TRAFFIC IMPACT ANALYSIS REPORT

FOR THE PROPOSED

WAIKOLOA ROAD – PANIOLO AVENUE INTERSECTION IMPROVEMENTS

SOUTH KOHALA, HAWAII ISLAND

PREPARED FOR

BELT COLLINS HAWAII LLC

FEBRUARY 18, 2022

PREPARED BY

TMC **THE TRAFFIC MANAGEMENT CONSULTANT**

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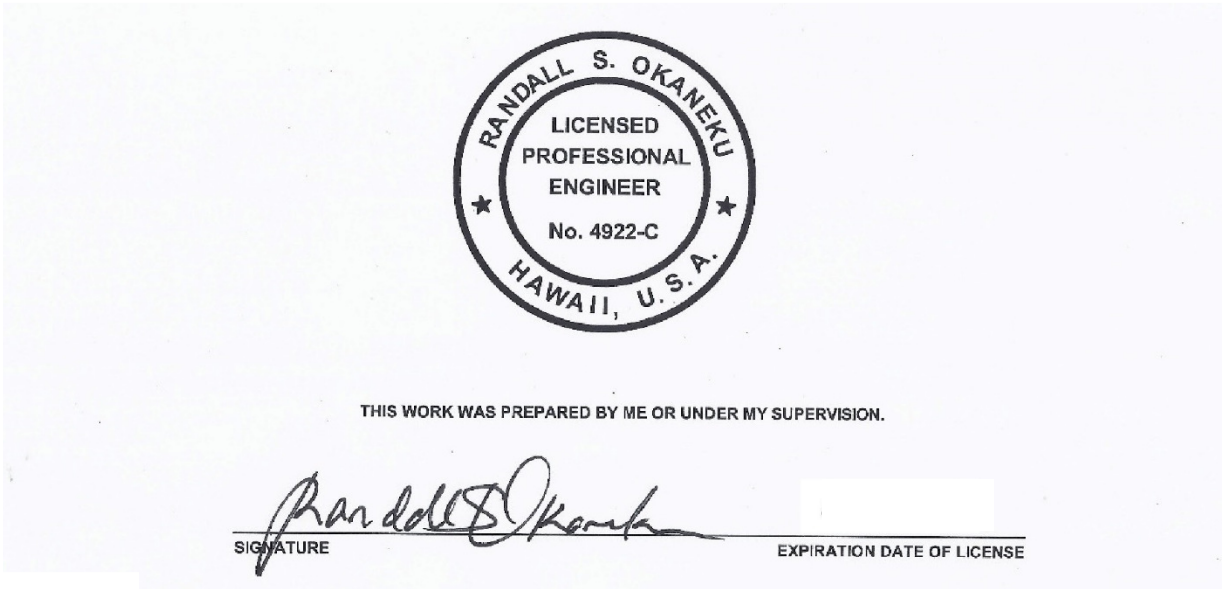

THE TRAFFIC MANAGEMENT CONSULTANT

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TRAFFIC IMPACT ANALYSIS REPORT

FOR THE PROPOSED

WAIKOLOA ROAD – PANIOLO AVENUE INTERSECTION IMPROVEMENTS

SOUTH KOHALA, HAWAII ISLAND

I. Introduction

A. Project Description

The County of Hawaii Department of Public Works is proposing to improve the intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street in Waikoloa Village, South Kohala, Hawaii Island. Two (2) alternative intersection improvements are analyzed herein: a roundabout intersection and traffic signalization. The intersection improvements are expected to be completed by the Year 2023. The Year 2033 was selected for the analysis of the interim intersection improvements. The Design Year 2043 is selected for the analysis of the long-term intersection improvements.

B. Existing Intersection

Waikoloa Road is a two-way, two-lane, major collector roadway in South Kohala, between Queen Kaahumanu Highway and Mamalahoa Highway. Figure 1 depicts the project location and vicinity map. In the vicinity of Waikoloa Village, Waikoloa Road is a two-way, four-lane roadway with a raised median. Eastbound Waikoloa Road reduces from two lanes to one lane as it approaches Paniolo Avenue. Waikoloa Road provides exclusive left-turn lanes in both directions at its unsignalized intersection with Paniolo Avenue/Pua Melia Street. East of Waikoloa Village, Waikoloa Road returns to a two-lane, undivided roadway. The posted speed on Waikoloa Road is 35 miles per hour (mph) in the vicinity of Waikoloa Village. Concrete sidewalks are provided on both sides of the west leg of Waikoloa Road. Paved shoulders are provided on both sides of the east leg of Waikoloa Road. Crosswalks are provided on all four legs of the intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street. Bicycle lanes/paths are not provided on Waikoloa Road.

Paniolo Avenue is a two-way, two- to four-lane collector roadway, which provides the primary access to Waikoloa Village. Paniolo Avenue provides separate left-turn, through, and right-turn lanes at its stop-controlled intersection with Waikoloa Road, opposite Pua Melia Street. Concrete sidewalks are provided on both sides of Paniolo Avenue. Bicycle lanes/paths are not provided on Paniolo Avenue.

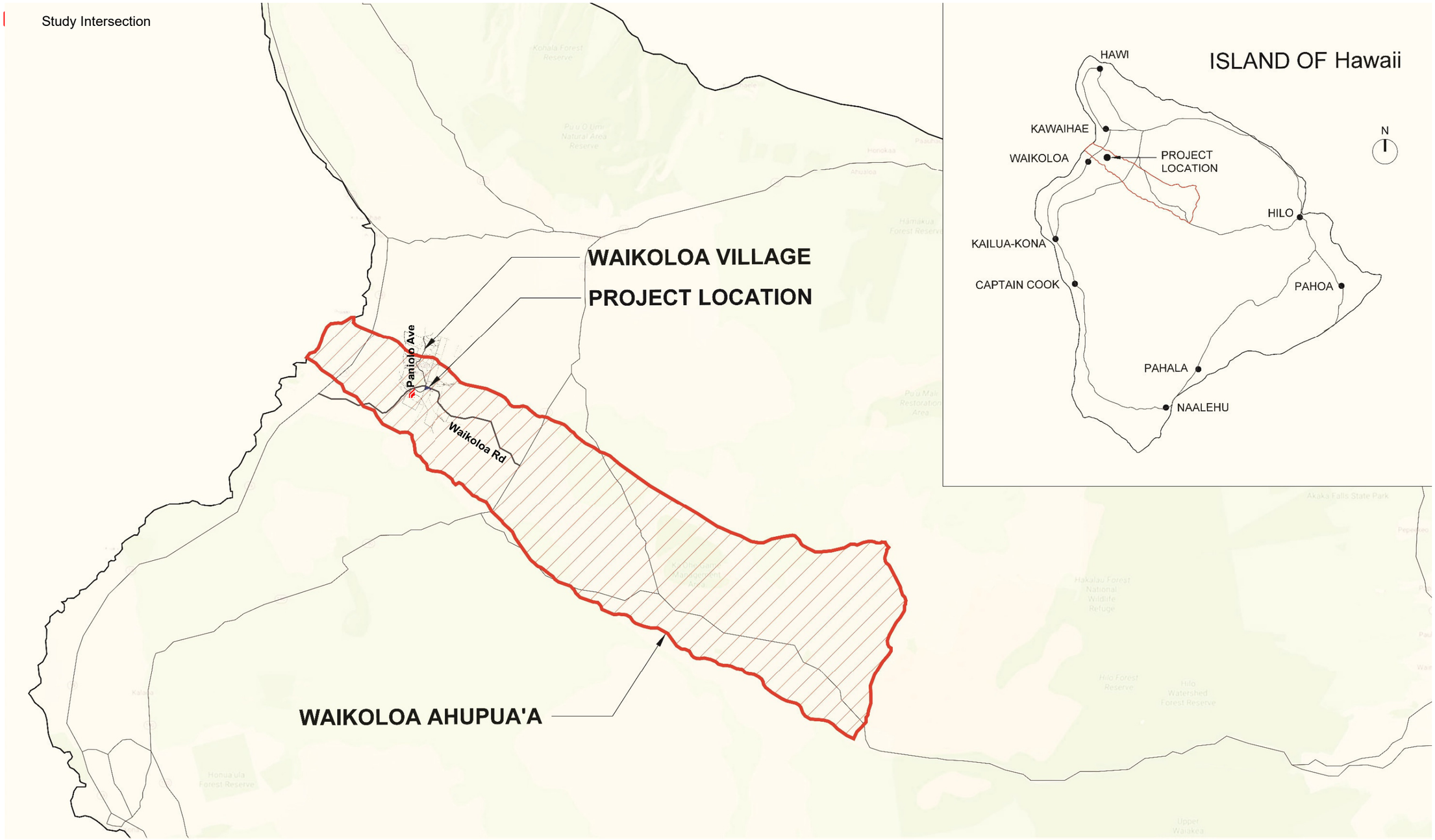


Figure 1. Location and Vicinity Map

Pua Melia Street is a two-way, two-lane loop roadway on the south side of Waikoloa Road. Pua Melia Street provides an exclusive left-turn lane and a shared through/right-turn lane at its stop-controlled intersection with Waikoloa Road. Concrete sidewalks are provided on both sides of Pua Melia Street. Bicycle lanes/paths are not provided on Pua Melia Street. The existing intersection plan is depicted on Figure 2.

C. Purpose and Scope of the Study

The purpose of this Traffic Impact Analysis Report (TIAR) is to analyze the traffic impacts resulting from the alternative improvements of the intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street. The scope of the TIAR includes the following:

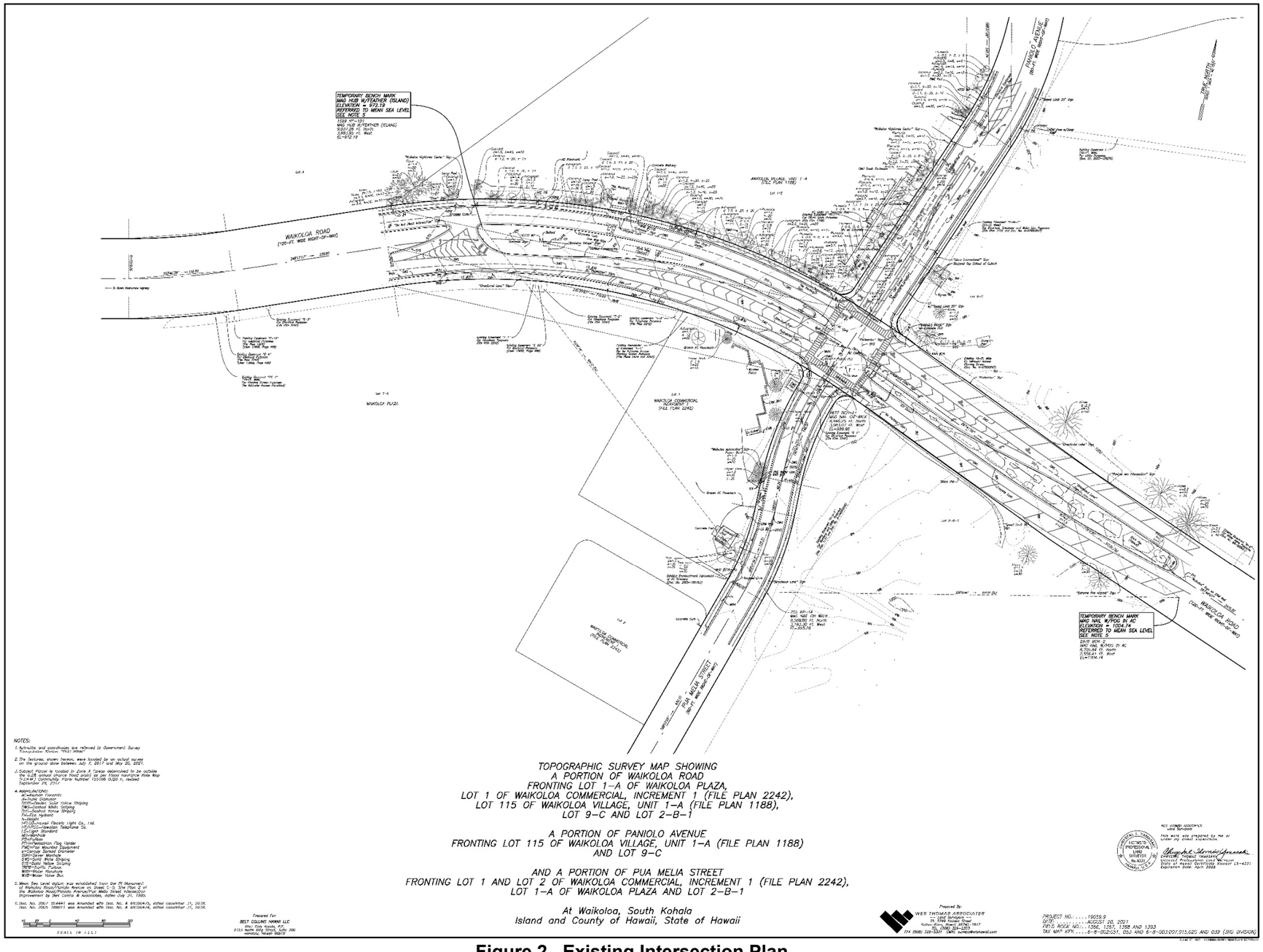
1. Description of the existing roadways.
2. Evaluation of existing traffic conditions.
3. Adjustment of the existing traffic demands to pre-pandemic traffic conditions.
4. Traffic signal warrant analysis of the existing intersection.
5. Analysis of the future traffic conditions.
6. Development of alternative intersection improvements, which would mitigate the traffic impacts identified in this study.
7. Summary of the advantages and the disadvantages of the alternative roundabout and traffic signalization improvements.

D. Methodologies

1. Capacity Analysis

The highway capacity analysis, performed in this study, is based upon procedures presented in the Highway Capacity Manual, 6th Edition (HCM), published by the Transportation Research Board. HCM defines the Level of Service (LOS) as "a quantitative stratification of a performance measure or measures representing the quality of service." HCM defines six (6) Levels of Service from the traveler's perspective, ranging from the best LOS "A" to the worst LOS "F". LOS translates the complex mathematical results of the highway capacity analysis into an A through F grading system for the purpose of simplifying the roadway performance for decision-makers.

LOS's "A", "B", and "C" are generally considered to be satisfactory Levels of Service. The Hawaii County Code "Concurrency Requirements" define LOS "D" as the minimum acceptable Level of Service. LOS's "E" and "F" are considered to be worse than acceptable Levels of Service. The intersection LOS is primarily based upon average delay (d) in seconds per vehicle (sec/veh).



TOPOGRAPHIC SURVEY MAP SHOWING
A PORTION OF WAIKOLOA ROAD
FRONTING LOT 1-A OF WAIKOLOA PLAZA,
LOT 1 OF WAIKOLOA COMMERCIAL, INCREMENT 1 (FILE PLAN 2242),
LOT 115 OF WAIKOLOA VILLAGE, UNIT 1-A (FILE PLAN 1188),
LOT 9-C AND LOT 2-B-1

A PORTION OF PANIOLO AVENUE
FRONTING LOT 115 OF WAIKOLOA VILLAGE, UNIT 1-A (FILE PLAN 1188)
AND LOT 9-C

AND A PORTION OF PUA MELIA STREET
FRONTING LOT 1 AND LOT 2 OF WAIKOLOA COMMERCIAL, INCREMENT 1 (FILE PLAN 2242),
LOT 1-A OF WAIKOLOA PLAZA AND LOT 2-B-1

At Waikoloa, South Kohala
Island and County of Hawaii, State of Hawaii

Figure 2. Existing Intersection Plan

The delays at unsignalized intersections, which includes stop-controlled intersections and roundabouts, are shorter than signalized intersections, due to the drivers' expectation and acceptance of longer delays at signalized intersections. Table 1 summarizes the HCM LOS criteria.

Table 1. Intersection Level of Service Criteria (HCM)

LOS	Signalized Control	Unsignalized Control	Description
	Delay d (sec/veh)		
A	d≤10	d≤10	Control delay is minimal.
B	10<d ≤20	10<d≤15	Control delay is not significant.
C	20<d≤35	15<d≤25	Stable operation. Queuing begins to occur.
D	35<d≤55	25<d≤35	Less stable condition. Increase in delays, decrease in travel speeds.
E	55<d≤80	35<d≤50	Unstable operation, significant delays.
F	d>80	d>50	High delays, extensive queuing.

Synchro is a traffic analysis software that was developed by Trafficware. Synchro is an intersection analysis program that is based upon the HCM 6th Edition methodology. Synchro is used to calculate the Levels of Service for the study intersection. Worksheets for the capacity analysis, performed throughout this report, are compiled in the Appendix.

2. Traffic Simulation

SimTraffic is a microscopic traffic simulation software, which was developed by Trafficware. Microscopic traffic simulation is a stochastic process, which can analyze the interactions of individual vehicles as they pass through a roadway network. SimTraffic was used to analyze the vehicle emissions and fuel consumption. The results of ten (10) simulations were averaged to determine the environmental impacts of the alternative traffic controls.

3. Traffic Signal Warrant Analysis

The Manual on Uniform Traffic Control Devices, 2009 Edition (MUTCD), published by the Federal Highways Administration, U. S. Department of Transportation, provides the guidelines to determine the need for the installation of traffic control signals. The MUTCD recommends that a "traffic control signal should not be installed unless one or more of the factors" are met. However, the MUTCD goes on to state that

the "satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal." Engineering analysis and judgment must be used to develop alternative traffic controls to improve operations and safety. The MUTCD has not published warrants for the construction of a roundabout intersection. However, a roundabout can provide an alternative traffic control, where traffic signal warrants are met.

In general practice, the installation of traffic signals at an intersection is based upon the satisfaction of more than one traffic signal warrant, with the exception of Warrant 7, Crash Experience. The satisfaction of Warrant 7 may justify a traffic signal installation based solely upon safety.

Warrants 10 is a traffic signal warrant analysis software program that also was developed by Trafficware. Warrants 10 is based upon the MUTCD guidelines. The traffic volume Warrants 1, 2, and 3 were analyzed in this study. The traffic signal warrant analysis worksheets are attached in the Appendix. The MUTCD Tables and Figures, referenced below, are included in the traffic signal warrant worksheets.

a. Warrant 1, Eight-Hour Vehicular Volume

Warrant 1 is satisfied if the minimum volumes are met for Condition A, Condition B, or the combination of Conditions A and B for each of any eight (8) hours of an average day.

Condition A (Minimum Vehicular Volume) is considered when the volume of intersecting traffic is the principal reason to consider traffic signalization. Condition A is satisfied when the intersecting traffic meets the minimum hourly volumes in the 100-percent columns of Condition A in Table 4C-1 of the MUTCD.

Condition B (Interruption of Continuous Traffic) is considered when the traffic volume on the major street is so heavy that the traffic on the minor street would suffer excessive delays or conflicts while entering or crossing the major street. Condition B is satisfied when the major and minor street traffic meet the minimum hourly volumes in the 100-percent columns of Condition B in Table 4C-1 of the MUTCD.

The combination of Conditions A and B is considered when the hourly volumes in Table 4C-1 of the MUTCD are met in the 80-percent columns of the respective Conditions A and B.

b. Warrant 2, Four-Hour Vehicular Volume

Warrant 2 is satisfied when the volumes of intersecting traffic for each of any four (4) hours of an average day, i.e., the plotted points of traffic volumes on the

major street, total for both directions, and corresponding traffic volume on the minor street (higher direction only) fall above the applicable curve on Figure 4C-1 of the MUTCD.

c. Warrant 3, Peak Hour

Warrant 3 is considered when the minor street traffic experiences undue delay while crossing or turning onto a major street for a minimum of one hour of an average day.

Condition A (Peak Hour Delay) is satisfied when, during the same 60-minute period, there is a total stop delay of 4 vehicle-hours on one minor-street approach; and traffic volumes exceed 100 vph for one lane and 150 vph for two lanes on the minor street; and 650 vph on a three-legged intersection or 800 vph on a four-legged intersection. Condition A is not analyzed in this study.

Condition B (Peak Hour Volume) is met when the approach volume on the minor street (higher direction only) and corresponding total volumes on both approaches on the major street fall above the plotted graph on Figure 4C-3 of the MUTCD.

The MUTCD goes on to specify that the Peak Hour Warrant 3 shall be applied only in unusual cases, such as office complexes, manufacturing plants, and industrial complexes, where high volumes of traffic occur during brief periods of the day.

d. Warrant 7, Crash Experience

Warrant 7 is considered when "five or more reported crashes of the types susceptible to correction by a traffic control signal, have occurred within a 12-month period".

II. Existing Conditions

A. Field Investigation and Data Collection

Turning movement traffic count surveys were conducted at the intersection of Waikoloa Road and Paniolo Avenue from 6:30 AM to 6:30 PM on August 24-25, 2021.

1. Existing AM Peak Hour Traffic

The existing AM peak hour of traffic at the study intersection occurred from 7:00 AM to 8:00 AM. West of Paniolo Avenue, Waikoloa Road carried about 700 vehicles per hour (vph), total for both directions. Waikoloa Road carried about 450 vph, total

for both directions, east of Paniolo Avenue. Paniolo Avenue carried about 800 vph, total for both directions, while Pua Melia Street carried less than 100 vph. A total of about 1,000 vph entered the intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street, during the existing AM peak hour of traffic. About 5 percent of the existing AM peak hour intersection traffic were comprised of trucks and buses.

One (1) pedestrian crossed Paniolo Avenue and two (2) pedestrians crossed Waikoloa Road, during the existing AM peak hour of traffic. No bicycles were observed entering the study intersection, during the existing AM peak hour of traffic.

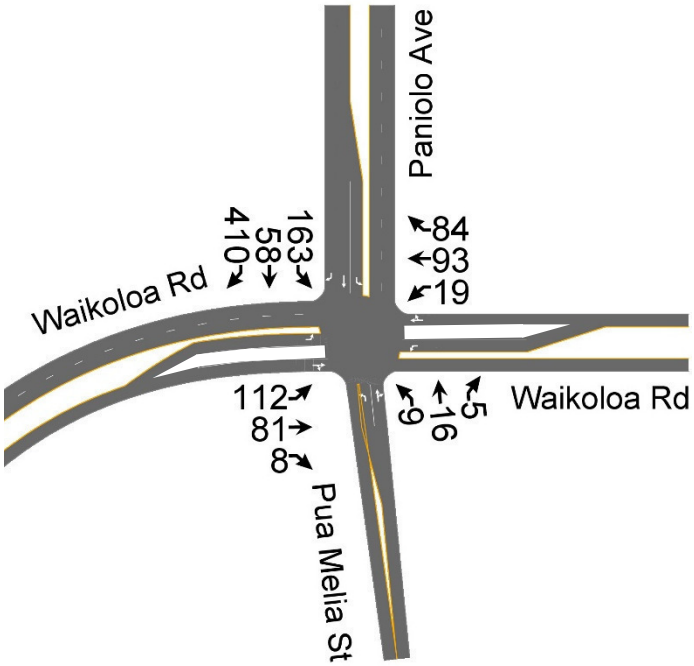
The left-turn movement on Pua Melia Street at Waikoloa Road operated at LOS "E", during the existing AM peak hour of traffic. The left-turn and through movements on Paniolo Avenue at Waikoloa Road operated at LOS "C". The other traffic movements at the intersection operated at LOS "B" or better, during the existing AM peak hour of traffic.

2. Existing PM Peak Hour Traffic

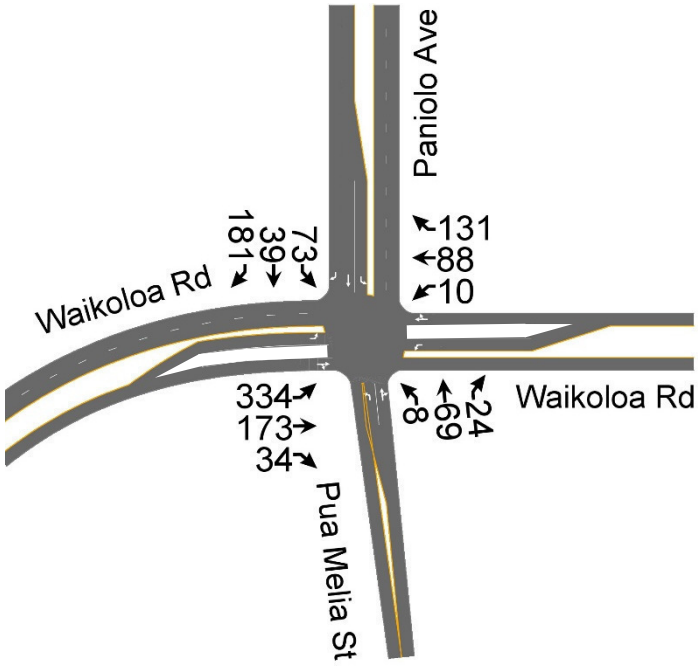
The existing PM peak hour of traffic at the study intersection occurred from 3:30 PM to 4:30 PM. Waikoloa Road carried about 900 vph, total for both directions, west of Paniolo Avenue. East of Paniolo Avenue, Waikoloa Road carried about 500 vph, total for both directions. Paniolo Avenue carried about 900 vph, while Pua Melia Street carried about 200 vph. A total of about 1,200 vph entered the intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street, during the existing PM peak hour of traffic. About 2 percent of the existing PM peak hour intersection traffic were comprised of trucks and buses.

Nine (9) pedestrians crossed Waikoloa Road and five (5) pedestrians crossed Pua Melia Street, during the existing PM peak hour of traffic. One (1) bicycle was observed eastbound on Waikoloa Road. No bicycles were observed on Paniolo Avenue or Pua Melia Street.

During the existing PM peak hour of traffic, the left-turn movements from Paniolo Avenue and from Pua Melia Street operated at LOS "F" at Waikoloa Road. The through/right-turn movement on Pua Melia Street and the through movement on Paniolo Avenue operated at LOS "E". The other traffic movements at the intersection operated at satisfactory Levels of Service, i.e., LOS "C" or better. The existing AM and PM peak hour traffic data are depicted on Figure 3.



Existing AM Peak Hour Traffic



Existing PM Peak Hour Traffic

Figure 3. Existing Peak Hour Traffic

B. Crash Analysis

The County of Hawaii Department of Public Works (DPW) requested the most recent available crash data from the State of Hawaii Department of Transportation (DOT) at the intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street. In its letter dated October 22, 2021 (HWY-TS 21-2.0251), DOT found four (4) major traffic crashes at the intersection between the Years 2016 and 2020. Three (3) crashes involved broadside collisions, and one (1) crash involved a single motorcycle crash. None of the crashes involved any fatalities. No pedestrian or bicycle accidents were reported by DOT. The DOT data were collected under the Highway Safety Improvement Program of Title 23, United States Code (U.S.C.), Section 148, and are protected under Title 23, U.S.C., Section 409.

C. Traffic Signal Warrant Analysis

Warrant 2 was met at the intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street for traffic signalization for eleven (11) hours where four (4) hours are required under existing conditions. Warrant 3 Condition B was met for four (4) hours where one (1) hour is required under existing conditions. Warrant 1 was not met. While the three (3) broadside collisions at the study intersection, reported by DOT, may have been prevented by traffic signalization, the number of crashes in a twelve (12) month period did not meet Warrant 7.

D. Pre-Pandemic Traffic Conditions

During the Years 2020-2021, traffic volumes in South Kohala declined dramatically, due to the coronavirus 2019 (COVID-19) travel restrictions and the Statewide shutdown order. Historic traffic count data collected on Waikoloa Road and Paniolo Avenue were obtained from the DOT. DOT collected traffic count data on Waikoloa Road, west of Paniolo Avenue in October 2019, and east of Paniolo Avenue in January 2019. DOT also collected data on Paniolo Avenue, north of Waikoloa Road, in January 2019.

