APPENDIX E

TRAFFIC ANALYSIS REPORT FOR

LIHUE TOWN CORE URBAN DESIGN PLAN

IN LIHUE, KAUAI, HAWAII

Prepared For

PBR HAWAII, INC.

and

COUNTY OF KAUAI
PLANNING DEPARTMENT

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1. INTRODUCTION

Phillip Rowell and Associates (PRA) has been retained to prepare the following traffic analysis report for Lihue Town Core Urban Design Plan. PRA is a sub-consultant to PBR Hawaii, Inc. on this project.

This introductory chapter presents the purpose and objective of the study, the study area, methodology and order of presentation.

Objective of Study

The objectives of this study are:

1. Identify and quantify existing vehicular deficiencies within the study area, including pedestrian circulation issues.

2. Estimate future traffic projections for the study intersections and roadway facilities within the study area.

3. Identify and develop traffic engineering solutions to address short-term and long-term transportation deficiencies, including traffic management and calming programs.

Study Methodology

1. Previously completed traffic studies for the area were obtained, reviewed and summarized.

2. An inventory of existing transportation facilities in the study area was performed. The following characteristics of the roadway network were identified:

    1. Classification and jurisdiction of roadways
    2. Existing roadway cross-sections
    3. Intersection lane configurations
    4. Traffic control devices
    5. Major traffic generators, such as schools and shopping districts

3. The data obtained during the inventory and review of previous studies were used to design and perform the following traffic surveys:

    a. Existing morning and afternoon peak hour traffic volumes for the study intersections were obtained and summarized.

    b. Existing operating conditions of the study intersections were evaluated with a level-of-service analysis using AM and PM traffic data obtained during the traffic surveys. The methodology described in the *2000 Highway Capacity Manual* (HCM) was used to estimate the existing levels-of-service at the study intersections.

4. The results of the traffic surveys and analyses were used to identify and quantify existing deficiencies. The deficiencies were quantified relative to delays, volume-to-capacity ratios and levels-of-service.

5. Future traffic conditions in the study area were estimated based on future roadway and development projects in the area, anticipated background traffic growth and traffic projections provided in the *Kauai Long-Range Land Transportation Plan*.

6. Traffic and transportation improvements needed to mitigate existing and near term deficiencies in the study area were identified.

7. The potential transportation improvements were evaluated using established criteria. The criteria included, but was not limited to the following:

    1. Final volume-to-capacity ratio
    2. Reduction in vehicular delay
    3. Pedestrian circulation

8. Conclusions of the analyses performed and recommendations were summarized in a report.

Study Area

The study area and the study intersections are shown as Figure 1. The study area is bounded by Kuhio Highway, Ahukini Road, Kapule Highway and Rice Street. This area includes Hardy Street, Akahi Street, Elua Street and Umi Street.

The study area for the project includes the following intersections:

1. Kuhio Highway at Rice Street
2. Haleko Street at Rice Street
3. Eiwa Street at Rice Street
4. Umi Street at Rice Street
5. Hardy Street/Kalena Street at Rice Street
6. Hoolako Street at Rice Street
7. Kapule Highway at Rice Street
8. Kuhio Highway at Hardy Street
9. Akahi Street at Hardy Street
10. Eiwa Street at Hardy Street
11. Elua Street at Hardy Street
12. Umi Street at Hardy Street
13. Kuhio Highway at Oxford Street
14. Akahi Street at Ahukini Road
15. Elua Street at Ahukini Road
16. Umi Street at Ahukini Road
17. Palai Street at Ahukini Road
18. Kapule Highway at Ahukini Road
19. Kapule Highway at Ka'ana Street

Order of Presentation

Chapter 2 describes existing traffic conditions, the Level-of-Service (LOS) concept and the results of the Level-of-Service analysis of existing conditions.

Chapter 3 describes the alternative future roadway networks.

Chapter 4 presents the 2020 traffic forecasts for the alternative roadway networks described in Chapter 3.

Chapter 5 describes the criteria used to evaluate the alternatives, identifies deficiencies and presents the final recommendations.

Chapter 6 presents conceptual designs for Rice Street between Kuhio Highway and Umi Street, Hardy Street between Kuhio Highway and Umi Street and Ahukini Road between Kuhio Highway and Umi Street.

2. ANALYSIS OF EXISTING CONDITIONS

This chapter presents the existing traffic conditions on the roadways adjacent to and within the study area. The level-of-service (LOS) concept and the results of the Level-of-Service analysis for existing conditions are also presented.

Existing Street Network

The existing street network is shown as Figure 1. Shown are the existing streets and the study intersections. All of the streets within the study area are two-lane, two-way roadways except Kuhio Highway and Rice Street, which are both four-lanes wide. Along Rice Street, parking is allowed along both sides during the off-peak hours. Parking is prohibited from 7:00 AM to 9:00 AM and from 3:00 PM to 5:00 PM on weekdays.

Existing Peak Hour Traffic Volumes

The existing morning and afternoon peak hour traffic volumes are shown in Figures 2 and 3, respectively. The peak hour volumes at the intersections adjacent to the Civic Center were obtained from the traffic study for the Lihue Civic Center Site Improvement Project. The peak hour volumes for the remaining intersections were determined from manual traffic counts.

1. The counts were performed during the first week of November 2004.

2. The counts shown include buses, large vehicles and motorcycles. They do not include bicycles and mopeds.

3. The total approach and departure volumes may not match those of adjacent intersections because the peak hour of one intersection may be different from that of an adjacent intersection and because there are driveways and on-street parking between intersections.

4. The peak hours of the intersections counted for this project are shown in Table 1. The remaining intersections were counted for the Civic Center TIAR, which indicated that the peak hours are from 7:15 to 8:15 AM and from 4:00 to 5:00 PM.

Table 1 Peak Hours of Study Intersections

Intersection No.	Intersection	AM Peak Hour	PM Peak Hour
5	Kalena Street at Rice Street	7:15 - 8:15	4:45 - 5:45
6	Hoolako Street at Rice Street	7:30 - 8:30	3:30 - 4:30
7	Kapule Highway at Rice Street	7:00 - 8:00	4:00 - 5:00
13	Kuhio Highway at Ahukini Road / Oxford Street	7:15 - 8:15	4:00 - 5:00
14	Akahi Street at Ahukini Road	7:45 - 8:45	3:30 - 4:30
15	Elua Street at Ahukini Road	7:15 - 8:15	4:00 - 5:00
16	Umi Street at Ahukini Road	7:00 - 8:00	4:00 - 5:00
17	Palai Street at Ahukini Road	7:00 - 8:00	4:30 - 5:30
18	Kapule Highway at Ahukini Road	7:15 - 8:15	3:30 - 4:30
19	Kapule Highway at Ka Ana Road	7:30 - 8:30	3:30 - 4:30

Level-of-Service Concept

Signalized Intersections

"Level-of-Service" is a term which denotes any of an infinite number of combinations of traffic operating conditions that may occur on a given lane or roadway when it is subjected to various traffic volumes. Level-of-service is a qualitative measure of the effect of a number of factors which include space, speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience.

There are six levels-of-service, A through F, which relate to the driving conditions from best to worst, respectively. The characteristics of traffic operations for each level-of-service are summarized in Table 2. In general, Level-of-Service A represents free-flow conditions with no congestion. Level-of-Service F, on the other hand, represents severe congestion with stop-and-go conditions.

Corresponding to each level-of-service shown in the table is a volume/capacity ratio. This is the ratio of either existing or projected traffic volumes to the capacity of the intersection. Capacity is defined as the maximum number of vehicles that can be accommodated by the roadway during a specified period of time. The capacity of a particular roadway is dependent upon its physical characteristics such as the number of lanes, the operational characteristics of the roadway (one-way, two-way, turn prohibitions, bus stops, etc.), the type of traffic using the roadway (trucks, buses, etc.) and turning movements.

Table 2 Level-of-Service Definitions for Signalized Intersections(1)

Level of Service	Interpretation	Volume-to-Capacity Ratio(2)	Stopped Delay (Seconds)
A, B	Uncongested operations; all vehicles clear in a single cycle.	0.000-0.700	<20.0
C	Light congestion; occasional backups on critical approaches	0.701-0.800	20.1-35.0
D	Congestion on critical approaches but intersection functional. Vehicles must wait through more than one cycle during short periods. No long standing lines formed.	0.801-0.900	35.1-55.0
E	Severe congestion with some standing lines on critical approaches. Blockage of intersection may occur if signal does not provide protected turning movements.	0.901-1.000	55.1-80.0
F	Total breakdown with stop-and-go operation	>1.001	>80.0

Notes:
(1) Source: *Highway Capacity Manual*, 2000.
(2) This is the ratio of the calculated critical volume to Level-of-Service E Capacity.

Level-of-service D is typically considered acceptable for peak hour conditions in urban areas. To be consistent with the conclusions of the TIAR for the Lihue Civic Center Master Plan, Level-of-Service E is considered acceptable under certain circumstances. "Although this level is generally considered undesirable for a signalized intersection, Level-of-Service E is sometimes tolerated for minor movements such as left turns when there are no feasible mitigating measures or if it helps maintain the main through movements at acceptable levels-of-service."[1]

[1] M&E Pacific, Inc. *Traffic Impact Analysis Report for Lihue Civic Center Master Plan*, October 2005, p. 25

Unsignalized Intersections

Like signalized intersections, the operating conditions of intersections controlled by stop signs can be classified by a level-of-service from A to F. However, the method for determining level-of-service for unsignalized intersections is based on the use of gaps in traffic on the major street by vehicles crossing or turning through that stream. Specifically, the capacity of the controlled legs of an intersection is based on two factors: 1) the distribution of gaps in the major street traffic stream, and 2) driver judgement in selecting gaps through which to execute a desired maneuver. The criteria for level-of-service at an unsignalized intersection is therefore based on delay of each controlled lane group. Table 3 summarizes the definitions for level-of-service and the corresponding delay. ***The lane group with the lowest level-of-service defines the level-of-service of the overall unsignalized intersection.*** This means that if all the controlled movements of an unsignalized intersection operate at Level-of-Service B except one that is Level-of-Service F, the intersection Level-of-Service is F.

Table 3 Level-of-Service Definitions for Unsignalized Intersections(1)

Level-of-Service	Expected Delay to Minor Street Traffic	Delay (Seconds)
A	Little or no delay	<10.0
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	See note (2) below	>50.1

Notes:
(1) Source: *Highway Capacity Manual*, 2000.
(2) When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvement of the intersection.

Level-of-Service Analysis of Existing Conditions

The results of the level-of-service analysis of the study intersections are summarized in Table 4. Shown in the table are the level-of-service of the overall intersection for signalized intersection and the lowest level-of-service of the controlled lane groups for the unsignalized intersections. Lastly, the levels-of-service shown are defined by delay rather than volume-to-capacity ratio.

A detailed summary of the level-of-service analysis results is presented as Appendix A.

Table 4 Existing (2004) Levels-of-Service [(1),(2)]

No.	Intersection	Right-of-Way Control	AM Peak Hour Level-of-Service	PM Peak Hour Level-of-Service	Conclusions and Comments
1	Kuhio Hwy at Rice St	Signalized	B	B	All movements are C, or better.
2	Haleko St at Rice St	Unsignalized	C	C	All movements operate at B and C.
3	Eiwa St at Rice St	Unsignalized	E	F	Southbound left operates at E during AM and F during PM. Remaining movements operate at C, or better.
4	Umi St at Rice St	Signalized	B	B	All movements operate at B, or better.
5	Hardy St at Rice St	Signalized	A	A	All movements operate at A and B.
6	Hoolako St at Rice St	Signalized	B	B	All movements operate at B, or better.
7	Kapule St at Rice St	Unsignalized	E	F	Southbound left operates at E and F during AM and PM, respectively. Intersection is to be reconfigured and signalized by SDOT. Design is underway.
8	Kuhio Hwy at Hardy St	Unsignalized	F	F	Westbound left operates at F during AM and PM.
9	Akahi St at Hardy St	Unsignalized	C	C	All movements operate at C, or better.
10	Eiwa St at Hardy St	Unsignalized	E	D	Northbound left operates at E during AM (39.3 seconds per vehicle), but is acceptable of short periods during peak periods. All other movements operate at D, or better.
11	Elua St at Hardy St	Unsignalized	C	C	All movements operate at C, or better.
12	Umi St at Hardy St	Unsignalized	F	F	Northbound approach operates at F during AM and PM. All other movements operate at D, or better.
13	Kuhio Hwy at Ahukini Rd	Signalized	B	C	Westbound left operates at E during AM and F during PM. All other movements operate at D, or better.
14	Akahi St at Ahukini Rd	Unsignalized	C	C	All movements operate at C, or better.
15	Elua St at Ahukini Rd	Unsignalized	C	D	All movements operate at D, or better.
16	Umi St at Ahukini Rd	Unsignalized	F	F	Northbound left operates at F during AM and PM.
17	Palai St at Ahukini Rd	Unsignalized	D	D	All movements operate at D, or better.
18	Kapule Hwy at Ahukini Rd	Signalized	D	D	Eastbound left and westbound left operate a F and E during AM. Eastbound left operates at F during PM and northbound thru and southbound left operates at E. All remaining movements operate at D, or better.
19	Kapule Hwy at Ka Ana St	Signalized	A	A	All movements operate at D, or better.

NOTES:
(1) The delays and levels-of-service shown for unsignalized intersections is the delay and level-of-service of the worse movement or lane group.
(2) Level-of-Service was calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay
(3) See Appendix B for detailed levels-of-service analysis results.
(4) See Appendix C for level-of-service analysis worksheets.

The conclusions of the level-of-service analysis are that the following intersections operate at Level-of-Service E or F, which are unacceptable levels-of-service:

	Intersection	AM	PM
1.	Eiwa Street at Rice Street	E	F
2.	Kapule Highway at Rice Street	E	F
3.	Kuhio Highway at Hardy Street	F	F
4.	Eiwa Street at Hardy Street	E	D
5.	Umi Street at Hardy Street	F	F
6.	Umi Street at Ahukini Road	F	F

The following improvements are in the planning or design phase and will mitigate the poor levels-of-service at the respective intersections:

1. Improvements for the intersection of Kapule Highway at Rice Street being designed by State of Hawaii Department of Transportation. These improvements consists of redesign of the intersection such that the Kapule Highway-Nawiliwili movement is a through movement and installation of traffic signals.

2. The County of Kauai Department of Public Works is planning to signalize the intersection of Hardy Street at Kuhio Highway and construct a roundabout at the intersection of Hardy Street at Umi Street as part of the Lihue Civic Center Site Improvements project. The timing of these improvement is not determined at this time.

3. FUTURE ROADWAY NETWORKS

The purpose of this chapter is to discuss the assumptions and data used to estimate 2020 traffic conditions.

Future traffic growth consists of two components. The first is ambient background growth that is a result of regional growth and cannot be attributed to a specific project. The second component is estimated traffic that will be generated by other development projects in the vicinity of the proposed project.

Design, or Horizon, Year

The design, or horizon, year is the future date for which traffic forecasts are developed. The year 2020 was selected as the design, or horizon, year. This year was selected because it is consistent with the *Kauai Long Range Land Transportation Plan*, completed in May, 1997. We are not aware of any updates planned or in progress.

Network A

Network A reflects the existing roadway network plus the following proposed or in progress roadway projects:

1. Kaumualii Highway is widened from two to four lanes south of Rice Street

2. The intersection of Rice Street at Kapule Highway is reconstructed and signalized.

3. Ahukini Road east of Kuhio Highway has been realigned so that the intersection with Kuhio Highway is relocated approximately one block north of the existing intersection. Ahukini Road will align with Ehiku Street.

4. Ahukini Road is widened from two to four lanes between Kuhio Highway and Kapule

Highway.

5. Kapule Highway is widened from two to four lanes between Ahukini Road and Rice Street.

6. The street network as shown is the Lihue-Hanama'ulu Master Plan has been completed. This includes extending Kaana Street to Kapule Highway and Ho`olako Street to Ahukini Road.

7. The intersection of Kuhio Highway at Hardy Street is signalized.

8. The intersection of Hardy Street at Umi Street is reconstructed with a roundabout as described in the Lihue Civic Center Master Plan TIAR.

9. Umi Street is extended north of Ahukini Road.

Network A is shown as Figure 4.

Network B - Proposed Network A Plus Lihue Bypass

Network B is shown as Figure 5. This network consists of the existing roadway network, Network A and the Lihue Bypass. The alignment shown for the Bypass is taken from the *Kauai Long Range Land Transportation Plan*. The bypass is described as "a new four-lane divided roadway between Kipu and the north side of Lihue-Hanamaulu town with a two-lane connector road to Kaumualii Highway at Nuhou Road, a two-lane connector road at Nawiliwili Road and a two-lane connector road to Kuhio Highway at Ehiku Street."[2]

Rice Street Alternatives

Alternative configurations for Rice Street were assessed early in the study. The objective of the alternative assessment was to determine if the width of Rice Street could be reduced from four to two lanes with a center turn lane to provide space for wider sidewalks and bicycle lanes and enhance the pedestrian feeling of the area. In addition, the viability of converting Rice Street and Hardy Street into a one-way couplet was part of the analysis in order to make up for the lost capacity.

Upon study of the traffic projections for both networks, it was determined that reduction of the width of Rice Street from four to two lanes would divert too much peak hour traffic for Hardy Street to accommodate as a two-lane road. Additionally, a public survey concluded that there was little community support for the one-way alternative. Accordingly, the alternatives were not studied further.

[2] Austin, Tsutsumi & Associates, Inc., *Kauai Long Range Land Transportation Plan*, May 1997, page ES-18

4. 2020 TRAFFIC FORECASTS AND LEVEL-OF-SERVICE ANALYSIS

Background Traffic Growth

The *Kauai Long Range Land Transportation Plan*[3] concluded that traffic along various roadways within the study area would increase between 1.2% per year and 2.3% per year from 1994 to 2020. A weighted average growth rate of 1.6% was used to estimate the background growth between 2004 and 2020, which is the design year for this project. The growth factor was calculated to be 1.29 using the following formula:

$$F = (1 + i)^n$$

where F = Growth Factor
i = Average annual growth rate, or 0.016
n = Growth period, or 3 years

As will be discussed in the following section, this factor was reduced by 50% to account for potential double counting of traffic generated by related projects.

[3] Austin, Tsutsumi & Associates, May 1997

Related Development Projects

The second component in estimating background traffic volumes is traffic resulting from other proposed projects in the vicinity. Related projects are defined as those projects that are under construction, have been approved for construction or have a high probability of being constructed and would significantly impact traffic in the study area. Related projects may be development projects or roadway improvements.

The following projects were identified as related projects:

1. Civic Center, which includes closure of Eiwa Street between Hardy Street and Rice Street
2. Lihue-Hanamaulu
3. Costco
4. Puakea Development

It was determined that traffic associated with all of the related projects are within the 2020 forecasts provided by the *Kauai Long Range Land Transportation Plan*. However, traffic associated with the Lihue-Hanamaulu project appeared to be greater than traffic estimated in the *Kauai Long Range Land Transportation Plan*. Accordingly, a separate trip generation and assignment analysis was performed for this particular project. See Appendix A. The project description and trip distribution data provided in the traffic impact study for Lihue-Hanamaulu was used as the basis for these calculations.

The background growth rate was reduced by 50% to avoid double counting the estimated background traffic generated by the Lihue-Hanamaulu project and what was reported in the *Kauai Long-Range Land Transportation Plan*.

2020 Traffic Forecasts

2020 cumulative traffic projections were calculated by expanding existing traffic volumes by the appropriate background growth rate and then superimposing traffic generated by related projects. The resulting 2020 peak hour traffic forecasts for the existing roadway network, referred to as Baseline, are shown as Figures 6 and 7. The 2020 peak hour traffic forecasts for Network A are shown in Figures 8 and 9 and the 2020 peak hour traffic forecasts for Network B are shown in Figures 10 and 11.

Level-of-Service Analysis for 2020 Conditions

2020 Baseline Conditions

The 2020 Baseline conditions represent the 2020 traffic projections on the existing roadway network. None of the improvements previously noted in this report are considered in this scenario. This is a "No Build Scenario."

The results of the level-of-service analysis for 2020 Baseline conditions are summarized in Table 5. Shown are the levels-of-service of the study intersections for 2020 traffic projections for existing intersection and roadway conditions. For this scenario, the following intersections will operate at Level-of-Service E or F:

	Intersection	AM	PM
1.	Eiwa Street at Rice Street	F	F
2.	Kapule Highway at Rice Street	F	F
3.	Kuhio Highway at Hardy Street	F	F
4.	Akahi Street at Hardy Street	D	F
5.	Eiwa Street at Hardy Street	F	F
6.	Elua Street at Hardy Street	E	E
7.	Umi Street at Hardy Street	F	F
8.	Kuhio Highway at Ahukini Road	E	E
9.	Akahi Street at Ahukini Road	E	F
10.	Elua Street at Ahukini Road	F	D
11.	Umi Street at Ahukini Road	F	F
12.	Palai Street at Ahukini Road	F	F
13.	Kapule Highway at Ahukini Road	E	F

Table 5 Results of Levels-of-Service Analysis of 2020 Baseline Conditions [(1),(2)]

No.	Intersection	Right-of-Way Control	AM Peak Hour Level-of-Service	PM Peak Hour Level-of-Service	Conclusions and Comments
1	Kuhio Hwy at Rice St	Signalized	D	D	Northbound thru operates at F during AM. During PM, westbound and northbound left operates at F.
2	Haleko St at Rice St	Unsignalized	D	D	All movements operate at D, or better, AM and PM.
3	Eiwa Street at Rice Street	Unsignalized	F	F	Southbound left operates at F, AM and PM. All other movements are D, or better.
4	Umi St at Rice St	Signalized	B	B	All movements are B, or better.
5	Hardy St at Rice St	Signalized	B	B	All movements are B, or better.
6	Hoolako St at Rice St	Signalized	B	C	All movements are D, or better.
7	Kapule St at Rice St	Unsignalized	F	F	Southbound left operates at F, AM and PM. All other movements are C, or better.
8	Kuhio Hwy at Hardy St	Unsignalized	F	F	Westbound left and Southbound left are F during AM. Westbound left and right are F during PM.
9	Akahi St at Hardy St	Unsignalized	D	F	Southbound left is F during PM.
10	Eiwa St at Hardy St	Unsignalized	F	F	Northbound left is F during AM and PM. All other movements are D, or better.
11	Elua St at Hardy St	Unsignalized	E	E	Eastbound left and thru is A, AM and PM. Southbound left and right is E, AM and PM.
12	Umi St at Hardy St	Unsignalized	F	F	Northbound and Southbound approaches are F during the AM and PM.
13	Kuhio Hwy at Ahukini Rd	Signalized	E	E	Only Northbound approach is acceptable. All other movements are E or F.
14	Akahi St at Ahukini Rd	Unsignalized	E	F	Northbound approach operates at E during AM and F during PM. Other movements are A.
15	Elua St at Ahukini Rd	Unsignalized	F	D	Northbound left operates at F during AM. All other movements are D, or better.
16	Umi St at Ahukini Rd	Unsignalized	F	F	Northbound operates at F, AM and PM.
17	Palai St at Ahukini Rd	Unsignalized	F	F	Northbound operates at F, AM and PM.
18	Kapule Hwy at Ahukini Rd	Signalized	E	F	Only 5 of 12 movements are acceptable during AM. Only 3 are acceptable during PM.
19	Kapule Hwy at Ka Ana St	Signalized	A	C	Northbound left is F during AM. All others are D, or better.

NOTES:
(1) The delays and levels-of-service shown for unsignalized intersections is the delay and level-of-service of the worse movement or lane group.
(2) Level-of-Service was calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay

Network A

The results of the level-of-service analysis for Network A are summarized in Table 6. Shown are the overall levels-of-service for the study intersections. Detailed results indicating the delay and level-of-service of each lane group is presented as Appendix B.

The assumptions used for the level-of-service analysis are:

1. Kaumualii Highway is widened from two to four lanes south of Rice Street

2. The intersection of Rice Street at Kapule Highway is reconstructed and signalized.

3. Ahukini Road east of Kuhio Highway has been realigned. The old alignment of Ahukini Road is referred to as Old Ahukini Road.

4. The old intersection of Ahukini Road at Kuhio Highway is retained but only right turns in and right turns out will be allowed. Left turns will not be allowed because queues from the new intersection.

5. Umi Street is extended across Ahukini Road and behind Walmart to the hospital. The intersection of Ahukini Road at Umi Street is signalized

6. Akahi Street is extended from Old Ahukini Road to the new Ahukini Road. The intersection of Ahukini Road is restricted to right turns only because the turn queue from Kuhio Highway.

7. Ahukini Road is widened from two to four lanes between Kuhio Highway and Kapule Highway.

8. Kapule Highway is widened from two to four lanes between Ahukini Road and Rice Street.

9. Kaana Street is extended to Kapule Highway.

10. Ho'olako Street is extended to Ahukini Road.

11. The intersection of Kuhio Highway at Hardy Street is signalized.

12. The intersection of Hardy Street at Umi Street is converted to a roundabout.

13. Eiwa Street between Hardy Street and Rice Street is demolished.

Network B

The results of the level-of-service analysis for Network B are summarized in Table 7. Detailed results indicating the delay and level-of-service of each lane group is presented as Appendix B.

Table 6 Results of Level-of-Service Analysis of 2020 Network A Conditions [(1),(2)]

No.	Intersection	Right-of-Way Control	AM Peak Hour Level-of-Service	PM Peak Hour Level-of-Service	Conclusions and Comments
1	Kuhio Hwy at Rice St	Signalized	C	C	Northbound thru is F during AM and PM. Westbound left is F during PM only. All other movements operate at Level-of-Service D, or better.
2	Haleko St at Rice St	Unsignalized	D	D	All movements operate at Level-of-Service D, or better, AM and PM.
3	Eiwa St at Rice St	Removed	-	-	Eiwa Street removed as part of Lihue Civic Center improvements.
4	Umi St at Rice St	Signalized	B	B	All movements operate at Level-of-Service A or B.
5	Hardy St at Rice St	Signalized	B	B	All movements operate at Level-of-Service B, or better.
6	Hoolako St at Rice St	Signalized	B	C	All movements operate at Level-of-Service D, or better.
7	Kapule St at Rice St	Signalized	B	C	All movements operate at Level-of-Service D, or better.
8	Kuhio Hwy at Hardy St	Signalized	C	C	Traffic signals are installed. Southbound left operates at E during PM.
9	Akahi St at Hardy St	Unsignalized	F	F	Northbound and Southbound approaches operate at F, AM and PM. Other movements are A. Signalization should be considered when warrants are met. Signalization will improve the level-of-service to C or better during both AM and PM peak periods.
10	Eiwa St at Hardy St	Removed	-	-	Eiwa Street removed as part of Lihue Civic Center improvements.
11	Elua St at Hardy St	Unsignalized	E	E	Southbound left and right are E, AM and PM. Eastbound left and thru are A, AM and PM.
12	Umi St at Hardy St	Roundabout	D	B	Level-of-Service D, or better during AM. Level-of-Service B, or better during PM.
13	Kuhio Hwy at Ahukini Rd "New"	Signalized	B	C	Southbound left is E during PM. All other movements Level-of-Service D, or better, AM and PM.
14	Akahi St at Ahukini Rd "New"	Unsignalized	B	B	All movements Level-of-Service B, or better.
15	Elua St at Ahukini Rd "New"	Not Applicable	-	-	No intersection created.
16	Umi St at Ahukini Rd "New"	Signalized	B	B	All movements Level-of-Service D, or better.
17	Palai St at Ahukini Rd	Unsignalized	F	E	Northbound left is F during AM and E during PM. All other movements are A or B.
18	Kapule Hwy at Ahukini Rd	Signalized	C	C	Westbound left is E during AM. All other movements are D, or better.
19	Kapule Hwy at Ka Ana St	Signalized	C	B	Northbound left is Level-of-Service F during the AM. All remaining movements are D or better.

NOTES:
(1) The delays and levels-of-service shown for unsignalized intersections is the delay and level-of-service of the worse movement or lane group.
(2) Level-of-Service was calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay

Table 7 Results of Level-of-Service Analysis of 2020 Network B Conditions (1),(2)

No.	Intersection	Right-of-Way Control	AM Peak Hour Level-of-Service	PM Peak Hour Level-of-Service	Conclusions and Comments
1	Kuhio Hwy at Rice St	Signalized	C	C	Southbound left is E during PM. All other movements are D, or better. The Bypass will divert 650 vehicles per hour during the morning peak hour and 450 during the afternoon peak hour from Kuhio Highway.
2	Haleko St at Rice St	Unsignalized	D	D	All movements operate at Level-of-Service D, or better, AM and PM.
3	Eiwa St at Rice St	Removed	-	-	Eiwa Street removed as part of Lihue Civic Center improvements.
4	Umi St at Rice St	Signalized	B	B	All movements operate at Level-of-Service C, or better.
5	Hardy St at Rice St	Signalized	B	B	All movements operate at Level-of-Service B, or better.
6	Hoolako St at Rice St	Signalized	B	C	All movements operate at Level-of-Service D, or better.
7	Kapule St at Rice St	Signalized	B	C	All movements operate at Level-of-Service D, or better.
8	Kuhio Hwy at Hardy St	Signalized	C	C	All movements are D, or better.
9	Akahi St at Hardy St	Unsignalized	F	F	Northbound and Southbound approaches operate at F, AM and PM. Other movements are A. Signalization should be considered when warrants are met. Signalization will improve the level-of-service to C or better during both AM and PM peak periods.
10	Eiwa St at Hardy St	Removed	-	-	Eiwa Street removed as part of Lihue Civic Center improvements.
11	Elua St at Hardy St	Unsignalized	E	E	Southbound left and right are E, AM and PM. Eastbound left and thru are A, AM and PM.
12	Umi St at Hardy St	Roundabout	D	B	Level-of-Service D, or better during AM. Level-of-Service B, or better during PM.
13	Kuhio Hwy at Ahukini Rd "New"	Signalized	C	C	Eastbound left and northbound left is F during AM. Eastbound left is F and westbound left is E during PM.
14	Akahi St at Ahukini Rd "New"	Unsignalized	B	B	All movements Level-of-Service B, or better.
15	Elua St at Ahukini Rd "New"	Not Applicable	-	-	No intersection created.
16	Umi St at Ahukini Rd "New"	Signalized	B	B	All movements Level-of-Service D, or better.
17	Palai St at Ahukini Rd	Unsignalized	F	E	Northbound left is F during AM and E during PM. All other movements are D, or better.
18	Kapule Hwy at Ahukini Rd	Signalized	C	C	Eastbound left and westbound left is E during AM. All other movements are D, or better.
19	Kapule Hwy at Ka Ana St	Signalized	C	B	Northbound left is Level-of-Service F during the PM. All remaining movements are D or better.

NOTES:
(1) The delays and levels-of-service shown for unsignalized intersections is the delay and level-of-service of the worse movement or lane group.
(2) Level-of-Service was calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay

5. CONCLUSIONS AND RECOMMENDATIONS

Planning Criteria

The Institute of Transportation Engineers recommends that Level-of-Service D should be the minimum acceptable level-of-service for urban peak hour conditions. Accordingly, this criterion has been used for this study.

Level-of-service D is typically considered acceptable for peak hour conditions in urban areas. To be consistent with the conclusions of the TIAR for the Lihue Civic Center Master Plan, Level-of-Service E is considered acceptable under certain circumstances. "Although this level is generally considered undesirable for a signalized intersection, Level-of-Service E is sometimes tolerated for minor movements such as left turns when there are no feasible mitigating measures or if it helps maintain the main through movements at acceptable levels-of-service."[4]

[4] M&E Pacific, Inc. *Traffic Impact Analysis Report for Lihue Civic Center Master Plan*, October 2005, p. 25

Conclusions and Recommendations

1. Rice Street at Kuhio Highway

Currently, this intersection operates at Level-of-Service B during both peak periods. All movements operate at Level-of-Service C, or better.

For 2020 Baseline conditions, the intersection will operate at Level-of-Service D during both peak periods. During the morning peak hour, the northbound through movement will operate at Level-of-Service F. The remaining movements will operate at Level-of-Service C, or better. During the afternoon peak hour, the westbound left and right and the northbound through movement will operate at Level-of-Service F and the remaining movements will operate at Level-of-Service C, or better.

For 2020 Network A conditions, the intersection will operate at Level-of-Service C, during both peak periods. During the morning peak hour, the southbound left turn will operate at Level-of-Service E and the remaining movements will operate at Level-of-Service D, or better. During the afternoon peak hour, the westbound left turn will operate at Level-of-Service E and the southbound left turn will operate at Level-of-Service F. The remaining movements will operate at Level-of-Service D, or better.

For 2020 Network B conditions, the intersection will also operate at Level-of-Service C during both peak hours. All movements will operate at Level-of-Service D, or better, except the southbound left turn, which will operate at Level-of-Service E during the afternoon peak hour.

An alternative that improves the level-of-service to Level-of-Service B during both peak periods is discussed in Chapter 6. It involves the addition of a second left turn lane from westbound Rice Street to southbound Kuhio Highway.

2. Rice Street at Haleko Street

The westbound approach currently operates at Level-of-Service B and the northbound approach operates at Level-of-Service C during both peak periods. For 2020 conditions, the westbound approach will also operate at Level-of-Service B, but the northbound right turn will operate at Level-of-Service D during the morning peak hour. During the afternoon peak hour, both the westbound and the northbound approaches will operate at Level-of-Service D. The levels-of-service will be the same for 2020 Baseline, Network A and Network B conditions.

3. Rice Street at Eiwa Street

Currently, the southbound left turn operates at Level-of-Service E during the morning peak hour and Level-of-Service F during the afternoon peak hour. The remaining movements operate at Level-of-Service C, or better. For 2020 baseline conditions, the southbound left turn will operate at Level-of-Service F during both peak periods and the remaining movements will operate at Level-of-Service D, or better. As Eiwa Street between Hardy Street and Rice Street will be removed as part of the Civic Center Improvement project, there are no level-of-service calculations for Networks A and B.

4. Rice Street at Umi Street

The intersection operates at Level-of-Service B during both peak periods. All movements operate at Level-of-Service A or B.

For 2020 conditions (Baseline, Network A and Network B), the intersection will operate at Level-of-Service B during both peak periods and all movements will operate at Level-of-Service C, or better.

5. Rice Street at Hardy Street

The intersection operates at Level-of-Service A during both peak periods. All movements operate at Level-of-Service A or B.

For 2020 conditions (Baseline, Network A and Network B), the intersection will operate at Level-of-Service B during both peak periods and all movements will operate at Level-of-Service B, or better.

6. Rice Street at Hoolako Street

This intersection currently operates at Level-of-Service B during the morning and afternoon peak periods. All movements operate at Level-of-Service B, or better. For future conditions (Baseline, Network A and Network B), the intersection will operate at Level-of-Service B during the morning peak hour and Level-of-Service C during the afternoon peak hour. All movements will operate at Level-of-Service D, or better. The eastbound left and through lane will operate as a default left turn lane and the volume-to-capacity ratio will exceed 1.35. However, the average vehicle delay implies Level-of-Service C.

7. Rice Street at Kapule Street

This intersection is currently unsignalized. The left turn from southbound Kapule Highway at eastbound Rice Street operates at Level-of-Service E during the morning peak hour and Level-of-Service F during the afternoon peak hour. For future Baseline conditions, this left turn will operate at Level-of-Service F during both peak periods. All other movements will operate at Level-of-Service C, or better.

For Networks A and B, the intersection will be reconfigured and signalized. The left turn from southbound Kapule Highway to eastbound Rice Street, which currently operates at Level-of-Service E and F, will be the southbound through movement. For Network A and Network B conditions, the overall intersection will operate at Level-of-Service B during the morning peak hour and all movements will operate at Level-of-Service C, or better. During the afternoon peak hour, the intersection will operate at Level-of-Service C and all movements will operate at Level-of-Service D, or better.

8. Hardy Street at Kuhio Highway

This intersection is currently unsignalized and operates at Level-of-Service F during both peak periods. The westbound left operates at Level-of-Service F, but the remaining movements operate at Level-of-Service B or C.

For 2020 Baseline conditions, the intersection will also operate at Level-of-Service F. During the morning peak hour, the westbound left turn and the southbound left turn will both operate at Level-of-Service F. During the afternoon peak hour, the westbound left turn and right turn will both operate at Level-of-Service F.

The intersection will be signalized under the Network A and Network B scenarios. As a signalized intersection, the intersection will operate at Level-of-Service C during both peak periods. For Network A, all movements will operate at Level-of-Service D, or better, except the southbound left turn during the afternoon peak hour, which will operate at Level-of-Service E. For Network B conditions, all movements will operate at Level-of-Service D, or better. This is a result of diverting a portion of the northbound and southbound through traffic from Kuhio Highway to the by pass (620 vehicles per hour during the morning peak hour and 450 vehicles per hour during the afternoon peak hour).

9. Hardy Street at Akahi Street

During the morning and afternoon peak hours, all movements currently operate at Level-of-Service C, or better. For 2020 Baseline conditions, the southbound left turn will operate at Level-of-Service D during the morning peak hour and Level-of-Service F during the afternoon peak hour.

As part of the Civic Center Improvements, the new entrance to the Civic Center parking lot will be aligned with Akahi Street. Therefore, for Networks A and B, this intersection will be a four-legged intersection with the south leg as the entrance to and exit from the Civic Center parking lot. Traffic along Hardy Street will operate at Level-of-Service A, which implies that traffic turning into and out of the Civic Center will have a minimal impact on traffic operations along Hardy Street. However, traffic approaching along southbound Akahi Street and exiting the Civic Center parking lot will experience long delays and will operate at Level-of-Service F during both peak periods. This implies that the peak hour delay warrants will be satisfied and the intersection may have to be signalized for 2020 conditions. As a signalized intersection, all movements will operate at Level-of-Service C, or better during both peak periods. The overall intersection will operate at Level-of-Service B during the morning peak hour and Level-of-Service C during the afternoon peak hour. It is our understanding that this intersection will be monitored to determine when the warrants for a traffic signal are satisfied.

10. Hardy Street at Eiwa Street

Currently, the northbound left turn operates at Level-of-Service E during the morning peak hour and Level-of-Service D during the afternoon peak hour. The remaining movements operate at Level-of-Service B, or better. For 2020 baseline conditions, the northbound left turn will operate at Level-of-Service F during both peak periods and the remaining movements will operate at Level-of-Service D, or better. As the closure of Eiwa Street between Hardy Street and Rice Street is recommended as part of the Civic Center Improvement project, there are no level-of-service calculations for Networks A and B.

11. Hardy Street at Elua Street

Under existing conditions, all movements operate at Level-of-Service C, or better. The southbound left and right turns will operate at Level-of-Service E during both peak periods under Baseline, Network A and Network B conditions.

12. Hardy Street at Umi Street

Under existing conditions, this intersection operates at Level-of-Service F during both peak periods. The northbound approach of Umi Street operates at Level-of-Service F and therefore determines the level-of-service of the intersection.

For 2020 Baseline conditions, the northbound and southbound approaches of Umi Street will operate at Level-of-Service F during both peak periods. The westbound and eastbound approaches of Hardy Street will operate at Level-of-Service A during both peak periods.

For Networks A and B conditions, the intersection will be converted to a roundabout. As a roundabout, the intersection will operate at Level-of-Service D (v/c = 0.89) during the morning peak hour and Level-of-Service B during the afternoon peak hour (v/c = 0.63). These level-of-service are based on the volume-to-capacity ratio (rather than delay) which is not widely accepted to determine the level-of-service of a roundabout.

13. Ahukini Road at Kuhio Highway

Under existing conditions, the overall intersection operates at Level-of-Service B during the morning peak hour and Level-of-Service C during the afternoon peak hour. The left turns from westbound Ahukini Road to southbound Kuhio Highway operate at Level-of-Service E during the morning peak hour and Level-of-Service F during the afternoon peak hour. All remaining movements operate at Level-of-Service D, or better.

For 2020 Baseline conditions, the overall intersection will operate at Level-of-Service E during both peak hours. During the morning peak hour all movements will operate at Level-of-Service E or F except the northbound approach which will operate at Level-of-Service A and the westbound approach which will operate at Level-of-Service D. During the afternoon peak hour, all movements will operate at Level-of-Service E or F except the northbound approach which will operate at Level-of-Service B.

For Network A conditions, Ahukini Road will be realigned and will tie into the Lihue Bypass via Ehiku Street. The new intersection of Ahukini Road at Kuhio Highway will operate at Level-of-Service B during the morning peak hour and all movements will operate at Level-of-Service D, or better. During the afternoon peak hour, the overall intersection will operate at Level-of-Service C and all movements will operate at Level-of-Service D, or better, except the southbound left turn which will operate at Level-of-Service E. The recommended lane configuration is described in Chapter 6.

For Network B, Ahukini Road will also be realigned. The overall intersection will operate at Level-of-Service C during both peak periods. During the morning peak hour, the eastbound and northbound left turns will operate at Level-of-Service F. All remaining movements will operate at Level-of-Service C, or better. During the afternoon peak hour, the eastbound and westbound left turns will operate at Level-of-Service F and E, respectively. All remaining movements will operate at Level-of-Service D, or better.

