Appendix G

Acoustic Study for the University of the Nations Kona, Kailua-Kona, Hawaii, June 2023

ACOUSTIC STUDY FOR THE UNIVERSITY OF THE NATIONS, KONA KAILUA-KONA, HAWAII

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G70

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CHAPTER 1. SUMMARY

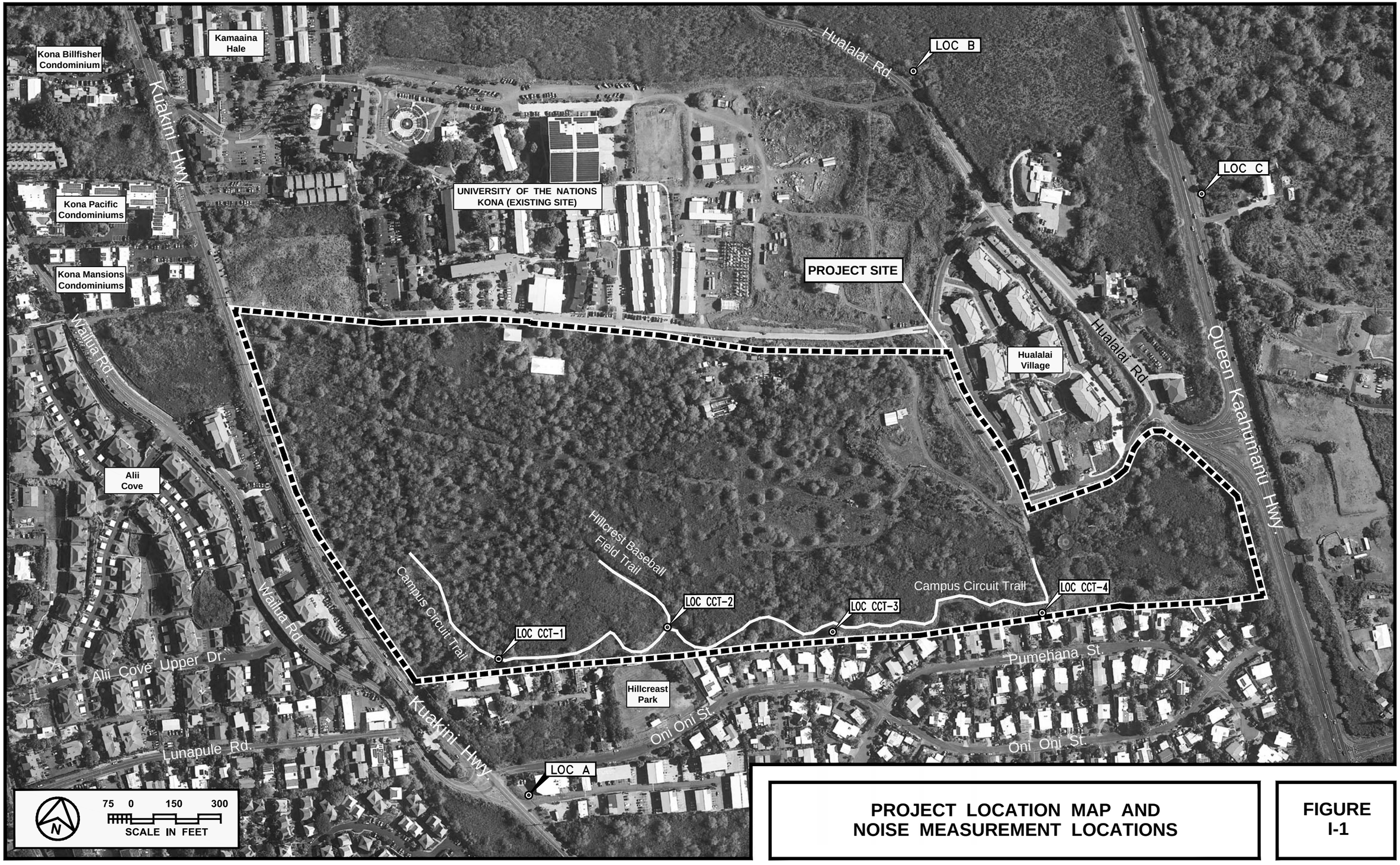
The existing and future traffic noise levels in the vicinity of the planned University of the Nations, Kona Hawaii were evaluated for their potential impacts and their relationship to the current FHA/HUD noise standard. The traffic noise level increases along the roadways servicing the project site (see Figure I-1) were calculated. No significant increases in traffic noise levels are predicted to occur as a result of project traffic following project build-out by CY 2050.

Along Queen Kaahumanu Highway fronting the school site, traffic noise levels are expected to increase from approximately 67.2 to 68.5 DNL at 100 foot distance from the centerline by CY 2050. The 1.3 DNL increase will result from increases in non-project traffic by CY 2050. Project traffic should not increase future traffic noise levels along Queen Kaahumanu Highway in the immediate vicinity of the project between the Kuakini Highway and Nani Kailua Road intersections. Along Kuakini Highway, traffic noise levels are expected to increase by 1.5 DNL by CY 2050 as a result of both project and non-project traffic, with future traffic noise levels of 64.5 DNL at 100 foot distance from the Kuakini Highway centerline by 2050. Along Hualalai Road north of the project, traffic noise levels are expected to remain relatively low at 55.2 DNL at 100 feet from the Hualalai Road centerline by CY 2050. Non-project traffic will be the sole cause of the increase in future traffic noise levels by 0.8 DNL along Hualalai Road. Project traffic is anticipated to cause increases along Kuakini Highway of 0.6 DNL or less by CY 2050. These levels of traffic noise increases resulting from project generated traffic are not considered to be significant, and will be difficult to measure or perceive between CY 2023 and 2050.

The school site is planned such that noise sensitive buildings of the school are situated at very large setback distances from Queen Kaahumanu and Kuakini Highways, where existing and future traffic noise levels are predicted to be less than 55 DNL. The large buffer distances to both highways will allow for the use of naturally ventilated buildings on the school campus. The planned new student dormitory buildings at the east end of the project site are located near but just outside the forecasted 65 DNL traffic noise contour. If air conditioning is included in these buildings for thermal comfort, exterior-to-interior noise reductions in the order of 20 dBA should result.

Potential noise impacts or complaint risks from outdoor activities and central plant equipment are possible on adjacent properties. Compliance with State Department of Health noise regulations for fixed equipment are recommended to minimize adverse noise impacts on adjacent properties from central plant equipment. Complaints may occur from the planned outdoor activity areas, particularly those play and practice fields closest to the south boundary. The addition of sound attenuating walls and community outreach are possible noise mitigation measures.

Unavoidable, but temporary, noise impacts may occur during construction of the



PROJECT LOCATION MAP AND NOISE MEASUREMENT LOCATIONS

FIGURE I-1

proposed project, particularly during the excavation and earth moving activities on the project site. Because construction activities are predicted to be audible within the project site and at nearby properties, the quality of the acoustic environment may be degraded to unacceptable levels during periods of construction. Mitigation measures to reduce construction noise to inaudible levels will not be practical in all cases, but the use of quiet equipment and compliance with State Department of Health construction noise regulations are recommended as standard mitigation measures.

CHAPTER II. PURPOSE

The primary objective of this study was to describe the existing and future traffic noise environment in the environs of the proposed University of the Nations, Kona facility in Kailua-Kona on the island of Hawaii. Traffic forecasts for 2050 were used. Traffic noise level increases and impacts associated with the proposed development were to be determined within the project site as well as along the public roadways which are expected to service the project traffic. A specific objective was to determine future traffic noise level increases associated with both project and non-project traffic, and the potential noise impacts associated with these increases.

Impacts from on-site activities and short term construction noise at the project site were also included as noise study objectives. Recommendations for minimizing identified noise impacts were also to be provided as required.

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

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

Table III-1, derived from Reference 1, presents current federal noise standards and acceptability criteria for residential land uses. Table III-2, also extracted from Reference 1, presents the general effects of noise on people in residential use situations. Land use compatibility guidelines for various levels of environmental noise as measured by the DNL descriptor system are shown in Figure III-1 (from Reference 2). As a general rule, noise levels of 55 DNL or less occur in rural areas, or in areas which are removed from high volume roadways. In urbanized areas which are shielded from high volume roadways, DNL levels generally range from 55 to 65 DNL, and are usually controlled by motor vehicle traffic noise. Receptors which front major roadways are generally exposed to levels of 65 DNL, and as high as 75 DNL when the roadway is a high speed freeway. In the project area, traffic noise levels associated with Queen Kaahumanu Highway and Kuakini Highway are typically greater than 65 DNL along their Rights-of-Way due to the relatively large volumes of traffic on these major thoroughfares.

For purposes of determining noise acceptability for funding assistance from federal agencies (FHA/HUD and VA), an exterior noise level of 65 DNL or less is considered acceptable for residences and noise sensitive receptors. This standard is applied nationally (Reference 3), including Hawaii. Because of our open-living conditions, the predominant use of naturally ventilated dwellings, and the relatively low exterior-to-interior sound attenuation afforded by these naturally ventilated structures, an exterior noise level of 65 DNL does not eliminate all risks of noise impacts. Because of these factors, and as recommended in Reference 4, a lower level of 55 DNL is considered as the "Unconditionally Acceptable" (or "Near-Zero Risk") level of exterior noise. However, after considering the cost and feasibility of applying the lower level of 55 DNL, government agencies such as FHA/HUD and VA have selected 65 DNL as a more appropriate regulatory standard.

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

TABLE III-1

EXTERIOR NOISE EXPOSURE CLASSIFICATION (RESIDENTIAL LAND USE)

NOISE EXPOSURE CLASS	DAY–NIGHT SOUND LEVEL	EQUIVALENT SOUND LEVEL	FEDERAL (1) STANDARD
Minimal Exposure	Not Exceeding 55 DNL	Not Exceeding 55 Leq	Unconditionally Acceptable
Moderate Exposure	Above 55 DNL But Not Above 65 DNL	Above 55 Leq But Not Above 65 Leq	Acceptable(2)
Significant Exposure	Above 65 DNL But Not Above 75 DNL	Above 65 Leq But Not Above 75 Leq	Normally Unacceptable
Severe Exposure	Above 75 DNL	Above 75 Leq	Unacceptable

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

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

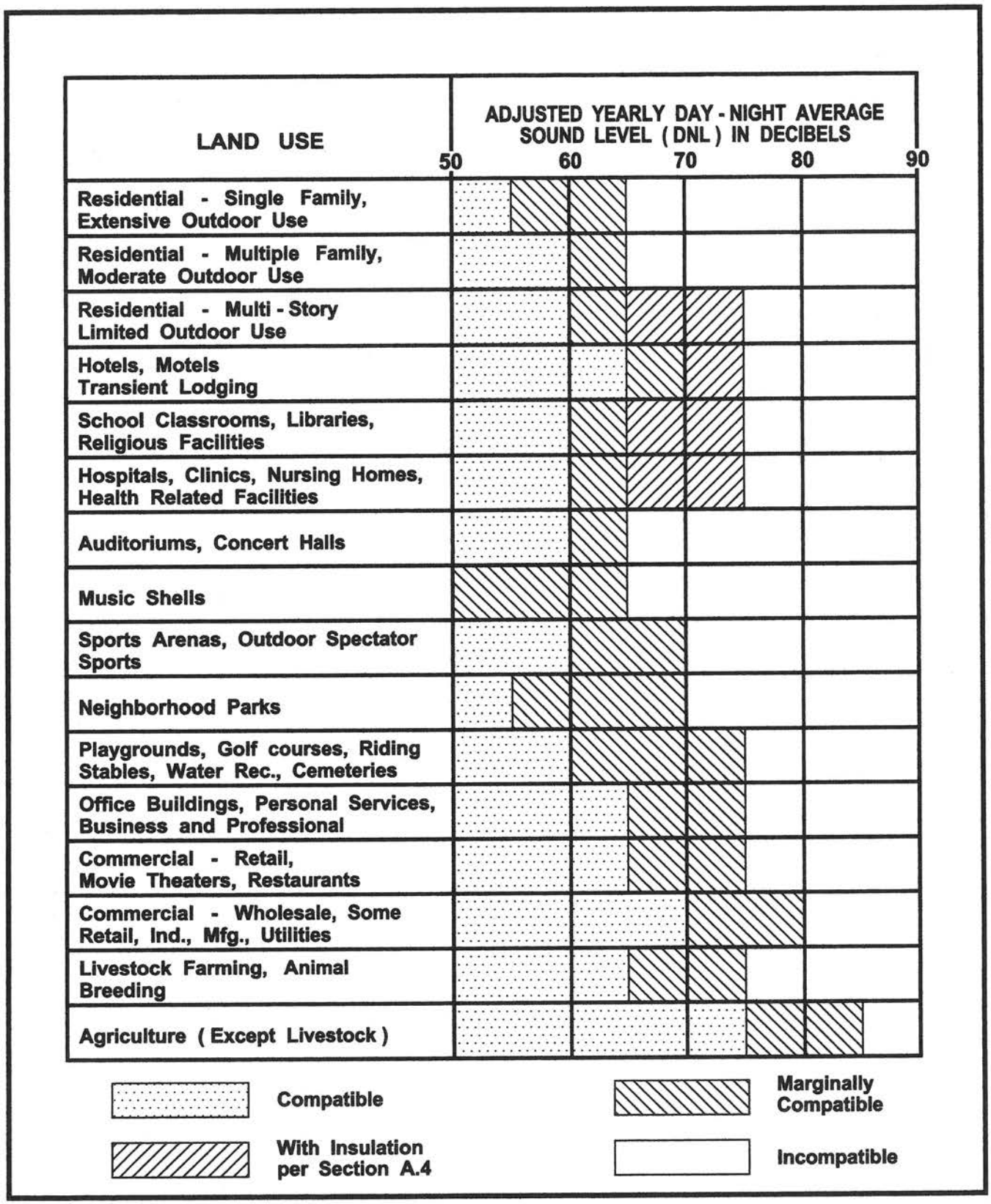
TABLE III-2

EFFECTS OF NOISE ON PEOPLE
(Residential Land Uses Only)

EFFECTS[1] / DAY-NIGHT AVERAGE SOUND LEVEL IN DECIBELS	Hearing Loss	Speech Interference		Annoyance[2]	Average Community Reaction[4]	General Community Attitude Towards Area
		Indoor	Outdoor			
	Qualitative Description	%Sentence Intelligibility	Distance In Meters for 95% Sentence Intelligibility	% of Population Highly Annoyed[3]		
75 and above	May Begin to Occur	98%	0.5	37%	Very Severe	Noise is likely to be the most Important of all adverse aspects of the community environment.
70	Will Not Likely Occur	99%	0.9	25%	Severe	Noise is one of the most Important adverse aspects of the community environment.
65	Will Not Occur	100%	1.5	15%	Significant	Noise is one of the important adverse aspects of the community environment.
60	Will Not Occur	100%	2.0	9%	Moderate to Slight	Noise may be considered an adverse aspect of the community environment.
55 and below	Will Not Occur	100%	3.5	4%		Noise considered no more important than various other environmental factors.

1. "Speech Interference" data are drawn from the following tables in EPA's "Levels Document": Table 3, Fig. D-1, Fig. D-2, Fig. D-3. All other data from National Academy of Science 1977 report "Guidelines for Preparing Environmental Impact Statements on Noise, Report of Working Group 69 on Evaluation of Environmental Impact of Noise."
2. Depends on attitudes and other factors.
3. The percentages of people reporting annoyance to lesser extents are higher in each case. An unknown small percentage of people will report being "highly annoyed" even in the quietest surroundings. One reason is the difficulty all people have in intergrating annoyance over a very long time.
4. Attitudes or other non-acoustic factors can modify this. Noise at low levels can still be an important problem, particularly when it intrudes into a quiet environment.

NOTE: Research implicates noise as a facor producing stress-related health effects such as heart disease, high-blood pressure and stroke, ulcers and other digestive disorders. The relationships between noise and these effects, however, have not as yet been quantified.



LAND USE COMPATIBILITY WITH YEARLY AVERAGE DAY - NIGHT SOUND LEVEL (DNL) AT A SITE FOR BUILDINGS AS COMMONLY CONSTRUCTED.
(Source: American National Standards Institute S12.9 - 1988/Part 5)

FIGURE III-1

On the island of Hawaii, the State Department of Health (DOH) regulates noise from construction activities through the issuance of permits for allowing excessive noise during limited time periods. State DOH noise regulations are expressed in maximum allowable property line noise limits rather than DNL (see Reference 5). Although they are not directly comparable to noise criteria expressed in DNL, State DOH noise limits for residential, commercial, and industrial lands equate to approximately 55, 60, and 76 DNL, respectively.

CHAPTER IV. GENERAL STUDY METHODOLOGY

Existing traffic noise levels were measured at seven locations (A, B, C, and CCT-1 through CCT-4) in the project environs to provide a basis for developing the project's traffic noise contributions along the roadways which will service the proposed development, and for describing the existing background noise levels at neighboring residences along the south boundary of the project site. The locations of the measurement sites are shown in Figure I-1. Noise measurements were performed during the month of May 2023. The results of the traffic noise measurements at Locations A, B, and C were compared with calculations of existing traffic noise levels to validate the computer model used. The traffic noise measurement results, and their comparisons with computer model predictions of existing traffic noise levels are summarized in Table IV-1. Daytime background noise measurement results on a Sunday at locations along the project's south boundary are shown in Figures IV-1 through IV-4 in statistical histogram format, where Lmax, Leq, and Lmin represent the maximum, average, and minimum dBA values measured during each 15-minute recording period. The L10 and L50 values shown in the figures represent the sound levels which where exceeded 10 and 50 percent of the time.

Traffic noise calculations for the existing conditions as well as noise predictions for the Year 2050 were performed using the Federal Highway Administration (FHWA) Traffic Noise Model, Version 3.5 (Reference 6). Traffic data entered into the noise prediction model were: roadway and receiver locations; hourly traffic volumes, average vehicle speeds; estimates of traffic mix; and "Hard Soil" propagation loss factor. The traffic data and forecasts for the project (Reference 7), plus the spot traffic counts obtained during the noise measurement periods were the primary sources of data inputs to the model. Appendix C summarizes the AM and PM peak hour traffic volumes for CY 2023 and 2050 which were used to model existing and future traffic noise along the roadways in the vicinity of the project site. For existing and future traffic along the roadways in the vicinity of the project site, it was assumed that the average noise levels, or Leq(h), during the AM peak traffic hour were 0.8 dB less than the 24-hour DNL along Queen Kaahumanu Highway. The PM peak hour Leq were were assumed to be 0.5 dB greater than the 24-hour DNL along Kuakini Highway. These assumptions were based on computations of both the hourly Leq and the 24-hour DNL of traffic noise on Queen Kaahumanu and Kuakini Highways (see Figures IV-5 and IV-6) using State of Hawaii hourly traffic counts from References 8 and 9. Along Hualalai Road, it was assumed that the peak hour Leq's were equal to the 24-hour DNL.

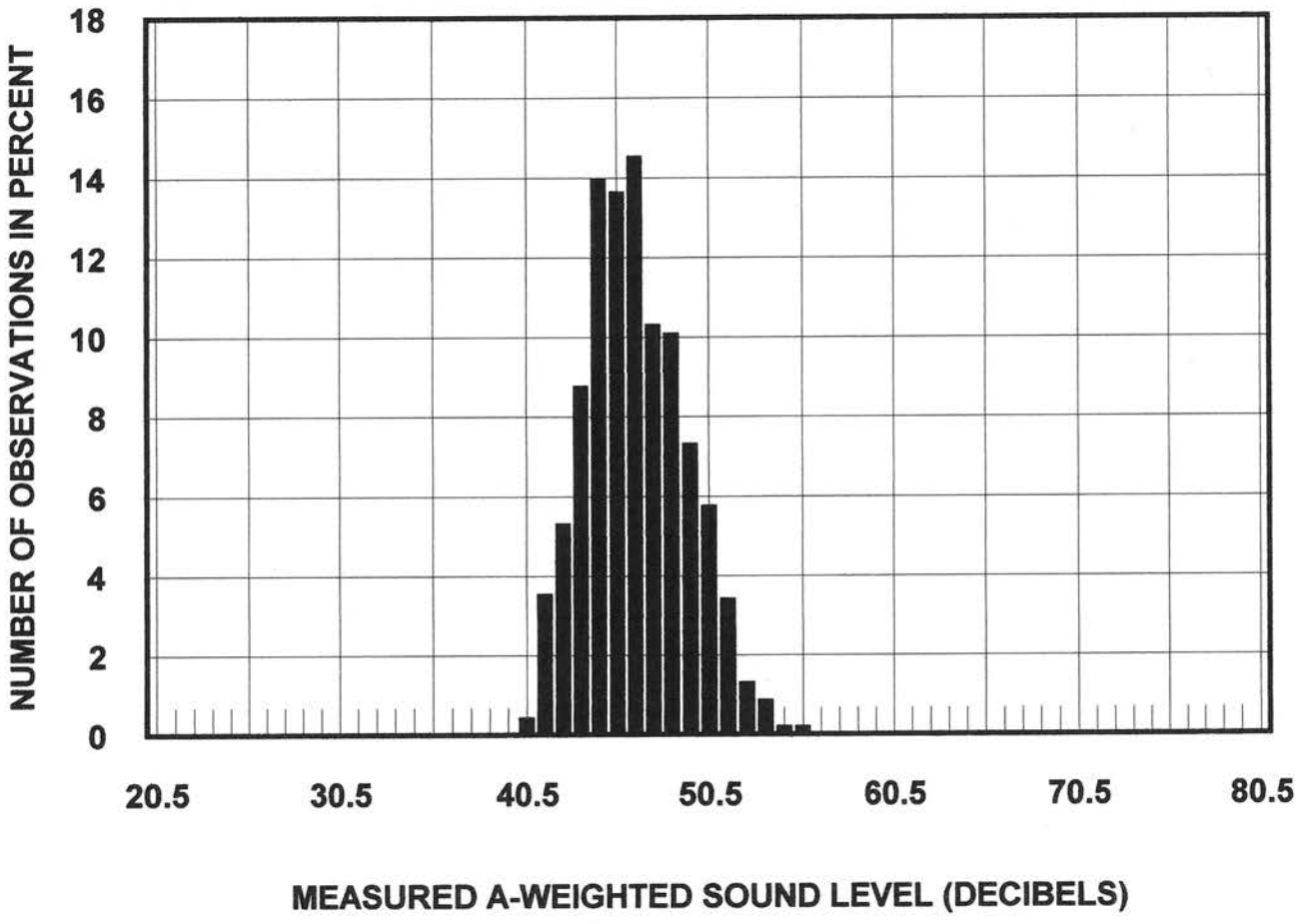
Traffic noise calculations for both the existing and future conditions in the project environs were developed for ground level receptors with and without the benefit of shielding from natural terrain features or man made obstructions. Traffic noise levels were also calculated for future conditions with and without the proposed project. The forecasted changes in traffic noise levels over existing levels were calculated with and without the project, and noise impact risks evaluated. The relative contributions of non-project and project traffic to the total noise levels were also calculated, and an

TABLE IV-1
TRAFFIC NOISE MEASUREMENT AND TRAFFIC NOISE MODEL VALIDATION RESULTS

	LOCATION	Time of Day (HRS)	Ave. Speed (MPH)	Hourly Traffic Volume AUTO	M.TRUCK	H.TRUCK	Measured Leq (dB)	Predicted Leq (dB)
C.	50 FT from the center-line of Q. Kaahumanu Hwy. (5/15/23)	0645 TO 0745	43	1,787	31	22	69.8	69.8
A.	50 FT from the center-line of Kuakini Hwy. (5/15/23)	0759 TO 0859	42	520	6	3	63.7	63.9
B.	50 FT from the center-line of Hualalai Rd. (5/15/23)	1151 TO 1251	30	144	7	0	54.8	54.8
A.	50 FT from the center-line of Kuakini Hwy. (5/15/23)	1455 TO 1555	42	696	8	5	65.0	65.0
C.	50 FT from the center-line of Q. Kaahumanu Hwy. (5/15/23)	1610 TO 1702	43	1,907	14	7	69.4	69.6

FIGURE IV-1
HISTOGRAM OF MEASURED SOUND LEVELS AT UNIVERSITY OF THE NATIONS KONA; LOC CCT-1

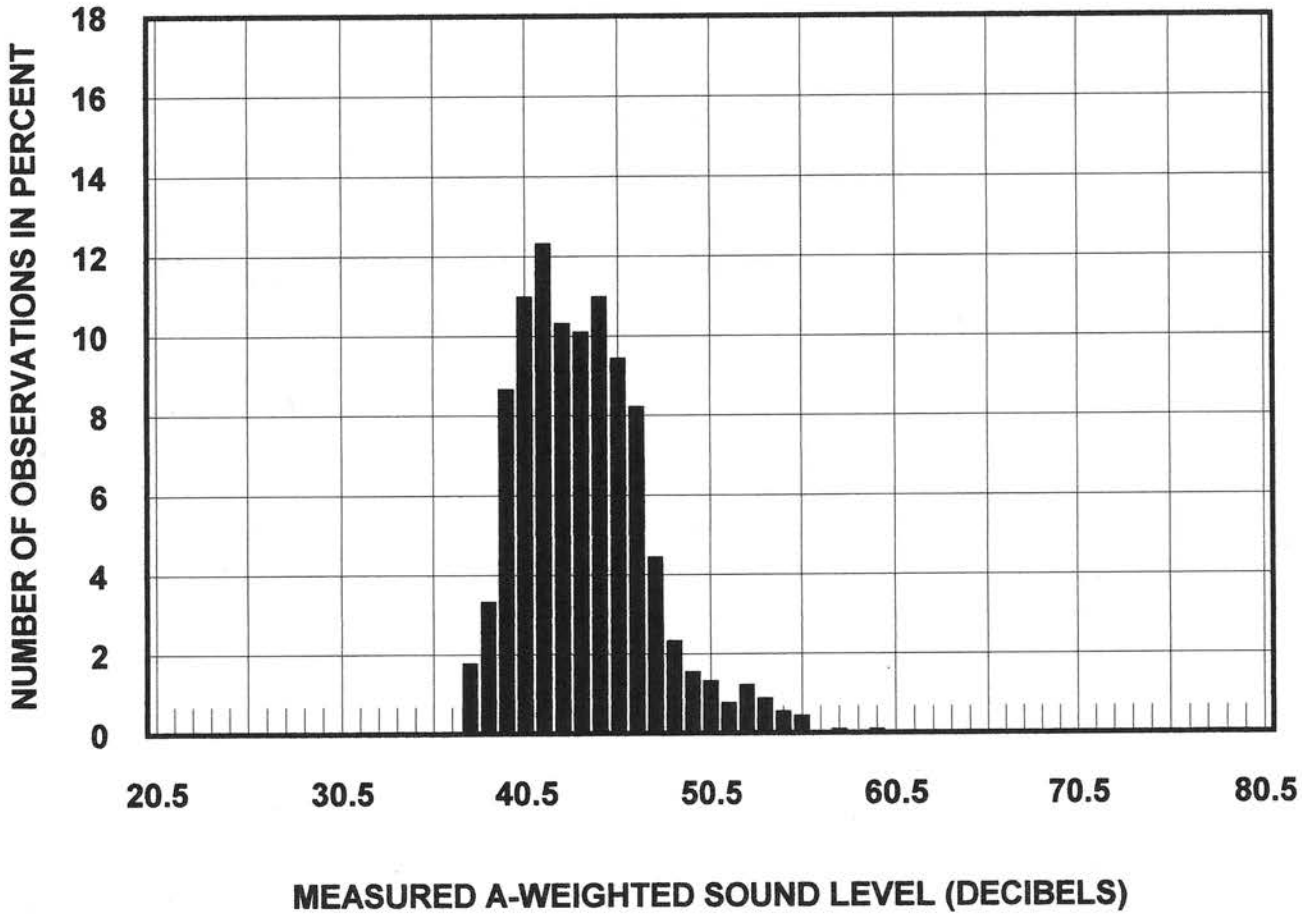
DATE: MAY 15, 2023
TIME: 1059 - 1114 HOURS
METER RESPONSE: LAEQ



Lmax:	55.5 dBA
L10:	50.2 dBA
L50:	46.3 dBA
Leq:	47.4 dBA
Lmin:	40.1 dBA

FIGURE IV-2
HISTOGRAM OF MEASURED SOUND LEVELS AT UNIVERSITY OF THE NATIONS KONA; LOC CCT-2

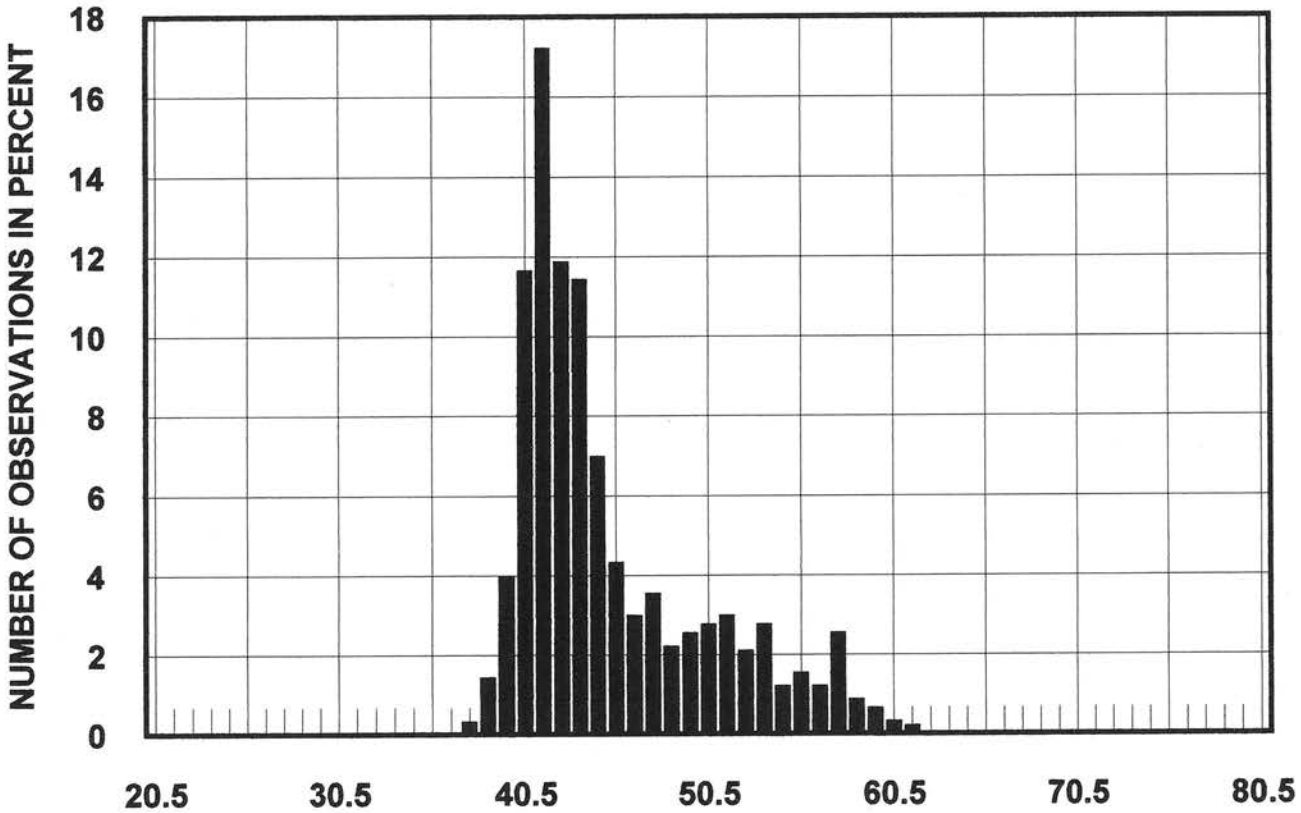
DATE: MAY 15, 2023
TIME: 1037 - 1052 HOURS
METER RESPONSE: LAEQ



Lmax:	59.1 dBA
L10:	47.9 dBA
L50:	43.3 dBA
Leq:	45.4 dBA
Lmin:	37.1 dBA

FIGURE IV-3
HISTOGRAM OF MEASURED SOUND LEVELS AT UNIVERSITY OF THE NATIONS KONA; LOC CCT-3

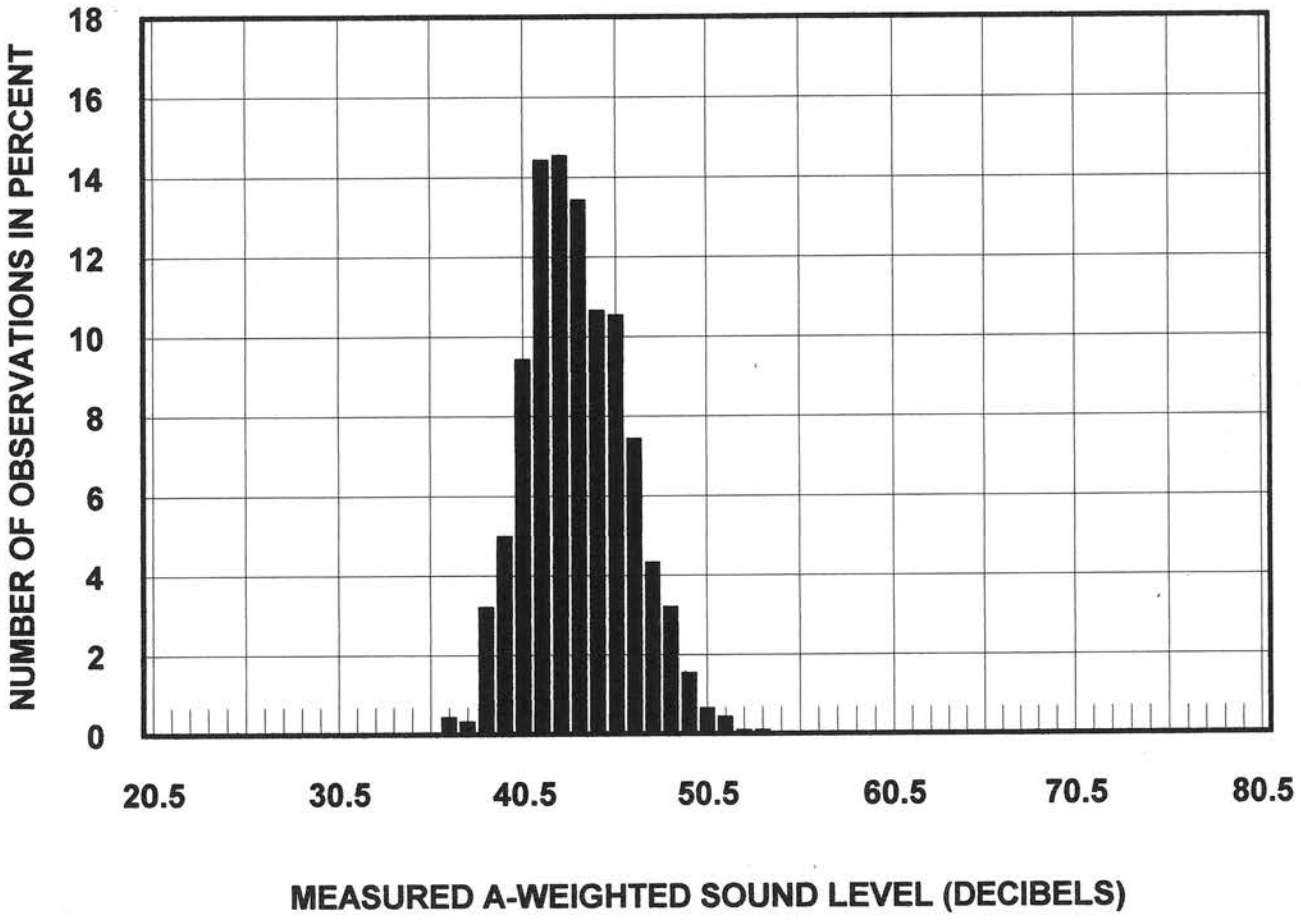
DATE: MAY 15, 2023
TIME: 1015 - 1030 HOURS
METER RESPONSE: LAEQ



Lmax: 62.0 dBA
L10: 53.6 dBA
L50: 43.3 dBA
Leq: 49.3 dBA
Lmin: 37.9 dBA

FIGURE IV-4
HISTOGRAM OF MEASURED SOUND LEVELS AT UNIVERSITY OF THE NATIONS KONA; LOC CCT-4

DATE: MAY 15, 2023
TIME: 0950 - 1005 HOURS
METER RESPONSE: LAEQ



Lmax:	53.2 dBA
L10:	47.1 dBA
L50:	43.2 dBA
Leq:	44.4 dBA
Lmin:	36.1 dBA

FIGURE IV-5
HOURLY TRAFFIC NOISE LEVELS VS. TIME OF DAY
STA. B71001112038; QUEEN KAAHUMANU HWY. BETWEEN HUALALAI RD. AND NANI KAILUA DR.; OCTOBER 24, 2019

