LA‘ALOA AVENUE EXTENSION

LA‘ALOA 1 AND 2 AND PAHOEHOE
NORTH KONA, HAWAII

FINAL ENVIRONMENTAL ASSESSMENT

APPENDIX 1

TRAFFIC ASSESSMENT

TRAFFIC IMPACT ANALYSIS REPORT FOR

LAALOA AVENUE EXTENSION

IN KAILUA-KONA, HAWAII

DRAFT REPORT

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1. INTRODUCTION

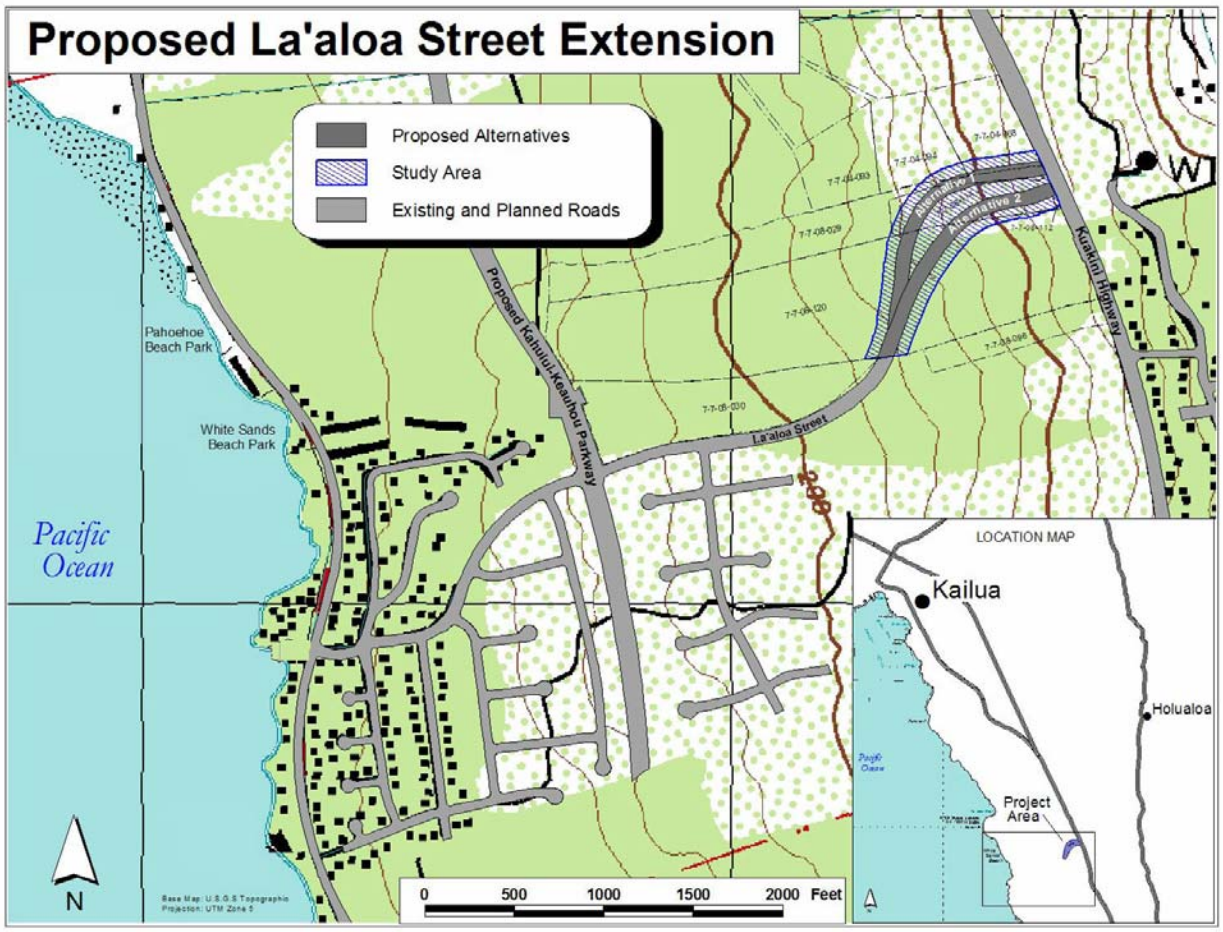
Project Location and Description

The project under study is the proposed extension of Laaloa Avenue from the existing end eastward to Kuakini Highway. As shown on Figure 1, Laaloa Avenue is currently a local collector ending several hundred feet west of Kuakini Highway. When completed, the eastern end of Laaloa Avenue will be at a new intersection with Kuakini Highway. Laaloa Avenue will be a secondary arterial when the extension is completed.

Purpose and Objectives of Study

1. Quantify and document the traffic related impacts of the proposed extension of Laaloa Avenue to Kuakini Highway.

2. Determine the method of right-of-way control (traffic signals, STOP signs, etc.) and lane configurations of the new intersections of Laaloa Avenue at Alii Drive, at Kuakini Highway and at the Parkway.



Source of Map: Geometrician Associates

Figure 1
PROJECT LOCATION

Study Methodology

The following is a summary list of the tasks performed:

1. A field reconnaissance was performed to identify existing roadway cross-sections, intersection lane configurations, traffic control devices, and surrounding land uses.

2. Existing levels-of-service of the study intersections were determined using the methodology described in the *2000 Highway Capacity Manual*.

3. The year 2020 was used as the design, or horizon, year. This year was selected to be consistent with the traffic study for the Keauhou Parkway[1].

4. 2020 background traffic volumes along Alii Drive and along Kuakini Highway in the vicinity of the Laaloa Avenue were estimated. Future traffic projections were developed for three scenarios:

   Scenario A Existing Conditions

   Scenario B Laaloa Avenue Extended to Kuakini Highway without the Parkway

   Scenario C Laaloa Avenue Extended to Kuakini Highway with the Parkway

5. A level-of-service analysis was performed for 2020 conditions, all scenarios. The results were compared to assess the impacts of the Laaloa Avenue Extension.

6. Locations with inadequate level-of-service were identified and, if required, alternative mitigation measures were formulated and assessed.

7. A draft report documenting the conclusions of the analyses performed and recommendations was prepared and submitted for review and comment.

8. Upon review of the draft report, it was determined that further analysis of the intersection of Laaloa Avenue at Kuakini Highway was needed to assess an interim scenario for the year 2008.

9. The report was finalized incorporating the comments received.

Study Area

The study includes Laaloa Avenue between Alii Drive and Kuakini Highway. The intersections include Laaloa Avenue at Alii Drive and Laaloa Avenue at Kuakini Highway. As will explained later in the report, it was decided to include the intersection of Laaloa Avenue at the Parkway as an alternate scenario as there is doubt whether this facility will be built or not.

[1] Julian Ng, Inc., *Traffic Analysis Report Kahului to Keauhou Parkway*, August 2000

Order of Presentation

Chapter 2 describes existing traffic conditions, the Level-of-Service (LOS) concept and the results of the Level-of-Service analysis of existing conditions.

Chapter 3 describes the process used to estimate future background traffic volumes and the resulting background traffic projections.

Chapter 4 describes the traffic impacts of the proposed project, identifies potential mitigation measures and summarizes the traffic impact study.

2. ANALYSIS OF EXISTING CONDITIONS

This chapter presents the existing traffic conditions on the roadways adjacent to the proposed project. The level-of-service (LOS) concept and the results of the Level-of-Service analysis for existing conditions are also presented. The purpose of this analysis is to establish the base conditions for the determination of the impacts of the project which are described in a subsequent chapter.

Existing Peak Hour Traffic Volumes

The existing morning and afternoon peak hour traffic volumes are shown in Figure 2. The peak hour volumes were determined from traffic counts of the study intersection of Laaloa Avenue at Alii Drive and historical traffic count data published by State of Hawaii Department of Transportation.

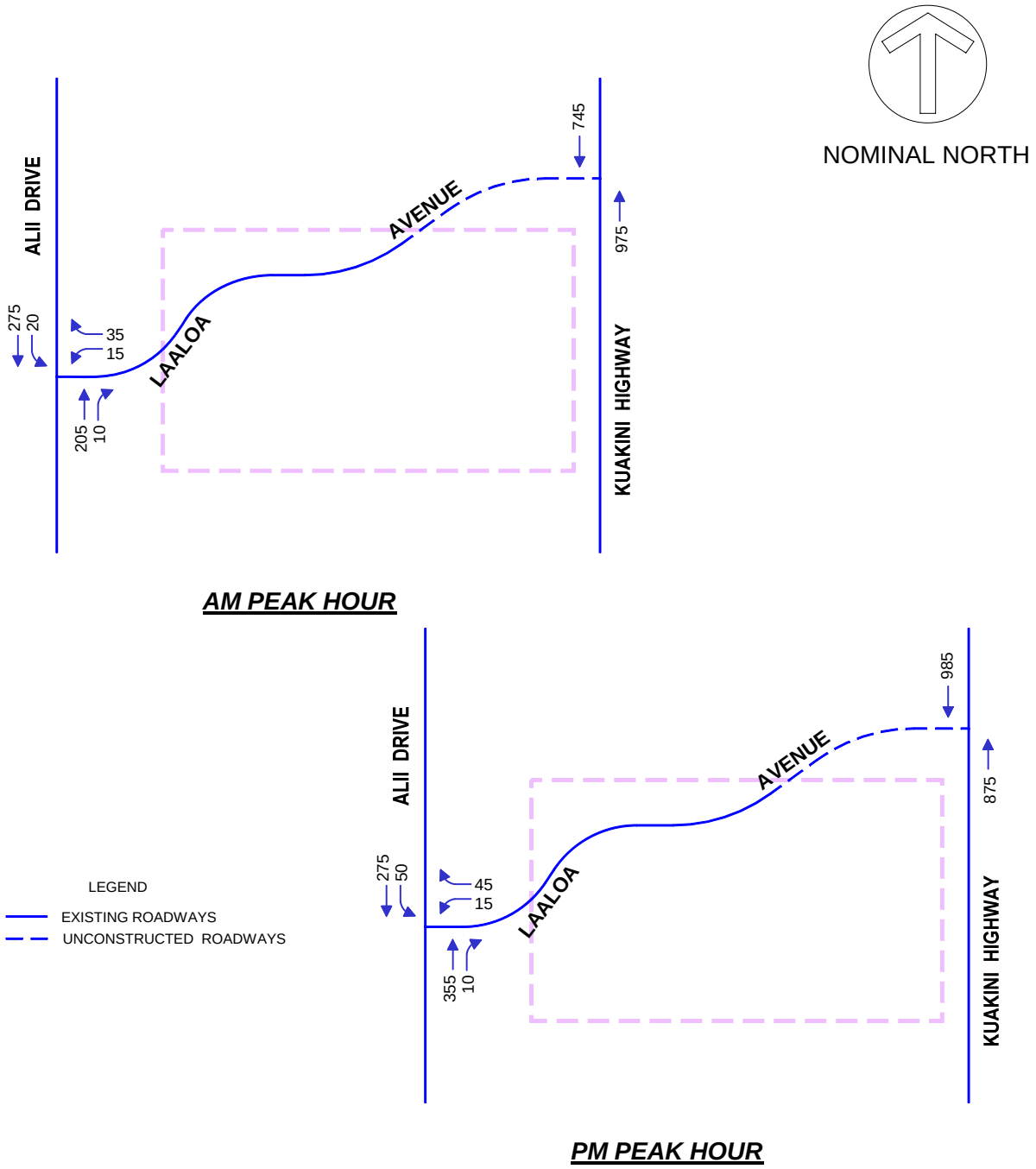


Figure 2
EXISTING (2004) PEAK HOUR TRAFFIC VOLUMES

Level-of-Service Concept

Signalized Intersections

"Level-of-Service" is a term which denotes any of an infinite number of combinations of traffic operating conditions that may occur on a given lane or roadway when it is subjected to various traffic volumes. Level-of-service (Level-of-Service) is a qualitative measure of the effect of a number of factors which include space, speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience.

There are six levels-of-service, A through F, which relate to the driving conditions from best to worst, respectively. The characteristics of traffic operations for each level-of-service are summarized in Table 1. In general, Level-of-Service A represents free-flow conditions with no congestion. Level-of-Service F, on the other hand, represents severe congestion with stop-and-go conditions. Level-of-service D is typically considered acceptable for peak hour conditions in urban areas.

Corresponding to each level-of-service shown in the table is a volume/capacity ratio. This is the ratio of either existing or projected traffic volumes to the capacity of the intersection. Capacity is defined as the maximum number of vehicles that can be accommodated by the roadway during a specified period of time. The capacity of a particular roadway is dependent upon its physical characteristics such as the number of lanes, the operational characteristics of the roadway (one-way, two-way, turn prohibitions, bus stops, etc.), the type of traffic using the roadway (trucks, buses, etc.) and turning movements.

Table 1 Level-of-Service Definitions for Signalized Intersections(1)

Level of Service	Interpretation	Volume-to-Capacity Ratio(2)	Stopped Delay (Seconds)
A, B	Uncongested operations; all vehicles clear in a single cycle.	0.000-0.700	<20.0
C	Light congestion; occasional backups on critical approaches	0.701-0.800	20.1-35.0
D	Congestion on critical approaches but intersection functional. Vehicles must wait through more than one cycle during short periods. No long standing lines formed.	0.801-0.900	35.1-55.0
E	Severe congestion with some standing lines on critical approaches. Blockage of intersection may occur if signal does not provide protected turning movements.	0.901-1.000	55.1-80.0
F	Total breakdown with stop-and-go operation	>1.001	>80.0

Notes:
(1) Source: *Highway Capacity Manual*, 2000.
(2) This is the ratio of the calculated critical volume to Level-of-Service E Capacity.

Unsignalized Intersections

Like signalized intersections, the operating conditions of intersections controlled by stop signs can be classified by a level-of-service from A to F. However, the method for determining level-of-service for unsignalized intersections is based on the use of gaps in traffic on the major street by vehicles crossing or turning through that stream. Specifically, the capacity of the controlled legs of an intersection is based on two factors: 1) the distribution of gaps in the major street traffic stream, and 2) driver judgement in selecting gaps through which to execute a desired maneuver. The criteria for level-of-service at an unsignalized intersection is therefore based on delay of each turning movement. Table 2 summarizes the definitions for level-of-service and the corresponding delay.

Table 2 Level-of-Service Definitions for Unsignalized Intersections(1)

Level-of-Service	Expected Delay to Minor Street Traffic	Delay (Seconds)
A	Little or no delay	<10.0
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	See note (2) below	>50.1

Notes:
(1) Source: *Highway Capacity Manual*, 2000.
(2) When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvement of the intersection.

Level-of-Service Analysis of Existing Conditions

The level-of-service analysis was performed using Highway Capacity Software (HCS). As all intersections are unsignalized, the methodology for unsignalized intersections was used. The results of the level-of-service of the study intersections is summarized in Table 3. Shown in the table are the average vehicle delays and the level-of-service of the controlled lane groups. Volume-to-capacity ratios are not calculated for unsignalized intersections.

All traffic movements operate at Level-of-Service A or B. This implies good operating conditions and minimal delays at the study intersections.

Table 3 Existing (2004) Levels-of-Service for Alii Drive at Laaloa Avenue

	AM Peak Hour		PM Peak Hour	
Intersection and Movement	Delay	LOS	Delay	LOS
Alii Drive at Laaloa Avenue				
Southbound Left & Thru	7.7	A	8.2	A
Westbound Left & Right	10.9	B	12.8	B

NOTES:
1. Delay is in seconds per vehicle.
2. LOS denotes Level-of-Service. LOS is based on delay.

3. PROJECTED BACKGROUND TRAFFIC CONDITIONS

The purpose of this chapter is to discuss the assumptions and data used to estimate 2024 background traffic conditions. Background traffic conditions are defined as future traffic volumes without the proposed project.

2020 Traffic Projections

2020 traffic volumes along Alii Drive and Kuakini Highway were derived from data provided in the traffic impact study for Keauhou Parkway. This document provided 2020 background traffic projections without and with the The Parkway. These projections did not appear to include traffic associated with the Keauhou View Estates development that is currently under construction or the extension of Laaloa Street to Kuakini Highway.

Accordingly, traffic associated with existing and future development adjacent to Laaloa Avenue was estimated, assigned to the roadway network and added to the traffic projections obtained from the The Parkway traffic report. Adjustments were also made to consider traffic diverted from background traffic. The resulting 2020 background peak hour traffic projections are shown in Figure 3, 4 and 5.

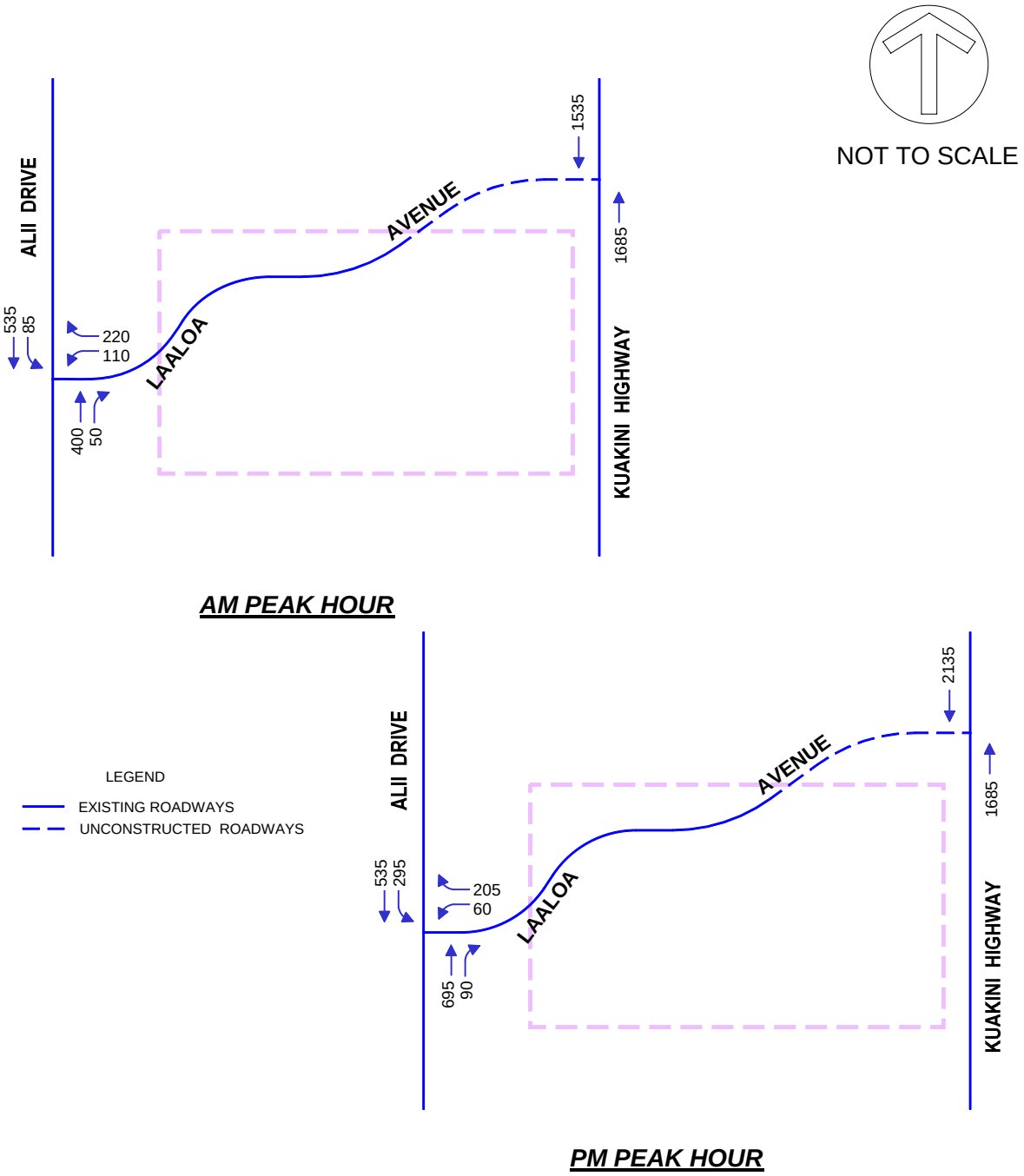
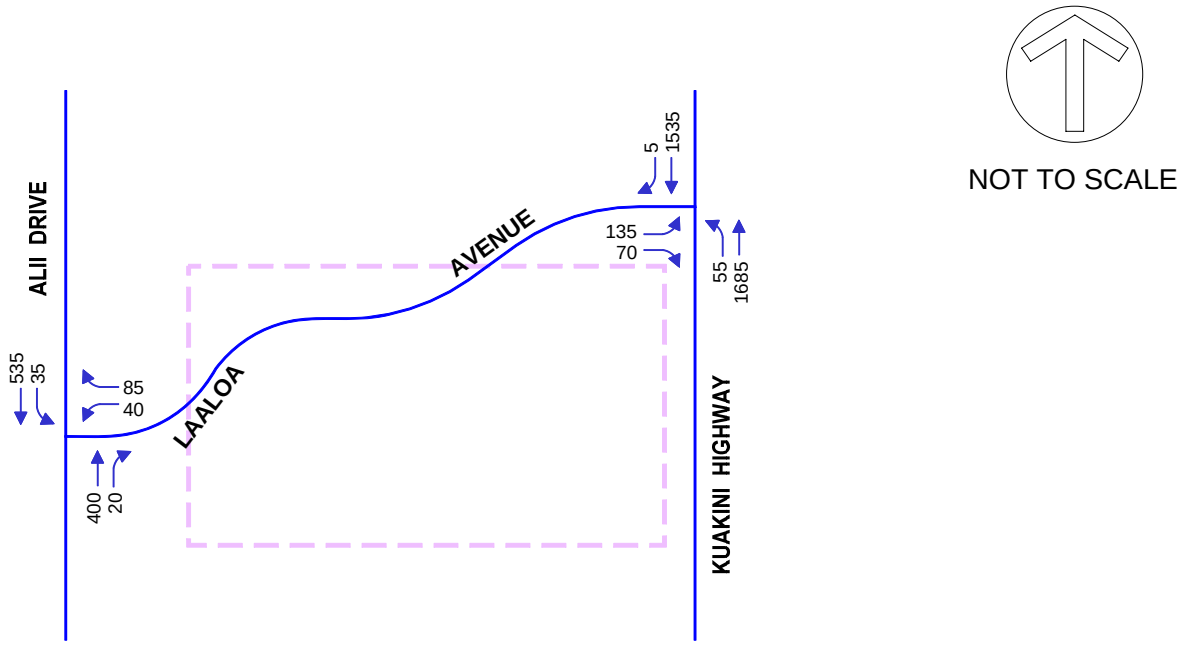
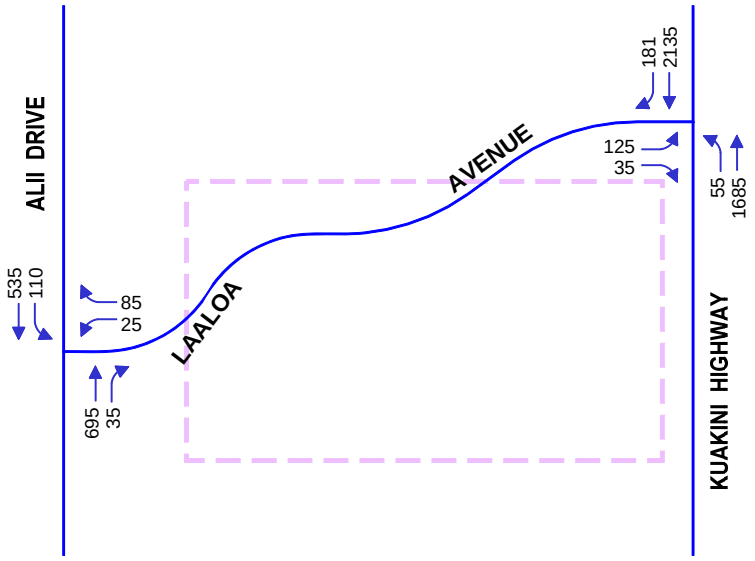


Figure 3
2020 PEAK HOUR TRAFFIC PROJECTIONS FOR SCENARIO A
(LAALOA AVENUE NOT EXTENDED, NO PARKWAY)

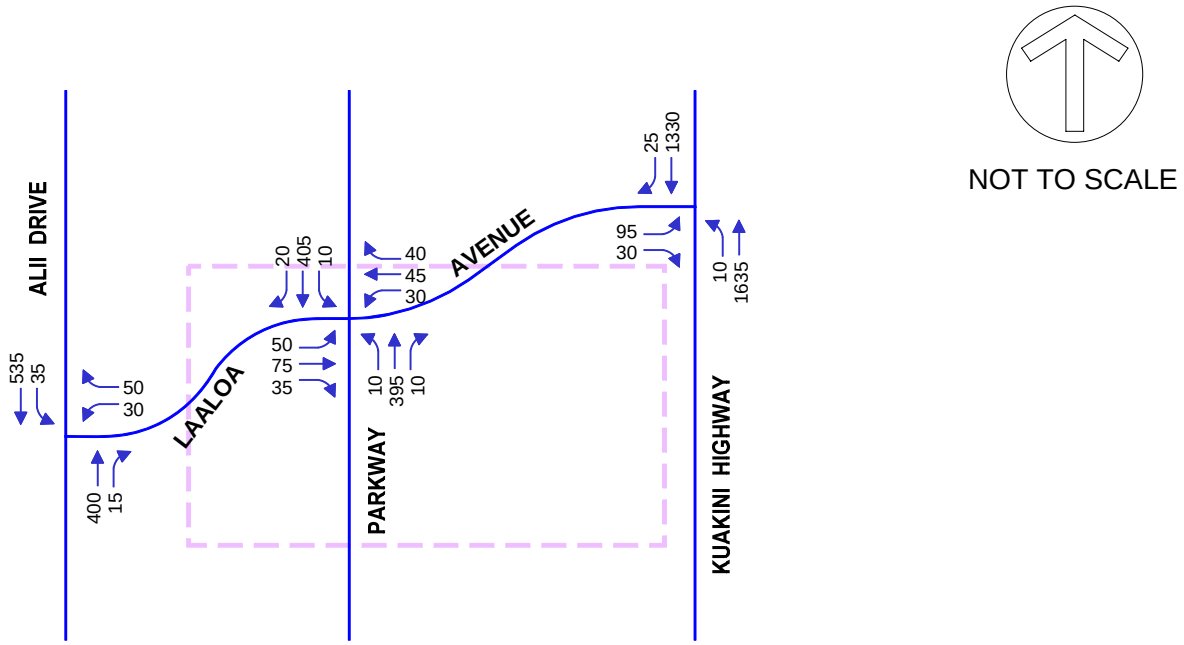


AM PEAK HOUR

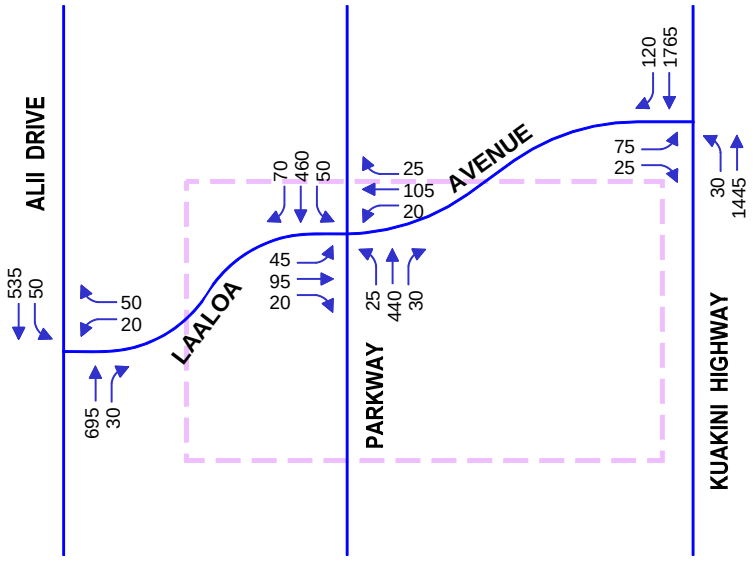


PM PEAK HOUR

Figure 4
2020 PEAK HOUR TRAFFIC PROJECTIONS FOR SCENARIO B
(LAALOA AVENUE EXTENDED, WITHOUT PARKWAY)



AM PEAK HOUR



PM PEAK HOUR

Figure 5
2020 PEAK HOUR TRAFFIC PROJECTIONS FOR SCENARIO C
(LAALOA AVENUE EXTENDED, WITH PARKWAY)

4. TRAFFIC IMPACT ANALYSIS

The purpose of this chapter is to summarize the results of the level-of-service and impact analysis. In addition, any mitigation measures necessary and feasible are identified and discussed.

The traffic impact of the project was quantified by analyzing the changes in the levels-of-service of the study intersections. Each intersection was analyzed separately. The analysis and the results are discussed in the following sections.

The assumptions used in the level-of-service analysis are:

Scenario A

1. Laaloa Avenue does not extend to Kuakini Highway. All access to and from the adjacent subdivisions is via the intersection of Laaloa Avenue at Alii Drive.

2. All approach lanes to the intersection are one lane each. There are no separate left turn or right turn lanes.

3. The intersection of Laaloa Avenue at Alii Drive is unsignalized.

Scenario B

1. Laaloa Avenue is extended to Kuakini Highway, but the Parkway is not constructed.

2. The intersection configuration of Laaloa Avenue at Alii Drive is the same as for Scenario A.

3. The intersections of Laaloa Avenue at Alii Drive and Laaloa Avenue at Kuakini Highway are unsignalized.

4. Kuakini Highway has two through lanes in each direction, a separate northbound to westbound left turn lane and a southbound to westbound right turn deceleration lane.

5. The westbound approach of Laaloa Avenue at Kuakini Highway has separate left and right turn lanes.

Scenario C

1. Laaloa Avenue is extended to Kuakini Highway and the Parkway is constructed.

2. The lane configurations for the intersections of Laaloa Avenue at Alii Drive and Laaloa Avenue at Kuakini Highway are the same as described for Scenario B.

3. The intersection of Laaloa Avenue at the Parkway is unsignalized. There are separate left turn lanes along the northbound and southbound approaches of the Parkway. The eastbound and westbound approaches of Laaloa Avenue are one lane each. The STOP signs will be along the Laaloa Avenue approaches to the intersection.

There is a fourth, but very unlikely, scenario that considers the construction of the Parkway without the extension of Laaloa Avenue to Kuakini Highway. This situation would occur if the Parkway is constructed because Laaloa Avenue already exists beyond the intersection with the The Parkway. This scenario was not analyzed because it is very unlikely to occur and is not consistent with the subject of this study, which is the impacts of the extension of Laaloa Avenue.

Standards for Significance and Mitigation

Level-of-Service D is considered acceptable. If the Level-of-Service is E of F, mitigation measures should be identified and assessed.

Left Turn Storage Lane Length Requirements

The left turn storage lengths required to accommodate estimated traffic volumes were calculated using guidelines in *A Policy on Geometric Design of Highways and Streets* published by the American Association of State Highway and Transportation Officials, 1990 edition. There are separate policies for signalized and unsignalized intersections. Based on this policy, the assumptions used to determine the required lengths of the left turn storage lanes are:

(1) For signalized intersections, the length of the left turn storage lane should be 1.5 (minimum) to 2.0 (desirable) times the average number of vehicles arriving during a signal cycle during the peak hour.

(2) The maximum traffic signal cycle length during the peak hour is 90 seconds.

(3) For unsignalized intersections, the length of the left turn storage lane should be1.5 to 2.0 times the average number of vehicles arriving during a 60-second cycle.

(4) The average length required per vehicle is 25 feet.

(5) The minimum length of a left turn storage lane should be 50 feet, which is sufficient to accommodate two vehicles.

Scenario A

For Scenario A, which is existing roadway conditions, only the intersection of Laaloa Avenue at Alii Drive was analyzed. Without the extension of Laaloa Avenue, none of the other study intersections will exist.

Without the Laaloa Avenue Extension, the westbound approach of Laaloa Avenue at Alii Drive will operate at Level-of-Service F. As Level-of-Service F is considered unacceptable, potential mitigation measures were identified and assessed.

The first mitigation measure assessed was the installation of a separate southbound to eastbound left turn lane and a separate westbound to northbound right turn lane. The results of the level-of-service analysis without and with these improvements are summarized in Table 4. As shown, even with these improvements, the westbound approach would still operate at Level-of-Service F during the peak hours. Therefore, these improvements would not result in acceptable operating conditions at this intersection.

Table 4 Mitigation Analysis for Laaloa Avenue at Alii Drive (Unsignalized Conditions) Scenario A

Approach and Movement	AM Peak Hour						PM Peak Hour					
	Existing Conditions (No Mitigation)		Add SB Left Turn Lane and WB Right Turn Lane		Add SB Left Turn Lane, WB Right Turn Lane & Left Turn Refuge Lane		Existing Conditions (No Mitigation)		Add SB Left Turn Lane and WB Right Turn Lane		Add SB Left Turn Lane, WB Right Turn Lane & Left Turn Refuge Lane	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
SB Left & Thru	8.6	A	8.6	A	8.6	A	12.8	B	12.8	B	12.8	B
WB Left & Right	112.0	F	Lt: 60.6 Rt: 15.0	F B	24.4 15.0	C B	738.4	F	Lt: 647.0 Rt: 28.0	F D	50.1 28.0	F D

NOTES:
1. Peak hour conditions analyzed are "worst-case" conditions, which is the sum of the peak hour of the adjacent street plus the peak hour of the generator.
2. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.

The second potential mitigation measure is to provide a refuge lane for westbound Laaloa Avenue to southbound Alii Drive left turns. As shown in Table 4, the delay is reduced significantly, but the level-of-service is still Level-of-Service F.

The third potential mitigation measure is to signalize the intersection. A traffic signal warrant analysis was performed for peak hour conditions as only peak hour traffic projections are available. The warrant analysis was performed using the procedures and criteria described in the *Manual of Uniform Traffic Control Devices* [2]. The warrant analysis concluded that, based on anticipated 2020 conditions without the extension of Laaloa Avenue, traffic signals would be warranted at the intersection of Laaloa Avenue at Alii Drive for both morning and afternoon peak hour conditions.

[2] US Department of Transportation, Federal Highway Administration, *Manual of Uniform Traffic Control Devices*, 2001, Washington, D.C., pages 4C-1 through 14.

Table 5 summarizes the results of the level-of-service for the intersection of Laaloa Avenue at Alii Drive for signalized conditions. Shown are the level-of-service results for the intersection with the existing lane configuration and with a separate southbound to eastbound left turn lane and separate westbound to northbound right turn lane.

As a signalized intersection, the intersection would operate at Level-of-Service A during the morning peak hour and Level-of-Service F during the afternoon peak hour. As a signalized intersection with the additional lanes, the intersection will operate at Level-of-Service B during the morning peak hour and Level-of-Service C during the afternoon peak hour.

Table 5 Mitigation Analysis for Laaloa Avenue at Alii Drive (Signalized Conditions) - Scenario A

	AM Peak Hour						PM Peak Hour					
	Signalized With Existing Lane Configuration			Signalized With SB Left Turn Lane and WB Right Turn Lane			Signalized With Existing Lane Configuration			Signalized With SB Left Turn Lane and WB Right Turn Lane		
Intersection and Movement	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Laaloa Ave at Alii Dr	***0.57***	***8.4***	***A***	***0.45***	***12.4***	***B***	***1.18***	***80.5***	***F***	***0.74***	***25.9***	***C***
Westbound Left	0.37	18.6	B	0.42	22.8	C	0.35	67.2	E	0.21	33.1	C
Westbound Left	0.15	17.4	B	0.15	21.1	C	0.14	62.5	E	0.14	32.3	C
Northbound Thru & Right	0.40	4.9	A	0.48	9.3	A	0.59	8.1	A	0.88	30.7	C
Southbound Left & Right	0.62	5.9	A	Lt: 0.70 Th: 0.45	40.8 4.8	D A	1.29	154.5	F	Lt: 0.83 Th: 0.43	44.1 5.6	D A

NOTES:
1. Peak hour conditions analyzed are "worst-case" conditions, which is the sum of the peak hour of the adjacent street plus the peak hour of the generator.
2. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.

In conclusion, if Laaloa Avenue is not extended, the intersection of Laaloa Avenue at Alii Drive will have to be signalized and a separate southbound to eastbound left turn lane and separate westbound to northbound left turn lane constructed in order for the intersection to operate at acceptable levels-of-service. As there are right-of-way constraints, an alternative to widening the intersection is required.

Scenario B

For Scenario B, the intersections of Laaloa Avenue at Alii Drive and Laaloa Avenue at Kuakini Highway were analyzed.

Laaloa Avenue at Alii Drive

The results of the level-of-service for the intersection of Laaloa Avenue at Alii Drive for Scenario B, unsignalized conditions, are summarized in Table 6. For this scenario, the westbound approach of Laaloa Avenue to Alii Drive will operate at Level-of-Service E and F, even with the additional lanes described under Scenario A, during the afternoon peak hour. However, if a left turn refuge lane is provided in addition to the separate left turn lane and the separate westbound right turn lane, the level-of-service would improve to Level-of-Service C, which is acceptable. The refuge lane will need to accommodate only one vehicle.

Table 6 Mitigation Analysis for Laaloa Avenue at Alii Drive (Unsignalized Conditions) - Scenario B

Intersection and Movement	AM Peak Hour						PM Peak Hour					
	Existing Conditions (No Mitigation)		Add SB Left Turn Lane and WB Right Turn Lane		Add SB Left Turn Lane, WB Right Turn Lane & Left Turn Refuge Lane		Existing Conditions (No Mitigation)		Add SB Left Turn Lane and WB Right Turn Lane		Add SB Left Turn Lane, WB Right Turn Lane & Left Turn Refuge Lane	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Laaloa Avenue at Alii Drive												
SB Left & Thru	8.4	A	8.4	A	8.4	A	10.1	B	10.1	B	10.1	B
WB Left & Right	19.2	C	Lt: 25.3 Rt: 12.0	D B	16.6 12.0	C B	36.0	E	Lt: 56.6 Rt: 16.9	F C	23.1 16.9	C C

NOTES:
1. Peak hour conditions analyzed are "worst-case" conditions, which is the sum of the peak hour of the adjacent street plus the peak hour of the generator.
2. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.

The traffic signal warrant analysis concluded that the warrants for a traffic signal are not satisfied for this scenario. The extension of Laaloa Avenue will divert enough traffic away from this intersection such that the peak hour traffic signal warrants are no longer satisfied. Therefore, a level-of-service analysis was not performed for signalized conditions.

Laaloa Avenue at Kuakini Highway

A traffic signal warrant analysis concluded that traffic signals are warranted for both morning and afternoon peak hour conditions at the intersection of Laaloa Avenue at Kuakini Highway. Accordingly, the level-of-service analysis was performed for signalized conditions only. The results are summarize in Table 7. As shown, all movements will operate at Level-of-Service D or better.

Table 7 Mitigation Analysis for Laaloa Avenue at Kuakini Highway (Signalized Conditions) - Scenario B

	AM Peak Hour			PM Peak Hour		
	Signalized Without NB Left Turn Lane and WB Right Turn Lane			Signalized Without NB Left Turn Lane and WB Right Turn Lane		
Intersection Approach and Movement	V/C	Delay	LOS	V/C	Delay	LOS
Laaloa Ave at Kuakini Hwy	***0.72***	***10.0***	***B***	***0.88***	***13.9***	***B***
Eastbound Left	0.66	44.6	D	0.60	42.5	D
Eastbound Right	0.05	34.9	C	0.02	35.3	D
Northbound Left	0.46	47.0	D	0.40	23.5	C
Northbound	0.73	6.7	A	0.66	5.6	A
Southbound Thru	0.67	9.3	A	0.93	19.1	B
Southbound Right	0.03	4.3	A	0.12	4.6	A

NOTES:
1. Peak hour conditions analyzed are "worst-case" conditions, which is the sum of the peak hour of the adjacent street plus the peak hour of the generator.
2. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.

Scenario C

For Scenario C, the intersections of Laaloa Avenue at Alii Drive, Laaloa Avenue at Kuakini Highway and Laaloa Avenue at The Parkway were analyzed.

Laaloa Avenue at Alii Drive

The results of the level-of-service analysis are summarized in Table 8. The conclusions and findings were consistent with those for Scenario B. In summary, a separate southbound left turn lane, a westbound to northbound right turn lane and a left turn refuge lane along Alii Drive will provide acceptable levels-of-service during the morning and afternoon peak hours.

Table 8 Mitigation Analysis for Laaloa Avenue at Alii Drive (Unsignalized Conditions) - Scenario C

Intersection and Movement	AM Peak Hour						PM Peak Hour					
	Existing Conditions (No Mitigation)		Add SB Left Turn Lane and WB Right Turn Lane		Add SB Left Turn Lane, WB Right Turn Lane & Left Turn Refuge Lane		Existing Conditions (No Mitigation)		Add SB Left Turn Lane and WB Right Turn Lane		Add SB Left Turn Lane, WB Right Turn Lane & Left Turn Refuge Lane	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
SB Left & Thru	8.3	A	8.3	A	8.3	A	9.7	A	9.7	A	9.7	A
WB Left & Right	17.5	C	Lt: 23.7 Rt: 11.4	C B	16.1 11.4	C B	27.1	D	Lt: 39.5 Rt: 15.6	E C	19.9 15.6	C C

NOTES:
1. Peak hour conditions analyzed are "worst-case" conditions, which is the sum of the peak hour of the adjacent street plus the peak hour of the generator.
2. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.

Laaloa Avenue at Kuakini Highway

For the intersection of Laaloa Avenue at Kuakini Highway, the peak hour volumes are sufficient to satisfy the warrant for traffic signals, assuming 70% conditions. This means that if the average running speed along Kuakini Highway is 40 miles per hour or greater, signals are warranted. Accordingly, the level-of-service analysis was performed using the methodology for signalized intersections. It was also assumed that Kuakini Highway would be widened from two to four lanes by 2020. The results of the level-of-service are summarized in Table 9. As shown, all movements will operate at Level-of-Service C, or better, except the northbound left turn, which will operate at Level-of-Service D. The volume-to-capacity ratio of this movement is only 0.41. This implies that the long delay is because vehicles must wait for the traffic signal to run through the other phases before this movement can proceed.

Table 9 Mitigation Analysis for Laaloa Avenue at Kuakini Highway (Signalized Conditions) - Scenario C

Intersection, Approach and Movement	AM Peak Hour			PM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS
Laaloa Ave at Kuakini Hwy	***0.64***	***6.9***	***A***	***0.67***	***6.1***	***A***
Eastbound Left	0.48	28.6	C	0.35	25.4	C
Eastbound Right	0.02	25.4	C	0.13	24	C
Northbound Left	0.41	40.0	D	0.28	8.3	A
Northbound Thru	0.66	5.2	A	0.60	4.8	A
Southbound Thru	0.60	6.9	A	0.73	6.4	A
Southbound Right	0.62	3.5	A	0.08	2.3	A

NOTES:
1. Peak hour conditions analyzed are "worst-case" conditions, which is the sum of the peak hour of the adjacent street plus the peak hour of the generator.
2. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.

Laaloa Avenue at the Parkway

The results of the level-of-service analysis for the intersection of Laaloa Avenue at the Parkway are summarized in Table 10. As shown in Table 10, the eastbound and westbound approaches of Laaloa Avenue to the Parkway will operate at E and D during the morning peak hour and F during the afternoon peak hour. Accordingly, mitigation will be required.

Table 10 Mitigation Analysis for Laaloa Avenue at the Parkway (Unsignalized Conditions) - Scenario C

Intersection	AM Peak Hour						PM Peak Hour					
	Two-Way Stop Along Laaloa Ave		All-Way Stop		Roundabout		Two-Way Stop Along Laaloa Ave		All-Way Stop		Roundabout	
Approach	Delay	LOS	Delay	LOS	V/C	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Laaloa Avenue at the Parkway												
Northbound	8.3	A	20.5	C	0.44	A	8.7	A	39.3	E	0.55	A
Southbound	8.2	A	21.9	C	0.44	A	8.6	A	52.1	F	0.62	A
Westbound	30.5	D	11.3	B	0.17	A	157.2	F	14.0	B	0.23	A
Eastbound	49.5	E	12.1	B	0.23	A	402.9	F	14.4	B	0.25	A

NOTES:
1. Peak hour conditions analyzed are "worst-case" conditions, which is the sum of the peak hour of the adjacent street plus the peak hour of the generator.
2. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.

The first mitigation measure assessed was the impacts of conversion to an all-way stop controlled intersection. During the morning peak hour all approaches will operate at Level-of-Service C or better. During the afternoon peak hour, the northbound approach would operate at Level-of-Service E and the southbound approach would operate at Level-of-Service F.

The second alternative mitigation measure assessed was the construction of a roundabout. As a roundabout, the intersection will operate at Level-of-Service A during the morning peak hour and Level-of-Service C during the afternoon peak hour.

The traffic signal warrant analysis concluded that the peak hour warrants are satisfied for the afternoon peak hour and 70% conditions. A level-of-service analysis was performed for the intersection using the methodology for signalized intersections. The results are summarized in Table 11. As shown, all movements will operate at Level-of-Service C or better. The overall intersection will operate at Level-of-Service B during the morning peak hour and Level-of-Service C during the afternoon peak hour. The lane configuration used for the level-of-service analysis will be presented further in the report.

Table 11 Level-of-Service Analysis for Laaloa Avenue at Parkway (Signalized Conditions) - Scenario C

Intersection and Movement	AM Peak Hour			PM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS
Overall Intersection	***0.43***	***17.0***	***C***	***0.54***	***19.1***	***B***
Eastbound Left, Thru & Right	0.42	24.8	C	0.42	24.8	C
Westbound Left, Thru & Right	0.30	22.9	C	0.33	23.2	C
Northbound Left	0.07	30.8	C	0.15	32.1	C
Northbound Thru & Right	0.51	14.0	B	0.58	15.6	B
Southbound Left	0.11	30.9	C	0.29	34.7	C
Southbound Thru & Right	0.51	14.4	B	0.66	17.4	B

NOTES:
1. Peak hour conditions analyzed are "worst-case" conditions, which is the sum of the peak hour of the adjacent street plus the peak hour of the generator.
2. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.

Interim (2008) Conditions

Upon review of the draft report, it was determined that further analysis of the intersection of Laaloa Avenue at Kuakini Highway was needed to assess an interim scenario. The design year for this interim scenario is 2008. The purpose of this interim analysis was to assess traffic conditions at the intersection of Laaloa Avenue at Kuakini Highway and determine the levels-of-service of the intersection with Kuakini Highway as a two-lane highway through 2008. If the intersection will operate at acceptable levels-of-service, widening of Kuakini Highway from two lanes to four lanes could be deferred until after 2008.

Accordingly, the traffic forecasts for the intersection of Laaloa Avenue at Kuakini Highway were recalculated for 2008 conditions for Scenarios B and C. The resulting 2008 traffic projections are shown in Figure 6.

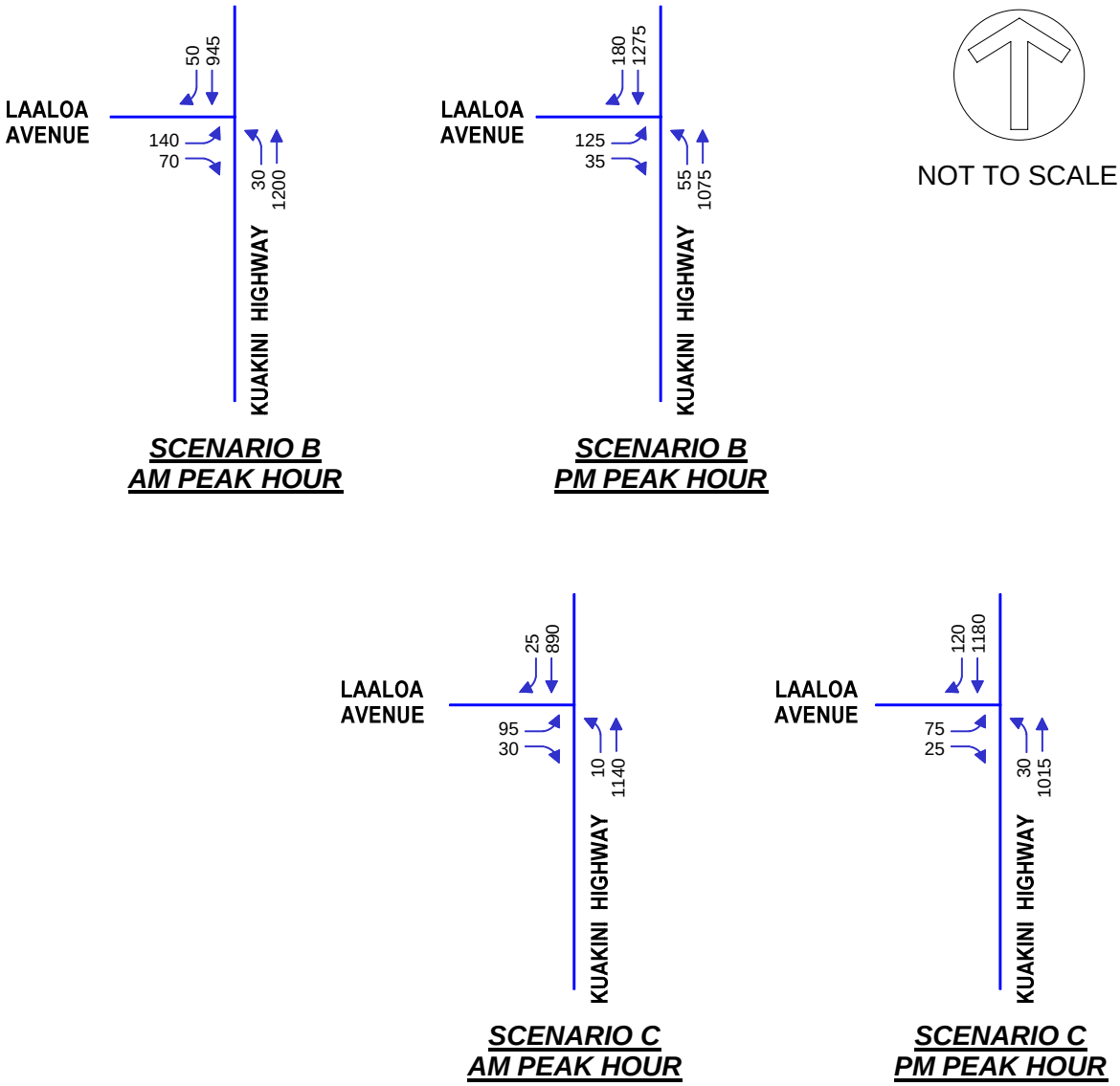
Scenario B

The results of the level-of-service analysis for Scenario B with Kuakini Highway as a two-lane roadway summarized in Table 12. Based on the average vehicle delay, all movements will operate at Level-of-Service D or better except the eastbound left and the northbound left. However, the volume-to-capacity ratios indicate Levels-of-Service D and C, respectively. This implies that the low level-of-service is a function of the traffic signal timing because vehicles making these movements have to wait for the traffic signal to cycle through the other phases, which increases the delay to these vehicles.

Table 12 Level-of-Service Analysis for Laaloa Avenue at Kuakini Highway - Scenario B (2008)

	AM Peak Hour			PM Peak Hour		
Intersection and Movement	V/C	Delay	LOS	V/C	Delay	LOS
Overall Intersection	***0.89***	***15.2***	***B***	***0.90***	***19.7***	***B***
Eastbound Left	0.82	69.5	E	0.90	70.5	E
Eastbound Right	0.05	38.6	D	0.28	28	C
Northbound Left	0.73	72.7	E	0.12	23.4	C
Northbound Thru	0.72	6.3	A	0.90	14.1	B
Southbound Thru	0.90	16.7	B	0.88	19.8	B
Southbound Right	0.15	2.7	A	0.06	4.8	A

NOTES:
1. Peak hour conditions analyzed are "worst-case" conditions, which is the sum of the peak hour of the adjacent street plus the peak hour of the generator.
2. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.



NOTES:
1. SCENARIO B = LAALOA AVENUE EXTENDED, WITHOUT PARKWAY
2. SCENARIO C = LAALOA AVENUE EXTENDED, WITH PARKWAY
3. ALL PROJECTIONS ARE ROUNDED TO NEAREST FIVE(5).

Figure 6
2008 PEAK HOUR TRAFFIC PROJECTIONS FOR SCENARIOS B AND C

Scenario C

The results of the level-of-service analysis for Scenario C with Kuakini Highway as a two-lane roadway summarized in Table 13. All the levels-of-service are D or better and all the volume-to-capacity ratios are less than 0.84.

Table 13 Level-of-Service Analysis for Laaloa Avenue at Kuakini Highway - Scenario C (2008)

	AM Peak Hour			PM Peak Hour		
Intersection and Movement	V/C	Delay	LOS	V/C	Delay	LOS
Overall Intersection	***0.83***	***14.3***	***B***	***0.78***	***10.3***	***B***
Eastbound Left	0.62	34.5	C	0.50	42.5	D
Eastbound Right	0.13	27.0	C	0.08	38.9	D
Northbound Left	0.05	23.0	C	0.42	46.5	D
Northbound Thru	0.85	11.0	B	0.68	5.6	A
Southbound Thru	0.83	16.3	B	0.84	12.0	B
Southbound Right	0.03	4.6	A	0.10	2.5	A

NOTES:
1. Peak hour conditions analyzed are "worst-case" conditions, which is the sum of the peak hour of the adjacent street plus the peak hour of the generator.
2. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.

Findings and Conclusions

Recent reports are that construction of the Parkway have been delayed indefinitely. Therefore, the conclusions associated with Scenario C can be deferred. The conclusions and recommendations for Scenarios A and B are as follows:

Scenario A

Without the extension of Laaloa Avenue to Kuakini Highway, a traffic signal will be required at the intersection of Laaloa Avenue at Alii Drive to provide acceptable levels-of-service during the peak hours. A separate southbound to eastbound left turn lane and westbound to northbound right turn lane will also be required. The improvements described above are shown schematically in Figure 7.

Scenario B

1. The recommended improvements for the intersection of Laaloa Avenue at Alii Drive are shown in Figure 8. These improvements include the following:

    a. A separate southbound to eastbound left turn lane along Alii Drive.

    b. A separate westbound to northbound right turn lane along Laaloa Avenue.

    c. A refuge lane along Alii Drive for traffic turning from westbound Laaloa Avenue to southbound Alii Drive.

2. The peak hour volume and delay warrant for a traffic signal at the intersection of Laaloa Avenue at Kuakini Highway are satisfied. Therefore, it is recommended that this intersection be signalized. Additionally, a separate northbound to westbound left turn lane should be provided. To accommodate 2020 traffic projections, Kuakini Highway should be widened from two to four lanes. A schematic diagram of the recommended intersection configuration and Kuakini as a four-lane roadway is provided as Figure 9.

3. An analysis of 2008 conditions determined the operating conditions of the intersection with Kuakini Highway as a two-lane highway. With Kuakini Highway as a two lane roadway, all movements will operate at Level-of-Service D or better except the eastbound left and the northbound left. However, the volume-to-capacity ratios indicate Levels-of-Service D and C, respectively. This implies that the low level-of-service is a function of the traffic signal timing because vehicles making these movements have to wait for the traffic signal to cycle through the other phases, which increases the delay to these vehicles. A schematic diagram of the recommended intersection configuration and Kuakini as a two-lane roadway is provided as Figure 10.

4. A two-lane cross-section for Laaloa Avenue is sufficient to provide adequate capacity with widening a major intersections to provide separate left turn lanes.

Scenario C

1. In the event that The Parkway is constructed, it is our understanding that the intersection of Laaloa Avenue at the Parkway will be signalized. Based on the findings of the level-of-service analysis, the intersection will operate at Level-of-Service B during the morning and afternoon peak hours and all movements will operate at Level-of-Service D or better. Schematic diagram of the lane configuration is shown as Figure 11.

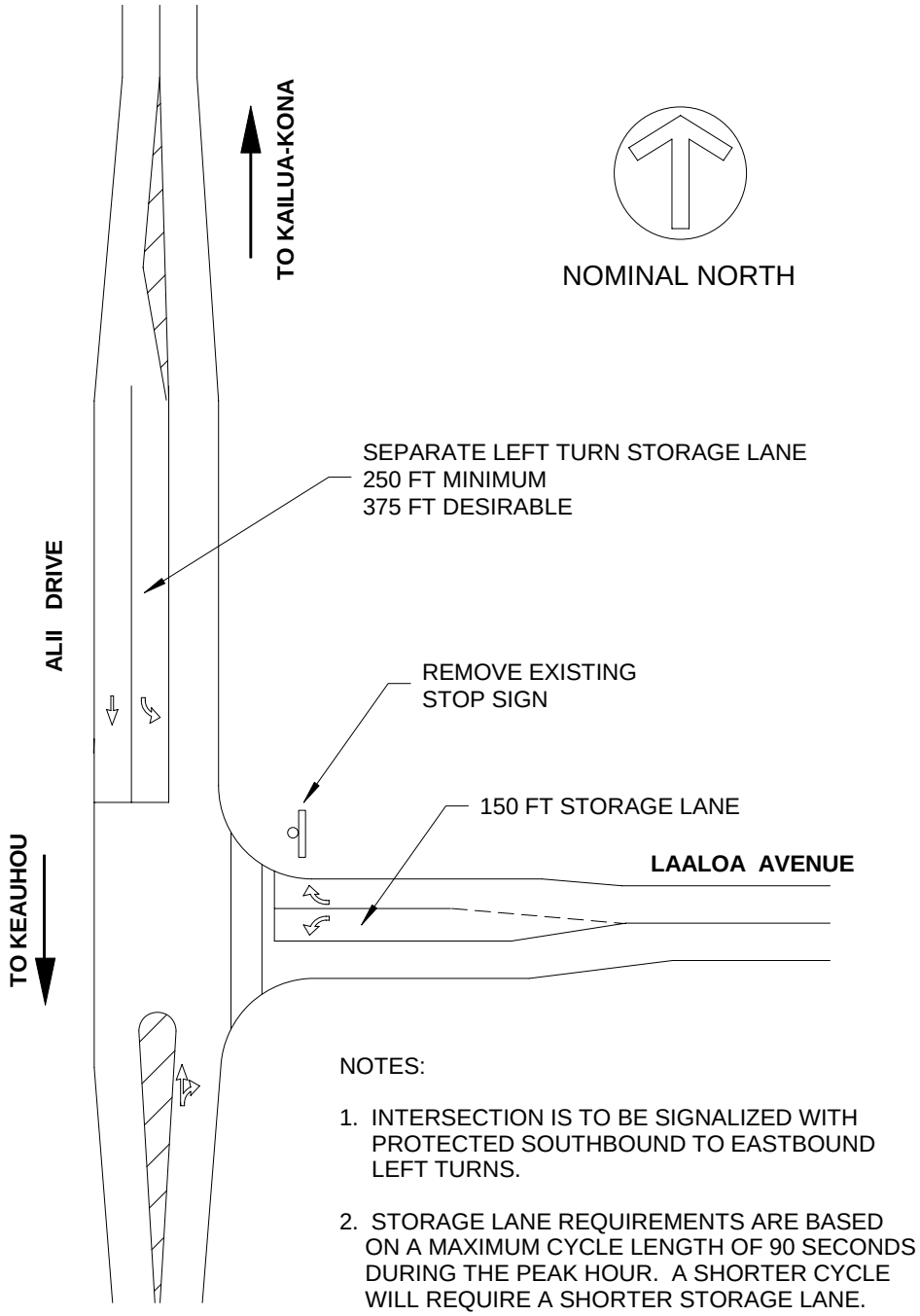


Figure 7
SCHEMATIC OF RECOMMENDED INTERSECTION CONFIGURATION
LAALOA AVENUE AT ALII DRIVE - SCENARIO A

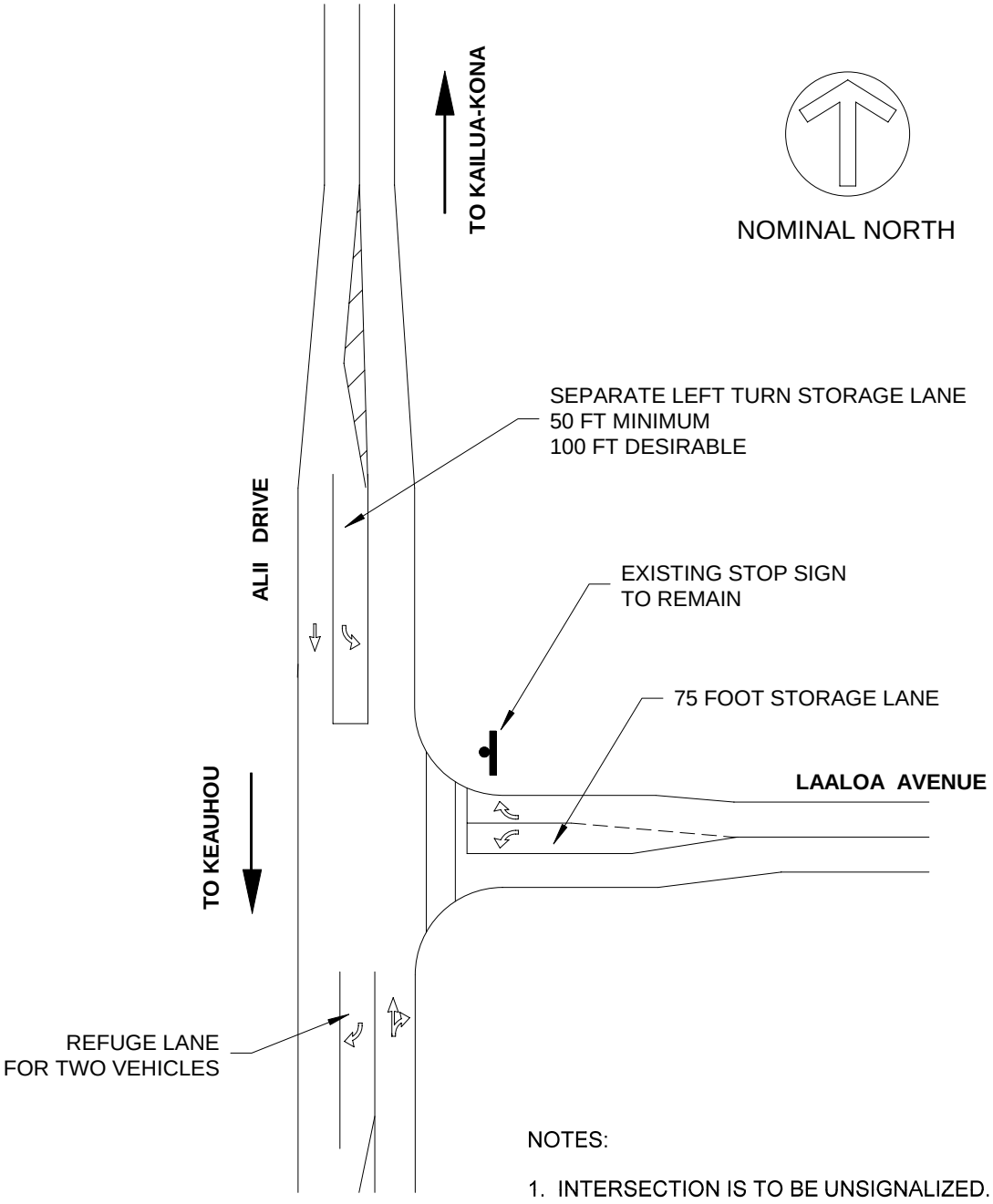
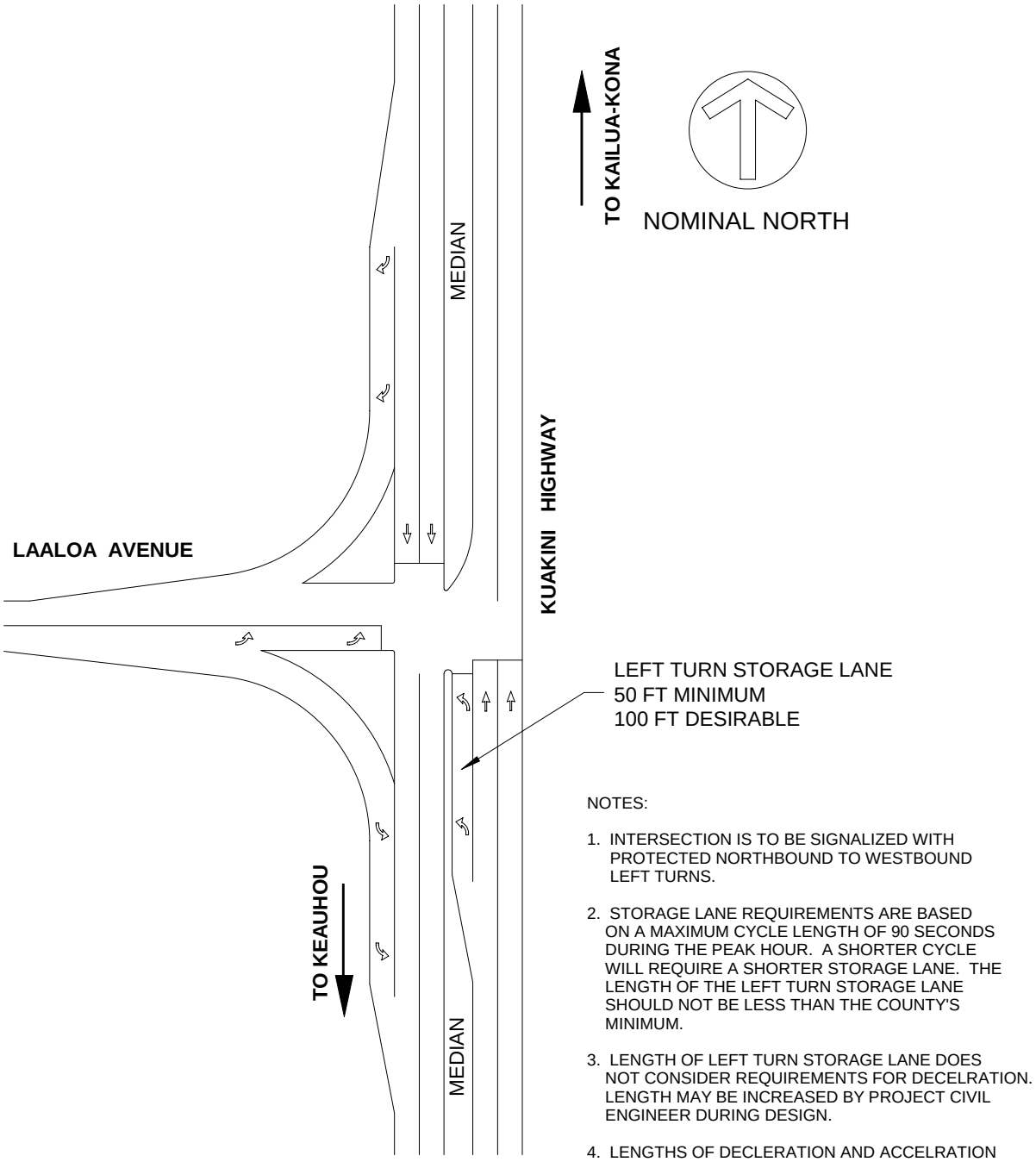


Figure 8
SCHEMATIC OF RECOMMENDED INTERSECTION CONFIGURATION
LAALOA AVENUE AT ALII DRIVE - SCENARIO B



NOTES:

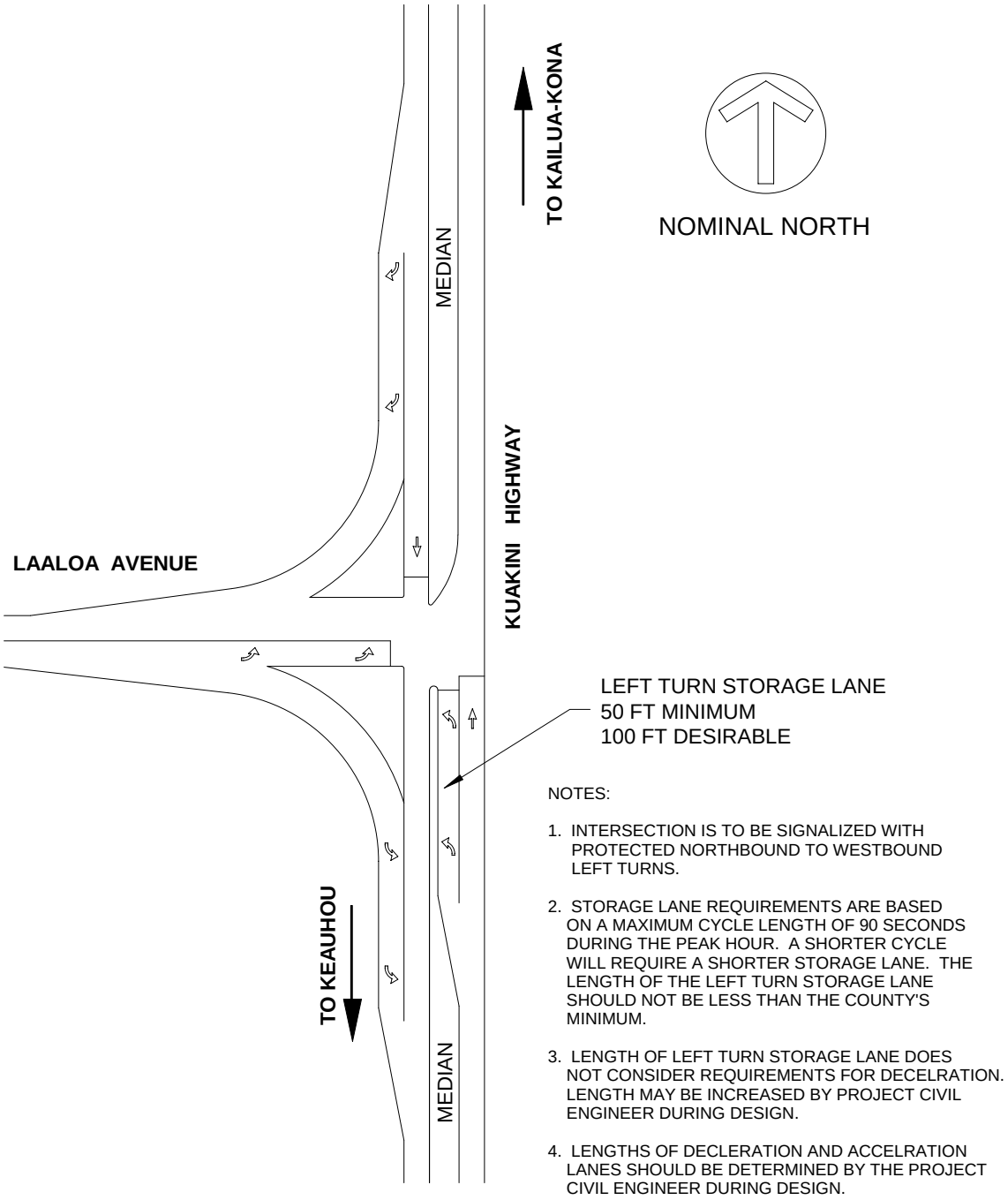
1. INTERSECTION IS TO BE SIGNALIZED WITH PROTECTED NORTHBOUND TO WESTBOUND LEFT TURNS.

