TRAFFIC IMPACT ANALYSIS REPORT

803 Waimanu

Honolulu, Oahu, HAWAII

December 2013

Prepared for:
MJF Development Corporation
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PARSONS BRINCKERHOFF

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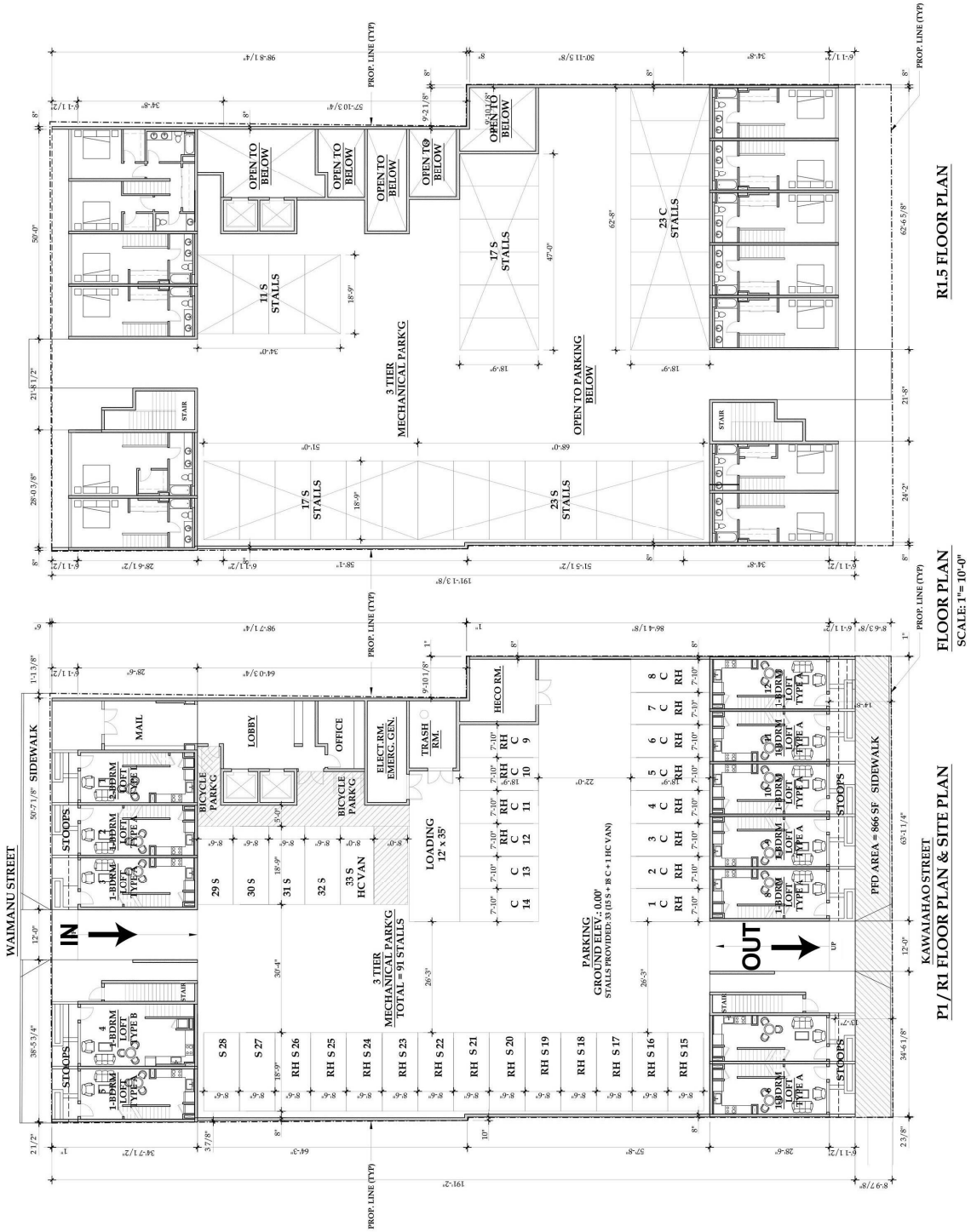
Introduction

MJF Development Corporation has proposed to develop a 7-story mid-rise condominium called 803 Waimanu within the mauka portion of Kakaako. The project is located makai of Waimanu Street at its intersection with Dreier Street near Kapiolani Boulevard. Imperial Plaza is located at the Ewa end of Waimanu, just past Dreier Street and adjacent to the project. 803 Waimanu will replace the existing roughly 20k square foot (SF) auto body shop currently operating out of the lot. The vicinity map is shown in Figure 1.

803 Waimanu will be constructed in a single phase which will consist of 153 residential dwelling units and 91 parking stalls. The project site plan in Figure 2 shows that 803 Waimanu will be accessed from Waimanu Street via a one-way in driveway. Exiting traffic will use a one-way out driveway to Kawaiahao Street.

Figure 1 Vicinity Map

Figure 2 Site Plan



Existing Conditions

The proposed development is located between Waimanu Street and Kawaiahao Street near Dreier Street. The site is currently occupied by an auto body shop. Waimanu Street and Kawaiahao Street are both two lane roadways characterized by similar light industrial land uses.

Imperial Plaza is located directly Ewa on the adjacent lot. Imperial Plaza is a mixed-use development consisting of 261 residential dwelling units with 4 floors of retail commercial and office space.

Data Collection

Existing traffic conditions were observed and documented. Field observations of intersection operations and general intersection characteristics were noted at study area intersections. Geometric lane configurations and intersection traffic control data were collected. Intersection geometry inventory included the following:

- Number of lanes and lane widths,
- Crosswalk locations,
- Unsignalized intersection control,
- Posted speed limits.

All study area intersections are unsignalized, stop-controlled intersections. At the intersection of Kapiolani Boulevard and Dreier Street, mauka-bound Dreier left turns are prohibited. The intersection of Waimanu Street and Dreier Street is all-way stop-controlled.

Intersection turning movement counts were conducted at the following intersections from Wednesday, November 6 to Thursday, November 7, 2013 during the AM and PM peak periods at the following intersections:

- Kapiolani Boulevard/Dreier Street
- Waimanu Street/Dreier Street
- Kawaiahao Street/Cooke Street
- Kawaiahao Street/Imperial Plaza Driveway

The AM and PM peak hours were found to occur from 7:30 to 8:30 AM and from 4:15 to 5:15 PM, respectively. Figure 3 shows the existing peak hour traffic volumes for each turning movement at these intersections. These data were used as inputs into the intersection analyses. Appendix A contains the traffic count data.

