APPENDIX I

Traffic Impact Analysis Report

WAIKAPU COUNTRY TOWN TRANSPORTATION IMPACT ANALYSIS REPORT

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Waikapu Country Town

Transportation Impact Analysis Report

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1. EXECUTIVE SUMMARY

This report presents the results of the Transportation Impact Analysis (TIAR) for the Waikapu Country Town Project (the Project).

The Project. The Project is a mixed use neighborhood development on mostly undeveloped land south of Waiko Road in the Waikapu community in Central Maui. It is located on both the mauka and makai side of Honoapiilani Highway (Highway 30).

The Project will be developed in two phases: 2017 through 2021 is the first phase, and the second phase will be from 2022 through 2026. Figure A in this Executive Summary depicts the proposed land use plan and street network for the Project, and more detail is provided in Figures 2 and 10 in the report.

Two Phases. The first phase is to be developed as a "Village Center" on the mauka side of Honoapiilani Highway and will contain approximately 170,000 square feet of commercial and employment uses, as well as 731 residential units, an elementary school and 27 acres of park and open space. Phase 2 will include: 848 residential units and approximately 6 acres of park and open space. Primary access would be provided via Honoapiilani Highway and Waiale Road, via the planned southward extension of Waiale Road known as the Waiale Bypass. Much of the right-of-way necessary to construct the Waiale Bypass lies within the Project site.

Project Site Plan. The proposed site plan provides an extensive internal roadway system which will provide community residents and visitors multiple options for accessing neighborhoods, employment centers, commercial areas, and institutional uses. The Project embodies Country Town Design principles that include a country sense of place with a mix of uses, and fosters walkability and connectivity through pedestrian/bicycle routing, with bridges and approximately 8 miles of hiking, biking, and walking trails. These characteristics promote the use of non-motorized modes, especially for short commutes, and help to reduce external vehicle trip generation.

Study Methodology. The study first forecasts traffic volumes based without the development of the Project, and then forecasts volumes with the development of each phase of the Project. It documents estimated traffic movements at the analyzed intersections and determines volume-to-capacity (V/C) ratios, average delay times and the resulting level of service (LOS) ratings. This study recommends specific mitigation measures to address locations where undesirable levels of service are projected. The project site plan and study area are depicted in Figure A in this Executive Summary.

Vehicle Trip Generation. The first phase of the Project is estimated to generate approximately 13,100 week day daily trips including approximately 700 trips during the weekday morning peak hour and 1,000 trips during the weekday afternoon peak hour. At the end of the second phase, the Project would

generate a total of approximately 19,000 weekday trips including approximately 1,200 trips in the weekday AM peak hour and 1,500 trips in the weekday PM peak hour.

Intersection Analysis. The traffic impact analysis was evaluated pursuant to guidelines established by the County of Maui and the Hawaii Department of Transportation-Highways Division-Planning Branch. Weekday AM and PM peak hour capacity analysis was conducted for eight (8) existing and six (6) future intersections in the vicinity of the Project site. Under the current baseline 2013 conditions, seven (7) of the eight (8) existing intersections are operating at the desired LOS of D or better during the weekday peak hours. The existing intersection LOS analysis is presented in Table 3 of the report.

Future Conditions without Project. The future intersection operating conditions will be significantly affected by regional growth and development in the study area before project implementation. By 2022 and 2026 the Project area will have experienced significant residential and commercial growth and due to the development of neighboring projects including Waiale, Maui Lani Development, Kehalani Development, Puunani residences, and other developments as outlined in Table 4. Future regional development will be accompanied by roadway network changes will improve mobility options for residents and visitors, as well as expand roadway capacity at various locations within the study area. Nevertheless, with this growth, five (5) of the 14 study intersections are projected to operate at an undesirable LOS E or F during one or both peak hours in each future year.

Project Traffic Impact. The traffic analysis addressed the completion of the first phase (2022) and the second phase (2026) with the Project. Following development of both the first phase and second phase of the Project, six (6) of the fourteen (14) intersections studied (Intersection 1-4 and 7-8) would operate at LOS (E) or (F) in either the AM and/or PM peak hour. As noted above, all but one of these six intersections (Intersection 8) are projected to operate at undesirable levels without the addition of project traffic. Eight (8) of the study intersections (Intersections 5-6 and 9-14) are projected to operate at acceptable LOS with buildout of the project and will not require mitigation strategies. See Tables 6 and 7.

Mitigation Strategies. Mitigation strategies were developed to identify recommended improvements at the intersections with projected overall intersection levels of service, LOS (E) or LOS (F) in the years 2022 and 2026. Each of the identified project-related and cumulative impacts would be fully mitigated (achieving LOS D or better for intersection operations) with recommended improvements as described in Chapter 5 and Appendix F of the TIAR. In some cases, certain individual turning movements or approaches would continue to operate at LOS (E) or (F), even with overall intersection mitigation. However, further mitigation measures to address specific turning movement or approach operations are not recommended because they do not meet typical traffic engineering guidelines or would result in atypical improvements (i.e., triple left-turn lanes) that could have significant right-of-way impacts or change community character. The estimated share of traffic mitigation cost shown on Table 8 was calculated for proposed mitigations under Year 2026 with project conditions.

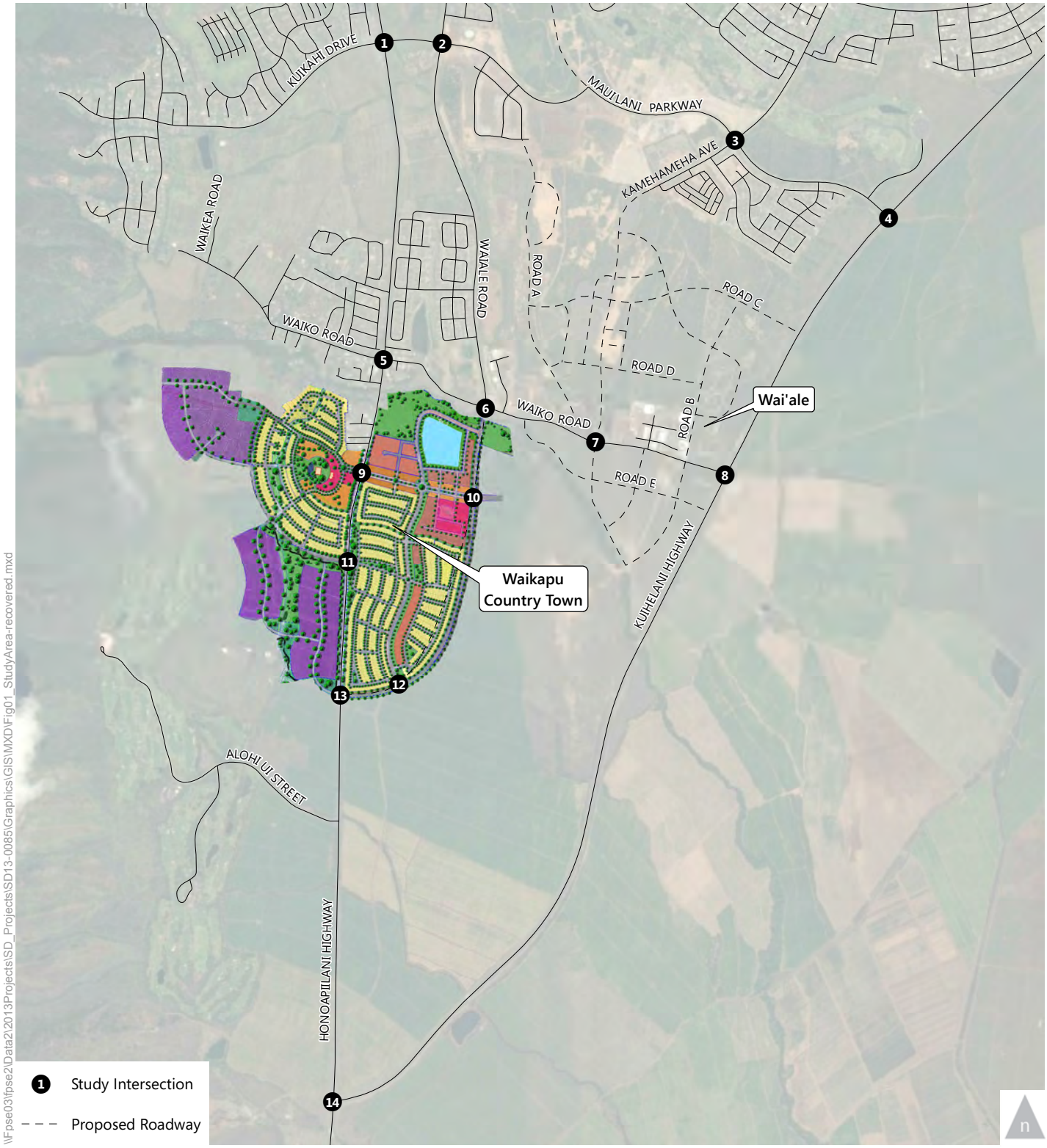

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Figure A

Study Area and Analyzed Intersections

2. INTRODUCTION

This transportation impact analysis report (TIAR) presents the results of the study conducted by Fehr & Peers for the proposed Waikapu Country Town Project (hereafter "WCT" or "Project") located in the area of south Waikapu in Central Maui, which is approximately two miles south of Wailuku. The purpose of this analysis is to identify the impacts of the proposed project on the surrounding transportation system. The TIAR includes a description of the assumptions and methods used to conduct the study, as well as a discussion of the results. This TIAR was conducted in accordance with the requirements of the affected government agencies.

PROJECT DESCRIPTION

The project would construct a new mixed-use neighborhood on approximately 500 acres of mostly undeveloped land south of Waiko Road on both the mauka and makai side of Honoapiilani Highway (Highway 30). The proposed development site lies within the County's adopted urban growth boundary and is part of larger property that totals approximately 1,562 acres. The area outside of the proposed WCT site will remain in agricultural use within the State's Agricultural District. **Figure 1** illustrates the study area of the proposed project.

WCT will be built in two phases through 2026 and the proposed land use plan and street network for the project is illustrated on **Figure 2**. The "village center" type development on the mauka side of Honoapiilani Highway is proposed to be constructed in the first phase, 2017 through 2021. Phase 1 also includes the development of residential parcels directly north and northwest of the "village center," as well as the northern half of the project site on the makai side of Honoapiilani Highway. Phase 1 is programmed as follows:

- 332 single-family dwelling units;
- 15 rural residential units;
- 216 mixed-use multi-family dwelling units;
- 41 "ohana" units;
- 127 country town mixed-use residential units;
- 58,475 square feet of country town mixed-use commercial;
- 111,122 square feet of new commercial and employment;
- an elementary school (12 acres); and
- 26.66 acres of parks and open space.

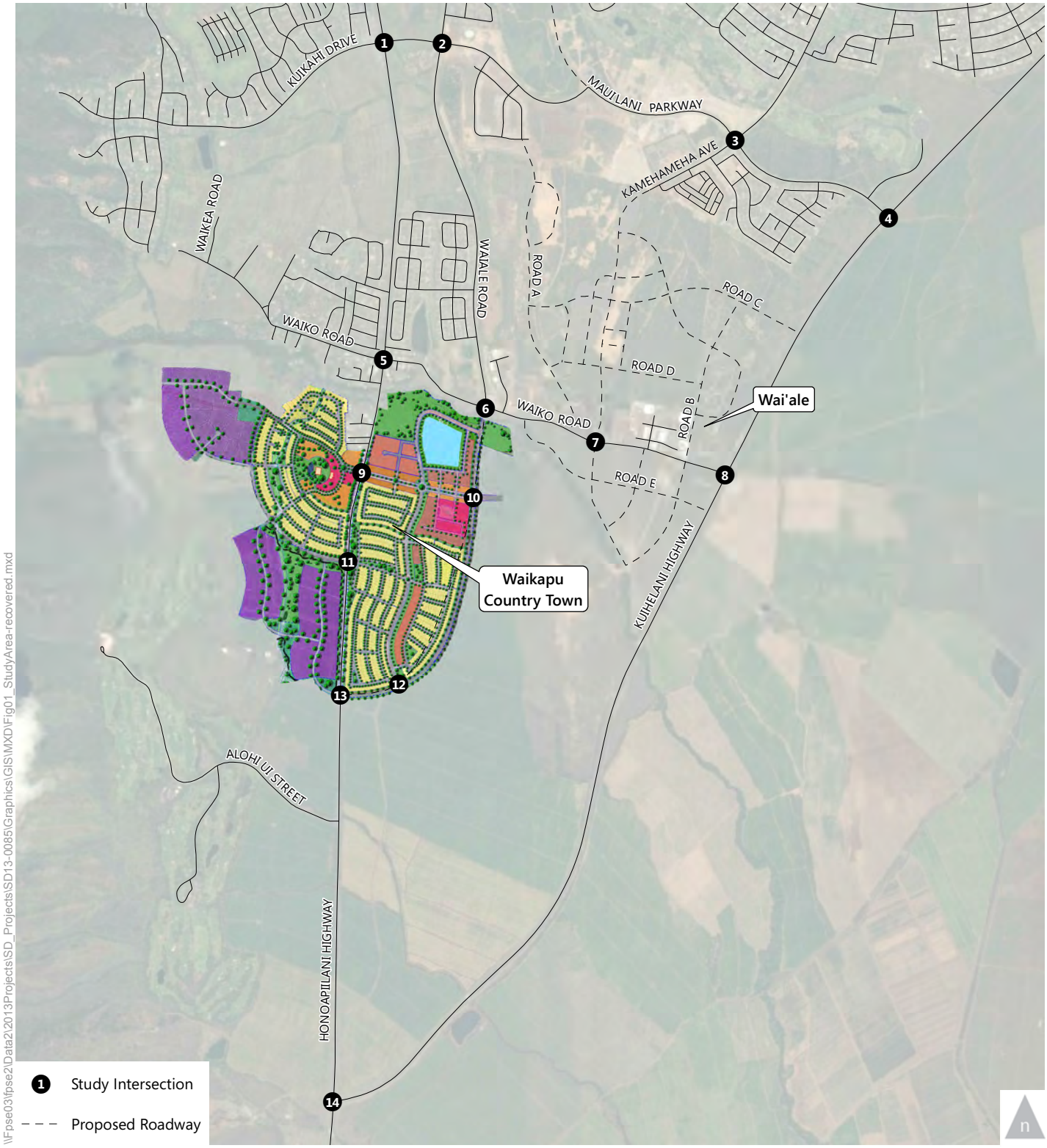

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Figure 1

Study Area and Analyzed Intersections

Figure 2

Conceptual Site Plan

Additionally, it is assumed that the 29,250 square feet of existing commercial uses located in the same area as the "village center" will remain.

Phase 2 of the development program, 2022-2026, will construct the remainder of the project and includes:

- 638 single-family dwelling units;
- 65 rural residential units;
- 40 multi-family dwelling units;
- 105 "ohana" units; and
- 5.78 acres of parks and open space.

Primary access would be provided via Honoapiilani Highway and Waiale Road via the planned southward extension of Waiale Road, known as the Waiale Bypass.

PROJECT STUDY AREA

The study analyzed the potential project-related traffic impacts under typical weekday AM and PM peak hour traffic conditions at partial buildout in 2022 and at full buildout in 2026. The transportation analysis evaluated the operations at eight existing and six future intersections (a total of 14 study intersections) in the vicinity of the proposed project. The analyzed intersections are listed below and are shown in **Figure 1**:

1. Honoapiilani Highway (Highway 30)/Kuikahi Drive
2. Waiale Road/Kuikahi Drive
3. S. Kamehameha Avenue/Maui Lani Parkway
4. Kuihelani Highway (Highway 380)/Maui Lani Parkway
5. Honoapiilani Highway (Highway 30)/Waiko Road
6. Waiale Road/Waiko Road
7. *S. Kamehameha Avenue/Waiko Road**
8. Kuihelani Highway (Highway 380)/Waiko Road
9. *Honoapiilani Highway (Highway 30)/Main Street**
10. *Waiale Road/Main Street**
11. *Honoapiilani Highway/East-West Residential Street**
12. *North-South Residential Street/ Waiale Road**
13. *Honoapiilani Highway* (Highway 30)*/Waiale Road**
14. Honoapiilani Highway (Highway 30)/Kuihelani Highway (Highway 380)

**Future intersection*

INTERSECTION ANALYSIS SCENARIOS

The operations of the study intersections were evaluated during the weekday morning and evening peak hours for the following scenarios:

- Scenario 1: Existing (2013) Conditions – The analysis of existing traffic conditions was based on 2013 counts collected for analyzed peak hours. The existing conditions analysis includes a description of key area streets and highways, and an assessment of traffic volumes and intersection operating conditions.
- Scenario 2: Year 2022 No Project Conditions – Future Year 2022 volumes were projected using the Maui Travel Demand Forecasting Model (TDFM). Traffic from approved but not yet constructed (and possibly pending) developments in the area were also be added to this scenario. Although the anticipated completion year of the first phase of the WCT development is 2021, the Phase 1 traffic impact analysis was conducted for 2022 to be consistent with the planned completion of large background projects in the area, such as the Waiale development and the Waiale Bypass, and to provide a conservative analysis.
- Scenario 3: Year 2022 with Partial Development Conditions – Traffic projections from Scenario 2 plus traffic estimates from the first phase of project development.
- Scenario 4: Year 2026 No Project Conditions **–** Future volumes in the anticipated year of project buildout and full occupancy were projected using the Maui TDFM. Traffic from approved and pending developments in the area not included in Scenario 2 is added in this scenario.
- Scenario 5: Year 2026 with Project Conditions – Traffic projections from Scenario 4 plus traffic estimates anticipated from project buildout and full occupancy.

TRAFFIC ANALYSIS METHODS

The analysis of roadway operations performed for this study is based on procedures presented in the *Highway Capacity Manual* (HCM), published by the Transportation Research Board in 2000. Although the 2010 *HCM* was available at the time this report was published; not many jurisdictions have yet adopted the 2010 HCM, as many LOS software programs are still fine tuning versions incorporating updated 2010 methods. Differences in analysis results for intersection level of service (LOS) evaluation have been found to be negligible between the 2000 and 2010 HCM and are not expected to change the conclusions of this report.

The operations of roadway facilities are described with the term level of service. LOS is a qualitative description of traffic flow based on such factors as speed, travel time, delay, and freedom to maneuver. Six

levels are defined from LOS A, with the least congested operating conditions, to LOS F, with the most congested operating conditions. LOS E represents "at-capacity" operations. Operations are designated as LOS F when volumes exceed capacity, resulting in stop-and-go conditions. The methodologies for signalized and unsignalized intersections are described below.

SIGNALIZED INTERSECTIONS

The method described in Chapter 16 of the 2000 *Highway Capacity Manual* was used to prepare the LOS calculations for the signalized study intersections. This LOS method analyzes a signalized intersection's operation based on average control delay per vehicle. Control delay includes the initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The average control delay for signalized intersections is calculated using Synchro analysis software and is correlated to a LOS designation as shown in **Table 1**.

TABLE 1 – SIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS

Level of Service	Description	Average Control Delay Per Vehicle (Seconds)
A	Operations with very low delay occurring with favorable progression and/or short cycle lengths.	≤ 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	10.1 to 20.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.1 to 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, and high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.1 to 55.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.	55.1 to 80.0
F	Operations with delays unacceptable to most drivers occurring due to over-saturation, poor progression, or very long cycle lengths.	> 80.0

Source: *Highway Capacity Manual*, Transportation Research Board, 2000.

UNSIGNALIZED INTERSECTIONS

The operations of the unsignalized intersections were evaluated using the method contained in Chapter 17 of the 2000 *Highway Capacity Manual*. LOS ratings for stop-sign-controlled intersections are based on the average control delay expressed in seconds per vehicle. At two-way or side-street-controlled intersections, the average control delay is calculated for each stopped movement, not for the intersection as a whole. For approaches composed of a single lane, the control delay is computed as the average of all movements in that lane. For approaches with multiple lanes, the control delay is computed for each movement; the movement with the worst (i.e., longest) delay is presented. The average control delay for unsignalized intersections is calculated using Synchro analysis software and is correlated to a LOS designation as shown in **Table 2**.

TABLE 2 – UNSIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS

Level of Service	Description	Average Control Delay Per Vehicle (Seconds)
A	Little or no delay.	≤ 10.0
B	Short traffic delay.	10.1 to 15.0
C	Average traffic delays.	15.1 to 25.0
D	Long traffic delays.	25.1 to 35.0
E	Very long traffic delays.	35.1 to 50.0
F	Extreme traffic delays with intersection capacity exceeded.	> 50.0

Source: *Highway Capacity Manual*, Transportation Research Board, 2000.

SIGNIFICANT IMPACT CRITERIA

The analysis of future conditions compares baseline scenarios with Phase 1 of the project and full buildout year of the project to determine whether the project traffic is expected to result in a significant impact on the surrounding roadways. Based on previous studies conducted for the County of Maui, the minimum acceptable operating standard for a signalized intersection is LOS D for the overall intersection. Additionally, the Hawaii Department of Transportation (HDOT) strives to universally maintain LOS D conditions and in their *HDOT Best Practices for Traffic Impact Report* (June 2012) defines a significant impact when the operations of an intersection, turning movement, or roadway segment changes from LOS D or better to LOS E or F. Also when evaluating intersection approach LOS at any location, other

factors should be considered in the analysis, such as traffic volumes, volume-to-capacity (V/C) ratios (should ideally be less than 1.00), and secondary impacts to pedestrian, bicycle, and transit travel.

Each of the identified significant impacts could be further categorized as either a cumulative impact or a project-related impact. If the addition of project traffic is expected to degrade acceptable service levels (LOS D or better) to unacceptable service levels (LOS E or F) then the project is considered to have a project-specific impact. Whereas, if the LOS for any roadway element is LOS E or F without the project and the project adds traffic to this location, causing the delay to increase by 5% or more, then this would be characterized as a cumulative impact.

For unsignalized intersections, the project is determined to have a significant cumulative impact when it adds traffic to a study location that includes a controlled approach that operates at an unacceptable level (i.e., LOS E or F). If the addition of project traffic causes an unsignalized intersection to degrade from LOS D or better to LOS E or F, then the impact is considered project-specific.

The County of Maui does not publish impact criteria for pedestrian, bicycle, and transit impacts. However, these impacts are generally evaluated based on whether a proposed project would: 1) conflict with existing or planned pedestrian, bicycle, or transit facilities, or 2) create walking, bicycling, or transit use demand without providing adequate and appropriate facilities for non-motorized mobility. The existing amenities for pedestrians, bicycles, and transit users were inventoried to evaluate the quality of the facilities in place today. Planning documents affecting future non-motorized transportation in the study area, including the draft *Federal-Aid Highways 2035 Transportation Plan for the District of Maui,* the *Central Maui Pedestrian and Bicycle Master Plan for 2030,* and the *Bike Plan Hawaii*, were reviewed to assess the compatibility of the project with planned future conditions for non-automobile modes.

REPORT ORGANIZATION

The remainder of this report is divided into six chapters, including this Introduction. The existing transportation system serving the project site and the current operating conditions of the key intersections are described in **Chapter 2** Existing Conditions. **Chapter 3** summarizes the methodologies used to forecast future cumulative and project traffic volumes and the resultant forecasts. **Chapter 4** presents an assessment of future traffic impacts at intersections in the surrounding area and identifies mitigation measures to address both cumulative and project-specific impacts. **Chapter 5** contains an assessment of the potential effect of the project on future transit, bicycle, and pedestrian facilities and discusses the project's site access and circulation. Finally, **Chapter 6** summarizes the conclusions of the study.

3. EXISTING CONDITIONS

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

EXISTING TRANSPORTATION FACILITIES

This section describes the significant roadway facilities in the study area, as well as the existing transit, bicycle, and pedestrian facilities.

EXISTING STREET SYSTEM

Primary regional access to the area is provided by Honoapiilani Highway, which traverses directly through the middle of the project site, and by Kuihelani Highway, which is located east of the project site. The key roadways providing access to the site are described below. **Figure 1** illustrates the proposed project location and the surrounding roadway system.

Honoapiilani Highway (Highway 30) provides regional access around the western side of Maui and links West Maui with Central Maui. The roadway is initially classified as a principal arterial in downtown Wailuku and as it extends south to Waikapu and Maalaea. As the roadway runs through Lahaina in West Maui, it transitions into a minor arterial. Through the regions of Kapalua and Honolua, it is classified as a collector roadway, and ends in Honokohau Bay, where it becomes Kahekili Highway. In the project area, this undivided arterial runs north-south and provides two travel lanes (one in each direction) with separate lanes for left and right turns at many intersections. Parking is not permitted on most segments of Honoapiilani Highway, and sidewalks are not provided. The posted speed limit ranges between 30 to 45 miles per hour (mph).

Kuihelani Highway (Highway 380) is a north-south, four-lane divided arterial with a posted speed limit of 45 or 55 mph in the study area. The roadway begins at its intersection with Puunene Avenue and Dairy Road in Kahului and extends southward until it terminates at its intersection with Honoapiilani Highway north of Maalaea Harbor.

Waiale Road is a north-south, undivided collector road that starts as an extension of Lower Main Street and terminates at Waiko Road. The roadway provides two travel lanes (one in each direction) and serves

as the only access road for residents of the Waikapu Gardens neighborhood located between Kuikahi Drive and Waiko Road. The posted speed limit is 20 mph.

Kuikahi Drive is an east-west, undivided collector road with two travel lanes (one in each direction). West of its intersection of Honoapiilani Highway, Kuikahi Drive passes through the Wailuku Heights Development until it terminates at a cul-de-sac. Approximately 1,000 feet east of its intersection with Honoapiilani Highway, the roadway terminates at its intersection with Waiale Road and Maui Lani Parkway. The posted speed limit is 20 to 30 mph in the study area.

Kamehameha Avenue is a north-south collector road with two travel lanes (one in each direction). Kamehameha Avenue begins at its intersection of Hana Highway and extends southward through the Maui Lani development until it terminates just south of Pomakai Elementary School. In the project study area, sidewalks are provided along most segments and the posted speed limit is 20 mph.

Maui Lani Parkway is an east-west, divided collector road with two travel lanes (one in each direction) and a raised median. Maui Lani Parkway begins as the east leg of where Kuikahi Drive intersects with Waiale Road and extends eastward until it terminates at its intersection with Kuihelani Highway. The posted speed limit is 20 mph.

Waiko Road is an east-west, undivided collector road with two travel lanes (one in each direction). Waiko Road begins in a residential neighborhood west of Honoapiilani Highway and traverses through mostly residential and industrial uses until it terminates when it intersects Kuihelani Parkway. In the project area, Waiko Road is a narrow, winding 20 to 30 mph road with no sidewalks provided and limited street parking opportunities.

EXISTING TRANSIT FACILITIES

The Maui Bus service, operated by Roberts Hawaii, provides public transit service around the island with 13 bus routes. Each route operates seven days a week, including holidays.

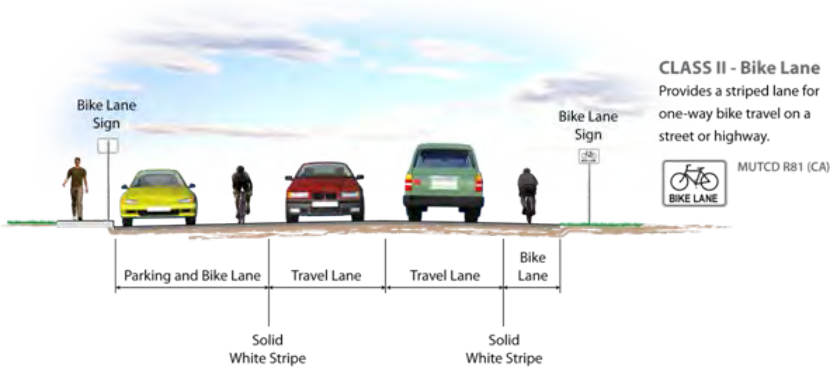
The Lahaina Islander Route (#20) is the only Maui Bus that serves the Waikapu area, which provides hourly service between the Wharf Cinema Center in Lahaina, Maia'aea Harbor Village, and Waikapu, before it originates and terminates at the Queen Ka'ahumanu Center in Kahului. In the study area, this route operates along Honoapiilani Highway with a bus stop approximately 2,000 feet north of the project site at the intersection of Honoapiilani Highway and Waiko Road.

EXISTING BICYCLE FACILITIES

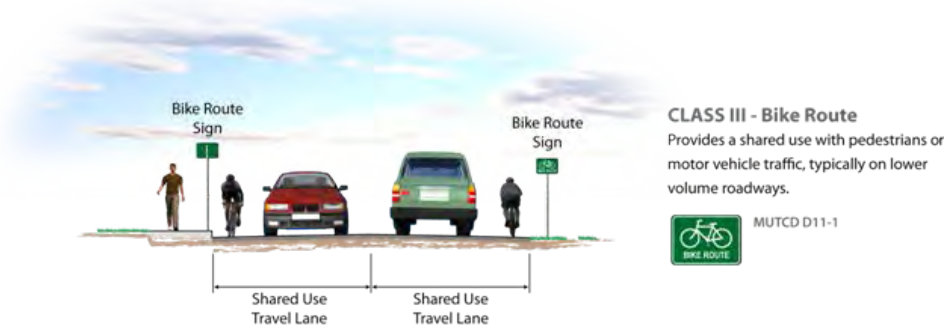
Bicycle facilities generally consist of three types of facilities, which are outlined below:

- *Bike or Shared Use Paths* provide a completely separate right-of-way and is designated for the exclusive use of bicycles and pedestrians with vehicle and pedestrian cross-flow minimized. Generally, the recommended pavement width for a two-directional shared use path is ten (10) feet.

- *Bike Lanes* provide a restricted right-of-way and is designated for the use of bicycles with a striped lane on a street or highway. Bicycle lanes are generally five (5) feet wide. Adjacent vehicle parking and vehicle/pedestrian cross-flow are permitted.



- *Bike Route or Signed Shared Roadways* provide for a right-of-way designated by signs or pavement markings for shared use with pedestrians or motor vehicles.



In 2003, the HDOT released the *Bike Plan Hawaii* to provide a blueprint for integrating bicycle facilities into the State's transportation system and enhancing the bicycle environment for its residents and visitors. *Bike Plan Hawaii* is the most current document that presents a comprehensive existing bicycle facility inventory for Maui. The *Bike Plan Hawaii* (2003) reported the island of Maui has 37.8 miles of bicycle facilities that are signed shared roads, 21.6 miles of bicycle lanes, and one mile of shared use path.

In March 2012 the State of Hawaii's Department of Health, Healthy Hawaii Initiative prepared a bicycle and pedestrian master plan for Central Maui, entitled *Central Maui Pedestrian & Bicycle Master Plan for 2030*. The report documents existing pedestrian and bicycle facilities within the region, current gaps in these facilities, and a detailed capital improvements program to significantly increase walking and bicycling. The Plan's major recommendations include:

- Initiating a comprehensive signage and striping program;
- Establishing a "bicycle" district within Kahului that emphasizes separating pedestrians and bicyclists from traffic by installing separated cycle/pedestrian tracks along Papa and Wakea Avenues and calming traffic along residential streets;
- Establishing "pedestrian" districts that emphasizes mixed-use development, wide sidewalks and pedestrian amenities within the core commercial districts of Wailuku and Kahului;
- Establishing a pedestrian/bicycle esplanade along the Kahului Beach Road; and
- Installing a separated pedestrian and bike path along the Waiale Road and Waiale Bypass to link Wailuku, Maui Lani, and Waikapu.

The Plan is being used by the County's Department of Public Works for its pedestrian and bicycle planning. Under existing conditions, the WCT site comprises of mostly vacant parcels and so there are no bicycle facilities. However, in the vicinity of the project site and in the greater study area, there are limited existing bicycle facilities. Honoapiilani Highway is a signed shared road facility that provides access between Waiale Road and Fleming Beach Park. In the study area, striped bicycle lanes have been identified along some north and south segments of Honoapiilani Highway. Waiale Road provides a bicycle facility that provides a ½-mile designated bicycle lane from the start of Waiale Road to the Maui Correctional Center. Maui Lani Parkway provides a ½-mile bicycle lane from Kamehameha Avenue and Kuihelani Highway.

EXISTING PEDESTRIAN FACILITIES

Pedestrian facilities consist of sidewalks, crosswalks, and pedestrian signals at signalized intersections. Pedestrian facilities do not currently exist within the WCT site and existing pedestrian facilities are limited in the major roadways that serve the project study area. For example, sidewalks are not provided on either side of Honoapiilani Highway, Kuihelani Highway, Waiko Road, and Waiale Road, while sidewalks are provided only on one side of Kuikahi Drive and most portions of Maui Lani Parkway.

Pedestrian facilities at the existing study intersections are described below. Five of the eight existing study intersections are marked with high visibility crosswalks on at least two of the legs.

- Intersection 1: Honoapiilani Highway (Highway 30) & Kuikahi Drive
    - Signalized with marked crosswalks and pedestrian signals on all four legs
- Intersection 2: Waiale Road & Kuikahi Drive
    - Signalized with marked crosswalks and pedestrian signals on all four legs
- Intersection 3: S. Kamehameha Avenue/Maui Lani Parkway
    - All-way stop-controlled with marked crosswalks on three legs
- Intersection 4: Kuihelani Parkway (Highway 380) & Maui Lani Parkway
    - Signalized with no marked crosswalks and pedestrian signals at all four legs
- Intersection 5: Honoapiilani Highway (Highway 30) & Waiko Road
    - Signalized with marked crosswalks and pedestrian signals on three legs
- Intersection 6: Waiale Road & Waiko Road
    - Side-street stop-controlled with no marked crosswalks on all legs
- Intersection 8: Kuihelani Highway (Highway 380) & Waiko Road
    - Signalized with marked crosswalks and pedestrian signals on two legs
- Intersection 14: Honoapiilani Highway (Highway 30) & Kuihelani Highway (Highway 380)
    - Signalized with no marked crosswalks and pedestrian signals at all four legs

EXISTING INTERSECTION VOLUMES AND LANE CONFIGURATIONS

The operations of the eight existing study intersections were evaluated during weekday morning (6:00 to 9:00 AM) and evening (3:00 to 6:00 PM) peak-period conditions. Traffic counts were collected during the weekday AM and PM peak periods at the study intersections in September 2013, when local schools were in session. Existing lane configurations and signal controls were obtained through field observations. **Figure 3** presents the existing AM and PM peak-hour turning movement volumes, corresponding lane configurations and traffic control devices. Traffic count data sheets are provided in **Appendix A**.

EXISTING INTERSECTION LEVELS OF SERVICE

Existing peak-hour volumes and lane configurations were used to calculate levels of service for each of the study intersections. The results of the existing LOS analysis are presented in **Table 3** and the corresponding LOS calculation sheets are included in **Appendix B**.

TABLE 3 – EXISTING INTERSECTION LEVEL OF SERVICE

Intersection	Traffic Control	Peak Hour	Delay (sec/veh)[1]	LOS[2,3]
1. Honoapiilani Highway (Highway 30) / Kuikahi Drive	Signalized	AM	25.2	C
		PM	23.3	C
2. Waiale Road / Kuikahi Drive	Signalized	AM	26.4	C
		PM	24.7	C
3. S. Kamehameha Avenue / Maui Lani Parkway	AWSC	AM	48.3	**E**
		PM	54.4	**F**
4. Kuihelani Highway / Mauilani Parkway	Signalized	AM	21.4	C
		PM	21.9	C
5. Honoapiilani Highway (Highway 30) / Waiko Road	Signalized	AM	13.3	B
		PM	11.9	B
6. Waiale Road / Waiko Road	SSSC	AM	12.4	B
		PM	10.9	B
7. S. Kamehameha Avenue / Waiko Road[4]	N/A	AM	Does not exist	
		PM		
8. Kuihelani Highway (Highway 380) / Waiko Road	Signalized	AM	14.5	B
		PM	11.2	B
9. Honoapiilani Highway (Highway 30) / Main Street[4]	N/A	AM	Does not exist	
		PM		
10. Waiale Road / Main Street[4]	N/A	AM	Does not exist	
		PM		
11. Honoapiilani Highway / East-West Residential Street[4]	N/A	AM	Does not exist	
		PM		
12. North-South Residential Street / Waiale Road[4]	SSSC	AM	Does not exist	
		PM		
13. Honoapiilani Highway (Highway 30) / Waiale Road[4]	N/A	AM	Does not exist	
		PM		
14. Honoapiilani Highway (Highway 30) / Kuihelani Highway (Highway 380)	Signalized	AM	15.2	B
		PM	12.4	B

Source: Fehr & Peers, 2014.

Notes:

** Indicated oversaturated conditions. Delay cannot be calculated

AWSC = All-way stop-controlled intersection

SSSC = Side-street stop-controlled intersection

[1] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized and all-way stop-controlled intersections. The vehicular delay for the worst movement is reported for side street stop-controlled intersections.

[2] LOS calculations performed using the *2000 Highway Capacity Manual (HCM)* method.

[3] Undesirable LOS highlighted in **bold.**

[4] Future intersection

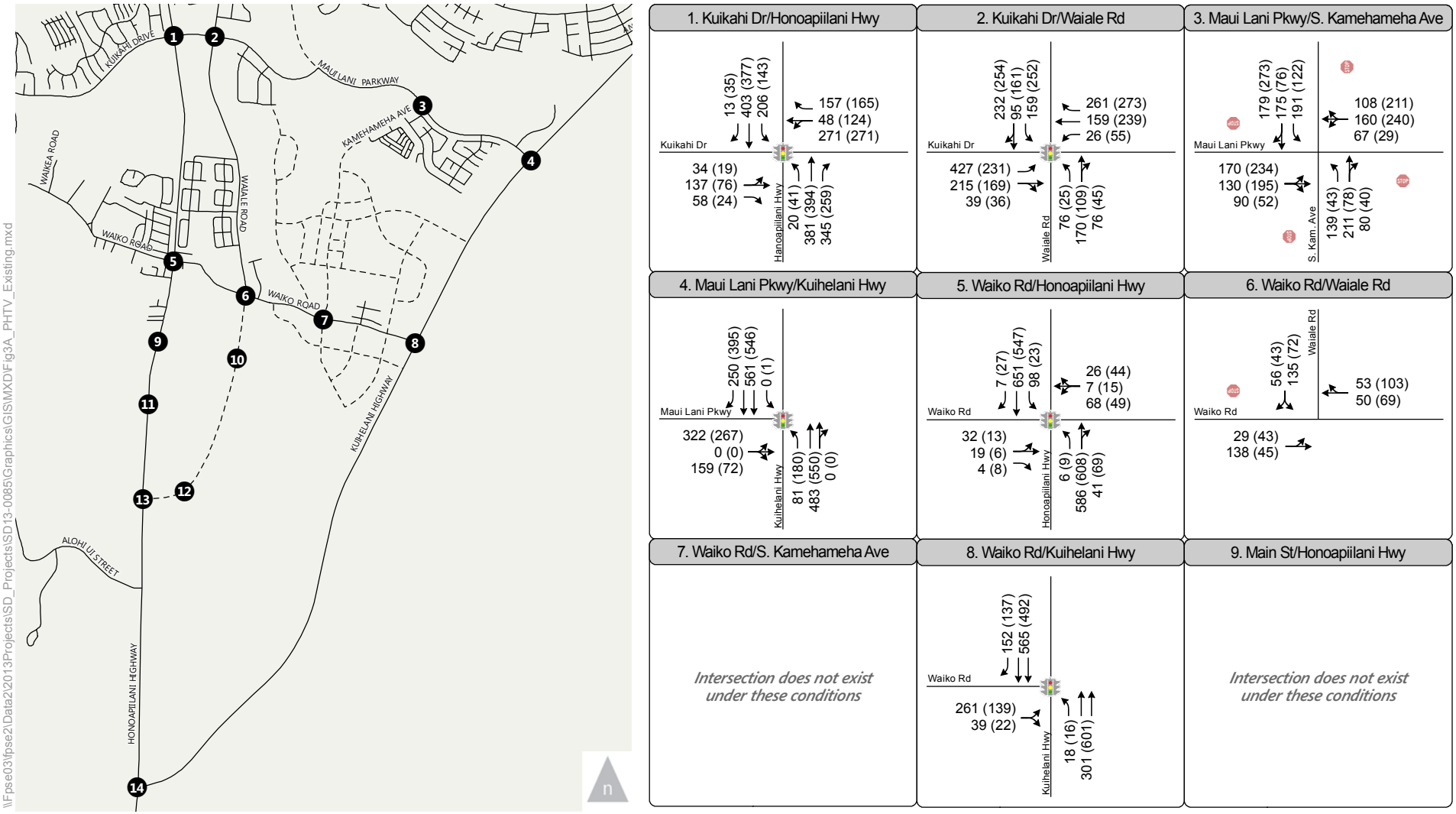
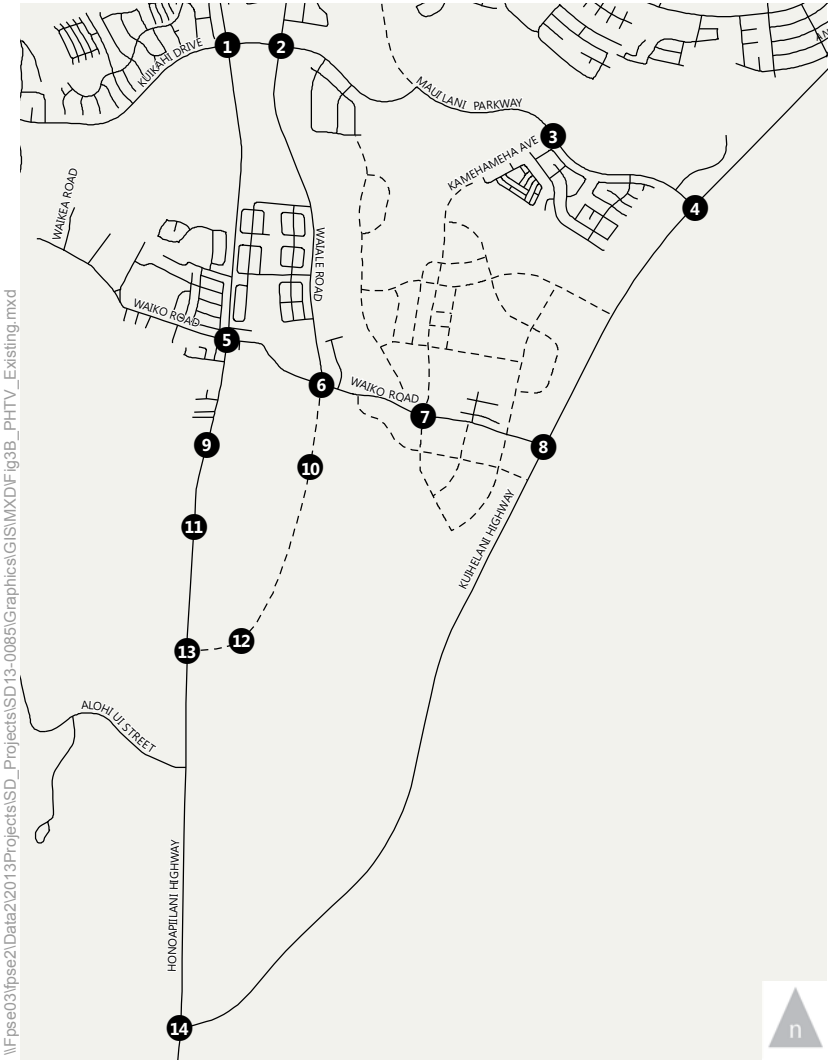
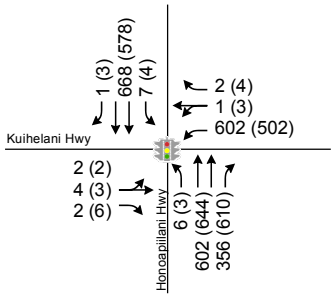


Figure 3A

Peak Hour Traffic Volumes and Lane Configurations - Existing (2013) Conditions



10. Main St/Waiale Rd	11. E-W Residential St/Honoapiilani Hwy	12. Waiale Rd/N-S Residential St
Intersection does not exist under these conditions	*Intersection does not exist under these conditions*	*Intersection does not exist under these conditions*

13. Waiale Rd/Honoapiilani Hwy	14. Kuihelani Hwy/Honoapiilani Hwy
Intersection does not exist under these conditions	

#	Study Intersection		Traffic Signal
	Turn Lane		Stop Sign
AM (PM)	Peak Hour Traffic Volume		Proposed Roadway

Figure 3B

Peak Hour Traffic Volumes and Lane Configurations - Existing (2013) Conditions

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The results of the LOS calculations indicate that all of the existing study intersections operate at an overall acceptable service level (LOS D or better), with the exception of the following location:

- Intersection 3: S. Kamehameha Avenue & Maui Lani Parkway (LOS E – AM peak hour and LOS F – PM peak hour)
    - The all-way stop-control and high eastbound and westbound volumes traversing through a shared left/through/right configuration contribute to the relatively high eastbound and westbound approach delays and overall poor operating peak levels of service at this intersection.

4. FUTURE TRAFFIC PROJECTIONS

To evaluate the potential impact of traffic generated by the proposed project on the surrounding street system, it was necessary to develop estimates of future traffic conditions in the area both with and without the project. Future traffic conditions without the proposed project reflect traffic increases due to general regional growth and development, as well as traffic increases generated by other specific developments near the project site. These conditions are referred to as the cumulative base condition (i.e., no project conditions). The sum of the cumulative base and project-generated traffic represents the cumulative plus project conditions. Development of these future traffic scenarios is described in this chapter.

CUMULATIVE BASE TRAFFIC PROJECTIONS

The cumulative base traffic projections include two elements: 1) model forecasts of future traffic volumes that take into account the expected changes in traffic over the existing traffic volumes caused by traffic generated by specific cumulative projects located in the study area and overall regional growth; and 2) by roadway network changes and street system improvements.

Although the anticipated completion year of the first phase of the WCT development is 2021, the analysis used 2022 for the horizon year for Phase 1 to be consistent with the planned completion of large background projects in the area, such as the Waiale development and the Waiale Bypass, providing a more conservative cumulative forecast against which to assess potential project impacts.

AREAWIDE TRAFFIC GROWTH AND CUMULATIVE DEVELOPMENT PROJECTS

Information was obtained from the County of Maui on approved, planned, and proposed development projects throughout Central Maui. This information was used to estimate future traffic volumes for the study area, since the growth and changes in traffic caused by anticipated projects in the Kahului, Wailuku and Waikapu areas could affect conditions on the streets around WCT. **Table 4** is a compiled list of future cumulative projects in the Central Maui vicinity. **Appendix C** provides a more detailed list with available project descriptions for residential projects that the County is monitoring, as well as maps of other residential and non-residential development projects in Central Maui that have come to the attention of the Department of Planning.

TABLE 4 – CENTRAL MAUI FUTURE CUMULATIVE PROJECT LIST [1,2]

Project Name	
• `Aina o Kane Condos	• Kehalani (C-9)
• Alternative Care Services, Inc.	• Kehalani Commercial Center
• Central Maui Regional Park	• Maui Beach Hotel Addition
• Central Maui Senior Housing	• Maui Lani Church
• Civil Defense Center	• Maui Lani Homes 1
• Consolidated Baseyards	• Maui Lani Lot 4
• Habitat For Humanity Condos	• Maui Lani Lot 7B
• Hale Ho`omalu Mental Health Kokua	• Maui Lani MF7 Condos
• Hale Mua	• Maui Lani Parkway Commercial
• Hale Kapili Project	• Maui Lani The Parkways
• Ka Lima O Maui Affordable Housing	• Maui Lani Village
• Kahawai Condos	• MEO B.E.S.T. House
• Kahului Harbor Improvements	• Mission Street Affordable Apts.
• Kahului Town Center Redevelopment	• Na Leo Pulama O Maui Hawaiian School Hale Hou
• Kehalani (C-12)	• Pi`ihana Project District 2
• Kehalani (C-13)	• Pu`unani Residences
• Kehalani (C-14)	• Valley Isle Fellowship Condos
• Kehalani (C-18)	• Wai`ale
• Kehalani (C-19)	• Wai'ale Affordable Homes
• Kehalani (C-3)	• Waiehu Mauka Affordable Townhomes
• Kehalani (C-6)	• Waikapu Gardens II
• Kehalani (C-7)	• Waikapu Light Industrial Park
• Kehalani (C-8)	• Waikapu Rural Village

Notes:

[1]The list above of development projects in Central Maui were pulled from multiple sources, including: conversations with County staff, a residential project list for Central Maui provided by the County of Maui in December 2013, available and relevant environmental assessments or impact studies available on the State's website for Maui, and the 2011 Central Maui Development Project maps and Development Project GIS layer available on the County website.

[2]During the related project review process, the socioeconomic and land use data in the interim year and long-term year No Build models was consistent with the future cumulative projects listed above.

By 2022 and by 2026, the WCT study area will have experienced significant residential growth and development of new commercial, industrial, business, and institutional land uses, primarily because of the following projects:

- *Waiale,* located along Waiko Road, south of the Maui Lani development, east of Waiale Road, and directly west of Kuihelani Highway, is assumed to be completed by 2022.[1] The planned mixed-use community will include 2,550 single-family and multi-family dwellings, commercial and light industrial land uses, as well as a middle school.
- *Maui Lani Development* is partially complete and assumed to be fully completed by 2026. This master planned community along Mauilani Parkway between Waiale Road and Kuihelani Highway, comprises of a mixture of residential subdivisions that total approximately 1,000 single-family and multi-family households and commercial uses. Specifically, the development includes the Maui Lani Village Center, which will be about 540,000 square feet or 79 lots available for commercial, business, or medical office uses.
- *Kehalani Development* is partially complete and assumed to be fully completed by 2026. This master planned community of 2,400 homes is located north of Kuikahi Drive, south of Iao Valley Road, east of the West Maui Mountains, and primarily west of Honoapiilani Highway.[2]
- *Puunani Residences* is located on the southwest quadrant of the intersection of Honoapiilani Highway & Kuikahi Drive. It is assumed that 20% and 40% of the project would be completed by both 2022 and 2026, respectively. Kuikahi Drive and Honoapiilani Highway are planned to provide access to the 600-home neighborhood.

Traffic generated by the above related projects and other developments were projected using the Maui Travel Demand Forecasting Model (TDFM)[3] and the trip generation methodology. The TDFM assigns land use and socioeconomic data provided by the County of Maui in 2007 to Traffic Analysis Zones (TAZs). These attributes were further used to generate and assign traffic across the roadway network for the base and horizon years, respectively.

[1] The TIAR for the Waiale development analyzed the project with Base Year 2022 conditions (Austin, Tsutsumi, and Associates, Inc., 2011).
[2] Source: http://www.kehalani.org/
[3] The base 2007 model, the interim horizon 2020 No Build model, and the long-term horizon 2035 No Build model were obtained from HDOT. The socioeconomic and land use data supplied by Maui County in 2007 was used to calibrate the TDFM.

BASELINE STREET SYSTEM IMPROVEMENTS

Discussions were held with County and State agency staff regarding the roadway improvements in or near the study area planned for completion by 2022. These improvements, whether the result of local capital improvement programs or in connection with planned or approved projects, would result in dramatically improved mobility options for residents and visitors as well as capacity changes at various locations throughout the study area as discussed below.

Based on the information received from agency staff, the review of planning documents related to the nearby projects, and the review of the roadway network changes between the base and horizon year models, the proposed transportation system changes that are projected to occur between 2007 and 2022 are included in the cumulative base traffic network of each horizon year No Build model.[4] The improvements are listed in detail below:

- Hana Highway Widening – The 2020 and 2035 roadway networks of the TDFM includes the widening of Hana Highway from a four-lane to a six-lane divided highway from Kaahumanu Avenue to the vicinity of the also proposed Kahului Airport Access Road.

- Honoapiilani Highway Widening – The 2020 and 2035 roadway networks of the TDFM includes the widening of Honoapiilani Highway between Lahainaluna Road and Aholo Road in West Maui from being a two-lane roadway to a four-lane roadway.

- Kahului Airport Access Road – This four-lane bypass will be constructed from Puunene Avenue to Hana Highway. The purpose of this road is to provide an alternative route to congested existing routes (i.e., Dairy Road) to Kahului Airport. This roadway improvement project is assumed in the 2020 and 2035 roadway networks of the TDFM.

- Kamehameha Avenue Extension – To support the Waiale development and related traffic, it is assumed that Kamehameha Avenue will extend southward from its existing terminus near its intersection with Maui Lani Parkway to intersect Waiko Road and eventually to intersect with the Waiale project site Road B.

- Intersection 7: Kamehameha Avenue & Waiko Road – This future side street stop-controlled, four-legged intersection will consist of one left-turn lane and one shared through/right-turn lane on all

[4] Per HDOT, No Build scenarios are considered baseline conditions, which includes socioeconomic forecasts but without implementing projects, such as major roadway improvements and some private developments. At the time the model files were obtained, HDOT was currently working on the build scenario that modeled future projects. Because some of the roadway improvements listed in the TIAR were absent from both the 2020 No Build model and 2035 No Build model roadway networks, the roadway network for each model horizon year was updated to ensure these future facility improvements are appropriately modeled.

approaches. This intersection is assumed to be constructed under cumulative base conditions, as it would provide access to portions of the Waiale mixed-use community.

- Lahaina Bypass – This two-lane highway will be located in West Maui and will extend between Launiupoko south of Lahaina and Honokowai to the north. This roadway improvement project was added to the 2020 and 2035 roadway networks of the TDFM.

- Maui Lani Parkway Extension – To support the Maui Lani developments and related traffic, it is assumed that Maui Lani Parkway will extend and connect Waiinu Street and Kuikahi Drive. It is assumed that the extension will provide one lane in each direction.

- Puunene Avenue Widening – The 2020 and 2035 roadway networks of the TDFM includes the widening of Puunene Avenue from two to four lanes from Wakea Avenue to Kuihelani Highway.

- Roadway Detailing for Waiale – To support the Waiale project and related traffic, the construction of the following roadways are assumed within the Waiale project site: Road A, Kamehameha Avenue extension, Road C, and Road B. These roadways are assumed to be constructed under cumulative base conditions, as it would provide access to various areas of the Waiale mixed-use community.

- Waiale Bypass – Waiale Road would extend from its existing terminus at Waiko Road to intersect Honoapiilani Highway approximately one mile south of Honoapiilani Highway/ Waiko Road. It is assumed that the bypass would be constructed as a two-way, two-lane roadway and left-turn pockets will be provided at key intersections, including the two future study intersections (discussed below).

- Intersection 6: Waiale Road & Waiko Road – This intersection will become a four-legged intersection under cumulative base conditions and the fourth (south) leg will be constructed as part of the Waiale Bypass. It is assumed that the reconfigured intersection will consist of one left-turn lane and one shared through/right-turn lane at the eastbound and southbound approaches, while the northbound and westbound approaches are assumed to consist of one left-turn lane, one through lane, and one right-turn lane. This existing, unsignalized intersection is assumed to become signalized as part of the construction of the Waiale Bypass.

- Intersection 13: Honoapi`ilani Highway & Waiale Road – This future intersection will consist of a northbound approach that provides one through lane and one free right-turn lane, a southbound approach that provide one through lane and one left-turn lane, and a westbound approach with one left-turn lane and one right-turn lane. This intersection is assumed to be signalized and constructed as part of the Waiale Bypass project under cumulative base conditions.

Cumulative Base Traffic Projection Methodology

Related projects were checked against the model growth between the base year (2007) and each of the horizon years (2020 and 2035) to see if the land use and socioeconomic attributes included the known related projects, such as those listed in **Table 4**. Since the horizon year models obtained from HDOT were No Build scenarios,[5] some of the major projects planned in the vicinity of the WCT study area were noticeably absent in the TDFM's projections; therefore, in order to appropriately model these future projects, the respective land use and socioeconomic attributes were adjusted for the corresponding horizon year the related projects are anticipated to be completed by. The changes in land use and socioeconomic assumptions between the updated 2020 and 2035 model were then used to interpolate the land use and socioeconomic data for the scaled 2022 and 2026 models, which were used to forecast cumulative base traffic volumes for 2022 and 2026, respectively.

After the land use and socioeconomic data adjustments were completed, trips generated by the related projects were estimated and assigned by the model to the future roadway system based on their locations and anticipated distribution patterns. The geographic distribution of traffic generated by new development depends on several factors, such as the type and density of the proposed land uses, the geographic distribution of the population from which employees and/or patrons may be drawn, the geographic distribution of activity centers (employment, commercial, and other) to which residents of proposed residential projects may be drawn, and the location of those developments in relation to the surrounding future street system.

Between 2013[6] and 2026, the TDFM anticipates an aggregate, island-wide growth of approximately 17,000 households and about 24,000 employees for Maui. Additionally, after land use and socioeconomic data adjustments were completed for the 2026 model, the TDFM projected an approximate 20% increase in demand over existing conditions along Honoapiilani Highway between Kuikahi Drive and Kuihelani Highway. The TDFM also projected an approximate 30% increase in demand along Kuihelani Highway over existing conditions between Maui Lani Parkway and Honoapiilani Highway. [7]

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[5] Ibid.

[6] The Base Year (2007) for the TDFM was adjusted to include known socioeconomic changes up to 2013 (See Appendix C for specific projects). Therefore, the updated Base Year TDFM used in this analysis reflects land use and employment updates between 2007 and 2013.

[7] The overall percentage increase in traffic demand was based on averaging the calculated percentage increase in each of the PM peak hour roadway segment volumes between the updated base year and 2026 horizon year models.

CUMULATIVE BASE TRAFFIC VOLUMES

The resulting cumulative base traffic volumes and the anticipated lane configurations, representing future conditions without the project for year 2022 and 2026, are presented in **Figure 4** and **Figure 5**, respectively. These future projections take into account the estimated overall growth in the surrounding area without the addition of traffic generated by the proposed Waikapu Country Town Project. To analyze level of service, post-processed model volumes for the 2022 cumulative base and the 2026 cumulative base were loaded into Synchro 8.0.

PROJECT TRAFFIC PROJECTIONS

Development of future traffic projections related to the amount of traffic added to the roadway system by WCT is estimated using a three-step process: (1) project trip generation, (2) trip distribution, and (3) trip assignment. The first step estimates the amount of project-generated traffic will be added to the roadway network. The second step estimates the direction of travel to and from the project site. The new trips are assigned to specific street segments and intersection turning movements during the third step. This process is described in more detail in the following sections.

PROJECT STREET SYSTEM IMPROVEMENTS

Based on feedback from agency staff and review of the proposed street network, the proposed transportation system changes described previously are anticipated to occur between 2013 and 2022/2026 and are therefore included in the cumulative base traffic network. Additional improvements will be made as part of the proposed project and are listed below:

- <u>Intersection 9: Honoapiilani Highway & Main Street</u> – This future intersection will be constructed as part of the Year 2022 Conditions (Phase 1) of the proposed project. The intersection is assumed to be configured with northbound and southbound approaches that provide one left-turn lane, one through lane, and one right-turn lane and eastbound and westbound approaches that provide one left-turn lane and one shared through/right-turn lane.

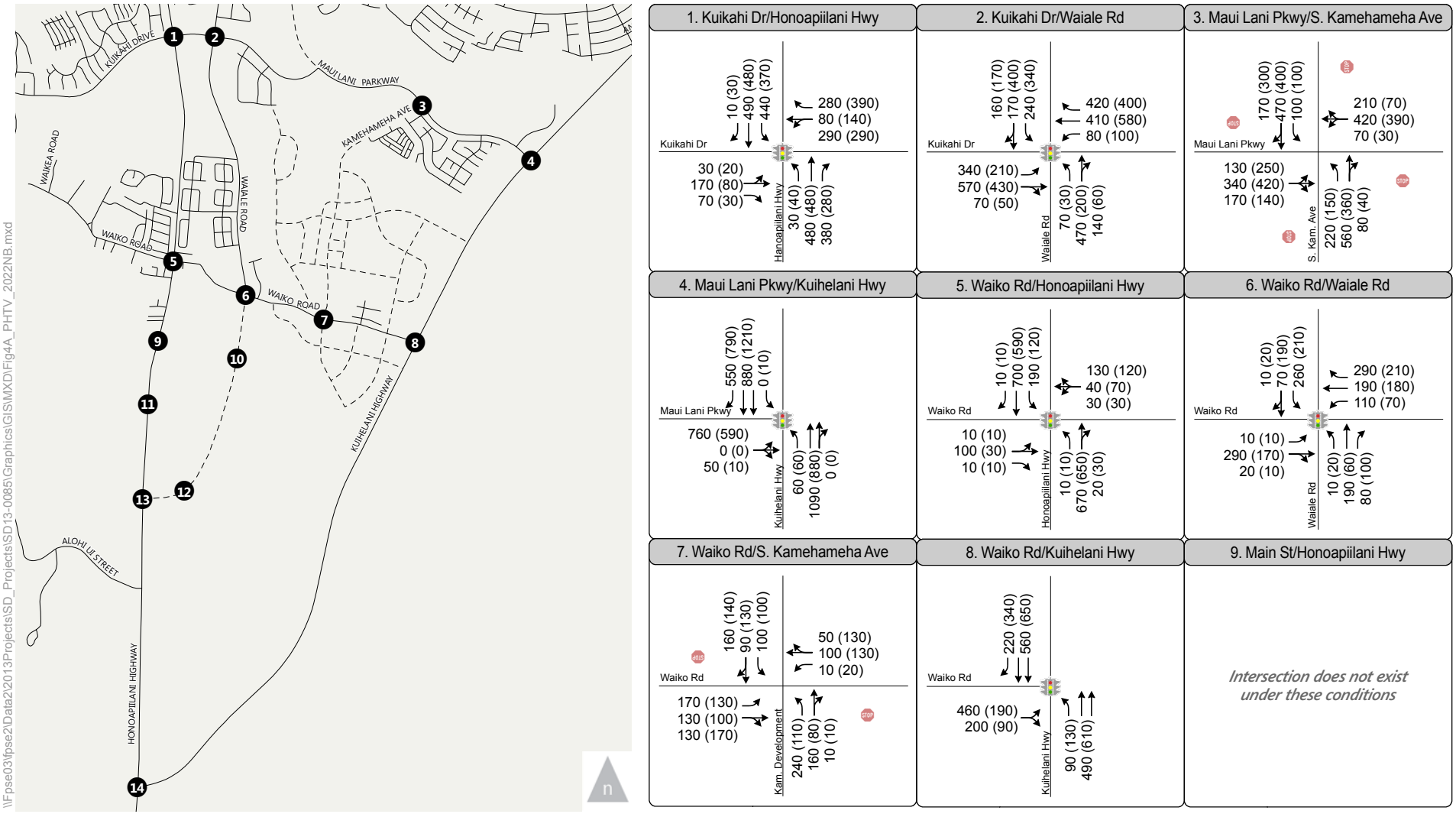
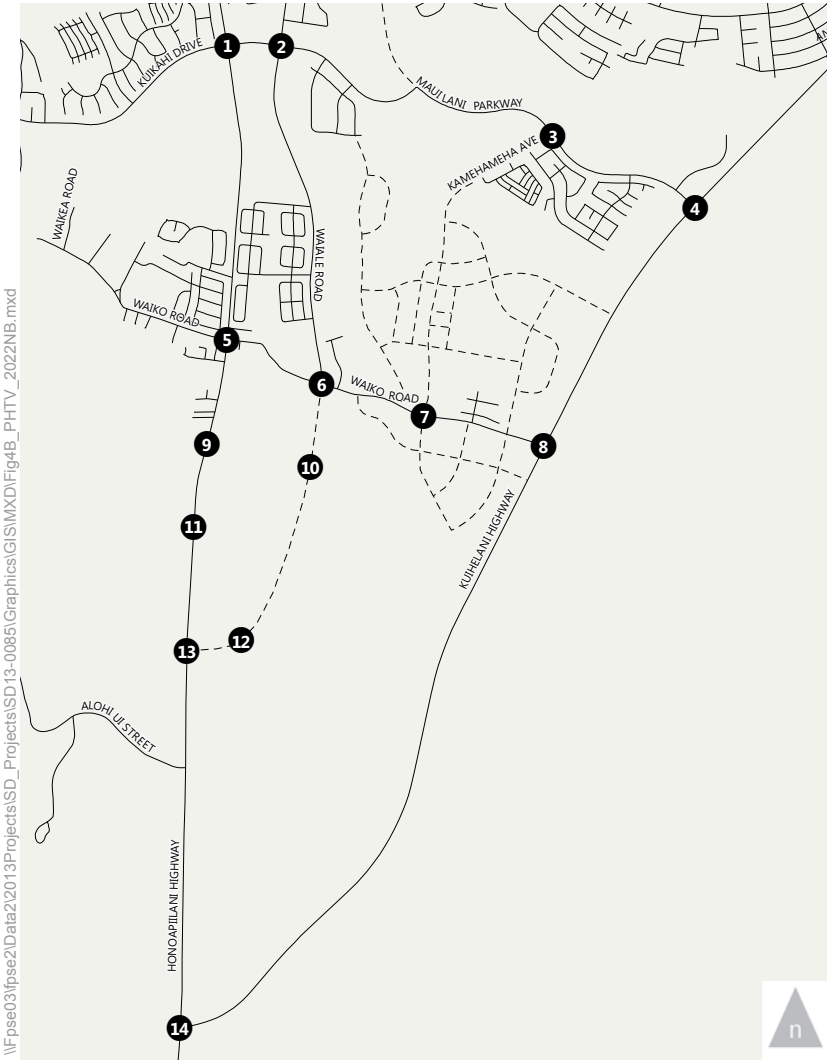


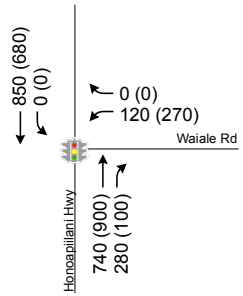
Figure 4A

Peak Hour Traffic Volumes and Lane Configurations - Year 2022 No Project Conditions

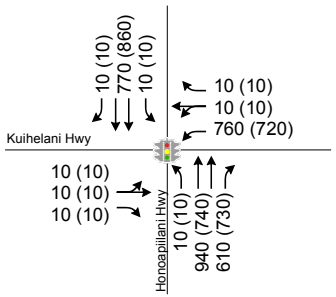


10. Main St/Waiale Rd	11. E-W Residential St/Honoapiilani Hwy	12. Waiale Rd/N-S Residential St
Intersection does not exist under these conditions	*Intersection does not exist under these conditions*	*Intersection does not exist under these conditions*

13. Waiale Rd/Honoapiilani Hwy



14. Kuihelani Hwy/Honoapiilani Hwy



#	Study Intersection		Traffic Signal
	Turn Lane		Stop Sign
AM (PM)	Peak Hour Traffic Volume		Proposed Roadway

Figure 4B

Peak Hour Traffic Volumes and Lane Configurations - Year 2022 No Project Conditions

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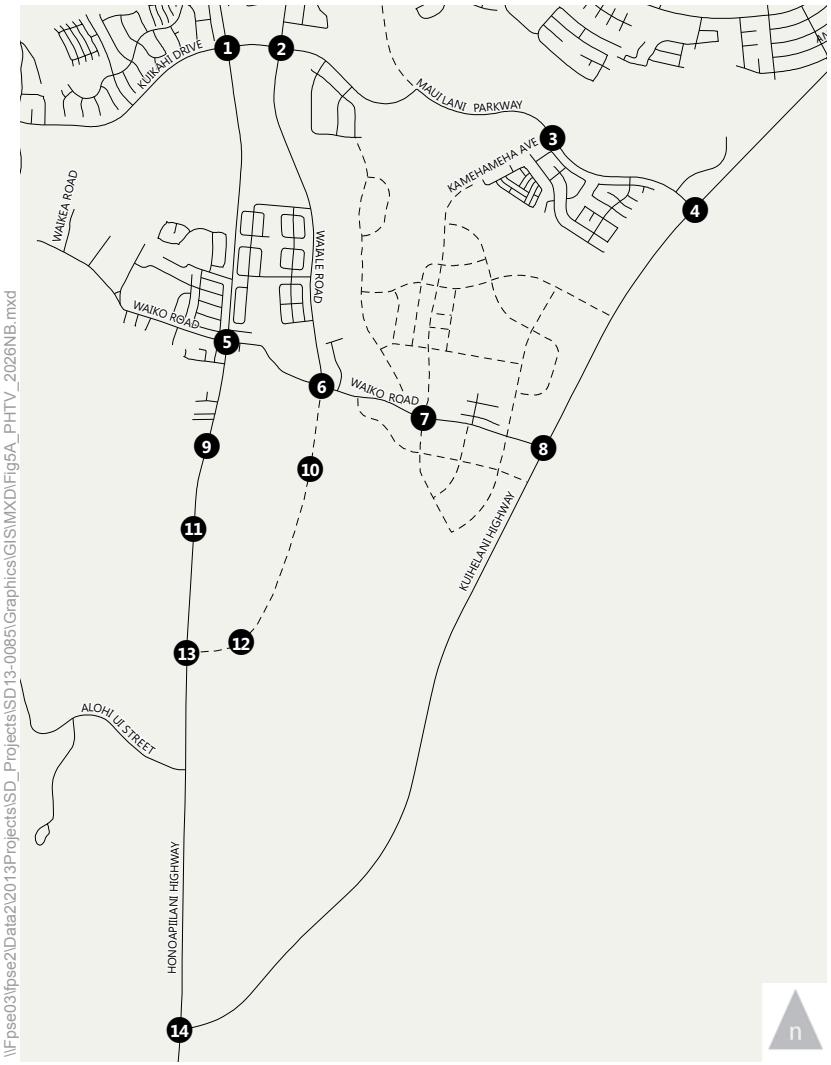

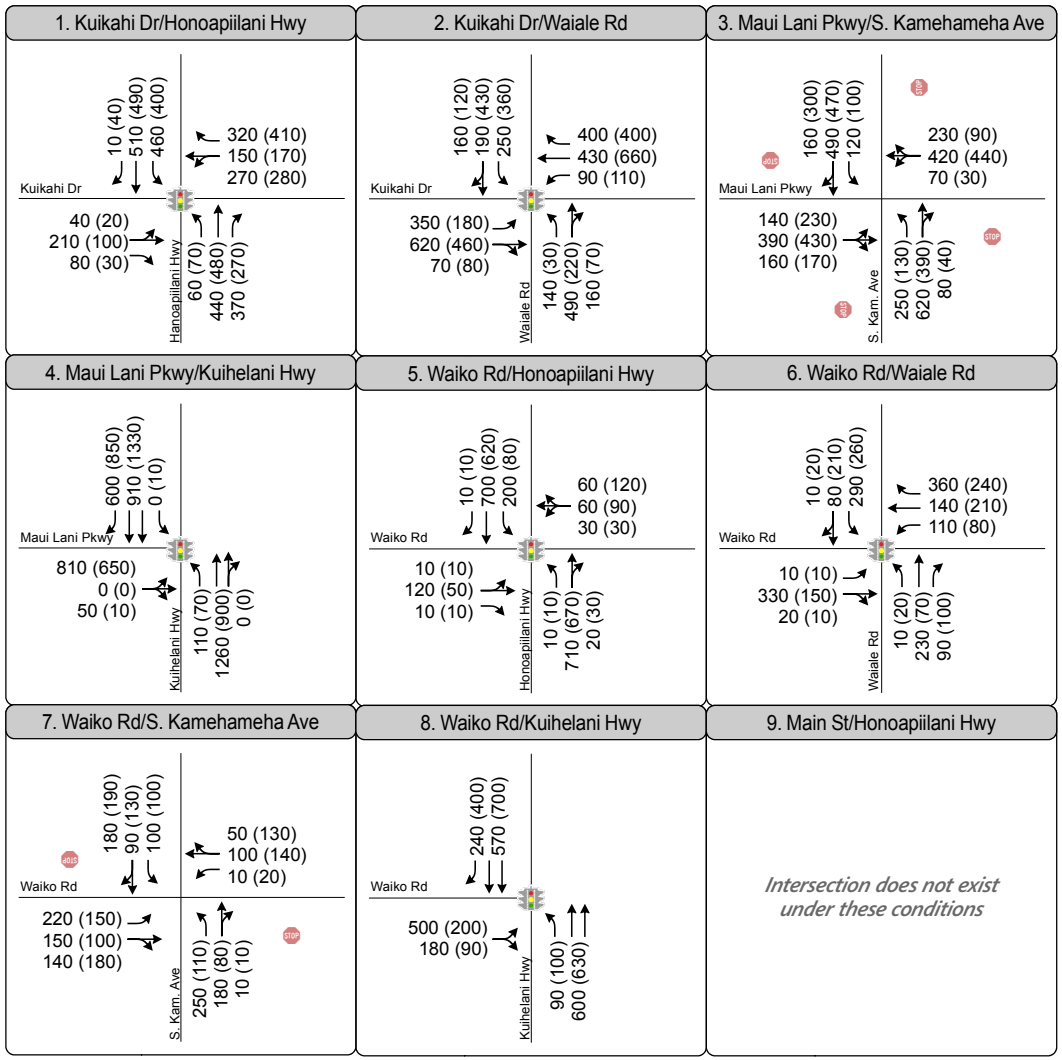

#	Study Intersection		Traffic Signal
	Turn Lane		Stop Sign
AM (PM)	Peak Hour Traffic Volume		Proposed Roadway

Figure 5A

Peak Hour Traffic Volumes and Lane Configurations - Year 2026 No Project Conditions

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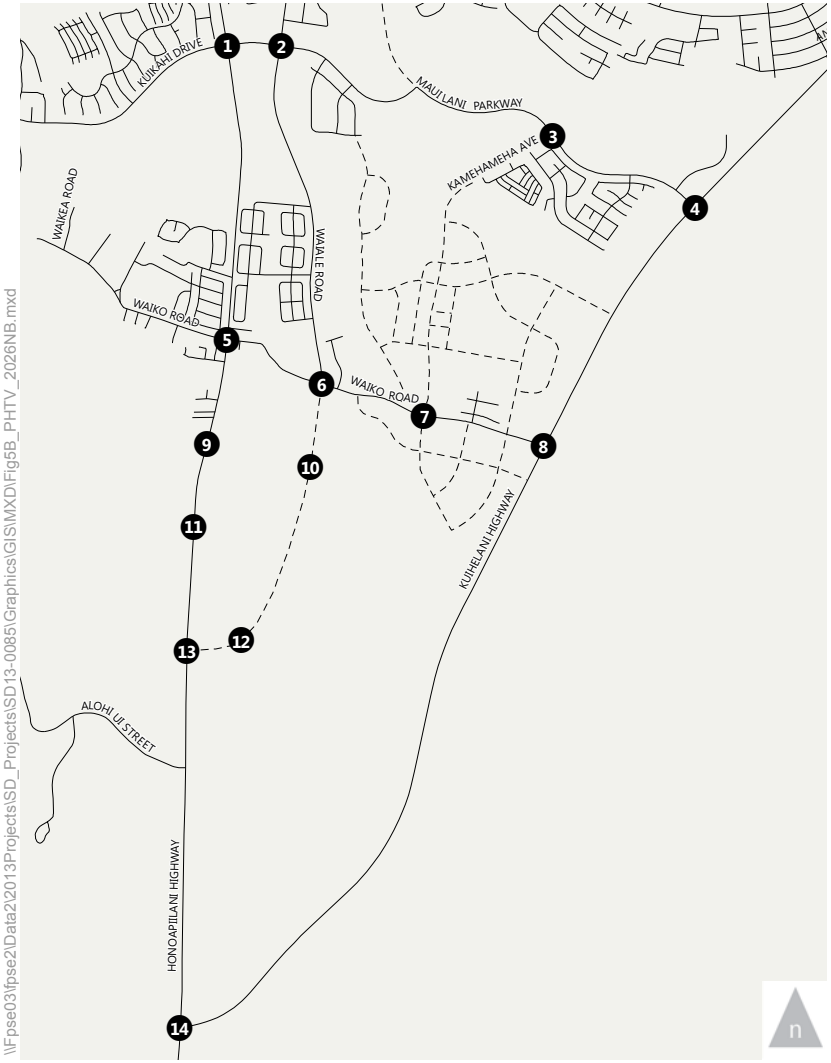

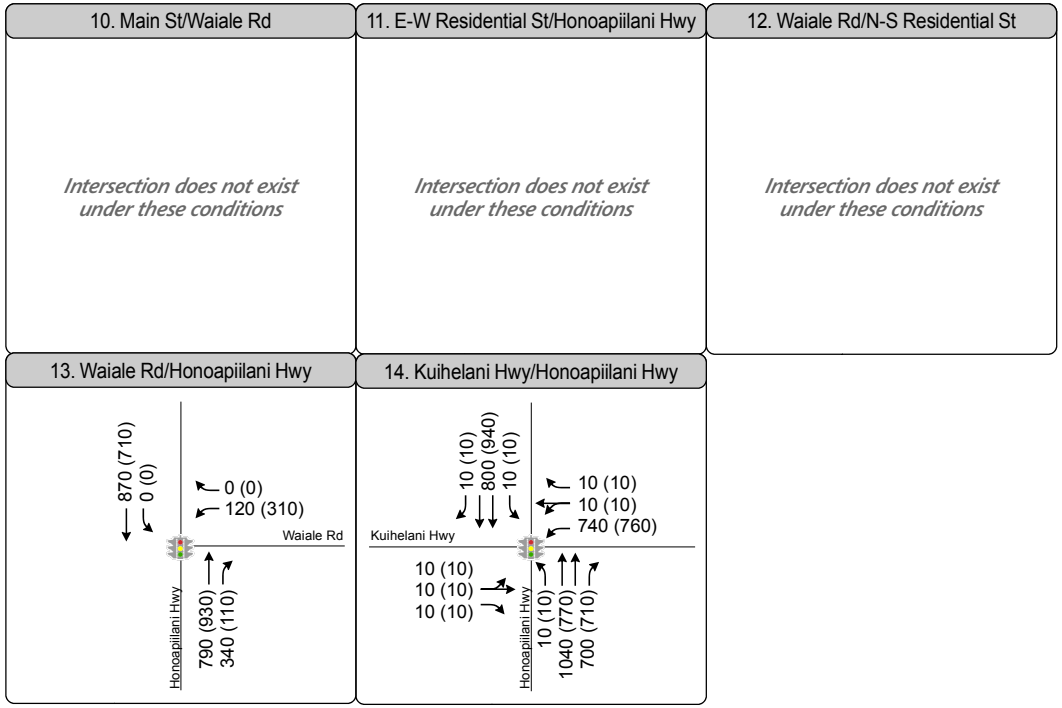

#	Study Intersection		Traffic Signal
	Turn Lane		Stop Sign
AM (PM)	Peak Hour Traffic Volume		Proposed Roadway

Figure 5B

Peak Hour Traffic Volumes and Lane Configurations - Year 2026 No Project Conditions

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Additionally, the intersection is proposed to be signalized.[8] If the intersection was side-street stop-controlled under future conditions, the side-street approaches would operate at undesirable LOS and drivers at the side streets would experience significantly long delays due to the heavy projected through volumes along the Honoapiilani Highway.