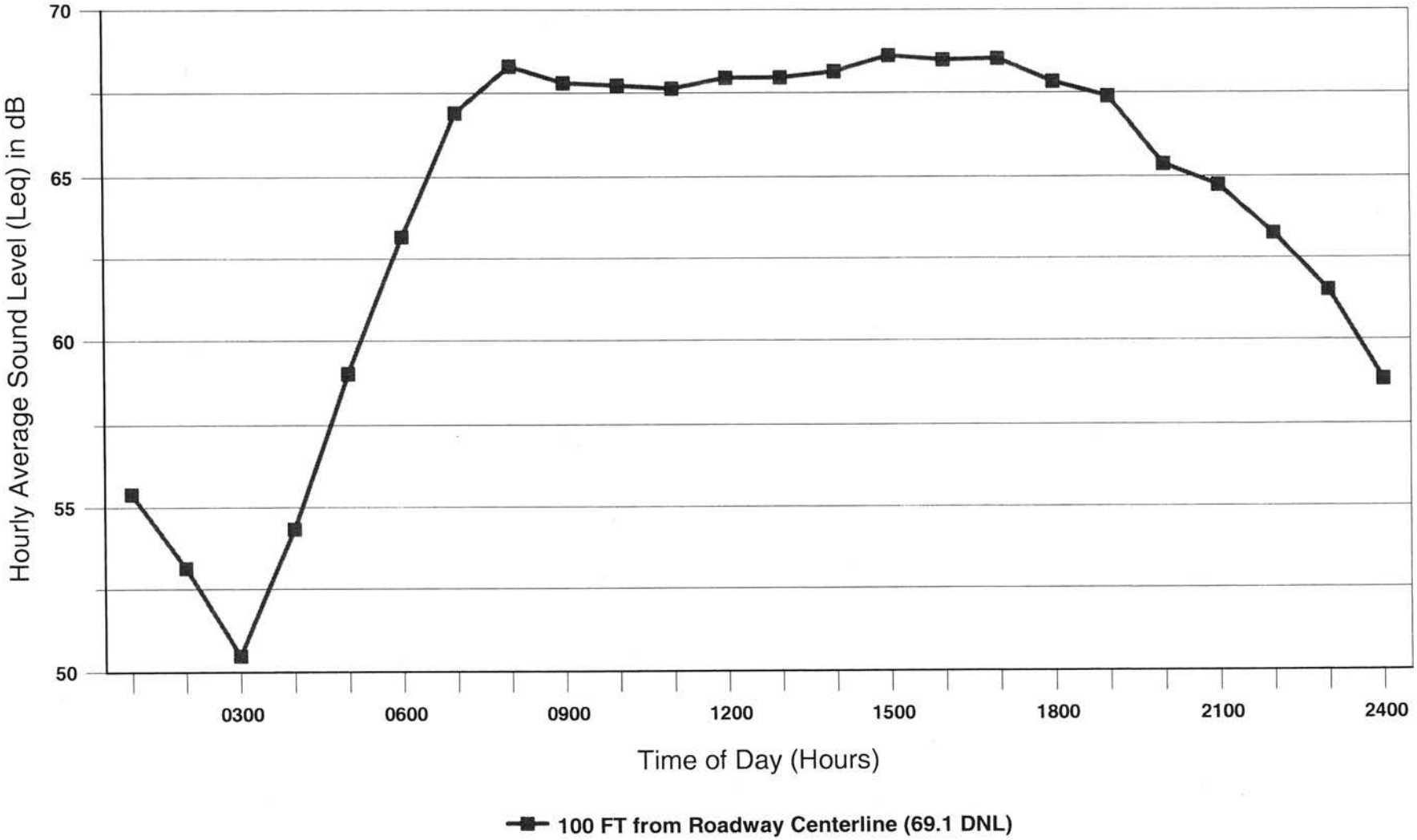
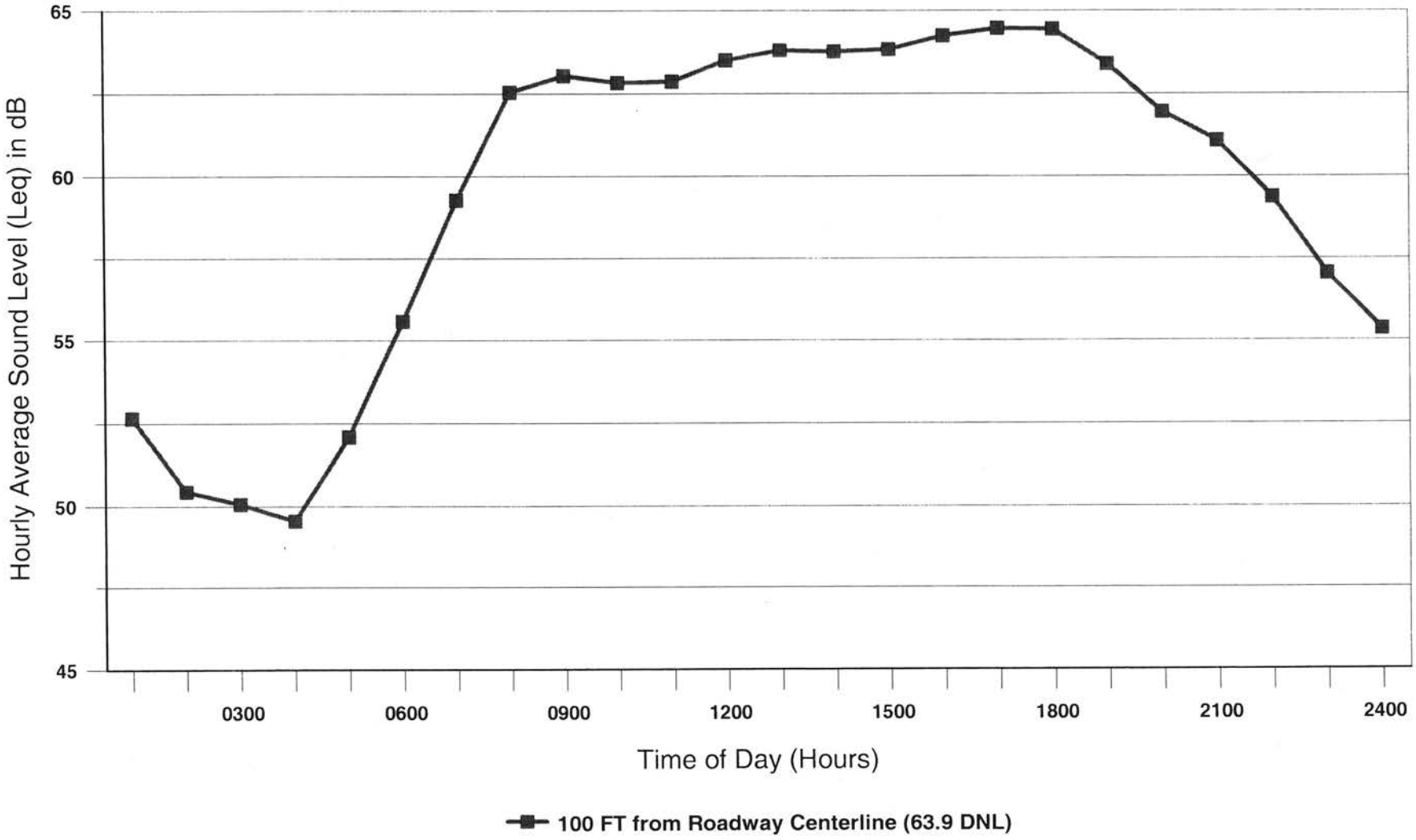


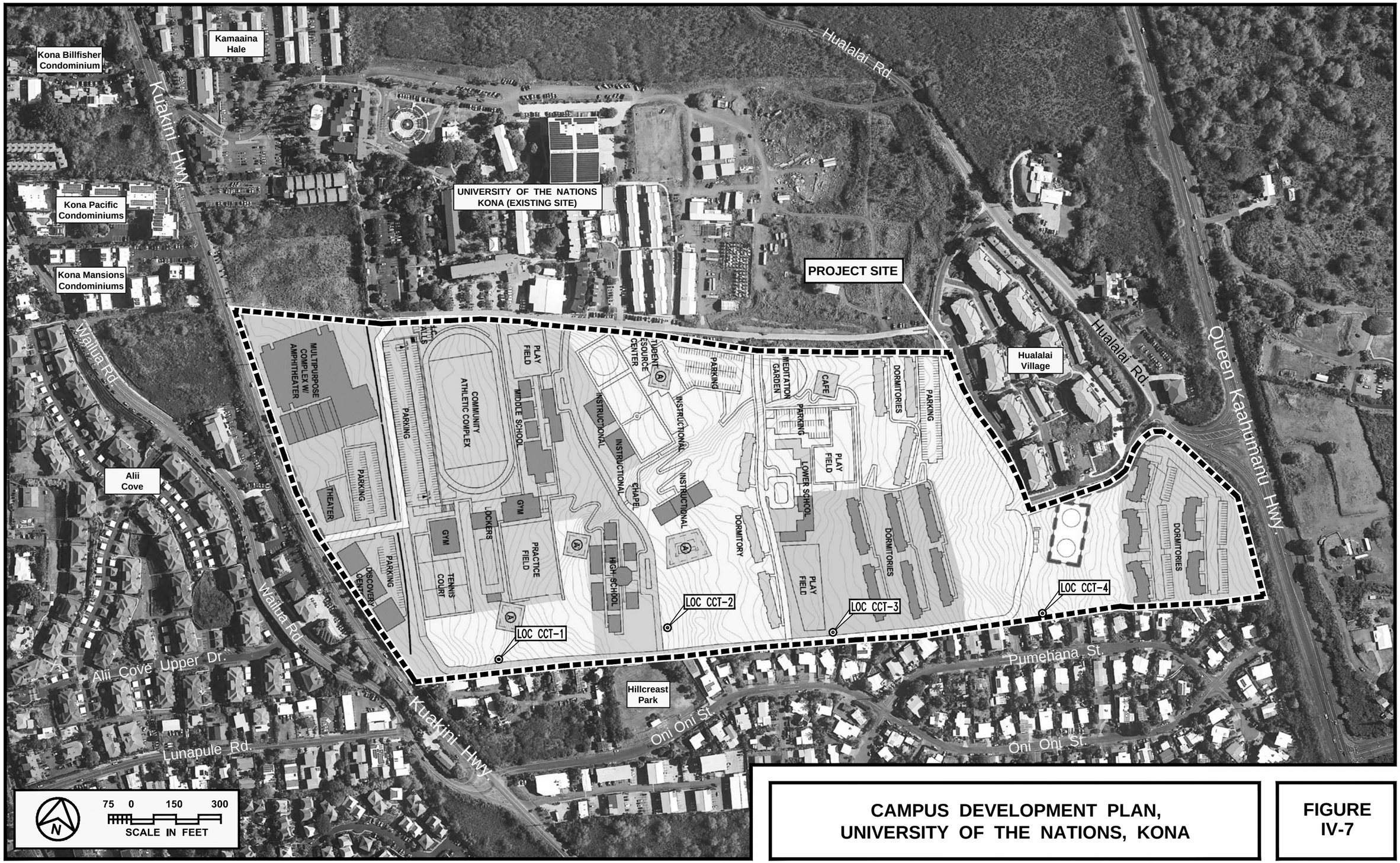
FIGURE IV-6
HOURLY TRAFFIC NOISE LEVELS VS. TIME OF DAY
STA. B71001110078; KUAKINI HWY. BETWEEN HUALALAI RD. AND ONI ONI ST.; JANUARY 10, 2019



evaluation of possible traffic noise impacts was made.

Estimates of potential noise levels from proposed project outdoor facilities (play fields, tennis courts, practice field, and community athletic complex) shown in Figure IV-7 were made and compared with existing background noise levels. Risks of potential noise impacts from the proposed outdoor facilities at neighboring noise sensitive receptors were provided.

Calculations of average exterior and interior noise levels from construction activities were performed for typical naturally ventilated and air conditioned dwellings. Predicted noise levels were compared with existing background ambient noise levels, and the potential for noise impacts was assessed.



CAMPUS DEVELOPMENT PLAN, UNIVERSITY OF THE NATIONS, KONA

FIGURE IV-7

CHAPTER V. EXISTING ACOUSTICAL ENVIRONMENT

The existing background ambient noise levels within the project site are slightly greater than the FHA/HUD 65 DNL standard for noise sensitive receptors along the mauka (east) and makai (west) ends of the project site. Traffic along Queen Kaahumanu Highway controls the background noise levels at the mauka end of the project site, and diminishes to approximately 65 DNL at the location of the planned dormitories fronting the highway. On the makai side of the project site, traffic along Kuakini Highway controls existing noise levels which also diminish from approximately 65 DNL at approximately 68 feet from that highway's centerline with increasing distances from Kuakini Highway toward the center of the project site. Beyond the existing university campus to the north, traffic on Hualalai Road controls existing background noise levels between its intersections with Queen Kaahumanu Highway and Kuakini Highway.

Traffic and background ambient noise measurements were obtained in May 2023 at seven locations (A, B, C, CCT-1, CCT-2, CCT-3, and CCT-4) in the project environs. These measurement locations are shown in Figure I-1. The results of the traffic and background ambient noise measurements are summarized in Table IV-1 and Figures IV-1 through IV-4, with measurement locations shown in Figures I-1 and IV-7. The measurement locations were all located at ground level. As shown in Table IV-1, correlation between measured and predicted traffic noise levels was good at traffic noise measurement locations A, B, and C. The Traffic Noise Model's "Hard Soil" propagation loss factor was used to obtain the good correlation. The measurement results along the south boundary of the project area were obtained on a Sunday afternoon, and did not include significant contributions from traffic noise. Intermittently audible construction and traffic noise were present at Location CCT-1, with aircraft flyovers causing the higher noise levels at Location CCT-2. Dog barking and human activities at a nearby residence were the sources of the louder noise events measured at Location CCT-3. Traffic noise from Queen Kaahumanu Highway was not audible at Location CCT-4.

Calculations of existing traffic noise levels during the AM and PM peak traffic hours are presented in Table V-1. The hourly Leq (or Equivalent Sound Level) contribution from each roadway section in the project environs was calculated for comparison with forecasted traffic noise levels with and without the project. The existing setback distances from the roadways' centerlines to their associated 65, 70, and 75 DNL contours were also calculated as shown in Table V-2. The contour line setback distances do not take into account noise shielding effects or the additive contributions of traffic noise from intersecting street sections.

The existing traffic noise levels in the project environs along Queen Kaahumanu Highway are in the "Significant Exposure, Normally Unacceptable" category, and at or greater than 65 DNL at the first row of existing homes within approximately 148 feet from the centerline and on the mauka and makai sides of that highway. Along Kuakini

TABLE V-1

EXISTING (CY 2023) TRAFFIC VOLUMES AND NOISE LEVELS ALONG ROADWAYS IN PROJECT AREA (AM OR PM PEAK HOUR)

LOCATION	SPEED (MPH)	TOTAL VPH	******* VOLUMES (VPH) ********* AUTOS	M TRUCKS	H TRUCKS	50' Leq	100' Leq	200' Leq
Kuakini Hwy. N. of Hualalai Rd. (PM)	42	1,993	1,957	22	14	69.9	66.2	62.2
Kuakini Hwy. S. of Hualalai Rd. (PM)	42	1,434	1,408	16	10	68.3	64.4	60.6
Kuakini Hwy. N. of North Entrance Rd. (PM)	42	1,250	1,227	14	9	67.7	63.8	60.0
Kuakini Hwy. S. of North Entrance Rd. (PM)	42	1,155	1,134	13	8	67.2	63.4	59.5
Kuakini Hwy. N. of South Entrance Rd. (PM)	42	1,155	1,134	13	8	67.2	63.4	59.5
Kuakini Hwy. S. of South Entrance Rd. (PM)	42	1,155	1,134	13	8	67.2	63.4	59.5
Kuakini Hwy. W. of Q. Kaahumanu Hwy. (PM)	42	967	949	11	7	66.4	62.6	58.7
Q. Kaahumanu Hwy. S. of Kuakini Hwy. (PM)	43	2,547	2,473	43	31	71.3	67.6	63.7
Q. Kaahumanu Hwy. N. of Kuakini Hwy. (AM)	43	1,748	1,697	30	21	69.6	66.0	62.0
Q. Kaahumanu Hwy. S. of Hualalai Rd. (AM)	43	2,081	2,021	35	25	70.4	66.7	62.8
Q. Kaahumanu Hwy. N. of Hualalai Rd. (AM)	43	1,931	1,875	33	23	70.0	66.4	62.5
Q. Kaahumanu Hwy. S. of Nani Kailua Dr. (AM)	43	1,896	1,841	32	23	70.0	66.3	62.4
Q. Kaahumanu Hwy. N. of Nani Kailua Dr. (AM)	43	2,083	2,023	35	25	70.4	66.7	62.8
Hualalai Rd. W. of Kuakini Hwy. (PM)	30	508	485	23	0	60.1	56.5	52.7
Hualalai Rd. E. of Kuakini Hwy. (PM)	30	503	480	23	0	60.0	56.5	52.7
Hualalai Rd. W. of Nani Kailua Rd. (AM)	30	393	375	18	0	59.0	55.4	51.6
Hualalai Rd. E. of Nani Kailua Rd. (AM)	30	266	254	12	0	57.3	53.7	49.9
Hualalai Rd. W. of Driveway (AM)	30	270	258	12	0	57.3	53.7	49.9
Hualalai Rd. E. of Driveway (AM)	30	262	250	12	0	57.2	53.6	49.8
Hualalai Rd. W. of Q. Kaahumanu Hwy. (AM)	30	262	250	12	0	57.2	53.6	49.8
North Entrance Driveway E. of Kuakini Hwy. (AM	25	226	216	10	0	54.8	51.3	47.5
South Entrance Driveway E. of Kuakini Hwy. (PM	N/A	0	0	0	0	0	0	0

Notes:

1. Traffic noise levels calculated for ground level receptors.
2. Hard soil and unobstructed field-of-view conditions assumed.

TABLE V-2

EXISTING AND CY 2050 DISTANCES TO 65, 70, AND 75 DNL CONTOURS

STREET SECTION	65 DNL SETBACK (FT)		70 DNL SETBACK (FT)		75 DNL SETBACK (FT)	
	EXISTING	CY 2050	EXISTING	CY 2050	EXISTING	CY 2050
Kuakini Hwy. N. of Hualalai Rd.	113	140	45	56	18	21
Kuakini Hwy. S. of Hualalai Rd.	82	106	34	43	14	18
Kuakini Hwy. N. of North Entrance Rd.	74	97	30	40	13	16
Kuakini Hwy. S. of North Entrance Rd.	68	91	27	36	< 12	14
Kuakini Hwy. N. of South Entrance Rd.	68	91	27	36	< 12	14
Kuakini Hwy. S. of South Entrance Rd.	68	86	27	35	< 12	14
Kuakini Hwy. W. of Q. Kaahumanu Hwy.	59	74	24	29	< 12	11
Q. Kaahumanu Hwy. S. of Kuakini Hwy.	180	222	73	93	29	35
Q. Kaahumanu Hwy. N. of Kuakini Hwy.	137	171	54	69	21	26
Q. Kaahumanu Hwy. S. of Hualalai Rd.	156	193	63	79	25	30
Q. Kaahumanu Hwy. N. of Hualalai Rd.	148	183	58	75	22	29
Q. Kaahumanu Hwy. S. of Nani Kailua Dr.	145	183	58	74	23	29
Q. Kaahumanu Hwy. N. of Nani Kailua Dr.	156	196	63	80	25	31
Hualalai Rd. W. of Kuakini Hwy.	18	21	< 12	< 12	< 12	< 12
Hualalai Rd. E. of Kuakini Hwy.	17	21	< 12	< 12	< 12	< 12
Hualalai Rd. W. of Nani Kailua Rd.	18	21	< 12	< 12	< 12	< 12
Hualalai Rd. E. of Nani Kailua Rd.	13	15	< 12	< 12	< 12	< 12
Hualalai Rd. W. of Driveway	13	15	< 12	< 12	< 12	< 12
Hualalai Rd. E. of Driveway	13	15	< 12	< 12	< 12	< 12
Hualalai Rd. W. of Q. Kaahumanu Hwy.	13	15	< 12	< 12	< 12	< 12
North Entrance Driveway E. of Kuakini Hwy.	< 12	< 12	< 12	< 12	< 12	< 12
South Entrance Driveway E. of Kuakini Hwy.	N/A	< 12	N/A	< 12	N/A	< 12

Highway, where the majority of front row receptors are in the commercial or resort category, existing traffic noise levels are in the "Moderate Exposure, Normally Acceptable" category at distances beyond 68 to 82 feet from the centerline of that roadway. The existing traffic noise levels in the project environs along Hualalai Road are also in the "Moderate Exposure, Normally Acceptable" category and less than 65 DNL at 13 to 18 feet from that roadway's centerline.

Existing traffic noise levels probably exceed the FHA/HUD 65 DNL standard at the front row homes of Kamaaina Hale located beyond the northwest corner of the existing University of the Nations, Kona campus. Exceedances of the 65 DNL standard probably occurs at the front row midrise units makai of the campus and across Kuakini Highway (Kona Pacific and Kona Mansions). Existing traffic noise levels also exceed the FHA/HUD 65 DNL standard at the front row lots of the residences at the Nani Kailua Drive intersection of Queen Kaahumanu Highway, and possibly at the elevated residences which front Queen Kaahumanu Highway at the mauka end of Oni Oni Street. Front row lots on the makai side of Queen Kaahumanu Highway are typically depressed from the highway surface, and ground floor receptors at these lots probably benefit from the noise shielding effects of the elevated highway's makai shoulder.

In the center portion of the project site and in areas removed from the highways to the east and west, existing background noise levels drop to levels below 50 dBA with steady noise levels of approximately 45 dBA. The sounds of birds and intermittent distant traffic and aircraft noise sources are the louder noise sources. Existing background noise levels should be compatible with the planned school and dormitory buildings on the project site.

CHAPTER VI. FUTURE NOISE ENVIRONMENT

Predictions of future traffic noise levels were made using the traffic volume assignments of Reference 7 for CY 2050 with and without the proposed project. The future projections of project plus non-project traffic noise levels on the roadways which would service the project are shown in Table VI-1 for the AM and PM peak hours of traffic, under the Build Alternative. Predicted increases in the setback distances to the 65, 70, and 75 DNL contours are shown in Table V-2. The separate non-project and project traffic noise contributions under the Build Alternative are shown in Table VI-2.

Very small changes in traffic noise levels (0.0 to 0.1 DNL) are expected along Queen Kaahumanu Highway in the project environs between CY 2023 and 2050 as a result of project traffic. The growth in non-project traffic by CY 2050 is predicted to result in traffic noise level increases of 1.1 to 1.3 DNL along Queen Kaahumanu Highway. Slightly smaller increases in future traffic noise levels from non-project traffic (0.8 to 0.9 DNL) are predicted to occur along Kuakini Highway. Project traffic along Kuakini Highway are predicted to increase existing traffic noise levels by 0.4 to 0.6 DNL at project build-out in CY 2050. The very small increases in future traffic noise levels caused by the project will be difficult to measure or perceive over the 27 year forecast period.

Along Hualalai Road, increases in future traffic noise levels will be difficult to measure, with future increases by CY 2050 associated primarily with non-project traffic. Very small increases (0 to 0.1 DNL) in traffic noise levels from project traffic are predicted along Hualalai Road, with non-project traffic increasing noise levels by 0.7 to 0.8 DNL.

The dominant traffic noise sources in the project environs will continue to be traffic along Queen Kaahumanu Highway and Kuakini Highway, with the increases in future traffic noise levels being relatively small along these two roadways over a 27 year period. Future traffic noise levels at the planned Middle School and High School buildings are not expected to exceed 55 DNL, and are not expected to exceed 50 DNL at the Lower School buildings. Both the planned upper and lower Dormitory buildings are predicted to be outside the 65 DNL traffic noise contour, with the lower Dormitory buildings located near the 55 DNL traffic noise contour.

The planned Multi-Purpose Complex is anticipated to be air conditioned, which should attenuate traffic noise entering the building as well as attenuate any sound splillover to neighboring properties outside that building. The Discovery Center buildings will probably be exposed to future traffic noise levels greater than 65 DNL, and they should also be closed and air conditioned if noise sensitive uses are planned within those buildings. Overall, the school facilities are planned to be located near the central portion of the property and at relatively large distances from the two highways along the mauka and makai ends of the property, at locations which will be removed from highway traffic noise sources.

TABLE VI-1

FUTURE (CY 2050) TRAFFIC VOLUMES AND NOISE LEVELS ALONG ROADWAYS IN PROJECT AREA (AM OR PM PEAK HOUR, WITH THE PROJECT)

LOCATION	SPEED (MPH)	TOTAL VPH	******* VOLUMES (VPH) ********* AUTOS	M TRUCKS	H TRUCKS	50' Leq	100' Leq	200' Leq
Kuakini Hwy. N. of Hualalai Rd. (PM)	42	2,640	2,593	29	18	71.1	67.5	63.4
Kuakini Hwy. S. of Hualalai Rd. (PM)	42	2,000	1,964	22	14	69.7	65.8	62.1
Kuakini Hwy. N. of North Entrance Rd. (PM)	42	1,780	1,748	20	12	69.2	65.3	61.6
Kuakini Hwy. S. of North Entrance Rd. (PM)	42	1,661	1,631	18	12	68.7	65.0	61.0
Kuakini Hwy. N. of South Entrance Rd. (PM)	42	1,661	1,631	18	12	68.7	65.0	61.0
Kuakini Hwy. S. of South Entrance Rd. (PM)	42	1,578	1,550	17	11	68.5	64.7	60.8
Kuakini Hwy. W. of Q. Kaahumanu Hwy. (PM)	42	1,291	1,268	14	9	67.6	63.9	59.9
Q. Kaahumanu Hwy. S. of Kuakini Hwy. (PM)	43	3,417	3,318	58	41	72.5	68.9	64.9
Q. Kaahumanu Hwy. N. of Kuakini Hwy. (AM)	43	2,350	2,282	40	28	70.9	67.3	63.3
Q. Kaahumanu Hwy. S. of Hualalai Rd. (AM)	43	2,770	2,690	47	33	71.6	68.0	64.0
Q. Kaahumanu Hwy. N. of Hualalai Rd. (AM)	43	2,592	2,517	44	31	71.3	67.7	63.7
Q. Kaahumanu Hwy. S. of Nani Kailua Dr. (AM)	43	2,544	2,470	43	31	71.3	67.6	63.7
Q. Kaahumanu Hwy. N. of Nani Kailua Dr. (AM)	43	2,792	2,711	47	34	71.7	68.0	64.1
Hualalai Rd. W. of Kuakini Hwy. (PM)	30	617	589	28	0	60.9	57.3	53.5
Hualalai Rd. E. of Kuakini Hwy. (PM)	30	619	591	28	0	60.9	57.3	53.5
Hualalai Rd. W. of Nani Kailua Rd. (AM)	30	481	459	22	0	59.8	56.3	52.5
Hualalai Rd. E. of Nani Kailua Rd. (AM)	30	319	304	15	0	58.1	54.5	50.7
Hualalai Rd. W. of Driveway (AM)	30	321	306	15	0	58.1	54.5	50.7
Hualalai Rd. E. of Driveway (AM)	30	311	297	14	0	57.9	54.3	50.5
Hualalai Rd. W. of Q. Kaahumanu Hwy. (AM)	30	312	298	14	0	57.9	54.3	50.6
North Entrance Driveway E. of Kuakini Hwy. (AM)	25	273	260	13	0	55.8	52.2	48.5
South Entrance Driveway E. of Kuakini Hwy. (PM)	25	327	312	15	0	56.5	53.0	49.2

Notes:

1. Traffic noise levels calculated for ground level receptors.
2. Hard soil and unobstructed field-of-view conditions assumed.

TABLE VI-2

CALCULATIONS OF PROJECT AND NON-PROJECT TRAFFIC NOISE CONTRIBUTIONS (CY 2050) (AM OR PM PEAK HOUR LEQ OR DNL)

STREET SECTION	NOISE LEVEL INCREASE DUE TO: NON-PROJECT TRAFFIC	PROJECT TRAFFIC
Kuakini Hwy. N. of Hualalai Rd. (PM)	0.8	0.4
Kuakini Hwy. S. of Hualalai Rd. (PM)	0.8	0.6
Kuakini Hwy. N. of North Entrance Rd. (PM)	0.9	0.6
Kuakini Hwy. S. of North Entrance Rd. (PM)	0.9	0.6
Kuakini Hwy. N. of South Entrance Rd. (PM)	0.9	0.6
Kuakini Hwy. S. of South Entrance Rd. (PM)	0.9	0.4
Kuakini Hwy. W. of Q. Kaahumanu Hwy. (PM)	0.8	0.4
Q. Kaahumanu Hwy. S. of Kuakini Hwy. (PM)	1.1	0.1
Q. Kaahumanu Hwy. N. of Kuakini Hwy. (AM)	1.3	0.0
Q. Kaahumanu Hwy. S. of Hualalai Rd. (AM)	1.2	0.0
Q. Kaahumanu Hwy. N. of Hualalai Rd. (AM)	1.3	0.0
Q. Kaahumanu Hwy. S. of Nani Kailua Dr. (AM)	1.3	0.0
Q. Kaahumanu Hwy. N. of Nani Kailua Dr. (AM)	1.2	0.1
Hualalai Rd. W. of Kuakini Hwy. (PM)	0.8	0.0
Hualalai Rd. E. of Kuakini Hwy. (PM)	0.8	0.1
Hualalai Rd. W. of Nani Kailua Rd. (AM)	0.8	0.0
Hualalai Rd. E. of Nani Kailua Rd. (AM)	0.8	0.0
Hualalai Rd. W. of Driveway (AM)	0.8	0.0
Hualalai Rd. E. of Driveway (AM)	0.7	0.0
Hualalai Rd. W. of Q. Kaahumanu Hwy. (AM)	0.7	0.0
North Entrance Driveway E. of Kuakini Hwy. (AM)	0.0	1.0
South Entrance Driveway E. of Kuakini Hwy. (PM)	N/A	56.5

Note: Large increase for South Entrance Driveway represents future traffic noise level at 50 feet from new roadway's centerline.

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

Traffic Noise. Existing traffic noise levels along Queen Kaahumanu Highway and Kuakini Highway are expected to remain the dominant noise sources in the project environs through CY 2050. Traffic noise impacts along those two roadways will continue to occur at existing noise sensitive receptors which are not provided with noise mitigation measures such as sound attenuating walls and/or closure and air conditioning. The noise sensitive receptors previously identified along Queen Kaahumanu Highway and Kuakini Highway where traffic noise levels exceed the FHA/HUD 65 DNL standard will continue to remain as such, with future traffic noise levels increasing by 1 to 2 DNL by CY 2050. In addition, front row buildings at the Kona Billfisher will be exposed to traffic noise levels greater then 65 DNL from Kuakini Highway by CY 2050.

Project related traffic along Queen Kaahumanu Highway and Kuakini Highway are not expected to cause significant increases in future traffic noise levels. The largest increases (of 0.6 DNL) in project related traffic noise are predicted to occur along Kuakini Highway, with project related traffic noise increases limited to 0.1 DNL along Queen Kaahumanu Highway. For these reasons, traffic noise mitigation measures should not be required.

On-Site Noise Sources. The potential noise from activities at the outdoor play fields, practice field, tennis courts, and Community Athletic Complex may disturb neighboring residences along the project's south property line. Noise levels associated with these outdoor facilities can be intermittently high due to the shouting and screaming which may occur during activities at these outdoor facilities. The residents at the neighboring properties to the south (where background noise levels are relatively low) may be annoyed by these outdoor activities. Noise sensitive neighbors to the west across Kuakini Highway are less likely to be annoyed by these outdoor activities due to their larger buffer distances from the outdoor facilities and their higher background noise levels associated with traffic along Kuakini Highway. In addition, commercial properties are the closest neighbors to the southwest.

Evaluations of the potential risk of noise complaints (or community reaction) from the residents south of the project were made by comparing the estimated DNL value of potential noise from the outdoor activity areas shown in Figure IV-7 with non-project background noise levels in accordance with the methodology described in Reference 4. The number of noise complaints tend to be less than the number of persons annoyed by a noise source, and no community reaction can be expected if the normalized DNL of the objectionable noise source(s) are 5 DNL less than the DNL of the background noise level without the objectionable noise source (see Page D-17, Reference 4). Adjacent lands across the other project boundaries contain properties to the north and east which are owned by the university. Existing background noise levels along the project's south property line at the neighboring residences were estimated to range

from 44 to 49 DNL based on the measurement results shown in Figures IV-1 to IV-4, where their measured Leq values were assumed to be equal to their DNL values. Figures VII-1 through VII-4 depict the relationships between the measured instantaneous background noise levels and their resulting Leq (or average) values at the four measurement locations along the south property boundary of the project site. The sounds of human voices or during tennis court play will exhibit similar variations in their instantaneous sound levels and their average (or Leq) values.

Table VII-1 presents the results of the predicted average (or Leq) and normalized DNL values from the University of the Nations Kona's planned six outdoor activity areas at a common reference distance of 200 feet from the geometric centers of the six planned activity areas. The DNL values are typically lower than the average noise levels during a period of noisy activity because of the DNL metric is based on annually averaged (over 365 days of the year) sound levels rather than average noise levels during the activity period. The estimated hours of noisy activities per day of usage at each or the planned activity areas are shown in Table VII-1, as well as the estimated number of days per calendar year that each activity area may be used.

The reference DNL values shown in Table VII-1 from each of the six planned activity areas were used to calculate the total DNL value from all planned activities at each of the four background noise measurement locations (CCT-1 through CCT-4) along the south property line. These total normalized DNL values associated with the planned outdoor activity areas are shown in Table VII-2 and compared to the measured background noise levels. Where the total normalized DNL values are not at least 5 DNL lower than the background noise levels shown in the table, community responses in the form of a noise complaint may occur, as indicated from the methodology contained in Reference 4. Noise mitigation measures in the form of sound attenuating walls along the south property line and in the vicinity of the Lower School's South Play Field and the High School Practice Field should be evaluated. In addition, a 5 DNL reduction in the normalized DNL values of the outdoor activities shown in Table VII-2 may occur if the neighboring community "are aware that bona fide efforts are being made to control the noise" and " the noise maker's relations with the community are good" (from Table D-7 of Reference 4). While risks of noise complaints apparently exist from the outdoor activities on the play and practice fields, the predicted DNL values associated with these are well below the unconditionally acceptable 55 DNL level identified in Reference 4.

The planned Amphitheater is anticipated to be fully enclosed which should allow for sound attenuation measures which eliminate sound spillover to adjacent land uses and neighboring properties.

Noise mitigation measures which limit the noise from fixed mechanical equipment to those allowed by the State Department of Health (Reference 5) should be incorporated into the project. In addition, a public address system, if installed at the Community Athletic Complex should be designed to minimize sound spillover into adjacent properties.