The intersection of Old Ahukini Road at Kuhio Highway will have to be restricted to right turns only because of the short distance between the this intersection and the new intersection. This intersection will operate at Level-of-Service B during the morning peak hour and Level-of-Service C during the afternoon peak hour for Network A and Network B conditions.

14. Ahukini Road at Akahi Street

Currently, the northbound left and right turns operate at Level-of-Service C and the westbound through and left turns operate at Level-of-Service A. For 2020 Baseline conditions, the northbound left and right turns will operate at Level-of-Service E during the morning peak hour and Level-of-Service F during the afternoon peak hour.

For Networks A and B, Ahukini Road will be realigned as discussed earlier. The intersection of Akahi Street at the realigned Ahukini will be restricted to right turns only because of the left turn storage lane requirements of the new intersection of Ahukini Road at Kuhio Highway. The right turns will operate at Level-of-Service B during both peak periods.

The intersection of Akahi Street at Old Ahukini Road will be a four-legged, unsignalized intersection. All movements of this intersection will operate at Level-of-Service A or B.

15. Ahukini Road at Elua Street

For existing conditions, this intersection operates at Level-of-Service C during the morning peak hour and Level-of-Service D during the afternoon peak hour. The northbound left and right turns determine the level-of-service of the intersection. For 2020 Baseline conditions, the northbound left and right turns will operate at Level-of-Service F during the morning peak hour and Level-of-Service D during the afternoon peak hour.

Elua Street will not be extended from Old Ahukini Road to the realigned Ahukini Road. The intersection of Old Ahukini Road at Elua Street will be a T-intersection. This intersection will operate at Level-of-Service B during the morning peak hour and Level-of-Service A during the afternoon peak hour.

16. Ahukini Road at Umi Street

Under existing conditions, the northbound left turns operate at Level-of-Service F during both peak periods. All other movements operate at Level-of-Service A or B.

For 2020 Baseline conditions, the northbound left turns will operate at Level-of-Service F during both peak periods and all other movements will operate at Level-of-Service C, or better.

The realignment of Ahukini Road also affects this intersection. Umi Street will be extended across the realigned Ahukini Road and east of the existing Walmart. The intersection of the realigned Ahukini Road with Umi Street will have to be signalized to accommodate left turns from both approaches of Ahukini Street. As a signalized intersection, the intersection will operate at Level-of-Service B during both peak periods and all movements will operate at Level-of-Service D, or better.

The intersection of Umi Street with Old Ahukini Road will be unsignalized and will operate at Level-of-Service B during both peak periods.

17. Ahukini Road at Palai Street

Under existing conditions, all movements operate at Level-of-Service D, or better.

For 2020 Baseline conditions, the left turn from northbound Palai Street to westbound Ahukini Road will operate at Level-of-Service F during both peak periods. All remaining movements will operate at Level-of-Service C, or better.

This intersection will be unsignalized and Ahukini Road will be widened from two to four lanes for Network A and Network B conditions. For 2020 Network A and Network B conditions, the northbound left turn will operate at Level-of-Service F during the morning peak hour and Level-of-Service E during the afternoon peak hour.

18. Ahukini Road at Kapule Highway

For existing conditions, this intersection operates at Level-of-Service D during both peak periods. During the morning peak hour, the eastbound left operates at Level-of-Service F and the westbound left operates at Level-of-Service E. During the afternoon peak hour, the eastbound left operates at Level-of-Service F and the northbound through and southbound left operates at Level-of-Service E.

For 2020 Baseline conditions, the intersection will operate at Level-of-Service E during the morning peak hour and Level-of-Service F during the afternoon peak hour. During the afternoon peak hour, all movements will operate at Level-of-Service D, or worse.

For Network A and Network B conditions, Ahukini Road and Kapule Highway will be widened from two to four lanes. As a result, the intersection will operate at Level-of-Service C during both peak periods. All movements except the westbound left will operate at Level-of-Service D, or better. The westbound left will operate at Level-of-Service E during the morning peak hour and Level-of-Service D during the afternoon peak hour.

19. Kapule Highway at Ka Ana Street

Under existing conditions, this intersection operates at Level-of-Service A during both peak periods. All movements operate at Level-of-Service D, or better.

For 2020 Baseline conditions, the overall intersection will operate at Level-of-Service B during the morning peak hour and Level-of-Service C during the afternoon peak hour. All movements will operate at Level-of-Service D, or better, except the northbound left turn during the morning peak hour which will operate at Level-of-Service F.

For 2020 Network A and Network B conditions, Kapule Highway will be widened from two to four lanes. The intersection will operate at Level-of-Service C during the morning peak hour and Level-of-Service B during the afternoon peak hour. The northbound left turn will operate at Level-of-Service F during the morning peak hour, but all other movements will operate at Level-of-Service D, or better, during both peak periods.

Summary

The level-of-service analysis concluded that the several intersections within the study area will be at or over-capacity by 2020 even with the major improvements included in Network A.

The overall levels-of-service of the intersections along Kuhio Highway are acceptable. However, each intersection has lane groups or movements that operate at Level-of-Service E or F, resulting in congested conditions along Kuhio Highway.

It appears that sufficient traffic must be diverted from Kuhio Highway so that the overall intersections and all the lane groups along Kuhio Highway will operate at acceptable levels-of-service. The most viable way to accomplish this is to construct the Lihue Bypass before the levels-of-service deteriorate to unacceptable levels. For 2020 conditions with the Lihue Bypass, the intersections along Kuhio Highway will operate at Level-of-Service D, or better.

There is some point between now (2005) and 2020 when the Bypass is needed in order to maintain acceptable levels-of-service along Kuhio Highway. The Bypass will divert 650 vehicles per hour during the morning peak hour and 450 vehicles per hour during the afternoon peak hour from Kuhio Highway. This date will have to be determined based on a review of traffic conditions as other roadway improvement projects are made in the area as well as community priorities.

6. CONCEPTUAL DESIGNS

The purpose of this chapter is to present the conceptual designs for the major roadway improvements within the study area and to discuss the resulting impacts of the levels-of-service. These roadway improvements include the following:

1. Realignment of Ahukini Road between Umi Street and Kuhio Highway

2. Signalization of the intersection of Kuhio Highway at Hardy Street and roadway improvements between Umi Street and Kuhio Highway

3. Roadway improvements along Rice Street between Hardy Street and Kuhio Highway

The engineering objective of the conceptual designs is to provided sufficient capacity for traffic to operate at acceptable levels-of-service. Therefore, the primary considerations in developing the conceptual designs are the required lane configurations as determined from the level-of-service analysis and the required left turn lane storage requirements. In addition to the engineering considerations, the need to landscaping space was also considered.

Prior to discussion of the conceptual designs, the standards used in the development of the conceptual designs is presented.

Standard for Left Turn Storage Lane Lengths

The left turn storage lengths required to accommodate estimated traffic volumes were calculated using guidelines in *A Policy on Geometric Design of Highways and Streets* published by the American Association of State Highway and Transportation Officials, 1990 edition. There are separate policies for signalized and unsignalized intersections. Based on this policy, the assumptions used to determine the required lengths of the left turn storage lanes are:

(1) For signalized intersections, the length of the left turn storage lane should be 1.5 to 2.0 times the average number of vehicles arriving during a signal cycle during the peak hour.

(2) For unsignalized intersections, the length of the left turn storage lane should be1.5 to 2.0 times the average number of vehicles arriving during a 60-second cycle.

(3) The average length required per vehicle is 25 feet.

(4) The traffic signal cycle lengths are 120 seconds. There is a direct relationship between the traffic signal cycle length and the length required for the left turn storage lane. A cycle length of 60 seconds will require half the storage length of a 120 second cycle. However, the existing traffic signals cycle lengths along Kuhio Highway were timed at approximately 120 seconds. Using 120 seconds as the cycle length will result in conservative calculations and allow flexibility in future modifications to the traffic signal system. However, this will result in longer queues lengths and limited space can become an issue.

(5) The minimum length of a left turn storage lane should be 60 feet, which is sufficient to accommodate one automobile and one medium size truck.

Ahukini Road between Umi Street and Kuhio Highway

The conceptual design for Ahukini Road between Umi Street and Kuhio Highway is shown as Figure 12. The major components of the plan are:

1. The intersection of Ahukini Road at Kuhio Highway is relocated approximately one block north of the existing intersection. Ahukini Road intersects Kuhio Highway at Ehiku Street rather than Oxford Street. The realigned section of Ahukini Road is north of Hilo Hatties rather than along the south side.

2. Traffic movements at the intersection of Old Ahukini Road at Kuhio Highway is restricted to right turns only. This is because the left turn storage length required for northbound to westbound left turns at the new intersection of Ahukini Road is longer than the distance between the two intersections.

3. Umi Street is extended across Ahukini Road, between Walmart to the hospital. This intersection is signalized.

The required lengths of the left turn storage lanes were determined using the criteria cited above and the peak hour left turn traffic projections presented in the previous chapter. The calculations are shown in Table 8.

Table 8 Turn Lane Length Requirements for Proposed Improvements Along Ahukini Road

Intersection	Approach	Design Volume	Cycle Length (Seconds)	Cycles per Hour	Average Vehicles per Cycle[2]	Required Length [1]				Length Recommended (Ft)
						Minimum		Desirable		
						Veh	Ft	Veh	Ft	
Ahukini Rd at Kuhio Hwy	EB	30	120	30	1	2	50	2	50	100
	WB	410	120	30	14	21	525	28	700	2@350" = 700'
Ahukini Rd at Umi St	EB	75	120	30	3	5	125	6	150	150
	WB	460	120	30	15	23	575	30	750	2@375' = 800'

NOTE:
(1) Minimum queue length is 1.5 time average number of vehicles. Desirable queue length is 2.0 time average number of vehicles.
(2) The average number of vehicles per cycle is calculated by dividing the design volume by the number of cycles per hour.

The results of the level-of-service analysis reflecting the proposed improvements are summarized in Table 9. As shown, all movements will operate at Level-of-Service D, or better, except the left turn from westbound Ahukini Road to southbound Kuhio Highway, which will operate at Level-of-Service E during the morning peak hour.

Table 9 Levels-of-Service - Ahukini Road Between Kuhio Highway and Umi Street

Intersection, Approach and Movement	AM Peak Hour			PM Peak Hour		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
Kuhio Highway at Ahukini Road	0.68	22.8	C	0.76	30.9	C
Eastbound Left	0.23	34.8	C	0.79	46.8	D
Eastbound Thru & Right	0.15	16.2	B	0.17	40.4	D
Westbound Left	0.83	32.0	C	0.97	73.9	E
Westbound Thru & Right	0.66	8.3	A	0.25	31.9	D
Northbound Left	0.18	35.2	D	0.51	53.3	C
Northbound Thru	0.58	20.1	C	0.90	33.4	D
Northbound Right	0.45	4.6	A	0.26	18.0	B
Southbound Left	0.67	36.0	D	0.62	35.8	D
Southbound Thru & Right	0.75	15.0	B	0.53	15.5	B
Umi Street at Ahukini Road	0.61	19.9	B	0.80	22.7	C
Eastbound Left	0.35	29.2	C	0.45	29.3	C
Eastbound Thru & Right	0.69	22.0	C	0.78	25.2	C
Westbound Left	0.73	26.3	C	0.78	33.9	C
Westbound Thru & Right	0.73	16.4	B	0.60	17.7	B
Northbound Left & Thru	0.49	19.5	B	0.81	28.6	C
Northbound Right	0.04	13.5	B	0.14	11.3	B
Southbound Left & Thru	0.15	14.8	B	0.28	13.8	B
Southbound Right	0.12	14.2	B	0.16	11.4	B

NOTES:
1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Ahukini Road at Kuhio Highway

The right-of-way needed to provide the roadway improvements shown along Kuhio Highway may not be obtainable. Therefore, there may be sufficient right-of-way to provide only four lanes. The configuration would have to be comparable to that shown as Figure 13, which is for two lanes each for southbound and northbound traffic along Kuhio Highway. Turns would be shared with the through lanes. For this scenario, the intersection of Ahukini Road at Kuhio Highway will operate at Level-of-Service E during both peak hour. If the traffic signal phasing were to split the northbound and southbound phases, the intersection will operate at Level-of-Service F during both peak hours.

The left turn storage lane required for left turns from westbound Ahukini Road to southbound Kuhio Highway extends beyond the intersection of Ahukini Road with Akahi Street. Left turns from Akahi Street across the left turn storage lane will not be a safe maneuver. Accordingly, turning movements at the intersection of Ahukini Road at Akahi Street should be restricted to right turn only.

Impacts of Optimized Traffic Signal Timing Along Ahukini Road

In response to comments, an alternate design for Ahukini Road was developed based using optimized traffic signal cycle lengths, which has a direct impact of the left turn storage lane requirements. Reduction of the left turn lane storage length requirements may provide additional area that could be used for landscaping.

The optimum traffic signal cycle lengths were determined using Synchro 7. Separate cycle lengths were determined for morning and afternoon peak hours. It was also assumed that the intersections with Kuhio Highway and Umi Street would be synchronized meaning that both intersections would have the same cycle length. The optimum traffic signal cycle lengths for the morning and afternoon peak hours were determined to be 70 seconds and 90 seconds, respectively. The resulting left turn lane storage requirements are summarized in Table 10. As shown there is a significant reduction in the left turn storage length required. Since the lane configurations and cycle splits are the same as the previously discussed design, the impacts of the levels-of-service are negligible. A revised conceptual design using the revised signal cycle lengths is provided as Figure 14. The conceptual plan is shown for the alternative with widening along Kuhio Highway. The required lengths of the left turn storage lanes along the Ahukini Road approaches to Kuhio Highway will be approximately the same regardless of the number of lanes along Kuhio HIghway.

Table 10 Left Turn Lane Length Requirements for Proposed Improvements Along Ahukini Road With Optimized Traffic Signal Cycle Length

Intersection	Approach & Time Period		Design Volume	Cycle Length (Seconds)	Cycles per Hour	Average Vehicles per Cycle[2]	Required Length [1]				Length Recommended (Ft)
							Minimum		Desirable		
							Veh	Ft	Veh	Ft	
Ahukini Rd at Kuhio Hwy	EB	AM	30	70	51	1	2	50	2	50	100
		PM	20	90	40	1	2	50	2	50	
	WB	AM	370	70	51	7	11	275	14	350	2@250" = 500'
		PM	410	90	40	10	15	375	20	500	
Ahukini Rd at Umi St	EB	AM	50	70	51	1	2	50	2	50	100
		PM	75	90	40	2	3	75	4	100	
	WB	AM	460	70	51	9	14	350	18	450	2@225' = 450'
		PM	320	90	40	8	12	300	16	400	

NOTE:
(1) Minimum queue length is 1.5 time average number of vehicles. Desirable queue length is 2.0 time average number of vehicles.
(2) The average number of vehicles per cycle is calculated by dividing the design volume by the number of cycles per hour.

Elimination of Umi Street Extension

The extension of Umi Street north of Ahukini Road was added late in the study in response to future development north of and east of the existing Walmart. Based on a subjective assessment of traffic volumes and levels-of-service in the area, it was determined that is additional link would provide an alternative route to Kuhio Highway between Rice Street and the existing entrance to Walmart along Kuhio Highway, which has and will have low levels-of-service. Therefore, an improvement of conditions along this section of Kuhio Highway would result. A level-of-service analysis without this extension concluded that both morning and afternoon levels-of-service at the intersection of Kuhio Highway at Ahukini Road would decrease one level-of-service (ie: from Level-of-Service C to Level-of-Service D). The level-of-service of the intersection of Ahukini Road at Umi Street would be Level-of-Service B, morning and afternoon. This is the same level-of-service as for a four-legged intersection. A schematic drawing of this intersection without the extension is presented as Figure 15.

Hardy Street between Kuhio Highway and Umi Street

The conceptual design for Hardy Street between Umi Street and Kuhio Highway is shown as Figure 16. The major components of the plan are:

1. The intersection of Kuhio Highway at Hardy Street is signalized. There will be separate southbound to eastbound left turn phase. The existing southbound left turn lane will be retained and the westbound approach of Hardy Street will remain as existing, which is a left turn lane and a right turn lane. Under these conditions, the intersection will operate at Level-of-Service D during the morning peak hour and Level-of-Service E during the afternoon peak hour.

   If sufficient right-of-way can be obtained to provide a second left turn lane the morning and afternoon levels-of-service would be Level-of-Service D during both peak periods. The length needed for the westbound left turn storage lane would be reduced from 450 feet to 225 feet. This would eliminate potential backup through the upstream unsignalized intersection at Akahi Street.

2. It was assumed that the intersection of Hardy Street at Akahi Street will be signalized for 2020 conditions. This intersection is the north entrance to the Civic Center. The eastbound and westbound left turns will be protected and there will be separate left turn lanes.

3. The intersection of Hardy Street at Umi Street will be converted to a roundabout. The level-of-service analysis assessed the intersection as a two-way STOP sign controlled intersection and as a four-way STOP sign controlled intersection. For both cases, the intersection operated at Level-of-Service F. As a roundabout, the maximum volume-to-capacity ratio is 0.89, which implies Level-of-Service D.

The required lengths of the left turn storage lanes were determined using the criteria cited above. The calculations are shown in Table 11.

Table 11 Turn Lane Length Requirements for Proposed Improvements Along Hardy Street

Intersection	Approach	Design Volume	Cycle Length (Seconds)	Cycles per Hour	Average Vehicles per Cycle [2]	Required Length [1]				Length Recommended (Ft)	Notes
						Minimum		Desirable			
						Veh	Ft	Veh	Ft		
Hardy St at Kuhio Hwy	WB	270	120	30	9	14	350	18	450	275	Signalized
Hardy St at Akahi St	EB	60	60	60	1	2	50	2	50	60	Unsignalized
	WB	95	60	60	2	3	75	4	100	100	Unsignalized
Hardy St at Elua St	EB	130	60	60	2	3	75	4	100	100	Unsignalized

NOTE:
(1) Minimum queue length is 1.5 time average number of vehicles. Desirable queue length is 2.0 time average number of vehicles.
(2) The average number of vehicles per cycle is calculated by dividing the design volume by the number of cycles per hour..

Impacts of Optimized Traffic Signal Timing Along Hardy Street

The required lengths of the left turn storage lanes were determined using optimized traffic signal cycle lengths are shown in Table 12. Because there is insufficient length to provide the desirable lengths between Kuhio Highway and Akahi Street, the recommended lane lengths are the same as without the optimized cycle lengths.

Table 12 Turn Lane Length Requirements for Proposed Improvements Along Hardy Street With Optimized Traffic Signal Cycle Length

Intersection	Approach		Design Volume	Cycle Length [3] (Seconds)	Cycles per Hour	Average Vehicles per Cycle [2]	Required Length [1]				Length Recommended (Ft)	Notes
							Minimum		Desirable			
							Veh	Ft	Veh	Ft		
Hardy St at Kuhio Hwy	WB	AM	100	90	40	3	5	125	6	150	275	Signalized
		PM	270	80	45	6	9	225	12	300		
Hardy St at Akahi St	WB	AM	95	90	40	2	3	75	4	100	60	Signalized [4]
		PM	70	80	45	2	3	75	4	100		
	EB	AM	60	90	40	2	3	75	4	100	100	Unsignalized
		PM	40	80	45	1	2	50	2	50		
Hardy St at Elua St	EB	AM	130	60	60	2	3	75	4	100	100	Unsignalized
		PM	130	60	60	2	3	75	4	100		

NOTE:
(1) Minimum queue length is 1.5 time average number of vehicles. Desirable queue length is 2.0 time average number of vehicles.
(2) The average number of vehicles per cycle is calculated by dividing the design volume by the number of cycles per hour.
(3) The cycle length for unsignalized intersections is based seconds based on the AASHTO standards as discussed earlier in this chapter.
(4) As discussed in Chapter 5 of this report, the intersection of Hardy at Akahi Street may be signalized. Therefore, the lengths of the left turn storage lane were determined for signalized conditions since the lengths for signalized conditions are longer than for unsignalized conditions. This minimizes the possibility that the pertinent section of Hardy Street will have to be reconstructed when signals are installed.

Rice Street between Kuhio Highway and Hardy Street

The conceptual design for this section of Rice Street is shown as Figure 17. The major improvement is the widening of the Rice Street approach to Kuhio Highway to provide a double westbound to southbound left turn. With this improvement, the intersection will operate at Level-of-Service B during both peak periods. This can be accomplished with SDOT's project to widen Kaumualii Highway from two to four lanes.

The calculations for the required length of the left turn storage lane are shown in Table 13. The required length could not be provided because of the geometry of the intersection and constraints by existing buildings adjacent to the roadway. Reduction of the traffic signal cycle length to approximately 70 seconds would reduce the required length to match the recommended length.

Table 13 Turn Storage Lane Requirements for Proposed Improvements Along Rice Street

Intersection	Approach	Design Volume	Cycle Length (Seconds)	Cycles per Hour	Average Vehicles per Cycle	Required Length (1)				Length Recommended (Ft)
						Minimum		Desirable		
						Veh	Ft	Veh	Ft	
Rice St at Kuhio Hwy	WB	480	120	30	16	24	600	32	800	2@200' =400'

NOTE:
(1) Minimum queue length is 1.5 time average number of vehicles. Desirable queue length is 2.0 time average number of vehicles.

The optimized traffic signal lengths are 75 seconds for the morning peak hour and 90 seconds for the afternoon peak hour. This implies that there is sufficient length to accommodate morning peak hour queues.

