June 8, 2020

Ms. Tracy Camuso
Group 70
111 S. King Street, Suite 170
Honolulu, HI 96813

Subject: ***Construction Traffic Assessment for the Proposed Ho'ohana Solar Farm (Oahu, HI)***

Dear Ms. Camuso:

Fehr & Peers has prepared a traffic assessment for a proposed solar farm to be constructed by Ho'ohana Solar 1, LLC, in the Kunia area on the island of O'ahu. This assessment was prepared to support the project in obtaining approvals from the State Land Use Commission and City and County of Honolulu, Department of Planning and Permitting. This letter includes an assessment of the vehicle trip generation anticipated during both project construction and typical project operations, as well as an analysis of intersection operations to determine any traffic-related impacts from the project.

PROJECT DESCRIPTION

The proposed project is located in the Kunia area, generally north of H-1 between Kunia Road and H-2, mauka of Royal Kunia Country Club. Construction of the site will consist of a 52-megawatt (MW) installation within an area of approximately 161 acres of land. Accordingly, this assessment focuses on traffic impacts related to the construction and operations of the proposed facility. The proposed access point for project-related traffic is expected to be on Plantation Road (a private road), by way of Kunia Road (State Highway 750). Based on the available regional access points/interchanges and the fact that materials will be transported from the Sand Island area to the site, trucks are expected to use H-1 Freeway and Kunia Road to access the site. **Figure 1** shows the proposed site plan and project vicinity.

Once operational, the site will be primarily self-sustaining with minimal periodic maintenance required. The solar farm is anticipated to have no more than five (5) employees on-site at any given time. No permanent employees will be on-site; however, employees will visit the site over the course of the year to conduct maintenance such as mowing and/or panel washing. As a result, the number of employee vehicle trips generated by the proposed project during typical operations is considered negligible (i.e. less than the standard daily variation in traffic during peak hours). The primary traffic concerns for the proposed project are associated with potential temporary construction traffic impacts.

PETITIONER'S EXHIBIT 10

Construction is expected to begin in April 2021 and continue through December 2022 (approximately 21 months). Based on the needs of a 52-MW facility, project construction is anticipated to require up to 175 workers on-site at a time during the peak of construction, or up to six months, and approximately 50 workers on-site during non-peak construction, or approximately 15 months. As a conservative approach, this assessment evaluates the peak of construction with 175 workers. Construction workers will be encouraged to carpool; therefore, the analysis assumes up to 150 construction worker vehicles will be arriving and departing the site each day during the peak of construction. Workers will be on-site between 6:00 AM to 6:00 PM Monday through Sunday with typical construction hours of operation occurring from 7:00 AM to 5:00 PM.

PROJECT LOCATION AND STUDY AREA

The proposed project is located mauka of the H-1 freeway and west of Mililani. A portion of the site was previously used for agricultural/farming purposes and a portion of the site is undeveloped. The traffic assessment evaluated the operations at the following six (6) intersections near the site and along the primary travel route:

1. Kunia Road/H-1 Eastbound On-Ramp
2. Kunia Road/H-1 Westbound Off-Ramp
3. Kunia Road/Kupuna Loop (South)
4. Kunia Road/Kupuna Loop (North)
5. Kunia Road/Anonui Street
6. Kunia Road/Plantation Road

Figure 2 shows the locations of the study intersections.

STUDY SCENARIOS

The operations of the study intersections were evaluated during the busiest peak (one) hour in the morning (between 6:00 and 9:00 AM) and in the afternoon (between 3:00 and 6:00 PM). The peak hour for each intersection was determined from traffic count data collected in 2019 for the project, which serves as the basis of the Existing Conditions analysis. Traffic operations were evaluated for the following scenarios:

- **Existing (2019) Conditions** – The analysis of existing traffic conditions was based on 2019 intersection turning movement counts collected for the project during peak hours.
- **Construction Year (2021) Plus Project Conditions** – Existing peak-hour volumes increased to account for growth in the area to the year of anticipated project construction in 2021. Traffic growth

was estimated based on an annual one percent growth factor to account for ambient growth. Traffic on Plantation Road was not grown or adjusted since no additional development is anticipated other than the proposed project. Analysis of Construction Year (2021) Plus Project traffic conditions includes the addition of forecasted traffic from construction of the proposed project, inclusive of construction trucks and employee vehicles.

This scenario analyzes the peak of construction assuming up to 150 worker vehicles will be arriving and departing the site each day. During non-peak months of construction there will be approximately 50 worker vehicles (or one-third of peak construction) arriving and departing each day. Note that while construction staff will be on site at 6:00 AM, all project commute traffic was conservatively added to the AM peak hour count, which occurs between 6:00 and 9:00 AM.

- **Opening Year (2023) No Project Conditions** – Existing (2019) peak-hour volumes increased to account for growth in the area to the opening year of anticipated project operations in 2023. Traffic growth was estimated based on an annual one percent per year growth factor to account for ambient growth. Traffic on Plantation Road was not grown or adjusted since no additional development is anticipated other than the proposed project.
- **Opening Year (2023) Plus Project Conditions** – Opening Year (2023) Conditions plus the addition of project-generated traffic once the project is fully operational. Once operational, project-generated traffic from the solar site is anticipated to be no more than five (5) trips per day for maintenance such as mowing and/or panel washing.

VEHICLE ACCESS

According to Ho'ohana Solar 1, LLC, the proposed access point for construction traffic is expected to be on Plantation Road where it intersects Kunia Road approximately 1.5 miles mauka of Anonui Street. The entrance to the solar facility will be located at the end of the Plantation Road extension approximately 0.8 miles east of Kunia Road and approximately 0.2 miles east of Leia Street. Kunia Road is under the jurisdiction of the State of Hawaii Department of Transportation - Highways Division (HDOT) and Plantation Road is a private street.

Based on the available regional access points/interchanges and the fact that materials will be transported from the Sand Island area to the site, all heavy trucks are expected to use the H-1 Freeway and turn right onto Kunia Road from the Ewa-bound H-1 Off-Ramp to access the site via Plantation Road and return using the opposite movements. Construction workers approaching the site in the morning will travel in both directions on Kunia Road and turn onto Plantation Road.

The Kunia Road/Plantation Road intersection includes gates on the east leg of Plantation Road. Kunia Road is posted with a 45 mile per hour speed limit. Approximately 175 feet south of Plantation Road, the shoulder on Kunia Road widens to allow right-turning vehicles to move out of the travel lane, which will help to

reduce delays for mauka-bound vehicles. This existing deceleration area is used by existing farm equipment and will benefit construction trucks accessing the site as it will allow them to begin making the transition onto Plantation Road earlier and thus reduce conflicts with through vehicles on Kunia Road. It should also be noted that mauka-bound vehicles are precluded from passing other mauka-bound vehicles from approximately 225 feet makai of Plantation Road to 260 feet mauka of the intersection.

EXISTING (2019) TRAFFIC VOLUMES

The addition of traffic from the proposed project may impact operations of intersections near the site during the anticipated 21-month construction period. To determine potential impacts, the operations of the six (6) study intersections were evaluated during weekday AM and PM peak hour conditions. Traffic counts were collected at the study intersections in October 2019 and included in **Attachment A**. Existing lane configurations and signal controls were obtained as part of the data collection. **Figure 3** presents the Existing (2019) weekday AM and PM peak hour turning movement volumes and lane configurations at each study intersection.

CONSTRUCTION YEAR (2021) TRAFFIC VOLUMES

For the purpose of this analysis, 2019 traffic volumes were increased by an average growth factor of one percent per year and rounded to the nearest tenth to forecast 2021 traffic volumes, with the exception of Plantation Road (private) where no additional growth is anticipated. This methodology is consistent with other traffic studies completed for local and regional projects on Oahu. Given the limited existing traffic along Kunia Road, this approach to forecasting 2021 volumes is conservative. To determine potential construction-related traffic impacts, the forecasted traffic generated by construction-related activities was added to the forecast 2021 volumes to obtain Construction Year (2021) Plus Project volumes.

OPENING YEAR (2023) TRAFFIC VOLUMES

The solar project is expected to be open and operational in 2023. For the purpose of this analysis, existing (2019) traffic volumes were increased by an average growth factor of one percent per year and rounded to the nearest tenth to forecast the Opening Year (2023) traffic volumes, with the exception of Plantation Road where no additional growth is anticipated. Forecasted trip generation from the project during typical operations was added to the Opening Year (2023) traffic volumes to determine if any impacts are anticipated.

FORECAST PROJECT TRIP GENERATION

The primary traffic issue for solar farm projects is associated with the temporary construction traffic. Construction traffic comprises of private vehicles driven by construction workers plus trips made by trucks delivering materials, hauling earth and debris, and providing other services (e.g., water trucks). In general, workers are assumed to make one (1) inbound trip and one (1) outbound trip for a total of two (2) daily trips. Detailed information on construction activities was provided by Ho'ohana Solar 1, LLC and included the number of trucks needed to deliver the photovoltaic panels, steel piles for mounting the panels, gravel for on-site roadways, etc. This information was used to estimate the total number of truck trips during the planned construction period of 21 months. It is important to note that this information is preliminary and may be refined once a specific contractor is selected to construct the project. At that time, a construction traffic management plan must be prepared for the City and County of Honolulu.

This assessment considered two scenarios: the first scenario represents Construction Year (2021) traffic volumes plus the forecasted construction-related traffic during the peak of construction when the highest volume of trucks and worker vehicles will be on-site. The second scenario represents Opening Year (2023) traffic volumes plus the addition of project-generated traffic once the site is fully constructed and operational.

The Construction Year (2021) scenario evaluates the peak periods of construction when a maximum of 175 workers are anticipated to be on-site. With some carpooling anticipated, the assessment assumes 150 construction worker vehicles will arrive in the AM peak hours and depart from the project site during PM peak hours. In reality, it is expected that additional carpooling will occur and that roughly half of the worker trips would be made outside of the peak hours of traffic on Kunia Road. For instance, many worker vehicles will be on-site before 6:00 AM.

Construction truck traffic was spread equally throughout the hours of operation to reflect the rotation of trips typical for construction activity. It is anticipated that 30 truck trips will arrive each day. The construction operating hours between 7:00 am and 5:00 pm would result in an average of three (3) truck trips or roughly 10 percent of the daily total arriving and departing during peak hours.

Forecasted trip generation for the construction portion of the project is summarized in **Table 1**.

Table 1- Peak Hour and Daily Project Construction Trip Generation							
Trip Type	Daily Trips	AM Peak Hour			PM Peak Hour		
		Total	In	Out	Total	In	Out
Auto[1]	300	150	150	0	150	0	150
Trucks[2,3] (in PCE)	60 (150 PCE)	6 (15 PCE)	3 (8 PCE)	3 (8 PCE)	6 (15 PCE)	3 (8 PCE)	3 (8 PCE)
Total (in PCE)	**360 (450 PCE)**	**156 (165 PCE)**	**153 (158 PCE)**	**3 (8 PCE)**	**156 (165 PCE)**	**3 (8 PCE)**	**153 (158 PCE)**

[1] Assumes150 worker vehicles arrive and depart during peak hours.
[2] Assumes equipment, debris, hauling, excavation, etc. trucks arrive and depart during peak hours as well as off peak hours.
[3] This table reflects an estimated number of daily construction truck and worker trips. In the analysis (see Attachment A), a Passenger Car Equivalent (PCE) factor of 2.5 per truck was applied to all truck trips assigned to the roadway network.

A Passenger Car Equivalent (PCE) factor of 2.5 vehicle trips per construction truck was applied to account for the larger impact and slower speeds of construction vehicles on the roadway network. As shown, the forecasted trip generation during construction is 360 daily trips (or 450 PCE), including 156 trips (or 165 PCE trips) during the AM and PM peak hour conditions.

Once operational, the solar farm is anticipated to have a maximum of five (5) employees on site at any given time. As a result, the employee trips generated by the proposed project are nominal. The trip generation summary for the Opening Year (2023) Plus Project scenario is presented in **Table 2** below.

Table 2-Project Operations Trip Generation							
Trip Type	Daily Trips	AM Peak Hour			PM Peak Hour		
		Total	In	Out	Total	In	Out
Employees[1]	10	5	5	0	5	0	5

[1] Assumes five (5) employees on-site once project is operational

PROJECT TRIP DISTRIBUTION

Based on the available regional access points/interchanges and the fact that materials will be transported from the Sand Island area to the site, all heavy trucks (100%) are expected to use the H-1 Freeway and turn right onto Kunia Road from the Ewa-bound H-1 Off-Ramp to access the site via Plantation Road and return using the opposite movements. Construction workers and employees approaching the site in the morning will travel in both directions on Kunia Road and turn onto Plantation Road.

The estimated trip distribution for construction worker vehicle trips is listed below:

- To/From the north — 20%
- To/From Ewa — 30%
- To/From Honolulu — 50%

Trip distribution percentages were applied to the forecasted trip generation for each scenario and assigned to the surrounding roadway network to assess potential traffic impacts in the area. **Figure 4** illustrates the project trip distribution and trip assignment.

INTERSECTION OPERATIONS ANALYSIS

The analysis of roadway operations performed for this study is based upon procedures presented in the *Highway Capacity Manual* (HCM), published by the Transportation Research Board. The operations of roadway facilities are described with the term level of service (LOS). LOS is a qualitative description of traffic flow based on such factors as speed, travel time, delay, and freedom to maneuver. Six 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 computerized analysis of intersection operations was performed utilizing the SYNCHRO 10 traffic analysis software.

Signalized Intersection Analysis

HCM methodology defines LOS for signalized intersections in terms of delay, or more specifically, average stopped delay per vehicle. Delay is a measure of driver and/or passenger discomfort, frustration, fuel consumption and lost travel time. This technique uses 1,900 vehicles per hour per lane (VPHPL) as the maximum saturation volume of an intersection. This saturation volume is adjusted to account for lane width, on-street parking, pedestrians, traffic composition (i.e., percentage trucks) and shared lane movements (i.e. through and right-turn movements originating from the same lane). The LOS criteria used for this technique are described in **Table 3.**

Table 3 – Signalized Intersection Level of Service Criteria	
Average Stopped Delay Per Vehicle (seconds)	**Level of Service (LOS) Characteristics**
<10.0	*LOS A* describes operations with very low delay. This occurs when progression is extremely favorable, and most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
10.1 – 20.0	*LOS B* describes operations with generally good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.
20.1 – 35.0	*LOS C* describes operations with higher delays, which may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
35.1 – 55.0	*LOS D* describes operations with high delay, resulting from some combination of unfavorable progression, long cycle lengths, or high volumes. The influence of congestion becomes more noticeable, and individual cycle failures are noticeable.
55.1 – 80.0	*LOS E* is considered the limit of acceptable delay. Individual cycle failures are frequent occurrences.
>80.0	*LOS F* describes a condition of excessively high delay, considered unacceptable to most drivers. This condition often occurs when arrival flow rates exceed the LOS D capacity of the intersection. Poor progression and long cycle lengths may also be major contributing causes to such delay.

Unsignalized Intersection Analysis

The HCM outlines methodology for unsignalized intersections, including two-way and all-way stop controlled intersections. The SYNCHRO 10 software supports this methodology and was utilized to produce LOS results. The LOS for a two-way stop controlled (TWSC) intersection is determined by the computed control delay and is defined for each minor movement. **Table 4** summarizes the LOS criteria for unsignalized intersections.

Table 4 – Unsignalized Intersection Level of Service Criteria	
Average Control Delay (sec/veh)	**Level of Service (LOS)**
<10	A
>10 and ≤15	B
>15 and ≤25	C
>25 and ≤35	D
>35 and ≤50	E
>50	F

INTERSECTION IMPACT CRITERIA

The analysis compares existing traffic conditions to the Construction Year (2021) Plus Project Construction traffic scenario to determine if the addition of construction traffic to existing roadways is expected to result in a significant impact on the surrounding area. Similarly, the analysis of Opening Year (2023) conditions compares future no-project operations with conditions when the project is fully built and operational to determine whether or not project implementation is expected to result in significant impacts. Based on previous studies conducted for both the City & County of Honolulu and HDOT, the minimum acceptable operating standard for a signalized intersection is LOS D. If the addition of project traffic is expected to degrade desirable service levels (LOS D or better) to lower than desirable service levels (LOS E or F) then the project is considered to have a project-specific impact. Impacts are also defined to occur when the addition of project traffic exacerbates locations already operating or projected to operate at LOS E or F. Construction-related impacts are considered temporary and are addressed with provisional mitigation measures during construction.

INTERSECTION LEVEL OF SERVICE (LOS) RESULTS

The analysis of intersection turning movement volumes was completed for all scenarios, including Existing (2019) Conditions, Construction Year (2021) Plus Project Conditions, Opening Year (2023) No Project Conditions, and Opening Year (2023) Plus Project Conditions. The results of the intersection LOS analysis are summarized in **Table 5**. **Attachment B** includes the detailed LOS calculation worksheets. Peak hour traffic volumes for Construction Year (2021) Plus Project Construction Conditions (in PCE), Opening Year (2023) No Project Conditions, and Opening Year (2023) Plus Project Conditions are shown on **Figures 5, 6, and 7**, respectively.

