Appendix C
Traffic Study

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Schofield Generating Station Project

FINAL

Traffic Study

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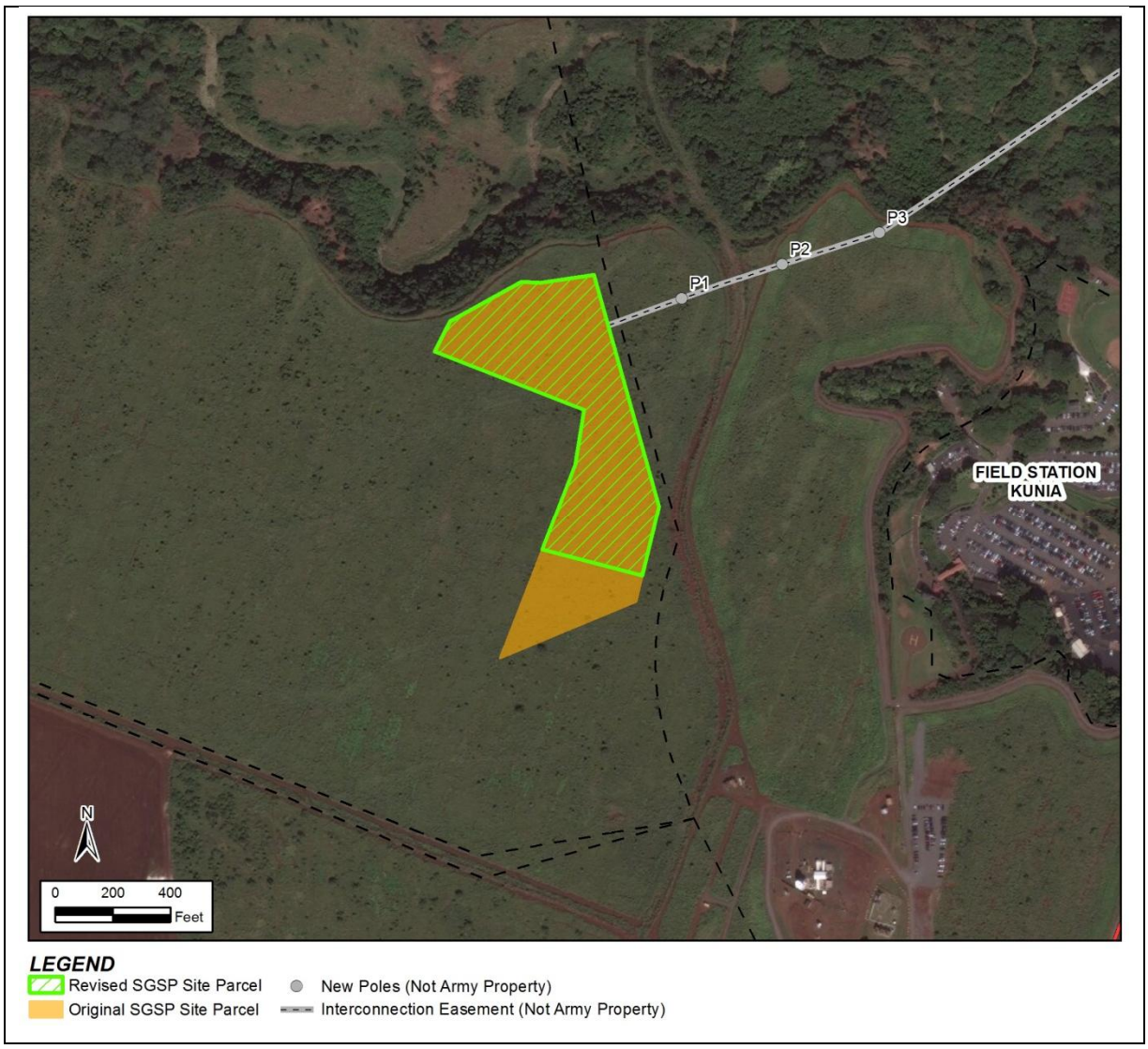
May 2014

Errata

Prepared on June 4, 2014

After completing the Traffic Study in support of the Joint Environmental Impact Statement (EIS) for the Schofield Generating Station Project, the Army and Hawaiian Electric reduced the size of the parcel on which the generating station will be located from 10.31 acres to 8.13 acres. The map below shows the reduced parcel indicated by hatch marks. Please note that the maps and discussions within the report are based on the larger 10.31 parcel, and therefore do not match the parcel size discussed in the EIS. The reduction in parcel size does not necessitate the revision of Traffic Study because it does not materially change the findings of this report.



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EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers is preparing an Environmental Impact Statement for the Schofield Generating Station Project (SGSP) at Schofield Barracks (SB), Hawaii. The purpose of the proposed action is to establish a stable, renewable source of power that provides energy security for SB, Wheeler Army Airfield (WAAF), and Field Station Kunia on the island of Oahu, Hawaii.

This study presents the results of the traffic impact analysis for the proposed biodiesel plant establishment. The focus of the study is the peak hour traffic impacts resulting from the construction and operation of the biodiesel facility.

Today Kunia Road traffic near SB experiences delays and congestion during peak hours. Grow The Army (GTA) Phase 1 is under construction and will be completed and fully occupied by 2017. Traffic on Kunia Road and Lyman Road will continue experiencing delays because future traffic growth will increase demand on the study area intersections.

The traffic volumes that will be generated by the construction and operation of the SGSP project on the roadway network are minimal. Comparing with the future No-Build scenario, the increase on average vehicle delays from construction traffic is less than 4 seconds per vehicle, and the effects from SGSP operations are negligible.

1. INTRODUCTION

This traffic study analyzes the effects of building and operating a power generating station on 10.31 acres at Schofield Barracks (SB). The Schofield generating station project (SGSP) consists of a 10.31-acre parcel (generating station parcel) and a 2.5-acre linear interconnection easement. The heavily overgrown, undeveloped generating station parcel was once used for growing pineapples and is situated along the eastern boundary of the South Range Acquisition Area. It is about a third of a mile south of Lyman Road, about half a mile west of Kunia Road, and about 150 feet north of the Grow the Army (GTA) construction offices that are accessed from Hauula Street. This site is adjacent to the GTA infrastructure facilities, which are currently under construction. The long-term access route will go through Lyman Road and the access road for the GTA infrastructure facilities in SB. ***Figure 1*** presents the project site location and traffic study intersections.

Figure 1: SGSP Site and Traffic Intersections Studied

The traffic study includes eight intersections on Kunia Road and Lyman Road as shown in ***Figure 1***. Of the eight intersections, six are signal controlled and two are stop sign controlled (Flagler Road and Maili Street intersections on Lyman Road).

This study will evaluate traffic operations for 2014 (current year) and 2017 (estimated year plant will become operational). The construction traffic impact will be evaluated for 2017. It is

anticipated that the Flagler Road and Lyman Road intersection will be improved to a signalized intersection before the plant becomes operational, and the Maili Street intersection will remain a stop sign-controlled intersection.

The operations of these intersections were evaluated for a typical weekday during AM and PM peak hours for the following scenarios:

- Existing 2014 AM and PM Peak Hour Traffic Operations
- 2017 No-Build AM and PM Peak Hour Traffic Operations
- 2017 Construction AM and PM Peak Hour Traffic Operations
- 2017 Build AM and PM Peak Hour Traffic Operations

2. EXISTING CONDITIONS

2.1 Street Network

Kunia Road (SR 750)

Kunia Road is State Route (SR) 750. It has no access control, and is not part of the National Highway System. The posted speed limit on Kunia Road is 35 miles per hour. At the north end, Kunia Road is a four-lane divided north-south major highway, and becomes a two-lane undivided roadway south of the Lyman Road intersection. At the north end, Kunia Road connects to SR 99 (Kamehameha Highway) with a signalized "T" intersection. Kunia Road, SR 99, and Highway (HI) 2 are three parallel roadways connecting the Pearl City/Waipahu area to Wahiawa, SB, and Wheeler Army Airfield (WAAF).

Most intersections on Kunia Road are signalized intersections within the study area. The three major intersections are SR 99, Foote Avenue, and Lyman Road (see ***Figure 2***). The Foote Avenue intersection is one of the two major gateways for SB. The Lyman Road intersection connects to two entrances—to the east is WAAF, and to the west is SB. There are sidewalks on the east side of Kunia Road from the Lyman Road intersection to the Wilikina Drive (SR 99) intersection. On the west end, sidewalk exits are only at the north end of Kunia Road. Utility poles are on the east side of Kunia Road, south of the study area, and cross to the west side south of Lyman Road. Roadway lighting poles are on both sides of Kunia Road north of the Lyman Road intersection.

Per the State of Hawaii, the 2009 Annual Average Daily Traffic (AADT) on Kunia Road in the study area is approximately 13,700 vehicles. The estimated 2014 AADT is approximately 15,400 vehicles.

Lyman Road

Lyman Road is a two-lane east-west roadway going through the SB post. It connects Kunia Road at the entrance gates to both SB and WAAF, and it extends to the west end of the SB post. There are administrative and storage facilities at the east portion of Lyman Road. At the west portion of Lyman Road, it connects mainly to military housing. Lyman Road connects to the GTA infrastructure facilities through the Mellichamp Road extension at the west end of Lyman Road. The facilities and roadways are under construction.

The Humphreys Road intersection is the only signalized intersection on Lyman Road on the post. There are plans to add signals to the Flagler Road intersection in the near future to address the increasing traffic volumes.

The traffic volumes vary along Lyman Road. A 2009 traffic count shows the weekday average daily traffic by the gate was more than14,400 vehicles per day, and decreased to less than 2,000 vehicles per day at the west end section.

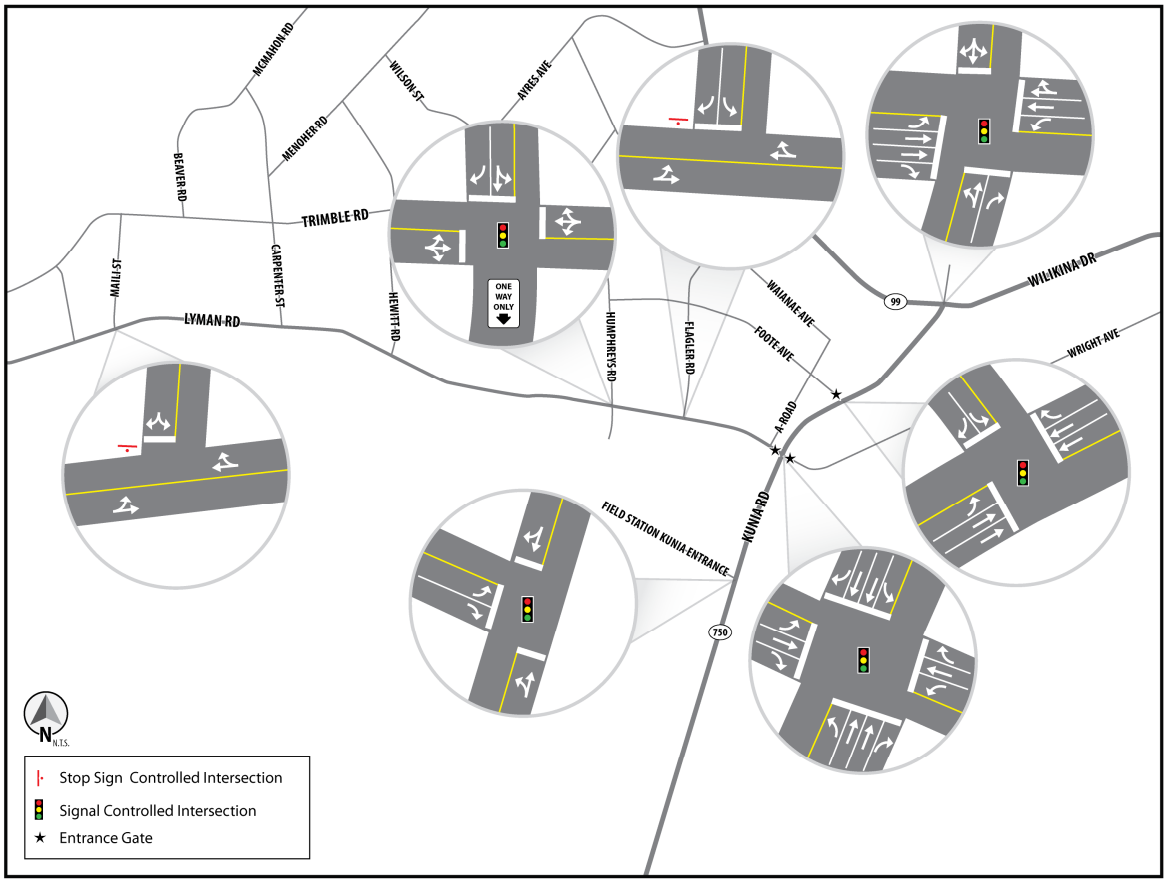


Figure 2. Existing Lane Channelization

2.2 Existing 2014 AM and PM Peak Hour Traffic Volumes

The peak hours observed on Lyman Road were 8:00 a.m.–10:00 a.m. for the morning and 4:00 p.m.–5:00 p.m. for the afternoon. The peak on Kunia Road (SR 750) is between 6:30 a.m.–8:30 a.m. and 3:30 p.m.–4:30 p.m. To capture the overall traffic peak for the study area, turn movement counts were conducted between 7:30 a.m. –9:30 a.m. and 3:30 p.m. –5:30 p.m. The turn movement volumes were then reviewed and balanced for all the study intersections to form the existing volumes.

Figure 3 shows the existing 2014 AM and PM peak hour traffic volumes and turning movement counts used as a baseline for this analysis. ***Appendix A*** provides traffic count data.

Kunia Road (SR 750) carries heavy traffic during AM and PM peak hours. The Kunia Road and Wilikina Drive (SR 99) intersection experiences long queues and delays during both AM and PM peak hours. The intersections at the Lyman Gate and Foot Avenue Gate entrances to the military installations have long cycles and delays.

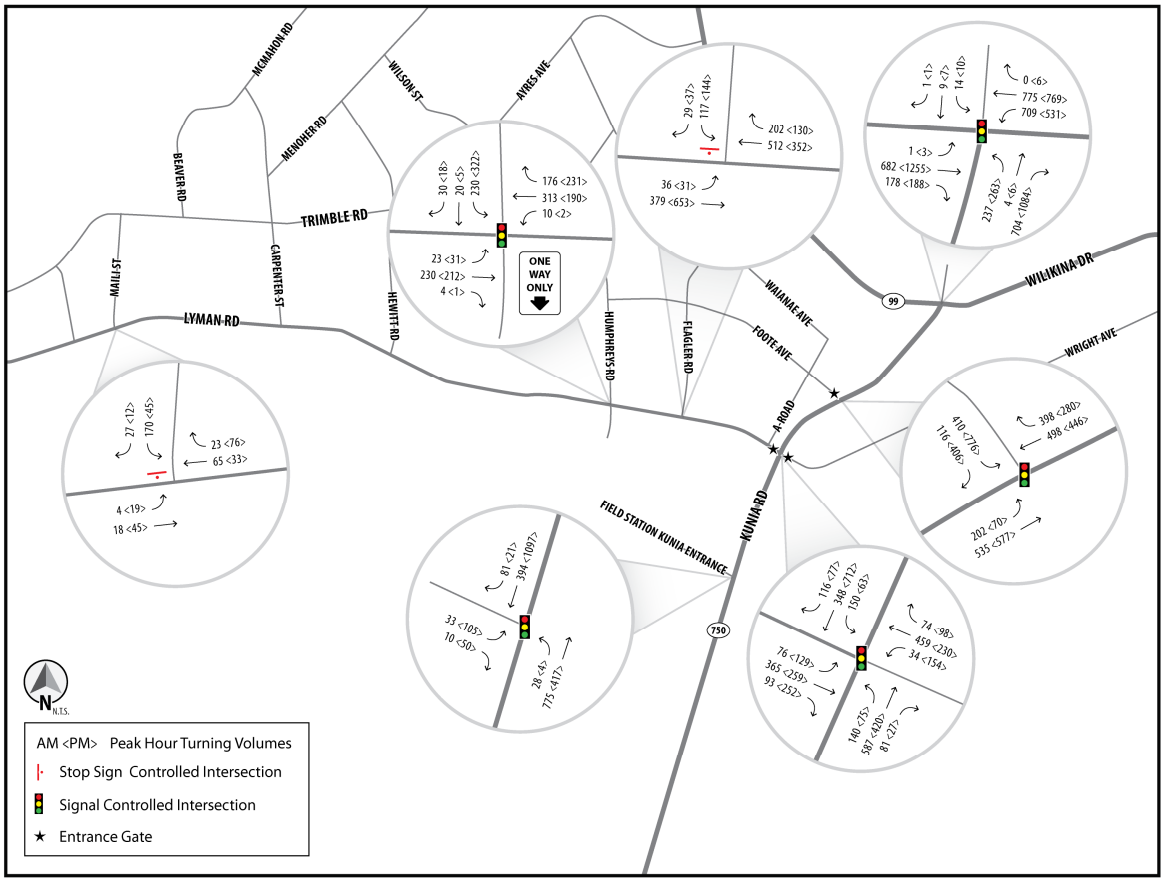


Figure 3. Existing 2014 Peak Hour Traffic Volumes

2.3 Existing 2014 AM and PM Peak Hour Traffic Operations

Trafficware's *Synchro 8* traffic modeling software was used to analyze traffic operations. Synchro is a traffic analysis software program that is based on methods outlined in the 2000 *Highway Capacity Manual* (HCM). The procedures measure the traffic flow obtained from traffic counts and future traffic forecasts to produce measures of effectiveness such as delay per vehicle, intersection level of service (LOS), and intersection queue length.

LOS, which ranges from LOS A to LOS F, is a tool to qualitatively measure the operational conditions of the traffic operations of the intersection. LOS A indicates the free-flow traffic with little or no delay, while LOS F indicates extreme conditions with lengthy delays. ***Appendix B*** provides an expanded definition of LOS.

Table 1 lists the results of the existing AM and PM peak hour traffic operations.

Table 1. Existing 2014 Peak Hour LOS and Average Delay (sec/veh) Summary

Evaluated Intersection	*Intersection Control*	*Existing AM Peak 2014 LOS*	*Existing PM Peak 2014 LOS*
Kunia Road & Wilikina Dr. (SR 99)	**Signalized**	**D** (44.1 sec/veh)	**D** (42.3 sec/veh)
Kunia Road & Foote Avenue	**Signalized**	**C** (33.1 sec/veh)	**C** (33.3 sec/veh)
Kunia Road & Lyman Road	**Signalized**	**D** (50.4 sec/veh)	**D** (38.3 sec/veh)
Kunia Road & Field Station Kunia Entrance	**Signalized**	**A** (6.6 sec/veh)	**B** (18.0 sec/veh)
Lyman Road & Flagler Road	**Stop Sign**	**F** (53.8 sec/veh)	**F** (83.9 sec/veh)
Lyman Road & Humphreys Road	**Signalized**	**B** (12.6 sec/veh)	**B** (11.0 sec/veh)
Lyman Road & Maili Street	**Stop Sign**	**B** (10.7 sec/veh)	**B** (10.3 sec/veh)

Note: sec/veh = seconds per vehicle.

Appendix C provides detailed LOS output reports from Synchro.

Most intersections operate at LOS D or better during both AM and PM peak hours for existing conditions, except the Lyman Road and Flagler Road intersection, which is LOS F. The Flagler Road intersection is stop sign controlled; therefore, the intersection LOS is determined by the average delays on Flagler Road. The delay indicates that it takes a long time for a vehicle on Flagler Road to find gaps in Lyman Road traffic. This supports the plan to add a traffic signal and other improvements at this location.

The Kunia Road and Wilikina Drive (SR 99) intersection suffers long queues and delays during both AM and PM peak hours, especially the Wilikina Drive westbound left turn to southbound Kunia Road movement. At this location the short left turn pocket on Wilikina Drive westbound is not long enough to hold the queuing at the intersection, and spills back into the inside through lane, which worsens the intersection operations.

The Kunia Road and Lyman Gate intersection has long delays and queues due to the large traffic demands and long signal cycles. The security check at the gate entrance also increases the delay and queues at this intersection.

3. FUTURE TRAFFIC VOLUME FORECASTING

It is anticipated that by the end of 2017 the project will be built and fully occupied. The 2017 forecasted traffic demand is comprised of three elements: (1) existing traffic, (2) background traffic growth between 2014 and 2017, and (3) forecasted project-generated traffic. The sum of all three results in the total forecasted traffic volumes for the built condition.

3.1 Background Traffic Growth

The background traffic consists of the future traffic incremental growth added to the existing traffic volumes. This traffic volume growth does not include the project or major developments in the project vicinity.

In determining the traffic growth rate, average daily traffic on Kunia Road was reviewed. The 2009 AADT on Kunia Road is approximately 13,700 vehicles in the study area. The estimated 2014 AADT is approximately 15,400 vehicles. This represents a 2.5 percent straight line annual growth from 2009 to 2014. The 2.5 percent straight line annual growth was used to project peak hour traffic volumes for both Kunia Road and Lyman Road intersections, and applied to existing traffic volumes to generate future background traffic. With limited information, this percentage growth rate represents a reasonable average for the purpose of establishing future background traffic levels. The actual growth rates experienced by the different intersections might be higher or lower than this average.

3.2 Grow The Army Project Traffic

GTA Phase 1 is under construction and will be completed and occupied before 2017. The project expands SB capacity and will generate new traffic volumes in the study area. The GTA traffic is not included in the background traffic growth. Per the Transportation Impact Analysis Report[1] completed by Feher & Peers Transportation Consultants in 2009, the total traffic generated by the GTA development are 690 inbound and 100 outbound vehicle trips during the AM peak hour, with the reverse (100 inbound trips and 690 outbound trips) occurring during the PM peak hour. 70 percent of personnel at the GTA site were assumed to originate from within the base during the AM peak hour, while 30 percent will travel through Lyman Gate. The majority of on-site personnel were expected to use Menoher Road, Carpenter Street, Trimble Road, and Mellichamp Road to get to the GTA site.

The GTA traffic study did not state how traffic was assigned on Kunia Road outside Lyman Gate. For the purpose of this study, the traffic assignment was assumed based on Lyman Gate AM peak hour traffic volume distributions— 45 percent of traffic to/from north on Kunia Road, and 55 percent traffic to/from south on Kunia Road.

[1] Final Transportation Impact Analysis: FY09 Grow the Army Project at Schofield Barracks, June 29, 2009

3.3 Estimated Construction Traffic

During construction, the site will be accessed through a temporary access road from Kunia Road south of the Field Station Kunia entrance signalized intersection. Construction is estimated to start in May 2016 and finish by June 2017.

Hawaiian Electric Company (Hawaiian Electric) and Quanta's estimates indicate that there will be two types of traffic impacts: (1) light personal and noncommercial traffic, and (2) commercial traffic.

Light personal and noncommercial traffic:

- Vehicles on-site and personnel vehicle impact – Average vehicles on-site during construction – Using 1.5 occupants per vehicle.
- Seventy-seven average vehicles will result in 62 noncommercial vehicles commuting daily from September 2016 to July 2017.
- Ninety-eight peak vehicles will result in 79 noncommercial vehicles commuting daily from December 2016 to June 2017.
- Both average and peak vehicles on site traffic was considered twice a day (6:00 a.m. – 8:00 a.m. and 4:00 p.m.–6:00 p.m. Monday through Saturday).

For the purpose of the traffic study, a single-occupant vehicle is assumed for the 98 peak vehicles to ensure the traffic volume is on the conservative side.

A portion of the construction traffic will come from the north on Kunia Road, with the other portion coming from the south. Only the traffic from the north will affect the intersections on Kunia Road within the study area. There will be no construction traffic impacts on Lyman Road intersections.

There is no information to determine the distribution of this construction traffic. For the purpose of this study, it was assumed that half of the traffic comes from the north on Kunia Road, and half comes from the south.

Commercial Traffic:

- Light, local commercial delivery traffic is defined as weighing between 5 – 8 tons class delivery vehicles from the local surrounding markets, and will range from five to seven deliveries a day starting in May 2016 and continuing through July 2017.
- Heavy loads, 10 tons and greater, will range from 3 to 4 loads a day starting in August 2016 and continuing through February 2017.
- Wide and permitted loads for heavy equipment (modules, Wärtsiläs, radiators, and the like) are planned between November 2016 and April 2017.

Hawaiian Electric will use the Barbers Point Harbor as the point of entry for major equipment. The vehicles will leave the port traveling southeast on Malakole Street (HI-95); make a left on Kalaeloa Boulevard (HI-95) to the entrance of HI-1 East; use exit 5 to go north on Kunia Road (HI-750) for approximately 5 miles; and then make a left on the unimproved construction road, entering the project site on the south end.

All commercial traffic will come from the south on Kunia Road and will not affect the studied intersections.

3.4 Project Operation Traffic

Upon project completion, the temporary access road will be closed. All traffic will access the site through the Lyman Gate and the newly built Mellichamp Road extension for GTA facilities.

Initial Fuel Delivery Traffic

Before normal operation begins, the facility fuel tanks need to be filled. According to Hawaiian Electric staff, initial fuel deliveries would occur on workdays at non-peak hours, and:

- Urea would require three 40-foot containers, one container per week.
- Fuel would be offloaded one truck at a time, and each truck will take an hour. Filling the the storage tanks will require 6 trucks per day and 60 fuel trucks over 2 weeks.
- Lube oil would require three trucks, one truck per day for 3 days.

Because the initial fueling delivery occurs during non-peak hours, peak hour traffic will be unaffected. Therefore, the initial fuel delivery traffic was not included in the traffic study.

Normal Operational Traffic

According to Hawaiian Electric staff, normal facility operation requires three shifts, and each shift has one operator and one supervisor. There will be one shift change during the AM peak hours, and no shift changes during the PM peak hours. There will also be an off-duty shift during the AM peak hours. It is assumed that all personnel will drive in a single-occupancy vehicle. This operation will generate six personal vehicles in the morning peak hours—four inbound and two outbound vehicles. For the purposes of this traffic study, it is assumed this traffic will be split equally on Kunia Road in the north and south directions.

It is anticipated that full operation of the facility might require a daily maximum of 26 delivery trucks for fuel/urea and other deliveries. These trucks would spread out evenly over the 24-hour period. For the purpose of the traffic study, it is assumed there will be two truck deliveries during AM peak hours and no truck delivery during PM peak hours.

Overall, the operational traffic is minor during the AM peak hours. There is no induced traffic during the PM peak hours. This traffic study, therefore, will only analyze the AM peak hours for the operation traffic volumes.

4. 2017 NO-BUILD TRAFFIC OPERATIONS

The Army is planning to add a traffic signal to the Flagler Road and Lyman Road intersection. It is assumed that this improvement will be constructed before 2017 and become part of the No-Build roadway network. The improvement will not change the roadway network capacity, and no traffic volume will be added to the network. ***Figure 4*** depicts the 2017 roadway intersection geometry.

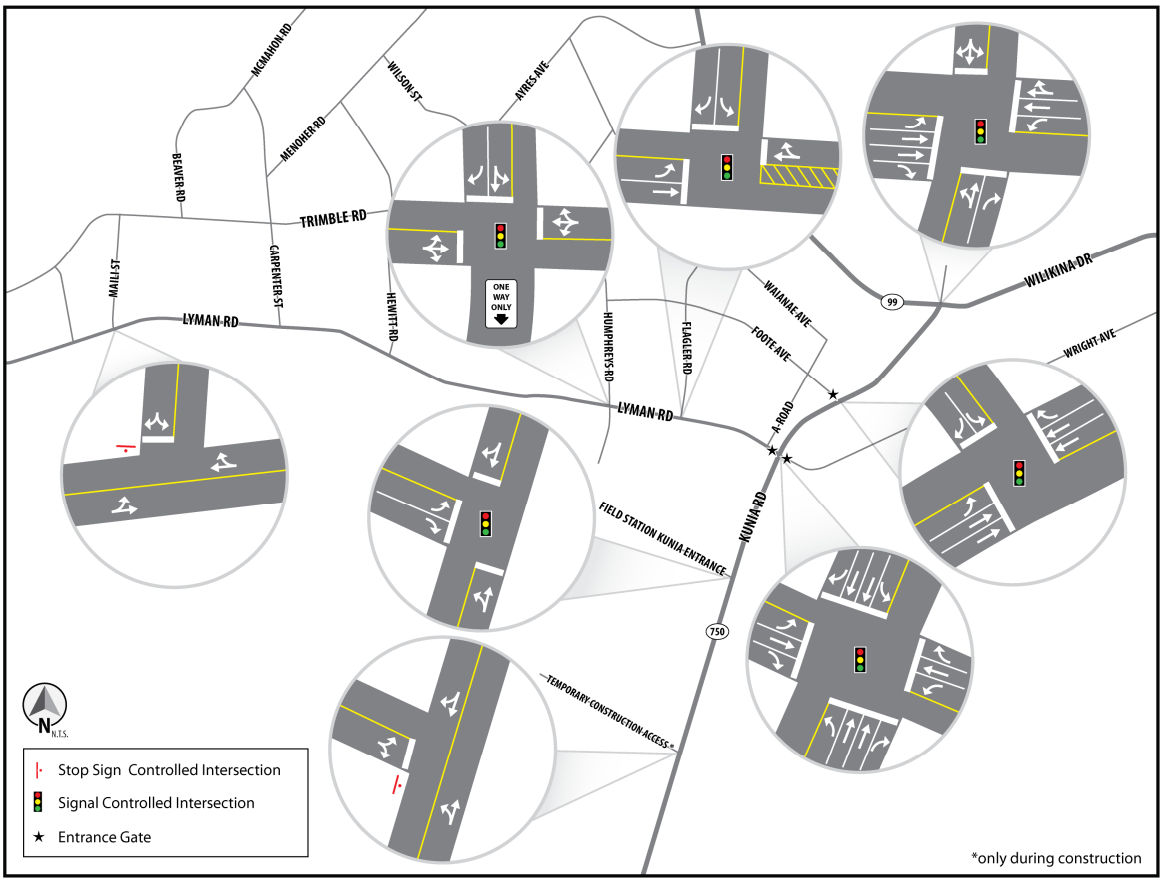


Figure 4. 2017 Intersection Channelization

The No-Build assumes the project will not be built. The construction for the GTA Phase 1 facilities will be finished and fully occupied before 2017. Therefore, the No-Build scenario will include traffic generated by GTA Phase 1 facilities. The 2017 No-Build scenario traffic comprises three elements: (1) existing traffic, (2) background traffic growth, and (3) GTA traffic. ***Figure 5*** shows the 2017 No-Build traffic volumes**.**

2017 No-Build Synchro models are based on the 2014 existing Synchro model. New traffic signal and intersection geometric improvements are added at Flagler Road and Lyman Road per design plans. The geometric and network data for the rest of the network was not modified.