FIGURES

LIST OF FIGURES

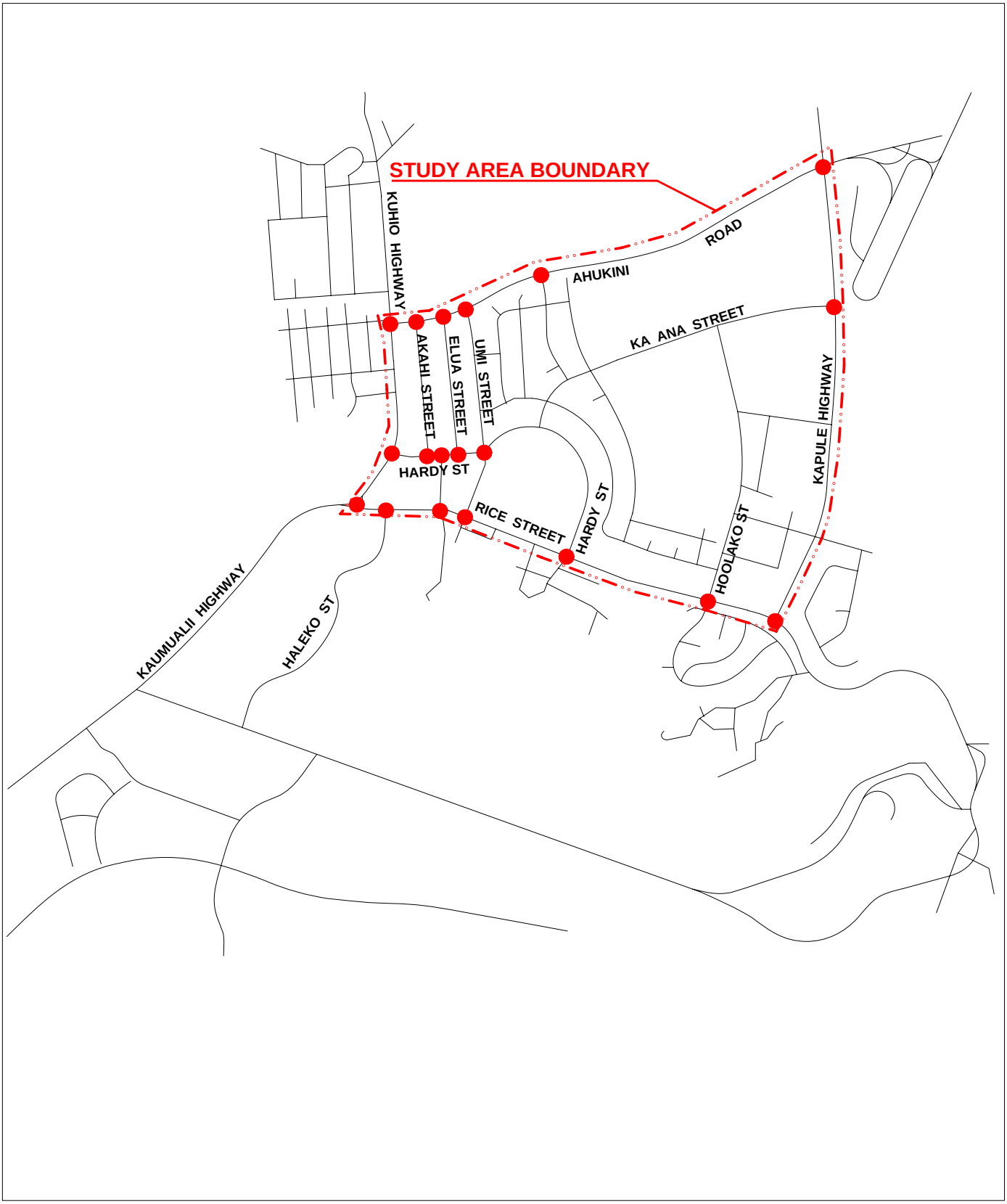


Figure 1
Study Area and Study Intersections

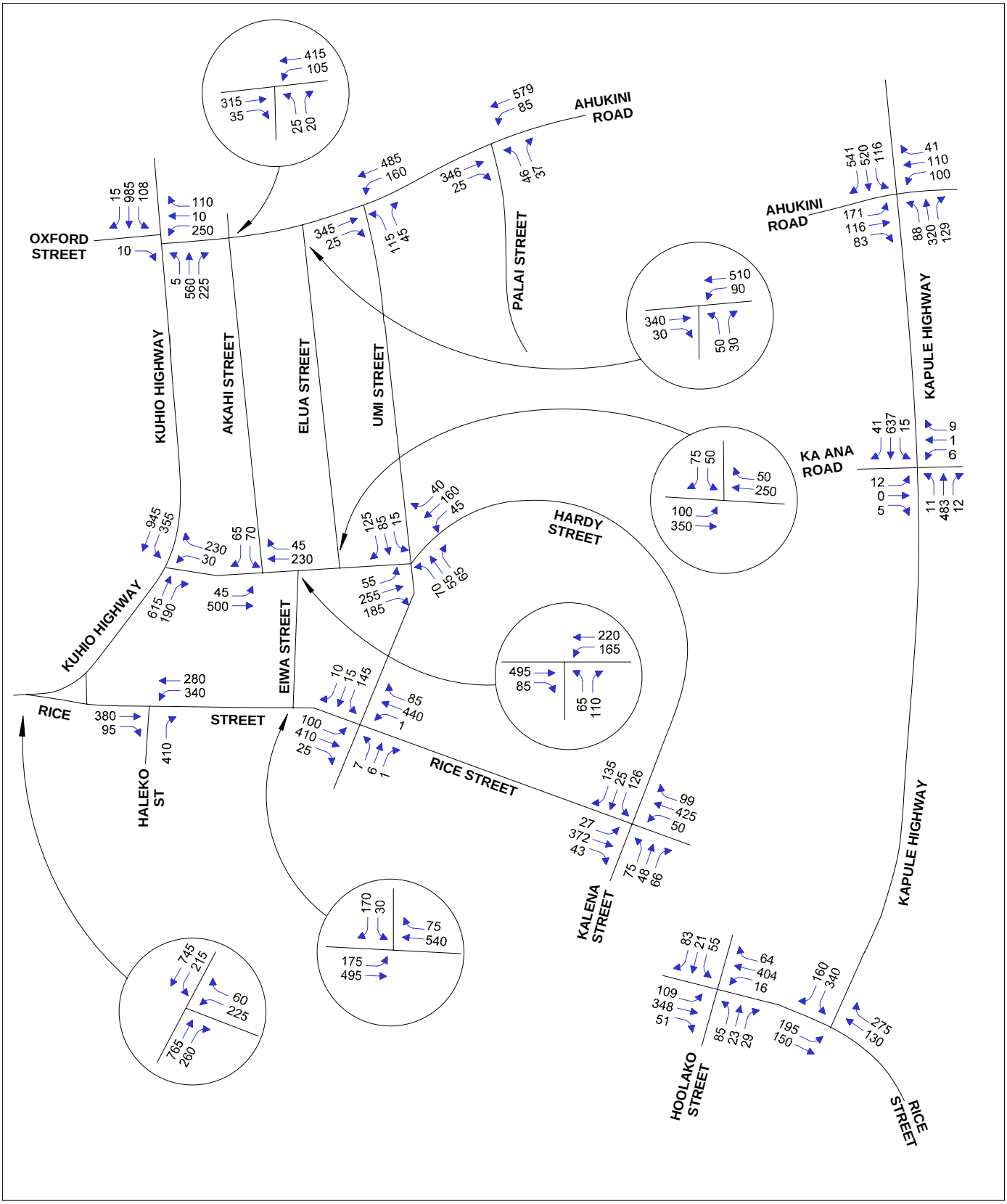


Figure 2
Existing (2005) AM Peak Hour Traffic Volumes

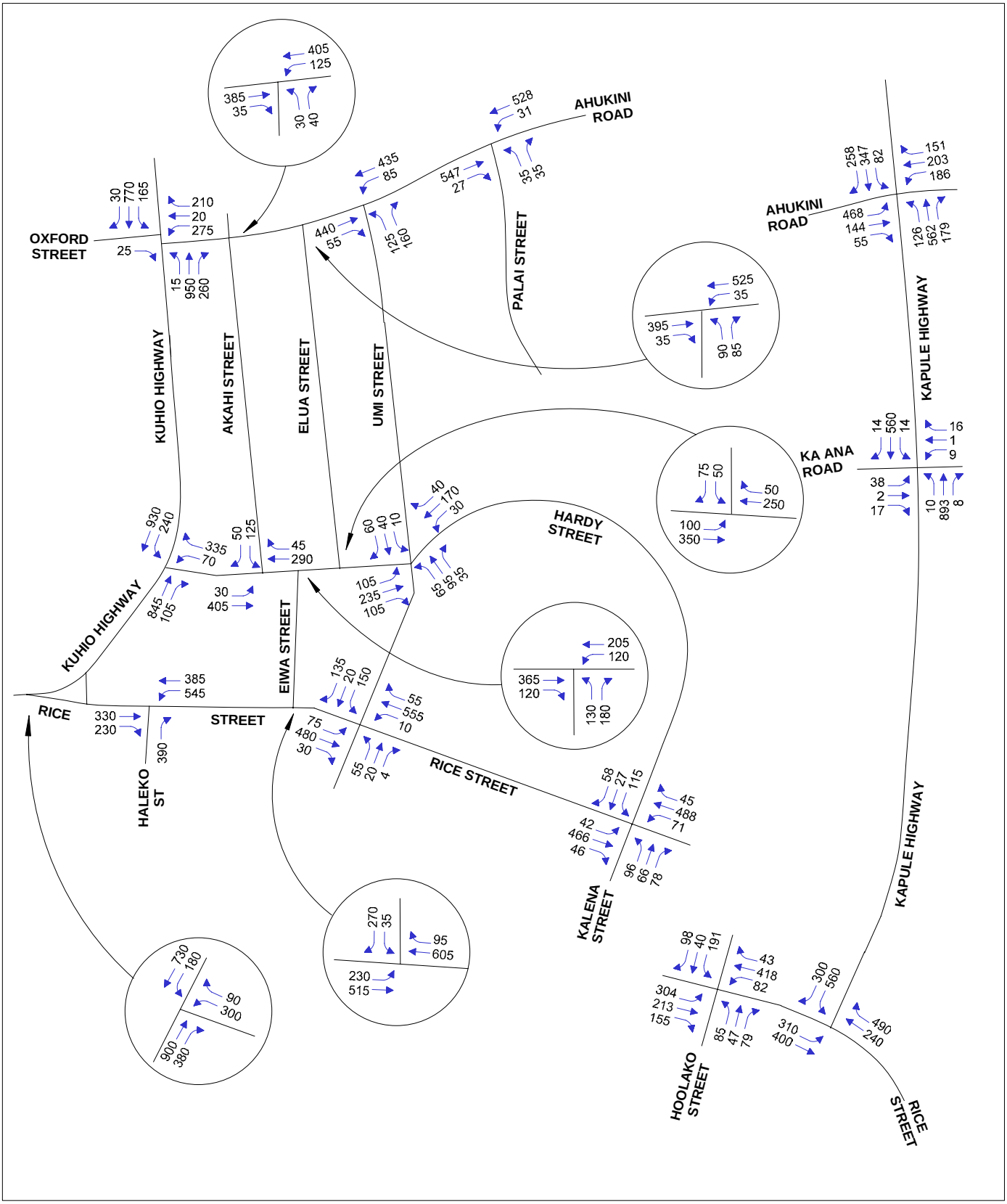


Figure 3
Existing (2005) PM Peak Hour Traffic Volumes

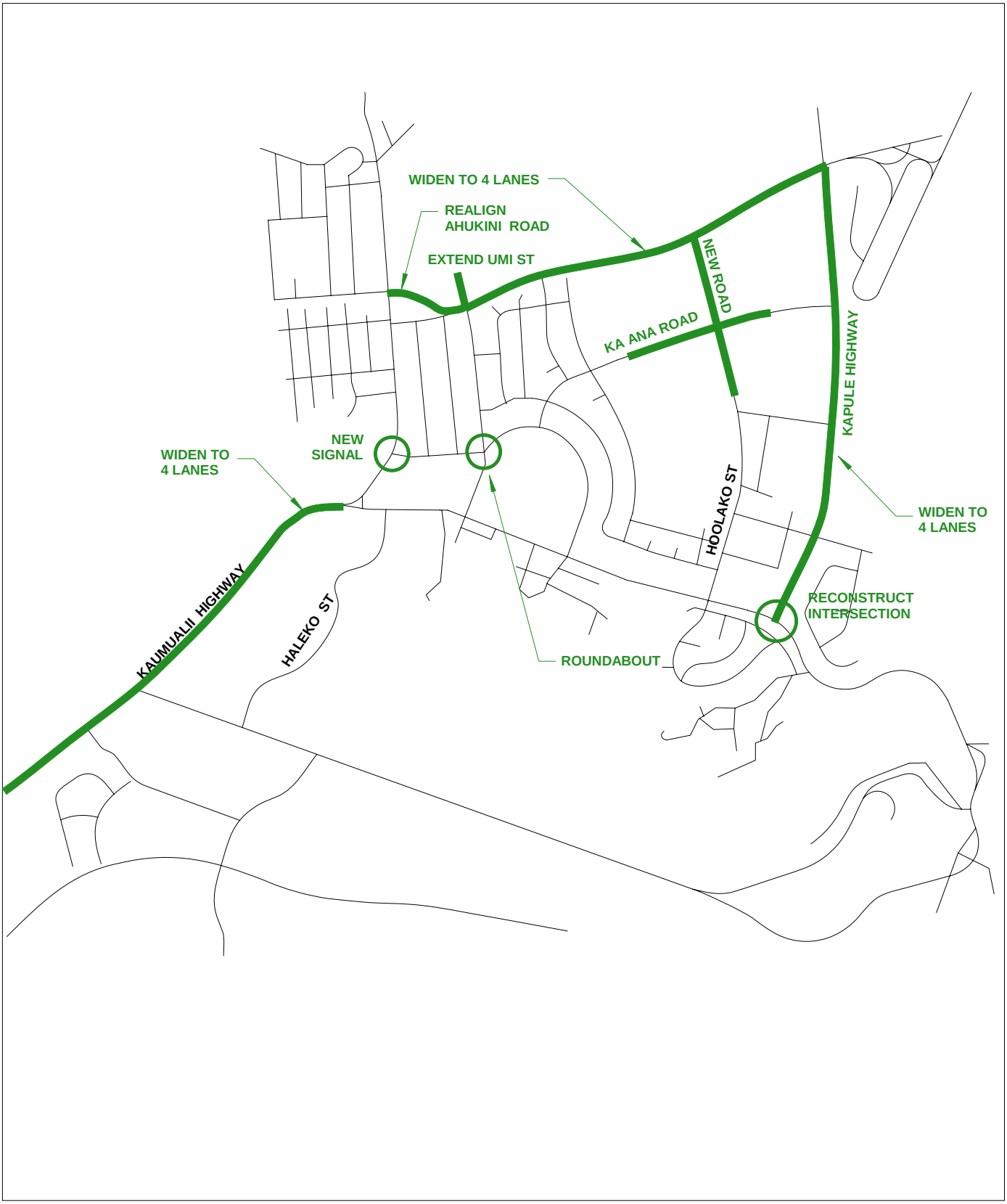


Figure 4
Network A

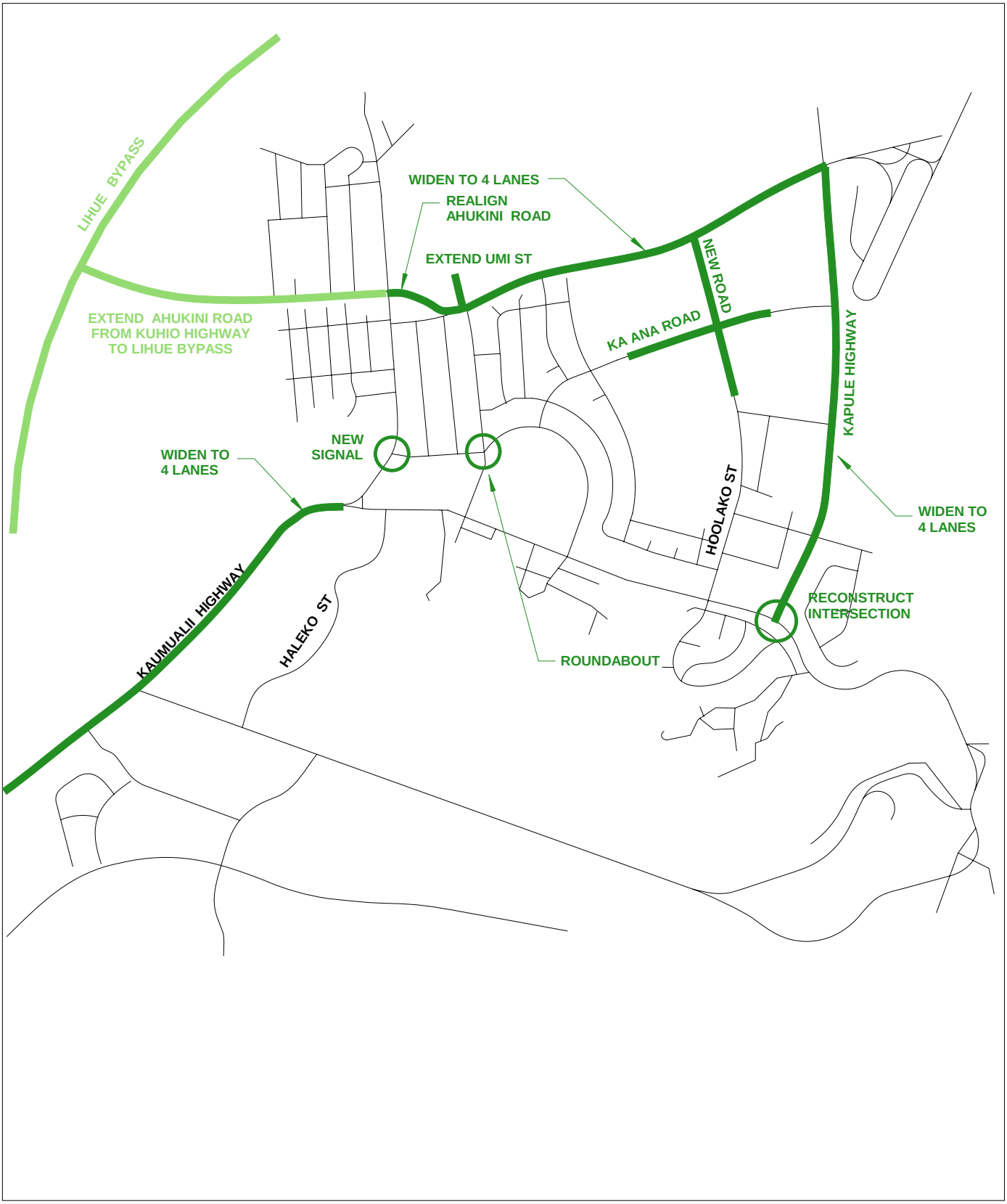


Figure 5
Network B - Network A Plus Lihue Bypass

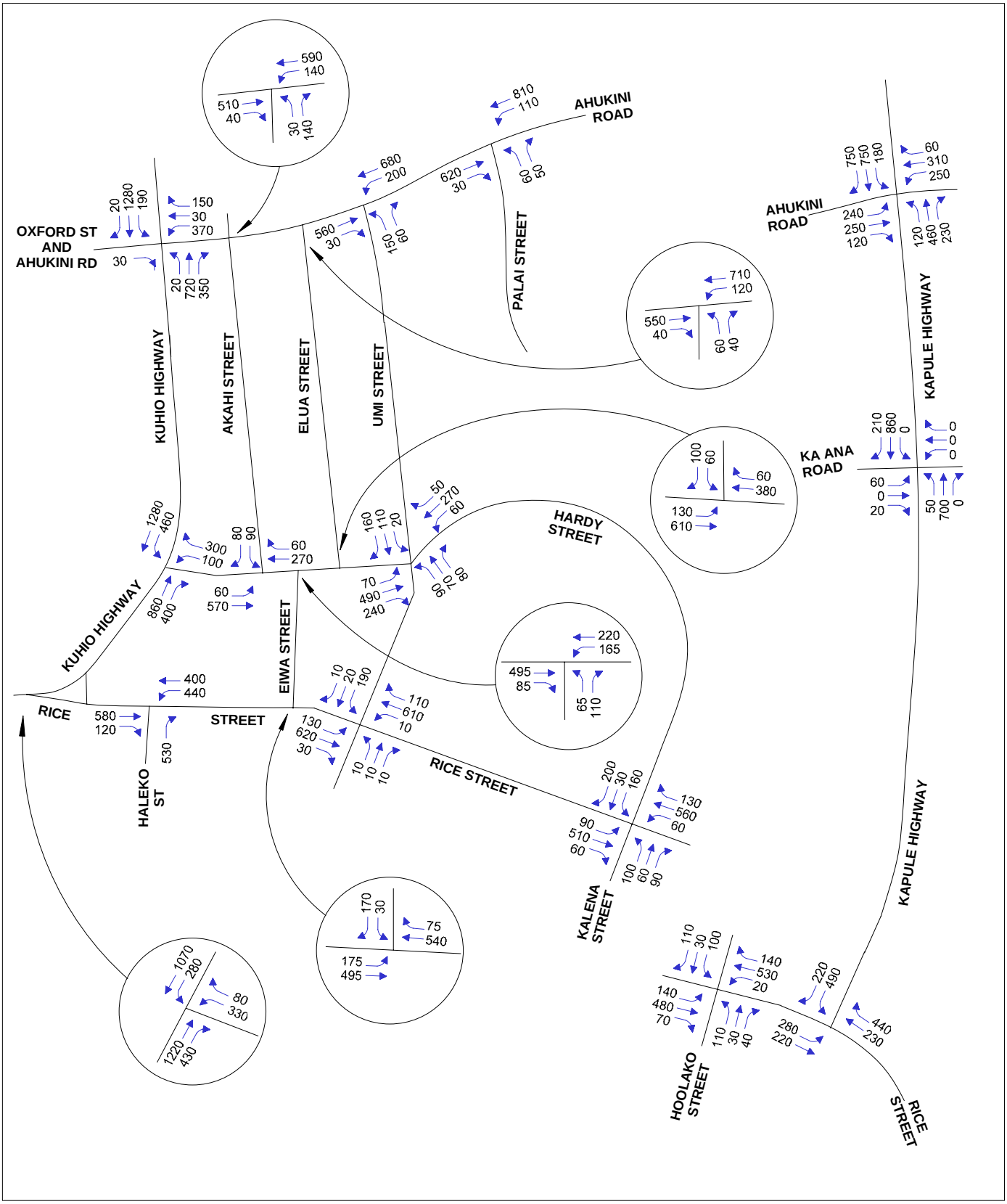


Figure 6
Baseline AM Peak Hour Traffic Projections

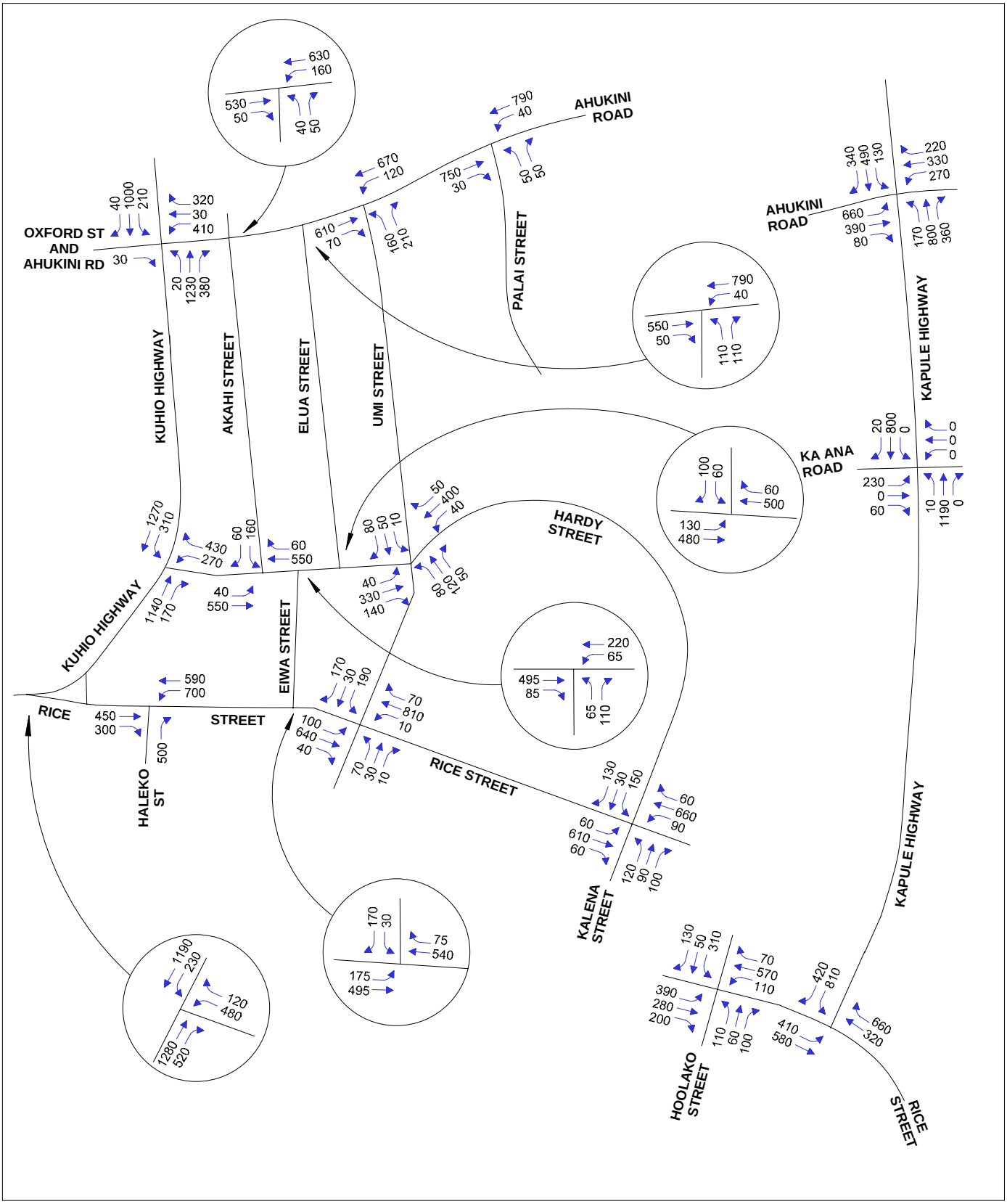


Figure 7
Baseline PM Peak Hour Traffic Projections

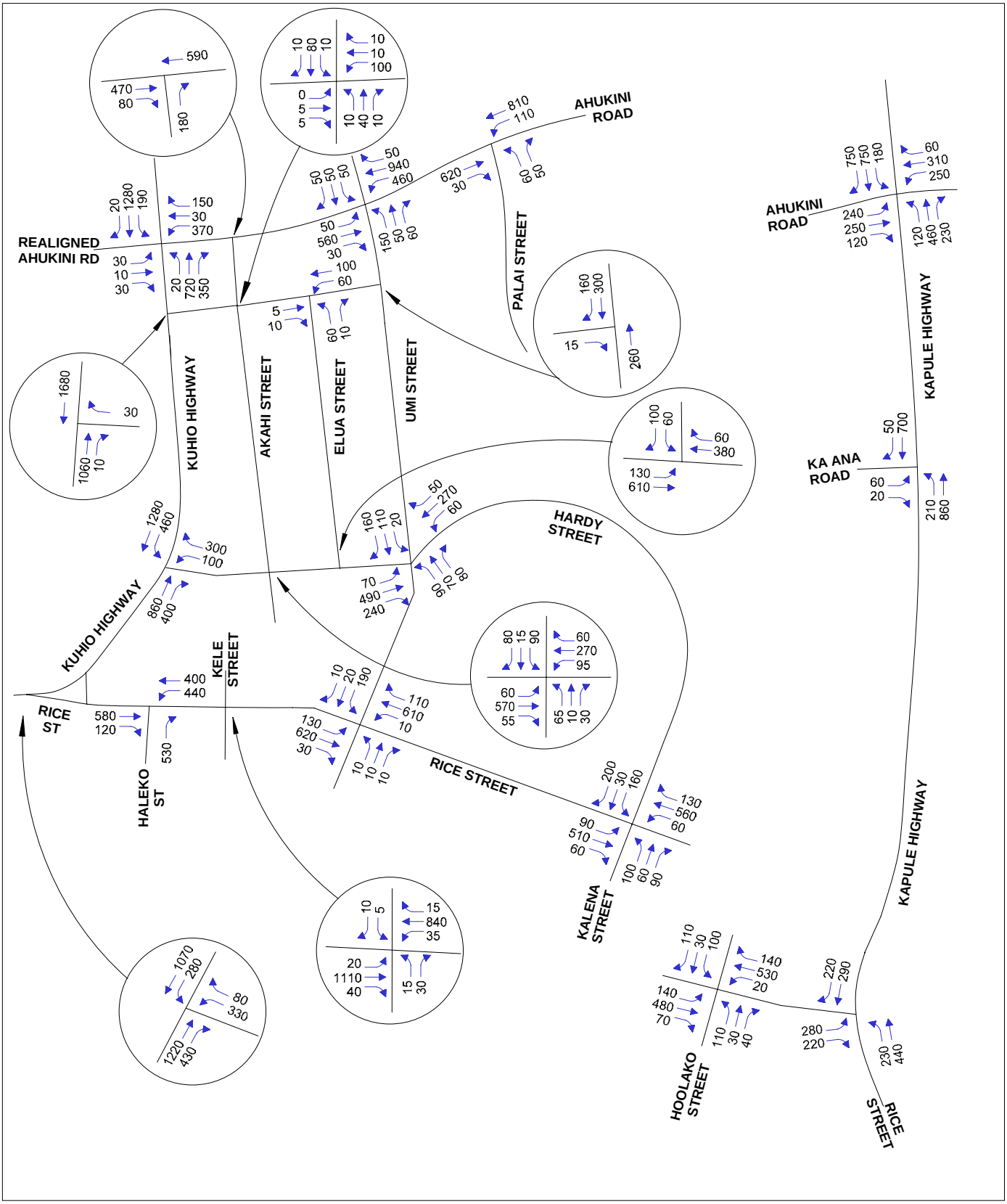


Figure 8
Network A - AM Peak HourTraffic Projections

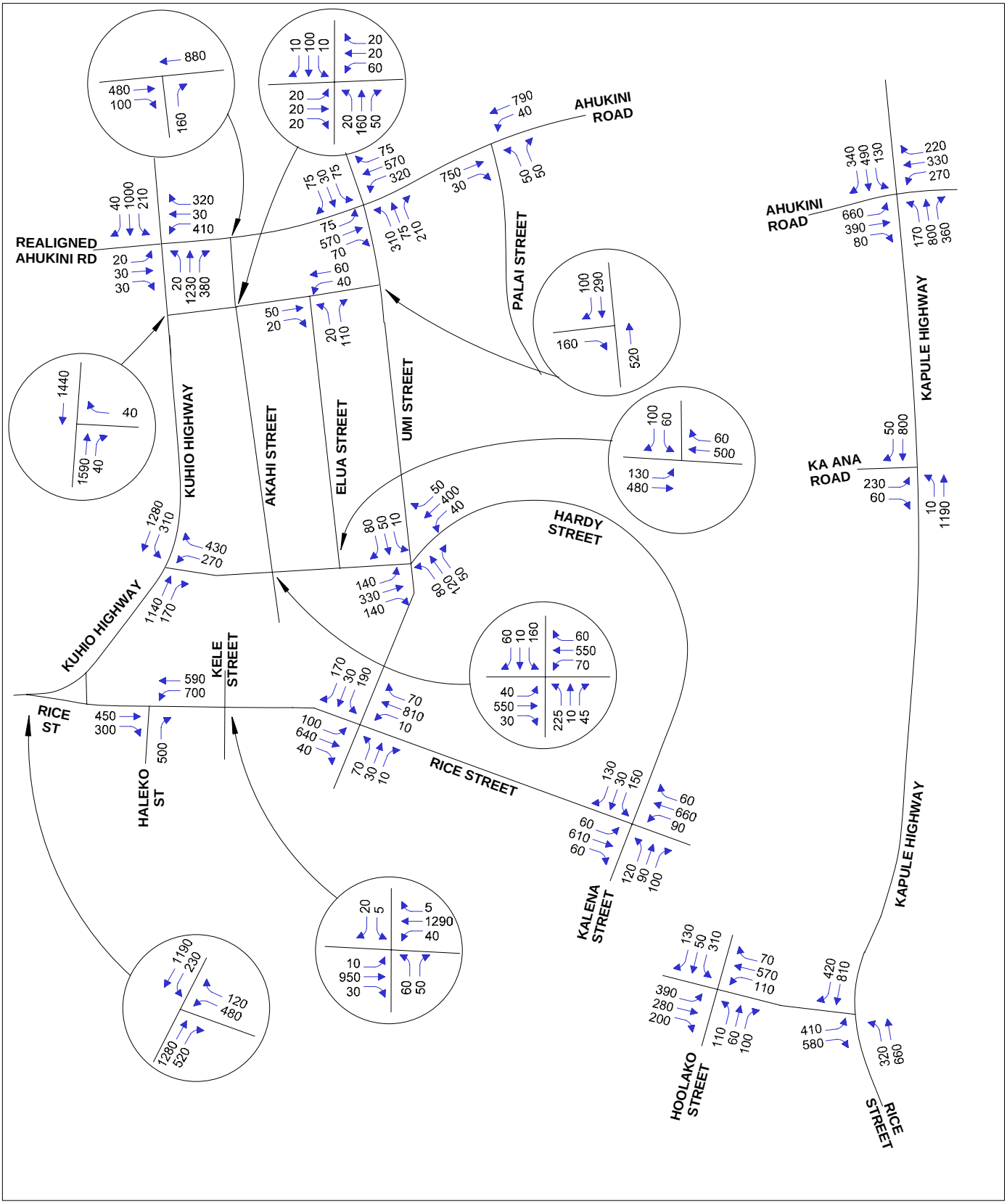


Figure 9
Network A - PM Peak Hour Traffic Projections

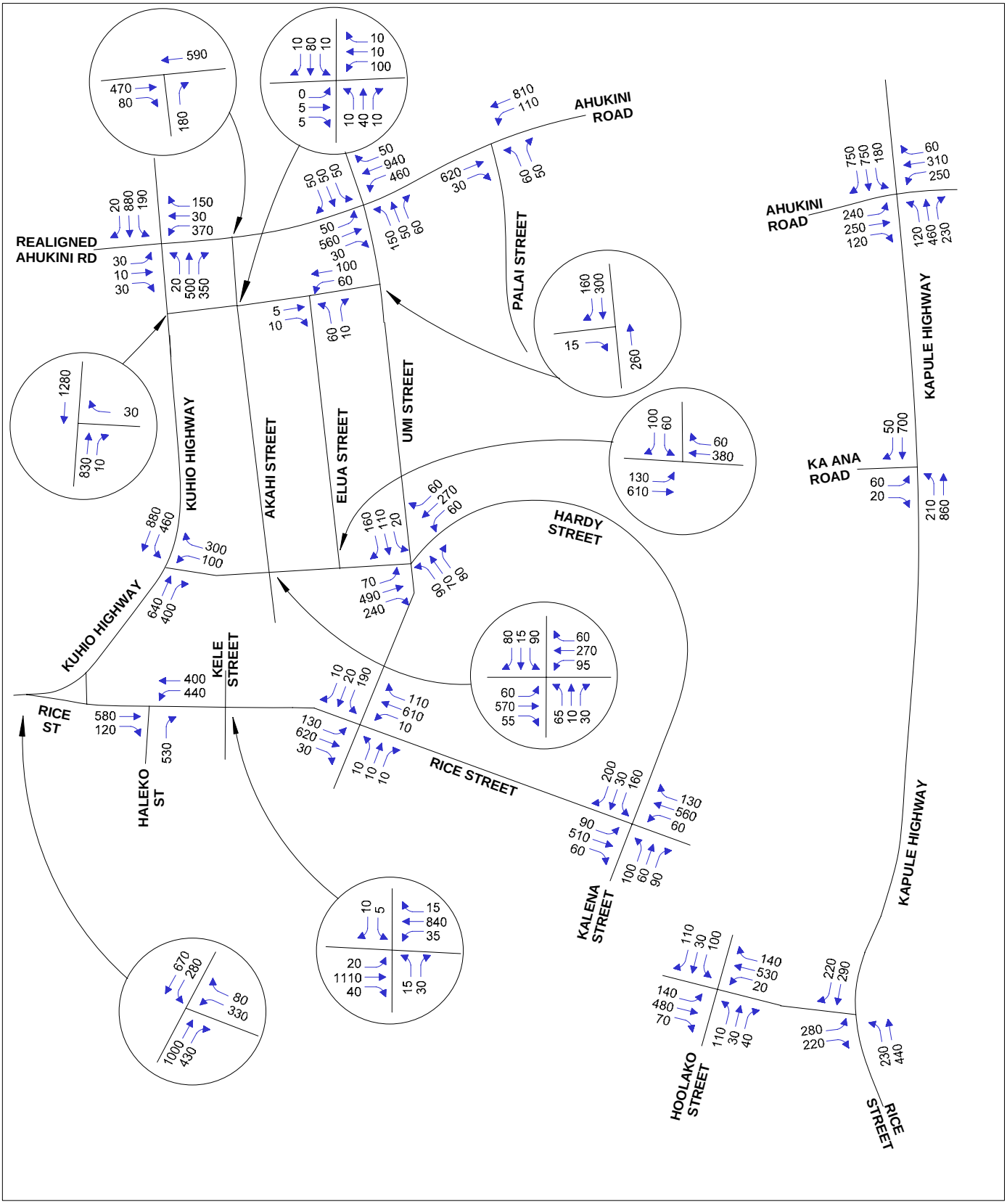


Figure 10
Network B - AM Peak Hour Traffic Projections

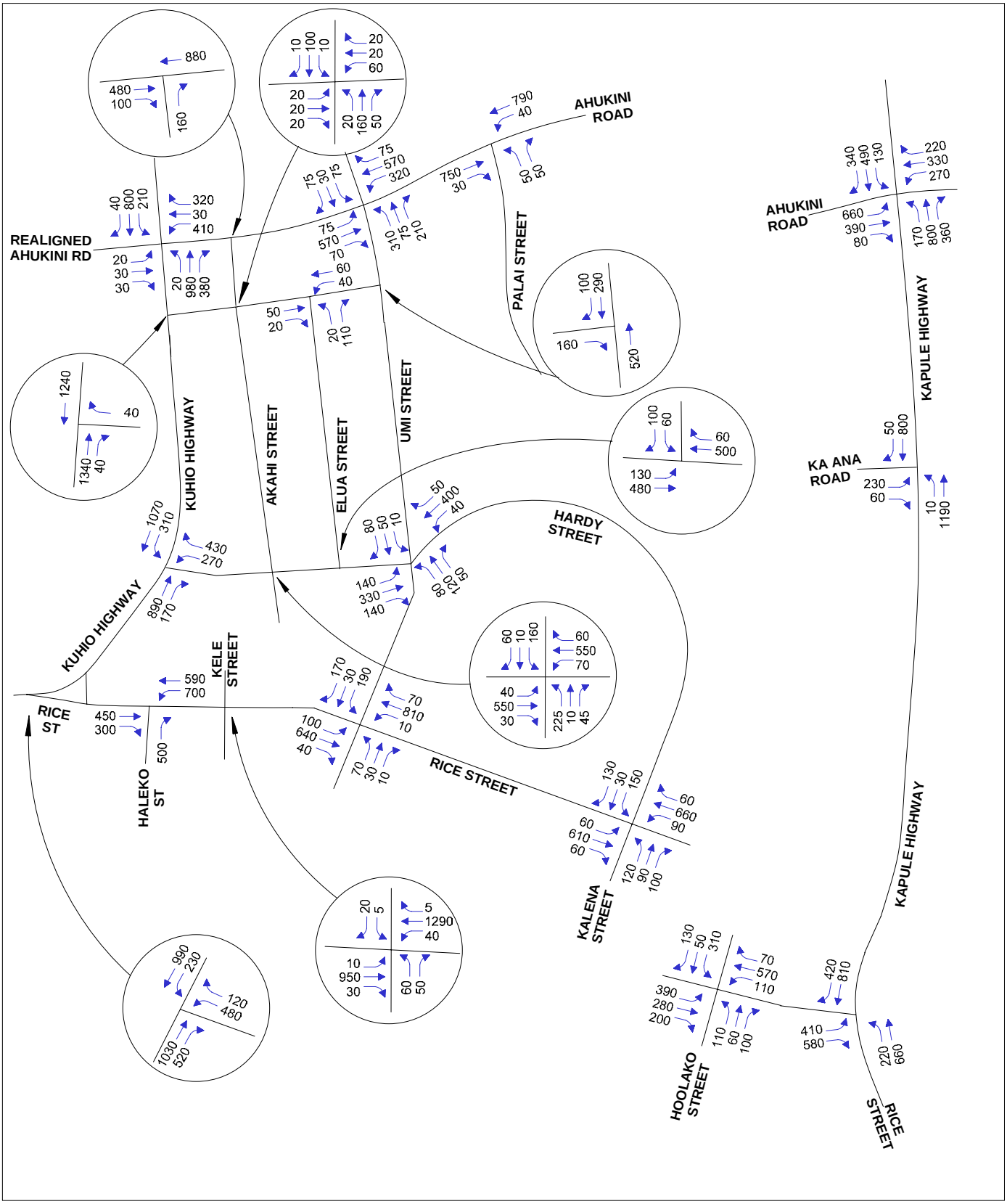


Figure 11
Network B - PM Peak Hour Traffic Projections

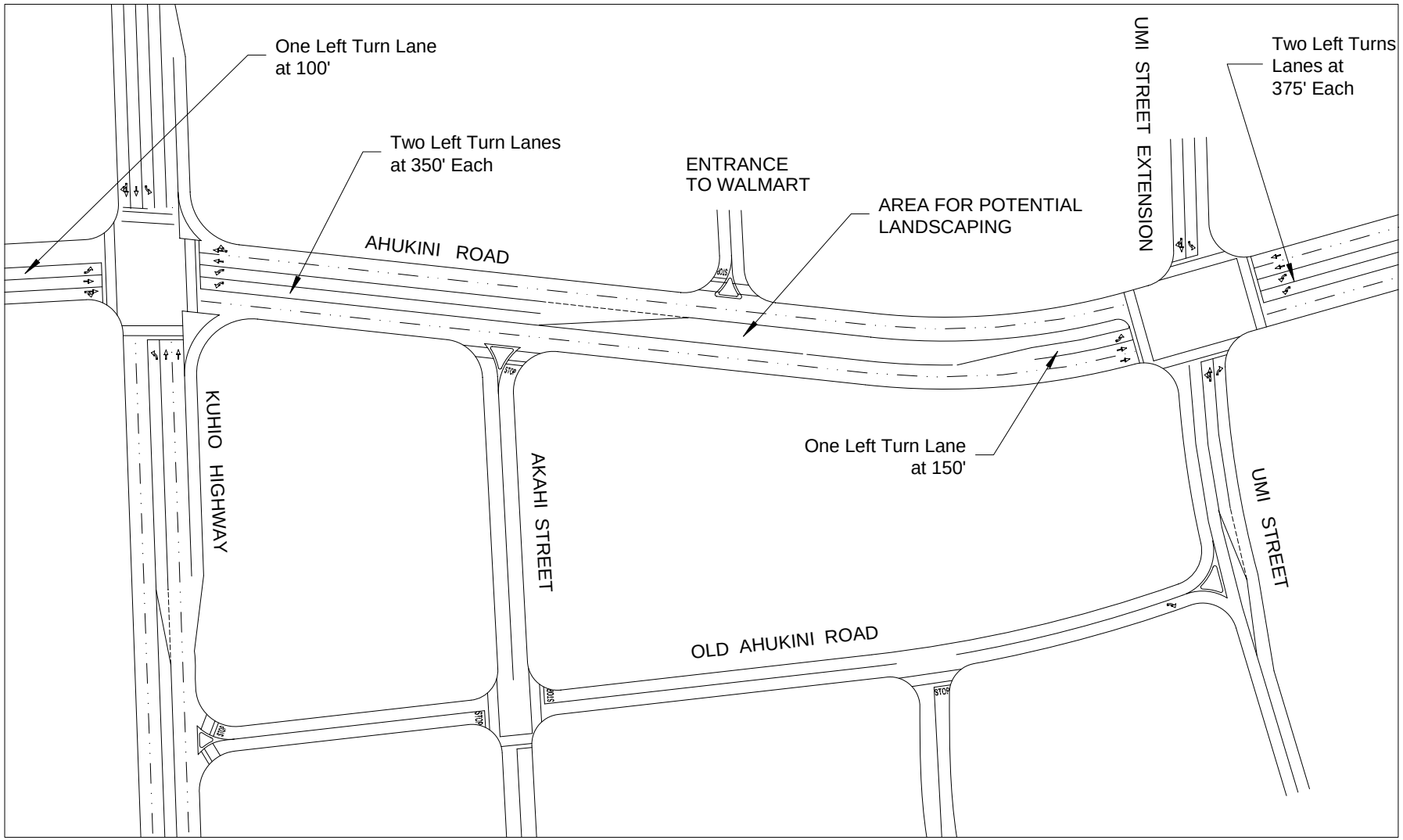


Figure 12
Conceptual Plan for Ahukini Road
Between Umi Street and Kuhio Highway
Alternate 1

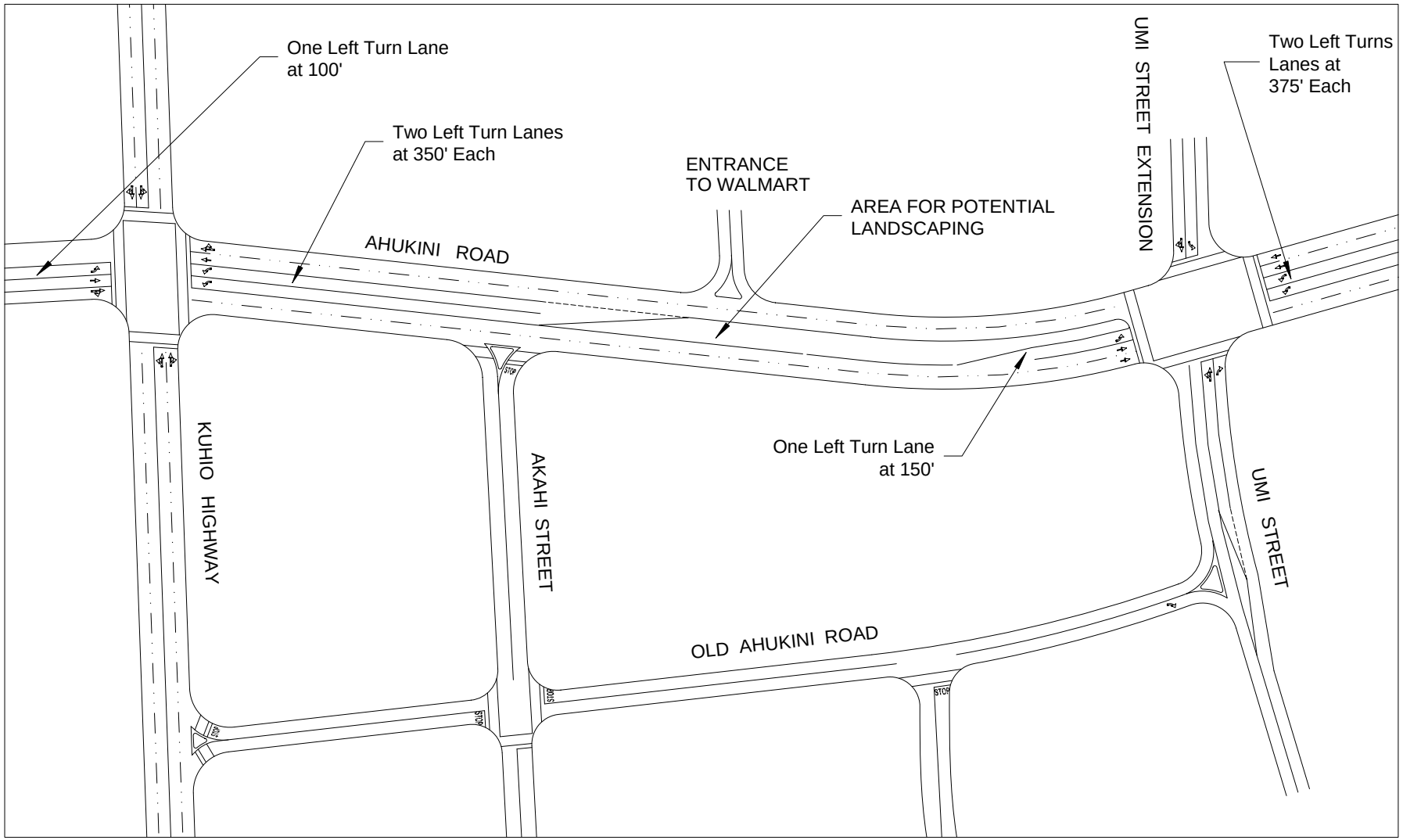


Figure 13
Conceptual Plan for Ahukini Road
Between Umi Street and Kuhio Highway
Alternate 2

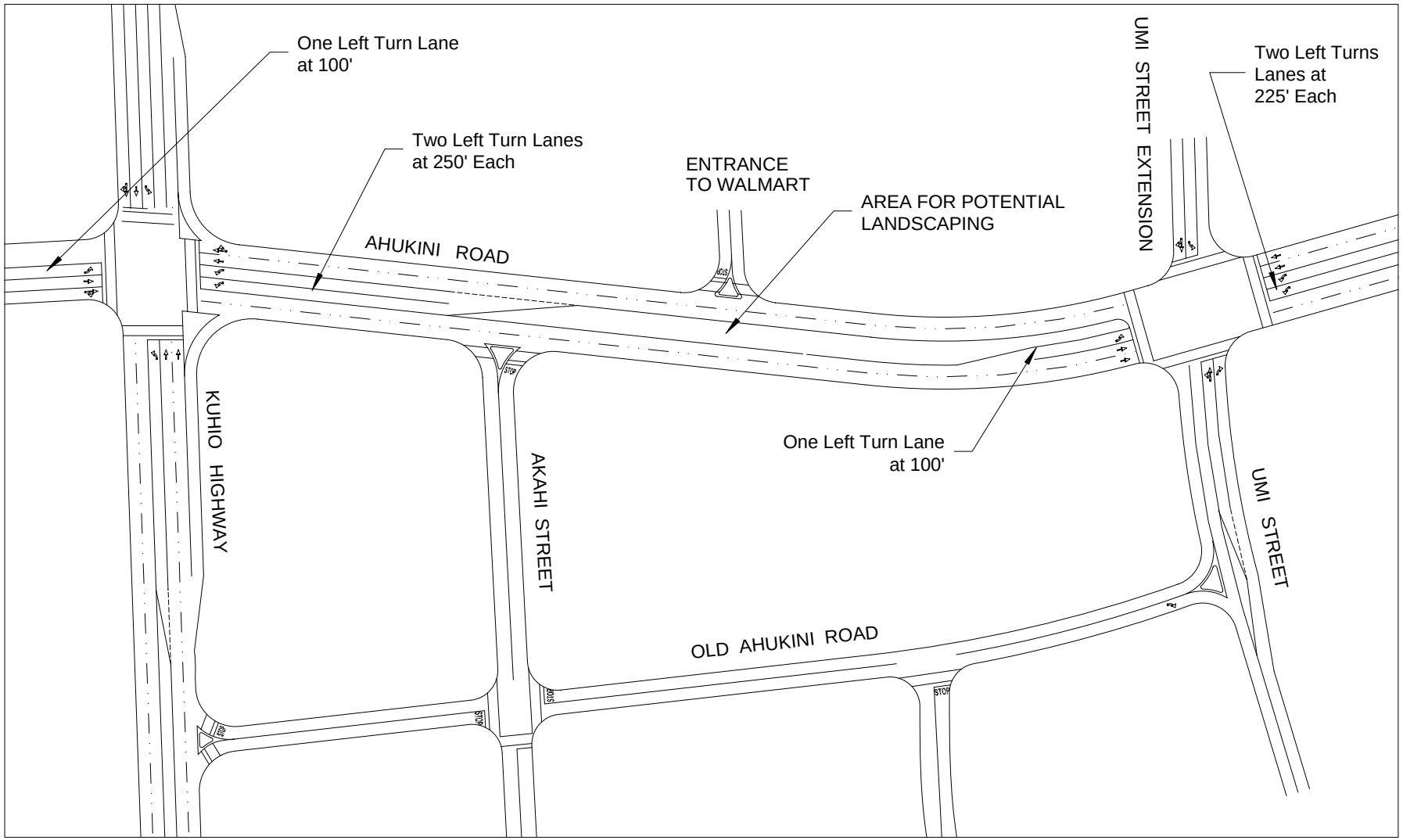


Figure 14
Conceptual Plan for Ahukini Road
Between Umi Street and Kuhio Highway
With Optimized Traffic Signal Lengths

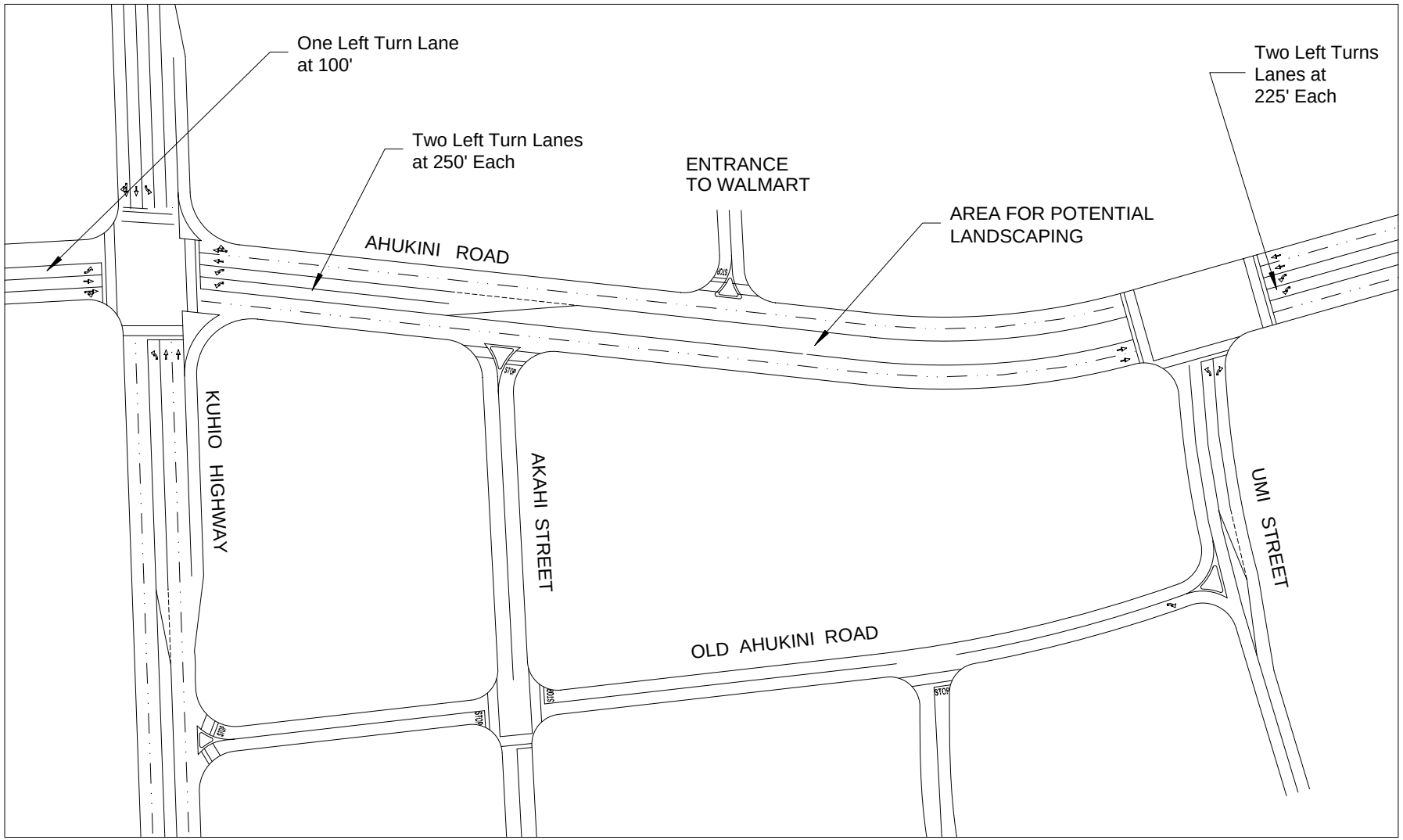


Figure 15
Conceptual Plan for Ahukini Road
Between Umi Street and Kuhio Highway
Without Umi Street Extension