Table 5 – LOS Summary of Intersection Operations									
Intersection	**Peak Hour**	**Existing 2019**		**2021 Plus Project Construction**		**Opening Year 2023 No Project**		**Opening Year 2023 Plus Project**	
		Delay[1]	**LOS[2]**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
1. Kunia Rd/ H1 Eastbound Ramps	AM	**55.6**	**E**	**67.4**	**E**	**71.7**	**E**	**72.0**	**E**
	PM	20.1	C	22.1	C	21.9	C	21.9	C
2. Kunia Rd/ H1 Westbound Ramps*	AM	3.2	A	3.2	A	3.2	A	3.2	A
	PM	6.2	A	6.9	A	6.6	A	6.6	A
3. Kunia Rd/ Kupuna Loop (South)	AM	20.9	C	21.2	C	21.5	C	21.4	C
	PM	17.3	B	18.2	B	17.9	B	17.9	B
4. Kunia Rd/ Kupuna Loop (North)	AM	11.4	B	12.5	B	12.4	B	12.4	B
	PM	17.1	B	19.0	B	19.1	B	19.1	B
5. Kunia Rd/Anonui St	AM	17.7	B	20.0	B	19.4	B	19.4	B
	PM	16.8	B	35.4	C	22.8	C	23.1	C
6. Kunia Rd/ Plantation Rd* *(private)*	AM	**69.7**	**F**	**>100**	**F**	**83.5**	**F**	**>100**	**F**
	PM	**45.5**	**E**	**>100**	**F**	**54.9**	**F**	**60.0**	**F**

Source: Fehr & Peers, March 2019 * indicates unsignalized intersection

[1] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized intersections. The worst movement is presented for unsignalized intersections.

[2] LOS calculations performed using the *Highway Capacity Manual (HCM) 6th Edition* method.

LOS E or F operations highlighted in **bold.**

Currently, all study intersections operate at Level of Service (LOS) D or better during the peak hours, with the exception of Kunia Road/H1 Eastbound Ramps and Kunia Road/Plantation Road (unsignalized).

- **Kunia Road/H1 Eastbound Ramps:** Traffic conditions at the intersection of Kunia Road/H1 Eastbound Ramps during the AM peak hour has long queues of vehicles waiting to get onto the H1 Eastbound on-ramp from both the northbound (via Fort Weaver) and southbound (via Kunia Road) directions. During the peak of construction, the proposed project is forecast to add up to 23 northbound through trips and eight (8) southbound left-turn trips at the Kunia Road/H1 Eastbound intersection during the AM peak hour. Since the addition of this traffic is a temporary condition during project construction only and because the traffic volumes on roadways can vary from day to day by up to 10 percent, the addition of this construction traffic is not likely to be noticed by the average driver and is not considered a significant traffic impact. In addition, no project trips will be added to the northbound right-turn, which has the most significant queue.
- **Kunia Road/Plantation Road:** Kunia Road/Plantation Road is unsignalized (side-street stop controlled) and the existing (2019) operations are LOS F during the AM peak hour and LOS E during

the PM peak hour. The reported LOS for unsignalized intersections represent the approach with the longest delay. At this location, the LOS represents the outbound vehicle delay from Plantation Road waiting for a gap in traffic along Kunia Road. Traffic flows on Kunia Road (north and southbound) are uncontrolled and operate at LOS A; based on the HCM analysis by approach, the LOS F and additional delay resulting from the project operations will occur on Plantation Road, which is a private, stop-controlled roadway.

All intersections through which project traffic is routed are forecast to operate at desirable LOS D or better during both peak hours under both project scenarios with the exception of Kunia Road/H1 Eastbound and Kunia Road/Plantation Road. The intersection is anticipated to operate similarly to existing (LOS E/F) operations and any noticeable impacts will be temporary.

The average of three (3) inbound truck trips during the peak hour equates to one truck every 20 minutes either making the inbound right-turn from Kunia Road onto Plantation Road or turning left out of Plantation Road during each peak hour. As a result, construction truck traffic is not anticipated to have a major impact or cause major disruptions to vehicular traffic on Kunia Road. However, the temporary addition of heavy trucks and the increase of vehicles turning on and off Kunia Road will represent a change in conditions for drivers in this area.

In addition, some mauka-bound drivers behind trucks turning right onto Plantation Road may be tempted to pass trucks as they slow approaching the intersection. Because the existing "Do Not Pass" zone ends 225 feet makai of the intersection, passing vehicles may end up in the opposing lane in or near the intersection. This could introduce additional conflicts. As such, steps should be taken to increase driver awareness and reduce the potential for vehicle conflicts at the Kunia Road/Plantation Road intersection.

Once fully operational, the solar farm is anticipated to have approximately five (5) employees on site at any given time. As a result, the employee trips generated by the proposed project are negligible.

RECOMMENDED MODIFICATIONS DURING PROJECT CONSTRUCTION

As noted above, the volume of traffic generated by construction of the project does not result in the need for typical roadway capacity enhancements (e.g., new turn or through lanes). However, the addition of vehicles, especially large trucks, turning into and out of the east leg of the Kunia Road/Plantation Road intersection does result in some modification to traffic control devices in the area to raise driver awareness and enhance safety. To minimize the potential for conflicts and impacts to traffic operations, the contractor should include the following elements in a construction traffic management plan:

- Install temporary signage on mauka-bound Kunia Road between Anonui Street and Plantation Road that indicates the presence of trucks and that they are entering/exiting the roadway near Plantation Road.
- Install temporary signage on makai-bound Kunia Road between the Hawaii Country Club and Plantation Road that indicates the presence of trucks and that they are entering the roadway from Plantation Road.
- Field verify available sight distance and maintain adequate sight distance for drivers exiting Plantation Road and turning onto Kunia Road. Maintenance may include pruning vegetation and not installing signage or other barriers that would block driver's field of vision at the intersection.
- Extend the painted median solid line delineating the "Do Not Pass" zone for mauka-bound vehicles at least an additional 500 feet in the makai direction.

The trips generated by the project once it is fully operational are negligible compared to those generated by construction traffic, and no traffic improvements are required. The extension of the "Do Not Pass" zone could be maintained or be eliminated at the discretion of HDOT.

ALTERNATIVE MODE ACCESS

Bicycle and Pedestrian Travel

Given the undeveloped nature of the project site and the low-density development of the immediate surrounding area, the potential conflict is low between site-generated traffic and non-automobile modes including walking and biking. While separate bicycle and pedestrian facilities are typically encouraged to reduce vehicle traffic, the rural circulation system and distant land uses in the vicinity of the project site are not conducive to multi-modal travel.

Transit

There is no existing transit access serving the project site or on Kunia Road near the Plantation Road intersection. There are existing bus stops within the residential neighborhoods south of the proposed project; the nearest stop is located on Anonui Street and would require walking approximately 2.5 miles to reach the project site entrance east of Leia Street.

Potential impacts to Active Modes and Transit

The City and County of Honolulu and HDOT do not specify 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. As noted above, the project is not expected to conflict with any existing active transportation modes (i.e., bicycling and walking) or transit, and it would not create demand for these modes given its isolated location. Accordingly, no impacts to non-automobile travel are anticipated.

CONCLUSION

The proposed project will generate a negligible amount of vehicle traffic when the solar farm is fully constructed and operational. During the peak of construction, the site is expected to generate a total of 360 daily vehicle trips including trucks and worker vehicles, including up to 156 trips in the AM peak hour and 156 trips in the PM peak hour. During non-peak periods of construction, the forecast project-related trips will be approximately one-third of the data presented in this analysis. The traffic assessment indicates that the project would only result in temporary impacts during construction and negligible increases once the project is operational, when a maximum of five (5) trips would be generated by the site.

Based on the evaluation presented in this report, the proposed point of access is sufficient to serve the anticipated construction traffic volume. However, several measures are recommended to enhance safety for vehicles turning into and out of Plantation Road, as well as for those on Kunia Road. These measures are typically included in construction traffic management plan for the project and include: verification of adequate sight distance at Plantation Road, extension of the mauka-bound "Do Not Pass" zone on Kunia Road at Plantation Road by at least 500 feet in the makai direction, and installation of temporary signage approaching the intersection from both directions informing drivers on the roadway of construction activities and the presence of heavy vehicle traffic.

We appreciate the opportunity to assist you with this project. Please let us know if you have any questions on the information in this report.

Sincerely,

FEHR & PEERS

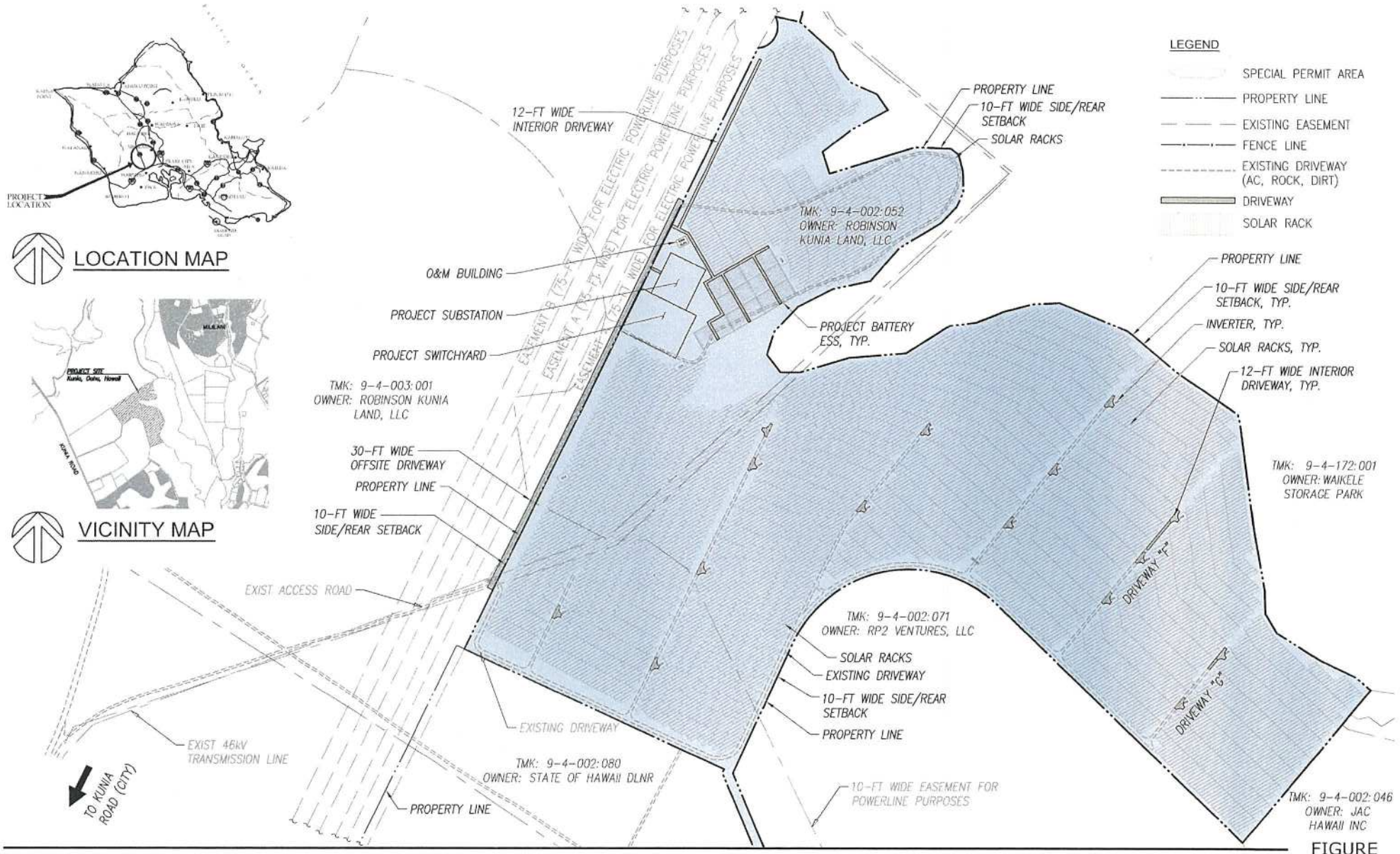
Sohrab Rashid, TE
Principal

Stephanie Cheng, AICP
Associate

SD19-0299

Attachments:

Figure 1 – Vicinity Map and Site Plan
Figure 2 – Study Intersections
Figure 3 – Peak Hour Traffic Volumes and Lane Configurations – Existing Conditions
Figure 4 – Project Trip Distribution and Trip Assignment
Figure 5 – Project Construction Traffic Trip Distribution
Figure 6 – Peak Hour Traffic Volumes and Lane Configurations – Project Construction Volumes
Figure 7 – Peak Hour Traffic Volumes and Lane Configurations – 2020 Plus Construction
Attachment A – Traffic Count Data
Attachment B – Level of Service Analysis Worksheets



HOOHANA SOLAR FARM
CONDITIONAL USE PERMIT

OVERALL SITE PLAN

SCALE: 1" = 400'

400 0 400 800

G70
111 S. KING STREET, SUITE 170
HONOLULU, HAWAII 96813
808.523.5866
WWW.G70.DESIGN

FIGURE 1

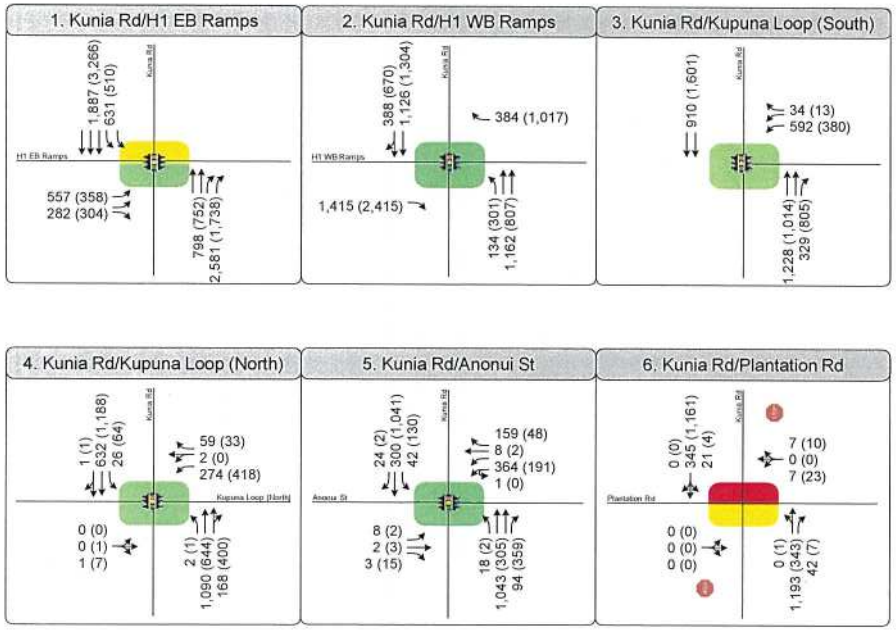
Legend

Project Site

Study Intersections

Figure 2

Study Intersections



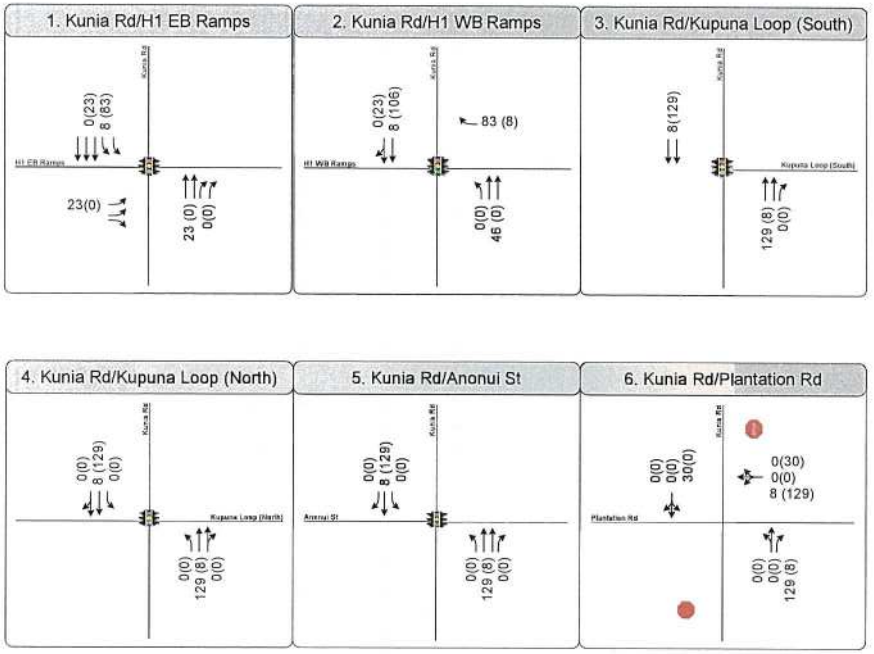
Legend

	Project Site
●	Study Intersections
A-C D E F	LOS
XX (XX)	AM (PM) Peak Hour Volume