2. STORAGE LANE REQUIREMENTS ARE BASED ON A MAXIMUM CYCLE LENGTH OF 90 SECONDS DURING THE PEAK HOUR. A SHORTER CYCLE WILL REQUIRE A SHORTER STORAGE LANE. THE LENGTH OF THE LEFT TURN STORAGE LANE SHOULD NOT BE LESS THAN THE COUNTY'S MINIMUM.

3. LENGTH OF LEFT TURN STORAGE LANE DOES NOT CONSIDER REQUIREMENTS FOR DECELRATION. LENGTH MAY BE INCREASED BY PROJECT CIVIL ENGINEER DURING DESIGN.

4. LENGTHS OF DECLERATION AND ACCELRATION LANES SHOULD BE DETERMINED BY THE PROJECT CIVIL ENGINEER DURING DESIGN.

Figure 9
SCHEMATIC OF RECOMMENDED INTERSECTION CONFIGURATION
LAALOA AVENUE AT KUAKINI HIGHWAY (SCENARIO B, KUAKINI HIGHWAY AS 4 LANES)



NOTES:

1. INTERSECTION IS TO BE SIGNALIZED WITH PROTECTED NORTHBOUND TO WESTBOUND LEFT TURNS.

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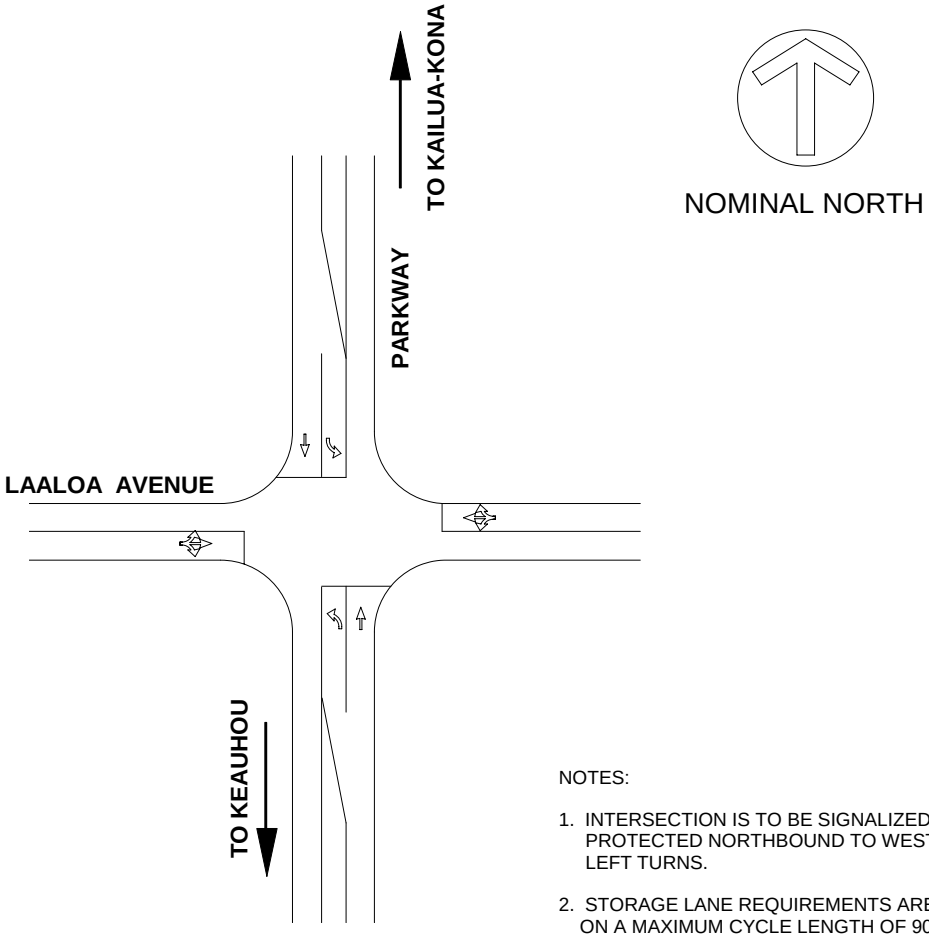
3. LENGTH OF LEFT TURN STORAGE LANE DOES NOT CONSIDER REQUIREMENTS FOR DECELRATION. LENGTH MAY BE INCREASED BY PROJECT CIVIL ENGINEER DURING DESIGN.

4. LENGTHS OF DECLERATION AND ACCELRATION LANES SHOULD BE DETERMINED BY THE PROJECT CIVIL ENGINEER DURING DESIGN.

Figure 10
SCHEMATIC OF RECOMMENDED INTERSECTION CONFIGURATION
LAALOA AVENUE AT KUAKINI HIGHWAY (SCENARIO B, KUAKINI HIGHWAY AS 2 LANES)



NOTES:

1. INTERSECTION IS TO BE SIGNALIZED WITH PROTECTED NORTHBOUND TO WESTBOUND LEFT TURNS.

2. STORAGE LANE REQUIREMENTS ARE BASED ON A MAXIMUM CYCLE LENGTH OF 90 SECONDS DURING THE PEAK HOUR. A SHORTER CYCLE WILL REQUIRE A SHORTER STORAGE LANE. THE LENGTH OF THE LEFT TURN STORAGE LANE SHOULD NOT BE LESS THAN THE COUNTY'S MINIMUM.

3. LENGTH OF LEFT TURN STORAGE LANE DOES NOT CONSIDER REQUIREMENTS FOR DECELRATION. LENGTH MAY BE INCREASED BY PROJECT CIVIL ENGINEER DURING DESIGN.

4. LENGTHS OF DECLERATION AND ACCELRATION LANES SHOULD BE DETERMINED BY THE PROJECT CIVIL ENGINEER DURING DESIGN.

Figure 11
SCHEMATIC OF RECOMMENDED INTERSECTION CONFIGURATION
LAALOA AVENUE AT PARKWAY (SCENARIO C)

LA‘ALOA AVENUE EXTENSION

LA‘ALOA 1 AND 2 AND PAHOEHOE
NORTH KONA, HAWAII

FINAL ENVIRONMENTAL ASSESSMENT

APPENDIX 2

NOISE STUDY

D. L. ADAMS ASSOCIATES, LTD.
Consultants in Acoustics and Performing Arts Technologies

Environmental Noise Assessment Report
Laaloa Avenue Extension

Kailua-Kona, Island of Hawaii

February 2005

DLAA Project No. 04-45

Prepared by: David L. Adams Associates, Ltd.
Kailua, O'ahu, Hawaii

Prepared for: Geometrician Associates, LLC
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5 Typical Sound Levels From Construction Equipment

Appendices

Appendix A Acoustical Terminology

1.0 EXECUTIVE SUMMARY

1.1 The Laaloa Avenue Extension project proposes to extend the existing Laaloa Avenue in a mauka direction and connect to Keauhou Parkway. The existing Laaola Avenue currently "dead ends." The existing site is undeveloped land.

1.2 Continuous ambient noise levels were measured within the undeveloped land near the proposed new road location, and approximately 150 feet from Kuakini Highway. The hourly Equivalent Sound Level ($L_{eq(h)}$) generally ranged between 40 dBA and 58 dBA, depending on the time of day and traffic volume on Kuakini Highway. The dominant noise source is vehicular traffic on Kuakini Highway, but other noises include aircrafts, distant construction activities, wind, birds, and crickets.

1.3 New homes along the proposed Laaloa Avenue Extension should be built at least 30 feet from the road to meet the FHWA and HUD noise criteria. Homes that are at least 150 from Kuakini Highway satisfy the FHWA and HUD noise criteria.

1.4 Vehicular traffic noise in the area is expected to increase by the year 2020. The noise levels along Alii Drive and Laaloa Avenue will be lower with the project versus year 2020 traffic projections without the project. The anticipated Keauhou Parkway project will further reduce noise levels by easing the traffic burden along Alii Drive, Kuakini Highway, and Laaloa Avenue. One exception is noise predictions along Kuakini Highway in the year 2020 with the project, but without the anticipated Keauhou project. In this case the noise levels will increase slightly by less than 1 dB. No noise impact for vehicular traffic along the existing roads in the area was found.

1.5 Noise levels near the future road location (currently undeveloped land) will increase due to the project. However, at typical home locations, the noise level will increase less than 15 dB over the existing ambient noise levels. There are no residences in close proximity (less than 30 feet) to the new road location. Therefore no noise impact was found within the proposed Laaloa Avenue Extension site.

1.6 During the construction phase of the project, typical construction noises will be audible in the area. Noise from construction activities must comply with State Department of Health noise regulations as specified for construction activities.

2.0 PROJECT DESCRIPTION

The Laaloa Avenue Extension project proposes to extend the Laaloa Avenue east (mauka) and connect to the Kuakini Highway near Kailua-Kona on the Island of Hawaii. The completed project will connect the Kuakini Highway to Alii Drive. The existing project site is undeveloped land with vegetation. Laaloa Avenue currently dead ends about midway between Alli Drive and Kuakiki Highway.

During construction, the project site will be closed to the public. Typical construction equipment will be on-site throughout the construction of the new road.

3.0 NOISE STANDARDS

Various local and federal agencies have established guidelines and standards for assessing environmental noise impacts and set noise limits as a function of land use. A brief description of common acoustic terminology used in these guidelines and standards is presented in Appendix A.

3.1 State of Hawaii, Community Noise Control

The State of Hawaii Community Noise Control Rule [Reference 1] defines three classes of zoning districts and specifies corresponding maximum permissible sound levels due to stationary noise sources such as air-conditioning units, exhaust systems, generators, compressors, pumps, etc., and equipment related to agricultural, construction, and industrial activities. These levels are enforced by the State Department of Health (DOH) for any location at or beyond the property line and shall not be exceeded for more than 10% of the time during any 20-minute period. The specified noise limits which apply are a function of the zoning and time of day as shown in Figure 1. With respect to mixed zoning districts, the rule specifies that the primary land use designation shall be used to determine the applicable zoning district class and the maximum permissible sound level. In determining the maximum permissible sound level, the background noise level is taken into account by the DOH.

3.2 U.S. Environmental Protection Agency (EPA)

The U.S. EPA has identified a range of day-night equivalent sound levels, L_{dn}, sufficient to protect public health and welfare from the effects of environmental noise [Reference 2]. The EPA has established a goal to reduce exterior environmental noise to an L_{dn} not exceeding 65 dBA and a future goal to further reduce exterior environmental noise to an L_{dn} not exceeding 55 dBA. Additionally, the EPA states that these goals are not intended as regulations as it has no authority to regulate noise levels, but rather they are intended to be viewed as levels below which the general population will not be at risk from any of the identified effects of noise.

3.3 U.S. Federal Highway Administration (FHWA)

The FHWA defines four land use categories and assigns corresponding maximum hourly equivalent sound levels, $L_{eq(h)}$, for traffic noise exposure [Reference 3], which are listed in Figure 2. For example, Category B, defined as picnic and recreation areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals, has a corresponding maximum exterior L_{eq} of 67dBA and a maximum interior L_{eq} of 52 dBA. These limits are viewed as design goals, and all projects meeting these limits are deemed in conformance with FHWA noise standards. Calculation of traffic noise levels should be conducted using the Federal Highway Administration's Traffic Noise Model, 1978 [Reference 4]. Since the Laaloa Avenue Extension is a county road, not funded by Federal or State agencies, compliance with FHWA noise limits is not required. However, the FHWA analyses were used as a guide to assess potential noise impacts in the vicinity of the project.

3.4 Hawaii Department of Transportation (HDOT)

The HDOT has adopted FHWA's design goals for traffic noise exposure in its noise analysis and abatement policy [Reference 5]. According to the policy, a traffic noise impact occurs when the predicted traffic noise levels "approach" or exceed FHWA's design goals or when the predicted traffic noise levels "substantially exceed the existing noise levels." The policy also states that "approach" means at least 1 dB less than FHWA's design goals and "substantially exceed the existing noise levels" means an increase of at least 15 dB. Since the Laaloa Avenue Extension is a county road, not funded by Federal or State agencies, compliance with HDOT noise limits is not required. However, the FHWA/HDOT analyses were used as a guide to assess potential noise impacts in the vicinity of the project.

3.5 U.S. Department of Housing and Urban Development (HUD)

HUD's environmental noise criteria and standards in 24 CFR 51 [Reference 6] were established for determining housing project site acceptability. These standards are based on day-night equivalent sound levels, L_{dn}, and are not limited to traffic noise exposure. However, for project sites in the vicinity of highways, the L_{dn} may be estimated to be equal to the design hour $L_{eq(h)}$, provided "heavy trucks (vehicles with three or more axles) do not exceed 10 percent of the total traffic flow in vehicles per 24 hours and the traffic flow between 10:00 p.m. and 7:00 a.m. does not exceed 15 percent of the average daily traffic flow in vehicles per 24 hours." For these same conditions, L_{dn}, may also be estimated as 3 dB less than the design hour L_{10}.

HUD site acceptability criteria rank sites as Acceptable, Normally Unacceptable, or Unacceptable. "Acceptable" sites are those where exterior noise levels do not exceed an L_{dn} of 65 dBA. Proposed housing projects on "Acceptable" sites do not require additional noise attenuation other than that provided by customary

building techniques. "Normally Unacceptable" sites are those where the L_{dn} is above 65 dBA, but does not exceed 75 dBA. Housing on "Normally Unacceptable" sites requires some form of noise abatement, either at the property line or in the building construction, to ensure the interior noise levels are acceptable. "Unacceptable" sites are those where the L_{dn} is 75 dBA or higher. The term "Unacceptable" does not necessarily mean that housing cannot be built on those sites; however, more elaborate sound attenuation will likely be needed.

4.0 EXISTING ACOUSTICAL ENVIRONMENT

Continuous long-term ambient noise level measurements were conducted at one (1) location, as shown on Figure 3. The noise measurements were conducted between February 15, 2005 and February 22, 2005. In addition, short term noise measurements and traffic counts were conducted on February 22, 2005. The purpose of the short-term measurements and traffic counts was to calibrate the traffic noise model prediction software.

4.1 Noise Measurement Procedure

Long-Term Noise Measurements

The microphone was mounted on a tripod, approximately 5' above grade. A windscreen covered the microphone during the entire measurement period. The sound level meter was secured in a weather resistant case.

Continuous, hourly, equivalent sound levels, L_{eq}, were recorded during the measurement period. The measurements were taken using a Larson-Davis Laboratories, Model 820, Type-1 Sound Level Meter together with a Larson-Davis, Model 2560 Type-1 Microphone. Calibration was checked before and after the measurements with a Larson-Davis Model CAL200 calibrator. Both the sound level meter and the calibrator have been certified by the manufacturer within the recommended calibration period.

Short-Term Noise Measurements

The microphone and sound level meter was mounted on a tripod, approximately 5' above grade. A windscreen covered the microphone during the entire measurement period.

An approximate 15-minute equivalent sound level, L_{eq}, was measured. The measurement was taken using a Larson-Davis Laboratories, Model 824, Type-1 Sound Level Meter together with a Larson-Davis, Model 2541 Type-1 Microphone. Calibration was checked before and after the measurements with a Larson-Davis Model CAL200 calibrator. Both the sound level meter and the calibrator have been certified by the manufacturer within the recommended calibration period.

4.2 Noise Measurement Location

The measurement location was positioned near the southeast section of the project site, approximately 150 feet from Kuakini Highway. Kuakini Highway is a 2-lane highway with no median and a guard rail on the makai side of the road. The grade slopes down on the makai side of the highway, such that only the tops of vehicles in the southbound lane can be seen from the measurement location. The noise measurement location is shown in Figure 3 (See Location A).

4.3 Noise Measurement Results

The results from the long-term noise measurements are graphically presented in Figure 4, which shows the measured equivalent sound level, L_{eq}, and the 90% exceedance level, L_{90}, in A-weighted decibels (dBA) as a function of the measurement date and time.

The sound levels are relatively dynamic and depend significantly on the vehicular traffic patterns on Kuakini Highway. The hourly $L_{eq(h)}$ noise levels generally range from 40 dBA during the low traffic times to approximately 58 dBA during peak hour traffic times. The hourly L_{90} ranges from 30 dBA to 50 dBA. The average day-night level, L_{dn} was 54 dBA for the measurement period. The dominant and secondary noise sources are described below:

<u>Noise Sources</u>

Dominant: Vehicular traffic on Kuakini Highway

Secondary: Occasional aircraft flyovers, wind, birds, crickets, and distant construction noise in the neighboring residential development.

5.0 POTENTIAL NOISE IMPACTS DUE TO THE PROJECT

5.1 Project Construction Noise

Development of project areas will involve excavation, grading, and other typical construction activities during construction. The various construction phases of the project may generate significant amounts of noise. The surrounding residences may be impacted by the construction noise due to their proximity to the project. The actual noise levels produced during construction will be a function of the methods employed during each stage of the construction process. Typical ranges of construction equipment noise are shown in Figure 5.

5.2 Projection of Project Generated Vehicular Traffic Noise

The Extension of Laaloa Avenue will effectively connect Allii Drive to Kuakini Highway and will change the traffic patterns in the area. In addition to the Laaloa Avenue extension, another road may be constructed in the area, Keauhou-Kahului Parkway (referred to as Keauhou Parkway). This road intersects Laaloa Avenue midway between Alii Drive and Kuakini Highway. This report does not include a

full analysis of the Keauhou Parkway road, but does consider the affect of Keauhou Parkway on future traffic volumes in the Laaloa Avenue area. All traffic noise predictions and calculations were completed using the FHWA Traffic Noise Model (1978) [Reference 4].

The traffic impact analysis report [Reference 7] shows existing and predicted traffic volumes for the year 2020. The future predictions include scenarios with and with and without the Laaloa Extension and with and without Keauhou Parkway.

In the year 2020, vehicular traffic on all roads in the area will increase because of natural growth in and around the greater Kailua-Kona area. The traffic study shows significant increases in vehicular traffic along Alii Drive and along the existing Laaloa Avenue, if the Laaloa Avenue Extension project is not completed. The Laaloa Avenue Extension project will ease the traffic burden along Alii Drive and the existing Laaloa Avenue when compared to year 2020 traffic projects without the project. Therefore, vehicular traffic noise levels will be lower than year 2020 projections without the project. Similarly, the anticipated Keauhou Parkway project will also ease the traffic burden on nearby roads and, therefore, lower vehicular traffic noise near these roads.

The only increase in noise level over year 2020 projects without the project is along Kuakini Highway, assuming the Keauhou Parkway project is not completed. However, the predicted increase is less than 1 dB, and is not considered a significant noise impact.

Vehicular traffic noise predictions are shown in Table 1 for Alii Drive, Laaloa Avenue, and Kuakini Highway. The noise prediction locations are shown in Figure 3.

5.3 Compliance with FHWA/HDOT Land Use Noise Limits and HUD Noise Guidelines

The Laaloa Avenue Extension project is a county road, not funded by Federal or State agencies. Therefore, compliance with FHWA and HDOT noise limits is not required. However, the FHWA/HDOT standards provide a good guide for evaluating noise impacts due to the new road.

Since the existing area for the proposed Laaloa Avenue Extension project is undeveloped land, noise levels caused by vehicular traffic on the new road will be higher than the existing ambient noise levels. However, no noise impact was found because the new road will not be placed close to any existing residences, and the increase in noise level at typical new home locations should be less than 15 dB over existing ambient noise levels. New homes should be built at least 30 feet from the new road.

The HUD “acceptable” maximum noise limit of 65 L_{dn} will be satisfied for all homes 150 feet, or more, from Kuakini Highway. Homes along Alii Drive and Laaloa Avenue that are at least 30 feet from the road satisfy the HUD criteria for vehicular traffic noise.

6.0 NOISE IMPACT MITIGATION

6.1 Mitigation of Construction Noise

In cases where construction noise exceeds, or is expected to exceed the State’s "maximum permissible" property line noise levels [Reference 1], a permit must be obtained from the State DOH to allow the operation of vehicles, cranes, construction equipment, power tools, etc., which emit noise levels in excess of the "maximum permissible" levels.

In order for the State DOH to issue a construction noise permit, the Contractor must submit a noise permit application to the DOH, which describes the construction activities for the project. Prior to issuing the noise permit, the State DOH may require action by the Contractor to incorporate noise mitigation into the construction plan. The DOH may also require the Contractor to conduct noise monitoring or community meetings inviting the neighboring residents and business owners to discuss construction noise. The Contractor should use reasonable and standard practices to mitigate noise, such as using mufflers on diesel and gasoline engine machines, using properly tuned and balanced machines, etc. However, the State DOH may require additional noise mitigation, such as temporary noise barriers, or time of day usage limits for certain kinds of construction activities.

Specific permit restrictions for construction activities [Reference 1] are:

> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels ... before 7:00 a.m. and after 6:00 p.m. of the same day, Monday through Friday."
>
> “No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels... before 9:00 a.m. and after 6:00 p.m. on Saturday."
>
> “No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels on Sundays and on holidays."

The use of hoe rams and jack hammers 25 lbs. or larger, high pressure sprayers, chain saws, and pile drivers must be restricted to 9:00 a.m. to 5:30 p.m., Monday through Friday.

The DOH noise permit does not limit the noise *level* generated at the construction site, but rather the *times* at which noisy construction can take place. Therefore, noise mitigation for construction activities should be addressed using project management, such that the time restrictions within the DOH permit are followed.

6.2 Mitigation of Vehicular Traffic Noise

Since the Laaloa Avenue Extension project will lower traffic noise when compared to year 2020 projections without the project, no noise mitigation for vehicular traffic is required for the project.

7.0 REFERENCES

1. Chapter 46, *Community Noise Control*, Department of Health, State of Hawaii, Administrative Rules, Title 11, September 23, 1996.

2. *Toward a National Strategy for Noise Control*, U.S. Environmental Protection Agency, April 1977.

3. *Department of Transportation, Federal Highway Administration Procedures for Abatement of Highway Traffic Noise*, Title 23, CFR, Chapter 1, Subchapter J, Part 772, 38 FR 15953, June 19, 1973; Revised at 47 FR 29654, July 8, 1982.

4. *Federal Highway Administration's Traffic Noise Model*, FHWA-RD-77-108; U.S. Department of Transportation, December 1978.

5. *Noise Analysis and Abatement Policy*, Department of Transportation, Highways Division, State of Hawaii, June 1977.

6. *Department of Housing and Urban Development Environmental Criteria and Standards*, Title 24, CFR, Part 51, 44 FR 40860, July 12, 1979; Amended by 49 FR 880, January 6, 1984.

7. *Traffic Impact Analysis Report for Laaloa Avenue Extension*, Phillip Rowell and Associates, February 14, 2005.

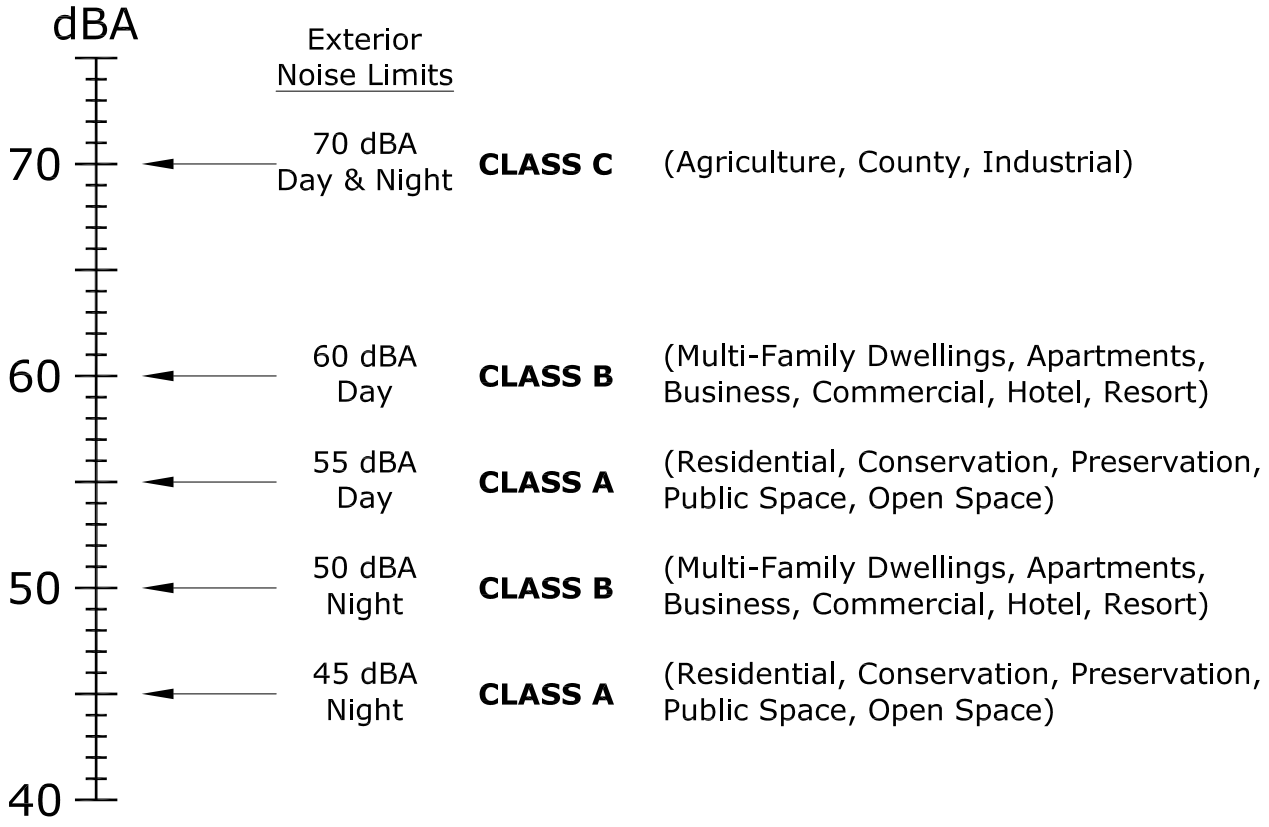
TABLE 1
Predicted Traffic Noise Levels With and Without the Project and Resulting Increases Due to the Project

Noise levels shown in the table are based on peak-hour traffic volumes, and are expressed in A-weighted decibels (dBA).

	Location 1* (Alii Drive)		**Location 2* (Laaloa Ave)**		**Location 3* (Kuakini Hwy)**	
	AM	**PM**	**AM**	**PM**	**AM**	**PM**
Existing (Calculated)	61.0	62.4	52.6	54.6	63.6	63.9
Future Without Project (2020)	64.7	66.2	60.2	62.0	66.3	67.0
Future With Project Without Keauhou Pkwy (2020)	64.0	65.2	56.1	57.9	66.5	67.1
Future With Project and Keauhou Pkwy (2020)	63.9	64.6	57.8	57.6	66.0	66.3
Future Increase Without Project (2020)	3.7	3.8	7.6	7.4	2.7	3.1
Future Increase With Project Without Keauhou Parkway (2020)	3.0	2.8	3.5	3.3	2.9	3.2
Future Increase With Project & Keauhou Pkwy (2020)	2.9	2.2	5.2	3.0	2.4	2.4
Future Increase Due to Project Without Keauhou Pkwy (2020)	**-0.7**	**-1.0**	**-4.1**	**-4.1**	**0.2**	**0.1**
Future Increase Due to Project With Keauhou Pkwy (2020)	**-0.8**	**-1.6**	**-2.4**	**-4.4**	**-0.3**	**-0.7**

* Location 1 - 30 feet east of Alii Drive
Location 2 - 30 feet south of Laaloa Avenue
Location 3 - 100 feet west of Kuakini Highway

Zoning District	Day Hours (7 AM to 10 PM)	Night Hours (10 PM to 7 AM)
CLASS A Residential, Conservation, Preservation, Public Space, Open Space	55 dBA (Exterior)	45 dBA (Exterior)
CLASS B Multi-Family Dwellings, Apartments, Business, Commercial, Hotel, Resort	60 dBA (Exterior)	50 dBA (Exterior)
CLASS C Agriculture, County, Industrial	70 dBA (Exterior)	70 dBA (Exterior)



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Hawaii Maximum Permissible Sound Levels for Various Zoning Districts

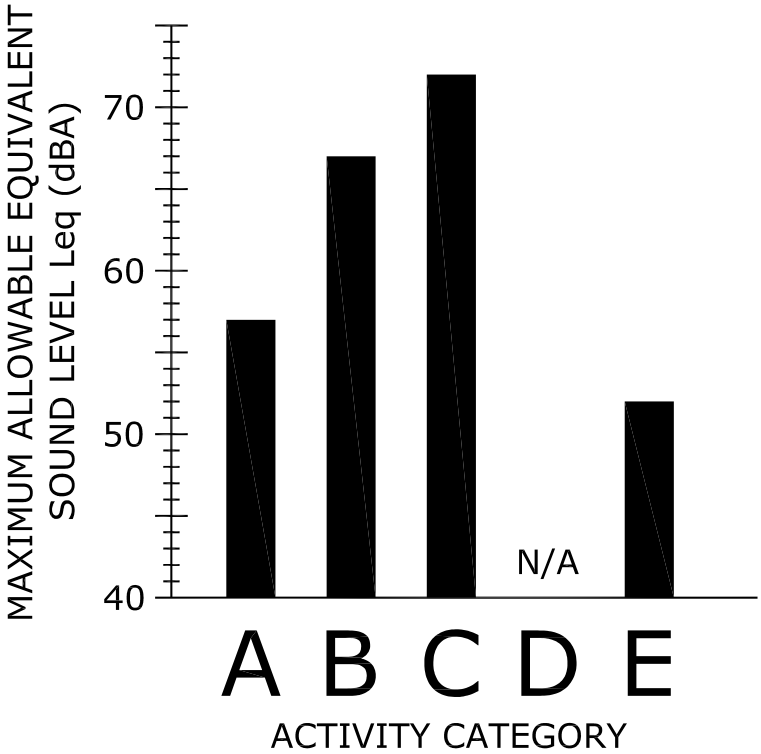
Laaloa Avenue Extension

not to scale

Date	Project No.	Drawn By
February 2005	04-45	TRB

Figure No 1

ACTIVITY CATEGORY	ACTIVITY CATEGORY DESCRIPTION	MAXIMUM EQUIVALENT SOUND LEVEL $L_{eq(h)}$
A	LANDS ON WHICH SERENITY AND QUIET ARE OF EXTRAORDINARY SIGNIFICANCE AND SERVE AN IMPORTANT PUBLIC NEED AND WHERE THE PRESERVATION OF THOSE QUALITIES IS ESSENTIAL IF THE AREA IS TO CONTINUE TO SERVE ITS INTENDED PURPOSE.	57 dBA (EXTERIOR)
B	PICNIC AREAS, RECREATION AREAS, PLAYGROUNDS, ACTIVE SPORT AREAS, PARKS, RESIDENCES, MOTELS, HOTELS, ACHOOLS, CHURCHES, LIBRARIES, AND HOSPITALS.	67 dBA (EXTERIOR)
C	DEVELOPED LANDS, PROPERTIES, OR ACTIVITIES NOT INCLUDED IN ACTIVITY CATEGORIES A OR B ABOVE.	72 dBA (EXTERIOR)
D	UNDEVELOPED LAND	N/A
E	RESIDENCES, MOTELS, HOTELS, PUBLIC MEETING ROOMS, SCHOOLS, CHURCHES, LIBRARIES, HOSPITALS, AND AUDITORIUMS.	52 dBA (INTERIOR)



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Federal Highways Administration Recommended Equivalent Hourly Sound Levels Based on Land Use

Laaloa Avenue Extension

not to scale

Date	Project No.	Drawn By
February 2005	04-45	TRB

Figure No 2

Noise Measurement & Prediction Locations

Kapolei West 100 Acre Petition

not to scale

Figure No
3

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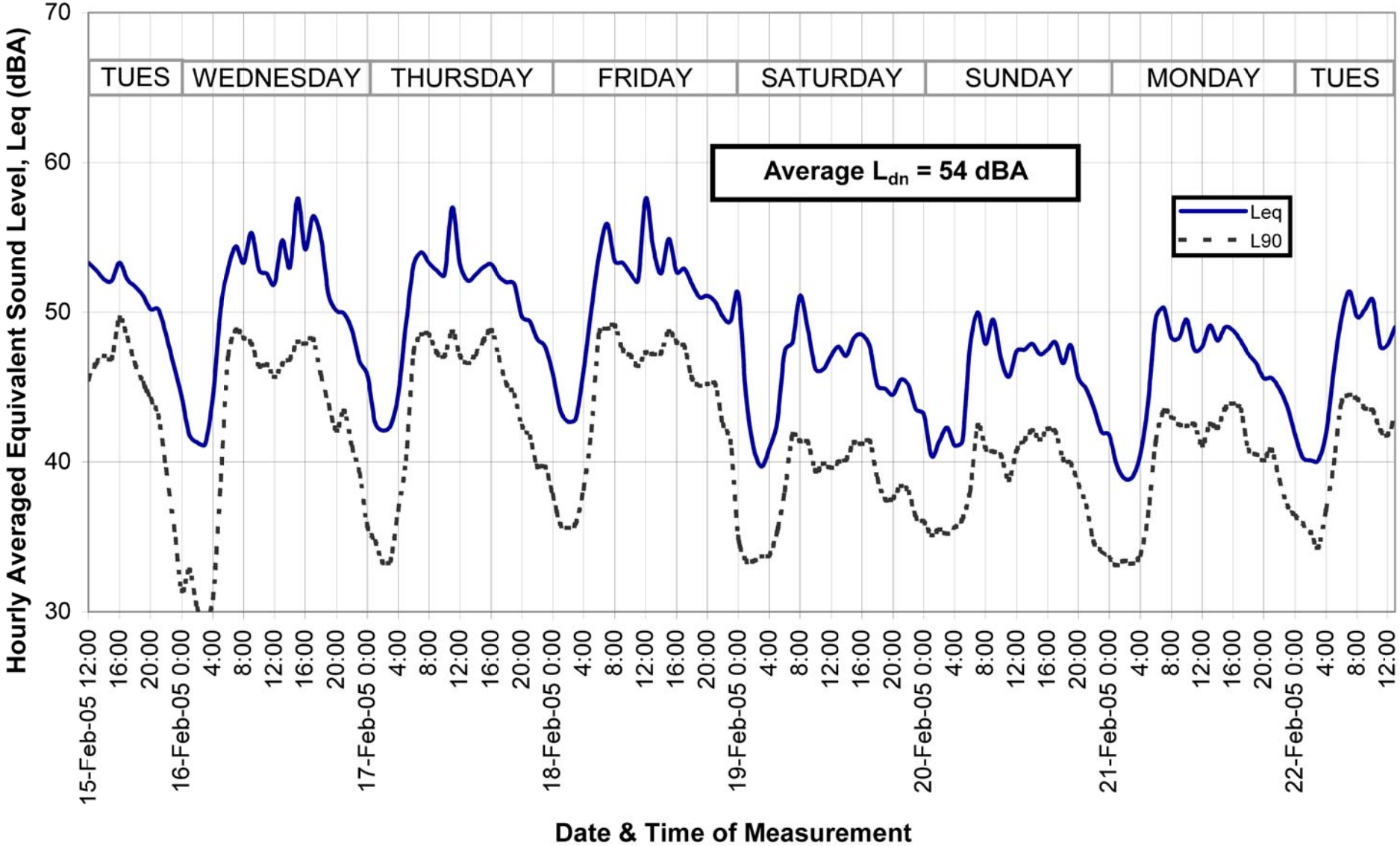

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Graph of Long Term Noise Measurements

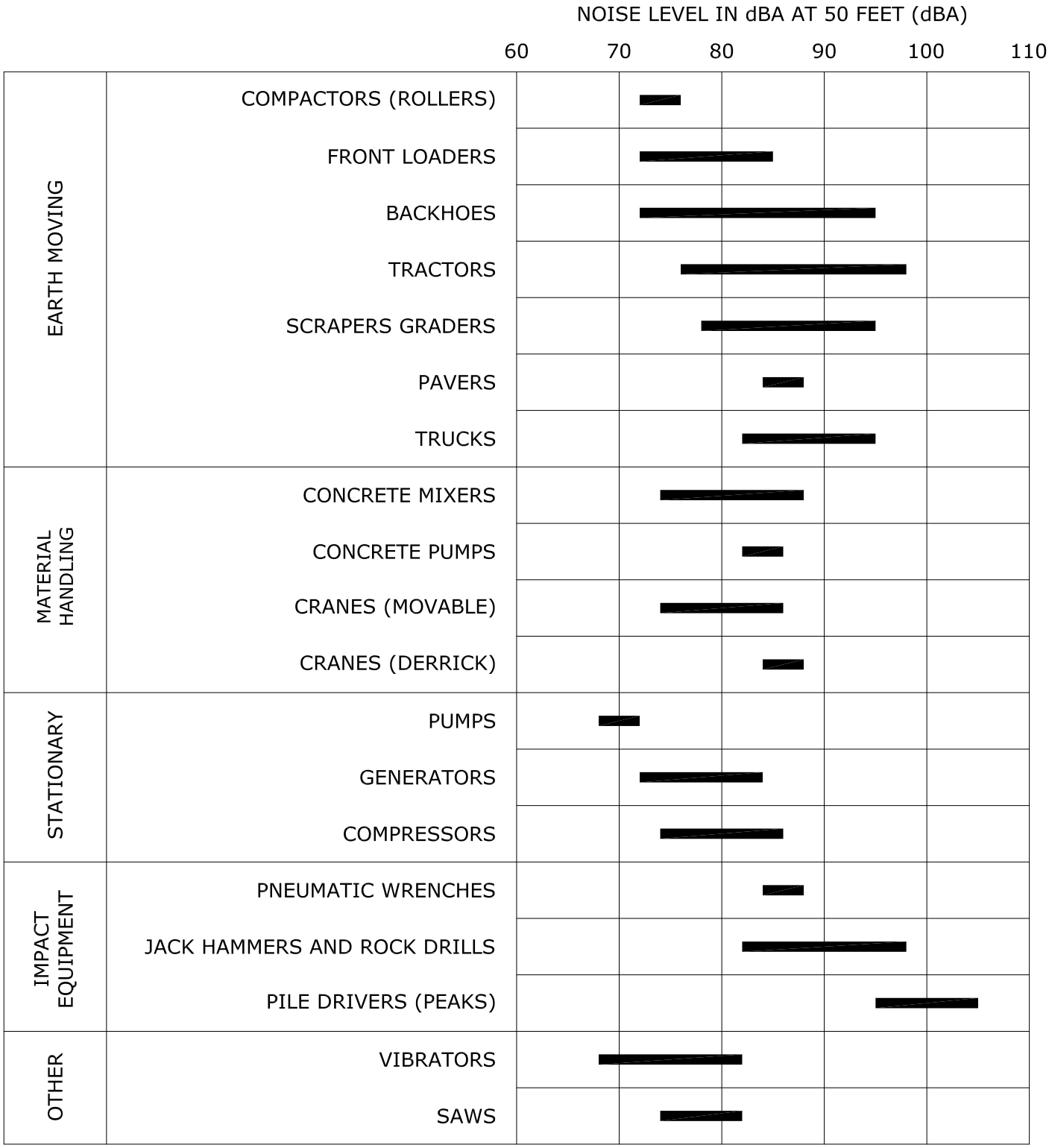
Laaloa Avenue Extension

not to scale

Date	Project No.	Drawn By
February 2005	04-45	TRB

Figure No

4



NOTE: BASED ON LIMITED AVAILABLE DATA SAMPLES

Typical Sound Levels from Construction Equipment

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Laaloa Avenue Extension

not to scale

Date	Project No.	Drawn By
February 2005	04-45	TRB

Figure No

5

APPENDIX A

Acoustic Terminology

Acoustic Terminology

Sound Pressure Level

Sound, or noise, is the term given to variations in air pressure that are capable of being detected by the human ear. Small fluctuations in atmospheric pressure (sound pressure) constitute the physical property measured with a sound pressure level meter. Because the human ear can detect variations in atmospheric pressure over such a large range of magnitudes, sound pressure is expressed on a logarithmic scale in units called decibels (dB). Noise is defined as "unwanted" sound.

Technically, sound pressure level (SPL) is defined as:

$$SPL = 20 \log (P/P_{ref}) \text{ dB}$$

where P is the sound pressure fluctuation (above or below atmospheric pressure) and P_{ref} is the reference pressure, 20 µPa, which is approximately the lowest sound pressure that can be detected by the human ear. For example:

If P = 20 µPa, then SPL = 0 dB
If P = 200 µPa, then SPL = 20 dB
If P = 2000 µPa, then SPL = 40 dB

The sound pressure level that results from a combination of noise sources is not the arithmetic sum of the individual sound sources, but rather the logarithmic sum. For example, two sound levels of 50 dB produce a combined sound level of 53 dB, not 100 dB. Two sound levels of 40 and 50 dB produce a combined level of 50.4 dB.

Human sensitivity to changes in sound pressure level is highly individualized. Sensitivity to sound depends on frequency content, time of occurrence, duration, and psychological factors such as emotions and expectations. However, in general, a change of 1 or 2 dB in the level of sound is difficult for most people to detect. A 3 dB change is commonly taken as the smallest perceptible change and a 6 dB change corresponds to a noticeable change in loudness. A 10 dB increase or decrease in sound level corresponds to an approximate doubling or halving of loudness, respectively.

A-Weighted Sound Level

Studies have shown conclusively that at equal sound pressure levels, people are generally more sensitive to certain higher frequency sounds (such as made by speech, horns, and whistles) than most lower frequency sounds (such as made by motors and engines)[1] at the same level. To address this preferential response to frequency, the A-weighted scale was developed. The A-weighted scale adjusts the sound level in each frequency band in much the same manner that the

[1] D.W. Robinson and R.S. Dadson, "A Re-Determination of the Equal-Loudness Relations for Pure Tones," *British Journal of Applied Physics*, vol. 7, pp. 166 - 181, 1956. (Adopted by the International Standards Organization as Recommendation R-226.

human auditory system does. Thus the A-weighted sound level (read as "dBA") becomes a single number that defines the level of a sound and has some correlation with the sensitivity of the human ear to that sound. Different sounds with the same A-weighted sound level are perceived as being equally loud. The A-weighted noise level is commonly used today in environmental noise analysis and in noise regulations. Typical values of the A-weighted sound level of various noise sources are shown in Figure A-1.

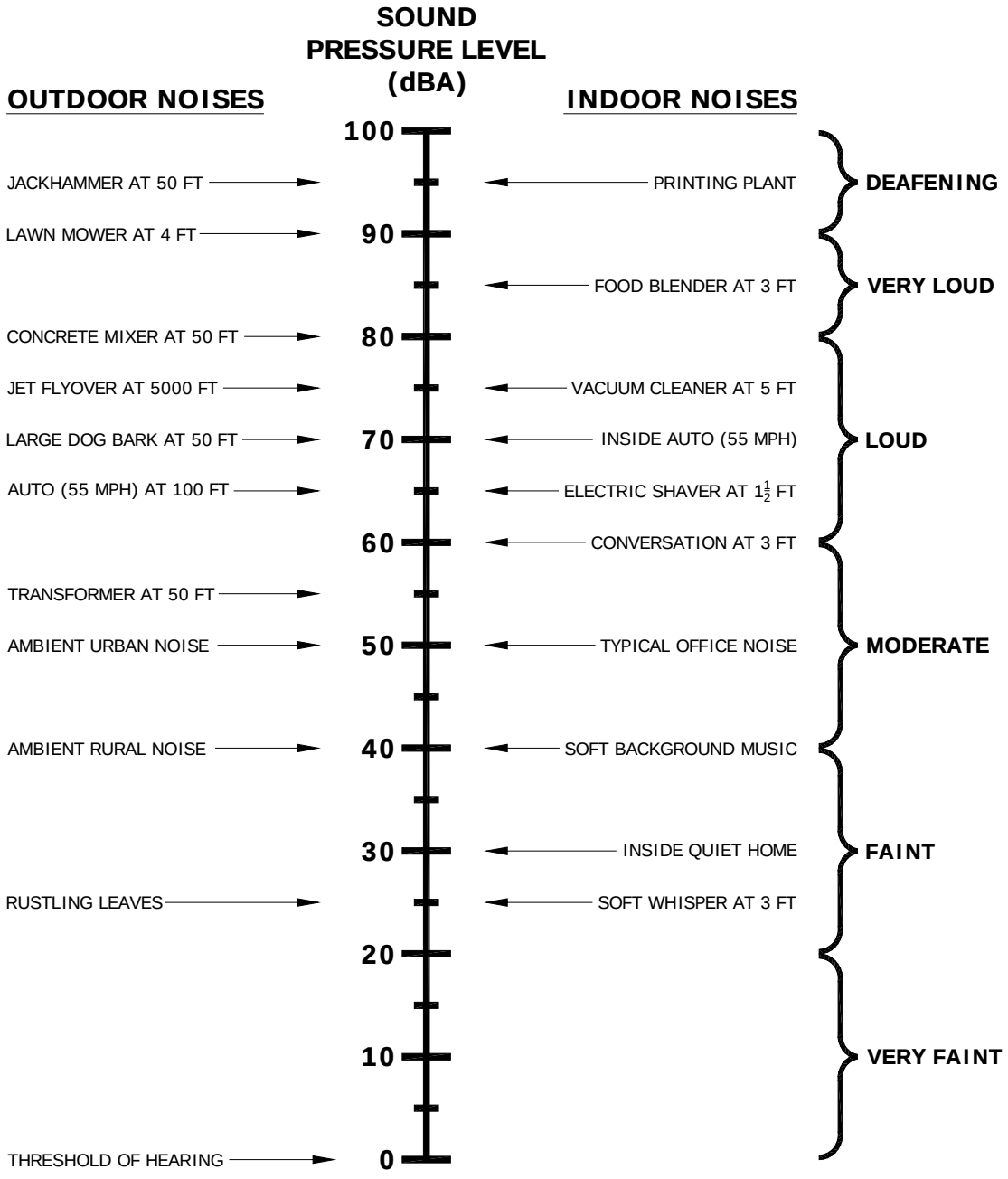

Figure A-1. Common Outdoor/Indoor Sound Levels

Equivalent Sound Level

The Equivalent Sound Level (L_{eq}) is a type of average which represents the steady level that, integrated over a time period, would produce the same energy as the actual signal. The actual *instantaneous* noise levels typically fluctuate above and below the measured L_{eq} during the measurement period. The A-weighted L_{eq} is a common index for measuring environmental noise. A graphical description of the equivalent sound level is shown in Figure A-2.

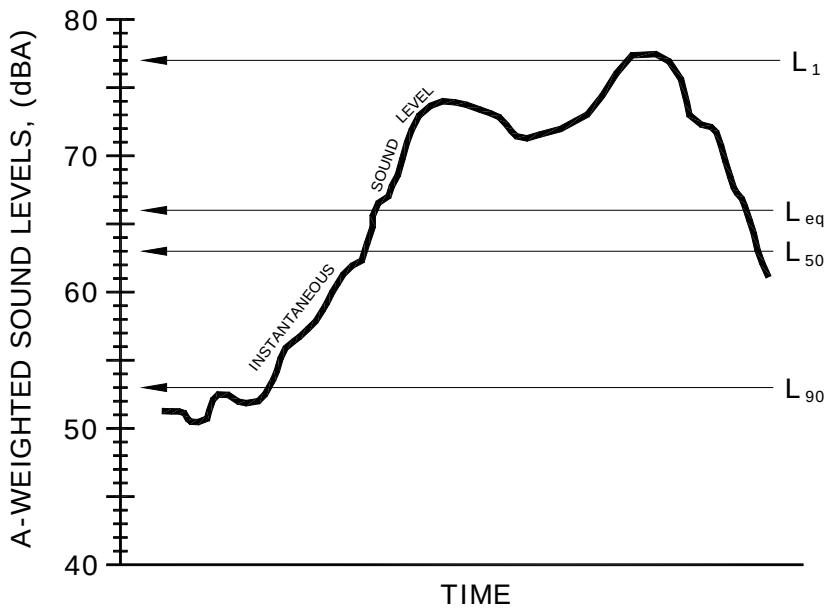

Figure A-2. Example Graph of Equivalent and Statistical Sound Levels

Statistical Sound Level

The sound levels of long-term noise producing activities such as traffic movement, aircraft operations, etc., can vary considerably with time. In order to obtain a single number rating of such a noise source, a statistically-based method of expressing sound or noise levels has been developed. It is known as the Exceedence Level, L_n. The L_n represents the sound level that is exceeded for n% of the measurement time period. For example, L_{10} = 60 dBA indicates that for the duration of the measurement period, the sound level exceeded 60 dBA 10% of the time. Typically, in noise regulations and standards, the specified time period is one hour. Commonly used Exceedence Levels include L_{01}, L_{10}, L_{50}, and L_{90}, which are widely used to assess community and environmental noise. A graphical description of the equivalent sound level is shown in Figure A-2.

Day-Night Equivalent Sound Level

The Day-Night Equivalent Sound Level, L_{dn}, is the Equivalent Sound Level, L_{eq}, measured over a 24-hour period. However, a 10 dB penalty is added to the noise levels recorded between 10 p.m. and 7 a.m. to account for people's higher sensitivity to noise at night when the background noise level is typically lower. The L_{dn} is a commonly used noise descriptor in assessing land use compatibility, and is widely used by federal and local agencies and standards organizations.

LA‘ALOA AVENUE EXTENSION

LA‘ALOA 1 AND 2 AND PAHOEHOE
NORTH KONA, HAWAII

FINAL ENVIRONMENTAL ASSESSMENT

APPENDIX 3

FAUNA SURVEY

A Survey of Avian and Terrestrial Mammalian Species, La‘aloa Avenue Extension, North Kona District, Island of Hawai‘i.

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February 2005

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Introduction

Towne Development Corporation is proposing to extend the existing La‘aloa Avenue *mauka* (east) and to connect it to Kuakini Highway. The project is located in the North Kona District, Island of Hawai‘i (Figure 1). This report summarizes the findings of an ornithological and mammalian survey conducted within the proposed project area (Figure 1). Fieldwork was conducted on December 4th and 5th 2004, and an additional site visit was made on February 26th 2005.

The primary purpose of the survey was to determine if there were any avian or mammalian species currently listed as endangered, threatened or proposed for listing under either the federal or the State of Hawai‘i’s endangered species programs on, or within in the immediate vicinity of the proposed project site. Federal and State of Hawai‘i listed species status follows species identified in the following referenced documents (DLNR, 1998, Federal Register, 1999a, 1999b, 2001, 2002, 2004).

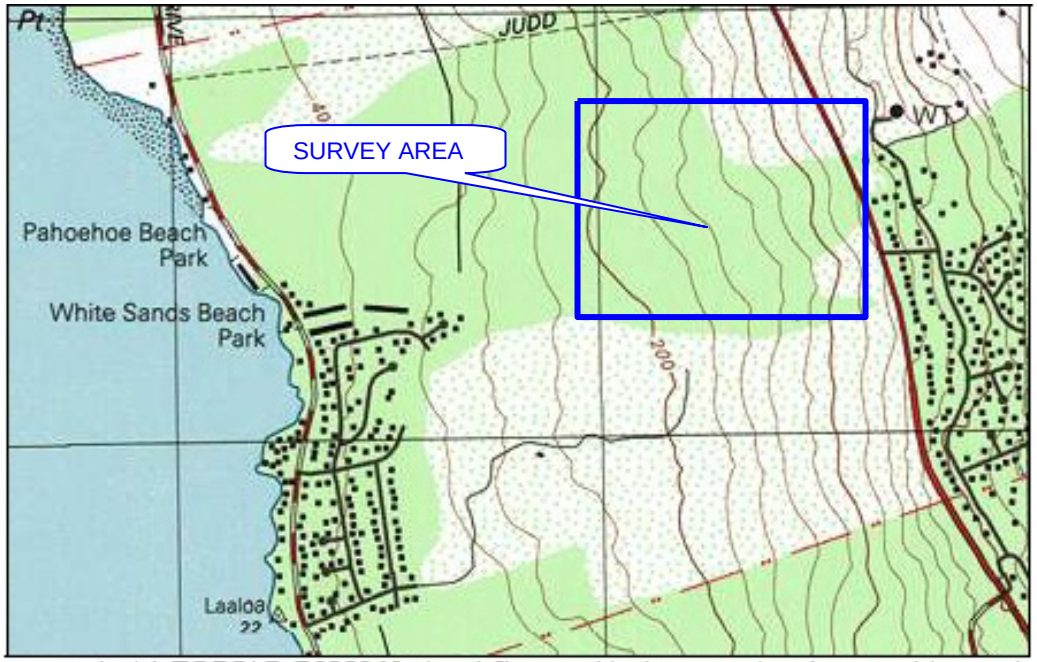
Avian phylogenetic order and nomenclature follows *The American Ornithologists’ Union Checklist of North American Birds 7th Edition* (American Ornithologists’ Union 1998), and the 42nd through the 45th supplements to *Check-list of North American Birds* (American Ornithologists’ Union 2000; Banks et al. 2002, 2003, 2004). Mammal scientific names follow *Mammals in Hawaii* (Tomich 1986). Plant names follow *Manual of the Flowering Plants of Hawai‘i* (Wagner et al. 1990). Place names follow *Place Names of Hawaii* (Pukui et al. 1974).

Hawaiian and scientific names are italicized in the text. A glossary of technical terms and acronyms used in the document, which may be unfamiliar to the reader, are included at the end of the narrative text on (Page 10).

General Site Description

The site is quite steep, descending from an elevation of approximately 480-feet above mean sea level (ASL) at the proposed junction of La‘aloa Avenue and Kuakini Highway, down to ~ 200-feet ASL at the current terminus of La‘aloa Avenue (Figure 1, USGS 1996). The terrain is composed of a mix of pahoehoe and a‘a lava flows disgorged from Hualalai during the Holocene age, more than 10,000 years (Wolfe and Morris 1996).

The vegetation present on the site is dominated almost to the exclusion of native species by alien plants. The bulk of the habitat is covered with low stature *koa haole* (*Leucaena leucocephala*), *kiawe* (*Prosopis pallida*) and a mix of alien grasses and weedy species typical of highly disturbed areas at this altitude in North Kona. The site has repeatedly been disturbed and shows signs of having been bulldozed, and altered in numerous ways by the hand of man.



N	FIGURE 1 LA'ALOA AVENUE STUDY AREA	SCALE 500 METERS

Mammalian Survey Methods

With the exception of the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), or 'ope'ape'a as it is know locally, all terrestrial mammals currently found on the Island of Hawai'i are alien species. Most are ubiquitous. No trapping program was proposed or undertaken to quantify the use of the property by alien mammalian species. The survey of mammals was limited to visual and auditory detection, coupled with visual observation of scat, tracks, and other animal sign. A running tally was kept of all vertebrate species observed and heard within the project area. Visual and electronic scans, using a Broadband AnaBat II® ultrasonic bat detector were made for bats during crepuscular periods on the evening of December 3rd and on the morning of December 4th , 2004.

Avian Survey Methods

Three avian count stations were located within the project site. The first was sited approximately 50 meters below the proposed intersection of La'aloa Avenue and Kuakini Highway, one at the current eastern terminus of La'aloa Avenue and a third equidistant between the other two. Eight-minute variable circular plot counts were made at each station. Field observations were made with the aid of Leitz 10 X 42 binoculars and by listening for vocalizations. Counts were concentrated between 07:30 a.m. and 9:30 a.m., the peak of daily bird activity.

An additional two hours were spent within the project area on the evening of December 3rd and on the morning of December 4th, 2004, in an attempt to detect nocturnally flying seabirds and owls over-flying the project area. Time not spent counting was used to search the project area for species and habitats that were not detected during count sessions.

Mammalian Survey Results

Three alien mammalian species were detected during the course of this survey. Several dogs (*Canis f. familiaris*) were heard barking from above Kuakini Highway and from within the subdivision below the current terminus of La‘aloa Avenue. Additionally two cats (*Felis cattus*) were seen within the project site as were three small Indian mongooses (*Herpestes a. auropunctatus*).

Hawai‘i‘s sole endemic terrestrial mammalian species, the endangered Hawaiian hoary bat, was not detected during this survey. All of the alien mammalian species recorded during this survey are deleterious to avian and floristic components of the remaining native ecosystems present on the Island.

Avian Survey Results

A total of 184 birds, of 15 different species, representing 10 separate families were recorded during station counts (Table 1). All but one of the avian species recorded are considered to be alien to the Hawaiian Islands. The single native species was a Pacific Golden-Plover (*Pluvialis fulva*) which is an indigenous migratory species commonly seen throughout Hawaii and the Tropical Pacific in the Fall and Spring months. No species currently listed as endangered, threatened or proposed for listing under either the federal or the State of Hawai‘i’s endangered species programs was detected on the site (DLNR 1998, Federal Register 1999a, 1999b, 2001, 2002, 2004).

Avian diversity was relatively low, densities were also low, with the exception of four species; Zebra Dove (*Geopelia striata*), Common Myna (*Acridotheres tristis*), House Finch (*Carpodacus mexicanus frontalis*) and Java Sparrow (*Padda oryzivora*), which accounted for 46% of the total number of all birds recorded during station counts. The most common avian species recorded was the Java Sparrow, which accounted for 12% of the total number of individual birds recorded. An average of 61 birds were detected per station count.

Table 1

Avian Species Detected Within the La‘aloa Avenue Extension Site

Common Name	*Scientific Name*	*ST*	*RA*
PHEASANTS & PATRIDGES – Phasianidae			
Grey Francolin	*Francolinus pondicerianus*	A	2.33
PLOVERS & LAPWINGS - Charadriidae			
Pacific Golden-Plover	*Pluvialis fulva*	**IM**	0.33
PIGEONS & DOVES - Columbidae			
Spotted Dove	*Streptopelia chinensis*	**A**	5.33
Zebra Dove	*Geopelia striata*	A	7.00
SILVEREYES - Zosteropidae			
Japanese White-Eye	*Zosterops japonicus*	A	5.00
STARLINGS - Sturnidae			
Common Myna	*Acridotheres tristis*	A	7.00
EMBERIZIDS - Emberizidae			
Saffron Finch	*Sicalis flaveola*	A	2.67
Yellow-billed Cardinal	*Paroaria capitata*	A	3.00
SALTATORS, CARDINALS & ALLIES – Cardinalidae			
Northern Cardinal	*Cardinalis cardinalis*	A	4.67
CARDULINE FINCHES & ALLIES - Fringillidae			
House Finch	*Carpodacus mexicanus frontalis*	A	7.00
Yellow-fronted Canary	*Serinus mozambicus*	A	2.67
OLD WORLD SPARROWS – Passeridae			
House Sparrow	*Passer d. domesticus*	A	1.00
WAXBILLS & ALLIES – Estrildidae			
African Silverbill	*Lonchura cantans*	A	3.33
Nutmeg Manikin	*Lonchura punctulata topela*	A	2.67
Java Sparrow	*Padda oryzivora*	A	7.33

KEY TO TABLE 1

ST Status
A Alien Species
IM Indigenous Migratory Species: Native to Hawaii but also found elsewhere naturally.
RA Relative Abundance: Number of birds detected divided by the number of count stations (3)

Discussion

A one-time survey can not provide a total picture of the wildlife utilizing any given area. Certain species will not be detected for one reason or another. Seasonal variations in populations coupled with seasonal usage and availability of resources will cause different usage patterns throughout a year or, in fact, over a number of years.

The findings of the mammalian survey are consistent with other surveys conducted in the North Kona District within the recent past (David 1999, 2000a, 2000b, 2000c, 2000d, 2001, 2003, 2004a, 2004b, 2004c). It is likely that Hawaiian hoary bats forage within the general project area at least occasionally, as they have been seen in areas both *mauka* and *makai* of the proposed project site on a seasonal basis (Jacobs 1994, R. David unpublished field notes 1985-2004).

It should be noted that current survey techniques available for gathering information on the distribution, abundance and usage of resources within a given area by Hawaiian hoary bats are inadequate and/or time and cost prohibitive. Data gathered by these methods only indicate whether bats are present or not in any given area. The two main methods currently being used to monitor lasiurine bats are; heterodyne echolocation detector surveys and mist netting. Scientists currently have no understanding of detection probabilities associated with either method (Carter et al., 2000). It may be impossible to standardize detection probabilities among surveyors, studies, or over time (O'Shea and Bogen, 2000). The inability to estimate detection probability, limits the usefulness of data collected using un-calibrated indices produced by either mist netting or echolocation surveys.

Unlike nocturnally flying seabirds, which often collide with man-made structures, bats are uniquely adapted to avoid collision with obstacles, man-made or natural. They navigate and locate their prey primarily by using ultrasonic echolocation, which is sensitive enough to allow them to locate and capture small volant insects at night.

Although no live rodents were detected during the course of this survey, it is likely that roof rats (*Rattus r. rattus*), Norway rats (*Rattus norvegicus*), European house mice (*Mus domesticus*) and possibly Polynesian rats (*Rattus exulans hawaiiensis*) use resources within the general project area. Without conducting a trapping program, it is difficult to assess the population densities of these often hard-to-see mammals. All of these introduced rodents are deleterious to native ecosystems and the native faunal species that are dependant on them.

The relatively low diversity of avian species detected during this survey was in keeping with the results of several other surveys conducted in the North Kona District in recent years (David 1999, 2000a, 2000b, 2000c, 2000d, 2001, 2003, 2004a, 2004b, 2004c). The habitat currently found within the project area and within the alien dominated lowland areas in North Kona is not conducive to supporting native forest birds, with the possible exception of Hawaiian Hawks (*Buteo solitarius*). There is no suitable foraging or nesting habitat for Hawaiian Hawks within the project site. There are not wetland features within the study area, thus no endemic waterbirds were expected, nor were any recorded.

Although not detected during this survey it is possible that small numbers of the endangered endemic Hawaiian Petrel (*Pterodroma sandwichensis*), or *ua‘u*, and the threatened Newell’s Shearwater (*Puffinus auricularis newelli*), or *‘a‘o*, over fly the project area between the months of May and November (Banko 1980a, 1980b, Day et al. 2003, Harrison 1990).

Hawaiian Petrels were formerly common on the Island of Hawai‘i (Wilson and Evans 1890–1899). This pelagic seabird reportedly nested in large numbers on the slopes of Mauna Loa and in the saddle area between Mauna Loa and Mauna Kea (Henshaw 1902), as well as at the mid to high elevations of Mount Hualalai. It has, within recent historic times, been reduced to relict breeding colonies located at high elevations on Mauna Loa and, possibly, Mount Hualalai (Banko 1980a, Banko et al. 2001, Cooper and David 1995, Cooper et al. 1995, Day et al. 2003, Harrison 1990, Hue et al. 2001, Simons and Hodges 1998).

Newell’s Shearwaters were formerly common on the Island of Hawai‘i (Wilson and Evans 1890–1899). This species breeds on Kaua‘i, Hawai‘i and Moloka‘i in extremely small numbers. Newell’s Shearwater populations have dropped precipitously since the 1880s (Banko 1980b, Day et al., 2003). This pelagic species nests high in the mountains in burrows excavated under thick vegetation, especially *uluhe* fern.

The primary cause of mortality in both these species is thought to be predation by alien mammalian species at the nesting colonies (Ainley et al. 2001, Cooper and Day 1995, 1998, Day and Cooper 1997, Hue et al. 2001). Collision with man-made structures is considered to be the second most significant cause of mortality of these seabird species in Hawai‘i. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by exterior lighting. When disoriented, seabirds often collide with manmade structures, and if they are not killed outright, the dazed or injured birds are easy targets of opportunity for feral mammals (Ainley et al. 1995, 1997, 2001, Cooper and Day 1995, 1998, Day and Cooper 1997). There is no suitable nesting habitat within or close to the proposed project site for either of these pelagic seabird species.

Potential Impacts to Protected Vertebrate Species

Hawaiian hoary bat

The construction and operation of the proposed La‘aloa Avenue extension is not expected to result in any adverse impacts to the endangered Hawaiian hoary bat, the only listed terrestrial mammalian species present in Hawai‘i.

Hawaiian Petrel and Newell’s Shearwater

The principal potential impact that the construction and operation of the proposed roadway poses to Hawaiian Petrels and Newell’s Shearwaters is the increased threat that birds will be downed after becoming disoriented by exterior lighting that may be required in conjunction with the construction and operation of the roadway.

Recommendations

To reduce the potential for interactions between nocturnally flying Hawaiian Petrels and Newell’s Shearwaters with external lights and man-made structures, it is recommended that any external lighting planned to be used during construction or being proposed as permanent street lights be shielded (Reed et al. 1985, Telfer et al., 1987). This mitigation would serve the dual purpose of minimizing the threat of disorientation and downing of Hawaiian Petrels and Newell’s Shearwaters, while at the same time complying with the Hawaii County Code § 14 – 50 *et seq.* which requires the shielding of exterior lights, so as to lower the ambient glare caused by unshielded lighting to the astronomical observatories located on Mauna Kea.

