No major roadway improvements are reflected in the analyses of traffic conditions in year 2005. The State DOT has been considering improvement options along the segment of Ala Moana Boulevard within Waikiki. However, these modifications would likely focus on facilities for pedestrians and bicycles, as well as enhanced landscaping. In the past, the State DOT has also considered the construction of an additional Diamond Head-bound lane on Ala Moana Boulevard from the vicinity of Kalia Road to Kalakaua Avenue. However, no additional roadway lanes are included in this analysis.

The City and County of Honolulu is considering the construction of a transitway through the central Honolulu and Waikiki areas to improve transit operations and to encourage additional use of public transportation by area residents, workers, and visitors. In the project area, one transitway alignment is planned from the Ala Moana Center area along Ala Moana Boulevard to Kalia Road, and then along Kalia Road into the central area of Waikiki. The segment along Ala Moana Boulevard would occupy one traffic lane in each direction on either side of the median. The segment along Kalia Road between Ala Moana Boulevard and Rainbow Drive would occupy two of the existing traffic lanes along the mauka side of the street, which would be separated from the remaining traffic lanes by a raised curb. This would leave three lanes for normal traffic use, versus the five lanes available at present. The traffic impact analyses for the Waikikian project is based on the existing lanes along Ala Moana Boulevard and Kalia Road, with the relationship of the Waikikian to the transitway discussed on a qualitative basis.

TRAFFIC FORECASTS

The traffic volumes for mid 2005 were estimated to include the additional traffic that would be generated by the Kalia Tower, the re-opening of the Lagoon Tower as a time-share operation, and the construction of the Asia-Pacific Center at Fort DeRussy. An annual growth factor was applied to the 1999/2000 traffic counts to reflect general growth in the area and those redevelopment projects located in other sections of Waikiki.

Lagoon Tower Time-Share Project

On the day the 1999 traffic counts were made, only 125 of the 235 units in the Lagoon Apartments tower were occupied; at the time of the 2000 counts, the building was being renovated and all units were vacant.

For year 2005 traffic forecasts, it is assumed that the Lagoon Tower time-share units would be 90% occupied, and that the units would exhibit similar trip generation characteristics to the present trip rates for the Hilton Hawaiian Village. The 90% occupancy rate would result in 212 occupied units on the analysis day. The 212 occupied units would generate an increase of 65 and 75 vehicle trips in the morning and afternoon peak hours, respectively, as summarized in Table 3-1.

Kalia Tower

The Kalia Tower project will add 453 hotel rooms to the Hilton Hawaiian Village. It will also include a health and wellness spa, small retail shops, a lobby bar, and a lounge, all oriented towards hotel guests.

The trip rates for the Hilton Hawaiian Village were applied to 408 occupied hotel rooms (90% occupancy factor) to estimate the additional peak hour vehicle trips. As summarized in Table 3-1, Kalia Tower is estimated to generate an additional 123 and 143 vehicle trips to/from the Hilton Hawaiian Village in the morning and afternoon peak hours, respectively.

Asia-Pacific Center

The Asia-Pacific Center has started renovation of an existing building at Fort DeRussy to house its operations, with the renovation work expected to be completed in the near future. Once the renovation has been completed, the Asia-Pacific Center will relocate its operations to Fort DeRussy from its current location in the Waikiki Trade Center.

The Asia-Pacific Center, with a present staff of 92 persons, conducts 12-week sessions for 50 to 75 students from Asian and Pacific countries three times a year. The Center expects to expand its staff to 122 personnel after its relocation to Fort DeRussy.

Table 3-1
VEHICLE TRIP GENERATION

Facility	Quantities	Morning Peak Hour			Afternoon Peak Hour		
		To Facility	From Facility	Total	To Facility	From Facility	Total
Lagoon Tower	212 Occupied Units	35	29	64	36	39	75
Kalia Tower	408 Occupied Hotel Rooms	68	55	123	70	73	143
Asia-Pacific Center	122 Staff	85	9	94	9	85	94

Wilbur Smith Associates; March 14, 2001

The Asia-Pacific Center staff would park at the Fort DeRussy parking structure on Maluhia Street. After discussions with the Public Affairs Officer for the Center,[1] traffic forecasts for the Asia-Pacific Center were based on the following assumptions:

- Three-quarters of the staff would arrive and depart in the 7:00-8:00 AM and 3:30-4:30 PM peak hours. Most of their staff presently start work between 6:30 and 8:00 AM and leave between 4:00 and 5:00 PM.
- All of the staff would arrive/depart by automobile with an average of 1.09 staff per vehicle, the average vehicle occupancy rate for work trips for Oahu.
- Off-peak direction vehicle trips would approximate 10% of peak direction trips to reflect drop-offs and deliveries.
- No students would drive to the Center. At present, all students are billeted at hotels or condominiums within walking distance of the Center.

Based on these assumptions, the Center would generate 94 vehicle trip ends in each peak hour, as summarized in Table 3-1.

General Area Growth

The growth factor was based on the average annual increases on Ala Moana Boulevard between 1995 and 1997, as determined from State DOT 24-hour machine counts made near Kalakaua Boulevard. The average annual increase for this period was 1.4%. This average annual growth rate would amount to an 8.7% increase between the 1999 counts and the mid-2005 period used for the analyses of the Waikikian traffic impacts.

Peak Hour Traffic Volumes

The resultant 2005 traffic forecasts are depicted in Figures 3-1 and 3-2 for the morning and afternoon commute peak hours, respectively. Note that the traffic forecasts reflect the gate from Hilton Hawaiian Village to Dewey Lane being open in 2005 for exiting vehicles.

The traffic volumes along Kalia Road ewa of Rainbow Drive would increase by about 27.1% and 21.5% in the morning and afternoon peak hours, respectively. The higher proportional increases in the morning peak hour result from the higher contribution of Hilton Hawaiian Village to the morning traffic than the afternoon traffic, when there is more through traffic using Kalia Road.

The increases along Ala Moana Boulevard between the Atkinson Drive and Kalakaua Avenue intersections would amount to between 14% and 18% higher than present volumes, depending on the location.

[1] Telephone conversation with Barbara O'Neal, Public Affairs Officer for Asia Pacific Center, September 28, 1999.

TRAFFIC CONDITIONS

Traffic conditions at the study area intersections are summarized in Table 3-2 for the morning and afternoon peak traffic hours.

At the Ala Moana Boulevard-Kalia Road intersection, the additional traffic would substantially increase the portion of the intersection capacity used in each peak hour, most significantly in the afternoon when the forecast traffic volume increases to 91% of capacity, versus 77% for existing conditions. In the morning peak hour, the ewa-bound left-turn/through traffic conditions would worsen from LOS D to LOS E with the present signal timing, but overall conditions would remain at LOS D. In the afternoon peak hour, the ewa-bound left-turn/through traffic conditions would worsen from LOS E to LOS F with the present signal timing, but overall conditions would remain at LOS E.

Table 3-2
2005 CONDITIONS AT KEY INTERSECTIONS WITHOUT PROJECT

Intersection	Morning Peak Hour			Afternoon Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Ala Moana Blvd. & Kalakaua Ave.	0.74	22.9	C	0.89	30.5	C
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.76	51.5	D	0.91	66.0	E
Ala Moana Blvd. & Hobron Ln.	0.65	39.5	D	0.77	46.2	D
Ala Moana Blvd. & Atkinson Dr.	0.86	38.2	D	0.87	55.9	E
Kalia Rd. & Rainbow Dr.	0.45	10.8	B	0.60	11.7	B
Holomoana St. & Hobron Ln.	--	8.6	A	--	13.6	B
Holomoana St. & Dewey Ln.	--	9.1	A	--	10.3	B

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; March 15, 2001

The traffic increases would have little effect on conditions at the Kalia Road-Rainbow Drive intersection with both the proportion of intersection capacity used by future traffic and the traffic conditions for the movements little changed from existing conditions.

Peak hour traffic conditions are forecast to remain at LOS D at the intersection of Hobron Lane with Ala Moana Boulevard. The additional traffic would increase the proportion of capacity use to 77% in the afternoon peak hour.

At the Ala Moana Boulevard intersection with Atkinson Drive, the forecast traffic growth would result in about 86 to 87% of capacity being used in each peak hour, or about 10 percentage points higher than existing conditions. The additional traffic would worsen conditions to LOS D in the morning peak hour and to LOS E in the afternoon peak hour.

Traffic conditions are forecast at LOS C at the Ala Moana Boulevard intersection with Kalakaua Avenue in both peak hours. The additional traffic is projected to increase the volume-to-capacity ratio to 0.89 in the afternoon peak hour.

The Stop sign-controlled intersections of Holomoana Street with Hobron Lane and Dewey Lane are both projected to remain at LOS A and LOS B in the morning and afternoon peak hours, the same as for existing conditions.

EFFECTS OF POTENTIAL FULL INTERSECTION AT DEWEY LANE

A number of potential modifications to traffic circulation have been considered for the area roadway system in the vicinity of the Hilton Hawaiian Village that would affect access to the Waikikian site and traffic flow along Dewey Lane. One of these alternatives is the provision of a full intersection at the Dewey Lane connection to Ala Moana Boulevard. The full intersection would permit both left turns out of and into Dewey Lane. Key features of the full intersection would include:

- Separate left-turn and right-turn lanes would be provided on the Dewey Lane approach to Ala Moana Boulevard.
- A right-turn lane would be provided on the Diamond Head-bound approach of Ala Moana Boulevard to the intersection.
- A left-turn lane would be provided in the median of Ala Moana Boulevard for turns into Dewey Lane.
- A pedestrian crosswalk would be provided across Ala Moana Boulevard on the Diamond Head side of the intersection.
- Traffic signal control would be provided at the intersection.

The estimated 2013 traffic volumes with a full intersection at the Dewey Lane connection to Ala Moana Boulevard, without the Waikikian Project, are depicted in Figures 3-3 and 3-4 for the morning and afternoon peak hours, respectively. Intersection conditions are presented in Table 3-3. Key effects of this circulation full intersection on area circulation are discussed below.

- The full intersection would increase traffic use of Dewey Lane, both by Hilton Hawaiian Village and Ala Wai Harbor traffic. The traffic on the segment mauka of the Rainbow Drive connection is estimated at about 380 to 490 vehicles in the peak traffic hours. Peak hour volumes makai of the Rainbow Drive connection are estimated at 100 to 150 vehicles.

- Traffic volumes on Kalia Road at Ala Moana Boulevard would be reduced by about 250 to 310 vehicles in each peak hour, as compared to No Action. The traffic reduction would result in a significant improvement in traffic conditions at the Kalia Road intersection with Ala Moana Boulevard. In the afternoon peak hour, the capacity use is estimated to decline by 5% below No Project with the existing roadways, with average delay reduced by 7 seconds per vehicle or more.

Table 3-3
2005 CONDITIONS AT KEY INTERSECTIONS
WITHOUT WAIKIKIAN PROJECT
WITH DEWEY LANE FULL INTERSECTION

Intersection	Morning Peak Hour			Afternoon Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Ala Moana Blvd. & Kalakaua Ave.	0.74	23.0	C	0.89	30.9	C
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.70	47.2	D	0.85	58.4	E
Ala Moana Blvd. & Dewey Ln.	0.41	16.5	C	0.56	17.3	B
Ala Moana Blvd. & Hobron Ln.	0.64	38.4	D	0.75	43.5	D
Ala Moana Blvd. & Atkinson Dr.	0.86	38.4	D	0.88	56.0	E
Kalia Rd. & Rainbow Dr.	0.34	8.8	A	0.46	9.7	A
Holomoana St. & Hobron Ln.	--	8.1	A	--	11.2	B
Holomoana St. & Dewey Ln.	--	11.3	B	--	9.7	A

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; May 5, 2001

- Traffic volumes on Hobron Lane makai of Ala Moana Boulevard would be reduced by about 80 to 130 vehicles in each peak hour, as compared to the existing roadway network. The traffic reduction would result in a small improvement in traffic conditions at the Hobron Lane intersection with Ala Moana Boulevard. In the afternoon peak hour, the capacity use is estimated to decline by 1% below the existing roadways, with average delay reduced by 2 to 3 seconds per vehicle.

- The full Dewey Lane intersection with Ala Moana Boulevard would operate with traffic volumes at 56% of capacity or less, and with average vehicle delays at LOS B or C.

- The installation of an additional traffic signal along Ala Moana Boulevard, with about 500 to 700 feet to the adjacent traffic signals, would likely affect traffic flow through the signal system and result in an increased number of vehicle stops.

- The additional pedestrian crossing point of Ala Moana Boulevard at Dewey Lane would improve pedestrian circulation for residents, workers, and visitors in the blocks on either side of the crosswalk, and reduce the pedestrian volumes at the heavily used Kalia Road and Hobron Lane crosswalks. The new crossing would also improve pedestrian access to the TheBus stops located near mid-block on both sides of Ala Moana Boulevard.

This full intersection would provide a second outlet for the Hilton Hawaiian Village and assist in alleviating future traffic conditions along Kalia Road.

PARKING GARAGE ENTRY CAPACITY

The entrances to the Hilton Hawaiian Village parking structure have been the key limitation on the flow rate at which vehicles could enter the Hilton complex in recent years, particularly for local functions. Prior to the Kalia Tower project, the garage had two entry gates with a normal capacity of about 1,000 vehicles per hour, if both entrances are fully utilized. The entry capacities could be further increased for special events by stationing a parking attendant at each ticket dispenser to hand tickets to the entering driver, with the gate locked in the up position. With two previous entry gates, this procedure could boost the total garage entrance rate to about 1,300 vehicles per hour

During the present Kalia Tower construction project, the mauka garage entrance is being reconstructed to provide two entry gates and lanes. With the provision of two entry gates at the mauka garage entrance, that entrance should be able to accommodate about 780 vehicles per hour with normal operation. The single gate at the makai entrance can accommodate about 600 vehicles per hour, for a total entry rate of 1,380 vehicles per hour using normal operation. The entry capacities can be further increased for special events by stationing a parking attendant at each ticket dispenser to hand tickets to the entering driver, with the gate locked in the up position. With three entry gates, this may boost the total garage entrance rate to 1,600 to 1,700 vehicles per hour.

Therefore, the parking entry capacity will be increased by about 25% to35% with the completion of the modifications to the mauka garage entrance.

Chapter 4
2005 TRAFFIC CONDITIONS WITH PROJECT

The assessment of traffic conditions with the Waikikian Project reflects a typical weekday in a peak visitor month in year 2005. The forecasts are based on 90% occupancy of all units in the Hilton Hawaiian Village complex with a typical day of meetings and other functions.

The traffic assessment was made for four different circulation alternatives in the vicinity of the Waikikian site. Two alternatives encompass whether the Dewey Lane connection to Ala Moana Boulevard is continued with its current limitation of right-turns in and out, or the connection is modified into a full intersection with traffic signal control. The other two alternatives pair the Dewey Lane intersection options with whether a section of Rainbow Drive is converted to one-way operation.

PROJECT DESCRIPTION

The Waikikian Project will add approximately 350 guest units, an increase of about 11% in the number of visitor units at the Hilton Hawaiian Village.[1] The Waikikian visitor units may be developed as either vacation ownership or hotel rooms. The Project will also include several ancillary uses for the Waikikian and Hilton Hawaiian Village, which are expected to include a wedding chapel oriented towards Village guests, a restaurant, retail shops, and administrative and back-of-house uses. The site plan is depicted in Figure 1-1.

Access features of the new Waikikian development include the following:

- Guest and employee parking for the Project will be provided by a new parking structure constructed within the podium of the Waikikian tower, and by the present Hilton parking structure.

- The new parking structure will be physically connected with the present Hilton Garage and provide internal circulation connections within the structure to allow vehicles to circulate between the new parking area and the existing Hilton Garage. The new parking facility will be accessed through the existing entrances and exits to the Hilton Garage. The makai entrance will be reconstructed to provide two entry lanes and gates.

- Rainbow Drive will be extended to connect to Dewey Lane in order to provide access between the Waikikian and the Hilton Garage, as well as circulation between the Waikikian-Lagoon Tower area and the other portions of the Hilton Hawaiian Village.

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[1] Includes the 2,545 existing hotel rooms plus the 235 time-share units in the Lagoon Apartments building and the 453 hotel rooms in the Kalia Tower.

- A porte cochere and drop-off driveway will be provided for the Waikikian along the makai side of the building, with entrance from the Rainbow Drive Extension and exit onto Dewey Lane. Traffic using the porte cochere will be able to enter the Hilton Garage via the extension of Rainbow Drive to Dewey Lane.

- Dewey Lane will be widened to 25 feet to provide an improved two-way roadway between Ala Moana Boulevard and Holomoana Street to provide access to the Waikikian.

- A pedestrian pathway will be provided along the Diamond Head side of Dewey Lane between Ala Moana Boulevard and Holomoana Street. Pedestrians currently have to walk within the travel lanes or along the unimproved shoulder area.

- Deliveries to the Waikikian will be made using the existing service driveway located along the ewa side of the Hilton parking garage.

- Tour and charter buses would continue to use the Hilton bus terminal on the Diamond-Head side of Tapa Tower to load/unload passengers. Trolleys and shuttle buses serving the Waikikian and Lagoon Tower would use a new bus pullout bay located along Dewey Lane ewa of the Lagoon Tower.

- Pedestrian access between the Waikikian and the Hilton Hawaiian Village will be provided by an improved pedestrian walkway along the Rainbow Drive extension to Dewey Lane.

POTENTIAL ROADWAY MODIFICATIONS

A number of potential modifications to traffic circulation have been considered for the area roadway system in the vicinity of the Hilton Hawaiian Village that would affect access to the Waikikian site and traffic flow along Dewey Lane. These alternatives center upon either the provision of a full intersection at the Dewey Lane connection to Ala Moana Boulevard, or the conversion of a segment of Rainbow Drive to one-way operation within the Hilton Hawaiian Village. A preliminary assessment of several of these is summarized in Appendix A.

The traffic impact assessment for the Waikikian Project has included several of these circulation alternatives to assess whether these roadway modifications would improve or adversely affect traffic conditions with the Waikikian project. The alternatives considered herein are:

A-1 Existing circulation with Dewey Lane limited to right turns at its connection to Ala Moana Boulevard, and Rainbow Drive extended to Dewey Lane with two-way traffic flow.

A-2 Dewey Lane connection to Ala Moana Boulevard reconstructed as a full intersection that permits left turns into and out of Dewey Lane, with Rainbow Drive extended to Dewey Lane with two-way traffic flow.

E-1 Dewey Lane limited to right turns at its connection to Ala Moana Boulevard, and Rainbow Drive extended to Dewey Lane with a short section near Rainbow Tower converted to one-way ewa-bound traffic flow.

E-2 Dewey Lane connection to Ala Moana Boulevard reconstructed as a full intersection that permits left turns into and out of Dewey Lane, and Rainbow Drive extended to Dewey Lane with a short section near Rainbow Tower converted to one-way ewa-bound traffic flow.

WIAKIKIAN TRIP GENERATION

The numbers of additional vehicle trips generated by the Waikikian Project were estimated using the trip generation rates, based on occupied visitor units, developed for the entire complex using the traffic counts from the September 23, 1999 survey. These vehicle trip rates include employee, guest, delivery, and special function traffic.

The trip rates were applied to 315 occupied visitor units, which reflect 90% occupancy level for the 350-unit Waikikian.

The numbers of additional vehicle trips generated by the Waikikian Project on a typical weekday in peak season are summarized in Table 4-1. The Project is estimated to generate 95 additional vehicle trips in the morning peak hour and 111 trips in the afternoon peak hour. These trips reflect the additional vehicles entering and exiting via Dewey Lane, Rainbow Drive, the Hilton bus terminal, or the service driveway on Ala Moana Boulevard.

Table 4-1
VEHICLE TRIPS GENERATED BY WAIKIKIAN PROJECT

Time Period	Trip Ends per Occupied Unit (1)			Vehicle Trip Ends		
	Arrive	Depart	Total	Arrive	Depart	Total
7:00 - 8:00 AM	.165	.134	.299	52	43	95
3:30 - 4:30 PM	.169	.180	.349	54	57	111

(1) Trip rates based on Hilton Hawaiian Village traffic counts on September 23, 1999.
Wilbur Smith Associates; April 2, 2001

TRAFFIC ASSESSMENT WITH CIRCULATION ALTERNATIVE A-1

This alternative reflects the existing circulation patterns in the vicinity of the Waikikian site, with the exception of the extension of Rainbow Drive to Dewey Lane. Traffic would be able to enter and exit the Hilton Hawaiian Village via Dewey Lane. However, the present Rainbow Drive connection would continue to be signed and to function as the main entrance to the Hilton Hawaiian Village. The roadway configuration, driveway connections, and the location of sidewalks at the junction of Dewey Lane with Ala Moana Boulevard would remain similar to the existing layout.

Peak Hour Traffic Volumes

The additional vehicle trips were assigned to the Alternative A-1 roadway system based generally on the existing traffic patterns in the area. These existing patterns were modified to reassign a portion of the Hilton Hawaiian Village trips that now use Kalia Road to enter/exit the Village via the new connection to Dewey Lane. The resultant traffic volumes at the study area intersections and driveways for the morning and afternoon peak hours are depicted in Figures 4-1 and 4-2, respectively. The numbers of additional vehicles and the proportional increase to the 2005 peak hour volumes without the Project are indicated for key street segments in Table 4-2.

Table 4-2
TRAFFIC INCREASES WITH WAIKIKIAN PROJECT
CIRCULATION ALTERNATIVE A-1

Location	Morning Peak Hour			Afternoon Peak Hour		
	Without Project	Project Increase	Percent Increase	Without Project	Project Increase	Percent Increase
Ala Moana Blvd. Mauka of Kalia Rd.	1,789	18	1.0	2,030	14	0.7
Ala Moana Blvd. Ewa of Hobron Ln.	3,150	59	1.9	4,300	68	1.6
Hobron Ln. Makai of Ala Moana Blvd.	479	26	5.4	817	31	3.8
Kalia Rd. At Ala Moana Blvd.	1,498	43	2.9	2,116	36	1.7
Dewey Ln. Makai of Ala Moana Blvd.	71	27	43.3	95	30	31.5

Wilbur Smith Associates; April 19, 2001

The combination of the Waikikian and the Rainbow Drive connection to Dewey Lane is forecast to add about 27 to 30 vehicles on the section of Dewey Lane between Ala Moana Boulevard and Rainbow Drive in both peak hours. This would increase the morning peak hour volumes on this segment by 43% and the afternoon peak hour volumes by 31%. Traffic volumes would increase on Kalia Road by about 2%. Traffic volumes on the section of Hobron Lane makai of Ala Moana Boulevard are estimated by 4% to 5% as a result of the Waikikian and the Rainbow Drive extension.

Peak Hour Intersection Conditions

The addition of the Waikikian traffic would have a small effect on overall traffic conditions at the key intersection near the project site (Table 4-3). With the Alternative A-1 circulation, the Project would increase the proportion of the capacity used at the Ala Moana Boulevard intersection with Kalia Road by 1% in the morning peak hour and 2% in the afternoon peak hour, with the afternoon volume-to-capacity ratio increasing to 0.93. The changes are estimated to add approximately 2 seconds to the average vehicle delay in each peak hour.

Table 4-3
2005 CONDITIONS AT KEY INTERSECTIONS
WITH WAIKIKIAN PROJECT
ALTERNATIVE A-1 DEWEY LANE RIGHT IN/OUT

Intersection	Morning Peak Hour			Afternoon Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Ala Moana Blvd. & Kalakaua Ave.	0.74	23.0	C	0.89	30.9	C
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.77	53.3	D	0.93	68.2	E
Ala Moana Blvd. & Hobron Ln.	0.66	39.8	D	0.78	47.1	D
Ala Moana Blvd. & Atkinson Dr.	0.86	38.4	D	0.88	56.6	E
Kalia Rd. & Rainbow Dr.	0.47	11.2	B	0.62	12.0	B
Holomoana St. & Hobron Ln.	--	8.7	A	--	14.4	B
Holomoana St. & Dewey Ln.	--	10.4	B	--	9.2	A

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; April 2, 2001

At the Ala Moana Boulevard intersection with Hobron Lane, the increased traffic would increase the proportion of the intersection capacity use by 1% in both peak hours, with the morning and afternoon volume-to capacity ratios at 0.66 and 0.78, respectively. The overall average traffic delay at the intersection would increase by 1.0 second in the morning and afternoon peak hours.

The additional traffic at the intersection of Kalia Road with Rainbow Drive would increase the proportion of intersection capacity used by 2% in each peak hour. However, the increased volumes would continue to amount to only 47% and 62% of the estimated intersection capacity in the morning and afternoon peak hours, respectively.

The Waikikian traffic would have little effect on conditions at the Ala Moana Boulevard intersections with Kalakaua Avenue and with Atkinson Drive. The additional traffic would increase the proportion of capacity used at the Atkinson Drive intersection to 88%, from 87% without the Project, in the afternoon peak hour with a one second increase in average delay per vehicle passing through the intersection.

The Waikikian project and the Rainbow Drive connection to Dewey Lane would add an estimated one second of delay per vehicle at the intersections of Holomoana Street with Dewey Lane and with Hobron Lane. The conditions for the Stop sign controlled traffic would remain at very acceptable Levels of Service A or B.

These estimated impacts of the Waikikian project are not of sufficient magnitude to warrant mitigative actions for normal weekday conditions.

Parking Garage Entry Capacity

The makai entrance to the Hilton Garage is planned for modification to include two entry gates, which could accommodate approximately 740 vehicles entering per hour with normal operation. When coupled with the two gates at the mauka end of the garage, the new entrances should be able to accommodate approximately 1,500 to 1,550 vehicles entering per hour, or about 40% more than the existing rate.

The entry capacities can be further increased for special events by stationing a parking attendant at each ticket dispenser to hand tickets to the entering driver, with the gate locked in the up position. With four entry gates, this may boost the total garage entrance rate to about 2,000 vehicles per hour, approximately 50% above the present entry rate for the Hilton Garage.

Effect on Special Event Traffic at the Hilton Hawaiian Village

The Waikikian should not affect the frequency or size of special events at the Hilton Hawaiian Village. The Waikikian should only impact traffic conditions during special events through the increases to the normal daily employee and guest traffic as a result of the additional accommodation units and ancillary uses.

The extension of Rainbow Drive to connect to Dewey Lane, coupled with the increased entry capacity at the makai garage entrance, could have a substantial effect on traffic operations and conditions during special events at the Hilton Hawaiian Village that attract a large number of Honolulu residents. Over time, many residents will become aware of Dewey Lane as a "back way" into the Hilton Hawaiian Village. Arriving residents from areas ewa of Waikiki could turn onto Holomoana Street at either the connection from Ala Moana Boulevard ewa of the Hawaii Prince Hotel or at Hobron Lane, and use Holomoana Street and the makai segment of Dewey Lane to reach the new Rainbow Drive connection to Dewey Lane. These arriving residents could also turn onto Dewey Lane at the front of the Ilikai to reach the new entrance.

With the increased garage entry capacity, the existing Rainbow Drive entrance to the Village from Kalia Drive would become the capacity constraint to the rate that vehicles can enter the parking facilities. Therefore, the use of this second entrance into the Hilton Hawaiian Village by vehicles arriving on Ala Moana Boulevard would likely increase the rate at which vehicles can enter the Village and the garage.

The entrance via Dewey Lane would also increase the length of roadway/number of vehicles that could queue before blocking the moving traffic lanes on Ala Moana Boulevard. An estimated 16 vehicles could queue between the Ala Moana Boulevard lanes at the Ilikai porte cochere and the makai garage entrance. A large number of vehicles could also queue along the makai segment of Dewey Lane and along Holomoana Street while approaching the Hilton parking, if arriving residents use this route. The combination of the increased entry gate capacity and the second entry into the Hilton Hawaiian Village should reduce the problem of arriving traffic queuing along Rainbow Drive, Kalia Road, and along Ala Moana Boulevard while waiting to enter the parking.

After the event, vehicles leaving from the makai garage exit could be directed to use Dewey Lane. These vehicles would use the mauka segment of Dewey Lane and Ala Moana Boulevard to reach Ena Road, Ala Wai Boulevard, or Kalakaua Avenue for travel into Waikiki or to reach the areas of central Honolulu ewa of the site and the H-1 Freeway. Hobron Lane could be used by vehicles traveling to areas ewa of Waikiki.

Several transportation management actions could be implemented for large local events at the Hilton Hawaiian Village to improve traffic flow and minimize disruption to other traffic:

- During the arrival and departure periods for an event with a large local attendance, a traffic control officer could be stationed at the mauka end of Dewey Lane to minimize any disruption to vehicles trying to exit the Ilikai porte cochere or enter the Ilikai parking garage.

- During the arrival period for an event with a large local attendance, vehicle parking and standing could be prohibited along the mauka curb of the old roadway alignment section of Ala Moana Boulevard. This would allow TheBus to bypass any vehicle queue waiting to enter Dewey Lane and access the bus stop.

- A traffic control officer could be stationed along the section of Hobron Lane makai of Ala Moana Boulevard during the arrival and departure period for events with a large local attendance to minimize delays to vehicles entering or exiting the driveways along this section.

TRAFFIC ASSESSMENT WITH MODIFIED ALTERNATIVE A-1

The preceding section reflects traffic operations and conditions with the roadways and sidewalks at the mauka end of Dewey Lane remaining with the present layout. This area could be modified to provide a conventional intersection layout, with Dewey Lane being extended to connect directly to the Diamond Head-bound lanes of Ala Moana Boulevard as depicted in Figure 1-1. The principal features of this modification are as follows:

- Only right turns would be allowed into and out of Dewey Lane. There would be no opening in the median of Ala Moana Boulevard, so left turns would not be possible into or out of Dewey Lane.
- A wider, improved walkway would be provided closer along Ala Moana Boulevard for pedestrians.
- A right-turn lane would be provided on the Diamond Head bound approach to the new Dewey Lane intersection. The right-turn lane would allow vehicles to wait for pedestrians to cross Dewey Lane without the stopped vehicle blocking the through lanes of Ala Moana Boulevard.
- The existing bus stops on Diamond Head-bound Ala Moana Boulevard in front of the Ilikai and on the Diamond Head side of Dewey Lane could be consolidated into one stop, probably located on the ewa side of Dewey Lane. The area would provide a much larger passenger waiting area and permit the installation of a passenger seating and shelter without blockage of the sidewalk. The location and design would have to be worked out with TheBus, the State DOT, the Ilikai, and area residents.

The impacts of this potential modification to the existing layout of the Dewey Lane intersection with Ala Moana Boulevard would likely be limited to the operations and conditions at this junction, but would not result in any major changes in area circulation. The potential beneficial effects would include:

- Improved pedestrian safety since pedestrians walking along the makai side of Ala Moana Boulevard would cross only a single roadway in addition to the entrance to the Ilikai porte cochere, and they would cross this new roadway at a right angle. At present, the walkway follows the edge of the Ilikai where they cross four driveways in addition to Dewey Lane, with several crossing made at angles and/or with their back to the approaching traffic.
- Improved pedestrian safety from the right-angle intersection slowing traffic speeds at the pedestrian crosswalk.
- Improved amenities and a safer wait area for TheBus passengers.
- Improved traffic safety as a result of the more conventional roadway layout without the existing large unmarked paved areas.

The modification could have several adverse effects on local conditions at the intersection:

- The modifications would remove the curb section along the present island that is used for deliveries or by private buses waiting for passengers.
- Many vehicles entering the two parking garage ramps into the Ilikai would have to travel through the Ilikai porte cochere. Potential design modifications should be investigated that may allow these vehicles to access the ramps from the extended section of Dewey Lane.
- Traffic turning left from the Ilikai porte cochere onto the Dewey Lane extension may be delayed by any queue of vehicles waiting to turn right onto Ala Moana Boulevard.

Some of the adverse impacts could be reduced or eliminated through the project design process. The design process should include close coordination with the Ilikai, State DOT, City DTS, and TheBus representatives to minimize any potential adverse impacts.

TRAFFIC ASSESSMENT WITH CIRCULATION ALTERNATIVE A-2

Alternative A-2 modifies the existing circulation patterns by providing a full intersection for the Dewey Lane connection to Ala Moana Boulevard. The full intersection would permit both left turns out of and into Dewey Lane. Key features of the full intersection would include:

- Separate left-turn and right-turn lanes would be provided on the Dewey Lane approach to Ala Moana Boulevard.
- A right-turn lane would be provided on the Diamond Head-bound approach of Ala Moana Boulevard to the intersection.
- A left-turn lane would be provided in the median of Ala Moana Boulevard for turns into Dewey Lane.
- A pedestrian crosswalk would be provided across Ala Moana Boulevard on the Diamond Head side of the intersection.
- Traffic signal control would be provided at the intersection.

Peak Hour Traffic Volumes

The existing traffic patterns were modified to reflect the full Dewey Lane intersection with Ala Moana Boulevard as follows:

- Most of the traffic traveling to either the Waikikian project or to the Lagoon Tower was routed to these sites or to the Hilton Garage via Dewey Lane.
- The Hilton Hawaiian Village traffic that currently exit via Holomoana Street and Hobron Lane to travel ewa-bound on Ala Moana Boulevard was rerouted to use Dewey Lane to reach Ala Moana Boulevard.
- A small portion of the other Hilton Hawaiian Village trips that currently exit onto Kalia Road to turn ewa onto Ala Moana Boulevard were rerouted via the Dewey Lane full intersection.
- About 75% of the Ala Wai Harbor traffic approaching from the Diamond Head side were rerouted via the left turn onto Dewey Lane to Holomoana Street and the harbor area.

- About 25% of the traffic leaving Ala Wai Harbor to travel to areas ewa was rerouted from Hobron Lane to use the left turn from Dewey Lane onto Ala Moana Boulevard.

The resultant traffic volumes at the study area intersections and driveways for the morning and afternoon peak hours are depicted in Figures 4-3 and 4-4, respectively. The numbers of additional vehicles and the proportional increase to the 2005 peak hour volumes without the Project and the roadway changes are indicated for key street segments in Table 4-4.

Traffic volumes along the mauka section of Dewey Lane are estimated to increase to 373 and 616 vehicles in the morning and afternoon peak hours, respectively. The increase in through traffic to or from the Ala Wai Harbor contributes 45 and 75 of these trips in the morning and afternoon peak hours, respectively. The traffic volumes along the makai segment of Dewey Lane would amount to 120 and 160 vehicles in the morning and afternoon peak hours, respectively.

The Dewey Lane connection would result in lower traffic volumes along the segment of Kalia Road between Ala Moana Boulevard and Rainbow Drive as compared to No Project and to circulation Alternative A-1. The reduction would amount to approximately 14% to 16%.

The Dewey Lane full intersection would also result in a reduction in traffic volumes on the section of Hobron Lane makai of ala Moana Boulevard. The reduction would amount to about 24% and 16% of the mauka-bound volumes in the morning and afternoon peak hours, respectively.

Table 4-4
TRAFFIC INCREASES WITH WAIKIKIAN PROJECT
CIRCULATION ALTERNATIVE A-2

Location	Morning Peak Hour			Afternoon Peak Hour		
	Without Project	Project Increase	Percent Increase	Without Project	Project Increase	Percent Increase
Ala Moana Blvd. Mauka of Kalia Rd.	1,789	18	1.0	2,030	14	0.7
Ala Moana Blvd. Ewa of Hobron Ln.	3,150	59	1.9	4,300	68	1.6
Hobron Ln. Makai of Ala Moana Blvd.	479	-115	-24.0	817	-132	-16.2
Kalia Rd. At Ala Moana Blvd.	1,498	-244	-16.2	2,116	-306	-14.4
Dewey Ln. Makai of Ala Moana Blvd.	71	402	466	95	521	448

Wilbur Smith Associates; April 19, 2001

Peak Hour Intersection Conditions

The full intersection at the Dewey Lane connection to Ala Moana Boulevard is projected to result in a substantial improvement in future traffic conditions at the intersections of Ala Moana Boulevard with Kalia Road and Kalia Road with Rainbow Drive due to the diversion of traffic to the new intersection. The diversion from Hobron Lane to Dewey Lane would result in a small improvement at that intersection relative to No Action and Alternative A-1. The intersection conditions are summarized for Alternative A-2 in Table 4-5.

Table 4-5
2005 CONDITIONS AT KEY INTERSECTIONS
WITH WAIKIKIAN PROJECT
ALTERNATIVE A-2 DEWEY LANE FULL INTERSECTION

Intersection	Morning Peak Hour			Afternoon Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Ala Moana Blvd. & Kalakaua Ave.	0.74	23.0	C	0.89	30.9	C
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.70	47.5	D	0.86	59.0	E
Ala Moana Blvd. & Dewey Ln.	0.44	18.8	C	0.59	18.9	B
Ala Moana Blvd. & Hobron Ln.	0.65	38.5	D	0.76	43.8	D
Ala Moana Blvd. & Atkinson Dr.	0.86	38.4	D	0.88	56.0	E
Kalia Rd. & Rainbow Dr.	0.35	9.0	A	0.47	9.7	A
Holomoana St. & Hobron Ln.	--	8.1	A	--	11.2	B
Holomoana St. & Dewey Ln.	--	11.3	B	--	9.7	A

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; April 9, 2001

At the intersection of Ala Moana Boulevard with Kalia Road, the traffic diversion is projected to reduce the capacity utilization by 5% to 6% from conditions without the Waikikian project and the roadway changes (No Project). The average delay would remain at LOS D and E in the morning and afternoon peak hours, respectively, although the diversion is estimated to reduce average delay per vehicle by 4 to 7 seconds per vehicle as compared to No Action. Most of the improvements would be experienced by the traffic exiting Kalia Road, which would improve to LOS E from LOS F.

The diversion is estimated to reduce the capacity use at the Kalia Road intersection with Rainbow Drive by 10% and 13% in the morning and afternoon peak hours, respectively.

At the Hobron Lane intersection with Ala Moana Boulevard, the diversion would reduce the capacity use by 1% and the average vehicle delay by 3 seconds in the afternoon peak hour. Most of the improvements would occur for the vehicles exiting from makai portion of Hobron Lane.

The diversion of Ala Wai Harbor traffic to Dewey Lane would increase the delay for vehicles turning left from Dewey Lane onto Holomoana Street by 1 to 2 seconds. However, the left turn conditions would remain at LOS A or B.

The traffic volumes at the new Dewey Lane intersection with Ala Moana Boulevard is projected to approximate 44% and 59% of capacity in the morning and afternoon peak hours, respectively. The average delays are forecast at a very acceptable LOS B or C.

The installation of the additional traffic signal along Ala Moana Boulevard, with about 500 to 700 feet to the adjacent traffic signals, would likely worsen traffic flow through the signal system in this section of Ala Moana Boulevard. The additional signalized location could result in an increased number of vehicle stops, and could cause potential stacking problems since it would divide one long block into two shorter blocks.

However, most of the signal green time at this new traffic signal could be assigned to Ala Moana Boulevard. The green time assigned to the Dewey Lane approach would be primarily a function of the time needed for pedestrians to cross Ala Moana Boulevard, rather than the amount of green time needed to accommodate the traffic exiting Dewey Lane. The through movements on Ala Moana Boulevard at the Dewey Lane signal could be assigned approximately 20% more green signal time than the through movements receive at the adjacent Hobron Lane and Kalia Road intersections. This smaller split of the green time to the side street (Dewey Lane) should minimize the number of additional traffic stops and minimize the potential for development of queuing problems due to the additional traffic signal.

No mitigative actions are proposed for this alternative.

Effect on Special Event Traffic at the Hilton Hawaiian Village

Most of the effects on special events would be similar to those discussed for Alternative A-1 as result of providing a second entry/exit point to the Hilton Hawaiian Village in addition to

Rainbow Drive. The differences due to the full intersection at Dewey Lane would include the following:

- The provision of the left-turn from ewa-bound Ala Moana Boulevard onto Dewey Lane would divert some of the traffic that would otherwise turn left at Kalia Road. This reduction in the traffic turning left onto Kalia Road should:

    1. Reduce the queue of vehicles waiting to turn left, with a reduction in blockage of the adjacent through lane of Ala Moana Boulevard at the intersection.

    2. Reduce the number of vehicles turning left from ewa-bound Ala Moana Boulevard who must then merge with and weave through traffic turning right from Diamond Head-bound Ala Moana Boulevard to reach the Rainbow Drive entrance to the Hilton site.

    3. Reduce the blockage of the Diamond Head-bound through lanes at the Kalia Road intersection by left-turn vehicles trapped in the intersection by the merge maneuver identified in item #2.

- The traffic turning left onto Dewey Lane could queue back into and block the adjacent through lane on this segment of Ala Moana Boulevard.

- The left-turn from Dewey Lane onto ewa-bound Ala Moana Boulevard would accommodate some exiting event traffic that would otherwise use either Kalia Road or Hobron Lane, thus lessening the queuing and delays at those intersections.

- The full intersection would result in higher traffic volumes along Dewey Lane during special events.

TRAFFIC ASSESSMENT WITH CIRCULATION ALTERNATIVE E-1

Alternative E-1 is similar to Alternative A-1 with the exception that portions of Rainbow Drive between the access driveway to the mauka Hilton Garage entrances/exits and the makai Garage entrance would be restricted to one-way operation in the makai/ewa-bound direction towards Dewey Lane. This one-way operation would reduce the roadway width and traffic volumes adjacent to the lawn area next to the Hilton Lagoon that is frequently used for outdoor functions.

The one-way operation would require all traffic using the makai exit from the Hilton Garage and traffic exiting the Rainbow Tower main lobby porte cochere to leave Hilton Hawaiian Village via Dewey Lane. All traffic wanting to access the Rainbow Tower main lobby area would have to enter via Kalia Road.

Peak Hour Traffic Volumes

The traffic assignment for circulation Alternative A-1 was revised to reflect the one-way restriction on portions of Rainbow Drive. The resultant traffic volumes at the study area intersections are depicted in Figures 4-5 and 4-6 for the morning and afternoon peak hours, respectively.

In the morning peak hour, the one-way section of Rainbow Drive is estimated to shift about 40 vehicles from exiting via Kalia Road to exiting via Dewey Lane, as compared to Alternative A-1. In the afternoon peak hour, the number exiting onto Kalia Road would be approximately 70 vehicles less than the number for Alternative A-1, with a similar increase in the number exiting onto Dewey Lane. Most of the change results for vehicles exiting from the Rainbow Tower porte cochere. Vehicles exiting from the parking garage can circulate within the garage to exit via either the mauka (to Kalia Road) or makai (to Dewey Lane) garage exits.

Peak Hour Intersection Conditions

The one-way segment of Rainbow Drive would primarily affect future traffic conditions at the intersections of Ala Moana Boulevard with Kalia Road and Kalia Road with Rainbow Drive due to the diversion of traffic from the Kalia Road exit to the Dewey Lane exit, as compared to Alternative A-1. The diversion would result in conditions at the Ala Moana Boulevard intersection with Kalia Road that are the same or slightly better than the No Project condition, thus offsetting the impact of the additional Waikikian traffic.

The increase in traffic exiting from Hobron Lane would result in an increase of 1% in the volume-to-capacity ratio at that intersection in both peak hours relative to Alternative A-1. The additional traffic would also increase the average delay by almost 2 seconds in the afternoon peak hour. The intersection conditions are summarized for Alternative E-1 in Table 4-6.

No special mitigative actions would be necessary with this circulation alternative.

Effect on Special Event Traffic at the Hilton Hawaiian Village

This circulation alternative would have similar effects and traffic management needs to Alternative A-1.

The one-way segments could be reversed in travel direction, or the section coned to provide circulation in both directions if future experience with traffic during special events indicates that such modifications would improve traffic operations in the area. Therefore, any single-lane one-way sections should be constructed with a minimum width of 20 feet to allow operation with two lanes. This width would also allow vehicles to pass any stalled vehicles during normal one-way flow conditions in the one-way sections.

Table 4-6
2005 CONDITIONS AT KEY INTERSECTIONS WITH WAIKIKIAN PROJECT
ALTERNATIVE E-1 DEWEY LANE RIGHT IN/OUT WITH SHORT RAINBOW DRIVE ONE-WAY SEGMENT

Intersection	Morning Peak Hour			Afternoon Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Ala Moana Blvd. & Kalakaua Ave.	0.74	23.0	C	0.89	30.9	C
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.76	53.0	D	0.90	63.9	E
Ala Moana Blvd. & Hobron Ln.	0.67	40.1	D	0.79	48.9	D
Ala Moana Blvd. & Atkinson Dr.	0.86	38.4	D	0.88	56.6	E
Kalia Rd. & Rainbow Dr.	0.46	10.5	B	0.59	11.6	B
Holomoana St. & Hobron Ln.	--	8.9	A	--	17.8	C
Holomoana St. & Dewey Ln.	--	10.8	B	--	9.3	A

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; April 19, 2001

TRAFFIC ASSESSMENT WITH CIRCULATION ALTERNATIVE E-2

Alternative E-2 is similar to Alternative A-2 with the exception that portions of Rainbow Drive between the access driveway to the mauka Hilton Garage entrances/exits and the makai Garage entrance are restricted to one-way operation in the makai/ewa-bound direction towards Dewey Lane. This one-way operation would reduce the roadway width and traffic volumes adjacent to the lawn area next to the Hilton Lagoon that is frequently used for outdoor functions.

The one-way operation would require all traffic using the makai exit from the Hilton Garage and traffic exiting the Rainbow Tower main lobby porte cochere to leave Hilton Hawaiian Village via Dewey Lane. All traffic wanting to access the Rainbow Tower main lobby area would have to enter via Kalia Road.

Peak Hour Traffic Volumes

The traffic volumes for Alternative E-2 was developed by revising the circulation Alternative E-1 traffic assignment to reflect the one-way restriction on portions of Rainbow Drive. The resultant traffic volumes at the study area intersections are depicted in Figures 4-7 and 4-8 for the morning and afternoon peak hours, respectively.

In the morning peak hour, the one-way section of Rainbow Drive is estimated to shift about 40 vehicles from exiting via Kalia Road to exiting via Dewey Lane, as compared to Alternative A-2. In the afternoon peak hour, the number exiting onto Kalia Road would be approximately 55 vehicles less than the number for Alternative A-2, with a similar increase in the number exiting onto Dewey Lane. Most of the change results for vehicles exiting from the Rainbow Tower porte cochere. Vehicles exiting from the parking garage can circulate within the garage to exit via either the mauka (to Kalia Road) or makai (to Dewey Lane) garage exits.

Peak Hour Intersection Conditions

The one-way segment of Rainbow Drive would further improve future traffic conditions at the intersections of Ala Moana Boulevard with Kalia Road and Kalia Road with Rainbow Drive, as compared to Alternative A-1, due to the diversion of traffic from the Kalia Road exit to the Dewey Lane exit. With the diversion, the projected level of capacity use at the Ala Moana Boulevard intersection with Kalia Road would be about 6% less than the No Action condition, with average delay per vehicle 7 to 8 seconds less than for No Action. The intersection conditions are summarized for Alternative E-2 in Table 4-7.

At the Kalia Road intersection with Rainbow Drive, the forecast Alternative E-2 traffic would use approximately 11% to 14% less of the intersection capacity than the No Action scenario. Most of this reduction is a result of the full intersection at the Dewey Lane junction with Ala Moana Boulevard.

The increase in traffic exiting from Dewey Lane onto Ala Moana Boulevard would result in an increase of 3% in the volume-to-capacity ratio at that intersection in both peak hours relative to Alternative A-2. The additional traffic would also increase the average delay by 1 to 2 seconds in each peak hour. However, the Dewey Lane intersection would operate at 62% or less of capacity and with delays reflective of LOS B or C conditions.

No special mitigative actions would be necessary with this circulation alternative.

Table 4-7
2005 CONDITIONS AT KEY INTERSECTIONS
WITH WAIKIKIAN PROJECT
OPTION E-2 DEWEY LANE FULL INTERSECTION
SHORT RAINBOW DRIVE ONE-WAY SEGMENT

Intersection	Morning Peak Hour			Afternoon Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Ala Moana Blvd. & Kalakaua Ave.	0.74	23.0	C	0.89	30.9	C
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.70	47.6	D	0.85	58.1	E
Ala Moana Blvd. & Dewey Ln.	0.47	19.9	B	0.62	20.5	C
Ala Moana Blvd. & Hobron Ln.	0.65	38.5	D	0.76	43.8	D
Ala Moana Blvd. & Atkinson Dr.	0.86	38.4	D	0.88	56.0	E
Kalia Rd. & Rainbow Dr.	0.34	8.3	A	0.46	9.5	A
Holomoana St. & Hobron Ln.	--	8.1	A	--	11.2	B
Holomoana St. & Dewey Ln.	--	11.3	B	--	9.7	A

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; April 20, 2001

Effect on Special Event Traffic at the Hilton Hawaiian Village

This circulation alternative would have similar effects and traffic management needs to Alternative A-2.

The one-way segments could be reversed in travel direction, or the section coned to provide circulation in both directions if future experience with traffic during special events indicates that such modifications would improve traffic operations in the area. Therefore, any single-lane one-way sections should be constructed with a minimum width of 20 feet to allow operation with two lanes. This width would also allow vehicles to pass any stalled vehicles during normal one-way flow conditions in the one-way sections.

APPENDIX A
ASSESSMENT OF RAINBOW DRIVE ONE-WAY OPTIONS IN 2005

A series of circulation options have been identified and analyzed for year 2005 afternoon peak hour traffic with the completion of the Waikikian project. The circulation options focus on potential variations in one-way versus two-way traffic flow on four segments of Rainbow Drive:

1. *Mauka segment* is the portion between Kalia Road and the mauka driveway connection to the garage, as well as to the Kalia Tower porte cochere.
2. *Central segment* is the portion along the Diamond Head side of the garage from the mauka garage driveway to the Rainbow Tower porte cochere.
3. *Makai segment* is the portion along the makai side of the garage from the Rainbow Tower porte cochere to the makai entrance to the parking garage, located across from the Lagoon Tower.
4. *Ewa segment* is the short section between the makai garage entrance and Dewey Lane.

These basic options were assessed on the assumption that two-way traffic flow is maintained on Dewey Lane. Each option was further assessed versus its compatibility with one-way flow on the sections of Dewey Lane mauka and makai of the Rainbow Drive connection, with both mauka-bound and makai-bound flow.

Each Rainbow Drive circulation option was analyzed versus the afternoon peak hour traffic in year 2005 with completion of Kalia Tower, Lagoon Tower, and the Waikikian project. Table A-1 provides an overview of the assessment of the year 2005 options. For intersection conditions, the solid squares for the Ala Moana Boulevard-Kalia Road location indicate a problem level that cannot be fully offset by the shifting of through traffic movement on the Kalia Road approach from the shared left-turn lane into the existing right-turn-only lane, while the open squares indicate a problem level that can be offset by this change in the lane usage.

Existing Conditions

Figure A-1 summarizes the traffic volumes and traffic conditions at key locations for the existing 2000 afternoon peak hour as a point of comparison for the year 2005 assessment.

Option A - Rainbow Drive with Two-way Operation

The short one-way section adjacent to Dewey Lane would be widened to provide a lane entering the HHV as well as an exit lane. The makai entrance to the parking garage would be modified to permit entry from either direction of Rainbow Drive. The Rainbow Drive connection to Kalia Road would continue as the main gateway to and from the Hilton Hawaiian Village. Dewey Lane would be primarily used by employees and visitors who are familiar with the streets in the area.

Key traffic volumes and intersection conditions for Option A are depicted in Figure A-2. Concept plan of makai segment of Rainbow Drive is depicted in Figure B-1.

Table A-1
Overview of Rainbow Drive Circulation Options
2005 Afternoon Peak Hour Typical Conditions

Assessment Item	Assessment of Options									
	A	B1	B2	C	D1	D2	E1	E2	E3	F
One-Way Segments										
Mauka of Garage		Yes	Yes		Yes	Yes				Yes
Central Segment		Yes	Yes	Yes	Yes	Yes	Yes			Yes
Makai of Garage		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ewa of Garage		Yes	Yes	Yes						Yes
Full Intersection for Dewey Ln. at AMB			Yes			Yes				Yes
Intersection Conditions										
AMB & Kalia Rd.	■			❑			❑	❑	■	■
AMB & Hobron Ln.		■		❑	■					
Right-turns Kalia Rd. to Rainbow Dr.	❑	■	■	■	❑	❑	❑	❑	❑	
Conditions at Rainbow Dr.-Mauka Garage Dwy. Intersection	■			❑			❑	❑	■	
Conditions at Rainbow Tower Porte Cochere	■									
Conditions at Garage Entrances										
Conditions at Garage Exits		■	■	❑	■	■	❑	❑	❑	
Traffic Volumes next to Lagoon Lawn Area	270	600	600	300	540	540	280	220	190	290
Traffic Lanes next to Lagoon Lawn Area	3	2	2	2	2	2	2	2	2	2
Compatible with One-Way Flow on Dewey Lane										
NB, north of Driveway	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No
NB, south of Driveway	No	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes
SB, north of Driveway	Yes	No	No	No	No	No	Yes	No	Yes	Yes
SB, south of Driveway	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No

■ = Poor conditions
❑ = Fair conditions
Blank = Satisfactory

Wilbur Smith Associates, September 1, 2000

Advantages
1. Inbound traffic use of the Dewey Lane entrance would likely keep the volume of right-turns from Kalia Road into Rainbow Drive similar to or less than current volumes. (Existing volumes in Figure 6-1 do not include the Lagoon Tower.) Thus, the pressures for widening Kalia Road for a second right-turn lane would remain similar to the existing conditions.
2. This option results in one of the lowest traffic volumes on the roadway adjacent to the Lagoon lawn.
3. Provides maximum flexibility in circulation for visitors and employees.
4. Should have little impact on the Hobron Lane intersection.
5. Compatible with one-way makai-bound flow on Dewey Lane.

Disadvantages
1. Results in severe congestion on Kalia Road approach to Ala Moana Boulevard signal, with the change in lane use on the Kalia Road approach still resulting in LOS E conditions.
2. The two-way flow on Rainbow Drive would result in congested conditions at the intersection with the mauka garage driveway, with the risk of queuing arriving traffic onto Kalia Road and Ala Moana Boulevard.
3. The two-way flow would permit the Kalia Tower parking valets to exit the garage via a U-turn at Rainbow Drive. However the two-way flow would greatly disrupt and delay the valet operations, as well as the valet operations disrupting the flow into the Village. Valets would likely have to use the delivery driveway and Kalia Road to return vehicles to the Kalia porte cochere during periods with moderate to high traffic volumes.
4. The two-way option would continue the present problems with the Rainbow Tower porte cochere disruption of traffic flow.

Option B1 - Entire Rainbow Drive with One-way Clockwise Operation
Rainbow Drive would have two lanes with entry from Kalia Road and all traffic exiting onto Dewey Lane. The Dewey Lane intersection with Ala Moana Boulevard would continue to be restricted to right turns. Key traffic volumes and intersection conditions for Option B1 are depicted in Figure A-3.

Advantages
1. This option would have the greatest beneficial effect on the Kalia Road approach to Ala Moana Boulevard.
2. The one-way operation would greatly improve operations at the intersection with the mauka garage driveway.
3. The one-way operation with two lanes would allow traffic to bypass vehicles waiting to turn left into the Rainbow Tower porte cochere. This would not increase the capacity of the porte cochere, but would minimize any blockage of the through traffic on Rainbow Drive and the vehicles exiting the porte cochere by the vehicles waiting to enter the porte cochere.

Disadvantages

1. The normal weekday afternoon peak hour traffic turning right from Kalia Road onto Rainbow Drive would be almost double existing levels, which would greatly increase the frequency of traffic queuing along Kalia Road and Ala Moana Boulevard curb lanes. This option would greatly increase the need for an additional lane along Kalia Road to accommodate the right-turn traffic.
2. Traffic turning left from Hobron Avenue would double from existing levels, with the Hobron Lane approaches requiring more green time than Ala Moana Boulevard. This would require mitigation, either by developing a full intersection at Dewey Lane or by adding a third approach lane on Hobron Lane.
3. This option would result in the highest traffic volumes on the roadway adjacent to the Lagoon lawn area.
4. The public parkers exiting from the makai exit would exceed the capacity of a single cashier lane. Therefore, either a cashier lane must be also operated at the mauka exit, or both makai lanes must allow public parkers, with most employee card-holders likely using the mauka exit rather than sitting in the public queue. Both options would increase traffic on Rainbow Drive past the Rainbow Village and the Rainbow Tower porte cochere.
5. Traffic on Dewey Lane would increase between three and five times existing volumes.
6. Parking valets returning vehicles to the Kalia Tower porte cochere would have to exit the Village and use Kalia Road.

The one-way operation on Rainbow Drive would also render ineffective the present taxi queuing operation on the service alley adjacent to the ewa side of the garage, except for servicing the Lagoon and Waikikian Towers. Alternatives to the existing one-way makai-bound flow would be:

- One-way Mauka Bound Flow - A taxi holding area could be provided at the mauka end for the Kalia Tower and Rainbow Porte Cochere, and the service alley could be used for deliveries. However, it could not be conveniently used to queue taxis for the Waikikian and Lagoon Towers unless a connection were provided to the Waikikian Porte Cochere.
- Split One-way Flow - This is depicted in Figure 6-3, with one-way mauka-bound mauka of the split and one-way makai-bound makai of the split. All service alley traffic, including delivery trucks, would use the Waikikian Porte Cochere or another special connecting driveway to access the service alley.
- Two-way Flow - The 18 to 22 feet of usable alley width would be minimally sufficient to permit vehicles to pass on this low-volume alley, with trucks restricted to only one flow direction. Vehicles would have to yield to oncoming vehicles in the sections where deliveries and taxi queues are permitted, which would restrict the travel area to one lane in these sections.

The split flow would be most desirable for this one-way Rainbow Drive option.

Option B2 - Entire Rainbow Drive with One-way Clockwise Operation
This option is the same as Option B1 except for the provision of a full intersection on Ala Moana Boulevard at Dewey Lane. Key traffic volumes and intersection conditions for Option B2 are depicted in Figure A-4.

Advantages
1. Advantages # 1 through #3 for Option B1 would apply.
2. This option would result in good conditions at the Hobron Lane approach to Ala Moana Boulevard.
3. This option would work well with one-way mauka-bound flow the length of Dewey Lane, except this would result in very awkward access for the Waikikian and Lagoon Towers via either Hobron Lane or Rainbow Drive.

Disadvantages
1. Disadvantages #1 and # 3 through #6 for Option B1would apply.
2. Dewey Lane would need 3 traffic lanes mauka of Rainbow Drive.

Option C - Rainbow Drive with One-way Clockwise Operation Except for Mauka Segment
This alternative retains two-way operation on Rainbow Drive between the mauka garage driveway intersection and Kalia Road. This would allow garage traffic to exit via either Kalia Road or Dewey Lane. This option would work best with a two-way service alley ewa of the garage, or the split one-way operation described for Option B1. Key traffic volumes and intersection conditions for Option C are depicted in Figure A-5.

Advantages
1. Low volume of traffic on Rainbow Drive adjacent to Lagoon lawn area.
2. Low volume of traffic on Dewey Lane.
3. Should provide improved operations at the Rainbow Tower porte cochere.

Disadvantages
1. The normal weekday afternoon peak hour traffic turning right from Kalia Road onto Rainbow Drive would be almost double existing levels, which would greatly increase the frequency of traffic queuing along Kalia Road and Ala Moana Boulevard curb lanes. This option would greatly increase the need for an additional lane along Kalia Road to accommodate the right-turn traffic..
2. The public parkers exiting from the mauka exit would exceed the capacity of a single cashier lane. Therefore, either a cashier lane must be also operated at the makai exit, or both mauka lanes must allow public parkers, with most employee card-holders likely using the makai exit rather than sitting in a public queue. If public lane opened at makai exit, this would increase vehicles passing by Lagoon lawn area and using Hobron Lane.
3. Rainbow Tower valets would be delayed in exiting garage via mauka exit shared with public parkers.

Option D1 - Rainbow Drive with One-way Clockwise Operation Except Ewa Segment

This alternative provides two-way operation on Rainbow Drive between Dewey Lane and the makai garage entrance. This would allow employee and public access to the garage via either Kalia Road or Dewey Lane. Vehicles desiring to access the Rainbow Tower or Kalia Tower porte cocheres would have to enter via Kalia Road.

This Rainbow Drive option would work with one-way mauka-bound traffic flow on the service alley, with taxis for the Lagoon and Waikikian Towers dispatched from the taxi queue area at the Rainbow Tower Porte Cochere. Key traffic volumes and intersection conditions for Option D1 are depicted in Figure A-6.

Advantages

1. This option would have the greatest beneficial effect on the Kalia Road approach to Ala Moana Boulevard.
2. Inbound traffic use of the Dewey Lane entrance would likely keep the volume of right-turns from Kalia Road into Rainbow Drive similar to or less than current volumes (without the Lagoon and Kalia Towers). Thus, the need to widen Kalia Road for a second right-turn lane would remain the same as for the existing conditions.
3. The one-way operation would greatly improve operations at the intersection with the mauka garage driveway.
4. The one-way operation with two lanes would allow traffic to bypass vehicles waiting to turn left into the Rainbow Tower porte cochere.

Disadvantages

1. Traffic turning left from Hobron Avenue would double from existing levels, with the Hobron Lane approaches requiring more green time than Ala Moana Boulevard. This would require mitigation, either by developing a full intersection at Dewey Lane or by adding a third approach lane on Hobron Lane.
2. This option would result in very high traffic volumes on the roadway adjacent to the Lagoon lawn area.
3. This option would result in very high traffic volumes on the roadway segment within the confined area between the Lagoon Tower and garage.
4. The public parkers exiting from the makai exit would exceed the capacity of a single cashier lane. Therefore, either a cashier lane must be also operated at the mauka exit, or both makai lanes must allow public parkers, with most employee card-holders likely using the mauka exit rather than sitting in the public queue. Both options would increase traffic on Rainbow Drive past the Rainbow Village.
5. Traffic on Dewey Lane would increase between three and five times existing volumes.
6. Parking valets returning vehicles to the Kalia Tower porte cochere would need to exit the Village and use Kalia Road.
7. Poor compatibility with one-way operation on part or all of Dewey Lane.

Option D2 - Rainbow Drive with One-way Clockwise Operation Except Ewa Segment

This option is the same as Option D1 except for the provision of a full intersection on Ala Moana Boulevard at Dewey Lane. Key traffic volumes and intersection conditions for Option D2 are depicted in Figure 6-7.

Advantages

1. Advantages #1 through # 4 for Option D1 would apply.
2. This option would result in good conditions at the Hobron Lane approach to Ala Moana Boulevard.

Disadvantages

1. Disadvantages # 2 through #6 for Option B1would apply.
2. Dewey Lane would need 3 traffic lanes mauka of Rainbow Drive.

Option E1 - Rainbow Drive with One-way Clockwise Operation Except for Mauka and Ewa Segments

This alternative retains two-way operation on Rainbow Drive between the mauka garage driveway intersection and Kalia Road, and between Dewey Lane and the makai garage entrance. This would allow garage traffic to enter or exit via either Kalia Road or Dewey Lane. Key traffic volumes and intersection conditions for Option E are depicted in Figure A-8. Concept plan of makai segment of Rainbow Drive is depicted in Figure B-2.

Advantages

1. Inbound traffic use of the Dewey Lane entrance would likely keep the volume of right-turns from Kalia Road into Rainbow Drive similar to or less than current volumes (without the Lagoon and Kalia Towers). Thus, the need to widen Kalia Road for a second right-turn lane would remain similar to existing conditions.
2. Low volume of traffic on Rainbow Drive adjacent to Lagoon lawn area.
3. The one-way operation with two lanes would allow traffic to bypass vehicles waiting to turn left into the Rainbow Tower porte cochere.
4. Convenient access between Waikikian and Lagoon porte cocheres and parking garage.

Disadvantages

1. The public parkers exiting from the mauka exit would exceed the capacity of a single cashier lane. Therefore, either a cashier lane must be also operated at the makai exit, or both mauka lanes must allow public parkers, with most employee card-holders likely using the makai exit rather than sitting in a public queue. If public lane opened at makai exit, this would increase vehicles passing by Lagoon lawn area and using Hobron Lane.
2. Rainbow Tower parking valets would be delayed in exiting garage via mauka exit lanes shared with public parkers.

Option E2 - Rainbow Drive with Two-way Operation Except for Short Makai Clockwise Segment

Rainbow Drive would be a two-way roadway except for the short segment between the Rainbow Tower porte cochere and the makai entrance to the parking garage, which would be restricted to one-way ewa-bound traffic. With this option, traffic would be able to access the makai parking entrance from either direction, but the Rainbow Tower porte cochere could be reached only from the Kalia Road side. All traffic exiting the garage via the makai driveway would have to depart via Dewey Lane. Key traffic volumes and intersection conditions for Option E2 are depicted in Figure A-9. Concept plan of makai segment of Rainbow Drive is depicted in Figure B-3.

Advantages

1. Inbound traffic use of the Dewey Lane entrance would likely keep the volume of right-turns from Kalia Road into Rainbow Drive similar to or less than current volumes (without the Lagoon and Kalia Towers). Thus, the need to widen Kalia Road for a second right-turn lane would remain similar to existing conditions.
2. Low volume of traffic on Rainbow Drive adjacent to Lagoon lawn area.
3. Convenient access between Waikikian and Lagoon porte cocheres and parking garage.

Disadvantages

1. The public parkers exiting from the mauka exit would exceed the capacity of a single cashier lane. Therefore, either a cashier lane must be also operated at the makai exit, or both mauka lanes must allow public parkers, with most employee card-holders likely using the makai exit rather than sitting in a public queue. If public lane opened at makai exit, this would increase vehicles passing by Lagoon lawn area and using Hobron Lane.
2. Two-way traffic and higher traffic volumes at Rainbow Drive intersection with mauka garage driveway would likely increase delays to traffic exiting the garage.
3. Rainbow Tower parking valets would be delayed in exiting garage via the mauka exit lanes shared with public parkers.

Option E3 - Rainbow Drive with Two-way Operation Except for Short Makai Counter-Clockwise Segment

Rainbow Drive would be a two-way roadway except for the short segment between the Rainbow Tower porte cochere and the service alley along the ewa side of the parking garage, which would be restricted to one-way Diamond Head direction traffic. With this option, traffic would be able to access the Rainbow Tower porte cochere from either direction. However, traffic could access the makai parking garage entrance only from the Dewey Lane side and all traffic exiting the makai side would have to depart via the Kalia Road side. Key traffic volumes and intersection conditions for Option E3 are depicted in Figure A-10. Concept plan of makai segment of Rainbow Drive is depicted in Figure B-4.

Advantages

1. Inbound traffic use of the Dewey Lane entrance would likely keep the volume of right-turns from Kalia Road into Rainbow Drive similar to or less than current volumes (without the Lagoon and Kalia Towers). Thus, the need to widen Kalia Road for a second right-turn lane would remain similar to existing conditions.
2. Lowest volume of traffic on Rainbow Drive adjacent to Lagoon lawn area.
3. Traffic operations at the Rainbow Tower porte cochere should not block traffic circulation.

Disadvantages

1. This option would result in the worst impacts to the Kalia Road intersection with Ala Moana Boulevard.
2. The public parkers exiting from the mauka exit would exceed the capacity of a single cashier lane. Therefore, either a cashier lane must be also operated at the makai exit, or both mauka lanes must allow public parkers, with most employee card-holders likely using the makai exit rather than sitting in a public queue. If public lane opened at makai exit, this would increase vehicles passing by Lagoon lawn area.
3. Rainbow Tower parking valets would be delayed in exiting garage via mauka exit lanes shared with public parkers.
4. The two-way flow would permit the Kalia Tower parking valets to exit the garage via a U-turn at Rainbow Drive. However the two-way flow would greatly disrupt and delay the valet operations, as well as the valet operations disrupting the flow into the Village. Valets would likely have to use the delivery driveway and Kalia Road to return vehicles to the Kalia porte cochere during periods with moderate to high traffic volumes.
5. Does not provide convenient access from the main parking garage to the Waikikian and Lagoon porte cocheres without new direct access connection within the Waikikian.

Option F - Entire Rainbow Drive with One-way Counter-Clockwise Operation

Rainbow Drive would have two lanes with entry only from Dewey Lane and all traffic exiting onto Kalia Road. The Dewey Lane intersection with Ala Moana Boulevard would have to be a full intersection. Key traffic volumes and intersection conditions for Option F are depicted in Figure A-11.

Advantages

1. Eliminates any problem with traffic queuing from Rainbow Drive onto Kalia Road and requiring additional right-turn lane along Kalia Road. However, this potential problem is relocated to Dewey Lane, where queue would more directly effect Ilikai and Hawaii Prince properties, both on Ala Moana Boulevard and Holomoana Street.
2. Improves Hobron Lane approach to Ala Moana Boulevard over existing conditions.
3. Results in low traffic volumes along Rainbow Drive adjacent to the Lagoon lawn area.
4. Greatly improves operations at Rainbow Drive intersection with mauka garage driveway.

5. Service roadway along ewa side of garage works same as existing.
6. Egress from Ilikai porte cochere and resident parking would be greatly improved over existing conditions.
7. Short taxi queue area could be provided along Rainbow Drive just makai of the mauka garage driveway to service the Kalia Tower.

Disadvantages
1. Dewey Lane would become the gateway to the Hilton Hawaiian Village.
2. This option would be dependent on providing a full intersection at Dewey Lane and Ala Moana Boulevard.
3. This option would result in severe impacts to traffic conditions on the Kalia Road approach to the Ala Moana Boulevard intersection.
4. Traffic on Dewey Lane would increase between three and six times existing volumes.

6.5 SUMMARY OF CONSULTANT FINDINGS

- Of the Rainbow Drive one-way options, Option E2 (short one-way clockwise segment between the Rainbow Tower porte cochere and the makai garage entrance, with both ends having two-way traffic) appears to provide the best trade-off between serving overall Hilton Hawaiian Village traffic circulation and reducing the traffic adjacent to the Lagoon lawn area. Option E1 would be the second most effective.

- Option A, with two-way flow, would provide the most flexibility. But two-way flow could result in slightly worse impacts on the Kalia Road intersection with Ala Moana Boulevard as well as the likelihood of congestion at the intersection of Rainbow Drive with the mauka garage driveway. The section of Rainbow Drive adjacent to the Lagoon lawn area could be limited to two lanes for the two-way option, although this would increase the potential for the queuing of arriving traffic back onto Ala Moana Boulevard.

- With Option E2, or any of the other options having two-way traffic flow between Dewey Lane and the makai garage entrance, the relocated porte cochere for the Lagoon Tower (on the ewa side of the Tower) and the porte cochere for the Waikikian would be less likely to result in traffic disruption if both the entrance and exit were provided to Dewey Lane as opposed to Rainbow Drive. A secondary connection could be provided to Rainbow Drive.

- One-way operation of either the mauka or makai portion of Dewey Lane, in either direction, would adversely affect Ilikai traffic circulation or operations, unless a full intersection is provided at Dewey Lane and Ala Moana Boulevard. A full intersection would allow mauka-bound one-way traffic with minimal impact on the Ilikai. The Chief of the State DOT Traffic Branch stated that he will oppose anything other than a right turn in/out of the Dewey Lane intersection with Ala Moana Boulevard due to the short distance to the adjacent intersections and existing traffic problems.

Figure 1-1
PROJECT LOCATION
362060\base/6-11-01

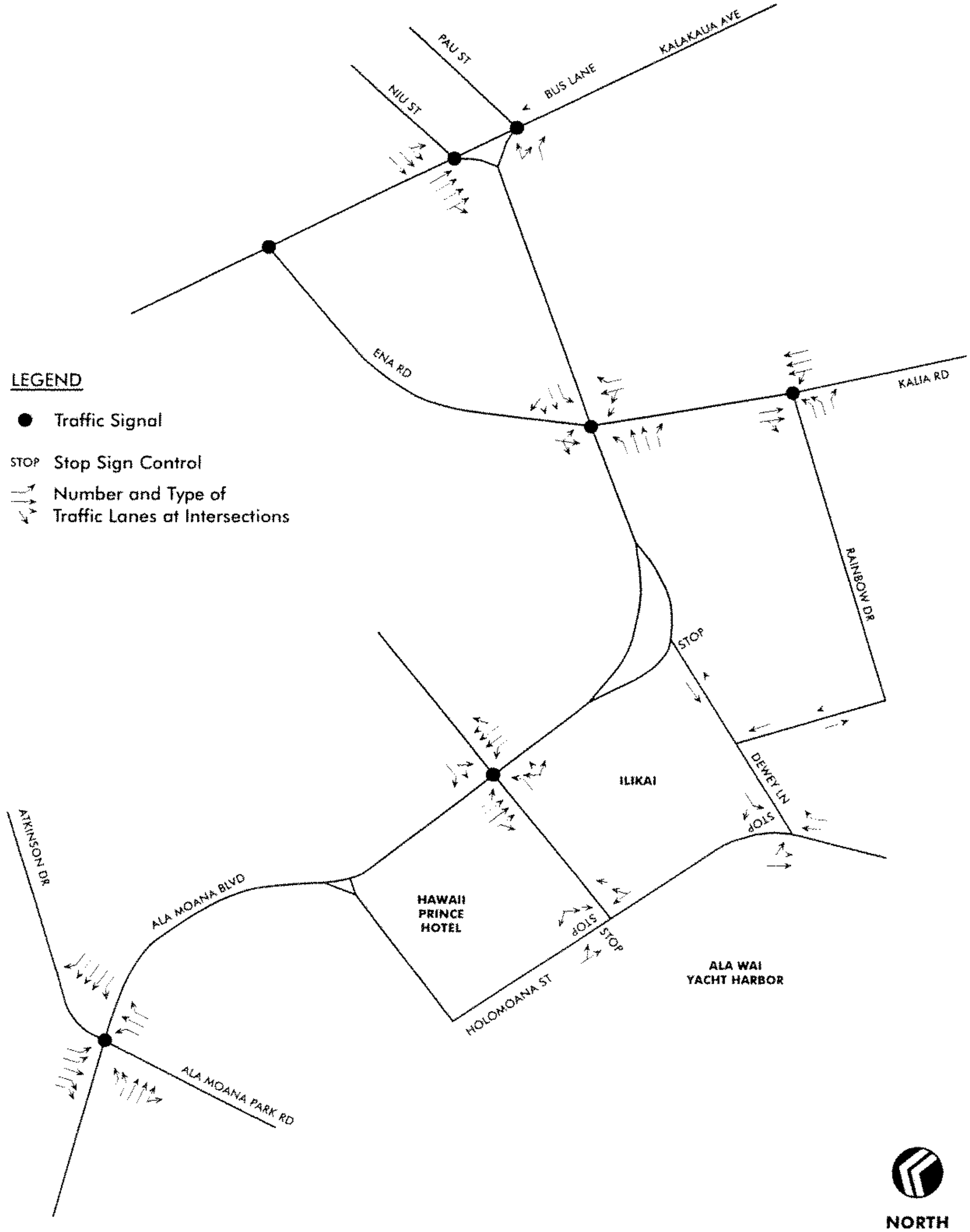

Figure 2-1
PROJECT LOCAITON
362060\geometry/6-14-01

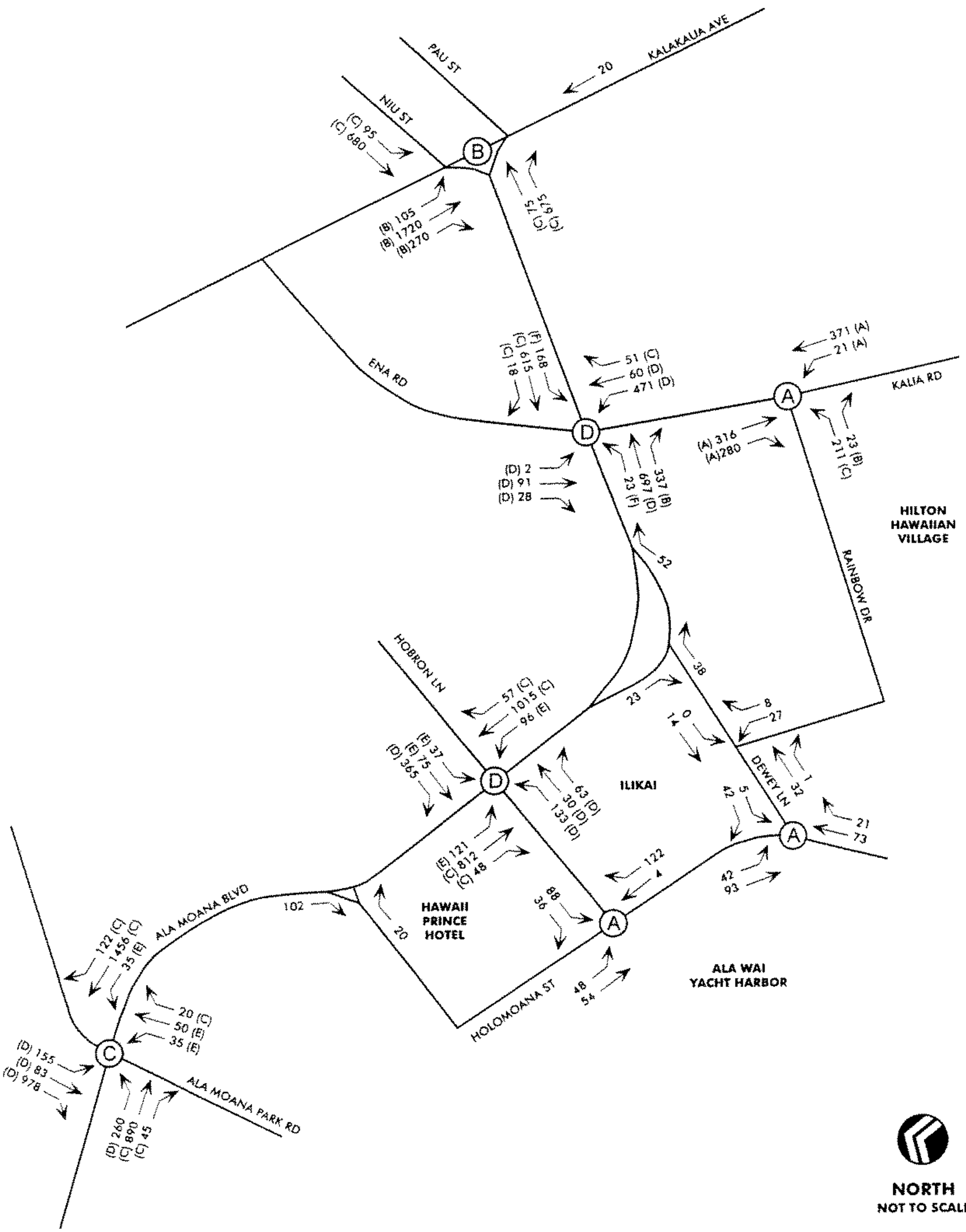

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Figure 2-2

EXISTING WEEKDAY MORNING PEAK HOUR TRAFFIC

362060\base/6-11-01

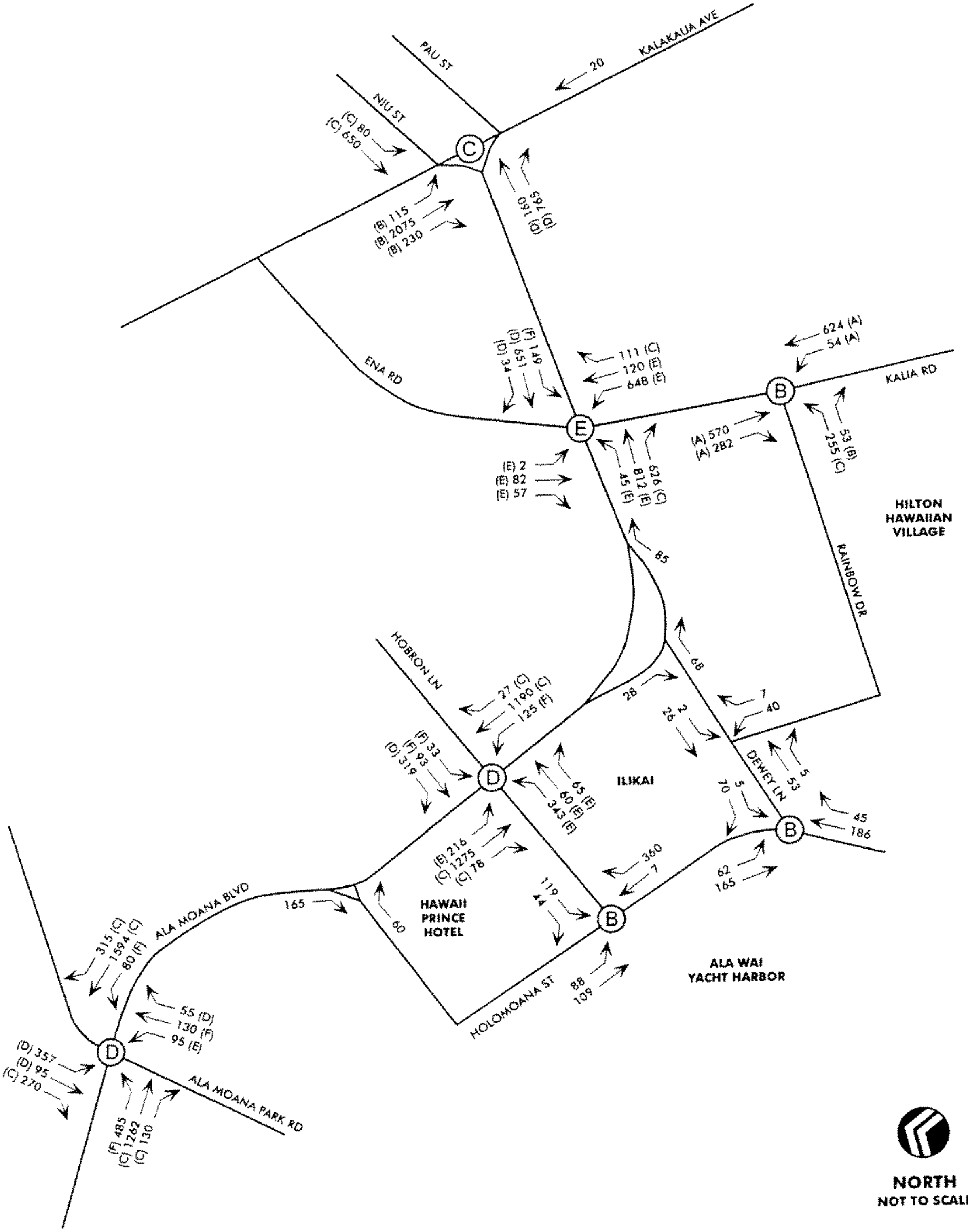

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Figure 2-3

EXISTING WEEKDAY AFTERNOON PEAK HOUR TRAFFIC

362060\base/6-11-01

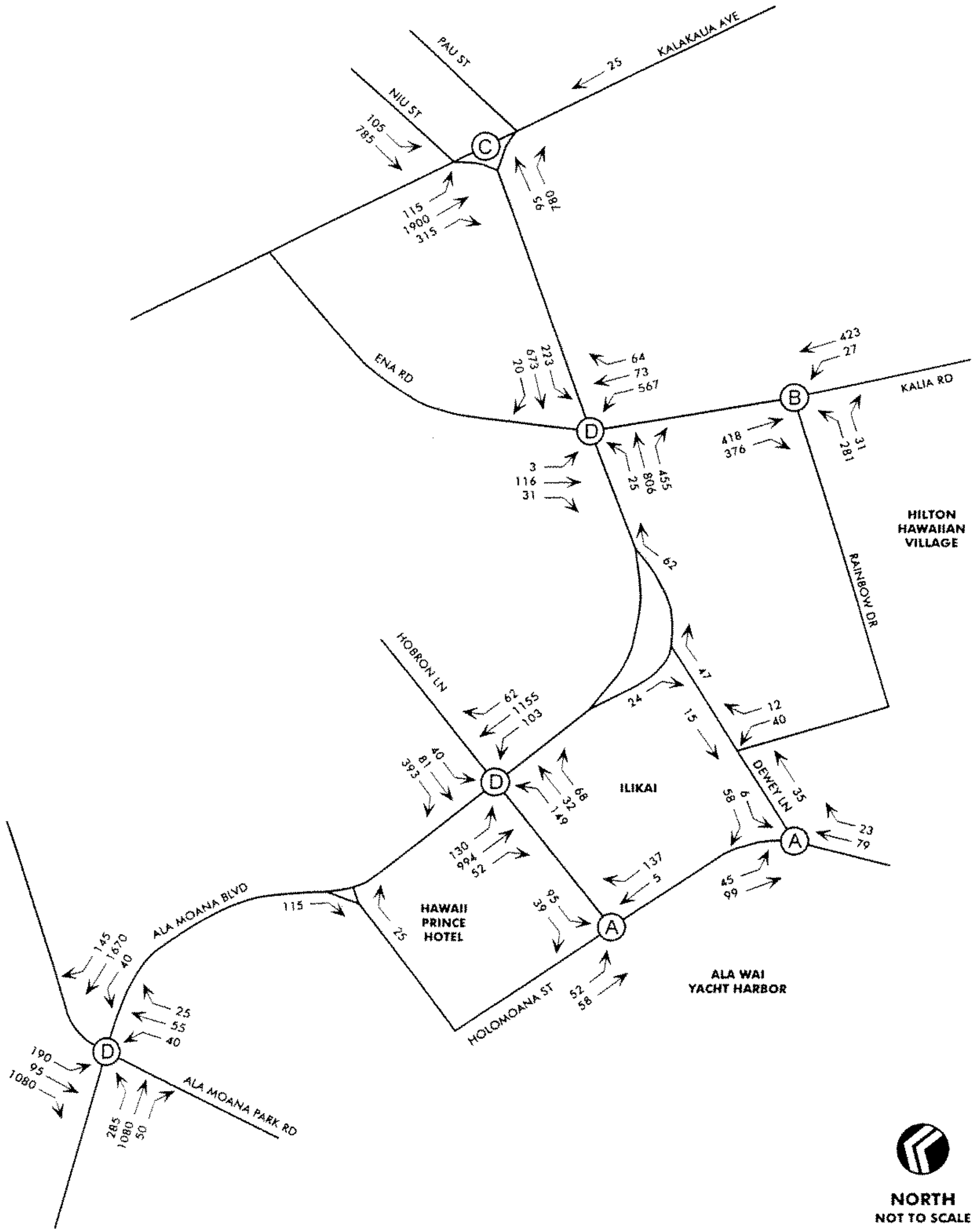

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Figure 3-1

2005 MORNING PEAK HOUR TRAFFIC WITHOUT WAIKIKIAN PROJECT

362060\base/6-11-01

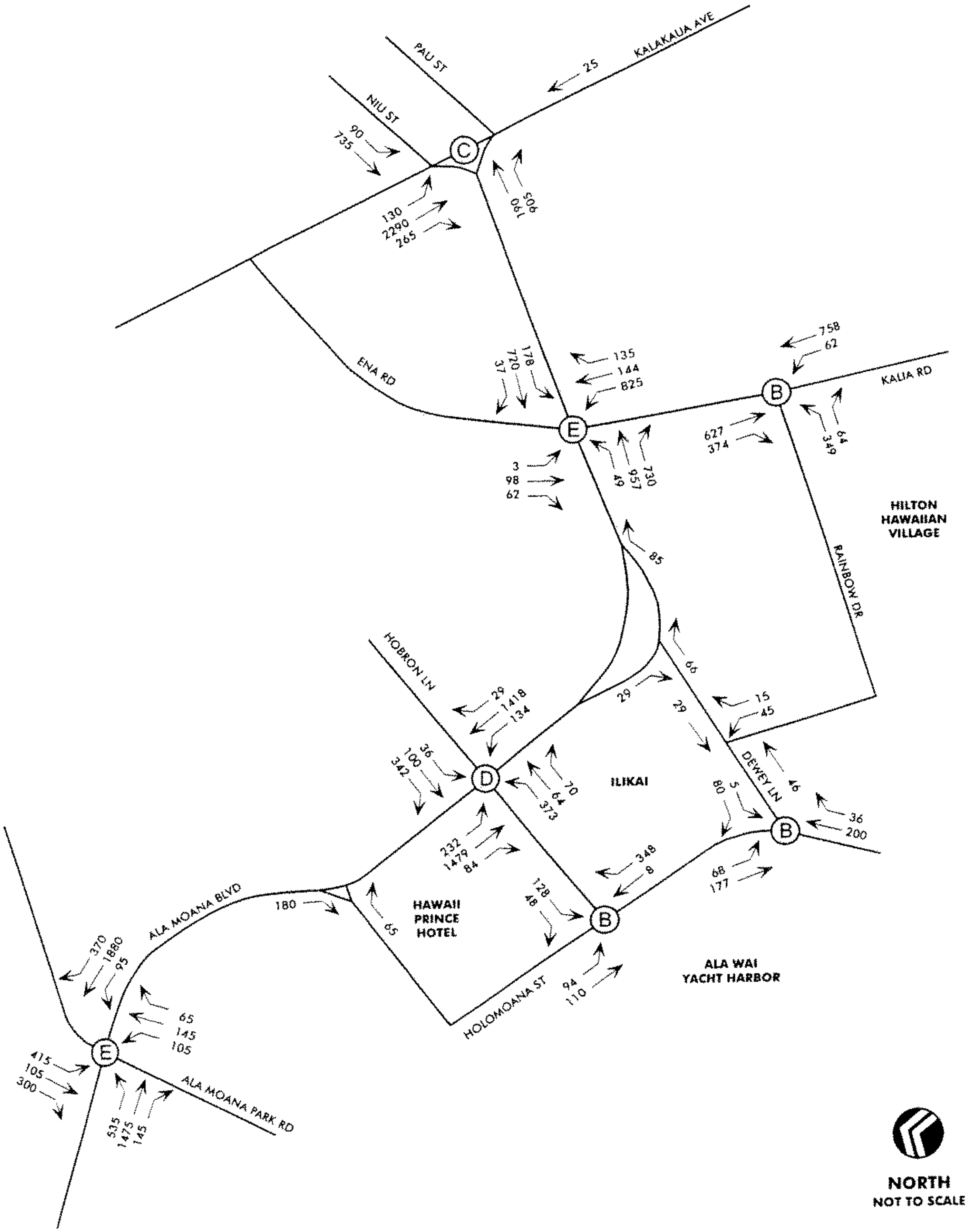
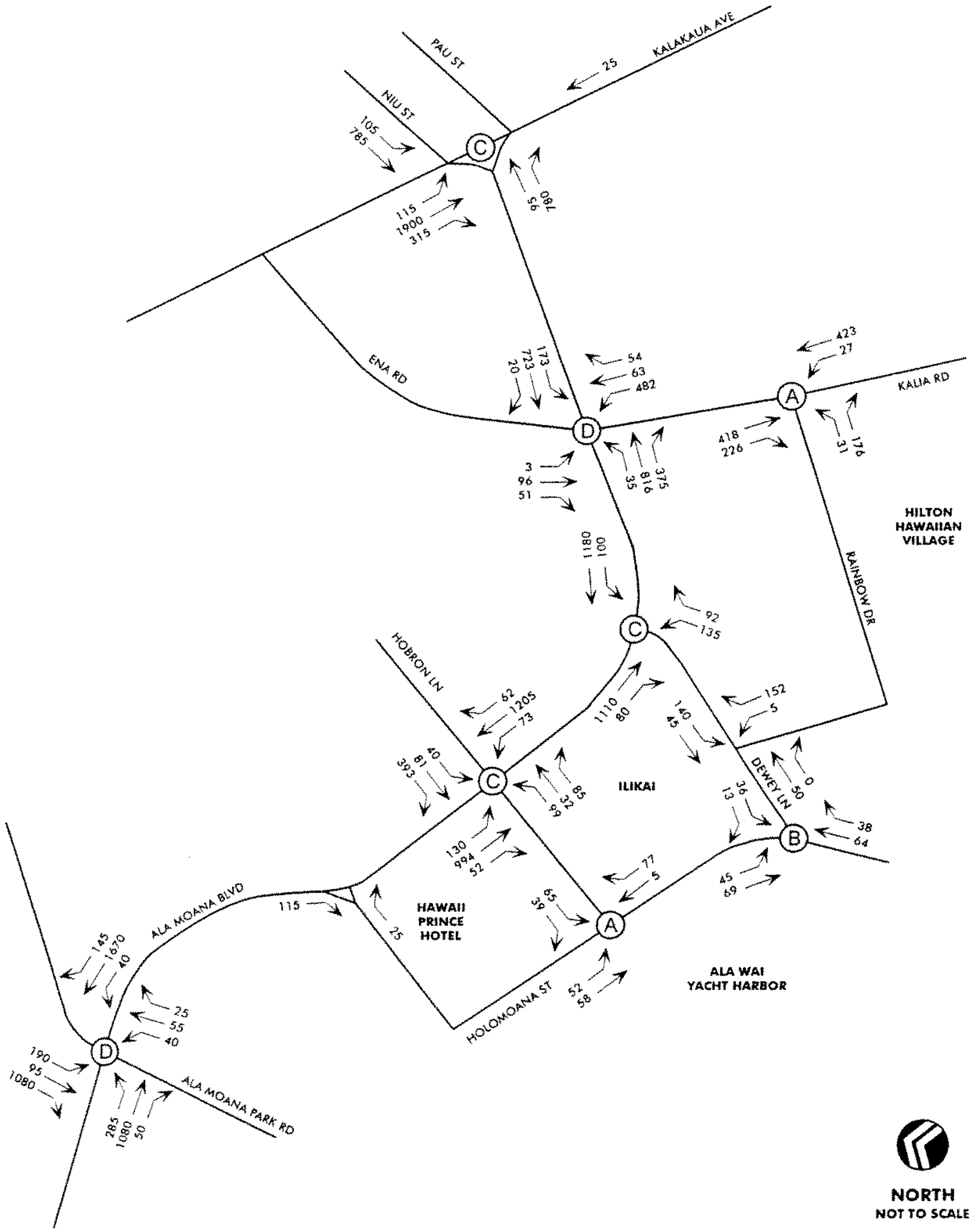


Figure 3-2

2005 AFTERNOON PEAK HOUR TRAFFIC WITHOUT WAIKIKIAN PROJECT

362060\base/6-11-01

Wilbur Smith Associates
ENGINEERS PLANNERS ECONOMISTS



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2005 MORNING PEAK HOUR TRAFFIC WITHOUT WAIKIKIAN PROJECT WITH DEWEY LANE FULL INTERSECTION

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362060\base/6-11-01

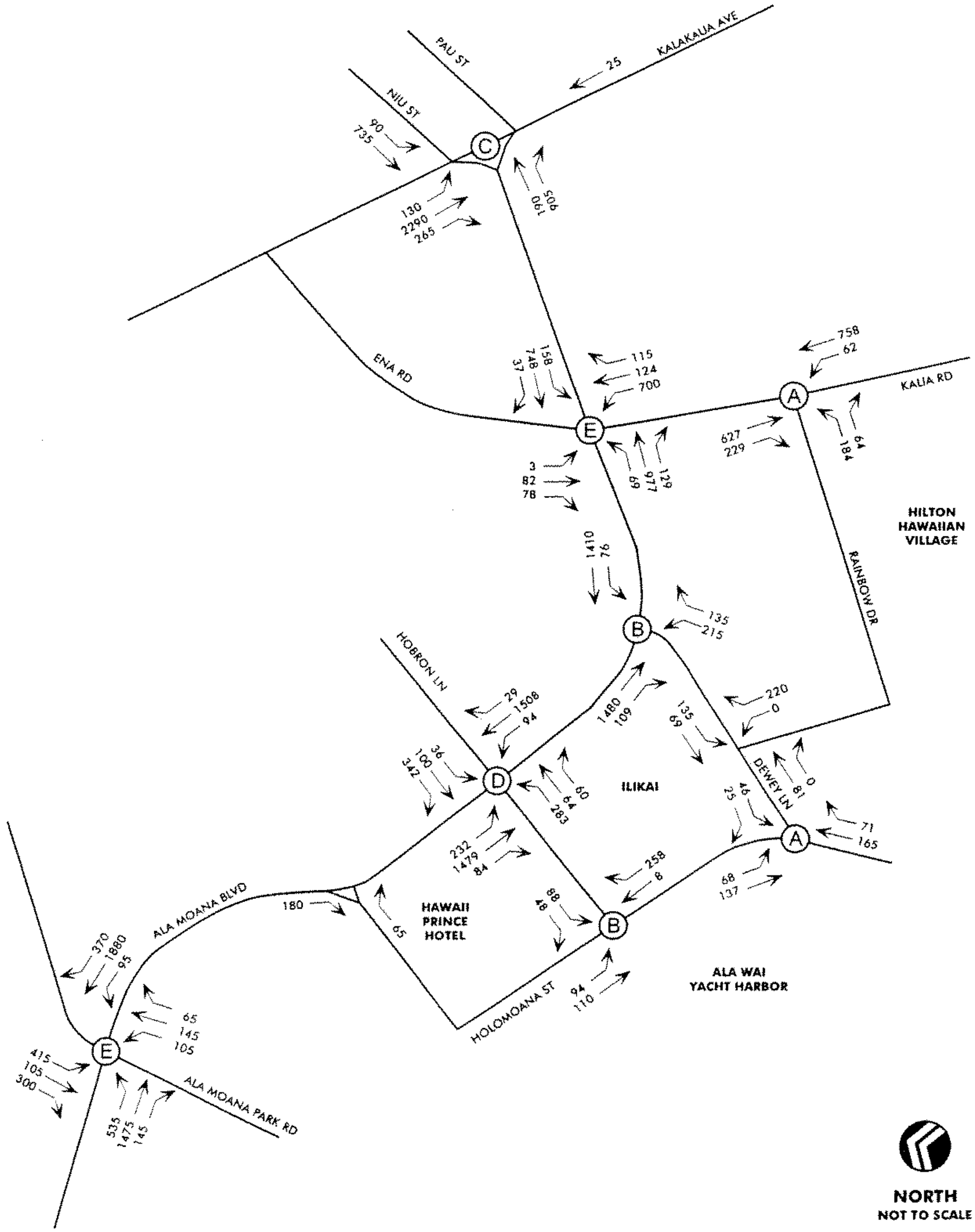


Figure 3-4

2005 AFTERNOON PEAK HOUR TRAFFIC WITHOUT WAIKIKIAN PROJECT WITH DEWEY LANE FULL INTERSECTION

ENGINEERS PLANNERS ECONOMISTS
Wilbur Smith Associates

362060\base/6-11-01

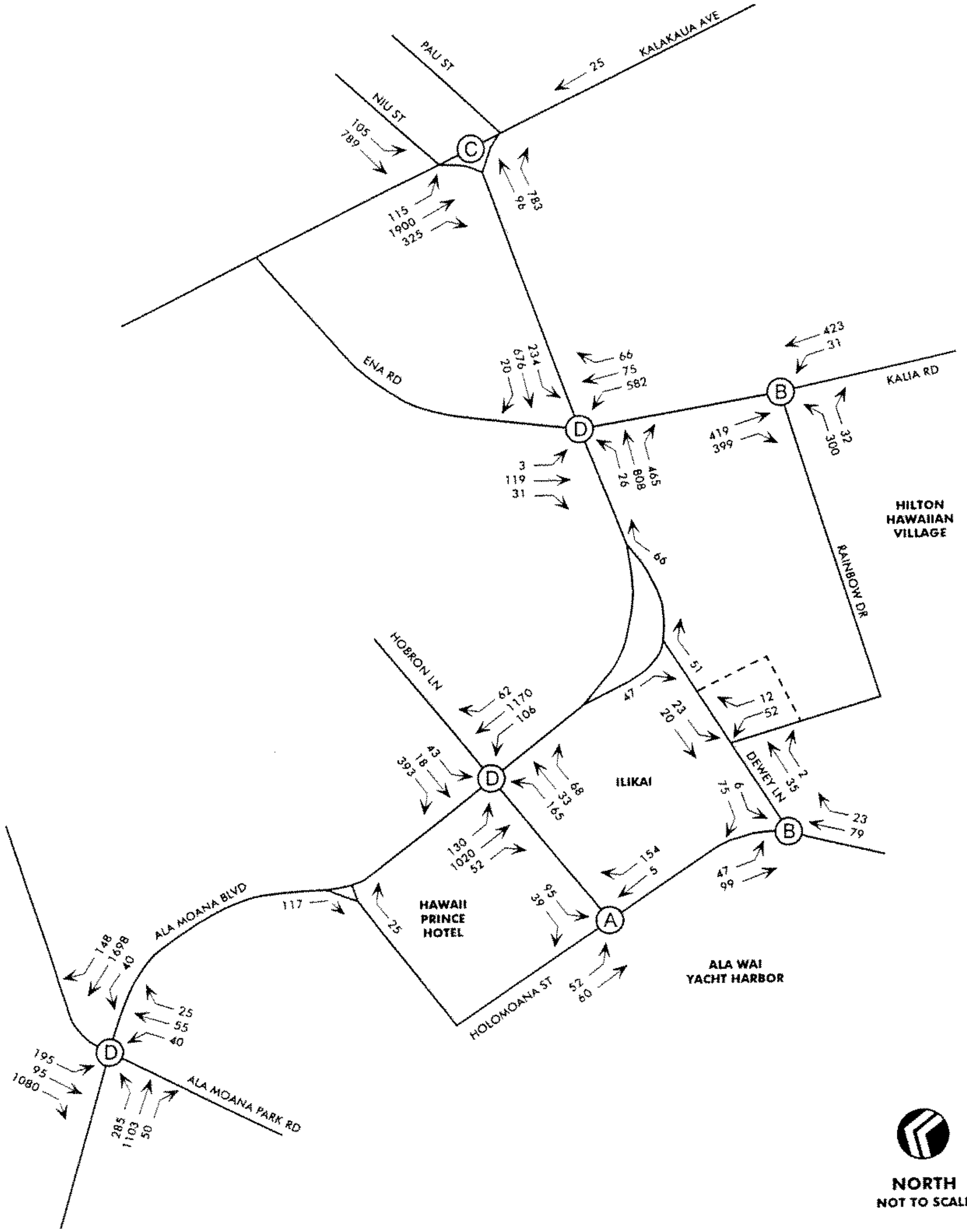
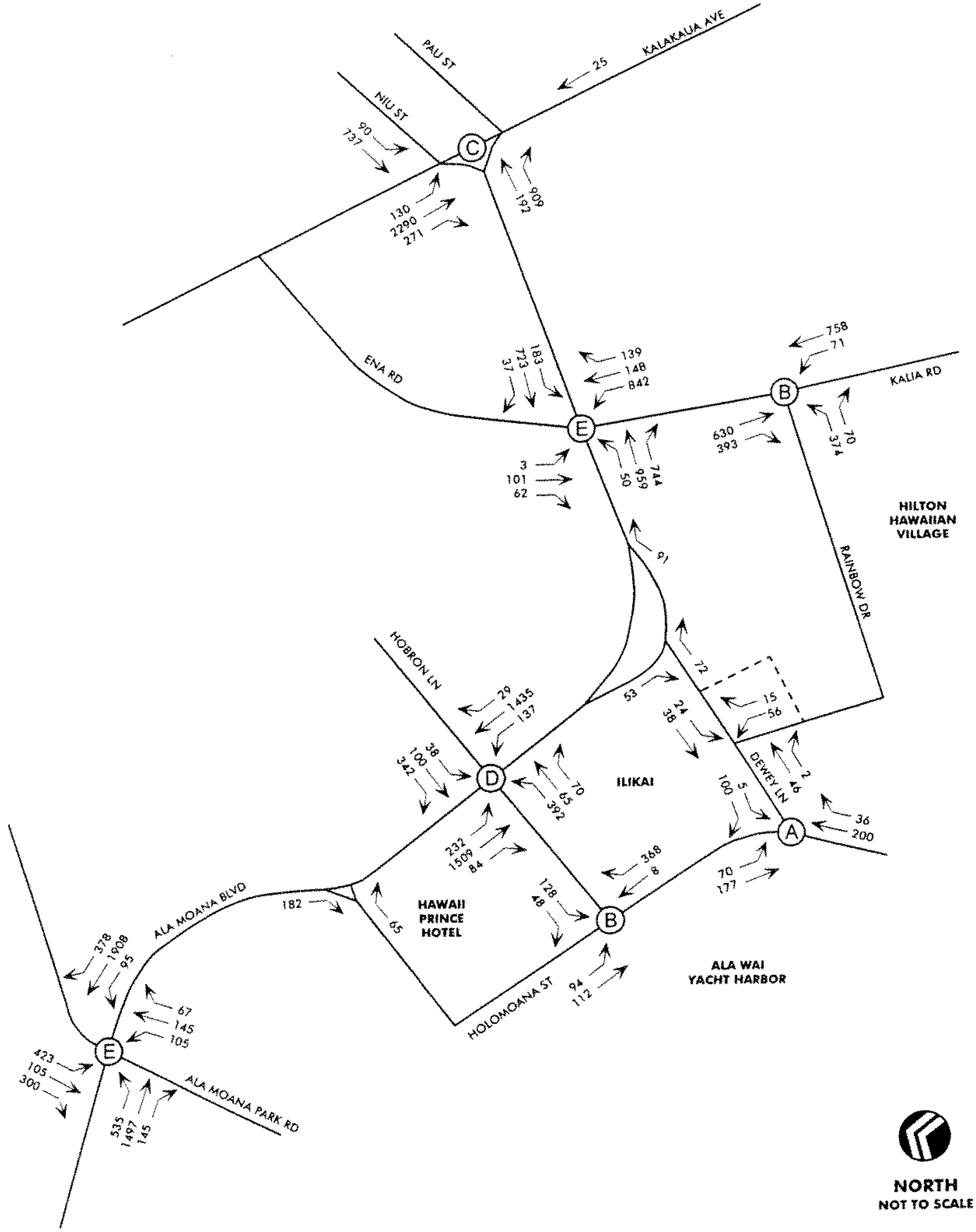


Figure 4-1

2005 MORNING PEAK HOUR TRAFFIC WITH WAIKIKIAN PROJECT CIRCULATION ALTERNATIVE A-1 DEWEY LANE RIGHT IN-OUT WITH TWO-WAY RAINBOW DRIVE

Wilbur Smith Associates
ENGINEERS PLANNERS ECONOMISTS

362060\base/6-11-01



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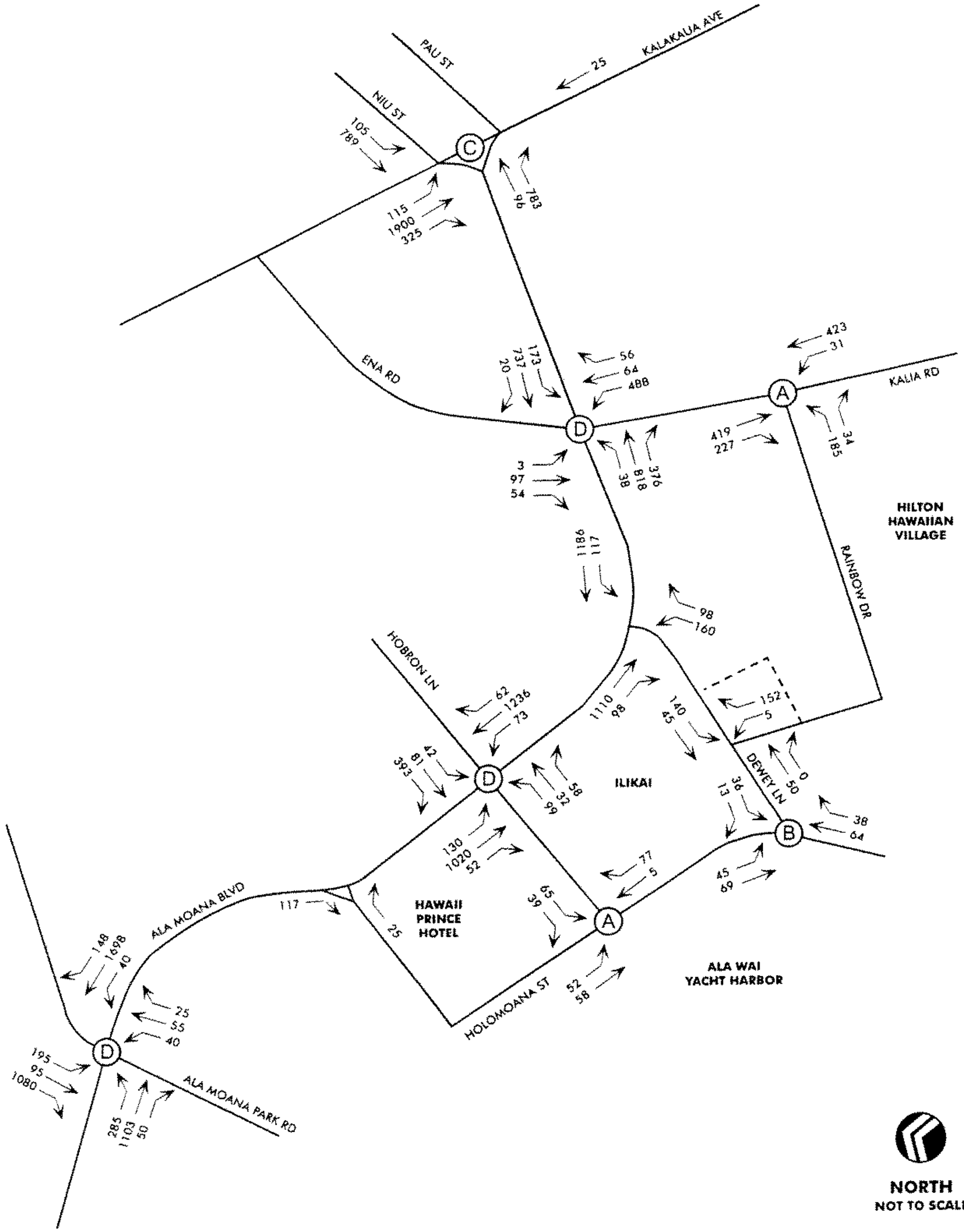
362060\base/6-11-01

Wilbur Smith Associates
ENGINEERS PLANNERS ECONOMISTS



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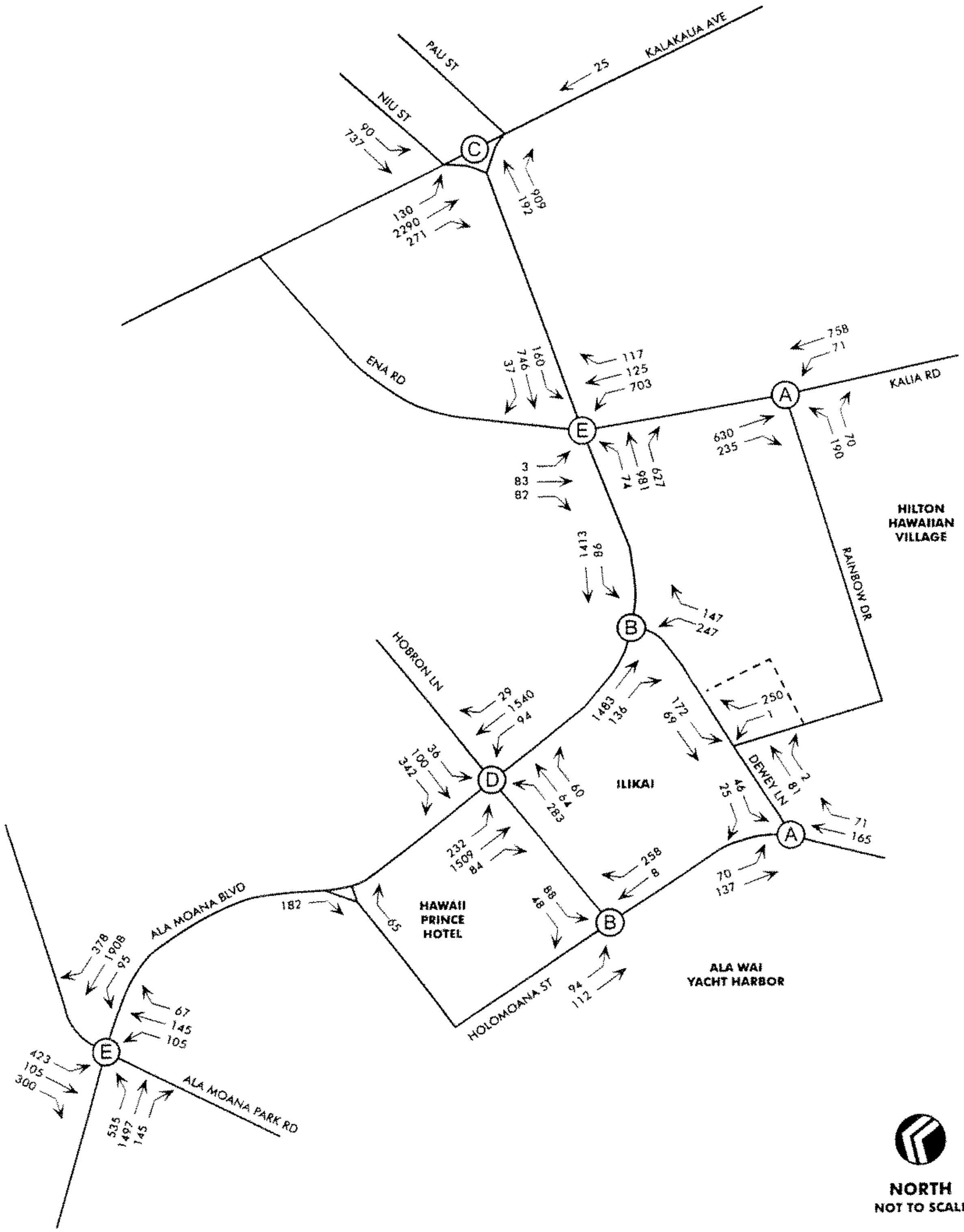
ENGINEERS PLANNERS ECONOMISTS
Wilbur Smith Associates