The existing lane configurations within the study area are shown in Figure 4. During the AM peak period, a contra-flow lane is provided in the town-bound direction on Kapiolani Boulevard for a total of 4 downtown-bound lanes. No contra-flow is provided during the PM peak period. On Cooke Street, parking restrictions during the PM peak period enable both mauka-bound through lanes to be used. During the AM peak, on-street parking reduces the mauka-bound travel way to a single lane.

Parking

Metered on-street parking is provided along Cooke Street on the Diamond Head side. This parking is restricted between 3:30 PM and 5:30 PM, which effectively opens up an additional mauka-bound lane on Cooke Street. Metered parking is provided on Kawaiahao Street Ewa of Cooke Street. On the Diamond Head side of Cooke Street, no sidewalks are provided beyond the park across from Imperial Plaza and vehicles park on both sides of Kawaiahao Street. Unmarked and unsigned parking is also provided on Dreier Street and Waimanu Street within the project area.

Existing Operations

The study area intersections were analyzed using the methodologies for unsignalized intersections outlined in the 2010 Highway Capacity Manual (HCM). Operating conditions at an intersection by approach are expressed as a qualitative measure known as Level of Service (LOS) ranging from A to F. LOS A represents free-flow operations with low delay, while LOS F represents congested conditions with relatively high delay. Appendix B has more detailed definitions of intersection LOS. Appendix C contains the Synchro worksheets.

Field observations were performed at selected intersections to verify the results of the intersection analyses. Table 1 displays the existing condition LOS for each intersection.