Glossary:

Alien - Introduced to Hawai‘i by humans.
Crepuscular – Twilight hours.
Mauka – Upslope, towards the mountains
Makai – Down-slope, towards the ocean.
Volant – Flying, capable of flight - as in flying insect.

DLNR – Hawaii State Department of Land & Natural resources.
ESA - Federal Endangered Species Act of 1973, as amended.
ASL – Above mean sea level.
VCP – Variable Circular Plot, method of censusing birds.

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LA‘ALOA AVENUE EXTENSION

LA‘ALOA 1 AND 2 AND PAHOEHOE
NORTH KONA, HAWAII

FINAL ENVIRONMENTAL ASSESSMENT

APPENDIX 4

ARCHAEOLOGICAL SURVEY

RC-0213

An Archaeological Inventory Survey for the Proposed La‘aloa Avenue Extension Project

(TMK:3-7-7-8:29 por., 114 por., and 120 por.)

Pāhoehoe 1st and 2nd Ahupua‘a
North Kona District
Island of Hawai‘i

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ARCHAEOLOGICAL, CULTURAL, AND HISTORICAL STUDIES

An Archaeological Inventory Survey for the Proposed La‘aloa Avenue Extension Project (TMK:3-7-7-8:29 por., 114 por., and 120 por.)

Pāhoehoe 1st and 2nd Ahupua‘a
North Kona District
Island of Hawai‘i

RECHTMAN CONSULTING

EXECUTIVE SUMMARY

At the request of Mr. Bill Moore of William L. Moore Planning, LLC, on behalf of his client the County of Hawai‘i, Rechtman Consulting, LLC conducted an archaeological inventory for the proposed extension of La‘aloa Avenue in Pāhoehoe 1st and 2nd *ahupua‘a*, North Kona District, Island of Hawai‘i. La‘aloa Avenue currently runs *mauka* from Ali‘i Drive and accesses several residential subdivisions. Existing La‘aloa Avenue begins in La‘aloa 2nd Ahupua‘a, and runs northeast through La‘aloa 1st, Pāhoehoe 4th, and Pāhoehoe 3rd *ahupua‘a*, before terminating at the southern boundary of Pāhoehoe 2nd Ahupua‘a. The proposed extension of La‘aloa Avenue will cross portions of TMK:3-7-7-8:29, 114, and 120, and see the roadway continue from its current termination northeast through Pāhoehoe 1st and 2nd *ahupua‘a* to Kuakini Highway, creating *mauka*/*makai* access between that road and Ali‘i Drive. The study area for the current inventory survey included portions of all three parcels and covered a roughly 14-acre area.

As a result of the current inventory survey six previously unrecorded archaeological sites and eight previously recorded sites were located and recorded on the subject parcel. The sites include seven Historic ranching/boundary walls (Sites 4591, 6352, 6381, 21384, 24271, 24376, and 24380), an alignment of possible Historic origins (Site 24379), a trail (Site 6350), four Precontact habitation sites including three complexes (Sites 6984, 24375, and 24378) and a terrace remnant (Site 24277), and a grouping of 213 agricultural features that spans the entire project area (a portion of Site 24272). Fifteen test units (TUs) were excavated at six of these sites.

In addition to the test units excavated at the recorded archaeological sites another test unit was excavated in what turned out to be a bulldozer push pile. The push pile was excavated because it contained a piece of wood, shaped like a headstone and painted white, that was propped upright in its center and contained an incised cross, and the inscription “Billy the Kid” painted in black on its surface (see cover photo). On the ground next to the push pile were two other markers made of wood; one was shaped like a cross and read, “Jesse James”, and the other, which was broken into several pieces, read, “Here lies Doc Holiday RIP”. However, the remains of these famous outlaws (or any other skeletal remains) were not discovered within the current project area. The markers are apparently fakes left at the study parcels for unknown reasons likely within the last twenty years.

This report contains background information outlining the project area’s physical and cultural contexts, a presentation of previous archaeological work in the vicinity of the parcel, and current survey expectations based on that previous work. Also presented is an explanation of the project’s methods, a detailed description of the archaeological sites encountered, interpretation and evaluation of those resources, and treatment recommendations for the documented sites.

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INTRODUCTION

At the request of Mr. Bill Moore of William L. Moore Planning, LLC, on behalf of his client, the County of Hawai‘i, Rechtman Consulting, LLC conducted an archaeological inventory for the proposed extension of La‘aloa Avenue in Pāhoehoe 1st and 2nd *ahupua‘a*, North Kona District, Island of Hawai‘i (Figure 1). La‘aloa Avenue currently runs *mauka* from Ali‘i Drive and accesses several residential subdivisions. The road begins in La‘aloa 2nd Ahupua‘a, and runs northeast through La‘aloa 1st, Pāhoehoe 4th, and Pāhoehoe 3rd *ahupua‘a*, before terminating at the southern boundary of Pāhoehoe 2nd Ahupua‘a. The proposed extension of La‘aloa Avenue will cross portions of TMK:3-7-7-8:29, 114, and 120, and the roadway will continue from its current termination northeast through Pāhoehoe 1st and 2nd *ahupua‘a* to Kuakini Highway, creating *mauka*/*makai* access between that road and Ali‘i Drive (Figure 2). The study area for the current inventory survey included portions of all three parcels and covered a roughly 14-acre area. The current project was undertaken in compliance with both the historic preservation review process requirements (HAR 13§13-275-5) of the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD) and the County of Hawai‘i Planning Department.

This report contains background information outlining the project area’s physical and cultural contexts, a presentation of previous archaeological work in the vicinity of the study area, and current survey expectations based on that previous work. Also presented is an explanation of the project’s methods, a detailed description of the archaeological sites encountered, interpretation and evaluation of those resources, and treatment recommendations for all the documented sites.

Project Area Description

The current project area consists of approximately 14 acres located in Pāhoehoe 1st and 2nd *ahupua‘a*, North Kona District, Island of Hawai‘i (see Figure 1). The study area crosses portions of TMK:3-7-7-8:29, 114, and 120, and runs from the existing La‘aloa Avenue to Kuakini Highway (see Figure 2). The survey area was determined using the staked centerlines of two possible alignments (Option-1 and Option-2) for the proposed extension of La‘aloa Avenue. The two options begin as one alignment near the current termination of La‘aloa Avenue, but separate after roughly fifty meters and follow separate routes to Kuakini Highway. The current project area included all the land fifty-feet beyond the centerline of each alignment and the area between the two alignments.

The study area is bounded both *mauka* and *makai* by undeveloped land, to the north and south by residential subdivisions that are currently being developed, and to the east by the Kuakini Highway (Route 11). The extreme eastern portion of the study area — on Parcels 29 and 114 within Pāhoehoe 1st Ahupua‘a along Kuakini Highway — has been previously grubbed and graded and is currently developed with a small shed and a concrete slab. Three separate bulldozed pathways run *makai* from the grubbed area; one along each boundary of Parcel 114, and one down the center of that parcel. They are connected further *makai* by the path of a bulldozer that runs north/south across the parcel. These bulldozer cuts may be former ranch roads, or were perhaps created as a fire suppression measures (several large trees within the project area exhibit signs of being burned in the not too distant past; Figure 3). No previous mechanical clearing was evident within the portion of the project area located on Parcel 120 (Pāhoehoe 2nd Ahupua‘a).

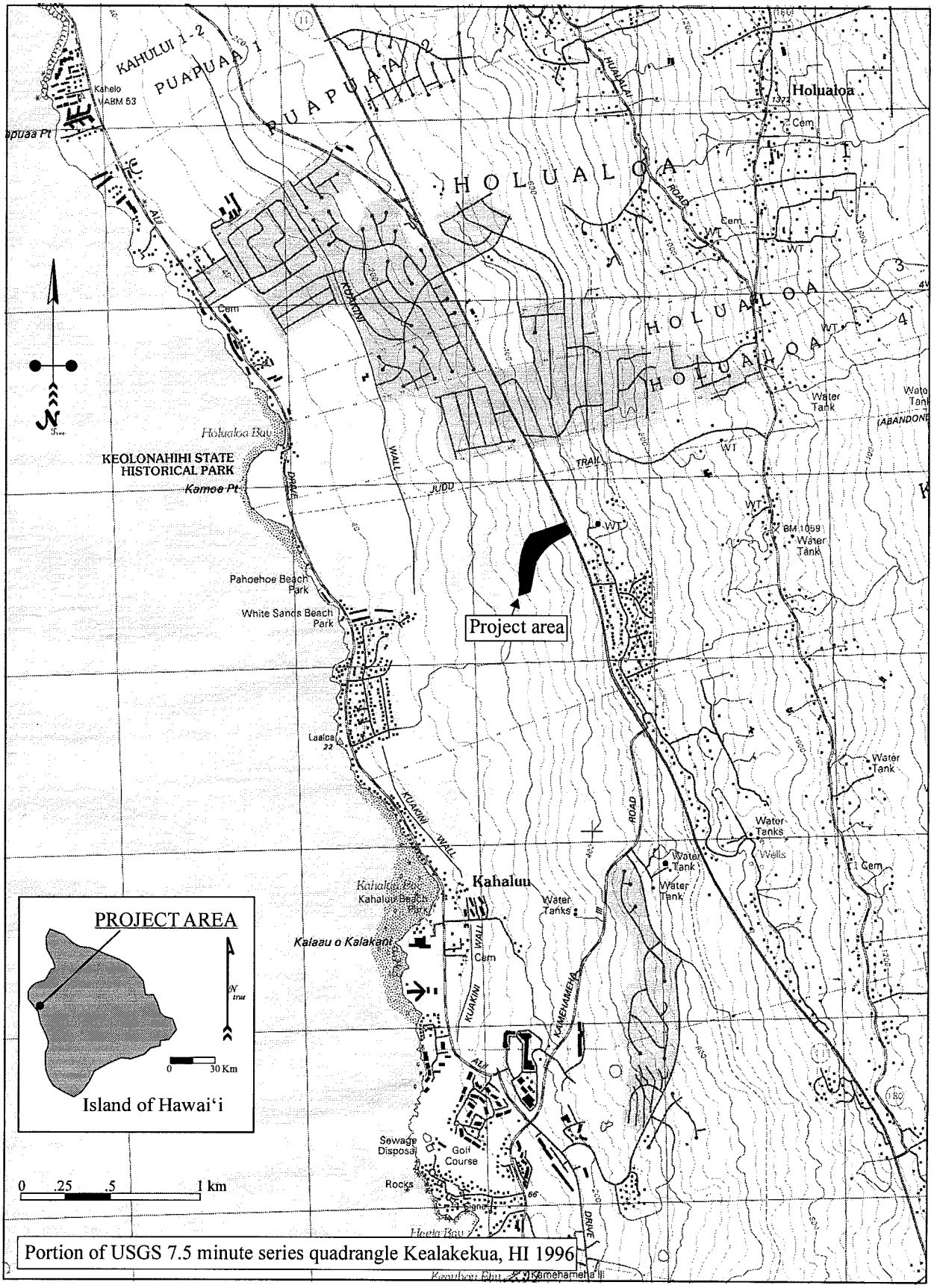


Figure 1. Project area location.

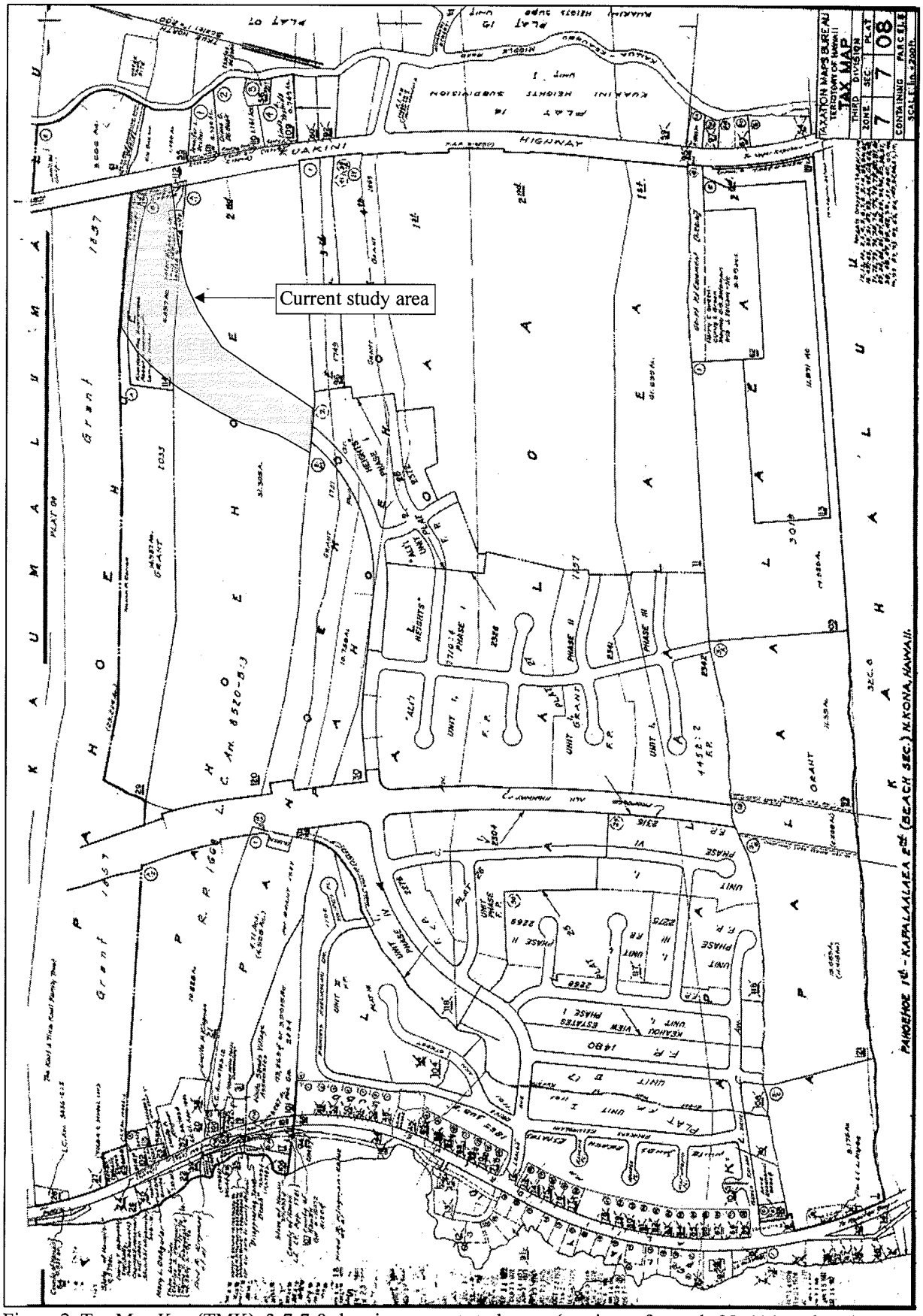


Figure 2. Tax Map Key (TMK): 3-7-7-8 showing current study area (portions of parcels 29, 114, and 120).

The current project area is situated at elevations ranging from 87 to 160 meters (280 to 480 feet) above sea level (Figure 4). Throughout much of the project area the terrain slopes fairly steeply to the west (*makai*); however, several large bedrock outcrops within the project area are raised on all sides and a large drainage with fairly steep sides is present in the central portion of Parcel 120 (*mauka* of the current project area). Terrain along the edge of this drainage slopes to the northwest or southwest depending on which side of the drainage you are on. Where the drainage enters the current project area it widens and levels into a soil filled flood basin. Based upon the amount erosion within the drainage basin, it appears as though the drainage may have carried (or still does carry) a significant amount of water during times of heavy rain in Kona. Ground surface over most of the current study area consists of sections of exposed *pāhoehoe* bedrock interspersed with patches of thin soil. Cattle had been grazing on the study parcels just prior to the current fieldwork, and as a result the vegetation was minimal. Floral species within the general project area consist primarily of an over story of *koa haole* (*Leucaena leucocephala*), *opiuma* (*Pithecellobium dulce*), and *kiawe* (*Prosopis pallida*), with and under story of various non-native grasses, vines, and weeds.

BACKGROUND

To generate a set of expectations regarding the nature of archaeological resources that might be encountered on the study parcel, and to establish an environment within which to assess the significance of any such resources, previous archaeological studies relative to the project area and a general historical context for the region are presented.

Previous Archaeological Research

Several proximate archaeological studies have taken place in the general vicinity of the current project area within Pāhoehoe 1st and 2nd *ahupua'a* (Borthwick et al. 1997; Haun et al. 1998; Henry et al. 1998; PHRI 1999). Three previous studies have included portions of the current project area (Barrera 1980; Rosendahl and Rosendahl 1986; Ketner et al. 2004). The findings of each of these studies are summarized below and their locations are depicted on Figure 5.

In 1999, Paul H. Rosendahl, Ph.D., Inc. (PHRI) conducted an archaeological inventory survey of 173 acres in Kaumalumalu, and Pāhoehoe 1st *ahupua'a*, North Kona District, Island of Hawai'i (TMKs: 3-7-7-04:2 and 3-7-7-08:27). Their study area was adjacent to the northernmost boundary of the current project area. The report encompassed two phases of survey. The first survey occurred on a portion of the property in 1997 and was submitted to DLNR-SHPD for review, but was never finalized because the developer wanted the rest of the property surveyed. After addressing the review comments by DLNR-SHPD and surveying the remainder of the property, a second report (PHRI 1999) was completed. PHRI (1999) recorded sixty-six sites and site complexes comprising 715 features including mounds, terraces, modified outcrops, walls, platforms, enclosures, and planting areas. Fifty-one of the sites were recorded as single features. Functions for the recorded Precontact sites and features included temporary and permanent habitation, agriculture, trail, storage, and possible *heiau*. Permanent habitation sites and features were located near the shore with only a few recorded in the upland agricultural areas where more temporary habitation features were located. Historic Period sites included mainly walls that functioned as either animal control features or land division boundaries, but a Historic trail (the Judd Trail) and four cattle enclosures were also recorded. PHRI dug a total of thirty-two excavation units and thirteen charcoal samples were taken. The charcoal samples yielded dates ranging from A.D. 1265 to modern times. PHRI (1999) states that their findings fit the expectations derived from the Kona Field System model in which more Prehistoric permanent habitation took place near the coast and Prehistoric temporary habitation and agricultural practices were conducted in the upland portions of the *kula* zone. Historical features related to ranching were expected due to the introduction of cattle into the project area in the 1920s.

Figure 3. Burnt *kiawe* on Parcel 114, view to south.

Figure 4. View of project area looking northwest towards the coast.

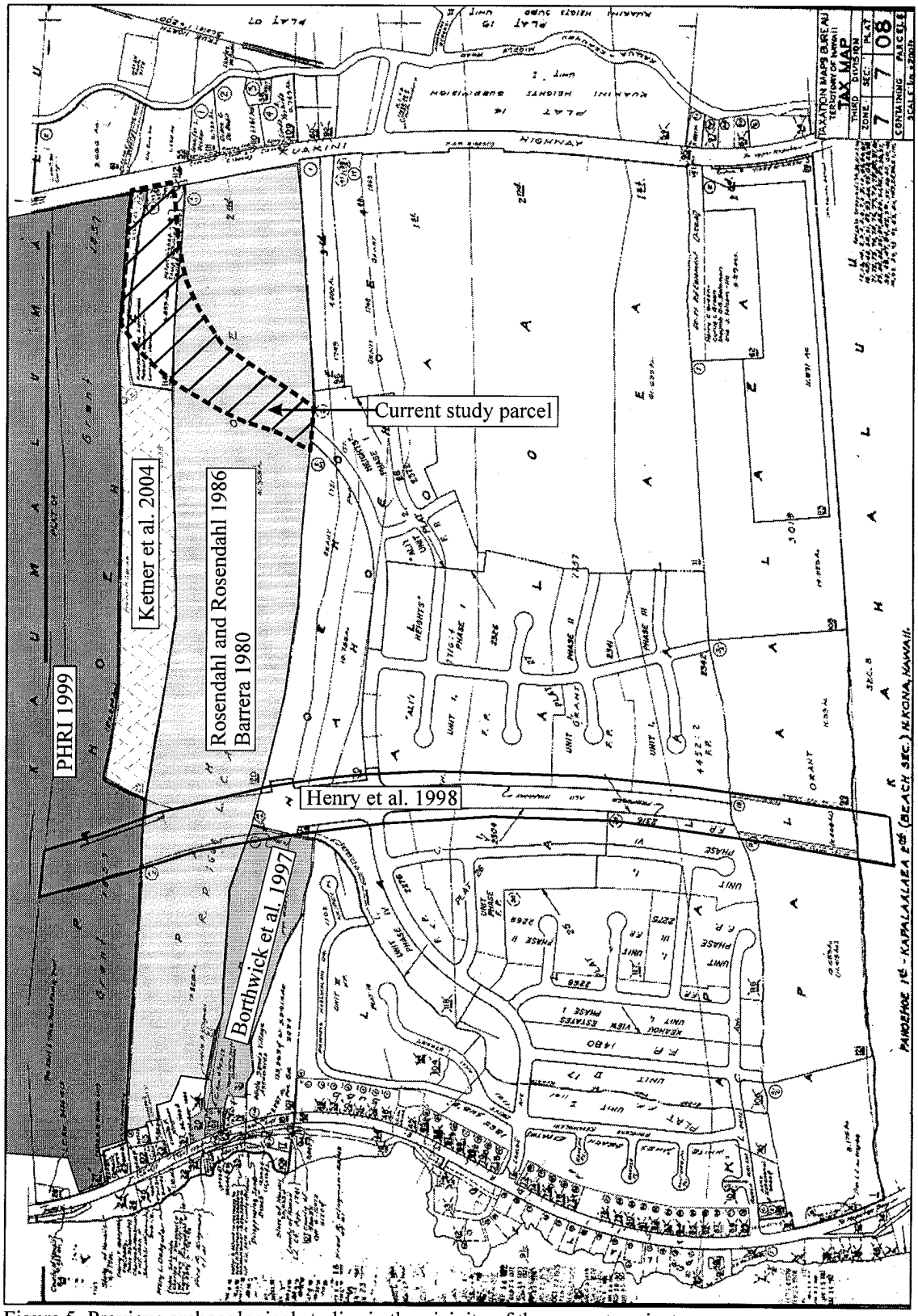


Figure 5. Previous archaeological studies in the vicinity of the current project area.

In 1985, PHRI conducted an archaeological reconnaissance survey of 44 acres in Pāhoehoe 2nd Ahupuaʻa, North Kona District, Island of Hawaiʻi (TMK: 3-7-7-08:21, 120) (Rosendahl and Rosendahl 1986). The study area included a portion of the current project area and covered an area previously surveyed by Barrera (1980). It also included the corridor for the proposed Aliʻi Highway that was later the subject of an intensive survey by Henry et al. (1998). Rosendahl and Rosendahl (1986) encountered a total of forty-four sites and site complexes comprising 481+ features that included walled shelters, enclosures, terraces, mounds, modified outcrops, walls, trails, raised stone platforms, and surface concentrations of marine shell. Twenty-one of the sites (comprising 92+ features) had been previously identified by Barrera (1980); these had existing SIHP site numbers, the other sites were assigned only temporary site numbers. The forty-four sites were distributed throughout the project area and included agricultural components, boundary walls, burials, habitation complexes, ranching features, and a single *heiau*. Rosendahl and Rosendahl (1986) found evidence of both Historic and Precontact occupation. Historic land use was limited to ranching features such as walls. The large Precontact habitation complexes and a single *heiau* were located near the coast, whereas smaller habitation complexes and associated agricultural features were located throughout the project area. The majority of agricultural field components were located in the higher elevations of the project area. Rosendahl and Rosendahl note that "the area extending inland from 230 ft elevation [including the current project area] to the project area eastern boundary at Kuakini includes over 300 features" (1986:34). These features were described collectively as Site T-21, a complex, but no individual feature mapping or description was undertaken. Site T-21 is described thusly:

> The complex is a portion of an extensive agricultural and habitation complex containing primarily walls terraces, enclosures, platforms, modified outcrops, mounds, and steppingstone trail segments. The southeast portion of the complex has the field boundaries typical of the Kona Field System. The other areas represent the transitional margin of the field system, characterized by agricultural features that are less formal layout and utilize natural geological formations. Terraces are constructed against sloping outcrops, platforms are built around raised bedrock outcrops, and piled stone mounds appear to be randomly scattered. (Rosendahl and Rosendahl 1986:34)

In 1991, Cultural Surveys Hawaii conducted an archaeological inventory survey of a 7-acre parcel within Pāhoehoe 2nd and Pāhoehoe 3rd *ahupuaʻa*, North Kona District, Island of Hawaiʻi (TMKs: 3-7-7-08:20, 31 and 100) (Borthwick et al. 1997). Their study area was located *makai* of the current project area. As a result of the survey, twenty sites and site complexes were recorded. Site types encountered were agricultural, boundary, burial, and habitation. Feature types included platforms, walls, wall complexes, enclosures, modified outcrops, and terraces. Excavation units were placed in six of the sites to determine function and age. Age was determined by observable characteristics of the site and the cultural remains found within the excavation units. Of the six sites tested, two were reported to be Precontact, three were Historic, and one represented use from Precontact through to Historic times. Borthwick et al. (1997) concluded that their study revealed a typical Kona settlement pattern in which Precontact habitation features are located near the coast with a few located more inland near agricultural features. They identified that areas of higher elevation contained agricultural features representative of the Kona Field System; and that soon after European contact and settlement, habitation moved more inland to make room for residential expansion along the coast. They surmised that the early to mid 1900s saw the introduction of cattle into the area leaving traces of ranching features on the landscape; and that following the 1940s, the coast was once again used for residential purposes, leaving the inland areas for pasturage.

In 2004, Rechtman Consulting, LLC conducted an archaeological inventory survey of a roughly 15-acre parcel (TMK:3-7-7-8:29) located between the proposed Aliʻi Highway and the current Kuakini Highway in Pāhoehoe 1st Ahupuaʻa to the north and west of the current project area (Ketner et al. 2004). The eastern portion of that survey area is included in the current study area. As a result of the Ketner et al. (2004) survey eight previously unrecorded archaeological sites and three previously recorded sites were located and recorded. The sites included the Kuakini Wall (Site 6302) and three other Historic ranching/boundary walls (Sites 6381, 21384, and 24271), a bedrock outcrop modified Historically for ranching purposes (Site 24273), a core-filled wall segment (Site 24276), four Precontact habitation complexes (Sites 24270, 24274, 24275, and 24277), one of which included a burial (Site 24270), and a

grouping of 321 agricultural features that spans nearly the entire project area (Site 24272). Regarding the agricultural features Ketner et al. note:

> The majority of the features found at Site 24272 were likely constructed during Precontact times, but the site may have been utilized continuously into early Historic times (Ellis 1963). Portions of the project area with the greatest amount of exposed bedrock and the least amount of soil (i.e. on slopes where the most run off occurs) seem to contain the highest density of features. The features in these sloped areas are almost exclusively terraced into the hillside and appear to aid in soil retention. They are usually located near small pockets of soil and on bedrock ground surface, suggesting that they were likely created during the process of clearing stones from the soil areas. On level ground where there is ample soil, such as occurs at a few locations throughout the project area, the features are generally concentrated around the outside edge of the soil creating clearings that could have been used for planting. The habitation areas recorded within the current project area are located on the periphery of these cleared level soil areas. (2004:57)

Cultural-Historical Contexts and Ahupuaʻa Settlement Patterns

The current project area lies within what has been termed the Kona Field System (Cordy 1995; Newman 1970; Schilt 1984). This area of dryland agricultural fields extends north from Hoʻokena Ahupuaʻa to at least Kaū Ahupuaʻa and east from the coastline all the way to the forested slopes of Hualālai (Cordy 1995). A large portion of the field system is designated in the Hawaiʻi State Inventory of Historic Places (SIHP) as Site 50-10-37-6601 and has been determined eligible for inclusion in the National Register of Historic Places. The basic characteristics of this agricultural/residential system as presented in Newman (1970) have been confirmed and elaborated on by ethnohistorical investigations (Kelly 1983) and summarized by Cordy (1995). The construct is based on the Hawaiian terms for the major vegetation zones, which are used to define and segregate space within the region's *ahupuaʻa*. These zones are bands roughly parallel to the coast that mark changes in elevation and rainfall. The current study parcel is located in both the *kula* and *kaluʻulu* zones. Provided below is information on the Kona Field System abstracted from prior studies (PHRI 1999; Rechtman et al. 2001).

The *kula* zone is the area from sea level to 600 feet elevation. Annual rainfall in the *kula* is 75 to 125 centimeters. This lower elevation zone is traditionally associated with habitation and the cultivation of sweet potatoes (*ʻuala*), paper mulberry (*wauke*), and gourds (*ipu*). Informal agricultural features, such as clearing mounds, planting mounds, planting depressions, modified outcrops, and planting terraces, are common throughout much of this zone, as shown in archaeological findings (Hammatt and Clark 1980; Hammatt and Folk 1980; Haun et al. 1998; Schilt 1984). Permanent habitation sites can be scattered throughout the agricultural portion of the *kula*, but they are commonly concentrated along the shoreline subdivision of the *kula* zone (Cordy 1981; Hammatt 1980). The more *mauka* portion of this zone was primarily used for agricultural purposes with mainly temporary habitations and an occasional permanent habitation (Borthwick et al. 1997; Rosendahl and Rosendahl 1986).

The *kaluʻulu* zone is the area from about 600 feet elevation to 1,600 feet elevation (Cordy 1995:19). This zone is somewhat indistinguishable from the *ʻapaʻa* zone in site patterning (Cordy 1995:7). For this reason, most information about the *kaluʻulu* is the same for the *ʻapaʻa*. Formal walled agricultural fields consisting of *kuaiwi* characterize this zone. *Kuaiwi* are low, broad, long multifunctional piles of rocks created by land clearing and rock removal from soil areas. *Kuaiwi* are oriented *mauka*/*makai* with shorter, perpendicular cross-wall segments connecting them. The cross-wall segments function as soil traps and retaining features, creating terrace-like areas to enhance planting. *Kuaiwi* can also function to move water downslope in a controlled manner, ensuring optimal distribution of the available runoff water (personal observation, Rechtman Consulting on going research in Kahaluʻu Ahupuaʻa). The distribution of soils suitable for agriculture determines, in part, the locations of the formal walled fields, and there is a direct relationship between suitable soils and older lava flows. Consequently, areas of

young lava flow in the *kalu'ulu* and *'apa'a* do not always have *kuaiwi* (Burtchard 1995; Hammatt et al. 1987; Haun et al. 1998).

The archaeological record contributes to an understanding of how the Kona Field System developed over time. Precisely how the record is interpreted is reflected in the various chronologies proposed for the system (Burtchard 1995; Cordy 1995; Haun et al. 1998; Hommon 1986; Kirch 1985; Schilt 1984). The chronology and terminology outlined by Haun et al. (1998) is used in the present discussion, and the chronological summary below is abstracted from Rechtman et al. (2001).

The first inhabitants of Hawai'i Island probably arrived by at least A.D. 300, and focused habitation and subsistence activity on the windward side of the island (Burtchard 1995; Kirch 1985; Hommon 1986). To date, there is no archaeological evidence for occupation of the Kona region during this initial, or Colonization stage of island occupation (A.D. 300 to 600). The Kona Field System represents a developmental adaptation to the leeward side that was concomitant with the evolving sociopolitical structure and increasing population of the island.

Through the first half of the subsequent period, Early Expansion (A.D. 600 to 1100), permanent habitation was still concentrated on the windward side of the island. It is likely that windward residents traveled to the leeward Kona coast for resource extraction purposes (Cordy 1995). By the latter half of the Early Expansion Period, permanent habitation was beginning in Kona and was concentrated along the shoreline and lowland slopes (Cordy 1981; 1995; Schilt 1984). Informal agricultural fields were probably situated in areas with higher rainfall.

The Late Expansion Period (A.D. 1100 to 1400) saw the spread of agricultural fields and habitation areas across the slopes and coastal areas of Hualālai (Burtchard 1995; Cordy 1995). The earliest fields may have been located in the southern portion of the system (Schilt 1984), with new fields expanding northward over time (Haun et al. 1998).

The beginning of the Kona Field System is marked by the development of formal walled agricultural fields sometime during the initial stages of the Intensification Period (A.D. 1400 to 1600) (Schilt 1984). Radiocarbon data indicates that the population in Kona increased dramatically during this period (Burtchard 1995; Haun et al. 1998; Schilt 1984). The pressures of a growing population on the food supply demanded growth in the agricultural fields.

The Competition Period (A.D. 1600 to 1800) may have seen the environment reach its maximum carrying capacity, resulting in social stress between neighboring groups. The resulting hostility is reflected archaeologically with the frequent occurrence of refuge caves dating to this period (Schilt 1984). This volatile period was probably accompanied by internal rebellion and territorial annexation (Hommon 1986; Kirch 1985).

Historic Land Use

The Historical chronology presented below is a modified version of one developed during the Ali'i Highway inventory survey and associated oral history work (Haun et al. 1998).

The first Historic Period of Hawai'i's history, termed the Last of the Ruling Chiefs (A.D. 1778-1819), begins with Captain Cook's arrival in the islands and ends with King Kamehameha's death in 1819. Early historical accounts emphasize that modern day Kailua Town was a significant political seat and population center during this period. Settlement and subsistence practices within the Kona Field System continued to operate much as it had prehistorically through the first few decades of the historic era (Handy and Handy 1972).

The Merchants and Missionaries Period (A.D. 1820-1847), was a time of social change in Hawai'i. This period begins with Kamehameha's death and his son Liholiho becoming the successor (Kelly 1983). Six months after Liholiho became the successor he, Ka'ahumanu, and the Queen mother Keopuolani broke the *kapu* prohibiting men and women eating together. This act symbolized the end of

the traditional *kapu* system. With the end of the *kapu* system changes in the social and economic patterns began to affect the lives of the common people. Liholiho moved his court to O‘ahu, lessening the burden of resource procurement for the chiefly class. Some of the work of the commoners shifted from subsistence agriculture to the production of foods and goods that they could trade to the early Western visitors. Introduced foods specific for trade with Westerners included yams, coffee, melons, Irish potatoes, Indian corn, beans, figs, oranges, guavas, and grapes (Wilkes 1845). Missionaries began arriving to Hawai‘i in the 1820’s and brought more social and religious change.

The ever-growing population of Westerners forced socioeconomic and demographic changes that promoted the establishment of a Euro-American style of land ownership, and the Great *Māhele* became the vehicle for determining ownership of native lands. During this period, termed the Legacy of the Great *Māhele* (1848-1899), land interests of the King (Kamehameha III), the high-ranking chiefs, and the low-ranking chiefs, the *konohiki,* were defined. The chiefs and *konohiki* were required to present their claims to the Land Commission to receive awards for lands provided to them by Kamehameha III. They were also required to provide commutations to the government in order to receive royal patents on their awards. The lands were identified by name only, with the understanding that the ancient boundaries would prevail until the land could be surveyed. This process expedited the work of the Land Commission (Chinen 1961:13).

During the *Māhele* all lands were placed in one of three categories: Crown Lands (for the occupant of the throne), Government Lands, and *Konohiki* Lands. All three types of land were subject to the rights of the native tenants therein. In 1862, the Commission of Boundaries (Boundary Commission) was established in the Kingdom of Hawai‘i to legally set the boundaries of all the *ahupua‘a* that had been awarded as a part of the *Māhele*. Subsequently, in 1874, the Commissioners of Boundaries was authorized to certify the boundaries for lands brought before them. The primary informants for the boundary descriptions were old native residents of the lands, many of which had also been claimants for *kuleana* during the *Māhele*. This information was collected primarily between A.D. 1873 and 1885 and was usually given in Hawaiian and transcribed in English as they occurred.

Following the *Māhele* was the Territorial Period (1900 to 1959). This period is marked by a decline in population in the Kona area. Residences along the shore comprised of garden plots and animal pens were concentrated in Kailua and Keauhou. Residences occurring inland were associated with agriculture and ranching pursuits. During this period many walls were constructed to keep cattle from entering the garden and residential areas.

Pāhoehoe 1st and 2nd Ahupua‘a

References to Pāhoehoe 1st and 2nd *ahupua‘a* are scarce in literature pertaining to Precontact and/or Historic times. Most of the literature mentioning Pāhoehoe does not distinguish whether the *ahupua‘a* being referred to is 1st, 2nd, 3rd, or 4th. This is understandable in that “[t]he land of Pāhoehoe was one large land unit until the change to a western style land ownership system (the *Māhele* of 1848), when it was divided into four units that are now all identified as separate *ahupua‘a*” (Maly 1996:A-4). A legendary reference to Pāhoehoe exists concerning the political relationship with the neighboring *ahupua‘a* Kaumalumalu to the north and is found in *Ka‘ao Ho‘oniua Pu‘uwai no Ka-Miki* (The Heart Stirring Story of Ka-Miki).

> …Kaumalumalu was named for the chief Kaumalumalu, who was the—*ali‘i ‘ai ahupua‘a, me nā paukū ‘āina a me nā ‘okana ‘āina o Pāhoehoe, La‘aloa, a me kāpala‘alaea*—chief who controlled the *ahupua‘a*, the land parcels, and combined subdivision (*‘okana*) of Pāhoehoe, La‘aloa and Kāpala‘alaea…(*Ka Hōkū o Hawai‘i*, April 9, 1914) (Maly 1996:A-5).

The next mention of Pāhoehoe is in the early 1800s by John Papa I‘i, a Hawaiian historian who lived in Pāhoehoe ca. 1812. When I‘i’s grandfather became ill he recalled:

> Papa’s health had become much worse after the king and chiefs had left for Kahaluu. His friends and the boy’s father had gathered at Pahoehoe in Kaumalumalu, near Kailua, to be with him. The boy and his companion arrived there at dusk, to find that Papa could no longer speak clearly…(I‘i 1959:115) (Maly 1996-A-5).

On William Ellis' trip around the island of Hawai'i in the early 1800s he wrote that while he was in Pāhoehoe he "entered a large house, in which many workmen were employed in making canoes" (Ellis 1963:75). While this statement does not provide us with information on the inland zone in which the current study takes place, we are offered a glimpse into the coastal portion of the *ahupua'a.*

During the *Māhele* of 1848 the large land tract in North Kona known as Pāhoehoe was split into four different *ahupua'a* (Pāhoehoe 1st through 4th). "Pāhoehoe 1st was allocated as Government Land, although it appears to have been under the stewardship of Pā'ele, the *konohiki* (Native Testimony Vol.8: 682)" (PHRI 1999:9). Land commission awards indicate that Gini Lahilahi, daughter of John Young received the *ahupua'a* of Pāhoehoe (LCA 8520-B; Royal Patent 1668), but there is no distinction whether it is Pāhoehoe 1st, 2nd, 3rd or 4th. Furthermore, according to the Rosendahl and Rosendahl (1986) study, there was some confusion about who actually received the *ahupua'a* of Pāhoehoe 2nd during the *Māhele*. They write:

> Under the Great Māhele, Pahoehoe 2 in North Kona was awarded to two different chiefs, each rightfully claiming the land as their own. The first of the two chiefs laying claim to Pahoehoe 2 was Jane (Gini/Kini) Lahilahi Young Kaeo (L.C.Aw. 8520B-3). She received Pahoehoe 2 as an inheritance from the estate of her father, John Young, the trusted advisor to and companion of Kamehameha I. The second of the chiefs claiming Pahoehoe 2 in North Kona (L.C.Aw. 11216) was Miriam Keahikuni Kekauonohi, the great granddaughter of Kekaulike of Maui. (1986:6).

Whoever the rightful awardee was, the current tax map key lists the Pāhoehoe 2nd Ahupua'a as Royal Patent 1668, LCAw. 8520-B:3 (see Figure 2). Soon after the *Māhele*, Pāhoehoe 1st Ahupua'a was divided up and sold as grants. A small portion of the current study parcel (Parcel 29) was sold to Haleluhi in 1856 (Grant 2033).

The next mention of Pāhoehoe does not come until the early 1900s when Thrum (1908:44) notes that there was supposed to be a *heiau* in Pāhoehoe, but upon surveying the area, the *heiau* could not be found.

In 1930, John Reinecke conducted "A Survey of Hawaiian Sites" (1930), in which he recorded three sites in coastal Pāhoehoe:

> Site 18. A series of four modern house sites, one occupied by a wooden shack.
> Site 19. A pen with walls on all but the mauka side, c. 13' thick and 4' high- a very interesting and puzzling ruin, probably small *heiau*. This is followed by two modern house sites; an old house site and well 6' in diameter and 2' feet deep; and by many heaps of rocks which probably obscure several sites.
> Site 20. At the northern side of Pahoehoe: (a) a modern house site on the mauka side, south of the house; (b) the same north of the house, with pens; (c) a modern house in the lot north that. There is a flat plate stone on this site. (Reinecke 1930:53)

During Historic times the land encompassed by the current project area, and much of the adjacent lands within the Pāhoehoe *ahupua'*a, was utilized for cattle ranching purposes.

CURRENT SURVEY EXPECTATIONS

Archaeological studies undertaken within the greater North Kona District indicate that initial prehistoric settlement was concentrated primarily along the coast (Cordy 1981, Cordy et al. 1991). As coastal populations increased, so did the development of agricultural fields in the upland areas, reaching their greatest extent in the late 1700s. As the fields expanded so did native populations in the upland resource areas. In Historic times, with the shift to a market economy and a western style of land ownership in

Hawai‘i, populations shifted from the coast to the upland areas (Cordy 1995, Ellis 1963). Much of the old style of agriculture was abandoned in favor of coffee farms and cattle ranches, which have had a significant impact on the Prehistoric archaeological record.

Based on specific information from archaeological studies that included portions of the current study area (Rosendahl and Rosendahl 1986; Ketner et al. 2004), it is probable that Precontact agricultural features representative of the Kona Field System are present and that habitation areas are present among these agricultural features. The possibility of encountering burial features and trails also exists. Historic ranching-related features will likely be present as an overlay on the earlier Precontact landscape.

FIELDWORK

Fieldwork for the current inventory survey was conducted between December 7-10 and 20-23, 2004 and between January 17–21, 2005 by Matthew R. Clark, B.A., Christopher S. Hand, B.A., Mark J. Winburn, B.A., J. David Nelson, B.A., Michael E. Rivera, B.A., and Olivier M. Bautista, B.A.. All fieldwork was directed by Robert B. Rechtman, Ph.D.

Methods

During the intensive inventory survey of the study area, the entire parcel was subject to east/west pedestrian transects with fieldworkers spaced at 15-meter intervals. During these initial transect sweeps the large number of crudely constructed agricultural features on the study parcel were largely ignored. Only Historic features (i.e. walls) and features with more substantial formal architecture than the apparent agricultural features were marked with flagging tape and plotted on a map of the study parcel using Garmin 76s handheld GPS technology (with sub five-meter accuracy). Then, all the site areas that appeared to have a function other then agricultural were cleared of vegetation, mapped in detail using tape and compass, photographed, and described using standardized site record forms. These sites were also evaluated at that time for the need of subsurface testing.

The smaller, crude constructions that dotted nearly the entire study parcel (presumed agricultural features) were then recorded. To accomplish this task, fieldworkers (in a group of four to six people) began in the northeastern corner of the main body of the study parcel and worked in tight formation north/south across the project area, progressing to the southwest as each sweep was completed. As features were encountered they were recorded using standardized agricultural feature description forms (see Appendix A for an example of the form), photographed, marked with metal tags containing their temporary site number (in this case Sites T-5 and T-8) and feature number, and plotted on a map of the project area using Garmin 76s handheld GPS technology (with sub five-meter accuracy). Each fieldworker was assigned a specific task (i.e. clearing vegetation, marking with site tags, photographing, measuring, filling out feature description forms, and plotting on a map of the project area). In this manner the entire project area was explored and all discrete features were recorded. The features were also evaluated at that time for the need of subsurface testing.

All test units (TUs) excavated during the current project measured 1 x 1 meter. Excavation of the test units proceeded following natural stratigraphic layers. Where applicable, the layers were excavated in arbitrary 10-centimeter levels. All recovered soil matrix was passed through 1/4-inch mesh screen, and all recovered cultural material was remanded to the laboratory for detailed analysis. Level record forms, filled out for each level of each layer in each unit, were used to record soil descriptions, Munsell color notations, cultural constituents collected, and a general description of the level. Upon completion of a unit, photographs were taken, a profile drawing was prepared, and the unit was back-filled as close to its original specifications as possible.

Recovered cultural material was processed at the Rechtman Consulting, LLC laboratory facility and is currently curated at that location. To begin the laboratory process the recovered cultural material was first washed and then separated, by level within individual units, into material classes and separated by species or type (to the lowest taxonomic level possible). An accession number (ACC #) was then sequentially assigned to each group of related items. The material encompassed by an individual accession number was quantified by the number of identified specimens (NISP), weighed, and when applicable considered for the

minimum number of individuals (MNI) present. The findings of the inventory survey along with detailed descriptions of the encountered archaeological resources and the subsurface testing are presented below.

Findings

As a result of the current inventory survey six previously unrecorded archaeological sites and eight previously recorded sites were located and recorded on the subject parcel. The sites include the seven Historic ranching/boundary walls (Sites 4591, 6352, 6381, 21384, 24271, 24376, and 24380), an alignment of possible Historic origins (Site 24379), a trail (Site 6350), four Precontact habitation sites including three complexes (Sites 6984, 24375, and 24378) and a terrace remnant (Site 24277), and a grouping of 213 agricultural features that spans the entire project area (a portion of Site 24272). Fifteen test units (TUs) were excavated at six of these sites. Detailed descriptions of all the recorded sites follow below. The locations of all sites and features are depicted on Figure 6.

Table 1. Archaeological sites recorded during the current inventory survey.

SIHP No.	*Formal Type*	*Functional Type*	*Age*
4591	Wall	Ranching/boundary	Historic
6350	Trail	Transportation	Precontact
6352	Wall	Ranching/boundary	Historic
6381	Wall	Ranching/boundary	Historic
6984	Complex	Habitation	Precontact
21384	Wall	Ranching/boundary	Historic
24271	Wall	Ranching/boundary	Historic
24272	Complex	Agricultural	Precontact
24375	Complex	Habitation	Precontact
24376	Wall	Ranching	Historic
24377	Terrace	Habitation	Precontact
24378	Complex	Habitation	Precontact
24379	Alignment	Unknown	Historic
24380	Wall	Ranching	Historic

In addition to the test units excavated at the recorded archaeological sites another test unit (TU-12) was excavated in what turned out to be a bulldozer push pile. This push pile is located along the southern edge of a bulldozed ranch road against a bedrock outcrop in the central portion of the current project area along the northern edge of Site 6381 (see Figure 6). The push pile was excavated because it contained a piece of wood, shaped like a headstone and painted white, that was propped upright in its center and contained an incised cross, and the inscription “Billy the Kid” painted in black on its surface. On the ground next to the push pile were two other fake burial markers made of wood; one was shaped like a cross and read, “Jesse James”, and the other, which was broken into several pieces, read, “Here lies Doc Holiday RIP”.

TU-12 was excavated in the central portion of the push pile to determine if Billy the Kid was in fact buried at that location. Excavation of TU-12 revealed a thirty-five centimeter thick layer (Layer I) of loose small boulders pocked with bulldozer percussion scars resting on bedrock (Figure 7). A small amount (up to five centimeters) of very dark grayish brown (10YR 3/2) silt (Layer II) was collected on bedrock at the base of Layer I. Excavation of TU-12 terminated at bedrock. No cultural material was recovered from TU-12 and the remains of Billy the Kid were not located. Based upon the percussion scars on several of the excavated boulders, the pile was determined to be created by a bulldozer. Based on the wooden construction of the fake burial markers and the amount of deterioration, they were likely deposited at their current location for some unknown reason within the last twenty years.

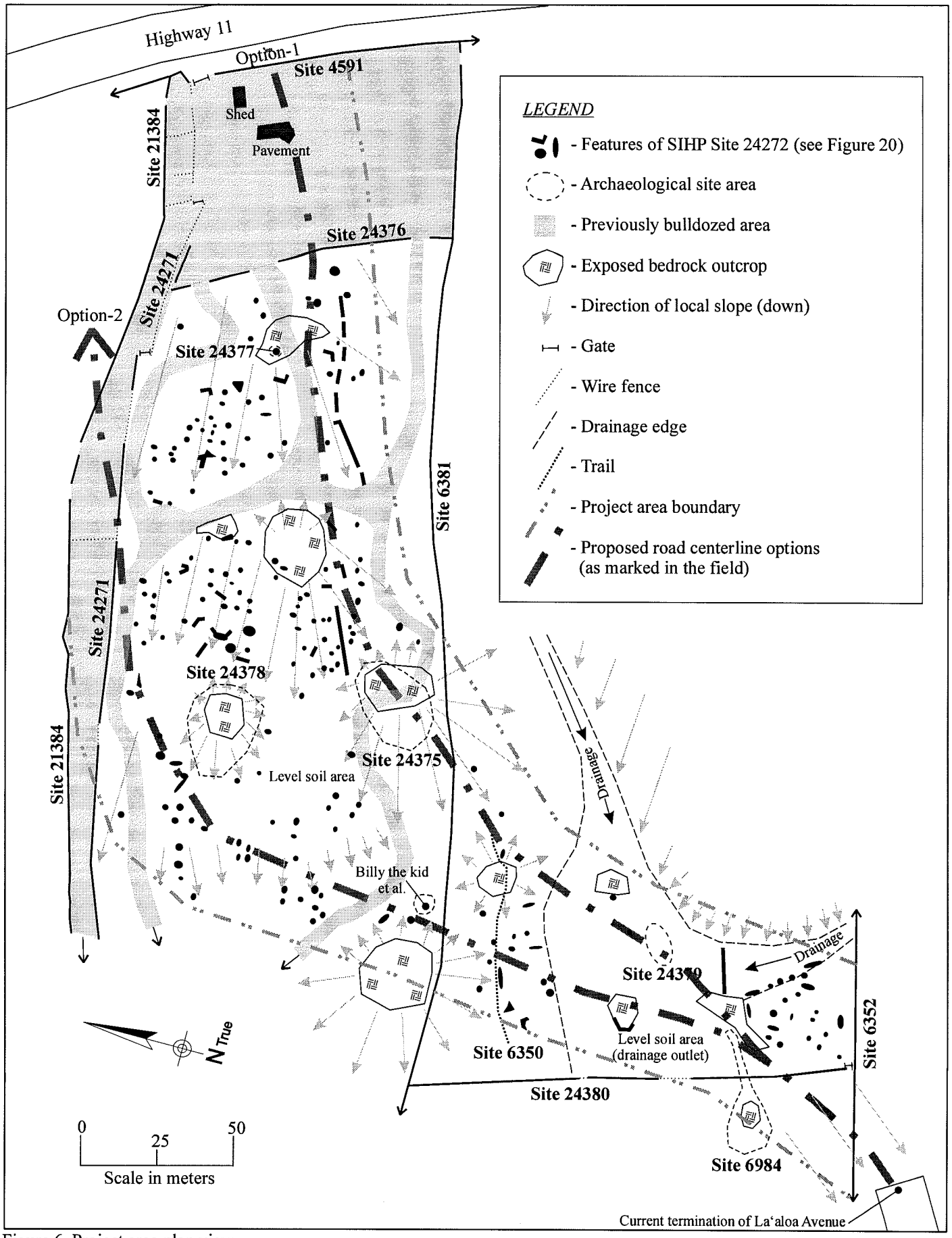
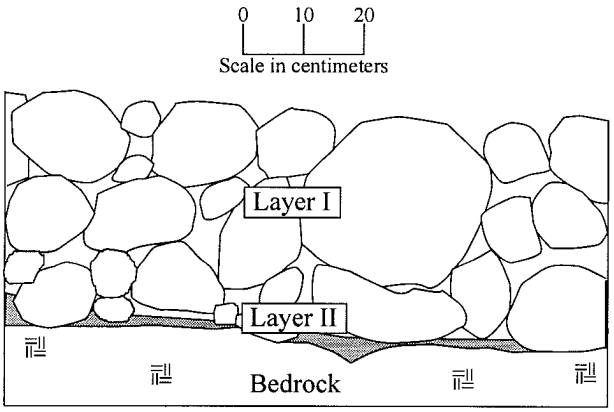


Figure 6. Project area plan view.

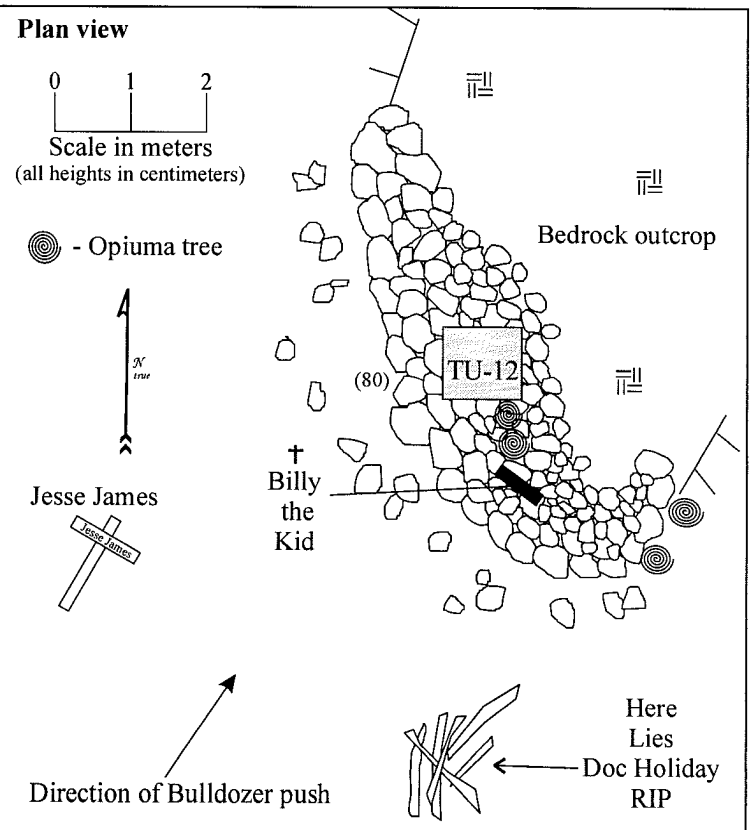
TU-12 East wall profile



Layer I - Loose, small boulders pocked with percussion scars and resting on bedrock.

Layer II - A small amount of very dark grayish brown (10YR 3/2) silt.

Plan view



View to North

Figure 7. Bulldozer push pile with " Billy the Kid" grave marker, plan view, photograph, and TU-12 profile.

SIHP Site 4591

Site 4591 is a Historic ranch wall that marks the eastern boundary of Parcel 114 along the *makai* edge of Kuakini Highway (see Figure 2). This wall was originally recorded by Hammatt and Clark (1980), and further studied by PHRI (1999). An approximately 40-meter long section of the wall is present within the current project area that runs south from a gate in the northeast corner of Parcel 114 (see Figure 6). Site 4591 continues both north (into the PHRI 1999 project area) and south out of the current project area for undetermined distances. The wall is core-filled and constructed of stacked basalt cobbles. Although slightly collapsed in a couple of sections, the wall is in a relatively good state of repair, and it continues to be used for ranching purposes (Figure 8). With the exception of the gate in the northeast corner of Parcel 114, there are no breaches other in the wall within the current project area. The most intact sections of Site 4591 stand up to 1.2 meters tall by 0.9 meters wide along its upper edge and 1.1 meters wide at its base. Site 4159 was likely originally constructed during the middle to late 19th or early 20th century for cattle control purposes and also as a boundary marker.

Figure 8. SIHP Site 4591, view to north.

SIHP Site 6350

Site 6350 is a stepping-stone trail segment that runs *mauka/makai* for approximately 65 meters through the central portion of the current project area to the south of Site 6381 (see Figure 6). Segments of this trial were previously recorded *makai* of the current project area by Ching et al. (1973), Barrera (1980), Hommon and Rosendahl (1983), and Henry et al. (1998). Rosendahl and Rosendahl (1986) recorded the section of the trail within the current project area as Site T-23 during a reconnaissance survey of Parcel 120. Henry et al. describe the section of Site 6350 located within the proposed Ali‘i Highway corridor thusly:

> The trail is built of 0.50-0.60 m steppingstones set on, or barely into, the ground. Some rest on cobbles. Flat stones (0.20-0.70 m) line each side of the trail. The tops of many are as much as 0.30 m above ground surface. Cobbles are piled along one or both sides of the trail. The tops of many are as much as 0.30 m above ground surface. Cobbles are piled along one or both sides of the trail in some segments, making the entire construction

> more than 1.0 m wide in spots. In some places, the trail traverses the side of a hill. In these locations, the trail construction consists of large pahoehoe steppingstones set into a terrace-like surface of cobbles, built on the side of the hill. (1998:317)

This description of Site 6350 very closely resembles the formal attributes of the trail segment observed during the current study. The majority of the Site 6350 as recorded during the current survey also consists of flat laid stepping-stones averaging 0.5 to 0.6 meters across with cobbles lining both sides of the trail giving it an overall width of up to 1.2 meters (Figure 9). In one location, where the trail traverses a steep hill within the current study area, it is terraced into the hillside as Henry et al. (1998) described. Although only a 65-meter long section of Site 6350 was recorded for the current study, further segments of the trail were noted outside the project area to the east. Site 6350 was likely constructed during Precontact times as part of interconnected trail system that allowed for pedestrian travel *mauka*/*makai* within Pāhoehoe 2nd Ahupua‘a and between various *ahupua‘a* as well. Site 6350 likely accessed both agricultural and residential sites.

Figure 9. SIHP Site 6350, view to east.

SIHP Site 6352

Site 6352 is a Historic ranch wall that marks the southern boundary of Parcel 120 and runs along he boundary between Pāhoehoe 2nd and 3rd *ahupua‘a* (see Figure 6). An approximately 85-meter long section of Site 6352 runs along the southern boundary of the current project area and continues both east and west out of the project area. This wall was previously studied by Barrera (1980), Rosendahl and Rosendahl (1986), and Henry et al. (1998), among others. Site 6352 is core-filled and constructed of stacked basalt cobbles. Although collapsed in a couple of sections, the wall is in a relatively good state of repair, and it continues to be used for ranching purposes (Figure 10). There are no breaches in the wall within the current project area. The most intact sections of Site 6352 stand up to 1.3 meters tall by 0.7 meters wide along its upper edge and 1.0 meter wide at its base. Site 6352 was likely originally constructed during the middle to late 19th or early 20th century for cattle control purposes and also as a boundary marker.

Figure 10. SIHP Site 6352, view to southwest.

SIHP Site 6381

Site 6381 is a Historic ranch wall that runs east/west through the central portion of the current project area (see Figure 6). An approximately 110-meter long section of Site 6381 bisects the current project area and continues out of the project area to both the east and west. This wall was previously studied by Barrera (1980), Rosendahl and Rosendahl (1986), Henry et al. (1998), and Ketner et al. (2004), among others. Overall, the wall runs a meandering course east/west between a ranch wall along the *makai* edge of Kuakini Highway (Site 4591) at its eastern end and the Kuakini Wall (Site 6302) at its western end. Site 6381 is core-filled and constructed of stacked basalt cobbles. Although collapsed in a couple of sections, the wall is in a relatively good state of repair, and it continues to be used for ranching purposes (Figure 11). There are no breaches in the wall within the current project area, but there is a former gate marked by two upright poles that has been filled in with stacked cobbles (Figure 12). The most intact sections of Site 6381 stand up to 1.2 meters tall by 0.7 meters wide. Site 6381, like Site 5352, was probably originally constructed during the middle to late 19th or early 20th century for cattle control purposes and also as a boundary marker.

Figure 11. SIHP Site 6381, view to east.

Figure 12. SIHP Site 6381 walled in gate, view to southwest.

SIHP Site 6984

Site 6984 was originally recorded by Barrera, who described it as a "habitation terrace measuring 5.3 by 5.8 meters and standing to a height of 0.9 meters," that was, "built against a bedrock lava outcrop, the surface of which undoubtedly served as part of the living area." (1980:6-7). Rosendahl and Rosendahl later relocated the site, but did not offer any further description, other than "no associated cultural remains were observed on the surface" (1986:12). The site was not mapped (or apparently cleared of vegetation) during either of the previous studies. In addition to the terrace, three other features were recorded and mapped at Site 6984 as a result of the current study.

Site 6984, as described for the current study, is a Precontact habitation complex located in the extreme southwestern portion of the current project area on Parcel 120 (see Figure 6). The complex consists of a terrace built against an eroding bedrock outcrop (Feature A), with two associated rough enclosures (Features B and C), and a wall/alignment running east from the *mauka* end of the bedrock outcrop (Feature D) (Figure 13). The area to the north and east of Site 6984 consists of level soil with some exposed bedrock at the outlet of a large drainage within Pāhoehoe 2nd Ahupuaʻa. This area could have been used for planting. A Historic wall (Site 24380) bisects Feature D, and has partially destroyed that feature, and a cattle enclosure (located outside the current project area to the north of Site 6984) may have also impacted the site. The general site area appears to have seen heavy use during Historic time for cattle ranching. A single test unit (TU-14) was excavated at Feature A of Site 6984. Cultural material recovered from the unit was consistent with a use of the site for Precontact habitation purposes. Detailed descriptions of each feature follow below.

Feature A

Feature A is a terrace that appears to be the main habitation feature at Site 6984. The terrace is constructed against the western edge of a raised bedrock outcrop. The constructed portion of the feature measures 5.3 meters (north/south) by four meters (east/west) and stands up to 90 centimeters above ground surface along its western edge. The north, south, and west edges of Feature A consist of neatly stacked cobbles, while the surface is roughly paved with small cobbles (Figure 14). The unmodified surface of the bedrock outcrop may have also been utilized for additional living space. A large *opiuma* (*Pithecellobium dulce*) is growing out of the terrace. A single 1 x 1 meter test unit (TU-14) was excavated in the central portion of Feature A (see Figure 13).

Excavation of TU-14 revealed a two-layer stratigraphic profile (see Figure 13). Layer I, the architectural layer, consisted of 75 centimeters of piled small to large sized *pāhoehoe* cobbles and boulders resting on bedrock. Layer II consisted of very dark brown (10YR 2/2) silt collected amongst the cobbles and boulders of Layer I. A large number of tree roots were present in Layer II near bedrock. Cultural material recovered from Layer II included marine shell, coral, volcanic glass, and a small amount of charcoal (Table 2). Excavation of TU-14 terminated at bedrock approximately seventy-five centimeters below the surface of the unit.

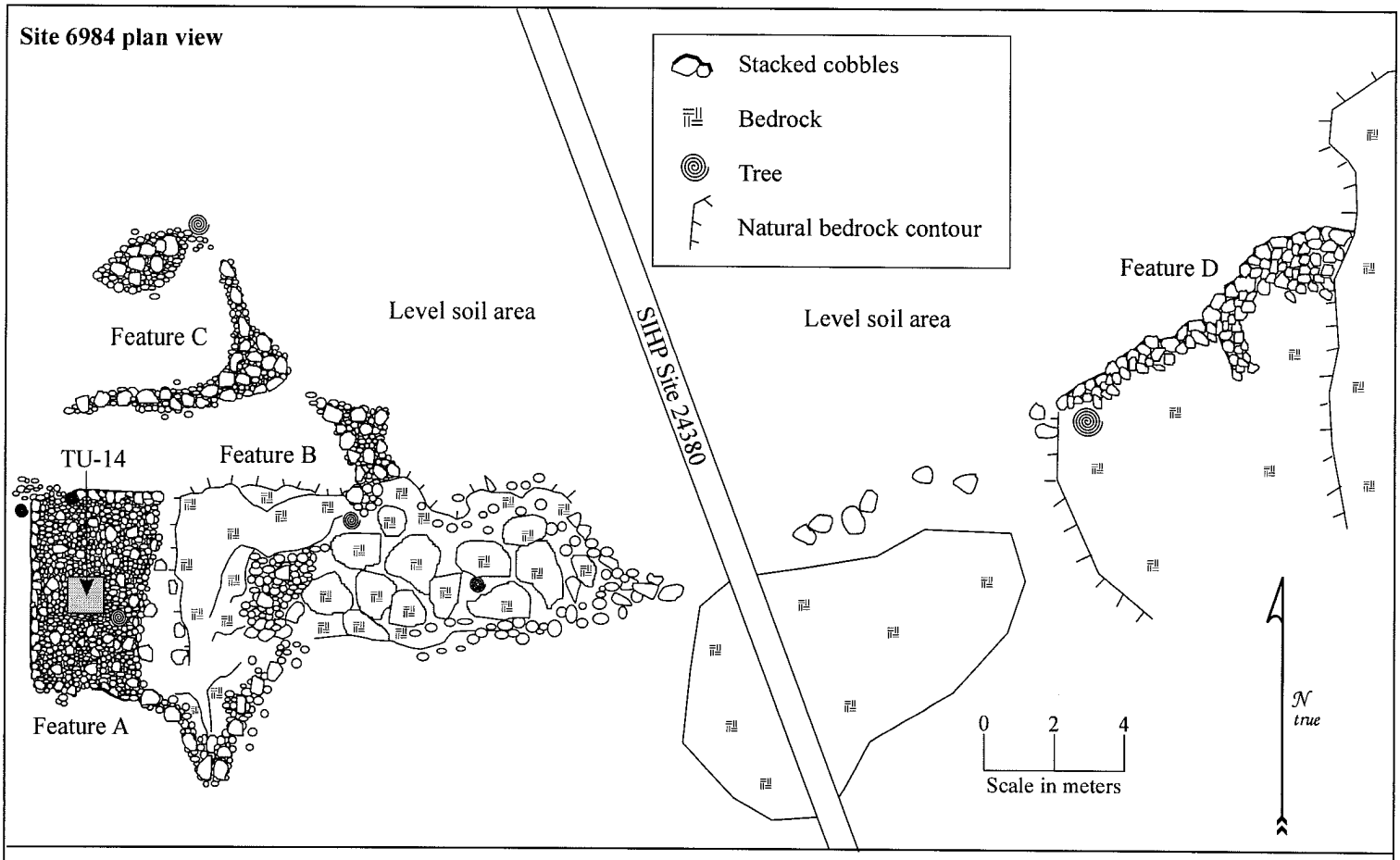
Table 2. Cultural material recovered from SIHP Site 6984 Feature A, TU-14, Layer II.

ACC#	*Material*	*Species/type*	*Count*	*MNI*	*Weight (g)*
24	Organic	Charcoal	-	-	1.4
25	Coral	Waterworn	3	-	1.2
26	Volcanic glass	Flake	5	-	2.1
27	Marine shell	*Cypraea*	3	1	1.9

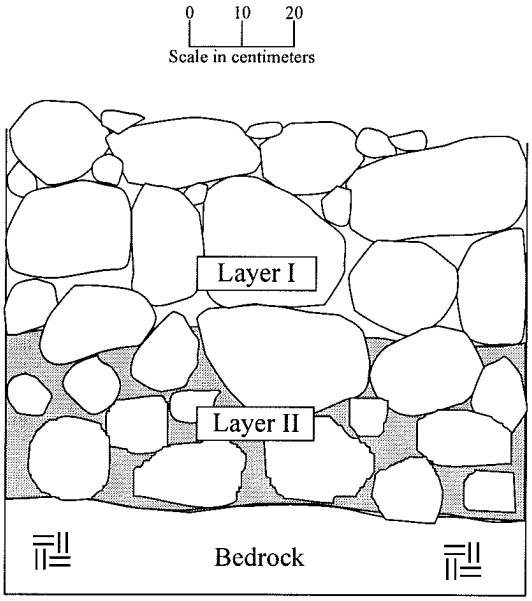
Feature B

Feature B is a long narrow enclosure located along the northern edge of Feature A below the raised bedrock outcrop (see Figure 13). The enclosure measures approximately seven meters long (east/west) by three meters wide (north/south). There are rough piled cobble alignments located along the northern and eastern edges of Feature B, and the southern edge is defined by the raised bedrock outcrop and Feature A. The feature is open to the west. The interior consists of level soil with some exposed bedrock covered by grass (Figure 15).