- Intersection 10: Waiale Road & Main Street – This future intersection will be constructed as part of the Year 2022 Project Conditions (Phase 1). It is assumed to be configured as a four-legged, single-lane roundabout, where vehicles must yield for a gap in the circulating flow before entering the circle. The east leg of the intersection is assumed to provide access to consolidated County and public facilities, light industrial uses, a regional park, fire station, and emergency management center.[9]

- Intersection 11: Honoapiilani Highway & East-West Residential Street – This future intersection will be constructed as part of the proposed project. The intersection is assumed to be configured as a four-legged intersection with northbound and southbound approaches that provide one left-turn lane, one through lane, and one right-turn lane and eastbound and westbound approaches that provide one left-turn lane and one shared through/right-turn lane.

  Additionally, it should be noted that the intersection is proposed to be signalized under full buildout conditions of the project.[8] If the intersection was side-street stop-controlled under future conditions, the side-street approaches would operate at undesirable LOS and drivers at the side streets would experience significantly long delays due to the heavy projected through volumes along the Honoapiilani Highway.

- Intersection 12: Waiale Road & North-South Residential Street – This future intersection will be constructed as part of the Year 2026 with Project Conditions (Phase 2). It is assumed to be configured as a three-legged, side-street stop-controlled intersection with an eastbound approach that provides a shared through/left-turn lane, a westbound approach that provides a

[8] Prior to the installation of a traffic signal, it is recommended that a full warrant analysis be conducted based on field-measured traffic data and a thorough study of traffic and roadway conditions by an experienced engineer. Furthermore, the decision to install a signal should not be based solely on the warrants because the installation of signals can lead to certain types of collisions. The responsible state or local agency should undertake regular monitoring of actual traffic conditions and collision data and conduct a timely re-evaluation of the full set of warrants to prioritize and program intersections for signalization.

[9] Based on consultations with the County, approximately 100 acres will be dedicated to consolidated facilities for water, parks, environmental management, and public works departments. The primary access to these uses is planned to be via Kuihelani Highway, however, some vehicles and maintenance trucks will likely access these uses via the Waiale Bypass. This analysis assumes that such mauka access will be via the east leg of Intersection 10: Waiale Road & Main Street. Additionally, the fire station, emergency management center, and regional park access will be through the east leg of Waiale Road & Main Street. Based on the best available data, traffic projections for theses uses have been estimated and applied to the intersection analysis.

shared through/right-turn lane, and a stop-controlled southbound approach that provides a shared left-turn/right-turn lane.

- Intersection 13: Honoapiilani Highway & Waiale Road – This signalized intersection will be a three-legged intersection under cumulative base conditions. The fourth (west) leg will be constructed as part of the Year 2026 Conditions (Phase 2) of the proposed project, resulting in a northbound approach that provides one left-turn lane, one through lane, and one free right-turn lane, a southbound approach that provides one left-turn lane, one through lane, and one right-turn lane, and eastbound and westbound approaches that provide one left-turn lane and one shared through/right-turn lane.

PROJECT TRIP GENERATION ESTIMATES

Vehicle trip rates presented in *Trip Generation 9th Edition* (Institute of Transportation Engineers, 2012) were used to estimate number of trips to and from the proposed project. The trip generation rates used in this study and the estimated new numbers of trips generated by the proposed project in 2026 are summarized in **Table 5**.

Project trip generation estimates are commonly developed using Institute of Transportation Engineers (ITE) rates. However, ITE rates are typically obtained from isolated, suburban developments generally not sensitive to the trip-making characteristics of mixed-use developments such as WCT. In fact, few methodologies are available to estimate the unique trip generation characteristics of mixed-use and infill developments. One of the most commonly used methods is to use trip generation rates or equations from *Trip Generation* and apply reductions from the mixed-use internalization spreadsheet from *Trip Generation Handbook, 2nd Edition* (ITE, 2004). This method has some shortcomings in that it is based on a limited sample of six mixed-use sites in Florida, it is limited to three land use types (residential, retail, and office), and it does not take into account the influence of nearby land uses.

More comprehensive analyses of mixed-use and infill trip generation were developed and presented in the following research studies: *Traffic Generated by Mixed-Use Developments – A Six-Region Study Using Consistent Built Environmental Measures* (Reid Ewing et al., September 2008) and *National Cooperative Highway Research Program Report 684: Enhancing Internal Trip Capture Estimation for Mixed-Use Developments* (Bochner et al., March 2011). The two studies examined over 260 mixed-use development sites throughout the U.S. and, using different approaches, developed new quantification methods. Fehr & Peers has reviewed the two methods, including the basis, capabilities, and appropriate uses of each, to produce a new method (MXD+) that combines the strengths of the two individual advances to best practice. MXD+ recognizes that traffic generation by mixed-use and other forms of sustainable development relate closely to the density, diversity, design, destination accessibility, transit proximity, and scale of development. MXD+ improves the accuracy of impact estimation and trip internalization and

gives planners a tool to rationally balance land use mix and to incorporate urban design, context compatibility, and transit orientation to create lower-impact development.

Accordingly, the MXD+ process was used to estimate more appropriate internalization and non-motorized trip reductions to apply to the ITE-based automobile trip generation for WCT. The MXD reductions for full buildout of WCT ranged from 22% to 27% during the peak hours and 15% for daily. Using the MXD+ process to inform and refine the internalization and non-motorized trip reduction estimate used for the project trip generation, it was determined that the application of a 15% daily reduction and a 25% AM and PM peak hour reduction were appropriate to account for the infill and mixed-use nature of the land use plan where vehicle trips would be linked (i.e. residential-school-retail interplay) and/or replaced with walk and bicycle trips to nearby land uses. The MXD+ model inputs and results are provided in **Appendix D.**

As shown in **Table 5**, by 2026 and completion of both Phase 1 and Phase 2 of WCT, the project full buildout is estimated to generate approximately 19,000 daily trips, including about 1,200 AM peak hour trips (409 inbound and 746 outbound) and about 1,500 PM peak hour trips (852 inbound and 633 outbound).

The MXD+ process was also used to estimate more appropriate internalization and non-motorized trip reductions to apply to the ITE-based automobile trip generation for just WCT Phase 1. The MXD reductions for partial buildout of WCT ranged from 26% to 35% during the peak hours and 17% for daily. The variation in reductions related to internal capture and non-motorized trips between the full buildout reductions are because a smaller portion of the makai and mauka side of the WCT project will be developed and less residential units will be constructed by Phase 1. Using the MXD+ process to inform and refine the internalization and non-motorized trip reduction estimate to be used for the Year 2022 project trip generation, it was determined that the application of a 15% daily reduction and a 25% AM and PM peak hour reduction would still be the appropriate, conservative approach.

With the application of the reductions to the WCT Phase 1 trip estimates, the partial buildout of the project is expected to generate approximately 13,100 daily trips, including about 700 trips during the AM peak hour (306 inbound and 427 outbound) and about 1,000 trips during the PM peak hour (552 inbound and 460 outbound). These WCT Phase 1 trip estimates were then used to conduct the traffic analysis for the Year 2022 with Partial Development Conditions. **Appendix E** provides the vehicle trip generation estimates for Phase 1 and **Appendix D** provides the corresponding MXD+ model inputs and outputs.

TABLE 5 – TRIP GENERATION RATE AND ESTIMATES

SUMMARY OF RATES

Land Use	ITE#	Rate	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Single-Family Housing	210	per Dwelling Unit	[a]	25%	75%	[a]	63%	37%	[a]
Apartments	220	per Dwelling Unit	[a]	20%	80%	[a]	65%	35%	[a]
Retail	820	per 1,000 square feet	[a]	62%	38%	[a]	48%	52%	[a]
Parks	412	per acre	2.28	61%	39%	0.02	61%	39%	0.09
Elementary School	520	per student	1.29	55%	45%	0.45	49%	51%	0.15
Quality Restaurant	931	per 1,000 square feet	89.95	82%	18%	0.81	67%	33%	7.49

Source: *ITE Trip Generation Manual,* 9th Edition, 2012.

VEHICLE TRIP ESTIMATES

Land Use	ITE#	Quantity	Unit	Daily	AM Peak Hour			PM Peak Hour		
					In	Out	Total	In	Out	Total
Phase 1 & 2 (2017-2026)										
Single-Family Housing	210	1,050	DU[1]	9,136	186	559	745	549	323	872
Apartments [b]	220	529	DU[1]	3,329	53	210	263	201	108	309
Retail [c]	820	169.597	KSF[2]	9,573	133	82	215	410	444	854
Parks	412	32.440	Acres	74	1	0	1	2	1	3
Elementary School [d]	520	750	Students	968	186	152	338	55	58	113
Internal Capture or Non-motorized Trips (15% Daily; 25% AM and PM) [e]				*-3,462*	*-140*	*-251*	*-391*	*-304*	*-234*	*-538*
Pass-by Reduction (10% Daily and AM; 20% PM) [f]				*-813*	*-10*	*-6*	*-16*	*-61*	*-67*	*-128*
Total Net New External Vehicle Trips (Phase 1 & 2)				**18,805**	**409**	**746**	**1,155**	**852**	**633**	**1,485**

Source: Fehr & Peers, 2014; Waikapu Country Town Conceptual Land Use Plan by Planning Consultants Hawaii, LLC. (October 2014)

Notes:

[1] Dwelling Unit = DU

[2] 1,000 square feet = ksf

[a] Fitted curve equations were used to derive AM peak hour, PM peak hour, and daily trip generation.

[b] The country town mixed-use residential units and the multi-family residential units were all analyzed as apartments for conservative trip generation analysis purposes.

[c] Does not include the 29,250 square feet of existing commercial uses located in the same area as the "village center," which will remain.

[d] Elementary school student body assumed based on information provided in the latest Waikapu Country Town Land Use Plan dated March 3, 2014 and further consultation with the Planning Consultants Hawaii, LLC and Hawaii Department of Education, Facilities.

[e] Reductions related to internal trip capture and non-motorized trips are due to residential-school-retail interplay. An estimated 15% reduction of daily trips and 25% reductions of the AM and PM peak hour trips were made to account for the mixed-use nature of the site, where vehicle trips can be linked and/or replaced with non-motorized trips. The MXD process was used to confirm and refine the initial reduction estimate. The MXD+ estimates peak hour internalization at 22% to 27%.

[f] Based on the ITE Trip Generation Handbook, 2nd Edition, 2004, the estimated pass-by trip credit (assuming all WCT commercial space is for retail) is about 33%. However, because some space is expected to be service-oriented or small office, and to provide a more conservative analysis it is estimated that the pass-by credit is 10% and 20% of the net daily and net AM and PM peak hour retail trips, respectively.

Figure 6 illustrates the net new 2022 Phase 1 project-generated traffic volumes for the AM and PM peak hours at each of the study intersections. **Figure 7** illustrates the net new 2026 project-generated traffic volumes with Phase 1 and Phase 2 project-generated traffic volumes for the AM and PM peak hours at each of the study intersections. The project trips shown on these figures reflect the inclusion of pass-by trips at some of the project intersections.

PROJECT TRIP DISTRIBUTION AND ASSIGNMENT

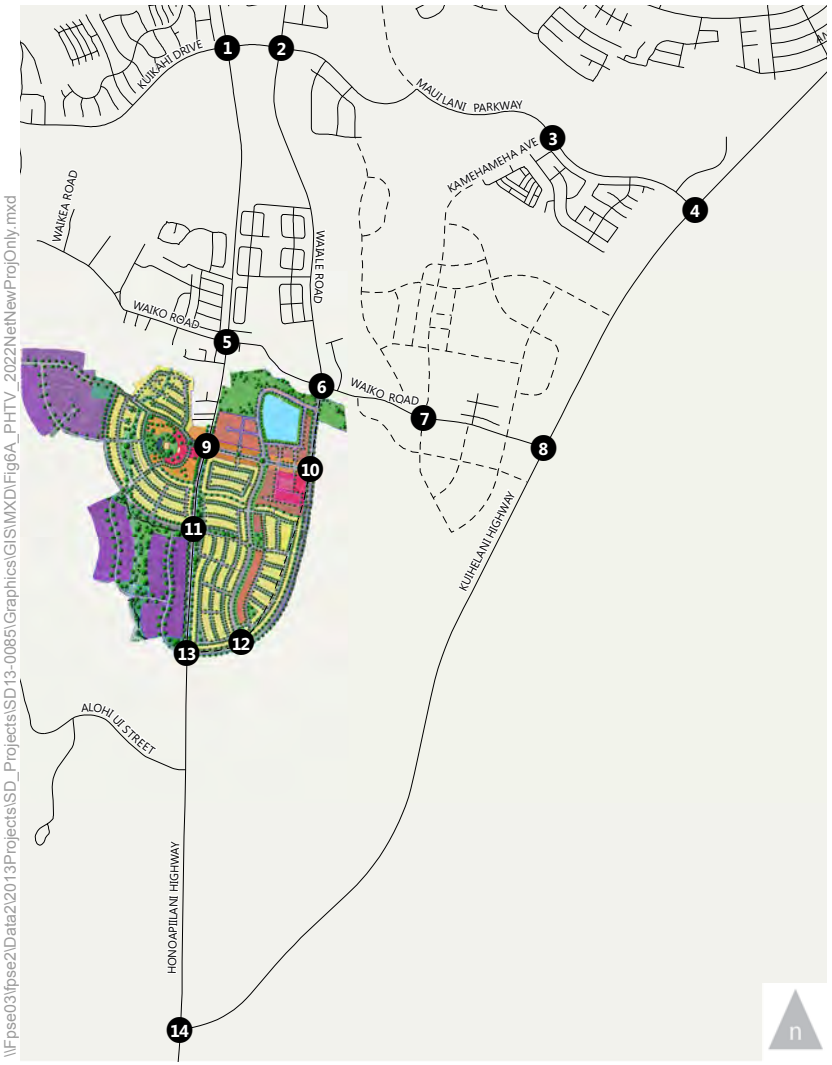
The trip distribution pattern was informed by a select zone analysis of the project site using the TDFM. Based on the model data and other refinements (i.e., adjustments based locations of complementary land uses), the following overall trip distribution pattern was estimated for the project-generated traffic:

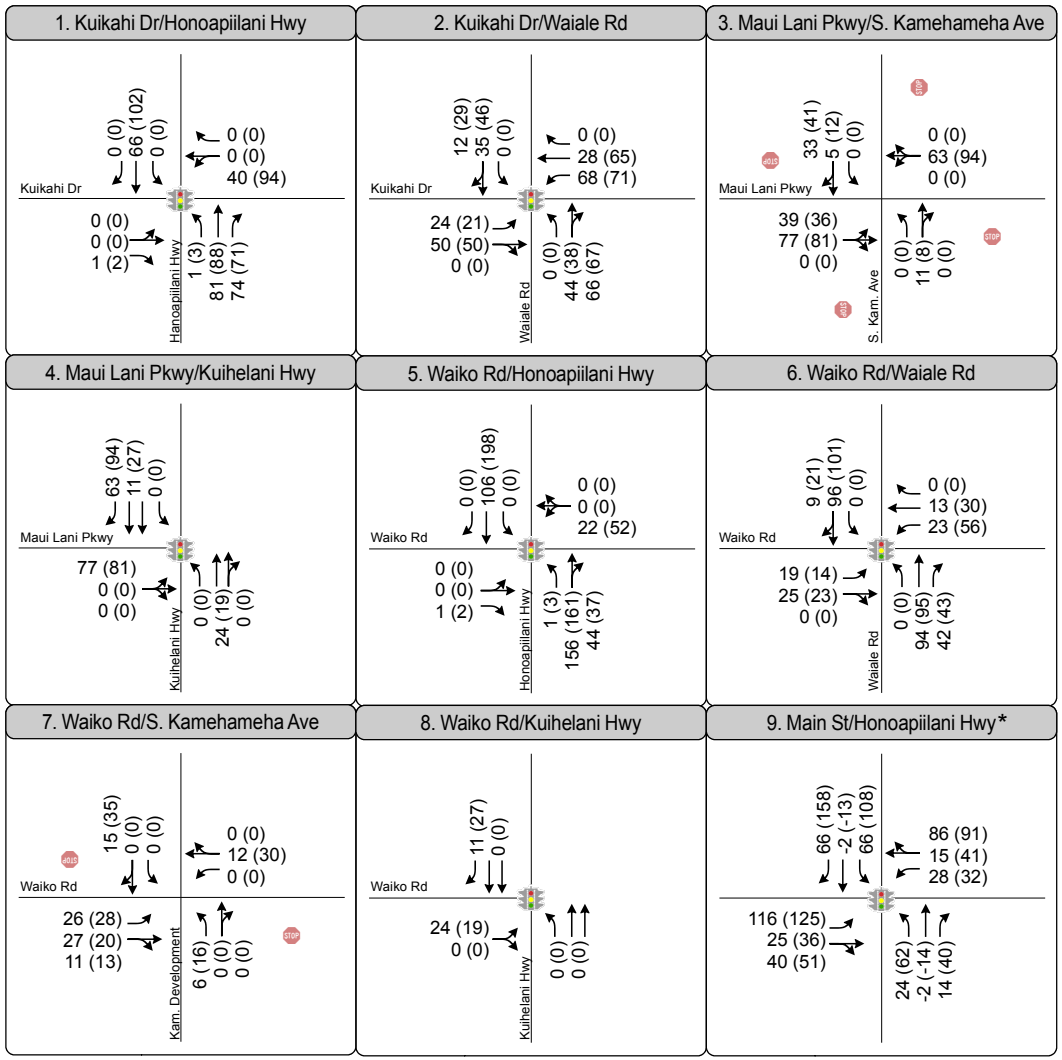
- 2% to/from the west for employment based trips
- 25% to/from the south for household based trips and 30% to/from the south for employment based trips
- 65% to/from the north for household based trips and 58% to/from the north for employment based trips
- 100% to/from the north for school-related external trips
- 10% to/from nearby developments or mixed-use communities for both household and employment based trips

Based on the trip distribution pattern discussed above, the estimated project trips were assigned to the future roadway network that will be in place by 2022 and 2026, the horizon years in which buildout of Phases 1 and 2 of WCT are planned to be completed, respectively. As discussed, this analysis assumes that the Waiale Bypass would be in place to serve project-related and other traffic.

CUMULATIVE PLUS PROJECT TRAFFIC PROJECTIONS

The project-generated traffic volumes were added to the cumulative base traffic projections to develop the cumulative plus project traffic forecasts for 2022 and 2026. **Figure 8** illustrates the anticipated lane configurations and projected Year 2022 with Partial Development AM and PM peak hour traffic volumes at each of the study intersections. **Figure 9** illustrates the anticipated lane configurations and the Year 2026 with Project AM and PM peak hour traffic volumes at each of the study intersections. At a few locations, differences in the future roadway network with Phase 1 and with Phase 2 of the project will result in slightly different trip assignments.





#	Study Intersection		Traffic Signal
	Turn Lane		Stop Sign
AM (PM)	Peak Hour Traffic Volume		Proposed Roadway
*	Includes Pass-by Trips		

Note: Under Phase 1, only the northern portion of both the mauka and makai sides of the project site are developed. Therefore, the negative volumes reported at some movements indicate that the traffic shifts caused by pass-by trips were greater than forecasted project volumes traversing through these movements.

Figure 6A

Peak Hour Traffic Volumes and Lane Configurations - Net New Project Only, Phase 1 (2022)

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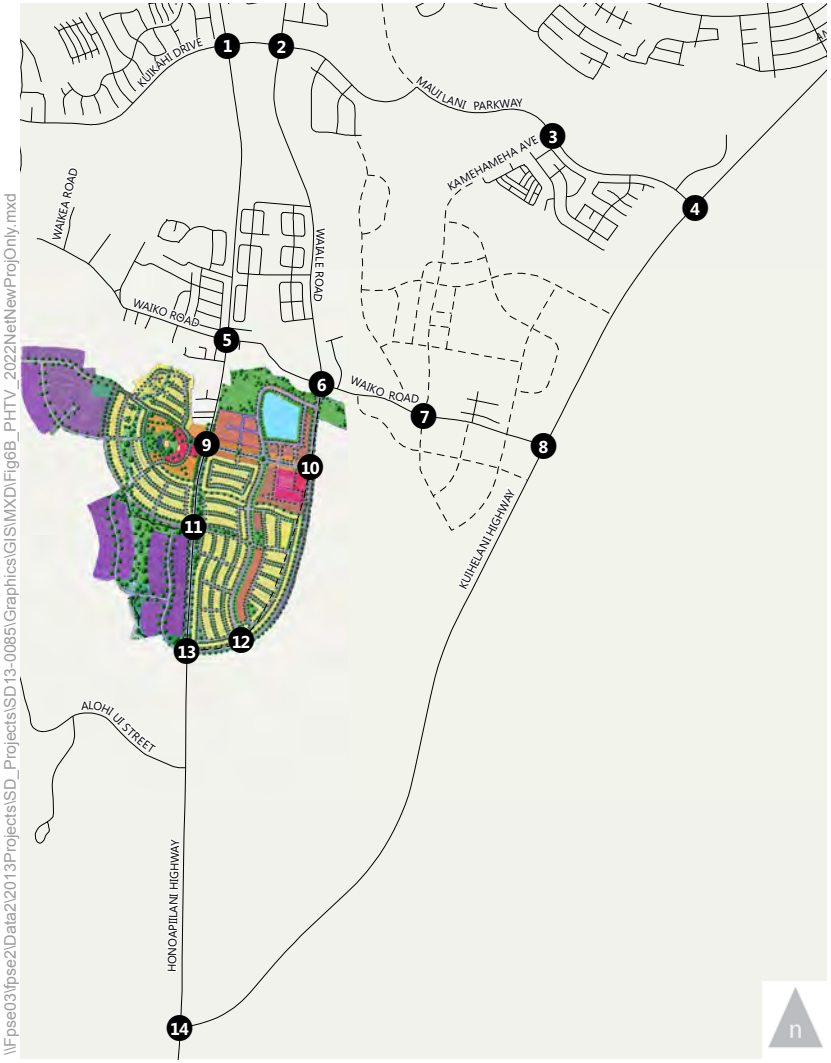

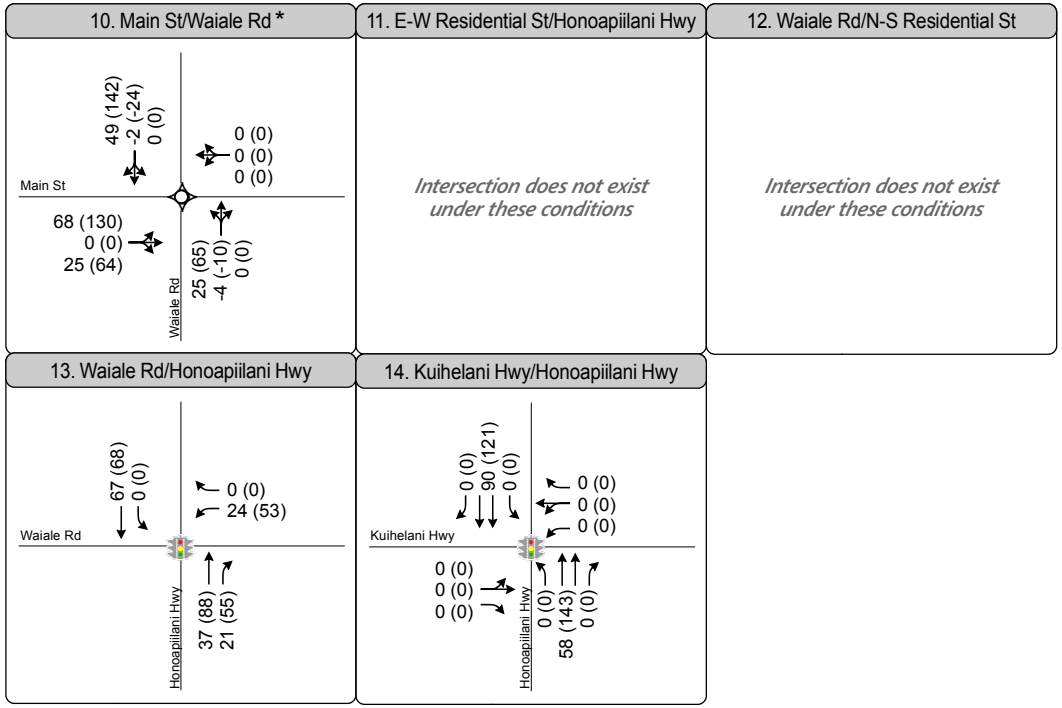

#	Study Intersection		Traffic Signal
	Turn Lane		Stop Sign
AM (PM)	Peak Hour Traffic Volume		Proposed Roadway
*	Includes Pass-by Trips		Roundabout

Note: Under Phase 1, only the northern portion of both the mauka and makai sides of the project site are developed. Therefore, the negative volumes reported at some movements indicate that the traffic shifts caused by pass-by trips were greater than forecasted project volumes traversing through these movements.

Figure 6B

Peak Hour Traffic Volumes and Lane Configurations - Net New Project Only, Phase 1 (2022)

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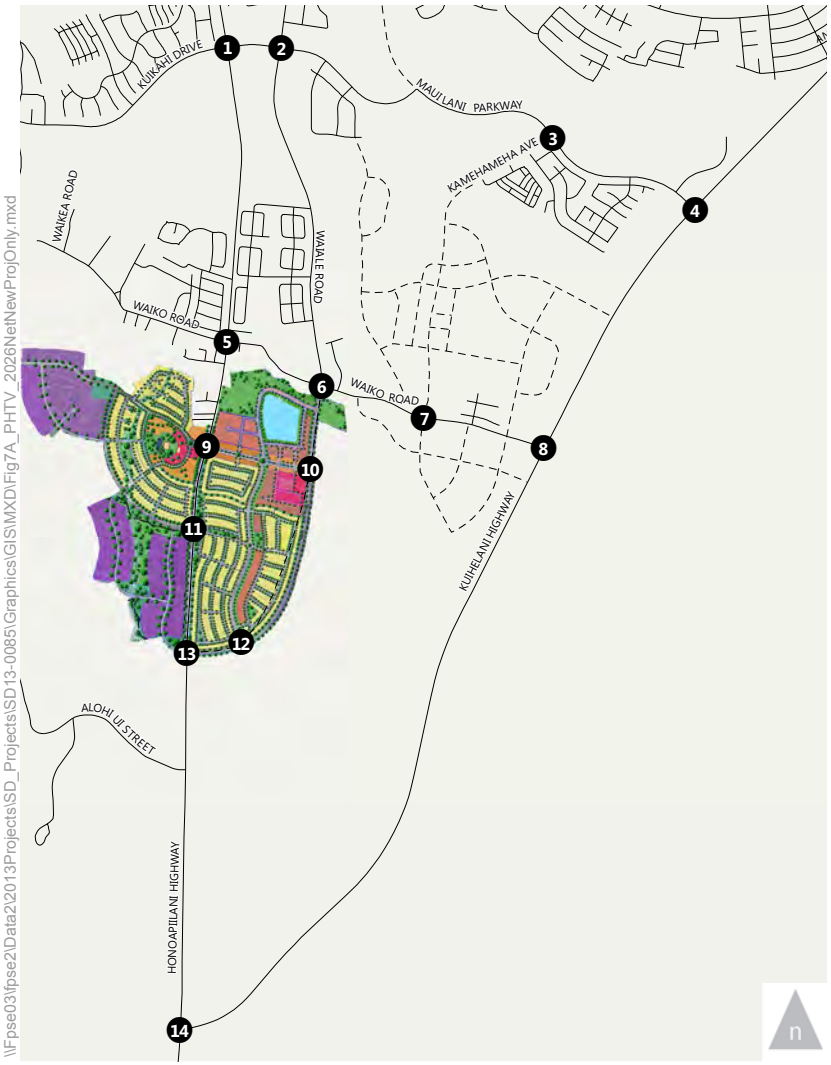

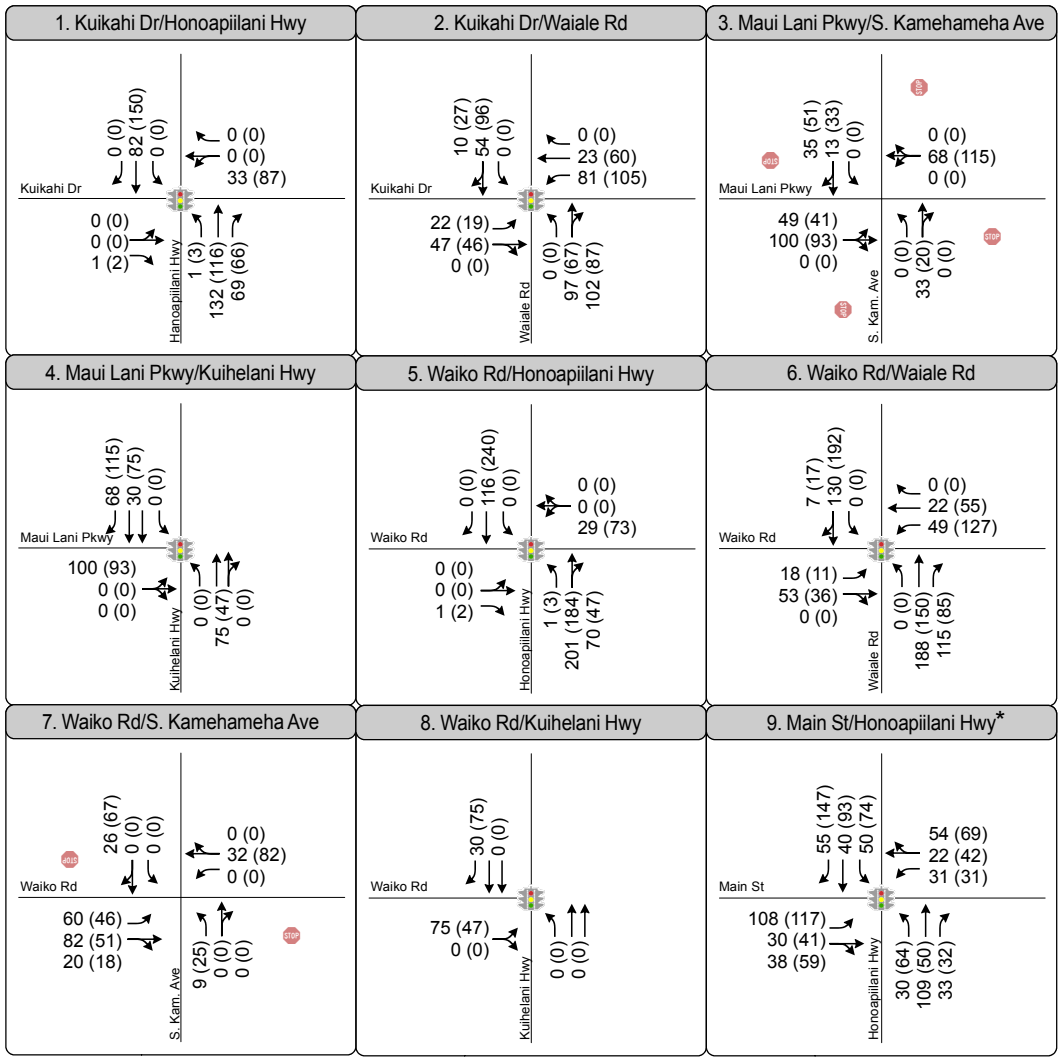

#	Study Intersection		Traffic Signal
	Turn Lane		Stop Sign
AM (PM)	Peak Hour Traffic Volume		Proposed Roadway
*	Includes Pass-by Trips		

Figure 7A

Peak Hour Traffic Volumes and Lane Configurations - Net New Project Only, Phase 1 & 2 (2026)

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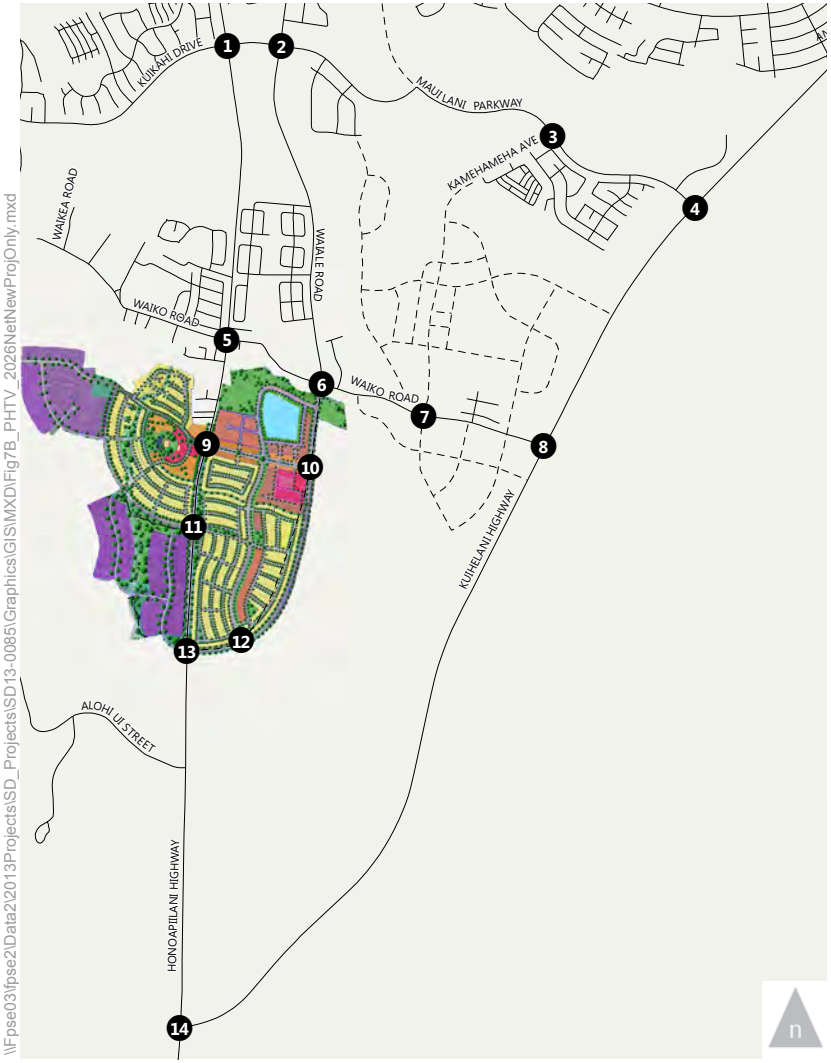

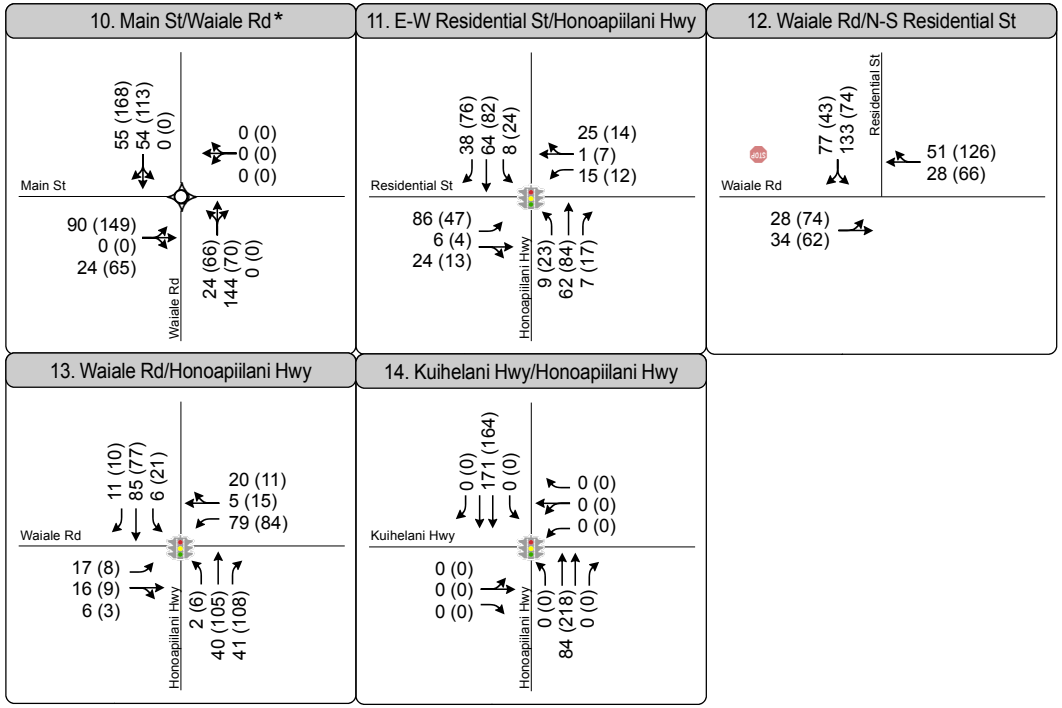

#	Study Intersection		Traffic Signal
	Turn Lane		Stop Sign
AM (PM)	Peak Hour Traffic Volume		Proposed Roadway
*	Includes Pass-by Trips		Roundabout

Figure 7B

Peak Hour Traffic Volumes and Lane Configurations - Net New Project Only, Phase 1 & 2 (2026)

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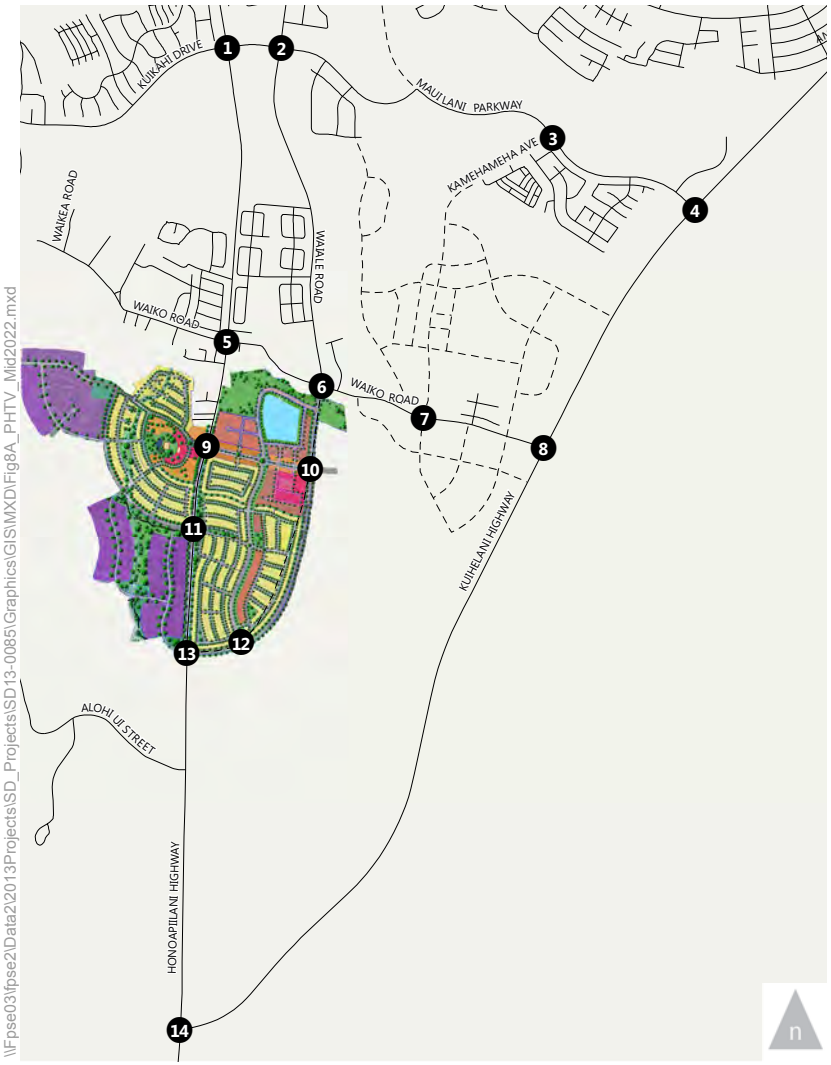

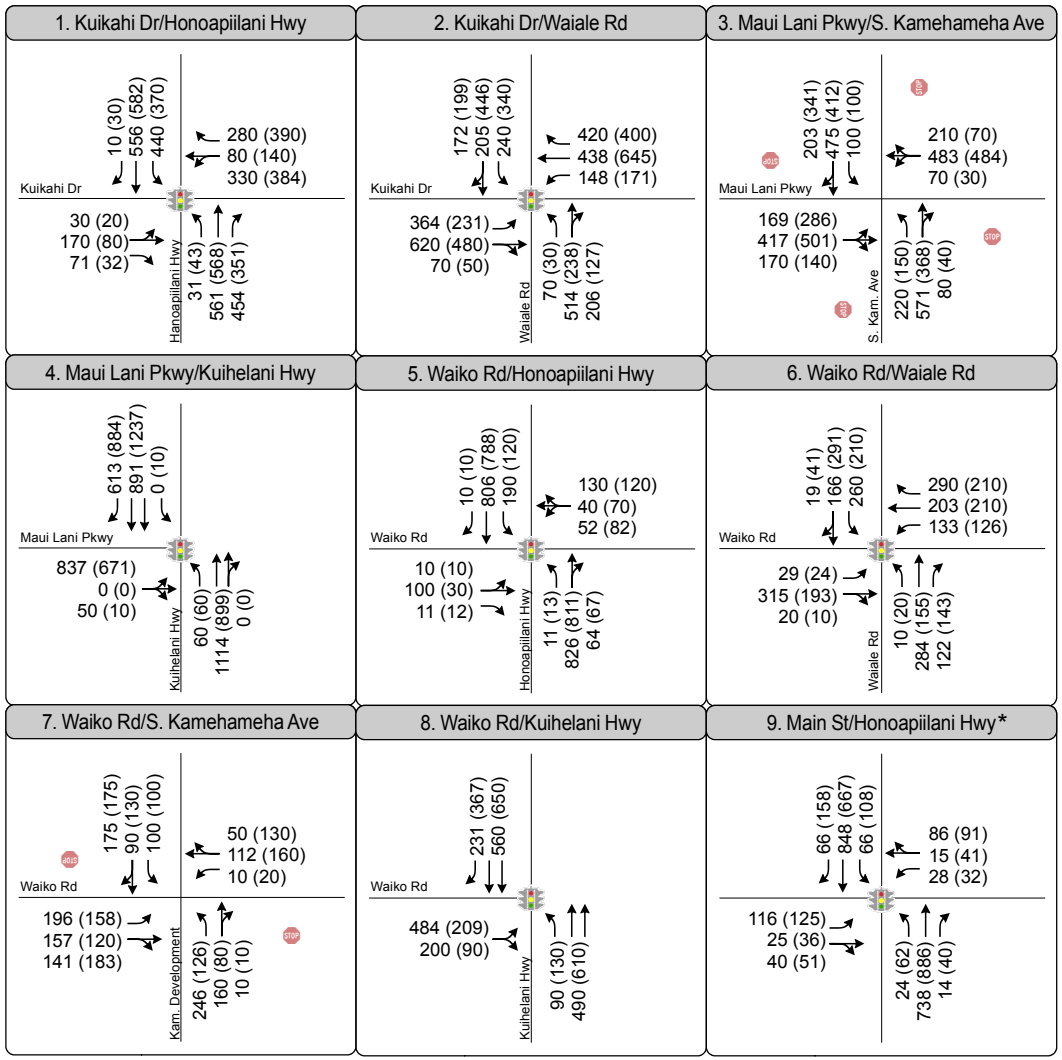

#	Study Intersection		Traffic Signal
	Turn Lane		Stop Sign
AM (PM)	Peak Hour Traffic Volume		Proposed Roadway
*	Includes Pass-by Trips		

Figure 8A

Peak Hour Traffic Volumes and Lane Configurations - Year 2022 with Partial Development - Phase 1 Conditions

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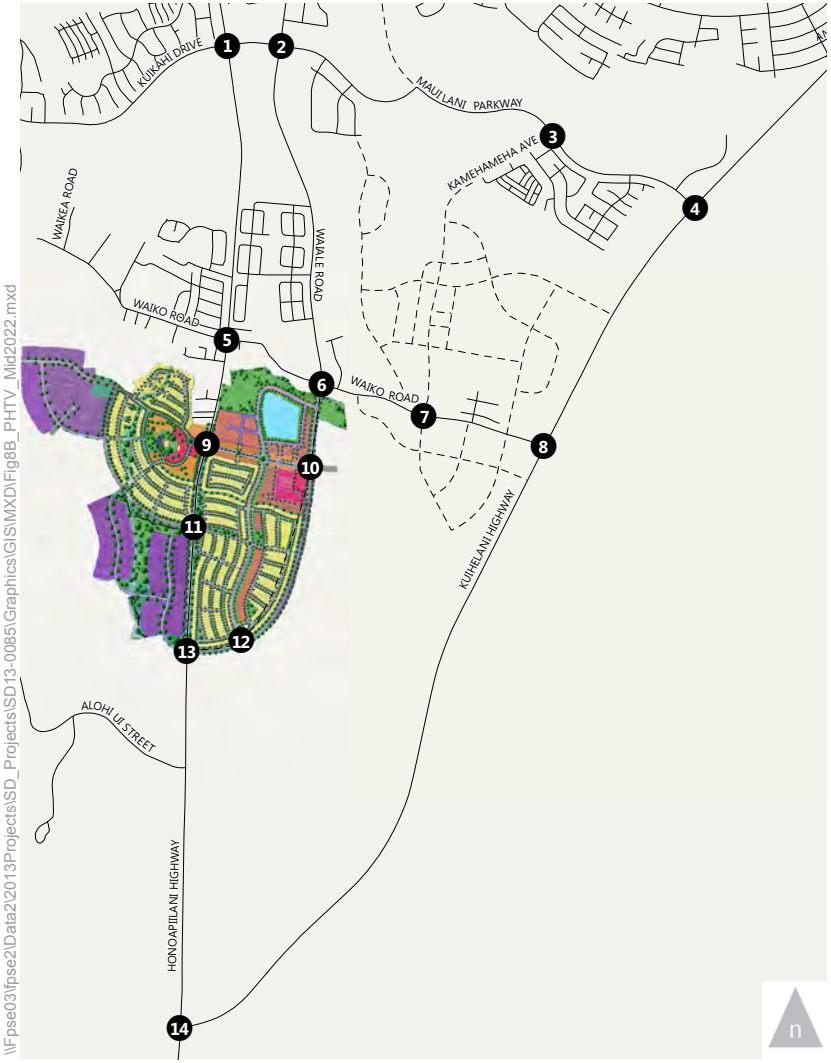

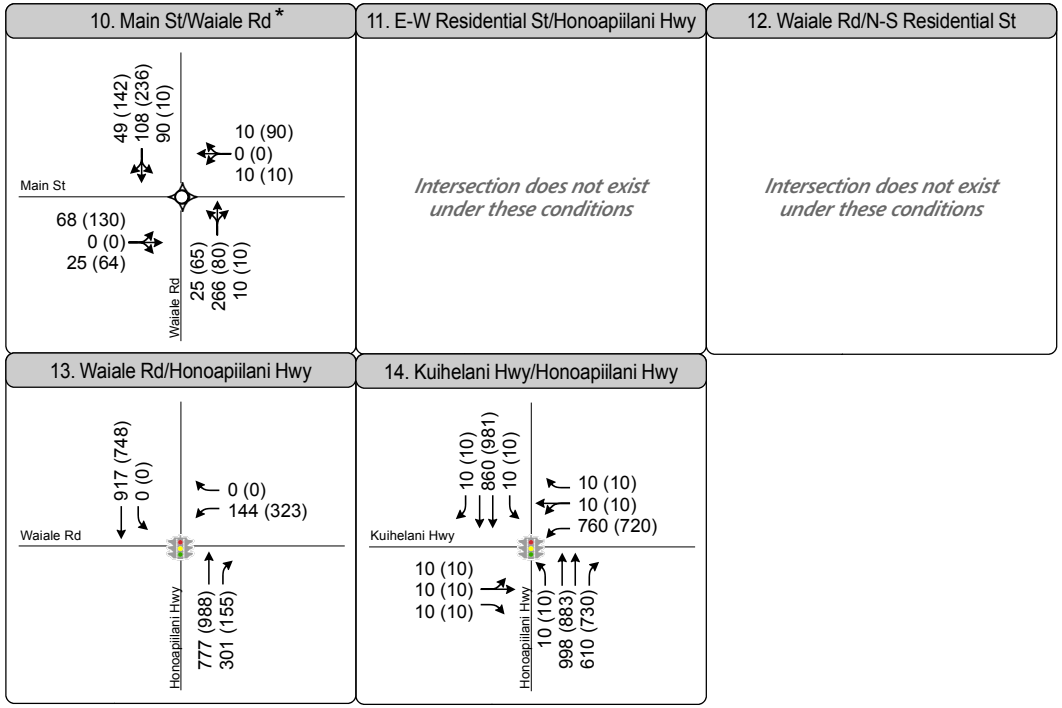

#	Study Intersection		Traffic Signal
	Turn Lane		Stop Sign
AM (PM)	Peak Hour Traffic Volume		Proposed Roadway
*	Includes Pass-by Trips		Roundabout

Figure 8B

Peak Hour Traffic Volumes and Lane Configurations - Year 2022 with Partial Development - Phase 1 Conditions

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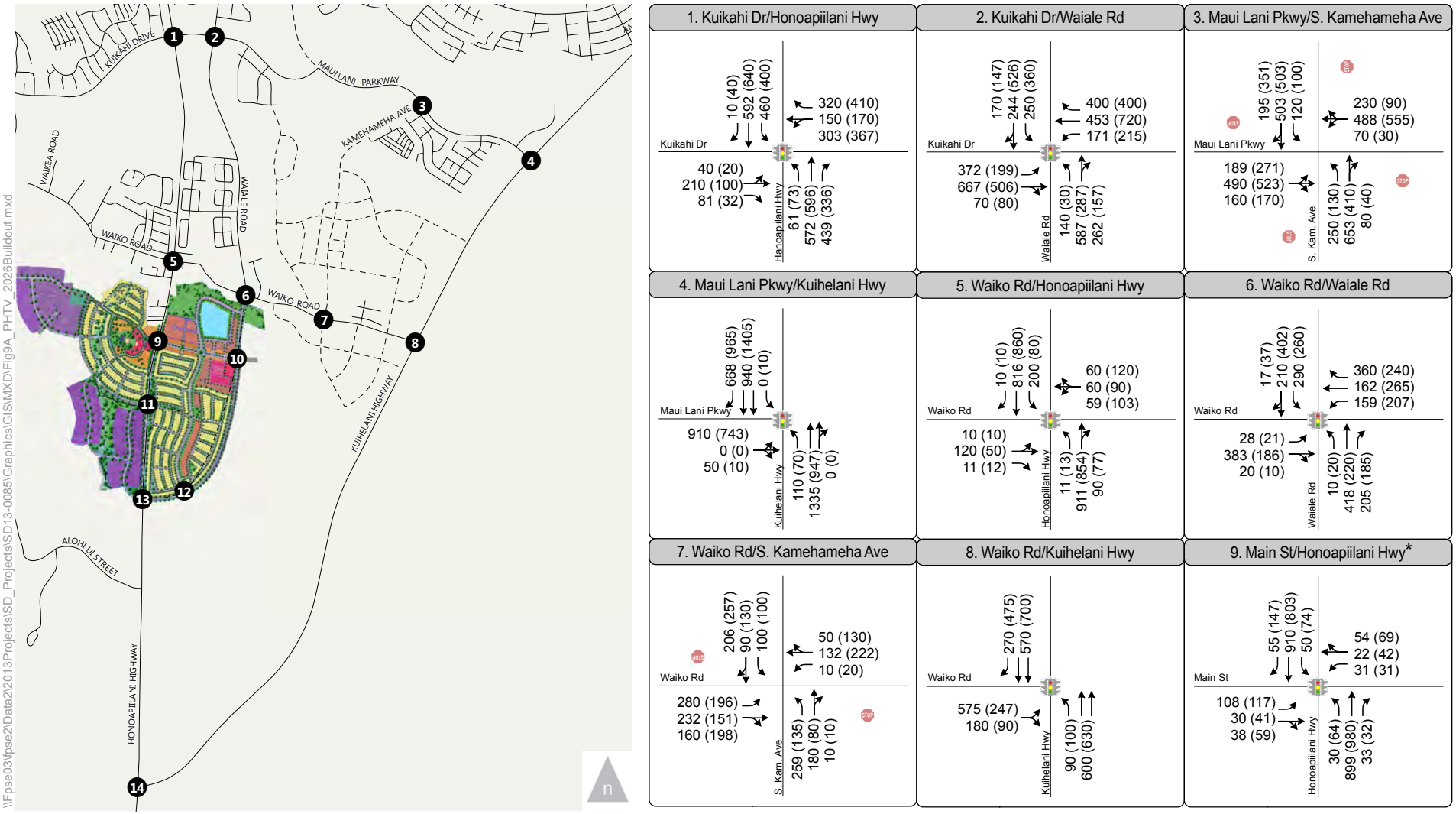
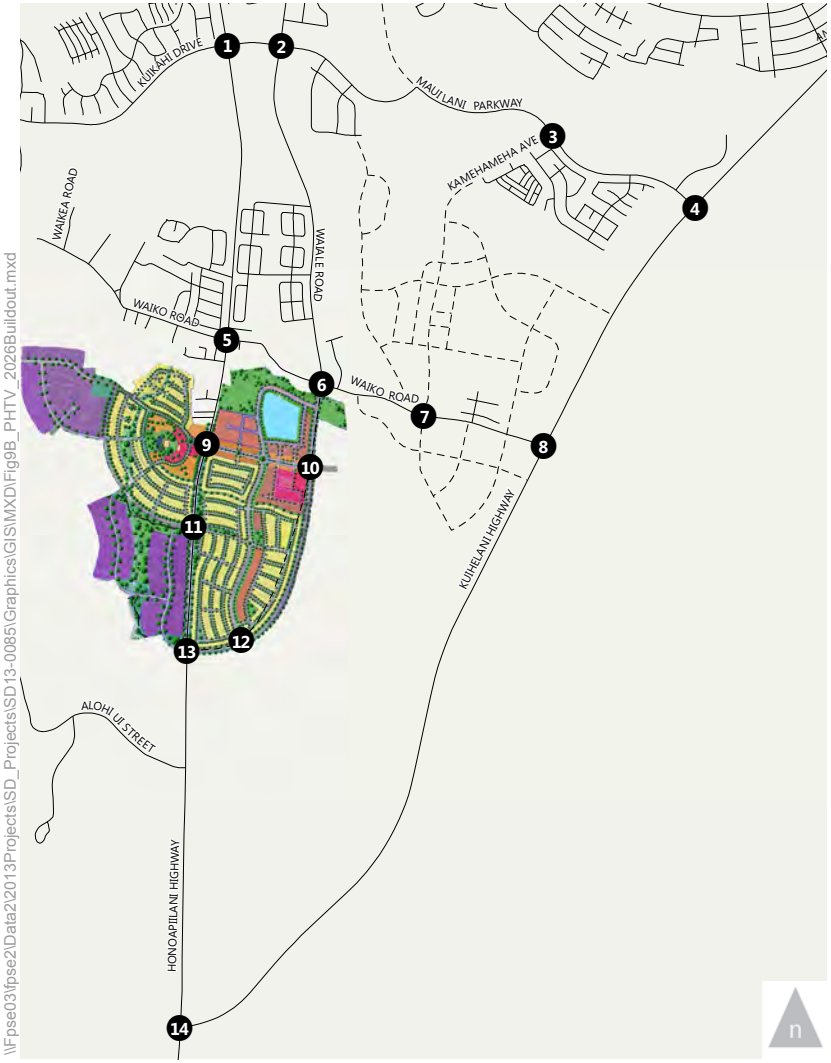
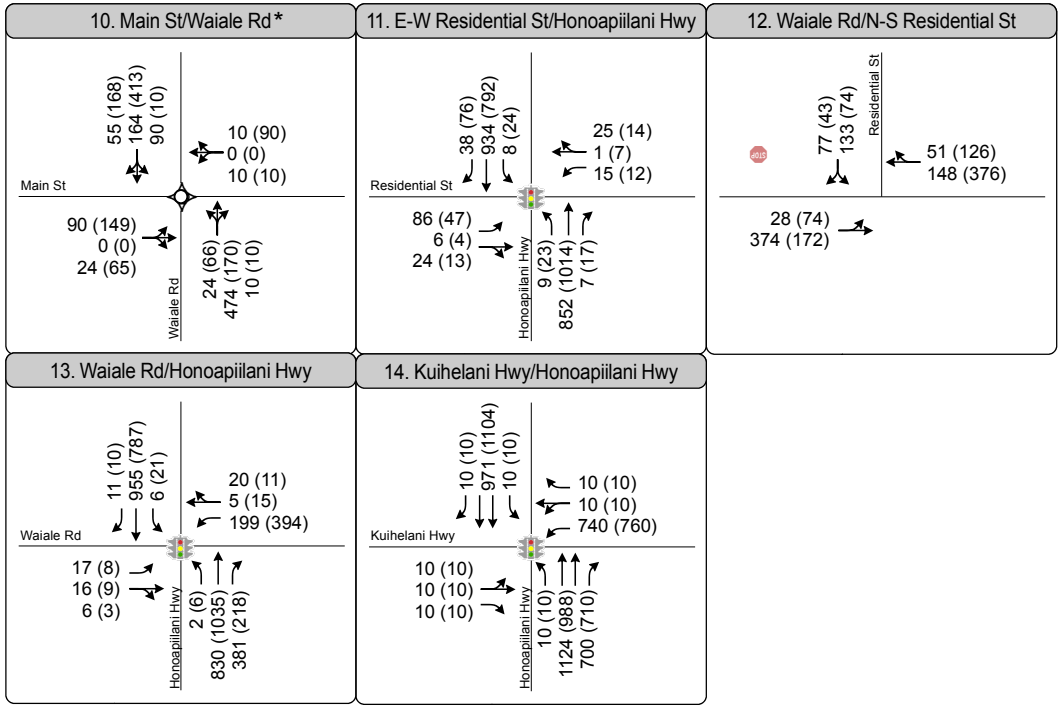


#	Study Intersection		Traffic Signal
	Turn Lane		Stop Sign
AM (PM)	Peak Hour Traffic Volume		Proposed Roadway
*	Includes Pass-by Trips		

Figure 9A

Peak Hour Traffic Volumes and Lane Configurations - Year 2026 with Project Conditions - Phase 1 & 2 Conditions





#	Study Intersection		Traffic Signal
	Turn Lane		Stop Sign
AM (PM)	Peak Hour Traffic Volume		Proposed Roadway
*	Includes Pass-by Trips		Roundabout

Figure 9B

Peak Hour Traffic Volumes and Lane Configurations - Year 2026 with Project Conditions - Phase 1 & 2 Conditions

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5. INTERSECTION ANALYSIS

This chapter presents an analysis of the potential impacts on the roadway system due to projected increases in traffic, including traffic generated by WCT, under partial and full buildout. The analysis compares the projected levels of service at each study intersection under cumulative conditions for 2022 and 2026 both with and without the proposed project to determine potential project impacts.

YEAR 2022 NO PROJECT TRAFFIC CONDITIONS

This section presents an analysis of potential future traffic conditions projected for the Year 2022. The Year 2022 No Project or cumulative base traffic volumes projected in Chapter 3 were analyzed using the methodologies described in Chapter 1 to forecast cumulative base peak hour LOS at the study intersections. The first few columns in **Table 6** summarize the results of this analysis and the corresponding LOS calculation sheets are included in **Appendix B**.

The results of the LOS calculations indicate that all of the future study intersections operate at an overall acceptable service level (LOS D or better) in 2022, with the exception of the following locations:

- Intersection 1: Honoapiilani Highway (Highway 30) & Kuikahi Drive (LOS E – AM peak hour)
- Intersection 2: Waiale Road & Kuikahi Drive (LOS E – AM peak hour)
- Intersection 3: S. Kamehameha Avenue & Maui Lani Parkway (LOS F – AM peak hour and PM peak hour)
- Intersection 4: Kuihelani Highway (Highway 380) & Maui Lani Parkway (LOS E – AM peak hour and PM peak hour)
- Intersection 7: S. Kamehameha Avenue & Waiko Road (LOS F – AM peak hour and PM peak hour)

The remaining five study intersections are expected to continue operating at an overall desirable LOS (LOS D or better) during both peak hours.

YEAR 2022 WITH PARTIAL DEVELOPMENT TRAFFIC CONDITIONS

The Year 2022 with Partial Development or cumulative plus project Phase 1 peak hour traffic volumes illustrated in **Figure 8**, were analyzed to determine 2022 operating conditions with the addition of project-related Phase 1 traffic. The results of the Year 2022 with Partial Development analysis is presented in **Table 6** and the corresponding LOS calculation sheets are included in **Appendix B**.