362060\base/6-11-01



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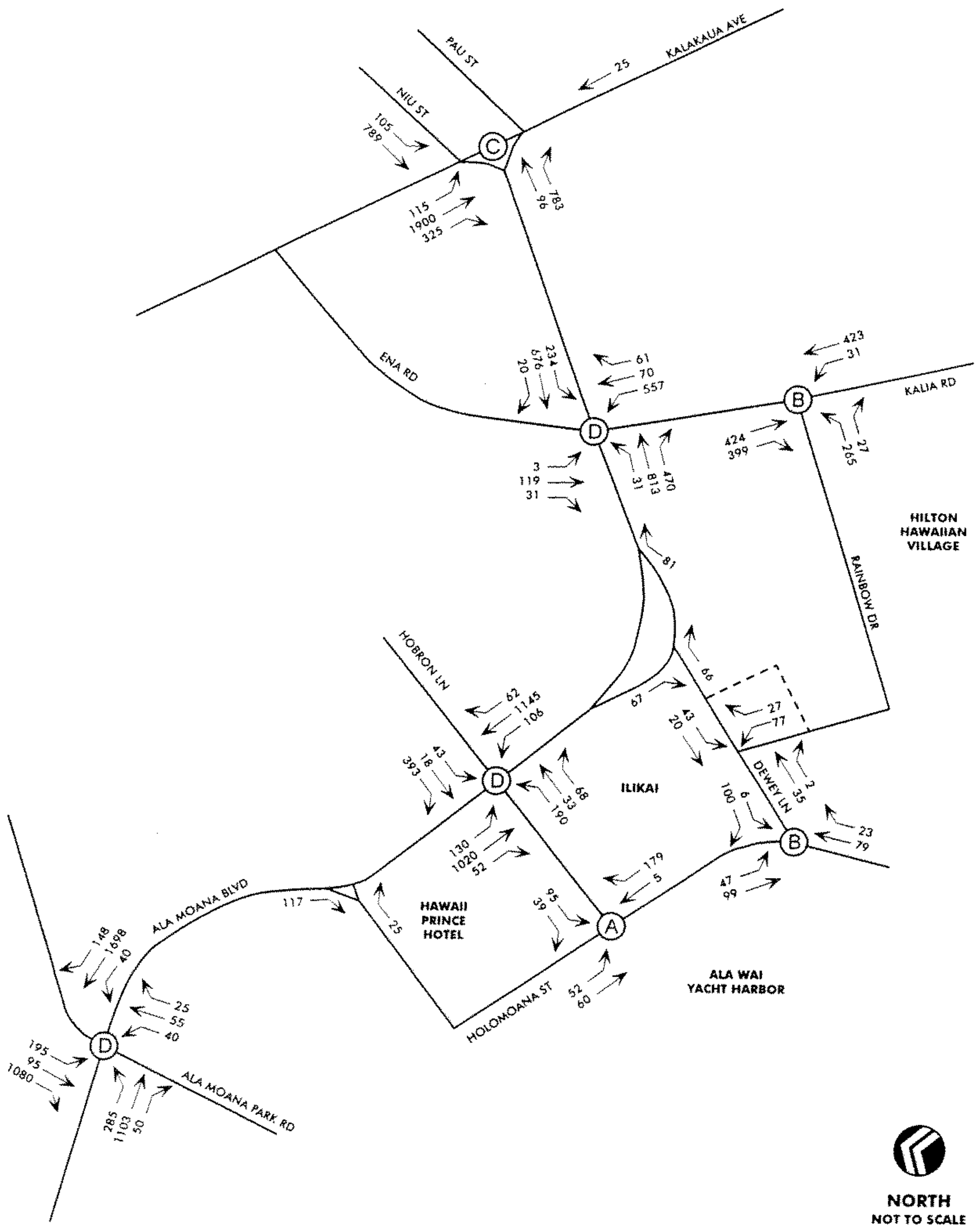
Wilbur Smith Associates

362060\base/6-11-01



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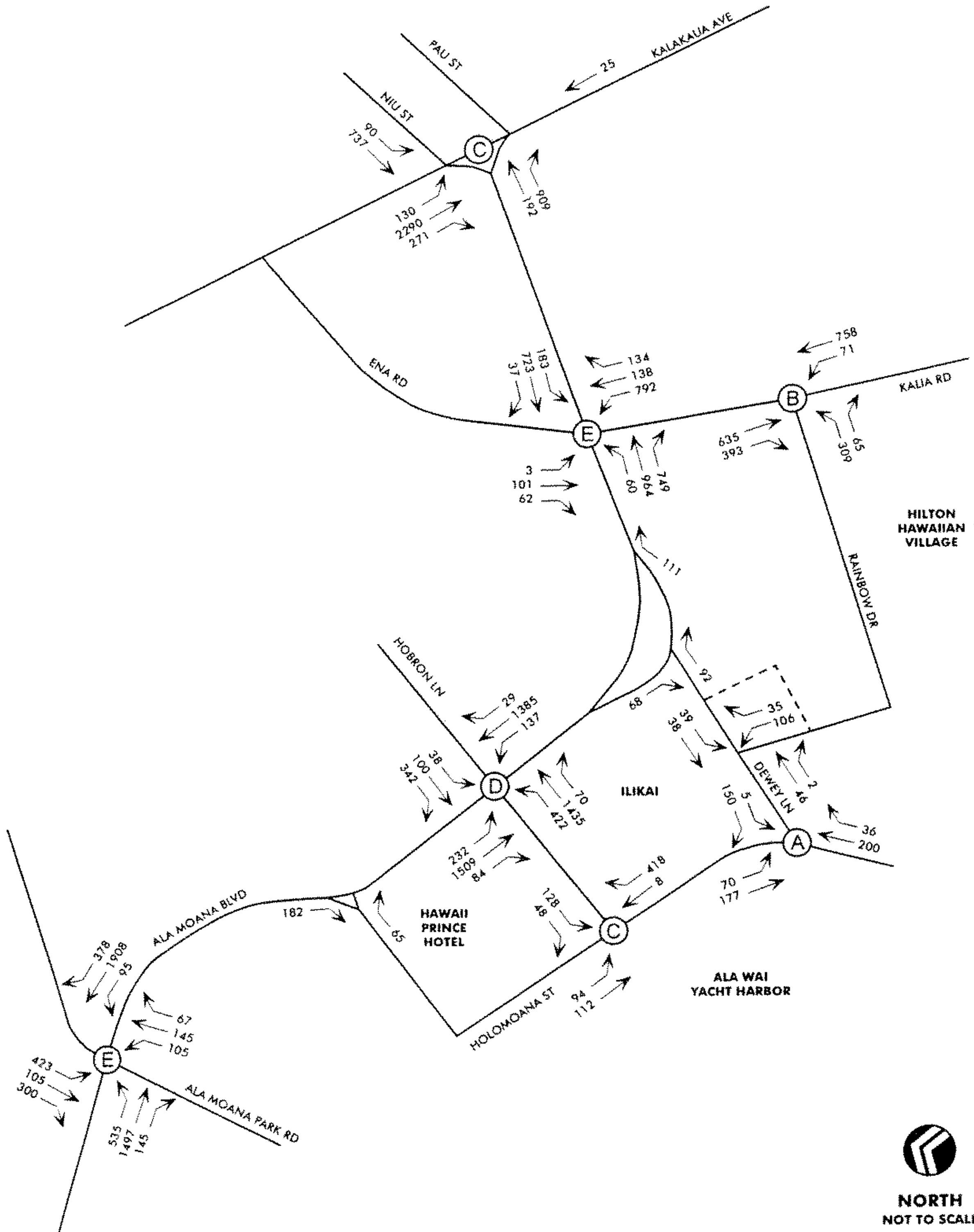
ENGINEERS PLANNERS ECONOMISTS

Wilbur Smith Associates

362060\base/6-11-01



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ENGINEERS PLANNERS ECONOMISTS

Wilbur Smith Associates

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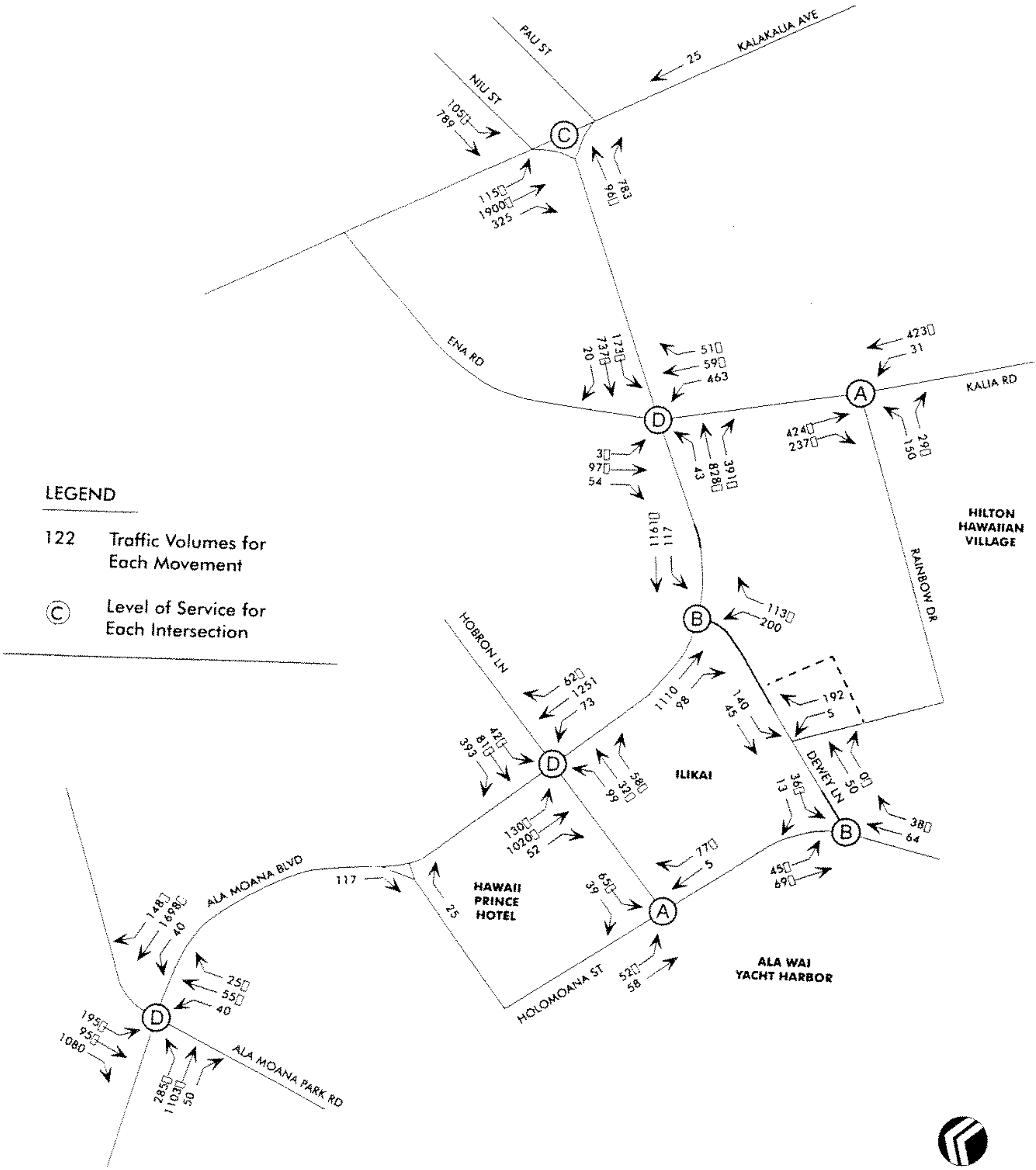

NORTH
NOT TO SCALE

Figure 4-7

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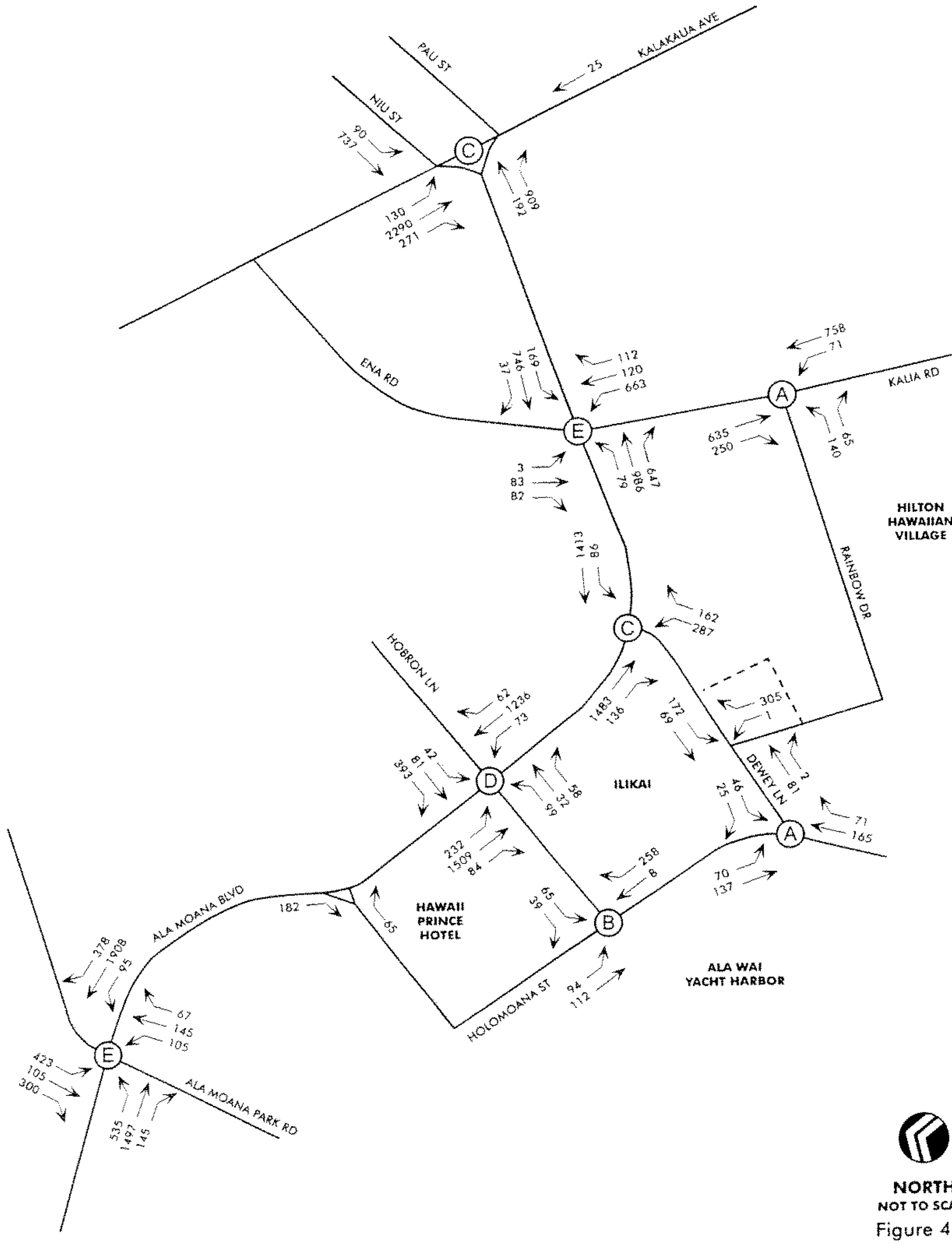
362060\base/6-11-01

ENGINEERS PLANNERS ECONOMISTS
Wilbur Smith Associates



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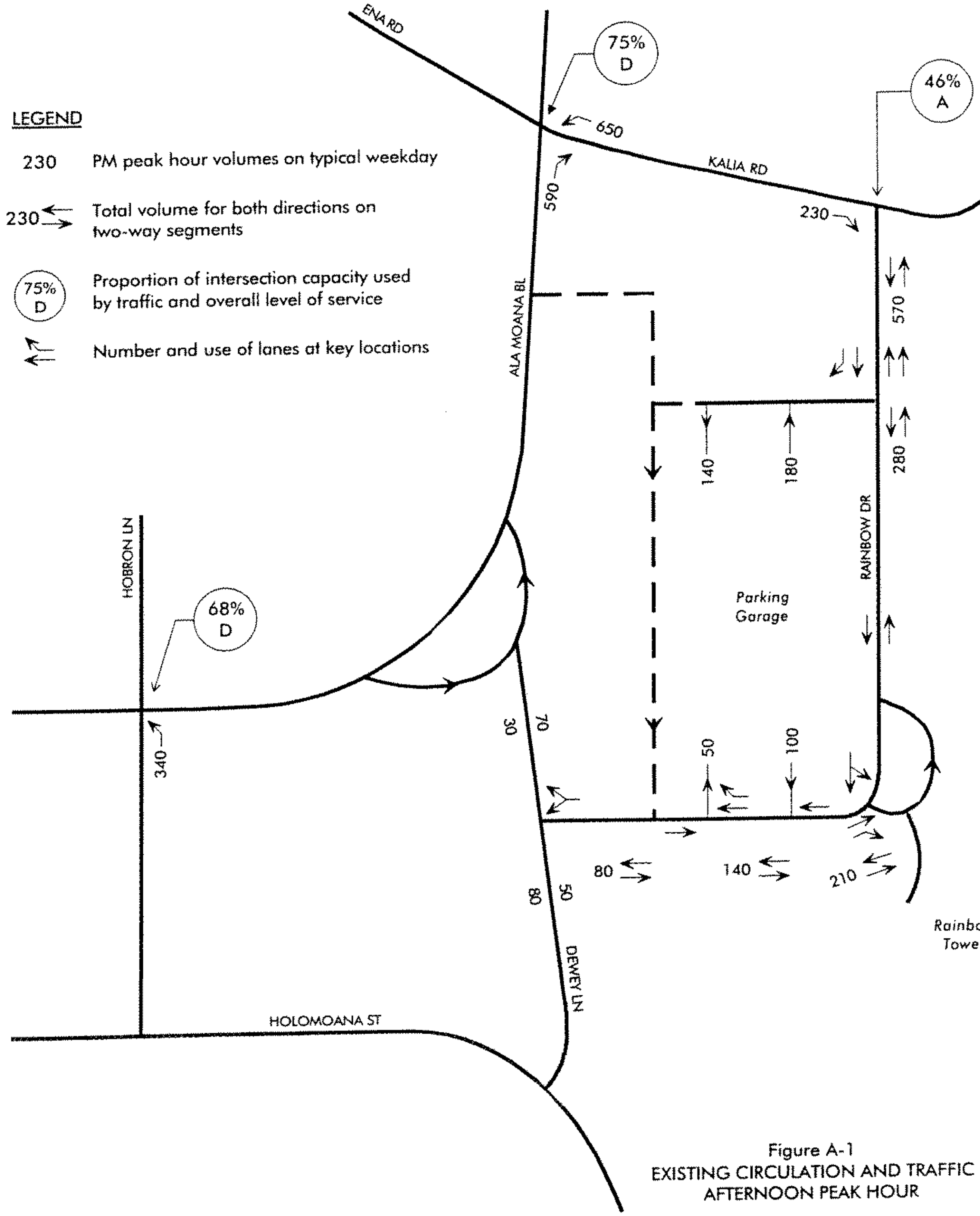
ENGINEERS PLANNERS ECONOMISTS
Wilbur Smith Associates

362060\base/6-11-01



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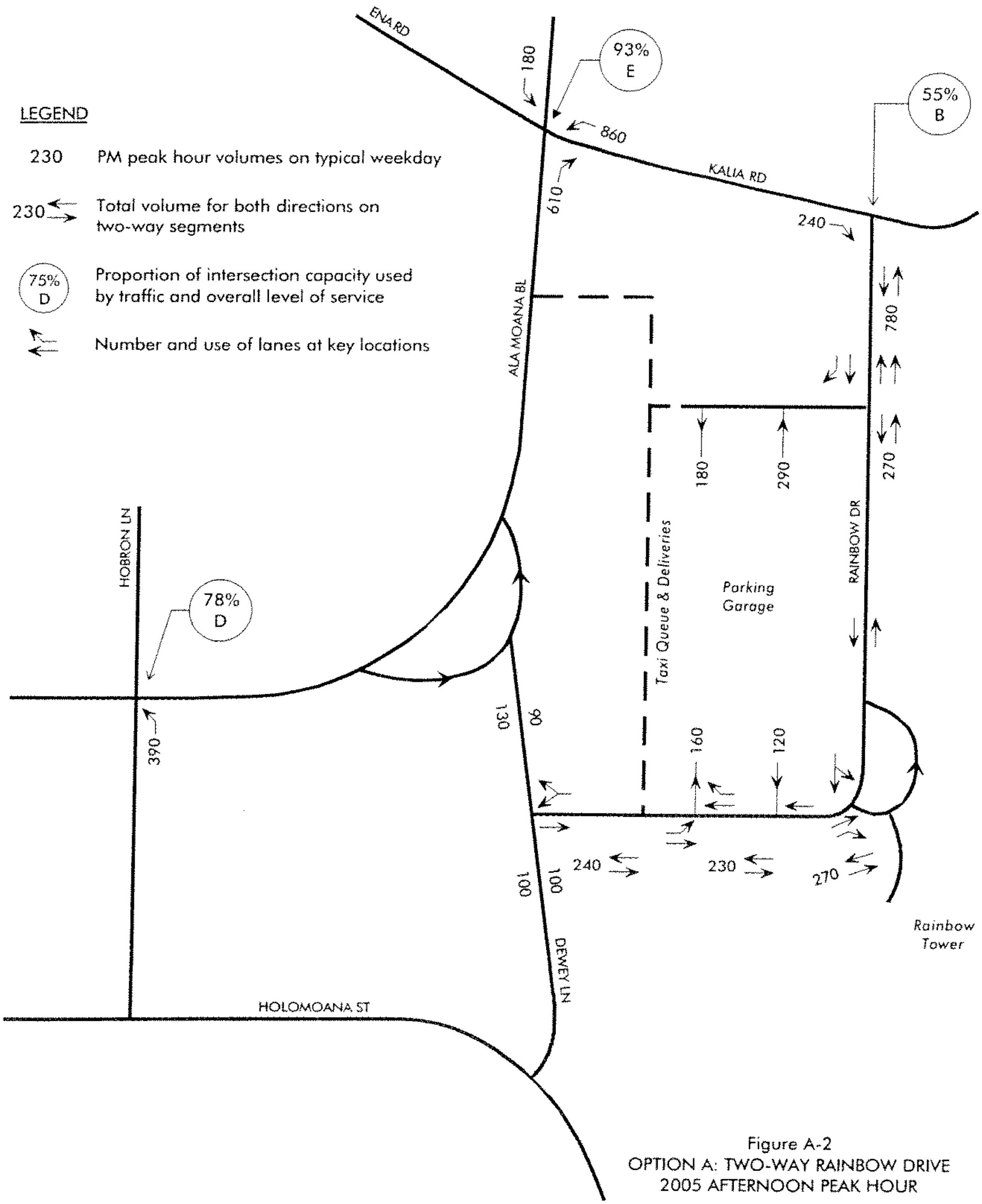

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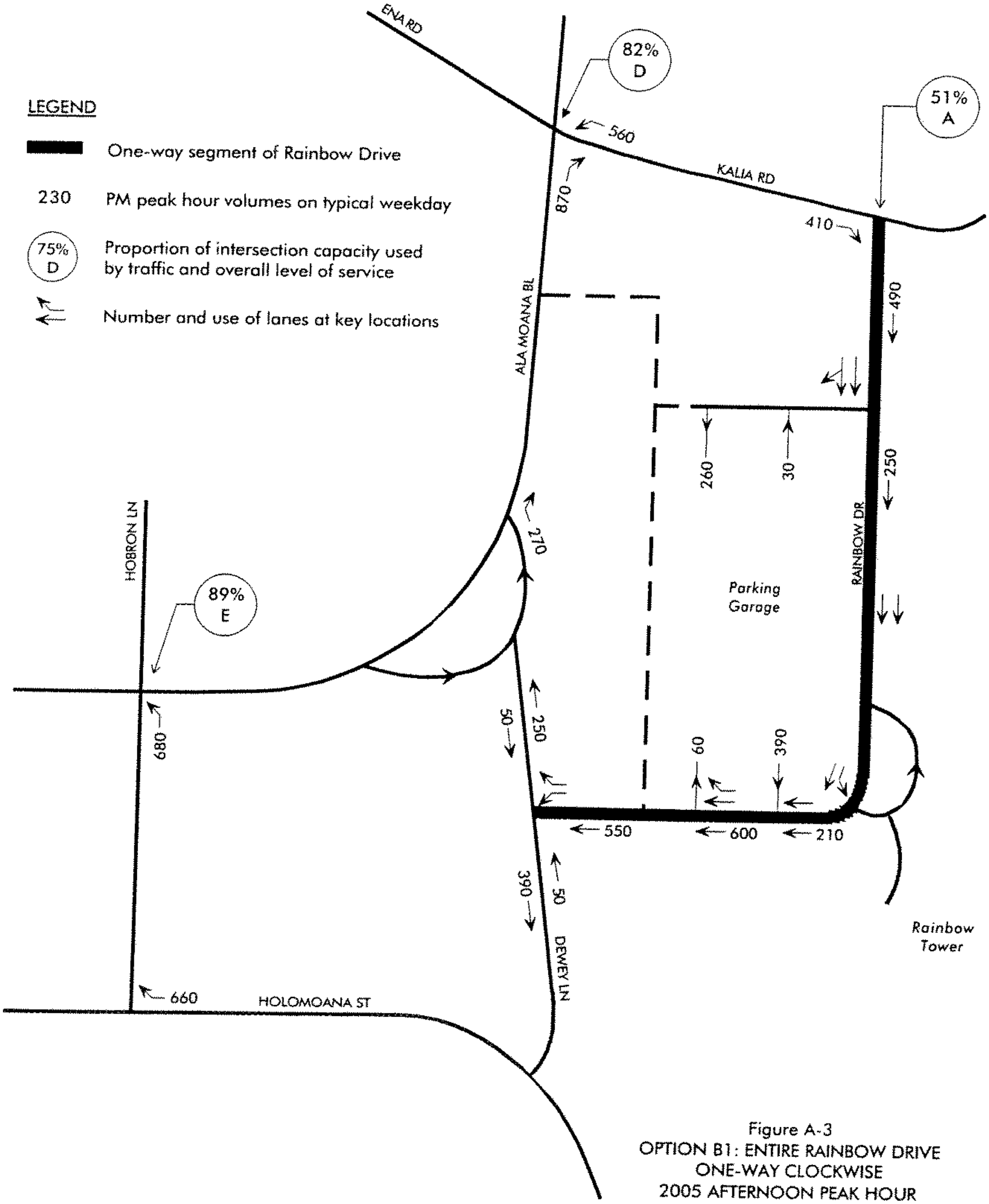

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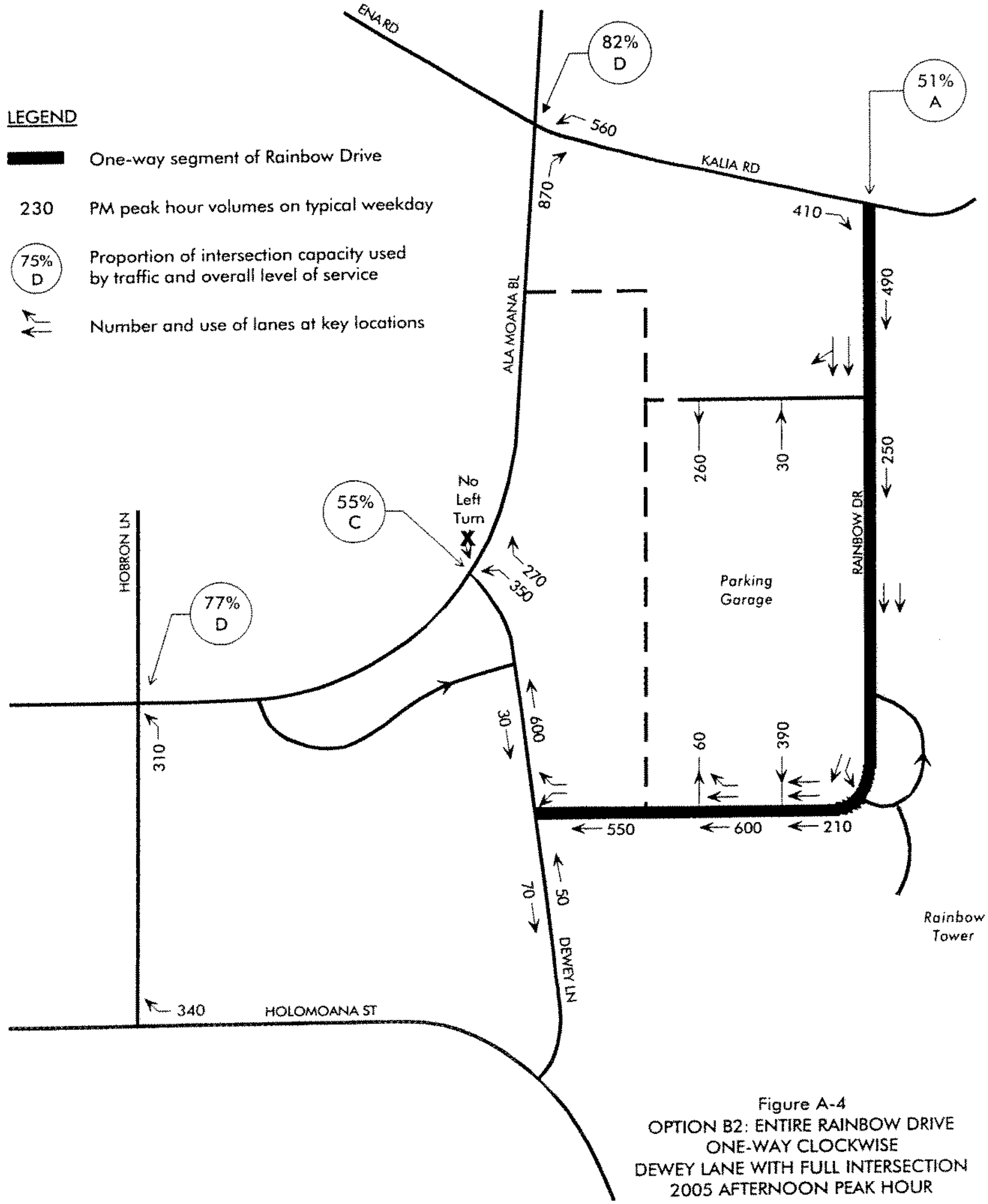

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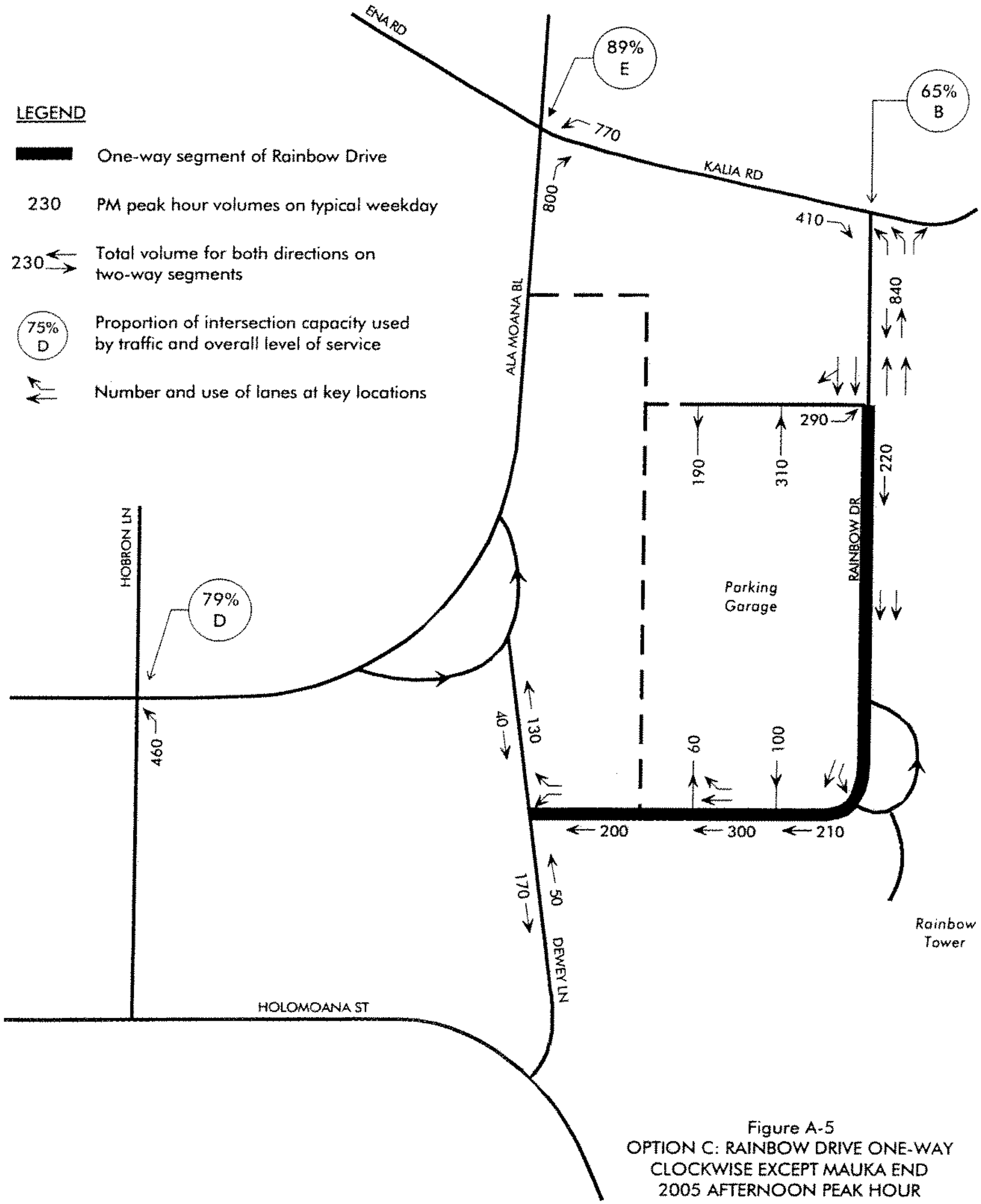

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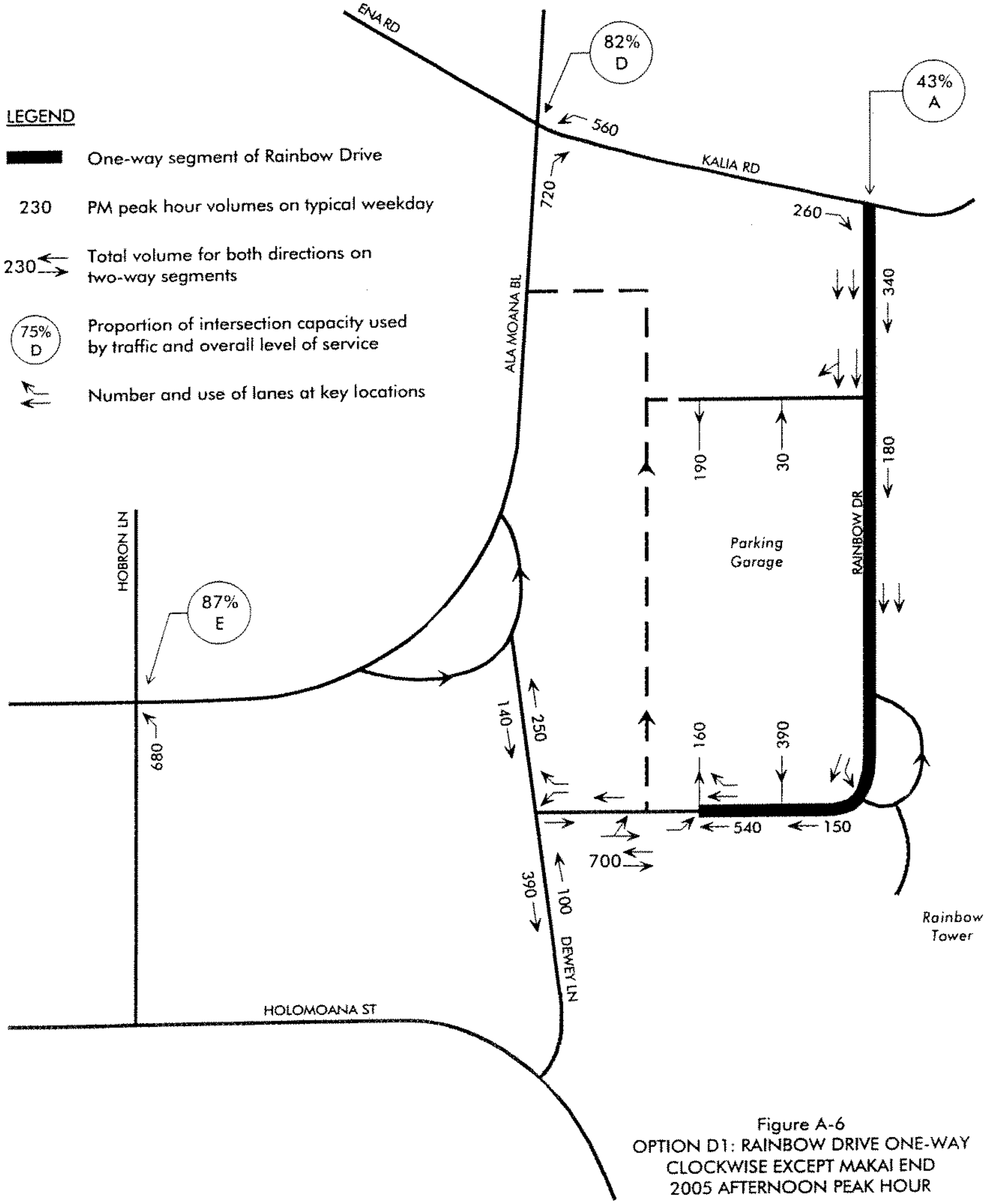

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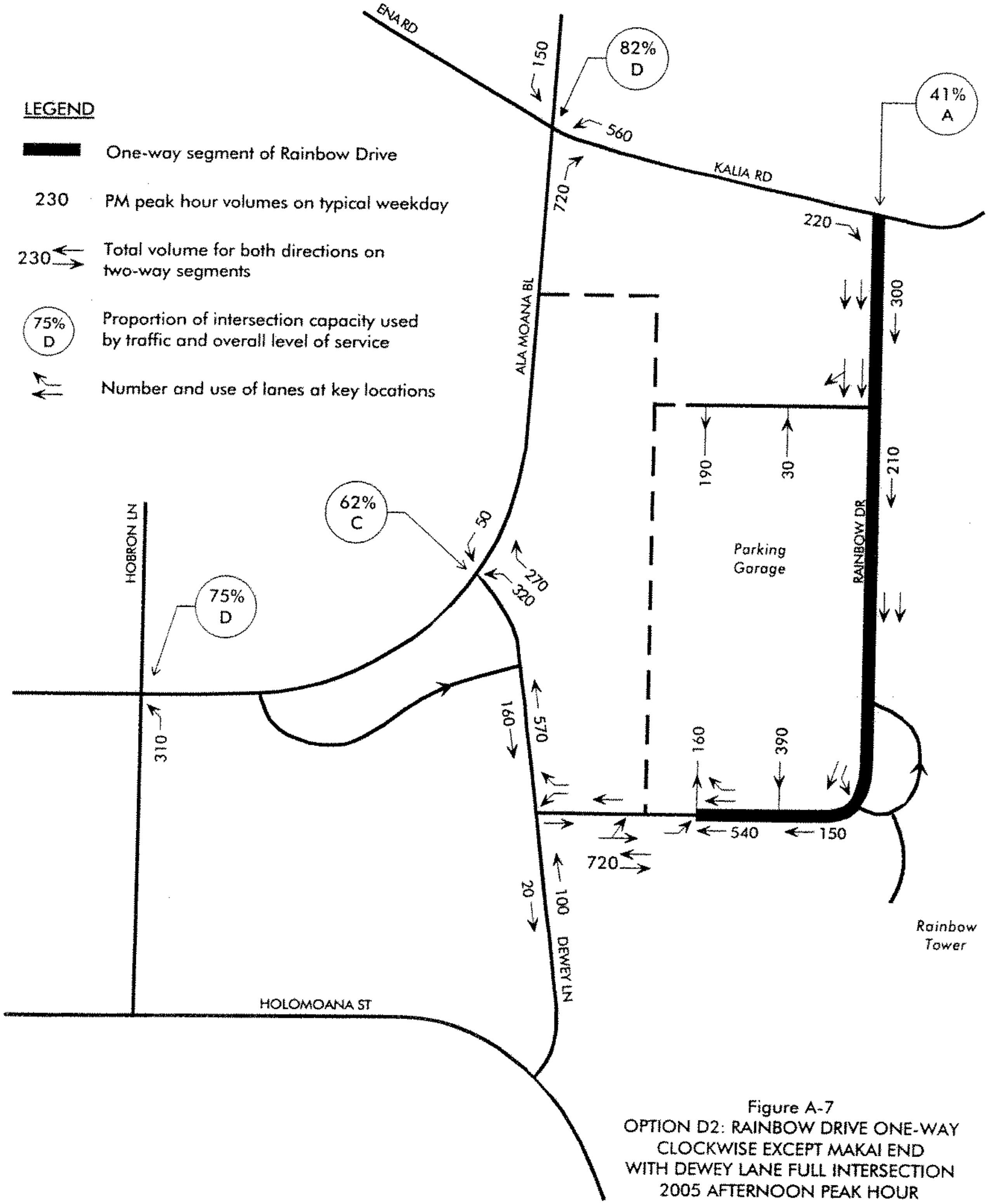

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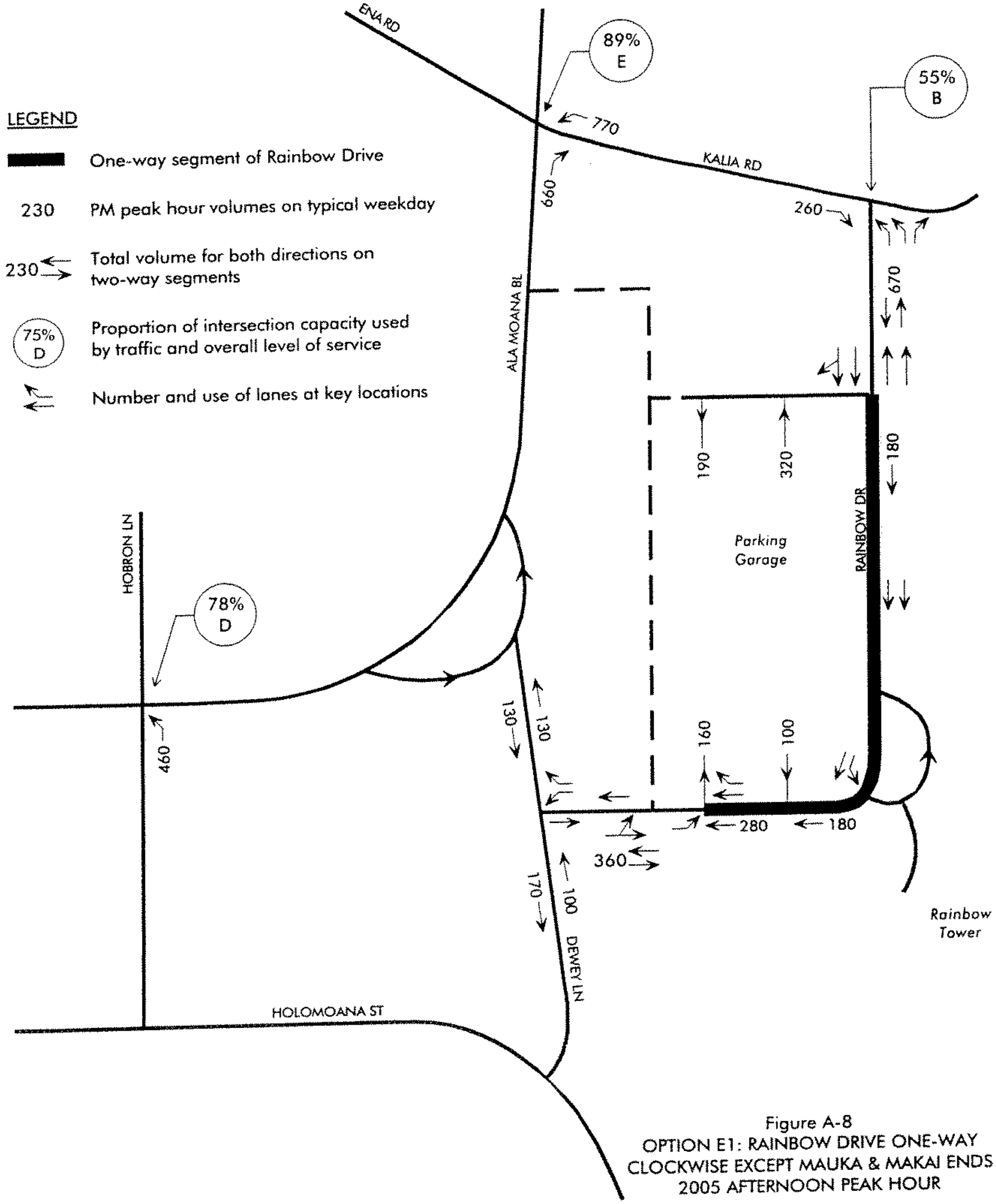

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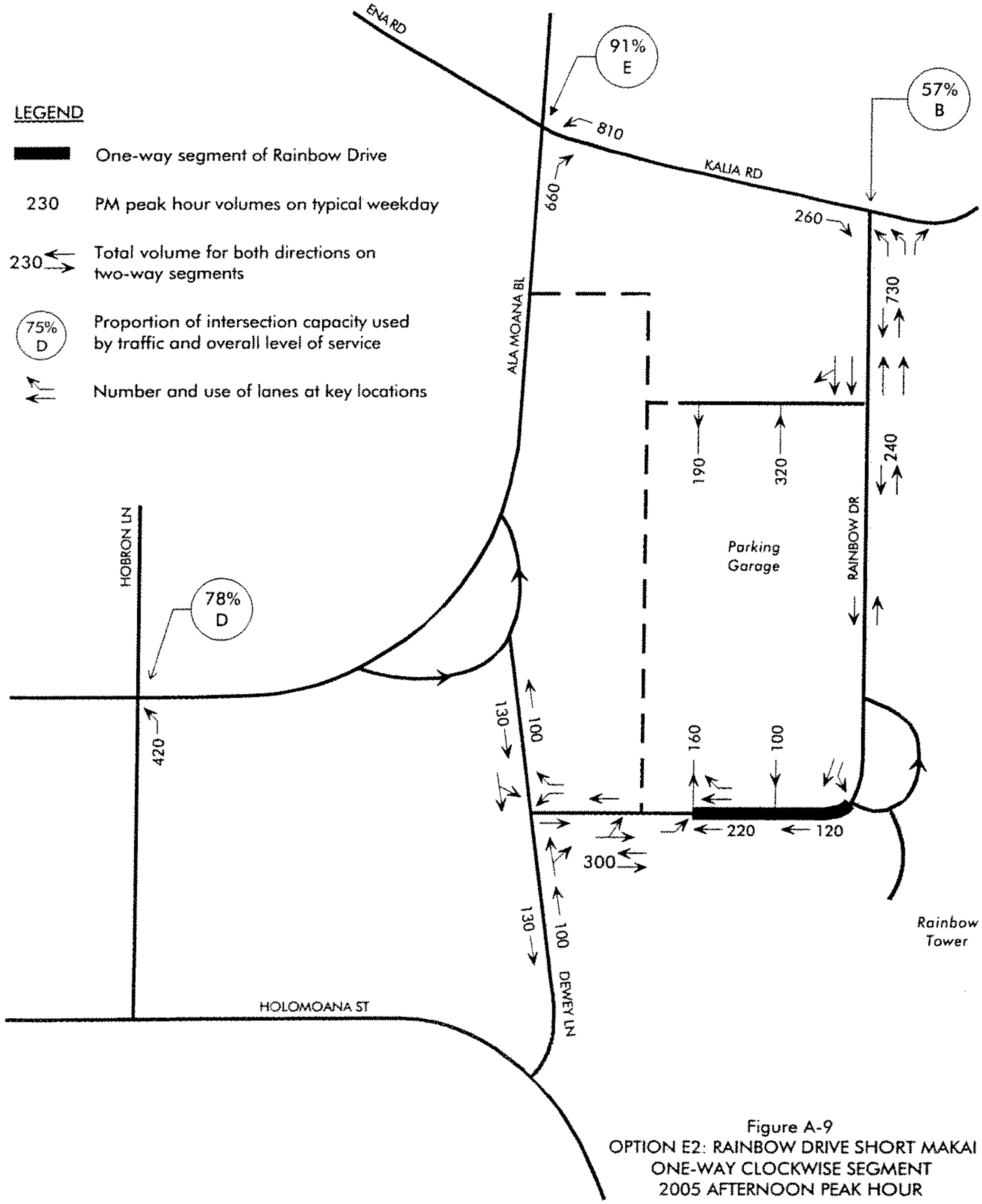

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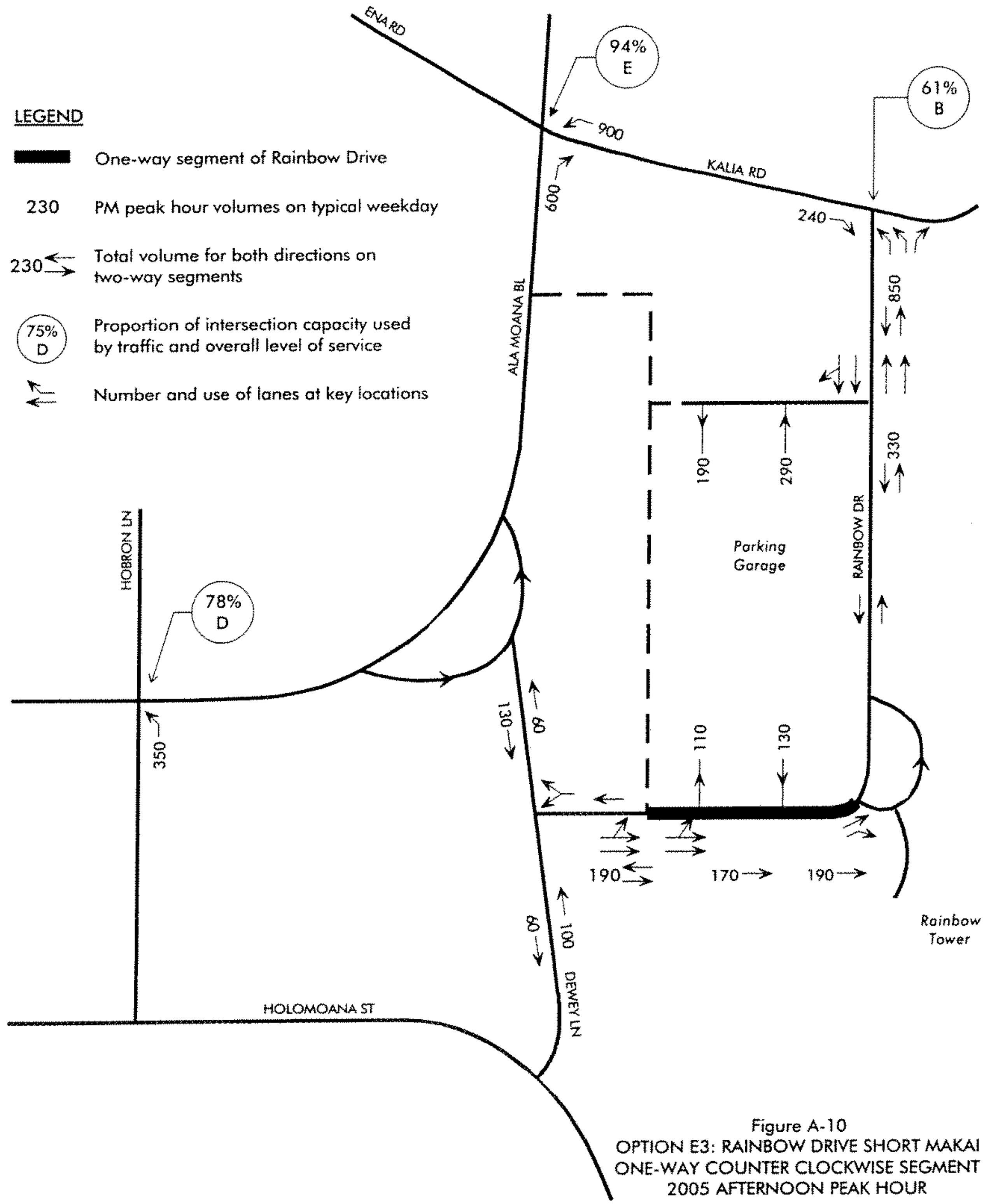

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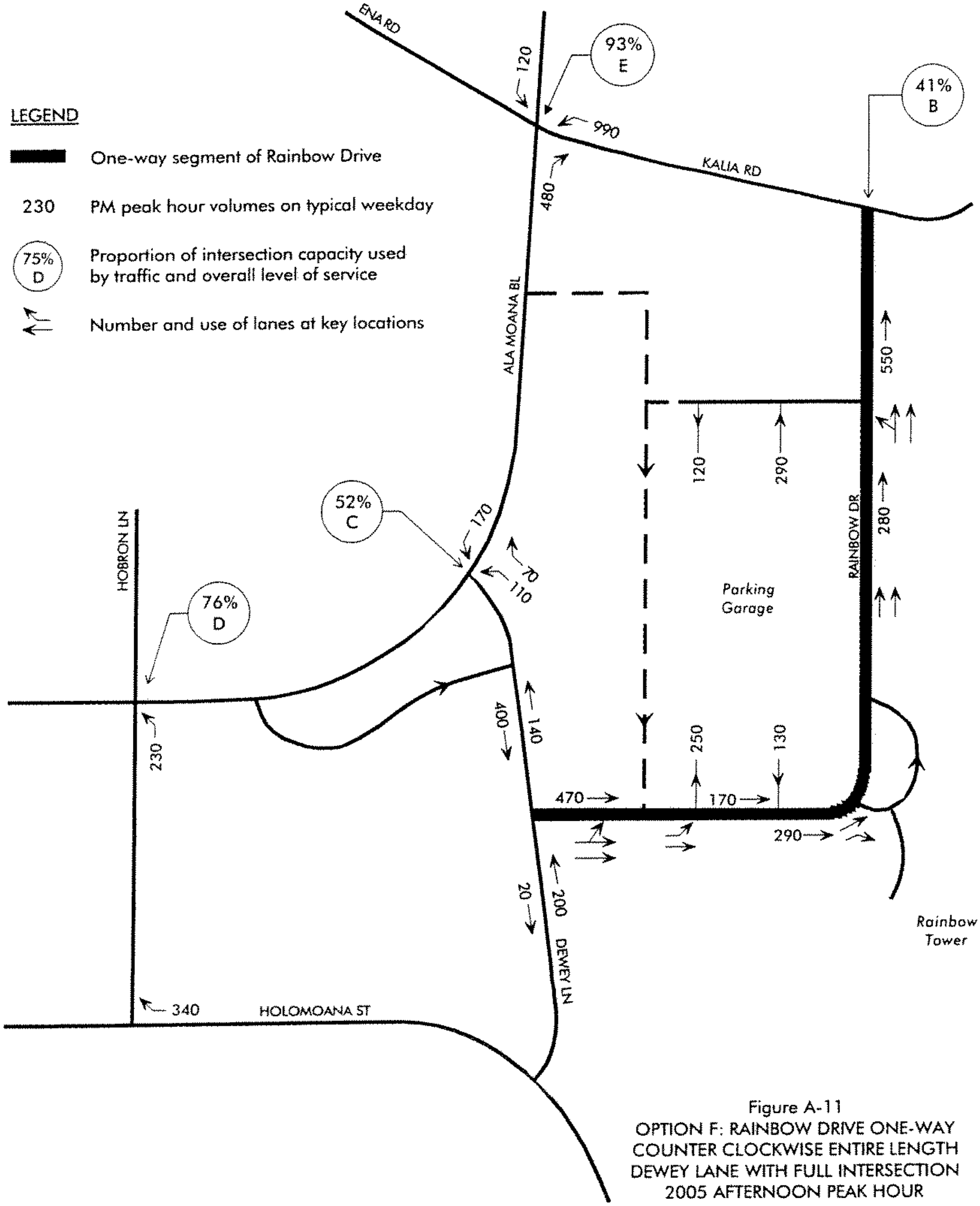

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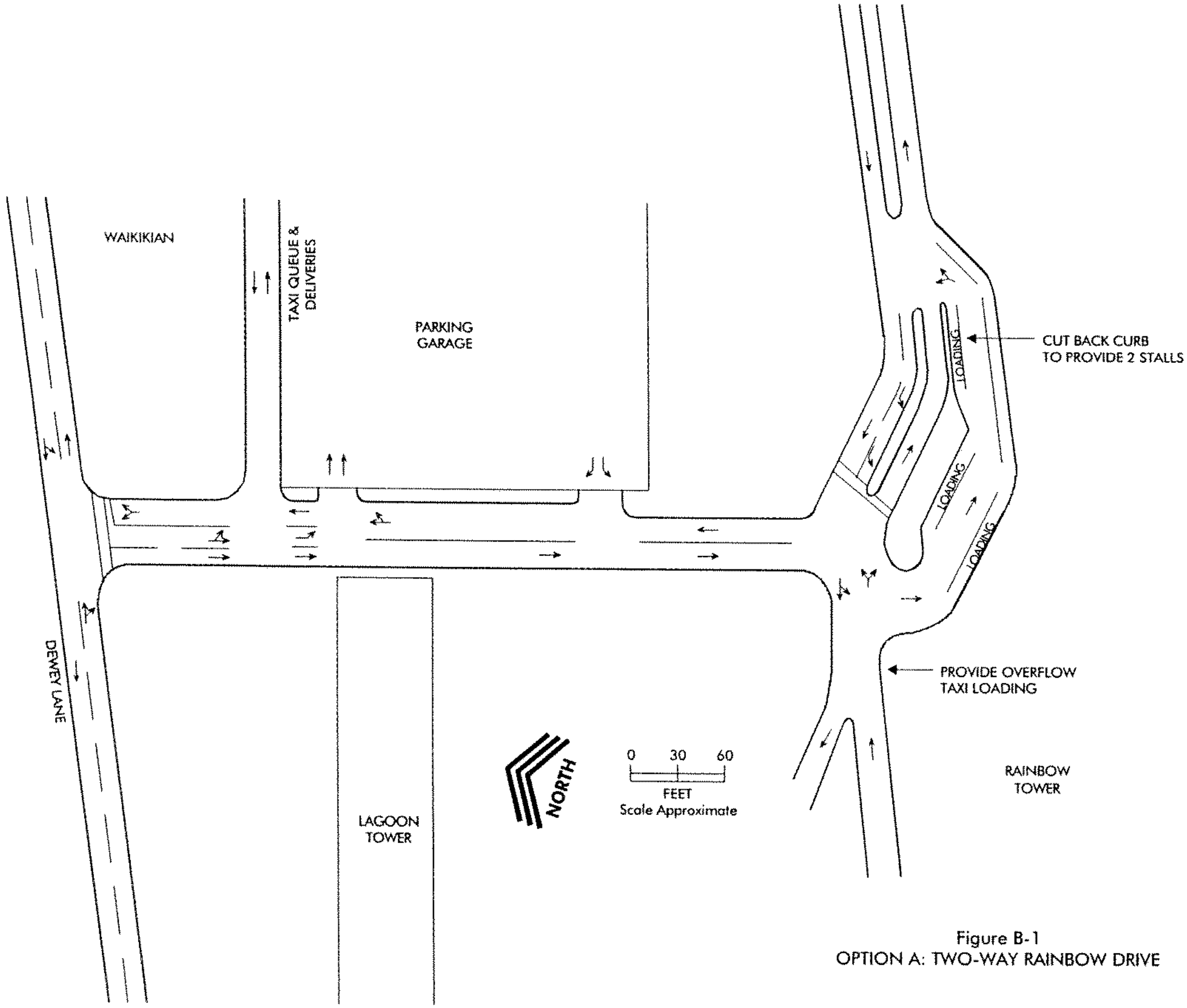

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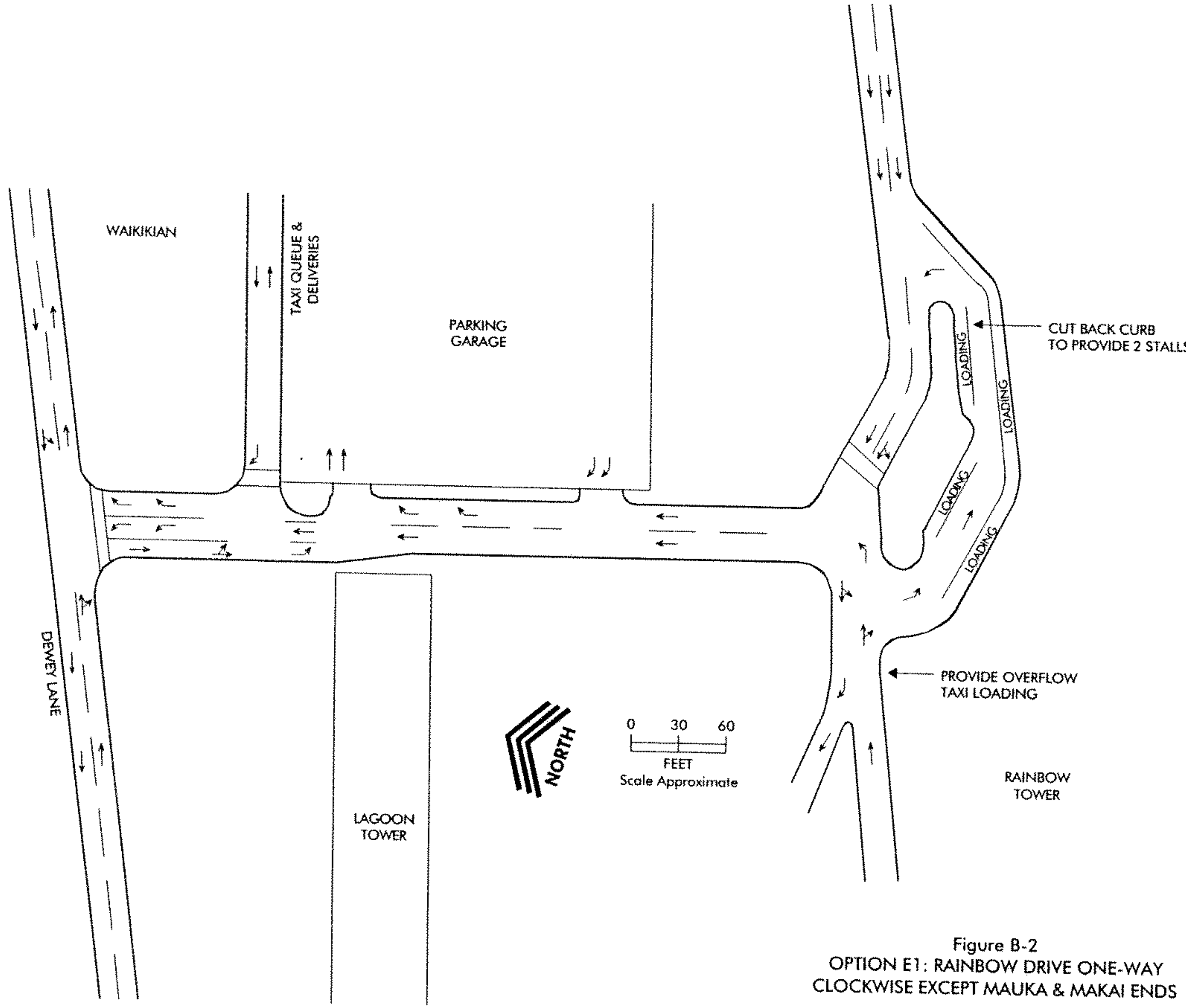

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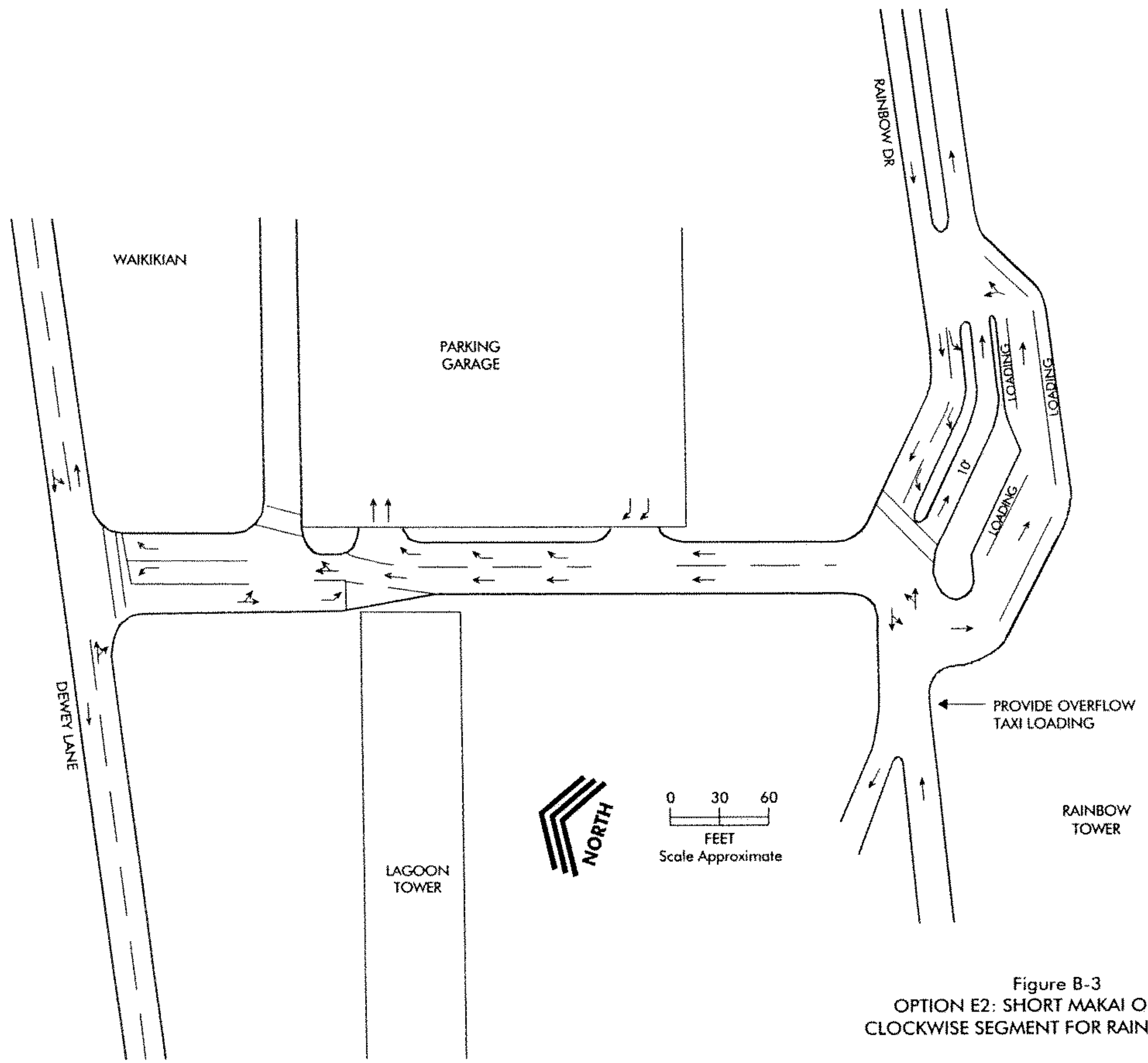

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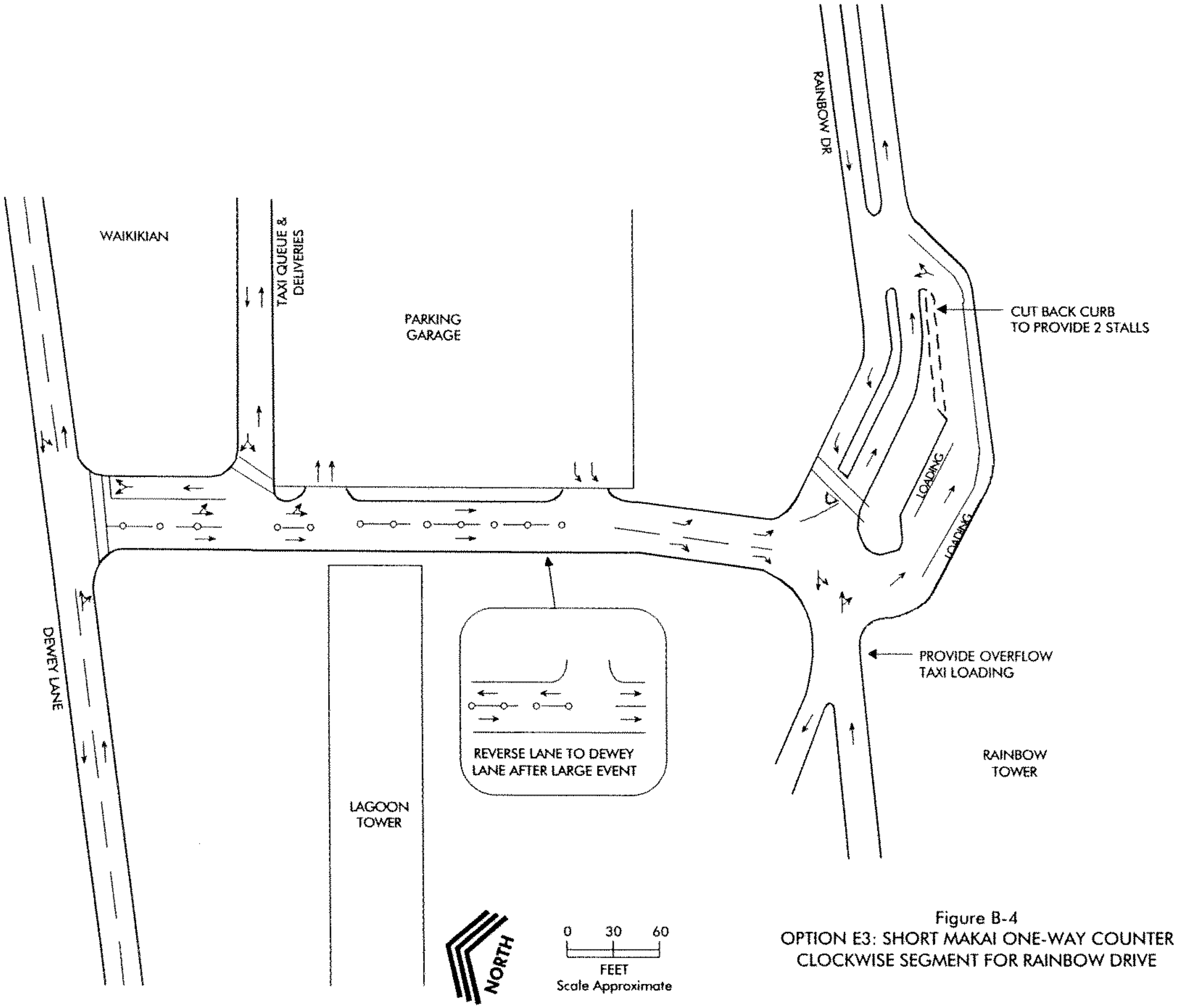

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HILTON WAIKIKIAN SITE
TRAFFIC IMPACT STUDY SUPPLEMENT
FINAL REPORT
Hilton Hawaiian Village, Waikiki

Prepared for

Belt Collins Hawaii

Prepared by

Wilbur Smith Associates
ENGINEERS
PLANNERS
ECONOMISTS

October 30, 2001

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INTRODUCTION TO SUPPLEMENTAL STUDIES

Since preparation of the traffic studies included within the Draft Environmental Impact Statement (DEIS)[1] for the Hilton Waikikian project, the new Kalia Tower has been completed and opened for guest occupancy, and the renovation and conversion of the Lagoon Tower to a time-share facility has been completed for guest use. Both of these projects were included among the forecasts of future traffic without the Waikikian development for the traffic study[2] included within the Hilton Waikikian DEIS.

With the completion of these two projects within the Hilton Hawaiian Village (HHV) area, Belt Collins Hawaii requested an update of the traffic study for the Waikikian development. These supplemental studies include new traffic counts with the Kalia Tower and Lagoon Tower operating near full capacity. These new existing counts have also been used to update the forecast of future traffic volumes and conditions. Whereas the traffic study in the DEIS focused on weekday conditions, the supplemental studies have been expanded to also include traffic counts, forecasts, and analyses for a Friday evening with special events at the HHV, and for a Saturday afternoon. The Saturday afternoon period has been included since the time-share operations usually have peak arrival and departure traffic on a Saturday, and in Waikiki, Saturdays have comparatively high traffic volumes that may differ in circulation patterns and traffic issues from those on weekdays.

In addition to the update of the existing counts and the forecast of future conditions, this supplement also addresses several other issues that may be raised by the community during the review of the environmental assessment. The tasks/sections discussed in this supplement include:

- **Task 1** – Traffic counts and analyses for a Weekday Afternoon (Thursday) with Kalia and Lagoon Towers
- **Task 2** – Traffic counts and analyses for Friday Afternoon/Evening with Kalia and Lagoon Towers
- **Task 3** – Traffic counts and analyses for Saturday Afternoon with Kalia and Lagoon Towers
- **Task 4** – Summary of Traffic Analyses Results
- **Task 5** – Expanded traffic count program that provides traffic data from a period of several weeks in duration to indicate the level of traffic variation in the area
- **Task 6** – Reanalyze past traffic volumes with the same HCS-3 model used to analyze traffic conditions for the traffic studies included in the DEIS to compare traffic conditions over the years

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[1] *Waikikian Development Plan Draft Environmental Impact Statement*, Belt Collins Hawaii Ltd., July 2001.

[2] *Hilton Waikikian Site Traffic Impact Study*, Wilbur Smith Associates, May 30, 2001.

Each of the preceding tasks has been documented in a separate section for this supplement. Each section presents the purpose, methodology, and results of each task, to include updated mitigation measures.

It is important to note that the intersection volumes depicted in the graphics following this supplemental study are not necessarily equal to the sum of traffic movements between the intersections. This is due to the presence of mid-block driveways for area commercial and residential buildings which attract and generate traffic, as well as unique traffic movements such as U-turns at intersections and service vehicle activities. The depicted traffic volumes represent only those vehicles at each individual intersection and do not indicate the mid-block driveway volumes.

SUPPLEMENT - Task 1

TRAFFIC COUNTS AND WEEKDAY AFTERNOON (THURSDAY) ANALYSES WITH KALIA AND LAGOON TOWERS

The Kalia Tower and Lagoon Tower have been completed and occupied since the counts of the existing traffic volumes were made for the *Hilton Waikikian Site Traffic Impact Study*. This supplemental study includes a new traffic count and analyses of the existing weekday afternoon peak period traffic with these two facilities now in full operation. These existing counts have then been used as the basis for a new forecast of future traffic conditions both without and with the Hilton Waikikian project in order to provide a more accurate forecast of future weekday conditions. This supplemental study also adds a full analysis of a Friday afternoon/evening (Task 2), as well as the Saturday afternoon period (Task 3) when most of the time-share guests are expected to arrive/depart from their stay at the Waikikian development,.

WEEKDAY AFTERNOON (THURSDAY) TRAFFIC COUNTS

The updated weekday afternoon traffic counts were made on Thursday, September 6, 2001 (Figure 1-1). On this survey day the Hilton Hawaiian Village occupancy was considered high, at 98%. Major trip generating facilities that are included in this recent count (September 2001) that were not part of the previous 1999/2000 counts include:

- Kalia Tower – Project was under construction in 1999 and 2000 and was completed in May 2001. Trips generated by the 453-room facility are represented in the September 2001 counts and reflected greater than 99% occupancy on the Thursday, September 6,2001.
- Lagoon Tower – Facility was under renovation and all units were vacant at the time of the 2000 counts. Full operation of the 235-unit tower began in January 2001 and was over 78% occupied on Thursday, September 6, 2001.
- Asia-Pacific Center for Security Services – Operations were shifted to Fort DeRussy on June 12, 2000. The center, with a present staff of 100 persons, conducts 12-week training sessions for 60 to 75 students three times a year. Most of the trips associated with this training center are from staff, as the majority of the students are billeted at hotels within walking distance of the facility.

Special events on this survey day included a 1,500-person reception on Lagoon Lawn. This reception included primarily Hilton Hawaiian Village guests that were transported to the event from the Convention Center on 20 full-size buses. This type of event would primarily generate traffic via employee trips to cater the event. It is estimated that 30 additional employees were on staff to cater the event, resulting in approximately 28 additional trips during the peak travel period.

The counts were recorded at the same key intersections as the previous study. These intersections are those locations along the major travel routes to and from Hilton Hawaiian

Village. The count locations are listed in Table 1-1, which indicates the total volume of vehicles entering the intersection during the afternoon peak hour (3:30 - 4:30 pm) on September 6, as well as the total volume recorded by the previous 1999/2000 counts.

Table 1-1

WEEKDAY TRAFFIC VOLUMES ENTERING KEY INTERSECTIONS

(2001 vs. 1999/2000)

Intersection	Afternoon Peak Hour		
	2001 Volume	1999/2000 Volume	Percent Difference
Ala Moana Blvd. & Kalakaua Ave.	4,283	4,095	+ 4.8%
Ala Moana Blvd. & Kalia Rd./Ena Rd.	3,091	3,337	- 7.4%
Ala Moana Blvd. & Hobron Ln.	3,584	3,824	- 6.3%
Ala Moana Blvd. & Atkinson Dr.	4,657	4,868	- 4.3%
Kalia Rd. & Rainbow Dr.	1,696	1,838	- 7.7%
Holomoana St. & Dewey Ln.	431	533	- 19.1%

Volume = Total peak hour traffic entering intersection from all approaches.

Percent Difference = The percent increase or decrease of the 2001 counts as compared to the 1999/2000 counts.

Wilbur Smith Associates; October 15, 2001

As the above table indicates, the counts recorded at the key intersections in the area are on average 6.7% lower than the counts recorded in 1999/2000. This fact that the 2001 counts show reductions is even more interesting given the fact that the 1999/2000 counts did not include the trips generated by Kalia Tower, Lagoon Tower and the Asian-Pacific Center for Security Studies. However, the 1999/2000 counts did include construction traffic for the Kalia Tower and Lagoon Tower projects that may have approximated or exceeded the amount of normal operational (employee and guest) traffic volumes for these two projects. Many construction workers were observed to park along Holomoana Street. The construction-related traffic would have increased the 1999/2000 counts along Hobron Lane, Dewey Lane, Kalia Road, Rainbow Drive, and Ala Moana Boulevard, and would have had the least effect on Kalakaua Avenue volumes.

EXISTING WEEKDAY AFTERNOON (THURSDAY) CONDITIONS ANALYSIS

The analysis of the existing weekday conditions was based on the existing traffic volumes (Figure 1-1), traffic lanes and traffic controls at each intersection. The findings proved to be similar to the previous study (Table 1-2).

Table 1-2

EXISTING WEEKDAY AFTERNOON CONDITIONS AT KEY INTERSECTIONS

Thursday – September 6, 2001

Intersection	Afternoon Peak Hour		
	V/C	ADPV	LOS
Ala Moana Blvd. & Kalakaua Ave. (analysis only includes the Pau St. side of the intersection)	0.82	22.1	C
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.76	51.2	D
Ala Moana Blvd. & Hobron Ln.	0.76	43.0	D
Ala Moana Blvd. & Atkinson Dr.	0.73	43.3	D
Kalia Rd. & Rainbow Dr.	0.28	9.8	A
Holomoana St. & Dewey Ln.	--	7.7	A

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; October 15, 2001

Although the analyses indicate acceptable overall traffic operations, problems were found for individual traffic movements at the intersections. At the intersections of Ala Moana Boulevard and Kalia Road and at Kalia Road and Rainbow Drive field observations identified operational concerns relative to storage of vehicles along Kalia Road.

Ala Moana Boulevard & Kalia Road – This intersection functions under overall acceptable operations at LOS D. However, the long signal cycle length and large number of crossing pedestrians result in LOS E conditions for Ena Road traffic and ewa-bound Kalia Road through and left-turn traffic. This combination of large amounts of conflicting vehicular and pedestrian traffic and long cycle lengths puts a premium on storage space in areas where storage space is limited. The storage space is limited as a result of the close spacing of adjacent traffic signals and the constraints on number of lanes by the existing right-of-way width.

Kalia Road & Rainbow Drive – From an analysis viewpoint, this intersection functions at a very good LOS A. However, field observations identified storage constraints along Kalia Road between Ala Moana Boulevard and Rainbow Drive. The limited storage results in the queuing of ewa-bound vehicles from the Ala Moana intersection through the Rainbow Drive intersection. These queues interfere with and delay the vehicles exiting Rainbow Drive onto ewa-bound Kalia Road, as well as reduce the green time available for traffic exiting from Hilton Hawaiian Village.

Additional traffic disruptions were observed on the Diamond Head side of the intersection as a result of transit and vehicular conflicts. Traffic disruptions result from the blockage of travel lanes for the loading and unloading of Diamond Head-bound city transit passengers. The close proximity of the bus stop, the short length of the bus pull-out, and the effect of buses waiting to enter the Hilton bus terminal effected the Diamond Head-bound traffic and resulted in traffic queues intermittently stacking into the Rainbow Drive intersection during the peak travel times.

Ala Moana Boulevard & Hobron Lane – Traffic operations at this intersection are satisfactory at LOS D. Some individual movements experience long delays in the range of LOS E to LOS F as a result of the long signal cycle length. The individual movements experiencing long delays times are minor street movements from and to Hobron Lane.

2005 WEEKDAY AFTERNOON (THURSDAY) CONDITIONS

The forecast 2005 traffic conditions reflect a typical weekday in 2005, based on 98.0% occupancy of all units in the Hilton Hawaiian Village complex with a typical day of meetings and functions. Two circulation alternatives were analyzed, both with and without the estimated Waikikian project trips. The two alternatives encompass whether the Dewey Lane connection to Ala Moana Boulevard is continued with its current limitation of right-turns in and out, or the connection is modified into a full intersection with traffic signal control.

General Area Growth

The growth factor used in the previous study was also used in this forecast. The growth factor was based on the average annual increases on Ala Moana Boulevard between 1995 and 1997, as determined from State DOT 24-hour machine counts made near Kalakaua Boulevard. The average annual increase for this period was 1.4%. This average annual growth rate would amount to a 5.7% increase between the 2001 counts and the mid-2005 period used for the analyses of the Waikikian traffic impacts.

Outrigger Redevelopment Growth

The potential Outrigger redevelopment of its properties in the Lewers Street area of Waikiki was included in the background traffic growth used for this analysis. The redevelopment and upgrade of the Outrigger properties is expected to be completed in two phases. Phase 1 is to involve the demolition and redevelopment of several properties by 2005, while Phase 2 involves further redevelopment and upgrades to be completed by 2010.

Preliminary Outrigger Redevelopment Numbers

Phase 1	
Hotel	- 436 rooms
Commercial	+ 26,100 square feet
Phase 2	
Hotel	+ 670 rooms
Commercial	+ 21,430 square feet
Phase 1 & Phase 2 Subtotal	
Hotel	+ 234 rooms
Commercial	+ 47,530 square feet

As a conservative approach for this analysis, it was assumed that all the development would be in-place by the 2005 build-out date estimated for the Hilton Waikikian. Therefore, the additional traffic forecast to/from the Outrigger Phase 1 and Phase 2 projects along Kalia Road and Ala Moana Boulevard have been included in this 2005 analysis for the Waikikian Project.

ANALYSIS WITHOUT WAIKIKIAN PROJECT

The travel forecasts and conditions for 2005 without the Waikikian Project are presented as a baseline from which to identify the effects of the project. The forecasted 2005 weekday (Thursday) traffic volumes, which reflect the general area growth assumption and Outrigger redevelopment trips are depicted for both Dewey Lane circulation alternatives in Figures 1-2 and 1-3. The resulting levels of service for these forecasted traffic volumes indicate favorable operations for the key intersections under both circulation alternatives (Table 1-3).

Table 1-3

2005 WEEKDAY AFTERNOON (THURSDAY) CONDITIONS AT KEY INTERSECTIONS

WITHOUT WAIKIKIAN PROJECT

Intersection	Afternoon Peak Hour					
	Dewey Lane & Ala Moana Right-In/Right-Out			Dewey Lane & Ala Moana Full Intersection		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Ala Moana Blvd. & Kalakaua Ave. (analysis only includes the Pau St. side of the intersection)	0.87	24.9	C	0.87	24.9	C
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.81	55.2	E	0.77	50.8	D
Ala Moana Blvd. & Hobron Ln.	0.81	45.6	D	0.80	44.8	D
Ala Moana Blvd. & Atkinson Dr.	0.78	47.4	D	0.78	47.4	D
Kalia Rd. & Rainbow Dr.	0.32	9.9	A	0.26	8.4	A
Dewey Ln. & Holomoana St.	--	7.8	A	--	7.8	A
Dewey Ln. & Ala Moana Blvd.	--	--	--	0.44	14.4	B

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; October 15, 2001

The two traffic circulation alternatives for the intersection of Dewey Lane and Ala Moana Boulevard indicate similar results for the 2005 forecasted traffic conditions without Waikikian project trips. Minor operational differences were identified at:

Ala Moana Boulevard & Kalia Road – This intersection showed the largest benefit from providing a full intersection at Dewey Lane and Ala Moana Boulevard. A reduction in the intersection volume results in an improved volume/capacity ratio and reduced intersection delay. These improvements are the result of an increased number of vehicles utilizing Dewey Lane Road for access to and from Hilton Hawaiian Village and the Ala Wai Yacht Harbor. This forecasted increase in traffic along Dewey Lane serves to reduce the traffic along Kalia Road, which provides operational relief and most importantly reduces the storage demand placed on Kalia Road.

Kalia Road & Rainbow Drive – This intersection functions under very good LOS A conditions for both Dewey Lane circulation alternatives. However, the Dewey Lane full intersection serves to reduce the inbound and outbound Hilton Hawaiian Village traffic along Rainbow Drive. Although this reduction in traffic does improve the operational performance of the intersection, the most significant benefit is the additional storage space gained along ewa-bound Kalia Road. The full intersection at Dewey Lane is estimated to result in 5 less vehicles per cycle or 100 feet of storage per signal cycle. This reduction in traffic will help limit the number of times queues extend into the Rainbow Drive intersection from Ala Moana Boulevard.

Ala Moana Boulevard & Hobron Lane – Left-turning traffic along Ala Moana Boulevard operates at LOS E or worse under both alternatives. Average vehicle delay is improved from LOS E to LOS D for the mauka-bound Hobron Lane traffic under the Dewey Lane full intersection alternative. Overall operations are satisfactory at LOS D.

Dewey Lane & Ala Moana Boulevard – The operational performance of this intersection under signalized control is good at LOS B. Acceptable operational performance is expected at this intersection because the intersection will operate as a "T" intersection, which reduces the number of traffic signal phases required to accommodate the traffic movements. Therefore, the amount of green time allocated to the Ala Moana Boulevard through traffic is higher as compared to the adjacent intersections with Kalia Road and Hobron Lane. This results in lower delay times for the Ala Moana Boulevard through traffic and better overall intersection conditions as compared to the adjacent intersections. Poor performance may occur for the ewa-bound left-turns (LOS F). This poor condition may result since the turn would only be made during the protected left-turn phase, with the same long signal cycle lengths as the adjacent intersections to allow for signal coordination and progressive traffic flow along Ala Moana Boulevard.

ANALYSIS WITH WAIKIKIAN PROJECT

Construction of the Waikikian Project is planned for completion in mid 2005, with initial occupancy in Summer 2005. The project will add approximately 350 guest units, an increase of about 11% in the number of visitor units at the Hilton Hawaiian Village. The assessment of traffic conditions with the Waikikian Project reflects a typical weekday in a peak visitor month in year 2005.

Waikikian Weekday Afternoon Trip Generation

The Waikikian Project traffic remained unchanged from the previous report. During the afternoon peak hour it is estimated that 111 vehicle trips are generated by the property. These trips were assigned to the traffic network per the previous study. The forecasted traffic demand for both Dewey Lane circulation alternatives are provided in Figures 1-4 and 1-5. Intersection conditions are presented in Table 1-4.

Table 1-4

2005 WEEKDAY AFTERNOON (THURSDAY) CONDITIONS AT KEY INTERSECTIONS

WITH WAIKIKIAN PROJECT

Intersection	Afternoon Peak Hour					
	Dewey Lane & Ala Moana Right-In/Right-Out			Dewey Lane & Ala Moana Full Intersection		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Ala Moana Blvd. & Kalakaua Ave. (analysis only includes the Pau St. side of the intersection)	0.87	25.0	C	0.87	25.0	C
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.83	56.7	E	0.78	51.1	D
Ala Moana Blvd. & Hobron Ln.	0.82	45.9	D	0.79	43.3	D
Ala Moana Blvd. & Atkinson Dr.	0.79	47.9	D	0.79	47.9	D
Kalia Rd. & Rainbow Dr.	0.33	10.2	B	0.27	8.5	A
Dewey Ln. & Holomoana St.	--	7.8	A	--	7.8	A
Dewey Ln. & Ala Moana Blvd.	--	--	--	0.48	15.9	B

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; October 15, 2001

The inclusion of a full signalized intersection at Dewey Lane and Ala Moana Boulevard would result in improvements in intersection operations similar to those discussed without the Waikikian Project. This improved secondary access into the Hilton Hawaiian Village via a full intersection at Dewey Lane and Ala Moana Boulevard should reduce the major left-turning movements at the Ala Moana Boulevard and Kalia Road intersection and result in improved conditions at the area intersections (Table 1-4).

Table 1-5

ALA MOANA BOULEVARD AND KALIA ROAD INTERSECTION LEFT-TURN STORAGE DEMANDS

Kalia Road Left-Turn Storage
(ewa-bound to Ala Moana Boulevard)

Scenario	Right-In/Right-Out Storage (1)	Full Intersection Storage (1)	Percent Reduction
Existing	1,425 ft	--	--
2005 With Project	1,605 ft	1,365	15%

Ala Moana Boulevard Left-Turn Storage
(makai-bound to Kalia Road)

Scenario	Right-In/Right-Out Storage (1)	Full Intersection Storage (1)	Percent Reduction
Existing	265	--	--
2005 With Project	290	270	7%

(1) Storage = Computed based on the following formula:

$$L = VK25(1+P)/N_c$$

Where:

L = storage length (feet)
V = vehicles per hour
K = constant (2.0) to reflect random arrival of vehicles
P = percentage of trucks/buses
N_c = number of signal cycles per hour

Assumptions: 140 signal cycle; 5% trucks/buses

Wilbur Smith Associates; October 15, 2001

The reductions in the storage needs identified in Table 1-5 are significant, and are directly related to traffic volume reductions at these locations. As identified under the without Waikikian Project analysis, minor operational improvements are also seen at the Kalia Road and Rainbow Drive and Ala Moana Boulevard and Hobron Lane intersections.

Based on the negligible differences between the without Waikikian Project and with Waikikian Project analyses, the project should have little to no impact on the traffic conditions on the roadway system. The assessment also indicates that the operational intersection efficiency should be improved with the Dewey Lane full intersection alternative.

WEEKDAY AFTERNOON (THURSDAY) ANALYSES WITH BRT PROJECT

In August 2000, the City and County of Honolulu published the Draft EIS for a Bus Rapid Transit (BRT) system that included service to Waikiki via the sections of Ala Moana Boulevard and Kalia Road adjacent to the Hilton Hawaiian Village and the Waikikian Project site. The DEIS disclosed that the BRT would use one lane in each direction along Ala Moana Boulevard and Kalia Road near the Project site. Indications were that the BRT would make exclusive use of two existing traffic lanes on Ala Moana Boulevard, and exclusive use of two existing or new lanes along the sections of Kalia Road.

At the time of the Waikikian Project traffic analyses, the City's Department of Transportation Services (DTS) was receiving input from its public outreach effort and continuing to review and refine the BRT design concepts in terms of lane location, exclusive versus shared lane use, and street/median landscaping along the alignment. As a "worse case" for the traffic impact assessment for the Waikikian Project, Wilbur Smith Associates (WSA) analyzed traffic conditions with the BRT project based on the exclusive use by the transit service of two existing traffic lanes along Ala Moana Boulevard, and exclusive use of both two existing lanes and two added lanes along Kalia Road. The WSA analyses was made for the intersections most directly affected by both the Waikikian and BRT projects:

- Ala Moana Boulevard & Hobron Lane
- Ala Moana Boulevard & Kalia Road
- Kalia Road & Rainbow Drive.

Since the WSA traffic analyses, the current concept for the BRT along the Diamond Head-direction of Ala Moana Boulevard near the Waikikian Project has been refined to include a curbside operation for the BRT and three lanes for general purpose traffic. The curbside lane for the BRT system would be shared with tour buses and right-turn vehicles at the intersections and at a few driveways along Ala Moana Boulevard.

ASSUMPTIONS FOR WAIKIKIAN TRAFFIC ANALYSES

The traffic impacts with the BRT project reflected the design concepts identified in the BRT DEIS, as well as several variations developed by City DTS as part of its continuing studies. The assumptions reflected in this analysis include:

- Based on the DEIS for the BRT project, the primary analyses was made based on the BRT displacing one general-purpose lane for both Diamond Head-bound and ewa-bound Ala Moana Boulevard on the ewa side of the Kalia Road intersection. This would reflect a "worse case" design scenario.
- Based on the DEIS for the BRT project, the assessment was made both with BRT displacement of two Kalia Road lanes, and with construction of additional Kalia Road lanes to accommodate BRT without loss of a traffic lane.

- It was assumed that increased transit ridership with BRT would result in a 1.5% reduction in personal auto trips along Ala Moana Boulevard. This is the average for all roadways in this portion of the BRT corridor and the actual reduction along Ala Moana Boulevard would likely be greater than 1.5%.
- The same traffic routings were used with the BRT as used in the Waikikian analyses without the BRT.
- Intersection signal timing was modified to provide for a protected movement of the BRT vehicles from the BRT lane on ewa-bound Kalia Road onto Ala Moana Boulevard.

FINDINGS WITH THE BRT PROJECT

The traffic analyses were made for conditions both with and without the Waikikian Project, and both with and without the full intersection of Dewey Lane with Ala Moana Boulevard. The analyses of traffic conditions for the intersections with the forecast year 2005 weekday afternoon peak hour traffic indicate the following:

1. As identified in the original Waikikian DEIS traffic studies, the traffic impacts associated with the Waikikian Project are minimal, as compared to conditions without the Waikikian Project. The Waikikian Project would add 1% to 2% to the volume-to-capacity ratio for each intersection, with no changes to the level of service (LOS).
2. With the removal of one general-purpose traffic lane in each direction along both Ala Moana Boulevard and Kalia Road, and if the Dewey Lane traffic continues to be restricted to the existing right-turn-in and right-turn-out movements, the volume/capacity ratio at the Hobron Lane intersection would increase by almost 25% over conditions without the BRT project, with the forecast traffic volumes approximating the reduced capacity of this intersection. The traffic conditions would be at LOS F both with and without the Waikikian Project.
3. If one general-purpose traffic lane were to be removed in each direction along Ala Moana Boulevard and no general traffic lanes are removed along Kalia Road near the Hilton, the volume-to-capacity ratio would be approximately 5% better (lower) than with the removal of two general use lanes along Kalia Road.
4. The removal of one general-purpose traffic lane in each direction along Ala Moana Boulevard would increase the volume/capacity ratio by about 20% at the Hobron Lane intersection, as compared to the conditions without the BRT project. The forecast traffic volumes would approach the reduced capacity of this intersection, if the Dewey Lane traffic continues to be restricted to the existing right-turn-in and right- turn-out movements. The traffic conditions would be at LOS E both with and without the Waikikian Project.
5. With a full signal-controlled intersection at Dewey Lane, the afternoon peak hour traffic would approximate 91% of capacity at the Kalia Road intersection, with the conditions improved to LOS E. These conditions could be further improved if additional traffic uses alternative routes, including the increased use of Dewey Lane by Hilton traffic.

6. With the full intersection at Dewey Lane, the forecast traffic would approximate 94% of capacity at the Hobron Lane intersection, or about 2% better than with Dewey Lane restricted to right-turn movements. These conditions could be further improved if additional traffic uses alternative routes, including the increased use of Dewey Lane by Ilikai and Ala Wai Harbor traffic.

7. At the Ala Moana Boulevard intersection with Kalia Road, if a lane is added to ewa-bound Kalia Road for the BRT, and the BRT vehicles operate in the existing mixed traffic curb lane on Diamond Head-bound Kalia Road, the intersection conditions would be about the same as those for adding two lanes to Kalia Road, or about 91% of capacity with a full intersection at Dewey Lane and 98% of capacity with the existing Dewey Lane right-turn-only intersection.

8. An analysis was made of providing the BRT and three general use Diamond Head-bound lanes on Ala Moana Boulevard, as in the City's most recent concept at the time of this assessment. With two lanes removed from general traffic use on Kalia Road and the Dewey Lane intersection restricted to right-turn movements, the traffic at the intersection of Ala Moana Boulevard with Kalia Road would approximate 90% of capacity, with average delays at LOS E. If no lanes are removed from general traffic use on Kalia Road and a full intersection is provided at Dewey Lane, the traffic at the intersection of Ala Moana Boulevard with Kalia Road would approximate 80% of capacity, with average delays at LOS E. Other variations in the roadway scenarios would fall within this range.

In conclusion, the Waikikian Project would have little impact upon area traffic conditions with the BRT Project. With the City's recent refinements to the BRT design concepts in the Waikikian study area, the key intersections should have sufficient capacity to accommodate the forecast weekday peak hour traffic volumes with the Waikikian Project. The construction of a full intersection at Dewey Lane and Ala Moana Boulevard would also improve traffic conditions at the adjacent Ala Moana Boulevard intersections with Hobron Lane and with Kalia Road.

SUPPLEMENT - Task 2

TRAFFIC COUNTS AND FRIDAY AFTERNOON/EVENING ANALYSES WITH KALIA AND LAGOON TOWERS

The worst traffic conditions in the project area are generally perceived by the community to occur on Friday afternoon and evenings, particularly when there is a special event held at the Hilton Hawaiian Village, or other Waikiki site. This supplemental task includes a traffic count and analyses of the existing Friday afternoon/evening peak period traffic. The counts were completed in September of 2001 and therefore reflect occupancy and full operation of both Kalia and Lagoon Towers. These existing counts are used as the basis for a forecast of future traffic conditions both without and with the Hilton Waikikian project in order to provide a more accurate forecast of future conditions.

FRIDAY AFTERNOON/EVENING TRAFFIC COUNTS

The Friday afternoon traffic counts were performed on September 7, 2001 (Figure 2-1). On this survey day the overall Hilton Hawaiian Village occupancy was considered exceptionally high, at 98%. As previously stated, the Kalia and Lagoon Towers are included in this count and reflected the following occupancies:

- Kalia Tower – 99% occupancy on Friday, September 7, 2001.
- Lagoon Tower – 85% occupancy on Friday, September 7, 2001.

Special events on this survey day included another 1,500-person reception on Lagoon Lawn. This reception again included primarily Hilton Hawaiian Village guests, which results in minimal personal auto trips. It is estimated that 30 additional employees were on staff to cater the event, resulting in approximately 28 additional employee trips during the peak travel period.

The counts were recorded at the same key intersections as those for the Thursday afternoon traffic survey. On Friday, the peak traffic hour was between 5:00 and 6:00 PM, or slightly later than for the Thursday counts.

EXISTING FRIDAY AFTERNOON CONDITIONS ANALYSIS

The analysis of the existing Friday afternoon conditions was based on the existing traffic volumes (Figure 2-1), traffic lanes and traffic controls at each intersection. The findings proved to be similar to the previous study (Table 2-1).

Table 2-1

EXISTING WEEKDAY AFTERNOON CONDITIONS AT KEY INTERSECTIONS

Friday – September 7, 2001

Intersection	Afternoon Peak Hour		
	V/C	ADPV	LOS
Ala Moana Blvd. & Kalakaua Ave. (analysis only includes the Pau St. side of the intersection)	0.77	21.9	C
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.75	51.5	D
Ala Moana Blvd. & Hobron Ln.	0.71	50.2	D
Ala Moana Blvd. & Atkinson Dr.	0.68	38.7	D
Kalia Rd. & Rainbow Dr.	0.25	10.0	A
Holomoana St. & Dewey Ln.	--	7.9	A

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; October 15, 2001

The existing Friday conditions for the key intersections remained similar to the results obtained in the Thursday analysis. Minor differences in the individual movements were found at some of the intersections, generally resulting from differences in left-turning volumes.

Ala Moana Boulevard & Kalia Road – Increased traffic along Ala Moana Boulevard resulted in LOS E conditions for mauka-bound and makai-bound traffic. The Ala Moana Boulevard makai-bound left-turning vehicles operate under LOS F with delay in excess of 105 seconds per vehicle. Poor operational performance of this movement can result in left-turn vehicle queues, which stack into and subsequently block a through traffic lane. This problem can be seen at intermittent times during the peak weekday travel period.

Kalia Road & Rainbow Drive – The capacity of this intersection to accommodate the surveyed demand is sufficient, as the overall efficiency is LOS A. Disruptions to the traffic operations from pedestrian and transit facilities in the area are frequent during the peak travel period. These disruptions can result from illegal pedestrian crossings and the loading and unloading of buses on the Diamond Head side of the intersection.

Ala Moana Boulevard & Hobron Lane – Traffic operations at this intersection are satisfactory at LOS D. The Ala Moana Boulevard left-turnings vehicles operate under long delays in the range of LOS E to LOS F. Long delays for these movements result from the protected phasing, which is essential for providing safe operations. The numbers of through lanes and traffic volumes along Ala Moana Boulevard eliminates the ability to safely accommodate left-turn volumes without protected left-turn phases. Since the left-turns from Ala Moana Boulevard can be made only during the protected left-turn phases, this results in long delays for these left turns.

2005 FRIDAY AFTERNOON CONDITIONS WITH A LOCAL EVENT

The worst traffic conditions in the project area are generally perceived to occur on Friday afternoon and evenings, particularly when there is a special event held at the Hilton Hawaiian Village, or other Waikiki site. The September 7, 2001 survey accounted for a special event at Hilton Hawaiian Village, however the event was a type that produces little to no vehicular traffic.

From a traffic standpoint there are two types of events that Hilton caters, which are "guest" events and "local" events. For the purpose of this study these events are different only in the number of vehicle trips that the event will attract. For example, the 1500-person event held on the Lagoon Lawn was mostly attended by guests at the Hilton complex (a "guest" event), and therefore there were few vehicle trips associated with travel to and from the event as most guests were already on the premises. However, if this event had been a "local" event, then the majority of the attendees would likely have arrived via personal autos.

For this assessment, the forecast of the 2005 Friday traffic volumes was adjusted to reflect a similar-size "local" event, rather than the actual guest event, being held at the Hilton Hawaiian Village. This modification was made so that the analyses would reflect a combination of a very high occupancy day (over 95% of guest units occupied) with a large local event (1,500 attendees) with the peak arrival time coinciding with the peak traffic hour.

To convert the actual 1500 person "guest" event, as reflected in the September 7, 2001 counts, to a 1500 person "local" event the following assumptions were applied:

- 80% of 1,500 attendees arrive via personal auto
- Vehicle occupancy of 2 persons per vehicle
- Peak arrival occurs in the hour preceding the event start time
- The traffic routes for the local guests is similar to the existing travel patterns

These assumptions would result in 600 additional vehicles entering the Hilton Hawaiian Village complex during the peak traffic period. These additional special event trips were incorporated into the forecasted 2005 traffic conditions to change the scenario to a Friday night with a large size "visitor" event at the Hilton Hawaiian Village. This "visitor event was used for both Dewey Lane circulation alternatives.

ANALYSIS WITHOUT WAIKIKIAN PROJECT

The travel forecasts and conditions for 2005 without the Waikikian Project are presented as a baseline from which to identify the effects of the project. The traffic growth in the area was projected using the same assumptions as described in Task 1, with the addition of the 600 vehicle trips for the local event (page 2-2). The forecast 2005 weekday (Friday) traffic volumes, which reflect the general area growth assumption, Outrigger redevelopment trips and special event traffic are depicted for both Dewey Lane circulation alternatives in Figures 2-2 and 2-3.

The resulting levels of service for these forecasted traffic volumes indicate favorable operations for the key intersections under both circulation alternatives, with the exception of the Ala Moana Boulevard and Kalia Road intersection (Table 2-2).

Table 2-2

2005 FRIDAY AFTERNOON CONDITIONS AT KEY INTERSECTIONS WITH LOCAL EVENT (1,500 Attendees)

WITHOUT WAIKIKIAN PROJECT

Intersection	Afternoon Peak Hour: Dewey Lane & Ala Moana Right-In/Right-Out			Dewey Lane & Ala Moana Full Intersection		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Ala Moana Blvd. & Kalakaua Ave. (analysis only includes the Pau St. side of the intersection)	0.82	24.6	C	0.82	24.6	C
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.98	93.9	F	0.91	80.8	F
Ala Moana Blvd. & Hobron Ln.	0.76	53.6	D	0.76	50.6	D
Ala Moana Blvd. & Atkinson Dr.	0.74	41.4	D	0.74	41.4	D
Kalia Rd. & Rainbow Dr.	0.48	12.6	B	0.37	9.5	A
Dewey Ln. & Holomoana St.	--	7.9	A	--	7.9	A
Dewey Ln. & Ala Moana Blvd.	--	--	--	0.52	24.7	C

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; October 15, 2001

The two traffic circulation alternatives for the intersection of Dewey Lane and Ala Moana Boulevard indicate similar results for the 2005 forecasted traffic conditions without Waikikian project trips, except at the Ala Moana Boulevard and Kalia Road intersection. Minor operational differences were identified at:

Ala Moana Boulevard & Kalia Road – With a 1,500-attendee local event at the Hilton Hawaiian Village, Friday night traffic is projected to operate at LOS F at this intersection. This intersection shows the largest benefit from providing a full intersection at Dewey Lane and Ala Moana Boulevard. Delay times are reduced by 14% under the Dewey Lane full intersection circulation alternative, although the overall LOS remains at F. The secondary access to and from the Hilton Hawaiian Village via Dewey Lane reduces the left-turning demand for both makai-bound Ala Moana Boulevard and ewa-bound Kalia Road, which greatly reduces delays for these two movements. Additionally, the volume-to-capacity ratio also improves by 7%, because approximately 7.5% of the traffic demand is diverted from the Rainbow Drive entrance/exit to the Dewey Lane entrance/exit with the full Dewey Lane intersection.

Kalia Road & Rainbow Drive –An operational improvement from LOS B to LOS A occurs at this intersection as a result of the Dewey Lane full-intersection circulation alternative. As discussed in the Task 1 section, the full intersection at Dewey Lane serves to reduce the inbound and outbound Hilton Hawaiian Village traffic along Rainbow Drive by about 17%. This decreased traffic also reduces the vehicle queuing and the need for storage capacity along the ewa-bound Kalia Road approach to this intersection and, in particular, the volume and queue of traffic turning right into Rainbow Drive.

Ala Moana Boulevard & Hobron Lane – Minor operational performance improvements are seen with the Dewey Lane full intersection alternative as a result of a portion of the left-turns from mauka-bound Hobron Lane changing their routes to turn left from Dewey Lane onto Ala Moana Boulevard. These vehicles then travel ewa-bound along Ala Moana Boulevard through this intersection, where they have less impact on the intersection operation.

Dewey Lane & Ala Moana Boulevard – This intersection would operate at very acceptable conditions with traffic signal control, in part as a result of the "T" geometry. An intersection with only three approaches (a T-type intersection) minimizes the number of signal phases needed to accommodate the traffic movements, which minimizes overall vehicle delay and improves the intersection efficiency.

ANALYSIS WITH WAIKIKIAN PROJECT

Construction of the Waikikian Project is planned for completion in mid 2005, with initial occupancy in Summer 2005. The project will add approximately 350 guest units, an increase of about 11% in the number of visitor units at the Hilton Hawaiian Village. The assessment of traffic conditions with the Waikikian Project reflects a typical weekday in a peak visitor month in year 2005, with the addition of the "local" event with 1,500 attendees.

Waikikian Weekday Afternoon Trip Generation

The Waikikian project traffic remained unchanged from the previous report. During the afternoon peak hour it is estimated that 111 vehicle trips are generated by the property. These trips were assigned to the traffic network per the previous study. The forecasted traffic demand for both Dewey Lane circulation alternatives are provided in Figures 2-4 and 2-5. Intersection conditions are presented in Table 2-3.

Table 2-3

2005 FRIDAY AFTERNOON CONDITIONS AT KEY INTERSECTIONS WITH LOCAL EVENT (1,500 Attendees) AND WITH WAIKIKIAN PROJECT

Intersection	Afternoon Peak Hour					
	Dewey Lane & Ala Moana Right-In/Right-Out			Dewey Lane & Ala Moana Full Intersection		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Ala Moana Blvd. & Kalakaua Ave. (analysis only includes the Pau St. side of the intersection)	0.82	24.8	C	0.82	24.8	C
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.99	95.4	F	0.92	81.8	F
Ala Moana Blvd. & Hobron Ln.	0.77	54.2	D	0.76	50.7	D
Ala Moana Blvd. & Atkinson Dr.	0.75	41.7	D	0.75	41.7	D
Kalia Rd. & Rainbow Dr.	0.49	13.0	B	0.38	9.6	A
Dewey Ln. & Holomoana St.	--	7.9	A	--	7.9	A
Dewey Ln. & Ala Moana Blvd.	--	--	--	0.55	27.6	C

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; October 15, 2001

The Waikikian Project increases the proportion of capacity used at the Ala Moana Boulevard intersection with Kalia Road by 1% both with and without the Dewey Lane full intersection. With the large local event, the Friday afternoon peak hour traffic would approximate 99% of the intersection capacity with the present circulation patterns.