The existing (2021) AM peak hour traffic count data were about 9 percent lower than the Year 2019 pre-pandemic peak hour traffic conditions. The existing PM peak hour traffic count data were 5 percent lower than the 2019 pre-pandemic PM peak hour traffic conditions. The existing peak hour traffic data were adjusted to pre-pandemic (2019) conditions. Table 2 compares the 2019 DOT peak hour traffic count data with the existing (2021) peak hour traffic count data on Waikoloa Road and Paniolo Avenue.

Table 2. Waikoloa Road/Paniolo Avenue Peak Hour Traffic Comparison				
Roadway	**Peak Hour**	**2019**	**2021**	**Change 2021 to 2019**
Waikoloa Road West Leg	AM	809	713	-11.8%
	PM	915	868	-5.1%
Waikoloa Road East Leg	AM	475	445	-6.2%
	PM	547	499	-8.7%
Paniolo Avenue North Leg	AM	873	810	-7.2%
	PM	893	877	-1.8%
Totals	AM	2,156	1,968	-8.7%
	PM	2,354	2,244	-4.7%

The existing 12-hour (6:30 AM-6:30 PM) traffic count data were about 11 percent lower than the Year 2019 pre-pandemic traffic conditions. Table 3 compares the 2019 DOT 12-hour traffic count data with the existing (2021) 12-hour traffic count data on Waikoloa Road and Paniolo Avenue.

Table 3. Waikoloa Road/Paniolo Avenue 12-Hour Traffic Comparison			
Roadway	**2019**	**2021**	**Change 2021 to 2019**
Waikoloa Road-West Leg	8,152	7,182	-11.8%
Waikoloa Road-East Leg	4,600	4,202	-8.7%
Paniolo Avenue-North Leg	8,346	7,451	-10.7%
Totals	21,098	18,834	-10.7%

After adjusting the existing traffic data to pre-pandemic conditions, Warrant 1 was met for traffic signalization for nine (9) hours, where eight (8) hours are required at the intersection of Waikoloa Road and Paniolo Avenue. Warrant 2 was met for twelve (12) hours where four (4) hours are required under pre-pandemic conditions. Warrant 3 Condition B was met for seven (7) hours where one (1) hour is required.

III. Future Traffic Conditions

A. Background Growth in Traffic

The Federal-Aid Highways 2035 Transportation Plan for the District of Hawaii (TPDH) was prepared by the State of Hawaii Department of Transportation, in cooperation with the County of Hawaii Department of Public Works and Planning Department. The TPDH developed long-range travel forecasts for Hawaii Island based upon future socio-economic conditions. The TPDH projected an average annual growth rate of about 2.0 percent in vehicle trips in South Kohala. For the purpose of this traffic impact analysis, an annual average growth factor of 2.0 percent was uniformly applied to the pre-pandemic adjusted peak hour traffic to estimate the Years 2033 and 2043 peak hour traffic demands.

B. Waikoloa Plaza

Waikoloa Plaza (also known as the Lofts at Waikoloa) is a mixed-use development located on the southwest corner of the intersection of Waikoloa Road and Paniolo Avenue/ Pua Melia Street. The east phase of the development is under construction at this writing. The Traffic Impact Analysis Report for the Proposed Kohala Place at Waikoloa, prepared by The Traffic Management Consultant and dated August 12, 2008, analyzed the master plan development of the Waikoloa Plaza property. Waikoloa Plaza is assumed to be 50 percent built-out and occupied by the Year 2033, and fully built-out and occupied by the Year 2043. Trip generation and traffic assignments of the Kohala Place TIAR were added to the Years 2033 and 2043 projected peak hour traffic.

C. Saddle Road Extension

Daniel K. Inouye (DKI) Highway (also known as Saddle Road) intersects Mamalahoa Highway about 3 miles south of Waikoloa Road. The Saddle Road Extension project proposes to extend the DKI Highway from Mamalahoa Highway to Queen Kaahumanu Highway. The Saddle Road Extension will provide a shorter route between Mamalahoa Highway and Queen Kaahumanu Highway and can be expected to divert a significant amount of through traffic from Waikoloa Road. However, at this writing, the Saddle Road Extension has been put on hold by the State of Hawaii Department of Transportation and the Federal Highways Administration due to the lack of funding. Therefore, the Saddle Road Extension is not included in this traffic impact analysis.

D. 2033 Peak Hour Traffic Without Improvements

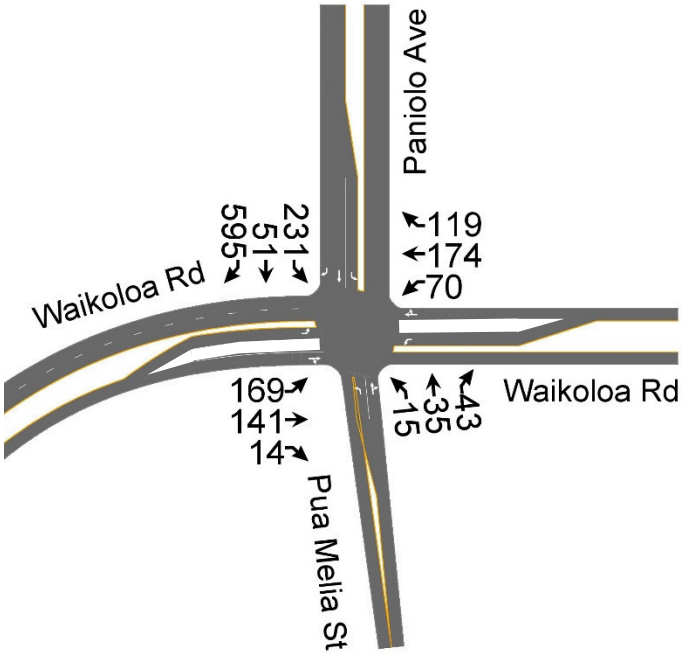
By the Year 2033 without intersection improvements, the left-turn movements from Paniolo Avenue and Pua Melia Street are expected to operate at LOS "F", during the AM peak hour of traffic.

Paniolo Avenue and Pua Melia Street are expected to continue to operate at LOS "F", during the Year 2033 PM peak hour of traffic without intersection improvements. Figure 4 depicts the Year 2033 AM and PM peak hour traffic volumes.

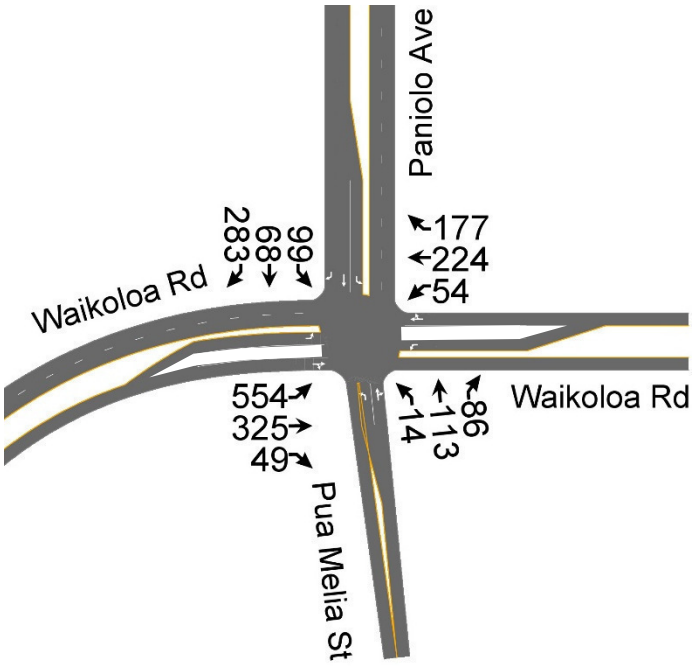
E. 2043 Peak Hour Traffic Without Improvements

Under the existing intersection geometrics and traffic controls, Paniolo Avenue and Pua Melia Street are expected to operate at LOS "F", during the Year 2043 AM peak hour of traffic without intersection improvements.

During the Year 2043 PM peak hour of traffic without intersection improvements, Paniolo Avenue and Pua Melia Street are expected to continue to operate at LOS "F". The Year 2043 AM and PM peak hour traffic volumes are depicted on Figure 5.

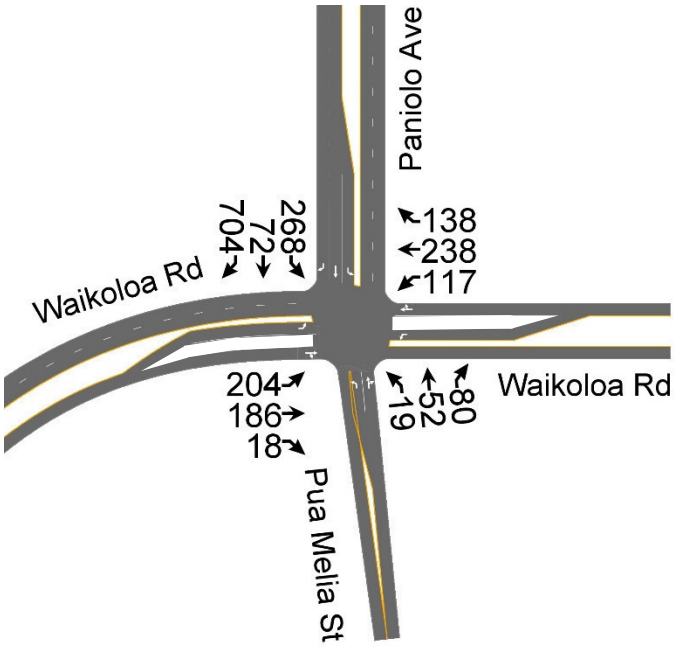


Year 2033 AM Peak Hour Traffic

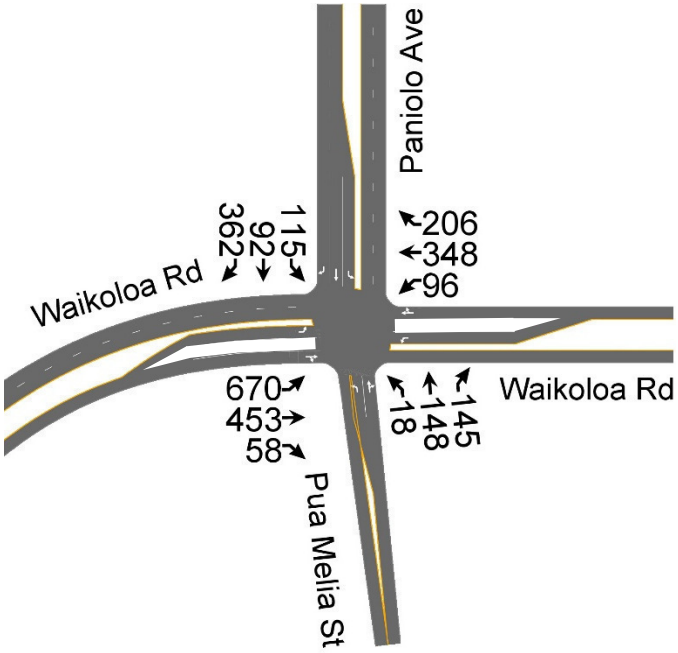


Year 2033 PM Peak Hour Traffic

Figure 4. Year 2033 Peak Hour Traffic



Year 2043 AM Peak Hour Traffic



Year 2043 PM Peak Hour Traffic

Figure 5. Year 2043 Peak Hour Traffic

IV. Alternative Intersection Improvements

A. Roundabout Intersection

1. Interim Roundabout Intersection Improvements

The proposed Saddle Road Extension is expected to provide the long-term traffic mitigation measure for the intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street by diverting through traffic between Mamalahoa Highway and Queen Kaahumanu Highway. The single-lane roundabout intersection improvements can provide an interim traffic mitigation until the Saddle Road Extension is constructed. A single-lane roundabout is lower in cost than the two-lane roundabout, which will require land acquisition. The interim single-lane roundabout will provide motorists an opportunity to gain experience navigating the roundabout. In fact, a roundabout operation can become more efficient as motorists become more accustomed to entering and exiting the roundabout. HCM continues to update the capacity analysis of a roundabout as U.S. motorists have become more familiar with the European intersection traffic controls.

The interim roundabout intersection improvements will consist of a single-lane circulatory roadway and right-turn by-pass lanes from westbound Waikoloa Road to northbound Paniolo Avenue, and from southbound Paniolo Avenue to westbound Waikoloa Road. The right-turn bypass lane will provide a "free" right-turn movement, i.e., the right-turn vehicles remain in curb lanes and do not enter the roundabout. Vehicles, exiting the roundabout onto Paniolo Avenue or westbound Waikoloa Road, will turn into the left lanes of the respective roadways.

The total estimated cost of the single-lane roundabout alternative is $3,560,000, exclusive of the costs acquiring the rights-of-way. Figure 6 depicts the single-lane roundabout concept. The following interim roundabout improvements, are proposed for implementation by the Year 2033:

a. A single-lane roundabout should be constructed at the intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street.
b. The one-lane entries on all approaches at the roundabout intersection should be yield-controlled.
c. A right-turn bypass lane should be provided on southbound Paniolo Avenue to westbound Waikoloa Road.
d. A right-turn bypass lane should be provided on westbound Waikoloa Road to northbound Paniolo Avenue.
e. Splitter islands should be provided on all legs of the roundabout.

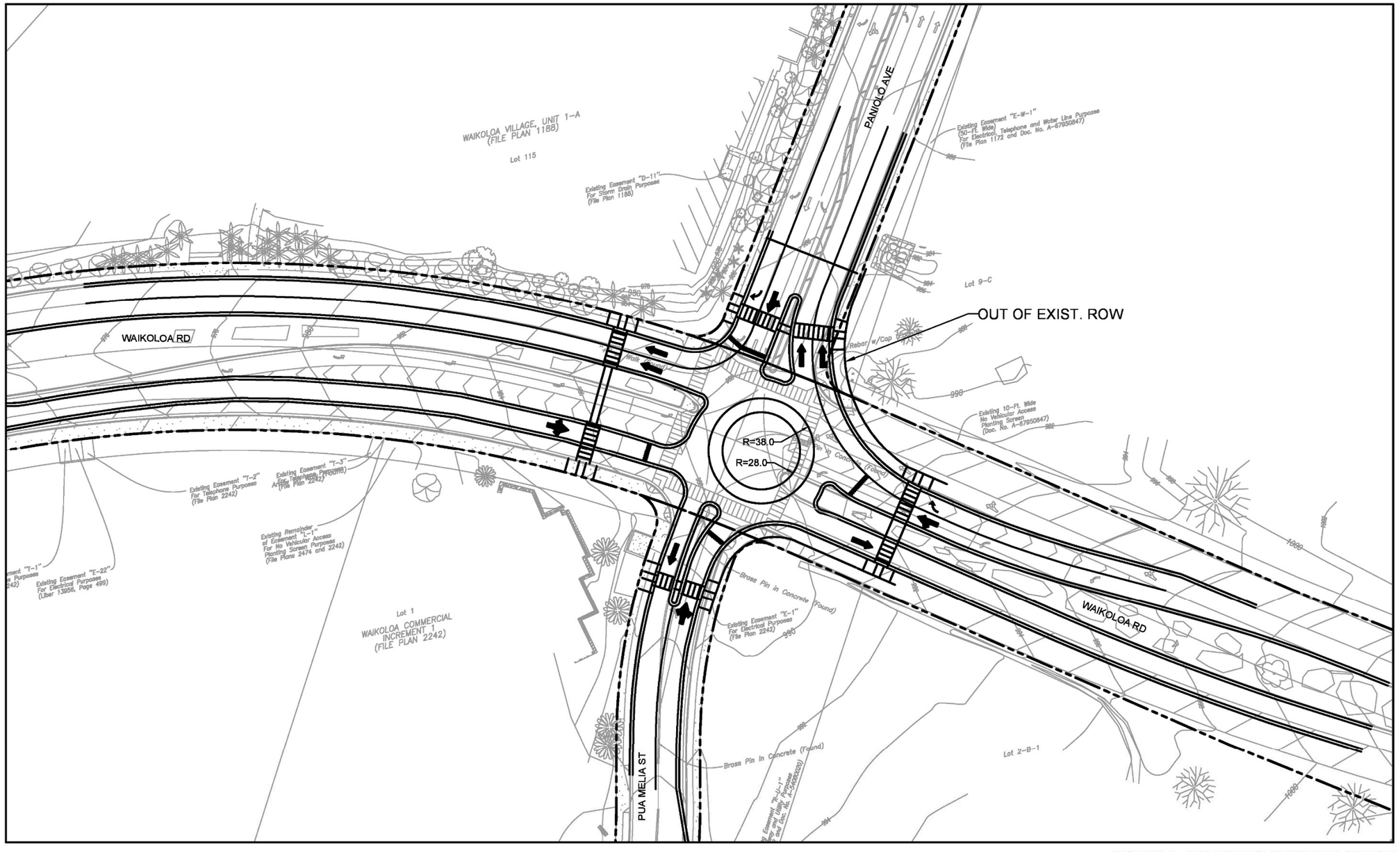


Figure 6. Interim Single-Lane Roundabout Concept

f. Advance "Roundabout Ahead" warning signs should be posted on all approaches to the intersection.

g. Crosswalks should be provided at the splitter islands, a minimum of one vehicle length from the circulatory roadway of the roundabout intersection.

h. Rectangular Rapid-Flashing Beacons (RRFB) and pedestrian crossing warning and diagonal downward arrow signs should be installed on the curbside and on the splitter island at all crosswalks.

i. Widen sidewalks at the crosswalks, as necessary.

j. The posted speeds on Waikoloa Road should be reduced to 25 mph in advance of the roundabout intersection.

k. Clear lines of sight should be provided from each approach to the entire roundabout intersection.

2. 2033 Peak Hour Traffic Impact Analysis With Single-Lane Roundabout

All approaches to the single-lane roundabout intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street are expected to operate at LOS "A", during the Year 2033 AM peak hour of traffic.

The single-lane roundabout intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street is expected to operate at an overall LOS "C", during the Year 2033 PM peak hour of traffic. Eastbound Waikoloa Road is expected to operate at LOS "D". The other approaches to the intersection are expected to operate at satisfactory Levels of Service.

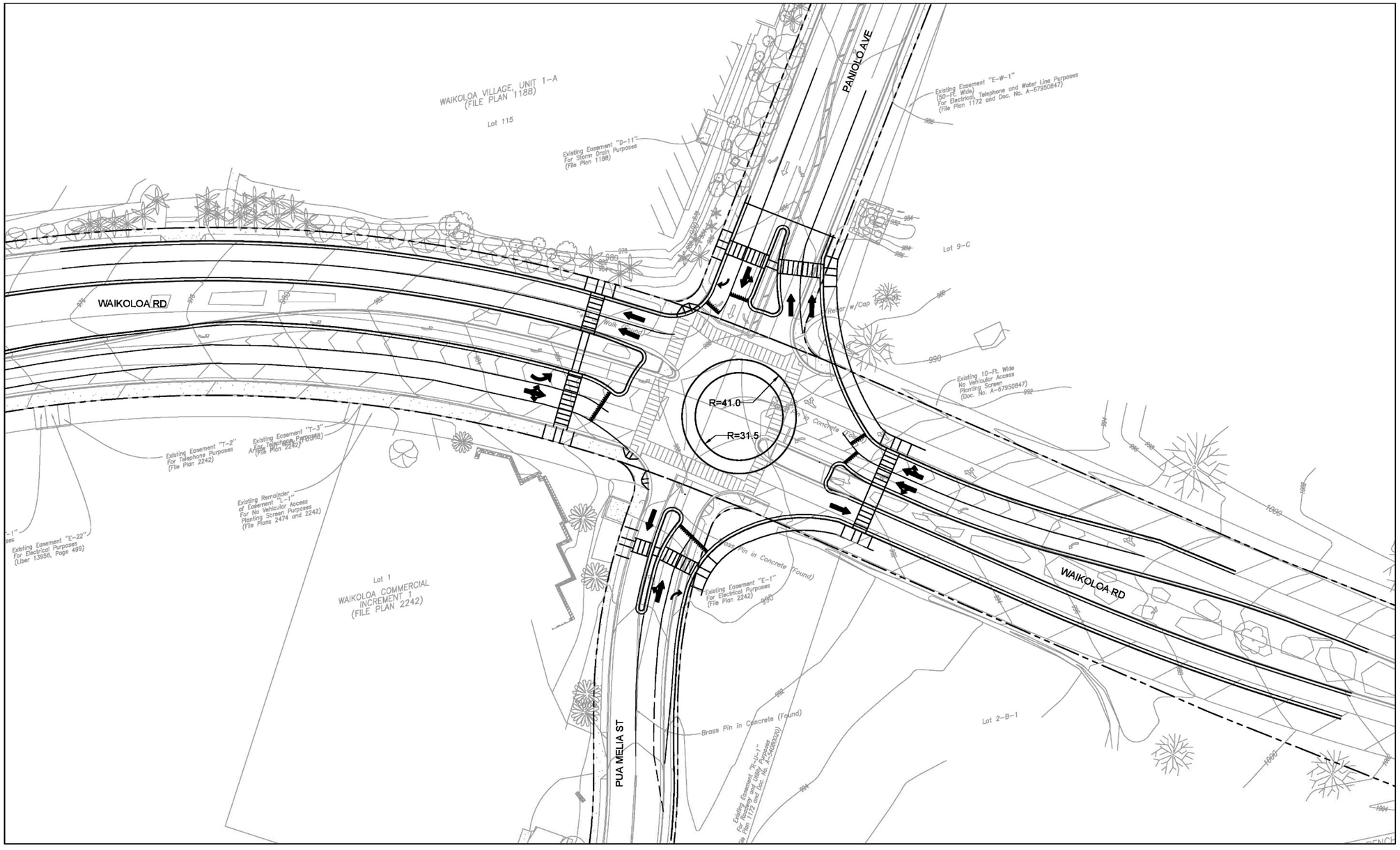
Bicycle traffic will share the vehicle traffic lanes at the roundabout intersection. Bicyclists will have the option to dismount and walk across the intersection at the crosswalks.

Pedestrians will cross one direction of traffic at a time at the roundabout intersection, from the sidewalk to the splitter island, and from the splitter island to the opposite sidewalk. The RRFB will be pedestrian-activated and provide visible/audible enhancements to improve pedestrian safety at the crosswalks.

3. 2043 Two-Lane Roundabout Intersection Improvements

The total estimated cost of the two-lane roundabout alternative is $4,360,000, exclusive of the costs acquiring the rights-of-way. Figure 7 depicts the following improvements for the two-lane roundabout intersection:

a. The circulatory roadway at the roundabout intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street should be widened to two (2) lanes.



BCH A Bowers + Kubota Company NORTH 0 15 30 60 SCALE IN FEET

FIGURE 7 - ROUNDABOUT OPTION
WAIKOLOA ROAD / PANIOLO AVE INTERSECTION IMPROVEMENT
HAWAII ISLAND, HAWAII
FEBRUARY 2022

Figure 7. Two-Lane Roundabout Concept

b. The eastbound approach of Waikoloa Road should provide an exclusive left-turn lane and a shared left-turn/through/right-turn lane.

c. The westbound approach of Waikoloa Road should provide a shared left-turn/ through lane with minimum length of 300 feet. The right-turn bypass lane should be converted to a shared through/right-turn lane with minimum length of 300 feet.

d. Paniolo Avenue should provide a shared left-turn/through lane and an exclusive right-turn lane. The right-turn bypass lane should be converted to a yield-controlled right-turn lane.

e. Pua Melia Street should provide a shared left-turn/through lane and an exclusive right-turn lane with a minimum storage length of 100 feet.

f. Lane use signs should be posted on all approaches to the intersection.

g. Crosswalks should be provided at the splitter islands, a minimum of one vehicle length from the circulatory roadway of the roundabout intersection.

h. Rectangular Rapid-Flashing Beacons (RRFB) and pedestrian crossing warning and diagonal downward arrow signs should be installed on the curbside and on the splitter island at all crosswalks.

i. Widen sidewalks at the crosswalks, as necessary.

j. Clear lines of sight should be maintained from each approach to the entire roundabout intersection.

4. 2043 Peak Hour Traffic Impact Analysis With Two-Lane Roundabout

During the Year 2043 AM peak hour of traffic with the two-lane roundabout improvements, the intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street is expected to operate at an overall LOS "B". All the traffic movements at the intersection are expected to operate at satisfactory Levels of Service.

The roundabout intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street is expected to operate at an overall LOS "B", during the Year 2043 PM peak hour of traffic. All of the traffic movements at the intersection are expected to continue to operate at satisfactory Levels of Service.

5. Advantages of the Roundabout Intersection

a. Reduces vehicle delays at the intersection.

b. Improves traffic safety by reducing conflict points between vehicle traffic movements.

c. Improves pedestrian safety by reducing conflict points between vehicles and pedestrians, providing shorter crosswalk distances across one direction of traffic, and by reducing speeds on the Waikoloa Road approaches to the intersection.

d. Reduces vehicle emissions and fuel consumption.

e. Improves bicycle safety by more closely matching vehicle speeds to bicycle speeds at the roundabout.

f. Provides U-turn movements on all approaches to the intersection.

g. Reduces the maintenance costs of the traffic signalization alternative.

6. Disadvantages of the Roundabout Intersection

a. May require a "learning curve" for motorists and bicyclists to navigate the roundabout.

b. Reduces the approach speeds on Waikoloa Road.

c. Pedestrians must wait for vehicles to stop at the crosswalks or wait for acceptable gaps in moving traffic before crossing the roadway.

d. May create longer pedestrian travel paths from the sidewalk to the crosswalk at the roundabout.

e. Navigating a roundabout may be difficult for unskilled bicyclists.

f. Reduces response times for emergency vehicles passing through the intersection.

g. Increases the total costs over the traffic signalization alternative.

h. Requires the acquisition of rights-of-way on the northeast and southeast corners of the intersection for the two-lane roundabout.

B. Signalized Intersection

1. Interim Traffic Signal Improvements

Signalizing the existing intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street is expected to accommodate the Year 2033 traffic demands. The total cost of the interim traffic signals alternative is estimated at $2,790,000. Figure 8 depicts the following interim traffic signal improvements are proposed:

a. The existing intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street should be signalized with protected-permissive left-turn phases (green arrow followed by green ball) in both directions on Waikoloa Road.

b. An "overlap" phase should be provided on the right-turn movement from Paniolo Avenue (protected right-turn phase overlapping the left-turn phase on eastbound Waikoloa Road).

c. Advance "Signal Ahead" warning signs should be posted on all approaches to the intersection.

d. Geometric intersection improvements are <u>not</u> required for the interim traffic signal improvements.