TABLE 6 – YEAR 2022 LEVELS OF SERVICE – WAIKAPU COUNTRY TOWN PARTIAL DEVELOPMENT (PHASE 1)

Intersection	Traffic Control	Peak Hour	Year 2022 No Project Conditions		Year 2022 with Partial Development (Phase 1) Conditions		Delay Change	Mitigation Required?	Mitigated to: Pre-Project or Better Conditions (≤ LOS D)		Mitigated to: LOS D or Better Conditions	
			Del/Veh[1]	LOS[2,3]	Del/Veh[1]	LOS[2,3]			Del/Veh[1]	LOS[2,3]	Del/Veh[1]	LOS[2,3]
1. Honoapiilani Highway / Kuikahi Drive	Signal	AM	67.3	**E**	92.5	**F**	25.2	**YES**	43.2	D	Same as Pre-Project Mitigation	
		PM	38.6	D	66.1	**E**	27.5	**YES**	35.2	D		
2. Waiale Road / Kuikahi Drive	Signal	AM	73.5	**E**	108.2	**F**	34.7	**YES**	61.9	**E**	39.8	D
		PM	48.6	D	73.6	**E**	25.0	**YES**	34.8	C	31.3	C
3. S. Kamehameha Avenue / Maui Lani Parkway[6]	AWSC	AM	> 180	**F**	> 180	**F**	**	**YES**	131.5	**F**	30.5	C
		PM	> 180	**F**	> 180	**F**	**	**YES**	133.1	**F**	36.0	D
4. Kuihelani Highway / Maui Lani Parkway	Signal	AM	78.0	**E**	101.6	**F**	23.6	**YES**	22.7	C	Same as Pre-Project Mitigation	
		PM	57.9	**E**	79.9	**E**	22.0	**YES**	26.4	C		
5. Honoapiilani Highway / Waiko Road	Signal	AM	18.6	B	34.5	C	15.9	NO	No Mitigation Required			
		PM	17.5	B	29.8	C	12.3	NO				
6. Waiale Road / Waiko Road[4,9]	Signal	AM	8.1	A	8.8	A	0.7	NO	No Mitigation Required			
		PM	7.3	A	7.5	A	0.2	NO				
7. S. Kamehameha Avenue / Waiko Road[6,7]	SSSC	AM	> 180	**F**	> 180	**F**	**	**YES**	8.1	A	Same as Pre-Project Mitigation	
		PM	169.9	**F**	> 180	**F**	**	**YES**	7.4	A		
8. Kuihelani Highway / Waiko Road	Signal	AM	38.7	D	43.2	D	4.5	NO	No Mitigation Required			
		PM	17.9	B	18.6	B	0.7	NO				
9. Honoapiilani Highway / Main Street[5,8]	Signal	AM	Only built with project		9.0	A	9.0	NO	No Mitigation Required			
		AM			10.4	B	10.4	NO				
10. Waiale Road / Main Street[5]	Roundabout	AM	Only built with project		6.6	A	6.6	NO	No Mitigation Required			
		PM			7.1	A	7.1	NO				
11. Honoapiilani Highway / East-West Residential Street	N/A	AM	Only built with Phase 2 of project									
		PM										
12. North-South Residential Street / Waiale Road	N/A	AM	Only built with Phase 2 of project									
		PM										
13. Honoapiilani Highway / Waiale Road[9]	Signal	AM	5.9	A	7.4	A	1.5	NO	No Mitigation Required			
		PM	12.9	B	17.9	B	5.0	NO				
14. Honoapiilani Highway / Kuihelani Highway	Signal	AM	22.2	C	23.1	C	0.9	NO	No Mitigation Required			
		PM	20.3	C	22.2	C	1.9	NO				

Source: Fehr & Peers, 2014

Notes:

** Indicated oversaturated conditions. Delay cannot be calculated.

AWSC = All-way stop-controlled intersection

SSSC = Side-street stop-controlled intersection

[1] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized and all-way stop-controlled intersections. The vehicular delay for the worst movement is reported for side street stop-controlled intersections.

[2] LOS calculations performed using the 2000 Highway Capacity Manual (HCM) method.

[3] Unacceptable LOS highlighted in **bold.**

[4] With the construction of the Waiale Bypass under future conditions, the intersection will include a fourth (south) leg and is assumed to be signalized.

[5] Intersection provides access to the project site.

[6] The proposed mitigation measure at this location is signalization and the delay and LOS displayed under this condition is based on the average control delay for the intersection as a whole.

[7] Intersection is or is assumed to be controlled by stop signs on the minor approach(es).

[8] The project intersection is assumed to be signalized in 2022.

[9] Intersection assumed to be signalized as part of the Waiale Bypass project.

As shown in Table 6, the proposed project would contribute to cumulative impacts (LOS E or F conditions) during one or both peak hours at five study intersections:

- Intersection 1: Honoapiilani Highway (Highway 30) & Kuikahi Drive (LOS F – AM peak hour)
- Intersection 2: Waiale Road & Kuikahi Drive (LOS F – AM peak hour and LOS E – PM peak hour)
- Intersection 3: S. Kamehameha Avenue & Maui Lani Parkway (LOS F – AM peak hour and PM peak hour)
- Intersection 4: Kuihelani Highway (Highway 380) & Maui Lani Parkway (LOS F – AM peak hour and LOS E – PM peak hour)
- Intersection 7: S. Kamehameha Avenue & Waiko Road (LOS F – AM peak hour and PM peak hour)

In addition, a project-specific impact has been identified at Intersection 1: Honoapiilani Highway & Kuikahi Drive during the PM peak hour, where the addition of project-generated traffic would cause the overall intersection operations to degrade from LOS D to LOS E.

YEAR 2026 NO PROJECT TRAFFIC CONDITIONS

This section presents an analysis of potential future traffic conditions projected for the Year 2026. The Year 2026 No Project or cumulative base traffic volumes projected in Chapter 3 were analyzed using the methodologies described in Chapter 1 to forecast cumulative base peak hour LOS at the study intersections. The first few columns in **Table 7** summarize the results of this analysis and the corresponding LOS calculation sheets are included in **Appendix B**.

The results of the LOS calculations indicate that all of the future study intersections operate at an overall acceptable service level (LOS D or better) in 2026, with the exception of the following locations:

- Intersection 1: Honoapiilani Highway (Highway 30) & Kuikahi Drive (LOS E – AM peak hour)
- Intersection 2: Waiale Road & Kuikahi Drive (LOS F – AM peak hour and LOS E – PM peak hour)
- Intersection 3: S. Kamehameha Avenue & Maui Lani Parkway (LOS F – AM peak hour and PM peak hour)
- Intersection 4: Kuihelani Highway (Highway 380) & Maui Lani Parkway (LOS F – AM peak hour and LOS E – PM peak hour)
- Intersection 7: S. Kamehameha Avenue & Waiko Road (LOS F – AM peak hour and PM peak hour)

The remaining five study intersections are expected to continue operating at an overall desirable LOS (LOS D or better) during both peak hours.

TABLE 7 – YEAR 2026 LEVELS OF SERVICE - WAIKAPU COUNTRY TOWN FULL DEVELOPMENT (PHASE 1 & 2)

Intersection	Traffic Control	Peak Hour	Year 2026 No Project Conditions		Year 2026 with Phase 1&2 Conditions		Delay Change	Mitigation Required?	Mitigated to: Pre-Project or Better Conditions (≤ LOS D)		Mitigated to: LOS D or Better Conditions	
			Del/Veh[1]	LOS[2,3]	Del/Veh[1]	LOS[2,3]			Del/Veh[1]	LOS[2,3]	Del/Veh[1]	LOS[2,3]
1. Honoapiilani Highway / Kuikahi Drive	Signal	AM	75.3	**E**	111.1	**F**	35.8	**YES**	50.3	D	Same as Pre-Project Mitigation	
		PM	46.3	D	77.0	**E**	30.7	**YES**	37.7	D		
2. Waiale Road / Kuikahi Drive	Signal	AM	87.8	**F**	149.2	**F**	61.4	**YES**	81.8	**F**	46.6	D
		PM	55.3	**E**	99.4	**F**	44.1	**YES**	41.5	D	33.3	C
3. S. Kamehameha Avenue / Maui Lani Parkway[6]	AWSC	AM	> 180	**F**	> 180	**F**	**	**YES**	> 180	**F**	30.2	C
		PM	> 180	**F**	> 180	**F**	**	**YES**	167.9	**F**	19.4	B
4. Kuihelani Highway / Maui Lani Parkway	Signal	AM	105.0	**F**	139.5	**F**	34.5	**YES**	27.2	C	Same as Pre-Project Mitigation	
		PM	75.9	**E**	100.1	**F**	24.2	**YES**	31.2	C		
5. Honoapiilani Highway / Waiko Road	Signal	AM	18.6	B	46.9	D	28.3	NO	No Mitigation Required			
		PM	18.5	B	37.8	D	19.3	NO				
6. Waiale Road / Waiko Road[4,9]	Signal	AM	9.0	A	15.0	B	6.0	NO	No Mitigation Required			
		PM	7.5	A	8.9	A	1.4	NO				
7. S. Kamehameha Avenue / Waiko Road[6,7]	SSSC	AM	**	**F**	**	**F**	**	**YES**	10.1	B	Same as Pre-Project Mitigation	
		PM	> 180	**F**	**	**F**	**	**YES**	8.1	A		
8. Kuihelani Highway / Waiko Road	Signal	AM	41.6	D	58.2	**E**	16.6	**YES**	25.2	C	Same as Pre-Project Mitigation	
		PM	17.1	B	19.7	B	2.6	NO	15.6	B		
9. Honoapiilani Highway / Main Street[5,8]	Signal	AM	Only built with project		9.8	A	9.8	NO	No Mitigation Required			
		AM			11.6	B	11.6	NO				
10. Waiale Road / Main Street[5]	Roundabout	AM	Only built with project		9.9	A	9.9	NO	No Mitigation Required			
		PM			10.3	B	10.3	NO				
11. Honoapiilani Highway / East-West Residential Street[5,8]	Signal	AM	Only built with project		8.3	A	8.3	NO	No Mitigation Required			
		PM			6.1	A	6.1	NO				
12. North-South Residential Street / Waiale Road[5,7]	SSSC	AM	Only built with project		17.4	C	17.4	NO	No Mitigation Required			
		PM			19.2	C	19.2	NO				
13. Honoapiilani Highway / Waiale Road[5,9]	Signal	AM	6.0	A	12.9	B	6.9	NO	No Mitigation Required			
		PM	15.5	B	30.2	C	14.7	NO				
14. Honoapiilani Highway / Kuihelani Highway	Signal	AM	22.5	C	24.0	C	1.5	NO	No Mitigation Required			
		PM	22.4	C	25.2	C	2.8	NO				

Source: Fehr & Peers, 2014

Notes:

** Indicated oversaturated conditions. Delay cannot be calculated. AWSC = All-way stop-controlled intersection; SSSC = Side-street stop-controlled intersection.

[1] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized and all-way stop-controlled intersections. The vehicular delay for the worst movement is reported for side street stop-controlled intersections.

[2] LOS calculations performed using the 2000 Highway Capacity Manual (HCM) method.

[3] Unacceptable LOS highlighted in **bold.**

[4] With the construction of the Waiale Bypass under future conditions, the intersection will include a fourth (south) leg and is assumed to be signalized.

[5] Intersection provides access to the project site.

[6] The proposed mitigation measure at this location is signalization and the delay and LOS displayed under this condition is based on the average control delay for the intersection as a whole.

[7] Intersection is or is assumed to be controlled by stop signs on the minor approach(es).

[8] The project intersection is assumed to be signalized in 2026.

[9] Intersection assumed to be signalized as part of the Waiale Bypass project.

YEAR 2026 WITH PROJECT TRAFFIC CONDITIONS

The Year 2026 with Project or cumulative plus project Phase 1 & 2 peak hour traffic volumes illustrated in **Figure 9**, were analyzed to determine 2026 operating conditions with the addition of project-related traffic. The results of the Year 2026 with Project analysis is presented in **Table 7** and the corresponding LOS calculation sheets are included in **Appendix B**.

The proposed project would contribute to cumulative impacts (LOS E or F conditions) during one or both peak hours at six study intersections:

- Intersection 1: Honoapiilani Highway (Highway 30) & Kuikahi Drive (LOS F – AM peak hour)
- Intersection 2: Waiale Road & Kuikahi Drive (LOS F – AM peak hour and PM peak hour)
- Intersection 3: S. Kamehameha Avenue & Maui Lani Parkway (LOS F – AM peak hour and PM peak hour)
- Intersection 4: Kuihelani Highway (Highway 380) & Maui Lani Parkway (LOS F – AM peak hour and PM peak hour)
- Intersection 7: S. Kamehameha Avenue & Waiko Road (LOS F – AM peak hour and PM peak hour)

In addition, project-specific impacts have been identified at intersections where the addition of project-generated traffic would cause their overall intersection operations to degrade below LOS D in the peak hours. The project-related impacts identified are:

- Intersection 1: Honoapiilani Highway (Highway 30) & Kuikahi Drive (cumulative and project-specific impact)
- Intersection 8: Kuihelani Highway (Highway 380) & Waiko Road (LOS E – AM peak hour)

POTENTIAL TRAFFIC IMPROVEMENTS

Potential traffic improvements were developed to increase the capacity and/or efficiency of the roadway system at the locations where the addition of project-related traffic would cause or contribute to poor operating conditions. The emphasis was to identify physical and/or operational improvements that could be implemented within the existing or planned roadway rights-of-way. The potential intersection improvement measures are illustrated in **Appendix F**. **Table 6** and **Table 7** summarize the projected LOS in 2022/2026 at the impacted locations with these proposed measures in place.

The potential measures to address the identified traffic impacts are described later in this chapter. Each of the identified impacts would be reduced such that future operations would be at the minimum desired LOS (LOS D) for the overall intersection with the project in place. Although HDOT also strives to maintain

LOS D or better conditions at the movement level, measures to improve turning movement conditions would only be proposed where feasible and appropriate from a traffic engineering perspective since adding lanes just to achieve the desired LOS for a particular movement also has secondary negative impacts to the environment and to active transportation modes.

The scope of corresponding improvements for this type of mitigation process can be well beyond the project's actual impact, and could effectively eliminate existing or cumulative deficiencies, which should not be the project's responsibility consistent with State of Hawaii law. Therefore, in addition to developing improvements that will result in LOS D or better operations, measures that only return operations to pre-project levels have also been identified (i.e., under Year 2022 No Project Conditions and Year 2026 No Project Conditions). This is especially important where the addition of project traffic alone would not degrade operations below LOS D, but would contribute to projected poor levels of service caused by the addition of traffic from other cumulative developments (e.g., Puunani Residences, Waiale Development, etc.).

The full range of improvements that address both project-related and/or cumulative traffic impacts are discussed in detail below. The specific improvements that are proposed to be fully implemented by WCT are specified in a subsequent section.

- Intersection 1: Honoapi`ilani Highway & Kuikahi Drive (Year 2022 & 2026) – The impact at this intersection could be reduced by widening the westbound approach from a shared through/left-turn lane and right-turn lane to a left-turn lane, a through lane, and a right-turn lane, and widening the southbound approach from a left-turn lane, a through lane, and a right-turn lane to two left-turn lanes, a through lane, and a right-turn lane. Additionally, to complement the addition of a second southbound left-turn lane, the east leg would need to be widened to provide a second departure lane and the northbound and southbound left-turn phasing would need to be converted to protected left turns. This improvement would result in LOS D operations, and no other measure is feasible that would only mitigate the operations to pre-project levels.

  Although the measures described above would improve the Year 2022 AM and PM peak hour impacts at the overall intersection level, half of the left-turn movements are projected to continue to operate at LOS E or F in both peak hours. The volumes and V/C ratios for the left-turn movements are as follows:

  - AM Peak Hour
    - Westbound: single left-turn lane with 330 vehicles and a V/C ratio of 1.09
    - Southbound: dual left-turn lanes with 440 vehicles and a V/C ratio of 0.98

- PM Peak Hour
  - Westbound: single left-turn lane with 384 vehicles and a V/C ratio of 0.98
  - Southbound: dual left-turn lanes with 370 vehicles and a V/C ratio of 0.94

The HCM recommends considering the provision of double left-turn lanes when the volume exceeds 300 vehicles. In the case of the southbound approach, the left-turn movement already has two left-lanes and from a volume standpoint does not warrant a third left-turn lane and the V/C ratios are within the acceptable range. Therefore, no further improvements are proposed for the southbound approach.

Although the westbound approach, is projected to warrant the provision of double left-turn lanes from a volume standpoint during both peak hours and the V/C ratio is greater than 1.0 during the AM peak hour, these movements and approaches were already operating below LOS D in pre-project conditions. Thus, proposing dual westbound left-turn lanes would be well beyond the project's actual impact. Additionally, implementing a second westbound left-turn lane would require more widening on the east leg, and widening of the south leg of Honoapiilani Highway to provide a second receiving lane to accommodate the left-turn movement. Therefore, no further project improvements are recommended for the westbound approach.

Similarly, the measures would only reduce the Year 2026 AM and PM peak hour impacts at the overall intersection level. During the AM and PM peak hour, three of the four left-turn movements are projected to continue to operate at LOSE or F. The volumes and V/C ratios for the left-turn movements are as follows:

- AM Peak Hour
  - Westbound: single left-turn lane with 303 vehicles and a V/C ratio of 1.08
  - Northbound: single left-turn lane with 61 vehicles and a V/C ratio of 0.99
  - Southbound: dual left-turn lanes with 460 vehicles and a V/C ratio of 1.01

- PM Peak Hour
  - Westbound: single left-turn lane with 367 vehicles and a V/C ratio of 1.02
  - Northbound: single left-turn lane with 73 vehicles and a V/C ratio of 0.90
  - Southbound: dual left-turn lanes with 400 vehicles and a V/C ratio of 0.92

In the case of the southbound approach, the left turn movement already has two left-lanes and from a volume standpoint does not warrant a third left-turn lane and the V/C ratios are mostly within the acceptable range. For the northbound left-turn lanes, the deficient lane operations are

not a result of capacity constraints, but rather signal operations. Therefore, no further improvements are proposed for both the southbound and northbound approaches.

Although the westbound approach, is projected to warrant the provision of double left-turn lanes from a volume standpoint and the V/C ratios are greater than 1.0 during both peak hours, these movements and approaches were already operating below LOS D in pre-project conditions. Thus, proposing dual westbound left-turns would be well beyond the project's actual impact. Additionally, implementing a second westbound left-turn lane would require more widening on the east leg, and widening of the south leg of Honoapiilani Highway to provide a second receiving lane to accommodate the left-turn movement. Therefore, no further project improvements are recommended for the westbound approach.

Additionally, under Year 2026 with Project Conditions the northbound through movement is projected to operate at LOS E in the AM peak hour with a V/C ratio of 0.97. However, because the 572 vehicles traveling through do not necessarily warrant an additional through lane and the improvement would require right-of-way acquisition along Honoapiilani Highway, no further physical improvements are proposed for this approach.

- Intersection 2: Waiale Road & Kuikahi Drive (Year 2022 & 2026) – The pre-project improvement includes widening the eastbound and westbound approaches to provide a left-turn lane, two through lanes, and a right-turn lane. To complement the widening of the eastbound and westbound approaches, both the eastbound and westbound departures would also need to be widened to each provide a second receiving lane. The LOS D or better measure includes the pre-project improvements plus widening the northbound approach to provide a left-turn lane, a through lane, and a right-turn lane.

  The measures described above would mitigate the Year 2022 PM peak hour impact so that the overall intersection and intersection movements or approaches would operate at acceptable LOS D or better.

  For the Year 2022 AM peak hour, the impact at the overall intersection level would be mitigated; however, two of the four left-turn movements are projected to continue to operate at LOS E or F. The volumes and V/C ratios for the left-turn movements are as follows:

  - AM Peak Hour
    - Eastbound: single left-turn lane with 364 vehicles and a V/C ratio of 1.04
    - Southbound: single left-turn lane with 240 vehicles and a V/C ratio of 1.00

The HCM recommends considering the provision of double left-turn lanes when the volume exceeds 300 vehicles. In the case of the southbound approach, the left turn movement does not warrant the provision of a second left-turn lane from a volume standpoint and the V/C ratios is within the acceptable range. Therefore, no further improvements are proposed for the southbound approach.

Although the eastbound approach is projected to warrant the provision of double left-turn lanes from a volume standpoint and the V/C ratio is greater than 1.0, this movement and approach were already operating below LOS D in pre-project conditions. Thus, proposing dual eastbound left-turns would be well beyond the project's actual impact at the approach-level. Additionally, implementing a second eastbound left-turn lane would require more widening on the west leg, and widening of the north leg of Waiale Road to provide a second receiving lane to accommodate the left-turn movement. Therefore, no further project improvements are recommended for the eastbound approach.

Similarly, the measures described would mitigate the Year 2026 PM peak hour impact so that the overall intersection and intersection movements or approaches would operate at acceptable LOS D or better.

For the Year 2026 AM peak hour, the impact at the overall intersection level would be mitigated; however, two of the four left-turn movements are projected to continue to operate at LOS F. The volumes and V/C ratios for the left-turn movements are as follows:

- AM Peak Hour
    - Eastbound: single left-turn lane with 372 vehicles and a V/C ratio of 1.07
    - Southbound: single left-turn lane with 250 vehicles and a V/C ratio of 1.15

For the southbound approach, the left turn movement does not warrant the provision of a second left-turn lane from a volume standpoint. Therefore, no further improvements are proposed for the southbound approach.

Although the eastbound approach is projected to warrant the provision of double left-turn lanes from a volume standpoint and the V/C ratio is greater than 1.0, this movement and approach were already operating below LOS D in pre-project conditions. Thus, proposing dual eastbound left-turn lanes would be well beyond the project's actual impact at the approach level. Additionally, implementing a second eastbound left-turn lane would require more widening on the west leg, and widening of the north leg of Waiale Road to provide a second receiving lane to

accommodate the left-turn movement. Therefore, no further project improvements are recommended for the eastbound approach.

Additionally, under Year 2026 with Project Conditions the northbound through movement is projected to operate at LOS E in the AM peak hour with a V/C ratio of 0.98. However, because the 587 vehicles traveling through do not necessarily warrant an additional through lane and the improvement would require right-of-way acquisition along Waiale Road, no further physical improvements are proposed for this approach.

- Intersection 3: S. Kamehameha Avenue/Maui Lani Parkway (Year 2022) – The pre-project improvement is installing a traffic control signal with permitted phasing at all approaches.[10] Although the intersection conditions are better than pre-project conditions with the implementation of a traffic control signal, the intersection would still operate with long delays in excess of 180 seconds during both peak hours in 2022. For LOS D or better operations, not only would the traffic signal need to be installed but the eastbound approach would need to provide a left-turn lane and a shared through/right-turn lane and the westbound approach would need to provide a left-turn lane, a through lane, and a right-turn lane.

  Although the measures described above would mitigate the Year 2022 AM peak hour impact at the overall intersection level, the northbound left-turn movement is projected to operate at LOS F with a V/C ratio of 1.22. Since the volumes at this movement do not warrant the provision of a second left-turn lane based on the HCM recommended provision of dual left-turn lanes, no further improvements are proposed for this approach.

  Similarly, the improvements would also mitigate the PM peak hour impact at the overall intersection level; however, the following left-turn movements are projected to continue to operate at LOS E or F. The volumes and V/C ratios for the left-turn movements are as follows:

  - Eastbound: single left-turn lane with 286 vehicles and a V/C ratio of 1.01
  - Northbound: single left-turn lane with 150 vehicles and a V/C ratio of 0.93

  Since the eastbound and northbound left-turn movements do not warrant the provision of a second left-turn lane from a volume standpoint and the V/C ratios are mostly within the acceptable range, no further improvements are proposed for these movements.

[10] For this location and any other where a new signal is proposed, it is recommended that the need for a traffic signal at this location be monitored as overall development proceeds in the greater study area and that signal installation be dependent on future traffic engineering studies and full warrant analysis.

Additionally, under Year 2022 with Project Conditions the southbound shared through/right-turn lane is projected to operate at LOS E in the PM peak hour with 412 vehicles traveling through and 341 vehicles turning right and a V/C ratio of 1.08. Although the southbound approach does warrant the provision of a separate right-turn lane from a volume standpoint, this approach was already operating below LOS D in pre-project conditions. Thus, proposing dual right-turn lanes would be well beyond the project's actual impact and would require right-of-way acquisition along Kamehameha Avenue. Therefore, no further project improvements are recommended for the southbound approach.

- Intersection 3: S. Kamehameha Avenue/Maui Lani Parkway (Year 2026) – The pre-project improvement is installing a traffic control signal with permitted phasing at all approaches.[10] Although the intersection conditions are better than pre-project conditions with the implementation of the traffic control signal, the intersection would still operate with long delays in excess of 180 seconds during both peak hours in 2026. For LOS D or better operations, not only would the traffic signal need to be installed but the eastbound approach would need to provide a left-turn lane and a shared through/right-turn lane, the westbound approach would need to provide a left-turn lane, a through lane, and a right-turn lane, and the southbound would need to provide a left-turn lane, a through lane, and a right-turn lane.

  The measures described above would mitigate the Year 2026 PM peak hour impact so that the overall intersection and intersection movements or approaches would operate at acceptable LOS D or better.

  For the Year 2026 AM peak hour impact, however, the measures would only mitigate the impact at the overall intersection level. During the AM peak hour, three of the four left-turn movements are projected still operate at LOS E. The volumes and V/C ratios for the left-turn movements are as follows:

  - Northbound: single left-turn lane with 250 vehicles and a V/C ratio of 1.01
  - Southbound: single left-turn lane with 120 vehicles and a V/C ratio of 0.93
  - Eastbound: single left-turn lane with 189 vehicles and a V/C ratio of 0.97

  The HCM recommends considering the provision of double left-turn lanes when the volume exceeds 300 vehicles. Since these movements do not warrant the provision of a second left-turn lane from a volume standpoint and the V/C ratios are mostly within the acceptable range, no further improvements are proposed for these approaches.

- Intersection 4: Kuihelani Highway & Maui Lani Parkway (Year 2022 & 2026) – The impact at this intersection could be reduced by widening the eastbound approach to provide a left-turn lane, a shared through/left-turn lane, and a right-turn lane. In addition to the change in configuration, the eastbound and westbound left-turn phasing would need to be modified to split phasing. This improvement would result in LOS D operations, and no other measure is feasible that would only mitigate operations to pre-project levels.

  Although the measures described above would reduce the Year 2022 AM and PM peak hour impacts at the overall intersection level, under AM peak hour conditions the northbound left-turn movement is projected to continue to operate at LOS F with 60 vehicles and a V/C ratio of 1.00.

  During the Year 2022 PM peak hour, all three left-turn movements are projected to continue to operate at LOS E or F. The volumes and V/C ratios for the left-turn movements are as follows:

  - Eastbound: single left-turn lane and shared through/left lane with 671 vehicles and a V/C ratio of 0.95
  - Northbound: single left-turn lane with 60 vehicles and a V/C ratio of 1.07
  - Southbound: single left-turn lane with 10 vehicles and a V/C ratio of 0.73

  The HCM recommends considering the provision of double left-turn lanes when the volume exceeds 300 vehicles. Since these movements either already have two left-turn lanes or do not warrant the provision of a second left-turn lane from a volume standpoint and the V/C ratios are mostly within the acceptable range, no further improvements are proposed for these approaches. Additionally, the deficient lane operations are not a result of capacity constraints, but rather signal operations.

  The measures described above would mitigate the Year 2026 AM peak hour impact so that the overall intersection and intersection movements or approaches would operate at acceptable LOS D or better.

For the Year 2026 PM peak hour impact, however, the measures would only mitigate the impact at the overall intersection level. During the AM peak hour, three of the four left-turn movements are projected still operate at LOS E or F. The volumes and V/C ratios for the left-turn movements are as follows:

- Eastbound: single left-turn lane and shared through/left lane with 743 vehicles and a V/C ratio of 0.96
- Northbound: single left-turn lane with 70 vehicles and a V/C ratio of 1.00
- Southbound: single left-turn lane with 10 vehicles and a V/C ratio of 1.00

Since these movements either already have two left-lanes or do not warrant the provision of a second left-turn lane from a volume standpoint and the V/C ratios are mostly within the acceptable range, no further improvements are proposed for these approaches. Additionally, the deficient lane operations are not a result of capacity constraints, but rather signal operations.

- Intersection 7: S. Kamehameha Avenue/Waiko Road (2022 & 2026) – This impact at this intersection could be reduced by installing a traffic signal with permitted phasing at all approaches.[10] This improvement would result in LOS D or better operations at both the overall intersection level and the turning movement level. No other measure is feasible that would only improve operations to pre-project levels.

- Intersection 8: Kuihelani Highway/Waiko Road (2026) – This impact at this intersection could be reduced by widening and restriping the eastbound approach to provide a left-turn lane and a right-turn lane. No changes are proposed to the signal timing. No other improvement is feasible that would only mitigate operations to pre-project levels.

The measure described above would improve the Year 2026 PM peak hour impact so that the overall intersection and intersection movements or approaches would operate at acceptable LOS D or better. For the Year 2026 AM peak hour impacts, however, the measure would only mitigate the impact at the overall intersection level. During the AM peak hour, the northbound left-turn movement is projected to operate at LOS E with 90 vehicles and a V/C ratio of 0.80. Based on HCM provisions for double left-turn lanes, the northbound left-turn movement does not warrant the provision of a second left-turn lane from a volume standpoint and the V/C ratio is within the acceptable range. Therefore, no further improvements are proposed for this approach.

MITIGATION FUNDING

For a project such as WCT that will be constructed in phases over an extended period of time, it is appropriate to identify the proposed project's share for the cost of the intersection improvements. Fair-share calculations for developer contributions were made for the intersections impacted by project-generated traffic. The estimates were developed by calculating the increase in traffic volumes from existing conditions to the Year 2026 with Project conditions. The increase establishes the total amount of projected growth at each location. Next, the WCT project-only volumes are divided by the total volume increase at each impacted intersection. This step determines the amount of traffic that the WCT project is contributing to the intersection and the approximate proportional contribution towards funding each potential proposed improvement.

The fair share calculations were performed for both the AM and PM peak hours, as shown in **Table 8**. For all but one location, the range of maximum project contribution is between 15.4% and 33.8%. At one location, the calculated maximum fair share does not accurately reflect the cause of the impacts at the intersection (i.e., the WCT causes the intersections to degrade from LOS D or better to LOS E or F). Based on the intersection analysis, the impact at Intersection 8: Kuihelani Highway & Waiko Road is project-specific (rather than a cumulative impact to which the project would make a fair-share contribution), and so that WCT should make a 100% contribution at this location.

While the project could make monetary contributions to partly fund the mitigation at all of the impacted locations, those improvements may not be implemented in a timely manner if the remaining funding is not available. Alternatively, HDOT has requested that projects fully fund the design and construction of improvements at selected locations under its jurisdiction that are roughly equal in value to the project's total collective fair-share contribution. While the project's fair-share contributions and the planning-level cost estimates for each element of the recommended mitigation program has not yet been finalized, a potential mitigation program for WCT is presented in the following section.

TABLE 8 – YEAR 2026 PROJECT FAIR SHARE INTERSECTION TRAFFIC CONTRIBUTION

Impacted Intersection	AM Peak Hour					PM Peak Hour					
	Existing Traffic	2026 Projected Traffic	Total New Traffic	Project Only Traffic	Project % of New Traffic	Existing Traffic	2026 Projected Traffic	Total New Traffic	Project Only Traffic	Project % of New Traffic	Maximum Contribution
1. Honoapiilani Highway / Kuikahi Drive**	2,073	3,238	318	1,165	27.3%	1,928	3,184	424	1,256	33.8%	33.8%
2. Waiale Road / Kuikahi Drive*	1,935	3,786	436	1,851	23.6%	1,849	3,627	507	1,778	28.5%	28.5%
3. S. Kamehameha Avenue / Maui Lani Parkway*	1,700	3,428	298	1,728	17.2%	1,593	3,173	353	1,580	22.3%	22.3%
4. Kuihelani Highway / Maui Lani Parkway**	1,856	4,013	273	2,157	12.7%	2,011	4,150	330	2,139	15.4%	15.4%
7. S. Kamehameha Avenue / Waiko Road*	0	1,709	229	1,709	13.4%	0	1,629	289	1,629	17.7%	17.7%
8. Kuihelani Highway / Waiko Road**	1,336	2,285	105	949	11.1%	1,407	2,242	122	835	14.6%	**100%**[1]

Source: Fehr & Peers, 2014
* County of Maui jurisdiction
** State HDOT jurisdiction
[1] Based on Table 7, the impact at this intersection is directly attributable to the project. Therefore, the maximum contribution is assumed for this intersection.

PROPOSED WCT MITIGATION PROGRAM

As discussed, improvements are proposed at intersections identified as significantly impacted under Year 2026 with Project Conditions. In the past, development projects would make a fair share financial contribution for each mitigation measure to the appropriate governing agency (i.e., the County or HDOT). However, simply providing partial funds for a variety of different improvements does not ensure construction of any individual improvement.

More recently, HDOT has indicated a preference for development projects like WCT to fully design and build improvements at a select set of locations to ensure their implementation. Accordingly, a mitigation program for WCT was developed that would require construction of improvements at intersections closer to the project site where the project contributes to, but does not directly cause a significant impact. Note that the mitigation program described below is a preliminary recommendation based on project proximity to intersections and without planning level cost estimates. As such, it is subject to change as the planning process continues.

The project proposes to fully fund mitigation measures that would return operations to pre-project levels at Intersection 1: Honoapi`ilani Highway & Kuikahi Drive and Intersection 8: Kuihelani Highway & Waiko Road. Additionally, although Intersection 13: Honoapiilani Highway & Waiale Road is not significantly impacted under Year 2026 with Project Conditions, the project may also be responsible for funding intersection improvements necessary to provide access to the project site (i.e., a fourth/west leg).

IMPROVEMENTS TO BE IMPLEMENTED BY OTHERS

For the remaining impacted intersections listed below, it is assumed that other development projects that are adjacent or in closer proximity to these impacted locations would be responsible for implementing the necessary intersection improvements:

- Intersection 2: Waiale Road & Kuikahi Drive
- Intersection 3: S. Kamehameha Avenue & Maui Lani Parkway
- Intersection 4: Kuihelani Highway & Maui Lani Parkway
- Intersection 7: S. Kamehameha Avenue & Waiko Road

6. ASSESSMENT OF SITE PLAN AND MULTI-MODAL REVIEW

The following section provides a summary of WCT's site access and circulation plan for bicycle, pedestrian, and transit facilities.

ROADWAY NETWORK

The proposed WCT site plan details an extensive internal roadway system which allows community residents and visitors to have multiple options for accessing neighborhoods, employment centers, and commercial and institutional uses. At full buildout of the project, access to mauka and makai land uses are provided along Honoapiilani Highway at four-legged, controlled intersections with Main Street, East-West Residential Street, and Waiale Road. Additional access to the makai land uses are provided along the Waiale Bypass at a roundabout with Main Street and a three-legged intersection with the major North-South Residential Street. Overall, the proposed WCT would provide sufficient vehicular connectivity to varying project uses and the multiple site access points help to better distribute traffic entering and exiting the community.

Proposed intersection spacing along Honoapiilani Highway in this area averages about every 2,100 feet. The distance from Waiko Road to the future Main Street is about 2,400 feet, from the future Main Street to the future East-West Road is about 1,600 feet, and from the future East-West Road to the southern terminus of the future Waiale Bypass is about 2,400 feet. Although spacing is less than ½ a mile between these intersections, which is HDOT's recommended and desired spacing on major arterials, the project site lies within the urbanized area of Maui rather than a rural area, and so more closely-spaced intersections are reasonable in this project setting, even for a major arterial. Furthermore, intersection level of service analysis results under Year 2022 and 2026 conditions demonstrated that each of these intersections would operate at acceptable levels during the peak hours.

ROUNDABOUT ANALYSIS

Roundabouts are not recommended at any of the study intersections along Honoapiilani Highway. The rationale of this recommendation is based on the review of the HDOT's roundabout guidelines. According to the *Hawaii Department of Transportation Modern Roundabout Policy Guideline* (HDOT, 2008):

- *Modern roundabouts involve low speeds for entering and circulating traffic and would need to be designed so that speeds of all vehicles is restricted to 35 mph or less within the roundabout.*

- *In situations where traffic volumes on both roadways are high and well balanced and/or where turning movements are relatively high, roundabouts provide better overall intersection operations and greater capacity than conventional intersection layouts.*

- *When the volumes on the major road are heavier than that on the minor road, the equal treatment of approaches may increase delay to the major road. Also, if the major road carries a heavy stream of through traffic, the lack of adequate gaps in the dominant flow may deter the minor flow from entering the roundabout during peak periods. Unless there are compelling reasons to do so, modern roundabouts need not be considered when less than 10% of the traffic enters the intersection from the minor roadway.*

- *No pedestrian activities take place across the circulating roadway or within the center island.*

- *Pedestrians and bicyclists may have difficulty finding the proper route through a modern roundabout due to unfamiliarity with operations.*

Along Honoapiilani Highway the projected northbound and southbound volumes are considerably higher than the volumes on the cross streets, and since the traffic flow through roundabouts is limited only by the availability of gaps in the circulating flow, this minor street-major street volume imbalance could lead to potential greater delay experienced at the side streets trying to access Honoapiilani Highway. In particular, at Honoapiilani Highway & East-West Residential Street (Intersection 11) the minor roadway does not comprise more than 10% of the total intersection volume in either the AM or the PM peak hour under both 2022 and 2026 conditions. Thus, based on HDOT's factors to consider for modern roundabouts, none of the proposed intersections along Highway 30 (Intersections 9, 11, and 13) appear suitable for roundabout installation.

PEDESTRIAN NETWORK

The Waikapu Country Town Project follows new urbanist design principles that include compact, higher-density, mixed-uses, and an emphasis on walkability and connectivity through extensive pedestrian and bicycle networks on the project site. These characteristics by nature reduce vehicle trip making and promote use of non-motorized modes. Consistent with State of Hawaii and County of Maui policies on Complete Streets, the transportation facilities for the residential and commercial districts will be developed to form a balanced multi-modal network designed to provide mobility choices and to meet the needs of the community and all roadway users.

A primary objective of the project is to develop a community where walking and biking are the preferred modes of transportation for short commutes. Therefore, approximately eight miles of hiking, biking and walking trails will be incorporated into the project site along with one or two pedestrian/bicycle bridges

over Waiko Stream to the north. Also, the development makai of the highway will focus on a pedestrian oriented "main street" close to an elementary school and parks. A principal objective of the project's active transportation plan is to separate pedestrians and bicyclists from automobiles through the use of multi-use cycle tracks and trails. Such facilities will link the project's mauka and makai neighborhoods with the project's commercial areas, civic, and recreational facilities.

All of the project's streets will emphasize traffic calming and street scape beautification. The use of residential roundabouts at key intersections, landscape planting strips to buffer pedestrians from traffic and linear greenways will serve to beautify the project while providing motivation for residents to walk and bike more. The project's pedestrian and bicycle facilities will be designed to make walking and bicycling safe, accessible and an enjoyable activity for all age groups. Within the project's residential neighborhoods, sidewalks will be provided on both sides of the street and traffic calming will encourage on-street bicycle riding. **Figure 10** shows the project's non-motorized network of multi-use trails, pedestrian and bicycle facilities.

BIKE NETWORK

According to *Bike Plan Hawaii,* there will be more future bicycle facilities provided in the Wailuku-Kahului area, where the project site is located, based on its list of proposed facilities. Listed below are the proposed facilities in the project study area:

- Kamehameha Avenue between Papa Avenue and Maui Lani Parkway is planned to provide 0.7 miles of bicycle lane.
- Waiale Road is planned to become a signed shared road for a length of 4.0 miles between Maui Lani and Honoapiilani Highway.
- Also 5.3 miles of Kuihelani Highway is planned to become a signed shared road or path from Puunene Avenue to Honoapiilani Highway.

The *Central Maui Pedestrian and Bicycle Master Plan for 2030* (State of Hawaii – Department of Health-Healthy Hawaii Initiative, 2012) further highlights that Waiale Road/Drive has significant unused ROW that could be used to create a separated pedestrian and bicycle path that will be an important link in connecting future growth in Waikapu to Kahului and Wailuku. The specific vision for this Waikapu-Waiale Road Connector is to connect Waikapu to Wailuku and Kahului by the Waiale Road Bikeway and provide a safe and convenient commute between communities. The Waiale Road Bikeway will be a contiguous bike path or cycle track between Kuikahi Drive and Waiko Road, which would then transition into a separated bike path, or at a minimum a bike lane with signage to Waiinu Road, and eventually transition into a multi-use path with a two-way bikeway and possible pedestrian path that would connect Waiinu Road or

Figure 10

Waikapu County Town
Pedestrian and Bicycle Facility Network

the Sandhills residential area with Lower Main Street or Wailuku. A local example of such a bikeway is in Kihei along Liola Drive between Waipuilani Road and Lipoa Street. The WCT project provides an opportunity to develop a major segment of this bikeway and to integrate it into the new community.

Additionally, the *Final Environmental Assessment for the Proposed Waiale Road Extension and East Waiko Road Improvements* (County of Maui, 2014) states that the Waiale Bypass will include a 10-foot bicycle/pedestrian path on the west side of the roadway.

TRANSIT NETWORK

Under existing conditions, the Honoapiilani & Waiko bus stop is the only bus stop located in the project vicinity. While the Maui Bus has no immediate plans to expand service in this area, as the WCT site develops, the project allows for the introduction of public transit to the site, and service to the Waikapu Country Town should be considered as the County plans future expansion of public transit service in this area. Additionally, enhancements and amenities (i.e., benches or covered shelter) could be installed at the existing bus stop and any new bus stops to support future transit riders in this area.

APPENDIX A: TRAFFIC COUNT DATA

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

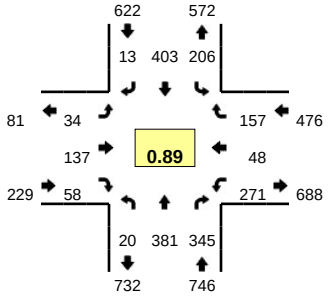
LOCATION: Honoapiilani Hwy (Hwy-30) -- Kuikahi Dr

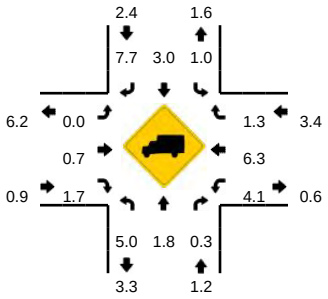
QC JOB #: 11217001

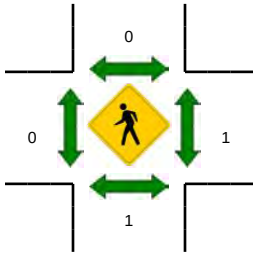
CITY/STATE: Wailuku, HI

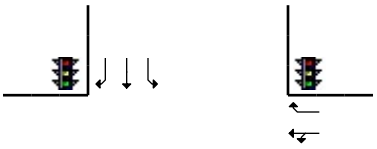
DATE: Wed, Sep 11 2013

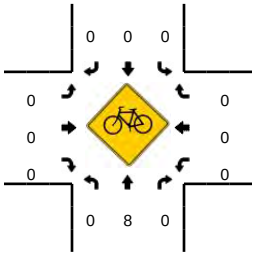
Peak-Hour: 6:50 AM -- 7:50 AM
Peak 15-Min: 7:20 AM -- 7:35 AM

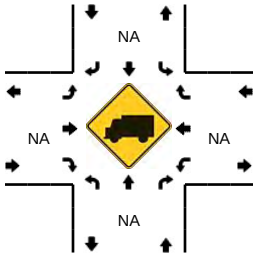


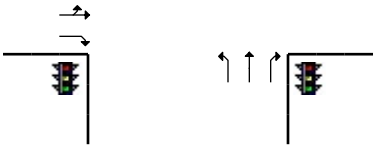


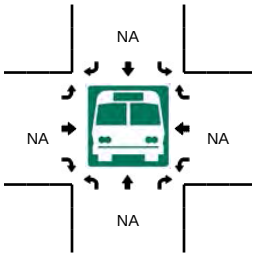












5-Min Count Period Beginning At	Honoapiilani Hwy (Hwy-30) (Northbound)				Honoapiilani Hwy (Hwy-30) (Southbound)				Kuikahi Dr (Eastbound)				Kuikahi Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:20 AM	1	10	12	0	5	25	1	0	2	7	3	0	11	1	12	0	90	
6:25 AM	0	11	14	0	4	31	1	0	5	8	5	0	10	1	5	0	95	
6:30 AM	1	10	18	0	6	29	0	0	3	10	4	0	12	0	5	0	98	
6:35 AM	1	13	19	0	10	30	1	0	1	5	7	0	14	0	6	0	107	
6:40 AM	1	15	29	0	8	37	0	0	3	9	3	0	6	3	10	0	124	
6:45 AM	2	18	28	0	11	27	0	0	3	13	0	0	10	2	8	0	122	
6:50 AM	2	14	24	0	19	37	0	0	0	15	3	0	30	2	7	0	153	
6:55 AM	2	20	28	0	11	22	1	0	3	16	3	0	15	9	5	0	135	1210
7:00 AM	4	20	24	0	7	36	1	0	1	11	5	0	24	4	13	0	150	1305
7:05 AM	3	26	26	0	16	25	0	0	2	9	5	0	14	5	13	0	144	1378
7:10 AM	0	35	27	0	15	44	0	0	4	13	6	0	21	5	15	0	185	1479
7:15 AM	2	34	31	0	17	25	1	0	3	15	11	0	20	5	12	0	176	1579
7:20 AM	0	36	27	0	17	36	3	0	4	13	7	0	21	1	19	0	184	1673
7:25 AM	1	54	38	0	21	36	1	0	2	8	3	0	21	2	16	0	203	1781
7:30 AM	0	39	36	0	17	43	2	0	2	10	4	0	23	3	19	0	198	1881
7:35 AM	2	41	28	0	17	27	2	0	4	10	6	0	27	2	14	0	180	1954
7:40 AM	0	37	30	0	23	34	1	0	6	8	1	0	16	2	14	0	172	2002
7:45 AM	4	25	26	0	26	38	1	0	3	9	4	0	39	8	10	0	193	2073
7:50 AM	2	25	26	0	25	36	1	0	0	4	1	0	17	3	13	0	153	2073
7:55 AM	0	32	22	0	11	22	1	0	2	8	5	0	18	4	8	0	133	2071
8:00 AM	2	26	16	0	10	27	0	0	1	9	1	0	22	1	11	0	126	2047
8:05 AM	4	28	15	0	8	25	1	0	2	4	1	0	13	3	6	0	110	2013
8:10 AM	1	25	21	0	8	31	0	0	2	8	3	0	12	8	11	0	130	1958
8:15 AM	0	20	18	0	11	22	1	0	1	5	2	0	9	2	5	0	96	1878

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	516	404	0	220	460	24	0	32	124	56	0	260	24	216	0	2340
Heavy Trucks	0	8	0		4	24	0		0	0	0		0	0	0		36
Pedestrians		0				0				0				0			0
Bicycles	0	1	0		0	0	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/20/2013 8:35 AM

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

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Honoapiilani Hwy (Hwy 30) -- Kuikahi Dr

QC JOB #: 11217002

CITY/STATE: Wailuku, HI

DATE: Wed, Sep 11 2013

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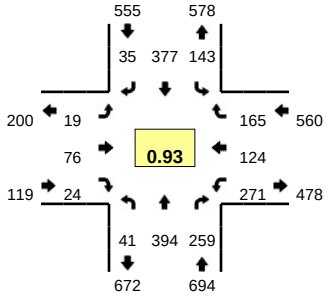
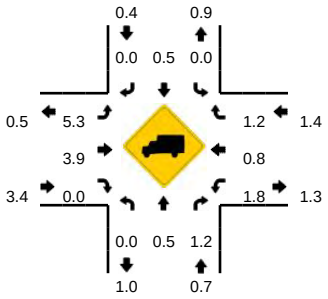
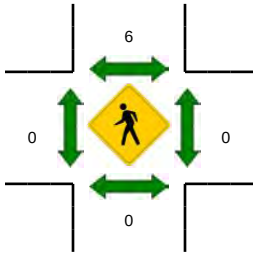
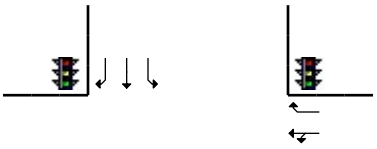
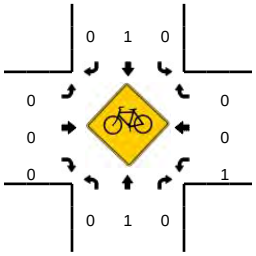
Peak 15-Min: 4:35 PM -- 4:50 PM

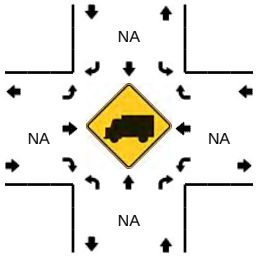


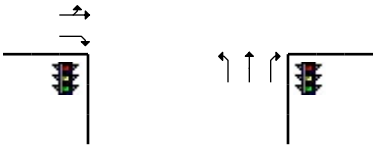


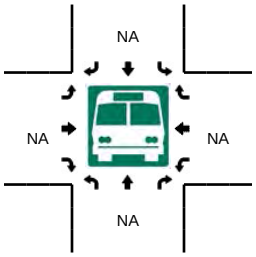












5-Min Count Period Beginning At	Honoapiilani Hwy (Hwy 30) (Northbound)				Honoapiilani Hwy (Hwy 30) (Southbound)				Kuikahi Dr (Eastbound)				Kuikahi Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:55 PM	0	29	17	0	14	22	1	0	0	7	2	0	30	8	15	0	145	1658
4:00 PM	0	30	18	0	13	25	0	0	4	3	3	0	20	13	15	0	144	1696
4:05 PM	1	25	25	0	10	31	1	0	0	6	1	0	21	11	18	0	150	1735
4:10 PM	4	37	29	0	13	28	0	0	0	2	1	0	19	15	15	0	163	1749
4:15 PM	3	26	24	0	6	34	0	0	1	5	1	0	15	11	11	0	137	1757
4:20 PM	1	23	17	0	8	27	2	0	0	4	1	0	24	7	17	0	131	1776
4:25 PM	3	39	21	0	13	30	1	0	3	10	1	0	20	8	19	0	168	1798
4:30 PM	4	23	17	0	10	30	7	0	2	3	1	0	25	13	10	0	145	1810
4:35 PM	5	41	22	0	15	31	1	0	0	2	3	0	24	10	15	0	169	1825
4:40 PM	5	20	18	0	13	44	7	0	4	7	1	0	26	10	16	0	171	1828
4:45 PM	3	36	26	0	17	45	1	0	3	6	3	0	18	9	11	0	178	1844
4:50 PM	2	31	24	0	8	20	4	0	0	8	2	0	31	8	6	0	144	1845
4:55 PM	2	29	26	0	12	27	6	0	1	8	2	0	22	7	13	0	155	1855
5:00 PM	1	31	22	0	9	26	3	0	2	4	2	0	23	12	14	0	149	1860
5:05 PM	3	39	24	0	12	34	0	0	1	6	2	0	22	6	12	0	161	1871
5:10 PM	5	31	19	0	11	30	2	0	1	5	1	0	28	16	15	0	164	1872
5:15 PM	7	37	16	0	10	26	3	0	0	8	4	0	17	13	13	0	154	1889
5:20 PM	1	37	24	0	13	34	0	0	2	9	2	0	15	12	21	0	170	1928
5:25 PM	2	28	24	0	8	26	1	0	0	4	2	0	11	16	13	0	135	1895
5:30 PM	3	40	22	0	6	19	4	0	1	10	1	0	9	8	11	0	134	1884
5:35 PM	1	31	27	0	11	31	3	0	0	10	0	0	16	12	14	0	156	1871
5:40 PM	6	25	25	0	10	25	5	0	2	3	0	0	13	10	10	0	134	1834
5:45 PM	2	21	19	0	9	13	3	0	2	4	2	0	19	14	10	0	118	1774
5:50 PM	2	24	11	0	7	23	2	0	4	7	1	0	13	4	12	0	110	1740

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	52	388	264	0	180	480	36	0	28	60	28	0	272	116	168	0	2072
Heavy Trucks	0	4	0		0	4	0		0	0	0		8	0	4		20
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	1	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/20/2013 8:35 AM

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

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

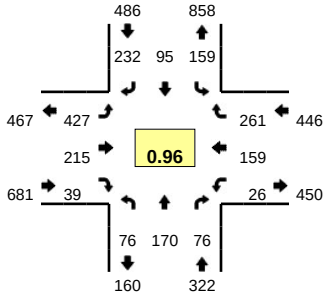
LOCATION: Waiale Rd -- Kuikahi Dr/Mauilani Pkwy

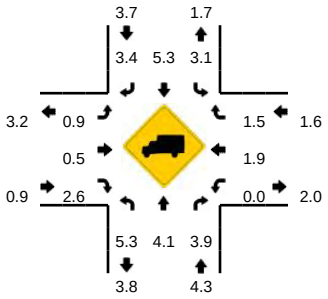
QC JOB #: 11217003

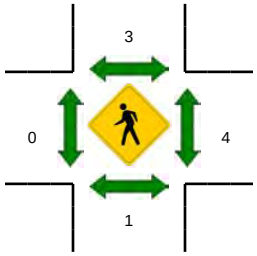
CITY/STATE: Wailuku, HI

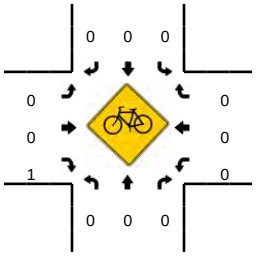
DATE: Wed, Sep 11 2013

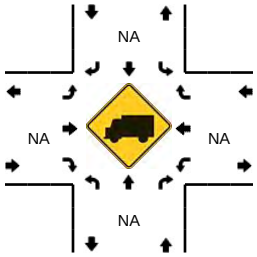
Peak-Hour: 6:50 AM -- 7:50 AM
Peak 15-Min: 7:35 AM -- 7:50 AM

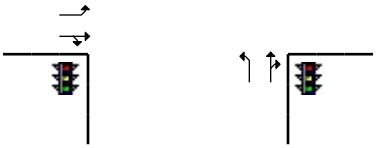


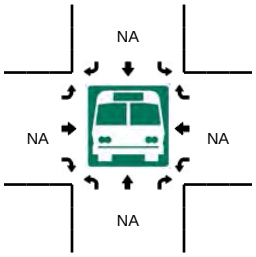












5-Min Count Period Beginning At	Waiale Rd (Northbound)				Waiale Rd (Southbound)				Kuikahi Dr/Mauilani Pkwy (Eastbound)				Kuikahi Dr/Mauilani Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:20 AM	1	9	5	0	7	4	9	0	8	13	2	0	2	14	6	0	80	
6:25 AM	2	5	2	0	18	5	9	0	16	5	1	0	3	5	11	0	82	
6:30 AM	2	10	3	0	10	3	9	0	26	9	1	0	1	5	8	0	87	
6:35 AM	2	5	6	0	23	8	11	0	23	13	0	0	4	7	13	0	115	
6:40 AM	3	13	5	0	10	2	5	0	25	14	1	0	3	14	21	0	116	
6:45 AM	4	10	1	0	17	8	9	0	28	22	1	0	4	10	28	0	142	
6:50 AM	1	9	8	0	18	4	25	0	29	30	2	0	1	15	24	0	166	
6:55 AM	5	10	7	0	14	7	13	0	25	25	1	0	1	16	24	0	148	1199
7:00 AM	7	6	10	0	16	9	18	0	31	17	0	0	4	12	17	0	147	1283
7:05 AM	7	18	5	0	14	14	17	0	21	20	4	0	1	9	12	0	142	1367
7:10 AM	4	11	4	0	17	5	21	0	40	22	3	0	1	17	18	0	163	1455
7:15 AM	13	19	9	0	9	6	21	0	33	20	3	0	4	12	24	0	173	1561
7:20 AM	9	25	10	0	12	5	15	0	41	10	2	0	2	11	26	0	168	1649
7:25 AM	5	10	4	0	10	5	20	0	53	13	4	0	1	9	18	0	152	1719
7:30 AM	9	21	7	0	11	10	18	0	40	11	4	0	2	14	24	0	171	1803
7:35 AM	6	18	3	0	14	7	20	0	45	7	5	0	3	10	15	0	153	1841
7:40 AM	8	15	8	0	15	12	19	0	32	21	2	0	4	18	26	0	180	1905
7:45 AM	2	8	1	0	9	11	25	0	37	19	9	0	2	16	33	0	172	1935
7:50 AM	3	10	3	0	17	8	16	0	30	19	4	0	5	14	34	0	163	1932
7:55 AM	0	5	3	0	17	14	12	0	30	15	6	0	6	18	14	0	140	1924
8:00 AM	1	6	2	0	11	1	18	0	17	12	5	0	1	14	23	0	111	1888
8:05 AM	2	10	0	0	10	5	10	0	11	12	3	0	1	14	16	0	94	1840
8:10 AM	2	4	1	0	17	5	9	0	23	10	0	0	1	11	15	0	98	1775
8:15 AM	1	8	3	0	7	8	11	0	16	17	1	0	0	9	17	0	98	1700

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	64	164	48	0	152	120	256	0	456	188	64	0	36	176	296	0	2020
Heavy Trucks	4	12	8		0	0	8		4	4	0		0	8	4		52
Pedestrians		0				0				0				8			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/20/2013 8:35 AM

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

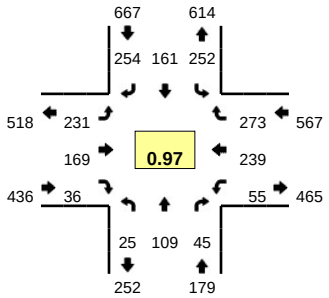
Type of peak hour being reported: Intersection Peak

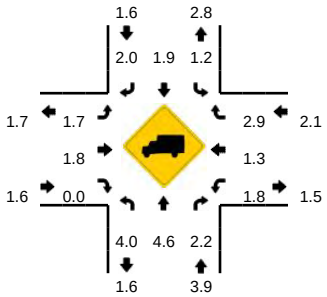
Method for determining peak hour: Total Entering Volume

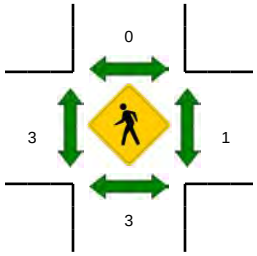
LOCATION: Waiale Rd -- Kuikahi Dr/Mauilani Pkwy
CITY/STATE: Wailuku, HI

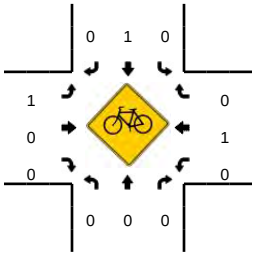
QC JOB #: 11217004
DATE: Wed, Sep 11 2013

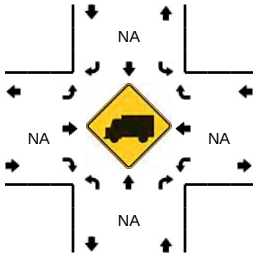
Peak-Hour: 4:15 PM -- 5:15 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

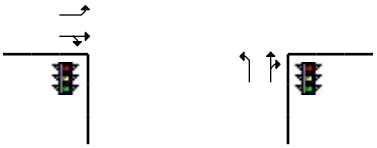


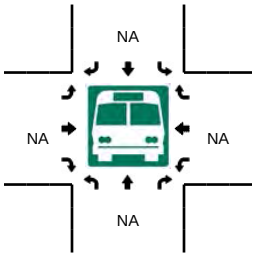












5-Min Count Period Beginning At	Waiale Rd (Northbound)				Waiale Rd (Southbound)				Kuikahi Dr/Mauilani Pkwy (Eastbound)				Kuikahi Dr/Mauilani Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:45 PM	1	6	4	0	22	15	20	0	24	14	5	0	4	27	14	0	156	
3:50 PM	3	9	2	0	22	15	27	0	12	21	2	0	4	17	23	0	157	
3:55 PM	2	10	4	0	13	6	25	0	16	21	3	0	5	19	26	0	150	1695
4:00 PM	4	11	5	0	16	12	10	0	13	15	1	0	5	30	30	0	152	1719
4:05 PM	3	9	2	0	21	12	21	0	13	19	2	0	4	27	24	0	157	1766
4:10 PM	4	12	4	0	19	8	16	0	22	10	6	0	3	21	17	0	142	1786
4:15 PM	5	3	1	0	24	18	13	0	24	8	0	0	6	17	25	0	144	1788
4:20 PM	3	13	5	0	14	13	18	1	17	10	1	0	9	17	26	0	147	1815
4:25 PM	2	6	5	0	24	9	19	0	22	15	6	0	4	23	20	0	155	1825
4:30 PM	1	9	9	0	24	10	25	0	16	12	2	0	6	21	22	0	157	1828
4:35 PM	0	11	2	0	27	14	26	0	9	15	2	0	3	26	20	0	155	1829
4:40 PM	6	6	2	0	31	13	21	0	26	14	6	0	3	17	22	0	167	1839
4:45 PM	0	11	3	0	12	14	17	0	20	20	4	0	5	17	26	0	149	1832
4:50 PM	0	6	2	0	28	15	24	0	22	13	3	0	3	16	20	0	152	1827
4:55 PM	2	9	5	0	14	12	21	0	23	18	4	0	5	21	21	0	155	1832
5:00 PM	2	8	4	0	17	19	25	0	20	12	2	0	4	16	29	0	158	1838
5:05 PM	2	11	4	0	16	12	19	0	23	15	3	0	6	25	20	0	156	1837
5:10 PM	2	16	3	0	20	12	26	0	9	17	3	0	1	23	22	0	154	1849
5:15 PM	2	6	1	0	26	8	17	0	15	13	1	0	3	22	22	0	136	1841
5:20 PM	0	8	6	0	15	9	10	0	19	16	7	0	3	33	25	0	151	1845
5:25 PM	2	3	3	0	19	6	14	0	25	8	2	0	3	16	18	0	119	1809
5:30 PM	1	12	2	0	15	5	7	0	21	18	1	0	8	19	18	0	127	1779
5:35 PM	0	8	3	0	15	11	15	0	23	19	0	0	9	28	18	0	149	1773
5:40 PM	0	8	4	0	28	15	16	0	14	14	1	0	8	15	16	0	139	1745

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	28	104	52	0	328	148	288	0	204	164	40	0	48	256	256	0	1916
Heavy Trucks	0	4	0		8	0	4		0	0	0		0	0	12		28
Pedestrians		8				0				8				0			16
Bicycles	0	0	0		0	1	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/20/2013 8:35 AM

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

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

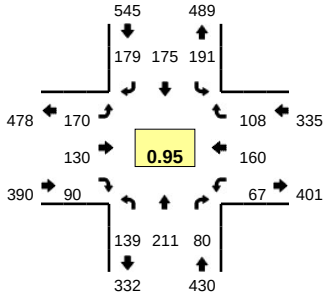
LOCATION: S Kamehameha Ave -- Mauilani Pkwy

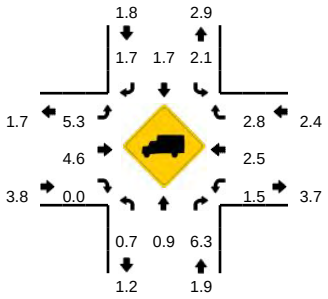
QC JOB #: 11217005

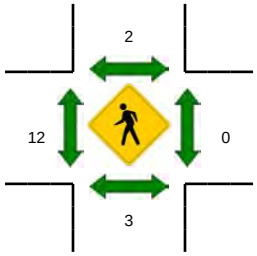
CITY/STATE: Kahului, HI

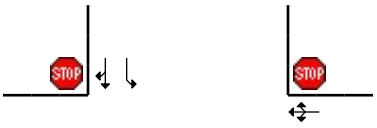
DATE: Wed, Sep 11 2013

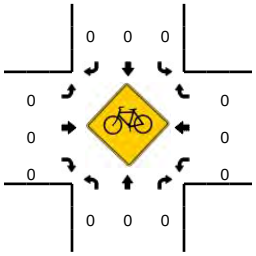
Peak-Hour: 6:55 AM -- 7:55 AM
Peak 15-Min: 7:35 AM -- 7:50 AM

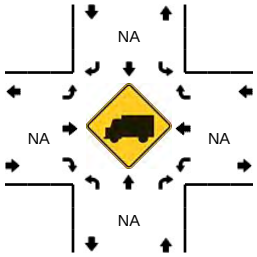


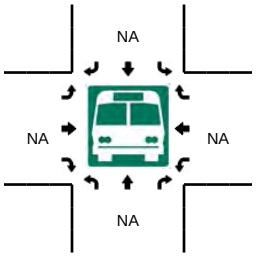












5-Min Count Period Beginning At	S Kamehameha Ave (Northbound)				S Kamehameha Ave (Southbound)				Mauilani Pkwy (Eastbound)				Mauilani Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:25 AM	1	1	2	0	16	1	7	0	10	10	1	0	3	3	2	0	57	
6:30 AM	2	1	4	0	17	2	11	0	7	15	2	0	5	16	7	0	89	
6:35 AM	2	3	2	0	16	4	16	0	7	20	3	0	4	17	6	0	100	
6:40 AM	5	9	1	0	24	6	22	0	12	13	3	0	4	19	9	0	127	
6:45 AM	4	6	2	0	18	3	17	0	13	13	1	0	3	19	16	0	115	
6:50 AM	5	4	2	0	20	9	21	0	15	15	3	0	8	19	9	0	130	
6:55 AM	6	13	3	0	21	7	19	0	21	10	3	0	2	19	5	0	129	1022
7:00 AM	8	6	4	0	35	13	14	0	17	10	10	0	3	8	13	0	141	1117
7:05 AM	6	13	7	0	20	18	15	0	18	7	4	0	9	6	10	0	133	1201
7:10 AM	7	18	7	0	18	15	20	0	19	8	9	0	5	11	9	0	146	1291
7:15 AM	17	20	4	0	15	19	11	0	13	9	8	0	7	8	10	0	141	1368
7:20 AM	4	20	5	0	5	23	11	0	8	12	13	0	8	19	7	0	135	1443
7:25 AM	10	16	6	0	13	18	18	0	9	14	11	0	6	15	10	0	146	1532
7:30 AM	10	26	3	0	11	20	9	0	14	4	12	0	9	8	15	0	141	1584
7:35 AM	23	22	12	0	7	19	6	0	10	9	9	0	9	11	8	0	145	1629
7:40 AM	20	19	12	0	20	14	15	0	9	17	4	0	3	16	7	0	156	1658
7:45 AM	15	23	11	0	12	6	15	0	14	16	3	0	4	20	8	0	147	1690
7:50 AM	13	15	6	0	14	3	26	0	18	14	4	0	2	19	6	0	140	1700
7:55 AM	5	8	3	0	14	3	15	0	10	19	1	0	0	12	7	0	97	1668
8:00 AM	2	3	1	0	10	2	14	0	16	20	3	0	1	10	3	0	85	1612
8:05 AM	4	2	1	0	13	2	18	0	11	11	2	0	0	9	9	0	82	1561
8:10 AM	1	5	3	0	10	6	8	0	6	6	1	0	1	14	1	0	62	1477
8:15 AM	2	3	0	0	15	1	13	0	18	12	1	0	2	16	9	0	92	1428
8:20 AM	2	5	3	0	9	1	12	0	7	8	3	0	0	22	4	0	76	1369

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	232	256	140	0	156	156	144	0	132	168	64	0	64	188	92	0	1792
Heavy Trucks	0	4	0		0	8	4		12	4	0		0	12	0		44
Pedestrians		4				4				16				0			24
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/20/2013 8:35 AM

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

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

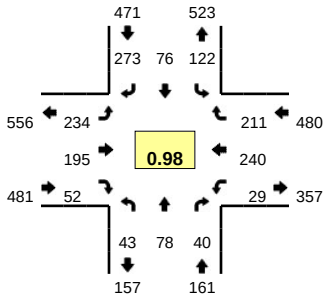
LOCATION: S Kamehameha Ave -- Mauilani Pkwy

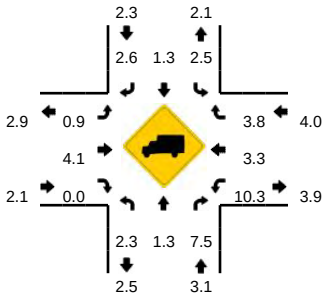
CITY/STATE: Kahului, HI

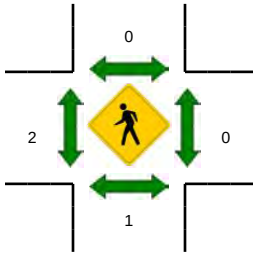
QC JOB #: 11217006

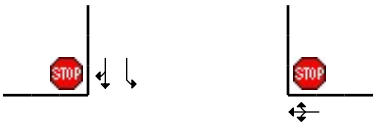
DATE: Wed, Sep 11 2013

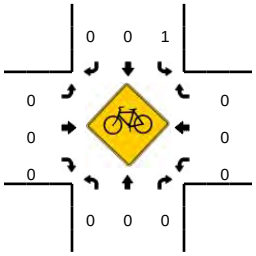
Peak-Hour: 3:30 PM -- 4:30 PM
Peak 15-Min: 3:35 PM -- 3:50 PM