Figure 3 Existing Traffic Volumes

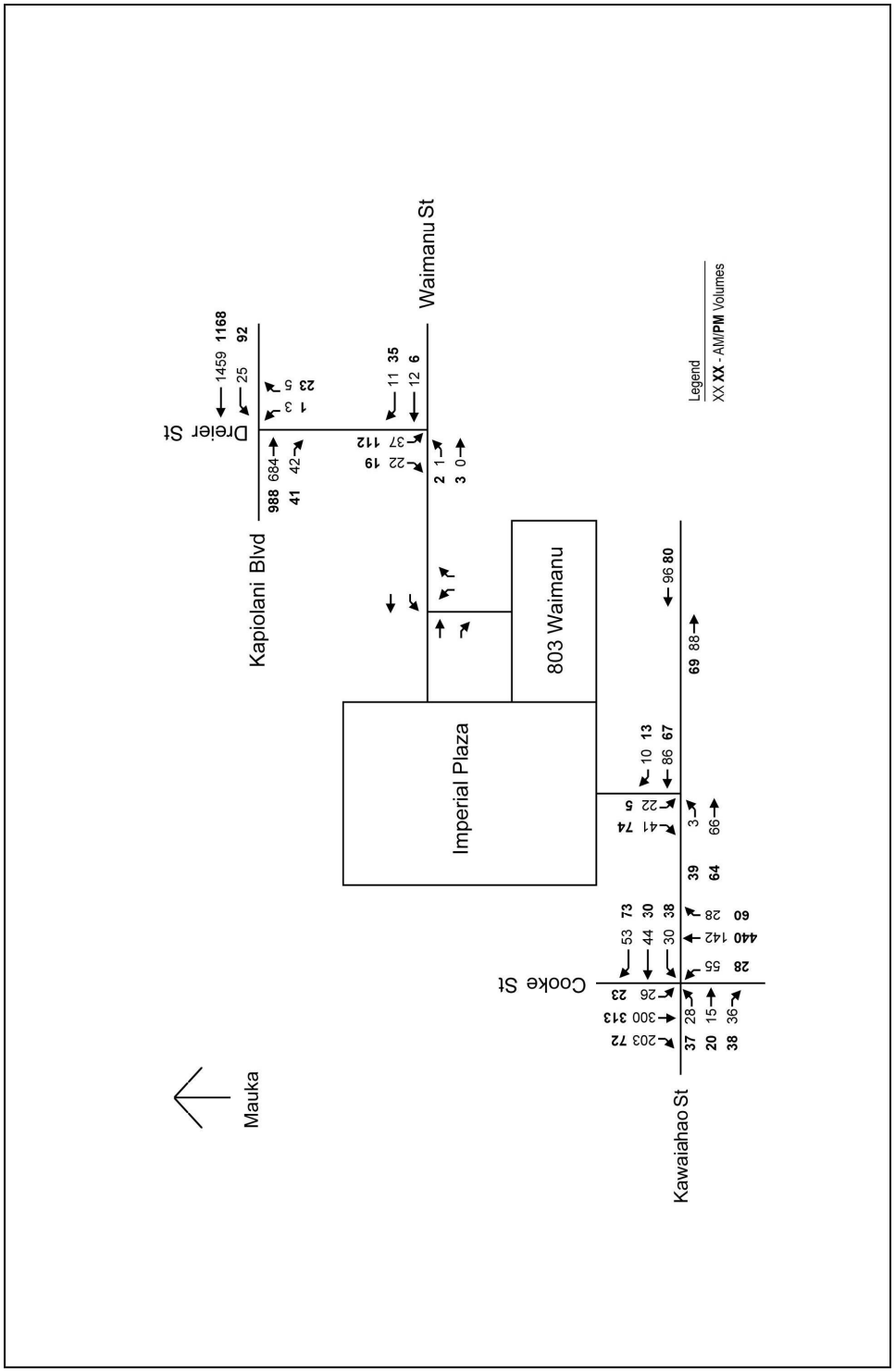


Figure 4 Existing Lane Configurations

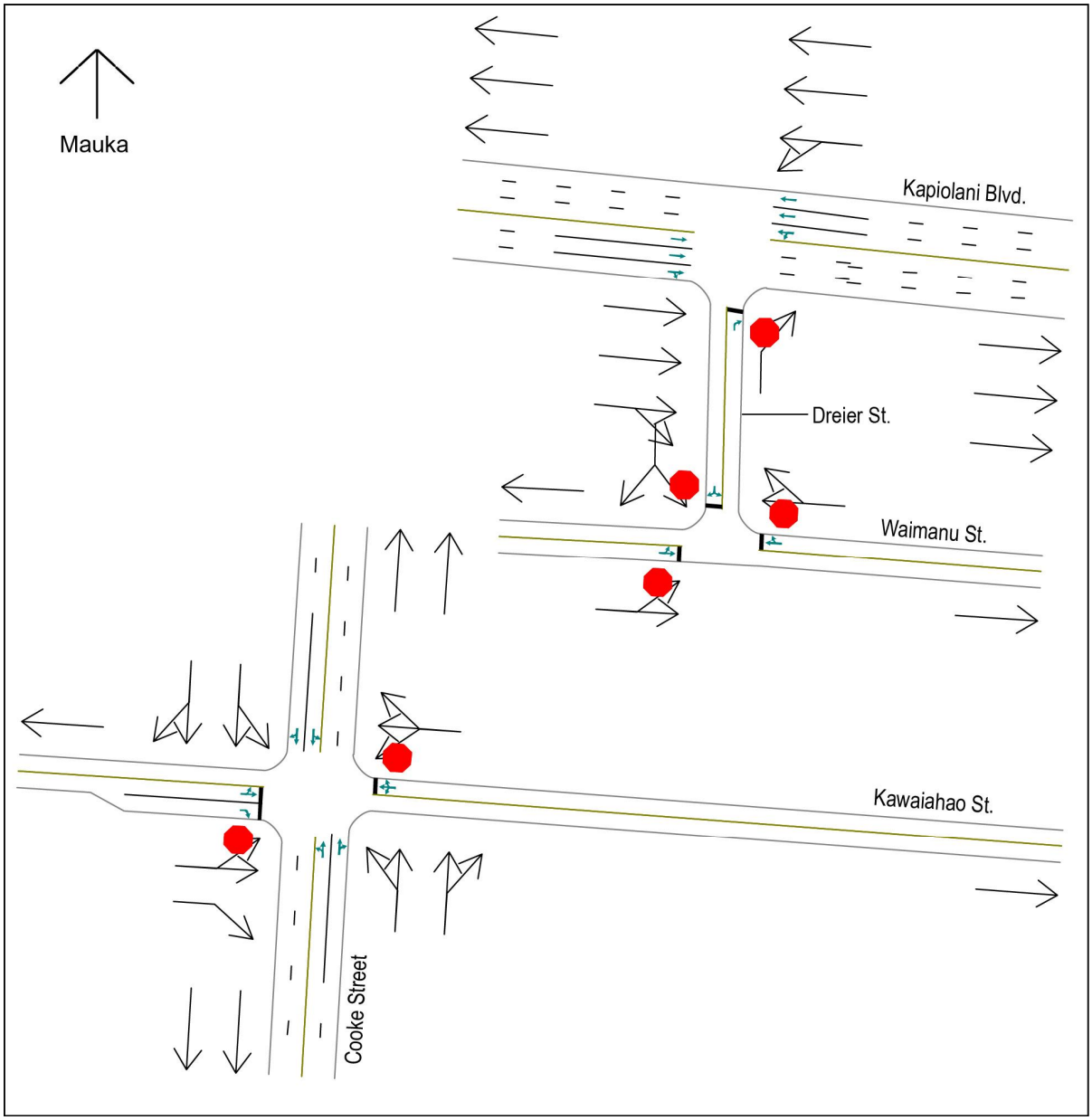


Table 1 Existing Level of Service

	AM		PM	
	LOS	Delay	LOS	Delay
Kapiolani Blvd/Dreier St	Unsignalized			
Dreier St mauka-bound right	B	11	B	15
Kapiolani Blvd Ewa-bound left	A	10	C	20
Cooke St/Kawaiahao St	Unsignalized			
Cooke St mauka-bound left	A	9	A	8
Cooke St makai-bound left	A	8	A	9
Kawaiahao St KKHD-bound left/through	C	22	D	25
Kawaiahao St KKHD-bound right	B	10	A	10
Kawaiahao St Ewa-bound left/through/right	C	18	C	23
Dreier St/Waimanu St	Unsignalized			
Dreier St makai-bound left/right	A	7	A	8
Waimanu St KKHD-bound left/through	A	7	A	7
Waimanu St Ewa-bound through/right	A	7	A	7

Delay expressed in seconds per vehicle.

Signal Warrant Analysis

Peak hour traffic signal warrant analysis was performed for the existing AM and PM peak hours at the intersection of Cooke Street and Kawaiahao Street. Using the Manual on Uniform Traffic Control Devices (MUTCD) 2009 Edition traffic signal warrant methodology, it was determined that the intersection does not satisfy the peak hour signal warrant during either peak hour. Warrant analysis is included in Appendix D.

Summary of Results

Overall the study area intersections operate acceptably in the existing condition. Two issues were identified under the existing conditions:

- Kapiolani Boulevard/Dreier Street – During the AM peak hour, the left-most Ewa-bound Kapiolani Boulevard lane would queue back from Cooke Street. As this lane serves as a de facto left turn lane at Cooke Street, the queuing was likely due to the downstream intersection. During the PM peak hour, town-bound congestion on Kapiolani Boulevard would prevent vehicles attempting to make the left turn to

Dreier Street from reaching the intersection to make the turn. During both peak hours, left turning vehicles were observed to have adequate gaps to complete the left turn despite the queuing.

- Cooke Street/Kawaiahao Street – During the PM peak period, queues originating from the mauka-bound Cooke Street approach at Kapiolani Boulevard were observed. These queues would go as far back as Kawaiahao Street and persisted beyond 5:30 PM, when on-street parking on Cooke Street was permitted. This in turn prevented vehicles from accessing Cooke Street from Kawaiahao Street. Vehicles at the Ewa-bound Kawaiahao Street approach were also hindered by on-street parking, which reduces the approach to a single approach lane.

Projected 2015 Conditions

803 Waimanu is projected to be completed in the Year 2015, which was used as the horizon year for future traffic analysis.

2015 Without Project

Historical data along Kapiolani Boulevard and Cooke Street shows negligible or negative growth. Therefore, the Kakaako Mauka Area Plan Supplemental Environmental Impact Statement Transportation Analysis report dated April 14, 2009 was consulted and a 1.15% annual growth rate was obtained. Projected 2015 background volumes were calculated by applying this growth rate to existing 2013 traffic volumes.

Figure 5 shows the projected 2015 peak hour turning movement volumes without project for each turning movement at the study area intersections.

2015 With Project

The With-Project scenario adds projected trips generated by the project to the Without-Project scenario. The assumed roadway networks are the same. 803 Waimanu consists of 153 dwelling units (DU) of residential condo/townhouse. The Institute of Transportation Engineers (ITE), Trip Generation, 9th Edition was used to estimate the number of trips generated by the project.