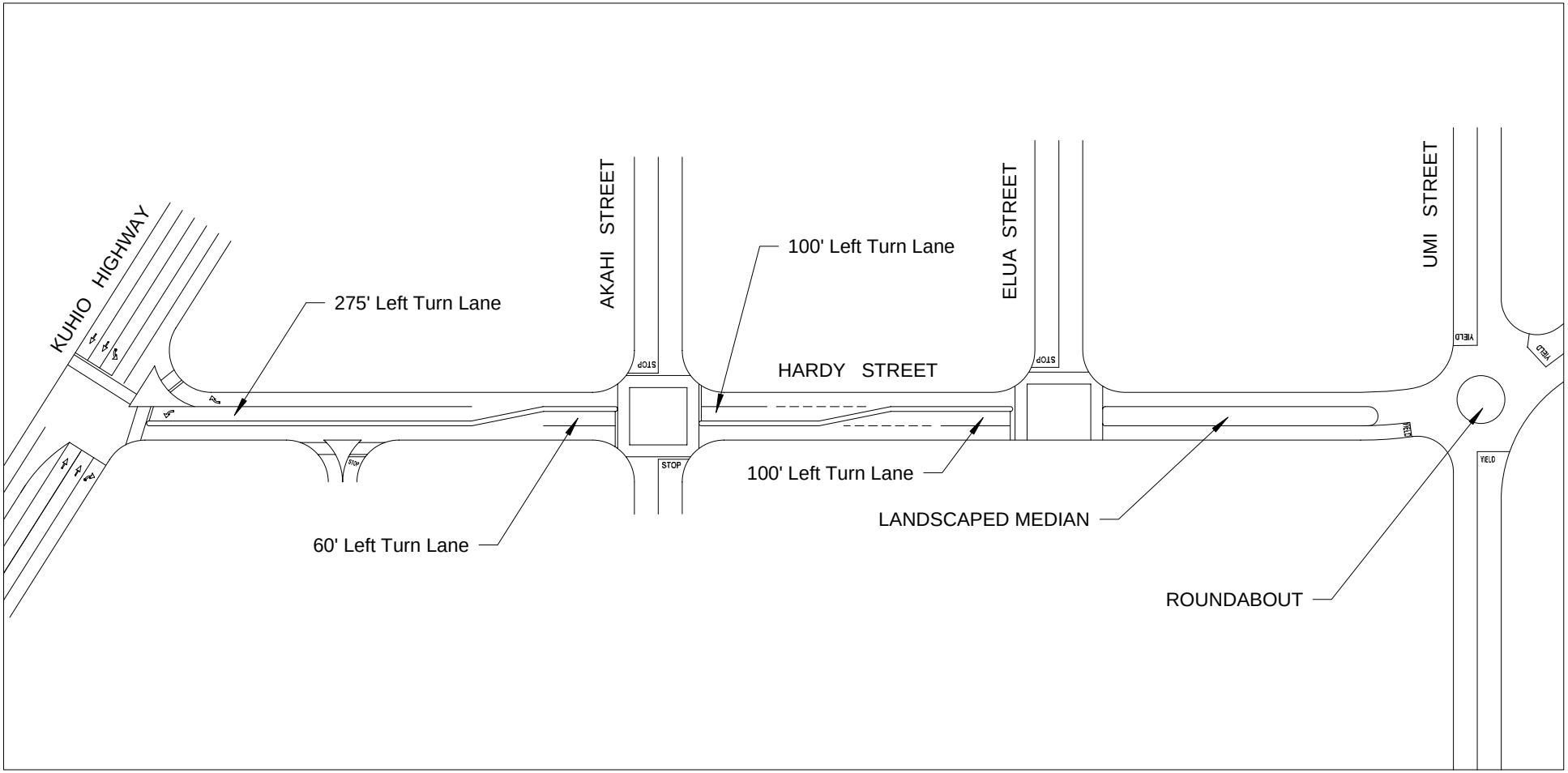


Figure 16
Conceptual Plan for Hardy Street Between Kuhio Highway and Umi Street

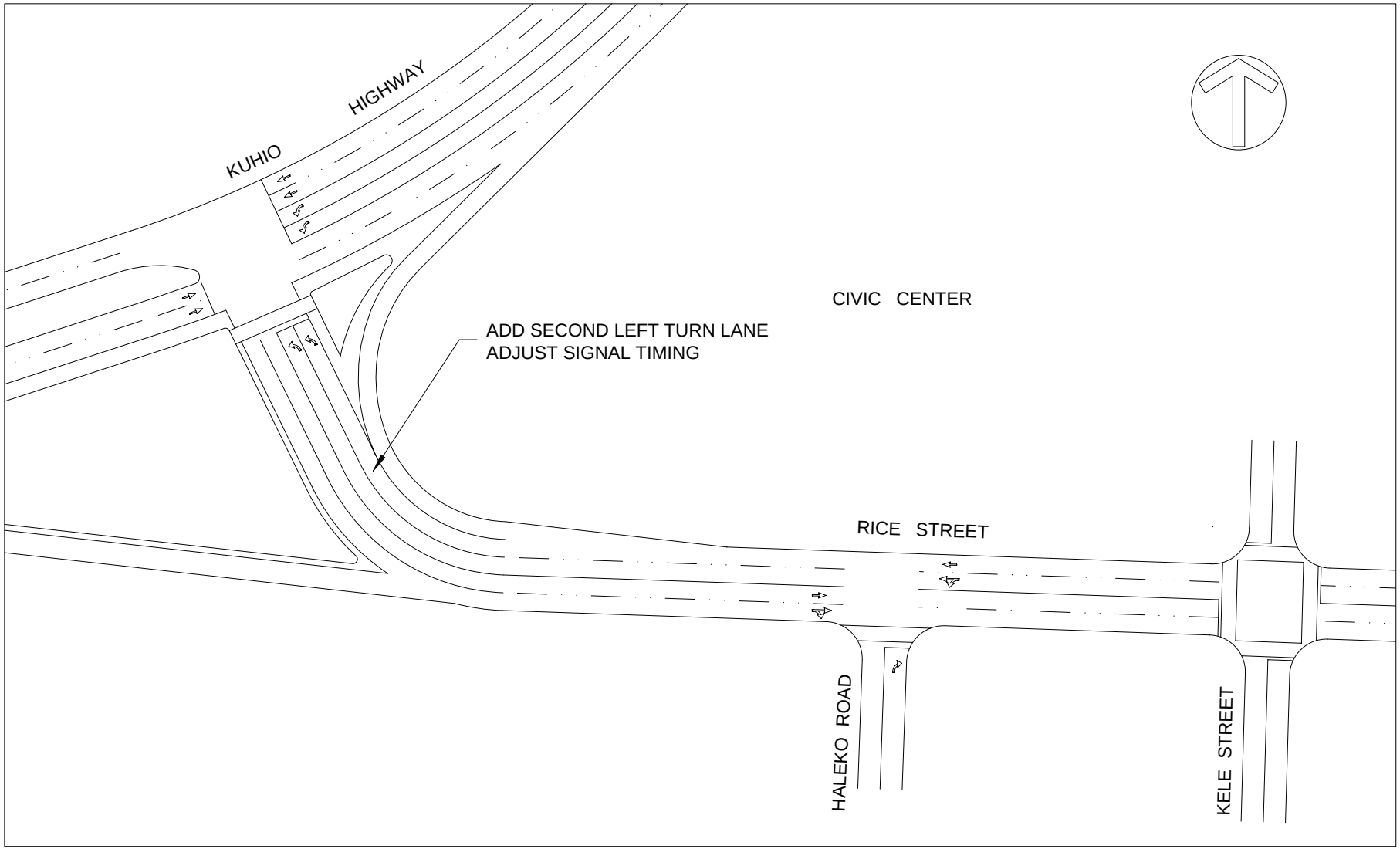
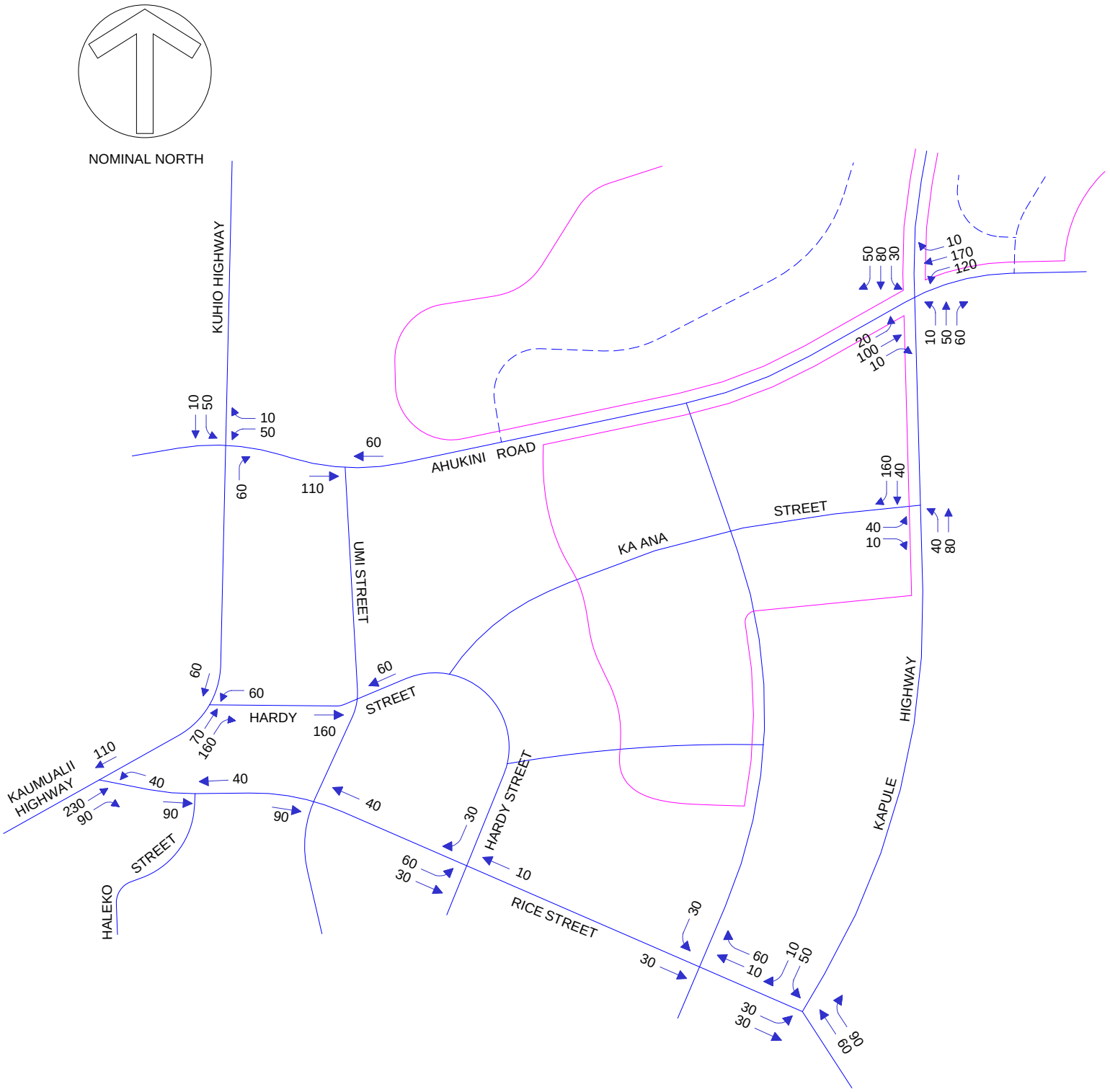
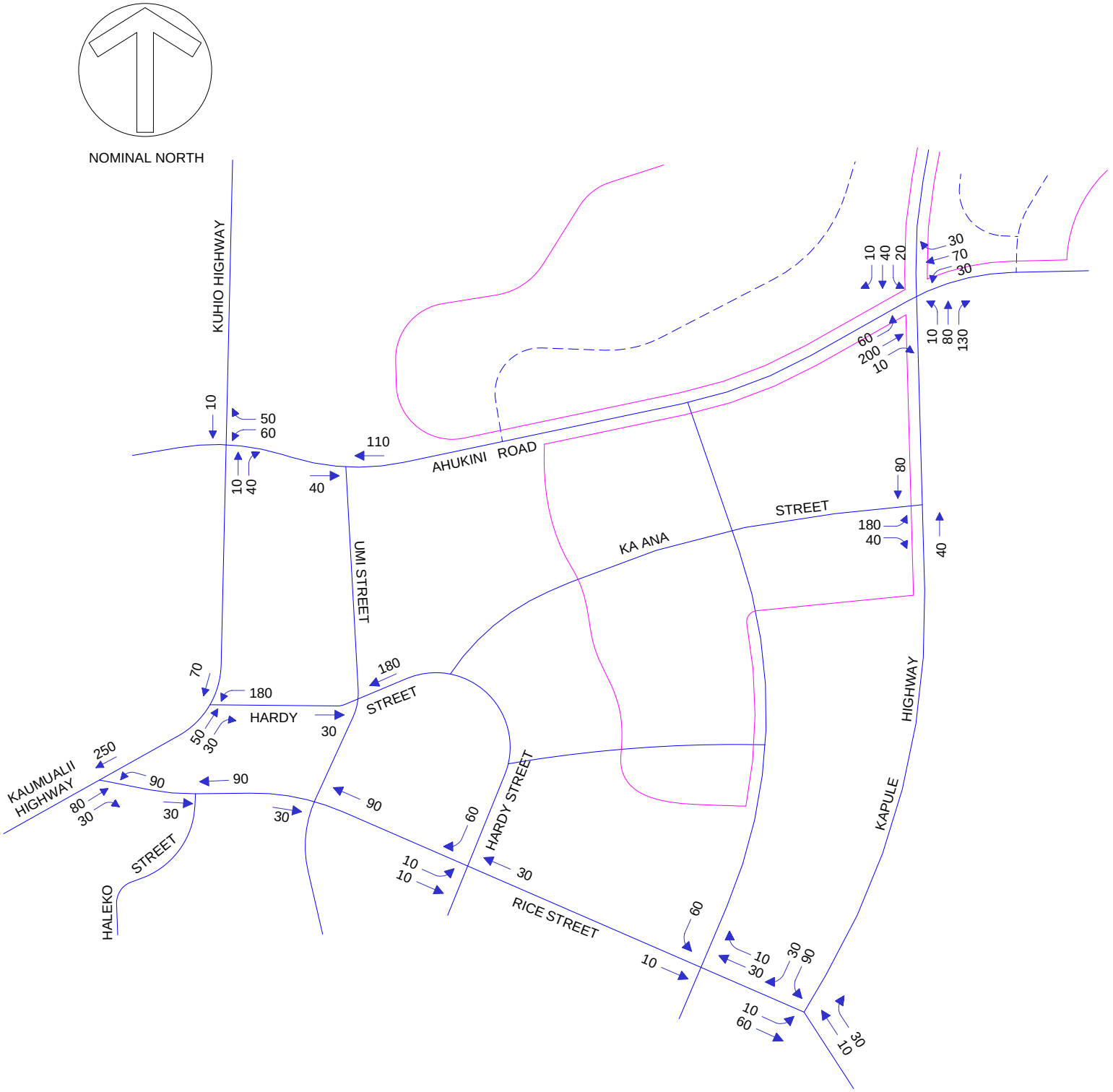


Figure 17
Conceptual Plan For Rice Street Between Kuhio Highway and Kele Street

APPENDIX A
TRAFFIC ASSIGNMENT WORKSHEETS
FOR
LIHUE - HANAMAULU



HANAMA'ULU TRIP ASSIGNMENTS
AM PEAK HOUR



HANAMA'ULU TRIP ASSIGNMENTS
PM PEAK HOUR

APPENDIX B
DETAILED LEVEL-OF-SERVICE RESULTS

Intersection 1 Levels-of-Service Analysis at Rice Street & Kuhio Avenue - Signalized

AM Peak Hour	Existing			Baseline			Network A			Network B		
Intersection, Approach and Movement	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	0.64	12.7	B	0.94	38.9	D	0.89	22.2	C	0.86	20.4	C
Rice Street, Westbound Left	0.63	23.4	C	0.81	31.5	C	0.91	51.9	D	0.81	31.5	C
Rice Street, Westbound Right	0.04	17.5	B	0.05	16.8	B	0.05	22.9	C	0.05	16.8	B
Kuhio Highway, Northbound Thru	0.63	17.0	B	1.12	84.4	F	0.87	26.8	C	0.92	31.3	C
Kuhio Highway, Northbound Right	0.18	0.2	A	0.30	0.5	A	0.30	0.5	A	0.30	0.5	A
Kuhio Highway, Southbound Left	0.67	25.8	C	0.82	34.9	C	0.92	58.5	E	0.82	34.9	C
Kuhio Highway, Southbound Thru	0.36	5.2	B	0.54	7.5	A	0.49	6.8	A	0.34	5.9	A

PM Peak Hour	Existing			Baseline			Network A			Network B		
Intersection, Approach and Movement	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	0.71	14.0	B	1.04	52.3	D	0.96	30.3	C	0.91	23.7	C
Rice Street, Westbound Left	0.78	30.1	C	1.11	95.5	F	0.98	65.7	E	0.94	48.3	D
Rice Street, Westbound Right	0.06	17.8	B	0.08	16.6	B	0.08	22.7	C	0.08	17.0	B
Kuhio Highway, Northbound Thru	0.68	17.2	B	1.17	104.8	F	0.93	36.5	D	0.88	30.2	C
Kuhio Highway, Northbound Right	0.26	0.4	A	0.36	0.6	A	0.36	0.6	A	0.37	0.6	A
Kuhio Highway, Southbound Left	0.71	31.8	C	0.72	29.5	C	0.98	87.6	F	0.90	57.3	E
Kuhio Highway, Southbound Thru	0.36	5.7	A	0.61	8.9	A	0.60	12.0	B	0.53	10.1	B

NOTES:
1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 2 Levels-of-Service Analysis at Haleko Street & Rice Street - Unsignalized

AM Peak Hour Intersection, Approach and Movement	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			See Note 4			See Note 4		
Rice Street, Westbound Left & Thru		10.2	B		13.1	B		13.1	B		13.1	B
Haleko Street, Northbound Right		16.7	C		34.2	D		34.2	D		34.2	D

PM Peak Hour Intersection, Approach and Movement	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			See Note 4			See Note 4		
Rice Street, Westbound Left & Thru		14.1	B		27.6	D		27.6	D		27.6	D
Haleko Street, Northbound Right		17.8	C		33.2	D		33.2	D		33.2	D

NOTES:

1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 3 Levels-of-Service Analysis at Eiwa Street & Rice Street - Unsignalized

AM Peak Hour Intersection, Approach and Movement	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4								
Rice Street, Eastbound Left & Thru		9.8	A		12.1	B	DELETED			DELETED		
Eiwa Street, Southbound Left		42.3	E		200.5	F						
Eiwa Street, Southbound Right		12.4	B		16.2	C						
PM Peak Hour **Intersection, Approach and Movement**	**Existing**			**Baseline**								
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS						
	See Note 4			See Note 4								
Rice Street, Eastbound Left & Thru		10.9	B		15.8	C	DELETED			DELETED		
Eiwa Street, Southbound Left		79.3	F		819.5	F						
Eiwa Street, Southbound Right		15.8	C		32.8	D						

NOTES:

1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 4 Levels-of-Service Analysis at Rice Street & Umi Street - Signalized

AM Peak Hour	Existing			Baseline			Network A			Network B		
Intersection, Approach and Movement	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	0.43	10.2	B	0.46	10.0	B	0.46	10.0	B	0.46	10.0	B
Rice Street, Eastbound Left, Thru & Right	0.62	11.4	B	0.63	11.4	B	0.63	11.4	B	0.63	11.4	B
Rice Street, Westbound Left, Thru & Right	0.49	9.8	A	0.57	10.4	B	0.57	10.4	B	0.57	10.4	B
Umi Street, Northbound Left, Thru & Right	0.02	5.8	A	0.14	6.8	A	0.14	6.8	A	0.14	6.8	A
Umi Street, Southbound Left & Thru	0.28	7.7	A	0.32	8.4	A	0.32	8.4	A	0.32	8.4	A
Umi Street, Southbound Right	0.01	5.8	A	0.09	6.5	A	0.09	6.5	A	0.09	6.5	A

PM Peak Hour	Existing			Baseline			Network A			Network B		
Intersection, Approach and Movement	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	0.66	15.9	B	0.69	15.7	B	0.69	15.7	B	0.69	15.7	B
Rice Street, Eastbound Left, Thru & Right	0.90	23.0	C	0.90	23.1	C	0.90	23.1	C	0.90	23.1	C
Rice Street, Westbound Left, Thru & Right	0.59	10.2	B	0.73	12.4	B	0.73	12.4	B	0.73	12.4	B
Umi Street, Northbound Left, Thru & Right	0.04	7.3	A	0.21	8.5	A	0.21	8.5	A	0.21	8.5	A
Umi Street, Southbound Left & Thru	0.42	10.9	B	0.47	11.8	B	0.47	11.8	B	0.47	11.8	B
Umi Street, Southbound Right	0.01	7.1	A	0.24	8.6	A	0.24	8.6	A	0.24	8.6	A

NOTES:
1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 5 Levels-of-Service Analysis at Rice Street & Hardy Street - Signalized

AM Peak Hour	Existing			Baseline			Network A			Network B		
Intersection, Approach and Movement	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	0.40	9.1	A	0.56	11.6	B	0.56	11.6	B	0.56	11.6	B
Rice Street, Eastbound Left, Thru & Right	0.44	9.7	A	0.75	13.8	B	0.75	13.8	B	0.75	13.8	B
Rice Street, Westbound Left, Thru & Right	0.57	10.7	B	0.71	12.4	B	0.71	12.4	B	0.71	12.4	B
Hardy Street, Northbound Left & Thru	0.21	6.8	A	0.30	8.7	A	0.30	8.7	A	0.30	8.7	A
Hardy Street, Northbound Right	0.05	5.7	A	0.06	6.7	A	0.06	6.7	A	0.06	6.7	A
Hardy Street, Southbound Left & Thru	0.28	7.5	A	0.40	10.0	B	0.40	10.0	B	0.40	10.0	B
Hardy Street, Southbound Right	0.09	6.0	A	0.20	7.6	A	0.20	7.6	A	0.20	7.6	A

PM Peak Hour	Existing			Baseline			Network A			Network B		
Intersection, Approach and Movement	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	0.44	9.9	A	0.61	13.1	B	0.61	13.1	B	0.61	13.1	B
Rice Street, Eastbound Left, Thru & Right	0.55	10.3	B	0.70	12.1	B	0.70	12.1	B	0.70	12.1	B
Rice Street, Westbound Left, Thru & Right	0.63	11.4	B	0.83	16.7	B	0.83	16.7	B	0.83	16.7	B
Hardy Street, Northbound Left & Thru	0.28	7.8	A	0.40	10.4	B	0.40	10.4	B	0.40	10.4	B
Hardy Street, Northbound Right	0.05	6.2	A	0.07	7.3	A	0.07	7.3	A	0.07	7.3	A
Hardy Street, Southbound Left & Thru	0.27	7.9	A	0.41	10.8	B	0.41	10.8	B	0.41	10.8	B
Hardy Street, Southbound Right	0.04	6.1	A	0.13	7.6	A	0.13	7.6	A	0.13	7.6	A

NOTES:

1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 6 Levels-of-Service Analysis at Rice Street & Hoolako Street - Signalized

AM Peak Hour	Existing			Baseline			Network A			Network B		
Intersection, Approach and Movement	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	0.36	10.7	B	0.54	11.9	B	0.53	11.6	B	0.53	11.6	B
Rice Street, Eastbound Left, Thru & Right	0.66	13.3	B	0.79	15.5	B	0.79	15.1	B	0.79	15.1	B
Rice Street, Westbound Left, Thru & Right	0.50	11.1	B	0.55	10.2	B	0.55	9.8	A	0.55	9.8	A
Hoolako Street, Northbound Left & Thru	0.17	6.0	A	0.28	9.5	A	0.28	9.3	A	0.28	9.3	A
Hoolako Street, Northbound Right	0.02	5.2	A	0.03	7.5	A	0.03	7.3	A	0.03	7.3	A
Hoolako Street, Southbound Left & Thru	0.11	5.7	A	0.25	9.3	A	0.26	9.1	A	0.26	9.1	A
Hoolako Street, Southbound Right	0.06	5.4	A	0.08	7.8	A	0.08	7.6	A	0.08	7.6	A

PM Peak Hour	Existing			Baseline			Network A			Network B		
Intersection, Approach and Movement	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	0.64	13.0	B	0.99	25.0	C	0.95	25.0	C	0.95	25.0	C
Rice Street, Eastbound Left, Thru & Right	0.91	17.5	B	1.36	34.5	C	1.36	34.5	C	1.36	34.5	C
Rice Street, Westbound Left, Thru & Right	0.53	10.6	B	0.70	11.5	B	0.70	11.5	B	0.70	11.5	B
Hoolako Street, Northbound Left & Thru	0.25	9.1	A	0.52	16.6	B	0.52	16.6	B	0.52	16.6	B
Hoolako Street, Northbound Right	0.05	7.6	A	0.07	9.8	A	0.07	9.8	A	0.07	9.8	A
Hoolako Street, Southbound Left & Thru	0.48	12.1	B	0.93	43.6	D	0.93	43.6	D	0.93	43.6	D
Hoolako Street, Southbound Right	0.07	7.7	A	0.09	10.0	A	0.09	10.0	A	0.09	10.0	A

NOTES:
1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 7 Levels-of-Service Analysis at Rice Street & Kapule Highway

AM Peak Hour	Unsignalized						Signalized					
	Existing			Baseline			Network A			Network B		
Intersection, Approach and Movement	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			0.51	15.5	B	0.51	15.5	B
Rice Street, Eastbound Left		8.9	A		11.2	B	0.71	25.0	C	0.71	25.0	C
Rice Street, Eastbound Thru												
Rice Street, Eastbound Right							0.15	17.1	B	0.15	17.1	B
Rice Street, Westbound Thru & Right												
Kapule Highway, Northbound Left							0.68	26.0	C	0.68	26.0	C
Kapule Highway, Northbound Thru							0.22	5.1	A	0.22	5.1	A
Kapule Highway, Southbound Left		47.8	E		163.6	F						
Kapule Highway, Southbound Thru							0.26	14.2	B	0.26	14.2	B
Kapule Highway, Southbound Right		9.9	A		11.5	B	0.15	13.7	B	0.15	13.7	B
PM Peak Hour	Unsignalized						Signalized					
	Existing			Baseline			Network A			Network B		
Intersection, Approach and Movement	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			0.86	24.2	C	0.86	24.2	C
Rice Street, Eastbound Left		12.1	B		20.9	C	0.88	38.3	D	0.88	38.3	D
Rice Street, Eastbound Thru												
Rice Street, Eastbound Right							0.62	22.5	C	0.62	22.5	C
Rice Street, Westbound Thru & Right												
Kapule Highway, Northbound Left							0.87	42.5	D	0.87	42.5	D
Kapule Highway, Northbound Thru							0.34	7.2	A	0.34	7.2	A
Kapule Highway, Southbound Left		>999.9	F		>999.9	F						
Kapule Highway, Southbound Thru							0.82	27.9	C	0.82	27.9	C
Kapule Highway, Southbound Right		12.8	B		19.2	C	0.29	18.7	B	0.29	18.7	B

NOTES:
1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 8 Levels-of-Service Analysis at Hardy Street & Kuhio Highway

AM Peak Hour	Unsignalized						Signalized					
	Existing			Baseline			Network A			Network B		
Intersection, Approach and Movement	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			0.85	24.6	C	0.75	21.9	C
Hardy Street, Westbound Left		401.8	F		>999.9	F	0.49	36.2	D	0.49	36.2	D
Hardy Street, Westbound Right		13.6	B		20.8	C	0.21	33.8	C	0.21	33.8	C
Kuhio Highway, Northbound Thru & Right							0.91	33.2	C	0.72	23.8	C
Kuhio Highway, Southbound Left		14.0	B		64.2	F	0.92	49.5	D	0.89	42.9	D
Kuhio Highway, Southbound Thru							0.50	4.0	A	0.35	3.1	A
PM Peak Hour	Unsignalized						Signalized					
	Existing			Baseline			Network A			Network B		
Intersection, Approach and Movement	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			0.90	25.5	C	0.83	21.1	C
Hardy Street, Westbound Left		751.9	F		>999.9	F	0.86	49.5	D	0.77	34.9	C
Hardy Street, Westbound Right		23.1	C		94.3	F	0.55	30.9	C	0.37	23.7	C
Kuhio Highway, Northbound Thru & Right							0.91	30.0	C	0.84	25.4	C
Kuhio Highway, Southbound Left		13.5	B		27.6	D	0.91	55.7	E	0.86	42.6	D
Kuhio Highway, Southbound Thru							0.55	6.5	A	0.50	6.4	A

NOTES:

1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 9 Levels-of-Service Analysis at Hardy Street & Akahi Street - Unsignalized

AM Peak Hour Intersection, Approach and Movement	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			See Note 4			See Note 4		
Hardy Street, Eastbound Left								8.1	A		8.1	A
Hardy Street, Eastbound Left & Thru		7.8	A		8.1	A						
Hardy Street, Westbound Left								9.4	A		9.4	A
Akahi Street, Northbound Left, Thru & Right								200.8	F		200.8	F
Akahi Street, Southbound Left, Thru & Right								147.7	F		147.7	F
Akahi Street, Southbound Left		15.4	C		31.2	D						
Akahi Street, Southbound Right		9.7	A		10.7	B						

PM Peak Hour Intersection, Approach and Movement	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			See Note 4			See Note 4		
Hardy Street, Eastbound Left								9.0	A		9.0	A
Hardy Street, Eastbound Left & Thru		8.1	A		9.0	A						
Hardy Street, Westbound Left								9.1	A		9.1	A
Akahi Street, Northbound Left, Thru & Right									F			F
Akahi Street, Southbound Left, Thru & Right								774.5	F		774.5	F
Akahi Street, Southbound Left		23.4	C		133.0	F						
Akahi Street, Southbound Right		10.5	B		13.6	B						

NOTES:
1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 10 Levels-of-Service Analysis at Eiwa Street & Hardy Street - Unsignalized

AM Peak Hour Intersection, Approach and Movement	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4								
Hardy Street, Westbound Left & Thru		9.6	A		12.5	B	DELETED			DELETED		
Eiwa Street, Northbound Left		39.3	E		338.6	F						
Eiwa Street, Northbound Right		14.1	B		25.1	D						
PM Peak Hour Intersection, Approach and Movement	**Existing**			**Baseline**								
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS						
	See Note 4			See Note 4								
Hardy Street, Westbound Left & Thru		8.9	A		9.9	A	DELETED			DELETED		
Eiwa Street, Northbound Left		34.6	D		325.2	F						
Eiwa Street, Northbound Right		13.8	B		19.8	C						

NOTES:

1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 11 Levels-of-Service Analysis Elua Street at Hardy Street - Unsignalized

AM Peak Hour Intersection, Approach and Movement	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			See Note 4			See Note 4		
Hardy Street, Eastbound Left & Thru		8.2	A		8.8	A		8.8	A		8.8	A
Elua Street, Southbound Left & Right		16.2	C		40.0	E		40.0	E		40.0	E

PM Peak Hour Intersection, Approach and Movement	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			See Note 4			See Note 4		
Hardy Street, Eastbound Left & Thru		8.2	A		9.3	A		9.3	A		9.3	A
Elua Street, Southbound Left & Right		16.2	C		44.5	E		44.5	E		44.5	E

NOTES:
1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 12 Levels-of-Service Analysis at Hardy Street & Umi Street - Unsignalized

AM Peak Hour Intersection, Approach and Movement	Existing			Baseline			Roundabout Network A			Roundabout Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			0.86		D	0.86		D
Hardy Street, Eastbound Left, Thru & Right		7.8	A		8.1	A	0.89		D	0.89		D
Hardy Street, Westbound Left, Thru & Right		8.4	A		9.7	A	0.44		A	0.44		A
Umi Street, Northbound Left, Thru & Right		64.4	F			F	0.39		A	0.39		A
Umi Street, Southbound Left, Thru & Right		26.1	D		375.5	F	0.40		A	0.40		A

PM Peak Hour Intersection, Approach and Movement	Existing			Baseline			Roundabout Network A			Roundabout Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			0.60		B	0.60		B
Hardy Street, Eastbound Left, Thru & Right		7.9	A		8.9	A	0.63		B	0.63		B
Hardy Street, Westbound Left, Thru & Right		8.1	A		8.5	A	0.63		B	0.63		B
Umi Street, Northbound Left, Thru & Right		55.1	F		846.8	F	0.37		A	0.37		A
Umi Street, Southbound Left, Thru & Right		18.0	C			F	0.21		A	0.21		A

NOTES:

1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 13 Levels-of-Service Analysis at Ahukini Road & Kuhio Highway - Signalized

AM Peak Hour	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Intersection, Approach and Movement	0.67	16.2	B	1.10	69.3	E	0.64	15.5	B	0.50	23.4	C
Ahukini Road, Eastbound Left							0.88	35.2	D	0.87	125.6	F
Ahukini Road, Eastbound Thru							0.21	37.5	D	0.21	32.9	C
Ahukini Road, Eastbound Right	0.01	46.1	D	0.02	72.9	E	0.32	40.3	D	0.02	30.9	D
Ahukini Road, Westbound Left	0.93	72.7	E	1.31	222.7	F	0.83	25.6	C	0.90	47.7	C
Ahukini Road, Westbound Thru							0.11	25.5	C	0.13	24.9	C
Ahukini Road, Westbound Thru & Right	0.11	28.9	C	0.19	48.3	D						
Ahukini Road, Westbound Right							0.10	25.5	C	0.10	24.8	C
Kuhio Highway, Northbound Left, Thru & Right				0.53	9.9	A						
Kuhio Highway, Northbound Left							0.13	11.6	B	1.38	393.6	F
Kuhio Highway, Northbound Thru							0.46	12.9	B	0.41	15.9	B
Kuhio Highway, Northbound Thru & Right	0.37	5.9	A									
Kuhio Highway, Northbound Right							0.24	11.3	B	0.24	14.9	B
Kuhio Highway, Southbound Left, Thru & Right	0.65	9.2	A	1.10	77.0	E						
Kuhio Highway, Southbound Left							0.44	6.5	A	0.53	23.8	C
Kuhio Highway, Southbound Thru & Right							0.61	8.0	A	0.47	8.5	A

PM Peak Hour	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Intersection, Approach and Movement	0.82	24.4	C	1.15	72.4	E	0.76	26.2	C	0.70	26.5	C
Ahukini Road, Eastbound Left							1.10	279.3	C	0.79	126.9	F
Ahukini Road, Eastbound Thru							0.28	41.5	D	0.36	43.9	D
Ahukini Road, Eastbound Right	0.02	52.9	D	0.02	66.7	E	0.02	39.6	D	0.02	40.9	D
Ahukini Road, Westbound Left	1.03	107.1	F	1.30	214.7	F	0.93	62.2	B	0.91	58.1	E
Ahukini Road, Westbound Thru							0.09	30.0	A	0.10	31.2	C
Ahukini Road, Westbound Thru & Right	0.48	38.3	D	0.84	58.0	E						
Ahukini Road, Westbound Right							0.56	35.3	A	0.22	32.1	C
Kuhio Highway, Northbound Left, Thru & Right				0.81	23.1	B						
Kuhio Highway, Northbound Left							0.09	11.5	C	0.51	53.3	D
Kuhio Highway, Northbound Thru							0.78	22.7	D	0.68	22.5	C
Kuhio Highway, Northbound Thru & Right	0.58	9.1	A									
Kuhio Highway, Northbound Right							0.26	14.5	C	0.26	16.8	B
Kuhio Highway, Southbound Left, Thru & Right	1.07dl	16.2	B	3.40dl	120.7	F						
Kuhio Highway, Southbound Left							0.71	28.6	E	0.68	39.7	D
Kuhio Highway, Southbound Thru & Right							0.53	11.5	B	0.43	10.1	B

NOTES:

1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 14 Levels-of-Service Analysis at Ahukini Road & Akahi Street - Unsignalized

AM Peak Hour Intersection, Approach and Movement	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			See Note 4			See Note 4		
Ahukini Road, Westbound Left & Thru		8.3	A		9.3	A						
Akahi Street, Northbound Left & Right		17.9	C		37.4	E						
Akahi Street, Northbound Right								12.1	B		12.1	B

PM Peak Hour Intersection, Approach and Movement	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			See Note 4			See Note 4		
Ahukini Road, Westbound Left & Thru		8.7	A		9.6	A						
Akahi Street, Northbound Left & Right		19.5	C		51.1	F						
Akahi Street, Northbound Right								12.0	B		12.0	B

NOTES:

1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 15 Levels-of-Service Analysis at Ahukini Road & Elua Street - Unsignalized

AM Peak Hour Intersection, Approach and Movement	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			See Note 4			See Note 4		
Ahukini Road, Westbound Left & Thru		8.4	A		9.4	A						
Elua Street, Northbound Left & Right		23.6	C		86.9	F	DELETED			DELETED		

PM Peak Hour Intersection, Approach and Movement	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			See Note 4			See Note 4		
Ahukini Road, Westbound Left & Thru		8.4	A		9.0	A						
Elua Street, Northbound Left & Right		29.2	D		201.5	D	DELETED			DELETED		

NOTES:

1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 16 Levels-of-Service Analysis at Ahukini Road & Umi Street - Unsignalized - Signalized

AM Peak Hour Intersection, Approach and Movement	Unsignalized						Signalized					
	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			0.52	14.9	B	0.52	14.9	B
Ahukini Road, Eastbound Left							0.50	26.4	C	0.50	26.4	C
Ahukini Road, Eastbound Thru & Right							0.58	14.5	B	0.58	14.5	B
Ahukini Road, Westbound Left							0.67	26.4	C	0.67	26.4	C
Ahukini Road, Westbound Left & Thru	See Note 4	8.6	A	See Note 4	9.9	A						
Ahukini Road, Westbound Thru & Right							0.59	12.7	B	0.59	12.7	B
Umi Street, Northbound Left		76.6	F		750.2	F	0.37	14.3	B	0.37	14.3	B
Umi Street, Northbound Thru & Right		10.9	B		13.5	B	0.13	11.3	B	0.13	11.3	B
Umi Street, Southbound Left							0.12	11.4	B	0.12	11.4	B
Umi Street, Southbound Thru & Right							0.12	11.2	B	0.12	11.2	B

PM Peak Hour Intersection, Approach and Movement	Unsignalized						Signalized					
	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			0.48	15.3	B	0.48	15.3	B
Ahukini Road, Eastbound Left							0.52	25.5	C	0.52	25.5	C
Ahukini Road, Eastbound Thru & Right							0.67	16.1	B	0.67	16.1	B
Ahukini Road, Westbound Left							0.48	22.5	C	0.48	22.5	C
Ahukini Road, Westbound Left & Thru	See Note 4	8.8	A	See Note 4	9.8	A						
Ahukini Road, Westbound Thru & Right							0.67	14.9	C	0.67	14.9	C
Umi Street, Northbound Left		59.6	F		541.5	F	0.38	13.6	D	0.38	13.6	D
Umi Street, Northbound Thru & Right		14.0	B		21.5	C	0.38	12.0	B	0.38	12.0	B
Umi Street, Southbound Left							0.25	12.5	B	0.25	12.5	B
Umi Street, Southbound Thru & Right							0.10	10.5	B	0.10	10.5	B

NOTES:
1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 17 Levels-of-Service Analysis at Ahukini Road & Palai Street - Unsignalized

AM Peak Hour Intersection, Approach and Movement	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			See Note 4			See Note 4		
Ahukini Road, Westbound Left & Thru		8.3	A		9.6	A		9.6	A		9.6	A
Palai Street, Northbound Left		30.4	D		158.7	F		64.0	F		64.0	F
Palai Street, Northbound Right		10.8	B		14.1	B		11.0	B		11.0	B

PM Peak Hour Intersection, Approach and Movement	Existing			Baseline			Network A			Network B		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	See Note 4			See Note 4			See Note 4			See Note 4		
Ahukini Road, Westbound Left & Thru		8.9	A		9.8	A		9.8	A		9.8	A
Palai Street, Northbound Left		29.3	D		98.3	F		47.4	E		47.4	E
Palai Street, Northbound Right		12.8	B		16.3	C		11.8	B		11.8	B

NOTES:

1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 18 Levels-of-Service Analysis at Ahukini Road & Kapule Highway - Signalized

AM Peak Hour	Existing			Baseline			Network A			Network B		
Intersection, Approach and Movement	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	0.75	39.8	D	0.93	56.6	E	0.78	33.8	C	0.74	34.8	C
Ahukini Road, Eastbound Left	1.48	278.0	F	0.98	92.1	F	0.66	45.5	D	0.87	59.7	E
Ahukini Road, Eastbound Thru	0.57	26.5	C	0.86	60.2	E	0.65	41.6	D	0.56	37.6	D
Ahukini Road, Eastbound Right	0.06	22.0	C	0.08	35.1	D	0.08	44.8	D	0.08	34.0	C
Ahukini Road, Westbound Left	0.87	67.7	E	0.96	84.4	F	0.90	65.1	E	0.90	65.1	E
Ahukini Road, Westbound Thru	0.54	25.7	C	1.01	91.7	F	0.55	34.9	D	0.68	40.8	D
Ahukini Road, Westbound Right	0.03	21.8	C	0.04	33.9	C	0.04	31.0	C	0.04	33.6	C
Kapule Highway, Northbound Left	0.46	24.6	C	0.92	96.2	F	0.62	43.1	D	0.70	49.5	D
Kapule Highway, Northbound Thru	0.53	17.7	B	0.71	32.3	C	0.37	21.1	C	0.39	22.1	C
Kapule Highway, Northbound Right	0.09	12.5	B	0.16	21.1	C	0.16	19.1	B	0.16	19.9	B
Kapule Highway, Southbound Left	0.41	21.5	C	0.84	66.0	E	0.71	44.5	D	0.73	46.5	D
Kapule Highway, Southbound Thru	0.75	20.9	C	1.02	64.7	E	0.56	21.6	C	0.56	22.0	C
Kapule Highway, Southbound Right	0.37	13.3	B	0.80	34.5	C	0.83	35.5	D	0.80	33.6	C

PM Peak Hour	Existing			Baseline			Network A			Network B		
Intersection, Approach and Movement	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	0.97	51.6	D	1.28	124.6	F	0.74	34.5	C	0.74	34.5	C
Ahukini Road, Eastbound Left	1.08	97.1	F	1.38	238.0	F	0.94	49.5	D	0.94	49.5	D
Ahukini Road, Eastbound Thru	0.31	26.1	C	0.79	56.3	E	0.65	32.4	C	0.65	32.4	C
Ahukini Road, Eastbound Right	0.04	23.9	C	0.07	39.3	D	0.05	26.9	C	0.05	26.9	C
Ahukini Road, Westbound Left	0.71	46.1	D	0.99	112.7	F	0.85	49.4	D	0.85	49.4	D
Ahukini Road, Westbound Thru	0.78	50.1	D	1.20	182.5	F	0.65	34.3	C	0.65	34.3	C
Ahukini Road, Westbound Right	0.10	33.1	C	0.47	58.6	E	0.22	29.9	C	0.22	29.9	C
Kapule Highway, Northbound Left	0.72	51.8	D	0.98	125.4	F	0.75	45.3	D	0.75	45.3	D
Kapule Highway, Northbound Thru	0.98	62.1	E	1.23	161.7	F	0.80	31.8	C	0.80	31.8	C
Kapule Highway, Northbound Right	0.12	21.3	C	0.45	37.3	D	0.25	22.0	C	0.25	22.0	C
Kapule Highway, Southbound Left	0.71	57.4	E	1.33	270.0	F	0.69	43.7	D	0.69	43.7	D
Kapule Highway, Southbound Thru	0.68	34.4	C	0.86	61.0	E	0.53	26.3	C	0.53	26.3	C
Kapule Highway, Southbound Right	0.18	24.2	C	0.35	39.6	D	0.23	23.3	C	0.23	23.3	C

NOTES:

1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

Intersection 19 Levels-of-Service Analysis at Ka Ana Street & Kapule Highway - Signalized

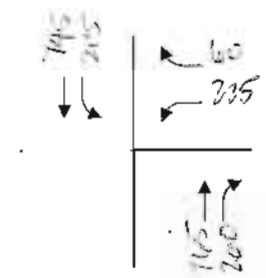
AM Peak Hour	Existing			Baseline			Network A			Network B		
Intersection, Approach and Movement	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	0.45	3.5	A	0.69	10.3	A	0.59	31.5	C	0.59	31.5	C
Ka Ana Street, Eastbound Left	0.25	46.9	D	0.35	28.9	C	0.34	19.5	B	0.34	19.5	B
Ka Ana Street, Eastbound Right	0.00	44.2	D	0.01	26.8	C	0.01	17.9	B	0.01	17.9	B
Kapule Highway, Northbound Left	0.40	54.2	D	0.82	84.1	F	1.41	236.3	F	1.41	236.3	F
Kapule Highway, Northbound Thru	0.32	1.4	A	0.53	4.2	A	0.30	2.7	A	0.30	2.7	A
Kapule Highway, Southbound Thru	0.45	3.2	A	0.74	10.9	B	0.50	7.6	A	0.50	7.6	A
Kapule Highway, Southbound Right	0.03	1.5	A	0.14	4.1	A	0.03	5.1	A	0.03	5.1	A

PM Peak Hour	Existing			Baseline			Network A			Network B		
Intersection, Approach and Movement	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS
	0.60	5.8	A	0.96	32.3	C	0.60	9.3	B	0.60	9.3	B
Ka Ana Street, Eastbound Left	0.33	40.9	D	0.69	29.2	C	0.63	22.1	C	0.63	22.1	C
Ka Ana Street, Eastbound Right	0.01	38.5	D	0.04	20.4	C	0.04	16.3	B	0.04	16.3	B
Kapule Highway, Northbound Left	0.42	54.2	D	0.50	47.9	D	0.41	35.8	D	0.41	35.8	D
Kapule Highway, Northbound Thru	0.62	4.3	A	1.03	45.2	D	0.58	7.0	A	0.58	7.0	A
Kapule Highway, Southbound Thru	0.42	4.1	A	0.78	15.3	B	0.46	8.4	A	0.46	8.4	A
Kapule Highway, Southbound Right	0.01	2.2	A	0.01	5.3	A	0.03	5.9	A	0.03	5.9	A

NOTES:
1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. Volume-to-capacity ratios are not calculated for unsignalized intersections. Overall intersection delays and levels-of-service are also not calculated for unsignalized intersections.