Figure 3

Peak Hour and Daily Traffic Volumes and Lane Configurations

Existing (2019) Conditions

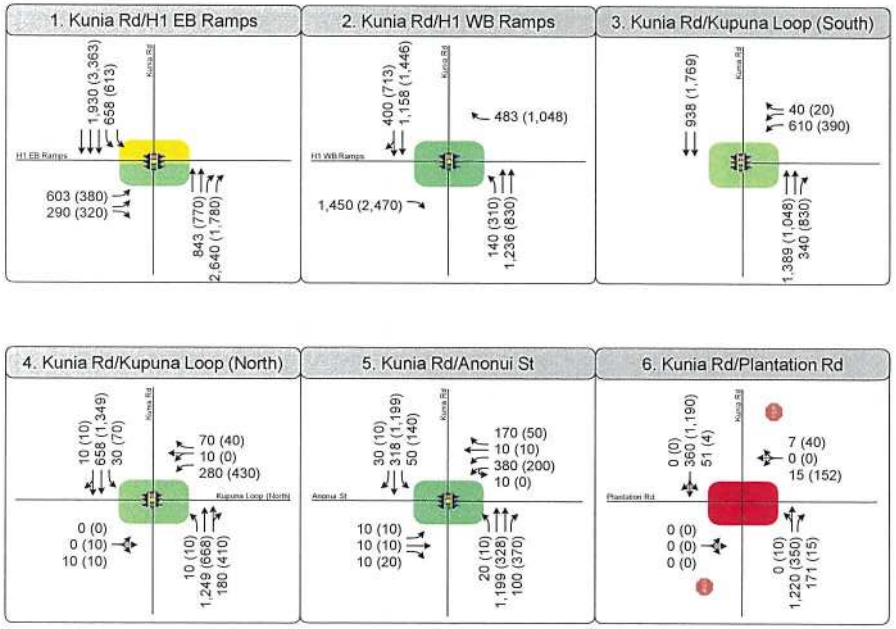


Legend

- Project Site
- Study Intersections
- XX (XX) AM (PM) Peak Hour Volume
- Construction Truck Route
- Worker Vehicle Route

Figure 4

Project Construction Trip Distribution and Peak Hour Trip Assignment



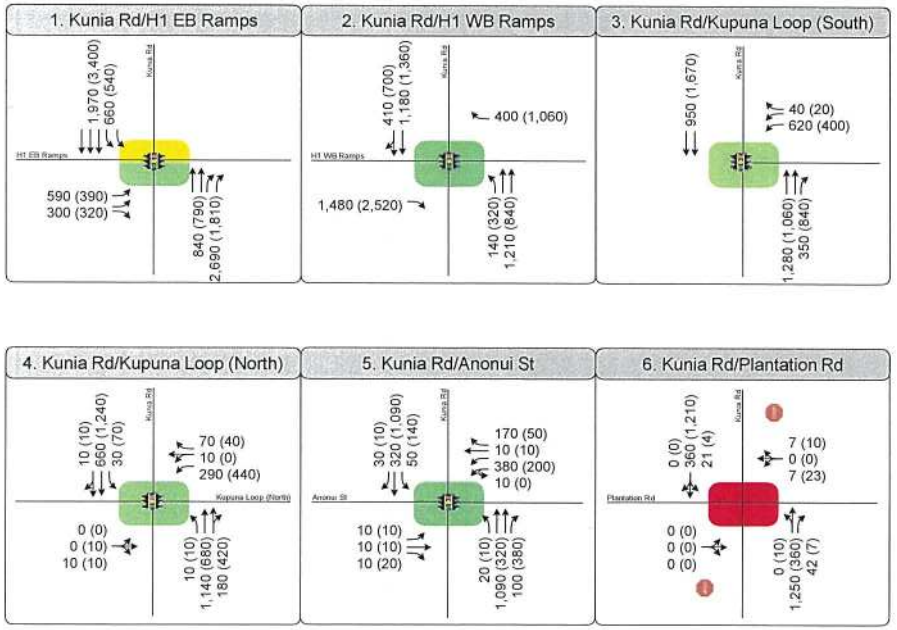
Legend

	Project Site
●	Study Intersections
A-C D E F	LOS
XX (XX)	AM (PM) Peak Hour Volume

Figure 5

Peak Hour and Daily Traffic Volumes and Lane Configurations

Construction Year (2021) Plus Project Conditions



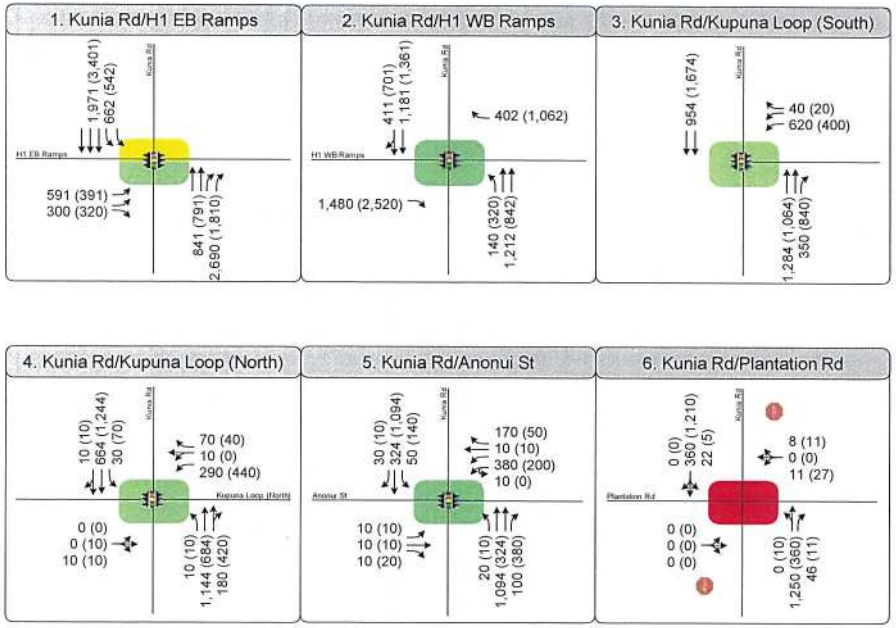
Legend

	Project Site
●	Study Intersections
A-C D E F	LOS
XX (XX)	AM (PM) Peak Hour Volume

Figure 6

Peak Hour and Daily Traffic Volumes and Lane Configurations

Opening Year (2023) No Project Conditions



Legend

	Project Site
●	Study Intersections
A-C D E F	LOS
XX (XX)	AM (PM) Peak Hour Volume

Figure 7

Peak Hour and Daily Traffic Volumes and Lane Configurations

Opening Year (2023) Plus Project Conditions

ATTACHMENT A: TRAFFIC COUNT DATA

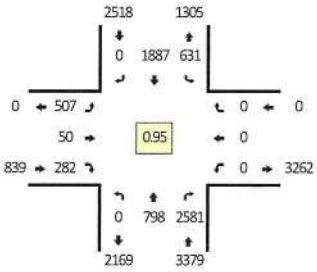
Type of peak hour being reported: System Peak

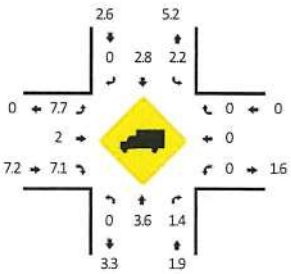
Method for determining peak hour: Total Entering Volume

LOCATION: Kunia Rd -- H1 EB Ramps
CITY/STATE: Waipahu, HI

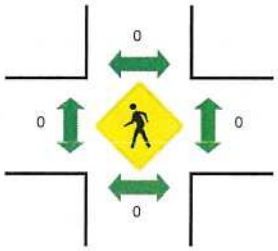
QC JOB #: 15105701
DATE: Tue, Oct 22 2019

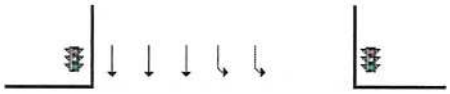
Peak-Hour: 6:45 AM -- 7:45 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

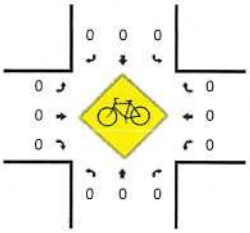


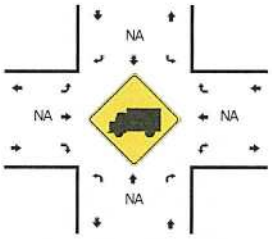


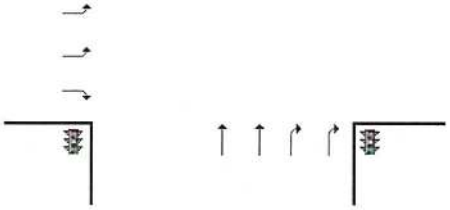
Quality Counts
DATA THAT DRIVES COMMUNITIES

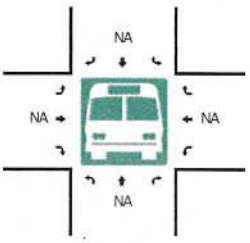












15-Min Count Period Beginning At	Kunia Rd (Northbound)				Kunia Rd (Southbound)				H1 EB Ramps (Eastbound)				H1 EB Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	188	746	0	150	266	0	0	124	19	61	0	0	0	0	0	1554	
6:15 AM	0	180	635	0	153	356	0	0	126	24	68	0	0	0	0	0	1542	
6:30 AM	0	205	541	0	154	409	0	0	144	26	53	0	0	0	0	0	1532	
6:45 AM	0	189	558	0	151	514	0	0	134	13	72	0	0	0	0	0	1631	6259
7:00 AM	0	200	649	0	175	446	0	0	121	16	55	0	0	0	0	0	1662	6367
7:15 AM	0	206	675	0	129	449	0	0	146	14	60	0	0	0	0	0	1679	6504
7:30 AM	0	203	699	0	176	478	0	0	106	7	95	0	0	0	0	0	1764	6736
7:45 AM	0	192	759	0	130	436	0	0	71	6	77	0	0	0	0	0	1671	6776
8:00 AM	0	182	675	0	142	422	0	0	87	1	68	0	0	0	0	0	1577	6691
8:15 AM	0	201	545	0	127	401	0	0	96	3	111	0	0	0	0	0	1484	6496
8:30 AM	0	175	562	0	147	390	0	0	83	0	85	0	0	0	0	0	1442	6174
8:45 AM	0	159	494	0	136	353	0	0	79	0	77	0	0	0	0	0	1298	5801

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	812	2796	0	704	1912	0	0	424	28	380	0	0	0	0	0	7056
Heavy Trucks	0	28	36		32	76	0		64	0	24		0	0	0		260
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 11/4/2019 3:22 PM

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

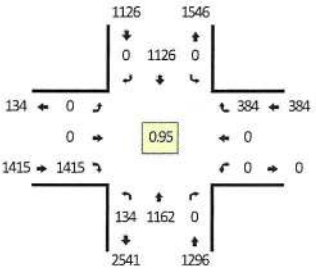
Type of peak hour being reported: System Peak

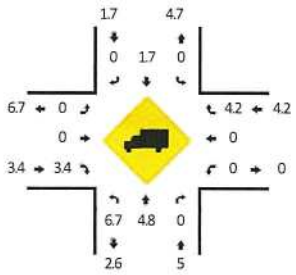
Method for determining peak hour: Total Entering Volume

LOCATION: Kunia Rd -- H1 WB Off South
CITY/STATE: Waipahu, HI

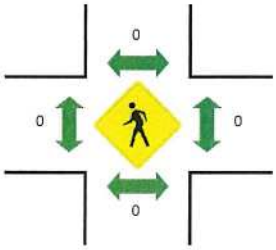
QC JOB #: 15105705
DATE: Tue, Oct 22 2019

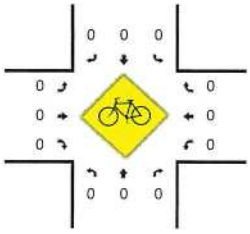
Peak-Hour: 6:45 AM -- 7:45 AM
Peak 15-Min: 6:45 AM -- 7:00 AM

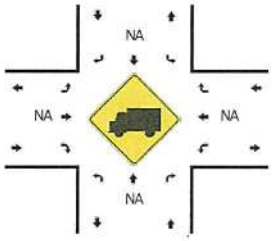


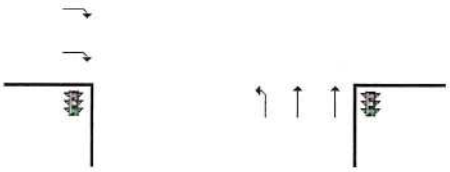


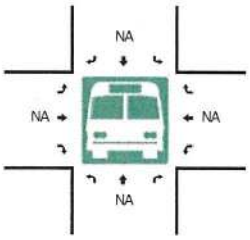
Quality Counts
DATA THAT DRIVES COMMUNITIES











15-Min Count Period Beginning At	Kunia Rd (Northbound)				Kunia Rd (Southbound)				H1 WB Off South (Eastbound)				H1 WB Off South (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	36	290	0	0	0	242	0	0	0	0	220	0	0	0	56	0	844	
6:15 AM	24	287	0	0	0	216	0	0	0	0	301	0	0	0	82	0	910	
6:30 AM	29	317	0	0	0	220	0	0	0	0	354	0	0	0	85	0	1005	
6:45 AM	20	296	0	0	0	286	0	0	0	0	400	0	0	0	105	0	1107	3866
7:00 AM	26	295	0	0	0	303	0	0	0	0	335	0	0	0	78	0	1037	4059
7:15 AM	43	303	0	0	0	254	0	0	0	0	332	0	0	0	95	0	1027	4176
7:30 AM	45	268	0	0	0	283	0	0	0	0	348	0	0	0	106	0	1050	4221
7:45 AM	44	225	0	0	0	220	0	0	0	0	346	0	0	0	135	0	970	4084
8:00 AM	45	229	0	0	0	221	0	0	0	0	341	0	0	0	119	0	955	4002
8:15 AM	38	256	0	0	0	218	0	0	0	0	319	0	0	0	121	0	952	3927
8:30 AM	51	213	0	0	0	220	0	0	0	0	319	0	0	0	120	0	923	3800
8:45 AM	47	202	0	0	0	213	0	0	0	0	290	0	0	0	117	0	869	3699

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	80	1184	0	0	0	1144	0	0	0	0	1600	0	0	0	420	0	4428
Heavy Trucks	8	24	0		0	12	0		0	0	44		0	0	12		100
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 11/4/2019 3:22 PM

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

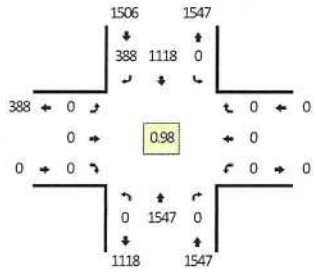
Type of peak hour being reported: System Peak

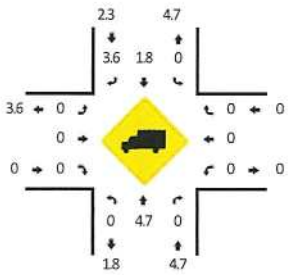
Method for determining peak hour: Total Entering Volume

LOCATION: Kunia Rd -- H1 WB On North
CITY/STATE: Royal Kunia, HI

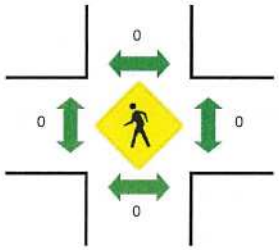
QC JOB #: 15105707
DATE: Tue, Oct 22 2019

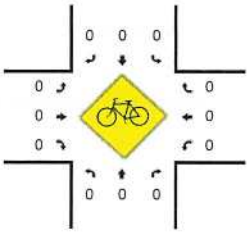
Peak-Hour: 6:45 AM -- 7:45 AM
Peak 15-Min: 6:45 AM -- 7:00 AM

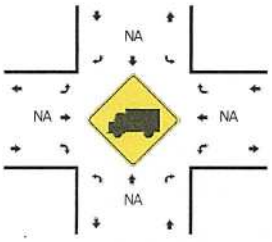


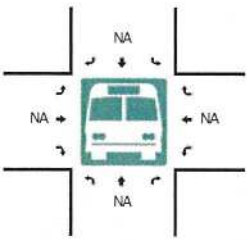


Quality Counts
DATA THAT DRIVES COMMUNITIES









15-Min Count Period Beginning At	Kunia Rd (Northbound)				Kunia Rd (Southbound)				H1 WB On North (Eastbound)				H1 WB On North (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	341	0	0	0	243	68	0	0	0	0	0	0	0	0	0	652	
6:15 AM	0	371	0	0	0	216	64	0	0	0	0	0	0	0	0	0	651	
6:30 AM	0	400	0	0	0	226	90	0	0	0	0	0	0	0	0	0	716	
6:45 AM	0	405	0	0	0	280	93	0	0	0	0	0	0	0	0	0	778	2797
7:00 AM	0	366	0	0	0	304	89	0	0	0	0	0	0	0	0	0	759	2904
7:15 AM	0	399	0	0	0	255	106	0	0	0	0	0	0	0	0	0	760	3013
7:30 AM	0	377	0	0	0	279	100	0	0	0	0	0	0	0	0	0	756	3053
7:45 AM	0	363	0	0	0	217	107	0	0	0	0	0	0	0	0	0	687	2962
8:00 AM	0	354	0	0	0	220	71	0	0	0	0	0	0	0	0	0	645	2848
8:15 AM	0	369	0	0	0	218	74	0	0	0	0	0	0	0	0	0	661	2749
8:30 AM	0	338	0	0	0	220	71	0	0	0	0	0	0	0	0	0	629	2622
8:45 AM	0	320	0	0	0	217	59	0	0	0	0	0	0	0	0	0	596	2531