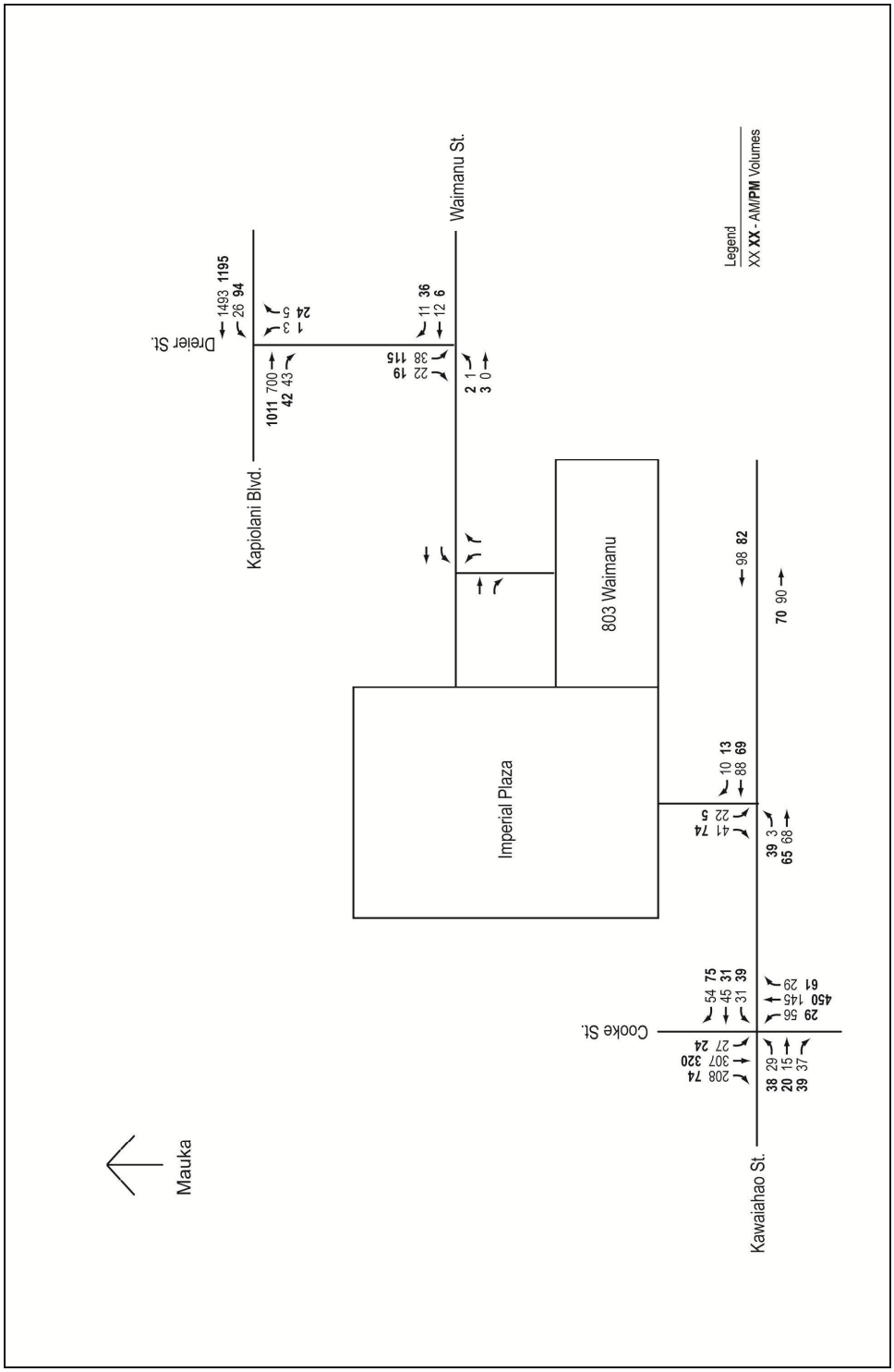
Table 2 summarizes the trips generated by the proposed 803 Waimanu development.

Table 2 Trip Generation

			AM Peak		PM Peak	
	ITE Code	Density	In	Out	In	Out
Residential Condo/Townhouse	230	153 DU	12	61	57	28

Trip Generation expressed in vehicles per hour

Figure 5 Projected 2015 Turning Movement Volumes Without Project



The traffic generated by the project was directionally distributed and assigned to the future roadway network using existing traffic patterns. The project-generated trip assignment was then added to the projected background traffic to obtain the total peak hour turning movement volumes shown in Figure 6.

Projected 2015 Operations

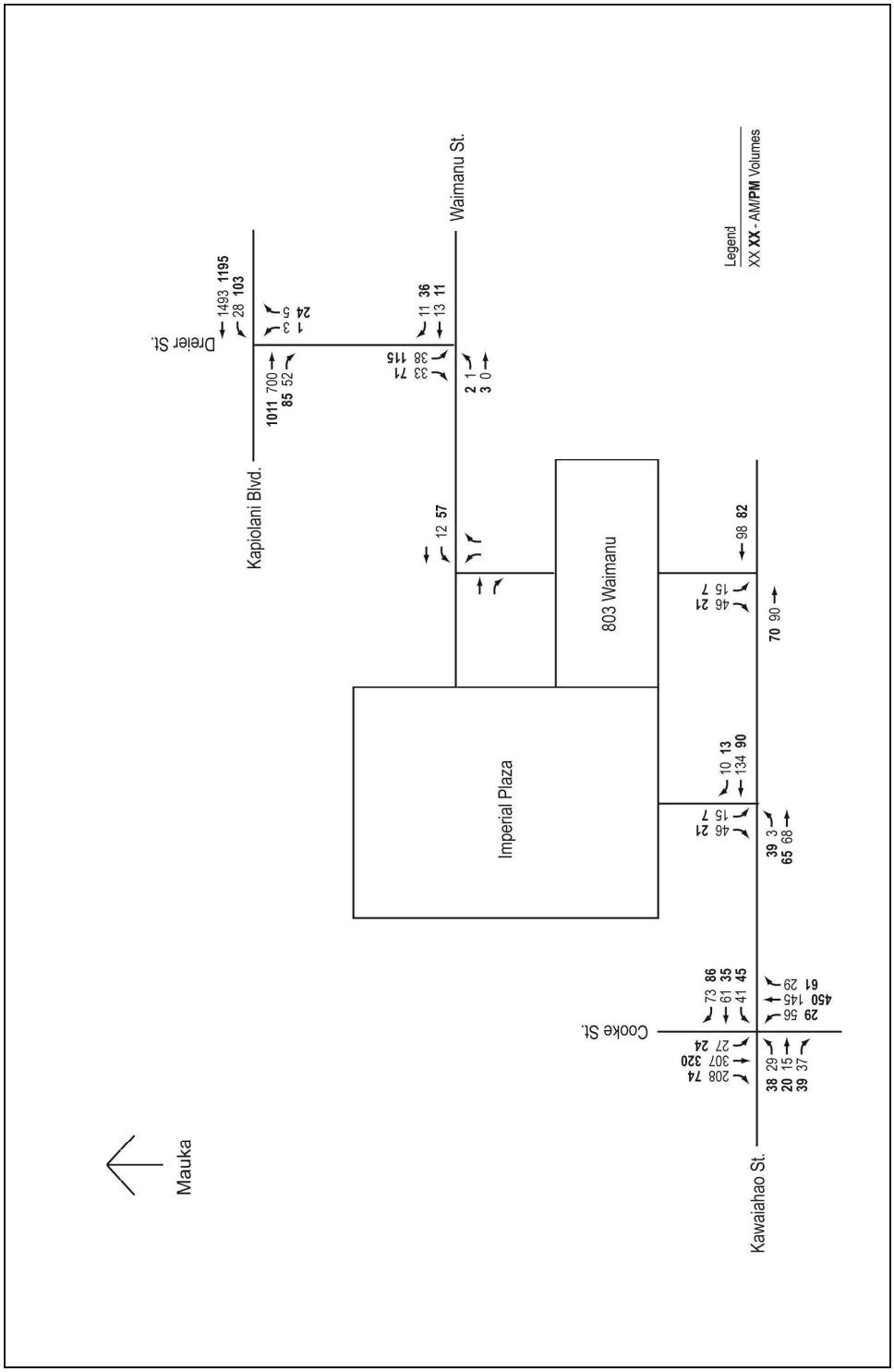
LOS analysis was performed for the study area intersections for the With and Without Project scenarios. The results of the analysis are shown in Table 3. As shown, the project has a minimal impact on the study area intersection operations.