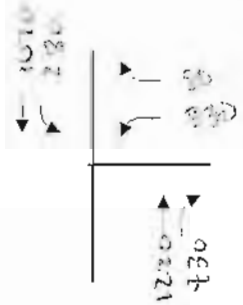
APPENDIX C
LEVEL-OF-SERVICE ANALYSIS WORKSHEETS

#1 - Kuhio Hwy at Rice St.



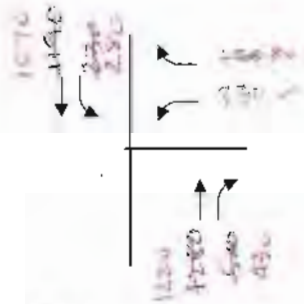
CASE 1.1 AM

Existing AM



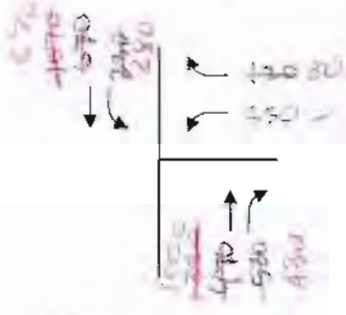
CASE

Baseline AM



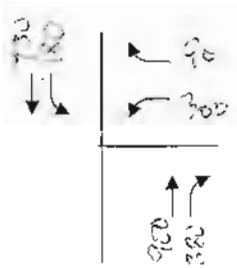
CASE

Network A AM



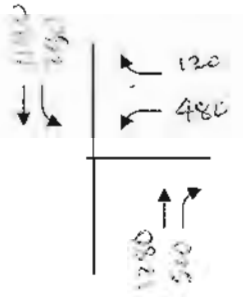
CASE

Network B AM



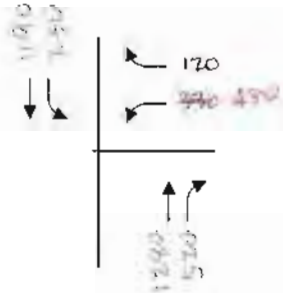
CASE 1.1 PM

Existing PM



CASE

Baseline PM



CASE

Network A PM

CASE

Network B PM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	3539
Volume (vph)	225	60	765	260	215	745
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	245	65	832	283	234	810
RTOR Reduction (vph)	0	51	0	0	0	0
Lane Group Flow (vph)	245	14	832	283	234	810
Turn Type		Perm		Free	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		Free		
Actuated Green, G (s)	12.4	12.4	21.0	56.6	11.2	36.2
Effective Green, g (s)	12.4	12.4	21.0	56.6	11.2	36.2
Actuated g/C Ratio	0.22	0.22	0.37	1.00	0.20	0.64
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	388	347	1313	1583	350	2263
v/s Ratio Prot	c0.14		c0.24		c0.13	0.23
v/s Ratio Perm		0.01		0.18		
v/c Ratio	0.63	0.04	0.63	0.18	0.67	0.36
Uniform Delay, d1	20.0	17.4	14.6	0.0	21.0	4.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.3	0.0	2.3	0.2	4.8	0.4
Delay (s)	23.4	17.5	17.0	0.2	25.8	5.2
Level of Service	C	B	B	A	C	A
Approach Delay (s)	22.1		12.7			9.8
Approach LOS	C		B			A

Intersection Summary			
HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	56.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	3539
Volume (vph)	330	80	1220	430	280	1070
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	359	87	1326	467	304	1163
RTOR Reduction (vph)	0	65	0	0	0	0
Lane Group Flow (vph)	359	22	1326	467	304	1163
Turn Type		Perm		Free	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		Free		
Actuated Green, G (s)	14.7	14.7	19.7	58.8	12.4	36.1
Effective Green, g (s)	14.7	14.7	19.7	58.8	12.4	36.1
Actuated g/C Ratio	0.25	0.25	0.34	1.00	0.21	0.61
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	443	396	1186	1583	373	2173
v/s Ratio Prot	c0.20		c0.37		c0.17	0.33
v/s Ratio Perm		0.01		0.29		
v/c Ratio	0.81	0.05	1.12	0.30	0.82	0.54
Uniform Delay, d1	20.7	16.8	19.5	0.0	22.1	6.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.7	0.1	64.9	0.5	12.8	0.9
Delay (s)	31.5	16.8	84.4	0.5	34.9	7.5
Level of Service	C	B	F	A	C	A
Approach Delay (s)	28.6		62.6			13.2
Approach LOS	C		E			B

Intersection Summary			
HCM Average Control Delay	38.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	58.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	3539
Volume (vph)	330	80	1220	430	280	1070
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	359	87	1326	467	304	1163
RTOR Reduction (vph)	0	68	0	0	0	0
Lane Group Flow (vph)	359	19	1326	467	304	1163
Turn Type		Perm		Free	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		Free		
Actuated Green, G (s)	16.7	16.7	32.0	74.7	14.0	50.0
Effective Green, g (s)	16.7	16.7	32.0	74.7	14.0	50.0
Actuated g/C Ratio	0.22	0.22	0.43	1.00	0.19	0.67
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	396	354	1516	1583	332	2369
v/s Ratio Prot	c0.20		c0.37		c0.17	0.33
v/s Ratio Perm		0.01		0.29		
v/c Ratio	0.91	0.05	0.87	0.30	0.92	0.49
Uniform Delay, d1	28.2	22.8	19.5	0.0	29.8	6.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	23.7	0.1	7.3	0.5	28.7	0.7
Delay (s)	51.9	22.9	26.8	0.5	58.5	6.8
Level of Service	D	C	C	A	E	A
Approach Delay (s)	46.3		20.0			17.5
Approach LOS	D		B			B

Intersection Summary			
HCM Average Control Delay	22.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	74.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	3539
Volume (vph)	330	80	1000	430	280	670
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	359	87	1087	467	304	728
RTOR Reduction (vph)	0	65	0	0	0	0
Lane Group Flow (vph)	359	22	1087	467	304	728
Turn Type		Perm		Free	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		Free		
Actuated Green, G (s)	14.7	14.7	19.7	58.8	12.4	36.1
Effective Green, g (s)	14.7	14.7	19.7	58.8	12.4	36.1
Actuated g/C Ratio	0.25	0.25	0.34	1.00	0.21	0.61
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	443	396	1186	1583	373	2173
v/s Ratio Prot	c0.20		c0.31		c0.17	0.21
v/s Ratio Perm		0.01		0.29		
v/c Ratio	0.81	0.05	0.92	0.30	0.82	0.34
Uniform Delay, d1	20.7	16.8	18.8	0.0	22.1	5.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.7	0.1	12.5	0.5	12.8	0.4
Delay (s)	31.5	16.8	31.3	0.5	34.9	5.9
Level of Service	C	B	C	A	C	A
Approach Delay (s)	28.6		22.0			14.5
Approach LOS	C		C			B

Intersection Summary			
HCM Average Control Delay	20.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	58.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	3539
Volume (vph)	300	90	900	380	180	730
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	326	98	978	413	196	793
RTOR Reduction (vph)	0	75	0	0	0	0
Lane Group Flow (vph)	326	23	978	413	196	793
Turn Type		Perm		Free	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		Free		
Actuated Green, G (s)	14.2	14.2	24.3	59.9	9.4	37.7
Effective Green, g (s)	14.2	14.2	24.3	59.9	9.4	37.7
Actuated g/C Ratio	0.24	0.24	0.41	1.00	0.16	0.63
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	420	375	1436	1583	278	2227
v/s Ratio Prot	c0.18		c0.28		c0.11	0.22
v/s Ratio Perm		0.01		0.26		
v/c Ratio	0.78	0.06	0.68	0.26	0.71	0.36
Uniform Delay, d1	21.4	17.7	14.6	0.0	23.9	5.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.7	0.1	2.6	0.4	7.9	0.4
Delay (s)	30.1	17.8	17.2	0.4	31.8	5.7
Level of Service	C	B	B	A	C	A
Approach Delay (s)	27.2		12.2			10.9
Approach LOS	C		B			B

Intersection Summary			
HCM Average Control Delay	14.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	59.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	3539
Volume (vph)	480	120	1280	520	230	1190
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	522	130	1391	565	250	1293
RTOR Reduction (vph)	0	95	0	0	0	0
Lane Group Flow (vph)	522	35	1391	565	250	1293
Turn Type		Perm		Free	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		Free		
Actuated Green, G (s)	16.0	16.0	20.2	60.0	11.8	36.0
Effective Green, g (s)	16.0	16.0	20.2	60.0	11.8	36.0
Actuated g/C Ratio	0.27	0.27	0.34	1.00	0.20	0.60
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	472	422	1191	1583	348	2123
v/s Ratio Prot	c0.29		c0.39		c0.14	0.37
v/s Ratio Perm		0.02		0.36		
v/c Ratio	1.11	0.08	1.17	0.36	0.72	0.61
Uniform Delay, d1	22.0	16.5	19.9	0.0	22.5	7.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	73.5	0.1	84.9	0.6	6.9	1.3
Delay (s)	95.5	16.6	104.8	0.6	29.5	8.9
Level of Service	F	B	F	A	C	A
Approach Delay (s)	79.8		74.7			12.2
Approach LOS	E		E			B

Intersection Summary			
HCM Average Control Delay	52.3	HCM Level of Service	D
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

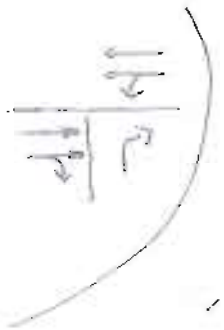
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	3539
Volume (vph)	480	120	1280	520	230	1190
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	522	130	1391	565	250	1293
RTOR Reduction (vph)	0	91	0	0	0	0
Lane Group Flow (vph)	522	39	1391	565	250	1293
Turn Type		Perm		Free	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		Free		
Actuated Green, G (s)	27.0	27.0	38.0	90.0	13.0	55.0
Effective Green, g (s)	27.0	27.0	38.0	90.0	13.0	55.0
Actuated g/C Ratio	0.30	0.30	0.42	1.00	0.14	0.61
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	531	475	1494	1583	256	2163
v/s Ratio Prot	c0.29		c0.39		c0.14	0.37
v/s Ratio Perm		0.02		0.36		
v/c Ratio	0.98	0.08	0.93	0.36	0.98	0.60
Uniform Delay, d1	31.3	22.6	24.8	0.0	38.3	10.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	34.5	0.1	11.8	0.6	49.2	1.2
Delay (s)	65.7	22.7	36.5	0.6	87.6	12.0
Level of Service	E	C	D	A	F	B
Approach Delay (s)	57.2		26.2			24.2
Approach LOS	E		C			C

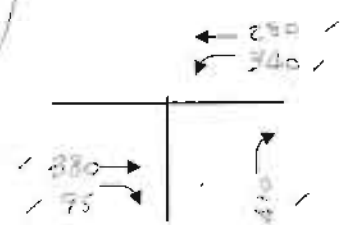
Intersection Summary			
HCM Average Control Delay	30.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	3539
Volume (vph)	480	120	1030	520	230	990
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	522	130	1120	565	250	1076
RTOR Reduction (vph)	0	89	0	0	0	0
Lane Group Flow (vph)	522	41	1120	565	250	1076
Turn Type		Perm		Free	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		Free		
Actuated Green, G (s)	21.8	21.8	25.0	69.8	11.0	40.0
Effective Green, g (s)	21.8	21.8	25.0	69.8	11.0	40.0
Actuated g/C Ratio	0.31	0.31	0.36	1.00	0.16	0.57
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	553	494	1268	1583	279	2028
v/s Ratio Prot	c0.29		c0.32		c0.14	0.30
v/s Ratio Perm		0.03		0.36		
v/c Ratio	0.94	0.08	0.88	0.36	0.90	0.53
Uniform Delay, d1	23.4	16.9	21.0	0.0	28.8	9.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	24.9	0.1	9.1	0.6	28.5	1.0
Delay (s)	48.3	17.0	30.2	0.6	57.3	10.1
Level of Service	D	B	C	A	E	B
Approach Delay (s)	42.1		20.3			19.0
Approach LOS	D		C			B

Intersection Summary			
HCM Average Control Delay	23.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	69.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

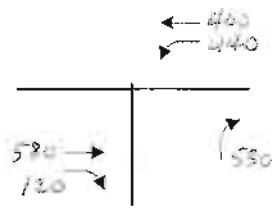
#2 - Holeka St. at Rice Street





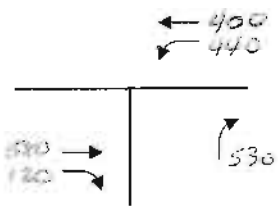
CASE Ex. AM

WB LT	10.2	B
NB R	16.7	C



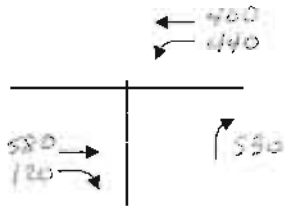
CASE Baseline AM

	13.1	B
	34.2	D



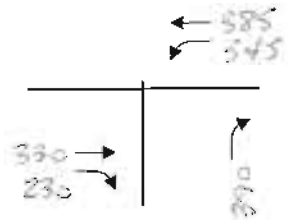
CASE Network A AM

Same



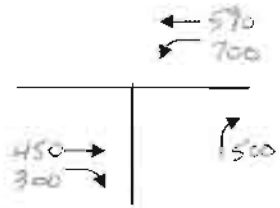
CASE Network B AM

Same



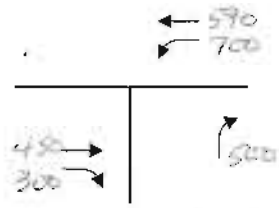
CASE Ex. PM

WB LT	14.1	B
NB R	17.8	C



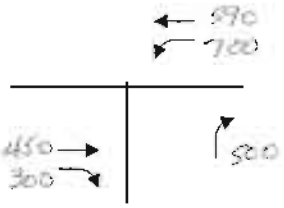
CASE Baseline PM

	27.6	D
	33.2	D



CASE Network A PM

Same



CASE Network B PM

Same

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 2 - Existing.am*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Rice Street* | North/South Street: *Haleko Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*380*	*95*	*340*	*280*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*413*	*103*	*369*	*304*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*0*	*0*	*2*	*0*
Configuration		*T*	*TR*	*LT*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*410*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*445*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*1*	*0*	*0*	*0*
Configuration			*R*			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*			*R*			
v (vph)		*369*			*445*			
C (m) (vph)		*1060*			*747*			
v/c		*0.35*			*0.60*			
95% queue length		*1.57*			*4.00*			
Control Delay		*10.2*			*16.7*			
LOS		*B*			*C*			
Approach Delay	--	--	*16.7*					
Approach LOS	--	--	*C*					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 2 - Baseline.am*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Rice Street*	North/South Street: *Haleko Street*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*580*	*120*	*440*	*400*	*0*
Peak-Hour Factor, PHF	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*
Hourly Flow Rate, HFR	*0*	*597*	*123*	*453*	*412*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*0*	*0*	*2*	*0*
Configuration		*T*	*TR*	*LT*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*530*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*
Hourly Flow Rate, HFR	*0*	*0*	*546*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*1*	*0*	*0*	*0*
Configuration			*R*			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*			*R*			
v (vph)		*453*			*546*			
C (m) (vph)		*891*			*642*			
v/c		*0.51*			*0.85*			
95% queue length		*2.94*			*9.52*			
Control Delay		*13.1*			*34.2*			
LOS		*B*			*D*			
Approach Delay	--	--	*34.2*					
Approach LOS	--	--	*D*					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 2 - Existing.pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Rice Street* | North/South Street: *Haleko Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*330*	*230*	*545*	*385*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*358*	*249*	*592*	*418*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*0*	*0*	*2*	*0*
Configuration		*T*	*TR*	*LT*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*390*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*423*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*1*	*0*	*0*	*0*
Configuration			*R*			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*			*R*			
v (vph)		*592*			*423*			
C (m) (vph)		*981*			*698*			
v/c		*0.60*			*0.61*			
95% queue length		*4.20*			*4.12*			
Control Delay		*14.1*			*17.8*			
LOS		*B*			*C*			
Approach Delay	--	--	*17.8*					
Approach LOS	--	--	*C*					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 2 - Baseline.pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Rice Street* | North/South Street: *Haleko Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

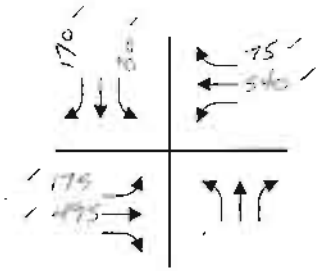
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*450*	*300*	*700*	*590*	*0*
Peak-Hour Factor, PHF	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*
Hourly Flow Rate, HFR	*0*	*463*	*309*	*721*	*608*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*0*	*0*	*2*	*0*
Configuration		*T*	*TR*	*LT*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*500*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*
Hourly Flow Rate, HFR	*0*	*0*	*515*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*1*	*0*	*0*	*0*
Configuration			*R*			

Delay, Queue Length, and Level of Service

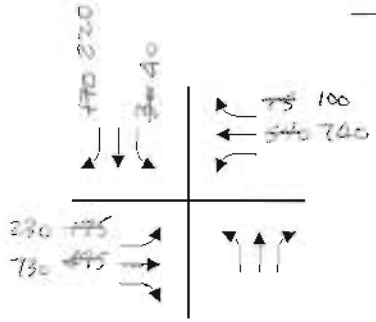
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*			*R*			
v (vph)		*721*			*515*			
C (m) (vph)		*852*			*618*			
v/c		*0.85*			*0.83*			
95% queue length		*10.18*			*8.88*			
Control Delay		*27.6*			*33.2*			
LOS		*D*			*D*			
Approach Delay	--	--	*33.2*					
Approach LOS	--	--	*D*					

#3. Ericson St. at Rice St.



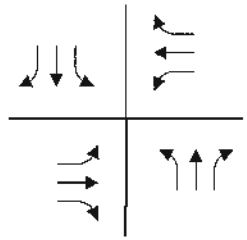
CASE Existing AM

EB	LT	9.8	A
SB	L	42.3	E
SB	R	12.4	B

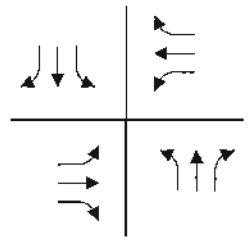


CASE Baseline AM

12.1	B	
200.5	F	
16.2	C	



CASE Network A



CASE Network B

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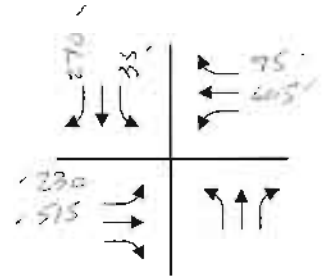
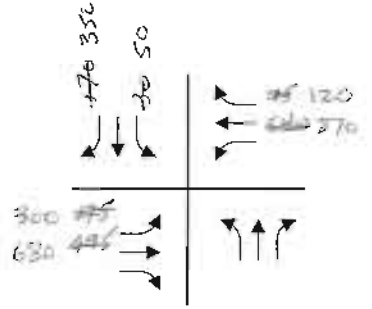


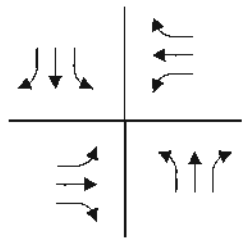
CASE Existing PM

EB	LT	10.9	B
SB	L	77.3	F
SB	R	15.8	C

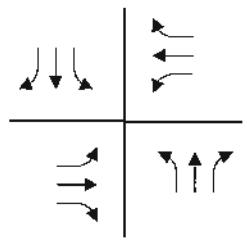


CASE Baseline PM

15.8	C	
819.5	F	
32.8	D	



CASE Network A



CASE Network B

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From M+G Study

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 3 - Existing.am
Jurisdiction	
Analysis Year	

Project Description: *Lihue Urban Core*

East/West Street: *Rice Street* | North/South Street: *Eiwa Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	175	495	0	0	540	75
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	190	538	0	0	586	81
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	0	2	0
Configuration	LT	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	30	0	170
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	0	0	32	0	184
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT					L		R
v (vph)	190					32		184
C (m) (vph)	932					128		668
v/c	0.20					0.25		0.28
95% queue length	0.76					0.93		1.12
Control Delay	9.8					42.3		12.4
LOS	A					E		B
Approach Delay	--	--				16.8		
Approach LOS	--	--				C		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 3 - Baseline.am
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Rice Street* | North/South Street: *Eiwa Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	230	730	0	0	740	100
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	249	793	0	0	804	108
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	0	2	0
Configuration	LT	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	40	0	220
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	0	0	43	0	239
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT					L		R
v (vph)	249					43		239
C (m) (vph)	755					52		557
v/c	0.33					0.83		0.43
95% queue length	1.44					3.49		2.14
Control Delay	12.1					200.5		16.2
LOS	B					F		C
Approach Delay	--	--				44.3		
Approach LOS	--	--				E		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 3 - Existing.pm
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Rice Street* | North/South Street: *Eiwa Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	230	515	0	0	605	95
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	249	559	0	0	657	103
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	0	2	0
Configuration	LT	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	35	0	270
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	0	0	38	0	293
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT					L		R
v (vph)	249					38		293
C (m) (vph)	861					84		624
v/c	0.29					0.45		0.47
95% queue length	1.20					1.87		2.50
Control Delay	10.9					79.3		15.8
LOS	B					F		C
Approach Delay	--	--				23.1		
Approach LOS	--	--				C		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 3 - Baseline.pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Rice Street* | North/South Street: *Eiwa Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

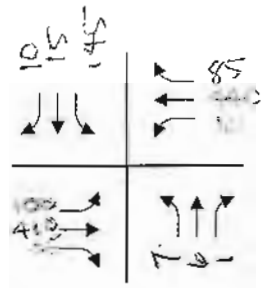
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*300*	*680*	*0*	*0*	*870*	*120*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*326*	*739*	*0*	*0*	*945*	*130*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*0*	*0*	*2*	*0*
Configuration	*LT*	*T*			*T*	*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*50*	*0*	*350*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*54*	*0*	*380*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

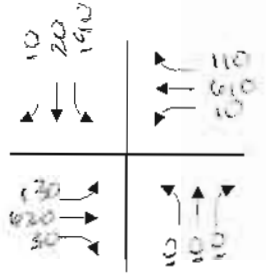
Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*					*L*		*R*
v (vph)	*326*					*54*		*380*
C (m) (vph)	*656*					*26*		*493*
v/c	*0.50*					*2.08*		*0.77*
95% queue length	*2.78*					*6.58*		*6.81*
Control Delay	*15.8*					*819.5*		*32.8*
LOS	*C*					*F*		*D*
Approach Delay	--	--				*130.7*		
Approach LOS	--	--				*F*		

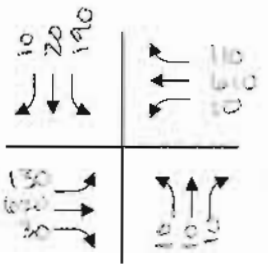
#4 - Uni St at Rice St



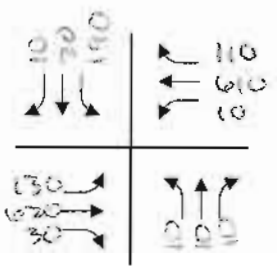
CASE 1.4 pm Existing AM



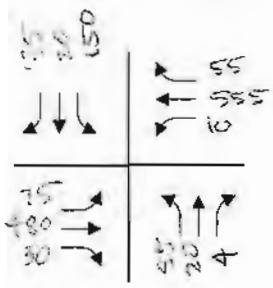
CASE Baseline AM



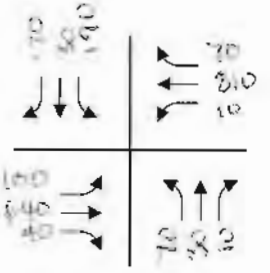
CASE Network A AM



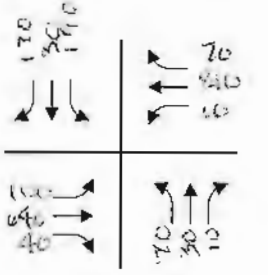
CASE Network B AM



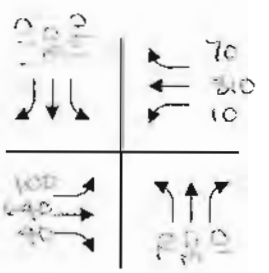
CASE 1.4 pm Existing PM



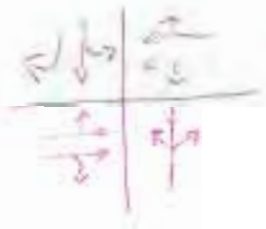
CASE Baseline PM



CASE Network A PM



CASE Network B PM



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		0.95			0.95			1.00			1.00	1.00
Frt		0.99			0.98			0.99			1.00	0.85
Flt Protected		0.99			1.00			0.98			0.96	1.00
Satd. Flow (prot)		3482			3452			1802			1782	1583
Flt Permitted		0.76			0.94			0.90			0.75	1.00
Satd. Flow (perm)		2687			3253			1660			1400	1583
Volume (vph)	100	410	25	10	440	85	7	6	1	145	15	10
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	446	27	11	478	92	8	7	1	158	16	11
RTOR Reduction (vph)	0	10	0	0	42	0	0	1	0	0	0	6
Lane Group Flow (vph)	0	572	0	0	539	0	0	15	0	0	174	5
Turn Type	Perm			Perm			Perm			Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		12.5			12.5			16.1			16.1	16.1
Effective Green, g (s)		12.5			12.5			16.1			16.1	16.1
Actuated g/C Ratio		0.34			0.34			0.44			0.44	0.44
Clearance Time (s)		4.0			4.0			4.0			4.0	4.0
Vehicle Extension (s)		3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)		918			1111			730			616	696
v/s Ratio Prot												
v/s Ratio Perm		c0.21			0.17			0.01			c0.12	0.00
v/c Ratio		0.62			0.49			0.02			0.28	0.01
Uniform Delay, d1		10.1			9.5			5.8			6.6	5.8
Progression Factor		1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2		1.3			0.3			0.1			1.1	0.0
Delay (s)		11.4			9.8			5.8			7.7	5.8
Level of Service		B			A			A			A	A
Approach Delay (s)		11.4			9.8			5.8			7.6	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	10.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	36.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		0.95			0.95			1.00			1.00	1.00
Frt		0.99			0.98			0.95			1.00	0.85
Flt Protected		0.99			1.00			0.98			0.96	1.00
Satd. Flow (prot)		3490			3457			1750			1782	1583
Flt Permitted		0.67			0.94			0.91			0.72	1.00
Satd. Flow (perm)		2368			3257			1618			1346	1583
Volume (vph)	130	620	30	10	610	110	10	10	10	190	20	10
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	674	33	11	663	120	11	11	11	207	22	11
RTOR Reduction (vph)	0	7	0	0	36	0	0	7	0	0	0	7
Lane Group Flow (vph)	0	841	0	0	758	0	0	26	0	0	229	4
Turn Type	Perm			Perm			Perm			Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		15.6			15.6			16.0			16.0	16.0
Effective Green, g (s)		15.6			15.6			16.0			16.0	16.0
Actuated g/C Ratio		0.39			0.39			0.40			0.40	0.40
Clearance Time (s)		4.0			4.0			4.0			4.0	4.0
Vehicle Extension (s)		3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)		933			1283			654			544	640
v/s Ratio Prot												
v/s Ratio Perm		c0.36			0.23			0.02			c0.17	0.00
v/c Ratio		0.90			0.59			0.04			0.42	0.01
Uniform Delay, d1		11.3			9.5			7.1			8.5	7.1
Progression Factor		1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2		11.7			0.7			0.1			2.4	0.0
Delay (s)		23.0			10.2			7.3			10.9	7.1
Level of Service		C			B			A			B	A
Approach Delay (s)		23.0			10.2			7.3			10.7	
Approach LOS		C			B			A			B	

Intersection Summary			
HCM Average Control Delay	15.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	39.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

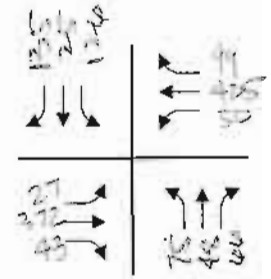
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		0.95			0.95			1.00			1.00	1.00
Frt		0.99			0.99			0.99			1.00	0.85
Flt Protected		0.99			1.00			0.97			0.96	1.00
Satd. Flow (prot)		3489			3489			1787			1784	1583
Flt Permitted		0.81			0.94			0.77			0.71	1.00
Satd. Flow (perm)		2832			3291			1428			1318	1583
Volume (vph)	75	480	30	10	555	55	55	20	5	150	20	135
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	522	33	11	603	60	60	22	5	163	22	147
RTOR Reduction (vph)	0	10	0	0	20	0	0	3	0	0	0	83
Lane Group Flow (vph)	0	627	0	0	654	0	0	84	0	0	185	64
Turn Type	Perm			Perm			Perm			Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		13.0			13.0			16.1			16.1	16.1
Effective Green, g (s)		13.0			13.0			16.1			16.1	16.1
Actuated g/C Ratio		0.35			0.35			0.43			0.43	0.43
Clearance Time (s)		4.0			4.0			4.0			4.0	4.0
Vehicle Extension (s)		3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)		992			1153			620			572	687
v/s Ratio Prot												
v/s Ratio Perm		c0.22			0.20			0.06			c0.14	0.04
v/c Ratio		0.63			0.57			0.14			0.32	0.09
Uniform Delay, d1		10.1			9.8			6.3			6.9	6.2
Progression Factor		1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2		1.3			0.6			0.5			1.5	0.3
Delay (s)		11.4			10.4			6.8			8.4	6.5
Level of Service		B			B			A			A	A
Approach Delay (s)		11.4			10.4			6.8			7.5	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	10.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	37.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

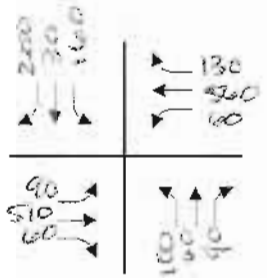
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		0.95			0.95			1.00			1.00	1.00
Frt		0.99			0.99			0.99			1.00	0.85
Flt Protected		0.99			1.00			0.97			0.96	1.00
Satd. Flow (prot)		3490			3496			1783			1786	1583
Flt Permitted		0.67			0.94			0.74			0.67	1.00
Satd. Flow (perm)		2359			3301			1366			1254	1583
Volume (vph)	100	640	40	10	810	70	70	30	10	190	30	170
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	696	43	11	880	76	76	33	11	207	33	185
RTOR Reduction (vph)	0	10	0	0	16	0	0	7	0	0	0	34
Lane Group Flow (vph)	0	838	0	0	951	0	0	113	0	0	240	151
Turn Type	Perm			Perm			Perm			Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		15.6			15.6			16.0			16.0	16.0
Effective Green, g (s)		15.6			15.6			16.0			16.0	16.0
Actuated g/C Ratio		0.39			0.39			0.40			0.40	0.40
Clearance Time (s)		4.0			4.0			4.0			4.0	4.0
Vehicle Extension (s)		3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)		929			1300			552			507	640
v/s Ratio Prot												
v/s Ratio Perm		c0.36			0.29			0.08			c0.19	0.10
v/c Ratio		0.90			0.73			0.21			0.47	0.24
Uniform Delay, d1		11.3			10.2			7.7			8.7	7.8
Progression Factor		1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2		11.8			2.2			0.8			3.1	0.9
Delay (s)		23.1			12.4			8.5			11.8	8.6
Level of Service		C			B			A			B	A
Approach Delay (s)		23.1			12.4			8.5			10.4	
Approach LOS		C			B			A			B	

Intersection Summary			
HCM Average Control Delay	15.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	39.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

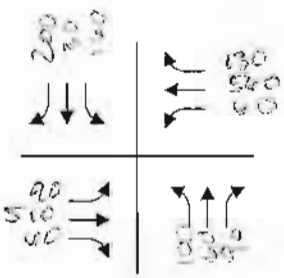
#5 - Kalamath St. at Rice St



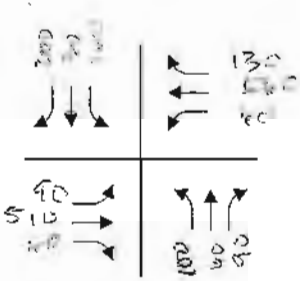
CASE 1.5 pm
Existing AM



CASE Baseline
AM

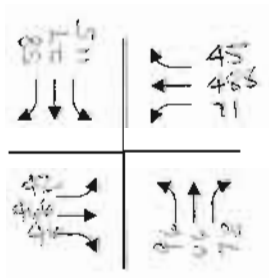


CASE Network A
AM



CASE Network B
PM

Same



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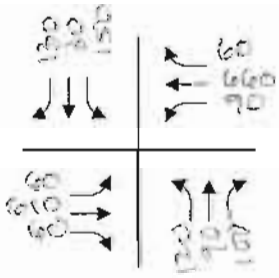
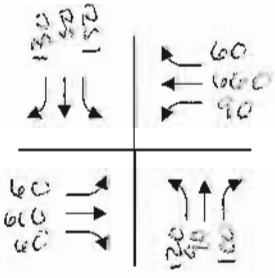
Existing PM



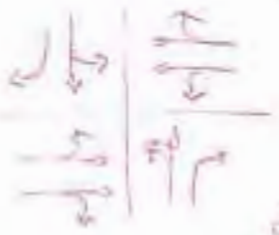
CASE
Baseline
PM



CASE Network A
PM

CASE Network B
PM

Same



2 phase
No Dr LT phase

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	1.00
Frt		0.99			0.97			1.00	0.85		1.00	0.85
Flt Protected		1.00			1.00			0.97	1.00		0.96	1.00
Satd. Flow (prot)		3477			3432			1807	1583		1788	1583
Flt Permitted		0.90			0.88			0.78	1.00		0.71	1.00
Satd. Flow (perm)		3138			3038			1456	1583		1313	1583
Volume (vph)	27	372	43	50	425	99	75	48	66	126	25	135
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	404	47	54	462	108	82	52	72	137	27	147
RTOR Reduction (vph)	0	23	0	0	50	0	0	0	40	0	0	81
Lane Group Flow (vph)	0	457	0	0	574	0	0	134	32	0	164	66
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		11.9			11.9			16.1	16.1		16.1	16.1
Effective Green, g (s)		11.9			11.9			16.1	16.1		16.1	16.1
Actuated g/C Ratio		0.33			0.33			0.45	0.45		0.45	0.45
Clearance Time (s)		4.0			4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1037			1004			651	708		587	708
v/s Ratio Prot												
v/s Ratio Perm		0.15			c0.19			0.09	0.02		c0.12	0.04
v/c Ratio		0.44			0.57			0.21	0.05		0.28	0.09
Uniform Delay, d1		9.4			9.9			6.1	5.6		6.3	5.7
Progression Factor		1.00			1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		0.3			0.8			0.7	0.1		1.2	0.3
Delay (s)		9.7			10.7			6.8	5.7		7.5	6.0
Level of Service		A			B			A	A		A	A
Approach Delay (s)		9.7			10.7			6.4			6.8	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM Average Control Delay	9.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	36.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	1.00
Frt		0.99			0.97			1.00	0.85		1.00	0.85
Flt Protected		0.99			1.00			0.97	1.00		0.96	1.00
Satd. Flow (prot)		3467			3434			1806	1583		1788	1583
Flt Permitted		0.73			0.85			0.74	1.00		0.66	1.00
Satd. Flow (perm)		2531			2944			1370	1583		1225	1583
Volume (vph)	90	510	60	60	560	130	100	60	90	160	30	200
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	554	65	65	609	141	109	65	98	174	33	217
RTOR Reduction (vph)	0	20	0	0	46	0	0	0	57	0	0	85
Lane Group Flow (vph)	0	697	0	0	769	0	0	174	41	0	207	132
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		14.1			14.1			16.1	16.1		16.1	16.1
Effective Green, g (s)		14.1			14.1			16.1	16.1		16.1	16.1
Actuated g/C Ratio		0.37			0.37			0.42	0.42		0.42	0.42
Clearance Time (s)		4.0			4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		934			1087			577	667		516	667
v/s Ratio Prot												
v/s Ratio Perm		c0.28			0.26			0.13	0.03		c0.17	0.08
v/c Ratio		0.75			0.71			0.30	0.06		0.40	0.20
Uniform Delay, d1		10.5			10.3			7.3	6.6		7.7	7.0
Progression Factor		1.00			1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		3.3			2.1			1.3	0.2		2.3	0.7
Delay (s)		13.8			12.4			8.7	6.7		10.0	7.6
Level of Service		B			B			A	A		B	A
Approach Delay (s)		13.8			12.4			8.0			8.8	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	38.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

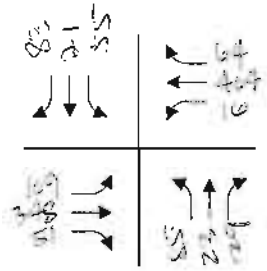
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	1.00
Frt		0.99			0.99			1.00	0.85		1.00	0.85
Flt Protected		1.00			0.99			0.97	1.00		0.96	1.00
Satd. Flow (prot)		3482			3479			1809	1583		1790	1583
Flt Permitted		0.87			0.83			0.77	1.00		0.69	1.00
Satd. Flow (perm)		3058			2905			1443	1583		1291	1583
Volume (vph)	42	466	46	71	488	45	96	66	78	115	27	58
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	46	507	50	77	530	49	104	72	85	125	29	63
RTOR Reduction (vph)	0	18	0	0	16	0	0	0	48	0	0	36
Lane Group Flow (vph)	0	585	0	0	640	0	0	176	37	0	154	27
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		12.9			12.9			16.1	16.1		16.1	16.1
Effective Green, g (s)		12.9			12.9			16.1	16.1		16.1	16.1
Actuated g/C Ratio		0.35			0.35			0.44	0.44		0.44	0.44
Clearance Time (s)		4.0			4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1066			1013			628	689		562	689
v/s Ratio Prot												
v/s Ratio Perm		0.19			c0.22			c0.12	0.02		0.12	0.02
v/c Ratio		0.55			0.63			0.28	0.05		0.27	0.04
Uniform Delay, d1		9.7			10.1			6.7	6.0		6.7	6.0
Progression Factor		1.00			1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		0.6			1.3			1.1	0.1		1.2	0.1
Delay (s)		10.3			11.4			7.8	6.2		7.9	6.1
Level of Service		B			B			A	A		A	A
Approach Delay (s)		10.3			11.4			7.3			7.4	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	37.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	1.00
Frt		0.99			0.99			1.00	0.85		1.00	0.85
Flt Protected		1.00			0.99			0.97	1.00		0.96	1.00
Satd. Flow (prot)		3481			3481			1811	1583		1788	1583
Flt Permitted		0.82			0.77			0.74	1.00		0.63	1.00
Satd. Flow (perm)		2852			2680			1385	1583		1178	1583
Volume (vph)	60	610	60	90	660	60	120	90	100	150	30	130
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	663	65	98	717	65	130	98	109	163	33	141
RTOR Reduction (vph)	0	17	0	0	15	0	0	0	65	0	0	60
Lane Group Flow (vph)	0	776	0	0	865	0	0	228	44	0	196	81
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		15.2			15.2			16.0	16.0		16.0	16.0
Effective Green, g (s)		15.2			15.2			16.0	16.0		16.0	16.0
Actuated g/C Ratio		0.39			0.39			0.41	0.41		0.41	0.41
Clearance Time (s)		4.0			4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1106			1039			565	646		481	646
v/s Ratio Prot												
v/s Ratio Perm		0.27			c0.32			0.16	0.03		c0.17	0.05
v/c Ratio		0.70			0.83			0.40	0.07		0.41	0.13
Uniform Delay, d1		10.1			10.9			8.2	7.1		8.2	7.2
Progression Factor		1.00			1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		2.0			5.8			2.1	0.2		2.5	0.4
Delay (s)		12.1			16.7			10.4	7.3		10.8	7.6
Level of Service		B			B			B	A		B	A
Approach Delay (s)		12.1			16.7			9.4			9.5	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	13.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	39.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

#6 - Hoalako St at Rice St.