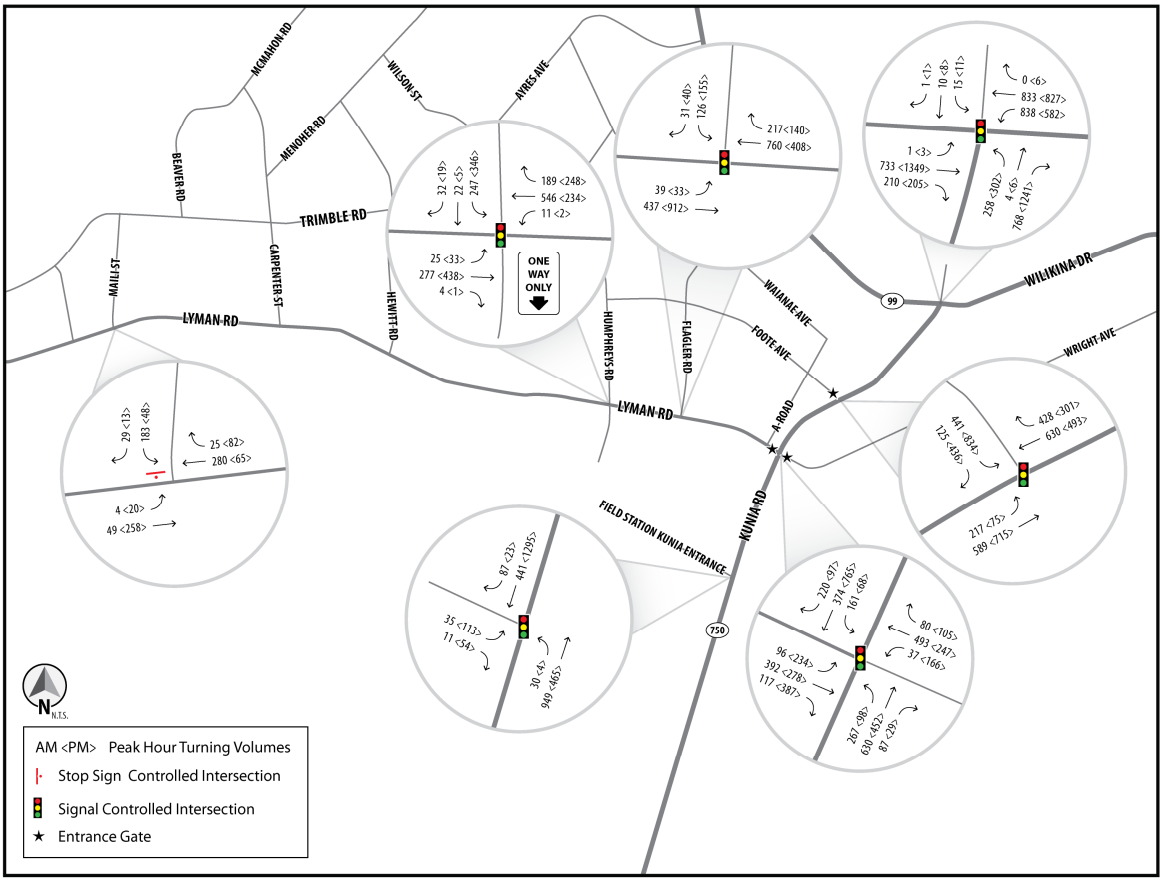


Figure 5. 2017 No-Build Peak Hour Traffic Volumes

Trafficware's *Synchro 8* was used to conduct the traffic operations analysis for the 2017 No-Build AM and PM peak hour scenario. ***Table 2*** lists the analysis results of the 2017 No-Build AM and PM peak hour traffic operations.

Appendix C provides detailed LOS output reports from Synchro.

The GTA facility generates significant traffic volumes in the study area. The Wilikina Drive / Kunia Road and Lyman Road / Kunia Road intersections operate in LOS E during the AM peak hours and LOS D during the PM peak hours. Long queues will be formed on all three legs of the Wilikina Drive and Kunia Road intersection. The Lyman Road and Kunia Road intersection would also have a longer queue. The Kunia Road northbound left turn queue will be longer than the available storage during AM peak hours, and spill back onto the through lane.

The new traffic signal at the Flagler Road and Lyman Road intersection will significantly improve traffic operations. The intersection is anticipated to operate at LOS C during 2017 No-Build AM peak hours and LOS B during PM peak hours.

The rest of the intersections operate at LOS D or better for both AM and PM peak hours in the 2017 No-Build scenario.

Table 2. 2017 No-Build Peak Hour LOS and Average Delay (sec/veh) Summary

Evaluated Intersection	*Intersection Control*	*2017 AM Peak*	*2017 PM Peak*
		LOS (Avg. Delay)	*LOS (Avg. Delay)*
Kunia Road & Wilikina Dr. (SR 99)	**Signalized**	**E** (61.0 sec/veh)	**D** (54.6 sec/veh)
Kunia Road & Foote Avenue	**Signalized**	**D** (36.2 sec/veh)	**D** (41.8 sec/veh)
Kunia Road & Lyman Road	**Signalized**	**E** (60.0 sec/veh)	**D** (51.9 sec/veh)
Kunia Road & Field Station Kunia Entrance	**Signalized**	**A** (7.6 sec/veh)	**D** (35.8 sec/veh)
Lyman Road & Flagler Road	**Signalized**	**C** (24.2 sec/veh)	**B** (13.1 sec/veh)
Lyman Road & Humphreys Road	**Signalized**	**C** (20.2 sec/veh)	**B** (14.7 sec/veh)
Lyman Road & Maili Street	**Stop Sign**	**C** (15.5 sec/veh)	**B** (14.4 sec/veh)

Note: sec/veh = seconds per vehicle.

5. TRAFFIC OPERATIONS DURING CONSTRUCTION

It is anticipated that by the end of 2017 the project will be built and fully occupied. 2017 is the construction and opening year for the project. The 2017 forecasted traffic demand during construction is comprised of four elements: (1) existing traffic, (2) background traffic growth, (3) GTA traffic, and (4) construction traffic. ***Figure 6*** shows the 2017 construction traffic volumes**.**

It is assumed that all construction traffic will access the site via a temporary construction access on Kunia Road south of the Field Station Kunia entrance intersection, and that all construction traffic will come from outside of the post. Construction, therefore, would only affect traffic on Kunia Road. The intersections inside the SB post will not be affected, and the operations will be the same as the No-Build operation.

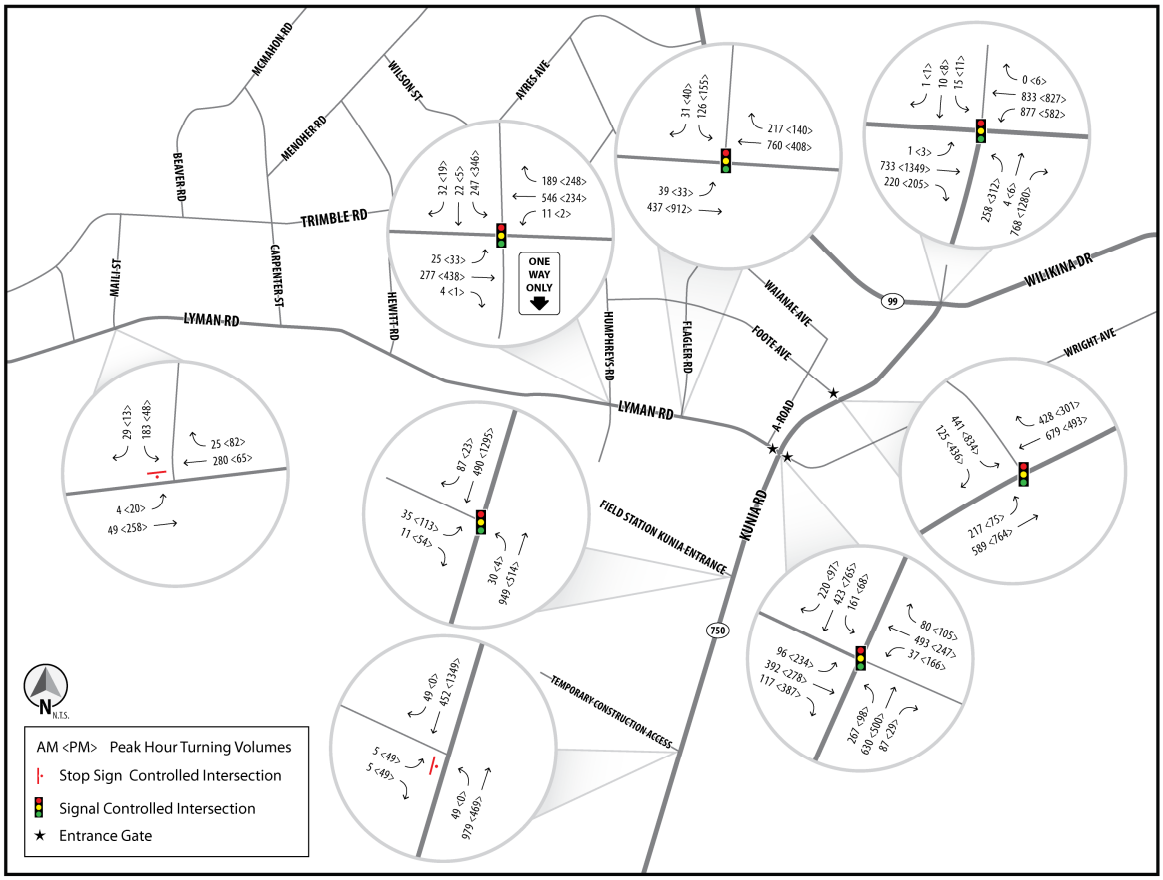


Figure 6. 2017 Peak Hour Traffic Volumes During Construction

2017 construction Synchro models are based on the 2017 No-Build Synchro model. It includes a new intersection on Kunia Road for the temporary construction access road. This intersection will be stop sign controlled with free traffic on Kunia Road.

Trafficware's *Synchro 8* was used to conduct the traffic operations analysis for the 2017 No-Build AM and PM peak hour scenario. ***Table 3*** lists the results of the existing AM and PM peak hour traffic operations.

Table 3. 2017 Construction Peak Hour LOS and Average Delay (sec/veh) Summary

Evaluated Intersection	*Intersection Control*	*2017 AM Peak*	*2017 PM Peak*
		LOS (Avg. Delay)	*LOS (Avg. Delay)*
Kunia Road & Wilikina Dr. (SR 99)	**Signalized**	**E** (64.6 sec/veh)	**E** (56.7 sec/veh)
Kunia Road & Foote Avenue	**Signalized**	**D** (36.6 sec/veh)	**D** (43.3 sec/veh)
Kunia Road & Lyman Road	**Signalized**	**E** (60.7 sec/veh)	**D** (51.8 sec/veh)
Kunia Road & Field Station Kunia Entrance	**Signalized**	**A** (7.7 sec/veh)	**D** (35.0 sec/veh)
Kunia Road & Construction Access Rd	**Stop Sign**	**E** (36.5 sec/veh)	**F** (234.5 sec/veh

Note: sec/veh = seconds per vehicle.

Appendix C provides detailed LOS output reports from Synchro.

The construction traffic will add to the existing traffic congestion within the study area. Although the LOS for the Wilikina Drive and Kunia Road intersection increased from LOS D to LOS E during the PM peak hours, the average delays only increased 2.1 seconds per vehicle. The increase of average control delays for all intersections is less than 4 seconds per vehicle, compared with the 2017 No-Build scenario. The queues and delays are slightly longer on Kunia Road, but the overall traffic impacts generated from construction vehicles are minor.

The vehicle leaving the temporary construction access road intersection will experience delays due to the high volumes on Kunia Road. The traffic on Kunia Road will be minimal. To avoid delays, it is recommended that construction vehicles leaving the site be limited to off-peak hours when possible.

6. 2017 BUILT TRAFFIC OPERATIONS

The Build scenario assumes the project has been constructed and is fully operational. It will include the traffic generated from the GTA facilities and the additional traffic signal at the Flagler Road and Lyman Road intersection. The 2017 Build scenario traffic comprises four elements: (1) existing traffic, (2) background traffic growth, (3) GTA traffic, and (4) facility operational traffic.

All operational traffic will go through the Lyman Gate intersection. It will only affect general traffic during AM peak hours and there will be minimal operational traffic during PM peak hours. ***Figure 7*** shows the 2017 Build traffic AM peak hour volumes**.**

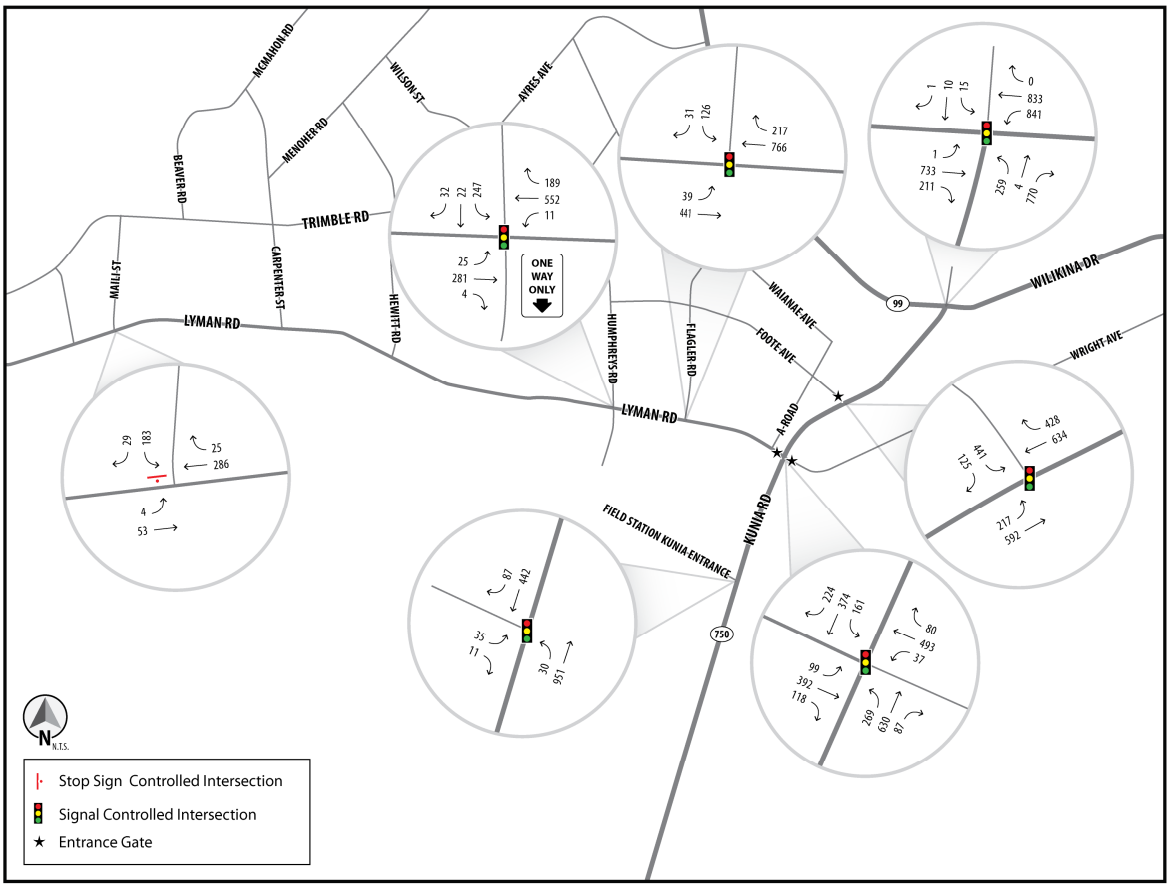


Figure 7. 2017 Build AM Peak Hour Traffic Volumes

2017 Build Synchro models are based on the 2017 No-Build Synchro model. The temporary construction access road is removed from the network.

Trafficware's *Synchro 8* was used to conduct the traffic operations analysis for the 2017 Build AM peak hour scenario. The 2017 Build PM peak hour operation is the same as the 2017 No-Build operation. ***Table 4*** lists the results of the 2017 Build AM peak hour traffic operational analysis. The PM peak hour result is copied from the 2017 No-Build scenario.

Table 4. 2017 Build Peak Hour LOS and Average Delay (sec/veh) Summary

Evaluated Intersection	*Intersection Control*	*2017 AM Peak*	*2017 PM Peak*
		LOS (Avg. Delay)	*LOS (Avg. Delay)*
Kunia Road & Wilikina Dr. (SR 99)	**Signalized**	**E** (61.4 sec/veh)	**D** (54.6 sec/veh)
Kunia Road & Foote Avenue	**Signalized**	**D** (36.2 sec/veh)	**D** (41.8 sec/veh)
Kunia Road & Lyman Road	**Signalized**	**E** (60.6 sec/veh)	**D** (51.9 sec/veh)
Kunia Road & Field Station Kunia Entrance	**Signalized**	**A** (7.6 sec/veh)	**D** (35.8 sec/veh)
Lyman Road & Flagler Road	**Signalized**	**C** (24.8 sec/veh)	**B** (13.1 sec/veh)
Lyman Road & Humphreys Road	**Signalized**	**C** (20.5 sec/veh)	**B** (14.7 sec/veh)
Lyman Road & Maili Street	**Stop Sign**	**C** (15.8 sec/veh)	**B** (14.4 sec/veh)

Note: sec/veh = seconds per vehicle.

Appendix C provides detailed LOS output reports from Synchro.

The facility operational traffic volume is small and only has minimal traffic impact during the AM peak hours. The average traffic delays increase less than 1 second per vehicle during the AM peak hour when compared with the No-Build scenario, and there are no noticeable impacts to queue lengths. All study intersections on the post operate in LOS C during the AM peak hours. No traffic impact is anticipated during the PM peak hours.

7. CONCLUSION

The traffic study analyzed traffic operations of eight intersections on Kunia Road and Lyman Road near SB. Today, the traffic on Kunia Road experiences delays and long queues at intersections during peak hours. By 2017 the traffic in the network will increase from the background growth and the completion of the GTA Phase 1 project. Traffic conditions will be worse on Kunia Road and Lyman Road as traffic demand increases.

The addition of traffic signal and intersection movements on the Flagler Road and Lyman Road intersection are necessary and will improve the operations dramatically compared with the current stop sign-controlled intersections.

The construction and operation of the SGSP project will generate more traffic volumes on the roadway network. These project-generated traffic volumes are small, and will not significantly affect traffic. Compared with the future No-Build scenario, the increase on average vehicle delays from construction traffic is less than 4 seconds per vehicle, and less than 1 second per vehicle for operational traffic during the AM peak hours. There is no traffic impact from operational traffic during the PM peak hour. Overall, the impact from the facility operation traffic is negligible.

The temporary construction access road will have long delays for the construction traffic. It is recommended that limiting the construction traffic to off-peak periods of time to reduce delays be considered if feasible. However, the construction traffic impacts to the general traffic are small because of the low volumes of construction traffic compared to general traffic during the peak hours.

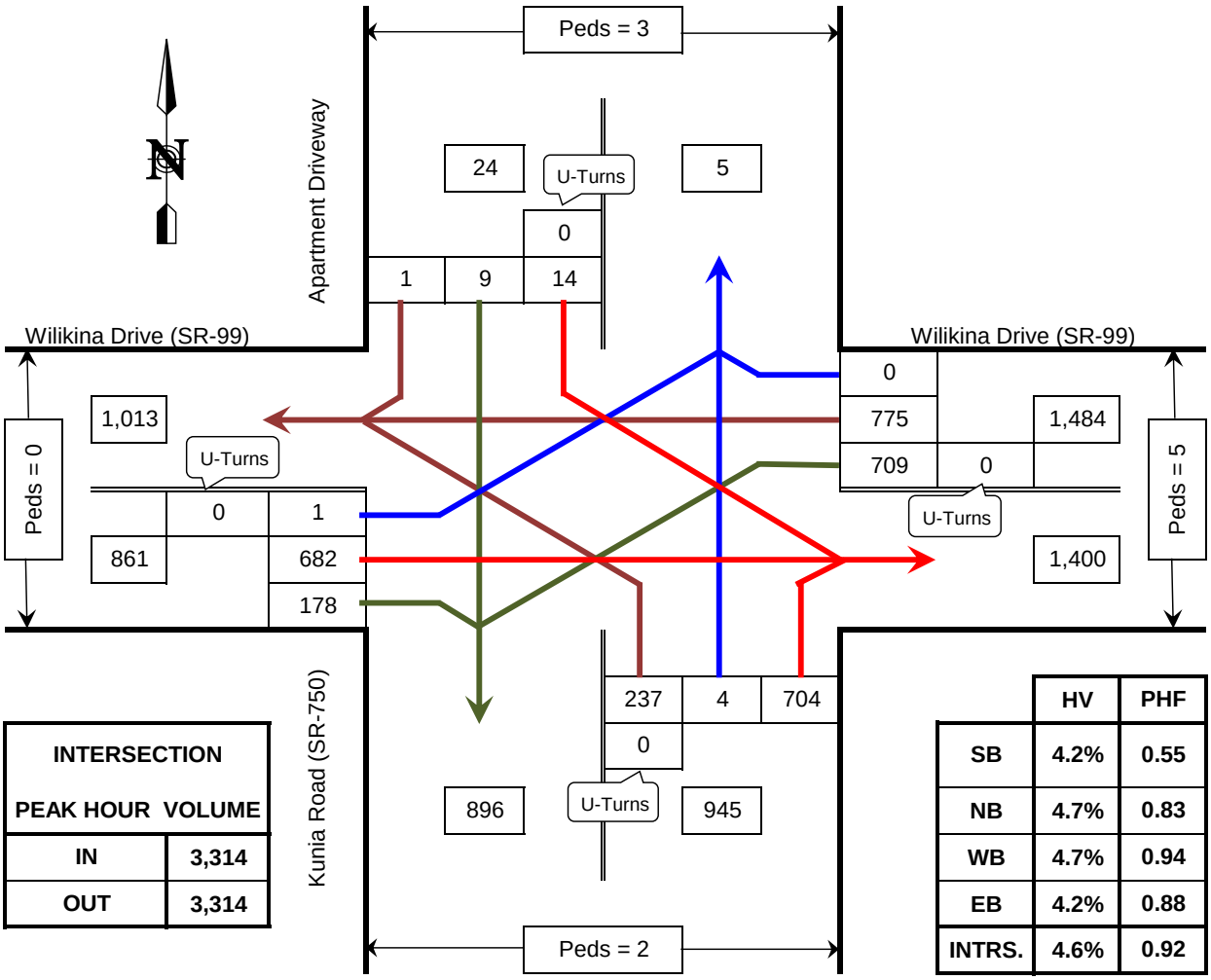
Traffic Study
Appendix A.

Traffic Count Data

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

7:30 AM - 9:30 AM PEAK HOUR: 7:30 AM TO 8:30 AM



INTERSECTION PEAK HOUR VOLUME	
IN	3,314
OUT	3,314

	HV	PHF
SB	4.2%	0.55
NB	4.7%	0.83
WB	4.7%	0.94
EB	4.2%	0.88
INTRS.	4.6%	0.92

PHF = Peak Hour Factor
HV = Heavy Vehicles

Kunia Road (SR-750) @ Wilikina Drive (SR-99)

Schofield Barracks, HI

COUNTED BY: CN

REDUCED BY: CN

REDUCTION DATE: Fri. 2/28/14

DATE OF COUNT: Thu. 2/27/14

TIME OF COUNT: 7:30 AM - 9:30 AM

WEATHER: Sunny

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Kunia Road (SR-750) @ Wilikina Drive (SR-99)
Schofield Barracks, HI

DATE OF COUNT: Thu. 2/27/14
TIME OF COUNT: 7:30 AM - 9:30 AM

COUNTED BY: CN
WEATHER: Sunny

TIME INTERVAL ENDING AT	FROM NORTH ON Apartment Driveway						FROM SOUTH ON Kunia Road (SR-750)						FROM EAST ON Wilikina Drive (SR-99)						FROM WEST ON Wilikina Drive (SR-99)						INTERVAL TOTALS
	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
05:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:45 AM	1	1	0	6	5	0	2	10	0	65	2	216	5	21	0	165	196	0	0	6	0	0	189	57	**901**
08:00 AM	0	0	0	4	2	1	0	12	0	53	0	176	0	17	0	180	214	0	0	10	0	1	155	51	**837**
08:15 AM	1	0	0	2	1	0	0	13	0	62	1	190	0	17	0	182	175	0	0	8	0	0	161	36	**810**
08:30 AM	1	0	0	2	1	0	0	9	0	57	1	122	0	15	0	182	190	0	0	12	0	0	177	34	**766**
08:45 AM	0	0	0	0	2	0	0	7	0	30	0	98	0	15	0	148	178	0	0	2	0	0	163	27	**646**
09:00 AM	5	0	0	5	1	0	1	10	0	50	0	109	0	14	0	151	216	0	0	8	0	0	128	38	**698**
09:15 AM	0	0	0	2	1	0	0	5	0	38	0	102	0	18	0	200	206	0	0	10	0	0	152	27	**728**
09:30 AM	0	1	0	3	0	0	2	5	0	39	0	109	2	15	0	141	161	0	0	10	0	0	124	43	**620**
PEAK HOUR TOTALS	**3**	**1**	**0**	**14**	**9**	**1**	**2**	**44**	**0**	**237**	**4**	**704**	**5**	**70**	**0**	**709**	**775**	**0**	**0**	**36**	**0**	**1**	**682**	**178**	**INTERSECTION**
ALL MOVEMENTS	**24**						**945**						**1484**						**861**						**3314**
% HV	**4.2%**						**4.7%**						**4.7%**						**4.2%**						**4.6%**
PEAK HOUR FACTOR	**0.55**						**0.83**						**0.94**						**0.88**						**0.92**

PHF = Peak Hour Factor

7:30 AM - 9:30 AM PEAK HOUR: 7:30 AM TO 8:30 AM

REDUCED BY: CN

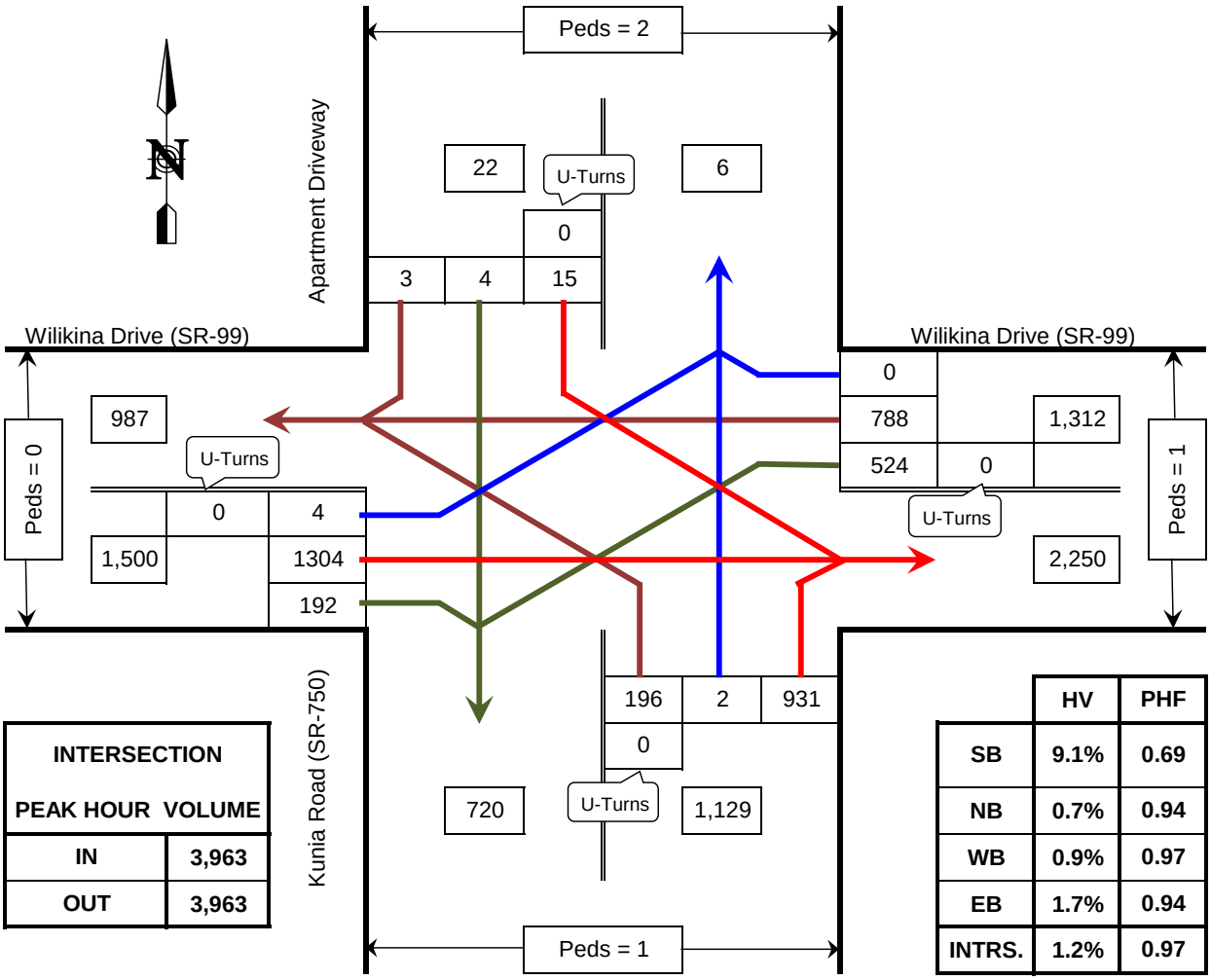
DATE OF REDUCTION: 2/28/2014

	FROM NORTH ON Apartment Driveway						FROM SOUTH ON Kunia Road (SR-750)						FROM EAST ON Wilikina Drive (SR-99)						FROM WEST ON Wilikina Drive (SR-99)						INTERVAL TOTALS
TIME INTERVAL	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
5:30 AM - 6:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
5:45 AM - 6:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:00 AM - 7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:15 AM - 7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:30 AM - 7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:45 AM - 7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:00 AM - 8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:15 AM - 8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:30 AM - 8:30 AM	3	1	0	14	9	1	2	44	0	237	4	704	5	70	0	709	775	0	0	36	0	1	682	178	**3314**
7:45 AM - 8:45 AM	2	0	0	8	6	1	0	41	0	202	2	586	0	64	0	692	757	0	0	32	0	1	656	148	**3059**
8:00 AM - 9:00 AM	7	0	0	9	5	0	1	39	0	199	2	519	0	61	0	663	759	0	0	30	0	0	629	135	**2920**
8:15 AM - 9:15 AM	6	0	0	9	5	0	1	31	0	175	1	431	0	62	0	681	790	0	0	32	0	0	620	126	**2838**
8:30 AM - 9:30 AM	5	1	0	10	4	0	3	27	0	157	0	418	2	62	0	640	761	0	0	30	0	0	567	135	**2692**

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

3:30 PM - 5:30 PM PEAK HOUR: 4:15 PM TO 5:15 PM



INTERSECTION PEAK HOUR VOLUME	
IN	3,963
OUT	3,963

	HV	PHF
SB	9.1%	0.69
NB	0.7%	0.94
WB	0.9%	0.97
EB	1.7%	0.94
INTRS.	1.2%	0.97

PHF = Peak Hour Factor
HV = Heavy Vehicles

Kunia Road (SR-750) @ Wilikina Drive (SR-99)

Schofield Barracks, HI

COUNTED BY: CN

REDUCED BY: CN

REDUCTION DATE: Fri. 2/28/14

DATE OF COUNT: Thu. 2/27/14

TIME OF COUNT: 3:30 PM - 5:30 PM

WEATHER: Sunny

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Kunia Road (SR-750) @ Wilikina Drive (SR-99)
Schofield Barracks, HI