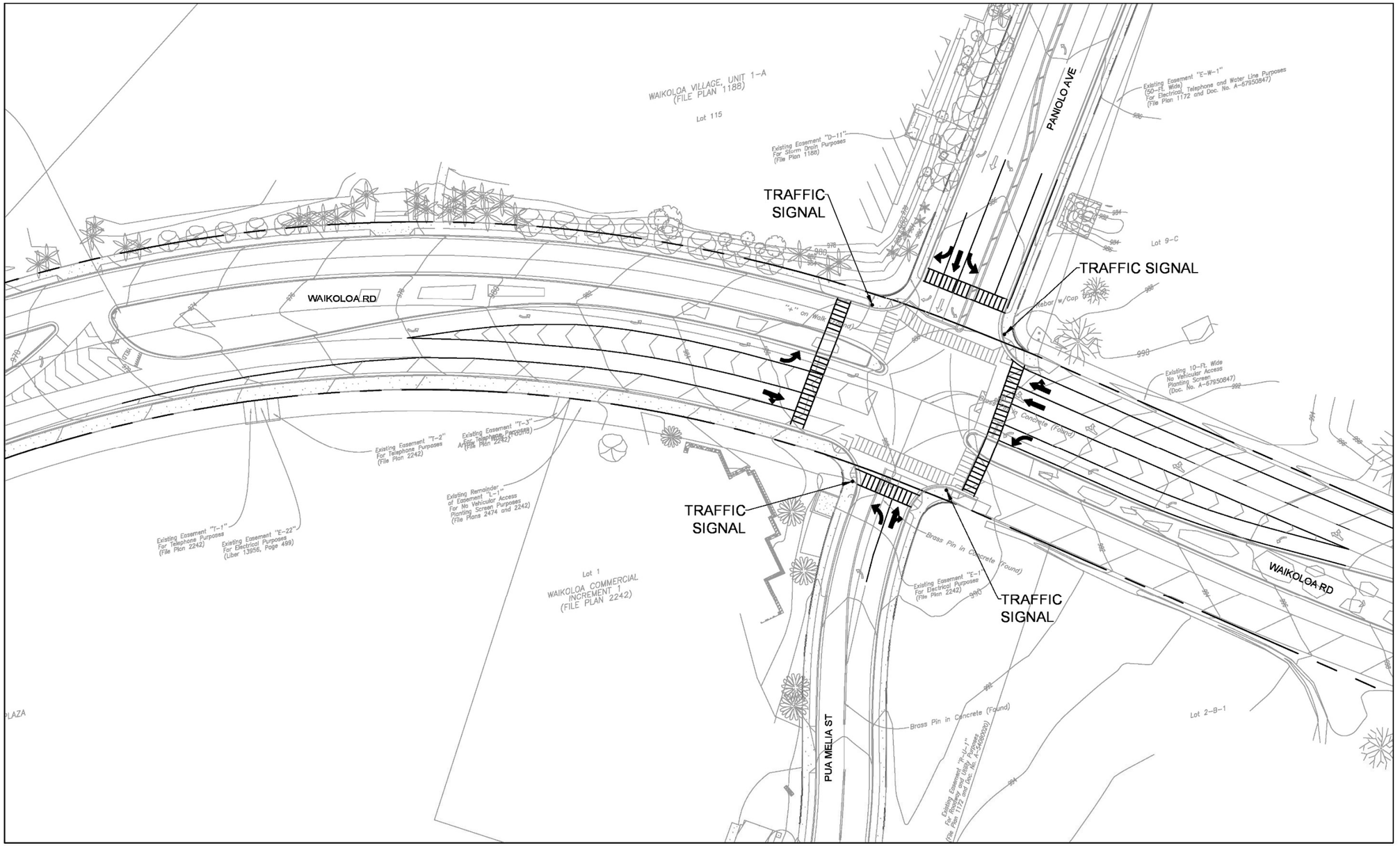


Figure 8. Interim Traffic Signal Improvements

2. 2033 Peak Hour Traffic Impact Analysis With Signalization

The intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street is expected to operate at an overall LOS "B", during the Year 2033 AM peak hour of traffic with traffic signalization. All the traffic movements at the intersection are expected to operate at satisfactory Levels of Service.

During the Year 2033 PM peak hour of traffic with traffic signalization, the intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street is expected to operate at an overall LOS "C". The left-turn movement on eastbound Waikoloa Road and the through/right-turn movement on westbound Waikoloa Road are expected to operate at LOS "D". The other traffic movements at the intersection are expected to operate at satisfactory Levels of Service.

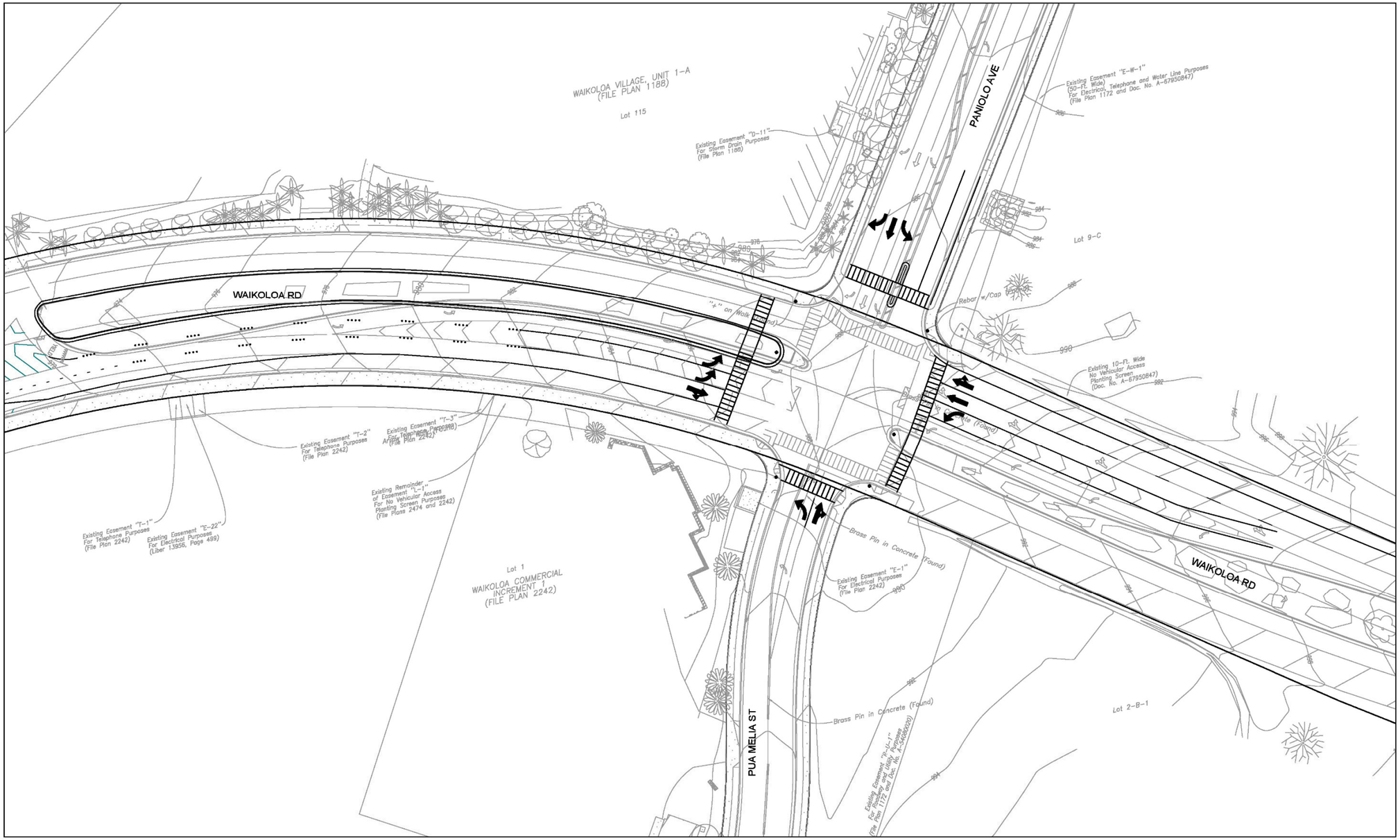
Bicycle traffic will share the vehicle traffic lanes at the signalized intersection. Bicyclists will have the option to dismount and walk across the intersection at the crosswalk.

Pedestrians will cross up to five (5) lanes of traffic plus the median on Waikoloa Road, during the pedestrian signal phase.

3. 2043 Traffic Signal Improvements

The total cost of the traffic signals alternative is estimated at $3,960,000. Figure 9 depicts the following improvements for the ultimate traffic signal improvements:

a. The signalized intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street should be upgraded with protected left-turn phases (green arrow only) in both directions on Waikoloa Road.
b. The eastbound Waikoloa Road should provide double left-turn lanes for a minimum length of 400 feet, and a shared through/right-turn lane.
c. The westbound approach of Waikoloa Road should provide an exclusive left-turn lane for a minimum length of 200 feet, and a through-only lane and a shared through/right-turn lane for a minimum distance of 300 feet.
d. Widen sidewalks, as necessary, at the crosswalks.



BCH A Bowers + Kubota Company

NORTH 0 30 60 120 SCALE IN FEET

FIGURE 9 - TRAFFIC SIGNAL OPTION
WAIKOLOA ROAD / PANIOLO AVE INTERSECTION IMPROVEMENT
HAWAII ISLAND, HAWAII
FEBRUARY 2022

Figure 9. Ultimate Traffic Signal Improvements

4. 2043 Peak Hour Traffic Impact Analysis With Signalization

The intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street is expected to operate at an overall LOS "B", during the Year 2043 AM peak hour of traffic. All the traffic movements at the intersection are expected to operate at satisfactory Levels of Service. The 95-percentile queue of the left-turn movement on Paniolo Avenue is expected to extend beyond the double left-turn lane lengths.

During the Year 2043 PM peak hour of traffic, the signalized intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street is expected to operate at an overall LOS "C". The left-turn movements from westbound Waikoloa Road and from southbound Paniolo Avenue are expected to operate at LOS "D". The other traffic movements at the intersection are expected to operate at satisfactory Levels of Service.

5. Advantages of the Signalized Intersection

a. Provides conventional intersection traffic controls.
b. Retains existing posted speed limits on Waikoloa Road.
c. Improves pedestrian safety by providing signalized crossings.
d. Can be constructed within the existing rights-of-way.
e. Decreases the total costs over the roundabout alternative.

6. Disadvantages of the Signalized Intersection

a. Increases the overall vehicle delays.
b. Requires extended "green" times on Paniolo Avenue and Pua Melia Street to accommodate the pedestrian clearance intervals (flashing "Don't Walk") crossing Waikoloa Road.
c. Increases vehicle conflict points.
d. Increases pedestrian delays, waiting for pedestrian-actuated traffic signals.
e. Increases conflict points between pedestrians and turning vehicles.
f. Peak hour left-turn queues on eastbound Waikoloa Road and on southbound Paniolo Avenue may extend beyond the left-turn lane lengths, which are limited by existing driveways.
g. Increases vehicle emissions.
h. Increases fuel consumption.
i. Increases the traffic signal maintenance costs over roundabout alternative.

V. Conclusions

The existing (2021) traffic demands at the intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street met two (2) MUTCD traffic signal warrants. The pre-pandemic adjusted (2019) traffic demands at the intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street met three (3) MUTCD traffic signal warrants. The MUTCD requires that engineering analysis and judgment must be used to develop alternative traffic controls to the installation of traffic signals, which will improve operations and safety. A roundabout can provide such an alternative traffic control.

A single-lane roundabout can provide an interim improvement, which can be expected to accommodate the projected traffic demands to the Year 2033. The single-lane roundabout would consist of a one-lane circulatory roadway with one-lane entries and exits on all legs of the roundabout. Right-turn bypass lanes would be provided from southbound Paniolo Avenue to westbound Waikoloa Road, and from westbound Waikoloa Road to northbound Paniolo Avenue. Motorists, bicyclists, and pedestrians can become accustomed to the interim single-lane roundabout traffic operations before implementing the two-lane roundabout expansion.

The proposed Saddle Road Extension is expected to provide the long-term traffic mitigation measure for the intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street. Without the construction of the proposed Saddle Road Extension, a two-lane roundabout is expected to be required to accommodate the Year 2043 traffic demands at the intersection of Waikoloa Road and Paniolo Avenue/Pua Melia Street. Two-lane entries and exits are expected to be required to accommodate the left-turn demand from eastbound Waikoloa Road to Paniolo Avenue, and the westbound through traffic demands on Waikoloa Road.

While two-lane roundabouts have been operating successfully on the mainland United States, it will be first of its kind in the State of Hawaii. Motorists and bicyclists will need to become accustomed to "rules of the road" in navigating the two-lane roundabout. Pedestrians also will need to become familiar with crossing a roundabout intersection, where the crosswalks are offset from the circulatory roadway. The proposed Rectangular Rapid-Flashing Beacons will provide additional pedestrian safety at these crossings. Public informational meetings may be required prior to implementation. Special-duty police officers also may be required for traffic control during the initial implementation of the roundabout operation.

Both the traffic signalization and the roundabout alternative improvements are expected to require double left-turn lanes to accommodate the Design Year 2043 PM peak hour traffic demands from eastbound Waikoloa Road to Paniolo Avenue. Both Alternatives are also expected to require two through lanes on westbound Waikoloa Road. Table 4 summarizes the capacity analysis for this Traffic Impact Analysis Report. Table 5 compares the costs of the alternatives.

Table 4. Summary of Capacity Analysis

Scenario	Peak Hour	MOE	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Intersection
Existing Conditions	2021 AM Peak Hour	LOS	A	-	-	A	-	-	E	B		C	C	B	B
		Delay	7.9	-	-	7.5	-	-	35.1	13.3		19.7	15.0	12.6	10.3
		v/c	0.09	-	-	0.01	-	-	0.07	0.05		0.41	0.15	0.48	N/A
	2021 PM Peak Hour	LOS	A	-	-	A	-	-	F	E		F	E	B	C
		Delay	8.6	-	-	7.7	-	-	55.2	45.7		167.1	36.7	10.2	19.8
		v/c	0.26	-	-	0.01	-	-	0.11	0.54		0.93	0.27	0.22	N/A
Without Improvements	2033 AM Peak Hour	LOS	A	-	-	A	-	-	F	C		F	D	D	B
		Delay	8.5	-	-	7.8	-	-	803.5	19.4		328.1	27.6	32.7	67.7
		v/c	0.15	-	-	0.06	-	-	1.32	0.25		1.55	0.25	0.86	N/A
	2033 PM Peak Hour	LOS	B	-	-	A	-	-	-	F		-	F	B	C
		Delay	11.4	-	-	8.2	-	-	-	1930.5		-	1003.9	13.6	3.3
		v/c	0.51	-	-	0.05	-	-	-	4.87		-	2.56	0.42	N/A
	2043 AM Peak Hour	LOS	A	-	-	A	-	-	-	E		F	F	F	F
		Delay	8.9	-	-	8.1	-	-	-	40.3		1767.2	67.5	99.3	263.0
		v/c	0.19	-	-	0.10	-	-	-	0.59		4.63	0.59	1.13	N/A
	2043 PM Peak Hour	LOS	C	-	-	A	-	-	-	F		-	F	D	A
		Delay	19.2	-	-	8.9	-	-	-	17803.7		-	9690.7	26.0	5.1
		v/c	0.75	-	-	0.10	-	-	-	38.55		-	19.37	0.70	N/A
One-Lane Roundabout	2033 AM Peak Hour	LOS	A			A		A	A			A		A	A
		Delay	8.5			7.0		0.0	7.2			6.9		0.0	4.3
		v/c	0.39			0.29		0.00	0.15			0.31		0.00	N/A
	2033 PM Peak Hour	LOS	D			B		A	C			A		A	C
		Delay	31.4			13.3		0.0	16.9			5.3		0.0	18.2
		v/c	0.92			0.47		0.00	0.48			0.18		0.00	N/A

Scenario	Peak Hour	MOE	EBL	EBLTR	WBLT	WBTR	NBL	NBT	NBR	SBL	SBT	SBR	Intersection
Two-Lane Roundabout	2043 AM Peak Hour	LOS	A	A	A	A	A		A	A		C	B
		Delay	7.8	6.6	7.0	6.8	7.1		7.2	9.4		20.6	12.0
		v/c	0.29	0.23	0.28	0.29	0.12		0.13	0.42		0.79	N/A
	2043 PM Peak Hour	LOS	B	B	C	C	C		B	A		A	B
		Delay	14.4	10.5	17.0	15.7	18.6		13.5	7.2		9.2	13.0
		v/c	0.68	0.56	0.57	0.57	0.45		0.34	0.26		0.43	N/A

Table 4. Summary of Capacity Analysis (Cont'd.)															
Scenario	**Peak Hour**	**MOE**	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**	**Intersection**
Traffic Signalization	**2033 AM Peak Hour**	**LOS**	B	B		B	B		B	A		C	B	A	B
		Delay	12.5	14.0		10.9	18.4		16.1	9.7		25.7	15.9	5.4	12.9
		v/c	0.37	0.20		0.15	0.54		0.05	0.17		0.62	0.09	0.64	0.64 (max.)
	2033 PM Peak Hour	**LOS**	D	B		B	D		C	C		C	C	A	C
		Delay	39.8	14.2		12.0	35.3		23.3	23.1		30.7	24.2	1.9	25.6
		v/c	0.92	0.39		0.15	0.77		0.04	0.44		0.41	0.15	0.28	0.92 (max.)
Traffic Signalization With Lane Widening	**2043 AM Peak Hour**	**LOS**	C	C		D	B		B	A		C	B	A	B
		Delay	32.7	28.8		38.3	16.7		11.7	6.6		20.1	11.9	6.5	16.8
		v/c	0.48	0.56		0.51	0.51		0.05	0.22		0.59	0.10	0.66	0.66 (max.)
	2043 PM Peak Hour	**LOS**	C	C		D	C		C	C		D	C	A	C
		Delay	34.4	22.7		42.0	20.9		21.7	26.4		42.2	22.5	4.6	24.7
		v/c	0.76	0.67		0.46	0.62		0.06	0.64		0.65	0.20	0.37	0.76 (max.)

Legend
MOE–Measure of Effectiveness
LOS–Level of Service
Delay–Average Delay (seconds/vehicle)
v/c–Volume-to-Capacity Ratio

EBL–Eastbound Left-Turn Movement
EBT–Eastbound Thru Movement
EBR–Eastbound Right–Turn Movement
EBLTR–Eastbound Left-Turn/Thru/ Right-Turn Movement

WBL–Westbound Left-Turn Movement
WBT–Westbound Thru Movement
WBR–Westbound Right-Turn Movement
WBLT–Westbound Left-Turn/Thru Movement
WBTR–Westbound Thru/Right-Turn Movement

NBL–Northbound Left-Turn Movement
NBT–Northbound Thru Movement
NBR–Northbound Right-Turn Movement

SBL–Southbound Left-Turn Movement
SBT– Southbound Thru Movement
SBR– Southbound Right-Turn Movement

Table 5. Waikoloa Road - Paniolo Avenue - Pua Melia Intersection Improvements - Cost Comparison of Options									
Alternative	**Construction Costs ($ Million)**	**Design Cost**	**Permits/EA**	**Total Cost**	**Design and Permit Cost Impact**	**Land Cost**	**Land Acquisition Required**	**Schedule Impacts**	**Remarks**
Roundabout Options									
Interim - One Lane Option	$3.00	$0.30	$0.26	$3.56	Yes	Not Incl.	Yes	Yes	The dedicated right turn lanes req'd for the Interim option
Ultimate - Two-lane Option	$3.75	$0.35	$0.26	$4.36	Yes	Not Incl.	Yes	Yes	This option can be striped as a one-lane roundabout until the traffic demands two lanes.
Signalization Options									
Interim Option	$2.33	$0.30	$0.16	$2.79	No	NA	No	No	Significant cost for the installation of the traffic signals, plus streetlight improvements. Limited work on the medians.
Ultimate Option	$3.45	$0.35	$0.16	$3.96	No	NA	No	No	Extended double, left turn storage lanes improvements required.
All costs are Class 4-5 Estimates									

TRAFFIC IMPACT ANALYSIS REPORT

FOR THE PROPOSED

WAIKOLOA ROAD – PANIOLO AVENUE INTERSECTION IMPROVEMENTS

SOUTH KOHALA, HAWAII ISLAND

APPENDIX A

EXISTING TRAFFIC COUNT DATA

aikoloa Rd Paniolo Ave - TMC

ue Aug 24, 2021
Full Length (6:30 AM-6:30 PM (+1))
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 866300, Location: 19.926669, -155.786985, Site Code: Waikoloa Rd Paniolo Ave

Provided by: The Traffic Management Consultant
1188 Bishop Street, Suite 1907,
Honolulu, HI, 96813, US

Leg Direction	Waikoloa Rd Eastbound						Waikoloa Rd Westbound						Pua Melia St Northbound						Paniolo Ave Southbound						
ime	L		R	U	**App**	Ped*	L		R	U	**App**	Ped*	L		R	U	**App**	Ped*	L		R	U	**App**	Ped*	**Int**
2021-08-24 6:30AM	11	7	1	0	**19**	0	2	45	9	0	**56**	0	1	2	0	0	**3**	0	25	6	96	0	**127**	0	**205**
6:45AM	21	9	5	0	**35**	0	8	29	13	0	**50**	0	1	1	1	0	**3**	0	34	9	81	0	**124**	0	**212**
Hourly Total	32	16	6	0	**54**	0	10	74	22	0	**106**	0	2	3	1	0	**6**	0	59	15	177	0	**251**	0	**417**
7:00AM	22	12	3	0	**37**	0	3	27	7	0	**37**	0	3	1	3	0	**7**	0	36	3	112	0	**151**	0	**232**
7:15AM	22	18	1	0	**41**	0	3	24	28	0	**55**	0	3	3	1	0	**7**	0	50	4	87	0	**141**	0	**244**
7:30AM	23	20	3	0	**46**	0	4	25	29	0	**58**	1	2	3	2	0	**7**	0	33	10	102	0	**145**	0	**256**
7:45AM	30	15	0	0	**45**	2	1	15	16	0	**32**	2	2	7	0	0	**9**	0	34	7	115	0	**156**	0	**242**
Hourly Total	97	65	7	0	**169**	2	11	91	80	0	**182**	3	10	14	6	0	**30**	0	153	24	416	0	**593**	0	**974**
8:00AM	38	17	0	0	**55**	4	2	23	12	0	**37**	0	2	3	1	0	**6**	0	32	7	101	0	**140**	0	**238**
8:15AM	27	18	6	1	**52**	0	3	16	14	0	**33**	2	1	5	3	0	**9**	0	20	7	80	0	**107**	0	**201**
8:30AM	32	33	5	0	**70**	3	3	21	25	1	**50**	0	2	5	1	0	**8**	0	23	9	74	0	**106**	0	**234**
8:45AM	29	15	5	0	**49**	1	3	14	19	0	**36**	0	5	8	4	0	**17**	0	17	9	55	0	**81**	0	**183**
Hourly Total	126	83	16	1	**226**	8	11	74	70	1	**156**	2	10	21	9	0	**40**	0	92	32	310	0	**434**	0	**856**
9:00AM	26	14	7	0	**47**	1	3	20	12	0	**35**	0	2	11	0	0	**13**	0	18	13	46	0	**77**	0	**172**
9:15AM	37	20	7	0	**64**	0	2	18	26	0	**46**	2	2	13	5	0	**20**	0	20	18	66	1	**105**	0	**235**
9:30AM	31	21	2	0	**54**	0	2	10	12	0	**24**	0	3	10	0	0	**13**	0	20	6	58	0	**84**	0	**175**
9:45AM	40	24	0	0	**64**	0	1	15	12	0	**28**	0	2	9	2	0	**13**	0	26	15	49	0	**90**	0	**195**
Hourly Total	134	79	16	0	**229**	1	8	63	62	0	**133**	2	9	43	7	0	**59**	0	84	52	219	1	**356**	0	**777**
10:00AM	37	20	2	0	**59**	0	2	17	19	0	**38**	0	2	10	4	0	**16**	0	24	7	56	0	**87**	0	**200**
10:15AM	34	14	2	0	**50**	2	3	22	11	0	**36**	1	0	13	0	0	**13**	0	27	11	50	2	**90**	0	**189**
10:30AM	30	17	10	0	**57**	0	1	16	21	0	**38**	0	3	16	1	0	**20**	0	19	12	66	1	**98**	0	**213**
10:45AM	39	22	1	0	**62**	0	2	21	18	0	**41**	0	1	9	2	0	**12**	0	21	15	45	0	**81**	0	**196**
Hourly Total	140	73	15	0	**228**	2	8	76	69	0	**153**	1	6	48	7	0	**61**	0	91	45	217	3	**356**	0	**798**
11:00AM	31	11	7	0	**49**	1	2	15	9	0	**26**	0	3	11	3	0	**17**	0	21	15	38	0	**74**	0	**166**
11:15AM	41	12	4	0	**57**	1	3	13	25	0	**41**	0	3	17	2	0	**22**	0	18	8	57	0	**83**	0	**203**
11:30AM	31	20	4	0	**55**	1	1	17	21	0	**39**	0	2	11	1	0	**14**	0	16	17	53	0	**86**	0	**194**
11:45AM	41	24	8	0	**73**	1	1	18	16	1	**36**	0	4	17	3	0	**24**	0	19	21	34	0	**74**	0	**207**
Hourly Total	144	67	23	0	**234**	4	7	63	71	1	**142**	0	12	56	9	0	**77**	0	74	61	182	0	**317**	0	**770**
12:00PM	39	14	5	0	**58**	0	1	18	18	0	**37**	1	5	20	4	0	**29**	0	14	12	44	0	**70**	0	**194**
12:15PM	32	13	2	1	**48**	0	4	17	20	0	**41**	0	3	13	2	0	**18**	1	11	14	40	0	**65**	0	**172**
12:30PM	32	13	6	0	**51**	1	0	14	13	0	**27**	0	2	10	1	0	**13**	1	13	11	35	0	**59**	0	**150**
12:45PM	39	17	5	2	**63**	2	4	19	26	0	**49**	0	3	11	4	0	**18**	0	21	8	37	0	**66**	0	**196**
Hourly Total	142	57	18	3	**220**	3	9	68	77	0	**154**	1	13	54	11	0	**78**	2	59	45	156	0	**260**	0	**712**
1:00PM	46	22	1	0	**69**	0	4	13	13	0	**30**	0	1	7	1	0	**9**	0	19	11	31	0	**61**	0	**169**
1:15PM	72	22	1	0	**95**	1	2	23	19	0	**44**	0	1	7	1	0	**9**	0	15	10	49	0	**74**	0	**222**
1:30PM	50	20	2	0	**72**	1	5	13	15	0	**33**	0	4	14	2	0	**20**	0	20	13	50	0	**83**	0	**208**
1:45PM	51	16	10	0	**77**	0	2	17	16	0	**35**	0	3	18	3	0	**24**	0	15	16	42	0	**73**	0	**209**