As described in the preceding "without Waikikian Project" analysis, the Dewey Lane full intersection circulation alternative results in a significant improvement at the Ala Moana Boulevard and Kalia Road intersection and minor improvements at the Ala Moana Boulevard and Hobron Lane and Kalia Road and Rainbow Drive intersections. As previously stated in the without Waikikian Project analysis, the improvements are the result of reducing the left-turning demand and in some cases overall traffic demand. The projected traffic approximates 91% of capacity at the Ala Moana Boulevard-Kalia Road intersection, which is an acceptable level. Although the full intersection also reduces the average delay times, the conditions at the Ala Moana Boulevard-Kalia Road intersection remain at LOS F.

As indicated in the Thursday analyses, the negligible differences between the without Waikikian Project and with Waikikian Project analyses indicate the trips generated by the Waikikian project have minimal impact on the operational performance of the key intersections near the Project site.

SUPPLEMENT - Task 3

TRAFFIC COUNTS AND SATURDAY AFTERNOON ANALYSES WITH KALIA AND LAGOON TOWERS

This supplemental task provides a full analysis of the Saturday afternoon period when most of the time-share guests are expected to arrive/depart from their stay at the Waikikian development. The Saturday afternoon counts were completed on September 8, 2001 and therefore reflect occupancy and full operation of both the Kalia and Lagoon Towers. These existing counts are used as the basis for a forecast of future traffic conditions both without and with the Hilton Waikikian project in order to provide a more accurate forecast of future conditions.

SATURDAY AFTERNOON TRAFFIC COUNTS

The Saturday afternoon traffic counts were made on September 8, 2001 (Figure 3-1). On this survey day the Hilton Hawaiian Village occupancy was very high, at 96% of all units. As previously stated, the Kalia and Lagoon Towers are included in this count and reflected the following occupancies:

- Kalia Tower – 95% occupancy on Saturday, September 8, 2001.
- Lagoon Tower – 93% occupancy on Saturday, September 8, 2001.

Special events on this survey day included the Aloha Festivals Royal Ball Dinner in the Tapa Ballroom, with attendance estimated at 600 people. This event started at 6:00 pm with peak guest arrival estimated from 5:00 pm to 6:00 pm. Based on previous events at the Hilton Hawaiian Village it is estimated that this event generated 195 trips from 5:00 pm to 6:00 pm.

The peak traffic hour for the Saturday afternoon period is 3:30 pm to 4:30 pm. This hour likely includes the employee shift changes at many of the area hotels, as well as afternoon beach traffic and other visitor traffic in the area. It is likely that some employee and delivery traffic for the Aloha Festivals Royal Ball Dinner special event occurred in this hour, but most of the attendees would have arrived after the peak hour period. The size of the event was not sufficient to shift the peak traffic hour to the later afternoon period when attendees would be arriving for the event.

The field counts of traffic movements were recorded at the same key intersections as those for the Thursday and Friday surveys.

EXISTING SATURDAY AFTERNOON CONDITIONS ANALYSIS

The analysis of the existing Saturday afternoon conditions was based on the existing traffic volumes (Figure 3-1), traffic lanes and traffic controls at each intersection. The findings (Table 3-1) generally paralleled those for the Thursday and Friday afternoon analyses.

Table 3-1

EXISTING SATURDAY AFTERNOON CONDITIONS AT KEY INTERSECTIONS

Saturday – September 8, 2001

Intersection	Afternoon Peak Hour		
	V/C	ADPV	LOS
Ala Moana Blvd. & Kalakaua Ave. (analysis only includes the Pau St. side of the intersection)	0.77	21.5	C
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.80	56.4	E
Ala Moana Blvd. & Hobron Ln.	0.69	45.1	D
Ala Moana Blvd. & Atkinson Dr.	0.72	39.1	D
Kalia Rd. & Rainbow Dr.	0.28	9.7	A
Holomoana St. & Dewey Ln.	--	7.8	A

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; October 15, 2001

The operational performance of the key intersections remained similar to the results obtained in the Thursday and Friday analyses. The only significant change in performance was seen at the Ala Moana Boulevard and Kalia Road intersection, where the average vehicle delay worsened from LOS D on Thursday and Friday to LOS E on Saturday.

Ala Moana Boulevard & Kalia Road – The operational performance of this intersection deteriorates from the weekday conditions as a result of the increase in the overall number of left-turns. Specifically, the Ala Moana makai-bound left-turns increase by 45% and 20% over Thursday and Friday respectively. The large number of left-turn vehicles from the Ala Moana Boulevard makai-bound approach increases the need for adequate storage in the left-turn lane to prevent left-turn queues from stacking into the through traffic lanes.

Kalia Road & Rainbow Drive – The overall conditions and most of the individual traffic movements experience conditions at LOS A. The only movements worse than LOS A are the traffic turning left and right from the Rainbow Drive approach, which experience LOS C and LOS B conditions, respectively.

Ala Moana Boulevard & Hobron Lane – Overall traffic conditions at this intersection are satisfactory at LOS D. However, the makai-bound and mauka-bound Hobron Lane traffic operates under LOS F and LOS E, respectively. These movements along Hobron Lane are expected to have poor operational efficiency because the two Hobron Lane approaches account for only 27% of the intersection traffic, with each approach operation as a separate signal phase. Therefore, each approach of Hobron Avenue receives only a small portion of the overall intersection green time, resulting in long delays for Hobron Lane traffic.

2005 SATURDAY AFTERNOON FORECASTS

The forecast 2005 traffic conditions reflect a typical Saturday in 2005, based on 96.0% occupancy of all units in the Hilton Hawaiian Village complex with a typical day of meetings and functions. As completed in the Thursday and Friday afternoon analyses, two circulation alternatives were analyzed, both with and without the estimated Waikikian project trips. General growth assumptions remained unchanged at 5.7% between 2001 and mid-2005. The estimated Outrigger redevelopment growth outlined in Task 1 - Thursday Afternoon Analyses also remained unchanged.

Traffic generation for the Waikikian Project on a Saturday afternoon was developed specifically to reflect the peak arrival and departure of time-share guests, which was assumed to coincide with the employee shift change in the afternoon period.

ANALYSIS WITHOUT WAIKIKIAN PROJECT

The travel forecasts and traffic conditions for 2005 without the Waikikian Project are presented as a baseline from which to identify the effects of the project. The forecasted 2005 Saturday traffic volumes, which reflect the general area growth assumption and Outrigger redevelopment trips are depicted for both Dewey Lane circulation alternatives in Figures 3-2 and 3-3. The resulting levels of service for these forecasted traffic volumes indicate favorable operations for the key intersections under both circulation alternatives, with the exception of the Ala Moana Boulevard and Kalia Road intersection (Table 3-2).

Table 3-2

2005 SATURDAY AFTERNOON CONDITIONS AT KEY INTERSECTIONS WITHOUT WAIKIKIAN PROJECT

Intersection	Afternoon Peak Hour					
	Dewey Lane & Ala Moana Right-In/Right-Out			Dewey Lane & Ala Moana Full Intersection		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Ala Moana Blvd. & Kalakaua Ave. (analysis only includes the Pau St. side of the intersection)	0.82	23.9	C	0.82	23.9	C
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.86	60.8	E	0.81	57.6	E
Ala Moana Blvd. & Hobron Ln.	0.74	47.6	D	0.73	45.4	D
Ala Moana Blvd. & Atkinson Dr.	0.77	41.5	D	0.77	41.5	D
Kalia Rd. & Rainbow Dr.	0.31	9.9	A	0.28	8.4	A
Dewey Ln. & Holomoana St.	--	7.9	A	--	7.9	A
Dewey Ln. & Ala Moana Blvd.	--	--	--	0.46	15.7	B

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; October 15, 2001

The analyses indicate similar operating conditions alternatives for area intersections with both the right-turn-only and full intersection alternatives at the Dewey Lane intersection with Ala Moana Boulevard with minor improvements for the full-intersection alternative at the Ala Moana Boulevard intersections with Kalia Road and with Hobron Lane, and the Kalia Road intersection with Rainbow Drive. These minor operational improvements parallel those identified at the same locations in the Thursday and Friday analyses. More detailed level of service information for some of the individual movements follows:

Ala Moana Boulevard & Kalia Road – Unacceptable operational conditions were identified for mauka-bound Ala Moana Boulevard through and left-turns (LOS E), makai-bound Ala Moana Boulevard left-turns (LOS F) and Diamond Head-bound Ena Road traffic under both circulation alternatives. The Dewey Lane full intersection alternative results in improved conditions from LOS E to LOS D for ewa-bound Kalia Road through traffic and left-turns. Overall intersection operations are at LOS E for both alternatives.

Kalia Road & Rainbow Drive – This intersection functions under very good LOS A conditions for both Dewey Lane circulation alternatives. Mauka-bound Rainbow Drive left-turning traffic operated at LOS C for both alternatives.

Ala Moana Boulevard & Hobron Lane – Traffic operations at this intersection are satisfactory at LOS D. Some of the individual movements experiencing long delays under both alternatives are: left-turning traffic along Ala Moana Boulevard operates at LOS E or worse; and the approaches along Hobron Lane operate at LOS E and LOS F for mauka-bound and makai-bound traffic respectively.

Dewey Lane & Ala Moana Boulevard – The operational performance of this intersection under signalized control is good at LOS B. Poor performance of the ewa-bound left-turns (LOS F) is the result of protected phasing and long signal cycle lengths. Through traffic along Ala Moana Boulevard operates very efficiently at LOS B and LOS A for Diamond Head-bound and ewa-bound traffic respectively.

ANALYSIS WITH WAIKIKIAN PROJECT

Construction of the Waikikian Project is planned for completion in mid-2005, with initial occupancy in Summer 2005. The project will add approximately 350 guest units, an increase of about 11% in the number of visitor units at the Hilton Hawaiian Village. The assessment of traffic conditions with the Waikikian Project reflects a typical Saturday in year 2005.

Waikikian Saturday Afternoon Traffic Forecasts

The Waikikian project traffic was estimated using a different methodology from that applied to the Thursday and Friday analyses. As previously stated, the inclusion of a Saturday analysis was to assess the traffic conditions during the peak traffic-generation period for the Waikikian time-share project, which is expected to occur on Saturday afternoons when most of the time-share guests arrive and depart for their stay at the Waikikian. Therefore, assumptions as to the arrival and departure of guests and associated employees were applied based on previously defined information outlined in the DEIS and historic information provided by Hilton relative to Lagoon Tower operations. The assumptions included:

- Waikikian designed for 350 units
- 90% occupancy of units on a typical day
- Turnover of occupants in most of the time share units change over on Saturdays or Sundays, with 60% turn-over of all units assumed to change occupants on Saturdays

- For unit turnovers, the departure and arrival of guests occurs over a 6-hour period between 10:00 AM and 4:00 PM
- The peak departure/arrival hour on Saturday is assumed to be twice the average rate for the 6-hour period
- 25% redundancy trips to account for guests who check-in and leave on a subsequent trips within the hour and those guests arriving by taxi, which means the taxi enters and exits the site within the hour
- 174 additional employees on staff
- 70% employees on first shift (exiting trips during afternoon peak hour)
- 25% employees on evening shift (entering trips during afternoon peak hour)
- 10% of employees on sick/vacation time
- 80% of employees arrive via personal auto
- Employee auto occupancy at 1.1 persons per car

The assumptions listed result in 189 trips during the peak hour. The entering traffic accounts for 93 trips while the exiting traffic accounts for 96 trips. The trip generation is summarized in Table 3-3.

These trips were assigned to the roadway network based on the same travel routes established for the Thursday and Friday analysis periods. The forecasted traffic demand for both Dewey Lane circulation alternatives are provided in Figures 3-4 and 3-5.

Intersection Conditions

Intersection conditions are presented in Table 3-4. Negligible differences between the without Waikikian Project and with Waikikian Project analyses indicate the trips generated by the Waikikian project have little to no impact on the operational performance of the roadway system. The Project increases the volume-to-capacity ratio by about 2% at the intersections of Ala Moana Boulevard with Kalia Road and Hobron Avenue, and of Kalia Road with Rainbow Drive. The volume-to-capacity ratio increases by 1% for the Ala Moana Boulevard intersections with Kalakaua Avenue and with Atkinson Drive. Operating conditions remain at the same levels of service both without and with the Project.

Improvements in operational performance with the inclusion of a full-signalized intersection at Dewey Lane and Ala Moana Boulevard parallel those discussed for the Thursday and Friday scenarios. Adjusting the circulation patterns to provide an improved secondary access into the Hilton Hawaiian Village effectively reduces the demand along Kalia Road, which should serve to improve the performance and safety at the intersections with Ala Moana Boulevard and Rainbow Drive.

Table 3-3
SATURDAY AFTERNOON PEAK HOUR TRIP GENERATION FOR THE WAIKIKIAN PROJECT

WAIKIKIAN GUEST TRIPS

Rooms	Occupancy	Turn-Over Rate (1)	Departure & Arrival Period (2)	Average Trips (trips/hr) (3)	Peak Period (trips/hr)	
350	90%	60%	6 hrs	32	64	enter
25% redundancy trips to account for guests who check-in and leave on a subsequent trips within the hour and those guests arriving by taxi, which means the taxi enters and exits the site within the hour					16	exit

WAIKIKIAN EMPLOYEE TRIPS

Employees	Shift	Percent Working (4)	Personal Auto Rate (5)	Auto Occupancy (persons/auto)	Peak Period (trips/hr)	
174	25% (nighttime)	90%	80%	1.1	29	enter
174	70% (primary)	90%	80%	1.1	80	exit
TOTAL PEAK HOUR TRIPS					**93 enter**	**96 exit**

(1) Turn-Over Rate = Percentage of units with old guests departing and new guests arriving.
(2) Departure and Arrival Period = Estimated guests will arrive and depart from the property from 10am to 4pm.
(3) Average Trips = Average hourly number of trips during the departure and arrival period (based on occupancy and turnover rate factors).
(4) Percent Working = Percentage of employees that come to work on a particular day, therefore discounting for employees on sick and vacation time.
(5) Personal Auto Rate = Percentage of employees commuting to work in a personal auto as opposed to public transit users.

Wilbur Smith Associates; October 15, 2001

Table 3-4

2005 SATURDAY AFTERNOON CONDITIONS AT KEY INTERSECTIONS

WITH WAIKIKIAN PROJECT

Intersection	Afternoon Peak Hour					
	Dewey Lane & Ala Moana Right-In/Right-Out			Dewey Lane & Ala Moana Full Intersection		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Ala Moana Blvd. & Kalakaua Ave. (analysis only includes the Pau St. side of the intersection)	0.83	24.3	C	0.83	24.3	C
Ala Moana Blvd. & Kalia Rd./Ena Rd.	0.88	63.8	E	0.83	58.8	E
Ala Moana Blvd. & Hobron Ln.	0.76	49.5	D	0.75	45.6	D
Ala Moana Blvd. & Atkinson Dr.	0.78	42.2	D	0.78	42.2	D
Kalia Rd. & Rainbow Dr.	0.34	10.4	B	0.30	8.6	A
Dewey Ln. & Holomoana St.	--	7.9	A	--	7.9	A
Dewey Ln. & Ala Moana Blvd.	--	--	--	0.51	18.2	B

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; October 15, 2001

SUPPLEMENTAL STUDIES - Task 4

SUMMARY OF TRAFFIC ANALYSES RESULTS

This summary of the findings from the Thursday, Friday and Saturday analyses focuses on the comparative advantages and disadvantages associated with the Dewey Lane circulation alternatives (right turns in/out versus full intersection with traffic signal). Areas where potential traffic problems may arise or mitigation measures may be appropriate are also documented in this task.

A comparison of the analyses for the Dewey Lane circulation alternatives results in several potential advantages and disadvantages for each alternative. It is noted that the overall operations of the roadway network are similar between the two alternatives, but some distinct differences are found which are summarized in the following two sections.

DEWEY LANE RIGHT-IN/RIGHT-OUT CIRCULATION ALTERNATIVE

Advantages

- *No increase in number of signalized intersections along Ala Moana Boulevard*

  Maintaining the number of signalized intersections along Ala Moana Boulevard helps to preserve the existing progression of traffic flow. Each additional signal increases the potential for additional delay to traffic along the major through roadway. The ability to sustain progression along Ala Moana Boulevard is important because this section of the roadway accommodates approximately 50,000 vehicles a day.

- *Less traffic disruption to the Ilikai porte cochere and resident parking entrances/exits*

  The right-in/right-out circulation alternative minimizes potential impacts to these elements of the Ilikai property, as only a portion of the Waikikian Project trips and some inbound trips currently using Rainbow Drive are added to Dewey Lane. The widening of Dewey Lane should help to minimize any perceived impacts by the Ilikai guests and residents.

Disadvantages

- *Increased traffic on the makai portion of Hobron Lane adjacent to the Ilikai*

  Without the full Dewey Lane intersection, most of the traffic exiting the Waikikian Project to travel ewa towards Ala Moana Center, Downtown Honolulu, and the Airport would use Hobron Lane to reach Ala Moana Boulevard. These additional vehicles will increase the delays for traffic turning left from Hobron Lane onto ewa-bound Ala Moana Boulevard.

- *Increased traffic delays and vehicle storage needs at the Ala Moana Boulevard - Kalia Road intersection*

  The limited right-in/right-out Dewey Lane intersection results in most of guests and visitors using the Rainbow Drive for access to and from the Hilton Hawaiian Village, including many of the Waikikian trips. This limited access condition results in a 15% (typical weekday) to 25% (typical weekday with large special event) higher traffic volumes along Kalia Road between Ala Moana Boulevard and Rainbow Drive than would occur with the full Dewey Lane intersection. The future traffic increase would slightly worsen the currently congested conditions along this section of roadway in the afternoon peak hour.

The section of Kalia Road between Ala Moana Boulevard and Rainbow Drive is limited in storage space by the close spacing of adjacent traffic signals and the constraints on the number of lanes by the existing right-of-way width (Table 4-1). Existing storage needs for the ewa-bound traffic on Kalia Road exceed the 1,020 feet of roadway lanes available from Rainbow Drive to Ala Moana Boulevard, with waiting vehicles queuing beyond the Rainbow Drive signal. Queuing problems along this section of roadway would increase slightly with the future traffic growth from the Waikikian and Outrigger projects and other area traffic growth.

There are also storage concerns for the left-turning vehicles from makai-bound Ala Moana Boulevard onto Kalia Road (Table 4-2). Current storage length for these vehicles (about 180 feet) is insufficient to accommodate the existing queues of vehicles waiting to turn left during peak conditions and when there is a special event at a resort property along Kalia Road. The limited storage can create queues that stack into the adjacent through travel lanes, resulting in reduced capacity and increased delays.

DEWEY LANE FULL INTERSECTION CIRCULATION ALTERNATIVE

Advantages

- *Improved operational performance at Ala Moana Boulevard and Kalia Road intersection*

  The performance of this intersection is improved as a result of reducing the number of left-turn movements and reducing the overall traffic demand through the intersection. Delay times are reduced by approximately 10% (typical weekday) to 14% (typical weekday with large special event) as compared to the conditions with only right turns in/out at the Dewey Lane intersection with Ala Moana Boulevard.

- *Reduces mauka-bound left-turning traffic demand on Hobron Lane*

  The mauka-bound left-turning demand on Hobron Lane is significant as this approach serves the egress of guests, residents and employees of the Ilikai and Hawaii Prince Hotels and visitors to the Ala Wai Yacht Harbor. Providing a full intersection at Dewey Lane would serve to reduce the number of vehicles turning left in the peak hours by approximately 45 to 60 vehicles, or about 20% to 30%. These are Waikikian and Ala Wai Yacht Harbor trips that would likely proceed directly up Dewey Lane as opposed to traveling along Holomoana Street to Hobron Lane to turn left onto ewa-bound Ala Moana Boulevard.

- *Reduces storage demand at the Ala Moana Boulevard and Kalia Road intersection*

  The travel patterns associated with providing a signalized intersection at Dewey Lane serves to reduce intersection volumes resulting in an improved volume/capacity ratio and intersection delay times. These improvements are the result of an increased number of vehicles utilizing Dewey Lane Road for access to and from Hilton Hawaiian Village and the Ala Wai Yacht Harbor.

The projected shift in some ewa-bound traffic from Kalia Road to Dewey Lane serves to reduce the traffic volumes along Kalia Road, which reduces the queuing and storage needs on Kalia Road (Table 4-1).

Disadvantages

- *Limited distance to adjacent signals at Kalia Road and Hobron Lane*

  Closely spaced traffic signals limit the storage capacity at intersections. This would most likely affect the through movements along Ala Moana Boulevard between Kalia Road and Hobron Lane where current queues in the afternoon peak hour extend beyond the potential location of the Dewey Lane traffic signal.

  Storage length could also be a concern for the left-turn lane on ewa-bound Ala Moana Boulevard at the Dewey Lane intersection. Calculations indicate that the approximately 620 feet of distance between the Kalia Road and Dewey Lane intersections would provide adequate storage for the traffic forecast for the Thursday, Friday, and Saturday scenarios analyzed in this study. However, larger special events at the Hilton or at the Ala Wai Boat Harbor could result in the queue of left-turn vehicles stacking into the adjacent through lane at the Dewey Lane signal.

- *Increased traffic along Dewey Lane could disrupt the Ilikai porte cochere and resident parking entrances/exits*

  A full intersection at Dewey Lane will attract additional traffic to this road for access to the Hilton Hawaiian Village or vehicles exiting from the Ala Wai Yacht Harbor and beach parking lot. The increased traffic could negatively impact the Ilikai's porte cochere operations, the delivery of goods at the Ilikai loading area off Dewey Lane, and residents exiting from the parking garage onto the makai end of Dewey Lane. It is important to note that operations along Dewey Lane remain at LOS A for this full intersection alternative and the widening of Dewey Lane should reduce the potential impacts.

Note that further detailed analysis will be required to determine the full extent of the proposed Dewey Lane signal on progression efficiency and operations of the signal network. Preliminary analyses indicate the ability to maintain favorable progression along Ala Moana Boulevard as a result of the proposed T-intersection geometry. T-intersections provide flexibility in the allocation of green time because there are less conflicting movements. Therefore, the proportion of green time for Ala Moana Boulevard increases, allowing easier coordination of flows from adjacent traffic signals. Signal delay at the proposed Dewey Lane intersection is estimated at 1.4 seconds per vehicle and 5.6 seconds per vehicle for Ala Moana Boulevard Diamond Head-bound and ewa-bound traffic respectively. This minimal delay for the Ala Moana Boulevard traffic results in an arterial speed reduction of about 1 mile per hour, therefore indicating little impact to progression along Ala Moana Boulevard.

Table 4-1

KALIA ROAD LEFT-TURN STORAGE NEEDS AT ALA MOANA BOULEVARD

Scenario	Right-In/Right-Out Storage (1)	Full Intersection Storage (1)	Percent Reduction
Thursday - Existing	1,425 ft	--	--
Thursday - 2005 With Project	1,605 ft	1,365 ft.	15%
Friday - Existing	1,175	--	--
Friday - 2005 With Project	1,340	1,110	17%
Saturday - Existing	1,315	--	--
2005 With Project	1,510	1,270	16%

Note: Existing available storage length is approximately 1,020 feet.

(1) Estimated Storage Length = Computed based on the following formula:

$$L = VK25(1+P)/Nc$$

Where:

L = storage length (feet)
V = vehicles per hour
K = constant (2.0) to reflect random arrival of vehicles
P = percentage of trucks/buses
Nc = number of signal cycles per hour

Assumptions: 140 signal cycle; 5% trucks/buses

Wilbur Smith Associates; October 15, 2001

Table 4-2

ALA MOANA BOULEVARD LEFT-TURN STORAGE NEEDS AT KALIA ROAD

Scenario	Right-In/Right-Out Storage (1)	Full Intersection Storage (1)	Percent Reduction
Thursday - Existing	265	--	--
Thursday - 2005 With Project	290	270	7%
Friday - Existing	325	--	--
Friday - 2005 With Project (No Special Event)	355	325	8%
Friday - 2005 With Project (Special Event)	705	600	15%
Saturday - Existing	390	--	--
2005 With Project	435	400	8%

Note: Existing available storage length is approximately 180 feet.

(1) Storage = Computed based on the following formula:

$$L = VK25(1+P)/N_c$$

Where:

L = storage length (feet)
V = vehicles per hour
K = constant (2.0) to reflect random arrival of vehicles
P = percentage of trucks/buses
N_c = number of signal cycles per hour

Assumptions: 140 signal cycle; 5% trucks/buses

Wilbur Smith Associates; October 15, 2001

EFFECT OF CITY BUS RAPID TRANSIT PROJECT

Based on the information contained in the DEIS issued August 2000, the Bus-Rapid-Transit (BRT) routes and proposed cross-sections were reviewed. The inclusion of BRT lanes along Ala Moana Boulevard will reduce the number of general-purpose lanes. The additional signal-timing phase needed to provide the BRT with priority will shorten the green time available to other traffic movements at several intersections on Ala Moana Boulevard.

The detailed impacts to the operational efficiency as a result of proposed BRT routes will require analyses by the Department of Transportation Services (DTS) to determine how the intersections will operate. Detailed information in regards to proposed intersection geometries, BRT lane volumes, frequency of service and the priority of service through the intersection will all greatly influence the signal timings, phasing and resulting performance. Therefore, at the time of this supplemental study, the impacts to levels of service have not been quantified in conjunction with the Waikikian project.

MITIGATION ACTIONS

The analyses indicate that the Waikikian Project should have only minor impacts on traffic conditions at the key intersections in the study area. Several mitigation actions could potentially reduce or eliminate these impacts.

- *Full Dewey Lane intersection with Ala Moana Boulevard*

  The full intersection would improve conditions for traffic entering Ala Moana Boulevard at the adjacent intersections with Hobron Lane and Kalia Road. However, the full intersection may also have adverse impacts on some Ilikai traffic and on traffic flow along Ala Moana Boulevard as discussed in the preceding section.

- *Left-turn traffic from Ala Moana Boulevard to Kalia Road*

  The existing storage capacity of this left-turn lane is approximately 180 feet. The analyses indicate that substantially greater length is needed to avoid blockage of the adjacent through lane by the queue of vehicles waiting to turn left onto Kalia Road. A minor lengthening of this left-turn storage lane, by an additional 50 to 100 feet, would reduce the number of occurrences when the through lane is blocked, although this increase would not eliminate such blockages. A major increase in the turn lane length is not recommended since such an increase would likely have a significant visual impact on this comparatively attractive section of the Ala Moana Boulevard median in Waikiki. This action would be needed primarily if the Dewey Lane intersection with Ala Moana Boulevard continues to be restricted to right turns in and out of Dewey Lane.

- *Traffic Control and Management Actions during special events*

  1. During the peak arrival and departure periods for an event at the Hilton Hawaiian Village with a large local attendance, a traffic control officer could be stationed at the mauka end of Dewey Lane to minimize any disruption to vehicles trying to exit the Ilikai porte cochere.

2. Special traffic signal operations should be implemented for the Ala Moana Boulevard intersections during peak arrival and departure hours for major local events at the Hilton Hawaiian Village, as well as for other major events in Waikiki.

SUPPLEMENTAL STUDIES - Task 5

EXPANDED TRAFFIC COUNTS

Machine traffic counts were recorded over a period of three weeks near the Hilton Hawaiian Village in order to observe day-to-day variations in area traffic volumes. The machine counters were placed along Ala Moana Boulevard makai of Kalia Road and along Kalia Road between Ala Moana Boulevard and Rainbow Drive. The machine counters record the traffic volumes in each travel direction throughout the day in 15-minute increments. Parsons Brinckerhoff performed the machine counts for Wilbur Smith Associates.

These machine counts were scheduled to begin on Labor Day weekend approximately one-week before the more detailed manual turning movement counts (September 6, 7 and 8), and continue for about two weeks beyond the manual surveys. This schedule was intended to allow verification between the manual and machine counts, and to compare the traffic levels on the manual survey days to the traffic counts over a longer period of time. It was expected that the Labor Day week and Aloha Week events would result in above-average traffic flow on Waikiki streets. The machine counts began on August 31, 2001 and ended on September 21, 2001. The 24-hour total count and afternoon peak hour count for each day on each of the two roadways are summarized in Table 5-1.

A recurring malfunction to the traffic counter for the Diamond Head-bound Kalia Road traffic resulted in erroneous counts on September 6 and from September 8, 2001 to September 20. Also the events on September 11 appeared to have affected traffic volumes on that day. The traffic volumes after September 11 continued to be lower than those prior to the date; it is uncertain as to the extent that the terrorism events continued to suppress traffic levels afterwards, versus a typical drop-off expected in tourism during the period after Labor Day week.

The traffic volumes after September 11, 2001 were lower by 15% to 20% than the counts made prior to the event. Comparison of the manual survey days (September 6, 7, and 8) to the other days prior to September 11th indicates that the traffic volumes on the survey days were 1% to 3% higher than the other volumes during the Labor Day week. The September 7 (Friday) manual survey day represented the highest traffic day during the period, the Saturday manual survey day (September 8) represented the highest weekend traffic in the period, and the Thursday survey day (September 6) represented the highest traffic volumes for any Monday through Thursday days.

Based on the 24-hour counts demonstrating the survey days as typical for area traffic and the fact that occupancy for the entire Hilton Hawaiian Village complex was greater than 95.0%, it is reasonable to assume that the recorded traffic conditions from September 6, 2001 to September 8, 2001 represent reasonable conditions to forecast the traffic impacts associated with the Hilton Waikikian time-share development.

Table 5-1

24-HOUR MACHINE COUNTS

(August 31, 2001 - September 20, 2001)

Date	Day of the Week	Ala Moana Boulevard PM Peak Hour Ewa-bound Time	Vehicles	PHF	Diamond Head-bound Time	Vehicles	PHF	24-Hour Vehicles	Kalia Road PM Peak Hour Ewa-bound Time	Vehicles	PHF	Diamond Head-bound Time	Vehicles	PHF	24-Hour Vehicles
8/31/01	Fri	3:40-4:40	1,517	0.909	6:20-7:20	1,481	0.924	39,229	3:20-4:20	1,081	0.892	1:30-2:30	859	0.837	24,666
9/1/01	Sat	3:40-4:40	1,204	0.908	5:20-6:20	1,439	0.941	39,478	3:40-4:40	1,060	0.888	5:20-6:20	861	0.886	24,364
9/2/01	Sun	3:40-4:40	1,159	0.907	6:20-7:20	1,409	0.886	37,045	3:40-4:40	945	0.816	4:40-5:40	756	0.913	22,269
9/3/01	Mon	4:00-5:00	1,210	0.847	3:20-4:20	1,276	0.897	34,326	3:40-4:40	1,037	0.823	3:10-4:10	650	0.846	18,789
9/4/01	Tue	4:00-5:00	1,361	0.828	4:10-5:10	1,266	0.868	35,177	3:40-4:40	1,005	0.825	1:10-2:10	974	0.859	17,375
9/5/01	Wed	4:00-5:00	1,411	0.849	5:50-6:50	1,448	0.881	36,827	3:30-4:30	1,065	0.879	3:40-4:40	684	0.820	22,931
9/6/01	Thur	3:30-4:30	1,425	0.870	5:20-6:20	1,341	0.920	37,314	3:40-4:40	1,034	0.898	-	-	-	-
9/7/01	Fri	4:10-5:10	1,439	0.885	6:10-7:10	1,426	0.970	40,360	3:50-4:50	1,050	0.884	12:40-1:40	776	0.930	25,302
9/8/01	Sat	3:10-4:10	1,145	0.875	1:40-2:40	1,342	0.909	39,944	3:30-4:30	965	0.914	-	-	-	-
9/9/01	Sun	1:30-2:30	1,079	0.895	3:10-4:10	1,209	0.892	32,769	2:50-3:50	869	0.934	-	-	-	-
9/10/01	Mon	3:30-4:30	1,359	0.885	5:00-6:00	1,308	0.890	36,047	3:40-4:40	1,021	0.891	-	-	-	-
9/11/01	Tue	4:00-5:00	1,184	0.805	5:00-6:00	1,098	0.839	30,558	3:50-4:50	859	0.770	-	-	-	-
9/12/01	Wed	3:30-4:30	1,274	0.814	4:50-5:50	1,259	0.933	33,420	3:30-4:30	908	0.784	-	-	-	-
9/13/01	Thur	4:00-5:00	1,260	0.802	4:20-5:20	1,215	0.880	32,640	3:30-4:30	885	0.745	-	-	-	-
9/14/01	Fri	3:20-4:20	1,284	0.829	5:30-6:30	1,324	0.904	36,536	9:30-10:30	949	0.807	-	-	-	-
9/15/01	Sat	3:30-4:30	1,007	0.898	3:00-4:00	1,158	0.906	33,212	9:40-10:40	807	0.903	-	-	-	-
9/16/01	Sun	2:10-3:10	906	0.956	3:10-4:10	1,038	0.887	27,445	3:10-4:10	687	0.854	-	-	-	-
9/17/01	Mon	3:30-4:30	1,120	0.778	4:50-5:50	1,076	0.920	28,904	3:50-4:50	807	0.769	-	-	-	-
9/18/01	Tue	3:20-4:20	1,162	0.814	4:50-5:50	1,094	0.960	28,948	3:50-4:50	771	0.673	-	-	-	-
9/19/01	Wed	4:00-5:00	1,165	0.903	4:10-5:10	1,234	0.906	30,858	3:40-4:40	806	0.781	-	-	-	-
9/20/01	Thur	3:50-4:50	1,238	0.829	4:50-5:50	1,242	0.912	31,346	3:40-4:40	821	0.728	-	-	-	-

SURVEY DAYS

***PHF = Peak Hour Factor is a measure to show the variations in traffic demand within the peak hour. The closer the factor is to 1.0, the more uniform/constant the flow.**

SUPPLEMENTAL STUDIES - Task 6

REANALYZE HISTORIC TRAFFIC VOLUMES WITH HCS-3 MODEL

The Transportation Research Board (TRB), a division of the National Science Foundation, has developed standardized methods for use in evaluating the effectiveness and quality of service for roadways and streets. The methodology has changed over the years as a result of more extensive research studies regarding this subject, and the availability of increased computer power that allows more complex mathematical analyses procedures to be employed to assess conditions at traffic signal-controlled intersections.

The DEIS for the Waikikian project has compared the traffic volumes and intersection conditions from the present study to those available from previous studies extending back to the early 1970's. However, the traffic conditions available from those studies are based on the different methodologies that were in effect at the time of each study.

The traffic conditions at traffic signal-controlled intersections in the present Hilton Waikikian Site Traffic Impact Study[1] were evaluated using the Operations Analysis methodology described in the *1997 Highway Capacity Manual Update (1997 HCM Update)*[2] to the *1994 Highway Capacity Manual* (1994 HCM)[3]. The method is further discussed in Chapter 2 of the Waikikian traffic study.

The primary tool used to conduct this 1997 HCM analyses is the Highway Capacity Software (HCS) developed by the University of Florida under contract with the Federal highway Administration, with Version 3 (HCS-3) used in the Waikikian traffic study. Therefore, to provide a common basis for comparison of the existing conditions with those recorded in the 70's, 80's and 90's, traffic volumes from earlier studies were reanalyzed using the HCS-3 software used in the most recent study

Table 6-1 summarizes the traffic counts for the Ala Moana Boulevard intersection with Kalia Road/Ena Road over the years, as well as changes in the daily traffic volumes along Ala Moana Boulevard. The peak hour traffic volumes available from these studies have shown a pattern of declining volumes over the years, while the daily traffic volumes have fluctuated without a discernible trend either upward or downward.

It should be noted that minor differences are expected in the recorded counts due to the impact of seasonal variations on tourism and local travel patterns. The highest traffic volumes are expected during the summer and winter months, which are the busiest times for tourism in Hawaii. In addition, the winter months are the most likely time for residents to drive, as rainfall is the heaviest between December and March.

---

1 *Hilton Waikikian Site Impact Traffic Study*, Wilbur Smith Associates, May 2001.

2 *1997 Highway Capacity Manual Update,* Transportation Research Board, December 1997.

3 *Highway Capacity Manual*, Special Report 209, Transportation Research Board, Third Edition. 1994.

Table 6-1

COMPARISON OF HISTORIC TRAFFIC VOLUMES

Ala Moana Blvd & Kalia Rd/Ena Rd		Ala Moana Blvd at Ala Wai Canal Bridge	
Date	**Volume[1]**	**Date**	**Volume[2]**
January 1973	3,995	February 1975	48,423
May 1990	3,872	February 1995	56,475
September 1991	3,772	April 1996	53,104
September 1999	3,351	May 1998	45,254
July 2000	3,337	May 1999	45,392
September 2001	3,091	August 2000	50,710

Volume[1] = Total peak hour traffic entering intersection from all approaches.
Volume[2] = Total 24-hour volume for both travel directions.

Wilbur Smith Associates; October 15, 2001

As summarized in Table 6-2, the traffic operations at the intersections in the Hilton Hawaiian Village area have shown little to no fluctuations over the past 28 years. This reflects the relatively constant traffic levels that have existed in this area of Waikiki. The results represent uniform geometry and signal timing data for all analyses. Therefore, the differences in delays and volume-to-capacity ratios are the result of increase or decreased traffic volumes.

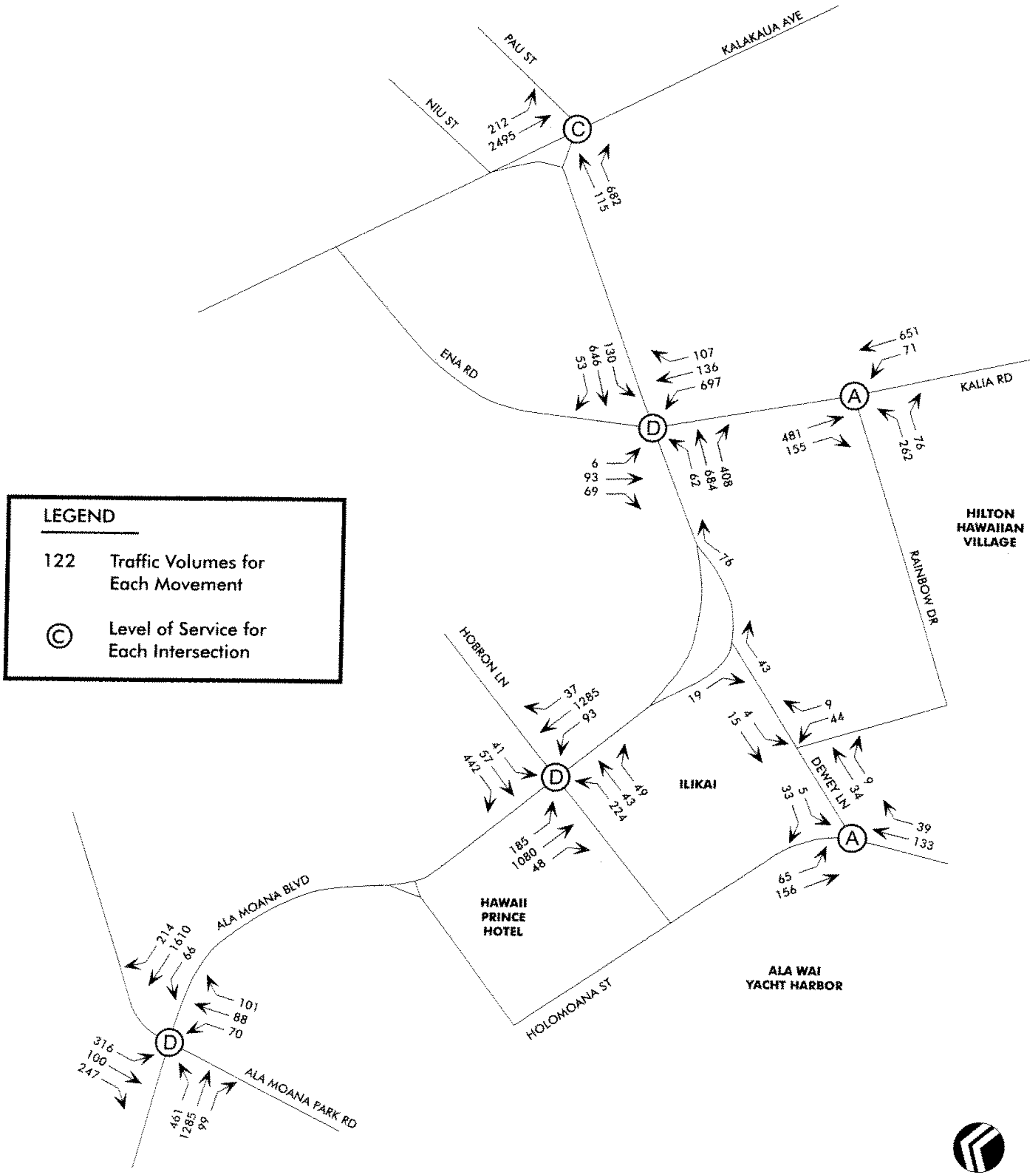
Table 6-2
COMPARATIVE LEVELS OF SERVICE AT KEY INTERSECTIONS
1973-2001

Intersection	Date	Afternoon Peak Hour		
		V/C	ADPV	LOS
Ala Moana Blvd. & Kalia Rd./Ena Rd.	September 1973	0.92	115.4	F
	May 1990	0.87	65.8	E
	September 1991	0.84	65.7	E
	September 2001	0.76	51.2	D
Ala Moana Blvd. & Hobron Rd.	May 1990	0.70	42.7	D
	September 2001	0.76	43.0	D
Kalia Rd. & Rainbow Dr.	September 1991	0.32	10.1	B
	September 2001	0.28	10.0	A

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; October 15, 2001

The comparison indicates that peak hour traffic conditions at the key intersection of Ala Moana Boulevard with Kalia Road/Ena Road have shown an improvement through the years as a result of slightly lower traffic volumes. Based on the available data and the use of the same HCM-3 analyses model, the average delays appear to have improved from LOS F in 1973 to LOS E in the 1980's, and to LOS D for the present study.



NOTE: THE INTERSECTION VOLUMES DEPICTED ARE NOT NECESSARILY EQUAL TO THE SUM OF TRAFFIC MOVEMENTS BETWEEN INTERSECTIONS. THIS IS DUE TO THE PRESENCE OF MID-BLOCK DRIVEWAYS AND CURB-CUTS WHICH ATTRACT AND GENERATE TRAFFIC, AS WELL AS UNIQUE TRAFFIC MOVEMENTS SUCH AS U-TURNS AND SERVICE VEHICLE ACTIVITIES.

Wilbur Smith Associates
ENGINEERS PLANNERS ECONOMISTS

Figure 1-1

EXISTING AFTERNOON PEAK HOUR TRAFFIC - THURSDAY (3:30 - 4:30PM)

364700\Ex Thu/10-19-01

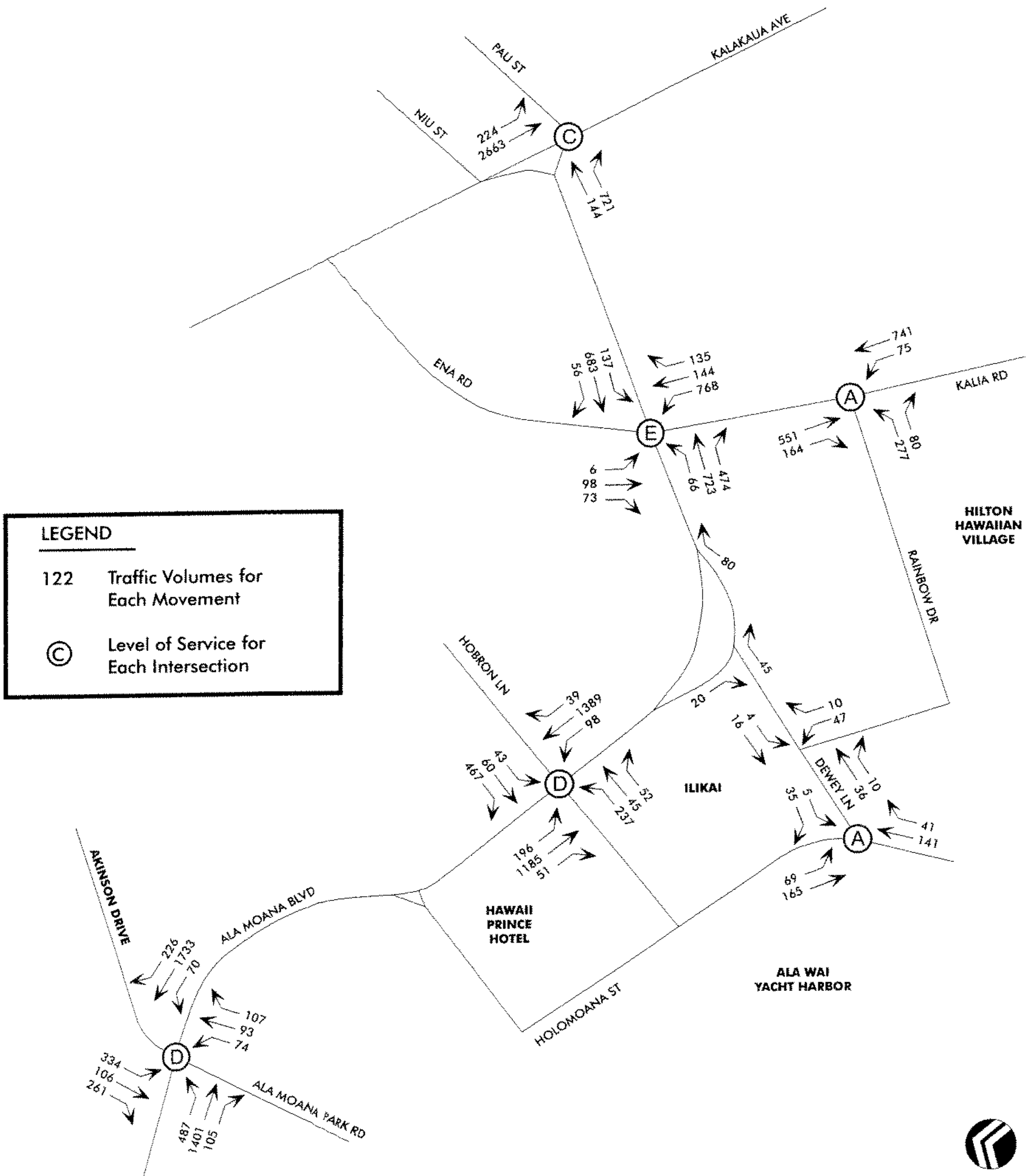


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Figure 1-2

2005 AFTERNOON PEAK HOUR TRAFFIC - THURSDAY NO WAIKIKIAN PROJECT

DEWEY LANE RIGHT-IN/RIGHT-OUT

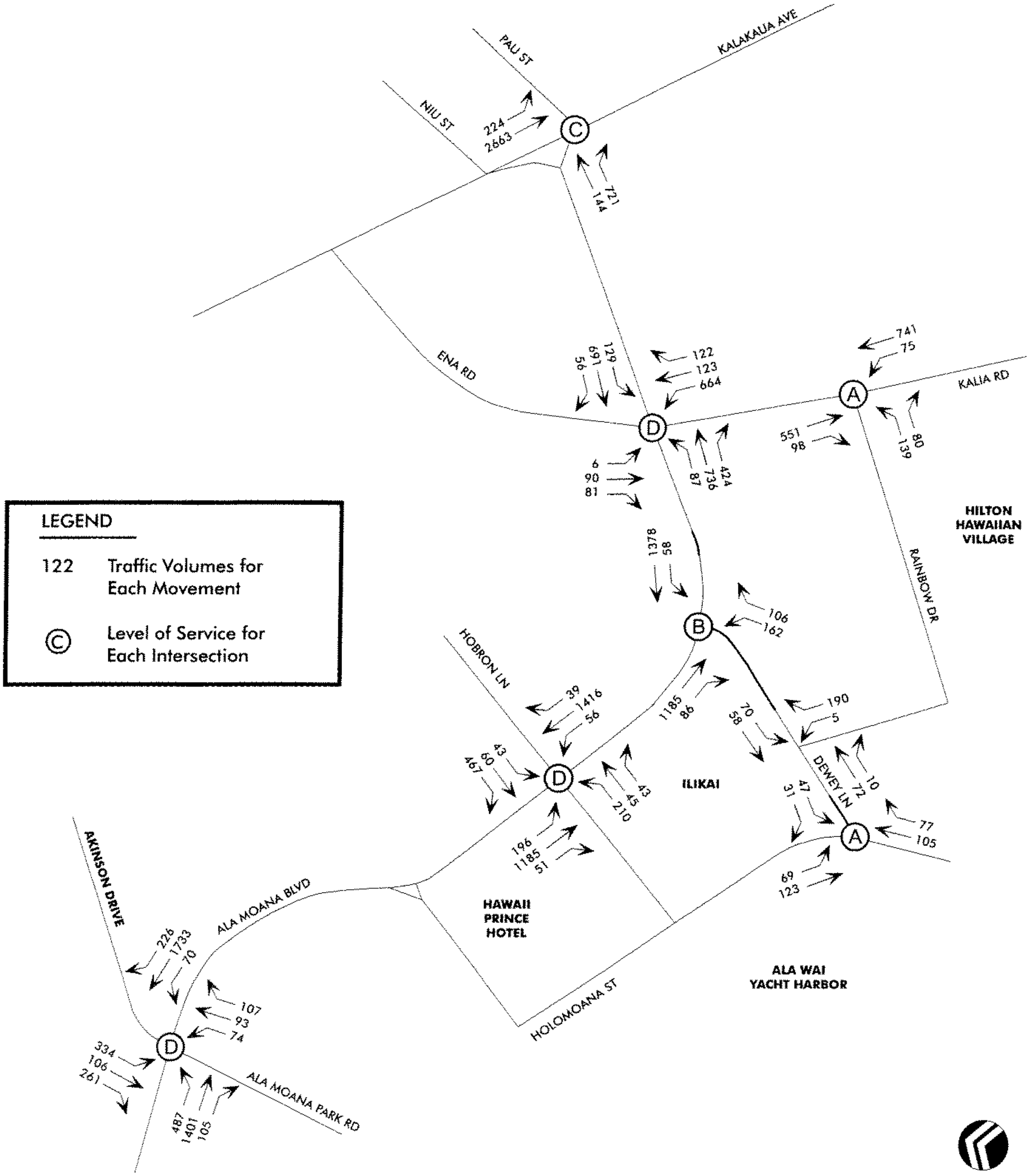

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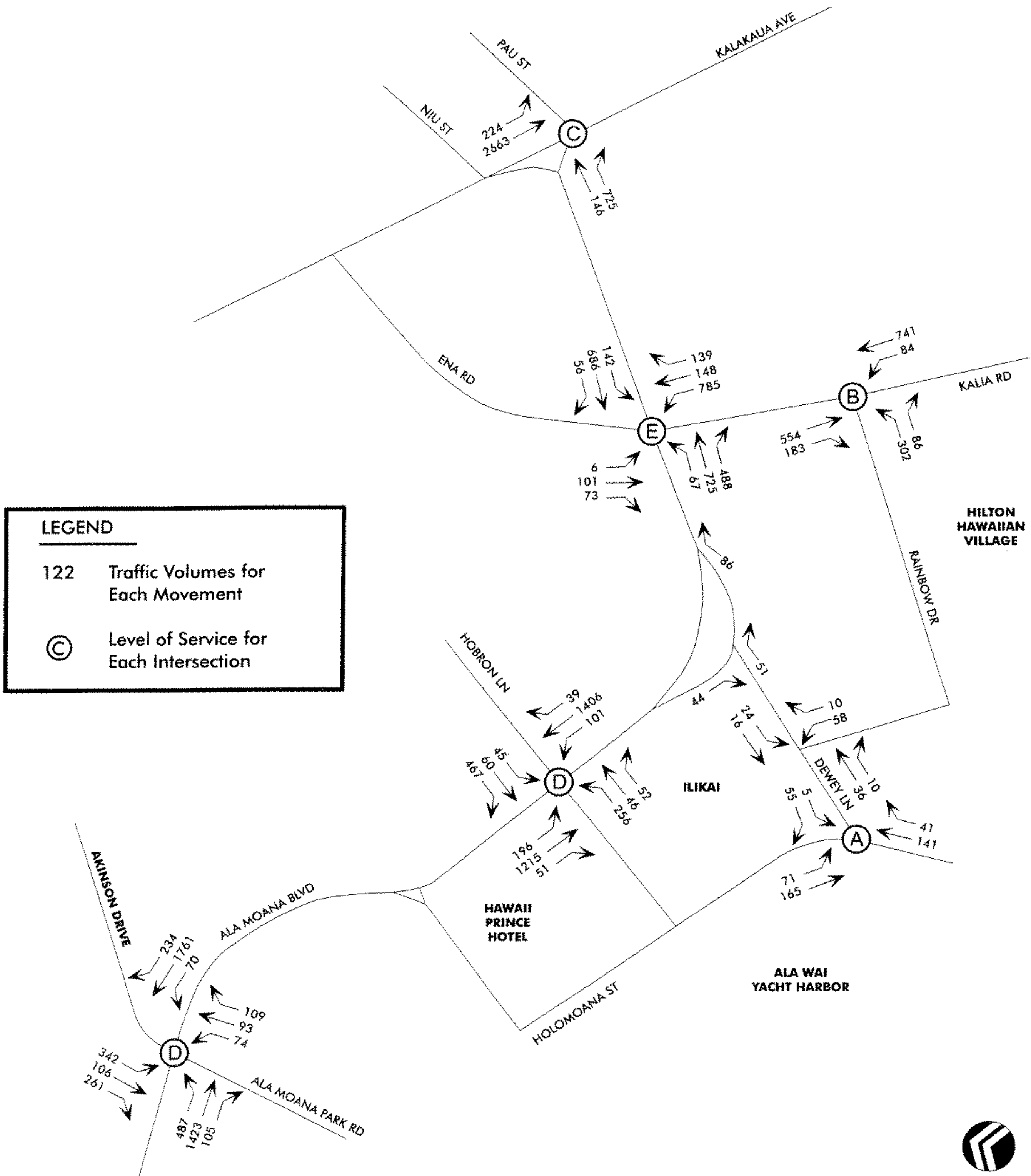
Figure 1-3
2005 AFTERNOON PEAK HOUR TRAFFIC - THURSDAY NO WAIKIKIAN PROJECT
DEWEY LANE FULL INTERSECTION

364700\2005 Thu full D no proj/10-19-01



NORTH
NOT TO SCALE

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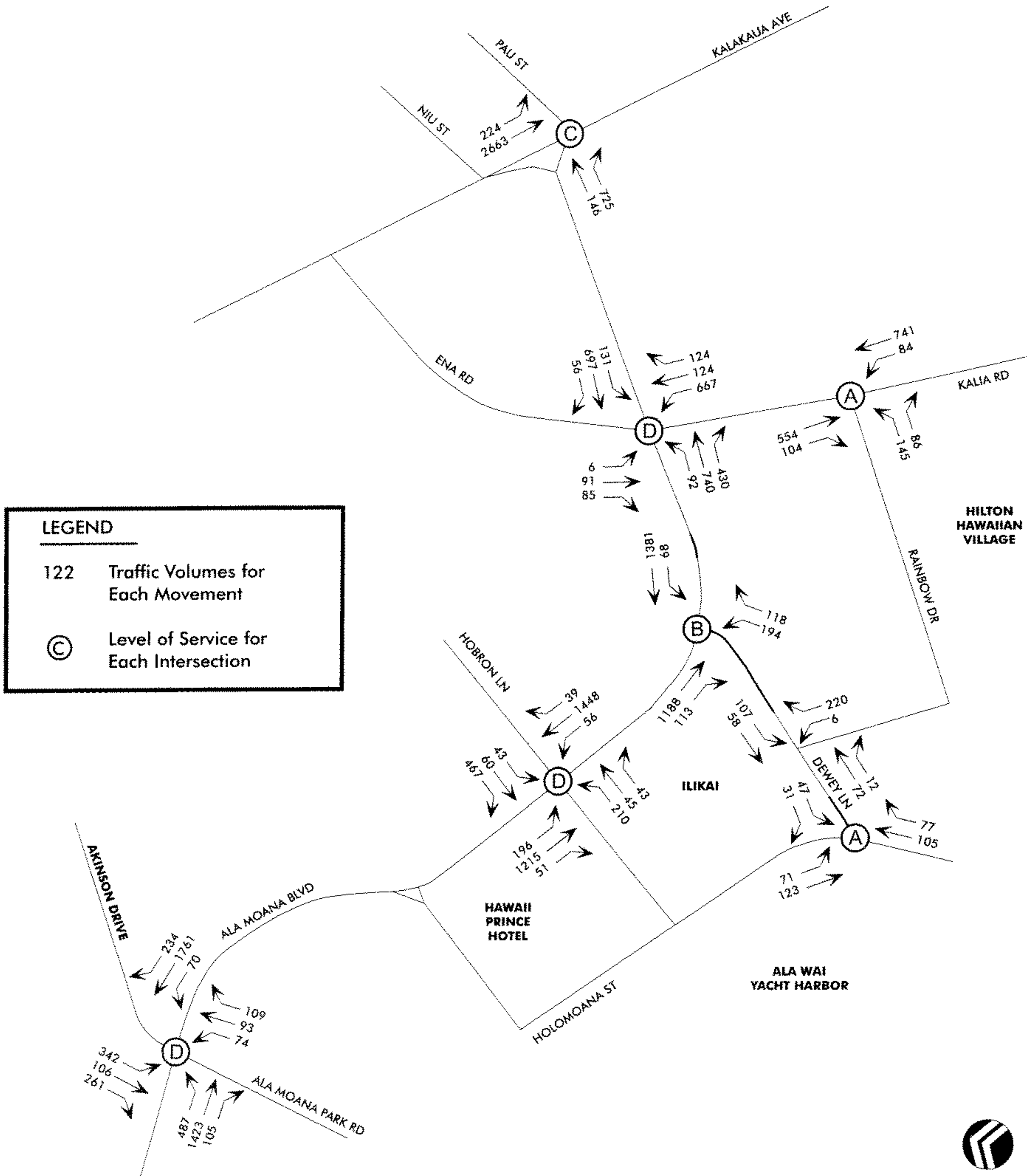
Figure 1-4

2005 AFTERNOON PEAK HOUR TRAFFIC
THURSDAY WITH WAIKIKIAN PROJECT
DEWEY LANE RIGHT-IN/RIGHT-OUT



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NORTH
NOT TO SCALE

Figure 1-5

2005 AFTERNOON PEAK HOUR TRAFFIC
THURSDAY WITH WAIKIKIAN PROJECT
DEWEY LANE FULL INTERSECTION

364700\2005 Thu full D/10-19-01

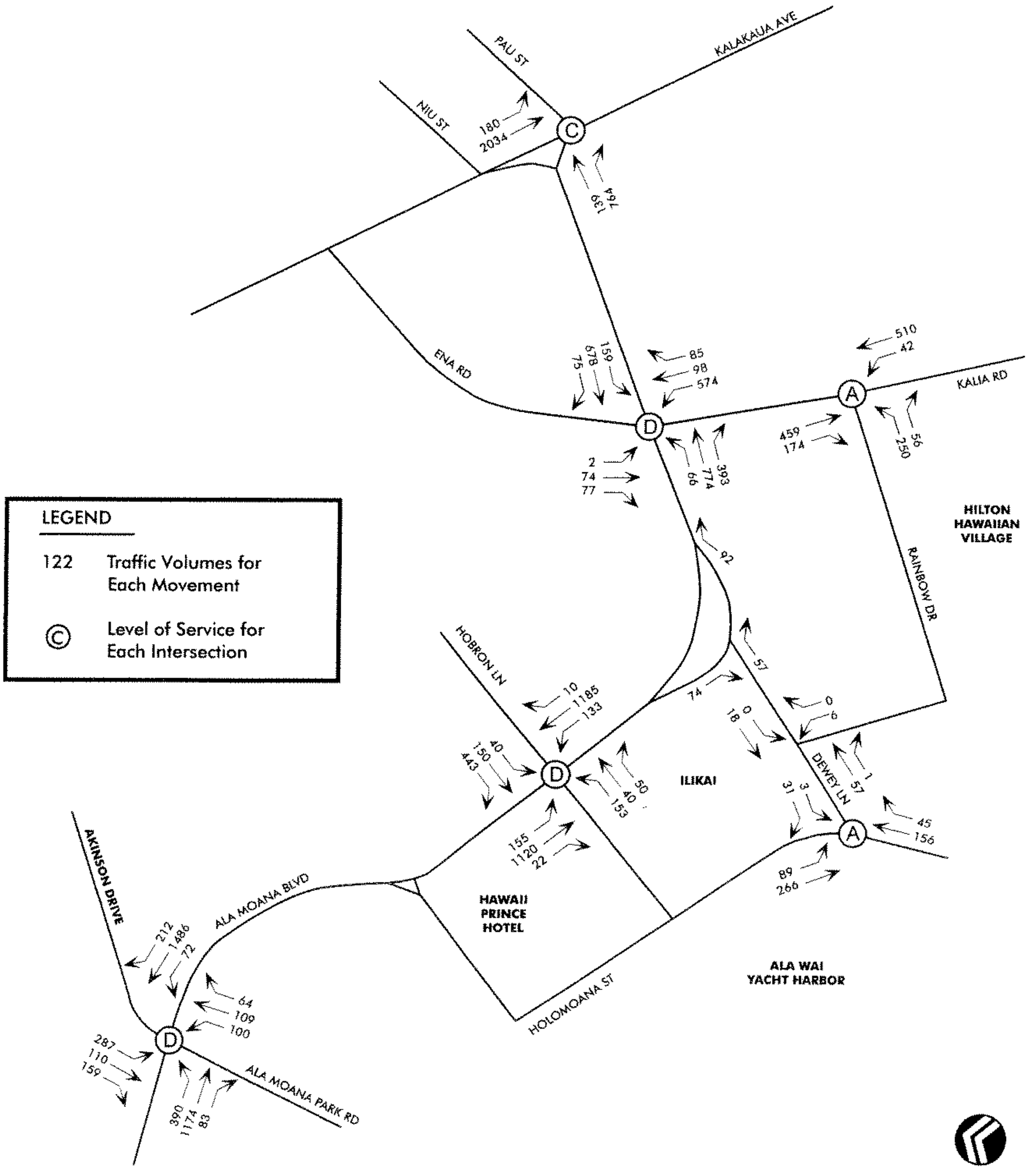

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Figure 2-1

EXISTING AFTERNOON PEAK HOUR TRAFFIC- FRIDAY (5:00 - 6:00PM)

362060\Ex Fri/12-05-01

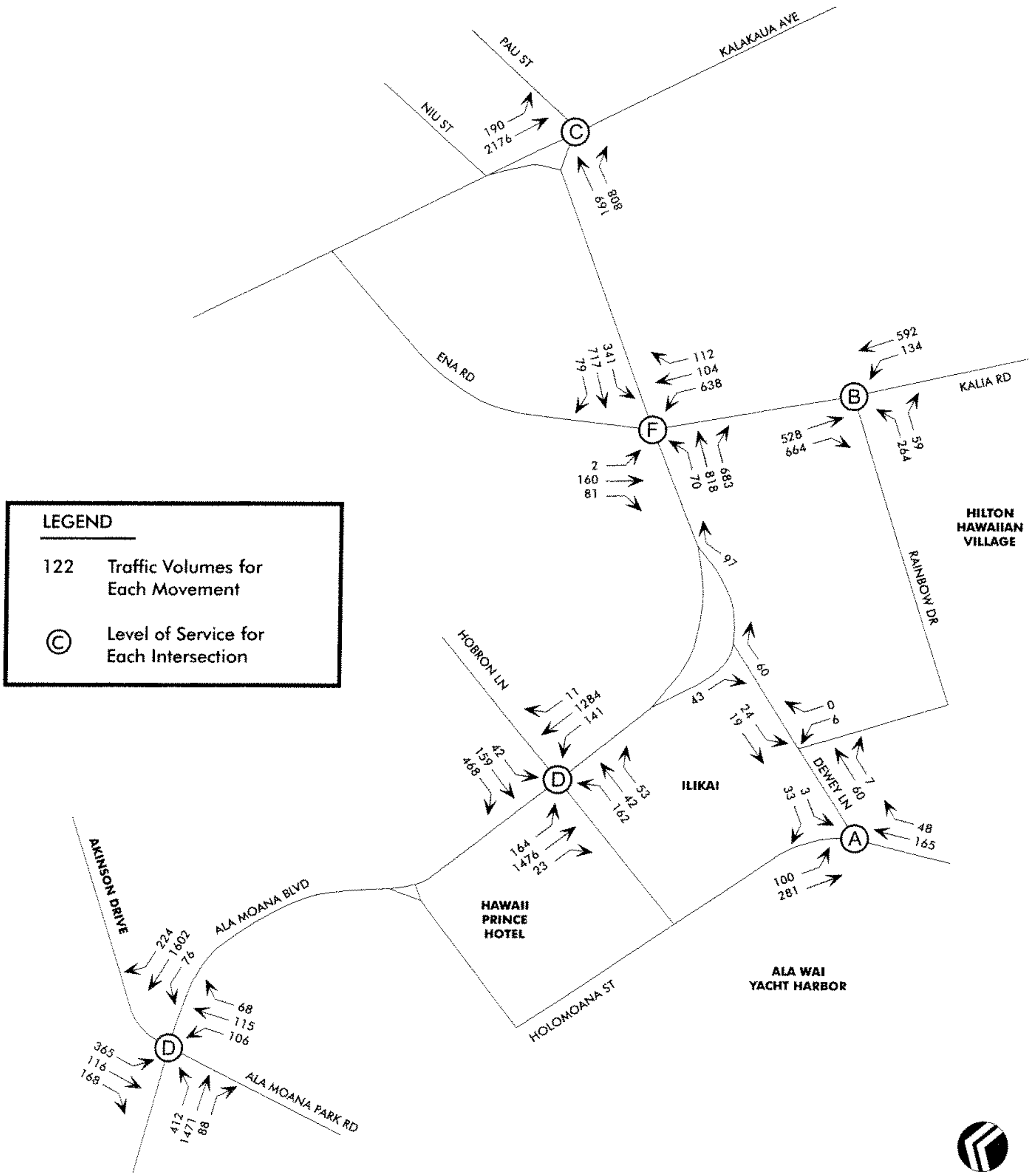

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Figure 2-2

2005 AFTERNOON PEAK HOUR TRAFFIC - FRIDAY NO WAIKIKIAN PROJECT

DEWEY LANE RIGHT-IN/RIGHT-OUT

364700\2005 Fri RRD/10-19-01

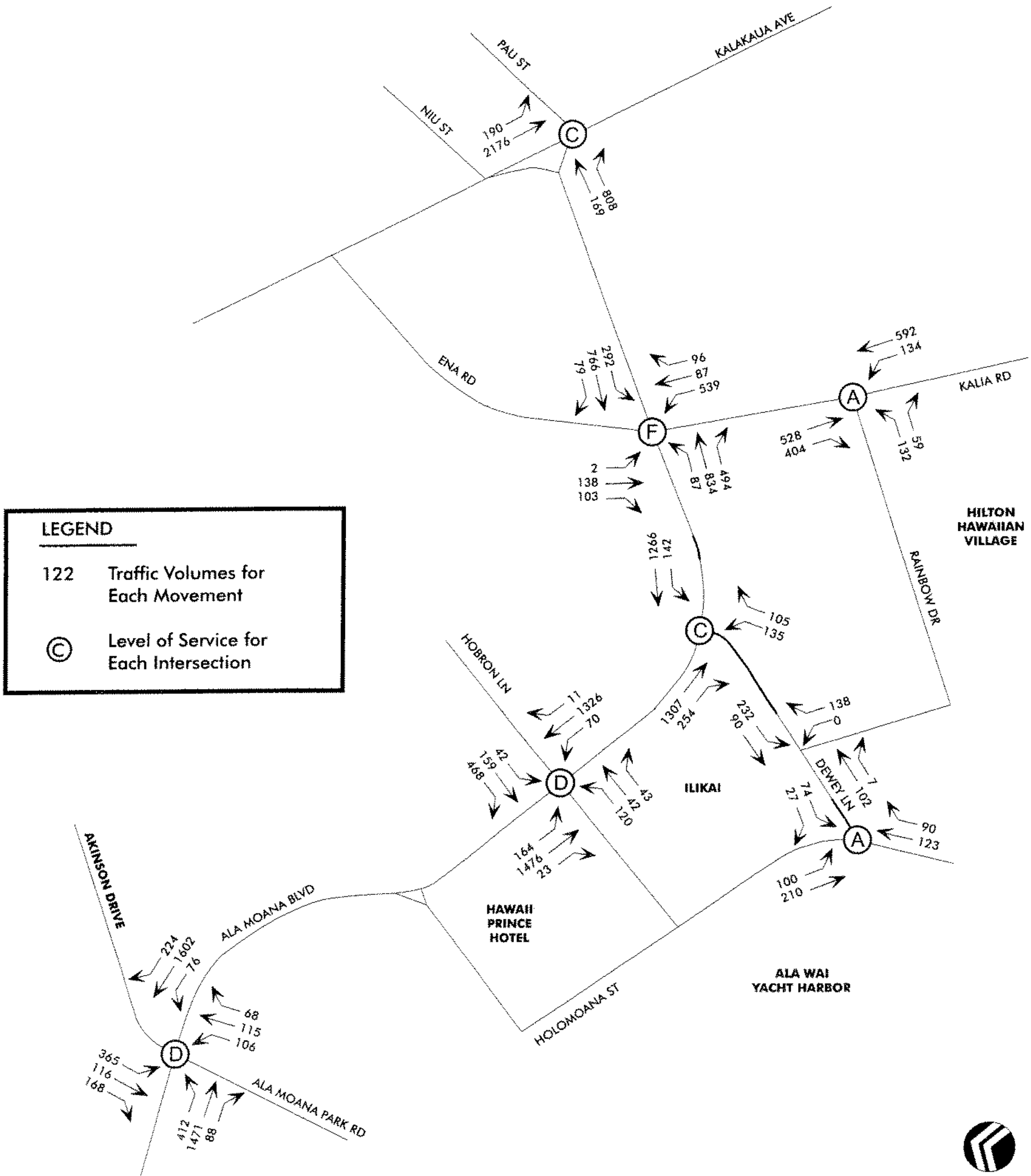

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Figure 2-3

2005 AFTERNOON PEAK HOUR TRAFFIC - FRIDAY NO WAIKIKIAN PROJECT DEWEY LANE FULL INTERSECTION

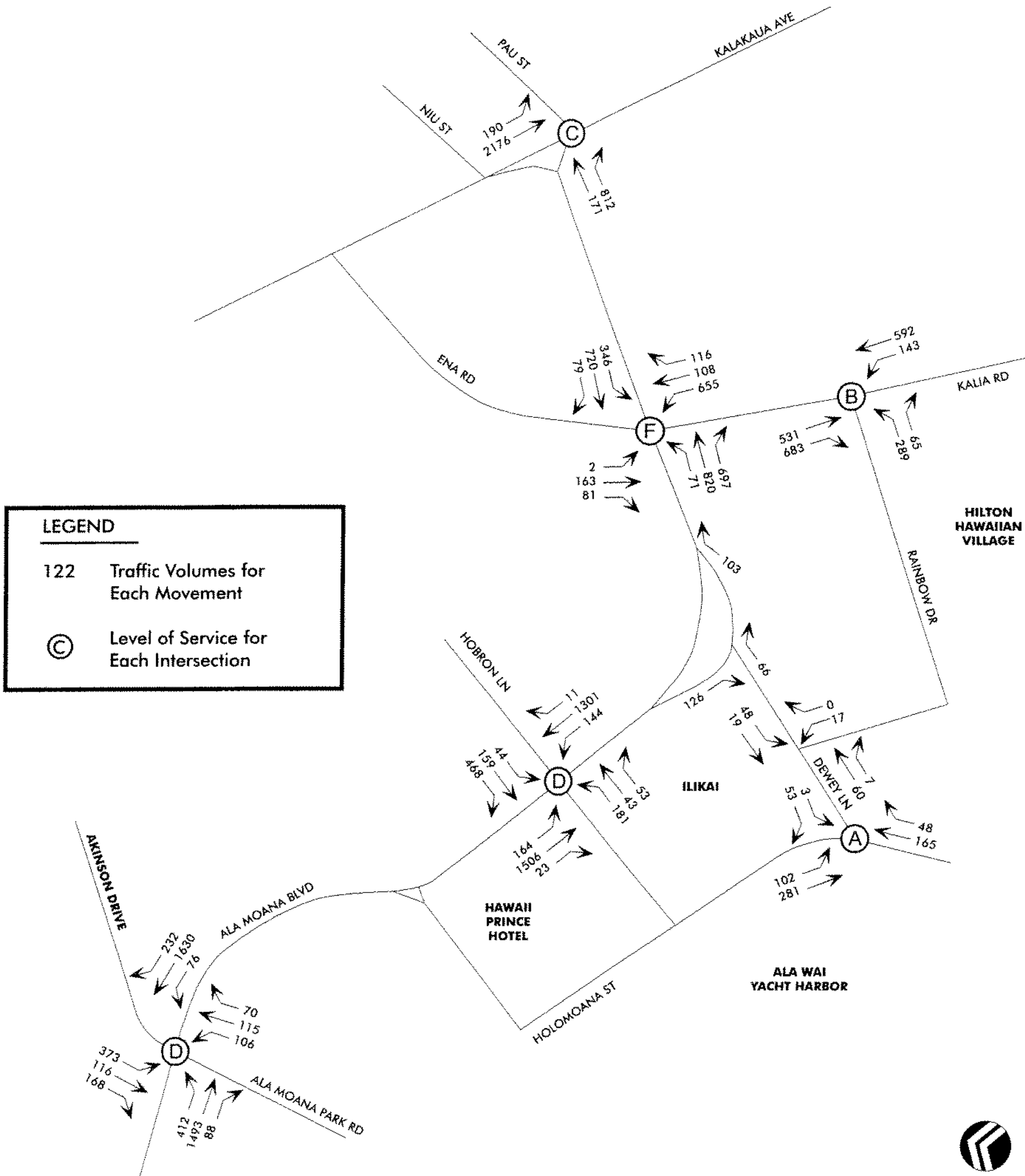

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Figure 2-4

2005 AFTERNOON PEAK HOUR TRAFFIC
FRIDAY WITH WAIKIKIAN PROJECT
DEWEY LANE RIGHT-IN/RIGHT-OUT

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364700\2005 Fri RRD/10-19-01

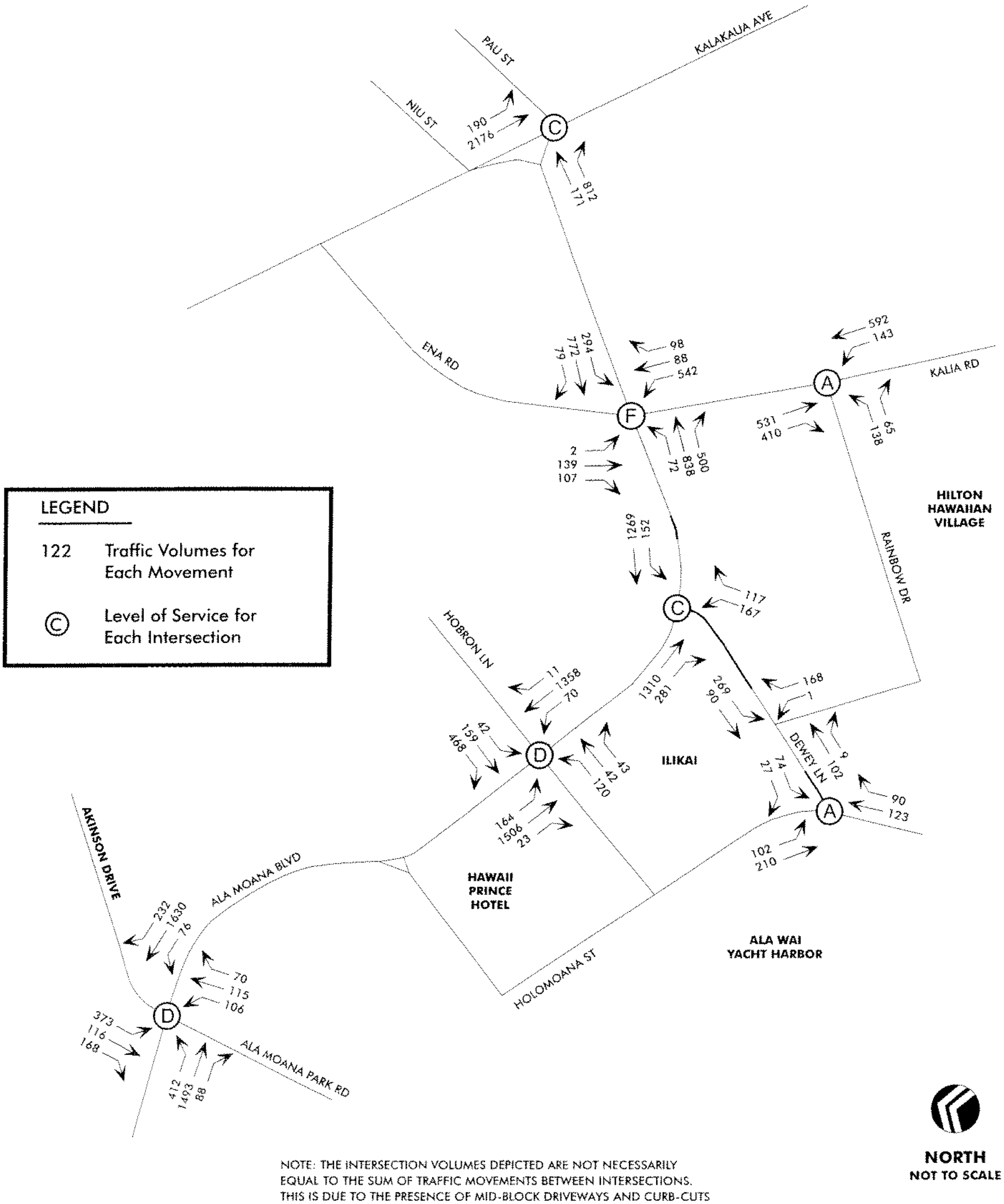

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Figure 2-5

2005 AFTERNOON PEAK HOUR TRAFFIC
FRIDAY WITH WAIKIKIAN PROJECT
DEWEY LANE FULL INTERSECTION

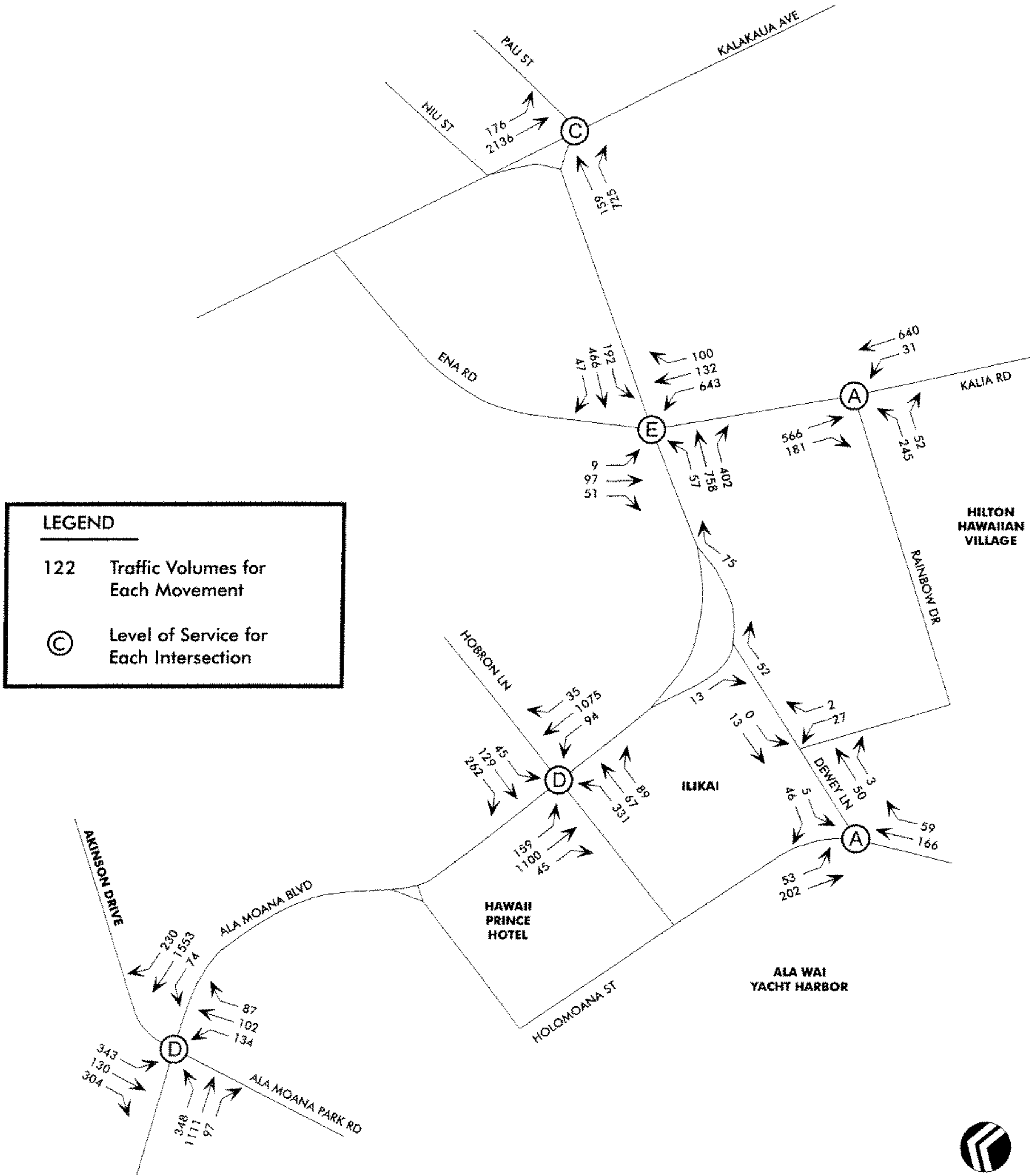

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Figure 3-1

EXISTING AFTERNOON PEAK HOUR - SATURDAY (3:30 - 4:30PM)

362060\Ex Sat/10-19-01

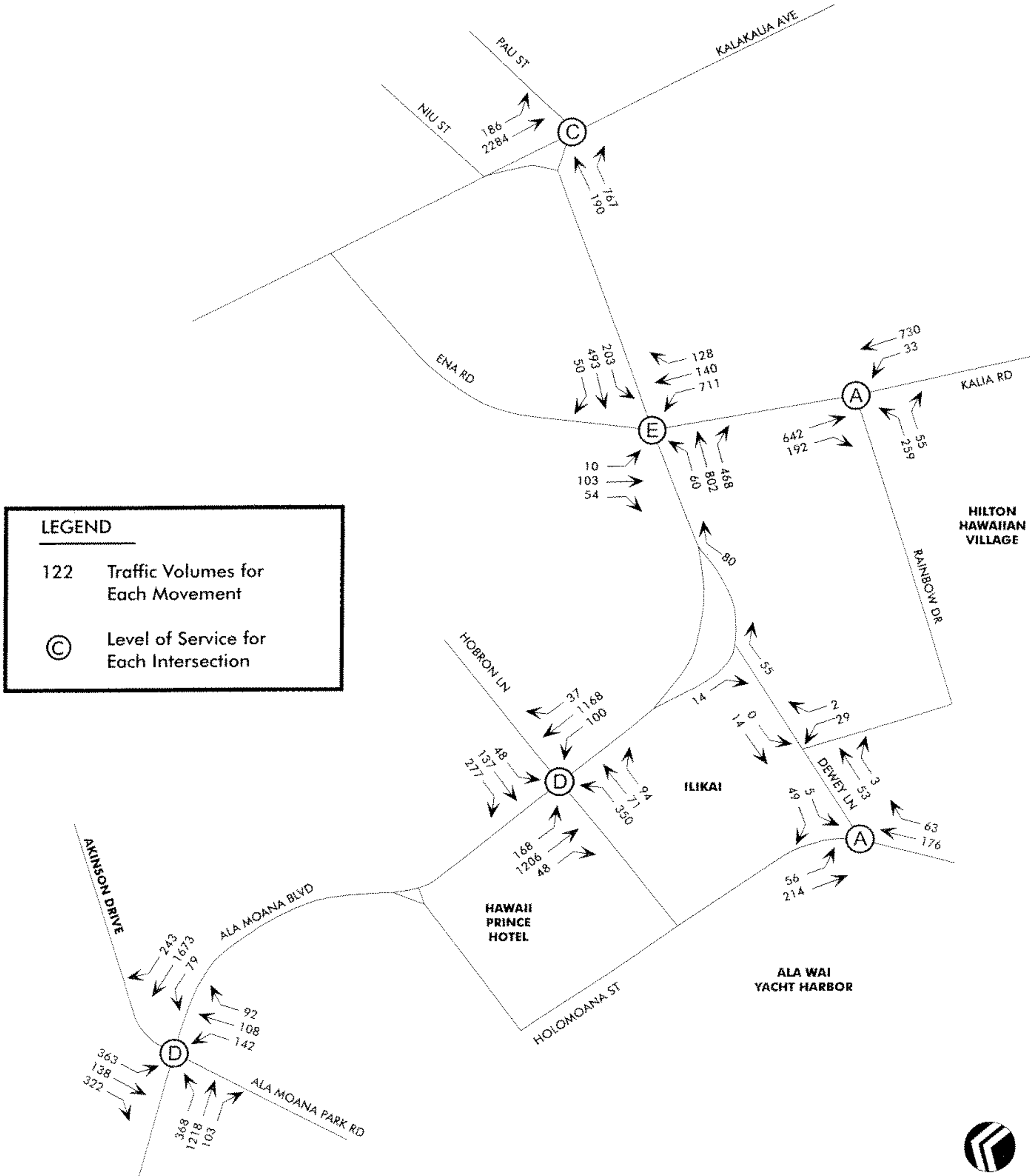

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Figure 3-2

2005 AFTERNOON PEAK HOUR TRAFFIC - SATURDAY NO WAIKIKIAN PROJECT
DEWEY LANE RIGHT-IN/RIGHT-OUT

364700\2005 Sat RRD no proj/10-19-01

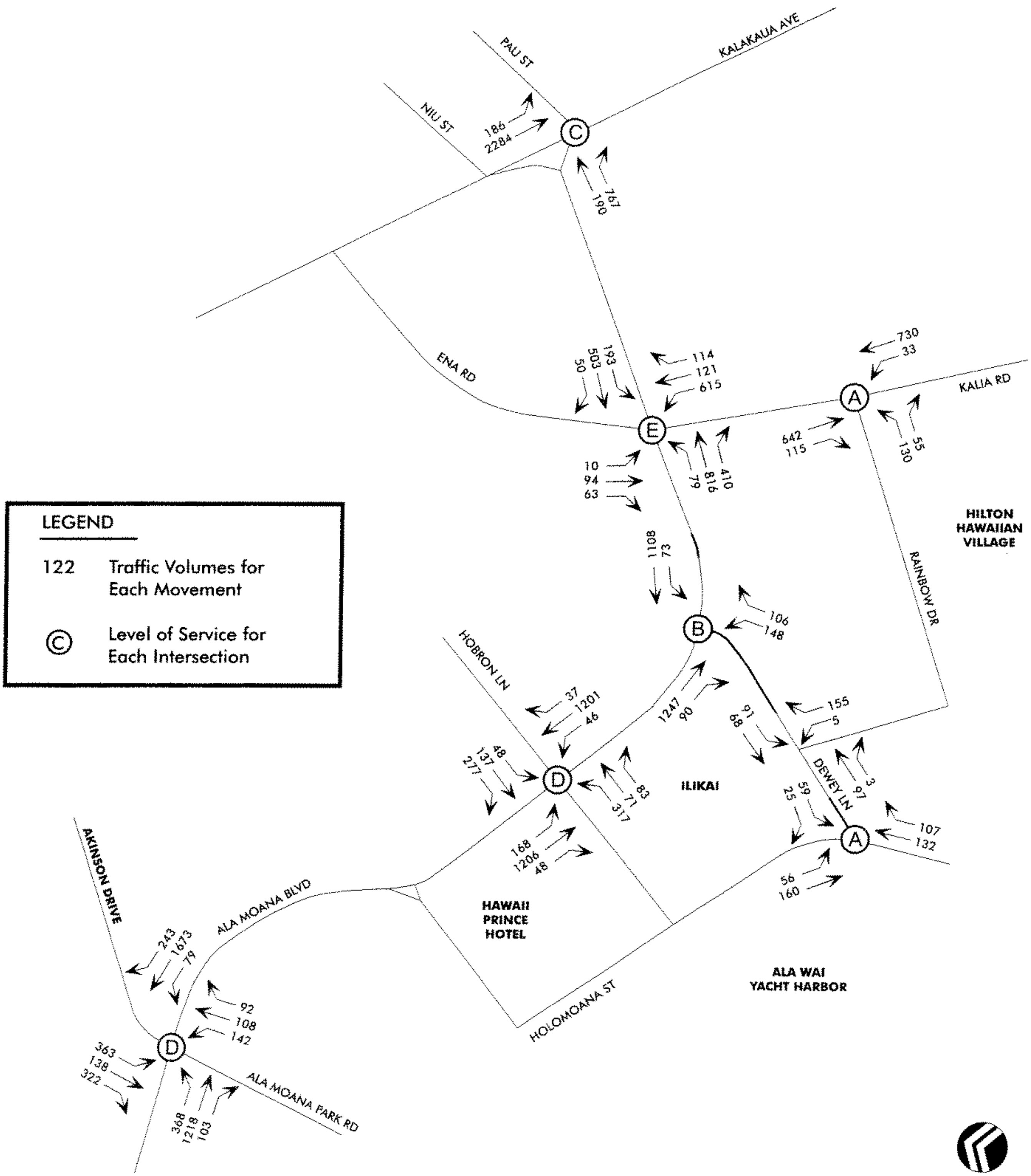

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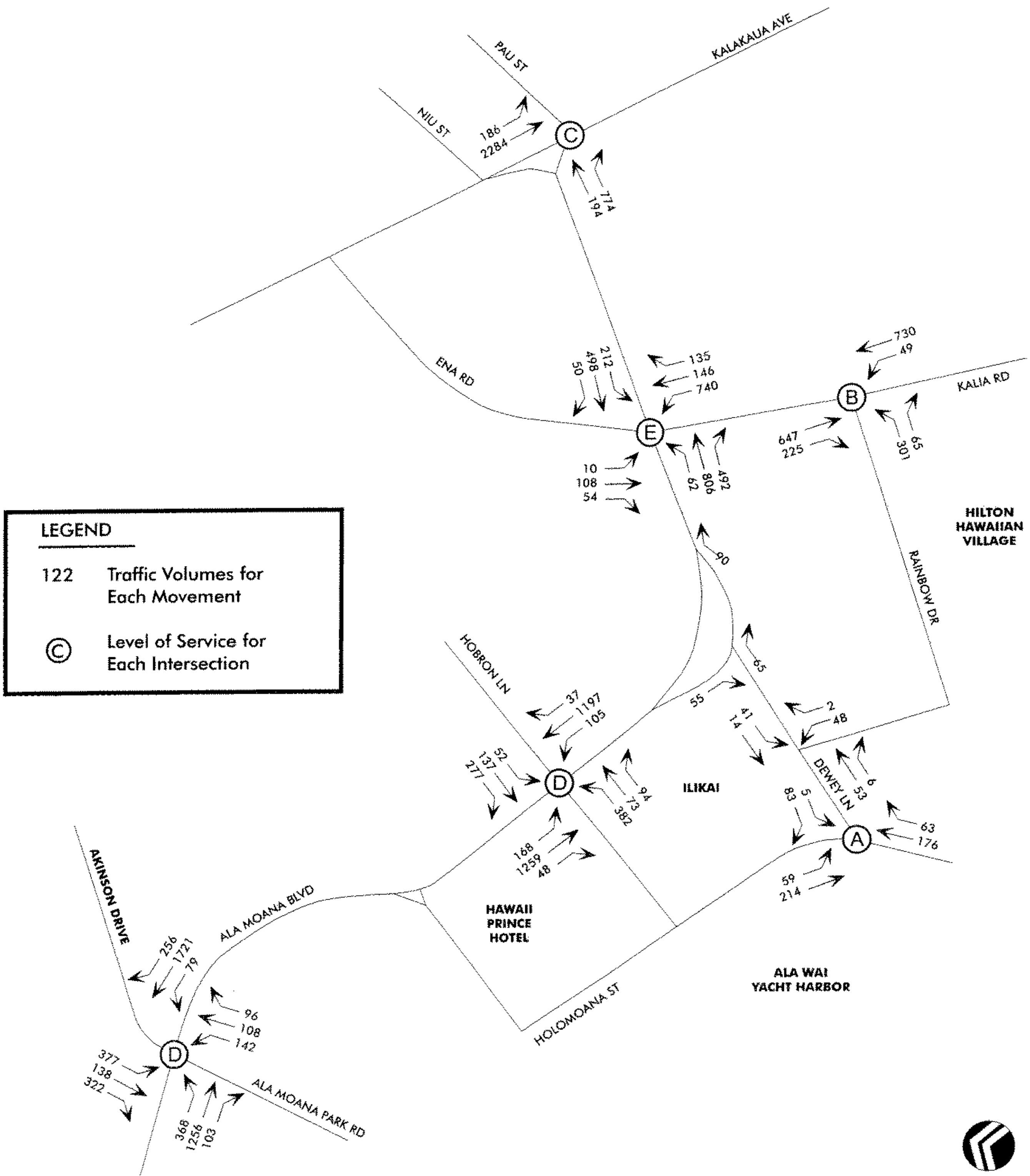
Figure 3-3

2005 AFTERNOON PEAK HOUR TRAFFIC - SATURDAY NO WAIKIKIAN PROJECT

DEWEY LANE FULL INTERSECTION

364700\2005 Sat full D no proj/10-19-01



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NOT TO SCALE

Figure 3-4
2005 AFTERNOON PEAK HOUR TRAFFIC SATURDAY WITH WAIKIKIAN PROJECT DEWEY LANE RIGHT-IN/RIGHT-OUT

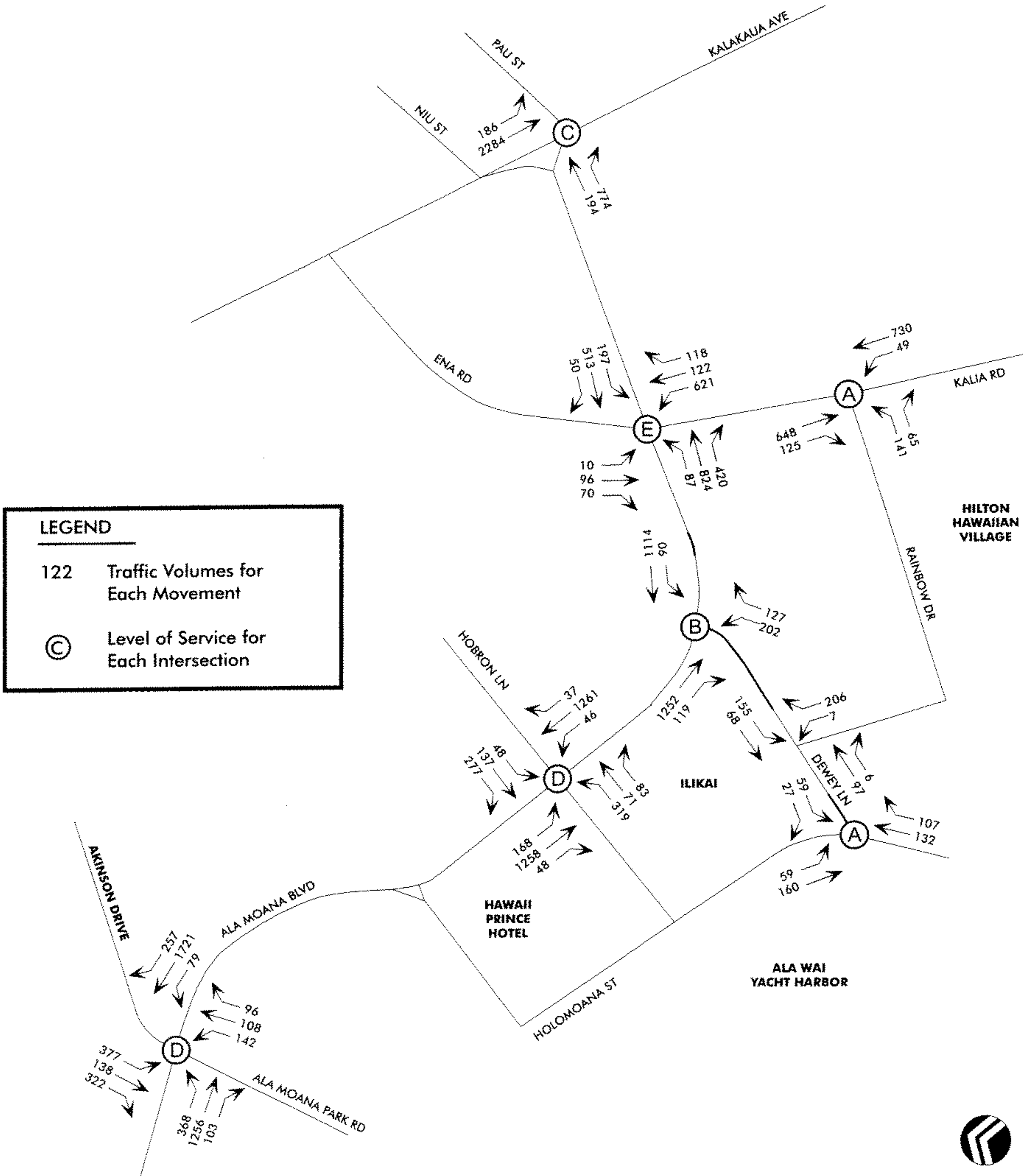

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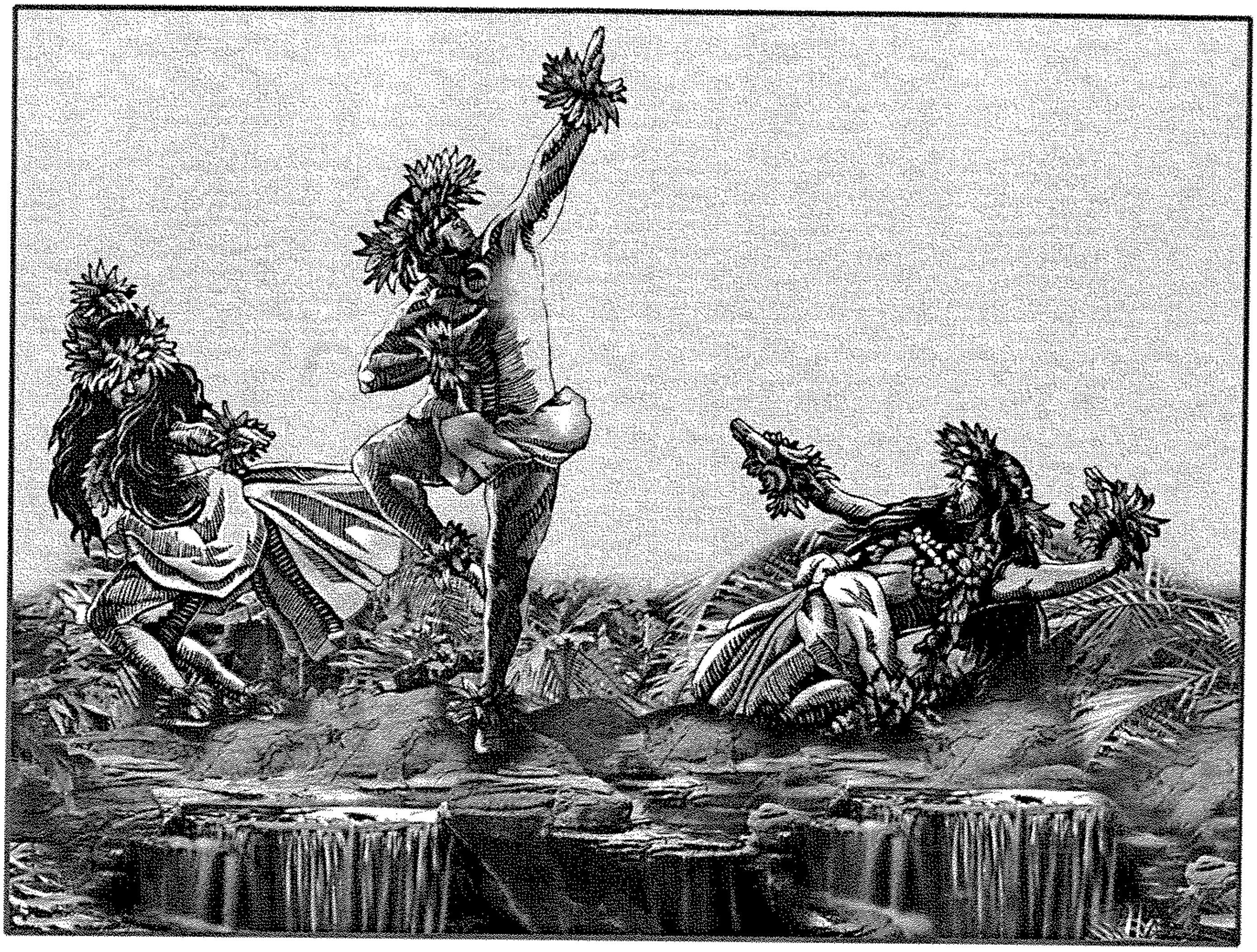
Figure 3-5

2005 AFTERNOON PEAK HOUR TRAFFIC SATURDAY WITH WAIKIKIAN PROJECT DEWEY LANE FULL INTERSECTION



Appendix C

Subsurface Archaeological Inventory Survey – Hilton Waikikian Property

Prepared by

Paul H. Rosendahl, Ph.D., PHRI

Report 2158-041801

Subsurface Archaeological Inventory Survey
Hilton Waikikian Property

Land of Waikiki, Honolulu (Kona) District
Island of O'ahu (TMK:2-6-9:2,3,10)

BY

Alan B. Corbin, M.A. • Supervisory Archaeologist, PHRI

WITH

Pacific Legacy, Inc.

PREPARED FOR

Belt Collins Hawaii
680 Ala Moana Boulevard, 1st Floor
Honolulu, Hawaii 96813

APRIL 2001

PHRI **Paul H. Rosendahl, Ph.D., Inc.**
Archaeological · Historical · Cultural Resource Management Studies & Services

HAWAII: 224 Waianuenue Avenue • Hilo, Hawaii 96720 • (808) 969-1763 • GUAM: P.O. Box 23305 • G.M.F., Guam 96921 • (671) 472-3117

SUMMARY

At the request of Belt Collins Hawaii, and on behalf of their client, Hilton Hotels, Paul H. Rosendahl, Ph.D., Inc. (PHRI) conducted a subsurface archaeological inventory survey of the Hilton Waikikian Property, located in the Land of Waikiki, Honolulu (Kona) District, Island of O'ahu, Hawai'i (TMK:2-6-09:2,3,10). The overall objective of the survey was to satisfy the current draft regulatory requirements of the Department of Land and Natural Resources – State Historic Preservation Division (DLNR 1998). The survey fieldwork for the current project was conducted April 2-5, 2001, by PHRI Supervisory Archaeologist Alan B. Corbin, M.A., and PHRI Field Archaeologist Bert Meigs. PHRI Principal Archaeologist Dr. Paul H. Rosendahl and Dr. Paul Cleghorn of Pacific Legacy, Inc. provided overall guidance for the project.

During the survey, 21 backhoe trenches were placed in the project area. The trenches were generally placed in areas deemed most likely to provide archaeological data; certain portions of the project area were avoided due to the high possibility that underground utility lines and water mains would be encountered.

The backhoe trenches, as expected on the basis of previous work in the vicinity, generally revealed very disturbed soils and fill material. The trenches primarily contained old sewer and utility lines, and recent materials such as metal, and glass and ceramic fragments. Also encountered was what may be remains from a trash dump associated with the former Tahitian Lanai Restaurant that operated on the property between 1955 and 1996.

The backhoe trenches sampled the property sufficiently. Based on the results of the trenching it is thought that any former archaeological features on the property, including the trash dump noted above, have been destroyed during past land modifications. However, due to the possibility that unknown archaeological resources may still remain, it is recommended that an archaeological monitor be present during any future subsurface modifications in the property.

Contents

Illustrations

Tables

INTRODUCTION

At the request of Belt Collins Hawaii, and on behalf of their client, Hilton Hotels, Paul H. Rosendahl, Ph.D., Inc. (PHRI) conducted a subsurface archaeological inventory survey of the Hilton Waikikian Property, located in the Land of Waikiki, Honolulu (Kona) District, Island of O'ahu, Hawai'i (TMK:2-6-09:2,10) (*Figure 1*). The overall objective of the survey was to satisfy the current draft regulatory requirements of the Department of Land and Natural Resources – State Historic Preservation Division (DLNR 1998). The specific purpose of the investigation was to provide information sufficient to facilitate planning for future expansion of the Hilton Hawaiian Village onto the current project area. The investigation was conducted in accordance with all current historic preservation regulatory review guidelines (draft rules) of the State of Hawai'i, Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD).

SCOPE OF WORK

The basic objectives of an inventory survey are fourfold: (a) to identify all sites and site complexes present within a project area; (b) to evaluate the potential significance of all identified archaeological remains; (c) to determine the possible impacts of proposed development upon any identified remains; and (d) to define the general scope of subsequent further data collection and/or other mitigation work that might be deemed necessary.

Based on a review of currently available background literature and acknowledgment of the current requirements of relevant review authorities, the following tasks were deemed to constitute an adequate scope for the current subsurface inventory survey:

1. Conduct background review and research of existing archaeological and historical documentary literature relating to the project area and its immediate vicinity, including examination of Land Commission Awards, *ahupua'a* records, historic maps, archival materials, archaeological reports, and other historic sources;

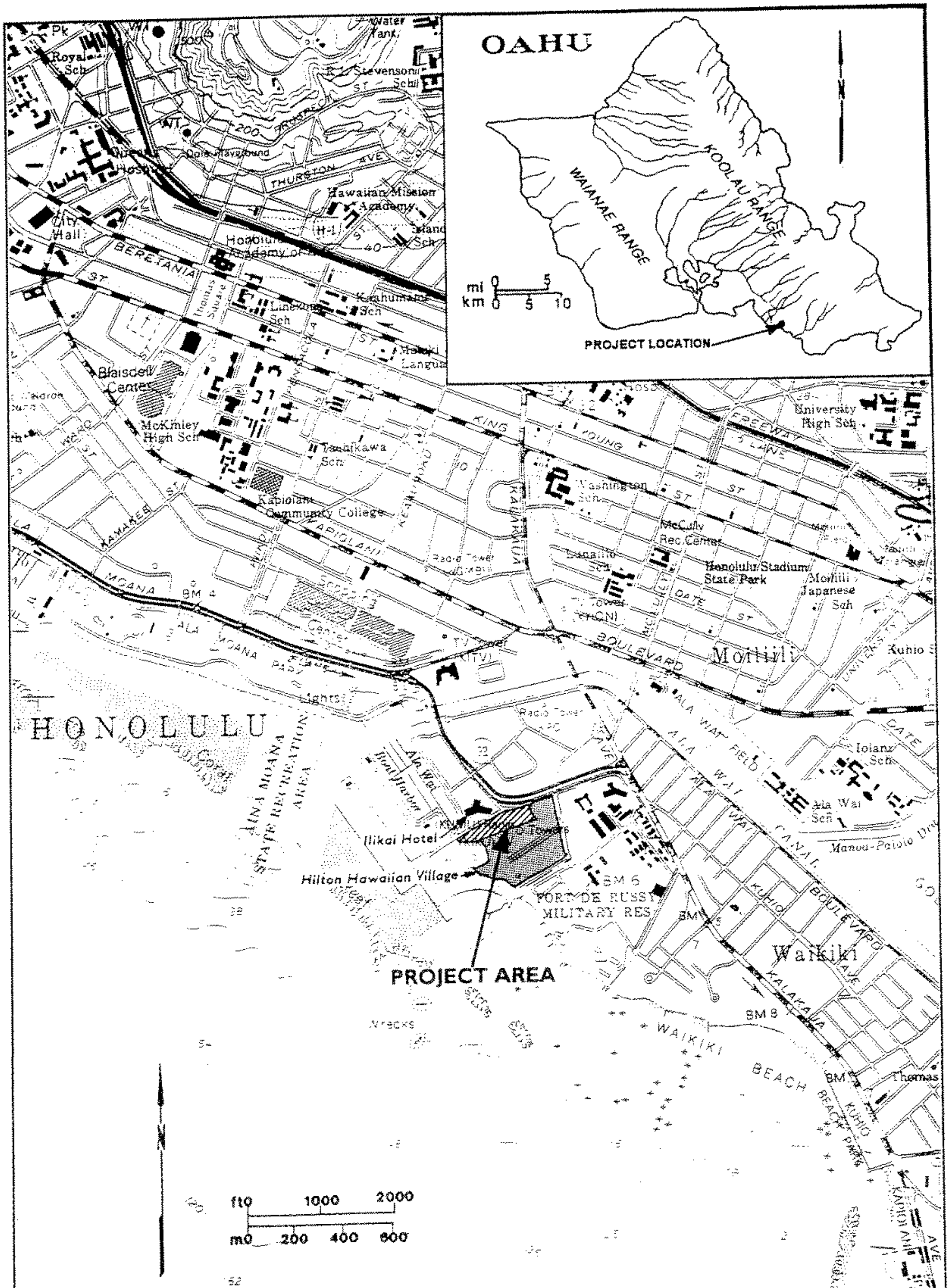
2. Conduct subsurface (backhoe) testing in the project area to determine the location, general nature, extent, and potential significance of any archaeological-historical remains that might be present;

3. Conduct inventory-level recordation of all identified sites and features;

4. Analyze recovered data and information for site evaluation, determination of significance, and recommendations pertaining to future proposed development; and

5. Prepare an appropriate final report.

Specific subtasks for the subsurface testing included: (a) to determine the location of the sea shoreline on the property as it existed in the 1880s; and (b) to locate any historical trash dumps in association with the Japanese tea houses that once existed on the property.



(Portion of 1983 USGS 7.5' Quadrangle Map, "Honolulu, Hawaii")

Figure 1. Project Area Location Map

PROJECT AREA DESCRIPTION

The project area consists of 1.895 acres (approximately 82,559 sq ft). It is bounded to the north by Ala Moana Boulevard, to the east by Budget Car Rental, to the south by Hilton Hawaiian Village, and to the west by the Hilton Lagoon and the Ilikai Hotel (*Figures 1 and 2*). The parcel is about 1-2 meters above mean sea level, and extends from the shoreline to about 240 meters (786 ft) inland. The ground surface of the property has been entirely disturbed and was formerly the site of the Waikikian Hotel and the Tahitian Lanai Restaurant that operated on the property between 1955 and 1996. Currently, there are several construction trailers belonging to Hawaiian Dredging Company on the property. The terrain in the project area is flat and consists mostly of asphalt and fill. Vegetation consists of a few ornamentals. The average minimum temperature in the project area is 63 degrees F, and the annual maximum temperature is 88 degrees F (Armstrong 1983). Rainfall in the project area averages 20 inches per year (Armstrong 1983).

SETTLEMENT PATTERNS AND HISTORICAL DOCUMENTARY RESEARCH

Historical documentary research and research on the settlement patterns for the project area was conducted by Pacific Legacy, Inc. (*Appendix A*), and is summarized below.