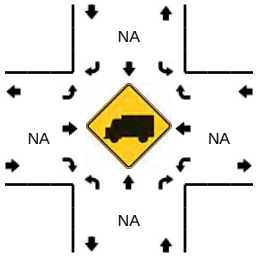


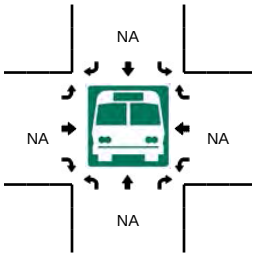












5-Min Count Period Beginning At	S Kamehameha Ave (Northbound)				S Kamehameha Ave (Southbound)				Mauilani Pkwy (Eastbound)				Mauilani Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	6	5	2	0	10	0	17	0	6	8	4	0	2	17	15	0	92	
3:05 PM	1	3	0	0	12	4	11	0	18	19	4	0	4	20	13	0	109	
3:10 PM	2	2	4	0	9	6	21	0	15	11	0	0	3	17	16	0	106	
3:15 PM	2	5	3	0	4	7	19	0	16	18	7	0	2	18	18	0	119	
3:20 PM	5	5	1	0	8	4	17	0	15	14	3	0	3	18	10	0	103	
3:25 PM	5	7	2	0	12	5	21	0	22	13	4	0	1	14	7	0	113	
3:30 PM	4	5	5	0	12	5	18	0	11	21	6	0	3	22	19	0	131	
3:35 PM	5	4	6	0	11	4	16	0	20	20	7	0	3	19	21	0	136	
3:40 PM	2	9	7	0	16	4	26	0	21	13	3	0	2	17	15	0	135	
3:45 PM	1	5	2	0	10	8	23	0	23	16	4	0	1	26	15	0	134	
3:50 PM	2	10	4	0	7	7	25	0	17	20	4	0	3	20	14	0	133	
3:55 PM	3	6	0	0	10	10	26	0	16	17	4	0	4	21	15	0	132	1443
4:00 PM	4	10	2	0	5	3	30	0	20	17	5	0	2	19	18	0	135	1486
4:05 PM	3	4	2	0	10	8	15	0	19	22	3	0	3	24	17	0	130	1507
4:10 PM	4	6	4	0	9	5	21	0	25	11	4	0	4	21	16	0	130	1531
4:15 PM	11	7	3	0	12	9	20	0	21	9	5	0	1	14	23	0	135	1547
4:20 PM	3	5	1	0	11	10	30	0	16	18	3	0	3	20	15	0	135	1579
4:25 PM	1	7	4	0	9	3	23	0	25	11	4	0	0	17	23	0	127	1593
4:30 PM	4	5	3	0	9	7	21	0	13	18	6	0	2	20	22	0	130	1592
4:35 PM	0	8	1	0	14	6	18	0	26	15	3	0	1	21	16	0	129	1585
4:40 PM	2	4	1	0	10	12	24	0	18	18	7	0	2	18	25	0	141	1591
4:45 PM	2	13	5	0	12	3	25	0	13	18	5	0	1	15	19	0	131	1588
4:50 PM	2	6	3	0	9	7	18	0	22	15	4	0	2	15	23	0	126	1581
4:55 PM	4	7	4	0	19	7	20	0	21	10	7	0	2	16	20	0	137	1586

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	32	72	60	0	148	64	260	0	256	196	56	0	24	248	204	0	1620
Heavy Trucks	0	4	8		8	4	8		4	4	0		8	8	8		64
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/20/2013 8:35 AM

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

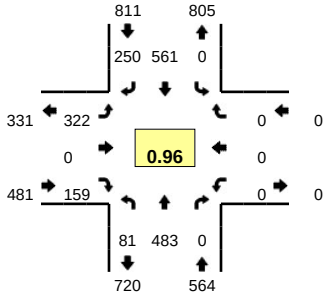
Type of peak hour being reported: Intersection Peak

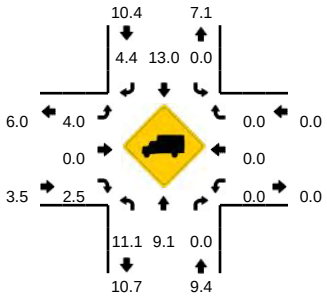
Method for determining peak hour: Total Entering Volume

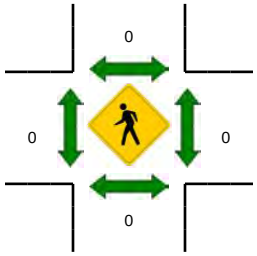
LOCATION: Kuihelani Hwy (Hwy 380) -- Mauilani Pkwy
CITY/STATE: Kahului, HI

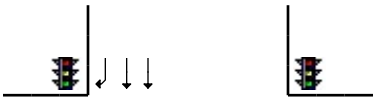
QC JOB #: 11217007
DATE: Wed, Sep 11 2013

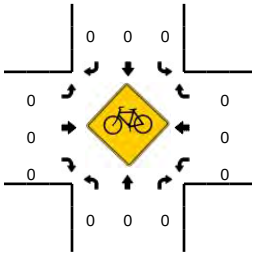
Peak-Hour: 6:55 AM -- 7:55 AM
Peak 15-Min: 7:25 AM -- 7:40 AM

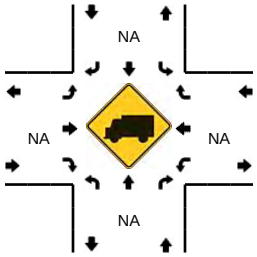


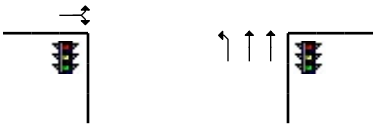


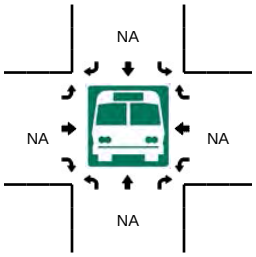












5-Min Count Period Beginning At	Kuihelani Hwy (Hwy 380) (Northbound)				Kuihelani Hwy (Hwy 380) (Southbound)				Mauilani Pkwy (Eastbound)				Mauilani Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:25 AM	2	25	0	0	0	40	10	0	21	0	14	0	0	0	0	0	112	
6:30 AM	1	11	0	0	0	38	21	0	21	0	14	0	0	0	0	0	106	
6:35 AM	3	33	0	0	0	34	25	0	31	0	9	0	0	0	0	0	135	
6:40 AM	1	37	0	0	0	37	29	0	29	0	17	0	0	0	0	0	150	
6:45 AM	9	33	0	0	0	35	24	0	24	0	17	0	0	0	0	0	142	
6:50 AM	3	32	0	0	0	32	23	0	19	0	15	0	0	0	0	0	124	
6:55 AM	3	31	0	0	0	68	22	0	23	0	15	0	0	0	0	0	162	1367
7:00 AM	4	25	0	0	0	60	16	0	23	0	20	0	0	0	0	0	148	1436
7:05 AM	9	37	0	0	0	30	16	0	36	0	22	0	0	0	0	0	150	1507
7:10 AM	5	37	0	0	0	49	20	0	20	0	13	0	0	0	0	0	144	1563
7:15 AM	9	29	0	0	0	45	26	0	27	0	17	0	0	0	0	0	153	1622
7:20 AM	4	35	0	0	0	47	26	0	21	0	10	0	0	0	0	0	143	1669
7:25 AM	14	66	0	0	0	43	31	0	26	0	6	0	0	0	0	0	186	1743
7:30 AM	9	37	0	0	0	53	15	0	20	0	12	0	0	0	0	0	146	1783
7:35 AM	11	40	0	0	0	42	23	0	27	0	9	0	0	0	0	0	152	1800
7:40 AM	5	59	0	0	0	39	20	0	28	0	10	0	0	0	0	0	161	1811
7:45 AM	3	48	0	0	0	52	18	0	39	0	11	0	0	0	0	0	171	1840
7:50 AM	5	39	0	0	0	33	17	0	32	0	14	0	0	0	0	0	140	1856
7:55 AM	1	43	0	0	0	35	15	0	39	0	3	0	0	0	0	0	136	1830
8:00 AM	4	51	0	0	0	34	19	0	25	0	9	0	0	0	0	0	142	1824
8:05 AM	1	36	0	0	0	41	16	0	17	0	7	0	0	0	0	0	118	1792
8:10 AM	3	40	0	0	0	26	17	0	18	0	4	0	0	0	0	0	108	1756
8:15 AM	4	39	0	0	0	52	22	0	18	0	9	0	0	0	0	0	144	1747
8:20 AM	1	31	0	0	0	39	28	0	15	0	7	0	0	0	0	0	121	1725

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	136	572	0	0	0	552	276	0	292	0	108	0	0	0	0	0	1936
Heavy Trucks	12	60	0		0	64	12		16	0	4		0	0	0		168
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/20/2013 8:35 AM

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

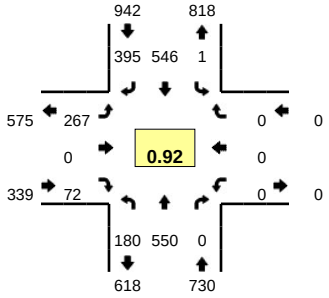
Type of peak hour being reported: Intersection Peak

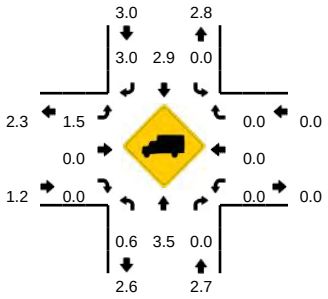
Method for determining peak hour: Total Entering Volume

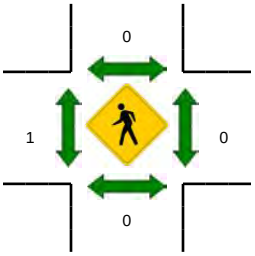
LOCATION: Kuihelani Hwy (Hwy 380) -- Mauilani Pkwy
CITY/STATE: Kahului, HI

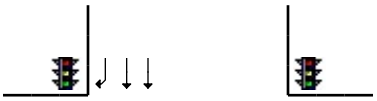
QC JOB #: 11217008
DATE: Wed, Sep 11 2013

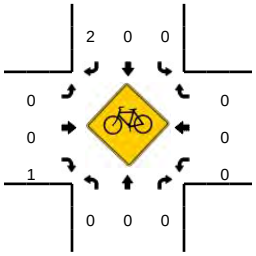
Peak-Hour: 4:25 PM -- 5:25 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

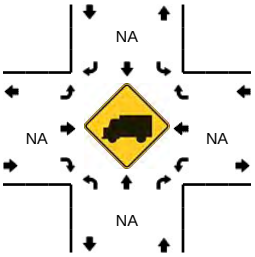


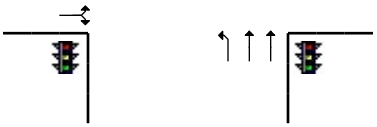


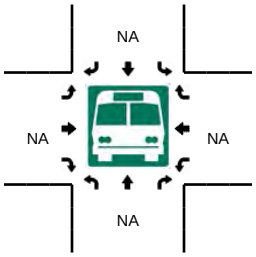












5-Min Count Period Beginning At	Kuihelani Hwy (Hwy 380) (Northbound)				Kuihelani Hwy (Hwy 380) (Southbound)				Mauilani Pkwy (Eastbound)				Mauilani Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:55 PM	8	48	0	0	0	60	34	0	21	0	2	0	0	0	0	0	173	1847
4:00 PM	13	30	0	0	0	22	39	0	21	0	9	0	0	0	0	0	134	1847
4:05 PM	11	56	0	0	0	34	28	0	20	0	8	0	0	0	0	0	157	1847
4:10 PM	14	63	0	0	0	44	27	0	28	0	6	0	0	0	0	0	182	1893
4:15 PM	15	52	0	0	0	52	26	1	14	0	7	0	0	0	0	0	167	1936
4:20 PM	7	33	0	0	0	39	29	1	20	0	3	0	0	0	0	0	132	1904
4:25 PM	15	42	0	0	0	57	40	0	12	0	8	0	0	0	0	0	174	1930
4:30 PM	11	45	0	0	0	40	28	0	25	0	4	0	0	0	0	0	153	1939
4:35 PM	16	36	0	0	0	49	39	0	17	0	6	0	0	0	0	0	163	1931
4:40 PM	19	53	0	0	0	34	36	1	30	0	7	0	0	0	0	0	180	1951
4:45 PM	16	58	0	0	0	48	32	0	20	0	8	0	0	0	0	0	182	1979
4:50 PM	11	34	0	0	0	42	33	0	23	0	5	0	0	0	0	0	148	1945
4:55 PM	18	52	0	0	0	38	23	0	19	0	1	0	0	0	0	0	151	1923
5:00 PM	11	42	0	0	0	48	34	0	21	0	8	0	0	0	0	0	164	1953
5:05 PM	9	55	0	0	0	62	37	0	21	0	5	0	0	0	0	0	189	1985
5:10 PM	26	57	0	0	0	31	32	0	23	0	13	0	0	0	0	0	182	1985
5:15 PM	13	44	0	0	0	52	33	0	32	0	4	0	0	0	0	0	178	1996
5:20 PM	15	32	0	0	0	45	28	0	24	0	3	0	0	0	0	0	147	2011
5:25 PM	12	52	0	0	0	44	26	0	16	0	3	0	0	0	0	0	153	1990
5:30 PM	17	42	0	0	0	50	34	0	15	0	4	0	0	0	0	0	162	1999
5:35 PM	7	41	0	0	1	20	29	0	30	0	4	0	0	0	0	0	132	1968
5:40 PM	8	30	0	0	0	44	35	0	10	0	5	0	0	0	0	0	132	1920
5:45 PM	14	39	0	0	0	46	33	0	14	0	3	0	0	0	0	0	149	1887
5:50 PM	5	35	0	0	0	30	26	0	26	0	5	0	0	0	0	0	127	1866

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	192	624	0	0	0	580	408	0	304	0	88	0	0	0	0	0	2196
Heavy Trucks	0	28	0		0	16	8		0	0	0		0	0	0		52
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	1		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/20/2013 8:35 AM

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

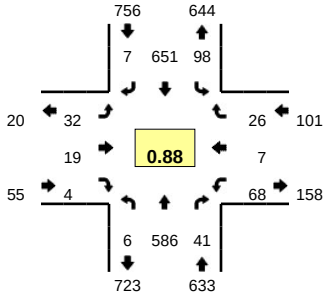
Type of peak hour being reported: Intersection Peak

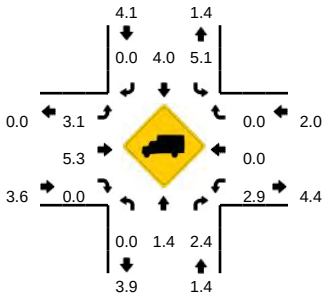
Method for determining peak hour: Total Entering Volume

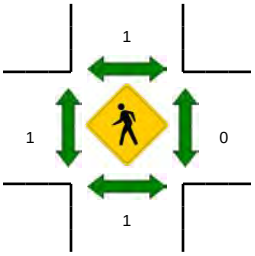
LOCATION: Honoapiilani Hwy (Hwy-30) -- Waiko Rd
CITY/STATE: Wailuku, HI

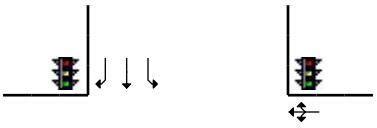
QC JOB #: 11217009
DATE: Wed, Sep 11 2013

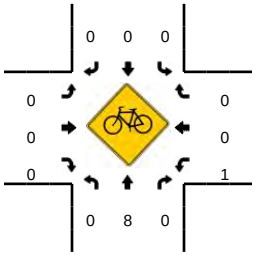
Peak-Hour: 6:55 AM -- 7:55 AM
Peak 15-Min: 7:15 AM -- 7:30 AM

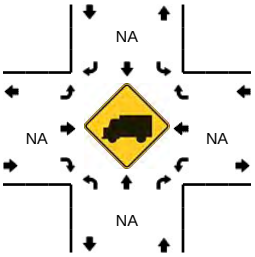


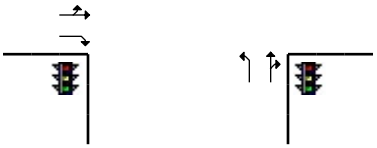


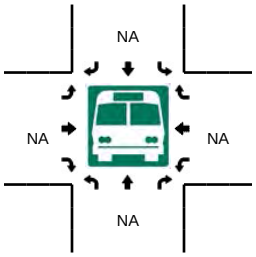












5-Min Count Period Beginning At	Honoapiilani Hwy (Hwy-30) (Northbound)				Honoapiilani Hwy (Hwy-30) (Southbound)				Waiko Rd (Eastbound)				Waiko Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:25 AM	0	20	2	0	6	41	1	0	1	3	1	0	5	1	2	0	83	
6:30 AM	0	24	2	0	4	52	0	0	1	0	1	0	7	0	1	0	92	
6:35 AM	0	33	3	0	5	44	0	0	2	2	0	0	2	0	1	0	92	
6:40 AM	0	31	2	0	5	39	0	0	5	2	0	0	2	0	1	0	87	
6:45 AM	0	37	5	0	4	43	0	0	0	1	0	0	9	0	0	0	99	
6:50 AM	0	33	1	0	5	37	0	0	1	2	1	0	7	0	2	0	89	
6:55 AM	2	32	1	0	3	63	2	0	4	1	1	0	4	0	0	0	113	954
7:00 AM	0	29	4	0	5	48	0	0	2	3	1	0	7	1	2	0	102	1013
7:05 AM	1	42	2	0	5	50	0	0	1	2	0	0	3	1	2	0	109	1076
7:10 AM	0	60	4	0	4	43	0	0	4	0	0	0	7	1	2	0	125	1130
7:15 AM	0	47	2	0	12	61	0	0	3	1	1	0	5	0	2	0	134	1190
7:20 AM	0	48	3	0	18	59	0	0	5	2	0	0	6	0	2	0	143	1268
7:25 AM	0	76	3	0	17	59	0	0	1	1	0	0	2	1	2	0	162	1347
7:30 AM	0	47	7	0	9	55	1	0	2	2	1	0	4	0	5	0	133	1388
7:35 AM	1	47	1	0	9	41	2	0	3	1	0	0	9	1	1	0	116	1412
7:40 AM	1	59	6	0	4	58	0	0	2	3	0	0	6	1	5	0	145	1470
7:45 AM	0	50	4	0	6	62	1	0	2	0	0	0	6	1	1	0	133	1504
7:50 AM	1	49	4	0	6	52	1	0	3	3	0	0	9	0	2	0	130	1545
7:55 AM	0	33	1	0	8	35	2	0	0	2	1	0	9	0	1	0	92	1524
8:00 AM	0	54	1	0	1	42	2	0	0	0	0	0	6	1	2	0	109	1531
8:05 AM	0	35	2	0	3	51	1	0	2	1	1	0	6	2	2	0	106	1528
8:10 AM	0	41	1	0	4	32	1	0	1	0	0	0	6	1	0	0	87	1490
8:15 AM	0	37	3	0	2	33	2	0	0	0	0	0	3	0	5	0	85	1441
8:20 AM	0	44	3	0	2	39	2	0	1	2	0	0	4	1	2	0	100	1398

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	684	32	0	188	716	0	0	36	16	4	0	52	4	24	0	1756
Heavy Trucks	0	12	4		12	36	0		0	0	0		0	0	0		64
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/20/2013 8:35 AM

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

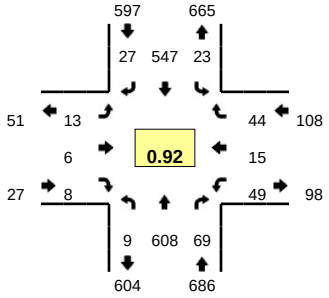
Type of peak hour being reported: Intersection Peak

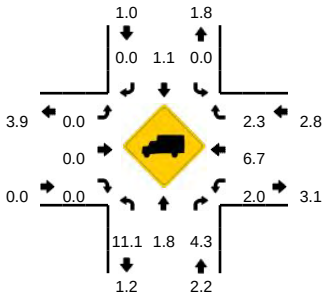
Method for determining peak hour: Total Entering Volume

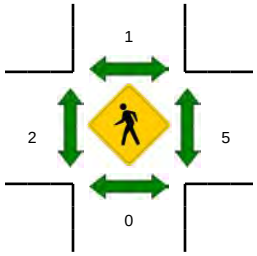
LOCATION: Honoapiilani Hwy (Hwy 30) -- Waiko Rd
CITY/STATE: Wailuku, HI

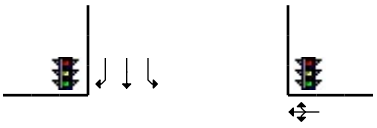
QC JOB #: 11217010
DATE: Wed, Sep 11 2013

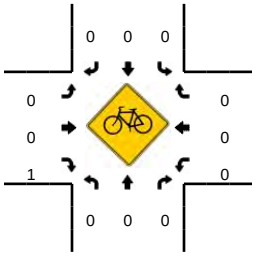
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:35 PM -- 4:50 PM

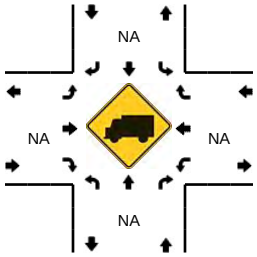


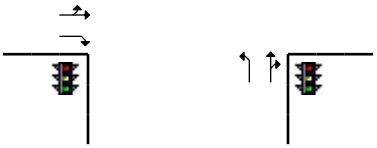


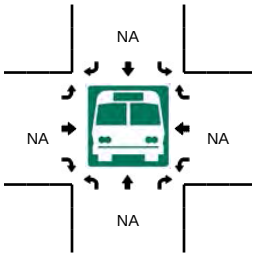












5-Min Count Period Beginning At	Honoapiilani Hwy (Hwy 30) (Northbound)				Honoapiilani Hwy (Hwy 30) (Southbound)				Waiko Rd (Eastbound)				Waiko Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	58	4	0	0	43	4	0	1	0	0	0	4	2	4	0	120	1244
4:05 PM	1	25	6	0	3	38	5	0	3	0	0	0	7	0	5	0	93	1240
4:10 PM	1	65	5	0	0	41	1	0	3	0	1	0	5	0	5	0	127	1260
4:15 PM	1	49	5	0	1	41	2	0	2	0	0	0	3	3	1	0	108	1274
4:20 PM	0	40	4	0	4	38	3	0	2	1	0	0	9	0	2	0	103	1296
4:25 PM	0	55	2	0	0	42	0	0	1	0	0	0	5	1	4	0	110	1324
4:30 PM	0	37	2	0	1	49	1	0	0	2	1	0	3	0	5	0	101	1317
4:35 PM	3	55	6	0	4	50	2	0	0	0	1	0	6	1	9	0	137	1346
4:40 PM	0	39	4	0	2	40	1	0	2	0	0	0	7	3	5	0	103	1318
4:45 PM	1	58	4	0	2	69	2	0	0	2	0	0	8	0	0	0	146	1346
4:50 PM	1	44	7	0	4	50	3	0	5	0	1	0	1	1	2	0	119	1365
4:55 PM	0	54	6	0	2	34	4	0	2	0	0	0	1	1	2	0	106	1373
5:00 PM	1	41	8	0	4	32	0	0	0	0	0	0	3	1	3	0	93	1346
5:05 PM	0	65	5	0	1	45	4	0	0	0	2	0	3	0	4	0	129	1382
5:10 PM	2	50	6	0	1	55	4	0	3	0	0	0	6	0	9	0	136	1391
5:15 PM	0	52	4	0	2	36	1	0	0	1	0	0	3	1	3	0	103	1386
5:20 PM	0	46	10	0	0	47	3	0	1	0	0	0	6	4	0	0	117	1400
5:25 PM	1	67	7	0	0	40	2	0	0	1	3	0	2	3	2	0	128	1418
5:30 PM	0	54	5	0	2	22	1	0	2	1	0	0	4	0	1	0	92	1409
5:35 PM	1	52	2	0	0	34	0	0	2	0	1	0	4	2	3	0	101	1373
5:40 PM	1	45	7	0	2	37	1	0	1	0	0	0	2	0	6	0	102	1372
5:45 PM	0	41	3	0	3	29	4	0	2	0	0	0	3	1	1	0	87	1313
5:50 PM	1	33	3	0	1	32	1	0	0	0	1	0	2	1	2	0	77	1271
5:55 PM	0	34	4	0	2	33	2	0	1	0	2	0	1	0	0	0	79	1244

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	16	608	56	0	32	636	20	0	8	8	4	0	84	16	56	0	1544
Heavy Trucks	0	8	0		0	12	0		0	0	0		0	0	0		20
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	1		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/20/2013 8:35 AM

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

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

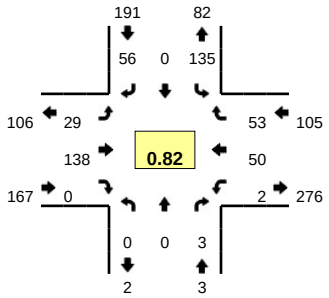
LOCATION: Waiale Rd -- Waiko Rd

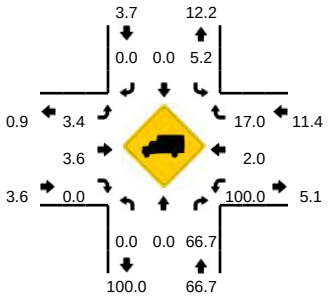
CITY/STATE: Wailuku, HI

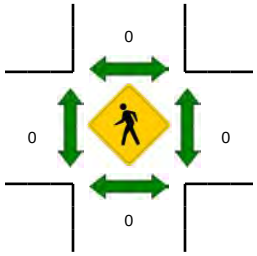
QC JOB #: 11217011

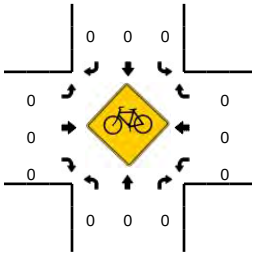
DATE: Wed, Sep 11 2013

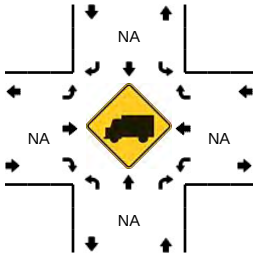
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:10 AM -- 7:25 AM

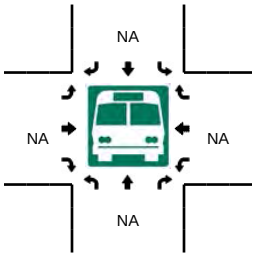












5-Min Count Period Beginning At	Waiale Rd (Northbound)				Waiale Rd (Southbound)				Waiko Rd (Eastbound)				Waiko Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	0	0	0	0	8	0	5	0	1	7	0	0	0	1	2	0	24	
6:35 AM	0	0	1	0	9	0	2	0	1	9	0	0	0	2	1	0	25	
6:40 AM	0	0	0	0	9	0	4	0	2	7	0	0	0	1	2	0	25	
6:45 AM	0	0	0	0	9	0	8	0	0	12	0	0	1	5	3	0	38	
6:50 AM	0	0	0	0	13	0	1	0	0	8	0	0	0	3	4	0	29	
6:55 AM	0	0	1	0	11	0	2	0	0	5	0	0	0	0	5	0	24	268
7:00 AM	0	0	0	0	12	0	5	0	2	11	0	0	0	4	3	0	37	295
7:05 AM	0	0	0	0	10	0	3	0	1	6	0	0	1	5	4	0	30	312
7:10 AM	0	0	0	0	17	0	7	0	4	9	0	0	0	2	8	0	47	341
7:15 AM	0	0	1	0	11	0	5	0	2	13	0	0	0	4	5	0	41	361
7:20 AM	0	0	0	0	18	0	4	0	1	23	0	0	0	1	7	0	54	401
7:25 AM	0	0	0	0	4	0	4	0	4	11	0	0	1	1	4	0	29	403
7:30 AM	0	0	0	0	10	0	3	0	6	16	0	0	0	2	5	0	42	421
7:35 AM	0	0	0	0	15	0	5	0	1	9	0	0	0	8	9	0	47	443
7:40 AM	0	0	1	0	7	0	4	0	2	13	0	0	0	5	1	0	33	451
7:45 AM	0	0	1	0	12	0	9	0	2	7	0	0	0	7	5	0	43	456
7:50 AM	0	0	0	0	7	0	2	0	1	12	0	0	0	6	2	0	30	457
7:55 AM	0	0	0	0	12	0	5	0	3	8	0	0	0	5	0	0	33	466
8:00 AM	0	0	0	0	6	0	2	0	1	1	0	0	0	0	3	0	13	442
8:05 AM	0	0	0	0	5	0	8	0	1	2	0	0	0	6	4	0	26	438
8:10 AM	0	0	0	0	5	0	3	0	1	4	0	0	0	2	4	0	19	410
8:15 AM	0	0	0	0	5	0	2	0	2	2	0	0	0	3	6	0	20	389
8:20 AM	0	0	0	0	2	0	2	0	1	4	0	0	0	5	4	0	18	353
8:25 AM	0	0	0	0	10	0	2	0	2	3	0	0	0	1	3	0	21	345

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	4	0	184	0	64	0	28	180	0	0	0	28	80	0	568
Heavy Trucks	0	0	4		20	0	0		4	16	0		0	0	12		56
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/20/2013 8:35 AM

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

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

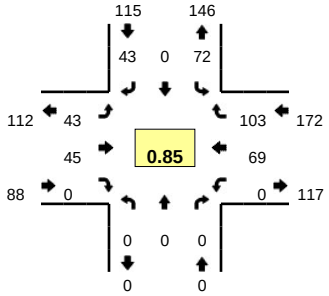
LOCATION: Waiale Rd -- Waiko Rd

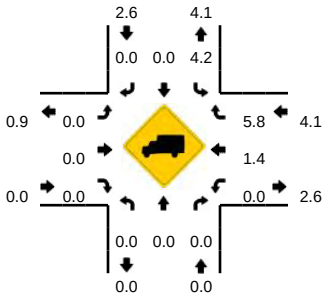
CITY/STATE: Wailuku, HI

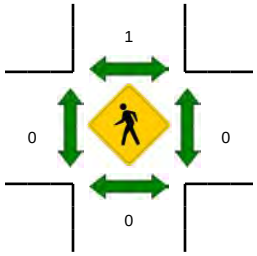
QC JOB #: 11217012

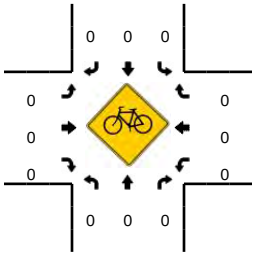
DATE: Wed, Sep 11 2013

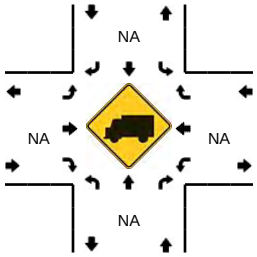
Peak-Hour: 4:15 PM -- 5:15 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

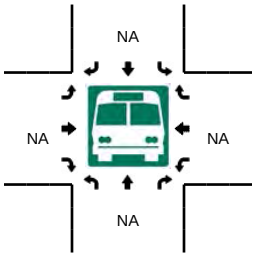












5-Min Count Period Beginning At	Waiale Rd (Northbound)				Waiale Rd (Southbound)				Waiko Rd (Eastbound)				Waiko Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:45 PM	0	0	0	0	5	0	0	0	5	8	0	0	0	5	8	0	31	
3:50 PM	0	0	0	0	5	0	1	0	5	4	0	0	0	4	4	0	23	
3:55 PM	0	0	0	0	4	0	4	0	6	4	0	0	0	4	6	0	28	287
4:00 PM	0	0	0	0	6	0	4	0	2	2	0	0	0	4	8	0	26	292
4:05 PM	0	0	0	0	3	0	3	0	4	5	0	0	0	11	5	0	31	301
4:10 PM	0	0	0	0	5	0	4	0	4	2	0	0	0	6	3	0	24	309
4:15 PM	0	0	0	0	5	0	3	0	2	4	0	0	0	6	9	0	29	316
4:20 PM	0	0	0	0	5	0	5	0	3	7	0	0	0	4	5	0	29	332
4:25 PM	0	0	0	0	6	0	3	0	2	1	0	0	0	5	5	0	22	334
4:30 PM	0	0	0	0	1	0	3	0	0	5	0	0	0	10	12	0	31	344
4:35 PM	0	0	0	0	3	0	2	0	6	4	0	0	0	13	12	0	40	349
4:40 PM	0	0	0	0	12	0	8	0	2	5	0	0	0	6	6	0	39	353
4:45 PM	0	0	0	0	6	0	2	0	3	3	0	0	0	2	11	0	27	349
4:50 PM	0	0	0	0	8	0	5	0	7	3	0	0	0	1	9	0	33	359
4:55 PM	0	0	0	0	6	0	1	0	4	3	0	0	0	3	10	0	27	358
5:00 PM	0	0	0	0	6	0	3	0	6	3	0	0	0	3	4	0	25	357
5:05 PM	0	0	0	0	6	0	8	0	5	2	0	0	0	6	14	0	41	367
5:10 PM	0	0	0	0	8	0	0	0	3	5	0	0	0	10	6	0	32	375
5:15 PM	0	0	0	0	5	0	2	0	2	5	0	0	0	6	5	0	25	371
5:20 PM	0	0	0	0	3	0	3	0	5	5	0	0	0	5	7	0	28	370
5:25 PM	0	0	0	0	3	0	0	0	4	3	0	0	0	4	7	0	21	369
5:30 PM	0	0	0	0	2	0	4	0	5	2	0	0	0	2	7	0	22	360
5:35 PM	0	0	0	0	2	0	3	0	1	1	0	0	0	4	3	0	14	334
5:40 PM	0	0	0	0	4	0	4	0	4	4	0	0	0	6	7	0	29	324

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	64	0	52	0	32	56	0	0	0	116	120	0	440
Heavy Trucks	0	0	0		4	0	0		0	0	0		0	0	8		12
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/20/2013 8:35 AM

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

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

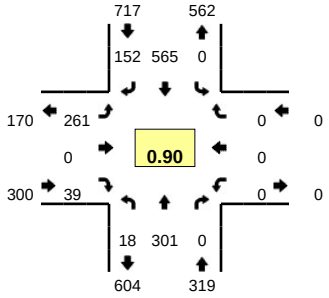
LOCATION: Kuihelani Hwy (Hwy-380) -- Waiko Rd

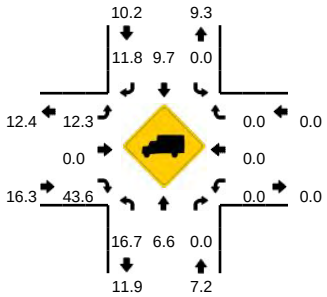
CITY/STATE: Wailuku, HI

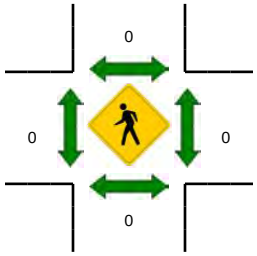
QC JOB #: 11217013

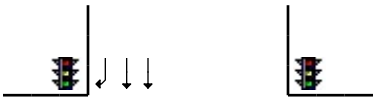
DATE: Wed, Sep 11 2013

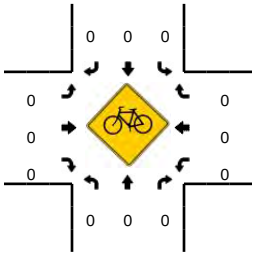
Peak-Hour: 6:55 AM -- 7:55 AM
Peak 15-Min: 7:25 AM -- 7:40 AM

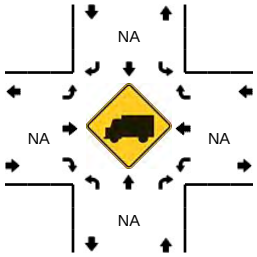


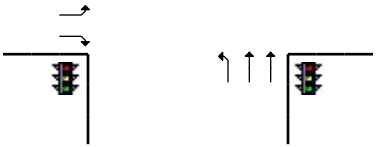


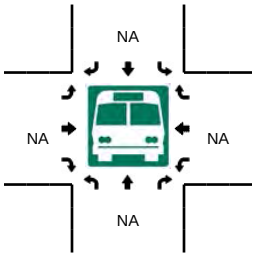












5-Min Count Period Beginning At	Kuihelani Hwy (Hwy-380) (Northbound)				Kuihelani Hwy (Hwy-380) (Southbound)				Waiko Rd (Eastbound)				Waiko Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:25 AM	2	17	0	0	0	39	7	0	11	0	2	0	0	0	0	0	78	
6:30 AM	2	7	0	0	0	39	6	0	8	0	2	0	0	0	0	0	64	
6:35 AM	0	26	0	0	0	49	9	0	13	0	1	0	0	0	0	0	98	
6:40 AM	2	28	0	0	0	35	8	0	15	0	0	0	0	0	0	0	88	
6:45 AM	3	24	0	0	0	43	14	0	10	0	1	0	0	0	0	0	95	
6:50 AM	2	21	0	0	0	43	11	0	19	0	1	0	0	0	0	0	97	
6:55 AM	1	20	0	0	0	59	14	0	16	0	7	0	0	0	0	0	117	964
7:00 AM	2	11	0	0	0	68	12	0	19	0	4	0	0	0	0	0	116	1013
7:05 AM	2	32	0	0	0	54	7	0	10	0	2	0	0	0	0	0	107	1071
7:10 AM	1	19	0	0	0	47	7	0	19	0	3	0	0	0	0	0	96	1102
7:15 AM	3	15	0	0	0	37	17	0	30	0	2	0	0	0	0	0	104	1132
7:20 AM	1	15	0	0	0	51	14	0	30	0	1	0	0	0	0	0	112	1172
7:25 AM	2	39	0	0	0	43	15	0	28	0	8	0	0	0	0	0	135	1229
7:30 AM	2	19	0	0	0	43	12	0	26	0	2	0	0	0	0	0	104	1269
7:35 AM	2	45	0	0	0	43	17	0	20	0	6	0	0	0	0	0	133	1304
7:40 AM	2	26	0	0	0	32	9	0	28	0	1	0	0	0	0	0	98	1314
7:45 AM	0	32	0	0	0	49	21	0	12	0	2	0	0	0	0	0	116	1335
7:50 AM	0	28	0	0	0	39	7	0	23	0	1	0	0	0	0	0	98	1336
7:55 AM	2	43	0	0	0	39	7	0	9	0	2	0	0	0	0	0	102	1321
8:00 AM	1	34	0	0	0	38	5	0	12	0	3	0	0	0	0	0	93	1298
8:05 AM	1	23	0	0	0	40	7	0	11	0	1	0	0	0	0	0	83	1274
8:10 AM	1	39	0	0	0	34	9	0	13	0	1	0	0	0	0	0	97	1275
8:15 AM	2	30	0	0	0	44	8	0	2	0	2	0	0	0	0	0	88	1259
8:20 AM	0	32	0	0	0	34	6	0	6	0	2	0	0	0	0	0	80	1227

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	24	412	0	0	0	516	176	0	296	0	64	0	0	0	0	0	1488
Heavy Trucks	4	28	0		0	56	24		40	0	28		0	0	0		180
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/20/2013 8:35 AM

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

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

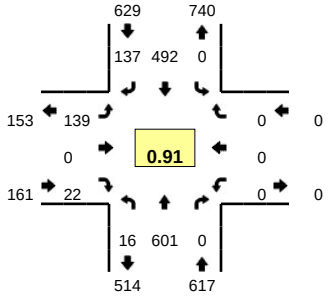
LOCATION: Kuihelani Hwy (Hwy-380) -- Waiko Rd

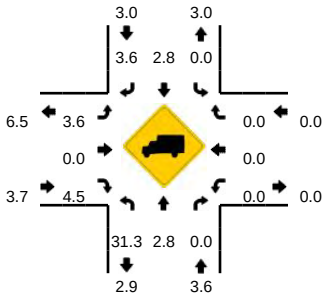
CITY/STATE: Wailuku, HI

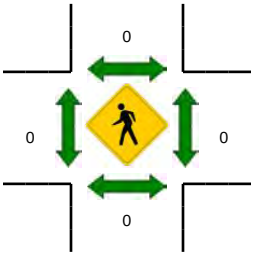
QC JOB #: 11217014

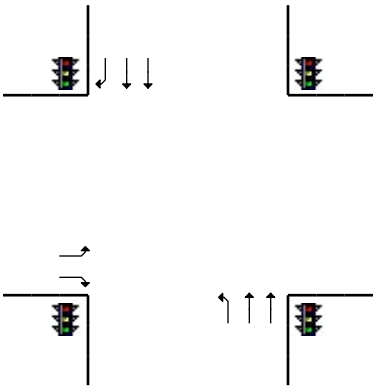
DATE: Wed, Sep 11 2013

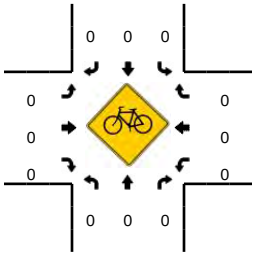
Peak-Hour: 4:15 PM -- 5:15 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

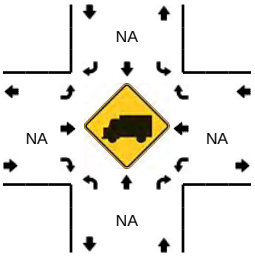


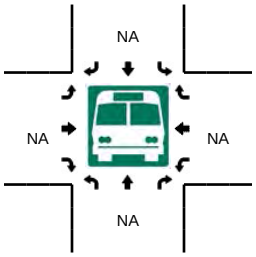












5-Min Count Period Beginning At	Kuihelani Hwy (Hwy-380) (Northbound)				Kuihelani Hwy (Hwy-380) (Southbound)				Waiko Rd (Eastbound)				Waiko Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:45 PM	3	26	0	0	0	71	7	0	11	0	2	0	0	0	0	0	120	
3:50 PM	6	41	0	0	0	45	10	0	11	0	0	0	0	0	0	0	113	
3:55 PM	2	57	0	0	0	41	6	0	9	0	1	1	0	0	0	0	117	1251
4:00 PM	3	35	0	0	0	38	8	0	8	0	2	0	0	0	0	0	94	1249
4:05 PM	0	53	0	0	0	23	12	0	15	0	1	0	0	0	0	0	104	1236
4:10 PM	4	52	0	0	0	36	8	0	11	0	2	0	0	0	0	0	113	1270
4:15 PM	2	50	0	0	0	44	14	0	12	0	2	0	0	0	0	0	124	1312
4:20 PM	2	43	0	0	0	44	9	0	6	0	3	0	0	0	0	0	107	1316
4:25 PM	2	45	0	0	0	50	13	0	10	0	2	0	0	0	0	0	122	1315
4:30 PM	0	45	0	0	0	27	14	0	15	0	2	0	0	0	0	0	103	1333
4:35 PM	2	43	0	0	0	42	18	0	15	0	1	0	0	0	0	0	121	1334
4:40 PM	2	42	0	0	0	24	10	0	13	0	1	0	0	0	0	0	92	1330
4:45 PM	0	54	0	0	0	46	8	0	19	0	1	0	0	0	0	0	128	1338
4:50 PM	2	33	0	0	0	48	8	0	10	0	1	0	0	0	0	0	102	1327
4:55 PM	3	64	0	0	0	31	13	0	10	0	1	0	0	0	0	0	122	1332
5:00 PM	1	60	0	0	0	53	8	0	11	0	1	0	0	0	0	0	134	1372
5:05 PM	0	54	0	0	0	32	15	0	9	0	3	0	0	0	0	0	113	1381
5:10 PM	0	68	0	0	0	51	7	0	9	0	4	0	0	0	0	0	139	1407
5:15 PM	0	45	0	0	0	37	7	0	9	0	5	0	0	0	0	0	103	1386
5:20 PM	1	46	0	0	0	39	10	0	11	0	1	0	0	0	0	0	108	1387
5:25 PM	1	58	0	0	0	48	10	0	7	0	1	0	0	0	0	0	125	1390
5:30 PM	1	43	0	0	0	39	2	0	7	0	1	0	0	0	0	0	93	1380
5:35 PM	0	37	0	0	0	29	10	0	2	0	0	0	0	0	0	0	78	1337
5:40 PM	1	44	0	0	0	37	4	0	7	0	0	0	0	0	0	0	93	1338

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	728	0	0	0	544	120	0	116	0	32	0	0	0	0	0	1544
Heavy Trucks	0	24	0		0	20	0		4	0	0		0	0	0		48
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/20/2013 8:35 AM

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

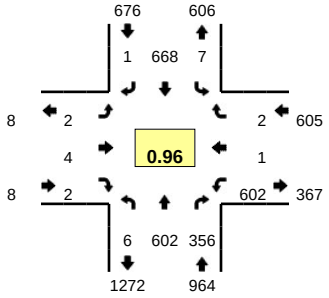
Type of peak hour being reported: Intersection Peak

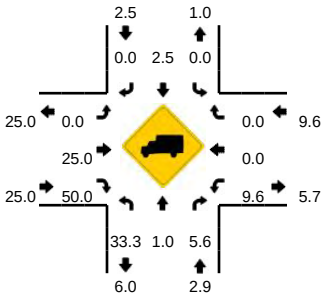
Method for determining peak hour: Total Entering Volume

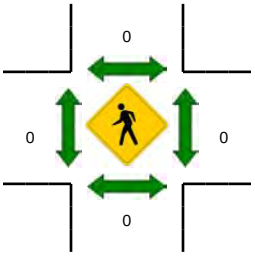
LOCATION: Honoapiilani Hwy (Hwy 30) -- Kuihelani Hwy (Hwy 380)
CITY/STATE: Wailuku, HI

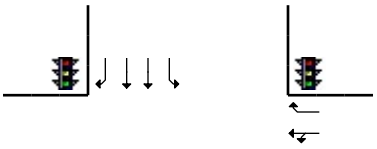
QC JOB #: 11217015
DATE: Wed, Sep 11 2013

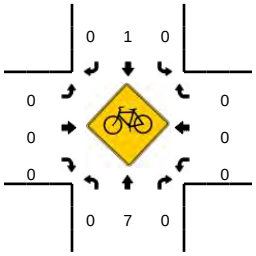
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:20 AM -- 7:35 AM

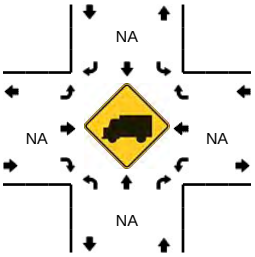


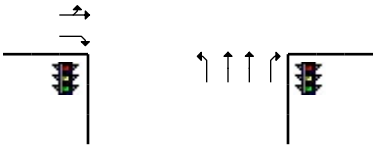


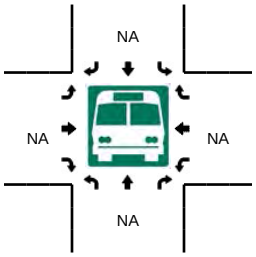












5-Min Count Period Beginning At	Honoapiilani Hwy (Hwy 30) (Northbound)				Honoapiilani Hwy (Hwy 30) (Southbound)				Kuihelani Hwy (Hwy 380) (Eastbound)				Kuihelani Hwy (Hwy 380) (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	0	27	29	0	0	46	0	0	0	0	0	0	49	1	0	0	152	
6:35 AM	0	27	23	2	0	43	0	0	0	0	0	0	41	0	0	0	136	
6:40 AM	0	40	33	0	0	49	0	0	0	0	0	0	38	0	0	0	160	
6:45 AM	0	30	24	0	0	46	0	0	0	0	0	0	45	0	0	0	145	
6:50 AM	0	35	15	0	0	47	0	0	0	0	0	0	36	0	0	0	133	
6:55 AM	0	32	19	0	0	51	0	0	0	0	0	0	39	0	0	0	141	1503
7:00 AM	0	32	29	0	0	48	0	0	0	0	0	0	80	0	0	0	189	1620
7:05 AM	0	58	21	0	0	68	0	0	0	0	0	0	70	0	0	0	217	1741
7:10 AM	0	47	18	0	0	45	0	0	0	0	0	0	54	0	0	0	164	1801
7:15 AM	0	43	19	0	0	55	0	0	0	0	0	0	47	0	0	0	164	1843
7:20 AM	0	78	38	0	0	59	0	0	0	0	0	0	47	0	0	0	222	1937
7:25 AM	0	58	23	0	1	64	0	0	0	0	0	0	43	0	0	0	189	2012
7:30 AM	1	45	36	0	0	46	1	0	1	0	0	0	48	0	0	0	178	2038
7:35 AM	1	62	38	0	1	72	0	0	0	1	1	0	43	1	1	0	221	2123
7:40 AM	2	45	35	0	2	53	0	0	1	0	0	0	48	0	0	0	186	2149
7:45 AM	0	44	26	0	1	40	0	0	0	0	0	0	44	0	0	0	155	2159
7:50 AM	2	42	27	0	2	70	0	0	0	3	1	0	37	0	0	0	184	2210
7:55 AM	0	48	46	0	0	48	0	0	0	0	0	0	41	0	1	0	184	2253
8:00 AM	0	42	27	0	1	37	0	0	0	0	0	0	37	0	0	0	144	2208
8:05 AM	0	40	30	0	0	48	0	0	0	0	0	0	39	0	1	0	158	2149
8:10 AM	0	32	43	0	0	34	0	0	1	0	0	0	43	0	0	0	153	2138
8:15 AM	0	40	26	0	1	44	0	0	0	0	0	0	27	0	0	0	138	2112
8:20 AM	0	46	29	0	0	27	0	0	0	0	0	0	54	0	0	0	156	2046
8:25 AM	0	39	38	0	2	42	0	0	0	0	0	0	38	0	0	0	159	2016

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	724	388	0	4	676	4	0	4	0	0	0	552	0	0	0	2356
Heavy Trucks	0	8	20		0	24	0		0	0	0		76	0	0		128
Pedestrians		0				0				0				0			0
Bicycles	0	7	0		0	0	0		0	0	0		0	0	0		7
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/20/2013 8:35 AM

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

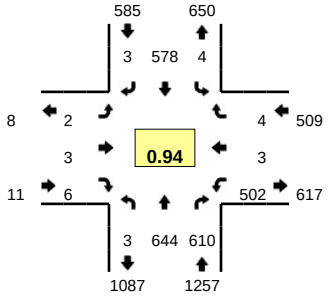
Type of peak hour being reported: Intersection Peak

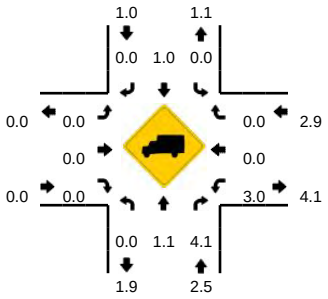
Method for determining peak hour: Total Entering Volume

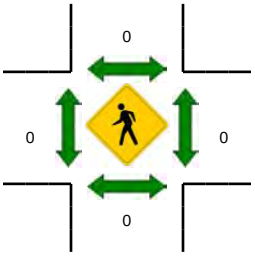
LOCATION: Honoapiilani Hwy (Hwy 30) -- Kuihelani Hwy (Hwy 380)
CITY/STATE: Wailuku, HI

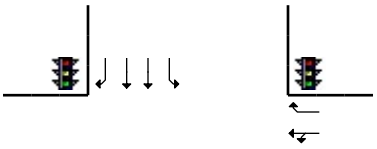
QC JOB #: 11217016
DATE: Wed, Sep 11 2013

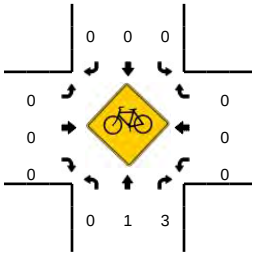
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

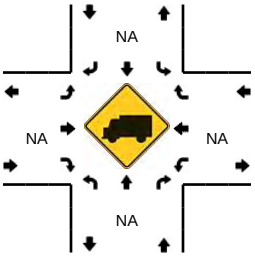


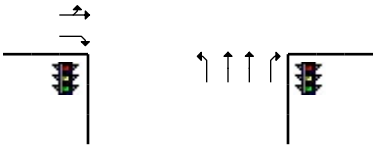


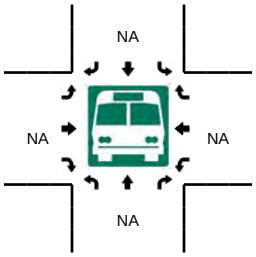












5-Min Count Period Beginning At	Honoapiilani Hwy (Hwy 30) (Northbound)				Honoapiilani Hwy (Hwy 30) (Southbound)				Kuihelani Hwy (Hwy 380) (Eastbound)				Kuihelani Hwy (Hwy 380) (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	39	51	0	0	48	0	0	0	0	0	0	45	0	0	0	183	2044
4:05 PM	1	56	69	0	0	36	2	0	0	0	0	0	27	0	0	0	191	2094
4:10 PM	0	44	48	0	1	40	0	0	0	0	3	0	29	0	0	0	165	2084
4:15 PM	0	34	38	0	0	40	0	0	0	0	0	0	49	0	0	0	161	2099
4:20 PM	0	58	52	0	2	51	0	0	0	0	0	0	39	0	1	0	203	2150
4:25 PM	0	32	40	0	3	36	0	0	0	0	0	0	36	0	0	0	147	2108
4:30 PM	0	54	29	0	1	46	0	0	0	0	0	0	57	0	0	0	187	2118
4:35 PM	0	43	58	0	0	50	1	0	0	0	0	0	32	0	0	0	184	2149
4:40 PM	0	53	62	0	0	48	1	0	0	0	0	0	35	0	0	0	199	2166
4:45 PM	0	54	34	0	0	58	1	0	0	0	2	0	49	0	1	0	199	2171
4:50 PM	0	48	59	0	2	67	0	0	0	0	1	0	39	1	0	0	217	2221
4:55 PM	1	56	43	0	0	42	0	0	2	1	0	0	29	0	0	0	174	2210
5:00 PM	0	60	57	1	0	39	0	0	0	0	0	0	37	0	0	0	194	2221
5:05 PM	0	54	72	0	0	42	0	0	0	0	1	0	49	1	2	0	221	2251
5:10 PM	1	61	54	0	0	47	0	0	0	0	0	0	49	0	1	0	213	2299
5:15 PM	0	40	40	0	0	48	0	0	0	2	1	0	48	1	0	0	180	2318
5:20 PM	0	66	51	0	0	44	0	0	0	0	1	0	35	0	0	0	197	2312
5:25 PM	0	55	51	0	1	47	0	0	0	0	0	0	43	0	0	0	197	2362
5:30 PM	0	50	45	0	0	27	0	0	0	0	0	0	46	0	0	0	168	2343
5:35 PM	0	51	31	0	0	35	0	0	0	0	0	0	41	0	0	0	158	2317
5:40 PM	0	44	43	0	0	30	0	0	0	0	0	0	25	0	0	0	142	2260
5:45 PM	0	29	37	0	1	36	1	0	0	0	2	0	38	1	0	0	145	2206
5:50 PM	0	38	35	0	1	30	1	0	0	0	0	0	40	0	0	0	145	2134
5:55 PM	0	33	35	0	0	30	0	0	0	0	0	0	29	0	0	0	127	2087

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	700	732	4	0	512	0	0	0	0	4	0	540	4	12	0	2512
Heavy Trucks	0	8	32		0	0	0		0	0	0		20	0	0		60
Pedestrians		0				0				0				0			0
Bicycles	0	1	0		0	0	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/20/2013 8:35 AM

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

APPENDIX B: LOS WORKSHEETS

LOS Worksheets – Existing Conditions

HCM Signalized Intersection Capacity Analysis
1: Honoapiilani Hwy & Kuikahi Drive

4/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	137	58	271	48	157	20	381	345	206	403	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.98		1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1844	1550		1784	1583	1770	1863	1547	1770	1863	1583
Flt Permitted		0.88	1.00		0.59	1.00	0.46	1.00	1.00	0.27	1.00	1.00
Satd. Flow (perm)		1640	1550		1105	1583	862	1863	1547	510	1863	1583
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	38	154	65	304	54	176	22	428	388	231	453	15
RTOR Reduction (vph)	0	0	41	0	0	111	0	0	248	0	0	8
Lane Group Flow (vph)	0	192	24	0	358	65	22	428	140	231	453	7
Confl. Peds. (#/hr)			1	1					1			
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		34.6	34.6		34.6	34.6	36.0	34.0	34.0	49.4	43.4	43.4
Effective Green, g (s)		34.6	34.6		34.6	34.6	36.0	34.0	34.0	49.4	43.4	43.4
Actuated g/C Ratio		0.37	0.37		0.37	0.37	0.38	0.36	0.36	0.53	0.46	0.46
Clearance Time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		603	570		406	582	349	673	559	420	860	730
v/s Ratio Prot							0.00	c0.23		c0.07	0.24	
v/s Ratio Perm		0.12	0.02		c0.32	0.04	0.02		0.09	0.22		0.00
v/c Ratio		0.32	0.04		0.88	0.11	0.06	0.64	0.25	0.55	0.53	0.01
Uniform Delay, d1		21.3	19.1		27.8	19.6	18.2	24.9	21.1	14.4	18.0	13.7
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2	0.0		19.5	0.1	0.0	2.7	0.5	0.9	1.1	0.0
Delay (s)		21.5	19.1		47.3	19.6	18.2	27.6	21.6	15.3	19.1	13.7
Level of Service		C	B		D	B	B	C	C	B	B	B
Approach Delay (s)		20.9			38.1			24.6			17.7	
Approach LOS		C			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	94.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	427	215	39	26	159	261	76	170	76	159	95	232
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.95		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1767	1813		1768	1863	1543	1770	1762		1768	1664	
Flt Permitted	0.44	1.00		0.60	1.00	1.00	0.36	1.00		0.30	1.00	
Satd. Flow (perm)	818	1813		1109	1863	1543	668	1762		567	1664	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	445	224	41	27	166	272	79	177	79	166	99	242
RTOR Reduction (vph)	0	4	0	0	0	219	0	13	0	0	69	0
Lane Group Flow (vph)	445	261	0	27	166	53	79	243	0	166	272	0
Confl. Peds. (#/hr)	3		1	1		3			4	4		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	47.5	40.5		19.8	17.8	17.8	24.1	18.6		32.7	22.9	
Effective Green, g (s)	47.5	40.5		19.8	17.8	17.8	24.1	18.6		32.7	22.9	
Actuated g/C Ratio	0.52	0.45		0.22	0.20	0.20	0.27	0.20		0.36	0.25	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	685	807		256	364	302	243	360		333	419	
v/s Ratio Prot	c0.18	0.14		0.00	0.09		0.02	0.14		c0.05	c0.16	
v/s Ratio Perm	c0.16			0.02		0.03	0.07			0.13		
v/c Ratio	0.65	0.32		0.11	0.46	0.18	0.33	0.68		0.50	0.65	
Uniform Delay, d1	14.3	16.3		28.2	32.3	30.4	26.0	33.4		21.4	30.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	0.2		0.1	0.9	0.3	0.3	5.0		0.4	3.5	
Delay (s)	15.9	16.6		28.3	33.2	30.7	26.2	38.3		21.8	33.9	
Level of Service	B	B		C	C	C	C	D		C	C	
Approach Delay (s)		16.2			31.5			35.5			29.9	
Approach LOS		B			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	26.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	170	130	90	67	160	108	139	211	80	191	175	179
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
Hourly flow rate (vph)	179	137	95	71	168	114	146	222	84	201	184	188

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	411	353	146	306	201	373
Volume Left (vph)	179	71	146	0	201	0
Volume Right (vph)	95	114	0	84	0	188
Hadj (s)	-0.02	-0.12	0.53	-0.16	0.53	-0.32
Departure Headway (s)	8.8	8.8	9.8	9.1	9.6	8.8
Degree Utilization, x	1.01	0.86	0.40	0.78	0.54	0.91
Capacity (veh/h)	411	403	351	386	361	400
Control Delay (s)	77.1	47.1	18.0	36.3	22.1	53.4
Approach Delay (s)	77.1	47.1	30.4		42.4	
Approach LOS	F	E	D		E	

Intersection Summary			
Delay	48.3		
Level of Service	E		
Intersection Capacity Utilization	81.1%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	322	0	159	0	0	0	81	483	0	0	561	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0					5.0	7.0			7.0	7.0
Lane Util. Factor		1.00					1.00	0.95			0.95	1.00
Frt		0.96					1.00	1.00			1.00	0.85
Flt Protected		0.97					0.95	1.00			1.00	1.00
Satd. Flow (prot)		1722					1770	3539			3539	1583
Flt Permitted		0.97					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1722					1770	3539			3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	335	0	166	0	0	0	84	503	0	0	584	260
RTOR Reduction (vph)	0	43	0	0	0	0	0	0	0	0	0	179
Lane Group Flow (vph)	0	458	0	0	0	0	84	503	0	0	584	81
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4											6
Actuated Green, G (s)		30.5					7.0	36.9			24.9	24.9
Effective Green, g (s)		30.5					7.0	36.9			24.9	24.9
Actuated g/C Ratio		0.38					0.09	0.46			0.31	0.31
Clearance Time (s)		6.0					5.0	7.0			7.0	7.0
Vehicle Extension (s)		2.0					2.0	5.0			5.0	5.0
Lane Grp Cap (vph)		653					154	1624			1096	490
v/s Ratio Prot							c0.05	0.14			c0.17	
v/s Ratio Perm		0.27										0.05
v/c Ratio		0.70					0.55	0.31			0.53	0.16
Uniform Delay, d1		21.1					35.2	13.7			22.9	20.2
Progression Factor		1.00					1.00	1.00			1.00	1.00
Incremental Delay, d2		2.8					2.1	0.2			0.9	0.3
Delay (s)		23.9					37.3	13.9			23.9	20.5
Level of Service		C					D	B			C	C
Approach Delay (s)		23.9			0.0			17.3			22.8	
Approach LOS		C			A			B			C	

Intersection Summary			
HCM 2000 Control Delay	21.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	80.4	Sum of lost time (s)	18.0
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	19	4	68	7	26	6	586	41	98	651	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.96		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1805	1546		1718		1769	1844		1770	1863	1549
Flt Permitted		0.79	1.00		0.76		0.30	1.00		0.24	1.00	1.00
Satd. Flow (perm)		1467	1546		1355		563	1844		439	1863	1549
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	36	22	5	77	8	30	7	666	47	111	740	8
RTOR Reduction (vph)	0	0	4	0	11	0	0	2	0	0	0	3
Lane Group Flow (vph)	0	58	1	0	104	0	7	711	0	111	740	5
Confl. Peds. (#/hr)	1		1	1		1	1					1
Confl. Bikes (#/hr)						8						
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		11.1	11.1		11.6		44.9	44.2		53.2	48.5	48.5
Effective Green, g (s)		11.1	11.1		11.6		44.9	44.2		53.2	48.5	48.5
Actuated g/C Ratio		0.14	0.14		0.15		0.58	0.58		0.69	0.63	0.63
Clearance Time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		2.0	2.0		2.0		2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		212	223		204		340	1061		390	1176	978
v/s Ratio Prot							0.00	c0.39		c0.02	c0.40	
v/s Ratio Perm		0.04	0.00		c0.08		0.01			0.18		0.00
v/c Ratio		0.27	0.00		0.51		0.02	0.67		0.28	0.63	0.01
Uniform Delay, d1		29.3	28.1		30.0		7.2	11.3		6.8	8.7	5.2
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.3	0.0		0.7		0.0	2.2		0.1	1.5	0.0
Delay (s)		29.5	28.1		30.7		7.2	13.5		6.9	10.2	5.2
Level of Service		C	C		C		A	B		A	B	A
Approach Delay (s)		29.4			30.7			13.4			9.7	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	76.8	Sum of lost time (s)	16.5
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	29	138	50	53	135	56
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	35	168	61	65	165	68
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	126				332	93
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	126				332	93
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				75	93
cM capacity (veh/h)	1461				647	964

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	204	126	233
Volume Left	35	0	165
Volume Right	0	65	68
cSH	1461	1700	716
Volume to Capacity	0.02	0.07	0.33
Queue Length 95th (ft)	2	0	35
Control Delay (s)	1.5	0.0	12.4
Lane LOS	A		B
Approach Delay (s)	1.5	0.0	12.4
Approach LOS			B

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	261	39	18	301	565	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8		5.0	6.3	6.3	6.3
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1754		1770	3539	3539	1583
Flt Permitted	0.96		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1754		1770	3539	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	290	43	20	334	628	169
RTOR Reduction (vph)	4	0	0	0	0	105
Lane Group Flow (vph)	329	0	20	334	628	64
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Actuated Green, G (s)	17.0		2.0	29.5	22.5	22.5
Effective Green, g (s)	17.0		2.0	29.5	22.5	22.5
Actuated g/C Ratio	0.29		0.03	0.49	0.38	0.38
Clearance Time (s)	6.8		5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	500		59	1751	1336	597
v/s Ratio Prot	c0.19		0.01	c0.09	c0.18	
v/s Ratio Perm						0.04
v/c Ratio	0.66		0.34	0.19	0.47	0.11
Uniform Delay, d1	18.7		28.2	8.4	14.0	12.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	2.4		1.2	0.1	0.3	0.1
Delay (s)	21.1		29.4	8.4	14.3	12.1
Level of Service	C		C	A	B	B
Approach Delay (s)	21.1			9.6	13.8	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	59.6	Sum of lost time (s)	18.1
Intersection Capacity Utilization	44.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	4	2	602	1	2	6	602	356	7	668	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1832	1583	1681	1686	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1832	1583	1681	1686	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	2	4	2	627	1	2	6	627	371	7	696	1
RTOR Reduction (vph)	0	0	2	0	0	0	0	0	0	0	0	1
Lane Group Flow (vph)	0	6	0	313	315	2	6	627	371	7	696	0
Turn Type	Split	NA	Perm	Split	NA	Free	Prot	NA	Free	Prot	NA	Perm
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4			Free			Free			6
Actuated Green, G (s)		0.8	0.8	20.8	20.8	65.8	0.7	24.5	65.8	0.7	24.5	24.5
Effective Green, g (s)		0.8	0.8	20.8	20.8	65.8	0.7	24.5	65.8	0.7	24.5	24.5
Actuated g/C Ratio		0.01	0.01	0.32	0.32	1.00	0.01	0.37	1.00	0.01	0.37	0.37
Clearance Time (s)		5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)		22	19	531	532	1583	18	1317	1583	18	1317	589
v/s Ratio Prot		0.00		0.19	c0.19		0.00	0.18		0.00	c0.20	
v/s Ratio Perm			0.00			0.00			c0.23			0.00
v/c Ratio		0.27	0.00	0.59	0.59	0.00	0.33	0.48	0.23	0.39	0.53	0.00
Uniform Delay, d1		32.2	32.1	18.9	18.9	0.0	32.3	15.8	0.0	32.3	16.1	13.0
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		6.6	0.0	1.7	1.8	0.0	3.9	0.4	0.3	5.0	0.5	0.0
Delay (s)		38.8	32.1	20.6	20.7	0.0	36.3	16.1	0.3	37.3	16.6	13.0
Level of Service		D	C	C	C	A	D	B	A	D	B	B
Approach Delay (s)		37.2			20.6			10.4			16.8	
Approach LOS		D			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	65.8	Sum of lost time (s)	19.0
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Honoapiilani Hwy & Kuikahi Drive

4/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	76	24	271	124	165	41	394	259	143	377	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1843	1583		1801	1532	1770	1863	1583	1770	1863	1583
Flt Permitted		0.90	1.00		0.73	1.00	0.47	1.00	1.00	0.29	1.00	1.00
Satd. Flow (perm)		1666	1583		1364	1532	870	1863	1583	540	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	20	82	26	291	133	177	44	424	278	154	405	38
RTOR Reduction (vph)	0	0	17	0	0	97	0	0	175	0	0	21
Lane Group Flow (vph)	0	102	9	0	424	80	44	424	103	154	405	17
Confl. Peds. (#/hr)	6					6						
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		31.1	31.1		31.1	31.1	35.1	31.8	31.8	44.7	37.4	37.4
Effective Green, g (s)		31.1	31.1		31.1	31.1	35.1	31.8	31.8	44.7	37.4	37.4
Actuated g/C Ratio		0.36	0.36		0.36	0.36	0.41	0.37	0.37	0.52	0.44	0.44
Clearance Time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		603	573		494	555	390	690	586	408	812	690
v/s Ratio Prot							0.00	c0.23		c0.04	0.22	
v/s Ratio Perm		0.06	0.01		c0.31	0.05	0.04		0.07	0.16		0.01
v/c Ratio		0.17	0.02		0.86	0.14	0.11	0.61	0.18	0.38	0.50	0.02
Uniform Delay, d1		18.6	17.5		25.3	18.4	15.4	22.0	18.2	12.5	17.4	13.8
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0		13.6	0.1	0.0	2.3	0.3	0.2	1.0	0.0
Delay (s)		18.7	17.5		38.9	18.5	15.5	24.4	18.5	12.7	18.5	13.8
Level of Service		B	B		D	B	B	C	B	B	B	B
Approach Delay (s)		18.4			32.9			21.6			16.7	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	23.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	85.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	231	169	36	55	239	273	25	109	45	252	161	254
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.96		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1806		1765	1863	1583	1767	1770		1769	1664	
Flt Permitted	0.35	1.00		0.63	1.00	1.00	0.43	1.00		0.49	1.00	
Satd. Flow (perm)	649	1806		1163	1863	1583	806	1770		907	1664	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	238	174	37	57	246	281	26	112	46	260	166	262
RTOR Reduction (vph)	0	5	0	0	0	216	0	12	0	0	39	0
Lane Group Flow (vph)	238	206	0	57	246	65	26	146	0	260	389	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	40.8	30.9		25.1	20.2	20.2	22.2	20.2		37.1	30.1	
Effective Green, g (s)	40.8	30.9		25.1	20.2	20.2	22.2	20.2		37.1	30.1	
Actuated g/C Ratio	0.46	0.35		0.29	0.23	0.23	0.25	0.23		0.42	0.34	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	500	634		365	428	363	225	406		499	569	
v/s Ratio Prot	c0.08	0.11		0.01	c0.13		0.00	0.08		c0.07	c0.23	
v/s Ratio Perm	0.14			0.04		0.04	0.03			0.15		
v/c Ratio	0.48	0.32		0.16	0.57	0.18	0.12	0.36		0.52	0.68	
Uniform Delay, d1	15.4	20.9		23.2	30.0	27.2	25.0	28.4		17.5	24.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.3		0.1	1.9	0.2	0.1	0.5		0.5	3.4	
Delay (s)	15.7	21.2		23.3	31.9	27.4	25.1	29.0		18.0	28.2	
Level of Service	B	C		C	C	C	C	C		B	C	
Approach Delay (s)		18.3			28.9			28.4			24.3	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	87.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	234	195	52	29	240	211	43	78	40	122	76	273
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	239	199	53	30	245	215	44	80	41	124	78	279

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	491	490	44	120	124	356
Volume Left (vph)	239	30	44	0	124	0
Volume Right (vph)	53	215	0	41	0	279
Hadj (s)	0.07	-0.22	0.53	-0.20	0.53	-0.51
Departure Headway (s)	7.7	7.3	9.8	9.1	8.9	7.8
Degree Utilization, x	1.05	0.99	0.12	0.30	0.31	0.78
Capacity (veh/h)	463	490	356	385	397	451
Control Delay (s)	83.0	65.8	13.0	14.8	14.6	31.8
Approach Delay (s)	83.0	65.8	14.3		27.3	
Approach LOS	F	F	B		D	