Leg	Waikoloa Rd						Waikoloa Rd						Pua Melia St						Paniolo Ave						
Direction	Eastbound						Westbound						Northbound						Southbound						
ime	L		R	U	**App**	Ped*	L		R	U	**App**	Ped*	L		R	U	**App**	Ped*	L		R	U	**App**	Ped*	**Int**
Hourly Total	219	80	14	0	**313**	2	13	66	63	0	**142**	0	9	46	7	0	**62**	0	69	50	172	0	**291**	0	**808**
2:00PM	59	9	6	0	**74**	0	1	18	11	0	**30**	2	2	14	3	0	**19**	0	15	13	49	0	**77**	0	**200**
2:15PM	64	18	3	0	**85**	1	3	18	24	0	**45**	4	0	18	1	0	**19**	1	22	14	65	0	**101**	0	**250**
2:30PM	57	28	7	1	**93**	0	0	26	17	0	**43**	0	5	14	1	0	**20**	0	29	14	77	0	**120**	0	**276**
2:45PM	53	23	6	0	**82**	0	1	17	12	0	**30**	0	4	11	1	0	**16**	0	23	9	42	0	**74**	0	**202**
Hourly Total	233	78	22	1	**334**	1	5	79	64	0	**148**	6	11	57	6	0	**74**	1	89	50	233	0	**372**	0	**928**
3:00PM	52	20	7	0	**79**	1	1	24	20	0	**45**	0	4	16	0	0	**20**	0	25	11	44	0	**80**	0	**224**
3:15PM	77	32	5	0	**114**	0	2	12	17	0	**31**	0	0	11	5	0	**16**	0	20	7	54	0	**81**	0	**242**
3:30PM	63	46	10	1	**120**	0	2	20	47	0	**69**	3	0	17	19	0	**36**	0	16	9	46	0	**71**	0	**296**
3:45PM	72	50	4	0	**126**	0	3	17	26	0	**46**	5	3	19	4	0	**26**	5	17	15	59	0	**91**	0	**289**
Hourly Total	264	148	26	1	**439**	1	8	73	110	0	**191**	8	7	63	28	0	**98**	5	78	42	203	0	**323**	0	**1051**
4:00PM	112	46	8	0	**166**	0	2	27	22	0	**51**	1	4	16	0	0	**20**	0	25	9	36	0	**70**	0	**307**
4:15PM	86	31	12	0	**129**	0	3	24	36	0	**63**	0	1	17	1	0	**19**	0	15	6	40	0	**61**	0	**272**
4:30PM	92	30	5	0	**127**	1	3	15	31	0	**49**	0	0	16	2	0	**18**	0	20	5	39	0	**64**	0	**258**
4:45PM	84	22	4	0	**110**	0	3	18	35	0	**56**	0	1	6	7	0	**14**	0	15	5	45	0	**65**	0	**245**
Hourly Total	374	129	29	0	**532**	1	11	84	124	0	**219**	1	6	55	10	0	**71**	0	75	25	160	0	**260**	0	**1082**
5:00PM	90	26	6	0	**122**	0	2	21	31	0	**54**	0	1	14	3	0	**18**	0	17	1	35	0	**53**	0	**247**
5:15PM	95	20	9	0	**124**	0	4	18	26	0	**48**	0	0	13	2	0	**15**	0	8	5	36	0	**49**	0	**236**
5:30PM	93	18	3	1	**115**	0	2	24	28	0	**54**	0	3	11	1	0	**15**	0	15	4	32	0	**51**	0	**235**
5:45PM	87	16	4	0	**107**	0	2	16	19	0	**37**	0	0	8	3	0	**11**	0	16	5	31	0	**52**	0	**207**
Hourly Total	365	80	22	1	**468**	0	10	79	104	0	**193**	0	4	46	9	0	**59**	0	56	15	134	0	**205**	0	**925**
6:00PM	54	12	1	0	**67**	0	0	21	26	0	**47**	0	1	5	1	0	**7**	0	16	2	29	0	**47**	0	**168**
6:15PM	89	17	2	0	**108**	1	0	10	17	0	**27**	0	1	4	0	0	**5**	0	7	3	26	0	**36**	0	**176**
Hourly Total	143	29	3	0	**175**	1	0	31	43	0	**74**	0	2	9	1	0	**12**	0	23	5	55	0	**83**	0	**344**
2021-08-25 6:30AM	9	12	3	0	**24**	0	5	44	7	0	**56**	0	1	2	0	0	**3**	0	20	2	106	0	**128**	0	**211**
6:45AM	15	13	1	0	**29**	1	8	30	10	0	**48**	0	1	2	0	0	**3**	2	31	5	112	0	**148**	0	**228**
Hourly Total	24	25	4	0	**53**	1	13	74	17	0	**104**	0	2	4	0	0	**6**	2	51	7	218	0	**276**	0	**439**
7:00AM	26	22	2	0	**50**	1	4	29	14	0	**47**	0	1	1	1	0	**3**	0	46	2	99	0	**147**	0	**247**
7:15AM	24	25	1	0	**50**	0	7	19	18	0	**44**	0	2	4	0	0	**6**	0	51	3	100	0	**154**	0	**254**
7:30AM	38	15	4	0	**57**	0	4	20	27	0	**51**	0	2	4	2	0	**8**	0	34	6	97	0	**137**	0	**253**
7:45AM	24	19	1	0	**44**	1	4	25	25	0	**54**	0	4	7	2	0	**13**	0	32	14	114	0	**160**	1	**271**
Hourly Total	112	81	8	0	**201**	2	19	93	84	0	**196**	0	9	16	5	0	**30**	0	163	25	410	0	**598**	1	**1025**
8:00AM	18	25	0	0	**43**	0	3	15	17	1	**36**	0	2	3	2	0	**7**	0	27	4	119	0	**150**	0	**236**
8:15AM	34	19	4	0	**57**	0	4	26	16	0	**46**	0	0	5	0	0	**5**	0	24	14	91	0	**129**	0	**237**
8:30AM	33	20	1	0	**54**	0	3	18	13	0	**34**	0	1	3	0	0	**4**	0	32	8	57	0	**97**	0	**189**
8:45AM	35	21	1	1	**58**	0	0	14	28	0	**42**	0	2	5	2	0	**9**	0	28	10	67	0	**105**	0	**214**
Hourly Total	120	85	6	1	**212**	0	10	73	74	1	**158**	0	5	16	4	0	**25**	0	111	36	334	0	**481**	0	**876**
9:00AM	33	24	2	0	**59**	3	4	23	20	0	**47**	0	5	7	2	0	**14**	0	30	13	60	0	**103**	0	**223**
9:15AM	31	22	4	0	**57**	2	2	13	16	1	**32**	0	6	7	2	0	**15**	0	27	12	64	0	**103**	0	**207**
9:30AM	24	36	3	0	**63**	1	0	15	12	0	**27**	0	1	8	1	0	**10**	0	31	6	55	0	**92**	0	**192**
9:45AM	37	23	3	0	**63**	0	0	14	8	0	**22**	0	6	9	1	0	**16**	0	31	8	46	0	**85**	0	**186**
Hourly Total	125	105	12	0	**242**	6	6	65	56	1	**128**	0	18	31	6	0	**55**	0	119	39	225	0	**383**	0	**808**
10:00AM	28	23	4	0	**55**	1	5	14	30	0	**49**	0	2	4	2	0	**8**	0	23	10	45	0	**78**	0	**190**
10:15AM	35	36	3	0	**74**	5	4	11	19	0	**34**	0	6	7	3	0	**16**	0	28	8	46	0	**82**	0	**206**
10:30AM	29	23	7	0	**59**	3	2	11	20	0	**33**	0	5	6	3	0	**14**	0	28	2	48	0	**78**	0	**184**

Leg	Waikoloa Rd						Waikoloa Rd						Pua Melia St						Paniolo Ave						
Direction	Eastbound						Westbound						Northbound						Southbound						
ime	L		R	U	**App**	Ped*	L		R	U	**App**	Ped*	L		R	U	**App**	Ped*	L		R	U	**App**	Ped*	**Int**
10:45AM	26	11	6	0	**43**	2	1	18	20	0	**39**	2	2	15	2	0	**19**	0	16	7	35	0	**58**	0	**159**
Hourly Total	118	93	20	0	**231**	11	12	54	89	0	**155**	2	15	32	10	0	**57**	0	95	27	174	0	**296**	0	**739**
11:00AM	27	17	5	0	**49**	4	3	13	20	0	**36**	0	1	7	1	0	**9**	0	21	9	35	0	**65**	0	**159**
11:15AM	39	9	3	0	**51**	0	5	18	23	0	**46**	0	3	9	0	0	**12**	0	33	6	25	0	**64**	0	**173**
11:30AM	36	11	0	0	**47**	0	1	12	12	0	**25**	0	2	5	3	0	**10**	0	20	4	40	0	**64**	0	**146**
11:45AM	31	6	5	0	**42**	0	2	19	26	0	**47**	0	1	14	3	0	**18**	0	21	5	43	0	**69**	0	**176**
Hourly Total	133	43	13	0	**189**	4	11	62	81	0	**154**	0	7	35	7	0	**49**	0	95	24	143	0	**262**	0	**654**
12:00PM	40	8	4	0	**52**	3	1	11	25	0	**37**	0	5	15	2	0	**22**	0	23	20	36	0	**79**	0	**190**
12:15PM	34	12	5	0	**51**	0	5	22	15	0	**42**	0	1	15	0	0	**16**	0	14	17	58	0	**89**	0	**198**
12:30PM	39	13	3	0	**55**	3	2	15	14	0	**31**	0	1	11	6	0	**18**	0	19	11	29	0	**59**	0	**163**
12:45PM	62	18	8	1	**89**	1	4	15	33	0	**52**	0	1	10	2	0	**13**	0	14	7	43	0	**64**	0	**218**
Hourly Total	175	51	20	1	**247**	7	12	63	87	0	**162**	0	8	51	10	0	**69**	0	70	55	166	0	**291**	0	**769**
1:00PM	55	11	4	1	**71**	0	3	18	16	0	**37**	0	1	15	2	0	**18**	0	30	12	57	0	**99**	0	**225**
1:15PM	54	19	6	1	**80**	0	1	21	20	0	**42**	0	6	10	3	0	**19**	0	12	14	49	0	**75**	0	**216**
1:30PM	38	17	4	0	**59**	1	1	21	15	0	**37**	0	5	15	1	0	**21**	0	20	12	43	0	**75**	0	**192**
1:45PM	39	16	11	0	**66**	3	2	17	14	0	**33**	0	3	11	5	0	**19**	0	19	10	50	0	**79**	0	**197**
Hourly Total	186	63	25	2	**276**	4	7	77	65	0	**149**	0	15	51	11	0	**77**	0	81	48	199	0	**328**	0	**830**
2:00PM	50	19	4	0	**73**	0	4	15	19	0	**38**	0	2	11	4	0	**17**	0	28	10	45	0	**83**	0	**211**
2:15PM	60	20	11	0	**91**	2	2	15	23	1	**41**	0	2	11	4	0	**17**	1	22	11	41	0	**74**	0	**223**
2:30PM	54	30	7	0	**91**	1	2	20	17	0	**39**	1	5	11	0	0	**16**	1	18	9	50	0	**77**	0	**223**
2:45PM	58	23	7	1	**89**	3	2	22	27	0	**51**	0	4	18	2	0	**24**	0	15	11	35	0	**61**	0	**225**
Hourly Total	222	92	29	1	**344**	6	10	72	86	1	**169**	1	13	51	10	0	**74**	2	83	41	171	0	**295**	0	**882**
3:00PM	71	25	7	0	**103**	6	0	16	25	0	**41**	0	2	13	4	0	**19**	0	21	8	51	0	**80**	0	**243**
3:15PM	81	37	7	0	**125**	6	0	17	26	0	**43**	0	0	10	4	0	**14**	0	28	6	49	0	**83**	0	**265**
3:30PM	77	38	7	0	**122**	0	3	11	40	0	**54**	1	2	17	15	0	**34**	1	22	9	45	0	**76**	0	**286**
3:45PM	73	43	6	0	**122**	1	3	25	32	0	**60**	0	3	17	3	0	**23**	0	27	7	48	0	**82**	0	**287**
Hourly Total	302	143	27	0	**472**	13	6	69	123	0	**198**	1	7	57	26	0	**90**	1	98	30	193	0	**321**	0	**1081**
4:00PM	63	43	11	1	**118**	0	3	25	25	0	**53**	0	1	23	1	0	**25**	0	26	8	42	0	**76**	0	**272**
4:15PM	72	38	9	0	**119**	0	4	23	18	0	**45**	0	2	15	3	0	**20**	0	20	8	42	0	**70**	0	**254**
4:30PM	80	31	4	0	**115**	0	0	18	28	0	**46**	0	2	18	1	0	**21**	0	15	5	25	0	**45**	0	**227**
4:45PM	90	12	8	1	**111**	1	4	14	34	0	**52**	0	0	10	3	0	**13**	0	11	7	38	0	**56**	0	**232**
Hourly Total	305	124	32	2	**463**	1	11	80	105	0	**196**	0	5	66	8	0	**79**	0	72	28	147	0	**247**	0	**985**
5:00PM	78	19	2	0	**99**	0	3	12	35	0	**50**	0	1	17	7	0	**25**	0	19	5	46	0	**70**	0	**244**
5:15PM	90	19	4	0	**113**	0	7	16	38	0	**61**	0	0	9	2	0	**11**	0	14	5	30	0	**49**	0	**234**
5:30PM	81	14	3	0	**98**	0	2	26	29	0	**57**	0	0	9	1	0	**10**	0	10	3	31	0	**44**	0	**209**
5:45PM	86	23	2	0	**111**	1	4	18	34	0	**56**	0	0	2	1	0	**3**	0	13	1	27	0	**41**	0	**211**
Hourly Total	335	75	11	0	**421**	1	16	72	136	0	**224**	0	1	37	11	0	**49**	0	56	14	134	0	**204**	0	**898**
6:00PM	59	11	1	0	**71**	0	1	16	21	0	**38**	0	0	10	1	0	**11**	0	11	4	40	0	**55**	0	**175**
6:15PM	72	16	2	0	**90**	0	0	21	26	0	**47**	0	0	4	1	0	**5**	0	9	5	25	0	**39**	0	**181**
Hourly Total	131	27	3	0	**161**	0	1	37	47	0	**85**	0	0	14	2	0	**16**	0	20	9	65	0	**94**	0	**356**
otal	4701	1991	427	14	**7133**	82	245	1812	2009	5	**4071**	28	206	976	221	0	**1403**	13	2116	844	5213	4	**8177**	1	**20784**
% Approach	65.9%	27.9%	6.0%	0.2%	**-**	-	6.0%	44.5%	49.3%	0.1%	**-**	-	14.7%	69.6%	15.8%	0%	**-**	-	25.9%	10.3%	63.8%	0%	**-**	-	-
% Total	22.6%	9.6%	2.1%	0.1%	**34.3%**	-	1.2%	8.7%	9.7%	0%	**19.6%**	-	1.0%	4.7%	1.1%	0%	**6.8%**	-	10.2%	4.1%	25.1%	0%	**39.3%**	-	-
Motorcycles	11	2	1	0	**14**	-	0	8	1	0	**9**	-	0	1	0	0	**1**	-	4	1	17	0	**22**	-	46
% Motorcycles	0.2%	0.1%	0.2%	0%	**0.2%**	-	0%	0.4%	0%	0%	**0.2%**	-	0%	0.1%	0%	0%	**0.1%**	-	0.2%	0.1%	0.3%	0%	**0.3%**	-	0.2%

Leg	Waikoloa Rd						Waikoloa Rd						Pua Melia St						Paniolo Ave						
Direction	Eastbound						Westbound						Northbound						Southbound						
ime	L		R	U	**App**	Ped*	L		R	U	**App**	Ped*	L		R	U	**App**	Ped*	L		R	U	**App**	Ped*	**Int**
Lights	4605	1789	417	14	**6825**	-	223	1593	1955	3	**3774**	-	189	963	200	0	**1352**	-	2071	831	5113	4	**8019**	-	19970
% Lights	98.0%	89.9%	97.7%	100%	**95.7%**	-	91.0%	87.9%	97.3%	60.0%	**92.7%**	-	91.7%	98.7%	90.5%	0%	**96.4%**	-	97.9%	98.5%	98.1%	100%	**98.1%**	-	96.1%
Single-Unit Trucks	57	86	8	0	**151**	-	13	111	41	1	**166**	-	10	4	14	0	**28**	-	31	9	52	0	**92**	-	437
% Single-Unit Trucks	1.2%	4.3%	1.9%	0%	**2.1%**	-	5.3%	6.1%	2.0%	20.0%	**4.1%**	-	4.9%	0.4%	6.3%	0%	**2.0%**	-	1.5%	1.1%	1.0%	0%	**1.1%**	-	2.1%
Articulated Trucks	4	101	0	0	**105**	-	9	91	3	1	**104**	-	2	0	6	0	**8**	-	4	0	4	0	**8**	-	225
% Articulated Trucks	0.1%	5.1%	0%	0%	**1.5%**	-	3.7%	5.0%	0.1%	20.0%	**2.6%**	-	1.0%	0%	2.7%	0%	**0.6%**	-	0.2%	0%	0.1%	0%	**0.1%**	-	1.1%
Buses	24	11	0	0	**35**	-	0	8	5	0	**13**	-	5	8	0	0	**13**	-	6	2	26	0	**34**	-	95
% Buses	0.5%	0.6%	0%	0%	**0.5%**	-	0%	0.4%	0.2%	0%	**0.3%**	-	2.4%	0.8%	0%	0%	**0.9%**	-	0.3%	0.2%	0.5%	0%	**0.4%**	-	0.5%
Bicycles on Road	0	2	1	0	**3**	-	0	1	4	0	**5**	-	0	0	1	0	**1**	-	0	1	1	0	**2**	-	11
% Bicycles on Road	0%	0.1%	0.2%	0%	**0%**	-	0%	0.1%	0.2%	0%	**0.1%**	-	0%	0%	0.5%	0%	**0.1%**	-	0%	0.1%	0%	0%	**0%**	-	0.1%
Pedestrians	-	-	-	-	-	81	-	-	-	-	-	27	-	-	-	-	-	11	-	-	-	-	-	1	
% Pedestrians	-	-	-	-	-	98.8%	-	-	-	-	-	96.4%	-	-	-	-	-	84.6%	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	1.2%	-	-	-	-	-	3.6%	-	-	-	-	-	15.4%	-	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U- urn

aikoloa Rd Paniolo Ave - TMC

ue Aug 24, 2021

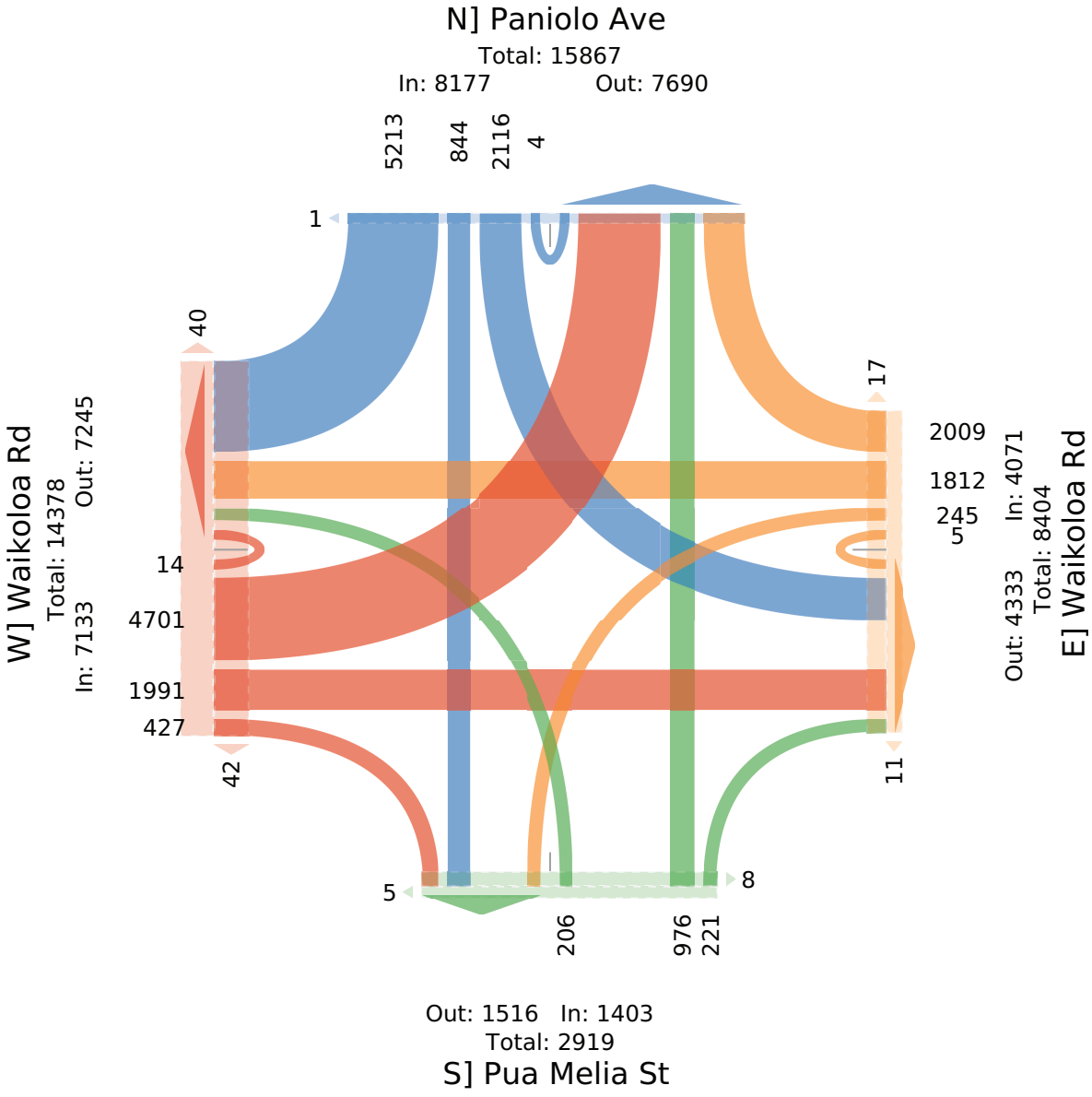
Full Length (6:30 AM-6:30 PM (+1))

All Classes (Motorcycles, Lights, Single-Unit rucks, Articulated rucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

ID: 866300, Location: 19.926669, -155.786985, Site Code: Waikoloa Rd Paniolo Ave

Provided by: he raffic Management Consultant
1188 Bishop Street, Suite 1907,
Honolulu, HI, 96813, US



aikoloa Rd Paniolo Ave - TMC

ue Aug 24, 2021

PM Peak (Aug 24 2021 3:30PM - 4:30 PM) - Overall Peak Hour

All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

ID: 866300, Location: 19.926669, -155.786985, Site Code: Waikoloa Rd Paniolo Ave

Provided by: The Traffic Management Consultant
1188 Bishop Street, Suite 1907,
Honolulu, HI, 96813, US

Leg / Direction	Waikoloa Rd Eastbound						Waikoloa Rd Westbound						Pua Melia St Northbound						Paniolo Ave Southbound						
ime	L		R	U	**App**	Ped*	L		R	U	**App**	Ped*	L		R	U	**App**	Ped*	L		R	U	**App**	Ped*	**Int**
2021-08-24 3:30PM	63	46	10	1	**120**	0	2	20	47	0	**69**	3	0	17	19	0	**36**	0	16	9	46	0	**71**	0	**296**
3:45PM	72	50	4	0	**126**	0	3	17	26	0	**46**	5	3	19	4	0	**26**	5	17	15	59	0	**91**	0	**289**
4:00PM	112	46	8	0	**166**	0	2	27	22	0	**51**	1	4	16	0	0	**20**	0	25	9	36	0	**70**	0	**307**
4:15PM	86	31	12	0	**129**	0	3	24	36	0	**63**	0	1	17	1	0	**19**	0	15	6	40	0	**61**	0	**272**
otal	333	173	34	1	**541**	0	10	88	131	0	**229**	9	8	69	24	0	**101**	5	73	39	181	0	**293**	0	**1164**
% Approach	61.6%	32.0%	6.3%	0.2%	**-**	-	4.4%	38.4%	57.2%	0%	**-**	-	7.9%	68.3%	23.8%	0%	**-**	-	24.9%	13.3%	61.8%	0%	**-**	-	-
% Total	28.6%	14.9%	2.9%	0.1%	**46.5%**	-	0.9%	7.6%	11.3%	0%	**19.7%**	-	0.7%	5.9%	2.1%	0%	**8.7%**	-	6.3%	3.4%	15.5%	0%	**25.2%**	-	-
PHF	0.743	0.865	0.708	0.250	**0.815**	-	0.833	0.837	0.697	-	**0.826**	-	0.500	0.908	0.316	-	**0.701**	-	0.730	0.650	0.767	-	**0.805**	-	0.950
Motorcycles	0	0	0	0	**0**	-	0	2	0	0	**2**	-	0	0	0	0	**0**	-	1	0	1	0	**2**	-	4
% Motorcycles	0%	0%	0%	0%	**0%**	-	0%	2.3%	0%	0%	**0.9%**	-	0%	0%	0%	0%	**0%**	-	1.4%	0%	0.6%	0%	**0.7%**	-	0.3%
Lights	329	164	34	1	**528**	-	10	78	130	0	**218**	-	8	68	24	0	**100**	-	72	39	178	0	**289**	-	1135
% Lights	98.8%	94.8%	100%	100%	**97.6%**	-	100%	88.6%	99.2%	0%	**95.2%**	-	100%	98.6%	100%	0%	**99.0%**	-	98.6%	100%	98.3%	0%	**98.6%**	-	97.5%
Single-Unit Trucks	1	6	0	0	**7**	-	0	3	1	0	**4**	-	0	0	0	0	**0**	-	0	0	1	0	**1**	-	12
% Single-Unit Trucks	0.3%	3.5%	0%	0%	**1.3%**	-	0%	3.4%	0.8%	0%	**1.7%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0.6%	0%	**0.3%**	-	1.0%
Articulated Trucks	0	2	0	0	**2**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	3
% Articulated Trucks	0%	1.2%	0%	0%	**0.4%**	-	0%	1.1%	0%	0%	**0.4%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.3%
Buses	3	1	0	0	**4**	-	0	3	0	0	**3**	-	0	1	0	0	**1**	-	0	0	1	0	**1**	-	9
% Buses	0.9%	0.6%	0%	0%	**0.7%**	-	0%	3.4%	0%	0%	**1.3%**	-	0%	1.4%	0%	0%	**1.0%**	-	0%	0%	0.6%	0%	**0.3%**	-	0.8%
Bicycles on Road	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	1.1%	0%	0%	**0.4%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	9	-	-	-	-	-	5	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	-	100%	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U- urn

aikoloa Rd Paniolo Ave - TMC

ue Aug 24, 2021

PM Peak (Aug 24 2021 3:30PM - 4:30 PM) - Overall Peak Hour

All Classes (Motorcycles, Lights, Single-Unit rucks, Articulated rucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