Site 6984 plan view



TU-14 west wall profile



Layer I - Architectural layer consisting of piled small to large sized piled *pāhoehoe* cobbles and boulders.

Layer II - Very dark brown (10YR 2/2) silt.

TU-14, base of excavation, view to west

Figure 13. SIHP Site 6984 plan view and TU-14 profile.

Figure 14. SIHP Site 6984 Feature A, view to northeast of western face.

Figure 15. SIHP Site 6984 Feature B (with Feature C in foreground), view to southeast.

Feature C

Feature C is a roughly square enclosure that shares its southern wall with the northern wall of Feature B (see Figure 13). Feature C measures approximately five meters by five meters. The northern and eastern walls of this feature, like the shared southern wall, are defined by rough piled cobble alignments that stand up to 0.9 meters high (Figure 16). Feature C also opens to the west, but this may be the result of Historic disturbance rather than intentional design. The interior of the enclosure consists of thin soil covered by thick grass.

Figure 16. SIHP Site 6984 Feature C, view to south.

Feature D

Feature D is a rough cobble alignment/wall that runs east from the eastern end of the raised bedrock outcrop (see Figure 13). The alignment begins along the southern edge of the outcrop that contains Feature A. It runs east for approximately five meters and then is absent for twelve meters where Site 24380 (a Historic wall) bisects its length. It continues for additional 10 meters along the northern edge of another raised bedrock outcrop on the opposite side of Site 24380 (Figure 17). It appears as though stones were taken from Feature D to construct the Historic ranch wall. Feature D never attains a height of more than two courses (approximately fifty centimeters high), and it measures approximately seventy centimeters wide for much of its length. Feature D may define the southern edge of a level soil area (a drainage flood plain) that could have been used by the residents of Site 6984 for planting.

Figure 17. SIHP Site 6984 Feature D, view to east of the eastern end of the alignment.

SIHP Site 21384

Site 21384 is a Historic ranch wall that marks the northern boundary of Parcel 29 and the northern most extent of the current project area (see Figure 6). It is also the northern boundary wall of Grant 2033, which was sold to Haleluhi in 1856. The wall runs a meandering course east/west along the entire length of Parcel 29 for a distance of approximately 865 meters from Kuakini Highway to the Kuakini Wall (Site 6302) (Ketner et al. 2004 15). An approximately 200-meter long section of the wall, at its eastern end, is present within the current project area. Site 21384 is core-filled and constructed of stacked basalt cobbles (Figure 18). Although collapsed in a couple sections, the wall is in a relatively good state of repair and it continues to be used for ranching purposes. There are several gates and constructed breaks along the length of the wall to allow for cattle control. The most intact sections of Site 21384 stand up to 1.4 meters tall by 1.0 meter wide. This wall was originally recorded by PHRI (PHRI 1999) on the parcel to the north of the current study parcel, and then further studied by Ketner et al. (2004) during an inventory survey of Parcel 29. Site 21384 was likely originally constructed during the middle to late 19th or early 20th century for cattle control purposes and as a boundary marker.

Figure 18. SHIP Site 21384, view to northwest.

SIHP Site 24271

Site 24271 is a Historic ranch wall that marks the northern and western boundaries of Parcel 114. Ketner et al. (2004) originally recorded Site 24271, in its entirety, during an inventory survey of Parcel 29. An approximately 150-meter long section of the wall is present within the current project area to the south of, and running parallel to, Site 21384 (see Figure 6). The wall is largely discontinuous within the boundaries of the current project area, as it has been impacted by bulldozing in several locations. The bulldozed sections of wall have been replaced with wire fencing. The most intact sections of Site 24271 stand up to 1.3 meters tall by 0.8 meters wide (Figure 19). Overall, the wall is L-shaped and runs a meandering course west, beginning from a point fifty meters west of Kuakini Highway, for approximately 275 meters parallel to Site 21384 along the northern boundary of Parcel 114. It then turns south (outside of the current project area) and runs along the western boundary of Parcel 114 for approximately 110 meters to Site 6381 (Ketner et al. 2004). Site 24271 was likely originally constructed during the middle to late 19th or early 20th century for cattle control purposes and as a boundary marker.

Figure 19. SIHP Site 24271, view to south.

SIHP Site 24272

Site 24272 is a large agricultural complex comprised of 534 distinct features, 213 of which are located within the project area (see Figure 6). The majority of the features found at Site 24272 were likely constructed during Precontact times, but the site may have been utilized continuously into early Historic times (Ellis 1963). All of the features of Site 24272 are crude collections of stones that are usually piled on or against bedrock outcrops (Appendix A). These collections of stones are generally in small piles or in linear arrangements. Portions of the project area with the greatest amount of exposed bedrock and the least amount of soil (i.e. on slopes where the most run off occurs) seem to contain the highest density of features. The features in these sloped areas are almost all exclusively terraced into the hillside and appear to aid in soil retention. They are usually located near small pockets of soil and on bedrock ground surface, suggesting that they were likely created during the process of clearing stones from the soil areas. On level ground where there is ample soil, such as occurs at a few locations throughout the project area (see Figure 6), the stone collections are concentrated around the outside edges of the soil areas, creating clearings that could have been used for planting. The habitation areas recorded within the current project area are generally located on the periphery of these cleared level soil areas.

It should be mentioned that years of cattle ranching within the project area and dense vegetation has greatly impacted the formal attributes of the recorded features. What were recorded as several piles of stones during the current study may have been connected and neatly stacked at some point in the past. The deteriorated nature of the agricultural features at Site 24272, combined with the sometimes dense vegetation on the project area, have made discrete associations between these features very difficult. It is important to remember however, that the features once functioned as a connected collection of garden plots, and that their yields supported the residents of this part of Kona.

The Missionary William Ellis, who visited the vicinity of the current project area in 1823, wrote:

> The environs were cultivated to a considerable extent; small gardens were seen among the barren rocks on which the houses are built, wherever soil could be found sufficient to nourish the sweet potato, the watermelon, or even a few plants of tobacco, and in many places these seemed to be growing literally in the fragments of lava, collected in heaps around their roots….
>
> Leaving Kairua [Kailua], we passed through the villages thickly scattered along the shore to the southward. The country around looked unusually green and cheerful, owing to the frequent rain, which for some months past have fallen on this side of the island. Even the barren lava, over which we traveled, seemed to veil its sterility beneath frequent tufts of tall waving grass, or spreading shrubs and flowers.
>
> The side of the hills, laid out for a considerable extent in gardens and fields, and generally cultivated with potatoes, and other vegetables, were beautiful. (1963[1823]:72-73).

The features of Site 24272 are quantifiable forms, constructed or modified by human hands, which make up the archaeological landscape and record generations of human occupation. It is important to keep in mind that individuals construct features at a certain time for a specific purpose. However, by the time archaeologists encounter formal features, they are often overgrown with vegetation, collapsed and destroyed (or trampled on by cows), and sometimes dismantled or rebuilt; and almost always lack all perishable components. Numerous formal feature types have been identified (but not agreed upon) during the past 100 or so years of archaeological research (augmented by historical documentation and oral historical accounts) on the island of Hawai‘i. Indeed, as Kirch points out, “given the bewildering variety of forms and permutations that Hawaiian structures take…no single classification has yet been found to be entirely satisfactory. In fact, Hawaiian archaeologists commonly use ad hoc combinations of functional and formal types in their survey work, applying functional terms to sites whose past use seems relatively unambiguous, and using formal, descriptive terms for sites that might have been used for several alternative purposes” (1985:36-38). By nature, this lack of agreement on feature terminology hinders comparisons between sites and projects, and the “ad hoc” combination of formal and functional terms used in describing features in the field can preclude innovative interpretation.

To help alleviate the hindrance of conflicting terminology, a set of formal feature definitions, specific to the current project area—but keeping in mind previous archaeological work—is presented below. The definitions present only the common attributes that enabled us to place the diverse formal feature types into easily quantifiable groups and are followed by a discussion of possible function. The formal feature types encountered at Site 24272 are mound, modified outcrop, wall, and terrace. A definition of each type is presented below and specific examples can be seen below and in Appendix A.

Mound

A mound is collection of stones with an irregular surface. Mounds range considerably in size, shape, method of construction, and type of stone used. They are constructed from as few as four stones or as many as the topography and the effort of the individual(s) constructing them allow. The shape of a mound (i.e. oval, round, linear, curvilinear, square, crescent, rectangular, or irregular) varies considerably depending on the terrain and the individual (purpose of construction). However, all mounds, as dictated by gravity, have sloped sides. Mounds are either piled or stacked, or a combination of both. Stacked mounds usually contain a fill of piled stones with an outside layer stacked around the edges. The type of stone used in mound construction is a reflection of the immediately available source material. The size of stone used is also a function of material availability. A mound can have a different function depending on its temporal and spatial associations. Mounds recorded within the current project area are thought to have functioned either as clearing features or planting features.

Modified outcrop

A modified outcrop is a natural bedrock formation with an associated collection of stones placed against and supported by it. Unlike a mound, the stone collection is not freestanding and depends on the bedrock

formation for support, although it may rise above the level of the outcrop itself. The type and size of the stones used is a function of the immediately available source materials. The stones are either stacked, piled, or a combination of both, but the size of the stone collection must be significantly smaller than the size of the bedrock formation, otherwise the feature is considered a mound. The surface of a modified outcrop is always irregular with sloped sides and incorporated bedrock. Occasionally, if the stones are stacked against a vertical bedrock formation, the stacked edges will also approach vertical. Modified Outcrops recorded within the current project area are thought to have functioned primarily as either clearing features or planting features. However, some of the modified outcrops may have once helped to trap or retain soil and create planting areas (similar to a terrace).

Wall

A wall is a linear or curvilinear alignment of stones (at least two courses high) that is considerably longer than it is wide. Walls are constructed using stones of various type and size depending upon the source material. They generally have sloped sides, although in neatly stacked walls the slope approaches vertical. Walls may also form adjoining or shaped segments (i.e. L-shaped, T-shaped, U-shaped, etc.). The walls encountered at Site 24272 were all piled with no obvious placement of stones. These recorded walls appear to have functioned primarily as agricultural field boundaries (*kuaiwi*) (Cordy 2000; Kirch 1985; Soehren and Newman 1968).

Terrace

A terrace is a linear or curvilinear stone construction built perpendicular to the natural slope of the terrain. It is generally longer than it is wide and at least two courses high. On the upslope side of the terrace soil is either placed, or more often naturally accumulated, to form a relatively level surface area. The stones of a terrace may be piled or stacked (piled edges are sloped, while stacked edges are generally vertical). The terrace is a specialized feature of an agricultural field. It functioned to trap or retain soil creating a planting area (Kirch 1985; Soehren and Newman 1968). Terrace walls are typically built connecting kuaiwi and are of stacked construction with a rectangular or trapezoidal profile.

Site 24272 was originally recorded by Ketner et al. (2004) during an inventory survey of Parcel 29 (a portion of that parcel is included in the current project area; see Figure 5). Ketner et al (2004) recorded 321 distinct features of Site 24272 (Features 1-321) on Parcel 29 including 186 modified outcrops (58%), 106 mounds (33%), 24 terraces (7%), and 5 *kuaiwi* (2%), none of which were located within the boundaries of the current project area. Four of these previously recorded features, a modified outcrop (Feature 196), two mounds (Features 195 and 313), and a terrace (Feature 321), were subject to subsurface testing by Ketner et al. (2004), but no cultural material was recovered from any of the test units.

During the current study it was realized that Site 24272 continued beyond the boundaries of Parcel 29 as a near continuous set of agricultural features separated only by the arbitrary divisions of Historic rock walls. For this reason, in consultation with MaryAnne Maigret, the DLNR-SHPD Assistant Hawai‘i Island Archaeologist, the designation of Site 24272 was retained for the agricultural features recoded within the current project area, which spans portions of several parcels including Parcel 29.

As a result of the current study 213 features were added to Site 24272 (Features 322-534). These features included 162 modified outcrops (68%), 62 mounds (29%), 4 terraces (2%), and 2 *kuaiwi* (1%). The higher incidence of modified outcrops recorded within the current project area (as opposed to the previously recorded features of Site 24272 on Parcel 29), is likely a reflection of the rockier terrain, steeper slope, and increased number of exposed bedrock outcrops within the current study parcels, and not a reflection of variation in planting techniques. All of these newly discovered features of Site 24272 were recorded in detail. They were first cleared of vegetation, and then recorded using standardized agricultural feature description forms (see Appendix A), photographed, marked with metal tags containing their temporary site number (in this case Site T-5 or T-8) and feature number, and plotted on a map of the project area using Garmin 76s handheld GPS technology (with sub five-meter accuracy), and evaluated for the need of subsurface testing. Based on the findings of the detailed recording of Site 24272 six of the features, four modified outcrops (Features 330, 352, 452, and 534), one mound (Feature 404), and one terrace (Feature 471) were subject to subsurface testing. Descriptions of the features tested and the results of the testing are discussed below (see also Appendix A). The location of each feature is depicted on Figure 20.

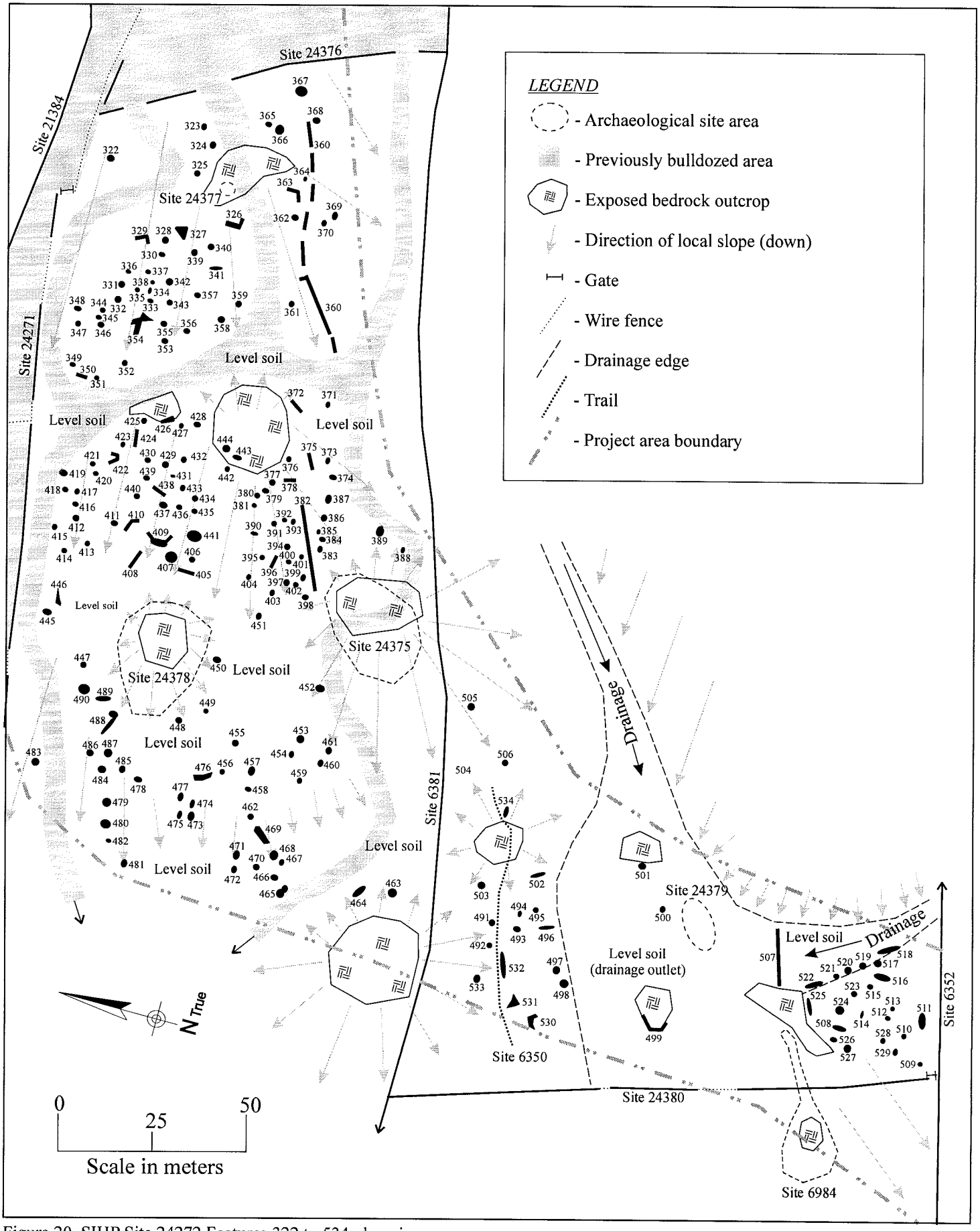


Figure 20. SIHP Site 24272 Features 322 to 534 plan view.

Feature 330

Feature 330 is a modified outcrop located in the northeastern portion of the current project area (see Figure 20). The feature consists of small to large sized cobbles piled on an extremely level bedrock outcrop. The pile measures 2.4 meters long (north/south) by 1.2 meters wide (east/west) and stands up to 60 centimeters above ground surface along its down slope (western) edge. A 1 x 1 meter test unit (TU-9) was excavated in the center of Feature 330 (Figure 21).

Excavation of TU-9 revealed a two-layer stratigraphic profile (see Figure 21). Layer I, the architectural layer, consisted of a 20 to 50 centimeters of piled *pāhoehoe* cobbles resting on bedrock. At the base of Layer I, collected on bedrock, were 2 to 4 centimeters of very dark brown (7.5YR 2.5/3) silt (Layer II). No cultural material was recovered from Feature 330. Excavation of TU-9 terminated at bedrock at a maximum depth of 50 centimeters beneath the surface of the unit (see Figure 21). Based on the formal attributes of this feature and the relative lack of soil found within TU-9, Feature 330 likely represents a clearing pile.

Feature 352

Feature 352 is a modified outcrop located in the northeastern portion of the current project area west of Feature 330 (see Figure 20). Feature 352 is constructed of approximately twenty-five large *pāhoehoe* cobbles that appear placed on a bedrock outcrop in a tight grouping with smaller cobbles filling the area between. The feature measures 1.4 meters (north/south) by 1.0 meters (east/west) and stands up to 75 centimeters tall along its down slope (western) edge. A 1 x 1 meter test unit (TU-7) was excavated in the central portion of Feature 32 (Figure 22).

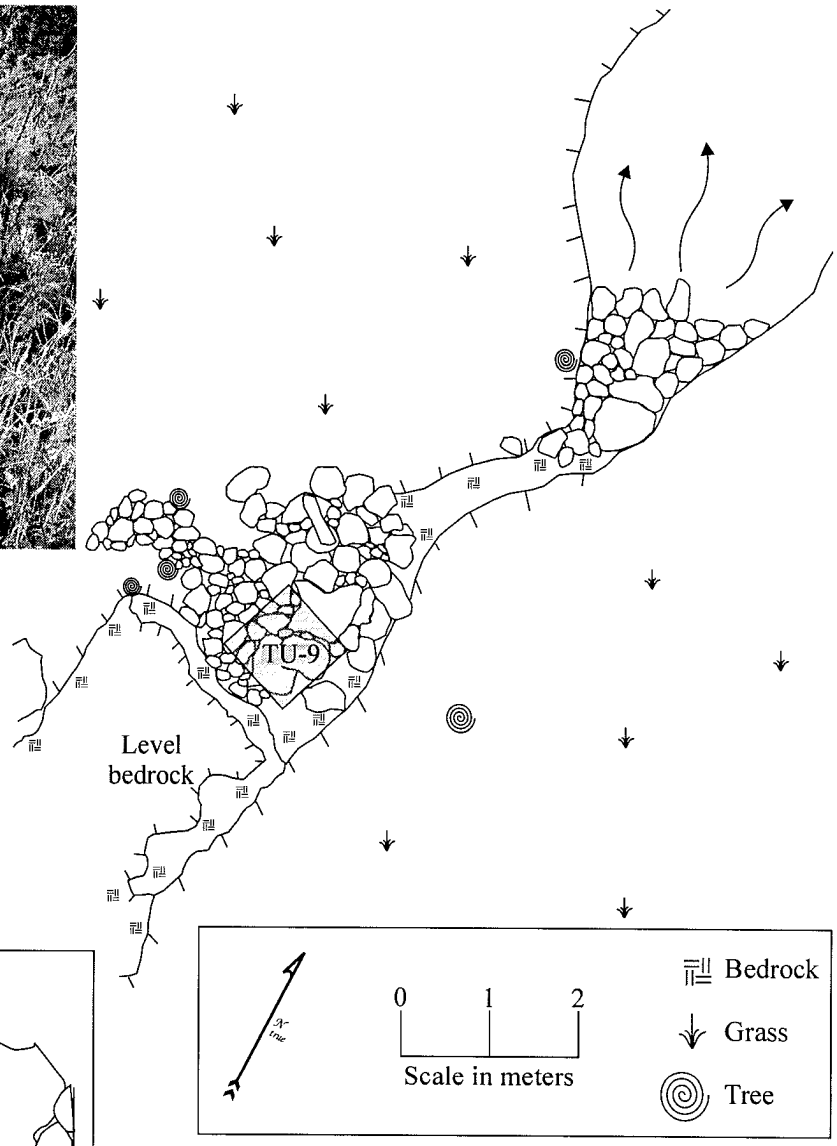
Excavation of TU-7 revealed a two-layer stratigraphic profile (see Figure 22). Layer I, the architectural layer, consisted of 25 centimeters of cobbles resting on bedrock. In the center of the unit, a low spot in the bedrock contained very dark brown (7.5YR 2/2) silt (Layer II), which continued beneath Layer I for approximately 20 centimeters. A single volcanic glass flake was recovered from Layer II. Excavation of TU-7 terminated at bedrock approximately 45 centimeters beneath the surface Feature 352 (see Figure 22). Based on the formal attributes of this feature, along with the presence of soil in the bedrock low spot and the volcanic glass flake found in TU-7, it is possible that Feature 352 was used as a planting feature.

Feature 404

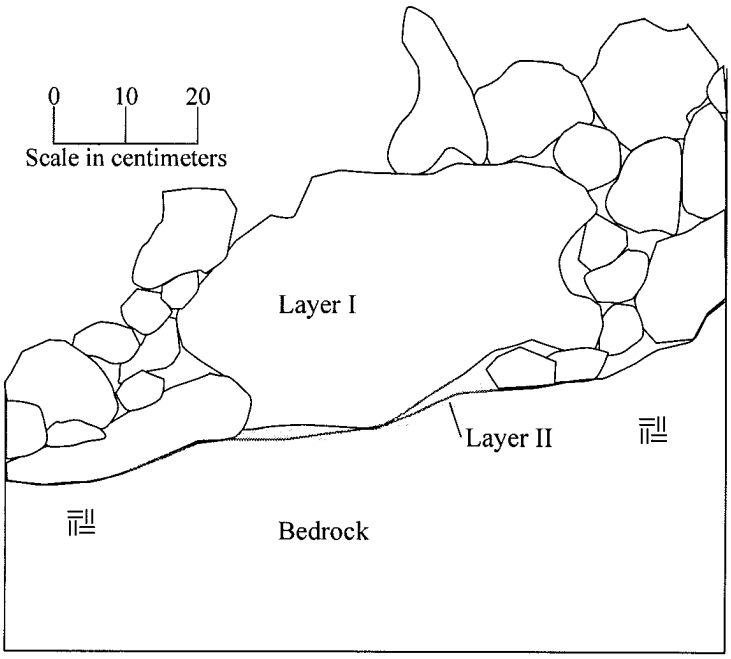
Feature 404 is an oval-shaped mound with loosely stacked edges located in the northwestern portion of the current project area (see Figure 20). This rather formal looking mound is constructed of small to large sized *pāhoehoe* cobbles resting partially on bedrock and partially on soil ground surface. It measures 3.8 meters long (east/west) by 3.2 meters wide (north/south) and stands up to 1.1 meters tall along its southern edge. The top surface of the mound is relatively level. A 1 x 1 meter test unit (TU-6) was excavated in the central portion of Feature 404 (Figure 23).

Excavation of TU-6 revealed a two-layer stratigraphic profile (see Figure 23). Layer I, the architectural layer, consisted of piled *pāhoehoe* cobbles and boulders. This layer extended beneath the surface of Feature 404 to a depth of 55 centimeters. Layer II consisted of approximately 25 centimeters of very dark brown (10YR 2/2) fine silt containing approximately 25% gravel and small cobbles that had collected in a crack in the bedrock beneath Layer I. No cultural material was recovered from the unit. Excavation of TU-6 terminated at bedrock at a maximum depth of 80 centimeters beneath the unit's surface (see Figure 23). Based on the formal attributes of this feature it is likely that it represents a clearing pile, however the presence of soil in the bedrock crack found in TU-6 makes it is possible that Feature 352 was also used as a planting feature.

Feature 330 view to southwest.



TU-9 north wall profile.

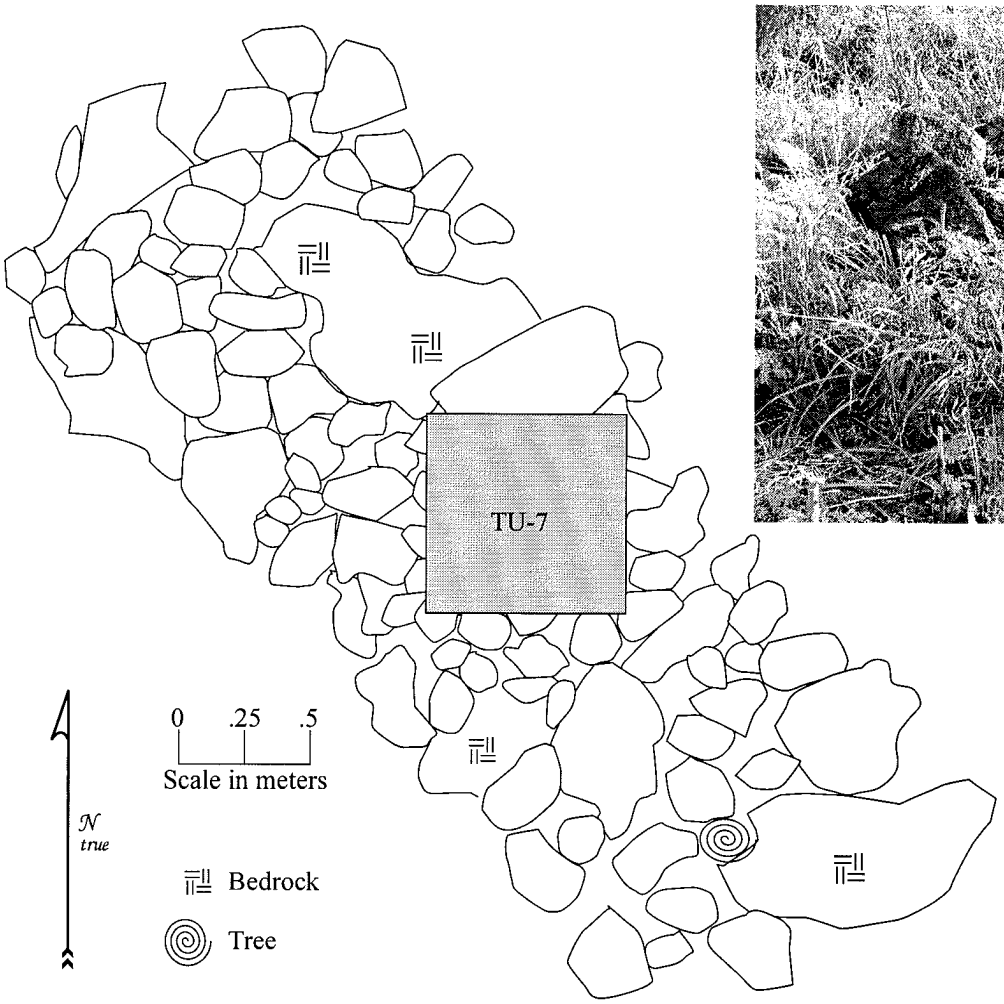


Layer I - Architectural layer consisting of piled *pāhoehoe* cobbles.

Layer II - Very dark brown (7.5YR 2.5/3) silt.

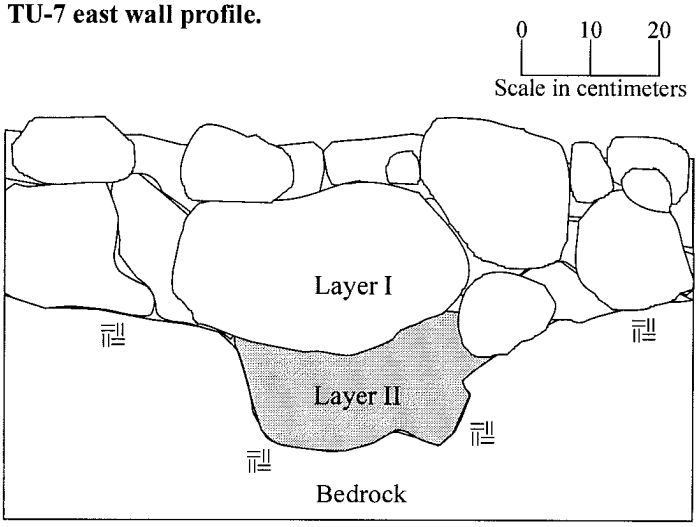
TU-9 base of excavation, overview to north.

Figure 21. SIHP Site 24272 Feature 330 plan view and TU-9 profile.



Feature 352 view to east.

TU-7 east wall profile.

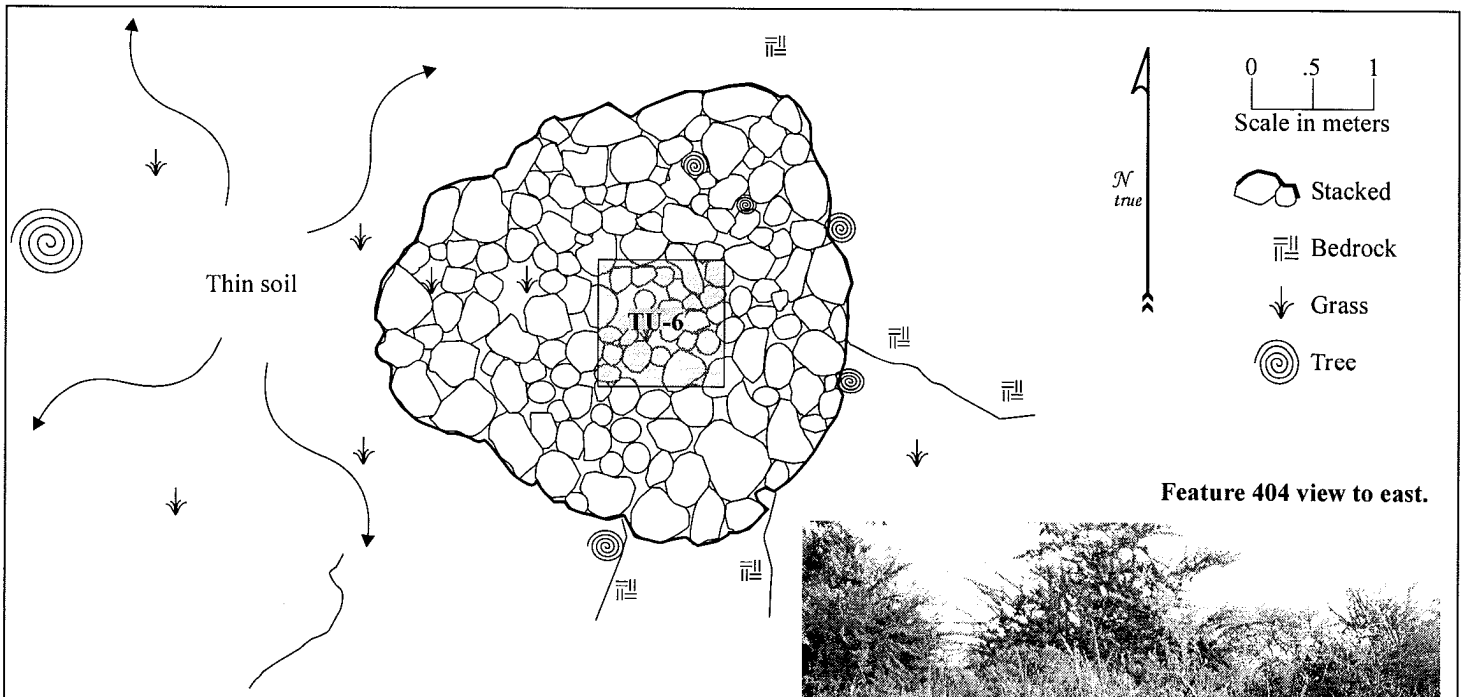


Layer I - Architectural layer consisting of *pāhoehoe* cobbles.

Layer II - Very dark brown (7.5YR 2/2) silt.

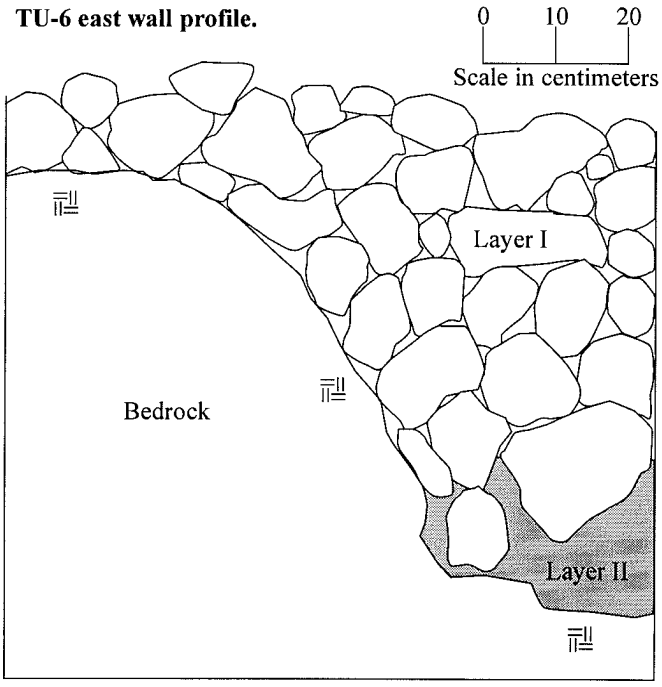
TU-7 base of excavation, overview to east.

Figure 22. SIHP Site 24272 Feature 352 plan view and TU-7 profile.



Feature 404 view to east.

TU-6 east wall profile.



TU-6 base of excavation, overview to east.

Layer I - Architectural layer consisting of piled *pāhoehoe* cobbles and boulders.

Layer II - Very dark brown (10YR 2/2) fine silt with 25% gravel and small cobbles.

Figure 23. SIHP Site 24272 Feature 404 plan view and TU-6 profile.

Feature 452

Feature 452 is a modified outcrop located in the central portion of the current project area near Site 24375 (see Figure 20). The feature is constructed of small to large sized *pāhoehoe* cobbles loosely stacked/piled against the western face of a bedrock outcrop. The feature is roughly rectangular with large cobbles and boulders that appear placed along its north, south, and west edges. The eastern edge is level with the bedrock outcrop and the top surface of the feature is relatively level. Including collapsed cobbles, Feature 452 measures 3.6 meters long (north/south) by 3.2 meters wide (east/west) and stands up to 1.3 centimeters tall along its down slope (western) edge. A bulldozed road cut runs to the south of Feature 452 and some pushed cobbles abut the southern edge of the feature. A 1 x 1 meter test unit (TU-3) was excavated in the central portion of Feature 452 (Figure 24).

Excavation of TU-3 revealed a two-layer stratigraphic profile (see Figure 24). Layer I, the architectural layer, consisted of 30 to 70 centimeters of piled *pāhoehoe* cobbles resting on bedrock. At the base of Layer I within a bedrock low spot approximately 20 centimeters of very dark brown (7.5YR 2.5/2) fine silt containing approximately 50% cobbles and gravel was present on bedrock (Layer II). No cultural material was recovered from the unit. Excavation of TU-3 terminated at bedrock at a maximum depth of 70 centimeters beneath the unit's surface (see Figure 24). Based on the formal attributes of Feature 452, it is likely that the modified outcrop represents a clearing pile; however, the presence of soil discovered during the excavation of TU-3 makes it is possible that this feature was also used as a planting feature. This feature, based on proximity, may be associated with the residential use of Site 24375.

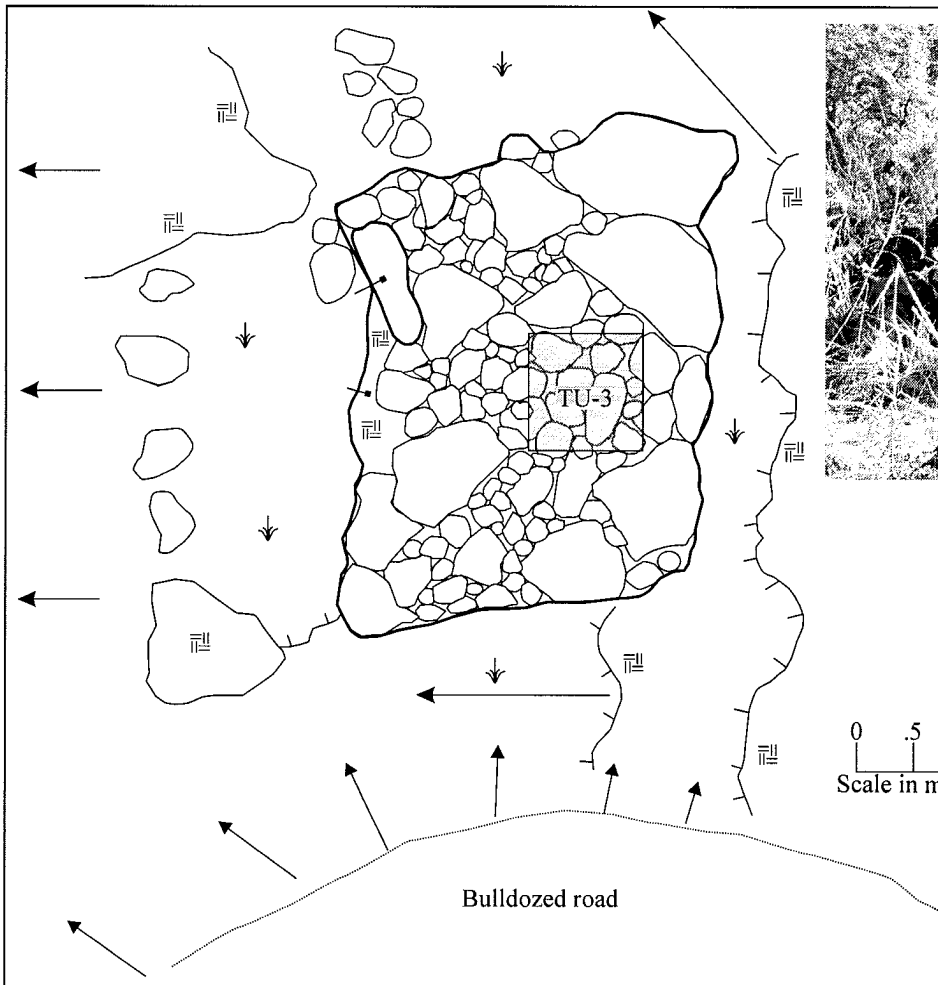
Feature 471

Feature 471 is a stacked terrace located in the west central portion of the project area (see Figure 20). The feature is located at the base of a steep slope along the northeastern edge of a small drainage channel. A similar feature (Feature 472) is located on the opposite (southwest) side of the drainage channel facing Feature 471 approximately four meters distant. Feature 471 is constructed with neatly stacked *pāhoehoe* cobbles along its western edge. The northern and southern edges exhibit some loose stacking that fades into the natural slope of the terrain while the eastern edge retains the slope. The surface of Feature 471 is fairly level. Overall, the terrace measures 3.1 meters long by 1.2 meters wide and stands up to 1.0 meter above ground surface along its western edge. A 1 x 1 meter test unit (TU-15) was excavated in the northern portion of Feature 471 (Figure 25).

Excavation of TU-15 revealed a two-layer stratigraphic profile (see Figure 25). Layer I, the architectural layer, consisted of jumbled *pāhoehoe* cobbles and boulders (only the western edge of the feature is stacked). At the location of the unit, this layer extended beneath the surface of the feature to a depth of 50 to 60 centimeters. Layer II was located directly beneath Layer I. It consisted of approximately 25 centimeters of very dark brown (10YR 2/2) fine silt containing approximately 60% gravel and small cobbles. No cultural material was recovered from the unit. Excavation of TU-6 terminated at bedrock at a maximum depth of 85 centimeters beneath the unit’s surface (see Figure 25). Based on the formal attributes of this feature it is likely that it was designed to retain soil on its up slope (eastern) side. This may have been for planting, but more likely it was to contain run off into the drainage area to the west of the feature, which contains a soil deposit and could have been used for planting. The possibility also exists that Feature 471 was stacked during Historic times and served a ranching related function.

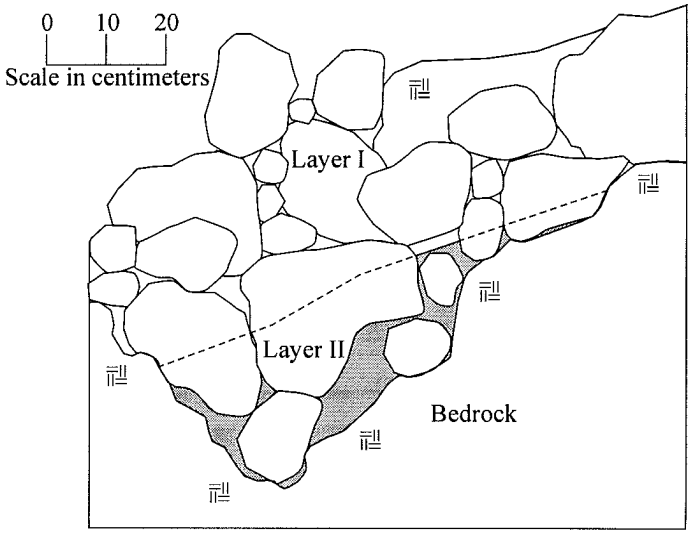
Feature 534

Feature 534 is a modified outcrop located in the south-central portion of the current project area to the south of Site 6350 (see Figure 20). The feature is constructed of small to large sized *pāhoehoe* cobbles at the top of a small hill with little or no soil in the surrounding area. It has neatly stacked southern, eastern, and western edges that abut a sloped bedrock outcrop to the north. The surface of Feature 534 is fairly level and exhibits some exposed bedrock near its northern termination at the bedrock outcrop. The feature measures 3.3 meters long (east/west) by 2.0 meters wide (north/south) and stands up to 90 centimeters above ground surface along its southern edge. This feature has a more formal appearance than nearly all the other features recorded at Site 24272. For this reason, and to eliminate the possibility of a burial being present within the feature, two 1 x 1 meter test units (TUs-11 and 16) were excavated in the surface of Feature 534 (Figure 26).



Feature 452 view to northeast.

TU-3 north wall profile.



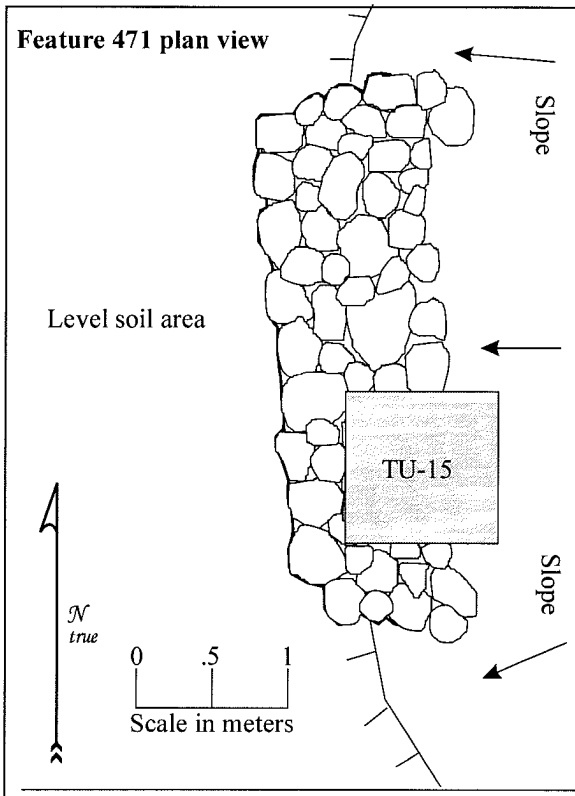
TU-3 base of excavation, overview to north.

Layer I - Architectural layer of piled *pāhoehoe* cobbles.

Layer II - Very dark brown (7.5YR 2.5/2) fine silt containing approximately 50% cobbles and gravel.

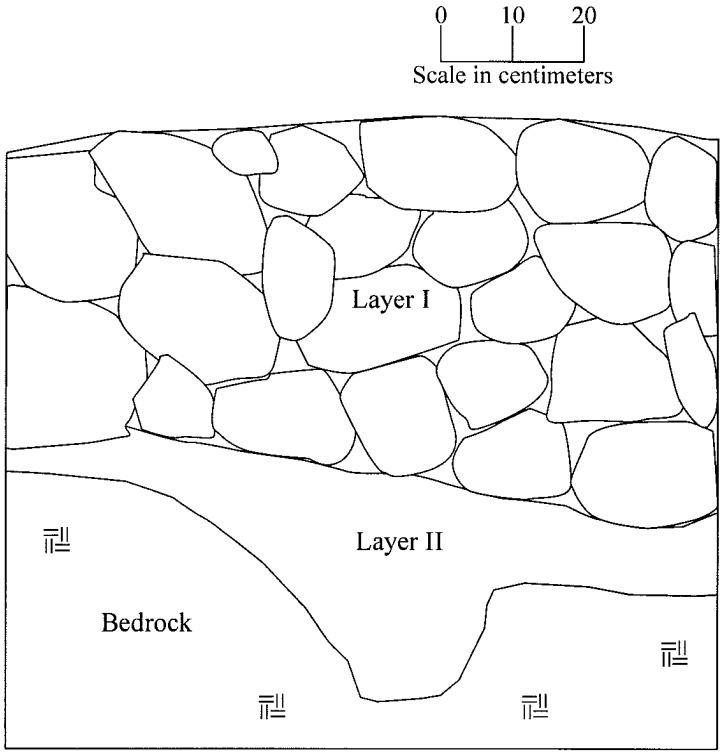
Figure 24. SIHP Site 24272 Feature 452 plan view and TU-3 profile.

Feature 471 plan view



Feature 471 view to north.

TU-15 south wall profile.



Layer I - Architectural layer consisting of *pāhoehoe* cobbles and boulders stacked at the western edge.

Layer II - Very dark brown (10YR 2/2) fine silt containing 60% gravel and small cobbles.

TU-15 base of excavation, overview to south.

Figure 25. SIHP Site 24272 Feature 471 plan view and TU-15 profile.

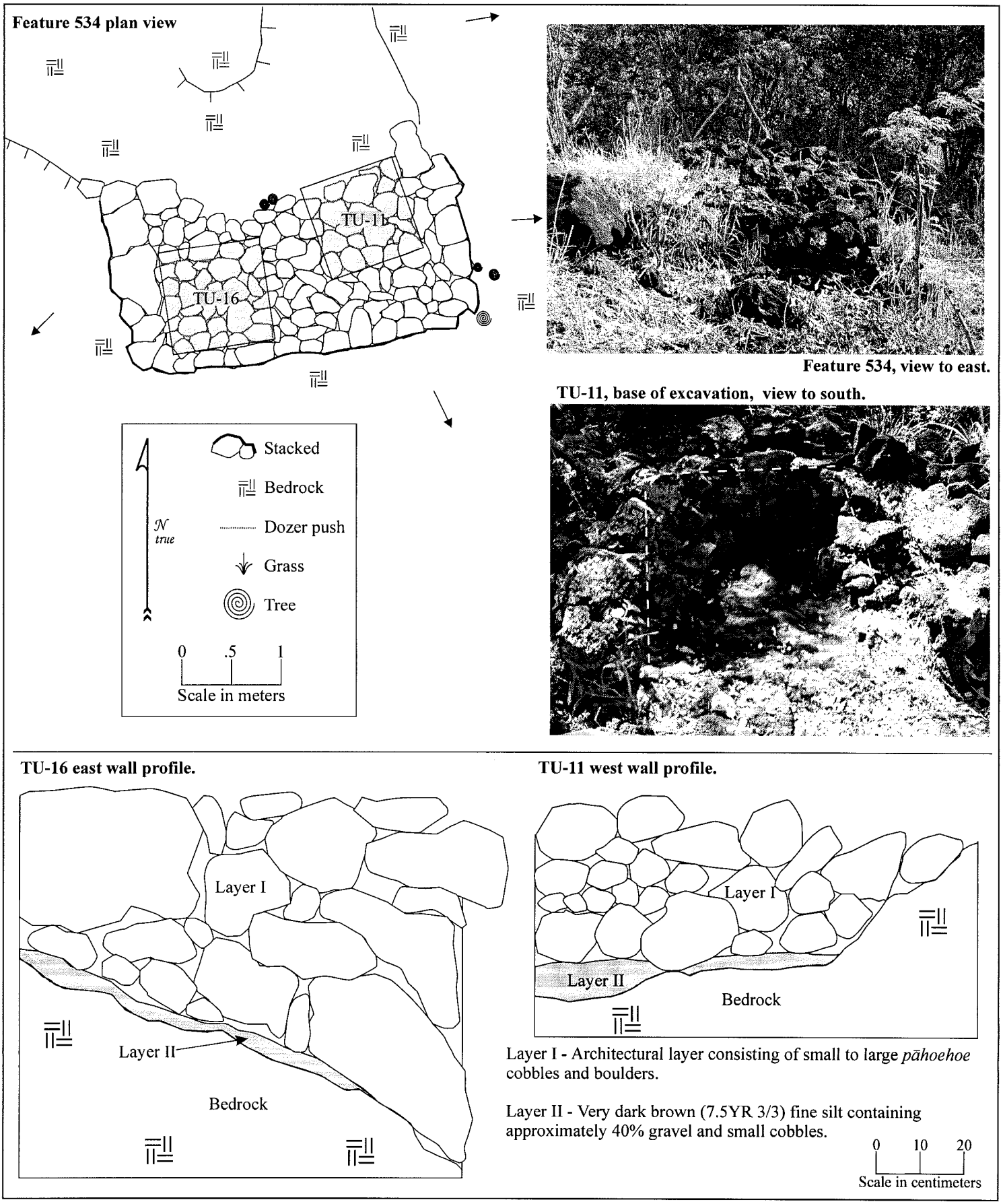


Figure 26. SIHP Site 24272 Feature 534 plan view and TU-11 and TU-16 profiles.

Excavation of TU-11 and TU-16 revealed similar two-layer stratigraphic profiles (see Figure 26). Layer I, the architectural layer, consisted of *pāhoehoe* cobbles and boulders resting on a bedrock outcrop that slopes downward to the south. Layer I extended beneath the feature's surface to a depth of 20 to 80 centimeters. Layer II consisted of 2 to 10 centimeters of dark brown (7.5YR 3/3) fine silt containing approximately 40% gravel and small cobbles that had collected on bedrock at the base of Layer I. No cultural material was recovered from TU-11, however TU-16 yielded a small volcanic flake. Excavation of TU-11 and TU-16 terminated at bedrock at a maximum depth of 20 to 80 centimeters beneath the unit's surface. Based on the formal attribute of Feature 534, its placement at the top of a small hill and lack of soil in the surrounding area, the presence of the volcanic glass flake found in TU-16, and its proximity to Site 6350 (a trail), it seems possible that this feature was used as an agricultural processing area. Conversely, based on the relative lack of subsurface findings and soil within the two test units, the feature could simply represent formal clearing feature.

SIHP Site 24375

Site 24375 is a Precontact habitation complex located in the central portion of the current project area (see Figure 6). The complex consists of five features that are located near the apex of a steep hill (Figure 27). The features of Site 24375 include a large, terraced enclosure (Feature A), a smaller attached enclosure (Feature B), a terrace (Feature C), a modified outcrop/remnant enclosure (Feature D), and an artificially leveled modified outcrop (Feature E). A bulldozed ranch road bisects the site, separating Features A and B from Features C, D, and E. Three test units were excavated at Site 24375; two at Feature A (TUs-1 and 10), and one at Feature C (TU-2) (see Figure 27). Cultural debris recovered from the test units supports the conclusion that Site 24375 was utilized for Precontact habitation purposes. Detailed feature and unit descriptions follow below.

Feature A

Feature A is a large enclosure that was likely used for Precontact habitation purposes. The enclosure is terraced into the slope of a fairly steep hill (see Figure 27). It is irregularly shaped, but has overall measurements of roughly fourteen meters by fourteen meters. The walls consist primarily of dry-stacked *pāhoehoe* cobbles, but they are collapsed in a few locations. The walls range in height from 1.0 to 1.7 meters and stand 0.7 to 1.5 meters wide. The eastern wall of the enclosure is constructed against a bedrock outcrop and there is a level cobble and soil terrace created to the east of that wall that could have been utilized as a living area. There is a constructed entryway into Feature A located in the northeastern corner of the enclosure (Figure 28). Two other breaks in the enclosure walls appear to have been caused by bovine traffic through the feature. The natural slope of the hillside and an exposed bedrock outcrop present in the center of Feature A creates a terrace that divides the enclosure into two levels. The lower (western) level has a possible living area of approximately 40 square meters, while the upper area has a possible living area of approximately 30 square meters (Figure 29). The interior of the enclosure consists primarily of thin soil covered by grass, with the aforementioned exposed bedrock present. Two 1 x 1 meter test units were excavated at Feature A; one in the soil of the upper terraced area (TU-1), and another in the cobble portion of the terraced eastern wall of the enclosure (TU-10) (see Figure 27).

Excavation of TU-1 revealed a 45-centimeter thick deposit of soil (Layer I) resting eroding bedrock (Layer II) (Figure 30). The upper portions of the unit consisted of charcoal rich, black (10YR 2/1) silt that contained decaying organic material, grass rootlets, and some larger cobbles, but almost no gravel (Layer I). Cultural material recovered from this layer included coral, a waterworn cobble, *kukui* nut, charcoal, and marine shell (Table 3). The charcoal observed in the upper portions of the unit appeared to be from a recent burn episode (several large trees observed at Site 24375 exhibited signs of having survived a fire) so was not collected. Layer I continued to a depth of approximately 30 centimeters beneath the unit's surface and then gradually transitioned to dark yellowish brown (10YR 3/4) silt containing approximately 50% gravels. This layer was excavated to a depth of 50 centimeters beneath the unit's surface, but was found to be culturally sterile, and the gravels were determined to be eroding bedrock. Excavation of TU-1 terminated at eroding bedrock 50 centimeters beneath the surface of the unit (see Figure 30).

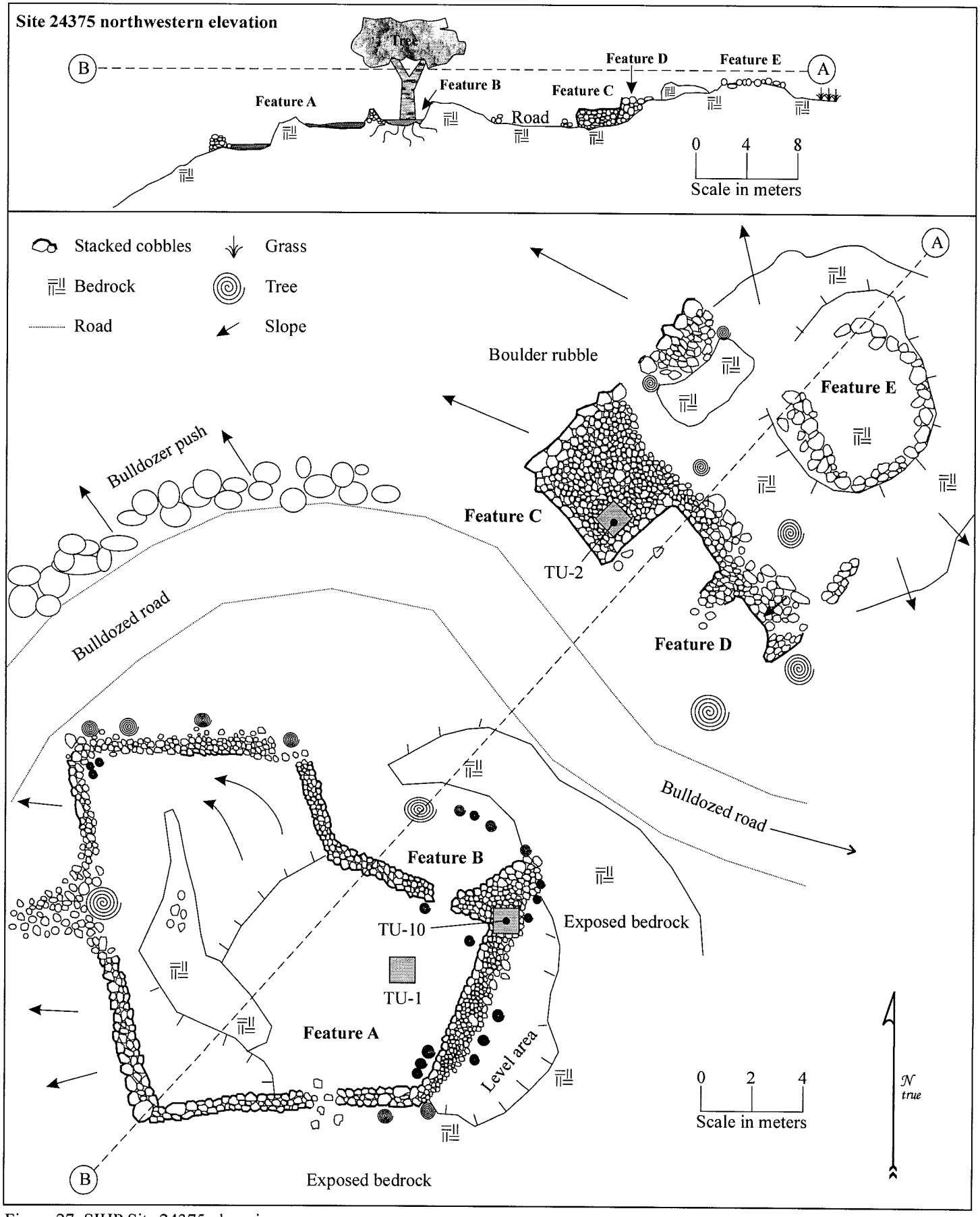
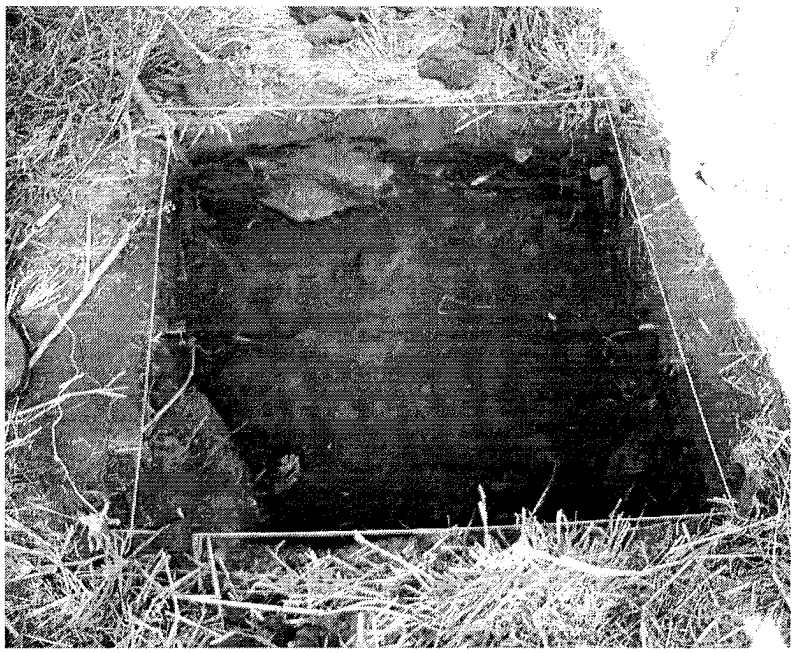


Figure 27. SIHP Site 24375 plan view.

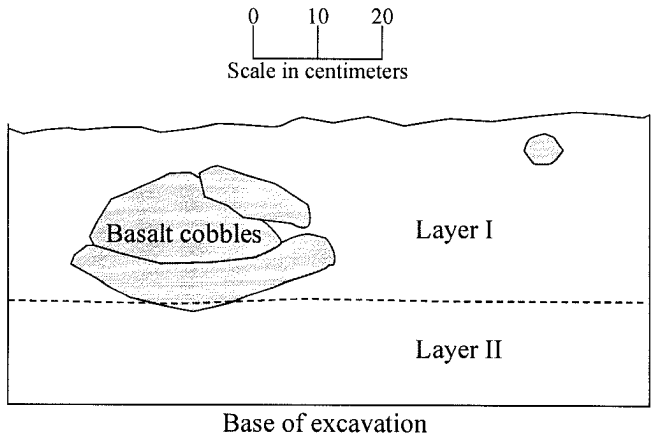
Figure 28. SIHP Site 24375 entrance to Feature A, view to southwest from Feature B.

Figure 29. SIHP Site 24375 Feature A, upper enclosure area, view to northeast.

TU-1, base of excavation, overview to north.



TU-1 north wall profile.



Layer I - Black (10YR 2/1) silt mixed with decaying organic material, grass rootlets and large cobbles.

Layer II - Dark yellowish brown (10YR 3/4) eroding bedrock

TU-10 overview to west.

Layer I - Architectural layer consisting of piled small to large sized *pāhoehoe* cobbles with a few boulders.

Layer II - Very dark brown (10YR 2/2) fine silt with approximately 10% small cobbles and gravel with tree roots.

TU-10 north wall profile.

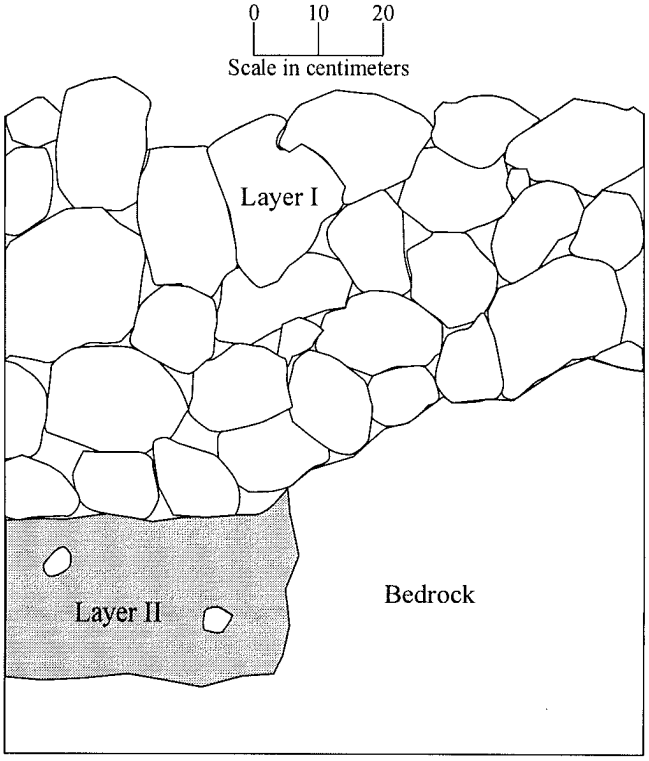


Figure 30. SIHP Site 24375 Feature A, TU-1 and TU-10 profile.

Table 3. Cultural material recovered from SIHP Site 24375 Feature A.

ACC#	*TU #*	*Layer*	*Material*	*Species/type*	*Count*	*MNI*	*Weight (g)*
1	1	I	Coral	Waterworn	1	-	1.5
2	1	I	Marine shell	*Drupa*	1	1	2.2
19	10	II	Cobble	Waterworn	1	-	49.6
20	10	II	Cobble	Waterworn	1	-	39.0
21	10	II	Volcanic glass	Flake	1	-	.03
22	10	II	Volcanic glass	Flake	1	-	1.3

Excavation of TU-10 revealed a two-layer stratigraphic profile resting on bedrock (see Figure 30). Layer I, the architectural layer, consisted of piled small to large sized *pāhoehoe* cobbles with a few boulders present. No cultural material was observed within this layer. Layer I terminated partially at bedrock and partially at Layer II approximately 67 centimeters beneath the surface of the unit. Layer II was collected in bedrock low spots beneath Layer I. It consisted of very dark brown (10YR 2/2) fine silt with approximately 10% small cobbles and gravel included in its matrix and tree roots present near its base at bedrock. Cultural material recovered from Layer II included a waterworn cobble and two volcanic glass flakes. Layer II continued to a maximum depth of 25 centimeters beneath Layer I. Excavation of TU-10 terminated at bedrock 45 to 90 centimeters beneath the surface of the unit (see Figure 30).

Feature B

Feature B is a roughly oval-shaped enclosure located adjacent to the northeastern corner of Feature A (see Figure 27). The enclosure utilizes a natural bedrock outcrop as its eastern wall and the walls of Feature A as its southern and western walls. Overall, Feature B measures approximately eight meters by four meters. Feature B was likely accessed from the north where no wall is present, and Feature A was likely accessed through Feature B's southwest corner. Feature B is not constructed in the sense that Feature A is constructed, but the interior of the enclosure consists of soil that was likely artificially leveled or at least cleared of cobbles, and the feature would almost certainly have been utilized for some particular purpose within the larger habitation site. A single volcanic glass flake was observed on ground surface within Feature B along the exterior edge of Feature A's eastern wall (see Figure 27). Currently, a large *kiawe* is growing out of the center of Feature B.

Feature C

Feature C is a terrace located approximately ten meters north of Feature B on the opposite side of the bulldozed road that bisects Site 24375 (see Figure 27). Feature C is constructed along the *makai* edge of a raised bedrock outcrop adjacent to Feature D and below Feature E. Overall, Feature C measures approximately four meters by five meters. The terrace has loosely stacked cobble edges to the north, south, and west and it abuts the natural bedrock outcrop to the east (Figure 31). The stacked edges stand up to 90 centimeters above the surrounding ground surface, and the bedrock outcrop slopes gently up to Feature E. The level surface of Feature C is paved with small to large sized cobbles (Figure 32). Feature D forms a continuous junction with Feature C and runs southwest from it southeastern corner. Features C and D may have formed a singular feature that could have supported a roofed structure, prior to the bulldozing in the vicinity of Site 24375. A single 1 x 1 meter unit (TU-2) was excavated in the southwestern corner of Feature C (see Figure 27).

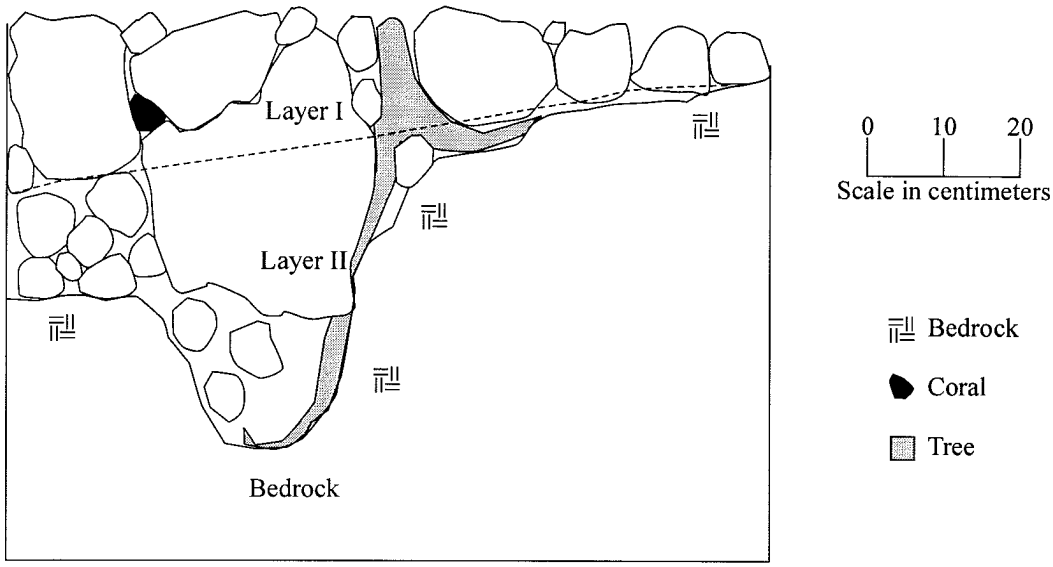
Excavation of TU-2 revealed a two-layer stratigraphic profile resting on bedrock (Figure 33). Layer I, the architectural layer, consisted of small to large sized *pāhoehoe* cobbles that appeared placed in order to form the level top surface of Feature C. Layer I was present from the surface of the unit to bedrock at a depth of 10 to 55 centimeters below surface. Several large waterworn coral fragments and a small waterworn cobble were recovered from Layer I. Layer II consisted of very dark brown (7.5YR 2.5/2) fine silt that had collected near the base of Layer II within bedrock low spots. This layer ranged from 5 to 35 centimeters thick. Cultural material recovered from Layer II included several more small fragments of coral. Excavation of TU-2 terminated at bedrock 10 to 55 centimeters below the unit's surface (see Figure 33).