The *ahupua'a* of Waikiki has a long and colorful past, and was once the favored locale for the ruling chiefs of O'ahu. This may have begun as early as the fourteenth century, when the *ali'i nui Mailikukahi* transferred the seat of government to Waikiki (Handy and Handy 1972:480). It remained the seat of government until Kamehameha briefly transferred the government, after unifying the islands, to Kailua-Kona on the Island of Hawai'i.

Much of early Waikiki, through the time of the *ali'i* Mailikukahi in the 14th century, was a plantation of irrigated agricultural fields covered in taro and fishponds. This area extended as far inland as Makiki, Mānoa, and Pālolo valleys. At the time of European contact, Waikiki was one of the richest and most densely populated areas on O'ahu (Davis 1989:8).

Beginning after western contact, after AD 1778, the increasing arrivals of Europeans and Americans greatly increased development and construction in Waikiki. This led to the disappearance of agricultural lands and the numerous fishponds that once dotted the landscape. Not long after, ordered by city ordinance, the remaining fishponds were filled in.

In 1921 the Waikiki Reclamation Project began. From 1921-29, the Dillingham Construction Company dredged the entire length of the Ala Wai Canal. The dredged material was used to fill a large portion of Waikiki – mainly the many ponds and terraces. The filling allowed the land to be used by the United States military (for the construction of Fort DeRussy), and by others for commercial use (Nakamura 1979). It is not known if any of the fill dredged from the Ala Wai was used in the project area.

LAND COMMISSION AWARD

Only one Land Commission Award (LCA) has been granted in the project area. LCA 1775 was awarded to Paoa in 1852 (*Appendix A, Figure 2*). After payment, it was given a Royal Patent Number (#7033)(in 1870). Additionally, two Land Court Applications were filed for the project area. The applications were obtained by the descendants of Paoa for land directly adjacent to and seaward of the LCA. This land had been created by filling an area that was once ocean. Presumably, a portion of the LCA's original ground surface was covered with fill during the process of creating the land.

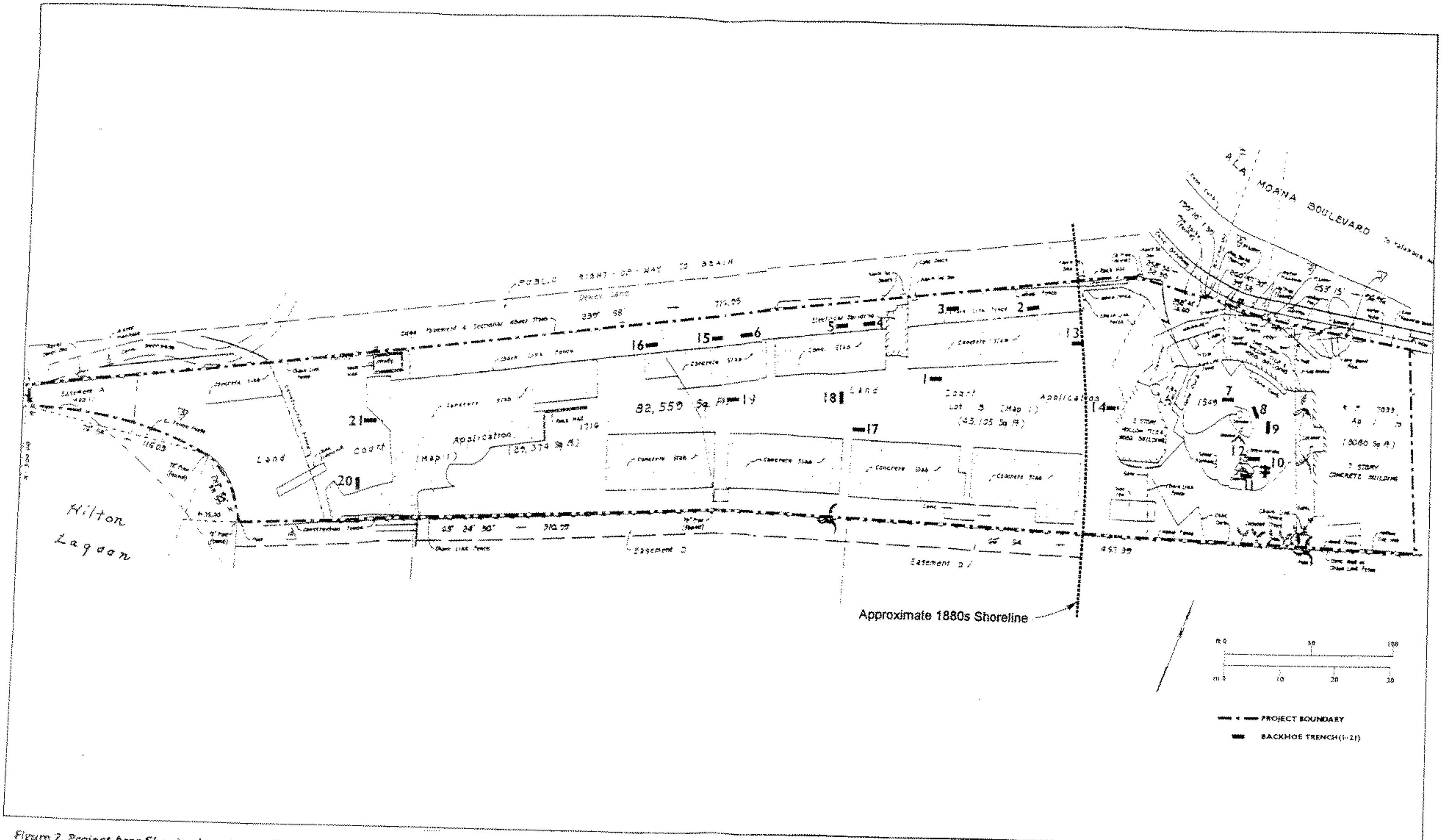


Figure 2. Project Area Showing Locations of Backhoe Trenches

The project area has undergone many changes since the awarding of the LCA. Two dwellings and a barn were present on the *mauka* portion of the property in 1895. In 1914, an unidentified single-story structure was present. In 1918, a section of the property was used as a commercial teahouse (Polk-Husted 1918:1275, as quoted in Hurst and Cleghorn 1990:7). In 1930, a new teahouse (the Shioyu Tea Gardens) was opened on the property and existed until 1940 (*Figure 3 in Appendix A*).

PREVIOUS ARCHAEOLOGICAL WORK

Research on previous archaeological work for this project was undertaken by Pacific Legacy, Inc., as part of the documentary research for the project (*Appendix A*). The following is taken from *Appendix A*.

Most of the archaeological studies that have been undertaken in the Waikiki area have occurred over the last 20 years. However, archaeological reports associated with Waikiki *ahupua'a* extend back 100 years. In 1901 human remains were discovered in the vicinity of the current Elks Club, near Kapiolani Park, on James B. Castle property (Emerson 1902:19). The remains were discovered while excavating for property improvements. The remains of four adults were uncovered, along with whale teeth and glass beads.

In 1930, J. Gilbert McAllister conducted an island-wide survey of O'ahu. He reported a total of four *heiau* (or temple) sites within the vicinity of Waikiki (McAllister 1933). The largest was Papaenaena (Site 58), located at the base of Diamond Head, in the area of Hawai'i School for Girls at La Pietra. This *luakini heiau* was used for human sacrifice and was reportedly associated with Kamehameha I. "Kenneth Emory of the Bishop Museum attempted to identify the foundation of the *heiau* in 1968 when the La Pietra property was being developed but the results were inconclusive" (Davis 1989: 20). Kukao'o *heiau* (Site 64) located on a small rise in Manoa Valley was reportedly constructed by the *menehune*. This site is on the property of Sam and Mary Cook and has been recently restored (Cleghorn 1992).

While excavating for the Hale Koa Hotel (located east of the Hilton property) in 1976, five human burials were recovered by the Bishop Museum (Kimble 1976). The remains were reported to be prehistoric or early historic bundle burials (Site 50-80-14-9500). A sixth human burial was believed to be a later interment.

In 1980, Buddy Neller conducted excavations for the Hilton Hawaiian Village's Tapa Tower project area (Neller 1980). Three individuals were recovered along with nearby trash pits (Site 50-80-14-2870). Unfortunately, Neller was deterred from conducting controlled excavations at the site. Using historic documents, however, Neller was able reconstruct the historic shoreline. Based on his results, he determined that the burials were likely interred after 1850.

Between 1985 and 1987, Paul H. Rosendahl, Inc. (PHRI) conducted archaeological monitoring of construction excavations associated with the Mechanical Loop Project at the Hilton Hawaiian Village (Hurlbett et al. 1992). The project area is directly adjacent to the current project area and extends between 10-250 meters east of the current project area. The project identified 15 features associated with historic use of the area; most of the features came from the northeast end of the project area, near Kalia Road. A total of 3,819 artifacts comprising household (glassware and tableware) and architectural (nails, glass, etc.) items were recovered. Most of the artifacts recovered dated between 1870 and 1930.

A substantial amount of work has been conducted in the area of Kalia Road and the Fort DeRussy property. Beginning in 1989, a series of test excavations, data recovery and monitoring projects were undertaken in the area.

In July 1989, PHRI (Rosendahl 1989) conducted a limited subsurface inventory survey for the then proposed luau facility located at the Hale Koa Hotel. Eleven backhoe trenches (BT) and three hand-excavated units were placed in the proposed luau facility. A buried cultural layer and associated historic artifacts were identified. Based on the disturbance of the cultural layer and the lack of midden deposits, Rosendahl concluded that the artifacts were from a secondary context. Archaeological monitoring was recommended during construction activities.

Between February and April 1989, Bert Davis conducted a subsurface reconnaissance survey and historical research at Fort DeRussy (Davis 1989). Davis conducted archaeological testing at Fort DeRussy in an attempt to confirm archival data suggesting that the Fort DeRussy area contained evidence of buried fishponds, *'auwai*, and associated habitation remains. The testing confirmed the presence of intact cultural deposits, *'auwai* and fishpond walls, and historic deposits. The ponds and *'auwai* at Fort DeRussy had been filled-in but had not been destroyed. Further, historic deposits located along the beachfront contained glass and ceramics that dated from the 19th century.

In April and June 1992, BioSystems Analysis, Inc., conducted archaeological data recovery operations to mitigate effects on the cultural resources during construction of new recreational facilities at Fort DeRussy (Simmons et al. 1995). During the investigation, five backhoe trenches and seventeen controlled test units were excavated in an area that was previously identified by Davis (1989) as containing buried fishpond and habitation deposits. Fieldwork uncovered information regarding the construction and structure of the fishponds and the *'auwai* system that fed the ponds. Also identified were a habitation deposit that exhibited continual use of the area and a paleo-beach deposit.

Between January and September 1993, BioSystems Analysis, Inc. conducted archaeological monitoring during Phase I activities for the Kalia Road Realignment, associated with the construction of a new tower for the Hale Koa Hotel (Carlson et al. 1995). The monitoring uncovered the remains of Loko Paweo I, a fishpond (Site 50-80-14-4574), and two other sites (4570 and 4966) containing historic trash pits, an occupation layer, and numerous human remains (Carlson and Cleghorn 1994).

In 1996, Pacific Legacy, Inc. conducted an archaeological inventory survey with subsurface testing for the then proposed Kalakaua Plaza, located on the *mauka* side of Kalakaua Avenue, directly across from Fort DeRussy. Archival research indicated that there was a probability of encountering fishpond deposits or other cultural resources associated with the intensive cultivation in Waikiki (Cleghorn 1996). A total of seven backhoe trenches were excavated during the course of field investigations. No cultural deposits were identified. The area was determined to be extremely wet or marshy and was "not conducive for traditional economic practices" (Cleghorn 1996:15).

In 1999, Hammatt and McDermott (1999) recovered the remains of two human burials (Site 50-80-14-5744-1 and 2) located along Kalakaua Avenue, near Ena Road. The remains were uncovered during the placement of anti-crime lighting in Waikiki. The remains were located between 1.2 and 1.5 m below surface within a beige sand matrix.

In 2000, Cultural Surveys Hawaii (LeSuer et al. 2000) conducted an archaeological subsurface inventory survey on a parcel located directly across Kalakaua Avenue from the Fort DeRussy tennis courts, and across Kalaimoku Street from where Cleghorn (1996) conducted his investigation. The subsurface testing located the *'auwai* (Site 50-80-14-4970) or irrigation ditch that fed the fishponds of Waikiki. Also identified was a historic period wetland that appears to have been used for agricultural purposes (Site 50-80-14-5796). LeSuer also identified abundant micro-strata that was interpreted as fill episodes from the dredging of the Ala Wai Canal.

IMPLICATIONS OF PREVIOUS RESEARCH FOR THE PRESENT PROJECT AREA

Based on the historic background and literature search, several conclusions were made regarding potential cultural resources in the project area. The research suggested the shoreline of ca. AD 1880 was located in the mid portion of the project area (*see Figure 2*). This location was determined based on information provided by the SHPD. SHPD Historic Sites Inventory Coordinator Eric Komori has reconstructed the Pearl Harbor to Diamond Head coastline ca. 1900 based on early maps. For the vicinity of the current project area (see GIS map, *Figure 1*, *Appendix A*), Komori used an 1881 Hawai'i Government Survey Map entitled "Waikiki" (Registered Map No. 1398, State Survey Office), drawn by S.E. Bishop, who worked under Surveyor General W. D. Alexander. Komori registered the GIS map using distinctive geographic features, mainly roads, structures, and land boundaries. Because of the former location of the shoreline it was thought likely that the *makai* portion of the project area would be devoid of traditional cultural remains. It was also thought that the historically filled and created areas could contain remains of the various teahouses and other ventures that occurred on the property, for example, remains of trash dumps, out-houses, building foundations, etc.; and also isolated artifacts such as bottles and tools. These resources although not traditional are still important aspects of our past and are protected by State preservation law. Most important, it was thought possible that human remains might be encountered in the area. Archival research indicated that both traditional and historic burial remains had been identified in the general area in the past. Specifically, it was thought that traditional Hawaiian burials might be present in the original ground surface inland of the AD 1880 shoreline, and undocumented historic burials might be present anywhere within the property.

METHODS

The fieldwork for the current project was conducted April 2-5, 2001, by PHRI Supervisory Archaeologist Alan B. Corbin, M.A., and PHRI Field Technician Bert Meigs. Dr. Paul Cleghorn of Pacific Legacy, Inc., and PHRI Principal Archaeologist Dr. Paul H. Rosendahl provided overall guidance for the project.

The backhoe trenches were excavated by a Case 580 K backhoe with a two-foot-wide bucket. The placement of the excavations was designed to provide, so far as possible, a representative sample of the entire project area, as well as to acquire data to: (a) determine the location of the sea shoreline on the property as it existed in the 1880s; (b) locate any former trash dumps associated with the Japanese Tea House that once existed on the subject property; (c) determine the location, general nature, extent, and potential significance of any other archaeological-historical remains present; and (d) assess the historic preservation work that might be needed.

During the course of the excavations, underground utilities were encountered, and it was realized that the area contained significant, modern and functioning underground electrical, water, and sewage systems. This had not been confirmed previously because no blueprints or maps of the project area showing the locations of such systems were available. Because of the high probability of inadvertently damaging the underground facilities, areas deemed likely to contain these facilities (as determined by examining the orientation and nature of the facilities encountered) were avoided.

The backhoe trenches (N=21) were each approximately 6.0 feet long by 2.0 feet wide and were excavated to sea level (see *Figure 2*). One face of each backhoe trenches was profiled, and soil depth, texture, color (Munsell), and nature of collected materials was recorded. At least one face of all backhoe trenches was photographed. After recordation, all backhoe trenches were backfilled. Materials collected from the backhoe trenches were tabulated and catalogued, and representative profiles of backhoe trenches were drawn.

FINDINGS

Table 1, below, summarizes the soils identified in each backhoe trench, by layer. Complete soil descriptions for each trench are provided in *Appendix B*. Backhoe trench locations are shown on *Figure 2*. None of the backhoe trenches contained any cultural materials other than recent (i.e., later than AD 1955).

Table 1. Summary of Soil Layers in Backhoe Trenches

B.T. #	Layer I	Layer II	Layer III	Layer IV	Layer V	Layer VI
1	Brown clay fill mixed w/ gravel	Light yellowish brown sand; in southwest corner are modern electric lines	Light gray sand to sea level	-	-	-
2	Brown clay fill mixed w/ gravel	Recent gravel fill w/ concrete rubble	Pale yellow sand	Light gray sand to sea level	-	-
3	Brown clay fill mixed w/ gravel	Recent gravel fill w/ concrete rubble	Pale yellow sand to sea level	-	-	-
4	Brown clay fill mixed w/ gravel	Recent gravel fill w/ concrete rubble	Pale yellow sand to sea level	-	-	-
5	Brown clay fill mixed w/ gravel	Recent gravel fill w/ concrete rubble; underlying concrete curb	Disturbed marbled soil with recent trash, e.g., porcelain bowl frag., #	Pale yellow sand to sea level	-	-
6	Brown clay fill mixed w/ gravel	Crushed limestone mixed w/ bluish gley	Pale yellow sand to sea level	-	-	-
7	Asphalt paving in parking lot	Recent dark gravel fill below asphalt	White crushed limestone fill	Brownish gray sand; disturbed, mixed, and marbled	Pale yellow sand to sea level	-
8	Asphalt paving in parking lot	Recent dark gravel fill below asphalt	White crushed limestone fill	Thin asphalt pavement	Brownish gray sand; disturbed, mixed, and marbled	Pale yellow sand to sea level
9	Asphalt paving in parking lot	Recent dark gravel fill below asphalt	White crushed limestone fill	Thin asphalt pavement	Brownish gray sand; disturbed, mixed, and marbled; metal piece seen at water level	-
10	Asphalt paving in parking lot	Recent dark gravel fill below asphalt	White crushed limestone fill	Brownish gray sand; disturbed, mixed, and marbled; recent materials to sea level: bottle, glass, metal, porcelain, wood	-	-

Table 1. (Continued)

B.T. #	Layer I	Layer II	Layer III	Layer IV	Layer V	Layer VI
11	Asphalt paving in parking lot	Recent dark gravel fill below asphalt	White crushed limestone fill	Brownish gray sand; disturbed, mixed, and marbled	Yellow crushed limestone fill	Brownish gray sand; disturbed, mixed, and marbled; Layer VII contains pale yellow sand to sea level
12	Asphalt paving in parking lot	Recent dark gravel fill below asphalt	White crushed limestone fill	Brownish gray sand; disturbed, mixed, and marbled; metal fragment noted	Pale yellow sand to sea level	-
13	Asphalt paving	Recent dark gravel fill below asphalt	Recent dark brown clay fill	White crushed limestone fill	Asphalt paving	White crushed limestone fill; Layer VII contains thin concrete layer; Layer VIII is pale yellow sand to sea level
14	Asphalt paving	Recent dark gravel fill below asphalt	White crushed limestone fill; B.T. abandoned at this point due to presence of electrical lines and current water main	-	-	-
15	Disturbed grayish brown clay loam; recent materials, e.g., plastic, porcelain, concrete frags.	White crushed limestone fill	Sand mixed w/ bluish gley to sea level	-	-	-
16	Disturbed grayish brown clay loam	Concrete layer	White crushed limestone fill	Bluish gley layer to sea level	-	-
17	Recent dark gravel fill	White crushed limestone fill	Concrete layer	Pale yellow sand	Light gray gley and coarse sand below sea level	-
18	Dark brown clay fill; recent glass, concrete pipe fragment	Disturbed yellowish brown sand	Bluish gray gley mixed w/clay and sand below sea level	-	-	-
19	Dark brown clay fill; recent tiles, concrete frags.	White crushed limestone fill	Bluish gray gley mixed w/ clay and sand; first few cm appear disturbed; below sea level	-	-	-
20	Dark brown clay fill; recent materials;wire,tiles	White crushed limestone fill; recent materials; tiles, concrete frags., wire	Bluish gray gley mixed w/ crushed limestone fill	-	-	-
21	Dark brown clay fill; recent materials; wire,tiles	White crushed limestone fill	Recent dark brown clay fill with concrete chunks; may be remnants of recent pool	Bluish gray gley mixed w/ crushed limestone fill	-	-

Cultural materials identified in the backhoe trenches consisted primarily of recent cultural debris. Most of the debris came from a remnant trash pit that was probably associated with the Tahitian Lanai Restaurant. *Table 2*, below, lists all of the representative samples collected from the trenches.

Table 2. Summary of Representative Materials Collected from Backhoe Trenches

BT-#	Material Collected	Provenience	Comments
5	Spoon	Above cement slab about 10 cm in fill	Serving spoon 21 cm long; originally silver plated; badly corroded; floral pattern on handle.
5	Ceramic dish fragment	In fill above cement slab	White, crackled finish; about 13.5x12.5; labeled on underside: "Homer Laughlin, Hudson"
5	Soda bottle	In fill above cement slab	Aloha Soda Works bottle with full logo; 20x5.75 cm dia.
5	Medicine bottle	In fill above cement slab	Graduated scale ounces and cc on bottle; black plastic or composition cap; dried pink material inside. 4.5x5x3.3 cm
5	Stoppered bottle (less stopper)	In fill above cement slab	Stamped "UO[?} , CO" on bottom; 10x4.5cm; possible perfume bottle
5	Misc. clear and blue glass bottle fragments; blue and white ceramic fragments	In fill above cement slab	-
5	Small grayish ceramic vase, broken lip.	In fill above cement slab	Decorated in relief with painted, banana-like and coconut-like trees. Japanese or other oriental characters stamped on bottom; 11x9x8 cm dia.
11	Ceramic fragment	In fill	

CONCLUSION

DISCUSSION

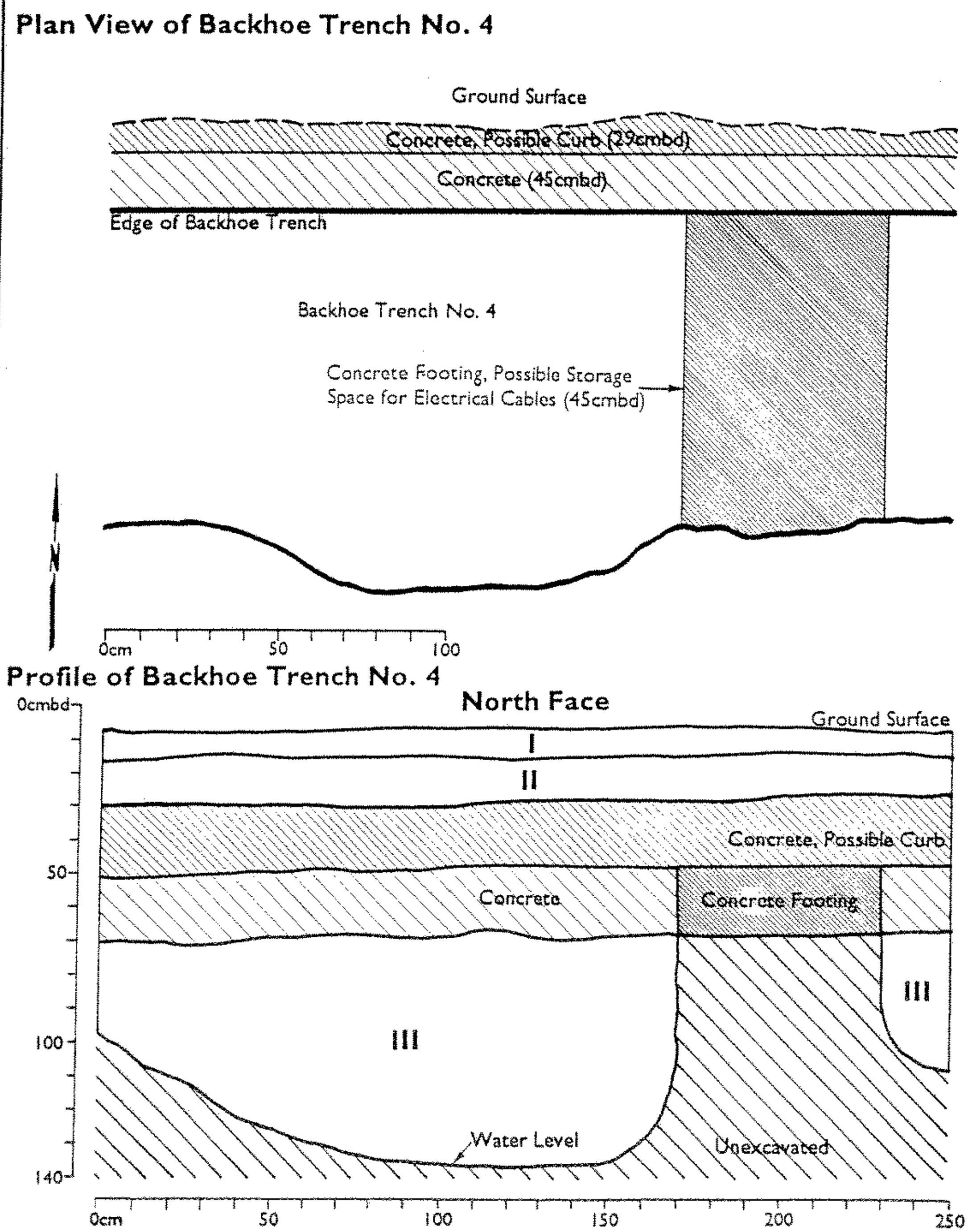
During the current excavation work, no archaeological sites were identified, and the only cultural materials identified in the backhoe trenches were recent cultural debris in secondary contexts. Most of the debris could have come from a remnant trash pit that may have been associated with the Tahitian Lanai Restaurant.

The project successfully recorded the soil stratigraphy of the project area. The stratigraphy findings are discussed below. For discussion, the excavations are grouped thus: (1) BT-7 through 12, in the northern section; (2) BT-4, -5, -6, -15, and –16, in the northwest section; and (3) BT-20 and –21, in the southern section. The other backhoe trenches, not mentioned here, provided only redundant information. *Figures 3-7* depict selected trenches in profile, and *Figures 8-12* are photos of the selected trench walls.

Backhoe Trenches 7-12. These trenches were placed in a small parking lot and work area surrounded by buildings. The stratigraphies in the trenches comprise separated asphalt layers with fill/crushed limestone between the layers, and pale yellow sand underneath the asphalt and fill/crushed limestone. BT-7 is an example of this typical stratigraphy (*Figures 5 and 10*).

Backhoe Trenches 4, 5, 6, 15, and 16. The stratigraphies in these trenches are very disturbed with brown clay fill, gravel, and recent trash in the upper layers and pale yellow sand or gley underneath the layers, to sea level. Gley was found in several of these trenches. BT-5 exemplifies this type of stratigraphy (*Figures 4 and 9*).

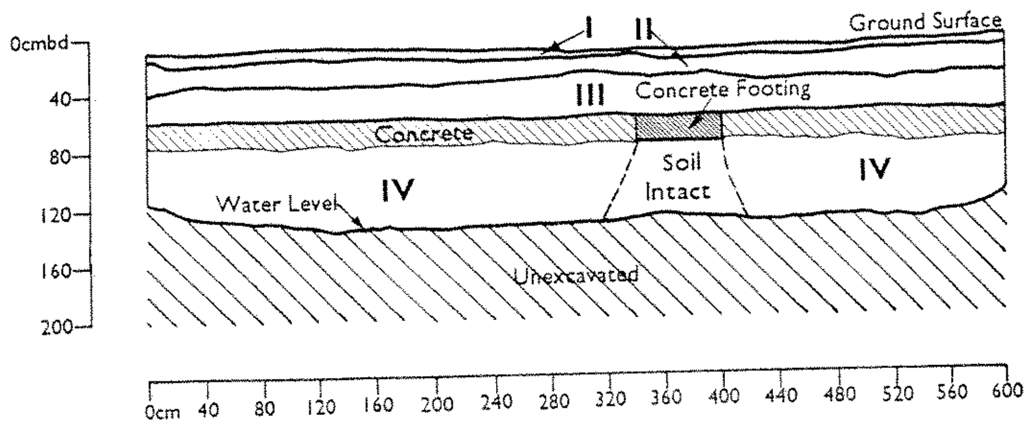
In BT-4 a possible curb was uncovered (*Figures 3 and 8*) on the beach access road side. Also uncovered were concrete footings.



Layer I Dark brown (10YR 3/3) clay, recent fill with gravel, few coconut roots
Layer II Dark yellowish brown (10YR 4/4) gravel, recent concrete rubble
Layer III Pale yellow (2.5YR 7/4) sand; loose sand appears sterile; abundant coconut roots present

Figure 3. Profile and Plan View of Backhoe Trench 4, North Face

North Face



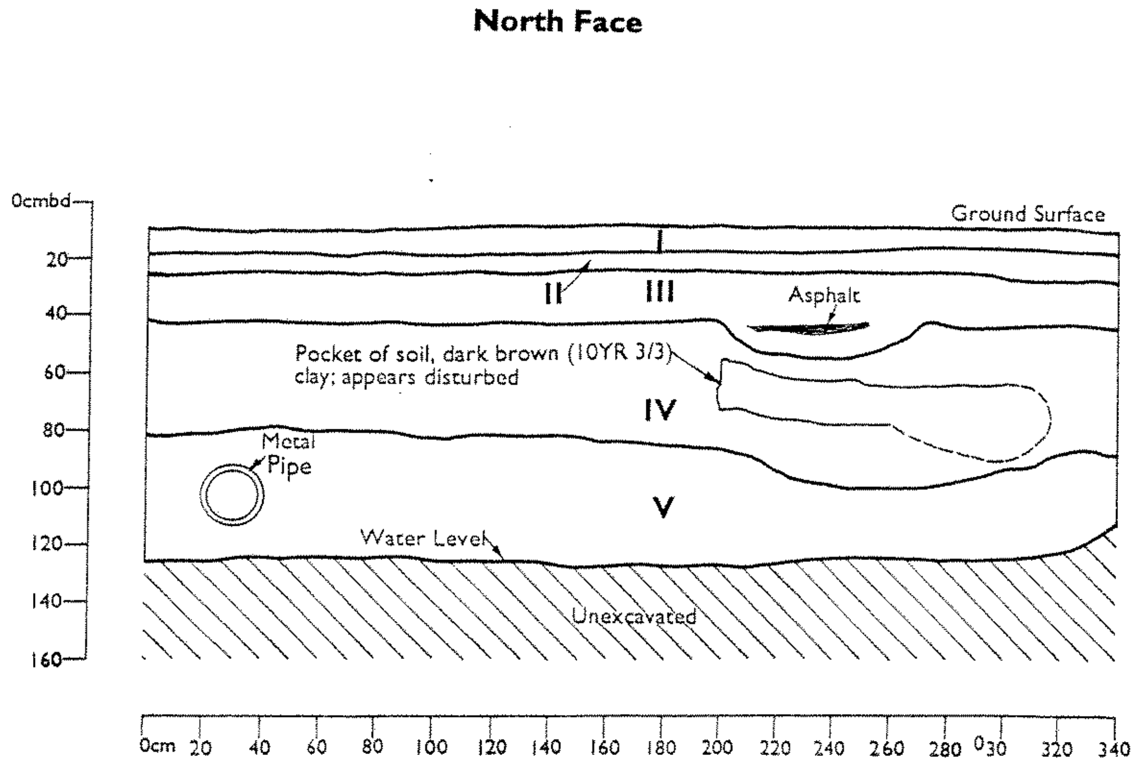
Layer I Dark brown (10YR 3/3) clay, recent fill with gravel and glass, some coconut roots

Layer II Dark yellowish brown (10YR 4/4) gravel and recent concrete rubble; a curb can be seen in some places along the datum line north of north trench wall

Layer III Grayish brown (10YR 5/2) sand; disturbed marbled soil, historic and recent refuse are found in this layer

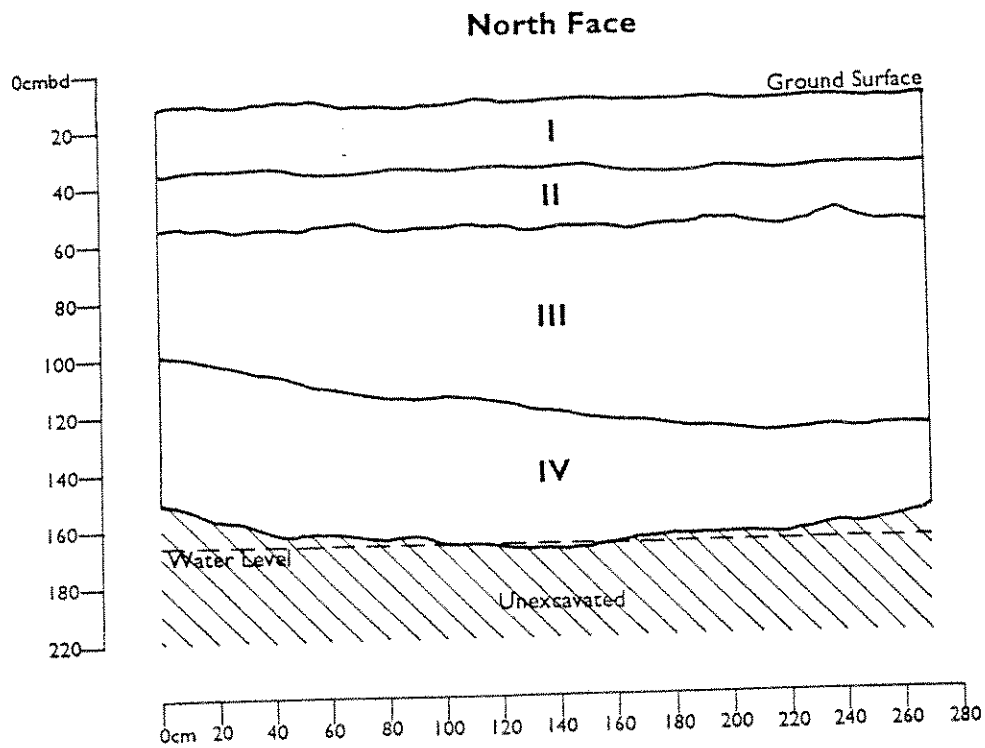
Layer IV Pale yellow (2.5YR 7/4) sand; loose sand appears sterile; abundant coconut roots with no cultural materials; the layer is above water line

Figure 4. Profile of Backhoe Trench 5, North Face



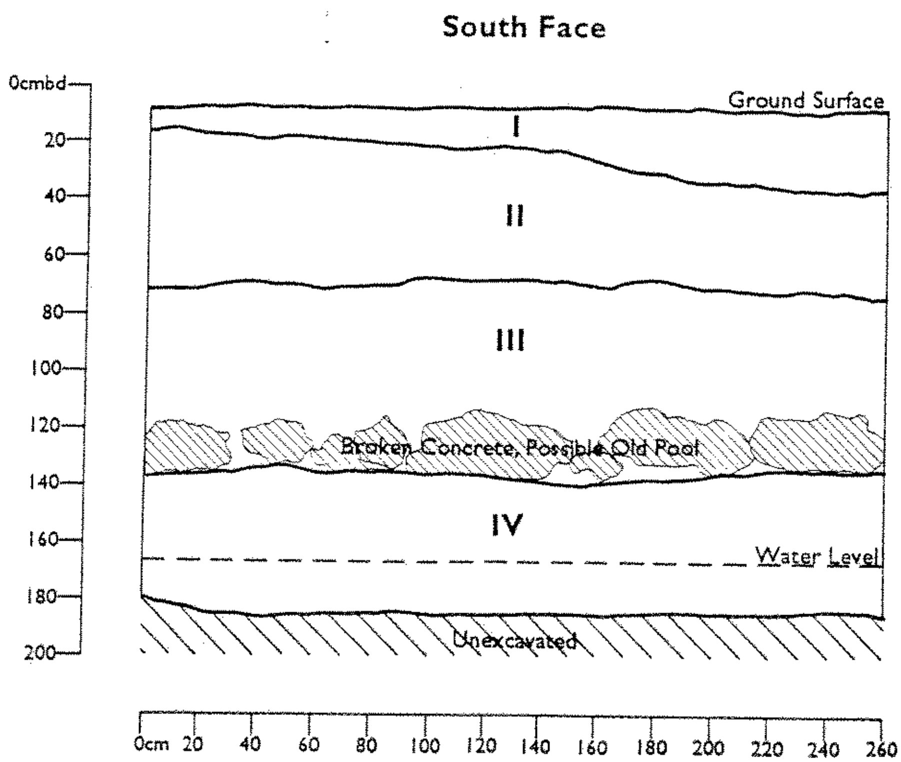
Layer I Asphalt paving on parking lot, no cultural materials
Layer II Dark black (10YR 4/1) gravel below asphalt paving, no cultural materials
Layer III White (10YR 8/1) crushed limestone fill, no cultural materials
Layer IV Light brownish gray (10YR 6/2) sand; mixed and marbled, no cultural materials
Layer V Pale yellow (2.5YR 7/3) sand; loose sand above water level; sterile

Figure 5. Profile of Backhoe Trench 7, North Face



Layer I Very dark grayish brown(10YR 3/2) clay loam; disturbed recent fill, no cultural materials
Layer II Concrete
Layer III White (10YR 8/1) crushed limestone fill
Layer IV Bluish gray (5B 5/1) gley, sterile; clay sand at water level, no cultural materials

Figure 6. Profile of Backhoe Trench 16, North Face



Layer I Dark brown (7.5YR 4/3) loamy clay; recent fill and refuse with few coconut roots
Layer II White (10YR 8/1) crushed limestone fill
Layer III Dark brown (7.5YR 4/3) loamy clay; recent fill; broken concrete is present at base of layer; possibly an old pool, filled with soil and crushed limestone fill
Layer IV Bluish gray (5B 5/1) gley; mixed with limestone fill which may have been placed at the base of the pool for stability

Figure 7. Profile of Backhoe Trench 21, South Face (Note Gley)

Figure 8. Photograph of Backhoe Trench 4, North Face

Figure 9. Photograph of Backhoe Trench 5, North Face

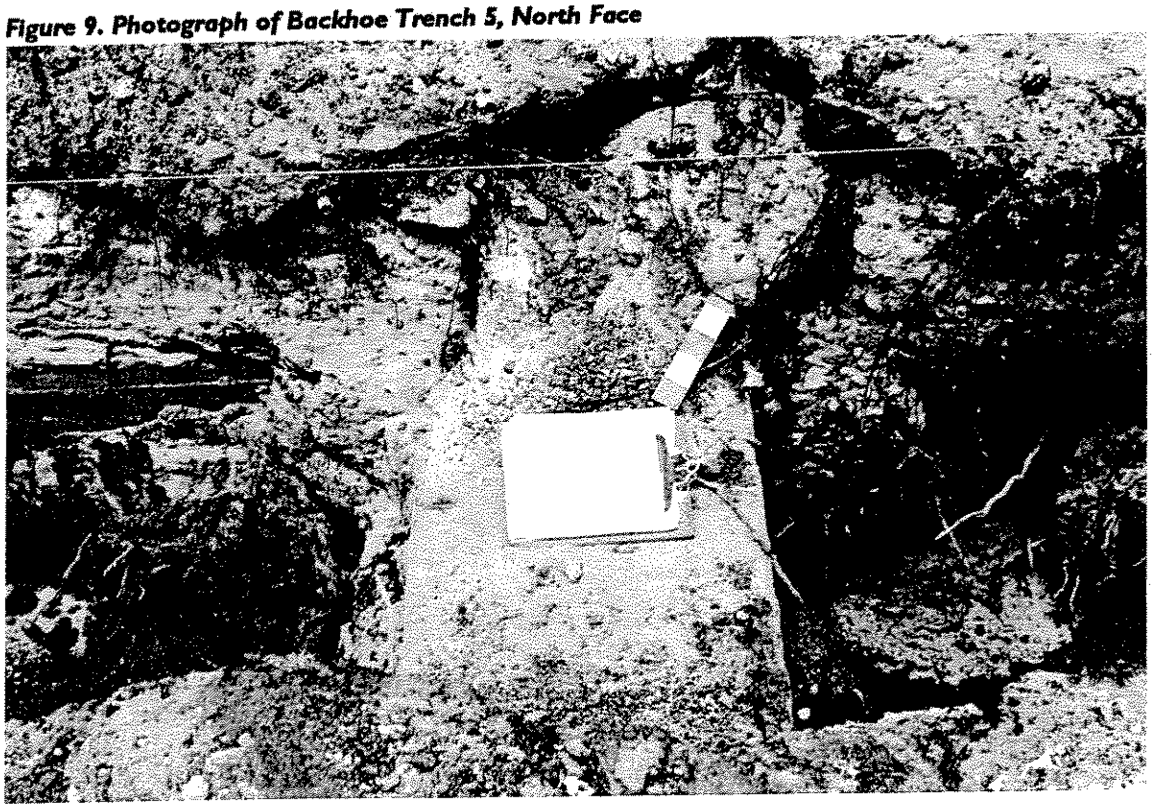


Figure 10. Photograph of Backhoe Trench 7, South Face

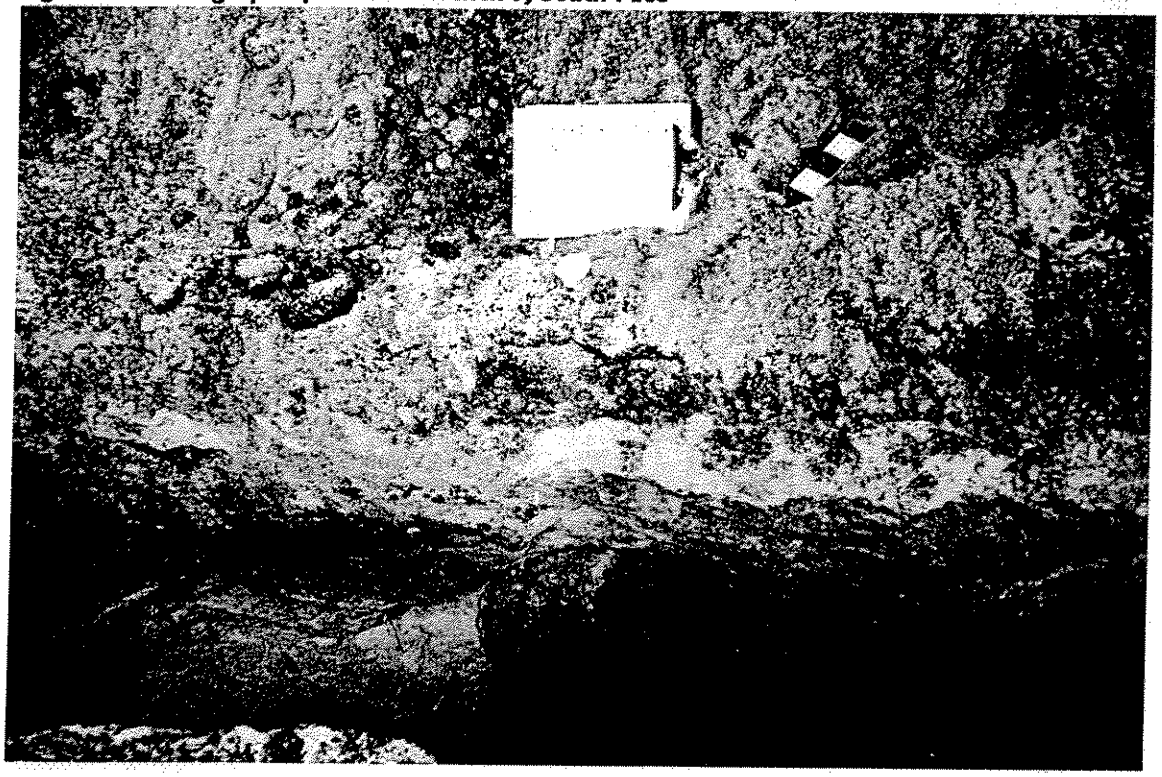


Figure 11. Photograph of Backhoe Trench 16, North Face

Figure 12. Photograph of Backhoe Trench 21, South Face

The sand in BT-5, below the disturbance, contained small shells and pieces of coral, whereas the sand further northeast, for example, in BT-7, did not contain as much of these materials. This may indicate that the original shoreline once existed in the area of BT-5, although other unknown factors may account for this difference. BT-5 is near the area postulated to be the 1880s shoreline (based on GPS data; *see Appendix A*).

BT-5 also contained recent materials found above a concrete slab (a spoon, a whole bottle and bottle fragments, and ceramic fragments). None of these materials appear older than the 1950s (*see Table 1*). During the current project, two passers-by stated that BT-5 was in the location of the former Tahitian Lanai Restaurant. The materials, therefore, probably represent a portion of a trash pit associated with the restaurant. The restaurant existed on the property from 1955 to 1996. Concrete footings found in BT-4 and BT-5 may have been foundation footings for the restaurant (see *Figures 3, 4, 8, and 9*).

Backhoe Trenches 20 and 21. BT-20 contained a single swimming pool tile in disturbed fill. BT-21 contained many concrete fragments in fill above a gley layer located above sea level. The fragments may be remains of the bottom of a swimming pool. During the course of the fieldwork, a hotel worker stated that a swimming pool once existed in the area of BT-21, and that the pool had simply been filled with soil and crushed limestone (which was noted in the stratigraphy of this backhoe trench; *Figures 7 and 12*).

The overall objectives of the current project were met, although certain specific subtasks could not be completed. The project was unable to determine with certainty the location of the property shoreline as it existed in the 1880s, although the project may have recovered some evidence (in BT-5) relevant to this question. Also, no trash dumps associated with the Japanese Tea House that once existed on the subject property could be found.

In conclusion, the current project has added, albeit minimally, to knowledge of the history of Waikiki. The following information was derived from this project: (a) the possible location of the 1880s shoreline; (b) the former location of the Tahitian Lanai Restaurant; (c) the former location of a recent swimming pool; and (d) confirmation of the soil stratigraphy in the area.

There are several likely explanations why so few cultural remains were found in the trenches: (1) the amount and variety of commercial and private construction and utilization of the project area has resulted in disturbance to such an extent that any cultural remains, including those of the Japanese Tea House, have been obliterated or mixed in with other disturbed fill over time; (2) refuse pits associated with the Japanese Tea House may exist in areas that were not tested due to the presence, or suspected presence, of subsurface electrical lines or water mains; and (3) the present testing simply did not, fortuitously, encounter these, or any other remains.

RECOMMENDATIONS

Based on the current findings, no further backhoe test excavations are recommended in the project area. Due to the possibility, however, that significant subsurface cultural remains are still present within the property, especially remains associated with the Japanese Tea House, it is recommended an archaeological monitor be present during any future subsurface disturbance.

SHPD CONSULTATION

On 16 April 2001, Dr. Paul Cleghorn of Pacific Legacy, Inc., met with SHPD Staff Archaeologist Dr. Sara Collins to inform her on the results of the backhoe trenching work. The principal points discussed were: (a) the project area was sufficiently sampled with 21 BTs placed; (b) the location of the shoreline ca. 1880s (*Figure 2*), based on the backhoe trenching findings, is relatively accurate; (c) several trenches placed seaward of the ca. 1880s shoreline did not identify trash pits associated with the Japanese tea houses that formerly existed in the area; (d) the area inland of ca. 1880s shoreline was tested to the extent possible given building and utility constraints; and (e) nothing outside of recent historic material was found in the 21 BTs excavated. Dr. Cleghorn suggested that, based on the current testing, there was a need to reevaluate whether subsurface testing was necessary in the area now occupied by the Waikikian Hotel; that subsurface testing was unnecessary due to the low probability of identifying significant cultural remains beneath the building, and that construction monitoring, however, was necessary due to the possibility that human burials might be encountered. Dr. Collins indicated that Dr. Cleghorn's suggestion had merit, and that she would await the final report on the project before making a decision on the matter (facsimile transmission dated 24 April 2001, to P. Rosendahl, PHRI, from P. Cleghorn, Pacific Legacy, Inc.). PHRI subsequently contacted (through Belt Collins Hawaii) Wimberly Allison Tong & Goo (WATG), the architectural firm that originally designed the Waikikian, seeking their opinion concerning the status, in regard to modification, of the land beneath the footprint of the Waikikian. WATG confirmed Dr. Cleghorn's opinion. In a letter dated 9 May 2001 (to Paul Rosendahl, PHRI, from Donald Goo, Chairman), Mr. Goo explained that the original design specifications for the Waikikian were no longer available but that the foundational work would have been one of two possible designs. In one design the area under the building would have been excavated to one-half foot below the ground water level for a minimum of 60% to 80%. In the other design the area would have been excavated to 100%. Mr. Goo concluded that it was "unlikely that under the footprint of the existing Waikikian building there is much undisturbed ground remaining above the water table. "

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APPENDIX A: HISTORICAL DOCUMENTARY RESEARCH

Prepared by Pacific Legacy, Inc.

THE PROJECT AREA

The property is a parcel located in Waikiki, Island of O'ahu, Hawai'i (TMK: 2-6-09: 2, 3 and 10). It is bounded to the north by Ala Moana Boulevard, to the east by Budget Car Rental, to the south by Hilton Hawaiian Village and to the west by the Hilton Lagoon and the Ilikai Hotel. The ground surface of the property is entirely disturbed and was formerly the site of the Waikikian Hotel and the Tahitian Lanai Restaurant that operated between 1955 and 1996.

In 1990, Bishop Museum (Hurst and Cleghorn 1990) conducted a historical literature and document search in conjunction with an Environmental Impact Statement (Kusao 1990) for the proposed redevelopment of the subject parcel. At that time, the project area contained several structures and the Waikikian Hotel and the Tahitian Lanai Restaurant were in operation.

METHODS

Archival research on the background of the subject parcel was performed at the State Historic Preservation Division (SHPD) Library in Kapolei, the State Surveyors Office, and the Bureau of Conveyances.

Correlation of historic maps was undertaken in an attempt to determine where the original shoreline was located prior to historic land filling. The SHPD Geographic Information System was accessed to determine extent of shoreline and location of adjacent archaeological sites. *Figure 1* shows the locations of former fishponds, previously recorded archaeological sites and the approximate location of the shoreline in ca. 1880.

HISTORICAL BACKGROUND

The *ahupua'a* of Waikiki has a rich and colorful past. Waikiki was once the favored spot for ruling chiefs of O'ahu. In the fourteenth century, "the new *ali'i nui*, Mailikukahi, transferred the seat of government to Waikiki" (Handy and Handy 1972:480). Under his line, Waikiki became rich and developed. Beckwith writes:

> . . .with Mailikukahi, Waikiki became the ruling seat of chiefs of Oahu. He carried out strict laws marked out land boundaries, and took the firstborn son of each family to be educated in his own household. He honored the priests, built *heiaus,* [sic] and discountenanced human sacrifice (Beckwith 1940: 383-384).

Kamehameha I kept a residence in Waikiki after his conquest of O'ahu. John Papa I'i writes:

> This place had long been a residence of chiefs. It is said that it had been Kekuapoi's home, through her husband Kahahana, since the time of Kahekiki (I'i 1959:17).

mainly the many ponds and terraces, thus making the previous "swamp land" useable to the United States Military (for Fort DeRussy) and to others for commercial use (Nakamura 1979).

LAND COMMISSION AWARD (LCA)

A single LCA was awarded within the project area. LCA 1775 was awarded to Paoa in 1852. His claim was stated on December 16, 1847:

> I hereby state my claim for a section of irrigation ditch. I do not know its length – perhaps it is two fathoms more or less. The length of my interest at this place is from the time of Kaahumanu I, which was when my people acquired this place, and until this day when I am telling you, no one has objected at this place where I live. The houselot where we live is on the north of the government fence at Kalia. Some planted trees grow there—five hau and four hala. There is a well which is used jointly.

This Royal Patent for the claim was awarded to Paoa on December 7, 1870 (Royal Patent No. 7033) (*see Figure 2*).

In addition to the LCA award, two Land Court applications were awarded for the current project area. The applications were obtained by the descendants of Paoa for land located directly adjacent (oceanside) to the LCA. This land had been created by land filling that created land where the ocean had once been. Presumably, a portion of the LCA's original ground surface was covered with fill.

The subject parcel has undergone many changes since the awarding of the LCA. Two dwellings and a barn were present on the *mauka* portion of the property in 1895. In 1914, an unidentified single-story structure was present on the property. In 1918, a section of the property was used as a commercial tea house (Polk-Husted 1918:1275, as quoted in Hurst and Cleghorn 1990:7). In 1930, a new teahouse (the *Shioyu Tea Gardens*) was opened on the property and existed until 1940 (*Figure 3*).

PREVIOUS ARCHAEOLOGY

Given the vast amount of literature associated with such a large *ahupua'a* as Waikiki, this document will provide only a cursory review of the archaeology of Waikiki and focus on the immediate are surrounding the project area.

Most of the archaeological studies that have been undertaken in the Waikiki area have occurred over the last 20 years. However, archaeological reports associated with Waikiki *ahupua'a* extend back 100 years. In 1901 human remains were discovered in the vicinity of the current Elks Club, near Kapiolani Park, on James B. Castle property (Emerson 1902:19). The remains were discovered while excavating for property improvements. The remains of four adults were uncovered, along with whale teeth and glass beads.

In 1930, J. Gilbert McAllister conducted an island-wide survey of O'ahu. He reported a total of four *heiau* (or temple) sites within the vicinity of Waikiki (McAllister 1933). The largest was Papaenaena (Site 58), located at the base of Diamond Head, in the area of Hawai'i School for Girls at La Pietra. This *luakini heiau* was used for human sacrifice and was reportedly associated with Kamehameha I. "Kenneth Emory of the Bishop Museum attempted to identify the foundation of the *heiau* in 1968 when the La Pietra property was being developed but the results were inconclusive" (Davis 1989: 20). Kukao'o heiau (Site 64) located on a small rise in Manoa Valley was reportedly constructed by the *menehune*. This site is on the property of Sam and Mary Cook and has been recently restored (Cleghorn 1992).

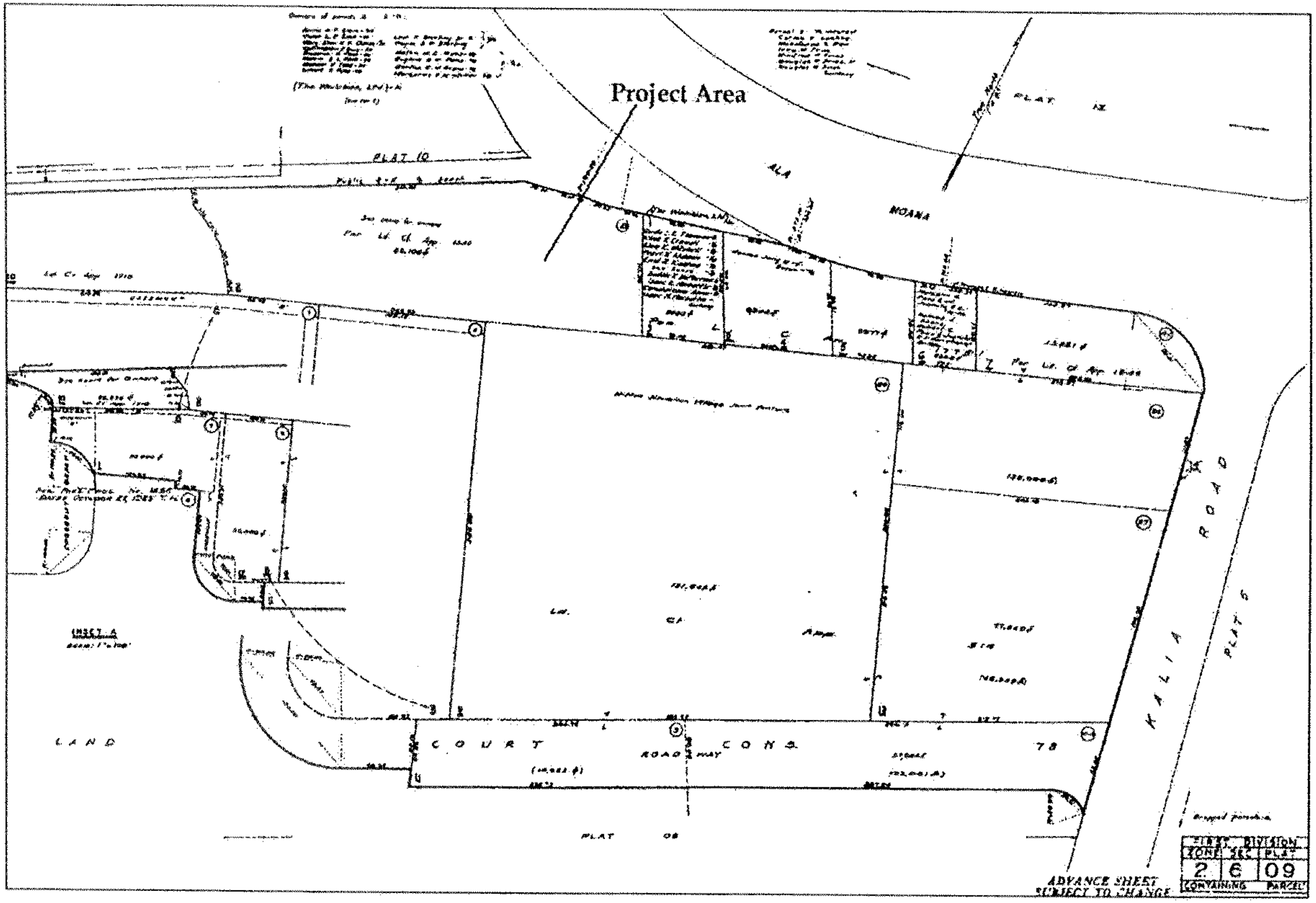

Figure 2. Project Location on TMK Map

In 1996, Pacific Legacy, Inc. conducted an archaeological inventory survey with subsurface testing for the then proposed Kalakaua Plaza, located on the *mauka* side of Kalakaua Avenue, directly across from Fort DeRussy. Archival research indicated that there was a probability of encountering fishpond deposits or other cultural resources associated with the intensive cultivation in Waikiki (Cleghorn 1996). A total of seven backhoe trenches were excavated during the course of field investigations. No cultural deposits were identified. The area was determined to be extremely wet or marshy and was "not conducive for traditional economic practices" (Cleghorn 1996:15).

In 1999, Hammatt and McDermott (1999) recovered the remains of two human burials (Site 50-80-14-5744-1 and 2) located along Kalakaua Avenue, near Ena Road. The remains were uncovered during the placement of anti-crime lighting in Waikiki. The remains were located between 1.2 and 1.5 m below surface within a beige sand matrix.

In 2000, Cultural Surveys Hawaii (LeSuer et al. 2000) conducted an archaeological subsurface inventory survey on a parcel located directly across Kalakaua Avenue from the Fort DeRussy tennis courts and across Kalaimoku Street where Cleghorn (1996) conducted his investigation. The subsurface testing located the *'auwai* (Site 50-80-14-4970) or irrigation ditch that fed the fishponds of Waikiki. Also identified was a historic period wetland that appears to have been used for agricultural purposes (Site 50-80-14-5796). LeSuer also identified abundant micro-strata that was interpreted as fill episodes from the dredging of the Ala Wai Canal.

SITE PREDICTABILITY

Based on the historic background and literature search, several conclusions can be made regarding the cultural resources that may be present within the project area.

The archival research suggests that the shoreline of ca. 1880 may be located at the midway portion of the project area. This means that the *makai* portion of the project area will likely be devoid of traditional cultural remains, and the traditional remains will be found in the *mauka* portion of the property.

The historically filled and created areas could contain historic resources associated with the various tea houses and other ventures that occurred on the property. Historic features such as trash dumps, out-houses, building foundations, etc., could be buried within the fill on the property. Further, isolated artifacts such as bottles and tools deposited during the various filling episodes may also be encountered. These resources, although not traditional, are still important aspects of our past and are protected by State Preservation Laws.

Most important, it is always possible that human remains may be encountered within the subject parcel. Archival research indicates that both traditional Hawaiian and historic remains have been encountered in the area. Traditional Hawaiian burials could be present within the original ground surface inland of the 1880 shoreline and undocumented historic burials could be present anywhere within the property.

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APPENDIX B: DETAILED STRATIGRAPHIC DESCRIPTIONS for BACKHOE TRENCHES

Backhoe Trench 1, South Face

Layer	Description
I	0.020-0.26 mbd; ranges in thickness from c. 0.13-0.17 m; dark brown (10YR 3/3 moist); clay; structureless, medium, blocky; soft, very friable, slightly sticky, slightly plastic; common, medium, tubular roots; recent fill mixed with gravel;
II	0.16-1.12 mbd; ranges in thickness from c. 1.03-1.12 m; light yellowish brown (2.5YR 6/4 moist); coarse sand; structureless, medium, single grain; loose, non-coherent, non-sticky, non-plastic; many, medium, tubular roots; abrupt, irregular boundary; electric lines in the southwest corner; undisturbed appearance in other areas; sterile sand;
III	1.28-1.36 mbd; thickness 0.80 m; light gray (N7/ moist) gley, very coarse sand; structureless, medium, single grain; loose, non-coherent, non-sticky, non-plastic; very few, fine, vesicular roots; clear, irregular boundary; sea level reached at 1.36 cmbd; undisturbed sterile sand.

Backhoe Trench 2, North Face

Layer	Description
I	0.5-0.24 mbd; ranges in thickness from c. 0.10-0.19 m; dark brown (10YR 3/3 moist); clay mixed with gravel; structureless, medium, blocky; friable; non-coherent, non-sticky, non-plastic; common, medium, vesicular roots; abrupt, irregular boundary; recent fill;
II	0.24-0.58 mbd; ranges in thickness from c. 0.33-0.37 m; dark yellowish brown (10YR 4/4 moist); gravel; structureless, coarse, blocky, friable, non-coherent, non-sticky, non-plastic; common, medium, vesicular roots; abrupt, irregular boundary; contains recent rubble;
III	0.73-1.53 mbd; ranges in thickness from c. 0.59-0.61 m; pale yellow (2.5 YR 7/4 moist); coarse sand; structureless, medium, single grain; non-sticky, non-plastic; many, medium, vesicular roots; clear, irregular boundary; sterile sand;
IV	1.33-1.43 mbd; 0.10 m thick; light gray (N 7/ moist) gley, very coarse sand; structureless, medium, single grain; non-sticky, non-plastic; very few, fine roots; reached sea level at 1.43 mbd; sterile gley.

Backhoe Trench 3, North Face

Layer	Description
I	0.04-0.15 mbd; ranges in thickness from c. 0.05-0.10 m; dark brown (10YR 3/3 moist) sandy clay loam; structureless, medium, blocky; loose, non-coherent; very few, medium, vesicular roots; abrupt, irregular boundary; recent fill with gravel;
II	0.12-0.48 mbd; ranges in thickness from c. 0.33-0.38; dark, yellowish brown (10YR 4/4 moist) gravel mixed with concrete rubble; structureless, medium, blocky; loose, non-coherent; few, medium, vesicular roots; abrupt, irregular boundary;
III	0.65-1.38 mbd; 0.70 m thick; pale yellow (2.5YR 7/4 moist) coarse sand; structureless, medium, small grain; loose, non-coherent; many, medium roots; clear, irregular boundary; sterile sand.

Backhoe Trench 4, North Face

Layer	Description
I	0.07-0.17 mbd; ranges in thickness from c. 0.07-0.10 m; dark brown (10YR 3/3 moist), clay and recent fill with gravel; weak, medium, blocky; firm, non-sticky, non-plastic, many, medium roots; abrupt, irregular boundary;
II	0.15-0.32 mbd; ranges in thickness from c. 0.10-0.17 m; dark, yellowish brown (10YR 4/4 moist), coarse gravel with concrete rubble; structureless, blocky; loose, non-coherent, non-sticky, non-plastic; few, medium roots; abrupt, irregular boundary;
III	0.68-1.38 mbd; 0.70 m thick; pale yellow (2.5 YR 4/4 moist), coarse sand, structureless, medium, single grain; loose, non-coherent; many, medium roots; clear, irregular boundary; sterile sand.

Backhoe Trench 5, North Face

Layer	Description
I	0.04-0.20 mbd; ranges in thickness from 0.04-0.08 m; dark brown (10YR 3/3 moist), gravelly sandy clay loam with recent fill including glass; weak, medium, blocky; firm, non-sticky, non-plastic, many, medium roots; abrupt, irregular boundary;
II	0.16-0.40 mbd; ranges in thickness from 0.04-0.08 m; dark, yellowish brown (10YR 4/4 moist), coarse gravel with concrete rubble; structureless, blocky; loose, non-coherent, non-sticky, non-plastic; many, medium roots; abrupt, irregular boundary;
III	0.32-0.52 mbd; ranges in thickness from 0.20-0.28 m; grayish brown (10YR 5/2 moist), coarse sand in disturbed soil; structureless, medium, single grain, loose, non-coherent, non-sticky, non-plastic; many, medium roots, abrupt, irregular boundary;

IV 0.60-1.36 mbd; 0.56 thick; pale yellow (2.5 YR 7/4 moist) coarse sand; structureless, medium, single grain, loose, non-coherent, non-sticky, non-plastic; many, medium roots, water table encountered at 1.36 mbd.

Backhoe Trench 6, North Face

Layer	Description
I	0.08-0.19 mbd; ranging in thickness from 0.10-0.12 m; dark brown (10YR 3/4 moist), clay with recent gravel fill; weak, medium, blocky; firm, non-sticky, non-plastic, very few, medium roots; abrupt, irregular boundary;
II	0.18-1.18 mbd; ranging in thickness from 0.90-1.05 m; gray (10YR 5/1 moist), crushed limestone with gray streaks throughout; structureless, coarse, sub-angular blocky; friable, loose, non-sticky, non-plastic; many, medium roots, abrupt, irregular boundary;
III	1.10-1.38 mbd; ranging in thickness from 0.04-0.30 m; pale yellow (2.5 YR 4/4 moist), coarse sand, structureless, medium, single grain; loose, non-coherent; many, medium roots; clear, irregular boundary; sterile sand; water table reached at 1.38 mbd.

Backhoe Trench 7, North Face

Layer	Description
I	0.08-0.20 mbd; 0.12 m in thickness. Asphalt paving in parking lot;
II	0.20-0.28 mbd; ranging in thickness from 0.04-0.08 m; dark (10YR 4/1 moist) gray gravel below asphalt paving; non-cultural;
III	0.24-0.55 mbd; ranging in thickness from 0.24-0.55 m; white (10YR 8/2 moist) white crushed limestone; non-cultural;
IV	0.42-1.00 mbd; ranging in thickness from 0.37-0.60 m; light brownish gray (10YR 6/2 moist), coarse sand in disturbed, mixed, and marbled soil; structureless, medium, single grain; loose, non-coherent, non-sticky, non-plastic; common, medium roots; clear, irregular boundary;
V	0.80-1.32 mbd; ranging in thickness from 0.24-0.44 m; pale yellow (2.5 YR 7/4 moist) coarse sand; structureless, medium, single grain, loose, non-coherent, slightly sticky, non-plastic; many, medium roots; water table reached at 1.32 m.

Backhoe Trench 8, South Face

Layer	Description
I	0.07-0.19 mbd; 0.12 m thick; recent asphalt layer; non-cultural;
II	0.19-0.28 mbd; ranging in thickness from 0.08-0.12 m; dark gray (10YR 4/1 moist) gravel; structureless, coarse, blocky; non-coherent, non-sticky, non-plastic; very few fine, roots; very abrupt, smooth, boundary;

Layer	Description
III	0.24-0.48 mbd; ranging in thickness from 0.20-0.24 m; white (10YR 8/2) crushed limestone; non-cultural;
IV	0.28-0.52 mbd; 0.04 m thick; recent asphalt layer; non-cultural;
V	0.52-1.12 mbd; ranging in thickness from 0.28-0.60 m; light brownish, gray (10YR 6/2) coarse sand; structureless, medium, single grain, loose, non-coherent, non-sticky, non-plastic; many, fine roots; clear, irregular boundary;
VI	0.80-1.24 mbd; ranging in thickness from 0.12-0.44 m; pale yellow (2.5 YR 7/4 moist) coarse sand; structureless, medium, single grain, loose, non-coherent, slightly sticky, non-plastic; many medium roots; water table reached at 1.24 m.

Backhoe Trench 9, South Face

Layer	Description
I	0.07-0.19 mbd; 0.12 m thick; recent asphalt layer; non-cultural;
II	0.19-0.31 mbd; ranging in thickness from 0.10-0.20 m; dark gray (10YR 4/1 moist) gravel; structureless, coarse, blocky; non-coherent, non-sticky, non-plastic; very few fine, roots; very abrupt, smooth, boundary;
III	0.23-0.48 mbd; ranging in thickness from 0.08-0.18 m; white (10YR 8/2) crushed limestone; non-cultural;
IV	0.48-0.60 mbd; 0.08 m thick; recent asphalt layer; non-cultural;
V	0.52-1.12 mbd; ranging in thickness from 0.28-0.60 m; light brownish, gray (10YR 6/2) coarse sand; structureless, medium, single grain, loose, non-coherent, non-sticky, non-plastic; many, fine roots; clear, irregular boundary;
VI	0.51-1.40 mbd; ranging in thickness from 0.12-0.44 m; light brownish (10YR 6/2 moist), coarse sand; structureless, medium, single grain, loose, non-coherent, slightly sticky, non-plastic; common, medium roots; water table reached at 1.40 m.

Backhoe Trench 10, South Face

Layer	Description
I	0.12-0.20 mbd; 0.08 m thick; recent asphalt layer; non-cultural;
II	0.20-0.39 mbd; ranging in thickness from 0.12-0.19 m; dark gray (10YR 4/1 moist), coarse gravel; blocky, loose, non-coherent, very few fine roots; very abrupt, smooth boundary;
III	0.30-0.60 mbd; ranging in thickness from 0.17-0.24 m; white (10YR 8/2 moist) crushed limestone; non-cultural;
IV	0.54-1.39 mbd; 0.83 m thick; dark grayish brown (10YR 4/2 moist), coarse sand; structureless, medium, single grain; loose, non-coherent, common, fine roots; water table encountered at 1.39 m.

Backhoe Trench 11, South Face

Layer	Description
I	0.08-0.16 mbd; 0.08 m thick; recent asphalt layer; non-cultural;
II	0.16-0.26 mbd; ranging from 0.06-0-0.10 m in thickness; dark gray (10YR 4/1 moist), coarse gravel; blocky, loose, non-coherent, very few fine roots; very abrupt, smooth boundary;
III	0.21-0.47 mbd; ranging in thickness from 0.06-0.10 m; white (10YR 8/2 moist) crushed limestone; non-cultural;
IV	0.35-0.48 mbd; ranging in thickness from 0.03-0.17 m; grayish brown (10YR 5/2 moist), coarse sand, disturbed and marbled; structureless, medium, single grain, loose, non-coherent, common, fine roots; very abrupt, irregular boundary;
V	0.48-0.35 mbd; ranging in thickness from 0.06-0.08 m; yellow, crushed limestone; non-cultural;
VI	0.54-0.96 mbd; ranging in thickness from 0.08-0.44 m; grayish brown (10YR 5/2) coarse sand; structureless, medium, single grain, loose, non-coherent, common, medium roots; clear irregular boundary;
VII	0.61-1.29 mbd; ranging in thickness from 0.28-0.60 m; pale yellow (2.5 YR 7/4 moist) coarse sand; structureless, medium, single grain, loose, non-coherent, slightly sticky, non-plastic; many, medium roots; water table reached at 1.29 m.

Backhoe Trench 12, North Face

Layer	Description
I	0.08-0.16 mbd; 0.08 m thick; recent asphalt; non-cultural;
II	0.16-0.32 mbd; ranging in thickness from 0.12-0.16; dark gray (10YR 4/1) coarse sand and gravel; structureless, coarse, blocky; loose, non-coherent, many, fine roots; very abrupt, smooth boundary;
III	0.26-0.54 mbd; ranging in thickness from 0.20-0.26 m; white (10YR 5/2 moist) white crushed coral; non-cultural;
IV	0.52-0.80 mbd; ranging in thickness from 0.22-0.30 m; grayish brown (10YR 5/2 moist) coarse sand mixed with crushed limestone; structureless, medium, single grain, loose, non-coherent, non-sticky, non-plastic, common, fine roots; clear, irregular boundary;
V	0.75-1.28 mbd; ranging in thickness from 0.47-0.56 m; pale yellow (2.5 YR 7/4 moist) coarse sand; structureless, medium, single grain, loose, non-coherent, slightly sticky, non-plastic; many, medium roots; clear, irregular boundary; water table reached at 1.28 m.

Backhoe Trench 13, North Face

Layer	Description
I	0.08-0.20 mbd; 0.12 m thick; recent asphalt; non-cultural;
II	0.20-0.32 mbd; ranging in thickness from 0.14-0.16 m; dark gray (10YR 4/1 moist) gravel; structureless, coarse, blocky; loose, non-coherent, non-sticky, non-plastic, very few, fine roots; very abrupt, smooth boundary;
III	0.29-0.48 mbd; ranging in thickness from 0.13-0.16 m; dark brown (10YR 4/3 moist) silty clay, recent; weak, coarse, blocky, loose, non-coherent, non-sticky, non-plastic; very few, medium roots; very abrupt, wavy boundary;
IV	0.48-0.59 mbd; ranging in thickness from 0.10-0.12 m; white (10YR 8/2 moist) crushed limestone; non-cultural;
V	0.59-0.64 mbd; 0.04 m thick; recent asphalt; non-cultural;
VI	0.64-0.72 mbd; ranging in thickness from 0.06-0.08 m; white (10YR 8/2 moist) crushed limestone; non-cultural;
VII	0.72-0.76 mbd; 0.04 m thick; cement, probably poured over rocks; non-cultural;
VIII	0.76-1.52 mbd; 0.76 m thick; pale yellow (2.5 YR 7/4 moist) coarse sand; structureless, medium, single grain, loose, non-coherent, slightly sticky, non-plastic; many, medium roots; water table reached at 1.29 m. Water table reached at 1.52 m.

Backhoe Trench 14, South Face

Layer	Description
I	0.10-0.24 mbd; 0.10 m thick; recent asphalt; non-cultural;
II	0.24-0.40 mbd; ranging in thickness from 0.12-0.18 m; dark gray (10YR 4/1 moist) gravel; structureless, coarse, blocky; loose, non-coherent, non-sticky, non-plastic, very few, fine roots; very abrupt, smooth boundary;
III	0.36-0.88 mbd; ranging in thickness from 0.36-0.52 m; white (10YR 8/2 moist), crushed limestone; non-cultural;

Backhoe Trench 15, North Face

Layer	Description
I	0.04-0.69 mbd; ranging in thickness from 0.24-0.69 m; very dark grayish brown (10YR 3/2 moist) clay loam, recent disturbance; structureless, coarse, blocky, soft, friable, non-sticky, non-plastic; very few, fine roots; very abrupt, irregular boundary;

Layer	Description
II	0.24-1.20 mbd; ranging in thickness from 0.52-0.72 m; yellow, crushed limestone; non-cultural;
III	1.00-1.48 mbd; ranging in thickness from 0.28-0.40 m; light gray (2.5YR 7/2 moist) coarse sand; structureless, medium, single grain, loose, non-coherent, non-sticky, non-plastic; very few, fine roots; water table reached at 1.48 m.

Backhoe Trench 16, North Face

Layer	Description
I	0.12-0.36 mbd; ranging in thickness from 0.22-0.24 m; very dark grayish brown (10YR 3/2 moist), clay loam; structureless, medium, blocky; slightly hard, friable, slightly sticky, slightly plastic; few, medium roots; very abrupt, irregular boundary; disturbed recent fill;
II	0.36-0.56 mbd; ranging in thickness from 0.20-0.22 m; recent cement; non-cultural;
III	0.56-1.28 mbd; ranging in thickness from 0.44-0.64 m; white (10YR 8/2 moist); crushed limestone fill; non cultural;
IV	1.28-1.68 mbd; ranging in thickness from 0.30-0.48 m; gley (5B51); clay sand at water level; non-cultural.

Backhoe Trench 17, North Face

Layer	Description
I	0.40-0.18 mbd; ranging in thickness from 0.14-0.16 m; 10YR 4/1; structureless, coarse, blocky; loose, non-coherent; very few roots; very abrupt, smooth boundary; recent dark gravel;
II	0.13-0.56 mbd; ranging in thickness from 0.36-0.40 m; white (10YR 8/2); structureless, coarse, blocky; non-coherent, very few roots; very abrupt, irregular boundary; crushed limestone fill;
III	0.56-0.72 mbd; 0.16 m thick; cement;
IV	1.43-1.52 mbd; ranging in thickness from 0.72-0.69 m; pale yellow (2.5YR 7/4); sand; coarse; structureless, medium, single-grain; loose, non-coherent; many roots; clear, irregular boundary; non-cultural; loose sand above water level.
V	1.43-1.52 mbd; ranging in thickness from 0.80-0.10 m; light gray (7.5 YR 7/0) coarse sand, non-cultural; structureless, single-grain; slightly sticky; very few roots; clear, irregular boundary.

Backhoe Trench 18, East Face

Layer	Description
I	0.8-0.28 mbd; ranging in thickness from 0.12-0.20 m; dark brown (7.5YR 4/3), recent sandy clay fill; structureless, medium, blocky; loose, non-coherent; many roots; abrupt, wavy boundary;
II	0.28-1.46 mbd; ranging in thickness from 1.28-1.32 m; light yellowish brown (10YR 6/4); coarse sand; structureless, medium, single grain; loose, non-coherent; many roots; clear, irregular boundary.
III	1.46-1.54 mbd; 0.8 m thick; bluish gray (SB51) sandy clay gley; structureless, medium, blocky; slightly sticky; very few roots ; clear wavy boundary.

Backhoe Trench 19, South Face

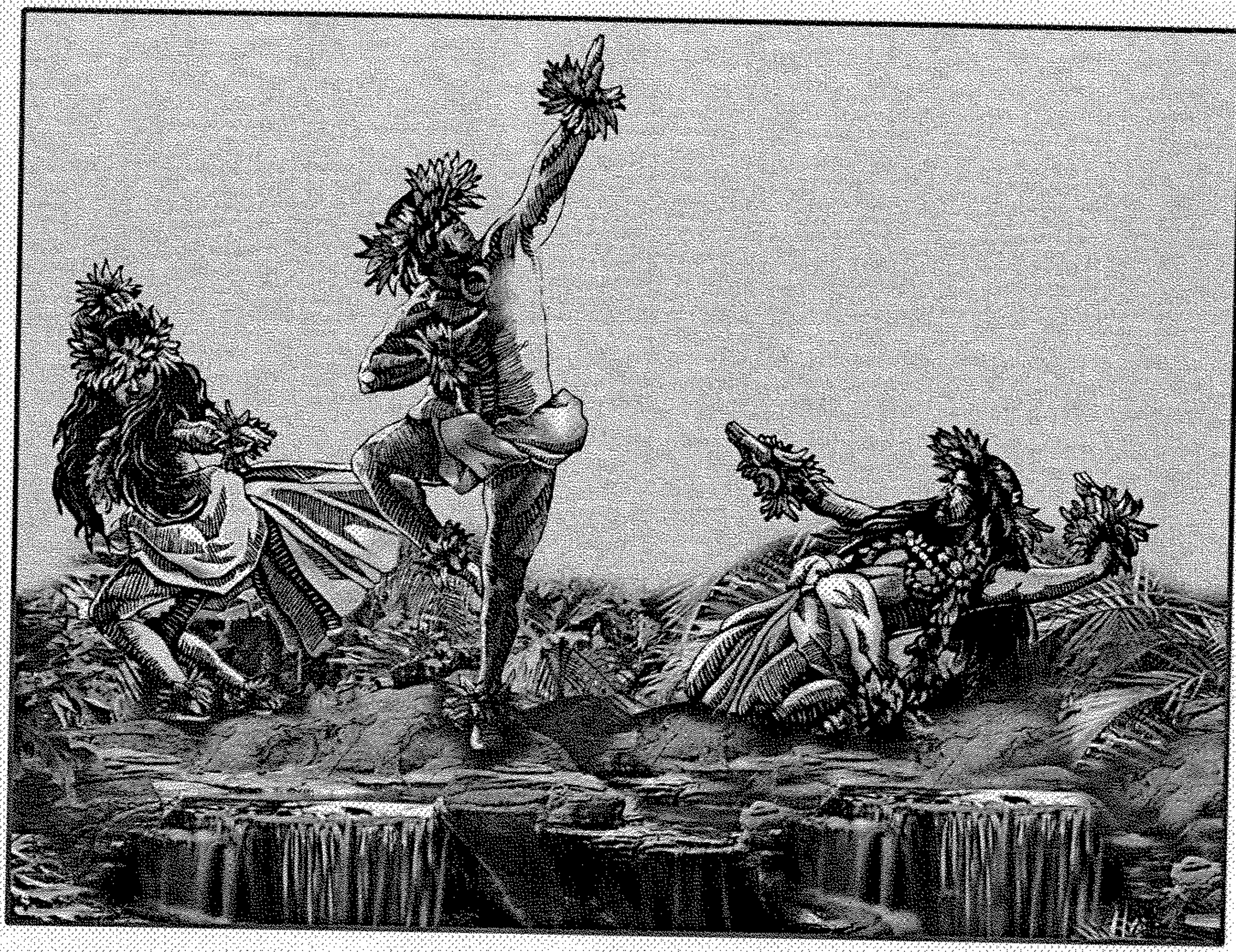
Layer	Description
I	0.60-0.28 mbd; ranging in thickness from 0.12-0.20 m; dark brown (7.5YR 4/3) recent fill; sandy clay; structureless, medium, subangular blocky; loose, non-coherent; many roots; abrupt, wavy boundary; cement and ceramic fragments present;
II	0.24-1.48 mbd; ranging in thickness from 1.12-1.16 m; white (10YR 8/2) sandy clay; structureless, medium, subangular blocky; loose, non-coherent; many roots; very abrupt, irregular boundary; crushed limestone fill;
III	1.45-1.58 mbd; 0.10 m thick; bluish gray (5B51) gley; sandy clay; clear, wavy boundary; structureless, medium, blocky; slightly sticky; very few roots.

Backhoe Trench 20, East Face

Layer	Description
I	0.10-0.19 mbd; ranging in thickness from 0.80-0.10 m; dark brown (7.5YR 4/3) loamy clay; structureless, medium, subangular blocky; loose, non-coherent; very few roots; abrupt, wavy boundary; recent fill with trash.
II	0.17-1.35 mbd; ranging in thickness from 1.08-1.12 m; white (10YR 8/2); stones and stony; loose, non-coherent, very few roots; very abrupt, irregular boundary; crushed limestone fill, recent trash;
III	1.35-1.86 mbd; ranging in thickness from 0.50-0.54 m; bluish gray (5B51) gley; stones and stony; slightly sticky; very few roots; very abrupt irregular boundary; mixed with crushed limestone fill.

Backhoe Trench 21, South Face

Layer	Description
I	0.8-0.37 mbd; ranging in thickness from 0.80-0.29 m; dark brown (7.5YR 4/3), loamy clay; structureless, subangular blocky; loose, non-coherent; very few roots; abrupt, wavy boundary; recent fill with trash;
II	0.16-0.73 mbd; ranging in thickness from 0.20-0.22 m; white (10YR 8/2); stones and stony; structureless, coarse, blocky; loose, non-coherent; very few roots; very abrupt irregular boundary; crushed limestone fill;
III	0.64-1.39 mbd; ranging in thickness from 0.56-0.68 m; dark brown (7.5YR 4/3) loamy clay; loose, non-coherent; very few roots; abrupt wavy boundary; crushed limestone fill present;
IV	1.38-1.87 mbd; ranging in thickness from 0.48-0.56 m; bluish gray (5B51) gley; stones and stony; loose, non-coherent; very few roots; very abrupt, irregular boundary; mixed with crushed limestone fill.



Appendix D

Cultural Impact Assessment for Draft Environmental Impact Statement

prepared by

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PHRI

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PHRI Report 2158-061201

CULTURAL IMPACT ASSESSMENT FOR DRAFT ENVIRONMENTAL IMPACT STATEMENT

HILTON HAWAIIAN VILLAGE WAIKIKIAN PROJECT

Land of Waikiki, Honolulu (Kona) District
Island of O'ahu (TMK:2-6-9:2,3,10)

The purpose of this cultural impact assessment is to comply with the requirements of *Chapter 343 (Haw.Rev.Stat.)*, as recently amended by H.B. No.2895 H.D.1 of the Hawai'i State Legislature (2000) and approved by the Governor as *Act 50* on April 26, 2000, and which among other things requires that environmental assessments (EA) and impact statements (EIS) identify and assess the potential effects of any proposed project upon the "...cultural practices of the community and State...." *Chapter 343 (Haw.Rev.Stat.)* was amended by the State legislature because of the perceived need to assure that the environmental review process explicitly addressed the potential effects of any proposed project upon "...Hawai'i's culture, and traditional and customary rights." Guidelines previously prepared and adopted by the State Office of Environmental Quality Control (OEQC) 1997) provide compliance guidance. Both *Act 50* and the OEQC *Guidelines for Assessing Cultural Impacts* mandate consideration of all the different groups comprising the multi-ethnic community of Hawaii. This inclusiveness, however, is generally understated, and the emphasis–as indicated by a background review (PHRI 1998:5-8) of the cultural impact assessment issue, and the intent and evolution of both the legislative action and the guidelines–is clearly meant to be primarily upon aspects of Native Hawaiian culture–particularly traditional and customary access and use rights.

The scope of work and methodology for the Hilton Hawaiian Village Waikikian Project cultural impact assessment is based on the general assumption that the level of study effort appropriate in any project-specific context should involve the consideration of several factors, the most relevant of which are the following: (a) the probable number and significance of known or suspected cultural properties, features, practices, or beliefs within or associated with the specific project area; (b) the potential number of individuals (potential informants) with cultural knowledge of the specific project area; (c) the availability of historical and cultural information on the specific project area or immediately adjacent lands; (d) the physical size, configuration, and natural and human modification history of the specific project area; and (e) the potential effects of the project on known or expected cultural properties, features, practices, or beliefs within or related to the specific project area. Consideration of these factors within the specific nature and context of the proposed Hilton Hawaiian Village Waikikian Project, as well as consultations with professional staff in the City and County of Honolulu–Department of Planning and Permitting (L. Sichter, pers.comm.), and in the State Historic Preservation Division–History and Culture Branch, indicated that the most appropriate level of study for an adequate assessment of potential cultural impacts would be a limited or abbreviated assessment study. Based on the location and the intensive historic period to recent occupation, commercial development, and utilization of the project area, this study assumes that (a) with the exception of shoreline access for purposes of recreation and marine resource exploitation, potential cultural impact assessment issues would be highly unlikely, (b) the negative results of the archaeological inventory survey conducted for the project would confirm both the greatly altered physical nature of the project area and the absence of cultural resources within or related to the project area, and (c) in the unlikely instance that any legitimate cultural impact assessment issues should arise during the environmental review period, they could be addressed adequately within the framework of the review process (i.e., from Draft to Final EIS).

In April of this year, PHRI completed the archaeological inventory survey of the project area (Corbin 2001; Appendix __, this DEIS). Historical background research done as part of the survey (Corbin 2001: Appendix A) documented both the greatly altered physical nature of the project area and the probable absence of cultural properties, features, practices, or beliefs within or associated with project area. Subsequent to the awarding of a Land Commission Award within the project area in 1852 (LCA 1775, to Paoa), the project area underwent significant alteration related to occupation and commercial development, as indicated by deposition of fill material to create additional land (date uncertain), presence of two houses and a barn in 1895 and a another structure in 1914, a commercial teahouse in 1918 and a later teahouse from 1930 through 1940, and more recently the Waikikian Hotel (scheduled for demolition) and the Tahitian Lanai Restaurant (already demolished) which operated between 1955 and 1996. As part of the archaeological inventory survey of the project area, subsurface testing for the presence or absence of potential significant archaeological or cultural resources was carried out by means of 21 backhoe trenches (Corbin 2001). The test excavations, as anticipated, generally revealed highly disturbed soils and deposits of various fill materials resulting from the intensive historic period to recent occupation, commercial development, and utilization of the project area. No surviving evidence of any prehistoric or early historic period occupation or use of the project area was encountered, nor was any evidence of any potentially significant cultural properties, features, practices, or beliefs within or related to the project area.

The Hilton Hawaiian Village Waikikian Project area has been extensively modified during historic period to recent times, as indicated by (a) the current condition of the property and (b) the findings of the archaeological inventory survey which included both historical documentary research and subsurface test excavations, and which yielded no evidence of the presence of any potentially significant cultural resources–properties, features, practices, or beliefs–within or related to the project area. Furthermore, there is no indication of any kind that the project area is currently being used either by Native Hawaiian cultural practitioners exercising traditional and customary access and use rights for any purposes, or by individuals of any other cultural affiliation for any traditional cultural purposes. Based on the negative results of the recently completed archaeological inventory survey and the absence of any evidence that the project area is currently being used for legitimate traditional cultural purposes by either Native Hawaiian cultural practitioners or individuals of any other cultural affiliation, it can be concluded that the proposed Hilton Hawaiian Village Waikikian Project should have no significant effects–much less any adverse impacts–upon any cultural resources, and that no mitigation measures of any kind are needed.

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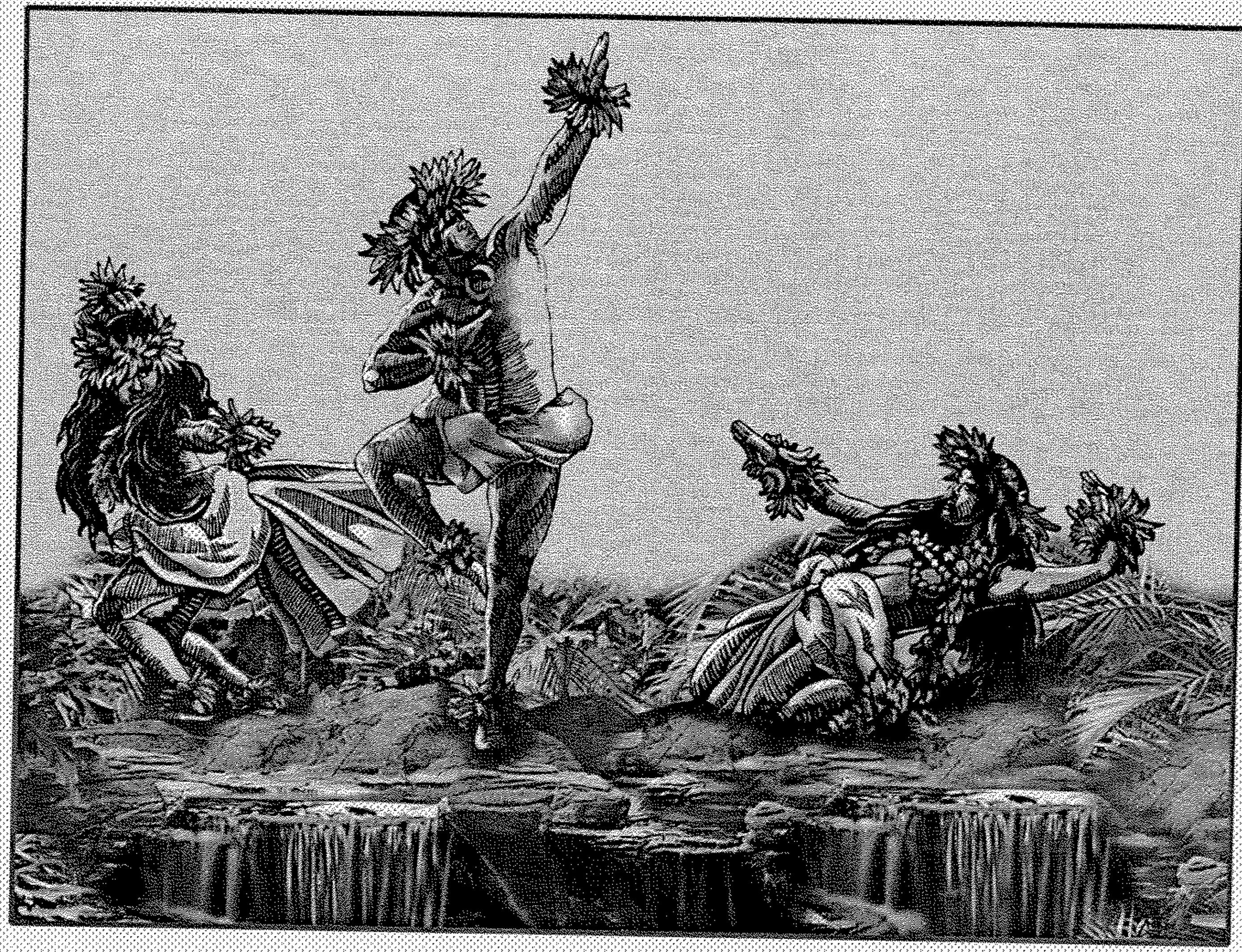

APPENDIX E

ACOUSTIC STUDY FOR THE WAIKIKIAN DEVELOPMENT PLAN AT THE HILTON HAWAIIAN VILLAGE

ACOUSTIC STUDY FOR THE WAIKIKIAN DEVELOPMENT PLAN AT THE HILTON HAWAIIAN VILLAGE HONOLULU, HAWAII

Prepared for:

BELT COLLINS HAWAII LTD.

Prepared by:

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JUNE 2001

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CHAPTER I. SUMMARY

The existing and future traffic noise levels in the vicinity of the proposed Waikikian Tower Project in Waikiki (see FIGURE 1) were evaluated for their potential impacts and their relationship to current FHA/HUD noise standards. The traffic noise level increases along the access roadways to and from the project site were calculated. No significant increases in traffic noise are predicted to occur along Ala Moana Boulevard, Kalia Road, and Ena Road as a result of project plus non-project traffic following project build-out by CY 2005. Traffic noise from Ala Moana Boulevard will continue to control background ambient noise levels in the project environs, with traffic noise levels exceeding 70 Ldn at existing and future resort units which front Ala Moana Boulevard. Mitigation of the high traffic noise levels will be required at all new resort units, and will be available in the form of closure and air conditioning of the future units in the Waikikian Tower Building.

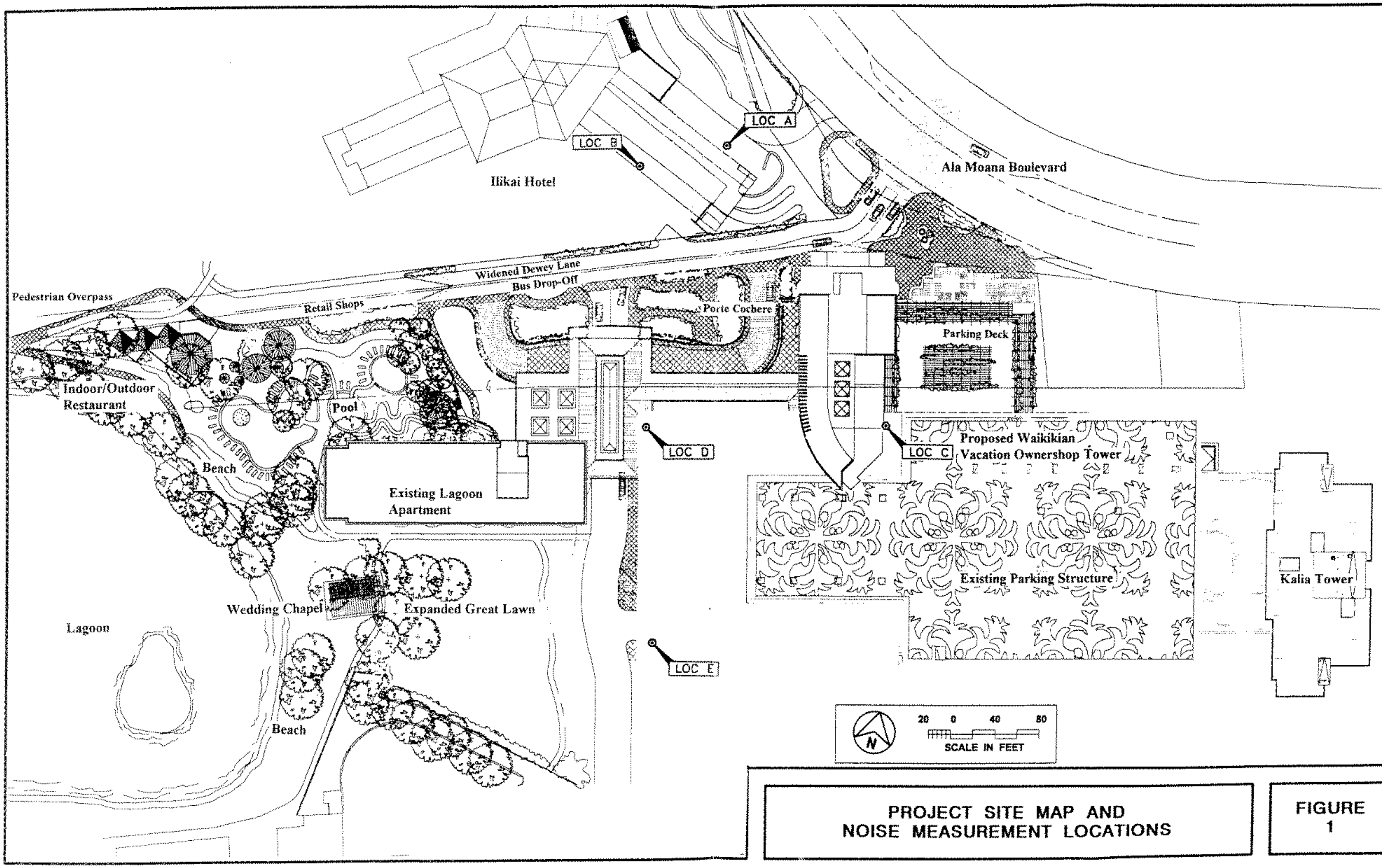
Project traffic will add less than 0.2 Ldn additional units of noise along Ala Moana Boulevard, Kalia Road, and Ena Road under the scenarios of worst case traffic volumes along all roadways in the project environs. These levels of traffic noise increases resulting from project generated traffic are not considered to be significant.

Larger increases in traffic noise levels are predicted to occur along Dewey Lane and Rainbow Drive at Dewey Lane under the worst case traffic scenarios. Total noise levels along the makai section of Dewey Lane will be controlled (or dominated) by existing mechanical equipment and loading dock activities, as well as future traffic along Dewey Lane and Rainbow Drive. Along the mauka section of Dewey Lane, traffic noise from Ala Moana Boulevard and Dewey Lane will be the dominant noise sources.

The large increases in traffic noise of approximately 10 Ldn units along Dewey Lane and Rainbow Drive at Dewey Lane, which could occur under the worst case scenarios, result from the projected addition of future traffic along the two narrow roadways which currently have relatively low traffic volumes. Under the scenarios with worst case traffic volumes along Dewey Lane and Rainbow Drive at Dewey Lane, CY 2005 traffic noise levels should be less than 65 Ldn at 64 foot setback distance from the centerlines of these two roadways.

The aircraft noise component should not exceed the Hawaii State Department of Transportation, Airports Division, recommended planning level of 60 Ldn for residences and resort units. Mitigation of aircraft noise levels is not required for the planned units in the Waikikian Tower building, but will be available in the form of closure and air conditioning of the planned resort units.

Unavoidable, but temporary, noise impacts may occur during construction of the proposed project, particularly during the excavation activities on the project site. Because construction activities are predicted to be audible within the project site and at adjoining properties, the quality of the acoustic environment may be degraded to



PROJECT SITE MAP AND
NOISE MEASUREMENT LOCATIONS

FIGURE
1

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 is recommended as a standard mitigation measure. The implementation of Hawaii State Department of Health permit procedures and curfew periods for construction activities is also expected for this project.

The present construction plans incorporate the use drilling and cast-in-place piles for the project, which should minimize risks of potential noise and vibration impacts on the surrounding area during the construction phase.

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 Waikikian Tower Project in Waikiki 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 which are 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.

Potential noise impacts from the activities and equipment at the planned Indoor/ Outdoor Restaurant, Swimming Pool with waterslide, and Retail Shops were also evaluated. Assessments of possible future impacts from short term construction noise at the project site were also included as noise study objectives. Recommendations for minimizing identified noise 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 or DNL). 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 2. 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 associated with Ala Moana Boulevard are greater than 70 Ldn along the Right-of-Way due to the large volume of traffic on that major thoroughfare.

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

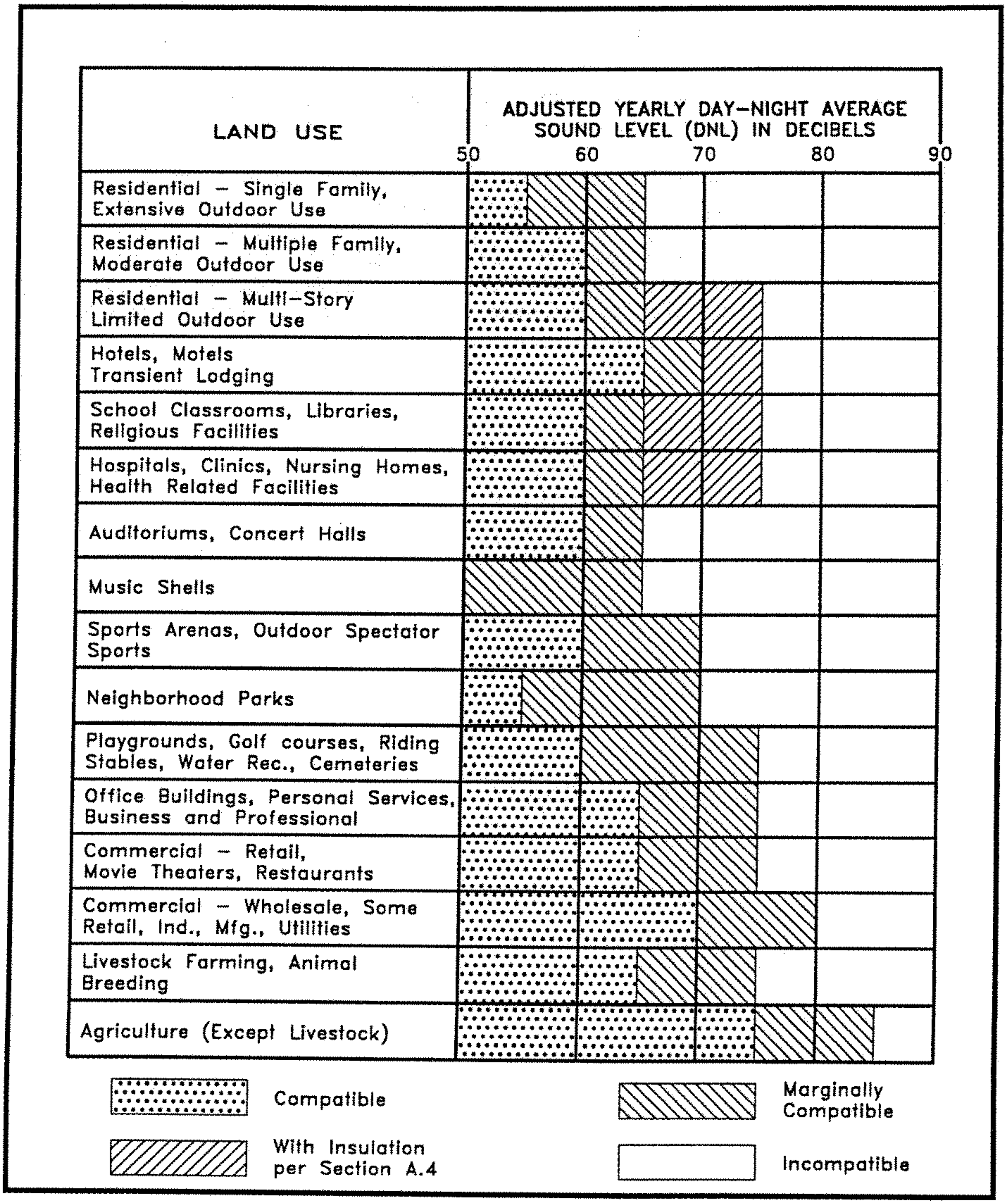
TABLE 1

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 DNL	Not Exceeding 55 Leq	Unconditionally Acceptable
Moderate Exposure	Above 55 DNL But Not Above 65 DNL	Above 55 Leq But Not Above 65 Leq	Acceptable(2)
Significant Exposure	Above 65 DNL But Not Above 75 DNL	Above 65 Leq But Not Above 75 Leq	Normally Unacceptable
Severe Exposure	Above 75 DNL	Above 75 Leq	Unacceptable

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

(2) FHWA uses the Leq instead of the Ldn 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 Leq.



LAND USE COMPATIBILITY WITH YEARLY AVERAGE DAY-NIGHT AVERAGE SOUND LEVEL (DNL) AT A SITE FOR BUILDINGS AS COMMONLY CONSTRUCTED.
(Source: American National Standards Institute S12.9-1998/Part 5)

FIGURE 2

from fixed mechanical equipment and construction activities. State DOH noise regulations are expressed in maximum allowable 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 single family residential lands equate to approximately 55 Ldn. For multifamily residential, commercial, and resort lands, the State DOH noise limits equate to approximately 60 Ldn. For light and heavy industrial lands, the State DOH noise limits equate to approximately 76 Ldn, respectively. Construction activities, which are typically noisier than the State DOH noise limits, are regulated through the issuance of permits for allowing excessive construction noise during limited time periods.

CHAPTER IV. GENERAL STUDY METHODOLOGY

Existing traffic and background ambient noise levels were measured at 5 locations (A, B, C, D, and E) in the project environs to provide a basis for describing the existing noise environment in the project environs. The locations of the measurement sites are shown in FIGURE 1. Location A was on the mauka (north) lanai of a 7th floor unit in the Renaissance Ilikai Waikiki, and Location B was on the makai (south) lanai of an 8th floor unit at the Ilikai. Locations C, D, and E were on the top of the existing parking garage structure at the Hilton Hawaiian Village.

Traffic and background ambient noise measurements were performed during the month of March 2001. Traffic noise measurements were obtained at Locations A and C. 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 at Locations A and C, and the comparisons of the measured traffic noise levels 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 2005 were performed using the Federal Highway Administration (FHWA) Traffic Noise Model (Reference 5). Traffic data entered into the noise prediction model were: roadway and receiver locations; hourly traffic volumes, average vehicle speeds; estimates of traffic mix; and "Pavement" propagation loss factor. The traffic data and forecasts for the project (Reference 6), plus the published traffic counts and vehicle type classifications along Ala Moana Boulevard (References 7 and 8) were the primary sources of data inputs to the model. APPENDIX C summarizes the AM and PM peak hour traffic volumes for CY 2000 and 2005 which were used to model existing and future traffic noise along the streets surrounding the project site. For existing and future traffic along the streets surrounding the project site, it was assumed that the average noise levels, or Leq(h), during the PM peak traffic hour were approximately 2 dB less than the 24-hour Ldn along those roadways. This assumption was based on the traffic counts from References 7 and 8 (see FIGURE 3) as well as the traffic noise measurement data from Location A (see FIGURE 4).