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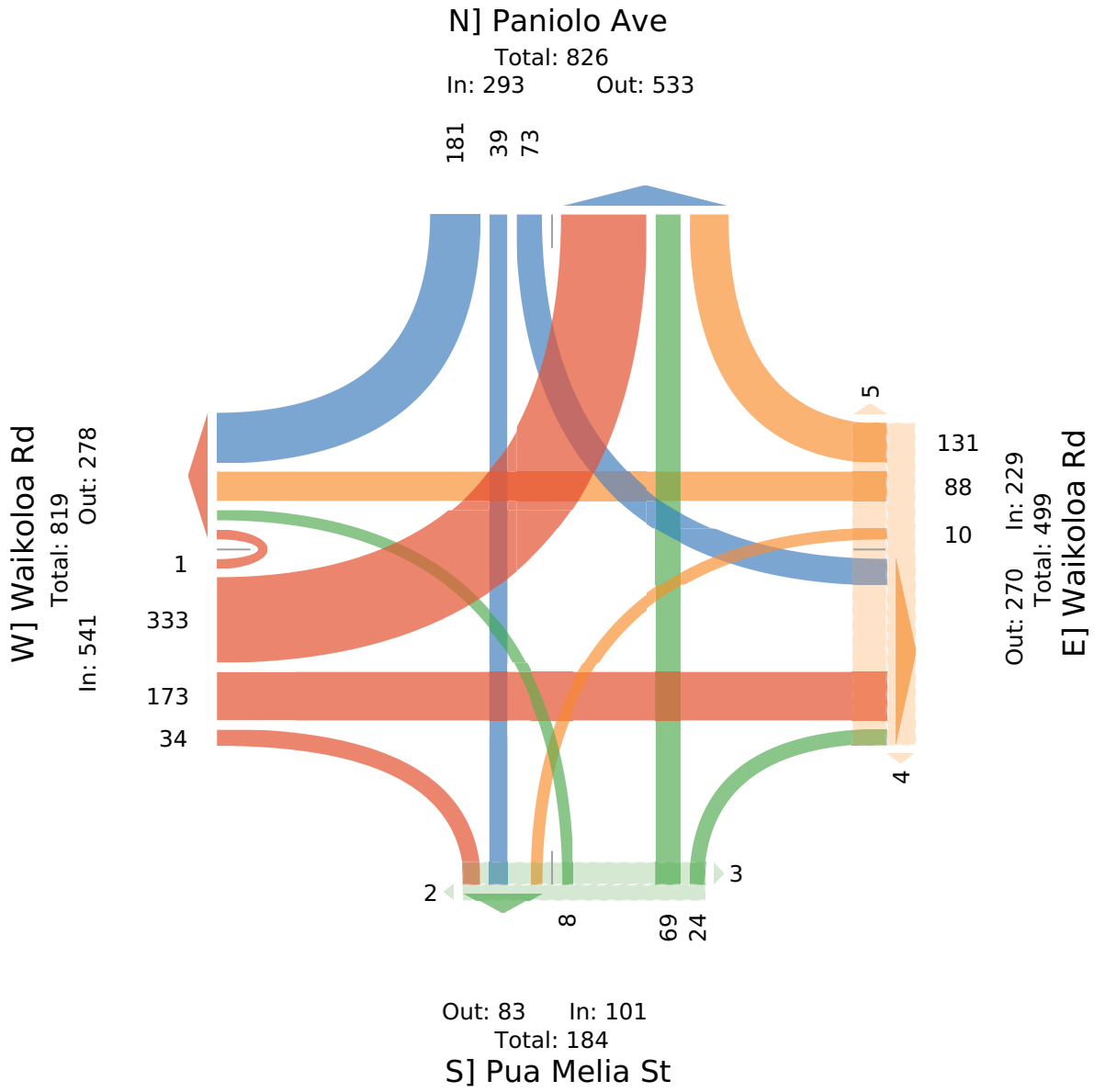

aikoloa Rd Paniolo Ave - TMC

ed Aug 25, 2021

AM Peak (Aug 25 2021 7AM - 8 AM)

All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

ID: 866300, Location: 19.926669, -155.786985, Site Code: Waikoloa Rd Paniolo Ave

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Leg / Direction	aikoloa Rd Eastbound						aikoloa Rd estbound						Pua Melia St Northbound						Paniolo Ave Southbound						
Time	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	**Int**
2021-08-25 7:00AM	26	22	2	0	**50**	1	4	29	14	0	**47**	0	1	1	1	0	**3**	0	46	2	99	0	**147**	0	**247**
7:15AM	24	25	1	0	**50**	0	7	19	18	0	**44**	0	2	4	0	0	**6**	0	51	3	100	0	**154**	0	**254**
7:30AM	38	15	4	0	**57**	0	4	20	27	0	**51**	0	2	4	2	0	**8**	0	34	6	97	0	**137**	0	**253**
7:45AM	24	19	1	0	**44**	1	4	25	25	0	**54**	0	4	7	2	0	**13**	0	32	14	114	0	**160**	1	**271**
Total	112	81	8	0	**201**	2	19	93	84	0	**196**	0	9	16	5	0	**30**	0	163	25	410	0	**598**	1	**1025**
% Approach	55.7%	40.3%	4.0%	0%	**-**	-	9.7%	47.4%	42.9%	0%	**-**	-	30.0%	53.3%	16.7%	0%	**-**	-	27.3%	4.2%	68.6%	0%	**-**	-	-
% Total	10.9%	7.9%	0.8%	0%	**19.6%**	-	1.9%	9.1%	8.2%	0%	**19.1%**	-	0.9%	1.6%	0.5%	0%	**2.9%**	-	15.9%	2.4%	40.0%	0%	**58.3%**	-	-
PHF	0.737	0.810	0.500	-	**0.882**	-	0.679	0.802	0.778	-	**0.907**	-	0.563	0.571	0.625	-	**0.577**	-	0.799	0.446	0.899	-	**0.934**	-	0.946
Motorcycles	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	2	0	**2**	-	2
% Motorcycles	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0.5%	0%	**0.3%**	-	0.2%
Lights	106	77	8	0	**191**	-	17	72	82	0	**171**	-	7	15	4	0	**26**	-	158	25	404	0	**587**	-	975
% Lights	94.6%	95.1%	100%	0%	**95.0%**	-	89.5%	77.4%	97.6%	0%	**87.2%**	-	77.8%	93.8%	80.0%	0%	**86.7%**	-	96.9%	100%	98.5%	0%	**98.2%**	-	95.1%
Single-Unit Trucks	2	2	0	0	**4**	-	1	10	1	0	**12**	-	1	0	1	0	**2**	-	2	0	2	0	**4**	-	22
% Single-Unit Trucks	1.8%	2.5%	0%	0%	**2.0%**	-	5.3%	10.8%	1.2%	0%	**6.1%**	-	11.1%	0%	20.0%	0%	**6.7%**	-	1.2%	0%	0.5%	0%	**0.7%**	-	2.1%
Articulated Trucks	0	2	0	0	**2**	-	1	11	1	0	**13**	-	0	0	0	0	**0**	-	1	0	0	0	**1**	-	16
% Articulated Trucks	0%	2.5%	0%	0%	**1.0%**	-	5.3%	11.8%	1.2%	0%	**6.6%**	-	0%	0%	0%	0%	**0%**	-	0.6%	0%	0%	0%	**0.2%**	-	1.6%
Buses	4	0	0	0	**4**	-	0	0	0	0	**0**	-	1	1	0	0	**2**	-	2	0	2	0	**4**	-	10
% Buses	3.6%	0%	0%	0%	**2.0%**	-	0%	0%	0%	0%	**0%**	-	11.1%	6.3%	0%	0%	**6.7%**	-	1.2%	0%	0.5%	0%	**0.7%**	-	1.0%
Bicycles on Road	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

aikoloa Rd Paniolo Ave - TMC

ed Aug 25, 2021

AM Peak (Aug 25 2021 7AM - 8 AM)

All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

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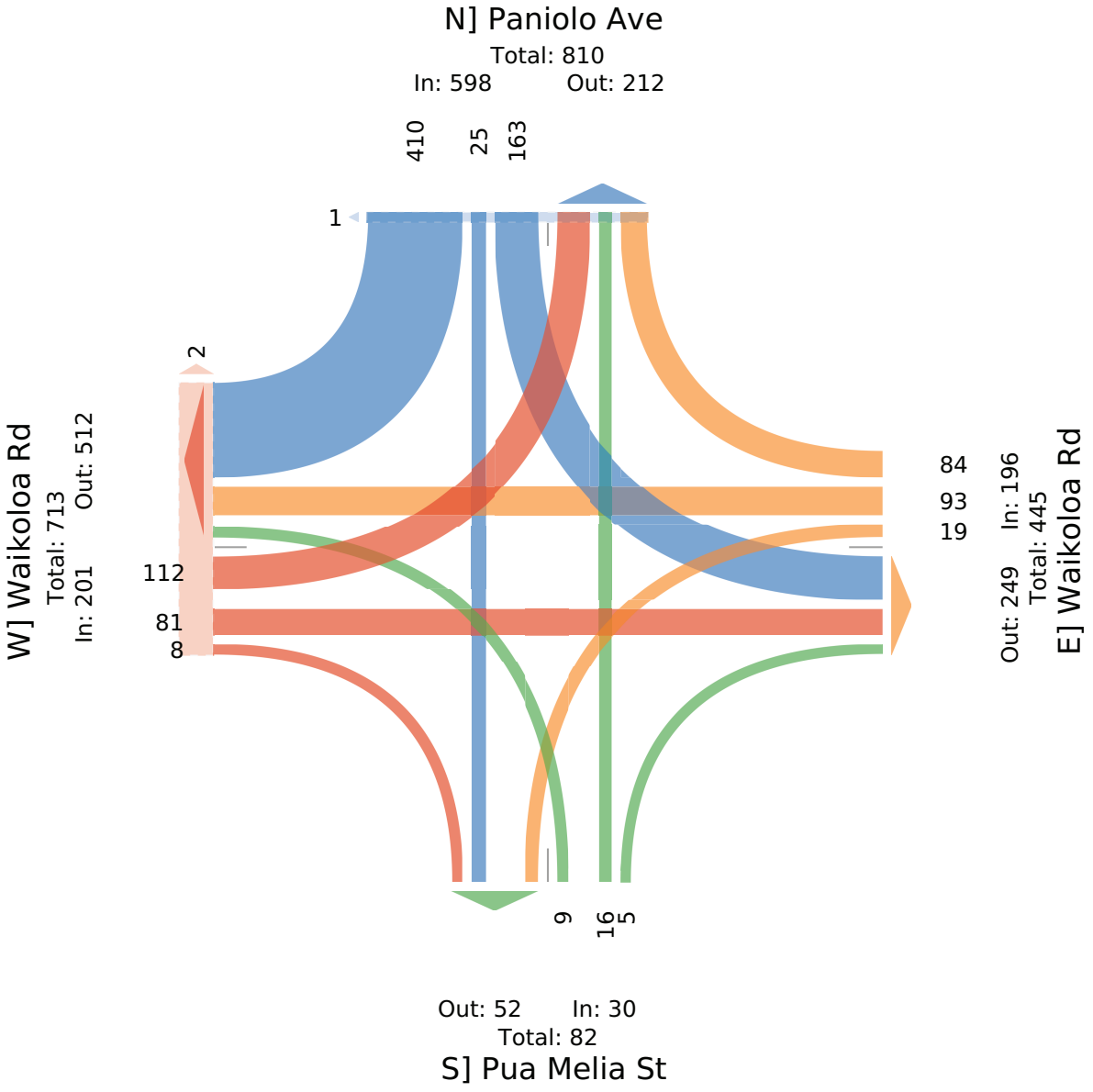

aikoloa Rd Paniolo Ave - TMC

ed Aug 25, 2021

Midday Peak (Aug 25 2021 12:45PM - 1:45 PM)

All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

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Leg / Direction	aikoloa Rd Eastbound						aikoloa Rd estbound						Pua Melia St Northbound						Paniolo Ave Southbound						
Time	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	**Int**
2021-08-25 12:45PM	62	18	8	1	**89**	1	4	15	33	0	**52**	0	1	10	2	0	**13**	0	14	7	43	0	**64**	0	**218**
1:00PM	55	11	4	1	**71**	0	3	18	16	0	**37**	0	1	15	2	0	**18**	0	30	12	57	0	**99**	0	**225**
1:15PM	54	19	6	1	**80**	0	1	21	20	0	**42**	0	6	10	3	0	**19**	0	12	14	49	0	**75**	0	**216**
1:30PM	38	17	4	0	**59**	1	1	21	15	0	**37**	0	5	15	1	0	**21**	0	20	12	43	0	**75**	0	**192**
Total	209	65	22	3	**299**	2	9	75	84	0	**168**	0	13	50	8	0	**71**	0	76	45	192	0	**313**	0	**851**
% Approach	69.9%	21.7%	7.4%	1.0%	**-**	-	5.4%	44.6%	50.0%	0%	**-**	-	18.3%	70.4%	11.3%	0%	**-**	-	24.3%	14.4%	61.3%	0%	**-**	-	-
% Total	24.6%	7.6%	2.6%	0.4%	**35.1%**	-	1.1%	8.8%	9.9%	0%	**19.7%**	-	1.5%	5.9%	0.9%	0%	**8.3%**	-	8.9%	5.3%	22.6%	0%	**36.8%**	-	-
PHF	0.843	0.855	0.688	0.750	**0.840**	-	0.563	0.893	0.629	-	**0.803**	-	0.542	0.833	0.667	-	**0.845**	-	0.633	0.804	0.842	-	**0.790**	-	0.949
Motorcycles	1	0	0	0	**1**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	1	0	**1**	-	3
% Motorcycles	0.5%	0%	0%	0%	**0.3%**	-	0%	1.3%	0%	0%	**0.6%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0.5%	0%	**0.3%**	-	0.4%
Lights	206	54	22	3	**285**	-	6	62	81	0	**149**	-	12	50	6	0	**68**	-	75	44	187	0	**306**	-	808
% Lights	98.6%	83.1%	100%	100%	**95.3%**	-	66.7%	82.7%	96.4%	0%	**88.7%**	-	92.3%	100%	75.0%	0%	**95.8%**	-	98.7%	97.8%	97.4%	0%	**97.8%**	-	94.9%
Single-Unit Trucks	1	4	0	0	**5**	-	2	5	1	0	**8**	-	0	0	1	0	**1**	-	1	0	2	0	**3**	-	17
% Single-Unit Trucks	0.5%	6.2%	0%	0%	**1.7%**	-	22.2%	6.7%	1.2%	0%	**4.8%**	-	0%	0%	12.5%	0%	**1.4%**	-	1.3%	0%	1.0%	0%	**1.0%**	-	2.0%
Articulated Trucks	1	6	0	0	**7**	-	1	7	0	0	**8**	-	0	0	1	0	**1**	-	0	0	0	0	**0**	-	16
% Articulated Trucks	0.5%	9.2%	0%	0%	**2.3%**	-	11.1%	9.3%	0%	0%	**4.8%**	-	0%	0%	12.5%	0%	**1.4%**	-	0%	0%	0%	0%	**0%**	-	1.9%
Buses	0	1	0	0	**1**	-	0	0	1	0	**1**	-	1	0	0	0	**1**	-	0	1	2	0	**3**	-	6
% Buses	0%	1.5%	0%	0%	**0.3%**	-	0%	0%	1.2%	0%	**0.6%**	-	7.7%	0%	0%	0%	**1.4%**	-	0%	2.2%	1.0%	0%	**1.0%**	-	0.7%
Bicycles on Road	0	0	0	0	**0**	-	0	0	1	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0%	1.2%	0%	**0.6%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Pedestrians	-	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

aikoloa Rd Paniolo Ave - TMC

ed Aug 25, 2021

Midday Peak (Aug 25 2021 12:45PM - 1:45 PM)

All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

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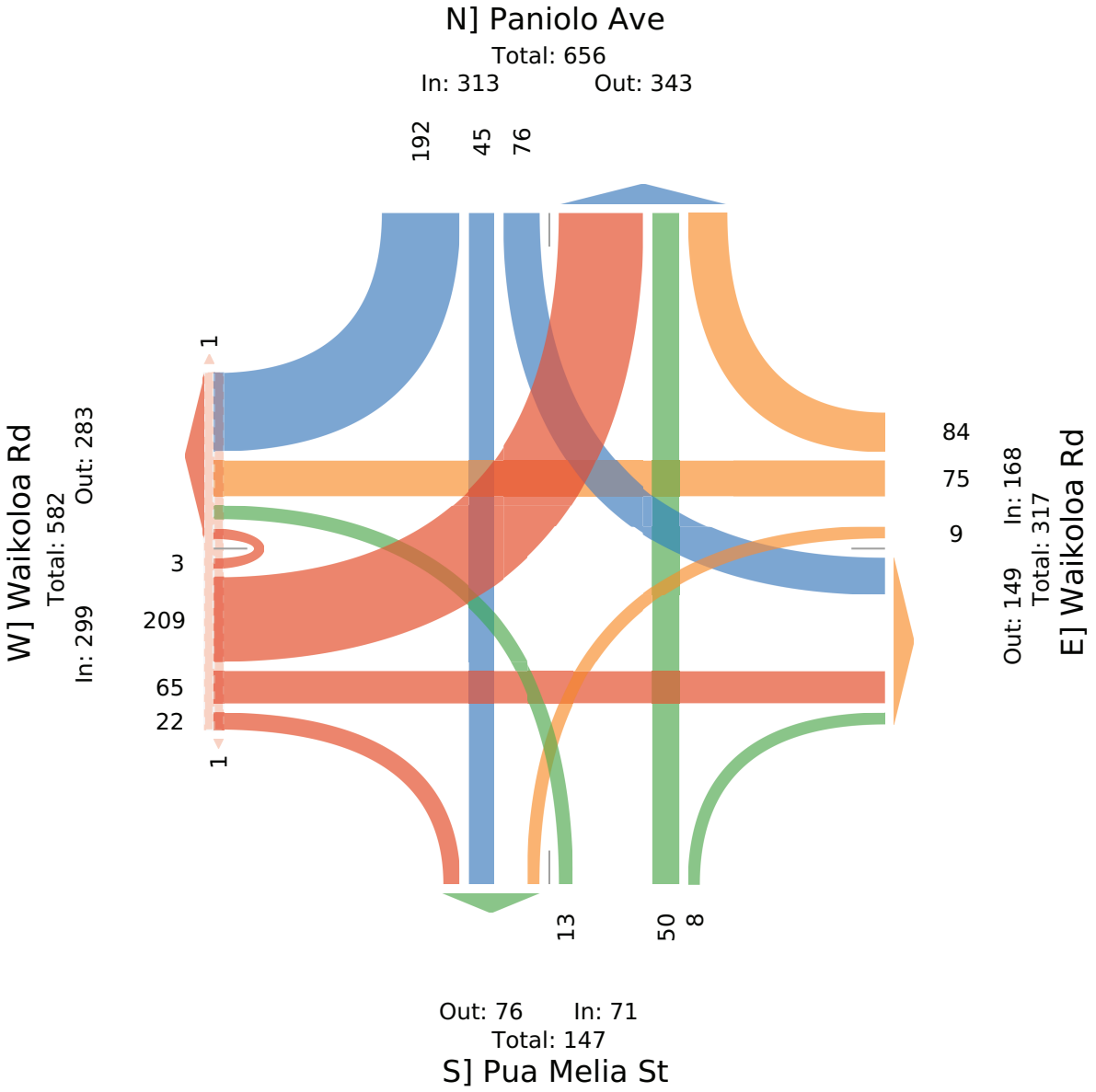


TRAFFIC IMPACT ANALYSIS REPORT

FOR THE PROPOSED

WAIKOLOA ROAD – PANIOLO AVENUE INTERSECTION IMPROVEMENTS

SOUTH KOHALA, HAWAII ISLAND

APPENDIX B

CAPACITY ANALYSIS WORKSHEETS

EXISTING TRAFFIC CONDITIONS

Intersectiou												
Int Delay, s/uehu	10.3u											
Mouemeutu	EBLu	EBTu	EBRu	WBLu	WBTu	WBRu	NBLu	NBTu	NBRu	SBLu	SBTu	SBRu
Lane Coufiguratiousu												
Traffic Vol, ueh/hu	112u	81u	8u	19u	93u	84u	9u	16u	5u	163u	58u	410u
Future Vol, ueh/hu	112u	81u	8u	19u	93u	84u	9u	16u	5u	163u	58u	410u
Couflictiug ueus, #/hru	1u	0u	0u	0u	0u	1u	2u	0u	0u	0u	0u	2u
Sigu Coutrol u	Freeu	Freeu	Freeu	Freeu	Freeu	Freeu	Stopu	Stopu	Stopu	Stopu	Stopu	Stopu
RT Chanuelizeu	-u	-uNoueu		-u	-uNoueu		-u	-uNoueu		-u	-uNoueu	
Storage Leugthu	325u	-u	-u	265u	-u	-u	80u	-u	-u	130u	-u	0u
Veh iu Meuiau Storage, #	-u	0u	-u	-u	0u	-u	-u	0u	-u	-u	0u	-u
Grade, %u	-u	0u	-u	-u	0u	-u	-u	0u	-u	-u	0u	-u
eak Hour Factoru	95u	95u	95u	95u	95u	95u	95u	95u	95u	95u	95u	95u
Heavy Vehicles, %u	5u	5u	0u	11u	23u	2u	22u	6u	20u	3u	0u	1u
Mvmt Flowu	118u	85u	8u	20u	98u	88u	9u	17u	5u	172u	61u	432u
u												

Major/Miuoru	Major1u			Major2u			Miuor1u			Miuor2u		
Couflictiug Flow ullu	187u	0u	0u	93u	0u	0u	756u	552u	89u	519u	512u	145u
Stage 1u	-u	-u	-u	-u	-u	-u	325u	325u	-u	183u	183u	-u
Stage 2u	-u	-u	-u	-u	-u	-u	431u	227u	-u	336u	329u	-u
Critical Hdwyu	4.15u	-u	-u	4.21u	-u	-u	7.32u	6.56u	6.4u	7.13u	6.5u	6.21u
Critical Hdwy Stg 1u	-u	-u	-u	-u	-u	-u	6.32u	5.56u	-u	6.13u	5.5u	-u
Critical Hdwy Stg 2u	-u	-u	-u	-u	-u	-u	6.32u	5.56u	-u	6.13u	5.5u	-u
Follow-up Hdwyu	2.245u	-u	-u	2.299u	-u	-u	3.698u	4.054u	3.48u	3.527u	4u	3.309u
ot Cap-1 Maneu eru	1369u	-u	-u	1447u	-u	-u	301u	436u	922u	466u	468u	905u
Stage 1u	-u	-u	-u	-u	-u	-u	647u	642u	-u	816u	752u	-u
Stage 2u	-u	-u	-u	-u	-u	-u	565u	709u	-u	676u	650u	-u
latoou blockeu, %u		-u	-u		-u	-u						
Mou Cap-1 Maneu eru	1368u	-u	-u	1447u	-u	-u	129u	392u	922u	414u	421u	902u
Mou Cap-2 Maneu eru	-u	-u	-u	-u	-u	-u	129u	392u	-u	414u	421u	-u
Stage 1u	-u	-u	-u	-u	-u	-u	591u	587u	-u	745u	741u	-u
Stage 2u	-u	-u	-u	-u	-u	-u	266u	698u	-u	597u	594u	-u
u												

pproachu	EBu	WBu	NBu	SBu
HCM Coutrol Delay, su	4.4u	0.7u	19.8u	14.7u
HCM LOSu			Cu	Bu
u				

Miuor Lane/Major Mvmtu	NBLu1	NBLu2u	EBLu	EBTu	EBRu	WBLu	WBTu	WBR	SBLu1	SBLu2	SBLu3u
Capacity (ueh/h)u	129u	454u	1368u	-u	-u	1447u	-u	-u	414u	421u	902u
HCM Lane V/C Ratiou	0.073u	0.049u	0.086u	-u	-u	0.014u	-u	-u	0.414u	0.145u	0.478u
HCM Coutrol Delay (s)u	35.1u	13.3u	7.9u	-u	-u	7.5u	-u	-u	19.7u	15u	12.6u
HCM Lane LOSu	Eu	Bu		-u	-u		-u	-u	Cu	Cu	Bu
HCM 95th %tile Q(ueh)u	0.2u	0.2u	0.3u	-u	-u	0u	-u	-u	2u	0.5u	2.6u

Intersectiou												
Int Delay, s/ eh	19.8											

Mo eme t	EBL	EBT	EBR	WBLu	WBTu	WBRu	NBLu	NBTu	NBRu	SBLu	SBTu	SBRu
Lane Coufiguratiousu												
Traffic Vol, eh/h	334	173	34	10	88	131	8	69	24	73	39	181
F ture Vol, eh/h	334	173	34	10	88	131	8	69	24	73	39	181
Co flicti g e s, #/hr	0	0	5	5	0	0	0	0	9	9	0	0
Sig Co trol	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Chan elize	-	-	No e	-	-	No e	-	-	No e	-	-	No e
Storage Le gth	325	-	-	265	-	-	80	-	-	130	-	0
Veh i Me ian Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
eak Ho r Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	5	0	0	8	1	0	1	0	0	0	1
Mvmt Flow	352	182	36	11	93	138	8	73	25	77	41	191

Major/Mi or	Major1			Major2			Mi or1			Mi or2		
Co flicti g Flow ll	231	0	0	223	0	0	1209	1162	214	1146	1111	162
Stage 1	-	-	-	-	-	-	909	909	-	184	184	-
Stage 2	-	-	-	-	-	-	300	253	-	962	927	-
Critical Hdwy	4.11	-	-	4.1	-	-	7.1	6.51	6.2	7.1	6.5	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.51	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.51	-	6.1	5.5	-
Follow- p Hdwy	2.209	-	-	2.2	-	-	3.5	4.009	3.3	3.5	4	3.309
ot Cap-1 Mane er	1343	-	-	1358	-	-	161	196	831	178	211	885
Stage 1	-	-	-	-	-	-	332	355	-	822	751	-
Stage 2	-	-	-	-	-	-	713	700	-	310	350	-
latoo blocke , %		-	-		-	-						
Mo Cap-1 Mane er	1343	-	-	1352	-	-	80	143	820	83	154	885
Mo Cap-2 Mane er	-	-	-	-	-	-	80	143	-	83	154	-
Stage 1	-	-	-	-	-	-	244	261	-	607	745	-
Stage 2	-	-	-	-	-	-	524	694	-	159	257	-

pproach	EB	WBu	NBu	SBu
HCM Coutrol Delay, s	5.3	0.3	46.5	52.8
HCM LOS			E	F

Mi or Lane/Major Mvmt	NBL 1	NBL 2	EBL	EBT	EBR	WBLu	WBTu	WBR	SBLu1	SBL 2	SBL 3
Capacity (eh/h)	80	182	1343	-	-	1352	-	-	83	154	885
HCM Lane V/C Ratio	0.105	0.538	0.262	-	-	0.008	-	-	0.926	0.267	0.215
HCM Co trol Delay (s)	55.2	45.7	8.6	-	-	7.7	-	-	167.1	36.7	10.2
HCM Lane LOS	F	E		-	-		-	-	F	E	B
HCM 95th %tile Q(eh)	0.3	2.8	1.1	-	-	0	-	-	5	1	0.8

TRAFFIC IMPACT ANALYSIS REPORT

FOR THE PROPOSED

WAIKOLOA ROAD – PANIOLO AVENUE INTERSECTION IMPROVEMENTS

SOUTH KOHALA, HAWAII ISLAND

APPENDIX C

CAPACITY ANALYSIS WORKSHEETS

PEAK HOUR TRAFFIC WITHOUT IMPROVEMENTS

Intersectiou												
Int Delay, s/uehu	67.7u											
Mouemeutu	EBLu	EBTu	EBRu	WBLu	WBTu	WBRu	NBLu	NBTu	NBRu	SBLu	SBTu	SBRu
Lane Coufiguratiousu												
Traffic Vol, ueh/hu	169u	141u	14u	70u	174u	119u	15u	35u	43u	231u	51u	595u
Future Vol, ueh/hu	169u	141u	14u	70u	174u	119u	15u	35u	43u	231u	51u	595u
Couflictiug ueus, #/hru	10u	0u	10u	10u	0u	10u	30u	0u	10u	10u	0u	30u
Sigu Coutrol u	Freeu	Freeu	Freeu	Freeu	Freeu	Freeu	Stopu	Stopu	Stopu	Stopu	Stopu	Stopu
RT Chanuelizeu	-u	-u	Noueu	-u	-u	Noueu	-u	-u	Noueu	-u	-u	Noueu
Storage Leugthu	325u	-u	-u	265u	-u	-u	80u	-u	-u	130u	-u	0u
Veh iu Meuiau Storage, #	-u	0u	-u	-u	0u	-u	-u	0u	-u	-u	0u	-u
Grade, %u	-u	0u	-u	-u	0u	-u	-u	0u	-u	-u	0u	-u
eak Hour Factoru	95u	95u	95u	95u	95u	95u	95u	95u	95u	95u	95u	95u
Heavy Vehicles, %u	5u	5u	0u	11u	23u	2u	22u	6u	20u	3u	0u	1u
Mvmt Flowu	178u	148u	15u	74u	183u	125u	16u	37u	45u	243u	54u	626u
u												