DATE OF COUNT: Thu. 2/27/14
TIME OF COUNT: 3:30 PM - 5:30 PM

COUNTED BY: CN
WEATHER: Sunny

TIME INTERVAL ENDING AT	FROM NORTH ON Apartment Driveway						FROM SOUTH ON Kunia Road (SR-750)						FROM EAST ON Wilikina Drive (SR-99)						FROM WEST ON Wilikina Drive (SR-99)						INTERVAL TOTALS
	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:45 PM	3	0	0	2	1	0	1	9	0	53	0	241	1	5	0	121	187	6	0	7	0	0	278	28	**917**
04:00 PM	1	0	0	3	3	0	0	2	0	51	3	240	0	9	0	113	200	0	0	10	0	0	305	43	**961**
04:15 PM	0	0	0	2	2	0	2	2	0	65	1	221	2	4	0	91	174	0	0	8	0	2	320	48	**926**
04:30 PM	2	1	0	3	0	1	0	3	0	57	1	230	0	5	0	128	208	0	0	2	0	1	352	41	**1022**
04:45 PM	0	1	0	5	2	1	0	1	0	36	1	222	0	2	0	118	196	0	0	9	0	1	343	55	**980**
05:00 PM	0	0	0	3	1	1	1	2	0	49	0	251	1	2	0	152	186	0	0	9	0	2	291	55	**991**
05:15 PM	0	0	0	4	1	0	0	2	0	54	0	228	0	3	0	126	198	0	0	6	0	0	318	41	**970**
05:30 PM	3	0	0	1	0	0	1	1	0	89	1	243	0	2	0	138	174	0	0	9	0	1	303	44	**994**
PEAK HOUR TOTALS	**2**	**2**	**0**	**15**	**4**	**3**	**1**	**8**	**0**	**196**	**2**	**931**	**1**	**12**	**0**	**524**	**788**	**0**	**0**	**26**	**0**	**4**	**1304**	**192**	**INTERSECTION**
ALL MOVEMENTS	**22**						**1129**						**1312**						**1500**						**3963**
% HV	**9.1%**						**0.7%**						**0.9%**						**1.7%**						**1.2%**
PEAK HOUR FACTOR	**0.69**						**0.94**						**0.97**						**0.94**						**0.97**

PHF = Peak Hour Factor

3:30 PM - 5:30 PM PEAK HOUR: **4:15 PM TO 5:15 PM**

REDUCED BY: CN

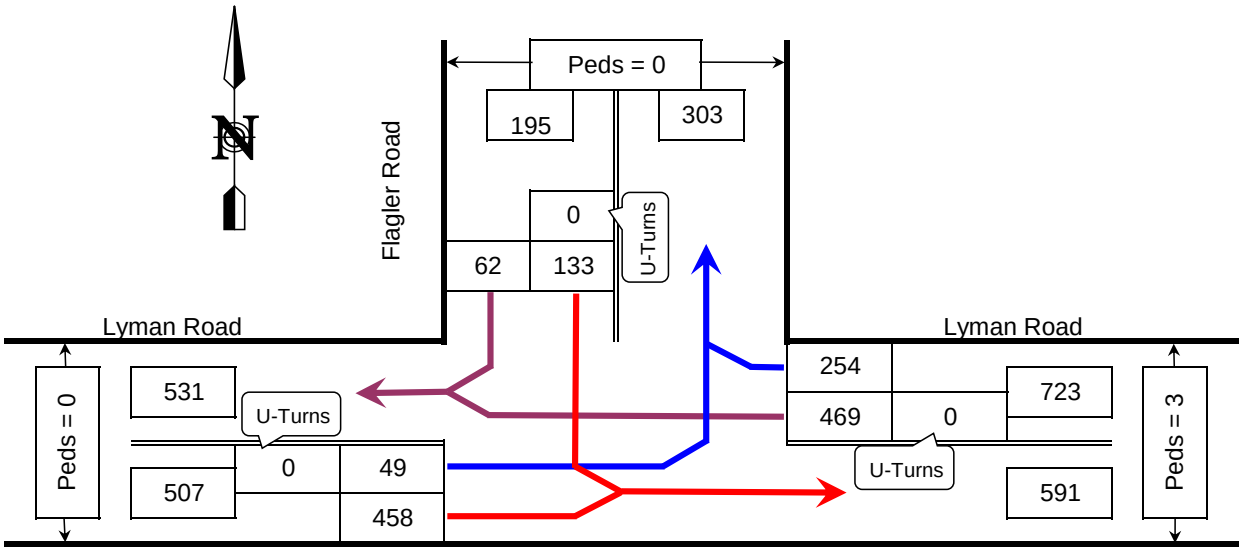
DATE OF REDUCTION: 2/28/2014

	FROM NORTH ON Apartment Driveway						FROM SOUTH ON Kunia Road (SR-750)						FROM EAST ON Wilikina Drive (SR-99)						FROM WEST ON Wilikina Drive (SR-99)						INTERVAL TOTALS
TIME INTERVAL	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
1:30 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1:45 PM - 2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:00 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:15 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:30 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:45 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:00 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:15 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:30 PM - 4:30 PM	6	1	0	10	6	1	3	16	0	226	5	932	3	23	0	453	769	6	0	27	0	3	1255	160	**3826**
3:45 PM - 4:45 PM	3	2	0	13	7	2	2	8	0	209	6	913	2	20	0	450	778	0	0	29	0	4	1320	187	**3889**
4:00 PM - 5:00 PM	2	2	0	13	5	3	3	8	0	207	3	924	3	13	0	489	764	0	0	28	0	6	1306	199	**3919**
4:15 PM - 5:15 PM	2	2	0	15	4	3	1	8	0	196	2	931	1	12	0	524	788	0	0	26	0	4	1304	192	**3963**
4:30 PM - 5:30 PM	3	1	0	13	4	2	2	6	0	228	2	944	1	9	0	534	754	0	0	33	0	4	1255	195	**3935**

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

7:30 AM - 9:30 AM PEAK HOUR: 8:30 AM TO 9:30 AM



INTERSECTION PEAK HOUR VOLUME	
IN	1,425
OUT	1,425

	HV	PHF
SB	1.5%	0.86
WB	6.6%	0.89
EB	11.6%	0.84
INTRS.	7.7%	0.89

HV = Heavy Vehicles
PHF = Peak Hour Factor

Lyman Road @ Flagler Road

Schofield Barracks, HI

COUNTED BY: SN

DATE OF COUNT: Thu. 2/27/14

REDUCED BY: CN

TIME OF COUNT: 7:30 AM - 9:30 AM

REDUCTION DATE: Fri. 2/28/14

WEATHER: Sunny

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Lyman Road @ Flagler Road
Schofield Barracks, HI

DATE OF COUNT: Thu. 2/27/14
TIME OF COUNT: 7:30 AM - 9:30 AM

COUNTED BY: SN
WEATHER: Sunny

TIME INTERVAL ENDING AT	FROM NORTH ON Flagler Road						FROM SOUTH ON						FROM EAST ON Lyman Road						FROM WEST ON Lyman Road						INTERVAL TOTALS
	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
05:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:45 AM	0	0	0	26	0	4	0	0	0	0	0	0	0	10	0	0	130	16	0	9	0	14	129	0	**319**
08:00 AM	0	1	0	21	0	13	0	0	0	0	0	0	2	6	0	0	113	54	0	6	0	6	75	0	**282**
08:15 AM	0	2	0	23	0	7	0	0	0	0	0	0	0	7	0	0	151	90	0	5	0	3	77	0	**351**
08:30 AM	0	1	0	47	0	5	0	0	0	0	0	0	0	10	0	0	118	42	0	6	0	13	98	0	**323**
08:45 AM	0	2	0	35	0	9	0	0	0	0	0	0	2	12	0	0	119	48	0	8	0	9	97	0	**317**
09:00 AM	0	1	0	30	0	15	0	0	0	0	0	0	0	15	0	0	110	61	0	5	0	9	91	0	**316**
09:15 AM	0	0	0	29	0	20	0	0	0	0	0	0	1	9	0	0	115	87	0	14	0	17	133	0	**401**
09:30 AM	0	0	0	39	0	18	0	0	0	0	0	0	0	12	0	0	125	58	0	32	0	14	137	0	**391**
PEAK HOUR TOTALS	**0**	**3**	**0**	**133**	**0**	**62**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**48**	**0**	**0**	**469**	**254**	**0**	**59**	**0**	**49**	**458**	**0**	**INTERSECTION**
ALL MOVEMENTS	**195**						**0**						**723**						**507**						**1425**
% HV	**1.5%**						**#N/A**						**6.6%**						**11.6%**						**7.7%**
PEAK HOUR FACTOR	**0.86**						**#N/A**						**0.89**						**0.84**						**0.89**

PHF = Peak Hour Factor

7:30 AM - 9:30 AM PEAK HOUR: 8:30 AM TO 9:30 AM

REDUCED BY: CN

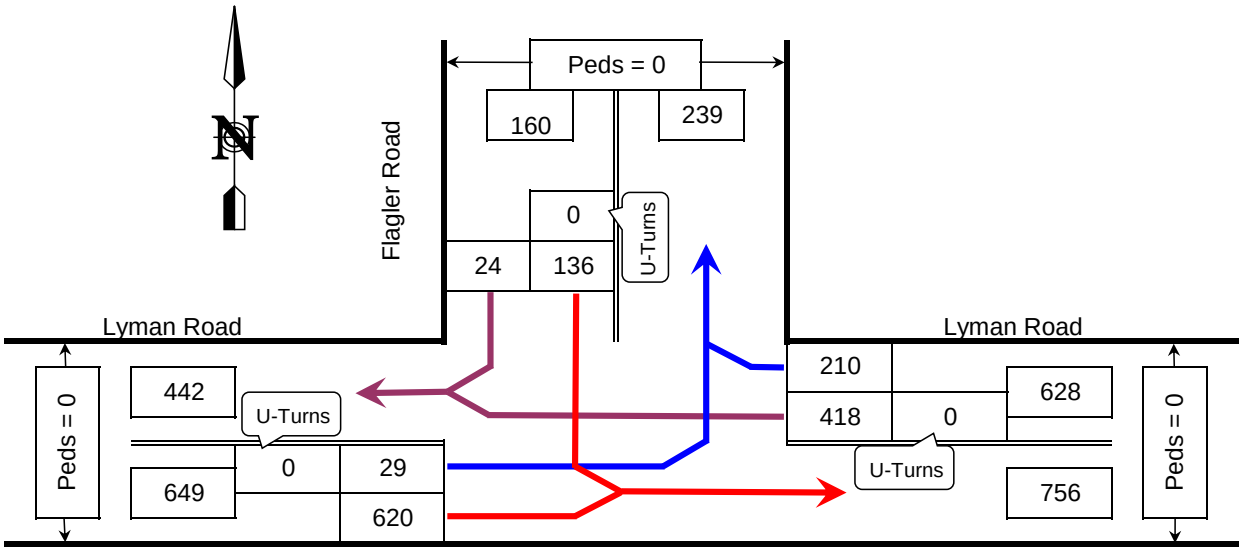
DATE OF REDUCTION: 2/28/2014

	FROM NORTH ON Flagler Road						FROM SOUTH ON						FROM EAST ON Lyman Road						FROM WEST ON Lyman Road						INTERVAL TOTALS
TIME INTERVAL	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
5:30 AM - 6:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
5:45 AM - 6:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:00 AM - 7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:15 AM - 7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:30 AM - 7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:45 AM - 7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:00 AM - 8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:15 AM - 8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:30 AM - 8:30 AM	0	4	0	117	0	29	0	0	0	0	0	0	2	33	0	0	512	202	0	26	0	36	379	0	**1275**
7:45 AM - 8:45 AM	0	6	0	126	0	34	0	0	0	0	0	0	4	35	0	0	501	234	0	25	0	31	347	0	**1273**
8:00 AM - 9:00 AM	0	6	0	135	0	36	0	0	0	0	0	0	2	44	0	0	498	241	0	24	0	34	363	0	**1307**
8:15 AM - 9:15 AM	0	4	0	141	0	49	0	0	0	0	0	0	3	46	0	0	462	238	0	33	0	48	419	0	**1357**
8:30 AM - 9:30 AM	0	3	0	133	0	62	0	0	0	0	0	0	3	48	0	0	469	254	0	59	0	49	458	0	**1425**

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

3:30 PM - 5:30 PM PEAK HOUR: 4:30 PM TO 5:30 PM



INTERSECTION PEAK HOUR VOLUME	
IN	1,437
OUT	1,437

	HV	PHF
SB	1.9%	0.87
WB	0.6%	0.90
EB	1.4%	0.92
INTRS.	1.1%	0.92

HV = Heavy Vehicles
PHF = Peak Hour Factor

Lyman Road @ Flagler Road

Schofield Barracks, HI

COUNTED BY: SN

DATE OF COUNT: Thu. 2/27/14

REDUCED BY: CN

TIME OF COUNT: 3:30 PM - 5:30 PM

REDUCTION DATE: Fri. 2/28/14

WEATHER: Sunny

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Lyman Road @ Flagler Road
Schofield Barracks, HI

DATE OF COUNT: Thu. 2/27/14
TIME OF COUNT: 3:30 PM - 5:30 PM

COUNTED BY: SN
WEATHER: Sunny

TIME INTERVAL ENDING AT	FROM NORTH ON Flagler Road						FROM SOUTH ON						FROM EAST ON Lyman Road						FROM WEST ON Lyman Road						INTERVAL TOTALS
	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:45 PM	0	0	0	39	0	13	0	0	0	0	0	0	0	3	0	0	88	38	0	5	0	10	162	0	**350**
04:00 PM	0	0	0	37	0	5	0	0	0	0	0	0	0	1	0	0	78	22	1	2	0	7	185	0	**334**
04:15 PM	0	0	0	38	0	13	0	0	0	0	0	0	0	5	0	0	97	30	0	3	0	8	142	0	**328**
04:30 PM	0	1	0	30	0	6	0	0	0	0	0	0	0	5	0	0	89	40	0	3	0	6	164	0	**335**
04:45 PM	0	1	0	27	0	6	0	0	0	0	0	0	0	2	0	0	105	51	0	2	0	10	167	0	**366**
05:00 PM	0	1	0	39	0	7	0	0	0	0	0	0	0	1	0	0	87	37	0	3	0	5	141	0	**316**
05:15 PM	0	0	0	37	0	3	0	0	0	0	0	0	0	1	0	0	111	62	0	2	0	5	172	0	**390**
05:30 PM	0	1	0	33	0	8	0	0	0	0	0	0	0	0	0	0	115	60	0	2	0	9	140	0	**365**
PEAK HOUR TOTALS	**0**	**3**	**0**	**136**	**0**	**24**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**418**	**210**	**0**	**9**	**0**	**29**	**620**	**0**	**INTERSECTION**
ALL MOVEMENTS	**160**						**0**						**628**						**649**						**1437**
% HV	**1.9%**						**#N/A**						**0.6%**						**1.4%**						**1.1%**
PEAK HOUR FACTOR	**0.87**						**#N/A**						**0.90**						**0.92**						**0.92**

PHF = Peak Hour Factor

3:30 PM - 5:30 PM PEAK HOUR: 4:30 PM TO 5:30 PM

REDUCED BY: CN

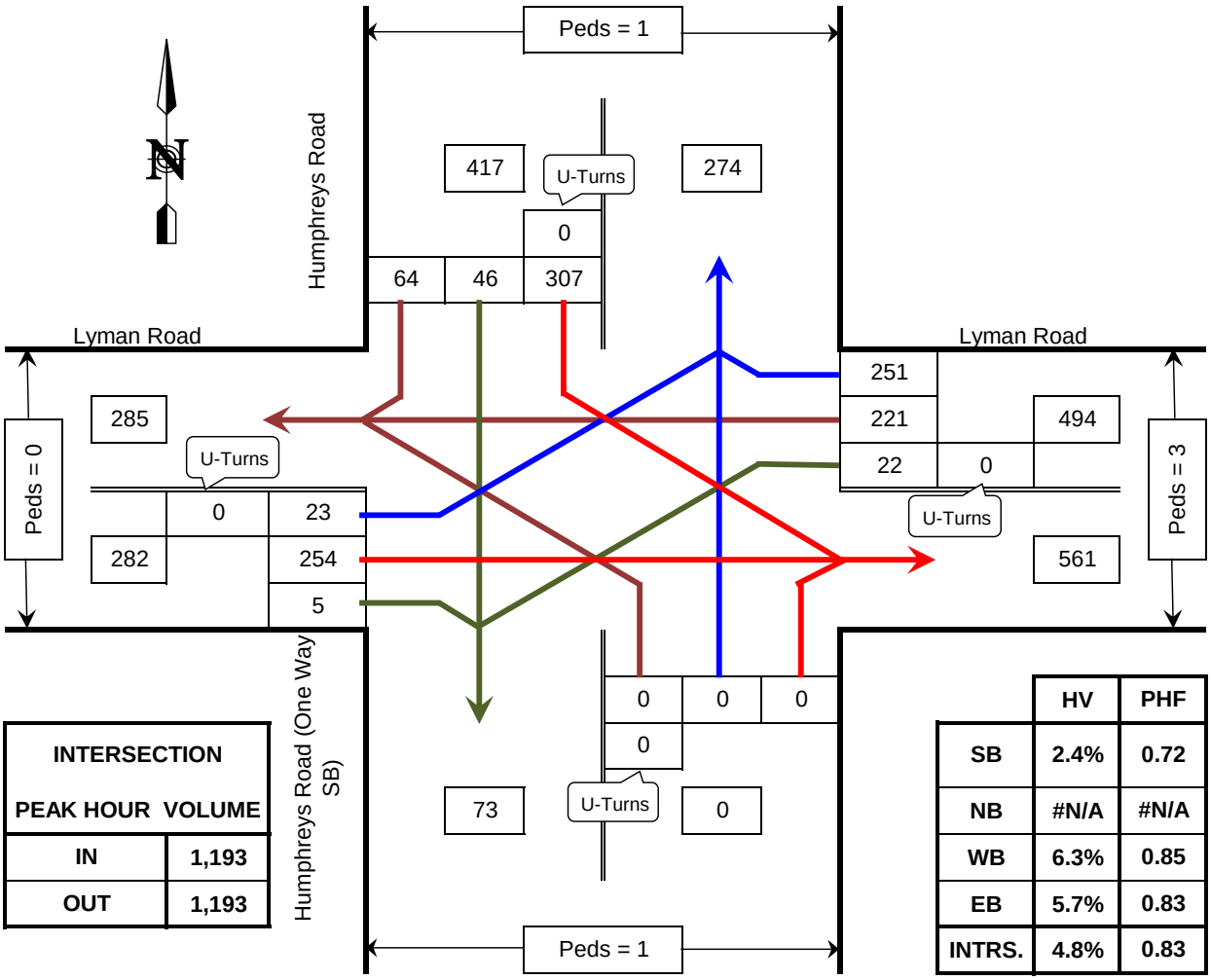
DATE OF REDUCTION: 2/28/2014

	FROM NORTH ON Flagler Road						FROM SOUTH ON						FROM EAST ON Lyman Road						FROM WEST ON Lyman Road						INTERVAL TOTALS
TIME INTERVAL	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
1:30 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1:45 PM - 2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:00 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:15 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:30 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:45 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:00 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:15 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:30 PM - 4:30 PM	0	1	0	144	0	37	0	0	0	0	0	0	0	14	0	0	352	130	1	13	0	31	653	0	**1347**
3:45 PM - 4:45 PM	0	2	0	132	0	30	0	0	0	0	0	0	0	13	0	0	369	143	1	10	0	31	658	0	**1363**
4:00 PM - 5:00 PM	0	3	0	134	0	32	0	0	0	0	0	0	0	13	0	0	378	158	0	11	0	29	614	0	**1345**
4:15 PM - 5:15 PM	0	3	0	133	0	22	0	0	0	0	0	0	0	9	0	0	392	190	0	10	0	26	644	0	**1407**
4:30 PM - 5:30 PM	0	3	0	136	0	24	0	0	0	0	0	0	0	4	0	0	418	210	0	9	0	29	620	0	**1437**

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

7:30 AM - 9:30 AM PEAK HOUR: 8:30 AM TO 9:30 AM



INTERSECTION PEAK HOUR VOLUME	
IN	1,193
OUT	1,193

	HV	PHF
SB	2.4%	0.72
NB	#N/A	#N/A
WB	6.3%	0.85
EB	5.7%	0.83
INTRS.	4.8%	0.83

PHF = Peak Hour Factor
HV = Heavy Vehicles

Lyman Road @ Humphreys Road

Schofield Barracks, HI

COUNTED BY: SN

DATE OF COUNT: Wed. 2/26/14

REDUCED BY: CN

TIME OF COUNT: 7:30 AM - 9:30 AM

REDUCTION DATE: Fri. 2/28/14

WEATHER: Sunny

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Lyman Road @ Humphreys Road
Schofield Barracks, HI

DATE OF COUNT: Wed. 2/26/14
TIME OF COUNT: 7:30 AM - 9:30 AM

COUNTED BY: SN
WEATHER: Sunny

TIME INTERVAL ENDING AT	FROM NORTH ON Humphreys Road						FROM SOUTH ON Humphreys Road (One Way SB)						FROM EAST ON Lyman Road						FROM WEST ON Lyman Road						INTERVAL TOTALS
	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
05:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:45 AM	0	3	0	66	3	5	24	0	0	0	0	0	16	8	0	0	82	51	9	5	0	6	72	1	**286**
08:00 AM	0	5	0	58	7	7	1	0	0	0	0	0	16	5	0	2	93	32	7	2	0	0	40	1	**240**
08:15 AM	1	2	0	58	7	15	2	0	0	0	0	0	0	7	0	6	84	47	1	2	0	8	63	1	**289**
08:30 AM	0	1	0	48	3	3	1	0	0	0	0	0	0	5	0	2	54	46	1	6	0	9	55	1	**221**
08:45 AM	1	5	0	57	1	13	1	0	0	0	0	0	0	7	0	2	53	50	0	2	0	3	38	0	**217**
09:00 AM	0	1	0	65	9	14	0	0	0	0	0	0	0	13	0	1	70	75	0	3	0	6	78	1	**319**
09:15 AM	0	2	0	78	24	12	0	0	0	0	0	0	2	2	0	12	48	50	0	8	0	6	66	2	**298**
09:30 AM	0	2	0	107	12	25	0	0	0	0	0	0	1	9	0	7	50	76	0	3	0	8	72	2	**359**
PEAK HOUR TOTALS	**1**	**10**	**0**	**307**	**46**	**64**	**1**	**0**	**0**	**0**	**0**	**0**	**3**	**31**	**0**	**22**	**221**	**251**	**0**	**16**	**0**	**23**	**254**	**5**	**INTERSECTION**
ALL MOVEMENTS	**417**						**0**						**494**						**282**						**1193**
% HV	**2.4%**						**#N/A**						**6.3%**						**5.7%**						**4.8%**
PEAK HOUR FACTOR	**0.72**						**#N/A**						**0.85**						**0.83**						**0.83**

PHF = Peak Hour Factor

7:30 AM - 9:30 AM PEAK HOUR: **8:30 AM TO 9:30 AM**

REDUCED BY: CN

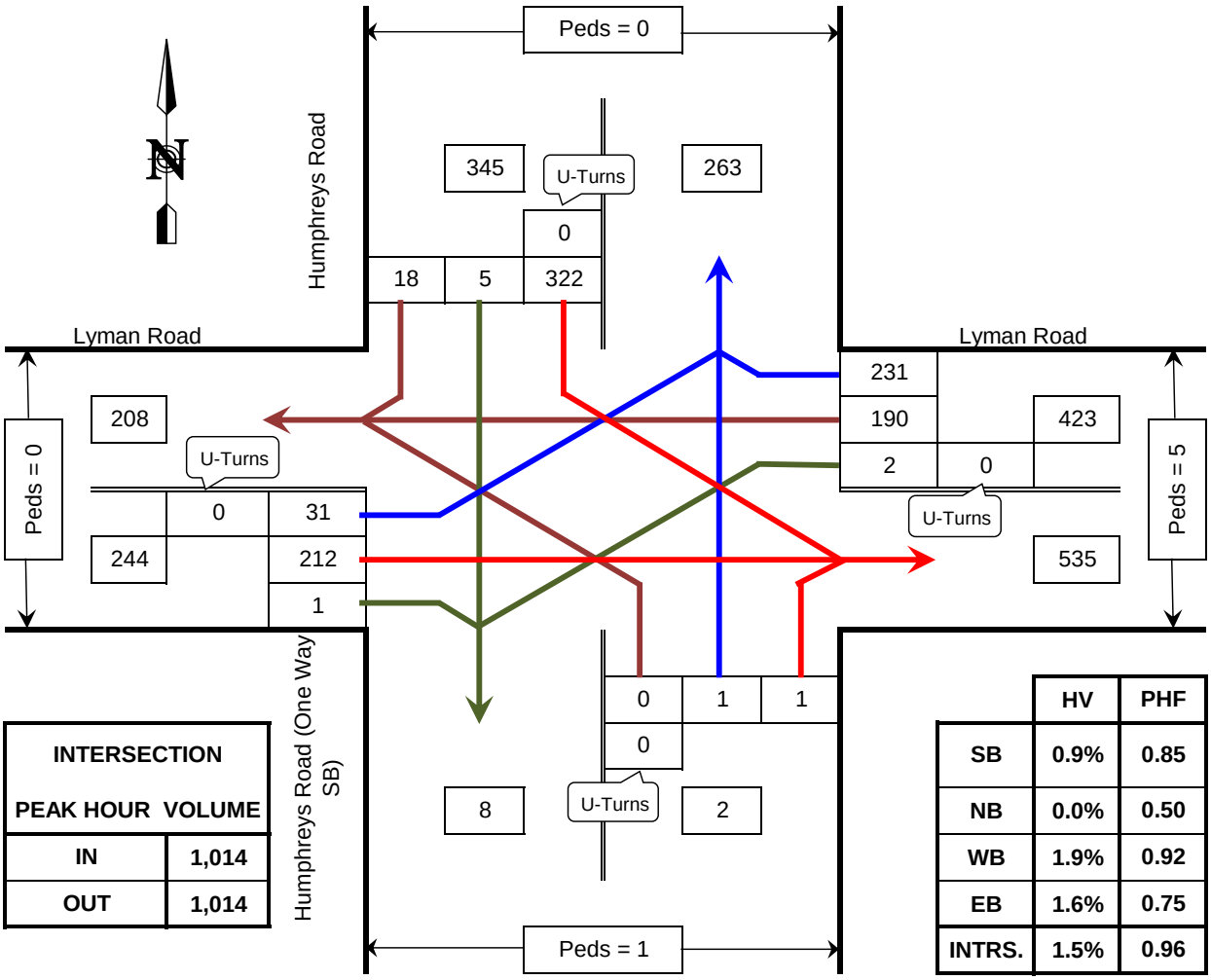
DATE OF REDUCTION: 2/28/2014

	FROM NORTH ON Humphreys Road						FROM SOUTH ON Humphreys Road (One Way SB)						FROM EAST ON Lyman Road						FROM WEST ON Lyman Road						INTERVAL TOTALS
TIME INTERVAL	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
5:30 AM - 6:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
5:45 AM - 6:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:00 AM - 7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:15 AM - 7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:30 AM - 7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:45 AM - 7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:00 AM - 8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:15 AM - 8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:30 AM - 8:30 AM	1	11	0	230	20	30	28	0	0	0	0	0	32	25	0	10	313	176	18	15	0	23	230	4	**1036**
7:45 AM - 8:45 AM	2	13	0	221	18	38	5	0	0	0	0	0	16	24	0	12	284	175	9	12	0	20	196	3	**967**
8:00 AM - 9:00 AM	2	9	0	228	20	45	4	0	0	0	0	0	0	32	0	11	261	218	2	13	0	26	234	3	**1046**
8:15 AM - 9:15 AM	1	9	0	248	37	42	2	0	0	0	0	0	2	27	0	17	225	221	1	19	0	24	237	4	**1055**
8:30 AM - 9:30 AM	1	10	0	307	46	64	1	0	0	0	0	0	3	31	0	22	221	251	0	16	0	23	254	5	**1193**

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

3:30 PM - 5:30 PM PEAK HOUR: 3:30 PM TO 4:30 PM



INTERSECTION PEAK HOUR VOLUME	
IN	1,014
OUT	1,014

	HV	PHF
SB	0.9%	0.85
NB	0.0%	0.50
WB	1.9%	0.92
EB	1.6%	0.75
INTRS.	1.5%	0.96

PHF = Peak Hour Factor
HV = Heavy Vehicles

Lyman Road @ Humphreys Road

Schofield Barracks, HI

COUNTED BY: SN

DATE OF COUNT: Wed. 2/26/14

REDUCED BY: CN

TIME OF COUNT: 3:30 PM - 5:30 PM

REDUCTION DATE: Fri. 2/28/14

WEATHER: Rainy

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Lyman Road @ Humphreys Road
Schofield Barracks, HI

DATE OF COUNT: Wed. 2/26/14
TIME OF COUNT: 3:30 PM - 5:30 PM

COUNTED BY: SN
WEATHER: Rainy

TIME INTERVAL ENDING AT	FROM NORTH ON Humphreys Road						FROM SOUTH ON Humphreys Road (One Way SB)						FROM EAST ON Lyman Road						FROM WEST ON Lyman Road						INTERVAL TOTALS
	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:45 PM	0	0	0	57	1	2	0	0	0	0	1	0	1	2	0	0	59	55	0	2	0	6	50	1	**232**
04:00 PM	0	0	0	83	2	7	0	0	0	0	0	0	2	3	0	1	35	55	0	1	0	15	66	0	**264**
04:15 PM	0	1	0	83	2	7	1	0	0	0	0	1	0	3	0	1	42	60	0	1	0	5	61	0	**262**
04:30 PM	0	2	0	99	0	2	0	0	0	0	0	0	2	0	0	0	54	61	0	0	0	5	35	0	**256**
04:45 PM	0	0	0	65	1	7	1	0	0	0	0	0	0	3	0	0	27	43	0	1	0	1	54	1	**199**
05:00 PM	0	0	0	58	0	1	1	0	0	0	0	0	0	3	0	0	31	43	0	1	0	5	46	0	**184**
05:15 PM	0	1	0	72	1	3	1	0	0	0	0	0	0	1	0	0	40	54	0	2	0	3	29	0	**202**
05:30 PM	0	0	0	78	1	1	0	0	0	0	1	0	0	1	0	0	61	52	0	0	0	1	29	0	**224**
PEAK HOUR TOTALS	**0**	**3**	**0**	**322**	**5**	**18**	**1**	**0**	**0**	**0**	**1**	**1**	**5**	**8**	**0**	**2**	**190**	**231**	**0**	**4**	**0**	**31**	**212**	**1**	**INTERSECTION**
ALL MOVEMENTS	**345**						**2**						**423**						**244**						**1014**
% HV	**0.9%**						**0.0%**						**1.9%**						**1.6%**						**1.5%**
PEAK HOUR FACTOR	**0.85**						**0.50**						**0.92**						**0.75**						**0.96**