FIGURE VII-1. 15 MINUTE DBA VS. TIME RECORD AT UNIVERSITY OF THE NATIONS KONA; LOC CCT-1 (1059 TO 1114 HOURS; MAY 15, 2023; LEQ = 47.4)

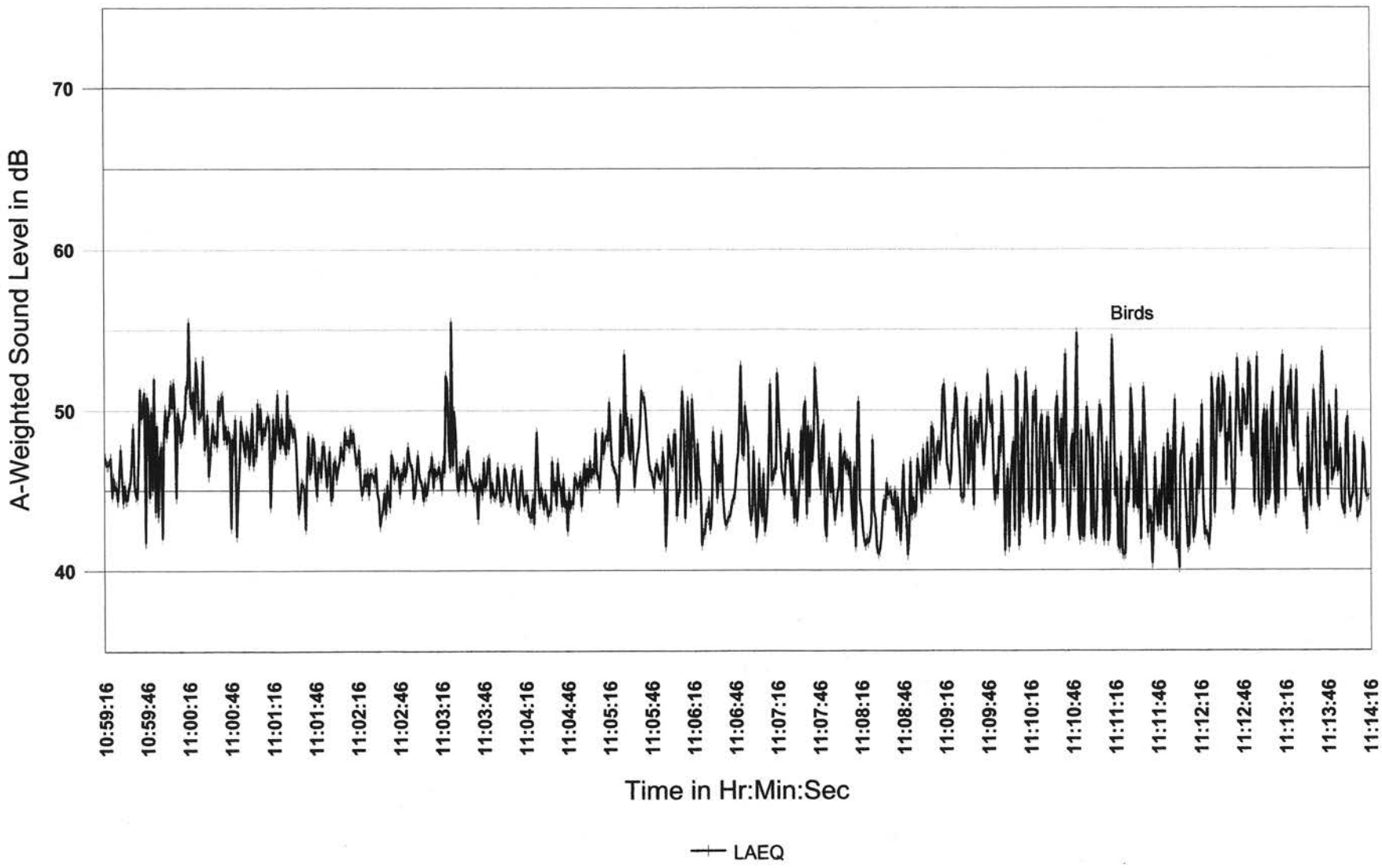


FIGURE VII-2. 15 MINUTE DBA VS. TIME RECORD AT UNIVERSITY OF THE NATIONS KONA; LOC CCT-2 (1037 TO 1052 HOURS; MAY 15, 2023; LEQ = 45.4)

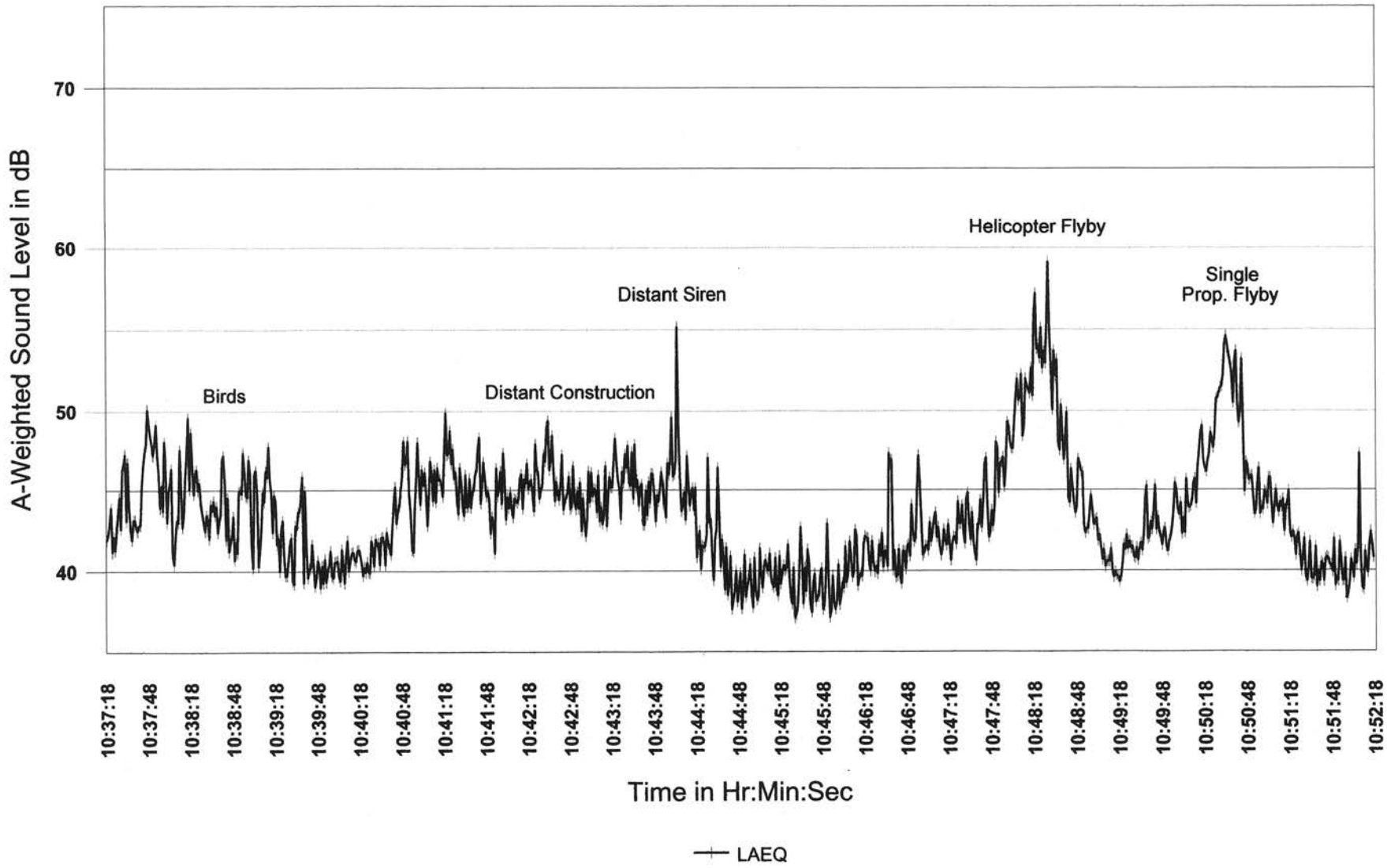


FIGURE VII-3. 15 MINUTE DBA VS. TIME RECORD AT UNIVERSITY OF THE NATIONS KONA; LOC CCT-3 (1015 TO 1030 HOURS; MAY 15, 2023; LEQ = 49.3)

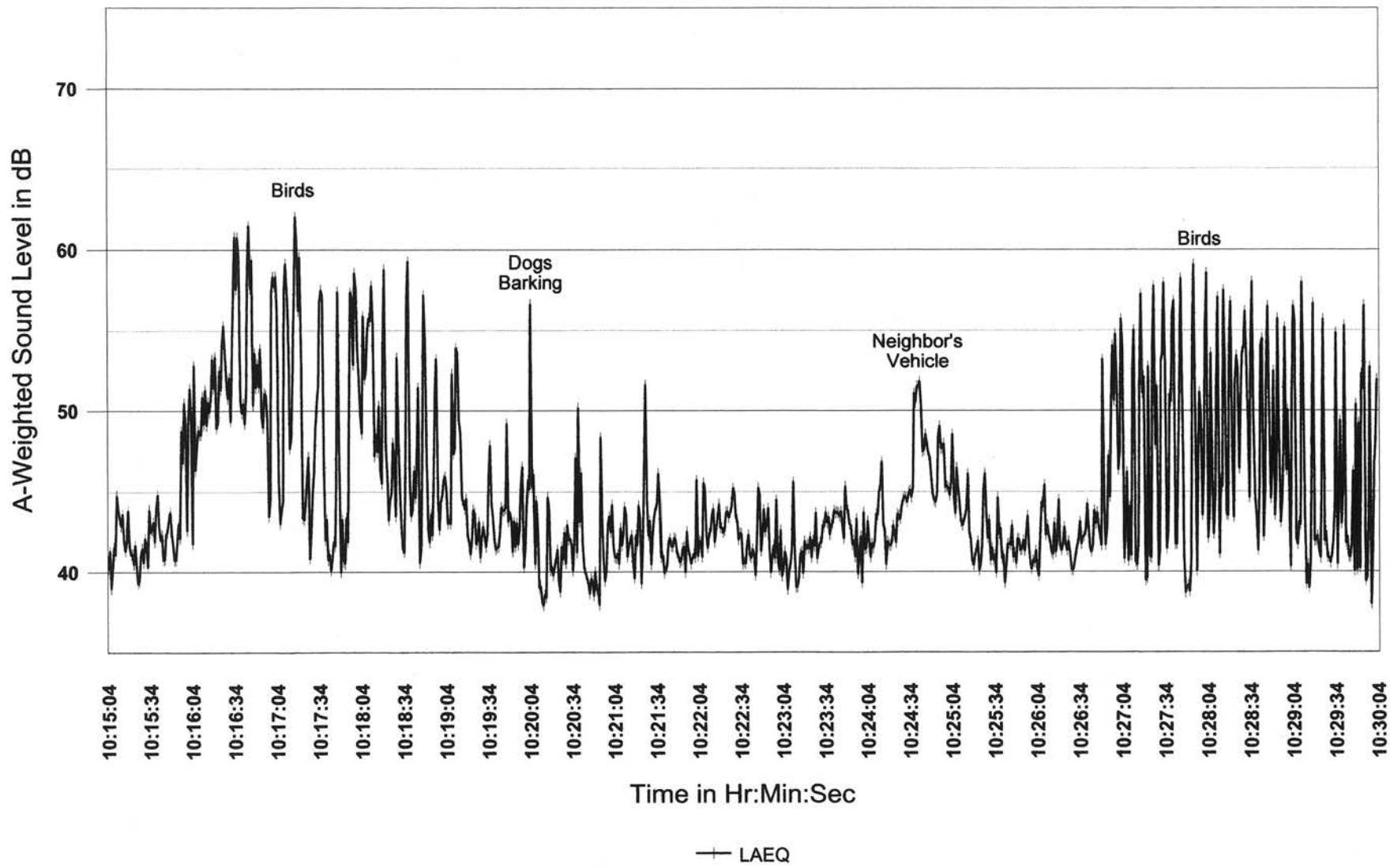


FIGURE VII-4. 15 MINUTE DBA VS. TIME RECORD AT UNIVERSITY OF THE NATIONS KONA; LOC CCT-4 (0950 TO 1005 HOURS; MAY 15, 2023; LEQ = 44.4)

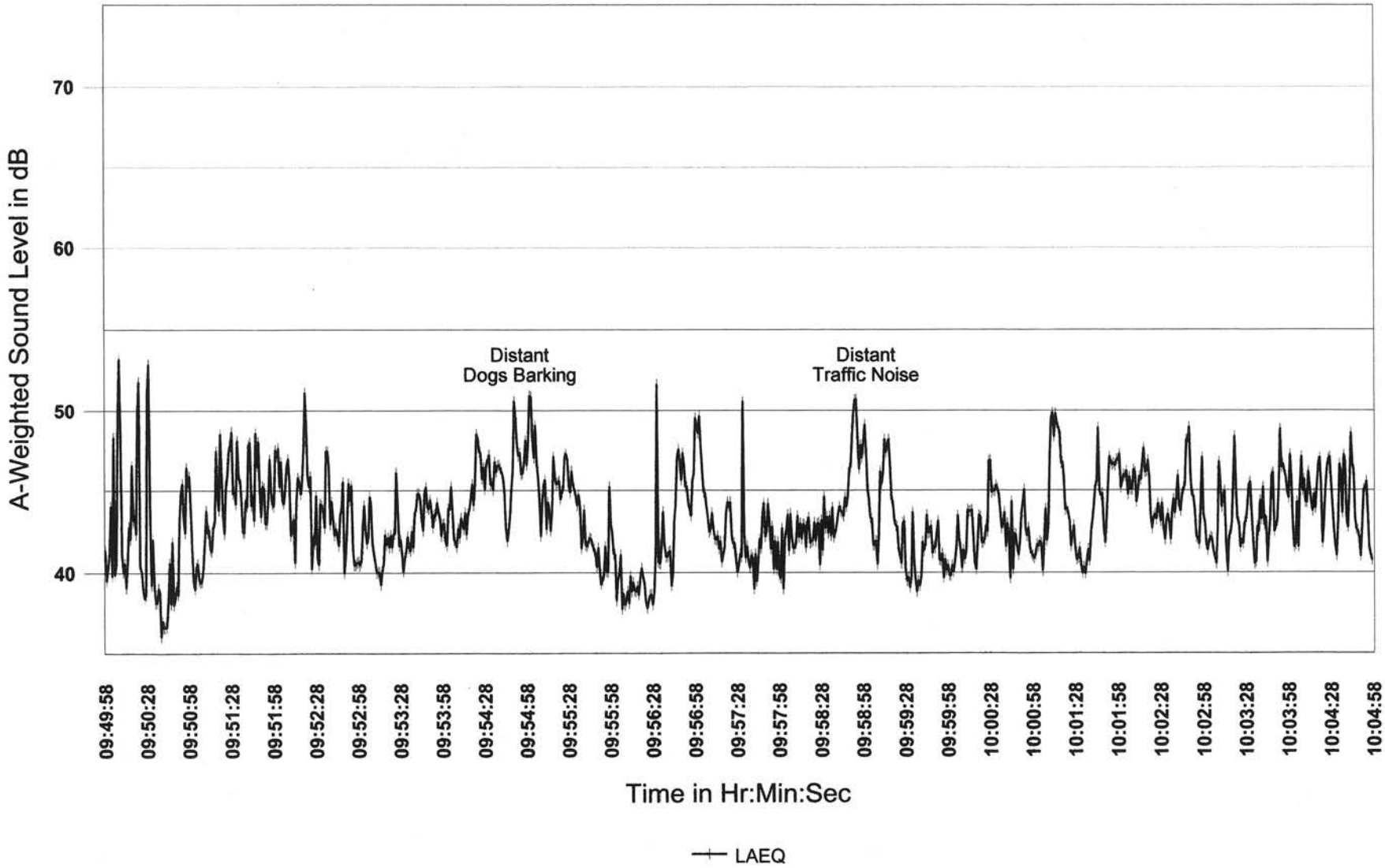


TABLE VII-1
OUTDOOR ACTIVITY AREAS AND PREDICTED AVERAGE AND NORMALIZED DNL SOUND LEVELS AT 200 FEET DISTANCE

OUTDOOR ACTIVITY AREA	HOURS OF NOISY ACTIVITY PER DAY OF USE	AVERAGE (LEQ) OF ACTIVITY	TOTAL DAYS OF USE PER YEAR	NORMALIZED DNL OF ACTIVITY
Lower School Play Field (North)	3.96	58.4	250	48.9
Lower School Play Field (South)	3.96	58.4	250	48.9
Middle School Play Field	3.96	58.4	250	48.9
High School Practice Field	8.00	52.3	300	46.7
Community Athletic Complex (200 seat)	6.00	64.4	300	57.5
Tennis Courts	4.00	52.3	150	40.7

Note:

1. Average Activity Noise Levels (Leq and DNL) Predicted at 200 Feet from Center of Activity Area.
2. For Tennis Court play, DNL values normalized (increased by 5 dB) due to impulsive noise characteristic.

TABLE VII-2

COMPARISONS OF MEASURED BACKGROUND AND NORMALIZED ACTIVITY DNL VALUES AT SOUTH PROPERTY LINE MEASUREMENT LOCATIONS

MEASUREMENT LOCATION	BACKGROUND NOISE DNL	------ NORMALIZED DNL FROM OUTDOOR ACTIVITIES ------		COMMUNITY REACTION THRESHOLD EXCEEDED?
		DNL from All Sources	DNL from Dominant Noise Sources	
CCT-1	47.4	49.7	47 DNL from H.S. Practice Field	YES
CCT-2	45.4	47.1	44 DNL from H.S. Practice Field	YES
CCT-3	49.3	50.6	50 DNL from L.S. Play Field (S.)	YES
CCT-4	44.4	38.8	35 DNL from L.S. Play Field (S.)	NO

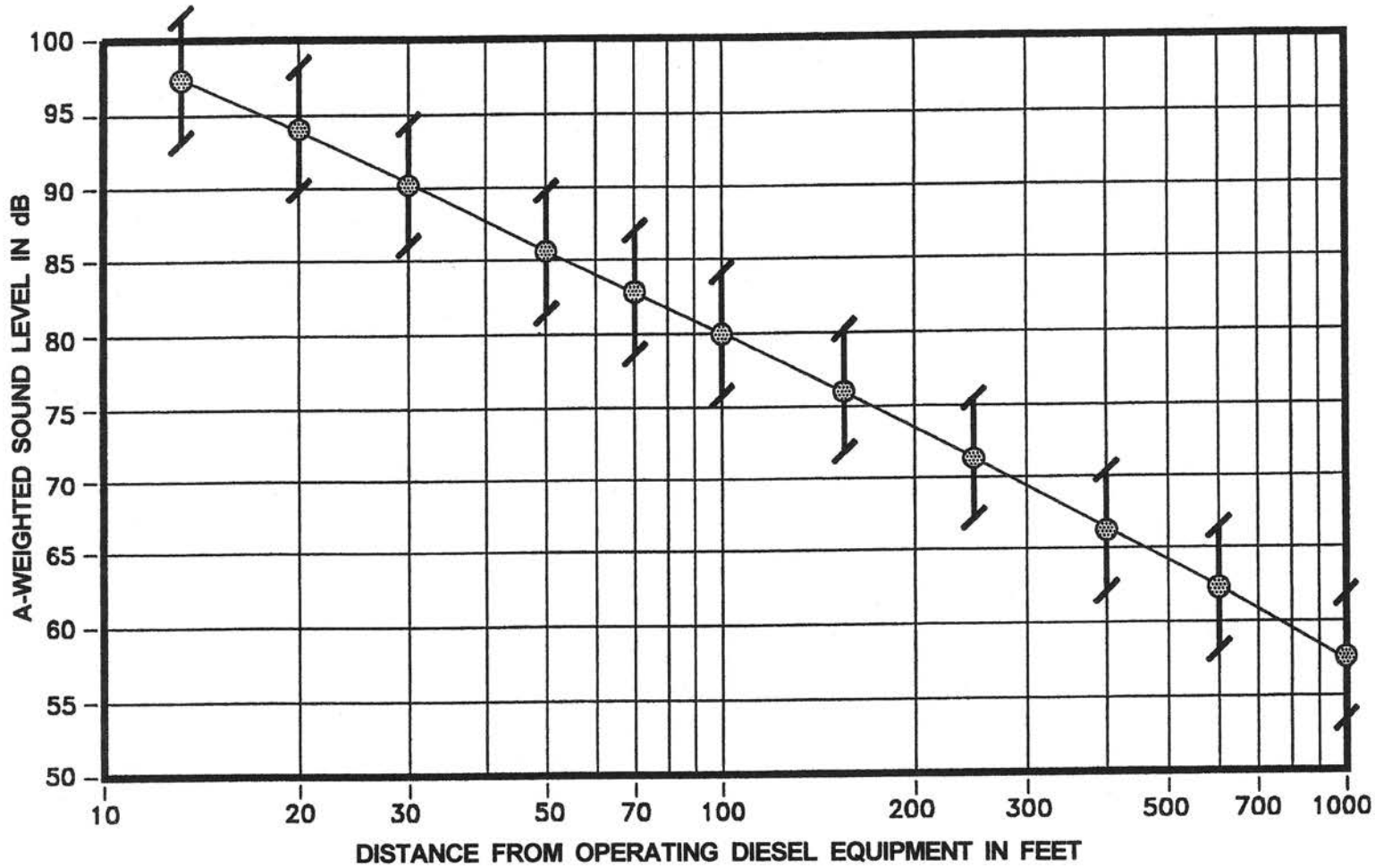
Note: L.S. Play Field (S.) is the south field.

General Construction Noise. Audible construction noise will probably be unavoidable during the entire project construction period. The final build out of the project elements as shown in Figure IV-7 will occur in phases. The total time period for construction is unknown, but it is anticipated that the actual work will be moving from one location on the project site to another during that period. Actual length of exposure to construction noise at any receptor location will probably be less than the total construction period for the entire project. Typical levels of exterior noise from construction activity (excluding pile driving activity) at various distances from the job site are shown in Figure VII-5. The impulsive noise levels of impact pile drivers are approximately 15 dB higher than the levels shown in Figure VII-5, while the intermittent noise levels of vibratory pile drivers are at the upper end of the noise level ranges depicted in the figure. Figure VII-5 is useful for predicting exterior noise levels at short distances (within 100 FT) from the work when visual line of sight exists between the construction equipment and the receptor. Direct line-of-sight distances from the construction equipment to existing residential buildings will range from less than 100 FT to greater than 2,000 FT, with corresponding average noise levels of greater than 80 dBA to less than 50 dBA (plus or minus 5 dBA). Typical levels of construction noise inside naturally ventilated and air conditioned structures are approximately 10 and 20 dB less, respectively, than the levels shown in Figure VII-5.

Unavoidable noise impacts during the noisier site preparation phase of construction are expected, particularly along the perimeters of the project site wherever buffer distances to existing noise sensitive receptors are 200 feet or less. Construction noise levels of 73 dBA and higher could occur within 200 feet of earth moving equipment or roadway construction. These highest noise levels are expected at existing receptors along the south project boundary, along the east project boundary adjoining Hualalai Village, along the north project boundary adjoining the existing school facilities, and at commercial properties across Kuakini Highway. As buffer distances increase to 1,000 feet or greater, the louder construction activities should decrease to 58 dBA or less, and be less disruptive. Adverse impacts from construction noise are not expected to be in the "public health and welfare" category due to the temporary nature of the work, and due to the administrative controls available for regulation of construction noise. Instead, these impacts will probably be limited to the temporary degradation of the quality of the acoustic environment in the immediate vicinity of the project site.

Mitigation of construction noise to inaudible levels will not be practical in all cases due to the intensity of construction noise sources (80 dB at 100 FT distance), and due to the exterior nature of the work (rock breaking, grading and earth moving, trenching, concrete pouring, hammering, etc.). The use of properly muffled construction equipment should be required on the job site.

Peak airborne noise levels from pile diving may be as much as 15 dBA greater than noise levels shown in Figure VII-5 for non-impulsive (steady) construction noise sources. Although the pile driving can produce more intense noise levels, each pulse is



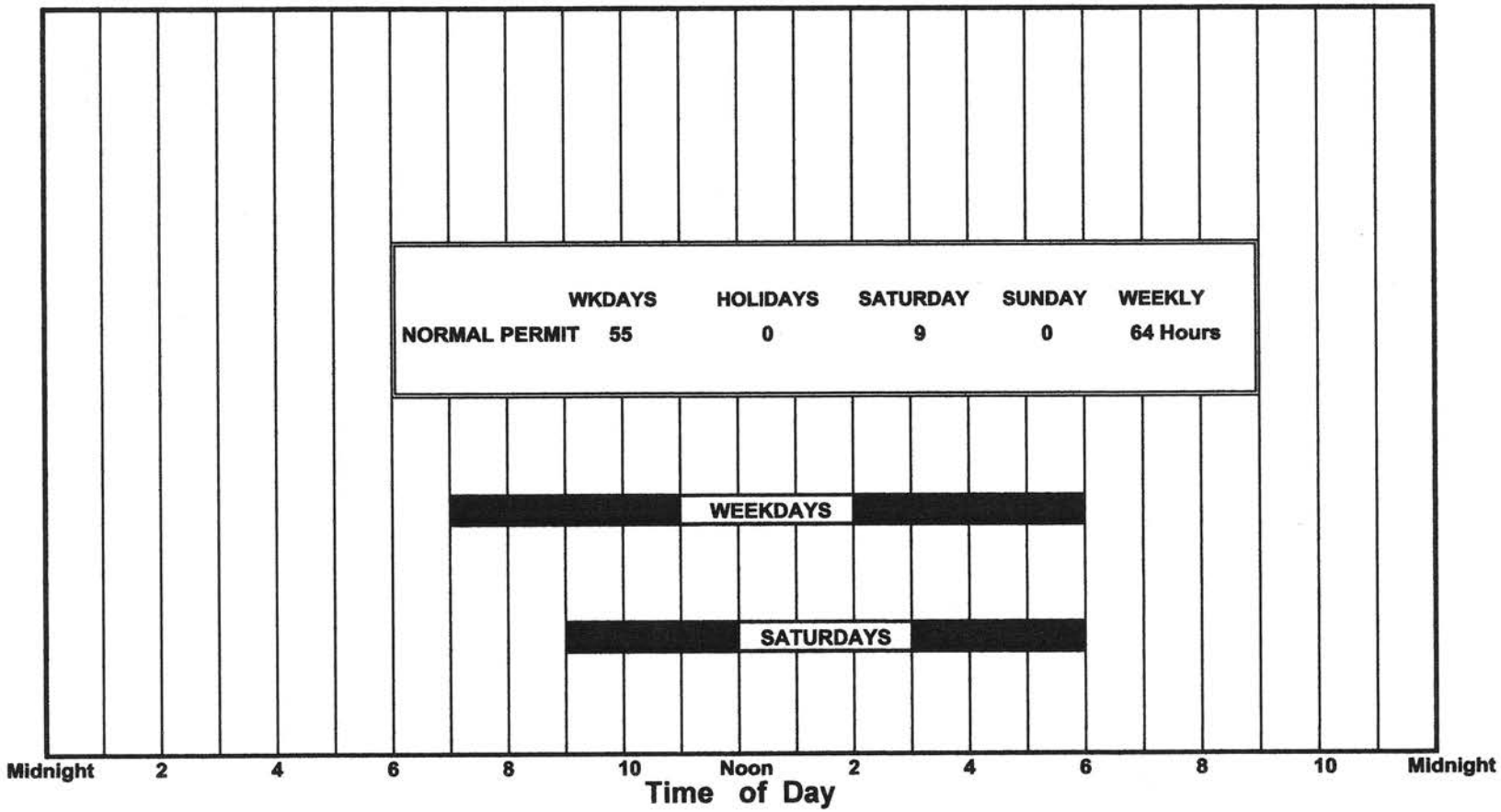
ANTICIPATED RANGE OF CONSTRUCTION NOISE LEVELS VS. DISTANCE

FIGURE VII-5

of short individual duration (less than one second). Therefore, its impact on speech communication is not as severe as that of a steady source of the same noise level.

Severe noise impacts are not expected to occur inside air conditioned structures which are beyond 200 FT of the project construction site. Inside naturally ventilated structures, interior noise levels (with windows or doors opened) are estimated to range between 64 to 49 dBA at 200 FT to 1,000 FT distances from the construction site. Closure of all doors and windows facing the construction site would generally reduce interior noise levels by an additional 5 to 10 dBA.

The incorporation of State Department of Health construction noise limits and curfew times, which are applicable throughout the State of Hawaii (Reference 5), is another noise mitigation measure which is normally applied to construction activities. Figure VII-6 depicts the normally permitted hours of construction. Noisy construction activities are not allowed on Sundays and holidays, during the early morning, and during the late evening and nighttime periods under the DOH permit procedures.



AVAILABLE WORK HOURS UNDER DOH PERMIT PROCEDURES FOR CONSTRUCTION NOISE

FIGURE VII-6

APPENDIX A. REFERENCES

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

(2) American National Standard, "Sound Level Descriptors for Determination of Compatible Land Use," ANSI S12.9-1998/ Part 5; Acoustical Society of America.

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

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

(5) "Title 11, Administrative Rules, Chapter 46, Community Noise Control;" Hawaii State Department of Health; September 23, 1996.

(6) "FHWA Highway Traffic Noise Model User's Guide;" FHWA-PD-96-009, Federal Highway Administration; Washington, D.C.; January 1998 and Version 2.5 Upgrade (April 14, 2004).

(7) Existing and Year 2050 Traffic Turning Movement Diagrams for The University of the Nations, Kona Project; Fehr & Peers Transportation Consultants; May 19, 2023.

(8) Hourly Traffic Counts At Station B71001112038, Queen Kaahumanu Highway Between Hualalai Rd., and Nani Kailua Dr.; October 25, 2019.

(9) Hourly Traffic Counts At Station B71001110078, Kuakini Highway Between Hualalai Rd. and Oni Oni St.; January 10, 2019.

APPENDIX B

EXCERPTS FROM EPA'S ACOUSTIC TERMINOLOGY GUIDE

Descriptor Symbol Usage

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

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

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

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

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

Descriptor Nomenclature

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

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

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

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

Noise Impact

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

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

APPENDIX B (CONTINUED)

TABLE I

A-WEIGHTED RECOMMENDED DESCRIPTOR LIST

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

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

SOURCE: EPA ACCOUSTIC TERMINOLOGY GUIDE, BNA 8-14-78,

APPENDIX B (CONTINUED)

TABLE II

RECOMMENDED DESCRIPTOR LIST

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

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

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

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

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

APPENDIX C
SUMMARY OF BASE YEAR AND FUTURE YEAR TRAFFIC VOLUMES

ROADWAY LANES	**** CY 2023***** AM VPH	PM VPH	CY 2050 (NO BUILD) AM VPH	PM VPH	CY 2050 (BUILD) AM VPH	PM VPH
Kuakini Hwy. N. of Hualalai Rd. (NB)	951	859	1,153	1,036	1,206	1,169
Kuakini Hwy. N. of Hualalai Rd. (SB)	627	1134	746	1,379	821	1,471
Two-Way	1,578	1,993	1,899	2,415	2,027	2,640
Kuakini Hwy. S. of Hualalai Rd. (NB)	611	617	744	745	805	897
Kuakini Hwy. S. of Hualalai Rd. (SB)	434	817	514	998	600	1,103
Two-Way	1,045	1,434	1,258	1,743	1,405	2,000
Kuakini Hwy. N. of North Entrance (NB)	558	513	682	619	742	771
Kuakini Hwy. N. of North Entrance (SB)	382	737	451	903	537	1,009
Two-Way	940	1,250	1,133	1,522	1,279	1,780
Kuakini Hwy. S. of North Entrance (NB)	573	454	697	560	755	693
Kuakini Hwy. S. of North Entrance (SB)	295	701	364	867	439	968
Two-Way	868	1,155	1,061	1,427	1,194	1,661
Kuakini Hwy. N. of South Entrance (NB)	573	454	697	560	755	693
Kuakini Hwy. N. of South Entrance (SB)	295	701	364	867	439	968
Two-Way	868	1,155	1,061	1,427	1,194	1,661
Kuakini Hwy. S. of South Entrance (NB)	573	454	697	560	748	622
Kuakini Hwy. S. of South Entrance (SB)	295	701	364	867	400	956
Two-Way	868	1,155	1,061	1,427	1,148	1,578
Kuakini Hwy. W. of Q. Kaahumanu Hwy. (EB)	295	701	352	835	383	912
Kuakini Hwy. W. of Q. Kaahumanu Hwy. (WB)	421	266	508	326	552	379
Two-Way	716	967	860	1,161	935	1,291
Q. Kaahumanu Hwy. S. of Kuakini Hwy. (NB)	1,280	1,017	1,673	1,341	1,714	1,391
Q. Kaahumanu Hwy. S. of Kuakini Hwy. (SB)	1,058	1,530	1,380	1,954	1,409	2,026
Two-Way	2,338	2,547	3,053	3,295	3,123	3,417
Q. Kaahumanu Hwy. N. of Kuakini Hwy. (NB)	922	796	1,241	1,069	1,243	1,074
Q. Kaahumanu Hwy. N. of Kuakini Hwy. (SB)	826	874	1,104	1,173	1,107	1,176
Two-Way	1,748	1,670	2,345	2,242	2,350	2,250
Q. Kaahumanu Hwy. S. of Hualalai Rd. (NB)	1,226	892	1,628	1,190	1,628	1,190
Q. Kaahumanu Hwy. S. of Hualalai Rd. (SB)	855	1,049	1,142	1,400	1,142	1,400
Two-Way	2,081	1,941	2,770	2,590	2,770	2,590

APPENDIX C (CONTINUED)
SUMMARY OF BASE YEAR AND FUTURE YEAR TRAFFIC VOLUMES

ROADWAY LANES	**** CY 2023***** AM VPH	PM VPH	CY 2050 (NO BUILD) AM VPH	PM VPH	CY 2050 (BUILD) AM VPH	PM VPH
Q. Kaahumanu Hwy. N. of Hualalai Rd. (NB)	1,113	839	1,494	1,127	1,494	1,127
Q. Kaahumanu Hwy. N. of Hualalai Rd. (SB)	818	985	1,098	1,323	1,098	1,323
Two-Way	1,931	1,824	2,592	2,450	2,592	2,450
Q. Kaahumanu Hwy. S. of Nani Kailua Dr. (NB)	1,078	842	1,448	1,130	1,448	1,130
Q. Kaahumanu Hwy. S. of Nani Kailua Dr. (SB)	818	989	1,096	1,330	1,096	1,330
Two-Way	1,896	1,831	2,544	2,460	2,544	2,460
Q. Kaahumanu Hwy. N. of Nani Kailua Dr. (NB)	1,222	938	1,634	1,255	1,636	1,260
Q. Kaahumanu Hwy. N. of Nani Kailua Dr. (SB)	861	1,138	1,153	1,522	1,156	1,525
Two-Way	2,083	2,076	2,787	2,777	2,792	2,785
Hualalai Rd. W. of Kuakini Hwy. (EB)	274	202	326	240	330	245
Hualalai Rd. W. of Kuakini Hwy. (WB)	207	306	246	365	249	372
Two-Way	481	508	572	605	579	617
Hualalai Rd. E. of Kuakini Hwy. (EB)	208	237	246	282	251	294
Hualalai Rd. E. of Kuakini Hwy. (WB)	288	266	343	317	350	325
Two-Way	496	503	589	599	601	619
Hualalai Rd. W. of Nani Kailua Rd. (EB)	120	159	143	189	148	201
Hualalai Rd. W. of Nani Kailua Rd. (WB)	273	202	326	241	333	249
Two-Way	393	361	469	430	481	450
Hualalai Rd. E. of Nani Kailua Rd. (EB)	90	85	107	102	107	102
Hualalai Rd. E. of Nani Kailua Rd. (WB)	176	97	212	117	212	117
Two-Way	266	182	319	219	319	219
Hualalai Rd. W. of Driveway (EB)	79	112	93	132	93	132
Hualalai Rd. W. of Driveway (WB)	191	100	228	120	228	120
Two-Way	270	212	321	252	321	252
Hualalai Rd. E. of Driveway (EB)	77	94	91	111	91	111
Hualalai Rd. E. of Driveway (WB)	185	94	220	112	220	112
Two-Way	262	188	311	223	311	223
Hualalai Rd. W. of Q. Kaahumanu Hwy. (EB)	93	93	111	112	111	112
Hualalai Rd. W. of Q. Kaahumanu Hwy. (WB)	169	82	201	98	201	98
Two-Way	262	175	312	210	312	210

APPENDIX C (CONTINUED)
SUMMARY OF BASE YEAR AND FUTURE YEAR TRAFFIC VOLUMES

ROADWAY LANES	**** CY 2023*****		CY 2050 (NO BUILD)		CY 2050 (BUILD)	
	AM VPH	PM VPH	AM VPH	PM VPH	AM VPH	PM VPH
North Entrance Driveway E. of Kuakini Hwy. (EB)	164	82	164	82	192	116
North Entrance Driveway E. of Kuakini Hwy. (WB)	62	105	62	105	81	153
Two-Way	226	187	226	187	273	269
South Entrance Driveway E. of Kuakini Hwy. (EB)	0	0	0	0	109	134
South Entrance Driveway E. of Kuakini Hwy. (WB)	0	0	0	0	77	193
Two-Way	0	0	0	0	186	327

Appendix H

Mobility Analysis Report for the University of the Nations Kona Master Plan Update, Kona, HI, December 2023

Mobility Analysis Report for the University of the Nations Kona Master Plan Update Kona, HI

Prepared for:
University of the Nations Kona

Dec 14, 2023

SD19-0323

FEHR PEERS

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1.0 EXECUTIVE SUMMARY

This report documents the assessment of traffic, mobility, and access for an update to the 2003 University of the Nations (UofN) Kona Master Plan (Project). The Project site is on tax map key parcels TMK (3) 7-5-010: 085 and (3) 7-5-017: 006, between Kuakini Highway and Hualalai Road on the Island of Hawai'i. The Project site is within the Kona Community Plan area. The existing site includes mainly the U of N which serves as a training center to prepare followers for Christian service throughout the world, specifically for Asia and the Pacific. A preschool also resides on the southwest corner of the campus.

Impacts of the proposed Master Plan Update were evaluated following guidelines established by the County of Hawai'i Department of Public Works-Engineering Division and the State of Hawai'i Department of Transportation (HDOT), which has jurisdiction over Hawai'i Belt Road/Queen Ka'ahumanu Highway (Highway 11). The operations of nine (9) intersections [eight (8) existing and one (1) future] were evaluated during the weekday morning (AM) and evening (PM) peak hours for Existing (2023), Master Plan Phase 1 (2030), Phase 2 (2040), and Phase 3 (2050) conditions. Master Plan Phase 1, 2, and 3 conditions were evaluated without and with the Project.

To estimate Project trip generation, multimodal counts of vehicles, bicyclists, and pedestrians were collected at the existing University of the Nations site driveway. The traffic counts obtained were instrumental in determining the trip rates for students, faculty, and staff residing on the site, as well as those commuting to the site. Estimated rates were then applied to future student enrollment and faculty/staff employment forecasts to estimate future Project trips. Using this approach, the following peak hour volumes are anticipated to be generated by the site during AM and PM peak hours:

- Phase 1 (2030): 41 new AM peak hour trips (11 inbound/30 outbound) and 44 new PM peak hour trips (36 inbound/8 outbound)
- Phase 1+2 (2040): 75 new AM peak hour trips (15 inbound/60 outbound) and 88 new PM peak hour trips (71 inbound/17 outbound)
- Phase 1+2+3 (2050): 122 new AM peak hour trips (29 inbound/93 outbound) and 139 new PM peak hour trips (107 inbound /32 outbound)

Project trip distribution was estimated using the location of complementary land uses and existing travel patterns, and trips were subsequently assigned to the adjacent streets. Intersection operations were evaluated for existing and future conditions, and potential changes to active transportation and transit were also assessed. The key findings of the mobility analysis are summarized below.

1.1 INTERSECTION OPERATIONS

1.1.1 EXISTING CONDITIONS

Under Existing Conditions, all but one (1) study intersections operate at LOS D or better during both AM and PM peak hours. The two locations with operations at undesirable levels include the following:

- Intersection #7 - Queen Ka'ahumanu Highway and Kuakini Highway (LOS E for the eastbound left-turn movement during AM peak hour)

1.1.2 PHASE 1, PHASE, AND PHASE 3 CONDITIONS

No direct impacts were calculated at any of the study intersections under Phase 1 (Year 2030) conditions, Phase 2 (Year 2040) conditions, and Phase 3 (Year 2050) conditions.

1.2 RECOMMENDED INTERSECTION IMPROVEMENTS

Recommendations are provided at locations where a significant traffic impact was not identified, but improvements may become necessary in the future. The emphasis was to identify physical and/or operational improvements that could be implemented within the existing or planned roadway rights-of-way and determine if improvements would be ultimately feasible. **Table** 1-1 provides a summary of the proposed intersection improvements and locations where future analysis is recommended prior to occupancy of selected development phases. Improvements are discussed in more detail under **Section 7.1**.