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	1620	0	0	0	1120	372	0	0	0	0	0	0	0	0	0	3112
Heavy Trucks	0	36	0		0	12	4		0	0	0		0	0	0		52
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 11/4/2019 3:22 PM

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

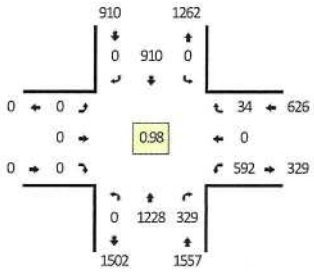
Type of peak hour being reported: System Peak

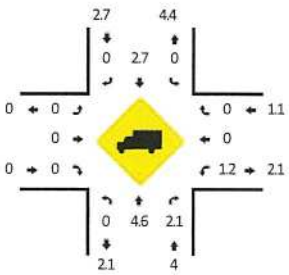
Method for determining peak hour: Total Entering Volume

LOCATION: Kunia Rd -- Kupuna Loop (South)
CITY/STATE: Royal Kunia, HI

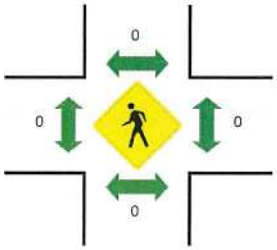
QC JOB #: 15105709
DATE: Tue, Oct 22 2019

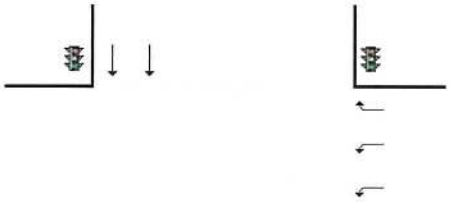
Peak-Hour: 6:45 AM -- 7:45 AM
Peak 15-Min: 6:45 AM -- 7:00 AM

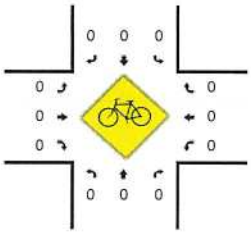


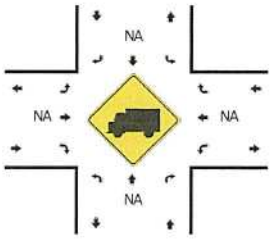


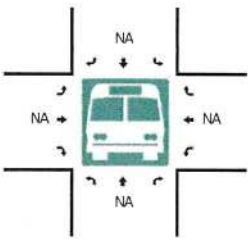
Quality Counts
DATA THAT DRIVES COMMUNITIES











15-Min Count Period Beginning At	Kunia Rd (Northbound)				Kunia Rd (Southbound)				Kupuna Loop (South) (Eastbound)				Kupuna Loop (South) (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	337	47	0	0	188	0	0	0	0	0	0	96	0	7	0	675	
6:15 AM	0	294	51	0	0	176	0	0	0	0	0	0	110	0	6	0	637	
6:30 AM	0	331	56	0	0	189	0	0	0	0	0	0	127	0	10	0	713	
6:45 AM	0	343	74	0	0	233	0	0	0	0	0	0	132	0	11	0	793	2818
7:00 AM	0	295	70	0	0	227	0	0	0	0	0	0	151	0	7	0	750	2893
7:15 AM	0	288	86	0	0	217	0	0	0	0	0	0	174	0	9	0	774	3030
7:30 AM	0	302	99	0	0	233	0	0	0	0	0	0	135	0	7	0	776	3093
7:45 AM	0	245	105	0	0	210	0	0	0	0	0	0	116	0	12	0	688	2988
8:00 AM	0	262	89	0	0	193	0	0	0	0	0	0	117	0	7	0	668	2906
8:15 AM	0	279	90	0	0	182	0	0	0	0	0	0	93	0	9	0	653	2785
8:30 AM	0	259	89	0	0	175	0	0	0	0	0	0	100	0	4	0	627	2636
8:45 AM	0	239	105	0	0	192	0	0	0	0	0	0	93	0	5	0	634	2582

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	1372	296	0	0	932	0	0	0	0	0	0	528	0	44	0	3172
Heavy Trucks	0	32	0		0	12	0		0	0	0		4	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 11/4/2019 3:22 PM

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

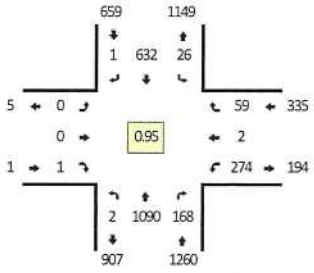
Type of peak hour being reported: System Peak

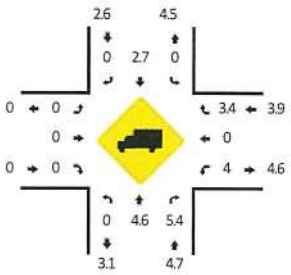
Method for determining peak hour: Total Entering Volume

LOCATION: Kunia Rd -- Kupuna Loop (North)
CITY/STATE: Royal Kunia, HI

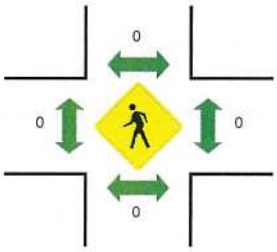
QC JOB #: 15105711
DATE: Tue, Oct 22 2019

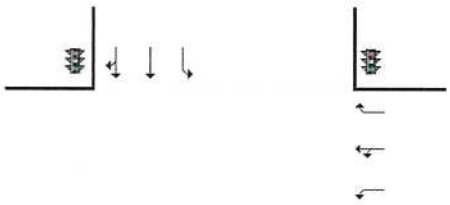
Peak-Hour: 6:45 AM -- 7:45 AM
Peak 15-Min: 6:45 AM -- 7:00 AM

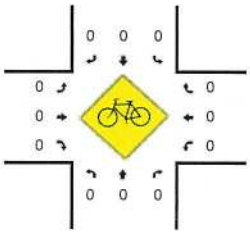


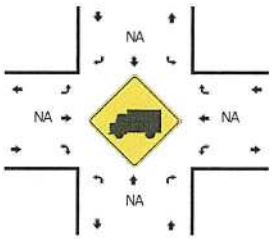


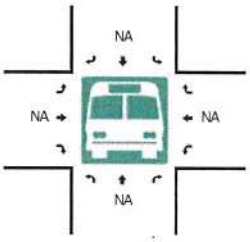
Quality Counts
DATA THAT DRIVES COMMUNITIES











15-Min Count Period Beginning At	Kunia Rd (Northbound)				Kunia Rd (Southbound)				Kupuna Loop (North) (Eastbound)				Kupuna Loop (North) (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	286	34	0	1	120	0	0	0	0	0	0	70	0	10	0	521	
6:15 AM	0	280	33	0	2	120	0	0	0	0	0	0	51	0	16	0	502	
6:30 AM	0	300	30	0	3	153	0	0	0	0	0	0	56	2	21	0	565	
6:45 AM	1	308	37	0	7	173	0	0	0	0	0	0	58	0	12	0	596	2184
7:00 AM	0	273	37	0	5	158	1	0	0	0	0	0	72	1	17	0	564	2227
7:15 AM	0	268	43	0	5	156	0	0	0	0	0	0	86	1	14	0	573	2298
7:30 AM	1	241	51	0	9	145	0	0	0	0	1	0	58	0	16	0	522	2255
7:45 AM	4	202	69	1	7	153	0	0	1	0	0	0	57	0	12	0	506	2165
8:00 AM	1	209	64	0	3	126	0	0	0	0	0	0	56	0	13	0	472	2073
8:15 AM	0	215	72	0	9	161	0	0	0	0	0	0	39	0	8	0	504	2004
8:30 AM	2	184	69	0	8	119	0	0	0	0	0	0	61	0	7	0	450	1932
8:45 AM	0	178	50	0	5	112	0	0	0	0	1	0	73	0	8	0	427	1853

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	1232	148	0	28	692	0	0	0	0	0	0	232	0	48	0	2384
Heavy Trucks	0	24	8		0	8	0		0	0	0		4	0	4		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 11/4/2019 3:22 PM

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

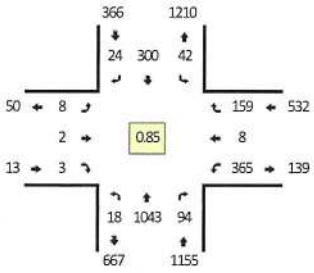
Type of peak hour being reported: System Peak

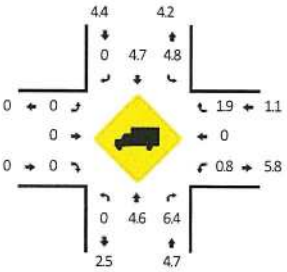
Method for determining peak hour: Total Entering Volume

LOCATION: Kunia Rd -- Anonui St
CITY/STATE: Royal Kunia, HI

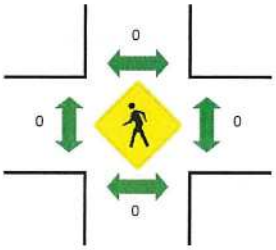
QC JOB #: 15105713
DATE: Tue, Oct 22 2019

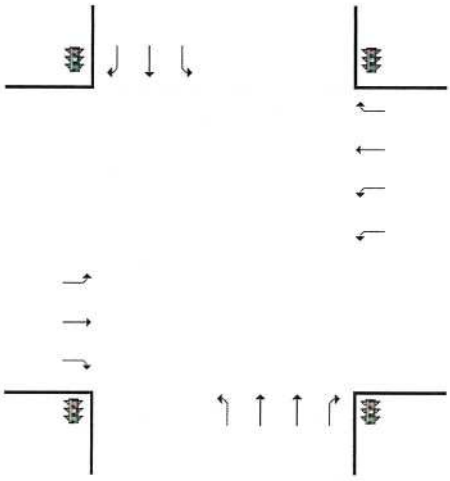
Peak-Hour: 6:45 AM -- 7:45 AM
Peak 15-Min: 6:45 AM -- 7:00 AM

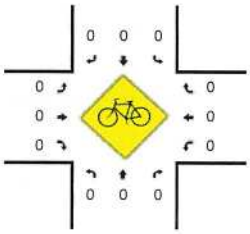


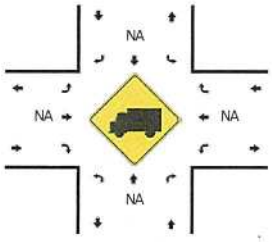


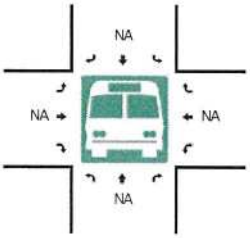
Quality Counts
DATA THAT DRIVES COMMUNITIES











15-Min Count Period Beginning At	Kunia Rd (Northbound)				Kunia Rd (Southbound)				Anonui St (Eastbound)				Anonui St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	9	280	13	0	4	30	6	0	1	0	1	0	89	2	22	0	457	
6:15 AM	18	261	17	0	3	39	6	0	0	2	1	0	77	10	29	0	463	
6:30 AM	21	284	23	0	9	58	8	0	1	1	2	0	97	13	38	0	555	
6:45 AM	9	297	21	0	16	91	23	0	6	0	1	0	92	6	48	0	610	2085
7:00 AM	4	265	19	0	7	74	0	0	0	0	0	0	89	1	54	1	514	2142
7:15 AM	3	242	27	0	7	59	0	0	1	1	0	0	104	1	30	0	475	2154
7:30 AM	2	239	27	0	12	76	1	0	1	1	2	0	79	0	27	0	467	2066
7:45 AM	1	173	37	0	18	96	0	0	0	0	1	0	57	0	23	0	406	1862
8:00 AM	1	171	48	0	11	98	0	0	0	1	0	0	52	1	15	0	398	1746
8:15 AM	1	175	41	0	7	79	0	0	0	0	1	0	70	0	18	0	392	1663
8:30 AM	0	182	28	0	5	76	0	0	0	0	1	0	56	0	41	0	389	1585
8:45 AM	1	158	33	0	12	57	5	0	0	0	4	0	51	0	14	1	336	1515

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	36	1188	84	0	64	364	92	0	24	0	4	0	368	24	192	0	2440
Heavy Trucks	0	32	4		0	4	0		0	0	0		4	0	0		44
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 11/4/2019 3:22 PM

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

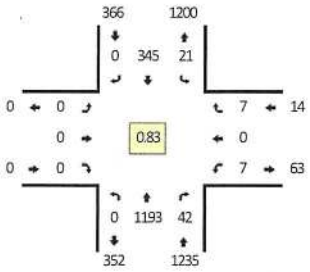
Type of peak hour being reported: System Peak

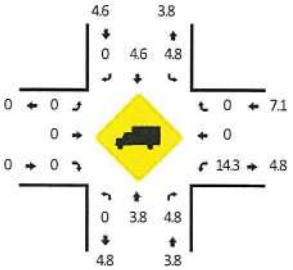
Method for determining peak hour: Total Entering Volume

LOCATION: Kunia Rd -- Plantation Rd
CITY/STATE: Waipahu, HI

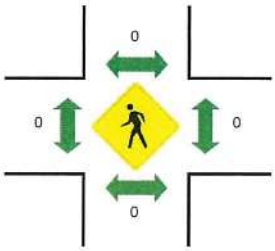
QC JOB #: 15105715
DATE: Tue, Oct 22 2019

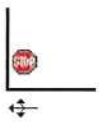
Peak-Hour: 6:45 AM -- 7:45 AM
Peak 15-Min: 6:45 AM -- 7:00 AM

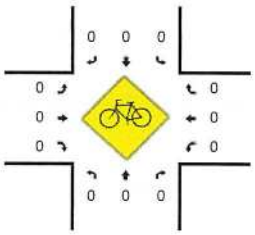


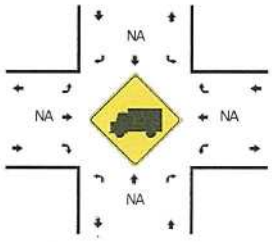


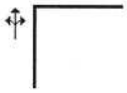
Quality Counts
DATA THAT DRIVES COMMUNITIES

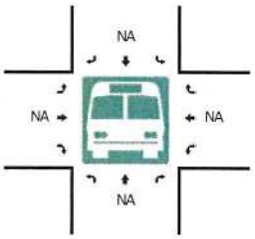












15-Min Count Period Beginning At	Kunia Rd (Northbound)				Kunia Rd (Southbound)				Plantation Rd (Eastbound)				Plantation Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	325	10	0	1	43	0	0	0	0	0	0	2	0	0	0	381	
6:15 AM	1	271	19	0	3	52	0	0	0	0	0	0	0	0	1	0	347	
6:30 AM	0	289	21	1	5	89	0	0	0	0	0	0	1	0	1	0	407	
6:45 AM	0	326	29	0	9	117	0	0	0	0	0	0	1	0	2	0	484	1619
7:00 AM	0	310	10	0	9	67	0	0	0	0	0	0	4	0	1	0	401	1639
7:15 AM	0	285	1	0	2	70	0	0	0	0	0	0	0	0	1	0	359	1651
7:30 AM	0	272	2	0	1	91	0	0	0	0	0	0	2	0	3	0	371	1615
7:45 AM	1	199	1	0	1	121	0	0	0	0	0	0	2	0	0	0	325	1456
8:00 AM	0	188	1	0	2	88	1	0	0	0	0	0	7	0	0	0	287	1342
8:15 AM	0	189	4	0	0	82	0	0	0	0	0	0	2	0	1	0	278	1261
8:30 AM	0	217	6	0	0	86	0	0	0	0	0	0	1	0	1	0	311	1201
8:45 AM	0	162	5	0	0	61	0	0	0	0	0	0	0	0	0	0	228	1104

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	1304	116	0	36	468	0	0	0	0	0	0	4	0	8	0	1936
Heavy Trucks	0	36	4		0	8	0		0	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 11/4/2019 3:22 PM

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

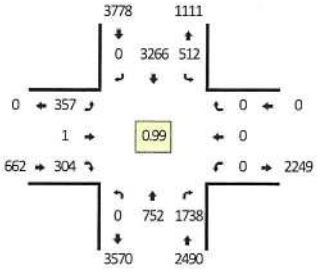
Type of peak hour being reported: System Peak