PHF = Peak Hour Factor

3:30 PM - 5:30 PM PEAK HOUR: 3:30 PM TO 4:30 PM

REDUCED BY: CN

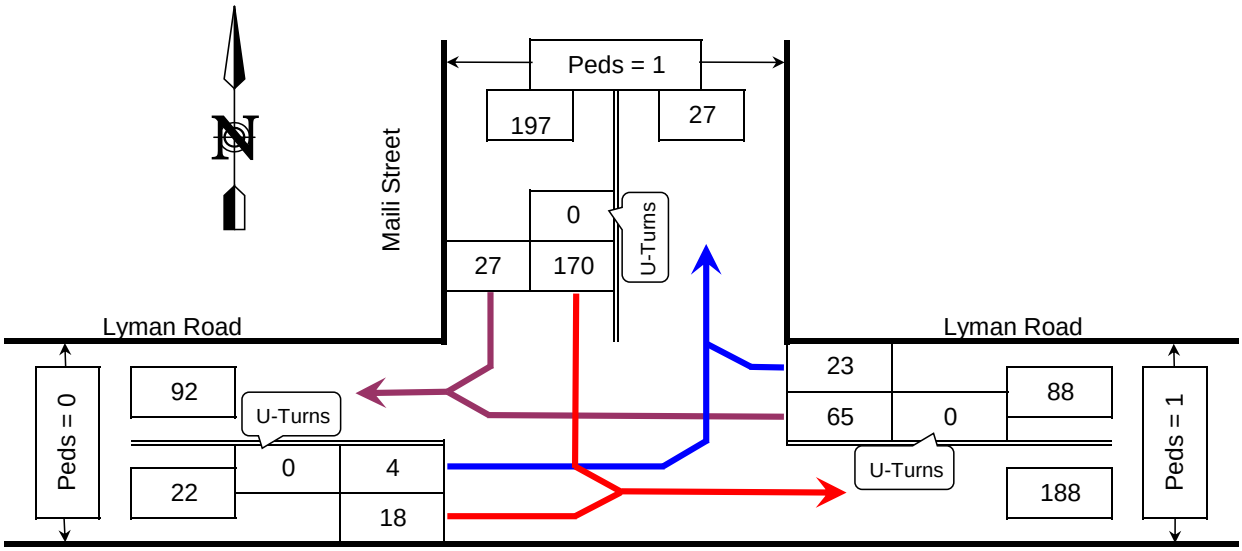
DATE OF REDUCTION: 2/28/2014

	FROM NORTH ON Humphreys Road						FROM SOUTH ON Humphreys Road (One Way SB)						FROM EAST ON Lyman Road						FROM WEST ON Lyman Road						INTERVAL TOTALS
TIME INTERVAL	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
1:30 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1:45 PM - 2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:00 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:15 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:30 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:45 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:00 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:15 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:30 PM - 4:30 PM	0	3	0	322	5	18	1	0	0	0	1	1	5	8	0	2	190	231	0	4	0	31	212	1	**1014**
3:45 PM - 4:45 PM	0	3	0	330	5	23	2	0	0	0	0	1	4	9	0	2	158	219	0	3	0	26	216	1	**981**
4:00 PM - 5:00 PM	0	3	0	305	3	17	3	0	0	0	0	1	2	9	0	1	154	207	0	3	0	16	196	1	**901**
4:15 PM - 5:15 PM	0	3	0	294	2	13	3	0	0	0	0	0	2	7	0	0	152	201	0	4	0	14	164	1	**841**
4:30 PM - 5:30 PM	0	1	0	273	3	12	3	0	0	0	1	0	0	8	0	0	159	192	0	4	0	10	158	1	**809**

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

7:30 AM - 9:30 AM PEAK HOUR: 8:30 AM TO 9:30 AM



INTERSECTION PEAK HOUR VOLUME	
IN	307
OUT	307

	HV	PHF
SB	0.5%	0.78
WB	10.2%	0.88
EB	22.7%	0.79
INTRS.	4.9%	0.85

HV = Heavy Vehicles
PHF = Peak Hour Factor

Lyman Road @ Maili Street

Schofield Barracks, HI

COUNTED BY: SN

DATE OF COUNT: Tue. 2/25/14

REDUCED BY: CN

TIME OF COUNT: 7:30 AM - 9:30 AM

REDUCTION DATE: Fri. 2/28/14

WEATHER: Overcast

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Lyman Road @ Maili Street
Schofield Barracks, HI

DATE OF COUNT: Tue. 2/25/14
TIME OF COUNT: 7:30 AM - 9:30 AM

COUNTED BY: SN
WEATHER: Overcast

TIME INTERVAL ENDING AT	FROM NORTH ON Maili Street						FROM SOUTH ON						FROM EAST ON Lyman Road						FROM WEST ON Lyman Road						INTERVAL TOTALS
	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
05:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:45 AM	0	0	0	12	0	0	0	0	0	0	0	0	2	0	0	0	6	6	0	0	0	0	2	0	**26**
08:00 AM	0	0	0	8	0	1	0	0	0	0	0	0	0	0	0	0	15	13	0	1	0	0	3	0	**40**
08:15 AM	0	0	0	10	0	1	0	0	0	0	0	0	0	0	0	0	6	13	0	1	0	1	5	0	**36**
08:30 AM	0	0	0	8	0	4	0	0	0	0	0	0	1	0	0	0	8	9	0	1	0	1	2	0	**32**
08:45 AM	0	1	0	23	0	7	0	0	0	0	0	0	1	5	0	0	14	5	0	0	0	1	4	0	**54**
09:00 AM	1	0	0	39	0	10	0	0	0	0	0	0	0	0	0	0	15	8	0	3	0	1	3	0	**76**
09:15 AM	0	0	0	52	0	3	0	0	0	0	0	0	0	3	0	0	19	6	0	0	0	1	6	0	**87**
09:30 AM	0	0	0	56	0	7	0	0	0	0	0	0	0	1	0	0	17	4	0	2	0	1	5	0	**90**
PEAK HOUR TOTALS	**1**	**1**	**0**	**170**	**0**	**27**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**9**	**0**	**0**	**65**	**23**	**0**	**5**	**0**	**4**	**18**	**0**	**INTERSECTION**
ALL MOVEMENTS	**197**						**0**						**88**						**22**						**307**
% HV	**0.5%**						**#N/A**						**10.2%**						**22.7%**						**4.9%**
PEAK HOUR FACTOR	**0.78**						**#N/A**						**0.88**						**0.79**						**0.85**

PHF = Peak Hour Factor

7:30 AM - 9:30 AM PEAK HOUR: 8:30 AM TO 9:30 AM

REDUCED BY: CN

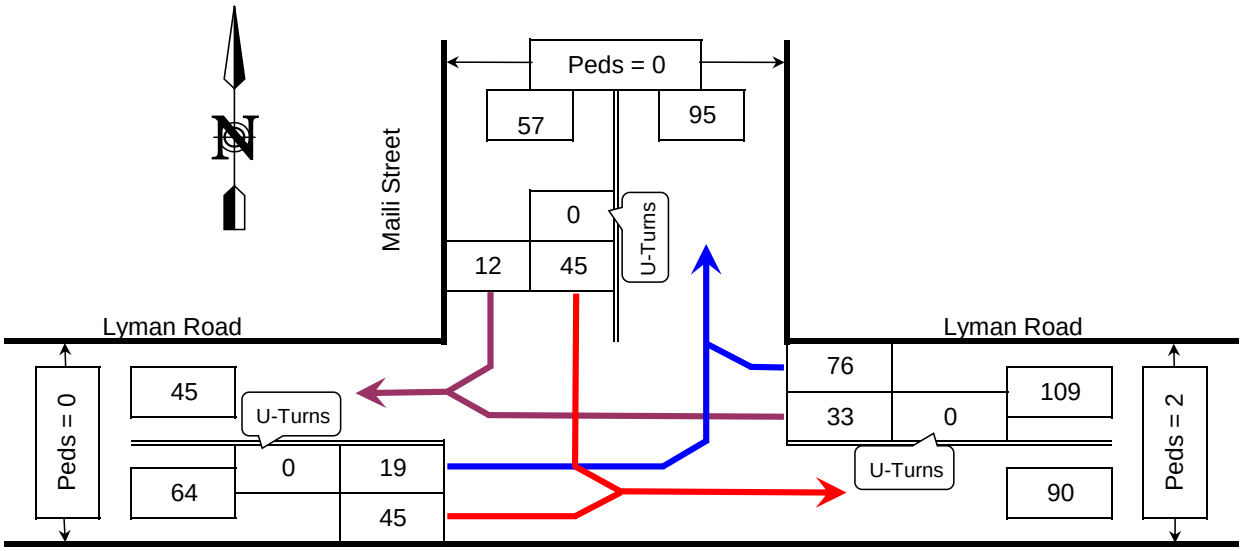
DATE OF REDUCTION: 2/28/2014

	FROM NORTH ON Maili Street						FROM SOUTH ON						FROM EAST ON Lyman Road						FROM WEST ON Lyman Road						INTERVAL TOTALS
TIME INTERVAL	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
5:30 AM - 6:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
5:45 AM - 6:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:00 AM - 7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:15 AM - 7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:30 AM - 7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:45 AM - 7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:00 AM - 8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:15 AM - 8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:30 AM - 8:30 AM	0	0	0	38	0	6	0	0	0	0	0	0	3	0	0	0	35	41	0	3	0	2	12	0	**134**
7:45 AM - 8:45 AM	0	1	0	49	0	13	0	0	0	0	0	0	2	5	0	0	43	40	0	3	0	3	14	0	**162**
8:00 AM - 9:00 AM	1	1	0	80	0	22	0	0	0	0	0	0	2	5	0	0	43	35	0	5	0	4	14	0	**198**
8:15 AM - 9:15 AM	1	1	0	122	0	24	0	0	0	0	0	0	2	8	0	0	56	28	0	4	0	4	15	0	**249**
8:30 AM - 9:30 AM	1	1	0	170	0	27	0	0	0	0	0	0	1	9	0	0	65	23	0	5	0	4	18	0	**307**

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

3:30 PM - 5:30 PM PEAK HOUR: 3:30 PM TO 4:30 PM



INTERSECTION PEAK HOUR VOLUME	
IN	230
OUT	230

	HV	PHF
SB	7.0%	0.79
WB	1.8%	0.76
EB	7.8%	0.57
INTRS.	4.8%	0.94

HV = Heavy Vehicles
PHF = Peak Hour Factor

Lyman Road @ Maili Street

Schofield Barracks, HI

COUNTED BY: SN

REDUCED BY: CN

REDUCTION DATE: Fri. 2/28/14

DATE OF COUNT: Tue. 2/25/14

TIME OF COUNT: 3:30 PM - 5:30 PM

WEATHER: Overcast

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Lyman Road @ Maili Street
Schofield Barracks, HI

DATE OF COUNT: Tue. 2/25/14
TIME OF COUNT: 3:30 PM - 5:30 PM

COUNTED BY: SN
WEATHER: Overcast

TIME INTERVAL ENDING AT	FROM NORTH ON Maili Street						FROM SOUTH ON						FROM EAST ON Lyman Road						FROM WEST ON Lyman Road						INTERVAL TOTALS
	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:45 PM	0	0	0	15	0	2	0	0	0	0	0	0	0	1	0	0	5	18	0	1	0	6	9	0	**55**
04:00 PM	0	1	0	8	0	3	0	0	0	0	0	0	0	0	0	0	4	24	0	0	0	8	6	0	**53**
04:15 PM	0	3	0	7	0	4	0	0	0	0	0	0	0	0	0	0	9	13	0	3	0	4	24	0	**61**
04:30 PM	0	0	0	15	0	3	0	0	0	0	0	0	2	1	0	0	15	21	0	1	0	1	6	0	**61**
04:45 PM	0	0	0	5	0	3	0	0	0	0	0	0	0	1	0	0	9	14	2	0	0	3	20	0	**54**
05:00 PM	1	0	0	8	0	2	0	0	0	0	0	0	0	0	0	0	8	8	0	0	0	5	19	0	**50**
05:15 PM	1	0	0	9	0	1	0	0	0	0	0	0	0	0	0	0	2	17	0	1	0	2	19	0	**50**
05:30 PM	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	5	10	0	1	0	2	10	0	**30**
PEAK HOUR TOTALS	**0**	**4**	**0**	**45**	**0**	**12**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**33**	**76**	**0**	**5**	**0**	**19**	**45**	**0**	**INTERSECTION**
ALL MOVEMENTS	**57**						**0**						**109**						**64**						**230**
% HV	**7.0%**						**#N/A**						**1.8%**						**7.8%**						**4.8%**
PEAK HOUR FACTOR	**0.79**						**#N/A**						**0.76**						**0.57**						**0.94**

PHF = Peak Hour Factor

3:30 PM - 5:30 PM PEAK HOUR: 3:30 PM TO 4:30 PM

REDUCED BY: CN

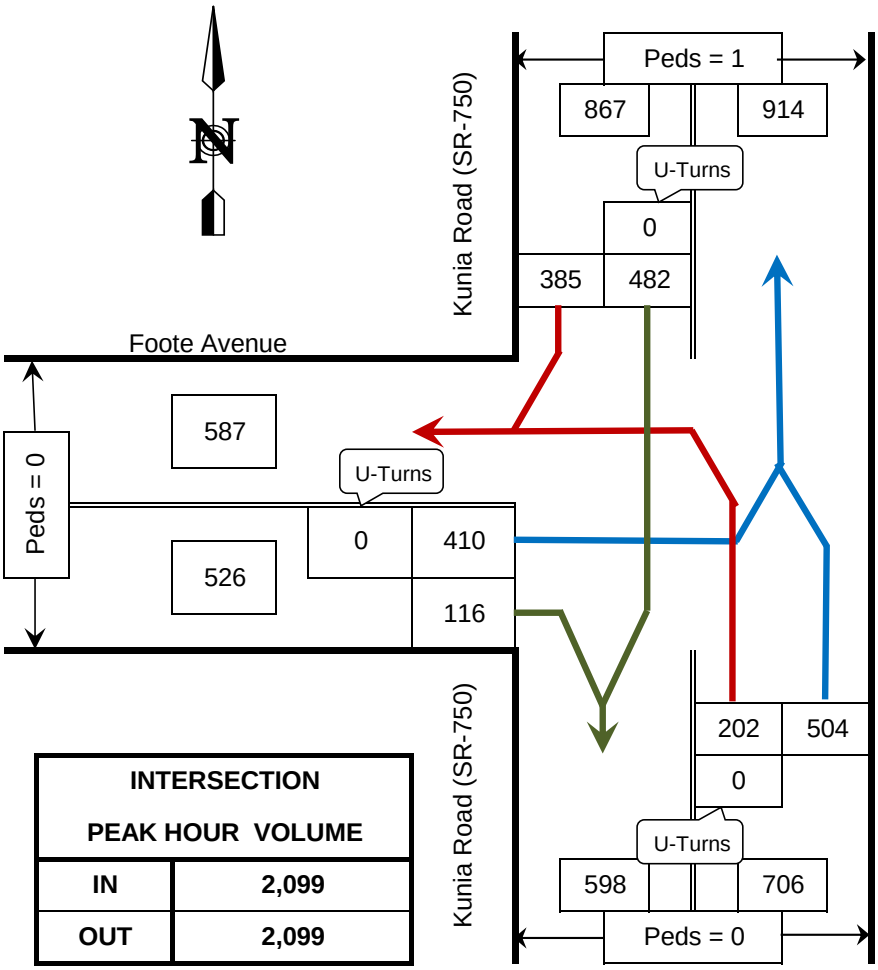
DATE OF REDUCTION: 2/28/2014

	FROM NORTH ON Maili Street						FROM SOUTH ON						FROM EAST ON Lyman Road						FROM WEST ON Lyman Road						INTERVAL TOTALS
TIME INTERVAL	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
1:30 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1:45 PM - 2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:00 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:15 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:30 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:45 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:00 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:15 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:30 PM - 4:30 PM	0	4	0	45	0	12	0	0	0	0	0	0	2	2	0	0	33	76	0	5	0	19	45	0	**230**
3:45 PM - 4:45 PM	0	4	0	35	0	13	0	0	0	0	0	0	2	2	0	0	37	72	2	4	0	16	56	0	**229**
4:00 PM - 5:00 PM	1	3	0	35	0	12	0	0	0	0	0	0	2	2	0	0	41	56	2	4	0	13	69	0	**226**
4:15 PM - 5:15 PM	2	0	0	37	0	9	0	0	0	0	0	0	2	2	0	0	34	60	2	2	0	11	64	0	**215**
4:30 PM - 5:30 PM	2	0	0	25	0	6	0	0	0	0	0	0	0	1	0	0	24	49	2	2	0	12	68	0	**184**

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

7:30 AM - 9:30 AM PEAK HOUR: 7:30 AM TO 8:30 AM



INTERSECTION PEAK HOUR VOLUME	
IN	2,099
OUT	2,099

	HV	PHF
SB	5.0%	0.87
NB	3.4%	0.92
EB	2.5%	0.84
INTRS.	3.8%	0.88

HV = Heavy Vehicles
PHF = Peak Hour Factor

Kunia Road (SR-750) @ Foote Avenue

Schofield Barracks, HI

COUNTED BY: CN

REDUCED BY: CN

REDUCTION DATE: Fri. 2/28/14

DATE OF COUNT: Wed. 2/26/14

TIME OF COUNT: 7:30 AM - 9:30 AM

WEATHER: Sunny

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Kunia Road (SR-750) @ Foote Avenue
Schofield Barracks, HI

DATE OF COUNT: Wed. 2/26/14
TIME OF COUNT: 7:30 AM - 9:30 AM

COUNTED BY: CN
WEATHER: Sunny

TIME INTERVAL ENDING AT	FROM NORTH ON Kunia Road (SR-750)						FROM SOUTH ON Kunia Road (SR-750)						FROM EAST ON						FROM WEST ON Foote Avenue						INTERVAL TOTALS
	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
05:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:45 AM	0	9	0	0	129	74	0	6	0	41	146	0	0	0	0	0	0	0	0	6	0	119	0	37	**546**
08:00 AM	0	11	0	0	128	90	0	6	0	47	115	0	0	0	0	0	0	0	0	1	0	97	0	24	**501**
08:15 AM	1	13	0	0	121	128	0	7	0	53	139	0	0	0	0	0	0	0	0	4	0	124	0	29	**594**
08:30 AM	0	10	0	0	104	93	0	5	0	61	104	0	0	0	0	0	0	0	0	2	0	70	0	26	**458**
08:45 AM	1	16	0	0	110	90	0	12	0	67	109	0	0	0	0	0	0	0	0	2	0	43	0	17	**436**
09:00 AM	0	13	0	0	111	129	0	8	0	43	93	0	0	0	0	0	0	0	0	1	0	75	0	30	**481**
09:15 AM	0	5	0	0	99	114	0	5	0	71	82	0	0	0	0	0	0	0	0	2	0	70	0	30	**466**
09:30 AM	1	8	0	0	95	96	0	2	0	56	69	0	0	0	0	0	0	0	0	5	0	76	0	23	**415**
PEAK HOUR TOTALS	**1**	**43**	**0**	**0**	**482**	**385**	**0**	**24**	**0**	**202**	**504**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**13**	**0**	**410**	**0**	**116**	**INTERSECTION**
ALL MOVEMENTS	**867**						**706**						**0**						**526**						**2099**
% HV	**5.0%**						**3.4%**						**#N/A**						**2.5%**						**3.8%**
PEAK HOUR FACTOR	**0.87**						**0.92**						**#N/A**						**0.84**						**0.88**

PHF = Peak Hour Factor

7:30 AM - 9:30 AM PEAK HOUR: 7:30 AM TO 8:30 AM

REDUCED BY: CN

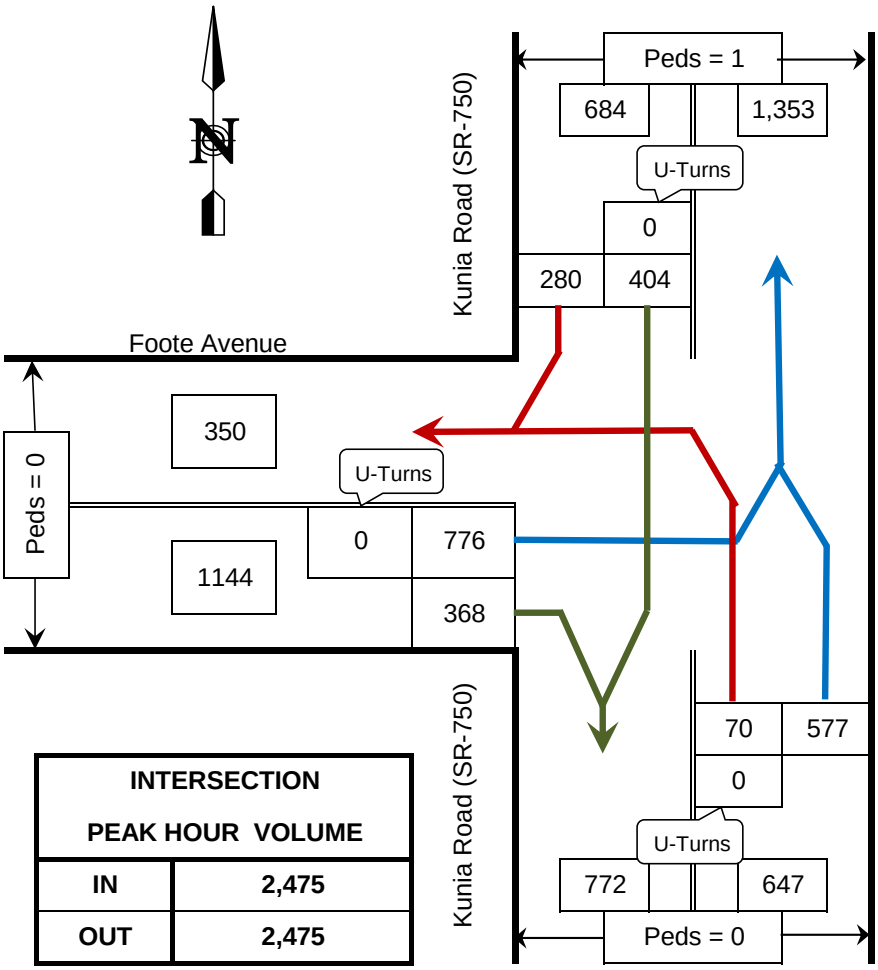
DATE OF REDUCTION: 2/28/2014

	FROM NORTH ON Kunia Road (SR-750)						FROM SOUTH ON Kunia Road (SR-750)						FROM EAST ON						FROM WEST ON Foote Avenue						INTERVAL TOTALS
TIME INTERVAL	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
5:30 AM - 6:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
5:45 AM - 6:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:00 AM - 7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:15 AM - 7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:30 AM - 7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:45 AM - 7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:00 AM - 8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:15 AM - 8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:30 AM - 8:30 AM	1	43	0	0	482	385	0	24	0	202	504	0	0	0	0	0	0	0	0	13	0	410	0	116	**2099**
7:45 AM - 8:45 AM	2	50	0	0	463	401	0	30	0	228	467	0	0	0	0	0	0	0	0	9	0	334	0	96	**1989**
8:00 AM - 9:00 AM	2	52	0	0	446	440	0	32	0	224	445	0	0	0	0	0	0	0	0	9	0	312	0	102	**1969**
8:15 AM - 9:15 AM	1	44	0	0	424	426	0	30	0	242	388	0	0	0	0	0	0	0	0	7	0	258	0	103	**1841**
8:30 AM - 9:30 AM	2	42	0	0	415	429	0	27	0	237	353	0	0	0	0	0	0	0	0	10	0	264	0	100	**1798**

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

3:30 PM - 5:30 PM PEAK HOUR: 3:30 PM TO 4:30 PM



INTERSECTION PEAK HOUR VOLUME	
IN	2,475
OUT	2,475

	HV	PHF
SB	2.2%	0.87
NB	0.8%	0.83
EB	0.5%	0.81
INTRS.	1.1%	0.93

HV = Heavy Vehicles
PHF = Peak Hour Factor

Kunia Road (SR-750) @ Foote Avenue

Schofield Barracks, HI

COUNTED BY: CN

REDUCED BY: CN

REDUCTION DATE: Fri. 2/28/14

DATE OF COUNT: Wed. 2/26/14

TIME OF COUNT: 3:30 PM - 5:30 PM

WEATHER: Rainy

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Kunia Road (SR-750) @ Foote Avenue
Schofield Barracks, HI

DATE OF COUNT: Wed. 2/26/14
TIME OF COUNT: 3:30 PM - 5:30 PM

COUNTED BY: CN
WEATHER: Rainy

TIME INTERVAL ENDING AT	FROM NORTH ON Kunia Road (SR-750)						FROM SOUTH ON Kunia Road (SR-750)						FROM EAST ON						FROM WEST ON Foote Avenue						INTERVAL TOTALS
	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:45 PM	1	0	0	0	82	71	0	2	0	15	116	0	0	0	0	0	0	0	0	0	0	220	0	134	**638**
04:00 PM	0	5	0	0	105	75	0	0	0	23	173	0	0	0	0	0	0	0	0	3	0	198	0	89	**663**
04:15 PM	0	7	0	0	105	50	0	1	0	11	154	0	0	0	0	0	0	0	0	0	0	185	0	93	**598**
04:30 PM	0	3	0	0	112	84	0	2	0	21	134	0	0	0	0	0	0	0	0	3	0	173	0	52	**576**
04:45 PM	0	1	0	0	89	76	0	2	0	26	130	0	0	0	0	0	0	0	0	1	0	141	0	53	**515**
05:00 PM	0	2	0	0	84	69	0	2	0	24	83	0	0	0	0	0	0	0	0	2	0	152	0	47	**459**
05:15 PM	0	4	0	0	109	88	0	2	0	17	129	0	0	0	0	0	0	0	0	1	0	179	0	62	**584**
05:30 PM	0	3	0	0	86	56	0	1	0	19	115	0	0	0	0	0	0	0	0	2	0	166	0	44	**486**
PEAK HOUR TOTALS	**1**	**15**	**0**	**0**	**404**	**280**	**0**	**5**	**0**	**70**	**577**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**776**	**0**	**368**	**INTERSECTION**
ALL MOVEMENTS	**684**						**647**						**0**						**1144**						**2475**
% HV	**2.2%**						**0.8%**						**#N/A**						**0.5%**						**1.1%**
PEAK HOUR FACTOR	**0.87**						**0.83**						**#N/A**						**0.81**						**0.93**

PHF = Peak Hour Factor

3:30 PM - 5:30 PM PEAK HOUR: 3:30 PM TO 4:30 PM

REDUCED BY: CN

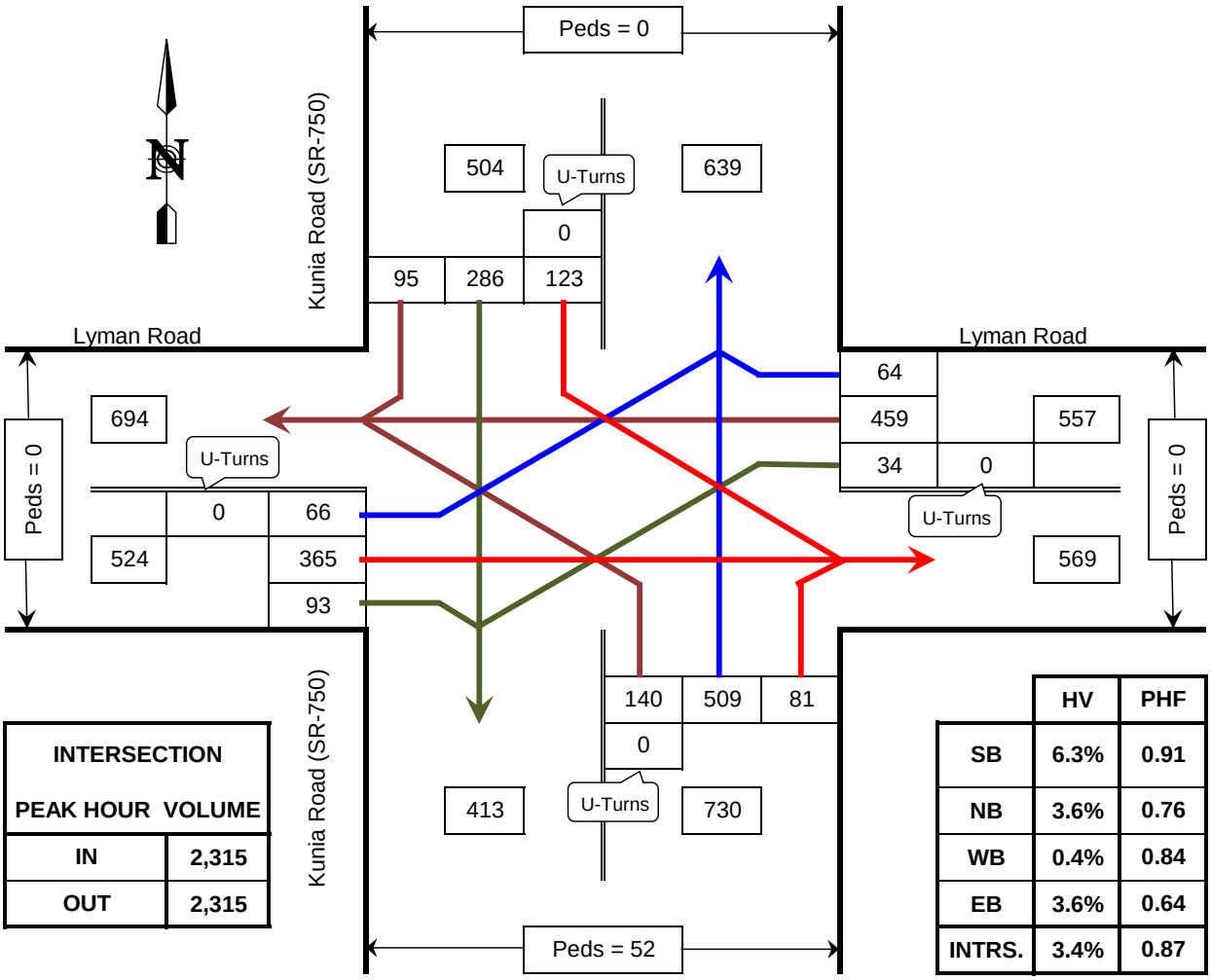
DATE OF REDUCTION: 2/28/2014

	FROM NORTH ON Kunia Road (SR-750)						FROM SOUTH ON Kunia Road (SR-750)						FROM EAST ON						FROM WEST ON Foote Avenue						INTERVAL TOTALS
TIME INTERVAL	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
1:30 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1:45 PM - 2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:00 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:15 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:30 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:45 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:00 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:15 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:30 PM - 4:30 PM	1	15	0	0	404	280	0	5	0	70	577	0	0	0	0	0	0	0	0	6	0	776	0	368	**2475**
3:45 PM - 4:45 PM	0	16	0	0	411	285	0	5	0	81	591	0	0	0	0	0	0	0	0	7	0	697	0	287	**2352**
4:00 PM - 5:00 PM	0	13	0	0	390	279	0	7	0	82	501	0	0	0	0	0	0	0	0	6	0	651	0	245	**2148**
4:15 PM - 5:15 PM	0	10	0	0	394	317	0	8	0	88	476	0	0	0	0	0	0	0	0	7	0	645	0	214	**2134**
4:30 PM - 5:30 PM	0	10	0	0	368	289	0	7	0	86	457	0	0	0	0	0	0	0	0	6	0	638	0	206	**2044**

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

7:30 AM - 9:30 AM PEAK HOUR: 7:30 AM TO 8:30 AM



INTERSECTION PEAK HOUR VOLUME	
IN	2,315
OUT	2,315

	HV	PHF
SB	6.3%	0.91
NB	3.6%	0.76
WB	0.4%	0.84
EB	3.6%	0.64
INTRS.	3.4%	0.87

PHF = Peak Hour Factor
HV = Heavy Vehicles

Kunia Road (SR-750) @ Lyman Road

Schofield Barracks, HI

COUNTED BY: CN

REDUCED BY: CN

REDUCTION DATE: Fri. 2/28/14

DATE OF COUNT: Tue. 2/25/14

TIME OF COUNT: 7:30 AM - 9:30 AM

WEATHER: Overcast

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Kunia Road (SR-750) @ Lyman Road
Schofield Barracks, HI

DATE OF COUNT: Tue. 2/25/14
TIME OF COUNT: 7:30 AM - 9:30 AM

COUNTED BY: CN
WEATHER: Overcast

TIME INTERVAL ENDING AT	FROM NORTH ON Kunia Road (SR-750)						FROM SOUTH ON Kunia Road (SR-750)						FROM EAST ON Lyman Road						FROM WEST ON Lyman Road						INTERVAL TOTALS
	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
05:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:45 AM	0	8	0	41	59	29	42	3	0	30	140	20	0	0	0	7	121	12	0	1	0	11	168	26	**664**
08:00 AM	0	9	0	30	68	20	9	7	0	38	168	33	0	0	0	7	141	10	0	6	0	20	100	33	**668**
08:15 AM	0	8	0	29	93	16	1	10	0	40	126	18	0	1	0	14	127	24	0	6	0	18	46	23	**574**
08:30 AM	0	7	0	23	66	30	0	6	0	32	75	10	0	1	0	6	70	18	0	6	0	17	51	11	**409**
08:45 AM	0	11	0	23	65	35	0	5	0	44	123	22	0	2	0	6	99	15	0	3	0	6	45	7	**490**
09:00 AM	0	10	0	23	48	44	0	7	0	31	105	18	0	6	0	6	143	14	0	2	0	8	66	15	**521**
09:15 AM	0	8	0	22	74	47	1	5	0	36	113	18	0	2	0	2	110	16	0	4	0	19	101	17	**575**
09:30 AM	0	16	0	28	60	29	0	8	0	42	103	20	0	4	0	3	89	18	0	7	0	13	83	9	**497**
PEAK HOUR TOTALS	**0**	**32**	**0**	**123**	**286**	**95**	**52**	**26**	**0**	**140**	**509**	**81**	**0**	**2**	**0**	**34**	**459**	**64**	**0**	**19**	**0**	**66**	**365**	**93**	**INTERSECTION**
ALL MOVEMENTS	**504**						**730**						**557**						**524**						**2315**
% HV	**6.3%**						**3.6%**						**0.4%**						**3.6%**						**3.4%**
PEAK HOUR FACTOR	**0.91**						**0.76**						**0.84**						**0.64**						**0.87**