Table 3 Projected 2015 Level of Service

	Without Project				With Project			
	AM		PM		AM		PM	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Kapiolani Blvd/Dreier St	Unsignalized				Unsignalized			
Dreier St mauka-bound right	B	11	B	15	B	11	C	15
Kapiolani Blvd Ewa-bound left	A	10	C	21	A	10	C	22
Cooke St/Kawaiahao St	Unsignalized				Unsignalized			
Cooke St mauka-bound left	A	9	A	8	A	9	A	8
Cooke St makai-bound left	A	8	A	9	A	8	A	9
Kawaiahao St KKHD-bound left/through	C	23	D	26	D	26	D	27
Kawaiahao St KKHD-bound right	B	10	A	10	B	10	A	10
Kawaiahao St Ewa-bound left/through/right	C	19	D	25	C	22	D	27
Dreier St/Waimanu St	Unsignalized				Unsignalized			
Dreier St makai-bound left/right	A	7	A	8	A	7	A	8
Waimanu St KKHD-bound left/through	A	7	A	7	A	7	A	8
Waimanu St Ewa-bound through/right	A	7	A	7	A	7	A	7

Delay expressed in seconds per vehicle.

Figure 6 Projected 2015 Turning Movement Volumes With Project



Signal Warrant Analysis

Peak Hour traffic signal warrant analysis was performed using projected 2015 AM and PM peak hour traffic volumes with and without project at the intersection of Cooke Street and Kawaiahao Street. Using the MUTCD traffic signal warrant methodology, it was determined that the intersection does not satisfy the peak hour signal warrant with or without the project. Warrant analysis is included in Appendix D.

Summary of Results

As shown in Table 3, the project does not significantly impact the operations at the study area intersections. Based on the analysis results and field observations, the following are recommended:

- Construct project access driveways on Waimanu Street and Kawaiahao Street:
    - One-way in driveway on Waimanu Street.
    - One-way out driveway on Kawaiahao Street. This driveway should be configured as a share left/right turn lane with stop control.
- Based on American Association of State Highway and Transportation Officials (AASHTO) sight distance guidelines, restrict parking on the mauka side of Kawaiahao Street fronting the property for 115' in each direction of the project driveway. This restriction would cover the area between the Imperial Plaza driveway and the Diamond Head property line of 803 Waimanu. Approximately 4 parking stalls would be displaced.
- Provide sidewalks on Waimanu Street and Kawaiahao Street for the areas fronting the project.
- It is not recommended to install a traffic signal at the intersection of Cooke Street and Kawaiahao Street. The existing two-way stop control should be preserved.

APPENDICES

APPENDIX A TRAFFIC COUNT DATA

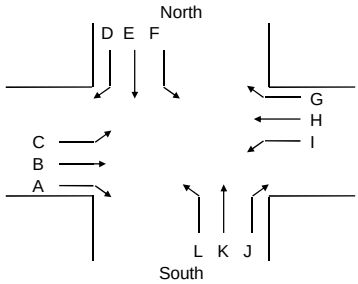
AM COUNT SHEET

Intersection: Cooke St and Kawaiahao St

Date: 11/6/2013

By: Phil Matsunaga

Weather: Clear



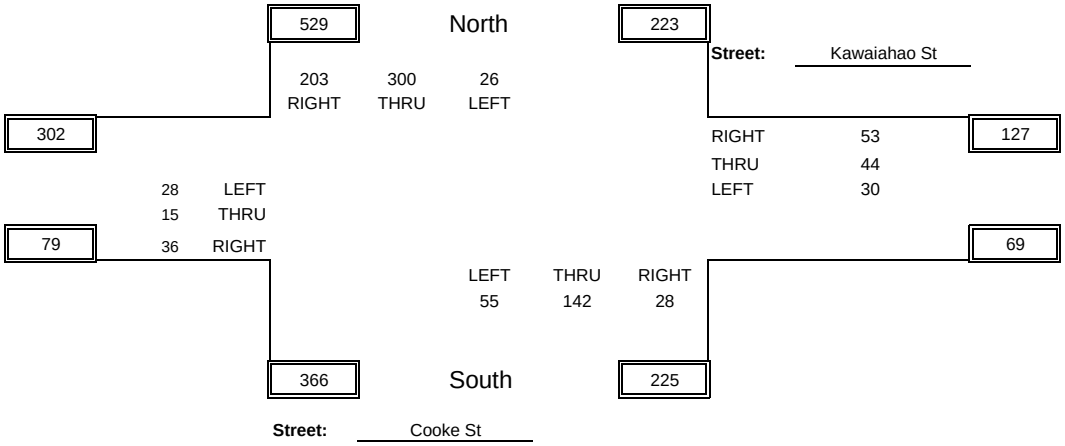
Street: Kawaiahao St

Street: Cooke St

TIME	A	B	C	D	E	F	G	H	I	J	K	L	Total Mvmt	Total Hour
6:30 AM - 6:45 AM	7	1	4	23	45	3	4	3	2	4	29	11	136	736
6:45 AM - 7:00 AM	8	0	3	37	61	2	8	5	1	8	30	7	170	854
7:00 AM - 7:15 AM	8	0	2	58	61	5	10	8	6	7	40	10	215	926
7:15 AM - 7:30 AM	10	3	9	39	70	3	15	13	2	4	36	11	215	948
7:30 AM - 7:45 AM	7	4	12	50	83	8	7	10	11	4	43	15	254	960
7:45 AM - 8:00 AM	9	3	3	53	81	3	16	12	4	6	38	14	242	
8:00 AM - 8:15 AM	10	4	7	49	74	4	17	12	10	11	28	11	237	
8:15 AM - 8:30 AM	10	4	6	51	62	11	13	10	5	7	33	15	227	
Phf	0.900	0.938	0.583	0.958	0.904	0.591	0.779	0.917	0.682	0.636	0.826	0.917	Peak	Phf
7:30 AM - 8:30 AM	36	15	28	203	300	26	53	44	30	28	142	55	960	0.945