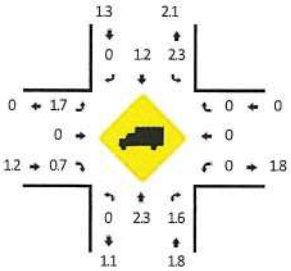
Method for determining peak hour: Total Entering Volume

LOCATION: Kunia Rd -- H1 EB Ramps
CITY/STATE: Waipahu, HI

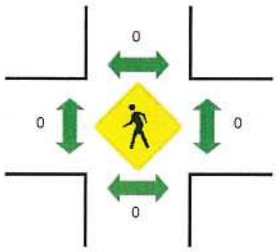
QC JOB #: 15105702
DATE: Tue, Oct 22 2019

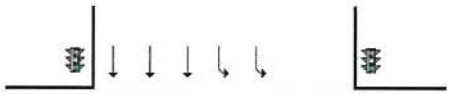
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:00 PM -- 4:15 PM

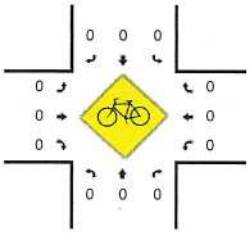


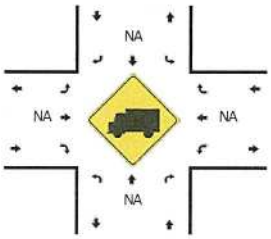


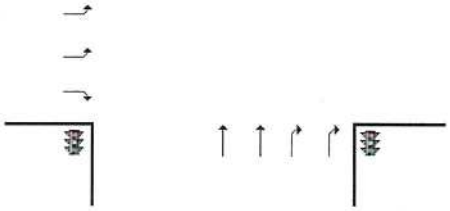
Quality Counts
DATA THAT DRIVES COMMUNITIES

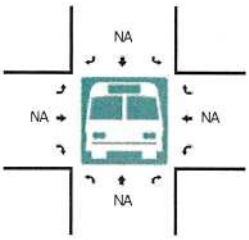












15-Min Count Period Beginning At	Kunia Rd (Northbound)				Kunia Rd (Southbound)				H1 EB Ramps (Eastbound)				H1 EB Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	0	172	467	0	115	713	0	1	93	0	57	0	0	0	0	0	1618	
3:15 PM	0	181	423	0	128	819	0	1	74	1	72	0	0	0	0	0	1699	
3:30 PM	0	210	511	0	117	849	0	0	99	0	83	0	0	0	0	0	1869	
3:45 PM	0	196	410	0	114	870	0	0	98	0	64	0	0	0	0	0	1752	6938
4:00 PM	0	189	451	0	131	813	0	2	88	0	83	0	0	0	0	0	1757	7077
4:15 PM	0	179	407	0	138	866	0	0	80	0	70	0	0	0	0	0	1740	7118
4:30 PM	0	188	449	0	107	760	0	0	107	1	72	0	0	0	0	0	1684	6933
4:45 PM	0	196	431	0	134	827	0	0	82	0	79	0	0	0	0	0	1749	6930
5:00 PM	0	176	374	0	112	794	0	0	77	0	59	0	0	0	0	0	1592	6765
5:15 PM	0	162	423	0	135	795	0	0	104	0	59	0	0	0	0	0	1678	6703
5:30 PM	0	207	409	0	120	752	0	0	82	0	50	0	0	0	0	0	1620	6639
5:45 PM	0	147	379	0	125	784	0	0	75	0	48	0	0	0	0	0	1558	6448

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	756	1804	0	524	3252	0	8	352	0	332	0	0	0	0	0	7028
Heavy Trucks	0	28	32		24	28	0		0	0	4		0	0	0		116
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 11/4/2019 3:22 PM

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

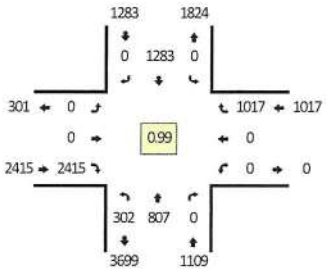
Type of peak hour being reported: System Peak

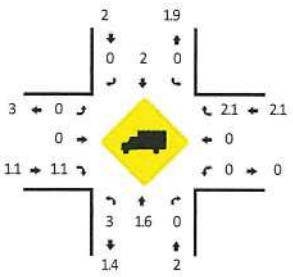
Method for determining peak hour: Total Entering Volume

LOCATION: Kunia Rd -- H1 WB Off South
CITY/STATE: Waipahu, HI

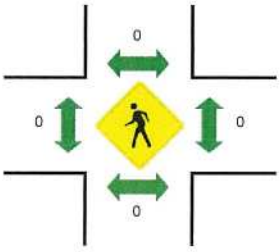
QC JOB #: 15105706
DATE: Tue, Oct 22 2019

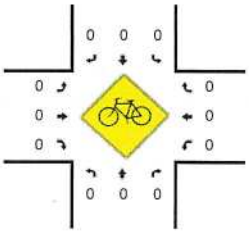
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:15 PM -- 4:30 PM

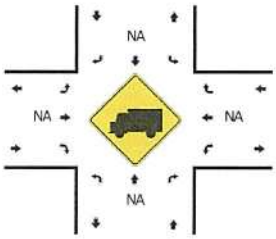


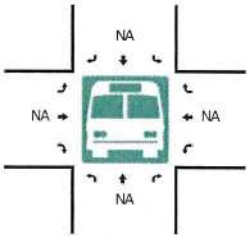


Quality Counts
DATA THAT DRIVES COMMUNITIES









15-Min Count Period Beginning At	Kunia Rd (Northbound)				Kunia Rd (Southbound)				H1 WB Off South (Eastbound)				H1 WB Off South (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	62	209	0	0	0	240	0	0	0	0	624	0	0	0	212	0	1347	
3:15 PM	73	195	0	0	0	260	0	0	0	0	639	0	0	0	277	0	1444	
3:30 PM	78	223	0	1	0	314	0	0	0	0	642	0	0	0	228	0	1486	
3:45 PM	72	214	0	0	0	322	0	0	0	0	651	0	0	0	252	0	1511	5788
4:00 PM	83	210	0	0	0	287	0	0	0	0	615	0	0	0	237	0	1432	5873
4:15 PM	70	173	0	1	0	350	0	0	0	0	633	0	0	0	247	0	1474	5903
4:30 PM	82	217	0	0	0	324	0	0	0	0	576	0	0	0	268	0	1467	5884
4:45 PM	66	207	0	0	0	322	0	0	0	0	591	0	0	0	265	0	1451	5824
5:00 PM	77	178	0	0	0	309	0	0	0	0	568	0	0	0	240	0	1372	5764
5:15 PM	63	211	0	0	0	329	0	0	0	0	598	0	0	0	209	0	1410	5700
5:30 PM	71	202	0	0	0	356	0	0	0	0	561	0	0	0	234	0	1424	5657
5:45 PM	69	179	0	0	0	304	0	0	0	0	600	0	0	0	216	0	1368	5574

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	280	692	0	4	0	1400	0	0	0	0	2532	0	0	0	988	0	5896
Heavy Trucks	4	8	0		0	32	0		0	0	36		0	0	16		96
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 11/4/2019 3:22 PM

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

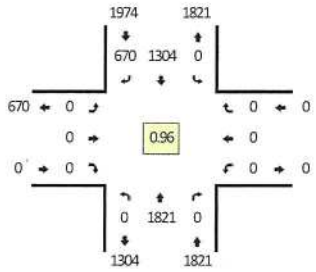
Type of peak hour being reported: System Peak

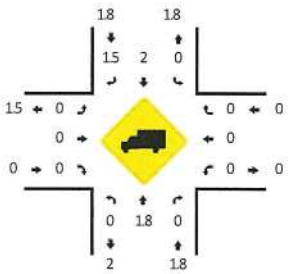
Method for determining peak hour: Total Entering Volume

LOCATION: Kunia Rd -- H1 WB On North
CITY/STATE: Royal Kunia, HI

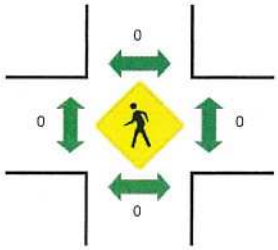
QC JOB #: 15105708
DATE: Tue, Oct 22 2019

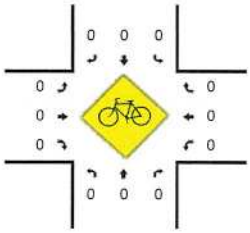
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

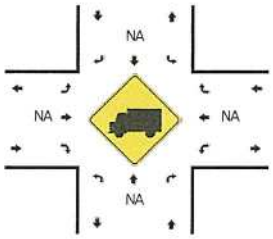


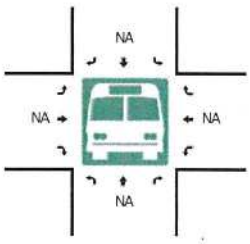


Quality Counts
DATA THAT DRIVES COMMUNITIES









15-Min Count Period Beginning At	Kunia Rd (Northbound)				Kunia Rd (Southbound)				H1 WB On North (Eastbound)				H1 WB On North (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	0	421	0	0	0	239	108	0	0	0	0	0	0	0	0	0	768	
3:15 PM	0	469	0	0	0	270	132	0	0	0	0	0	0	0	0	0	871	
3:30 PM	0	450	0	0	0	312	142	0	0	0	0	0	0	0	0	0	904	
3:45 PM	0	471	0	0	0	321	166	0	0	0	0	0	0	0	0	0	958	3501
4:00 PM	0	445	0	0	0	294	149	0	0	0	0	0	0	0	0	0	888	3621
4:15 PM	0	421	0	0	0	358	177	0	0	0	0	0	0	0	0	0	956	3706
4:30 PM	0	479	0	0	0	330	180	0	0	0	0	0	0	0	0	0	989	3791
4:45 PM	0	476	0	0	0	322	164	0	0	0	0	0	0	0	0	0	962	3795
5:00 PM	0	418	0	0	0	318	159	0	0	0	0	0	0	0	0	0	895	3802
5:15 PM	0	426	0	0	0	330	160	0	0	0	0	0	0	0	0	0	916	3762
5:30 PM	0	436	0	0	0	355	159	0	0	0	0	0	0	0	0	0	950	3723
5:45 PM	0	390	0	0	0	307	115	0	0	0	0	0	0	0	0	0	812	3573

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	1916	0	0	0	1320	720	0	0	0	0	0	0	0	0	0	3956
Heavy Trucks	0	56	0		0	16	12		0	0	0		0	0	0		84
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 11/4/2019 3:22 PM

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

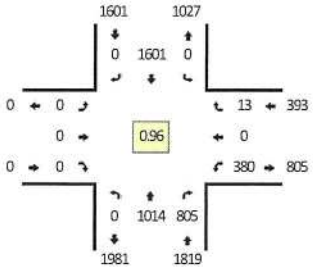
Type of peak hour being reported: System Peak

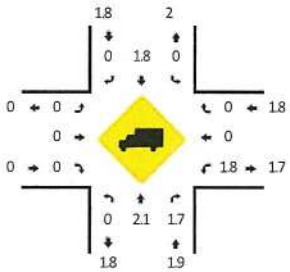
Method for determining peak hour: Total Entering Volume

LOCATION: Kunia Rd -- Kupuna Loop (South)
CITY/STATE: Royal Kunia, HI

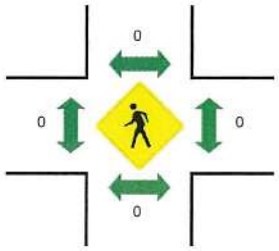
QC JOB #: 15105710
DATE: Tue, Oct 22 2019

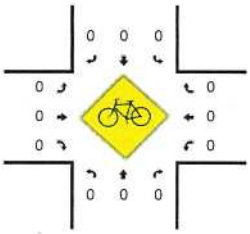
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:45 PM -- 5:00 PM

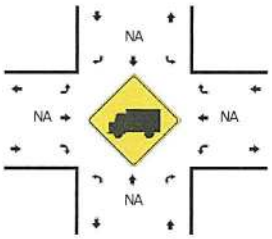


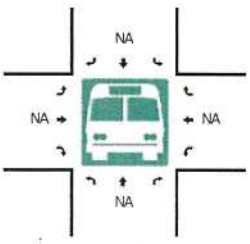


Quality Counts
DATA THAT DRIVES COMMUNITIES









15-Min Count Period Beginning At	Kunia Rd (Northbound)				Kunia Rd (Southbound)				Kupuna Loop (South) (Eastbound)				Kupuna Loop (South) (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	0	228	172	0	0	271	0	0	0	0	0	0	80	0	0	0	751	
3:15 PM	0	233	213	0	0	290	0	0	0	0	0	0	98	0	0	0	834	
3:30 PM	0	254	203	0	0	358	0	0	0	0	0	0	72	0	3	0	890	
3:45 PM	0	270	218	0	0	410	0	0	0	0	0	0	80	0	5	0	983	3458
4:00 PM	0	263	179	0	0	343	0	0	0	0	0	0	95	0	1	0	881	3588
4:15 PM	0	227	201	0	0	429	0	0	0	0	0	0	101	0	4	0	962	3716
4:30 PM	0	257	200	0	0	425	0	0	0	0	0	0	89	0	4	0	975	3801
4:45 PM	0	267	225	0	0	404	0	0	0	0	0	0	95	0	4	0	995	3813
5:00 PM	0	234	195	0	0	388	0	0	0	0	0	0	95	0	6	0	918	3850
5:15 PM	0	253	184	0	0	393	0	0	0	0	0	0	97	0	2	0	929	3817
5:30 PM	0	232	170	0	0	423	0	0	0	0	0	0	77	0	2	0	904	3746
5:45 PM	0	219	182	0	0	372	0	0	0	0	0	0	85	0	4	0	862	3613

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	1068	900	0	0	1616	0	0	0	0	0	0	380	0	16	0	3980
Heavy Trucks	0	4	20		0	16	0		0	0	0		8	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 11/4/2019 3:22 PM

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

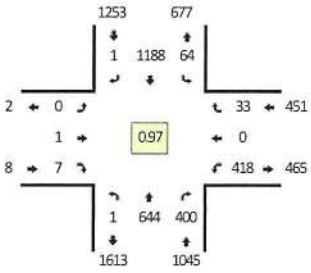
Type of peak hour being reported: System Peak

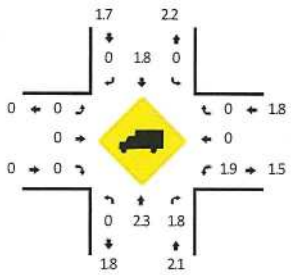
Method for determining peak hour: Total Entering Volume

LOCATION: Kunia Rd -- Kupuna Loop (North)
CITY/STATE: Royal Kunia, HI

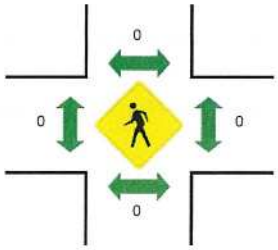
QC JOB #: 15105712
DATE: Tue, Oct 22 2019

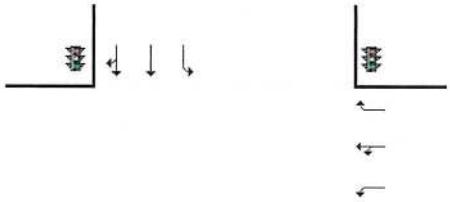
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

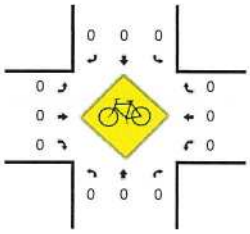


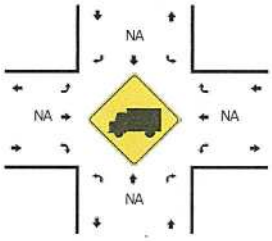


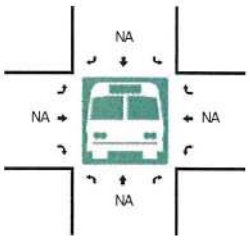
Quality Counts
DATA THAT DRIVES COMMUNITIES











15-Min Count Period Beginning At	Kunia Rd (Northbound)				Kunia Rd (Southbound)				Kupuna Loop (North) (Eastbound)				Kupuna Loop (North) (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	1	120	99	0	12	163	0	0	0	0	0	0	106	0	11	0	512	
3:15 PM	0	150	101	0	14	206	0	0	0	0	3	0	92	0	14	0	580	
3:30 PM	0	157	83	0	23	257	0	0	0	1	2	0	123	0	8	0	654	
3:45 PM	0	156	112	1	16	293	0	0	0	1	1	0	99	0	13	0	692	2438
4:00 PM	1	169	98	0	15	264	0	0	0	0	2	0	96	0	9	0	654	2580
4:15 PM	0	155	87	0	13	320	0	0	0	1	1	0	113	0	10	0	700	2700
4:30 PM	0	151	107	0	20	301	1	0	0	0	4	0	118	0	10	0	712	2758
4:45 PM	0	169	108	0	16	303	0	0	0	0	0	0	91	0	4	0	691	2757
5:00 PM	0	134	95	0	24	276	0	0	0	0	0	0	110	0	13	0	652	2755
5:15 PM	0	160	99	0	21	292	0	0	1	1	0	0	115	0	5	0	694	2749
5:30 PM	1	142	95	0	18	304	0	0	0	0	0	0	117	0	3	0	680	2717
5:45 PM	0	124	87	0	16	236	0	0	0	0	0	0	114	0	8	0	585	2611