Figure 31. SIHP Site 24375 Feature C, view to northeast.

Figure 32. SIHP Site 24375 Feature C, view to northwest.

TU-2, base of excavation, view to northwest.

TU-2 northwest wall profile.



Layer I - Architectural layer consisting of small to large sized *pāhoehoe* cobbles.

Layer II - Very dark brown (7.5YR 2.5/2) fine silt collected at the base of Layer I within bedrock low spots.

Figure 33. SIHP Site 24375 Feature C, TU-2 profile and photograph.

Feature D

Feature D is an enclosure remnant/modified outcrop located adjacent to Feature C along the base of the same bedrock outcrop (see Figure 27). Feature D forms a continuous junction with the southeastern corner of Feature C and runs southwest from that feature for approximately seven meters. Feature D is constructed with loosely stacked cobbles along its *makai* edge that form a vertical face standing up to 1.2 meters above ground surface to the west (Figure 34). The bedrock outcrop supports the eastern side of Feature D and it slopes steeply upwards toward Feature E beyond the feature. Two small wall segments protrude from Feature D towards Features A and B. Both segments are roughly three meters long and end in collapse at bulldozer rubble; these segments may have continued further to the west (southwest) forming an enclosure prior to the bulldozing that occurred at Site 24375. At one time, Features D and C may have formed a singular feature that could have supported a roofed structure.

Feature E

Feature E consists of the modified top of the bedrock outcrop that also contains Features C and D (see Figure 27). Feature E is located at the highest point at Site 24375. Feature E does not contain any obvious architectural traits, but an area measuring roughly five meters by five meters at the top of the outcrop has been artificially leveled. The surface of the feature consists primarily of exposed bedrock with some vegetation growing. Shallow low spots in the bedrock have been loosely filled with cobbles and other cobbles have been cleared to the edges to form a roughly level area. The bedrock outcrop slopes downward from Feature E in all directions. Feature E could have been utilized for habitation purposes, perhaps as a work area, or possibly as a lookout. Feature E has a commanding view of the ocean and receives more of a breeze than the other features at Site 24375.

Figure 34. SIHP Site 24375 Feature D, view to northeast.

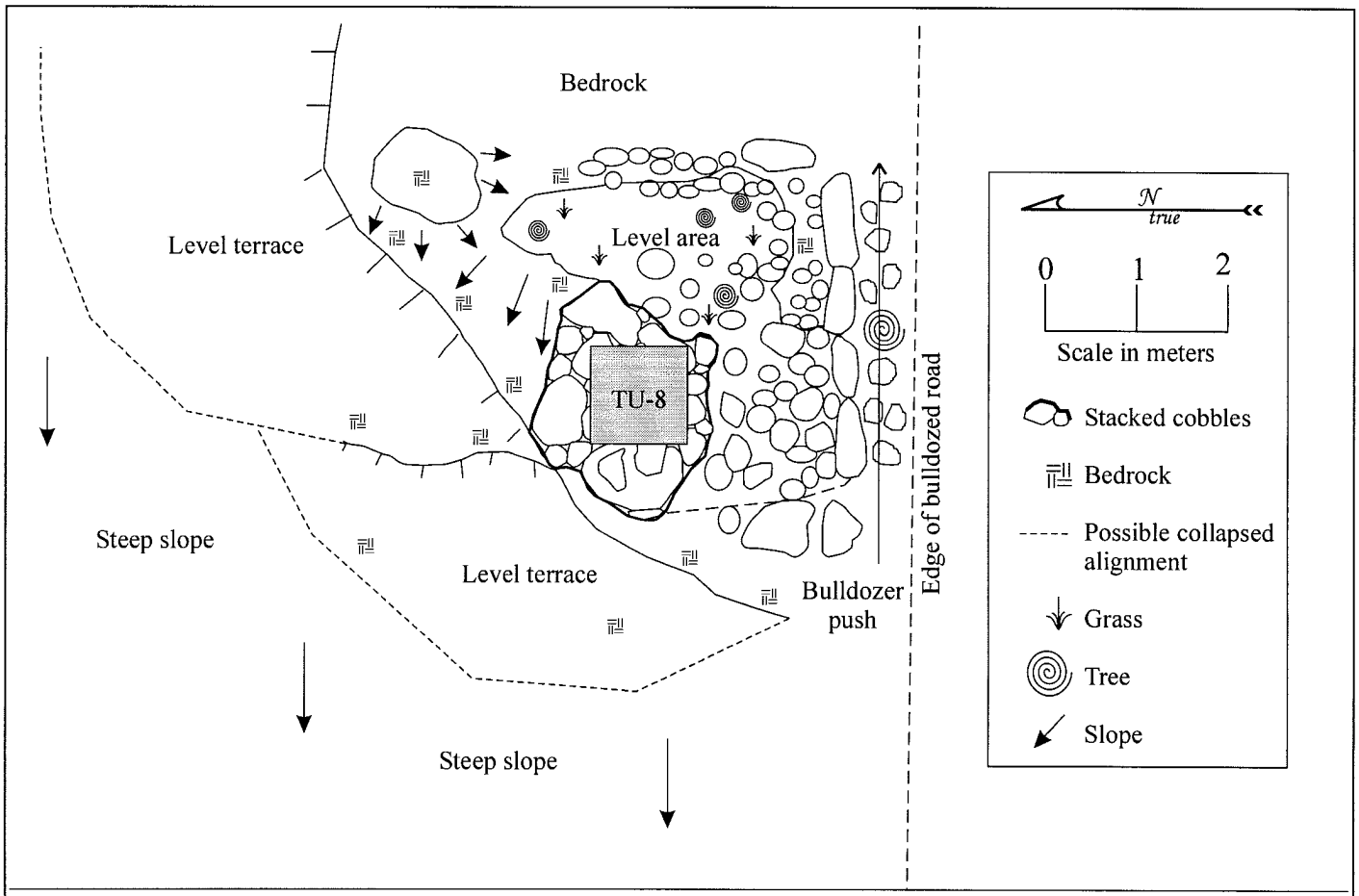
SIHP Site 24376

Site 24376 is a Historic ranch wall that runs roughly north/south between Sites 6381 and 24271 (see Figure 6). The wall measures approximately ninety-five meters long in its entirety, but only a seventy-meter section of the wall at its northern end is included in the current project area. The wall is largely discontinuous within the boundaries of the current project area, as a bulldozer has breached it in three separate locations where rough roads run *makai*. The area *mauka* of Site 24376, stretching to Site 4591, has been completely grubbed and grated and is currently developed with a small shed and a concrete slab. The most intact sections of Site 24376 stand up to 1.3 meters tall along the western edge and 0.8 meters tall along the eastern edge by 0.8 meters wide (Figure 35). Site 24376 was likely constructed during the middle to late 19th or early 20th century for cattle control purposes, but it no longer continues to serve that function.

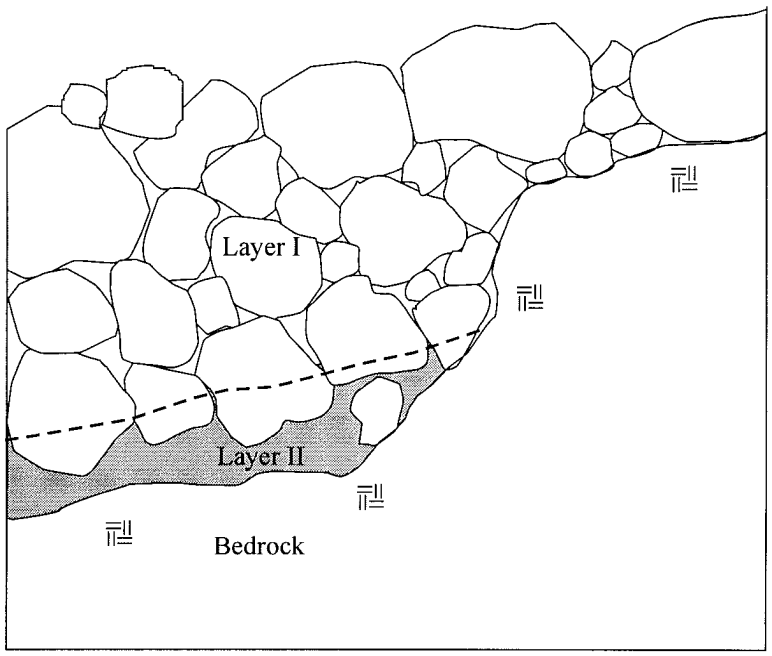
Figure 35. SIHP Site 24376, view to north.

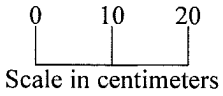
SIHP Site 24377

Site 24377 is a habitation terrace remnant located on an exposed bedrock outcrop near the top of a steep hill in the eastern portion of the current study area (see Figure 6). A bulldozed road running *makai* through the central portion of Site 24376 has bisected the bedrock outcrop and nearly destroyed the entire site. All that remains of Site 24377 is an L-shaped terrace that utilizes natural bedrock with some cobble modification to create a roughly level living area against the northwestern edge of the outcrop, and an artificially leveled area on top of the outcrop (Figure 36). The L-shaped terrace runs north from the edge of the bulldozed road for approximately seven meters and then turns northeast following the contours of the bedrock outcrop and continues for an additional five meters. The terrace measures approximately two meters wide along most of its length. Bedrock along the western and northern edges of the terrace rises up to one meter above ground surface and has scattered cobbles and boulders piled against it. The surface of the terrace, although rough with exposed bedrock, has been artificially leveled with cobbles and some soil is present.



TU-8 north wall profile.





Layer I - Architectural layer consisting of small to large *pāhoehoe* cobbles and boulders.

Layer II - Very dark brown (10YR 2/2) fine silt containing approximately 25% gravel.

Figure 36. SIHP Site 24377 plan view and TU-8 profile.

Along the southeastern edge of the terrace exposed bedrock rises a sloped 1.2 meters to the top of the outcrop and an artificially leveled area (Figure 37). The leveled area measures approximately 3.0 meters (north/south) by 4.5 meters (east/west). The western and northern edges of this area consist of roughly stacked cobbles raised approximately 80 centimeters above the exposed bedrock slope; the eastern edge is level with the top of the outcrop, and the southern edge disappears into bulldozer push material. The central portion of level area is roughly paved with small cobbles and contains a thin soil deposit. There is an excellent view of the coast from Site 24377 (Figure 38). A 1 x 1 meter test unit (TU-8) was excavated in the northwestern corner of the leveled area.

Excavation of TU-8 revealed a two-layer stratigraphic profile (see Figure 36). Layer I, the architectural layer, consisted of small to large sized *pāhoehoe* cobbles and boulders resting partially on bedrock and partially on Layer II. Layer II consisted of very dark brown (10YR 2/2) fine silt containing approximately 25% gravel collected on bedrock at the base of Layer I. Layer II was confined primarily to the western (down slope) half of TU-8. Where present Layer II measured approximately 10 centimeters thick, except in a bedrock low spot in the southeastern quadrant of the unit where it was up to forty centimeters thick. Cultural debris recovered Layer II included marine shell, *kukui*, and urchin (Table 4). Excavation of TU-8 terminated at bedrock 20 to 80 centimeters below the surface of the unit (Figure 39).

Table 4. Cultural material recovered from SIHP Site 24377, TU-8.

ACC#	*Layer*	*Material*	*Species/type*	*Count*	*MNI*	*Weight (g)*
14	II	Organic	*Kukui*	7	-	4.0
15	II	*Echinoderm*	*Echinoidea*	2	1	0.3
16	II	Marine shell	Unknown	3	1	1.2
17	II	Marine shell	*Cypraea*	4	2	8.6
18	II	Marine shell	*Conus*	3	1	20

Figure 37. SIHP Site 24377, artificially leveled area, view to southeast.

Figure 38. View to southwest from Site 24377 (note bulldozed road in foreground).

Figure 39. SIHP Site 24377, TU-8 base of excavation, overview to north.

SIHP Site 24378

Site 24378 is a Precontact habitation complex located in the north-central portion of the current project area to the north of Site 24375 (see Figure 6). The complex consists of eleven features that are constructed on and around a steeply sloped hill with an eroding bedrock outcrop near its apex (Figure 40). The features of Site 24378 include five terraces (Features A, E, F, H, and I), the modified top surface of the eroding bedrock outcrop (Feature B), two planting areas/modified depressions with stacked edges that have been cleared out of the eroding bedrock slope (Features C and D), a possible shrine within a bedrock depression that contains coral and waterworn cobbles (Feature G), and two cobble alignments that form a rough enclosure along the northern edge of the bedrock outcrop on level ground surface (Features J and K). One of the planting areas/modified depressions (Feature D) contained pineapples growing within it at the time of the current survey. Also, several waterworn stones and coral fragments were noted at Site 24378 in various locations. Two test units were excavated at Site 24378; one at Feature A (TU-4), and one at Feature F (TU-5) (see Figure 40). Cultural debris recovered from the test units supports the conclusion that Site 24378 was utilized for Precontact habitation purposes. Detailed feature and unit descriptions follow below.

Feature A

Feature A is a terrace located at the eastern extent of Site 24378 (see Figure 40). The terrace is positioned against the northeastern edge of the eroding bedrock outcrop at the apex of the large hill. The outcrop rises to feature B beyond the western edge of Feature A. Ground surface to the east of the feature is fairly level and consists of thin soil. Feature A is roughly square, measuring 3.2 meters by 3.2 meters with a maximum height of 85 centimeters along its eastern edge. The north, south, and east edges are constructed of loosely stacked *pāhoehoe* cobbles that they have collapsed in a few locations (Figure 41). The surface of the feature has is level and roughly paved with small to large sized cobbles that appear loosely placed. A 1 x 1 meter test unit (TU-4) was excavated in the central portion of Feature A (see Figure 40).

Excavation of TU-4 revealed a two-layer stratigraphic profile (Figure 42). Layer I, the architectural layer, consisted of small to large sized cobbles and a few boulders piled/placed on bedrock. Upon removing the upper 15 centimeters of Layer I, however, an open, vaulted area was discovered within Feature A (see Figure 42). The vaulted area measured 90 centimeters long (north/south) by 53 centimeters wide (east/west) by approximately 40 centimeters deep. Its edges were defined partially by bedrock and partially by large slabs with smaller slabs and the removed cobbles covering it. This vault appeared to be an incidental construction (a result of the raised bedrock and a natural crack) rather than an intentional construction. The floor of the vaulted area contained soil (Layer II). With the exception of this soil, the remainder of TU-4 terminated at bedrock beneath Layer I, 20 to 40 centimeters beneath the surface of the unit. No cultural material was observed within the architectural layer. Layer II, the soil contained within the vaulted area, was removed in arbitrary 10-centimer levels. Layer II consisted of a 40-centimeter thick deposit of very dark grayish brown (10YR 3/2) silt containing 20% gravel that was present in a bedrock crack beneath the vaulted area. Two marine shell fragments (*Drupa*; 6.4 grams) and a volcanic glass flake were recovered from the upper ten centimeters of Layer II within the bedrock crack. No further cultural material was observed below ten centimeters in Layer II. Excavation of TU-4 terminated at bedrock at the base of the crack at a maximum depth of 85 centimeters below the surface of Feature A (see Figure 42).

Feature B

Feature B consists of the modified top of the eroding bedrock outcrop located at the apex of Site 24378 (see Figure 40). Feature B is located at the highest point at Site 24378 and offers the best view from the site. Feature B does not contain any obvious architectural traits, but an area measuring roughly four meters by four meters at the top of the outcrop has been artificially leveled. The leveling is minimal and fills in the cracks in the bedrock. The surface of the feature consists primarily of exposed bedrock with some vegetation growing. Shallow low spots in the bedrock have been loosely filled with cobbles and other cobbles have been cleared to the edges to form a roughly level area. The bedrock outcrop slopes downward from Feature B in all directions. Feature B could have been utilized for habitation purposes, perhaps as a work area, or possibly as a lookout.

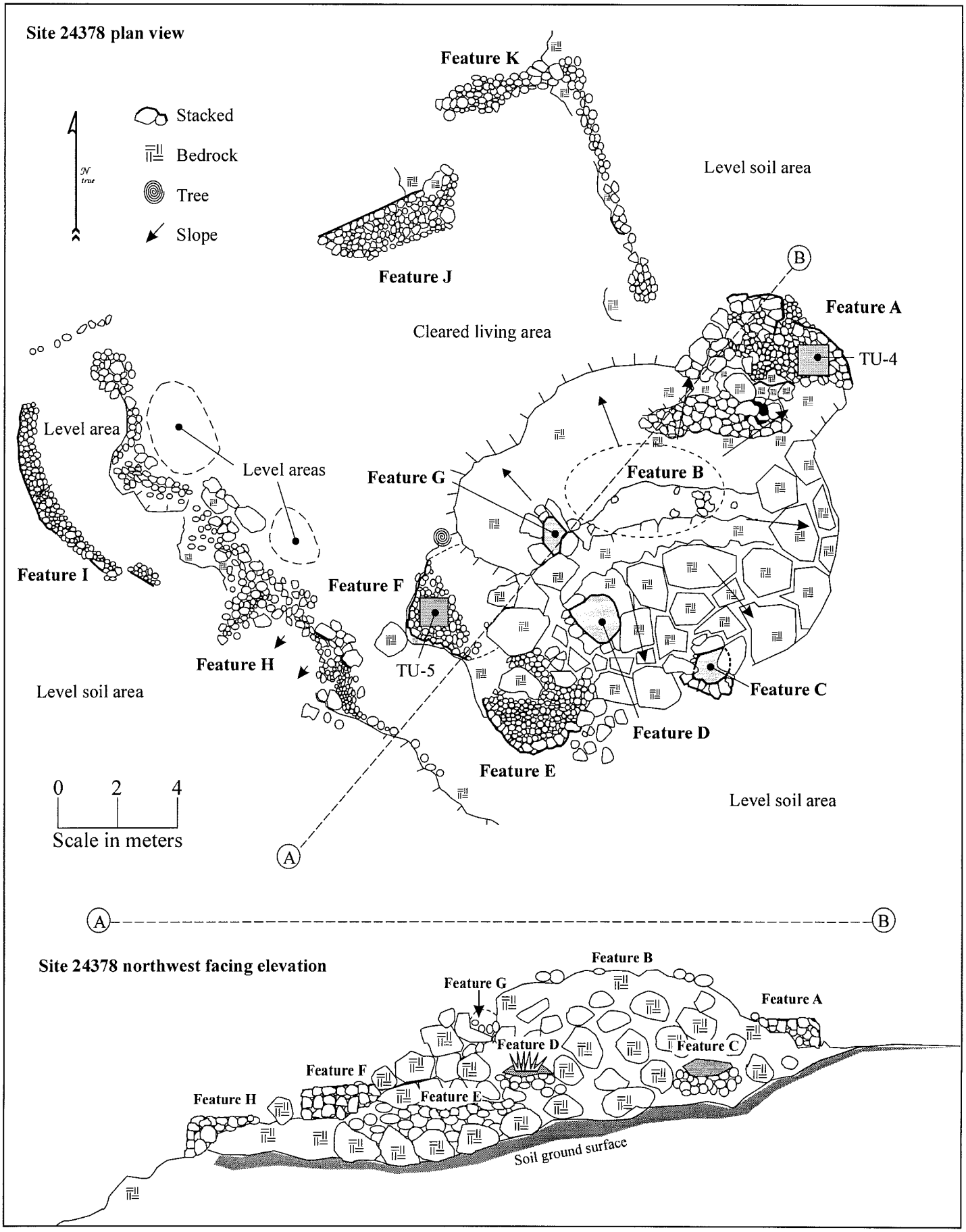


Figure 40. SIHP Site 24378 plan view.

Figure 41. SIHP Site 24378 Feature A, view to west.

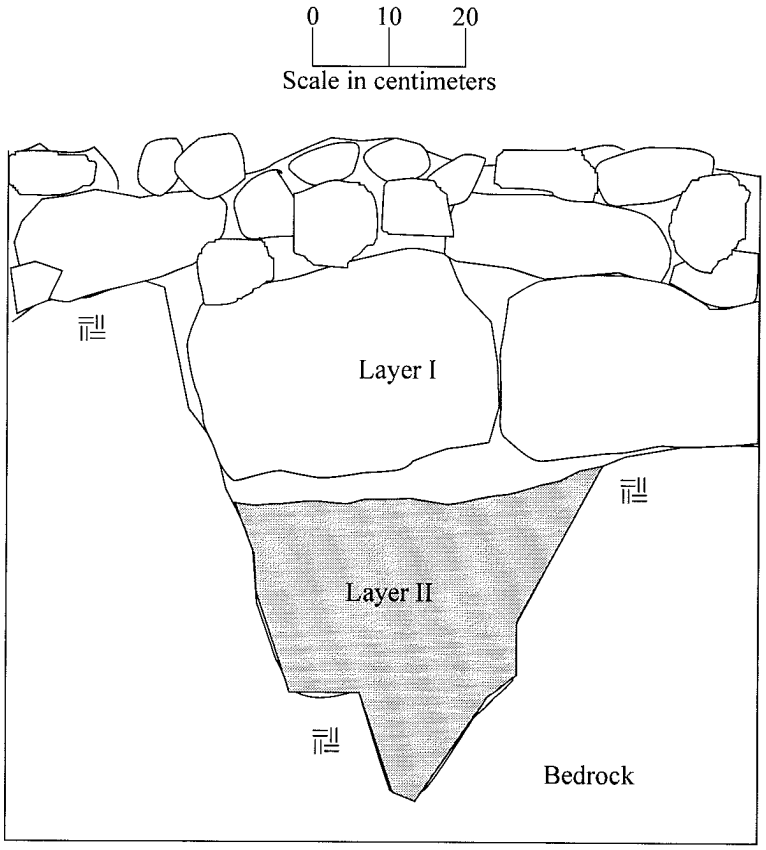
Feature C

Feature C is a planting area/modified depression located along the southern edge of the eroding bedrock outcrop at Site 24378 (see Figure 40). Feature C consists of a roughly circular area has been cleared out of the cobble and boulder rubble of the eroding bedrock outcrop (Figure 43). It is constructed with stacked cobbles along its southern edge that form a vertical face standing up to 85 centimeters above ground surface along its exterior. The interior of Feature C measures roughly 1.3 meters (east/west) by 1.1 meters (north/south) and has a depth in the center of 1.7 meters (Figure 44). The bedrock outcrop, which consists of large boulders in this area, creates the vertical northern face of Feature C. The floor of the modified depression consists of soil. Feature C, based on its formal attributes and the presence of pineapple growing at Feature D (a similar feature located to the west of Feature C; see below), likely functioned as a planting area.

Feature D

Feature D is a modified depression/planting area located along the southern edge of the eroding bedrock outcrop at Site 24378, approximately three meters northwest of Feature C (see Figure 40). Feature D, like Feature C, consists of a roughly circular area has been cleared out of the cobble and boulder rubble of the eroding bedrock outcrop (Figure 45). It is constructed with stacked cobbles along its southern edge that form a vertical face standing up to 90 centimeters above ground surface along its interior. Overall, Feature D measures roughly 1.8 meters (east/west) by 1.7 meters (north/south) and has a depth along the interior northern edge of 1.8 meters. The bedrock outcrop and one large boulder create the vertical northern and eastern edges of Feature D. The floor of the modified depression consists of soil with pineapple growing out of it. The pineapple appears to be an older variety that was introduced to Hawai‘i Island as early as 1813 (Figure 46). The pineapple likely survived at its current location solely because of the protection offered by Feature D. Feature D, based on its formal attributes and the presence of pineapple growing within it, likely functioned as a planting area that appears to have been utilized into Historic times.

TU-4 west wall profile



TU-4, base of excavation, view to west

Layer I - Architectural layer of piled/placed small to large sized cobbles and a few boulders on bedrock.

Layer II - Very dark grayish brown (10YR 3/2) silt containing 20% gravel.

Overview of vaulted area within Layer I of TU-4

Figure 42. SIHP Site 24378 Feature A, TU-4 profile.

Figure 43. SIHP Site 24378 Feature C, exterior view to northwest.

Figure 44. SIHP Site 24378 Feature C, interior overview to east.

Figure 45. SIHP Site 24378 Feature D, view to north.

Figure 46. SIHP Site 24378 Feature D, close-up of pineapples, overview to south.

Feature E

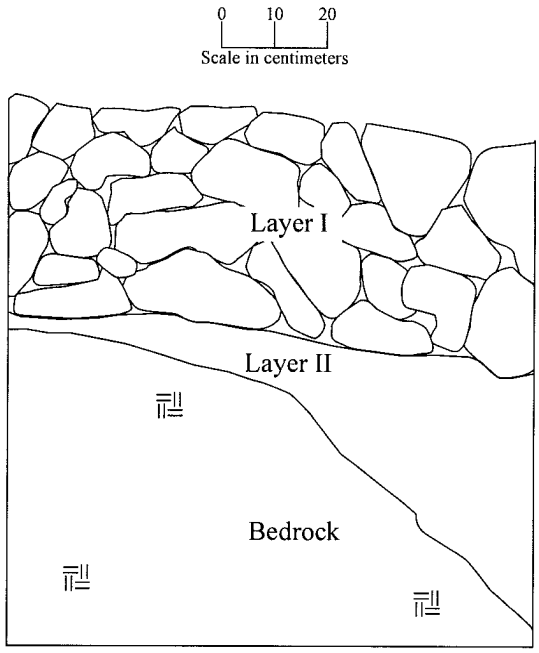
Feature E is a terrace located immediately to the southwest of Feature D (see Figure 40). Feature E is constructed with stacked cobbles (two to five courses high) along its southern edge (Figure 47). These stacked cobbles retain an artificially leveled area to the north on the eroding bedrock outcrop at Site 24378 against Feature D. Overall, the surface of the terrace measures roughly three meters by three meters and stands up to 1.2 meters high along it southwestern edge. Feature E, based on its formal attributes, likely functioned as habitation area or served some specialized function at the larger habitation/agricultural site (perhaps as a processing area or work area). The construction of Feature E may be related to the use of Feature D as a planting area.

Figure 47. SIHP Site 24378 Feature E, view to north.

Feature F

Feature F is a terrace located along the western edge of the eroding bedrock outcrop at Site 24378 (see Figure 40). The terrace is located below Feature E approximately two meters to the north. Overall, Feature F measures approximately 3.2 meters (north/south) by 2.6 meters (east/west). The terrace has stacked cobble edges to the south and west, and it abuts the natural bedrock outcrop to the east (Figure 48). The stacked edges stand up to 1.4 meters above the ground surface to the west; a vertical bedrock face marks the eastern edge of the feature. Feature F has a level surface that is paved with small to large sized cobbles and covered by thin soil. A 1 x 1 meter test unit (TU-5) was excavated in the west-central portion of Feature F (see Figure 40).

TU-5 East wall profile



TU-5, base of excavation, view to east

Layer I - Architectural layer consisting of piled small to large sized *pāhoehoe* cobbles.

Layer II - Very dark brown (7.5YR 2.5/2) fine silt collected on bedrock at the base of Layer I.

SIHP Site 24378, Feature F, view to north.

Figure 48. SIHP Site 24378 Feature F, TU-5 profile.

Excavation of TU-5 revealed a two-layer stratigraphic profile resting on bedrock (see Figure 48). Layer I, the architectural layer, consisted of small to large sized *pāhoehoe* cobbles piled on bedrock, filling the area behind the stacked western edge of Feature F. Layer I was present from the surface of the unit to bedrock at a depth of 45 to 90 centimeters below surface. Layer II consisted of 5 to 45 centimeters of very dark brown (7.5YR 2.5/2) fine silt that had collected on bedrock at the base of Layer I. Cultural material recovered from Layer II included marine shell, urchin, coral, a waterworn cobble and a fine-grained basalt tool fragment (see Table 5). Excavation of TU-5 terminated at bedrock 450 to 90 centimeters below the unit's surface (see Figure 48).

Table 5. Cultural material recovered from SIHP Site 24378, Feature F, TU-5.

ACC#	*Layer*	*Material*	*Species/type*	*Count*	*MNI*	*Weight (g)*
8	II	Basalt	Tool fragment	1	-	1.5
9	II	Marine shell	*Cellana*	1	1	1.1
10	II	Basalt	Waterworn cobble	1	1	144.2
11	II	Marine shell	*Cypraea*	6	2	23.2
12	II	Coral	Waterworn	3	-	11.7

Feature G

Feature G is a small, unmodified bedrock depression located above Feature F, roughly two meters to the east (see Figure 40). The bedrock depression measures approximately one meter by one meter and has a depth of 0.8 meters along its western interior edge and 1.2 meters along its interior eastern edge (Figure 49). The base of the depression contains loose small cobbles. Several coral fragments and a waterworn cobble were observed within the feature. Based on the presence of the coral and waterworn cobble, Feature G is interpreted as a possible shrine.

Figure 49. SIHP Site 24378 Feature G, overview to northwest.

Feature H

Feature H is a terrace located approximately two meters southwest of, and down slope from, Feature F (see Figure 40). Feature H follows a natural bedrock contour north/south across the steep slope in the western portion of Site 24378. Overall, the terrace measures approximately twenty meters long by two to three meters wide. The terrace has a loosely stacked western edge that stands up to 1.5 meters tall, but has collapsed in several sections (Figure 50). To the east of the loosely stacked edge the ground surface consists of cobbles, soil, and bedrock that has been artificially leveled. This leveled area could have been used as a living area or a planting area in several locations. A large waterworn cobble was discovered in the southwestern portion of the terrace's western wall.

Figure 50. SIHP Site 24378 Feature H, view to east.

Feature I

Feature I is a terrace located approximately two meters west of, and down slope from, Feature H near its southern extent (see Figure 40). Feature I follows a natural bedrock contour north/south across the steep slope in the western portion of Site 24378 below Feature H. Overall, the terrace measures approximately 7.5 meters long by as much as two meters wide. The terrace has a loosely stacked western edge that stands 0.8 to 1.5 meters tall, but has collapsed in several sections (Figure 51). To the east of the loosely stacked edge the ground surface consists of cobbles, soil, and bedrock that has been artificially leveled. Like Feature H, this leveled area could have been used as a living area or a planting area.

Feature J

Feature J is a rough cobble alignment located on a bedrock outcrop along the northern edge of Site 24378 (see Figure 40). The alignment is roughly five meters long by 1.5 meters wide. The northern edge of the feature is loosely stacked and stands approximately one meter tall (Figure 52). The southern edge is piled or collapsed and stands 20 to 30 centimeters above ground surface to the south. The area to the south of Feature J consists of level bedrock with thin pockets of soil. The cobbles used to construct the feature appear to have been removed from this area to create a cobble-free living space. Feature K defines the eastern extent of this possible living area (see Figure 40).

Figure 51. SIHP Site 24378 Feature I (with Feature H in the background), view to east.

Figure 52. SIHP Site 24378 Feature J, view to south.

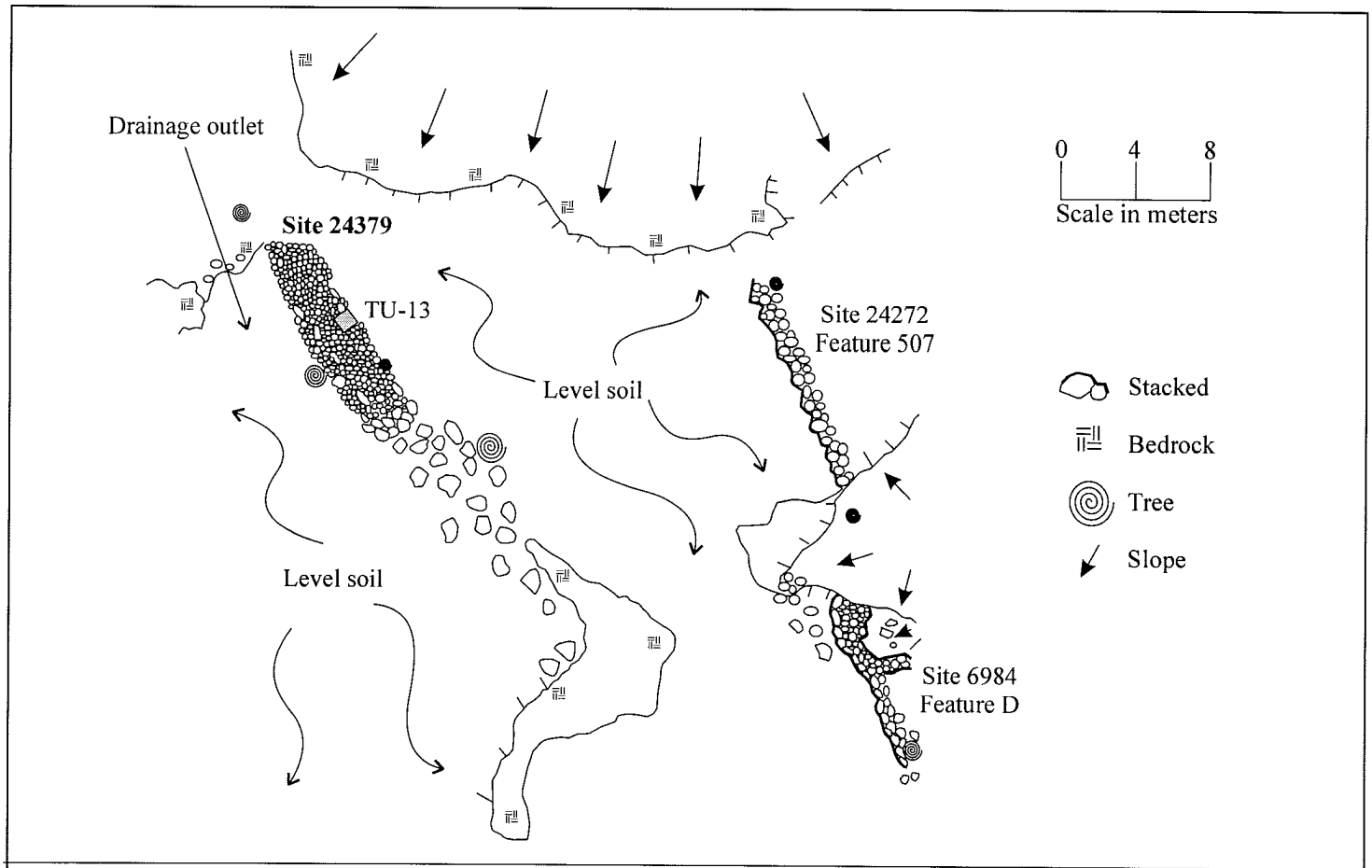
Feature K

Feature K is an L-shaped cobble alignment located slightly to the east of Feature J in the northeastern corner of Site 23478 (see Figure 40). Beginning two meters to the north of the eastern end of Feature J, the alignment runs 4.5 meters east before turning ninety degrees and continuing to the south for 8.5 meters nearly to Feature A. Feature K is constructed of small to large sized cobbles piled to a height of 30 to 80 centimeters above the surrounding bedrock ground surface (Figure 53). The alignment has an average width of one meter. The cobbles used to construct Feature K appear to have been cleared from the level area immediately adjacent to the alignment's southern and western edges. This feature, along with Feature J, may have defined the edges of a cleared living area in the northeastern corner of Site 24378.

Figure 53. SIHP Site 24378 Feature K, view to southeast.

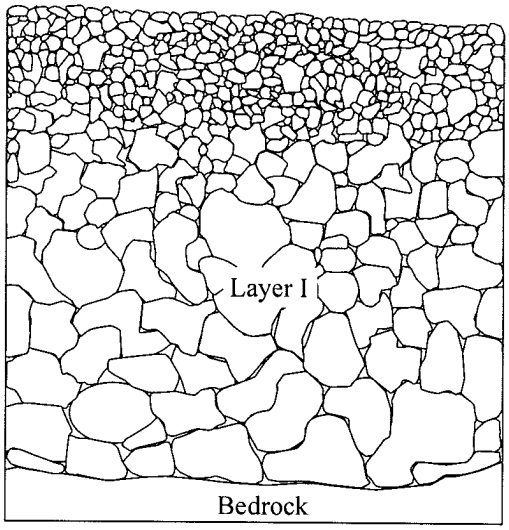
SIHP Site 24379

Site 24379 is a rough alignment of waterworn stones located in the southwestern portion of the current project area (see Figure 6). Site 24379 is located at the outlet of a drainage that flows intermittently through the center of Pāhoehoe 2nd Ahupuaʻa (Rosendahl and Rosendahl 1986:34). The waterworn stones that make up the feature almost certainly washed down the drainage from up slope. The alignment measures approximately eleven meters long by up to 2.5 meters wide and it is raised 0.2 to 0.4 meters above the surrounding ground surface (Figure 54). The alignment runs roughly northwest/southeast and it generally attains a greater height along its northern edge than its southern edge. The surface of the alignment consists of relatively level small cobbles and pebbles, and it appears as though the feature may have had definite edges marked by larger cobbles and boulders at some point in the past. Currently, however, the edges are scattered and not at all uniform. It even appears as though the feature could have been naturally created by flood deposits. As the function of Site 24379 was not at all clear based on its surface attributes, a one by one meter test unit (TU-13) was excavated along the features southern edge (see Figure 54).



SIHP Site 24379 feature surface, view to west

TU-13 north wall profile



Layer I - Architectural layer consisting of size sorted stones mixed with a small amount of very dark brown (10YR 2/2) silt.

Figure 54. SIHP Site 24379 plan view and TU-13 profile.

Excavation of TU-13 revealed that Site 24379 consists of a ninety-centimeter thick layer of size-sorted stones mixed with a small amount of very dark brown (10YR 2/2) silt (Layer I) resting on bedrock (see Figure 54). The upper 25 centimeters of TU-13 consisted of stream worn pebbles and small cobbles. Beneath this the stones became increasingly larger with depth, ranging in size from cobbles below the pebbles to boulders on top of bedrock (Figure 55). The soil recovered from TU-13 was screened through 1/4-inch mesh screen, but no artifacts were recovered. The only artifact recovered from the unit was a rusted sheet of tin found in situ in the northeastern quadrant of the unit at a depth of 20 centimeters below surface. The tin sheet measured 10 centimeters wide by 19 centimeters long and weighed 69.3 grams. The presence of the tin within the TU-13 suggests that the feature likely dates to Historic or Modern times. Excavation of the unit did not, however, do much to illuminate the function of the feature. The size sorted nature of the alignment and its presence along the edge of a drainage could indicate that it is a natural feature, deposited during a severe flood episode. If however, it was constructed, it was done so by hand (no evidence of heavy machinery was present in the vicinity of Site 24379), and built in successive layers with the size of the material carefully selected. If Site 24379 was constructed, possible functions could include water control or pedestrian access across a sometimes swampy or flooded area (i.e. a walkway). Alternatively, Site 24379 could have functioned as an agricultural terrace used to retain soil on its southern side and to channel water flow into a planting area (Feature 507 of Site 24272, a terrace, is located just to the north of Site 24379).

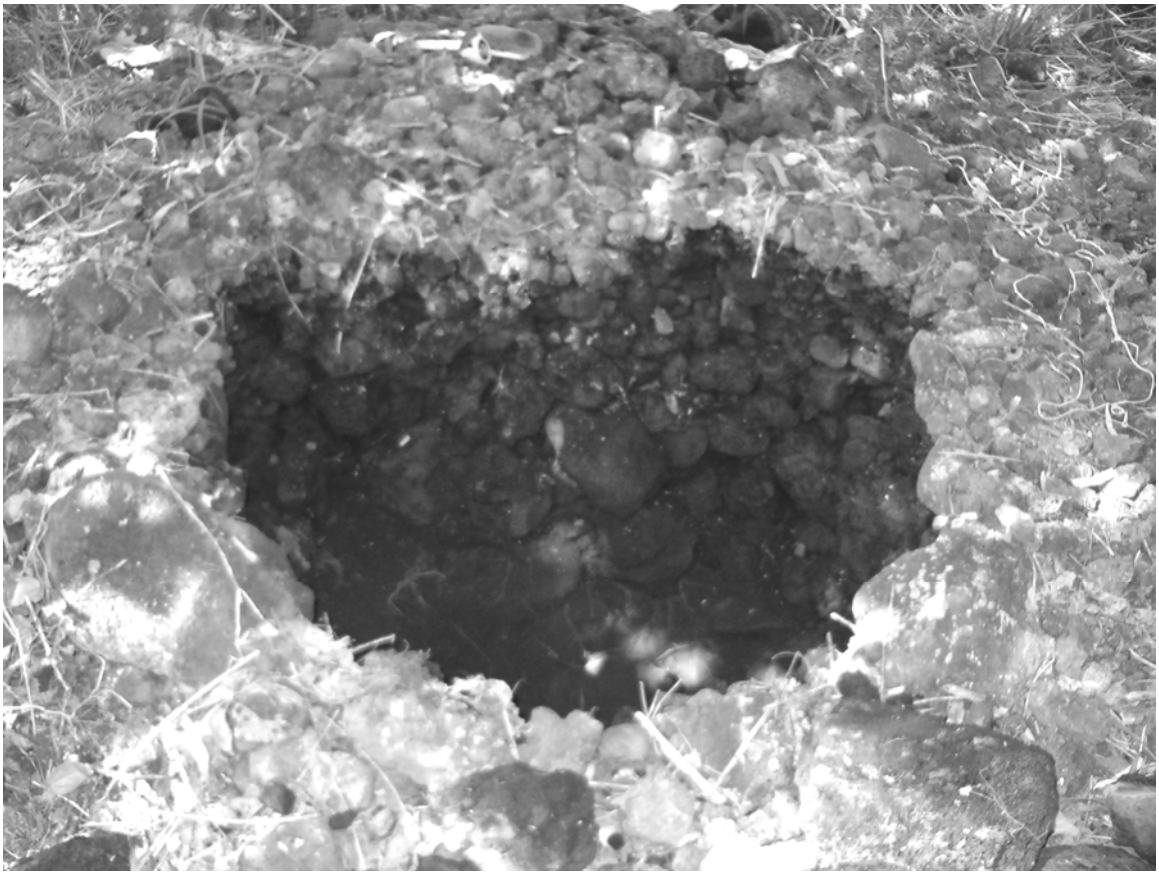


Figure 55. SIHP Site 24379, TU-13 base of excavation, overview to west

SIHP Site 24380

Site 24380 is a core-filled Historic ranch wall that runs roughly north/south between Sites 6352 and 6381 in the southwestern portion of the current project area (see Figure 6). The wall measures approximately 150 meters long in its entirety, but only a 55-meter long section of the wall at its southern end is included in the current project area. The wall has three breaks in its length, one at its junction with Site 6352 that is gated, and two (one small one that was constructed and another larger one that appears to have been caused by

washout) that have been replaced with wire fence. Otherwise, the wall is in a relatively good state of repair and it continues to be used for ranching purposes. The most intact sections of Site 24380 stand up to 1.2 meters tall along its eastern edge and 1.8 meters tall along its western edge, by 0.7 meters wide along its upper edge and 1.0 meter wide at its base (Figure 56). This wall was originally recorded by Rosendahl and Rosendahl (1986) as Site T-19 during a reconnaissance survey of Parcel 120. According to that survey the wall has a small cattle enclosure along its western edge near its northern termination at Site 6381 outside of the current project area (this fact was verified during the current study). Site 24380 was likely constructed during the middle to late 19th or early 20th century for cattle control purposes.

Figure 56. SIHP Site 24380, view to west.

Summary and Conclusions

As a result of the current inventory survey six previously unrecorded archaeological sites and eight previously recorded sites were located and recorded on the subject parcel. The sites include seven Historic ranching/boundary walls (Sites 4591, 6352, 6381, 21384, 24271, 24376, and 24380), an alignment of possible Historic origins (Site 24379), a trail (Site 6350), four Precontact habitation sites including three complexes (Sites 6984, 24375, and 24378) and a terrace remnant (Site 24277), and a grouping of 213 agricultural features that spans the entire project area (a portion of Site 24272). Fifteen test units (TUs) were excavated at six of these sites.

Sites 4591, 6352, 6381, 21384, 24271, 24376, and 24380 are all core-filled ranching/boundary walls. All of these Historic sites were likely originally constructed during the middle to late 19th or early 20th century for cattle control purposes and/or as boundary markers. Haleluhi, who purchased a small portion of the current project area (Parcel 29) as Grant 2033 in 1856, may have constructed some of the boundary walls. All of these ranching related walls, with the exception of Site 24376, have been maintained to the present day for cattle control purposes.

Site 24379 is a rough alignment of stream worn stones located at the outlet of a drainage that flows intermittently through the center of Pāhoehoe 2nd Ahupuaʻa. Based on the presence of tin discovered in situ within the feature during the excavation of a test unit (TU-13), it appears that Site 24379 dates to Historic or Modern times. It is possible that the alignment could have been created naturally during a severe flood episode. But if Site 24379 was constructed, possible functions could include water control or pedestrian access across a sometimes swampy or flooded area (i.e. a walkway). Or it could have functioned as an agricultural terrace used to retain soil on its southern side and to channel water flow into a planting area.

Site 6350 is a stepping-stone trail segment that runs *mauka/makai* through the central portion of the current project area. Segments of this trial were previously recorded *makai* of the current project area and further segments were noted *mauka* of the current project area. Site 6350 was likely constructed during Precontact times as part of interconnected trail system that allowed for pedestrian travel *mauka*/*makai* within Pāhoehoe 2nd Ahupuaʻa and between various *ahupuaʻa* as well. Site 6350 likely accessed both agricultural and residential sites.

Sites 6984, 24375, 24377, and 24378 are all Precontact habitation sites. All of these complexes are located on exposed bedrock outcrops at the periphery of level soil areas that appear to be the best locations for planting within the project area. The residents of these habitations were most likely responsible for tending the nearby crops. One of the sites (Site 24378) had pineapple growing within a planting depression (Feature D) at the time of the current inventory survey. This suggests that the habitation sites also incorporated household planting areas. Furthermore, pineapples were a historically introduced crop to Hawaiʻi, suggesting that perhaps the habitation sites, or at least the surrounding fields (Site 24272) were used into early Historic times. However, no Historic debris was observed at any of the habitation sites.

Site 24272 is a large agricultural complex comprised of 534 distinct features, 213 of which are located within the project area. This site was originally recorded as 321 distinct features located on Parcel 29 *makai* of the current project area (Ketner et al. 2004). The majority of the features found at Site 24272 were likely constructed during Precontact times, but the site may have been utilized continuously into early Historic times (Ellis 1963). Portions of the project area with the greatest amount of exposed bedrock and the least amount of soil (i.e., on slopes where the most run off occurs) seem to contain the highest density of features. The features in these sloped areas are almost exclusively terraced into the hillside and appear to aid in soil retention. They are usually located near small pockets of soil and on bedrock ground surface, suggesting that they were likely created during the process of clearing stones from the soil areas. On level ground where there is ample soil, such as occurs at a few locations throughout the project area, the features are generally concentrated around the outside edge of the soil creating clearings that could have been used for planting. The habitation areas recorded within the current project area and on Parcel 29 (Ketner et al. 2004) are located on the periphery of these cleared level soil areas.

SIGNIFICANCE EVALUATION AND TREATMENT RECOMMENDATIONS

The above-described archaeological sites are assessed for their significance based on criteria established and promoted by the DLNR-SHPD and contained in the Hawaiʻi Administrative Rules 13§13-284-6. This significance evaluation should be considered as preliminary until DLNR-SHPD provides concurrence. For a resource to be considered significant it must possess integrity of location, design, setting, materials, workmanship, feeling, and association and meet one or more of the following criteria:

A Be associated with events that have made an important contribution to the broad patterns of our history;

B Be associated with the lives of persons important in our past;

C Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;

D Have yielded, or is likely to yield, information important for research on prehistory or history;

E Have an important traditional cultural value to the native Hawaiian people or to another ethnic group of the state due to associations with traditional cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group's history and cultural identity.

The significance and recommended treatment for the eleven sites recorded are discussed below and presented in Table 6.

Table 6. Site significance and treatment recommendations.

SIHP No.	*Function*	*Temporal Association*	*Significance*	*Recommended Treatment*
4591	Ranching/boundary	Historic	D	No further work
6350	Trail	Precontact/Historic	D	No further work
6352	Ranching/boundary	Historic	D	No further work
6381	Ranching/boundary	Historic	D	No further work
6984	Habitation	Precontact	D	Data Recovery
21384	Ranching/boundary	Historic	D	No further work
24271	Ranching/boundary	Historic	D	No further work
24272	Agricultural	Precontact	D	No further work
24375	Habitation	Precontact	D	Data recovery
24376	Ranching	Historic	D	No further work
24377	Habitation	Precontact	D	Data Recovery
24378	Habitation	Precontact	D	Data recovery
24379	Unknown	Historic	D	No further work
24380	Ranching	Historic	D	No further work

Sites 4591, 6350, 6352, 6381, 6984, 21384, 24271, and 24272 have all been determined to be significant under Criterion D based on prior studies (Haun et al. 1998; Ketner et al. 2004; PHRI 1999). The previously approved treatments for all of these sites were no further work. The additional documentation of these sites during the current project supports the conclusion that no further work is needed at these sites.

Sites 24376, and 24380 are newly recorded core-filled walls. They are considered significant under Criterion D for the information they have provided relative to the Historic use of the study parcel. As very little data collection potential remains at these sites, no further work is the recommended treatment.

Sites 24375, 24377, and 24378 are all newly recorded Precontact habitation sites. These sites are considered significant under Criterion D for information they have provided relative to the Precontact settlement patterns on the current study parcel. As further data collection potential remains at these sites (to augment the information collected during the current inventory survey, establish a chronology of use, and refine functional interpretations), all four are recommended for data recovery.

Site 24379 is a rough alignment of stream worn stones at the outlet of a drainage. Subsurface testing revealed the possible natural origin of this site. This site has been fully documented during the current study and is potentially considered significant under Criterion D. No further work is the recommended treatment.

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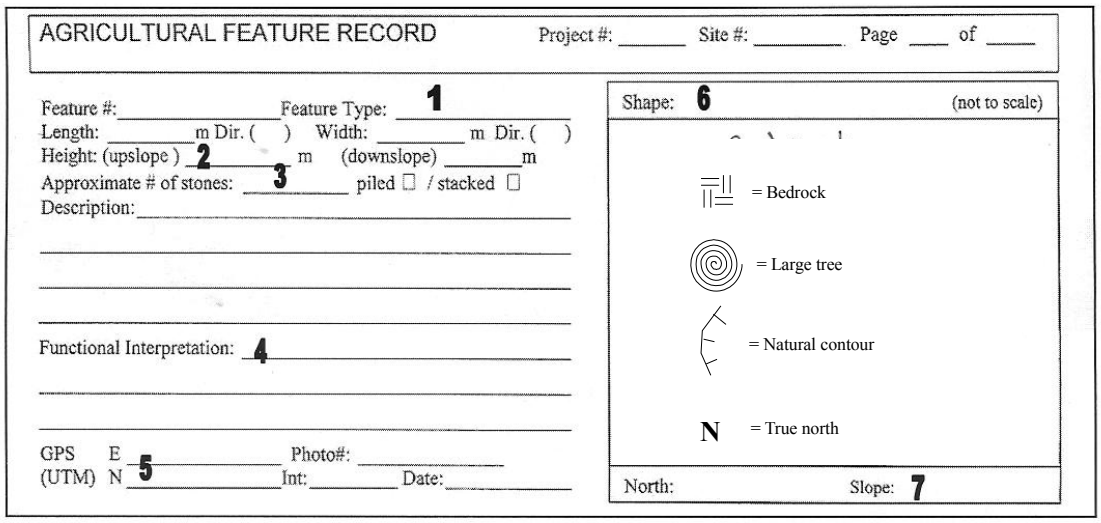
APPENDIX A

Below is an example of the agricultural feature record used by fieldworkers during the current inventory survey. The information contained on these forms was used to generate the feature descriptions for SIHP Site 24272 that follow. The numbers that are present next to some of the data fields correspond to notes (listed below) about the form.


AGRICULTURAL FEATURE RECORD Project #: _____ Site #: _____ Page ____ of ____

Feature #: _____ Feature Type: 1 _____
Length: _____ m Dir. ( ) Width: _____ m Dir. ( )
Height: (upslope) 2 _____ m (downslope) _____ m
Approximate # of stones: 3 _____ piled ☐ / stacked ☐
Description: _____

Functional Interpretation: 4 _____

GPS E 5 _____ Photo#: _____
(UTM) N _____ Int: _____ Date: _____

Shape: 6 (not to scale)

= Bedrock

= Large tree

= Natural contour

N = True north

North: Slope: 7

1. For a discussion of the feature types recorded during the current survey see the description for Site 24272 on page 26 of this report
2. Heights are listed in meters above ground surface. Since the majority of the project area slopes fairly steeply *makai,* these measurements give a fairly accurate idea of the minimum and maximum height attained by the feature.
3. The approximate number of stones encompassed by a feature is solely a guesstimate by the fieldworkers. This approximation is meant to suggest the amount of labor invested in the construction of a particular feature and aid in comparisons between features (the same is true for piled or stacked).
4. Functional interpretation is a possibility suggested by the fieldworkers that is derived from the feature's formal attributes and the surrounding landscape. The functional interpretations listed below are by no means a certainty. Observable soil areas located nearby a recorded feature are considered possible planting areas, whether they were used for that purpose or not.
5. GPS coordinates use the WGS 84 datum.
6. The quick sketches of the features are meant to show their shape and any unique attributes they might contain. The drawings are not to scale. A legend of the common symbols used in the plan view drawings is shown in the box on the example form.
7. The slope indicator points down slope on all feature descriptions.

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
DEPUTY DIRECTOR - LAND

DEAN NAKANO
ACTING DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING, ROOM 555
KAPOLEI, HAWAII 96707

July 27, 2005

LOG NO: 2005.1606
DOC NO: 0507NM59

Dr. Robert Rechtman
Rechtman Consulting LLC
HC 1 Box 4149
Kea'au, Hawaii 96749-9710

Dear Dr. Rechtman:

SUBJECT: **Chapter 6E-42- Historic Preservation Review – An Archaeological Inventory Survey of TMK: 3-7-7-8: 29 por., 114 por., and 120 por. Pahoehoe 1st and 2nd Ahupua'a, North Kona District, Island of Hawaii TMK: 3-7-7-8: 29 por., 114 por., and 120 por.**

Thank you for submitting the archaeological inventory survey report (Clark, Baustista and Rechtman, 2004, *An Archaeological Inventory Survey of TMK: 3-7-7-8: 29 por., 114 por., and 120 por. Pahoehoe 1st and 2nd Ahupua'a, North Kona District, Island of Hawaii,* RC, ms.). We received the report on April 11, 2004. We apologized for our delayed review.

A 100% surface survey was conducted on the fourteen acre parcel. Fourteen significant historic sites (sites 4591, 6352, 6381, 21384, 24271, 24376 and 24380 -- boundary walls), 24379 – historic alignments, 6359 – a trail, and (6984, 24375, and 24378) – habitation sites, 24277- a terrace remnant and a grouping of 213 agricultural features - portion Site 24272 were identified. Fifteen test units were excavated at six of these sites. All of the sites were evaluated for its significance under criteria D. We concur with these significance evaluations and their recommend mitigation commitments.

Data recovery is recommended for the habitation sites 6984, 24375, 24378 and 24277. An approved data recovery plan will be required for work at these sites. No further archaeological work is recommended for the other sites. This survey report is acceptable.

If you have any questions, please call Nancy McMahon, our Kaua'i archaeologist, who reviewed this report at 742-7033.

Aloha,

MELANIE CHINEN, Administrator
State Historic Preservation Division

NM:jen

LA‘ALOA AVENUE EXTENSION

LA‘ALOA 1 AND 2 AND PAHOEHOE
NORTH KONA, HAWAII

FINAL ENVIRONMENTAL ASSESSMENT

APPENDIX 5A

PRE-DRAFT E.A. PUBLIC INVOLVEMENT

PUBLIC NOTICE

KONA ROAD PROJECTS
INFORMATIONAL MEETING

The public is advised that the County of Hawai'i, Department of Public Works will hold an informational meeting for the Kona Road Projects.

This will be a time for community input and discussions concerning the present and future roadway projects in Kona. All are invited to attend.

Representatives from various County departments will be present to answer your questions and concerns.

- Tuesday, December 21, 2004 from 5:00 p.m. to 6:30 p.m.
- King Kamehameha's Kona Beach Hotel
  Ekolu; Ballroom No. 3

For more details, please contact the Department of Public Works, Administration Office at (808) 961-8321.

Bruce C. McClure

Bruce C. McClure, P.E., Director
Department of Public Works
County of Hawai'i

West Hawai'i Today
December 17 and 19, 2004

-5585 CIRCULATION 329-9311

Help Wanted 100

CAFE PESTO, Kawaihae- Immediate openings for Saute Cook, Prep and Potwasher flexible hours, part time or full time. 882-1071 ask for Moke or Michael

---

CAPTAINS part time, possibly leading to full time. Flexible days, Honokohau Harbor. New 6 pax dive boat, scuba experience helpful. 331-8324

CAREGIVER needed for toddler with developmental disabilities after school and during school breaks. Call 325-6402 and leave a message

---

CARQUEST WAIMEA
Full time Positions:
-COUNTER SALES
(Experience required)
-DRIVER
Drug test required.
[illegible]on, 885-0588

CDL DRIVER, Class A or B w/ haz mat endorsement. Please submit resume with current Abstract to: Conen's Freight Transport, Inc., 60 Kuhio Street, Hilo, Hawaii 96720.

CDL "Type A" DRIVERS: Full time positions for our Kawaihae operations. Previous driving experience required. Must provide current traffic abstract upon applying.

Journey Mechanic: Full time position for Kawaihae operation. Provide proof of experience upon applying. Possession of current CDL license preferred.

Warehouse Laborer: Full time position for our Kona operation. Previous forklift and warehouse experience desired. All positions, applicant must pass [illegible] employment drug [illegible]. Pick up applications at our Kona or Kawaihae (at the pier) offices:

HT&T Hauling and Repair Services
74-5223-A Queen Kaahumanu Hwy.
Kailua-Kona (next to

Help Wanted 100

CAPTAIN/ SCUBA INSTRUCTOR, top pay. Captain 50 ton license, with experience for Kona Honu Divers. Team player, reliable, Aloha Spirit. Benefits included. 808-324-4668 or send resume to PO Box 390-190, Keauhou, HI 96739

CAREGIVERS/ COMPANIONS needed. Part time: 4, 6 & 8 hours per day positions available in Kailua-Kona and Honaunau. Provide services to persons with developmental disabilities, including personal care support, social interaction and community access. Good pay, benefits and paid training provided. Call 322-9333 for more information; or stop by the Full Life office at Mango Court #207 in Kealakekua to apply

Help Wanted 100

COFFEE FARM MANAGER, Holualoa area. Needs to manage and work coffee farm and roaster. Also needs knowledge of bookkeeping & general repairs. High energy person! Good benefits. Housing is included. Send resume to: BB-109, c/o WHT, POBox 789, Kailua-Kona, HI 96745

COSMETOLOGY:
Are you looking to double your current income? Join a top salon in Kona? Receive benefits such as: paid vacation; salary; health insurance. Hair Art Salon is looking for a few experienced hair stylists who are ambitious and honest. Join our team now while retaining & growing your current clientele. Call now to apply, 331-1545

Help Wanted 100

CUSTOMER service and parts counter person needed for Motorcycle & ATV Dealership in Kailua-Kona. Assist customers t our store and over the phone with all of the vehicle parts and merchandise needs. Strong customer friendly attitude and some motorcycle/ ATV knowledge a must. Excellent benefits and competitive pay. Call Terry or fax resume to 329-9100

Help Wanted 100

COFFEE ORCHARD WORKER 8 to 10 hours per week, $15.00 per hour. Holualoa Farm seeks reliable attentive worker for orchard care. Experience preferred or horticultural background. Michael 324-0700

DANIEL THIEBAUT'S now hiring for day and night Dish/ Prep. Contact Porch in the kitchen. Apply in person

Help Wanted 100

DELIVERY SPECIALIST WANTED:
Flexible hours.
Must have own car, insurance, and good driving record. Cash paid nightly. Apply at Domino's Pizza, Kona

---

DELIVERY/ WAREHOUSE PERSON.
Must be able to work with the public, communicate with customers, valid driver's license.
$11/ hour to start.
Call Gail at 326-9177

State/County Notices 15

PUBLIC NOTICE

KONA ROAD PROJECTS INFORMATIONAL MEETING

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- King Kamehameha's Kona Beach Hotel
  Ekolu; Ballroom No. 3

For more details, please contact the Department of Public Works, Administration Office at (808) 961-8321.

Bruce C. McClure, P.E., Director
Department of Public Works
County of Hawai'i

(No. 6135–West Hawai'i Today: December 17 and 19, 2004)

Help Wanted 100

PART TIME
WEST HAWAII TODAY
MAIL ROOM INSERTER

Must be available 11pm to 3am.

Hours may vary some

- Heavy lifting, fast paced.
- Need a dependable hard working person.

Fill out application at:
West Hawaii Today Reception Desk
between 9:00 a.m. - 4:00 p.m.
75-5580 Kuakini Highway

NO PHONE CALLS PLEASE

West Hawaii Today

HOLUA RESORT
AT MAUNA LOA VILLAGE
A SHELL VACATIONS™ RESORT

Help Wanted 100

Hawaii Pacific Health

Kapi'olani • Pali Momi • Straub • Wilcox

PATIENT SERVICE REPRESENTATIVE II

Straub Clinic, Hualalai
Part Time 20 to 32 hours per week (Job ID 7228)

Responsible for patient registration, demographics, insurance and cash collection. Must be able to schedule exams and instructions to patients. ***Requirements:*** Knowledge of ICD-9 and CPT coding, medical terminology, and personal computers.

Apply online at:
www.hawaiipacifichealth.org
Click on *Careers* to search for jobs.

Harry Kim
Mayor

Christopher J. Yuen
Director

Roy R. Takemoto
Deputy Director

County of Hawaii
PLANNING DEPARTMENT
101 Pauahi Street, Suite 3 • Hilo, Hawaii 96720-3043
(808) 961-8288 • Fax (808) 961-8742

August 4, 2004

Mr. Ron Terry
Geometrician Associates, LLC
HC 2 Box 9575
Keaau, HI 96749

Dear Mr. Terry:

Subject: Pre-Environmental Assessment Consultation
Applicant: Hawaii County Department of Public Works (DPW)
Project: La'aloa Street Extension
TMK: 7-7-8:29, 112, 114 and 120, Pahoehoe, North Kona, Hawai'i
TMK: 7-7-4:68, 93 & 94, Kaumalumalu, North Kona, Hawai'i

This is in response to your request for comments on the above-referenced project.

According to your submittal, the Department of Public Works proposes construction of a County road that would extend La'aloa Street between its current terminus and Kuakini Highway.

Please note the following for the proposed project site:

TMK NUMBER	AREA	STATE LAND USE	COUNTY ZONING	GENERAL PLAN	Special Management Area (SMA)
7-7-8:29	14.987 acres	Agricultural	Agricultural (A-5a)	Urban Expansion	Yes
7-7-8:112	.027 acre	Agricultural	Agricultural (A-5a)	Urban Expansion	Yes
7-7-8:114	6.839 acres	Agricultural	Agricultural (A-5a)	Urban Expansion	Yes
7-7-8:120	31.305 acres	Urban	RM-3.5 & RS-7.5	Urban Expansion	Yes
7-7-4:68	5.41 acres	Agricultural	Agricultural (A-5a)	Urban Expansion	Yes
7-7-4:93	5.062 acres	Agricultural	Agricultural (A-5a)	Urban Expansion	Yes
7-7-4:94	5.259 acres	Agricultural	Agricultural (A-5a)	Urban Expansion	Yes

In addition:

1. SMA: According to Rule 9-4(10)A(i) of the Planning Commission Rules of Practice and Procedure, the placement or erection of any solid material or any gaseous, liquid, solid, or thermal waste is considered to be development. Therefore, a Special Management Area Minor Permit or a Special Management Area Use Permit will be required.
2. Hawaii County Zoning Code Section 25-4-11 states that public and private utilities are permitted in any district. Therefore, no land use permits are required for the proposed project.
3. Consultation should include all applicable individuals, agencies and organizations regarding trails as well as historic and archaeological sites.
4. Discussion should include the impact to and of Towne Keauhou, LLC's development of TMK: 7-7-8:11.

Please provide us with a copy of the Draft Environmental Impact Statement for our review and file.

If you have questions, please feel free to contact Esther Imamura or Larry Brown of this office at 961-8288.

Sincerely,

CHRISTOPHER J. YUEN
Planning Department

ETI:cd
P:\WPWIN60\ETI\EAdraftPre-consul\TerryLaaloa778&774.doc

cc: Planning Department – Kona

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAI'I
345 KEKŪANAŌ'A STREET, SUITE 20 • HILO, HAWAI'I 96720
TELEPHONE (808) 961-8050 • FAX (808) 961-8657

August 6, 2004

Mr. Ron Terry
HC 2, Box 9575
Kea'au, HI 96749

LA'ALOA STREET EXTENSION
ENVIRONMENTAL ASSESSMENT
TAX MAP KEYS 7-7-008:029, 114, AND 120

Thank you for the opportunity to comment on the aforementioned project. We have no comments to offer at this time.

Should there be any questions, please contact Ms. Shari Komata of our Water Resources and Planning Branch at 961-8070, extension 252.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

SHK:dfg

... Water brings progress...

The Department of Water Supply is an Equal Opportunity provider and employer. To file a complaint of discrimination, write: USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington DC 20250-9410. Or call (202) 720-5964 (voice and TDD)

Aloha Mr. Terry:

This map that you sent is so old and out of date.....for it to show only the old White Sands houses and not any of the the new su\bdivision is incomplete. I am trying to find out where exactly the proposed roads will exit to Kuakini, could you tell me?.....Where is Akoni Street? and how close to Seaview circle and Hoomalu subdivison?....There are homes built close to the top of Kuakini and where are they?

...How Can anyone make any responsibile decisions when so much information is lacking. I am very interested that we really do have an exit from Kuakini, but I think you are wasting time and money with seeking public information with out proper identification.

The bond Town Dev put up is minor if they would of had to build the connection that was promised at the time the subdivision was built. And it is criminal that the developler has taken so much soil and rocks for the past 8 or 9 months and still is hauling out and with the concrete from the Kona Lagoon the developer would ovf been able to build the connection he said he would. So now the developer has more lots, $700,000++and no responsiblility to build the connector, just a BOND. He saved and is costing the county all this money for this additional research for new exits, which I doubt will ever be built. It will not be acceptable if the Parkway gets approved. We still need the exit!!

Have you had Nancy Burns and the historical group out to go over this land to see if we have any conflict with preserving historical sites? Have you contacted the present owners of these two parcels that this exit may come out on their property? Again this is a costly repeat of all the investigations that were done when Town orignally wanted approval from the county for thier subdivision. Which was conditional on an EXIT on their property.

I have requested from Roy Takomoto a map of approved subdivisions in Kona, this request was in Feb. and to date no map. **Are you certain that the county has not already approved a subdivision on either of these two parcels**? We can
Not get an answer!