Traffic noise calculations for both the existing and future conditions in the project environs were developed for ground level and elevated receptors with and without the benefit of shielding from the proposed Waikikian Tower. Traffic noise levels were also calculated for future conditions with (Build Alternatives) and without (No Build Alternative) the proposed project. The forecasted changes in traffic noise levels over existing levels were calculated with and without the project, 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. The calculations of future traffic noise levels for Options A-1, A-2, E-1, and E-2 were performed. Since the preferred option had not been selected, a worst case

TABLE 2

TRAFFIC AND BACKGROUND NOISE MEASUREMENT RESULTS

LOCATION	Time of Day (HRS)	Ave. Speed (MPH)	-------- Hourly Traffic Volume -------- AUTO	M.TRUCK	H.TRUCK	Measured Leq (dB)	Predicted Leq (dB)
A. 147 FT from the center-line of Ala Moana Blvd. (3/21/01)	1500 TO 1600	37	2,555	97	125	69.8	70.1
B. 8th Floor Makai Unit of Renaissance Ilikai Waikiki (3/22/00)	1500 TO 1600	N/A	N/A	N/A	N/A	61.1	N/A
B. 8th Floor Makai Unit of Renaissance Ilikai Waikiki (3/23/00)	0400 TO 0500	N/A	N/A	N/A	N/A	54.7	N/A
C. 264 FT from the center-line of Ala Moana Blvd. (3/28/01)	1507 TO 1700	37	2,555	97	125	63.6	64.7
D. Makai-Ewa Corner of 6th Floor of Parking Structure (3/28/01)	1702 TO 1715	N/A	N/A	N/A	N/A	60.9	N/A

TABLE 2 (CONTINUED)

TRAFFIC AND BACKGROUND NOISE MEASUREMENT RESULTS

LOCATION	Time of Day (HRS)	Ave. Speed (MPH)	Hourly Traffic Volume AUTO	Hourly Traffic Volume M.TRUCK	Hourly Traffic Volume H.TRUCK	Measured Leq (dB)	Predicted Leq (dB)
E. Makai-D.H. Corner of 6th Floor of Parking Structure (3/28/01)	1716 TO 1730	N/A	N/A	N/A	N/A	59.7	N/A

FIGURE 3

HOURLY VARIATIONS OF TRAFFIC NOISE AT 147 FT SETBACK DISTANCE FROM THE CENTERLINE OF ALA MOANA BOULEVARD AT KALAKAUA AVENUE (AUGUST 24 – 25, 2000)

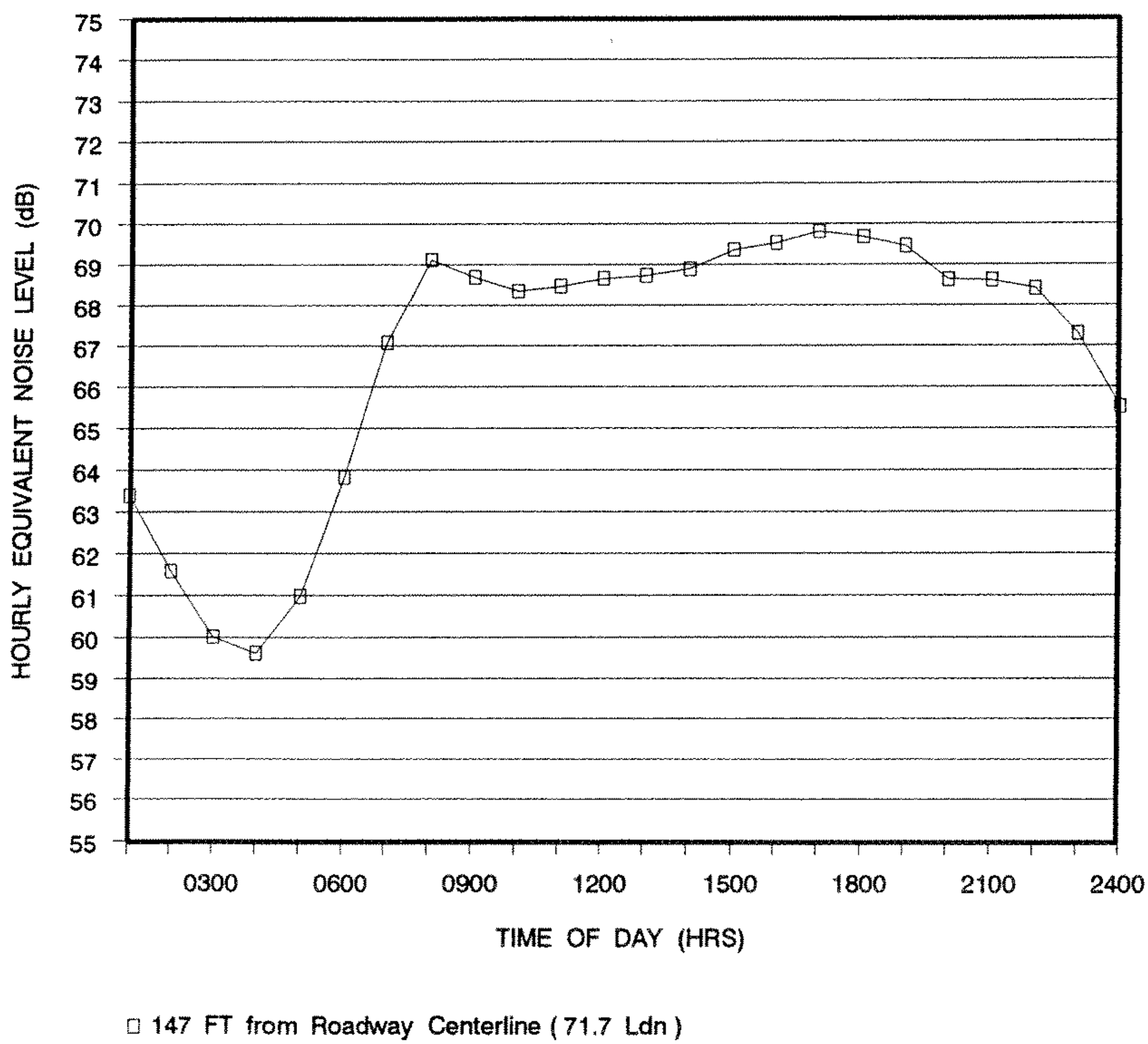
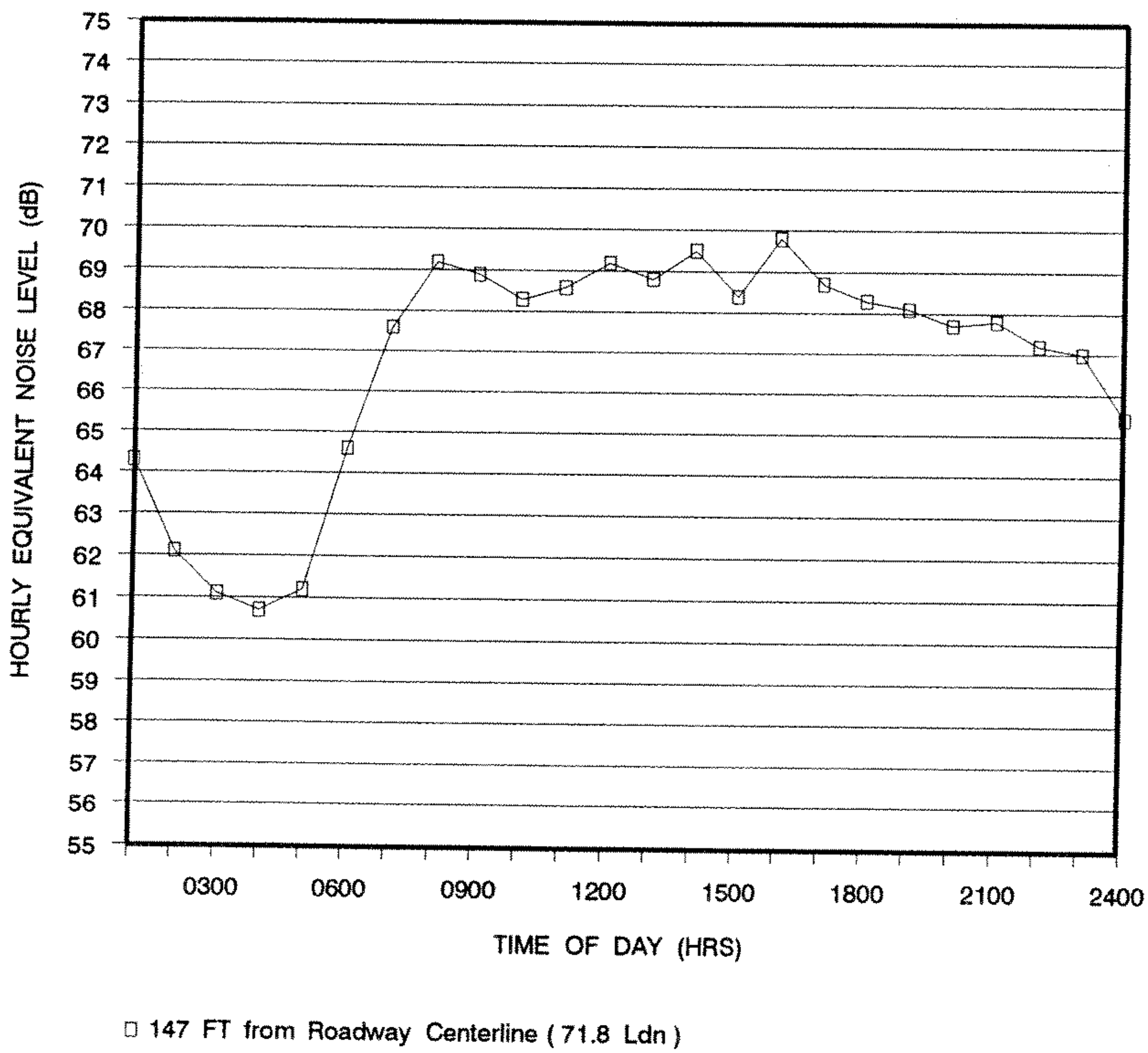


FIGURE 4

MEASURED TRAFFIC NOISE LEVELS AT 147 FT SETBACK DISTANCE FROM THE CENTERLINE OF ALA MOANA BOULEVARD AT LOCATION "A" (MARCH 21 – 22, 2001)



evaluation of potential traffic noise, using the highest traffic volumes forecasted along each roadway, was performed. The options which resulted in the highest traffic noise levels along each of the roadways were identified as the worst case option for that roadway, and the resulting worst case condition along each roadway was included in the Worst Case Build Alternative.

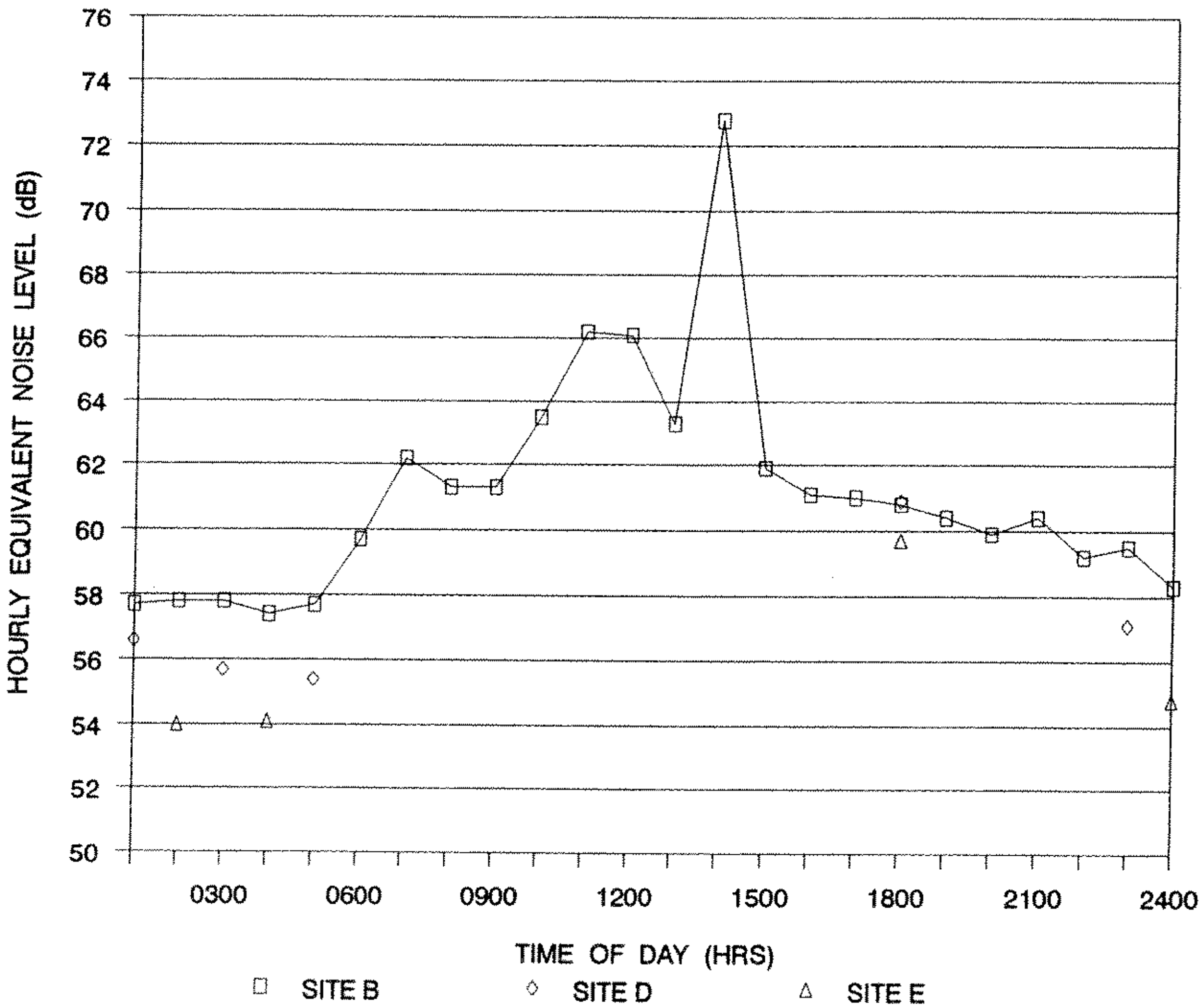
In addition to the traffic noise measurements, background ambient and aircraft noise measurements were obtained at Locations B, D, and E. The measured average noise levels at Locations B, D, and E are shown in TABLE 2 and FIGURE 5. The results of these measurements plus the results of the traffic noise measurements and predictions were used to describe the existing noise levels in the project environs, and to determine if the units of the proposed Waikikian Tower are located in an existing area with acceptable noise levels of 65 Ldn or less.

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.

Measurements of typical noise levels from water slides at resorts on Maui were also obtained to determine the typical noise levels which could be associated with activities at the proposed Swimming Pool with waterslide. These measurements were used to predict the potential noise levels at receptor locations in the Ilikai and Lagoon Tower buildings from activities at the pool.

FIGURE 5

MEASURED BACKGROUND NOISE LEVELS AT LOCATIONS B, D, AND E (MARCH 22 TO 29, 2001)



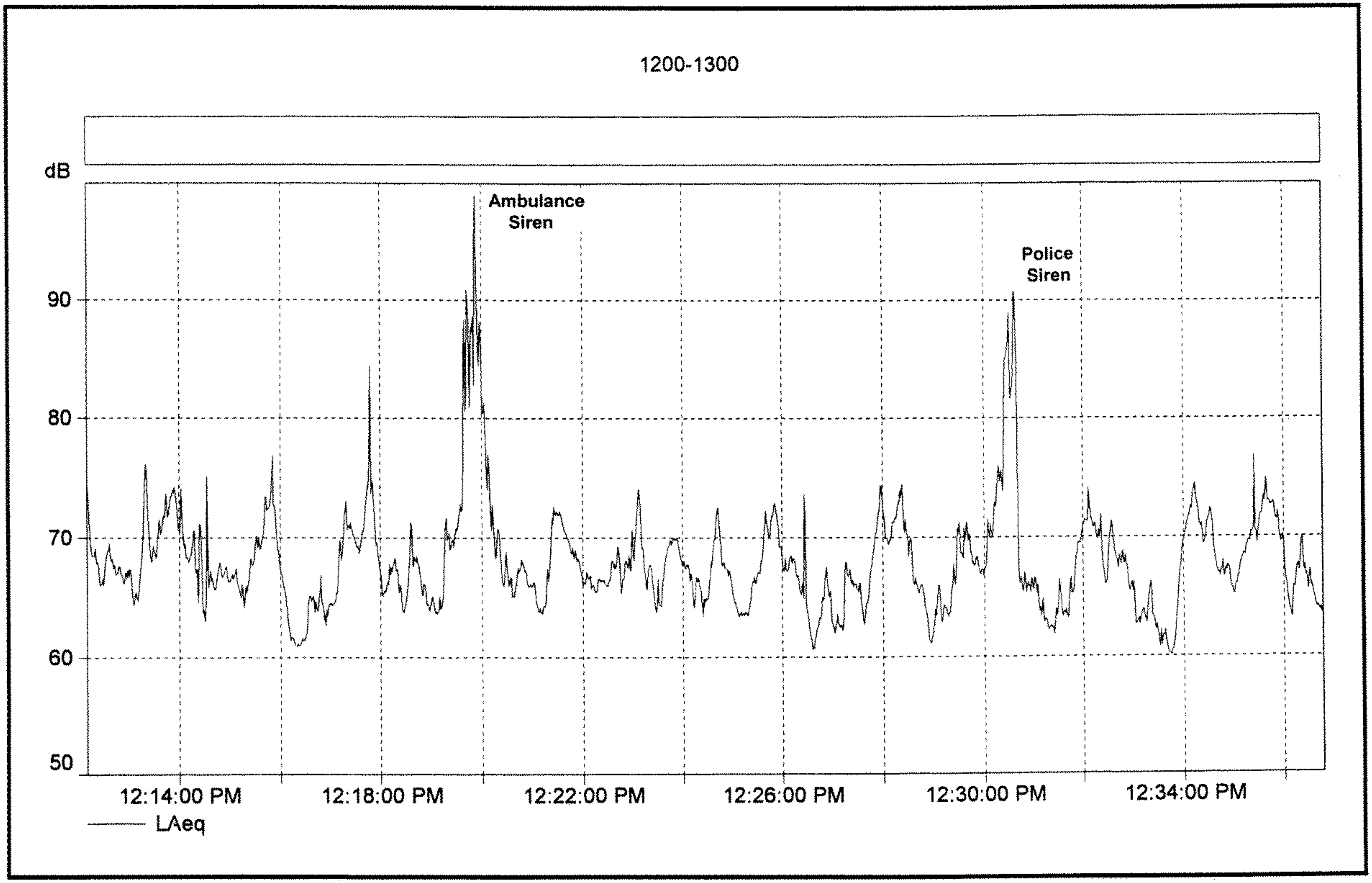
V. EXISTING ACOUSTICAL ENVIRONMENT

Contributors to the existing background ambient noise levels within the project area are: traffic along Ala Moana Boulevard, Kalia Road, Rainbow Drive, and Dewey Lane; interisland jet aircraft departing from Honolulu International Airport; delivery and grounds maintenance activities along Dewey Lane and on the grounds of the Hilton Hawaiian Village; and mechanical equipment on the grounds of the Renaissance Ilikai Waikiki. Traffic, aircraft, and background ambient noise measurements were obtained at five locations (A, B, C, D, and E) in the project environs in March 2001. These measurement locations are shown in FIGURE 1.

The traffic noise contributions from Ala Moana Boulevard were measured at Locations A and C, and the results of these measurements are shown in TABLE 2, and FIGURE 4. The measured hourly variation in traffic noise levels shown in FIGURE 4 compared well with the modeled variation of traffic noise along Ala Moana Boulevard shown in FIGURE 3. Based on these measurement and noise modeling results, it was concluded that existing traffic noise levels at approximately 147 FT setback distance from the centerline of Ala Moana Boulevard exceeds 70 Ldn. It was also concluded that 70 Ldn could be exceeded at all buildings within 252 feet setback distance from Ala Moana Boulevard under unobstructed line-of-sight conditions.

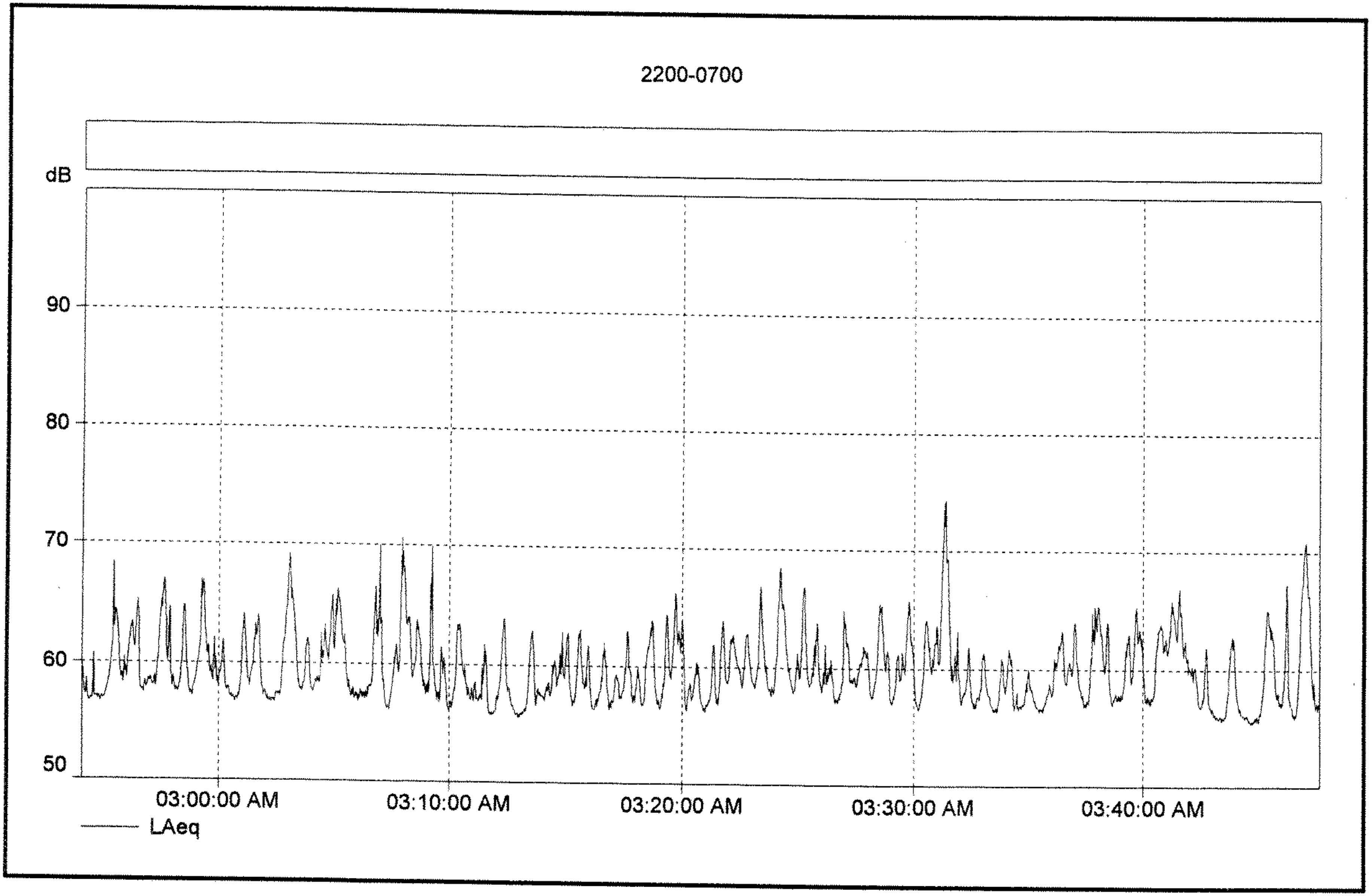
Existing noise levels on the north and east sides of the proposed Waikikian Tower building range between 65 and 70 Ldn, and are controlled by traffic noise from Ala Moana Boulevard. In addition, emergency sirens are frequent, high amplitude noise sources which occur throughout the daytime and nighttime periods. For units of the proposed Waikikian Tower which have unobstructed lines-of-sight to Ala Moana Boulevard, the sound levels from emergency sirens and daytime traffic will be similar to those shown in FIGURE 6. In FIGURE 6, the 99 dBA and 91 dBA sound levels of sirens from an ambulance and police car, respectively, are shown occurring at approximately 12:20 pm and 12:31 pm., with the daytime traffic noise levels from Ala Moana Boulevard varying between 61 and 84 dBA. During the early morning period when traffic volumes on Ala Moana Boulevard are low, background ambient noise levels from Ala Moana Boulevard are similar to those shown in FIGURE 7.

At receptor locations which are shielded from Ala Moana Boulevard's traffic noise by buildings, such as at Location B, existing background ambient noise levels are lower due to the noise shielding effects of the buildings. Noise reductions of 5 to 20 dBA can be expected from these noise shielding effects. Due to the presence of local traffic and non-traffic noise sources which are located on the makai side of the Ilikai and the proposed Waikikian Tower buildings, existing background ambient noise levels at these shielded locations range between 55 and 66 Ldn. These noise sources which are located on the makai side of the high rise buildings include: local traffic along Rainbow Drive and Dewey Lane; fixed machinery and equipment on the grounds of the Renaissance Ilikai Waikiki; maintenance equipment on the grounds of the Hilton



DBA VS. TIME HISTORY OF TRAFFIC NOISE AT MEASUREMENT LOCATION "A"; 3/21/01

FIGURE 6



DBA VS. TIME HISTORY OF EARLY MORNING TRAFFIC NOISE AT LOCATION "A"; 3/22/01

FIGURE 7

Hawaiian Village; and eastbound aircraft departing Honolulu International Airport. In addition, the sounds from sirens are also audible despite the beneficial noise shielding effects from the high rise buildings.

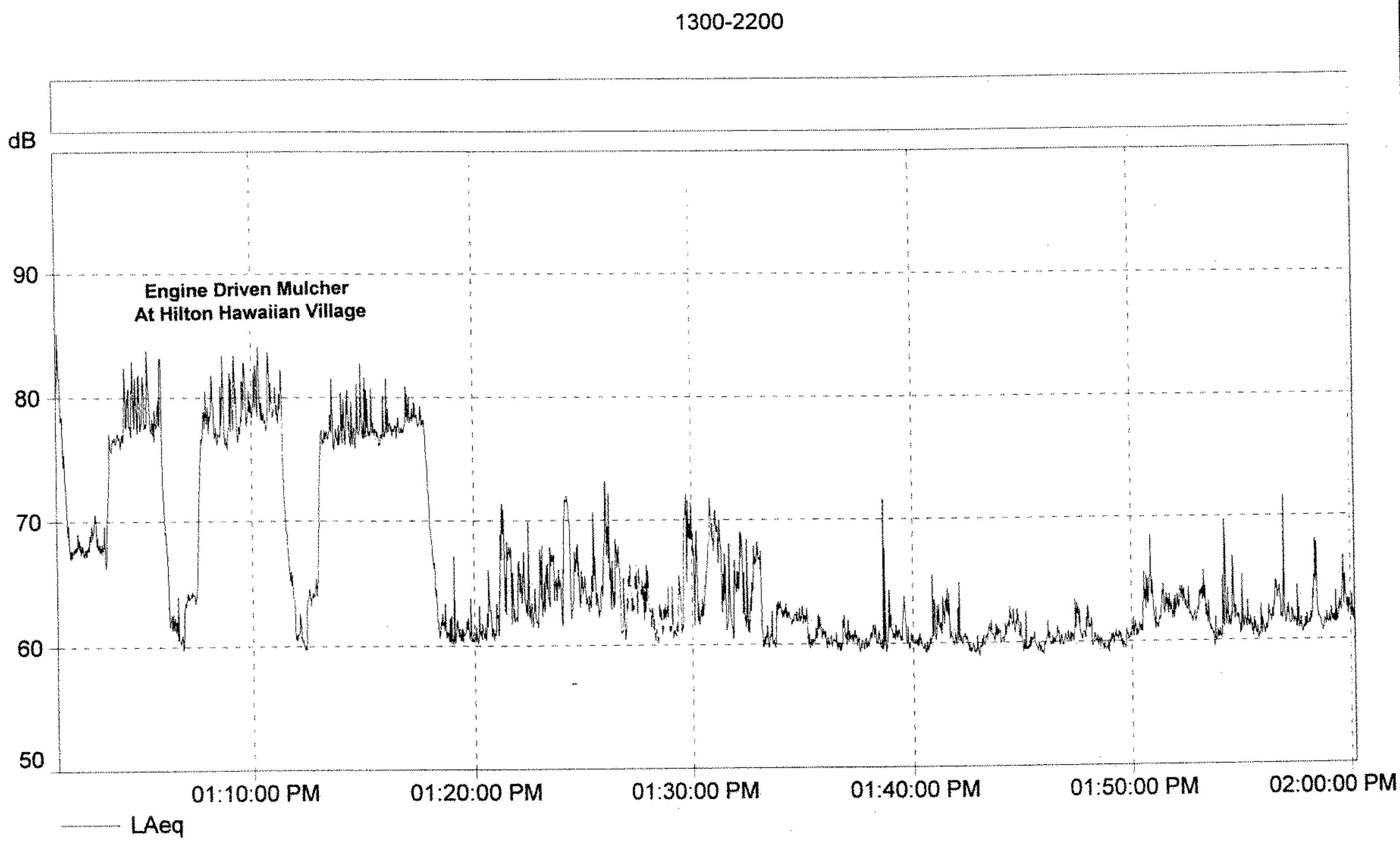
FIGURE 5 depicts the typical hourly variations in sound levels at Locations B, D, and E, which were shielded from Ala Moana Boulevard's traffic noise. The noise levels at these three locations where lower than those measured at Location A (see FIGURE 4), primarily due to the noise shielding effects from the Ilikai Tower, old Waikikian structure, and the existing parking structure. The source of the high noise level measured at Location B between 1:00 and 2:00 pm was an engine-driven mulcher which was operating on the grounds of the Hilton Hawaiian Village near Dewey Lane. The level vs. time history of the noise from the mulcher, which was operated between 1:00 pm and 1:20 pm is shown in FIGURE 8. Noise from truck movement and loading dock activities along Dewey Lane at the Renaissance Ilikai Waikiki are shown in FIGURE 9.

The maximum noise levels from offshore aircraft ranged between 65 and 70 dBA as shown in FIGURE 10. The loudest aircraft noise events were typically associated with departures by interisland jet aircraft. Aircraft noise events were audible above the background ambient noise. However, aircraft noise levels at the project site do not exceed 60 Ldn, which is the level above which the Hawaii State Department of Transportation, Airports Division, considers to be unacceptable for residences and resorts. The most recently published airport noise contours for Honolulu International Airport indicate that the project site is located beyond (or outside) the 55 Ldn contour for the Year 2007. This correlates with the measured aircraft noise data and the Year 2001 estimate of 50 to 55 Ldn for aircraft noise at the project site.

Typical daytime noise levels measured at Location E are shown in FIGURE 11. Note that the sirens were audible and their levels ranged between 60 and 68 dBA at Location E even though the emergency vehicles were traveling on Ala Moana Boulevard.

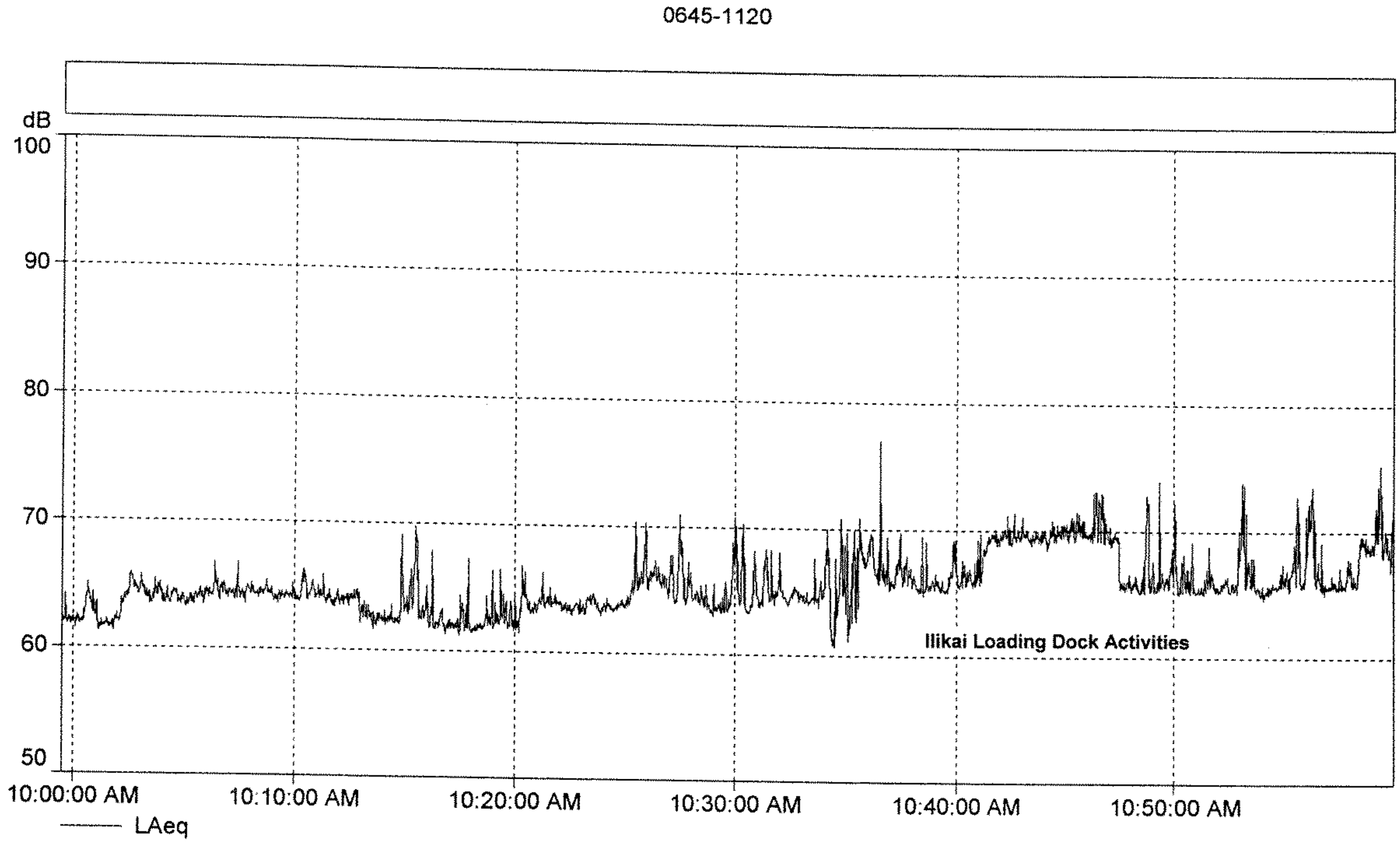
The existing noise levels from traffic along Dewey Lane or the makai sections of Rainbow Drive do not exceed 60 Ldn at 50 feet setback distance from the roadways' centerlines due to the very low traffic volumes on these two roadway sections. Except for the periods when Dewey Lane is used during unloading operations at the Ilikai, the noise from motor vehicles along these two roadway sections are not a significant contributor to the existing background ambient noise levels.

Results of calculations of existing (CY 2000) traffic noise levels at reference distances of 50, 100, and 200 feet from the centerlines of the roadways in the project environs are shown in TABLES 3 and 4. The results of the calculations are shown for ground level receptors without noise shielding effects from nearby buildings. As indicated in TABLES 3 and 4, the existing noise levels in the project environs are highest along Ala Moana Boulevard, and lowest along the makai section of Rainbow Drive and along Dewey Lane.



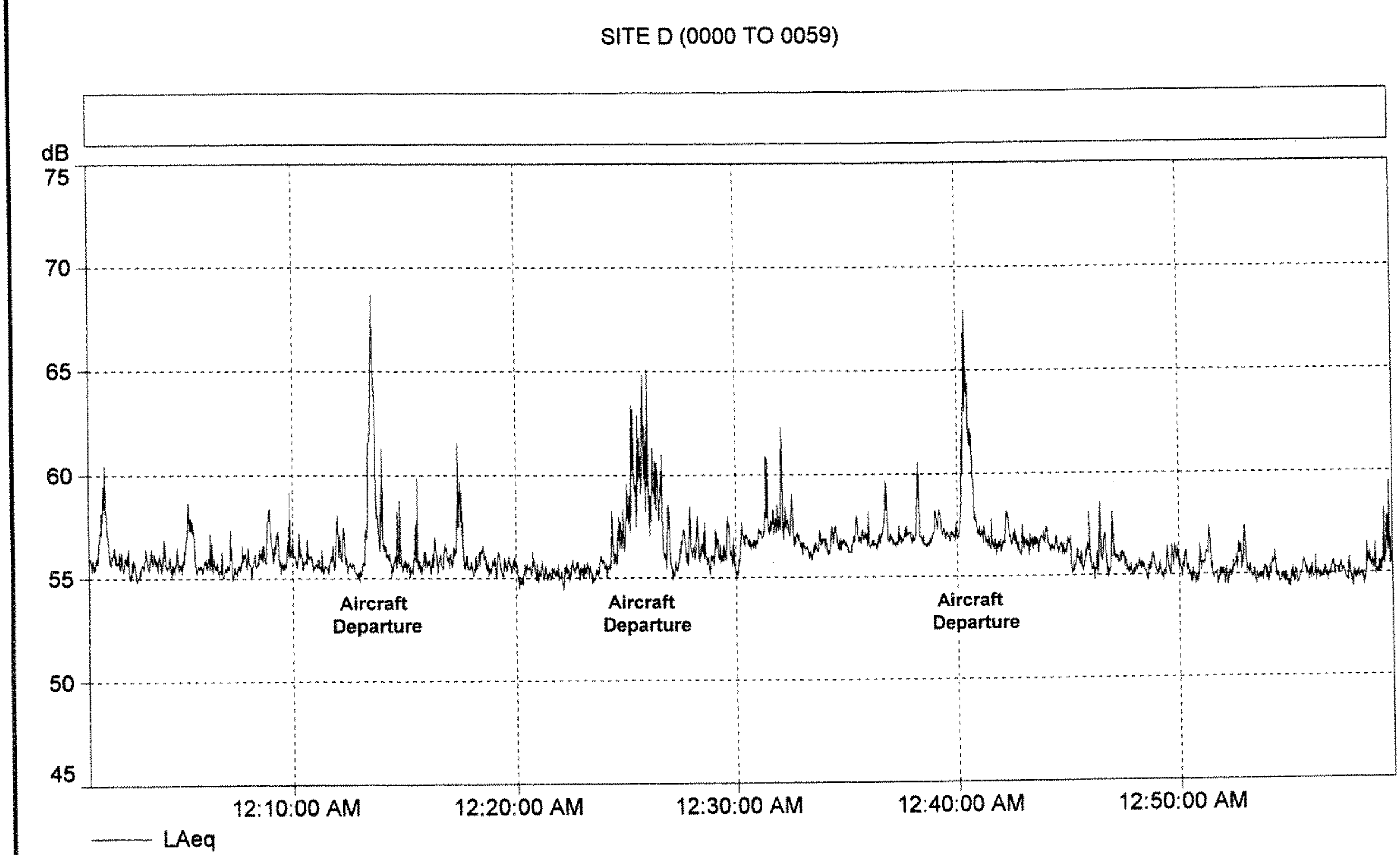
DBA VS. TIME HISTORY OF MULCHER NOISE AT MEASUREMENT LOCATION "B"; 3/22/01

FIGURE 8



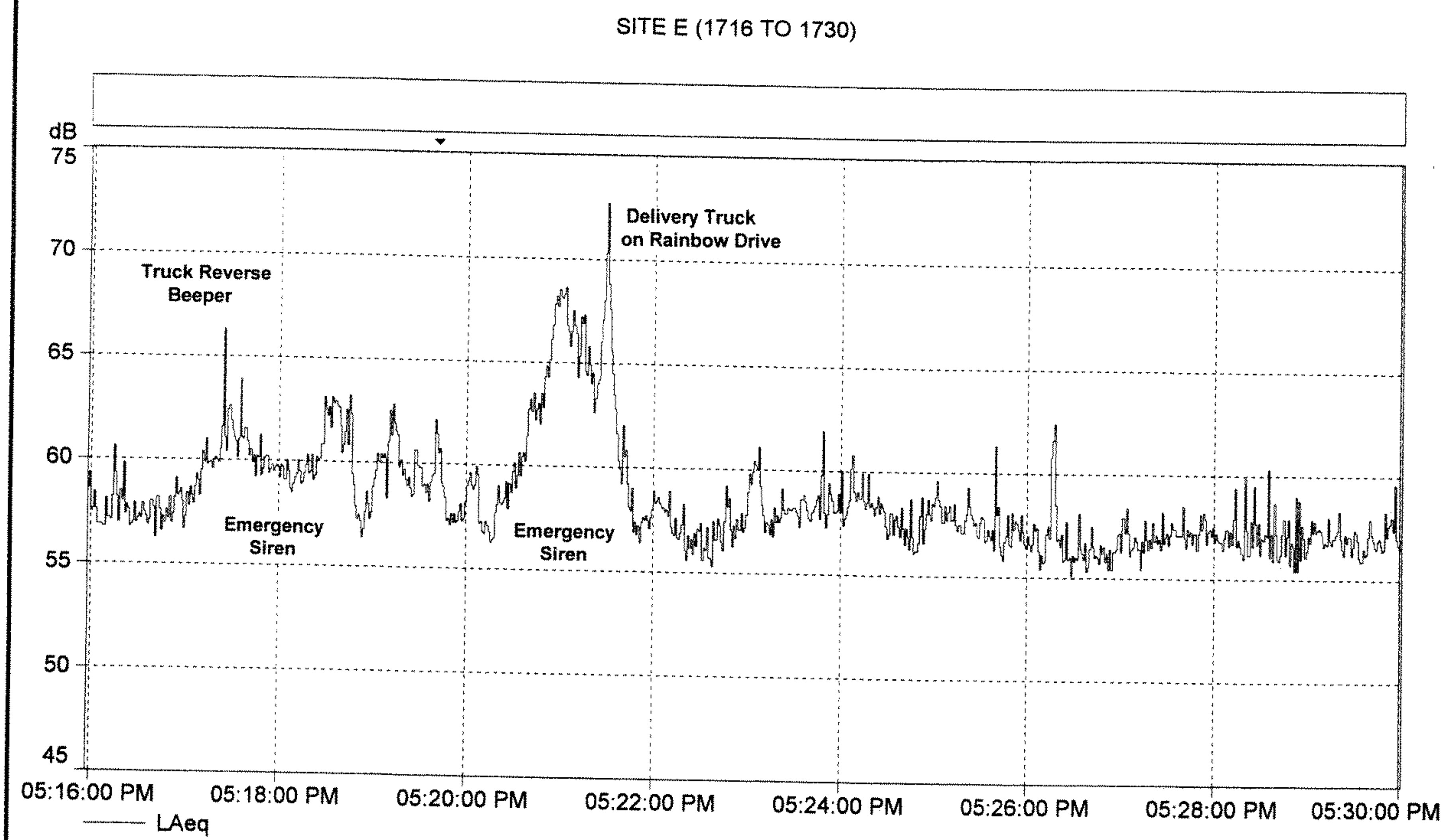
DBA VS. TIME HISTORY OF LOADING DOCK NOISE AT MEASUREMENT LOCATION "B"; 3/23/01

FIGURE 9



DBA VS. TIME HISTORY OF JET AIRCRAFT NOISE AT MEASUREMENT LOCATION "D"; 3/29/01

FIGURE 10



DBA VS. TIME HISTORY OF BACKGROUND NOISE AT MEASUREMENT LOCATION "E"; 3/28/01

FIGURE 11

TABLE 3

EXISTING (CY 2000) TRAFFIC VOLUMES AND NOISE LEVELS ALONG ROADWAYS IN PROJECT AREA (PM PEAK HOUR)

LOCATION	SPEED (MPH)	TOTAL VPH	******* VOLUMES (VPH) ********* AUTOS	M TRUCKS	H TRUCKS	50' Leq	100' Leq	200' Leq
Ala Moana Blvd. - Ewa of Project	37	3,421	3,147	120	154	75.9	73.0	69.8
Ala Moana Blvd. - Fronting Project	37	2,777	2,527	97	153	75.3	72.4	69.2
Ala Moana Blvd. - D.H. of Project	37	1,759	1,674	62	23	71.7	68.9	65.8
Dewey Lane - Mauka End	20	92	89	2	1	53.6	50.8	47.7
Dewey Lane - Makai End	20	152	147	3	2	55.9	53.2	50.1
Rainbow Drive - At Dewey Lane	20	52	52	0	0	47.6	44.8	41.7
Rainbow Drive - At Kalia Road	20	644	633	10	1	60.0	57.3	54.3
Ena Road - At Ala Moana Boulevard	25	340	335	3	2	59.3	56.6	53.5
Kalia Road - At Ala Moana Boulevard	25	1,734	1,569	35	130	71.3	68.4	65.3
Kalia Road - D.H. of Rainbow Dr.	25	1,301	1,138	33	130	71.0	68.1	65.0

Notes:

1. Traffic noise levels calculated for ground level receptors.
2. Hard ground and unobstructed field-of-view conditions assumed.

TABLE 4

EXISTING CONDITIONS; YEAR 2000; PM PEAK HR. LEQ AND LDN SETBACK DISTANCES

ROADWAY SEGMENT	SPEED (MPH)	VEHICLE MIX (%A/%MT/%HT)	TOTAL VPH	Leq @ 100' (dB)	DIST. (FT) FROM CENTERLINE 65 Ldn	70 Ldn	75 Ldn
Ala Moana Blvd. - Ewa of Project	37	(92.0 / 3.5 / 4.5)	3,421	73.0	906	301	100
Ala Moana Blvd. - Fronting Project	37	(91.0 / 3.5 / 5.5)	2,777	72.4	794	264	88
Ala Moana Blvd. - D.H. of Project	37	(95.2 / 3.5 / 1.3)	1,759	68.9	378	123	40
Dewey Lane - Mauka End	20	(97.0 / 2.0 / 1.0)	92	50.8	< 25	< 25	< 25
Dewey Lane - Makai End	20	(97.0 / 2.0 / 1.0)	152	53.2	< 25	< 25	< 25
Rainbow Drive - At Dewey Lane	20	(99.5 / 0.5 / 0.0)	52	44.8	< 25	< 25	< 25
Rainbow Drive - At Kalia Road	20	(98.3 / 1.5 / 0.2)	644	57.3	27	< 25	< 25
Ena Road - At Ala Moana Boulevard	25	(98.5 / 1.0 / 0.5)	340	56.6	< 25	< 25	< 25
Kalia Road - At Ala Moana Boulevard	25	(90.5 / 2.0 / 7.5)	1,734	68.4	338	109	35
Kalia Road - D.H. of Rainbow Dr.	25	(87.5/ 2.5 / 10.0)	1,301	68.1	316	102	33

Notes:

(1) All setback distances are from the roadways' centerlines.
(2) Setback distances are for ground level receptors with unobstructed fields-of-view.
(3) "Pavement" or hard ground conditions assumed along all roadways.

CHAPTER VI. FUTURE NOISE ENVIRONMENT

Predictions of future traffic noise levels were made using the traffic volume assignments of Reference 6 for CY 2005 with and without the proposed project. The future projections of non-project and project traffic volumes for the No Build and Build Alternatives (Options A-1, A-2, E-1 and E-2) are shown in APPENDICES C-1, C-2, C-3 and C-4. The alternative for which the greatest increase in two-way traffic noise level (above those for the No Build Alternative) could occur was considered to be the worst case alternative for that specific roadway. The corresponding worst case traffic volume which produced the greatest increase in future traffic noise level above the No Build Alternative was used to model the worst case future traffic noise condition (and identified as the Worst Case Build Alternative) along that roadway.

TABLES 5 and 6 contain the CY 2005 traffic volumes and noise levels for the No Build and Worst Case Build Alternatives. The traffic scenarios (or options) used to describe the Worst Case Build Alternative along each roadway section are shown in TABLE 6. TABLE 7 contains the CY 2005 vehicle mixes used to describe these noise levels and setback distances to the 65, 70, and 75 Ldn contours under the corresponding worst case alternatives. Future average vehicle speeds along all roadways were assumed to be identical to those used for CY 2000 (see TABLE 4).

The dominant traffic noise source in the project area will continue to be traffic noise from Ala Moana Boulevard. Increases in traffic noise levels along Ala Moana Boulevard by CY 2005 are expected to be 0.6 dB under the No Build Alternative and 0.7 dB under any of the four Build Alternatives. Significant increases in traffic noise levels along Ala Moana Boulevard are not expected to result from the Waikikian Development. Similar conclusions were possible for future traffic noise along Ena Road and Kalia Road, where future traffic noise increases associated with the Waikikian Development were predicted to remain at 0.1 dB or less for all four Build Alternatives.

Along Dewey Lane and Rainbow Drive at the Dewey Lane intersection, relatively large increases in traffic noise levels may occur. Because of the relatively low noise levels during CY 2000 along Dewey Lane and Rainbow Drive at the Dewey Lane intersection, traffic noise levels from these two roadways will not approach those associated with Ala Moana Boulevard in spite of the large increases anticipated. Under Options A-2 and E-2, increases in future traffic noise levels of 9.9 dB and 10.3 dB, respectively, are predicted along the mauka section of Dewey Lane. Under Options A-2 and E-2, increases in future traffic noise levels of 9.8 dB and 10.3 dB, respectively, are predicted along Rainbow Drive at the Dewey Lane intersection. Option E-2 was used to model the worst case Build Alternative along the mauka section of Dewey Lane and along Rainbow Drive at Dewey Lane. Future traffic noise levels under the Worst Case Build Alternatives are predicted to range between 60 to 66 Ldn at 50 feet setback distance from the roadways' centerlines.

TABLE 5

FUTURE (CY 2005) TRAFFIC VOLUMES AND NOISE LEVELS ALONG ROADWAYS IN PROJECT AREA (PM PEAK HOUR, NO-BUILD)

LOCATION	SPEED (MPH)	TOTAL VPH	******* VOLUMES (VPH) ********* AUTOS	M TRUCKS	H TRUCKS	50' Leq	100' Leq	200' Leq
Ala Moana Blvd. - Ewa of Project	37	3,928	3,614	137	177	76.5	73.6	70.4
Ala Moana Blvd. - Fronting Project	37	3,255	2,965	114	176	76.0	73.1	69.9
Ala Moana Blvd. - D.H. of Project	37	2,030	1,935	71	24	72.3	69.4	66.4
Dewey Lane - Mauka End	20	93	90	2	1	53.4	50.7	47.7
Dewey Lane - Makai End	20	155	150	3	2	56.0	53.2	50.1
Rainbow Drive - At Dewey Lane	20	60	60	0	0	48.2	45.4	42.4
Rainbow Drive - At Kalia Road	20	849	835	13	1	61.2	58.5	55.4
Ena Road - At Ala Moana Boulevard	25	393	387	4	2	59.9	57.2	54.1
Kalia Road - At Ala Moana Boulevard	25	2,109	1,915	42	152	72.0	69.2	66.0
Kalia Road - D.H. of Rainbow Dr.	25	1,511	1,322	38	151	71.6	68.8	65.6

Notes:

1. Traffic noise levels calculated for ground level receptors.
2. Hard ground and unobstructed field-of-view conditions assumed.

TABLE 6

FUTURE (CY 2005) TRAFFIC VOLUMES AND NOISE LEVELS ALONG ROADWAYS IN PROJECT AREA (PM PEAK HOUR, WORST CASE OPTIONS)

LOCATION	WORST CASE OPTION	SPEED (MPH)	TOTAL VPH	******* VOLUMES (VPH) ********* AUTOS	M TRUCKS	H TRUCKS	50' Leq	100' Leq	200' Leq
Ala Moana Blvd. - Ewa of Project	A-1 & E-1	37	3,994	3,674	140	180	76.5	73.7	70.5
Ala Moana Blvd. - Fronting Project	A-1	37	3,299	3,006	115	178	76.0	73.1	69.9
Ala Moana Blvd. - D.H. of Project	All	37	2,044	1,947	72	25	72.3	69.5	66.4
Dewey Lane - Mauka End	E-2	20	649	617	16	16	63.7	61.0	57.8
Dewey Lane - Makai End	E-1	20	227	215	6	6	59.3	56.5	53.4
Rainbow Drive - At Dewey Lane	E-2	20	480	473	7	0	58.4	55.7	52.6
Rainbow Drive - At Kalia Road	A-1	20	908	892	14	2	61.7	59.0	55.9
Ena Road - At Ala Moana Boulevard	A-2 & E-2	25	404	398	4	2	60.0	57.2	54.2
Kalia Road - At Ala Moana Boulevard	A-1	25	2,156	1,960	43	153	72.1	69.2	66.0
Kalia Road - D.H. of Rainbow Dr.	All	25	1,529	1,338	38	153	71.7	68.8	65.7

Notes:

1. Traffic noise levels calculated for ground level receptors.
2. Hard ground and unobstructed field-of-view conditions assumed.

TABLE 7

FUTURE WORST CASE OPTIONS; YEAR 2005; PM PEAK HR. LEQ AND LDN SETBACK DISTANCES

ROADWAY SEGMENT	SPEED (MPH)	VEHICLE MIX (%A/%MT/%HT)	TOTAL VPH	Leq @ 100' (dB)	DIST. (FT) FROM CENTERLINE 65 Ldn	70 Ldn	75 Ldn
Ala Moana Blvd. - Ewa of Project	37	(92.0 / 3.5 / 4.5)	3,994	73.7	1,057	351	117
Ala Moana Blvd. - Fronting Project	37	(91.1 / 3.5 / 5.4)	3,299	73.1	926	308	102
Ala Moana Blvd. - D.H. of Project	37	(95.3 / 3.5 / 1.2)	2,044	69.5	433	140	45
Dewey Lane - Mauka End	20	(95.0 / 2.5 / 2.5)	649	61.0	64	< 25	< 25
Dewey Lane - Makai End	20	(95.0 / 2.5 / 2.5)	227	56.5	< 25	< 25	< 25
Rainbow Drive - At Dewey Lane	20	(98.5 / 1.5 / 0.0)	480	55.7	< 25	< 25	< 25
Rainbow Drive - At Kalia Road	20	(98.3 / 1.5 / 0.2)	908	59.0	41	< 25	< 25
Ena Road - At Ala Moana Boulevard	25	(98.5 / 1.0 / 0.5)	404	57.2	26	< 25	< 25
Kalia Road - At Ala Moana Boulevard	25	(90.9 / 2.0 / 7.1)	2,156	69.2	392	130	43
Kalia Road - D.H. of Rainbow Dr.	25	(87.5/ 2.5 / 10.0)	1,529	68.8	370	120	39

Notes:

(1) All setback distances are from the roadways' centerlines.
(2) Setback distances are for ground level receptors with unobstructed fields-of-view.
(3) "Pavement" or hard ground conditions assumed along all roadways.

TABLE 8 presents the existing and future noise levels at various locations in the project environs, which are depicted in FIGURE 12. Locations which front Ala Moana Boulevard (A, B, #3, and #4) will experience relatively high noise levels above 65 Ldn, due to existing and future non-project traffic along Ala Moana Boulevard. Lower elevation receptors at Locations C and #5 will benefit from the noise shielding effects from the new parking garage structure associated with the Waikikian Development. Receptors at the Lagoon Tower (Locations #1 and #2) as well as those on the makai side of the new Waikikian Tower building and at Location #6 will benefit from the noise shielding effects from the proposed Waikikian Tower building.

As indicated in TABLES 5, 6, and 8, with or without the proposed Waikikian Development, future traffic and background ambient noise levels in CY 2005 are expected to remain very similar to those in CY 2000 along Ala Moana Boulevard, Kalia Road, Ena Road, and along Rainbow Drive at Kalia Road. Under the Worst Case Alternatives, total noise levels along these roadways should not be more than 1 Ldn unit greater than those in CY 2000.

Noise sensitive receptor locations which front Rainbow Drive or Dewey Lane will experience relatively large increases in future traffic noise levels under the Worst Case Build Alternatives. However, the resulting noise levels at 64 foot or more setback distances from these two roadways should not exceed 65 Ldn. The dominant noise sources in the project environs will continue to be traffic along Ala Moana Boulevard, delivery and grounds maintenance activities along Dewey Lane, and operating mechanical equipment on the grounds of the Ilikai.

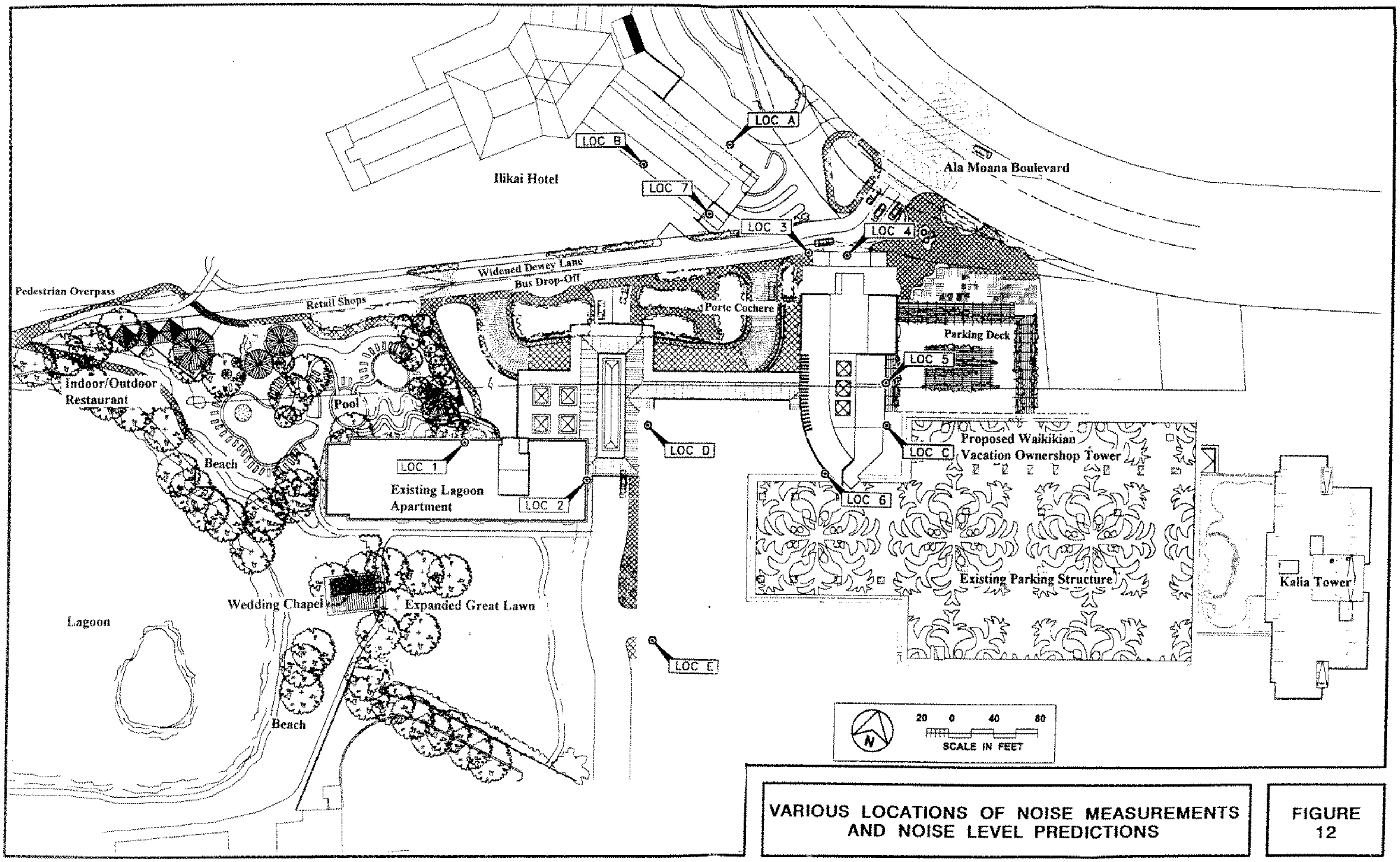
Units on the north and east sides of the proposed Waikikian Tower with unobstructed lines-of-sight to Ala Moana Boulevard will have exterior noise levels greater than 70 Ldn. Those units on the makai (west) and south sides of the tower building will experience noise levels in the range of 65 to 70 Ldn. Future exterior noise levels at the proposed Waikikian Tower building will be similar to those experienced at the southeast wing of the Renaissance Ilikai Waikiki building.

Aircraft noise levels over the project site should not change significantly between CY 2000 and 2005, and should remain at or below the current levels of 50 to 55 Ldn. During the period between CY 2001 and CY 2005, aircraft noise levels over the project site are expected to decrease by 2 to 3 Ldn with the anticipated replacement of Hawaiian Airlines' current DC-9(50) aircraft with new B-717(200) aircraft. With or without the replacement of its aircraft by Hawaiian Airlines, aircraft noise levels over the project site should not be significant when compared to traffic noise levels.

TABLE 8

EXISTING AND FUTURE TRAFFIC NOISE LEVELS
(NO BUILD AND WORST CASE BUILD OPTIONS)

RECEPTOR LOCATION	SETBACK DIST. FROM EXIST. C/L	RECEPTOR ELEVATION	EXISTING (CY 2000) Ldn	FUTURE (CY 2005) LEVELS NO BUILD Ldn	BUILD Ldn
Location A	147 FT from Ala Moana Blvd.	75 FT Above Ground	71	72	72
Location B	76 FT from Dewey Lane	85 FT Above Ground	66	67	67
Location C	264 FT from Ala Moana Blvd.	55 FT Above Ground	65	66	66
Location D	30 FT from Rainbow Drive	65 FT Above Ground	65	66	65
Location E	30 FT from Rainbow Drive	65 FT Above Ground	64	65	64
Location 1	146 FT from Dewey Lane	50 FT Above Ground	62	63	62
Location 2	30 FT from Rainbow Drive	50 FT Above Ground	61	61	64
Location 3	166 FT from Ala Moana Blvd.	50 FT Above Ground	70	71	72
Location 4	156 FT from Ala Moana Blvd.	50 FT Above Ground	70	71	72
Location 5	240 FT from Ala Moana Blvd.	65 FT Above Ground	66	66	65
Location 6	334 FT from Ala Moana Blvd.	65 FT Above Ground	64	65	64
Location 7	35 FT from Dewey Lane	50 FT Above Ground	66	67	69



VARIOUS LOCATIONS OF NOISE MEASUREMENTS AND NOISE LEVEL PREDICTIONS

FIGURE 12

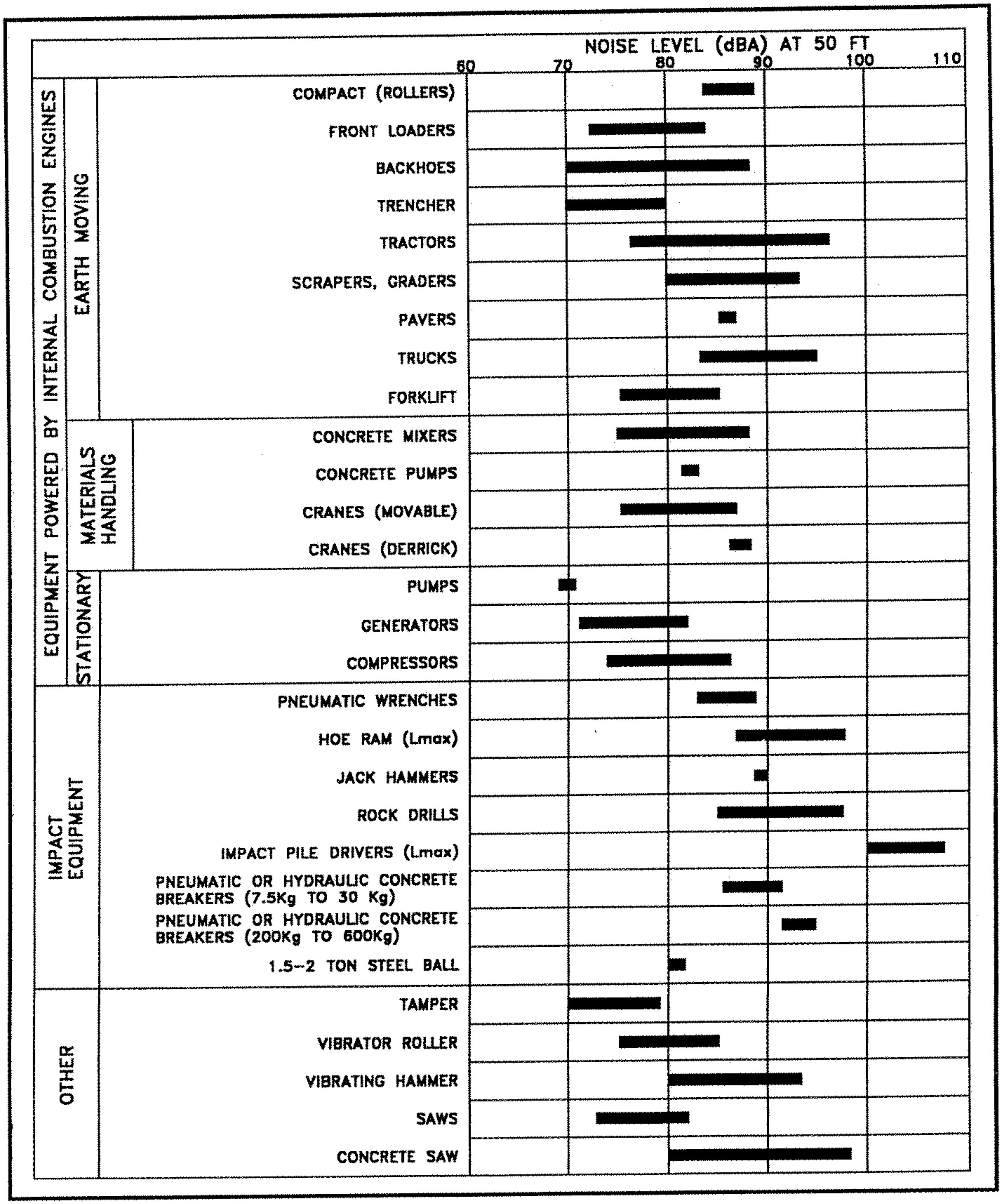
CHAPTER VII. DISCUSSION OF PROJECT-RELATED NOISE IMPACTS AND POSSIBLE MITIGATION MEASURES

Traffic Noise. For the units in the proposed Waikikian Tower building, noise mitigation measures are recommended. Closure and air conditioning of the units in the building is an effective noise mitigation measure for this project. Approximately 30 to 35 dB of exterior-to-interior noise reduction is recommended for those units which have unobstructed lines-of-sight to Ala Moana Boulevard, and approximately 25 to 30 dB of noise reduction is recommended for the remaining units. Noise impacts from project related traffic along the roadways which are expected to service the project traffic are not expected due to the relatively low levels of project related traffic noise when compared to the noise levels of non-project related traffic and other noise sources. In addition, the existing resort units which are located in the immediate vicinity of the project along Rainbow Drive and Dewey Lane are currently provided with air conditioning.

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. FIGURE 13 depicts the range of noise levels of various types of construction equipment when measured at 50 FT distance from the equipment. Typical levels of exterior noise from construction activity (excluding pile driving activity) at various distances from the job site are shown in FIGURE 14. The impulsive noise levels of impact pile drivers are approximately 15 dB higher than the levels shown in FIGURE 14, while the intermittent noise levels of vibratory pile drivers are at the upper end of the noise level ranges depicted in the figure.

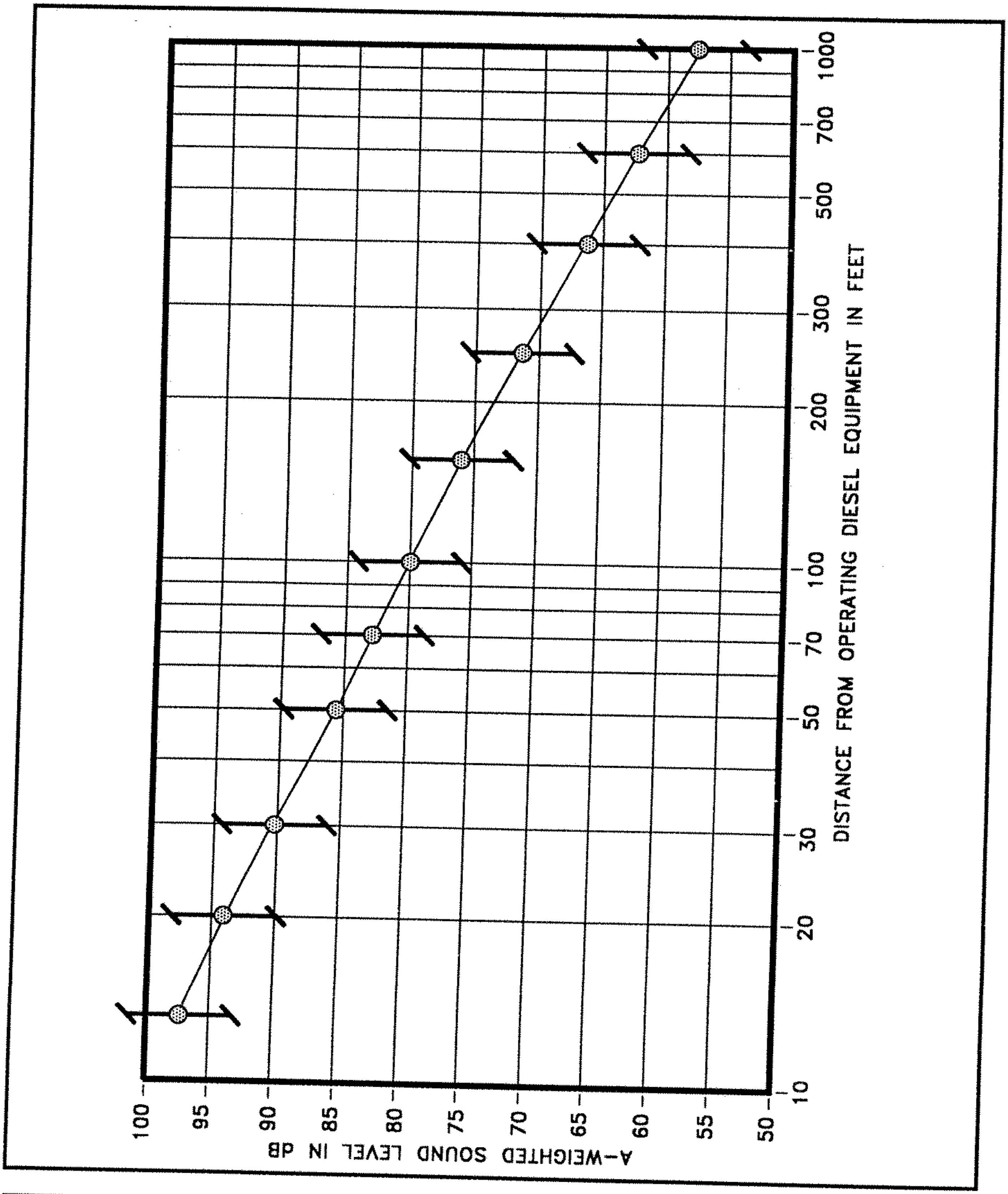
FIGURE 14 is useful for predicting exterior noise levels at short distances (within 100 FT) from the work when visual line of sight exists between the construction equipment and the receptor. Direct line-of-sight distances from the construction equipment to existing resort and commercial buildings will range from 40 FT to 400 FT, with corresponding average noise levels of 88 to 66 dBA (plus or minus 5 dBA). For receptors along a cross-street, the construction noise level vs. distance curve of FIGURE 14 should be reduced by approximately 8 dBA when the work is occurring at the intersection with the cross street, and should be reduced by 15 dBA when work is occurring at least 100 FT from the intersection (and the visual line-of-sight is blocked by intervening buildings). 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 14.

The units in the east wing of the Renaissance Ilikai Waikiki building across Dewey Lane and units on the mauka side of the Lagoon Tower building are predicted to experience the highest noise levels during construction activities due to their close prox-



RANGES OF CONSTRUCTION EQUIPMENT NOISE LEVELS

FIGURE 13



ANTICIPATED RANGE OF CONSTRUCTION NOISE LEVELS VS. DISTANCE

FIGURE 14

imity 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 availability of closure and air conditioning for noise mitigation at the Ilikai and Lagoon Tower units, 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.

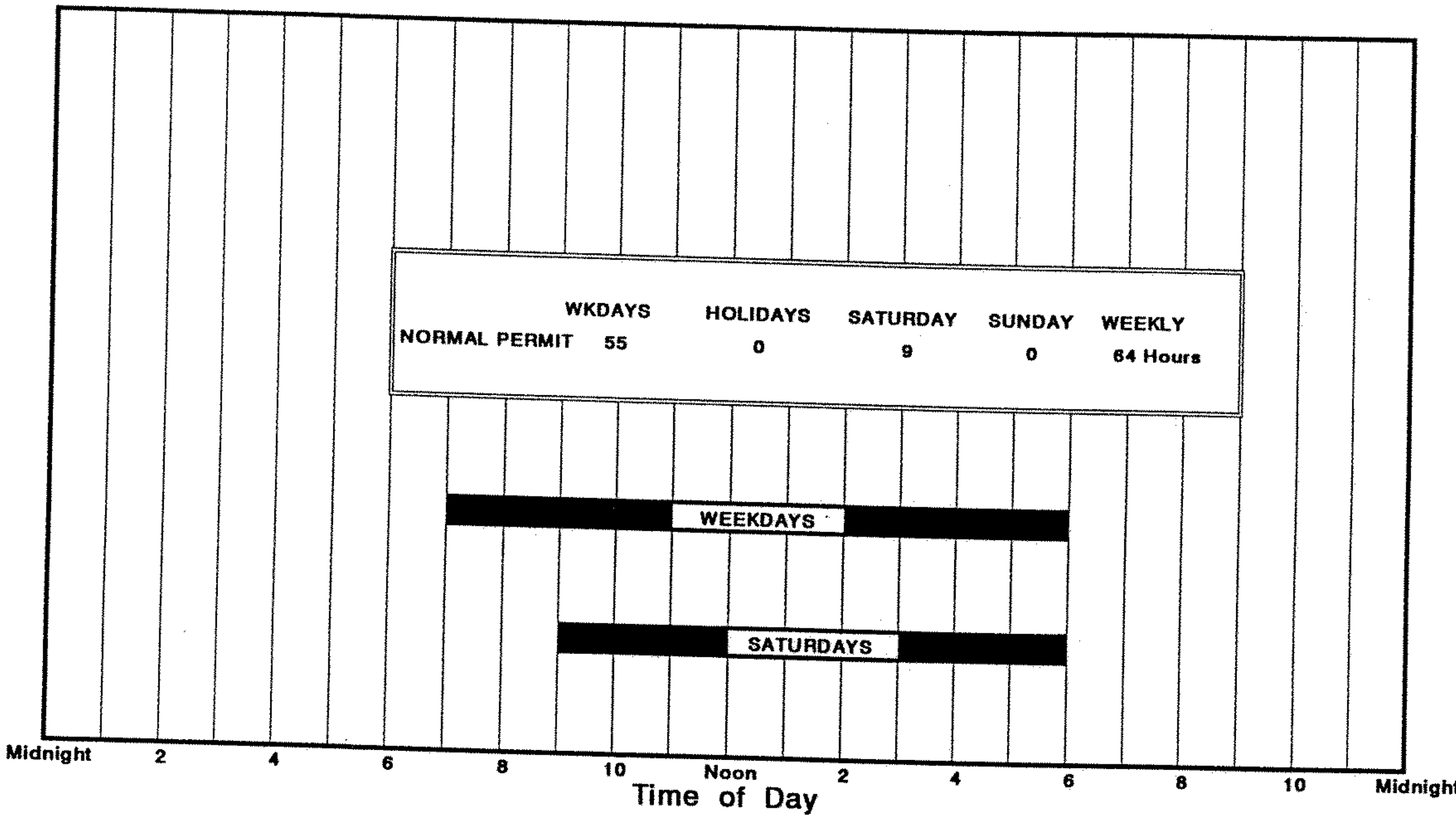
Mitigation of construction noise to inaudible levels will not be practical in all cases due to the intensity of construction noise sources (80 to 90+ dB at 50 FT distance), and due to the exterior nature of the work (grading and earth moving, trenching, concrete pouring, hammering, etc.). The use of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

Severe noise impacts are not expected to occur inside air conditioned structures which are beyond 70 to 450 FT of the project construction site. Inside naturally ventilated structures, interior noise levels (with windows or doors opened) are estimated to range between 73 to 55 dBA at 70 FT to 450 FT distances from the construction site. Closure of all doors and windows facing the construction site would generally reduce interior noise levels by an additional 5 to 10 dBA.

The incorporation of State Department of Health construction noise limits and curfew times, which are applicable throughout the State of Hawaii (Reference 4), is another noise mitigation measure which is normally applied to construction activities. FIGURE 15 depicts the normally permitted hours of construction. Noisy construction activities are not allowed on Sundays and holidays, during the early morning, and during the late evening and nighttime periods under the DOH permit procedures.

New On Site Activities. The Retail Shops, Swimming Pool with waterslide, Indoor/Outdoor Restaurant, and Wedding Chapel represent new activity centers on the project site. Risks of adverse noise impacts from the shops, restaurant, and chapel are considered to be low as long as local noise limits are not exceeded. The applicable State Department of Health noise limits (see Reference 4) are 60 dBA and 50 dBA during the daytime and nighttime periods, respectively, and these limits apply to fixed machinery and equipment. The Honolulu Liquor Commission also applies similar noise limits to music and other noises which may emanate from an establishment where alcohol is served.

The Swimming Pool with waterslide may represent the highest risk of adverse noise impacts if yelling, screaming, and other boisterous activities are allowed on a regular basis. Maximum sound levels of 70 to 85 dBA at 50 feet from the center of the pool (and at the northwest units of the Lagoon Tower) could occur if administrative controls are not implemented. At the westernmost units of the Renaissance Ilikai Waikiki, maximum noise levels from boisterous activities could range between 60 to 75



AVAILABLE WORK HOURS UNDER DOH PERMIT PROCEDURES FOR CONSTRUCTION NOISE

FIGURE 15

dBA. If the future pool activities are more similar to those currently being conducted (sunbathing, swimming, wading, etc.) at the existing pools adjacent to the Lagoon Tower and the Ilikai, risk of adverse noise impacts should be very low.

Sound level measurements between 9:00 am to 5:00 pm were obtained during three days at the Maui Marriott's waterslide feature to better quantify the level and frequency of loud noises associated with the future Swimming Pool with waterslide. The Maui Marriott's waterslide was compared with the waterslides at the Hyatt Regency Maui and the Westin Maui, and was determined to be the quietest of the three facilities. Comparisons of the measured sound levels obtained at the three waterslides on Maui during three weekdays are shown in Tables 10, 11, and 12. The LAeq and LAmax are the average and maximum sound levels, respectively, recorded in each 15 minute period.

Additional weekend measurements were obtained at the Maui Marriott's waterslide at both ground level and at an elevated resort unit between 55 and 75 feet from the center of the waterslide. The results from these weeekend measurements indicated that average noise levels associated with a waterslide similar to the Maui Marriott's should range between 63 Leq at 50 feet to 52 Leq at 200 feet. These levels are comparable to existing background ambient noise levels long Dewey Lane (see Figure 5). At the Ilikai, where measured average noise levels ranged between 61 and 73 Leq during the 9:00 am to 5:00 pm period (see Figure 5), projected average noise levels from the proposed waterslide are substantially lower at 50 to 52 Leq.

Figures 16 through 21 present comparisons of maximum sound levels recorded at Location B with those predicted to occur from the proposed waterslide during the period between 9:00 am and 5:00 pm. The light tracings represent measured maximum sound levels at Location B (Ilikai) on March 22 and 23, 2001. The dark and generally lower tracings represent the measured maximum sound levels at the Maui Marriott's waterslide on June 3, 2001, with 11 dB of reduction due to distance effects associated with the 200+ feet distance between the proposed waterslide location and Location B. The general conclusion resulting from the waterslide vs. background noise time history tracings shown in Figures 16 through 21 is that noise from the proposed waterslide should be comparable or less than existing background ambient noise levels at Location B, and therefore, should not be intrusive. Risks of potential noise impacts at Location B from the proposed waterslide should be low.

TABLE 9
MEASURED WATERSLIDE NOISE LEVELS AT WESTIN MAUI HOTEL

WESTIN MAUI HOTEL
May 21,2001

Open Long Waterslide.
Sound Level Meter Located At 60 Feet from Bottom of Slide

TIME	LAeq	LAmax	Number of Adults		Number of Children		Number on Slide	
			In Water	On Deck	In Water	On Deck	Adults	Children
0900 to 0915	59.2	73.1	2	3	2	0	0	0
0915 to 0930	60.4	74.3	1	3	3	0	0	0
0930 to 0945	60.2	76.8	2	7	3	1	10	12
0945 to 1000	60.6	74.4	3	11	6	3	2	3
1000 to 1015	63.3	78.7	6	9	9	0	2	16
1015 to 1030	63.7	83.4	8	11	13	0	14	23
1030 to 1045	61.6	82.0	9	12	8	1	11	9
1045 to 1100	62.3	80.5	10	14	12	1	5	19
1100 to 1115	62.6	82.3	6	11	2	4	9	1
1115 to 1130	60.8	70.8	5	10	1	3	10	4
1130 to 1145	60.9	82.6	12	9	5	2	12	1
1145 to 1200	63.8	83.5	13	17	7	2	8	6
1200 to 1215	62.7	80.7	11	11	5	3	30	5
1215 to 1230	68.4	79.3	6	8	3	3	14	0
1230 to 1245	69.7	75.1	5	10	3	1	18	0
1245 to 1300	69.5	74.7	6	12	1	1	13	10
1300 to 1315	69.9	81.3	7	13	2	1	6	2
1315 to 1330	70.3	89.2	10	13	1	1	20	1
1330 to 1345	70.1	80.4	14	15	3	2	14	0
1345 to 1400	70.2	82.3	14	15	4	1	27	4
1400 to 1415	69.9	78.5	8	13	0	1	24	0
1415 to 1430	69.8	80.4	13	17	4	0	22	0
1430 to 1445	69.9	79.2	4	6	1	1	20	1
1445 to 1500	69.7	76.0	6	3	1	0	15	3
1500 to 1515	69.6	76.3	4	8	1	2	7	1
1515 to 1530	69.9	76.9	10	5	3	0	18	11
1530 to 1545	69.9	77.1	15	14	1	0	19	8
1545 to 1600	70.0	81.4	11	12	3	0	23	6
1600 to 1615	69.9	76.0	7	7	1	1	18	5
1615 to 1630	69.9	79.7	8	7	2	0	16	20
1630 to 1645	69.8	80.7	8	2	3	0	10	11
1645 to 1700	69.7	82.0	4	2	2	0	7	4
						TOTALS:	424	186

TABLE 10
MEASURED WATERSLIDE NOISE LEVELS AT HYATT REGENCY MAUI HOTEL

HYATT REGENCY MAUI HOTEL — 150 Foot Enclosed "Lava Tube" Waterslide.
May 22,2001 — Sound Level Meter Located At 50 Feet from Bottom of Slide

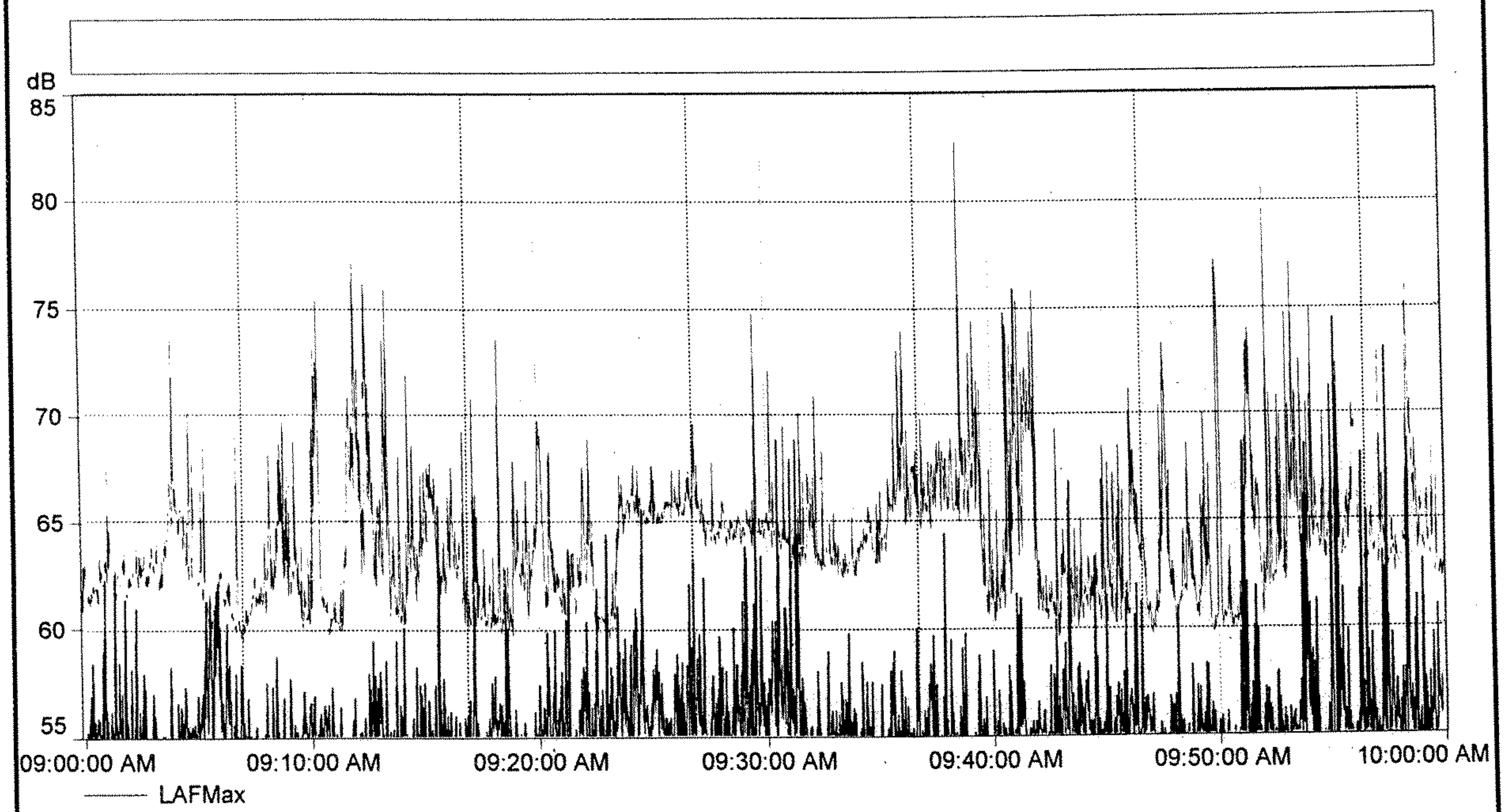
TIME	LAeq	LAmax	Number of Adults		Number of Children		Number on Slide	
			In Water	On Deck	In Water	On Deck	Adults	Children
0900 to 0915	64.6		2	16	0	2	0	0
0915 to 0930	64.7		4	12	1	1	0	0
0930 to 0945	64.8		0	17	0	1	0	0
0945 to 1000	66.8		1	25	0	4	0	0
1000 to 1015	65.2	71.2	3	21	5	1	9	4
1015 to 1030	69.2	77.6	0	25	0	1	1	9
1030 to 1045	67.4	72.0	6	35	0	2	1	0
1045 to 1100	67.2	76.3	7	41	2	1	10	7
1100 to 1115	64.9	76.8	4	53	2	1	8	10
1115 to 1130	65.3	82.3	3	47	3	2	3	4
1130 to 1145	65.0	78.3	4	48	1	3	2	2
1145 to 1200	66.5	83.6	15	43	2	1	19	0
1200 to 1215	65.0	77.1	15	52	2	2	11	0
1215 to 1230	65.4	80.6	4	50	2	2	9	0
1230 to 1245	65.2	78.1	8	56	3	2	10	2
1245 to 1300	65.2	78.4	4	58	4	3	12	0
1300 to 1315	65.2	77.6	19	47	2	2	8	0
1315 to 1330	65.7	75.0	13	71	2	3	12	0
1330 to 1345	65.5	79.1	22	50	6	2	10	2
1345 to 1400	66.6	83.3	32	42	4	0	15	11
1400 to 1415	65.9	81.0	10	49	2	1	19	0
1415 to 1430	65.4	75.5	8	51	2	1	2	0
1430 to 1445	65.2	74.5	9	54	1	2	5	0
1445 to 1500	65.7	88.7	6	46	0	4	22	0
1500 to 1515	65.2	75.4	14	37	1	2	8	0
1515 to 1530	65.5	79.7	10	52	1	0	22	0
1530 to 1545	65.6	79.4	12	41	3	2	14	0
1545 to 1600	66.3	79.6	11	34	3	1	12	11
1600 to 1615	65.9	76.6	21	21	6	0	11	22
1615 to 1630	66.1	78.4	8	21	6	0	9	14
1630 to 1645	68.9	92.8	14	15	2	1	38	0
1645 to 1700	65.9	77.2	5	17	3	0	2	2
						TOTALS:	304	100

TABLE 11
MEASURED WATERSLIDE NOISE LEVELS AT MAUI MARRIOTT HOTEL

MAUI MARRIOTT HOTEL
May 23,2001

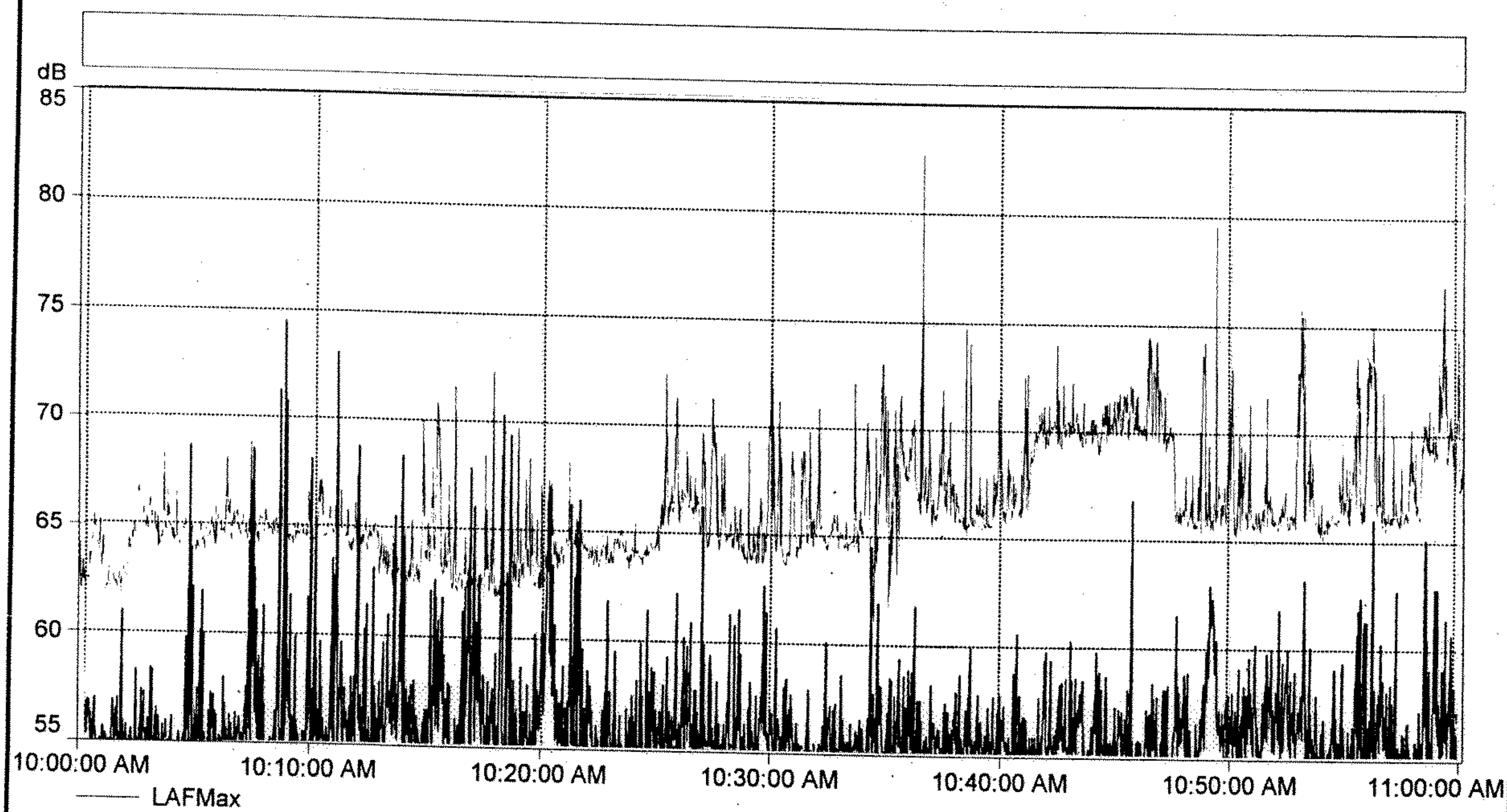
Open Short Waterslide.
Sound Level Meter Located At 50 Feet from Bottom of Slide

TIME	LAeq	LAmax	Number of Adults In Water	Number of Adults On Deck	Number of Children In Water	Number of Children On Deck	Number on Slide Adults	Number on Slide Children
0900 to 0915	68.6	<73	0	8	0	0	0	0
0915 to 0930	69.0	<73	1	9	0	0	3	0
0930 to 0945	69.0	<73	1	13	1	2	4	15
0945 to 1000	69.6	75.9	1	13	3	1	0	16
1000 to 1015	69.5	75.7	2	15	3	0	5	32
1015 to 1030	69.2	76.6	7	24	2	0	9	1
1030 to 1045	69.1	76.8	6	19	1	0	1	20
1045 to 1100	63.3	78.5	12	15	0	0	10	3
1100 to 1115	69.2	<73	5	22	0	0	14	0
1115 to 1130	69.0	<73	6	26	0	0	1	0
1130 to 1145	69.0	80.6	3	20	3	0	15	8
1145 to 1200	69.1	81.4	7	22	4	0	14	3
1200 to 1215	69.1	77.0	13	20	6	0	22	10
1215 to 1230	68.9	<73	9	26	1	0	19	9
1230 to 1245	68.8	<73	10	19	2	1	25	0
1245 to 1300 (Relocated Sound Level Meter Toward Molokai Tower Buildin							8	8
1300 to 1315	64.8	<73	5	25	2	0	0	35
1315 to 1330	64.6	<73	11	22	3	0	9	21
1330 to 1345	64.6	<73	12	25	2	2	18	12
1345 to 1400	64.2	73.5	10	19	0	1	22	0
1400 to 1415	65.7	<73	4	24	3	0	35	9
1415 to 1430	64.7	<73	15	21	4	2	12	13
1430 to 1445	64.6	79.3	9	22	1	0	26	1
1445 to 1500	64.4	78.2	5	22	3	0	14	7
1500 to 1515	64.3	<73	13	12	2	0	27	2
1515 to 1530	64.6	77.1	18	24	0	0	7	0
1530 to 1545	64.3	<73	11	27	6	0	7	16
1545 to 1600	64.4	75.5	9	28	3	0	18	38
1600 to 1615	64.8	74.3	9	29	5	0	27	1
1615 to 1630	64.5	76.4	13	26	1	0	31	6
1630 to 1645	64.6	75.7	18	28	1	2	30	3
1645 to 1700	64.6	75.0	24	25	4	2	34	2
						TOTALS:	467	291



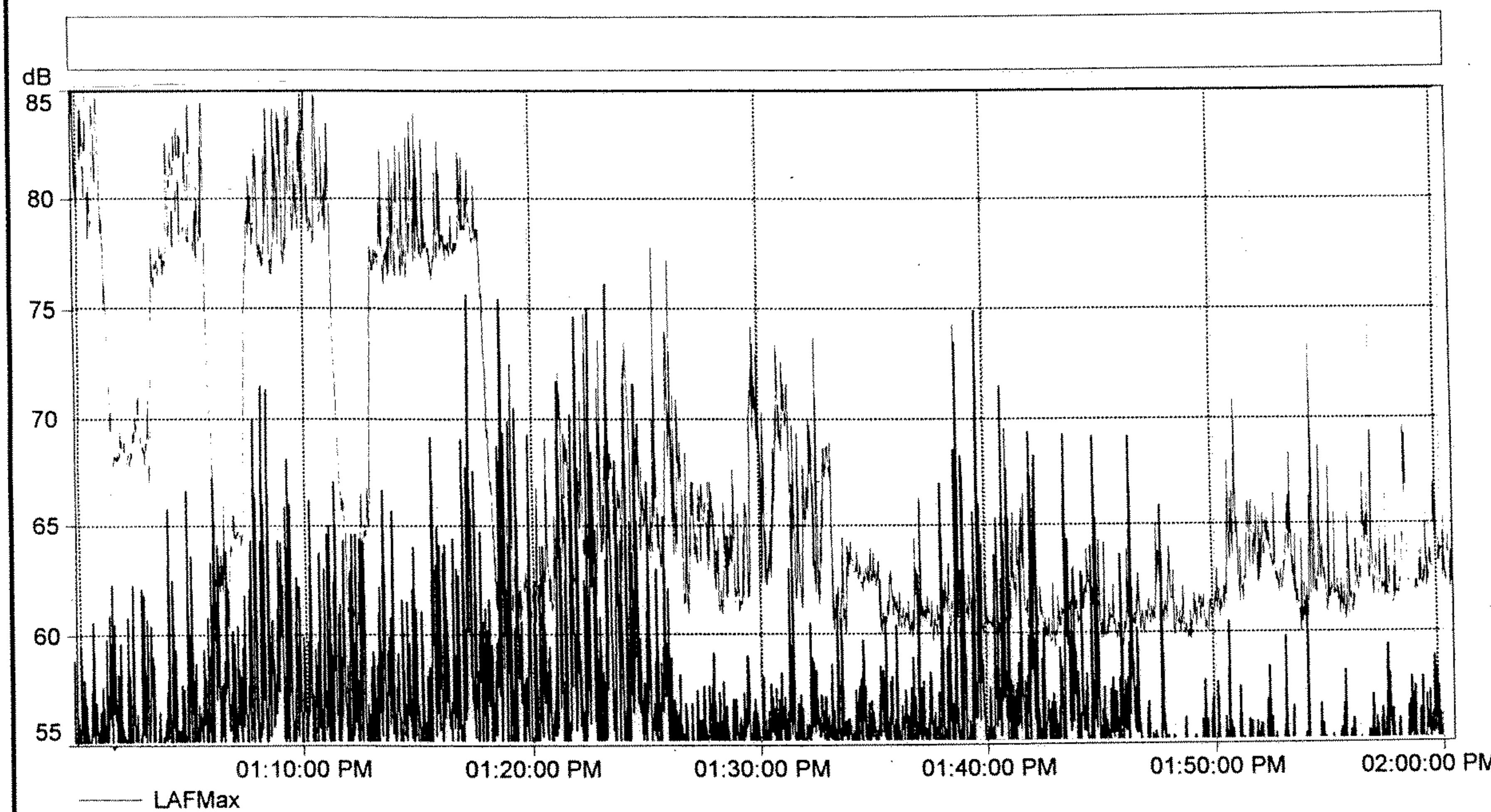
DBA VS. TIME HISTORY OF EXISTING BACKGROUND NOISE AND PREDICTED WATER SLIDE NOISE AT ILIKAI LOCATION "B"

FIGURE 16



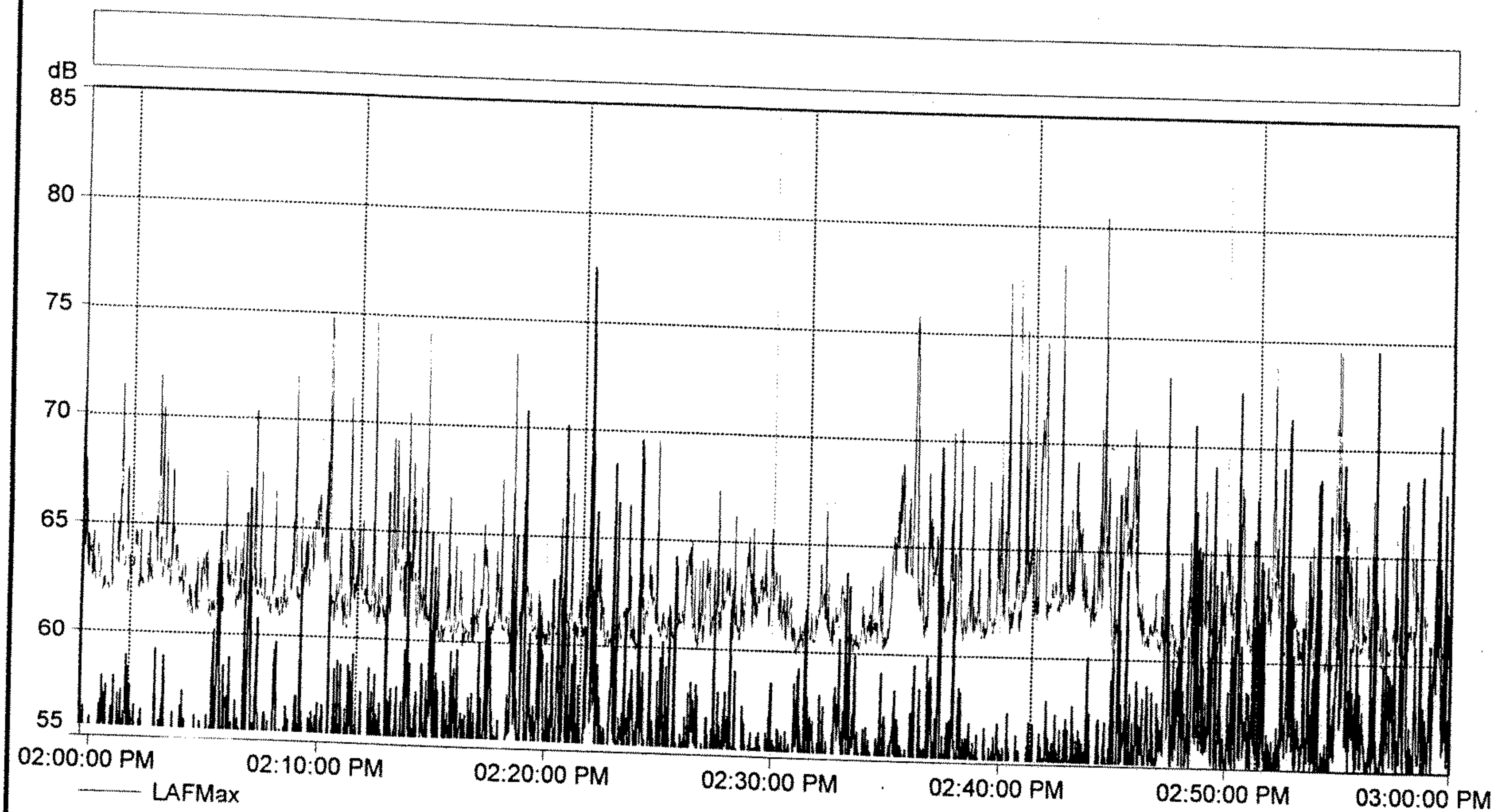
DBA VS. TIME HISTORY OF EXISTING BACKGROUND NOISE AND PREDICTED WATER SLIDE NOISE AT ILIKAI LOCATION "B"

FIGURE 17



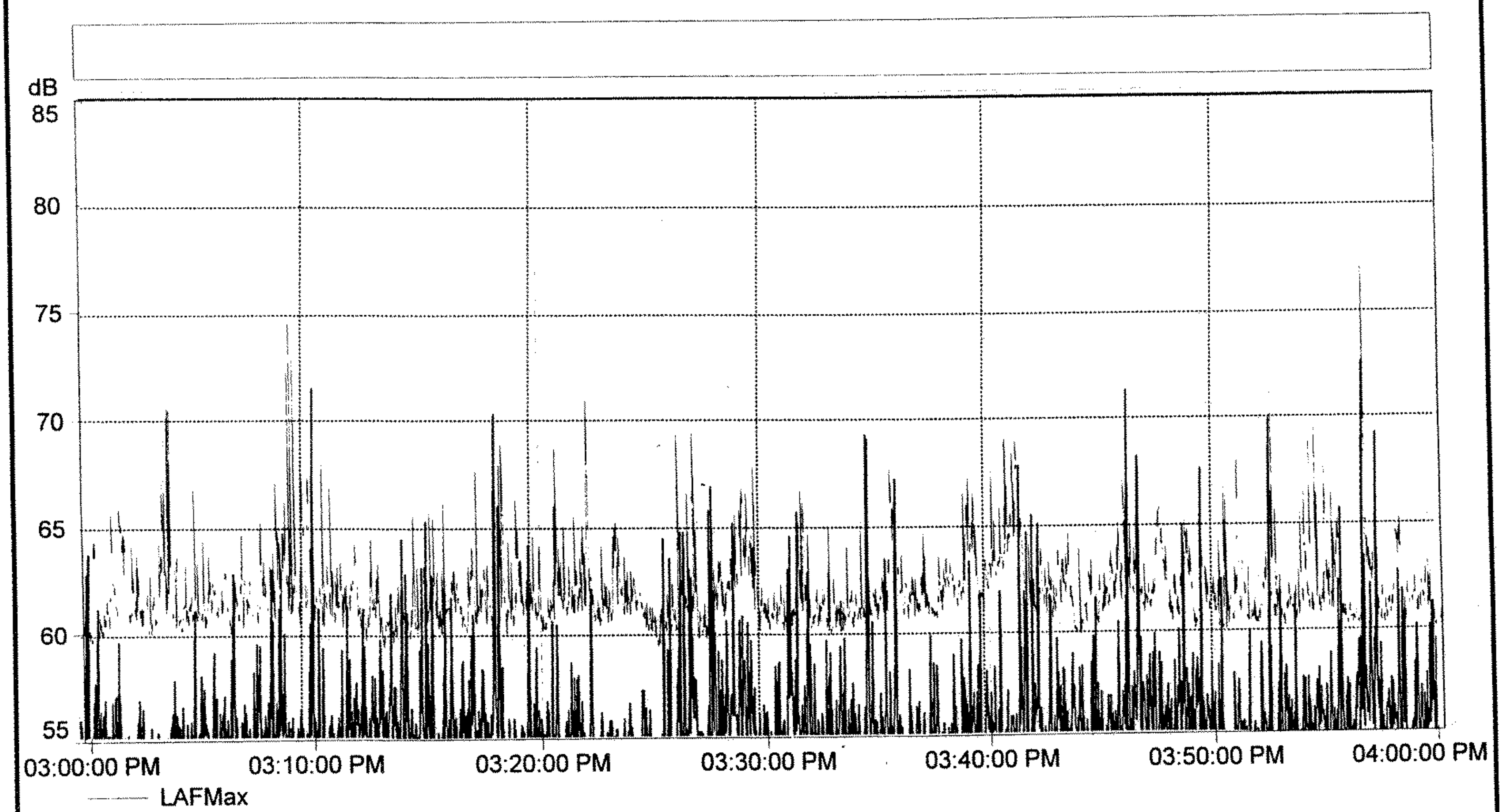
DBA VS. TIME HISTORY OF EXISTING BACKGROUND NOISE AND PREDICTED WATER SLIDE NOISE AT ILIKAI LOCATION "B"

FIGURE 18



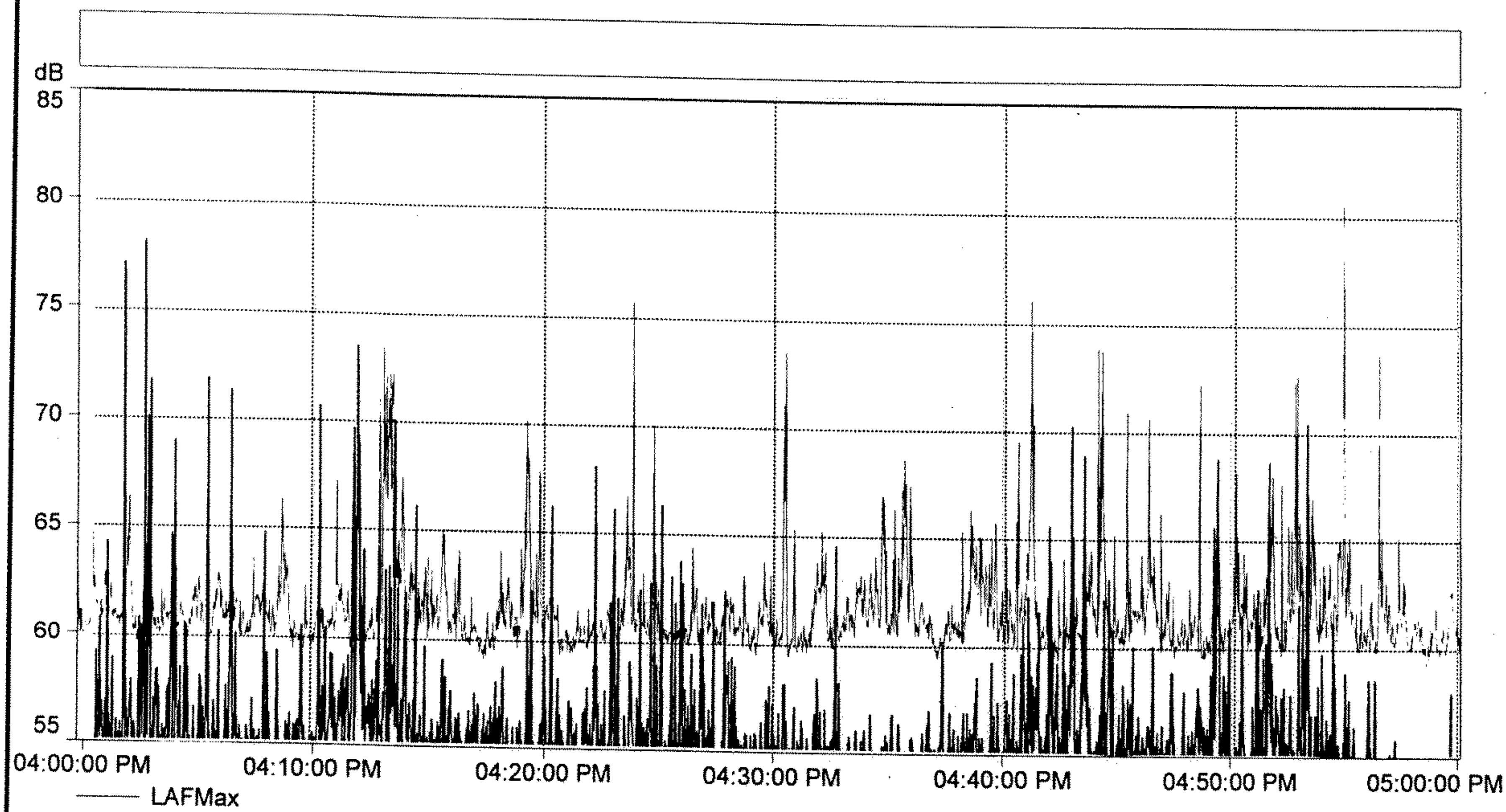
DBA VS. TIME HISTORY OF EXISTING BACKGROUND NOISE AND PREDICTED WATER SLIDE NOISE AT ILIKAI LOCATION "B"

FIGURE 19



DBA VS. TIME HISTORY OF EXISTING BACKGROUND NOISE AND PREDICTED WATER SLIDE NOISE AT ILIKAI LOCATION "B"

FIGURE 20



DBA VS. TIME HISTORY OF EXISTING BACKGROUND NOISE AND PREDICTED WATER SLIDE NOISE AT ILIKAI LOCATION "B"

FIGURE 21

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 FR, Part 51, Subpart B;" U.S. Department of Housing and Urban Development; July 12, I979.

(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 46, Community Noise Control;" Hawaii State Department of Health; September 23, 1996.

(5) "FHWA Traffic Noise Model User's Guide;" FHWA-PD-96-009, DOT-VNTSC-FHWA-98-1, Federal Highway Administration; Washington, D.C.; January 1998 and Version 1.1 Addendum dated September 2000.

(6) Existing and Future AM and PM Peak Hour Traffic Turning Movements for the Waikikian Development Project; Transmittals from Belt Collins Hawaii, Ltd.; April 10 and 12, 2001.

(7) 24-Hour Traffic Counts, Station 816, Ala Moana Boulevard at Kalakaua Avenue; August 24-25, 2000; Hawaii State Department of Transportation.

(8) 12-Hour Traffic Classification Counts, Station SL-50, Ala Moana Boulevard at Ala Wai Canal Bridge; August 14-15, 2000; Hawaii State Department of Transportation.

APPENDIX B

EXCERPTS FROM EPA'S ACOUSTIC TERMINOLOGY GUIDE

<u>Descriptor Symbol Usage</u>

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.

<u>Descriptor Nomenclature</u>

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).

<u>Noise Impact</u>

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" (PHL) shall be used consistent with CHABA Working Group 69 Report <u>Guidelines for Preparing Environmental Impact Statements (1977)</u>.