Intersection Summary			
Delay	54.4		
Level of Service	F		
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	267	0	72	0	0	0	180	550	0	1	546	395
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0					5.0	7.0		5.0	7.0	7.0
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes		1.00					1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00					1.00	1.00		1.00	1.00	1.00
Frt		0.97					1.00	1.00		1.00	1.00	0.85
Flt Protected		0.96					0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1741					1770	3539		1770	3539	1550
Flt Permitted		0.96					0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1741					1770	3539		1770	3539	1550
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	290	0	78	0	0	0	196	598	0	1	593	429
RTOR Reduction (vph)	0	53	0	0	0	0	0	0	0	0	0	264
Lane Group Flow (vph)	0	315	0	0	0	0	196	598	0	1	593	165
Confl. Peds. (#/hr)												1
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4											6
Actuated Green, G (s)		21.2					14.3	47.0		0.7	33.4	33.4
Effective Green, g (s)		21.2					14.3	47.0		0.7	33.4	33.4
Actuated g/C Ratio		0.24					0.16	0.54		0.01	0.38	0.38
Clearance Time (s)		6.0					5.0	7.0		5.0	7.0	7.0
Vehicle Extension (s)		2.0					2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		424					291	1914		14	1360	595
v/s Ratio Prot							c0.11	0.17		0.00	c0.17	
v/s Ratio Perm		0.18										0.11
v/c Ratio		0.74					0.67	0.31		0.07	0.44	0.28
Uniform Delay, d1		30.3					34.1	11.0		42.8	19.8	18.4
Progression Factor		1.00					1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		6.1					4.8	0.2		0.8	0.5	0.5
Delay (s)		36.4					38.9	11.2		43.6	20.3	19.0
Level of Service		D					D	B		D	C	B
Approach Delay (s)		36.4			0.0			18.0			19.7	
Approach LOS		D			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	86.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	6	8	49	15	44	9	608	69	23	547	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		0.98		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.94		1.00	0.98		1.00	1.00	0.85
Flt Protected		0.97	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1801	1583		1692		1769	1829		1769	1863	1546
Flt Permitted		0.81	1.00		0.84		0.37	1.00		0.25	1.00	1.00
Satd. Flow (perm)		1508	1583		1461		686	1829		471	1863	1546
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	7	9	53	16	48	10	661	75	25	595	29
RTOR Reduction (vph)	0	0	8	0	21	0	0	3	0	0	0	11
Lane Group Flow (vph)	0	21	1	0	96	0	10	733	0	25	595	18
Confl. Peds. (#/hr)	1					1	2		5	5		2
Confl. Bikes (#/hr)						8						
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		10.5	10.5		11.0		42.5	41.8		44.3	42.7	42.7
Effective Green, g (s)		10.5	10.5		11.0		42.5	41.8		44.3	42.7	42.7
Actuated g/C Ratio		0.15	0.15		0.16		0.60	0.59		0.63	0.61	0.61
Clearance Time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		2.0	2.0		2.0		2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		224	236		228		424	1085		325	1129	937
v/s Ratio Prot							0.00	c0.40		c0.00	0.32	
v/s Ratio Perm		0.01	0.00		c0.07		0.01			0.05		0.01
v/c Ratio		0.09	0.01		0.42		0.02	0.68		0.08	0.53	0.02
Uniform Delay, d1		25.8	25.5		26.8		5.9	9.7		6.5	8.0	5.5
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0		0.5		0.0	2.2		0.0	0.8	0.0
Delay (s)		25.9	25.5		27.3		5.9	11.9		6.5	8.9	5.5
Level of Service		C	C		C		A	B		A	A	A
Approach Delay (s)		25.8			27.3			11.8			8.6	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	70.4	Sum of lost time (s)	16.5
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	43	45	69	103	72	43
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	51	53	81	121	85	51
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	203				297	143
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	203				297	143
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				87	94
cM capacity (veh/h)	1367				668	904

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	104	202	135
Volume Left	51	0	85
Volume Right	0	121	51
cSH	1367	1700	740
Volume to Capacity	0.04	0.12	0.18
Queue Length 95th (ft)	3	0	17
Control Delay (s)	3.9	0.0	10.9
Lane LOS	A		B
Approach Delay (s)	3.9	0.0	10.9
Approach LOS			B

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	31.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	139	22	16	601	492	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8		5.0	6.3	6.3	6.3
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1753		1770	3539	3539	1583
Flt Permitted	0.96		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1753		1770	3539	3539	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	153	24	18	660	541	151
RTOR Reduction (vph)	4	0	0	0	0	90
Lane Group Flow (vph)	173	0	18	660	541	61
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Actuated Green, G (s)	13.7		0.9	27.8	21.9	21.9
Effective Green, g (s)	13.7		0.9	27.8	21.9	21.9
Actuated g/C Ratio	0.25		0.02	0.51	0.40	0.40
Clearance Time (s)	6.8		5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	439		29	1801	1419	634
v/s Ratio Prot	c0.10		0.01	c0.19	0.15	
v/s Ratio Perm						0.04
v/c Ratio	0.39		0.62	0.37	0.38	0.10
Uniform Delay, d1	17.0		26.7	8.1	11.6	10.2
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2		26.1	0.1	0.2	0.1
Delay (s)	17.2		52.8	8.2	11.7	10.2
Level of Service	B		D	A	B	B
Approach Delay (s)	17.2			9.4	11.4	
Approach LOS	B			A	B	

Intersection Summary			
HCM 2000 Control Delay	11.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	54.6	Sum of lost time (s)	18.1
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	3	6	502	3	4	3	644	610	4	578	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1826	1583	1681	1686	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1826	1583	1681	1686	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	2	3	6	534	3	4	3	685	649	4	615	3
RTOR Reduction (vph)	0	0	6	0	0	0	0	0	0	0	0	2
Lane Group Flow (vph)	0	5	0	267	270	4	3	685	649	4	615	1
Turn Type	Split	NA	Perm	Split	NA	Free	Prot	NA	Free	Prot	NA	Perm
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4			Free			Free			6
Actuated Green, G (s)		0.8	0.8	17.7	17.7	60.9	0.6	22.8	60.9	0.6	22.8	22.8
Effective Green, g (s)		0.8	0.8	17.7	17.7	60.9	0.6	22.8	60.9	0.6	22.8	22.8
Actuated g/C Ratio		0.01	0.01	0.29	0.29	1.00	0.01	0.37	1.00	0.01	0.37	0.37
Clearance Time (s)		5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)		23	20	488	490	1583	17	1324	1583	17	1324	592
v/s Ratio Prot		0.00		0.16	c0.16		0.00	c0.19		0.00	0.17	
v/s Ratio Perm			0.00			0.00			c0.41			0.00
v/c Ratio		0.22	0.00	0.55	0.55	0.00	0.18	0.52	0.41	0.24	0.46	0.00
Uniform Delay, d1		29.7	29.7	18.2	18.2	0.0	29.9	14.8	0.0	29.9	14.4	11.9
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		4.7	0.1	1.3	1.3	0.0	1.8	0.5	0.8	2.6	0.4	0.0
Delay (s)		34.5	29.7	19.5	19.6	0.0	31.7	15.2	0.8	32.5	14.8	11.9
Level of Service		C	C	B	B	A	C	B	A	C	B	B
Approach Delay (s)		31.9			19.4			8.3			14.9	
Approach LOS		C			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	60.9	Sum of lost time (s)	19.0
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

LOS Worksheets – Year 2022 without Project Conditions

HCM Signalized Intersection Capacity Analysis
1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	170	70	290	80	280	30	480	380	440	490	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.98		1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1849	1550		1790	1583	1770	1863	1547	1770	1863	1583
Flt Permitted		0.82	1.00		0.56	1.00	0.35	1.00	1.00	0.15	1.00	1.00
Satd. Flow (perm)		1532	1550		1039	1583	657	1863	1547	286	1863	1583
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	34	191	79	326	90	315	34	539	427	494	551	11
RTOR Reduction (vph)	0	0	50	0	0	174	0	0	265	0	0	6
Lane Group Flow (vph)	0	225	29	0	416	141	34	539	162	494	551	5
Confl. Peds. (#/hr)			1	1					1			
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		40.1	40.1		40.1	40.1	42.2	38.7	38.7	57.7	50.2	50.2
Effective Green, g (s)		40.1	40.1		40.1	40.1	42.2	38.7	38.7	57.7	50.2	50.2
Actuated g/C Ratio		0.37	0.37		0.37	0.37	0.39	0.36	0.36	0.54	0.47	0.47
Clearance Time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		569	576		386	588	293	668	555	359	867	737
v/s Ratio Prot							0.00	0.29		c0.19	0.30	
v/s Ratio Perm		0.15	0.02		c0.40	0.09	0.04		0.10	c0.54		0.00
v/c Ratio		0.40	0.05		1.08	0.24	0.12	0.81	0.29	1.38	0.64	0.01
Uniform Delay, d1		24.9	21.7		33.8	23.3	20.7	31.2	24.7	26.0	21.9	15.4
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.3	0.0		68.2	0.2	0.1	8.0	0.6	185.9	2.1	0.0
Delay (s)		25.3	21.7		102.0	23.5	20.8	39.2	25.3	211.9	24.0	15.4
Level of Service		C	C		F	C	C	D	C	F	C	B
Approach Delay (s)		24.3			68.2			32.7			111.8	
Approach LOS		C			E			C			F	

Intersection Summary			
HCM 2000 Control Delay	67.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.29		
Actuated Cycle Length (s)	107.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	96.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	340	570	70	80	410	420	70	470	140	240	170	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.97		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1828		1770	1863	1539	1770	1786		1770	1727	
Flt Permitted	0.14	1.00		0.11	1.00	1.00	0.44	1.00		0.09	1.00	
Satd. Flow (perm)	256	1828		203	1863	1539	827	1786		161	1727	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	354	594	73	83	427	438	73	490	146	250	177	167
RTOR Reduction (vph)	0	2	0	0	0	166	0	8	0	0	22	0
Lane Group Flow (vph)	354	665	0	83	427	272	73	628	0	250	322	0
Confl. Peds. (#/hr)	3		1	1		3			4	4		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	65.5	52.5		44.7	36.7	36.7	47.2	41.3		59.4	48.5	
Effective Green, g (s)	65.5	52.5		44.7	36.7	36.7	47.2	41.3		59.4	48.5	
Actuated g/C Ratio	0.49	0.39		0.33	0.27	0.27	0.35	0.31		0.44	0.36	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	391	711		160	506	418	330	546		227	620	
v/s Ratio Prot	c0.16	c0.36		0.03	0.23		0.01	0.35		c0.11	0.19	
v/s Ratio Perm	0.28			0.14		0.18	0.07			c0.38		
v/c Ratio	0.91	0.93		0.52	0.84	0.65	0.22	1.15		1.10	0.52	
Uniform Delay, d1	35.1	39.6		34.8	46.4	43.4	30.0	46.8		40.4	34.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	23.3	19.4		1.2	12.2	3.6	0.1	87.4		89.5	0.7	
Delay (s)	58.4	58.9		36.0	58.6	47.0	30.1	134.2		129.9	34.7	
Level of Service	E	E		D	E	D	C	F		F	C	
Approach Delay (s)		58.7			51.3			123.5			74.8	
Approach LOS		E			D			F			E	

Intersection Summary			
HCM 2000 Control Delay	73.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	134.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	103.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	130	340	170	70	420	210	220	560	80	100	470	170
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
Hourly flow rate (vph)	137	358	179	74	442	221	232	589	84	105	495	179

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	674	737	232	674	105	674
Volume Left (vph)	137	74	232	0	105	0
Volume Right (vph)	179	221	0	84	0	179
Hadj (s)	-0.08	-0.13	0.53	-0.05	0.53	-0.15
Departure Headway (s)	9.4	9.3	10.2	9.6	10.2	9.5
Degree Utilization, x	1.75	1.91	0.65	1.79	0.30	1.77
Capacity (veh/h)	389	391	347	381	351	384
Control Delay (s)	372.3	440.7	29.2	388.2	16.2	379.9
Approach Delay (s)	372.3	440.7	296.4		330.7	
Approach LOS	F	F	F		F	

Intersection Summary			
Delay	355.9		
Level of Service	F		
Intersection Capacity Utilization	119.3%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	760	0	50	0	0	0	60	1090	0	0	880	550
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0					5.0	7.0			7.0	7.0
Lane Util. Factor		1.00					1.00	0.95			0.95	1.00
Frt		0.99					1.00	1.00			1.00	0.85
Flt Protected		0.96					0.95	1.00			1.00	1.00
Satd. Flow (prot)		1764					1770	3539			3539	1583
Flt Permitted		0.96					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1764					1770	3539			3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	792	0	52	0	0	0	62	1135	0	0	917	573
RTOR Reduction (vph)	0	49	0	0	0	0	0	0	0	0	0	311
Lane Group Flow (vph)	0	795	0	0	0	0	62	1135	0	0	917	262
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4											6
Actuated Green, G (s)		31.3					6.9	59.2			47.3	47.3
Effective Green, g (s)		31.3					6.9	59.2			47.3	47.3
Actuated g/C Ratio		0.30					0.07	0.57			0.46	0.46
Clearance Time (s)		6.0					5.0	7.0			7.0	7.0
Vehicle Extension (s)		2.0					2.0	5.0			5.0	5.0
Lane Grp Cap (vph)		533					118	2024			1617	723
v/s Ratio Prot							0.04	c0.32			0.26	
v/s Ratio Perm		0.45										0.17
v/c Ratio		1.49					0.53	0.56			0.57	0.36
Uniform Delay, d1		36.1					46.7	14.0			20.6	18.3
Progression Factor		1.00					1.00	1.00			1.00	1.00
Incremental Delay, d2		231.2					1.9	0.6			0.8	0.6
Delay (s)		267.3					48.7	14.5			21.4	18.9
Level of Service		F					D	B			C	B
Approach Delay (s)		267.3			0.0			16.3			20.4	
Approach LOS		F			A			B			C	

Intersection Summary			
HCM 2000 Control Delay	78.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	103.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	93.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	100	10	30	40	130	10	670	20	190	700	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.98		0.97		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.91		1.00	1.00		1.00	1.00	0.85
Flt Protected		1.00	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1854	1547		1642		1769	1855		1770	1863	1548
Flt Permitted		0.93	1.00		0.93		0.29	1.00		0.18	1.00	1.00
Satd. Flow (perm)		1727	1547		1531		531	1855		328	1863	1548
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	11	114	11	34	45	148	11	761	23	216	795	11
RTOR Reduction (vph)	0	0	9	0	56	0	0	1	0	0	0	4
Lane Group Flow (vph)	0	125	2	0	171	0	11	783	0	216	795	7
Confl. Peds. (#/hr)	1		1	1		1	1					1
Confl. Bikes (#/hr)						8						
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		14.3	14.3		14.8		51.0	50.3		62.9	58.2	58.2
Effective Green, g (s)		14.3	14.3		14.8		51.0	50.3		62.9	58.2	58.2
Actuated g/C Ratio		0.16	0.16		0.16		0.57	0.56		0.70	0.65	0.65
Clearance Time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		2.0	2.0		2.0		2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		275	246		252		311	1040		368	1208	1004
v/s Ratio Prot							0.00	c0.42		c0.06	0.43	
v/s Ratio Perm		0.07	0.00		c0.11		0.02			0.36		0.00
v/c Ratio		0.45	0.01		0.68		0.04	0.75		0.59	0.66	0.01
Uniform Delay, d1		34.2	31.7		35.2		9.1	15.0		11.1	9.7	5.6
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.4	0.0		5.6		0.0	3.7		1.5	1.8	0.0
Delay (s)		34.6	31.7		40.8		9.1	18.7		12.7	11.4	5.6
Level of Service		C	C		D		A	B		B	B	A
Approach Delay (s)		34.4			40.8			18.6			11.6	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	89.7	Sum of lost time (s)	16.5
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	290	20	110	190	290	10	190	80	260	70	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1767	1842		1768	1863	1549	1767	1863	1549	1767	1822	
Flt Permitted	0.63	1.00		0.52	1.00	1.00	0.70	1.00	1.00	0.63	1.00	
Satd. Flow (perm)	1169	1842		966	1863	1549	1303	1863	1549	1169	1822	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	315	22	120	207	315	11	207	87	283	76	11
RTOR Reduction (vph)	0	6	0	0	0	201	0	0	53	0	7	0
Lane Group Flow (vph)	11	331	0	120	207	114	11	207	34	283	80	0
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	11.8	11.8		11.8	11.8	11.8	12.9	12.9	12.9	12.9	12.9	
Effective Green, g (s)	11.8	11.8		11.8	11.8	11.8	12.9	12.9	12.9	12.9	12.9	
Actuated g/C Ratio	0.36	0.36		0.36	0.36	0.36	0.39	0.39	0.39	0.39	0.39	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	421	664		348	672	558	514	734	611	461	718	
v/s Ratio Prot		c0.18			0.11			0.11			0.04	
v/s Ratio Perm	0.01			0.12		0.07	0.01		0.02	c0.24		
v/c Ratio	0.03	0.50		0.34	0.31	0.20	0.02	0.28	0.06	0.61	0.11	
Uniform Delay, d1	6.7	8.1		7.6	7.5	7.2	6.0	6.7	6.1	7.9	6.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	0.6		0.6	0.3	0.2	0.0	0.2	0.0	2.4	0.1	
Delay (s)	6.8	8.7		8.2	7.8	7.4	6.1	7.0	6.2	10.3	6.3	
Level of Service	A	A		A	A	A	A	A	A	B	A	
Approach Delay (s)		8.7			7.7			6.7			9.4	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	32.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	170	130	130	10	100	50	240	160	10	100	90	160
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	185	141	141	11	109	54	261	174	11	109	98	174
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	163			283			935	766	212	766	810	136
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	163			283			935	766	212	766	810	136
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	87			99			0	39	99	26	64	81
cM capacity (veh/h)	1416			1280			129	287	828	148	271	913

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	185	283	11	163	261	185	109	272
Volume Left	185	0	11	0	261	0	109	0
Volume Right	0	141	0	54	0	11	0	174
cSH	1416	1700	1280	1700	129	298	148	492
Volume to Capacity	0.13	0.17	0.01	0.10	2.02	0.62	0.74	0.55
Queue Length 95th (ft)	11	0	1	0	528	96	110	83
Control Delay (s)	7.9	0.0	7.8	0.0	543.5	34.9	77.7	20.9
Lane LOS	A		A		F	D	F	C
Approach Delay (s)	3.1		0.5		332.6		37.2	
Approach LOS					F		E	

Intersection Summary			
Average Delay	111.7		
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	460	200	90	490	560	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8		5.0	6.3	6.3	6.3
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	0.97		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1726		1770	3539	3539	1583
Flt Permitted	0.97		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1726		1770	3539	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	511	222	100	544	622	244
RTOR Reduction (vph)	10	0	0	0	0	175
Lane Group Flow (vph)	723	0	100	544	622	69
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Actuated Green, G (s)	32.4		7.7	35.5	22.8	22.8
Effective Green, g (s)	32.4		7.7	35.5	22.8	22.8
Actuated g/C Ratio	0.40		0.10	0.44	0.28	0.28
Clearance Time (s)	6.8		5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	690		168	1551	996	445
v/s Ratio Prot	c0.42		c0.06	0.15	c0.18	
v/s Ratio Perm						0.04
v/c Ratio	1.05		0.60	0.35	0.62	0.15
Uniform Delay, d1	24.3		35.2	15.1	25.4	21.9
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	47.6		3.7	0.1	1.2	0.2
Delay (s)	71.9		38.9	15.2	26.6	22.0
Level of Service	E		D	B	C	C
Approach Delay (s)	71.9			18.9	25.3	
Approach LOS	E			B	C	

Intersection Summary			
HCM 2000 Control Delay	38.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	120	0	740	280	0	850
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		4.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	1770		1863	1583		1863
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	1770		1863	1583		1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	0	804	304	0	924
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	130	0	804	304	0	924
Turn Type	NA	custom	NA	Free	Perm	NA
Protected Phases			2			6
Permitted Phases	8	8		Free	6	
Actuated Green, G (s)	7.7		38.0	53.7		38.0
Effective Green, g (s)	7.7		38.0	53.7		38.0
Actuated g/C Ratio	0.14		0.71	1.00		0.71
Clearance Time (s)	4.0		4.0			4.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	253		1318	1583		1318
v/s Ratio Prot			0.43			c0.50
v/s Ratio Perm	c0.07			0.19		
v/c Ratio	0.51		0.61	0.19		0.70
Uniform Delay, d1	21.3		4.0	0.0		4.6
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	1.8		0.8	0.3		1.7
Delay (s)	23.0		4.9	0.3		6.3
Level of Service	C		A	A		A
Approach Delay (s)	23.0		3.6			6.3
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	5.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	53.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	10	10	760	10	10	10	940	610	10	770	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1817	1583	1681	1687	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1817	1583	1681	1687	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	10	10	10	792	10	10	10	979	635	10	802	10
RTOR Reduction (vph)	0	0	10	0	0	0	0	0	0	0	0	6
Lane Group Flow (vph)	0	20	0	404	398	10	10	979	635	10	802	4
Turn Type	Split	NA	Perm	Split	NA	Free	Prot	NA	Free	Prot	NA	Perm
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4			Free			Free			6
Actuated Green, G (s)		3.9	3.9	36.0	36.0	101.3	0.9	41.5	101.3	0.9	41.5	41.5
Effective Green, g (s)		3.9	3.9	36.0	36.0	101.3	0.9	41.5	101.3	0.9	41.5	41.5
Actuated g/C Ratio		0.04	0.04	0.36	0.36	1.00	0.01	0.41	1.00	0.01	0.41	0.41
Clearance Time (s)		5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)		69	60	597	599	1583	15	1449	1583	15	1449	648
v/s Ratio Prot		0.01		c0.24	0.24		0.01	c0.28		0.01	0.23	
v/s Ratio Perm			0.00			0.01			c0.40			0.00
v/c Ratio		0.29	0.01	0.68	0.66	0.01	0.67	0.68	0.40	0.67	0.55	0.01
Uniform Delay, d1		47.4	46.8	27.7	27.6	0.0	50.1	24.4	0.0	50.1	22.8	17.7
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		2.3	0.0	3.0	2.8	0.0	62.4	1.4	0.8	62.4	0.6	0.0
Delay (s)		49.7	46.9	30.8	30.3	0.0	112.4	25.8	0.8	112.4	23.4	17.7
Level of Service		D	D	C	C	A	F	C	A	F	C	B
Approach Delay (s)		48.7			30.2			16.5			24.4	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	22.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	101.3	Sum of lost time (s)	19.0
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	80	30	290	140	390	40	480	280	370	480	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1842	1583		1802	1528	1770	1863	1583	1770	1863	1583
Flt Permitted		0.81	1.00		0.73	1.00	0.40	1.00	1.00	0.17	1.00	1.00
Satd. Flow (perm)		1508	1583		1364	1528	749	1863	1583	325	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	22	86	32	312	151	419	43	516	301	398	516	32
RTOR Reduction (vph)	0	0	20	0	0	211	0	0	194	0	0	17
Lane Group Flow (vph)	0	108	12	0	463	208	43	516	107	398	516	15
Confl. Peds. (#/hr)	6					6						
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		37.5	37.5		37.5	37.5	40.5	36.9	36.9	56.1	48.5	48.5
Effective Green, g (s)		37.5	37.5		37.5	37.5	40.5	36.9	36.9	56.1	48.5	48.5
Actuated g/C Ratio		0.36	0.36		0.36	0.36	0.39	0.36	0.36	0.54	0.47	0.47
Clearance Time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		545	572		493	553	328	663	563	387	872	741
v/s Ratio Prot							0.00	0.28		c0.15	0.28	
v/s Ratio Perm		0.07	0.01		c0.34	0.14	0.05		0.07	c0.40		0.01
v/c Ratio		0.20	0.02		0.94	0.38	0.13	0.78	0.19	1.03	0.59	0.02
Uniform Delay, d1		22.7	21.2		31.9	24.4	19.9	29.7	23.0	23.4	20.3	14.8
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0		25.8	0.3	0.1	6.7	0.3	53.2	1.6	0.0
Delay (s)		22.8	21.3		57.7	24.7	19.9	36.4	23.4	76.6	21.9	14.8
Level of Service		C	C		E	C	B	D	C	E	C	B
Approach Delay (s)		22.5			42.0			31.0			44.7	
Approach LOS		C			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	38.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	103.6	Sum of lost time (s)	14.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	210	430	50	100	580	400	30	200	60	340	400	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.97		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1828		1768	1863	1583	1770	1789		1769	1764	
Flt Permitted	0.09	1.00		0.29	1.00	1.00	0.13	1.00		0.34	1.00	
Satd. Flow (perm)	164	1828		549	1863	1583	240	1789		631	1764	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	216	443	52	103	598	412	31	206	62	351	412	175
RTOR Reduction (vph)	0	2	0	0	0	260	0	8	0	0	11	0
Lane Group Flow (vph)	216	493	0	103	598	152	31	260	0	351	576	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	60.4	47.1		48.6	40.3	40.3	34.8	31.0		49.1	40.3	
Effective Green, g (s)	60.4	47.1		48.6	40.3	40.3	34.8	31.0		49.1	40.3	
Actuated g/C Ratio	0.51	0.39		0.41	0.34	0.34	0.29	0.26		0.41	0.34	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	285	720		307	628	533	118	464		384	594	
v/s Ratio Prot	c0.10	0.27		0.02	c0.32		0.01	0.15		c0.10	c0.33	
v/s Ratio Perm	0.29			0.11		0.10	0.07			0.28		
v/c Ratio	0.76	0.68		0.34	0.95	0.28	0.26	0.56		0.91	0.97	
Uniform Delay, d1	30.5	30.0		23.5	38.7	29.0	33.0	38.3		30.9	39.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.8	2.7		0.2	24.5	0.3	0.4	1.5		25.3	29.4	
Delay (s)	40.3	32.7		23.7	63.2	29.3	33.5	39.9		56.2	68.5	
Level of Service	D	C		C	E	C	C	D		E	E	
Approach Delay (s)		35.0			47.0			39.2			63.9	
Approach LOS		D			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	48.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	119.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	93.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	250	420	140	30	390	70	150	360	40	100	400	300
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	255	429	143	31	398	71	153	367	41	102	408	306

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	827	500	153	408	102	714
Volume Left (vph)	255	31	153	0	102	0
Volume Right (vph)	143	71	0	41	0	306
Hadj (s)	-0.01	-0.04	0.53	-0.04	0.53	-0.27
Departure Headway (s)	9.4	9.4	10.2	9.6	10.2	9.4
Degree Utilization, x	2.17	1.31	0.43	1.09	0.29	1.86
Capacity (veh/h)	388	390	342	384	350	390
Control Delay (s)	555.8	183.5	19.5	102.4	16.0	416.6
Approach Delay (s)	555.8	183.5	79.8		366.5	
Approach LOS	F	F	F		F	

Intersection Summary			
Delay	331.0		
Level of Service	F		
Intersection Capacity Utilization	132.0%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	590	0	10	0	0	0	60	880	0	10	1210	790
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0					5.0	7.0		5.0	7.0	7.0
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes		1.00					1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00					1.00	1.00		1.00	1.00	1.00
Frt		1.00					1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95					0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1771					1770	3539		1770	3539	1550
Flt Permitted		0.95					0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1771					1770	3539		1770	3539	1550
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	641	0	11	0	0	0	65	957	0	11	1315	859
RTOR Reduction (vph)	0	53	0	0	0	0	0	0	0	0	0	380
Lane Group Flow (vph)	0	599	0	0	0	0	65	957	0	11	1315	479
Confl. Peds. (#/hr)												1
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4											6
Actuated Green, G (s)		30.3					7.7	76.9		1.3	70.5	70.5
Effective Green, g (s)		30.3					7.7	76.9		1.3	70.5	70.5
Actuated g/C Ratio		0.24					0.06	0.61		0.01	0.56	0.56
Clearance Time (s)		6.0					5.0	7.0		5.0	7.0	7.0
Vehicle Extension (s)		2.0					2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		424					107	2151		18	1972	863
v/s Ratio Prot							c0.04	0.27		0.01	c0.37	
v/s Ratio Perm		0.34										0.31
v/c Ratio		1.41					0.61	0.44		0.61	0.67	0.55
Uniform Delay, d1		48.1					57.9	13.3		62.3	19.7	17.9
Progression Factor		1.00					1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		199.0					6.5	0.3		36.2	1.1	1.3
Delay (s)		247.1					64.5	13.6		98.5	20.9	19.3
Level of Service		F					E	B		F	C	B
Approach Delay (s)		247.1			0.0			16.9			20.6	
Approach LOS		F			A			B			C	

Intersection Summary			
HCM 2000 Control Delay	57.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	126.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	30	10	30	70	120	10	650	30	120	590	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		0.98		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.93		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1839	1583		1678		1769	1848		1769	1863	1545
Flt Permitted		0.85	1.00		0.95		0.37	1.00		0.20	1.00	1.00
Satd. Flow (perm)		1574	1583		1601		692	1848		368	1863	1545
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	33	11	33	76	130	11	707	33	130	641	11
RTOR Reduction (vph)	0	0	9	0	35	0	0	1	0	0	0	4
Lane Group Flow (vph)	0	44	2	0	204	0	11	739	0	130	641	7
Confl. Peds. (#/hr)	1					1	2		5	5		2
Confl. Bikes (#/hr)						8						
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		14.7	14.7		15.2		47.6	46.8		57.8	53.0	53.0
Effective Green, g (s)		14.7	14.7		15.2		47.6	46.8		57.8	53.0	53.0
Actuated g/C Ratio		0.17	0.17		0.18		0.56	0.55		0.68	0.62	0.62
Clearance Time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		2.0	2.0		2.0		2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		272	273		286		397	1017		365	1161	963
v/s Ratio Prot							0.00	c0.40		c0.03	c0.34	
v/s Ratio Perm		0.03	0.00		c0.13		0.02			0.21		0.00
v/c Ratio		0.16	0.01		0.71		0.03	0.73		0.36	0.55	0.01
Uniform Delay, d1		29.9	29.1		32.8		8.5	14.3		9.1	9.2	6.1
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0		6.8		0.0	3.2		0.2	1.0	0.0
Delay (s)		30.0	29.1		39.6		8.5	17.5		9.3	10.2	6.1
Level of Service		C	C		D		A	B		A	B	A
Approach Delay (s)		29.8			39.6			17.4			10.0	
Approach LOS		C			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	170	10	70	180	210	20	60	100	210	190	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1767	1845		1767	1863	1549	1767	1863	1549	1767	1832	
Flt Permitted	0.63	1.00		0.63	1.00	1.00	0.62	1.00	1.00	0.71	1.00	
Satd. Flow (perm)	1180	1845		1180	1863	1549	1145	1863	1549	1329	1832	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	185	11	76	196	228	22	65	109	228	207	22
RTOR Reduction (vph)	0	6	0	0	0	166	0	0	57	0	8	0
Lane Group Flow (vph)	11	190	0	76	196	62	22	65	52	228	221	0
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	8.5	8.5		8.5	8.5	8.5	14.8	14.8	14.8	14.8	14.8	
Effective Green, g (s)	8.5	8.5		8.5	8.5	8.5	14.8	14.8	14.8	14.8	14.8	
Actuated g/C Ratio	0.27	0.27		0.27	0.27	0.27	0.47	0.47	0.47	0.47	0.47	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	320	501		320	505	420	541	880	732	628	866	
v/s Ratio Prot		0.10			c0.11			0.03			0.12	
v/s Ratio Perm	0.01			0.06		0.04	0.02		0.03	c0.17		
v/c Ratio	0.03	0.38		0.24	0.39	0.15	0.04	0.07	0.07	0.36	0.26	
Uniform Delay, d1	8.4	9.3		8.9	9.3	8.7	4.4	4.5	4.5	5.3	4.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	0.5		0.4	0.5	0.2	0.0	0.0	0.0	0.4	0.2	
Delay (s)	8.4	9.7		9.3	9.8	8.8	4.5	4.5	4.5	5.6	5.1	
Level of Service	A	A		A	A	A	A	A	A	A	A	
Approach Delay (s)		9.7			9.3			4.5			5.4	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	31.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	130	100	170	20	130	130	110	80	10	100	130	140
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	141	109	185	22	141	141	120	87	11	109	141	152
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	283			293			891	810	201	701	832	212
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	283			293			891	810	201	701	832	212
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	89			98			0	68	99	55	47	82
cM capacity (veh/h)	1280			1268			114	275	840	239	267	828

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	141	293	22	283	120	98	109	293
Volume Left	141	0	22	0	120	0	109	0
Volume Right	0	185	0	141	0	11	0	152
cSH	1280	1700	1268	1700	114	297	239	411
Volume to Capacity	0.11	0.17	0.02	0.17	1.05	0.33	0.45	0.71
Queue Length 95th (ft)	9	0	1	0	176	35	55	136
Control Delay (s)	8.2	0.0	7.9	0.0	169.9	23.0	32.0	32.8
Lane LOS	A		A		F	C	D	D
Approach Delay (s)	2.7		0.6		103.8		32.6	
Approach LOS					F		D	

Intersection Summary			
Average Delay	27.2		
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	190	90	130	610	650	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8		5.0	6.3	6.3	6.3
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	0.97		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1723		1770	3539	3539	1583
Flt Permitted	0.97		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1723		1770	3539	3539	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	209	99	143	670	714	374
RTOR Reduction (vph)	13	0	0	0	0	242
Lane Group Flow (vph)	295	0	143	670	714	132
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Actuated Green, G (s)	18.5		11.4	42.7	26.3	26.3
Effective Green, g (s)	18.5		11.4	42.7	26.3	26.3
Actuated g/C Ratio	0.25		0.15	0.57	0.35	0.35
Clearance Time (s)	6.8		5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	429		271	2033	1252	560
v/s Ratio Prot	c0.17		c0.08	0.19	c0.20	
v/s Ratio Perm						0.08
v/c Ratio	0.69		0.53	0.33	0.57	0.24
Uniform Delay, d1	25.3		29.0	8.3	19.4	16.9
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	3.6		0.9	0.1	0.6	0.2
Delay (s)	28.9		29.8	8.4	20.1	17.1
Level of Service	C		C	A	C	B
Approach Delay (s)	28.9			12.2	19.1	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	74.3	Sum of lost time (s)	18.1
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	270	0	900	100	0	680
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		4.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	1770		1863	1583		1863
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	1770		1863	1583		1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	293	0	978	109	0	739
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	293	0	978	109	0	739
Turn Type	NA	custom	NA	Free	Perm	NA
Protected Phases			2			6
Permitted Phases	8	8		Free	6	
Actuated Green, G (s)	13.4		34.8	56.2		34.8
Effective Green, g (s)	13.4		34.8	56.2		34.8
Actuated g/C Ratio	0.24		0.62	1.00		0.62
Clearance Time (s)	4.0		4.0			4.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	422		1153	1583		1153
v/s Ratio Prot			c0.53			0.40
v/s Ratio Perm	c0.17			0.07		
v/c Ratio	0.69		0.85	0.07		0.64
Uniform Delay, d1	19.5		8.6	0.0		6.8
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	4.9		6.0	0.1		1.2
Delay (s)	24.4		14.6	0.1		8.0
Level of Service	C		B	A		A
Approach Delay (s)	24.4		13.1			8.0
Approach LOS	C		B			A

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	56.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	10	10	720	10	10	10	740	730	10	860	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1817	1583	1681	1688	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1817	1583	1681	1688	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	11	11	11	766	11	11	11	787	777	11	915	11
RTOR Reduction (vph)	0	0	11	0	0	0	0	0	0	0	0	7
Lane Group Flow (vph)	0	22	0	391	386	11	11	787	777	11	915	4
Turn Type	Split	NA	Perm	Split	NA	Free	Prot	NA	Free	Prot	NA	Perm
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4			Free			Free			6
Actuated Green, G (s)		3.9	3.9	33.7	33.7	96.6	1.8	38.2	96.6	1.8	38.2	38.2
Effective Green, g (s)		3.9	3.9	33.7	33.7	96.6	1.8	38.2	96.6	1.8	38.2	38.2
Actuated g/C Ratio		0.04	0.04	0.35	0.35	1.00	0.02	0.40	1.00	0.02	0.40	0.40
Clearance Time (s)		5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)		73	63	586	588	1583	32	1399	1583	32	1399	625
v/s Ratio Prot		0.01		c0.23	0.23		0.01	0.22		0.01	c0.26	
v/s Ratio Perm			0.00			0.01			c0.49			0.00
v/c Ratio		0.30	0.01	0.67	0.66	0.01	0.34	0.56	0.49	0.34	0.65	0.01
Uniform Delay, d1		45.0	44.5	26.7	26.6	0.0	46.8	22.7	0.0	46.8	23.8	17.7
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		2.3	0.0	2.9	2.6	0.0	2.3	0.6	1.1	2.3	1.2	0.0
Delay (s)		47.3	44.5	29.6	29.2	0.0	49.2	23.3	1.1	49.2	25.0	17.7
Level of Service		D	D	C	C	A	D	C	A	D	C	B
Approach Delay (s)		46.4			29.0			12.5			25.2	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	96.6	Sum of lost time (s)	19.0
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

LOS Worksheets – Year 2022 with Partial Development Conditions

HCM Signalized Intersection Capacity Analysis
1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	170	71	330	80	280	31	561	454	440	556	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.98		1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1849	1550		1788	1583	1770	1863	1547	1770	1863	1583
Flt Permitted		0.73	1.00		0.55	1.00	0.28	1.00	1.00	0.09	1.00	1.00
Satd. Flow (perm)		1358	1550		1018	1583	521	1863	1547	165	1863	1583
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	34	191	80	371	90	315	35	630	510	494	625	11
RTOR Reduction (vph)	0	0	51	0	0	159	0	0	257	0	0	6
Lane Group Flow (vph)	0	225	29	0	461	156	35	630	253	494	625	5
Confl. Peds. (#/hr)			1	1					1			
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		40.0	40.0		40.0	40.0	44.8	41.2	41.2	60.2	52.6	52.6
Effective Green, g (s)		40.0	40.0		40.0	40.0	44.8	41.2	41.2	60.2	52.6	52.6
Actuated g/C Ratio		0.36	0.36		0.36	0.36	0.41	0.37	0.37	0.55	0.48	0.48
Clearance Time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		492	562		369	574	252	696	578	308	889	755
v/s Ratio Prot							0.00	0.34		c0.22	0.34	
v/s Ratio Perm		0.17	0.02		c0.45	0.10	0.05		0.16	c0.66		0.00
v/c Ratio		0.46	0.05		1.25	0.27	0.14	0.91	0.44	1.60	0.70	0.01
Uniform Delay, d1		26.8	22.8		35.1	24.8	20.8	32.7	25.8	34.0	22.7	15.1
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.5	0.0		132.8	0.2	0.1	16.1	1.1	286.5	3.2	0.0
Delay (s)		27.3	22.8		167.9	25.0	20.9	48.8	26.9	320.4	25.8	15.1
Level of Service		C	C		F	C	C	D	C	F	C	B
Approach Delay (s)		26.1			109.9			38.5			154.5	
Approach LOS		C			F			D			F	

Intersection Summary			
HCM 2000 Control Delay	92.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.50		
Actuated Cycle Length (s)	110.2	Sum of lost time (s)	14.0
Intersection Capacity Utilization	102.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	364	620	70	148	438	420	70	514	206	240	205	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.96		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1830		1770	1863	1538	1770	1767		1770	1735	
Flt Permitted	0.10	1.00		0.11	1.00	1.00	0.36	1.00		0.09	1.00	
Satd. Flow (perm)	183	1830		199	1863	1538	676	1767		161	1735	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	379	646	73	154	456	438	73	535	215	250	214	179
RTOR Reduction (vph)	0	3	0	0	0	149	0	10	0	0	20	0
Lane Group Flow (vph)	379	716	0	154	456	289	73	740	0	250	373	0
Confl. Peds. (#/hr)	3		1	1		3			4	4		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	68.5	50.9		50.0	37.4	37.4	47.3	41.3		59.3	48.3	
Effective Green, g (s)	68.5	50.9		50.0	37.4	37.4	47.3	41.3		59.3	48.3	
Actuated g/C Ratio	0.50	0.37		0.36	0.27	0.27	0.34	0.30		0.43	0.35	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	391	675		215	505	417	279	529		221	608	
v/s Ratio Prot	c0.18	c0.39		0.07	0.24		0.01	c0.42		c0.11	0.21	
v/s Ratio Perm	0.30			0.19		0.19	0.08			0.38		
v/c Ratio	0.97	1.06		0.72	0.90	0.69	0.26	1.40		1.13	0.61	
Uniform Delay, d1	42.6	43.5		35.0	48.4	45.1	31.7	48.3		41.1	37.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	36.8	52.1		9.1	19.3	5.0	0.2	190.9		100.4	1.8	
Delay (s)	79.4	95.5		44.1	67.8	50.0	31.8	239.1		141.5	38.9	
Level of Service	E	F		D	E	D	C	F		F	D	
Approach Delay (s)		90.0			56.9			220.7			78.8	
Approach LOS		F			E			F			E	

Intersection Summary			
HCM 2000 Control Delay	108.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	137.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	114.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	169	417	170	70	483	210	220	571	80	100	475	203
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
Hourly flow rate (vph)	178	439	179	74	508	221	232	601	84	105	500	214

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	796	803	232	685	105	714
Volume Left (vph)	178	74	232	0	105	0
Volume Right (vph)	179	221	0	84	0	214
Hadj (s)	-0.06	-0.11	0.53	-0.05	0.53	-0.18
Departure Headway (s)	9.4	9.3	10.2	9.6	10.2	9.5
Degree Utilization, x	2.08	2.09	0.65	1.82	0.30	1.87
Capacity (veh/h)	389	392	347	381	351	386
Control Delay (s)	515.2	518.0	29.2	401.8	16.2	424.0
Approach Delay (s)	515.2	518.0	307.7		371.5	
Approach LOS	F	F	F		F	

Intersection Summary			
Delay	423.6		
Level of Service	F		
Intersection Capacity Utilization	139.0%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	837	0	50	0	0	0	60	1114	0	0	891	613
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0					5.0	7.0			7.0	7.0
Lane Util. Factor		1.00					1.00	0.95			0.95	1.00
Frt		0.99					1.00	1.00			1.00	0.85
Flt Protected		0.95					0.95	1.00			1.00	1.00
Satd. Flow (prot)		1765					1770	3539			3539	1583
Flt Permitted		0.95					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1765					1770	3539			3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	872	0	52	0	0	0	62	1160	0	0	928	639
RTOR Reduction (vph)	0	49	0	0	0	0	0	0	0	0	0	339
Lane Group Flow (vph)	0	875	0	0	0	0	62	1160	0	0	928	300
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4											6
Actuated Green, G (s)		31.2					7.0	61.7			49.7	49.7
Effective Green, g (s)		31.2					7.0	61.7			49.7	49.7
Actuated g/C Ratio		0.29					0.07	0.58			0.47	0.47
Clearance Time (s)		6.0					5.0	7.0			7.0	7.0
Vehicle Extension (s)		2.0					2.0	5.0			5.0	5.0
Lane Grp Cap (vph)		520					116	2061			1660	742
v/s Ratio Prot							0.04	c0.33			0.26	
v/s Ratio Perm		0.50										0.19
v/c Ratio		1.68					0.53	0.56			0.56	0.40
Uniform Delay, d1		37.4					47.9	13.7			20.2	18.4
Progression Factor		1.00					1.00	1.00			1.00	1.00
Incremental Delay, d2		315.2					2.4	0.6			0.7	0.8
Delay (s)		352.5					50.2	14.3			20.9	19.2
Level of Service		F					D	B			C	B
Approach Delay (s)		352.5			0.0			16.1			20.2	
Approach LOS		F			A			B			C	

Intersection Summary			
HCM 2000 Control Delay	101.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	105.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	98.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	100	11	52	40	130	11	826	64	190	806	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.98		0.98		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		1.00	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1854	1547		1654		1770	1843		1770	1863	1547
Flt Permitted		0.92	1.00		0.84		0.22	1.00		0.06	1.00	1.00
Satd. Flow (perm)		1711	1547		1400		416	1843		110	1863	1547
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	11	114	12	59	45	148	12	939	73	216	916	11
RTOR Reduction (vph)	0	0	10	0	42	0	0	2	0	0	0	3
Lane Group Flow (vph)	0	125	2	0	210	0	12	1010	0	216	916	8
Confl. Peds. (#/hr)	1		1	1		1	1					1
Confl. Bikes (#/hr)						8						
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		19.7	19.7		20.2		73.8	71.9		88.6	82.7	82.7
Effective Green, g (s)		19.7	19.7		20.2		73.8	71.9		88.6	82.7	82.7
Actuated g/C Ratio		0.16	0.16		0.17		0.61	0.60		0.73	0.68	0.68
Clearance Time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		2.0	2.0		2.0		2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		279	252		234		275	1096		255	1275	1059
v/s Ratio Prot							0.00	c0.55		c0.09	0.49	
v/s Ratio Perm		0.07	0.00		c0.15		0.03			0.53		0.00
v/c Ratio		0.45	0.01		0.90		0.04	0.92		0.85	0.72	0.01
Uniform Delay, d1		45.6	42.4		49.3		11.4	21.9		38.4	11.8	6.0
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.4	0.0		31.6		0.0	13.0		21.3	2.4	0.0
Delay (s)		46.1	42.4		80.9		11.4	34.9		59.6	14.3	6.0
Level of Service		D	D		F		B	C		E	B	A
Approach Delay (s)		45.7			80.9			34.6			22.8	
Approach LOS		D			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	34.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	120.8	Sum of lost time (s)	16.5
Intersection Capacity Utilization	90.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	315	20	133	203	290	10	284	122	260	166	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1767	1843		1768	1863	1549	1767	1863	1549	1767	1827	
Flt Permitted	0.62	1.00		0.47	1.00	1.00	0.63	1.00	1.00	0.56	1.00	
Satd. Flow (perm)	1154	1843		874	1863	1549	1173	1863	1549	1042	1827	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.82
Adj. Flow (vph)	32	342	22	145	221	315	11	309	133	283	180	23
RTOR Reduction (vph)	0	6	0	0	0	201	0	0	78	0	11	0
Lane Group Flow (vph)	32	358	0	145	221	114	11	309	55	283	192	0
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	12.8	12.8		12.8	12.8	12.8	14.7	14.7	14.7	14.7	14.7	
Effective Green, g (s)	12.8	12.8		12.8	12.8	12.8	14.7	14.7	14.7	14.7	14.7	
Actuated g/C Ratio	0.36	0.36		0.36	0.36	0.36	0.41	0.41	0.41	0.41	0.41	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	416	664		315	671	558	485	771	641	431	756	
v/s Ratio Prot		c0.19			0.12			0.17			0.11	
v/s Ratio Perm	0.03			0.17		0.07	0.01		0.04	c0.27		
v/c Ratio	0.08	0.54		0.46	0.33	0.20	0.02	0.40	0.09	0.66	0.25	
Uniform Delay, d1	7.5	9.0		8.7	8.2	7.8	6.2	7.3	6.3	8.4	6.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.8		1.1	0.3	0.2	0.0	0.3	0.1	3.6	0.2	
Delay (s)	7.5	9.9		9.8	8.5	8.0	6.2	7.6	6.4	12.0	7.0	
Level of Service	A	A		A	A	A	A	A	A	B	A	
Approach Delay (s)		9.7			8.6			7.2			9.9	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	35.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	196	157	141	10	112	50	246	160	10	100	90	175
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	213	171	153	11	122	54	267	174	11	109	98	190
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	176			324			1056	871	247	865	921	149
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	176			324			1056	871	247	865	921	149
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	85			99			0	28	99	0	57	79
cM capacity (veh/h)	1400			1236			94	243	791	101	227	898

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	213	324	11	176	267	185	109	288
Volume Left	213	0	11	0	267	0	109	0
Volume Right	0	153	0	54	0	11	0	190
cSH	1400	1700	1236	1700	94	253	101	449
Volume to Capacity	0.15	0.19	0.01	0.10	2.84	0.73	1.07	0.64
Queue Length 95th (ft)	13	0	1	0	639	127	172	110
Control Delay (s)	8.0	0.0	7.9	0.0	924.4	49.8	189.1	26.3
Lane LOS	A		A		F	E	F	D
Approach Delay (s)	3.2		0.5		567.0		70.9	
Approach LOS					F		F	

Intersection Summary			
Average Delay	182.0		
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	484	200	90	490	560	231
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8		5.0	6.3	6.3	6.3
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	0.97		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1728		1770	3539	3539	1583
Flt Permitted	0.97		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1728		1770	3539	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	538	222	100	544	622	257
RTOR Reduction (vph)	9	0	0	0	0	185
Lane Group Flow (vph)	751	0	100	544	622	72
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Actuated Green, G (s)	32.4		7.7	35.5	22.8	22.8
Effective Green, g (s)	32.4		7.7	35.5	22.8	22.8
Actuated g/C Ratio	0.40		0.10	0.44	0.28	0.28
Clearance Time (s)	6.8		5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	691		168	1551	996	445
v/s Ratio Prot	c0.43		c0.06	0.15	c0.18	
v/s Ratio Perm						0.05
v/c Ratio	1.09		0.60	0.35	0.62	0.16
Uniform Delay, d1	24.3		35.2	15.1	25.4	21.9
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	60.2		3.7	0.1	1.2	0.2
Delay (s)	84.5		38.9	15.2	26.6	22.1
Level of Service	F		D	B	C	C
Approach Delay (s)	84.5			18.9	25.3	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	43.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	116	25	40	28	15	86	24	738	14	66	848	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.91		1.00	0.87		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1760	1665		1760	1588		1767	1863	1540	1767	1863	1540
Flt Permitted	0.69	1.00		0.71	1.00		0.19	1.00	1.00	0.26	1.00	1.00
Satd. Flow (perm)	1272	1665		1318	1588		348	1863	1540	474	1863	1540
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	126	27	43	30	16	93	26	802	15	72	922	72
RTOR Reduction (vph)	0	35	0	0	76	0	0	0	5	0	0	24
Lane Group Flow (vph)	126	35	0	30	33	0	26	802	10	72	922	48
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	9.8	9.8		9.8	9.8		34.7	34.7	34.7	34.7	34.7	34.7
Effective Green, g (s)	9.8	9.8		9.8	9.8		34.7	34.7	34.7	34.7	34.7	34.7
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.66	0.66	0.66	0.66	0.66	0.66
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	237	310		246	296		230	1231	1017	313	1231	1017
v/s Ratio Prot		0.02			0.02			0.43			c0.49	
v/s Ratio Perm	c0.10			0.02			0.07		0.01	0.15		0.03
v/c Ratio	0.53	0.11		0.12	0.11		0.11	0.65	0.01	0.23	0.75	0.05
Uniform Delay, d1	19.3	17.7		17.8	17.7		3.3	5.3	3.0	3.6	6.0	3.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.3	0.2		0.2	0.2		0.2	1.2	0.0	0.4	2.5	0.0
Delay (s)	21.6	17.9		18.0	17.9		3.5	6.5	3.0	3.9	8.5	3.1
Level of Service	C	B		B	B		A	A	A	A	A	A
Approach Delay (s)		20.3			17.9			6.4			7.8	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	52.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Volume (veh/h)	68	0	25	10	0	10	25	266	10	90	108	49
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	74	0	27	11	0	11	27	289	11	98	117	53
Approach Volume (veh/h)		101			22			327			268	
Crossing Volume (veh/h)		226			390			172			38	
High Capacity (veh/h)		1160			1019			1211			1344	
High v/c (veh/h)		0.09			0.02			0.27			0.20	
Low Capacity (veh/h)		957			830			1003			1124	
Low v/c (veh/h)		0.11			0.03			0.33			0.24	

Intersection Summary				
Maximum v/c High	0.27			
Maximum v/c Low	0.33			
Intersection Capacity Utilization	47.5%	ICU Level of Service	A	

Intersection	
Intersection Delay, s/veh	6.6
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	101	22	327	268
Demand Flow Rate, veh/h	103	22	334	273
Vehicles Circulating, veh/h	230	398	175	39
Vehicles Exiting, veh/h	82	111	158	381
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.2	5.0	7.7	5.8
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	103	22	334	273
Cap Entry Lane, veh/h	898	759	949	1087
Entry HV Adj Factor	0.981	1.000	0.980	0.980
Flow Entry, veh/h	101	22	327	268
Cap Entry, veh/h	880	759	929	1065
V/C Ratio	0.115	0.029	0.352	0.251
Control Delay, s/veh	5.2	5.0	7.7	5.8
LOS	A	A	A	A
95th %tile Queue, veh	0	0	2	1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	144	0	777	301	0	917
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		4.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frpb, ped/bikes	1.00		1.00	0.98		1.00
Flpb, ped/bikes	1.00		1.00	1.00		1.00
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	1770		1863	1550		1863
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	1770		1863	1550		1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	157	0	845	327	0	997
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	157	0	845	327	0	997
Confl. Peds. (#/hr)		2		2		
Turn Type	NA	custom	NA	Free	Perm	NA
Protected Phases			2			6
Permitted Phases	8	8		Free	6	
Actuated Green, G (s)	9.6		41.6	59.2		41.6
Effective Green, g (s)	9.6		41.6	59.2		41.6
Actuated g/C Ratio	0.16		0.70	1.00		0.70
Clearance Time (s)	4.0		4.0			4.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	287		1309	1550		1309
v/s Ratio Prot			0.45			c0.54
v/s Ratio Perm	c0.09			0.21		
v/c Ratio	0.55		0.65	0.21		0.76
Uniform Delay, d1	22.8		4.8	0.0		5.6
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	2.1		1.1	0.3		2.7
Delay (s)	24.9		5.9	0.3		8.3
Level of Service	C		A	A		A
Approach Delay (s)	24.9		4.3			8.3
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	59.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	10	10	760	10	10	10	998	610	10	860	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1817	1583	1681	1687	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1817	1583	1681	1687	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	10	10	10	792	10	10	10	1040	635	10	896	10
RTOR Reduction (vph)	0	0	10	0	0	0	0	0	0	0	0	6
Lane Group Flow (vph)	0	20	0	404	398	10	10	1040	635	10	896	4
Turn Type	Split	NA	Perm	Split	NA	Free	Prot	NA	Free	Prot	NA	Perm
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4			Free			Free			6
Actuated Green, G (s)		3.9	3.9	37.1	37.1	105.3	0.9	44.4	105.3	0.9	44.4	44.4
Effective Green, g (s)		3.9	3.9	37.1	37.1	105.3	0.9	44.4	105.3	0.9	44.4	44.4
Actuated g/C Ratio		0.04	0.04	0.35	0.35	1.00	0.01	0.42	1.00	0.01	0.42	0.42
Clearance Time (s)		5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)		67	58	592	594	1583	15	1492	1583	15	1492	667
v/s Ratio Prot		0.01		c0.24	0.24		0.01	c0.29		0.01	0.25	
v/s Ratio Perm			0.00			0.01			c0.40			0.00
v/c Ratio		0.30	0.01	0.68	0.67	0.01	0.67	0.70	0.40	0.67	0.60	0.01
Uniform Delay, d1		49.4	48.8	29.1	28.9	0.0	52.1	24.9	0.0	52.1	23.6	17.7
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		2.5	0.0	3.2	3.0	0.0	62.4	1.6	0.8	62.4	0.8	0.0
Delay (s)		51.9	48.9	32.3	31.9	0.0	114.4	26.5	0.8	114.4	24.4	17.7
Level of Service		D	D	C	C	A	F	C	A	F	C	B
Approach Delay (s)		50.9			31.7			17.3			25.3	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	105.3	Sum of lost time (s)	19.0
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	80	32	384	140	390	43	568	351	370	582	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1844	1583		1797	1526	1770	1863	1583	1770	1863	1583
Flt Permitted		0.65	1.00		0.72	1.00	0.25	1.00	1.00	0.09	1.00	1.00
Satd. Flow (perm)		1214	1583		1333	1526	470	1863	1583	172	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	22	86	34	413	151	419	46	611	377	398	626	32
RTOR Reduction (vph)	0	0	22	0	0	171	0	0	239	0	0	17
Lane Group Flow (vph)	0	108	13	0	564	248	46	611	138	398	626	15
Confl. Peds. (#/hr)	6					6						
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		40.0	40.0		40.0	40.0	44.7	39.8	39.8	58.8	49.9	49.9
Effective Green, g (s)		40.0	40.0		40.0	40.0	44.7	39.8	39.8	58.8	49.9	49.9
Actuated g/C Ratio		0.37	0.37		0.37	0.37	0.41	0.37	0.37	0.54	0.46	0.46
Clearance Time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		446	581		490	561	251	681	579	313	854	726
v/s Ratio Prot							0.01	0.33		c0.18	0.34	
v/s Ratio Perm		0.09	0.01		c0.42	0.16	0.07		0.09	c0.51		0.01
v/c Ratio		0.24	0.02		1.15	0.44	0.18	0.90	0.24	1.27	0.73	0.02
Uniform Delay, d1		23.9	21.9		34.4	26.0	20.7	32.6	24.0	33.1	24.0	16.1
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2	0.0		89.3	0.4	0.1	15.4	0.4	144.9	4.0	0.0
Delay (s)		24.1	21.9		123.7	26.4	20.8	47.9	24.4	178.0	28.0	16.1
Level of Service		C	C		F	C	C	D	C	F	C	B
Approach Delay (s)		23.6			82.2			38.2			84.2	
Approach LOS		C			F			D			F	

Intersection Summary			
HCM 2000 Control Delay	66.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	108.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	97.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	231	480	50	171	645	400	30	238	127	340	446	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.95		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1831		1770	1863	1583	1770	1752		1769	1760	
Flt Permitted	0.09	1.00		0.17	1.00	1.00	0.12	1.00		0.20	1.00	
Satd. Flow (perm)	168	1831		316	1863	1583	226	1752		373	1760	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	238	495	52	176	665	412	31	245	131	351	460	205
RTOR Reduction (vph)	0	3	0	0	0	237	0	14	0	0	11	0
Lane Group Flow (vph)	238	544	0	176	665	175	31	362	0	351	654	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	60.8	44.3		53.2	40.5	40.5	36.6	32.9		51.0	42.3	
Effective Green, g (s)	60.8	44.3		53.2	40.5	40.5	36.6	32.9		51.0	42.3	
Actuated g/C Ratio	0.49	0.36		0.43	0.33	0.33	0.30	0.27		0.41	0.34	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	297	659		286	613	521	113	468		303	605	
v/s Ratio Prot	c0.11	0.30		0.06	c0.36		0.01	0.21		c0.12	0.37	
v/s Ratio Perm	0.29			0.20		0.11	0.07			c0.36		
v/c Ratio	0.80	0.83		0.62	1.08	0.34	0.27	0.77		1.16	1.08	
Uniform Delay, d1	33.3	35.8		25.3	41.2	31.1	34.3	41.6		31.2	40.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.6	8.4		2.8	61.5	0.4	0.5	7.8		101.7	60.3	
Delay (s)	46.9	44.2		28.1	102.7	31.5	34.8	49.4		132.9	100.7	
Level of Service	D	D		C	F	C	C	D		F	F	
Approach Delay (s)		45.0			68.8			48.3			111.8	
Approach LOS		D			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	73.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	123.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	102.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	286	501	140	30	484	70	150	368	40	100	412	341
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	292	511	143	31	494	71	153	376	41	102	420	348

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	946	596	153	416	102	768
Volume Left (vph)	292	31	153	0	102	0
Volume Right (vph)	143	71	0	41	0	348
Hadj (s)	0.01	-0.03	0.53	-0.03	0.53	-0.28
Departure Headway (s)	9.5	9.4	10.2	9.6	10.2	9.3
Degree Utilization, x	2.49	1.56	0.43	1.11	0.29	2.00
Capacity (veh/h)	389	385	342	386	350	391
Control Delay (s)	696.8	288.9	19.5	109.5	16.0	476.9
Approach Delay (s)	696.8	288.9	85.3		422.9	
Approach LOS	F	F	F		F	

Intersection Summary			
Delay	418.5		
Level of Service	F		
Intersection Capacity Utilization	146.4%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	671	0	10	0	0	0	60	899	0	10	1237	884
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0					5.0	7.0		5.0	7.0	7.0
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes		1.00					1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00					1.00	1.00		1.00	1.00	1.00
Frt		1.00					1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95					0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1772					1770	3539		1770	3539	1550
Flt Permitted		0.95					0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1772					1770	3539		1770	3539	1550
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	729	0	11	0	0	0	65	977	0	11	1345	961
RTOR Reduction (vph)	0	54	0	0	0	0	0	0	0	0	0	405
Lane Group Flow (vph)	0	686	0	0	0	0	65	977	0	11	1345	556
Confl. Peds. (#/hr)												1
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4											6
Actuated Green, G (s)		30.1					7.8	78.8		1.3	72.3	72.3
Effective Green, g (s)		30.1					7.8	78.8		1.3	72.3	72.3
Actuated g/C Ratio		0.23					0.06	0.61		0.01	0.56	0.56
Clearance Time (s)		6.0					5.0	7.0		5.0	7.0	7.0
Vehicle Extension (s)		2.0					2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		416					107	2175		17	1995	874
v/s Ratio Prot							c0.04	0.28		0.01	c0.38	
v/s Ratio Perm		0.39										0.36
v/c Ratio		1.65					0.61	0.45		0.65	0.67	0.64
Uniform Delay, d1		49.0					58.7	13.1		63.2	19.7	19.0
Progression Factor		1.00					1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		303.1					6.5	0.3		49.2	1.2	2.1
Delay (s)		352.2					65.2	13.5		112.4	20.9	21.1
Level of Service		F					E	B		F	C	C
Approach Delay (s)		352.2			0.0			16.7			21.4	
Approach LOS		F			A			B			C	

Intersection Summary			
HCM 2000 Control Delay	79.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	128.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	90.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	30	12	82	70	120	13	811	67	120	788	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		0.98		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.94		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1839	1583		1697		1770	1837		1770	1863	1543
Flt Permitted		0.85	1.00		0.88		0.22	1.00		0.09	1.00	1.00
Satd. Flow (perm)		1589	1583		1521		410	1837		159	1863	1543
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	33	13	89	76	130	14	882	73	130	857	11
RTOR Reduction (vph)	0	0	10	0	22	0	0	2	0	0	0	4
Lane Group Flow (vph)	0	44	3	0	273	0	14	953	0	130	857	7
Confl. Peds. (#/hr)	1					1	2		5	5		2
Confl. Bikes (#/hr)						8						
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		22.6	22.6		23.1		69.4	67.5		80.3	74.4	74.4
Effective Green, g (s)		22.6	22.6		23.1		69.4	67.5		80.3	74.4	74.4
Actuated g/C Ratio		0.20	0.20		0.20		0.60	0.58		0.70	0.64	0.64
Clearance Time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		2.0	2.0		2.0		2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		311	310		304		268	1074		233	1201	994
v/s Ratio Prot							0.00	c0.52		c0.04	c0.46	
v/s Ratio Perm		0.03	0.00		c0.18		0.03			0.35		0.00
v/c Ratio		0.14	0.01		0.90		0.05	0.89		0.56	0.71	0.01
Uniform Delay, d1		38.4	37.4		45.0		11.9	20.7		20.9	13.5	7.3
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0		26.3		0.0	9.7		1.6	2.5	0.0
Delay (s)		38.5	37.4		71.3		11.9	30.4		22.5	16.0	7.3
Level of Service		D	D		E		B	C		C	B	A
Approach Delay (s)		38.2			71.3			30.1			16.8	
Approach LOS		D			E			C			B	

Intersection Summary			
HCM 2000 Control Delay	29.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	115.4	Sum of lost time (s)	16.5
Intersection Capacity Utilization	89.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	193	10	126	210	210	20	155	143	210	291	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1767	1847		1767	1863	1549	1768	1863	1549	1767	1823	
Flt Permitted	0.62	1.00		0.62	1.00	1.00	0.52	1.00	1.00	0.65	1.00	
Satd. Flow (perm)	1146	1847		1154	1863	1549	964	1863	1549	1211	1823	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	210	11	137	228	228	22	168	155	228	316	45
RTOR Reduction (vph)	0	5	0	0	0	152	0	0	90	0	12	0
Lane Group Flow (vph)	26	216	0	137	228	76	22	168	65	228	349	0
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	10.7	10.7		10.7	10.7	10.7	13.6	13.6	13.6	13.6	13.6	
Effective Green, g (s)	10.7	10.7		10.7	10.7	10.7	13.6	13.6	13.6	13.6	13.6	
Actuated g/C Ratio	0.33	0.33		0.33	0.33	0.33	0.42	0.42	0.42	0.42	0.42	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	379	611		382	617	513	405	784	652	509	767	
v/s Ratio Prot		0.12			c0.12			0.09			c0.19	
v/s Ratio Perm	0.02			0.12		0.05	0.02		0.04	0.19		
v/c Ratio	0.07	0.35		0.36	0.37	0.15	0.05	0.21	0.10	0.45	0.46	
Uniform Delay, d1	7.4	8.2		8.2	8.2	7.6	5.5	5.9	5.7	6.7	6.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.4		0.6	0.4	0.1	0.1	0.1	0.1	0.6	0.4	
Delay (s)	7.5	8.5		8.8	8.6	7.7	5.6	6.1	5.7	7.3	7.1	
Level of Service	A	A		A	A	A	A	A	A	A	A	
Approach Delay (s)		8.4			8.3			5.9			7.2	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	32.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	158	120	183	20	160	130	126	80	10	100	130	175
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	172	130	199	22	174	141	137	87	11	109	141	190
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	315			329			1052	932	230	816	961	245
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	315			329			1052	932	230	816	961	245
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	86			98			0	61	99	40	35	76
cM capacity (veh/h)	1245			1230			67	226	809	182	217	794

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	172	329	22	315	137	98	109	332
Volume Left	172	0	22	0	137	0	109	0
Volume Right	0	199	0	141	0	11	0	190
cSH	1245	1700	1230	1700	67	245	182	372
Volume to Capacity	0.14	0.19	0.02	0.19	2.05	0.40	0.60	0.89
Queue Length 95th (ft)	12	0	1	0	320	45	82	222
Control Delay (s)	8.4	0.0	8.0	0.0	621.7	29.1	50.6	57.0
Lane LOS	A		A		F	D	F	F
Approach Delay (s)	2.9		0.5		374.8		55.4	
Approach LOS					F		F	

Intersection Summary			
Average Delay	75.3		
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	209	90	130	610	650	367
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8		5.0	6.3	6.3	6.3
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	0.97		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1727		1770	3539	3539	1583
Flt Permitted	0.97		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1727		1770	3539	3539	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	230	99	143	670	714	403
RTOR Reduction (vph)	12	0	0	0	0	261
Lane Group Flow (vph)	317	0	143	670	714	142
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Actuated Green, G (s)	19.7		11.5	43.2	26.7	26.7
Effective Green, g (s)	19.7		11.5	43.2	26.7	26.7
Actuated g/C Ratio	0.26		0.15	0.57	0.35	0.35
Clearance Time (s)	6.8		5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	447		267	2011	1243	556
v/s Ratio Prot	c0.18		c0.08	0.19	c0.20	
v/s Ratio Perm						0.09
v/c Ratio	0.71		0.54	0.33	0.57	0.25
Uniform Delay, d1	25.6		29.8	8.7	20.0	17.6
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	4.2		1.0	0.1	0.6	0.2
Delay (s)	29.7		30.8	8.8	20.7	17.8
Level of Service	C		C	A	C	B
Approach Delay (s)	29.7			12.7	19.6	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	36	51	32	41	91	62	886	40	108	667	158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.91		1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1757	1672		1758	1638		1765	1863	1536	1770	1863	1536
Flt Permitted	0.62	1.00		0.70	1.00		0.31	1.00	1.00	0.18	1.00	1.00
Satd. Flow (perm)	1140	1672		1288	1638		568	1863	1536	334	1863	1536
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	39	55	35	45	99	67	963	43	117	725	172
RTOR Reduction (vph)	0	44	0	0	80	0	0	0	13	0	0	53
Lane Group Flow (vph)	136	50	0	35	64	0	67	963	30	117	725	119
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	13.8	13.8		13.8	13.8		49.6	49.6	49.6	49.6	49.6	49.6
Effective Green, g (s)	13.8	13.8		13.8	13.8		49.6	49.6	49.6	49.6	49.6	49.6
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.69	0.69	0.69	0.69	0.69	0.69
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	220	323		248	316		394	1294	1067	232	1294	1067
v/s Ratio Prot		0.03			0.04			c0.52			0.39	
v/s Ratio Perm	c0.12			0.03			0.12		0.02	0.35		0.08
v/c Ratio	0.62	0.15		0.14	0.20		0.17	0.74	0.03	0.50	0.56	0.11
Uniform Delay, d1	26.4	23.9		23.9	24.2		3.8	6.9	3.4	5.1	5.4	3.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.1	0.2		0.3	0.3		0.2	2.4	0.0	1.7	0.6	0.0
Delay (s)	31.5	24.2		24.1	24.5		4.0	9.3	3.4	6.8	6.0	3.7
Level of Service	C	C		C	C		A	A	A	A	A	A
Approach Delay (s)		28.5			24.4			8.7			5.7	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	71.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Volume (veh/h)	130	0	64	10	0	90	65	80	10	10	236	142
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	141	0	70	11	0	98	71	87	11	11	257	154
Approach Volume (veh/h)		211			109			168			422	
Crossing Volume (veh/h)		278			299			152			82	
High Capacity (veh/h)		1113			1095			1229			1299	
High v/c (veh/h)		0.19			0.10			0.14			0.32	
Low Capacity (veh/h)		915			899			1020			1084	
Low v/c (veh/h)		0.23			0.12			0.17			0.39	

Intersection Summary			
Maximum v/c High	0.32		
Maximum v/c Low	0.39		
Intersection Capacity Utilization	57.8%	ICU Level of Service	B