Table 1-1. Summary of Intersection Improvement Recommendations

Intersection	Phase 1 (Year 2030)	Phase 2 (Year 2040)	Phase 3 (Year 2050)
Intersection #2 Kuakini Highway and Main Driveway	Install a left-turn refuge lane serving the westbound left-turn traffic out of the campus.	No additional improvements required	No additional improvements required

Intersection #6 Queen Ka'ahumanu Highway and Hualalai Road	No improvements required	Based on projected traffic volumes, a traffic signal is not warranted under this scenario, but it may be needed to provide adequate gaps in traffic on the highway and to enhance safety. Intersection conditions should be evaluated prior to occupancy of Phase 2 to determine if a traffic signal is warranted.	Based on projected traffic volumes, a traffic signal is not warranted under this scenario, but it may be needed to provide adequate gaps in traffic on the highway and to enhance safety. Intersection conditions should be evaluated prior to occupancy of Phase 3 to determine if a traffic signal is warranted.
Intersection #7 Queen Ka'ahumanu Highway and Kuakini Highway	No improvements required	Based on projected traffic volumes, a traffic signal is not warranted under this scenario, but it may be needed to provide adequate gaps in traffic on the highway and to enhance safety. Intersection conditions should be evaluated prior to occupancy of Phase 2 to determine if a traffic signal is warranted.	Based on projected traffic volumes, a traffic signal is not warranted under this scenario, but it may be needed to provide adequate gaps in traffic on the highway and to enhance safety. Intersection conditions should be evaluated prior to occupancy of Phase 3 to determine if a traffic signal is warranted.

1.3 PROJECT SITE ASSESSMENT

Site Access

Direct access to the project site is provided by a driveway located on Kuakini Highway and is controlled by an access gate located approximately 125 feet east of Kuakini Highway. During peak travel periods or special events, campus-bound traffic could potentially queue up while waiting to pass through the access gate and spill back onto Kuakini Highway impeding through traffic. To reduce the potential for spillback, it is recommended that the access gate be relocated to a point further east.

Under Phase 1 (Year 2030) conditions, a second access point will be provided off of the Kuakini Highway via a new unsignalized intersection and driveway leading to the project site. The proposed new access point is recommended to be constructed with an exclusive left-turn lane on the southbound approach and the south leg to be striped to accommodate a refuge lane serving the westbound left-turn vehicles. Due to the relatively low volume of vehicles on this roadway and the limited land uses served by it, no vehicular site access or operational issues are expected as a result of the implementation of this access point. In general,

providing multiple access points to the project site will distribute the traffic and minimize the potential for intermittent congestion issues during peak hours.

On-Site Circulation

Under Phase 1, the proposed site plan includes the extension of multiple on-site internal campus roadways. First, there are three new north-south roadways proposed along the development area that connects new buildings and facilities to the center east-west on-campus roadway. In addition, a new east-west campus roadway is planned to be located along the southern edge of the developed campus. The roadway will be extended from the western edge of the campus to the existing roadway that serves Hualalai Village Apartments. The proposed access at the Hualalai Village Apartments is planned to be operating as emergency access only. To manage travel speeds along the proposed roadways, it is recommended that stop signs and other traffic calming devices be included at key points along these roadways.

Parking

Vehicle parking will be provided via on- and off-street parking throughout campus. Insufficient parking was not noted as an issue by the project development team at the time this report was prepared. As such, it is assumed that the existing parking inventory is sufficient to accommodate the parking demand generated by current levels of campus students, faculty, staff, and visitors. Therefore, it is recommended that the parking supply provided in each phase of the project maintain (or reduce if feasible) the current ratio of parking spaces to the number of campus students, faculty, staff, and visitors. Reduced parking supplies are a key incentive to minimizing the number of vehicle trips generated by land uses, but they must be supported by services and facilities to accommodate non-automobile travel such as, but not limited to, increased transit accessibility, bicycle lanes, and dedicated walking paths.

1.4 MULTIMODAL ASSESSMENT

Bicycle and Pedestrian Facilities

Implementation of the proposed Project will not conflict with any existing pedestrian or bicycle facilities and will not preclude the implementation of any planned pedestrian or bicycle facilities within the study area.

A proposed bike lane along Kuakini Highway from Lako Street to Hualalai Road is identified as a high-priority project in Bike Plan Hawai'i. When completed, this facility will enhance bicycle connectivity to and

from the University of the Nations Kona west entrance. No pedestrian improvements are planned along roadways adjacent to the University of the Nations Kona campus.

While the project-generated pedestrian and bicycle volumes are initially expected to be low, the addition of any active travelers along Kuakini Highway may result in people walking or biking along the roadway, which could result in a potential safety issue and a significant multimodal impact. To address this issue, the following pedestrian improvements are proposed at this location:

- A raised sidewalk or path separated from traffic by a raised asphalt berm should be installed between the existing sidewalk on the east side of Kuakini Highway from the existing sidewalk's terminus near the site to the existing crosswalk located approximately 600 feet north of the University of the Nations Kona Driveway.
- A high-visibility crosswalk, adequate nighttime lighting levels, and crosswalk warning signs should be added on the north and east legs of the Kuakini Highway/North Entrance and Kuakini Highway/South Entrance intersections.
- The existing striped triangle on the east leg of the intersection should be converted to a raised median to provide a pedestrian refuge area.

Direct pedestrian and bicycle connections between campus facilities and parking lots would be provided via pedestrian and bicycle pathways throughout the campus. The following improvements are planned along on-site campus roadways:

- A shared-use path should be included on one side of both on-site campus roadways to further enhance pedestrian and bicycle connectivity and safety throughout the campus.
- An enhanced bicycle facility (e.g. bike lanes, shared-use-path, or "sharrows") should be included along the Makai north-south campus roadway between the northern and central roadways.
- Pedestrian-level lighting is recommended along any shared-use path or pedestrian-only sidewalk or path.
- Raised crosswalks should be provided at several locations on the new spine road through the center of the site where higher levels of pedestrian activity are expected.

We also recommend the provision of secure bike parking – including bike racks near building entrance(s) – be provided to encourage the use of non-motorized travel. Specific locations for bike racks should be determined by the project team in consultation with the University of the Nations Kona planning and security staff. A summary of recommended on-site pedestrian and bicycle improvements is shown in **Figure 9-1**.

Transit

The Pahala-Kailua-Kona-South Kohala Resorts Route provides daily transit service along Queen Kaahumanu Highway. The nearest bus stop would require transit patrons from the project site to walk or bike at least 2,000 feet from campus to use the transit service. One potential improvement would be to provide a multi-use connection directly to Hualalai Road to reduce the overall distance transit riders would have to walk or bike to access the campus.

The project is anticipated to generate a relatively low number of transit riders through Project buildout. As site-generated transit ridership is anticipated to be low, no project impacts to transit facilities or services are anticipated, and no modifications to transit stop locations or services would be required.

2.0 INTRODUCTION

This mobility analysis report (MAR) presents the study conducted by Fehr & Peers for the University of the Nations (UofN) Kona Master Plan Update. The UofN in the Kona Community Plan area of Kailua-Kona on the Island of Hawai'i. This update replaces the previous Master Plan approved in 2003. The project site is located on tax map key parcels TMK (4) 7-5-010: 085 and (4) 7-5-017: 006, between Kuakini Highway and Hualalai Road. This MAR was conducted in accordance with the guidelines and standards of the affected government agencies, and it addresses the potential impact of the project on vehicular, bicycle, pedestrian, and transit conditions.

2.1 PROJECT DESCRIPTION

The University of the Nations is a Christian university with over 600 locations across 160 countries. With approximately 500 university students, 340 Pre-K-12 students, and 750 staff members, the Kona campus is one of the largest UofN campuses worldwide. The existing site includes residential, religious, educational, recreational, and commercial uses.

The 2023 Master Plan Update was prepared for UofN Kona and includes plans for the Existing Campus Site as well as the Petition Area (approximately 62 acres of land adjacent to the Existing Campus). The purpose is to update the Master Plan and to reflect current and upcoming priorities since the 2002-2005 master planning and land use entitlements were completed. Future buildings and projects planned in roughly 10-year increments, with emphasis given to the next 5-10 years, are projected into the 2023 Master Plan Update.

The projected population after the completion of each phase is as follows:

- Phase 1: Within the next 5-7 years
    - 340 Pre-K-12 Students
    - 718 University Students
    - 783 Faculty/Staff Members
- Phase 2: Within the next 17 years
    - Potentially up to 469 Pre-K-12 Students
    - 955 University Students
    - 923 Faculty/Staff Members
- Phase 3: Within the next 27 years.
    - Potentially up to 575 Pre-K-12 Students
    - 1,200 University Students
    - 1,100 Faculty/Staff Members

Phase 1 of the project Master Plan includes the addition of new roadways, parking, instructional space, a student resource center, dormitories, a cafeteria, and a chapel. During the first phase of the Master Plan (by the Year 2030), a second campus access point is planned that is located on the south side of the existing access point along Kuakini Highway.

Phase 2 of the Master Plan includes additional parking and dormitories, Middle and High-School, a gymnasium area, a community athletic complex, practice fields, tennis courts, and lockers. Phase 3 of the Master Plan includes a multipurpose complex with an amphitheater, Discovery Center, expansion of instructional spaces, and additional dormitories and parking space.

Direct access to the project site is provided by a driveway located on Kuakini Highway and is controlled by an access gate located approximately 125 feet east of Kuakini Highway. A secondary access point will also be provided off of Kuakini Highway approximately 1,200 feet south of the existing access via a new unsignalized intersection. Additionally, the intersection of Hualalai Village South Driveway and Hualalai Road will function as emergency access only.

The university expects to host weekly community and athletic events throughout the year. Attendees would include campus students, faculty, and visitors, as well as community members. A general overview of the potential effects of these events is described in **Section 6.6**.

The location of the project site and immediate study area is shown in **Figure 2-1**. The proposed site plan showing building locations and campus access is illustrated in **Figure 2-2**.

2.2 PROJECT STUDY AREA

The project site is located in Kailua-Kona, bounded by Kuakini Highway and Hualalai Road. The campus is currently accessible via one driveway along Kuakini Highway, approximately one-half mile north of the intersection of Kuakini Highway and Walua Road/Oni Oni Street. The University of the Nations Driveway is a two-lane road that provides controlled access to university visitors. Land uses along Kuakini Highway in the vicinity of the project include commercial, single-family residential, and multi-family residential uses. Other surrounding land uses include residential neighborhoods and agricultural uses.

The mobility analysis evaluated the operations at a total of nine (9) intersections [eight (8) existing and one (1) future] in the vicinity of the proposed project which are listed below and shown in **Figure 2-1**.

1. Kuakini Highway and Hualalai Road
2. Kuakini Highway and North Campus Entrance
3. Hualalai Road and Nani Kailua Drive

4. Queen Kaahumanu Hwy & Nani Kailua Drive
5. Hualalai Road and Hualalai Village North Driveway
6. Hualalai Road and Queen Kaahumanu Highway (Route 11)
7. Kuakini Highway and Queen Kaahumanu Highway (Route 11)
8. Hualalai Road and Hualalai Village South Driveway (emergency access only)
9. Kuakini Highway and South Campus Entrance (Future Intersection)

The study analyzed the potential project-related traffic impacts under typical weekday AM and PM peak-hour traffic conditions. The AM and PM peak hours for each intersection are identified as the highest one-hour totals of traffic at the intersection from 6:00 to 9:00 AM and from 3:00 to 6:00 PM on a weekday. Note the Project is not expected to add any traffic volume to the intersections on Hualalai Road south of Nani Kailua Drive, but these locations were originally studied when the project included a different access configuration. Thus, they were included here for informational purposes.

2.3 STUDY SCENARIOS

This report includes the following types of analysis:

Existing (2023) Conditions – The analysis of existing traffic conditions was based on 2023 counts collected for the weekday peak hours. The existing conditions analysis includes a description of key area streets and an assessment of bicycle, pedestrian, and transit facilities and services in the study area.

Baseline Conditions – Future traffic volumes in the anticipated completion year of each phase of the project (Phase 1, 2, or 3) were projected by increasing the existing volumes using an annual growth factor to account for ambient growth. This scenario does not include any project traffic.

Baseline Plus Project Conditions – Traffic projections from baseline Conditions plus traffic estimated from the completion of each phase (Phase 1, 2, and 3) of the project. The impact of the project under this scenario was also assessed for bicycle, pedestrian, and transit facilities and services.

2.4 ANALYSIS METHODOLOGY

The analysis of roadway operations performed for this study is based on procedures presented in the *Highway Capacity Manual 6th Edition* (HCM), published by the Transportation Research Board in 2016. The operations of roadway facilities are described with the term level of service (LOS). LOS is a qualitative

description of traffic flow based on such factors as speed, travel time, delay, and freedom to maneuver. Six (6) levels are defined; from LOS A, with the least congested operating conditions, to LOS F, with the most congested operating conditions. LOS E represents "at-capacity" operations. Operations are designated as LOS F when volumes exceed capacity, resulting in stop-and-go conditions. The methodologies for signalized and unsignalized intersections are described below.

2.4.1 SIGNALIZED INTERSECTIONS

Signalized intersection operations were analyzed using the method described in Chapter 19: Signalized Intersections of the HCM. This LOS method analyzes a signalized intersection's operation based on average control delay per vehicle. Control delay alone is used to characterize LOS for the entire intersection or an approach. Control delay includes the initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The average control delay for signalized intersections is calculated using Synchro 11.0 analysis software and is correlated to a LOS designation as shown in **Table 2-1**.

2.4.2 UNSIGNALIZED INTERSECTIONS

Unsignalized intersection operations were evaluated using the method contained in Chapter 20: Two-Way Stop-Controlled Intersections of the HCM. LOS ratings for stop-sign-controlled intersections are based on the average control delay expressed in seconds per vehicle. At two-way or side-street-controlled (SSSC) intersections, the average control delay is calculated for each minor-street-stopped movement and the major street left turns; not for the intersection as a whole. For approaches composed of a single lane, the control delay is computed as the average of all movements in that lane. For approaches with multiple lanes, the control delay is computed for each movement; the movement with the worst (i.e., longest) delay is presented for two-way stop-controlled (TWSC). The average control delay for unsignalized intersections is calculated using Synchro 11.0 analysis software and is correlated to a LOS designation as shown in **Table 2-2**.

Table 2-1. Signalized Intersection Level of Service Definitions

Level of Service	Description	Delay in Seconds
A	Progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.	≤ 10.0
B	Progression is good, cycle lengths are short, or both. More vehicles stop than with LOS A, causing higher levels of average delay.	> 10.0 to 20.0

C	Higher congestion may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level, though many still pass through the intersection without stopping.	> 20.0 to 35.0
D	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	> 35.0 to 55.0
E	This level is considered by many agencies to be the limit of desirable delay. These high delay values generally indicate poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.	> 55.0 to 80.0
F	This level is considered undesirable with oversaturation, which is when arrival flow rates exceed the capacity of the intersection. This level may also occur at high V/C ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be contributing factors to such delay levels.	> 80.0

Source: *Highway Capacity Manual*, Transportation Research Board, 2016.

Table 2-2. Unsignalized Intersection Level of Service Definitions

Level of Service	Description	Average Control Delay Per Vehicle (Seconds)
A	Little or no delay	≤ 10.0
B	Short traffic delay	> 10.0 to 15.0
C	Average traffic delays	> 15.0 to 25.0
D	Long traffic delays	> 25.0 to 35.0
E	Very long traffic delays	> 35.0 to 50.0
F	Extreme traffic delays with capacity exceeded	> 50.0

Source: *Highway Capacity Manual*, Transportation Research Board, 2016.

2.4.3 TRANSIT AND ACTIVE TRANSPORTATION MODES

The assessments of planned pedestrian, bicycle, and transit facilities were conducted using the information in planning documents, such as the *Bike Plan Hawai'i Master Plan (2012)*, *Statewide Pedestrian Master Plan (2013),* and *County of Hawai'i Transit and Multi-Modal Transportation Master Plan (2018)*. In addition, best practices for transit and active transportation planning and engineering were applied to determine if deficiencies currently exist or are projected in the future.

2.4.4 SIGNIFICANT IMPACT CRITERIA

The analysis of future conditions compares the "no project" condition with conditions that include project-generated traffic assuming full development of Phase 1, 2, and 3 uses. This is done to determine if the addition of project traffic is expected to result in a significant impact on the surrounding roadways. Based on previous studies conducted for the County of Hawai'i, the minimum desired operating standard for a signalized intersection is LOS D for the overall intersection. Additionally, the Hawai'i Department of Transportation (HDOT) strives to universally maintain LOS D intersection operations and in their *Draft, HDOT Best Practices for Traffic Impact Report* (June 2012) defines a significant impact when the operations of an intersection, turning movement, or roadway segment change from LOS D or better to LOS E or F. Also, when evaluating intersection approach LOS at any location, other factors should be considered in the analysis, such as traffic volumes and potential secondary impacts to pedestrian, bicycle, and transit travel.

Any identified significant impact is further categorized as either a direct or cumulative impact. At a signalized intersection, if the addition of project traffic is expected to degrade acceptable service levels (LOS D or better) to unacceptable service levels (LOS E or F), then the project is considered to have a direct impact. Alternatively, if the intersection LOS is determined to be LOS E or F without the project and the project adds traffic to this location, causing the delay to increase by five (5) seconds or more, then this result would be characterized as a cumulative impact.

For unsignalized intersections, the criterion for a direct impact is similar to that of signalized intersections as described above, but one or more signal warrants must also be met. The signal warrants used for this evaluation are those described in Chapter 4C of the Manual of Uniform Control Devices (MUTCD, 2009) published by the U.S. Department of Transportation Federal Highway Administration (FHWA). However, the project is determined to have a potentially significant cumulative impact when it adds traffic to a study location that includes a controlled approach already operating at an unacceptable level (i.e., LOS E or F) *and* one or more volume-based signal warrants are met.

The County of Hawai'i and HDOT does not publish impact criteria for pedestrian, bicycle, and transit impacts. For this analysis, these impacts were evaluated based on whether the proposed Project would: 1) conflict

with the existing or planned pedestrian, bicycle, or transit facilities and services, or 2) create substantive walking, bicycling, or transit use demand without providing adequate and appropriate facilities for non-motorized mobility. If either of these criteria were satisfied, then the project would be determined to have a project-specific impact on non-motorized modes of transportation.

N:\Projects\2019_Projects\0323_University of the Nations Kona MAR\Graphics\GIS\StudyIntersections.mxd

Legend

- Project Study Area
- X Study Intersections
- X Future Study Intersections

Figure 2-1

Project Site & Study Intersections

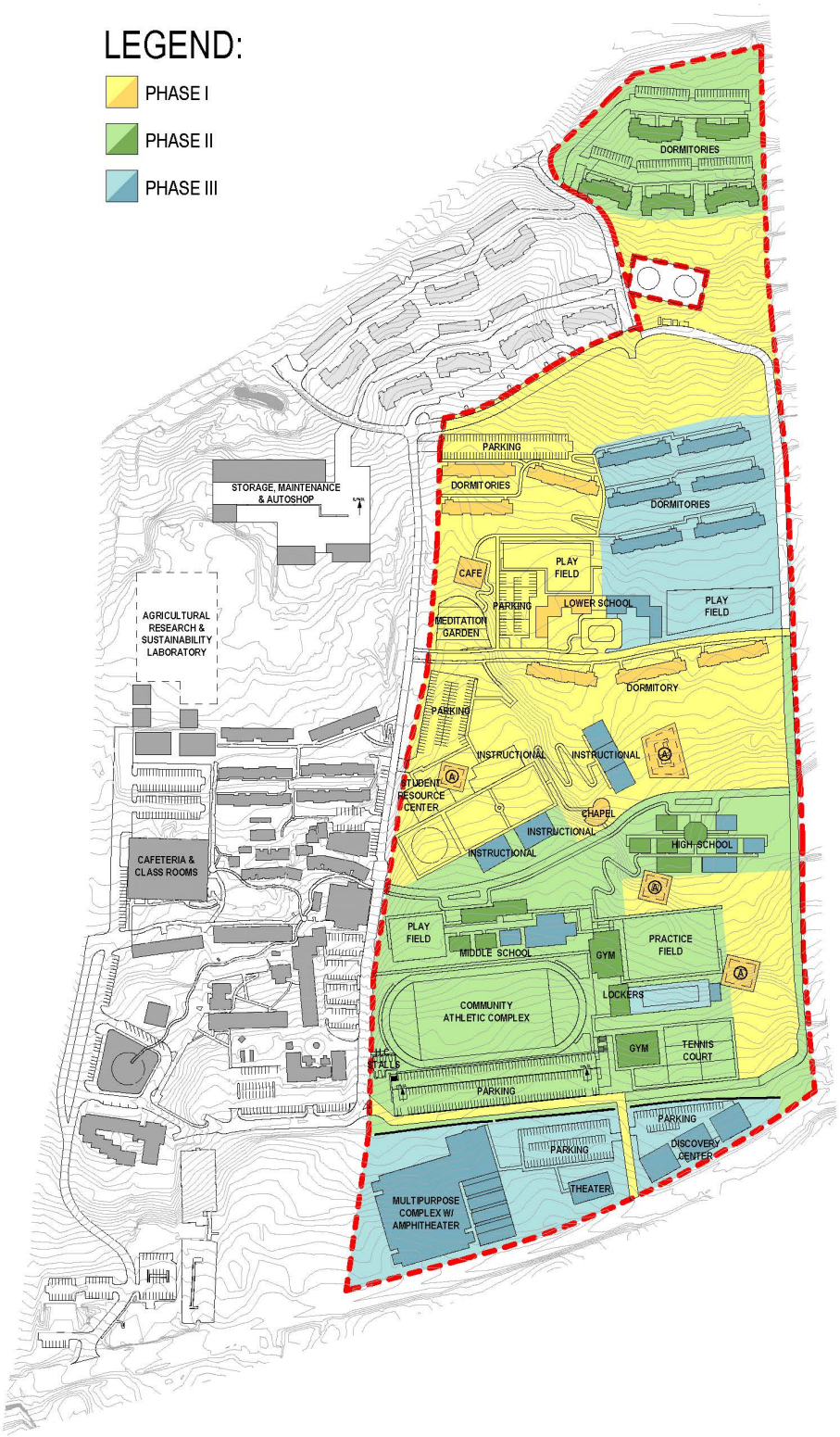


Figure 2-2

Proposed Site Plan

3.0 EXISTING CONDITIONS

This chapter describes the existing transportation network and includes a discussion of pedestrian, bicycle, and transit facilities located within the project study area. This chapter also includes a discussion of the existing intersection LOS operation results.

3.1 EXISTING SITE

The University of the Nations campus is located at 75-5952 Kuakini Highway in the community of Kona in Hawai'i County. The project site is on tax map key parcels TMK (4) 7-5-010: 085 and (4) 7-5-017: 006, between Kuakini Highway and Hualalai Road. The existing campus includes the following mix of uses:

- Residential land use (e.g., student and faculty housing)
- Religious land use (i.e., chapel)
- Educational land use (e.g., classrooms, campus services)
- Recreational land use (e.g., sports complex, swimming pool)
- Commercial land use (e.g., coffee shop, convenience store)

3.2 EXISTING TRANSPORTATION FACILITIES

A comprehensive data collection effort was undertaken to identify existing transportation conditions in the vicinity of the proposed project. The assessment of existing conditions relevant to this study includes an inventory of the street system, traffic volumes on these facilities, and operating conditions at key intersections. Existing public transit, bicycle, and pedestrian facilities are also described.

3.2.1 EXISTING ROADWAY SYSTEM

The key roadways providing access to or in the vicinity of the study area are described below.

The University of the Nations Driveway provides direct access from Kuakini Highway to the University of the Nations campus and serves as the primary internal campus roadway providing access to existing campus facilities. The roadway terminates just west of the Aloha Lanai Cafeteria. The unnamed road has speed bumps and is currently two lanes. The posted speed limit is 15 miles per hour (mph).

Kuakini Highway is the primary street that provides access to the project site. Adjacent to the project site, it is a two-lane collector roadway that extends generally from the north end of the town of Kailua-Kona to

Queen Kaahumanu Highway. The posted speed limit is 35 mph. Kuakini Highway is under the jurisdiction of the County of Hawai'i Department of Public Works (DPW). Sidewalks are not provided on either side of Kuakini Highway. No bicycle facilities exist along Kuakini Highway within the study area. Crosswalks are provided at the intersection of Kuakini Highway and Hualalai Road.

Hualalai Road is a two-lane local roadway that is under the jurisdiction of DPW. It runs east-west between Ali'i Drive and Queen Kaahumanu Hwy. The posted speed limit is 25 mph. Sidewalks are provided on both sides of the roadway makai of Kuakini Highway, on the north side of the roadway between Kuakini Highway and the Regency at Hualalai, and the south side of the roadway just makai of Queen Kaahumanu Hwy. No bicycle facilities exist along Hualalai Road within the study area. On-street parking is not provided.

Queen Kaahumanu Highway is a two-lane highway that is under the jurisdiction of the State of Hawai'i Department of Transportation (HDOT). It is a major component of the Hawai'i Belt Road and runs from Hwy 19 in Kailua-Kona to Hwy 19 in Hilo. The posted speed limit within the study area is 35 mph. Neither sidewalks nor bicycle facilities are provided along the roadway. On-street parking is not provided.

Nani Kailua Drive is a two-lane local roadway that is under the jurisdiction of DPW. It runs east-west and extends from Hualalai Road to just mauka of Pikake Place. The posted speed limit is 25 mph. Neither sidewalks nor bicycle facilities are provided along the roadway. On-street parking is provided on both sides of the roadway.

3.2.2 EXISTING TRANSIT FACILITIES AND SERVICES

The County of Hawai'i Mass Transit Agency provides island-wide commuter and fixed-route service on the Island of Hawai'i, where it served over 800,000 riders in the fiscal year of 2016-2017.[1] Hele-On offers fixed-route transit service in the Hilo and Kona areas Monday through Saturday, and limited commuter services to the South Kohala Resort (SKR) areas seven days a week. Within the project study area, the Pahala-Kailua-Kona-South Kohala Resorts Route provides daily service along Queen Kaahumanu Highway with transit stops both north and south of the project site[2]. Detailed route schedule information, such as operating hours and frequencies, was not available at the time this was written.

[1] County of Hawai'i Mass Transit Agency Transit Agency Profile. National Transit Database, 2017. Accessed online at https://www.transit.dot.gov/sites/fta.dot.gov/files/transit_agency_profile_doc/2017/9R03-91080.pdf
[2] County of Hawai'i Mass Transit Agency. Accessed online at https://www.hawaiicounty.gov/departments/mass-transit.

3.2.3 EXISTING BICYCLE ACTIVITY

The study area has a low level of bicycle activity. Based on the peak hour traffic counts, a range of 0-2 bicyclists were observed at the study location during the AM and PM peak hours. The highest level of bicycle activity occurred in the study area from 3:35 to 4:35 PM.

3.2.4 EXISTING PEDESTRIAN ACTIVITY

The study area generally has a low level of pedestrian activity, except for the intersection of Kuakini Highway and Hualalai Road, where pedestrian activity is high. During the AM peak hour, 12 pedestrians were observed at the intersection of Kuakini Highway and Hualalai Road, and between 0 and 9 pedestrians were observed at the other study intersections. During the PM peak hour, 37 pedestrians were observed at the intersection of Kuakini Highway and Hualalai Road, and between 0 and 7 pedestrians were observed at the other study intersections.

3.3 EXISTING TRAFFIC VOLUMES/LANE CONFIGURATIONS

Operations of the seven (8) existing study intersections were evaluated for the weekday AM and PM peak hours. Traffic counts were collected during the weekday AM and PM peak periods in April 2023 while university classes were in session. The weekday peak hours of traffic for the study area generally occurred between 7:15 to 8:15 AM and 3:15 to 4:15 PM. Existing lane configurations and signal controls were obtained through field observations.

Additionally, the Synchro analysis was calibrated by incorporating local saturation rates observed at the critical movements within the study area to accurately replicates real-world traffic conditions. Saturation rates represent the maximum flow of vehicles a movement or intersection can handle before experiencing congestion. The process included capturing traffic volume and the time it took for vehicles to pass through specific movements during peak traffic periods.

Figure 3-1 presents the existing peak-hour turning movement volumes, corresponding lane configurations, and traffic control devices. Raw traffic count data sheets are provided in **Appendix A**.

3.4 FIELD OBSERVATIONS

As noted, a site visit was conducted by the project team in April 2023. During this visit, the project team observed vehicular traffic conditions (e.g. intersection operations, queuing, and travel speeds) to better

understand how the development of Phase 1 of the project could affect future traffic operations. During this visit, the following key operational issues were observed:

- Kuakini Highway/Hualalai Road: Vehicular congestion along Kuakini Highway limited the number of vehicles that can pass through this intersection during the peak hour than would in free-flow conditions.
- Queen Ka'ahumanu Highway & Nani Kailua: Vehicular congestion along Queen Ka'ahumanu Highway limits the number of vehicles that can pass through this intersection during the peak hour than would in free-flow conditions.
- Queen Ka'ahumanu Highway & Lako Street: Though not located within the study area, delays at this intersection cause substantive amounts of queuing in the southbound direction along Queen Ka'ahumanu Highway. This queuing spills back into the intersection of Queen Ka'ahumanu Highway & Kuakini Highway and can disrupt intersection operations.
- Queen Ka'ahumanu Highway & Hualalai Road: Making a left turn from Hualalai Road during the morning hours was observed challenging. Northbound queues originating from Nani Kailua often spill back and contribute to the congestion at the intersection with Hualalai Road.
- Queen Ka'ahumanu Highway & Kuakini Highway: Queues extending almost to the point of spillback to Kuakini Highway. The southbound flow remained consistent. Making a left turn from Kuakini Highway to Queen Ka'ahumanu Highway during peak hours was observed challenging.

3.5 EXISTING INTERSECTION LEVELS OF SERVICE

Peak hour intersection capacity analysis was performed for the study intersections using the methodology described in **Section 2.4** and the recently collected peak hour traffic count data. **Table 3-1** summarizes the results of the intersection operations analysis for Existing Conditions. Detailed LOS worksheets are provided in **Appendix B**.

Table 3-1. Existing Peak Hour Intersection Level of Service

Intersection	Traffic Control	Peak Hour	Existing Conditions	
			(sec/veh)[1,3]	LOS[2,3]
1. Kuakini Highway & Hualalai Road	Signalized	AM	33.5	C
		PM	28.0	C
2. Kuakini Highway & North Campus Entrance [4]	SSSC	AM	27.4	D
		PM	31.1	D
3. Hualalai Road & Nani Kailua Road	SSSC	AM	10.6	B
		PM	9.7	A
4. Queen Ka'ahumanu Highway & Nani Kailua Drive	Signalized	AM	47.7	D
		PM	35.8	D
5. Hualalai Road & Hualalai Village North Driveway	SSSC	AM	10.6	B
		PM	10.1	B
6. Queen Ka'ahumanu Highway & Hualalai Road	SSSC	AM	32.6	D
		PM	22.4	C
7. Queen Ka'ahumanu Highway & Kuakini Highway	SSSC	AM	**37.9**	**E**
		PM	27.4	D
8. Hualalai Road & Hualalai Village South Driveway	SSSC	Hualalai Village South Driveway is currently closed. This access is assumed to be used as emergency access only under plus project conditions		

Source: Fehr & Peers, 2023

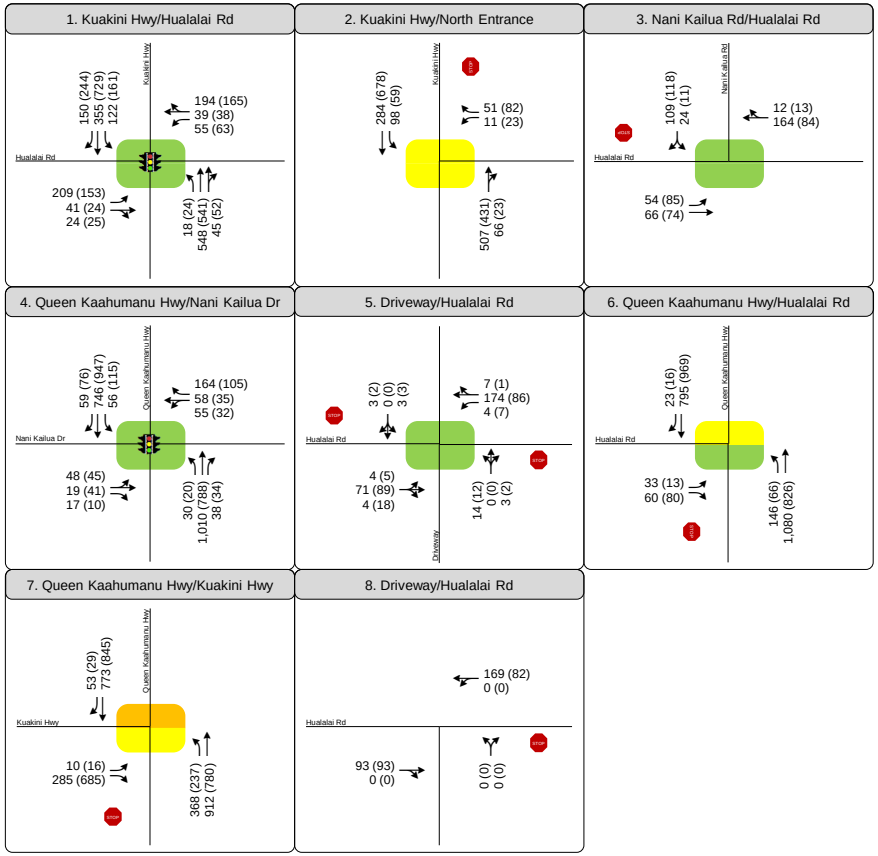
Notes:

[1] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized intersections. The vehicular delay for the worst movement is reported for the side-street stop-controlled (SSSC) intersection, and traffic along the main roadways typically moves more efficiently.
[2] LOS calculations were performed using the Highway Capacity Manual (HCM) method.
[3] Unacceptable seconds of delay per vehicle and LOS are highlighted in **bold**.
[4] Eastbound left-turn movement operates at LOS F during AM, and LOS E during PM peak hours.

As shown in **Table 3-1,** the following intersection operates at less-than-desirable LOS:

- (7) Queen Ka'ahumanu Highway and Kuakini Highway: LOS E during AM peak hour

Intersection results are generally consistent with field observations. The intersections of Kuakini Highway/Hualalai Road and Nani Kailua/Queen Ka'ahumanu Highway could occasionally operate worse than average conditions, primarily because congestion along Kuakini Highway and Queen Ka'ahumanu Highway limits the number of vehicles that can pass through the intersection during the peak hour than would pass in free-flow conditions. Saturation flow rates were reduced by 20% in the Synchro model along Queen Ka'ahumanu Highway and Kuakini Highway to account for this variation in flow rates.



LEGEND

AM (PM) Peak Hour Traffic Volumes

Lane Configuration

AM / PM | A-C | D | E | F — Level of Service (LOS)

Figure 3-1
Peak Hour Traffic Volumes and Lane Configurations
Existing Conditions

4.0 PHASE 1, 2, AND 3 NO PROJECT CONDITIONS

To evaluate the potential impacts of traffic generated by the proposed project on the surrounding street system, it was necessary to first develop estimates of future traffic conditions in the area without the project. Future traffic conditions without the project reflect traffic increases due to regional growth and development. The forecasted future traffic volumes were then used to identify impacts on the roadway system from the project.

4.1 NO PROJECT TRAFFIC ESTIMATES

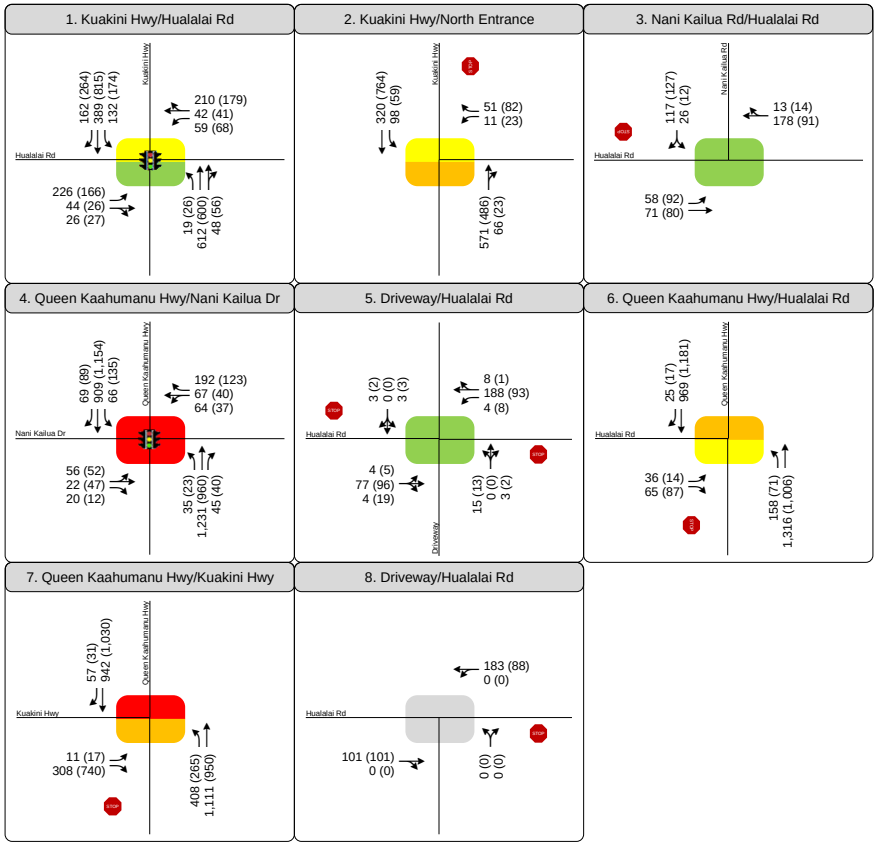
The following section summarizes growth assumptions used to estimate the amount of traffic that would be added to existing intersection volumes to develop Phase 1 (2030), Phase 2 (2040), and Phase 3 (2050) No Project volume estimates.