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,

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 C-1

SUMMARY OF BASE YEAR AND FUTURE YEAR TRAFFIC VOLUMES UNDER OPTION A-1

ROADWAY LANES	**** CY 2000 ***** AM VPH	PM VPH	CY 2005 (NO BUILD) AM VPH	PM VPH	CY 2005 (OPT. A-1) AM VPH	PM VPH
Ala Moana Blvd. - Northwest (EB)	981	1,569	1,176	1,795	1,202	1,825
Ala Moana Blvd. - Northwest (WB)	1,513	1,852	1,697	2,133	1,728	2,169
Two-Way	2,494	3,421	2,873	3,928	2,930	3,994
Ala Moana Blvd. - Middle (EB)	985	1,428	1,194	1,661	1,215	1,685
Ala Moana Blvd. - Middle (WB)	1,141	1,349	1,296	1,594	1,314	1,614
Two-Way	2,126	2,777	2,490	3,255	2,529	3,299
Ala Moana Blvd. - East (EB)	750	925	873	1,095	877	1,101
Ala Moana Blvd. - East (WB)	801	834	916	935	930	943
Two-Way	1,551	1,759	1,789	2,030	1,807	2,044
Dewey Lane - Mauka (EB)	39	64	47	64	49	67
Dewey Lane - Mauka (WB)	19	28	20	29	45	63
Two-Way	58	92	67	93	94	129
Dewey Lane - Makai (EB)	48	82	52	75	54	77
Dewey Lane - Makai (WB)	44	71	60	80	77	100
Two-Way	92	152	111	155	130	177
Ena Road At Ala Moana Blvd. (SB)	121	141	150	163	153	166
Ena Road At Ala Moana Blvd. (NB)	101	199	118	230	121	235
Two-Way	222	340	268	393	274	401
Kalia Road At Ala Moana Blvd. (SB)	596	855	794	1,004	818	1,026
Kalia Road At Ala Moana Blvd. (NB)	582	879	704	1,106	723	1,131
Two-Way	1,178	1,734	1,498	2,109	1,541	2,156
Kalia Road South of Rainbow Dr. (SB)	339	623	449	691	451	700
Kalia Road South of Rainbow Dr. (NB)	392	678	450	820	454	829
Two-Way	731	1,301	899	1,511	905	1,529
Rainbow Drive At Kalia Rd. (EB)	234	308	312	413	332	444
Rainbow Drive At Kalia Rd. (WB)	301	336	403	436	430	464
Two-Way	535	644	715	849	762	908
Rainbow Drive At Dewey Ln. (SB)	1	5	0	0	25	26
Rainbow Drive At Dewey Ln. (NB)	35	47	52	60	64	71
Two-Way	36	52	52	60	89	97

APPENDIX C-2

SUMMARY OF BASE YEAR AND FUTURE YEAR TRAFFIC VOLUMES UNDER OPTION A-2

ROADWAY LANES	**** CY 2000 ***** AM VPH	PM VPH	CY 2005 (NO BUILD) AM VPH	PM VPH	CY 2005 (OPT. A-2) AM VPH	PM VPH
Ala Moana Blvd. - Northwest (EB)	981	1,569	1,176	1,795	1,202	1,825
Ala Moana Blvd. - Northwest (WB)	1,513	1,852	1,697	2,133	1,728	2,165
Two-Way	2,494	3,421	2,873	3,928	2,930	3,990
Ala Moana Blvd. - Middle (EB)	985	1,428	1,194	1,661	1,176	1,644
Ala Moana Blvd. - Middle (WB)	1,141	1,349	1,296	1,594	1,325	1,597
Two-Way	2,126	2,777	2,490	3,255	2,501	3,241
Ala Moana Blvd. - East (EB)	750	925	873	1,095	877	1,101
Ala Moana Blvd. - East (WB)	801	834	916	935	930	943
Two-Way	1,551	1,759	1,789	2,030	1,807	2,044
Dewey Lane - Mauka (EB)	39	64	47	64	230	363
Dewey Lane - Mauka (WB)	19	28	20	29	200	232
Two-Way	58	92	67	93	430	594
Dewey Lane - Makai (EB)	48	82	52	75	67	112
Dewey Lane - Makai (WB)	44	71	60	80	50	70
Two-Way	92	152	111	155	116	182
Ena Road At Ala Moana Blvd. (SB)	121	141	150	163	154	168
Ena Road At Ala Moana Blvd. (NB)	101	199	118	230	122	236
Two-Way	222	340	268	393	276	404
Kalia Road At Ala Moana Blvd. (SB)	596	855	794	1,004	646	868
Kalia Road At Ala Moana Blvd. (NB)	582	879	704	1,106	608	947
Two-Way	1,178	1,734	1,498	2,109	1,254	1,814
Kalia Road South of Rainbow Dr. (SB)	339	623	449	691	453	700
Kalia Road South of Rainbow Dr. (NB)	392	678	450	820	454	829
Two-Way	731	1,301	899	1,511	907	1,529
Rainbow Drive At Kalia Rd. (EB)	234	308	312	413	219	260
Rainbow Drive At Kalia Rd. (WB)	301	336	403	436	258	306
Two-Way	535	644	715	849	477	566
Rainbow Drive At Dewey Ln. (SB)	1	5	0	0	140	174
Rainbow Drive At Dewey Ln. (NB)	35	47	52	60	157	251
Two-Way	36	52	52	60	297	425

APPENDIX C-3

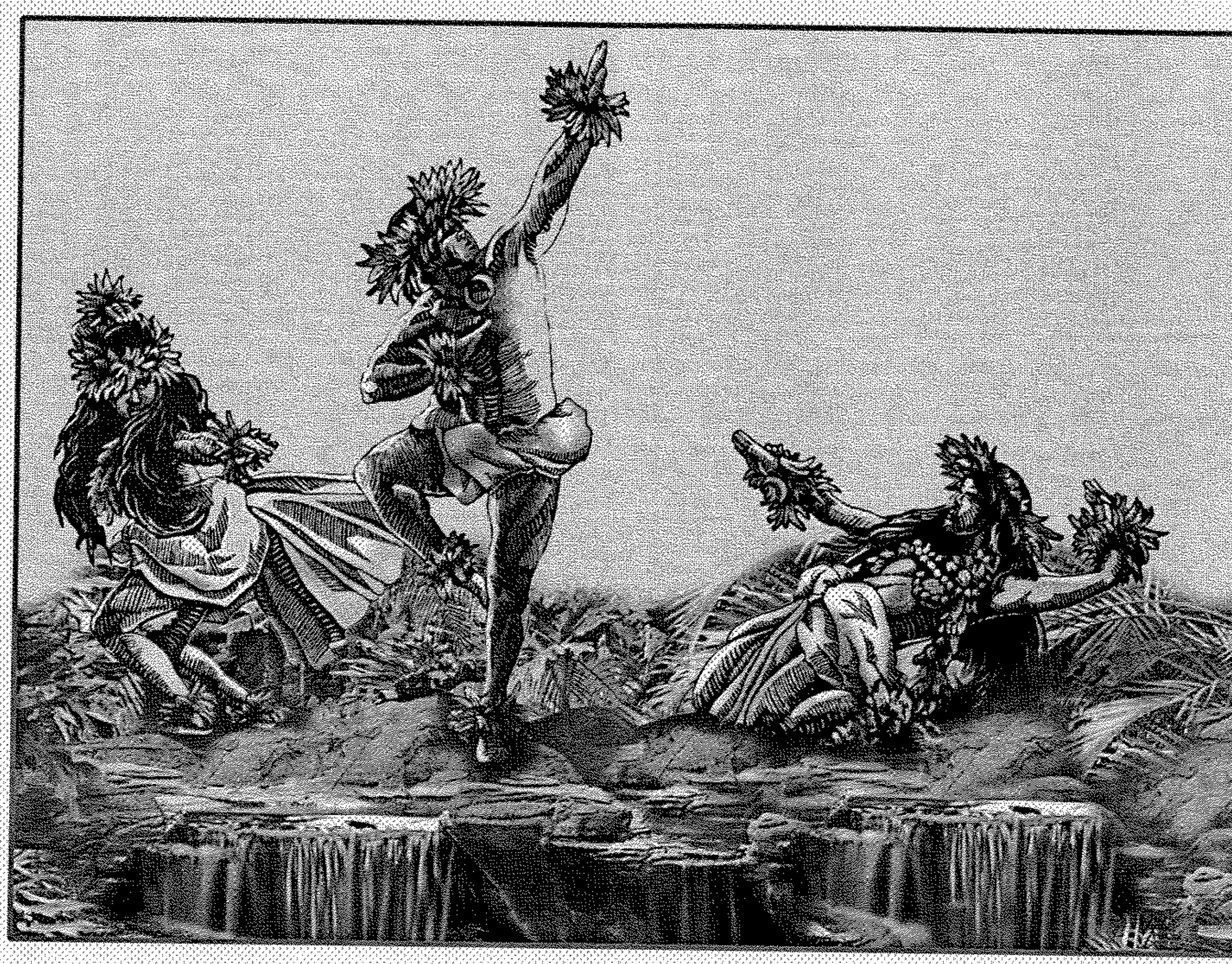
SUMMARY OF BASE YEAR AND FUTURE YEAR TRAFFIC VOLUMES UNDER OPTION E-1

ROADWAY LANES	**** CY 2000 *****		CY 2005 (NO BUILD)		CY 2005 (OPT. E-1)	
	AM VPH	PM VPH	AM VPH	PM VPH	AM VPH	PM VPH
Ala Moana Blvd. - Northwest (EB)	981	1,569	1,176	1,795	1,202	1,825
Ala Moana Blvd. - Northwest (WB)	1,513	1,852	1,697	2,133	1,728	2,169
Two-Way	2,494	3,421	2,873	3,928	2,930	3,994
Ala Moana Blvd. - Middle (EB)	985	1,428	1,194	1,661	1,223	1,695
Ala Moana Blvd. - Middle (WB)	1,141	1,349	1,296	1,594	1,289	1,564
Two-Way	2,126	2,777	2,490	3,255	2,511	3,259
Ala Moana Blvd. - East (EB)	750	925	873	1,095	877	1,101
Ala Moana Blvd. - East (WB)	801	834	916	935	930	943
Two-Way	1,551	1,759	1,789	2,030	1,807	2,044
Dewey Lane - Mauka (EB)	39	64	47	64	64	87
Dewey Lane - Mauka (WB)	19	28	20	29	65	73
Two-Way	58	92	67	93	129	159
Dewey Lane - Makai (EB)	48	82	52	75	59	77
Dewey Lane - Makai (WB)	44	71	60	80	102	150
Two-Way	92	152	111	155	161	227
Ena Road At Ala Moana Blvd. (SB)	121	141	150	163	153	166
Ena Road At Ala Moana Blvd. (NB)	101	199	118	230	121	235
Two-Way	222	340	268	393	274	401
Kalia Road At Ala Moana Blvd. (SB)	596	855	794	1,004	823	1,031
Kalia Road At Ala Moana Blvd. (NB)	582	879	704	1,106	688	1,066
Two-Way	1,178	1,734	1,498	2,109	1,511	2,096
Kalia Road South of Rainbow Dr. (SB)	339	623	449	691	451	700
Kalia Road South of Rainbow Dr. (NB)	392	678	450	820	454	829
Two-Way	731	1,301	899	1,511	905	1,529
Rainbow Drive At Kalia Rd. (EB)	234	308	312	413	292	374
Rainbow Drive At Kalia Rd. (WB)	301	336	403	436	430	464
Two-Way	535	644	715	849	722	838
Rainbow Drive At Dewey Ln. (SB)	1	5	0	0	45	41
Rainbow Drive At Dewey Ln. (NB)	35	47	52	60	104	141
Two-Way	36	52	52	60	149	182

APPENDIX C-4

SUMMARY OF BASE YEAR AND FUTURE YEAR TRAFFIC VOLUMES UNDER OPTION E-2

ROADWAY LANES	**** CY 2000 ***** AM VPH	PM VPH	CY 2005 (NO BUILD) AM VPH	PM VPH	CY 2005 (OPT. E-2) AM VPH	PM VPH
Ala Moana Blvd. - Northwest (EB)	981	1,569	1,176	1,795	1,202	1,825
Ala Moana Blvd. - Northwest (WB)	1,513	1,852	1,697	2,133	1,743	2,165
Two-Way	2,494	3,421	2,873	3,928	2,945	3,990
Ala Moana Blvd. - Middle (EB)	985	1,428	1,194	1,661	1,189	1,659
Ala Moana Blvd. - Middle (WB)	1,141	1,349	1,296	1,594	1,320	1,577
Two-Way	2,126	2,777	2,490	3,255	2,509	3,236
Ala Moana Blvd. - East (EB)	750	925	873	1,095	877	1,101
Ala Moana Blvd. - East (WB)	801	834	916	935	930	943
Two-Way	1,551	1,759	1,789	2,030	1,807	2,044
Dewey Lane - Mauka (EB)	39	64	47	64	278	418
Dewey Lane - Mauka (WB)	19	28	20	29	200	232
Two-Way	58	92	67	93	478	649
Dewey Lane - Makai (EB)	48	82	52	75	67	112
Dewey Lane - Makai (WB)	44	71	60	80	50	70
Two-Way	92	152	111	155	116	182
Ena Road At Ala Moana Blvd. (SB)	121	141	150	163	154	168
Ena Road At Ala Moana Blvd. (NB)	101	199	118	230	122	236
Two-Way	222	340	268	393	276	404
Kalia Road At Ala Moana Blvd. (SB)	596	855	794	1,004	661	888
Kalia Road At Ala Moana Blvd. (NB)	582	879	704	1,106	573	897
Two-Way	1,178	1,734	1,498	2,109	1,234	1,784
Kalia Road South of Rainbow Dr. (SB)	339	623	449	691	453	700
Kalia Road South of Rainbow Dr. (NB)	392	678	450	820	454	829
Two-Way	731	1,301	899	1,511	907	1,529
Rainbow Drive At Kalia Rd. (EB)	234	308	312	413	179	205
Rainbow Drive At Kalia Rd. (WB)	301	336	403	436	268	321
Two-Way	535	644	715	849	447	526
Rainbow Drive At Dewey Ln. (SB)	1	5	0	0	140	174
Rainbow Drive At Dewey Ln. (NB)	35	47	52	60	197	306
Two-Way	36	52	52	60	337	480



Appendix F
Air Emission Calculations

APPENDIX A
EMISSION CALCULATION WORKSHEETS

Construction-Related Emissions

Appendix A
Summary of Construction Emissions
Calendar Year 2003
(tons/year)

Pollutant	Tons/year
Carbon Monoxide	25
Reactive Organic Carbon	2.8
Nitrogen Oxides	35.4
Sulfur Oxides	3.7
Particulate Matter <10 μg	3.1

Note: Assumes all construction related activities are occurring simultaneously.

SOURCE: Estimations of Construction-Related Emissions using South Coast Air Quality Management District CEQA Assessment Guide1993.

Summary of Construction Emissions
Calendar Year 2004
(tons/year)

Pollutant	Tons/year
Carbon Monoxide	20.7
Reactive Organic Carbon	2.2
Nitrogen Oxides	31.2
Sulfur Oxides	3.3
Particulate Matter <10 μg	2.7

Note: Assumes all construction related activities are occurring simultaneously.

SOURCE: Estimations of Construction-Related Emissions using South Coast Air Quality Management District CEQA Assessment Guide1993.

Appendix A
Construction-Related Emissions Contribution and Comparison to Federal De Minimis Thresholds

Pollutant	Project Total (tons/year)*	De Minimis Threshold** (tons/year)	Project's Percentage of De Minimis (percentage)
Reactive Hydrocarbons	2.8	100	2.8
Carbon Monoxide	25.0	100	25.0
Oxides of Nitrogen	35.2	100	35.2
Sulfur Dioxide	3.7	100	3.7
Particulates	3.1	100	3.1

* Calendar year 2003 selected as "worst case"
**SOURCE: General Conformity of Federal Actions – De Minimis Thresholds (Section 51.583(i). Area classification "attainment- maintenance"

APPENDIX B
EMISSION CALCULATION WORKSHEETS

AP-42 Table of Emission Factors

HAWAIIAN HILTON- VEHICLE EMISSIONS

AP-42 TABLES OF EMISSION FACTORS

Sep-01 (Rev 10-06-01)

VEHICLE CATEGORIES:	ALA MOANA	HOBORN	KALIA
AUTO = LIGHT DUTY GASOLINE POWERED VEHICLES	82.50%	85%	82.50%
VAN = HEAVY DUTY GASOLINE POWERED VEHCILES	9.50%	10%	9.50%
BUSES = HEAVY DUTY DIESEL POWER VEHICLES	3%	2.50%	3%
TRUCKS = HEAVY DUTY DIESEL POWERED VEHICLES	5%	2.50%	5%

FLEET AGE: 1990@ 50% 1995@ 25% 2000@ 25%

PM: AP-42 Factors	Idling
Assumed Heavy Diesel/Buses 160 hp	1988-1990 3.174 g/hr
1988 0.4575 gr/BHP/hr	1991-1993 1.860
1991 0.2234	1994+ 1.004
1994+ 0.07135	

VEHICLE CATEGORY-YR	CO @ 2.5 MPH	CO @ 25 MPH	CO @35 MPH	CO IDLE- G/HR	NOX @ 2.5 MPH	NOX @ 25 MPH	NOX @35 MPH	NOX IDLE- G/HR
LDGPV-1990	296	33	24.72	740.00	2.28	1.68	1.72	5.70
LDGPV-1995	165	22	16.31	412.50	2.42	1.69	1.74	6.05
LDGPV-2000	111.5	16	12.19	278.75	2.18	1.55	1.54	5.45
LDGT-1990	421.7	45	36.53	1054.25	2.68	2.25	2.36	6.70
LDGT-1995	255.78	33	24.66	639.45	2.76	2	2.09	6.90
LDGT-2000	164.49	24	18.2	411.23	2.78	1.91	1.95	6.95
HDDPV-1990	44.31	10	7.69	110.78	37.78	20	18.86	94.45
HDDPV-1995	39.55	9	6.87	98.88	25.43	13.25	12.69	63.58
HDDPV-2000	36.96	8	6.42	92.40	18.57	10	9.27	46.43
COMPOSITE EMISSION FACTOR (50% 1990- 25% 1995- 25% 2000)								
LDGPV	217.13	26.00	19.49	542.81	2.29	1.65	1.68	5.73
LDGT	315.92	36.75	28.98	789.79	2.73	2.10	2.19	6.81
HDDPV	41.28	9.25	7.17	103.21	29.89	15.81	14.92	74.73
COMPOSITE VEHICLE MIXTURE								
ALA MOANA	212.44	25.68	19.40	531.11	4.54	2.83	2.79	11.35
HOBRON	218.21	26.24	19.82	545.53	3.71	2.40	2.39	9.28
KALIA	212.44	25.68	19.40	531.11	4.54	2.83	2.79	11.35

VEHICLE CATEGORY-YR	HC @ 2.5 MPH	HC @ 25 MPH	HC @35 MPH	HC IDLE- G/HR	PM @ 2.5 MPH	PM @ 25 MPH	PM @35 MPH	PM IDLE- G/HR
LDGPV-1990	17.77	2.4	1.59	44.43	0.06	0.13	0.15	0.15
LDGPV-1995	10.79	1.6	1.14	26.98	0.06	0.13	0.15	0.15
LDGPV-2000	7.91	1.3	0.95	19.78	0.06	0.13	0.15	0.15
LDGT-1990	25	3.3	2.45	62.50	0.06	0.13	0.15	0.15
LDGT-1995	15.74	2.3	1.76	39.35	0.06	0.13	0.15	0.15
LDGT-2000	11.54	1.7	1.39	28.85	0.06	0.13	0.15	0.15
HDDPV-1990	7.16	2.8	2.05	17.90		2.93	2.09	3.174
HDDPV-1995	5.45	2	1.56	13.63		1.4	1	1.86
HDDPV-2000	4.68	1.7	1.34	11.70		0.46	0.33	1.004
COMPOSITE EMISSION FACTOR (50% 1990- 25% 1995- 25% 2000)								
LDGPV	13.56	1.93	1.32	33.90		0.13	0.15	0.15
LDGT	19.32	2.65	2.01	48.30		0.13	0.15	0.15
HDDPV	6.11	2.33	1.75	15.28		1.93	1.38	2.30
COMPOSITE VEHICLE MIXTURE								
ALA MOANA	13.51	2.03	1.42	33.78		0.27	0.25	0.32
HOBRON	13.76	2.02	1.41	34.41		0.22	0.21	0.26
KALIA	13.51	2.03	1.42	33.78		0.27	0.25	0.32

APPENDIX C

USEPA CAL3QHC LINE SOURCE MODEL- Version 2.0 Dated 95221

Carbon Monoxide & PM- Ala Moana & Hobron

INPUT FILE: AM_HOBEX.DAT

```
'HILTON HVILL CO EMISSIONS MODELING' 60. 321.  0. 0.  16  0.3048 1 1
'R1  (NE CORNER 1_FL)'         42      68      6
'R2  (NE CORNER 2_FL)'         42      68      21
'R3  (SE CORNER 1_FL)'         42     -68      6
'R4  (SE CORNER 2_FL)'         42     -68      21
'R5  (NW CORNER 1_FL)'        -42      68      6
'R6  (NW CORNER 2_FL)'        -42      68      21
'R7  (SW CORNER 1_FL)'        -42     -68      6
'R8  (SW CORNER 2_FL)'        -42     -68      21
'R9  (NE 150 FT 1_FL)'        150     150      6
'R10(NE 150 FT 2_FL)'         150     150      21
'R11(SE 150 FT 1_FL)'         150    -150      6
'R12(SE 150 FT 2_FL)'         150    -150      21
'R13(NW 150 FT 1_FL)'        -150     150      6
'R14(NW 150 FT 2_FL)'        -150     150      21
'R15(SW 150 FT 1_FL)'        -150    -150      6
'R16(SW 150 FT 2_FL)'        -150    -150      21
'ALA MOANA BLVD & HOBRON INTERSECTION R1'      20  1  1  'C'
 1
'1A.AM_EB.Arr 1LTLn   '   'AG'   -20.    0.   -1000.     0.  132.   19.4   0. 32.
 1
'1B.AM_EB.Arr 3_Lns   '   'AG'   -20.  -12.   -1000.   -12. 1317.   19.4   0. 56.
 1
'2A.AM_EB.Dep 4_Lns   '   'AG'   -20.    0.    1000.     0. 1245.   19.4   0. 68.
 1
'3A.AM_WB.Arr 1LTLn   '   'AG'    20.    0.    1000.     0.  126.   19.4   0. 32.
 1
'3B.AM_WB.Arr 3_Lns   '   'AG'    20.   12.    1000.    12. 1377.   19.4   0. 56.
 1
'4A.AM_WB.Dep 4_Lns   '   'AG'    20.    0.   -1000.     0. 1245.   19.4   0. 68.
 1
'5A.Hob_SB.Arr 1RTLn  '   'AG'   -11.   48.     -11.  1000.  426.   26.3   0. 31.
 1
'5B.Hob_SB.Arr 1_Ln   '   'AG'     0.   48.       0.  1000.  116.   26.3   0. 31.
 1
'6A.Hob_SB.Dep 1_Ln   '   'AG'     0.   48.       0. -1000.  214.   26.3   0. 42.
 1
'7A.Hob_NB.Arr 1LTLn  '   'AG'   -11.  -48.     -11. -1000.  179.   26.3   0. 31.
 1
'7B.Hob_NB.Arr 1_Ln   '   'AG'     0.  -48.       0. -1000.   88.   26.3   0. 31.
 1
'8A.Hob_NB.Dep 1_Ln   '   'AG'     0.  -48.       0.  1000.  181.   26.3   0. 42.
 2
'11A.AM_EB.Arr Q1LTLn'    'AG'   -20.    0.   -1000.     0.   0.   12.   1
       140        60       3.0    132    531.0    1600   1  2
 2
'11B.AM_EB.Arr Q3_Lns'    'AG'   -20.  -12.   -1000.   -12.   0.   12.   3
       140        60       3.0   1317    531.0    1600   1  2
 2
'13A.AM_WB.Arr Q1LTLn'    'AG'    20.    0.    1000.     0.   0.   12.   1
       140        71       3.0    126    531.0    1600   1  2
 2
'13B.AM_WB.Arr Q3_Lns'    'AG'    20.   12.    1000.    12.   0.   12.   3
       140        71       3.0   1377    531.0    1600   1  2
 2
'15A.Hob_SB.ArrQ1RTLn'    'AG'   -11.   48.     -11.  1000.   0.   11.   1
       140        95       3.0   426    545.0    1600   1  2
 2
'15B.Hob_SB.ArrQ2_Lns'    'AG'     0.   48.       0.  1000.   0.   11.   1
       140       126       3.0    116    545.0    1600   1  2
 2
'17A.Hob_NB.ArrQ1LTLn'    'AG'   -11.  -48.     -11. -1000.   0.   11.   1
       140       112       3.0    179    545.0    1600   1  2
 2
'17B.Hob_NB.ArrQ2_Lns'    'AG'     0.  -48.       0. -1000.   0.   11.   1
       140       112       3.0     88    545.0    1600   1  2
 1.0 00. 4 1000. 0.  'Y' 10  0 36
```

INPUT FILE: AM_HOBPR.DAT

```
'HILTON HVILL CO EMISSIONS PROPOSED' 60. 321.  0. 0.  16  0.3048 1 1
'R1  (NE CORNER 1_FL)'        42       68      6
'R2  (NE CORNER 2_FL)'        42       68      21
'R3  (SE CORNER 1_FL)'        42      -68      6
'R4  (SE CORNER 2_FL)'        42      -68      21
'R5  (NW CORNER 1_FL)'       -42       68      6
'R6  (NW CORNER 2_FL)'       -42       68      21
'R7  (SW CORNER 1_FL)'       -42      -68      6
'R8  (SW CORNER 2_FL)'       -42      -68      21
'R9  (NE 150 FT 1_FL)'       150      150      6
'R10(NE 150 FT 2_FL)'        150      150      21
'R11(SE 150 FT 1_FL)'        150     -150      6
'R12(SE 150 FT 2_FL)'        150     -150      21
'R13(NW 150 FT 1_FL)'       -150      150      6
'R14(NW 150 FT 2_FL)'       -150      150      21
'R15(SW 150 FT 1_FL)'       -150     -150      6
'R16(SW 150 FT 2_FL)'       -150     -150      21
'ALA MOANA BLVD & HOBRON INTERSECTION R1'      20  1  1  'C'
 1
'1A.AM_EB.Arr 1LTLn  '   'AG'   -20.     0.   -1000.      0.  132.   19.4   0. 32.
 1
'1B.AM_EB.Arr 3_Lns  '   'AG'   -20.   -12.   -1000.    -12. 1347.   19.4   0. 56.
 1
'2A.AM_EB.Dep 4_Lns  '   'AG'   -20.     0.    1000.      0. 1278.   19.4   0. 68.
 1
'3A.AM_WB.Arr 1LTLn  '   'AG'    20.     0.    1000.      0.  129.   19.4   0. 32.
 1
'3B.AM_WB.Arr 3_Lns  '   'AG'    20.    12.    1000.     12. 1395.   19.4   0. 56.
 1
'4A.AM_WB.Dep 4_Lns  '   'AG'    20.     0.   -1000.      0. 1414.   19.4   0. 68.
 1
'5A.Hob_SB.Arr 1RTLn '   'AG'   -11.    48.     -11.  1000.  426.   26.3   0. 31.
 1
'5B.Hob_SB.Arr 1_Ln  '   'AG'     0.    48.       0.  1000.  118.   26.3   0. 31.
 1
'6A.Hob_SB.Dep 1_Ln  '   'AG'     0.    48.       0. -1000.  229.   26.3   0. 42.
 1
'7A.Hob_NB.Arr 1LTLn '   'AG'   -11.   -48.     -11. -1000.  198.   26.3   0. 31.
 1
'7B.Hob_NB.Arr 1_Ln  '   'AG'     0.   -48.       0. -1000.   89.   26.3   0. 31.
 1
'8A.Hob_NB.Dep 1_Ln  '   'AG'     0.   -48.       0.  1000.  192.   26.3   0. 42.
 2
'11A.AM_EB.Arr Q1LTLn'   'AG'   -20.     0.   -1000.      0.   0.   12.   1
     140         60       3.0    132     531.0    1600  1  2
 2
'11B.AM_EB.Arr Q3_Lns'   'AG'   -20.   -12.   -1000.    -12.   0.   12.   3
     140         60       3.0   1347     531.0    1600  1  2
 2
'13A.AM_WB.Arr Q1LTLn'   'AG'    20.     0.    1000.      0.   0.   12.   1
     140         71       3.0    129     531.0    1600  1  2
 2
'13B.AM_WB.Arr Q3_Lns'   'AG'    20.    12.    1000.     12.   0.   12.   3
     140         71       3.0   1379     531.0    1600  1  2
 2
'15A.Hob_SB.ArrQ1RTLn'   'AG'   -11.    48.     -11.   1000.   0.   11.   1
     140         95       3.0    426     545.0    1600  1  2
 2
'15B.Hob_SB.ArrQ2_Lns'   'AG'     0.    48.       0.   1000.   0.   11.   1
     140        126       3.0    118     545.0    1600  1  2
 2
'17A.Hob_NB.ArrQ1LTLn'   'AG'   -11.   -48.     -11.  -1000.   0.   11.   1
     140        112       3.0    198     545.0    1600  1  2
 2
'17B.Hob_NB.ArrQ2_Lns'   'AG'     0.   -48.       0.  -1000.   0.   11.   1
     140        112       3.0     89     545.0    1600  1  2
1.0 00. 4 1000. 0.  'Y' 10  0 36
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INPUT FILE: AM_HOBS3.DAT

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'HILTON HVILL CO EMISSIONS WORST' 60. 321.  0. 0.  16  0.3048 1 1
'R1  (NE CORNER 1_FL)'       42      68      6
'R2  (NE CORNER 2_FL)'       42      68      21
'R3  (SE CORNER 1_FL)'       42     -68      6
'R4  (SE CORNER 2_FL)'       42     -68      21
'R5  (NW CORNER 1_FL)'      -42      68      6
'R6  (NW CORNER 2_FL)'      -42      68      21
'R7  (SW CORNER 1_FL)'      -42     -68      6
'R8  (SW CORNER 2_FL)'      -42     -68      21
'R9  (NE 150 FT 1_FL)'      150     150      6
'R10(NE 150 FT 2_FL)'       150     150      21
'R11(SE 150 FT 1_FL)'       150    -150      6
'R12(SE 150 FT 2_FL)'       150    -150      21
'R13(NW 150 FT 1_FL)'      -150     150      6
'R14(NW 150 FT 2_FL)'      -150     150      21
'R15(SW 150 FT 1_FL)'      -150    -150      6
'R16(SW 150 FT 2_FL)'      -150    -150      21
'ALA MOANA BLVD & HOBRON INTERSECTION S3'      20  1  1  'C'
 1
'1A.AM_EB.Arr 1LTLn   '   'AG'   -20.    0.    -1000.     0.  132.  19.4  0. 32.
 1
'1B.AM_EB.Arr 3_Lns   '   'AG'   -20.  -12.    -1000.   -12. 1347.  19.4  0. 56.
 1
'2A.AM_EB.Dep 4_Lns   '   'AG'   -20.    0.     1000.     0. 1278.  19.4  0. 68.
 1
'3A.AM_WB.Arr 1LTLn   '   'AG'    20.    0.     1000.     0.  129.  19.4  0. 32.
 1
'3B.AM_WB.Arr 3_Lns   '   'AG'    20.   12.     1000.    12. 1395.  19.4  0. 56.
 1
'4A.AM_WB.Dep 4_Lns   '   'AG'    20.    0.    -1000.     0. 1414.  19.4  0. 68.
 1
'5A.Hob_SB.Arr 1RTLn  '   'AG'   -11.   48.      -11.  1000.  426.  26.3  0. 31.
 1
'5B.Hob_SB.Arr 1_Ln   '   'AG'     0.   48.        0.  1000.  118.  26.3  0. 31.
 1
'6A.Hob_SB.Dep 1_Ln   '   'AG'     0.   48.        0. -1000.  229.  26.3  0. 42.
 1
'7A.Hob_NB.Arr 1LTLn  '   'AG'   -11.  -48.      -11. -1000.  198.  26.3  0. 31.
 1
'7B.Hob_NB.Arr 1_Ln   '   'AG'     0.  -48.        0. -1000.   89.  26.3  0. 31.
 1
'8A.Hob_NB.Dep 1_Ln   '   'AG'     0.  -48.        0.  1000.  192.  26.3  0. 42.
 2
'11A.AM_EB.Arr Q1LTLn'   'AG'   -20.    0.    -1000.     0.  0.  12.  1
       140        60       3.0    132    531.0    1600  1  1
 2
'11B.AM_EB.Arr Q3_Lns'   'AG'   -20.  -12.    -1000.   -12.  0.  12.  3
       140        60       3.0   1347    531.0    1600  1  1
 2
'13A.AM_WB.Arr Q1LTLn'   'AG'    20.    0.     1000.     0.  0.  12.  1
       140        71       3.0    129    531.0    1600  1  1
 2
'13B.AM_WB.Arr Q3_Lns'   'AG'    20.   12.     1000.    12.  0.  12.  3
       140        71       3.0   1379    531.0    1600  1  1
 2
'15A.Hob_SB.ArrQ1RTLn'   'AG'   -11.   48.      -11.  1000.  0.  11.  1
       140        95       3.0    426    545.0    1600  1  1
 2
'15B.Hob_SB.ArrQ2_Lns'   'AG'     0.   48.        0.  1000.  0.  11.  1
       140       126       3.0    118    545.0    1600  1  1
 2
'17A.Hob_NB.ArrQ1LTLn'   'AG'   -11.  -48.      -11. -1000.  0.  11.  1
       140       112       3.0    198    545.0    1600  1  1
 2
'17B.Hob_NB.ArrQ2_Lns'   'AG'     0.  -48.        0. -1000.  0.  11.  1
       140       112       3.0     89    545.0    1600  1  1
 1.0 00. 4 1000. 0.  'Y' 10  0 36
```

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221

PAGE 1

JOB: HILTON HVILL CO EMISSIONS EXISTING

RUN: ALA MOANA BLVD & HOBRON INTERSECTION R1

DATE : 10/ 8/ 1
TIME : 18:16:51

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S   VD = .0 CM/S   Z0 = 321. CM
U = 1.0 M/S   CLAS = 4 (D)   ATIM = 60. MINUTES   MIXH = 1000. M   AMB = .0 PPM

LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1. 1A.AM_EB.Arr 1LTLn	-20.0	.0	-1000.0	.0	980.	270.	AG	132.	19.4	.0	32.0		
2. 1B.AM_EB.Arr 3_Lns	-20.0	-12.0	-1000.0	-12.0	980.	270.	AG	1317.	19.4	.0	56.0		
3. 2A.AM_EB.Dep 4_Lns	-20.0	.0	1000.0	.0	1020.	90.	AG	1245.	19.4	.0	68.0		
4. 3A.AM_WB.Arr 1LTLn	20.0	.0	1000.0	.0	980.	90.	AG	126.	19.4	.0	32.0		
5. 3B.AM_WB.Arr 3_Lns	20.0	12.0	1000.0	12.0	980.	90.	AG	1377.	19.4	.0	56.0		
6. 4A.AM_WB.Dep 4_Lns	20.0	.0	-1000.0	.0	1020.	270.	AG	1245.	19.4	.0	68.0		
7. 5A.Hob_SB.Arr 1RTLn	-11.0	48.0	-11.0	1000.0	952.	360.	AG	426.	26.3	.0	31.0		
8. 5B.Hob_SB.Arr 1_Ln	.0	48.0	.0	1000.0	952.	360.	AG	116.	26.3	.0	31.0		
9. 6A.Hob_SB.Dep 1_Ln	.0	48.0	.0	-1000.0	1048.	180.	AG	214.	26.3	.0	42.0		
10. 7A.Hob_NB.Arr 1LTLn	-11.0	-48.0	-11.0	-1000.0	952.	180.	AG	179.	26.3	.0	31.0		
11. 7B.Hob_NB.Arr 1_Ln	.0	-48.0	.0	-1000.0	952.	180.	AG	88.	26.3	.0	31.0		
12. 8A.Hob_NB.Dep 1_Ln	.0	-48.0	.0	1000.0	1048.	360.	AG	181.	26.3	.0	42.0		
13. 11A.AM_EB.Arr Q1LTLn	-20.0	.0	-63.3	.0	43.	270.	AG	610.	100.0	.0	12.0	.15	2.2
14. 11B.AM_EB.Arr Q3_Lns	-20.0	-12.0	-164.0	-12.0	144.	270.	AG	1831.	100.0	.0	12.0	.51	7.3
15. 13A.AM_WB.Arr Q1LTLn	20.0	.0	68.9	.0	49.	90.	AG	722.	100.0	.0	12.0	.17	2.5
16. 13B.AM_WB.Arr Q3_Lns	20.0	12.0	198.2	12.0	178.	90.	AG	2167.	100.0	.0	12.0	.63	9.1
17. 15A.Hob_SB.ArrQ1RTLn	-11.0	48.0	-11.0	350.8	303.	360.	AG	992.	100.0	.0	11.0	.93	15.4
18. 15B.Hob_SB.ArrQ2_Lns	.0	48.0	.0	339.0	291.	360.	AG	1316.	100.0	.0	11.0	1.14	14.8
19. 17A.Hob_NB.ArrQ1LTLn	-11.0	-48.0	-11.0	-171.6	124.	180.	AG	1169.	100.0	.0	11.0	.68	6.3
20. 17B.Hob_NB.ArrQ2_Lns	.0	-48.0	.0	-106.0	58.	180.	AG	1169.	100.0	.0	11.0	.34	2.9

JOB: HILTON HVILL CO EMISSIONS MODELING RUN: ALA MOANA BLVD & HOBRON INTERSECTION R1

DATE : 10/ 8/ 1
TIME : 18:16:51

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
13. 11A.AM_EB.Arr Q1LTLn*	140	60	3.0	132	1600	531.00	1	2
14. 11B.AM_EB.Arr Q3_Lns*	140	60	3.0	1317	1600	531.00	1	2
15. 13A.AM_WB.Arr Q1LTLn*	140	71	3.0	126	1600	531.00	1	2
16. 13B.AM_WB.Arr Q3_Lns*	140	71	3.0	1377	1600	531.00	1	2
17. 15A.Hob_SB.ArrQ1RTLn*	140	95	3.0	426	1600	545.00	1	2
18. 15B.Hob_SB.ArrQ2_Lns*	140	126	3.0	116	1600	545.00	1	2
19. 17A.Hob_NB.ArrQ1LTLn*	140	112	3.0	179	1600	545.00	1	2
20. 17B.Hob_NB.ArrQ2_Lns*	140	112	3.0	88	1600	545.00	1	2

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. R1 (NE CORNER 1_FL)	42.0	68.0	6.0
2. R2 (NE CORNER 2_FL)	42.0	68.0	21.0
3. R3 (SE CORNER 1_FL)	42.0	-68.0	6.0
4. R4 (SE CORNER 2_FL)	42.0	-68.0	21.0
5. R5 (NW CORNER 1_FL)	-42.0	68.0	6.0
6. R6 (NW CORNER 2_FL)	-42.0	68.0	21.0
7. R7 (SW CORNER 1_FL)	-42.0	-68.0	6.0
8. R8 (SW CORNER 2_FL)	-42.0	-68.0	21.0
9. R9 (NE 150 FT 1_FL)	150.0	150.0	6.0
10. R10(NE 150 FT 2_FL)	150.0	150.0	21.0
11. R11(SE 150 FT 1_FL)	150.0	-150.0	6.0
12. R12(SE 150 FT 2_FL)	150.0	-150.0	21.0
13. R13(NW 150 FT 1_FL)	-150.0	150.0	6.0
14. R14(NW 150 FT 2_FL)	-150.0	150.0	21.0
15. R15(SW 150 FT 1_FL)	-150.0	-150.0	6.0
16. R16(SW 150 FT 2_FL)	-150.0	-150.0	21.0

JOB: HILTON HVILL CO EMISSIONS MODELING RUN: ALA MOANA BLVD & HOBRON INTERSECTION R1 PAGE 3

MODEL RESULTS
WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (ug/m**3) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
0.	*	1.9	1.8	5.3	4.4	2.7	2.4	5.9	4.6	.0	.0	2.0	1.8	.0	.0	1.8	1.6
10.	*	.7	.6	4.6	3.6	4.1	3.7	6.1	5.1	.0	.0	1.6	1.3	.1	.1	2.5	2.4
20.	*	.1	.1	3.8	3.2	5.0	4.3	5.2	4.4	.0	.0	1.2	1.0	.4	.4	3.2	3.0
30.	*	.0	.0	3.6	2.8	5.1	4.2	4.5	3.6	.0	.0	.9	.8	.8	.8	3.4	3.2
40.	*	.0	.0	3.4	2.8	4.7	3.9	4.4	3.5	.0	.0	.7	.7	1.3	1.2	3.1	3.1
50.	*	.0	.0	3.2	2.7	4.5	3.4	5.2	4.0	.0	.0	.6	.6	1.7	1.4	3.2	2.9
60.	*	.0	.0	2.8	2.5	4.3	3.1	5.7	4.6	.0	.0	.6	.6	1.8	1.6	3.2	2.8
70.	*	.0	.0	2.2	1.8	4.1	2.9	5.8	4.6	.0	.0	.6	.6	1.7	1.5	2.4	2.3
80.	*	.5	.4	1.5	1.3	4.7	3.1	5.5	4.3	.0	.0	.4	.4	1.7	1.6	1.7	1.5
90.	*	1.3	1.1	.8	.7	5.7	4.0	4.8	3.5	.2	.2	.2	.2	2.1	2.0	1.1	.9
100.	*	2.4	2.1	.3	.2	6.6	5.0	4.2	2.9	.5	.4	.0	.0	2.6	2.4	.5	.4
110.	*	3.4	2.8	.0	.0	6.7	5.5	3.8	2.8	.7	.6	.0	.0	2.9	2.9	.3	.2
120.	*	3.9	3.3	.0	.0	6.0	4.9	3.7	2.7	.7	.6	.0	.0	3.1	2.9	.2	.2
130.	*	4.2	3.5	.0	.0	4.5	3.6	3.5	2.6	.7	.6	.0	.0	2.7	2.6	.1	.1
140.	*	4.1	3.3	.0	.0	3.6	2.8	3.2	2.4	.7	.7	.0	.0	2.5	2.5	.2	.1
150.	*	4.2	3.3	.0	.0	3.4	2.5	2.9	2.1	1.0	.9	.0	.0	2.4	2.2	.2	.2
160.	*	4.2	3.3	.0	.0	3.6	3.0	2.3	1.8	1.4	1.2	.0	.0	2.2	2.0	.2	.2
170.	*	4.6	3.5	.1	.1	4.2	3.3	1.6	1.2	1.7	1.6	.0	.0	1.9	1.5	.0	.0
180.	*	5.0	4.0	.3	.3	4.1	3.3	.7	.6	2.0	1.8	.0	.0	1.4	1.1	.0	.0
190.	*	5.1	3.9	.7	.6	3.6	3.0	.4	.3	2.3	2.1	.0	.0	1.0	.8	.0	.0
200.	*	4.9	3.9	1.2	1.0	3.2	2.6	.0	.0	2.6	2.4	.1	.1	.8	.6	.0	.0
210.	*	4.0	3.2	1.8	1.3	3.1	2.4	.0	.0	3.1	2.8	.1	.1	.7	.4	.0	.0
220.	*	3.8	3.1	2.4	1.9	2.9	2.4	.0	.0	3.1	3.0	.1	.1	.6	.6	.0	.0
230.	*	4.0	3.3	2.8	2.3	2.5	2.1	.0	.0	2.9	2.7	.1	.1	.6	.6	.0	.0
240.	*	4.4	3.6	3.1	2.5	2.2	1.8	.0	.0	2.9	2.6	.1	.1	.6	.6	.0	.0
250.	*	4.7	3.8	3.3	2.6	1.8	1.4	.0	.0	2.4	2.3	.3	.1	.6	.6	.0	.0
260.	*	4.6	3.6	3.8	3.0	1.2	1.0	.4	.3	2.1	2.0	.4	.3	.4	.4	.0	.0
270.	*	4.2	3.1	4.6	3.6	.7	.6	1.1	.9	1.8	1.7	1.1	1.0	.2	.2	.2	.2
280.	*	3.8	2.7	5.2	4.3	.3	.2	1.9	1.6	1.6	1.5	1.8	1.6	.0	.0	.4	.4
290.	*	3.6	2.8	5.3	4.3	.0	.0	2.6	2.2	1.6	1.5	2.2	2.0	.0	.0	.6	.6
300.	*	3.7	2.9	4.6	3.9	.0	.0	3.2	2.6	1.7	1.5	2.6	2.3	.0	.0	.7	.6
310.	*	3.9	3.2	3.7	3.3	.0	.0	3.6	2.8	1.6	1.3	2.7	2.5	.0	.0	.6	.6
320.	*	4.1	3.6	3.2	2.5	.0	.0	3.6	2.8	1.2	1.1	2.8	2.8	.0	.0	.6	.6
330.	*	4.3	3.7	3.6	3.0	.0	.0	3.7	2.7	.7	.7	3.3	3.1	.0	.0	.7	.6
340.	*	4.2	3.7	4.8	4.0	.2	.2	3.9	3.0	.4	.4	3.2	2.9	.0	.0	.8	.6
350.	*	3.2	2.9	5.6	4.7	1.0	.9	4.8	3.8	.1	.1	2.7	2.4	.0	.0	1.1	1.0
360.	*	1.9	1.8	5.3	4.4	2.7	2.4	5.9	4.6	.0	.0	2.0	1.8	.0	.0	1.8	1.6
MAX	*	5.1	4.0	5.6	4.7	6.7	5.5	6.1	5.1	3.1	3.0	3.3	3.1	3.1	2.9	3.4	3.2
DEGR.	*	190	180	350	350	110	110	10	10	210	220	330	330	120	110	30	30

THE HIGHEST CONCENTRATION OF 6.70 PPM OCCURRED AT RECEPTOR REC5 .

JOB: HILTON HVILL CO EMISSIONS MODELING RUN: ALA MOANA BLVD & HOBRON INTERSECTION R1

DATE : 10/ 8/ 1
TIME : 18:16:51

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

CO/LINK (PPM)
ANGLE (DEGREES)

LINK #	REC1 190	REC2 180	REC3 350	REC4 350	REC5 110	REC6 110	REC7 10	REC8 10	REC9 210	REC10 220	REC11 330	REC12 330	REC13 120	REC14 110	REC15 30	REC16 30
1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
2	.0	.0	.0	.0	.0	.0	.4	.2	.0	.1	.0	.0	.0	.0	.3	.2
3	.5	.3	.5	.3	.6	.5	.2	.1	.3	.2	.3	.2	.3	.3	.1	.1
4	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
5	.4	.3	.3	.2	.6	.6	.0	.0	.3	.2	.2	.2	.3	.3	.0	.0
6	.2	.0	.2	.1	.1	.0	.5	.3	.1	.1	.1	.1	.1	.0	.3	.2
7	.0	.0	.2	.2	.2	.1	.2	.2	.0	.0	.1	.1	.1	.1	.1	.1
8	.0	.0	.1	.1	.0	.0	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0
9	.2	.1	.1	.0	.1	.0	.1	.0	.1	.1	.0	.0	.0	.0	.0	.0
10	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
11	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
12	.1	.0	.1	.1	.1	.1	.1	.1	.0	.0	.1	.1	.0	.0	.1	.1
13	.0	.0	.0	.0	.0	.0	.4	.4	.0	.1	.0	.0	.0	.0	.1	.1
14	.1	.0	.0	.0	.0	.0	1.7	1.4	.2	.4	.1	.1	.1	.0	1.1	1.1
15	.5	.5	.5	.4	.2	.2	.0	.0	.2	.2	.2	.2	.1	.1	.0	.0
16	2.0	2.0	1.4	1.2	2.3	2.2	.1	.1	1.4	.9	1.1	1.0	1.0	.8	.2	.2
17	.0	.0	.9	.9	1.3	.9	1.0	1.0	.0	.1	.5	.5	.5	.6	.5	.5
18	.0	.0	1.3	1.2	1.2	.9	1.3	1.2	.0	.1	.6	.6	.6	.7	.6	.6
19	.6	.4	.0	.0	.0	.0	.0	.0	.3	.3	.0	.0	.0	.0	.0	.0
20	.4	.3	.0	.0	.0	.0	.0	.0	.2	.2	.0	.0	.0	.0	.0	.0

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: HILTON HVILL CO EMISSIONS PROPOSED

RUN: ALA MOANA BLVD & HOBRON INTERSECTION R1

DATE : 10/ 8/ 1
TIME : 18:19: 2

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 321. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = .0 PPM

LINK VARIABLES

	LINK DESCRIPTION	X1	Y1	X2	Y2	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1.	1A.AM_EB.Arr 1LTLn	-20.0	.0	-1000.0	.0	980.	270.	AG	132.	19.4	.0	32.0		
2.	1B.AM_EB.Arr 3_Lns	-20.0	-12.0	-1000.0	-12.0	980.	270.	AG	1347.	19.4	.0	56.0		
3.	2A.AM_EB.Dep 4_Lns	-20.0	.0	1000.0	.0	1020.	90.	AG	1278.	19.4	.0	68.0		
4.	3A.AM_WB.Arr 1LTLn	20.0	.0	1000.0	.0	980.	90.	AG	129.	19.4	.0	32.0		
5.	3B.AM_WB.Arr 3_Lns	20.0	12.0	1000.0	12.0	980.	90.	AG	1395.	19.4	.0	56.0		
6.	4A.AM_WB.Dep 4_Lns	20.0	.0	-1000.0	.0	1020.	270.	AG	1414.	19.4	.0	68.0		
7.	5A.Hob_SB.Arr 1RTLn	-11.0	48.0	-11.0	1000.0	952.	360.	AG	426.	26.3	.0	31.0		
8.	5B.Hob_SB.Arr 1_Ln	.0	48.0	.0	1000.0	952.	360.	AG	118.	26.3	.0	31.0		
9.	6A.Hob_SB.Dep 1_Ln	.0	48.0	.0	-1000.0	1048.	180.	AG	229.	26.3	.0	42.0		
10.	7A.Hob_NB.Arr 1LTLn	-11.0	-48.0	-11.0	-1000.0	952.	180.	AG	198.	26.3	.0	31.0		
11.	7B.Hob_NB.Arr 1_Ln	.0	-48.0	.0	-1000.0	952.	180.	AG	89.	26.3	.0	31.0		
12.	8A.Hob_NB.Dep 1_Ln	.0	-48.0	.0	1000.0	1048.	360.	AG	192.	26.3	.0	42.0		
13.	11A.AM_EB.Arr Q1LTLn	-20.0	.0	-63.3	.0	43.	270.	AG	610.	100.0	.0	12.0	.15	2.2
14.	11B.AM_EB.Arr Q3_Lns	-20.0	-12.0	-167.3	-12.0	147.	270.	AG	1831.	100.0	.0	12.0	.52	7.5
15.	13A.AM_WB.Arr Q1LTLn	20.0	.0	70.1	.0	50.	90.	AG	722.	100.0	.0	12.0	.18	2.5
16.	13B.AM_WB.Arr Q3_Lns	20.0	12.0	198.2	12.0	178.	90.	AG	2167.	100.0	.0	12.0	.63	9.1
17.	15A.Hob_SB.ArrQ1RTLn	-11.0	48.0	-11.0	350.8	303.	360.	AG	992.	100.0	.0	11.0	.93	15.4
18.	15B.Hob_SB.ArrQ2_Lns	.0	48.0	.0	361.3	313.	360.	AG	1316.	100.0	.0	11.0	1.16	15.9
19.	17A.Hob_NB.ArrQ1LTLn	-11.0	-48.0	-11.0	-191.3	143.	180.	AG	1169.	100.0	.0	11.0	.76	7.3
20.	17B.Hob_NB.ArrQ2_Lns	.0	-48.0	.0	-106.7	59.	180.	AG	1169.	100.0	.0	11.0	.34	3.0

JOB: HILTON HVILL CO EMISSIONS PROPOSED　　RUN: ALA MOANA BLVD & HOBRON INTERSECTION R1

DATE : 10/ 8/ 1
TIME : 18:19: 2

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
13. 11A.AM_EB.Arr Q1LTLn	140	60	3.0	132	1600	531.00	1	2
14. 11B.AM_EB.Arr Q3_Lns	140	60	3.0	1347	1600	531.00	1	2
15. 13A.AM_WB.Arr Q1LTLn	140	71	3.0	129	1600	531.00	1	2
16. 13B.AM_WB.Arr Q3_Lns	140	71	3.0	1379	1600	531.00	1	2
17. 15A.Hob_SB.ArrQ1RTLn	140	95	3.0	426	1600	545.00	1	2
18. 15B.Hob_SB.ArrQ2_Lns	140	126	3.0	118	1600	545.00	1	2
19. 17A.Hob_NB.ArrQ1LTLn	140	112	3.0	198	1600	545.00	1	2
20. 17B.Hob_NB.ArrQ2_Lns	140	112	3.0	89	1600	545.00	1	2

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. R1 (NE CORNER 1_FL)	42.0	68.0	6.0
2. R2 (NE CORNER 2_FL)	42.0	68.0	21.0
3. R3 (SE CORNER 1_FL)	42.0	-68.0	6.0
4. R4 (SE CORNER 2_FL)	42.0	-68.0	21.0
5. R5 (NW CORNER 1_FL)	-42.0	68.0	6.0
6. R6 (NW CORNER 2_FL)	-42.0	68.0	21.0
7. R7 (SW CORNER 1_FL)	-42.0	-68.0	6.0
8. R8 (SW CORNER 2_FL)	-42.0	-68.0	21.0
9. R9 (NE 150 FT 1_FL)	150.0	150.0	6.0
10. R10(NE 150 FT 2_FL)	150.0	150.0	21.0
11. R11(SE 150 FT 1_FL)	150.0	-150.0	6.0
12. R12(SE 150 FT 2_FL)	150.0	-150.0	21.0
13. R13(NW 150 FT 1_FL)	-150.0	150.0	6.0
14. R14(NW 150 FT 2_FL)	-150.0	150.0	21.0
15. R15(SW 150 FT 1_FL)	-150.0	-150.0	6.0
16. R16(SW 150 FT 2_FL)	-150.0	-150.0	21.0

JOB: HILTON HVILL CO EMISSIONS PROPOSED RUN: ALA MOANA BLVD & HOBRON INTERSECTION R1 PAGE 3

MODEL RESULTS
WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
	CONCENTRATION (ug/m**3)															
0.	1.9	1.9	5.4	4.6	2.7	2.5	6.1	4.8	.0	.0	2.0	1.8	.0	.0	1.8	1.7
10.	.8	.7	4.6	3.7	4.3	3.7	6.2	5.2	.0	.0	1.6	1.3	.1	.1	2.6	2.5
20.	.1	.1	3.9	3.2	5.0	4.3	5.4	4.5	.0	.0	1.2	1.1	.5	.4	3.2	3.1
30.	.0	.0	3.6	2.8	5.2	4.3	4.5	3.8	.0	.0	.9	.9	.9	.9	3.4	3.3
40.	.0	.0	3.4	2.9	4.7	3.9	4.6	3.5	.0	.0	.7	.7	1.3	1.3	3.3	3.1
50.	.0	.0	3.2	2.7	4.5	3.4	5.4	4.0	.0	.0	.6	.6	1.7	1.6	3.3	3.1
60.	.0	.0	2.8	2.5	4.3	3.1	5.8	4.6	.0	.0	.6	.6	1.8	1.6	3.2	2.9
70.	.0	.0	2.3	1.8	4.1	2.9	6.0	4.6	.0	.0	.6	.6	1.8	1.5	2.4	2.4
80.	.5	.4	1.5	1.3	4.7	3.2	5.5	4.3	.0	.0	.4	.4	1.8	1.6	1.9	1.7
90.	1.3	1.1	.8	.7	5.7	4.2	4.8	3.6	.2	.2	.2	.2	2.2	2.0	1.3	1.1
100.	2.4	2.1	.3	.2	6.6	5.1	4.3	3.0	.5	.4	.0	.0	2.7	2.5	.7	.6
110.	3.5	2.8	.0	.0	6.8	5.5	3.8	2.8	.7	.6	.0	.0	2.9	2.9	.5	.4
120.	3.9	3.3	.0	.0	6.1	5.0	3.8	2.7	.7	.6	.0	.0	3.2	2.9	.4	.2
130.	4.2	3.5	.0	.0	4.6	3.6	3.6	2.6	.7	.6	.0	.0	2.7	2.7	.2	.2
140.	4.1	3.4	.0	.0	3.7	2.8	3.5	2.5	.7	.7	.0	.0	2.6	2.5	.2	.2
150.	4.2	3.3	.0	.0	3.4	2.8	3.0	2.3	1.0	1.0	.0	.0	2.4	2.4	.2	.2
160.	4.3	3.3	.0	.0	3.8	3.2	2.5	2.0	1.4	1.2	.0	.0	2.4	2.2	.2	.2
170.	4.7	3.5	.1	.1	4.2	3.5	1.8	1.5	1.7	1.6	.0	.0	1.9	1.8	.0	.0
180.	5.0	4.0	.3	.3	4.3	3.3	.9	.8	2.0	1.8	.0	.0	1.5	1.2	.0	.0
190.	5.2	4.1	.8	.8	3.9	3.1	.4	.4	2.4	2.1	.0	.0	1.1	1.0	.0	.0
200.	5.1	4.0	1.3	1.2	3.4	2.6	.0	.0	2.8	2.5	.2	.1	.8	.7	.0	.0
210.	4.1	3.3	1.9	1.6	3.2	2.5	.0	.0	3.2	2.9	.2	.2	.7	.7	.0	.0
220.	4.0	3.1	2.6	2.0	3.0	2.5	.0	.0	3.2	3.0	.2	.2	.6	.6	.0	.0
230.	4.1	3.3	2.9	2.3	2.7	2.2	.0	.0	3.0	2.7	.1	.1	.7	.6	.0	.0
240.	4.7	3.8	3.2	2.5	2.3	1.9	.0	.0	3.0	2.7	.2	.2	.7	.6	.0	.0
250.	5.0	3.9	3.3	2.6	1.9	1.5	.0	.0	2.5	2.3	.4	.4	.6	.6	.0	.0
260.	4.7	3.8	3.9	3.1	1.3	1.2	.4	.4	2.3	2.2	.6	.5	.4	.4	.0	.0
270.	4.2	3.3	4.6	3.8	.7	.7	1.1	1.0	1.9	1.7	1.2	1.1	.2	.2	.2	.2
280.	3.8	2.9	5.5	4.5	.3	.3	1.9	1.7	1.7	1.5	1.9	1.8	.0	.0	.5	.4
290.	3.6	2.8	5.6	4.4	.0	.0	2.9	2.3	1.7	1.5	2.3	2.2	.0	.0	.6	.6
300.	3.7	2.9	4.8	3.9	.0	.0	3.4	2.7	1.7	1.5	2.6	2.4	.0	.0	.8	.6
310.	3.9	3.2	3.9	3.3	.0	.0	3.7	2.9	1.6	1.5	2.9	2.6	.0	.0	.8	.6
320.	4.1	3.6	3.4	2.6	.0	.0	3.7	3.0	1.2	1.2	3.0	2.8	.0	.0	.6	.6
330.	4.4	3.8	3.6	3.1	.0	.0	3.8	2.8	.8	.8	3.3	3.1	.0	.0	.7	.7
340.	4.2	3.7	5.1	4.1	.2	.2	4.0	3.0	.5	.4	3.2	2.9	.0	.0	.9	.8
350.	3.4	2.9	5.7	4.8	1.1	1.0	4.9	3.9	.1	.1	2.8	2.4	.0	.0	1.2	1.1
360.	1.9	1.9	5.4	4.6	2.7	2.5	6.1	4.8	.0	.0	2.0	1.8	.0	.0	1.8	1.7
MAX	5.2	4.1	5.7	4.8	6.8	5.5	6.2	5.2	3.2	3.0	3.3	3.1	3.2	2.9	3.4	3.3
DEGR.	190	190	350	350	110	110	10	10	210	220	330	330	120	110	30	30

THE HIGHEST CONCENTRATION OF 6.80 PPM OCCURRED AT RECEPTOR REC5 .

JOB: HILTON HVILL CO EMISSIONS PROPOSED RUN: ALA MOANA BLVD & HOBRON INTERSECTION R1

DATE : 10/ 8/ 1
TIME : 18:19: 2

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM) * ANGLE (DEGREES) LINK # *	REC1 190	REC2 190	REC3 350	REC4 350	REC5 110	REC6 110	REC7 10	REC8 10	REC9 210	REC10 220	REC11 330	REC12 330	REC13 120	REC14 110	REC15 30	REC16 30
1 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
2 *	.0	.0	.0	.0	.0	.0	.4	.2	.0	.1	.0	.0	.0	.0	.3	.2
3 *	.5	.3	.5	.3	.6	.5	.2	.1	.3	.2	.3	.2	.3	.3	.1	.1
4 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
5 *	.4	.2	.3	.2	.7	.6	.0	.0	.3	.2	.2	.2	.3	.3	.0	.0
6 *	.2	.1	.2	.1	.1	.0	.5	.3	.1	.1	.1	.1	.1	.0	.3	.3
7 *	.0	.0	.2	.2	.2	.1	.2	.2	.0	.0	.1	.1	.1	.1	.1	.1
8 *	.0	.0	.1	.1	.0	.0	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0
9 *	.2	.2	.1	.0	.1	.0	.1	.0	.1	.1	.0	.0	.0	.0	.0	.0
10 *	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
11 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
12 *	.1	.0	.2	.1	.1	.1	.2	.1	.0	.0	.1	.1	.1	.0	.1	.1
13 *	.0	.0	.0	.0	.0	.0	.4	.4	.0	.1	.0	.0	.0	.0	.1	.1
14 *	.1	.1	.0	.0	.0	.0	1.7	1.4	.2	.4	.1	.1	.1	.0	1.1	1.1
15 *	.5	.4	.5	.4	.2	.2	.0	.0	.2	.2	.2	.2	.1	.1	.0	.0
16 *	2.0	1.6	1.4	1.2	2.3	2.2	.1	.1	1.4	.9	1.1	1.0	1.0	.8	.2	.2
17 *	.0	.0	.9	.9	1.3	.9	1.0	1.0	.0	.1	.5	.5	.5	.6	.5	.5
18 *	.0	.0	1.3	1.3	1.2	.9	1.3	1.3	.0	.1	.6	.6	.6	.7	.6	.6
19 *	.7	.7	.0	.0	.0	.0	.0	.0	.4	.3	.0	.0	.0	.0	.0	.0
20 *	.4	.4	.0	.0	.0	.0	.0	.0	.2	.2	.0	.0	.0	.0	.0	.0

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: HILTON HVILL CO EMISSIONS WORST RUN: ALA MOANA BLVD & HOBRON INTERSECTION S3

DATE : 10/ 8/ 1
TIME : 18:21:50

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 321. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = .0 PPM

LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1. 1A.AM_EB.Arr 1LTLn	-20.0	.0	-1000.0	.0	980.	270.	AG	132.	19.4	.0	32.0		
2. 1B.AM_EB.Arr 3_Lns	-20.0	-12.0	-1000.0	-12.0	980.	270.	AG	1347.	19.4	.0	56.0		
3. 2A.AM_EB.Dep 4_Lns	-20.0	.0	1000.0	.0	1020.	90.	AG	1278.	19.4	.0	68.0		
4. 3A.AM_WB.Arr 1LTLn	20.0	.0	1000.0	.0	980.	90.	AG	129.	19.4	.0	32.0		
5. 3B.AM_WB.Arr 3_Lns	20.0	12.0	1000.0	12.0	980.	90.	AG	1395.	19.4	.0	56.0		
6. 4A.AM_WB.Dep 4_Lns	20.0	.0	-1000.0	.0	1020.	270.	AG	1414.	19.4	.0	68.0		
7. 5A.Hob_SB.Arr 1RTLn	-11.0	48.0	-11.0	1000.0	952.	360.	AG	426.	26.3	.0	31.0		
8. 5B.Hob_SB.Arr 1_Ln	.0	48.0	.0	1000.0	952.	360.	AG	118.	26.3	.0	31.0		
9. 6A.Hob_SB.Dep 1_Ln	.0	48.0	.0	-1000.0	1048.	180.	AG	229.	26.3	.0	42.0		
10. 7A.Hob_NB.Arr 1LTLn	-11.0	-48.0	-11.0	-1000.0	952.	180.	AG	198.	26.3	.0	31.0		
11. 7B.Hob_NB.Arr 1_Ln	.0	-48.0	.0	-1000.0	952.	180.	AG	89.	26.3	.0	31.0		
12. 8A.Hob_NB.Dep 1_Ln	.0	-48.0	.0	1000.0	1048.	360.	AG	192.	26.3	.0	42.0		
13. 11A.AM_EB.Arr Q1LTLn	-20.0	.0	-63.3	.0	43.	270.	AG	610.	100.0	.0	12.0	.15	2.2
14. 11B.AM_EB.Arr Q3_Lns	-20.0	-12.0	-178.9	-12.0	159.	270.	AG	1831.	100.0	.0	12.0	.52	8.1
15. 13A.AM_WB.Arr Q1LTLn	20.0	.0	70.5	.0	50.	90.	AG	722.	100.0	.0	12.0	.18	2.6
16. 13B.AM_WB.Arr Q3_Lns	20.0	12.0	212.1	12.0	192.	90.	AG	2167.	100.0	.0	12.0	.63	9.8
17. 15A.Hob_SB.ArrQ1RTLn	-11.0	48.0	-11.0	386.7	339.	360.	AG	992.	100.0	.0	11.0	.93	17.2
18. 15B.Hob_SB.ArrQ2_Lns	.0	48.0	.0	382.8	335.	360.	AG	1316.	100.0	.0	11.0	1.16	17.0
19. 17A.Hob_NB.ArrQ1LTLn	-11.0	-48.0	-11.0	-210.2	162.	180.	AG	1169.	100.0	.0	11.0	.76	8.2
20. 17B.Hob_NB.ArrQ2_Lns	.0	-48.0	.0	-118.4	70.	180.	AG	1169.	100.0	.0	11.0	.34	3.6

JOB: HILTON HVILL CO EMISSIONS WORST

RUN: ALA MOANA BLVD & HOBRON INTERSECTION S3

PAGE 2

DATE : 10/ 8/ 1
TIME : 18:21:50

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
13. 11A.AM_EB.Arr Q1LTLn	140	60	3.0	132	1600	531.00	1	1
14. 11B.AM_EB.Arr Q3_Lns	140	60	3.0	1347	1600	531.00	1	1
15. 13A.AM_WB.Arr Q1LTLn	140	71	3.0	129	1600	531.00	1	1
16. 13B.AM_WB.Arr Q3_Lns	140	71	3.0	1379	1600	531.00	1	1
17. 15A.Hob_SB.ArrQ1RTLn	140	95	3.0	426	1600	545.00	1	1
18. 15B.Hob_SB.ArrQ2_Lns	140	126	3.0	118	1600	545.00	1	1
19. 17A.Hob_NB.ArrQ1LTLn	140	112	3.0	198	1600	545.00	1	1
20. 17B.Hob_NB.ArrQ2_Lns	140	112	3.0	89	1600	545.00	1	1

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. R1 (NE CORNER 1_FL)	42.0	68.0	6.0
2. R2 (NE CORNER 2_FL)	42.0	68.0	21.0
3. R3 (SE CORNER 1_FL)	42.0	-68.0	6.0
4. R4 (SE CORNER 2_FL)	42.0	-68.0	21.0
5. R5 (NW CORNER 1_FL)	-42.0	68.0	6.0
6. R6 (NW CORNER 2_FL)	-42.0	68.0	21.0
7. R7 (SW CORNER 1_FL)	-42.0	-68.0	6.0
8. R8 (SW CORNER 2_FL)	-42.0	-68.0	21.0
9. R9 (NE 150 FT 1_FL)	150.0	150.0	6.0
10. R10 (NE 150 FT 2_FL)	150.0	150.0	21.0
11. R11 (SE 150 FT 1_FL)	150.0	-150.0	6.0
12. R12 (SE 150 FT 2_FL)	150.0	-150.0	21.0
13. R13 (NW 150 FT 1_FL)	-150.0	150.0	6.0
14. R14 (NW 150 FT 2_FL)	-150.0	150.0	21.0
15. R15 (SW 150 FT 1_FL)	-150.0	-150.0	6.0
16. R16 (SW 150 FT 2_FL)	-150.0	-150.0	21.0

JOB: HILTON HVILL CO EMISSIONS WORST

RUN: ALA MOANA BLVD & HOBRON INTERSECTION S3

PAGE 3

MODEL RESULTS
WIND ANGLE RANGE: 0.-360.
WIND * CONCENTRATION
ANGLE * (ug/m**3)

(DEGR) *	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
0. *	2.1	1.9	5.6	4.6	2.8	2.6	6.2	4.9	.0	.0	2.1	1.8	.0	.0	1.9	1.9
10. *	.8	.7	4.6	3.8	4.4	3.9	6.4	5.2	.0	.0	1.7	1.4	.3	.3	2.7	2.6
20. *	.1	.1	3.9	3.2	5.2	4.5	5.4	4.6	.0	.0	1.4	1.2	.6	.6	3.4	3.2
30. *	.0	.0	3.6	2.8	5.3	4.3	4.6	3.8	.0	.0	1.0	1.0	1.1	1.0	3.5	3.3
40. *	.0	.0	3.4	3.0	4.7	3.9	4.7	3.6	.0	.0	.7	.7	1.5	1.5	3.4	3.1
50. *	.0	.0	3.3	2.8	4.5	3.4	5.4	4.1	.0	.0	.6	.6	1.8	1.7	3.3	3.2
60. *	.0	.0	2.9	2.6	4.3	3.1	5.9	4.6	.0	.0	.6	.6	1.8	1.7	3.2	3.0
70. *	.0	.0	2.5	2.0	4.1	2.9	6.1	4.7	.0	.0	.6	.6	1.8	1.5	2.5	2.5
80. *	.5	.4	1.6	1.4	4.8	3.3	5.6	4.3	.0	.0	.4	.4	1.8	1.6	2.1	1.9
90. *	1.4	1.1	.8	.7	5.8	4.3	4.9	3.7	.2	.2	.2	.2	2.2	2.0	1.5	1.3
100. *	2.5	2.2	.3	.2	6.7	5.2	4.3	3.0	.5	.4	.0	.0	2.7	2.5	1.0	.8
110. *	3.7	3.0	.0	.0	6.9	5.6	3.9	2.8	.7	.6	.0	.0	3.0	2.9	.7	.6
120. *	4.0	3.4	.0	.0	6.1	5.1	4.0	2.9	.7	.6	.0	.0	3.2	3.0	.5	.4
130. *	4.3	3.5	.0	.0	4.6	3.6	3.9	2.9	.8	.7	.0	.0	2.8	2.7	.3	.3
140. *	4.1	3.4	.0	.0	3.7	2.9	3.8	2.8	.8	.8	.0	.0	2.6	2.5	.2	.2
150. *	4.2	3.3	.0	.0	3.5	2.8	3.4	2.6	1.2	1.1	.0	.0	2.4	2.4	.2	.2
160. *	4.3	3.3	.0	.0	3.9	3.3	2.8	2.2	1.6	1.4	.0	.0	2.5	2.3	.2	.2
170. *	4.7	3.6	.1	.1	4.4	3.7	2.0	1.7	1.9	1.7	.0	.0	2.1	1.9	.0	.0
180. *	5.1	4.1	.4	.4	4.3	3.4	1.0	.9	2.1	1.9	.0	.0	1.6	1.5	.0	.0
190. *	5.4	4.2	1.0	1.0	3.9	3.2	.5	.5	2.6	2.3	.0	.0	1.2	1.1	.0	.0
200. *	5.2	4.2	1.7	1.4	3.4	2.6	.1	.1	2.8	2.5	.2	.1	.9	.8	.0	.0
210. *	4.2	3.4	2.4	1.9	3.2	2.5	.0	.0	3.2	2.9	.2	.2	.7	.7	.0	.0
220. *	4.0	3.2	3.0	2.4	3.1	2.6	.0	.0	3.2	3.0	.2	.2	.6	.6	.0	.0
230. *	4.1	3.3	3.3	2.6	2.8	2.4	.0	.0	3.0	2.7	.2	.2	.7	.6	.0	.0
240. *	4.7	3.8	3.4	2.7	2.4	2.0	.0	.0	3.1	2.8	.3	.3	.7	.6	.0	.0
250. *	5.1	4.0	3.4	2.6	2.0	1.7	.0	.0	2.6	2.3	.5	.5	.6	.6	.0	.0
260. *	4.8	3.8	3.9	3.2	1.3	1.3	.4	.4	2.3	2.2	.8	.7	.4	.4	.0	.0
270. *	4.2	3.3	4.6	3.9	.7	.7	1.1	1.0	1.9	1.7	1.4	1.2	.2	.2	.2	.2
280. *	3.8	2.9	5.5	4.5	.3	.3	2.0	1.8	1.7	1.5	2.0	2.0	.0	.0	.5	.4
290. *	3.6	2.8	5.7	4.4	.0	.0	3.0	2.5	1.7	1.5	2.4	2.3	.0	.0	.6	.6
300. *	3.7	2.9	4.9	3.9	.0	.0	3.5	2.8	1.7	1.6	2.7	2.5	.0	.0	.8	.6
310. *	3.9	3.2	3.9	3.3	.0	.0	3.8	3.0	1.7	1.6	2.9	2.7	.0	.0	.8	.6
320. *	4.1	3.6	3.4	2.7	.0	.0	3.7	3.0	1.4	1.4	3.0	2.8	.0	.0	.6	.6
330. *	4.5	3.9	3.7	3.2	.0	.0	3.8	2.8	1.0	.9	3.4	3.1	.0	.0	.8	.7
340. *	4.3	3.8	5.1	4.2	.3	.2	4.1	3.0	.5	.5	3.4	3.1	.0	.0	1.0	1.0
350. *	3.5	3.1	5.9	4.8	1.2	1.0	4.9	3.9	.2	.2	2.9	2.5	.0	.0	1.3	1.3
360. *	2.1	1.9	5.6	4.6	2.8	2.6	6.2	4.9	.0	.0	2.1	1.8	.0	.0	1.9	1.9
MAX *	5.4	4.2	5.9	4.8	6.9	5.6	6.4	5.2	3.2	3.0	3.4	3.1	3.2	3.0	3.5	3.3
DEGR. *	190	190	350	350	110	110	10	10	210	220	330	340	120	120	30	30

THE HIGHEST CONCENTRATION OF 6.90 PPM OCCURRED AT RECEPTOR REC5 .

PAGE 4

JOB: HILTON HVILL CO EMISSIONS WORST RUN: ALA MOANA BLVD & HOBRON INTERSECTION S3

DATE : 10/ 8/ 1
TIME : 18:21:50

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

CO/LINK (PPM)
ANGLE (DEGREES)

LINK #	REC1 190	REC2 190	REC3 350	REC4 350	REC5 110	REC6 110	REC7 10	REC8 10	REC9 210	REC10 220	REC11 330	REC12 340	REC13 120	REC14 120	REC15 30	REC16 30
1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
2	.0	.0	.0	.0	.0	.0	.4	.2	.0	.1	.0	.0	.0	.0	.3	.2
3	.5	.3	.5	.3	.6	.5	.2	.1	.3	.2	.3	.2	.3	.3	.1	.1
4	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
5	.4	.2	.3	.2	.7	.6	.0	.0	.3	.2	.2	.2	.3	.3	.0	.0
6	.2	.1	.2	.1	.1	.0	.5	.3	.1	.1	.1	.0	.1	.1	.3	.3
7	.0	.0	.2	.2	.2	.1	.2	.2	.0	.0	.1	.1	.1	.1	.1	.1
8	.0	.0	.1	.1	.0	.0	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0
9	.2	.2	.1	.0	.1	.0	.1	.0	.1	.1	.0	.0	.0	.0	.0	.0
10	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
11	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
12	.1	.0	.2	.1	.1	.1	.2	.1	.0	.0	.1	.1	.1	.0	.1	.1
13	.0	.0	.0	.0	.0	.0	.4	.4	.0	.1	.0	.0	.0	.0	.1	.1
14	.1	.1	.0	.0	.0	.0	1.7	1.4	.2	.4	.1	.0	.1	.1	1.1	1.1
15	.5	.4	.5	.4	.2	.2	.0	.0	.2	.2	.2	.1	.1	.1	.0	.0
16	2.0	1.6	1.4	1.2	2.4	2.3	.1	.1	1.4	.9	1.1	1.2	1.0	1.0	.2	.2
17	.0	.0	1.0	.9	1.3	.9	1.1	1.0	.0	.1	.5	.5	.5	.5	.5	.5
18	.0	.0	1.4	1.3	1.2	.9	1.4	1.3	.0	.1	.7	.7	.6	.5	.7	.6
19	.8	.7	.0	.0	.0	.0	.0	.0	.4	.3	.0	.0	.0	.0	.0	.0
20	.5	.5	.0	.0	.0	.0	.0	.0	.2	.2	.0	.0	.0	.0	.0	.0

INPUT FILE: PM_AM_HOBEX.DAT

```
'HILTON HVILL PM EMISSIONS MODELING' 60. 321.  0. 0.  16  0.3048 1 1
'R1  (NE CORNER 1_FL)'       42       68       6
'R2  (NE CORNER 2_FL)'       42       68       21
'R3  (SE CORNER 1_FL)'       42      -68       6
'R4  (SE CORNER 2_FL)'       42      -68       21
'R5  (NW CORNER 1_FL)'      -42       68       6
'R6  (NW CORNER 2_FL)'      -42       68       21
'R7  (SW CORNER 1_FL)'      -42      -68       6
'R8  (SW CORNER 2_FL)'      -42      -68       21
'R9  (NE 150 FT 1_FL)'      150      150       6
'R10(NE 150 FT 2_FL)'       150      150       21
'R11(SE 150 FT 1_FL)'       150     -150       6
'R12(SE 150 FT 2_FL)'       150     -150       21
'R13(NW 150 FT 1_FL)'      -150      150       6
'R14(NW 150 FT 2_FL)'      -150      150       21
'R15(SW 150 FT 1_FL)'      -150     -150       6
'R16(SW 150 FT 2_FL)'      -150     -150       21
'ALA MOANA BLVD & HOBRON INTERSECTION PM'      20  1  1  'P'
  1
'1A.AM_EB.Arr 1LTLn  '  'AG'   -20.    0.   -1000.     0.  132.   0.25  0. 32.
  1
'1B.AM_EB.Arr 3_Lns  '  'AG'   -20.  -12.   -1000.   -12. 1317.   0.25  0. 56.
  1
'2A.AM_EB.Dep 4_Lns  '  'AG'   -20.    0.    1000.     0. 1245.   0.27  0. 68.
  1
'3A.AM_WB.Arr 1LTLn  '  'AG'    20.    0.    1000.     0.  126.   0.25  0. 32.
  1
'3B.AM_WB.Arr 3_Lns  '  'AG'    20.   12.    1000.    12. 1377.   0.25  0. 56.
  1
'4A.AM_WB.Dep 4_Lns  '  'AG'    20.    0.   -1000.     0. 1245.   0.27  0. 68.
  1
'5A.Hob_SB.Arr 1RTLn '  'AG'   -11.   48.     -11.  1000.  426.   0.22  0. 31.
  1
'5B.Hob_SB.Arr 1_Ln  '  'AG'     0.   48.       0.  1000.  116.   0.22  0. 31.
  1
'6A.Hob_SB.Dep 1_Ln  '  'AG'     0.   48.       0. -1000.  214.   0.22  0. 42.
  1
'7A.Hob_NB.Arr 1LTLn '  'AG'   -11.  -48.     -11. -1000.  179.   0.22  0. 31.
  1
'7B.Hob_NB.Arr 1_Ln  '  'AG'     0.  -48.       0. -1000.   88.   0.22  0. 31.
  1
'8A.Hob_NB.Dep 1_Ln  '  'AG'     0.  -48.       0.  1000.  181.   0.22  0. 42.
  2
'11A.AM_EB.Arr Q1LTLn'  'AG'   -20.    0.   -1000.     0.  0.  12.  1
      140        60       3.0    132      0.32    1600  1  2
  2
'11B.AM_EB.Arr Q3_Lns'  'AG'   -20.  -12.   -1000.   -12.  0.  12.  3
      140        60       3.0   1317      0.32    1600  1  2
  2
'13A.AM_WB.Arr Q1LTLn'  'AG'    20.    0.    1000.     0.  0.  12.  1
      140        71       3.0    126      0.32    1600  1  2
  2
'13B.AM_WB.Arr Q3_Lns'  'AG'    20.   12.    1000.    12.  0.  12.  3
      140        71       3.0   1377      0.32    1600  1  2
  2
'15A.Hob_SB.ArrQ1RTLn'  'AG'   -11.   48.     -11.  1000.  0.  11.  1
      140        95       3.0   426       0.26    1600  1  2
  2
'15B.Hob_SB.ArrQ2_Lns'  'AG'     0.   48.       0.  1000.  0.  11.  1
      140       126       3.0    116      0.26    1600  1  2
  2
'17A.Hob_NB.ArrQ1LTLn'  'AG'   -11.  -48.     -11. -1000.  0.  11.  1
      140       112       3.0    179      0.26    1600  1  2
  2
'17B.Hob_NB.ArrQ2_Lns'  'AG'     0.  -48.       0. -1000.  0.  11.  1
      140       112       3.0     88      0.26    1600  1  2
1.0 00. 4 1000. 0.  'Y' 10  0 36
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INPUT FILE: PM_AM_HOBPR.DAT

```
'HILTON HVILL PM EMISSIONS PROPOSED' 60. 321.  0. 0.  16  0.3048 1 1
'R1  (NE CORNER 1_FL)'        42       68       6
'R2  (NE CORNER 2_FL)'        42       68       21
'R3  (SE CORNER 1_FL)'        42      -68       6
'R4  (SE CORNER 2_FL)'        42      -68       21
'R5  (NW CORNER 1_FL)'       -42       68       6
'R6  (NW CORNER 2_FL)'       -42       68       21
'R7  (SW CORNER 1_FL)'       -42      -68       6
'R8  (SW CORNER 2_FL)'       -42      -68       21
'R9  (NE 150 FT 1_FL)'       150      150       6
'R10(NE 150 FT 2_FL)'        150      150       21
'R11(SE 150 FT 1_FL)'        150     -150       6
'R12(SE 150 FT 2_FL)'        150     -150       21
'R13(NW 150 FT 1_FL)'       -150      150       6
'R14(NW 150 FT 2_FL)'       -150      150       21
'R15(SW 150 FT 1_FL)'       -150     -150       6
'R16(SW 150 FT 2_FL)'       -150     -150       21
'ALA MOANA BLVD & HOBRON INTERSECTION PM'      20  1  1  'P'
 1
'1A.AM_EB.Arr 1LTLn   '   'AG'   -20.    0.   -1000.     0.  132.   0.25  0. 32.
 1
'1B.AM_EB.Arr 3_Lns   '   'AG'   -20.  -12.   -1000.   -12. 1347.   0.25  0. 56.
 1
'2A.AM_EB.Dep 4_Lns   '   'AG'   -20.    0.    1000.     0. 1278.   0.27  0. 68.
 1
'3A.AM_WB.Arr 1LTLn   '   'AG'    20.    0.    1000.     0.  129.   0.25  0. 32.
 1
'3B.AM_WB.Arr 3_Lns   '   'AG'    20.   12.    1000.    12. 1395.   0.25  0. 56.
 1
'4A.AM_WB.Dep 4_Lns   '   'AG'    20.    0.   -1000.     0. 1414.   0.27  0. 68.
 1
'5A.Hob_SB.Arr 1RTLn '    'AG'   -11.   48.     -11.  1000.  426.   0.22  0. 31.
 1
'5B.Hob_SB.Arr 1_Ln   '   'AG'     0.   48.       0.  1000.  118.   0.22  0. 31.
 1
'6A.Hob_SB.Dep 1_Ln   '   'AG'     0.   48.       0. -1000.  229.   0.22  0. 42.
 1
'7A.Hob_NB.Arr 1LTLn '    'AG'   -11.  -48.     -11. -1000.  198.   0.22  0. 31.
 1
'7B.Hob_NB.Arr 1_Ln   '   'AG'     0.  -48.       0. -1000.   89.   0.22  0. 31.
 1
'8A.Hob_NB.Dep 1_Ln   '   'AG'     0.  -48.       0.  1000.  192.   0.22  0. 42.
 2
'11A.AM_EB.Arr Q1LTLn'   'AG'   -20.    0.   -1000.     0.  0.  12.  1
      140        60      3.0    132      0.32   1600  1  2
 2
'11B.AM_EB.Arr Q3_Lns'   'AG'   -20.  -12.   -1000.   -12.  0.  12.  3
      140        60      3.0   1347      0.32   1600  1  2
 2
'13A.AM_WB.Arr Q1LTLn'   'AG'    20.    0.    1000.     0.  0.  12.  1
      140        71      3.0    129      0.32   1600  1  2
 2
'13B.AM_WB.Arr Q3_Lns'   'AG'    20.   12.    1000.    12.  0.  12.  3
      140        71      3.0   1379      0.32   1600  1  2
 2
'15A.Hob_SB.ArrQ1RTLn'   'AG'   -11.   48.     -11.  1000.  0.  11.  1
      140        95      3.0    426      0.26   1600  1  2
 2
'15B.Hob_SB.ArrQ2_Lns'   'AG'     0.   48.       0.  1000.  0.  11.  1
      140       126      3.0    118      0.26   1600  1  2
 2
'17A.Hob_NB.ArrQ1LTLn'   'AG'   -11.  -48.     -11. -1000.  0.  11.  1
      140       112      3.0    198      0.26   1600  1  2
 2
'17B.Hob_NB.ArrQ2_Lns'   'AG'     0.  -48.       0. -1000.  0.  11.  1
      140       112      3.0     89      0.26   1600  1  2
1.0 00. 4 1000. 0.  'Y' 10  0 36
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INPUT FILE: PM_AM_HOBS3.DAT

```
'HILTON HVILL PM EMISSIONS WORST' 60. 321.  0. 0.  16  0.3048 1 1
'R1 (NE CORNER 1_FL)'        42       68       6
'R2 (NE CORNER 2_FL)'        42       68       21
'R3 (SE CORNER 1_FL)'        42      -68       6
'R4 (SE CORNER 2_FL)'        42      -68       21
'R5 (NW CORNER 1_FL)'       -42       68       6
'R6 (NW CORNER 2_FL)'       -42       68       21
'R7 (SW CORNER 1_FL)'       -42      -68       6
'R8 (SW CORNER 2_FL)'       -42      -68       21
'R9 (NE 150 FT 1_FL)'       150      150       6
'R10(NE 150 FT 2_FL)'       150      150       21
'R11(SE 150 FT 1_FL)'       150     -150       6
'R12(SE 150 FT 2_FL)'       150     -150       21
'R13(NW 150 FT 1_FL)'      -150      150       6
'R14(NW 150 FT 2_FL)'      -150      150       21
'R15(SW 150 FT 1_FL)'      -150     -150       6
'R16(SW 150 FT 2_FL)'      -150     -150       21
'ALA MOANA BLVD & HOBRON INTERSECTION S3'      20  1  1  'P'
 1
'1A.AM_EB.Arr 1LTLn  '   'AG'   -20.    0.    -1000.      0.  132.   0.25  0. 32.
 1
'1B.AM_EB.Arr 3_Lns  '   'AG'   -20.  -12.    -1000.    -12. 1347.   0.25  0. 56.
 1
'2A.AM_EB.Dep 4_Lns  '   'AG'   -20.    0.     1000.      0. 1278.   0.27  0. 68.
 1
'3A.AM_WB.Arr 1LTLn  '   'AG'    20.    0.     1000.      0.  129.   0.25  0. 32.
 1
'3B.AM_WB.Arr 3_Lns  '   'AG'    20.   12.     1000.     12. 1395.   0.25  0. 56.
 1
'4A.AM_WB.Dep 4_Lns  '   'AG'    20.    0.    -1000.      0. 1414.   0.27  0. 68.
 1
'5A.Hob_SB.Arr 1RTLn '   'AG'   -11.   48.      -11.  1000.  426.   0.22  0. 31.
 1
'5B.Hob_SB.Arr 1_Ln  '   'AG'     0.   48.        0.  1000.  118.   0.22  0. 31.
 1
'6A.Hob_SB.Dep 1_Ln  '   'AG'     0.   48.        0. -1000.  229.   0.22  0. 42.
 1
'7A.Hob_NB.Arr 1LTLn '   'AG'   -11.  -48.      -11. -1000.  198.   0.22  0. 31.
 1
'7B.Hob_NB.Arr 1_Ln  '   'AG'     0.  -48.        0. -1000.   89.   0.22  0. 31.
 1
'8A.Hob_NB.Dep 1_Ln  '   'AG'     0.  -48.        0.  1000.  192.   0.22  0. 42.
 2
'11A.AM_EB.Arr Q1LTLn'   'AG'   -20.    0.   -1000.      0.  0.  12.  1
      140        60        3.0    132      0.32    1600  1  1
 2
'11B.AM_EB.Arr Q3_Lns'   'AG'   -20.  -12.   -1000.    -12.  0.  12.  3
      140        60        3.0   1347      0.32    1600  1  1
 2
'13A.AM_WB.Arr Q1LTLn'   'AG'    20.    0.    1000.      0.  0.  12.  1
      140        71        3.0    129      0.32    1600  1  1
 2
'13B.AM_WB.Arr Q3_Lns'   'AG'    20.   12.    1000.     12.  0.  12.  3
      140        71        3.0   1379      0.32    1600  1  1
 2
'15A.Hob_SB.ArrQ1RTLn'   'AG'   -11.   48.     -11.  1000.  0.  11.  1
      140        95        3.0    426      0.26    1600  1  1
 2
'15B.Hob_SB.ArrQ2_Lns'   'AG'     0.   48.       0.  1000.  0.  11.  1
      140       126        3.0    118      0.26    1600  1  1
 2
'17A.Hob_NB.ArrQ1LTLn'   'AG'   -11.  -48.     -11. -1000.  0.  11.  1
      140       112        3.0    198      0.26    1600  1  1
 2
'17B.Hob_NB.ArrQ2_Lns'   'AG'     0.  -48.       0. -1000.  0.  11.  1
      140       112        3.0     89      0.26    1600  1  1
1.0 00. 4 1000. 0.  'Y' 10  0 36
```

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: HILTON HVILL PM EMISSIONS MODELING EXISTING RUN: ALA MOANA BLVD & HOBRON INTERSECTION PM

DATE : 10/ 8/ 1
TIME : 18:47:12

The MODE flag has been set to P for calculating PM averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 321. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = .0 ug/m**3

LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1. 1A.AM_EB.Arr 1LTLn	-20.0	.0	-1000.0	.0	980.	270.	AG	132.	.3	.0	32.0		
2. 1B.AM_EB.Arr 3_Lns	-20.0	-12.0	-1000.0	-12.0	980.	270.	AG	1317.	.3	.0	56.0		
3. 2A.AM_EB.Dep 4_Lns	-20.0	.0	1000.0	.0	1020.	90.	AG	1245.	.3	.0	68.0		
4. 3A.AM_WB.Arr 1LTLn	20.0	.0	1000.0	.0	980.	90.	AG	126.	.3	.0	32.0		
5. 3B.AM_WB.Arr 3_Lns	20.0	12.0	1000.0	12.0	980.	90.	AG	1377.	.3	.0	56.0		
6. 4A.AM_WB.Dep 4_Lns	20.0	.0	-1000.0	.0	1020.	270.	AG	1245.	.3	.0	68.0		
7. 5A.Hob_SB.Arr 1RTLn	-11.0	48.0	-11.0	1000.0	952.	360.	AG	426.	.2	.0	31.0		
8. 5B.Hob_SB.Arr 1_Ln	.0	48.0	.0	1000.0	952.	360.	AG	116.	.2	.0	31.0		
9. 6A.Hob_SB.Dep 1_Ln	.0	48.0	.0	-1000.0	1048.	180.	AG	214.	.2	.0	42.0		
10. 7A.Hob_NB.Arr 1LTLn	-11.0	-48.0	-11.0	-1000.0	952.	180.	AG	179.	.2	.0	31.0		
11. 7B.Hob_NB.Arr 1_Ln	.0	-48.0	.0	-1000.0	952.	180.	AG	88.	.2	.0	31.0		
12. 8A.Hob_NB.Dep 1_Ln	.0	-48.0	.0	1000.0	1048.	360.	AG	181.	.2	.0	42.0		
13. 11A.AM_EB.Arr Q1LTLn	-20.0	.0	-63.3	.0	43.	270.	AG	0.	100.0	.0	12.0	.15	2.2
14. 11B.AM_EB.Arr Q3_Lns	-20.0	-12.0	-164.0	-12.0	144.	270.	AG	1.	100.0	.0	12.0	.51	7.3
15. 13A.AM_WB.Arr Q1LTLn	20.0	.0	68.9	.0	49.	90.	AG	0.	100.0	.0	12.0	.17	2.5
16. 13B.AM_WB.Arr Q3_Lns	20.0	12.0	198.2	12.0	178.	90.	AG	1.	100.0	.0	12.0	.63	9.1
17. 15A.Hob_SB.ArrQ1RTLn	-11.0	48.0	-11.0	350.8	303.	360.	AG	0.	100.0	.0	11.0	.93	15.4
18. 15B.Hob_SB.ArrQ2_Lns	.0	48.0	.0	339.0	291.	360.	AG	1.	100.0	.0	11.0	1.14	14.8
19. 17A.Hob_NB.ArrQ1LTLn	-11.0	-48.0	-11.0	-171.6	124.	180.	AG	1.	100.0	.0	11.0	.68	6.3
20. 17B.Hob_NB.ArrQ2_Lns	.0	-48.0	.0	-106.0	58.	180.	AG	1.	100.0	.0	11.0	.34	2.9

JOB: HILTON HVILL PM EMISSIONS MODELING RUN: ALA MOANA BLVD & HOBRON INTERSECTION PM

DATE : 10/ 8/ 1
TIME : 18:47:12

13.	11A.AM_EB.Arr Q1LTLn*	140	60	3.0	132	1600	.32	1	2
14.	11B.AM_EB.Arr Q3_Lns*	140	60	3.0	1317	1600	.32	1	2
15.	13A.AM_WB.Arr Q1LTLn*	140	71	3.0	126	1600	.32	1	2
16.	13B.AM_WB.Arr Q3_Lns*	140	71	3.0	1377	1600	.32	1	2
17.	15A.Hob_SB.ArrQ1RTLn*	140	95	3.0	426	1600	.26	1	2
18.	15B.Hob_SB.ArrQ2_Lns*	140	126	3.0	116	1600	.26	1	2
19.	17A.Hob_NB.ArrQ1LTLn*	140	112	3.0	179	1600	.26	1	2
20.	17B.Hob_NB.ArrQ2_Lns*	140	112	3.0	88	1600	.26	1	2

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. R1 (NE CORNER 1_FL)	42.0	68.0	6.0
2. R2 (NE CORNER 2_FL)	42.0	68.0	21.0
3. R3 (SE CORNER 1_FL)	42.0	-68.0	6.0
4. R4 (SE CORNER 2_FL)	42.0	-68.0	21.0
5. R5 (NW CORNER 1_FL)	-42.0	68.0	6.0
6. R6 (NW CORNER 2_FL)	-42.0	68.0	21.0
7. R7 (SW CORNER 1_FL)	-42.0	-68.0	6.0
8. R8 (SW CORNER 2_FL)	-42.0	-68.0	21.0
9. R9 (NE 150 FT 1_FL)	150.0	150.0	6.0
10. R10(NE 150 FT 2_FL)	150.0	150.0	21.0
11. R11(SE 150 FT 1_FL)	150.0	-150.0	6.0
12. R12(SE 150 FT 2_FL)	150.0	-150.0	21.0
13. R13(NW 150 FT 1_FL)	-150.0	150.0	6.0
14. R14(NW 150 FT 2_FL)	-150.0	150.0	21.0
15. R15(SW 150 FT 1_FL)	-150.0	-150.0	6.0
16. R16(SW 150 FT 2_FL)	-150.0	-150.0	21.0

JOB: HILTON HVILL PM EMISSIONS MODELING RUN: ALA MOANA BLVD & HOBRON INTERSECTION PM PAGE 3

MODEL RESULTS
WIND ANGLE RANGE: 0.-360.
WIND * CONCENTRATION
ANGLE * (ug/m**3)

(DEGR) *	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
0. *	4.	4.	21.	14.	6.	5.	23.	15.	1.	1.	11.	9.	1.	1.	11.	9.
10. *	2.	2.	19.	13.	8.	7.	25.	16.	0.	0.	10.	9.	2.	1.	12.	11.
20. *	0.	0.	18.	12.	9.	7.	24.	15.	0.	0.	9.	8.	2.	2.	13.	12.
30. *	0.	0.	18.	12.	8.	6.	23.	15.	0.	0.	10.	8.	3.	2.	13.	12.
40. *	0.	0.	18.	13.	8.	5.	23.	15.	0.	0.	10.	9.	3.	3.	14.	12.
50. *	0.	0.	19.	14.	7.	4.	24.	17.	0.	0.	10.	9.	3.	3.	14.	13.
60. *	0.	0.	20.	16.	7.	4.	25.	19.	0.	0.	11.	10.	3.	3.	14.	13.
70. *	1.	1.	20.	17.	8.	5.	26.	20.	0.	0.	10.	9.	3.	3.	13.	12.
80. *	6.	5.	18.	16.	12.	9.	23.	19.	1.	1.	7.	7.	4.	4.	10.	10.
90. *	14.	12.	11.	10.	21.	16.	16.	13.	3.	3.	3.	3.	8.	7.	6.	5.
100. *	21.	18.	4.	4.	28.	22.	10.	7.	8.	7.	1.	1.	12.	11.	2.	2.
110. *	24.	19.	1.	1.	28.	22.	6.	4.	11.	10.	0.	0.	14.	13.	1.	1.
120. *	23.	18.	0.	0.	26.	19.	5.	3.	11.	10.	0.	0.	14.	13.	1.	1.
130. *	22.	15.	0.	0.	23.	16.	5.	3.	11.	10.	0.	0.	13.	12.	1.	1.
140. *	20.	14.	0.	0.	21.	14.	5.	3.	10.	9.	0.	0.	12.	11.	1.	1.
150. *	20.	12.	0.	0.	20.	13.	5.	4.	10.	9.	0.	0.	12.	10.	1.	1.
160. *	20.	12.	0.	0.	20.	13.	5.	4.	10.	8.	0.	0.	12.	10.	1.	1.
170. *	21.	12.	1.	1.	20.	13.	5.	4.	11.	9.	0.	0.	11.	9.	1.	1.
180. *	22.	13.	2.	2.	19.	13.	3.	3.	11.	10.	0.	0.	10.	9.	1.	1.
190. *	23.	14.	4.	3.	18.	12.	2.	1.	12.	10.	1.	1.	10.	8.	1.	1.
200. *	23.	15.	4.	3.	17.	11.	1.	0.	13.	11.	1.	1.	9.	8.	0.	0.
210. *	22.	15.	4.	3.	17.	12.	0.	0.	13.	11.	1.	1.	9.	8.	0.	0.
220. *	22.	15.	4.	3.	17.	13.	0.	0.	13.	12.	1.	1.	10.	9.	0.	0.
230. *	23.	16.	4.	3.	18.	14.	0.	0.	14.	13.	1.	1.	10.	9.	0.	0.
240. *	24.	19.	4.	3.	19.	15.	0.	0.	14.	13.	1.	1.	10.	10.	0.	0.
250. *	25.	20.	6.	4.	19.	17.	1.	1.	13.	13.	1.	1.	10.	9.	0.	0.
260. *	23.	19.	10.	8.	17.	15.	6.	5.	11.	10.	2.	2.	7.	6.	1.	1.
270. *	16.	13.	18.	15.	11.	10.	13.	12.	7.	6.	6.	6.	3.	3.	3.	3.
280. *	10.	7.	24.	21.	4.	4.	20.	18.	4.	3.	10.	10.	1.	1.	7.	7.
290. *	6.	4.	26.	21.	1.	1.	23.	18.	3.	2.	13.	12.	0.	0.	10.	10.
300. *	6.	4.	24.	18.	0.	0.	22.	17.	3.	2.	13.	12.	0.	0.	11.	10.
310. *	6.	4.	21.	15.	0.	0.	21.	15.	3.	3.	12.	11.	0.	0.	11.	10.
320. *	6.	5.	20.	13.	0.	0.	20.	13.	2.	2.	12.	11.	0.	0.	10.	9.
330. *	7.	5.	20.	14.	0.	0.	19.	12.	2.	2.	13.	11.	0.	0.	10.	8.
340. *	7.	6.	22.	15.	1.	1.	19.	12.	2.	2.	13.	11.	0.	0.	9.	8.
350. *	6.	5.	22.	15.	3.	2.	21.	13.	1.	1.	12.	10.	0.	0.	10.	8.
360. *	4.	4.	21.	14.	6.	5.	23.	15.	1.	1.	11.	9.	1.	1.	11.	9.
MAX *	25.	20.	26.	21.	28.	22.	26.	20.	14.	13.	13.	12.	14.	13.	14.	13.
DEGR. *	250	250	290	280	110	110	70	70	230	230	300	290	120	110	40	50

THE HIGHEST CONCENTRATION OF 28. ug/m**3 OCCURRED AT RECEPTOR REC5 .

JOB: HILTON HVILL PM EMISSIONS MODELING   RUN: ALA MOANA BLVD & HOBRON INTERSECTION PM

DATE : 10/ 8/ 1
TIME : 18:47:12

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

PM/LNK(ug/m**3)
ANGLE (DEGREES)

LINK #	REC1 250	REC2 250	REC3 290	REC4 280	REC5 110	REC6 110	REC7 70	REC8 70	REC9 230	REC10 230	REC11 300	REC12 290	REC13 120	REC14 110	REC15 40	REC16 50
1	.8	.7	.7	.7	.0	.0	.0	.0	.2	.2	.3	.4	.0	.0	.2	.1
2	8.0	7.2	9.1	8.5	.0	.0	.1	.0	2.7	2.5	3.8	4.5	.4	.0	2.9	1.5
3	1.1	.5	1.1	.1	10.0	8.4	10.0	8.4	2.5	2.2	1.3	.4	4.7	4.9	2.3	3.3
4	.0	.0	.0	.0	.7	.6	.7	.7	.1	.1	.0	.0	.3	.4	.1	.2
5	.1	.0	.0	.0	9.5	8.2	8.4	7.5	1.8	1.6	.4	.0	4.0	4.7	1.5	2.6
6	10.0	8.4	10.0	8.2	1.1	.5	1.1	.5	3.6	3.3	4.7	4.9	1.3	.4	3.6	2.2
7	1.0	.6	.0	.0	2.1	.7	.0	.0	.3	.3	.1	.0	.7	.8	.5	.2
8	.4	.2	.0	.0	.4	.2	.0	.0	.1	.1	.0	.0	.2	.2	.1	.1
9	.5	.3	1.3	.6	.5	.3	1.3	.6	.4	.3	.6	.5	.2	.1	.4	.4
10	.0	.0	.4	.4	.0	.0	.9	.3	.1	.1	.2	.3	.0	.0	.1	.2
11	.0	.0	.3	.2	.0	.0	.3	.1	.0	.0	.1	.2	.0	.0	.0	.1
12	1.1	.5	.5	.1	1.1	.5	.5	.3	.4	.4	.2	.1	.5	.4	.5	.3
13	.1	.1	.1	.0	.0	.0	.0	.0	.1	.1	.1	.0	.0	.0	.1	.1
14	.8	.7	1.2	.8	.0	.0	.0	.0	.4	.4	.5	.4	.1	.0	.6	.3
15	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.0	.0	.1	.0	.1	.1
16	.0	.0	.0	.0	1.6	1.5	1.1	1.0	.4	.4	.1	.0	.7	.5	.3	.5
17	.3	.3	.0	.0	.7	.5	.0	.0	.1	.1	.0	.0	.3	.3	.2	.1
18	.6	.5	.0	.0	.6	.5	.0	.0	.2	.2	.0	.0	.3	.4	.2	.1
19	.0	.0	.4	.5	.0	.0	.8	.5	.1	.1	.2	.3	.0	.0	.1	.2
20	.0	.0	.6	.6	.0	.0	.6	.4	.1	.1	.2	.2	.0	.0	.1	.1

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221   PAGE 1

JOB: HILTON HVILL PM EMISSIONS PROPOSED   RUN: ALA MOANA BLVD & HOBRON INTERSECTION PM

DATE : 10/ 8/ 1
TIME : 18:52:16

The MODE flag has been set to P for calculating PM averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S   VD = .0 CM/S   Z0 = 321. CM
U = 1.0 M/S   CLAS = 4 (D)   ATIM = 60. MINUTES   MIXH = 1000. M   AMB = .0 ug/m**3

LINK VARIABLES

	LINK DESCRIPTION	X1	Y1	X2	Y2	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1.	1A.AM_EB.Arr 1LTLn	-20.0	.0	-1000.0	.0	980.	270.	AG	132.	.3	.0	32.0		
2.	1B.AM_EB.Arr 3_Lns	-20.0	-12.0	-1000.0	-12.0	980.	270.	AG	1347.	.3	.0	56.0		
3.	2A.AM_EB.Dep 4_Lns	-20.0	.0	1000.0	.0	1020.	90.	AG	1278.	.3	.0	68.0		
4.	3A.AM_WB.Arr 1LTLn	20.0	.0	1000.0	.0	980.	90.	AG	129.	.3	.0	32.0		
5.	3B.AM_WB.Arr 3_Lns	20.0	12.0	1000.0	12.0	980.	90.	AG	1395.	.3	.0	56.0		
6.	4A.AM_WB.Dep 4_Lns	20.0	.0	-1000.0	.0	1020.	270.	AG	1414.	.3	.0	68.0		
7.	5A.Hob_SB.Arr 1RTLn	-11.0	48.0	-11.0	1000.0	952.	360.	AG	426.	.2	.0	31.0		
8.	5B.Hob_SB.Arr 1_Ln	.0	48.0	.0	1000.0	952.	360.	AG	118.	.2	.0	31.0		
9.	6A.Hob_SB.Dep 1_Ln	.0	48.0	.0	-1000.0	1048.	180.	AG	229.	.2	.0	42.0		
10.	7A.Hob_NB.Arr 1LTLn	-11.0	-48.0	-11.0	-1000.0	952.	180.	AG	198.	.2	.0	31.0		
11.	7B.Hob_NB.Arr 1_Ln	.0	-48.0	.0	-1000.0	952.	180.	AG	89.	.2	.0	31.0		
12.	8A.Hob_NB.Dep 1_Ln	.0	-48.0	.0	1000.0	1048.	360.	AG	192.	.2	.0	42.0		
13.	11A.AM_EB.Arr Q1LTLn	-20.0	.0	-63.3	.0	43.	270.	AG	0.	100.0	.0	12.0	.15	2.2
14.	11B.AM_EB.Arr Q3_Lns	-20.0	-12.0	-167.3	-12.0	147.	270.	AG	1.	100.0	.0	12.0	.52	7.5
15.	13A.AM_WB.Arr Q1LTLn	20.0	.0	70.1	.0	50.	90.	AG	0.	100.0	.0	12.0	.18	2.5
16.	13B.AM_WB.Arr Q3_Lns	20.0	12.0	198.2	12.0	178.	90.	AG	1.	100.0	.0	12.0	.63	9.1
17.	15A.Hob_SB.ArrQ1RTLn	-11.0	48.0	-11.0	350.8	303.	360.	AG	0.	100.0	.0	11.0	.93	15.4
18.	15B.Hob_SB.ArrQ2_Lns	.0	48.0	.0	361.3	313.	360.	AG	1.	100.0	.0	11.0	1.16	15.9
19.	17A.Hob_NB.ArrQ1LTLn	-11.0	-48.0	-11.0	-191.3	143.	180.	AG	1.	100.0	.0	11.0	.76	7.3
20.	17B.Hob_NB.ArrQ2_Lns	.0	-48.0	.0	-106.7	59.	180.	AG	1.	100.0	.0	11.0	.34	3.0

JOB: HILTON HVILL PM EMISSIONS PROPOSED RUN: ALA MOANA BLVD & HOBRON INTERSECTION PM

DATE : 10/ 8/ 1
TIME : 18:52:16

13. 11A.AM_EB.Arr Q1LTLn*	140	60	3.0	132	1600	.32	1	2
14. 11B.AM_EB.Arr Q3_Lns*	140	60	3.0	1347	1600	.32	1	2
15. 13A.AM_WB.Arr Q1LTLn*	140	71	3.0	129	1600	.32	1	2
16. 13B.AM_WB.Arr Q3_Lns*	140	71	3.0	1379	1600	.32	1	2
17. 15A.Hob_SB.ArrQ1RTLn*	140	95	3.0	426	1600	.26	1	2
18. 15B.Hob_SB.ArrQ2_Lns*	140	126	3.0	118	1600	.26	1	2
19. 17A.Hob_NB.ArrQ1LTLn*	140	112	3.0	198	1600	.26	1	2
20. 17B.Hob_NB.ArrQ2_Lns*	140	112	3.0	89	1600	.26	1	2

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. R1 (NE CORNER 1_FL)	42.0	68.0	6.0
2. R2 (NE CORNER 2_FL)	42.0	68.0	21.0
3. R3 (SE CORNER 1_FL)	42.0	-68.0	6.0
4. R4 (SE CORNER 2_FL)	42.0	-68.0	21.0
5. R5 (NW CORNER 1_FL)	-42.0	68.0	6.0
6. R6 (NW CORNER 2_FL)	-42.0	68.0	21.0
7. R7 (SW CORNER 1_FL)	-42.0	-68.0	6.0
8. R8 (SW CORNER 2_FL)	-42.0	-68.0	21.0
9. R9 (NE 150 FT 1_FL)	150.0	150.0	6.0
10. R10(NE 150 FT 2_FL)	150.0	150.0	21.0
11. R11(SE 150 FT 1_FL)	150.0	-150.0	6.0
12. R12(SE 150 FT 2_FL)	150.0	-150.0	21.0
13. R13(NW 150 FT 1_FL)	-150.0	150.0	6.0
14. R14(NW 150 FT 2_FL)	-150.0	150.0	21.0
15. R15(SW 150 FT 1_FL)	-150.0	-150.0	6.0
16. R16(SW 150 FT 2_FL)	-150.0	-150.0	21.0

JOB: HILTON HVILL PM EMISSIONS PROPOSED	RUN: ALA MOANA BLVD & HOBRON INTERSECTION PM	PAGE 3

MODEL RESULTS
WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
		CONCENTRATION (ug/m**3)															
0.	*	4.	4.	21.	15.	6.	5.	25.	16.	1.	1.	11.	10.	1.	1.	12.	10.
10.	*	2.	2.	19.	13.	8.	7.	26.	17.	0.	0.	10.	9.	2.	1.	13.	11.
20.	*	0.	0.	18.	12.	9.	7.	25.	16.	0.	0.	10.	8.	2.	2.	14.	12.
30.	*	0.	0.	18.	12.	8.	6.	24.	16.	0.	0.	10.	9.	3.	3.	14.	13.
40.	*	0.	0.	18.	13.	8.	5.	24.	16.	0.	0.	10.	9.	3.	3.	14.	13.
50.	*	0.	0.	19.	15.	7.	4.	25.	18.	0.	0.	10.	10.	3.	3.	14.	13.
60.	*	0.	0.	20.	16.	7.	4.	26.	19.	0.	0.	11.	10.	3.	3.	14.	13.
70.	*	1.	1.	21.	18.	8.	5.	27.	21.	0.	0.	10.	9.	3.	3.	13.	13.
80.	*	6.	5.	18.	16.	13.	9.	24.	19.	1.	1.	7.	7.	4.	4.	10.	10.
90.	*	14.	13.	11.	10.	21.	16.	17.	13.	4.	3.	3.	3.	8.	7.	6.	6.
100.	*	21.	19.	4.	4.	28.	22.	10.	7.	8.	7.	1.	1.	12.	11.	3.	2.
110.	*	24.	20.	1.	1.	29.	22.	6.	4.	11.	10.	0.	0.	14.	13.	2.	1.
120.	*	24.	18.	0.	0.	27.	20.	5.	3.	11.	11.	0.	0.	14.	13.	1.	1.
130.	*	22.	16.	0.	0.	24.	17.	5.	3.	11.	10.	0.	0.	13.	12.	1.	1.
140.	*	21.	14.	0.	0.	22.	14.	5.	4.	11.	9.	0.	0.	13.	11.	2.	1.
150.	*	20.	13.	0.	0.	21.	14.	6.	4.	10.	9.	0.	0.	13.	11.	2.	2.
160.	*	20.	12.	0.	0.	22.	14.	5.	4.	10.	9.	0.	0.	12.	11.	1.	1.
170.	*	21.	13.	1.	1.	21.	14.	5.	4.	11.	9.	0.	0.	12.	10.	1.	1.
180.	*	23.	14.	3.	2.	21.	14.	3.	3.	12.	10.	0.	0.	11.	9.	1.	1.
190.	*	24.	15.	4.	3.	19.	13.	2.	1.	12.	10.	1.	1.	10.	9.	0.	0.
200.	*	24.	15.	4.	3.	19.	12.	1.	0.	13.	11.	1.	1.	10.	8.	0.	0.
210.	*	23.	15.	4.	3.	18.	12.	0.	0.	13.	12.	1.	1.	10.	9.	0.	0.
220.	*	24.	16.	5.	3.	19.	13.	0.	0.	14.	13.	1.	1.	10.	9.	0.	0.
230.	*	24.	18.	4.	3.	20.	15.	0.	0.	14.	13.	1.	1.	11.	10.	0.	0.
240.	*	26.	20.	5.	3.	21.	16.	0.	0.	14.	13.	1.	1.	11.	10.	0.	0.
250.	*	27.	21.	6.	4.	21.	18.	1.	1.	14.	13.	2.	1.	10.	10.	0.	0.
260.	*	24.	20.	11.	9.	18.	17.	6.	5.	11.	11.	3.	3.	7.	7.	1.	1.
270.	*	18.	14.	19.	16.	12.	11.	14.	13.	7.	7.	7.	6.	3.	3.	4.	4.
280.	*	10.	8.	26.	22.	5.	4.	22.	19.	4.	3.	11.	11.	1.	1.	8.	8.
290.	*	7.	5.	28.	22.	1.	1.	24.	20.	3.	2.	14.	13.	0.	0.	11.	10.
300.	*	6.	4.	25.	19.	0.	0.	24.	18.	3.	3.	14.	13.	0.	0.	12.	11.
310.	*	6.	4.	23.	16.	0.	0.	23.	16.	3.	3.	13.	12.	0.	0.	11.	10.
320.	*	6.	5.	21.	14.	0.	0.	21.	14.	3.	2.	13.	11.	0.	0.	11.	10.
330.	*	7.	5.	21.	14.	0.	0.	20.	13.	2.	2.	13.	12.	0.	0.	10.	9.
340.	*	7.	6.	23.	16.	1.	1.	21.	13.	2.	2.	13.	12.	0.	0.	10.	9.
350.	*	6.	6.	23.	16.	3.	2.	22.	13.	1.	1.	12.	10.	0.	0.	11.	9.
360.	*	4.	4.	21.	15.	6.	5.	25.	16.	1.	1.	11.	10.	1.	1.	12.	10.
MAX	*	27.	21.	28.	22.	29.	22.	27.	21.	14.	13.	14.	13.	14.	13.	14.	13.
DEGR.	*	250	250	290	290	110	110	70	70	230	230	290	290	110	110	50	50

THE HIGHEST CONCENTRATION OF 29. ug/m**3 OCCURRED AT RECEPTOR REC5 .