PHF = Peak Hour Factor

7:30 AM - 9:30 AM PEAK HOUR: 7:30 AM TO 8:30 AM

REDUCED BY: CN

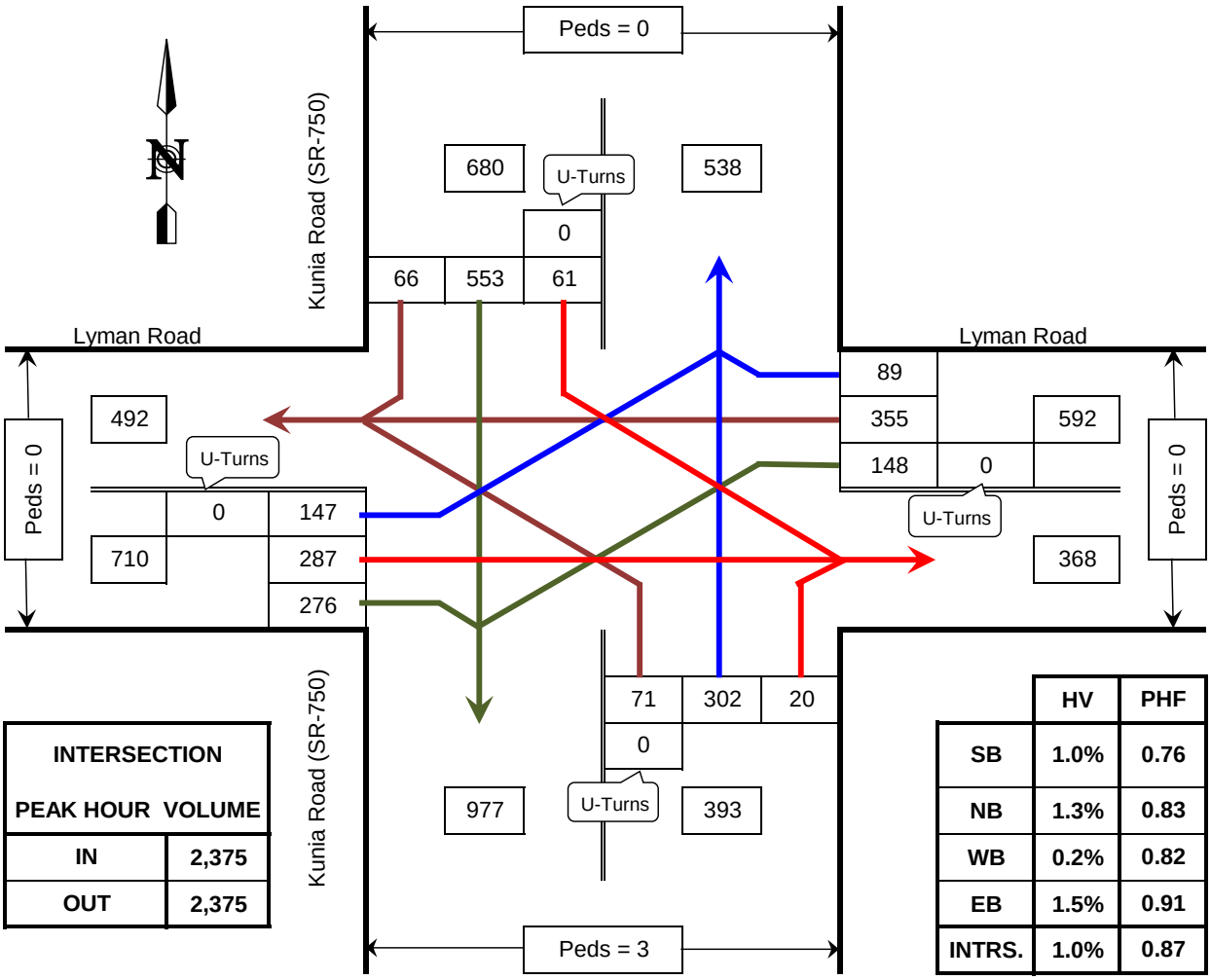
DATE OF REDUCTION: 2/28/2014

	FROM NORTH ON Kunia Road (SR-750)						FROM SOUTH ON Kunia Road (SR-750)						FROM EAST ON Lyman Road						FROM WEST ON Lyman Road						INTERVAL TOTALS
TIME INTERVAL	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
5:30 AM - 6:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
5:45 AM - 6:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:00 AM - 7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:15 AM - 7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:30 AM - 7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:45 AM - 7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:00 AM - 8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:15 AM - 8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:30 AM - 8:30 AM	0	32	0	123	286	95	52	26	0	140	509	81	0	2	0	34	459	64	0	19	0	66	365	93	**2315**
7:45 AM - 8:45 AM	0	35	0	105	292	101	10	28	0	154	492	83	0	4	0	33	437	67	0	21	0	61	242	74	**2141**
8:00 AM - 9:00 AM	0	36	0	98	272	125	1	28	0	147	429	68	0	10	0	32	439	71	0	17	0	49	208	56	**1994**
8:15 AM - 9:15 AM	0	36	0	91	253	156	1	23	0	143	416	68	0	11	0	20	422	63	0	15	0	50	263	50	**1995**
8:30 AM - 9:30 AM	0	45	0	96	247	155	1	25	0	153	444	78	0	14	0	17	441	63	0	16	0	46	295	48	**2083**

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

3:30 PM - 5:30 PM PEAK HOUR: 4:30 PM TO 5:30 PM



INTERSECTION PEAK HOUR VOLUME	
IN	2,375
OUT	2,375

	HV	PHF
SB	1.0%	0.76
NB	1.3%	0.83
WB	0.2%	0.82
EB	1.5%	0.91
INTRS.	1.0%	0.87

PHF = Peak Hour Factor
HV = Heavy Vehicles

Kunia Road (SR-750) @ Lyman Road

Schofield Barracks, HI

COUNTED BY:	CN	DATE OF COUNT:	Tue. 2/25/14
REDUCED BY:	CN	TIME OF COUNT:	3:30 PM - 5:30 PM
REDUCTION DATE:	Fri. 2/28/14	WEATHER:	Overcast

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Kunia Road (SR-750) @ Lyman Road
Schofield Barracks, HI

DATE OF COUNT: Tue. 2/25/14
TIME OF COUNT: 3:30 PM - 5:30 PM

COUNTED BY: CN
WEATHER: Overcast

TIME INTERVAL ENDING AT	FROM NORTH ON Kunia Road (SR-750)						FROM SOUTH ON Kunia Road (SR-750)						FROM EAST ON Lyman Road						FROM WEST ON Lyman Road						INTERVAL TOTALS
	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:45 PM	0	5	0	27	129	23	0	3	0	20	107	11	0	2	0	30	50	18	0	6	0	41	55	30	**541**
04:00 PM	0	3	0	12	147	17	0	2	0	16	134	8	0	1	0	23	47	19	0	2	0	27	63	41	**554**
04:15 PM	0	5	0	13	117	19	1	0	0	18	79	5	0	6	0	36	60	28	0	1	0	28	72	49	**524**
04:30 PM	0	2	0	11	119	18	0	0	0	21	82	3	0	2	0	22	73	29	0	2	0	27	69	61	**535**
04:45 PM	0	1	0	10	130	13	2	1	0	22	73	3	0	1	0	43	62	15	0	5	0	21	69	58	**519**
05:00 PM	0	5	0	14	127	16	0	2	0	9	73	7	0	0	0	32	67	14	0	6	0	48	69	78	**554**
05:15 PM	0	0	0	16	114	15	1	0	0	20	95	3	0	0	0	30	117	31	0	0	0	31	72	78	**622**
05:30 PM	0	1	0	21	182	22	0	2	0	20	61	7	0	0	0	43	109	29	0	0	0	47	77	62	**680**
PEAK HOUR TOTALS	**0**	**7**	**0**	**61**	**553**	**66**	**3**	**5**	**0**	**71**	**302**	**20**	**0**	**1**	**0**	**148**	**355**	**89**	**0**	**11**	**0**	**147**	**287**	**276**	**INTERSECTION**
ALL MOVEMENTS	**680**						**393**						**592**						**710**						**2375**
% HV	**1.0%**						**1.3%**						**0.2%**						**1.5%**						**1.0%**
PEAK HOUR FACTOR	**0.76**						**0.83**						**0.82**						**0.91**						**0.87**

PHF = Peak Hour Factor

3:30 PM - 5:30 PM PEAK HOUR: **4:30 PM TO 5:30 PM**

REDUCED BY: CN

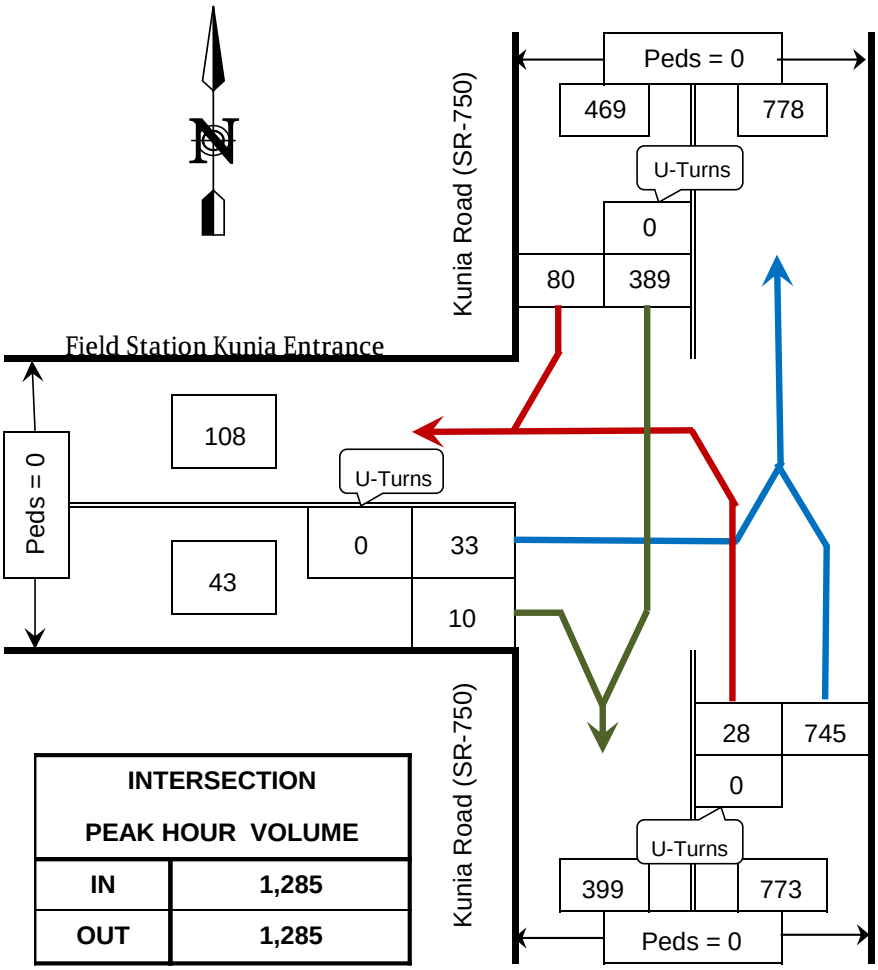
DATE OF REDUCTION: 2/28/2014

	FROM NORTH ON Kunia Road (SR-750)						FROM SOUTH ON Kunia Road (SR-750)						FROM EAST ON Lyman Road						FROM WEST ON Lyman Road						INTERVAL TOTALS
TIME INTERVAL	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
1:30 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1:45 PM - 2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:00 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:15 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:30 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2:45 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:00 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:15 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3:30 PM - 4:30 PM	0	15	0	63	512	77	1	5	0	75	402	27	0	11	0	111	230	94	0	11	0	123	259	181	**2154**
3:45 PM - 4:45 PM	0	11	0	46	513	67	3	3	0	77	368	19	0	10	0	124	242	91	0	10	0	103	273	209	**2132**
4:00 PM - 5:00 PM	0	13	0	48	493	66	3	3	0	70	307	18	0	9	0	133	262	86	0	14	0	124	279	246	**2132**
4:15 PM - 5:15 PM	0	8	0	51	490	62	3	3	0	72	323	16	0	3	0	127	319	89	0	13	0	127	279	275	**2230**
4:30 PM - 5:30 PM	0	7	0	61	553	66	3	5	0	71	302	20	0	1	0	148	355	89	0	11	0	147	287	276	**2375**

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

7:30 AM - 9:30 AM PEAK HOUR: 7:30 AM TO 8:30 AM



INTERSECTION PEAK HOUR VOLUME	
IN	1,285
OUT	1,285

	HV	PHF
SB	4.7%	0.92
NB	4.3%	0.89
EB	14.0%	0.51
INTRS.	4.7%	0.95

HV = Heavy Vehicles
PHF = Peak Hour Factor

Kunia Road (SR-750) @ Field Station Kunia Entrance

Schofield Barracks, HI

COUNTED BY: VT

DATE OF COUNT: Wed. 2/26/14

REDUCED BY: CN

TIME OF COUNT: 7:30 AM - 9:30 AM

REDUCTION DATE: Fri. 2/28/14

WEATHER: Overcast

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Kunia Road (SR-750) @ FSK Entrance
Schofield Barracks, HI

DATE OF COUNT: Wed. 2/26/14
TIME OF COUNT: 7:30 AM - 9:30 AM

COUNTED BY: VT
WEATHER: Overcast

TIME INTERVAL ENDING AT	FROM NORTH ON Kunia Road (SR-750)						FROM SOUTH ON Kunia Road (SR-750)						FROM EAST ON						FROM WEST ON FSK Entrance						INTERVAL TOTALS
	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
05:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:45 AM	0	5	0	0	92	25	0	4	0	5	211	0	0	0	0	0	0	0	0	1	0	5	0	1	**339**
08:00 AM	0	8	0	0	105	23	0	5	0	13	165	0	0	0	0	0	0	0	0	1	0	6	0	1	**313**
08:15 AM	0	5	0	0	100	20	0	10	0	4	171	0	0	0	0	0	0	0	0	1	0	7	0	2	**304**
08:30 AM	0	4	0	0	92	12	0	14	0	6	198	0	0	0	0	0	0	0	0	3	0	15	0	6	**329**
08:45 AM	0	7	0	0	76	12	0	18	0	7	195	0	0	0	0	0	0	0	0	0	0	15	0	2	**307**
09:00 AM	0	9	0	0	71	9	0	10	0	2	150	0	0	0	0	0	0	0	0	0	0	11	0	0	**243**
09:15 AM	0	5	0	0	49	16	0	13	0	6	164	0	0	0	0	0	0	0	0	0	0	11	0	3	**249**
09:30 AM	0	6	0	0	59	18	0	7	0	5	117	0	0	0	0	0	0	0	0	0	0	13	0	1	**213**
PEAK HOUR TOTALS	**0**	**22**	**0**	**0**	**389**	**80**	**0**	**33**	**0**	**28**	**745**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**33**	**0**	**10**	**INTERSECTION**
ALL MOVEMENTS	**469**						**773**						**0**						**43**						**1285**
% HV	**4.7%**						**4.3%**						**#N/A**						**14.0%**						**4.7%**
PEAK HOUR FACTOR	**0.92**						**0.89**						**#N/A**						**0.51**						**0.95**

PHF = Peak Hour Factor

7:30 AM - 9:30 AM PEAK HOUR: 7:30 AM TO 8:30 AM

REDUCED BY: CN

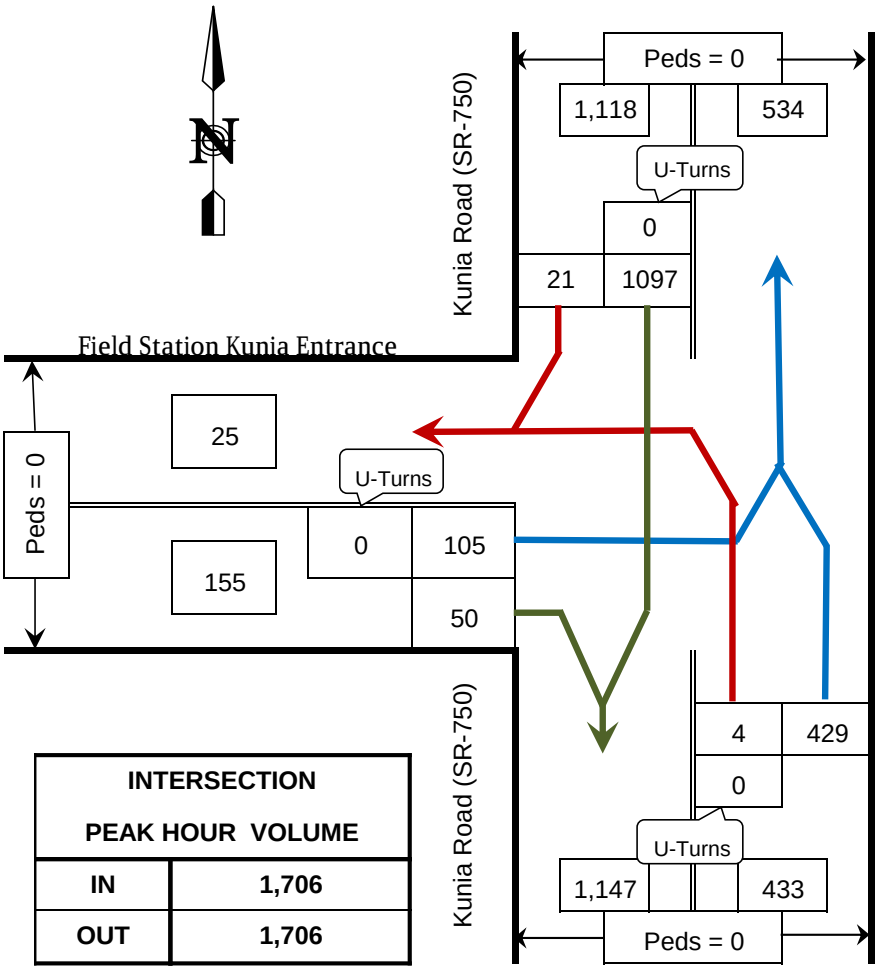
DATE OF REDUCTION: 2/28/2014

	FROM NORTH ON Kunia Road (SR-750)						FROM SOUTH ON Kunia Road (SR-750)						FROM EAST ON						FROM WEST ON FSK Entrance						INTERVAL TOTALS
TIME INTERVAL	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
5:30 AM - 6:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
5:45 AM - 6:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:00 AM - 7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:15 AM - 7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:30 AM - 7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6:45 AM - 7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:00 AM - 8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:15 AM - 8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7:30 AM - 8:30 AM	0	22	0	0	389	80	0	33	0	28	745	0	0	0	0	0	0	0	0	6	0	33	0	10	**1285**
7:45 AM - 8:45 AM	0	24	0	0	373	67	0	47	0	30	729	0	0	0	0	0	0	0	0	5	0	43	0	11	**1253**
8:00 AM - 9:00 AM	0	25	0	0	339	53	0	52	0	19	714	0	0	0	0	0	0	0	0	4	0	48	0	10	**1183**
8:15 AM - 9:15 AM	0	25	0	0	288	49	0	55	0	21	707	0	0	0	0	0	0	0	0	3	0	52	0	11	**1128**
8:30 AM - 9:30 AM	0	27	0	0	255	55	0	48	0	20	626	0	0	0	0	0	0	0	0	0	0	50	0	6	**1012**

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

3:30 PM - 5:30 PM PEAK HOUR: 3:30 PM TO 4:30 PM



INTERSECTION PEAK HOUR VOLUME	
IN	1,706
OUT	1,706

	HV	PHF
SB	1.3%	0.87
NB	2.5%	0.87
EB	0.6%	0.97
INTRS.	1.6%	0.90

HV = Heavy Vehicles
PHF = Peak Hour Factor

Kunia Road (SR-750) @ Field Station Kunia Entrance

Schofield Barracks, HI

COUNTED BY: VT

DATE OF COUNT: Wed. 2/26/14

REDUCED BY: CN

TIME OF COUNT: 3:30 PM - 5:30 PM

REDUCTION DATE: Fri. 2/28/14

WEATHER: Overcast

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Kunia Road (SR-750) @ FSK Entrance
Schofield Barracks, HI

DATE OF COUNT: Wed. 2/26/14
TIME OF COUNT: 3:30 PM - 5:30 PM

COUNTED BY: VT
WEATHER: Overcast

TIME INTERVAL ENDING AT	FROM NORTH ON Kunia Road (SR-750)						FROM SOUTH ON Kunia Road (SR-750)						FROM EAST ON						FROM WEST ON FSK Entrance						INTERVAL TOTALS
	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	4	0	0	260	6	0	3	0	2	90	0	0	0	0	0	0	0	0	0	0	28	0	12	398
04:00 PM	0	3	0	0	264	6	0	4	0	2	122	0	0	0	0	0	0	0	0	1	0	21	0	18	433
04:15 PM	0	4	0	0	314	6	0	1	0	0	117	0	0	0	0	0	0	0	0	0	0	25	0	13	475
04:30 PM	0	4	0	0	259	3	0	3	0	0	100	0	0	0	0	0	0	0	0	0	0	31	0	7	400
04:45 PM	0	5	0	0	271	2	0	1	0	1	90	0	0	0	0	0	0	0	0	0	0	18	0	8	390
05:00 PM	0	3	0	0	221	4	0	3	0	2	92	0	0	0	0	0	0	0	0	0	0	13	0	9	341
05:15 PM	0	2	0	0	160	3	0	4	0	1	74	0	0	0	0	0	0	0	0	0	0	18	0	4	260
05:30 PM	0	2	0	0	211	1	0	1	0	1	85	0	0	0	0	0	0	0	0	0	0	15	0	3	316
PEAK HOUR TOTALS	0	15	0	0	1097	21	0	11	0	4	429	0	0	0	0	0	0	0	0	1	0	105	0	50	INTERSECTION
ALL MOVEMENTS	1118						433						0						155						1706
% HV	1.3%						2.5%						#N/A						0.6%						1.6%
PEAK HOUR FACTOR	0.87						0.87						#N/A						0.97						0.90

PHF = Peak Hour Factor

3:30 PM - 5:30 PM PEAK HOUR: 3:30 PM TO 4:30 PM

REDUCED BY: CN

DATE OF REDUCTION: 2/28/2014

	FROM NORTH ON Kunia Road (SR-750)						FROM SOUTH ON Kunia Road (SR-750)						FROM EAST ON						FROM WEST ON FSK Entrance						INTERVAL TOTALS
TIME INTERVAL	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	Peds	HV	UTurn	Left	Thru	Right	
1:30 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:45 PM - 2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM - 4:30 PM	0	15	0	0	1097	21	0	11	0	4	429	0	0	0	0	0	0	0	0	1	0	105	0	50	1706
3:45 PM - 4:45 PM	0	16	0	0	1108	17	0	9	0	3	429	0	0	0	0	0	0	0	0	1	0	95	0	46	1698
4:00 PM - 5:00 PM	0	16	0	0	1065	15	0	8	0	3	399	0	0	0	0	0	0	0	0	0	0	87	0	37	1606
4:15 PM - 5:15 PM	0	14	0	0	911	12	0	11	0	4	356	0	0	0	0	0	0	0	0	0	0	80	0	28	1391
4:30 PM - 5:30 PM	0	12	0	0	863	10	0	9	0	5	341	0	0	0	0	0	0	0	0	0	0	64	0	24	1307

Traffic Study
Appendix B.

Level of Service (LOS) Definitions

Level of Service (LOS) Definitions

The following sections describe the Level of Service (LOS) definitions for unsignalized and signalized intersection capacity.

The objective of applied traffic analysis is to provide a method of quantifying the degree of expected traffic congestion and compare this to the overall traffic-related performance of the roadway[1].

The capacity of any transportation facility reflects its ability to accommodate a moving stream of people or vehicles. It is a measure of the supply side of transportation facilities. LOS uses qualitative measures that characterize operational conditions within a traffic stream and perception of these conditions by motorists and passengers. The descriptions of individual LOS characterize these conditions in terms of factors such as speed and travel time, freedom to maneuver, traffic interruptions, and driver comfort and convenience[2].

Six LOS are defined for each type of transportation facility for which analysis procedures are available. They are given letter designations, ranging from "A" to "F," with "A" representing the best operating conditions and "F" representing the worst. Each LOS represents a range of operating conditions that are defined by quantitative factors known as measures of effectiveness.

The volume of traffic that can be served under stop-and-go conditions of LOS F is generally accepted as being lower than that possible at LOS E. Typically a facility that operates a LOS E is at the maximum service flow rate. For most design or planning purposes, however, obtaining service flow rates of C are usually the desired norm because they ensure a more acceptable quality of service to all users of the transportation facility.

Unsignalized Intersection Capacity

The LOS for an unsignalized intersection is determined by the amount of delay experienced at the intersection. Delay is measured as the average time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line. The LOS is determined from the length of the average delay experienced at the intersection during the peak commute hour. LOS A indicates short delays associated with very small queues, while LOS F indicates very long delays associated with longer queues.

Unsignalized intersections were evaluated according to the methodologies presented in Chapter 17 of the 2000 update of the *Highway Capacity Manual* (HCM)[3]. For the purposes of this report, the worst movement at each unsignalized intersection was used to compare LOS and delay to other intersections. The following table summarizes the LOS criteria for unsignalized intersections.

[1] *Principals of Highway Engineering and Traffic Analysis*, Mannering and Kilareksi (1997).
[2] *Traffic Engineering Handbook*, Institute of Transportation Engineers (1999).
[3] *Highway Capacity Manual: Special Report 209*, Transportation Research Board (2000 Update).

Unsignalized Intersection LOS Criteria

Average Control Delay (sec/veh)	*Intersection Level of Service*
≤ 10	A
> 10 and ≤ 15	B
>15 and ≤ 25	C
>25 and ≤ 35	D
>35 and ≤ 50	E
> 50	F

Note: sec/veh = seconds per vehicle.

It should be mentioned that equal LOS values at several locations do not necessarily indicate equal overall performance of intersections. One location might experience a higher degree of delay for a considerable period of the day while at another the peak period is of short duration.

In addition, a poor LOS is more tolerable to drivers at a low-volume intersection than at a high-volume intersection. Capacity analysis for any stop sign-controlled approach is based on the assumption that the major street traffic is not affected by the minor street movements, and left turns from the major streets to the minor streets are influenced only by opposing major street traffic flow. The calculated LOS for stop sign-controlled intersections is only for movements on the minor street and left turn movements on the major street.

Signalized Intersection Capacity

LOS for signalized intersections is defined in terms of delay, and is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. The delay a driver experiences is due to a number of factors related to intersection traffic control phasing and timing, roadway geometrics, traffic volumes, and incidents (traffic accidents) or events.

Signalized intersections were evaluated according to the methodologies presented in Chapter 16 of the 2000 update of the HCM[4]. The table below summarizes the intersection LOS criteria for signalized intersections.

Signalized Intersection LOS Criteria

Control Delay per Vehicle (sec/veh)	*Intersection Level of Service*
≤ 10	A
>10 and ≤ 20	B
>20 and ≤ 35	C
>35 and ≤ 55	D
>55 and ≤ 80	E
> 80	F

Note: sec/veh = seconds per vehicle.

[4] *Highway Capacity Manual: Special Report 209*, Transportation Research Board (2000 Update).

Traffic Study
Appendix C.