Intersection	
Intersection Delay, s/veh	7.1
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	211	109	169	422
Demand Flow Rate, veh/h	215	111	172	430
Vehicles Circulating, veh/h	284	305	155	83
Vehicles Exiting, veh/h	229	22	344	333
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	7.0	5.7	5.5	8.1
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	215	111	172	430
Cap Entry Lane, veh/h	851	833	968	1040
Entry HV Adj Factor	0.981	0.982	0.984	0.981
Flow Entry, veh/h	211	109	169	422
Cap Entry, veh/h	835	818	952	1020
V/C Ratio	0.253	0.133	0.178	0.413
Control Delay, s/veh	7.0	5.7	5.5	8.1
LOS	A	A	A	A
95th %tile Queue, veh	1	0	1	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	323	0	988	155	0	748
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		4.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frpb, ped/bikes	1.00		1.00	0.98		1.00
Flpb, ped/bikes	1.00		1.00	1.00		1.00
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	1770		1863	1550		1863
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	1770		1863	1550		1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	351	0	1074	168	0	813
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	351	0	1074	168	0	813
Confl. Peds. (#/hr)		2		2		
Turn Type	NA	custom	NA	Free	Perm	NA
Protected Phases			2			6
Permitted Phases	8	8		Free	6	
Actuated Green, G (s)	17.6		44.3	69.9		44.3
Effective Green, g (s)	17.6		44.3	69.9		44.3
Actuated g/C Ratio	0.25		0.63	1.00		0.63
Clearance Time (s)	4.0		4.0			4.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	445		1180	1550		1180
v/s Ratio Prot			c0.58			0.44
v/s Ratio Perm	c0.20			0.11		
v/c Ratio	0.79		0.91	0.11		0.69
Uniform Delay, d1	24.4		11.1	0.0		8.3
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	9.0		10.5	0.1		1.7
Delay (s)	33.4		21.6	0.1		10.0
Level of Service	C		C	A		B
Approach Delay (s)	33.4		18.7			10.0
Approach LOS	C		B			B

Intersection Summary			
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	69.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	10	10	720	10	10	10	883	730	10	981	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1817	1583	1681	1688	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1817	1583	1681	1688	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	11	11	11	766	11	11	11	939	777	11	1044	11
RTOR Reduction (vph)	0	0	11	0	0	0	0	0	0	0	0	6
Lane Group Flow (vph)	0	22	0	391	386	11	11	939	777	11	1044	5
Turn Type	Split	NA	Perm	Split	NA	Free	Prot	NA	Free	Prot	NA	Perm
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4			Free			Free			6
Actuated Green, G (s)		3.9	3.9	36.0	36.0	106.0	1.9	45.2	106.0	1.9	45.2	45.2
Effective Green, g (s)		3.9	3.9	36.0	36.0	106.0	1.9	45.2	106.0	1.9	45.2	45.2
Actuated g/C Ratio		0.04	0.04	0.34	0.34	1.00	0.02	0.43	1.00	0.02	0.43	0.43
Clearance Time (s)		5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)		66	58	570	573	1583	31	1509	1583	31	1509	675
v/s Ratio Prot		0.01		c0.23	0.23		0.01	0.27		0.01	c0.29	
v/s Ratio Perm			0.00			0.01			c0.49			0.00
v/c Ratio		0.33	0.01	0.69	0.67	0.01	0.35	0.62	0.49	0.35	0.69	0.01
Uniform Delay, d1		49.8	49.2	30.1	30.0	0.0	51.4	23.7	0.0	51.4	24.7	17.5
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		3.0	0.0	3.4	3.1	0.0	2.5	0.9	1.1	2.5	1.5	0.0
Delay (s)		52.8	49.2	33.6	33.1	0.0	54.0	24.6	1.1	54.0	26.2	17.5
Level of Service		D	D	C	C	A	D	C	A	D	C	B
Approach Delay (s)		51.6			32.9			14.2			26.4	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	22.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	64.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

LOS Worksheets – Year 2026 without Project Conditions

HCM Signalized Intersection Capacity Analysis
1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	210	80	270	150	320	60	440	370	460	510	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.98		1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1848	1550		1803	1583	1770	1863	1547	1770	1863	1583
Flt Permitted		0.69	1.00		0.53	1.00	0.29	1.00	1.00	0.18	1.00	1.00
Satd. Flow (perm)		1290	1550		994	1583	536	1863	1547	333	1863	1583
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	45	236	90	303	169	360	67	494	416	517	573	11
RTOR Reduction (vph)	0	0	56	0	0	173	0	0	234	0	0	6
Lane Group Flow (vph)	0	281	34	0	472	187	67	494	182	517	573	5
Confl. Peds. (#/hr)			1	1					1			
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		40.1	40.1		40.1	40.1	41.3	36.0	36.0	55.1	45.8	45.8
Effective Green, g (s)		40.1	40.1		40.1	40.1	41.3	36.0	36.0	55.1	45.8	45.8
Actuated g/C Ratio		0.38	0.38		0.38	0.38	0.39	0.34	0.34	0.52	0.44	0.44
Clearance Time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		491	590		378	603	272	637	529	380	811	689
v/s Ratio Prot							0.01	0.27		c0.19	0.31	
v/s Ratio Perm		0.22	0.02		c0.47	0.12	0.08		0.12	c0.52		0.00
v/c Ratio		0.57	0.06		1.25	0.31	0.25	0.78	0.34	1.36	0.71	0.01
Uniform Delay, d1		25.8	20.6		32.5	22.8	21.0	31.0	25.8	23.3	24.2	16.8
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.3	0.0		132.2	0.2	0.2	6.9	0.8	178.5	3.5	0.0
Delay (s)		27.1	20.6		164.7	23.1	21.2	37.8	26.6	201.8	27.8	16.8
Level of Service		C	C		F	C	C	D	C	F	C	B
Approach Delay (s)		25.5			103.4			31.9			109.4	
Approach LOS		C			F			C			F	

Intersection Summary			
HCM 2000 Control Delay	75.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	105.2	Sum of lost time (s)	14.0
Intersection Capacity Utilization	100.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	350	620	70	90	430	400	140	490	160	250	190	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.96		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1830		1770	1863	1539	1770	1781		1770	1735	
Flt Permitted	0.11	1.00		0.11	1.00	1.00	0.37	1.00		0.09	1.00	
Satd. Flow (perm)	213	1830		201	1863	1539	697	1781		165	1735	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	365	646	73	94	448	417	146	510	167	260	198	167
RTOR Reduction (vph)	0	2	0	0	0	157	0	8	0	0	21	0
Lane Group Flow (vph)	365	717	0	94	448	260	146	669	0	260	344	0
Confl. Peds. (#/hr)	3		1	1		3			4	4		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	67.0	53.4		45.7	37.1	37.1	48.0	40.2		58.3	45.5	
Effective Green, g (s)	67.0	53.4		45.7	37.1	37.1	48.0	40.2		58.3	45.5	
Actuated g/C Ratio	0.50	0.39		0.34	0.27	0.27	0.35	0.30		0.43	0.34	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	392	722		167	510	422	309	529		226	583	
v/s Ratio Prot	c0.17	c0.39		0.04	0.24		0.03	c0.38		c0.11	0.20	
v/s Ratio Perm	0.29			0.15		0.17	0.14			0.38		
v/c Ratio	0.93	0.99		0.56	0.88	0.62	0.47	1.26		1.15	0.59	
Uniform Delay, d1	38.8	40.8		35.6	46.9	42.9	31.4	47.6		40.2	37.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	28.3	31.5		2.6	15.7	2.7	0.4	133.2		106.4	1.5	
Delay (s)	67.2	72.2		38.2	62.6	45.6	31.9	180.8		146.7	38.7	
Level of Service	E	E		D	E	D	C	F		F	D	
Approach Delay (s)		70.5			52.8			154.4			83.6	
Approach LOS		E			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	87.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	135.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	108.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	140	390	160	70	420	230	250	620	80	120	490	160
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
Hourly flow rate (vph)	147	411	168	74	442	242	263	653	84	126	516	168

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	726	758	263	737	126	684
Volume Left (vph)	147	74	263	0	126	0
Volume Right (vph)	168	242	0	84	0	168
Hadj (s)	-0.06	-0.14	0.53	-0.05	0.53	-0.14
Departure Headway (s)	9.4	9.3	10.2	9.6	10.2	9.5
Degree Utilization, x	1.90	1.96	0.74	1.96	0.36	1.80
Capacity (veh/h)	389	392	349	381	351	384
Control Delay (s)	434.3	463.7	36.2	462.7	17.5	393.2
Approach Delay (s)	434.3	463.7	350.5		334.6	
Approach LOS	F	F	F		F	

Intersection Summary			
Delay	391.1		
Level of Service	F		
Intersection Capacity Utilization	126.6%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	810	0	50	0	0	0	110	1260	0	0	910	600
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0					5.0	7.0			7.0	7.0
Lane Util. Factor		1.00					1.00	0.95			0.95	1.00
Frt		0.99					1.00	1.00			1.00	0.85
Flt Protected		0.96					0.95	1.00			1.00	1.00
Satd. Flow (prot)		1765					1770	3539			3539	1583
Flt Permitted		0.96					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1765					1770	3539			3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	844	0	52	0	0	0	115	1312	0	0	948	625
RTOR Reduction (vph)	0	51	0	0	0	0	0	0	0	0	0	336
Lane Group Flow (vph)	0	845	0	0	0	0	115	1312	0	0	948	289
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4											6
Actuated Green, G (s)		30.7					11.9	68.9			52.0	52.0
Effective Green, g (s)		30.7					11.9	68.9			52.0	52.0
Actuated g/C Ratio		0.27					0.11	0.61			0.46	0.46
Clearance Time (s)		6.0					5.0	7.0			7.0	7.0
Vehicle Extension (s)		2.0					2.0	5.0			5.0	5.0
Lane Grp Cap (vph)		481					187	2165			1634	731
v/s Ratio Prot							0.06	c0.37			0.27	
v/s Ratio Perm		0.48										0.18
v/c Ratio		1.76					0.61	0.61			0.58	0.39
Uniform Delay, d1		40.9					48.2	13.5			22.3	19.9
Progression Factor		1.00					1.00	1.00			1.00	1.00
Incremental Delay, d2		349.1					4.2	0.7			0.8	0.7
Delay (s)		390.0					52.3	14.2			23.1	20.7
Level of Service		F					D	B			C	C
Approach Delay (s)		390.0			0.0			17.3			22.1	
Approach LOS		F			A			B			C	

Intersection Summary			
HCM 2000 Control Delay	105.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	112.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	101.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	120	10	30	60	60	10	710	20	200	700	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.98		0.98		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.95		1.00	1.00		1.00	1.00	0.85
Flt Protected		1.00	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1856	1546		1715		1769	1855		1770	1863	1548
Flt Permitted		0.96	1.00		0.89		0.30	1.00		0.16	1.00	1.00
Satd. Flow (perm)		1788	1546		1539		553	1855		294	1863	1548
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	11	136	11	34	68	68	11	807	23	227	795	11
RTOR Reduction (vph)	0	0	9	0	20	0	0	1	0	0	0	4
Lane Group Flow (vph)	0	147	2	0	150	0	11	829	0	227	795	7
Confl. Peds. (#/hr)	1		1	1		1	1					1
Confl. Bikes (#/hr)						8						
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		13.5	13.5		14.0		53.5	52.8		65.9	61.2	61.2
Effective Green, g (s)		13.5	13.5		14.0		53.5	52.8		65.9	61.2	61.2
Actuated g/C Ratio		0.15	0.15		0.15		0.58	0.57		0.72	0.67	0.67
Clearance Time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		2.0	2.0		2.0		2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		262	227		234		331	1065		356	1240	1030
v/s Ratio Prot							0.00	c0.45		c0.06	0.43	
v/s Ratio Perm		0.08	0.00		c0.10		0.02			0.39		0.00
v/c Ratio		0.56	0.01		0.64		0.03	0.78		0.64	0.64	0.01
Uniform Delay, d1		36.4	33.5		36.6		8.6	15.0		12.4	8.9	5.2
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		1.6	0.0		4.2		0.0	4.3		2.7	1.6	0.0
Delay (s)		38.1	33.5		40.8		8.6	19.3		15.2	10.5	5.2
Level of Service		D	C		D		A	B		B	B	A
Approach Delay (s)		37.8			40.8			19.2			11.5	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	91.9	Sum of lost time (s)	16.5
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	330	20	110	140	360	10	230	90	290	80	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1767	1844		1768	1863	1549	1767	1863	1549	1767	1824	
Flt Permitted	0.66	1.00		0.45	1.00	1.00	0.69	1.00	1.00	0.60	1.00	
Satd. Flow (perm)	1228	1844		838	1863	1549	1289	1863	1549	1124	1824	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.82
Adj. Flow (vph)	11	359	22	120	152	391	11	250	98	315	87	12
RTOR Reduction (vph)	0	5	0	0	0	250	0	0	58	0	7	0
Lane Group Flow (vph)	11	376	0	120	152	141	11	250	40	315	92	0
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	12.6	12.6		12.6	12.6	12.6	14.4	14.4	14.4	14.4	14.4	
Effective Green, g (s)	12.6	12.6		12.6	12.6	12.6	14.4	14.4	14.4	14.4	14.4	
Actuated g/C Ratio	0.36	0.36		0.36	0.36	0.36	0.41	0.41	0.41	0.41	0.41	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	442	663		301	670	557	530	766	637	462	750	
v/s Ratio Prot		c0.20			0.08			0.13			0.05	
v/s Ratio Perm	0.01			0.14		0.09	0.01		0.03	c0.28		
v/c Ratio	0.02	0.57		0.40	0.23	0.25	0.02	0.33	0.06	0.68	0.12	
Uniform Delay, d1	7.2	9.0		8.4	7.8	7.9	6.1	7.0	6.2	8.4	6.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	1.1		0.9	0.2	0.2	0.0	0.3	0.0	4.1	0.1	
Delay (s)	7.3	10.1		9.2	8.0	8.1	6.1	7.3	6.3	12.5	6.5	
Level of Service	A	B		A	A	A	A	A	A	B	A	
Approach Delay (s)		10.0			8.3			6.9			11.1	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	35.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	220	150	140	10	100	50	250	180	10	100	90	180
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	239	163	152	11	109	54	272	196	11	109	98	196
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	163			315			1092	902	239	908	951	136
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	163			315			1092	902	239	908	951	136
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	83			99			0	14	99	0	54	79
cM capacity (veh/h)	1416			1245			85	229	800	62	214	913

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	239	315	11	163	272	207	109	293
Volume Left	239	0	11	0	272	0	109	0
Volume Right	0	152	0	54	0	11	0	196
cSH	1416	1700	1245	1700	85	237	62	437
Volume to Capacity	0.17	0.19	0.01	0.10	3.21	0.87	1.75	0.67
Queue Length 95th (ft)	15	0	1	0	Err	177	248	121
Control Delay (s)	8.1	0.0	7.9	0.0	Err	73.3	503.8	28.5
Lane LOS	A		A		F	F	F	D
Approach Delay (s)	3.5		0.5		5712.9		157.0	
Approach LOS					F		F	

Intersection Summary			
Average Delay	1738.9		
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	500	180	90	600	570	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8		5.0	6.3	6.3	6.3
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1733		1770	3539	3539	1583
Flt Permitted	0.96		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1733		1770	3539	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	556	200	100	667	633	267
RTOR Reduction (vph)	8	0	0	0	0	191
Lane Group Flow (vph)	748	0	100	667	633	76
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Actuated Green, G (s)	32.4		7.8	35.8	23.0	23.0
Effective Green, g (s)	32.4		7.8	35.8	23.0	23.0
Actuated g/C Ratio	0.40		0.10	0.44	0.28	0.28
Clearance Time (s)	6.8		5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	690		169	1558	1001	447
v/s Ratio Prot	c0.43		c0.06	0.19	c0.18	
v/s Ratio Perm						0.05
v/c Ratio	1.08		0.59	0.43	0.63	0.17
Uniform Delay, d1	24.4		35.2	15.7	25.5	22.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	59.4		3.7	0.2	1.3	0.2
Delay (s)	83.8		38.9	15.9	26.8	22.1
Level of Service	F		D	B	C	C
Approach Delay (s)	83.8			18.9	25.4	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	41.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	81.3	Sum of lost time (s)	18.1
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	120	0	790	340	0	870
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		4.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	1770		1863	1583		1863
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	1770		1863	1583		1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	0	859	370	0	946
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	130	0	859	370	0	946
Turn Type	NA	custom	NA	Free	Perm	NA
Protected Phases			2			6
Permitted Phases	8	8		Free	6	
Actuated Green, G (s)	7.7		38.8	54.5		38.8
Effective Green, g (s)	7.7		38.8	54.5		38.8
Actuated g/C Ratio	0.14		0.71	1.00		0.71
Clearance Time (s)	4.0		4.0			4.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	250		1326	1583		1326
v/s Ratio Prot			0.46			c0.51
v/s Ratio Perm	c0.07			0.23		
v/c Ratio	0.52		0.65	0.23		0.71
Uniform Delay, d1	21.7		4.2	0.0		4.6
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	1.9		1.1	0.3		1.8
Delay (s)	23.6		5.3	0.3		6.4
Level of Service	C		A	A		A
Approach Delay (s)	23.6		3.8			6.4
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	6.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	54.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	10	10	740	10	10	10	1040	700	10	800	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1817	1583	1681	1687	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1817	1583	1681	1687	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	10	10	10	771	10	10	10	1083	729	10	833	10
RTOR Reduction (vph)	0	0	10	0	0	0	0	0	0	0	0	6
Lane Group Flow (vph)	0	20	0	393	388	10	10	1083	729	10	833	4
Turn Type	Split	NA	Perm	Split	NA	Free	Prot	NA	Free	Prot	NA	Perm
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4			Free			Free			6
Actuated Green, G (s)		3.9	3.9	36.7	36.7	108.6	1.9	47.1	108.6	1.9	47.1	47.1
Effective Green, g (s)		3.9	3.9	36.7	36.7	108.6	1.9	47.1	108.6	1.9	47.1	47.1
Actuated g/C Ratio		0.04	0.04	0.34	0.34	1.00	0.02	0.43	1.00	0.02	0.43	0.43
Clearance Time (s)		5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)		65	56	568	570	1583	30	1534	1583	30	1534	686
v/s Ratio Prot		0.01		c0.23	0.23		0.01	c0.31		0.01	0.24	
v/s Ratio Perm			0.00			0.01			c0.46			0.00
v/c Ratio		0.31	0.01	0.69	0.68	0.01	0.33	0.71	0.46	0.33	0.54	0.01
Uniform Delay, d1		51.0	50.5	31.1	30.9	0.0	52.7	25.1	0.0	52.7	22.8	17.5
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		2.7	0.0	3.6	3.3	0.0	2.4	1.6	1.0	2.4	0.5	0.0
Delay (s)		53.7	50.5	34.7	34.3	0.0	55.1	26.7	1.0	55.1	23.3	17.5
Level of Service		D	D	C	C	A	E	C	A	E	C	B
Approach Delay (s)		52.7			34.0			16.6			23.6	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	108.6	Sum of lost time (s)	19.0
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	100	30	280	170	410	70	480	270	400	490	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1846	1583		1807	1527	1770	1863	1583	1770	1863	1583
Flt Permitted		0.82	1.00		0.73	1.00	0.34	1.00	1.00	0.16	1.00	1.00
Satd. Flow (perm)		1522	1583		1366	1527	640	1863	1583	304	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	22	108	32	301	183	441	75	516	290	430	527	43
RTOR Reduction (vph)	0	0	20	0	0	208	0	0	189	0	0	24
Lane Group Flow (vph)	0	130	12	0	484	233	75	516	101	430	527	19
Confl. Peds. (#/hr)	6					6						
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		39.2	39.2		39.2	39.2	41.9	36.4	36.4	55.5	46.0	46.0
Effective Green, g (s)		39.2	39.2		39.2	39.2	41.9	36.4	36.4	55.5	46.0	46.0
Actuated g/C Ratio		0.37	0.37		0.37	0.37	0.40	0.35	0.35	0.53	0.44	0.44
Clearance Time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		569	592		511	571	315	647	550	372	818	695
v/s Ratio Prot							0.01	0.28		c0.17	0.28	
v/s Ratio Perm		0.09	0.01		c0.35	0.15	0.08		0.06	c0.44		0.01
v/c Ratio		0.23	0.02		0.95	0.41	0.24	0.80	0.18	1.16	0.64	0.03
Uniform Delay, d1		22.4	20.6		31.7	24.2	20.2	30.8	23.8	24.7	23.0	16.7
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0		26.8	0.3	0.1	7.8	0.3	96.3	2.4	0.0
Delay (s)		22.6	20.7		58.6	24.5	20.3	38.6	24.1	121.0	25.3	16.7
Level of Service		C	C		E	C	C	D	C	F	C	B
Approach Delay (s)		22.2			42.3			32.3			66.1	
Approach LOS		C			D			C			E	

Intersection Summary			
HCM 2000 Control Delay	46.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	104.7	Sum of lost time (s)	14.0
Intersection Capacity Utilization	90.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	180	460	80	110	660	400	30	220	70	360	430	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.96		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1814		1769	1863	1583	1770	1786		1769	1790	
Flt Permitted	0.09	1.00		0.19	1.00	1.00	0.14	1.00		0.30	1.00	
Satd. Flow (perm)	168	1814		361	1863	1583	258	1786		550	1790	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	186	474	82	113	680	412	31	227	72	371	443	124
RTOR Reduction (vph)	0	4	0	0	0	226	0	8	0	0	7	0
Lane Group Flow (vph)	186	552	0	113	680	186	31	291	0	371	560	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	56.9	44.3		49.1	40.4	40.4	33.8	30.1		48.2	39.5	
Effective Green, g (s)	56.9	44.3		49.1	40.4	40.4	33.8	30.1		48.2	39.5	
Actuated g/C Ratio	0.49	0.38		0.42	0.35	0.35	0.29	0.26		0.41	0.34	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	255	691		257	647	550	123	462		365	608	
v/s Ratio Prot	c0.08	c0.30		0.03	c0.37		0.01	0.16		c0.11	0.31	
v/s Ratio Perm	0.28			0.15		0.12	0.07			c0.31		
v/c Ratio	0.73	0.80		0.44	1.05	0.34	0.25	0.63		1.02	0.92	
Uniform Delay, d1	27.1	32.0		23.4	37.9	28.0	31.7	38.1		31.3	36.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.5	6.4		0.4	49.5	0.4	0.4	2.7		51.3	19.5	
Delay (s)	35.6	38.4		23.8	87.4	28.4	32.1	40.8		82.6	56.4	
Level of Service	D	D		C	F	C	C	D		F	E	
Approach Delay (s)		37.7			61.3			40.0			66.8	
Approach LOS		D			E			D			E	

Intersection Summary			
HCM 2000 Control Delay	55.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	116.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	97.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	230	430	170	30	440	90	130	390	40	100	470	300
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	235	439	173	31	449	92	133	398	41	102	480	306

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	847	571	133	439	102	786
Volume Left (vph)	235	31	133	0	102	0
Volume Right (vph)	173	92	0	41	0	306
Hadj (s)	-0.03	-0.05	0.53	-0.03	0.53	-0.24
Departure Headway (s)	9.4	9.4	10.2	9.6	10.2	9.4
Degree Utilization, x	2.22	1.49	0.37	1.17	0.29	2.05
Capacity (veh/h)	389	394	351	379	350	390
Control Delay (s)	576.9	259.9	17.9	130.3	16.0	501.2
Approach Delay (s)	576.9	259.9	104.2		445.4	
Approach LOS	F	F	F		F	

Intersection Summary			
Delay	379.5		
Level of Service	F		
Intersection Capacity Utilization	139.7%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	650	0	10	0	0	0	70	900	0	10	1330	850
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0					5.0	7.0		5.0	7.0	7.0
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes		1.00					1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00					1.00	1.00		1.00	1.00	1.00
Frt		1.00					1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95					0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1772					1770	3539		1770	3539	1550
Flt Permitted		0.95					0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1772					1770	3539		1770	3539	1550
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	707	0	11	0	0	0	76	978	0	11	1446	924
RTOR Reduction (vph)	0	54	0	0	0	0	0	0	0	0	0	396
Lane Group Flow (vph)	0	664	0	0	0	0	76	978	0	11	1446	528
Confl. Peds. (#/hr)												1
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4											6
Actuated Green, G (s)		30.1					8.5	80.4		1.3	73.2	73.2
Effective Green, g (s)		30.1					8.5	80.4		1.3	73.2	73.2
Actuated g/C Ratio		0.23					0.07	0.62		0.01	0.56	0.56
Clearance Time (s)		6.0					5.0	7.0		5.0	7.0	7.0
Vehicle Extension (s)		2.0					2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		410					115	2192		17	1995	874
v/s Ratio Prot							c0.04	0.28		0.01	c0.41	
v/s Ratio Perm		0.37										0.34
v/c Ratio		1.62					0.66	0.45		0.65	0.72	0.60
Uniform Delay, d1		49.9					59.2	13.0		64.0	20.9	18.7
Progression Factor		1.00					1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		290.1					10.5	0.3		49.2	1.6	1.7
Delay (s)		339.9					69.7	13.3		113.2	22.5	20.5
Level of Service		F					E	B		F	C	C
Approach Delay (s)		339.9			0.0			17.4			22.1	
Approach LOS		F			A			B			C	

Intersection Summary			
HCM 2000 Control Delay	75.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	129.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	92.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	50	10	30	90	120	10	670	30	80	620	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		0.98		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.93		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1847	1583		1695		1769	1848		1770	1863	1545
Flt Permitted		0.91	1.00		0.95		0.32	1.00		0.19	1.00	1.00
Satd. Flow (perm)		1687	1583		1622		599	1848		355	1863	1545
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	54	11	33	98	130	11	728	33	87	674	11
RTOR Reduction (vph)	0	0	9	0	28	0	0	1	0	0	0	4
Lane Group Flow (vph)	0	65	2	0	233	0	11	760	0	87	674	7
Confl. Peds. (#/hr)	1					1	2		5	5		2
Confl. Bikes (#/hr)						8						
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		17.1	17.1		17.6		49.6	48.9		57.7	53.0	53.0
Effective Green, g (s)		17.1	17.1		17.6		49.6	48.9		57.7	53.0	53.0
Actuated g/C Ratio		0.20	0.20		0.20		0.57	0.56		0.66	0.61	0.61
Clearance Time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		2.0	2.0		2.0		2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		330	310		327		349	1035		312	1131	937
v/s Ratio Prot							0.00	c0.41		c0.02	c0.36	
v/s Ratio Perm		0.04	0.00		c0.14		0.02			0.17		0.00
v/c Ratio		0.20	0.01		0.71		0.03	0.73		0.28	0.60	0.01
Uniform Delay, d1		29.4	28.3		32.5		8.8	14.3		9.7	10.6	6.8
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0		6.0		0.0	3.3		0.2	1.3	0.0
Delay (s)		29.5	28.3		38.5		8.8	17.7		9.9	11.8	6.8
Level of Service		C	C		D		A	B		A	B	A
Approach Delay (s)		29.3			38.5			17.5			11.6	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	87.3	Sum of lost time (s)	16.5
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	150	10	80	210	240	20	70	100	260	210	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1767	1843		1767	1863	1549	1767	1863	1549	1767	1835	
Flt Permitted	0.62	1.00		0.65	1.00	1.00	0.60	1.00	1.00	0.71	1.00	
Satd. Flow (perm)	1146	1843		1204	1863	1549	1124	1863	1549	1316	1835	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	163	11	87	228	261	22	76	109	283	228	22
RTOR Reduction (vph)	0	6	0	0	0	176	0	0	62	0	7	0
Lane Group Flow (vph)	11	168	0	87	228	85	22	76	47	283	243	0
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	10.6	10.6		10.6	10.6	10.6	13.9	13.9	13.9	13.9	13.9	
Effective Green, g (s)	10.6	10.6		10.6	10.6	10.6	13.9	13.9	13.9	13.9	13.9	
Actuated g/C Ratio	0.33	0.33		0.33	0.33	0.33	0.43	0.43	0.43	0.43	0.43	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	373	601		392	607	505	480	796	662	562	784	
v/s Ratio Prot		0.09			c0.12			0.04			0.13	
v/s Ratio Perm	0.01			0.07		0.05	0.02		0.03	c0.22		
v/c Ratio	0.03	0.28		0.22	0.38	0.17	0.05	0.10	0.07	0.50	0.31	
Uniform Delay, d1	7.5	8.1		8.0	8.4	7.8	5.4	5.5	5.5	6.8	6.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	0.3		0.3	0.4	0.2	0.0	0.1	0.0	0.7	0.2	
Delay (s)	7.5	8.4		8.2	8.8	8.0	5.5	5.6	5.5	7.5	6.4	
Level of Service	A	A		A	A	A	A	A	A	A	A	
Approach Delay (s)		8.3			8.3			5.6			7.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	32.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	150	100	180	20	140	130	110	80	10	100	130	190
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	163	109	196	22	152	141	120	87	11	109	141	207
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	293			304			1005	870	207	755	897	223
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	293			304			1005	870	207	755	897	223
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	87			98			0	65	99	48	41	75
cM capacity (veh/h)	1268			1256			79	248	834	209	239	817

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	163	304	22	293	120	98	109	348
Volume Left	163	0	22	0	120	0	109	0
Volume Right	0	196	0	141	0	11	0	207
cSH	1268	1700	1256	1700	79	269	209	412
Volume to Capacity	0.13	0.18	0.02	0.17	1.52	0.36	0.52	0.84
Queue Length 95th (ft)	11	0	1	0	243	40	67	202
Control Delay (s)	8.3	0.0	7.9	0.0	379.8	25.8	39.4	46.0
Lane LOS	A		A		F	D	E	E
Approach Delay (s)	2.9		0.5		220.5		44.4	
Approach LOS					F		E	

Intersection Summary			
Average Delay	47.9		
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	200	90	100	630	700	400
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8		5.0	6.3	6.3	6.3
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	0.97		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1725		1770	3539	3539	1583
Flt Permitted	0.97		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1725		1770	3539	3539	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	220	99	110	692	769	440
RTOR Reduction (vph)	13	0	0	0	0	271
Lane Group Flow (vph)	306	0	110	692	769	169
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Actuated Green, G (s)	19.3		8.1	41.4	28.3	28.3
Effective Green, g (s)	19.3		8.1	41.4	28.3	28.3
Actuated g/C Ratio	0.26		0.11	0.56	0.38	0.38
Clearance Time (s)	6.8		5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	451		194	1985	1357	607
v/s Ratio Prot	c0.18		c0.06	0.20	c0.22	
v/s Ratio Perm						0.11
v/c Ratio	0.68		0.57	0.35	0.57	0.28
Uniform Delay, d1	24.5		31.2	8.8	17.9	15.7
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	3.2		2.3	0.1	0.5	0.3
Delay (s)	27.7		33.4	8.9	18.5	16.0
Level of Service	C		C	A	B	B
Approach Delay (s)	27.7			12.3	17.6	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	73.8	Sum of lost time (s)	18.1
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	310	0	930	110	0	710
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		4.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	1770		1863	1583		1863
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	1770		1863	1583		1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	337	0	1011	120	0	772
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	337	0	1011	120	0	772
Turn Type	NA	custom	NA	Free	Perm	NA
Protected Phases			2			6
Permitted Phases	8	8		Free	6	
Actuated Green, G (s)	14.4		35.1	57.5		35.1
Effective Green, g (s)	14.4		35.1	57.5		35.1
Actuated g/C Ratio	0.25		0.61	1.00		0.61
Clearance Time (s)	4.0		4.0			4.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	443		1137	1583		1137
v/s Ratio Prot			c0.54			0.41
v/s Ratio Perm	c0.19			0.08		
v/c Ratio	0.76		0.89	0.08		0.68
Uniform Delay, d1	20.0		9.5	0.0		7.5
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	7.5		8.7	0.1		1.6
Delay (s)	27.5		18.3	0.1		9.1
Level of Service	C		B	A		A
Approach Delay (s)	27.5		16.3			9.1
Approach LOS	C		B			A

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	57.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	10	10	760	10	10	10	770	710	10	940	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1817	1583	1681	1688	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1817	1583	1681	1688	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	11	11	11	809	11	11	11	819	755	11	1000	11
RTOR Reduction (vph)	0	0	11	0	0	0	0	0	0	0	0	7
Lane Group Flow (vph)	0	22	0	413	407	11	11	819	755	11	1000	4
Turn Type	Split	NA	Perm	Split	NA	Free	Prot	NA	Free	Prot	NA	Perm
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4			Free			Free			6
Actuated Green, G (s)		4.0	4.0	37.8	37.8	105.7	1.9	43.0	105.7	1.9	43.0	43.0
Effective Green, g (s)		4.0	4.0	37.8	37.8	105.7	1.9	43.0	105.7	1.9	43.0	43.0
Actuated g/C Ratio		0.04	0.04	0.36	0.36	1.00	0.02	0.41	1.00	0.02	0.41	0.41
Clearance Time (s)		5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)		68	59	601	603	1583	31	1439	1583	31	1439	643
v/s Ratio Prot		0.01		c0.25	0.24		0.01	0.23		0.01	c0.28	
v/s Ratio Perm			0.00			0.01			c0.48			0.00
v/c Ratio		0.32	0.01	0.69	0.67	0.01	0.35	0.57	0.48	0.35	0.69	0.01
Uniform Delay, d1		49.5	48.9	28.9	28.7	0.0	51.3	24.2	0.0	51.3	25.9	18.6
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		2.8	0.0	3.3	3.0	0.0	2.5	0.6	1.0	2.5	1.6	0.0
Delay (s)		52.3	49.0	32.2	31.7	0.0	53.8	24.8	1.0	53.8	27.5	18.7
Level of Service		D	D	C	C	A	D	C	A	D	C	B
Approach Delay (s)		51.2			31.5			13.7			27.7	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	22.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	105.7	Sum of lost time (s)	19.0
Intersection Capacity Utilization	64.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

LOS Worksheets – Year 2026 with Project Conditions

HCM Signalized Intersection Capacity Analysis
1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	210	81	303	150	320	61	572	439	460	592	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.98		1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1848	1550		1801	1583	1770	1863	1547	1770	1863	1583
Flt Permitted		0.59	1.00		0.51	1.00	0.21	1.00	1.00	0.09	1.00	1.00
Satd. Flow (perm)		1091	1550		954	1583	385	1863	1547	166	1863	1583
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	45	236	91	340	169	360	69	643	493	517	665	11
RTOR Reduction (vph)	0	0	58	0	0	164	0	0	219	0	0	6
Lane Group Flow (vph)	0	281	33	0	509	196	69	643	274	517	665	5
Confl. Peds. (#/hr)			1	1					1			
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		40.0	40.0		40.0	40.0	46.3	40.8	40.8	59.8	50.3	50.3
Effective Green, g (s)		40.0	40.0		40.0	40.0	46.3	40.8	40.8	59.8	50.3	50.3
Actuated g/C Ratio		0.36	0.36		0.36	0.36	0.42	0.37	0.37	0.54	0.46	0.46
Clearance Time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		397	564		347	576	231	692	574	309	853	725
v/s Ratio Prot							0.01	0.35		c0.23	0.36	
v/s Ratio Perm		0.26	0.02		c0.53	0.12	0.11		0.18	c0.68		0.00
v/c Ratio		0.71	0.06		1.47	0.34	0.30	0.93	0.48	1.67	0.78	0.01
Uniform Delay, d1		29.9	22.7		34.9	25.3	21.2	33.1	26.3	33.9	25.1	16.2
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		5.3	0.0		225.3	0.3	0.3	19.5	1.3	316.8	5.3	0.0
Delay (s)		35.2	22.7		260.2	25.6	21.4	52.6	27.7	350.7	30.4	16.2
Level of Service		D	C		F	C	C	D	C	F	C	B
Approach Delay (s)		32.1			163.0			40.6			169.1	
Approach LOS		C			F			D			F	

Intersection Summary			
HCM 2000 Control Delay	111.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.63		
Actuated Cycle Length (s)	109.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	109.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	372	667	70	171	453	400	140	587	262	250	244	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.95		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1832		1770	1863	1538	1770	1760		1770	1748	
Flt Permitted	0.09	1.00		0.10	1.00	1.00	0.27	1.00		0.09	1.00	
Satd. Flow (perm)	172	1832		195	1863	1538	495	1760		165	1748	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	388	695	73	178	472	417	146	611	273	260	254	177
RTOR Reduction (vph)	0	3	0	0	0	135	0	11	0	0	18	0
Lane Group Flow (vph)	388	765	0	178	472	282	146	873	0	260	413	0
Confl. Peds. (#/hr)	3		1	1		3			4	4		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	70.4	51.0		52.6	38.2	38.2	48.0	40.1		58.1	45.2	
Effective Green, g (s)	70.4	51.0		52.6	38.2	38.2	48.0	40.1		58.1	45.2	
Actuated g/C Ratio	0.51	0.37		0.38	0.28	0.28	0.35	0.29		0.42	0.33	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	401	674		237	513	424	244	509		219	570	
v/s Ratio Prot	c0.19	c0.42		0.08	0.25		0.03	c0.50		c0.11	0.24	
v/s Ratio Perm	0.30			0.21		0.18	0.17			0.38		
v/c Ratio	0.97	1.14		0.75	0.92	0.66	0.60	1.71		1.19	0.73	
Uniform Delay, d1	43.4	43.8		34.3	48.7	44.5	34.2	49.2		40.9	41.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	35.9	78.5		11.2	21.9	3.9	2.6	329.8		120.6	4.6	
Delay (s)	79.3	122.2		45.5	70.6	48.4	36.9	379.0		161.5	45.7	
Level of Service	E	F		D	E	D	D	F		F	D	
Approach Delay (s)		107.8			57.7			330.5			89.3	
Approach LOS		F			E			F			F	

Intersection Summary			
HCM 2000 Control Delay	149.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.34		
Actuated Cycle Length (s)	138.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	126.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	189	490	160	70	488	230	250	653	80	120	503	195
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
Hourly flow rate (vph)	199	516	168	74	514	242	263	687	84	126	529	205

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	883	829	263	772	126	735
Volume Left (vph)	199	74	263	0	126	0
Volume Right (vph)	168	242	0	84	0	205
Hadj (s)	-0.04	-0.12	0.53	-0.04	0.53	-0.16
Departure Headway (s)	9.4	9.3	10.2	9.6	10.2	9.5
Degree Utilization, x	2.31	2.15	0.74	2.05	0.36	1.93
Capacity (veh/h)	390	393	349	382	351	386
Control Delay (s)	618.8	547.3	36.2	503.9	17.5	449.6
Approach Delay (s)	618.8	547.3	385.0		386.2	
Approach LOS	F	F	F		F	

Intersection Summary			
Delay	479.8		
Level of Service	F		
Intersection Capacity Utilization	151.3%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	910	0	50	0	0	0	110	1335	0	0	940	668
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0					5.0	7.0			7.0	7.0
Lane Util. Factor		1.00					1.00	0.95			0.95	1.00
Frt		0.99					1.00	1.00			1.00	0.85
Flt Protected		0.95					0.95	1.00			1.00	1.00
Satd. Flow (prot)		1766					1770	3539			3539	1583
Flt Permitted		0.95					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1766					1770	3539			3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	948	0	52	0	0	0	115	1391	0	0	979	696
RTOR Reduction (vph)	0	52	0	0	0	0	0	0	0	0	0	362
Lane Group Flow (vph)	0	948	0	0	0	0	115	1391	0	0	979	334
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4											6
Actuated Green, G (s)		30.7					12.1	73.1			56.0	56.0
Effective Green, g (s)		30.7					12.1	73.1			56.0	56.0
Actuated g/C Ratio		0.26					0.10	0.63			0.48	0.48
Clearance Time (s)		6.0					5.0	7.0			7.0	7.0
Vehicle Extension (s)		2.0					2.0	5.0			5.0	5.0
Lane Grp Cap (vph)		464					183	2214			1696	758
v/s Ratio Prot							0.06	c0.39			0.28	
v/s Ratio Perm		0.54										0.21
v/c Ratio		2.04					0.63	0.63			0.58	0.44
Uniform Delay, d1		43.0					50.2	13.5			21.9	20.1
Progression Factor		1.00					1.00	1.00			1.00	1.00
Incremental Delay, d2		477.3					4.8	0.8			0.8	0.9
Delay (s)		520.3					55.0	14.3			22.6	20.9
Level of Service		F					D	B			C	C
Approach Delay (s)		520.3			0.0			17.4			21.9	
Approach LOS		F			A			B			C	

Intersection Summary			
HCM 2000 Control Delay	139.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	116.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	108.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	120	11	59	60	60	11	911	90	200	816	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.95		1.00	0.99		1.00	1.00	0.85
Flt Protected		1.00	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1856	1547		1725		1770	1838		1770	1863	1547
Flt Permitted		0.96	1.00		0.73		0.22	1.00		0.05	1.00	1.00
Satd. Flow (perm)		1783	1547		1271		410	1838		97	1863	1547
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	11	136	12	67	68	68	12	1035	102	227	927	11
RTOR Reduction (vph)	0	0	10	0	15	0	0	2	0	0	0	3
Lane Group Flow (vph)	0	147	2	0	188	0	12	1135	0	227	927	8
Confl. Peds. (#/hr)	1		1	1		1	1					1
Confl. Bikes (#/hr)						8						
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		19.7	19.7		20.2		74.7	72.8		90.0	84.1	84.1
Effective Green, g (s)		19.7	19.7		20.2		74.7	72.8		90.0	84.1	84.1
Actuated g/C Ratio		0.16	0.16		0.17		0.61	0.60		0.74	0.69	0.69
Clearance Time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		2.0	2.0		2.0		2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		287	249		210		271	1094		252	1282	1064
v/s Ratio Prot							0.00	c0.62		c0.10	0.50	
v/s Ratio Perm		0.08	0.00		c0.15		0.03			0.57		0.00
v/c Ratio		0.51	0.01		0.90		0.04	1.04		0.90	0.72	0.01
Uniform Delay, d1		46.9	43.0		50.0		11.5	24.7		42.9	11.8	6.0
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.6	0.0		34.1		0.0	37.3		31.3	2.5	0.0
Delay (s)		47.5	43.0		84.0		11.6	62.0		74.2	14.3	6.0
Level of Service		D	D		F		B	E		E	B	A
Approach Delay (s)		47.2			84.0			61.5			25.9	
Approach LOS		D			F			E			C	

Intersection Summary			
HCM 2000 Control Delay	46.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	122.2	Sum of lost time (s)	16.5
Intersection Capacity Utilization	94.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	383	20	159	162	360	10	418	205	290	210	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00	1.00	0.99	1.00	1.00	0.99	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1752	1846		1759	1863	1532	1753	1863	1532	1759	1834	
Flt Permitted	0.65	1.00		0.33	1.00	1.00	0.60	1.00	1.00	0.41	1.00	
Satd. Flow (perm)	1191	1846		608	1863	1532	1116	1863	1532	754	1834	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.82
Adj. Flow (vph)	30	416	22	173	176	391	11	454	223	315	228	21
RTOR Reduction (vph)	0	4	0	0	0	197	0	0	116	0	7	0
Lane Group Flow (vph)	30	434	0	173	176	194	11	454	107	315	242	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	16.2	16.2		16.2	16.2	16.2	22.3	22.3	22.3	22.3	22.3	
Effective Green, g (s)	16.2	16.2		16.2	16.2	16.2	22.3	22.3	22.3	22.3	22.3	
Actuated g/C Ratio	0.35	0.35		0.35	0.35	0.35	0.48	0.48	0.48	0.48	0.48	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	414	643		211	649	533	535	893	734	361	879	
v/s Ratio Prot		0.24			0.09			0.24			0.13	
v/s Ratio Perm	0.03			c0.28		0.13	0.01		0.07	c0.42		
v/c Ratio	0.07	0.68		0.82	0.27	0.36	0.02	0.51	0.15	0.87	0.28	
Uniform Delay, d1	10.1	12.9		13.8	10.9	11.3	6.4	8.3	6.8	10.8	7.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	2.8		21.4	0.2	0.4	0.0	0.5	0.1	20.0	0.2	
Delay (s)	10.2	15.7		35.2	11.1	11.7	6.4	8.8	6.9	30.9	7.4	
Level of Service	B	B		D	B	B	A	A	A	C	A	
Approach Delay (s)		15.4			17.1			8.1			20.5	
Approach LOS		B			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	46.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	280	232	160	10	132	50	259	180	10	100	90	206
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	304	252	174	11	143	54	282	196	11	109	98	224
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	198			426			1386	1167	339	1162	1227	171
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	198			426			1386	1167	339	1162	1227	171
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			99			0	0	98	0	29	74
cM capacity (veh/h)	1375			1133			32	149	703	0	137	873

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	304	426	11	198	282	207	109	322
Volume Left	304	0	11	0	282	0	109	0
Volume Right	0	174	0	54	0	11	0	224
cSH	1375	1700	1133	1700	32	156	0	332
Volume to Capacity	0.22	0.25	0.01	0.12	8.77	1.33	Err	0.97
Queue Length 95th (ft)	21	0	1	0	Err	313	Err	259
Control Delay (s)	8.4	0.0	8.2	0.0	Err	240.2	Err	77.7
Lane LOS	A		A		F	F	F	F
Approach Delay (s)	3.5		0.4		5869.4		Err	
Approach LOS					F		F	

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	575	180	90	600	570	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8		5.0	6.3	6.3	6.3
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1737		1770	3539	3539	1583
Flt Permitted	0.96		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1737		1770	3539	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	639	200	100	667	633	300
RTOR Reduction (vph)	7	0	0	0	0	214
Lane Group Flow (vph)	832	0	100	667	633	86
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Actuated Green, G (s)	32.5		7.8	36.2	23.4	23.4
Effective Green, g (s)	32.5		7.8	36.2	23.4	23.4
Actuated g/C Ratio	0.40		0.10	0.44	0.29	0.29
Clearance Time (s)	6.8		5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	690		168	1566	1012	452
v/s Ratio Prot	c0.48		c0.06	0.19	c0.18	
v/s Ratio Perm						0.05
v/c Ratio	1.21		0.60	0.43	0.63	0.19
Uniform Delay, d1	24.6		35.5	15.7	25.4	22.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	106.2		3.7	0.2	1.2	0.2
Delay (s)	130.8		39.2	15.8	26.6	22.2
Level of Service	F		D	B	C	C
Approach Delay (s)	130.8			18.9	25.2	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	58.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	81.8	Sum of lost time (s)	18.1
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	108	30	38	31	22	54	30	899	33	50	910	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.92		1.00	0.89		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1758	1683		1760	1632		1768	1863	1539	1768	1863	1539
Flt Permitted	0.70	1.00		0.71	1.00		0.17	1.00	1.00	0.18	1.00	1.00
Satd. Flow (perm)	1301	1683		1313	1632		316	1863	1539	328	1863	1539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	33	41	34	24	59	33	977	36	54	989	60
RTOR Reduction (vph)	0	34	0	0	49	0	0	0	11	0	0	18
Lane Group Flow (vph)	117	40	0	34	34	0	33	977	25	54	989	42
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	9.9	9.9		9.9	9.9		40.3	40.3	40.3	40.3	40.3	40.3
Effective Green, g (s)	9.9	9.9		9.9	9.9		40.3	40.3	40.3	40.3	40.3	40.3
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.69	0.69	0.69	0.69	0.69	0.69
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	221	286		223	277		218	1290	1065	227	1290	1065
v/s Ratio Prot		0.02			0.02			0.52			c0.53	
v/s Ratio Perm	c0.09			0.03			0.10		0.02	0.16		0.03
v/c Ratio	0.53	0.14		0.15	0.12		0.15	0.76	0.02	0.24	0.77	0.04
Uniform Delay, d1	22.0	20.5		20.6	20.5		3.1	5.8	2.8	3.3	5.9	2.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.3	0.2		0.3	0.2		0.3	2.6	0.0	0.5	2.8	0.0
Delay (s)	24.3	20.8		20.9	20.7		3.4	8.4	2.8	3.8	8.7	2.8
Level of Service	C	C		C	C		A	A	A	A	A	A
Approach Delay (s)		22.9			20.7			8.0			8.1	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	58.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Volume (veh/h)	90	0	24	10	0	10	24	474	10	90	164	55
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	0	26	11	0	11	26	515	11	98	178	60
Approach Volume (veh/h)		124			22			552			336	
Crossing Volume (veh/h)		287			639			196			37	
High Capacity (veh/h)		1106			835			1188			1345	
High v/c (veh/h)		0.11			0.03			0.46			0.25	
Low Capacity (veh/h)		908			667			983			1125	
Low v/c (veh/h)		0.14			0.03			0.56			0.30	

Intersection Summary				
Maximum v/c High	0.46			
Maximum v/c Low	0.56			
Intersection Capacity Utilization	63.8%	ICU Level of Service	B	

Intersection	
Intersection Delay, s/veh	9.9
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	124	22	552	336
Demand Flow Rate, veh/h	127	22	563	343
Vehicles Circulating, veh/h	293	652	200	38
Vehicles Exiting, veh/h	88	111	220	636
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.9	6.5	13.0	6.5
Approach LOS	A	A	B	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	127	22	563	343
Cap Entry Lane, veh/h	843	589	925	1088
Entry HV Adj Factor	0.976	1.000	0.980	0.981
Flow Entry, veh/h	124	22	552	336
Cap Entry, veh/h	823	589	907	1067
V/C Ratio	0.151	0.037	0.609	0.315
Control Delay, s/veh	5.9	6.5	13.0	6.5
LOS	A	A	B	A
95th %tile Queue, veh	1	0	4	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	86	6	24	15	1	25	9	852	7	8	934	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.97		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.88		1.00	0.86		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1756	1608		1758	1551		1770	1863	1538	1767	1863	1538
Flt Permitted	0.74	1.00		0.74	1.00		0.17	1.00	1.00	0.22	1.00	1.00
Satd. Flow (perm)	1366	1608		1362	1551		324	1863	1538	407	1863	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	93	7	26	16	1	27	10	926	8	9	1015	41
RTOR Reduction (vph)	0	22	0	0	23	0	0	0	2	0	0	11
Lane Group Flow (vph)	93	11	0	16	5	0	10	926	6	9	1015	30
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	9.3	9.3		9.3	9.3		44.4	44.4	44.4	44.4	44.4	44.4
Effective Green, g (s)	9.3	9.3		9.3	9.3		44.4	44.4	44.4	44.4	44.4	44.4
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.72	0.72	0.72	0.72	0.72	0.72
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	205	242		205	233		233	1340	1106	292	1340	1106
v/s Ratio Prot		0.01			0.00			0.50			c0.54	
v/s Ratio Perm	c0.07			0.01			0.03		0.00	0.02		0.02
v/c Ratio	0.45	0.05		0.08	0.02		0.04	0.69	0.01	0.03	0.76	0.03
Uniform Delay, d1	23.9	22.4		22.5	22.3		2.5	4.8	2.4	2.5	5.3	2.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	0.1		0.2	0.0		0.1	1.6	0.0	0.0	2.5	0.0
Delay (s)	25.5	22.5		22.7	22.4		2.6	6.4	2.4	2.5	7.8	2.5
Level of Service	C	C		C	C		A	A	A	A	A	A
Approach Delay (s)		24.7			22.5			6.3			7.6	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	61.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	28	374	148	51	133	77
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	407	161	55	145	84
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		1047				
pX, platoon unblocked						
vC, conflicting volume	216				656	189
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	216				656	189
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				66	90
cM capacity (veh/h)	1353				421	853

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	437	216	228
Volume Left	30	0	145
Volume Right	0	55	84
cSH	1353	1700	517
Volume to Capacity	0.02	0.13	0.44
Queue Length 95th (ft)	2	0	56
Control Delay (s)	0.8	0.0	17.4
Lane LOS	A		C
Approach Delay (s)	0.8	0.0	17.4
Approach LOS			C

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	16	6	199	5	20	2	830	381	6	955	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.98		1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1781		1770	1604		1770	1863	1550	1770	1863	1583
Flt Permitted	0.93	1.00		0.48	1.00		0.11	1.00	1.00	0.19	1.00	1.00
Satd. Flow (perm)	1733	1781		898	1604		202	1863	1550	345	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	17	7	216	5	22	2	902	414	7	1038	12
RTOR Reduction (vph)	0	7	0	0	18	0	0	0	0	0	0	4
Lane Group Flow (vph)	18	17	0	216	9	0	2	902	414	7	1038	8
Confl. Peds. (#/hr)						2			2			
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Free	Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2		Free	6		6
Actuated Green, G (s)	4.9	4.3		16.5	11.9		46.9	46.9	71.4	46.9	46.9	46.9
Effective Green, g (s)	4.9	4.3		16.5	11.9		46.9	46.9	71.4	46.9	46.9	46.9
Actuated g/C Ratio	0.07	0.06		0.23	0.17		0.66	0.66	1.00	0.66	0.66	0.66
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	119	107		307	267		132	1223	1550	226	1223	1039
v/s Ratio Prot	0.00	0.01		c0.08	0.01			0.48			c0.56	
v/s Ratio Perm	0.01			c0.08			0.01		0.27	0.02		0.00
v/c Ratio	0.15	0.16		0.70	0.03		0.02	0.74	0.27	0.03	0.85	0.01
Uniform Delay, d1	31.3	31.8		24.2	24.9		4.2	8.2	0.0	4.3	9.5	4.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.7		7.1	0.0		0.0	2.4	0.4	0.1	5.7	0.0
Delay (s)	31.9	32.6		31.3	25.0		4.3	10.5	0.4	4.3	15.2	4.2
Level of Service	C	C		C	C		A	B	A	A	B	A
Approach Delay (s)		32.3			30.6			7.3			15.0	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	71.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	10	10	740	10	10	10	1124	700	10	971	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1817	1583	1681	1687	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1817	1583	1681	1687	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	10	10	10	771	10	10	10	1171	729	10	1011	10
RTOR Reduction (vph)	0	0	10	0	0	0	0	0	0	0	0	5
Lane Group Flow (vph)	0	20	0	393	388	10	10	1171	729	10	1011	5
Turn Type	Split	NA	Perm	Split	NA	Free	Prot	NA	Free	Prot	NA	Perm
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4			Free			Free			6
Actuated Green, G (s)		3.9	3.9	37.8	37.8	114.3	1.9	51.7	114.3	1.9	51.7	51.7
Effective Green, g (s)		3.9	3.9	37.8	37.8	114.3	1.9	51.7	114.3	1.9	51.7	51.7
Actuated g/C Ratio		0.03	0.03	0.33	0.33	1.00	0.02	0.45	1.00	0.02	0.45	0.45
Clearance Time (s)		5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)		61	54	555	557	1583	29	1600	1583	29	1600	716
v/s Ratio Prot		0.01		c0.23	0.23		0.01	c0.33		0.01	0.29	
v/s Ratio Perm			0.00			0.01			c0.46			0.00
v/c Ratio		0.33	0.01	0.71	0.70	0.01	0.34	0.73	0.46	0.34	0.63	0.01
Uniform Delay, d1		53.9	53.3	33.4	33.3	0.0	55.6	25.6	0.0	55.6	24.0	17.2
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		3.1	0.0	4.1	3.8	0.0	2.6	1.9	1.0	2.6	0.9	0.0
Delay (s)		57.1	53.4	37.5	37.0	0.0	58.2	27.5	1.0	58.2	24.9	17.2
Level of Service		E	D	D	D	A	E	C	A	E	C	B
Approach Delay (s)		55.8			36.8			17.5			25.2	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	24.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	114.3	Sum of lost time (s)	19.0
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	100	32	367	170	410	73	596	336	400	640	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1847	1583		1801	1526	1770	1863	1583	1770	1863	1583
Flt Permitted		0.63	1.00		0.71	1.00	0.18	1.00	1.00	0.09	1.00	1.00
Satd. Flow (perm)		1172	1583		1321	1526	329	1863	1583	167	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	22	108	34	395	183	441	78	641	361	430	688	43
RTOR Reduction (vph)	0	0	22	0	0	177	0	0	227	0	0	23
Lane Group Flow (vph)	0	130	12	0	578	264	78	641	134	430	688	20
Confl. Peds. (#/hr)	6					6						
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		40.0	40.0		40.0	40.0	46.4	40.6	40.6	59.6	49.8	49.8
Effective Green, g (s)		40.0	40.0		40.0	40.0	46.4	40.6	40.6	59.6	49.8	49.8
Actuated g/C Ratio		0.36	0.36		0.36	0.36	0.42	0.37	0.37	0.54	0.45	0.45
Clearance Time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		427	577		482	556	215	690	586	310	846	719
v/s Ratio Prot							0.02	0.34		c0.19	0.37	
v/s Ratio Perm		0.11	0.01		c0.44	0.17	0.13		0.08	c0.56		0.01
v/c Ratio		0.30	0.02		1.20	0.47	0.36	0.93	0.23	1.39	0.81	0.03
Uniform Delay, d1		24.9	22.3		34.8	26.7	21.7	33.1	23.7	33.9	25.9	16.5
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.3	0.0		108.2	0.5	0.4	19.5	0.4	193.0	6.8	0.0
Delay (s)		25.2	22.3		143.0	27.2	22.1	52.6	24.1	226.8	32.7	16.6
Level of Service		C	C		F	C	C	D	C	F	C	B
Approach Delay (s)		24.6			92.9			40.9			104.0	
Approach LOS		C			F			D			F	

Intersection Summary			
HCM 2000 Control Delay	77.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	109.6	Sum of lost time (s)	14.0
Intersection Capacity Utilization	101.1%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	199	506	80	215	720	400	30	287	157	360	526	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1818		1770	1863	1583	1770	1750		1770	1790	
Flt Permitted	0.10	1.00		0.10	1.00	1.00	0.11	1.00		0.15	1.00	
Satd. Flow (perm)	185	1818		181	1863	1583	196	1750		271	1790	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	205	522	82	222	742	412	31	296	162	371	542	152
RTOR Reduction (vph)	0	4	0	0	0	214	0	14	0	0	7	0
Lane Group Flow (vph)	205	600	0	222	742	198	31	444	0	371	687	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	55.3	40.3		57.1	41.2	41.2	41.7	38.0		56.1	47.4	
Effective Green, g (s)	55.3	40.3		57.1	41.2	41.2	41.7	38.0		56.1	47.4	
Actuated g/C Ratio	0.43	0.32		0.45	0.32	0.32	0.33	0.30		0.44	0.37	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	267	575		279	602	512	109	522		273	666	
v/s Ratio Prot	0.09	0.33		c0.10	c0.40		0.01	0.25		c0.14	0.38	
v/s Ratio Perm	0.24			0.26		0.12	0.08			c0.46		
v/c Ratio	0.77	1.04		0.80	1.23	0.39	0.28	0.85		1.36	1.03	
Uniform Delay, d1	31.4	43.5		33.1	43.0	33.3	33.9	42.0		28.9	40.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.3	49.3		13.6	118.6	0.5	0.5	12.6		183.5	43.3	
Delay (s)	42.6	92.8		46.7	161.7	33.8	34.4	54.5		212.4	83.2	
Level of Service	D	F		D	F	C	C	D		F	F	
Approach Delay (s)		80.1			104.8			53.3			128.2	
Approach LOS		F			F			D			F	

Intersection Summary			
HCM 2000 Control Delay	99.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	127.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	110.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	271	523	170	30	555	90	130	410	40	100	503	351
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	277	534	173	31	566	92	133	418	41	102	513	358

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	984	689	133	459	102	871
Volume Left (vph)	277	31	133	0	102	0
Volume Right (vph)	173	92	0	41	0	358
Hadj (s)	-0.02	-0.04	0.53	-0.03	0.53	-0.25
Departure Headway (s)	9.4	9.4	10.2	9.6	10.2	9.4
Degree Utilization, x	2.58	1.80	0.37	1.22	0.29	2.27
Capacity (veh/h)	391	387	351	380	350	392
Control Delay (s)	738.6	393.6	17.9	150.5	16.0	598.8
Approach Delay (s)	738.6	393.6	120.8		537.7	
Approach LOS	F	F	F		F	

Intersection Summary			
Delay	491.9		
Level of Service	F		
Intersection Capacity Utilization	157.7%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	743	0	10	0	0	0	70	947	0	10	1405	965
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0					5.0	7.0		5.0	7.0	7.0
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes		1.00					1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00					1.00	1.00		1.00	1.00	1.00
Frt		1.00					1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95					0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1772					1770	3539		1770	3539	1550
Flt Permitted		0.95					0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1772					1770	3539		1770	3539	1550
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	808	0	11	0	0	0	76	1029	0	11	1527	1049
RTOR Reduction (vph)	0	54	0	0	0	0	0	0	0	0	0	396
Lane Group Flow (vph)	0	765	0	0	0	0	76	1029	0	11	1527	653
Confl. Peds. (#/hr)												1
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4											6
Actuated Green, G (s)		30.1					8.5	80.4		1.3	73.2	73.2
Effective Green, g (s)		30.1					8.5	80.4		1.3	73.2	73.2
Actuated g/C Ratio		0.23					0.07	0.62		0.01	0.56	0.56
Clearance Time (s)		6.0					5.0	7.0		5.0	7.0	7.0
Vehicle Extension (s)		2.0					2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		410					115	2192		17	1995	874
v/s Ratio Prot							c0.04	0.29		0.01	c0.43	
v/s Ratio Perm		0.43										0.42
v/c Ratio		1.87					0.66	0.47		0.65	0.77	0.75
Uniform Delay, d1		49.9					59.2	13.3		64.0	21.7	21.3
Progression Factor		1.00					1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		399.1					10.5	0.3		49.2	2.1	4.2
Delay (s)		449.0					69.7	13.6		113.2	23.8	25.6
Level of Service		F					E	B		F	C	C
Approach Delay (s)		449.0			0.0			17.5			24.9	
Approach LOS		F			A			B			C	

Intersection Summary			
HCM 2000 Control Delay	100.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	129.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	99.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	50	12	103	90	120	13	854	77	80	860	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		0.99		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.95		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1847	1583		1713		1770	1835		1770	1863	1542
Flt Permitted		0.88	1.00		0.86		0.16	1.00		0.07	1.00	1.00
Satd. Flow (perm)		1645	1583		1506		303	1835		124	1863	1542
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	54	13	112	98	130	14	928	84	87	935	11
RTOR Reduction (vph)	0	0	10	0	17	0	0	2	0	0	0	4
Lane Group Flow (vph)	0	65	3	0	323	0	14	1010	0	87	935	7
Confl. Peds. (#/hr)	1					1	2		5	5		2
Confl. Bikes (#/hr)						8						
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		24.5	24.5		25.0		74.5	72.5		83.3	77.3	77.3
Effective Green, g (s)		24.5	24.5		25.0		74.5	72.5		83.3	77.3	77.3
Actuated g/C Ratio		0.20	0.20		0.21		0.62	0.60		0.69	0.64	0.64
Clearance Time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		2.0	2.0		2.0		2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		335	322		312		212	1105		178	1197	990
v/s Ratio Prot							0.00	c0.55		c0.03	c0.50	
v/s Ratio Perm		0.04	0.00		c0.21		0.04			0.31		0.00
v/c Ratio		0.19	0.01		1.03		0.07	0.91		0.49	0.78	0.01
Uniform Delay, d1		39.7	38.2		47.6		14.2	21.1		23.4	15.4	7.7
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0		60.0		0.0	12.0		0.8	3.9	0.0
Delay (s)		39.8	38.2		107.6		14.3	33.1		24.1	19.4	7.7
Level of Service		D	D		F		B	C		C	B	A
Approach Delay (s)		39.6			107.6			32.9			19.6	
Approach LOS		D			F			C			B	

Intersection Summary			
HCM 2000 Control Delay	37.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	120.3	Sum of lost time (s)	16.5
Intersection Capacity Utilization	91.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	186	10	207	265	240	20	220	185	260	402	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1758	1845		1756	1863	1536	1761	1863	1536	1757	1835	
Flt Permitted	0.57	1.00		0.62	1.00	1.00	0.37	1.00	1.00	0.61	1.00	
Satd. Flow (perm)	1051	1845		1155	1863	1536	686	1863	1536	1128	1835	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	202	11	225	288	261	22	239	201	283	437	40
RTOR Reduction (vph)	0	4	0	0	0	165	0	0	118	0	8	0
Lane Group Flow (vph)	23	209	0	225	288	96	22	239	83	283	469	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	13.2	13.2		13.2	13.2	13.2	14.8	14.8	14.8	14.8	14.8	
Effective Green, g (s)	13.2	13.2		13.2	13.2	13.2	14.8	14.8	14.8	14.8	14.8	
Actuated g/C Ratio	0.37	0.37		0.37	0.37	0.37	0.41	0.41	0.41	0.41	0.41	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	385	676		423	683	563	282	765	631	463	754	
v/s Ratio Prot		0.11			0.15			0.13			c0.26	
v/s Ratio Perm	0.02			c0.19		0.06	0.03		0.05	0.25		
v/c Ratio	0.06	0.31		0.53	0.42	0.17	0.08	0.31	0.13	0.61	0.62	
Uniform Delay, d1	7.4	8.1		9.0	8.5	7.7	6.4	7.2	6.6	8.3	8.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.3		1.3	0.4	0.1	0.1	0.2	0.1	2.4	1.6	
Delay (s)	7.4	8.4		10.3	9.0	7.8	6.6	7.4	6.7	10.7	10.0	
Level of Service	A	A		B	A	A	A	A	A	B	A	
Approach Delay (s)		8.3			9.0			7.1			10.3	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	36.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	196	151	198	20	222	130	135	80	10	100	130	257
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	213	164	215	22	241	141	147	87	11	109	141	279
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	383			379			1333	1124	272	1000	1161	312
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	383			379			1333	1124	272	1000	1161	312
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	82			98			0	47	99	2	10	62
cM capacity (veh/h)	1176			1179			16	165	767	110	157	728

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	213	379	22	383	147	98	109	421
Volume Left	213	0	22	0	147	0	109	0
Volume Right	0	215	0	141	0	11	0	279
cSH	1176	1700	1179	1700	16	181	110	328
Volume to Capacity	0.18	0.22	0.02	0.23	9.27	0.54	0.98	1.28
Queue Length 95th (ft)	17	0	1	0	Err	70	157	491
Control Delay (s)	8.7	0.0	8.1	0.0	Err	46.2	154.4	182.0
Lane LOS	A		A		F	E	F	F
Approach Delay (s)	3.1		0.4		6017.9		176.4	
Approach LOS					F		F	

Intersection Summary			
Average Delay	885.1		
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	247	90	100	630	700	475
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8		5.0	6.3	6.3	6.3
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1732		1770	3539	3539	1583
Flt Permitted	0.96		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1732		1770	3539	3539	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	271	99	110	692	769	522
RTOR Reduction (vph)	9	0	0	0	0	333
Lane Group Flow (vph)	361	0	110	692	769	189
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Actuated Green, G (s)	22.9		10.2	44.3	29.1	29.1
Effective Green, g (s)	22.9		10.2	44.3	29.1	29.1
Actuated g/C Ratio	0.29		0.13	0.55	0.36	0.36
Clearance Time (s)	6.8		5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	493		224	1952	1282	573
v/s Ratio Prot	c0.21		c0.06	0.20	c0.22	
v/s Ratio Perm						0.12
v/c Ratio	0.73		0.49	0.35	0.60	0.33
Uniform Delay, d1	25.9		32.6	10.0	20.9	18.5
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	4.8		0.6	0.1	0.8	0.3
Delay (s)	30.7		33.3	10.1	21.6	18.9
Level of Service	C		C	B	C	B
Approach Delay (s)	30.7			13.3	20.5	
Approach LOS	C			B	C	

Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	80.3	Sum of lost time (s)	18.1
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	117	41	59	31	42	69	64	980	32	74	803	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.91		1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1756	1671		1758	1659		1767	1863	1536	1770	1863	1536
Flt Permitted	0.67	1.00		0.69	1.00		0.23	1.00	1.00	0.13	1.00	1.00
Satd. Flow (perm)	1243	1671		1271	1659		422	1863	1536	235	1863	1536
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	127	45	64	34	46	75	70	1065	35	80	873	160
RTOR Reduction (vph)	0	52	0	0	61	0	0	0	11	0	0	49
Lane Group Flow (vph)	127	57	0	34	60	0	70	1065	24	80	873	111
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	13.7	13.7		13.7	13.7		49.5	49.5	49.5	49.5	49.5	49.5
Effective Green, g (s)	13.7	13.7		13.7	13.7		49.5	49.5	49.5	49.5	49.5	49.5
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.70	0.70	0.70	0.70	0.70	0.70
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	239	321		244	319		293	1295	1067	163	1295	1067
v/s Ratio Prot		0.03			0.04			c0.57			0.47	
v/s Ratio Perm	c0.10			0.03			0.17		0.02	0.34		0.07
v/c Ratio	0.53	0.18		0.14	0.19		0.24	0.82	0.02	0.49	0.67	0.10
Uniform Delay, d1	25.9	24.0		23.9	24.1		4.0	7.7	3.4	5.0	6.2	3.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.3	0.3		0.3	0.3		0.4	4.3	0.0	2.3	1.4	0.0
Delay (s)	28.1	24.3		24.1	24.4		4.4	12.1	3.4	7.3	7.6	3.6
Level of Service	C	C		C	C		A	B	A	A	A	A
Approach Delay (s)		26.4			24.3			11.3			7.0	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	71.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Volume (veh/h)	149	0	65	10	0	90	66	170	10	10	413	168
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	162	0	71	11	0	98	72	185	11	11	449	183
Approach Volume (veh/h)		233			109			267			642	
Crossing Volume (veh/h)		471			418			173			83	
High Capacity (veh/h)		956			996			1210			1298	
High v/c (veh/h)		0.24			0.11			0.22			0.49	
Low Capacity (veh/h)		774			810			1002			1083	
Low v/c (veh/h)		0.30			0.13			0.27			0.59	

Intersection Summary				
Maximum v/c High	0.49			
Maximum v/c Low	0.59			
Intersection Capacity Utilization	74.6%	ICU Level of Service	D	