Major/Miuoru	Major1u			Major2u			Miuor1u			Miuor2u		
Couflictiug Flow ullu	318u	0u	0u	173u	0u	0u	1286u	988u	176u	967u	933u	286u
Stage 1u	-u	-u	-u	-u	-u	-u	522u	522u	-u	404u	404u	-u
Stage 2u	-u	-u	-u	-u	-u	-u	764u	466u	-u	563u	529u	-u
Critical Hdwyu	4.15u	-u	-u	4.21u	-u	-u	7.32u	6.56u	6.4u	7.13u	6.5u	6.21u
Critical Hdwy Stg 1u	-u	-u	-u	-u	-u	-u	6.32u	5.56u	-u	6.13u	5.5u	-u
Critical Hdwy Stg 2u	-u	-u	-u	-u	-u	-u	6.32u	5.56u	-u	6.13u	5.5u	-u
Follow-up Hdwyu	2.245u	-u	-u	2.299u	-u	-u	3.698u	4.054u	3.48u	3.527u	4u	3.309u
ot Cap-1 Maneu eru	1225u	-u	-u	1351u	-u	-u	128u	243u	823u~	233u	268u	755u
Stage 1u	-u	-u	-u	-u	-u	-u	503u	524u	-u	621u	603u	-u
Stage 2u	-u	-u	-u	-u	-u	-u	367u	556u	-u	509u	530u	-u
latoou blockeu, %u		-u	-u		-u	-u						
Mou Cap-1 Maneu eru	1213u	-u	-u	1338u	-u	-u	~ 12u	192u	807u~	157u	212u	726u
Mou Cap-2 Maneu eru	-u	-u	-u	-u	-u	-u	~ 12u	192u	-u~	157u	212u	-u
Stage 1u	-u	-u	-u	-u	-u	-u	425u	442u	-u	525u	564u	-u
Stage 2u	-u	-u	-u	-u	-u	-u	42u	520u	-u	372u	447u	-u
u												

pproachu	EBu	WBu	NBu	SBu
HCM Coutrol Delay, su	4.4u	1.5u	145.9u	110.2u
HCM LOSu			Fu	Fu
u				

Miuor Lane/Major Mvmtu	NBLu1	NBLu2u	EBLu	EBTu	EBRu	WBLu	WBTu	WBR	SBLu1	SBLu2	SBLu3u
Capacity (ueh/h)u	12u	331u	1213u	-u	-u	1338u	-u	-u	157u	212u	726u
HCM Lane V/C Ratiou	1.316u	0.248u	0.147u	-u	-u	0.055u	-u	-u	1.549u	0.253u	0.863u
HCM Coutrol Delay (s)u	$ 803.5u	19.4u	8.5u	-u	-u	7.8u	-u	-u	$ 328.1u	27.6u	32.7u
HCM Lane LOSu	Fu	Cu		-u	-u		-u	-u	Fu	Du	Du
HCM 95th %tile Q(ueh)u	2.7u	1u	0.5u	-u	-u	0.2u	-u	-u	16.3u	1u	10.3u

Notesu			
~: Volume exceeus capacity	$: Delay exceeus 300s	+: Computatiou Not Defiueu	*: ull major uolume iu platoou

Intersectiou												
Int Delay, s/uehu	3.3u											
Mouemeutu	EBL	EBTu	EBRu	WBL	WBTu	WBRu	NBL	NBTu	NBRu	SBL	SBTu	SBRu
Lane Coufiguratiousu												
Traffic Vol, ueh/hu	554u	325u	49u	54u	224u	177u	14u	113u	86u	99u	68u	283u
Future Vol, ueh/hu	554u	325u	49u	54u	224u	177u	14u	113u	86u	99u	68u	283u
Couflictiug ueus, #/hru	0u	0u	5u	5u	0u	0u	0u	0u	9u	9u	0u	0u
Sigu Coutrol u	Freeu	Freeu	Freeu	Freeu	Freeu	Freeu	Stopu	Stopu	Stopu	Stopu	Stopu	Stopu
RT Chanuelizeu	-u	-u	Noueu	-u	-u	Noueu	-u	-u	Noueu	-u	-u	Noueu
Storage Leugthu	325u	-u	-u	265u	-u	-u	80u	-u	-u	130u	-u	0u
Veh iu Meuiau Storage, #	-u	0u	-u	-u	0u	-u	-u	0u	-u	-u	0u	-u
Grade, %u	-u	0u	-u	-u	0u	-u	-u	0u	-u	-u	0u	-u
eak Hour Factoru	95u	95u	95u	95u	95u	95u	95u	95u	95u	95u	95u	95u
Heavy Vehicles, %u	1u	5u	0u	0u	8u	1u	0u	1u	0u	0u	0u	1u
Mvmt Flowu	583u	342u	52u	57u	236u	186u	15u	119u	91u	104u	72u	298u
u												

Major/Miuoru	Major1u			Major2u			Miuor1u			Miuor2u		
Couflictiug Flow ullu	422u	0u	0u	399u	0u	0u	2167u	2075u	382u	2091u	2008u	329u
Stage 1u	-u	-u	-u	-u	-u	-u	1539u	1539u	-u	443u	443u	-u
Stage 2u	-u	-u	-u	-u	-u	-u	628u	536u	-u	1648u	1565u	-u
Critical Hdwyu	4.11u	-u	-u	4.1u	-u	-u	7.1u	6.51u	6.2u	7.1u	6.5u	6.21u
Critical Hdwy Stg 1u	-u	-u	-u	-u	-u	-u	6.1u	5.51u	-u	6.1u	5.5u	-u
Critical Hdwy Stg 2u	-u	-u	-u	-u	-u	-u	6.1u	5.51u	-u	6.1u	5.5u	-u
Follow-up Hdwyu	2.209u	-u	-u	2.2u	-u	-u	3.5u	4.009u	3.3u	3.5u	4u	3.309u
ot Cap-1 Maneu eru	1143u	-u	-u	1171u	-u	-u	34u	~ 54u	670u	~ 39u	~ 60u	715u
Stage 1u	-u	-u	-u	-u	-u	-u	146u	178u	-u	598u	579u	-u
Stage 2u	-u	-u	-u	-u	-u	-u	474u	525u	-u	126u	174u	-u
latoou blockeu, %u		-u	-u		-u	-u						
Mou Cap-1 Maneu eru	1143u	-u	-u	1165u	-u	-u	-u	~ 25u	661u	-u	~ 28u	715u
Mou Cap-2 Maneu eru	-u	-u	-u	-u	-u	-u	-u	~ 25u	-u	-u	~ 28u	-u
Stage 1u	-u	-u	-u	-u	-u	-u	71u	~ 87u	-u	293u	551u	-u
Stage 2u	-u	-u	-u	-u	-u	-u	229u	499u	-u	-u	85u	-u
u												

pproachu	EBu	WBu	NBu	SBu
HCM Coutrol Delay, su	6.8u	1u		
HCM LOSu			-u	-u
u				

Miuor Lane/Major Mvmtu	NBL 1u	NBL 2u	EBL	EBTu	EBRu	WBL	WBTu	WBR	SBL 1u	SBL 2u	SBL 3u
Capacity (ueh/h)u	-u	43u	1143u	-u	-u	1165u	-u	-u	-u	28u	715u
HCM Lane V/C Ratiou	-u	4.871u	0.51u	-u	-u	0.049u	-u	-u	-u	2.556u	0.417u
HCM Coutrol Delay (s)u	$-1	930.5u	11.4u	-u	-u	8.2u	-u	-u	$-1	003.9u	13.6u
HCM Lane LOSu	-u	Fu	Bu	-u	-u		-u	-u	-u	Fu	Bu
HCM 95th %tile Q(ueh)u	-u	24.1u	3u	-u	-u	0.2u	-u	-u	-u	8.6u	2.1u

Notesu			
~: Volume exceeus capacity	$: Delay exceeus 300s	+: Computatiou Not Defiueu	*: ull major uolume iu platoou

Intersectio3												
Int Delay, s/3eh3	263											
Mo3eme3t3	EBL3	EBT3	EBR3	WBL3	WBT3	WBR3	NBL3	NBT3	NBR3	SBL3	SBT3	SBR3
Lane Co3figuratio3s3												
Traffic Vol, 3eh/h3	2043	1863	183	1173	2383	1383	193	523	803	2683	723	7043
Future Vol, 3eh/h3	2043	1863	183	1173	2383	1383	193	523	803	2683	723	7043
Co3flicti3g 3e3s, #/hr3	103	03	103	103	03	103	03	03	103	103	03	03
Sig3 Co3trol 3	Free3	Free3	Free3	Free3	Free3	Free3	Stop3	Stop3	Stop3	Stop3	Stop3	Stop3
RT Chan3elize3	-3	-3	No3e3	-3	-3	No3e3	-3	-3	No3e3	-3	-3	No3e3
Storage Le3gth3	253	-3	-3	2653	-3	-3	803	-3	-3	1303	-3	03
Veh i3 Me3ian3 Storage, #	-3	03	-3	-3	03	-3	-3	03	-3	-3	03	-3
Grade, %3	-3	03	-3	-3	03	-3	-3	03	-3	-3	03	-3
eak Hour Factor3	953	953	953	953	953	953	953	953	953	953	953	953
Heavy Vehicles, %3	53	53	03	113	23	23	223	63	203		03	13
Mvmt Flow3	2153	1963	193	123	2513	1453	203	553	843	2823	763	7413
3												

Major/Mi3or3	Major13			Major23			Mi3or13			Mi3or23		
Co3flicti3g Flow 3ll3	4063	03	03	2253	03	03	16543	12983	2263	12953	12353	643
Stage 13	-3	-3	-3	-3	-3	-3	6463	6463	-3	5803	5803	-3
Stage 23	-3	-3	-3	-3	-3	-3	10083	6523	-3	7153	6553	-3
Critical Hdwy3	4.153	-3	-3	4.213	-3	-3	7.323	6.563	6.43	7.13	6.53	6.213
Critical Hdwy Stg 13	-3	-3	-3	-3	-3	-3	6.323	5.563	-3	6.13	5.53	-3
Critical Hdwy Stg 23	-3	-3	-3	-3	-3	-3	6.323	5.563	-3	6.13	5.53	-3
Follow-up Hdwy3	2.2453	-3	-3	2.2993	-3	-3	.6983	4.0543	.483	.5273	43	.3093
ot Cap-1 Maneu3er3	11373	-3	-3	12923	-3	-3	703	1593	7713	~ 1393	1783	~ 683
Stage 13	-3	-3	-3	-3	-3	-3	4293	4613	-3	4983	503	-3
Stage 23	-3	-3	-3	-3	-3	-3	2663	4583	-3	4203	4663	-3
latoo3 blocke3, %3		-3	-3		-3	-3						
Mo3 Cap-1 Maneu3er	11263	-3	-3	12803	-3	-3	-3	1143	7563	~ 613	1283	~ 6573
Mo3 Cap-2 Maneu3er3	-3	-3	-3	-3	-3	-3	-3	1143	-3	~ 613	1283	-3
Stage 13	-3	-3	-3	-3	-3	-3	443	693	-3	993	4503	-3
Stage 23	-3	-3	-3	-3	-3	-3	-3	4103	-3	~ 2553	73	-3
3												

pproach3	EB	WB	NB	SB
HCM Co3trol Delay, s3	4.53	1.93	$ 525.3	
HCM LOS3			-3	F3
3				

Mi3or Lane/Major Mvmt3	NBL31	NBL323	EBL3	EBT3	EBR3	WBL3	WBT3	WBR	SBL31	SBL32	SBL3
Capacity (3eh/h)3	-3	2353	11263	-3	-3	12803	-3	-3	613	1283	6573
HCM Lane V/C Ratio3	-3	0.5913	0.1913	-3	-3	0.0963	-3	-3	4.6253	0.5923	1.1283
HCM Co3trol Delay (s)3	-3	40.3	8.93	-3	-3	8.13	-3	$	-1767.23	67.53	99.3
HCM Lane LOS3	-3	E3		-3	-3		-3	-3	F3	F3	F3
HCM 95th %tile Q(3eh)3	-3	.43	0.73	-3	-3	0.3	-3	-3	13		22.73

Notes3			
~: Volume excee3s capacity	$: Delay excee3s 300s	+: Computatio3 Not Defi3e3	*: 3ll major 3olume i3 platoo3

Intersectio3												
Int Delay, s/3eh3	5.13											
Mo3eme3t3	EBL3	EBT3	EBR3	WBL3	WBT3	WBR3	NBL3	NBT3	NBR3	SBL3	SBT3	SBR3
Lan3 Co3figuratio3s3												
Traffic Vol, 3eh/h3	6703	453	583	963	483	2063	183	1483	1453	1153	923	623
Future Vol, 3eh/h3	6703	453	583	963	483	2063	183	1483	1453	1153	923	623
Co3flicti3g 3e3s, #/hr3	03	03	103	103	03	103	103	03	203	203	03	103
Sig3 Co3trol 3	Free3	Free3	Free3	Free3	Free3	Free3	Stop3	Stop3	Stop3	Stop3	Stop3	Stop3
RT Chan3elize3	-3	-3	No3e3	-3	-3	No3e3	-3	-3	No3e3	-3	-3	No3e3
Storage Le3gth3	253	-3	-3	2653	-3	-3	803	-3	-3	1303	-3	03
Veh i3 Me3ian3 Storage, #	-3	03	-3	-3	03	-3	-3	03	-3	-3	03	-3
Grad3, %3	-3	03	-3	-3	03	-3	-3	03	-3	-3	03	-3
eak Hour Factor3	953	953	953	953	953	953	953	953	953	953	953	953
Heavy Vehicles, %3	13	53	03	03	83	13	03	13	03	03	03	13
Mvmt Flow3	7053	4773	613	1013	663	2173	193	1563	153	1213	973	813
3												

Major/Mi3or3	Major13			Major23			Mi3or13			Mi3or23		
Co3flicti3g Flow 3ll3	613	03	03	5483	03	03	28543	2743	5383	27993	26653	5153
Stage 13	-3	-3	-3	-3	-3	-3	19283	19283	-3	7073	7073	-3
Stage 23	-3	-3	-3	-3	-3	-3	9263	8153	-3	20923	19583	-3
Critical Hdwy3	4.113	-3	-3	4.13	-3	-3	7.13	6.513	6.23	7.13	6.53	6.213
Critical Hdwy Stg 13	-3	-3	-3	-3	-3	-3	6.13	5.513	-3	6.13	5.53	-3
Critical Hdwy Stg 23	-3	-3	-3	-3	-3	-3	6.13	5.513	-3	6.13	5.53	-3
Follow-up Hdwy3	2.2093	-3	-3	2.23	-3	-3	.533	4.0093	.	.53	43	. 093
ot Cap-1 Maneu3er3	9713	-3	-3	10323	-3	-3	~ 113	~ 203	5473	~ 123	~ 23	5623
Stage 13	-3	-3	-3	-3	-3	-3	873	~ 1143	-3	4293	4413	-3
Stage 23	-3	-3	-3	-3	-3	-3	253	923	-3	~ 693	1113	-3
latoo3 blocke3, %3		-3	-3		-3	-3						
Mo3 Cap-1 Maneu3er3	943	-3	-3	10223	-3	-3	-3	~ 43	5313	-3	~ 53	5413
Mo3 Cap-2 Maneu3er3	-3	-3	-3	-3	-3	-3	-3	~ 43	-3	-3	~ 53	-3
Stage 13	-3	-3	-3	-3	-3	-3	223	~ 283	-3	~ 1053	863	-3
Stage 23	-3	-3	-3	-3	-3	-3	643	43	-3	-3	~ 283	-3
3												

pproach3	EB3	WB3	NB3	SB3
HCM Co3trol Delay, s3	10.93	1.		
HCM LOS3			-3	-3
3				

Mi3or Lan3/Major Mvmt3	NBL31	NBL323	EBL3	EBT3	EBR3	WBL3	WBT3	WBR	SBL31	SBL32	SBL3
Capacity (3eh/h)3	-3	83	943	-3	-3	10223	-3	-3	-3	53	5413
HCM Lan3 V/C Ratio3	-3	8.553	0.7483	-3	-3	0.0993	-3	-3	-19.	683	0.7043
HCM Co3trol Delay (s)3	$ 1-7	803.73	19.23	-3	-3	8.93	-3	-3	$-96	90.73	263
HCM Lan3 LOS3	-3	F3	C3	-3	-3		-3	-3	-3	F3	D3
HCM 95th %tile Q(3eh)3	-3	40.43	7.23	-3	-3	0.	-3	-3	-3	14.13	5.63

Notes3			
~: Volume excee3s capacity	$: Delay excee3s 300s	+: Computatio3 Not Defi3e3	*: 3ll major 3olume i3 platoo3

TRAFFIC IMPACT ANALYSIS REPORT

FOR THE PROPOSED

WAIKOLOA ROAD – PANIOLO AVENUE INTERSECTION IMPROVEMENTS

SOUTH KOHALA, HAWAII ISLAND

APPENDIX D

CAPACITY ANALYSIS WORKSHEETS

PEAK HOUR TRAFFIC WITH ROUNDABOUT

Intersectio:					
Intersectio: Delay, s/: eh:	4.3:				
Intersectio: LOS:					

pproach:	EB:	WB:	NB:	SB:
E: try Lanes:	1:	1:	1:	1:
Co: flicti: g Circle Lanes:	1:	1:	1:	1:
j : pproach Flow, : eh/h:	341:	382:	98:	923:
Deman: Flow Rate, : eh/h:	357:	435:	113:	936:
Vehicles Circulati: g, : eh/h:	386:	246:	592:	327:
Vehicles Exiti: g, : eh/h:	245:	459:	151:	226:
e: Vol Crossi: g Leg, #/h:	30:	10:	10:	10:
e: Cap : j:	0.996:	0.999:	0.999:	0.999:
pproach Delay, s/: eh:	8.5:	4.7:	7.2:	2.2:
pproach LOS:				

Lane:	Left:	Left:	Bypass:	Left:	Left:	Bypass:
Desig: ate: Mo: es:	LTR:	LT:	R:	LTR:	LT:	R:
ssume: Mo: es:	LTR:	LT:	R:	LTR:	LT:	R:
RT Chan: elize:			Free:			Free:
Lane Util:	1.000:	1.000:		1.000:	1.000:	
Follow-Up Headway, s:	2.609:	2.609:		2.609:	2.609:	
Critical Headway, s:	4.976:	4.976:	127:	4.976:	4.976:	632:
E: try Flow, : eh/h:	357:	307:	1941:	113:	304:	1922:
Cap E: try Lane, : eh/h:	931:	1074:	0.980:	754:	989:	0.990:
E: try HV : j Factor:	0.954:	0.837:	125:	0.865:	0.977:	626:
Flow E: try, : eh/h:	341:	257:	1900:	98:	297:	1900:
Cap E: try, : eh/h:	884:	897:	0.066:	652:	964:	0.329:
V/C Ratio:	0.385:	0.286:	0.0:	0.150:	0.308:	0.0:
Co: trol Delay, s/: eh:	8.5:	7.0:		7.2:	6.9:	
LOS:			0:			1:
95th %tile Queue, : eh:	2:	1:		1:	1:	

Intersectio:	
Intersectio: Delay, s/uehu	18.2M
IntersectioM LOSM	CM

pproachM	EBM	WBM	NBM	SBM
EMtry LaneM	1M	1M	1M	1M
CoMflictiMg Circle LaneM	1M	1M	1M	1M
j Mpproach Flow, Meh/hM	977M	479M	225M	474M
DemanM Flow Rate, Meh/hM	1000M	500M	226M	477M
Vehicles CirculatiMg, Meh/hM	233M	724M	1052M	327M
Vehicles ExitiMg, Meh/hM	270M	554M	181M	709M
eMVol CrossiMg Leg, #/hM	0M	9M	5M	0M
eMCap M jM	1.000M	0.999M	1.000M	1.000M
pproach Delay, s/MehM	31.4M	8.1M	16.9M	2.0M
pproach LOSM	DM		CM	

LaneM	LeftM	LeftM	BypassM	LeftM	LeftM	BypassM
DesigMateMMoMesM	LTRM	LTM	RM	LTRM	LTM	RM
ssumeMMoMesM	LTRM	LTM	RM	LTRM	LTM	RM
RT ChanMelizeM			FreeM			FreeM
LaneMUtilM	1.000M	1.000M		1.000M	1.000M	
Follow-Up HeadMay, sM	2.609M	2.609M		2.609M	2.609M	
Critical HeadMay, sM	4.976M	4.976M	188M	4.976M	4.976M	301M
EMtry Flow, Meh/hM	1000M	312M	1921M	226M	176M	1919M
Cap EMtry LaneM, Meh/hM	1088M	659M	0.990M	472M	989M	0.990M
EMtry HV M j FactorM	0.977M	0.939M	186M	0.995M	1.000M	298M
Flow EMtry, Meh/hM	977M	293M	1900M	225M	176M	1900M
Cap EMtry, Meh/hM	1063M	619M	0.098M	469M	989M	0.157M
V/C RatioM	0.919M	0.474M	0.0M	0.479M	0.178M	0.0M
CoMtrol Delay, s/MehM	31.4M	13.3M		16.9M	5.3M	
LOSM	DM	BM	0M	CM		1M
95th %tile Queue, MehM	15M	3M		3M	1M	

Intersectio3	
Intersectio3 Delay, s/3eh3	12.03
Intersectio3 LOS3	B3

pproach3	EB3	WB3	NB3	SB3
E3try Lane3s3	23	23	23	23
Co3flicti3g Circle Lane3s3	23	23	23	23
j 3pproach Flow, 3eh/h3	4303	5193	1593	10993
Deman3 Flow Rate, 3eh/h3	4513	5943	183	11143
Vehicles Circulati3g, 3eh/h3	503	083	7223	4703
Vehicles Exiti3g, 3eh/h3	10813	5973	2323	4323
e3 Vol Crossi3g Leg, #/h3	03	103	103	103
e3 Cap 3 j3	0.9813	0.9913	0.9973	0.993
pproach Delay, s/3eh3	7.23	6.93	7.13	16.93
pproach LOS3				C3

Lane3 3	Left3	Right3	Left3	Right3	Left3	Right3	Left3	Right3
Desig3ate3 Mo3es3	L3	LTR3	LT3	TR3	LT3	R3	LT3	R3
ssume3 Mo3es3	L3	LTR3	LT3	TR3	LT3	R3	LT3	R3
RT Chan3elize3								
Lane3 Util3	0.5303	0.4703	0.4703	0.5303	0.4483	0.5523	0. 293	0.6713
Follow-Up Headway, s3	2.6673	2.5353	2.6673	2.5353	2.6673	2.5353	2.6673	2.5353
Critical Headway, s3	4.6453	4. 283	4.6453	4. 283	4.6453	4. 283	4.6453	4. 283
E3try Flow, 3eh/h3	2393	2123	2793	153	823	1013	663	7483
Cap E3try Lane3, 3eh/h3	8503	9263	10173	1093	6953	7693	8763	9523
E3try HV 3 j Factor3	0.9543	0.9543	0.8753	0.8743	0.9113	0.8323	0.9783	0.9913
Flow E3try, 3eh/h3	2283	2023	2443	2753	753	843	583	7413
Cap E3try, 3eh/h3	7953	8663	8823	9473	6313	6373	8513	9373
V/C Ratio3	0.2873	0.23	0.2773	0.2913	0.1183	0.1323	0.4213	0.7913
Co3trol Delay, s/3eh3	7.83	6.63	7.03	6.83	7.13	7.23	9.43	20.63
LOS3								C3
95th %tile Queue, 3eh3	13	13	13	13	03	03	23	83

Intersectio3	
Intersectio3 Delay, s/3eh3	13.03
Intersectio3 LOS3	B3

pproach3	EB3	WB3	NB3	SB3
E3try Lane3s3	23	23	23	23
Co3flicti3g Circle Lane3s3	23	23	23	23
j 3pproach Flow, 3eh/h3	1243	6843	28:	5993
Deman3 Flow Rate, 3eh/h3	12743	7153	03	603
Vehicles Circulati3g, 3eh/h3	193	8893	13 43	5153
Vehicles Exiti3g, 3eh/h3	7993	7753	2593	10893
e3 Vol Crossi3g Leg, #/h3	103	203	103	03
e3 Cap 3 j3	0.9923	0.9993	1.0003	0.9813
pproach Delay, s/3eh3	12.63	16.	16.23	8.53
pproach LOS3	B3	C3	C3	

Lane3 3	Left3	Right3	Left3	Right3	Left3	Right3	Left3	Right3
Desig3ate3 Mo3es3	L3	LTR3	LT3	TR3	LT3	R3	LT3	R3
ssume3 Mo3es3	L3	LTR3	LT3	TR3	LT3	R3	LT3	R3
RT Chan3elize3								
Lane3 Util3	0.5303	0.4703	0.4703	0.5303	0.5363	0.4643	0. 623	0.6383
Follow-Up Headway, s3	2.6673	2.5353	2.6673	2.5353	2.6673	2.5353	2.6673	2.5353
Critical Headway, s3	4.6453	4. 283	4.6453	4. 283	4.6453	4. 283	4.6453	4. 283
E3try Flow, 3eh/h3	6753	5993	63	793	1773	153	2183	853
Cap E3try Lane3, 3eh/h3	10073	1083	5963	6673	963	4573	8413	9173
E3try HV 3 j Factor3	0.9763	0.9753	0.9563	0.9563	0.9913	1.0003	1.0003	0.9903
Flow E3try, 3eh/h3	6593	5843	213	623	1753	153	2183	813
Cap E3try, 3eh/h3	9743	10473	5693	6373	923	4573	8253	8903
V/C Ratio3	0.6763	0.5583	0.5653	0.5693	0.4473	0. 53	0.2643	0.4283
Co3trol Delay, s/3eh3	14.43	10.53	17.03	15.73	18.63	13.53	7.23	9.23
LOS3	B3	B3	C3	C3	C3	B3		
95th %tile Queue, 3eh3	63	43		43	23	13	13	23