CASE 1.0 pm
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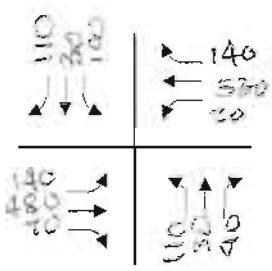
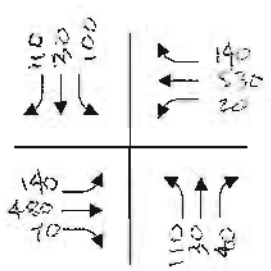
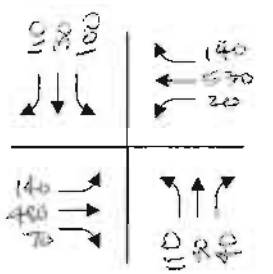


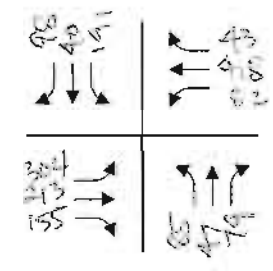
CASE
Baseline AM



CASE
Network A
AM



CASE
Network B
AM



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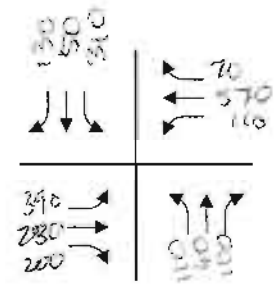
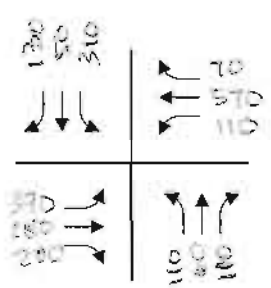
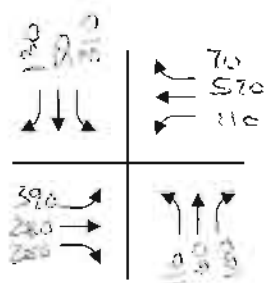


CASE
Baseline PM



CASE
Network A
PM



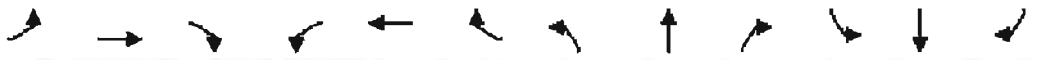
CASE
Network B
PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	1.00
Frt		0.99			0.98			1.00	0.85		1.00	0.85
Flt Protected		0.99			1.00			0.96	1.00		0.97	1.00
Satd. Flow (prot)		3449			3462			1792	1583		1798	1583
Flt Permitted		0.75			0.93			0.78	1.00		0.81	1.00
Satd. Flow (perm)		2621			3222			1459	1583		1507	1583
Volume (vph)	109	348	51	18	404	64	85	23	29	55	21	83
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	118	378	55	20	439	70	92	25	32	60	23	90
RTOR Reduction (vph)	0	22	0	0	33	0	0	0	17	0	0	47
Lane Group Flow (vph)	0	529	0	0	496	0	0	117	15	0	83	43
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		12.6			12.6			19.2	19.2		19.2	19.2
Effective Green, g (s)		11.6			11.6			18.2	18.2		18.2	18.2
Actuated g/C Ratio		0.31			0.31			0.48	0.48		0.48	0.48
Clearance Time (s)		3.0			3.0			3.0	3.0		3.0	3.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		804			989			702	762		726	762
v/s Ratio Prot												
v/s Ratio Perm		c0.20			0.15			c0.08	0.01		0.06	0.03
v/c Ratio		0.66			0.50			0.17	0.02		0.11	0.06
Uniform Delay, d1		11.4			10.7			5.5	5.1		5.4	5.2
Progression Factor		1.00			1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		2.0			0.4			0.5	0.0		0.3	0.1
Delay (s)		13.3			11.1			6.0	5.2		5.7	5.4
Level of Service		B			B			A	A		A	A
Approach Delay (s)		13.3			11.1			5.9			5.5	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	37.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	1.00
Frt		0.98			0.97			1.00	0.85		1.00	0.85
Flt Protected		0.99			1.00			0.96	1.00		0.96	1.00
Satd. Flow (prot)		3450			3427			1792	1583		1794	1583
Flt Permitted		0.67			0.93			0.72	1.00		0.73	1.00
Satd. Flow (perm)		2319			3186			1347	1583		1358	1583
Volume (vph)	140	480	70	20	530	140	110	30	40	100	30	110
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	522	76	22	576	152	120	33	43	109	33	120
RTOR Reduction (vph)	0	20	0	0	54	0	0	0	25	0	0	71
Lane Group Flow (vph)	0	730	0	0	696	0	0	153	18	0	142	49
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		17.9			17.9			18.3	18.3		18.3	18.3
Effective Green, g (s)		16.9			16.9			17.3	17.3		17.3	17.3
Actuated g/C Ratio		0.40			0.40			0.41	0.41		0.41	0.41
Clearance Time (s)		3.0			3.0			3.0	3.0		3.0	3.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		929			1276			552	649		557	649
v/s Ratio Prot												
v/s Ratio Perm		c0.32			0.24			c0.11	0.03		0.10	0.08
v/c Ratio		0.79			0.55			0.28	0.03		0.25	0.08
Uniform Delay, d1		11.1			9.7			8.3	7.4		8.2	7.6
Progression Factor		1.00			1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		4.4			0.5			1.2	0.1		1.1	0.2
Delay (s)		15.5			10.2			9.5	7.5		9.3	7.8
Level of Service		B			B			A	A		A	A
Approach Delay (s)		15.5			10.2			9.1			8.6	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	11.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	42.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	1.00
Frt		0.98			0.97			1.00	0.85		1.00	0.85
Flt Protected		0.99			1.00			0.96	1.00		0.96	1.00
Satd. Flow (prot)		3450			3427			1792	1583		1794	1583
Flt Permitted		0.67			0.93			0.72	1.00		0.73	1.00
Satd. Flow (perm)		2332			3186			1346	1583		1357	1583
Volume (vph)	140	480	70	20	530	140	110	30	40	100	30	110
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	522	76	22	576	152	120	33	43	109	33	120
RTOR Reduction (vph)	0	22	0	0	57	0	0	0	26	0	0	72
Lane Group Flow (vph)	0	728	0	0	693	0	0	153	17	0	142	48
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		16.9			16.9			17.2	17.2		17.2	17.2
Effective Green, g (s)		15.9			15.9			16.2	16.2		16.2	16.2
Actuated g/C Ratio		0.40			0.40			0.40	0.40		0.40	0.40
Clearance Time (s)		3.0			3.0			3.0	3.0		3.0	3.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		925			1263			544	640		548	640
v/s Ratio Prot												
v/s Ratio Perm		c0.31			0.22			c0.11	0.01		0.10	0.03
v/c Ratio		0.79			0.55			0.28	0.03		0.26	0.08
Uniform Delay, d1		10.6			9.3			8.0	7.2		8.0	7.3
Progression Factor		1.00			1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		4.5			0.5			1.3	0.1		1.1	0.2
Delay (s)		15.1			9.8			9.3	7.3		9.1	7.6
Level of Service		B			A			A	A		A	A
Approach Delay (s)		15.1			9.8			8.9			8.4	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	40.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	1.00
Frt		0.98			0.97			1.00	0.85		1.00	0.85
Flt Protected		0.99			1.00			0.96	1.00		0.96	1.00
Satd. Flow (prot)		3450			3427			1792	1583		1794	1583
Flt Permitted		0.67			0.93			0.72	1.00		0.73	1.00
Satd. Flow (perm)		2332			3186			1346	1583		1357	1583
Volume (vph)	140	480	70	20	530	140	110	30	40	100	30	110
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	522	76	22	576	152	120	33	43	109	33	120
RTOR Reduction (vph)	0	22	0	0	57	0	0	0	26	0	0	72
Lane Group Flow (vph)	0	728	0	0	693	0	0	153	17	0	142	48
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		16.9			16.9			17.2	17.2		17.2	17.2
Effective Green, g (s)		15.9			15.9			16.2	16.2		16.2	16.2
Actuated g/C Ratio		0.40			0.40			0.40	0.40		0.40	0.40
Clearance Time (s)		3.0			3.0			3.0	3.0		3.0	3.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		925			1263			544	640		548	640
v/s Ratio Prot												
v/s Ratio Perm		c0.31			0.22			c0.11	0.01		0.10	0.03
v/c Ratio		0.79			0.55			0.28	0.03		0.26	0.08
Uniform Delay, d1		10.6			9.3			8.0	7.2		8.0	7.3
Progression Factor		1.00			1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		4.5			0.5			1.3	0.1		1.1	0.2
Delay (s)		15.1			9.8			9.3	7.3		9.1	7.6
Level of Service		B			A			A	A		A	A
Approach Delay (s)		15.1			9.8			8.9			8.4	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	40.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	1.00
Frt		0.97			0.99			1.00	0.85		1.00	0.85
Flt Protected		0.98			0.99			0.97	1.00		0.96	1.00
Satd. Flow (prot)		3342			3471			1805	1583		1789	1583
Flt Permitted		0.61			0.78			0.73	1.00		0.67	1.00
Satd. Flow (perm)		2090			2740			1362	1583		1249	1583
Volume (vph)	304	213	155	82	418	43	85	47	79	191	40	98
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	330	232	168	89	454	47	92	51	86	208	43	107
RTOR Reduction (vph)	0	65	0	0	15	0	0	0	50	0	0	62
Lane Group Flow (vph)	0	665	0	0	575	0	0	143	36	0	251	45
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		18.1			18.1			19.3	19.3		19.3	19.3
Effective Green, g (s)		17.1			17.1			18.3	18.3		18.3	18.3
Actuated g/C Ratio		0.39			0.39			0.42	0.42		0.42	0.42
Clearance Time (s)		3.0			3.0			3.0	3.0		3.0	3.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		823			1080			574	667		527	667
v/s Ratio Prot												
v/s Ratio Perm		c0.32			0.21			0.10	0.02		c0.20	0.03
v/c Ratio		0.91dl			0.53			0.25	0.05		0.48	0.07
Uniform Delay, d1		11.7			10.1			8.1	7.4		9.1	7.5
Progression Factor		1.00			1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		5.8			0.5			1.0	0.2		3.1	0.2
Delay (s)		17.5			10.6			9.1	7.6		12.1	7.7
Level of Service		B			B			A	A		B	A
Approach Delay (s)		17.5			10.6			8.6			10.8	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	43.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.3%	ICU Level of Service	C
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↑↱			↰↑↑↱			↰↑	↱		↰↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	1.00
Frt		0.97			0.99			1.00	0.85		1.00	0.85
Flt Protected		0.98			0.99			0.97	1.00		0.96	1.00
Satd. Flow (prot)		3342			3464			1804	1583		1786	1583
Flt Permitted		0.57			0.70			0.54	1.00		0.63	1.00
Satd. Flow (perm)		1950			2432			1010	1583		1180	1583
Volume (vph)	390	280	200	110	570	70	110	60	100	310	50	130
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	424	304	217	120	620	76	120	65	109	337	54	141
RTOR Reduction (vph)	0	62	0	0	17	0	0	0	70	0	0	91
Lane Group Flow (vph)	0	883	0	0	799	0	0	185	39	0	391	50
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		22.0			22.0			17.0	17.0		17.0	17.0
Effective Green, g (s)		21.0			21.0			16.0	16.0		16.0	16.0
Actuated g/C Ratio		0.47			0.47			0.36	0.36		0.36	0.36
Clearance Time (s)		3.0			3.0			3.0	3.0		3.0	3.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		910			1135			359	563		420	563
v/s Ratio Prot												
v/s Ratio Perm		c0.48			0.34			0.18	0.07		c0.33	0.09
v/c Ratio		1.36dl			0.70			0.52	0.07		0.93	0.09
Uniform Delay, d1		11.7			9.5			11.4	9.6		14.0	9.6
Progression Factor		1.00			1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		22.8			2.0			5.2	0.2		29.6	0.3
Delay (s)		34.5			11.5			16.6	9.8		43.6	10.0
Level of Service		C			B			B	A		D	A
Approach Delay (s)		34.5			11.5			14.1			34.7	
Approach LOS		C			B			B			C	

Intersection Summary			
HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Baseline

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↑↱			↰↑↑↱			↰↑	↱		↰↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	1.00
Frt		0.97			0.99			1.00	0.85		1.00	0.85
Flt Protected		0.98			0.99			0.97	1.00		0.96	1.00
Satd. Flow (prot)		3342			3464			1804	1583		1786	1583
Flt Permitted		0.57			0.70			0.54	1.00		0.63	1.00
Satd. Flow (perm)		1950			2432			1010	1583		1180	1583
Volume (vph)	390	280	200	110	570	70	110	60	100	310	50	130
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	424	304	217	120	620	76	120	65	109	337	54	141
RTOR Reduction (vph)	0	62	0	0	17	0	0	0	70	0	0	91
Lane Group Flow (vph)	0	883	0	0	799	0	0	185	39	0	391	50
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		22.0			22.0			17.0	17.0		17.0	17.0
Effective Green, g (s)		21.0			21.0			16.0	16.0		16.0	16.0
Actuated g/C Ratio		0.47			0.47			0.36	0.36		0.36	0.36
Clearance Time (s)		3.0			3.0			3.0	3.0		3.0	3.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		910			1135			359	563		420	563
v/s Ratio Prot												
v/s Ratio Perm		c0.45			0.33			0.18	0.02		c0.33	0.03
v/c Ratio		1.36dl			0.70			0.52	0.07		0.93	0.09
Uniform Delay, d1		11.7			9.5			11.4	9.6		14.0	9.6
Progression Factor		1.00			1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		22.8			2.0			5.2	0.2		29.6	0.3
Delay (s)		34.5			11.5			16.6	9.8		43.6	10.0
Level of Service		C			B			B	A		D	A
Approach Delay (s)		34.5			11.5			14.1			34.7	
Approach LOS		C			B			B			C	

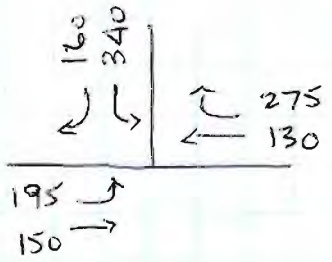
Intersection Summary			
HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

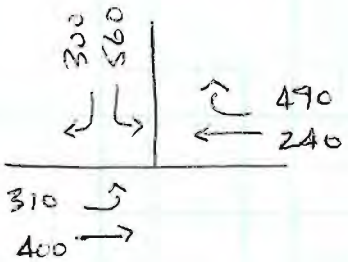
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱			↰↑↱			↰	↱		↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	1.00
Frt		0.97			0.99			1.00	0.85		1.00	0.85
Flt Protected		0.98			0.99			0.97	1.00		0.96	1.00
Satd. Flow (prot)		3342			3464			1804	1583		1786	1583
Flt Permitted		0.57			0.70			0.54	1.00		0.63	1.00
Satd. Flow (perm)		1950			2432			1010	1583		1180	1583
Volume (vph)	390	280	200	110	570	70	110	60	100	310	50	130
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	424	304	217	120	620	76	120	65	109	337	54	141
RTOR Reduction (vph)	0	62	0	0	17	0	0	0	70	0	0	91
Lane Group Flow (vph)	0	883	0	0	799	0	0	185	39	0	391	50
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		22.0			22.0			17.0	17.0		17.0	17.0
Effective Green, g (s)		21.0			21.0			16.0	16.0		16.0	16.0
Actuated g/C Ratio		0.47			0.47			0.36	0.36		0.36	0.36
Clearance Time (s)		3.0			3.0			3.0	3.0		3.0	3.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		910			1135			359	563		420	563
v/s Ratio Prot												
v/s Ratio Perm		c0.45			0.33			0.18	0.02		c0.33	0.03
v/c Ratio		1.36dl			0.70			0.52	0.07		0.93	0.09
Uniform Delay, d1		11.7			9.5			11.4	9.6		14.0	9.6
Progression Factor		1.00			1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		22.8			2.0			5.2	0.2		29.6	0.3
Delay (s)		34.5			11.5			16.6	9.8		43.6	10.0
Level of Service		C			B			B	A		D	A
Approach Delay (s)		34.5			11.5			14.1			34.7	
Approach LOS		C			B			B			C	

Intersection Summary			
HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group



Existing. am ✓



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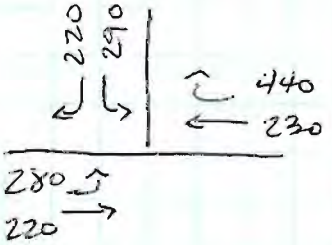

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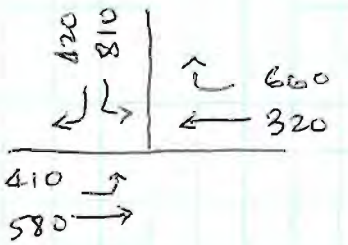
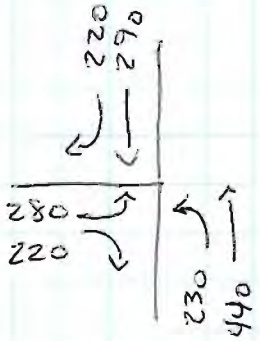
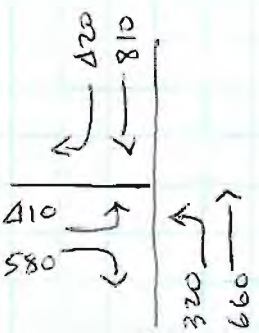


Baseline. pm



Network A. am



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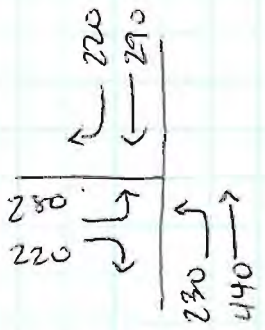

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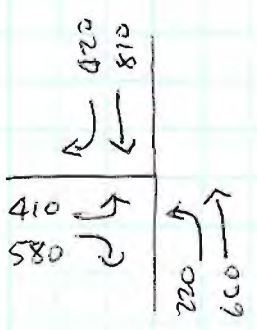

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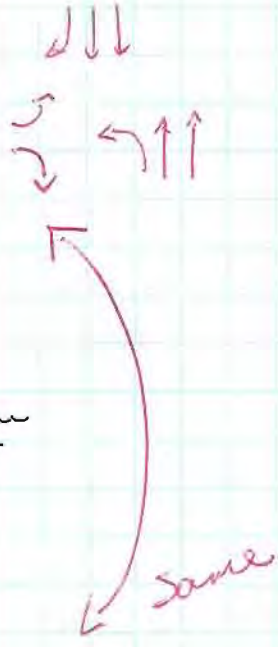


TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 7 - Existing.am*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Rice Street*	North/South Street: *Kapule Highway*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*195*	*150*	*0*	*0*	*130*	*275*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*211*	*163*	*0*	*0*	*141*	*298*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*340*	*0*	*160*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*369*	*0*	*173*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*					*L*		*R*
v (vph)	*211*					*369*		*173*
C (m) (vph)	*1132*					*427*		*912*
v/c	*0.19*					*0.86*		*0.19*
95% queue length	*0.68*					*8.68*		*0.70*
Control Delay	*8.9*					*47.8*		*9.9*
LOS	*A*					*E*		*A*
Approach Delay	--	--				*35.7*		
Approach LOS	--	--				*E*		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 7 - Baseline.am*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Rice Street*	North/South Street: *Kapule Highway*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*280*	*220*	*0*	*0*	*230*	*440*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*304*	*239*	*0*	*0*	*249*	*478*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*290*	*0*	*220*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*315*	*0*	*239*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*					*L*		*R*
v (vph)	*304*					*315*		*239*
C (m) (vph)	*886*					*261*		*795*
v/c	*0.34*					*1.21*		*0.30*
95% queue length	*1.53*					*14.76*		*1.27*
Control Delay	*11.2*					*163.6*		*11.5*
LOS	*B*					*F*		*B*
Approach Delay	--	--				*98.0*		
Approach LOS	--	--				*F*		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	280	220	230	440	290	220
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	304	239	250	478	315	239
RTOR Reduction (vph)	0	181	0	0	0	158
Lane Group Flow (vph)	304	58	250	478	315	81
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	13.8	13.8	11.8	35.1	19.3	19.3
Effective Green, g (s)	13.8	13.8	11.8	35.1	19.3	19.3
Actuated g/C Ratio	0.24	0.24	0.21	0.62	0.34	0.34
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	429	384	367	2183	1200	537
v/s Ratio Prot	c0.17		c0.14	0.14	c0.09	
v/s Ratio Perm		0.04				0.05
v/c Ratio	0.71	0.15	0.68	0.22	0.26	0.15
Uniform Delay, d1	19.7	16.9	20.8	4.8	13.6	13.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.3	0.2	5.1	0.2	0.5	0.6
Delay (s)	25.0	17.1	26.0	5.1	14.2	13.7
Level of Service	C	B	C	A	B	B
Approach Delay (s)	21.5			12.2	14.0	
Approach LOS	C			B	B	

Intersection Summary				
HCM Average Control Delay	15.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	56.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Attachment A

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 7 - Existing.pm
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Rice Street* | North/South Street: *Kapule Highway*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	310	400	0	0	240	490
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	336	434	0	0	260	532
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Two Way Left Turn Lane					
RT Channelized			0			0
Lanes	1	1	0	0	1	1
Configuration	L	T			T	R
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	560	0	300
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	0	0	608	0	326
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L					L		R
v (vph)	336					608		326
C (m) (vph)	838					181		784
v/c	0.40					3.36		0.42
95% queue length	1.95					57.35		2.06
Control Delay	12.1							12.8
LOS	B					F		B
Approach Delay	--	--				729.7		
Approach LOS	--	--				F		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 7 - Baseline.pm
Jurisdiction	
Analysis Year	

Project Description	Lihue Urban Core
East/West Street:	Rice Street
North/South Street:	Kapule Highway
Intersection Orientation:	East-West
Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	410	580	0	0	320	660
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	445	630	0	0	347	717
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	1
Configuration	L	T			T	R
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	810	0	420
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	0	0	880	0	456
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

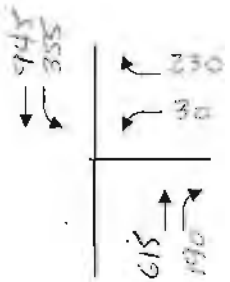
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L					L		R
v (vph)	445					880		456
C (m) (vph)	662					27		701
v/c	0.67					32.59		0.65
95% queue length	5.17					109.63		4.82
Control Delay	20.9							19.2
LOS	C					F		C
Approach Delay	--	--						
Approach LOS	--	--				F		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	410	580	320	660	810	420
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	446	630	348	717	880	457
RTOR Reduction (vph)	0	351	0	0	0	319
Lane Group Flow (vph)	446	279	348	717	880	138
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	18.4	18.4	14.5	38.0	19.5	19.5
Effective Green, g (s)	18.4	18.4	14.5	38.0	19.5	19.5
Actuated g/C Ratio	0.29	0.29	0.23	0.59	0.30	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	506	452	399	2088	1072	479
v/s Ratio Prot	c0.25		c0.20	0.20	c0.25	
v/s Ratio Perm		0.18				0.09
v/c Ratio	0.88	0.62	0.87	0.34	0.82	0.29
Uniform Delay, d1	22.0	20.0	24.1	6.8	20.8	17.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.4	2.5	18.5	0.5	7.1	1.5
Delay (s)	38.3	22.5	42.5	7.2	27.9	18.7
Level of Service	D	C	D	A	C	B
Approach Delay (s)	29.0			18.8	24.7	
Approach LOS	C			B	C	

Intersection Summary			
HCM Average Control Delay	24.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	64.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Network A
PM

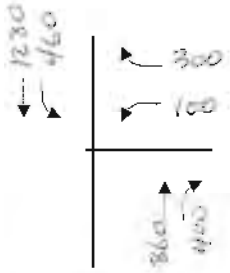
#8 - Kuhio Hwy at Hardy St.



CASE Ex AM

Unsignalized

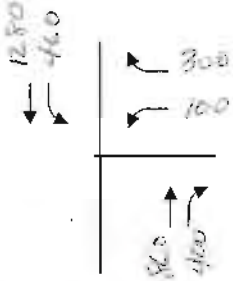
SB L	14.0	B
WB L	401.8	F
WB R	13.6	B



CASE Base Case AM

Unsignalized

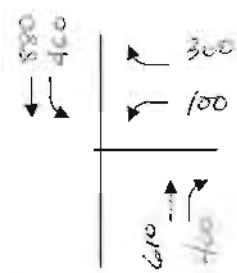
	64.2	F
	—	F
	20.8	C



CASE Net A AM

Signalized

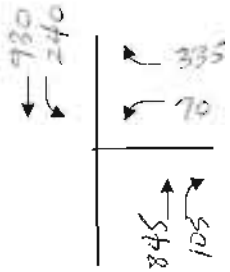
Total	18.6	24.6	C
WBL	.49	36.2	D
WBR	.21	22.5	C
NBT/R	.34	33.2	C
SBL	.42	49.5	D
SBT	.50	41.0	A



CASE Net B AM

Signalized

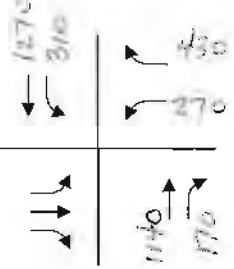
0.75	21.9	C
.49	32.2	D
.21	22.8	C
.72	28.8	C
.89	42.4	D
.33	3.1	A



CASE Ex PM

Unsignalized

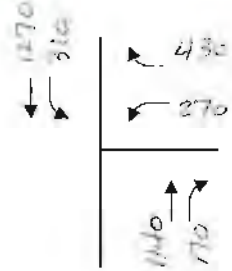
SB L	13.5	B
WB L	751.9	F
WB R	23.1	C



CASE Baseline PM

Unsignalized

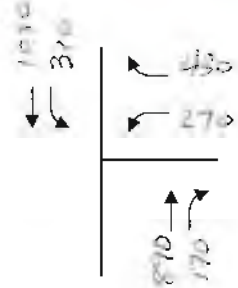
	27.6	D
	—	F
	94.3	F



CASE Net A PM

Signalized

Total	1.33	154.9 F
WB L		
WB R		
NB T		
NB R		
SB L		
SB T		



CASE Net B PM

Signalized

0.75	44.5	D

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 8 - Existing.am*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Lihue Urban Core*		
East/West Street:	*Hardy Street*	North/South Street:	*Kuhio Highway*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*615*	*190*	*355*	*945*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*668*	*206*	*385*	*1027*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*1*	*1*	*2*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*30*	*0*	*230*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*32*	*0*	*249*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (vph)		*385*	*32*		*249*			
C (m) (vph)		*781*	*29*		*668*			
v/c		*0.49*	*1.10*		*0.37*			
95% queue length		*2.76*	*3.66*		*1.73*			
Control Delay		*14.0*	*401.8*		*13.6*			
LOS		*B*	*F*		*B*			
Approach Delay	--	--	*57.8*					
Approach LOS	--	--	*F*					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 8 - Baseline.am*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description	*Lihue Urban Core*
East/West Street: *Hardy Street*	North/South Street: *Kuhio Highway*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*860*	*400*	*460*	*1280*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*934*	*434*	*499*	*1391*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*1*	*1*	*2*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*100*	*0*	*300*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*108*	*0*	*326*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (vph)		*499*	*108*		*326*			
C (m) (vph)		*508*	*0*		*548*			
v/c		*0.98*			*0.59*			
95% queue length		*13.13*			*3.87*			
Control Delay		*64.2*			*20.8*			
LOS		*F*	*F*		*C*			
Approach Delay	--	--						
Approach LOS	--	--						

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 Version 4.1c

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.95		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3371		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3371		1770	3539
Volume (vph)	100	300	860	400	460	1280
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	326	935	435	500	1391
RTOR Reduction (vph)	0	285	58	0	0	0
Lane Group Flow (vph)	109	41	1312	0	500	1391
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	10.6	10.6	36.1		26.0	66.1
Effective Green, g (s)	10.6	10.6	36.1		26.0	66.1
Actuated g/C Ratio	0.13	0.13	0.43		0.31	0.78
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	222	198	1437		543	2762
v/s Ratio Prot	c0.06		c0.39		c0.28	0.39
v/s Ratio Perm		0.03				
v/c Ratio	0.49	0.21	0.91		0.92	0.50
Uniform Delay, d1	34.5	33.3	22.8		28.4	3.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.7	0.5	10.4		21.1	0.7
Delay (s)	36.2	33.8	33.2		49.5	4.0
Level of Service	D	C	C		D	A
Approach Delay (s)	34.4		33.2			16.0
Approach LOS	C		C			B

Intersection Summary			
HCM Average Control Delay	24.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	84.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.94		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3329		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3329		1770	3539
Volume (vph)	100	300	610	400	460	880
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	326	663	435	500	957
RTOR Reduction (vph)	0	285	111	0	0	0
Lane Group Flow (vph)	109	41	987	0	500	957
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	10.6	10.6	35.1		27.0	66.1
Effective Green, g (s)	10.6	10.6	35.1		27.0	66.1
Actuated g/C Ratio	0.13	0.13	0.41		0.32	0.78
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	222	198	1380		564	2762
v/s Ratio Prot	c0.06		c0.30		c0.28	0.27
v/s Ratio Perm		0.03				
v/c Ratio	0.49	0.21	0.72		0.89	0.35
Uniform Delay, d1	34.5	33.3	20.6		27.4	2.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.7	0.5	3.2		15.5	0.3
Delay (s)	36.2	33.8	23.8		42.9	3.1
Level of Service	D	C	C		D	A
Approach Delay (s)	34.4		23.8			16.8
Approach LOS	C		C			B

Intersection Summary			
HCM Average Control Delay	21.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	84.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 8 - Existing.pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Lihue Urban Core*		
East/West Street:	*Hardy Street*	North/South Street:	*Kuhio Highway*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*845*	*107*	*240*	*930*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*918*	*116*	*260*	*1010*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*1*	*1*	*2*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*70*	*0*	*335*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*76*	*0*	*364*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (vph)		*260*	*76*		*364*			
C (m) (vph)		*680*	*36*		*554*			
v/c		*0.38*	*2.11*		*0.66*			
95% queue length		*1.80*	*8.39*		*4.78*			
Control Delay		*13.5*	*751.9*		*23.1*			
LOS		*B*	*F*		*C*			
Approach Delay	--	--	*149.0*					
Approach LOS	--	--	*F*					

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 Version 4.1c

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 8 - Baseline.pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description	*Lihue Urban Core*
East/West Street: *Hardy Street*	North/South Street: *Kuhio Highway*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*1140*	*170*	*310*	*1270*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*1239*	*184*	*336*	*1380*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*1*	*1*	*2*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*270*	*0*	*430*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*293*	*0*	*467*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (vph)		*336*	*293*		*467*			
C (m) (vph)		*484*	*6*		*436*			
v/c		*0.69*	*48.83*		*1.07*			
95% queue length		*5.30*	*38.71*		*15.31*			
Control Delay		*27.6*			*94.3*			
LOS		*D*	*F*		*F*			
Approach Delay	--	--						
Approach LOS	--	--		*F*				

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 Version 4.1c

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3470		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3470		1770	3539
Volume (vph)	270	430	1140	170	310	1270
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	293	467	1239	185	337	1380
RTOR Reduction (vph)	0	300	14	0	0	0
Lane Group Flow (vph)	293	167	1410	0	337	1380
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	15.3	15.3	35.4		16.6	56.0
Effective Green, g (s)	15.3	15.3	35.4		16.6	56.0
Actuated g/C Ratio	0.19	0.19	0.45		0.21	0.71
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	342	305	1549		371	2499
v/s Ratio Prot	c0.17		c0.41		c0.19	0.39
v/s Ratio Perm		0.11				
v/c Ratio	0.86	0.55	0.91		0.91	0.55
Uniform Delay, d1	30.9	28.9	20.5		30.6	5.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	18.6	2.0	9.5		25.1	0.9
Delay (s)	49.5	30.9	30.0		55.7	6.5
Level of Service	D	C	C		E	A
Approach Delay (s)	38.1		30.0			16.2
Approach LOS	D		C			B

Intersection Summary			
HCM Average Control Delay	25.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	79.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3454		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3454		1770	3539
Volume (vph)	270	430	890	170	310	1080
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	293	467	967	185	337	1174
RTOR Reduction (vph)	0	343	22	0	0	0
Lane Group Flow (vph)	293	124	1130	0	337	1174
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	14.7	14.7	26.8		15.2	46.0
Effective Green, g (s)	14.7	14.7	26.8		15.2	46.0
Actuated g/C Ratio	0.21	0.21	0.39		0.22	0.67
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	379	339	1347		392	2370
v/s Ratio Prot	c0.17		c0.33		c0.19	0.33
v/s Ratio Perm		0.08				
v/c Ratio	0.77	0.37	0.84		0.86	0.50
Uniform Delay, d1	25.4	23.0	19.0		25.7	5.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	9.4	0.7	6.4		16.9	0.7
Delay (s)	34.9	23.7	25.4		42.6	6.4
Level of Service	C	C	C		D	A
Approach Delay (s)	28.0		25.4			14.4
Approach LOS	C		C			B

Intersection Summary			
HCM Average Control Delay	21.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	68.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 9 - Existing.am*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Akahi Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*45*	*320*	*0*	*0*	*165*	*45*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*48*	*347*	*0*	*0*	*179*	*48*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*70*	*0*	*65*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*76*	*0*	*70*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*					*L*		*R*
v (vph)	*48*					*76*		*70*
C (m) (vph)	*1353*					*423*		*843*
v/c	*0.04*					*0.18*		*0.08*
95% queue length	*0.11*					*0.65*		*0.27*
Control Delay	*7.8*					*15.4*		*9.7*
LOS	*A*					*C*		*A*
Approach Delay	--	--				*12.6*		
Approach LOS	--	--				*B*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 9 - Baseline.am
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Akahi Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	60	570	0	0	270	60
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	65	619	0	0	293	65
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	90	0	80
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	0	0	97	0	86
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT					L		R
v (vph)	65					97		86
C (m) (vph)	1212					232		720
v/c	0.05					0.42		0.12
95% queue length	0.17					1.93		0.40
Control Delay	8.1					31.2		10.7
LOS	A					D		B
Approach Delay	--	--				21.6		
Approach LOS	--	--				C		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 9 - Network A.am
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Akahi Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	60	570	55	95	270	60
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	65	619	59	103	293	65
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	1	1	0
Configuration	L		TR	L		TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	90	15	80	65	10	30
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	97	16	86	70	10	32
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR			LTR	
v (vph)	65	103		199			112	
C (m) (vph)	1212	923		162			115	
v/c	0.05	0.11		1.23			0.97	
95% queue length	0.17	0.38		11.26			6.30	
Control Delay	8.1	9.4		200.8			147.7	
LOS	A	A		F			F	
Approach Delay	--	--	200.8			147.7		
Approach LOS	--	--	F			F		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 9 - Network B.am
Jurisdiction	
Analysis Year	

Project Description: Lihue Urban Core

East/West Street: Hardy Street | North/South Street: Akahi Street

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	60	570	55	95	270	60
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	65	619	59	103	293	65
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	1	1	0
Configuration	L		TR	L		TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	90	15	80	65	10	30
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	97	16	86	70	10	32
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR			LTR	
v (vph)	65	103		199			112	
C (m) (vph)	1212	923		162			115	
v/c	0.05	0.11		1.23			0.97	
95% queue length	0.17	0.38		11.26			6.30	
Control Delay	8.1	9.4		200.8			147.7	
LOS	A	A		F			F	
Approach Delay	--	--	200.8			147.7		
Approach LOS	--	--	F			F		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 9 - Existing.pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Akahi Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*30*	*405*	*0*	*0*	*290*	*45*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*32*	*440*	*0*	*0*	*315*	*48*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*125*	*0*	*50*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*135*	*0*	*54*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*					*L*		*R*
v (vph)	*32*					*135*		*54*
C (m) (vph)	*1207*					*328*		*708*
v/c	*0.03*					*0.41*		*0.08*
95% queue length	*0.08*					*1.94*		*0.25*
Control Delay	*8.1*					*23.4*		*10.5*
LOS	*A*					*C*		*B*
Approach Delay	--	--				*19.7*		
Approach LOS	--	--				*C*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 9 - Baseline.pm
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Akahi Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	40	550	0	0	550	60
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	43	597	0	0	597	65
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	160	0	60
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	0	0	173	0	65
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT					L		R
v (vph)	43					173		65
C (m) (vph)	936					168		485
v/c	0.05					1.03		0.13
95% queue length	0.14					8.37		0.46
Control Delay	9.0					133.0		13.6
LOS	A					F		B
Approach Delay	--	--				100.4		
Approach LOS	--	--				F		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 9 - Network A.pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Akahi Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*40*	*550*	*30*	*70*	*550*	*60*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*43*	*597*	*32*	*76*	*597*	*65*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*1*	*0*
Configuration	*L*		*TR*	*L*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*225*	*10*	*45*	*160*	*10*	*60*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*244*	*10*	*48*	*173*	*10*	*65*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (vph)	*43*	*76*		*302*			*248*	
C (m) (vph)	*936*	*963*		*84*			*99*	
v/c	*0.05*	*0.08*		*3.60*			*2.51*	
95% queue length	*0.14*	*0.26*		*30.91*			*22.72*	
Control Delay	*9.0*	*9.1*					*774.5*	
LOS	*A*	*A*		*F*			*F*	
Approach Delay	--	--					*774.5*	
Approach LOS	--	--		*F*			*F*	

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 9 - Network B.pm
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Akahi Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

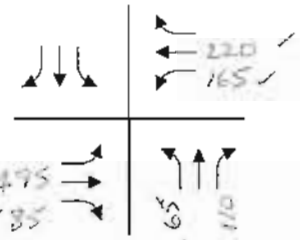
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	40	550	30	70	550	60
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	43	597	32	76	597	65
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	1	1	0
Configuration	L		TR	L		TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	225	10	45	160	10	60
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	244	10	48	173	10	65
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

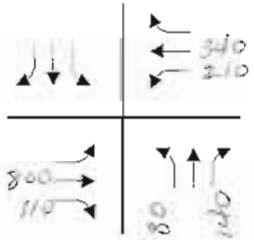
Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR			LTR	
v (vph)	43	76		302			248	
C (m) (vph)	936	963		84			99	
v/c	0.05	0.08		3.60			2.51	
95% queue length	0.14	0.26		30.91			22.72	
Control Delay	9.0	9.1					774.5	
LOS	A	A		F			F	
Approach Delay	--	--					774.5	
Approach LOS	--	--		F			F	

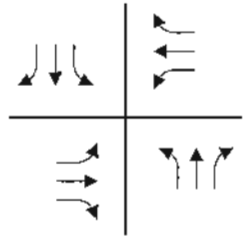
#10 Handy St. at Elwin St.