Intersection	
Intersection Delay, s/veh	10.3
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	233	109	268	643
Demand Flow Rate, veh/h	237	111	273	656
Vehicles Circulating, veh/h	480	427	176	84
Vehicles Exiting, veh/h	260	22	541	454
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.6	6.6	6.9	12.5
Approach LOS	A	A	A	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	237	111	273	656
Cap Entry Lane, veh/h	699	737	948	1039
Entry HV Adj Factor	0.983	0.982	0.983	0.980
Flow Entry, veh/h	233	109	268	643
Cap Entry, veh/h	687	724	931	1018
V/C Ratio	0.339	0.151	0.288	0.631
Control Delay, s/veh	9.6	6.6	6.9	12.5
LOS	A	A	A	B
95th %tile Queue, veh	1	1	1	5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	4	13	12	7	14	23	1014	17	24	792	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.88		1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1755	1611		1757	1650		1766	1863	1537	1770	1863	1537
Flt Permitted	0.74	1.00		0.75	1.00		0.28	1.00	1.00	0.17	1.00	1.00
Satd. Flow (perm)	1372	1611		1379	1650		520	1863	1537	319	1863	1537
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	4	14	13	8	15	25	1102	18	26	861	83
RTOR Reduction (vph)	0	13	0	0	13	0	0	0	4	0	0	18
Lane Group Flow (vph)	51	5	0	13	10	0	25	1102	14	26	861	65
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	6.8	6.8		6.8	6.8		51.9	51.9	51.9	51.9	51.9	51.9
Effective Green, g (s)	6.8	6.8		6.8	6.8		51.9	51.9	51.9	51.9	51.9	51.9
Actuated g/C Ratio	0.10	0.10		0.10	0.10		0.78	0.78	0.78	0.78	0.78	0.78
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	139	164		140	168		404	1449	1195	248	1449	1195
v/s Ratio Prot		0.00			0.01			c0.59			0.46	
v/s Ratio Perm	c0.04			0.01			0.05		0.01	0.08		0.04
v/c Ratio	0.37	0.03		0.09	0.06		0.06	0.76	0.01	0.10	0.59	0.05
Uniform Delay, d1	27.9	27.0		27.2	27.1		1.7	4.0	1.7	1.8	3.1	1.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	0.1		0.3	0.1		0.1	2.4	0.0	0.2	0.7	0.0
Delay (s)	29.6	27.1		27.4	27.2		1.8	6.4	1.7	2.0	3.7	1.7
Level of Service	C	C		C	C		A	A	A	A	A	A
Approach Delay (s)		28.9			27.3			6.3			3.5	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	66.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	74	172	376	126	74	43
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	80	187	409	137	80	47
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		1047				
pX, platoon unblocked						
vC, conflicting volume	546				825	477
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	546				825	477
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				74	92
cM capacity (veh/h)	1024				315	588

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	267	546	127
Volume Left	80	0	80
Volume Right	0	137	47
cSH	1024	1700	380
Volume to Capacity	0.08	0.32	0.33
Queue Length 95th (ft)	6	0	36
Control Delay (s)	3.2	0.0	19.2
Lane LOS	A		C
Approach Delay (s)	3.2	0.0	19.2
Approach LOS			C

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	9	3	394	15	11	6	1035	218	21	787	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1793		1770	1724		1770	1863	1550	1770	1863	1583
Flt Permitted	1.00	1.00		0.68	1.00		0.24	1.00	1.00	0.11	1.00	1.00
Satd. Flow (perm)	1863	1793		1263	1724		451	1863	1550	198	1863	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	8	9	3	415	16	12	6	1089	229	22	828	11
RTOR Reduction (vph)	0	3	0	0	10	0	0	0	0	0	0	3
Lane Group Flow (vph)	8	9	0	415	18	0	6	1089	229	22	828	8
Confl. Peds. (#/hr)						2			2			
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Free	Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2		Free	6		6
Actuated Green, G (s)	3.1	1.9		22.0	16.8		68.1	68.1	98.1	68.1	68.1	68.1
Effective Green, g (s)	3.1	1.9		22.0	16.8		68.1	68.1	98.1	68.1	68.1	68.1
Actuated g/C Ratio	0.03	0.02		0.22	0.17		0.69	0.69	1.00	0.69	0.69	0.69
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	57	34		366	295		313	1293	1550	137	1293	1098
v/s Ratio Prot	0.00	0.01		c0.19	0.01			c0.58			0.44	
v/s Ratio Perm	0.00			c0.07			0.01		0.15	0.11		0.00
v/c Ratio	0.14	0.27		1.13	0.06		0.02	0.84	0.15	0.16	0.64	0.01
Uniform Delay, d1	46.2	47.4		37.6	34.0		4.6	11.0	0.0	5.2	8.3	4.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	4.2		88.6	0.1		0.0	5.2	0.2	0.6	1.1	0.0
Delay (s)	47.4	51.6		126.1	34.1		4.7	16.2	0.2	5.7	9.4	4.6
Level of Service	D	D		F	C		A	B	A	A	A	A
Approach Delay (s)		49.9			120.3			13.4			9.2	
Approach LOS		D			F			B			A	

Intersection Summary			
HCM 2000 Control Delay	30.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	98.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	10	10	760	10	10	10	988	710	10	1104	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1817	1583	1681	1688	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1817	1583	1681	1688	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	11	11	11	809	11	11	11	1051	755	11	1174	11
RTOR Reduction (vph)	0	0	11	0	0	0	0	0	0	0	0	6
Lane Group Flow (vph)	0	22	0	413	407	11	11	1051	755	11	1174	5
Turn Type	Split	NA	Perm	Split	NA	Free	Prot	NA	Free	Prot	NA	Perm
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4			Free			Free			6
Actuated Green, G (s)		4.0	4.0	40.2	40.2	117.8	2.0	52.6	117.8	2.0	52.6	52.6
Effective Green, g (s)		4.0	4.0	40.2	40.2	117.8	2.0	52.6	117.8	2.0	52.6	52.6
Actuated g/C Ratio		0.03	0.03	0.34	0.34	1.00	0.02	0.45	1.00	0.02	0.45	0.45
Clearance Time (s)		5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)		61	53	573	576	1583	30	1580	1583	30	1580	706
v/s Ratio Prot		0.01		c0.25	0.24		0.01	0.30		0.01	c0.33	
v/s Ratio Perm			0.00			0.01			c0.48			0.00
v/c Ratio		0.36	0.01	0.72	0.71	0.01	0.37	0.67	0.48	0.37	0.74	0.01
Uniform Delay, d1		55.6	55.0	33.9	33.7	0.0	57.3	25.7	0.0	57.3	27.0	18.1
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		3.6	0.1	4.4	3.9	0.0	2.8	1.2	1.0	2.8	2.1	0.0
Delay (s)		59.3	55.0	38.3	37.6	0.0	60.0	26.8	1.0	60.0	29.1	18.1
Level of Service		E	E	D	D	A	E	C	A	E	C	B
Approach Delay (s)		57.9			37.5			16.3			29.2	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	117.8	Sum of lost time (s)	19.0
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

LOS Worksheets – Year 2022 with Partial Development with Mitigation (Pre-Project or Better) Conditions

HCM Signalized Intersection Capacity Analysis
1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	170	71	330	80	280	31	561	454	440	556	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frpb, ped/bikes		1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1849	1549	1767	1863	1583	1770	1863	1562	3433	1863	1583
Flt Permitted		0.95	1.00	0.55	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1768	1549	1030	1863	1583	1770	1863	1562	3433	1863	1583
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	34	191	80	371	90	315	35	630	510	494	625	11
RTOR Reduction (vph)	0	0	54	0	0	211	0	0	264	0	0	6
Lane Group Flow (vph)	0	225	26	371	90	104	35	630	246	494	625	5
Confl. Peds. (#/hr)			1	1					1			
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		27.0	27.0	27.0	27.0	27.0	3.0	28.6	28.6	12.0	37.6	37.6
Effective Green, g (s)		27.0	27.0	27.0	27.0	27.0	3.0	28.6	28.6	12.0	37.6	37.6
Actuated g/C Ratio		0.33	0.33	0.33	0.33	0.33	0.04	0.35	0.35	0.15	0.46	0.46
Clearance Time (s)		5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5	2.5	2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		585	512	340	616	523	65	652	547	504	858	729
v/s Ratio Prot					0.05		0.02	c0.34		c0.14	0.34	
v/s Ratio Perm		0.13	0.02	c0.36		0.07			0.16			0.00
v/c Ratio		0.38	0.05	1.09	0.15	0.20	0.54	0.97	0.45	0.98	0.73	0.01
Uniform Delay, d1		20.9	18.6	27.3	19.2	19.6	38.6	26.0	20.4	34.7	17.9	11.9
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.3	0.0	75.5	0.1	0.1	4.2	27.2	1.2	34.8	3.8	0.0
Delay (s)		21.2	18.6	102.8	19.3	19.7	42.9	53.2	21.7	69.4	21.7	11.9
Level of Service		C	B	F	B	B	D	D	C	E	C	B
Approach Delay (s)		20.6			59.4			39.2			42.5	
Approach LOS		C			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	43.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	81.6	Sum of lost time (s)	14.0
Intersection Capacity Utilization	86.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	364	620	70	148	438	420	70	514	206	240	205	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	3539	1548	1769	3539	1540	1770	1768		1770	1735	
Flt Permitted	0.22	1.00	1.00	0.25	1.00	1.00	0.50	1.00		0.08	1.00	
Satd. Flow (perm)	409	3539	1548	475	3539	1540	934	1768		140	1735	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	379	646	73	154	456	438	73	535	215	250	214	179
RTOR Reduction (vph)	0	0	55	0	0	209	0	12	0	0	24	0
Lane Group Flow (vph)	379	646	18	154	456	229	73	738	0	250	369	0
Confl. Peds. (#/hr)	3		1	1		3			4	4		
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	44.1	29.7	29.7	31.5	22.1	22.1	50.5	48.1		65.1	57.7	
Effective Green, g (s)	44.1	29.7	29.7	31.5	22.1	22.1	50.5	48.1		65.1	57.7	
Actuated g/C Ratio	0.37	0.25	0.25	0.26	0.19	0.19	0.42	0.40		0.55	0.48	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	345	881	385	227	656	285	412	713		240	839	
v/s Ratio Prot	c0.16	0.18		0.05	0.13		0.00	0.42		c0.10	0.21	
v/s Ratio Perm	c0.25		0.01	0.13		0.15	0.07			c0.46		
v/c Ratio	1.10	0.73	0.05	0.68	0.70	0.80	0.18	1.04		1.04	0.44	
Uniform Delay, d1	31.9	41.1	34.0	35.7	45.4	46.5	21.0	35.5		37.4	20.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	77.6	3.2	0.1	6.2	3.2	14.9	0.1	43.1		69.4	0.4	
Delay (s)	109.5	44.3	34.1	41.9	48.6	61.4	21.1	78.7		106.8	20.5	
Level of Service	F	D	C	D	D	E	C	E		F	C	
Approach Delay (s)		66.1			53.0			73.5			54.1	
Approach LOS		E			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	61.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	119.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	102.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	169	417	170	70	483	210	220	571	80	100	475	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.96		1.00	0.98		1.00	0.96	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1776			1774		1766	1828		1770	1767	
Flt Permitted		0.61			0.89		0.22	1.00		0.22	1.00	
Satd. Flow (perm)		1103			1578		413	1828		414	1767	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	178	439	179	74	508	221	232	601	84	105	500	214
RTOR Reduction (vph)	0	23	0	0	31	0	0	11	0	0	34	0
Lane Group Flow (vph)	0	773	0	0	772	0	232	674	0	105	680	0
Confl. Peds. (#/hr)	2		3	3		2	12					12
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		19.0			19.0		18.0	18.0		18.0	18.0	
Effective Green, g (s)		19.0			19.0		18.0	18.0		18.0	18.0	
Actuated g/C Ratio		0.42			0.42		0.40	0.40		0.40	0.40	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		465			666		165	731		165	706	
v/s Ratio Prot								0.37			0.38	
v/s Ratio Perm		c0.70			0.49		c0.56			0.25		
v/c Ratio		1.66			1.16		1.41	0.92		0.64	0.96	
Uniform Delay, d1		13.0			13.0		13.5	12.8		10.9	13.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		307.4			87.9		214.9	17.0		7.8	24.9	
Delay (s)		320.4			100.9		228.4	29.8		18.7	38.0	
Level of Service		F			F		F	C		B	D	
Approach Delay (s)		320.4			100.9			80.1			35.6	
Approach LOS		F			F			F			D	

Intersection Summary			
HCM 2000 Control Delay	131.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.54		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	139.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	837	0	50	0	0	0	60	1114	0	0	891	613
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0				5.0	7.0			7.0	7.0
Lane Util. Factor	0.95	0.95	1.00				1.00	0.95			0.95	1.00
Frt	1.00	1.00	0.85				1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00				0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1681	1583				1770	3539			3539	1583
Flt Permitted	0.95	0.95	1.00				0.95	1.00			1.00	1.00
Satd. Flow (perm)	1681	1681	1583				1770	3539			3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	872	0	52	0	0	0	62	1160	0	0	928	639
RTOR Reduction (vph)	0	0	37	0	0	0	0	0	0	0	0	393
Lane Group Flow (vph)	436	436	15	0	0	0	62	1160	0	0	928	246
Turn Type	Split	NA	Perm				Prot	NA		Prot	NA	Perm
Protected Phases	4	4					5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	18.2	18.2	18.2				2.2	31.2			24.0	24.0
Effective Green, g (s)	18.2	18.2	18.2				2.2	31.2			24.0	24.0
Actuated g/C Ratio	0.29	0.29	0.29				0.04	0.50			0.38	0.38
Clearance Time (s)	6.0	6.0	6.0				5.0	7.0			7.0	7.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	5.0			5.0	5.0
Lane Grp Cap (vph)	490	490	461				62	1769			1361	608
v/s Ratio Prot	c0.26	0.26					0.04	c0.33			0.26	
v/s Ratio Perm			0.01									0.16
v/c Ratio	0.89	0.89	0.03				1.00	0.66			0.68	0.40
Uniform Delay, d1	21.1	21.1	15.8				30.1	11.6			16.0	14.0
Progression Factor	1.00	1.00	1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2	17.3	17.3	0.0				114.3	1.2			1.8	0.9
Delay (s)	38.4	38.4	15.8				144.4	12.8			17.9	14.9
Level of Service	D	D	B				F	B			B	B
Approach Delay (s)		37.1			0.0			19.5			16.7	
Approach LOS		D			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	62.4	Sum of lost time (s)	18.0
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	196	157	141	10	112	50	246	160	10	100	90	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.95		1.00	0.99		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1731		1770	1777		1770	1846		1770	1678	
Flt Permitted	0.65	1.00		0.52	1.00		0.58	1.00		0.64	1.00	
Satd. Flow (perm)	1204	1731		976	1777		1087	1846		1194	1678	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	213	171	153	11	122	54	267	174	11	109	98	190
RTOR Reduction (vph)	0	88	0	0	36	0	0	5	0	0	110	0
Lane Group Flow (vph)	213	236	0	11	140	0	267	180	0	109	178	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	11.3	11.3		11.3	11.3		13.9	13.9		13.9	13.9	
Effective Green, g (s)	11.3	11.3		11.3	11.3		13.9	13.9		13.9	13.9	
Actuated g/C Ratio	0.34	0.34		0.34	0.34		0.42	0.42		0.42	0.42	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	409	589		332	604		455	772		499	702	
v/s Ratio Prot		0.14			0.08			0.10			0.11	
v/s Ratio Perm	c0.18			0.01			c0.25			0.09		
v/c Ratio	0.52	0.40		0.03	0.23		0.59	0.23		0.22	0.25	
Uniform Delay, d1	8.8	8.4		7.3	7.8		7.4	6.2		6.2	6.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	0.4		0.0	0.2		1.9	0.2		0.2	0.2	
Delay (s)	10.0	8.8		7.3	8.0		9.4	6.4		6.4	6.5	
Level of Service	A	A		A	A		A	A		A	A	
Approach Delay (s)		9.3			8.0			8.1			6.4	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	33.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	80	32	384	140	390	43	568	351	370	582	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frpb, ped/bikes		1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1840	1583	1770	1863	1533	1770	1863	1583	3433	1863	1583
Flt Permitted		0.93	1.00	0.69	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1733	1583	1280	1863	1533	1770	1863	1583	3433	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	22	86	34	413	151	419	46	611	377	398	626	32
RTOR Reduction (vph)	0	0	23	0	0	190	0	0	236	0	0	17
Lane Group Flow (vph)	0	108	11	413	151	229	46	611	141	398	626	15
Confl. Peds. (#/hr)	6					6						
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		26.8	26.8	26.8	26.8	26.8	3.0	30.2	30.2	10.0	37.2	37.2
Effective Green, g (s)		26.8	26.8	26.8	26.8	26.8	3.0	30.2	30.2	10.0	37.2	37.2
Actuated g/C Ratio		0.33	0.33	0.33	0.33	0.33	0.04	0.37	0.37	0.12	0.46	0.46
Clearance Time (s)		5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5	2.5	2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		573	523	423	616	507	65	694	590	423	855	727
v/s Ratio Prot					0.08		0.03	c0.33		c0.12	0.34	
v/s Ratio Perm		0.06	0.01	c0.32		0.15			0.09			0.01
v/c Ratio		0.19	0.02	0.98	0.25	0.45	0.71	0.88	0.24	0.94	0.73	0.02
Uniform Delay, d1		19.3	18.3	26.8	19.7	21.3	38.6	23.7	17.5	35.2	17.8	12.0
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0	37.2	0.2	0.5	24.8	13.4	0.4	28.9	4.0	0.0
Delay (s)		19.5	18.3	64.0	19.9	21.8	63.4	37.1	17.9	64.1	21.8	12.0
Level of Service		B	B	E	B	C	E	D	B	E	C	B
Approach Delay (s)		19.2			39.2			31.3			37.5	
Approach LOS		B			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	35.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	80.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	231	480	50	171	645	400	30	238	127	340	446	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1543	1768	3539	1583	1769	1752		1769	1768	
Flt Permitted	0.21	1.00	1.00	0.36	1.00	1.00	0.16	1.00		0.25	1.00	
Satd. Flow (perm)	393	3539	1543	675	3539	1583	296	1752		471	1768	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	238	495	52	176	665	412	31	245	131	351	460	205
RTOR Reduction (vph)	0	0	38	0	0	304	0	22	0	0	18	0
Lane Group Flow (vph)	238	495	14	176	665	108	31	354	0	351	647	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	31.0	22.9	22.9	30.0	22.4	22.4	26.9	25.2		40.3	33.6	
Effective Green, g (s)	31.0	22.9	22.9	30.0	22.4	22.4	26.9	25.2		40.3	33.6	
Actuated g/C Ratio	0.36	0.27	0.27	0.35	0.26	0.26	0.31	0.29		0.47	0.39	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	271	944	411	332	923	413	121	514		374	692	
v/s Ratio Prot	c0.08	0.14		0.05	0.19		0.01	0.20		c0.11	0.37	
v/s Ratio Perm	c0.23		0.01	0.14		0.07	0.07			c0.33		
v/c Ratio	0.88	0.52	0.03	0.53	0.72	0.26	0.26	0.69		0.94	0.94	
Uniform Delay, d1	21.7	26.8	23.3	20.3	28.9	25.1	22.4	26.8		18.7	25.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	25.2	0.5	0.0	0.8	2.8	0.3	0.4	3.8		30.5	19.9	
Delay (s)	46.9	27.3	23.3	21.2	31.6	25.5	22.8	30.7		49.3	44.9	
Level of Service	D	C	C	C	C	C	C	C		D	D	
Approach Delay (s)		33.0			28.1			30.1			46.4	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	34.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	85.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	286	501	140	30	484	70	150	368	40	100	412	341
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.98			0.98		1.00	0.99		1.00	0.93	
Flt Protected		0.98			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1791			1828		1770	1835		1770	1725	
Flt Permitted		0.64			0.93		0.20	1.00		0.31	1.00	
Satd. Flow (perm)		1158			1713		373	1835		576	1725	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	292	511	143	31	494	71	153	376	41	102	420	348
RTOR Reduction (vph)	0	11	0	0	8	0	0	7	0	0	50	0
Lane Group Flow (vph)	0	935	0	0	588	0	153	410	0	102	718	0
Confl. Peds. (#/hr)			1	1			2					2
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		32.0			32.0		20.0	20.0		20.0	20.0	
Effective Green, g (s)		32.0			32.0		20.0	20.0		20.0	20.0	
Actuated g/C Ratio		0.53			0.53		0.33	0.33		0.33	0.33	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		617			913		124	611		192	575	
v/s Ratio Prot								0.22			c0.42	
v/s Ratio Perm		c0.81			0.34		0.41			0.18		
v/c Ratio		1.52			0.64		1.23	0.67		0.53	1.25	
Uniform Delay, d1		14.0			10.0		20.0	17.2		16.2	20.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		240.4			1.6		156.7	2.9		2.8	125.9	
Delay (s)		254.4			11.5		176.7	20.1		19.0	145.9	
Level of Service		F			B		F	C		B	F	
Approach Delay (s)		254.4			11.5			62.1			131.0	
Approach LOS		F			B			E			F	

Intersection Summary			
HCM 2000 Control Delay	133.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.41		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	146.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	671	0	10	0	0	0	60	899	0	10	1237	884
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0				5.0	7.0		5.0	7.0	7.0
Lane Util. Factor	0.95	0.95	1.00				1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00				1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00				0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1681	1681	1583				1770	3539		1770	3539	1550
Flt Permitted	0.95	0.95	1.00				0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1681	1681	1583				1770	3539		1770	3539	1550
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	729	0	11	0	0	0	65	977	0	11	1345	961
RTOR Reduction (vph)	0	0	8	0	0	0	0	0	0	0	0	504
Lane Group Flow (vph)	364	365	3	0	0	0	65	977	0	11	1345	457
Confl. Peds. (#/hr)												1
Turn Type	Split	NA	Perm				Prot	NA		Prot	NA	Perm
Protected Phases	4	4					5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	15.2	15.2	15.2				2.3	32.8		0.6	31.1	31.1
Effective Green, g (s)	15.2	15.2	15.2				2.3	32.8		0.6	31.1	31.1
Actuated g/C Ratio	0.23	0.23	0.23				0.03	0.49		0.01	0.47	0.47
Clearance Time (s)	6.0	6.0	6.0				5.0	7.0		5.0	7.0	7.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)	383	383	361				61	1742		15	1652	723
v/s Ratio Prot	0.22	c0.22					c0.04	0.28		0.01	c0.38	
v/s Ratio Perm			0.00									0.30
v/c Ratio	0.95	0.95	0.01				1.07	0.56		0.73	0.81	0.63
Uniform Delay, d1	25.3	25.3	19.9				32.1	11.9		32.9	15.3	13.4
Progression Factor	1.00	1.00	1.00				1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	33.0	33.5	0.0				134.6	0.7		93.0	3.6	2.5
Delay (s)	58.4	58.9	19.9				166.8	12.5		125.9	18.9	15.9
Level of Service	E	E	B				F	B		F	B	B
Approach Delay (s)		58.1			0.0			22.2			18.2	
Approach LOS		E			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	26.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	66.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	158	120	183	20	160	130	126	80	10	100	130	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.93		1.00	0.98		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1694		1770	1738		1770	1831		1770	1702	
Flt Permitted	0.55	1.00		0.53	1.00		0.56	1.00		0.69	1.00	
Satd. Flow (perm)	1033	1694		992	1738		1045	1831		1292	1702	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	172	130	199	22	174	141	137	87	11	109	141	190
RTOR Reduction (vph)	0	138	0	0	85	0	0	6	0	0	111	0
Lane Group Flow (vph)	172	191	0	22	230	0	137	92	0	109	220	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	8.7	8.7		8.7	8.7		11.9	11.9		11.9	11.9	
Effective Green, g (s)	8.7	8.7		8.7	8.7		11.9	11.9		11.9	11.9	
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.42	0.42		0.42	0.42	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	314	515		301	528		434	761		537	708	
v/s Ratio Prot		0.11			0.13			0.05			0.13	
v/s Ratio Perm	c0.17			0.02			c0.13			0.08		
v/c Ratio	0.55	0.37		0.07	0.44		0.32	0.12		0.20	0.31	
Uniform Delay, d1	8.3	7.8		7.1	8.0		5.6	5.1		5.3	5.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.0	0.5		0.1	0.6		0.4	0.1		0.2	0.3	
Delay (s)	10.3	8.3		7.2	8.6		6.0	5.2		5.5	5.9	
Level of Service	B	A		A	A		A	A		A	A	
Approach Delay (s)		8.9			8.5			5.7			5.8	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	28.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

LOS Worksheets – Year 2022 with Partial Development with Mitigation (LOS D or Better) Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	364	620	70	148	438	420	70	514	206	240	205	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1768	3539	1549	1769	3539	1543	1770	1863	1558	1769	1735	
Flt Permitted	0.33	1.00	1.00	0.25	1.00	1.00	0.41	1.00	1.00	0.12	1.00	
Satd. Flow (perm)	619	3539	1549	463	3539	1543	773	1863	1558	231	1735	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	379	646	73	154	456	438	73	535	215	250	214	179
RTOR Reduction (vph)	0	0	54	0	0	170	0	0	145	0	32	0
Lane Group Flow (vph)	379	646	19	154	456	268	73	535	70	250	361	0
Confl. Peds. (#/hr)	3		1	1		3			4	4		
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	32.6	22.5	22.5	28.6	20.5	20.5	32.1	28.2	28.2	40.3	32.3	
Effective Green, g (s)	32.6	22.5	22.5	28.6	20.5	20.5	32.1	28.2	28.2	40.3	32.3	
Actuated g/C Ratio	0.38	0.26	0.26	0.33	0.24	0.24	0.37	0.32	0.32	0.46	0.37	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	366	917	401	274	835	364	330	605	506	249	645	
v/s Ratio Prot	c0.12	0.18		0.05	0.13		0.01	0.29		c0.09	0.21	
v/s Ratio Perm	c0.27		0.01	0.13		0.17	0.07		0.04	c0.37		
v/c Ratio	1.04	0.70	0.05	0.56	0.55	0.74	0.22	0.88	0.14	1.00	0.56	
Uniform Delay, d1	24.6	29.1	24.1	21.8	29.1	30.6	18.2	27.8	20.7	20.5	21.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	56.5	2.5	0.0	1.6	0.7	7.5	0.1	14.4	0.1	58.1	1.1	
Delay (s)	81.1	31.6	24.2	23.4	29.8	38.2	18.3	42.1	20.8	78.6	22.7	
Level of Service	F	C	C	C	C	D	B	D	C	E	C	
Approach Delay (s)		48.2			32.4			34.5			44.4	
Approach LOS		D			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	39.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	86.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	169	417	170	70	483	210	220	571	80	100	475	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1768	1770		1768	1863	1548	1766	1828		1770	1768	
Flt Permitted	0.31	1.00		0.26	1.00	1.00	0.25	1.00		0.25	1.00	
Satd. Flow (perm)	568	1770		493	1863	1548	465	1828		466	1768	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	178	439	179	74	508	221	232	601	84	105	500	214
RTOR Reduction (vph)	0	37	0	0	0	93	0	12	0	0	38	0
Lane Group Flow (vph)	178	581	0	74	508	128	232	673	0	105	676	0
Confl. Peds. (#/hr)	2		3	3		2	12					12
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	15.1	15.1		15.1	15.1	15.1	16.0	16.0		16.0	16.0	
Effective Green, g (s)	15.1	15.1		15.1	15.1	15.1	16.0	16.0		16.0	16.0	
Actuated g/C Ratio	0.39	0.39		0.39	0.39	0.39	0.41	0.41		0.41	0.41	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	219	683		190	719	597	190	748		190	723	
v/s Ratio Prot		c0.33			0.27			0.37			0.38	
v/s Ratio Perm	0.31			0.15		0.08	c0.50			0.23		
v/c Ratio	0.81	0.85		0.39	0.71	0.21	1.22	0.90		0.55	0.94	
Uniform Delay, d1	10.7	11.0		8.7	10.1	8.0	11.6	10.8		8.8	11.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	20.1	9.9		1.3	3.2	0.2	137.4	13.6		3.5	19.2	
Delay (s)	30.8	20.9		10.0	13.3	8.2	148.9	24.4		12.3	30.3	
Level of Service	C	C		A	B	A	F	C		B	C	
Approach Delay (s)		23.1			11.6			55.9			28.0	
Approach LOS		C			B			E			C	

Intersection Summary			
HCM 2000 Control Delay	30.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	39.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	99.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	231	480	50	171	645	400	30	238	127	340	446	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1543	1768	3539	1583	1769	1863	1563	1769	1768	
Flt Permitted	0.21	1.00	1.00	0.36	1.00	1.00	0.16	1.00	1.00	0.41	1.00	
Satd. Flow (perm)	394	3539	1543	677	3539	1583	298	1863	1563	770	1768	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	238	495	52	176	665	412	31	245	131	351	460	205
RTOR Reduction (vph)	0	0	38	0	0	304	0	0	93	0	18	0
Lane Group Flow (vph)	238	495	14	176	665	108	31	245	38	351	647	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	31.0	22.9	22.9	30.0	22.4	22.4	26.7	25.0	25.0	40.1	33.4	
Effective Green, g (s)	31.0	22.9	22.9	30.0	22.4	22.4	26.7	25.0	25.0	40.1	33.4	
Actuated g/C Ratio	0.36	0.27	0.27	0.35	0.26	0.26	0.31	0.29	0.29	0.47	0.39	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	272	946	412	334	926	414	122	544	456	478	689	
v/s Ratio Prot	c0.08	0.14		0.05	0.19		0.01	0.13		c0.09	c0.37	
v/s Ratio Perm	c0.23		0.01	0.14		0.07	0.07		0.02	0.26		
v/c Ratio	0.88	0.52	0.03	0.53	0.72	0.26	0.25	0.45	0.08	0.73	0.94	
Uniform Delay, d1	21.6	26.7	23.2	20.2	28.7	25.0	22.4	24.7	22.0	16.6	25.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	24.7	0.5	0.0	0.7	2.7	0.3	0.4	0.6	0.1	5.0	20.5	
Delay (s)	46.2	27.2	23.2	20.9	31.4	25.4	22.8	25.3	22.1	21.6	45.7	
Level of Service	D	C	C	C	C	C	C	C	C	C	D	
Approach Delay (s)		32.7			28.0			24.1			37.4	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	31.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	85.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	286	501	140	30	484	70	150	368	40	100	412	341
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.99		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1793		1769	1863	1583	1770	1835		1770	1725	
Flt Permitted	0.35	1.00		0.20	1.00	1.00	0.24	1.00		0.38	1.00	
Satd. Flow (perm)	654	1793		377	1863	1583	438	1835		713	1725	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	292	511	143	31	494	71	153	376	41	102	420	348
RTOR Reduction (vph)	0	22	0	0	0	39	0	9	0	0	67	0
Lane Group Flow (vph)	292	632	0	31	494	32	153	408	0	102	701	0
Confl. Peds. (#/hr)			1	1			2					2
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	20.0	20.0		20.0	20.0	20.0	17.0	17.0		17.0	17.0	
Effective Green, g (s)	20.0	20.0		20.0	20.0	20.0	17.0	17.0		17.0	17.0	
Actuated g/C Ratio	0.44	0.44		0.44	0.44	0.44	0.38	0.38		0.38	0.38	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	290	796		167	828	703	165	693		269	651	
v/s Ratio Prot		0.35			0.27			0.22			c0.41	
v/s Ratio Perm	c0.45			0.08		0.02	0.35			0.14		
v/c Ratio	1.01	0.79		0.19	0.60	0.04	0.93	0.59		0.38	1.08	
Uniform Delay, d1	12.5	10.7		7.6	9.5	7.1	13.4	11.2		10.2	14.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	54.6	5.5		0.5	1.2	0.0	48.7	1.3		0.9	58.0	
Delay (s)	67.1	16.2		8.1	10.6	7.1	62.1	12.5		11.1	72.0	
Level of Service	E	B		A	B	A	E	B		B	E	
Approach Delay (s)		31.9			10.1			25.8			64.8	
Approach LOS		C			B			C			E	

Intersection Summary			
HCM 2000 Control Delay	36.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	105.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

LOS Worksheets – Year 2026 with Project with Mitigation (Pre-Project or Better) Conditions

HCM Signalized Intersection Capacity Analysis
1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	210	81	303	150	320	61	572	439	460	592	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frpb, ped/bikes		1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1848	1549	1767	1863	1583	1770	1863	1562	3433	1863	1583
Flt Permitted		0.93	1.00	0.47	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1729	1549	880	1863	1583	1770	1863	1562	3433	1863	1583
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	45	236	91	340	169	360	69	643	493	517	665	11
RTOR Reduction (vph)	0	0	59	0	0	214	0	0	231	0	0	6
Lane Group Flow (vph)	0	281	33	340	169	146	69	643	262	517	665	5
Confl. Peds. (#/hr)			1	1					1			
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		36.0	36.0	36.0	36.0	36.0	4.0	35.8	35.8	15.0	46.8	46.8
Effective Green, g (s)		36.0	36.0	36.0	36.0	36.0	4.0	35.8	35.8	15.0	46.8	46.8
Actuated g/C Ratio		0.36	0.36	0.36	0.36	0.36	0.04	0.36	0.36	0.15	0.46	0.46
Clearance Time (s)		5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5	2.5	2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		617	553	314	665	565	70	661	554	510	864	734
v/s Ratio Prot					0.09		0.04	c0.35		c0.15	0.36	
v/s Ratio Perm		0.16	0.02	c0.39		0.09			0.17			0.00
v/c Ratio		0.46	0.06	1.08	0.25	0.26	0.99	0.97	0.47	1.01	0.77	0.01
Uniform Delay, d1		24.9	21.3	32.4	22.9	22.9	48.4	32.0	25.2	42.9	22.5	14.5
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.4	0.0	74.7	0.1	0.2	101.7	28.4	1.3	43.3	4.9	0.0
Delay (s)		25.3	21.3	107.1	23.1	23.1	150.1	60.4	26.5	86.2	27.4	14.5
Level of Service		C	C	F	C	C	F	E	C	F	C	B
Approach Delay (s)		24.3			56.0			51.7			52.8	
Approach LOS		C			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	50.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	100.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	89.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	372	667	70	171	453	400	140	587	262	250	244	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	3539	1547	1769	3539	1539	1770	1760		1770	1748	
Flt Permitted	0.19	1.00	1.00	0.17	1.00	1.00	0.40	1.00		0.07	1.00	
Satd. Flow (perm)	351	3539	1547	325	3539	1539	748	1760		122	1748	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	388	695	73	178	472	417	146	611	273	260	254	177
RTOR Reduction (vph)	0	0	56	0	0	194	0	12	0	0	19	0
Lane Group Flow (vph)	388	695	17	178	472	223	146	872	0	260	412	0
Confl. Peds. (#/hr)	3		1	1		3			4	4		
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	45.9	29.3	29.3	34.5	22.9	22.9	63.9	57.0		72.1	61.1	
Effective Green, g (s)	45.9	29.3	29.3	34.5	22.9	22.9	63.9	57.0		72.1	61.1	
Actuated g/C Ratio	0.36	0.23	0.23	0.27	0.18	0.18	0.50	0.44		0.56	0.47	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	323	804	351	216	628	273	425	778		208	828	
v/s Ratio Prot	c0.17	0.20		0.07	0.13		0.02	0.50		c0.11	0.24	
v/s Ratio Perm	c0.26		0.01	0.15		0.14	0.15			c0.59		
v/c Ratio	1.20	0.86	0.05	0.82	0.75	0.82	0.34	1.12		1.25	0.50	
Uniform Delay, d1	34.9	47.9	38.9	39.4	50.3	51.0	18.5	36.0		41.1	23.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	116.4	9.6	0.1	20.9	5.1	16.9	0.2	70.7		145.9	0.5	
Delay (s)	151.4	57.5	39.0	60.3	55.4	67.9	18.7	106.7		186.9	23.8	
Level of Service	F	E	D	E	E	E	B	F		F	C	
Approach Delay (s)		87.8			61.1			94.2			85.2	
Approach LOS		F			E			F			F	

Intersection Summary			
HCM 2000 Control Delay	81.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.29		
Actuated Cycle Length (s)	128.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	111.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	189	490	160	70	488	230	250	653	80	120	503	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.96		1.00	0.98		1.00	0.96	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1786			1770		1766	1832		1770	1774	
Flt Permitted		0.58			0.88		0.22	1.00		0.22	1.00	
Satd. Flow (perm)		1055			1559		413	1832		414	1774	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	199	516	168	74	514	242	263	687	84	126	529	205
RTOR Reduction (vph)	0	19	0	0	33	0	0	10	0	0	31	0
Lane Group Flow (vph)	0	864	0	0	797	0	263	761	0	126	703	0
Confl. Peds. (#/hr)	2		3	3		2	12					12
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		19.0			19.0		18.0	18.0		18.0	18.0	
Effective Green, g (s)		19.0			19.0		18.0	18.0		18.0	18.0	
Actuated g/C Ratio		0.42			0.42		0.40	0.40		0.40	0.40	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		445			658		165	732		165	709	
v/s Ratio Prot								0.42			0.40	
v/s Ratio Perm		c0.82			0.51		c0.64			0.30		
v/c Ratio		1.94			1.21		1.59	1.04		0.76	0.99	
Uniform Delay, d1		13.0			13.0		13.5	13.5		11.7	13.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		431.8			108.8		293.9	44.1		18.7	31.5	
Delay (s)		444.8			121.8		307.4	57.6		30.4	44.9	
Level of Service		F			F		F	E		C	D	
Approach Delay (s)		444.8			121.8			121.2			42.8	
Approach LOS		F			F			F			D	

Intersection Summary			
HCM 2000 Control Delay	181.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.77		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	151.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	910	0	50	0	0	0	110	1335	0	0	940	668
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0				5.0	7.0			7.0	7.0
Lane Util. Factor	0.95	0.95	1.00				1.00	0.95			0.95	1.00
Frt	1.00	1.00	0.85				1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00				0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1681	1583				1770	3539			3539	1583
Flt Permitted	0.95	0.95	1.00				0.95	1.00			1.00	1.00
Satd. Flow (perm)	1681	1681	1583				1770	3539			3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	948	0	52	0	0	0	115	1391	0	0	979	696
RTOR Reduction (vph)	0	0	36	0	0	0	0	0	0	0	0	422
Lane Group Flow (vph)	474	474	16	0	0	0	115	1391	0	0	979	274
Turn Type	Split	NA	Perm				Prot	NA		Prot	NA	Perm
Protected Phases	4	4					5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	27.3	27.3	27.3				7.6	46.9			34.3	34.3
Effective Green, g (s)	27.3	27.3	27.3				7.6	46.9			34.3	34.3
Actuated g/C Ratio	0.31	0.31	0.31				0.09	0.54			0.39	0.39
Clearance Time (s)	6.0	6.0	6.0				5.0	7.0			7.0	7.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	5.0			5.0	5.0
Lane Grp Cap (vph)	526	526	495				154	1903			1392	622
v/s Ratio Prot	c0.28	0.28					0.06	c0.39			0.28	
v/s Ratio Perm			0.01									0.17
v/c Ratio	0.90	0.90	0.03				0.75	0.73			0.70	0.44
Uniform Delay, d1	28.7	28.7	20.8				38.9	15.3			22.2	19.4
Progression Factor	1.00	1.00	1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2	18.2	18.2	0.0				15.7	1.8			2.1	1.0
Delay (s)	46.8	46.8	20.8				54.6	17.1			24.2	20.4
Level of Service	D	D	C				D	B			C	C
Approach Delay (s)		45.5			0.0			20.0			22.7	
Approach LOS		D			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	87.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	280	232	160	10	132	50	259	180	10	100	90	206
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.96		1.00	0.99		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1749		1770	1786		1770	1848		1770	1668	
Flt Permitted	0.63	1.00		0.41	1.00		0.54	1.00		0.63	1.00	
Satd. Flow (perm)	1181	1749		765	1786		1002	1848		1170	1668	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	304	252	174	11	143	54	282	196	11	109	98	224
RTOR Reduction (vph)	0	64	0	0	33	0	0	5	0	0	137	0
Lane Group Flow (vph)	304	362	0	11	164	0	282	202	0	109	185	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	13.4	13.4		13.4	13.4		13.6	13.6		13.6	13.6	
Effective Green, g (s)	13.4	13.4		13.4	13.4		13.6	13.6		13.6	13.6	
Actuated g/C Ratio	0.38	0.38		0.38	0.38		0.39	0.39		0.39	0.39	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	452	669		292	683		389	718		454	648	
v/s Ratio Prot		0.21			0.09			0.11			0.11	
v/s Ratio Perm	c0.26			0.01			c0.28			0.09		
v/c Ratio	0.67	0.54		0.04	0.24		0.72	0.28		0.24	0.29	
Uniform Delay, d1	9.0	8.4		6.8	7.3		9.1	7.3		7.2	7.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.9	0.9		0.1	0.2		6.6	0.2		0.3	0.2	
Delay (s)	12.9	9.3		6.8	7.5		15.7	7.6		7.5	7.6	
Level of Service	B	A		A	A		B	A		A	A	
Approach Delay (s)		10.8			7.5			12.2			7.6	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	35.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	575	180	90	600	570	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8	5.0	6.3	6.3	6.3
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	639	200	100	667	633	300
RTOR Reduction (vph)	0	121	0	0	0	214
Lane Group Flow (vph)	639	79	100	667	633	86
Turn Type	NA	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	28.9	28.9	5.2	31.1	20.9	20.9
Effective Green, g (s)	28.9	28.9	5.2	31.1	20.9	20.9
Actuated g/C Ratio	0.40	0.40	0.07	0.43	0.29	0.29
Clearance Time (s)	6.8	6.8	5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	699	625	125	1505	1011	452
v/s Ratio Prot	c0.36		c0.06	0.19	c0.18	
v/s Ratio Perm		0.05				0.05
v/c Ratio	0.91	0.13	0.80	0.44	0.63	0.19
Uniform Delay, d1	20.9	14.1	33.4	14.9	22.7	19.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.2	0.0	28.1	0.2	1.2	0.2
Delay (s)	37.1	14.1	61.5	15.1	23.9	19.9
Level of Service	D	B	E	B	C	B
Approach Delay (s)	31.6			21.1	22.6	
Approach LOS	C			C	C	

Intersection Summary			
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	73.1	Sum of lost time (s)	18.1
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	100	32	367	170	410	73	596	336	400	640	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frpb, ped/bikes		1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1844	1583	1770	1863	1533	1770	1863	1583	3433	1863	1583
Flt Permitted		0.94	1.00	0.67	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1742	1583	1255	1863	1533	1770	1863	1583	3433	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	22	108	34	395	183	441	78	641	361	430	688	43
RTOR Reduction (vph)	0	0	23	0	0	205	0	0	224	0	0	23
Lane Group Flow (vph)	0	130	11	395	183	236	78	641	137	430	688	20
Confl. Peds. (#/hr)	6					6						
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		25.0	25.0	25.0	25.0	25.0	4.0	30.5	30.5	11.0	37.5	37.5
Effective Green, g (s)		25.0	25.0	25.0	25.0	25.0	4.0	30.5	30.5	11.0	37.5	37.5
Actuated g/C Ratio		0.31	0.31	0.31	0.31	0.31	0.05	0.38	0.38	0.14	0.47	0.47
Clearance Time (s)		5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5	2.5	2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		540	491	389	578	476	87	705	599	469	867	737
v/s Ratio Prot					0.10		0.04	c0.34		c0.13	0.37	
v/s Ratio Perm		0.07	0.01	c0.31		0.15			0.09			0.01
v/c Ratio		0.24	0.02	1.02	0.32	0.49	0.90	0.91	0.23	0.92	0.79	0.03
Uniform Delay, d1		20.7	19.3	27.8	21.2	22.6	38.0	23.7	17.0	34.3	18.2	11.6
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2	0.0	49.6	0.2	0.6	61.8	16.4	0.4	22.2	5.8	0.0
Delay (s)		20.8	19.3	77.3	21.4	23.2	99.8	40.1	17.4	56.5	24.0	11.7
Level of Service		C	B	E	C	C	F	D	B	E	C	B
Approach Delay (s)		20.5			43.9			36.8			35.6	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	37.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	80.5	Sum of lost time (s)	14.0
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	199	506	80	215	720	400	30	287	157	360	526	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1543	1768	3539	1583	1769	1750		1769	1795	
Flt Permitted	0.17	1.00	1.00	0.32	1.00	1.00	0.15	1.00		0.16	1.00	
Satd. Flow (perm)	321	3539	1543	604	3539	1583	281	1750		303	1795	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	205	522	82	222	742	412	31	296	162	371	542	152
RTOR Reduction (vph)	0	0	61	0	0	300	0	22	0	0	11	0
Lane Group Flow (vph)	205	522	21	222	742	112	31	436	0	371	683	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	30.2	23.2	23.2	30.2	23.2	23.2	28.2	26.5		43.5	36.8	
Effective Green, g (s)	30.2	23.2	23.2	30.2	23.2	23.2	28.2	26.5		43.5	36.8	
Actuated g/C Ratio	0.34	0.26	0.26	0.34	0.26	0.26	0.32	0.30		0.49	0.41	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	223	925	403	297	925	414	117	522		346	744	
v/s Ratio Prot	c0.07	0.15		0.06	0.21		0.01	0.25		c0.14	0.38	
v/s Ratio Perm	c0.24		0.01	0.20		0.07	0.08			c0.38		
v/c Ratio	0.92	0.56	0.05	0.75	0.80	0.27	0.26	0.84		1.07	0.92	
Uniform Delay, d1	24.2	28.4	24.5	23.5	30.6	26.0	22.7	29.1		20.8	24.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	37.8	0.8	0.1	8.7	5.1	0.4	0.4	11.1		68.9	16.1	
Delay (s)	62.0	29.2	24.6	32.2	35.7	26.4	23.2	40.2		89.7	40.6	
Level of Service	E	C	C	C	D	C	C	D		F	D	
Approach Delay (s)		37.0			32.3			39.1			57.7	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	41.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	88.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	92.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	271	523	170	30	555	90	130	410	40	100	503	351
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.98			0.98		1.00	0.99		1.00	0.94	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1786			1825		1770	1838		1770	1737	
Flt Permitted		0.60			0.94		0.17	1.00		0.25	1.00	
Satd. Flow (perm)		1094			1718		310	1838		474	1737	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	277	534	173	31	566	92	133	418	41	102	513	358
RTOR Reduction (vph)	0	11	0	0	8	0	0	5	0	0	36	0
Lane Group Flow (vph)	0	973	0	0	681	0	133	454	0	102	835	0
Confl. Peds. (#/hr)			1	1			2					2
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		38.0			38.0		24.0	24.0		24.0	24.0	
Effective Green, g (s)		38.0			38.0		24.0	24.0		24.0	24.0	
Actuated g/C Ratio		0.54			0.54		0.34	0.34		0.34	0.34	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		593			932		106	630		162	595	
v/s Ratio Prot								0.25			c0.48	
v/s Ratio Perm		c0.89			0.40		0.43			0.22		
v/c Ratio		1.64			0.73		1.25	0.72		0.63	1.40	
Uniform Delay, d1		16.0			12.1		23.0	20.1		19.3	23.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		296.0			3.0		170.8	4.0		7.4	191.4	
Delay (s)		312.0			15.1		193.8	24.1		26.7	214.4	
Level of Service		F			B		F	C		C	F	
Approach Delay (s)		312.0			15.1			62.2			194.7	
Approach LOS		F			B			E			F	

Intersection Summary			
HCM 2000 Control Delay	167.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.55		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	157.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	743	0	10	0	0	0	70	947	0	10	1405	965
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0				5.0	7.0		5.0	7.0	7.0
Lane Util. Factor	0.95	0.95	1.00				1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00				1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00				0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1681	1681	1583				1770	3539		1770	3539	1550
Flt Permitted	0.95	0.95	1.00				0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1681	1681	1583				1770	3539		1770	3539	1550
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	808	0	11	0	0	0	76	1029	0	11	1527	1049
RTOR Reduction (vph)	0	0	8	0	0	0	0	0	0	0	0	487
Lane Group Flow (vph)	404	404	3	0	0	0	76	1029	0	11	1527	562
Confl. Peds. (#/hr)												1
Turn Type	Split	NA	Perm				Prot	NA		Prot	NA	Perm
Protected Phases	4	4					5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	22.8	22.8	22.8				3.9	49.4		0.6	46.1	46.1
Effective Green, g (s)	22.8	22.8	22.8				3.9	49.4		0.6	46.1	46.1
Actuated g/C Ratio	0.25	0.25	0.25				0.04	0.54		0.01	0.51	0.51
Clearance Time (s)	6.0	6.0	6.0				5.0	7.0		5.0	7.0	7.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)	422	422	397				76	1925		11	1796	786
v/s Ratio Prot	c0.24	0.24					c0.04	c0.29		0.01	c0.43	
v/s Ratio Perm			0.00									0.36
v/c Ratio	0.96	0.96	0.01				1.00	0.53		1.00	0.85	0.71
Uniform Delay, d1	33.5	33.5	25.5				43.4	13.3		45.1	19.4	17.3
Progression Factor	1.00	1.00	1.00				1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	32.4	32.4	0.0				103.2	0.5		271.4	4.5	3.8
Delay (s)	65.9	65.9	25.5				146.7	13.8		316.5	23.8	21.1
Level of Service	E	E	C				F	B		F	C	C
Approach Delay (s)		65.4			0.0			23.0			24.0	
Approach LOS		E			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	196	151	198	20	222	130	135	80	10	100	130	257
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.94		1.00	0.98		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1704		1770	1760		1770	1831		1770	1677	
Flt Permitted	0.49	1.00		0.49	1.00		0.41	1.00		0.69	1.00	
Satd. Flow (perm)	908	1704		914	1760		767	1831		1292	1677	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	213	164	215	22	241	141	147	87	11	109	141	279
RTOR Reduction (vph)	0	119	0	0	53	0	0	7	0	0	182	0
Lane Group Flow (vph)	213	260	0	22	329	0	147	91	0	109	238	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.5	12.5		12.5	12.5		11.0	11.0		11.0	11.0	
Effective Green, g (s)	12.5	12.5		12.5	12.5		11.0	11.0		11.0	11.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40		0.35	0.35		0.35	0.35	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	360	676		362	698		267	639		451	585	
v/s Ratio Prot		0.15			0.19			0.05			0.14	
v/s Ratio Perm	c0.23			0.02			c0.19			0.08		
v/c Ratio	0.59	0.38		0.06	0.47		0.55	0.14		0.24	0.41	
Uniform Delay, d1	7.5	6.8		5.9	7.0		8.3	7.0		7.3	7.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.6	0.4		0.1	0.5		2.4	0.1		0.3	0.5	
Delay (s)	10.1	7.1		5.9	7.6		10.7	7.1		7.6	8.2	
Level of Service	B	A		A	A		B	A		A	A	
Approach Delay (s)		8.2			7.5			9.3			8.1	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	31.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	247	90	100	630	700	475
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8	5.0	6.3	6.3	6.3
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	271	99	110	692	769	522
RTOR Reduction (vph)	0	73	0	0	0	334
Lane Group Flow (vph)	271	26	110	692	769	188
Turn Type	NA	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	15.9	15.9	5.3	32.5	22.2	22.2
Effective Green, g (s)	15.9	15.9	5.3	32.5	22.2	22.2
Actuated g/C Ratio	0.26	0.26	0.09	0.53	0.36	0.36
Clearance Time (s)	6.8	6.8	5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	457	409	152	1870	1277	571
v/s Ratio Prot	c0.15		c0.06	0.20	c0.22	
v/s Ratio Perm		0.02				0.12
v/c Ratio	0.59	0.06	0.72	0.37	0.60	0.33
Uniform Delay, d1	20.0	17.2	27.4	8.5	16.0	14.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.0	13.4	0.1	0.8	0.3
Delay (s)	21.3	17.2	40.8	8.6	16.9	14.6
Level of Service	C	B	D	A	B	B
Approach Delay (s)	20.2			13.0	15.9	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	61.5	Sum of lost time (s)	18.1
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

LOS Worksheets – Year 2026 with Project with Mitigation (LOS D or Better) Conditions

HCM Signalized Intersection Capacity Analysis
2: Waiale Rd & Kuikahi Drive/Maui Lani Pkwy

10/13/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	372	667	70	171	453	400	140	587	262	250	244	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1768	3539	1549	1769	3539	1543	1770	1863	1558	1769	1748	
Flt Permitted	0.33	1.00	1.00	0.21	1.00	1.00	0.32	1.00	1.00	0.13	1.00	
Satd. Flow (perm)	614	3539	1549	386	3539	1543	603	1863	1558	240	1748	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	388	695	73	178	472	417	146	611	273	260	254	177
RTOR Reduction (vph)	0	0	54	0	0	154	0	0	182	0	28	0
Lane Group Flow (vph)	388	695	19	178	472	263	146	611	91	260	403	0
Confl. Peds. (#/hr)	3		1	1		3			4	4		
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	32.8	22.8	22.8	29.6	21.2	21.2	34.1	29.1	29.1	38.1	31.1	
Effective Green, g (s)	32.8	22.8	22.8	29.6	21.2	21.2	34.1	29.1	29.1	38.1	31.1	
Actuated g/C Ratio	0.38	0.26	0.26	0.34	0.24	0.24	0.39	0.33	0.33	0.44	0.36	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	362	924	404	263	859	374	302	621	519	227	622	
v/s Ratio Prot	c0.12	0.20		0.06	0.13		0.03	0.33		c0.09	0.23	
v/s Ratio Perm	c0.28		0.01	0.16		0.17	0.16		0.06	c0.41		
v/c Ratio	1.07	0.75	0.05	0.68	0.55	0.70	0.48	0.98	0.18	1.15	0.65	
Uniform Delay, d1	24.6	29.7	24.1	21.9	28.9	30.2	18.4	28.9	20.6	21.2	23.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	67.7	3.5	0.0	5.3	0.7	5.9	0.4	31.8	0.2	104.5	2.3	
Delay (s)	92.4	33.1	24.2	27.3	29.6	36.1	18.9	60.7	20.8	125.8	25.9	
Level of Service	F	C	C	C	C	D	B	E	C	F	C	
Approach Delay (s)		52.5			31.8			44.2			63.4	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	46.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	87.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	95.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	189	490	160	70	488	230	250	653	80	120	503	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1767	1783		1770	1863	1546	1762	1832		1770	1863	1545
Flt Permitted	0.28	1.00		0.18	1.00	1.00	0.31	1.00		0.16	1.00	1.00
Satd. Flow (perm)	514	1783		339	1863	1546	573	1832		298	1863	1545
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	199	516	168	74	514	242	263	687	84	126	529	205
RTOR Reduction (vph)	0	22	0	0	0	89	0	8	0	0	0	109
Lane Group Flow (vph)	199	662	0	74	514	153	263	763	0	126	529	96
Confl. Peds. (#/hr)	2		3	3		2	12					12
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	22.0	22.0		22.0	22.0	22.0	25.0	25.0		25.0	25.0	25.0
Effective Green, g (s)	22.0	22.0		22.0	22.0	22.0	25.0	25.0		25.0	25.0	25.0
Actuated g/C Ratio	0.40	0.40		0.40	0.40	0.40	0.45	0.45		0.45	0.45	0.45
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	205	713		135	745	618	260	832		135	846	702
v/s Ratio Prot		0.37			0.28			0.42			0.28	
v/s Ratio Perm	c0.39			0.22		0.10	c0.46			0.42		0.06
v/c Ratio	0.97	0.93		0.55	0.69	0.25	1.01	0.92		0.93	0.63	0.14
Uniform Delay, d1	16.2	15.8		12.7	13.7	11.0	15.0	14.0		14.2	11.4	8.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	54.2	18.3		4.5	2.7	0.2	58.8	14.7		57.1	1.5	0.1
Delay (s)	70.4	34.1		17.2	16.4	11.2	73.8	28.7		71.3	12.9	8.8
Level of Service	E	C		B	B	B	E	C		E	B	A
Approach Delay (s)		42.3			14.9			40.2			20.5	
Approach LOS		D			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	30.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	98.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Waiale Rd & Kuikahi Drive/Maui Lani Pkwy

10/13/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	199	506	80	215	720	400	30	287	157	360	526	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1543	1768	3539	1583	1769	1863	1563	1769	1795	
Flt Permitted	0.17	1.00	1.00	0.33	1.00	1.00	0.16	1.00	1.00	0.35	1.00	
Satd. Flow (perm)	323	3539	1543	616	3539	1583	294	1863	1563	649	1795	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	205	522	82	222	742	412	31	296	162	371	542	152
RTOR Reduction (vph)	0	0	60	0	0	290	0	0	115	0	11	0
Lane Group Flow (vph)	205	522	22	222	742	122	31	296	47	371	683	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	30.2	23.1	23.1	30.2	23.1	23.1	27.0	25.3	25.3	41.4	34.7	
Effective Green, g (s)	30.2	23.1	23.1	30.2	23.1	23.1	27.0	25.3	25.3	41.4	34.7	
Actuated g/C Ratio	0.35	0.27	0.27	0.35	0.27	0.27	0.31	0.29	0.29	0.48	0.40	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	231	944	411	309	944	422	120	544	456	453	719	
v/s Ratio Prot	c0.07	0.15		0.06	0.21		0.01	0.16		c0.10	c0.38	
v/s Ratio Perm	c0.24		0.01	0.19		0.08	0.07		0.03	0.29		
v/c Ratio	0.89	0.55	0.05	0.72	0.79	0.29	0.26	0.54	0.10	0.82	0.95	
Uniform Delay, d1	22.5	27.3	23.6	22.1	29.5	25.2	22.8	25.8	22.4	16.9	25.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	30.2	0.7	0.1	6.5	4.4	0.4	0.4	1.1	0.1	10.5	21.7	
Delay (s)	52.7	28.0	23.7	28.6	33.8	25.6	23.3	26.9	22.5	27.4	46.8	
Level of Service	D	C	C	C	C	C	C	C	C	C	D	
Approach Delay (s)		33.8			30.5			25.2			40.1	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	33.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	86.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	87.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	271	523	170	30	555	90	130	410	40	100	503	351
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1785		1769	1863	1583	1768	1838		1770	1863	1561
Flt Permitted	0.32	1.00		0.21	1.00	1.00	0.25	1.00		0.28	1.00	1.00
Satd. Flow (perm)	595	1785		384	1863	1583	457	1838		525	1863	1561
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	277	534	173	31	566	92	133	418	41	102	513	358
RTOR Reduction (vph)	0	23	0	0	0	46	0	7	0	0	0	166
Lane Group Flow (vph)	277	684	0	31	566	46	133	452	0	102	513	192
Confl. Peds. (#/hr)			1	1			2					2
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	24.4	24.4		24.4	24.4	24.4	16.3	16.3		16.3	16.3	16.3
Effective Green, g (s)	24.4	24.4		24.4	24.4	24.4	16.3	16.3		16.3	16.3	16.3
Actuated g/C Ratio	0.50	0.50		0.50	0.50	0.50	0.33	0.33		0.33	0.33	0.33
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	298	894		192	933	793	152	615		175	623	522
v/s Ratio Prot		0.38			0.30			0.25			0.28	
v/s Ratio Perm	c0.47			0.08		0.03	c0.29			0.19		0.12
v/c Ratio	0.93	0.76		0.16	0.61	0.06	0.88	0.73		0.58	0.82	0.37
Uniform Delay, d1	11.3	9.8		6.6	8.7	6.2	15.2	14.3		13.4	14.9	12.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	33.7	3.9		0.4	1.1	0.0	38.8	4.5		4.9	8.7	0.4
Delay (s)	45.0	13.8		7.0	9.8	6.3	54.1	18.8		18.3	23.5	12.7
Level of Service	D	B		A	A	A	D	B		B	C	B
Approach Delay (s)		22.6			9.2			26.7			19.0	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	48.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX C: RELATED PROJECTS

Residential Projects Status Report

Applicant	Acres	Tax Map Key	SF Units	MF Units	Visitor Units
Maui -- Central					
Committed *					
`Aina o Kane Condos					
A&B Properties	0	3-7-005:003,11,23	0	100	0
Hale Mua					
Sterling Kim	240	3-3-002:031	466	0	0
Imi Ikena Affordable Rentals					
Elleair Hawai`I Inc., sold 2009, now CHP Matt Slepin	0.76	3-8-037:028	0	28	0
Kahawai Condos					
Habitat For Humanity, Sherri Dodson	0.257	2-3-4-033:002	0	16	0
Kahului Town Center Redevelopment					
A & B Properties	17	3-7-007:005,8,9,10,27,50	0	442	0
Kehalani (C-12)					
Kehalani Mauka LLC	28	3-5-001:067	150	0	0
Kehalani (C-13)					
Kehalani Mauka LLC	11	3-5-001:067	0	77	0
Kehalani (C-14)					
Kehalani Mauka LLC	20	3-5-001:067	80	0	0
Kehalani (C-18)					
Kehalani Mauka LLC	9.23		0	83	0
Kehalani (C-19)					
Kehalani Mauka LLC	16.77		76	0	0
Kehalani (C-3)					
Kehalani Mauka LLC	10	3-5-001:067	30	0	0
Kehalani (C-6)					
Kehalani Mauka LLC	16	3-5-001:067	0	80	0
Kehalani (C-7)					
Kehalani Mauka LLC	10	3-5-001:067	35	0	0
Kehalani (C-8)					
Kehalani Mauka LLC	14	3-5-001:067	0	84	0
Kehalani (C-9)					
Kehalani Mauka LLC	26	3-5-001:067	90	0	0
Kehalani Ho'olea Terrace					
Kehalani Mauka LLC	12.25		0	112	0
Kehalani Wai'olu Estates					
Kehalani Mauka LLC	23.72		60	0	0

Applicant	Acres	Tax Map Key	SF Units	MF Units	Visitor Units
Maui Beach Hotel Addition					
KI Concepts Eric Matsuda	0	3-7-003:007,9	0	0	136
Maui Lani Lot 4					
D.R.Horton Schuler Homes	13.8	3-8-007:109,130 (por)	0	238	0
Maui Lani The Fairways					
Maui Lani Homes, LLC; DR Horton/Schuller Homes	13	3-8-007:141	50	0	0
Maui Lani The Parkways					
Maui Lani Homes, LLC; DR Horton/Schuller Homes	45.168	3-8-007:141	225	0	0
Maui Lani Traditions					
Maui Lani 100	20	3-8-007:131	153	0	0
Maui Lani Village					
Maui Lani 100 LLC	0	3-8-007:151,152,155(por)	79	0	0
Mission Street Affordable Apts.					
Kahealani LTD Part., Joseph Kealoha, CHP	0.92	234-018:088	0	10	0
Pi`ihana Project District 2					
Hawaii Land & Farming Co. Inc., Jay Nakamura	78	3-4-032:1,10,18. 3-4-7:2. 3-3-1:16,33.	95	440	0
Waikapu Gardens II					
Spencer Homes	10.5	235-002:016	56	0	
MIP and CP *					
Habitat For Humanity Condos					
Habitat For Humanity, Sheri Dodson	0.6	3-8-037:047	0	40	0
Ka Lima O Maui Affordable Housing					
Ka Lima O Maui, County of Maui, Munekiyo & Hiraga Inc.	2	2-3-8-046:016	0	16	0
Maui Lani Homes 1					
Maui Lani 100	40	3-8-007:130	240	0	0
Maui Lani Lot 7B					
DR Horton; Schuler homes	24.879	3-8-007:141	120	0	0
Maui Lani MF7 Condos					
Maui Lani 100	16	3-8-007:130	0	68	0
Waikapu Mauka Country Town					
Mike Atherton	115	3-6-002:003	228	195	0
Waikapu Mauka Rural Lots					
THP Assoc., Waikapu Mauka Partners	288	236:004:004,5,9,13	304	0	0
MIP Only *					
Pu`unani Residences					
Towne Dev of Hawaii, Endurance Investors, II Wai Hui	210	3-5-002:002,3	150	450	0

Applicant	Acres	Tax Map Key	SF Units	MF Units	Visitor Units
Wai`ale					
A & B Properties	826	3-8-007:101,102,104,105,71, 3-8-005:023,37	1127	1127	0
Wai'ale Affordable Homes					
A & B Properties	50	3-8-007:101	0	300	0
Waikapu Makai Village					
Mike Atherton, Maui Tropical Plantation	225	3-6-002:003(por)	468	513	0
Waikapu Rural Village					
Mike Atherton	23	3-6-004:003	29	0	0

* Definitions of Status Categories:

The development projects shown are those projects that have come to the attention of the Department of Planning. There are certain to be other developments being contemplated or planned by private individuals or corporations of which the Department has not been informed. Further, the Department is not attempting to track housing projects smaller than 6 dwelling units and subdivisions of less than 4 lots. Therefore, this is not a complete depiction of the development projects for the county.

Projects identified as "Committed" have inclusion in the Maui Island Plan Growth Boundaries and generally have conforming Community Plan and zoning entitlements; or are approved 201G/H projects. "Committed" refers to the status of the land relative to the primary county land use entitlements, but is in no way intended to convey the level of commitment by the land owner or the developer to proceed with development or convey any time frame for development.

Projects identified as "MIP and CP" have inclusion in the Maui Island Plan Growth Boundaries and the appropriate urban or rural Community Plan designations but not the conforming zoning entitlements to proceed.

Projects identified as "MIP Only" do have inclusion in the Maui Island Plan Growth Boundaries but do not have the appropriate Community Plan designation nor zoning to proceed.

Projects identified as "Agricultural Subdivisions" are projects permitted through Maui County Code 19.30A Agricultural District Ordinance.

Projects identified as "DHHL Near Term" are Department of Hawaiian Homelands (DHHL) projects planned to be initiated within the current planning horizon.

Projects identified as "DHHL Long Term" are Department of Hawaiian Homelands (DHHL) projects with projections beyond the current planning horizon.

Projects identified as "Recently Completed" include those where the subdivision process is complete, total build-out of the project has been reached or nearly reached, and real property is being actively marketed. These projects remain "Recently Completed" until other map layers show the completed project.

Lastly, the classifications above are in reference to the general level of county land use entitlements for the entire project. Project plans frequently change over time, and specific portions of the projects may gain or loose conformity in the process. Also, state entitlement and various county permits may be required before all or particular portions of a project can be developed. Please consult with the Department of Planning's Zoning Administration and Enforcement Division to confirm Maui Island Plan, Community Plan, Zoning and other land use entitlements.

Central Maui North Development Projects - Waihe`e to Maui Lani February 15, 2011 Long Range Planning Division - Department of Planning - County of Maui

Projects by Geographic Map Extent	Unit Types		
	Single Family	Multi Family	Time Share and Hotel
Recently Completed			
Kehalani Akolea	97	0	0
Kehalani Cottages	109	0	0
Kehalani Koa	72	0	0
Kehalani Mili Court	0	89	0
Kehalani Ohia II	44	0	0
Kehalani Villas	0	103	0
M.C.C. Student Housing	0	100	0
Maui Lani Legends 2	180	0	0
Maui Lani Na Hoku	116	0	0
Maui Lani Sandhills Estates	106	0	0
Waiehu Kou DHHL	211	0	0
TOTAL	937	292	0
Planned/Committed			
Aina o Kane Condos	0	103	0
E Pasapas Ka Pukoa Spreckelsville	16	0	0
Hale Kapili Project	0	4	0
Hale Mua	466	0	0
Ikena Affordable Rentals	0	28	0
Kahawai Condos	0	16	0
Kehalani Town Center Redevelopment	0	442	0
Ka Hale AG Lots	17	0	0
Kehalani (C-12)	50	0	0
Kehalani (C-13)	0	77	0
Kehalani (C-14)	80	0	0
Kehalani (C-15)	0	83	0
Kehalani (C-16)	75	0	0
Kehalani (C-3)	30	0	0
Kehalani (C-4)	0	86	0
Kehalani (C-7)	35	0	0
Kehalani (C-8)	0	84	0
Kehalani (C-9)	90	0	0
Kehalani Ho'olina Terrace	0	112	0
Kehalani Wai'olu Estates	60	0	0
Makani Ag Subdivision	10	0	0
Makani Mauka Ag Subdivision	2	0	0
Marriott Courtyard Hotel Kahului Airport	0	0	140
Maui Lani Lot 4	0	235	0
Maui Lani Sandhills – Commercial	15	0	0
Maui Lani The Pallways	50	0	0
Maui Lani The Pathways	225	0	0
Maui Lani Traditions	155	0	0
Maui Lani Village	79	0	0
Maui Palms Expansion	0	0	130
MEO B.E.S.T. House	0	12	0
Mission Street Affordable Apts.	0	16	0
Na Mala o Waihee	5	0	0
Pi'ihana Project District 2	95	410	0
Waihee Mauka AG Lots	14	0	0
Waihee Valley Large Lot Subdivision	24	0	0
Winn 4-lot	4	0	0
SUB-TOTAL	1,407	1,729	270
Planned/Designated			
Church Street Professional Center	0	8	0
Habitat For Humanity Condos	0	46	0
Hale Ho'omalu Mental Health Kokua	0	8	0
Ka Lima O Maui Affordable Housing	0	16	0
Maui Lani Homes 1	240	0	0
Maui Lani Lot 7B	120	0	0
Maui Lani MF7 Condos	0	68	0
Waiehu Mauka Affordable Townhomes	0	103	0
SUB-TOTAL	360	235	0
Proposed			
Central Maui Senior Housing	0	39	0
Hale Kilinahe Project	80	0	0
Pu'unene Residences	276	476	0
Pu'unene Village A&B	1,200	0	0
Spreckelsville Mauka A&B	280	0	0
Valley Isle Fellowship Condos	0	100	0
Waiakoi Affordable Homes	300	300	0
Waiehu Neighborhood Center	25	82	0
SUB-TOTAL	2,261	997	0
TOTAL	4,318	2,961	270

The development projects shown are those that have come to the attention of the Department of Planning. There are certain to be other developments being contemplated or planned by private individuals or corporations of which the Department has not been informed. Further, the Department is not attempting to track housing projects smaller than 4 dwelling units and subdivisions of less than 4 lots. Therefore, this is not a complete depiction of the development projects for the county.

Projects identified as "Planned/Committed" have the appropriate conforming Community Plan and zoning entitlements, are approved agricultural subdivisions, are approved 201GM projects, or are Department of Hawaiian Homelands (DHHL) projects. Projects identified as "Planned/Designated" have urban or rural Community Plan designations but not the conforming zoning entitlements to proceed. Projects identified as "Proposed" are currently lacking urban or rural Community Plan designations. Projects identified as "Recently Completed" include those where the subdivision process is complete, total build-out of the project has been reached or nearly reached, and real property is being actively marketed. Further, these projects remain "Recently Completed" until other map layers show the completed project.

WCT TIAR Note: This map used only for the purpose of locating cumulative projects.