4.1.1 AREAWIDE OR AMBIENT TRAFFIC GROWTH

A growth factor was applied to existing traffic volumes to account for future study area growth. This factor was derived using the travel demand forecasting model (TDFM), which was developed for the *Federal-Aid Highways 2035 Transportation Plan for the District of Hawaii (July 2014)* published by HDOT. The TDFM uses land use and socioeconomic data to assign traffic across the planned roadway network for the base and horizon years. Future year (2035) model volumes were compared to base year (2007) model volumes to develop growth factors along study area roadways. A comparison of these daily roadway volumes demonstrated that traffic near the project site would increase annually by 2.5% along Queen Kaahumanu Highway, 1.5% along Kuakini Highway, 2% along Nani Kailua Drive, and 1% along Hualalai Road. Growth rates were compounded over the future-year timeframe for Phase 1 (2023 to 2030) and applied to each of the existing intersection turning movement traffic volumes collected in April 2023.

To estimate traffic volumes in the years 2040 and 2050, volumes from 2030 were grown using a compounded rate of 0.5% over 10 years applied to each intersection movement. It should be noted that before growth factors are applied, existing campus volumes were removed from the network volumes as the growth of campus traffic will be accounted for in Phase 1 through 3 development vehicle trip estimates described in **Chapter 5.0**.

Figure 4-1, **Figure** 4-2, and **Figure** 4-3 illustrate the forecasted peak hour traffic volumes respectively for Phase 1 (Year 2030), Phase 2 (Year 2040), and Phase 3 (Year 2050) No Project Conditions.



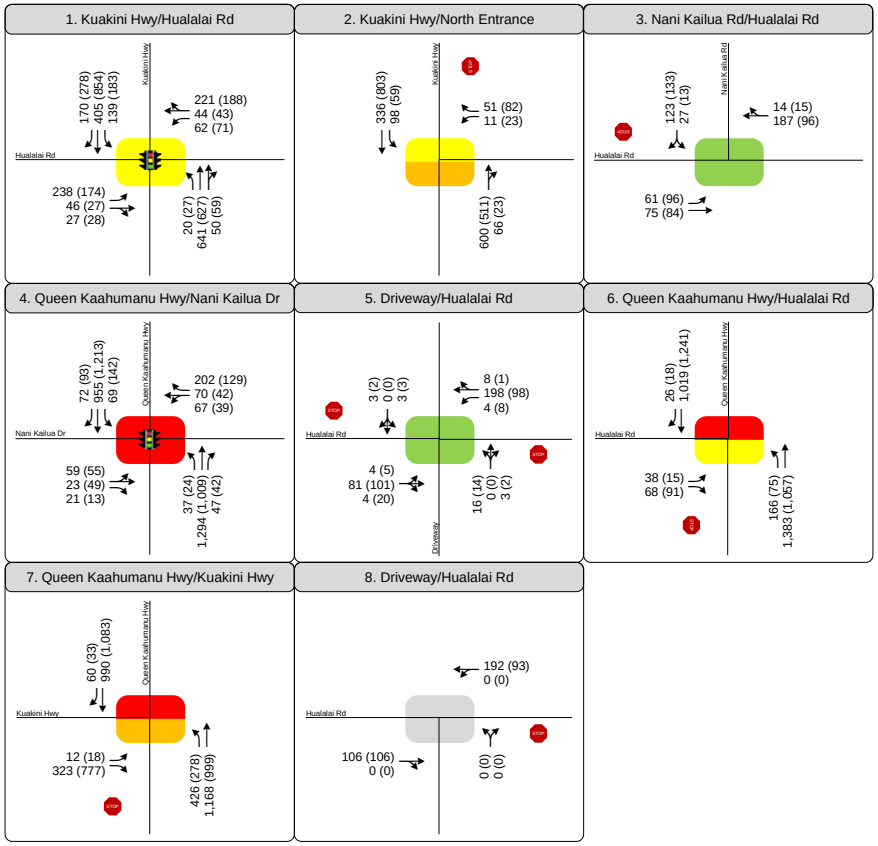
LEGEND

AM (PM) — Peak Hour Traffic Volumes

Lane Configuration

AM / PM — A-C | D | E | F — Level of Service (LOS)

Figure 4-1
Peak Hour Traffic Volumes and Lane Configurations
Baseline Year 2030



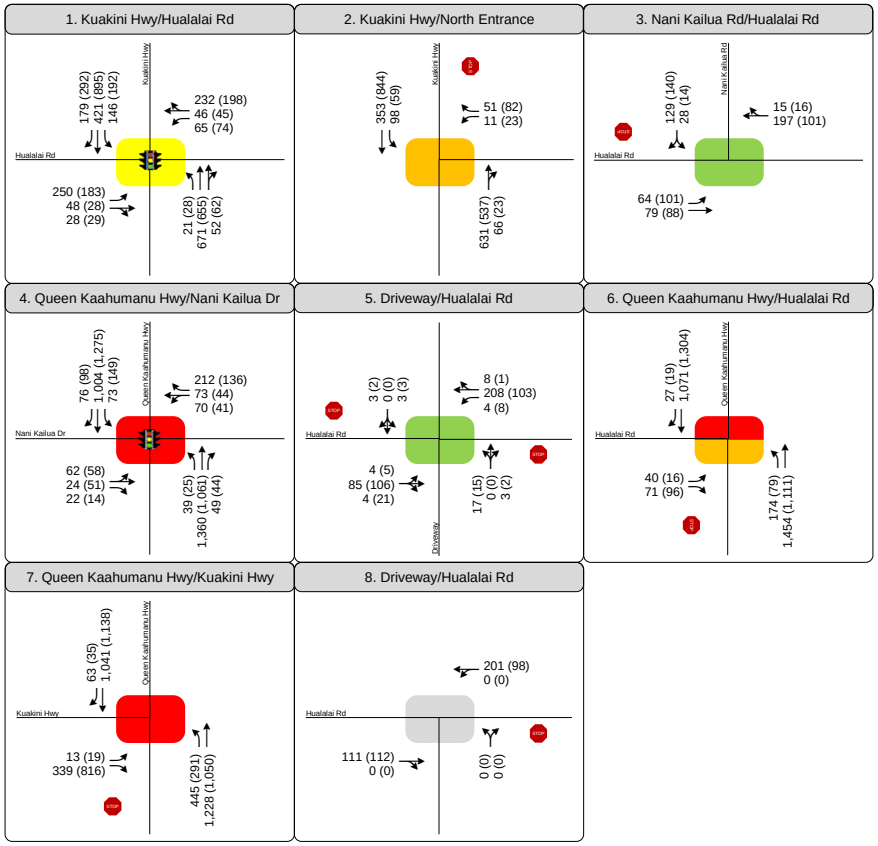
LEGEND

AM (PM) Peak Hour Traffic Volumes

Lane Configuration

AM / PM | A-C | D | E | F — Level of Service (LOS)

Figure 4-2
Peak Hour Traffic Volumes and Lane Configurations
Baseline Year 2040



LEGEND

AM (PM) Peak Hour Traffic Volumes

Lane Configuration

AM / PM | A-C | D | E | F — Level of Service (LOS)

Figure 4-3
Peak Hour Traffic Volumes and Lane Configurations
Baseline Year 2050

4.1.2 FUTURE TRANSPORTATION IMPROVEMENTS

The project team coordinated with HDOT and the Hawai'i County Department of Public Works (DPW) to identify any transportation improvements within the study area that could affect vehicular traffic operations. Hawai'i County DPW noted that Kuakini Highway is planned to be widened within the study area, but this improvement does not have secured funding at the time this report was prepared. No other planned and funded improvements were identified in the study area through 2050. Therefore, intersection lane configurations and traffic control devices are expected to remain the same in Phase 1, 2, and 3 No Project conditions as under Existing Conditions.

4.2 PHASE 1 (2030) NO PROJECT LEVELS OF SERVICE

Peak hour intersection capacity analysis was performed for the study intersections using the volumes generated by the methodology described in **Section 4.1**. **Table 4-1** summarizes the results of the intersection operations analysis for Phase 1 (2030). Detailed LOS worksheets are provided in **Appendix B**.

Table 4-1. Phase 1 (2030) No Project Peak Hour Intersection Level of Service

Intersection	Traffic Control	Peak Hour	Phase 1 Conditions	
			(sec/veh)[1,3]	LOS[2,3]
1. Kuakini Highway & Hualalai Road	Signalized	AM	37.7	D
		PM	31.5	C
2. Kuakini Highway & North Campus Entrance [4]	SSSC	AM	32.1	D
		PM	**38.7**	**E**
3. Hualalai Road & Nani Kailua Road	SSSC	AM	10.9	B
		PM	9.9	A
4. Queen Ka'ahumanu Highway & Nani Kailua Drive	Signalized	AM	**114.6**	**F**
		PM	**105.0**	**F**
5. Hualalai Road & Hualalai Village North Driveway	SSSC	AM	10.9	B
		PM	10.3	B
6. Queen Ka'ahumanu Highway & Hualalai Road	SSSC	AM	**49.4**	**E**
		PM	28.8	D
7. Queen Ka'ahumanu Highway & Kuakini Highway	SSSC	AM	**58.2**	**F**
		PM	**38.2**	**E**
8. Hualalai Road & Hualalai Village South Driveway	Hualalai Village South Driveway is currently closed. This access is assumed to be used as emergency access only under plus project conditions			

Source: Fehr & Peers, 2023

Notes:

[1] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized intersections. The vehicular delay for the worst movement is reported for the side-street stop-controlled (SSSC) intersection, and traffic along the main roadways typically moves more efficiently.
[2] LOS calculations were performed using the Highway Capacity Manual (HCM) method.
[3] Unacceptable seconds of delay per vehicle and LOS are highlighted in **bold**.
[4] Eastbound left-turn movement operates at LOS F during AM and PM peak hours.

As shown in **Table 4-1,** the following intersections operate at less-than-desirable LOS in 2030 without the Project:

- (2) Kuakini Highway and North Campus Entrance: LOS E during the PM peak hour
- (4) Queen Ka'ahumanu Highway & Nani Kailua Driveway: LOS F during the AM and PM peak hour
- (6) Queen Ka'ahumanu Highway and Hualalai Road: LOS E during AM peak hour
- (7) Queen Ka'ahumanu Highway and Kuakini Highway: LOS F during AM and LOS E during PM peak hour

Similar to the existing conditions, results are generally consistent with field observations. The intersections of Kuakini Highway/Hualalai Road and Nani Kailua/Queen Ka'ahumanu Highway could occasionally operate worse than average conditions, primarily because congestion along Kuakini Highway and Queen Ka'ahumanu Highway limits the number of vehicles that can pass through the intersection during the peak hour than would pass in free-flow conditions. Saturation flow rates were reduced by 20% in the Synchro model along Queen Ka'ahumanu Highway and Kuakini Highway to account for this variation in flow rates.

4.3 PHASE 2 (2040) NO PROJECT LEVELS OF SERVICE

Peak hour intersection capacity analysis was performed for the study intersections using the volumes generated by the methodology described in **Section 4.1**. **Table** 4-2 summarizes the results of the intersection operations analysis for Phase 2 (2040). Detailed LOS worksheets are provided in **Appendix B**.

Table 4-2. Phase 2 (2040) No Project Peak Hour Intersection Level of Service

Intersection	Traffic Control	Peak Hour	Phase 2 Conditions	
			(sec/veh)[1,3]	LOS[2,3]
1. Kuakini Highway & Hualalai Road	Signalized	AM	41.1	D
		PM	35.6	D
2. Kuakini Highway & North Campus Entrance	SSSC	AM	34.5	D
		PM	**42.9**	**E**
3. Hualalai Road & Nani Kailua Road	SSSC	AM	11.1	B
		PM	10.0	B
4. Queen Ka'ahumanu Highway & Nani Kailua Drive [4]	Signalized	AM	**136.2**	**F**
		PM	**129.3**	**F**
5. Hualalai Road & Hualalai Village North Driveway	SSSC	AM	11.0	B
		PM	10.4	B
6. Queen Ka'ahumanu Highway & Hualalai Road [4]	SSSC	AM	**58.4**	**F**
		PM	31.7	D
7. Queen Ka'ahumanu Highway & Kuakini Highway [4]	SSSC	AM	**70.8**	**F**
		PM	**43.5**	**E**
8. Hualalai Road & Hualalai Village South Driveway	Hualalai Village South Driveway is currently closed. This access is assumed to be used as emergency access only under plus project conditions			

Source: Fehr & Peers, 2023

Notes:

[1] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized intersections. The vehicular delay for the worst movement is reported for the side-street stop-controlled (SSSC) intersection, and traffic along the main roadways typically moves more efficiently.
[2] LOS calculations were performed using the Highway Capacity Manual (HCM) method.
[3] Unacceptable seconds of delay per vehicle and LOS are highlighted in **bold**.
[4] Eastbound left-turn movement operates at LOS F during AM and PM peak hours.

As shown in **Table 4-2** the following intersections operate at less-than-desirable LOS in 2040 without the project:

- (2) Kuakini Highway and North Campus Entrance: LOS E during the PM peak hour
- (4) Queen Ka'ahumanu Highway & Nani Kailua Driveway: LOS F during AM and PM peak hours
- (6) Queen Ka'ahumanu Highway and Hualalai Road: LOS F during AM peak hour
- (7) Queen Ka'ahumanu Highway and Kuakini Highway: LOS F during AM and LOS E during PM peak hour

Similar to the existing conditions, results are generally consistent with field observations. The intersections of Kuakini Highway/Hualalai Road and Nani Kailua/Queen Ka'ahumanu Highway could occasionally operate worse than average conditions, primarily because congestion along Kuakini Highway and Queen Ka'ahumanu Highway limits the number of vehicles that can pass through the intersection during the peak hour than would pass in free-flow conditions. Saturation flow rates were reduced by 20% in the Synchro model along Queen Ka'ahumanu Highway and Kuakini Highway to account for this variation in flow rates.

4.4 PHASE 3 (2050) NO PROJECT LEVELS OF SERVICE

Peak hour intersection capacity analysis was performed for the study intersections using the volumes generated by the methodology described in Section 4.1. Table 4-3 summarizes the results of the intersection operations analysis for Phase 3 (2050). Detailed LOS worksheets are provided in **Appendix B**.

Table 4-3. Phase 3 (2050) No Project Peak Hour Intersection Level of Service

Intersection	Traffic Control	Peak Hour	Phase 3 Conditions	
			(sec/veh)[1,3]	LOS[2,3]
1. Kuakini Highway & Hualalai Road	Signalized	AM	44.6	D
		PM	42.3	D
2. Kuakini Highway & North Campus Entrance[4]	SSSC	AM	**37.4**	**E**
		PM	**48.3**	**E**
3. Hualalai Road & Nani Kailua Road	SSSC	AM	11.3	B
		PM	10.1	B
4. Queen Ka'ahumanu Highway & Nani Kailua Drive	Signalized	AM	**160.4**	**E**
		PM	**156.7**	**F**
5. Hualalai Road & Hualalai Village North Driveway	SSSC	AM	11.2	B
		PM	10.6	B
6. Queen Ka'ahumanu Highway & Hualalai Road	SSSC	AM	**70.4**	**F**
		PM	**35.0**	**E**
7. Queen Ka'ahumanu Highway & Kuakini Highway	SSSC	AM	**92.9**	**F**
		PM	**50.8**	**F**
8. Hualalai Road & Hualalai Village South Driveway	Hualalai Village South Driveway is currently closed. This access is assumed to be used as emergency access only under plus project conditions			

Source: Fehr & Peers, 2023

Notes:

[1] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized intersections. The vehicular delay for the worst movement is reported for the side-street stop-controlled (SSSC) intersection, and traffic along the main roadways typically moves more efficiently.
[2] LOS calculations were performed using the Highway Capacity Manual (HCM) method.
[3] Unacceptable seconds of delay per vehicle and LOS are highlighted in **bold**.
[4] Eastbound left-turn movement operates at LOS F during AM and PM peak hours.

As shown in Table 4-3, the following intersections operate at less-than-desirable LOS in 2050 without the project:

- (2) Kuakini Highway and North Entrance: LOS E during AM and PM peak hours
- (4) Queen Ka'ahumanu Hwy & Nani Kailua Driveway: LOS E during AM peak hour and LOS F during the PM peak hour
- (6) Queen Ka'ahumanu Highway and Hualalai Road: LOS F during AM peak hour and LOS E during the PM peak hour
- (7) Queen Ka'ahumanu Highway and Kuakini Highway: LOS F during AM and PM peak hours

Similar to the existing conditions, results are generally consistent with field observations. The intersections of Kuakini Highway/Hualalai Road and Nani Kailua/Queen Ka'ahumanu Highway could occasionally operate worse than average conditions, primarily because congestion along Kuakini Highway and Queen Ka'ahumanu Highway limits the number of vehicles that can pass through the intersection during the peak hour than would pass in free-flow conditions. Saturation flow rates were reduced by 20% in the Synchro model along Queen Ka'ahumanu Highway and Kuakini Highway to account for this variation in flow rates.

5.0 PROJECT TRAFFIC ESTIMATES

This section describes the anticipated number of vehicle trips and the directionality of those trips that would result from the implementation of Phase 1 (Year 2030), Phase 2 (Year 2040), and Phase 3 (Year 2050) of the Campus Master Plan. Future traffic added to the roadway system by the project is estimated using a three-step process: (1) project trip generation, (2) trip distribution, and (3) trip assignment. The first step estimates the amount of project-generated traffic that would be added to the roadway network. The second step estimates the direction of travel to and from the project site. The third step assigns trips generated by the project to specific street segments and intersection turning movements. This process is described in more detail in the following sections.

5.1 PROJECT TRIP GENERATION ESTIMATES

Since the existing campus is self-contained, and existing access is limited to one location, it can be assumed that any growth in student and/or faculty/staff levels would directly result in an increase in trips to and from the university campus and that any trips entering or exiting the University of the Nations Driveway are those generated by the university itself. Table 5-1 lists the projected student, faculty, and staff numbers during each phase of the project.

Table 5-1. Projected University Population

	Existing	Phase 1	Phase 2	Phase 3
PK - 12 Children Total	**294**	**340**	**469**	**575**
PK - 12 Children commuting	148	110	155	175
PK - 12 Children in student housing	146	230	314	400
University Students Total	**480**	**718**	**955**	**1,200**
University students commuting	17	11	6	-
University students in student housing	463	706	949	1,200
Faculty/Staff Total	**602**	**667**	**716**	**800**
Staff commuting	322	282	225	200
Staff in faculty/staff housing	280	386	491	600
Mission Builders, Volunteers, Speakers, Seminar Guests, and Visitors	**25**	**116**	**207**	**300**
Commuting	5	3	2	-
Guest housing	20	112	205	300
Total commuting population (Not including PK-12 Children)	*344*	*296*	*232*	*200*
Total population in campus housing (Not including PK-12 Children)	*763*	*1,204*	*1,645*	*2,100*
Total Campus Population	*1,401*	*1,841*	*1,347*	*2,875*

Source: G70 International and the University of Nations Kona

To estimate Project trip generation, multimodal counts of vehicles, bicyclists, and pedestrians were collected at the existing University of the Nations Kona site driveway. The traffic counts obtained were instrumental in determining the trip rates for students, faculty, and staff residing on the site, as well as those commuting to the site.

General campus trips were divided into two main groups: *Dorming Population* and *Commuting Population*. Daily and peak hour trips associated with the Dorming Population were estimated using an average daily trip rate of 2.25 per person per day, and 0.13 trips per person per each peak hour. The peak hour trip rates were determined through a meticulous process that involved the review of comparable land uses from the Institute of Transportation Engineers (ITE) Trip Generation Manual (11th edition) in conjunction with the expertise of our engineering judgment and a thorough evaluation of the existing driveway counts at the university.

Trips associated with the commuting population were estimated by subtracting estimated trips for the dorm population from the driveway counts. Commuting trip numbers were then used to calculate approximate trips per commuting population for each peak hour. Estimated rates were then applied to future student enrollment and faculty/staff employment forecasts to estimate future Project trips. Total peak hour trips were then split into inbound and outbound trips. For this step, the ratio of inbound and outbound trips is assumed to be the same as under existing conditions.

Table 5-2 summarizes the forecasted trip generation for the proposed project under each Phase.

Table 5-2. Project Trip Generation

Land Use	Input		Average Trip Rate			Total Daily Trips	Peak Hour									
							AM					PM				
	Quantity	Unit	Daily	AM Peak	PM Peak		In %	Out %	In	Out	Total	In %	Out %	In	Out	Total
Existing																
Total housing population	763	Person	2.25	0.13	0.13	1,717	45%	60%	45	55	100	65%	35%	65	35	100
Total commuting population [1]	344	Person	1.41	0.37	0.25	484	94%	6%	119	7	126	20%	80%	17	70	87
Existing Driveway Counts	1,107	Person	-	-	-	2,201	73%	27%	**164**	**62**	226	44%	56%	**82**	**105**	187
Phase I																
Total housing population	1,204	Person	-	-	-	2,709	45%	55%	71	86	157	65%	35%	103	54	157
Total commuting population	296	Person	-	-	-	417	94%	6%	104	6	110	20%	80%	15	59	74
Subtotal	1,500	-	-	-	-	3,126	-	-	**175**	**92**	267	-	-	**118**	**113**	231
Phase I + II																
Total housing population	1,645	Person	-	-	-	3,701	45%	55%	98	118	216	65%	35%	141	75	216
Total commuting population	232	Person	-	-	-	327	94%	6%	81	4	85	20%	80%	12	47	59
Subtotal	1,877	-	-	-	-	4,028	-	-	**179**	**122**	301	-	-	**153**	**122**	275
Phase I + II + III																
Total housing population	2,100	Person	-	-	-	4,725	45%	55%	124	151	275	65%	35%	179	96	275
Total commuting population	200	Person	-	-	-	282	94%	6%	69	4	73	20%	80%	10	41	51
Subtotal	2,300	-	-	-	-	5,007	-	-	**193**	**155**	348	-	-	**189**	**137**	326

[1] To estimate trip numbers for the commuting population, estimated trips for the housing population were subtracted from the existing driveway counts. Trip rates were then calculated by using the commuting population and estimated total trips during each peak hour.

5.2 PROJECT TRIP DISTRIBUTION AND ASSIGNMENT

The geographic distribution of project trips is primarily dependent on the roadway circulation network and the location of residential, commercial, and other land uses that would either produce trips destined for campus (e.g. faculty/staff housing) or attract trips from campus (e.g. commercial shopping centers).

As noted in **Section 2.1**, a second access point is planned on the Mauka side of campus along Kuakini Hwy. Once this connection is completed, campus students, faculty/staff, and visitors will be able to access campus via this driveway. The proposed new access point is recommended to be constructed with the exclusive left-turn lane on the southbound approach and the south leg is striped to accommodate a refuge lane serving the westbound left-turn vehicles.

Project trip distribution was developed using existing travel patterns and anticipated growth areas and assumed no substantive changes to the surrounding roadway circulation network. **Figure 5-1** illustrates the project trip distribution pattern in the study area.

Using the estimated trip generation and trip distribution approach discussed above, the traffic forecast to be generated by the proposed project was assigned to individual turning movements at each of the study intersections. **Figure 5-2**, **Figure 5-3**, and **Figure 5-4** illustrate the assignment of new project-generated trips for each turning movement at the study intersections.

It should be noted that no project-generated trips were assigned to (#6) Queen Ka'ahumanu Highway & Hualalai Road, and (#5) Hualalai Road/Hualalai Village North Driveway. However, these intersections were evaluated to better understand the traffic conditions and circulation along Hualalai Road where the Master Plan proposes to utilize the Hualalai Village South Driveway as an emergency access.

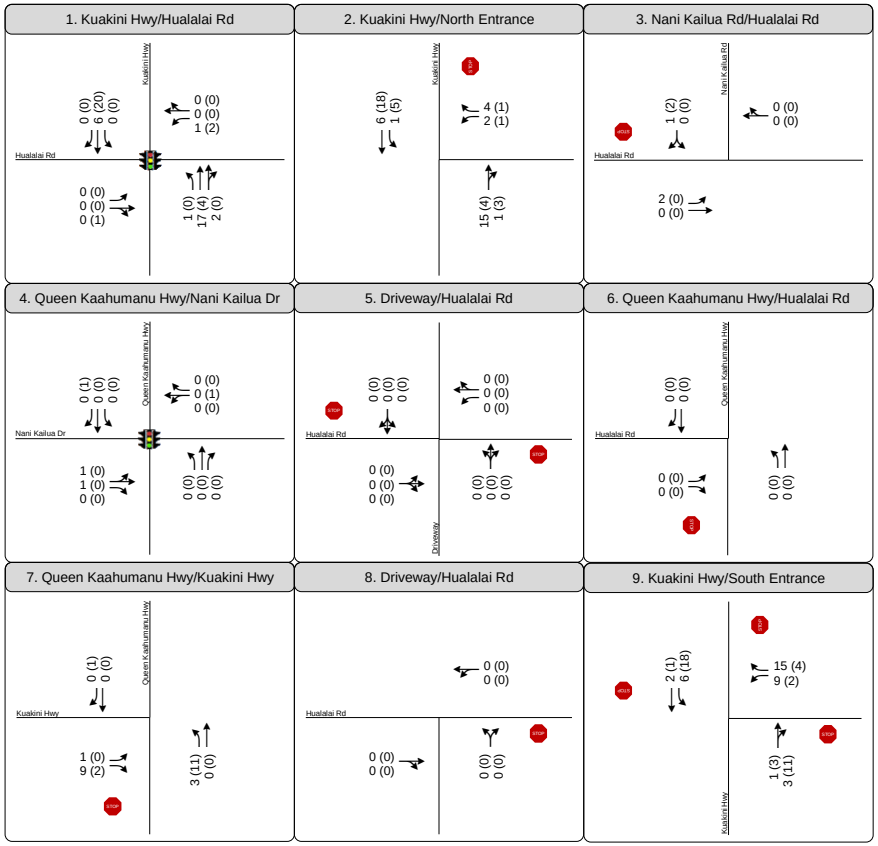
N:\Projects\2019_Projects\0323_University of the Nations Kona MAR\Graphics\GIS\Distribution.mxd

Legend

- Project Study Area
- X Study Intersections
- X Future Study Intersections

Figure 5-1

Project Trip Distribution

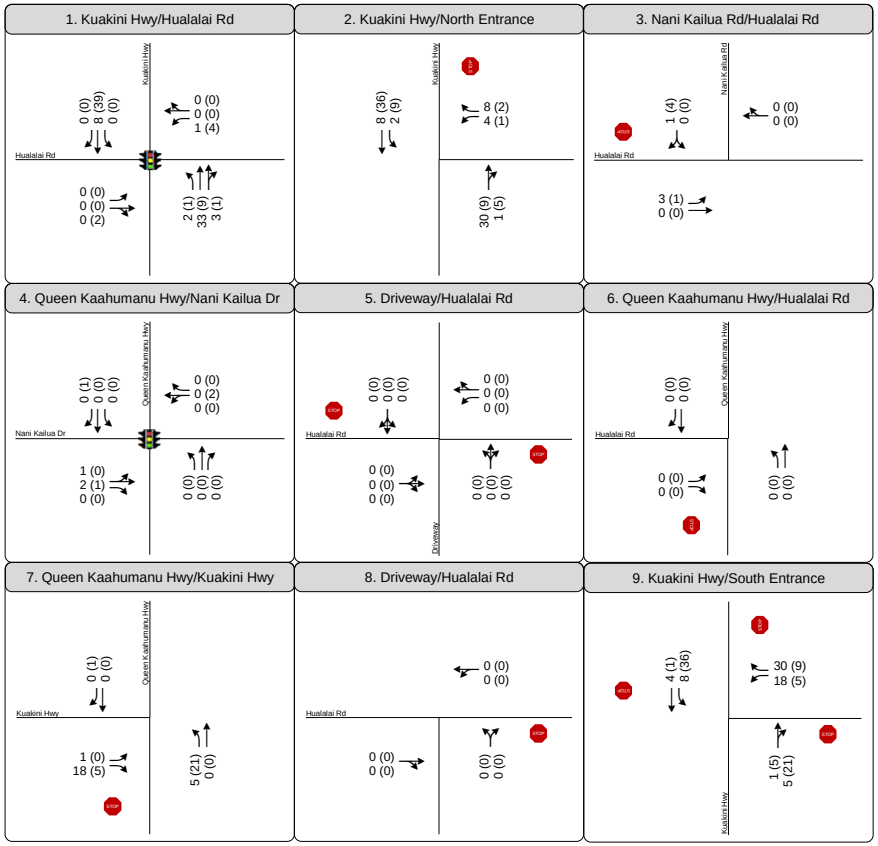


LEGEND

AM (PM) Peak Hour Traffic Volumes

Lane Configuration

Figure 5-2
Peak Hour Traffic Volumes and Lane Configurations
Project Phase 1

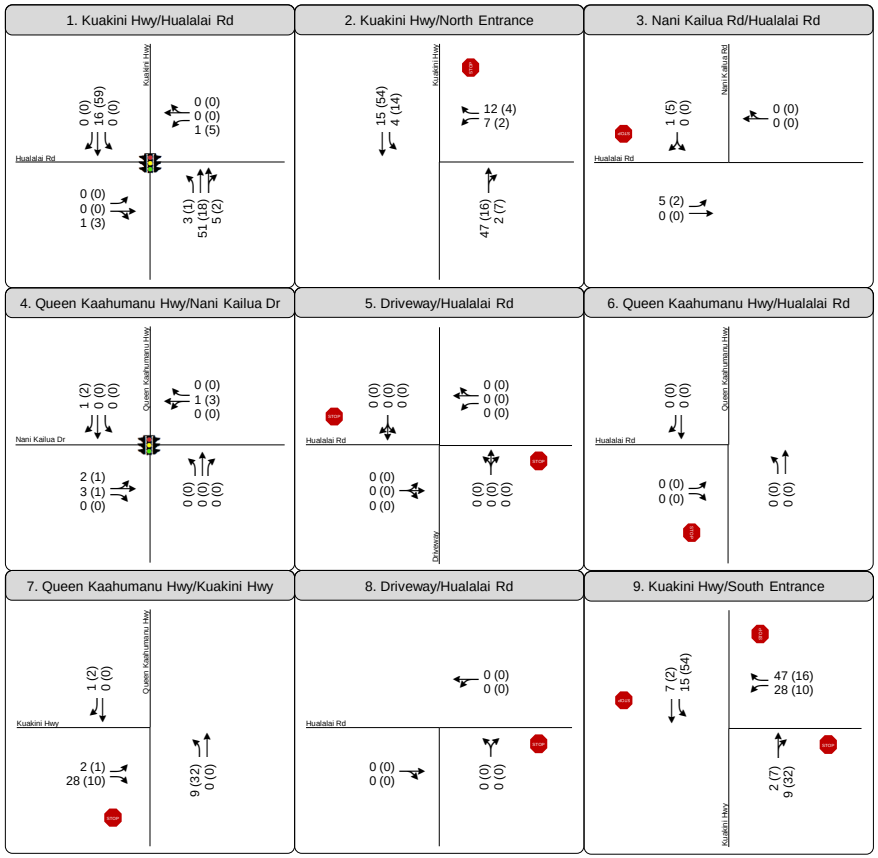


LEGEND

AM (PM) Peak Hour Traffic Volumes

Lane Configuration

Figure 5-3
Peak Hour Traffic Volumes and Lane Configurations
Project Phase 2



LEGEND

AM (PM) Peak Hour Traffic Volumes

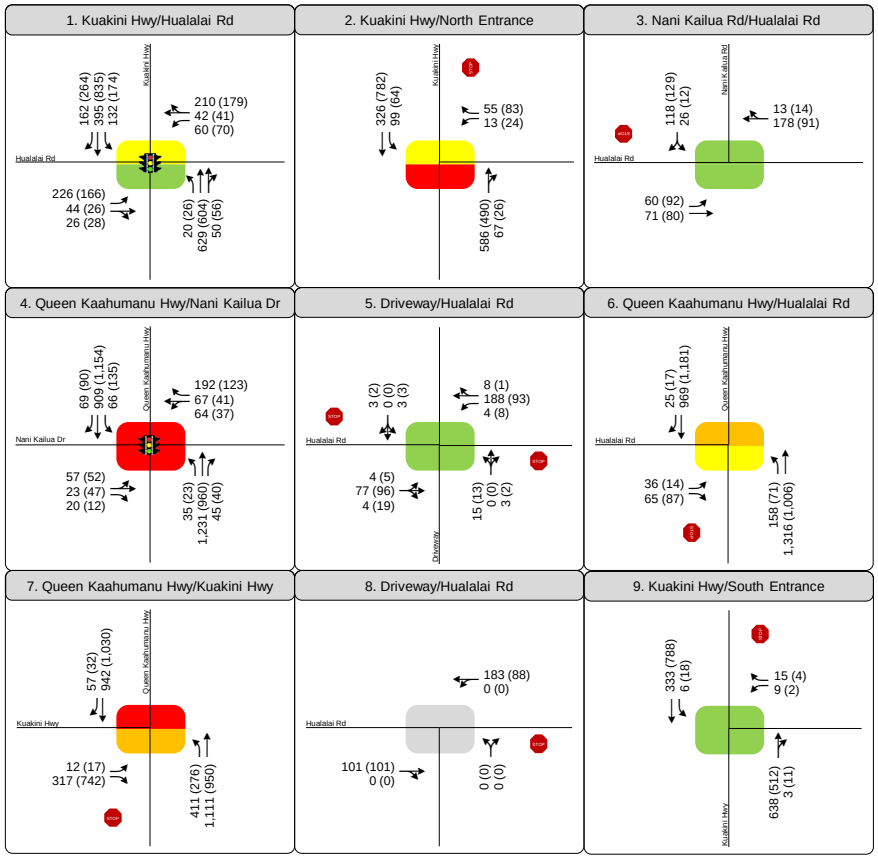
Lane Configuration

Figure 5-4
Peak Hour Traffic Volumes and Lane Configurations
Project Phase 3

6.0 PHASE 1, 2, AND 3 PLUS PROJECT CONDITIONS

This section describes the analysis of potential impacts on the roadway system due to projected future increases in traffic, including traffic generated by Phase 1 (2030), Phase 2 (2040), and Phase 3 (2050). The Plus Project roadway network is the same network assumed under the Existing Conditions scenario except for the addition of the proposed South Campus Entrance along the Kuakini Highway planned as a part of the Phase 1 development. The analysis compares the project delays and levels of service (LOS) at each study intersection with and without the addition of project-generated trips to identify potentially significant impacts to the transportation network resulting from Master Plan implementation.

To forecast the peak hour operating conditions at each study intersection, project trip volumes were added to No Project traffic volumes in each phase to derive Plus Project volumes. **Figure 6-1**, **Figure** 6-2, and **Figure** 6-3 illustrate respectively the forecasted Phase 1 (2030) Plus Project, Phase 2 (2040) Plus Project, and Phase 3 (2050) Plus Project AM and PM peak hour volumes. The peak hour volumes were used to analyze operations using the LOS methodology described in **Section 2.4**.



LEGEND

AM (PM) Peak Hour Traffic Volumes

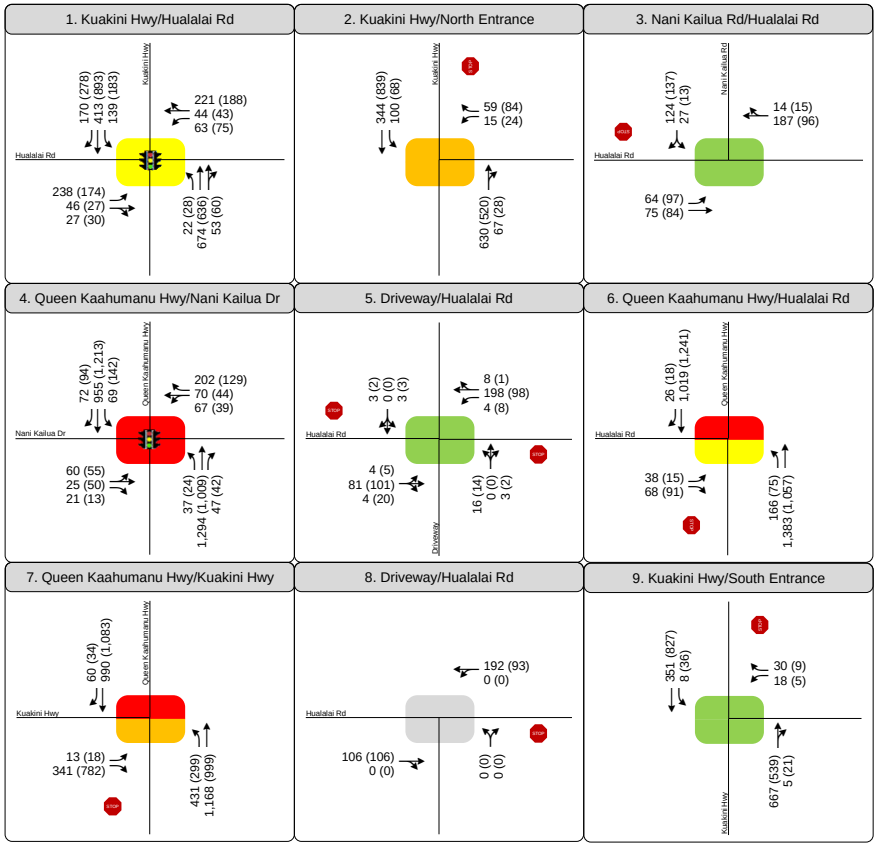
Lane Configuration

AM / PM | A-C | D | E | F — Level of Service (LOS)

Figure 6-1

Peak Hour Traffic Volumes and Lane Configurations

Year 2030 + Phase 1



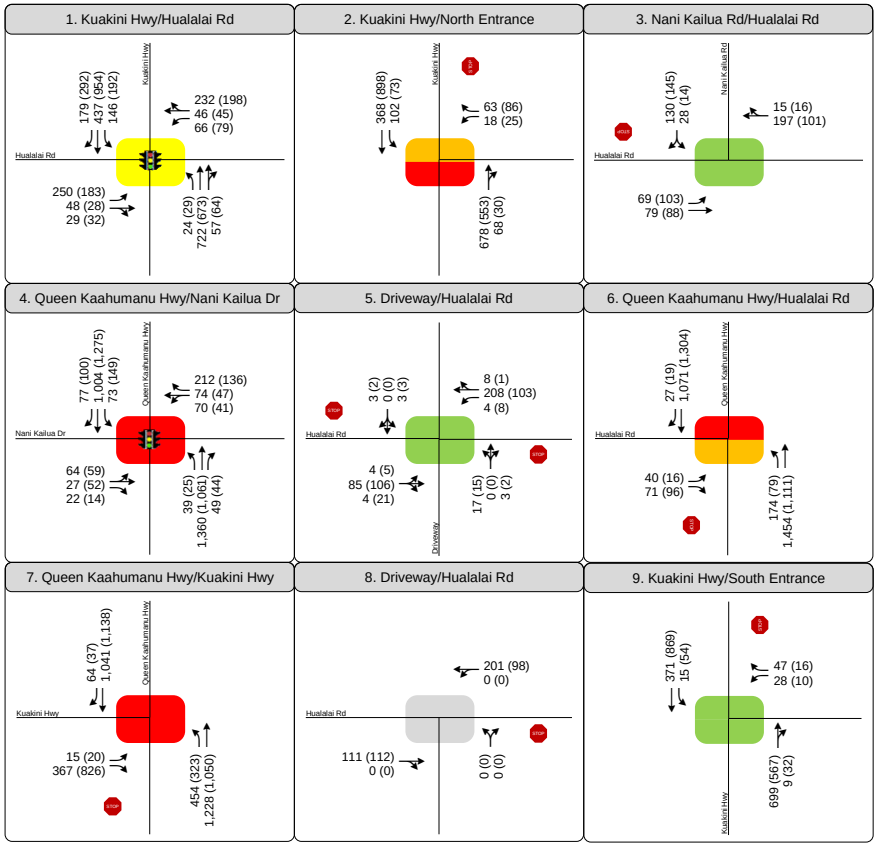
LEGEND

AM (PM) Peak Hour Traffic Volumes

Lane Configuration

AM / PM | A-C | D | E | F — Level of Service (LOS)

Figure 6-2
Peak Hour Traffic Volumes and Lane Configurations
Year 2040 + Phase 1 + Phase 2



LEGEND

AM (PM) Peak Hour Traffic Volumes

Lane Configuration

AM / PM | A-C | D | E | F — Level of Service (LOS)

Figure 6-3
Peak Hour Traffic Volumes and Lane Configurations
Year 2050 + Phase 1 + Phase 2 + Phase 3

6.1 PHASE 1 (2030) PLUS PROJECT INTERSECTION LEVEL OF SERVICE

The comparative LOS analysis results for the study intersections under Phase 1 (2030) Without and With Project conditions are presented in **Table 6-1**. Detailed LOS results for intersection movements and corresponding LOS calculation sheets are included in **Appendix B**.