Peak Hour

7:30 AM - 8:30 AM



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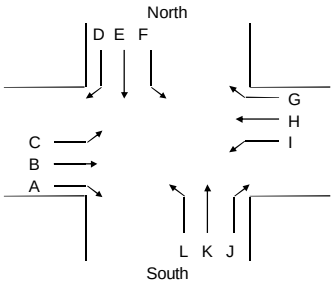
PM COUNT SHEET

Intersection: Cooke St and Kawaiahao St

Date: 11/6/2013

By: Phil Matsunaga

Weather: Clear



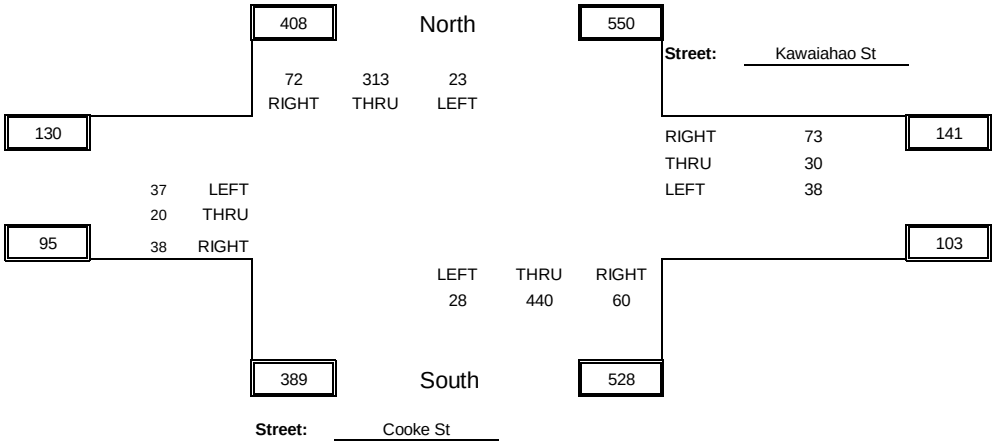
Street: Kawaiahao St

Street: Cooke St

TIME	A	B	C	D	E	F	G	H	I	J	K	L	Total Mvmt	Total Hour
4:00 PM - 4:15 PM	14	4	9	19	66	5	18	9	8	18	76	7	253	1133
4:15 PM - 4:30 PM	6	3	2	19	74	4	21	9	9	15	95	6	263	1172
4:30 PM - 4:45 PM	10	5	8	22	80	4	14	9	8	16	124	8	308	1198
4:45 PM - 5:00 PM	9	6	18	12	89	7	18	6	14	14	110	6	309	1162
5:00 PM - 5:15 PM	13	6	9	19	70	8	20	6	7	15	111	8	292	1085
5:15 PM - 5:30 PM	11	4	13	15	76	7	23	9	7	11	106	7	289	
5:30 PM - 5:45 PM	15	5	7	17	60	7	17	11	7	22	99	5	272	
5:45 PM - 6:00 PM	11	8	9	16	38	5	25	10	6	13	89	2	232	
Phf	0.731	0.833	0.514	0.818	0.879	0.719	0.869	0.833	0.679	0.938	0.887	0.875	Peak	Phf
4:15 PM - 5:15 PM	38	20	37	72	313	23	73	30	38	60	440	28	1172	0.948

Peak Hour

4:15 PM - 5:15 PM



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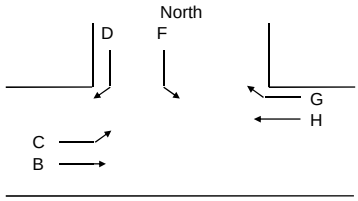
AM COUNT SHEET

Intersection: Kawaiahao St and Driveway

Date: 11/6/2013

By: Phil Matsunaga

Weather: Clear



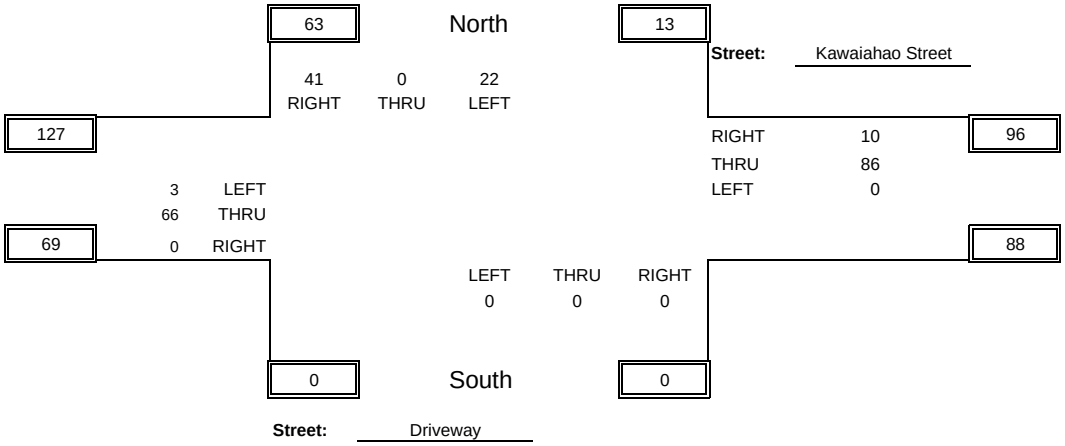
Street: Kawaiahao Street

South
Street: Driveway

TIME	A	B	C	D	E	F	G	H	I	J	K	L	Total Mvmt	Total Hour
6:30 AM - 6:45 AM	0	8	0	0	0	0	0	9	0	0	0	0	17	123
6:45 AM - 7:00 AM	0	10	0	4	0	1	0	10	0	0	0	0	25	156
7:00 AM - 7:15 AM	0	11	1	8	0	1	1	16	0	0	0	0	38	183
7:15 AM - 7:30 AM	0	8	2	10	0	3	0	20	0	0	0	0	43	208
7:30 AM - 7:45 AM	0	15	1	11	0	3	3	17	0	0	0	0	50	228
7:45 AM - 8:00 AM	0	12	0	13	0	5	3	19	0	0	0	0	52	
8:00 AM - 8:15 AM	0	18	1	11	0	4	1	28	0	0	0	0	63	
8:15 AM - 8:30 AM	0	21	1	6	0	10	3	22	0	0	0	0	63	
Phf	#DIV/0!	0.786	0.750	0.788	#DIV/0!	0.550	0.833	0.768	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	Peak	Phf
7:30 AM - 8:30 AM	0	66	3	41	0	22	10	86	0	0	0	0	228	0.905