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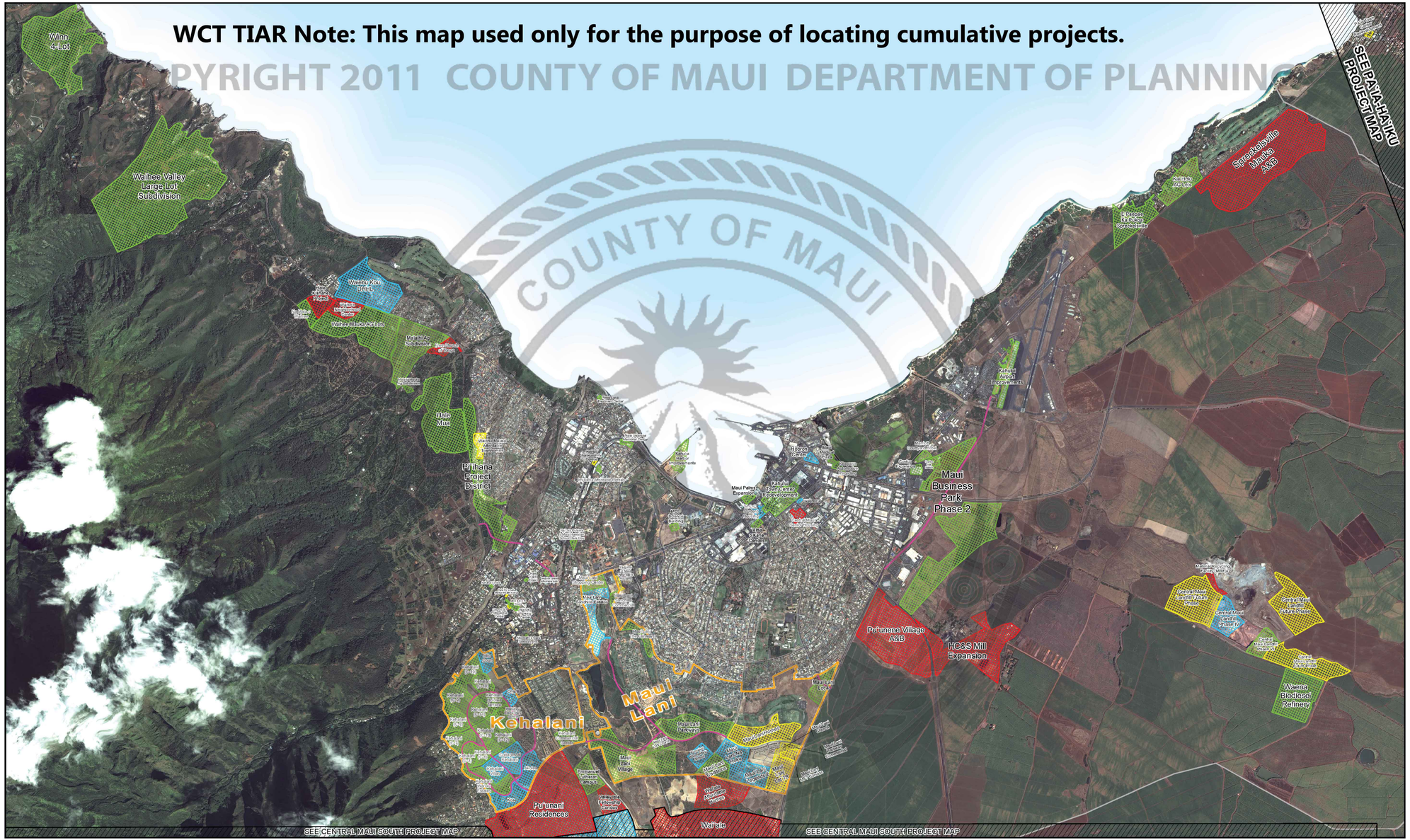

Central Maui North Development Projects

Waihe`e to Maui Lani

Legend

Development Projects

Growth Classes

- Recently Completed
- Planned/Committed
- Planned/Designated
- Proposed
- Proposed Roads
- Phased Development
- Community Plan Area Boundaries

LOCATION MAP

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Feet

0 1,000 2,000 4,000 6,000

PREPARED BY:

Long Range Planning Division
Department of Planning
County of Maui
250 South High Street
Wailuku, Hawaii 96793

Central Maui South Development Projects - Maui Lani to Ma`alaea February 15, 2011 Long Range Planning Division - Department of Planning - County of Maui

Projects by Geographic Map Extent	Unit Types		
	Single Family	Multi Family	Time Share and Hotel
Recently Completed			
Waikapu Gardens	410	0	0
Waiohani Elua	25	0	0
Waiohani Mauka	104	0	0
Waiohani Pikake	38	0	0
TOTAL	**577**	**0**	**0**
Planned/Committed			
Ma'alaea Village Condos	0	100	0
SUB-TOTAL	**0**	**100**	**0**
Planned/Designated			
Ma'alaea Village A&B Project District 11	2,000	0	0
Ohana Kai Village Project District 12	1,100	0	0
Waikapu Mauka Rural Lots	304	0	0
SUB-TOTAL	**3,404**	**0**	**0**
Proposed			
Wai`ale	1,065	2,715	0
Waikapu Makai Village	468	513	0
Waikapu Mauka Country Town	228	195	0
Waikapu Rural Village	29	0	0
SUB-TOTAL	**1,790**	**3,423**	**0**
TOTAL	**5,194**	**3,523**	**0**

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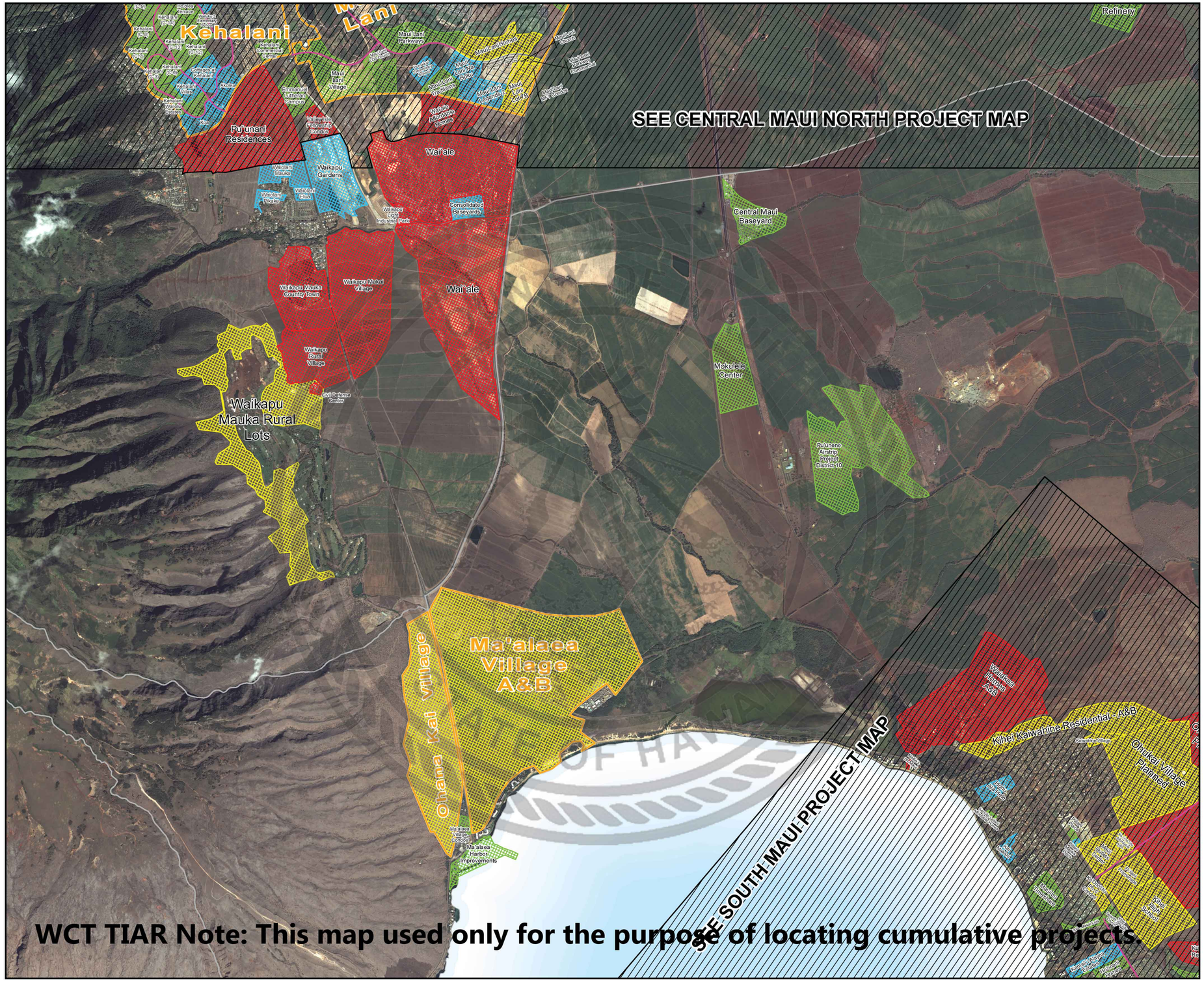
Projects identified as "Planned/Committed" have the appropriate conforming Community Plan and zoning entitlements, are approved agricultural subdivisions, are approved 201G/H projects, or are Department of Hawaiian Homelands (DHHL) projects. Projects identified as "Planned/Designated" have urban or rural Community Plan designations but not the conforming zoning entitlements to proceed. Projects identified as "Proposed" are currently lacking urban or rural Community Plan designations. Projects identified as "Recently Completed" include those where the subdivision process is complete, total build-out of the project has been reached or nearly reached, and real property is being actively marketed. Further, these projects remain "Recently Completed" until other map layers show the completed project.



WCT TIAR Note: This map used only for the purpose of locating cumulative projects.

Central Maui South Development Projects

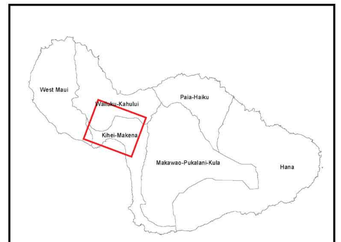
Maui Lani to Ma`alaea

Legend

Development Projects

Growth Classes

- Recently Completed
- Planned/Committed
- Planned/Designated
- Proposed
- Proposed Roads
- Phased Development
- Community Plan Area Boundaries



LOCATION MAP

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Feet

0 1,000 2,000 4,000 6,000

PREPARED BY:

Long Range Planning Division
Department of Planning
County of Maui
250 South High Street
Wailuku, Hawaii 96793

CENTRAL MAUI RELATED PROJECTS COMPLETED BY YEAR 2013 [1,2]

Project Name
• Church Street Professional Center
• Imi Ikena Affordable Rentals
• Kehalani Akolea
• Kehalani Cottages
• Kehalani Koa
• Kehalani Ho'olea Terrace
• Kehalani Milo Court
• Kehalani Ohia II
• Kehalani Villas
• Kehalani Wai'olu Estates
• Maui Lani LDS Church
• Maui Lani Legends 2
• Maui Lani Na Hoku
• Maui Lani Sandhills Estates
• Maui Lani Sandhills - Commercial
• Maui Lani Shopping Center
• Maui Lani The Fairways
• Maui Lani Traditions
• Nisei Veterans Memorial Center
• Pomaikai Elementary School
• Waikapu Gardens
• Wailuku 2 Elementary School
• Waiolani Elua
• Waiolani Mauka
• Waiolani Pikake
• Walgreens

Notes:

[1]The list above of development projects in Central Maui were pulled from multiple sources, including: conversations with County staff and developers, a residential project list for Central Maui provided by the County of Maui in December 2013, available and relevant environmental assessments or impact studies available on the State's website for Maui, and the 2011 Central Maui Development Project maps and Development Project GIS layer available on the County website.

[2]During the related project review process, the projects listed above were found to have been completed. The socioeconomic and land use data in the TDFM Base Year (2007) was reviewed and in some areas adjusted to appropriately model the above related projects and to further update the Base Year (2007) model to a Base Year (2013) model.

APPENDIX D: MXD+ WORKSHEETS

MXD+ Worksheets – Year 2022 Phase 1 Project Conditions

MIXED USE TRIP GENERATION MODEL - BASIC INPUT

All shaded cells are inputs
Regular inputs (project-specific)
Inputs that may depend on regional values from census data, travel demand model, etc…
Treat like other inputs, but please send values and source to Mackenzie Watten so that a library of values can be compiled in future versions!

Section 1 - General Site Information

Site Name	Waikapu Country Town	int/sq mi	50
	Phase 1 (2017-2021)		
Geographic		**Notes / Instructions**	
Developed Area (in acres)	244.72	Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.	
Number of Intersections	19	Count intersections either within or on the perimeter of the MXD. Check resulting intersections per square mile in blue above	
Is Transit (bus or rail) present within the site or across the street?	Yes	Note: This is only used as a way to zero out the probability of external trips if no transit is present.	
Proportion of households within 1/4 mile of a transit stop	25%	Enter as a percentage	
Land Use - Surrounding Area			
Is the site in a Central Business District and/or TOD?	No	Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.	
Employment within one mile of the MXD	**3,503**	Do not include employment within the MXD itself	
Employment within a 30 minute Transit Trip (Door-to-door)	**7,686**	Include employment within the MXD itself	
Total Regional Employment	**90,855**	Employment at MPO or similar level	
Site Demographics			
Enter Population Directly?	No	If "No", will apply average HH size factors (immediately below) to dwelling unit totals in section 2	
Population		You do not need to enter population here. It will be calculated based on dwelling units below and average HH sizes.	
Average HH Size by type within MXD			
Single Family	3.2	These HH size inputs by dwelling type are used to calculate population if it is not entered above, and are also used for average HH size if block group average HH size option is "No" below	
Multi-Family	2.5		
Townhouse	2.5		
High Rise Condo	2.5		
Average Vehicles Owned per Dwelling Unit within site	2.70		
Use Surrounding Area (Block Group) Demographics for On-Site Average HH Size?	Yes	If no project-specific information exists, can use block group average HH size (see below)	
Use Surrounding Area (Block Group) Demographics for On-Site Average Veh Own?	Yes	If no project-specific information exists, can use block group average veh owned (see below)	
Surrounding Area (Block Group) Demographics			
Average HH size near Site	3.37	See http://factfinder2.census.gov/	
Average Vehicles Owned per Dwelling Unit near Site	2.07	See http://factfinder2.census.gov/	

Section 2 - Trip Generation

			Trip Equation Method			Trips			NHB Trips Outside of Project		
	Quantity	**Units**	Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour
Number of Dwelling Units											
Single Family	347	DU	Log Equation	Linear Equation	Log Equation	3,299	253	322	699	11	65
Multi-Family	384	DU	Linear Equation	Linear Equation	Linear Equation	2,451	192	229	773	12	71
Townhouse	0	DU	Log Equation	Log Equation	Log Equation	0	0	0	0	0	0
High Rise Condo	0	DU	Linear Equation	Linear Equation	Linear Equation	0	0	0	0	0	0
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)											
General Retail other than those listed below	169.597	ksf	Log Equation	Log Equation	Log Equation	9,573	215	854			
Supermarket	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Bank	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Health Club	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Restaurant (non-fast food)	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Fast-Food Restaurant	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Gas Station	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Auto Repair	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Home Improvement Superstore		ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Free-Standing Discount		ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Office											
Non-Medical	0	ksf	Log Equation	Log Equation	Linear Equation	0	0	0			
Medical	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Industrial											
Light Industrial	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Manufacturing	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Warehousing / Self-Storage	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Hotel (including restaurant, facilities, etc…)	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0			
Motel		Rooms	Average Rate	Average Rate	Average Rate	0	0	0			
Movie Theater (Theater with Matinee)			Average Rate	Average Rate	Average Rate	0	0	0			
Movie Theater (Multiplex)	0	Screens	Average Rate	Average Rate	Average Rate	0	0	0			
School											
University		Students	Linear Equation	Average Rate	Average Rate	0	0	0			
High School		Students	Average Rate	Average Rate	Average Rate	0	0	0			
Middle School		Students	Average Rate	Average Rate	Average Rate	0	0	0			
Elementary	750	Students	Average Rate	Average Rate	Average Rate	968	338	113			
Trips from Land uses not covered above ==>											
Daily	61	Park related trips									
AM Peak Hour	1	Park related trips									
PM Peak Hour	2	Park related trips									
Jobs in those Land Uses	0										

	Daily	AM Peak Hour	PM Peak Hour
Total "Raw" ITE Trips	**16,351**	**998**	**1,519**

MIXED USE TRIP GENERATION MODEL - ADVANCED OUTPUT

MODEL APPLICATION - ALL TRIPS

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Number of "Raw" ITE Trips Subject to Model												
Productions	1263	3203	1475	5940	192	104	53	349	167	258	149	575
Attractions	1016	6897	1824	9736	82	293	59	434	126	558	186	871
Total	2278	10099	3298	15676	274	397	112	783	293	817	335	1445
Predicted Probabilities:												
Productions												
Internal Capture	5.30%	10.35%	9.68%	12.49%	7.16%	14.06%	13.20%	12.91%	10.00%	19.62%	18.42%	21.92%
Walking External	3.17%	2.07%	0.51%	1.93%	4.19%	2.73%	0.51%	3.27%	3.17%	2.07%	0.51%	2.03%
Transit External	0.52%	1.08%	5.44%	2.05%	0.74%	2.33%	11.70%	2.80%	0.81%	2.16%	10.88%	4.00%
Attractions												
Internal Capture	5.30%	10.35%	9.68%	7.62%	7.16%	14.06%	13.20%	10.36%	10.00%	19.62%	18.42%	14.47%
Walking External	3.17%	2.07%	0.51%	1.90%	4.19%	2.73%	0.51%	2.70%	3.17%	2.07%	0.51%	1.91%
Transit External	0.52%	1.08%	5.44%	1.83%	0.74%	2.33%	11.70%	3.29%	0.81%	2.16%	10.88%	3.78%
Total												
Internal Capture	5.27%	10.34%	9.70%	9.47%	7.30%	14.12%	12.45%	11.50%	10.23%	19.59%	18.49%	17.43%
Walking External	3.17%	2.07%	0.51%	1.91%	4.19%	2.73%	0.51%	2.95%	3.17%	2.07%	0.51%	1.96%
Transit External	0.52%	1.08%	5.44%	1.91%	0.74%	2.33%	11.70%	3.08%	0.81%	2.16%	10.88%	3.86%
Number of Trips:												
Productions												
Internal Capture	60	522	160	742	10	28	7	45	15	80	31	126
Walking External	38	56	7	100	8	2	0	10	5	4	1	9
Transit External	6	29	72	107	1	2	5	9	1	4	13	18
Attractions												
Internal Capture	60	522	160	742	10	28	7	45	15	80	31	126
Walking External	30	132	8	171	3	7	0	11	4	10	1	14
Transit External	5	69	91	164	1	6	6	13	1	10	17	28
Total												
Internal Capture	120	1044	320	1484	20	56	14	90	30	160	62	252
Walking External	68	188	15	271	11	9	1	20	8	14	1	23
Transit External	11	98	162	271	2	8	12	21	2	14	30	46
Internal Capture including Site Specific Internal	190	1589	320	2099	44	246	14	304	38	223	62	323
												Walkir
Net Number of IXXI Vehicle Trips	**2079**	**8770**	**2801**	**13649**	**241**	**323**	**86**	**651**	**253**	**629**	**242**	**1124**

	External Vehicle Trips			VMT		
Results	Raw	Net	Reduction %	Raw	Net	Reduction %
Daily	16,351	13,649	17%	61,319	52,259	15%
AM Peak Hour	998	651	35%	4,235	2,990	29%
PM Peak Hour	1,519	1,124	26%	5,974	4,601	23%

NOTE: External trips are attributed half to project site uses,
internal trips all to site uses for purposes of VMT allocation.
NHB Trips by households that start and end outside the site are not included.

MODEL APPLICATION - TRIP ENDS ASSOCIATED WITH HOUSES IN THE PROJECT ONLY

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Number of "Raw" ITE Trips Subject to Model												
Productions	1263	3203	0	4465	192	104	0	295	167	258	0	426
Attractions	-35	356	349	670	-12	-59	6	-65	-4	21	37	54
Total	1228	3558	349	5135	180	44	6	230	163	279	37	479
Predicted Probabilities:												
Productions												
Internal Capture	5.30%	10.35%	9.68%	12.49%	7.16%	14.06%	13.20%	12.91%	10.00%	19.62%	18.42%	21.92%
Walking External	3.17%	2.07%	0.51%	1.93%	4.19%	2.73%	0.51%	3.27%	3.17%	2.07%	0.51%	2.03%
Transit External	0.52%	1.08%	5.44%	2.05%	0.74%	2.33%	11.70%	2.80%	0.81%	2.16%	10.88%	4.00%
Attractions												
Internal Capture	5.30%	10.35%	9.68%	7.62%	7.16%	14.06%	13.20%	10.36%	10.00%	19.62%	18.42%	14.47%
Walking External	3.17%	2.07%	0.51%	1.90%	4.19%	2.73%	0.51%	2.70%	3.17%	2.07%	0.51%	1.91%
Transit External	0.52%	1.08%	5.44%	1.83%	0.74%	2.33%	11.70%	3.29%	0.81%	2.16%	10.88%	3.78%
Total												
Internal Capture	-5.67%	10.34%	0.00%	5.81%	-13.52%	-266.39%	0.00%	-61.95%	-4.96%	14.87%	0.00%	6.97%
Walking External	3.17%	2.07%	0.51%	2.25%	4.19%	2.73%	0.51%	3.49%	3.17%	2.07%	0.51%	2.36%
Transit External	0.52%	1.08%	5.44%	1.25%	0.74%	2.33%	11.70%	1.61%	0.81%	2.16%	10.88%	2.36%
Number of Trips:												
Productions												
Internal Capture	-35	184	0	149	-12	-59	0	-71	-4	21	0	17
Walking External	41	63	0	104	9	4	0	13	5	5	0	10
Transit External	7	33	0	39	2	4	0	5	1	5	0	7
Attractions												
Internal Capture	-35	184	0	149	-12	-59	0	-71	-4	21	0	17
Walking External	0	4	2	5	0	0	0	0	0	0	0	0
Transit External	0	2	19	21	0	0	1	1	0	0	4	4
Total												
Internal Capture	-70	368	0	298	-24	-118	0	-143	-8	42	0	33
Walking External	41	66	2	109	9	4	0	13	5	5	0	11
Transit External	7	35	19	60	2	4	1	6	1	5	4	11
Internal Capture including Site Specific Internal	-35	640	0	606	-12	-23	0	-35	-4	73	0	69
NHB trips occuring outside the project			1472				23				136	
Non-XX NHB trips based on MXD model			143				3				25	
NHB trips still occuring outside the project			1329				20				111	
Net Number of IXXI Vehicle Trips generated by Project Residences	**1249**	**3090**	**328**	**4667**	**194**	**154**	**5**	**354**	**165**	**228**	**33**	**425**

	External Vehicle Trips			VMT			VMT Per Household	
Results	Raw	Net	Reduction %	Raw	Net	Reduction %	Raw	Net
Daily	5,750	4,667	19%	56,051	48,312	14%	76.7	66.1
AM Peak Hour	445	354	20%	4,376	3,695	16%	6.0	5.1
PM Peak Hour	551	425	23%	5,635	4,698	17%	7.7	6.4

NOTE: all trips generated by project households (either produced or attracted or both)
are counted 100%. This cannot be compared directly to the VMT in the section above.

MXD+ Worksheets – Year 2026 Phase 1 and Phase 2 Project Conditions

MIXED USE TRIP GENERATION MODEL - BASIC INPUT

All shaded cells are inputs
Regular inputs (project-specific)
Inputs that may depend on regional values from census data, travel demand model, etc…
Treat like other inputs, but please send values and source to Mackenzie Watten so that a library of values can be compiled in future versions!

Section 1 - General Site Information

Site Name	Waikapu Country Town *Phase 1 & 2 (2017-2026)*	int/sq mi	**40**
Geographic		**Notes / Instructions**	
Developed Area (in acres)	444.21	Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.	
Number of Intersections	28	Count intersections either within or on the perimeter of the MXD. Check resulting intersections per square mile in blue above	
Is Transit (bus or rail) present within the site or across the street?	Yes	Note: This is only used as a way to zero out the probability of external trips if no transit is present.	
Proportion of households within 1/4 mile of a transit stop	25%	Enter as a percentage	
Land Use - Surrounding Area			
Is the site in a Central Business District and/or TOD?	No	Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.	
Employment within one mile of the MXD	**3,743**	Do not include employment within the MXD itself	
Employment within a 30 minute Transit Trip (Door-to-door)	**8,089**	Include employment within the MXD itself	
Total Regional Employment	**94,824**	Employment at MPO or similar level	
Site Demographics			
Enter Population Directly?	No	If "No", will apply average HH size factors (immediately below) to dwelling unit totals in section 2	
Population		You do not need to enter population here. It will be calculated based on dwelling units below and average HH sizes.	
Average HH Size by type within MXD			
Single Family	3.2	These HH size inputs by dwelling type are used to calculate population if it is not entered above, and are also used for average HH size if block group average HH size option is "No" below	
Multi-Family	2.5		
Townhouse	2.5		
High Rise Condo	2.5		
Average Vehicles Owned per Dwelling Unit within site	2.70		
Use Surrounding Area (Block Group) Demographics for On-Site Average HH Size?	Yes	If no project-specific information exists, can use block group average HH size (see below)	
Use Surrounding Area (Block Group) Demographics for On-Site Average Veh Own?	Yes	If no project-specific information exists, can use block group average veh owned (see below)	
Surrounding Area (Block Group) Demographics			
Average HH size near Site	3.37	See http://factfinder2.census.gov/	
Average Vehicles Owned per Dwelling Unit near Site	2.07	See http://factfinder2.census.gov/	

Section 2 - Trip Generation

			Trip Equation Method			Trips			NHB Trips Outside of Project		
	Quantity	**Units**	Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour
Number of Dwelling Units											
Single Family	1,050	DU	Log Equation	Linear Equation	Log Equation	9,136	745	872	2,114	33	195
Multi-Family	529	DU	Linear Equation	Linear Equation	Linear Equation	3,329	263	309	1,065	17	98
Townhouse	0	DU	Log Equation	Log Equation	Log Equation	0	0	0	0	0	0
High Rise Condo	0	DU	Linear Equation	Linear Equation	Linear Equation	0	0	0	0	0	0
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)											
General Retail other than those listed below	169.597	ksf	Log Equation	Log Equation	Log Equation	9,573	215	854			
Supermarket	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Bank	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Health Club	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Restaurant (non-fast food)	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Fast-Food Restaurant	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Gas Station	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Auto Repair	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Home Improvement Superstore		ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Free-Standing Discount		ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Office											
Non-Medical	0	ksf	Log Equation	Log Equation	Linear Equation	0	0	0			
Medical	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Industrial											
Light Industrial	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Manufacturing	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Warehousing / Self-Storage	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Hotel (including restaurant, facilities, etc…)	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0			
Motel		Rooms	Average Rate	Average Rate	Average Rate	0	0	0			
Movie Theater (Theater with Matinee)			Average Rate	Average Rate	Average Rate	0	0	0			
Movie Theater (Multiplex)	0	Screens	Average Rate	Average Rate	Average Rate	0	0	0			
School											
University		Students	Linear Equation	Average Rate	Average Rate	0	0	0			
High School		Students	Average Rate	Average Rate	Average Rate	0	0	0			
Middle School		Students	Average Rate	Average Rate	Average Rate	0	0	0			
Elementary	750	Students	Average Rate	Average Rate	Average Rate	968	338	113			
Trips from Land uses not covered above ==>											
Daily	74	Park related trips									
AM Peak Hour	1	Park related trips									
PM Peak Hour	3	Park related trips									
Jobs in those Land Uses	0										

	Daily	AM Peak Hour	PM Peak Hour
Total "Raw" ITE Trips	**23,080**	**1,561**	**2,150**

MIXED USE TRIP GENERATION MODEL - ADVANCED OUTPUT

MODEL APPLICATION - ALL TRIPS

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Number of "Raw" ITE Trips Subject to Model												
Productions	2778	7262	1475	11514	450	355	53	859	363	590	149	1103
Attractions	1016	7630	2231	10878	82	338	67	487	126	618	228	973
Total	3794	14892	3706	22392	532	694	120	1346	489	1208	377	2075
Predicted Probabilities:												
Productions												
Internal Capture	4.42%	10.48%	11.04%	9.28%	6.05%	14.30%	15.11%	8.73%	7.36%	17.42%	18.39%	14.33%
Walking External	2.92%	1.57%	0.46%	1.79%	3.86%	2.08%	0.47%	2.97%	2.92%	1.57%	0.46%	1.93%
Transit External	0.41%	1.13%	5.45%	1.47%	0.59%	2.42%	11.71%	1.93%	0.64%	2.25%	10.89%	2.71%
Attractions												
Internal Capture	4.42%	10.48%	11.04%	9.83%	6.05%	14.30%	15.11%	15.39%	7.36%	17.42%	18.39%	16.24%
Walking External	2.92%	1.57%	0.46%	1.47%	3.86%	2.08%	0.47%	2.14%	2.92%	1.57%	0.46%	1.49%
Transit External	0.41%	1.13%	5.45%	1.95%	0.59%	2.42%	11.71%	3.43%	0.64%	2.25%	10.89%	4.09%
Total												
Internal Capture	4.43%	10.48%	11.06%	9.55%	6.01%	14.42%	14.99%	11.14%	7.36%	17.38%	18.54%	15.23%
Walking External	2.92%	1.57%	0.46%	1.63%	3.86%	2.08%	0.47%	2.68%	2.92%	1.57%	0.46%	1.73%
Transit External	0.41%	1.13%	5.45%	1.70%	0.59%	2.42%	11.71%	2.45%	0.64%	2.25%	10.89%	3.35%
Number of Trips:												
Productions												
Internal Capture	84	780	205	1069	16	50	9	75	18	105	35	158
Walking External	79	102	6	187	17	6	0	23	10	8	1	18
Transit External	11	73	69	153	3	7	5	15	2	11	12	26
Attractions												
Internal Capture	84	780	205	1069	16	50	9	75	18	105	35	158
Walking External	27	108	9	144	3	6	0	9	3	8	1	12
Transit External	4	77	110	191	0	7	7	14	1	12	21	33
Total												
Internal Capture	168	1560	410	2138	32	100	18	150	36	210	70	316
Walking External	106	210	15	331	19	12	0	32	13	16	1	30
Transit External	15	150	180	345	3	14	12	29	3	22	33	59
Internal Capture including Site Specific Internal	238	2105	410	2753	56	290	18	364	44	273	70	387
												Walkir
Net Number of IXXI Vehicle Trips	**3505**	**12972**	**3101**	**19578**	**478**	**567**	**90**	**1135**	**437**	**960**	**273**	**1670**

	External Vehicle Trips			VMT		
Results	Raw	Net	Reduction %	Raw	Net	Reduction %
Daily	23,080	19,578	15%	88,254	76,475	13%
AM Peak Hour	1,561	1,135	27%	6,908	5,347	23%
PM Peak Hour	2,150	1,670	22%	8,672	7,000	19%

NOTE: External trips are attributed half to project site uses,
internal trips all to site uses for purposes of VMT allocation.
NHB Trips by households that start and end outside the site are not included.

MODEL APPLICATION - TRIP ENDS ASSOCIATED WITH HOUSES IN THE PROJECT ONLY

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Number of "Raw" ITE Trips Subject to Model												
Productions	2778	7262	0	10040	450	355	0	805	363	590	0	953
Attractions	-35	1090	757	1812	-12	-14	14	-12	-4	81	79	156
Total	2743	8351	757	11851	438	341	14	793	359	671	79	1109
Predicted Probabilities:												
Productions												
Internal Capture	4.42%	10.48%	11.04%	9.28%	6.05%	14.30%	15.11%	8.73%	7.36%	17.42%	18.39%	14.33%
Walking External	2.92%	1.57%	0.46%	1.79%	3.86%	2.08%	0.47%	2.97%	2.92%	1.57%	0.46%	1.93%
Transit External	0.41%	1.13%	5.45%	1.47%	0.59%	2.42%	11.71%	1.93%	0.64%	2.25%	10.89%	2.71%
Attractions												
Internal Capture	4.42%	10.48%	11.04%	9.83%	6.05%	14.30%	15.11%	15.39%	7.36%	17.42%	18.39%	16.24%
Walking External	2.92%	1.57%	0.46%	1.47%	3.86%	2.08%	0.47%	2.14%	2.92%	1.57%	0.46%	1.49%
Transit External	0.41%	1.13%	5.45%	1.95%	0.59%	2.42%	11.71%	3.43%	0.64%	2.25%	10.89%	4.09%
Total												
Internal Capture	-2.54%	10.49%	0.00%	6.80%	-5.55%	-8.00%	0.00%	-6.51%	-2.25%	17.29%	0.00%	9.73%
Walking External	2.92%	1.57%	0.46%	1.84%	3.86%	2.08%	0.47%	3.03%	2.92%	1.57%	0.46%	1.98%
Transit External	0.41%	1.13%	5.45%	1.24%	0.59%	2.42%	11.71%	1.57%	0.64%	2.25%	10.89%	2.34%
Number of Trips:												
Productions												
Internal Capture	-35	438	0	403	-12	-14	0	-26	-4	58	0	54
Walking External	82	107	0	190	18	8	0	25	11	8	0	19
Transit External	12	77	0	88	3	9	0	12	2	12	0	14
Attractions												
Internal Capture	-35	438	0	403	-12	-14	0	-26	-4	58	0	54
Walking External	0	10	4	14	0	0	0	0	0	0	0	1
Transit External	0	7	41	49	0	0	2	2	0	1	9	9
Total												
Internal Capture	-70	876	0	806	-24	-27	0	-52	-8	116	0	108
Walking External	82	118	4	203	18	8	0	26	11	9	0	20
Transit External	12	84	41	137	3	9	2	13	2	12	9	23
Internal Capture including Site Specific Internal	-35	1148	0	1114	-12	68	0	56	-4	148	0	144
NHB trips occuring outside the project			3179				50				294	
Non-XX NHB trips based on MXD model			351				8				54	
NHB trips still occuring outside the project			2828				42				240	
Net Number of IXXI Vehicle Trips generated by Project Residences	**2719**	**7274**	**712**	**10705**	**442**	**352**	**12**	**806**	**354**	**534**	**70**	**958**

	External Vehicle Trips			VMT			VMT Per Household	
Results	Raw	Net	Reduction %	Raw	Net	Reduction %	Raw	Net
Daily	12,466	10,705	14%	121,445	108,392	11%	76.9	68.6
AM Peak Hour	1,008	806	20%	9,902	8,435	15%	6.3	5.3
PM Peak Hour	1,181	958	19%	12,093	10,404	14%	7.7	6.6

NOTE: all trips generated by project households (either produced or attracted or both)
are counted 100%. This cannot be compared directly to the VMT in the section above.

APPENDIX E: YEAR 2026 PROJECT TRIP GENERATION ESTIMTATES

TRIP GENERATION RATES AND ESTIMATES FOR WCT PHASE 1 ONLY

SUMMARY OF RATES

Land Use	ITE#	Rate	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Single-Family Housing	210	per Dwelling Unit	[a]	25%	75%	[a]	63%	37%	[a]
Apartments	220	per Dwelling Unit	[a]	20%	80%	[a]	65%	35%	[a]
Retail	820	per 1,000 square feet	[a]	62%	38%	[a]	48%	52%	[a]
Parks	412	per acre	2.28	61%	39%	0.02	61%	39%	0.09
Elementary School	520	per student	1.29	55%	45%	0.45	49%	51%	0.15
Quality Restaurant	931	per 1,000 square feet	89.95	82%	18%	0.81	67%	33%	7.49

Source: *ITE Trip Generation Manual,* 9th Edition, 2012.

VEHICLE TRIP ESTIMATES

Land Use	ITE#	Quantity	Unit	Daily	AM Peak Hour			PM Peak Hour		
					In	Out	Total	In	Out	Total
Phase 1 (2017-2021)										
Single-Family Housing	210	347	DU[1]	3,299	63	190	253	203	119	322
Apartments [b]	220	384	DU[1]	2,451	38	154	192	149	80	229
Retail [c]	820	169.597	KSF[2]	9,573	133	82	215	410	444	854
Parks	412	26.660	Acres	61	1	0	1	1	1	2
Elementary School [d]	520	750	Students	968	186	152	338	55	58	113
Internal Capture or Non-motorized Trips (15% Daily; 25% AM and PM) [e]				*-2,453*	*-105*	*-145*	*-250*	*-205*	*-175*	*-380*
Pass-by Reduction (10% Daily and AM; 20% PM) [f]				*-813*	*-10*	*-6*	*-16*	*-61*	*-67*	*-128*
Total Net New External Vehicle Trips (Phase 1 Only)				**13,086**	**306**	**427**	**733**	**552**	**460**	**1,012**

Source: Fehr & Peers, 2014; Waikapu Country Town Conceptual Land Use Plan by Planning Consultants Hawaii, LLC. (October 2014)

Notes:

[1] Dwelling Unit = DU

[2] 1,000 square feet = ksf

[a] Fitted curve equations were used to derive AM peak hour, PM peak hour, and daily trip generation.

[b] The country town mixed-use residential units and the multi-family residential units were all analyzed as apartments for conservative trip generation analysis purposes.

[c] Does not include the 29,250 square feet of existing commercial uses located in the same area as the "village center," which will remain.

[d] Elementary school student body assumed based on information provided in the latest Waikapu Country Town Land Use Plan dated March 3, 2014 and further consultation with the Planning Consultants Hawaii, LLC and Hawaii Department of Education, Facilities.

[e] Under Phase 1 conditions, it is assumed that the percentage reductions related to internal capture and non-motorized trips are different than full project buildout reductions because a smaller portion of the makai and the mauka side of the WCT project will be developed and less residential units will be constructed. An estimated 15% reduction of daily trips and 25% AM and PM peak hour trips were made to account for the mixed-use nature of the site, where vehicle trips can be linked and/or replaced with non-motorized trips. The MXD process was used to confirm and refine the initial reduction estimate. The MXD+ estimates peak hour internalization at 26% to 35% for WCT Phase 1.

[f] Based on the ITE Trip Generation Handbook, 2nd Edition, 2004, the estimated pass-by trip credit (assuming all WCT commercial space is for retail) is about 33%. However, because some space is expected to be service-oriented or small office, and to provide a more conservative analysis it is estimated that the pass-by credit is 10% and 20% of the net daily and net AM and PM peak hour retail trips, respectively.

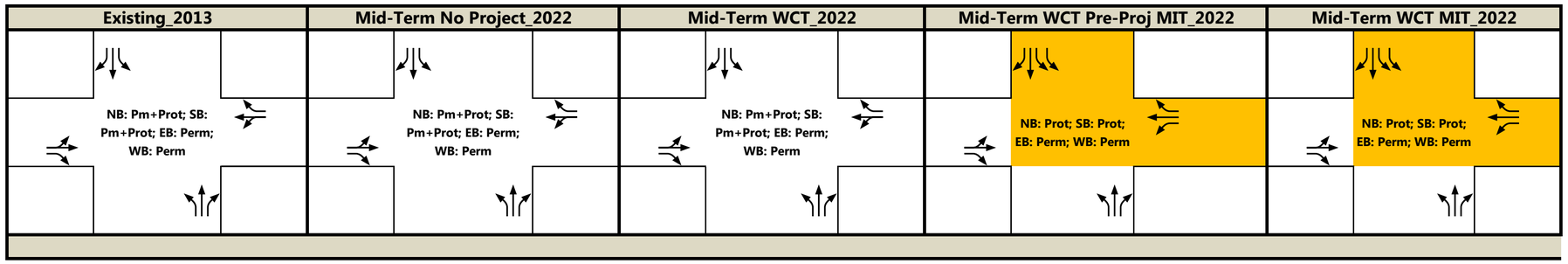
APPENDIX F: PROPOSED MITIGATION MEASURES

Proposed Year 2022 Mitigation Measures

Proposed Year 2022 Mitigation Measures for the Waikapu Country Town (WCT) Project

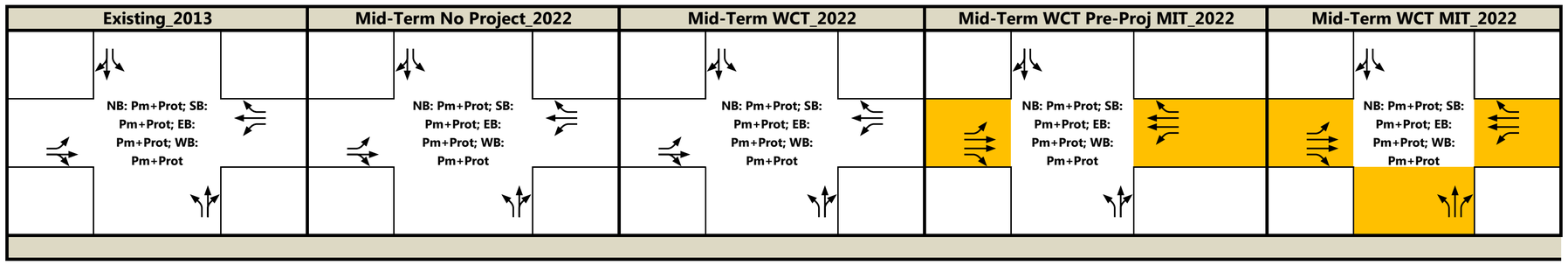
Intersection #
1

N-S : Honoapi'ilani Highway
E-W : Kuikahi Drive



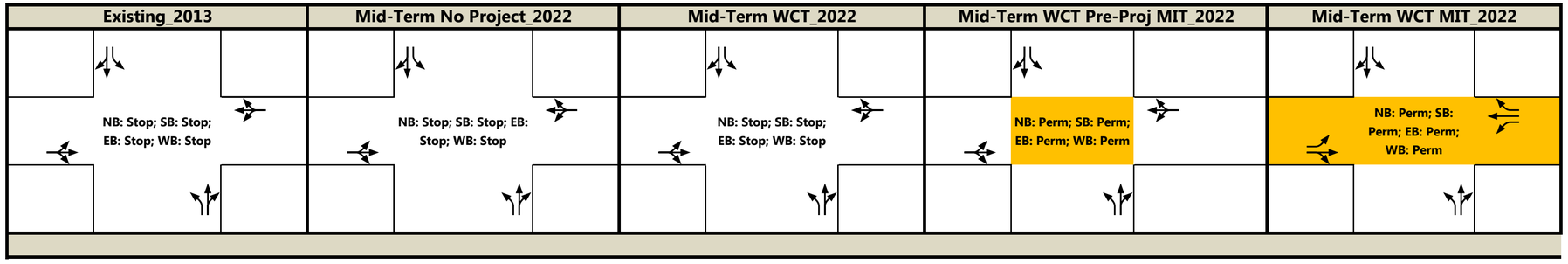
Intersection #
2

N-S : Waiale Road
E-W : Kuikahi Drive



Intersection #
3

N-S : S. Kamehameha Avenue
E-W : Maui Lani Parkway



Legend:

- Pre-Proj MIT = Mitigation measure improves intersection conditions to pre-project conditions or better.
- WCT MIT = Mitigation measure improves intersection conditions to LOS D conditions or better.

: Indicates changes between the "pre-mitigation" scenarios

: Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2022 Mitigation Measures for the Waikapu Country Town (WCT) Project

Intersection #
4

N-S : Kuihelani Highway
E-W : Maui Lani Parkway

Existing_2013	Mid-Term No Project_2022	Mid-Term WCT_2022	Mid-Term WCT Pre-Proj MIT_2022	Mid-Term WCT MIT_2022
NB: Prot; SB: Prot; EB: Perm	NB: Prot; SB: Prot; EB: Perm	NB: Prot; SB: Prot; EB: Perm	NB: Prot; SB: Prot; EB: Split	NB: Prot; SB: Prot; EB: Split

Intersection #
5

N-S : Honoapi'ilani Highway
E-W : Waiko Road

Existing_2013	Mid-Term No Project_2022	Mid-Term WCT_2022	Mid-Term WCT Pre-Proj MIT_2022	Mid-Term WCT MIT_2022
NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm	NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm	NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm	No Impact	No Impact

Intersection #
6

N-S : Waiale Road
E-W : Waiko Road

Existing_2013	Mid-Term No Project_2022	Mid-Term WCT_2022	Mid-Term WCT Pre-Proj MIT_2022	Mid-Term WCT MIT_2022
SB: Stop; EB: Free; WB: Free	NB: Perm; SB: Perm; EB: Perm; WB: Perm	NB: Perm; SB: Perm; EB: Perm; WB: Perm	No Impact	No Impact

Legend:

- Pre-Proj MIT = Mitigation measure improves intersection conditions to pre-project conditions or better.
- WCT MIT = Mitigation measure improves intersection conditions to LOS D conditions or better.

: Indicates changes between the "pre-mitigation" scenarios

: Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2022 Mitigation Measures for the Waikapu Country Town (WCT) Project

Intersection #
7

N-S : S. Kamehameha Avenue
E-W : Waiko Road

Existing_2013	Mid-Term No Project_2022	Mid-Term WCT_2022	Mid-Term WCT Pre-Proj MIT_2022	Mid-Term WCT MIT_2022
Intersection Does Not Exist	NB: Stop; SB: Stop; EB: Free; WB: Free	NB: Stop; SB: Stop; EB: Free; WB: Free	NB: Perm; SB: Perm; EB: Perm; WB: Perm	NB: Perm; SB: Perm; EB: Perm; WB: Perm

Intersection #
8

N-S : Kuihelani Highway
E-W : Waiko Road

Existing_2013	Mid-Term No Project_2022	Mid-Term WCT_2022	Mid-Term WCT Pre-Proj MIT_2022	Mid-Term WCT MIT_2022
NB: Prot; SB: Perm; EB: Perm	NB: Prot; SB: Perm; EB: Perm	NB: Prot; SB: Perm; EB: Perm	No Impact	No Impact

Intersection #
9

N-S : Honoapi'ilani Highway
E-W : Main Street

Existing_2013	Mid-Term No Project_2022	Mid-Term WCT_2022	Mid-Term WCT Pre-Proj MIT_2022	Mid-Term WCT MIT_2022
Intersection Does Not Exist	Intersection Does Not Exist	NB: Perm; SB: Perm; EB: Perm; WB: Perm	No Impact	No Impact

Legend:

- Pre-Proj MIT = Mitigation measure improves intersection conditions to pre-project conditions or better.
- WCT MIT = Mitigation measure improves intersection conditions to LOS D conditions or better.

: Indicates changes between the "pre-mitigation" scenarios

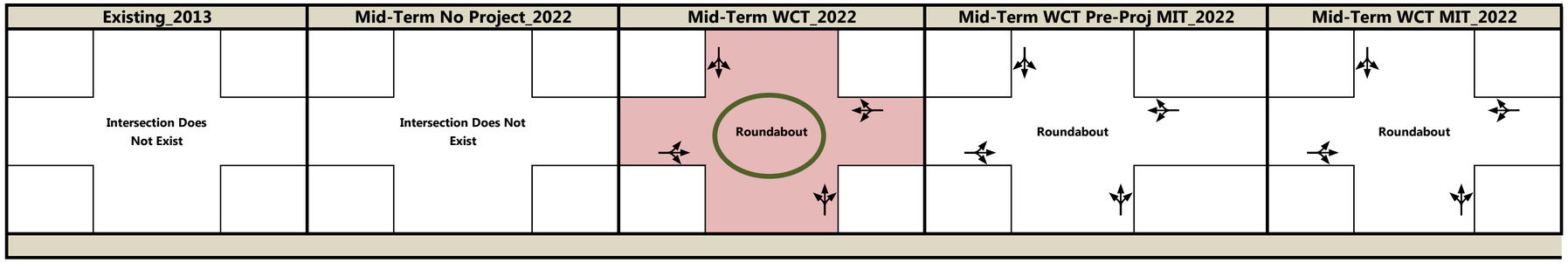
: Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2022 Mitigation Measures for the Waikapu Country Town (WCT) Project

Intersection #
10

N-S : Waiale Road

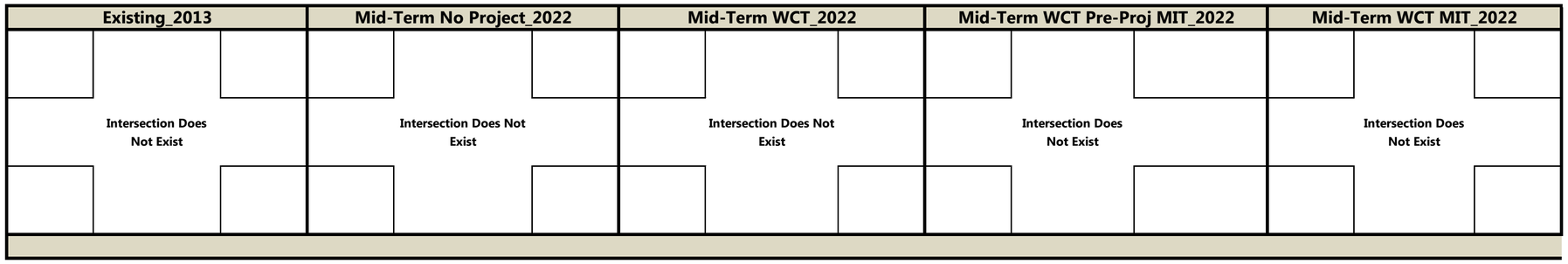
E-W : Main Street



Intersection #
11

N-S : Honoapi'ilani Highway

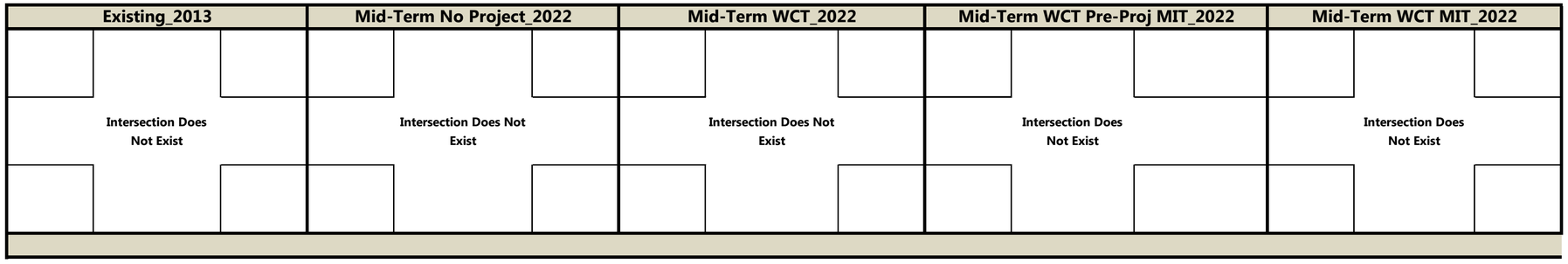
E-W : East-West Residential Street



Intersection #
12

N-S : North-South Residential Street

E-W : Waiale Road



Legend:

- Pre-Proj MIT = Mitigation measure improves intersection conditions to pre-project conditions or better.
- WCT MIT = Mitigation measure improves intersection conditions to LOS D conditions or better.

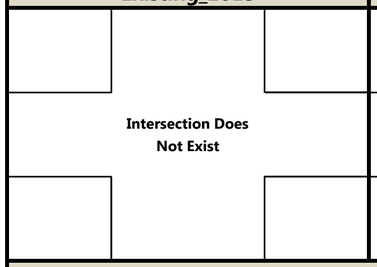
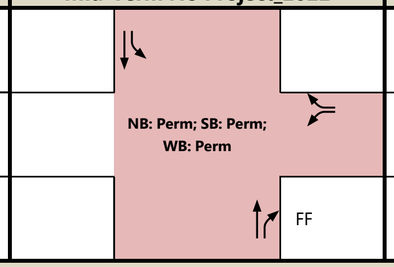
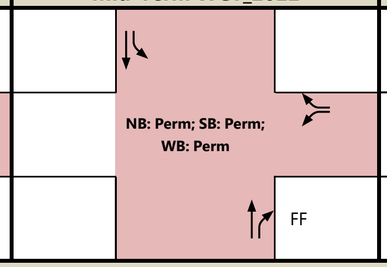
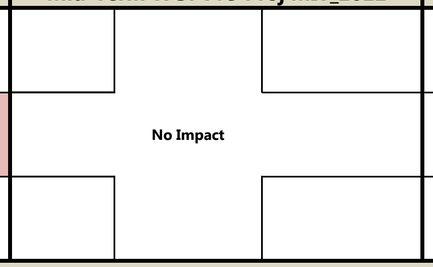
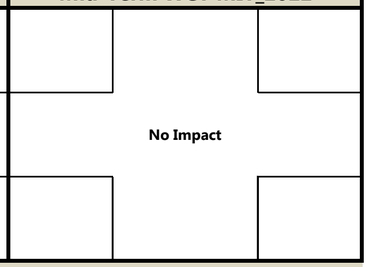
: Indicates changes between the "pre-mitigation" scenarios

: Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2022 Mitigation Measures for the Waikapu Country Town (WCT) Project

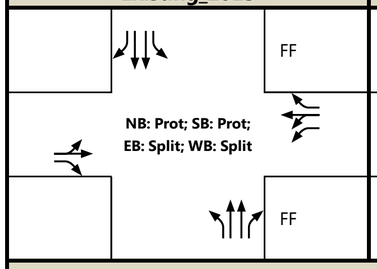
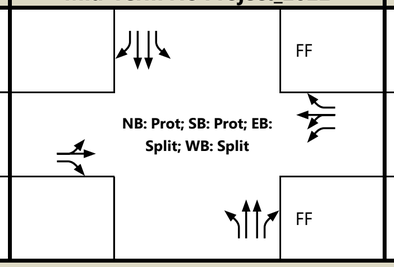
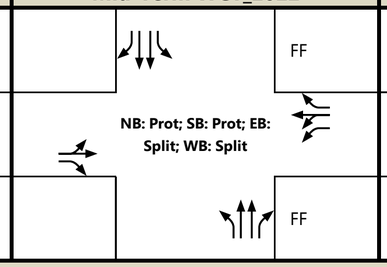
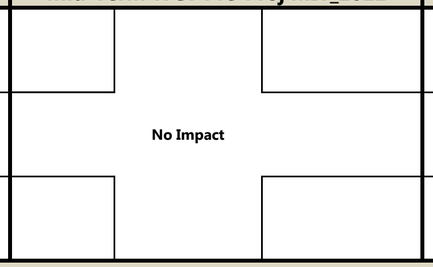
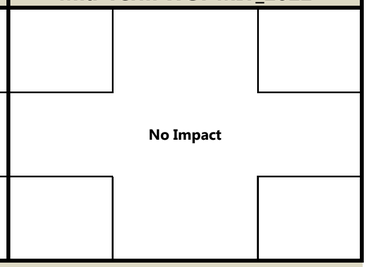
Intersection #
13

N-S : Honoapi'ilani Highway
E-W : Waiale Road

Existing_2013	Mid-Term No Project_2022	Mid-Term WCT_2022	Mid-Term WCT Pre-Proj MIT_2022	Mid-Term WCT MIT_2022
				

Intersection #
14

N-S : Honoapi'ilani Highway
E-W : Kuihelani Highway

Existing_2013	Mid-Term No Project_2022	Mid-Term WCT_2022	Mid-Term WCT Pre-Proj MIT_2022	Mid-Term WCT MIT_2022
				

Legend:

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: Indicates changes between the "pre-mitigation" scenarios

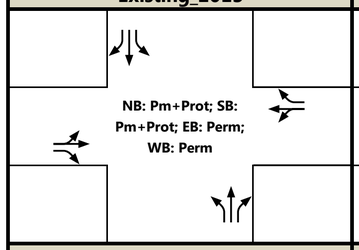
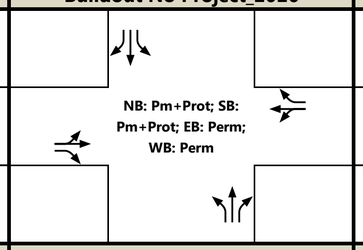
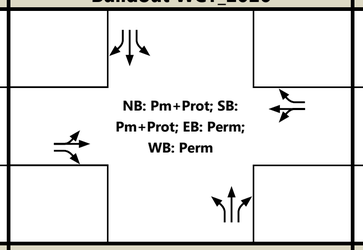
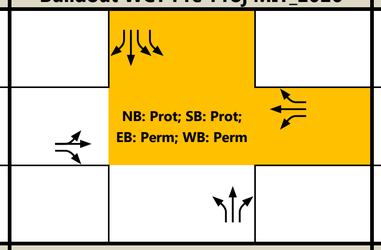
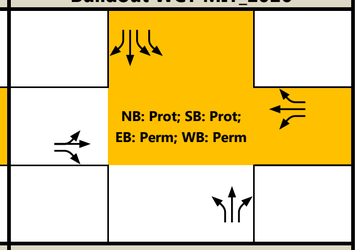
: Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2026 Mitigation Measures

Proposed Year 2026 Mitigation Measures for the Waikapu Country Town (WCT) Project

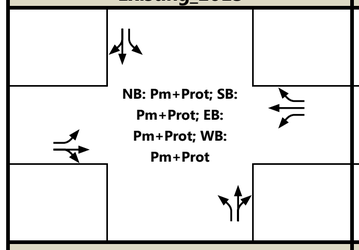
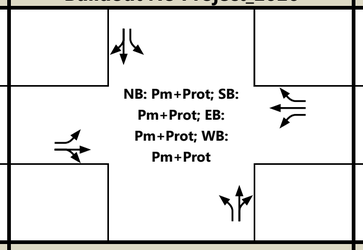
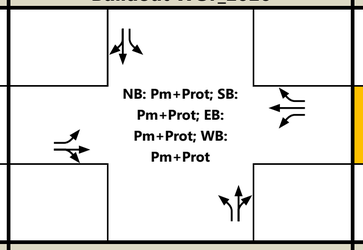
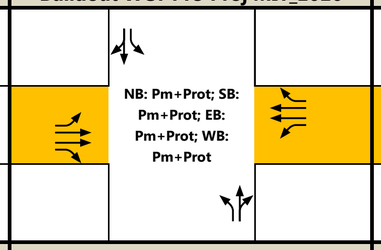
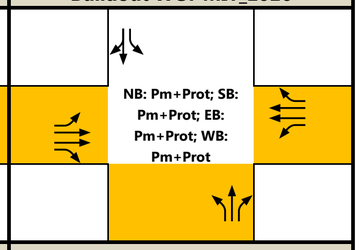
Intersection #
1

N-S : Honoapi'ilani Highway
E-W : Kuikahi Drive

Existing_2013	Buildout No Project_2026	Buildout WCT_2026	Buildout WCT Pre-Proj MIT_2026	Buildout WCT MIT_2026
				

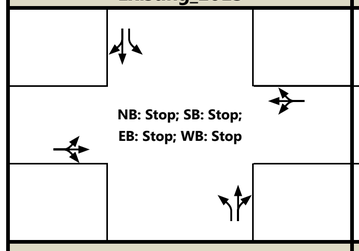
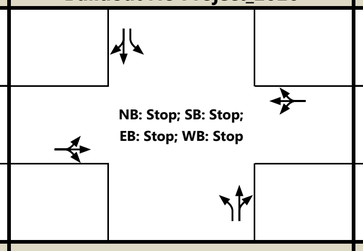
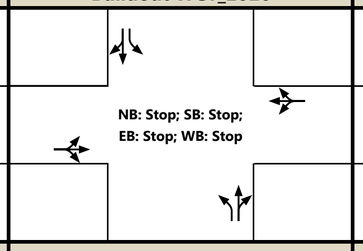
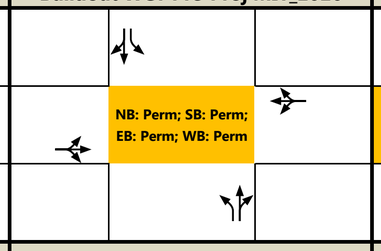
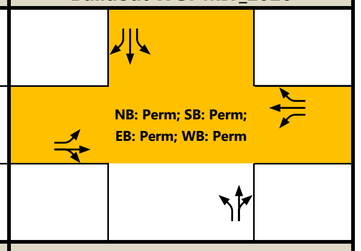
Intersection #
2

N-S : Waiale Road
E-W : Kuikahi Drive

Existing_2013	Buildout No Project_2026	Buildout WCT_2026	Buildout WCT Pre-Proj MIT_2026	Buildout WCT MIT_2026
				

Intersection #
3

N-S : S. Kamehameha Avenue
E-W : Maui Lani Parkway

Existing_2013	Buildout No Project_2026	Buildout WCT_2026	Buildout WCT Pre-Proj MIT_2026	Buildout WCT MIT_2026
				

Legend:

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- WCT MIT = Mitigation measure improves intersection conditions to LOS D conditions or better.

: Indicates changes between the "pre-mitigation" scenarios

: Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2026 Mitigation Measures for the Waikapu Country Town (WCT) Project

Intersection #
4

N-S : Kuihelani Highway
E-W : Maui Lani Parkway

Existing_2013	Buildout No Project_2026	Buildout WCT_2026	Buildout WCT Pre-Proj MIT_2026	Buildout WCT MIT_2026
NB: Prot; SB: Prot; EB: Perm	NB: Prot; SB: Prot; EB: Perm	NB: Prot; SB: Prot; EB: Perm	NB: Prot; SB: Prot; EB: Split	NB: Prot; SB: Prot; EB: Split

Intersection #
5

N-S : Honoapi'ilani Highway
E-W : Waiko Road

Existing_2013	Buildout No Project_2026	Buildout WCT_2026	Buildout WCT Pre-Proj MIT_2026	Buildout WCT MIT_2026
NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm	NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm	NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm	No Impact	No Impact

Intersection #
6

N-S : Waiale Road
E-W : Waiko Road

Existing_2013	Buildout No Project_2026	Buildout WCT_2026	Buildout WCT Pre-Proj MIT_2026	Buildout WCT MIT_2026
SB: Stop; EB: Free; WB: Free	NB: Perm; SB: Perm; EB: Perm; WB: Perm	NB: Perm; SB: Perm; EB: Perm; WB: Perm	No Impact	No Impact

Legend:

- Pre-Proj MIT = Mitigation measure improves intersection conditions to pre-project conditions or better.
- WCT MIT = Mitigation measure improves intersection conditions to LOS D conditions or better.

: Indicates changes between the "pre-mitigation" scenarios

: Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2026 Mitigation Measures for the Waikapu Country Town (WCT) Project

Intersection #
7

N-S : S. Kamehameha Avenue
E-W : Waiko Road

Existing_2013	Buildout No Project_2026	Buildout WCT_2026	Buildout WCT Pre-Proj MIT_2026	Buildout WCT MIT_2026
Intersection Does Not Exist	NB: Stop; SB: Stop; EB: Free; WB: Free	NB: Stop; SB: Stop; EB: Free; WB: Free	NB: Perm; SB: Perm; EB: Perm; WB: Perm	NB: Perm; SB: Perm; EB: Perm; WB: Perm

Intersection #
8

N-S : Kuihelani Highway
E-W : Waiko Road

Existing_2013	Buildout No Project_2026	Buildout WCT_2026	Buildout WCT Pre-Proj MIT_2026	Buildout WCT MIT_2026
NB: Prot; SB: Perm; EB: Perm	NB: Prot; SB: Perm; EB: Perm	NB: Prot; SB: Perm; EB: Perm	NB: Prot; SB: Perm; EB: Perm	NB: Prot; SB: Perm; EB: Perm

Intersection #
9

N-S : Honoapi'ilani Highway
E-W : Main Street

Existing_2013	Buildout No Project_2026	Buildout WCT_2026	Buildout WCT Pre-Proj MIT_2026	Buildout WCT MIT_2026
Intersection Does Not Exist	Intersection Does Not Exist	NB: Perm; SB: Perm; EB: Perm; WB: Perm	No Impact	No Impact

Legend:

- Pre-Proj MIT = Mitigation measure improves intersection conditions to pre-project conditions or better.
- WCT MIT = Mitigation measure improves intersection conditions to LOS D conditions or better.

: Indicates changes between the "pre-mitigation" scenarios

: Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2026 Mitigation Measures for the Waikapu Country Town (WCT) Project

Intersection #
10

N-S : Waiale Road
E-W : Main Street

Existing_2013	Buildout No Project_2026	Buildout WCT_2026	Buildout WCT Pre-Proj MIT_2026	Buildout WCT MIT_2026
Intersection Does Not Exist	Intersection Does Not Exist	Roundabout	Roundabout	Roundabout

Intersection #
11

N-S : Honoapi'ilani Highway
E-W : East-West Residential Street

Existing_2013	Buildout No Project_2026	Buildout WCT_2026	Buildout WCT Pre-Proj MIT_2026	Buildout WCT MIT_2026
Intersection Does Not Exist	Intersection Does Not Exist	NB: Perm; SB: Perm; EB: Perm; WB: Perm	No Impact	No Impact

Intersection #
12

N-S : North-South Residential Street
E-W : Waiale Road

Existing_2013	Buildout No Project_2026	Buildout WCT_2026	Buildout WCT Pre-Proj MIT_2026	Buildout WCT MIT_2026
Intersection Does Not Exist	Intersection Does Not Exist	SB: Stop; EB: Free; WB: Free	No Impact	No Impact

Legend:

- Pre-Proj MIT = Mitigation measure improves intersection conditions to pre-project conditions or better.
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: Indicates changes between the "pre-mitigation" scenarios

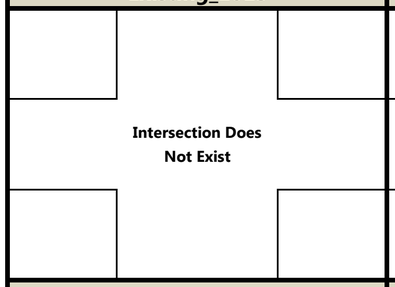
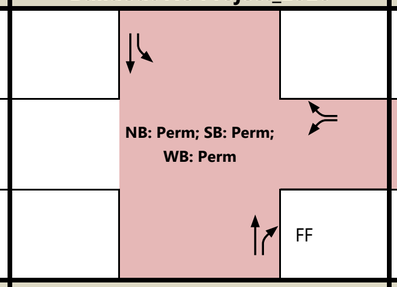
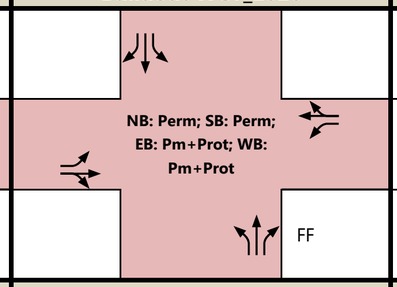
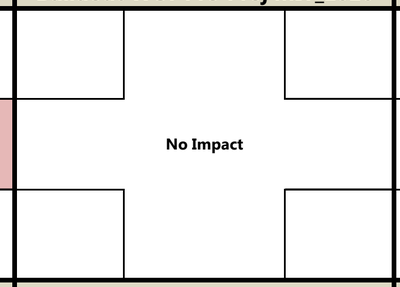
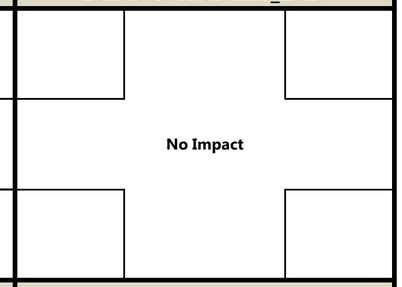
: Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2026 Mitigation Measures for the Waikapu Country Town (WCT) Project

Intersection #
13

N-S : Honoapi'ilani Highway

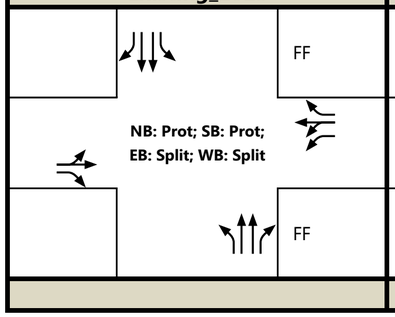
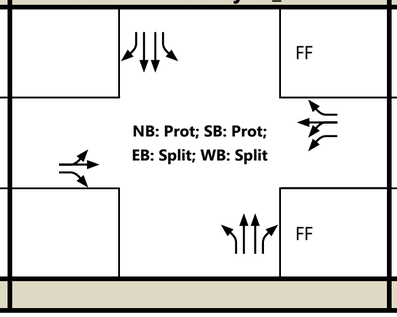
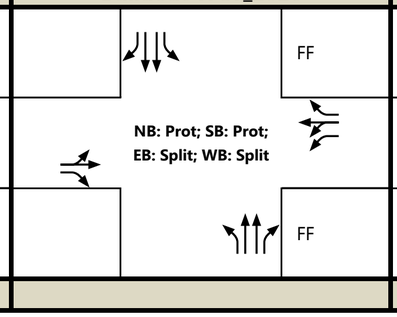
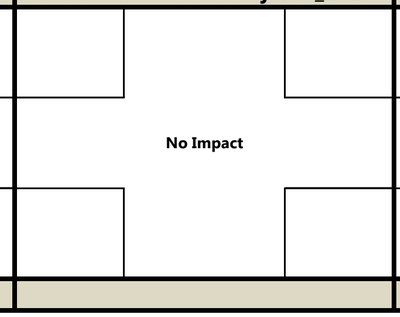
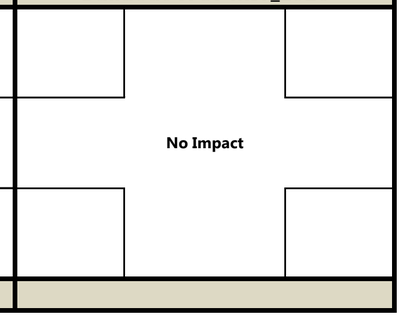
E-W : Waiale Road

Existing_2013	Buildout No Project_2026	Buildout WCT_2026	Buildout WCT Pre-Proj MIT_2026	Buildout WCT MIT_2026
				

Intersection #
14

N-S : Honoapi'ilani Highway

E-W : Kuihelani Highway

Existing_2013	Buildout No Project_2026	Buildout WCT_2026	Buildout WCT Pre-Proj MIT_2026	Buildout WCT MIT_2026
				

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