Please respond to me and Mrs Erway.

Sincerely,

Merry Anne Stone

Mr. Terry, and/or Mr. Kuba:

While I am very anxious for the La'aloa extension to be completed, I have no expertise in helping to decide between the two proposed routes. I know of no special impacts, and since it's all private land, and I can't walk on it, I will not comment.

However, you are or have experts and when the EA is completed, I trust that DPW will stay involved and get the extension built as quickly as possible. Traffic is close to unbearable and this extension should be quite a help in this area.

Please do send a copy of the Draft EA when it is completed.

Mahalo nui loa,
Marjorie Erway
PO Box 2807
Kailua-Kona, HI 96745
324-4624

LA‘ALOA AVENUE EXTENSION

LA‘ALOA 1 AND 2 AND PAHOEHOE
NORTH KONA, HAWAII

FINAL ENVIRONMENTAL ASSESSMENT

APPENDIX 5B

COMMENTS TO DRAFT E.A. AND RESPONSES

to all commentors

geometrician

ASSOCIATES, LLC

integrating geographic science and planning

phone: (808) 982-5831 fax: (808) 966-7593 HC 2 Box 9575 Kea au Hawai i 96749

ronterry@verizon.net

October 25, 2005

The County of Hawaii and Geometrician Associates thank you for your letter on the Draft Environmental Assessment (DEA) for the proposed La'aloa Avenue Extension. We have received a great deal of input concerning traffic calming, noise, drainage, and the general Kona roadway network. We value your comments and will give them our full consideration as we refine and optimize the roadway design to meet community concerns.

We are planning to hold a community meeting sometime during late November or early December. We hope to strategize with community members about how to achieve a design that satisfies all concerns to the greatest extent feasible. There will be more details concerning this meeting at the next Department of Public Works update on Kona projects, which will be held the evening of November 10, 5-7 PM, at the Royal Kona Resort. When the community meeting details are set, we will send you a postcard advising you of the time, date and location.

We plan to develop detailed answers to the individual points raised in your letter and then provide you another response after the community meetings and re-design process is complete. Again, thank you for your response.

Sincerely,

Ron Terry

Ron Terry, Ph.D.
Project Environmental Consultant

Harry Kim
Mayor

Barbara Bell
Director

Nelson Ho
Deputy Director

County of Hawaii

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

25 Aupuni Street, Room 210 • Hilo, Hawaii 96720-4252
(808) 961-8083 • Fax (808) 961-8086

October 11, 2005

Mr. Ron Terry
GEOMETRICIAN ASSOCIATES
HC 2, Box 9575
Keaau, HI 96749

Subject: **DRAFT ENVIRONMENTAL ASSESSMENT**
Project Name: La`aloa Avenue Extension
North Kona,Hawai'i
TMK: 7-7-08:29, 114, 120

We have reviewed the subject EA and offer the following comments:

TECHNICAL SERVICES COMMENTS:

- No county sewer is planned for this area.

SOLID WASTE COMMENTS:

- Commercial operations, State and Federal agencies, religious entities and non-profit organizations may not use transfer stations for disposal.
- Aggregates and any other construction/demolition waste should be responsibly reused to its fullest extent.
- Ample room should be provided for implementation of a recycling program.
- Greenwaste may be transported to the green waste sites located at the Kailua and Hilo transfer stations, or other suitable diversion programs.
- Construction and demolition waste is prohibited at all County Transfer Stations.
- It is stated that the entire project corridor is within the Special Management Area (SMA) of the coastal zone. Since an SMA permit will be required for the project, one component will be the need for a Solid Waste Management Plan (SWMP) submitted to the County of Hawai'i, Department of Environmental Management. In particular, the construction contractor or the Department of Public Works will need to follow the Guidelines for preparing a SWMP.

Thank you for allowing us to comment on the La`aloa Avenue Extension Draft EA.

Barbara Bell
DIRECTOR

cc: OEQC
DPW
SWD
TSS

7361

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

County of Hawai'i
DEPARTMENT OF PUBLIC WORKS
Aupuni Center
101 Pauahi Street, Suite 7 · Hilo, Hawai'i 96720-4224
(808) 961-8321 Fax (808) 961-8630
www.co.hawaii.hi.us

May 19, 2008

Ms. Bobby Jean Leithead-Todd, Director
Hawai'i County Department of Environmental Management
25 Aupuni Street, Rm. 210
Hilo HI 96720

Subject: Draft Environmental Assessment - La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for your comment letter sent by your predecessor, Barbara Bell, dated October 11, 2005, on the Draft EA. In answer to your specific comments.

1. *Technical Services.* Thank you for your confirmation that no County sewer is currently planned for the Extension area.

2. *Solid Waste.* Contractors will be made aware of the regulations you cite and recommendations you provide, as well as the need for providing a Solid Waste Management Plan in association with the SMA permit.

Thank you for reviewing the Draft EA. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Sincerely,

Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

Harry Kim
Mayor

Darryl J. Oliveira
Fire Chief

Desmond K. Wery
Deputy Fire Chief

County of Hawai'i
FIRE DEPARTMENT
25 Aupuni Street • Suite 103 • Hilo, Hawai'i 96720
(808) 961-8297 • Fax (808) 961-8296

8/25/2005

TO : RON TERRY
GEOMETRICIAN ASSOCIATES
HC 2 BOX 9575
KEA`AU, HAWAII 96749

FROM : DARRYL OLIVEIRA, FIRE CHIEF

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (DEA)
PROJECT NAME: LA`ALOA AVENUE EXTENSION
LOCATION: ISLAND: HAWAI`I DISTRICT: NORTH KONA
TAX MAP KEY: (3) 7-7-08: 29, 114 120

We have no comments to offer at this time in reference to the above-mentioned Draft Environmental Assessment for Project: La`aloa Avenue Extension.

DARRYL OLIVEIRA
Fire Chief

JCP:lpc

CC: Director, Office of Environmental Quality
Galen Kuba, Hawaii County Department of Public Works

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

County of Hawai'i
DEPARTMENT OF PUBLIC WORKS
Aupuni Center
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www.co.hawaii.hi.us

May 19, 2008

Darryl Oliveira, Fire Chief
Hawai'i County Fire Department
25 Aupuni St., Suite 103
Hilo HI 96720

Subject: Draft Environmental Assessment - La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for your comment letter dated August 25, 2005, on the Draft EA, in which you stated that you had no comments at this time.

Thank you for reviewing the Draft EA. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Sincerely,

Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

Harry Kim
Mayor

Patricia G. Engelhard
Director

Pamela N. Mizuno
Deputy Director

County of Hawai'i

DEPARTMENT OF PARKS AND RECREATION
101 Pauahi Street, Suite 6 • Hilo, Hawai'i 96720
(808) 961-8311 • Fax (808) 961-8411

September 7, 2005

Mr. Ron Terry
Geometrician Associates
HC 2 Box 9575
Keaau, HI 96749

Dear Mr. Terry:

Subject: La'aloa Avenue Extension Draft Environmental Assessment
North Kona, Hawai'i; TMK (3) 7-7-08:029, 114 & 120

Thank you for the opportunity to review and provide comment on the proposed project. Upon review of the Draft EA we are not aware of any potentially adverse impacts, environmental or otherwise, that the proposed project could have on our park sites or facilities in the area. Conversely, we feel the added mauka-makai interconnectivity should have the effects of localizing traffic on Ali'i Drive and reducing some through traffic thereon, creating a positive effect for our beach parks as well as pedestrian and bicycle traffic.

We advocate conscious design considerations be made, insofar as practicable, for inclusion of dedicated bicycle paths on the entire length of La'aloa Avenue and at its intersections with both Kuakini Highway and Ali'i Drive as the connectivity will affect all three conditions and the prevalence of non-vehicular traffic is identified and recognized in your document.

Thank you, again, for soliciting our input on the proposed project.

Sincerely,

Pat Engelhard

Patricia G. Engelhard
Director

Copies:

Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Galen Kuba, P.E.
Department of Public Works, Engineering Division
101 Pauahi Street, Suite 7
Hilo, HI 96720

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

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www.co.hawaii.hi.us

May 19, 2008

Patricia Engelhard, Director
County of Hawaii
Dept. of Parks and Recreation
101 Pauahi Street, Suite 6
Hilo HI 96720

Subject: Draft Environmental Assessment - La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for your comment letter dated September 7, 2005, on the Draft EA, in which you stated that you were not aware of any potentially adverse impacts, environmental or otherwise on park sites or facilities in the area. In answer to your specific comments:

1. *Mauka-makai interconnectivity should localize traffic on Ali'i Drive and reduce some through traffic thereon, creating a positive effect for our beach parks as well as pedestrian and bicycle traffic.* Thank you for your assessment, which we concur with.

2. *Inclusion of dedicated bicycle paths the entire length of La'aloa Avenue and at its intersections with Kuakini Highway and Ali'i Drive.* The preferred project cross-sections that resulted from the Context Sensitive Solutions design process included bike lanes for the entire length of the La'aloa Avenue.

Thank you for reviewing the Draft EA. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

Harry Kim
Mayor

Christopher J. Yuen
Director

Roy R. Takemoto
Deputy Director

County of Hawaii
PLANNING DEPARTMENT
101 Pauahi Street, Suite 3 • Hilo, Hawaii 96720-3043
(808) 961-8288 • Fax (808) 961-8742

August 30, 2004

Mr. Ron Terry
Geometrician Associates
HC 2 Box 9575
Keaau, HI 96749

Dear Mr. Terry:

Subject: Draft Environmental Assessment
Applicant: Hawaii County Department of Public Works (DPW)
Project: La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'I

This is in response to your request for comments on the above-referenced project.

According to your submittal, the project would extend La'aloa Avenue as a two-lane, 60-foot collector road from the existing makua terminus 1,500 feet makua to Kuakini Highway.

We have a correction to a sentence on Page 36, "County Zoning and State Land Use District", which states:

> "*County zoning for properties along the project corridor varies from Single Family Residential (RS-7.5),* ***Double*** *Family Residential (****RD****-3.5) to* ***Low Density*** *Residential (RS-15), consistent with use for the proposed project.*" (Emphasis supplied)

Double should be changed to **Multiple** as the zoning is Multiple-Family Residential (RM-3.5). Also, instead of **Low Density** Residential, it should be **Single-Family** Residential.

Other than the foregoing, we have no further comments to offer.

If you have questions, please feel free to contact Esther Imamura or Larry Brown of this office at 961-8288, extension 257 or 258, respectively.

Sincerely,

CHRISTOPHER J. YUEN
Planning Department

ETI: je

P:\WPWIN60\ETI\EAdraftPre-consul\TerryLaaloa77008029114120.doc

cc: Planning Department – Kona

Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu HI 96813

Mr. Galen Kuba
Hawaii County Department of Public Works
101 Pauahi Street, Suite 7
Hilo HI 96720

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

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May 19, 2008

Christopher J. Yuen, Director
County of Hawaii
Planning Department
101 Pauahi Street, Suite 3
Hilo HI 96720

Subject: Draft Environmental Assessment - La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for your comment letter dated August 30, 2005, on the Draft EA. In answer to your specific comments:

1. *Corrections: Multiple Residential (RM-3.5) instead of Double Family Residential (RD-3.5) and Single-Family Residential instead of Low Density Residential.* We have amended this inadvertent error for the Final EA.

Thank you for reviewing the Draft EA. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. Box 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:

EPO-05-068

September 1, 2005

Mr. Ron Terry
Geometrician Associates
HC 2 Box 9575
Keaau, Hawaii 96749

Dear Mr. Terry:

SUBJECT: Draft Environmental Assessment
Laaloa Avenue Extension, Laaloa 1 and 2 and Pahoehoe
North Kona, Hawaii
TMK: 7-7-08: 29, 114, 120

Thank you for allowing us to review and comment on the subject document. We have no comment at this time. Please refer to our website for the Standard Comments (http://www.state.hi.us/health/environmental/env-planning/landuse/landuse.html). If there are any questions about these standard comments please contact Jiacai Liu with the Environmental Planning Office at 586-4346.

Sincerely,

HAROLD LAO, ACTING MANAGER
Environmental Planning Office

c: EPO
CWB
SDWB

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

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May 19, 2008

Harold Lao, Acting Manager
Environmental Planning Office
State of Hawaii Dept. of Health
P.O. Box 3378
Honolulu HI 96801-3378

Subject: Draft Environmental Assessment - La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for your comment letter dated September 1, 2005, on the Draft EA, in which you stated that you had no comments at this time and referred us to your standard comments. We have referred the environmental consultant and the consulting engineers to these comments.

Thank you for reviewing the Draft EA. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Sincerely,

Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

LINDA LINGLE
GOVERNOR OF HAWAII

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186
E-mail: oeqc@health.state.hi.us

September 2, 2005

Mr. Bruce McClure, Director
Department of Public Works
101 Pauahi Street, Suite 7
Hilo, Hawaii 96720-4224

Dear Mr. McClure:

Subject: Draft Environmental Assessment for the La'aloa Avenue Extension, O'ahu

Thank you for the opportunity to review and comment on the subject project. We have the following comments.

1. This project should comply with sections 103D-407 and 408 of Hawaii Revised Statutes concerning the use of indigenous plants and recycled glass.

2. Please consult with affected and adjacent landowners.

3. Please consult with the County Department of Environmental Management.

Should you have any questions, please call Jeyan Thirugnanam at 586-4185.

Sincerely,

Genevieve Salmonson

Genevieve Salmonson
Director

c: Ron Terry

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

County of Hawai'i
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May 19, 2008

Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu HI 96813

Subject: Draft Environmental Assessment - La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for your comment letter dated September 2, 2005, on the Draft EA. In answer to your specific comments:

1. *Compliance with sections 103D-407 and 408 of Hawai'i Revised Statutes concerning the use of indigenous plants and recycled glass.* Indigenous plants will be considered for landscaping. Glassphalt is not currently commercially available on the Big Island, but paving contractors are working to provide it for some areas. The County will require the paving contractor to determine at the time of bidding if it is logistically feasible and financially reasonable to utilize glassphalt.

2. *Consultation with affected and adjacent landowners.* After the Draft EA, as extensively explain in the Final EA, a Context Sensitive Solutions design process was undertaken which included extensive involvement with community members.

3. *Consultation with the County Department of Environmental Management.* This agency has been consulted and has supplied comments on the Draft EA.

Thank you for reviewing the Draft EA. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Sincerely,

Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

County of Hawai'i is an Equal Opportunity Provider and Employer

A The county has decided that La'Aloa Avenue will be a through road, because it was reserved back in the 70's to be so. This fact was withheld from the residents, by both Towne Development and the county. (as of 7/3/05)

B Be that as it may, in the 70's Keauhou View Estates, Ali'i Heights, and Ali'i Mauka did not exist. The county must realize that the safety of the residents must be considered.

It really doesn't matter that public works sees this as the only street open to carry large number of cars,unthwarted by the citizen's needs. We are here, our voices will be heard!

Safety in a single-family residential areas must be respected.

Traffic that has no mitigation devices will by design be dangerous to our neighborhood.

C Speed down an 8% grade will be unabated , creating a greater probability of accidents. The county feels that installing 25 mph speed limits should suffice to "calm" traffic. We have 25 mph signs now and traffic travels at 45 mph.

D The county was non-commital about allowing heavy trucks down our street- this is an outrage!

E The noise level will rise (The EA draft supports this) and our quality of life will diminish.

F Mr. McClure said if our street was not the only collector street then maybe they could install stop signs or a traffic round at the Ali'i By-pass. Let us fix that! Open Lako and La' Aloa concurrently so we are not the only street carrying Kona's traffic problems.

77- 171 LA'ALOA AVE.
Kailua Kona, HI 96740

808 322 3689.

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

County of Hawai'i
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May 19, 2008

Sammy Afifi
77-171 La'aloa Avenue
Kailua-Kona HI 96740

Subject: **Draft Environmental Assessment - La'aloa Avenue Extension**
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for your comment letter mailed to us by Ms. Nanci Coulter on or about September 1, 2005, on the above-referenced Draft EA. In answer to your specific comments:

A. *Withholding of information that La'aloa Avenue was meant to connect to Kuakini Highway.* We have no knowledge that any information was ever withheld, and our Department has certainly never withheld this information.

B. *Consider the safety of residents.* The CSS process included as one of its primary concerns the safety of residents whether at home, in their motor-vehicles, on their bicycles, or on foot. The reduction in speed that we expect to be achieved by the combination of traffic calming devices and cross-section adjustments will increase safety.

C. *Unabated speed.* Both the cross-section and the traffic calming devices are aimed at slowing travel speeds.

D. *Restricting heavy-duty truck/commercial vehicles.* Restricting such vehicles would cause a difficulty for homeowners receiving goods or services requiring such trucks. The problem posed by heavy trucks has been minimized by reducing the grade in the extension section and providing for cross-sections below the extension section designed to reduce speeding. Traffic calming devices will also be employed, as discussed above.

E. *Noise.* With the reduction in speed that we expect to be achieved by the combination of traffic calming devices and cross-section adjustments, noise should be reduced.

F. *Lako and La'aloa opening timing.* We are hopeful that the two projects can open within a short time of each other.

Thank you for reviewing the Draft EA. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

County of Hawai'i is an Equal Opportunity Provider and Employer

Mr. Ron Terry
Geometrician Associates
HC2 Box 9575
Keaau, Hawaii 96749

September 4, 2005

Aloha Mr. Terry,

This letter is a response to the "Laaloa Avenue Extension, Draft Environmental Assessment, July 2005".

The conditions that concern me the most in the DEA are drainage, flooding and storm water runoff. I live on Laaloa Avenue in the thirty year old White Sands Estates subdivision and have a direct view of eight of the original twelve residences facing Laaloa. I can see the buildup and flow of water every time it rains for more than 15 minutes. The increase of runoff both during construction and after the connection of Laaloa to Kuakini Highway concerns all of my neighbors and me very much.

I believe that the subject of drainage is inadequately addressed in the DEA. The section "Hydrology and Floodplains, Impacts and Mitigation Measures" (Section 3.1.2, page 25, DEA) states that "a drainage plan for the road will be developed and will undergo review, revision and approval by the Hawaii County Department of Public Works to ensure compliance with standards related to storm water runoff management...and will not be finalized until the road is at a more advanced design state." This is not right.

I say this with all respect to you and strictly in a business sense, -- but in a document with page after page of archeological features (Archeology Survey, Appendix A, pages 71 to 113); detailed presentation of existing and future traffic conditions (Traffic Assessment, Appendix 1); and even a list of area birds (Fauna Survey, page 6), I believe it borders on negligence to blandly state that flooding and drainage is a subject that will be dealt with later in design.

One of the most important conditions which section 3.1.2 must address is that runoff has increased significantly since the extension of Laaloa mauka to create Keauhou View Estates and may increase once the entire length to Kuakini Highway is finished. Although there are some drywells at intersections in the new development, they are clearly inadequate or improperly placed. In heavy rains a large amount of water now comes cascading down the unimproved portion of Laaloa, which has no drywells, through White Sands Estates, across or directly onto Princess Keelikolani Drive and out onto Alii Drive.

Just two examples to show you how serious this issue is:

The first is at the intersection of Laaloa and Princess Keelikolani. Right now water coming down the north (Kailua) side of Laaloa, turns the corner right onto Princess K, and forms an approximately 8 foot by 20 foot pool off the pavement but in the Princess K right of way. In just moderately heavy rains this pool fills high enough to flow makai over the pavement and onto private property at 77-6516 Princess Keelikolani, partly into the garage and then to the left and directly around the house. I am not an expert in public works but it seems to me that once water is on a street it should not flow back onto private property. Princess K, in the vicinity right next to Laaloa has no swale, is almost perfectly flat and is blocked from flowing makai onto Laaloa but yet Laaloa flows from mauka onto this substandard street. This should be documented in the Environmental Assessment.

A second example is even more serious and far reaching. In extremely heavy, long duration rain it is very possible that drywell and other drainage measures in the newly built intersection at Alii Drive will be inadequate. Should the water run even moderately fast from Laaloa onto Alii Drive it may not head north fast enough to drain and it will go into the driveway entrance to the Kona Onanalo, through the property and into the ocean. This is the condominium-townhouse project with detached copper-roofed hales at 77-6516 Alii Drive. Recently, after seeing the pools of water and slow runoff after moderate nighttime rain in this intersection, I think the Kona Onenalo problem must also be mentioned in the Environmental Assessment.

There are other water problems that I feel must be in the DEA, and thus in the final report. I am willing to show you or anyone from your firm, the County Dept of Public Works or any other organization these and other specific examples of current flooding problems. If you want to discuss any of these issues, please call me at 322-0056.

Mahalo for your time and consideration of this very important subject.

Gregory Bell
77-123 Laaloa Avenue
Kailua-Kona, HI 96740

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

County of Hawai'i
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May 19, 2008

Gregory Bell
77-123 La'aloa Avenue
Kailua-Kona, HI 96740

Subject: **Draft Environmental Assessment - La'aloa Avenue Extension**
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for your comment letter dated September 4, 2005, on the Draft EA. In answer to your specific comments:

1. *Flooding and drainage must be adequately addressed now, not later.* First of all, we should note that detailed analysis of drainage is not usually undertaken as part of an EA. As part of design of the roadway, there will be a detailed study including topographic survey and a drainage report, after which an engineer can size and design drainage structures. This effort cannot be undertaken until there is a commitment for the project and design funds are available. That said, we recognize that drainage is an important issue, and we can assure that if the project moves forward, roadway design will include substantial drainage improvements including provisions for "green" drainage for all additional permeable surfaces added.

2. *Extension of La'aloa Avenue mauka to create Keauhou View Estates increased runoff during construction and after completion and may increase once entire length of Kuakini Highway is finished.* The drainage plans will take into account existing drainage quantities and problems as well as new ones that might be created by the roadway itself.

3. *At intersection of La'aloa and Princess Keelikolani, water pools and flows back onto private property; EA should document flood condition here.* This information has been added to the Final EA.

4. *New intersection of La'aloa and Ali'i Drive had inadequate drywell and other drainage measures; runoff may pool and go into the driveway entrance of Kona Onanalo.* The intersection of La'aloa and Ali'i Drive will be redesigned and the drainage addressed.

Thank you for reviewing the Draft EA. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

County of Hawai'i is an Equal Opportunity Provider and Employer

77-165 La'Aloa Ave.
Kailua-Kona, HI 96740
August 29th 2005

Mr. Ron Terry
Geometrician Associates
H.C.2
P.O. Box 9575
Keaau, HI 96749

Re: La'Aloa Ave.-Kuakini Highway Extension Project

Dear Mr. Terry:

As a La'Aloa Ave. resident, here are my concerns and potential mitigation ideas on the Project. I would very much appreciate your reviewing them and accounting for them in your environmental impact assessment.

My biggest concern is safety. On July 4th 2005, my nephew, son and I were almost run over by a speeding car turning on to La'Aloa Ave. from Alii Drive—a section without sidewalks. There was also a near fatality at this intersection recently.

While one arm of Hawaii County—North Hawaii Outcome's project, much to its credit is working to reduce accidents, another arm is about to significantly increase traffic accident risk dramatically due to the La'Aloa Ave.-Kuakini Highway Extension Project.

Safety Issues:

1. Currently there is no enforcement of the 25 MPH posted speed limit, and most drivers far exceed the posted limit, on this steep-grade road.
2. Without steps being taken by the County of Hawaii to encourage adherence to the speed limit on in its present state, it is grossly negligent to add more traffic that would multiply the risk of traffic accidents.
3. At increased risk on this residential street are pedestrians, bicyclists, walkers, vacationers—adults and children, and pets: serious and even fatal injuries.

Mitigation of Safety Issues:

1. Speed bumps.
2. 3 or 4-way stop signs at all intersections.
3. Enforcement of speed limit: by Law Enforcement Officers, by radar monitors giving feedback on speed to drivers prior to periodic monitoring/ticketing enforcement by Officers.
4. "Robocops" mounted on street lights that capture speeders/license plates on camera and issue tickets automatically.
5. Sidewalks constructed on both sides of La'Aloa Ave. at the White Sands Beach development.

August 23, 2005

Geometrician Associates
H.C. 2
P,O Box 9575
Keaau, HI 96749

Attention: Ron Terry

I have been informed that your company is compiling letters from the public for the EA of the La Aloa Extension.

I'm aware that Kona needs connector roads, but it is extremely important that the county use at least calming devices on this road.

Keauhou View Estates, White Sands sub-division and Ali'i Heights are all single family residential areas. Is it possible for the county to be proactive and not denigrate the properties on this road, drive people out of their homes, due to unabated speed and the potential of heavy trucks rumbling our homes to the foundation?

There will definitely be an environmental impact on the people who live here.

As it stands, what is proposed by Public Works is a 60 foot wide road from Kuakini Hwy. to Ali'i Drive. The topography is such that in about 2 miles the elevation drops from 1000 feet to sea level.

This will cause a car's speed to increase as they go down the hill. Every reasonable person assumed there would be something done to mitigate traffic. Mr. McClure's stand is that traffic should go unimpeded without any consideration to the residents of the street.
Mr. McClure went on to say that they would put up speed limit signs of 25 MPH. The speed limit now is 25 MPH and workers and residents from half way up the hill are driving at 45 MPH. The police have been kind enough to come over and ticket speeders, but they do not have the resources to police this street on a constant basis, nor should they have to if we have good planning to begin with. We need to address the inevitable problems that will ensue if nothing is done to mitigate traffic. We shouldn't have to wait until people are injured and the quality of life of the residents becomes non-existent.

There is also the issue of limited sight distances, such as where La' Aloa crosses the proposed Ali'i By-pass, and where La Aloa meets Ali'i Drive. Sight distance is extemely limited to the left on to Ali'i not a good thing for a collector road as well as it floods to the right.

Build a connector road but please do so responsibly.
Nanci Coulter,
77-173 La' Aloa Avenue, Kailua Kona 96740

Nanci Coulter
322-5264

September 1st, 2005

Enclosed please find individually composed letters regarding the La'Aloa Extension, as well as a form letter than many residents signed because they lacked the time to compose one of their own.

These are just from Keauhou View Estates residents primarly, we didn't have time to reach the other subdivisions.

This is because the county didn't see fit to send the EA (or it's cut off to reply) to the neighborhood it most affected. We were told to go to the library, which we did (8/27)

The issues that have been raised must be replied to; and addressed in a meaningful manner. Thank you.

Nanci Coulter

Nanci Coulter
77-173 La Aloa
Kailua-Kona
96740

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

County of Hawai'i
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May 28, 2008

Nanci Coulter
77-173 La'aloa Avenue
Kailua-Kona HI 96740

Subject: Draft Environmental Assessment - La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for your comment letter dated August 23, 2005, on the Draft EA. As stated in our consultant Geometrician's initial response letter to you of October 25, 2005, we intended to develop detailed answers to the individual points raised in your letter and then provide you another response after process of community meetings and re-design that attempted to fully respond to community concerns. This process has taken longer than anticipated. As a preface to responding to your specific questions, I would like to first recap the efforts the County has undertaken to respond to community concerns and improve the design of not only the La'aloa Avenue Extension but the entire length of La'aloa Avenue.

After completion of the Draft EA in August of 2005, our Department held several meetings and received over two dozen letters. Most commenters agreed that the proposed road would provide more efficient travel connections and was vitally needed. However, they were concerned that as designed it would also have undesirable side-effects, like speeding, increased traffic, difficulty exiting driveways, visual impact, loss of neighborhood character, and decreased safety for other motor vehicles, pedestrians, bicyclists, and roadside property.

In order to resolve concerns and move the project forward, we embarked on a Context Sensitive Solution (CSS) process. CSS is a collaborative, interdisciplinary approach in which a diverse group of citizens and affected public agencies are part of an Advisory Group, formulating and evaluating alternatives from a new perspective.

The CSS process was completed with five Advisory Group meetings and one public meeting over an eight-month period that started in August, 2006. Project meetings were conducted in the vicinity of the project corridor, during the evening to allow for ease of attendance, which promoted substantial participation by 50 to 80 people per meeting. County of Hawai'i staff worked closely with consultant CH2M Hill in preparation for and during each meeting. Meeting

announcements to provide notice to the general public and local residents were made in newspaper ads, postcard mailings, and the County website.

The purpose of the Advisory Group was to represent a diverse group of project stakeholders to advise the County on the goals, values, interests, and views relating to the La'aloa Avenue corridor. A group with diverse interests was desired to ensure that competing objectives could be discussed and that the goals and values of all users were being accommodated into the transportation improvements. The range of the members' background and interests included: La'aloa Avenue and neighboring community residents, business owners, landowners, bicycle and pedestrian advocates, cultural advocates, and a resident who later became an elected County official. The goal of the CSS process was for members to discuss and provide input on a variety of variables, such as issues affecting the roadway, the importance of criteria for decision-making, the pros and cons of identified alignments, and the preferred alignment. The County of Hawai'i utilized the Advisory Group's input in its entirety in its own decision-making process.

The scale of alternative analysis in the CSS process was more extensive than the one conducted for the Draft EA. This involved both *alignment alternatives* (see attached Figure 2-3a from the Final EA), meaning the various route that the roadway might take, and *cross-section alternatives* (see attached Figure 2-4 from the Final EA), meaning the cross sections that would be developed for use in the various sections of La'aloa Avenue to achieve the project purpose, especially aspects dealing with pedestrian safety, bicycle lanes, speeding, and parking. The evaluation process focused on how well each alternative satisfied the performance measures and criteria that were developed with the assistance of the Advisory Group.

Alignment Alternatives. The Draft EA had considered two slightly different paths, named Alternatives 1 and 2, for the La'aloa Avenue Extension. Alternative 1 was more direct but steeper route, while Alternative 2 had a gentler slope and less effect on any future activities on TMK 7-7-08:114. As part of the CSS process, additional potential alternatives were developed. One commenter-suggested route north of and parallel to the existing La'aloa Avenue was carefully evaluated before ultimately being rejected for a number of reasons outlined in the Advisory Group meeting minutes. Alternative 3, a hybrid of Alternatives 1 and 2, was also developed, primarily to reduce the grade, because both Alternatives 1 and 2 required extensive earthwork and/or retaining walls. As speed, steep roadway grades and property impacts were among the identified community concerns, an alignment that dealt with these concerns was desired. Alignment 3 remained within properties already studied in full in the EA but incorporated changes to the curvature of the roadway to lengthen the extension. **Based on its performance on criteria measures and the Advisory Group's input, the County selected Alignment Alternative 3 as the preferred alignment alternative.**

Cross-Section Alternatives. After discussion of a number of possible cross-sections that could be used to achieve varying degrees of speed reduction, access control, pedestrian and bicycle safety, visual impact reduction, and motor-vehicle efficiency, two basic cross-section alternatives were settled on. Each cross-section type varied in the three different sections of the project, i.e., the Extension Section, the existing La'aloa Avenue mauka of the future Parkway, and the existing La'aloa Avenue makai of the Parkway. Both corridors had the following elements.

- Two travel lanes, and curb/gutter/sidewalk treatment the entire length from Kuakini Highway to Ali'i Drive;
- A landscaped, no-travel median (except at cross-roads) in the La'aloa Extension section;

- Striped medians with left-turn lanes at intersections in the existing La'aloa Avenue mauka of the Parkway;
- On street parking with no median in the existing La'aloa Avenue makai of the Parkway;
- Traffic calming measures to be determined after the conclusion of County/community demonstration projects;
- A traffic signal at the intersection of La'aloa Avenue and Kuakini Highway, and various intersection improvements at Ali'i Drive and Kuakini Highway.

The most important differences between the cross-section alternatives are that Cross-Section A divided the 60-foot right-of-way so as to have consistently wider travel lanes (12 to 14 feet, depending on section), which are shared with bicycles. Cross-Section B had narrower travel lanes (10 to 11 feet) to discourage speeding and a 4-6 foot dedicated bike lane along the entire length (see attached Figure 2-4). Sidewalks 7 feet wide would be constructed on both sides of the road. They would be provided both a horizontal and vertical buffer/separation from vehicular traffic by a striped bicycle lane and a curb. Bike lanes would be striped in both directions of travel, adjacent to the sidewalk. The bike lane in the mauka-bound direction would be wider to allow for the more difficult mauka movement. The mauka-bound bike lane would be 6 feet wide and the makai-bound lane 4 feet wide. **Based on the performance on criteria measures and Advisory Group input, the County selected Cross-section Alternative B the preferred cross-section alternative.**

Our Department recognizes that not all concerns about the La'aloa Avenue Extension can be completely mitigated. Nevertheless, the Context Sensitive Solutions design has resulted in the advancement of a recommended alternative that both the Advisory Group and the County of Hawai'i believe enhances the functionality of the project through greater attention to safety, mobility, preservation of neighborhood character, aesthetics, and other values.

In answer to your specific comments:

1. *Steep road grade is unsafe.* The recommended alternative for the extension section involves an alignment that has reduced the grade to the minimum steepness feasible for this extension and a cross-section with a median, a bike-lane, and a sidewalk to minimize safety problems associated with the grade.

2. *Heavy trucks are a hazard.* This problem has been minimized by reducing the grade in the extension section and providing for cross-sections below the extension section designed to reduce speeding. Traffic calming devices will also be employed, as discussed below.

3. *Use calming devices.* In order to ensure that the traffic calming methods chosen for the La'aloa Avenue Extension project truly fit the needs and desires of residents, the County of Hawai'i sponsored a temporary demonstration project along the corridor to test various devices, including speed humps, speed tables, chokers, center islands, and roundabouts. The demonstration project allowed the CSS Advisory Group and public hands-on experience with the devices and to provide opinions on the effectiveness of the devices. Speed humps and a speed table were installed in the spring of 2007. Before/after travel speed and user surveys were completed for these devices. The County plans to install additional traffic calming devices in the project vicinity and encourages the public to continue to provide comments. The final design on the La'aloa Avenue Extension

project will incorporate traffic calming methods in order to mitigate to the greatest degree we can effects on speeding and pedestrian and bicycle safety.

4. *Unabated speed.* Both the cross-section and the traffic calming devices are aimed at slowing travel speeds.

5. *Quality of residents' life will be diminished.* The County understands that traffic will increase when La'aloa Avenue is connected to Kuakini Highway and that this will affect the character of the neighborhood, particularly for those homes located on or near the lower sections of La'aloa Avenue. It is also true that without the connection, there will be no other outlet for traffic generated by the subdivisions accessed by La'aloa Avenue, also adversely affecting the quality of life. Through the CSS process the County has selected a design aimed at maximizing the benefits and minimizing the adverse effects of additional vehicles traveling on La'aloa Avenue.

6. *Cannot rely on police to constantly enforce speed limit.* Please see the discussion related to items 1-4 above concerning speed.

7. *Increased probability of accidents and injuries.* The revised conceptual design for the road will decrease speeding, which is correlated to a reduction in accidents.

8. *Limited sight distance at intersection of La'aloa Avenue and the proposed Parkway and intersection of La'aloa Avenue and Ali'i Drive.* The intersection of the Parkway will have a roundabout and adequate sight distance. The intersection at Ali'i Drive will undergo some widening, and the County will continue to monitor this intersection to determine if additional improvements are required.

9. *Flooding.* Roadway design will include substantial drainage improvements including provisions for "green" drainage for all additional permeable surfaces added.

10. *Need to address problems now.* We concur.

11. *Build a connector road but do so responsibly.* The Context Sensitive Solutions process has led to a design that has been intensively examined by the community and should lead to a road that serves the needs of Kona and the La'aloa Avenue neighborhoods in a responsible way.

We also wish to acknowledge receipt of the individually signed form letters that you attached with your communications. We have provided individual responses and mailed them for with legible names and/or mailing addresses. For your information, the following are our responses to these points.

A. *Withholding of information that La'aloa Avenue was meant to connect to Kuakini Highway.* We have no knowledge that any information was ever withheld, and our Department has certainly never withheld this information.

B. *Consider the safety of residents.* The CSS process included as one of its primary concerns the safety of residents whether at home, in their motor-vehicles, on their bicycles, or on foot. The reduction in speed that we expect to be achieved by the

combination of traffic calming devices and cross-section adjustments will increase safety.

C. *Unabated speed.* Both the cross-section and the traffic calming devices are aimed at slowing travel speeds.

D. *Restricting heavy-duty truck/commercial vehicles.* Restricting such vehicles would cause a difficulty for homeowners receiving goods or services requiring such trucks. The problem posed by heavy trucks has been minimized by reducing the grade in the extension section and providing for cross-sections below the extension section designed to reduce speeding. Traffic calming devices will also be employed, as discussed above.

E. *Noise.* With the reduction in speed that we expect to be achieved by the combination of traffic calming devices and cross-section adjustments, noise should be reduced.

F. *Lako and La'aloa opening timing.* We are hopeful that the two projects can open within a short time of each other.

Thank you for reviewing the Draft EA. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Sincerely,

Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

Flooding: Current road drainage systems cannot handle heavy rainfall without flooding; drainage augmentation/improvement needs to be incorporated in the Project.

Noise levels: Even currently, noise levels due to trucks and speeding vehicles are unacceptable. The Project will exacerbate this.

Mitigation of Noise:

1. Posted weight limits for loaded vehicles.
2. Time limits for Project Work: say 8:00 a.m. to 5:00 p.m. Right now, people working on the Alii Heights Subdivision start streaming up the hill in speeding pickups shortly after 6:00 a.m. This is totally unacceptable in a residential neighborhood.

Pollution: When heavy trucking activity occurred for the Alii Heights Subdivision, we could smell exhaust fumes in our bedroom!

Mitigation of pollution: I don't know whether this is due to vehicle exhaust emissions being out of specification or traffic density during compressed periods. Please incorporate mitigation measures for the Project—during construction and after completion.

Thank you very much,

Sincerely,

Sohrab F. Dorabji

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

County of Hawai'i
DEPARTMENT OF PUBLIC WORKS
Aupuni Center
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May 19, 2008

Sohrab F. Dorabji
77-165 La'aloa Avenue
Kailua-Kona HI 96740

Subject: Draft Environmental Assessment - La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for your comment letter dated August 29, 2005, on the Draft EA. As stated in our consultant Geometrician's initial response letter to you of October 25, 2005, we intended to develop detailed answers to the individual points raised in your letter and then provide you another response after process of community meetings and re-design that attempted to fully respond to community concerns. This process has taken longer than anticipated. As a preface to responding to your specific questions, I would like to first recap the efforts the County has undertaken to respond to community concerns and improve the design of not only the La'aloa Avenue Extension but the entire length of La'aloa Avenue.

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announcements to provide notice to the general public and local residents were made in newspaper ads, postcard mailings, and the County website.

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Our Department recognizes that not all concerns about the La'aloa Avenue Extension can be completely mitigated. Nevertheless, the Context Sensitive Solutions design has resulted in the advancement of a recommended alternative that both the Advisory Group and the County of Hawai'i believe enhances the functionality of the project through greater attention to safety, mobility, preservation of neighborhood character, aesthetics, and other values.

In answer to your specific comments:

1. *Safety.* We are sorry to hear that you that your family had a near-disaster experience on La'aloa Street. As discussed above, the CSS process included as one of its primary concerns the safety of residents whether at home, in their motor-vehicles, on their bicycles, or on foot. The reduction in speed that we expect to be achieved by the combination of traffic calming devices and cross-section adjustments will increase safety. The recommended alternative for the extension section involves an alignment that has reduced the grade to the minimum steepness feasible for this extension and a cross-section with a median, a bike-lane, and a sidewalk to minimize safety problems associated with the grade. We agree that some of the measures you outline – "Robocop" cameras, radar signs, and constant police presence, would help reduce speeding on this and all the other streets in the County, but there are not enough resources to employ them everywhere they might be needed.

2. *Noise caused by trucks and speeding cars.* With the reduction in speed that we expect to be achieved by the combination of traffic calming devices and cross-section adjustments, noise should be reduced

3. *Pollution caused by truck exhaust or traffic density.* Pollution will occur in association with any road, but poor traffic Levels of Service lead to the worst pollution, as motor vehicles idle. If the connection is not established, traffic at and near Ali'i Drive will

remain congested, leading to worse levels of pollution than without the connection. We will attempt to mitigate construction-phase pollution to some degree by specifying as part of the contract how and when and vehicles and material will be moved to the site In addition, a CSS meeting related to construction activities will be conducted prior to commencement of construction.

4. *Flooding – insufficient road drainage.* Roadway design will include substantial drainage improvements including provisions for "green" drainage for all additional permeable surfaces added.

5. *Limit hours for project work from 8 to 5.* For reasons of noise and traffic, work will be limited to off-peak hours, and no night-time work will be allowed. Some weekend work may be necessary in order to expedite the finish of the project.

Thank you for reviewing the Draft EA. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Sincerely,

Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

The county has decided that La'Aloa Avenue will be a through road, because it was reserved back in the 70's to be so. This fact was withheld from the residents, by both Towne Development and the county. (as of 7/3/05)

Be that as it may, in the 70's Keauhou View Estates, Ali'i Heights, and Ali'i Mauka did not exist. The county must realize that the safety of the residents must be considered.

It really doesn't matter that public works sees this as the only street open to carry large number of cars,unthwarted by the citizen's needs. We are here, our voices will be heard!

Safety in a single-family residential areas must be respected.

Traffic that has no mitigation devices will by design be dangerous to our neighborhood.

Speed down an 8% grade will be unabated , creating a greater probability of accidents. The county feels that installing 25 mph speed limits should suffice to "calm" traffic. We have 25 mph signs now and traffic travels at 45 mph.

The county was non-commital about allowing heavy trucks down our street- this is an outrage!

The noise level will rise (The EA draft supports this) and our quality of life will diminish.

Mr. McClure said if our street was not the only collector street then maybe they could install stop signs or a traffic round at the Ali'i By-pass. Let us fix that! Open Lako and La' Aloa concurrently so we are not the only street carrying Kona's traffic problems.

Dorothy Gee
77-155 La'Aloa Ave
K.K.

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

County of Hawai'i
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May 19, 2008

Dorothy Gill
77-155 La'aloa Avenue
Kailua-Kona HI 96740

Subject: Draft Environmental Assessment - La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for your comment letter mailed to us by Ms. Nanci Coulter on or about September 1, 2005, on the above-referenced Draft EA. In answer to your specific comments:

A. *Withholding of information that La'aloa Avenue was meant to connect to Kuakini Highway.* We have no knowledge that any information was ever withheld, and our Department has certainly never withheld this information.

B. *Consider the safety of residents.* The CSS process included as one of its primary concerns the safety of residents whether at home, in their motor-vehicles, on their bicycles, or on foot. The reduction in speed that we expect to be achieved by the combination of traffic calming devices and cross-section adjustments will increase safety.

C. *Unabated speed.* Both the cross-section and the traffic calming devices are aimed at slowing travel speeds.

D. *Restricting heavy-duty truck/commercial vehicles.* Restricting such vehicles would cause a difficulty for homeowners receiving goods or services requiring such trucks. The problem posed by heavy trucks has been minimized by reducing the grade in the extension section and providing for cross-sections below the extension section designed to reduce speeding. Traffic calming devices will also be employed, as discussed above.

E. *Noise.* With the reduction in speed that we expect to be achieved by the combination of traffic calming devices and cross-section adjustments, noise should be reduced.

F. *Lako and La'aloa opening timing.* We are hopeful that the two projects can open within a short time of each other.

Thank you for reviewing the Draft EA. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

County of Hawai'i is an Equal Opportunity Provider and Employer

Mr Ron Terry
Geometrician Associates
H.C.2
PO Box 9575
Keaau, HI 96749

Re: Laaloa Ave - Kuakini Hwy Extension Project

Dear Mr Terry, August 31, 2005

Being a home-owner in the area affected by the above named project, I hereby forward to you my concerns and views, etc. for the list of information that you collect, to be added to the environmental impact assessment of the project on the neighborhood and its residents.

1. **HOMES ALONG LAALOA AVE.**
   This is a moot point by now but it is meant to be for the record and in the hope that the County Council and the PWD will avoid the same thing from happening to future connector roads.
   The issue is this: knowing for some 30 odd years that Laaloa Ave is planned to be a connector road, **houses should never have been built directly along the street with their fronts facing the street.** Frontage roads, paralel to both sides of Laaloa shoud have been constructed which, with the various sidestreets, would have become the **proper** infrastructure for the various developments.

2. **OTHER CONNECTOR ROADS.**
   Considering that homes are built along Laaloa Ave (see ietm 1) which will be greatly impacted by the increase in traffic and the subsequent noise level, why not start a new major road construction to connect Alii Drive with Kuakini Hwy and do everything right from the beginning. This could be the road starting at Pahoehoe Beach Park.
   And when will the Lako street - Alii Drive be restarted and completed?

3. **QUALITY OF RESIDENCY (QR).**
   The quality of residency at Laaloa Ave is greatly dependend on the amount of traffic and noise that is generated. The Environmental Assessment (EA) of the Department of Public Works give estimates for both, but they are based on data that may very well not match the reality, especially as more subdivisions are being built around Laaloa Ave and more residents are coming to live on the Kona-side of the island. Think 2006 -2008. Then what is the County and the DPW going to do, to bring traffic and noise under control?
   Another concern I have is that the property value will decline, a loss I must bear. Have he County and the DPW any consideration for that fact?

4. **SAFETY ISSUES.**
   The safety issues have all to do with motorized traffic in and Laaloa Ave.
   Please consider the following rules (or principles):
   A. Where there is traffic, there will be accidents.
   B. Where there is more traffic, there will be more accidents.
   C. Where there are speeders who excessively violate the speedlimit, the number of accidents will skyrocket (exponential increase).
   D. At low speeds, an accident may be a fenderbender. At higher speeds, serious injuries and even fatalities can be expected.

8/31/05 8/31/05

Herbert W. Hall date Henriette Hall date

4. SAFETY ISSUES, contiued.

Now apply the above rules A - D to Laaloa Ave,

- o A typical residential street with houses facing the street, a posted 25 mph speedlimit, where adults and childern walk and bike, where there are vacationers going to the beaches, children beig picked up by schoolbuses and pets.
  Note that the White Sands Beach Estates' part of Laaloa Ave has presently no sidewalks at all and two, 10-11 ft/each wide lanes separated by badly faded double yellow lines.
- o Laaloa Ave is made a right-of-way street (a through-street), no stoplights or stopsigns except at Alii Drive.
- o Laaloa Ave is built on an 8 degree (ave) incline.
- o Even now there are a large number of speed violators doing 45 mph and over. The police has on occasion set speedtraps but it is not their duty to constantly patrol Laaloa Ave.

Here are the obvious predictions that If the prevailing conditions are not properly addressed that is if the street LOS A/B are insisted on, meaning Laaloa remains an unrestricted thoroughfare,

- o. The increased traffic will go up and down Laaloa at dangerously increased speeds.
- o. The results will be a host of serious or fatal accidents.
- o A run-away car or worse, a truck, may do serious damage to life and property.
  (This happend in 2003 when an 18-wheeler lost two wheels on an axle while going down on Laaloa Ave, which killed a public department worker. The truck damaged property before coming to a stop way down the street).
  What does the DPW propose to solve that rpoblem?

Necessary restrictions must be applied to help keep the traffic flowing at speeds within the 25 mph speedlimit and that will allow cross street traffic access to Laaloa Ave.

- o **Stopsigns** - three or fourway - must be installed at most of Laaloa's sidestreet, except where they are too closely following. Example: if a stopsigns were installed at Luplupa Wy and at Princess Keelikolani, no stopsign would be needed for Naniloa.
- o An occasional speedbump where the distance between two stopsigns is large.
- o Definitely a threeway stopsign at the Laaloa Ave - Alii Drive intersection for the following two reasons:
  - + To prevent traffic backup at Laaloa Ave.
  - + To prevent accidents. Sight distance along Alii Drive is limited because of a bend in the road. and traffic on Alii Drive often moves much faster than the posted 30 mph.

5. NOISELEVEL ISSUE.

Estimates were made in the EA of the DPW, however, they remain estimates. The rumble of the big construction trucks and the staccato sound of their jackbrakes are still fresh in my ear. Combine that with the sound of car tires and far worse, the high whining sound of motorscooters and the loud, penetrating scream of motorcycles and that is what will be awaiting Laaloa Ave residents when the street opens to Kuakini Hwy and the traffic flow really starts. And since there will be no time limit to the traffic, some of the noise will be there at night as well.

Please consider and adopt the following limitations.

a. A loadlimit on trucks.
b. A time limit for commercial trucks to pass through Laaloa Ave, say only between 7AM - 7PM.

The question is, what will the County and the DPW do for countermeasures should the noiselevel be unacceptable? Another item to be prepared for to act on.

8/31/05 — Herbert W. Hall — date

8/31/05 — Henriette Hall — date

6. **QUALITY OF LIFE (QOL).**
The QOL for the homeowner at Laaloa Ave depends on the amount of traffic, the level of noise it generates, the duration and the timing of the noise and whether the safety concerns are receiving the proper and adequate attention or not. And the level of satisfaction to the homeowner is determined by how willing the county government and the DPW are to listen to the homeowners' concerns, how proactive they will be to find adequate and acceptable solutions. Their help may even involve the reviewing of rules and regulations and where possible to make the necessary amendments or the waiving of the rules and regulations in line with the situation.

7. **MISCELLANEOUS.**
Suggestion: Laaloa Ave at the Laaloa Bypass section may be a round-about. Stopsigns there?

8. **PERSONAL VIEWS.**
I hope that what I said in item 1 will become a standard for the infrastructure of future develoments that are build along a (major) connector road.

Thank you for including this letter in the Environmental Impact Assessment section of the Laaloa Ave - Kuakini Hwy Extension Project.

Sincerely,

8/31/05 — Herbert W. Hall — date

8/31/05 — Henriette Hall — date

Homeowners
77-157 Laaloa Ave
Kailua Kona
Hi 96740 -2435

Mr Bob Yanabu
Project Engineer
Dept of Public Works
75-5706 Kuakini Hwy
Kailua-Kona, HI 96740

November 17, 2005

Re: La'aloa Street Extension Project

Dear Mr Yanabu,

Allow me to introduce myself. I am a homeowner in La'aloa Ave - my wife and I are retirees. For 39 years I was employed in the semicondutor industry in the Bay Area in California. In the course of the years I worked in both R&D and in Manufacturing. As an Engineer I worked on processes involving chemistry, physics, documentation and also logistics and industrial ergonomics. I was also the safety coordinator for my department.
What I am driving at is that you and I have two major items in common, one, we are Engineers and we understand processes and what is involved to do a project to ensure it is right from the start. Henceforth we can communicate well, by the use of principles.

What could have been.
Having said this I am borrowing the "What if.....," question from Hewlett and Packard Co in the following context.
What if....., the homes on La'aloa Ave had been built along frontage roads (either one or two roads) parallel to La'aloa Ave. You will immediately recognize the advantages to all parties when La'aloa Ave opens as a Major Collector Road.

1. It would have separated the homes from La'aloa Ave and set them back a distance.
2. It would have been so much safer for residents, adults and children, to walk along a residential street.
3. There would have been ample opportunity to plan for a sound barrier and a collision barrier along La'aloa Ave.
4. The speedlimit could have been increased to 30 mph.
5. Let me just say, etcetera.

This advance planning would have been in line with Hewlett and Packard's most famous saying: **"Do it right, the first time!"**

The crucial mistake.
As the homes are built on La'aloa Ave, the exact opposite is true, **"it was done the wrong way from the beginning".** The houses are at La'aloa Ave, which is now a residential street at 25 mph speedlimit.
My experience as an Industrial Ergonomic Engineer has taught me that once a process

area has been established without taking Ergonomics in consideration, it becomes either very expensive to apply a solution or is impossible without major reconstruction of the process-area. Conversely, it will now be impossible to build a sound and collision barrier along La'aloa Ave.
Another principle I learned from Ergonmics is that in order to prevent injury to muscle, bone and nerve systems, any physical activity must be slowed down, be restricted to only a number of hours per day while personnel-rotation is required. This example applies to traffic speed in La'aloa Ave. In order to prevent tragic accidents from occurring, the speedlimit on La'aloa Ave must be maintained at 25 mph which requires the installation of speed bumps.

Enough said, here is the point. **The County Council made the crucial mistake** allowing the homes on La'aloa Ave to be built the way they are.
Now to impose the classification of Major Collector Road on La'aloa Ave, is like trying to fit a size 8 shoe on a size 10 foot! Except there is not a shred of humor in the reality. The ramifications to the La'aloa Ave and neighborhood residents is **horrific**, in terms of high danger, noise, no parking in the street and other restrictions. In fact, so horrific that I can not think of any rational person with a semblance of a heart who would force the project down the residents' throat. The best medicine is always to put oneself in the other person's shoes.

Conclusion.
Valid and impelling reasons have been here presented to request reclassification of the La'aloa Extension Project from a "Major Collector Road" to a "Residential Road with Restrictions" (such as for instance "access to residents only", vehicle weight limits, but also the installation of speed bumps and sidewalks along all of La'aloa Ave).

Other options.
There are other options for the County to pursue.
1. The "Lako street Extension", where the homes on Lako street are oriented more favorably to allow for Lako street to be a (Major) Collector Road.
2. The experience gained from the La'aloa Ave Project can now fully be applied to the building of a new Major Collector Road between Alii Drive and Kuakini Hwy, which is the road to be built from Pahoehoe Beach Park up.

In closing.
I have been direct, I have been blunt maybe, but the situation is serious for us at La'aloa Ave. I count on it that at the Cty Council, at the Mayor's office and at the Dept of PW, the decision-making authorities will have an ear and their heart open for the real and valid concerns of the La'aloa Ave people and the whole neighborhood there.

Thank you for your understanding, for your all the help and support you can give us. It is my personal observation that the face in the mirror I see is basically that of my conscience. I am glad that I can meet the image's eyes without flinching. That is not because I am so perfect. It is for having a heart and an ear open for others. I wish this to be so for everyone.
Lastly, I will be looking forward to meeting with you in person at the November 29th Open House at the King Kam Hotel.

Sincerely,

Herbert W. and Henriette Hall.

Herbert W. and Henriette Hall
77-157 La'aloa Ave
Kailua Kona - HI 96740
Ph 322-5270

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

County of Hawai'i
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May 28, 2008

Herbert W. Hall
Henriette Hall
77-157 La'aloa Avenue
Kailua-Kona HI 96740

Subject: Draft Environmental Assessment - La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for your comment letters dated August 31 and November 17, 2005, on the Draft EA. As stated in our consultant Geometrician's initial response letter to you of October 25, 2005, we intended to develop detailed answers to the individual points raised in your letter and then provide you another response after process of community meetings and re-design that attempted to fully respond to community concerns. This process has taken longer than anticipated. As a preface to responding to your specific questions, I would like to first recap the efforts the County has undertaken to respond to community concerns and improve the design of not only the La'aloa Avenue Extension but the entire length of La'aloa Avenue.

After completion of the Draft EA in August of 2005, our Department held several meetings and received over two dozen letters. Most commenters agreed that the proposed road would provide more efficient travel connections and was vitally needed. However, they were concerned that as designed it would also have undesirable side-effects, like speeding, increased traffic, difficulty exiting driveways, visual impact, loss of neighborhood character, and decreased safety for other motor vehicles, pedestrians, bicyclists, and roadside property.

In order to resolve concerns and move the project forward, we embarked on a Context Sensitive Solution (CSS) process. CSS is a collaborative, interdisciplinary approach in which a diverse group of citizens and affected public agencies are part of an Advisory Group, formulating and evaluating alternatives from a new perspective.

The CSS process was completed with five Advisory Group meetings and one public meeting over an eight-month period that started in August, 2006. Project meetings were conducted in the vicinity of the project corridor, during the evening to allow for ease of attendance, which promoted substantial participation by 50 to 80 people per meeting. County of Hawai'i staff worked closely with consultant CH2M Hill in preparation for and during each meeting. Meeting

announcements to provide notice to the general public and local residents were made in newspaper ads, postcard mailings, and the County website.

The purpose of the Advisory Group was to represent a diverse group of project stakeholders to advise the County on the goals, values, interests, and views relating to the La'aloa Avenue corridor. A group with diverse interests was desired to ensure that competing objectives could be discussed and that the goals and values of all users were being accommodated into the transportation improvements. The range of the members' background and interests included: La'aloa Avenue and neighboring community residents, business owners, landowners, bicycle and pedestrian advocates, cultural advocates, and a resident who later became an elected County official. The goal of the CSS process was for members to discuss and provide input on a variety of variables, such as issues affecting the roadway, the importance of criteria for decision-making, the pros and cons of identified alignments, and the preferred alignment. The County of Hawai'i utilized the Advisory Group's input in its entirety in its own decision-making process.

The scale of alternative analysis in the CSS process was more extensive than the one conducted for the Draft EA. This involved both alignment alternatives (see attached Figure 2-3a from the Final EA), meaning the various route that the roadway might take, and cross-section alternatives (see attached Figure 2-4 from the Final EA), meaning the cross sections that would be developed for use in the various sections of La'aloa Avenue to achieve the project purpose, especially aspects dealing with pedestrian safety, bicycle lanes, speeding, and parking. The evaluation process focused on how well each alternative satisfied the performance measures and criteria that were developed with the assistance of the Advisory Group.

Alignment Alternatives. The Draft EA had considered two slightly different paths, named Alternatives 1 and 2, for the La'aloa Avenue Extension. Alternative 1 was more direct but steeper route, while Alternative 2 had a gentler slope and less effect on any future activities on TMK 7-7-08:114. As part of the CSS process, additional potential alternatives were developed. One commenter-suggested route north of and parallel to the existing La'aloa Avenue was carefully evaluated before ultimately being rejected for a number of reasons outlined in the Advisory Group meeting minutes. Alternative 3, a hybrid of Alternatives 1 and 2, was also developed, primarily to reduce the grade, because both Alternatives 1 and 2 required extensive earthwork and/or retaining walls. As speed, steep roadway grades and property impacts were among the identified community concerns, an alignment that dealt with these concerns was desired. Alignment 3 remained within properties already studied in full in the EA but incorporated changes to the curvature of the roadway to lengthen the extension. **Based on its performance on criteria measures and the Advisory Group's input, the County selected Alignment Alternative 3 as the preferred alignment alternative.**

Cross-Section Alternatives. After discussion of a number of possible cross-sections that could be used to achieve varying degrees of speed reduction, access control, pedestrian and bicycle safety, visual impact reduction, and motor-vehicle efficiency, two basic cross-section alternatives were settled on. Each cross-section type varied in the three different sections of the project, i.e., the Extension Section, the existing La'aloa Avenue mauka of the future Parkway, and the existing La'aloa Avenue makai of the Parkway. Both corridors had the following elements.

- Two travel lanes, and curb/gutter/sidewalk treatment the entire length from Kuakini Highway to Ali'i Drive;
- A landscaped, no-travel median (except at cross-roads) in the La'aloa Extension section;

- Striped medians with left-turn lanes at intersections in the existing La'aloa Avenue mauka of the Parkway;
- On street parking with no median in the existing La'aloa Avenue makai of the Parkway;
- Traffic calming measures to be determined after the conclusion of County/community demonstration projects;
- A traffic signal at the intersection of La'aloa Avenue and Kuakini Highway, and various intersection improvements at Ali'i Drive and Kuakini Highway.

The most important differences between the cross-section alternatives are that Cross-Section A divided the 60-foot right-of-way so as to have consistently wider travel lanes (12 to 14 feet, depending on section), which are shared with bicycles. Cross-Section B had narrower travel lanes (10 to 11 feet) to discourage speeding and a 4-6 foot dedicated bike lane along the entire length (see attached Figure 2-4). Sidewalks 7 feet wide would be constructed on both sides of the road. They would be provided both a horizontal and vertical buffer/separation from vehicular traffic by a striped bicycle lane and a curb. Bike lanes would be striped in both directions of travel, adjacent to the sidewalk. The bike lane in the mauka-bound direction would be wider to allow for the more difficult mauka movement. The mauka-bound bike lane would be 6 feet wide and the makai-bound lane 4 feet wide. **Based on the performance on criteria measures and Advisory Group input, the County selected Cross-section Alternative B the preferred cross-section alternative.**

Our Department recognizes that not all concerns about the La'aloa Avenue Extension can be completely mitigated. Nevertheless, the Context Sensitive Solutions design has resulted in the advancement of a recommended alternative that both the Advisory Group and the County of Hawai'i believe enhances the functionality of the project through greater attention to safety, mobility, preservation of neighborhood character, aesthetics, and other values.

In answer to your specific comments:

August 25, 2005 letter:

1. *Homes along La'aloa Avenue should never have been built.* Your statement is acknowledged.

2. *Other connector roads.* Both the original EA and the CSS process took a hard look at potential alternative routes, and none were acceptable because all had greater impacts that the proposed route.

3. *Quality of residency.* The County understands that traffic will increase when La'aloa Avenue is connected to Kuakini Highway and that this will affect the character of the neighborhood, particularly for those homes located on or near the lower sections of La'aloa Avenue. It is also true that without the connection, there will be no other outlet for traffic generated by the subdivisions accessed by La'aloa Avenue, also adversely affecting the quality of life. Through the CSS process the County has selected a design aimed at maximizing the benefits and minimizing the adverse effects of additional vehicles traveling on La'aloa Avenue. The project will help preserve the quality of life and property values for all of the La'aloa area. We believe the more damaging effect to property values would be to fail to build the La'aloa Extension and improve La'aloa Avenue, which would subject every home to unmitigable traffic congestion that would grow through time.

4. *Safety issues.* We appreciate your in-depth analysis of the factors leading to potentially unsafe conditions, which you wrote before the CSS process. This process included as one of its primary concerns the safety of residents whether at home, in their motor-vehicles, on their bicycles, or on foot. The reduction in speed that we expect to be achieved by the combination of traffic calming devices and cross-section adjustments will increase safety.

5. *Noise and load limits or time of day limits on trucks.* With the reduction in speed that we expect to be achieved by the combination of traffic calming devices and cross-section adjustments, noise should be reduced. If noise levels appear to be unacceptably high after opening the La'aloa Extension we are willing to consider an additional noise study and measures such as load limits or time of day restrictions for trucks.

6. *Quality of life.* We hope that the design that was developed together with the community through the CSS process will minimize any degradation to the quality of life. We at DPW have been happy to work with the community through this process. We agree that there should be periodic review of rules and regulations that deal with the impacts of roads.

7. *Roundabout at La'aloa "Bypass".* We are not sure which intersection you are referring to. The Kahului-Keauhou Parkway (also called Ali'i Highway) intersection will have a roundabout when that road is built.

8. *Use of frontage roads.* Frontage roads are one approach to reducing road proximity impacts. Large unsubdivided buffer strips, larger lots at the front with greater setbacks, and a denser network of collector roads are other approaches that can work.

November 17, 2005 letter:

1. *Frontage roads.* Please see our response to Questions 1 and 8 of the August letter.

2. *Lako Street as an alternative.* The County plans to pursue both of these roads as mauka-makai connectors.

Thank you for reviewing the Draft EA and participating in the CSS process. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Sincerely,

Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

August 31, 2005

Mr. Ron Terry
Geometrician Associates
HC2
PO Box 9545
Kea'au, HI 96749

Dear Mr. Terry,

As a resident in the Keauhou View Estates on La 'aloa Ave, I hereby am forwarding to you my concerns in regards to the Environmental Impact Study for the La 'aloa Ave. Public Works Project.

I. Safety Issues/Concern

- The Environment Impact report does not address the real central traffic issue. The original study was built around the Keauhou View Estates development, prior to the new developments, Alii Heights and Alii Mauka.
- Heavy Vehicles- especially trucks coming down a 16% grade is a big concern.
- What type of traffic controls is being proposed for La'aloa Ave.?
- Are Bike lanes being developed? Walk ways? School bus routes and stops?
- The driveways currently back out onto La'aloa Ave. What precautionary measure is being addressed to resolve this problem?
- The study does not address the 16% grade road from Kuakini Hwy on to La'aloa Ave. Why? Isn't 8% or higher considered unsafe?

II. Noise Level

- The Environment Impact Study does not address the true projected noise level with the increased traffic. The study addresses the noise level of the original Keauhou View Estate development only. The newest developments, Alii Heights and Alii Mauka were not considered.
- What solutions are being implemented to restrict heavy-duty truck/commercial vehicles on La'aloa Ave?

III. Design Features/concerns

- What speed/calming methods are being planned? Nothing was addressed in the ERI study.
- Is there a "green belt" proposal for the upper La 'aloa Ave.?
- How is the flood zone problem being addresses on the cross street of Alii Dr. and La 'aloa Ave?
- Are trees, chevrons, bollard, being considered to assist in calming the noise?

- Why can't Alii Parkway, Lako Rd., and La 'aloa Ave. open at the same time?
- What is the status on Lako Rd.?
- What is the status on Alii Parkway?
- What happen to the original County Park plans for Keauhou View Estates?
- Why not consider a new thru way as mentioned in the Environment Report, Pahoehoe Park on Alli Drive to Kuakini Hwy?
- The ERI does not address the de-valuation of real property on La'aloa Ave. as a result of the La'aloa Work Project. WHY?
- What is being considered to maintain our property values?

The county government needs to have an effective plan with consideration for home value, safety, noise pollution, and aesthetic to blend with the Keauhou View Estates community.

Dr. Mike A. Hernandez,

Theresa Hernandez,

77-156 La Aloa Ave
Kailua-Kona, Hi 96740
808.322.5025

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
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May 19, 2008

Dr. Mike A. Hernandez
Theresa Hernandez
77-156 La'aloa Avenue
Kailua-Kona HI 96740

Subject: Draft Environmental Assessment - La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

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- Striped medians with left-turn lanes at intersections in the existing La'aloa Avenue mauka of the Parkway;
- On street parking with no median in the existing La'aloa Avenue makai of the Parkway;

- Traffic calming measures to be determined after the conclusion of County/community demonstration projects;
- A traffic signal at the intersection of La'aloa Avenue and Kuakini Highway, and various intersection improvements at Ali'i Drive and Kuakini Highway.

The most important differences between the cross-section alternatives are that Cross-Section A divided the 60-foot right-of-way so as to have consistently wider travel lanes (12 to 14 feet, depending on section), which are shared with bicycles. Cross-Section B had narrower travel lanes (10 to 11 feet) to discourage speeding and a 4-6 foot dedicated bike lane along the entire length (see attached Figure 2-4). Sidewalks 7 feet wide would be constructed on both sides of the road. They would be provided both a horizontal and vertical buffer/separation from vehicular traffic by a striped bicycle lane and a curb. Bike lanes would be striped in both directions of travel, adjacent to the sidewalk. The bike lane in the mauka-bound direction would be wider to allow for the more difficult mauka movement. The mauka-bound bike lane would be 6 feet wide and the makai-bound lane 4 feet wide. **Based on the performance on criteria measures and Advisory Group input, the County selected Cross-section Alternative B the preferred cross-section alternative.**

Our Department recognizes that not all concerns about the La'aloa Avenue Extension can be completely mitigated. Nevertheless, the Context Sensitive Solutions design has resulted in the advancement of a recommended alternative that both the Advisory Group and the County of Hawai'i believe enhances the functionality of the project through greater attention to safety, mobility, preservation of neighborhood character, aesthetics, and other values.

In answer to your specific comments:

1. *Prior noise and traffic studies obsolete.* It is true that studies are often somewhat obsolete before the projects that implement them are able to be built. That is why we attempt to account for potential future actions and generally model in a conservative manner. We believe that the studies are adequate to demonstrate that noise or traffic impacts will be better with a functional connector road rather than a dead-end road with no outlet.

2. *Steep road grade is unsafe.* While eight percent is a desirable maximum for busier roads, the steep topography in Kona does not allow this in many areas. The recommended alternative for the extension section involves an alignment that has reduced the grade to the minimum steepness feasible for this extension and a cross-section with a median, a bike-lane, and a sidewalk to minimize safety problems associated with the grade.

3. *Traffic controls.* Please refer to the material above for this information.

4. *Mitigation of hazard posed by driveways backing out onto La'aloa Avenue.* We suggest that residents consider re-orienting their parking areas inside their lots to allow for front entry and exit, or at the very least to exercise extreme caution when backing out of driveways during times of heavy traffic.