Table 6-1. Phase 1 (2030) With and Without Project Peak Hour Intersection Level of Service

Intersection	Traffic Control	Peak Hour	Year 2030 No Project Conditions		Year 2030 + Project Conditions		Change in Delay[4]
			(sec/veh)[1,3]	LOS[2,3]	(sec/veh)[1,3]	LOS[2,3]	
1. Kuakini Highway & Hualalai Road [5]	Signalized	AM	37.7	D	39.5	D	1.8
		PM	31.5	C	32.4	C	0.9
2. Kuakini Highway & North Campus Entrance	SSSC	AM	32.1	D	33.9	D	1.8
		PM	**38.7**	**E**	**41.4**	**F**	2.7
3. Hualalai Road & Nani Kailua Road	SSSC	AM	10.9	B	10.9	B	0.0
		PM	9.9	A	9.9	A	0.0
4. Queen Ka'ahumanu Highway & Nani Kailua Drive	Signalized	AM	**114.6**	**F**	**114.6**	**F**	0.0
		PM	**105.0**	**F**	**105.3**	**F**	0.3
5. Hualalai Road & Hualalai Village North Driveway	SSSC	AM	10.9	B	10.9	B	0.0
		PM	10.3	B	10.3	B	0.0
6. Queen Ka'ahumanu Highway & Hualalai Road	SSSC	AM	**49.4**	**E**	**49.4**	**E**	0.0
		PM	28.8	D	28.8	D	0.0
7. Queen Ka'ahumanu Highway & Kuakini Highway	SSSC	AM	**58.2**	**F**	**59.9**	**F**	1.7
		PM	**38.2**	**E**	**39.5**	**E**	1.3
8. Hualalai Rd & Hualalai Village South Drwy	Hualalai Village South Driveway is currently closed. This access is assumed to be used as emergency access only under plus project conditions						
9. Kuakini Hwy and South Campus Entrance	SSSC	AM	-	-	13.6	C	-
		PM	-	-	16.0	C	-

Source: Fehr & Peers, 2023

[1] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized intersections. The vehicular delay for the worst movement is reported for the side-street stop-controlled (SSSC) intersection, and traffic along the main roadways typically moves more efficiently.

[2] LOS calculations were performed using the Highway Capacity Manual (HCM) method.

[3] Unacceptable seconds of delay per vehicle and LOS are highlighted in **bold**.

[4] Delay increases of more than five seconds or degradation from LOS A, B, C, or D to E/F are colored in **red**.

[5] Eastbound left-turn movement operates at LOS F during AM and PM peak hours.

The results presented in **Table 6-1** indicate that under Phase 1 (2030) Plus Project conditions, four of the study intersections are anticipated to operate at a less than desirable level (i.e., LOS E or F) during the AM and PM peak hours with the addition of project-generated traffic. These include:

- (2) Kuakini Highway & North Campus Entrance: LOS F during PM peak hour
- (4) Queen Ka'ahumanu Highway & Nani Kailua Drive: LOS F during AM and PM peak hours
- (6) Queen Ka'ahumanu Highway and Hualalai Road: LOS E during AM peak hour
- (7) Queen Ka'ahumanu Highway and Kuakini Highway: LOS F during AM peak hour and LOS E during PM peak hour

As noted in **Section 2.4.3**, one or more signal warrants must also be met at unsignalized intersections for a significant impact to occur. An overview of signal warrant analysis is included in **Section 6.4**.

Similar to the existing conditions, results are generally consistent with field observations. The intersections of Kuakini Highway/Hualalai Road and Nani Kailua/Queen Ka'ahumanu Highway could occasionally operate worse than average conditions, primarily because congestion along Kuakini Highway and Queen Ka'ahumanu Highway limits the number of vehicles that can pass through the intersection during the peak hour than would pass in free-flow conditions. Saturation flow rates were reduced by 20% in the Synchro model along Queen Ka'ahumanu Highway and Kuakini Highway to account for this variation in flow rates.

6.2 PHASE 2 (2040) PLUS PROJECT INTERSECTION LEVEL OF SERVICE

To forecast the peak hour operating conditions at each study intersection, project trip volumes were added to Phase 2 (2040) No Project traffic volumes to derive Phase 2 (2040) Plus Project volumes.

The comparative LOS analysis results for the study intersections under Phase 2 (2040) Without and With Project conditions are presented in **Table 6-2**. Detailed LOS results for intersection movements and corresponding LOS calculation sheets are included in **Appendix B**.

Table 6-2. Phase 2 (2040) With and Without Project Peak Hour Intersection Level of Service

Intersection	Traffic Control	Peak Hour	Year 2040 No Project Conditions		Year 2040 + Project Conditions		Change in Delay[4]
			(sec/veh)[1,3]	LOS[2,3]	(sec/veh)[1,3]	LOS[2,3]	
1. Kuakini Highway & Hualalai Road [5]	Signalized	AM	41.1	D	43.2	D	2.1
		PM	35.6	D	38.9	D	3.3
2. Kuakini Highway & North Campus Entrance	SSSC	AM	34.5	D	**38.5**	**E**	4.0
		PM	**42.9**	**E**	**48.9**	**E**	**6.0**
3. Hualalai Road & Nani Kailua Road	SSSC	AM	11.1	B	11.1	B	0.0
		PM	10.0	B	10.0	B	0.0
4. Queen Ka'ahumanu Highway & Nani Kailua Drive	Signalized	AM	**136.2**	**F**	**136.2**	**F**	0.0
		PM	**129.3**	**F**	**129.9**	**F**	0.6
5. Hualalai Road & Hualalai Village North Driveway	SSSC	AM	11.0	B	11.0	B	0.0
		PM	10.4	B	10.4	B	0.0
6. Queen Ka'ahumanu Highway & Hualalai Road	SSSC	AM	**58.4**	**F**	**58.4**	**F**	0.0
		PM	31.7	D	31.7	D	0.0
7. Queen Ka'ahumanu Highway & Kuakini Highway	SSSC	AM	**70.8**	**F**	**74.6**	**F**	3.8
		PM	**43.5**	**E**	**46.6**	**E**	3.1
8. Hualalai Rd & Hualalai Village South Drwy	Hualalai Village South Driveway is currently closed. This access is assumed to be used as emergency access only under plus project conditions						
9. Kuakini Hwy and South Campus Entrance	SSSC	AM	-	-	14.2	B	-
		PM	-	-	17.3	C	-

Source: Fehr & Peers, 2023

Notes:

[1] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized intersections. The vehicular delay for the worst movement is reported for the side-street stop-controlled (SSSC) intersection, and traffic along the main roadways typically moves more efficiently.

[2] LOS calculations were performed using the Highway Capacity Manual (HCM) method.

[3] Unacceptable seconds of delay per vehicle and LOS are highlighted in **bold**.

[4] Delay increases of more than five seconds or degradation from LOS A, B, C, or D to E/F are colored in **red**.

[5] Eastbound left-turn movement operates at LOS F during AM and PM peak hours.

The results presented in **Table 6-2** indicate that under Phase 2 (2040) Plus Project conditions, all study intersections are anticipated to continue to operate at LOS D or better during the AM and PM peak hours with the addition of project-generated traffic except for the following intersections:

- (2) Kuakini Highway and North Campus Entrance: LOS E during AM and PM peak hours
- (4) Queen Ka'ahumanu Hwy and Nani Kailua Driveway: LOS F during AM and PM peak hours
- (6) Queen Ka'ahumanu Highway and Hualalai Road: LOS F during AM peak hour

- (7) Queen Ka'ahumanu Highway and Kuakini Highway: LOS F during AM peak hour and LOS E during PM peak hour

As noted in **Section 2.4.3**, one or more signal warrants must also be met at unsignalized intersections for a direct impact to occur. An overview of signal warrant analysis is included in **Section 6.4**.

Similar to the existing conditions, results are generally consistent with field observations. The intersections of Kuakini Highway/Hualalai Road and Nani Kailua/Queen Ka'ahumanu Highway could occasionally operate worse than average conditions, primarily because congestion along Kuakini Highway and Queen Ka'ahumanu Highway limits the number of vehicles that can pass through the intersection during the peak hour than would pass in free-flow conditions. Saturation flow rates were reduced by 20% in the Synchro model along Queen Ka'ahumanu Highway and Kuakini Highway to account for this variation in flow rates.

6.3 PHASE 3 (2050) PLUS PROJECT INTERSECTION LEVEL OF SERVICE

To forecast the peak hour operating conditions at each study intersection, project trip volumes were added to Phase 3 (2050) No Project traffic volumes to derive Phase 3 (2050) Plus Project volumes.

The comparative LOS analysis results for the study intersections under Phase 3 (2050) Without and With Project conditions are presented in **Table 6-3**. Detailed LOS results for intersection movements and corresponding LOS calculation sheets are included in **Appendix B**.

Table 6-3. Phase 3 (2050) With and Without Project Peak Hour Intersection Level of Service

Intersection	Traffic Control	Peak Hour	Year 2050 No Project Conditions		Year 2050+ Project Conditions		Change in Delay[4]
			(sec/veh)[1,3]	LOS[2,3]	(sec/veh)[1,3]	LOS[2,3]	
1. Kuakini Highway & Hualalai Road [5]	Signalized	AM	44.6	D	46.9	D	2.3
		PM	42.3	D	50.0	D	7.7
2. Kuakini Highway & North Campus Entrance	SSSC	AM	**37.4**	**E**	**46.4**	**E**	**9.0**
		PM	**48.3**	**E**	**60.1**	**F**	**11.8**
3. Hualalai Road & Nani Kailua Road	SSSC	AM	11.3	B	11.4	B	0.1
		PM	10.1	B	10.2	B	0.1
4. Queen Ka'ahumanu Highway & Nani Kailua Drive	Signalized	AM	**160.4**	**E**	**160.4**	**F**	0.0
		PM	**156.7**	**F**	**158.4**	**F**	1.7
5. Hualalai Road & Hualalai Village North Driveway	SSSC	AM	11.2	B	11.2	B	0.0
		PM	10.6	B	10.6	B	0.0
6. Queen Ka'ahumanu Highway & Hualalai Road	SSSC	AM	**70.4**	**F**	**70.4**	**F**	0.0
		PM	**35.0**	**E**	**35.0**	**E**	0.0
7. Queen Ka'ahumanu Highway & Kuakini Highway	SSSC	AM	**92.9**	**F**	**102.0**	**F**	**9.1**
		PM	**50.8**	**F**	**58.2**	**F**	**7.4**
8. Hualalai Rd & Hualalai Village South Drwy	Hualalai Village South Driveway is currently closed. This access is assumed to be used as emergency access only under plus project conditions						
9. Kuakini Hwy and South Campus Entrance	SSSC	AM	-	-	15.2	C	-
		PM	**-**	**-**	19.1	C	-

Source: Fehr & Peers, 2021

Notes:

[1] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized intersections. The vehicular delay for the worst movement is reported for the side-street stop-controlled (SSSC) intersection, and traffic along the main roadways typically moves more efficiently.

[2] LOS calculations were performed using the Highway Capacity Manual (HCM) method.

[3] Unacceptable seconds of delay per vehicle and LOS are highlighted in **bold**.

[4] Delay increases of more than five seconds or degradation from LOS A, B, C, or D to E/F are colored in **red**.

[5] Eastbound left-turn movement operates at LOS F during AM and PM peak hours.

The results presented in **Table** 6-3 indicate that under Phase 3 (2050) Plus Project conditions, all study intersections are anticipated to continue to operate at LOS D or better during the AM and PM peak hours with the addition of project-generated traffic except for the following intersections:

- (2) Kuakini Highway and North Campus Entrance: LOS E during AM and F during PM peak hour
- (4) Queen Ka'ahumanu Hwy & Nani Kailua Driway: LOS F during AM and PM peak hours

- (6) Queen Ka'ahumanu Highway and Hualalai Road: LOS F during AM peak hour and LOS E during the PM peak hour
- (7) Queen Ka'ahumanu Highway and Kuakini Highway: LOS F during AM and PM peak hours

As noted in **Section 2.4.3**, one or more signal warrants must also be met at unsignalized intersections for a direct impact to occur. An overview of signal warrant analysis is included in **Section 6.4**.

Similar to the existing conditions, results are generally consistent with field observations. The intersections of Kuakini Highway/Hualalai Road and Nani Kailua/Queen Ka'ahumanu Highway could occasionally operate worse than average conditions, primarily because congestion along Kuakini Highway and Queen Ka'ahumanu Highway limits the number of vehicles that can pass through the intersection during the peak hour than would pass in free-flow conditions. Saturation flow rates were reduced by 20% in the Synchro model along Queen Ka'ahumanu Highway and Kuakini Highway to account for this variation in flow rates.

6.4 SIGNAL WARRANT ANALYSIS

As noted in **Section 2.4.4**, a significant impact is determined to occur at unsignalized intersections if operations change from LOS D or better to LOS E or F, and one or more signal warrants are met.

As noted in **Sections 6.1**, **6.2**, and **6.3** the intersections of Kuakini Highway and the North Campus Entrance Driveway (#2) and Queen Ka'ahumanu Highway and Kuakini Highway intersection (#7) operate at an unacceptable LOS (LOS E or F) during one or both peak hours under Plus Project conditions. To determine whether significant impacts would occur at any of these intersections, Eight-Hour Vehicular Volume and Peak-Hour Vehicular Volume signal warrants analyses were performed based on the methodology described in Chapter 4C of the Manual of Uniform Control Devices (MUTCD, 2009) published by the U.S. Department of Transportation Federal Highway Administration (FHWA). Table 6-4 summarizes the signal warrant analysis.

Table 6-4. Signal Warrant Review Summary

Intersection	Warrant	Scenario		
		YR 2030 + P	YR 2040 + P	YR 2050 + P
(2) Kuakini Hwy & North Campus Entrance	8-Hour Vehicular Volumes Warrant	Not Met	Not Met	Not Met
	Peak-Hour Vehicular Volumes	Not Met	Not Met	Not Met
(7) Queen Ka'ahumanu Hwy & Kuakini Hwy	8-Hour Vehicular Volumes Warrant	Not Met	Not Met	Not Met
	Peak-Hour Vehicular Volumes	Not Met	Not Met	Not Met

Intersections of Kuakini Highway / North Campus Entrance (#2) and Queen Ka'ahumanu Highway / Kuakini Highway (#7) intersections did not meet any of the signal warrants in any of the three Master Plan phases. Signal warrant worksheets are included in **Appendix C**.

6.5 POTENTIAL INTERSECTION IMPACTS

Based upon the impact significance criteria and the results of the operations analysis no direct impact was calculated at any of the study intersections.

6.6 SPECIAL EVENTS

As noted in **Section 2.1**, the University of the Nations Kona plans to host weekly community and athletic events throughout the year. Because these events generate low volumes compared to day-to-day operations and would occur mostly on weekends, it is not reasonable to conduct a detailed impact analysis for these conditions.

It is recommended that the University of the Nations Kona develop a transportation management plan (TMP) – which should include a transportation demand management (TDM) program – to reduce potential temporary impacts to study area intersections during special events. Potential TDM strategies include the use of event shuttles/buses, dynamic event parking pricing, remote parking, and incentives to encourage attendees to carpool to and/or from events. In addition to TDM, it is also expected that manual traffic control and focused enforcement will be needed to effectively manage special event traffic and minimize adjacent neighborhood intrusion.

7.0 TRAFFIC IMPROVEMENTS

7.1 IMPROVEMENTS AND RECOMMENDATIONS

Recommendations are provided at locations where a significant traffic impact was not identified, but improvements may become necessary in the future. The emphasis was to identify physical and/or operational improvements that could be implemented within the existing or planned roadway rights-of-way and determine if improvements would be ultimately feasible.

Intersection #2 Kuakini Highway and Campus North Entrance – is estimated to operate at LOS E during PM peak hour under 2030 Plus Project conditions. This intersection, however, does not meet signal warrant analysis. Recommended improvements to improve intersection operation include restriping the south leg to include a refuge lane for the westbound left turn traffic. **Table** 7-1 summarizes intersection operations before and after the proposed improvement. LOS calculation sheets are included in **Appendix D**.

Table 7-1 Intersection #2 Kuakini Highway and Main Driveway mitigation results

Peak Hour	Phase 1 (Year 2030)				Phase 2 (Year 2040)				Phase 3 (Year 2050)			
	No Mitigation		With Mitigation		No Mitigation		With Mitigation		No Mitigation		With Mitigation	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
AM	33.9	D	18.8	C	34.5	D	19.9	C	37.4	E	21.3	C
PM	41.4	E	21.1	C	42.9	E	22.7	C	48.3	E	24.7	C

Intersection #6 Queen Ka'ahumanu Highway and Hualalai Road – Based on projected traffic volumes, a traffic signal is not warranted under this scenario, but it may be needed to provide adequate gaps in traffic on the highway and to enhance safety. We recommend that intersection conditions be evaluated prior to occupancy of Phase 2 and Phase 3 to determine if a traffic signal is warranted.

Intersection #7 Queen Ka'ahumanu Highway and Kuakini Highway – Based on projected traffic volumes, a traffic signal is not warranted under this scenario, but it may be needed to provide adequate gaps in traffic on the highway and to enhance safety. We recommend that intersection conditions be evaluated prior to occupancy of Phase 2 to determine if a traffic signal is warranted.

Table 7-2 provides a summary of the proposed improvement at the end of the section.

Table 7-2. Summary of Proposed Improvements

Intersection	Phase 1 (Year 2030)	Phase 2 (Year 2040)	Phase 3 (Year 2050)
Intersection #2 Kuakini Highway and North Entrance	Install a refuge lane serving the westbound left-turn traffic out of the campus.	No additional improvements required	No additional improvements required
Intersection #6 Queen Ka'ahumanu Highway and Hualalai Road	No improvements required	Based on projected traffic volumes, a traffic signal is not warranted under this scenario, but it may be needed to provide adequate gaps in traffic on the highway and to enhance safety. Intersection conditions should be evaluated prior to occupancy of Phase 2 to determine if a traffic signal is warranted.	Based on projected traffic volumes, a traffic signal is not warranted under this scenario, but it may be needed to provide adequate gaps in traffic on the highway and to enhance safety. Intersection conditions should be evaluated prior to occupancy of Phase 3 to determine if a traffic signal is warranted.
Intersection #7 Queen Ka'ahumanu Highway and Kuakini Highway	No improvements required	Based on projected traffic volumes, a traffic signal is not warranted under this scenario, but it may be needed to provide adequate gaps in traffic on the highway and to enhance safety. Intersection conditions should be evaluated prior to occupancy of Phase 2 to determine if a traffic signal is warranted.	Based on projected traffic volumes, a traffic signal is not warranted under this scenario, but it may be needed to provide adequate gaps in traffic on the highway and to enhance safety. Intersection conditions should be evaluated prior to occupancy of Phase 3 to determine if a traffic signal is warranted.

8.0 VEHICLE ACCESS, CIRCULATION, AND PARKING

This chapter includes a review of the proposed site plan to evaluate site access and on-site circulation. The site plan was reviewed to determine if adequate vehicle circulation would be provided so that turning vehicles to and from site driveways would not substantially impact operations on adjacent roadways. Additional recommendations are also provided, where applicable. All recommended improvements shall be designed in conformance with policies and principles established and maintained by the County of Hawaii Public Works Department Traffic Division.

8.1 VEHICULAR SITE ACCESS

Direct access to the project site is provided by a driveway located on Kuakini Highway and is controlled by an access gate located approximately 125 feet east of Kuakini Highway. During peak travel periods or special events, campus-bound traffic could potentially queue up while waiting to pass through the access gate and spill back onto Kuakini Highway impeding through traffic. To reduce the potential for spillback, it is recommended that the access gate be relocated to a point further east.

Under Phase 1 (Year 2030) conditions, a second access point will be provided off of the Kuakini Highway via a new unsignalized intersection and driveway leading to the project site. The proposed new access point is recommended to be constructed with an exclusive left-turn lane on the southbound approach and the south leg to be striped to accommodate a refuge lane serving the westbound left-turn vehicles. Due to the relatively low volume of vehicles on this roadway and the limited land uses served by it, no vehicular site access or operational issues are expected as a result of the implementation of this access point. In general, providing multiple access points to the project site will distribute the traffic and minimize the potential for intermittent congestion issues during peak hours.

8.2 ON-SITE VEHICLE CIRCULATION

Under Phase 1, the proposed site plan includes the extension of multiple on-site internal campus roadways. First, there are three new north-south roadways proposed along the development area that connects new buildings and facilities to the center east-west on-campus roadway. In addition, a new east-west campus roadway is planned to be located along the southern edge of the developed campus. The roadway will be extended from the western edge of the campus to the existing roadway that is serving Hualalai Village Apartments. The proposed access at the Hualalai Village Apartments is planned to be operating as

emergency access only. To manage travel speeds along the proposed roadways, it is recommended that stop signs and other traffic calming devices be included at key points along these roadways.

8.3 PARKING

As shown on the project site plan, vehicle parking will be provided via on- and off-street parking throughout campus. Insufficient parking was not noted as an issue by the project development team at the time this report was prepared. As such, it is assumed that the existing parking inventory is sufficient to accommodate the parking demand generated by current levels of campus students, faculty, staff, and visitors. Therefore, it is recommended that the parking supply provided in each phase of the project maintain (or reduce if feasible) the current ratio of parking spaces to the number of campus students, faculty, staff, and visitors. Reduced parking supplies are a key incentive to minimizing the number of vehicle trips generated by land uses, but they must be supported by services and facilities to accommodate non-automobile travel such as, but not limited to, increased transit accessibility, bicycle lanes, and dedicated walking paths..

9.0 MULTIMODAL ASSESSMENT

This section summarizes potential project impacts from the Project to off- and on-site pedestrian, bicycle, and transit facilities and services, and identifies recommended improvements.

9.1 PEDESTRIAN AND BICYCLE ACCESS AND CIRCULATION

9.1.1 OFF-SITE PEDESTRIAN AND BICYCLE ACCESS

Pedestrian:

Pedestrians and cyclists can access the university from Kuakini Highway at the existing campus driveway. A pedestrian sidewalk runs along the east side of Kuakini Highway, beginning at the University of the Nations Kona Driveway and terminating approximately 150 feet north of the driveway. A pedestrian crosswalk exists approximately 600 feet north of the University of the Nations Driveway and provides connectivity across Kuakini Highway.

No pedestrian improvements are planned along roadways adjacent to the University of the Nations Kona campus. However, the gap in formal pedestrian facilities between the campus and the crosswalk on Kuakini Highway identified above will continue to exist.

Bicyclists:

Bicycle facilities do not exist along Kuakini Highway near the campus. The following bicycle improvements, identified as high-priority projects in Bike Plan Hawai'i, are proposed within the study area:

- Hualalai Road from Kuakini Highway to Old Mamaloha: Signed shared path
- Kuakini Highway from Lako Street to Hualalai Road: Bike lanes
- Queen Ka'ahumanu Highway from Henry Road to Kuakini Highway: Signed shared path

The proposed bike lane along Kuakini Highway will enhance bicycle connectivity to and from the University of the Nations Kona via the existing and future driveways.

Implementation of the Master Plan will not conflict with any existing pedestrian or bicycle facilities and will not preclude the implementation of any planned pedestrian or bicycle facilities within the study area. The proposed Master Plan is expected to generate some bicycle and pedestrian trips to and from the project site. Most of these trips would occur along Kuakini Highway by university students, faculty/staff, or visitors traveling between campus and nearby residential, commercial, and retail land uses. As project-generated

pedestrian and bicycle trips are projected to be low, no significant project impacts are anticipated. However, we recommend the enhancement of the pedestrian route on Kuakini Highway as it will directly serve campus students, faculty/staff, and visitors. See **Section 9.3** below for a description of the recommended enhancement.

9.1.2 ON-SITE PEDESTRIAN AND BICYCLE CIRCULATION

Direct connections between campus facilities and parking lots would be provided via unrestricted pedestrian and bicycle pathways throughout campus. Pedestrians and bicyclists would travel throughout campus via the shared-use path and crosswalks provided. Bicyclists may also share the on-campus roadway with vehicular traffic. The proposed unrestricted pedestrian and bicycle pathways are expected to provide adequate connectivity between buildings on campus.

9.2 TRANSIT ACCESS

As noted in **Section 3.2.2**, The Pahala-Kailua-Kona-South Kohala Resorts Route provides daily transit service along Queen Kaahumanu Highway. The nearest bus stop would require transit patrons from the project site to walk or bike at least 2,000 feet from campus to use the transit service. One potential improvement would be to provide a multi-use connection directly to Hualalai Road to reduce the overall distance transit riders would have to walk or bike to access the campus.

The project is anticipated to generate a relatively low number of transit riders through Project buildout. As site-generated transit ridership is anticipated to be low, no project impacts to transit facilities or services are anticipated, and no modifications to transit stop locations or services would be required.

9.3 RECOMMENDED IMPROVEMENTS

9.3.1 OFF-SITE PEDESTRIAN AND BICYCLE IMPROVEMENTS

Using Federal Highway Administration (FHWA) guidelines and the Fehr & Peers proprietary Crosswalk+ tool, the project team identified potential pedestrian improvements that can be considered at the intersection of Kuakini Highway and the existing University of the Nations Driveway. The following improvements are proposed at this location:

- A raised sidewalk or path separated from traffic by a raised asphalt berm should be installed between the existing sidewalk on the east side of Kuakini Highway from the existing sidewalk's

terminus near the site to the existing crosswalk located approximately 600 feet north of the University of the Nations Kona Driveway.
- Addition of a high-visibility crosswalk, adequate nighttime lighting levels, and crosswalk warning signs on the north and east legs of the Kuakini Highway/North Entrance and Kuakini Highway/South Entrance intersections.
- The existing striped triangle on the east leg of the intersection should be converted to an raised median to provide a pedestrian refuge area.
- A Pedestrian Hybrid Beacon (PHB) could also be installed on the north leg of the intersection, however, a warrant would need to be conducted to determine whether it would be necessary. If it is not warranted, a Rectangular Rapid-Flashing Beacon (RRFB) could be added.

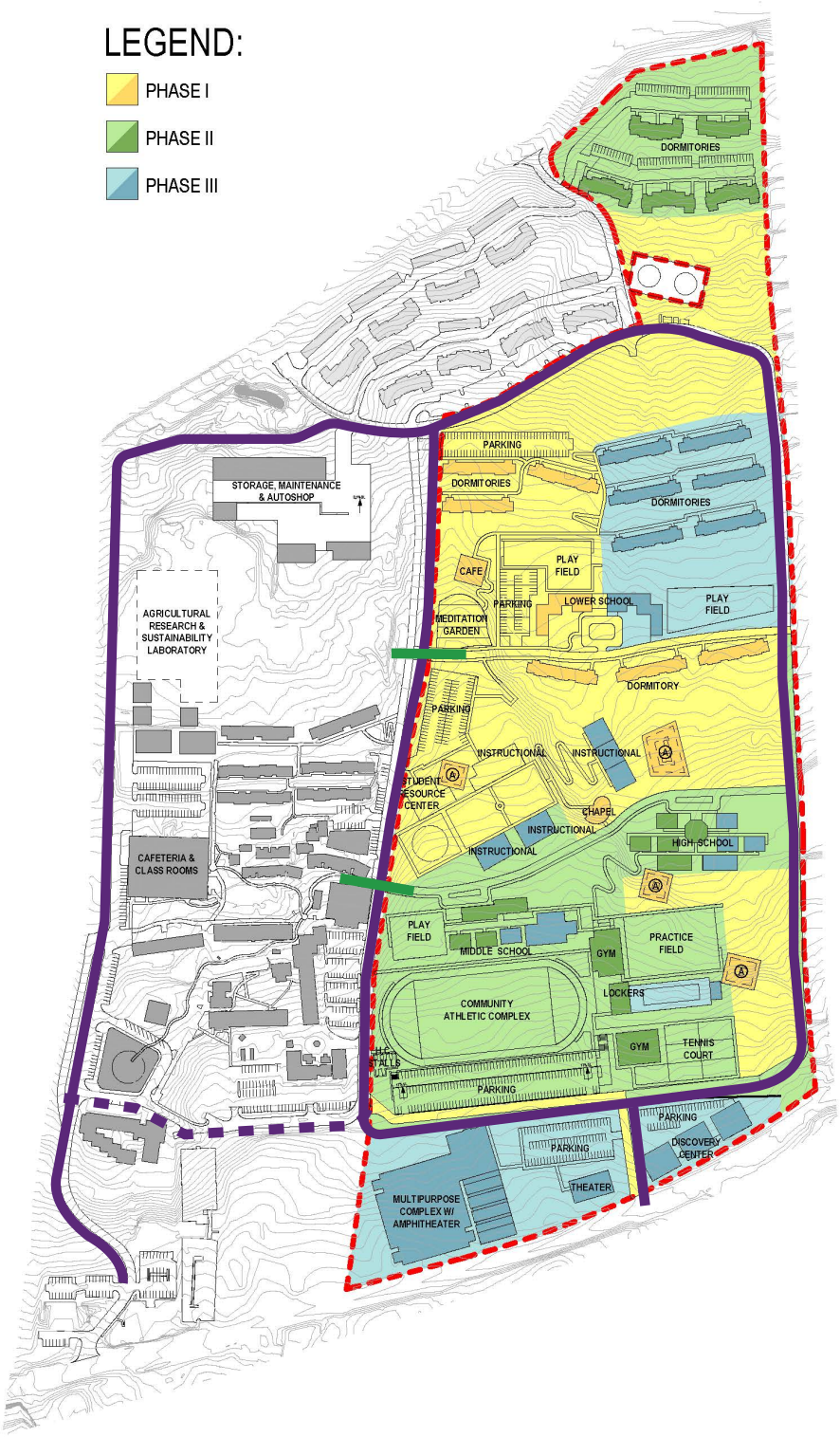
While the project-generated pedestrian and bicycle volumes are initially expected to be low, the addition of any active travelers along Kuakini Highway may result in people walking or biking along the roadway, which could result in a potential safety issue and a significant multimodal impact. To address this issue and encourage non-automobile travel and provide greater connectivity to nearby land uses, it is recommended that an elevated or raised sidewalk be installed on the east side of Kuakini Highway from the existing sidewalk's terminus (closest to the campus driveway) to the existing crosswalk approximately 600 feet north of the University of the Nations Driveway. Alternatively, an asphalt berm could be installed to physically separate vehicle traffic and pedestrians. This ADA-compliant path should be a minimum of five (5) feet wide plus a two-foot buffer between the roadway edge and the path.

9.3.2 ON-SITE PEDESTRIAN AND BICYCLE IMPROVEMENTS

As noted, the project site plan does not include any pedestrian or bicycle facilities along the on-site campus roadways. As such, the following recommendations are recommended:

- A shared-use path should be included on one side of both on-site campus roadways to further enhance pedestrian and bicycle connectivity and safety throughout the campus.
- An enhanced bicycle facility (e.g. bike lanes, shared use paths, or "sharrows") should be included along the Makai north-south campus roadway between the northern and central roadways.
- Pedestrian-level lighting is recommended along any shared-use path or pedestrian-only sidewalk or path.
- Raised crosswalks should be provided at several locations on the new spine road through the center of the site where higher levels of pedestrian activity are expected.

We also recommend the provision of secure bike parking – including bike racks near building entrance(s) – be provided to encourage the use of non-motorized travel. Specific locations for bike racks should be determined by the project team in consultation with the University of the Nations Kona planning and security staff. A summary of recommended on-site pedestrian and bicycle improvements is shown in **Figure 9-1**.