TRAFFIC IMPACT ANALYSIS REPORT

FOR THE PROPOSED

WAIKOLOA ROAD – PANIOLO AVENUE INTERSECTION IMPROVEMENTS

SOUTH KOHALA, HAWAII ISLAND

APPENDIX E

CAPACITY ANALYSIS WORKSHEETS

PEAK HOUR TRAFFIC WITH TRAFFIC SIGNALS

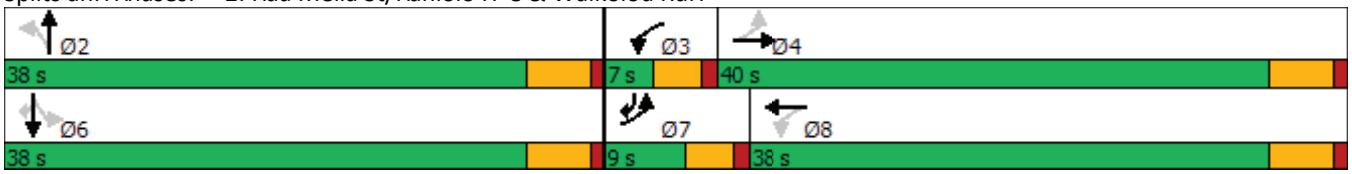
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	141	14	70	174	119	15	35	43	231	51	595
Future Volume (vph)	169	141	14	70	174	119	15	35	43	231	51	595
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	325		0	265		0	80		0	130		0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	100			100			100			100		
Satd. Flow (prot)	1719	1787	0	1626	1546	0	1480	1507	0	1752	1900	1599
Flt Permitted	0.432			0.654			0.722			0.704		
Satd. Flow (perm)	778	1787	0	1108	1546	0	1100	1507	0	1284	1900	1543
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			47			45				557
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		500			484			396			373	
Travel Time (s)		9.7			9.4			10.8			10.2	
Confl. Peds. (#/hr)	10		10	10		10	30		10	10		30
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	5%	5%	0%	11%	23%	2%	22%	6%	20%	3%	0%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	178	163	0	74	308	0	16	82	0	243	54	626
Turn Type	pm+pt	N		pm+pt	N		erm	N		erm	N	pm+ov
Protected Phases	7	4		3	8			2			6	7
Permitted Phases	4			8			2			6		6
Detector Phase	7	4		3	8		2	2		6	6	7
Switch Phase												
Minimum Initial (s)	3.0	15.0		3.0	15.0		7.0	7.0		7.0	7.0	3.0
Minimum Split (s)	7.0	38.0		7.0	38.0		38.0	38.0		38.0	38.0	7.0
Total Split (s)	9.0	40.0		7.0	38.0		38.0	38.0		38.0	38.0	9.0
Total Split (%)	10.6%	47.1%		8.2%	44.7%		44.7%	44.7%		44.7%	44.7%	10.6%
Yellow Time (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	3.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0		4.0	5.0		5.0	5.0		5.0	5.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag							Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							Yes
Recall Mode	None	None		None	None		Min	Min		Min	Min	None
Act Effct Green (s)	31.5	27.7		26.0	21.6		18.9	18.9		18.9	18.9	25.5
Actuated g/C Ratio	0.51	0.45		0.42	0.35		0.31	0.31		0.31	0.31	0.42
v/c Ratio	0.37	0.20		0.15	0.54		0.05	0.17		0.62	0.09	0.64
Control Delay	12.5	14.0		10.9	18.4		16.1	9.7		25.7	15.9	5.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	12.5	14.0		10.9	18.4		16.1	9.7		25.7	15.9	5.4
LOS	B	B		B	B		B			C	B	
Approach Delay		13.2			16.9			10.7			11.4	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	24	30		9	60		3	7		58	11	9
Queue Length 95th (ft)	87	94		41	176		18	40		165	41	79
Internal Link Dist (ft)		420			404			316			293	
Turn Bay Length (ft)	325			265			80			130		

LaneH GroupH	EBLH	EBTH	EBRH	WBLH	WBTH	WBRH	NBLH	NBTH	NBRH	SBLH	SBTH	SBRH
Base Capacity (Hph)H	483H	1119H		497H	930H		648H	906H		756H	1119H	971H
StarHatioH Cap ReHuctnH	0H	0H		0H	0H		0H	0H		0H	0H	0H
Spillback Cap ReHuctnH	0H	0H		0H	0H		0H	0H		0H	0H	0H
Storage Cap ReHuctnH	0H	0H		0H	0H		0H	0H		0H	0H	0H
ReHuceH H/c RatioH	0.37H	0.15H		0.15H	0.33H		0.02H	0.09H		0.32H	0.05H	0.64H

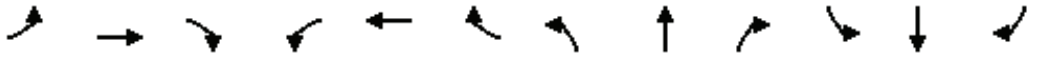
IntersectioH SummaryH

rea Type:H OtherH
Cycle LeHgth: 85H
ctuateH Cycle LeHgth: 61.4H
Natural Cycle: 85H
CoHtrol Type: HctuateH-UHcoorHiHateH
Maximum H/c Ratio: 0.64H
IntersectioH SigHal Delay: 12.9H IntersectioH LOS: BH
IntersectioH Capacity UtilizatioH 76.9%H ICU LeHel of SerHice DH
alysis HerioH (miH) 15H

Splits anH HhaseH: 2: Hua Melia St/Haniolo H e & Waikoloa RdH



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (ph)	554	325	49	54	224	177	14	113	86	99	68	283
Future Volume (ph)	554	325	49	54	224	177	14	113	86	99	68	283
Ideal Flow (phpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	325		0	265		0	80		0	130		0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	100			100			100			100		
Satd Flow (prot)	1787	1778	0	1805	1691	0	1805	1741	0	1805	1900	1599
Flt Permitted	0.250			0.529			0.710			0.528		
Satd Flow (perm)	470	1778	0	1001	1691	0	1349	1741	0	994	1900	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd Flow (RTOR)		11			42			41				298
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		500			484			396			373	
Travel Time (s)		9.7			9.4			10.8			10.2	
Confl. Peds. (#/hr)			5	5					9	9		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	5%	0%	0%	8%	1%	0%	1%	0%	0%	0%	1%
Shared Lane Traffic (%)												
Lane Group Flow (ph)	583	394	0	57	422	0	15	210	0	104	72	298
Turn Type	pm+pt	NA		pm+pt	NA		erm	NA		erm	NA	pm+ov
Protected Phases	7	4		3	8			2			6	7
Permitted Phases	4			8			2			6		6
Detector Phase	7	4		3	8		2	2		6	6	7
Switch Phase												
Minimum Initial (s)	3.0	15.0		3.0	15.0		7.0	7.0		7.0	7.0	3.0
Minimum Split (s)	7.0	38.0		7.0	38.0		38.0	38.0		38.0	38.0	7.0
Total Split (s)	24.0	55.0		7.0	38.0		38.0	38.0		38.0	38.0	24.0
Total Split (%)	24.0%	55.0%		7.0%	38.0%		38.0%	38.0%		38.0%	38.0%	24.0%
Yellow Time (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	3.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0		4.0	5.0		5.0	5.0		5.0	5.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag							Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							Yes
Recall Mode	None	None		None	None		Min	Min		Min	Min	None
Act Effct Green (s)	52.3	47.7		29.8	25.5		21.4	21.4		21.4	21.4	48.2
Actuated g/C Ratio	0.63	0.57		0.36	0.31		0.26	0.26		0.26	0.26	0.58
v/c Ratio	0.92	0.39		0.15	0.77		0.04	0.44		0.41	0.15	0.28
Control Delay	39.8	14.2		12.0	35.3		23.3	23.1		30.7	24.2	1.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	39.8	14.2		12.0	35.3		23.3	23.1		30.7	24.2	1.9
LOS	D	B		B	D		C	C		C	C	
Approach Delay		29.5			32.6			23.1			11.6	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	~298	150		15	212		6	79		49	32	0
Queue Length 95th (ft)	#510	226		32	328		21	142		96	64	33
Internal Link Dist (ft)		420			404			316			293	
Turn Bay Length (ft)	325			265			80			130		

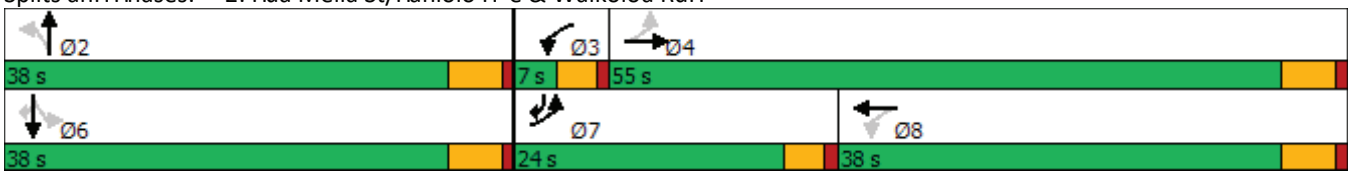


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (ph)	633	1146		388	741		572	762		421	806	1050
Star atio Cap Reuctn	0	0		0	0		0	0		0	0	0
Spillback Cap Reuctn	0	0		0	0		0	0		0	0	0
Storage Cap Reuctn	0	0		0	0		0	0		0	0	0
Reuce H/c Ratio	0.92	0.34		0.15	0.57		0.03	0.28		0.25	0.09	0.28

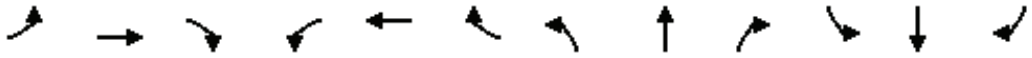
Intersectio Summary

rea Type: Other
Cycle Legth: 100
ctuate Cycle Legth: 83.4
Natural Cycle: 95
Control Type: ctuate-Uncoor ate
Maximum H/c Ratio: 0.92
Intersectio Signal Delay: 25.6 Intersectio LOS: C
Intersectio Capacity Utilizatio 90.7% ICU Level of Service E
 alysis erio (mi) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile olume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits an hases: 2: Hua Melia St/Haniolo H e & Waikoloa Rd



LaneMGroupM	EBLM	EBTM	EBRM	WBLM	WBTM	WBRM	NBLM	NBTM	NBRM	SBLM	SBTM	SBRM
LaneMCoMfiguratioMsM												
Traffic Volume (Mph)M	204M	186M	18M	117M	238M	138M	19M	52M	80M	268M	72M	704M
Future Volume (Mph)M	204M	186M	18M	117M	238M	138M	19M	52M	80M	268M	72M	704M
Ideal Flow (Mphpl)M	1900M	1900M	1900M	1900M	1900M	1900M	1900M	1900M	1900M	1900M	1900M	1900M
Storage LeMgth (ft)M	400M		0M	200M		0M	100M		0M	130M		0M
Storage LaneMsM	2M		0M	1M		0M	1M		0M	1M		1M
Taper LeMgth (ft)M	100M			100M			100M			100M		
SatdMFlow (prot)M	3335M	1788M	0M	1626M	2936M	0M	1480M	1479M	0M	1752M	1900M	1599M
Flt MermitteM	0.950M			0.950M			0.708M			0.668M		
SatdMFlow (perm)M	3307M	1788M	0M	1608M	2936M	0M	1079M	1479M	0M	1219M	1900M	1599M
Right TurMoMReM			YesM			YesM			YesM			YesM
SatdMFlow (RTOR)M		5M			129M			84M				412M
LiMk SpeeM(mph)M		35M			35M			25M			25M	
LiMk DistanMe (ft)M		500M			484M			396M			373M	
TravMl Time (s)M		9.7M			9.4M			10.8M			10.2M	
CoMfl. MeMs. (#/hr)M	10M		10M	10M		10M	30M		10M	10M		30M
eak Hour FactorM	0.95M	0.95M	0.95M	0.95M	0.95M	0.95M	0.95M	0.95M	0.95M	0.95M	0.95M	0.95M
HeavyM Vehicles (%)M	5%M	5%M	0%M	11%M	23%M	2%M	22%M	6%M	20%M	3%M	0%M	1%M
ShareMLaneMTraffic (%)M												
LaneMGroup Flow (Mph)M	215M	215M	0M	123M	396M	0M	20M	139M	0M	282M	76M	741M
TurMTypeM	rotM	NM		rotM	NM		ermM	NM		ermM	NM	pt+oM
rotecteMMhasesM	7M	4M		3M	8M			2M			6M	6 7M
ermitteMMhasesM							2M			6M		
Detector MhaseM	7M	4M		3M	8M		2M	2M		6M	6M	6 7M
Switch Mhase												
MiMmum InMal (s)M	3.0M	7.0M		3.0M	7.0M		5.0M	5.0M		5.0M	5.0M	
iMmum Split (s)M	9.5M	38.0M		9.5M	40.0M		42.5M	42.5M		43.0M	43.0M	
Total Split (s)M	15.0M	38.0M		18.0M	41.0M		44.0M	44.0M		44.0M	44.0M	
Total Split (%)M	15.0%M	38.0%M		18.0%M	41.0%M		44.0%M	44.0%M		44.0%M	44.0%M	
Yellow Time (s)M	3.0M	4.0M		3.0M	4.0M		4.0M	4.0M		4.0M	4.0M	
ll-ReMTime (s)M	1.0M	1.0M		1.0M	1.0M		1.0M	1.0M		1.0M	1.0M	
Lost Time M just (s)M	0.0M	0.0M		0.0M	0.0M		0.0M	0.0M		0.0M	0.0M	
Total Lost Time (s)M	4.0M	5.0M		4.0M	5.0M		5.0M	5.0M		5.0M	5.0M	
LeadMLagM	LeadM	LagM		LeadM	LagM							
LeadMLag Optimize?M	YesM	YesM		YesM	YesM							
Recall MoMeM	NoMeM	NoMeM		NoMeM	NoMeM		i	MiM		i	MiM	
ct Effct GreeM(s)M	10.1M	17.0M		10.6M	14.2M		25.1M	25.1M		25.1M	25.1M	39.5M
ctuateMg/C RatioM	0.16M	0.26M		0.16M	0.22M		0.39M	0.39M		0.39M	0.39M	0.61M
/c RatioM	0.41M	0.45M		0.46M	0.53M		0.05M	0.22M		0.59M	0.10M	0.65M
CoMtrol DelayM	31.4M	28.1M		34.9M	18.5M		13.7M	7.6M		22.2M	13.7M	6.6M
Queue DelayM	0.0M	0.0M		0.0M	0.0M		0.0M	0.0M		0.0M	0.0M	0.0M
Total DelayM	31.4M	28.1M		34.9M	18.5M		13.7M	7.6M		22.2M	13.7M	6.6M
LOSM	CM	CM		CM	B		B			CM	B	
pproach DelayM		29.7M			22.3M			8.3M			11.1M	
pproach LOSM		CM			CM						B	
Queue LeMgth 50th (ft)M	38M	73M		44M	47M		5M	13M		82M	18M	50M
Queue LeMgth 95th (ft)M	93M	170M		117M	104M		19M	51M		186M	49M	195M
InterMal LiMk Dist (ft)M		420M			404M			316M			293M	
TurMBay LeMgth (ft)M	400M			200M			100M			130M		

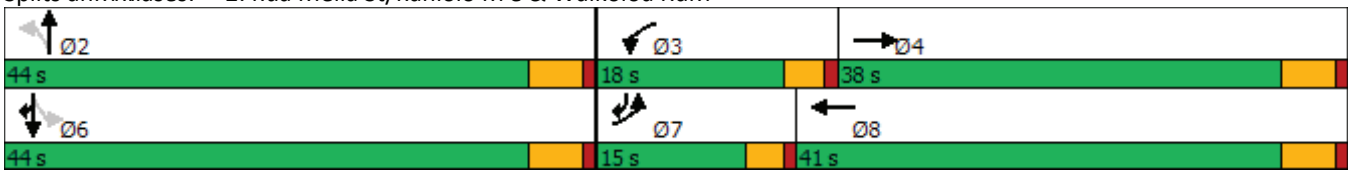


LaneMGroupM	EBLM	EBTM	EBRM	WBLM	WBTM	WBRM	NBLM	NBTM	NBRM	SBLM	SBTM	SBRM
Base Capacity (Mph)M	614M	990M		381M	1821M		704M	995M		796M	1240M	1260M
StarMatioMCap ReMuctnM	0M	0M		0M	0M		0M	0M		0M	0M	0M
Spillback Cap ReMuctnM	0M	0M		0M	0M		0M	0M		0M	0M	0M
Storage Cap ReMuctnM	0M	0M		0M	0M		0M	0M		0M	0M	0M
ReMuceMMMc RatioM	0.35M	0.22M		0.32M	0.22M		0.03M	0.14M		0.35M	0.06M	0.59M

IntersectioMSummaryM

rea Type:M OtherM
Cycle LeMgth: 100M
ctuateMCycle LeMgth: 64.4M
Natural Cycle: 95M
CoMtrol Type: MctuateM4UMctoorMMate
Maximum MMc Ratio: 0.65M
IntersectioMSigMal Delay: 17.2M IntersectioMLOS: B
IntersectioMCapacity UtilizatioM79.4%M ICU LeMel of SerMce DM
alysis MerioM(miM) 15M

Splits anMMhases: 2: Mua Melia St/Maniolo M e & Waikoloa RdM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	670	453	58	96	348	206	18	148	145	115	92	362
Future Volume (vph)	670	453	58	96	348	206	18	148	145	115	92	362
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	325		0	265		0	80		0	130		0
Storage Lanes	2		0	1		0	1		0	1		1
Taper Length (ft)	100			100			100			100		
Satd. Flow (prot)	3467	1781	0	1805	3208	0	1805	1709	0	1805	1900	1599
Flt Permitted	0.950			0.950			0.694			0.386		
Satd. Flow (perm)	3398	1781	0	1791	3208	0	1309	1709	0	721	1900	1567
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			124			53				381
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		500			484			396			373	
Travel Time (s)		9.7			9.4			10.8			10.2	
Confl. Peds. (#/hr)	30		10	10		10	10		20	20		10
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	5%	0%	0%	8%	1%	0%	1%	0%	0%	0%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	705	538	0	101	583	0	19	309	0	121	97	381
Turn Type	rot	NM		rot	NM		erm	NM		erm	NM	erm
rotected Phases	7	4		3	8			2			6	
ermitted Phases							2			6		6
Detector Phase	7	4		3	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	3.0	7.0		3.0	7.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	38.0		9.5	40.0		42.5	42.5		43.0	43.0	43.0
Total Split (s)	22.0	48.8		13.2	40.0		43.0	43.0		43.0	43.0	43.0
Total Split (%)	21.0%	46.5%		12.6%	38.1%		41.0%	41.0%		41.0%	41.0%	41.0%
Yellow Time (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0		4.0	5.0		5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	None		None	None		i	Min		i	Min	Min
Act Effct Green (s)	19.0	32.1		8.7	18.9		18.4	18.4		18.4	18.4	18.4
Actuated g/C Ratio	0.27	0.45		0.12	0.27		0.26	0.26		0.26	0.26	0.26
v/c Ratio	0.76	0.67		0.46	0.62		0.06	0.64		0.65	0.20	0.55
Control Delay	34.4	22.7		42.0	20.9		21.7	26.4		42.2	22.5	6.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	34.4	22.7		42.0	20.9		21.7	26.4		42.2	22.5	6.1
LOS	C	C		D	C		C	C		D	C	
Approach Delay		29.4			24.0			26.1			16.1	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	135	184		38	86		6	90		43	31	0
Queue Length 95th (ft)	#381	385		#128	167		25	214		123	82	63
Internal Link Dist (ft)		420			404			316			293	
Turn Bay Length (ft)	325			265			80			130		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	927	1162		246	1728		739	988		407	1073	1050
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.76	0.46		0.41	0.34		0.03	0.31		0.30	0.09	0.36

Intersection Summary

Area Type: Other

Cycle Length: 105

Actuated Cycle Length: 71

Natural Cycle: 105

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 24.9 Intersection LOS: C

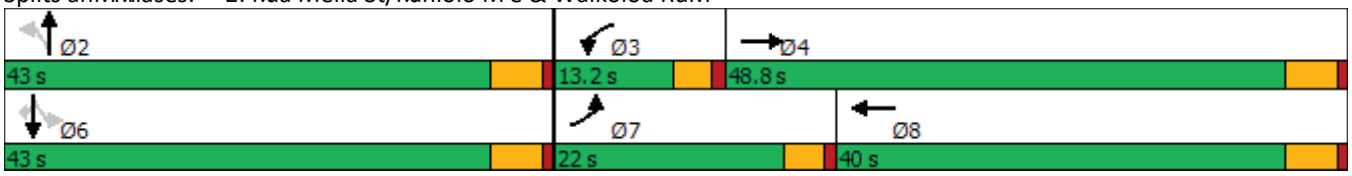
Intersection Capacity Utilization 85.5% ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Mua Melia St/Paniolo M e & Waikoloa Rd



TRAFFIC IMPACT ANALYSIS REPORT

FOR THE PROPOSED

WAIKOLOA ROAD – PANIOLO AVENUE INTERSECTION IMPROVEMENTS

SOUTH KOHALA, HAWAII ISLAND

APPENDIX F

TRAFFIC SIGNAL WARRANT ANALYSIS WORKSHEETS

EXISTING CONDITIONS

WarraMts Summary MeportM

2: Waiko oa M a io o Ave

IMtersectioMIMformatioM

	ajor StreetM	iMor StreetM
Street NameM	Waikoloa Rm	Paniolo Avem
DirectioM	Wm	NmSm
Number of LaMes		
Approch SpeeM	35m	5m

WarraMtM	etM	NotesM
WarraMt 1, Eight-Hour Vehicu ar Vo ume		
	Nom	
Conmition A or m Met'	Nom	6 Hours met (8 requirem)m
Conmition A anmm Me	Nom	4 Hours met (8 requirem)m
WarraMt 2, Four-Hour Vehicu ar Vo ume		
	Yesm	10 Hours met (4 requirem)m
WarraMt 3, Meak Hour		
	Yesm	
Conmition A Met?m	Nom	0 Hours met (1 requirem)m
Conmition m Met?m	Yesm	4 Hours met (1 requirem)m

WarraMt 1: Eight-hour Vehicu ar Vo umeM

2: Waiko oa M a io o Ave

IMtersectioMIMformatioN

Major Street Na e:	Waikoloa Rm
Major Street Direction:	Wm
Minor Street Direction:	NmSm

WAM ANT 1 MET?M No

Detai s:M

Conmition A Met?m	Nom	6 Hours met (8 requirem)m
Conmition m Met?m	Nom	4 Hours met (8 requirem)m

Hour	ajor Street Vehic es M (Tota of Both Approaches)M	High Vo ume MiMor M Approach Vehic esM	70% StaM arM Met? M CoM . A OM	56% StaM arM Met? M CoM . A AND CoM . BM
			Conmition A 70% m Columnm	Conmition m 70% m Columnm	Conmition A 56% m Columnm	Conmition m 56% m Columnm
06:30 to 07:30	**348M**	**577M**	Nom	Nom	Yesm	Nom
Conmition Am	Volume >= 70% m column (4m0)? Nom	Volume >= 70% m column (630)? Yesm				
	Volume >= 56% m column (336)? Yesm	Volume >= 56% m column (504)? Yesm				
Conmition m	Vo ume >= 70% M co umM(630)?M No	Vo ume >= 70% M co umM(70)?M Yes				
	Vo ume >= 56% M co umM(504)?M No	Vo ume >= 56% M co umM(56)?M Yes				
06:45 to 07:45	**376M**	**586M**	Nom	Nom	Yesm	Nom
Conmition Am	Volume >= 70% m column (4m0)? Nom	Volume >= 70% m column (630)? Yesm				
	Volume >= 56% m column (336)? Yesm	Volume >= 56% m column (504)? Yesm				
Conmition m	Vo ume >= 70% M co umM(630)?M No	Vo ume >= 70% M co umM(70)?M Yes				
	Vo ume >= 56% M co umM(504)?M No	Vo ume >= 56% M co umM(56)?M Yes				
07:00 to 08:00	**397M**	**598M**	Nom	Nom	Yesm	Nom
Conmition Am	Volume >= 70% m column (4m0)? Nom	Volume >= 70% m column (630)? Yesm				
	Volume >= 56% m column (336)? Yesm	Volume >= 56% m column (504)? Yesm				
Conmition m	Vo ume >= 70% M co umM(630)?M No	Vo ume >= 70% M co umM(70)?M Yes				
	Vo ume >= 56% M co umM(504)?M No	Vo ume >= 56% M co umM(56)?M Yes				
07:15 to 08:15	**379M**	**601M**	Nom	Nom	Yesm	Nom
Conmition Am	Volume >= 70% m column (4m0)? Nom	Volume >= 70% m column (630)? Yesm				
	Volume >= 56% m column (336)? Yesm	Volume >= 56% m column (504)? Yesm				
Conmition m	Vo ume >= 70% M co umM(630)?M No	Vo ume >= 70% M co umM(70)?M Yes				
	Vo ume >= 56% M co umM(504)?M No	Vo ume >= 56% M co umM(56)?M Yes				

07:30 to 08:30	388M		576M		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

07:45 to 08:45	368M		536M		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

08:00 to 09:00	370		481M		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

08:15 to 09:15	397M		434M		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

08:30 to 09:30	383M		408M		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

08:45 to 09:45	385M		403M		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

09:00 to 10:00	370		383M		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

09:15 to 10:15	**368M**		**358M**		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				
09:30 to 10:30	**387M**		**337M**		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				
09:45 to 10:45	**389M**		**323M**		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				
10:00 to 11:00	**386M**		**296M**		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				
10:15 to 11:15	**367M**		**283M**		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				
10:30 to 11:30	**356M**		**265M**		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				
10:45 to 11:45	**336M**		**251M**		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

11:00 to 12:00	**343M**		**262M**		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				
11:15 to 12:15	**347M**		**276M**		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				
11:30 to 12:30	**343M**		**301M**		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				
11:45 to 12:45	**357M**		**296M**		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				
12:00 to 13:00	**409M**		**291M**		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				
12:15 to 13:15	**428M**		**311M**		Yes*	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				
12:30 to 13:30	**457M**		**297M**		Yes	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

12:45 to 13:45	467M		313M		Yes	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	Vo ume >= 70% M co umM(630)?M	No	Vo ume >= 70% M co umM(70)?M	Yes				
	Vo ume >= 56% M co umM(504)?M	No	Vo ume >= 56% M co umM(56)?M	Yes				

13:00 to 14:00	425M		328M		Yes	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	Vo ume >= 70% M co umM(630)?M	No	Vo ume >= 70% M co umM(70)?M	Yes				
	Vo ume >= 56% M co umM(504)?M	No	Vo ume >= 56% M co umM(56)?M	Yes				

13:15 to 14:15	428M		312M		Yes*	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	Vo ume >= 70% M co umM(630)?M	No	Vo ume >= 70% M co umM(70)?M	Yes				
	Vo ume >= 56% M co umM(504)?M	No	Vo ume >= 56% M co umM(56)?M	Yes				

13:30 to 14:30	438M		311M		Yes	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	Vo ume >= 70% M co umM(630)?M	No	Vo ume >= 70% M co umM(70)?M	Yes				
	Vo ume >= 56% M co umM(504)?M	No	Vo ume >= 56% M co umM(56)?M	Yes				

13:45 to 14:45	472M		313M		Yes	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	Vo ume >= 70% M co umM(630)?M	No	Vo ume >= 70% M co umM(70)?M	Yes				
	Vo ume >= 56% M co umM(504)?M	No	Vo ume >= 56% M co umM(56)?M	Yes				

14:00 to 15:00	513M		295M		Yes	No	Yes*	Yes*
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	Vo ume >= 70% M co umM(630)?M	No	Vo ume >= 70% M co umM(70)?M	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	Vo ume >= 56% M co umM(56)?M	Yes				

14:15 to 15:15	546M		292M		Yes*	No	Yes	Yes
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	Vo ume >= 70% M co umM(630)?M	No	Vo ume >= 70% M co umM(70)?M	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	Vo ume >= 56% M co umM(56)?M	Yes				

14:30 to 15:30	**582M**		**301M**		Yes	No	Yes	Yes
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
14:45 to 15:45	**628M**		**300**		Yes	No	Yes	Yes
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
15:00 to 16:00	**670**		**321M**		Yes	Yes*	Yes*	Yes*
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
15:15 to 16:15	**697M**		**317M**		Yes*	Yes	Yes	Yes
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
15:30 to 16:30	**693M**		**304M**		Yes	Yes	Yes	Yes
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
15:45 to 16:45	**678M**		**273M**		Yes	Yes	Yes	Yes
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
16:00 to 17:00	**659M**		**247M**		Yes	Yes*	Yes*	Yes*
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				