5. *Noise and restrictions on trucks.* Please see our response to Question 1, above, regarding the noise study. Prohibiting such vehicles would cause a difficulty for homeowners receiving goods or services requiring such trucks. The problem posed by heavy trucks has been minimized by reducing the grade in the extension section and providing for cross-sections below the extension section designed to reduce speeding. Traffic calming devices will also be employed, as discussed below. If noise levels appear to be unacceptably high after opening the La'aloa Extension we are willing to consider an

additional noise study and measures such as load limits or time of day restrictions for trucks.

6. *Traffic calming, bike lanes, walkways, school bus routes and stops.* Please see the material at the beginning of the letter for the answer to your questions about design features involving traffic calming.

7. *Will there be a "green belt" for upper La'aloa Avenue?* The characteristics of the developments in the extension section will depend on the landowner's designs coupled with conditions imposed during rezoning and subdivision. We will be recommending a minimum number of roadways and at least 30-foot setbacks for homes.

8. *Flooding at cross street of Ali'i Drive and La'aloa Avenue.* Roadway design will include substantial drainage improvements including provisions for "green" drainage for all additional permeable surfaces added. Not all existing flood problems will be completely fixed, but no additional drainage problems will result.

9. *Want Ali'i Parkway, Lako Road, and La'aloa Avenue to open simultaneously.* We are hopeful that the Lako Street and La'aloa Avenue can open within a short time of each other. The status of the Keauhou-Kahului Parkway (also called Ali'i Highway or Parkway) is less certain because of its dependence of federal funding, unlike Lako Street and La'aloa Avenue.

10. *What happened to the original County Park plans for Keauhou View Estates?* The construction of a County Park was not related to our project. We suggest that questions regarding this park be directed to the Planning Department and the Department of Parks and Recreation.

11. *Alternative connector roads.* Both the original EA and the CSS process took a hard look at potential alternative routes, and none were acceptable because all had greater impacts that the proposed route, including the alternate route to the south that would terminate at Pahoehoe Park.

12. *Property values will decrease.* The project will help preserve the quality of life and property values for all of the La'aloa area. We believe the more damaging effect to property values would be to fail to build the La'aloa Extension and improve La'aloa Avenue, which would subject every home to unmitigable traffic congestion that would grow through time.

Thank you for reviewing the Draft EA. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Sincerely,

Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

A The county has decided that La'Aloa Avenue will be a through road, because it was reserved back in the 70's to be so. This fact was withheld from the residents, by both Towne Development and the county. (as of 7/3/05)

B Be that as it may, in the 70's Keauhou View Estates, Ali'i Heights, and Ali'i Mauka did not exist. The county must realize that the safety of the residents must be considered.

It really doesn't matter that public works sees this as the only street open to carry large number of cars,unthwarted by the citizen's needs. We are here, our voices will be heard!

Safety in a single-family residential areas must be respected.

Traffic that has no mitigation devices will by design be dangerous to our neighborhood.

C Speed down an 8% grade will be unabated , creating a greater probability of accidents. The county feels that installing 25 mph speed limits should suffice to "calm" traffic. We have 25 mph signs now and traffic travels at 45 mph.

D The county was non-commital about allowing heavy trucks down our street- this is an outrage!

E The noise level will rise (The EA draft supports this) and our quality of life will diminish.

F Mr. McClure said if our street was not the only collector street then maybe they could install stop signs or a traffic round at the Ali'i By-pass. Let us fix that! Open Lako and La' Aloa concurrently so we are not the only street carrying Kona's traffic problems.

Tony & Denise Hernandez
77-180 Kapu Kapu ST.

FORMER LAALOA RESIDENT WHO MOVED BECAUSE OF SPEEDING VEHICLES (TRUCKS, RESIDENTS, CONSTRUCTION TRAFFIC). CALLS TO COUNTY, MENTAL HEALTH, COUNCIL MEMBERS, WENT NO WHERE!

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

County of Hawai'i
DEPARTMENT OF PUBLIC WORKS

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May 19, 2008

Tony & Denise Hernandez
77-180 Kapu Kapu Street
Kailua-Kona HI 96740

Subject: **Draft Environmental Assessment - La'aloa Avenue Extension**
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for your comment letter mailed to us by Ms. Nanci Coulter on or about September 1, 2005, on the above-referenced Draft EA. In answer to your specific comments:

A. *Withholding of information that La'aloa Avenue was meant to connect to Kuakini Highway.* We have no knowledge that any information was ever withheld, and our Department has certainly never withheld this information.

B. *Consider the safety of residents.* The CSS process included as one of its primary concerns the safety of residents whether at home, in their motor-vehicles, on their bicycles, or on foot. The reduction in speed that we expect to be achieved by the combination of traffic calming devices and cross-section adjustments will increase safety.

C. *Unabated speed.* Both the cross-section and the traffic calming devices are aimed at slowing travel speeds.

D. *Restricting heavy-duty truck/commercial vehicles.* Restricting such vehicles would cause a difficulty for homeowners receiving goods or services requiring such trucks. The problem posed by heavy trucks has been minimized by reducing the grade in the extension section and providing for cross-sections below the extension section designed to reduce speeding. Traffic calming devices will also be employed, as discussed above.

E. *Noise.* With the reduction in speed that we expect to be achieved by the combination of traffic calming devices and cross-section adjustments, noise should be reduced.

F. *Lako and La'aloa opening timing.* We are hopeful that the two projects can open within a short time of each other.

Thank you for reviewing the Draft EA. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

County of Hawai'i is an Equal Opportunity Provider and Employer

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The noise level will rise (The EA draft supports this) and our quality of life will diminish.

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Dave Howell & Sharon Howell
77-154 LaaLaa ST
322-4101

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

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www.co.hawaii.hi.us

May 19, 2008

Dave & Sharee Howell
77-154 Laelae Street
Kailua-Kona HI 96740

Subject: Draft Environmental Assessment - La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for your comment letter mailed to us by Ms. Nanci Coulter on or about September 1, 2005, on the above-referenced Draft EA. In answer to your specific comments:

A. *Withholding of information that La'aloa Avenue was meant to connect to Kuakini Highway.* We have no knowledge that any information was ever withheld, and our Department has certainly never withheld this information.

B. *Consider the safety of residents.* The CSS process included as one of its primary concerns the safety of residents whether at home, in their motor-vehicles, on their bicycles, or on foot. The reduction in speed that we expect to be achieved by the combination of traffic calming devices and cross-section adjustments will increase safety.

C. *Unabated speed.* Both the cross-section and the traffic calming devices are aimed at slowing travel speeds.

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County of Hawai'i is an Equal Opportunity Provider and Employer.

Mr. Galen Kuba - Chief Engineer
Hawai'I County Department of Public Works
101 Aupuni Street, Ste 7
Hilo, Hawaii 96720

September 7, 2005

RE: My Comments on the Draft Environmental Assessment for the La'aloa Street Extension

Dear Mr. Kuba,

Since the La'aloa Extension is going to run through neighborhoods (especially an existing one with dozens of driveways) and since it will be lined with sidewalks (for our current and future pedestrians) then **TRAFFIC CALMING SHOULD BE REQUIRED** as follows:

1) Keep the slope of the future extension at no more than 8% so that if speeding should become a problem for the future residents of that neighborhood and should they ask for traffic calming, the county won't be able to give them the "too steep" excuse as was done on Lako Street, etc.,

2) Install speed humps at every spot on the existing La'aloa Street (I think there were 3 spots) where the slope is at 8% or less,

3) Install chicanes at all other spots on the existing La'aloa Street where traffic calming is needed but the slope is greater than 8%,

4) Install traffic circles at all intersections on the existing La'aloa Street.

We cannot keep building collector roads that function like Kamehameha III Road when we are placing these collector roads through existing and future neighborhoods where pedestrian safety will be an issue. The only safe pedestrian collector road is a traffic calmed road.

Since the County's current Traffic Calming Policy is sorely out of date, then the County should update this policy to include more traffic calming devices other than just the current 4 inch speed hump, before it makes any further plans for the La'aloa Extension.

Also, the County might want to wait and see what our Community Development Plans say about the La'aloa Extension before it continues plans for this extension.

Mahalo,

Josephine Keliiipio
76-168 Royal Poinciana Drive
Kailua-Kona, Hi 96740
(808) 326-7998 Ph.

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

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May 19, 2008

Josephine Keliipio
76-168 Royal Poinciana Drive
Kailua-Kona Hawaii 96740

Subject: Draft Environmental Assessment - La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for your comment letter dated September 7, 2005, on the Draft EA. As stated in our consultant Geometrician's initial response letter to you of October 25, 2005, we intended to develop detailed answers to the individual points raised in your letter and then provide you another response after process of community meetings and re-design that attempted to fully respond to community concerns. This process has taken longer than anticipated. As a preface to responding to your specific questions, I would like to first recap the efforts the County has undertaken to respond to community concerns and improve the design of not only the La'aloa Avenue Extension but the entire length of La'aloa Avenue.

After completion of the Draft EA in August of 2005, our Department held several meetings and received over two dozen letters. Most commenters agreed that the proposed road would provide more efficient travel connections and was vitally needed. However, they were concerned that as designed it would also have undesirable side-effects, like speeding, increased traffic, difficulty exiting driveways, visual impact, loss of neighborhood character, and decreased safety for other motor vehicles, pedestrians, bicyclists, and roadside property.

In order to resolve concerns and move the project forward, we embarked on a Context Sensitive Solution (CSS) process. CSS is a collaborative, interdisciplinary approach in which a diverse group of citizens and affected public agencies are part of an Advisory Group, formulating and evaluating alternatives from a new perspective.

The CSS process was completed with five Advisory Group meetings and one public meeting over an eight-month period that started in August, 2006. Project meetings were conducted in the vicinity of the project corridor, during the evening to allow for ease of attendance, which promoted substantial participation by 50 to 80 people per meeting. County of Hawai'i staff worked closely with consultant CH2M Hill in preparation for and during each meeting. Meeting

announcements to provide notice to the general public and local residents were made in newspaper ads, postcard mailings, and the County website.

The purpose of the Advisory Group was to represent a diverse group of project stakeholders to advise the County on the goals, values, interests, and views relating to the La'aloa Avenue corridor. A group with diverse interests was desired to ensure that competing objectives could be discussed and that the goals and values of all users were being accommodated into the transportation improvements. The range of the members' background and interests included: La'aloa Avenue and neighboring community residents, business owners, landowners, bicycle and pedestrian advocates, cultural advocates, and a resident who later became an elected County official. The goal of the CSS process was for members to discuss and provide input on a variety of variables, such as issues affecting the roadway, the importance of criteria for decision-making, the pros and cons of identified alignments, and the preferred alignment. The County of Hawai'i utilized the Advisory Group's input in its entirety in its own decision-making process.

The scale of alternative analysis in the CSS process was more extensive than the one conducted for the Draft EA. This involved both alignment alternatives (see attached Figure 2-3a from the Final EA), meaning the various route that the roadway might take, and cross-section alternatives (see attached Figure 2-4 from the Final EA), meaning the cross sections that would be developed for use in the various sections of La'aloa Avenue to achieve the project purpose, especially aspects dealing with pedestrian safety, bicycle lanes, speeding, and parking. The evaluation process focused on how well each alternative satisfied the performance measures and criteria that were developed with the assistance of the Advisory Group.

Alignment Alternatives. The Draft EA had considered two slightly different paths, named Alternatives 1 and 2, for the La'aloa Avenue Extension. Alternative 1 was more direct but steeper route, while Alternative 2 had a gentler slope and less effect on any future activities on TMK 7-7-08:114. As part of the CSS process, additional potential alternatives were developed. One commenter-suggested route north of and parallel to the existing La'aloa Avenue was carefully evaluated before ultimately being rejected for a number of reasons outlined in the Advisory Group meeting minutes. Alternative 3, a hybrid of Alternatives 1 and 2, was also developed, primarily to reduce the grade, because both Alternatives 1 and 2 required extensive earthwork and/or retaining walls. As speed, steep roadway grades and property impacts were among the identified community concerns, an alignment that dealt with these concerns was desired. Alignment 3 remained within properties already studied in full in the EA but incorporated changes to the curvature of the roadway to lengthen the extension. **Based on its performance on criteria measures and the Advisory Group's input, the County selected Alignment Alternative 3 as the preferred alignment alternative.**

Cross-Section Alternatives. After discussion of a number of possible cross-sections that could be used to achieve varying degrees of speed reduction, access control, pedestrian and bicycle safety, visual impact reduction, and motor-vehicle efficiency, two basic cross-section alternatives were settled on. Each cross-section type varied in the three different sections of the project, i.e., the Extension Section, the existing La'aloa Avenue mauka of the future Parkway, and the existing La'aloa Avenue makai of the Parkway. Both corridors had the following elements.

- Two travel lanes, and curb/gutter/sidewalk treatment the entire length from Kuakini Highway to Ali'i Drive;
- A landscaped, no-travel median (except at cross-roads) in the La'aloa Extension section;

- Striped medians with left-turn lanes at intersections in the existing La'aloa Avenue mauka of the Parkway;
- On street parking with no median in the existing La'aloa Avenue makai of the Parkway;
- Traffic calming measures to be determined after the conclusion of County/community demonstration projects;
- A traffic signal at the intersection of La'aloa Avenue and Kuakini Highway, and various intersection improvements at Ali'i Drive and Kuakini Highway.

The most important differences between the cross-section alternatives are that Cross-Section A divided the 60-foot right-of-way so as to have consistently wider travel lanes (12 to 14 feet, depending on section), which are shared with bicycles. Cross-Section B had narrower travel lanes (10 to 11 feet) to discourage speeding and a 4-6 foot dedicated bike lane along the entire length (see attached Figure 2-4). Sidewalks 7 feet wide would be constructed on both sides of the road. They would be provided both a horizontal and vertical buffer/separation from vehicular traffic by a striped bicycle lane and a curb. Bike lanes would be striped in both directions of travel, adjacent to the sidewalk. The bike lane in the mauka-bound direction would be wider to allow for the more difficult mauka movement. The mauka-bound bike lane would be 6 feet wide and the makai-bound lane 4 feet wide. **Based on the performance on criteria measures and Advisory Group input, the County selected Cross-section Alternative B the preferred cross-section alternative.**

Our Department recognizes that not all concerns about the La'aloa Avenue Extension can be completely mitigated. Nevertheless, the Context Sensitive Solutions design has resulted in the advancement of a recommended alternative that both the Advisory Group and the County of Hawai'i believe enhances the functionality of the project through greater attention to safety, mobility, preservation of neighborhood character, aesthetics, and other values.

In answer to your specific comments:

1. *Must have traffic calming devices to ensure pedestrian safety.* In order to ensure that the traffic calming methods chosen for the La'aloa Avenue Extension project truly fit the needs and desires of residents, the County of Hawai'i sponsored a temporary demonstration project along the corridor to test various devices, including speed humps, speed tables, chokers, center islands, and roundabouts. The demonstration project allowed the CSS Advisory Group and public hands-on experience with the devices and to provide opinions on the effectiveness of the devices. The County plans to install additional traffic calming devices in the project vicinity and encourages the public to continue to provide comments. The final design on the La'aloa Avenue Extension project will incorporate traffic calming methods in order to mitigate to the greatest degree we can effects on speeding and pedestrian and bicycle safety.

2. *The maximum slope of the extension should be 8%.* While eight percent is a desirable maximum for busier roads, the steep topography in Kona does not allow this in many areas. The recommended alternative for the extension section involves an alignment that has reduced the grade to the minimum steepness feasible for this extension and a cross-section with a median, a bike-lane, and a sidewalk to minimize safety problems associated with the grade.

3. *For existing La'aloa Avenue, install speed humps at each spot that has a slope of 8% or less and chicanes at all other spots where traffic calming is needed but slope is greater than 8%; traffic circles.* Please see our response to Question 1.

4. *Stop building connector roads through existing and future neighborhoods where pedestrian safety is an issue.* Without an outlet to Kuakini Highway, there will be no other outlet for traffic generated by the subdivisions accessed by La'aloa Avenue, also adversely affecting safety and congestion. We believe the proposed design will be safe, efficient, and attractive.

5. *Update the County's traffic calming policy to include more traffic calming devices before making further plans for La'aloa Avenue.* Please see the material above relating to traffic calming.

6. *Stop any plans on the extension until Community Development Plans are completed.* The La'aloa Avenue Extension as well as the Lako Street Extension have been advanced because of their consistency with the General Plan, which calls for interconnectivity and developing networks that service existing neighborhoods.

Thank you for reviewing the Draft EA. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Sincerely,

Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

The county has decided that La'Aloa Avenue will be a through road, because it was reserved back in the 70's to be so. This fact was withheld from the residents, by both Towne Development and the county. (as of 7/3/05)

Be that as it may, in the 70's Keauhou View Estates, Ali'i Heights, and Ali'i Mauka did not exist. The county must realize that the safety of the residents must be considered.

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William J. Marengo
77-127 LAALOA AVE.
KAILUA-KONA, HI.
96740

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Roberta N Vercegain
77-127 La'Aloa Ave. same address
Kailua-Kona, HI.
96740

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

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May 19, 2008

William J. & Roberta B. Marcigan
77-127 La'aloa Avenue
Kailua-Kona HI 96740

Subject: Draft Environmental Assessment - La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

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Robert Margetts
77-154 Lupalupa Way
Kailua-Kona Hi 96740
Ph. 324-1355

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

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May 19, 2008

Robert Marzetta
77-154 Lupalupa Way
Kailua-Kona HI 96740

Subject: Draft Environmental Assessment - La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

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Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

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PUBLIC COMMENT SHEET

La'aloa Avenue Extension Project

Your comments and suggestions will assist in the responsible development of the highway project under consideration at this public meeting. Space is provided below to write out any comment you may wish to make. Please hand in your statement during this meeting or, if you prefer, mail to the address printed below. Although comments are welcome throughout the project development process, we would like to receive your initial comments postmarked by September 7, 2005, in order to ensure they are considered in the Final Environmental Assessment.

Are you generally in favor of this proposal? *Yes / No*
(Please Circle One)

COMMENT OR STATEMENT

MAUKA-MAKAI ROADS

MITIGATE BLINDING
SUN WITH SOMETHING

Notice: Copies of all comments provided are available to the public under the Freedom of Information Act. This will include names, addresses, and any other personal information provided with the comments. Your comments will be considered with or without the following optional information (please print):

Name HAROLD KUMATA

Address Surley2K@MSN.COM

Representing SELF

Mailing Address: Mr. Bruce McClure, P.E., Director, Hawaii County Department of Public Works, 101 Aupuni Street, Suite 7, Hilo HI 96720.

1

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

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May 19, 2008

Harold Murata
Zarley2k@msn.com

Subject: Draft Environmental Assessment - La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for your comment letter dated August 23, 2005, on the Draft EA. In answer to your specific comments:

1. *Mitigate blinding sun on mauka-makai roads.* We are unable to envision any practical mitigation for this problem.

Thank you for reviewing the Draft EA. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Sincerely,

Bruce C. McClure

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Joe F. Bypp
77-165 Ho'ohonua Ct
Ka'ena-Kona Hi 96740
1-808-322-2721

Harry Kim
Mayor

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May 19, 2008

John F. Poggensee
77-165 Ho'ohonua Court
Kailua-Kona HI 96740

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Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

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MIKAHALA ROY

1. La`aloa is renowned for its name, and therefore burials there are likely to be renowned.
2. There should be a second archaeologist to review the work. A Hawaiian archaeologist would be best – Kehau Abad, Ph.D., is recommended.
3. This is a wider issue that also extends to Alii Highway. The issues raised for that project are applicable – the concern for damage and disrespect, for sacrilegious impact on burials, and thus, directly to Hawaiian people.
4. The harm to living Hawaiians that occurs each time there is an impact to burials – it severely impacts their living condition.
5. The repeated instances where developers, government and the archaeologists claim there are no burials, and yet during construction they turn up.

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

County of Hawai'i
DEPARTMENT OF PUBLIC WORKS
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May 19, 2008

Mikahala Roy
PO Box 596
Kailua-Kona HI 96745-0596

Subject: Draft Environmental Assessment - La'aloa Avenue Extension
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for the oral comments you delivered at the public meeting for the Environmental Assessment held on November 29, 2005, and also for your participation in the Context Sensitive Solutions Process.

As a preface to responding to your specific questions, I would like to first recap the efforts the County has undertaken to respond to community concerns and improve the design of not only the La'aloa Avenue Extension but the entire length of La'aloa Avenue.

After completion of the Draft EA in August of 2005, our Department held several meetings and received over two dozen letters. Most commenters agreed that the proposed road would provide more efficient travel connections and was vitally needed. However, they were concerned that as designed it would also have undesirable side-effects, like speeding, increased traffic, difficulty exiting driveways, visual impact, loss of neighborhood character, and decreased safety for other motor vehicles, pedestrians, bicyclists, and roadside property.

In order to resolve concerns and move the project forward, we embarked on a Context Sensitive Solution (CSS) process. CSS is a collaborative, interdisciplinary approach in which a diverse group of citizens and affected public agencies are part of an Advisory Group, formulating and evaluating alternatives from a new perspective.

The CSS process was completed with five Advisory Group meetings and one public meeting over an eight-month period that started in August, 2006. Project meetings were conducted in the vicinity of the project corridor, during the evening to allow for ease of attendance, which promoted substantial participation by 50 to 80 people per meeting. County of Hawai'i staff worked closely with consultant CH2M Hill in preparation for and during each meeting. Meeting announcements to provide notice to the general public and local residents were made in newspaper ads, postcard mailings, and the County website.

The purpose of the Advisory Group was to represent a diverse group of project stakeholders to advise the County on the goals, values, interests, and views relating to the La'aloa Avenue corridor. A group with diverse interests was desired to ensure that competing objectives could be discussed and that the goals and values of all users were being accommodated into the transportation improvements. The range of the members' background and interests included: La'aloa Avenue and neighboring community residents, business owners, landowners, bicycle and pedestrian advocates, cultural advocates, and a resident who later became an elected County official. The goal of the CSS process was for members to discuss and provide input on a variety of variables, such as issues affecting the roadway, the importance of criteria for decision-making, the pros and cons of identified alignments, and the preferred alignment. The County of Hawai'i utilized the Advisory Group's input in its entirety in its own decision-making process.

The scale of alternative analysis in the CSS process was more extensive than the one conducted for the Draft EA. This involved both alignment alternatives (see attached Figure 2-3a from the Final EA), meaning the various route that the roadway might take, and cross-section alternatives (see attached Figure 2-4 from the Final EA), meaning the cross sections that would be developed for use in the various sections of La'aloa Avenue to achieve the project purpose, especially aspects dealing with pedestrian safety, bicycle lanes, speeding, and parking. The evaluation process focused on how well each alternative satisfied the performance measures and criteria that were developed with the assistance of the Advisory Group.

Alignment Alternatives. The Draft EA had considered two slightly different paths, named Alternatives 1 and 2, for the La'aloa Avenue Extension. Alternative 1 was more direct but steeper route, while Alternative 2 had a gentler slope and less effect on any future activities on TMK 7-7-08:114. As part of the CSS process, additional potential alternatives were developed. One commenter-suggested route north of and parallel to the existing La'aloa Avenue was carefully evaluated before ultimately being rejected for a number of reasons outlined in the Advisory Group meeting minutes. Alternative 3, a hybrid of Alternatives 1 and 2, was also developed, primarily to reduce the grade, because both Alternatives 1 and 2 required extensive earthwork and/or retaining walls. As speed, steep roadway grades and property impacts were among the identified community concerns, an alignment that dealt with these concerns was desired. Alignment 3 remained within properties already studied in full in the EA but incorporated changes to the curvature of the roadway to lengthen the extension. **Based on its performance on criteria measures and the Advisory Group's input, the County selected Alignment Alternative 3 as the preferred alignment alternative.**

Cross-Section Alternatives. After discussion of a number of possible cross-sections that could be used to achieve varying degrees of speed reduction, access control, pedestrian and bicycle safety, visual impact reduction, and motor-vehicle efficiency, two basic cross-section alternatives were settled on. Each cross-section type varied in the three different sections of the project, i.e., the Extension Section, the existing La'aloa Avenue mauka of the future Parkway, and the existing La'aloa Avenue makai of the Parkway. Both corridors had the following elements.

- Two travel lanes, and curb/gutter/sidewalk treatment the entire length from Kuakini Highway to Ali'i Drive;
- A landscaped, no-travel median (except at cross-roads) in the La'aloa Extension section;
- Striped medians with left-turn lanes at intersections in the existing La'aloa Avenue mauka of the Parkway;

- On street parking with no median in the existing La'aloa Avenue makai of the Parkway;
- Traffic calming measures to be determined after the conclusion of County/community demonstration projects;
- A traffic signal at the intersection of La'aloa Avenue and Kuakini Highway, and various intersection improvements at Ali'i Drive and Kuakini Highway.

The most important differences between the cross-section alternatives are that Cross-Section A divided the 60-foot right-of-way so as to have consistently wider travel lanes (12 to 14 feet, depending on section), which are shared with bicycles. Cross-Section B had narrower travel lanes (10 to 11 feet) to discourage speeding and a 4-6 foot dedicated bike lane along the entire length (see attached Figure 2-4). Sidewalks 7 feet wide would be constructed on both sides of the road. They would be provided both a horizontal and vertical buffer/separation from vehicular traffic by a striped bicycle lane and a curb. Bike lanes would be striped in both directions of travel, adjacent to the sidewalk. The bike lane in the mauka-bound direction would be wider to allow for the more difficult mauka movement. The mauka-bound bike lane would be 6 feet wide and the makai-bound lane 4 feet wide. **Based on the performance on criteria measures and Advisory Group input, the County selected Cross-section Alternative B the preferred cross-section alternative.**

Our Department recognizes that not all concerns about the La'aloa Avenue Extension can be completely mitigated. Nevertheless, the Context Sensitive Solutions design has resulted in the advancement of a recommended alternative that both the Advisory Group and the County of Hawai'i believe enhances the functionality of the project through greater attention to safety, mobility, preservation of neighborhood character, aesthetics, and other values.

In answer to your specific comments as transcribed by Dr. Ron Terry of Geometrician Associates, we believe that the archaeological inventory survey contained in the Draft EA was very professionally conducted and that it adequately surveyed the affected area and that there is no evidence of burials. Construction contracts will require that in the unlikely event that human remains are encountered during future development activities, work in the immediate area of the discovery will be halted and DLNR-SHPD contacted as outlined in Hawai'i Administrative Rules 13§13-275-12..

If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Sincerely,

Bruce McClure, P.E., Director
Hawai'i County Department of Public Works

A The county has decided that La'Aloa Avenue will be a through road, because it was reserved back in the 70's to be so. This fact was withheld from the residents, by both Towne Development and the county. (as of 7/3/05)

B Be that as it may, in the 70's Keauhou View Estates, Ali'i Heights, and Ali'i Mauka did not exist. The county must realize that the safety of the residents must be considered.

It really doesn't matter that public works sees this as the only street open to carry large number of cars,unthwarted by the citizen's needs. We are here, our voices will be heard!

Safety in a single-family residential areas must be respected.

Traffic that has no mitigation devices will by design be dangerous to our neighborhood.

C Speed down an 8% grade will be unabated , creating a greater probability of accidents. The county feels that installing 25 mph speed limits should suffice to "calm" traffic. We have 25 mph signs now and traffic travels at 45 mph.

D The county was non-commital about allowing heavy trucks down our street- this is an outrage!

E The noise level will rise (The EA draft supports this) and our quality of life will diminish.

F Mr. McClure said if our street was not the only collector street then maybe they could install stop signs or a traffic round at the Ali'i By-pass. Let us fix that! Open Lako and La' Aloa concurrently so we are not the only street carrying Kona's traffic problems.

Michael Roberts
77-181 Lakeah Ave
Kona HI 96740

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

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May 19, 2008

Michael Robertson
77-181 La'aloa Avenue
Kailua-Kona HI 96740

Subject: **Draft Environmental Assessment - La'aloa Avenue Extension**
TMK: 7-7-8:29, 114 and 120, Pahoehoe, North Kona, Hawai'i

Thank you for your comment letter mailed to us by Ms. Nanci Coulter on or about September 1, 2005, on the above-referenced Draft EA. In answer to your specific comments:

A. *Withholding of information that La'aloa Avenue was meant to connect to Kuakini Highway.* We have no knowledge that any information was ever withheld, and our Department has certainly never withheld this information.

B. *Consider the safety of residents.* The CSS process included as one of its primary concerns the safety of residents whether at home, in their motor-vehicles, on their bicycles, or on foot. The reduction in speed that we expect to be achieved by the combination of traffic calming devices and cross-section adjustments will increase safety.

C. *Unabated speed.* Both the cross-section and the traffic calming devices are aimed at slowing travel speeds.

D. *Restricting heavy-duty truck/commercial vehicles.* Restricting such vehicles would cause a difficulty for homeowners receiving goods or services requiring such trucks. The problem posed by heavy trucks has been minimized by reducing the grade in the extension section and providing for cross-sections below the extension section designed to reduce speeding. Traffic calming devices will also be employed, as discussed above.

E. *Noise.* With the reduction in speed that we expect to be achieved by the combination of traffic calming devices and cross-section adjustments, noise should be reduced.

F. *Lako and La'aloa opening timing.* We are hopeful that the two projects can open within a short time of each other.

Thank you for reviewing the Draft EA. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

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Mayor

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Jiro A. Sumada
Deputy Director

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May 19, 2008

Walsh Trust
77-177 La'aloa Avenue
Kailua-Kona HI 96740

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Hawai'i County Department of Public Works

Illegible - [illegible]

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~~73-1150~~ 177. LaALoa Av
989-3787

(same address)
-177

Geometrician Associates
Attn: Ron Terry
HC 2 Box 9575
Keaau, HI 96749

September 5, 2005

RE: La'aloa Avenue Extension (HRS 343 DEA)

West Hawai'i does need more mauka-makai collector roads to improve connectivity and provide route flexibility. However, with over 800 miles of substandard homestead roads in existence we can not afford to spend millions of dollars to build more substandard roads. Consequently, the final EA must examine all of the best options. Determining the best route that will provide the safest and most efficient solution must remain the primary focus of this assessment.

Under Section 2.5.3 very few alternatives were considered. One very obvious selection that was overlooked exists across the land located south of the Ho'omalu Access Road. This land has been on the market and no property development is imminent. Why isn't a collector running mauka from Pahoehoe Beach Park being considered as an alternative? This alignment will have a higher cost, but will provide significant benefits that no other mauka-makai collector in Kona can:

A

1. A gradient that conforms to County guidelines, and sustains a maximum grade of 10 percent.
2. A significantly safer route that avoids grades that approach 16 percent and the almost inevitable speeding.
3. A route that provides pedestrian access the entire length and is also ADA compliant.
4. A greenbelt parkway that can provide a unique and valuable recreational opportunity.
5. A right of way that could provide a path of suitable width and grades to accommodate most cyclists.
6. Additional room for off-street parking at the makai end to enhance safety on Ali'i Drive in the La'aloa Beach Park and Pahoehoe Park areas, while increasing accessibility to the shoreline.
7. A Collector Road that does not run through the middle of any residential areas. This would provide the safest route possible.
8. A mauka-makai collector that adds reliability to civil defense evacuation routes under all conditions.
9. Provides connectivity to other roads, including La'aloa, Ho'omalu, and Sea View Circle.
10. Provides the opportunity to add to the permanent inventory of valuable "open space."
11. Allows the County to permanently protect the existing drainage way through this area.
12. Would provide the least disruption to residents during all phases of construction and maintenance.

Only two construction alternatives were presented. Both routes are nearly identical in concept allowing limited consideration for analysis. Why isn't a third construction alternative being considered? A route that turns back south near the mauka end and connects closer to Ali'i Heights will absorb some of the natural topography. This alternative would have an incremental cost, but would provide several benefits.

A

1. Allow a lower maximum grade for La'aloa, perhaps even fulfilling the County's standard for minimum grade for collectors, instead of a nearly 16 percent grade.
2. The lower grade will provide enhanced safety for pedestrians, cyclists and vehicles using La'aloa by permitting better speed control of descending vehicles.
3. The reduced grade will also bring the pedestrian sidewalk into closer compliance with ADA and make it more accessible by all pedestrians.
4. The Ali'i Heights utility corridor and emergency connection could be connected directly to the connector and eliminate another driveway from the Kuakini Highway.
5. The driveway to the 4-acre parcel north of Ali'i Heights could also be connected directly to La'aloa. This would eliminate one more driveway from the highway.
6. A lower grade near the intersection with Kuakini Highway will provide safer vehicle storage on La'aloa and faster clearing times on to the highway.
7. The acceleration lane for southbound traffic can be more economically extended to connect with the existing second lane near King Kamehameha III Road.
8. Provides a better solution for spacing intersections along the Kuakini Highway corridor.
9. Would provide the best accommodation for a future connection, if a mauka makai connector were built from the Pahoehoe Beach Park area as the primary collector.

Improvements at the existing intersection of La'aloa with Ali'i Drive are crucial. A channeled intersection was the only improvement presented. Why wasn't either a compact urban roundabout or an "offset T" considered? The more efficient "offset T" could provide several benefits by shifting the intersection to the makai right of way line:

B

1. Resolves the most glaring safety issue by improving the safe sight distance for vehicles leaving La'aloa.
2. Shifting the La'aloa stop line 7 or 8 feet toward the Ali'I Drive centerline improves visibility of all vehicles and cyclists entering the intersection.
3. Improves safety for pedestrians and cyclists by accommodating separate bike lane and walkway on the makai side.
4. Provides a mauka bike lane that is more visible from La'aloa by shifting the lane away from the right-of-way line.
5. Places the La'aloa crosswalk behind stopped vehicles preparing to turn. This provides the best pedestrian safety feature of a roundabout.
6. Would not force hundreds of daily cyclists to stop unnecessarily if a three-way stop sign was established.

7. Would not require thousands of daily vehicles to stop if additional stop signs or signals were installed maintaining a high Level of Service.
8. Could be completed at a fraction of the cost of improvements proposed in the draft EA.
9. Could be completed with less disruption to local residents and those traveling through the intersection.
10. Could be completed immediately to improve safety in the area, independently of other improvements to La'aloa.

C

Specific safety mitigation measures have not been adequately addressed. This must be considered to limit the potential danger to residents and road users from excessive speed.

1. Consider supplemental signage. This may include additional Regulatory Signs like Speed Limit, and Warning Signs like Use Low Gear, and yellow-green Pedestrian signs with retroreflective signposts.
2. Consider Traffic Calming Features that will not impede the safe flow of traffic. This may include small traffic circles, chokers, short center medians, or a Center-Pede (short combination of staggered chokers and center median), but not speed humps.
3. Consider the use of flexible retroreflective bollards in combination with Traffic Calming Features to influence driver behavior to reduce speed.
4. Consider inducement striping. Using 10-foot travel lanes, wide edge lines and 5-foot bike lanes on each side of the street would strongly impact driver behavior to maintain a safe speed.

D

Adverse impacts that could occur during an emergency were not addressed. It is absolutely imperative that full functionality of the roadway be maintained when the need for an evacuation occurs.

1. Elimination of all overhead power lines is a vital need for any emergency evacuation route. A single downed line could render the road impassible.
2. Elimination of all utility poles is also a vital element for any potential emergency evacuation route. A single downed pole could completely obstruct the road and render it useless at a time when it is needed most.
3. Consider reevaluating the standards for street lighting. A downed high level mast will obstruct the road. Newer technology with LED lighting can use shorter and less expensive masts that will conform to "dark skies" requirements while providing an illumination pattern that is more favorable to pedestrians and cyclists.

E

Specific attention must be given to the makai segment of existing La'aloa Avenue through White Sands Estates. This segment still lacks the promised sidewalks and drainage facilities. This route is the only connection to mass transit and school bus routes. It is also the primary shoreline access for all of the mauka subdivisions along La'aloa Avenue. This section is located within a 60-foot wide right-of-way that is already owned by the County. Since it is already exempt from additional environmental review and the County has funds allocated for La'aloa it should be improved immediately.

If the extension along La'aloa is opened to all through traffic, there will be a sudden shift in traffic volumes through all three subdivisions that will impact the residents to an extent that cannot be completely determined at this time. The County should give consideration to extending its concurrency policy for simultaneous openings of roads through residential areas that will be used as connectors. The opening of La'aloa should be coordinated directly with the opening of Lower Lako Street.

Sincerely,

Robert Ward
77-6526 Ho'olaupa'i
Kailua Kona, HI 96740

Cc: Galen Kuba
Cc: OEQC

Harry Kim
Mayor

Bruce C. McClure
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Thank you for your comment letter dated September 5, 2005, on the Draft EA. As stated in our consultant Geometrician's initial response letter to you of October 25, 2005, we intended to develop detailed answers to the individual points raised in your letter and then provide you another response after process of community meetings and re-design that attempted to fully respond to community concerns. This process has taken longer than anticipated. As a preface to responding to your specific questions, I would like to first recap the efforts the County has undertaken to respond to community concerns and improve the design of not only the La'aloa Avenue Extension but the entire length of La'aloa Avenue.

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Our Department recognizes that not all concerns about the La'aloa Avenue Extension can be completely mitigated. Nevertheless, the Context Sensitive Solutions design has resulted in the advancement of a recommended alternative that both the Advisory Group and the County of Hawai'i believe enhances the functionality of the project through greater attention to safety, mobility, preservation of neighborhood character, aesthetics, and other values.

In answer to your specific comments:

A. *Alternative routes (first set of numbered points, 1-12; second set, points 1—9)).* The Draft EA examined potential alternative routes, and none were acceptable because all had greater impacts that the proposed route. It should be noted that a route that had a maximum grade of 10 percent would require a very sinuous alignment that would require use of much of the undeveloped property available between La'aloa and Ho'omalu. The construction of a new road that would be up to five times the length of the La'aloa Avenue Extension does not seem like a practical alternative. The CSS process took a fresh look at alternatives and in particular had a detailed examination of a potential route that might terminate at Pahoehoe Park. This route would not have occurred on undeveloped land, as the one you proposed, but instead would have consisted of the proposed La'aloa Avenue Extension, La'aloa Avenue above the proposed Parkway, and then the Parkway itself – through a parcel to the North of the existing La'aloa Avenue, so-called WestPro alignment. This examination found a number of difficulties concerning archaeological sites, costs, route length, impacts to adjacent properties, and other issues. This excerpt from page 23 of the CSS Technical Memorandum provides some insight:

"Discussions outside of the Advisory Group meetings between the County staff and property owners yielded the following results:

- WestPro would be amenable to use of their property as part of the La'aloa corridor if existing development conditions on their mauka parcel (parcel 120) could be changed. Current conditions prohibit development of the property until specific advances related to the Ali'i Parkway occur.
- WestPro would construct the new roadway alignment through their property. The development of Parcel 120 would create the funds to construct the roadway.
- The makai-bound diversion would only be a temporary route, until the Ali'i Parkway is constructed. This is due to access management restrictions planned for the parkway. The WestPro intersection at the Parkway would be gated to be used only as emergency access when the parkway is completed.
- Environmental and archaeological studies have been prepared for the property. Burials were identified which may affect the timeframe for development of the parcel/roadway.
- The Planning Department was not in agreement with changing development conditions, as the current roadway infrastructure in Kona cannot accommodate the additional demands.
- Lower La'aloa Avenue improvements would still be required in the long term, as through makai-bound vehicles would utilize the section once the parkway is completed. If not improved as part of this project, funding availability in the future is uncertain.
- The diversion would create additional traffic and delay along Ali`i Drive. The greatest impacts would be caused by the diverted traffic with destinations in the lower La'aloa neighborhood (left-turn movement from the WestPro roadway to southbound Ali'i Drive and the left turn movement from southbound Ali`i Drive to La`aloa Avenue).

As this alternative would only be a temporary solution, creating additional local and potentially regional traffic impacts while reasonable alternatives along the existing corridor exist, the WestPro alternative was not recommended for further consideration."

While we recognize that an alternative not using the proposed La'aloa Extension route might achieve some of the benefits that your letter lists, we do not believe that it would be in any way cost-effective, because of the added costs of right-of-way acquisition, road construction, greenbelt area purchase, and maintenance. The design arrived at as part of the CSS process will very effectively function as a collector road that is also safe and attractive.

B. *Intersection of Ali'i Drive and La'aloa Avenue (Third set of numbered points 1-10).* We appreciate your input and will consider the options you have presented during design. We suggest you call our Traffic Division and share your ideas about these solutions.

C. *Specific safety mitigation measures have not been addressed, and supplemental signage, traffic calming features that will not impede the safe flow of traffic, bollards, and inducement striping should be considered. (Fourth set of numbered points 1-4).* Please see the material at the beginning of this letter, which demonstrates how the CSS-guided design has addressed these points.

D. *Did not address adverse impacts that could occur during emergency, and the project should include elimination of overhead power lines, utility poles, and new technology LED street lighting (Fifth set of numbered points 1-3).* Again, we appreciate your input and will consider the options you have presented during design.

E. *The makai segment of existing La'aloa through White Sands Estates lacks promised sidewalks and drainage facilities.* Since it is exempt from additional environmental review and the County has funds allocated for La'aloa, it should be improved immediately. Expenditure of funds in this area may not be exempt from environmental review, but this EA includes consideration of work in the makai area as well, which will be part of the project, as discussed in the material at the beginning of this letter.

Thank you for reviewing the Draft EA. If you have any questions about the project, please contact Jiro Sumada at 961-8321.

Sincerely,

Bruce C. McClure

Bruce C. McClure, P.E., Director
Hawai'i County Department of Public Works

Letters without legible senders or valid addresses

Illegible would not order

The county has decided that La'Aloa Avenue will be a through road, because it was reserved back in the 70's to be so. This fact was withheld from the residents, by both Towne Development and the county. (as of 7/3/05)

Be that as it may, in the 70's Keauhou View Estates, Ali'i Heights, and Ali'i Mauka did not exist. The county must realize that the safety of the residents must be considered.

It really doesn't matter that public works sees this as the only street open to carry large number of cars,unthwarted by the citizen's needs. We are here, our voices will be heard!

Safety in a single-family residential areas must be respected.

Traffic that has no mitigation devices will by design be dangerous to our neighborhood.

Speed down an 8% grade will be unabated , creating a greater probability of accidents. The county feels that installing 25 mph speed limits should suffice to "calm" traffic. We have 25 mph signs now and traffic travels at 45 mph.

The county was non-commital about allowing heavy trucks down our street- this is an outrage!

The noise level will rise (The EA draft supports this) and our quality of life will diminish.

Mr. McClure said if our street was not the only collector street then maybe they could install stop signs or a traffic round at the Ali'i By-pass. Let us fix that! Open Lako and La' Aloa concurrently so we are not the only street carrying Kona's traffic problems.

Oliver E. Harker III
77-154 Mahiehie
Kailua-Kona HI 96740

NO 154

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77-167 LA' ALOA

937-6443

WALSH TRUST

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(WALSH TRUST)
77-177 LA ALOA ST
808 322 4084

NO MAILING ADDRESS
NO RESPONSE

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Rhonda Schulke
77-160 La Aloa Ave
Kailua-Kona, HI
96740
322-9843

same address.

NO MAILING ADDRESS
NO RESPONSE

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Michael Scheller

77-160 La'Aloa Ave
Kailua-Kona, HI
96740
322-9843

LA‘ALOA AVENUE EXTENSION

LA‘ALOA 1 AND 2 AND PAHOEHOE
NORTH KONA, HAWAII

FINAL ENVIRONMENTAL ASSESSMENT

APPENDIX 6

CONTEXT SENSITIVE SOLUTIONS TECHNICAL MEMORANDUM

(MAIN PORTION)

La`aloa Avenue Extension Context Sensitive Solutions Kona, Hawaii

PREPARED FOR: Ron Terry/Geometrician Associates

PREPARED BY: Cheryl Yoshida/CH2M HILL
Paul Luersen/CH2M HILL
Buddy Desai/CH2M HILL

COPIES: Jiro Sumada

DATE: June 27, 2007

Introduction

The Draft Environmental Assessment (EA) has been completed for the La`aloa Avenue Extension. Through this preliminary planning process, community concerns arose that needed to be addressed before completion of the environmental documentation and project design. There were several major concerns or elements that had the potential to impact the limits of the project. There were numerous opposing viewpoints related to specific aspects of the extension. There was also a general feeling of enmity and distrust stemming from past arrangements of the Keauhou View Estates and Ali`i Mauka developer, which made forward progress of the project difficult.

A Context Sensitive Solution (CSS) public involvement process was applied to the proposed project to work with project stakeholders in order to move forward to reach an acceptable conceptual design solution. The CSS process involved a collaborative, interdisciplinary approach in which a diverse group of citizens and affected public agencies were part of the design team. The CSS process allowed the team to methodically identify and address key issues identified for the project. In addition to meeting the capacity and circulation needs of the region, the CSS process allowed concerns of the community to be addressed, including:

- Safety
- Mobility
- Preservation of neighborhood character
- Aesthetic characteristics
- Historic and cultural resources
- Environmental and other community values

The CSS process was completed within 5 meetings over an 8-month period that started in August, 2006. This memorandum describes the public involvement process and specific steps leading to the final recommendations for the corridor.

Project Meetings

Four Advisory Group meetings and one Public meeting were held to develop the project recommendations. Figure 1 outlines the meeting contents and overall project schedule.

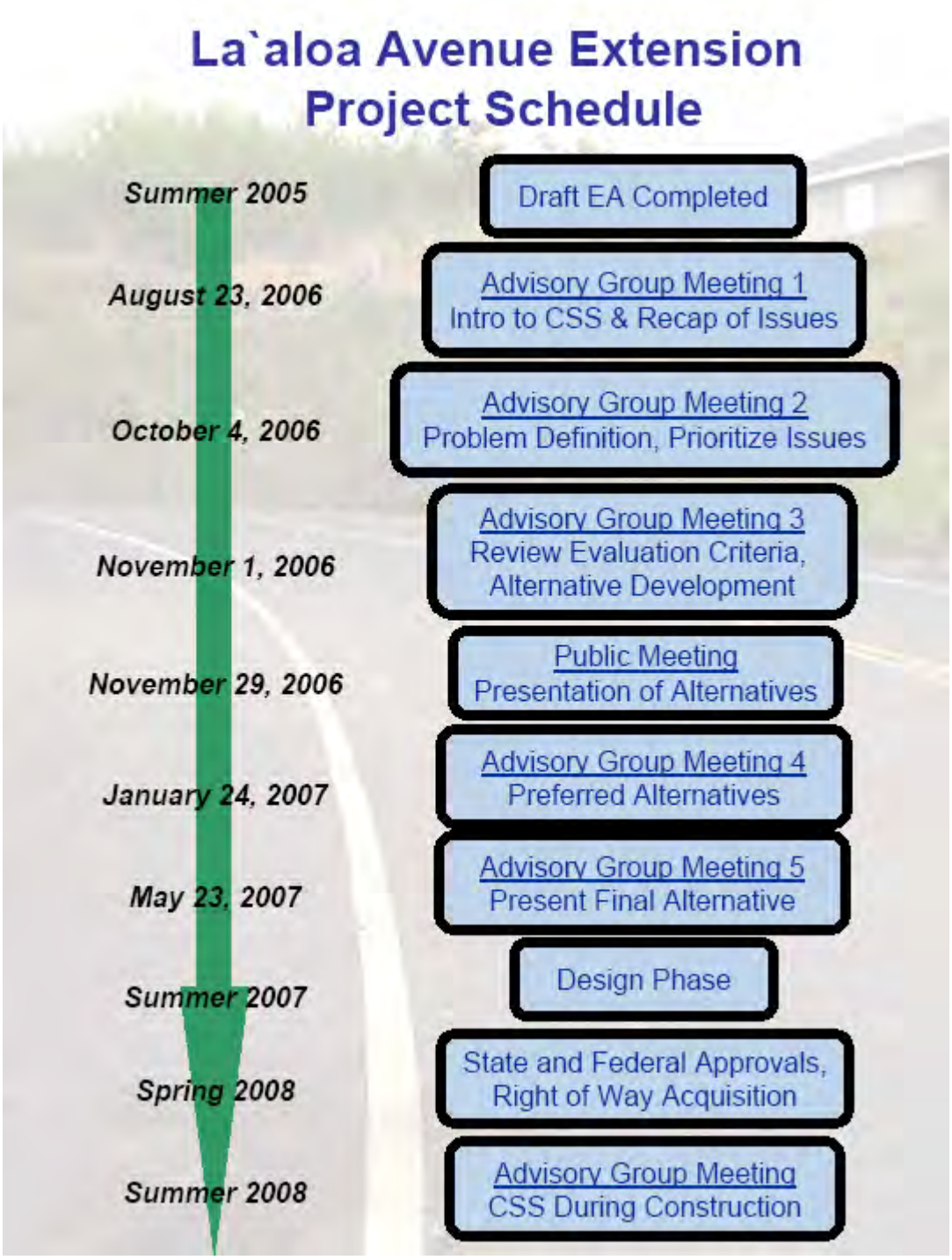


Figure 1. PROJECT SCHEDULE

The Advisory Group (AG) meeting format was comprised of discussions and activities primarily geared towards the AG members (described in the following section of this memo). The discussions were focused towards the AG members, as they had committed themselves to the project and attended all meetings which allowed for steady progression towards the recommendations. Attendance and observation of the meeting by the general public were also encouraged. However, open dialogue with the general public preferably occurred after the formal AG meeting agenda was completed. All attendees were provided the opportunity to contact any member of the project team with questions or concerns at any time during the process.

Project meetings were conducted in the vicinity of the project corridor, during the evening to allow for ease of attendance. Meeting announcements/advertisements were made in multiple venues to provide notice to the general public and local residents:

- Newspaper ads and press releases were placed in West Hawaii Today
- Meeting announcements were posted on the Hawai`i County Weekly News (electronic newsletter) and on the County's project update website
- Meeting announcement postcards were mailed to residents in the direct vicinity of the La`aloa Avenue corridor
- Meeting announcements were e-mailed (if applicable) to all previous meeting attendees

Attendance at each meeting was approximately 50-80 people. Meeting notes and copies of the sign-in sheets are contained in Appendix A.

The County of Hawaii staff worked closely with the Consultant in preparation of and during each of the meetings. The staff/consultant project team included:

Bruce McClure/County of Hawai`i Public Works Department/Director
Jiro Sumada/County of Hawai`i Public Works Department/Deputy Director
Bob Yanabu/County of Hawai`i Public Works Department/Project Manager
Noelani Whittington/County of Hawai`i Public Works Department/Community Outreach
Brad Kurokawa/County of Hawai`i Planning Department/Deputy Director
Cheryl Yoshida/CH2M HILL/Project Manager
Paul Luersen/CH2M HILL/Environmental Planner
Buddy Desai/CH2M HILL/Context Sensitive Solutions

As specific issues were raised, the project team invited additional resource staff to attend one or more of the project meetings. These included:

Tom Brown/County of Hawai`i Transit
Millie Kaya-Arruda/County of Hawai`i School Transit
Stanley Tamura/State of Hawai`i Department of Transportation
Captain Kealoha/County of Hawai`i Police Department

Advisory Group

The purpose of the Advisory Group was to organize a diverse group of project stakeholders to advise the County on the goals, values, interests, and views relating to the La`aloa Avenue corridor. A group with diverse interests was desired to ensure that competing objectives could be discussed and that the goals and values of the wider community, not just the immediate neighborhood, were being accommodated into the transportation improvements.

At the first CSS meeting in August 2006 volunteers were solicited to serve as Advisory Group members. Follow-up questions were sent to all of the volunteers, from which the Advisory Group was developed. The range of the members' background and interests included: La`aloa Avenue and neighboring community residents, business owners, landowners, bicycle & pedestrian advocates, cultural advocates, and a resident who later became an elected County official.

Each member was asked to comply with an Operating Agreement. The agreement outlined the rules and roles pertaining to each member of the project team.

Rules that the Advisory Group members agreed to follow included:

- Attend all meetings and prepare appropriately (because of the importance of continuity of participation and the relationships which will develop among members, no provision is made for substitutes in the event of an unavoidable absence),
- Clearly articulate and reflect the interests you bring to the table,
- Listen to other points of view and try to understand the interests of others,
- Openly discuss issues with people who hold diverse views,
- Actively generate and evaluate options, and
- Keep their agency or organization informed of the Advisory Group's work.

By law, the County of Hawai`i has the responsibility of making final decisions about the improvement on La`aloa Avenue. For this reason, the County of Hawai`i was not a member of the Advisory Group, although its representatives participated in all meetings to understand the community concerns. As its name implies, the Group was advisory to the County of Hawaii on matters of general interest to the community as they related to the planning, design, and construction of the improvements.

The goal of the CSS process was for members to reach consensus on a variety of variables, such as the importance of criteria for decision-making, the pros and cons of identified alignments, and the preferred alignment. The County of Hawai`i utilized the Advisory Group's input in its entirety in its own decision-making process.

Figure 2 shows the decision making flowchart, including the role of the Advisory Group and the County of Hawai`i.

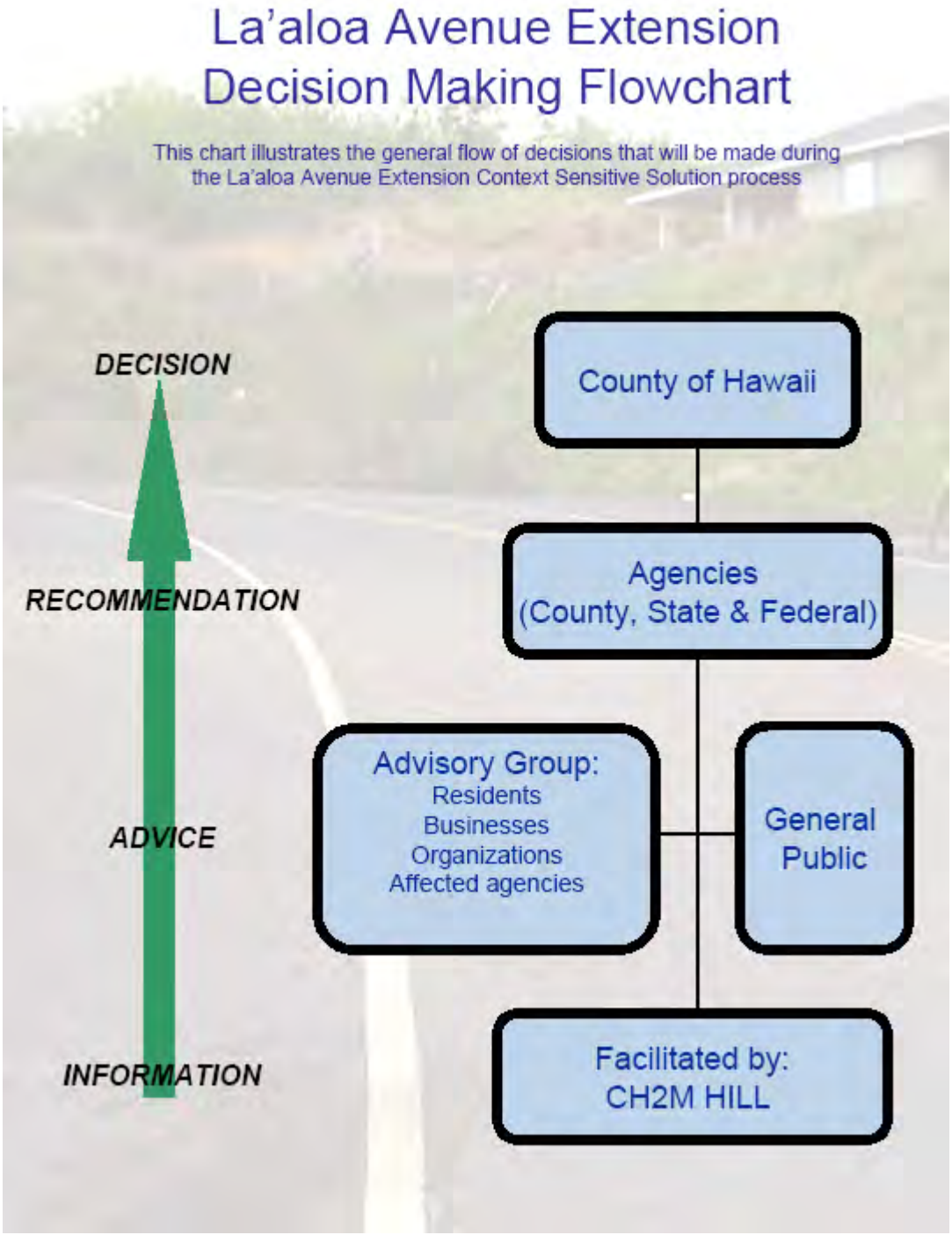


FIGURE 2. DECISION MAKING FLOWCHART

To remind all project team members of their agreement to respectfully work together, an Operating Agreement signature sheet was distributed and is shown in Figure 3.

La'aloa Avenue Extension

Advisory Group
Operating Agreement
October 4, 2006

These 'Operating Agreements' will evolve as needed to continue to meet the needs of the Advisory Group.

Advisory Group Members

Herbert W. Hall
Gregg Lupien
Bill Brooks
Brenda Fred
Josephine Flores
Mary Anne Stone
Melitta Hodson
Nonie Loveless
Mikehale Roy

Facilitator Staff (CH2M HILL)

Cheryl Yoshida

Hawaii County and Resource Staff

Bruce C. McClure

FIGURE 3. OPERATING AGREEMENT SIGNATURE SHEET

Definition of Issues

A recap of the Draft EA alternatives, recommendations, and a summary of the resultant comments were presented to the Advisory Group. The Advisory Group was then tasked to develop their own list of issues related to the corridor. After the group compiled their comprehensive issue list, each Advisory Group member was provided "La`aloa Kala" to spend on the issues that mattered most to them. The prioritized list of issues is summarized below.

Prioritized Issues

($10 = 1 vote by Advisory Group Member, each person given 10 - $10 votes)

$310 Traffic Calming
$200 Connection to Kuakini Highway
$140 Speeding
$140 Sidewalks
$120 Cultural Sites
$110 Parking/Driveway
$100 Bikeways
$100 Transit Stop (Protected Area)
$90 Drainage/Utilities
$70 Right-of-Way Impact
$70 Neighborhood Character
$70 Noise/Air pollution
$60 Truck Traffic Impacts
$60 Alternative Connection to Ali`i Drive
$60 Due Process
$50 Steep grades
$40 Construction Phasing

Traffic calming, or the need to keep vehicle speeds at the posted speed limit, by far topped the list of issues. The next top issue, provision of a connection to Kuakini Highway reinforced that the community as a whole favors the roadway extension project both as a circulation alternative and an emergency access/egress route.

Definition of Goals and Values

Using their issue list as a guide, the Advisory Group was asked to formalize the problem(s) and create a project definition for the La`aloa Avenue Corridor. The group was instructed to develop the definition by thinking in terms of measurable problems. For example there is a lack of connector roads for circulation and emergency vehicles over a 5 mile area in the North Kona area, or pedestrians are forced to walk in the roadway where there are parked cars on narrow/unpaved shoulders. The following project definition was developed:

The extension of La`aloa Avenue will provide a connector route between Ali`i Drive and Kuakini Highway. The route has been identified to provide better access to/from the coastal road and the highway for the traveling public, emergency vehicles, and for tsunami evacuation.

La`aloa Avenue travels through several neighborhoods, thus the design of the roadway should complement the needs of the residential neighborhood while serving its circulation function. The residential neighborhood needs include the means for direct property access, accommodating all modes of travel, locating pedestrian and bike facilities such that connections beyond this project are not precluded, and maintaining a high quality of life and historical/neighborhood identity.

Both the issues list and project definition were utilized in development of the project's performance measures. The performance measure criteria were the mechanism utilized for evaluating the alternatives. The criteria were developed prior to the alternatives to minimize a biased evaluation. Three categories were defined for each measure. An alternative that performed well received a plus (+), fair performance received a zero (0) and a poor performance received a minus (-) rating. The following table provides the full list of performance measures and criteria used to evaluate alternative performance. The measures are organized in order of priority ranking.

La'aloa Avenue Performance Measures

Issue	Weight	+	o	-
Traffic Calming	310	Calming measures present		No calming measures
Connection to Kuakini	200	Yes		No
Speeding	140	Curvilinear alignment		Straighter alignment
Sidewalks	140	Serves adjacent land use/grass buffer between sidewalk and road	Sidewalk adjacent to road	No sidewalks
Cultural Sites	120	No Cultural sites impacted	Minimal cultural sites impacted	Numerous cultural sites impacted
Parking/Driveway	110	9' to 12' parking lanes on both sides of road	8' to 9' parking lanes/ parking only on one side	No parking lanes
Bikeways	100	Separated bikeway	Shared lane	No bikeway
Transit stop (protected)	100	Protected transit stop on Ali'i Drive		No protected transit stop on Ali'i Drive
Drainage/Utilities	90	Utilities underground		Utilities above ground
Drainage/Utilities	90	Runoff reduction/filtration		No runoff reduction/filtration
Right of Way Impact	70	Low R/W impacts	Medium R/W impacts	High R/W impacts
Neighborhood Character	70	Promotes residential neighborhood vision and usability		Discourages residential neighborhood vision and usability
Noise/Pollution	70	Travel lanes further from existing homes		Travel lanes closer to existing homes
Noise/Pollution	70	Promotes slow/ constant speeds		Promotes faster/ stop and go traffic
Trucks	60	No thru truck traffic/ weight limits/ deters truck use		No limitations on trucks
Alternate Connection to Ali'i Drive	60	Yes		No
Due process	60			
Steep Grades	50	Gradual grades (4%<)	Moderate grades (4% to 8%)	Steep grades (>8%)
Construction phasing	40			

Alternatives Development

Initial alternatives were discussed for three distinct aspects of the project; roadway cross-section, La`aloa Avenue Extension alignment, and the existing La`aloa Avenue alignment. CH2M HILL developed the initial alternatives for each aspect to address the identified issues, and presented them to the Advisory Group for discussion, evaluation, and refinement.

The Advisory Group was presented with six different cross-sections as potential solutions for La`aloa Avenue. All were intended to address one or more project issues, such as pedestrian safety, speeding, and parking. The sections were presented to show that there was flexibility in design of various characteristics of the cross-section elements. The Advisory Group discussions focused on refinement of cross section elements for specific portions of the corridor. The initial six sections are shown in Figure 4 and the evaluation against all applicable performance measures are shown in Figure 5.

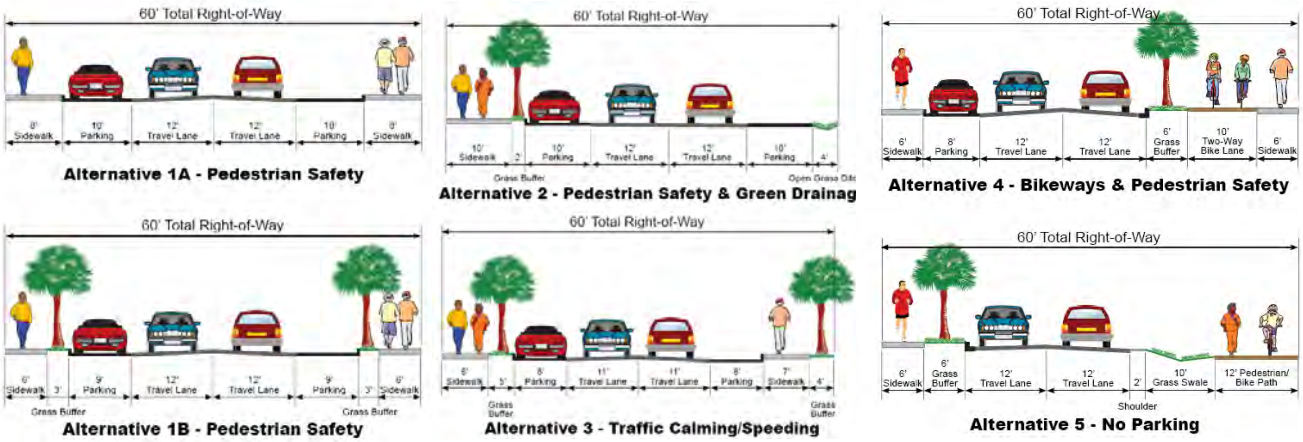


FIGURE 4. INITIAL CROSS-SECTIONS

The two mauka extension alignments recommended in the Draft EA were presented to the Advisory Group. The locations and details of each alternative were discussed and evaluated against performance measures applicable to the location and profile of the roadway.

An alternative alignment between Ali`i Drive and the future Ali`i Parkway, referred to as the WestPro alignment (owner of the traversed parcel) was also presented and evaluated. The WestPro alignment was developed in response to a Draft EA comment. The alignment would utilize a portion of the future parkway then run along a new roadway parallel and north of the existing La`aloa Avenue. The new alignment would serve the makaibound traffic, while maukabound traffic would continue to utilize La`aloa Avenue. A semi-diverter would be placed at the La`aloa Avenue/Ali`i Parkway intersection to block the makaibound traffic from directly accessing the lower portion of La`aloa Avenue. La`aloa Avenue makai of the diverter would remain a two-way street. The purpose of the diversion was to minimize makai-bound traffic past the existing residences and to keep downhill speeding vehicles to a minimum.

Figures 6 and 7 show the alignments and evaluation ratings, respectively.