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	604	428	0	80	1204	4	0	0	0	16	0	472	0	40	0	2848
Heavy Trucks	0	20	12		0	16	0		0	0	0		12	0	0		60
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 11/4/2019 3:22 PM

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

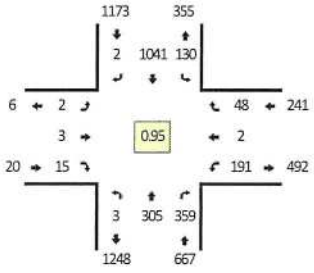
Type of peak hour being reported: System Peak

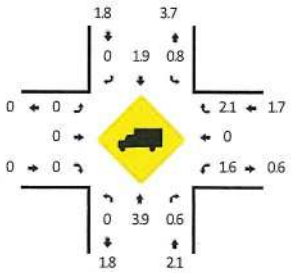
Method for determining peak hour: Total Entering Volume

LOCATION: Kunia Rd -- Anonui St
CITY/STATE: Royal Kunia, HI

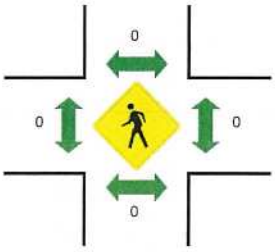
QC JOB #: 15105714
DATE: Tue, Oct 22 2019

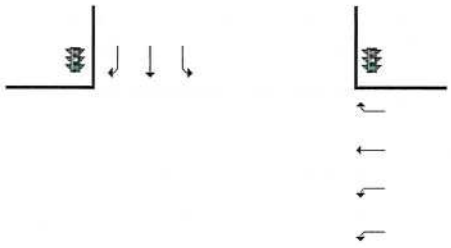
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:45 PM -- 5:00 PM

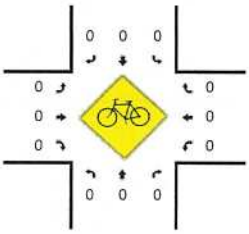


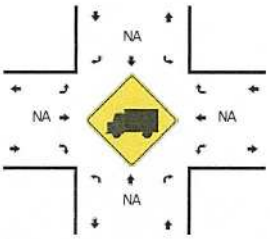


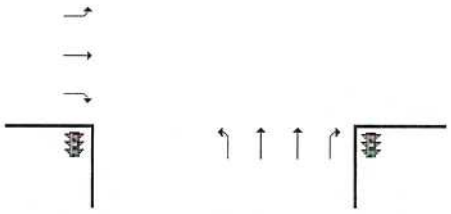
Quality Counts
DATA THAT DRIVES COMMUNITIES

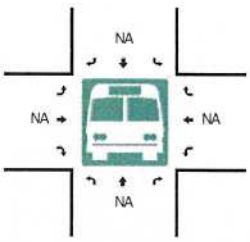












15-Min Count Period Beginning At	Kunia Rd (Northbound)				Kunia Rd (Southbound)				Anonui St (Eastbound)				Anonui St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	1	65	72	0	18	131	0	0	0	0	2	0	55	0	9	0	353	
3:15 PM	2	68	88	0	22	161	4	0	1	0	12	0	42	1	11	0	412	
3:30 PM	1	90	74	0	22	205	1	0	36	14	50	0	50	1	9	0	553	
3:45 PM	1	94	83	0	40	243	1	0	2	2	10	0	46	0	10	0	532	1850
4:00 PM	0	74	91	1	29	228	0	0	2	1	5	0	45	1	13	0	490	1987
4:15 PM	1	76	80	0	27	258	0	0	0	2	1	0	61	0	9	0	515	2090
4:30 PM	1	76	97	0	31	278	1	0	0	0	5	0	44	0	11	0	544	2081
4:45 PM	0	79	91	0	43	277	1	0	0	0	4	0	41	1	15	0	552	2101
5:00 PM	0	74	78	0	27	235	1	0	0	0	2	0	56	0	18	0	491	2102
5:15 PM	0	72	101	0	23	273	0	0	1	2	2	0	45	0	9	0	528	2115
5:30 PM	0	62	80	0	44	249	0	0	1	0	0	0	64	0	17	0	517	2088
5:45 PM	4	55	77	0	24	215	0	0	0	0	2	0	51	0	10	1	439	1975

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	316	364	0	172	1108	4	0	0	0	16	0	164	4	60	0	2208
Heavy Trucks	0	4	0		0	20	0		0	0	0		4	0	4		32
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 11/4/2019 3:22 PM

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

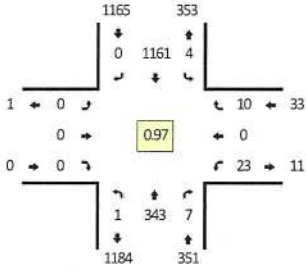
Type of peak hour being reported: System Peak

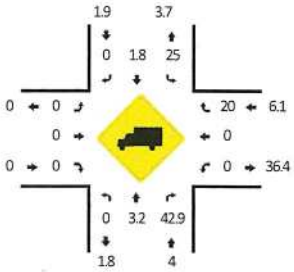
Method for determining peak hour: Total Entering Volume

LOCATION: Kunia Rd -- Plantation Rd
CITY/STATE: Waipahu, HI

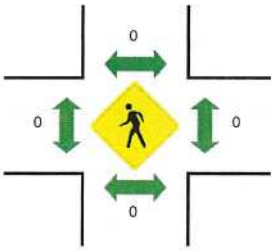
QC JOB #: 15105716
DATE: Tue, Oct 22 2019

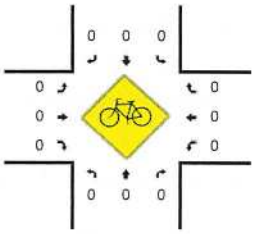
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

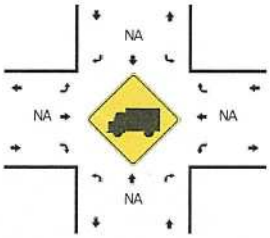


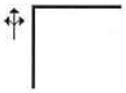


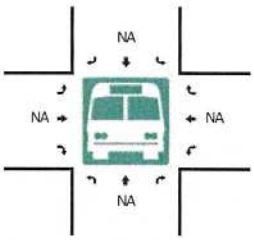
Quality Counts
DATA THAT DRIVES COMMUNITIES











15-Min Count Period Beginning At	Kunia Rd (Northbound)				Kunia Rd (Southbound)				Plantation Rd (Eastbound)				Plantation Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	1	73	1	0	2	149	0	0	0	0	0	0	2	0	0	0	228	
3:15 PM	0	77	0	2	1	186	0	0	0	0	0	0	1	0	1	0	268	
3:30 PM	0	133	3	0	0	263	0	0	0	0	0	0	3	0	1	0	403	
3:45 PM	0	108	0	0	1	242	0	0	0	0	0	0	4	0	2	0	357	1256
4:00 PM	0	88	4	0	1	280	0	0	0	0	0	0	2	0	2	0	377	1405
4:15 PM	1	82	2	0	0	292	0	0	0	0	0	0	5	0	2	0	384	1521
4:30 PM	0	88	1	0	1	300	0	0	0	0	0	0	3	0	5	0	398	1516
4:45 PM	0	85	0	0	2	289	0	0	0	0	0	0	13	0	1	0	390	1549
5:00 PM	1	92	2	1	0	270	1	0	2	0	1	0	7	0	6	0	383	1555
5:15 PM	0	82	5	0	3	297	0	0	0	0	1	0	5	0	0	0	393	1564
5:30 PM	0	72	0	0	0	260	0	0	0	0	0	0	16	0	7	0	355	1521
5:45 PM	0	69	3	0	1	213	0	0	1	0	2	0	19	0	5	0	313	1444

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	352	4	0	4	1200	0	0	0	0	0	0	12	0	20	0	1592
Heavy Trucks	0	12	4		0	8	0		0	0	0		0	0	8		32
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 11/4/2019 3:22 PM

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

ATTACHMENT B: LEVEL OF SERVICE ANALYSIS WORKSHEETS

HCM 6th Signalized Intersection Summary
1: Kunia Rd & H1 EB Ramps

11/14/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	557	0	282	0	0	0	0	798	2581	631	1887	0
Future Volume (veh/h)	557	0	282	0	0	0	0	798	2581	631	1887	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1796	0	1796				0	1856	1870	1870	1870	0
Adj Flow Rate, veh/h	586	0	0				0	840	1664	664	1986	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	7	0	7				0	3	2	2	2	0
Cap, veh/h	627	0					0	1842	1458	735	3884	0
Arrive On Green	0.19	0.00	0.00				0.00	0.52	0.52	0.21	0.76	0.00
Sat Flow, veh/h	3319	0	1522				0	3618	2790	3456	5274	0
Grp Volume(v), veh/h	586	0	0				0	840	1664	664	1986	0
Grp Sat Flow(s),veh/h/ln	1659	0	1522				0	1763	1395	1728	1702	0
Q Serve(g_s), s	31.0	0.0	0.0				0.0	26.6	93.1	33.4	27.1	0.0
Cycle Q Clear(g_c), s	31.0	0.0	0.0				0.0	26.6	93.1	33.4	27.1	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	627	0					0	1842	1458	735	3884	0
V/C Ratio(X)	0.94	0.00					0.00	0.46	1.14	0.90	0.51	0.00
Avail Cap(c_a), veh/h	661	0					0	1842	1458	1271	3884	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	71.2	0.0	0.0				0.0	26.7	42.5	68.3	8.4	0.0
Incr Delay (d2), s/veh	20.1	0.0	0.0				0.0	0.8	72.4	5.1	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.1	0.0	0.0				0.0	11.5	46.0	15.3	9.6	0.0
Unsig. Movement Delay, s/veh			0.00									
LnGrp Delay(d),s/veh	91.3	0.0	0.0				0.0	27.5	114.9	73.4	8.8	0.0
LnGrp LOS	F	A	A				A	C	F	E	A	A
Approach Vol, veh/h		852	A					2504			2650	
Approach Delay, s/veh		62.8						85.6			25.0	
Approach LOS		E						F			C	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	42.4	97.6		38.1		140.0
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5
Max Green Setting (Gmax), s	65.5	65.5		35.5		135.5
Max Q Clear Time (g_c+I1), s	35.4	95.1		33.0		29.1
Green Ext Time (p_c), s	2.6	0.0		0.7		32.4

Intersection Summary	
HCM 6th Ctrl Delay	55.6
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Unsignalized Delay for [EBR] is included in calculations of the approach delay and intersection delay.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	134	1162	1126	388
Future Volume (veh/h)	0	0	134	1162	1126	388
Initial Q (Qb), veh			0	0	0	0
Ped-Bike Adj(A_pbT)			1.00			1.00
Parking Bus, Adj			1.00	1.00	1.00	1.00
Work Zone On Approach				No	No	
Adj Sat Flow, veh/h/ln			1811	1841	1870	1870
Adj Flow Rate, veh/h			141	1223	1185	0
Peak Hour Factor			0.95	0.95	0.95	0.95
Percent Heavy Veh, %			6	4	2	2
Cap, veh/h			192	3010	2169	
Arrive On Green			0.11	0.86	0.61	0.00
Sat Flow, veh/h			1725	3589	3741	0
Grp Volume(v), veh/h			141	1223	1185	0
Grp Sat Flow(s),veh/h/ln			1725	1749	1777	0
Q Serve(g_s), s			2.6	2.4	6.3	0.0
Cycle Q Clear(g_c), s			2.6	2.4	6.3	0.0
Prop In Lane			1.00			0.00
Lane Grp Cap(c), veh/h			192	3010	2169	
V/C Ratio(X)			0.74	0.41	0.55	
Avail Cap(c_a), veh/h			1361	9256	6105	
HCM Platoon Ratio			1.00	1.00	1.00	1.00
Upstream Filter(I)			1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh			13.9	0.5	3.7	0.0
Incr Delay (d2), s/veh			5.4	0.1	0.2	0.0
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln			1.0	0.0	0.4	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh			19.3	0.6	3.9	0.0
LnGrp LOS			B	A	A	
Approach Vol, veh/h				1364	1185	A
Approach Delay, s/veh				2.5	3.9	
Approach LOS				A	A	

Timer - Assigned Phs	2			5	6
Phs Duration (G+Y+Rc), s	32.3			8.1	24.2
Change Period (Y+Rc), s	4.5			4.5	4.5
Max Green Setting (Gmax), s	85.5			25.5	55.5
Max Q Clear Time (g_c+I1), s	4.4			4.6	8.3
Green Ext Time (p_c), s	12.7			0.3	11.4

Intersection Summary	
HCM 6th Ctrl Delay	3.2
HCM 6th LOS	A

Notes

User approved ignoring U-Turning movement.

Unsignalized Delay for [EBR, SBR] is excluded from calculations of the approach delay and intersection delay.

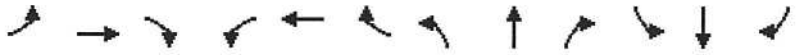
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	592	34	1228	329	0	910
Future Volume (veh/h)	592	34	1228	329	0	910
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1870	1870	1841	1870	0	1870
Adj Flow Rate, veh/h	604	0	1253	0	0	929
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	4	2	0	2
Cap, veh/h	818		2460		0	2499
Arrive On Green	0.24	0.00	0.70	0.00	0.00	0.70
Sat Flow, veh/h	3456	1585	3589	1585	0	3741
Grp Volume(v), veh/h	604	0	1253	0	0	929
Grp Sat Flow(s),veh/h/ln	1728	1585	1749	1585	0	1777
Q Serve(g_s), s	24.3	0.0	24.8	0.0	0.0	15.8
Cycle Q Clear(g_c), s	24.3	0.0	24.8	0.0	0.0	15.8
Prop In Lane	1.00	1.00		1.00	0.00	
Lane Grp Cap(c), veh/h	818		2460		0	2499
V/C Ratio(X)	0.74		0.51		0.00	0.37
Avail Cap(c_a), veh/h	818		2460		0	2499
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	53.0	0.0	10.3	0.0	0.0	8.9
Incr Delay (d2), s/veh	5.9	0.0	0.8	0.0	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.3	0.0	9.3	0.0	0.0	6.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	58.9	0.0	11.0	0.0	0.0	9.4
LnGrp LOS	E		B		A	A
Approach Vol, veh/h	604	A	1253	A		929
Approach Delay, s/veh	58.9		11.0			9.4
Approach LOS	E		B			A

Timer - Assigned Phs	2			6	8
Phs Duration (G+Y+Rc), s	110.0			110.0	40.0
Change Period (Y+Rc), s	4.5			4.5	4.5
Max Green Setting (Gmax), s	105.5			105.5	35.5
Max Q Clear Time (g_c+I1), s	26.8			17.8	26.3
Green Ext Time (p_c), s	13.2			8.1	1.7

Intersection Summary	
HCM 6th Ctrl Delay	20.9
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	1	274	2	59	2	1090	168	26	632	1
Future Volume (veh/h)	0	0	1	274	2	59	2	1090	168	26	632	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1841	1870	1856	1870	1841	1841	1870	1870	1870
Adj Flow Rate, veh/h	0	0	0	289	0	6	2	1147	171	27	665	1
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
Percent Heavy Veh, %	2	2	2	4	2	3	2	4	4	2	2	2
Cap, veh/h	0	2	0	401	0	180	5	2135	317	49	2637	4
Arrive On Green	0.00	0.00	0.00	0.11	0.00	0.11	0.00	0.70	0.70	0.03	0.72	0.72
Sat Flow, veh/h	0	1870	0	3506	0	1572	1781	3054	454	1781	3641	5
Grp Volume(v), veh/h	0	0	0	289	0	6	2	655	663	27	325	341
Grp Sat Flow(s),veh/h/ln	0	1870	0	1753	0	1572	1781	1749	1759	1781	1777	1869
Q Serve(g_s), s	0.0	0.0	0.0	6.8	0.0	0.3	0.1	15.3	15.5	1.3	5.2	5.2
Cycle Q Clear(g_c), s	0.0	0.0	0.0	6.8	0.0	0.3	0.1	15.3	15.5	1.3	5.2	5.2
Prop In Lane	0.00		0.00	1.00		1.00	1.00		0.26	1.00		0.00
Lane Grp Cap(c), veh/h	0	2	0	401	0	180	5	1223	1230	49	1287	1354
V/C Ratio(X)	0.00	0.00	0.00	0.72	0.00	0.03	0.41	0.54	0.54	0.55	0.25	0.25
Avail Cap(c_a), veh/h	0	143	0	1133	0	508	387	1223	1230	387	1287	1354
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	36.4	0.0	33.5	42.4	6.2	6.2	40.8	4.0	4.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.5	0.0	0.1	48.1	1.7	1.7	9.1	0.5	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	3.0	0.0	0.1	0.1	4.8	4.8	0.7	1.5	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	0.0	38.8	0.0	33.6	90.4	7.8	7.9	49.9	4.4	4.4
LnGrp LOS	A	A	A	D	A	C	F	A	A	D	A	A
Approach Vol, veh/h		0			295			1320			693	
Approach Delay, s/veh		0.0			38.7			8.0			6.2	
Approach LOS					D			A			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.9	64.0		0.0	4.7	66.1		14.2
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	18.5	59.5		6.5	18.5	59.5		27.5
Max Q Clear Time (g_c+I1), s	13.3	17.5		0.0	2.1	7.2		8.8
Green Ext Time (p_c), s	0.0	12.1		0.0	0.0	4.5		1.0