Peak Hour

7:30 AM - 8:30 AM



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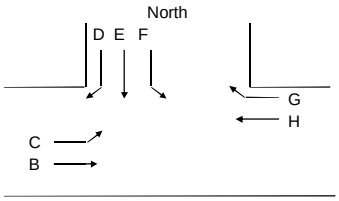
PM COUNT SHEET

Intersection: Kawaiahao St and Driveway

Date: 11/6/2013

By: Phil Matsunaga

Weather: Rainy



Street: Kawaiahao Street

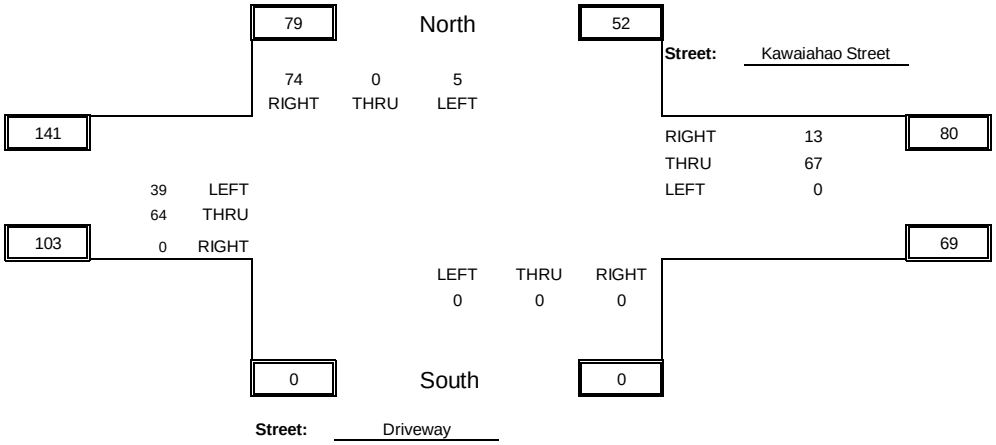
South

Street: Driveway

TIME	A	B	C	D	E	F	G	H	I	J	K	L	Total Mvmt	Total Hour
4:00 PM - 4:15 PM	0	16	11	14	0	6	1	21	0	0	0	0	69	263
4:15 PM - 4:30 PM	0	11	11	16	0	3	1	23	0	0	0	0	65	262
4:30 PM - 4:45 PM	0	16	9	17	0	1	3	14	0	0	0	0	60	264
4:45 PM - 5:00 PM	0	18	9	22	0	1	3	16	0	0	0	0	69	277
5:00 PM - 5:15 PM	0	19	10	19	0	0	6	14	0	0	0	0	68	280
5:15 PM - 5:30 PM	0	7	15	18	0	5	1	21	0	0	0	0	67	
5:30 PM - 5:45 PM	0	27	7	12	0	4	0	23	0	0	0	0	73	
5:45 PM - 6:00 PM	0	22	4	15	0	4	1	26	0	0	0	0	72	
Phf	#DIV/0!	0.842	0.886	0.841	#DIV/0!	0.417	0.542	0.728	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	Peak	Phf
4:15 PM - 5:15 PM	0	64	39	74	0	5	13	67	0	0	0	0	262	0.949

Peak Hour

4:15 PM - 5:15 PM



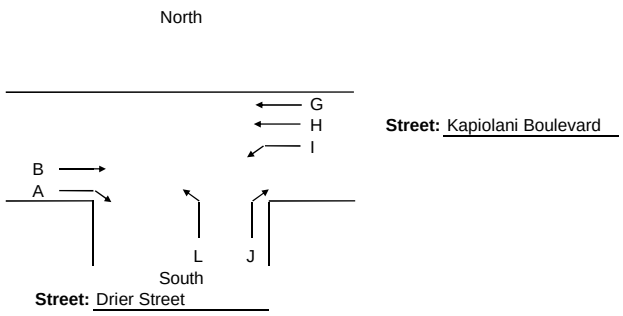
AM COUNT SHEET

Intersection: Kapiolani Blvd and Drier St

Date: 11/7/2013

By: David Miyasaki

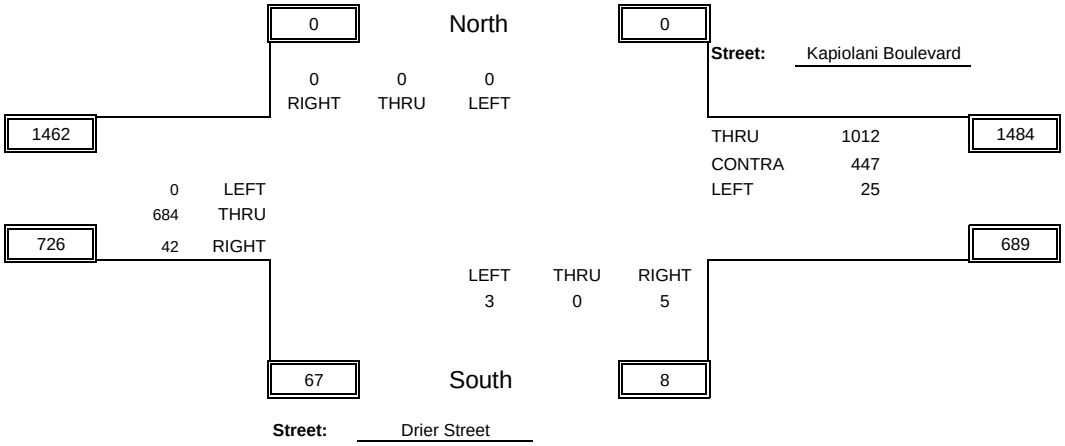
Weather: Cloudy



TIME	A	B	C	D	E	F	G	H	I	J	K	L	Total Mvmt	Total Hour
6:30 AM - 6:45 AM	8	86	0	0	0	0	135	48	5	1	0	0	283	1596
6:45 AM - 7:00 AM	3	114	0	0	0	0	143	74	8	1	0	1	344	1886
7:00 AM - 7:15 AM	6	99	0	0	0	0	217	131	5	0	0	1	459	2112
7:15 AM - 7:30 AM	11	160	0	0	0	0	230	104	4	1	0	0	510	2222
7:30 AM - 7:45 AM	3	139	0	0	0	0	295	132	4	0	0	0	573	2218
7:45 AM - 8:00 AM	11	183	0	0	0	0	257	113	4	2	0	0	570	
8:00 AM - 8:15 AM	11	188	0	0	0	0	246	115	8	1	0	0	569	
8:15 AM - 8:30 AM	17	174	0	0	0	0	214	87	9	2	0	3	506	
Phf	0.618	0.910	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.858	0.847	0.694	0.625	#DIV/0!	0.250	Peak	Phf
7:30 AM - 8:30 AM	42	684	0	0	0	0	1012	447	25	5	0	3	2218	0.968