JOB: HILTON HVILL PM EMISSIONS PROPOSED RUN: ALA MOANA BLVD & HOBRON INTERSECTION PM

DATE : 10/ 8/ 1
TIME : 18:52:16

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

PM/LNK(ug/m**3)
ANGLE (DEGREES)

LINK #	REC1 250	REC2 250	REC3 290	REC4 290	REC5 110	REC6 110	REC7 70	REC8 70	REC9 230	REC10 230	REC11 290	REC12 290	REC13 110	REC14 110	REC15 50	REC16 50
1	.8	.7	.7	.7	.0	.0	.0	.0	.2	.2	.4	.4	.0	.0	.1	.1
2	8.2	7.4	9.3	8.0	.0	.0	.1	.0	2.7	2.6	4.8	4.6	.1	.0	1.8	1.5
3	1.1	.5	1.1	.5	10.3	8.6	10.3	8.6	2.6	2.2	.5	.4	5.3	5.0	3.7	3.4
4	.0	.0	.0	.0	.7	.7	.7	.7	.1	.1	.0	.0	.4	.4	.2	.2
5	.1	.0	.0	.0	9.6	8.3	8.5	7.6	1.9	1.6	.1	.0	5.0	4.8	2.8	2.7
6	11.4	9.5	11.4	9.5	1.3	.5	1.3	.5	4.1	3.8	5.8	5.5	.5	.4	2.8	2.4
7	1.0	.6	.0	.0	2.1	.7	.0	.0	.3	.3	.0	.0	.9	.8	.2	.2
8	.4	.2	.0	.0	.4	.2	.0	.0	.1	.1	.0	.0	.2	.2	.1	.1
9	.6	.3	1.4	.6	.6	.3	1.4	.6	.4	.4	.6	.5	.1	.1	.5	.5
10	.0	.0	.5	.3	.0	.0	1.0	.3	.1	.1	.4	.3	.0	.0	.2	.2
11	.0	.0	.3	.1	.0	.0	.3	.1	.0	.0	.2	.2	.0	.0	.1	.1
12	1.1	.5	.5	.3	1.1	.5	.5	.3	.4	.4	.1	.1	.5	.4	.3	.3
13	.1	.1	.1	.1	.0	.0	.0	.0	.1	.1	.0	.0	.0	.0	.1	.1
14	.8	.8	1.2	1.2	.0	.0	.0	.0	.4	.4	.4	.4	.0	.0	.3	.3
15	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.0	.0	.0	.0	.1	.1
16	.0	.0	.0	.0	1.6	1.5	1.1	1.0	.4	.4	.0	.0	.6	.5	.6	.5
17	.3	.3	.0	.0	.7	.5	.0	.0	.1	.1	.0	.0	.3	.3	.1	.1
18	.6	.5	.0	.0	.6	.5	.0	.0	.2	.2	.0	.0	.4	.4	.1	.1
19	.0	.0	.4	.3	.0	.0	.8	.5	.1	.1	.3	.3	.0	.0	.2	.2
20	.0	.0	.6	.4	.0	.0	.6	.4	.1	.1	.2	.2	.0	.0	.1	.1

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: HILTON HVILL PM EMISSIONS WORST RUN: ALA MOANA BLVD & HOBRON INTERSECTION S3

DATE : 10/ 8/ 1
TIME : 18:55:38

The MODE flag has been set to P for calculating PM averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 321. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = .0 ug/m**3

LINK VARIABLES

	LINK DESCRIPTION	X1	Y1	X2	Y2	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1.	1A.AM_EB.Arr 1LTLn	-20.0	.0	-1000.0	.0	980.	270.	AG	132.	.3	.0	32.0		
2.	1B.AM_EB.Arr 3_Lns	-20.0	-12.0	-1000.0	-12.0	980.	270.	AG	1347.	.3	.0	56.0		
3.	2A.AM_EB.Dep 4_Lns	-20.0	.0	1000.0	.0	1020.	90.	AG	1278.	.3	.0	68.0		
4.	3A.AM_WB.Arr 1LTLn	20.0	.0	1000.0	.0	980.	90.	AG	129.	.3	.0	32.0		
5.	3B.AM_WB.Arr 3_Lns	20.0	12.0	1000.0	12.0	980.	90.	AG	1395.	.3	.0	56.0		
6.	4A.AM_WB.Dep 4_Lns	20.0	.0	-1000.0	.0	1020.	270.	AG	1414.	.3	.0	68.0		
7.	5A.Hob_SB.Arr 1RTLn	-11.0	48.0	-11.0	1000.0	952.	360.	AG	426.	.2	.0	31.0		
8.	5B.Hob_SB.Arr 1_Ln	.0	48.0	.0	1000.0	952.	360.	AG	118.	.2	.0	31.0		
9.	6A.Hob_SB.Dep 1_Ln	.0	48.0	.0	-1000.0	1048.	180.	AG	229.	.2	.0	42.0		
10.	7A.Hob_NB.Arr 1LTLn	-11.0	-48.0	-11.0	-1000.0	952.	180.	AG	198.	.2	.0	31.0		
11.	7B.Hob_NB.Arr 1_Ln	.0	-48.0	.0	-1000.0	952.	180.	AG	89.	.2	.0	31.0		
12.	8A.Hob_NB.Dep 1_Ln	.0	-48.0	.0	1000.0	1048.	360.	AG	192.	.2	.0	42.0		
13.	11A.AM_EB.Arr Q1LTLn	-20.0	.0	-63.3	.0	43.	270.	AG	0.	100.0	.0	12.0	.15	2.2
14.	11B.AM_EB.Arr Q3_Lns	-20.0	-12.0	-178.9	-12.0	159.	270.	AG	1.	100.0	.0	12.0	.52	8.1
15.	13A.AM_WB.Arr Q1LTLn	20.0	.0	70.5	.0	50.	90.	AG	0.	100.0	.0	12.0	.18	2.6
16.	13B.AM_WB.Arr Q3_Lns	20.0	12.0	212.1	12.0	192.	90.	AG	1.	100.0	.0	12.0	.63	9.8
17.	15A.Hob_SB.ArrQ1RTLn	-11.0	48.0	-11.0	386.7	339.	360.	AG	0.	100.0	.0	11.0	.93	17.2
18.	15B.Hob_SB.ArrQ2_Lns	.0	48.0	.0	382.8	335.	360.	AG	1.	100.0	.0	11.0	1.16	17.0
19.	17A.Hob_NB.ArrQ1LTLn	-11.0	-48.0	-11.0	-210.2	162.	180.	AG	1.	100.0	.0	11.0	.76	8.2
20.	17B.Hob_NB.ArrQ2_Lns	.0	-48.0	.0	-118.4	70.	180.	AG	1.	100.0	.0	11.0	.34	3.6

JOB: HILTON HVILL PM EMISSIONS WORST RUN: ALA MOANA BLVD & HOBRON INTERSECTION S3 PAGE 2

DATE : 10/ 8/ 1
TIME : 18:55:38

13. 11A.AM_EB.Arr Q1LTLn*	140	60	3.0	132	1600	.32	1	1
14. 11B.AM_EB.Arr Q3_Lns*	140	60	3.0	1347	1600	.32	1	1
15. 13A.AM_WB.Arr Q1LTLn*	140	71	3.0	129	1600	.32	1	1
16. 13B.AM_WB.Arr Q3_Lns*	140	71	3.0	1379	1600	.32	1	1
17. 15A.Hob_SB.ArrQ1RTLn*	140	95	3.0	426	1600	.26	1	1
18. 15B.Hob_SB.ArrQ2_Lns*	140	126	3.0	118	1600	.26	1	1
19. 17A.Hob_NB.ArrQ1LTLn*	140	112	3.0	198	1600	.26	1	1
20. 17B.Hob_NB.ArrQ2_Lns*	140	112	3.0	89	1600	.26	1	1

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. R1 (NE CORNER 1_FL)	42.0	68.0	6.0
2. R2 (NE CORNER 2_FL)	42.0	68.0	21.0
3. R3 (SE CORNER 1_FL)	42.0	-68.0	6.0
4. R4 (SE CORNER 2_FL)	42.0	-68.0	21.0
5. R5 (NW CORNER 1_FL)	-42.0	68.0	6.0
6. R6 (NW CORNER 2_FL)	-42.0	68.0	21.0
7. R7 (SW CORNER 1_FL)	-42.0	-68.0	6.0
8. R8 (SW CORNER 2_FL)	-42.0	-68.0	21.0
9. R9 (NE 150 FT 1_FL)	150.0	150.0	6.0
10. R10(NE 150 FT 2_FL)	150.0	150.0	21.0
11. R11(SE 150 FT 1_FL)	150.0	-150.0	6.0
12. R12(SE 150 FT 2_FL)	150.0	-150.0	21.0
13. R13(NW 150 FT 1_FL)	-150.0	150.0	6.0
14. R14(NW 150 FT 2_FL)	-150.0	150.0	21.0
15. R15(SW 150 FT 1_FL)	-150.0	-150.0	6.0
16. R16(SW 150 FT 2_FL)	-150.0	-150.0	21.0

PAGE 3

JOB: HILTON HVILL PM EMISSIONS WORST RUN: ALA MOANA BLVD & HOBRON INTERSECTION S3

MODEL RESULTS
WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
	CONCENTRATION (ug/m**3)															
0.	4.	4.	22.	15.	6.	5.	25.	16.	1.	1.	11.	10.	1.	1.	12.	10.
10.	2.	2.	19.	13.	8.	7.	26.	17.	0.	0.	10.	9.	2.	1.	13.	11.
20.	1.	0.	18.	12.	9.	7.	25.	16.	0.	0.	10.	8.	2.	2.	14.	13.
30.	0.	0.	18.	12.	8.	6.	24.	16.	0.	0.	10.	9.	3.	3.	14.	13.
40.	0.	0.	18.	13.	8.	5.	24.	16.	0.	0.	10.	9.	3.	3.	14.	13.
50.	0.	0.	20.	15.	7.	4.	25.	18.	0.	0.	10.	10.	3.	3.	14.	13.
60.	0.	0.	20.	16.	7.	4.	26.	19.	0.	0.	11.	10.	3.	3.	14.	13.
70.	1.	1.	21.	18.	8.	5.	27.	21.	0.	0.	10.	9.	3.	3.	13.	13.
80.	6.	5.	18.	16.	13.	9.	24.	19.	1.	1.	7.	7.	4.	4.	10.	10.
90.	14.	13.	11.	10.	21.	16.	17.	13.	4.	3.	3.	3.	8.	7.	6.	6.
100.	21.	19.	4.	4.	28.	22.	10.	7.	8.	7.	1.	1.	12.	11.	3.	2.
110.	24.	20.	1.	1.	29.	23.	6.	4.	11.	10.	0.	0.	14.	13.	2.	2.
120.	24.	18.	0.	0.	27.	20.	5.	3.	11.	11.	0.	0.	14.	13.	2.	1.
130.	22.	16.	0.	0.	24.	17.	5.	3.	11.	10.	0.	0.	13.	12.	1.	1.
140.	21.	14.	0.	0.	22.	14.	6.	4.	11.	9.	0.	0.	13.	11.	2.	1.
150.	20.	13.	0.	0.	21.	14.	6.	4.	10.	9.	0.	0.	13.	11.	2.	2.
160.	20.	12.	0.	0.	22.	14.	5.	4.	10.	9.	0.	0.	12.	11.	1.	1.
170.	21.	13.	1.	1.	22.	14.	5.	4.	11.	9.	0.	0.	12.	10.	1.	1.
180.	23.	14.	3.	2.	21.	14.	3.	3.	12.	10.	0.	0.	11.	9.	1.	1.
190.	24.	15.	4.	3.	19.	13.	2.	1.	12.	10.	1.	1.	10.	9.	0.	0.
200.	24.	15.	4.	4.	19.	12.	1.	0.	13.	11.	1.	1.	10.	8.	0.	0.
210.	23.	15.	5.	4.	18.	12.	0.	0.	13.	12.	1.	1.	10.	9.	0.	0.
220.	24.	16.	5.	3.	19.	13.	0.	0.	14.	13.	1.	1.	10.	9.	0.	0.
230.	25.	18.	5.	3.	20.	15.	0.	0.	14.	13.	1.	1.	11.	10.	0.	0.
240.	26.	20.	5.	3.	21.	16.	0.	0.	15.	13.	1.	1.	11.	10.	0.	0.
250.	27.	21.	6.	4.	21.	18.	1.	1.	14.	13.	2.	2.	10.	10.	0.	0.
260.	24.	20.	11.	9.	18.	17.	6.	5.	11.	11.	3.	3.	7.	7.	1.	1.
270.	18.	14.	19.	16.	12.	11.	14.	13.	7.	7.	7.	6.	3.	3.	4.	4.
280.	10.	8.	26.	22.	5.	4.	22.	19.	4.	3.	11.	11.	1.	1.	8.	8.
290.	7.	5.	28.	22.	1.	1.	24.	20.	3.	2.	14.	13.	0.	0.	11.	10.
300.	6.	4.	25.	19.	0.	0.	24.	18.	3.	3.	14.	13.	0.	0.	12.	11.
310.	6.	4.	23.	16.	0.	0.	23.	16.	3.	3.	13.	12.	0.	0.	11.	10.
320.	6.	5.	21.	14.	0.	0.	21.	14.	3.	3.	13.	11.	0.	0.	11.	10.
330.	7.	5.	21.	14.	0.	0.	20.	13.	3.	2.	13.	12.	0.	0.	10.	9.
340.	7.	6.	23.	16.	1.	1.	21.	13.	2.	2.	13.	12.	0.	0.	10.	9.
350.	6.	6.	23.	16.	3.	2.	22.	14.	1.	1.	12.	10.	0.	0.	11.	9.
360.	4.	4.	22.	15.	6.	5.	25.	16.	1.	1.	11.	10.	1.	1.	12.	10.
MAX	27.	21.	28.	22.	29.	23.	27.	21.	15.	13.	14.	13.	14.	13.	14.	13.
DEGR.	250	250	290	280	110	110	70	70	240	240	290	290	110	110	50	50

THE HIGHEST CONCENTRATION OF 29. ug/m**3 OCCURRED AT RECEPTOR REC5 .

JOB: HILTON HVILL PM EMISSIONS WORST RUN: ALA MOANA BLVD & HOBRON INTERSECTION S3 PAGE 4

DATE : 10/ 8/ 1
TIME : 18:55:38

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

PM/LNK(ug/m**3)
ANGLE (DEGREES)

LINK #	REC1 250	REC2 250	REC3 290	REC4 280	REC5 110	REC6 110	REC7 70	REC8 70	REC9 240	REC10 240	REC11 290	REC12 290	REC13 110	REC14 110	REC15 50	REC16 50
1	.8	.7	.7	.7	.0	.0	.0	.0	.3	.3	.4	.4	.0	.0	.1	.1
2	8.2	7.4	9.3	8.6	.0	.0	.1	.0	3.9	3.7	4.8	4.6	.1	.0	1.8	1.5
3	1.1	.5	1.1	.1	10.3	8.6	10.3	8.6	1.4	1.2	.5	.4	5.3	5.0	3.7	3.4
4	.0	.0	.0	.0	.7	.7	.7	.7	.0	.0	.0	.0	.4	.4	.2	.2
5	.1	.0	.0	.0	9.6	8.3	8.5	7.6	.8	.7	.1	.0	5.0	4.8	2.8	2.7
6	11.4	9.5	11.4	9.3	1.3	.5	1.3	.5	5.3	5.0	5.8	5.5	.5	.4	2.8	2.4
7	1.0	.6	.0	.0	2.1	.7	.0	.0	.6	.5	.0	.0	.9	.8	.2	.2
8	.4	.2	.0	.0	.4	.2	.0	.0	.2	.2	.0	.0	.2	.2	.1	.1
9	.6	.3	1.4	.6	.6	.3	1.4	.6	.2	.2	.6	.5	.1	.1	.5	.5
10	.0	.0	.5	.4	.0	.0	1.0	.3	.0	.0	.4	.3	.0	.0	.2	.2
11	.0	.0	.3	.2	.0	.0	.3	.1	.0	.0	.2	.2	.0	.0	.1	.1
12	1.1	.5	.5	.1	1.1	.5	.5	.3	.5	.4	.1	.1	.5	.4	.3	.3
13	.1	.1	.1	.0	.0	.0	.0	.0	.1	.1	.0	.0	.0	.0	.1	.1
14	.9	.8	1.3	.9	.0	.0	.0	.0	.5	.5	.4	.4	.0	.0	.3	.3
15	.0	.0	.0	.0	.1	.1	.1	.1	.0	.0	.0	.0	.0	.0	.1	.1
16	.0	.0	.0	.0	1.7	1.6	1.2	1.1	.2	.1	.0	.0	.6	.6	.6	.6
17	.3	.3	.0	.0	.7	.5	.0	.0	.2	.2	.0	.0	.3	.3	.1	.1
18	.6	.5	.0	.0	.6	.5	.0	.0	.3	.3	.0	.0	.4	.4	.1	.1
19	.0	.0	.4	.5	.0	.0	.8	.5	.0	.0	.3	.3	.0	.0	.2	.2
20	.0	.0	.6	.6	.0	.0	.6	.4	.0	.0	.2	.2	.0	.0	.1	.1

APPENDIX D

USEPA CAL3QHC LINE SOURCE MODEL Version 2.0 Dated 95221

Carbon Monoxide & PM- Ala Moana & Ena/Kalia

INPUT FILE: AM_EKEX.DAT

```
'HHV CO EMISSIONS MODELING - EXISTING' 60. 321.  0. 0.  16  0.3048 1 1
'R1  (NE CORNER 1_FL)'      60       50      6
'R2  (NE CORNER 2_FL)'      60       50      21
'R3  (SE CORNER 1_FL)'      60      -50      6
'R4  (SE CORNER 2_FL)'      60      -50      21
'R5  (NW CORNER 1_FL)'     -60       50      6
'R6  (NW CORNER 2_FL)'     -60       50      21
'R7  (SW CORNER 1_FL)'     -60      -50      6
'R8  (SW CORNER 2_FL)'     -60      -50      21
'R9  (NE 150 FT 1_FL)'     150      150      6
'R10(NE 150 FT 2_FL)'      150      150      21
'R11(SE 150 FT 1_FL)'      150     -150      6
'R12(SE 150 FT 2_FL)'      150     -150      21
'R13(NW 150 FT 1_FL)'     -150      150      6
'R14(NW 150 FT 2_FL)'     -150      150      21
'R15(SW 150 FT 1_FL)'     -150     -150      6
'R16(SW 150 FT 2_FL)'     -150     -150      21
'ALA MOANA AND ENA/KALIA INTERSECTION EX'      22  1  1  'C'
 1
'1A.AM_NB.Arr 1LTLn   '   'AG'     0. -1000.      0.    -30.   19.   19.4  0. 32.
 1
'1B.AM_NB.Arr 2_Lns   '   'AG'    12. -1000.     12.    -30.  690.   19.4  0. 44.
 1
'1C.AM_NB.Arr 1RTLn   '   'AG'    36. -1000.     36.    -30.  443.   19.4  0. 34.
 1
'2A.AM_NB.Dep 3_Lns   '   'AG'     0.   -30.      0.   1000.  690.   19.4  0. 58.
 1
'3A.AM_SB.Arr 1LTLn   '   'AG'    48.  1000.     48.     30.  172.   19.4  0. 32.
 1
'3B.AM_SB.Arr 3_Lns   '   'AG'    36.  1000.     36.     30.  633.   19.4  0. 56.
 1
'4A.AM_SB.Dep 4_Lns   '   'AG'     0.    30.      0.  -1000. 1413.   19.4  0. 68.
 1
'5A.Ena_EB.Arr 1_ln   '   'AG' -1000.    -5.    -48.     -5.  197.   25.7  0. 30.
 1
'6A.Ena_EB.Dep 2_Lns  '   'AG'   -48.    -5.   1000.     -5.  146.   25.7  0. 40.
 1
'7A.Kal_WB.Arr 2LTLn  '   'AG'  1000.     0.     48.      0.  712.   25.7  0. 30.
 1
'7B.Kal_WB.Arr 1RTLn  '   'AG'  1000.    20.     48.     20.  116.   25.7  0. 30.
 1
'7C.Kal_WB.Arr 1_Ln   '   'AG'  1000.    10.     48.     10.  146.   25.7  0. 30.
 1
'8A.Kal_WB.Dep 1_Ln   '   'AG'    48.     0.  -1000.      0.  146.   25.7  0. 30.
 2
'11A.AM_NB.Arr Q1LTLn'    'AG'     0.    -30.      0. -1000.  0.  12.  1
      140         86       3.0    19    531.0    1600  1  2
 2
'11B.AM_NB.Arr Q2_Lns'    'AG'    12.    -30.     12. -1000.  0.  12.  2
      140         86       3.0   690    531.0    1600  1  2
 2
'11C.AM_NB.Arr Q1RTLn'    'AG'    36.    -30.     36. -1000.  0.  12.  1
      140         66       3.0   443    531.0    1600  1  2
 2
'12A.AM_SB.Arr Q1LTLn'    'AG'    48.     30.     48.  1000.  0.  12.  1
      140         86       3.0   172    531.0    1600  1  2
 2
'12B.AM_SB.Arr Q3_Lns'    'AG'    36.     30.     36.  1000.  0.  12.  3
      140         51       3.0   633    531.0    1600  1  2
 2
'13A.Ena_EB.Arr Q1_Ln'    'AG'   -48.     -5.  -1000.    -5.  0.  10.  1
      140        104       3.0   197    531.0    1600  1  2
 2
'14A.Kal_WB.ArrQ2LTLn'    'AG'    48.      0.   1000.     0.  0.  10.  2
      140         98       3.0   712    531.0    1600  1  2
 2
'14B.Kal_WB.ArrQ1RTLn'    'AG'    48.     20.   1000.    20.  0.  10.  1
      140         78       3.0   116    531.0    1600  1  2
 2
'14C.Kal_WB.Arr Q1_Ln'    'AG'    48.     10.   1000.    10.  0.  10.  1
      140         98       3.0   146    531.0    1600  1  2
 1.0 00. 4 1000. 0.  'Y' 10  0 36
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INPUT FILE: AM_EXPRP.DAT

```
'HHV CO EMISSIONS MODELING - PROPOSED' 60. 321.  0. 0.  16  0.3048 1 1
'R1  (NE CORNER 1_FL)'       60       50      6
'R2  (NE CORNER 2_FL)'       60       50      21
'R3  (SE CORNER 1_FL)'       60      -50      6
'R4  (SE CORNER 2_FL)'       60      -50      21
'R5  (NW CORNER 1_FL)'      -60       50      6
'R6  (NW CORNER 2_FL)'      -60       50      21
'R7  (SW CORNER 1_FL)'      -60      -50      6
'R8  (SW CORNER 2_FL)'      -60      -50      21
'R9  (NE 150 FT 1_FL)'      150      150      6
'R10(NE 150 FT 2_FL)'       150      150      21
'R11(SE 150 FT 1_FL)'       150     -150      6
'R12(SE 150 FT 2_FL)'       150     -150      21
'R13(NW 150 FT 1_FL)'      -150      150      6
'R14(NW 150 FT 2_FL)'      -150      150      21
'R15(SW 150 FT 1_FL)'      -150     -150      6
'R16(SW 150 FT 2_FL)'      -150     -150      21
'ALA MOANA AND ENA/KALIA INTERSECTION'      22  1  1  'C'
  1
'1A.AM_NB.Arr 1LTLn  '   'AG'    0. -1000.     0.   -30.   19.  19.4  0. 32.
  1
'1B.AM_NB.Arr 2_Lns  '   'AG'   12. -1000.    12.   -30.  692.  19.4  0. 44.
  17
'1C.AM_NB.Arr 1RTLn  '   'AG'   36. -1000.    36.   -30.  457.  19.4  0. 34.
  1
'2A.AM_NB.Dep 3_Lns  '   'AG'    0.   -30.     0.  1000.  692.  19.4  0. 58.
  1
'3A.AM_SB.Arr 1LTLn  '   'AG'   48.  1000.    48.    30.  177.  19.4  0. 32.
  1
'3B.AM_SB.Arr 3_Lns  '   'AG'   36.  1000.    36.    30.  636.  19.4  0. 56.
  1
'4A.AM_SB.Dep 4_Lns  '   'AG'    0.    30.     0. -1000. 1424.  19.4  0. 68.
  1
'5A.Ena_EB.Arr 1_ln  '   'AG' -1000.   -5.   -48.    -5.  200.  25.7  0. 30.
  1
'6A.Ena_EB.Dep 2_Lns '   'AG'  -48.    -5.  1000.    -5.  150.  25.7  0. 40.
  1
'7A.Kal_WB.Arr 1LTLn '   'AG'  1000.    0.    48.     0.  720.  25.7  0. 30.
  1
'7B.Kal_WB.Arr 1RTLn '   'AG'  1000.   20.    48.    20.  120.  25.7  0. 30.
  1
'7C.Kal_WB.Arr 1_Ln  '   'AG'  1000.   10.    48.    10.  154.  25.7  0. 30.
  1
'8A.Kal_WB.Dep 1_Ln  '   'AG'   48.     0.  -1000.    0.  149.  25.7  0. 30.
  2
'11A.AM_NB.Arr Q1LTLn'   'AG'    0.   -30.     0. -1000.  0.  12.  1
       140        86      3.0   19    531.0   1600  1  2
  2
'11B.AM_NB.Arr Q2_Lns'   'AG'   12.   -30.    12. -1000.  0.  12.  2
       140        86      3.0   692   531.0   1600  1  2
  2
'11C.AM_NB.Arr Q1RTLn'   'AG'   36.   -30.    36. -1000.  0.  12.  1
       140        66      3.0   457   531.0   1600  1  2
  2
'12A.AM_SB.Arr Q1LTLn'   'AG'   48.    30.    48.  1000.  0.  12.  1
       140        86      3.0   177   531.0   1600  1  2
  2
'12B.AM_SB.Arr Q3_Lns'   'AG'   36.    30.    36.  1000.  0.  12.  3
       140        51      3.0   636   531.0   1600  1  2
  2
'13A.Ena_EB.Arr Q1_Ln'   'AG'  -48.    -5.  -1000.   -5.  0.  10.  1
       140       104      3.0   200   531.0   1600  1  2
  2
'14A.Kal_WB.ArrQ1LTLn'   'AG'   48.     0.   1000.    0.  0.  10.  2
       140        98      3.0   720   531.0   1600  1  2
  2
'14B.Kal_WB.ArrQ1RTLn'   'AG'   48.    20.   1000.   20.  0.  10.  1
       140        78      3.0   120   531.0   1600  1  2
  2
'14C.Kal_WB.Arr Q1_Ln'   'AG'   48.    10.   1000.   10.  0.  10.  1
       140        98      3.0   154   531.0   1600  1  2
1.0 00. 4 1000. 0.  'Y' 10  0 36
```

INPUT FILE: AM_EKS3.DAT

```
'HHV CO EMISSIONS MODELING - WORST' 60. 321.  0. 0.  16  0.3048 1 1
'R1  (NE CORNER 1_FL)'        60      50      6
'R2  (NE CORNER 2_FL)'        60      50      21
'R3  (SE CORNER 1_FL)'        60     -50      6
'R4  (SE CORNER 2_FL)'        60     -50      21
'R5  (NW CORNER 1_FL)'       -60      50      6
'R6  (NW CORNER 2_FL)'       -60      50      21
'R7  (SW CORNER 1_FL)'       -60     -50      6
'R8  (SW CORNER 2_FL)'       -60     -50      21
'R9  (NE 150 FT 1_FL)'       150     150      6
'R10(NE 150 FT 2_FL)'        150     150      21
'R11(SE 150 FT 1_FL)'        150    -150      6
'R12(SE 150 FT 2_FL)'        150    -150      21
'R13(NW 150 FT 1_FL)'       -150     150      6
'R14(NW 150 FT 2_FL)'       -150     150      21
'R15(SW 150 FT 1_FL)'       -150    -150      6
'R16(SW 150 FT 2_FL)'       -150    -150      21
'ALA MOANA AND ENA/KALIA INTERSECTION'      22  1  1  'C'
 1
'1A.AM_NB.Arr 1LTLn  '  'AG'     0. -1000.     0.   -30.   19.  19.4  0. 32.
 1
'1B.AM_NB.Arr 2_Lns  '  'AG'    12. -1000.    12.   -30.  692.  19.4  0. 44.
 1
'1C.AM_NB.Arr 1RTLn  '  'AG'    36. -1000.    36.   -30.  457.  19.4  0. 34.
 1
'2A.AM_NB.Dep 3_Lns  '  'AG'     0.   -30.     0.  1000.  692.  19.4  0. 58.
 1
'3A.AM_SB.Arr 1LTLn  '  'AG'    48.  1000.    48.    30.  177.  19.4  0. 32.
 1
'3B.AM_SB.Arr 3_Lns  '  'AG'    36.  1000.    36.    30.  636.  19.4  0. 56.
 1
'4A.AM_SB.Dep 4_Lns  '  'AG'     0.    30.     0. -1000. 1424.  19.4  0. 68.
 1
'5A.Ena_EB.Arr 1_ln  '  'AG' -1000.    -5.   -48.    -5.  200.  25.7  0. 30.
 1
'6A.Ena_EB.Dep 2_Lns '  'AG'   -48.    -5.  1000.    -5.  150.  25.7  0. 40.
 1
'7A.Kal_WB.Arr 1LTLn '  'AG'  1000.     0.    48.     0.  720.  25.7  0. 30.
 1
'7B.Kal_WB.Arr 1RTLn '  'AG'  1000.    20.    48.    20.  120.  25.7  0. 30.
 1
'7C.Kal_WB.Arr 1_Ln  '  'AG'  1000.    10.    48.    10.  154.  25.7  0. 30.
 1
'8A.Kal_WB.Dep 1_Ln  '  'AG'    48.     0. -1000.     0.  149.  25.7  0. 30.
 2
'11A.AM_NB.Arr Q1LTLn'  'AG'     0.   -30.     0. -1000.  0.  12.  1
       140        86      3.0    19    531.0    1600  1  1
 2
'11B.AM_NB.Arr Q2_Lns'  'AG'    12.   -30.    12. -1000.  0.  12.  2
       140        86      3.0   692    531.0    1600  1  1
 2
'11C.AM_NB.Arr Q1RTLn'  'AG'    36.   -30.    36. -1000.  0.  12.  1
       140        66      3.0   457    531.0    1600  1  1
 2
'12A.AM_SB.Arr Q1LTLn'  'AG'    48.    30.    48.  1000.  0.  12.  1
       140        86      3.0   177    531.0    1600  1  1
 2
'12B.AM_SB.Arr Q3_Lns'  'AG'    36.    30.    36.  1000.  0.  12.  3
       140        51      3.0   636    531.0    1600  1  1
 2
'13A.Ena_EB.Arr Q1_Ln'  'AG'   -48.    -5. -1000.    -5.  0.  10.  1
       140       104      3.0   200    531.0    1600  1  1
 2
'14A.Kal_WB.ArrQ1LTLn'  'AG'    48.     0.  1000.     0.  0.  10.  2
       140        98      3.0   720    531.0    1600  1  1
 2
'14B.Kal_WB.ArrQ1RTLn'  'AG'    48.    20.  1000.    20.  0.  10.  1
       140        78      3.0   120    531.0    1600  1  1
 2
'14C.Kal_WB.Arr Q1_Ln'  'AG'    48.    10.  1000.    10.  0.  10.  1
       140        98      3.0   154    531.0    1600  1  1
 1.0 00. 4 1000. 0.  'Y' 10  0 36
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221

PAGE 1

JOB: HHV CO EMISSIONS MODELING - EXISTING

RUN: ALA MOANA AND ENA/KALIA INTERSECTION EX

DATE : 10/ 9/ 1
TIME : 13:33:48

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 321. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = .0 PPM

LINK VARIABLES

	LINK DESCRIPTION	X1	Y1	X2	Y2	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1.	1A.AM_NB.Arr 1LTLn	.0	-1000.0	.0	-30.0	970.	360.	AG	19.	19.4	.0	32.0		
2.	1B.AM_NB.Arr 2_Lns	12.0	-1000.0	12.0	-30.0	970.	360.	AG	690.	19.4	.0	44.0		
3.	1C.AM_NB.Arr 1RTLn	36.0	-1000.0	36.0	-30.0	970.	360.	AG	443.	19.4	.0	34.0		
4.	2A.AM_NB.Dep 3_Lns	.0	-30.0	.0	1000.0	1030.	360.	AG	690.	19.4	.0	58.0		
5.	3A.AM_SB.Arr 1LTLn	48.0	1000.0	48.0	30.0	970.	180.	AG	172.	19.4	.0	32.0		
6.	3B.AM_SB.Arr 3_Lns	36.0	1000.0	36.0	30.0	970.	180.	AG	633.	19.4	.0	56.0		
7.	4A.AM_SB.Dep 4_Lns	.0	30.0	.0	-1000.0	1030.	180.	AG	1413.	19.4	.0	68.0		
8.	5A.Ena_EB.Arr 1_ln	-1000.0	-5.0	-48.0	-5.0	952.	90.	AG	197.	25.7	.0	30.0		
9.	6A.Ena_EB.Dep 2_Lns	-48.0	-5.0	1000.0	-5.0	1048.	90.	AG	146.	25.7	.0	40.0		
10.	7A.Kal_WB.Arr 2LTLn	1000.0	.0	48.0	.0	952.	270.	AG	712.	25.7	.0	30.0		
11.	7B.Kal_WB.Arr 1RTLn	1000.0	20.0	48.0	20.0	952.	270.	AG	116.	25.7	.0	30.0		
12.	7C.Kal_WB.Arr 1_Ln	1000.0	10.0	48.0	10.0	952.	270.	AG	146.	25.7	.0	30.0		
13.	8A.Kal_WB.Dep 1_Ln	48.0	.0	-1000.0	.0	1048.	270.	AG	146.	25.7	.0	30.0		
14.	11A.AM_NB.Arr Q1LTLn	.0	-30.0	.0	-38.9	9.	180.	AG	875.	100.0	.0	12.0	.03	.5
15.	11B.AM_NB.Arr Q2_Lns	12.0	-30.0	12.0	-194.3	164.	180.	AG	1750.	100.0	.0	12.0	.62	8.3
16.	11C.AM_NB.Arr Q1RTLn	36.0	-30.0	36.0	-189.9	160.	180.	AG	671.	100.0	.0	12.0	.56	8.1
17.	12A.AM_SB.Arr Q1LTLn	48.0	30.0	48.0	110.9	81.	360.	AG	875.	100.0	.0	12.0	.31	4.1
18.	12B.AM_SB.Arr Q3_Lns	36.0	30.0	36.0	88.8	59.	360.	AG	1557.	100.0	.0	12.0	.22	3.0
19.	13A.Ena_EB.Arr Q1_Ln	-48.0	-5.0	-171.6	-5.0	124.	270.	AG	1058.	100.0	.0	10.0	.56	6.3
20.	14A.Kal_WB.ArrQ2LTLn	48.0	.0	277.5	.0	229.	90.	AG	1994.	100.0	.0	10.0	.84	11.7
21.	14B.Kal_WB.ArrQ1RTLn	48.0	20.0	97.5	20.0	49.	90.	AG	794.	100.0	.0	10.0	.18	2.5
22.	14C.Kal_WB.Arr Q1_Ln	48.0	10.0	128.2	10.0	80.	90.	AG	997.	100.0	.0	10.0	.35	4.1

PAGE 2

JOB: HHV CO EMISSIONS MODELING - EXISTING RUN: ALA MOANA AND ENA/KALIA INTERSECTION EX

DATE : 10/ 9/ 1
TIME : 13:33:48

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
14. 11A.AM_NB.Arr Q1LTLn*	140	86	3.0	19	1600	531.00	1	2
15. 11B.AM_NB.Arr Q2_Lns*	140	86	3.0	690	1600	531.00	1	2
16. 11C.AM_NB.Arr Q1RTLn*	140	66	3.0	443	1600	531.00	1	2
17. 12A.AM_SB.Arr Q1LTLn*	140	86	3.0	172	1600	531.00	1	2
18. 12B.AM_SB.Arr Q3_Lns*	140	51	3.0	633	1600	531.00	1	2
19. 13A.Ena_EB.Arr Q1_Ln*	140	104	3.0	197	1600	531.00	1	2
20. 14A.Kal_WB.ArrQ2LTLn*	140	98	3.0	712	1600	531.00	1	2
21. 14B.Kal_WB.ArrQ1RTLn*	140	78	3.0	116	1600	531.00	1	2
22. 14C.Kal_WB.Arr Q1_Ln*	140	98	3.0	146	1600	531.00	1	2

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. R1 (NE CORNER 1_FL)	60.0	50.0	6.0
2. R2 (NE CORNER 2_FL)	60.0	50.0	21.0
3. R3 (SE CORNER 1_FL)	60.0	-50.0	6.0
4. R4 (SE CORNER 2_FL)	60.0	-50.0	21.0
5. R5 (NW CORNER 1_FL)	-60.0	50.0	6.0
6. R6 (NW CORNER 2_FL)	-60.0	50.0	21.0
7. R7 (SW CORNER 1_FL)	-60.0	-50.0	6.0
8. R8 (SW CORNER 2_FL)	-60.0	-50.0	21.0
9. R9 (NE 150 FT 1_FL)	150.0	150.0	6.0
10. R10(NE 150 FT 2_FL)	150.0	150.0	21.0
11. R11(SE 150 FT 1_FL)	150.0	-150.0	6.0
12. R12(SE 150 FT 2_FL)	150.0	-150.0	21.0
13. R13(NW 150 FT 1_FL)	-150.0	150.0	6.0
14. R14(NW 150 FT 2_FL)	-150.0	150.0	21.0
15. R15(SW 150 FT 1_FL)	-150.0	-150.0	6.0
16. R16(SW 150 FT 2_FL)	-150.0	-150.0	21.0

JOB: HHV CO EMISSIONS MODELING - EXISTING

RUN: ALA MOANA AND ENA/KALIA INTERSECTION EX

PAGE 3

MODEL RESULTS
WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
		CONCENTRATION (ug/m**3)															
0.	*	2.6	1.6	5.7	4.9	.3	.3	1.6	1.2	.2	.1	2.1	1.9	.1	.0	.6	.6
10.	*	1.4	.8	5.6	4.5	.5	.5	1.8	1.3	.0	.0	1.6	1.5	.2	.2	.8	.8
20.	*	.6	.3	5.0	4.1	.6	.5	2.1	1.3	.0	.0	1.4	1.4	.3	.3	1.1	1.1
30.	*	.2	.0	4.7	3.6	.6	.5	2.1	1.7	.0	.0	1.2	1.2	.3	.3	1.4	1.3
40.	*	.1	.0	4.6	3.8	.7	.5	2.7	2.0	.0	.0	.9	.9	.3	.3	1.8	1.8
50.	*	.1	.0	4.3	3.6	.9	.8	3.2	2.8	.0	.0	.6	.6	.3	.2	2.5	2.4
60.	*	.0	.0	3.9	3.5	1.4	1.0	4.1	3.4	.0	.0	.3	.3	.3	.2	2.8	2.8
70.	*	.0	.0	3.4	3.1	1.9	1.6	5.1	4.4	.0	.0	.2	.2	.2	.2	2.9	2.8
80.	*	.4	.3	2.4	2.2	2.8	2.4	5.2	4.5	.0	.0	.1	.1	.3	.2	2.6	2.4
90.	*	1.5	1.4	1.2	1.2	4.2	3.8	4.8	4.0	.1	.1	.1	.1	.7	.6	2.0	1.9
100.	*	2.7	2.6	.4	.3	4.8	4.3	3.9	3.1	.1	.1	.0	.0	1.4	1.3	1.4	1.4
110.	*	4.1	3.6	.0	.0	4.5	4.1	3.5	2.8	.2	.2	.0	.0	2.1	2.1	1.0	1.0
120.	*	5.0	4.4	.0	.0	3.5	3.2	3.5	3.0	.3	.3	.0	.0	2.3	2.2	.7	.7
130.	*	5.6	4.7	.0	.0	3.1	2.6	3.6	2.9	.6	.6	.0	.0	2.1	2.1	.6	.5
140.	*	5.9	4.7	.0	.0	3.2	2.7	3.4	2.8	.9	.9	.0	.0	2.1	2.1	.7	.5
150.	*	5.9	4.4	.0	.0	3.6	3.1	2.9	2.4	1.2	1.2	.0	.0	1.9	1.8	.7	.5
160.	*	6.1	4.6	.3	.1	3.7	2.9	2.2	1.9	1.4	1.3	.0	.0	1.7	1.6	.5	.5
170.	*	6.8	5.0	.9	.8	3.2	2.6	1.5	1.2	1.6	1.5	.0	.0	1.3	1.2	.3	.3
180.	*	7.8	5.9	2.2	1.8	2.5	2.0	.9	.8	2.2	2.1	.2	.2	.7	.6	.1	.1
190.	*	8.3	6.0	3.8	3.2	1.7	1.4	.3	.3	2.8	2.7	.4	.4	.3	.3	.0	.0
200.	*	7.9	5.5	4.9	3.9	1.5	1.2	.1	.0	3.6	3.4	.6	.6	.1	.1	.0	.0
210.	*	7.4	4.4	5.6	4.3	1.5	1.2	.0	.0	3.5	3.4	.7	.6	.0	.0	.0	.0
220.	*	6.5	3.5	5.6	4.1	1.5	1.3	.0	.0	3.4	3.4	.7	.6	.1	.0	.0	.0
230.	*	6.4	3.0	5.4	3.8	1.4	1.2	.0	.0	2.4	2.4	.8	.6	.1	.0	.0	.0
240.	*	6.7	3.2	5.2	3.6	1.1	1.0	.0	.0	1.8	1.7	1.0	.9	.1	.1	.0	.0
250.	*	7.3	3.4	5.0	3.3	.8	.7	.0	.0	1.3	1.0	1.4	1.2	.1	.0	.0	.0
260.	*	7.4	3.1	5.2	3.4	.5	.4	.0	.0	.9	.6	1.8	1.7	.0	.0	.0	.0
270.	*	7.2	2.9	5.5	3.6	.3	.3	.4	.4	.5	.3	2.1	1.9	.0	.0	.0	.0
280.	*	6.8	2.8	5.3	3.6	.0	.0	.7	.6	.4	.2	2.3	2.2	.0	.0	.0	.0
290.	*	6.7	2.9	4.9	3.2	.0	.0	1.1	1.0	.3	.2	2.5	2.3	.0	.0	.0	.0
300.	*	6.6	3.0	3.8	2.2	.0	.0	1.4	1.3	.4	.2	2.3	2.3	.0	.0	.1	.1
310.	*	6.5	3.2	2.8	1.8	.0	.0	1.7	1.4	.4	.2	2.4	2.3	.0	.0	.1	.1
320.	*	6.6	3.3	2.6	1.5	.0	.0	1.7	1.5	.4	.4	2.4	2.3	.0	.0	.1	.1
330.	*	6.2	3.3	3.0	2.0	.0	.0	1.7	1.3	.4	.4	2.5	2.5	.0	.0	.1	.0
340.	*	5.2	3.0	4.0	3.1	.0	.0	1.6	1.2	.4	.4	2.7	2.5	.0	.0	.1	.0
350.	*	4.0	2.4	5.2	4.3	.1	.1	1.6	1.2	.3	.2	2.3	2.2	.0	.0	.2	.1
360.	*	2.6	1.6	5.7	4.9	.3	.3	1.6	1.2	.2	.1	2.1	1.9	.1	.0	.3	.3
MAX	*	8.3	6.0	5.7	4.9	4.8	4.3	5.2	4.5	3.6	3.4	2.7	2.5	2.3	2.2	2.9	2.8
DEGR.	*	190	190	0	0	100	100	80	80	200	200	340	340	120	120	70	60

THE HIGHEST CONCENTRATION OF 8.30 PPM OCCURRED AT RECEPTOR REC1 .

JOB: HHV CO EMISSIONS MODELING - EXISTING RUN: ALA MOANA AND ENA/KALIA INTERSECTION EX

DATE : 10/ 9/ 1
TIME : 13:33:48

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM) * ANGLE (DEGREES)	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
LINK #	190	190	0	0	100	100	80	80	200	200	340	340	120	120	70	60
1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
2	.3	.3	.0	.0	.0	.0	.1	.1	.2	.1	.0	.0	.0	.0	.1	.1
3	.2	.2	.0	.0	.0	.0	.1	.0	.1	.1	.0	.0	.0	.0	.1	.0
4	.0	.0	.2	.2	.3	.1	.1	.1	.0	.0	.2	.2	.1	.1	.0	.0
5	.1	.0	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
6	.1	.0	.3	.3	.1	.1	.0	.0	.0	.0	.2	.1	.1	.1	.0	.0
7	.8	.6	.0	.0	.2	.1	.6	.3	.4	.4	.0	.0	.1	.1	.3	.3
8	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
9	.1	.0	.1	.0	.1	.1	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0
10	.2	.1	.3	.2	.3	.3	.3	.3	.1	.1	.1	.1	.1	.1	.2	.1
11	.1	.0	.0	.0	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
12	.1	.0	.0	.0	.1	.1	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0
13	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
14	.0	.0	.0	.0	.0	.0	.2	.2	.0	.0	.0	.0	.0	.0	.0	.0
15	1.5	1.4	.0	.0	.0	.0	1.2	1.0	.6	.6	.0	.0	.1	.1	1.0	.8
16	.7	.7	.0	.0	.0	.0	.3	.3	.3	.3	.0	.0	.1	.1	.3	.2
17	.7	.2	.7	.6	.4	.3	.0	.0	.1	.1	.2	.2	.2	.2	.0	.1
18	.1	.0	.7	.7	.7	.7	.0	.0	.1	.1	.3	.3	.4	.3	.0	.1
19	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
20	1.4	1.2	1.9	1.6	1.7	1.6	1.7	1.6	1.1	1.0	1.1	1.0	.8	.8	.8	.8
21	1.0	.6	.6	.5	.3	.3	.1	.1	.2	.2	.2	.2	.1	.1	.0	.1
22	.9	.7	.8	.7	.5	.5	.3	.3	.4	.4	.4	.4	.2	.2	.1	.2

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221

PAGE 1

JOB: HHV CO EMISSIONS MODELING - PROPOSED

RUN: ALA MOANA AND ENA/KALIA INTERSECTION

DATE : 10/ 9/ 1
TIME : 13:33:51

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S   VD = .0 CM/S   Z0 = 321. CM
U = 1.0 M/S   CLAS = 4 (D)   ATIM = 60. MINUTES   MIXH = 1000. M   AMB = .0 PPM

LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1. 1A.AM_NB.Arr 1LTLn	.0	-1000.0	.0	-30.0	970.	360.	AG	19.	19.4	.0	32.0		
2. 1B.AM_NB.Arr 2_Lns	12.0	-1000.0	12.0	-30.0	970.	360.	AG	692.	19.4	.0	44.0		
3. 1C.AM_NB.Arr 1RTLn	36.0	-1000.0	36.0	-30.0	970.	360.	AG	457.	19.4	.0	34.0		
4. 2A.AM_NB.Dep 3_Lns	.0	-30.0	.0	1000.0	1030.	360.	AG	692.	19.4	.0	58.0		
5. 3A.AM_SB.Arr 1LTLn	48.0	1000.0	48.0	30.0	970.	180.	AG	177.	19.4	.0	32.0		
6. 3B.AM_SB.Arr 3_Lns	36.0	1000.0	36.0	30.0	970.	180.	AG	636.	19.4	.0	56.0		
7. 4A.AM_SB.Dep 4_Lns	.0	30.0	.0	-1000.0	1030.	180.	AG	1424.	19.4	.0	68.0		
8. 5A.Ena_EB.Arr 1_ln	-1000.0	-5.0	-48.0	-5.0	952.	90.	AG	200.	25.7	.0	30.0		
9. 6A.Ena_EB.Dep 2_Lns	-48.0	-5.0	1000.0	-5.0	1048.	90.	AG	150.	25.7	.0	40.0		
10. 7A.Kal_WB.Arr 1LTLn	1000.0	.0	48.0	.0	952.	270.	AG	720.	25.7	.0	30.0		
11. 7B.Kal_WB.Arr 1RTLn	1000.0	20.0	48.0	20.0	952.	270.	AG	120.	25.7	.0	30.0		
12. 7C.Kal_WB.Arr 1_Ln	1000.0	10.0	48.0	10.0	952.	270.	AG	154.	25.7	.0	30.0		
13. 8A.Kal_WB.Dep 1_Ln	48.0	.0	-1000.0	.0	1048.	270.	AG	149.	25.7	.0	30.0		
14. 11A.AM_NB.Arr Q1LTLn	.0	-30.0	.0	-38.9	9.	180.	AG	875.	100.0	.0	12.0	.03	.5
15. 11B.AM_NB.Arr Q2_Lns	12.0	-30.0	12.0	-194.9	165.	180.	AG	1750.	100.0	.0	12.0	.62	8.4
16. 11C.AM_NB.Arr Q1RTLn	36.0	-30.0	36.0	-194.9	165.	180.	AG	671.	100.0	.0	12.0	.58	8.4
17. 12A.AM_SB.Arr Q1LTLn	48.0	30.0	48.0	113.2	83.	360.	AG	875.	100.0	.0	12.0	.32	4.2
18. 12B.AM_SB.Arr Q3_Lns	36.0	30.0	36.0	89.1	59.	360.	AG	1557.	100.0	.0	12.0	.22	3.0
19. 13A.Ena_EB.Arr Q1_Ln	-48.0	-5.0	-173.8	-5.0	126.	270.	AG	1058.	100.0	.0	10.0	.56	6.4
20. 14A.Kal_WB.ArrQ1LTLn	48.0	.0	282.7	.0	235.	90.	AG	1994.	100.0	.0	10.0	.85	11.9
21. 14B.Kal_WB.ArrQ1RTLn	48.0	20.0	99.2	20.0	51.	90.	AG	794.	100.0	.0	10.0	.18	2.6
22. 14C.Kal_WB.Arr Q1_Ln	48.0	10.0	132.9	10.0	85.	90.	AG	997.	100.0	.0	10.0	.36	4.3

JOB: HHV CO EMISSIONS MODELING - PROPOSED RUN: ALA MOANA AND ENA/KALIA INTERSECTION

DATE : 10/ 9/ 1
TIME : 13:33:51

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
14. 11A.AM_NB.Arr Q1LTLn	140	86	3.0	19	1600	531.00	1	2
15. 11B.AM_NB.Arr Q2_Lns	140	86	3.0	692	1600	531.00	1	2
16. 11C.AM_NB.Arr Q1RTLn	140	66	3.0	457	1600	531.00	1	2
17. 12A.AM_SB.Arr Q1LTLn	140	86	3.0	177	1600	531.00	1	2
18. 12B.AM_SB.Arr Q3_Lns	140	51	3.0	636	1600	531.00	1	2
19. 13A.Ena_EB.Arr Q1_Ln	140	104	3.0	200	1600	531.00	1	2
20. 14A.Kal_WB.ArrQ1LTLn	140	98	3.0	720	1600	531.00	1	2
21. 14B.Kal_WB.ArrQ1RTLn	140	78	3.0	120	1600	531.00	1	2
22. 14C.Kal_WB.Arr Q1_Ln	140	98	3.0	154	1600	531.00	1	2

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. R1 (NE CORNER 1_FL)	60.0	50.0	6.0
2. R2 (NE CORNER 2_FL)	60.0	50.0	21.0
3. R3 (SE CORNER 1_FL)	60.0	-50.0	6.0
4. R4 (SE CORNER 2_FL)	60.0	-50.0	21.0
5. R5 (NW CORNER 1_FL)	-60.0	50.0	6.0
6. R6 (NW CORNER 2_FL)	-60.0	50.0	21.0
7. R7 (SW CORNER 1_FL)	-60.0	-50.0	6.0
8. R8 (SW CORNER 2_FL)	-60.0	-50.0	21.0
9. R9 (NE 150 FT 1_FL)	150.0	150.0	6.0
10. R10 (NE 150 FT 2_FL)	150.0	150.0	21.0
11. R11 (SE 150 FT 1_FL)	150.0	-150.0	6.0
12. R12 (SE 150 FT 2_FL)	150.0	-150.0	21.0
13. R13 (NW 150 FT 1_FL)	-150.0	150.0	6.0
14. R14 (NW 150 FT 2_FL)	-150.0	150.0	21.0
15. R15 (SW 150 FT 1_FL)	-150.0	-150.0	6.0
16. R16 (SW 150 FT 2_FL)	-150.0	-150.0	21.0

JOB: HHV CO EMISSIONS MODELING - PROPOSED

RUN: ALA MOANA AND ENA/KALIA INTERSECTION

MODEL RESULTS
WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (ug/m**3) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
0.	2.7	1.7	5.7	4.9	.3	.3	1.6	1.2	.2	.1	2.1	2.0	.1	.0	.6	.6
10.	1.5	.9	5.7	4.5	.5	.5	1.8	1.3	.0	.0	1.6	1.5	.2	.2	.8	.8
20.	.6	.3	5.1	4.1	.6	.5	2.0	1.4	.0	.0	1.4	1.4	.3	.3	1.1	1.1
30.	.2	.0	4.7	3.8	.6	.5	2.1	1.7	.0	.0	1.3	1.2	.3	.3	1.4	1.3
40.	.1	.0	4.6	3.9	.7	.5	2.7	2.2	.0	.0	1.0	.9	.3	.3	1.8	1.8
50.	.1	.0	4.4	3.8	.9	.8	3.2	2.9	.0	.0	.6	.6	.3	.2	2.6	2.4
60.	.0	.0	4.0	3.6	1.4	1.1	4.2	3.4	.0	.0	.3	.3	.3	.2	2.8	2.8
70.	.0	.0	3.5	3.1	1.9	1.6	5.1	4.5	.0	.0	.2	.2	.2	.2	3.0	2.9
80.	.4	.3	2.4	2.3	2.8	2.4	5.5	4.5	.0	.0	.1	.1	.3	.2	2.6	2.5
90.	1.6	1.5	1.3	1.2	4.2	3.8	4.9	4.0	.1	.1	.1	.1	.7	.6	2.0	1.9
100.	2.8	2.6	.4	.3	4.9	4.3	3.9	3.1	.1	.1	.0	.0	1.4	1.3	1.4	1.4
110.	4.2	3.7	.0	.0	4.5	4.1	3.5	2.8	.2	.2	.0	.0	2.2	2.1	1.0	1.0
120.	5.1	4.5	.0	.0	3.6	3.2	3.5	3.0	.3	.3	.0	.0	2.3	2.2	.8	.8
130.	5.8	4.8	.0	.0	3.1	2.7	3.6	2.9	.6	.6	.0	.0	2.1	2.1	.6	.5
140.	5.9	4.7	.0	.0	3.2	2.8	3.4	2.8	1.0	.9	.0	.0	2.1	2.1	.7	.5
150.	6.0	4.6	.0	.0	3.6	3.1	2.9	2.5	1.3	1.2	.0	.0	1.9	1.8	.7	.5
160.	6.1	4.6	.3	.1	3.8	3.0	2.2	1.9	1.4	1.4	.0	.0	1.7	1.7	.6	.5
170.	6.8	5.0	.9	.8	3.2	2.6	1.5	1.2	1.6	1.5	.0	.0	1.3	1.2	.3	.3
180.	7.8	5.9	2.2	1.8	2.5	2.1	.9	.8	2.2	2.1	.2	.2	.7	.7	.1	.1
190.	8.5	6.0	3.8	3.2	1.7	1.4	.3	.3	2.9	2.7	.4	.4	.3	.3	.0	.0
200.	8.0	5.5	4.9	3.9	1.5	1.2	.1	.0	3.7	3.4	.7	.6	.2	.1	.0	.0
210.	7.4	4.4	5.7	4.4	1.5	1.2	.0	.0	3.5	3.4	.7	.6	.1	.0	.0	.0
220.	6.5	3.5	5.6	4.1	1.5	1.3	.0	.0	3.4	3.4	.7	.6	.1	.0	.0	.0
230.	6.4	3.0	5.4	3.8	1.4	1.3	.0	.0	2.4	2.4	.8	.7	.1	.1	.0	.0
240.	6.7	3.2	5.2	3.6	1.2	1.1	.0	.0	1.9	1.7	1.1	1.0	.1	.1	.0	.0
250.	7.3	3.4	5.0	3.3	.8	.7	.0	.0	1.3	1.0	1.4	1.3	.1	.0	.0	.0
260.	7.5	3.1	5.2	3.4	.5	.5	.0	.0	.9	.6	1.8	1.7	.0	.0	.0	.0
270.	7.2	2.9	5.5	3.6	.3	.3	.4	.4	.5	.3	2.1	2.0	.0	.0	.0	.0
280.	6.8	2.8	5.4	3.7	.0	.0	.7	.6	.4	.2	2.3	2.2	.0	.0	.0	.0
290.	6.7	2.9	4.9	3.2	.0	.0	1.1	1.0	.3	.2	2.6	2.3	.0	.0	.1	.1
300.	6.6	3.0	3.8	2.2	.0	.0	1.5	1.3	.4	.2	2.3	2.3	.0	.0	.1	.1
310.	6.5	3.2	2.8	1.8	.0	.0	1.7	1.5	.4	.2	2.4	2.3	.0	.0	.1	.1
320.	6.7	3.3	2.7	1.5	.0	.0	1.7	1.5	.4	.4	2.4	2.3	.0	.0	.1	.0
330.	6.2	3.3	3.1	2.0	.0	.0	1.7	1.3	.5	.4	2.5	2.5	.0	.0	.2	.1
340.	5.2	3.0	4.0	3.2	.0	.0	1.6	1.2	.5	.4	2.7	2.5	.0	.0	.2	.2
350.	4.1	2.5	5.2	4.3	.1	.1	1.6	1.2	.3	.2	2.3	2.2	.0	.0	.3	.3
360.	2.7	1.7	5.7	4.9	.3	.3	1.6	1.2	.2	.1	2.1	2.0	.1	.0	.6	.6
MAX	8.5	6.0	5.7	4.9	4.9	4.3	5.5	4.5	3.7	3.4	2.7	2.5	2.3	2.2	3.0	2.9
DEGR.	190	190	0	0	100	100	80	70	200	200	340	340	120	120	70	70

THE HIGHEST CONCENTRATION OF 8.50 PPM OCCURRED AT RECEPTOR REC1 .

JOB: HHV CO EMISSIONS MODELING - PROPOSED RUN: ALA MOANA AND ENA/KALIA INTERSECTION

DATE : 10/ 9/ 1
TIME : 13:33:51

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM) * ANGLE (DEGREES)	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
LINK #	190	190	0	0	100	100	80	70	200	200	340	340	120	120	70	70
1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
2	.3	.3	.0	.0	.0	.0	.1	.1	.2	.1	.0	.0	.0	.0	.1	.1
3	.2	.2	.0	.0	.0	.0	.1	.0	.1	.1	.0	.0	.0	.0	.1	.1
4	.0	.0	.2	.2	.3	.1	.1	.1	.0	.0	.2	.2	.1	.1	.0	.0
5	.1	.0	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
6	.2	.0	.3	.3	.1	.1	.0	.0	.0	.0	.2	.1	.1	.1	.0	.0
7	.8	.6	.0	.0	.2	.1	.6	.3	.4	.4	.0	.0	.1	.1	.3	.3
8	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
9	.1	.0	.1	.0	.1	.1	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0
10	.2	.1	.3	.2	.4	.3	.4	.3	.1	.1	.1	.1	.1	.1	.2	.2
11	.1	.0	.0	.0	.1	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0
12	.1	.0	.0	.0	.1	.1	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0
13	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
14	.0	.0	.0	.0	.0	.0	.2	.2	.0	.0	.0	.0	.0	.0	.0	.0
15	1.5	1.4	.0	.0	.0	.0	1.2	.6	.6	.6	.0	.0	.1	.1	1.0	1.0
16	.8	.7	.0	.0	.0	.0	.3	.2	.3	.3	.0	.0	.1	.1	.3	.3
17	.7	.2	.7	.6	.4	.3	.0	.1	.1	.1	.2	.2	.2	.2	.0	.0
18	.1	.0	.7	.7	.7	.7	.0	.1	.1	.1	.3	.3	.4	.3	.0	.0
19	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
20	1.4	1.2	1.9	1.6	1.7	1.6	1.7	1.6	1.1	1.0	1.1	1.0	.8	.8	.8	.8
21	1.0	.6	.6	.5	.3	.3	.1	.2	.2	.2	.2	.2	.1	.1	.1	.0
22	.9	.7	.8	.7	.5	.5	.4	.5	.5	.4	.4	.4	.2	.2	.1	.1

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221

PAGE 1

JOB: HHV CO EMISSIONS MODELING - PROPOSED

RUN: ALA MOANA AND ENA/KALIA INTERSECTION

DATE : 10/ 9/ 1
TIME : 13:33:52

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S   VD = .0 CM/S   Z0 = 321. CM
U = 1.0 M/S   CLAS = 4 (D)   ATIM = 60. MINUTES   MIXH = 1000. M   AMB = .0 PPM

LINK VARIABLES

	LINK DESCRIPTION	X1	Y1	X2	Y2	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1.	1A.AM_NB.Arr 1LTLn	.0	-1000.0	.0	-30.0	970.	360.	AG	19.	19.4	.0	32.0		
2.	1B.AM_NB.Arr 2_Lns	12.0	-1000.0	12.0	-30.0	970.	360.	AG	692.	19.4	.0	44.0		
3.	1C.AM_NB.Arr 1RTLn	36.0	-1000.0	36.0	-30.0	970.	360.	AG	457.	19.4	.0	34.0		
4.	2A.AM_NB.Dep 3_Lns	.0	-30.0	.0	1000.0	1030.	360.	AG	692.	19.4	.0	58.0		
5.	3A.AM_SB.Arr 1LTLn	48.0	1000.0	48.0	30.0	970.	180.	AG	177.	19.4	.0	32.0		
6.	3B.AM_SB.Arr 3_Lns	36.0	1000.0	36.0	30.0	970.	180.	AG	636.	19.4	.0	56.0		
7.	4A.AM_SB.Dep 4_Lns	.0	30.0	.0	-1000.0	1030.	180.	AG	1424.	19.4	.0	68.0		
8.	5A.Ena_EB.Arr 1_ln	-1000.0	-5.0	-48.0	-5.0	952.	90.	AG	200.	25.7	.0	30.0		
9.	6A.Ena_EB.Dep 2_Lns	-48.0	-5.0	1000.0	-5.0	1048.	90.	AG	150.	25.7	.0	40.0		
10.	7A.Kal_WB.Arr 1LTLn	1000.0	.0	48.0	.0	952.	270.	AG	720.	25.7	.0	30.0		
11.	7B.Kal_WB.Arr 1RTLn	1000.0	20.0	48.0	20.0	952.	270.	AG	120.	25.7	.0	30.0		
12.	7C.Kal_WB.Arr 1_Ln	1000.0	10.0	48.0	10.0	952.	270.	AG	154.	25.7	.0	30.0		
13.	8A.Kal_WB.Dep 1_Ln	48.0	.0	-1000.0	.0	1048.	270.	AG	149.	25.7	.0	30.0		
14.	11A.AM_NB.Arr Q1LTLn	.0	-30.0	.0	-39.5	10.	180.	AG	875.	100.0	.0	12.0	.03	.5
15.	11B.AM_NB.Arr Q2_Lns	12.0	-30.0	12.0	-214.1	184.	180.	AG	1750.	100.0	.0	12.0	.62	9.4
16.	11C.AM_NB.Arr Q1RTLn	36.0	-30.0	36.0	-219.8	190.	180.	AG	671.	100.0	.0	12.0	.58	9.6
17.	12A.AM_SB.Arr Q1LTLn	48.0	30.0	48.0	125.1	95.	360.	AG	875.	100.0	.0	12.0	.32	4.8
18.	12B.AM_SB.Arr Q3_Lns	36.0	30.0	36.0	89.1	59.	360.	AG	1557.	100.0	.0	12.0	.22	3.0
19.	13A.Ena_EB.Arr Q1_Ln	-48.0	-5.0	-199.3	-5.0	151.	270.	AG	1058.	100.0	.0	10.0	.56	7.7
20.	14A.Kal_WB.ArrQ1LTLn	48.0	.0	308.5	.0	260.	90.	AG	1994.	100.0	.0	10.0	.85	13.2
21.	14B.Kal_WB.ArrQ1RTLn	48.0	20.0	102.0	20.0	54.	90.	AG	794.	100.0	.0	10.0	.18	2.7
22.	14C.Kal_WB.Arr Q1_Ln	48.0	10.0	149.0	10.0	101.	90.	AG	997.	100.0	.0	10.0	.36	5.1

JOB: HHV CO EMISSIONS MODELING - PROPOSED RUN: ALA MOANA AND ENA/KALIA INTERSECTION

DATE : 10/ 9/ 1
TIME : 13:33:52

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
14. 11A.AM_NB.Arr Q1LTLn	140	86	3.0	19	1600	531.00	1	1
15. 11B.AM_NB.Arr Q2_Lns	140	86	3.0	692	1600	531.00	1	1
16. 11C.AM_NB.Arr Q1RTLn	140	66	3.0	457	1600	531.00	1	1
17. 12A.AM_SB.Arr Q1LTLn	140	86	3.0	177	1600	531.00	1	1
18. 12B.AM_SB.Arr Q3_Lns	140	51	3.0	636	1600	531.00	1	1
19. 13A.Ena_EB.Arr Q1_Ln	140	104	3.0	200	1600	531.00	1	1
20. 14A.Kal_WB.ArrQ1LTLn	140	98	3.0	720	1600	531.00	1	1
21. 14B.Kal_WB.ArrQ1RTLn	140	78	3.0	120	1600	531.00	1	1
22. 14C.Kal_WB.Arr Q1_Ln	140	98	3.0	154	1600	531.00	1	1

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. R1 (NE CORNER 1_FL)	60.0	50.0	6.0
2. R2 (NE CORNER 2_FL)	60.0	50.0	21.0
3. R3 (SE CORNER 1_FL)	60.0	-50.0	6.0
4. R4 (SE CORNER 2_FL)	60.0	-50.0	21.0
5. R5 (NW CORNER 1_FL)	-60.0	50.0	6.0
6. R6 (NW CORNER 2_FL)	-60.0	50.0	21.0
7. R7 (SW CORNER 1_FL)	-60.0	-50.0	6.0
8. R8 (SW CORNER 2_FL)	-60.0	-50.0	21.0
9. R9 (NE 150 FT 1_FL)	150.0	150.0	6.0
10. R10 (NE 150 FT 2_FL)	150.0	150.0	21.0
11. R11 (SE 150 FT 1_FL)	150.0	-150.0	6.0
12. R12 (SE 150 FT 2_FL)	150.0	-150.0	21.0
13. R13 (NW 150 FT 1_FL)	-150.0	150.0	6.0
14. R14 (NW 150 FT 2_FL)	-150.0	150.0	21.0
15. R15 (SW 150 FT 1_FL)	-150.0	-150.0	6.0
16. R16 (SW 150 FT 2_FL)	-150.0	-150.0	21.0

JOB: HHV CO EMISSIONS MODELING - PROPOSED   RUN: ALA MOANA AND ENA/KALIA INTERSECTION   PAGE 3

MODEL RESULTS
WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (ug/m**3) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
0.	2.8	1.8	5.7	5.0	.3	.3	1.6	1.2	.2	.1	2.2	2.1	.1	.0	.7	.7
10.	1.6	1.0	5.7	4.7	.5	.5	1.9	1.4	.0	.0	1.7	1.5	.2	.2	.9	.8
20.	.6	.3	5.1	4.1	.6	.5	2.0	1.4	.0	.0	1.6	1.4	.3	.3	1.1	1.1
30.	.2	.0	4.8	3.9	.6	.5	2.2	1.7	.0	.0	1.4	1.3	.3	.3	1.4	1.3
40.	.1	.0	4.8	4.0	.7	.5	2.8	2.2	.0	.0	1.2	1.1	.3	.3	1.8	1.8
50.	.1	.0	4.5	3.9	1.0	.9	3.2	3.0	.0	.0	.8	.8	.3	.2	2.6	2.5
60.	.0	.0	4.3	3.9	1.5	1.1	4.4	3.5	.0	.0	.5	.5	.3	.2	2.9	2.9
70.	.1	.0	3.7	3.3	2.0	1.7	5.2	4.6	.0	.0	.3	.3	.2	.2	3.1	3.1
80.	.4	.4	2.7	2.6	3.0	2.7	5.6	4.7	.0	.0	.1	.1	.4	.3	2.8	2.8
90.	1.7	1.6	1.5	1.3	4.4	4.0	5.2	4.2	.1	.1	.1	.1	.9	.7	2.3	2.2
100.	3.1	2.9	.4	.4	5.1	4.4	4.1	3.3	.1	.1	.0	.0	1.6	1.5	1.7	1.7
110.	4.5	4.1	.1	.1	4.5	4.2	3.5	2.9	.3	.3	.0	.0	2.2	2.1	1.3	1.3
120.	5.5	4.9	.0	.0	3.7	3.3	3.5	3.0	.5	.5	.0	.0	2.6	2.3	.9	.9
130.	5.9	5.1	.0	.0	3.1	2.7	3.6	3.1	.8	.8	.0	.0	2.1	2.1	.6	.6
140.	6.1	4.9	.0	.0	3.3	2.9	3.5	3.0	1.2	1.1	.0	.0	2.1	2.1	.7	.5
150.	6.1	4.7	.0	.0	3.6	3.1	3.2	2.7	1.4	1.3	.0	.0	1.9	1.9	.7	.5
160.	6.1	4.6	.3	.1	3.9	3.1	2.4	2.2	1.6	1.5	.0	.0	1.9	1.7	.6	.5
170.	6.9	5.1	1.1	.8	3.3	2.6	1.7	1.4	1.7	1.6	.0	.0	1.4	1.4	.3	.3
180.	8.0	6.0	2.5	2.0	2.5	2.1	.9	.8	2.4	2.2	.2	.2	.8	.8	.1	.1
190.	8.6	6.2	4.1	3.4	1.7	1.4	.3	.3	3.1	2.8	.4	.4	.5	.4	.0	.0
200.	8.1	5.6	5.2	4.2	1.5	1.3	.1	.0	3.8	3.5	.7	.6	.3	.3	.0	.0
210.	7.5	4.5	5.8	4.6	1.5	1.2	.0	.0	3.8	3.4	.7	.6	.1	.1	.0	.0
220.	6.6	3.5	5.7	4.2	1.5	1.4	.0	.0	3.5	3.4	.9	.8	.1	.0	.0	.0
230.	6.4	3.0	5.4	3.9	1.5	1.4	.0	.0	2.6	2.5	1.0	.9	.1	.1	.0	.0
240.	6.8	3.2	5.2	3.6	1.3	1.2	.0	.0	2.0	1.8	1.4	1.3	.1	.1	.0	.0
250.	7.3	3.5	5.0	3.3	1.0	.9	.0	.0	1.5	1.3	1.7	1.7	.1	.0	.0	.0
260.	7.6	3.2	5.2	3.4	.6	.6	.1	.1	1.0	.7	2.1	2.0	.0	.0	.0	.0
270.	7.3	3.0	5.7	3.7	.3	.3	.5	.5	.6	.3	2.2	2.1	.0	.0	.0	.0
280.	6.8	2.8	5.4	3.8	.0	.0	.9	.8	.4	.2	2.5	2.3	.0	.0	.0	.0
290.	6.7	2.9	4.9	3.3	.0	.0	1.3	1.2	.3	.2	2.6	2.4	.0	.0	.1	.1
300.	6.6	3.0	3.8	2.3	.0	.0	1.6	1.4	.4	.2	2.3	2.3	.0	.0	.1	.1
310.	6.6	3.2	2.8	1.8	.0	.0	1.8	1.5	.4	.2	2.5	2.4	.0	.0	.1	.1
320.	6.7	3.4	2.7	1.5	.0	.0	1.7	1.5	.4	.4	2.5	2.4	.0	.0	.2	.1
330.	6.3	3.4	3.1	2.0	.0	.0	1.7	1.3	.5	.4	2.6	2.5	.0	.0	.3	.2
340.	5.4	3.1	4.0	3.2	.0	.0	1.6	1.2	.5	.4	2.9	2.5	.0	.0	.3	.3
350.	4.3	2.6	5.2	4.4	.1	.1	1.6	1.2	.3	.2	2.5	2.4	.0	.0	.5	.5
360.	2.8	1.8	5.7	5.0	.3	.3	1.6	1.2	.2	.1	2.2	2.1	.1	.0	.7	.7
MAX	8.6	6.2	5.8	5.0	5.1	4.4	5.6	4.7	3.8	3.5	2.9	2.5	2.6	2.3	3.1	3.1
DEGR.	190	190	210	0	100	100	80	80	200	200	340	340	120	120	70	70

THE HIGHEST CONCENTRATION OF 8.60 PPM OCCURRED AT RECEPTOR REC1 .

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JOB: HHV CO EMISSIONS MODELING - PROPOSED RUN: ALA MOANA AND ENA/KALIA INTERSECTION

DATE : 10/ 9/ 1
TIME : 13:33:52

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

CO/LINK (PPM)
ANGLE (DEGREES)

LINK #	REC1 190	REC2 190	REC3 210	REC4 0	REC5 100	REC6 100	REC7 80	REC8 80	REC9 200	REC10 200	REC11 340	REC12 340	REC13 120	REC14 120	REC15 70	REC16 70
1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
2	.3	.3	.4	.0	.0	.0	.1	.1	.2	.1	.0	.0	.0	.0	.1	.1
3	.2	.2	.4	.0	.0	.0	.1	.0	.1	.1	.0	.0	.0	.0	.1	.1
4	.0	.0	.0	.2	.3	.1	.1	.1	.0	.0	.2	.2	.1	.1	.0	.0
5	.1	.0	.0	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
6	.2	.0	.0	.3	.1	.1	.0	.0	.0	.0	.2	.1	.1	.1	.0	.0
7	.8	.6	.8	.0	.2	.1	.6	.3	.4	.4	.0	.0	.1	.1	.3	.3
8	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
9	.1	.0	.0	.0	.1	.1	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0
10	.2	.1	.0	.2	.4	.3	.4	.3	.1	.1	.1	.1	.1	.1	.2	.2
11	.1	.0	.0	.0	.1	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0
12	.1	.0	.0	.0	.1	.1	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0
13	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
14	.0	.0	.0	.0	.0	.0	.2	.2	.0	.0	.0	.0	.0	.0	.0	.0
15	1.6	1.5	2.5	.0	.0	.0	1.2	1.0	.7	.6	.0	.0	.1	.1	1.0	1.0
16	.8	.8	1.7	.0	.0	.0	.3	.3	.3	.3	.0	.0	.1	.1	.3	.3
17	.7	.2	.0	.7	.4	.3	.0	.0	.1	.1	.3	.2	.3	.2	.0	.0
18	.1	.0	.0	.7	.7	.7	.0	.0	.1	.1	.3	.3	.4	.3	.0	.0
19	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
20	1.4	1.2	.0	1.6	1.8	1.7	1.8	1.7	1.1	1.0	1.1	1.0	.9	.9	.8	.8
21	1.0	.6	.0	.5	.3	.3	.1	.1	.2	.2	.2	.2	.1	.1	.1	.1
22	.9	.7	.0	.7	.6	.5	.4	.4	.5	.5	.5	.4	.3	.2	.2	.2

INPUT FILE: PM_AM_EKEX.DAT

```
'HHV PM EMISSIONS MODELING - EXISTING' 60. 321.  0. 0.  16  0.3048 1 1
'R1  (NE CORNER 1_FL)'       60        50       6
'R2  (NE CORNER 2_FL)'       60        50       21
'R3  (SE CORNER 1_FL)'       60       -50       6
'R4  (SE CORNER 2_FL)'       60       -50       21
'R5  (NW CORNER 1_FL)'      -60        50       6
'R6  (NW CORNER 2_FL)'      -60        50       21
'R7  (SW CORNER 1_FL)'      -60       -50       6
'R8  (SW CORNER 2_FL)'      -60       -50       21
'R9  (NE 150 FT 1_FL)'      150       150       6
'R10 (NE 150 FT 2_FL)'      150       150       21
'R11 (SE 150 FT 1_FL)'      150      -150       6
'R12 (SE 150 FT 2_FL)'      150      -150       21
'R13 (NW 150 FT 1_FL)'     -150       150       6
'R14 (NW 150 FT 2_FL)'     -150       150       21
'R15 (SW 150 FT 1_FL)'     -150      -150       6
'R16 (SW 150 FT 2_FL)'     -150      -150       21
'ALA MOANA AND ENA/KALIA INTERSECTION EX'      22  1  1  'P'
 1
'1A.AM_NB.Arr 1LTLn  '   'AG'     0. -1000.      0.    -30.   19.  0.25  0. 32.
 1
'1B.AM_NB.Arr 2_Lns  '   'AG'    12. -1000.     12.    -30.  690.  0.25  0. 44.
 1
'1C.AM_NB.Arr 1RTLn  '   'AG'    36. -1000.     36.    -30.  443.  0.25  0. 34.
 1
'2A.AM_NB.Dep 3_Lns  '   'AG'     0.   -30.      0.   1000.  690.  0.27  0. 58.
 1
'3A.AM_SB.Arr 1LTLn  '   'AG'    48.  1000.     48.     30.  172.  0.25  0. 32.
 1
'3B.AM_SB.Arr 3_Lns  '   'AG'    36.  1000.     36.     30.  633.  0.25  0. 56.
 1
'4A.AM_SB.Dep 4_Lns  '   'AG'     0.    30.      0.  -1000. 1413.  0.27  0. 68.
 1
'5A.Ena_EB.Arr 1_ln  '   'AG' -1000.    -5.    -48.     -5.  197.  0.25  0. 30.
 1
'6A.Ena_EB.Dep 2_Lns '   'AG'   -48.    -5.   1000.     -5.  146.  0.27  0. 40.
 1
'7A.Kal_WB.Arr 2LTLn '   'AG'  1000.     0.     48.      0.  712.  0.25  0. 30.
 1
'7B.Kal_WB.Arr 1RTLn '   'AG'  1000.    20.     48.     20.  116.  0.25  0. 30.
 1
'7C.Kal_WB.Arr 1_Ln  '   'AG'  1000.    10.     48.     10.  146.  0.25  0. 30.
 1
'8A.Kal_WB.Dep 1_Ln  '   'AG'    48.     0.  -1000.      0.  146.  0.27  0. 30.
 2
'11A.AM_NB.Arr Q1LTLn'   'AG'     0.    -30.      0. -1000.  0.  12.  1
      140         86        3.0     19       0.32  1600  1  2
 2
'11B.AM_NB.Arr Q2_Lns'   'AG'    12.    -30.     12. -1000.  0.  12.  2
      140         86        3.0    690       0.32  1600  1  2
 2
'11C.AM_NB.Arr Q1RTLn'   'AG'    36.    -30.     36. -1000.  0.  12.  1
      140         66        3.0    443       0.32  1600  1  2
 2
'12A.AM_SB.Arr Q1LTLn'   'AG'    48.     30.     48.  1000.  0.  12.  1
      140         86        3.0    172       0.32  1600  1  2
 2
'12B.AM_SB.Arr Q3_Lns'   'AG'    36.     30.     36.  1000.  0.  12.  3
      140         51        3.0    633       0.32  1600  1  2
 2
'13A.Ena_EB.Arr Q1_Ln'   'AG'   -48.     -5.  -1000.    -5.  0.  10.  1
      140        104        3.0    197       0.32  1600  1  2
 2
'14A.Kal_WB.ArrQ2LTLn'   'AG'    48.      0.   1000.     0.  0.  10.  2
      140         98        3.0    712       0.32  1600  1  2
 2
'14B.Kal_WB.ArrQ1RTLn'   'AG'    48.     20.   1000.    20.  0.  10.  1
      140         78        3.0    116       0.32  1600  1  2
 2
'14C.Kal_WB.Arr Q1_Ln'   'AG'    48.     10.   1000.    10.  0.  10.  1
      140         98        3.0    146       0.32  1600  1  2
1.0 00. 4 1000. 0.  'Y' 10  0 36
```

INPUT FILE: PM_AM_EKPRP.DAT

```
'HHV PM EMISSIONS MODELING - PROPOSED' 60. 321.  0. 0.  16  0.3048 1 1
'R1  (NE CORNER 1_FL)'       60       50       6
'R2  (NE CORNER 2_FL)'       60       50       21
'R3  (SE CORNER 1_FL)'       60      -50       6
'R4  (SE CORNER 2_FL)'       60      -50       21
'R5  (NW CORNER 1_FL)'      -60       50       6
'R6  (NW CORNER 2_FL)'      -60       50       21
'R7  (SW CORNER 1_FL)'      -60      -50       6
'R8  (SW CORNER 2_FL)'      -60      -50       21
'R9  (NE 150 FT 1_FL)'      150      150       6
'R10 (NE 150 FT 2_FL)'      150      150       21
'R11 (SE 150 FT 1_FL)'      150     -150       6
'R12 (SE 150 FT 2_FL)'      150     -150       21
'R13 (NW 150 FT 1_FL)'     -150      150       6
'R14 (NW 150 FT 2_FL)'     -150      150       21
'R15 (SW 150 FT 1_FL)'     -150     -150       6
'R16 (SW 150 FT 2_FL)'     -150     -150       21
'ALA MOANA AND ENA/KALIA INTERSECTION PRP'      22  1  1  'P'
 1
'1A.AM_NB.Arr 1LTLn   '   'AG'     0. -1000.      0.    -30.   19.    0.25  0. 32.
 1
'1B.AM_NB.Arr 2_Lns   '   'AG'    12. -1000.     12.    -30.  692.    0.25  0. 44.
 1
'1C.AM_NB.Arr 1RTLn   '   'AG'    36. -1000.     36.    -30.  457.    0.25  0. 34.
 1
'2A.AM_NB.Dep 3_Lns   '   'AG'     0.   -30.      0.   1000.  692.    0.27  0. 58.
 1
'3A.AM_SB.Arr 1LTLn   '   'AG'    48.  1000.     48.     30.  177.    0.25  0. 32.
 1
'3B.AM_SB.Arr 3_Lns   '   'AG'    36.  1000.     36.     30.  636.    0.25  0. 56.
 1
'4A.AM_SB.Dep 4_Lns   '   'AG'     0.    30.      0.  -1000. 1424.    0.27  0. 68.
 1
'5A.Ena_EB.Arr 1_ln   '   'AG' -1000.    -5.    -48.     -5.  200.    0.25  0. 30.
 1
'6A.Ena_EB.Dep 2_Lns  '   'AG'   -48.    -5.   1000.     -5.  150.    0.27  0. 40.
 1
'7A.Kal_WB.Arr 1LTLn  '   'AG'  1000.     0.     48.      0.  720.    0.25  0. 30.
 1
'7B.Kal_WB.Arr 1RTLn  '   'AG'  1000.    20.     48.     20.  120.    0.25  0. 30.
 1
'7C.Kal_WB.Arr 1_Ln   '   'AG'  1000.    10.     48.     10.  154.    0.25  0. 30.
 1
'8A.Kal_WB.Dep 1_Ln   '   'AG'    48.     0.  -1000.      0.  149.    0.27  0. 30.
 2
'11A.AM_NB.Arr Q1LTLn'    'AG'     0.    -30.      0. -1000.  0.  12.  1
     140        86          3.0    19       0.32   1600  1  2
 2
'11B.AM_NB.Arr Q2_Lns'    'AG'    12.    -30.     12. -1000.  0.  12.  2
     140        86          3.0   692       0.32  1600  1  2
 2
'11C.AM_NB.Arr Q1RTLn'    'AG'    36.    -30.     36. -1000.  0.  12.  1
     140        66          3.0   457       0.32  1600  1  2
 2
'12A.AM_SB.Arr Q1LTLn'    'AG'    48.     30.     48.  1000.  0.  12.  1
     140        86          3.0   177       0.32  1600  1  2
 2
'12B.AM_SB.Arr Q3_Lns'    'AG'    36.     30.     36.  1000.  0.  12.  3
     140        51          3.0   636       0.32  1600  1  2
 2
'13A.Ena_EB.Arr Q1_Ln'    'AG'   -48.     -5.  -1000.    -5.  0.  10.  1
     140       104          3.0   200       0.32  1600  1  2
 2
'14A.Kal_WB.ArrQ1LTLn'    'AG'    48.      0.   1000.     0.  0.  10.  2
     140        98          3.0   720       0.32  1600  1  2
 2
'14B.Kal_WB.ArrQ1RTLn'    'AG'    48.     20.   1000.    20.  0.  10.  1
     140        78          3.0   120       0.32  1600  1  2
 2
'14C.Kal_WB.Arr Q1_Ln'    'AG'    48.     10.   1000.    10.  0.  10.  1
     140        98          3.0   154       0.32  1600  1  2
 1.0 00. 4 1000. 0.  'Y' 10  0 36
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INPUT FILE: PM_AM_EKS3.DAT

```
'HHV PM EMISSIONS MODELING - WORST CASE' 60. 321.  0. 0.  16  0.3048 1 1
'R1  (NE CORNER 1_FL)'      60      50     6
'R2  (NE CORNER 2_FL)'      60      50     21
'R3  (SE CORNER 1_FL)'      60     -50     6
'R4  (SE CORNER 2_FL)'      60     -50     21
'R5  (NW CORNER 1_FL)'     -60      50     6
'R6  (NW CORNER 2_FL)'     -60      50     21
'R7  (SW CORNER 1_FL)'     -60     -50     6
'R8  (SW CORNER 2_FL)'     -60     -50     21
'R9  (NE 150 FT 1_FL)'     150     150     6
'R10(NE 150 FT 2_FL)'      150     150     21
'R11(SE 150 FT 1_FL)'      150    -150     6
'R12(SE 150 FT 2_FL)'      150    -150     21
'R13(NW 150 FT 1_FL)'     -150     150     6
'R14(NW 150 FT 2_FL)'     -150     150     21
'R15(SW 150 FT 1_FL)'     -150    -150     6
'R16(SW 150 FT 2_FL)'     -150    -150     21
'ALA MOANA AND ENA/KALIA INTERSECTION S3'   22  1  1  'P'
 1
'1A.AM_NB.Arr 1LTLn   '   'AG'     0. -1000.     0.   -30.   19.   0.25  0. 32.
 1
'1B.AM_NB.Arr 2_Lns   '   'AG'    12. -1000.    12.   -30.  692.   0.25  0. 44.
 1
'1C.AM_NB.Arr 1RTLn   '   'AG'    36. -1000.    36.   -30.  457.   0.25  0. 34.
 1
'2A.AM_NB.Dep 3_Lns   '   'AG'     0.   -30.     0.  1000.  692.   0.27  0. 58.
 1
'3A.AM_SB.Arr 1LTLn   '   'AG'    48.  1000.    48.    30.  177.   0.25  0. 32.
 1
'3B.AM_SB.Arr 3_Lns   '   'AG'    36.  1000.    36.    30.  636.   0.25  0. 56.
 1
'4A.AM_SB.Dep 4_Lns   '   'AG'     0.    30.     0. -1000. 1424.   0.27  0. 68.
 1
'5A.Ena_EB.Arr 1_ln   '   'AG' -1000.    -5.   -48.    -5.  200.   0.25  0. 30.
 1
'6A.Ena_EB.Dep 2_Lns  '   'AG'   -48.    -5.  1000.    -5.  150.   0.27  0. 40.
 1
'7A.Kal_WB.Arr 1LTLn  '   'AG'  1000.     0.    48.     0.  720.   0.25  0. 30.
 1
'7B.Kal_WB.Arr 1RTLn  '   'AG'  1000.    20.    48.    20.  120.   0.25  0. 30.
 1
'7C.Kal_WB.Arr 1_Ln   '   'AG'  1000.    10.    48.    10.  154.   0.25  0. 30.
 1
'8A.Kal_WB.Dep 1_Ln   '   'AG'    48.     0.  -1000.    0.  149.   0.27  0. 30.
 2
'11A.AM_NB.Arr Q1LTLn'   'AG'    0.    -30.      0. -1000.  0.  12.  1
      140         86       3.0     19      0.32  1600  1  1
 2
'11B.AM_NB.Arr Q2_Lns'   'AG'   12.    -30.     12. -1000.  0.  12.  2
      140         86       3.0    692      0.32  1600  1  1
 2
'11C.AM_NB.Arr Q1RTLn'   'AG'   36.    -30.     36. -1000.  0.  12.  1
      140         66       3.0    457      0.32  1600  1  1
 2
'12A.AM_SB.Arr Q1LTLn'   'AG'   48.     30.     48.  1000.  0.  12.  1
      140         86       3.0    177      0.32  1600  1  1
 2
'12B.AM_SB.Arr Q3_Lns'   'AG'   36.     30.     36.  1000.  0.  12.  3
      140         51       3.0    636      0.32  1600  1  1
 2
'13A.Ena_EB.Arr Q1_Ln'   'AG'  -48.     -5.  -1000.    -5.  0.  10.  1
      140        194       3.0    200      0.32  1600  1  1
 2
'14A.Kal_WB.ArrQ1LTLn'   'AG'   48.      0.   1000.     0.  0.  10.  2
      140         98       3.0    720      0.32  1600  1  1
 2
'14B.Kal_WB.ArrQ1RTLn'   'AG'   48.     20.   1000.    20.  0.  10.  1
      140         78       3.0    120      0.32  1600  1  1
 2
'14C.Kal_WB.Arr Q1_Ln'   'AG'   48.     10.   1000.    10.  0.  10.  1
      140         98       3.0    154      0.32  1600  1  1
1.0 00. 4 1000. 0.  'Y' 10  0 36
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: HHV PM EMISSIONS MODELING - EXISTING RUN: ALA MOANA AND ENA/KALIA INTERSECTION EX

DATE : 10/ 9/ 1
TIME : 13:34:53

The MODE flag has been set to P for calculating PM averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 321. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = .0 ug/m**3

LINK VARIABLES

	LINK DESCRIPTION	X1	Y1	X2	Y2	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1.	1A.AM_NB.Arr 1LTLn	.0	-1000.0	.0	-30.0	970.	360.	AG	19.	.3	.0	32.0		
2.	1B.AM_NB.Arr 2_Lns	12.0	-1000.0	12.0	-30.0	970.	360.	AG	690.	.3	.0	44.0		
3.	1C.AM_NB.Arr 1RTLn	36.0	-1000.0	36.0	-30.0	970.	360.	AG	443.	.3	.0	34.0		
4.	2A.AM_NB.Dep 3_Lns	.0	-30.0	.0	1000.0	1030.	360.	AG	690.	.3	.0	58.0		
5.	3A.AM_SB.Arr 1LTLn	48.0	1000.0	48.0	30.0	970.	180.	AG	172.	.3	.0	32.0		
6.	3B.AM_SB.Arr 3_Lns	36.0	1000.0	36.0	30.0	970.	180.	AG	633.	.3	.0	56.0		
7.	4A.AM_SB.Dep 4_Lns	.0	30.0	.0	-1000.0	1030.	180.	AG	1413.	.3	.0	68.0		
8.	5A.Ena_EB.Arr 1_ln	-1000.0	-5.0	-48.0	-5.0	952.	90.	AG	197.	.3	.0	30.0		
9.	6A.Ena_EB.Dep 2_Lns	-48.0	-5.0	1000.0	-5.0	1048.	90.	AG	146.	.3	.0	40.0		
10.	7A.Kal_WB.Arr 2LTLn	1000.0	.0	48.0	.0	952.	270.	AG	712.	.3	.0	30.0		
11.	7B.Kal_WB.Arr 1RTLn	1000.0	20.0	48.0	20.0	952.	270.	AG	116.	.3	.0	30.0		
12.	7C.Kal_WB.Arr 1_Ln	1000.0	10.0	48.0	10.0	952.	270.	AG	146.	.3	.0	30.0		
13.	8A.Kal_WB.Dep 1_Ln	48.0	.0	-1000.0	.0	1048.	270.	AG	146.	.3	.0	30.0		
14.	11A.AM_NB.Arr Q1LTLn	.0	-30.0	.0	-38.9	9.	180.	AG	1.	100.0	.0	12.0	.03	.5
15.	11B.AM_NB.Arr Q2_Lns	12.0	-30.0	12.0	-194.3	164.	180.	AG	1.	100.0	.0	12.0	.62	8.3
16.	11C.AM_NB.Arr Q1RTLn	36.0	-30.0	36.0	-189.9	160.	180.	AG	0.	100.0	.0	12.0	.56	8.1
17.	12A.AM_SB.Arr Q1LTLn	48.0	30.0	48.0	110.9	81.	360.	AG	1.	100.0	.0	12.0	.31	4.1
18.	12B.AM_SB.Arr Q3_Lns	36.0	30.0	36.0	88.8	59.	360.	AG	1.	100.0	.0	12.0	.22	3.0
19.	13A.Ena_EB.Arr Q1_Ln	-48.0	-5.0	-171.6	-5.0	124.	270.	AG	1.	100.0	.0	10.0	.56	6.3
20.	14A.Kal_WB.ArrQ2LTLn	48.0	.0	277.5	.0	229.	90.	AG	1.	100.0	.0	10.0	.84	11.7
21.	14B.Kal_WB.ArrQ1RTLn	48.0	20.0	97.5	20.0	49.	90.	AG	0.	100.0	.0	10.0	.18	2.5
22.	14C.Kal_WB.Arr Q1_Ln	48.0	10.0	128.2	10.0	80.	90.	AG	1.	100.0	.0	10.0	.35	4.1

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JOB: HHV PM EMISSIONS MODELING - EXISTING                RUN: ALA MOANA AND ENA/KALIA INTERSECTION EX          PAGE  2

DATE : 10/ 9/ 1
TIME : 13:34:53

14. 11A.AM_NB.Arr Q1LTLn*   140    86    3.0    19   1600   .32   1   2
15. 11B.AM_NB.Arr Q2_Lns*   140    86    3.0   690   1600   .32   1   2
16. 11C.AM_NB.Arr Q1RTLn*   140    66    3.0   443   1600   .32   1   2
17. 12A.AM_SB.Arr Q1LTLn*   140    86    3.0   172   1600   .32   1   2
18. 12B.AM_SB.Arr Q3_Lns*   140    51    3.0   633   1600   .32   1   2
19. 13A.Ena_EB.Arr Q1_Ln*   140   104    3.0   197   1600   .32   1   2
20. 14A.Kal_WB.ArrQ2LTLn*   140    98    3.0   712   1600   .32   1   2
21. 14B.Kal_WB.ArrQ1RTLn*   140    78    3.0   116   1600   .32   1   2
22. 14C.Kal_WB.Arr Q1_Ln*   140    98    3.0   146   1600   .32   1   2