Intersection Summary	
HCM 6th Ctrl Delay	11.4
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (veh/h)	8	2	3	1	364	8	159	18	1043	94	42	300	24
Future Volume (veh/h)	8	2	3	1	364	8	159	18	1043	94	42	300	24
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No				No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870		1870	1870	1870	1870	1841	1811	1841	1841	1870
Adj Flow Rate, veh/h	9	2	0		428	9	12	21	1227	0	49	353	14
Peak Hour Factor	0.85	0.85	0.85		0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2		2	2	2	2	4	6	4	4	2
Cap, veh/h	24	25	21		543	294	249	640	2057		313	1114	959
Arrive On Green	0.01	0.01	0.00		0.16	0.16	0.16	0.02	0.59	0.00	0.04	0.60	0.60
Sat Flow, veh/h	1781	1870	1585		3456	1870	1585	1781	3497	1535	1753	1841	1585
Grp Volume(v), veh/h	9	2	0		428	9	12	21	1227	0	49	353	14
Grp Sat Flow(s),veh/h/ln	1781	1870	1585		1728	1870	1585	1781	1749	1535	1753	1841	1585
Q Serve(g_s), s	0.4	0.1	0.0		10.6	0.4	0.6	0.4	19.9	0.0	1.0	8.4	0.3
Cycle Q Clear(g_c), s	0.4	0.1	0.0		10.6	0.4	0.6	0.4	19.9	0.0	1.0	8.4	0.3
Prop In Lane	1.00		1.00		1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	24	25	21		543	294	249	640	2057		313	1114	959
V/C Ratio(X)	0.38	0.08	0.00		0.79	0.03	0.05	0.03	0.60		0.16	0.32	0.01
Avail Cap(c_a), veh/h	449	472	400		987	534	453	929	2057		568	1114	959
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00		1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.7	43.5	0.0		36.2	31.8	31.9	7.1	11.7	0.0	8.8	8.6	7.0
Incr Delay (d2), s/veh	9.6	1.3	0.0		2.6	0.0	0.1	0.0	1.3	0.0	0.2	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.1	0.0		4.6	0.2	0.2	0.1	7.1	0.0	0.3	2.9	0.1
Unsig. Movement Delay, s/veh													
LnGrp Delay(d),s/veh	53.2	44.8	0.0		38.8	31.9	32.0	7.1	12.9	0.0	9.1	9.4	7.1
LnGrp LOS	D	D	A		D	C	C	A	B		A	A	A
Approach Vol, veh/h		11				449			1248	A		416	
Approach Delay, s/veh		51.7				38.4			12.8			9.3	
Approach LOS		D				D			B			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.0	57.0		5.7	6.5	58.5		18.5
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	16.5	52.5		22.5	16.5	52.5		25.5
Max Q Clear Time (g_c+I1), s	13.0	21.9		2.4	2.4	10.4		12.6
Green Ext Time (p_c), s	0.1	10.8		0.0	0.0	2.1		1.4

Intersection Summary	
HCM 6th Ctrl Delay	17.7
HCM 6th LOS	B

Notes

User approved ignoring U-Turning movement.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↑	↱		↕	
Traffic Vol, veh/h	0	0	0	7	0	7	0	1193	42	21	345	0
Future Vol, veh/h	0	0	0	7	0	7	0	1193	42	21	345	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	350	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	14	2	2	2	3	4	4	4	2
Mvmt Flow	0	0	0	8	0	8	0	1437	51	25	416	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1933	1954	416	1903	1903	1437	416	0	0	1488	0	0
Stage 1	466	466	-	1437	1437	-	-	-	-	-	-	-
Stage 2	1467	1488	-	466	466	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.24	6.52	6.22	4.12	-	-	4.14	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.24	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.24	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.626	4.018	3.318	2.218	-	-	2.236	-	-
Pot Cap-1 Maneuver	50	64	637	49	69	163	1143	-	-	446	-	-
Stage 1	577	562	-	156	199	-	-	-	-	-	-	-
Stage 2	159	188	-	555	562	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	45	59	637	46	64	163	1143	-	-	446	-	-
Mov Cap-2 Maneuver	45	59	-	46	64	-	-	-	-	-	-	-
Stage 1	577	521	-	156	199	-	-	-	-	-	-	-
Stage 2	151	188	-	514	521	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	69.7	0	0.8
HCM LOS	A	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1143	-	-	-	72	446	-	-
HCM Lane V/C Ratio	-	-	-	-	0.234	0.057	-	-
HCM Control Delay (s)	0	-	-	0	69.7	13.6	0	-
HCM Lane LOS	A	-	-	A	F	B	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0.8	0.2	-	-

HCM 6th Signalized Intersection Summary
1: Kunia Rd & H1 EB Ramps

11/08/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	358	0	304	0	0	0	0	752	1738	2	510	3266
Future Volume (veh/h)	358	0	304	0	0	0	0	752	1738	2	510	3266
Initial Q (Qb), veh	0	0	0				0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00		1.00	
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Work Zone On Approach		No						No				No
Adj Sat Flow, veh/h/ln	1870	0	1870				0	1870	1870		1870	1870
Adj Flow Rate, veh/h	362	0	0				0	760	0		515	3299
Peak Hour Factor	0.99	0.99	0.99				0.99	0.99	0.99		0.99	0.99
Percent Heavy Veh, %	2	0	2				0	2	2		2	2
Cap, veh/h	422	0					0	2226			585	4203
Arrive On Green	0.12	0.00	0.00				0.00	0.63	0.00		0.17	0.82
Sat Flow, veh/h	3456	0	1585				0	3647	2790		3456	5274
Grp Volume(v), veh/h	362	0	0				0	760	0		515	3299
Grp Sat Flow(s),veh/h/ln	1728	0	1585				0	1777	1395		1728	1702
Q Serve(g_s), s	16.9	0.0	0.0				0.0	16.7	0.0		23.9	53.1
Cycle Q Clear(g_c), s	16.9	0.0	0.0				0.0	16.7	0.0		23.9	53.1
Prop In Lane	1.00		1.00				0.00		1.00		1.00	
Lane Grp Cap(c), veh/h	422	0					0	2226			585	4203
V/C Ratio(X)	0.86	0.00					0.00	0.34			0.88	0.78
Avail Cap(c_a), veh/h	745	0					0	2226			1375	4203
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	0.00		1.00	1.00
Uniform Delay (d), s/veh	70.8	0.0	0.0				0.0	14.6	0.0		66.7	7.3
Incr Delay (d2), s/veh	5.1	0.0	0.0				0.0	0.4	0.0		4.5	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	7.9	0.0	0.0				0.0	6.9	0.0		10.9	16.0
Unsig. Movement Delay, s/veh			0.00									
LnGrp Delay(d),s/veh	76.0	0.0	0.0				0.0	15.0	0.0		71.2	8.8
LnGrp LOS	E	A	A				A	B			E	A
Approach Vol, veh/h		640	A					760	A			3814
Approach Delay, s/veh		43.0						15.0				17.2
Approach LOS		D						B				B

Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	32.4	107.6		24.6		140.0						
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5						
Max Green Setting (Gmax), s	65.5	65.5		35.5		135.5						
Max Q Clear Time (g_c+I1), s	25.9	18.7		18.9		55.1						
Green Ext Time (p_c), s	1.9	6.1		1.2		71.5						

Intersection Summary	
HCM 6th Ctrl Delay	20.1
HCM 6th LOS	C

Notes

User approved ignoring U-Turning movement.

Unsignalized Delay for [EBR] is included in calculations of the approach delay and intersection delay.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	0
Future Volume (veh/h)	0
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	0
Adj Flow Rate, veh/h	0
Peak Hour Factor	0.99
Percent Heavy Veh, %	0
Cap, veh/h	0
Arrive On Green	0.00
Sat Flow, veh/h	0
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	0
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	0.00
Lane Grp Cap(c), veh/h	0
V/C Ratio(X)	0.00
Avail Cap(c_a), veh/h	0
HCM Platoon Ratio	1.00
Upstream Filter(I)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	A
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Movement	EBL	EBR	NBU	NBL	NBT	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	0	0	1	301	807	1304	670
Future Volume (veh/h)	0	0	1	301	807	1304	670
Initial Q (Qb), veh				0	0	0	0
Ped-Bike Adj(A_pbT)				1.00			1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00
Work Zone On Approach					No	No	
Adj Sat Flow, veh/h/ln				1870	1870	1870	1870
Adj Flow Rate, veh/h				304	815	1317	0
Peak Hour Factor				0.99	0.99	0.99	0.99
Percent Heavy Veh, %				2	2	2	2
Cap, veh/h				388	3199	2070	
Arrive On Green				0.22	0.90	0.58	0.00
Sat Flow, veh/h				1781	3647	3741	0
Grp Volume(v), veh/h				304	815	1317	0
Grp Sat Flow(s),veh/h/ln				1781	1777	1777	0
Q Serve(g_s), s				7.3	1.3	11.1	0.0
Cycle Q Clear(g_c), s				7.3	1.3	11.1	0.0
Prop In Lane				1.00			0.00
Lane Grp Cap(c), veh/h				388	3199	2070	
V/C Ratio(X)				0.78	0.25	0.64	
Avail Cap(c_a), veh/h				1007	6733	4370	
HCM Platoon Ratio				1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				16.6	0.3	6.2	0.0
Incr Delay (d2), s/veh				3.5	0.0	0.3	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				2.8	0.0	2.3	0.0
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh				20.1	0.3	6.6	0.0
LnGrp LOS				C	A	A	
Approach Vol, veh/h					1119	1317	A
Approach Delay, s/veh					5.7	6.6	
Approach LOS					A	A	

Timer - Assigned Phs	2		5	6
Phs Duration (G+Y+Rc), s	45.1		14.3	30.8
Change Period (Y+Rc), s	4.5		4.5	4.5
Max Green Setting (Gmax), s	85.5		25.5	55.5
Max Q Clear Time (g_c+I1), s	3.3		9.3	13.1
Green Ext Time (p_c), s	6.8		0.8	13.2

Intersection Summary	
HCM 6th Ctrl Delay	6.2
HCM 6th LOS	A

Notes

User approved ignoring U-Turning movement.

Unsignalized Delay for [EBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	380	13	1014	805	0	1601
Future Volume (veh/h)	380	13	1014	805	0	1601
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	0	1870
Adj Flow Rate, veh/h	396	0	1056	0	0	1668
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	0	2
Cap, veh/h	818		2499		0	2499
Arrive On Green	0.24	0.00	0.70	0.00	0.00	0.70
Sat Flow, veh/h	3456	1585	3647	1585	0	3741
Grp Volume(v), veh/h	396	0	1056	0	0	1668
Grp Sat Flow(s),veh/h/ln	1728	1585	1777	1585	0	1777
Q Serve(g_s), s	14.8	0.0	18.8	0.0	0.0	39.4
Cycle Q Clear(g_c), s	14.8	0.0	18.8	0.0	0.0	39.4
Prop In Lane	1.00	1.00		1.00	0.00	
Lane Grp Cap(c), veh/h	818		2499		0	2499
V/C Ratio(X)	0.48		0.42		0.00	0.67
Avail Cap(c_a), veh/h	818		2499		0	2499
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	49.4	0.0	9.4	0.0	0.0	12.4
Incr Delay (d2), s/veh	2.0	0.0	0.5	0.0	0.0	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.7	0.0	7.1	0.0	0.0	15.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	51.4	0.0	9.9	0.0	0.0	13.9
LnGrp LOS	D		A		A	B
Approach Vol, veh/h	396	A	1056	A		1668
Approach Delay, s/veh	51.4		9.9			13.9
Approach LOS	D		A			B

Timer - Assigned Phs	2			6	8
Phs Duration (G+Y+Rc), s	110.0			110.0	40.0
Change Period (Y+Rc), s	4.5			4.5	4.5
Max Green Setting (Gmax), s	105.5			105.5	35.5
Max Q Clear Time (g_c+I1), s	20.8			41.4	16.8
Green Ext Time (p_c), s	9.9			22.3	1.4

Intersection Summary	
HCM 6th Ctrl Delay	17.3
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1	7	418	0	33	1	644	400	64	1188	1
Future Volume (veh/h)	0	1	7	418	0	33	1	644	400	64	1188	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	1	0	431	0	5	1	664	353	66	1225	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	0	3	0	541	0	241	2	1374	730	86	2405	2
Arrive On Green	0.00	0.00	0.00	0.15	0.00	0.15	0.00	0.61	0.61	0.05	0.66	0.66
Sat Flow, veh/h	0	1870	0	3563	0	1585	1781	2241	1191	1781	3644	3
Grp Volume(v), veh/h	0	1	0	431	0	5	1	526	491	66	597	629
Grp Sat Flow(s),veh/h/ln	0	1870	0	1781	0	1585	1781	1777	1656	1781	1777	1870
Q Serve(g_s), s	0.0	0.1	0.0	11.3	0.0	0.3	0.1	15.8	15.8	3.6	16.7	16.7
Cycle Q Clear(g_c), s	0.0	0.1	0.0	11.3	0.0	0.3	0.1	15.8	15.8	3.6	16.7	16.7
Prop In Lane	0.00		0.00	1.00		1.00	1.00		0.72	1.00		0.00
Lane Grp Cap(c), veh/h	0	3	0	541	0	241	2	1089	1015	86	1173	1234
V/C Ratio(X)	0.00	0.39	0.00	0.80	0.00	0.02	0.41	0.48	0.48	0.77	0.51	0.51
Avail Cap(c_a), veh/h	0	125	0	1009	0	449	340	1089	1015	340	1173	1234
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	48.4	0.0	39.7	0.0	35.0	48.4	10.3	10.3	45.6	8.4	8.4
Incr Delay (d2), s/veh	0.0	76.0	0.0	2.7	0.0	0.0	84.0	1.5	1.6	13.2	1.6	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.1	0.0	5.2	0.0	0.1	0.1	5.9	5.6	1.9	6.0	6.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	124.4	0.0	42.5	0.0	35.1	132.4	11.9	12.0	58.8	10.0	10.0
LnGrp LOS	A	F	A	D	A	D	F	B	B	E	B	A
Approach Vol, veh/h		1			436			1018			1292	
Approach Delay, s/veh		124.4			42.4			12.0			12.5	
Approach LOS		F			D			B			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.2	64.0		4.6	4.6	68.6		19.2
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	18.5	59.5		6.5	18.5	59.5		27.5
Max Q Clear Time (g_c+I1), s	5.6	17.8		2.1	2.1	18.7		13.3
Green Ext Time (p_c), s	0.1	8.3		0.0	0.0	10.4		1.4

Intersection Summary	
HCM 6th Ctrl Delay	17.1
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (veh/h)	2	3	15	191	2	48	1	2	305	359	130	1041	2
Future Volume (veh/h)	2	3	15	191	2	48	1	2	305	359	130	1041	2
Initial Q (Qb), veh	0	0	0	0	0	0		0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00		1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No				No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870		1870	1856	1870	1870	1870	1870
Adj Flow Rate, veh/h	2	3	0	201	2	4		2	321	0	137	1096	1
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
Percent Heavy Veh, %	2	2	2	2	2	2		2	3	2	2	2	2
Cap, veh/h	12	12	10	302	164	139		216	2227		819	1284	1088
Arrive On Green	0.01	0.01	0.00	0.09	0.09	0.09		0.00	0.63	0.00	0.06	0.69	0.69
Sat Flow, veh/h	1781	1870	1585	3456	1870	1585		1781	3526	1585	1781	1870	1585
Grp Volume(v), veh/h	2	3	0	201	2	4		2	321	0	137	1096	1
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1728	1870	1585		1781	1763	1585	1781	1870	1585
Q Serve(g_s), s	0.1	0.1	0.0	4.7	0.1	0.2		0.0	3.1	0.0	2.0	36.9	0.0
Cycle Q Clear(g_c), s	0.1	0.1	0.0	4.7	0.1	0.2		0.0	3.1	0.0	2.0	36.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00		1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	12	12	10	302	164	139		216	2227		819	1284	1088
V/C Ratio(X)	0.17	0.24	0.00	0.67	0.01	0.03		0.01	0.14		0.17	0.85	0.00
Avail Cap(c_a), veh/h	482	506	429	1060	574	486		565	2227		1070	1284	1088
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00		1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.1	41.1	0.0	36.7	34.6	34.7		11.9	6.2	0.0	3.9	9.9	4.1
Incr Delay (d2), s/veh	6.8	10.0	0.0	2.5	0.0	0.1		0.0	0.1	0.0	0.1	7.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.1	0.0	2.1	0.0	0.1		0.0	1.0	0.0	0.5	12.4	0.0
Unsig. Movement Delay, s/veh													
LnGrp Delay(d),s/veh	47.8	51.0	0.0	39.3	34.7	34.8		11.9	6.3	0.0	4.0	17.2	4.1
LnGrp LOS	D	D	A	D	C	C		B	A		A	B	A
Approach Vol, veh/h		5			207				323	A		1234	
Approach Delay, s/veh		49.7			39.1				6.4			15.7	
Approach LOS		D			D				A			B	