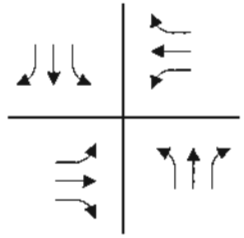
CASE Ex AM



CASE Baseline AM

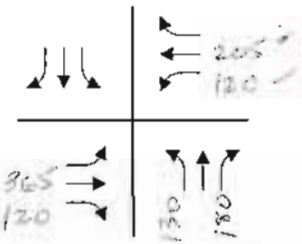


CASE A

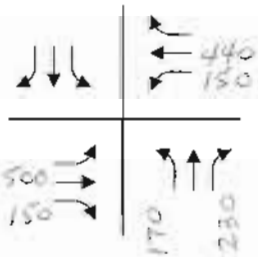


CASE B

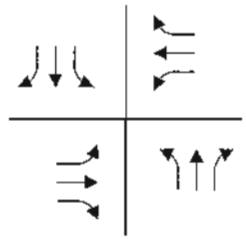
WB	LT	9.6	A	12.5	B
NB	L	59.3	E	338.6	F
NB	R	14.1	B	25.1	D



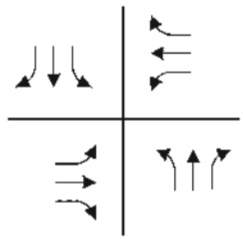
CASE Ex PM



CASE Baseline PM



CASE A



CASE B

WB	LT	8.7	A	9.9	A
NB	L	34.6	D	325.2	F
NB	R	13.8	B	19.8	C

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 10 - Existing.am
Jurisdiction	
Analysis Year	

Project Description: *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Eiwa Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	0	495	85	165	220	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	538	92	179	239	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	65	0	110	0	0	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	70	0	119	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT	L		R			
v (vph)		179	70		119			
C (m) (vph)		962	173		515			
v/c		0.19	0.40		0.23			
95% queue length		0.68	1.79		0.89			
Control Delay		9.6	39.3		14.1			
LOS		A	E		B			
Approach Delay	--	--	23.4					
Approach LOS	--	--	C					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 10 - Baseline.am*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street*	North/South Street: *Eiwa Street*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*800*	*110*	*210*	*340*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*869*	*119*	*228*	*369*	*0*
Percent Heavy Vehicles	*0*	--	–	*0*	–	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*80*	*0*	*140*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*86*	*0*	*152*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*	*L*		*R*			
v (vph)		*228*	*86*		*152*			
C (m) (vph)		*708*	*64*		*328*			
v/c		*0.32*	*1.34*		*0.46*			
95% queue length		*1.39*	*7.22*		*2.34*			
Control Delay		*12.5*	*338.6*		*25.1*			
LOS		*B*	*F*		*D*			
Approach Delay	--	--	*138.4*					
Approach LOS	--	--	*F*					

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	*Int 10 - Existing.pm*
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Eiwa Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*365*	*120*	*120*	*205*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*396*	*130*	*130*	*222*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*130*	*0*	*180*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*141*	*0*	*195*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*	*L*		*R*			
v (vph)		*130*	*141*		*195*			
C (m) (vph)		*1051*	*258*		*605*			
v/c		*0.12*	*0.55*		*0.32*			
95% queue length		*0.42*	*3.00*		*1.39*			
Control Delay		*8.9*	*34.6*		*13.8*			
LOS		*A*	*D*		*B*			
Approach Delay	--	--	*22.5*					
Approach LOS	--	--	*C*					

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Version 4.1c

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 10 - Baseline.pm
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Eiwa Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	0	500	150	150	440	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	543	163	163	478	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	170	0	230	0	0	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	184	0	249	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT	L		R			
v (vph)		163	184		249			
C (m) (vph)		902	123		489			
v/c		0.18	1.50		0.51			
95% queue length		0.66	12.95		2.84			
Control Delay		9.9	325.2		19.8			
LOS		A	F		C			
Approach Delay	--	--	149.5					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 11 - Existing.am
Jurisdiction	
Analysis Year	

Project Description: *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Elua Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	100	350	0	0	250	50
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	108	380	0	0	271	54
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	50	0	75
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	0	0	54	0	81
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (vph)	108						135	
C (m) (vph)	1246						455	
v/c	0.09						0.30	
95% queue length	0.28						1.23	
Control Delay	8.2						16.2	
LOS	A						C	
Approach Delay	--	--				16.2		
Approach LOS	--	--				C		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 11 - Baseline.am
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Elua Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	130	610	0	0	380	60
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	141	663	0	0	413	65
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	60	0	100
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	0	0	65	0	108
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (vph)	141						173	
C (m) (vph)	1095						268	
v/c	0.13						0.65	
95% queue length	0.44						4.07	
Control Delay	8.8						40.0	
LOS	A						E	
Approach Delay	--	--					40.0	
Approach LOS	--	--					E	

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 11 - Network A.am
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Elua Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	130	610	0	0	380	60
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	141	663	0	0	413	65
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	60	0	100
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	0	0	65	0	108
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (vph)	141						173	
C (m) (vph)	1095						268	
v/c	0.13						0.65	
95% queue length	0.44						4.07	
Control Delay	8.8						40.0	
LOS	A						E	
Approach Delay	--	--					40.0	
Approach LOS	--	--					E	

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 11 - Network B.am
Jurisdiction	
Analysis Year	

Project Description: Lihue Urban Core

East/West Street: Hardy Street | North/South Street: Elua Street

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	130	610	0	0	380	60
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	141	663	0	0	413	65
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	60	0	100
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	0	0	65	0	108
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (vph)	141						173	
C (m) (vph)	1095						268	
v/c	0.13						0.65	
95% queue length	0.44						4.07	
Control Delay	8.8						40.0	
LOS	A						E	
Approach Delay	--	--					40.0	
Approach LOS	--	--					E	

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 11 - Existing.pm
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Elua Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	100	350	0	0	250	50
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	108	380	0	0	271	54
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	50	0	75
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	0	0	54	0	81
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (vph)	108						135	
C (m) (vph)	1246						455	
v/c	0.09						0.30	
95% queue length	0.28						1.23	
Control Delay	8.2						16.2	
LOS	A						C	
Approach Delay	--	--				16.2		
Approach LOS	--	--				C		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 11 - Baseline.pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Elua Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*130*	*480*	*0*	*0*	*500*	*60*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*141*	*521*	*0*	*0*	*543*	*65*
Percent Heavy Vehicles	*0*	–	–	*0*	–	–
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*60*	*0*	*100*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*65*	*0*	*108*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*141*						*173*	
C (m) (vph)	*980*						*255*	
v/c	*0.14*						*0.68*	
95% queue length	*0.50*						*4.42*	
Control Delay	*9.3*						*44.5*	
LOS	*A*						*E*	
Approach Delay	–	–					*44.5*	
Approach LOS	–	–					*E*	

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 11 - Network A.pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Elua Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*130*	*480*	*0*	*0*	*500*	*60*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*141*	*521*	*0*	*0*	*543*	*65*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*60*	*0*	*100*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*65*	*0*	*108*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*141*						*173*	
C (m) (vph)	*980*						*255*	
v/c	*0.14*						*0.68*	
95% queue length	*0.50*						*4.42*	
Control Delay	*9.3*						*44.5*	
LOS	*A*						*E*	
Approach Delay	--	--					*44.5*	
Approach LOS	--	--					*E*	

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 11 - Network B.pm
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Elua Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	130	480	0	0	500	60
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	141	521	0	0	543	65
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	60	0	100
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	0	0	65	0	108
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (vph)	141						173	
C (m) (vph)	980						255	
v/c	0.14						0.68	
95% queue length	0.50						4.42	
Control Delay	9.3						44.5	
LOS	A						E	
Approach Delay	--	--				44.5		
Approach LOS	--	--				E		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 12 - Existing.am*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Umi Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*55*	*255*	*185*	*45*	*160*	*40*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*59*	*277*	*201*	*48*	*173*	*43*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*70*	*55*	*65*	*15*	*85*	*125*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*76*	*59*	*70*	*15*	*92*	*135*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (vph)	*59*	*48*		*205*			*242*	
C (m) (vph)	*1366*	*1095*		*247*			*406*	
v/c	*0.04*	*0.04*		*0.83*			*0.60*	
95% queue length	*0.14*	*0.14*		*6.53*			*3.74*	
Control Delay	*7.8*	*8.4*		*64.4*			*26.1*	
LOS	*A*	*A*		*F*			*D*	
Approach Delay	--	--	*64.4*			*26.1*		
Approach LOS	--	--	*F*			*D*		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 12 - Baseline.am*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Umi Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*70*	*490*	*240*	*60*	*270*	*50*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*76*	*532*	*260*	*65*	*293*	*54*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*90*	*70*	*80*	*20*	*110*	*160*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*97*	*76*	*86*	*20*	*119*	*173*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (vph)	*76*	*65*		*259*			*312*	
C (m) (vph)	*1223*	*838*		*0*			*185*	
v/c	*0.06*	*0.08*					*1.69*	
95% queue length	*0.20*	*0.25*					*21.35*	
Control Delay	*8.1*	*9.7*					*375.5*	
LOS	*A*	*A*		*F*			*F*	
Approach Delay	--	--				*375.5*		
Approach LOS	--	--				*F*		

ROUNDABOUTS - UNSIGNALIZED INTERSECTIONS WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Int 12.NetworkA.am*
Agency/Co.		Jurisdiction	
Date Performed	*2/24/2006*	Analysis Year	
Time Period			

Project Description

Volume Adjustments

		EB	WB	NB	SB
LT Traffic	Volume, veh/h	*70*	*60*	*90*	*20*
	PHF	*0.95*	*0.95*	*0.95*	*0.95*
	Flow rate, veh/h	*73*	*63*	*94*	*21*
TH Traffic	Volume, veh/h	*490*	*270*	*70*	*110*
	PHF	*0.95*	*0.95*	*0.95*	*0.95*
	Flow rate, veh/h	*515*	*284*	*73*	*115*
RT Traffic	Volume, veh/h	*240*	*60*	*80*	*160*
	PHF	*0.95*	*0.95*	*0.95*	*0.95*
	Flow rate, veh/h	*252*	*63*	*84*	*168*

Approach Flow Computation

Approach Flow (veh/h)	Va (veh/h)
V_{ae}	*840*
V_{aw}	*410*
V_{an}	*251*
V_{as}	*304*

Circulating Flow Computation

Approach Flow (veh/h)	Vc (veh/h)
V_{ce}	*199*
V_{cw}	*240*
V_{cn}	*609*
V_{cs}	*441*

Capacity Computation

		EB	WB	NB	SB
Capacity	Upper bound	*1185*	*1147*	*855*	*978*
	Lower bound	*979*	*945*	*685*	*794*
v/c Ratio	Upper bound	*0.71*	*0.36*	*0.29*	*0.31*
	Lower bound	*0.86*	*0.43*	*0.37*	*0.38*

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 12 - Existing.pm
Jurisdiction	
Analysis Year	

Project Description: *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Umi Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	105	235	105	30	170	40
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	114	255	114	32	184	43
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	65	95	35	8	40	60
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	70	103	38	8	43	65
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (vph)	114	32		211			116	
C (m) (vph)	1353	1201		267			391	
v/c	0.08	0.03		0.79			0.30	
95% queue length	0.28	0.08		6.06			1.22	
Control Delay	7.9	8.1		55.1			18.0	
LOS	A	A		F			C	
Approach Delay	--	--	55.1			18.0		
Approach LOS	--	--	F			C		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 12 - Baseline.pm
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Hardy Street* | North/South Street: *Umi Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	140	330	140	40	400	50
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	152	358	152	43	434	54
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	80	120	50	10	50	80
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	86	130	54	10	54	86
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (vph)	152	43		270			150	
C (m) (vph)	1086	1065		101			0	
v/c	0.14	0.04		2.67				
95% queue length	0.49	0.13		25.15				
Control Delay	8.9	8.5		846.8				
LOS	A	A		F			F	
Approach Delay	--	--	846.8					
Approach LOS	--	--	F					

ROUNDABOUTS - UNSIGNALIZED INTERSECTIONS WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Int 12.NetworkA.pm*
Agency/Co.		Jurisdiction	
Date Performed	*2/24/2006*	Analysis Year	
Time Period			

Project Description

Volume Adjustments

		EB	WB	NB	SB
LT Traffic	Volume, veh/h	*140*	*40*	*80*	*10*
	PHF	*0.95*	*0.95*	*0.95*	*0.95*
	Flow rate, veh/h	*147*	*42*	*84*	*10*
TH Traffic	Volume, veh/h	*330*	*400*	*120*	*50*
	PHF	*0.95*	*0.95*	*0.95*	*0.95*
	Flow rate, veh/h	*347*	*421*	*126*	*52*
RT Traffic	Volume, veh/h	*140*	*50*	*50*	*80*
	PHF	*0.95*	*0.95*	*0.95*	*0.95*
	Flow rate, veh/h	*147*	*52*	*52*	*84*

Approach Flow Computation

Approach Flow (veh/h)	Va (veh/h)
V_{ae}	*641*
V_{aw}	*515*
V_{an}	*262*
V_{as}	*146*

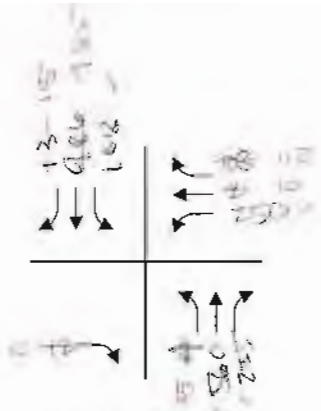
Circulating Flow Computation

Approach Flow (veh/h)	Vc (veh/h)
V_{ce}	*104*
V_{cw}	*357*
V_{cn}	*504*
V_{cs}	*547*

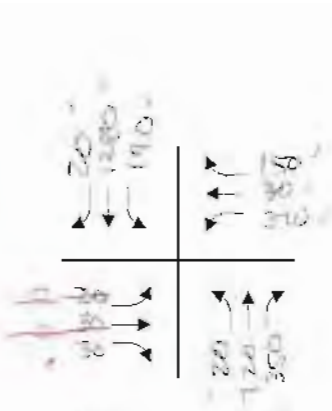
Capacity Computation

		EB	WB	NB	SB
Capacity	Upper bound	*1276*	*1046*	*930*	*898*
	Lower bound	*1062*	*854*	*751*	*723*
v/c Ratio	Upper bound	*0.50*	*0.49*	*0.28*	*0.16*
	Lower bound	*0.60*	*0.60*	*0.35*	*0.20*

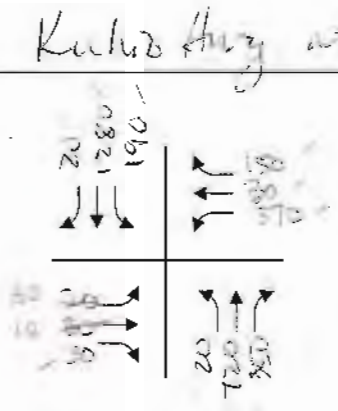
#13 Kuhio Hwy at Alaukini Rd.



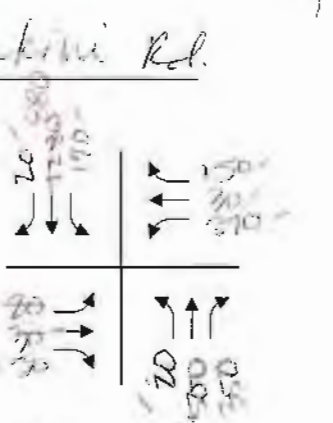
CASE 1: 13 AM Existing



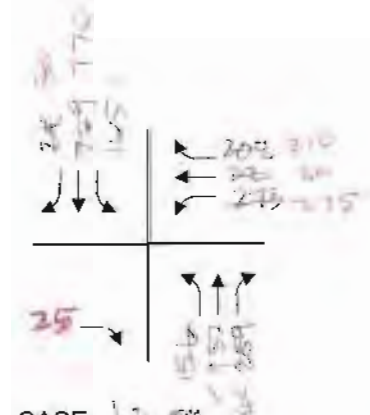
CASE Baseline AM



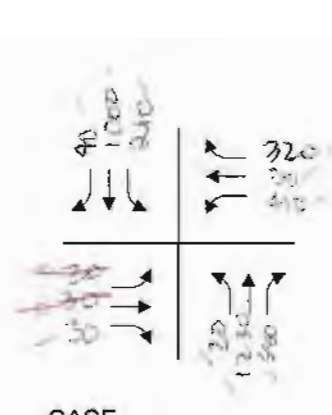
CASE Network A AM



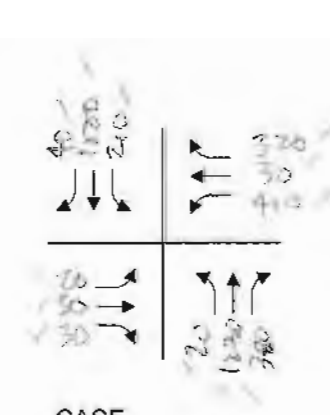
CASE Network B AM



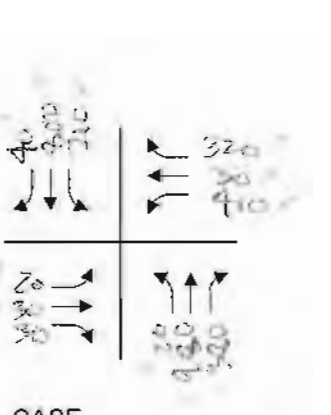
CASE 1: 13 PM Existing



CASE Baseline PM



CASE Network A PM



CASE Network B PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0	4.0	4.0			4.0			4.0	
Lane Util. Factor			1.00	1.00	1.00			0.95			0.95	
Frt			0.86	1.00	0.86			0.96			1.00	
Flt Protected			1.00	0.95	1.00			1.00			1.00	
Satd. Flow (prot)			1611	1770	1607			3387			3515	
Flt Permitted			1.00	0.95	1.00			0.95			0.75	
Satd. Flow (perm)			1611	1770	1607			3218			2649	
Volume (vph)	0	0	10	250	10	110	5	560	225	110	985	15
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	11	272	11	120	5	609	245	120	1071	16
RTOR Reduction (vph)	0	0	11	0	95	0	0	30	0	0	1	0
Lane Group Flow (vph)	0	0	0	272	36	0	0	829	0	0	1206	0
Turn Type			custom	Prot			Perm			Perm		
Protected Phases				3	8			2			6	
Permitted Phases			4				2			6		
Actuated Green, G (s)			1.1	15.8	19.9			64.1			64.1	
Effective Green, g (s)			0.1	14.8	18.9			63.1			63.1	
Actuated g/C Ratio			0.00	0.16	0.21			0.70			0.70	
Clearance Time (s)			3.0	3.0	3.0			3.0			3.0	
Vehicle Extension (s)			3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)			2	291	337			2256			1857	
v/s Ratio Prot				c0.15	c0.02							
v/s Ratio Perm			0.00					0.26			c0.46	
v/c Ratio			0.01	0.93	0.11			0.37			0.65	
Uniform Delay, d1			44.9	37.1	28.7			5.4			7.4	
Progression Factor			1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2			1.2	35.6	0.1			0.5			1.8	
Delay (s)			46.1	72.7	28.9			5.9			9.2	
Level of Service			D	E	C			A			A	
Approach Delay (s)		46.1			58.4			5.9			9.2	
Approach LOS		D			E			A			A	

Intersection Summary			
HCM Average Control Delay	16.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0	4.0	4.0			4.0			4.0	
Lane Util. Factor			1.00	1.00	1.00			0.95			0.95	
Frt			0.86	1.00	0.88			0.95			1.00	
Flt Protected			1.00	0.95	1.00			1.00			0.99	
Satd. Flow (prot)			1611	1770	1630			3366			3510	
Flt Permitted			1.00	0.95	1.00			0.88			0.57	
Satd. Flow (perm)			1611	1770	1630			2963			2012	
Volume (vph)	0	0	30	370	30	150	20	720	350	190	1280	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	33	402	33	163	22	783	380	207	1391	22
RTOR Reduction (vph)	0	0	32	0	128	0	0	28	0	0	1	0
Lane Group Flow (vph)	0	0	1	402	68	0	0	1157	0	0	1619	0
Turn Type			custom	Prot			Perm			Perm		
Protected Phases				3	8			2			6	
Permitted Phases			4				2			6		
Actuated Green, G (s)			3.5	27.0	33.5			110.5			110.5	
Effective Green, g (s)			2.5	26.0	32.5			109.5			109.5	
Actuated g/C Ratio			0.02	0.17	0.22			0.73			0.73	
Clearance Time (s)			3.0	3.0	3.0			3.0			3.0	
Vehicle Extension (s)			3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)			27	307	353			2163			1469	
v/s Ratio Prot				c0.23	c0.04							
v/s Ratio Perm			0.00					0.39			c0.81	
v/c Ratio			0.02	1.31	0.19			0.53			1.10	
Uniform Delay, d1			72.5	62.0	48.0			9.0			20.2	
Progression Factor			1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2			0.3	160.7	0.3			1.0			56.8	
Delay (s)			72.9	222.7	48.3			9.9			77.0	
Level of Service			E	F	D			A			E	
Approach Delay (s)		72.9			165.6			9.9			77.0	
Approach LOS		E			F			A			E	

Intersection Summary			
HCM Average Control Delay	69.3	HCM Level of Service	E
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	103.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	3433	1863	1583	1770	3539	1583	1770	3531	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.19	1.00	1.00	0.25	1.00	
Satd. Flow (perm)	1770	1863	1583	3433	1863	1583	347	3539	1583	474	3531	
Volume (vph)	20	10	30	370	30	150	20	720	350	190	1280	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	11	33	402	33	163	22	783	380	207	1391	22
RTOR Reduction (vph)	0	0	18	0	0	138	0	0	197	0	1	0
Lane Group Flow (vph)	22	11	15	402	33	25	22	783	183	207	1412	0
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	pm+pt		
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases			4			8	2		2	6		
Actuated Green, G (s)	2.0	3.0	3.0	10.9	11.9	11.9	34.8	34.8	34.8	47.1	47.1	
Effective Green, g (s)	1.0	2.0	2.0	9.9	10.9	10.9	33.8	33.8	33.8	46.1	46.1	
Actuated g/C Ratio	0.01	0.03	0.03	0.14	0.16	0.16	0.48	0.48	0.48	0.66	0.66	
Clearance Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
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	
Lane Grp Cap (vph)	25	53	45	486	290	246	168	1709	764	466	2325	
v/s Ratio Prot	0.01	0.01		c0.12	0.02			0.22		0.05	c0.40	
v/s Ratio Perm			c0.01			0.02	0.06		0.12	0.24		
v/c Ratio	0.88	0.21	0.32	0.83	0.11	0.10	0.13	0.46	0.24	0.44	0.61	
Uniform Delay, d1	34.4	33.2	33.3	29.2	25.4	25.4	10.0	12.0	10.6	5.8	6.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	127.2	1.9	4.1	11.1	0.2	0.2	1.6	0.9	0.7	0.7	1.2	
Delay (s)	161.6	35.2	37.5	40.3	25.6	25.5	11.6	12.9	11.3	6.5	8.0	
Level of Service	F	D	D	D	C	C	B	B	B	A	A	
Approach Delay (s)		78.5			35.4			12.4			7.8	
Approach LOS		E			D			B			A	

Intersection Summary			
HCM Average Control Delay	15.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	3433	1863	1583	1770	3539	1583	1770	3527	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	3433	1863	1583	1770	3539	1583	1770	3527	
Volume (vph)	30	10	30	370	30	150	20	500	350	190	880	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	11	33	402	33	163	22	543	380	207	957	22
RTOR Reduction (vph)	0	0	32	0	0	141	0	0	237	0	2	0
Lane Group Flow (vph)	33	11	1	402	33	22	22	543	143	207	977	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			
Actuated Green, G (s)	2.4	2.8	2.8	9.5	9.9	9.9	1.6	25.4	25.4	15.3	39.1	
Effective Green, g (s)	1.4	1.8	1.8	8.5	8.9	8.9	0.6	24.4	24.4	14.3	38.1	
Actuated g/C Ratio	0.02	0.03	0.03	0.13	0.14	0.14	0.01	0.38	0.38	0.22	0.59	
Clearance Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
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	
Lane Grp Cap (vph)	38	52	44	449	255	217	16	1328	594	389	2067	
v/s Ratio Prot	0.02	0.01		c0.12	c0.02		0.01	0.15		c0.12	c0.28	
v/s Ratio Perm			0.00			0.01			0.09			
v/c Ratio	0.87	0.21	0.02	0.90	0.13	0.10	1.38	0.41	0.24	0.53	0.47	
Uniform Delay, d1	31.7	30.9	30.7	27.8	24.6	24.6	32.2	15.0	13.9	22.4	7.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	93.8	2.0	0.2	19.9	0.2	0.2	361.4	0.9	1.0	1.4	0.8	
Delay (s)	125.6	32.9	30.9	47.7	24.9	24.8	393.6	15.9	14.9	23.8	8.5	
Level of Service	F	C	C	D	C	C	F	B	B	C	A	
Approach Delay (s)		71.8			40.2			24.3			11.2	
Approach LOS		E			D			C			B	

Intersection Summary			
HCM Average Control Delay	23.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0	4.0	4.0			4.0			4.0	
Lane Util. Factor			1.00	1.00	1.00			0.95			0.95	
Frt			0.86	1.00	0.86			0.97			1.00	
Flt Protected			1.00	0.95	1.00			1.00			0.99	
Satd. Flow (prot)			1611	1770	1608			3424			3493	
Flt Permitted			1.00	0.95	1.00			0.94			0.53	
Satd. Flow (perm)			1611	1770	1608			3208			1850	
Volume (vph)	0	0	25	275	20	210	15	950	260	165	770	30
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	27	299	22	228	16	1033	283	179	837	33
RTOR Reduction (vph)	0	0	26	0	81	0	0	16	0	0	1	0
Lane Group Flow (vph)	0	0	1	299	169	0	0	1316	0	0	1048	0
Turn Type			custom	Prot			Perm			Perm		
Protected Phases				3	8			2			6	
Permitted Phases			4				2			6		
Actuated Green, G (s)			3.3	19.0	25.3			78.7			78.7	
Effective Green, g (s)			2.3	18.0	24.3			77.7			77.7	
Actuated g/C Ratio			0.02	0.16	0.22			0.71			0.71	
Clearance Time (s)			3.0	3.0	3.0			3.0			3.0	
Vehicle Extension (s)			3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)			34	290	355			2266			1307	
v/s Ratio Prot				c0.17	c0.11							
v/s Ratio Perm			0.00					0.41			c0.57	
v/c Ratio			0.02	1.03	0.48			0.58			1.07dl	
Uniform Delay, d1			52.7	46.0	37.3			8.0			10.9	
Progression Factor			1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2			0.2	61.1	1.0			1.1			5.3	
Delay (s)			52.9	107.1	38.3			9.1			16.2	
Level of Service			D	F	D			A			B	
Approach Delay (s)		52.9			75.8			9.1			16.2	
Approach LOS		D			E			A			B	

Intersection Summary			
HCM Average Control Delay	24.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	87.3%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0	4.0	4.0			4.0			4.0	
Lane Util. Factor			1.00	1.00	1.00			0.95			0.95	
Frt			0.86	1.00	0.86			0.97			1.00	
Flt Protected			1.00	0.95	1.00			1.00			0.99	
Satd. Flow (prot)			1611	1770	1608			3413			3493	
Flt Permitted			1.00	0.95	1.00			0.91			0.48	
Satd. Flow (perm)			1611	1770	1608			3120			1694	
Volume (vph)	0	0	30	410	30	320	20	1230	380	210	1000	40
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	33	446	33	348	22	1337	413	228	1087	43
RTOR Reduction (vph)	0	0	32	0	46	0	0	15	0	0	1	0
Lane Group Flow (vph)	0	0	1	446	335	0	0	1757	0	0	1357	0
Turn Type			custom	Prot			Perm			Perm		
Protected Phases				3	8			2			6	
Permitted Phases			4				2			6		
Actuated Green, G (s)			5.1	30.0	38.1			105.9			105.9	
Effective Green, g (s)			4.1	29.0	37.1			104.9			104.9	
Actuated g/C Ratio			0.03	0.19	0.25			0.70			0.70	
Clearance Time (s)			3.0	3.0	3.0			3.0			3.0	
Vehicle Extension (s)			3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)			44	342	398			2182			1185	
v/s Ratio Prot				c0.25	c0.21							
v/s Ratio Perm			0.00					0.56			c0.80	
v/c Ratio			0.02	1.30	0.84			0.81			3.40dl	
Uniform Delay, d1			71.0	60.5	53.7			15.5			22.5	
Progression Factor			1.00	1.00	1.00			0.92			1.00	
Incremental Delay, d2			0.2	156.6	14.8			2.9			75.6	
Delay (s)			71.2	217.1	68.5			17.1			98.1	
Level of Service			E	F	E			B			F	
Approach Delay (s)		71.2			148.6			17.1			98.1	
Approach LOS		E			F			B			F	

Intersection Summary			
HCM Average Control Delay	72.4	HCM Level of Service	E
HCM Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	114.4%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Baseline

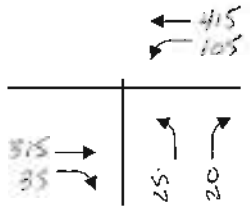
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	3433	1863	1583	1770	3539	1583	1770	3519	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.23	1.00	1.00	0.08	1.00	
Satd. Flow (perm)	1770	1863	1583	3433	1863	1583	433	3539	1583	156	3519	
Volume (vph)	20	30	30	410	30	320	20	1230	380	210	1000	40
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	33	33	446	33	348	22	1337	413	228	1087	43
RTOR Reduction (vph)	0	0	31	0	0	178	0	0	212	0	2	0
Lane Group Flow (vph)	22	33	2	446	33	170	22	1337	201	228	1128	0
Turn Type	Prot		Perm	Prot		Perm	pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8	2		2	6		
Actuated Green, G (s)	2.0	6.7	6.7	13.6	18.3	18.3	47.3	44.7	44.7	60.7	55.1	
Effective Green, g (s)	1.0	5.7	5.7	12.6	17.3	17.3	45.3	43.7	43.7	59.7	54.1	
Actuated g/C Ratio	0.01	0.06	0.06	0.14	0.19	0.19	0.50	0.49	0.49	0.66	0.60	
Clearance Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
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	
Lane Grp Cap (vph)	20	118	100	481	358	304	242	1718	769	319	2115	
v/s Ratio Prot	0.01	0.02		c0.13	0.02		0.00	c0.38		c0.10	0.32	
v/s Ratio Perm			0.00			c0.11	0.04		0.13	0.38		
v/c Ratio	1.10	0.28	0.02	0.93	0.09	0.56	0.09	0.78	0.26	0.71	0.53	
Uniform Delay, d1	44.5	40.2	39.5	38.2	29.9	32.9	11.3	19.1	13.6	21.2	10.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	234.8	1.3	0.1	24.0	0.1	2.4	0.2	3.6	0.8	7.4	1.0	
Delay (s)	279.3	41.5	39.6	62.2	30.0	35.3	11.5	22.7	14.5	28.6	11.5	
Level of Service	F	D	D	E	C	D	B	C	B	C	B	
Approach Delay (s)		100.2			49.6			20.6			14.4	
Approach LOS		F			D			C			B	

Intersection Summary			
HCM Average Control Delay	26.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	3433	1863	1583	1770	3539	1583	1770	3514	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	3433	1863	1583	1770	3539	1583	1770	3514	
Volume (vph)	20	30	30	410	30	320	20	980	380	210	800	40
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	33	33	446	33	348	22	1065	413	228	870	43
RTOR Reduction (vph)	0	0	31	0	0	287	0	0	231	0	3	0
Lane Group Flow (vph)	22	33	2	446	33	61	22	1065	182	228	910	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			
Actuated Green, G (s)	2.4	5.4	5.4	13.9	16.9	16.9	3.2	40.7	40.7	18.0	55.5	
Effective Green, g (s)	1.4	4.4	4.4	12.9	15.9	15.9	2.2	39.7	39.7	17.0	54.5	
Actuated g/C Ratio	0.02	0.05	0.05	0.14	0.18	0.18	0.02	0.44	0.44	0.19	0.61	
Clearance Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
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	
Lane Grp Cap (vph)	28	91	77	492	329	280	43	1561	698	334	2128	
v/s Ratio Prot	0.01	c0.02		c0.13	0.02		0.01	c0.30		c0.13	0.26	
v/s Ratio Perm			0.00			0.04			0.12			
v/c Ratio	0.79	0.36	0.02	0.91	0.10	0.22	0.51	0.68	0.26	0.68	0.43	
Uniform Delay, d1	44.2	41.4	40.7	38.0	31.1	31.7	43.4	20.1	15.9	34.0	9.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	82.7	2.5	0.1	20.1	0.1	0.4	9.9	2.4	0.9	5.7	0.6	
Delay (s)	126.9	43.9	40.9	58.1	31.2	32.1	53.3	22.5	16.8	39.7	10.1	
Level of Service	F	D	D	E	C	C	D	C	B	D	B	
Approach Delay (s)		63.5			46.1			21.4			16.0	
Approach LOS		E			D			C			B	

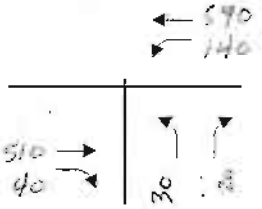
Intersection Summary			
HCM Average Control Delay	26.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

#14. Akahi @ Akala



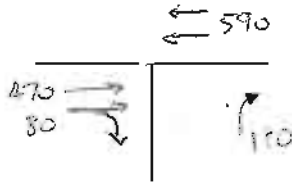
CASE Ex AM

WB LT 8.3 A
NB LR 17.9 C



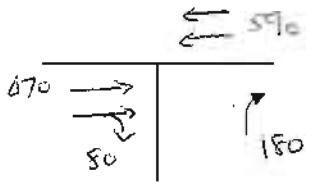
CASE Baseline AM

9.3 A
37.4 E



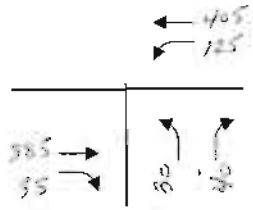
CASE A AM

NB Rt 12.1 B



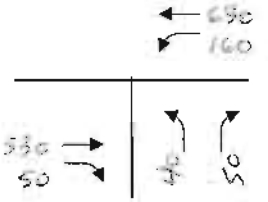
CASE B AM

12.1 B



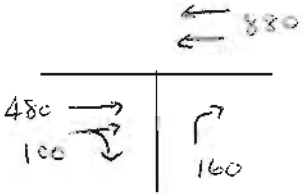
CASE Ex PM

WB LT 8.7 A
NB LR 19.5 C



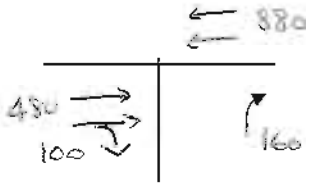
CASE Baseline PM

9.6 A
51.1 F



CASE A PM

NB Rt 12.0 B



CASE B PM

12.0 B

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 14 - Existing.am*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road*	North/South Street: *Akahi Street*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*315*	*35*	*105*	*415*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*342*	*38*	*114*	*451*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*25*	*0*	*20*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*27*	*0*	*21*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (vph)		*114*		*48*				
C (m) (vph)		*1190*		*327*				
v/c		*0.10*		*0.15*				
95% queue length		*0.32*		*0.51*				
Control Delay		*8.3*		*17.9*				
LOS		*A*		*C*				
Approach Delay	--	--		*17.9*				
Approach LOS	--	--		*C*				

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 14 - Baseline.am
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road* | North/South Street: *Akahi Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	0	510	40	140	590	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	554	43	152	641	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	20	0	0	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	1.00	0.92	0.92
Hourly Flow Rate, HFR	32	0	21	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (vph)		152		53				
C (m) (vph)		989		163				
v/c		0.15		0.33				
95% queue length		0.54		1.32				
Control Delay		9.3		37.4				
LOS		A		E				
Approach Delay	--	--		37.4				
Approach LOS	--	--		E				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 14 - Network A.am*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road*	North/South Street: *Akahi Street*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*470*	*80*	*0*	*590*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*510*	*86*	*0*	*641*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*0*	*0*	*2*	*0*
Configuration		*T*	*TR*		*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*180*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*195*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*1*	*0*	*0*	*0*
Configuration			*R*			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					*R*			
v (vph)					*195*			
C (m) (vph)					*704*			
v/c					*0.28*			
95% queue length					*1.13*			
Control Delay					*12.1*			
LOS					*B*			
Approach Delay	--	--	*12.1*					
Approach LOS	--	--	*B*					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 14 - Network B.am*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road*	North/South Street: *Akahi Street*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*470*	*80*	*0*	*590*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*510*	*86*	*0*	*641*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*0*	*0*	*2*	*0*
Configuration		*T*	*TR*		*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*180*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*195*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*1*	*0*	*0*	*0*
Configuration			*R*			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					*R*			
v (vph)					*195*			
C (m) (vph)					*704*			
v/c					*0.28*			
95% queue length					*1.13*			
Control Delay					*12.1*			
LOS					*B*			
Approach Delay	--	--	*12.1*					
Approach LOS	--	--	*B*					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 14 - Existing.pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road* | North/South Street: *Akahi Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*9*	*385*	*35*	*125*	*405*	*20*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*418*	*38*	*135*	*440*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*30*	*11*	*40*	*11*	*5*	*15*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*32*	*0*	*43*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (vph)		*135*		*75*				
C (m) (vph)		*1115*		*322*				
v/c		*0.12*		*0.23*				
95% queue length		*0.41*		*0.89*				
Control Delay		*8.7*		*19.5*				
LOS		*A*		*C*				
Approach Delay	--	--		*19.5*				
Approach LOS	--	--		*C*				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 14 - Baseline.pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road*	North/South Street: *Akahi Street*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*530*	*50*	*160*	*630*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*576*	*54*	*173*	*684*	*0*
Percent Heavy Vehicles	*0*	–	--	*0*	--	–
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*40*	*0*	*50*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*43*	*0*	*54*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (vph)		*173*		*97*				
C (m) (vph)		*962*		*170*				
v/c		*0.18*		*0.57*				
95% queue length		*0.65*		*3.00*				
Control Delay		*9.6*		*51.1*				
LOS		*A*		*F*				
Approach Delay	--	--		*51.1*				
Approach LOS	--	--		*F*				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 14 - Network A.pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road*	North/South Street: *Akahi Street*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*480*	*100*	*0*	*880*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*521*	*108*	*0*	*956*	*0*
Percent Heavy Vehicles	*0*	–	--	*0*	–	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*0*	*0*	*2*	*0*
Configuration		*T*	*TR*		*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*160*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*173*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*1*	*0*	*0*	*0*
Configuration			*R*			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					*R*			
v (vph)					*173*			
C (m) (vph)					*688*			
v/c					*0.25*			
95% queue length					*0.99*			
Control Delay					*12.0*			
LOS					*B*			
Approach Delay	--	--	*12.0*					
Approach LOS	--	--	*B*					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 14 - Network B.pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road*	North/South Street: *Akahi Street*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

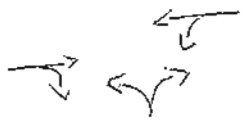
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*480*	*100*	*0*	*880*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*521*	*108*	*0*	*956*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*0*	*0*	*2*	*0*
Configuration		*T*	*TR*		*T*	
Upstream Signal		*0*			*0*	

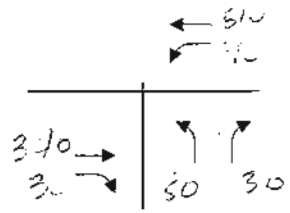
Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*160*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*173*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*1*	*0*	*0*	*0*
Configuration			*R*			

Delay, Queue Length, and Level of Service

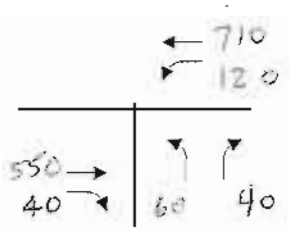
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					*R*			
v (vph)					*173*			
C (m) (vph)					*688*			
v/c					*0.25*			
95% queue length					*0.99*			
Control Delay					*12.0*			
LOS					*B*			
Approach Delay	--	--		*12.0*				
Approach LOS	--	--		*B*				

#16 Alameda & Elm

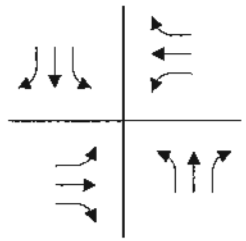




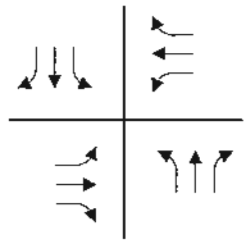
CASE Ex AM



CASE Baseline AM



CASE



CASE

WB LT	8.4	A
NB LR	23.6	C

	9.4	A
	86.9	F

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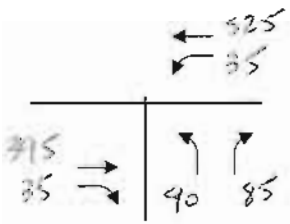
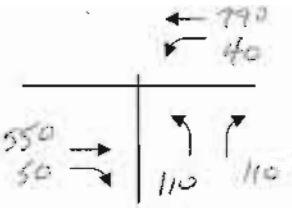
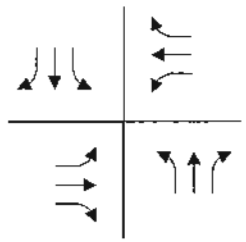


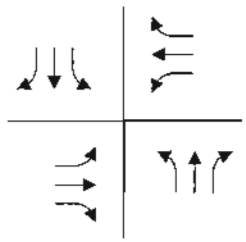
CASE Ex PM



CASE Baseline PM



CASE



CASE

WB LT	8.4	A
NB LR	29.2	D

	9.0	A
	201.5	F

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 16 - Existing.am*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road*	North/South Street: *Elua Street*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*340*	*30*	*90*	*510*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*369*	*32*	*97*	*554*	*0*
Percent Heavy Vehicles	*0*	–	–	*0*	–	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*50*	*0*	*30*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.25*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*54*	*0*	*32*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (vph)		*97*		*86*				
C (m) (vph)		*1169*		*278*				
v/c		*0.08*		*0.31*				
95% queue length		*0.27*		*1.28*				
Control Delay		*8.4*		*23.6*				
LOS		*A*		*C*				
Approach Delay	–	--		*23.6*				
Approach LOS	–	--		*C*				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 16 - Baseline.am*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road*	North/South Street: *Elua Street*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*550*	*40*	*120*	*710*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*597*	*43*	*130*	*771*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*60*	*0*	*40*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.25*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*65*	*0*	*43*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (vph)		*130*		*108*				
C (m) (vph)		*954*		*140*				
v/c		*0.14*		*0.77*				
95% queue length		*0.47*		*4.67*				
Control Delay		*9.4*		*86.9*				
LOS		*A*		*F*				
Approach Delay	--	--		*86.9*				
Approach LOS	--	--		*F*				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 16 - Existing.pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road*	North/South Street: *Elua Street*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*395*	*35*	*35*	*525*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*429*	*38*	*38*	*570*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*90*	*0*	*85*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*97*	*0*	*92*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (vph)		*38*		*189*				
C (m) (vph)		*1105*		*332*				
v/c		*0.03*		*0.57*				
95% queue length		*0.11*		*3.34*				
Control Delay		*8.4*		*29.2*				
LOS		*A*		*D*				
Approach Delay	--	--		*29.2*				
Approach LOS	--	--		*D*				