RECEPTOR LOCATIONS
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                           *       COORDINATES (FT)          *
        RECEPTOR           *      X         Y         Z      *
---------------------------*---------------------------------*
 1. R1  (NE CORNER 1_FL)   *     60.0      50.0       6.0    *
 2. R2  (NE CORNER 2_FL)   *     60.0      50.0      21.0    *
 3. R3  (SE CORNER 1_FL)   *     60.0     -50.0       6.0    *
 4. R4  (SE CORNER 2_FL)   *     60.0     -50.0      21.0    *
 5. R5  (NW CORNER 1_FL)   *    -60.0      50.0       6.0    *
 6. R6  (NW CORNER 2_FL)   *    -60.0      50.0      21.0    *
 7. R7  (SW CORNER 1_FL)   *    -60.0     -50.0       6.0    *
 8. R8  (SW CORNER 2_FL)   *    -60.0     -50.0      21.0    *
 9. R9  (NE 150 FT 1_FL)   *    150.0     150.0       6.0    *
10. R10(NE 150 FT 2_FL)    *    150.0     150.0      21.0    *
11. R11(SE 150 FT 1_FL)    *    150.0    -150.0       6.0    *
12. R12(SE 150 FT 2_FL)    *    150.0    -150.0      21.0    *
13. R13(NW 150 FT 1_FL)    *   -150.0     150.0       6.0    *
14. R14(NW 150 FT 2_FL)    *   -150.0     150.0      21.0    *
15. R15(SW 150 FT 1_FL)    *   -150.0    -150.0       6.0    *
16. R16(SW 150 FT 2_FL)    *   -150.0    -150.0      21.0    *
```

JOB: HHV PM EMISSIONS MODELING - EXISTING   RUN: ALA MOANA AND ENA/KALIA INTERSECTION EX

MODEL RESULTS
WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
	*	CONCENTRATION (ug/m**3)															
0.	*	17.	11.	19.	15.	6.	5.	9.	7.	2.	2.	7.	6.	1.	1.	3.	3.
10.	*	10.	6.	15.	11.	9.	8.	13.	10.	1.	1.	5.	4.	3.	3.	5.	5.
20.	*	5.	2.	11.	8.	10.	9.	16.	12.	0.	0.	4.	4.	5.	5.	7.	7.
30.	*	2.	1.	9.	7.	10.	8.	17.	12.	0.	0.	4.	4.	5.	5.	8.	8.
40.	*	1.	0.	9.	7.	9.	7.	18.	13.	0.	0.	4.	4.	5.	5.	10.	9.
50.	*	1.	0.	10.	8.	9.	6.	19.	13.	0.	0.	4.	3.	5.	4.	11.	10.
60.	*	1.	0.	10.	8.	9.	6.	21.	14.	0.	0.	4.	3.	5.	4.	13.	11.
70.	*	1.	1.	10.	9.	10.	7.	23.	16.	0.	0.	3.	3.	4.	4.	13.	12.
80.	*	3.	3.	9.	8.	12.	9.	23.	16.	0.	0.	2.	2.	5.	4.	12.	11.
90.	*	6.	6.	6.	5.	16.	12.	22.	15.	1.	1.	1.	1.	6.	6.	11.	9.
100.	*	10.	8.	2.	2.	19.	14.	19.	12.	2.	2.	0.	0.	8.	7.	9.	8.
110.	*	11.	9.	1.	0.	19.	14.	17.	11.	4.	3.	0.	0.	9.	9.	9.	7.
120.	*	11.	9.	0.	0.	19.	13.	17.	11.	4.	4.	0.	0.	10.	9.	9.	7.
130.	*	11.	8.	0.	0.	18.	13.	18.	12.	4.	4.	0.	0.	10.	9.	9.	8.
140.	*	11.	8.	0.	0.	20.	15.	19.	14.	4.	4.	0.	0.	11.	10.	9.	9.
150.	*	11.	7.	1.	0.	22.	17.	20.	15.	4.	4.	0.	0.	11.	11.	10.	9.
160.	*	13.	9.	3.	2.	23.	19.	20.	16.	4.	4.	0.	0.	11.	11.	9.	8.
170.	*	19.	13.	8.	7.	21.	18.	18.	15.	5.	5.	1.	1.	9.	8.	6.	6.
180.	*	28.	20.	17.	15.	15.	13.	11.	10.	9.	8.	3.	3.	5.	5.	3.	3.
190.	*	33.	24.	25.	20.	8.	6.	5.	4.	13.	12.	7.	7.	2.	2.	1.	1.
200.	*	32.	21.	27.	20.	4.	3.	1.	1.	15.	14.	10.	9.	1.	1.	0.	0.
210.	*	28.	18.	26.	18.	3.	2.	0.	0.	14.	13.	11.	10.	1.	1.	0.	0.
220.	*	26.	14.	24.	15.	3.	2.	0.	0.	13.	12.	10.	9.	1.	1.	0.	0.
230.	*	24.	12.	22.	13.	3.	2.	0.	0.	11.	10.	10.	9.	1.	1.	0.	0.
240.	*	23.	11.	21.	12.	3.	3.	0.	0.	9.	8.	9.	8.	1.	1.	0.	0.
250.	*	22.	10.	21.	11.	3.	3.	0.	0.	8.	6.	9.	8.	1.	1.	0.	0.
260.	*	21.	9.	21.	11.	3.	2.	1.	1.	7.	6.	10.	9.	1.	1.	0.	0.
270.	*	19.	7.	23.	12.	2.	2.	2.	2.	6.	5.	11.	9.	0.	0.	0.	0.
280.	*	17.	6.	23.	12.	1.	1.	3.	3.	6.	5.	11.	10.	0.	0.	1.	1.
290.	*	16.	6.	22.	12.	0.	0.	3.	3.	5.	4.	11.	10.	0.	0.	1.	1.
300.	*	17.	6.	21.	11.	0.	0.	3.	3.	6.	5.	11.	10.	0.	0.	1.	1.
310.	*	17.	7.	19.	11.	0.	0.	3.	3.	6.	5.	11.	10.	0.	0.	1.	1.
320.	*	19.	9.	18.	11.	0.	0.	3.	2.	6.	6.	11.	10.	0.	0.	1.	1.
330.	*	20.	10.	18.	12.	0.	0.	3.	2.	6.	6.	11.	10.	0.	0.	1.	1.
340.	*	21.	12.	20.	14.	1.	0.	4.	3.	6.	6.	11.	10.	0.	0.	1.	1.
350.	*	21.	13.	21.	16.	2.	2.	5.	4.	5.	5.	10.	9.	0.	0.	2.	2.
360.	*	17.	11.	19.	15.	6.	5.	9.	7.	2.	2.	7.	6.	1.	1.	3.	3.
MAX	*	33.	24.	27.	20.	23.	19.	23.	16.	15.	14.	11.	10.	11.	11.	13.	12.
DEGR.	*	190	190	200	200	160	160	80	160	200	200	290	320	160	160	70	70

THE HIGHEST CONCENTRATION OF 33. ug/m**3 OCCURRED AT RECEPTOR REC1 .

JOB: HHV PM EMISSIONS MODELING - EXISTING

RUN: ALA MOANA AND ENA/KALIA INTERSECTION EX

PAGE 4

DATE : 10/ 9/ 1
TIME : 13:34:53

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

PM/LNK(ug/m**3)
ANGLE (DEGREES)

LINK #	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
	190	190	200	200	160	160	80	160	200	200	290	320	160	160	70	70
1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.0	.0	.1	.1	.0	.0
2	4.7	4.3	5.9	4.6	3.8	3.5	2.1	3.8	2.3	2.2	2.0	.6	2.1	2.1	1.7	1.5
3	3.2	2.9	5.8	3.5	2.0	1.9	.9	1.9	1.4	1.4	1.4	.6	1.2	1.1	.9	.8
4	.5	.3	.0	.0	1.3	.7	1.5	.0	.3	.2	.3	1.9	.3	.2	.3	.2
5	1.1	.0	.0	.0	.0	.0	.0	.0	.1	.1	.0	.2	.0	.0	.0	.0
6	2.2	.0	.0	.0	.0	.0	.1	.0	.2	.2	.0	.8	.0	.0	.1	.1
7	12.0	10.2	12.9	10.0	12.5	10.1	9.4	10.0	5.9	5.6	5.1	2.7	5.9	5.6	5.1	4.3
8	.0	.0	.0	.0	.3	.2	.0	.0	.0	.0	.6	.1	.4	.4	.0	.0
9	.9	.5	.0	.0	.6	.4	1.3	.0	.4	.4	.1	.4	.1	.1	.6	.5
10	2.2	1.3	.0	.0	.0	.0	3.9	.0	1.6	1.4	.0	.7	.0	.0	2.0	2.0
11	.6	.2	.0	.0	.0	.0	.6	.0	.3	.3	.0	.1	.0	.0	.3	.3
12	.6	.3	.0	.0	.0	.0	.7	.0	.4	.3	.0	.1	.0	.0	.4	.4
13	.4	.2	.0	.0	.9	.5	.2	.0	.1	.1	.5	.3	.4	.4	.1	.1
14	.0	.0	.0	.0	.0	.0	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0
15	1.0	1.0	1.3	1.1	1.0	.9	.8	.0	.4	.4	.8	.3	.3	.3	.7	.7
16	.5	.5	1.0	.8	.2	.2	.2	.5	.2	.2	.4	.2	.1	.1	.2	.2
17	.5	.1	.0	.0	.0	.0	.0	.1	.1	.1	.0	.1	.0	.0	.0	.0
18	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.0	.2	.0	.0	.0	.0
19	.0	.0	.0	.0	.3	.2	.0	.0	.0	.0	.2	.1	.4	.4	.0	.0
20	1.0	.8	.0	.0	.0	.0	1.2	.0	.8	.7	.0	.3	.0	.0	.5	.5
21	.7	.4	.0	.0	.0	.0	.1	.0	.1	.1	.0	.1	.0	.0	.0	.0
22	.6	.5	.0	.0	.0	.0	.2	.0	.3	.3	.0	.1	.0	.0	.1	.1

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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                    PAGE  1

JOB: HHV PM EMISSIONS MODELING - PROPOSED              RUN: ALA MOANA AND ENA/KALIA INTERSECTION PRP

DATE : 10/ 9/ 1
TIME : 13:35:18

  The MODE flag has been set to P for calculating PM averages.

 SITE & METEOROLOGICAL VARIABLES
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 VS =    .0 CM/S        VD =    .0 CM/S       Z0 = 321. CM
  U =  1.0 M/S          CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =   .0 ug/m**3

 LINK VARIABLES
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LINK DESCRIPTION	X1	Y1	X2	Y2	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1. 1A.AM_NB.Arr 1LTLn	.0	-1000.0	.0	-30.0	970.	360.	AG	19.	.3	.0	32.0		
2. 1B.AM_NB.Arr 2_Lns	12.0	-1000.0	12.0	-30.0	970.	360.	AG	692.	.3	.0	44.0		
3. 1C.AM_NB.Arr 1RTLn	36.0	-1000.0	36.0	-30.0	970.	360.	AG	457.	.3	.0	34.0		
4. 2A.AM_NB.Dep 3_Lns	.0	-30.0	.0	1000.0	1030.	360.	AG	692.	.3	.0	58.0		
5. 3A.AM_SB.Arr 1LTLn	48.0	1000.0	48.0	30.0	970.	180.	AG	177.	.3	.0	32.0		
6. 3B.AM_SB.Arr 3_Lns	36.0	1000.0	36.0	30.0	970.	180.	AG	636.	.3	.0	56.0		
7. 4A.AM_SB.Dep 4_Lns	.0	30.0	.0	-1000.0	1030.	180.	AG	1424.	.3	.0	68.0		
8. 5A.Ena_EB.Arr 1_ln	-1000.0	-5.0	-48.0	-5.0	952.	90.	AG	200.	.3	.0	30.0		
9. 6A.Ena_EB.Dep 2_Lns	-48.0	-5.0	1000.0	-5.0	1048.	90.	AG	150.	.3	.0	40.0		
10. 7A.Kal_WB.Arr 1LTLn	1000.0	.0	48.0	.0	952.	270.	AG	720.	.3	.0	30.0		
11. 7B.Kal_WB.Arr 1RTLn	1000.0	20.0	48.0	20.0	952.	270.	AG	120.	.3	.0	30.0		
12. 7C.Kal_WB.Arr 1_Ln	1000.0	10.0	48.0	10.0	952.	270.	AG	154.	.3	.0	30.0		
13. 8A.Kal_WB.Dep 1_Ln	48.0	.0	-1000.0	.0	1048.	270.	AG	149.	.3	.0	30.0		
14. 11A.AM_NB.Arr Q1LTLn	.0	-30.0	.0	-38.9	9.	180.	AG	1.	100.0	.0	12.0	.03	.5
15. 11B.AM_NB.Arr Q2_Lns	12.0	-30.0	12.0	-194.9	165.	180.	AG	1.	100.0	.0	12.0	.62	8.4
16. 11C.AM_NB.Arr Q1RTLn	36.0	-30.0	36.0	-194.9	165.	180.	AG	0.	100.0	.0	12.0	.58	8.4
17. 12A.AM_SB.Arr Q1LTLn	48.0	30.0	48.0	113.2	83.	360.	AG	1.	100.0	.0	12.0	.32	4.2
18. 12B.AM_SB.Arr Q3_Lns	36.0	30.0	36.0	89.1	59.	360.	AG	1.	100.0	.0	12.0	.22	3.0
19. 13A.Ena_EB.Arr Q1_Ln	-48.0	-5.0	-173.8	-5.0	126.	270.	AG	1.	100.0	.0	10.0	.56	6.4
20. 14A.Kal_WB.ArrQ1LTLn	48.0	.0	282.7	.0	235.	90.	AG	1.	100.0	.0	10.0	.85	11.9
21. 14B.Kal_WB.ArrQ1RTLn	48.0	20.0	99.2	20.0	51.	90.	AG	0.	100.0	.0	10.0	.18	2.6
22. 14C.Kal_WB.Arr Q1_Ln	48.0	10.0	132.9	10.0	85.	90.	AG	1.	100.0	.0	10.0	.36	4.3

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JOB: HHV PM EMISSIONS MODELING - PROPOSED                    RUN: ALA MOANA AND ENA/KALIA INTERSECTION PRP        PAGE  2

DATE : 10/ 9/ 1
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14. 11A.AM_NB.Arr Q1LTLn*   140     86     3.0     19    1600    .32    1    2
15. 11B.AM_NB.Arr Q2_Lns*   140     86     3.0    692    1600    .32    1    2
16. 11C.AM_NB.Arr Q1RTLn*   140     66     3.0    457    1600    .32    1    2
17. 12A.AM_SB.Arr Q1LTLn*   140     86     3.0    177    1600    .32    1    2
18. 12B.AM_SB.Arr Q3_Lns*   140     51     3.0    636    1600    .32    1    2
19. 13A.Ena_EB.Arr Q1_Ln*   140    104     3.0    200    1600    .32    1    2
20. 14A.Kal_WB.ArrQ1LTLn*   140     98     3.0    720    1600    .32    1    2
21. 14B.Kal_WB.ArrQ1RTLn*   140     78     3.0    120    1600    .32    1    2
22. 14C.Kal_WB.Arr Q1_Ln*   140     98     3.0    154    1600    .32    1    2

 RECEPTOR LOCATIONS
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                           *       COORDINATES (FT)        *
   RECEPTOR                *      X         Y         Z    *
---------------------------*-------------------------------*
 1. R1  (NE CORNER 1_FL)   *     60.0      50.0      6.0   *
 2. R2  (NE CORNER 2_FL)   *     60.0      50.0     21.0   *
 3. R3  (SE CORNER 1_FL)   *     60.0     -50.0      6.0   *
 4. R4  (SE CORNER 2_FL)   *     60.0     -50.0     21.0   *
 5. R5  (NW CORNER 1_FL)   *    -60.0      50.0      6.0   *
 6. R6  (NW CORNER 2_FL)   *    -60.0      50.0     21.0   *
 7. R7  (SW CORNER 1_FL)   *    -60.0     -50.0      6.0   *
 8. R8  (SW CORNER 2_FL)   *    -60.0     -50.0     21.0   *
 9. R9  (NE 150 FT 1_FL)   *    150.0     150.0      6.0   *
10. R10(NE 150 FT 2_FL)    *    150.0     150.0     21.0   *
11. R11(SE 150 FT 1_FL)    *    150.0    -150.0      6.0   *
12. R12(SE 150 FT 2_FL)    *    150.0    -150.0     21.0   *
13. R13(NW 150 FT 1_FL)    *   -150.0     150.0      6.0   *
14. R14(NW 150 FT 2_FL)    *   -150.0     150.0     21.0   *
15. R15(SW 150 FT 1_FL)    *   -150.0    -150.0      6.0   *
16. R16(SW 150 FT 2_FL)    *   -150.0    -150.0     21.0   *
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JOB: HHV PM EMISSIONS MODELING - PROPOSED RUN: ALA MOANA AND ENA/KALIA INTERSECTION PRP

MODEL RESULTS
WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (ug/m**3) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
0.	18.	11.	19.	15.	6.	5.	9.	7.	2.	2.	7.	7.	1.	1.	3.	3.
10.	11.	6.	15.	11.	9.	8.	13.	10.	1.	1.	5.	5.	3.	3.	5.	5.
20.	5.	2.	11.	8.	10.	9.	16.	12.	0.	0.	4.	4.	5.	5.	7.	7.
30.	2.	1.	10.	7.	10.	8.	17.	12.	0.	0.	4.	4.	5.	5.	8.	8.
40.	1.	0.	10.	7.	9.	7.	18.	13.	0.	0.	4.	4.	5.	5.	10.	9.
50.	1.	0.	10.	8.	9.	6.	20.	13.	0.	0.	4.	4.	5.	4.	11.	10.
60.	1.	0.	10.	8.	9.	6.	21.	14.	0.	0.	4.	4.	5.	4.	13.	12.
70.	1.	1.	10.	9.	10.	7.	23.	16.	0.	0.	3.	3.	4.	4.	13.	12.
80.	3.	3.	9.	8.	12.	9.	24.	17.	0.	0.	2.	2.	5.	4.	13.	11.
90.	7.	6.	6.	5.	16.	12.	22.	15.	1.	1.	1.	1.	6.	6.	11.	9.
100.	10.	9.	2.	2.	19.	14.	19.	12.	3.	2.	0.	0.	8.	7.	9.	8.
110.	11.	10.	1.	1.	19.	14.	17.	11.	4.	3.	0.	0.	9.	9.	9.	7.
120.	12.	9.	0.	0.	19.	13.	17.	11.	4.	4.	0.	0.	10.	9.	9.	7.
130.	12.	9.	0.	0.	19.	13.	18.	12.	4.	4.	0.	0.	10.	9.	9.	8.
140.	11.	8.	0.	0.	20.	15.	19.	14.	4.	4.	0.	0.	11.	10.	9.	9.
150.	11.	8.	1.	0.	22.	17.	20.	15.	4.	4.	0.	0.	11.	11.	10.	9.
160.	13.	9.	3.	2.	23.	19.	20.	17.	4.	4.	0.	0.	11.	11.	9.	9.
170.	19.	13.	8.	7.	21.	18.	18.	15.	5.	5.	1.	1.	9.	8.	6.	6.
180.	28.	20.	18.	15.	15.	13.	12.	10.	9.	8.	3.	3.	5.	5.	3.	3.
190.	33.	24.	25.	20.	8.	6.	5.	4.	13.	12.	7.	7.	2.	2.	1.	1.
200.	32.	22.	27.	20.	4.	3.	1.	1.	15.	14.	10.	9.	1.	1.	0.	0.
210.	29.	18.	26.	18.	3.	2.	0.	0.	15.	14.	11.	10.	1.	1.	0.	0.
220.	26.	15.	24.	15.	3.	2.	0.	0.	13.	12.	10.	9.	1.	1.	0.	0.
230.	24.	12.	23.	13.	3.	2.	0.	0.	11.	10.	10.	9.	1.	1.	0.	0.
240.	24.	11.	22.	12.	3.	3.	0.	0.	9.	8.	10.	8.	1.	1.	0.	0.
250.	23.	10.	21.	11.	3.	3.	0.	0.	8.	7.	9.	8.	1.	1.	0.	0.
260.	21.	9.	22.	11.	3.	2.	1.	1.	7.	6.	10.	9.	1.	1.	0.	0.
270.	19.	7.	23.	12.	2.	2.	2.	2.	6.	5.	11.	9.	0.	0.	0.	0.
280.	17.	6.	24.	12.	1.	1.	3.	3.	6.	5.	11.	10.	0.	0.	1.	1.
290.	16.	6.	23.	12.	0.	0.	3.	3.	5.	4.	12.	10.	0.	0.	1.	1.
300.	17.	6.	21.	11.	0.	0.	4.	3.	6.	5.	11.	10.	0.	0.	1.	1.
310.	17.	7.	20.	11.	0.	0.	3.	3.	6.	5.	11.	10.	0.	0.	1.	1.
320.	19.	9.	18.	11.	0.	0.	3.	2.	6.	6.	11.	10.	0.	0.	1.	1.
330.	20.	10.	19.	12.	0.	0.	3.	2.	7.	6.	11.	10.	0.	0.	1.	1.
340.	21.	12.	20.	14.	1.	0.	4.	3.	6.	6.	11.	10.	0.	0.	1.	1.
350.	21.	13.	21.	16.	2.	2.	5.	4.	5.	5.	10.	9.	0.	0.	2.	2.
360.	18.	11.	19.	15.	6.	5.	9.	7.	2.	2.	7.	7.	1.	1.	3.	3.
MAX	33.	24.	27.	20.	23.	19.	24.	17.	15.	14.	12.	10.	11.	11.	13.	12.
DEGR.	190	190	200	200	160	160	80	160	200	200	290	300	160	160	70	70

THE HIGHEST CONCENTRATION OF 33. ug/m**3 OCCURRED AT RECEPTOR REC1 .

JOB: HHV PM EMISSIONS MODELING - PROPOSED RUN: ALA MOANA AND ENA/KALIA INTERSECTION PRP PAGE 4

DATE : 10/ 9/ 1
TIME : 13:35:18

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

PM/LNK(ug/m**3)
ANGLE (DEGREES)

LINK #	REC1 190	REC2 190	REC3 200	REC4 200	REC5 160	REC6 160	REC7 80	REC8 160	REC9 200	REC10 200	REC11 290	REC12 300	REC13 160	REC14 160	REC15 70	REC16 70
1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.0	.0	.1	.1	.0	.0
2	4.7	4.3	5.9	4.7	3.8	3.5	2.2	3.8	2.3	2.2	2.0	1.5	2.1	2.1	1.7	1.5
3	3.3	3.0	6.0	3.6	2.1	2.0	.9	2.0	1.5	1.4	1.4	1.2	1.2	1.2	.9	.8
4	.5	.3	.0	.0	1.3	.7	1.5	.0	.3	.2	.3	.7	.3	.2	.3	.2
5	1.1	.0	.0	.0	.0	.0	.0	.0	.1	.1	.0	.0	.0	.0	.0	.0
6	2.2	.0	.0	.0	.0	.0	.1	.0	.2	.2	.0	.1	.0	.0	.1	.1
7	12.1	10.2	13.0	10.1	12.6	10.1	9.5	10.1	5.9	5.6	5.2	4.2	5.9	5.6	5.2	4.3
8	.0	.0	.0	.0	.4	.2	.0	.0	.0	.0	.6	.4	.4	.4	.0	.0
9	.9	.5	.0	.0	.6	.4	1.4	.0	.4	.4	.1	.2	.1	.1	.6	.5
10	2.3	1.3	.0	.0	.0	.0	3.9	.0	1.6	1.4	.0	.1	.0	.0	2.1	2.0
11	.7	.2	.0	.0	.0	.0	.6	.0	.3	.3	.0	.0	.0	.0	.3	.3
12	.6	.3	.0	.0	.0	.0	.8	.0	.4	.3	.0	.0	.0	.0	.4	.4
13	.4	.2	.0	.0	.9	.6	.2	.0	.1	.1	.5	.5	.4	.4	.1	.1
14	.0	.0	.0	.0	.0	.0	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0
15	1.0	1.0	1.3	1.1	1.0	.9	.8	.5	.4	.4	.8	.7	.3	.3	.7	.7
16	.5	.5	1.1	.8	.3	.2	.2	.1	.2	.2	.4	.3	.1	.1	.2	.2
17	.5	.1	.0	.0	.0	.0	.0	.0	.1	.1	.0	.0	.0	.0	.0	.0
18	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.0	.0	.0	.0	.0	.0
19	.0	.0	.0	.0	.3	.2	.0	.0	.0	.0	.2	.2	.4	.4	.0	.0
20	1.0	.8	.0	.0	.0	.0	1.2	.0	.8	.7	.0	.0	.0	.0	.5	.5
21	.7	.4	.0	.0	.0	.0	.1	.0	.1	.1	.0	.0	.0	.0	.0	.0
22	.6	.5	.0	.0	.0	.0	.2	.0	.3	.3	.0	.0	.0	.0	.1	.1

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              CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                     PAGE  1

   JOB: HHV PM EMISSIONS MODELING - WORST CASE            RUN: ALA MOANA AND ENA/KALIA INTERSECTION S3

   DATE : 10/ 9/ 1
   TIME : 13:35:43

     The MODE flag has been set to P for calculating PM averages.

    SITE & METEOROLOGICAL VARIABLES
    -------------------------------
    VS =    .0 CM/S      VD =    .0 CM/S      Z0 = 321. CM
     U =  1.0 M/S        CLAS =   4  (D)    ATIM =  60. MINUTES     MIXH =  1000. M   AMB =   .0 ug/m**3

    LINK VARIABLES
    --------------
     LINK DESCRIPTION     *         LINK COORDINATES (FT)           *   LENGTH  BRG TYPE  VPH    EF      H   W    V/C QUEUE
                          *    X1        Y1        X2        Y2     *    (FT)  (DEG)           (G/MI)  (FT) (FT)       (VEH)
   -----------------------*-------------------------------------------*------------------------------------------------------
    1. 1A.AM_NB.Arr 1LTLn *      .0   -1000.0        .0     -30.0 *    970.   360. AG    19.     .3    .0 32.0
    2. 1B.AM_NB.Arr 2_Lns *    12.0   -1000.0      12.0     -30.0 *    970.   360. AG   692.     .3    .0 44.0
    3. 1C.AM_NB.Arr 1RTLn *    36.0   -1000.0      36.0     -30.0 *    970.   360. AG   457.     .3    .0 34.0
    4. 2A.AM_NB.Dep 3_Lns *      .0     -30.0        .0    1000.0 *   1030.   360. AG   692.     .3    .0 58.0
    5. 3A.AM_SB.Arr 1LTLn *    48.0    1000.0      48.0      30.0 *    970.   180. AG   177.     .3    .0 32.0
    6. 3B.AM_SB.Arr 3_Lns *    36.0    1000.0      36.0      30.0 *    970.   180. AG   636.     .3    .0 56.0
    7. 4A.AM_SB.Dep 4_Lns *      .0      30.0        .0   -1000.0 *   1030.   180. AG  1424.     .3    .0 68.0
    8. 5A.Ena_EB.Arr 1_ln * -1000.0      -5.0     -48.0      -5.0 *    952.    90. AG   200.     .3    .0 30.0
    9. 6A.Ena_EB.Dep 2_Lns *  -48.0      -5.0    1000.0      -5.0 *   1048.    90. AG   150.     .3    .0 40.0
   10. 7A.Kal_WB.Arr 1LTLn * 1000.0        .0      48.0        .0 *    952.   270. AG   720.     .3    .0 30.0
   11. 7B.Kal_WB.Arr 1RTLn * 1000.0      20.0      48.0      20.0 *    952.   270. AG   120.     .3    .0 30.0
   12. 7C.Kal_WB.Arr 1_Ln  * 1000.0      10.0      48.0      10.0 *    952.   270. AG   154.     .3    .0 30.0
   13. 8A.Kal_WB.Dep 1_Ln  *   48.0        .0   -1000.0        .0 *   1048.   270. AG   149.     .3    .0 30.0
   14. 11A.AM_NB.Arr Q1LTLn*     .0     -30.0        .0     -39.5 *     10.   180. AG     1.  100.0    .0 12.0  .03     .5
   15. 11B.AM_NB.Arr Q2_Lns*   12.0     -30.0      12.0    -214.1 *    184.   180. AG     1.  100.0    .0 12.0  .62    9.4
   16. 11C.AM_NB.Arr Q1RTLn*   36.0     -30.0      36.0    -219.8 *    190.   180. AG     0.  100.0    .0 12.0  .58    9.6
   17. 12A.AM_SB.Arr Q1LTLn*   48.0      30.0      48.0     125.1 *     95.   360. AG     1.  100.0    .0 12.0  .32    4.8
   18. 12B.AM_SB.Arr Q3_Lns*   36.0      30.0      36.0      89.1 *     59.   360. AG     1.  100.0    .0 12.0  .22    3.0
   19. 13A.Ena_EB.Arr Q1_Ln*  -48.0      -5.0    -457.6      -5.0 *    410.   270. AG     1.  100.0    .0 10.0 -.30   20.8
   20. 14A.Kal_WB.ArrQ1LTLn*   48.0        .0     308.5        .0 *    260.    90. AG     1.  100.0    .0 10.0  .85   13.2
   21. 14B.Kal_WB.ArrQ1RTLn*   48.0      20.0     102.0      20.0 *     54.    90. AG     0.  100.0    .0 10.0  .18    2.7
   22. 14C.Kal_WB.Arr Q1_Ln*   48.0      10.0     149.0      10.0 *    101.    90. AG     1.  100.0    .0 10.0  .36    5.1
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JOB: HHV PM EMISSIONS MODELING - WORST CASE                RUN: ALA MOANA AND ENA/KALIA INTERSECTION S3        PAGE  2

DATE : 10/ 9/ 1
TIME : 13:35:43

14. 11A.AM_NB.Arr Q1LTLn*    140     86     3.0     19     1600     .32    1     1
15. 11B.AM_NB.Arr Q2_Lns*    140     86     3.0    692     1600     .32    1     1
16. 11C.AM_NB.Arr Q1RTLn*    140     66     3.0    457     1600     .32    1     1
17. 12A.AM_SB.Arr Q1LTLn*    140     86     3.0    177     1600     .32    1     1
18. 12B.AM_SB.Arr Q3_Lns*    140     51     3.0    636     1600     .32    1     1
19. 13A.Ena_EB.Arr Q1_Ln*    140    194     3.0    200     1600     .32    1     1
20. 14A.Kal_WB.ArrQ1LTLn*    140     98     3.0    720     1600     .32    1     1
21. 14B.Kal_WB.ArrQ1RTLn*    140     78     3.0    120     1600     .32    1     1
22. 14C.Kal_WB.Arr Q1_Ln*    140     98     3.0    154     1600     .32    1     1

 RECEPTOR LOCATIONS
 -----------------

                             *        COORDINATES (FT)          *
   RECEPTOR                  *     X         Y          Z       *
-----------------------------*----------------------------------*
 1. R1  (NE CORNER 1_FL)     *     60.0      50.0       6.0     *
 2. R2  (NE CORNER 2_FL)     *     60.0      50.0      21.0     *
 3. R3  (SE CORNER 1_FL)     *     60.0     -50.0       6.0     *
 4. R4  (SE CORNER 2_FL)     *     60.0     -50.0      21.0     *
 5. R5  (NW CORNER 1_FL)     *    -60.0      50.0       6.0     *
 6. R6  (NW CORNER 2_FL)     *    -60.0      50.0      21.0     *
 7. R7  (SW CORNER 1_FL)     *    -60.0     -50.0       6.0     *
 8. R8  (SW CORNER 2_FL)     *    -60.0     -50.0      21.0     *
 9. R9  (NE 150 FT 1_FL)     *    150.0     150.0       6.0     *
10. R10(NE 150 FT 2_FL)      *    150.0     150.0      21.0     *
11. R11(SE 150 FT 1_FL)      *    150.0    -150.0       6.0     *
12. R12(SE 150 FT 2_FL)      *    150.0    -150.0      21.0     *
13. R13(NW 150 FT 1_FL)      *   -150.0     150.0       6.0     *
14. R14(NW 150 FT 2_FL)      *   -150.0     150.0      21.0     *
15. R15(SW 150 FT 1_FL)      *   -150.0    -150.0       6.0     *
16. R16(SW 150 FT 2_FL)      *   -150.0    -150.0      21.0     *
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PAGE 3

JOB: HHV PM EMISSIONS MODELING - WORST CASE RUN: ALA MOANA AND ENA/KALIA INTERSECTION S3

MODEL RESULTS
WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
	*	CONCENTRATION (ug/m**3)															
0.	*	18.	11.	19.	15.	6.	5.	10.	8.	2.	2.	7.	7.	1.	1.	4.	4.
10.	*	11.	6.	15.	11.	9.	8.	14.	11.	1.	1.	5.	5.	3.	3.	6.	6.
20.	*	5.	2.	11.	8.	10.	9.	17.	12.	0.	0.	4.	4.	5.	5.	8.	7.
30.	*	2.	1.	10.	7.	10.	8.	17.	12.	0.	0.	4.	4.	5.	5.	9.	8.
40.	*	1.	0.	10.	7.	9.	7.	19.	13.	0.	0.	4.	4.	5.	5.	10.	9.
50.	*	1.	0.	10.	8.	9.	6.	20.	13.	0.	0.	4.	4.	5.	4.	11.	10.
60.	*	1.	0.	10.	8.	9.	6.	21.	14.	0.	0.	4.	4.	5.	4.	13.	12.
70.	*	1.	1.	10.	9.	10.	7.	23.	16.	0.	0.	3.	3.	4.	4.	13.	12.
80.	*	3.	3.	9.	8.	12.	9.	24.	17.	0.	0.	2.	2.	5.	4.	13.	11.
90.	*	7.	6.	6.	5.	16.	12.	22.	15.	1.	1.	1.	1.	6.	6.	11.	9.
100.	*	10.	9.	2.	2.	19.	14.	19.	12.	3.	2.	0.	0.	8.	7.	10.	8.
110.	*	12.	10.	1.	1.	19.	14.	17.	11.	4.	3.	0.	0.	10.	9.	9.	8.
120.	*	12.	9.	0.	0.	19.	13.	17.	11.	4.	4.	0.	0.	10.	9.	9.	8.
130.	*	12.	9.	0.	0.	19.	13.	18.	12.	4.	4.	0.	0.	10.	9.	9.	8.
140.	*	11.	8.	0.	0.	20.	15.	19.	14.	4.	4.	0.	0.	11.	10.	9.	9.
150.	*	11.	8.	1.	0.	23.	17.	20.	16.	4.	4.	0.	0.	12.	11.	10.	9.
160.	*	13.	9.	3.	2.	24.	19.	20.	17.	4.	4.	0.	0.	12.	11.	9.	9.
170.	*	19.	13.	8.	7.	22.	19.	18.	16.	5.	5.	1.	1.	9.	9.	6.	6.
180.	*	28.	20.	18.	15.	15.	13.	12.	10.	9.	8.	3.	3.	5.	5.	3.	3.
190.	*	33.	24.	25.	20.	8.	7.	5.	4.	13.	12.	7.	7.	3.	3.	1.	1.
200.	*	32.	22.	28.	21.	5.	4.	1.	1.	16.	14.	10.	9.	2.	2.	0.	0.
210.	*	29.	18.	26.	18.	4.	3.	0.	0.	15.	14.	11.	10.	2.	2.	0.	0.
220.	*	26.	15.	25.	16.	4.	3.	0.	0.	13.	12.	10.	9.	2.	2.	0.	0.
230.	*	24.	12.	23.	13.	4.	3.	0.	0.	11.	10.	10.	9.	2.	2.	0.	0.
240.	*	24.	12.	22.	12.	4.	4.	0.	0.	10.	9.	10.	8.	2.	2.	0.	0.
250.	*	23.	11.	21.	11.	5.	4.	0.	0.	8.	7.	10.	8.	2.	1.	0.	0.
260.	*	22.	10.	22.	11.	4.	4.	1.	1.	7.	6.	10.	9.	1.	1.	0.	0.
270.	*	20.	8.	24.	12.	2.	2.	3.	3.	6.	5.	11.	9.	0.	0.	0.	0.
280.	*	17.	6.	25.	13.	1.	1.	5.	4.	6.	5.	12.	10.	0.	0.	1.	1.
290.	*	17.	6.	23.	13.	0.	0.	5.	4.	5.	4.	12.	11.	0.	0.	2.	2.
300.	*	17.	6.	22.	12.	0.	0.	5.	4.	6.	5.	12.	11.	0.	0.	2.	2.
310.	*	17.	7.	20.	11.	0.	0.	5.	4.	6.	5.	11.	10.	0.	0.	2.	2.
320.	*	19.	9.	18.	11.	0.	0.	4.	3.	6.	6.	11.	10.	0.	0.	2.	2.
330.	*	20.	11.	19.	12.	0.	0.	4.	3.	7.	6.	11.	10.	0.	0.	2.	2.
340.	*	21.	13.	20.	14.	1.	0.	4.	3.	6.	6.	11.	10.	0.	0.	2.	2.
350.	*	21.	14.	21.	16.	2.	2.	6.	5.	5.	5.	10.	9.	0.	0.	2.	2.
360.	*	18.	11.	19.	15.	6.	5.	10.	8.	2.	2.	7.	7.	1.	1.	4.	4.
MAX	*	33.	24.	28.	21.	24.	19.	24.	17.	16.	14.	12.	11.	12.	11.	13.	12.
DEGR.	*	190	190	200	200	160	160	80	160	200	200	290	300	160	160	70	70

THE HIGHEST CONCENTRATION OF 33. ug/m**3 OCCURRED AT RECEPTOR REC1 .

JOB: HHV PM EMISSIONS MODELING - WORST CASE RUN: ALA MOANA AND ENA/KALIA INTERSECTION S3 PAGE 4

DATE : 10/ 9/ 1
TIME : 13:35:43

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

PM/LNK(ug/m**3)
ANGLE (DEGREES)

LINK #	REC1 190	REC2 190	REC3 200	REC4 200	REC5 160	REC6 160	REC7 80	REC8 160	REC9 200	REC10 200	REC11 290	REC12 300	REC13 160	REC14 160	REC15 70	REC16 70
1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.0	.0	.1	.1	.0	.0
2	4.7	4.3	5.9	4.7	3.8	3.5	2.2	3.8	2.3	2.2	2.0	1.5	2.1	2.1	1.7	1.5
3	3.3	3.0	6.0	3.6	2.1	2.0	.9	2.0	1.5	1.4	1.4	1.2	1.2	1.2	.9	.8
4	.5	.3	.0	.0	1.3	.7	1.5	.0	.3	.2	.3	.7	.3	.2	.3	.2
5	1.1	.0	.0	.0	.0	.0	.0	.0	.1	.1	.0	.0	.0	.0	.0	.0
6	2.2	.0	.0	.0	.0	.0	.1	.0	.2	.2	.0	.1	.0	.0	.1	.1
7	12.1	10.2	13.0	10.1	12.6	10.1	9.5	10.1	5.9	5.6	5.2	4.2	5.9	5.6	5.2	4.3
8	.0	.0	.0	.0	.4	.2	.0	.0	.0	.0	.6	.4	.4	.4	.0	.0
9	.9	.5	.0	.0	.6	.4	1.4	.0	.4	.4	.1	.2	.1	.1	.6	.5
10	2.3	1.3	.0	.0	.0	.0	3.9	.0	1.6	1.4	.0	.1	.0	.0	2.1	2.0
11	.7	.2	.0	.0	.0	.0	.6	.0	.3	.3	.0	.0	.0	.0	.3	.3
12	.6	.3	.0	.0	.0	.0	.8	.0	.4	.3	.0	.0	.0	.0	.4	.4
13	.4	.2	.0	.0	.9	.6	.2	.0	.1	.1	.5	.5	.4	.4	.1	.1
14	.0	.0	.0	.0	.0	.0	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0
15	1.1	1.0	1.4	1.2	1.0	1.0	.8	.7	.5	.4	.8	.7	.4	.3	.7	.7
16	.6	.5	1.1	.9	.3	.3	.2	.1	.2	.2	.4	.3	.1	.1	.2	.2
17	.5	.1	.0	.0	.0	.0	.0	.0	.1	.1	.0	.0	.0	.0	.0	.0
18	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.0	.0	.0	.0	.0	.0
19	.0	.0	.0	.0	.5	.4	.0	.0	.0	.0	.8	.7	.7	.7	.0	.0
20	1.0	.8	.0	.0	.0	.0	1.2	.0	.8	.7	.0	.0	.0	.0	.6	.6
21	.7	.4	.0	.0	.0	.0	.1	.0	.2	.1	.0	.0	.0	.0	.0	.0
22	.6	.5	.0	.0	.0	.0	.3	.0	.4	.3	.0	.0	.0	.0	.1	.1

APPENDIX E
EMISSION CALCULATION WORKSHEETS

Operational Emissions

Indirect Emissions

Appendix E
Hotel Emissions (Combustion Sources) per Year

Pollutant	Tons/year
Carbon Monoxide	0.21
Reactive Organic Carbon	0.06
Nitrogen Oxides	1.26
Sulfur Oxides	0.00
Particulate Matter <10 μg	0.00

Appendix E
Power Plant (Indirect) Emissions per Year

Pollutant	Tons/year
Carbon Monoxide	0.43
Reactive Organic Carbon	0.02
Nitrogen Oxides	2.47
Sulfur Oxides	0.26
Particulate Matter <10 μg	0.23

HILTON HAWAII VILLAGE - WAIKIKIAN DEVELOPMENT PLAN

AIR EMISSION CALCULATIONS 4/16/01

OPERATION OF HOTEL COMPLEX - ANNUAL ESTIMATED NATURAL GAS CONSUMPTION & EMISSIONS

EMISSIONS GENERATED AT HOTEL COMPLEX (Boiler, Spa, Laundry)

Area Summary	Square feet	Natural Gas Consumption Factor (cubic feet/ft2/month)	Total CF/month	CO factor (#/MCF)	CO (ton/yr)	ROC Factor (#/MCF)	ROC (ton/yr)	Nox Factor (#/MCF)	Nox (ton/yr)	Sox Factor (#/MCF)	Sox/yr (ton/yr)	PM10 Factor (#/MCF)	PM10 (ton/yr)
1- BR	55,404	4.8	265939	20	0.03	5.3	0.01	120	0.19	0	0.00	0.2	0.00
2 - BR	266,814	4.8	1280707	20	0.15	5.3	0.04	120	0.92	0	0.00	0.2	0.00
3 - BR	14,580	4.8	69984	20	0.01	5.3	0.00	120	0.05	0	0.00	0.2	0.00
Resturant	2,500	4.8	12000	20	0.00	5.3	0.00	120	0.01	0	0.00	0.2	0.00
Retail Shops	13,600	2.9	39440	20	0.00	5.3	0.00	120	0.03	0	0.00	0.2	0.00
Other	8970	2.9	26013	20	0.00	5.3	0.00	120	0.02	0	0.00	0.2	0.00
Offices	25,770	2	51540	20	0.01	5.3	0.00	120	0.04	0	0.00	0.2	0.00
Garage	50,300	0	0	20	0.00	5.3	0.00	120	0.00	0	0.00	0.2	0.00
TOTAL			**1745623**		**0.21**		**0.06**		**1.26**		**0.00**		**0.00**

MCF/YR **20.95**

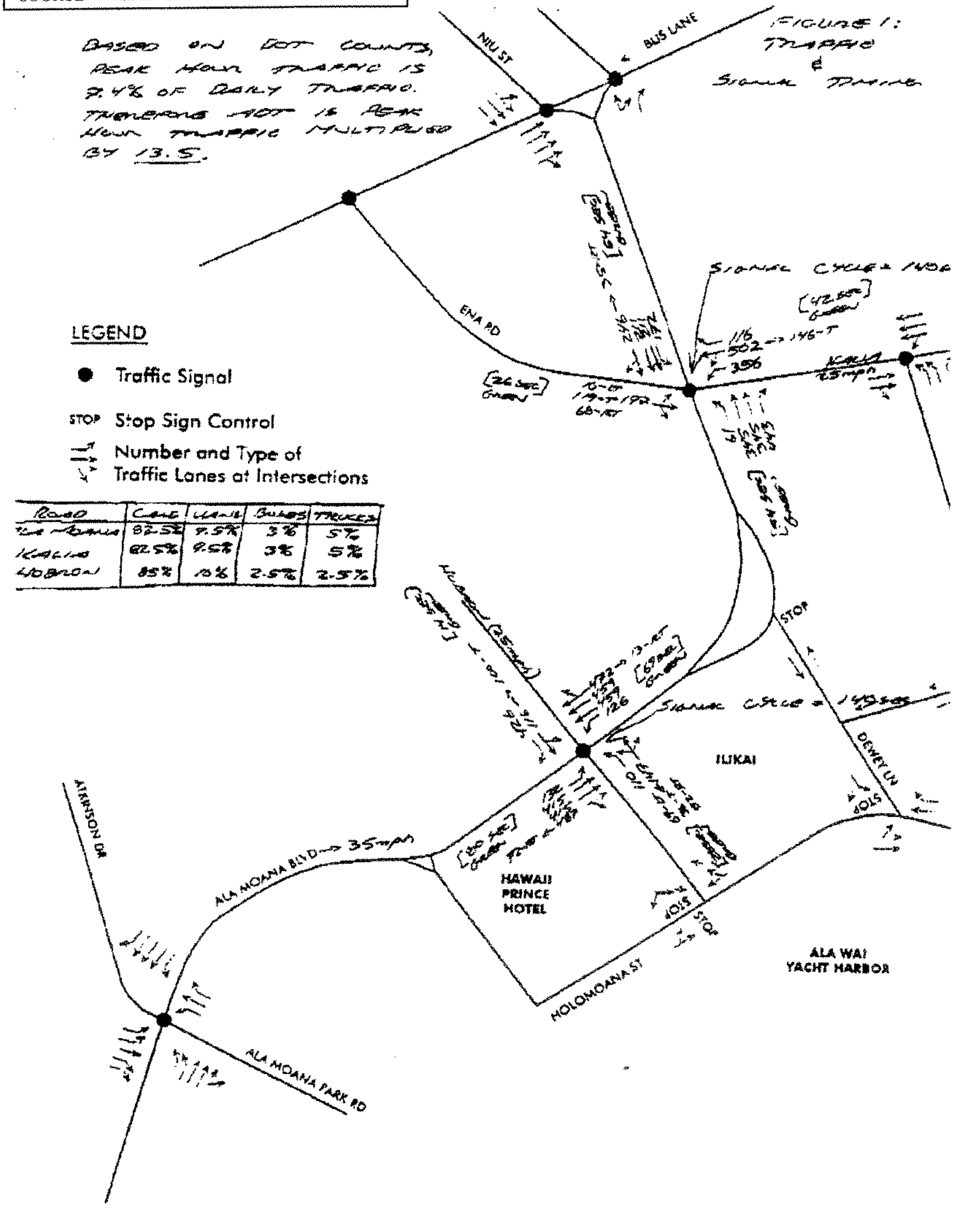
South Coast Air Quality Management District- CEQA 1993
Tables A9-12, A9-12A, A9-12-B

APPENDIX F

FIGURE 1 AND 2

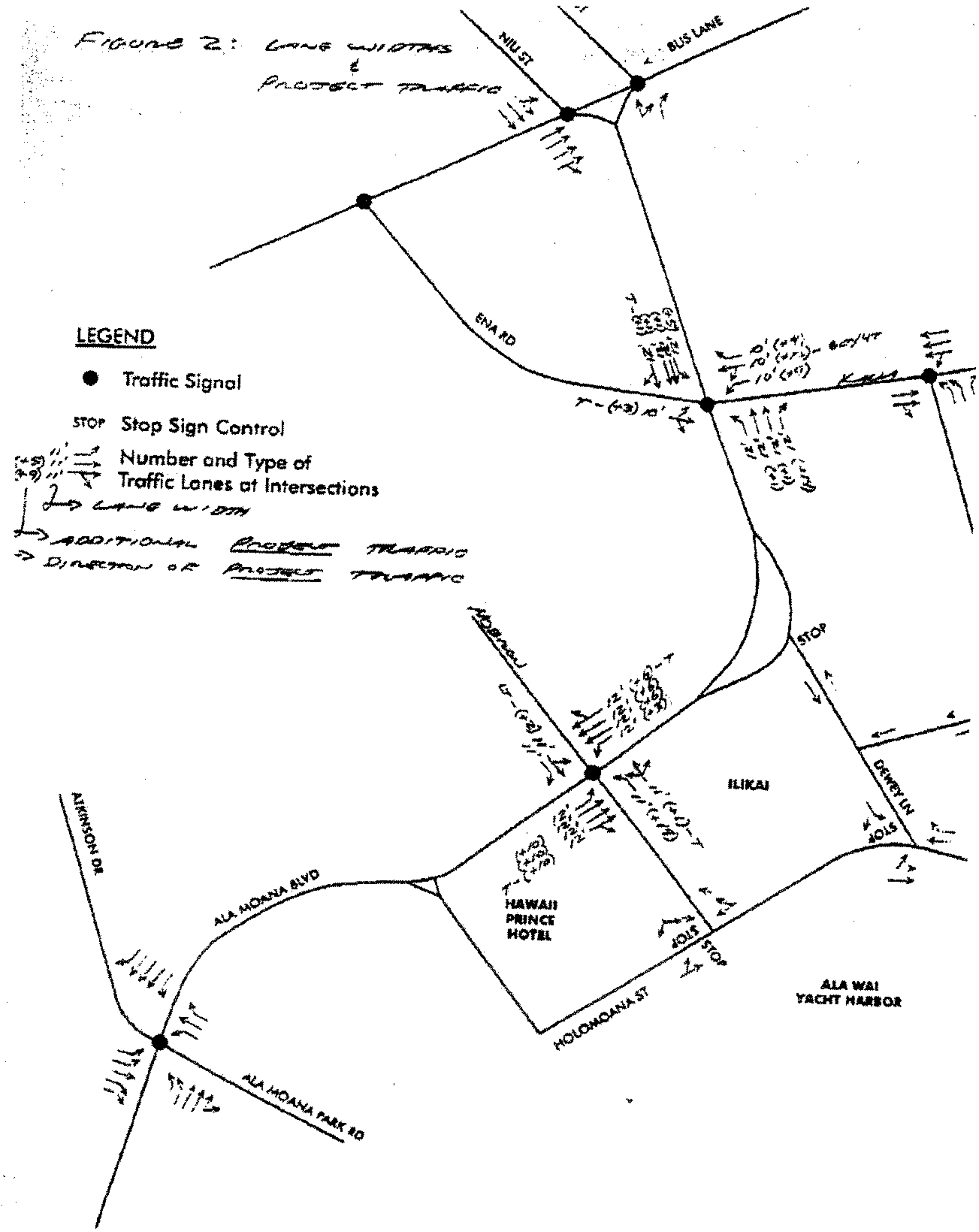
Lane Widths and Existing/Proposed Traffic from Wilber Smith and Associates

FIGURE 1, EXISTING TRAFFIC COUNTS
SOURCE: WILBER SMITH AND ASSOCIATES

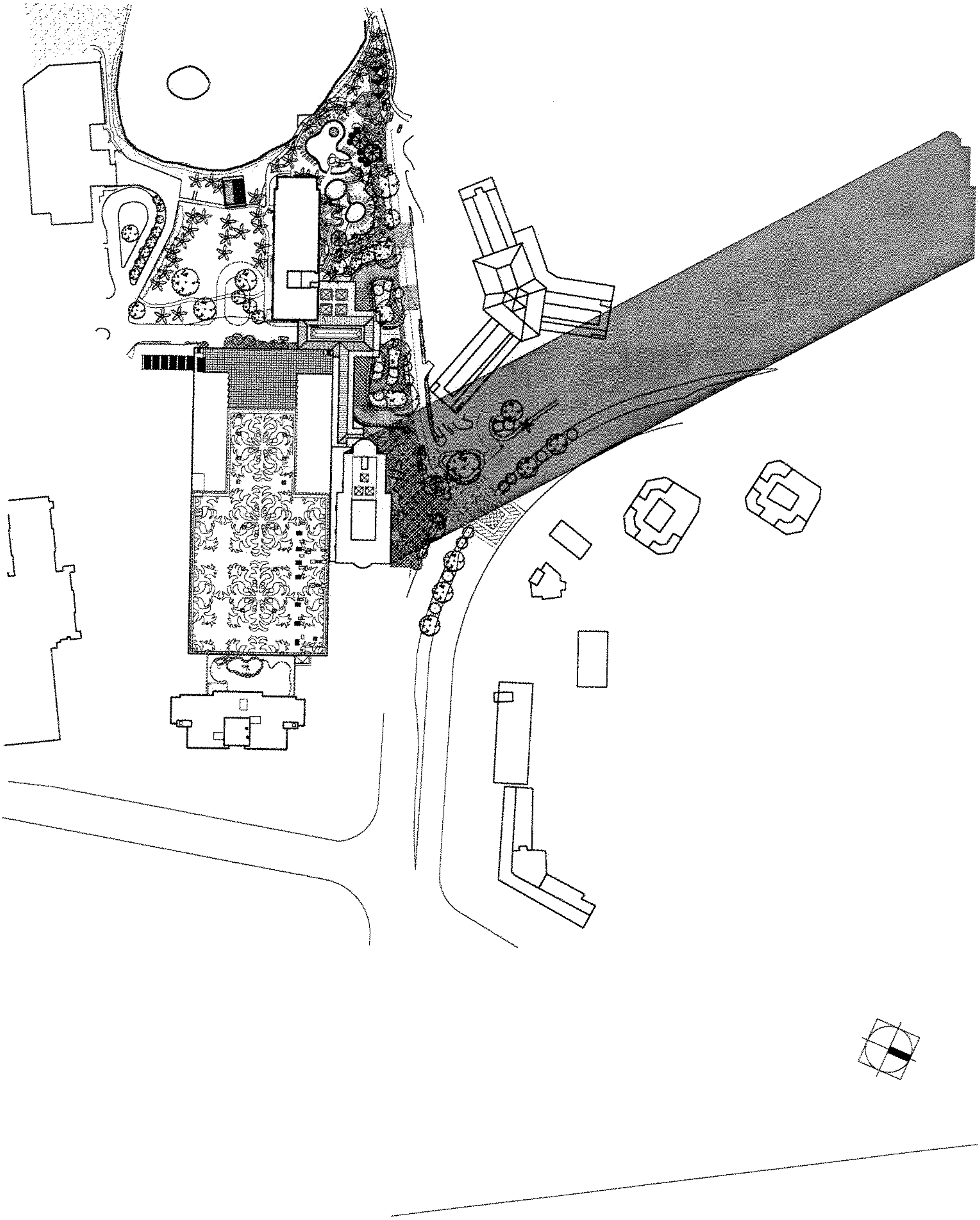


Road	Cars	Vans	Buses	Trucks
Ala Moana	82.5%	9.5%	3%	5%
Kalia	82.5%	9.5%	3%	5%
Hobron	85%	10%	2.5%	2.5%

FIGURE 2, PROJECTED TRAFFIC COUNTS
SOURCE: WILBER SMITH AND ASSOCIATES



Appendix G
Shadow Analysis

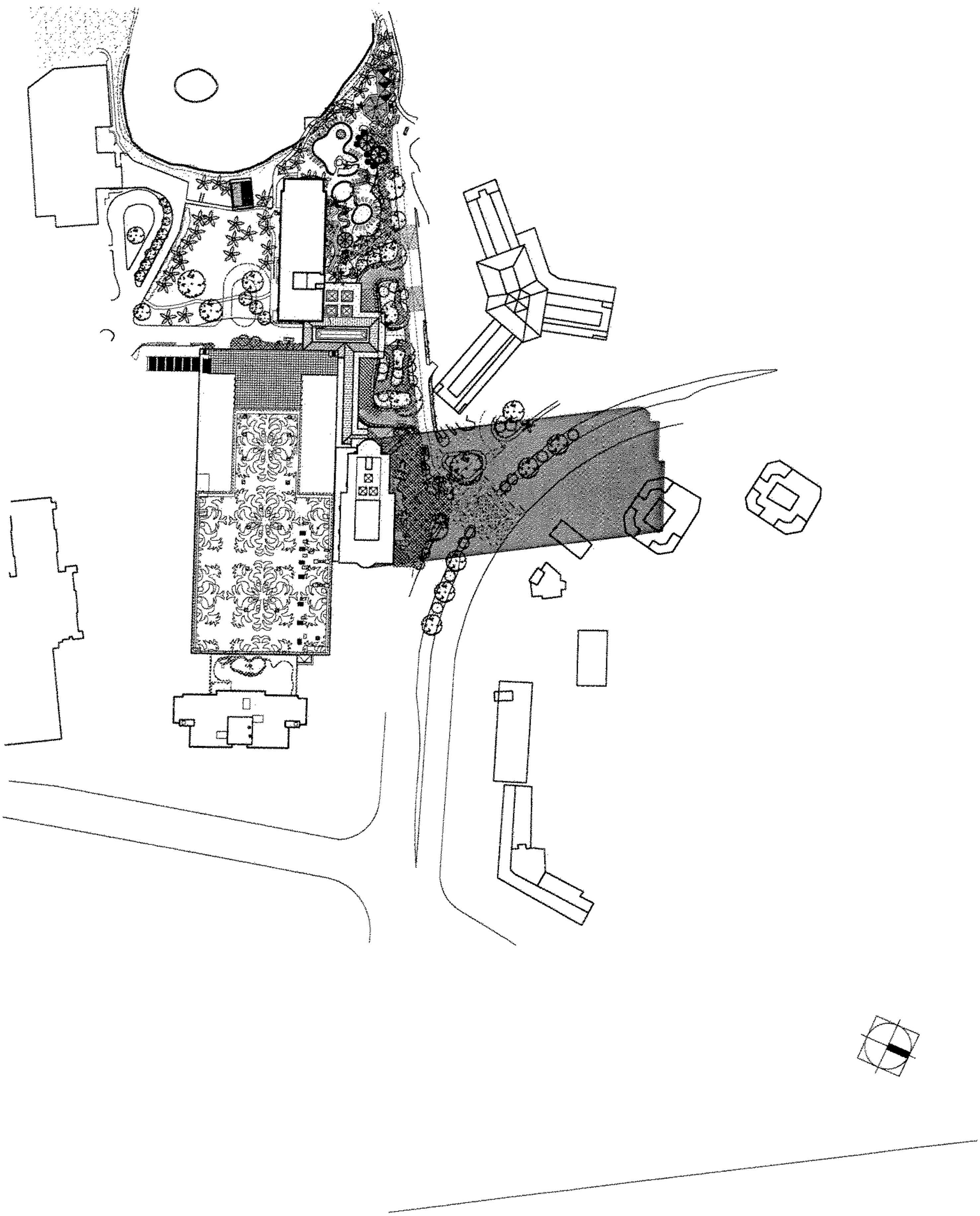


SHADOW STUDY 21 Dec @ 0800

1:2500

A–10

WAIKIKIAN



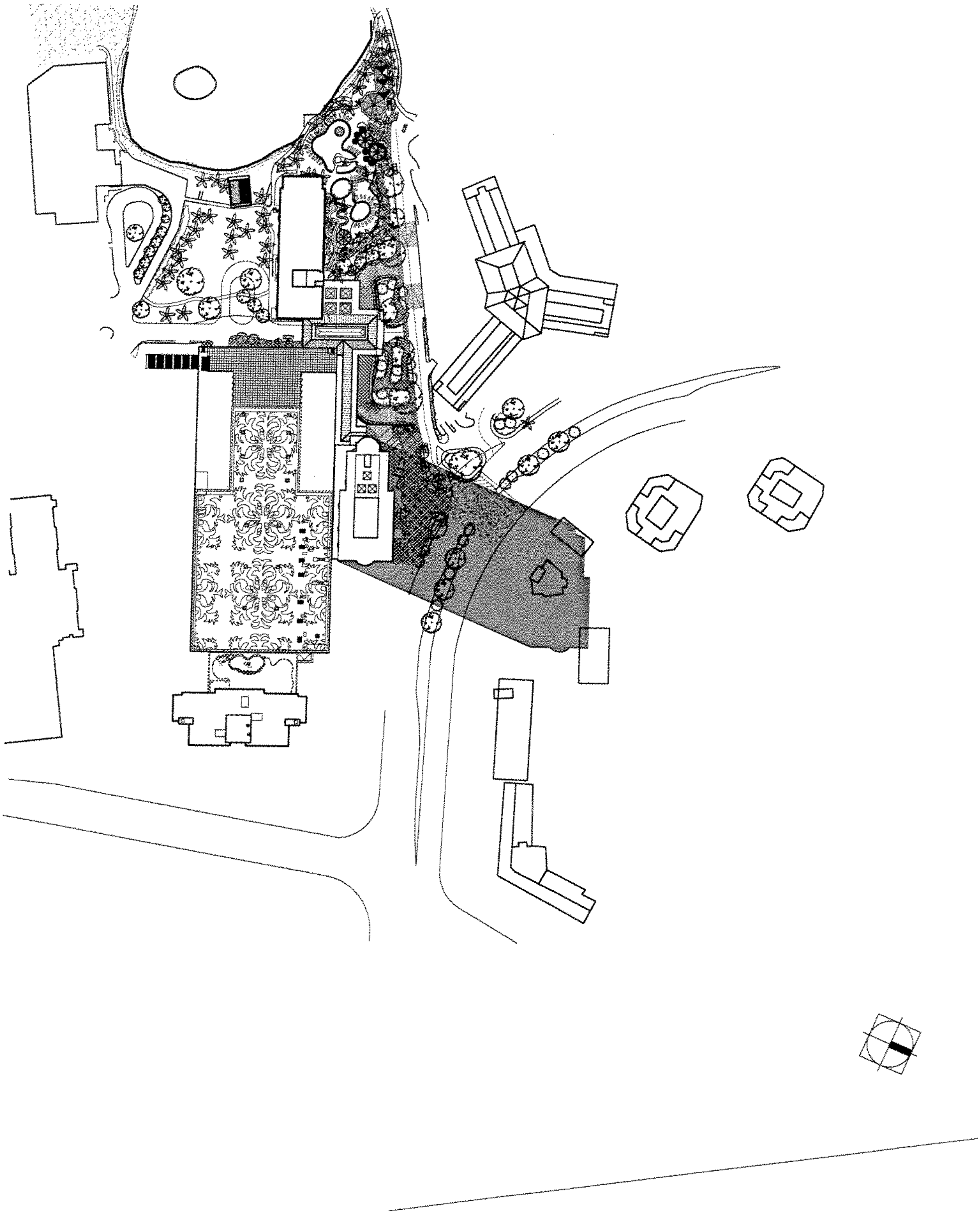
WATG

SHADOW STUDY 21 Dec @ 1000

1:2500

A-11

WAIKIKIAN

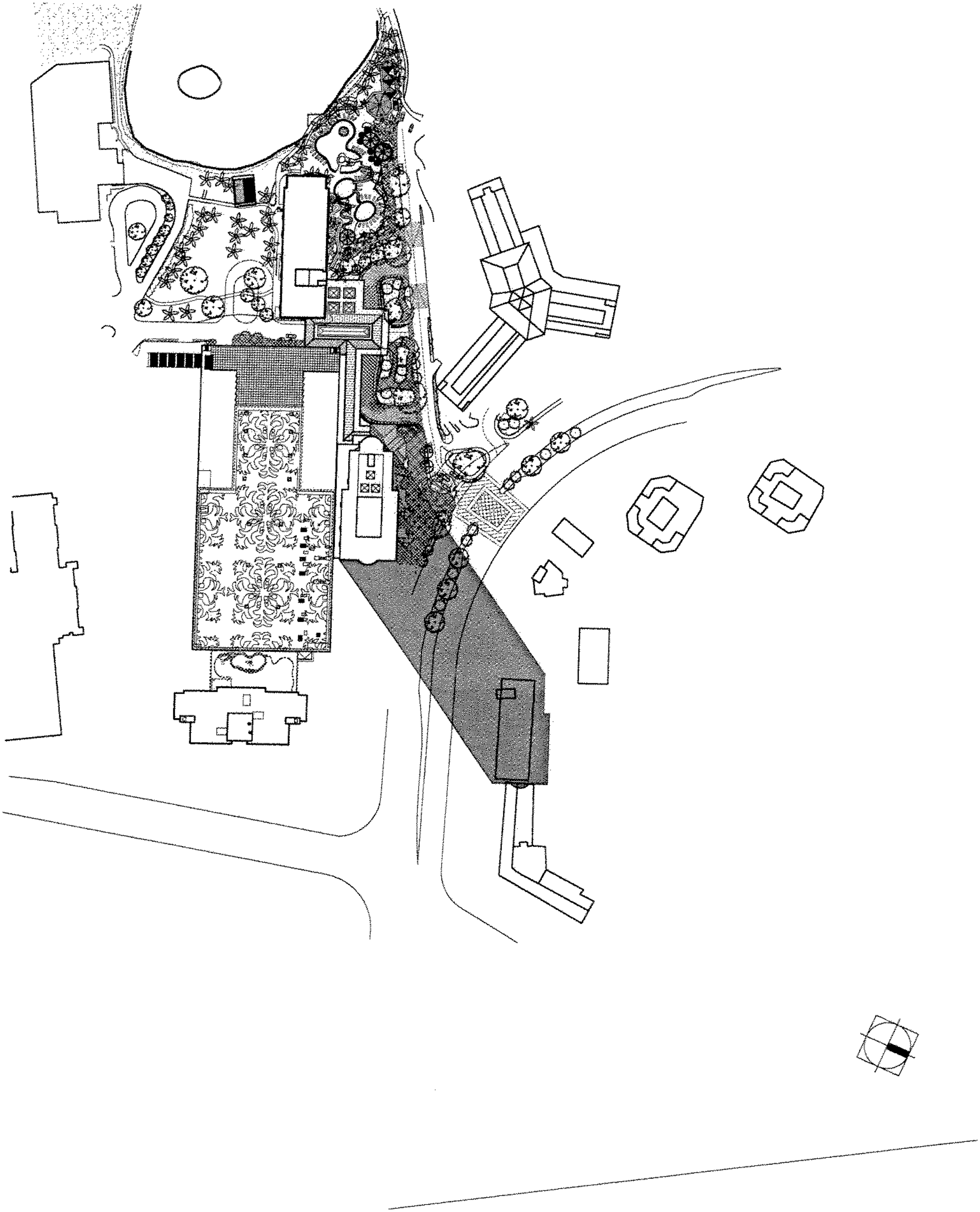


SHADOW STUDY 21 Dec @ 1200

1:2500

A–12

WAIKIKIAN



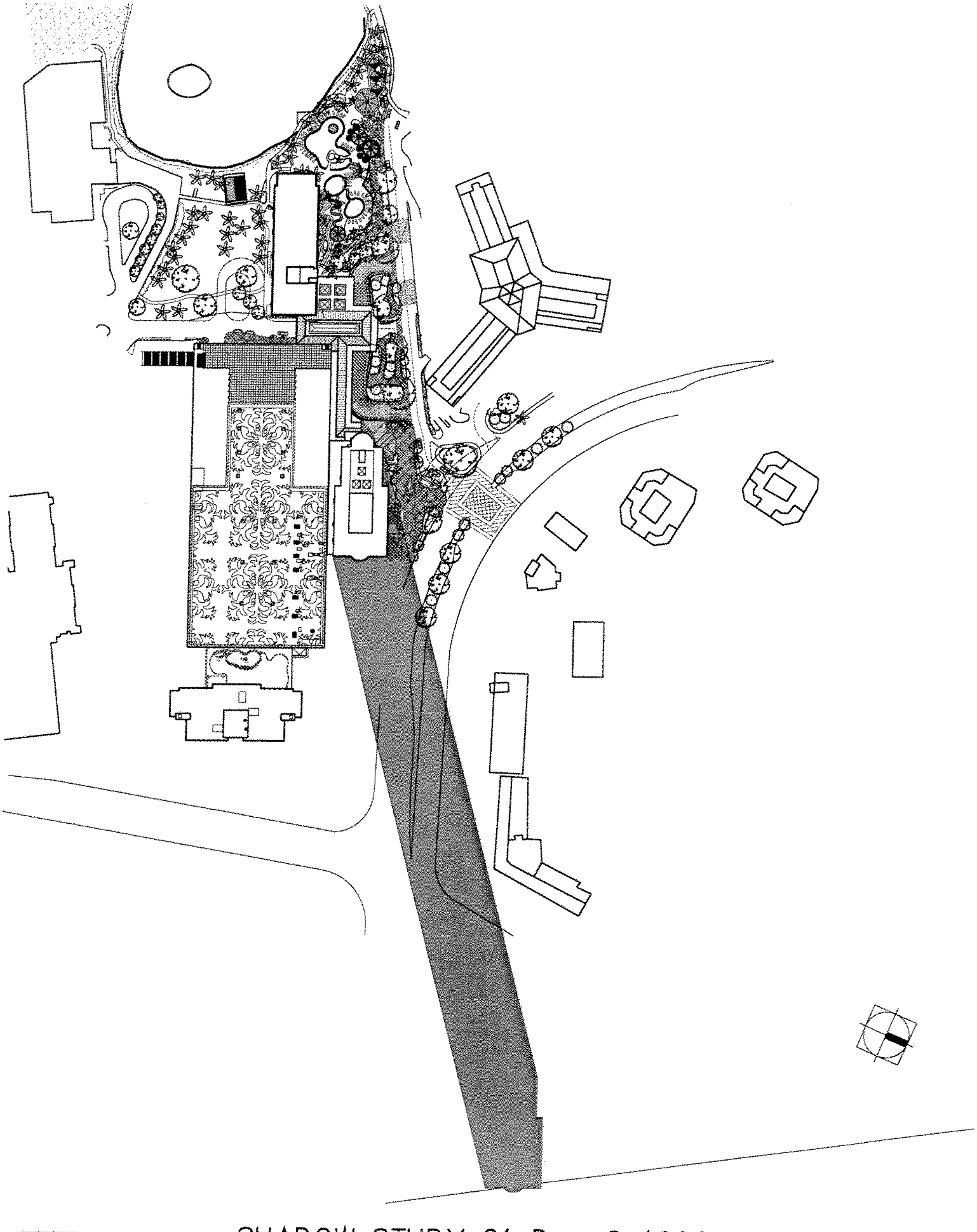
WATG

SHADOW STUDY 21 Dec @ 1400

1:2500

A-13

WAIKIKIAN

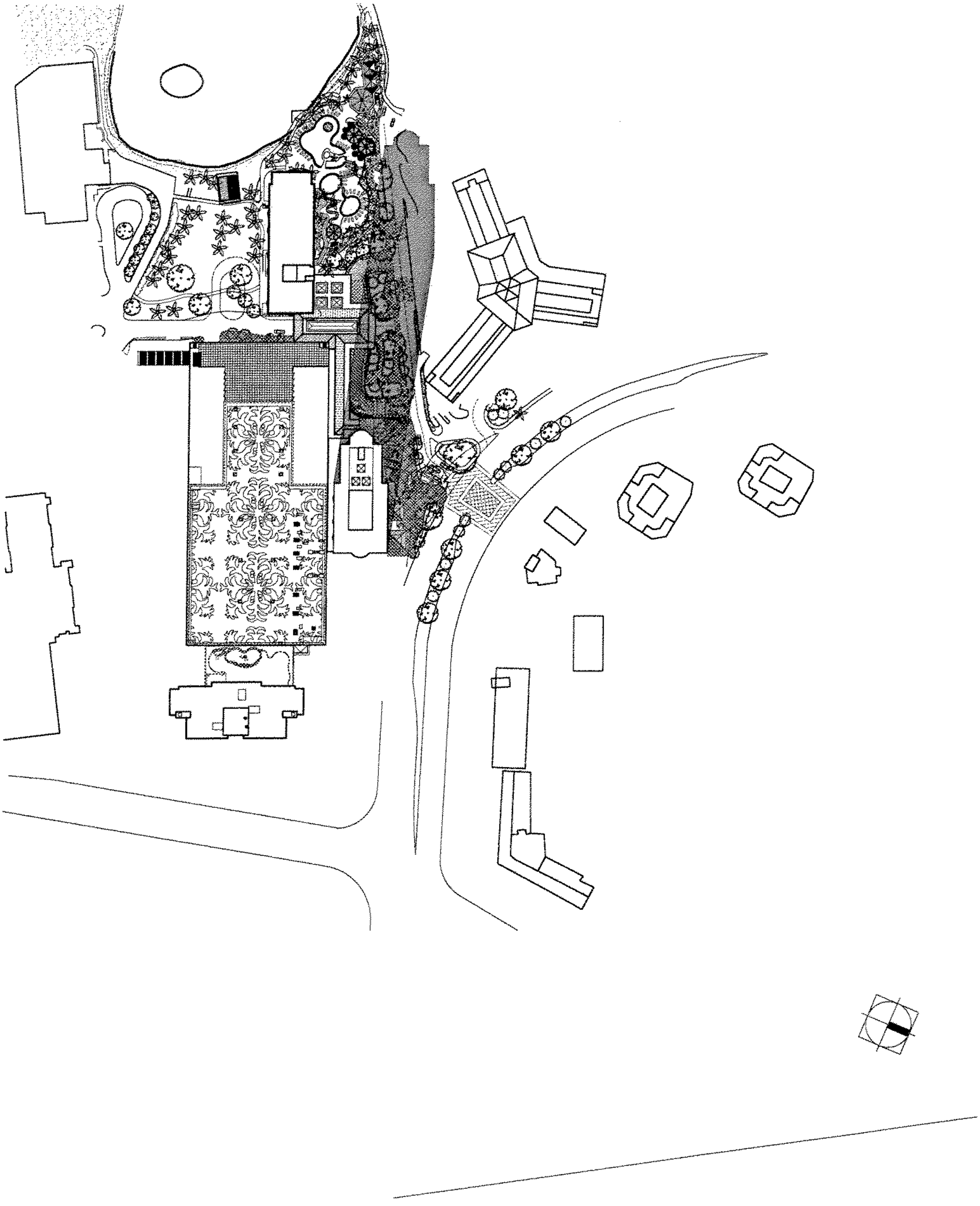


SHADOW STUDY 21 Dec @ 1600

1:2500

A-14

WAIKIKIAN

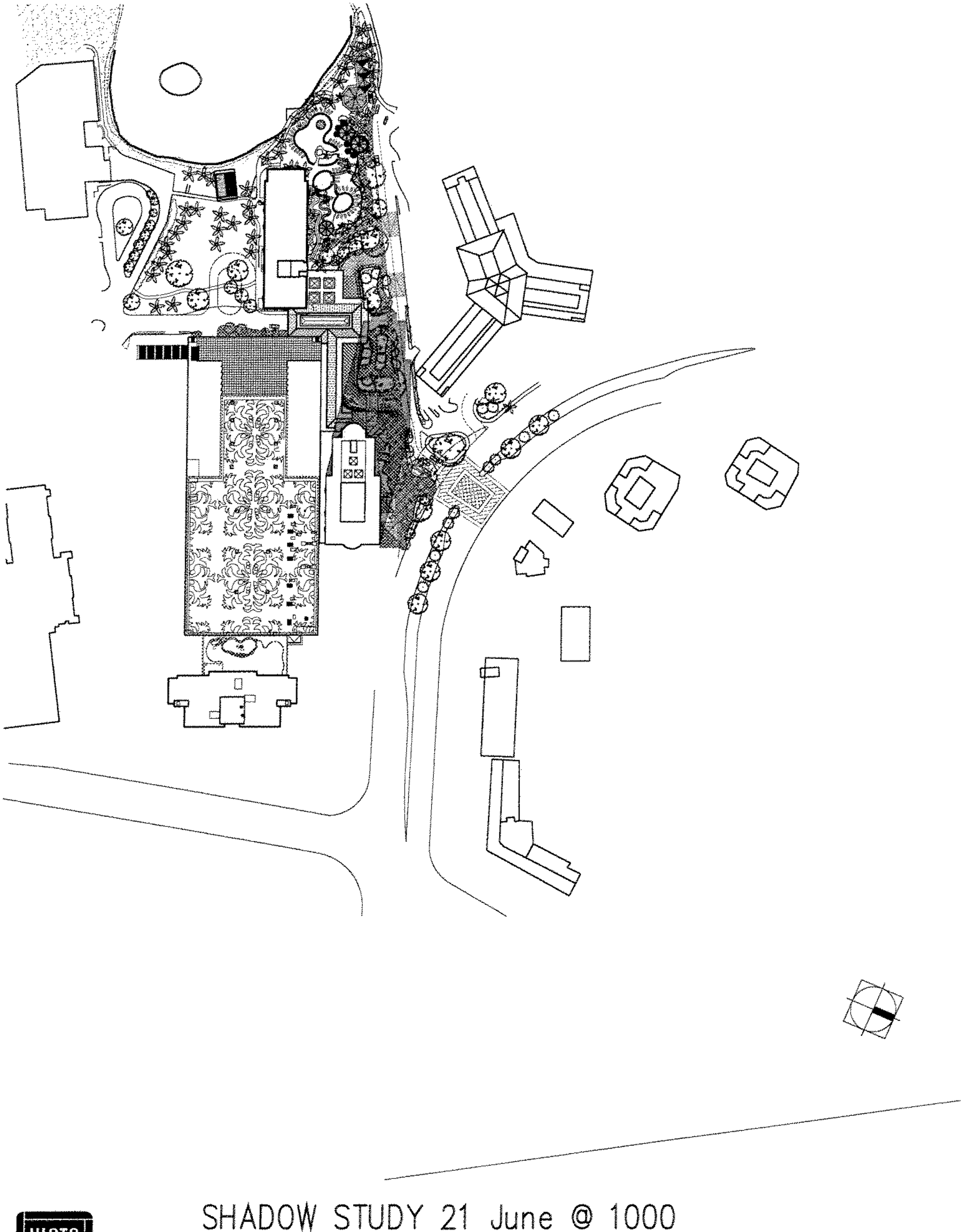


SHADOW STUDY 21 June @ 0800

1:2500

A–15

WAIKIKIAN

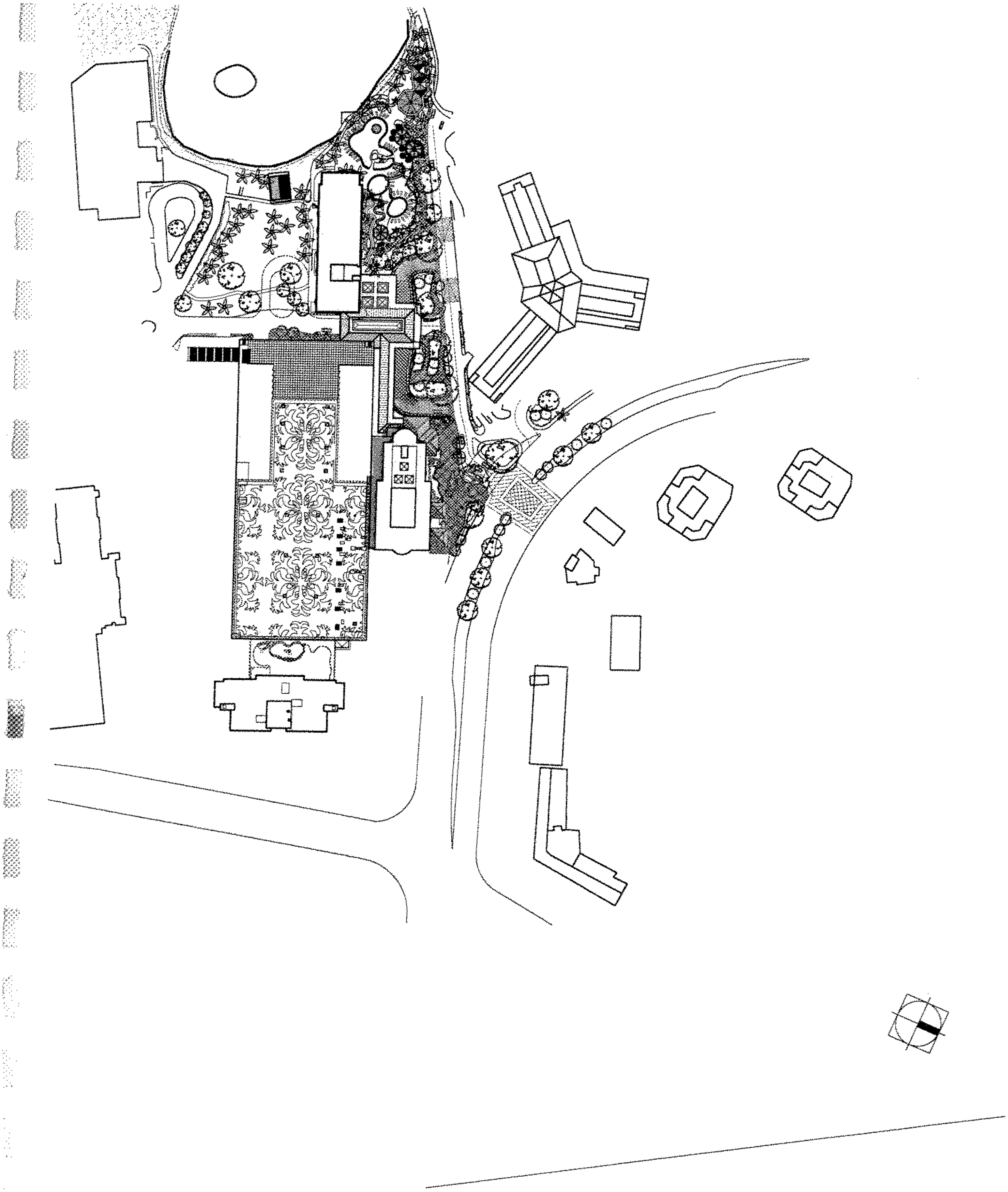


SHADOW STUDY 21 June @ 1000

1:2500

A-16

WAIKIKIAN

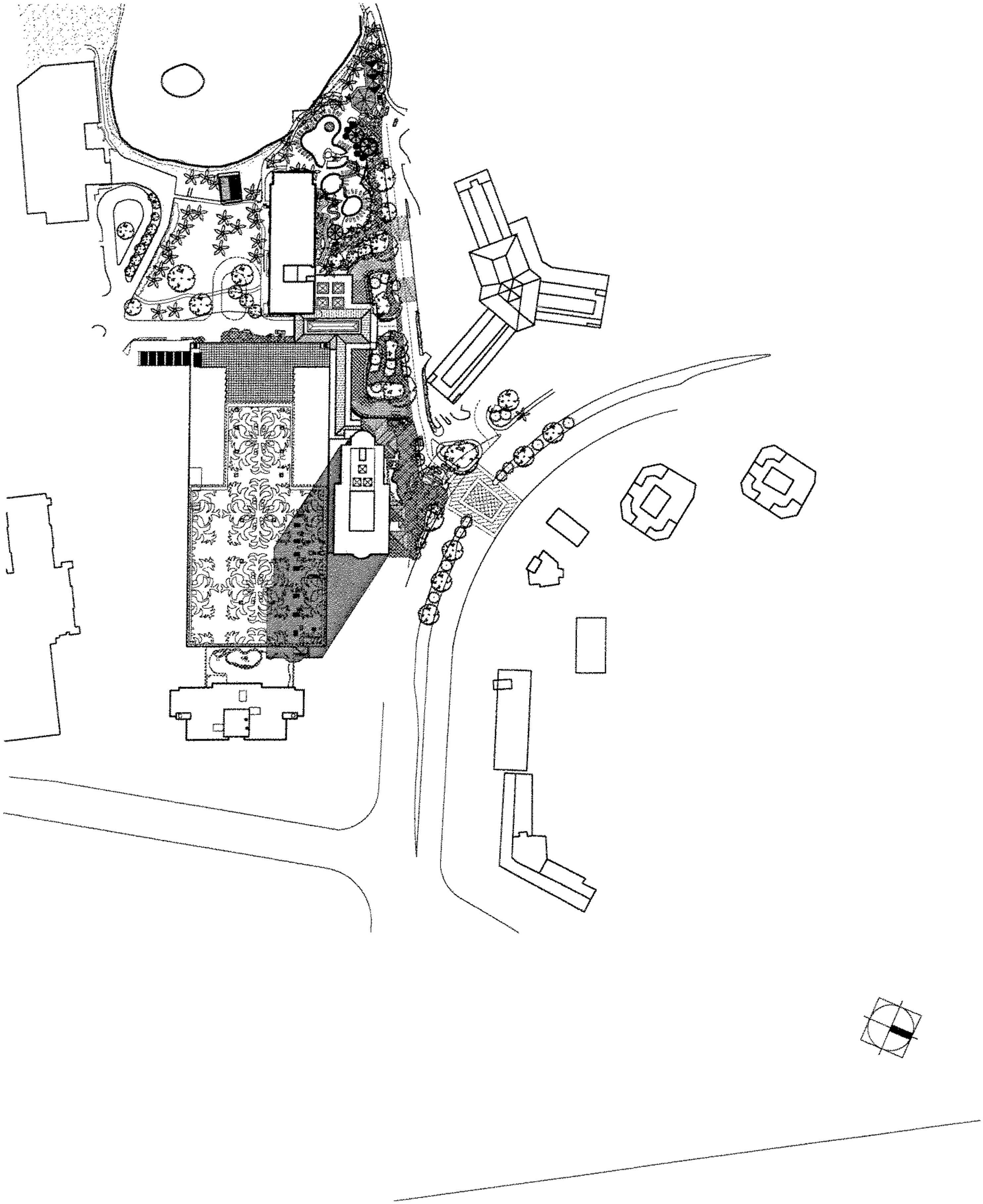


SHADOW STUDY 21 June @ 1200

1:2500

A-17

WAIKIKIAN

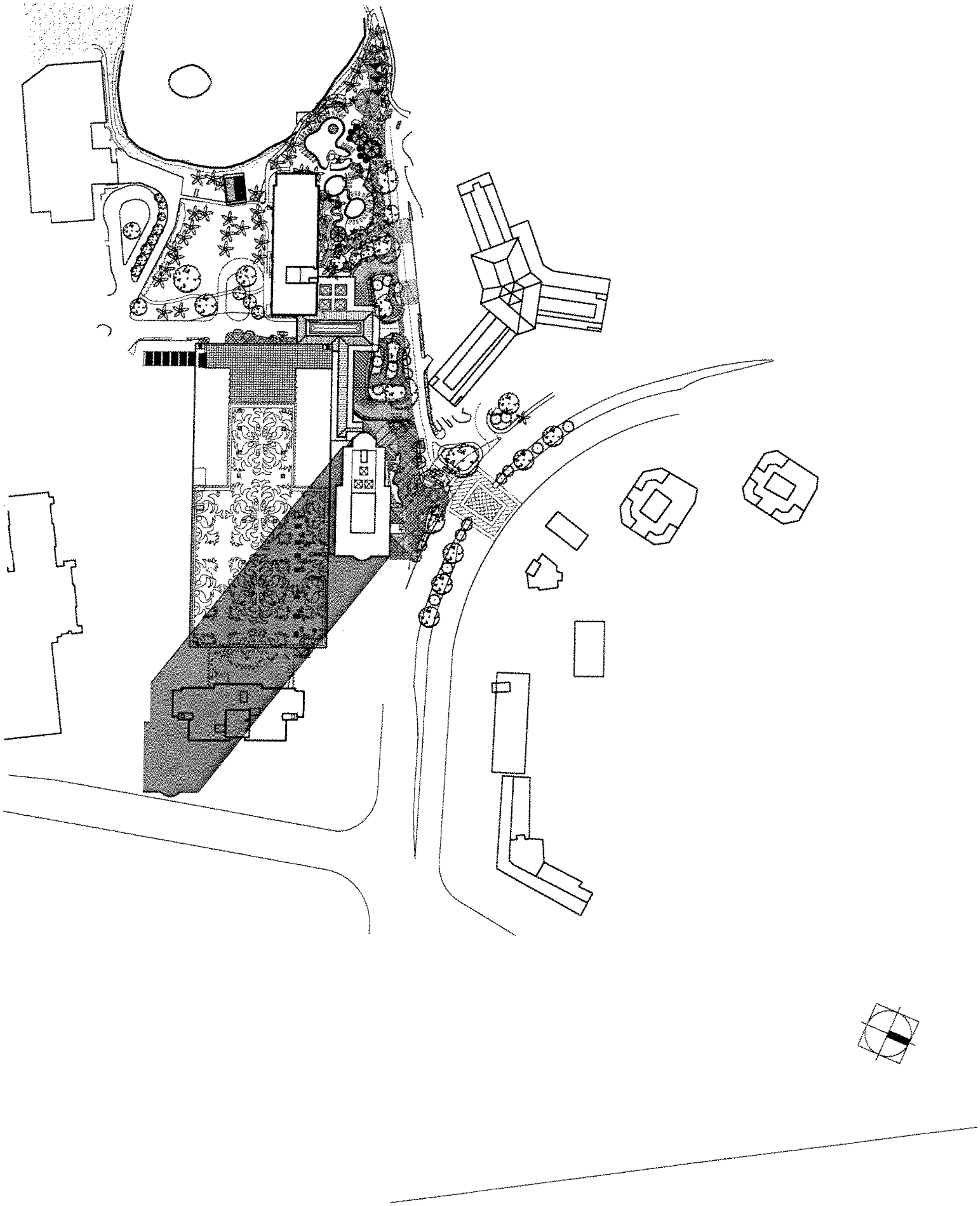


SHADOW STUDY 21 June @ 1400

1:2500

A-18

WAIKIKIAN



WATG

SHADOW STUDY 21 June @ 1600

1:2500

A-19

WAIKIKIAN

Appendix H
Wind Study Update

RWDI

SUPPLEMENTARY PEDESTRIAN WIND ASSESSMENT FOR THE PROPOSED HILTON HAWAIIAN VILLAGE - WAIKIKIAN HOTEL HONOLULU, HAWAII

Project Number: 01-533B

Date: October 18, 2001

Project Team: Rowan Williams Davies & Irwin, Inc.
Project Engineer - Hanqing Wu, Ph.D., P.Eng.
Project Manager - Will W. Kochanski, P. Eng.
Project Director - Bill F. Waechter, CET, Associate

Submitted To: Belt Collins Hawaii Ltd.

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Email: info@rwdi.com
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1. INTRODUCTION

Rowan Williams Davies & Irwin Inc. (RWDI) was retained by Belt Collins Hawaii Ltd. in May 2001 to initially conduct a wind-tunnel study to determine the existing and potential pedestrian wind conditions around the site of the proposed Hilton Hawaiian Village - Waikikian Hotel in Honolulu, Hawaii. The final report for that study was submitted by RWDI to Belt Collins Hawaii Ltd. on June 18, 2001 (Ref. 1).

On October 5, 2001, Mr. Lee Sichter of Belt Collins Hawaii Ltd. indicated, in a fax to RWDI, that the current Preferred Alternative for the tower of this proposed development is to rotate the tower 90 degrees from what was originally tested in our wind tunnel. Drawings, provided by Mr. Christopher Walling of Wimberly Allison Tong & Goo on October 9, 2001 (Ref. 2), illustrate the revised design (refer to Figure 1). The orientation of the proposed tower in the rotated position is similar to a previous RWDI study of this same development site, on which RWDI conducted a wind-tunnel study for KOP Hawaii Inc. in August 1990 (Ref. 3).

Based on the above-mentioned information and on our experience and understanding of wind flow around buildings in this area, the wind impact of the proposed tower rotation was assessed through a desk-top analysis. This report provides an assessment of our findings and is a supplement to the RWDI report (Project #01-533) dated June 18, 2001.

2. SITE INFORMATION

Figure 1 shows a site plan with major surrounding buildings identified and pedestrian areas around the development site, as per the recent design proposal. The proposed Waikikian Hotel tower is to be located on the south side of Dewey Lane at the intersection with Ala Moana Boulevard.

Long-term wind data, gathered from the Honolulu International Airport between 1949 and 1999, were analysed to determine the wind directions that prevail at the site. The wind roses in Figure 2 display the frequency of wind directions for the summer (May through October) and winter (November through April). Winds from the east-northeast, northeast and east directions are dominant in both seasons.

3. WIND COMFORT CRITERIA

Pedestrian wind comfort criteria developed at RWDI used in this study are the same as those applied in previous studies (Refs. 1 and 3). They are categorized by three typical pedestrian activities:

- **Sitting:** Low wind speeds when one could read a newspaper without having it blown away. Suitable for outdoor cafes and other sitting areas - typically gust speeds up to 11 mph at the pedestrian level.

- **Standing:** Slightly higher wind speeds that would be strong enough to rustle leaves. These winds speeds are typically comfortable at building entrances, bus stops or other areas where people may want to linger but not necessarily sit for extended periods of time - typically gust speeds up to 16 mph.

- **Walking:** Winds that would lift leaves, cause movement to litter, hair and loose clothing. Appropriate for sidewalks, plazas, parks or playing fields where people are more likely to be active and receptive to some wind activity - typically gust speeds up to 20 mph.

Wind conditions are considered suitable for sitting, standing or walking if the wind speeds are within the ranges for at least 4 out of 5 days (80% of the time). An **uncomfortable** designation means that the criterion for walking is not satisfied. **Safety** is also considered by the criteria. Excessive gust wind speeds greater than 55 mph can adversely affect a pedestrian's balance and footing. If winds sufficient to affect a person's balance occur more than 3 times per year, the wind conditions are considered severe. Wind control measures are typically required at locations where winds are rated as uncomfortable or severe.

These guidelines represent an average of wind tolerance. Regional differences in wind climate and variations in age, health, clothing, etc. can affect people's perception of wind climate. With the warm climate in Hawaii, higher wind speeds may be tolerated as the cooling effect of the wind would be considered pleasant.

4. ASSESSMENT OF WIND CONDITIONS

Generally, wind conditions suitable for walking are appropriate for sidewalks and parking lots; wind speeds comfortable for standing are preferred for building entrances, outdoor retail plazas and pick-up/drop-off areas; and lower wind speeds comfortable for sitting are desired for seating areas, such as outdoor cafes, swimming pools and terraces.

Tall buildings tend to intercept the stronger winds at higher elevations and redirect them down to ground level. This form of wind activity, considered as a down-washing flow, is often the cause for wind acceleration around buildings at the pedestrian level. When two buildings are situated side by side, wind flow tends to accelerate through the gap between the buildings due to the Venturi effect. This building arrangement can also be associated with increased wind activity, in particular when the gap between the buildings is aligned with the prevailing winds.

From a wind control point of view, the proposed tower rotation is considered a positive design change, as it effectively reduces the area of building facade that is directly exposed to the prevailing winds, and increases the distance between the proposed building and the existing Ilikai Hotel. The following discussions focus on the potential wind conditions and their suitability for anticipated pedestrian activities around the proposed development, as affected by the tower rotation.

Surrounding Areas Unaffected by the Proposed Development

As indicated by the June 2001 wind-tunnel test results of wind conditions around the existing and proposed building configurations (Ref.1), most areas on and around the study site were unaffected by the proposed development. The rotation of the proposed Waikikian Hotel is considered a positive design change and is estimated to have no effect on the existing wind conditions in the following areas (see Figure 1 and associated test locations in Ref. 1):

- Ala Moana Boulevard;
- Dewey Lane;
- Ilikai Hotel entrance, podium and balconies;
- Lagoon and Ala Wai Boat Harbor;
- Amenity spaces around the Lagoon Tower; and
- Sidewalks south of the existing Ballroom.

Areas Adjacent to the Waikikian Hotel

Wind-tunnel test results in Ref.1 indicated increased wind activity in two areas immediately adjacent to the proposed Waikikian Hotel. The first area was located at the intersection of Ala Moana Boulevard and Dewey Lane. In this area the increased wind activity was considered acceptable since it was rated suitable for walking. The rotation of the proposed tower would have less of an effect on the wind activity in this area (Area **A** in Figure 3). We, therefore, anticipate that the resulting wind conditions would be suitable for the general usage of the retail plaza for both summer and winter seasons and would be further improved with the proposed landscaping in this area.

The second area where increased wind activity was predicted, due to the earlier design of the proposed development (Ref. 1), is on the roof of the existing Ballroom. The west part of the roof area (Area **B** in Figure 3) is accessible to pedestrians. The increased wind activity is caused by the acceleration of the east-northeast winds between the proposed Waikikian Hotel and the existing Kalia Tower. The rotation of the proposed tower is expected to improve the roof-top wind environment, resulting in wind conditions comfortable for walking or better for both seasons. As suggested in our wind tunnel test report (Ref. 1), if more passive pedestrian activities (i.e., standing and sitting) are anticipated in this area, then localized wind protection in the form of wind screens and/or landscaping should be considered.

Wind conditions at the proposed Porte Cochere under the large entrance canopy (Area **C** in Figure 3) were predicted by wind tunnel tests (Ref. 1) to be comfortable for standing for both seasons. Similar wind conditions are expected in this area after the tower rotation and are considered appropriate for building entrances.

Lobby Areas

The main lobby of the proposed Waikikian Hotel is approximately 12 ft above grade level (Area **D** in Figure 4). It is sheltered by a Sundry Room for winds approaching from the east and, to a lesser extent, the east-northeast directions. The northeast winds, however, are expected to affect the lobby area and may at certain times create uncomfortable wind conditions in the passage to the west side of the tower (Area **D1**).

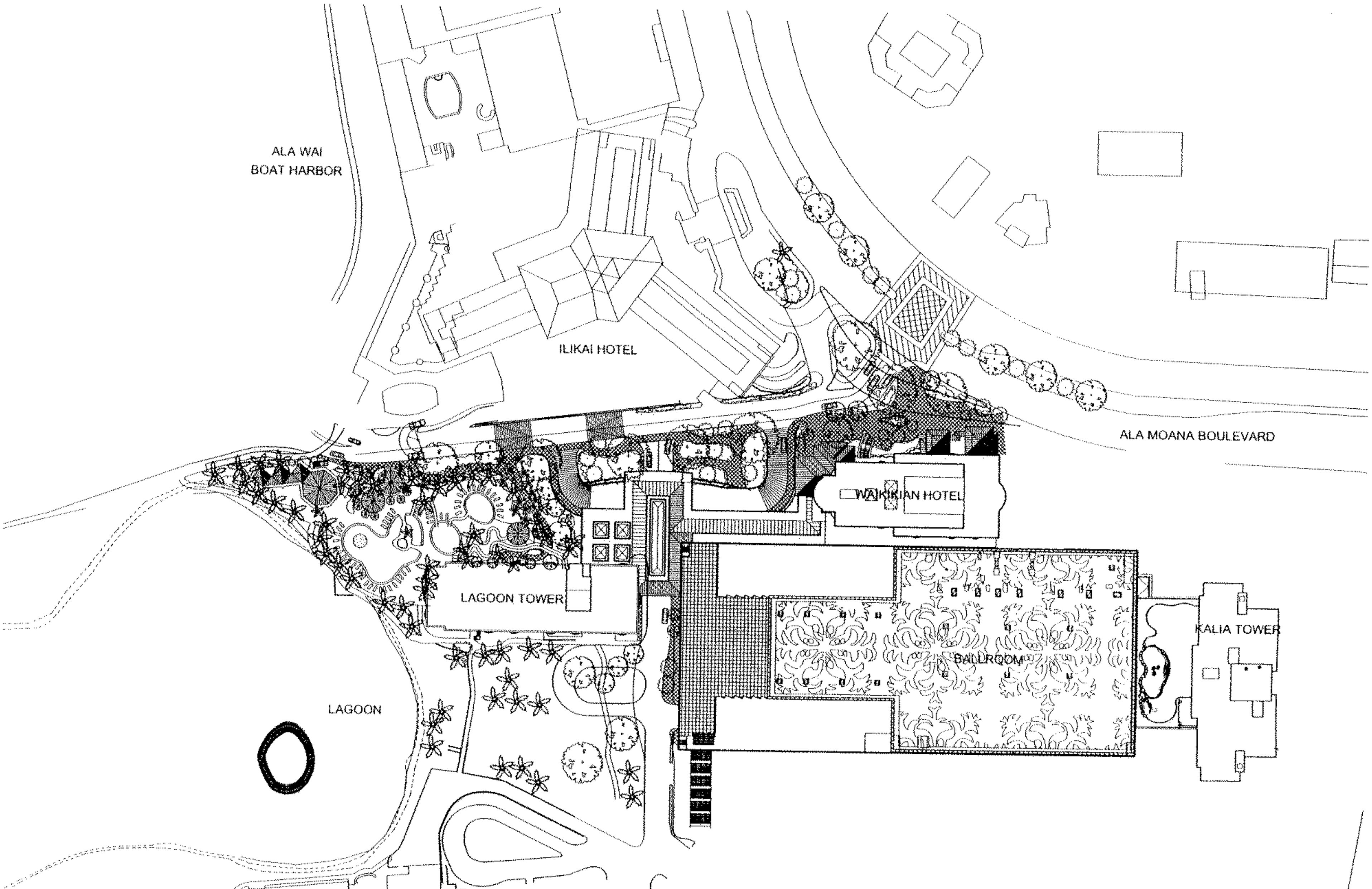
Currently, architectural details of the passage are yet to be finalized. At a more advanced design stage, a wind tunnel study can be used to determine the wind conditions in the lobby area, especially in the passage, and, if necessary, to develop design features that promote a comfortable wind environment for these areas.

5. REFERENCES

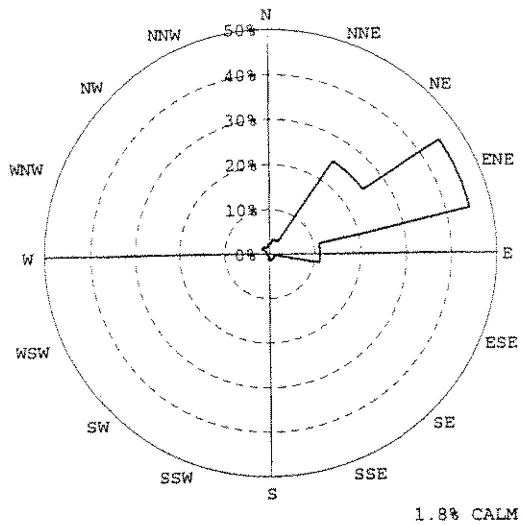
1. Final Report, Pedestrian Wind Study, Hilton Hawaiian Village - Waikikian Hotel, Honolulu, Hawaii, RWDI Report 01-533, Submitted to Belt Collins Hawaii Ltd., June 18, 2001.

2. Fax from Tina Goodwin for Christopher Walling of Wimberly Allison Tong & Goo, to Will Kochanski of RWDI, 12 pages, October 9, 2001.

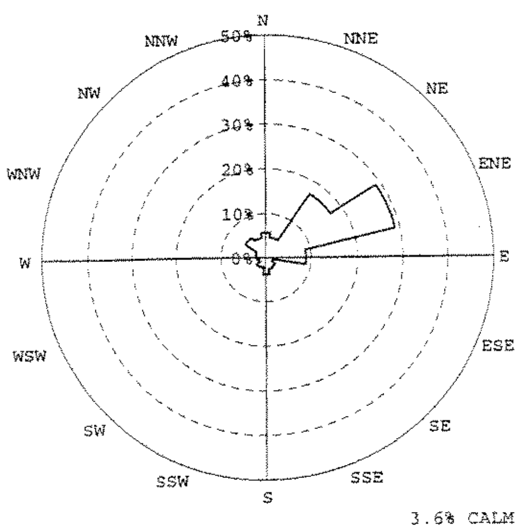
3. Pedestrian Level Wind Study, Waikikian Hotel, Honolulu, Hawaii, RWDI Report 90-254F-1, Submitted to KOP Hawaii Inc., August 14, 1990.



Site Plan True North	Drawn by: CTS	Figure: 1	RWDI
	Approx. Scale: 1"=150'		
Hilton Hawaiian Village - Waikikian Hotel - Honolulu, Hawaii — Project #01-533B	Date Revised: Oct. 16, 2001		

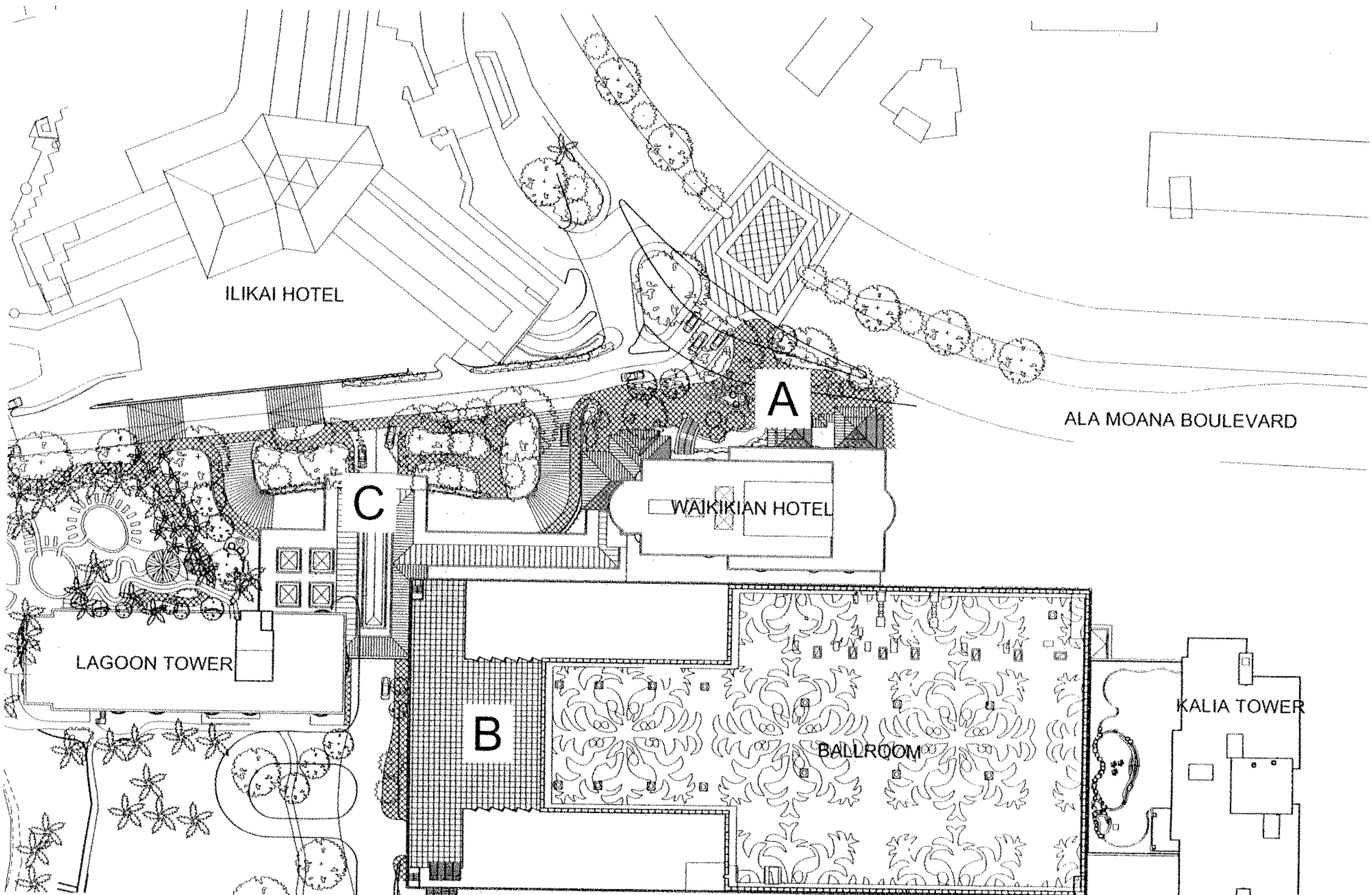


ALL SUMMER WINDS



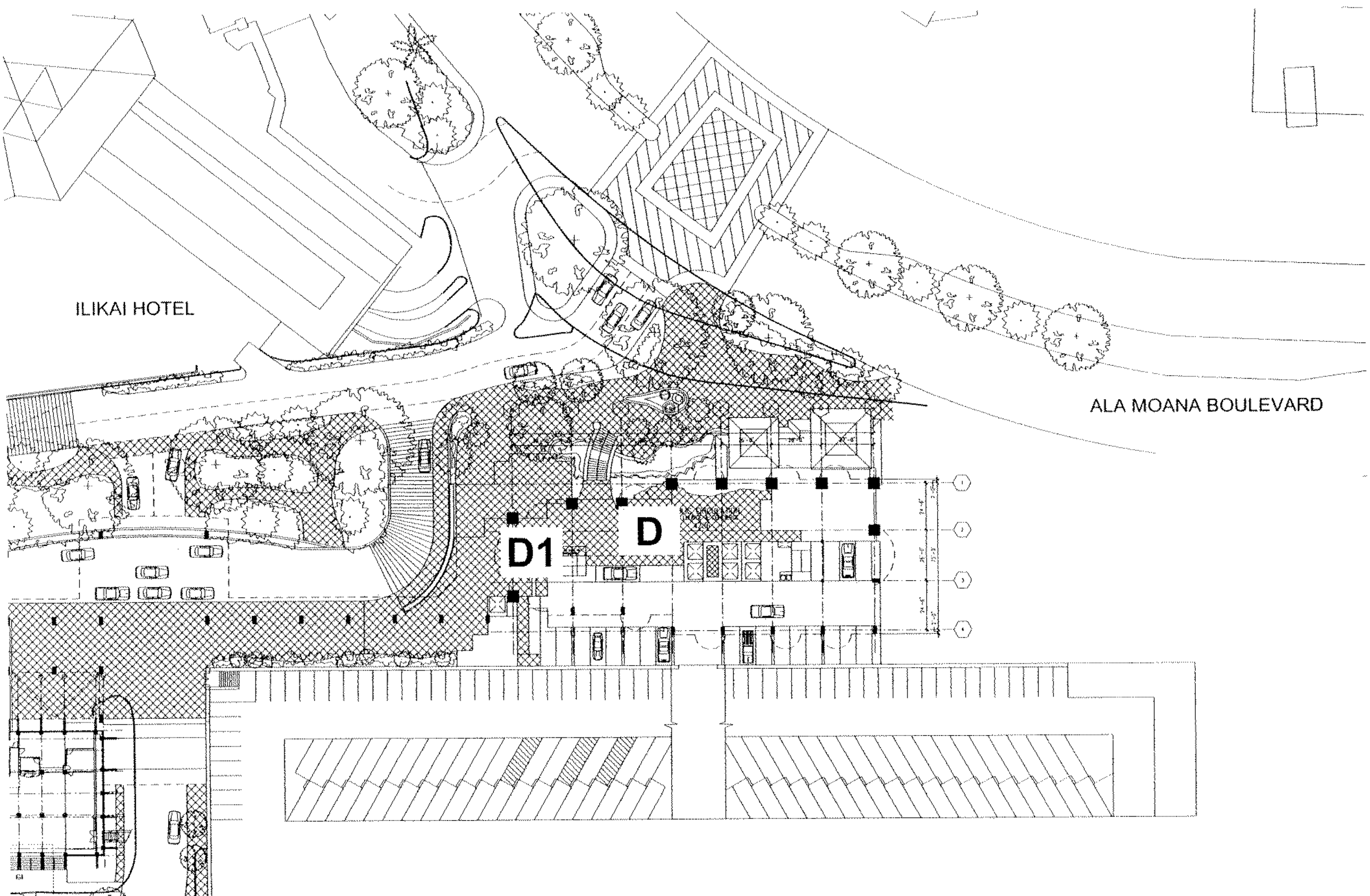
ALL WINTER WINDS

Directional Distribution (%) of Winds (Blowing From) **Honolulu International Airport, Hawaii (1949 - 1999)**	Figure No. **2**	RWDI
Hilton Hawaiian Village - Waikikian Hotel Project #01-533B	Date: October 18, 2001	



Areas Adjacent to the Waikikian Hotel	True North	Drawn by: CTS	Figure: 3
Hilton Hawaiian Village - Waikikian Hotel - Honolulu, Hawaii	Project #01-533B	Approx. Scale: 1"=100'	
		Date Revised: Oct. 16, 2001	

RWDI



Lobby Level of the Waikikian Hotel

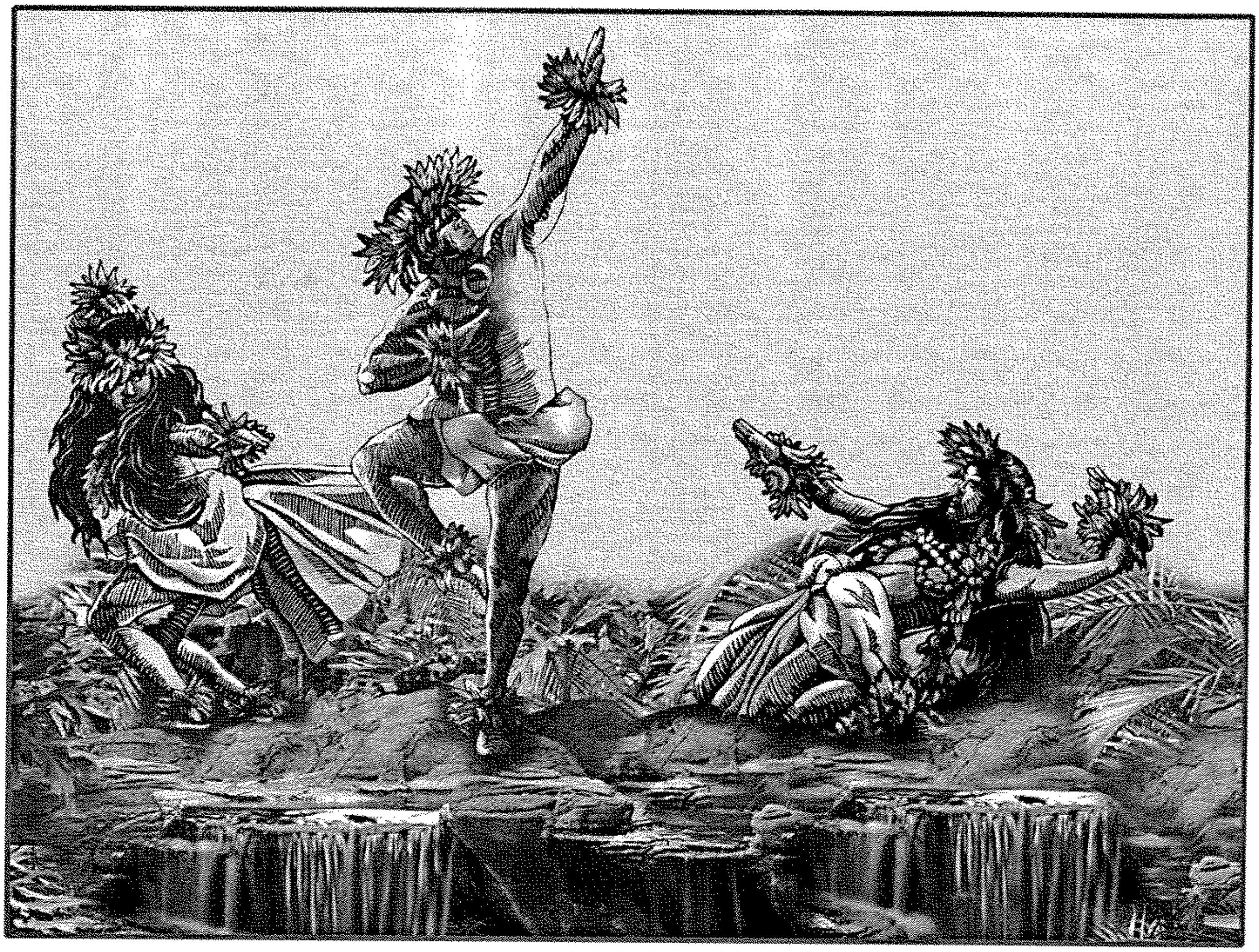
Hilton Hawaiian Village - Waikikian Hotel - Honolulu, Hawaii

True North

Project #01-533B

Drawn by:	CTS	Figure:	4
Approx. Scale:	1"=100'		
Date Revised:	Oct. 16, 2001		

RWDI



APPENDIX I
SOCIO-ECONOMIC STUDY UPDATE

SMS®

Consulting
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Economic & Social Impact Studies
Research
Solutions Modeling
Training

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Beyond Information. Intelligence.

October 19, 2001

TO: Lee Sichter, Senior Planner
Belt Collins Hawaii Ltd.

FM: John Kirkpatrick, Ph.D.
Vice President

Per your request of October 5, SMS has done additional research with regard to two issues in connection with the socio-economic impacts of development of the Waikikian Tower, Hilton Hawaiian Village.

1. *Beach usage.* By adding to the Hilton Hawaiian Village's visitor plant, the proposed Waikikian project will increase the number of people using the beach and near shore waters immediately adjacent to the Hilton, as was noted in the DEIS. More information is wanted concerning the extent of that impact:

    a. Once the proposed new pools have been created beside the Lagoon Tower, two recreational areas will be enhanced that may draw Hilton visitors away from the public beach: the enlarged pool area and the Hilton Lagoon beach. The latter will become more attractive to visitors with a larger, continuous beach and (in a separate, earlier action) improved water flow. The former will provide more swimming area and new amenities, compared to the existing pool.

b. We expect that the additional population in the Waikikian Tower will have a larger impact than any withdrawal of beach population due to the Lagoon Tower pool or the Lagoon itself. The question is, what is the size of the impact associated with some 1,100 visitors in approximately 350 vacation ownership units?

As a first estimate,, the proposed new building increases the Hilton Hawaiian Village unit count by 11%, the resort guest population by about 17%. If Waikikian Tower vacationers are much like others in the resort, the increase in beach usage attributable to the new guests will likely be an increase of about 10% to 20% of Hilton Hawaiian Village guest usage of nearby areas.

However, the tower will be designed for vacation ownership, and will by 2010 largely be occupied by this population (as shown in EIS Table 6-24). SMS requested a special tabulation from the Visitor Satisfaction survey conducted for the State Department of Business, Economic Development and Tourism to see whether time share vacationers use the beach in much the same way that hotel guests do. It turns out that

i. O‘ahu vacationers are less likely to go to the beach and swim in the ocean than are visitors to other islands;
ii. O‘ahu time share visitors are even less likely to be beachgoers than O’ahu hotel guests; but
iii. statewide, time share visitors are a bit more likely than hotel guests to be beachgoers.

(Data are from US Mainland visitors sampled during the first six months of 2001. O‘ahu data refer to visitors’ experience on that island only. If a visitor went shopping on O‘ahu then went to the beach on Maui, the beach activity shows up in the statewide data, but not the O‘ahu data.)

The attached table (Exhibit 1) converts the data on visitors’ activities into percentages, so that groups in different accommodations can be compared and O‘ahu data contrasted with statewide results. It shows that time share visitors on O‘ahu are less active than hotel guests in many ways. They may be more likely to jog, but less likely to engage in more adventurous activities or to seek out cultural venues. The one exception: they are more likely to go on sunset or dinner cruises.

Based on these indications, SMS expects that Hilton Hawaiian Village guest use of nearby beaches will over time increase by about 10% to 15% as a result of occupancy of the Waikikian Tower. Hilton guests are only part of the user group on

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the nearby beaches, so the increase in total user count would be a smaller percentage.

2. *Impact on Property Values.* Residents of nearby condominium buildings are concerned that effects on view planes could translate into loss of economic value.

In the DEIS, we approached this issue by asking how much difference we could find in cases in which views, but little else, varied. Section 6.12.4 reports on two approaches we took to estimate the importance of views for property values. First, we selected units in nearby buildings that were likely to overlook the project site and compared the appraised value of units, floor by floor. We wanted to learn how much value increased when the views changed greatly, for instance, when one unit was level with the Hilton garage, so the unit above it had a view over the garage out to sea, and the next unit up had a clearer view. We found that there was a regular increase in value from floor to floor – but not a notable increase at points where we found that views improved greatly. Appraised real property values correlate with height, but not with major changes in views. Next, we looked at sales in the Diamond Head tower of Discovery Bay, correlating sales price per square foot with height. We showed a trend for sales prices to correlate with height.

In light of concerns on the part of residents, we extended the analysis. We looked more closely at the real property tax assessors' procedures. "View" is an attribute of some properties, included in real property data and used in estimating value. Because value is established through statistical techniques, it is very difficult to assign a value to views in general from a particular property – much less to the part of the view that is affected by the presence of a particular building across the street. SMS compiled data to contrast valuation of units characterized by the assessors as having views with others in the same building, in order to analyze the impact on assessed value and on sales value of "View." We also considered additional buildings. We had earlier looked at data from Discovery Bay, Pomaika'i and Wailana, since the Waikikian site stood between them and the ocean. (We also looked at data from the Ilikai.) We went on to compile real property data for Canterbury Place, Chateau Waikiki, Ilikai Marina, Kalia, Tradewinds, Villa on Eaton Square, and Waipuna. For these properties, we took the following steps:

a. Compiled data from real property records and checked to see whether the appraisers considered units in the building as having views. (This entry can be omitted or included for the units in a particular building. If it is included, each unit will be classified as having "Waterfront View," "Ocean View," or the like. Units without distinctive views are identified as "Other View.")
b. If the view category was filled in, we entered data on real property values, sales, and key unit characteristics (size, floor, view).

c. For real property valuations, we ran regression analyses using a least-squares approach to identify whether, in a given building, unit views, unit height (floor number) and/or unit size were associated regularly with increased value.
d. We looked at sales data with the same objective, limiting the analysis to sales since 1995 since average prices have changed little in the last few years.
e. We then considered the question of how "views" in general related to the specific part of the viewplane from each building that could be obscured by the proposed Waikikian tower.

Our findings are shown in the attached Exhibit 2. We did find some association between "View" and assessed value in Canterbury Place, Chateau Waikiki, Pomaika'i and Waipuna. No significant association emerged between sales prices and view. One reason for these different results is that "View" is a well-defined category used by assessors. In contrast, buyers and sellers have a wider range of ideas about what is a good view. In running the regression analysis for assessed value, we were reverse engineering the mathematical process used by the City appraisers to estimate value. In studying actual sales, we deal with buyers' considerations of many different factors, and many different ways of deciding what views are worth.

The regression statistics shown in the table deal with (a) the attempt to find consistent relations between values and key characteristics of units and (b) the contribution of "View" to variation in value. Beta estimates the contribution of a particular independent variable to variation in the dependent variable. For example, at Canterbury Place, the overall regression for assessed value is fairly strong (as shown by the high adjusted R^2 value) and the contribution of "View" is significant (as shown by the low p value). For each unit with an Ocean or Mountain View, about $55,000, on average, of the assessed value is associated with the view. Similar strong associations were found for assessed values and views at Chateau Waikiki, Inn on the Park, and Pomaika'i.

To understand the importance of the proposed new Waikikian tower for these buildings, we noted the number of units with views that could see the project site and estimated the share of their ocean view that the proposed tower could obscure. When those two factors are noted, it is clear that the impact of the project on views is large only for one building, Pomaika'i. Elsewhere, the view that qualifies units as having Ocean Views is affected little, if at all, by the project.

The beta coefficient can be translated, as an estimate or prediction, into a rough value for view. In the case of Pomaika'i, the analysis suggests that view contributes about $21,600 each to the assessed value of eight units. At current tax rates ($4.21 per $1,000 assessed value for

Apartments), this amounts to about $91 in taxes per unit per year, for an annual total of about $725 for the building.

The average assessed value of the Pomaika'i view units is $209,330 each. The estimated view impact is, then, 10.3% of their assessed value.

As noted earlier, no association was strong enough to quantify the relationship between views and sales prices. Since the impact on viewplanes from most buildings is small, this is not particularly problematic. For Pomaika'i, where views will change greatly if the project is built, it is important to note that the analysis fails to prove or disprove any association. Our earlier analysis suggests that increases in value associated with height remain, but do not address the question of sales value in Pomaika'i, simply because the sample is so small.

In sum, the additional analysis complements the work summarized in the DEIS and indicates that, while the project will affect some views from some condominium units mauka of Ala Moana Boulevard, the data show no factual basis for expecting that that effect will translate into a loss of value except in the case of Pomaika'i. There, the impact of views on property taxes appears to be about $725 per year. The impact on sales values for Pomaika'i is unknown.

Exhibit 1: ACTIVITIES OF MAINLAND VISITORS, BY TYPE OF ACCOMMODATION

	Statewide			O`ahu		
	Hotel/Condo	Timeshare	Other	Hotel/Condo	Timeshare	Other
RECREATION						
Swim in ocean, sunbathe on beach	80.4%	84.4%	70.1%	66.0%	56.6%	43.3%
Snorkel, scuba	51.0%	65.6%	66.9%	28.5%	26.3%	29.3%
Jet Ski, windsurf	5.4%	3.3%	4.7%	6.4%	1.9%	15.0%
Golf	16.8%	20.6%	4.7%	7.9%	4.0%	15.0%
Run, jog	37.9%	50.9%	39.8%	29.0%	32.1%	25.6%
Backpack, hike	20.8%	27.3%	53.9%	15.4%	9.2%	32.6%
SIGHTSEEING						
Boat, sub, whale watching	35.2%	29.0%	31.8%	21.0%	9.2%	32.6%
Helicopter, plane tour	13.9%	20.3%	8.1%	4.4%	3.1%	15.0%
Bus tour	20.1%	11.5%	14.3%	24.9%	12.9%	31.1%
Limousine, van tour	8.1%	6.2%	4.7%	7.6%	7.1%	15.0%
Self-guided tour	81.3%	85.4%	71.7%	69.8%	60.4%	40.0%
CULTURAL						
Historic site	64.0%	60.5%	60.8%	64.1%	38.1%	36.3%
Museum or gallery	32.3%	34.8%	34.0%	25.0%	24.3%	29.3%
Polynesian show, luau	54.3%	50.5%	60.8%	43.8%	24.0%	25.7%
ENTERTAINMENT						
Cruise boat trip	34.4%	37.8%	34.9%	69.4%	79.2%	74.4%
Lounge or stage show	36.7%	35.9%	25.9%	30.1%	16.4%	25.7%
Nightclub, bar, karaoke	17.3%	15.4%	28.4%	15.7%	15.1%	15.0%
SAMPLE SIZE	1,382	190	27	695	86	10

SOURCE: Special tabulation, from Visitor Satisfaction survey for the first half of 2001. Hawai'i State Department of Business, Economic Development and Tourism.

Exhibit 2: ANALYSIS OF REAL PROPERTY ASSESSMENT AND SALES DATA

	Are There Units with Ocean or Mountain Views?	Do Ocean Views Affect RP Assessed Values?	Do Views Affect Sales Value?	Number of View Units that can see Project Site	Share of Ocean View over Project Site
Canterbury	Yes	Adj R2=0.854 Beta and (p value) view=55,005 (0.00)	Not significant Adj R2=0.173	33 Unit A: Floors 7-40	Little (major view is over Fort DeRussy)
Chateau Waikiki	Yes	Adj R2=0.988 Beta and (p value) view=17,644 (0.00)	Not significant Adj R2=0.175	40 Units: 1, 3, 5, 7, 9, 11, 13, 14	Little or none (project is distant; intervening
Discovery Bay	Yes	Not significant Adj. R2=0.257	Not significant Adj R2=0.534	32	Little, from DH tower end units
Ilikai Apartment Building	Yes	NA	NA	Many, but project is inland in relation to this building	None
Ilikai Marina	Yes	NA	NA	View of project is blocked by main Ilikai building	None
Inn on the Park	Yes	Adj R2=0.999 Beta and (p value) view=9,857 (0.00)	Not Significant Adj R2= -0.045	9 (unit #15 floors 14-22)	Little or none (major view over DeRussy)
Kalia	No	NA	NA	NA	None
Pomaika`i	Yes	Adj. R2 = 0.978 Beta (p value) View=21632 (0.00) Height=2367 (0.00)	Not enough view data to assess	8 (floors 15 through 19)	Large, probably total
Tradewinds	Coop: unit characteristics not publicly listed	NA	NA	None	None
Villa on Eaton Square	No	NA	NA	NA	None
Wailana	Penthouse Only	Not enough view data to assess	Not enough view data to assess	6	Little (major view over DeRussy; project intrudes on part of view through HHV)
Waipuna	Yes	Adj. R2=0.790 Beta (p value) View=28144 (0.00)	Not Significant Adj. R2=0.678	40	Little or none (Wailana and Parkside between bldg. and project)

NOTES: Regression analyses based on Real Property Dvision records of valuation and sales. Analyses took Improved Value and Sales Price as dependent variables (shown in RP and Sales columns above) and unit size, floor, and view as independent variables.