Timer - Assigned Phs	1	2		4	5	6		8					
Phs Duration (G+Y+Rc), s	9.3	57.0		5.0	4.7	61.6		11.8					
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5					
Max Green Setting (Gmax), s	6.5	52.5		22.5	16.5	52.5		25.5					
Max Q Clear Time (g_c+I1), s	4.0	5.1		2.1	2.0	38.9		6.7					
Green Ext Time (p_c), s	0.2	2.2		0.0	0.0	6.9		0.6					

Intersection Summary	
HCM 6th Ctrl Delay	16.8
HCM 6th LOS	B

Notes

User approved ignoring U-Turning movement.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↰	↱		↕	
Traffic Vol, veh/h	0	0	0	23	0	10	1	343	7	4	1161	0
Future Vol, veh/h	0	0	0	23	0	10	1	343	7	4	1161	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	350	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	20	2	3	42	25	2	2
Mvmt Flow	0	0	0	24	0	10	1	354	7	4	1197	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1570	1568	1197	1561	1561	354	1197	0	0	361	0	0
Stage 1	1205	1205	-	356	356	-	-	-	-	-	-	-
Stage 2	365	363	-	1205	1205	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.4	4.12	-	-	4.35	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.48	2.218	-	-	2.425	-	-
Pot Cap-1 Maneuver	90	111	226	91	112	651	583	-	-	1081	-	-
Stage 1	225	257	-	661	629	-	-	-	-	-	-	-
Stage 2	654	625	-	225	257	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	88	110	226	90	111	651	583	-	-	1081	-	-
Mov Cap-2 Maneuver	88	110	-	90	111	-	-	-	-	-	-	-
Stage 1	225	254	-	660	628	-	-	-	-	-	-	-
Stage 2	642	624	-	223	254	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	45.5	0	0
HCM LOS	A	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	583	-	-	-	122	1081	-	-
HCM Lane V/C Ratio	0.002	-	-	-	0.279	0.004	-	-
HCM Control Delay (s)	11.2	0	-	0	45.5	8.3	0	-
HCM Lane LOS	B	A	-	A	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	1.1	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	603	0	290	0	0	0	0	843	2640	658	1930	0
Future Volume (veh/h)	603	0	290	0	0	0	0	843	2640	658	1930	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1796	0	1796				0	1856	1870	1870	1870	0
Adj Flow Rate, veh/h	635	0	0				0	887	1726	693	2032	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	7	0	7				0	3	2	2	2	0
Cap, veh/h	655	0					0	1786	1413	765	3844	0
Arrive On Green	0.20	0.00	0.00				0.00	0.51	0.51	0.22	0.75	0.00
Sat Flow, veh/h	3319	0	1522				0	3618	2790	3456	5274	0
Grp Volume(v), veh/h	635	0	0				0	887	1726	693	2032	0
Grp Sat Flow(s),veh/h/ln	1659	0	1522				0	1763	1395	1728	1702	0
Q Serve(g_s), s	34.2	0.0	0.0				0.0	29.9	91.2	35.2	29.4	0.0
Cycle Q Clear(g_c), s	34.2	0.0	0.0				0.0	29.9	91.2	35.2	29.4	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	655	0					0	1786	1413	765	3844	0
V/C Ratio(X)	0.97	0.00					0.00	0.50	1.22	0.91	0.53	0.00
Avail Cap(c_a), veh/h	655	0					0	1786	1413	1257	3844	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	71.7	0.0	0.0				0.0	29.3	44.4	68.3	9.1	0.0
Incr Delay (d2), s/veh	27.8	0.0	0.0				0.0	1.0	106.3	5.9	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.2	0.0	0.0				0.0	13.0	51.7	16.2	10.6	0.0
Unsig. Movement Delay, s/veh			0.00									
LnGrp Delay(d),s/veh	99.5	0.0	0.0				0.0	30.3	150.7	74.2	9.7	0.0
LnGrp LOS	F	A	A				A	C	F	E	A	A
Approach Vol, veh/h		911	A					2613			2725	
Approach Delay, s/veh		69.4						109.8			26.1	
Approach LOS		E						F			C	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	44.3	95.7		40.0		140.0
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5
Max Green Setting (Gmax), s	65.5	65.5		35.5		135.5
Max Q Clear Time (g_c+I1), s	37.2	93.2		36.2		31.4
Green Ext Time (p_c), s	2.7	0.0		0.0		34.1

Intersection Summary	
HCM 6th Ctrl Delay	67.4
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Unsignalized Delay for [EBR] is included in calculations of the approach delay and intersection delay.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	1450	140	1236	1158	400
Future Volume (veh/h)	0	1450	140	1236	1158	400
Initial Q (Qb), veh			0	0	0	0
Ped-Bike Adj(A_pbT)			1.00			1.00
Parking Bus, Adj			1.00	1.00	1.00	1.00
Work Zone On Approach				No	No	
Adj Sat Flow, veh/h/ln			1811	1841	1870	1870
Adj Flow Rate, veh/h			147	1301	1219	0
Peak Hour Factor			0.95	0.95	0.95	0.95
Percent Heavy Veh, %			6	4	2	2
Cap, veh/h			197	3026	2192	
Arrive On Green			0.11	0.87	0.62	0.00
Sat Flow, veh/h			1725	3589	3741	0
Grp Volume(v), veh/h			147	1301	1219	0
Grp Sat Flow(s),veh/h/ln			1725	1749	1777	0
Q Serve(g_s), s			2.8	2.7	6.7	0.0
Cycle Q Clear(g_c), s			2.8	2.7	6.7	0.0
Prop In Lane			1.00			0.00
Lane Grp Cap(c), veh/h			197	3026	2192	
V/C Ratio(X)			0.75	0.43	0.56	
Avail Cap(c_a), veh/h			1316	8947	5901	
HCM Platoon Ratio			1.00	1.00	1.00	1.00
Upstream Filter(I)			1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh			14.3	0.5	3.7	0.0
Incr Delay (d2), s/veh			5.6	0.1	0.2	0.0
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln			1.1	0.0	0.5	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh			19.9	0.6	4.0	0.0
LnGrp LOS			B	A	A	
Approach Vol, veh/h				1448	1219	A
Approach Delay, s/veh				2.5	4.0	
Approach LOS				A	A	

Timer - Assigned Phs	2			5	6
Phs Duration (G+Y+Rc), s	33.4			8.3	25.1
Change Period (Y+Rc), s	4.5			4.5	4.5
Max Green Setting (Gmax), s	85.5			25.5	55.5
Max Q Clear Time (g_c+I1), s	4.7			4.8	8.7
Green Ext Time (p_c), s	14.2			0.4	11.9

Intersection Summary	
HCM 6th Ctrl Delay	3.2
HCM 6th LOS	A

Notes

User approved ignoring U-Turning movement.

Unsignalized Delay for [EBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	610	40	1389	340	0	938
Future Volume (veh/h)	610	40	1389	340	0	938
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1870	1870	1841	1870	0	1870
Adj Flow Rate, veh/h	622	0	1417	0	0	957
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	4	2	0	2
Cap, veh/h	818		2460		0	2499
Arrive On Green	0.24	0.00	0.70	0.00	0.00	0.70
Sat Flow, veh/h	3456	1585	3589	1585	0	3741
Grp Volume(v), veh/h	622	0	1417	0	0	957
Grp Sat Flow(s),veh/h/ln	1728	1585	1749	1585	0	1777
Q Serve(g_s), s	25.1	0.0	30.3	0.0	0.0	16.4
Cycle Q Clear(g_c), s	25.1	0.0	30.3	0.0	0.0	16.4
Prop In Lane	1.00	1.00		1.00	0.00	
Lane Grp Cap(c), veh/h	818		2460		0	2499
V/C Ratio(X)	0.76		0.58		0.00	0.38
Avail Cap(c_a), veh/h	818		2460		0	2499
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	53.3	0.0	11.1	0.0	0.0	9.0
Incr Delay (d2), s/veh	6.6	0.0	1.0	0.0	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.8	0.0	11.3	0.0	0.0	6.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	59.9	0.0	12.1	0.0	0.0	9.5
LnGrp LOS	E		B		A	A
Approach Vol, veh/h	622	A	1417	A		957
Approach Delay, s/veh	59.9		12.1			9.5
Approach LOS	E		B			A

Timer - Assigned Phs	2			6	8
Phs Duration (G+Y+Rc), s	110.0			110.0	40.0
Change Period (Y+Rc), s	4.5			4.5	4.5
Max Green Setting (Gmax), s	105.5			105.5	35.5
Max Q Clear Time (g_c+I1), s	32.3			18.4	27.1
Green Ext Time (p_c), s	16.6			8.5	1.7

Intersection Summary	
HCM 6th Ctrl Delay	21.2
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	10	280	10	70	10	1249	180	30	658	10
Future Volume (veh/h)	0	0	10	280	10	70	10	1249	180	30	658	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1841	1870	1856	1870	1841	1841	1870	1870	1870
Adj Flow Rate, veh/h	0	0	0	303	0	11	11	1315	183	32	693	10
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	4	2	3	2	4	4	2	2	2
Cap, veh/h	0	2	0	416	0	187	24	2139	296	55	2548	37
Arrive On Green	0.00	0.00	0.00	0.12	0.00	0.12	0.01	0.69	0.69	0.03	0.71	0.71
Sat Flow, veh/h	0	1870	0	3506	0	1572	1781	3086	427	1781	3586	52
Grp Volume(v), veh/h	0	0	0	303	0	11	11	741	757	32	343	360
Grp Sat Flow(s),veh/h/ln	0	1870	0	1753	0	1572	1781	1749	1764	1781	1777	1861
Q Serve(g_s), s	0.0	0.0	0.0	7.2	0.0	0.5	0.5	19.4	19.8	1.5	6.0	6.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	7.2	0.0	0.5	0.5	19.4	19.8	1.5	6.0	6.0
Prop In Lane	0.00		0.00	1.00		1.00	1.00		0.24	1.00		0.03
Lane Grp Cap(c), veh/h	0	2	0	416	0	187	24	1212	1222	55	1263	1322
V/C Ratio(X)	0.00	0.00	0.00	0.73	0.00	0.06	0.46	0.61	0.62	0.58	0.27	0.27
Avail Cap(c_a), veh/h	0	142	0	1123	0	504	384	1212	1222	384	1263	1322
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	36.5	0.0	33.6	42.0	7.0	7.1	41.0	4.5	4.5
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.5	0.0	0.1	13.1	2.3	2.4	9.2	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	3.2	0.0	0.2	0.3	6.2	6.4	0.8	1.8	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	0.0	38.9	0.0	33.7	55.2	9.3	9.4	50.2	5.0	5.0
LnGrp LOS	A	A	A	D	A	C	E	A	A	D	A	A
Approach Vol, veh/h		0			314			1509			735	
Approach Delay, s/veh		0.0			38.8			9.7			6.9	
Approach LOS					D			A			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.2	64.0		0.0	5.7	65.5		14.7
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	18.5	59.5		6.5	18.5	59.5		27.5
Max Q Clear Time (g_c+I1), s	13.5	21.8		0.0	2.5	8.0		9.2
Green Ext Time (p_c), s	0.0	14.6		0.0	0.0	4.8		1.0

Intersection Summary	
HCM 6th Ctrl Delay	12.5
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (veh/h)	10	10	10	10	380	10	170	20	1199	100	50	318	30
Future Volume (veh/h)	10	10	10	10	380	10	170	20	1199	100	50	318	30
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No				No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870		1870	1870	1870	1870	1841	1811	1841	1841	1870
Adj Flow Rate, veh/h	12	12	1		447	12	42	24	1411	0	59	374	35
Peak Hour Factor	0.85	0.85	0.85		0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2		2	2	2	2	4	6	4	4	2
Cap, veh/h	46	48	41		563	305	258	597	2003		259	1086	935
Arrive On Green	0.03	0.03	0.03		0.16	0.16	0.16	0.02	0.57	0.00	0.04	0.59	0.59
Sat Flow, veh/h	1781	1870	1585		3456	1870	1585	1781	3497	1535	1753	1841	1585
Grp Volume(v), veh/h	12	12	1		447	12	42	24	1411	0	59	374	35
Grp Sat Flow(s),veh/h/ln	1781	1870	1585		1728	1870	1585	1781	1749	1535	1753	1841	1585
Q Serve(g_s), s	0.6	0.6	0.1		11.4	0.5	2.1	0.5	26.5	0.0	1.2	9.6	0.8
Cycle Q Clear(g_c), s	0.6	0.6	0.1		11.4	0.5	2.1	0.5	26.5	0.0	1.2	9.6	0.8
Prop In Lane	1.00		1.00		1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	46	48	41		563	305	258	597	2003		259	1086	935
V/C Ratio(X)	0.26	0.25	0.02		0.79	0.04	0.16	0.04	0.70		0.23	0.34	0.04
Avail Cap(c_a), veh/h	437	459	389		961	520	441	873	2003		500	1086	935
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.8	43.8	43.5		36.9	32.3	33.0	7.9	14.0	0.0	11.6	9.7	7.9
Incr Delay (d2), s/veh	3.0	2.7	0.2		2.6	0.1	0.3	0.0	2.1	0.0	0.4	0.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.3	0.0		5.0	0.2	0.8	0.2	9.8	0.0	0.4	3.5	0.3
Unsig. Movement Delay, s/veh													
LnGrp Delay(d),s/veh	46.8	46.5	43.8		39.5	32.4	33.3	7.9	16.1	0.0	12.0	10.5	8.0
LnGrp LOS	D	D	D		D	C	C	A	B		B	B	A
Approach Vol, veh/h		25				501			1435	A		468	
Approach Delay, s/veh		46.5				38.8			16.0			10.5	
Approach LOS		D				D			B			B	

Timer - Assigned Phs	1	2		4	5	6		8					
Phs Duration (G+Y+Rc), s	8.4	57.0		6.9	6.8	58.6		19.4					
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5					
Max Green Setting (Gmax), s	16.5	52.5		22.5	16.5	52.5		25.5					
Max Q Clear Time (g_c+I1), s	13.2	28.5		2.6	2.5	11.6		13.4					
Green Ext Time (p_c), s	0.1	11.7		0.0	0.0	2.3		1.5					

Intersection Summary	
HCM 6th Ctrl Delay	20.0
HCM 6th LOS	B

Notes

User approved ignoring U-Turning movement.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↰	↱		↕	
Traffic Vol, veh/h	0	0	0	15	0	7	0	1220	171	51	360	0
Future Vol, veh/h	0	0	0	15	0	7	0	1220	171	51	360	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	350	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	14	2	2	2	3	4	4	4	2
Mvmt Flow	0	0	0	18	0	8	0	1470	206	61	434	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2133	2232	434	2026	2026	1470	434	0	0	1676	0	0
Stage 1	556	556	-	1470	1470	-	-	-	-	-	-	-
Stage 2	1577	1676	-	556	556	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.24	6.52	6.22	4.12	-	-	4.14	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.24	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.24	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.626	4.018	3.318	2.218	-	-	2.236	-	-
Pot Cap-1 Maneuver	36	43	622	40	58	156	1126	-	-	377	-	-
Stage 1	515	513	-	149	191	-	-	-	-	-	-	-
Stage 2	137	152	-	495	513	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	28	34	622	33	46	156	1126	-	-	377	-	-
Mov Cap-2 Maneuver	28	34	-	33	46	-	-	-	-	-	-	-
Stage 1	515	404	-	149	191	-	-	-	-	-	-	-
Stage 2	130	152	-	390	404	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	171.1	0	2
HCM LOS	A	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1126	-	-	-	44	377	-	-
HCM Lane V/C Ratio	-	-	-	-	0.602	0.163	-	-
HCM Control Delay (s)	0	-	-	0	171.1	16.4	0	-
HCM Lane LOS	A	-	-	A	F	C	A	-
HCM 95th %tile Q(veh)	0	-	-	-	2.2	0.6	-	-