Legend

- Recommended Shared Use Paths
- Potential Bicycle Route Enhancement
- Potential Raised Crosswalk Locations

Figure 9-1

On-site Improvements

APPENDIX A: TRAFFIC COUNT DATA

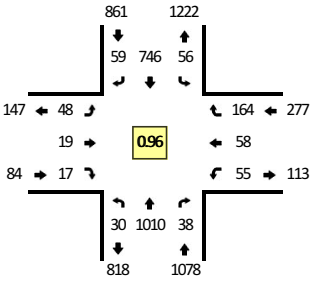
Type of peak hour being reported: Intersection Peak

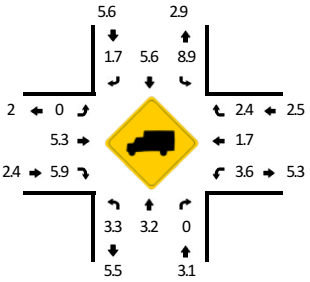
Method for determining peak hour: Total Entering Volume

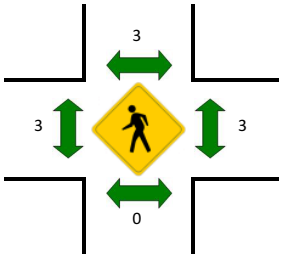
LOCATION: Queen Kaahumanu Hwy -- Nani Kailua Dr
CITY/STATE: Kailua, HI

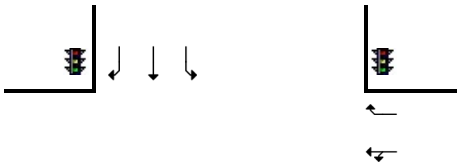
QC JOB #: 16145001
DATE: Wed, Apr 19 2023

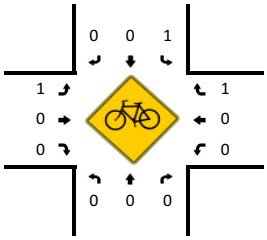
Peak-Hour: 7:20 AM -- 8:20 AM
Peak 15-Min: 7:25 AM -- 7:40 AM

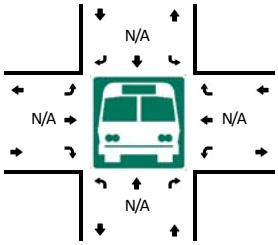


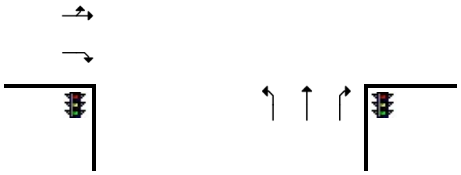


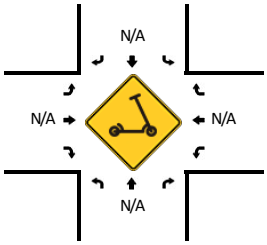












5-Min Count Period Beginning At	Queen Kaahumanu Hwy (Northbound)				Queen Kaahumanu Hwy (Southbound)				Nani Kailua Dr (Eastbound)				Nani Kailua Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	2	81	1	0	2	56	5	0	2	0	2	0	3	4	12	0	170	
7:05 AM	1	66	1	0	3	44	5	0	6	2	2	0	4	2	5	0	141	
7:10 AM	2	92	1	0	2	51	4	0	7	0	0	0	5	2	10	0	176	
7:15 AM	2	85	4	0	6	55	1	0	4	1	1	0	5	4	14	0	182	
7:20 AM	4	76	1	0	4	63	5	0	4	0	2	0	11	5	14	0	189	
7:25 AM	3	98	2	0	4	86	5	0	1	1	1	0	6	2	9	0	218	
7:30 AM	4	87	5	0	3	57	7	0	6	1	4	0	3	3	11	0	191	
7:35 AM	2	86	0	0	4	67	4	0	3	3	1	0	3	5	14	0	192	
7:40 AM	2	89	4	0	3	67	3	0	7	4	2	0	6	4	16	0	207	
7:45 AM	4	76	7	0	4	52	4	0	5	2	2	0	7	8	12	0	183	
7:50 AM	1	90	4	0	5	83	2	0	1	0	0	0	4	3	14	0	207	
7:55 AM	3	87	2	0	6	53	7	0	3	1	0	0	2	5	18	0	187	2243
8:00 AM	1	85	2	0	7	42	5	0	3	3	2	0	7	7	10	0	174	2247
8:05 AM	2	80	5	0	4	63	5	0	7	1	0	0	5	5	13	0	190	2296
8:10 AM	3	72	3	0	8	54	9	0	4	2	2	0	1	5	16	0	179	2299
8:15 AM	1	84	3	0	4	59	3	0	4	1	1	0	0	6	17	0	183	2300
8:20 AM	2	76	5	0	5	57	5	0	4	2	0	0	1	3	10	0	170	2281
8:25 AM	1	74	1	0	9	55	3	0	4	3	3	0	3	2	18	0	176	2239
8:30 AM	0	77	2	0	9	64	6	0	5	3	0	0	1	2	8	0	177	2225
8:35 AM	0	70	1	0	14	60	2	0	5	4	1	0	1	1	20	0	179	2212
8:40 AM	1	77	3	0	7	55	2	0	3	2	1	0	0	0	14	0	165	2170
8:45 AM	1	80	0	0	5	66	8	0	5	1	1	0	1	0	10	0	178	2165
8:50 AM	0	71	0	0	8	47	8	0	8	0	2	0	10	2	11	0	167	2125
8:55 AM	4	68	3	0	8	52	7	0	3	3	1	0	3	8	6	0	166	2104

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	36	1084	28	0	44	840	64	0	40	20	24	0	48	40	136	0	2404
Heavy Trucks	0	20	0		8	40	0		0	0	0		0	0	0		68
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	4		4
Scooters																	

Comments:

Report generated on 4/28/2023 3:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

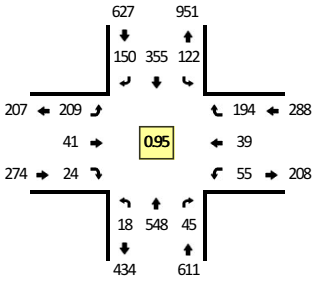
Type of peak hour being reported: Intersection Peak

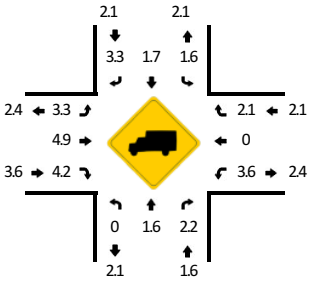
Method for determining peak hour: Total Entering Volume

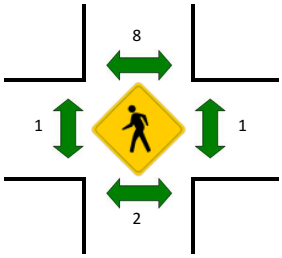
LOCATION: Kuakini Hwy -- Hualalai Rd
CITY/STATE: Kailua, HI

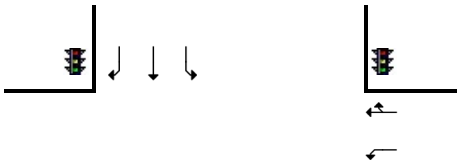
QC JOB #: 16145003
DATE: Wed, Apr 19 2023

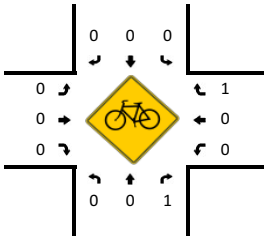
Peak-Hour: 7:35 AM -- 8:35 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

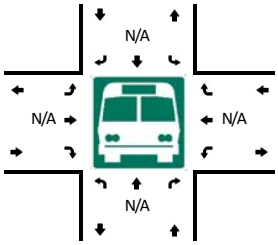


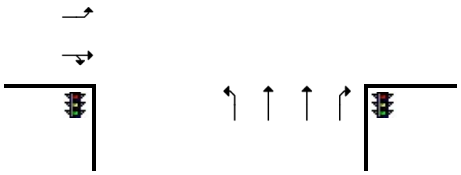


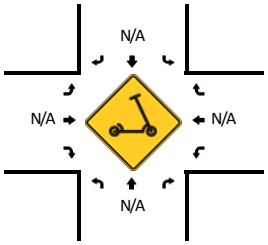












5-Min Count Period Beginning At	Kuakini Hwy (Northbound)				Kuakini Hwy (Southbound)				Hualalai Rd (Eastbound)				Hualalai Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	4	36	3	0	3	10	9	0	9	1	1	0	1	0	10	0	87	
7:05 AM	0	34	0	0	6	15	13	0	16	1	0	0	2	2	13	0	102	
7:10 AM	1	53	2	0	4	18	11	0	10	3	1	0	0	0	8	0	111	
7:15 AM	0	31	0	0	3	20	10	0	19	8	1	0	4	0	6	0	102	
7:20 AM	4	37	0	0	11	33	10	0	9	2	1	0	5	1	9	0	122	
7:25 AM	2	45	3	0	4	18	5	0	11	0	1	0	9	1	6	0	105	
7:30 AM	2	38	6	0	11	32	12	0	13	3	1	0	5	3	11	0	137	
7:35 AM	1	49	3	0	10	27	10	0	12	3	1	0	3	1	12	0	132	
7:40 AM	0	46	3	0	11	32	12	0	22	4	4	0	6	3	19	0	162	
7:45 AM	3	60	3	0	7	35	13	0	10	4	4	0	6	0	19	0	164	
7:50 AM	3	54	4	0	9	30	9	0	13	1	4	0	7	1	12	0	147	
7:55 AM	0	31	4	0	11	30	14	0	25	4	1	0	5	9	24	0	158	1529
8:00 AM	0	53	6	0	15	36	6	0	18	3	1	0	5	2	13	0	158	1600
8:05 AM	1	35	4	0	7	20	10	0	20	3	3	0	7	5	11	0	126	1624
8:10 AM	2	43	2	0	9	29	12	0	17	4	2	0	3	2	18	0	143	1656
8:15 AM	1	53	4	0	7	39	19	0	12	3	1	0	5	2	12	0	158	1712
8:20 AM	0	34	3	0	10	26	17	0	20	4	0	0	4	7	17	0	142	1732
8:25 AM	1	55	6	0	13	31	11	0	18	6	1	0	2	4	13	0	161	1788
8:30 AM	6	35	3	0	13	20	17	0	22	2	2	0	2	3	24	0	149	1800
8:35 AM	0	35	3	0	14	25	11	0	13	3	0	0	2	0	19	0	125	1793
8:40 AM	0	52	7	0	6	26	16	0	7	1	1	0	2	3	14	0	135	1766
8:45 AM	2	39	4	0	17	23	13	0	18	3	2	0	5	2	15	0	143	1745
8:50 AM	2	46	4	0	8	31	28	0	12	5	1	0	1	1	14	0	153	1751
8:55 AM	3	41	5	0	11	20	20	0	17	0	5	0	9	5	12	0	148	1741

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	24	640	40	0	108	388	136	0	180	36	48	0	76	16	200	0	1892
Heavy Trucks	0	4	0		4	0	4		12	0	4		0	0	0		28
Buses																	
Pedestrians		0				4				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 4/28/2023 3:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Queen Kaahumanu Hwy -- Hualalai Rd

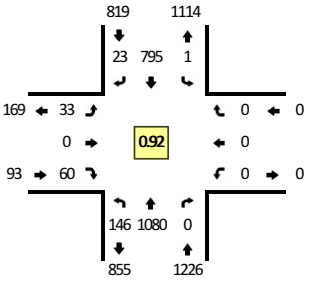
CITY/STATE: Kailua, HI

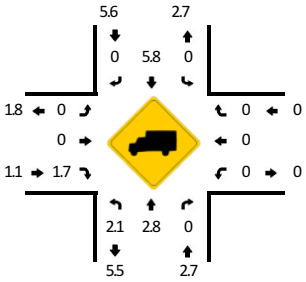
QC JOB #: 16145005

DATE: Wed, Apr 19 2023

Peak-Hour: 7:10 AM -- 8:10 AM

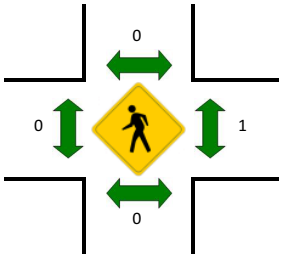
Peak 15-Min: 7:40 AM -- 7:55 AM

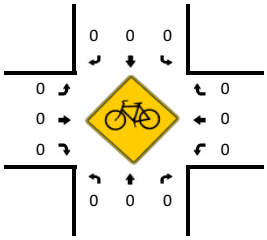


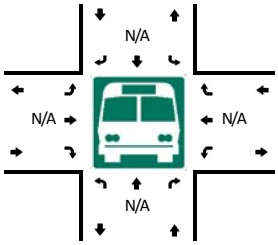


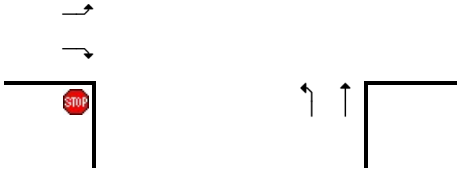
Quality Counts

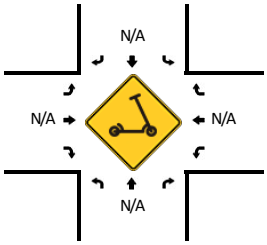
DATA THAT DRIVES COMMUNITIES











5-Min Count Period Beginning At	Queen Kaahumanu Hwy (Northbound)				Queen Kaahumanu Hwy (Southbound)				Hualalai Rd (Eastbound)				Hualalai Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	6	66	0	0	0	60	0	0	0	0	1	0	0	0	0	0	133	
7:05 AM	5	76	0	0	0	46	3	0	2	0	5	0	0	0	0	0	137	
7:10 AM	2	102	0	0	0	59	0	0	1	0	5	0	0	0	0	0	169	
7:15 AM	7	97	0	0	0	52	4	0	0	0	0	0	0	0	0	0	160	
7:20 AM	13	81	0	0	0	78	1	1	2	0	5	0	0	0	0	0	181	
7:25 AM	8	104	0	0	0	86	2	0	6	0	4	0	0	0	0	0	210	
7:30 AM	10	86	0	0	0	67	2	0	5	0	2	0	0	0	0	0	172	
7:35 AM	10	92	0	0	0	57	4	0	7	0	7	0	0	0	0	0	177	
7:40 AM	20	90	0	0	0	76	3	0	8	0	6	0	0	0	0	0	203	
7:45 AM	14	81	0	0	0	69	0	0	1	0	5	0	0	0	0	0	170	
7:50 AM	21	88	0	0	0	83	4	0	2	0	10	0	0	0	0	0	208	
7:55 AM	21	82	0	0	0	55	0	0	0	0	5	0	0	0	0	0	163	2083
8:00 AM	9	76	0	0	0	52	2	0	1	0	5	0	0	0	0	0	145	2095
8:05 AM	11	101	0	0	0	61	1	0	0	0	6	0	0	0	0	0	180	2138
8:10 AM	10	80	0	0	0	60	2	0	0	0	6	0	0	0	0	0	158	2127
8:15 AM	16	79	0	0	0	58	2	0	0	0	3	0	0	0	0	0	158	2125
8:20 AM	10	85	0	0	0	54	1	0	1	0	3	0	0	0	0	0	154	2098
8:25 AM	18	81	0	0	0	64	0	0	0	0	3	0	0	0	0	0	166	2054
8:30 AM	16	75	0	0	0	57	1	0	0	0	7	0	0	0	0	0	156	2038
8:35 AM	10	81	0	0	0	54	1	0	0	0	6	0	0	0	0	0	152	2013
8:40 AM	7	68	0	0	0	63	0	0	0	0	5	0	0	0	0	0	143	1953
8:45 AM	7	69	0	0	0	62	2	0	0	0	3	0	0	0	0	0	143	1926
8:50 AM	6	81	0	0	0	61	2	0	1	0	6	0	0	0	0	0	157	1875
8:55 AM	12	77	0	0	0	56	0	0	0	0	1	0	0	0	0	0	146	1858

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	220	1036	0	0	0	912	28	0	44	0	84	0	0	0	0	0	2324
Heavy Trucks	0	20	0		0	44	0		0	0	0		0	0	0		64
Buses																	
Pedestrians		0				0				0				4			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 4/28/2023 3:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

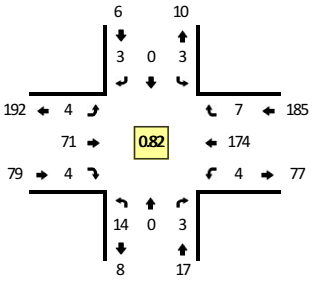
Type of peak hour being reported: Intersection Peak

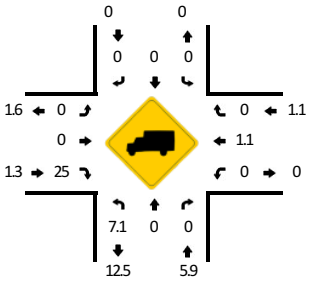
Method for determining peak hour: Total Entering Volume

LOCATION: Hualalai Village North Driveway -- Hualalai Rd
CITY/STATE: Kailua, HI

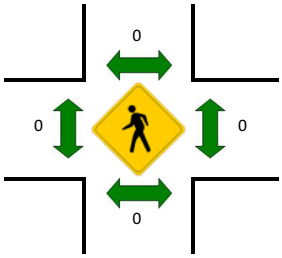
QC JOB #: 16145007
DATE: Wed, Apr 19 2023

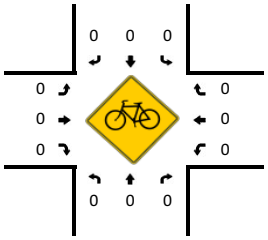
Peak-Hour: 7:35 AM -- 8:35 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

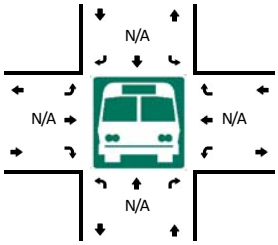


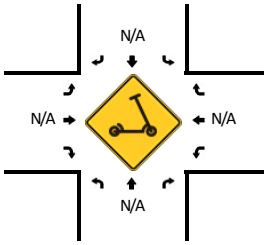


Quality Counts
DATA THAT DRIVES COMMUNITIES









5-Min Count Period Beginning At	Hualalai Village North Driveway (Northbound)				Hualalai Village North Driveway (Southbound)				Hualalai Rd (Eastbound)				Hualalai Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	1	0	0	0	0	0	0	0	0	1	1	0	1	4	0	0	8	
7:05 AM	2	0	0	0	1	0	0	0	0	5	1	0	1	5	0	0	15	
7:10 AM	1	0	2	0	0	0	0	0	0	4	1	0	0	3	0	0	11	
7:15 AM	3	0	0	0	0	0	0	0	0	1	0	0	1	6	0	0	11	
7:20 AM	5	0	0	0	0	0	0	0	0	8	0	0	0	11	0	0	24	
7:25 AM	1	0	0	0	0	0	1	0	0	9	0	0	0	4	0	0	15	
7:30 AM	1	0	0	0	0	0	0	0	1	7	0	0	0	10	0	0	19	
7:35 AM	1	0	0	0	0	0	0	0	1	13	0	0	0	9	0	0	24	
7:40 AM	1	0	1	0	0	0	0	0	0	5	0	0	0	21	0	0	28	
7:45 AM	2	0	1	0	0	0	0	0	0	6	0	0	1	11	1	0	22	
7:50 AM	2	0	0	0	0	0	0	0	0	10	1	0	0	18	1	0	32	
7:55 AM	1	0	0	0	0	0	1	0	0	5	0	1	0	24	1	0	33	242
8:00 AM	1	0	1	0	0	0	0	0	0	6	0	0	0	8	2	0	18	252
8:05 AM	0	0	0	0	0	0	0	0	0	5	0	0	0	11	1	0	17	254
8:10 AM	0	0	0	0	1	0	0	0	0	6	2	0	1	11	0	0	21	264
8:15 AM	3	0	0	0	0	0	0	0	0	3	1	0	1	16	1	0	25	278
8:20 AM	0	0	0	0	1	0	0	0	0	2	0	0	0	10	0	0	13	267
8:25 AM	2	0	0	0	1	0	0	0	0	3	0	0	0	15	0	0	21	273
8:30 AM	1	0	0	0	0	0	2	0	2	7	0	0	1	20	0	0	33	287
8:35 AM	3	0	0	0	0	0	0	0	0	5	0	0	0	9	1	0	18	281
8:40 AM	3	0	0	0	1	0	0	0	0	6	0	0	0	6	0	0	16	269
8:45 AM	3	0	0	0	0	0	1	0	0	1	2	0	2	7	1	0	17	264
8:50 AM	1	0	1	0	0	0	1	0	0	6	1	0	0	5	0	0	15	247
8:55 AM	2	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	13	227

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	20	0	4	0	0	0	4	0	0	84	4	4	4	212	12	0	348
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 4/28/2023 3:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

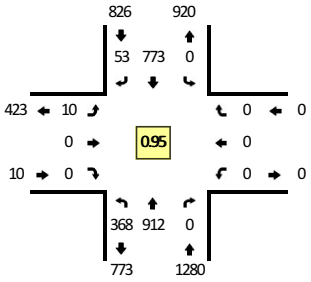
Type of peak hour being reported: Intersection Peak

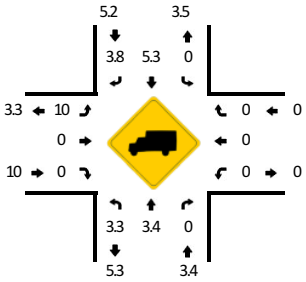
Method for determining peak hour: Total Entering Volume

LOCATION: Queen Kaahumanu Hwy -- Kuakini Hwy
CITY/STATE: Kailua, HI

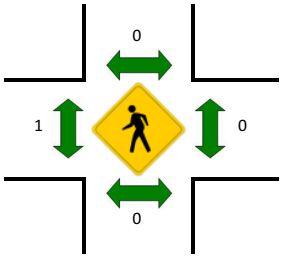
QC JOB #: 16145009
DATE: Wed, Apr 19 2023

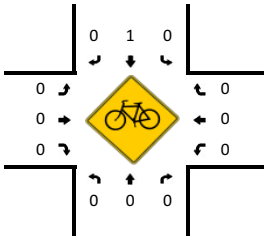
Peak-Hour: 7:10 AM -- 8:10 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

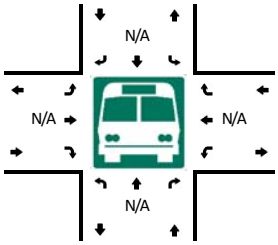


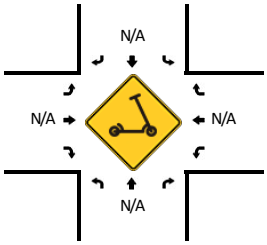


Quality Counts
DATA THAT DRIVES COMMUNITIES









5-Min Count Period Beginning At	Queen Kaahumanu Hwy (Northbound)				Queen Kaahumanu Hwy (Southbound)				Kuakini Hwy (Eastbound)				Kuakini Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	18	68	0	0	0	57	1	0	1	0	0	0	0	0	0	0	145	
7:05 AM	27	83	0	0	0	42	2	0	1	0	0	0	0	0	0	0	155	
7:10 AM	19	89	0	0	0	56	1	0	1	0	0	0	0	0	0	0	166	
7:15 AM	23	72	0	0	0	64	4	0	0	0	0	0	0	0	0	0	163	
7:20 AM	23	80	0	0	0	73	1	0	2	0	0	0	0	0	0	0	179	
7:25 AM	19	77	0	0	0	66	7	0	1	0	0	0	0	0	0	0	170	
7:30 AM	24	83	0	0	0	68	4	0	2	0	0	0	0	0	0	0	181	
7:35 AM	30	83	0	0	0	61	5	0	0	0	0	0	0	0	0	0	179	
7:40 AM	34	67	0	0	0	72	4	0	0	0	0	0	0	0	0	0	177	
7:45 AM	52	66	0	0	0	59	6	0	1	0	0	0	0	0	0	0	184	
7:50 AM	43	62	0	0	0	73	9	0	0	0	0	1	0	0	0	0	188	
7:55 AM	38	72	0	0	0	69	6	0	0	0	0	0	0	0	0	0	185	2072
8:00 AM	28	82	0	0	0	54	3	0	1	0	0	0	0	0	0	0	168	2095
8:05 AM	35	79	0	0	0	58	3	0	0	0	0	1	0	0	0	0	176	2116
8:10 AM	30	58	0	0	0	56	3	0	0	0	1	0	0	0	0	0	148	2098
8:15 AM	28	74	0	0	0	53	4	0	1	0	0	0	0	0	0	0	160	2095
8:20 AM	23	78	0	0	0	47	3	0	0	0	0	0	0	0	0	0	151	2067
8:25 AM	15	80	0	0	0	50	5	0	1	0	0	0	0	0	0	0	151	2048
8:30 AM	10	81	0	0	0	60	4	0	0	0	0	0	0	0	0	0	155	2022
8:35 AM	14	75	0	0	0	54	3	0	0	0	0	0	0	0	0	0	146	1989
8:40 AM	33	69	0	0	0	49	5	0	0	0	0	0	0	0	0	0	156	1968
8:45 AM	29	61	0	0	0	49	7	0	2	0	1	1	0	0	0	0	150	1934
8:50 AM	34	67	0	0	0	64	6	0	0	0	0	0	0	0	0	0	171	1917
8:55 AM	21	77	0	0	0	47	2	0	1	0	0	0	0	0	0	0	148	1880

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	532	800	0	0	0	804	84	0	4	0	0	4	0	0	0	0	2228
Heavy Trucks	8	40	0		0	36	0		0	0	0		0	0	0		84
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

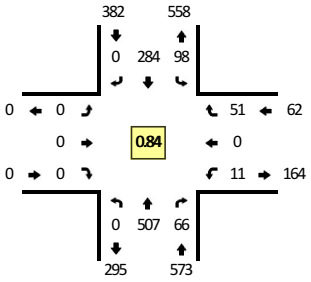
Report generated on 4/28/2023 3:00 PM

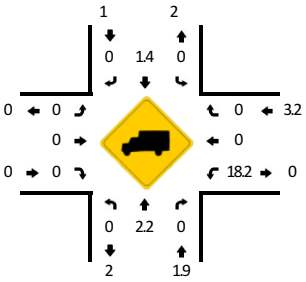
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

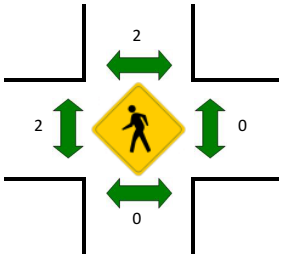
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

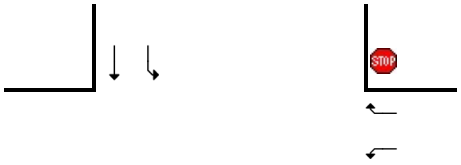
LOCATION: Kuakini Hwy -- YWAM Driveway | **QC JOB #:** 16145011
CITY/STATE: Kailua, HI | **DATE:** Wed, Apr 19 2023

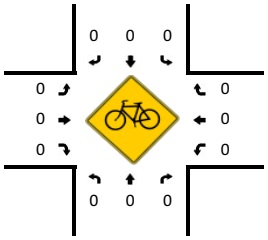
Peak-Hour: 7:25 AM -- 8:25 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

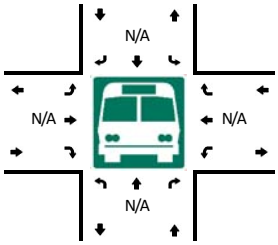


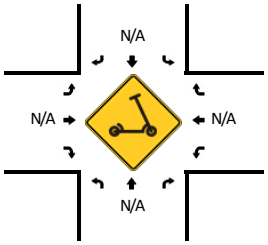












5-Min Count Period Beginning At	Kuakini Hwy (Northbound)				Kuakini Hwy (Southbound)				YWAM Driveway (Eastbound)				YWAM Driveway (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	48	3	0	2	12	0	0	0	0	0	0	1	0	1	0	67	
7:05 AM	0	42	2	0	3	13	0	0	0	0	0	0	1	0	0	0	61	
7:10 AM	0	42	0	0	2	8	0	0	0	0	0	0	0	0	0	0	52	
7:15 AM	0	31	2	0	4	23	0	0	0	0	0	0	0	0	1	0	61	
7:20 AM	0	36	2	0	7	24	0	0	0	0	0	0	1	0	1	0	71	
7:25 AM	0	41	4	0	6	19	0	0	0	0	0	0	1	0	2	0	73	
7:30 AM	0	38	5	0	5	26	0	0	0	0	0	0	1	0	3	0	78	
7:35 AM	0	41	2	0	6	24	0	0	0	0	0	0	0	0	2	0	75	
7:40 AM	0	46	4	0	8	26	0	0	0	0	0	0	1	0	7	0	92	
7:45 AM	0	54	6	0	13	25	0	0	0	0	0	0	0	0	1	0	99	
7:50 AM	0	48	14	0	14	23	0	0	0	0	0	0	0	0	4	0	103	
7:55 AM	0	42	13	0	10	21	0	0	0	0	0	0	3	0	13	0	102	934
8:00 AM	0	33	10	0	12	19	0	0	0	0	0	0	1	0	5	0	80	947
8:05 AM	0	39	2	0	6	25	0	0	0	0	0	0	0	0	5	0	77	963
8:10 AM	0	38	3	0	0	27	0	0	0	0	0	0	1	0	4	0	73	984
8:15 AM	0	38	2	0	11	27	0	0	0	0	0	0	1	0	2	0	81	1004
8:20 AM	0	49	1	0	7	22	0	0	0	0	0	0	2	0	3	0	84	1017
8:25 AM	0	34	2	0	2	27	0	0	0	0	0	0	2	0	2	0	69	1013
8:30 AM	0	28	2	0	5	16	0	0	0	0	0	0	0	0	4	0	55	990
8:35 AM	0	36	1	0	6	14	0	0	0	0	0	0	0	0	3	0	60	975
8:40 AM	0	42	1	0	1	29	0	0	0	0	0	0	0	0	4	0	77	960
8:45 AM	0	34	1	0	6	14	0	0	0	0	0	0	1	0	4	0	60	921
8:50 AM	0	30	1	0	5	24	0	0	0	0	0	0	0	0	2	0	62	880
8:55 AM	0	62	3	0	7	15	0	1	0	0	0	0	0	0	2	0	90	868

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	576	132	0	148	276	0	0	0	0	0	0	12	0	72	0	1216
Heavy Trucks	0	12	0		0	0	0		0	0	0		0	0	0		12
Buses																	
Pedestrians		0				8				0				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 4/28/2023 3:00 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

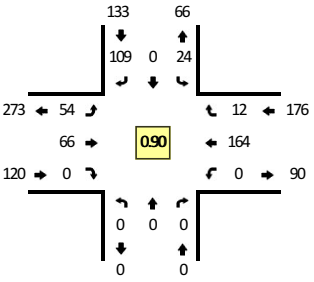
Type of peak hour being reported: Intersection Peak

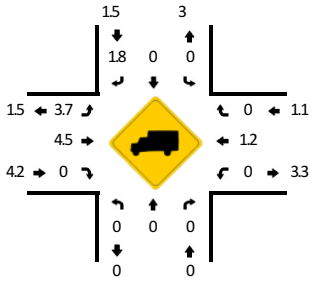
Method for determining peak hour: Total Entering Volume

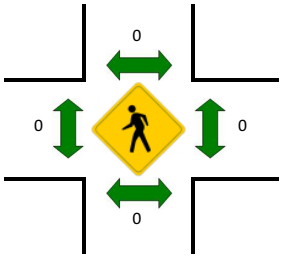
LOCATION: Nani Kailua Drive -- Hualalai Rd
CITY/STATE: Kailua, HI

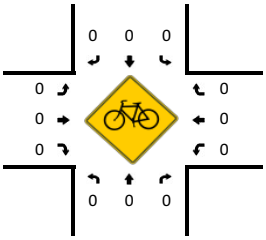
QC JOB #: 16145013
DATE: Wed, Apr 19 2023

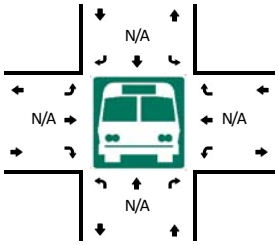
Peak-Hour: 7:20 AM -- 8:20 AM
Peak 15-Min: 7:50 AM -- 8:05 AM

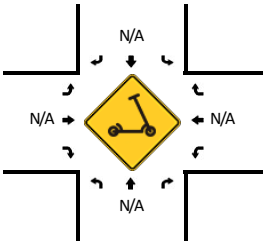












5-Min Count Period Beginning At	Nani Kailua Drive (Northbound)				Nani Kailua Drive (Southbound)				Hualalai Rd (Eastbound)				Hualalai Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	1	0	10	0	6	1	0	0	0	4	1	0	23	
7:05 AM	0	0	0	0	0	0	3	0	6	7	0	0	0	5	2	0	23	
7:10 AM	0	0	0	0	4	0	4	0	3	1	0	0	0	4	0	0	16	
7:15 AM	0	0	0	0	0	0	4	0	2	1	0	0	0	7	1	0	15	
7:20 AM	0	0	0	0	4	0	12	0	2	5	0	0	0	14	2	0	39	
7:25 AM	0	0	0	0	3	0	10	0	4	5	0	0	0	5	1	0	28	
7:30 AM	0	0	0	0	4	0	6	0	6	8	0	0	0	10	0	0	34	
7:35 AM	0	0	0	0	5	0	8	0	6	6	0	0	0	10	1	0	36	
7:40 AM	0	0	0	0	1	0	6	0	4	3	0	0	0	22	0	0	36	
7:45 AM	0	0	0	0	2	0	8	0	3	5	0	0	0	11	1	0	30	
7:50 AM	0	0	0	0	1	0	7	0	3	9	0	0	0	18	1	0	39	
7:55 AM	0	0	0	0	2	0	11	0	3	4	0	0	0	27	0	0	47	366
8:00 AM	0	0	0	0	0	0	9	0	7	6	0	0	0	8	3	0	33	376
8:05 AM	0	0	0	0	0	0	12	0	6	5	0	0	0	11	0	0	34	387
8:10 AM	0	0	0	0	2	0	13	0	5	6	0	0	0	11	0	0	37	408
8:15 AM	0	0	0	0	0	0	7	0	5	4	0	0	0	17	3	0	36	429
8:20 AM	0	0	0	0	0	0	10	0	5	2	0	0	0	11	0	0	28	418
8:25 AM	0	0	0	0	0	0	4	0	7	6	0	0	0	15	1	0	33	423
8:30 AM	0	0	0	0	1	0	4	0	2	5	0	0	0	21	1	0	34	423
8:35 AM	0	0	0	0	0	0	2	0	6	6	0	0	0	11	1	0	26	413
8:40 AM	0	0	0	0	1	0	3	0	1	4	0	0	0	8	2	0	19	396
8:45 AM	0	0	0	0	2	0	4	0	7	0	0	0	0	8	2	0	23	389
8:50 AM	0	0	0	0	2	0	12	0	3	5	0	0	0	5	0	0	27	377
8:55 AM	0	0	0	0	0	0	14	0	5	1	0	0	0	14	1	0	35	365

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	12	0	108	0	52	76	0	0	0	212	16	0	476
Heavy Trucks	0	0	0		0	0	4		4	0	0		0	0	0		8
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 4/28/2023 3:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Queen Kaahumanu Hwy -- Nani Kailua Dr

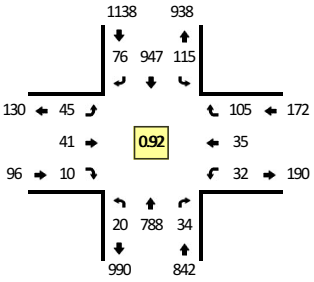
CITY/STATE: Kailua, HI

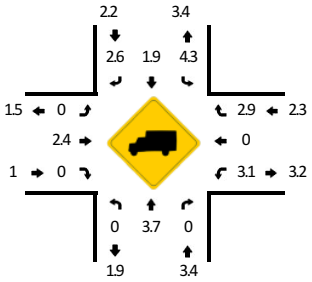
QC JOB #: 16145015

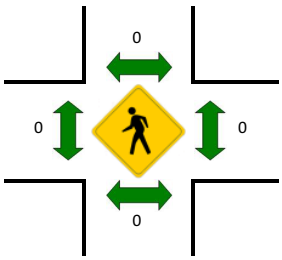
DATE: Wed, Apr 19 2023

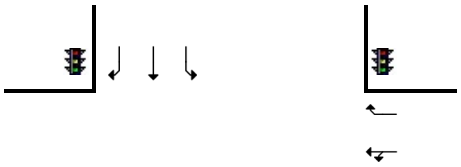
Peak-Hour: 3:05 PM -- 4:05 PM

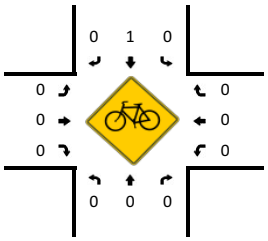
Peak 15-Min: 3:05 PM -- 3:20 PM

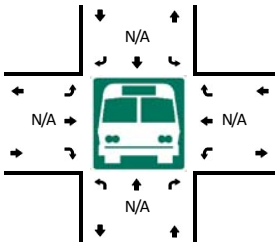


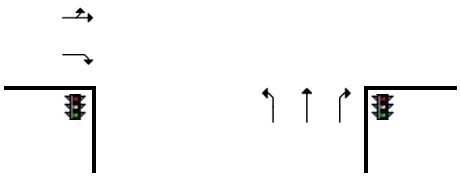


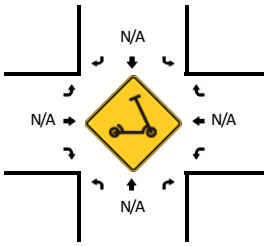












5-Min Count Period Beginning At	Queen Kaahumanu Hwy (Northbound)				Queen Kaahumanu Hwy (Southbound)				Nani Kailua Dr (Eastbound)				Nani Kailua Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	2	74	5	0	3	80	7	0	2	2	1	0	1	1	7	0	185	
3:05 PM	1	76	2	0	15	89	12	0	1	3	1	0	1	1	8	0	210	
3:10 PM	1	73	3	0	7	84	2	0	3	13	3	0	2	1	5	0	197	
3:15 PM	0	73	3	0	10	87	6	0	4	1	1	0	3	3	14	0	205	
3:20 PM	2	60	5	1	7	75	3	0	3	2	0	0	0	6	12	0	176	
3:25 PM	4	67	1	0	7	70	4	0	4	1	0	0	4	3	7	0	172	
3:30 PM	1	78	3	0	16	75	13	0	2	0	1	0	0	5	9	0	203	
3:35 PM	2	49	3	0	9	68	5	0	4	6	0	0	4	1	5	0	156	
3:40 PM	1	63	2	0	14	64	5	0	6	4	0	0	6	1	11	0	177	
3:45 PM	2	69	3	0	6	85	6	0	3	2	2	0	5	6	13	0	202	
3:50 PM	3	55	2	0	6	80	2	0	8	2	0	0	3	5	8	0	174	
3:55 PM	2	65	4	0	9	84	8	0	3	4	1	0	2	0	5	0	187	2244
4:00 PM	0	60	3	0	9	86	10	0	4	3	1	0	2	3	8	0	189	2248
4:05 PM	3	66	1	0	9	81	2	0	5	6	4	0	3	2	5	0	187	2225
4:10 PM	0	58	4	0	9	55	4	0	5	7	4	0	2	3	6	0	157	2185
4:15 PM	1	52	2	0	9	75	5	0	10	3	0	0	2	7	7	0	173	2153
4:20 PM	1	59	3	0	7	76	8	0	2	7	0	0	2	2	5	0	172	2149
4:25 PM	2	68	3	0	16	78	5	0	1	8	0	0	1	1	9	0	192	2169
4:30 PM	2	74	3	0	14	75	5	0	1	5	2	0	3	5	8	0	197	2163
4:35 PM	4	56	4	0	14	67	8	0	1	2	0	0	4	2	10	0	172	2179
4:40 PM	2	52	3	1	4	69	6	0	5	4	0	0	4	4	5	0	159	2161
4:45 PM	3	74	2	0	12	79	6	0	4	8	0	0	0	1	8	0	197	2156
4:50 PM	2	62	1	0	11	84	5	1	3	4	0	0	1	1	6	0	181	2163
4:55 PM	0	69	0	0	8	69	6	0	2	3	0	0	2	4	3	0	166	2142
5:00 PM	0	55	2	0	7	69	3	0	5	3	3	0	3	3	8	0	161	2114
5:05 PM	2	47	4	0	4	65	4	0	2	3	2	0	2	2	6	0	143	2070
5:10 PM	0	46	2	0	8	65	8	0	3	5	2	0	2	1	9	0	151	2064
5:15 PM	2	69	1	0	12	77	7	0	1	1	0	0	1	2	1	0	174	2065
5:20 PM	0	53	0	0	13	74	8	0	3	4	0	0	5	3	6	0	169	2062
5:25 PM	0	59	0	0	6	68	3	0	7	5	1	0	4	4	3	0	160	2030
5:30 PM	0	41	3	0	9	59	3	0	2	3	2	0	2	2	7	0	133	1966
5:35 PM	3	52	3	0	8	60	1	0	1	6	0	0	1	1	2	0	138	1932
5:40 PM	1	31	4	0	3	73	4	0	1	0	1	0	2	2	6	0	128	1901
5:45 PM	0	42	1	0	5	74	4	0	4	2	3	0	1	4	8	0	148	1852
5:50 PM	0	42	3	0	6	55	1	0	8	5	0	0	3	2	6	0	131	1802
5:55 PM	0	47	2	0	11	71	4	0	3	3	0	0	1	1	6	0	149	1785