Synchro Level of Service Analysis Reports

HCM Signalized Intersection Capacity Analysis
1: Kunia Rd & Foote Ave

3/24/2014

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	410	116	202	535	498	398
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1752	1568	1752	3505	3438	1538
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1752	1568	1752	3505	3438	1538
Peak-hour factor, PHF	0.84	0.84	0.92	0.92	0.87	0.87
Adj. Flow (vph)	488	138	220	582	572	457
RTOR Reduction (vph)	0	0	0	0	0	297
Lane Group Flow (vph)	488	138	220	582	572	160
Confl. Peds. (#/hr)	1					
Heavy Vehicles (%)	3%	3%	3%	3%	5%	5%
Turn Type	NA	custom	Prot	NA	NA	Perm
Protected Phases	4	4	1	6	2	
Permitted Phases		6				2
Actuated Green, G (s)	55.6	109.0	19.9	53.4	28.5	28.5
Effective Green, g (s)	55.6	109.0	19.9	53.4	28.5	28.5
Actuated g/C Ratio	0.47	0.92	0.17	0.45	0.24	0.24
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	819	1568	293	1573	823	368
v/s Ratio Prot	c0.28	0.04	c0.13	0.17	c0.17	
v/s Ratio Perm		0.05				0.10
v/c Ratio	0.60	0.09	0.75	0.37	0.70	0.44
Uniform Delay, d1	23.4	0.5	47.2	21.7	41.3	38.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.2	0.0	10.3	0.1	2.6	0.8
Delay (s)	26.6	0.5	57.5	21.8	43.8	39.3
Level of Service	C	A	E	C	D	D
Approach Delay (s)	20.8			31.6	41.8	
Approach LOS	C			C	D	

Intersection Summary			
HCM Average Control Delay	33.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	119.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues
1: Kunia Rd & Foote Ave

3/24/2014

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	488	138	220	582	572	457
v/c Ratio	0.60	0.09	0.75	0.37	0.70	0.69
Control Delay	29.8	0.1	64.4	21.8	46.5	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.8	0.1	64.4	21.8	46.5	13.0
Queue Length 50th (ft)	270	0	161	150	211	41
Queue Length 95th (ft)	444	0	272	191	281	139
Internal Link Dist (ft)	1099			1376	2153	
Turn Bay Length (ft)			150			150
Base Capacity (vph)	818	1568	416	2232	1226	799
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.09	0.53	0.26	0.47	0.57

Intersection Summary

HCM Signalized Intersection Capacity Analysis
30: Kunia Rd/Driveway & SR 99

3/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	682	178	709	775	6	237	4	704	14	9	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	2.0	3.0	3.0			3.0	3.0		3.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.97	
Satd. Flow (prot)	1736	3471	1533	1719	3433			1725	1517		1764	
Flt Permitted	0.34	1.00	1.00	0.95	1.00			0.70	1.00		0.59	
Satd. Flow (perm)	620	3471	1533	1719	3433			1264	1517		1069	
Peak-hour factor, PHF	0.88	0.88	0.88	0.94	0.94	0.94	0.83	0.83	0.83	0.55	0.55	0.55
Adj. Flow (vph)	1	775	202	754	824	6	286	5	848	25	16	2
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	1	775	202	754	830	0	0	291	848	0	42	0
Confl. Peds. (#/hr)			2			3			5	5		
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	5%	5%	5%	4%	4%	4%
Turn Type	Perm	NA	Free	Prot	NA		Perm	NA	Free	Perm	NA	
Protected Phases		6		5	2			8			4	
Permitted Phases	6		Free				8		Free	4		
Actuated Green, G (s)	47.6	47.6	200.1	89.9	142.5			47.6	200.1		47.6	
Effective Green, g (s)	49.6	49.6	200.1	91.9	144.5			49.6	200.1		49.6	
Actuated g/C Ratio	0.25	0.25	1.00	0.46	0.72			0.25	1.00		0.25	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	154	860	1533	789	2479			313	1517		265	
v/s Ratio Prot		c0.22		c0.44	0.24							
v/s Ratio Perm	0.00		0.13					c0.23	0.56		0.04	
v/c Ratio	0.01	0.90	0.13	0.96	0.33			0.93	0.56		0.16	
Uniform Delay, d1	56.7	72.9	0.0	52.1	10.2			73.5	0.0		58.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.0	12.5	0.2	21.7	0.1			32.6	1.5		0.3	
Delay (s)	56.7	85.4	0.2	73.8	10.3			106.2	1.5		59.2	
Level of Service	E	F	A	E	B			F	A		E	
Approach Delay (s)		67.8			40.5			28.2			59.2	
Approach LOS		E			D			C			E	

Intersection Summary			
HCM Average Control Delay	44.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	200.1	Sum of lost time (s)	9.0
Intersection Capacity Utilization	88.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Queues
30: Kunia Rd/Driveway & SR 99

3/24/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	1	775	202	754	830	291	848	43
v/c Ratio	0.01	0.90	0.13	0.96	0.33	0.93	0.56	0.16
Control Delay	60.0	88.1	0.2	74.9	10.7	109.0	1.5	62.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.0	88.1	0.2	74.9	10.7	109.0	1.5	62.4
Queue Length 50th (ft)	1	554	0	998	207	399	0	46
Queue Length 95th (ft)	7	624	0	#1288	239	#520	0	52
Internal Link Dist (ft)		1998			2306	2153		237
Turn Bay Length (ft)	150		200	150				
Base Capacity (vph)	162	911	1533	842	2636	332	1517	282
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.85	0.13	0.90	0.31	0.88	0.56	0.15

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Unsignalized Intersection Capacity Analysis
9: Lyman Rd & Flagler Rd

7/17/2014

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	36	379	512	202	117	29
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.84	0.84	0.89	0.89	0.86	0.86
Hourly flow rate (vph)	43	451	575	227	136	34
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						3
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		1279				
pX, platoon unblocked						
vC, conflicting volume	802				1226	689
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	802				1226	689
tC, single (s)	4.2				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	94				27	92
cM capacity (veh/h)	779				186	446

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	494	802	170
Volume Left	43	0	136
Volume Right	0	227	34
cSH	779	1700	233
Volume to Capacity	0.06	0.47	0.73
Queue Length 95th (ft)	4	0	124
Control Delay (s)	1.5	0.0	53.8
Lane LOS	A		F
Approach Delay (s)	1.5	0.0	53.8
Approach LOS			F

Intersection Summary			
Average Delay	6.7		
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
44: Kunia Rd & Lyman Rd

7/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	76	365	93	34	459	74	140	587	81	150	348	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1736	1827	1356	1787	1881	1599	1736	3471	1553	1703	3406	1524
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1736	1827	1356	1787	1881	1599	1736	3471	1553	1703	3406	1524
Peak-hour factor, PHF	0.64	0.64	0.64	0.84	0.84	0.84	0.76	0.76	0.76	0.91	0.91	0.91
Adj. Flow (vph)	119	570	145	40	546	88	184	772	107	165	382	127
RTOR Reduction (vph)	0	0	15	0	0	12	0	0	41	0	0	67
Lane Group Flow (vph)	119	570	130	40	546	76	184	772	66	165	382	60
Confl. Peds. (#/hr)			52									
Heavy Vehicles (%)	4%	4%	4%	1%	1%	1%	4%	4%	4%	6%	6%	6%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Actuated Green, G (s)	16.7	65.4	65.4	6.9	55.6	55.6	23.1	43.8	43.8	21.6	42.3	42.3
Effective Green, g (s)	18.7	67.4	66.4	8.9	57.6	56.6	25.1	45.8	44.8	23.6	44.3	43.3
Actuated g/C Ratio	0.12	0.43	0.42	0.06	0.37	0.36	0.16	0.29	0.28	0.15	0.28	0.27
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	206	781	571	101	687	574	276	1008	441	255	957	418
v/s Ratio Prot	c0.07	0.31		0.02	c0.29		c0.11	c0.22		0.10	0.11	
v/s Ratio Perm			0.10			0.05			0.04			0.04
v/c Ratio	0.58	0.73	0.23	0.40	0.79	0.13	0.67	0.77	0.15	0.65	0.40	0.14
Uniform Delay, d1	65.8	37.6	29.2	71.8	44.8	34.0	62.4	51.1	42.2	63.1	45.9	43.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.9	3.4	0.2	2.5	6.3	0.1	6.0	3.5	0.2	5.6	0.3	0.2
Delay (s)	69.7	41.0	29.4	74.4	51.1	34.1	68.3	54.6	42.4	68.7	46.2	43.3
Level of Service	E	D	C	E	D	C	E	D	D	E	D	D
Approach Delay (s)		43.1			50.3			55.7			51.2	
Approach LOS		D			D			E			D	

Intersection Summary			
HCM Average Control Delay	50.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	157.7	Sum of lost time (s)	9.0
Intersection Capacity Utilization	66.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues
44: Kunia Rd & Lyman Rd

7/17/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	119	570	145	40	546	88	184	772	107	165	382	127
v/c Ratio	0.57	0.73	0.26	0.33	0.81	0.15	0.66	0.76	0.22	0.64	0.40	0.26
Control Delay	84.5	46.4	28.3	89.9	58.5	30.9	79.8	58.9	25.7	81.0	49.9	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	84.5	46.4	28.3	89.9	58.5	30.9	79.8	58.9	25.7	81.0	49.9	18.0
Queue Length 50th (ft)	118	503	81	40	510	48	181	384	38	163	169	26
Queue Length 95th (ft)	167	491	104	97	744	102	282	480	82	313	282	100
Internal Link Dist (ft)		1752			1465			949			1376	
Turn Bay Length (ft)	150		60	240		80	250		200	250		130
Base Capacity (vph)	283	1140	811	145	1021	866	400	1460	676	370	1386	666
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.50	0.18	0.28	0.53	0.10	0.46	0.53	0.16	0.45	0.28	0.19

Intersection Summary

HCM Signalized Intersection Capacity Analysis
16: Humphreys Rd & Lyman Rd

3/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	230	4	10	313	176	0	0	0	230	20	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0						5.0	5.0
Lane Util. Factor		1.00			1.00						1.00	1.00
Frt		1.00			0.95						1.00	0.85
Flt Protected		1.00			1.00						0.96	1.00
Satd. Flow (prot)		1781			1705						1781	1583
Flt Permitted		0.93			0.99						0.96	1.00
Satd. Flow (perm)		1660			1693						1781	1583
Peak-hour factor, PHF	0.83	0.83	0.83	0.85	0.85	0.85	0.92	0.92	0.92	0.72	0.72	0.72
Adj. Flow (vph)	28	277	5	12	368	207	0	0	0	319	28	42
RTOR Reduction (vph)	0	1	0	0	30	0	0	0	0	0	0	28
Lane Group Flow (vph)	0	309	0	0	557	0	0	0	0	0	347	14
Heavy Vehicles (%)	6%	6%	6%	6%	6%	6%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA					Split	NA	Perm
Protected Phases		4			8					2	2	
Permitted Phases	4			8								2
Actuated Green, G (s)		21.5			21.5						15.4	15.4
Effective Green, g (s)		21.5			21.5						15.4	15.4
Actuated g/C Ratio		0.46			0.46						0.33	0.33
Clearance Time (s)		5.0			5.0						5.0	5.0
Vehicle Extension (s)		3.0			3.0						3.0	3.0
Lane Grp Cap (vph)		761			776						585	520
v/s Ratio Prot											c0.19	
v/s Ratio Perm		0.19			c0.33							0.01
v/c Ratio		0.41			0.72						0.59	0.03
Uniform Delay, d1		8.5			10.2						13.1	10.7
Progression Factor		1.00			1.00						1.00	1.00
Incremental Delay, d2		0.4			3.2						1.6	0.0
Delay (s)		8.8			13.4						14.8	10.7
Level of Service		A			B						B	B
Approach Delay (s)		8.8			13.4			0.0			14.3	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	12.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	46.9	Sum of lost time (s)	10.0
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	SBT	SBR
Lane Group Flow (vph)	310	587	347	42
v/c Ratio	0.42	0.74	0.61	0.08
Control Delay	11.2	16.8	20.1	5.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	11.2	16.8	20.1	5.9
Queue Length 50th (ft)	48	100	74	0
Queue Length 95th (ft)	116	242	143	12
Internal Link Dist (ft)	2460	1199	1412	
Turn Bay Length (ft)				200
Base Capacity (vph)	1266	1304	1020	925
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.24	0.45	0.34	0.05

Intersection Summary

HCM Unsignalized Intersection Capacity Analysis
3: Lyman Rd & Maili Rd

3/24/2014

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	4	18	65	23	170	27
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.79	0.79	0.88	0.88	0.78	0.78
Hourly flow rate (vph)	5	23	74	26	218	35
Pedestrians			1		1	
Lane Width (ft)			12.0		12.0	
Walking Speed (ft/s)			4.0		4.0	
Percent Blockage			0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	101				122	88
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	101				122	88
tC, single (s)	4.3				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.4				3.5	3.3
p0 queue free %	100				75	96
cM capacity (veh/h)	1369				871	972

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	28	100	253
Volume Left	5	0	218
Volume Right	0	26	35
cSH	1369	1700	884
Volume to Capacity	0.00	0.06	0.29
Queue Length 95th (ft)	0	0	30
Control Delay (s)	1.4	0.0	10.7
Lane LOS	A		B
Approach Delay (s)	1.4	0.0	10.7
Approach LOS			B

Intersection Summary			
Average Delay	7.2		
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	33	10	28	775	394	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1583	1417	1736	1827	1768	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1583	1417	1736	1827	1768	
Peak-hour factor, PHF	0.51	0.51	0.89	0.89	0.92	0.92
Adj. Flow (vph)	65	20	31	871	428	88
RTOR Reduction (vph)	0	17	0	0	6	0
Lane Group Flow (vph)	65	3	31	871	510	0
Heavy Vehicles (%)	14%	14%	4%	4%	5%	5%
Turn Type	NA	Perm	Prot	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4				
Actuated Green, G (s)	6.5	6.5	2.8	40.2	32.4	
Effective Green, g (s)	8.5	7.5	4.8	42.2	34.4	
Actuated g/C Ratio	0.15	0.13	0.08	0.74	0.61	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	237	187	147	1360	1073	
v/s Ratio Prot	c0.04		0.02	c0.48	0.29	
v/s Ratio Perm		0.00				
v/c Ratio	0.27	0.01	0.21	0.64	0.48	
Uniform Delay, d1	21.4	21.4	24.2	3.5	6.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.0	0.7	1.0	0.3	
Delay (s)	22.0	21.4	24.9	4.6	6.5	
Level of Service	C	C	C	A	A	
Approach Delay (s)	21.9			5.3	6.5	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	6.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	56.7	Sum of lost time (s)	6.0
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues
41: Kunia Rd & Field Station Kunia Entrance

7/17/2014

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	65	20	31	871	516
v/c Ratio	0.20	0.07	0.10	0.62	0.43
Control Delay	22.1	11.1	22.8	7.2	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	22.1	11.1	22.8	7.2	9.2
Queue Length 50th (ft)	19	0	9	115	48
Queue Length 95th (ft)	29	6	32	263	225
Internal Link Dist (ft)	642			1901	1624
Turn Bay Length (ft)	140		300		
Base Capacity (vph)	936	818	566	1814	1491
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.07	0.02	0.05	0.48	0.35

Intersection Summary

HCM Signalized Intersection Capacity Analysis
1: Kunia Rd & Foote Ave

3/28/2014

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	776	406	70	577	446	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1787	1599	1787	3574	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1787	1599	1787	3574	3539	1583
Peak-hour factor, PHF	0.81	0.81	0.83	0.83	0.87	0.87
Adj. Flow (vph)	958	501	84	695	513	322
RTOR Reduction (vph)	0	0	0	0	0	237
Lane Group Flow (vph)	958	501	84	695	513	85
Confl. Peds. (#/hr)	1					
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%
Turn Type	NA	custom	Prot	NA	NA	Perm
Protected Phases	4	4	1	6	2	
Permitted Phases		6				2
Actuated Green, G (s)	70.4	111.3	11.1	40.9	24.8	24.8
Effective Green, g (s)	70.4	111.3	11.1	40.9	24.8	24.8
Actuated g/C Ratio	0.58	0.92	0.09	0.34	0.20	0.20
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1037	1599	164	1205	724	324
v/s Ratio Prot	c0.54	0.18	0.05	c0.19	c0.14	
v/s Ratio Perm		0.13				0.05
v/c Ratio	0.92	0.31	0.51	0.58	0.71	0.26
Uniform Delay, d1	23.0	0.6	52.5	33.1	44.9	40.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	14.7	0.1	2.7	0.7	3.2	0.4
Delay (s)	37.7	0.7	55.2	33.8	48.1	41.0
Level of Service	D	A	E	C	D	D
Approach Delay (s)	25.0			36.1	45.3	
Approach LOS	C			D	D	

Intersection Summary			
HCM Average Control Delay	33.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	121.3	Sum of lost time (s)	15.0
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues
1: Kunia Rd & Foote Ave

3/28/2014

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	958	501	84	695	513	322
v/c Ratio	0.92	0.31	0.52	0.58	0.71	0.57
Control Delay	40.2	0.5	65.3	34.7	50.7	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.2	0.5	65.3	34.7	50.7	10.5
Queue Length 50th (ft)	636	0	63	233	197	15
Queue Length 95th (ft)	#960	0	114	262	257	85
Internal Link Dist (ft)	1138			1376	2153	
Turn Bay Length (ft)			150			150
Base Capacity (vph)	1036	1599	237	1777	1143	713
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.31	0.35	0.39	0.45	0.45

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
30: Kunia Rd/Driveway & SR 99

3/28/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	1255	188	531	769	6	263	6	1084	10	7	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	2.0	3.0	3.0			3.0	3.0		3.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.97	
Satd. Flow (prot)	1770	3539	1564	1787	3570			1793	1579		1686	
Flt Permitted	0.35	1.00	1.00	0.95	1.00			0.73	1.00		0.68	
Satd. Flow (perm)	651	3539	1564	1787	3570			1366	1579		1187	
Peak-hour factor, PHF	0.94	0.94	0.94	0.97	0.97	0.97	0.94	0.94	0.94	0.69	0.69	0.69
Adj. Flow (vph)	3	1335	200	547	793	6	280	6	1153	14	10	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	3	1335	200	547	799	0	0	286	1153	0	24	0
Confl. Peds. (#/hr)			1						1			
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	9%	9%	9%
Turn Type	Perm	NA	Free	Prot	NA		Perm	NA	Free	Perm	NA	
Protected Phases		6		5	2			8			4	
Permitted Phases	6		Free				8		Free	4		
Actuated Green, G (s)	79.8	79.8	201.2	62.2	147.0			44.2	201.2		44.2	
Effective Green, g (s)	81.8	81.8	201.2	64.2	149.0			46.2	201.2		46.2	
Actuated g/C Ratio	0.41	0.41	1.00	0.32	0.74			0.23	1.00		0.23	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	265	1439	1564	570	2644			314	1579		273	
v/s Ratio Prot		c0.38		c0.31	0.22							
v/s Ratio Perm	0.00		0.13					c0.21	0.73		0.02	
v/c Ratio	0.01	0.93	0.13	0.96	0.30			0.91	0.73		0.09	
Uniform Delay, d1	35.6	56.9	0.0	67.2	8.7			75.5	0.0		60.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.0	10.6	0.2	27.5	0.1			29.1	3.0		0.1	
Delay (s)	35.6	67.5	0.2	94.7	8.8			104.6	3.0		61.1	
Level of Service	D	E	A	F	A			F	A		E	
Approach Delay (s)		58.6			43.7			23.2			61.1	
Approach LOS		E			D			C			E	

Intersection Summary			
HCM Average Control Delay	42.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	201.2	Sum of lost time (s)	9.0
Intersection Capacity Utilization	95.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Queues
30: Kunia Rd/Driveway & SR 99

3/28/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	3	1335	200	547	799	286	1153	25
v/c Ratio	0.01	0.93	0.13	0.96	0.30	0.91	0.73	0.09
Control Delay	37.3	69.1	0.2	95.4	9.2	108.1	3.0	62.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.3	69.1	0.2	95.4	9.2	108.1	3.0	62.3
Queue Length 50th (ft)	3	924	0	756	184	389	0	26
Queue Length 95th (ft)	12	1030	0	#1014	213	#577	0	45
Internal Link Dist (ft)		1998			2306	2153		237
Turn Bay Length (ft)	150		200	150				
Base Capacity (vph)	281	1523	1564	591	2771	335	1579	292
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.88	0.13	0.93	0.29	0.85	0.73	0.09

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Unsignalized Intersection Capacity Analysis
9: Lyman Rd & Flagler Rd

7/17/2014

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	31	653	352	130	144	37
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.90	0.90	0.87	0.87
Hourly flow rate (vph)	34	710	391	144	166	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						3
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		1279				
pX, platoon unblocked						
vC, conflicting volume	536				1241	463
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	536				1241	463
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				11	93
cM capacity (veh/h)	1037				187	599

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	743	536	208
Volume Left	34	0	166
Volume Right	0	144	43
cSH	1037	1700	228
Volume to Capacity	0.03	0.32	0.91
Queue Length 95th (ft)	3	0	192
Control Delay (s)	0.8	0.0	83.9
Lane LOS	A		F
Approach Delay (s)	0.8	0.0	83.9
Approach LOS			F

Intersection Summary			
Average Delay	12.2		
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
44: Kunia Rd & Lyman Rd

3/28/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	129	259	252	154	230	98	75	420	27	63	712	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1556	1787	1881	1599	1787	3574	1599	1787	3574	1599
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1556	1787	1881	1599	1787	3574	1599	1787	3574	1599
Peak-hour factor, PHF	0.91	0.91	0.91	0.82	0.82	0.82	0.83	0.83	0.83	0.76	0.76	0.76
Adj. Flow (vph)	142	285	277	188	280	120	90	506	33	83	937	101
RTOR Reduction (vph)	0	0	70	0	0	36	0	0	18	0	0	20
Lane Group Flow (vph)	142	285	207	188	280	84	90	506	15	83	937	81
Confl. Peds. (#/hr)			3									
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Actuated Green, G (s)	17.0	28.0	28.0	20.4	31.4	31.4	12.8	42.0	42.0	12.2	41.4	41.4
Effective Green, g (s)	19.0	30.0	29.0	22.4	33.4	32.4	14.8	44.0	43.0	14.2	43.4	42.4
Actuated g/C Ratio	0.15	0.24	0.24	0.18	0.27	0.26	0.12	0.36	0.35	0.12	0.35	0.35
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	274	456	368	326	512	423	216	1283	561	207	1265	553
v/s Ratio Prot	0.08	c0.15		c0.11	0.15		c0.05	0.14		0.05	c0.26	
v/s Ratio Perm			0.13			0.05			0.01			0.05
v/c Ratio	0.52	0.62	0.56	0.58	0.55	0.20	0.42	0.39	0.03	0.40	0.74	0.15
Uniform Delay, d1	47.6	41.3	41.2	45.8	38.1	35.0	49.9	29.3	26.1	50.3	34.7	27.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	2.7	2.0	2.5	1.2	0.2	1.3	0.2	0.0	1.3	2.4	0.1
Delay (s)	49.3	44.0	43.2	48.2	39.3	35.2	51.2	29.6	26.1	51.5	37.0	27.7
Level of Service	D	D	D	D	D	D	D	C	C	D	D	C
Approach Delay (s)		44.7			41.3			32.5			37.3	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM Average Control Delay	38.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	122.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues
44: Kunia Rd & Lyman Rd

3/28/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	142	285	277	188	280	120	90	506	33	83	937	101
v/c Ratio	0.52	0.63	0.64	0.58	0.55	0.26	0.42	0.40	0.06	0.40	0.75	0.18
Control Delay	60.4	51.5	37.6	58.1	45.7	26.1	63.4	32.3	12.9	64.0	40.8	23.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.4	51.5	37.6	58.1	45.7	26.1	63.4	32.3	12.9	64.0	40.8	23.3
Queue Length 50th (ft)	105	202	132	137	190	43	67	157	3	62	341	38
Queue Length 95th (ft)	221	380	288	246	318	101	141	239	25	121	428	77
Internal Link Dist (ft)		1752			1815			882			1376	
Turn Bay Length (ft)	150		60	240		80	250		200	250		130
Base Capacity (vph)	499	1305	1101	473	1285	1095	305	2015	901	290	1985	888
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.22	0.25	0.40	0.22	0.11	0.30	0.25	0.04	0.29	0.47	0.11

Intersection Summary

HCM Signalized Intersection Capacity Analysis
16: Humphreys Rd & Lyman Rd

3/28/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	212	1	2	190	231	0	0	0	322	5	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0						5.0	5.0
Lane Util. Factor		1.00			1.00						1.00	1.00
Frpb, ped/bikes		1.00			1.00						1.00	1.00
Flpb, ped/bikes		1.00			1.00						1.00	1.00
Frt		1.00			0.93						1.00	0.85
Flt Protected		0.99			1.00						0.95	1.00
Satd. Flow (prot)		1850			1725						1793	1599
Flt Permitted		0.92			1.00						0.95	1.00
Satd. Flow (perm)		1709			1723						1793	1599
Peak-hour factor, PHF	0.75	0.75	0.75	0.92	0.92	0.92	0.92	0.92	0.92	0.85	0.85	0.85
Adj. Flow (vph)	41	283	1	2	207	251	0	0	0	379	6	21
RTOR Reduction (vph)	0	0	0	0	69	0	0	0	0	0	0	13
Lane Group Flow (vph)	0	325	0	0	391	0	0	0	0	0	385	8
Confl. Peds. (#/hr)										5		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA					Split	NA	Perm
Protected Phases		4			8					2	2	
Permitted Phases	4			8								2
Actuated Green, G (s)		15.2			15.2						14.9	14.9
Effective Green, g (s)		15.2			15.2						14.9	14.9
Actuated g/C Ratio		0.38			0.38						0.37	0.37
Clearance Time (s)		5.0			5.0						5.0	5.0
Vehicle Extension (s)		3.0			3.0						3.0	3.0
Lane Grp Cap (vph)		648			653						666	594
v/s Ratio Prot											c0.21	
v/s Ratio Perm		0.19			c0.23							0.00
v/c Ratio		0.50			0.60						0.58	0.01
Uniform Delay, d1		9.5			10.0						10.1	8.0
Progression Factor		1.00			1.00						1.00	1.00
Incremental Delay, d2		0.6			1.5						1.2	0.0
Delay (s)		10.2			11.5						11.3	8.0
Level of Service		B			B						B	A
Approach Delay (s)		10.2			11.5			0.0			11.1	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	11.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	40.1	Sum of lost time (s)	10.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	SBT	SBR
Lane Group Flow (vph)	325	460	385	21
v/c Ratio	0.51	0.65	0.59	0.04
Control Delay	13.8	13.4	15.8	5.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	13.8	13.4	15.8	5.5
Queue Length 50th (ft)	49	53	60	0
Queue Length 95th (ft)	111	172	167	10
Internal Link Dist (ft)	2460	1199	1378	
Turn Bay Length (ft)				200
Base Capacity (vph)	1355	1387	1353	1211
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.24	0.33	0.28	0.02

Intersection Summary

HCM Unsignalized Intersection Capacity Analysis
3: Lyman Rd & Maili Rd

3/28/2014

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	19	45	33	76	45	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.57	0.57	0.76	0.76	0.79	0.79
Hourly flow rate (vph)	33	79	43	100	57	15
Pedestrians			2			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			4.0			
Percent Blockage			0			
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	143				241	93
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	143				241	93
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	98				92	98
cM capacity (veh/h)	1403				718	950

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	112	143	72
Volume Left	33	0	57
Volume Right	0	100	15
cSH	1403	1700	757
Volume to Capacity	0.02	0.08	0.10
Queue Length 95th (ft)	2	0	8
Control Delay (s)	2.4	0.0	10.3
Lane LOS	A		B
Approach Delay (s)	2.4	0.0	10.3
Approach LOS			B

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	20.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	105	50	4	417	1097	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1787	1599	1752	1845	1876	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1787	1599	1752	1845	1876	
Peak-hour factor, PHF	0.97	0.97	0.87	0.87	0.87	0.87
Adj. Flow (vph)	108	52	5	479	1261	24
RTOR Reduction (vph)	0	46	0	0	1	0
Lane Group Flow (vph)	108	6	5	479	1284	0
Heavy Vehicles (%)	1%	1%	3%	3%	1%	1%
Turn Type	NA	Perm	Prot	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4				
Actuated Green, G (s)	8.7	8.7	1.2	66.9	60.7	
Effective Green, g (s)	10.7	9.7	3.2	68.9	62.7	
Actuated g/C Ratio	0.12	0.11	0.04	0.80	0.73	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	223	181	65	1485	1374	
v/s Ratio Prot	c0.06		0.00	c0.26	c0.68	
v/s Ratio Perm		0.00				
v/c Ratio	0.48	0.03	0.08	0.32	0.93	
Uniform Delay, d1	34.9	33.8	39.8	2.2	9.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.7	0.1	0.5	0.1	11.9	
Delay (s)	36.5	33.8	40.3	2.3	21.6	
Level of Service	D	C	D	A	C	
Approach Delay (s)	35.7			2.7	21.6	
Approach LOS	D			A	C	

Intersection Summary			
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	85.6	Sum of lost time (s)	9.0
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Queues
41: Kunia Rd & Field Station Kunia Entrance

7/17/2014

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	108	52	5	479	1285
v/c Ratio	0.40	0.19	0.03	0.32	0.87
Control Delay	35.5	11.2	34.8	3.5	18.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	35.5	11.2	34.8	3.5	18.5
Queue Length 50th (ft)	48	0	2	54	340
Queue Length 95th (ft)	102	31	13	106	#1036
Internal Link Dist (ft)	642			1901	1685
Turn Bay Length (ft)	140		300		
Base Capacity (vph)	514	477	263	1652	1477
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.21	0.11	0.02	0.29	0.87

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
1: Kunia Rd & Foote Ave

3/24/2014

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	441	125	217	589	630	428
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1752	1568	1752	3505	3438	1538
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1752	1568	1752	3505	3438	1538
Peak-hour factor, PHF	0.84	0.84	0.92	0.92	0.87	0.87
Adj. Flow (vph)	525	149	236	640	724	492
RTOR Reduction (vph)	0	0	0	0	0	242
Lane Group Flow (vph)	525	149	236	640	724	250
Confl. Peds. (#/hr)	1					
Heavy Vehicles (%)	3%	3%	3%	3%	5%	5%
Turn Type	NA	custom	Prot	NA	NA	Perm
Protected Phases	4	4	1	6	2	
Permitted Phases		6				2
Actuated Green, G (s)	55.5	117.5	21.5	62.0	35.5	35.5
Effective Green, g (s)	55.5	117.5	21.5	62.0	35.5	35.5
Actuated g/C Ratio	0.44	0.92	0.17	0.49	0.28	0.28
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	763	1568	295	1704	957	428
v/s Ratio Prot	c0.30	0.04	c0.13	0.18	c0.21	
v/s Ratio Perm		0.05				0.16
v/c Ratio	0.69	0.10	0.80	0.38	0.76	0.58
Uniform Delay, d1	29.0	0.4	50.9	20.6	42.0	39.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.0	0.0	14.3	0.1	3.5	2.0
Delay (s)	34.0	0.5	65.3	20.7	45.5	41.7
Level of Service	C	A	E	C	D	D
Approach Delay (s)	26.6			32.7	44.0	
Approach LOS	C			C	D	

Intersection Summary			
HCM Average Control Delay	36.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	127.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues
1: Kunia Rd & Foote Ave

3/24/2014

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	525	149	236	640	724	492
v/c Ratio	0.69	0.10	0.80	0.38	0.76	0.74
Control Delay	37.2	0.1	71.8	20.8	48.1	20.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.2	0.1	71.8	20.8	48.1	20.1
Queue Length 50th (ft)	358	0	191	168	290	119
Queue Length 95th (ft)	502	0	300	211	361	238
Internal Link Dist (ft)	1099			1376	2153	
Turn Bay Length (ft)			150			150
Base Capacity (vph)	762	1568	374	2080	1170	744
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.10	0.63	0.31	0.62	0.66

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	441	125	217	592	634	428
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1752	1568	1752	3505	3438	1538
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1752	1568	1752	3505	3438	1538
Peak-hour factor, PHF	0.84	0.84	0.92	0.92	0.87	0.87
Adj. Flow (vph)	525	149	236	643	729	492
RTOR Reduction (vph)	0	0	0	0	0	240
Lane Group Flow (vph)	525	149	236	643	729	252
Confl. Peds. (#/hr)	1					
Heavy Vehicles (%)	3%	3%	3%	3%	5%	5%
Turn Type	NA	custom	Prot	NA	NA	Perm
Protected Phases	4	4	1	6	2	
Permitted Phases		6				2
Actuated Green, G (s)	55.5	117.9	21.6	62.4	35.8	35.8
Effective Green, g (s)	55.5	117.9	21.6	62.4	35.8	35.8
Actuated g/C Ratio	0.43	0.92	0.17	0.49	0.28	0.28
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	760	1568	296	1710	962	430
v/s Ratio Prot	c0.30	0.04	c0.13	0.18	c0.21	
v/s Ratio Perm		0.05				0.16
v/c Ratio	0.69	0.10	0.80	0.38	0.76	0.59
Uniform Delay, d1	29.3	0.4	51.0	20.5	42.1	39.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.1	0.0	13.8	0.1	3.5	2.0
Delay (s)	34.4	0.5	64.9	20.7	45.5	41.7
Level of Service	C	A	E	C	D	D
Approach Delay (s)	26.9			32.5	44.0	
Approach LOS	C			C	D	

Intersection Summary			
HCM Average Control Delay	36.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	127.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues
1: Kunia Rd & Foote Ave

3/25/2014

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	525	149	236	643	729	492
v/c Ratio	0.69	0.10	0.80	0.38	0.76	0.73
Control Delay	37.5	0.1	72.0	20.7	48.0	20.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.5	0.1	72.0	20.7	48.0	20.2
Queue Length 50th (ft)	359	0	192	170	293	120
Queue Length 95th (ft)	502	0	300	212	363	240
Internal Link Dist (ft)	1099			1376	2153	
Turn Bay Length (ft)			150			150
Base Capacity (vph)	759	1568	373	2072	1165	741
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.10	0.63	0.31	0.63	0.66