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 16 - Baseline.pm
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road* | North/South Street: *Elua Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

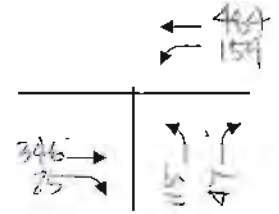
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	0	550	50	40	790	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	597	54	43	858	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	110	0	110	0	0	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	119	0	119	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

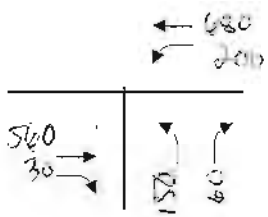
Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (vph)		43		238				
C (m) (vph)		945		189				
v/c		0.05		1.26				
95% queue length		0.14		12.99				
Control Delay		9.0		201.5				
LOS		A		F				
Approach Delay	--	--	201.5					
Approach LOS	--	--	F					

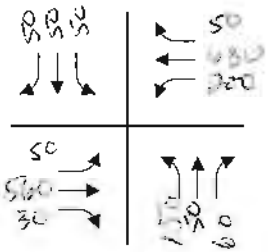
#17 Uni St at Alexkini Rd



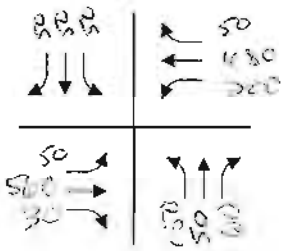
CASE 1.17 PM
Existing



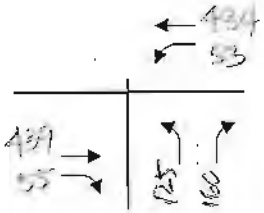
CASE
Baseline PM



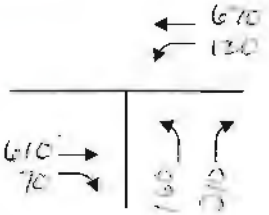
CASE
Network A PM



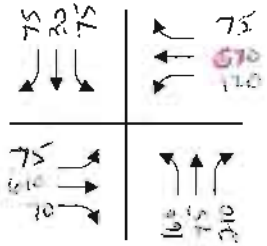
CASE
Network B PM



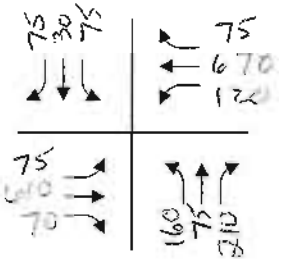
CASE 1.17 pm
Existing



CASE
Baseline PM



CASE
Network A pm



CASE
Network B PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 17 - Existing.am
Jurisdiction	
Analysis Year	

Project Description: *Lihue Urban Core*

East/West Street: *Ahukini Road* | North/South Street: *Umi Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	0	346	25	159	484	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	376	27	172	526	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	115	0	47	0	0	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	124	0	51	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (vph)		172	124		51			
C (m) (vph)		1167	162		663			
v/c		0.15	0.77		0.08			
95% queue length		0.52	4.85		0.25			
Control Delay		8.6	76.6		10.9			
LOS		A	F		B			
Approach Delay	--	--	57.5					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 17 - Baseline.am
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road*

North/South Street: *Umi Street*

Intersection Orientation: *East-West*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	0	560	30	200	680	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	608	32	217	739	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	150	0	60	0	0	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	163	0	65	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (vph)		217	163		65			
C (m) (vph)		954	69		489			
v/c		0.23	2.36		0.13			
95% queue length		0.87	15.65		0.46			
Control Delay		9.9	750.2		13.5			
LOS		A	F		B			
Approach Delay	--	--	540.2					
Approach LOS	--	--	F					

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.95		0.97	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.92		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3512		3433	3503		1770	1710		1770	1723	
Flt Permitted	0.95	1.00		0.95	1.00		0.69	1.00		0.68	1.00	
Satd. Flow (perm)	3433	3512		3433	3503		1280	1710		1268	1723	
Volume (vph)	50	560	30	200	680	50	150	50	60	50	50	50
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	609	33	217	739	54	163	54	65	54	54	54
RTOR Reduction (vph)	0	8	0	0	11	0	0	43	0	0	36	0
Lane Group Flow (vph)	54	634	0	217	782	0	163	76	0	54	72	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	1.5	15.0		4.5	18.0		16.4	16.4		16.4	16.4	
Effective Green, g (s)	1.5	15.0		4.5	18.0		16.4	16.4		16.4	16.4	
Actuated g/C Ratio	0.03	0.31		0.09	0.38		0.34	0.34		0.34	0.34	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	108	1100		323	1316		438	585		434	590	
v/s Ratio Prot	0.02	0.18		c0.06	c0.22			0.04			0.04	
v/s Ratio Perm							c0.13			0.04		
v/c Ratio	0.50	0.58		0.67	0.59		0.37	0.13		0.12	0.12	
Uniform Delay, d1	22.8	13.8		21.0	12.0		11.9	10.8		10.8	10.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.6	0.7		5.4	0.7		2.4	0.5		0.6	0.4	
Delay (s)	26.4	14.5		26.4	12.7		14.3	11.3		11.4	11.2	
Level of Service	C	B		C	B		B	B		B	B	
Approach Delay (s)		15.5			15.7			13.0			11.3	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	47.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 17 - Existing.pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road*	North/South Street: *Umi Street*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*439*	*55*	*93 83*	*434*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*477*	*59*	*101*	*471*	*0*
Percent Heavy Vehicles	*0*	–	--	*0*	–	–
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*125*	*0*	*160*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*135*	*0*	*173*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (vph)		*101*	*135*		*173*			
C (m) (vph)		*1042*	*191*		*570*			
v/c		*0.10*	*0.71*		*0.30*			
95% queue length		*0.32*	*4.43*		*1.27*			
Control Delay		*8.8*	*59.6*		*14.0*			
LOS		*A*	*F*		*B*			
Approach Delay	--	--	*34.0*					
Approach LOS	--	--	*D*					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 17 - Baseline.pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road* | North/South Street: *Umi Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*610*	*70*	*120*	*670*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*663*	*76*	*130*	*728*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*160*	*0*	*210*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*173*	*0*	*228*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

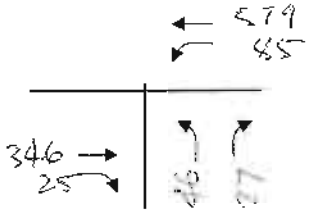
Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (vph)		*130*	*173*		*228*			
C (m) (vph)		*876*	*89*		*442*			
v/c		*0.15*	*1.94*		*0.52*			
95% queue length		*0.52*	*14.86*		*2.89*			
Control Delay		*9.8*	*541.5*		*21.5*			
LOS		*A*	*F*		*C*			
Approach Delay	--	--	*245.8*					
Approach LOS	--	--	*F*					

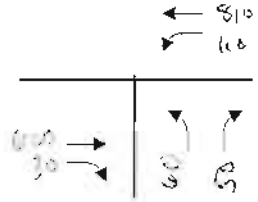
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.95		0.97	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.98		1.00	0.89		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3485		3433	3485		1770	1657		1770	1664	
Flt Permitted	0.95	1.00		0.95	1.00		0.68	1.00		0.49	1.00	
Satd. Flow (perm)	3433	3485		3433	3485		1272	1657		920	1664	
Volume (vph)	75	610	70	120	670	75	160	75	210	75	30	75
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	663	76	130	728	82	174	82	228	82	33	82
RTOR Reduction (vph)	0	18	0	0	17	0	0	145	0	0	52	0
Lane Group Flow (vph)	82	721	0	130	793	0	174	165	0	82	63	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	2.2	14.8		3.8	16.4		17.4	17.4		17.4	17.4	
Effective Green, g (s)	2.2	14.8		3.8	16.4		17.4	17.4		17.4	17.4	
Actuated g/C Ratio	0.05	0.31		0.08	0.34		0.36	0.36		0.36	0.36	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	157	1075		272	1191		461	601		334	603	
v/s Ratio Prot	0.02	0.21		c0.04	c0.23			0.10			0.04	
v/s Ratio Perm							c0.14			0.09		
v/c Ratio	0.52	0.67		0.48	0.67		0.38	0.27		0.25	0.10	
Uniform Delay, d1	22.4	14.5		21.2	13.5		11.3	10.8		10.7	10.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.1	1.7		1.3	1.4		2.3	1.1		1.7	0.3	
Delay (s)	25.5	16.1		22.5	14.9		13.6	12.0		12.5	10.5	
Level of Service	C	B		C	B		B	B		B	B	
Approach Delay (s)		17.1			15.9			12.6			11.3	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	15.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	48.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

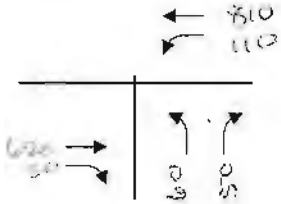
18 Palai St. at Akuki Rd



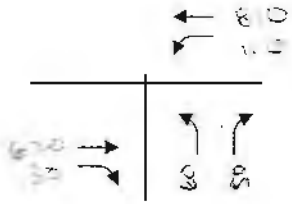
CASE 1.1B AM
Existing



CASE
Baseline
AM

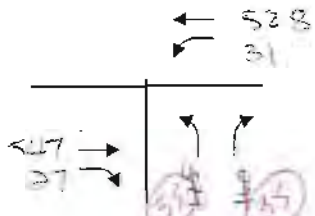


CASE
Network A
AM

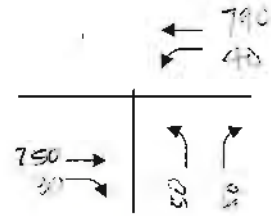


CASE
Network B
AM

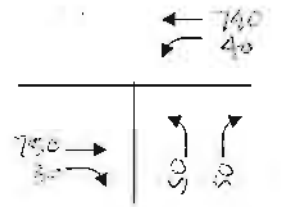
same



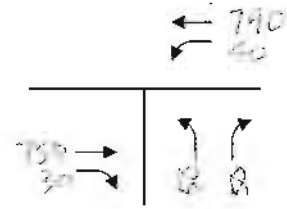
CASE 1.1C PM
Existing



CASE
Baseline
PM



CASE
Network A
PM



CASE
Network B
PM

same

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	Int 18 - Existing.am
Agency/Co.		Jurisdiction	
Date Performed	1/16/2006	Analysis Year	
Analysis Time Period			

Project Description: *Lihue Urban Core*

East/West Street: *Ahukini Road* | North/South Street: *Palai Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	0	346	25	85	579	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	376	27	92	629	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	46	0	37	0	0	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.25	0.92	0.92
Hourly Flow Rate, HFR	49	0	40	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT	L		R			
v (vph)		92	49		40			
C (m) (vph)		1167	190		663			
v/c		0.08	0.26		0.06			
95% queue length		0.26	0.99		0.19			
Control Delay		8.3	30.4		10.8			
LOS		A	D		B			
Approach Delay	--	--	21.6					
Approach LOS	--	--	C					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 18 - Baseline.am*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road* | North/South Street: *Palai Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*620*	*30*	*110*	*810*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*673*	*32*	*119*	*880*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*60*	*0*	*50*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*		*0.92*	*0.92*
Hourly Flow Rate, HFR	*65*	*0*	*54*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*	*L*		*R*			
v (vph)		*119*	*65*		*54*			
C (m) (vph)		*902*	*76*		*449*			
v/c		*0.13*	*0.86*		*0.12*			
95% queue length		*0.45*	*4.30*		*0.41*			
Control Delay		*9.6*	*158.7*		*14.1*			
LOS		*A*	*F*		*B*			
Approach Delay	--	--	*93.1*					
Approach LOS	--	--	*F*					

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 18 - Network A.am
Jurisdiction	
Analysis Year	

Project Description: Lihue Urban Core

East/West Street: Ahukini Road | North/South Street: Palai Street

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	0	620	30	110	810	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	673	32	119	880	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	1	2	0
Configuration		T	TR	L	T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	60	0	50	0	0	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.25	0.92	0.92
Hourly Flow Rate, HFR	65	0	54	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (vph)		119	65		54			
C (m) (vph)		902	122		650			
v/c		0.13	0.53		0.08			
95% queue length		0.45	2.53		0.27			
Control Delay		9.6	64.0		11.0			
LOS		A	F		B			
Approach Delay	--	--	40.0					
Approach LOS	--	--	E					

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 18 - Existing.pm
Jurisdiction	
Analysis Year	

Project Description: Lihue Urban Core

East/West Street: Ahukini Road | North/South Street: Palai Street

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	0	547	27	31	528	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	594	29	33	573	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	~~35~~ 105	0	~~35~~ 60	0	0	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	38	0	38	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT	L		R			
v (vph)		33	38		38			
C (m) (vph)		968	186		499			
v/c		0.03	0.20		0.08			
95% queue length		0.11	0.74		0.25			
Control Delay		8.9	29.3		12.8			
LOS		A	D		B			
Approach Delay	--	--	21.0					
Approach LOS	--	--	C					

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	1/16/2006
Analysis Time Period	

Site Information

Intersection	Int 18 - Baseline.pm
Jurisdiction	
Analysis Year	

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road* | North/South Street: *Palai Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	0	750	30	40	790	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	0	815	32	43	858	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	50	0	50	0	0	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR	54	0	54	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT	L		R			
v (vph)		43	54		54			
C (m) (vph)		799	87		373			
v/c		0.05	0.62		0.14			
95% queue length		0.17	2.89		0.50			
Control Delay		9.8	98.3		16.3			
LOS		A	F		C			
Approach Delay	--	--	57.3					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Int 18 - Network A.pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/16/2006*	Analysis Year	
Analysis Time Period			

Project Description *Lihue Urban Core*

East/West Street: *Ahukini Road* | North/South Street: *Palai Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

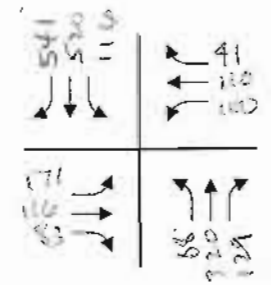
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*750*	*30*	*40*	*790*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*815*	*32*	*43*	*858*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*0*	*1*	*2*	*0*
Configuration		*T*	*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*50*	*0*	*50*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*54*	*0*	*54*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

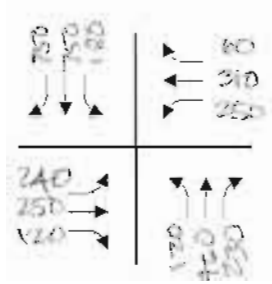
Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (vph)		*43*	*54*		*54*			
C (m) (vph)		*799*	*137*		*584*			
v/c		*0.05*	*0.39*		*0.09*			
95% queue length		*0.17*	*1.68*		*0.30*			
Control Delay		*9.8*	*47.4*		*11.8*			
LOS		*A*	*E*		*B*			
Approach Delay	--	--	*29.6*					
Approach LOS	--	--	*D*					

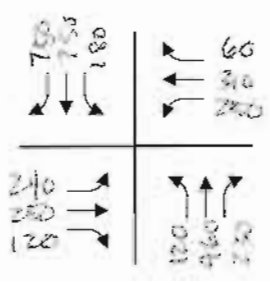
#19- Kapule Hwy at Ahukini Rd



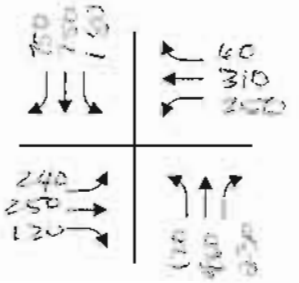
CASE 1.19 AM Existing



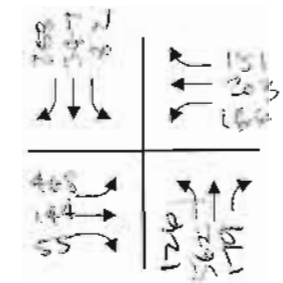
CASE Baseline AM



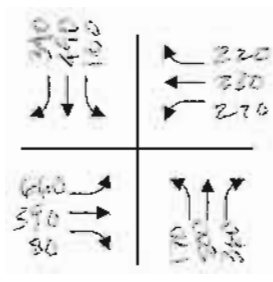
CASE Network A AM



CASE Network B AM

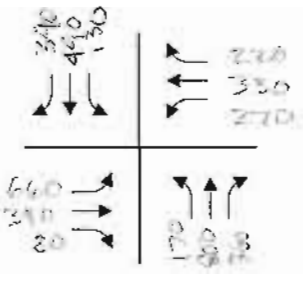


CASE 1.19 PM Existing



CASE Baseline PM

CASE Network A PM



CASE Network B PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	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	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
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	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	171	116	83	100	110	41	88	320	129	116	520	541
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	186	126	90	109	120	45	96	348	140	126	565	588
RTOR Reduction (vph)	0	0	79	0	0	40	0	0	91	0	0	350
Lane Group Flow (vph)	186	126	11	109	120	5	96	348	49	126	565	238
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.0	7.7	7.7	5.0	7.7	7.7	7.6	20.6	20.6	10.7	23.7	23.7
Effective Green, g (s)	4.0	6.7	6.7	4.0	6.7	6.7	6.6	19.6	19.6	9.7	22.7	22.7
Actuated g/C Ratio	0.07	0.12	0.12	0.07	0.12	0.12	0.12	0.35	0.35	0.17	0.41	0.41
Clearance Time (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
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)	126	223	189	126	223	189	209	652	554	307	755	642
v/s Ratio Prot	c0.11	c0.07		0.06	0.06		0.05	0.19		c0.07	c0.30	
v/s Ratio Perm			0.01			0.00			0.03			0.15
v/c Ratio	1.48	0.57	0.06	0.87	0.54	0.03	0.46	0.53	0.09	0.41	0.75	0.37
Uniform Delay, d1	26.0	23.3	21.8	25.7	23.2	21.8	23.0	14.5	12.2	20.6	14.2	11.7
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	252.0	3.3	0.1	42.0	2.5	0.1	1.6	3.1	0.3	0.9	6.7	1.6
Delay (s)	278.0	26.5	22.0	67.7	25.7	21.8	24.6	17.7	12.5	21.5	20.9	13.3
Level of Service	F	C	C	E	C	C	C	B	B	C	C	B
Approach Delay (s)		141.8			41.8			17.6			17.5	
Approach LOS		F			D			B			B	

Intersection Summary			
HCM Average Control Delay	39.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	56.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	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	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
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	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	240	250	120	250	310	60	120	460	230	180	750	750
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	261	272	130	272	337	65	130	500	250	196	815	815
RTOR Reduction (vph)	0	0	108	0	0	53	0	0	155	0	0	268
Lane Group Flow (vph)	261	272	22	272	337	12	130	500	95	196	815	547
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	16.0	18.0	18.0	17.0	19.0	19.0	9.0	38.9	38.9	14.1	44.0	44.0
Effective Green, g (s)	15.0	17.0	17.0	16.0	18.0	18.0	8.0	37.9	37.9	13.1	43.0	43.0
Actuated g/C Ratio	0.15	0.17	0.17	0.16	0.18	0.18	0.08	0.38	0.38	0.13	0.43	0.43
Clearance Time (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
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)	266	317	269	283	335	285	142	706	600	232	801	681
v/s Ratio Prot	0.15	0.15		c0.15	c0.18		0.07	0.27		c0.11	0.44	
v/s Ratio Perm			0.08			0.04			0.16			0.51
v/c Ratio	0.98	0.86	0.08	0.96	1.01	0.04	0.92	0.71	0.16	0.84	1.02	0.80
Uniform Delay, d1	42.4	40.3	34.9	41.7	41.0	33.9	45.7	26.4	20.5	42.5	28.5	24.8
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	49.7	19.9	0.1	42.7	50.7	0.1	50.5	5.9	0.6	23.5	36.2	9.7
Delay (s)	92.1	60.2	35.1	84.4	91.7	33.9	96.2	32.3	21.1	66.0	64.7	34.5
Level of Service	F	E	D	F	F	C	F	C	C	E	E	C
Approach Delay (s)		67.8			83.2			38.5			51.4	
Approach LOS		E			F			D			D	

Intersection Summary			
HCM Average Control Delay	56.6	HCM Level of Service	E
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	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)	3433	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
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)	3433	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	240	250	120	250	310	60	120	460	230	180	750	750
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	261	272	130	272	337	65	130	500	250	196	815	815
RTOR Reduction (vph)	0	0	115	0	0	54	0	0	156	0	0	268
Lane Group Flow (vph)	261	272	15	272	337	11	130	500	94	196	815	547
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	11.3	11.7	11.7	16.3	16.7	16.7	11.7	35.0	35.0	15.0	38.3	38.3
Effective Green, g (s)	10.3	10.7	10.7	15.3	15.7	15.7	10.7	34.0	34.0	14.0	37.3	37.3
Actuated g/C Ratio	0.11	0.12	0.12	0.17	0.17	0.17	0.12	0.38	0.38	0.16	0.41	0.41
Clearance Time (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
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)	393	421	188	301	617	276	210	1337	598	275	1467	656
v/s Ratio Prot	0.08	0.08		c0.15	c0.10		0.07	0.14		c0.11	0.23	
v/s Ratio Perm			0.01			0.01			0.06			c0.35
v/c Ratio	0.66	0.65	0.08	0.90	0.55	0.04	0.62	0.37	0.16	0.71	0.56	0.83
Uniform Delay, d1	38.2	37.8	35.3	36.6	33.9	30.9	37.7	20.3	18.5	36.1	20.0	23.6
Progression Factor	1.08	1.01	1.26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.0	3.3	0.2	28.4	1.0	0.1	5.3	0.8	0.6	8.4	1.5	11.9
Delay (s)	45.5	41.6	44.8	65.1	34.9	31.0	43.1	21.1	19.1	44.5	21.6	35.5
Level of Service	D	D	D	E	C	C	D	C	B	D	C	D
Approach Delay (s)		43.7			46.7			23.8			30.3	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	33.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	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	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
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	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	240	250	120	250	310	60	120	460	230	180	750	750
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	261	272	130	272	337	65	130	500	250	196	815	815
RTOR Reduction (vph)	0	0	112	0	0	56	0	0	159	0	0	295
Lane Group Flow (vph)	261	272	18	272	337	9	130	500	91	196	815	520
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	16.2	13.4	13.4	16.3	13.5	13.5	10.5	33.7	33.7	14.6	37.8	37.8
Effective Green, g (s)	15.2	12.4	12.4	15.3	12.5	12.5	9.5	32.7	32.7	13.6	36.8	36.8
Actuated g/C Ratio	0.17	0.14	0.14	0.17	0.14	0.14	0.11	0.36	0.36	0.15	0.41	0.41
Clearance Time (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
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)	299	488	218	301	492	220	187	1286	575	267	1447	647
v/s Ratio Prot	0.15	0.08		c0.15	c0.10		0.07	0.14		c0.11	0.23	
v/s Ratio Perm			0.01			0.01			0.06			c0.33
v/c Ratio	0.87	0.56	0.08	0.90	0.68	0.04	0.70	0.39	0.16	0.73	0.56	0.80
Uniform Delay, d1	36.5	36.2	33.8	36.6	36.9	33.6	38.9	21.2	19.4	36.5	20.4	23.4
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	23.3	1.4	0.2	28.4	3.9	0.1	10.7	0.9	0.6	10.0	1.6	10.2
Delay (s)	59.7	37.6	34.0	65.1	40.8	33.6	49.5	22.1	19.9	46.5	22.0	33.6
Level of Service	E	D	C	E	D	C	D	C	B	D	C	C
Approach Delay (s)		45.6			49.9			25.6			29.8	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	34.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	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	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
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	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	468	144	55	166	203	151	126	562	179	82	347	258
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	509	157	60	180	221	164	137	611	195	89	377	280
RTOR Reduction (vph)	0	0	43	0	0	139	0	0	130	0	0	197
Lane Group Flow (vph)	509	157	17	180	221	25	137	611	65	89	377	83
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	25.0	25.8	25.8	13.8	14.6	14.6	10.6	31.0	31.0	7.4	27.8	27.8
Effective Green, g (s)	24.0	24.8	24.8	12.8	13.6	13.6	9.6	30.0	30.0	6.4	26.8	26.8
Actuated g/C Ratio	0.27	0.28	0.28	0.14	0.15	0.15	0.11	0.33	0.33	0.07	0.30	0.30
Clearance Time (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
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)	472	513	436	252	282	239	189	621	528	126	555	471
v/s Ratio Prot	c0.29	0.08		0.10	c0.12		c0.08	c0.33		0.05	0.20	
v/s Ratio Perm			0.01			0.02			0.04			0.05
v/c Ratio	1.08	0.31	0.04	0.71	0.78	0.10	0.72	0.98	0.12	0.71	0.68	0.18
Uniform Delay, d1	33.0	25.8	23.9	36.9	36.8	32.9	38.9	29.8	20.9	40.9	27.8	23.4
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	64.1	0.3	0.0	9.2	13.3	0.2	12.9	32.4	0.5	16.5	6.6	0.8
Delay (s)	97.1	26.1	23.9	46.1	50.1	33.1	51.8	62.1	21.3	57.4	34.4	24.2
Level of Service	F	C	C	D	D	C	D	E	C	E	C	C
Approach Delay (s)		75.7			43.9			52.2			33.3	
Approach LOS		E			D			D			C	

Intersection Summary			
HCM Average Control Delay	51.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	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	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
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	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	660	390	80	270	330	220	170	800	360	130	490	340
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	717	424	87	293	359	239	185	870	391	141	533	370
RTOR Reduction (vph)	0	0	54	0	0	121	0	0	118	0	0	183
Lane Group Flow (vph)	717	424	33	293	359	118	185	870	273	141	533	187
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	45.0	44.0	44.0	26.0	25.0	25.0	17.0	58.0	58.0	10.0	51.0	51.0
Effective Green, g (s)	44.0	43.0	43.0	25.0	24.0	24.0	16.0	57.0	57.0	9.0	50.0	50.0
Actuated g/C Ratio	0.29	0.29	0.29	0.17	0.16	0.16	0.11	0.38	0.38	0.06	0.33	0.33
Clearance Time (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
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)	519	534	454	295	298	253	189	708	602	106	621	528
v/s Ratio Prot	c0.41	0.23		0.17	c0.19		0.10	c0.47		c0.08	0.29	
v/s Ratio Perm			0.05			0.15			0.25			0.23
v/c Ratio	1.38	0.79	0.07	0.99	1.20	0.47	0.98	1.23	0.45	1.33	0.86	0.35
Uniform Delay, d1	53.0	49.4	39.0	62.4	63.0	57.2	66.8	46.5	34.8	70.5	46.7	37.8
Progression Factor	1.03	0.98	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	183.3	7.9	0.1	50.3	119.5	1.4	58.6	115.2	2.4	199.5	14.3	1.9
Delay (s)	238.0	56.3	39.3	112.7	182.5	58.6	125.4	161.7	37.3	270.0	61.0	39.6
Level of Service	F	E	D	F	F	E	F	F	D	F	E	D
Approach Delay (s)		161.2			126.3			123.4			81.7	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	124.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	116.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	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)	3433	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
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)	3433	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	660	390	80	270	330	220	170	800	360	130	490	340
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	717	424	87	293	359	239	185	870	391	141	533	370
RTOR Reduction (vph)	0	0	71	0	0	186	0	0	271	0	0	265
Lane Group Flow (vph)	717	424	16	293	359	53	185	870	120	141	533	105
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	18.8	15.8	15.8	16.5	13.5	13.5	12.1	25.5	25.5	10.2	23.6	23.6
Effective Green, g (s)	17.8	14.8	14.8	15.5	12.5	12.5	11.1	24.5	24.5	9.2	22.6	22.6
Actuated g/C Ratio	0.22	0.18	0.18	0.19	0.16	0.16	0.14	0.31	0.31	0.12	0.28	0.28
Clearance Time (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
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)	764	655	293	343	553	247	246	1084	485	204	1000	447
v/s Ratio Prot	c0.21	c0.12		0.17	0.10		c0.10	c0.25		0.08	0.15	
v/s Ratio Perm			0.01			0.03			0.08			0.07
v/c Ratio	0.94	0.65	0.05	0.85	0.65	0.22	0.75	0.80	0.25	0.69	0.53	0.23
Uniform Delay, d1	30.6	30.2	26.8	31.2	31.7	29.5	33.1	25.5	20.8	34.0	24.2	22.0
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	18.9	2.2	0.1	18.3	2.6	0.4	12.2	6.3	1.2	9.7	2.0	1.2
Delay (s)	49.5	32.4	26.9	49.4	34.3	29.9	45.3	31.8	22.0	43.7	26.3	23.3
Level of Service	D	C	C	D	C	C	D	C	C	D	C	C
Approach Delay (s)		42.0			38.1			30.9			27.6	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	34.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

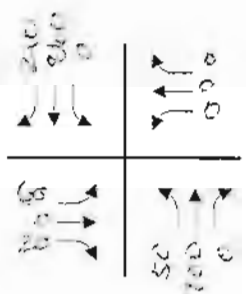
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	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)	3433	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
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)	3433	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	660	390	80	270	330	220	170	800	360	130	490	340
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	717	424	87	293	359	239	185	870	391	141	533	370
RTOR Reduction (vph)	0	0	71	0	0	186	0	0	271	0	0	265
Lane Group Flow (vph)	717	424	16	293	359	53	185	870	120	141	533	105
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	18.8	15.8	15.8	16.5	13.5	13.5	12.1	25.5	25.5	10.2	23.6	23.6
Effective Green, g (s)	17.8	14.8	14.8	15.5	12.5	12.5	11.1	24.5	24.5	9.2	22.6	22.6
Actuated g/C Ratio	0.22	0.18	0.18	0.19	0.16	0.16	0.14	0.31	0.31	0.12	0.28	0.28
Clearance Time (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
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)	764	655	293	343	553	247	246	1084	485	204	1000	447
v/s Ratio Prot	c0.21	c0.12		0.17	0.10		c0.10	c0.25		0.08	0.15	
v/s Ratio Perm			0.01			0.03			0.08			0.07
v/c Ratio	0.94	0.65	0.05	0.85	0.65	0.22	0.75	0.80	0.25	0.69	0.53	0.23
Uniform Delay, d1	30.6	30.2	26.8	31.2	31.7	29.5	33.1	25.5	20.8	34.0	24.2	22.0
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	18.9	2.2	0.1	18.3	2.6	0.4	12.2	6.3	1.2	9.7	2.0	1.2
Delay (s)	49.5	32.4	26.9	49.4	34.3	29.9	45.3	31.8	22.0	43.7	26.3	23.3
Level of Service	D	C	C	D	C	C	D	C	C	D	C	C
Approach Delay (s)		42.0			38.1			30.9			27.6	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	34.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

#20 Kapiolani Hwy at Ka'ahua St.

CASE 1 2030 PM

Existing



CASE

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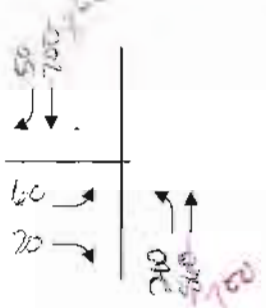
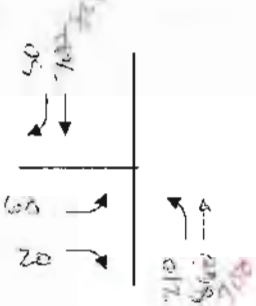


CASE

Network A

AM



CASE

Network B

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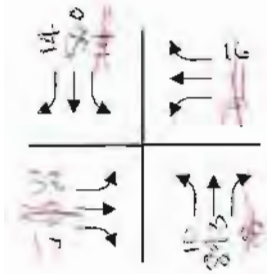

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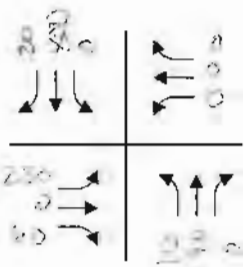

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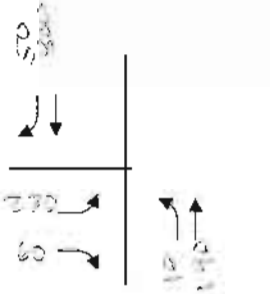
Baseline

PM



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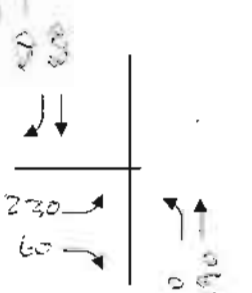
Network A

PM



CASE

Network B

PM

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Volume (vph)	12	5	11	483	637	41
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	5	12	525	692	45
RTOR Reduction (vph)	0	5	0	0	0	8
Lane Group Flow (vph)	13	0	12	525	692	37
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	2.8	2.8	1.6	83.0	77.4	77.4
Effective Green, g (s)	2.8	2.8	1.6	83.0	77.4	77.4
Actuated g/C Ratio	0.03	0.03	0.02	0.88	0.83	0.83
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	53	47	30	1648	1537	1306
v/s Ratio Prot	c0.01		0.01	c0.28	c0.37	
v/s Ratio Perm		0.00				0.02
v/c Ratio	0.25	0.00	0.40	0.32	0.45	0.03
Uniform Delay, d1	44.5	44.1	45.6	0.9	2.3	1.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.4	0.0	8.5	0.5	1.0	0.0
Delay (s)	46.9	44.2	54.2	1.4	3.2	1.5
Level of Service	D	D	D	A	A	A
Approach Delay (s)	46.1			2.6	3.1	
Approach LOS	D			A	A	

Intersection Summary			
HCM Average Control Delay	3.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	93.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	43.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Volume (vph)	60	20	50	700	860	210
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	22	54	761	935	228
RTOR Reduction (vph)	0	20	0	0	0	73
Lane Group Flow (vph)	65	2	54	761	935	155
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	7.0	7.0	2.5	51.8	45.3	45.3
Effective Green, g (s)	7.0	7.0	2.5	51.8	45.3	45.3
Actuated g/C Ratio	0.10	0.10	0.04	0.78	0.68	0.68
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	185	166	66	1445	1263	1074
v/s Ratio Prot	c0.04		0.03	c0.41	c0.50	
v/s Ratio Perm		0.00				0.10
v/c Ratio	0.35	0.01	0.82	0.53	0.74	0.14
Uniform Delay, d1	27.8	26.8	31.9	2.8	6.9	3.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.0	52.2	1.4	3.9	0.3
Delay (s)	28.9	26.8	84.1	4.2	10.9	4.1
Level of Service	C	C	F	A	B	A
Approach Delay (s)	28.4			9.5	9.6	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	10.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	66.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	60	20	210	700	860	50
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	22	228	761	935	54
RTOR Reduction (vph)	0	20	0	0	0	25
Lane Group Flow (vph)	65	2	228	761	935	29
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	4.9	4.9	4.1	32.0	23.9	23.9
Effective Green, g (s)	4.9	4.9	4.1	32.0	23.9	23.9
Actuated g/C Ratio	0.11	0.11	0.09	0.71	0.53	0.53
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	193	173	162	2522	1884	843
v/s Ratio Prot	c0.04		c0.13	0.22	c0.26	
v/s Ratio Perm		0.00				0.02
v/c Ratio	0.34	0.01	1.41	0.30	0.50	0.03
Uniform Delay, d1	18.5	17.8	20.4	2.4	6.7	5.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.0	215.9	0.3	0.9	0.1
Delay (s)	19.5	17.9	236.3	2.7	7.6	5.1
Level of Service	B	B	F	A	A	A
Approach Delay (s)	19.1			56.5	7.5	
Approach LOS	B			E	A	

Intersection Summary			
HCM Average Control Delay	31.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	44.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Volume (vph)	38	17	10	893	560	14
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	18	11	971	609	15
RTOR Reduction (vph)	0	17	0	0	0	3
Lane Group Flow (vph)	41	1	11	971	609	12
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	6.3	6.3	1.3	74.7	69.4	69.4
Effective Green, g (s)	6.3	6.3	1.3	74.7	69.4	69.4
Actuated g/C Ratio	0.07	0.07	0.01	0.84	0.78	0.78
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	125	112	26	1564	1453	1234
v/s Ratio Prot	c0.02		0.01	c0.52	0.33	
v/s Ratio Perm		0.00				0.01
v/c Ratio	0.33	0.01	0.42	0.62	0.42	0.01
Uniform Delay, d1	39.3	38.5	43.5	2.4	3.2	2.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.5	0.0	10.7	1.9	0.9	0.0
Delay (s)	40.9	38.5	54.2	4.3	4.1	2.2
Level of Service	D	D	D	A	A	A
Approach Delay (s)	40.1			4.8	4.1	
Approach LOS	D			A	A	

Intersection Summary			
HCM Average Control Delay	5.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	89.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Volume (vph)	230	60	10	1190	800	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	250	65	11	1293	870	22
RTOR Reduction (vph)	0	52	0	0	0	9
Lane Group Flow (vph)	250	13	11	1293	870	13
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	12.9	12.9	0.8	42.6	37.8	37.8
Effective Green, g (s)	12.9	12.9	0.8	42.6	37.8	37.8
Actuated g/C Ratio	0.20	0.20	0.01	0.67	0.60	0.60
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	360	322	22	1250	1109	942
v/s Ratio Prot	c0.14		0.01	c0.69	0.47	
v/s Ratio Perm		0.01				0.01
v/c Ratio	0.69	0.04	0.50	1.03	0.78	0.01
Uniform Delay, d1	23.5	20.3	31.2	10.4	9.8	5.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.7	0.1	16.8	34.8	5.6	0.0
Delay (s)	29.2	20.4	47.9	45.2	15.3	5.3
Level of Service	C	C	D	D	B	A
Approach Delay (s)	27.4			45.2	15.1	
Approach LOS	C			D	B	

Intersection Summary			
HCM Average Control Delay	32.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	63.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	82.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	230	60	10	1190	800	50
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	250	65	11	1293	870	54
RTOR Reduction (vph)	0	51	0	0	0	25
Lane Group Flow (vph)	250	14	11	1293	870	29
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	11.9	11.9	0.8	33.5	28.7	28.7
Effective Green, g (s)	11.9	11.9	0.8	33.5	28.7	28.7
Actuated g/C Ratio	0.22	0.22	0.01	0.63	0.54	0.54
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	394	353	27	2220	1902	851
v/s Ratio Prot	c0.14		0.01	c0.37	0.25	
v/s Ratio Perm		0.01				0.02
v/c Ratio	0.63	0.04	0.41	0.58	0.46	0.03
Uniform Delay, d1	18.8	16.3	26.1	5.8	7.6	5.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.3	0.0	9.7	1.1	0.8	0.1
Delay (s)	22.1	16.3	35.8	7.0	8.4	5.9
Level of Service	C	B	D	A	A	A
Approach Delay (s)	20.9			7.2	8.2	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	9.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	53.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX F

COUNTY OF KAUAI
PLANNING DEPARTMENT
4444 RICE STREET, SUITE A473
LIHUE, KAUAI, HAWAII 96766-1326

MEMORANDUM

DATE: October 12, 2006

TO: Planning Director Ian K. Costa

FROM: Kauai Historic Preservation Review Commission

SUBJECT: Lihue Mill Complex

This is to inform you that the Kauai Historic Preservation Review Commission (KHPRC) met in January 2006 to discuss the status of the Lihue Mill Complex in light of preliminary inquiries for demolition permits for certain buildings at this historic site and the report on development options produced by the Planning Department.

Discussion focused on a letter sent to the KHPRC and the Planning Department elaborating on the historical significance of the Lihue Mill Complex and the need for comprehensive historical research and documentation and preservation alternatives prior to permitting activities at this site.

Based on the information provided, the KHPRC made the following recommendation at its January 5, 2006 meeting:

"The Kaua'i Historic Preservation Review Commission recognizes the Lihue Plantation mill as one of the most historic properties on the island and the historic reason why the town was established and developed in its current location. As such, the following actions are recommended:

✔ no demolition permits be granted for all or part of the mill without a comprehensive history first undertaken and all preservation alternatives reviewed,

✔ the owner initiate a two-stage program: a Scope of Work document created with the assistance of a professional consultant, and a subsequent compilation of the site's history.

These recommendations follow a 2005 report by the County of Kaua'i Planning Department, which recognizes the site's historic importance. Page 3 of that report states:

The mill site itself is historical from the perspective that it was central to the development of Lihue as Kauai's capitol. Also, most of the mill buildings are more than fifty (50) years old.

The historical aspects of the mill will play a vital role in the eventual development of the site from preservation of buildings along with an interpretive program to ensure that the "history" of the project site is not lost.

Compiling the history of the site will require an extensive amount of time to research and develop. However, "history" will play a very vital role in the planning process for the development of the property. At this point, it is extremely vital to recognize the historical importance of the site and have it incorporated into the planning process for development that will eventually follow the completion of this plan. The compilation of the mill's history will remain as one of the important tasks ahead in the planning process for its development.

Also important for the mill, is the role that the mill played in the building of Lihue and the evolution of its role in relation to the development of the town. This part of the mill's history is significant from the perspective that it is not only a historical site in and of itself, but its importance to the overall town and island."

Thank you for your consideration of the KHPRC's concerns regarding development impacts and preservation issues pertaining to this important historical complex.

cc: State Historic Preservation Division
Keith Nitta