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	8	888	32	0	128	1040	80	0	32	68	20	0	24	20	108	0	2448
Heavy Trucks	0	48	0		4	28	4		0	0	0		0	0	4		88
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	
Comments:																	

Report generated on 4/28/2023 3:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Kuakini Hwy -- Hualalai Rd

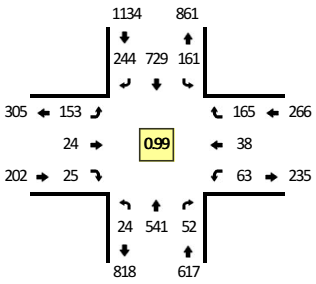
CITY/STATE: Kailua, HI

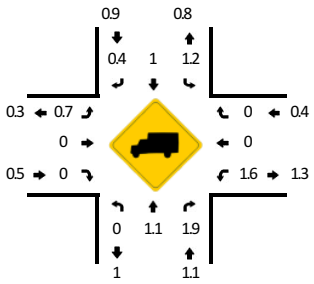
QC JOB #: 16145016

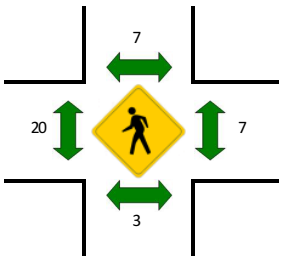
DATE: Wed, Apr 19 2023

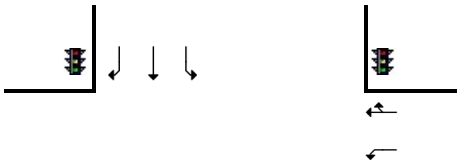
Peak-Hour: 3:35 PM -- 4:35 PM

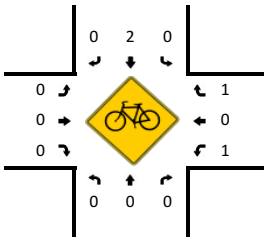
Peak 15-Min: 3:35 PM -- 3:50 PM

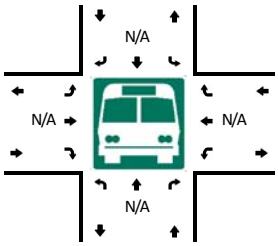


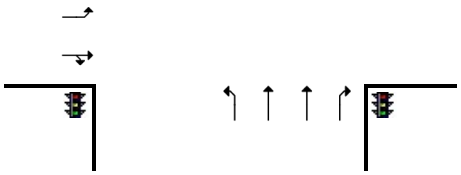


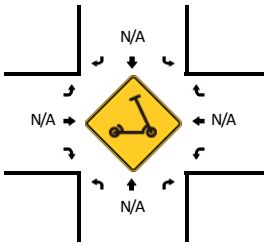












5-Min Count Period Beginning At	Kuakini Hwy (Northbound)				Kuakini Hwy (Southbound)				Hualalai Rd (Eastbound)				Hualalai Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	0	38	8	0	26	57	19	0	15	1	1	0	8	1	20	0	194	
3:05 PM	5	43	9	0	23	49	17	0	14	3	0	0	4	2	19	0	188	
3:10 PM	2	46	8	0	14	59	21	0	14	3	2	0	6	6	12	0	193	
3:15 PM	1	50	4	0	16	55	13	0	14	1	0	0	5	2	8	0	169	
3:20 PM	0	47	4	0	14	47	19	1	15	4	6	0	6	3	19	0	185	
3:25 PM	3	40	0	0	12	53	17	1	16	1	1	0	6	3	21	0	174	
3:30 PM	2	38	5	0	10	50	19	0	15	1	4	0	5	1	8	0	158	
3:35 PM	4	48	6	0	17	63	20	0	19	1	1	0	6	7	14	0	206	
3:40 PM	2	49	7	0	11	50	20	0	8	4	4	0	5	5	14	0	179	
3:45 PM	3	43	3	0	11	55	19	0	14	0	1	0	5	6	18	0	178	
3:50 PM	1	46	4	0	17	57	28	1	11	0	1	0	4	1	9	0	180	
3:55 PM	3	45	11	1	7	73	20	0	10	4	3	0	5	1	16	0	199	2203
4:00 PM	1	38	0	0	14	56	21	1	11	3	2	0	6	4	16	0	173	2182
4:05 PM	1	41	4	0	17	62	15	0	14	1	2	0	6	0	15	0	178	2172
4:10 PM	2	56	2	0	12	69	21	0	14	2	2	0	4	2	10	0	196	2175
4:15 PM	4	43	3	0	9	61	17	0	8	4	1	0	6	5	14	0	175	2181
4:20 PM	0	44	4	0	17	60	21	0	14	1	2	0	3	3	17	0	186	2182
4:25 PM	0	49	1	0	13	59	26	0	16	3	4	0	9	3	12	0	195	2203
4:30 PM	2	39	7	0	14	64	16	0	14	1	2	0	4	1	10	0	174	2219
4:35 PM	1	42	4	0	9	70	17	0	14	1	2	0	8	7	13	0	188	2201
4:40 PM	2	37	3	0	14	59	21	0	19	4	0	0	5	0	10	0	174	2196
4:45 PM	3	47	6	0	13	54	17	0	18	2	2	0	9	1	9	0	181	2199
4:50 PM	2	45	5	0	6	54	15	0	15	2	3	0	6	6	15	0	174	2193
4:55 PM	4	44	1	0	16	64	17	0	11	4	0	0	4	3	17	0	185	2179
5:00 PM	2	48	5	0	6	57	19	0	10	1	3	0	4	4	11	0	170	2176
5:05 PM	6	37	4	0	11	63	9	0	15	2	1	0	6	3	15	0	172	2170
5:10 PM	3	52	4	0	5	68	15	0	13	3	1	0	4	1	9	0	178	2152
5:15 PM	4	40	4	0	8	55	11	0	12	0	3	0	8	2	6	0	153	2130
5:20 PM	5	25	5	0	9	55	18	0	11	3	2	0	4	1	8	0	146	2090
5:25 PM	2	54	9	0	6	50	19	0	10	0	1	0	5	5	7	0	168	2063
5:30 PM	1	34	5	0	4	48	12	0	14	4	1	0	1	2	13	0	139	2028
5:35 PM	2	35	1	0	6	49	11	0	11	2	2	0	7	0	7	0	133	1973
5:40 PM	2	25	2	0	5	54	26	0	12	5	2	0	1	1	5	0	140	1939
5:45 PM	2	40	6	0	10	57	18	0	8	3	1	0	5	0	7	0	157	1915
5:50 PM	2	30	3	0	4	39	13	0	9	0	1	0	3	0	7	0	111	1852
5:55 PM	1	38	4	0	7	41	10	0	9	1	2	0	3	6	7	0	129	1796

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	36	560	64	0	156	672	236	0	164	20	24	0	64	72	184	0	2252
Heavy Trucks	0	20	4		8	8	0		0	0	0		4	0	0		44
Buses																	
Pedestrians		4				4				16				16			40
Bicycles	0	0	0		0	4	0		0	0	0		4	0	4		12
Scooters																	

Comments:

Report generated on 4/28/2023 3:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Queen Kaahumanu Hwy -- Hualalai Rd

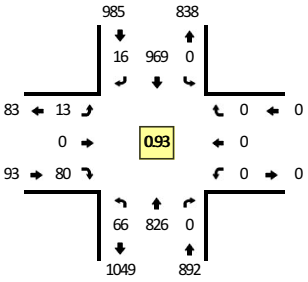
QC JOB #: 16145017

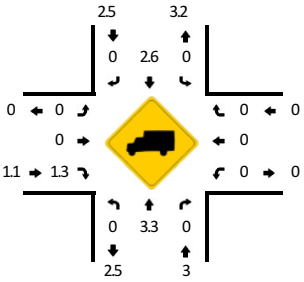
CITY/STATE: Kailua, HI

DATE: Wed, Apr 19 2023

Peak-Hour: 3:00 PM -- 4:00 PM

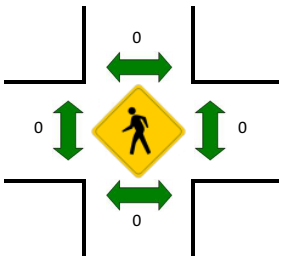
Peak 15-Min: 3:00 PM -- 3:15 PM

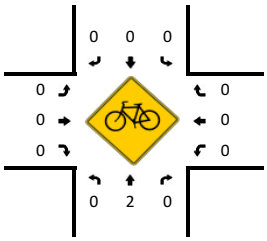


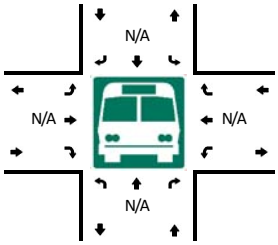


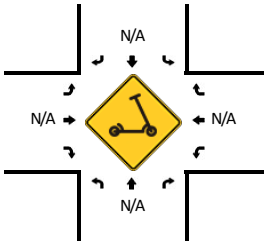
Quality Counts

DATA THAT DRIVES COMMUNITIES









5-Min Count Period Beginning At	Queen Kaahumanu Hwy (Northbound)				Queen Kaahumanu Hwy (Southbound)				Hualalai Rd (Eastbound)				Hualalai Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	4	83	0	0	0	88	3	0	1	0	10	0	0	0	0	0	189	
3:05 PM	5	65	0	0	0	87	0	0	0	0	6	0	0	0	0	0	163	
3:10 PM	4	80	0	0	0	84	0	0	2	0	8	0	0	0	0	0	178	
3:15 PM	5	71	0	0	0	88	1	0	2	0	9	1	0	0	0	0	177	
3:20 PM	15	68	0	0	0	78	0	0	0	0	7	0	0	0	0	0	168	
3:25 PM	5	72	0	0	0	79	3	0	2	0	4	0	0	0	0	0	165	
3:30 PM	4	67	0	0	0	62	1	0	2	0	8	0	0	0	0	0	144	
3:35 PM	2	60	0	0	0	75	0	0	1	0	3	0	0	0	0	0	141	
3:40 PM	8	59	0	0	0	69	2	0	0	0	3	0	0	0	0	0	141	
3:45 PM	3	81	0	0	0	91	2	0	0	0	9	0	0	0	0	0	186	
3:50 PM	6	66	0	0	0	84	4	0	0	0	9	0	0	0	0	0	169	
3:55 PM	5	54	0	0	0	84	0	0	2	0	4	0	0	0	0	0	149	1970
4:00 PM	3	66	0	0	0	86	1	0	0	0	9	0	0	0	0	0	165	1946
4:05 PM	5	59	0	0	0	91	3	0	0	0	2	0	0	0	0	0	160	1943
4:10 PM	1	72	0	0	0	52	0	0	0	0	5	0	0	0	0	0	130	1895
4:15 PM	6	58	0	0	0	81	2	0	2	0	5	0	0	0	0	0	154	1872
4:20 PM	2	64	0	0	0	79	0	0	0	0	5	0	0	0	0	0	150	1854
4:25 PM	7	70	0	0	0	73	1	0	2	0	4	0	0	0	0	0	157	1846
4:30 PM	3	77	0	0	0	78	1	0	1	0	5	0	0	0	0	0	165	1867
4:35 PM	2	53	0	0	0	78	2	0	0	0	5	0	0	0	0	0	140	1866
4:40 PM	3	74	0	0	0	67	1	0	0	0	4	0	0	0	0	0	149	1874
4:45 PM	5	69	0	0	0	83	3	0	1	0	10	0	0	0	0	0	171	1859
4:50 PM	6	50	0	0	0	81	0	0	0	0	5	0	0	0	0	0	142	1832
4:55 PM	3	75	0	0	0	70	2	0	0	0	5	0	0	0	0	0	155	1838
5:00 PM	2	55	0	0	0	78	1	0	1	0	7	0	0	0	0	0	144	1817
5:05 PM	8	49	0	0	0	70	0	0	0	0	4	0	0	0	0	0	131	1788
5:10 PM	6	53	0	0	0	68	0	0	0	0	5	0	0	0	0	0	132	1790
5:15 PM	4	69	0	0	0	78	0	0	0	0	5	0	0	0	0	0	156	1792
5:20 PM	7	57	0	0	0	76	1	0	2	0	8	0	0	0	0	0	151	1793
5:25 PM	3	52	0	0	0	80	0	0	0	0	6	0	0	0	0	0	141	1777
5:30 PM	4	51	0	0	0	51	0	0	0	0	6	0	0	0	0	0	112	1724
5:35 PM	4	45	0	0	0	64	0	0	0	0	5	0	0	0	0	0	118	1702
5:40 PM	2	40	0	0	0	80	1	0	0	0	7	0	0	0	0	0	130	1683
5:45 PM	2	39	0	0	0	73	0	0	0	0	3	0	0	0	0	0	117	1629
5:50 PM	2	46	0	0	0	59	3	0	0	0	4	0	0	0	0	0	114	1601
5:55 PM	3	53	0	0	0	71	1	0	0	0	3	0	0	0	0	0	131	1577

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	52	912	0	0	0	1036	12	0	12	0	96	0	0	0	0	0	2120
Heavy Trucks	0	28	0		0	60	0		0	0	0		0	0	0		88
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	4	0		0	0	0		0	0	0		0	0	0		4
Scooters																	

Comments:

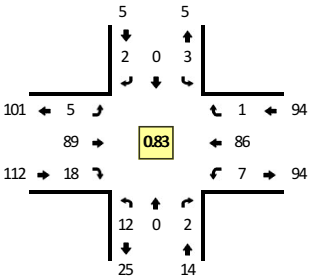
Report generated on 4/28/2023 3:00 PM

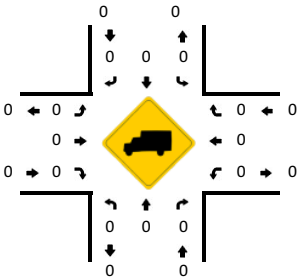
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

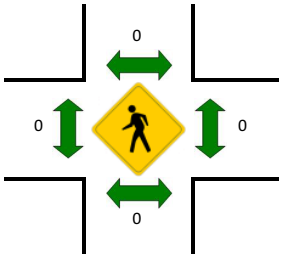
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

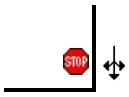
LOCATION: Hualalai Village North Driveway -- Hualalai Rd | **QC JOB #:** 16145018
CITY/STATE: Kailua, HI | **DATE:** Wed, Apr 19 2023

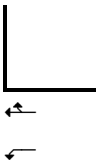
Peak-Hour: 3:00 PM -- 4:00 PM
Peak 15-Min: 3:00 PM -- 3:15 PM

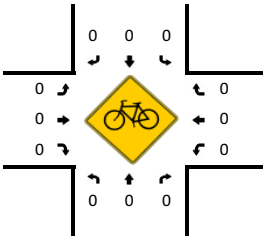


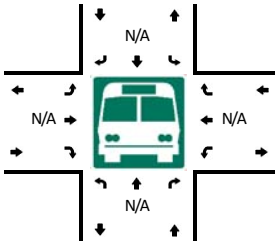


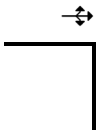


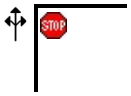


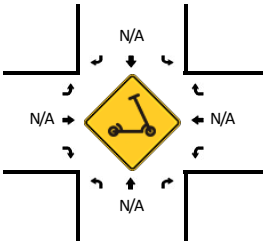












5-Min Count Period Beginning At	Hualalai Village North Driveway (Northbound)				Hualalai Village North Driveway (Southbound)				Hualalai Rd (Eastbound)				Hualalai Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	1	0	0	0	0	0	0	0	1	11	3	1	1	4	0	0	22	
3:05 PM	1	0	1	0	0	0	1	0	1	13	3	0	1	7	0	0	28	
3:10 PM	1	0	1	0	0	0	0	0	1	7	1	0	0	7	0	0	18	
3:15 PM	1	0	0	0	0	0	0	0	0	12	1	0	1	6	0	0	21	
3:20 PM	1	0	0	0	1	0	0	0	0	6	3	0	0	15	0	0	26	
3:25 PM	1	0	0	0	0	0	0	0	0	5	0	0	1	6	0	0	13	
3:30 PM	2	0	0	0	1	0	0	0	0	7	0	0	0	7	1	0	18	
3:35 PM	1	0	0	0	0	0	0	0	1	5	0	0	0	3	0	0	10	
3:40 PM	0	0	0	0	0	0	0	0	0	4	3	0	0	11	0	0	18	
3:45 PM	0	0	0	0	0	0	0	0	0	7	2	0	1	7	0	0	17	
3:50 PM	2	0	0	0	0	0	1	0	0	9	1	0	2	6	0	0	21	
3:55 PM	1	0	0	0	1	0	0	0	0	3	1	0	0	7	0	0	13	225
4:00 PM	0	0	0	0	0	0	0	0	0	8	1	0	1	7	1	0	18	221
4:05 PM	2	0	0	0	0	0	0	0	0	3	0	0	1	7	0	0	13	206
4:10 PM	1	1	0	0	0	0	1	0	0	4	1	0	0	1	0	0	9	197
4:15 PM	2	0	0	0	0	0	0	0	0	7	1	0	0	6	1	0	17	193
4:20 PM	1	0	0	0	1	0	1	0	0	4	1	0	0	3	0	0	11	178
4:25 PM	0	0	0	0	0	0	0	0	0	6	1	0	1	7	0	0	15	180
4:30 PM	2	0	0	0	0	0	0	0	1	6	2	0	1	4	0	0	16	178
4:35 PM	1	0	1	0	0	0	0	0	0	5	4	0	1	2	1	0	15	183
4:40 PM	0	0	0	0	0	0	1	0	0	4	2	0	0	4	1	0	12	177
4:45 PM	1	0	0	0	0	0	0	0	0	11	1	0	2	6	0	0	21	181
4:50 PM	2	0	0	0	0	0	2	0	0	6	2	1	0	6	0	0	19	179
4:55 PM	1	0	0	0	0	0	0	0	0	4	0	0	2	3	0	0	10	176
5:00 PM	1	0	0	0	0	0	0	0	0	6	2	0	1	2	0	0	12	170
5:05 PM	2	0	0	0	0	0	0	0	0	5	4	0	1	7	0	0	19	176
5:10 PM	2	0	0	0	0	0	1	0	0	3	0	0	0	7	0	0	13	180
5:15 PM	0	0	0	0	0	0	0	0	0	7	0	0	0	3	1	0	11	174
5:20 PM	1	0	1	0	0	0	0	0	0	4	2	0	2	5	0	0	15	178
5:25 PM	3	0	0	0	0	0	2	0	0	7	0	0	0	3	0	0	15	178
5:30 PM	0	0	0	0	0	0	0	0	0	7	3	0	0	4	0	0	14	176
5:35 PM	1	0	1	0	0	0	1	0	0	2	0	0	0	2	0	0	7	168
5:40 PM	4	0	0	0	0	0	0	0	0	7	3	0	1	3	0	0	18	174
5:45 PM	0	0	0	0	1	0	2	0	0	3	1	0	0	2	0	0	9	162
5:50 PM	3	0	0	0	0	0	1	0	0	3	2	0	1	3	0	0	13	156
5:55 PM	0	0	0	0	0	0	0	0	0	3	0	0	1	3	0	0	7	153

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	0	8	0	0	0	4	0	12	124	28	4	8	72	0	0	272
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 4/28/2023 3:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Queen Kaahumanu Hwy -- Kuakini Hwy

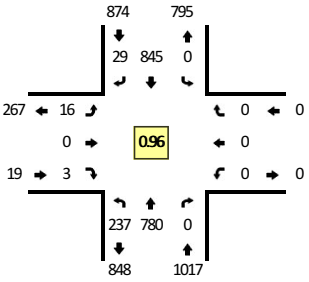
CITY/STATE: Kailua, HI

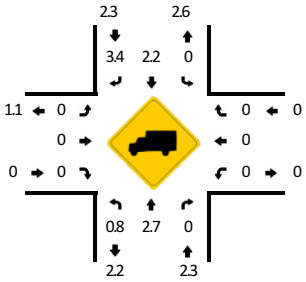
QC JOB #: 16145019

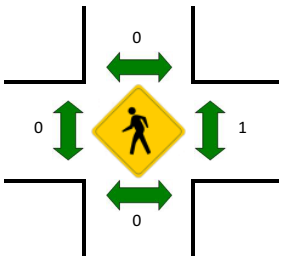
DATE: Wed, Apr 19 2023

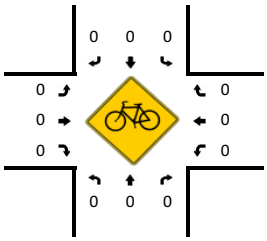
Peak-Hour: 3:05 PM -- 4:05 PM

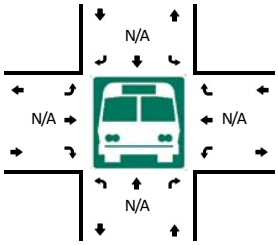
Peak 15-Min: 3:05 PM -- 3:20 PM

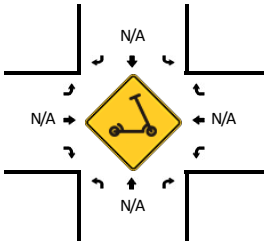












5-Min Count Period Beginning At	Queen Kaahumanu Hwy (Northbound)				Queen Kaahumanu Hwy (Southbound)				Kuakini Hwy (Eastbound)				Kuakini Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	12	63	0	0	0	71	4	0	2	0	0	0	0	0	0	0	152	
3:05 PM	19	73	0	0	0	82	3	0	3	0	0	0	0	0	0	0	180	
3:10 PM	17	60	0	0	0	79	1	0	0	0	0	0	0	0	0	0	157	
3:15 PM	11	69	0	0	0	76	2	0	1	0	0	0	0	0	0	0	159	
3:20 PM	24	69	0	0	0	73	1	0	3	0	0	1	0	0	0	0	171	
3:25 PM	17	71	0	0	0	56	3	0	2	0	0	0	0	0	0	0	149	
3:30 PM	23	61	0	0	0	66	1	0	2	0	0	0	0	0	0	0	153	
3:35 PM	18	65	0	0	0	56	2	0	2	0	0	0	0	0	0	0	143	
3:40 PM	21	59	0	0	0	69	1	0	0	0	0	0	0	0	0	0	150	
3:45 PM	18	71	0	0	0	72	1	0	0	0	0	0	0	0	0	0	162	
3:50 PM	20	61	0	0	0	78	5	0	0	0	0	0	0	0	0	0	164	
3:55 PM	30	55	0	0	0	69	3	0	0	0	2	0	0	0	0	0	159	1899
4:00 PM	19	66	0	0	0	69	6	0	2	0	1	0	0	0	0	0	163	1910
4:05 PM	14	54	0	0	0	78	6	0	2	0	0	0	0	0	0	0	154	1884
4:10 PM	19	56	0	0	0	59	2	0	2	0	0	0	0	0	0	0	138	1865
4:15 PM	16	70	0	0	0	71	2	0	0	0	0	0	0	0	0	0	159	1865
4:20 PM	16	62	0	0	0	65	2	0	2	0	0	0	0	0	0	0	147	1841
4:25 PM	22	67	0	0	0	61	2	0	1	0	0	0	0	0	0	0	153	1845
4:30 PM	17	53	0	0	0	64	3	0	3	0	0	0	0	0	0	0	140	1832
4:35 PM	13	67	0	0	0	59	5	0	0	0	0	0	0	0	0	0	144	1833
4:40 PM	20	63	0	0	0	73	0	0	1	0	0	1	0	0	0	0	158	1841
4:45 PM	18	69	0	0	0	65	2	0	1	0	0	0	0	0	0	0	155	1834
4:50 PM	21	66	0	0	0	63	6	0	2	0	0	1	0	0	0	0	159	1829
4:55 PM	9	44	0	0	0	57	2	0	0	0	0	0	0	0	0	0	112	1782
5:00 PM	15	52	0	0	0	72	3	0	0	0	0	0	0	0	0	0	142	1761
5:05 PM	9	46	0	0	0	67	1	0	0	0	0	0	0	0	0	0	123	1730
5:10 PM	23	62	0	0	0	60	1	0	0	0	0	1	0	0	0	0	147	1739
5:15 PM	15	55	0	0	0	69	3	0	1	0	1	0	0	0	0	0	144	1724
5:20 PM	18	60	0	0	0	71	3	0	0	0	0	0	0	0	0	0	152	1729
5:25 PM	11	33	0	0	0	71	1	0	0	0	0	0	0	0	0	0	116	1692
5:30 PM	23	46	0	0	0	55	1	0	2	0	0	0	0	0	0	0	127	1679
5:35 PM	8	37	0	0	0	56	2	0	3	0	0	0	0	0	0	0	106	1641
5:40 PM	15	44	0	0	0	66	1	0	2	0	0	0	0	0	0	0	128	1611
5:45 PM	12	35	0	0	0	56	1	0	1	0	0	0	0	0	0	0	105	1561
5:50 PM	20	39	0	0	0	54	2	0	1	0	0	0	0	0	0	0	116	1518
5:55 PM	14	40	0	0	0	74	0	0	1	0	0	0	0	0	0	0	129	1535

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	188	808	0	0	0	948	24	0	16	0	0	0	0	0	0	0	1984
Heavy Trucks	0	32	0		0	40	4		0	0	0		0	0	0		76
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

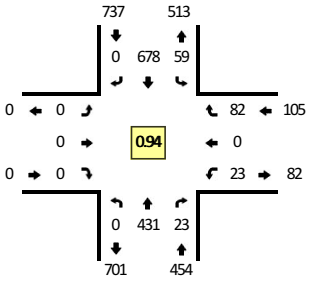
Report generated on 4/28/2023 3:00 PM

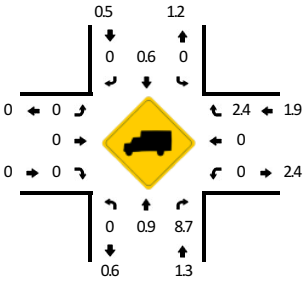
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

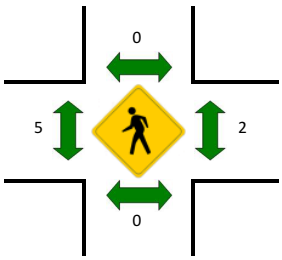
LOCATION: Kuakini Hwy -- YWAM Driveway | **QC JOB #:** 16145020
CITY/STATE: Kailua, HI | **DATE:** Wed, Apr 19 2023

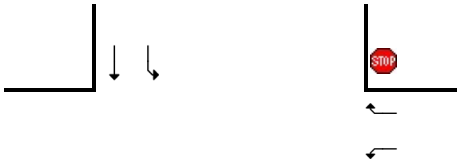
Peak-Hour: 4:25 PM -- 5:25 PM
Peak 15-Min: 4:35 PM -- 4:50 PM

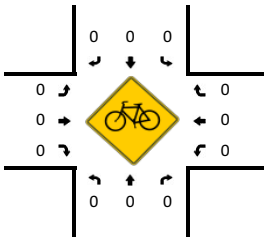


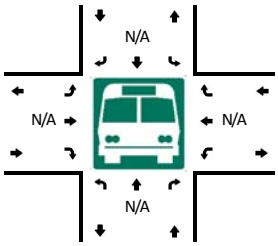


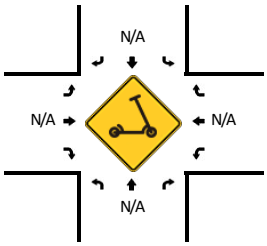
Quality Counts
DATA THAT DRIVES COMMUNITIES











5-Min Count Period Beginning At	Kuakini Hwy (Northbound)				Kuakini Hwy (Southbound)				YWAM Driveway (Eastbound)				YWAM Driveway (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	0	27	6	0	2	58	0	0	0	0	0	0	2	0	14	0	109	
3:05 PM	0	42	1	0	4	45	0	0	0	0	0	0	1	0	10	0	103	
3:10 PM	0	35	1	0	4	50	0	0	0	0	0	0	0	0	11	0	101	
3:15 PM	0	34	1	0	4	49	0	0	0	0	0	0	1	0	13	0	102	
3:20 PM	0	23	2	0	6	48	0	0	0	0	0	0	5	0	4	0	88	
3:25 PM	0	32	1	0	3	42	0	0	0	0	0	0	0	0	3	0	81	
3:30 PM	0	35	3	0	5	55	0	0	0	0	0	0	1	0	11	0	110	
3:35 PM	0	31	1	0	1	50	0	0	0	0	0	0	3	0	10	0	96	
3:40 PM	0	43	1	0	4	48	0	0	0	0	0	0	5	0	4	0	105	
3:45 PM	0	27	2	0	2	70	0	1	0	0	0	0	0	0	5	0	107	
3:50 PM	0	35	1	0	7	52	0	0	0	0	0	0	2	0	3	0	100	
3:55 PM	0	32	0	0	6	56	0	0	0	0	0	0	2	0	6	0	102	1204
4:00 PM	0	39	0	0	2	61	0	0	0	0	0	0	1	0	3	0	106	1201
4:05 PM	0	39	1	0	5	49	0	0	0	0	0	0	1	0	2	0	97	1195
4:10 PM	0	43	0	0	4	64	0	0	0	0	0	0	0	0	4	0	115	1209
4:15 PM	0	26	1	0	7	64	0	0	0	0	0	0	1	0	3	0	102	1209
4:20 PM	0	33	1	0	7	47	0	0	0	0	0	0	1	0	2	0	91	1212
4:25 PM	0	32	4	0	0	67	0	0	0	0	0	0	2	0	7	0	112	1243
4:30 PM	0	36	3	0	4	57	0	0	0	0	0	0	3	0	10	0	113	1246
4:35 PM	0	31	4	0	4	61	0	0	0	0	0	0	2	0	5	0	107	1257
4:40 PM	0	37	2	0	6	62	0	0	0	0	0	0	1	0	7	0	115	1267
4:45 PM	0	47	1	0	6	52	0	0	0	0	0	0	4	0	11	0	121	1281
4:50 PM	0	27	3	0	6	51	0	0	0	0	0	0	1	0	4	0	92	1273
4:55 PM	0	37	1	0	11	57	0	0	0	0	0	0	0	0	7	0	113	1284
5:00 PM	0	32	1	0	7	60	0	0	0	0	0	0	2	0	12	0	114	1292
5:05 PM	0	39	0	0	1	55	0	0	0	0	0	0	1	0	3	0	99	1294
5:10 PM	0	42	1	0	5	55	0	0	0	0	0	0	3	0	6	0	112	1291
5:15 PM	0	29	1	0	4	52	0	0	0	0	0	0	2	0	6	0	94	1283
5:20 PM	0	42	2	0	5	49	0	0	0	0	0	0	2	0	4	0	104	1296
5:25 PM	0	33	1	0	4	57	0	0	0	0	0	0	1	0	11	0	107	1291
5:30 PM	0	31	3	0	2	46	0	0	0	0	0	0	3	0	7	0	92	1270
5:35 PM	0	23	2	0	3	53	0	0	0	0	0	0	0	0	2	0	83	1246
5:40 PM	0	27	1	0	6	42	0	0	0	0	0	0	2	0	5	0	83	1214
5:45 PM	0	28	1	0	5	51	0	0	0	0	0	0	0	0	6	0	91	1184
5:50 PM	0	27	5	0	4	37	0	0	0	0	0	0	1	0	4	0	78	1170
5:55 PM	0	33	2	0	7	39	0	0	0	0	0	0	1	0	3	0	85	1142

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	460	28	0	64	700	0	0	0	0	0	0	28	0	92	0	1372
Heavy Trucks	0	4	0		0	0	0		0	0	0		0	0	8		12
Buses																	
Pedestrians		0				0				8				4			12
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 4/28/2023 3:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

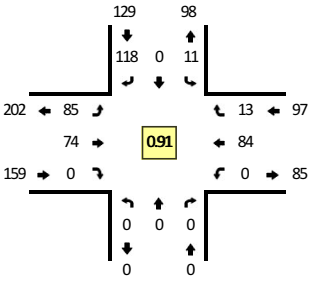
Type of peak hour being reported: Intersection Peak

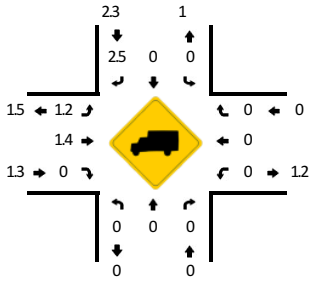
Method for determining peak hour: Total Entering Volume

LOCATION: Nani Kailua Drive -- Hualalai Rd
CITY/STATE: Kailua, HI

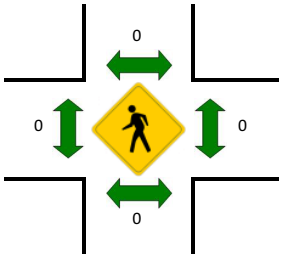
QC JOB #: 16145021
DATE: Wed, Apr 19 2023

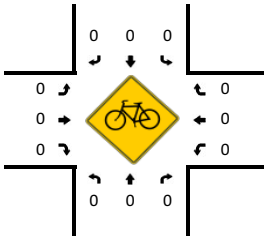
Peak-Hour: 3:20 PM -- 4:20 PM
Peak 15-Min: 3:45 PM -- 4:00 PM

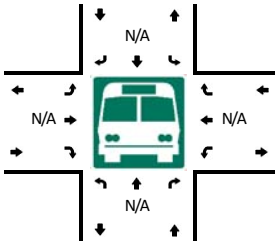


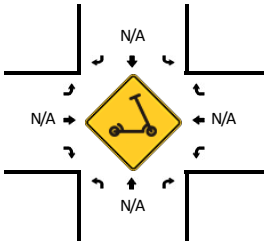


Quality Counts
DATA THAT DRIVES COMMUNITIES









5-Min Count Period Beginning At	Nani Kailua Drive (Northbound)				Nani Kailua Drive (Southbound)				Hualalai Rd (Eastbound)				Hualalai Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	0	0	0	0	2	0	5	0	7	15	0	0	0	6	0	0	35	
3:05 PM	0	0	0	0	2	0	9	0	4	10	0	0	0	7	1	0	33	
3:10 PM	0	0	0	0	1	0	6	0	6	12	0	0	0	2	6	0	33	
3:15 PM	0	0	0	0	0	0	7	0	2	9	0	0	0	6	0	0	24	
3:20 PM	0	0	0	0	2	0	9	0	5	7	0	0	0	15	2	0	40	
3:25 PM	0	0	0	0	1	0	6	0	1	5	0	0	0	6	1	0	20	
3:30 PM	0	0	0	0	3	0	12	0	8	5	0	0	0	7	2	0	37	
3:35 PM	0	0	0	0	1	0	9	0	1	5	0	0	0	3	1	0	20	
3:40 PM	0	0	0	0	0	0	8	0	7	7	0	0	0	11	0	0	33	
3:45 PM	0	0	0	0	3	0	13	0	8	9	0	0	0	4	1	0	38	
3:50 PM	0	0	0	0	0	0	8	0	8	7	0	0	0	8	1	0	32	
3:55 PM	0	0	0	0	0	0	13	0	10	5	0	0	0	8	0	0	36	381
4:00 PM	0	0	0	0	0	0	14	0	8	8	0	0	0	6	1	0	37	383
4:05 PM	0	0	0	0	0	0	6	0	6	3	0	0	0	7	0	0	22	372
4:10 PM	0	0	0	0	0	0	9	0	13	6	0	0	0	3	2	0	33	372
4:15 PM	0	0	0	0	1	0	11	0	10	7	0	0	0	6	2	0	37	385
4:20 PM	0	0	0	0	0	0	10	0	11	5	0	0	0	3	2	0	31	376
4:25 PM	0	0	0	0	2	0	5	0	5	5	0	0	0	7	0	0	24	380
4:30 PM	0	0	0	0	3	0	8	0	9	10	0	0	0	4	0	0	34	377
4:35 PM	0	0	0	0	0	0	9	0	4	3	0	0	0	3	1	0	20	377
4:40 PM	0	0	0	0	1	0	9	0	7	8	0	0	0	4	1	0	30	374
4:45 PM	0	0	0	0	1	0	10	0	11	10	0	0	0	7	0	0	39	375
4:50 PM	0	0	0	0	2	0	8	0	7	4	0	0	0	8	2	0	31	374
4:55 PM	0	0	0	0	0	0	7	0	6	7	0	0	0	5	0	0	25	363
5:00 PM	0	0	0	0	1	0	5	0	7	5	0	0	0	3	0	0	21	347
5:05 PM	0	0	0	0	3	0	9	0	9	5	0	1	0	9	0	0	36	361
5:10 PM	0	0	0	0	0	0	8	0	5	4	0	0	0	10	0	0	27	355
5:15 PM	0	0	0	0	1	0	12	0	6	7	0	1	0	3	0	0	30	348
5:20 PM	0	0	0	0	0	0	5	0	9	6	0	0	0	5	1	0	26	343
5:25 PM	0	0	0	0	0	0	8	0	4	9	0	0	0	6	2	0	29	348
5:30 PM	0	0	0	0	1	0	3	0	9	5	0	0	0	4	0	0	22	336
5:35 PM	0	0	0	0	1	0	2	0	2	4	0	0	0	3	1	0	13	329
5:40 PM	0	0	0	0	1	0	3	0	3	6	0	0	0	3	3	0	19	318
5:45 PM	0	0	0	0	0	0	7	0	11	5	0	0	0	4	1	0	28	307
5:50 PM	0	0	0	0	0	0	4	0	3	4	0	0	0	4	2	0	17	293
5:55 PM	0	0	0	0	0	0	4	0	8	3	0	0	0	3	0	0	18	286

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	12	0	136	0	104	84	0	0	0	80	8	0	424
Heavy Trucks	0	0	0		0	0	4		0	0	0		0	0	0		4
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 4/28/2023 3:00 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212