Intersection Summary

HCM Signalized Intersection Capacity Analysis
30: Kunia Rd/Driveway & SR 99

3/25/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	733	211	841	833	0	259	4	770	15	10	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	2.0	3.0	3.0			3.0	3.0		3.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.97	
Satd. Flow (prot)	1736	3471	1533	1719	3438			1725	1517		1766	
Flt Permitted	0.32	1.00	1.00	0.95	1.00			0.69	1.00		0.48	
Satd. Flow (perm)	586	3471	1533	1719	3438			1250	1517		871	
Peak-hour factor, PHF	0.88	0.88	0.88	0.94	0.94	0.94	0.83	0.83	0.83	0.55	0.55	0.55
Adj. Flow (vph)	1	833	240	895	886	0	312	5	928	27	18	2
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	1	833	240	895	886	0	0	317	928	0	46	0
Confl. Peds. (#/hr)			2			3			5	5		
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	5%	5%	5%	4%	4%	4%
Turn Type	Perm	NA	Free	Prot	NA		Perm	NA	Free	Perm	NA	
Protected Phases		6		5	2			8			4	
Permitted Phases	6		Free				8		Free	4		
Actuated Green, G (s)	47.0	47.0	210.0	101.0	153.0			47.0	210.0		47.0	
Effective Green, g (s)	49.0	49.0	210.0	103.0	155.0			49.0	210.0		49.0	
Actuated g/C Ratio	0.23	0.23	1.00	0.49	0.74			0.23	1.00		0.23	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	137	810	1533	843	2538			292	1517		203	
v/s Ratio Prot		c0.24		c0.52	0.26							
v/s Ratio Perm	0.00		0.16					c0.25	0.61		0.05	
v/c Ratio	0.01	1.03	0.16	1.06	0.35			1.09	0.61		0.23	
Uniform Delay, d1	61.8	80.5	0.0	53.5	9.7			80.5	0.0		65.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.0	39.1	0.2	48.7	0.1			77.4	1.8		0.6	
Delay (s)	61.8	119.6	0.2	102.2	9.8			157.9	1.8		65.8	
Level of Service	E	F	A	F	A			F	A		E	
Approach Delay (s)		92.9			56.2			41.6			65.8	
Approach LOS		F			E			D			E	

Intersection Summary			
HCM Average Control Delay	61.4	HCM Level of Service	E
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	210.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	98.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Queues
30: Kunia Rd/Driveway & SR 99

3/25/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	1	833	240	895	886	317	928	47
v/c Ratio	0.01	1.03	0.16	1.06	0.35	1.09	0.61	0.23
Control Delay	62.0	115.2	0.2	98.6	10.1	148.2	1.8	67.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.0	115.2	0.2	98.6	10.1	148.2	1.8	67.5
Queue Length 50th (ft)	1	~644	0	~1355	213	~490	0	52
Queue Length 95th (ft)	8	#754	0	#1624	245	#624	0	58
Internal Link Dist (ft)		1998			2306	2153		237
Turn Bay Length (ft)	150		200	150				
Base Capacity (vph)	137	810	1533	843	2538	292	1517	204
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	1.03	0.16	1.06	0.35	1.09	0.61	0.23

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
30: Kunia Rd/Driveway & SR 99

3/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	733	210	838	833	0	258	4	768	15	10	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	2.0	3.0	3.0			3.0	3.0		3.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.97	
Satd. Flow (prot)	1736	3471	1533	1719	3438			1725	1517		1766	
Flt Permitted	0.32	1.00	1.00	0.95	1.00			0.69	1.00		0.48	
Satd. Flow (perm)	586	3471	1533	1719	3438			1250	1517		874	
Peak-hour factor, PHF	0.88	0.88	0.88	0.94	0.94	0.94	0.83	0.83	0.83	0.55	0.55	0.55
Adj. Flow (vph)	1	833	239	891	886	0	311	5	925	27	18	2
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	1	833	239	891	886	0	0	316	925	0	46	0
Confl. Peds. (#/hr)			2			3			5	5		
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	5%	5%	5%	4%	4%	4%
Turn Type	Perm	NA	Free	Prot	NA		Perm	NA	Free	Perm	NA	
Protected Phases		6		5	2			8			4	
Permitted Phases	6		Free				8		Free	4		
Actuated Green, G (s)	47.0	47.0	210.0	101.0	153.0			47.0	210.0		47.0	
Effective Green, g (s)	49.0	49.0	210.0	103.0	155.0			49.0	210.0		49.0	
Actuated g/C Ratio	0.23	0.23	1.00	0.49	0.74			0.23	1.00		0.23	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	137	810	1533	843	2538			292	1517		204	
v/s Ratio Prot		c0.24		c0.52	0.26							
v/s Ratio Perm	0.00		0.16					c0.25	0.61		0.05	
v/c Ratio	0.01	1.03	0.16	1.06	0.35			1.08	0.61		0.23	
Uniform Delay, d1	61.8	80.5	0.0	53.5	9.7			80.5	0.0		65.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.0	39.1	0.2	47.2	0.1			76.3	1.8		0.6	
Delay (s)	61.8	119.6	0.2	100.7	9.8			156.8	1.8		65.7	
Level of Service	E	F	A	F	A			F	A		E	
Approach Delay (s)		92.9			55.3			41.3			65.7	
Approach LOS		F			E			D			E	

Intersection Summary			
HCM Average Control Delay	61.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	210.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	97.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Queues
30: Kunia Rd/Driveway & SR 99

3/24/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	1	833	239	891	886	316	925	47
v/c Ratio	0.01	1.03	0.16	1.06	0.35	1.08	0.61	0.23
Control Delay	62.0	115.2	0.2	97.2	10.1	147.4	1.8	67.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.0	115.2	0.2	97.2	10.1	147.4	1.8	67.5
Queue Length 50th (ft)	1	~644	0	~1343	213	~487	0	52
Queue Length 95th (ft)	8	#754	0	#1612	245	#622	0	58
Internal Link Dist (ft)		1998			2306	2153		237
Turn Bay Length (ft)	150		200	150				
Base Capacity (vph)	137	810	1533	843	2538	292	1517	204
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	1.03	0.16	1.06	0.35	1.08	0.61	0.23

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	39	437	760	217	126	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.97		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1612	1696	1722		1770	1583
Flt Permitted	0.08	1.00	1.00		0.95	1.00
Satd. Flow (perm)	138	1696	1722		1770	1583
Peak-hour factor, PHF	0.84	0.84	0.89	0.89	0.86	0.86
Adj. Flow (vph)	46	520	854	244	147	36
RTOR Reduction (vph)	0	0	7	0	0	28
Lane Group Flow (vph)	46	520	1091	0	147	8
Heavy Vehicles (%)	12%	12%	7%	7%	2%	2%
Turn Type	pm+pt	NA	NA		NA	Perm
Protected Phases	7	4	8		2	
Permitted Phases	4					2
Actuated Green, G (s)	86.2	86.2	74.6		14.2	14.2
Effective Green, g (s)	86.2	86.2	74.6		14.2	14.2
Actuated g/C Ratio	0.78	0.78	0.68		0.13	0.13
Clearance Time (s)	5.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	196	1324	1164		228	204
v/s Ratio Prot	0.01	c0.31	c0.63		c0.08	
v/s Ratio Perm	0.17					0.01
v/c Ratio	0.23	0.39	0.94		0.64	0.04
Uniform Delay, d1	18.5	3.8	15.8		45.7	42.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	0.2	13.8		6.1	0.1
Delay (s)	19.1	4.0	29.6		51.8	42.2
Level of Service	B	A	C		D	D
Approach Delay (s)		5.2	29.6		49.9	
Approach LOS		A	C		D	

Intersection Summary			
HCM Average Control Delay	24.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	110.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	46	520	1098	147	36
v/c Ratio	0.22	0.39	0.93	0.64	0.15
Control Delay	5.7	5.3	32.2	59.0	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.7	5.3	32.2	59.0	17.8
Queue Length 50th (ft)	6	96	646	101	3
Queue Length 95th (ft)	16	162	#1128	163	30
Internal Link Dist (ft)		1199	1752	1564	
Turn Bay Length (ft)	100				65
Base Capacity (vph)	243	1392	1182	343	332
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.19	0.37	0.93	0.43	0.11

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
44: Kunia Rd & Lyman Rd

3/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	96	392	117	37	493	80	267	630	87	161	374	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1736	1827	1337	1787	1881	1599	1736	3471	1553	1703	3406	1524
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1736	1827	1337	1787	1881	1599	1736	3471	1553	1703	3406	1524
Peak-hour factor, PHF	0.64	0.64	0.64	0.84	0.84	0.84	0.76	0.76	0.76	0.91	0.91	0.91
Adj. Flow (vph)	150	612	183	44	587	95	351	829	114	177	411	242
RTOR Reduction (vph)	0	0	17	0	0	12	0	0	41	0	0	118
Lane Group Flow (vph)	150	612	166	44	587	83	351	829	73	177	411	124
Confl. Peds. (#/hr)			52									
Heavy Vehicles (%)	4%	4%	4%	1%	1%	1%	4%	4%	4%	6%	6%	6%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Actuated Green, G (s)	19.8	75.2	75.2	7.1	62.5	62.5	41.1	48.9	48.9	23.0	30.8	30.8
Effective Green, g (s)	21.8	77.2	76.2	9.1	64.5	63.5	43.1	50.9	49.9	25.0	32.8	31.8
Actuated g/C Ratio	0.13	0.44	0.44	0.05	0.37	0.36	0.25	0.29	0.29	0.14	0.19	0.18
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	217	810	585	93	696	583	430	1014	445	244	641	278
v/s Ratio Prot	c0.09	0.33		0.02	c0.31		c0.20	c0.24		0.10	0.12	
v/s Ratio Perm			0.12			0.05			0.05			0.08
v/c Ratio	0.69	0.76	0.28	0.47	0.84	0.14	0.82	0.82	0.16	0.73	0.64	0.45
Uniform Delay, d1	73.0	40.6	31.5	80.2	50.2	37.1	61.8	57.3	46.5	71.3	65.3	63.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.1	4.0	0.3	3.8	9.2	0.1	11.4	5.2	0.2	10.2	2.2	1.1
Delay (s)	82.1	44.6	31.7	84.0	59.4	37.2	73.2	62.5	46.7	81.5	67.5	64.5
Level of Service	F	D	C	F	E	D	E	E	D	F	E	E
Approach Delay (s)		48.1			58.0			64.0			69.6	
Approach LOS		D			E			E			E	

Intersection Summary			
HCM Average Control Delay	60.1	HCM Level of Service	E
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	174.2	Sum of lost time (s)	9.0
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues
44: Kunia Rd & Lyman Rd

3/24/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	150	612	183	44	587	95	351	829	114	177	411	242
v/c Ratio	0.68	0.75	0.31	0.39	0.86	0.16	0.81	0.81	0.23	0.72	0.64	0.61
Control Delay	95.1	49.8	30.1	99.3	66.6	33.3	80.0	66.3	28.3	93.0	73.6	36.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	95.1	49.8	30.1	99.3	66.6	33.3	80.0	66.3	28.3	93.0	73.6	36.3
Queue Length 50th (ft)	175	631	121	52	655	62	402	491	51	206	242	108
Queue Length 95th (ft)	201	525	128	104	820	109	477	521	90	339	352	241
Internal Link Dist (ft)		1752			1465			949			1376	
Turn Bay Length (ft)	150		60	240		80	250		200	250		130
Base Capacity (vph)	273	1039	743	130	910	774	578	1302	609	309	765	446
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.59	0.25	0.34	0.65	0.12	0.61	0.64	0.19	0.57	0.54	0.54

Intersection Summary

HCM Signalized Intersection Capacity Analysis
16: Humphreys Rd & Lyman Rd

3/25/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	277	4	11	546	189	0	0	0	247	22	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0						5.0	5.0
Lane Util. Factor		1.00			1.00						1.00	1.00
Frt		1.00			0.97						1.00	0.85
Flt Protected		1.00			1.00						0.96	1.00
Satd. Flow (prot)		1782			1730						1781	1583
Flt Permitted		0.91			0.99						0.96	1.00
Satd. Flow (perm)		1625			1720						1781	1583
Peak-hour factor, PHF	0.83	0.83	0.83	0.85	0.85	0.85	0.92	0.92	0.92	0.72	0.72	0.72
Adj. Flow (vph)	30	334	5	13	642	222	0	0	0	343	31	44
RTOR Reduction (vph)	0	1	0	0	17	0	0	0	0	0	0	32
Lane Group Flow (vph)	0	368	0	0	860	0	0	0	0	0	374	12
Heavy Vehicles (%)	6%	6%	6%	6%	6%	6%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA					Split	NA	Perm
Protected Phases		4			8					2	2	
Permitted Phases	4			8								2
Actuated Green, G (s)		34.5			34.5						17.4	17.4
Effective Green, g (s)		34.5			34.5						17.4	17.4
Actuated g/C Ratio		0.56			0.56						0.28	0.28
Clearance Time (s)		5.0			5.0						5.0	5.0
Vehicle Extension (s)		3.0			3.0						3.0	3.0
Lane Grp Cap (vph)		906			959						501	445
v/s Ratio Prot											c0.21	
v/s Ratio Perm		0.23			c0.50							0.01
v/c Ratio		0.41			0.90						0.75	0.03
Uniform Delay, d1		7.8			12.1						20.2	16.1
Progression Factor		1.00			1.00						1.00	1.00
Incremental Delay, d2		0.3			10.9						6.0	0.0
Delay (s)		8.1			23.0						26.2	16.1
Level of Service		A			C						C	B
Approach Delay (s)		8.1			23.0			0.0			25.2	
Approach LOS		A			C			A			C	

Intersection Summary			
HCM Average Control Delay	20.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	61.9	Sum of lost time (s)	10.0
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	SBT	SBR
Lane Group Flow (vph)	369	877	374	44
v/c Ratio	0.41	0.90	0.75	0.09
Control Delay	10.0	27.3	32.4	6.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	10.0	27.3	32.4	6.9
Queue Length 50th (ft)	77	275	141	0
Queue Length 95th (ft)	123	#502	171	14
Internal Link Dist (ft)	2460	1199	1412	
Turn Bay Length (ft)				200
Base Capacity (vph)	1053	1129	622	581
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.35	0.78	0.60	0.08

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Unsignalized Intersection Capacity Analysis
3: Lyman Rd & Maili Rd

3/25/2014

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	4	49	280	25	183	29
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.79	0.79	0.88	0.88	0.78	0.78
Hourly flow rate (vph)	5	62	318	28	235	37
Pedestrians			1		1	
Lane Width (ft)			12.0		12.0	
Walking Speed (ft/s)			4.0		4.0	
Percent Blockage			0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	348				407	333
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	348				407	333
tC, single (s)	4.3				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.4				3.5	3.3
p0 queue free %	100				61	95
cM capacity (veh/h)	1103				599	710

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	67	347	272
Volume Left	5	0	235
Volume Right	0	28	37
cSH	1103	1700	612
Volume to Capacity	0.00	0.20	0.44
Queue Length 95th (ft)	0	0	57
Control Delay (s)	0.7	0.0	15.5
Lane LOS	A		C
Approach Delay (s)	0.7	0.0	15.5
Approach LOS			C

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	34.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	35	11	30	949	441	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1583	1417	1736	1827	1769	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1583	1417	1736	1827	1769	
Peak-hour factor, PHF	0.51	0.51	0.89	0.89	0.92	0.92
Adj. Flow (vph)	69	22	34	1066	479	95
RTOR Reduction (vph)	0	19	0	0	5	0
Lane Group Flow (vph)	69	3	34	1066	569	0
Heavy Vehicles (%)	14%	14%	4%	4%	5%	5%
Turn Type	NA	Perm	Prot	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4				
Actuated Green, G (s)	7.0	7.0	2.8	52.6	44.8	
Effective Green, g (s)	9.0	8.0	4.8	54.6	46.8	
Actuated g/C Ratio	0.13	0.11	0.07	0.78	0.67	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	205	163	120	1433	1190	
v/s Ratio Prot	c0.04		0.02	c0.58	0.32	
v/s Ratio Perm		0.00				
v/c Ratio	0.34	0.02	0.28	0.74	0.48	
Uniform Delay, d1	27.6	27.3	30.8	3.9	5.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	0.0	1.3	2.1	0.3	
Delay (s)	28.6	27.3	32.1	6.0	5.8	
Level of Service	C	C	C	A	A	
Approach Delay (s)	28.3			6.8	5.8	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	7.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	69.6	Sum of lost time (s)	6.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues
41: Kunia Rd & Field Station Kunia Entrance

7/17/2014

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	69	22	34	1066	574
v/c Ratio	0.25	0.09	0.13	0.73	0.44
Control Delay	31.3	14.7	32.1	8.7	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	31.3	14.7	32.1	8.7	7.9
Queue Length 50th (ft)	26	0	13	189	60
Queue Length 95th (ft)	41	7	46	410	252
Internal Link Dist (ft)	642			1901	1624
Turn Bay Length (ft)	140		300		
Base Capacity (vph)	620	544	355	1744	1460
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.11	0.04	0.10	0.61	0.39

Intersection Summary

HCM Signalized Intersection Capacity Analysis
1: Kunia Rd & Foote Ave

3/25/2014

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	441	125	217	589	679	428
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1752	1568	1752	3505	3438	1538
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1752	1568	1752	3505	3438	1538
Peak-hour factor, PHF	0.84	0.84	0.92	0.92	0.87	0.87
Adj. Flow (vph)	525	149	236	640	780	492
RTOR Reduction (vph)	0	0	0	0	0	223
Lane Group Flow (vph)	525	149	236	640	780	269
Confl. Peds. (#/hr)	1					
Heavy Vehicles (%)	3%	3%	3%	3%	5%	5%
Turn Type	NA	custom	Prot	NA	NA	Perm
Protected Phases	4	4	1	6	2	
Permitted Phases		6				2
Actuated Green, G (s)	54.5	118.5	21.6	64.0	37.4	37.4
Effective Green, g (s)	54.5	118.5	21.6	64.0	37.4	37.4
Actuated g/C Ratio	0.42	0.92	0.17	0.50	0.29	0.29
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	743	1568	294	1746	1001	448
v/s Ratio Prot	c0.30	0.04	c0.13	0.18	c0.23	
v/s Ratio Perm		0.05				0.18
v/c Ratio	0.71	0.10	0.80	0.37	0.78	0.60
Uniform Delay, d1	30.4	0.4	51.4	19.8	41.8	39.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.6	0.0	14.6	0.1	3.9	2.3
Delay (s)	36.0	0.5	66.0	19.9	45.7	41.4
Level of Service	D	A	E	B	D	D
Approach Delay (s)	28.2			32.3	44.0	
Approach LOS	C			C	D	

Intersection Summary			
HCM Average Control Delay	36.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	128.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues
1: Kunia Rd & Foote Ave

3/25/2014

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	525	149	236	640	780	492
v/c Ratio	0.71	0.10	0.80	0.37	0.78	0.74
Control Delay	39.2	0.1	72.4	20.0	48.2	21.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.2	0.1	72.4	20.0	48.2	21.5
Queue Length 50th (ft)	371	0	194	165	316	137
Queue Length 95th (ft)	509	0	300	207	390	258
Internal Link Dist (ft)	1099			1376	2153	
Turn Bay Length (ft)			150			150
Base Capacity (vph)	742	1568	371	2090	1187	736
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.10	0.64	0.31	0.66	0.67

Intersection Summary

HCM Signalized Intersection Capacity Analysis
30: Kunia Rd/Driveway & SR 99

3/25/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	733	220	877	833	0	258	4	768	15	10	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	2.0	3.0	3.0			3.0	3.0		3.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.97	
Satd. Flow (prot)	1736	3471	1533	1719	3438			1725	1517		1766	
Flt Permitted	0.32	1.00	1.00	0.95	1.00			0.69	1.00		0.45	
Satd. Flow (perm)	586	3471	1533	1719	3438			1248	1517		826	
Peak-hour factor, PHF	0.88	0.88	0.88	0.94	0.94	0.94	0.83	0.83	0.83	0.55	0.55	0.55
Adj. Flow (vph)	1	833	250	933	886	0	311	5	925	27	18	2
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	1	833	250	933	886	0	0	316	925	0	46	0
Confl. Peds. (#/hr)			2			3			5	5		
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	5%	5%	5%	4%	4%	4%
Turn Type	Perm	NA	Free	Prot	NA		Perm	NA	Free	Perm	NA	
Protected Phases		6		5	2			8			4	
Permitted Phases	6		Free				8		Free	4		
Actuated Green, G (s)	47.0	47.0	210.0	103.0	155.0			45.0	210.0		45.0	
Effective Green, g (s)	49.0	49.0	210.0	105.0	157.0			47.0	210.0		47.0	
Actuated g/C Ratio	0.23	0.23	1.00	0.50	0.75			0.22	1.00		0.22	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	137	810	1533	860	2570			279	1517		185	
v/s Ratio Prot		c0.24		c0.54	0.26							
v/s Ratio Perm	0.00		0.16					c0.25	0.61		0.06	
v/c Ratio	0.01	1.03	0.16	1.08	0.34			1.13	0.61		0.25	
Uniform Delay, d1	61.8	80.5	0.0	52.5	9.0			81.5	0.0		67.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.0	39.1	0.2	56.3	0.1			94.5	1.8		0.7	
Delay (s)	61.8	119.6	0.2	108.8	9.1			176.0	1.8		67.7	
Level of Service	E	F	A	F	A			F	A		E	
Approach Delay (s)		92.0			60.3			46.2			67.7	
Approach LOS		F			E			D			E	

Intersection Summary			
HCM Average Control Delay	64.4	HCM Level of Service	E
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	210.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	100.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Queues
30: Kunia Rd/Driveway & SR 99

3/25/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	1	833	250	933	886	316	925	47
v/c Ratio	0.01	1.03	0.16	1.08	0.34	1.13	0.61	0.25
Control Delay	62.0	115.2	0.2	104.7	9.4	161.7	1.8	70.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.0	115.2	0.2	104.7	9.4	161.7	1.8	70.0
Queue Length 50th (ft)	1	~644	0	~1440	205	~504	0	53
Queue Length 95th (ft)	8	#754	0	#1709	235	#639	0	59
Internal Link Dist (ft)		1998			2306	2153		237
Turn Bay Length (ft)	150		200	150				
Base Capacity (vph)	137	810	1533	860	2570	280	1517	185
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	1.03	0.16	1.08	0.34	1.13	0.61	0.25

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
44: Kunia Rd & Lyman Rd

3/25/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	96	392	117	37	493	80	267	630	87	161	423	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1736	1827	1337	1787	1881	1599	1736	3471	1553	1703	3406	1524
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1736	1827	1337	1787	1881	1599	1736	3471	1553	1703	3406	1524
Peak-hour factor, PHF	0.64	0.64	0.64	0.84	0.84	0.84	0.76	0.76	0.76	0.91	0.91	0.91
Adj. Flow (vph)	150	612	183	44	587	95	351	829	114	177	465	242
RTOR Reduction (vph)	0	0	17	0	0	12	0	0	41	0	0	104
Lane Group Flow (vph)	150	612	166	44	587	83	351	829	73	177	465	138
Confl. Peds. (#/hr)			52									
Heavy Vehicles (%)	4%	4%	4%	1%	1%	1%	4%	4%	4%	6%	6%	6%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Actuated Green, G (s)	19.8	75.2	75.2	7.1	62.5	62.5	41.0	49.0	49.0	23.0	31.0	31.0
Effective Green, g (s)	21.8	77.2	76.2	9.1	64.5	63.5	43.0	51.0	50.0	25.0	33.0	32.0
Actuated g/C Ratio	0.13	0.44	0.44	0.05	0.37	0.36	0.25	0.29	0.29	0.14	0.19	0.18
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	217	809	585	93	696	583	428	1016	445	244	645	280
v/s Ratio Prot	c0.09	0.33		0.02	c0.31		c0.20	c0.24		0.10	0.14	
v/s Ratio Perm			0.12			0.05			0.05			0.09
v/c Ratio	0.69	0.76	0.28	0.47	0.84	0.14	0.82	0.82	0.16	0.73	0.72	0.49
Uniform Delay, d1	73.0	40.7	31.5	80.3	50.3	37.1	62.0	57.3	46.5	71.4	66.3	63.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.1	4.1	0.3	3.8	9.2	0.1	11.9	5.1	0.2	10.2	4.0	1.4
Delay (s)	82.2	44.7	31.8	84.0	59.4	37.3	73.9	62.4	46.7	81.6	70.3	65.3
Level of Service	F	D	C	F	E	D	E	E	D	F	E	E
Approach Delay (s)		48.2			58.0			64.2			71.2	
Approach LOS		D			E			E			E	

Intersection Summary			
HCM Average Control Delay	60.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	174.3	Sum of lost time (s)	9.0
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues
44: Kunia Rd & Lyman Rd

3/25/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	150	612	183	44	587	95	351	829	114	177	465	242
v/c Ratio	0.69	0.75	0.31	0.39	0.86	0.16	0.81	0.81	0.23	0.72	0.72	0.63
Control Delay	95.2	49.9	30.2	99.4	66.7	33.3	80.4	66.2	28.3	93.2	76.4	41.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	95.2	49.9	30.2	99.4	66.7	33.3	80.4	66.2	28.3	93.2	76.4	41.5
Queue Length 50th (ft)	175	631	121	52	655	62	402	491	51	206	278	129
Queue Length 95th (ft)	201	525	128	104	820	109	480	521	90	339	398	265
Internal Link Dist (ft)		1752			1465			949			1376	
Turn Bay Length (ft)	150		60	240		80	250		200	250		130
Base Capacity (vph)	273	1038	743	130	910	774	567	1302	609	309	783	440
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.59	0.25	0.34	0.65	0.12	0.62	0.64	0.19	0.57	0.59	0.55

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	35	11	30	949	490	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1583	1417	1736	1827	1773	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1583	1417	1736	1827	1773	
Peak-hour factor, PHF	0.51	0.51	0.89	0.89	0.92	0.92
Adj. Flow (vph)	69	22	34	1066	533	95
RTOR Reduction (vph)	0	19	0	0	5	0
Lane Group Flow (vph)	69	3	34	1066	623	0
Heavy Vehicles (%)	14%	14%	4%	4%	5%	5%
Turn Type	NA	Perm	Prot	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4				
Actuated Green, G (s)	7.0	7.0	2.8	52.6	44.8	
Effective Green, g (s)	9.0	8.0	4.8	54.6	46.8	
Actuated g/C Ratio	0.13	0.11	0.07	0.78	0.67	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	205	163	120	1433	1192	
v/s Ratio Prot	c0.04		0.02	c0.58	0.35	
v/s Ratio Perm		0.00				
v/c Ratio	0.34	0.02	0.28	0.74	0.52	
Uniform Delay, d1	27.6	27.3	30.8	3.9	5.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	0.0	1.3	2.1	0.4	
Delay (s)	28.6	27.3	32.1	6.0	6.2	
Level of Service	C	C	C	A	A	
Approach Delay (s)	28.3			6.8	6.2	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	7.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	69.6	Sum of lost time (s)	6.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	69	22	34	1066	628
v/c Ratio	0.25	0.09	0.13	0.73	0.48
Control Delay	31.3	14.7	32.1	8.7	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	31.3	14.7	32.1	8.7	8.5
Queue Length 50th (ft)	26	0	13	189	69
Queue Length 95th (ft)	41	7	46	410	289
Internal Link Dist (ft)	642			1901	1624
Turn Bay Length (ft)	140		300		
Base Capacity (vph)	620	544	355	1744	1462
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.11	0.04	0.10	0.61	0.43

Intersection Summary

HCM Unsignalized Intersection Capacity Analysis
5: Kunia Rd & Temp Access

3/24/2014

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	5	5	49	979	452	49
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	0.77	0.77	0.91	0.91
Hourly flow rate (vph)	5	5	64	1271	497	54
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1922	524	551			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1922	524	551			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	99	94			
cM capacity (veh/h)	70	557	1019			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	10	1335	551
Volume Left	5	64	0
Volume Right	5	0	54
cSH	124	1019	1700
Volume to Capacity	0.08	0.06	0.32
Queue Length 95th (ft)	6	5	0
Control Delay (s)	36.5	2.5	0.0
Lane LOS	E	A	
Approach Delay (s)	36.5	2.5	0.0
Approach LOS	E		

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	103.3%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	39	441	766	217	126	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.97		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1612	1696	1723		1770	1583
Flt Permitted	0.08	1.00	1.00		0.95	1.00
Satd. Flow (perm)	132	1696	1723		1770	1583
Peak-hour factor, PHF	0.84	0.84	0.89	0.89	0.86	0.86
Adj. Flow (vph)	46	525	861	244	147	36
RTOR Reduction (vph)	0	0	7	0	0	28
Lane Group Flow (vph)	46	525	1098	0	147	8
Heavy Vehicles (%)	12%	12%	7%	7%	2%	2%
Turn Type	pm+pt	NA	NA		NA	Perm
Protected Phases	7	4	8		2	
Permitted Phases	4					2
Actuated Green, G (s)	86.2	86.2	74.6		14.2	14.2
Effective Green, g (s)	86.2	86.2	74.6		14.2	14.2
Actuated g/C Ratio	0.78	0.78	0.68		0.13	0.13
Clearance Time (s)	5.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	192	1324	1164		228	204
v/s Ratio Prot	0.01	c0.31	c0.64		c0.08	
v/s Ratio Perm	0.17					0.01
v/c Ratio	0.24	0.40	0.94		0.64	0.04
Uniform Delay, d1	19.0	3.8	16.0		45.7	42.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	0.2	14.7		6.1	0.1
Delay (s)	19.7	4.0	30.7		51.8	42.2
Level of Service	B	A	C		D	D
Approach Delay (s)		5.3	30.7		49.9	
Approach LOS		A	C		D	

Intersection Summary			
HCM Average Control Delay	24.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	110.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	46	525	1105	147	36
v/c Ratio	0.22	0.40	0.93	0.64	0.15
Control Delay	5.8	5.3	33.1	59.0	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.8	5.3	33.1	59.0	17.8
Queue Length 50th (ft)	6	97	658	101	3
Queue Length 95th (ft)	16	164	#1140	163	30
Internal Link Dist (ft)		1199	1752	1564	
Turn Bay Length (ft)	100				65
Base Capacity (vph)	239	1392	1182	343	332
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.19	0.38	0.93	0.43	0.11

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
44: Kunia Rd & Lyman Rd

3/28/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	99	392	118	37	493	80	269	630	87	161	374	224
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1736	1827	1336	1787	1881	1599	1736	3471	1553	1703	3406	1524
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1736	1827	1336	1787	1881	1599	1736	3471	1553	1703	3406	1524
Peak-hour factor, PHF	0.64	0.64	0.64	0.84	0.84	0.84	0.76	0.76	0.76	0.91	0.91	0.91
Adj. Flow (vph)	155	612	184	44	587	95	354	829	114	177	411	246
RTOR Reduction (vph)	0	0	17	0	0	12	0	0	41	0	0	120
Lane Group Flow (vph)	155	612	167	44	587	83	354	829	73	177	411	126
Confl. Peds. (#/hr)			52									
Heavy Vehicles (%)	4%	4%	4%	1%	1%	1%	4%	4%	4%	6%	6%	6%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Actuated Green, G (s)	20.2	75.8	75.8	7.1	62.7	62.7	41.4	49.1	49.1	23.0	30.7	30.7
Effective Green, g (s)	22.2	77.8	76.8	9.1	64.7	63.7	43.4	51.1	50.1	25.0	32.7	31.7
Actuated g/C Ratio	0.13	0.44	0.44	0.05	0.37	0.36	0.25	0.29	0.29	0.14	0.19	0.18
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	220	812	586	93	695	582	431	1014	445	243	636	276
v/s Ratio Prot	c0.09	0.33		0.02	c0.31		c0.20	c0.24		0.10	0.12	
v/s Ratio Perm			0.12			0.05			0.05			0.08
v/c Ratio	0.70	0.75	0.28	0.47	0.84	0.14	0.82	0.82	0.16	0.73	0.65	0.46
Uniform Delay, d1	73.3	40.6	31.5	80.6	50.5	37.3	62.1	57.6	46.8	71.8	65.8	64.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.8	4.0	0.3	3.8	9.2	0.1	11.9	5.2	0.2	10.4	2.3	1.2
Delay (s)	83.1	44.6	31.7	84.4	59.8	37.4	74.0	62.8	47.0	82.2	68.1	65.2
Level of Service	F	D	C	F	E	D	E	E	D	F	E	E
Approach Delay (s)		48.4			58.4			64.5			70.2	
Approach LOS		D			E			E			E	

Intersection Summary			
HCM Average Control Delay	60.5	HCM Level of Service	E
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	175.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues
44: Kunia Rd & Lyman Rd