Cross Section Options

	Traffic Calming	Sidewalks	Parking/Driveway	Bikeways	Drainage/Utilities	Character	Pollution	Trucks
EA Sect	No features -	7' both sides o	Allowed w/in 21' lanes +	Shared lane o	Underground C&G +	No features -	No measures o	No measures -
Alt 1A	No features -	8' both sides o	10' striped lanes +	Shared lane o	Underground C&G +	No features -	No measures o	No measures -
Alt 1B	No features -	6' both sides 3' grass +	9' striped lanes +	Shared lane o	Underground C&G +	Street trees +	No measures o	No measures -
Alt 2	No features -	10' one side 2' grass +	10' striped lanes +	Shared lane o	Green drainage +	Street trees +	No measures o	No measures -
Alt 3	Narrow lanes +	6'/7' both sides 5'/4' grass +	8' striped lanes o	Shared lane o	Underground C&G +	Street trees +	Narrow lanes +	Narrow lanes +
Alt 4	No features -	6' both sides 2' grass +	8' striped one side +	10' separated one side +	Underground C&G +	Street trees +	No measures o	No measures -
Alt 5	No features -	6' one side 6' grass +	None -	12' separated one side +	Underground C&G +	Street trees +	One side closer/ other further -/+	No measures -

FIGURE 5. INITIAL CROSS-SECTION EVALUATION

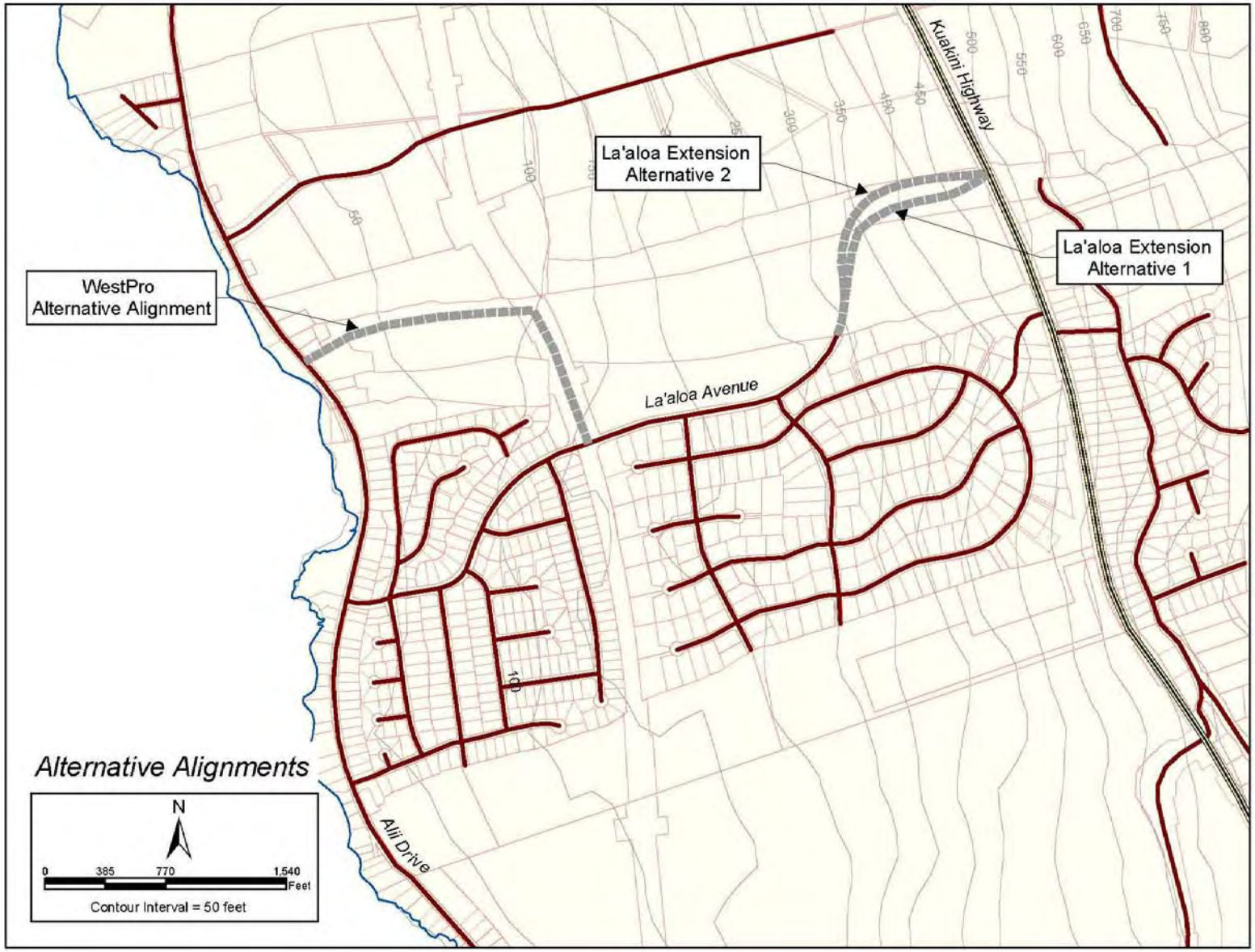


FIGURE 6. INITIAL ALIGNMENTS

Alignment Alternatives

	Connection to Kuakini Hwy	Speeding	Cultural Sites	Right-of-way	Steep Grades
EA Alt 1	Thru Parcel 114 +	Straighter -	Sites 24272, 6352, 24379, 6350, 6381, 24375, 24376, 4591 -	Parcels 120 and 114 +	Steeper -
EA Alt 2	Thru Parcel 29 +	Curvilinear +	Sites 24272, 6352, 6350, 6381, 24378, 24271, 21384, 4591 -	Parcels 120, 114 and 29 -	Steep o

	Alternate Connection to Ali'i Drive	Speeding	Cultural Sites	Right-of-way	Steep Grades
Westpro	Yes +	Non-direct path +	Potential Sites 6302, 6348, 6990, 6349, 6351, 24541, 24542, 6350, 24543, 24544, 6991, 6992, 24545, 6993, 6994, 2456, 24547, 24548, 24549 -	Mid-level road, Parcel 21,23,120 -	Steep o

FIGURE 7. INITIAL ALIGNMENT EVALUATION

Based on the AG group discussions and comments, alignment and cross section alternatives were refined for specific areas of the corridor. The surrounding context and land use along La`aloa Avenue provided natural boundaries for 3 distinct segments of the corridor. These segments were defined as:

- La`aloa Avenue Extension – the new portion of roadway, through undeveloped parcels

- Existing La`aloa Avenue, mauka of the future parkway – existing wide travel lanes and paved shoulders, with limited intersections and no direct residential property access
- Existing La`aloa Avenue, makai of the future parkway (including Westpro) – mixture of improved cross-section with wide pavement/sidewalks to narrow travel lanes/unpaved shoulders. Direct property access occurs throughout entire segment. WestPro alignment would occur through undeveloped parcels.

The refined alternatives were presented at the public meeting for comment and evaluation by the general public.

Public Meeting

A public meeting was conducted in November 2006 after the initial alternative evaluation to inform the public of the La`aloa Avenue project history, CSS process, and progress of the Advisory Group.

The meeting was formatted as an Open House with four stations, followed by a formal project presentation and question/answer session.

The Open House stations were manned with both County and consultant staff to discuss the project and answer any questions from the public.

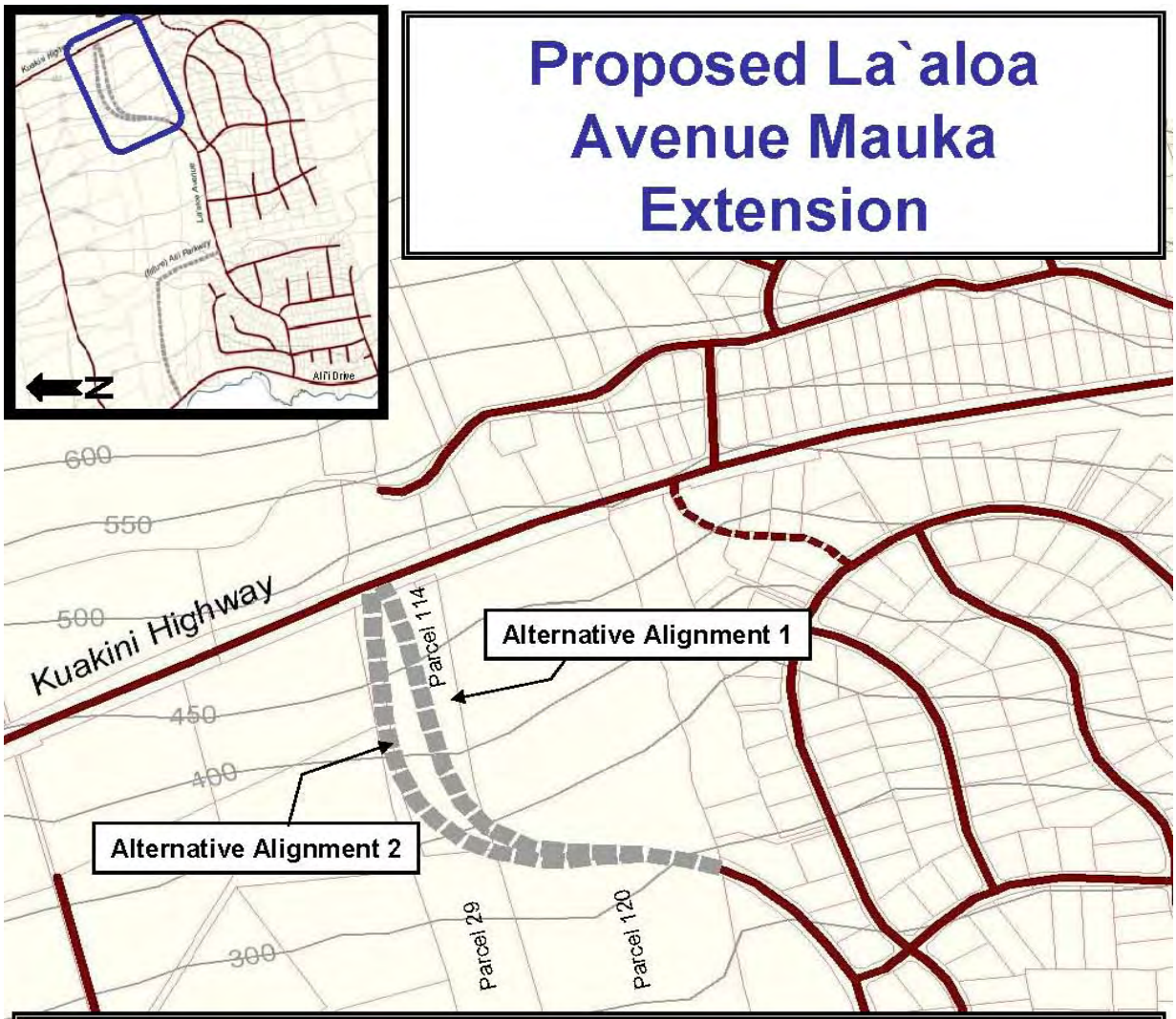
- Station 1 focused on the project history and summarized the Context Sensitive Solution process/schedule as well as the Advisory Group progress.
- Station 2 provided a summary of the proposed La`aloa Avenue Extension alignments and cross-section alternatives developed in conjunction with the Draft EA and the Advisory Group evaluation.
- Station 3 provided a summary of the cross section alternatives for the existing section of La`aloa Avenue mauka of the future Ali`i Parkway.
- Station 4 provided a summary of the alignment alternatives as well as cross section alternatives makai of the future Ali`i Parkway.

The station displays are shown in Figures 8 through 12.

During the Open House and presentation of the project, the public was encouraged to compile their questions on post-it notes for the formal Question and Answer portion of the meeting. All questions were either answered at the meeting, or in the meeting notes.

Questionnaires were also provided to allow the public to provide input on the likes/dislikes of each of the alternative alignments and cross-sections.

Summaries of the questions and responses are contained in Appendix A.

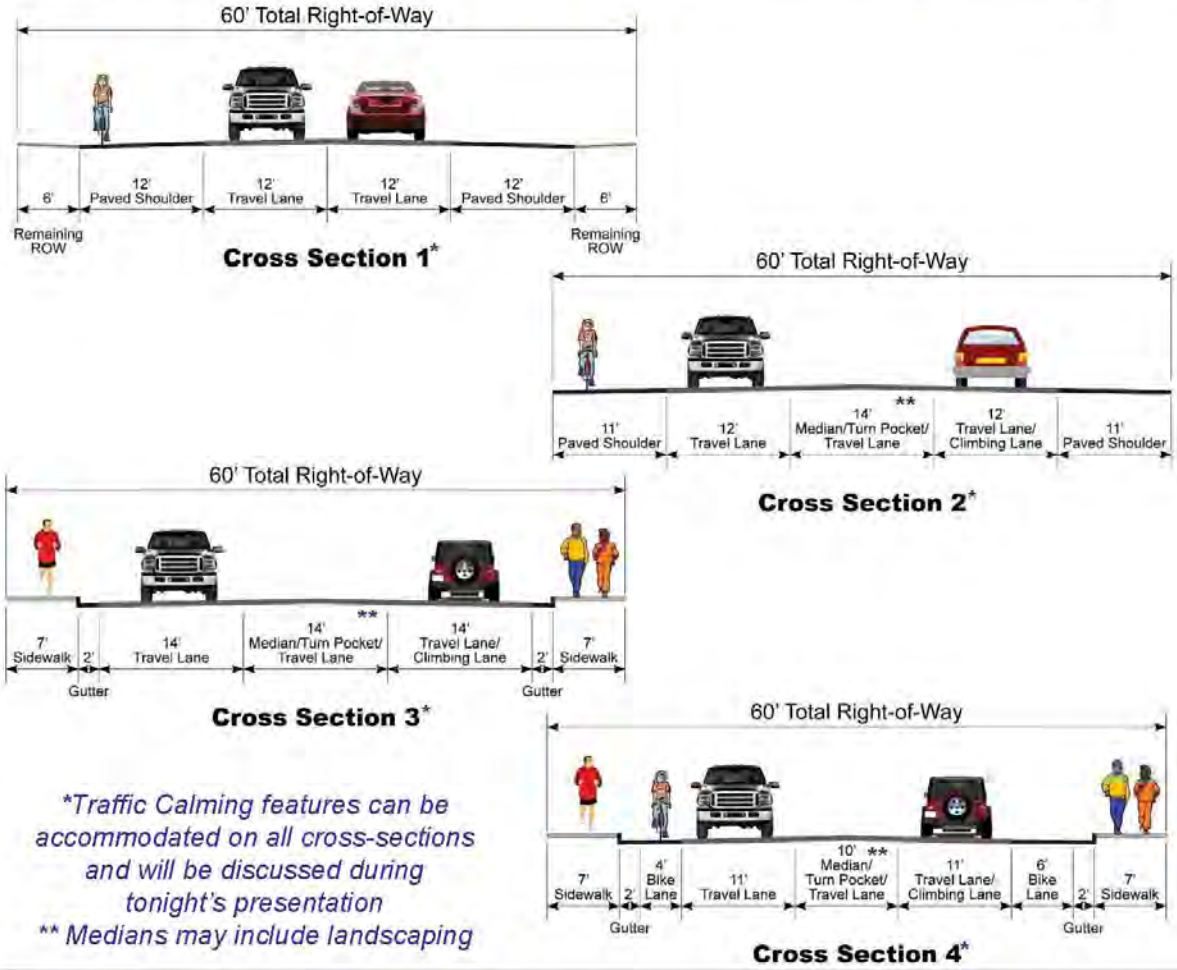


	Connection to Kuakini Hwy	Speeding	Cultural Sites	Right-of-way	Steep Grades
Alternative Alignment 1	Thru Parcel 114 +	Straighter Alignment -	Affects 8 known Cultural Sites -	Affects 2 Parcels o	Steeper ~12% -
Alternative Alignment 2	Thru Parcel 29 +	Curvilinear Alignment +	Affects 8 known Cultural Sites -	Affects 3 Parcels -	Steep ~11% o

Performance Measure Rating: Positive Effect on Issue + Neutral Effect on Issue O Negative Effect on Issue –

FIGURE 8. EXTENSION ALIGNMENT CORRIDORS AND EVALUATION

Proposed La`aloa Avenue Mauka Extension



**Traffic Calming features can be accommodated on all cross-sections and will be discussed during tonight's presentation*
*** Medians may include landscaping*

Cross Section	*Traffic Calming	Sidewalks	Parking	Bikeways	Utilities	Pollution	Trucks
1	To Be Determined	None -	No Parking -	Shoulder O	Underground +	No Measures -	No Measures -
2	To Be Determined	None -	No Parking -	Shoulder O	Underground +	No Measures -	No Measures -
3	To Be Determined	7' Adjacent O	No Parking -	Shared Lane -	Underground +	No Measures -	No Measures -
4	To Be Determined	7' Buffered +	No Parking -	Separate Lane +	Underground +	No Measures -	No Measures -

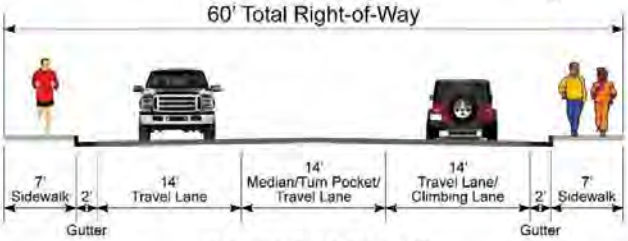
Performance Measure Rating: Positive Effect on Issue + Neutral Effect on Issue O Negative Effect on Issue –

FIGURE 9. EXTENSION CROSS SECTIONS AND EVALUATION

Existing Section Mauka of Parkway

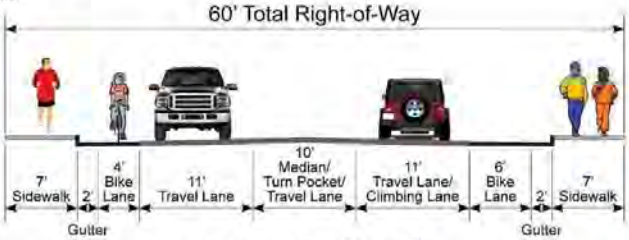
Cross Section 1*

Cross Section 2*



Cross Section 3*

**Traffic Calming features can be accommodated on all cross-sections and will be discussed during tonight's presentation*

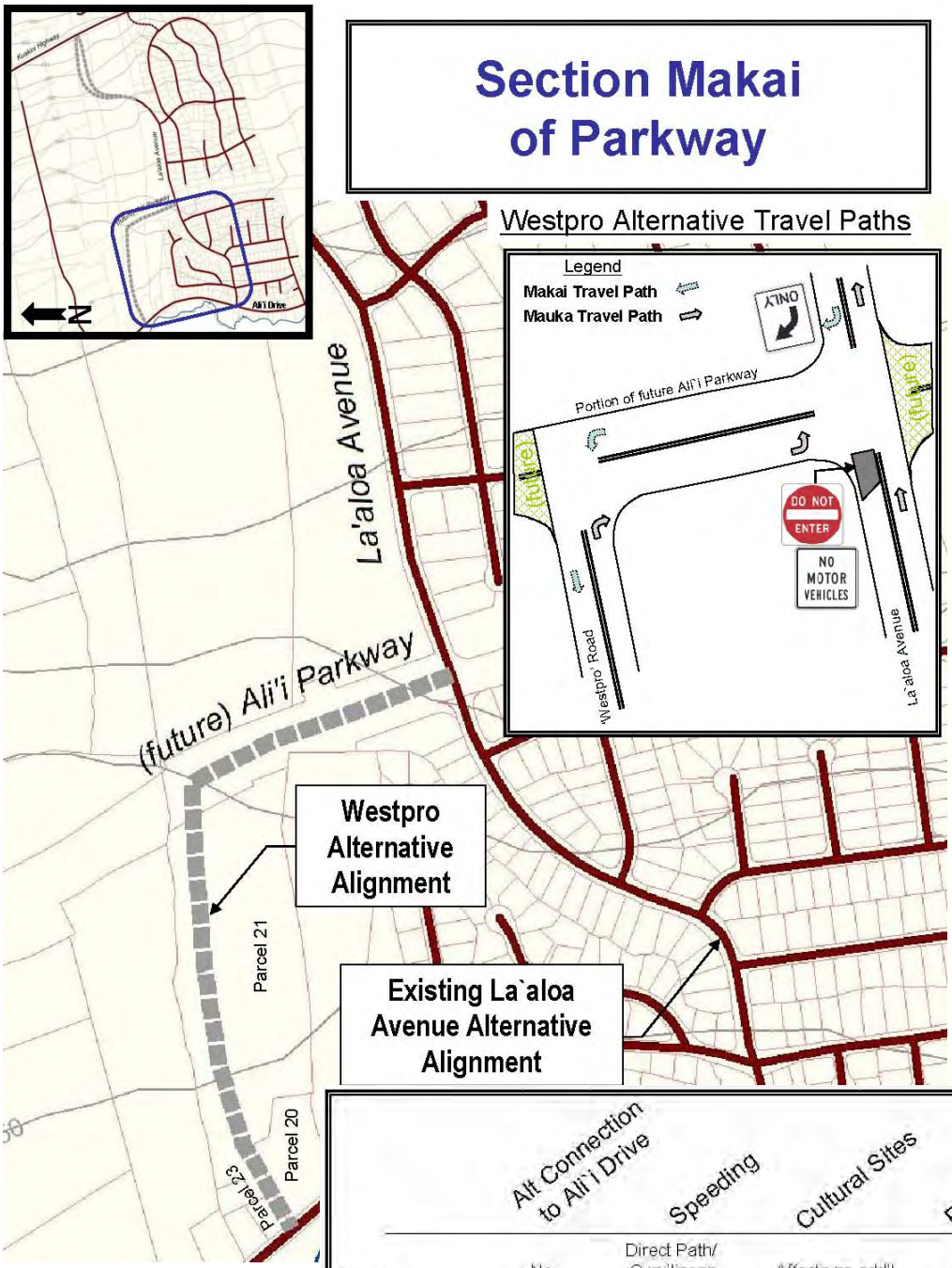


Cross Section 4*

Cross Section	*Traffic Calming	Sidewalks	Parking	Bikeways	Utilities	Pollution	Trucks
1	To Be Determined	None -	No Parking -	Shoulder O	Underground +	No Measures -	No Measures -
2	To Be Determined	None -	No Parking -	Shoulder O	Underground +	No Measures -	No Measures -
3	To Be Determined	7' Adjacent O	No Parking -	Shared Lane -	Underground +	No Measures -	No Measures -
4	To Be Determined	7' Buffered +	No Parking -	Separate Lane +	Underground +	No Measures -	No Measures -

Performance Measure Rating: Positive Effect on Issue + Neutral Effect on Issue O Negative Effect on Issue –

FIGURE 10. EXISTING MAUKA SECTION CROSS SECTIONS AND EVALUATION



	Alt Connection to Ali'i Drive	Speeding	Cultural Sites	Right-of-way	Steep Grades
Existing Alignment	No -	Direct Path/ Curvilinear Alignment -	Affects no add'l Cultural Sites +	Affects no add'l Parcels +	Steep ~7% o
Westpro Alignment	Yes +	Non-Direct Path/Straight Alignment -	Potential to affect 19 known Cultural/Burial Sites -	Affects 3 Parcels and future Parkway -	Steep ~6% o

Performance Measure Rating: Positive Effect on Issue + Neutral Effect on Issue O Negative Effect on Issue -

FIGURE 11. EXISTING MAKAI SECTION ALIGNMENTS AND EVALUATION

Section Makai of Parkway

Cross Section 5*

Cross Section 6*

Cross Section 7*

**Traffic Calming features can be accommodated on all cross-sections and will be discussed during tonight's presentation*

Cross Section 8*

Cross Section	*Traffic Calming	Sidewalks	Parking	Bikeways	Utilities	Pollution	Trucks
5	To Be Determined	7' Buffered +	11' Parking +	None -	Underground +	No Measures -	No Measures -
6	To Be Determined	7' Buffered +	8' Parking O	Separate Lane +	Underground +	Narrow Lanes +	Narrow Lanes +
7	To Be Determined	7' Buffered +	8' Parking O	Separate Lane +	Underground +	Narrow Lanes +	Narrow Lanes +
8	To Be Determined	7' Buffered +	8' Parking O	None -	Underground +	Narrow Lanes +	Narrow Lanes +

Performance Measure Rating: Positive Effect on Issue + Neutral Effect on Issue O Negative Effect on Issue -

FIGURE 12. EXISTING MAKAI SECTION CROSS SECTIONS AND EVALUATION

Preferred Corridor Alternatives

Input from the Advisory Group and public meeting were utilized to further refine the alternatives and enabled the project team to prepare several preferred corridor alternatives. A higher level detailed analysis was performed for these preferred alternatives including overlaying the alignments and cross-sections with the ground topography and cultural site locations.

Roadway profiles, earthwork quantities and property/cultural site impact information were extracted for each of the preferred extension alternatives.

Based on the topographic information, the Draft EA extension alignments were calculated to have steeper grades than originally projected. Alignment 1 was estimated to require a constant 16% grade between the current terminus and Kuakini Highway. Alignment 2 had a slightly lesser gradient of 14%. Both alignments required extensive earthwork and/or retaining walls. As speed, steep roadway grades and property impacts were among the identified community concerns, an additional alignment was presented. The new alignment remained within the three affected parcels, but incorporated an 'S' curve to lengthen the extension. The profile of this alignment was calculated to require a constant 13% grade. Figure 13 depicts the new alignment in relation to the Draft EA alternatives.

FIGURE 13. PREFERRED ALIGNMENT ALTERNATIVES

Three preferred corridor alternatives were developed independently from the extension alignments. The sections presented below could be applied to any of the previously described alignments.

Corridor options A and B are shown in Figure 14.

In the extension portion, both accommodate pedestrians with 7′ wide sidewalks, and accommodate drainage via an open median. Corridor B however, is striped with narrower travel lanes (11′ versus 12′ for Corridor A) and provides striped bike lanes along both sides of the roadway. Additional roadway width for shared bicycle/vehicle use was not provided in Corridor A, due to the steepness of the roadway.

Within the existing mauka section of the roadway, Corridors A and B are characterized by 2 travel lanes separated by a striped median with 7′ sidewalks. Corridor B, again provides narrower travel lanes and striped bicycle lanes. Corridor A accommodates bicyclists in a 14′ wide shared travel lane.

Makai of the future parkway, two travel lanes, parking and sidewalks will be provided for both Corridor A and B. Corridor B, again provides narrower travel lanes and striped bicycle lanes. Corridor A accommodates bicyclists in a 13′ wide shared travel lane.

Both corridors address the major issues of pedestrian safety, drainage, and (lower La'aloa) parking. Traffic calming will be achieved, to an extent, by the narrowing of travel lanes in Corridor B. However, both Corridor Alternatives do not preclude the installation of additional traffic calming devices (discussed in the following section). The major difference in the alternatives relate to the accommodation of bicycles – within shared or designated bicycle lanes.

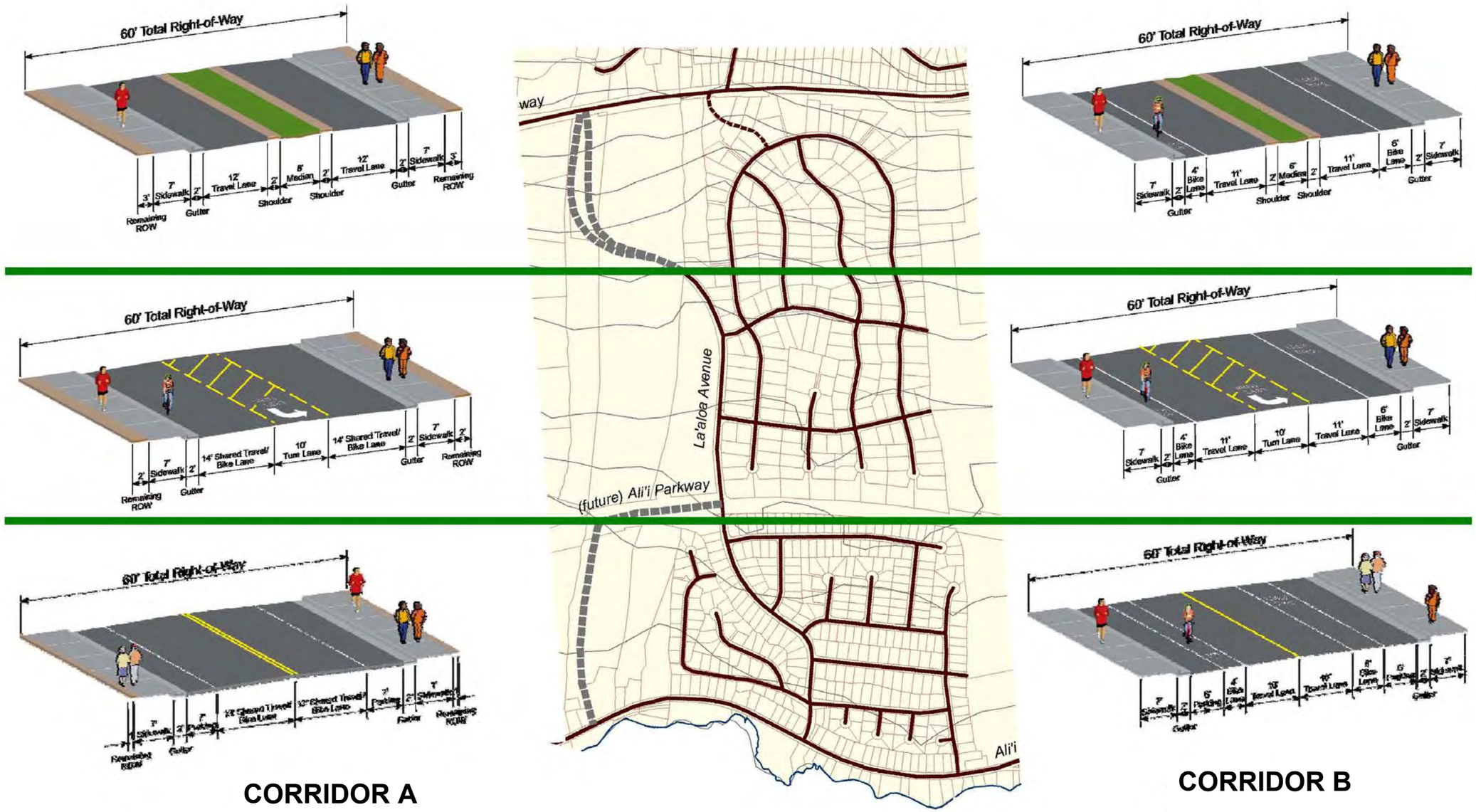


FIGURE 14. PREFERRED CORRIDOR ALTERNATIVES

Corridor C focused on the section makai of the future parkway associated with the WestPro alignment. As previously defined, a semi-diverter would prohibit through traffic from utilizing La`aloa Avenue makai of the future parkway. The physical details of the alternative include paving a portion of the future parkway corridor in its ultimate location. This section would consist of paved travel lanes and shoulders. Pedestrian, bicycle and landscaping elements would occur as part of the parkway construction. The portion of roadway through the WestPro property would follow their proposed roadway alignment with sidewalks, on-street parking and 2 travel lanes. The new Ali`i Drive intersection would need to be improved to accommodate the additional traffic.

Discussions outside of the Advisory Group meetings between the County staff and property owners yielded the following results:

- Westpro would be amenable to use of their property as part of the La'aloa corridor if existing development conditions on their mauka parcel (parcel 120) could be changed. Current conditions prohibit development of the property until specific advances related to the Ali'i Parkway occur.
- WestPro would construct the new roadway alignment through their property. The development of Parcel 120 would create the funds to construct the roadway.
- The makaibound diversion would only be a temporary route, until the Ali'i Parkway is constructed. This is due to access management restrictions planned for the parkway. The WestPro intersection would be gated to be used only as emergency access when the parkway is completed.
- Environmental and archaeological studies have been prepared for the property. Burials were identified which may affect the timeframe for development of the parcel/roadway.
- The Planning Department was not in agreement with changing development conditions, as the current roadway infrastructure in Kona cannot accommodate the additional demands.
- Lower La`aloa Avenue improvements would still be required in the long term, as through makaibound vehicles would utilize the section once the parkway is completed. If not improved as part of this project, funding availability in the future is uncertain.
- The diversion would create additional traffic and delay along Ali`i Drive. The greatest impacts would be caused by the diverted traffic with destinations in the lower La`aloa neighborhood (left-turn movement from the WestPro roadway to southbound Ali`i Drive and the left turn movement from southbound Ali`i Drive to La`aloa Avenue).

As this alternative would only be a temporary solution, creating additional local and potentially regional traffic impacts while reasonable alternatives along the existing corridor exist, the WestPro alternative was not recommended for further consideration.

The preferred alignment and cross-section alternatives were presented to and discussed at separate meetings with each of the three property owners to understand their concerns as well as their development plans. These initial discussions were aimed to aid in a smooth property negotiation process.

Traffic Calming

The Advisory Group was introduced to the concept of traffic calming, and shown examples of horizontal deflection, vertical deflection and narrowings, depicted in Figure 15.

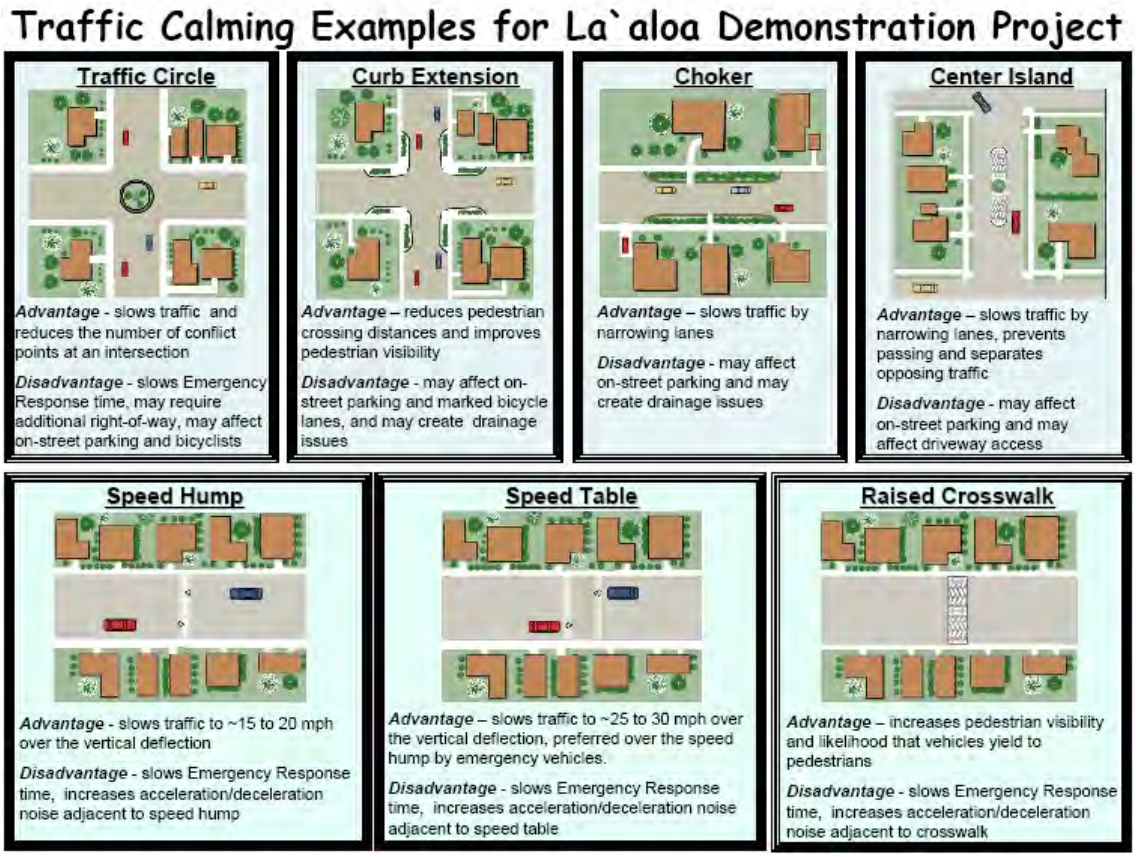


FIGURE 15. TRAFFIC CALMING EXAMPLES

Due to the public's limited exposure to traffic calming devices, the County of Hawaii sponsored a demonstration project along the corridor to test various devices, on a temporary basis. The demonstration project allowed the Advisory Group and public to provide educated opinions regarding the devices.

A collaborative effort with the Advisory Group was performed to design various calming devices along the corridor. Figure 16 depicts the type and locations of the devices. An informational brochure and survey form was sent out and advertised to solicit input on the devices. An informational meeting was also scheduled to answer any questions that the public had.

Due to various circumstances, the demonstration project installation was delayed, and only the devices makai of the future parkway were installed. The comments related to that portion of the demonstration are contained in Appendix B. The County will install the remaining devices and accept additional comments on the traffic calming element of the project at that time.

Generally the comments supported the use of the traffic calming devices, as noticeable slowing of vehicles occurred. Both the sinusoidal hump (speed hump A) and speed table received about 50% favorable comments, with the other 50% evenly split between dislike of the devices for being to harsh or too gentle to slow traffic. The majority (~80%) of respondents disliked the mini-hump (speed hump B) due to the jarring and noise associated with the device.

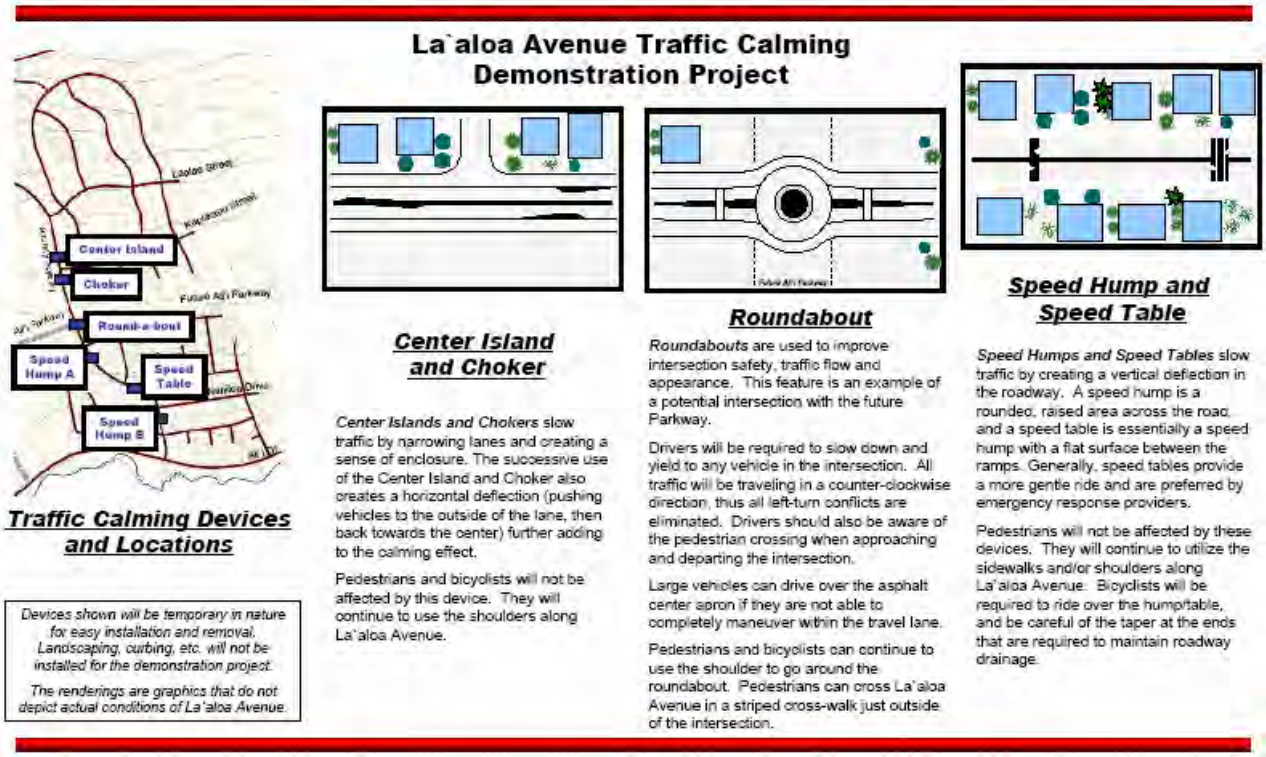
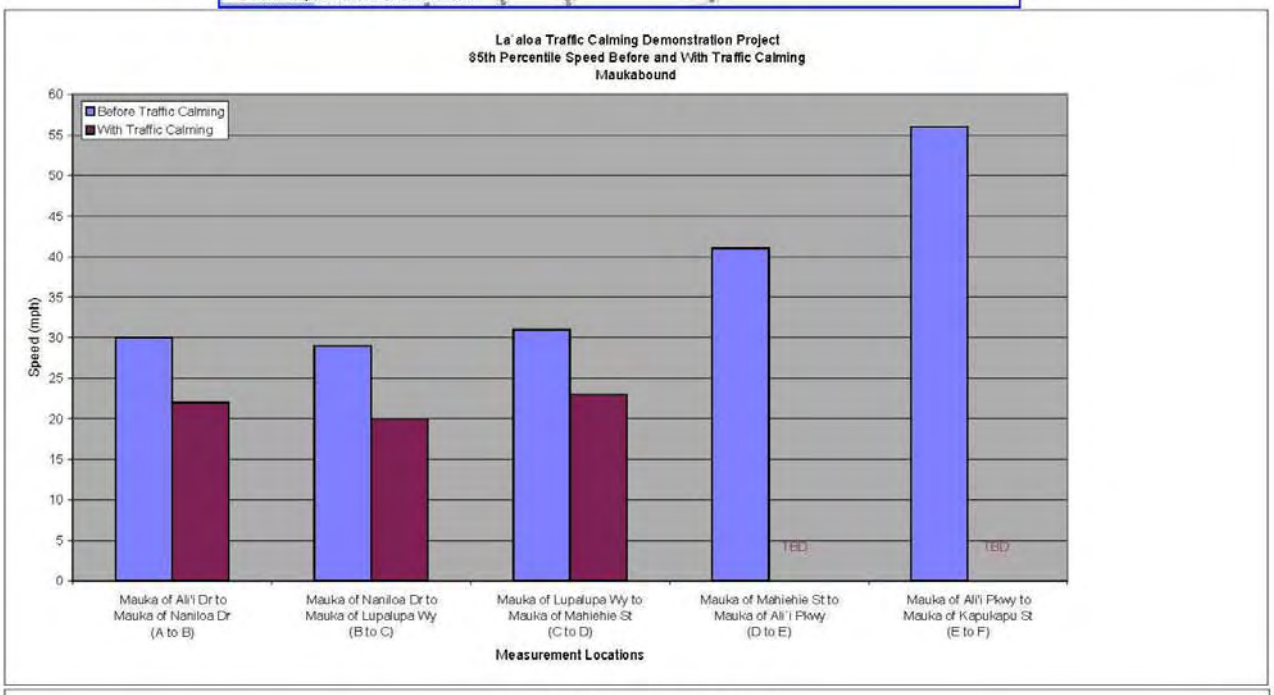


FIGURE 16. TRAFFIC CALMING DEMONSTRATION PROJECT

The effectiveness of the vertical calming measures was also characterized by travel time measurements taken before the devices were installed and approximately 2 weeks after the devices were installed. Figure 17 shows 85th percentile speeds for various segments of the corridor before and after the devices were installed (85 percent of the measurements were slower than the noted speed). The remaining 2 segments will be measured after installation of the roundabout, choker and center island devices.

The segments calmed with the various speed hump devices experienced approximately 5 to 10 mph decrease in 85th percentile speeds.



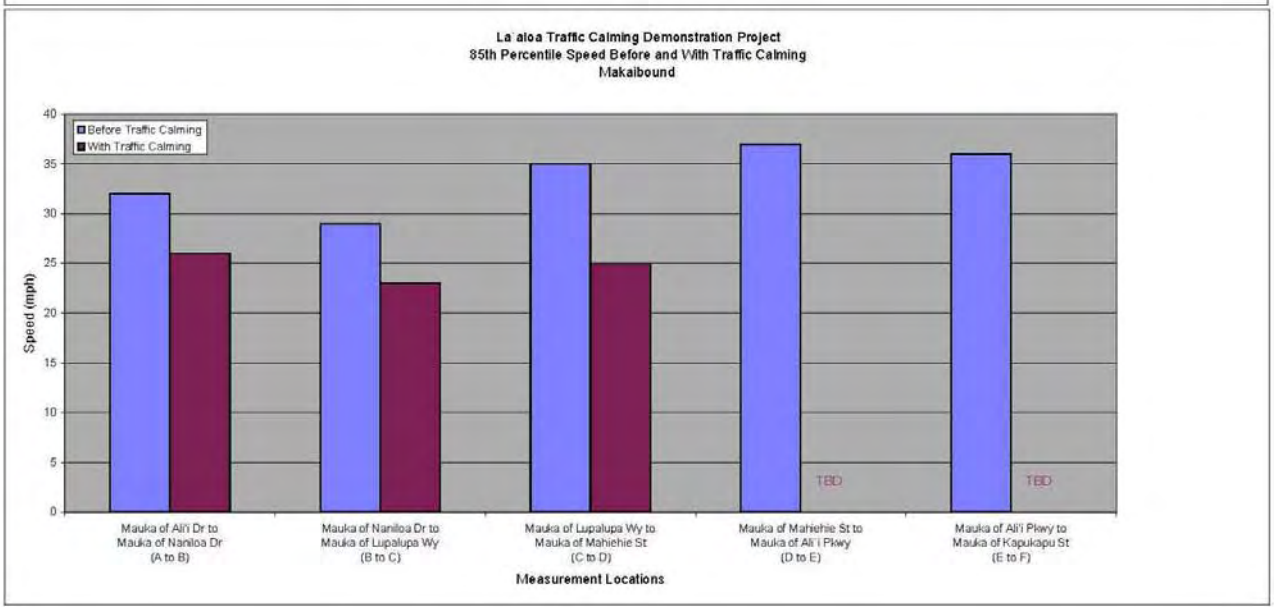


FIGURE 17. TRAVEL TIME STUDY RESULTS

Recommendations

Input received throughout the CSS process and one-on-one discussions with the affected property owners were taken into consideration by the County as they developed the final project recommendations.

Extension Alignment –Performance measures related to alignment characteristics are shown below (in priority order) to show how the three alignments addressed community concerns.

Table 1. Performance Measure Comparison

Performance Measure	Weight	Alignment 1	Alignment 2	Alignment 3
Connection to Kuakini Highway	200	yes	yes	yes
Speeding	140	Most direct alignment	Curvilinear	Most curvilinear alignment
Cultural Sites	120	6352 (wall) 6984 (complex) 24380 (wall) 24379 (alignment) 6350 (trail) 6381 (wall) 24375 (complex) 24377 (terrace) 24376 (wall) 4591 (wall)	6352 (wall) 6984 (complex) 24380 (wall) 6350 (trail) 6381 (wall) 24378 (complex) 24271(wall) 21384 (wall) 4591 (wall)	6352 (wall) 6984 (complex) 24380 (wall) 6350 (trail) 6381 (wall) 24377 (terrace) 24376 (wall) 24271 (wall) 4591 (wall)
Right of Way Impact	70	$802,000 (5 acres)	$892,000 (4.8 acres)	$884,000 (4.4 acres)
Grades	50	16% max grade (1550 feet)	13.8% max grade (1730 feet)	13% max grade (1990 feet)
Construction Cost	*	$6,379,000	$10,653,000	$7,348,000

*Cost was not a performance measure – this is for informational purposes.

Based on the advisory group values, Alignment 3 was most desirable, followed by Alignment 2. Support for Alignment 3 largely was provided due to the effect on speed by the roadway profile and curvature. The property owner's preferred alignment choices were 2 and 3. Property owner's main concerns included access to the parcels and usefulness of parcels following construction of the roadway.

To accommodate the host of issues related to the extension, a hybrid of Alignments 2 and 3 was recommended. The hybrid alignment minimized remnant parcels, unusable for development and provided better access to the affected parcels. The hybrid alignment also provided a slightly longer roadway than Alternative 2, to minimize the roadway extension grade and associated speeds along the corridor, which were issues brought up in the CSS public involvement process. The modification will not affect parcels or cultural sites outside of the area studied for the Draft Environmental Assessment.

Figure 18 shows the recommended alignment, and Table 2 summarizes the performance measure criteria for the recommendation.

Table 2. Performance Measures for Recommended Alignment

Performance Measure	**Recommended Alternative**
Connection to Kuakini Highway	yes
Speeding	2 turns
Cultural Sites	6352 (wall) 6984 (complex) 24380 (wall) 6350 (trail) 6381 (wall) 24271(wall) 21384 (wall) 4591 (wall)
Right of Way Impact	$670,000 (3.6 acres)
Grades	13.5% (1850 feet)
Total Cost*	$7,168,000

*Cost was not a performance measure – this is for informational purposes.

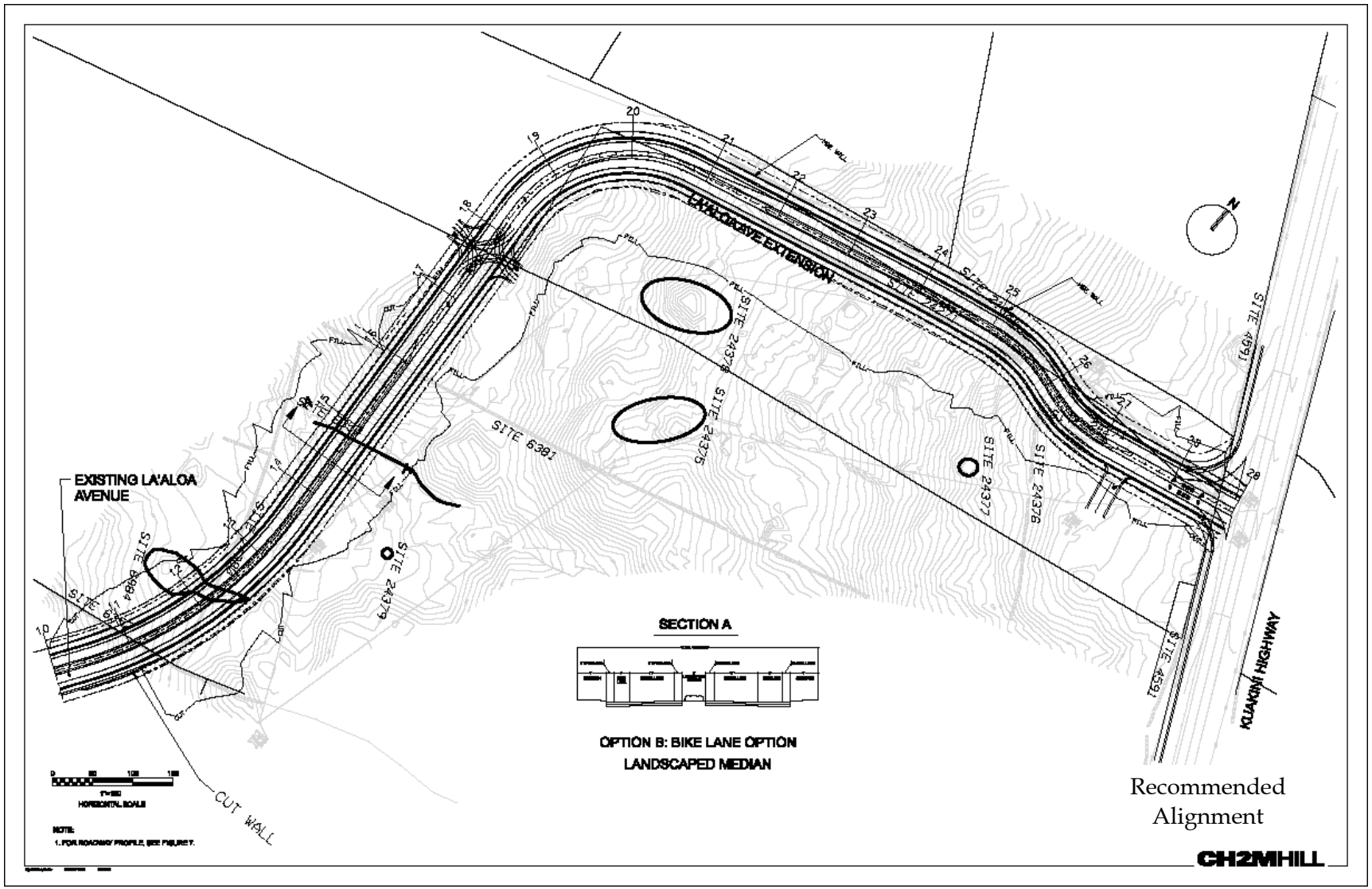


FIGURE 18. RECOMMENDED ALIGNMENT

Cross Section – Corridor Alternative B is the recommended cross-section. This section will address many of the top prioritized issues identified through the CSS process as follows:

- Pedestrians will be facilitated along 7′ wide sidewalks on both sides of the road. They will be provided both a horizontal and vertical buffer/separation from vehicular traffic by a striped bicycle lane and a curb.
- Bicycle lanes will be striped in both directions of travel, adjacent to the sidewalk. The bicycle lane in the maukabound direction will be wider to allow for the more difficult movement. The maukabound bicycle lane will be 6′ wide and the makaibound lane will be 4′ wide.
- One vehicular traffic lane will be provided in each direction travel. The travel lane will be striped at 11′ wide. The narrow lane will discourage speeding. The lanes will be separated by a planted or striped median except at intersections with cross roads mauka of the parkway.
- Planting/landscaping within the median will be coordinated with a local botanist, County Engineers and County Maintenance personnel to achieve a low-maintenance solution that is suitable for the area.
- Street lighting will be provided along the corridor, all other utilities will be constructed underground.

Mauka Extension

- To promote the County's emphasis on "Green Drainage" and address the Advisory Group's issue related to drainage, the median will be utilized to treat/percolate a portion of the surface water runoff.
- The remainder of the drainage of surface water will be accommodated by drywells. The location and size of the drywells will be determined during the design phase.
- In case of emergencies or vehicle breakdown, adequate pavement (21′ mauka and 19′ makai, including travel lane, bicycle lane and gutters) is provided to allow a vehicle to pass.
- The median will be utilized as a center left-turn lane at (future) intersections. Intermittent center islands will also be constructed within the median area. Locations for both the islands and turn lanes are to be determined.

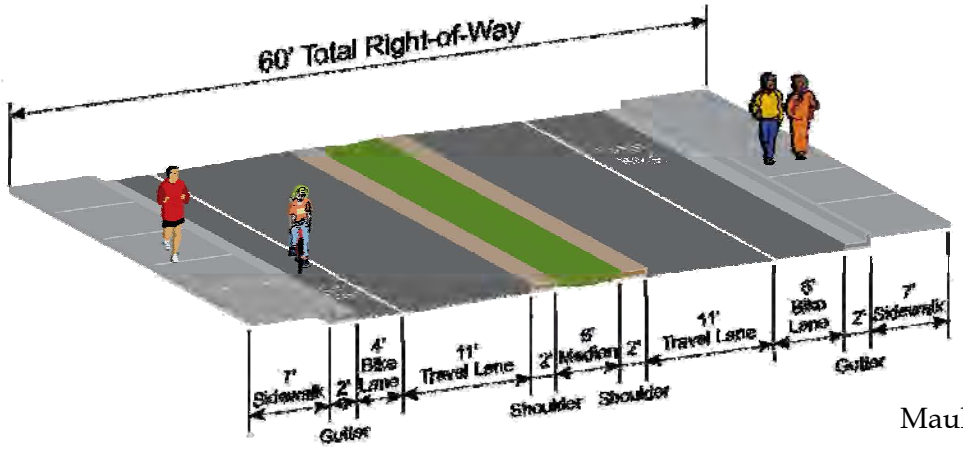
Existing Mauka Section

- The striped median will preserve the existing pavement (saving cost), and can be delineated with posts or raised pavement markers to discourage vehicles from utilizing the area for travel.
- Surface water runoff will be accommodated by drywells. The existing drainage system will be evaluated and modified as necessary, as the runoff flow characteristics will be altered by the construction of sidewalks.
- The striped median will be utilized as a center left-turn lane at existing intersections. Intermittent center islands will also be constructed within the median area for aesthetic and traffic calming purposes. Locations and appropriate plantings for the islands are to be determined.

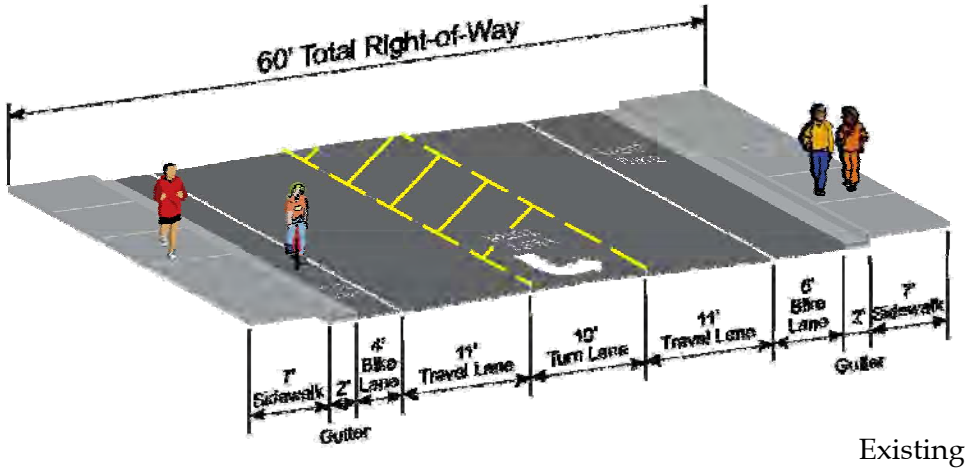
Existing Makai Section

- On-street parking will be provided. The parking will provide parking capacity as well as a buffer zone between vehicular and pedestrian travel.
- Travel lanes will be further narrowed to a 10′ width. The narrow lane will aid in discouraging speeding and reinforce the residential characteristic of the segment.

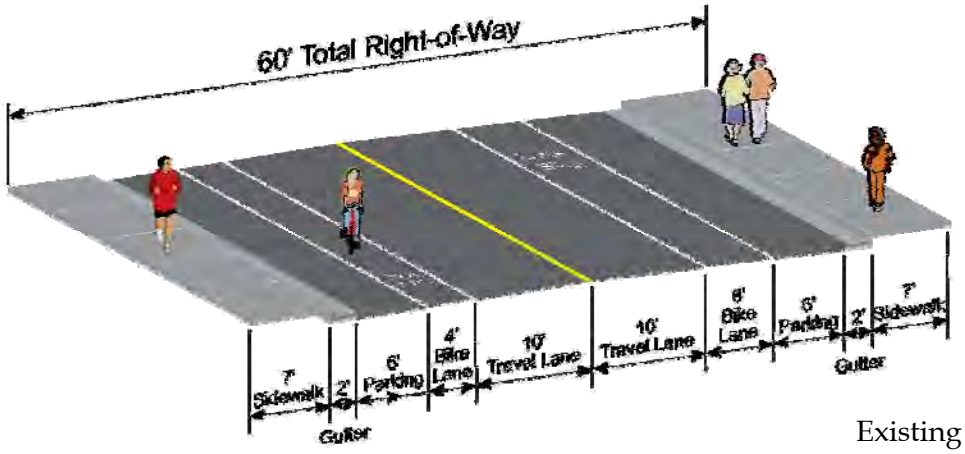
– Surface water runoff will be accommodated by drywells. The existing drainage system will be evaluated and modified as necessary.



Mauka Extension



Existing Mauka Section



Existing Makai Section

FIGURE 19. RECOMMENDED CROSS SECTIONS

Traffic Calming – Traffic calming devices are recommended along the corridor to encourage drivers to obey the posted speed of 25 mph

- The 10′-11′ wide travel lanes will serve to discourage high speeds
- Intermittent center islands will add to the calming effect of the narrow lanes
- Additional traffic calming features to be determined utilizing the traffic calming demonstration/survey results

Kuakini Highway intersection – The traffic control and lane configuration recommended in the La`aloa Avenue Draft Environmental Assessment is recommended for the intersection of the La`aloa Avenue Extension and Kuakini Highway. The intersection will consist of:

- A separate northbound to westbound left-turn lane on Kuakini Highway with 100 feet of storage and approximately 500 feet length to accommodate deceleration and tapers. (actual lengths will be coordinated with HDOT, as a portion of the deceleration may be assumed to occur in the travel lane)
- A separate southbound to westbound right-turn deceleration lane on Kuakini Highway with 115 feet of storage and approximately 500 feet length for deceleration and tapers.
- A separate eastbound to southbound right-turn acceleration lane onto Kuakini Highway approximately 600 feet long including length for acceleration and tapers.
- Separate left and right-turn lanes on the eastbound approach of La`aloa Avenue to Kuakini Highway, with the right-turn storage length being at least 100 feet long (2x's the average length of queue during an average signal cycle).
- Ultimate configuration will include 2 through lanes on Kuakini Highway in each direction (future HDOT project)
- Traffic signal control - signal warrant analyses met for both the am and pm peak hours

Operations analyses performed for the Draft EA reflect overall good operations with the proposed lane configuration and signal control. During the forecast year the intersection will operate at LOS D or better during the peak traffic hours without the parkway and LOS B or better if the parkway is constructed. (Source: La`aloa Avenue Extension Draft Environmental Assessment, July 2005)

Figure 20 depicts the Kuakini Highway/La`aloa Avenue intersection configuration.

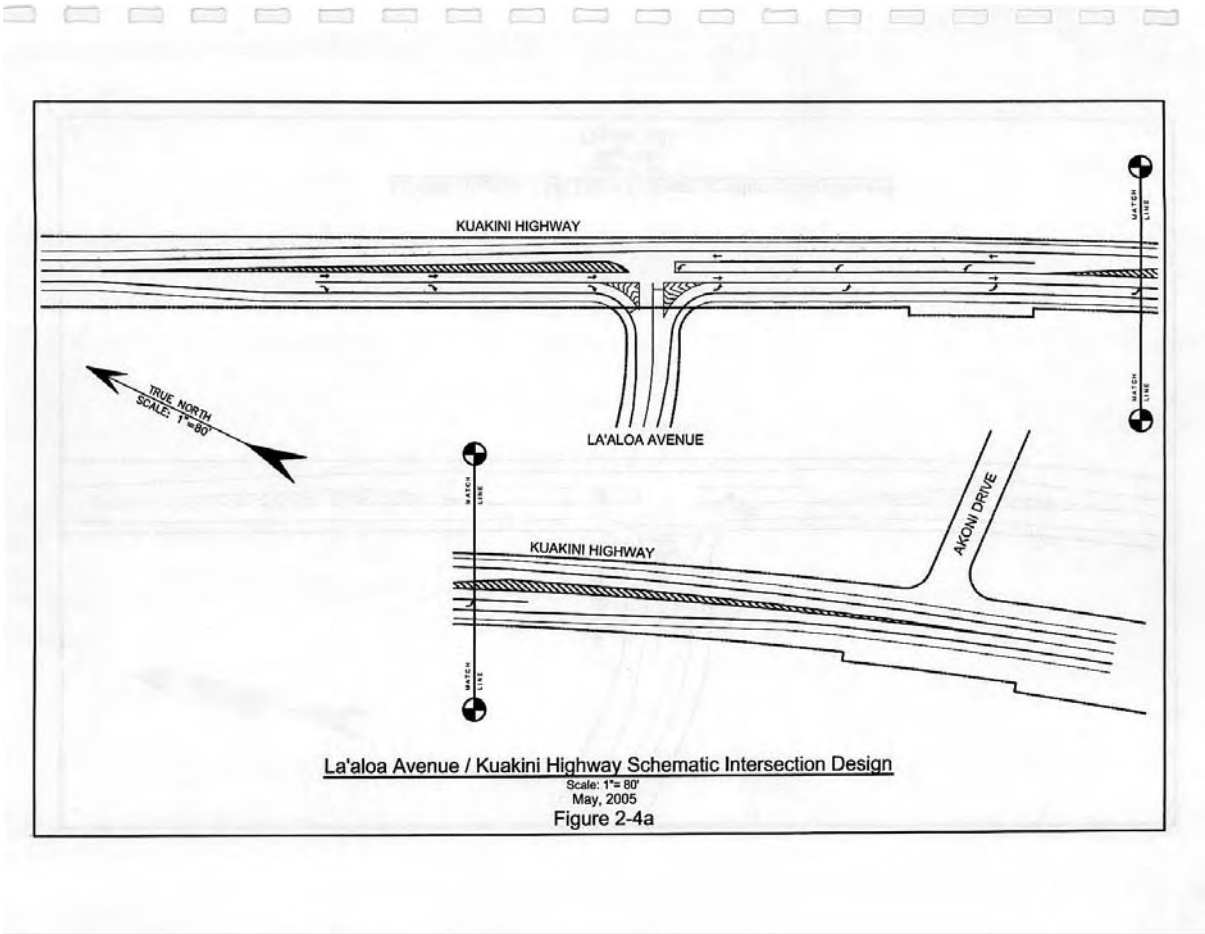


FIGURE 20. KUAKINI HIGHWAY INTERSECTION
(Source: La`aloa Avenue Extension Draft Environmental Assessment, July 2005)

**Ali`i Drive Intersection –** The traffic control and lane configuration recommended in the La`aloa Avenue Draft Environmental Assessment is recommended for the intersection of the La`aloa Avenue Extension and Ali`i Drive. The intersection will consist of:

- A separate southbound to eastbound left-turn lane on Ali`i Drive with 100 feet of storage and approximately 100 feet to accommodate lane tapers. (actual lengths will be coordinated with the County during the design phase)
- A separate southbound refuge lane to receive left-turn traffic from La`aloa Avenue. Storage of 50 feet and approximately 100 feet to accommodate lane tapers is required.
- Separate left and right-turn lanes on the westbound approach of La`aloa Avenue to Ali`i Drive, with the left-turn storage length being at least 75 feet long (2x's the average length of queue during an average signal cycle). *(analyses indicate the westbound operations will be similar with or without this left-turn pocket – thus this can be designed as a single lane approach if desired)*
- Stop sign control for La`aloa Avenue traffic- signal warrants were not met at this intersection

Operations analyses reflect overall good operations with the proposed lane configuration and traffic control. By the design Year 2020, all movements will operate at LOS C or better both with and without the parkway during peak traffic periods. (Source: La`aloa Avenue Extension Draft Environmental Assessment, July 2005)

Figure 21 depicts the Ali`i Drive/La`aloa Avenue intersection configuration.

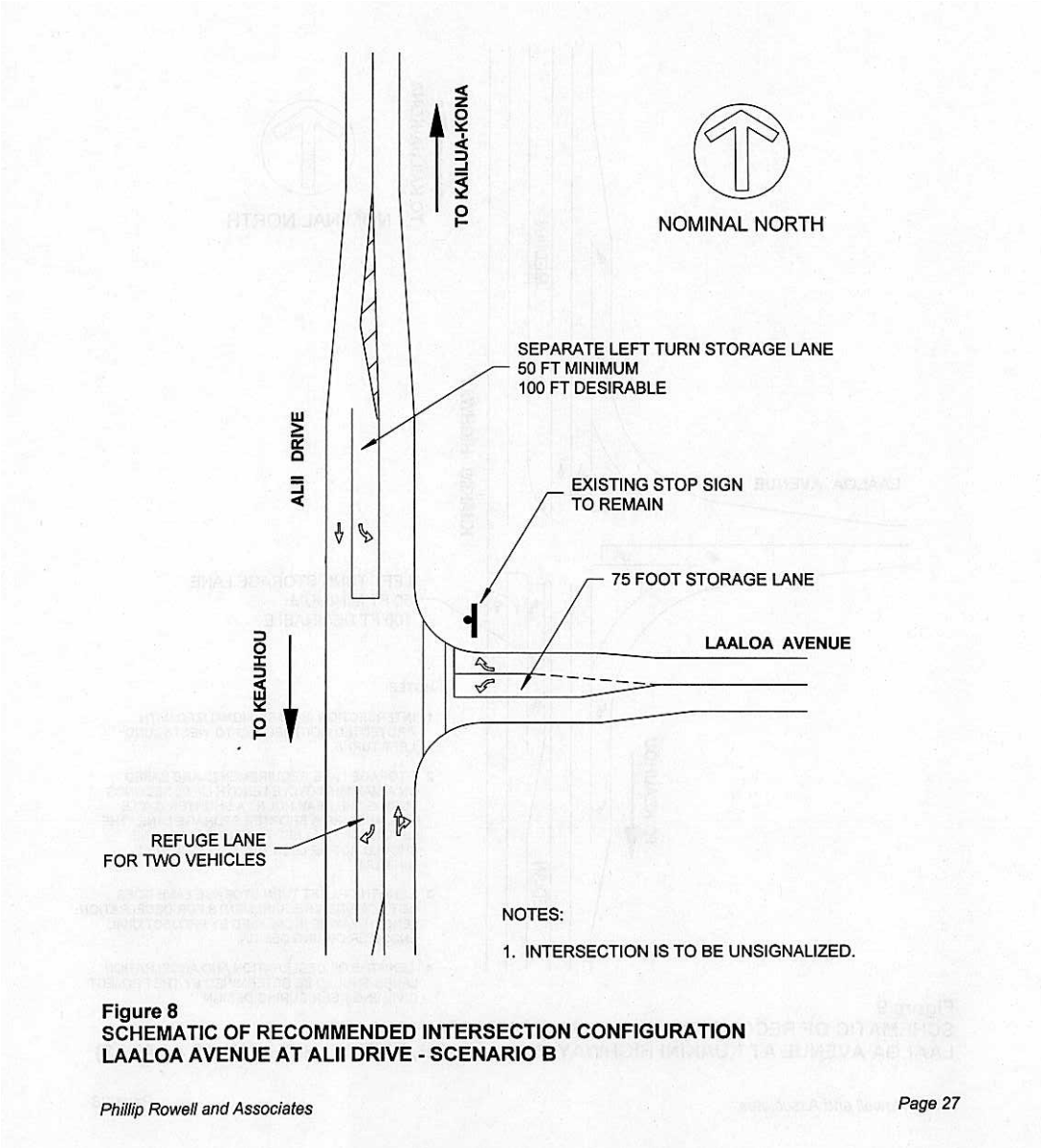


FIGURE 21. ALI`I DRIVE INTERSECTION
(Source: La`aloa Avenue Extension Draft Environmental Assessment, July 2005)

To accommodate school children utilizing transit service, the sidewalk on La`aloa Avenue is recommended to be extended onto Ali`i Drive approximately 100 feet. This will provide a safe walking area and a safe waiting area for the children. The sidewalk should be constructed as 8′ wide to meet ADA requirements. Lane widths would need to be narrowed to 10′ wide to accommodate both the sidewalk and the left-turn pocket for La`aloa Avenue.

Coordination with County and school transit authorities will be conducted. Any transit stop facilities will be their responsibility.

Children waiting for school transit