16:15 to 17:15	**637M**		**241M**		Yes*	Yes	Yes	Yes
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
16:30 to 17:30	**647M**		**220**		Yes	Yes	Yes	Yes
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
16:45 to 17:45	**641M**		**219M**		Yes	Yes	Yes	Yes
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
17:00 to 18:00	**645M**		**204M**		Yes	Yes*	Yes*	Yes*
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
17:15 to 18:15	**605M**		**189M**		Yes*	No	Yes	Yes
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
17:30 to 18:30	**568M**		**179M**		Yes	No	Yes	Yes
Con ition A	Volu e >= 70% colu n (4 0)?	Yes	Volu e >= 70% colu n (630)?	Yes				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
17:45 to 18:45	**413M**		**135M**		No	No	Yes	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	No				
	Volu e >= 56% colu n (336)?	Yes	Volu e >= 56% colu n (504)?	Yes				
Con ition	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

18:00 to 19:00	246M		94M		No	No	No	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	No				
	Volu e >= 56% colu n (336)?	No	Volu e >= 56% colu n (504)?	No				
Con ition	Vo ume >= 70% M co umM(630)?M	No	Vo ume >= 70% M co umM(70)?M	Yes				
	Vo ume >= 56% M co umM(504)?M	No	Vo ume >= 56% M co umM(56)?M	Yes				

18:15 to 19:15	137M		39M		No	No	No	No
Con ition A	Volu e >= 70% colu n (4 0)?	No	Volu e >= 70% colu n (630)?	No				
	Volu e >= 56% colu n (336)?	No	Volu e >= 56% colu n (504)?	No				
Con ition	Vo ume >= 70% M co umM(630)?M	No	Vo ume >= 70% M co umM(70)?M	No				
	Vo ume >= 56% M co umM(504)?M	No	Vo ume >= 56% M co umM(56)?M	No				

WarraMt 2: Four-hour Vehicu ar Vo umeM

2: Waiko oa M a io o Ave

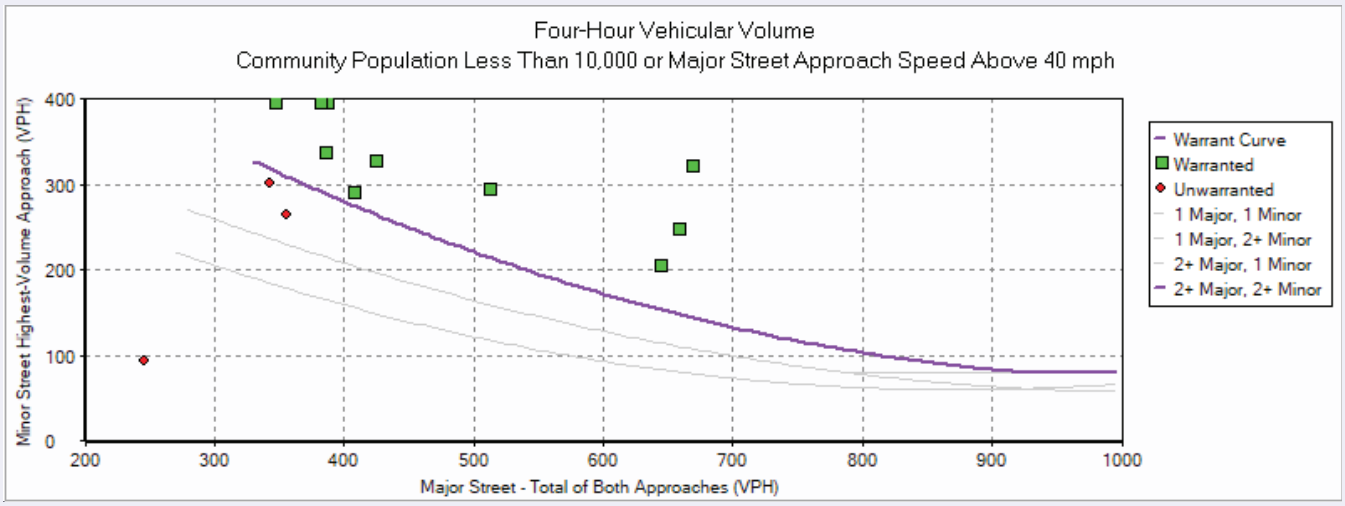
IMtersectioMIMformatioN

	ajor StreetM	iMor StreetM
Street NameM	Waikoloa Rm	Paniolo Avem
DirectioM	Wm	NmSm
Number of LaMes		
Approch SpeeM	35m	5m

WarraMt 2 Met?M Yes

Detai s:M

NotesM	10 Hours met (4 requirem)m
Low popu atioN	Yesm



Hour y Vo umesM

Hour	ajor StreetM Total All Approaches (vph)	iMor StreetM Highest Volu e Approach (vph)
00:00:00 - 01:00:00	0.00	0.00
01:00:00 - 0 :00:00	0.00	0.00
0 :00:00 - 03:00:00	0.00	0.00
03:00:00 - 04:00:00	0.00	0.00
04:00:00 - 05:00:00	0.00	0.00
05:00:00 - 06:00:00	0.00	0.00
06:00:00 - 07:00:00	157.00	76.00
07:00:00 - 08:00:00	397.00	598.00
08:00:00 - 09:00:00	370.00	481.00
09:00:00 - 10:00:00	370.00	383.00
10:00:00 - 11:00:00	386.00	96.00
11:00:00 - 1 :00:00	343.00	6 .00
1 :00:00 - 13:00:00	409.00	91.00
13:00:00 - 14:00:00	4 5.00	3 8.00
14:00:00 - 15:00:00	513.00	95.00
15:00:00 - 16:00:00	670.00	3 1.00
16:00:00 - 17:00:00	659.00	47.00
17:00:00 - 18:00:00	645.00	04.00
18:00:00 - 19:00:00	46.00	94.00
19:00:00 - 0:00:00	0.00	0.00
0:00:00 - 1:00:00	0.00	0.00
1:00:00 - :00:00	0.00	0.00
:00:00 - 3:00:00	0.00	0.00
3:00:00 - 00:00:00	0.00	0.00

WarraMteMVo umesM

Hour	ajor StreetM Total All Approaches (vph)	iMor StreetM Highest Volu e Approach (vph)
06:30:00 - 07:30:00	348.00	577.00
07:30:00 - 08:30:00	388.00	576.00
08:30:00 - 09:30:00	383.00	408.00
09:30:00 - 10:30:00	387.00	337.00
1 :00:00 - 13:00:00	409.00	91.00
13:00:00 - 14:00:00	4 5.00	3 8.00
14:00:00 - 15:00:00	513.00	95.00
15:00:00 - 16:00:00	670.00	3 1.00
16:00:00 - 17:00:00	659.00	47.00
17:00:00 - 18:00:00	645.00	04.00

WarraMt 3: Meak HourM

2: Waiko oa M a io o Ave

IMtersectioMIMformatioN

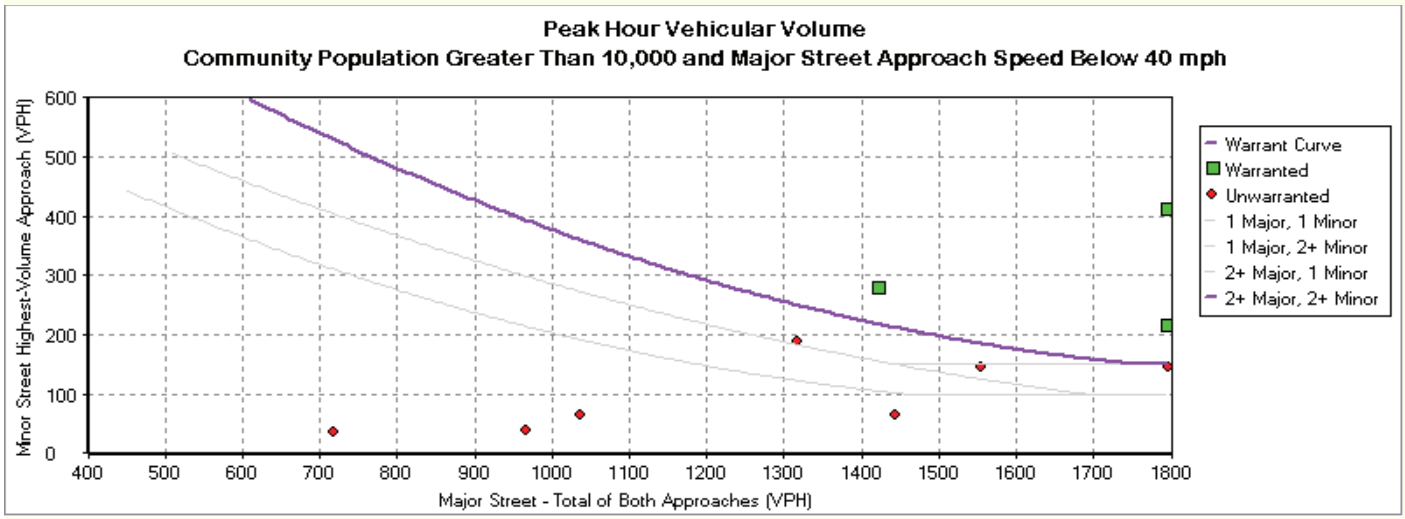
	ajor StreetM	iMor StreetM
Street NameM	Waikoloa Rm	Paniolo Avem
DirectioM	Wm	NmSm
Number of LaMes		
Approch SpeeM	35m	5m

WarraMt 3 Met?M Yes

Detai sM

Low Mopu atioM	Yesm		
CoM itioMA Met'	Nom	**CoM itioMB Met'**	Yesm
NotesM	0 Hours met (1 requirem)m	**NotesM**	4 Hours met (1 requirem)m

Minor Approach Time Delay Conmition Met?m	Not Metm
Minor Approach Volume Conmition Met?m	Metm
Total mntering Intersection Volume Conmition Met?m	Not Metm



HourM	ajor StreetM Total All Approaches (vph)	iMor StreetM Highest Volu e Approach (vph)
6:30	348	577
7:30	388	576
8:30	383	408
9:30	387	337
10:30	356	65
11:30	343	301
1 :30	457	97
13:30	438	311
14:30	58	301
14:45	6 8	300
15:45	678	73
16:45	641	19
17:45	413	135

TRAFFIC IM ACT A A I RE ORT

FOR THE RO O ED

WAIKO OA ROAD – A IO O AVE UE I TER ECTIO IM ROVEME T

OUTH KOHA A, HAWAII I A D

A E DIX G

TRAFFIC IG A WARRA T A A I WORK HEET

RE- A DEMIC CO DITIO

WarraMts Summary MeportM

2: Waiko oa M a io o Ave

IMtersectioM IMformatioM

	ajor StreetM	iMor StreetM
Street NameM	Waikoloa Ru	Paniolo Aveu
DirectioM	Wu	Nu Su
Number of LaMes		
Approch SpeeM	35u	5u

WarraMtM	etM	NotesM
WarraMt 1, Eight-Hour Vehicu ar Vo ume		
	Yesu	
Conuition A or u Met'	Yesu	9 Hours met (8 requireu)u
Conuition A anu u Me	Nou	5 Hours met (8 requireu)u
WarraMt 2, Four-Hour Vehicu ar Vo ume		
	Yesu	1u Hours met (4 requireu)u
WarraMt 3, Meak Hour		
	Yesu	
Conuition A Met?u	Nou	0 Hours met (1 requireu)u
Conuition u Met?u	Yesu	7 Hours met (1 requireu)u

WarraM t 1: Eight-hour Vehicu ar Vo umeM

2: Waiko oa M a io o Ave

IMtersectioMIMformatioN

Major Street Name:u Waikoloa Ru

Major Street Direction:u Wu

Minor Street Direction:u Nu Su

WAM ANT 1 MET?M Yes

Detai s:M

Conuition A Met?u	Yesu	9 Hours met (8 requireu)u
Conuition u Met?u	Nou	5 Hours met (8 requireu)u

Hour	ajor Street Vehic es M (Tota of Both Approaches)M		High Vo ume MiMor M Approach Vehic esM		70% StaM arMMet? M CoM . A OM	56% StaM arMMet? CoM . A AND CoM . B	
					Conuition A 70% u Columnu	Conuition u 70% u Columnu	Conuition A 56% u Columnu	Conuition u 56% u Columnu
06:30 to 07:30	**389M**		**646M**		Nou	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Nou	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				
06:45 to 07:45	**420**		**657M**		Yes*u	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				
07:00 to 08:00	**442M**		**671M**		Yesu	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				
07:15 to 08:15	**422M**		**673M**		Yesu	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

07:30 to 08:30	431M		646M		Yesu	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

07:45 to 08:45	409M		601M		Nou	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Nou	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

08:00 to 09:00	412M		538M		Nou	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Nou	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

08:15 to 09:15	442M		487M		Yes*u	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

08:30 to 09:30	428M		457M		Yesu	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

08:45 to 09:45	430		452M		Yesu	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

09:00 to 10:00	413M		431M		Nou	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Nou	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

09:15 to 10:15	412M		402M		Nou	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Nou	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

09:30 to 10:30	431M		379M		Yes*u	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

09:45 to 10:45	433M		362M		Yesu	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

10:00 to 11:00	429M		331M		Yesu	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

10:15 to 11:15	407M		317M		Nou	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Nou	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

10:30 to 11:30	397M	297M	Nou	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)? Nou	Volume >= 70% u column (630)? Yesu				
	Volume >= 56% u column (336)? Yesu	Volume >= 56% u column (504)? Yesu				
Conuition u	Vo ume >= 70% M co umM(630)?M No	Vo ume >= 70% M co umM(70)?M Yes				
	Vo ume >= 56% M co umM(504)?M No	Vo ume >= 56% M co umM(56)?M Yes				

10:45 to 11:45	374M	281M	Nou	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)? Nou	Volume >= 70% u column (630)? Yesu				
	Volume >= 56% u column (336)? Yesu	Volume >= 56% u column (504)? Yesu				
Conuition u	Vo ume >= 70% M co umM(630)?M No	Vo ume >= 70% M co umM(70)?M Yes				
	Vo ume >= 56% M co umM(504)?M No	Vo ume >= 56% M co umM(56)?M Yes				

11:00 to 12:00	383M	294M	Nou	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)? Nou	Volume >= 70% u column (630)? Yesu				
	Volume >= 56% u column (336)? Yesu	Volume >= 56% u column (504)? Yesu				
Conuition u	Vo ume >= 70% M co umM(630)?M No	Vo ume >= 70% M co umM(70)?M Yes				
	Vo ume >= 56% M co umM(504)?M No	Vo ume >= 56% M co umM(56)?M Yes				

11:15 to 12:15	387M	309M	Nou	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)? Nou	Volume >= 70% u column (630)? Yesu				
	Volume >= 56% u column (336)? Yesu	Volume >= 56% u column (504)? Yesu				
Conuition u	Vo ume >= 70% M co umM(630)?M No	Vo ume >= 70% M co umM(70)?M Yes				
	Vo ume >= 56% M co umM(504)?M No	Vo ume >= 56% M co umM(56)?M Yes				

11:30 to 12:30	383M	337M	Nou	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)? Nou	Volume >= 70% u column (630)? Yesu				
	Volume >= 56% u column (336)? Yesu	Volume >= 56% u column (504)? Yesu				
Conuition u	Vo ume >= 70% M co umM(630)?M No	Vo ume >= 70% M co umM(70)?M Yes				
	Vo ume >= 56% M co umM(504)?M No	Vo ume >= 56% M co umM(56)?M Yes				

11:45 to 12:45	401M	331M	Nou	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)? Nou	Volume >= 70% u column (630)? Yesu				
	Volume >= 56% u column (336)? Yesu	Volume >= 56% u column (504)? Yesu				
Conuition u	Vo ume >= 70% M co umM(630)?M No	Vo ume >= 70% M co umM(70)?M Yes				
	Vo ume >= 56% M co umM(504)?M No	Vo ume >= 56% M co umM(56)?M Yes				

12:00 to 13:00	459M		325M		Yes*u	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?					
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

12:15 to 13:15	480		348M		Yesu	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?					
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

12:30 to 13:30	512M		332M		Yesu	Nou	Yes*u	Yes*u
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				

12:45 to 13:45	523M		350		Yesu	Nou	Yesu	Yesu
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				

13:00 to 14:00	476M		366M		Yes*u	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

13:15 to 14:15	479M		347M		Yesu	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

13:30 to 14:30	489M		346M		Yesu	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

13:45 to 14:45	526M		349M		Yesu	Nou	Yes*u	Yes*u
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				

14:00 to 15:00	572M		329M		Yes*u	Nou	Yesu	Yesu
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				

14:15 to 15:15	611M		327M		Yesu	Nou	Yesu	Yesu
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				

14:30 to 15:30	652M		337M		Yesu	Yes*u	Yesu	Yesu
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				

14:45 to 15:45	704M		336M		Yesu	Yesu	Yes*u	Yes*u
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				

15:00 to 16:00	**751M**		**360**		Yes*u	Yesu	Yesu	Yesu
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
15:15 to 16:15	**780**		**355M**		Yesu	Yesu	Yesu	Yesu
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
15:30 to 16:30	**776M**		**340**		Yesu	Yes*u	Yesu	Yesu
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
15:45 to 16:45	**759M**		**306M**		Yesu	Yesu	Yes*u	Yes*u
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
16:00 to 17:00	**737M**		**277M**		Yes*u	Yesu	Yesu	Yesu
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
16:15 to 17:15	**711M**		**271M**		Yesu	Yesu	Yesu	Yesu
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				

16:30 to 17:30	**722M**		**249M**		Yesu	Yes*u	Yesu	Yesu
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
16:45 to 17:45	**715M**		**247M**		Yesu	Yesu	Yes*u	Yes*u
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
17:00 to 18:00	**719M**		**230**		Yes*u	Yesu	Yesu	Yesu
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
17:15 to 18:15	**676M**		**212M**		Yesu	Yesu	Yesu	Yesu
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
17:30 to 18:30	**635M**		**200**		Yesu	Yes*u	Yesu	Yesu
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	Yes	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	Yes	**Vo ume >= 56% M co umM(56)?M**	Yes				
17:45 to 18:45	**462M**		**151M**		Yesu	Nou	Yesu	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Yesu	Volume >= 70% u column (630)?	Yesu				
	Volume >= 56% u column (336)?	Yesu	Volume >= 56% u column (504)?	Yesu				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

18:00 to 19:00	276M		105M		Nou	Nou	Nou	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Nou	Volume >= 70% u column (630)?	Nou				
	Volume >= 56% u column (336)?	Nou	Volume >= 56% u column (504)?	Nou				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	Yes				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	Yes				

18:15 to 19:15	154M		44M		Nou	Nou	Nou	Nou
Conuition Au	Volume >= 70% u column (4u0)?	Nou	Volume >= 70% u column (630)?	Nou				
	Volume >= 56% u column (336)?	Nou	Volume >= 56% u column (504)?	Nou				
Conuition u	**Vo ume >= 70% M co umM(630)?M**	No	**Vo ume >= 70% M co umM(70)?M**	No				
	Vo ume >= 56% M co umM(504)?M	No	**Vo ume >= 56% M co umM(56)?M**	No				

WarraMt 2: Four-hour Vehicu ar Vo umeM

2: Waiko oa M a io o Ave

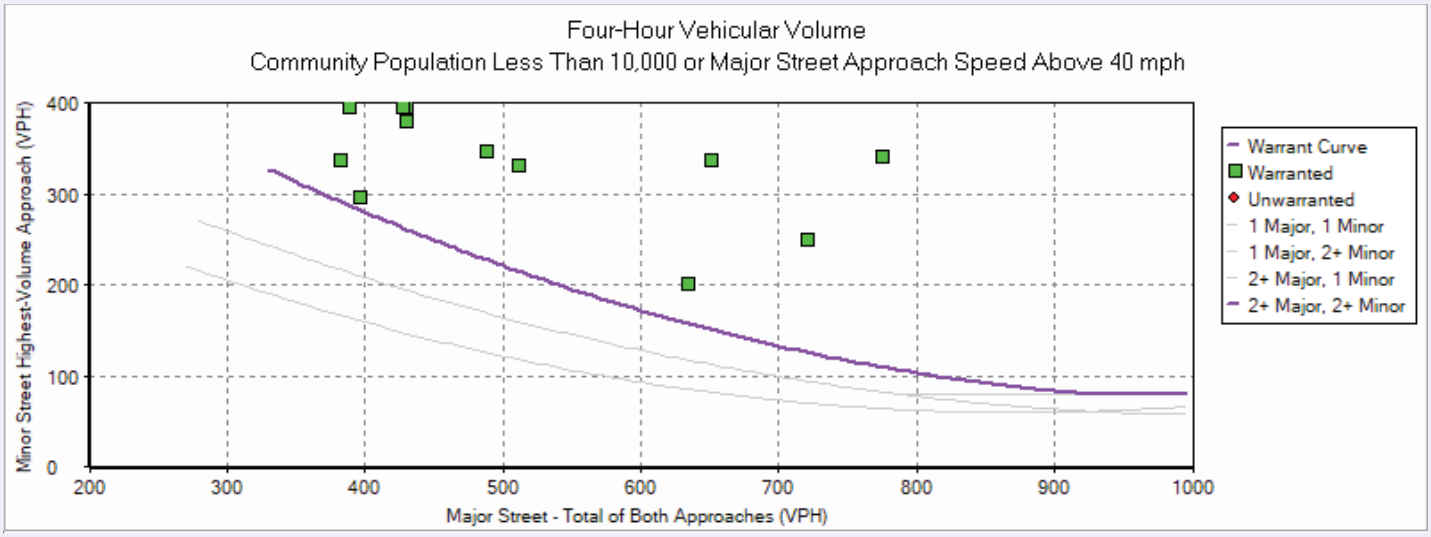
IMtersectioM IMformatioM

	ajor StreetM	iMor StreetM
Street NameM	Waikoloa Ru	Paniolo Aveu
DirectioM	Wu	Nu Su
Number of LaMes		
Approch SpeeM	35u	5u

WarraMt 2 Met?M Yes

Detai s:M

NotesM	1u Hours met (4 requireu)u
Low popu atioM	Yesu



Hour y Vo umesM

Hour	ajor StreetM Total All u Approaches (vph)u	iMbr StreetM Highest Volume u Approach (vph)u
00:00:00 - 01:00:00u	0u	0u
01:00:00 - 0u:00:00u	0u	0u
0u:00:00 - 03:00:00u	0u	0u
03:00:00 - 04:00:00u	0u	0u
04:00:00 - 05:00:00u	0u	0u
05:00:00 - 06:00:00u	0u	0u
06:00:00 - 07:00:00u	176u	309u
07:00:00 - 08:00:00u	44u	671u
08:00:00 - 09:00:00u	41u	538u
09:00:00 - 10:00:00u	413u	431u
10:00:00 - 11:00:00u	4u9u	331u
11:00:00 - 1u:00:00u	383u	94u
1u:00:00 - 13:00:00u	459u	3u5u
13:00:00 - 14:00:00u	476u	366u
14:00:00 - 15:00:00u	57u	3u9u
15:00:00 - 16:00:00u	751u	360u
16:00:00 - 17:00:00u	737u	77u
17:00:00 - 18:00:00u	719u	30u
18:00:00 - 19:00:00u	76u	105u
19:00:00 - u0:00:00u	0u	0u
0:00:00 - u1:00:00u	0u	0u
1:00:00 - u :00:00u	0u	0u
:00:00 - u3:00:00u	0u	0u
3:00:00 - 00:00:00u	0u	0u

WarraMteM HoursM

Hour	ajor StreetM Total All u Approaches (vph)u	iMbr StreetM Highest Volume u Approach (vph)u

WarraMt 3: Meak HourM

2: Waiko oa M a io o Ave

IMtersectioMIMformatioM

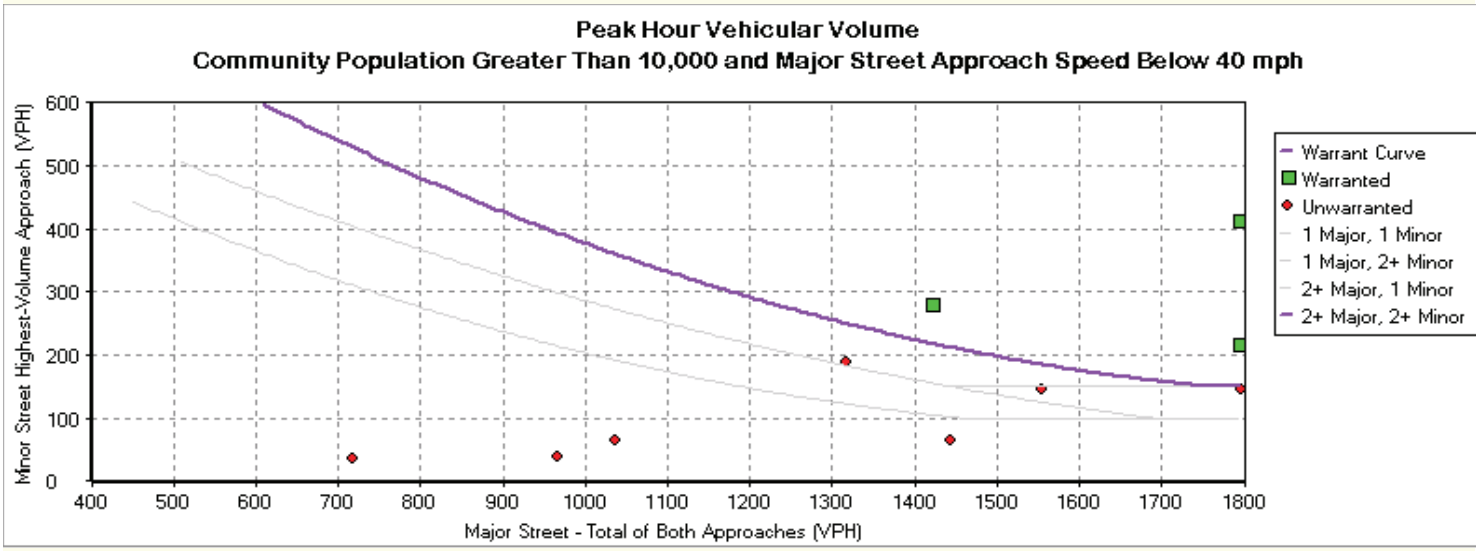
	ajor StreetM	iMor StreetM
Street NameM	Waikoloa Ru	Paniolo Aveu
DirectioM	Wu	Nu Su
Number of LaMes		
Approch SpeeM	35u	5u

WarraMt 3 Met?M Yes

Detai sM

Low Mopu atioM	Yesu		
CoM itioMA Met	Nou	**CoM itioMB Met**	Yesu
NotesM	0 Hours met (1 requireu)u	**NotesM**	7 Hours met (1 requireu)u

Minor Approach Time Delay Conuition Met?u	Not Metu
Minor Approach Volume Conuition Met?u	Metu
Total untering Intersection Volume Conuition Met?u	Not Metu



HourM	ajor StreetM Total All u Approaches (vph)u	iMbr StreetM Highest Volume u Approach (vph)u
6:30u	389u	646u
7:30u	431u	646u
8:30u	4u8u	457u
9:30u	431u	379u
10:30u	397u	97u
11:30u	383u	337u
1u:30u	51u	33u
13:30u	489u	346u
13:45u	5u6u	349u
14:45u	704u	336u
15:45u	759u	306u
16:45u	715u	47u
17:45u	46u	151u