3/28/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	155	612	184	44	587	95	354	829	114	177	411	246
v/c Ratio	0.70	0.75	0.31	0.39	0.86	0.16	0.82	0.81	0.23	0.72	0.64	0.62
Control Delay	95.4	49.6	30.1	99.7	67.0	33.4	80.6	66.6	28.4	93.6	74.2	36.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	95.4	49.6	30.1	99.7	67.0	33.4	80.6	66.6	28.4	93.6	74.2	36.8
Queue Length 50th (ft)	182	633	122	52	661	62	409	496	52	207	244	112
Queue Length 95th (ft)	209	525	129	104	820	109	480	521	90	339	352	246
Internal Link Dist (ft)		1752			1465			949			1376	
Turn Bay Length (ft)	150		60	240		80	250		200	250		130
Base Capacity (vph)	272	1033	739	129	905	770	575	1295	606	307	760	445
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.59	0.25	0.34	0.65	0.12	0.62	0.64	0.19	0.58	0.54	0.55

Intersection Summary

HCM Signalized Intersection Capacity Analysis
16: Humphreys Rd & Lyman Rd

3/21/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	281	4	11	552	189	0	0	0	247	22	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0						5.0	5.0
Lane Util. Factor		1.00			1.00						1.00	1.00
Frt		1.00			0.97						1.00	0.85
Flt Protected		1.00			1.00						0.96	1.00
Satd. Flow (prot)		1782			1730						1781	1583
Flt Permitted		0.91			0.99						0.96	1.00
Satd. Flow (perm)		1626			1721						1781	1583
Peak-hour factor, PHF	0.83	0.83	0.83	0.85	0.85	0.85	0.92	0.92	0.92	0.72	0.72	0.72
Adj. Flow (vph)	30	339	5	13	649	222	0	0	0	343	31	44
RTOR Reduction (vph)	0	1	0	0	17	0	0	0	0	0	0	32
Lane Group Flow (vph)	0	373	0	0	867	0	0	0	0	0	374	12
Heavy Vehicles (%)	6%	6%	6%	6%	6%	6%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA					Split	NA	Perm
Protected Phases		4			8					2	2	
Permitted Phases	4			8								2
Actuated Green, G (s)		34.9			34.9						17.4	17.4
Effective Green, g (s)		34.9			34.9						17.4	17.4
Actuated g/C Ratio		0.56			0.56						0.28	0.28
Clearance Time (s)		5.0			5.0						5.0	5.0
Vehicle Extension (s)		3.0			3.0						3.0	3.0
Lane Grp Cap (vph)		911			964						497	442
v/s Ratio Prot											c0.21	
v/s Ratio Perm		0.23			c0.50							0.01
v/c Ratio		0.41			0.90						0.75	0.03
Uniform Delay, d1		7.8			12.1						20.5	16.3
Progression Factor		1.00			1.00						1.00	1.00
Incremental Delay, d2		0.3			11.0						6.4	0.0
Delay (s)		8.1			23.2						26.8	16.3
Level of Service		A			C						C	B
Approach Delay (s)		8.1			23.2			0.0			25.7	
Approach LOS		A			C			A			C	

Intersection Summary			
HCM Average Control Delay	20.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	62.3	Sum of lost time (s)	10.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
3: Lyman Rd & Maili Rd

3/28/2014

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	4	53	286	25	183	29
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.79	0.79	0.88	0.88	0.78	0.78
Hourly flow rate (vph)	5	67	325	28	235	37
Pedestrians			1		1	
Lane Width (ft)			12.0		12.0	
Walking Speed (ft/s)			4.0		4.0	
Percent Blockage			0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	354				418	340
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	354				418	340
tC, single (s)	4.3				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.4				3.5	3.3
p0 queue free %	100				60	95
cM capacity (veh/h)	1096				589	704

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	72	353	272
Volume Left	5	0	235
Volume Right	0	28	37
cSH	1096	1700	603
Volume to Capacity	0.00	0.21	0.45
Queue Length 95th (ft)	0	0	58
Control Delay (s)	0.6	0.0	15.8
Lane LOS	A		C
Approach Delay (s)	0.6	0.0	15.8
Approach LOS			C

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	35.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	35	11	30	951	442	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1583	1417	1736	1827	1769	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1583	1417	1736	1827	1769	
Peak-hour factor, PHF	0.51	0.51	0.89	0.89	0.92	0.92
Adj. Flow (vph)	69	22	34	1069	480	95
RTOR Reduction (vph)	0	19	0	0	5	0
Lane Group Flow (vph)	69	3	34	1069	570	0
Heavy Vehicles (%)	14%	14%	4%	4%	5%	5%
Turn Type	NA	Perm	Prot	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4				
Actuated Green, G (s)	7.0	7.0	2.8	52.9	45.1	
Effective Green, g (s)	9.0	8.0	4.8	54.9	47.1	
Actuated g/C Ratio	0.13	0.11	0.07	0.79	0.67	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	204	162	119	1435	1192	
v/s Ratio Prot	c0.04		0.02	c0.59	0.32	
v/s Ratio Perm		0.00				
v/c Ratio	0.34	0.02	0.29	0.74	0.48	
Uniform Delay, d1	27.7	27.5	30.9	3.9	5.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	0.0	1.3	2.1	0.3	
Delay (s)	28.7	27.5	32.2	6.0	5.8	
Level of Service	C	C	C	A	A	
Approach Delay (s)	28.4			6.8	5.8	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	7.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	69.9	Sum of lost time (s)	6.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues
41: Kunia Rd & Field Station Kunia Entrance

7/17/2014

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	69	22	34	1069	575
v/c Ratio	0.25	0.09	0.13	0.73	0.44
Control Delay	31.4	14.6	32.2	8.7	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	31.4	14.6	32.2	8.7	7.9
Queue Length 50th (ft)	26	0	13	191	60
Queue Length 95th (ft)	41	7	46	411	253
Internal Link Dist (ft)	642			1901	1624
Turn Bay Length (ft)	140		300		
Base Capacity (vph)	617	542	353	1741	1455
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.11	0.04	0.10	0.61	0.40

Intersection Summary

HCM Signalized Intersection Capacity Analysis
1: Kunia Rd & Foote Ave

3/24/2014

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	834	436	75	715	493	301
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1787	1599	1787	3574	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1787	1599	1787	3574	3539	1583
Peak-hour factor, PHF	0.81	0.81	0.83	0.83	0.87	0.87
Adj. Flow (vph)	1030	538	90	861	567	346
RTOR Reduction (vph)	0	0	0	0	0	210
Lane Group Flow (vph)	1030	538	90	861	567	136
Confl. Peds. (#/hr)	1					
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%
Turn Type	NA	custom	Prot	NA	NA	Perm
Protected Phases	4	4	1	6	2	
Permitted Phases		6				2
Actuated Green, G (s)	89.0	128.8	9.6	39.8	25.2	25.2
Effective Green, g (s)	89.0	128.8	9.6	39.8	25.2	25.2
Actuated g/C Ratio	0.64	0.93	0.07	0.29	0.18	0.18
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1146	1599	124	1025	643	287
v/s Ratio Prot	c0.58	0.22	0.05	c0.24	0.16	
v/s Ratio Perm		0.12				0.09
v/c Ratio	0.90	0.34	0.73	0.84	0.88	0.47
Uniform Delay, d1	21.1	0.5	63.3	46.5	55.3	50.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.2	0.1	18.9	6.2	13.5	1.2
Delay (s)	32.3	0.6	82.2	52.7	68.8	52.1
Level of Service	C	A	F	D	E	D
Approach Delay (s)	21.4			55.5	62.5	
Approach LOS	C			E	E	

Intersection Summary			
HCM Average Control Delay	41.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	138.8	Sum of lost time (s)	10.0
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues
1: Kunia Rd & Foote Ave

3/24/2014

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	1030	538	90	861	567	346
v/c Ratio	0.90	0.34	0.73	0.84	0.88	0.69
Control Delay	33.6	0.6	94.8	55.1	71.5	22.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.6	0.6	94.8	55.1	71.5	22.3
Queue Length 50th (ft)	760	0	82	385	266	72
Queue Length 95th (ft)	799	0	#144	420	#328	171
Internal Link Dist (ft)	1138			1376	2153	
Turn Bay Length (ft)			150			150
Base Capacity (vph)	1146	1599	129	1056	663	505
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.34	0.70	0.82	0.86	0.69

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
30: Kunia Rd/Driveway & SR 99

3/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	1349	205	582	827	6	302	6	1241	11	8	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	2.0	3.0	3.0			3.0	3.0		3.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.97	
Satd. Flow (prot)	1770	3539	1564	1787	3571			1793	1579		1688	
Flt Permitted	0.33	1.00	1.00	0.95	1.00			0.72	1.00		0.56	
Satd. Flow (perm)	614	3539	1564	1787	3571			1348	1579		980	
Peak-hour factor, PHF	0.94	0.94	0.94	0.97	0.97	0.97	0.94	0.94	0.94	0.69	0.69	0.69
Adj. Flow (vph)	3	1435	218	600	853	6	321	6	1320	16	12	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	3	1435	218	600	859	0	0	327	1320	0	28	0
Confl. Peds. (#/hr)			1						1			
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	9%	9%	9%
Turn Type	Perm	NA	Free	Prot	NA		Perm	NA	Free	Perm	NA	
Protected Phases		6		5	2			8			4	
Permitted Phases	6		Free				8		Free	4		
Actuated Green, G (s)	83.0	83.0	210.0	66.0	154.0			46.0	210.0		46.0	
Effective Green, g (s)	85.0	85.0	210.0	68.0	156.0			48.0	210.0		48.0	
Actuated g/C Ratio	0.40	0.40	1.00	0.32	0.74			0.23	1.00		0.23	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	249	1432	1564	579	2653			308	1579		224	
v/s Ratio Prot		c0.41		c0.34	0.24							
v/s Ratio Perm	0.00		0.14					c0.24	0.84		0.03	
v/c Ratio	0.01	1.00	0.14	1.04	0.32			1.06	0.84		0.13	
Uniform Delay, d1	37.4	62.5	0.0	71.0	9.1			81.0	0.0		64.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.0	24.3	0.2	47.1	0.1			68.5	5.4		0.3	
Delay (s)	37.4	86.8	0.2	118.1	9.2			149.5	5.4		64.6	
Level of Service	D	F	A	F	A			F	A		E	
Approach Delay (s)		75.3			54.0			34.0			64.6	
Approach LOS		E			D			C			E	

Intersection Summary			
HCM Average Control Delay	54.6	HCM Level of Service	D
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	210.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	103.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Queues
30: Kunia Rd/Driveway & SR 99

3/24/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	3	1435	218	600	859	327	1320	29
v/c Ratio	0.01	1.00	0.14	1.04	0.32	1.06	0.84	0.13
Control Delay	37.7	85.2	0.2	113.5	9.5	141.5	5.4	64.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.7	85.2	0.2	113.5	9.5	141.5	5.4	64.7
Queue Length 50th (ft)	3	~1053	0	~889	197	~495	0	31
Queue Length 95th (ft)	12	#1216	0	#1147	227	#718	0	51
Internal Link Dist (ft)		1998			2306	2153		237
Turn Bay Length (ft)	150		200	150				
Base Capacity (vph)	249	1432	1564	579	2653	308	1579	225
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	1.00	0.14	1.04	0.32	1.06	0.84	0.13

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	33	912	408	140	155	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.97		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	1881	1816		1770	1583
Flt Permitted	0.26	1.00	1.00		0.95	1.00
Satd. Flow (perm)	491	1881	1816		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.90	0.90	0.87	0.87
Adj. Flow (vph)	36	991	453	156	178	46
RTOR Reduction (vph)	0	0	13	0	0	37
Lane Group Flow (vph)	36	991	596	0	178	9
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%
Turn Type	pm+pt	NA	NA		NA	Perm
Protected Phases	7	4	8		2	
Permitted Phases	4					2
Actuated Green, G (s)	38.9	38.9	31.6		11.2	11.2
Effective Green, g (s)	38.9	38.9	31.6		11.2	11.2
Actuated g/C Ratio	0.65	0.65	0.53		0.19	0.19
Clearance Time (s)	5.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	367	1217	955		330	295
v/s Ratio Prot	0.00	c0.53	0.33		c0.10	
v/s Ratio Perm	0.06					0.01
v/c Ratio	0.10	0.81	0.62		0.54	0.03
Uniform Delay, d1	5.7	7.9	10.1		22.1	20.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	4.3	1.3		1.7	0.0
Delay (s)	5.8	12.2	11.3		23.8	20.0
Level of Service	A	B	B		C	C
Approach Delay (s)		12.0	11.3		23.0	
Approach LOS		B	B		C	

Intersection Summary			
HCM Average Control Delay	13.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	60.1	Sum of lost time (s)	10.0
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	36	991	609	178	46
v/c Ratio	0.08	0.84	0.60	0.51	0.13
Control Delay	5.1	18.1	14.4	27.2	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.1	18.1	14.4	27.2	8.0
Queue Length 50th (ft)	4	222	91	59	0
Queue Length 95th (ft)	14	#571	#361	107	21
Internal Link Dist (ft)		1199	1752	1508	
Turn Bay Length (ft)	100				50
Base Capacity (vph)	539	1311	1016	664	623
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.07	0.76	0.60	0.27	0.07

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
44: Kunia Rd & Lyman Rd

3/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	234	278	387	166	247	105	98	452	29	68	765	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1554	1787	1881	1599	1787	3574	1599	1787	3574	1599
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1554	1787	1881	1599	1787	3574	1599	1787	3574	1599
Peak-hour factor, PHF	0.91	0.91	0.91	0.82	0.82	0.82	0.83	0.83	0.83	0.76	0.76	0.76
Adj. Flow (vph)	257	305	425	202	301	128	118	545	35	89	1007	128
RTOR Reduction (vph)	0	0	85	0	0	32	0	0	18	0	0	25
Lane Group Flow (vph)	257	305	340	202	301	96	118	545	17	89	1007	103
Confl. Peds. (#/hr)			3									
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Actuated Green, G (s)	29.9	42.6	42.6	24.5	37.2	37.2	16.3	56.5	56.5	13.2	53.4	53.4
Effective Green, g (s)	31.9	44.6	43.6	26.5	39.2	38.2	18.3	58.5	57.5	15.2	55.4	54.4
Actuated g/C Ratio	0.20	0.28	0.28	0.17	0.25	0.24	0.12	0.37	0.37	0.10	0.35	0.35
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	360	530	432	302	470	390	209	1333	586	173	1263	555
v/s Ratio Prot	c0.15	0.16		0.11	0.16		c0.07	0.15		0.05	c0.28	
v/s Ratio Perm			c0.22			0.06			0.01			0.06
v/c Ratio	0.71	0.58	0.79	0.67	0.64	0.25	0.56	0.41	0.03	0.51	0.80	0.18
Uniform Delay, d1	58.2	48.0	52.3	61.0	52.5	47.7	65.5	36.4	31.8	67.3	45.6	35.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.6	1.5	9.1	5.5	3.0	0.3	3.5	0.2	0.0	2.6	3.6	0.2
Delay (s)	64.8	49.5	61.4	66.6	55.5	48.1	69.0	36.6	31.8	69.9	49.2	35.9
Level of Service	E	D	E	E	E	D	E	D	C	E	D	D
Approach Delay (s)		58.6			57.5			41.8			49.3	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM Average Control Delay	51.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	156.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues
44: Kunia Rd & Lyman Rd

3/24/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	257	305	425	202	301	128	118	545	35	89	1007	128
v/c Ratio	0.72	0.58	0.83	0.67	0.64	0.31	0.56	0.41	0.06	0.51	0.80	0.22
Control Delay	75.5	55.7	54.7	79.0	62.8	37.5	85.2	40.1	15.3	88.6	54.6	29.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.5	55.7	54.7	79.0	62.8	37.5	85.2	40.1	15.3	88.6	54.6	29.9
Queue Length 50th (ft)	252	273	313	199	282	72	118	221	4	89	496	64
Queue Length 95th (ft)	449	457	551	331	424	141	219	323	30	160	605	118
Internal Link Dist (ft)		1752			1815			882			1376	
Turn Bay Length (ft)	150		60	240		80	250		200	250		130
Base Capacity (vph)	529	848	760	437	754	655	279	1869	839	218	1747	791
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.36	0.56	0.46	0.40	0.20	0.42	0.29	0.04	0.41	0.58	0.16

Intersection Summary

HCM Signalized Intersection Capacity Analysis
16: Humphreys Rd & Lyman Rd

3/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	438	1	2	234	248	0	0	0	346	5	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0						5.0	5.0
Lane Util. Factor		1.00			1.00						1.00	1.00
Frpb, ped/bikes		1.00			1.00						1.00	1.00
Flpb, ped/bikes		1.00			1.00						1.00	1.00
Frt		1.00			0.93						1.00	0.85
Flt Protected		1.00			1.00						0.95	1.00
Satd. Flow (prot)		1856			1733						1793	1599
Flt Permitted		0.94			1.00						0.95	1.00
Satd. Flow (perm)		1752			1731						1793	1599
Peak-hour factor, PHF	0.75	0.75	0.75	0.92	0.92	0.92	0.92	0.92	0.92	0.85	0.85	0.85
Adj. Flow (vph)	44	584	1	2	254	270	0	0	0	407	6	22
RTOR Reduction (vph)	0	0	0	0	57	0	0	0	0	0	0	15
Lane Group Flow (vph)	0	629	0	0	469	0	0	0	0	0	413	7
Confl. Peds. (#/hr)										5		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA					Split	NA	Perm
Protected Phases		4			8					2	2	
Permitted Phases	4			8								2
Actuated Green, G (s)		24.4			24.4						17.6	17.6
Effective Green, g (s)		24.4			24.4						17.6	17.6
Actuated g/C Ratio		0.47			0.47						0.34	0.34
Clearance Time (s)		5.0			5.0						5.0	5.0
Vehicle Extension (s)		3.0			3.0						3.0	3.0
Lane Grp Cap (vph)		822			812						607	541
v/s Ratio Prot											c0.23	
v/s Ratio Perm		c0.36			0.27							0.00
v/c Ratio		0.77			0.58						0.68	0.01
Uniform Delay, d1		11.4			10.0						14.8	11.4
Progression Factor		1.00			1.00						1.00	1.00
Incremental Delay, d2		4.3			1.0						3.1	0.0
Delay (s)		15.7			11.0						17.9	11.4
Level of Service		B			B						B	B
Approach Delay (s)		15.7			11.0			0.0			17.6	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	52.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	SBT	SBR
Lane Group Flow (vph)	629	526	413	22
v/c Ratio	0.78	0.61	0.69	0.04
Control Delay	20.2	12.2	23.5	7.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.2	12.2	23.5	7.2
Queue Length 50th (ft)	146	83	106	0
Queue Length 95th (ft)	232	202	218	12
Internal Link Dist (ft)	2460	1199	1378	
Turn Bay Length (ft)				200
Base Capacity (vph)	1232	1249	922	833
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.51	0.42	0.45	0.03

Intersection Summary

HCM Unsignalized Intersection Capacity Analysis
3: Lyman Rd & Maili Rd

3/25/2014

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	20	258	65	82	48	13
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.57	0.57	0.76	0.76	0.79	0.79
Hourly flow rate (vph)	35	453	86	108	61	16
Pedestrians			2			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			4.0			
Percent Blockage			0			
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	193				664	139
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	193				664	139
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	97				85	98
cM capacity (veh/h)	1345				406	895

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	488	193	77
Volume Left	35	0	61
Volume Right	0	108	16
cSH	1345	1700	460
Volume to Capacity	0.03	0.11	0.17
Queue Length 95th (ft)	2	0	15
Control Delay (s)	0.8	0.0	14.4
Lane LOS	A		B
Approach Delay (s)	0.8	0.0	14.4
Approach LOS			B

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	113	54	4	465	1295	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1787	1599	1752	1845	1877	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1787	1599	1752	1845	1877	
Peak-hour factor, PHF	0.97	0.97	0.87	0.87	0.87	0.87
Adj. Flow (vph)	116	56	5	534	1489	26
RTOR Reduction (vph)	0	50	0	0	0	0
Lane Group Flow (vph)	116	6	5	534	1515	0
Heavy Vehicles (%)	1%	1%	3%	3%	1%	1%
Turn Type	NA	Perm	Prot	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4				
Actuated Green, G (s)	13.2	13.2	1.3	103.6	97.3	
Effective Green, g (s)	15.2	14.2	3.3	105.6	99.3	
Actuated g/C Ratio	0.12	0.11	0.03	0.83	0.78	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	214	179	46	1537	1470	
v/s Ratio Prot	c0.06		0.00	c0.29	c0.81	
v/s Ratio Perm		0.00				
v/c Ratio	0.54	0.04	0.11	0.35	1.03	
Uniform Delay, d1	52.5	50.2	60.3	2.5	13.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.8	0.1	1.0	0.1	31.6	
Delay (s)	55.3	50.3	61.4	2.6	45.4	
Level of Service	E	D	E	A	D	
Approach Delay (s)	53.7			3.2	45.4	
Approach LOS	D			A	D	

Intersection Summary			
HCM Average Control Delay	35.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	126.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues
41: Kunia Rd & Field Station Kunia Entrance

7/17/2014

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	116	56	5	534	1515
v/c Ratio	0.52	0.24	0.04	0.35	1.00
Control Delay	59.0	15.1	57.0	3.6	36.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	59.0	15.1	57.0	3.6	36.2
Queue Length 50th (ft)	85	0	4	78	822
Queue Length 95th (ft)	156	41	18	143	#1718
Internal Link Dist (ft)	642			1901	1685
Turn Bay Length (ft)	140		300		
Base Capacity (vph)	336	333	172	1672	1519
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.35	0.17	0.03	0.32	1.00

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
1: Kunia Rd & Foote Ave

3/25/2014

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	834	436	75	764	493	301
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1787	1599	1787	3574	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1787	1599	1787	3574	3539	1583
Peak-hour factor, PHF	0.81	0.81	0.83	0.83	0.87	0.87
Adj. Flow (vph)	1030	538	90	920	567	346
RTOR Reduction (vph)	0	0	0	0	0	210
Lane Group Flow (vph)	1030	538	90	920	567	136
Confl. Peds. (#/hr)	1					
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%
Turn Type	NA	custom	Prot	NA	NA	Perm
Protected Phases	4	4	1	6	2	
Permitted Phases		6				2
Actuated Green, G (s)	89.0	128.8	9.6	39.8	25.2	25.2
Effective Green, g (s)	89.0	128.8	9.6	39.8	25.2	25.2
Actuated g/C Ratio	0.64	0.93	0.07	0.29	0.18	0.18
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1146	1599	124	1025	643	287
v/s Ratio Prot	c0.58	0.22	0.05	c0.26	0.16	
v/s Ratio Perm		0.12				0.09
v/c Ratio	0.90	0.34	0.73	0.90	0.88	0.47
Uniform Delay, d1	21.1	0.5	63.3	47.5	55.3	50.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.2	0.1	18.9	10.4	13.5	1.2
Delay (s)	32.3	0.6	82.2	57.9	68.8	52.1
Level of Service	C	A	F	E	E	D
Approach Delay (s)	21.4			60.1	62.5	
Approach LOS	C			E	E	

Intersection Summary			
HCM Average Control Delay	43.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	138.8	Sum of lost time (s)	10.0
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues
1: Kunia Rd & Foote Ave

3/25/2014

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	1030	538	90	920	567	346
v/c Ratio	0.90	0.34	0.73	0.90	0.88	0.69
Control Delay	33.6	0.6	94.8	59.8	71.5	22.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.6	0.6	94.8	59.8	71.5	22.3
Queue Length 50th (ft)	760	0	82	421	266	72
Queue Length 95th (ft)	799	0	#144	455	#328	171
Internal Link Dist (ft)	1138			1376	2153	
Turn Bay Length (ft)			150			150
Base Capacity (vph)	1146	1599	129	1056	663	505
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.34	0.70	0.87	0.86	0.69

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
30: Kunia Rd/Driveway & SR 99

3/25/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	1349	205	582	827	6	312	6	1280	11	8	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	2.0	3.0	3.0			3.0	3.0		3.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.97	
Satd. Flow (prot)	1770	3539	1564	1787	3571			1793	1579		1688	
Flt Permitted	0.33	1.00	1.00	0.95	1.00			0.72	1.00		0.57	
Satd. Flow (perm)	614	3539	1564	1787	3571			1348	1579		991	
Peak-hour factor, PHF	0.94	0.94	0.94	0.97	0.97	0.97	0.94	0.94	0.94	0.69	0.69	0.69
Adj. Flow (vph)	3	1435	218	600	853	6	332	6	1362	16	12	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	3	1435	218	600	859	0	0	338	1362	0	28	0
Confl. Peds. (#/hr)			1						1			
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	9%	9%	9%
Turn Type	Perm	NA	Free	Prot	NA		Perm	NA	Free	Perm	NA	
Protected Phases		6		5	2			8			4	
Permitted Phases	6		Free				8		Free	4		
Actuated Green, G (s)	81.0	81.0	210.0	66.0	152.0			48.0	210.0		48.0	
Effective Green, g (s)	83.0	83.0	210.0	68.0	154.0			50.0	210.0		50.0	
Actuated g/C Ratio	0.40	0.40	1.00	0.32	0.73			0.24	1.00		0.24	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	243	1399	1564	579	2619			321	1579		236	
v/s Ratio Prot		c0.41		c0.34	0.24							
v/s Ratio Perm	0.00		0.14					c0.25	0.86		0.03	
v/c Ratio	0.01	1.03	0.14	1.04	0.33			1.05	0.86		0.12	
Uniform Delay, d1	38.6	63.5	0.0	71.0	9.8			80.0	0.0		62.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.0	30.8	0.2	47.1	0.1			64.8	6.5		0.2	
Delay (s)	38.6	94.3	0.2	118.1	9.9			144.8	6.5		63.0	
Level of Service	D	F	A	F	A			F	A		E	
Approach Delay (s)		81.8			54.4			34.0			63.0	
Approach LOS		F			D			C			E	

Intersection Summary			
HCM Average Control Delay	56.7	HCM Level of Service	E
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	210.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	103.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
44: Kunia Rd & Lyman Rd

3/25/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	234	278	387	166	247	105	98	500	29	68	765	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1554	1787	1881	1599	1787	3574	1599	1787	3574	1599
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1554	1787	1881	1599	1787	3574	1599	1787	3574	1599
Peak-hour factor, PHF	0.91	0.91	0.91	0.82	0.82	0.82	0.83	0.83	0.83	0.76	0.76	0.76
Adj. Flow (vph)	257	305	425	202	301	128	118	602	35	89	1007	128
RTOR Reduction (vph)	0	0	85	0	0	32	0	0	17	0	0	25
Lane Group Flow (vph)	257	305	340	202	301	96	118	602	18	89	1007	103
Confl. Peds. (#/hr)			3									
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Actuated Green, G (s)	29.9	42.6	42.6	24.5	37.2	37.2	16.3	56.5	56.5	13.2	53.4	53.4
Effective Green, g (s)	31.9	44.6	43.6	26.5	39.2	38.2	18.3	58.5	57.5	15.2	55.4	54.4
Actuated g/C Ratio	0.20	0.28	0.28	0.17	0.25	0.24	0.12	0.37	0.37	0.10	0.35	0.35
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	360	530	432	302	470	390	209	1333	586	173	1263	555
v/s Ratio Prot	c0.15	0.16		0.11	0.16		c0.07	0.17		0.05	c0.28	
v/s Ratio Perm			c0.22			0.06			0.01			0.06
v/c Ratio	0.71	0.58	0.79	0.67	0.64	0.25	0.56	0.45	0.03	0.51	0.80	0.18
Uniform Delay, d1	58.2	48.0	52.3	61.0	52.5	47.7	65.5	37.1	31.8	67.3	45.6	35.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.6	1.5	9.1	5.5	3.0	0.3	3.5	0.2	0.0	2.6	3.6	0.2
Delay (s)	64.8	49.5	61.4	66.6	55.5	48.1	69.0	37.3	31.8	69.9	49.2	35.9
Level of Service	E	D	E	E	E	D	E	D	C	E	D	D
Approach Delay (s)		58.6			57.5			42.0			49.3	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM Average Control Delay	51.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	156.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues
44: Kunia Rd & Lyman Rd

3/25/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	257	305	425	202	301	128	118	602	35	89	1007	128
v/c Ratio	0.72	0.58	0.83	0.67	0.64	0.31	0.56	0.46	0.06	0.51	0.80	0.22
Control Delay	75.5	55.7	54.7	79.0	62.8	37.5	85.2	41.0	16.7	88.6	54.6	29.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.5	55.7	54.7	79.0	62.8	37.5	85.2	41.0	16.7	88.6	54.6	29.9
Queue Length 50th (ft)	252	273	313	199	282	72	118	248	5	89	496	64
Queue Length 95th (ft)	449	457	551	331	424	141	219	360	32	160	605	118
Internal Link Dist (ft)		1752			1815			882			1376	
Turn Bay Length (ft)	150		60	240		80	250		200	250		130
Base Capacity (vph)	529	848	760	437	754	655	279	1869	838	218	1747	791
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.36	0.56	0.46	0.40	0.20	0.42	0.32	0.04	0.41	0.58	0.16

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	113	54	4	514	1295	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1787	1599	1752	1845	1877	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1787	1599	1752	1845	1877	
Peak-hour factor, PHF	0.97	0.97	0.87	0.87	0.87	0.87
Adj. Flow (vph)	116	56	5	591	1489	26
RTOR Reduction (vph)	0	50	0	0	0	0
Lane Group Flow (vph)	116	6	5	591	1515	0
Heavy Vehicles (%)	1%	1%	3%	3%	1%	1%
Turn Type	NA	Perm	Prot	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4				
Actuated Green, G (s)	13.2	13.2	1.3	103.6	97.3	
Effective Green, g (s)	15.2	14.2	3.3	105.6	99.3	
Actuated g/C Ratio	0.12	0.11	0.03	0.83	0.78	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	214	179	46	1537	1470	
v/s Ratio Prot	c0.06		0.00	c0.32	c0.81	
v/s Ratio Perm		0.00				
v/c Ratio	0.54	0.04	0.11	0.38	1.03	
Uniform Delay, d1	52.5	50.2	60.3	2.6	13.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.8	0.1	1.0	0.2	31.6	
Delay (s)	55.3	50.3	61.4	2.8	45.4	
Level of Service	E	D	E	A	D	
Approach Delay (s)	53.7			3.3	45.4	
Approach LOS	D			A	D	

Intersection Summary			
HCM Average Control Delay	35.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	126.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues
41: Kunia Rd & Field Station Kunia Entrance

7/17/2014

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	116	56	5	591	1515
v/c Ratio	0.52	0.24	0.04	0.39	1.00
Control Delay	59.0	15.1	57.0	3.8	36.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	59.0	15.1	57.0	3.8	36.2
Queue Length 50th (ft)	85	0	4	90	822
Queue Length 95th (ft)	156	41	18	163	#1718
Internal Link Dist (ft)	642			1901	1685
Turn Bay Length (ft)	140		300		
Base Capacity (vph)	336	333	172	1672	1519
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.35	0.17	0.03	0.35	1.00

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Unsignalized Intersection Capacity Analysis
5: Kunia Rd & Temp Access

3/21/2014

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	49	49	0	469	1349	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	0.77	0.77	0.91	0.91
Hourly flow rate (vph)	49	49	0	609	1482	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2092	1482	1482			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2092	1482	1482			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	16	68	100			
cM capacity (veh/h)	58	155	454			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	98	609	1482
Volume Left	49	0	0
Volume Right	49	0	0
cSH	85	454	1700
Volume to Capacity	1.15	0.00	0.87
Queue Length 95th (ft)	173	0	0
Control Delay (s)	234.5	0.0	0.0
Lane LOS	F		
Approach Delay (s)	234.5	0.0	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	10.5		
Intersection Capacity Utilization	91.9%	ICU Level of Service	F
Analysis Period (min)	15		