Peak Hour

7:30 AM - 8:30 AM



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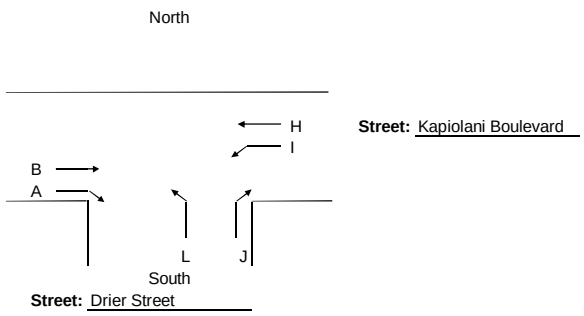
PM COUNT SHEET

Intersection: Kapiolani Blvd and Drier St

Date: 11/7/2013

By: David Miyasaki

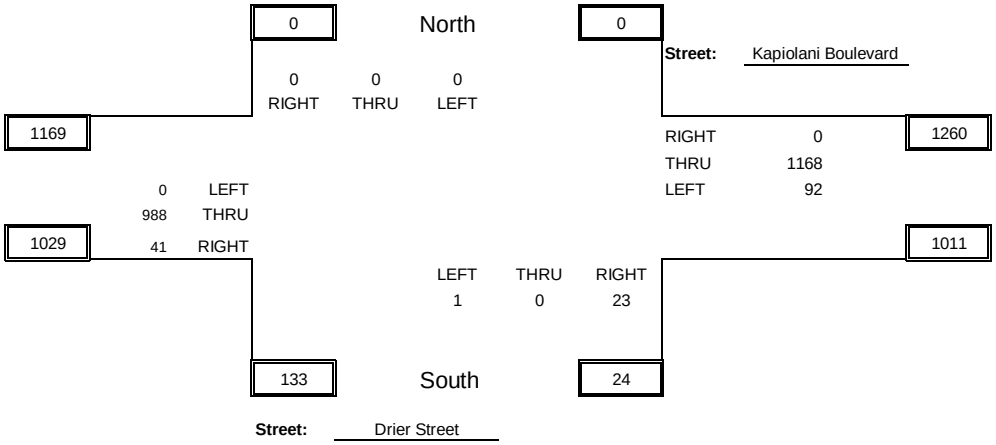
Weather: Cloudy



TIME	A	B	C	D	E	F	G	H	I	J	K	L	Total Mvmt	Total Hour
4:00 PM - 4:15 PM	8	228	0	0	0	0	0	253	29	4	0	0	522	2256
4:15 PM - 4:30 PM	12	248	0	0	0	0	0	302	27	5	0	1	595	2313
4:30 PM - 4:45 PM	13	253	0	0	0	0	0	309	25	4	0	0	604	2289
4:45 PM - 5:00 PM	12	236	0	0	0	0	0	269	11	7	0	0	535	2221
5:00 PM - 5:15 PM	4	251	0	0	0	0	0	288	29	7	0	0	579	2216
5:15 PM - 5:30 PM	10	267	0	0	0	0	0	259	30	5	0	0	571	
5:30 PM - 5:45 PM	8	269	0	0	0	0	0	247	8	4	0	0	536	
5:45 PM - 6:00 PM	10	272	0	0	0	0	0	238	4	6	0	0	530	
Phf	0.788	0.976	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.945	0.793	0.821	#DIV/0!	0.250	Peak	Phf
4:15 PM - 5:15 PM	41	988	0	0	0	0	0	1168	92	23	0	1	2313	0.957

Peak Hour

4:15 PM - 5:15 PM



PARSONS
BRINCKERHOFF

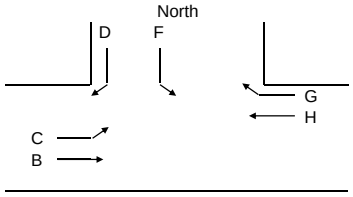
AM COUNT SHEET

Intersection: Waimanu St and Drier St

Date: 11/7/2013

By: Phil Matsunaga

Weather: Cloudy



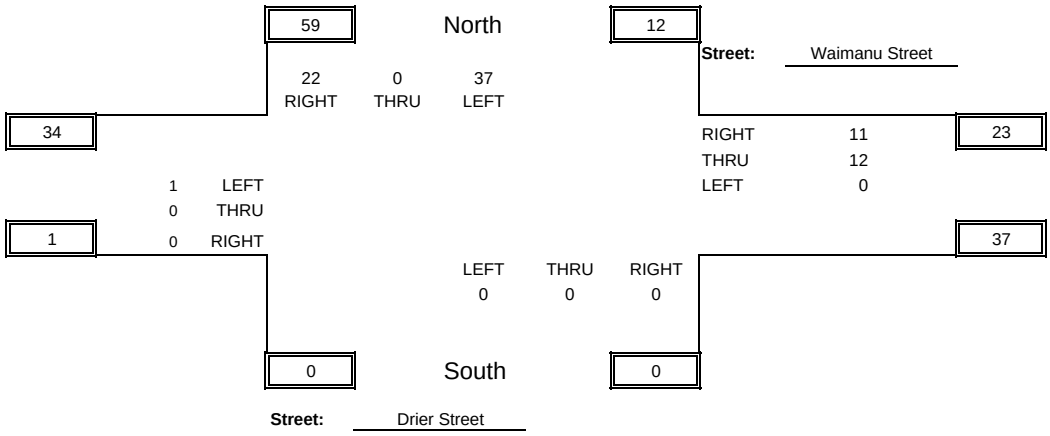
Street: Waimanu Street

South
Street: Drier Street

TIME	A	B	C	D	E	F	G	H	I	J	K	L	Total Mvmt	Total Hour
6:30 AM - 6:45 AM	0	0	0	2	0	8	3	1	0	0	0	0	14	59
6:45 AM - 7:00 AM	0	0	0	4	0	6	3	0	0	0	0	0	13	57
7:00 AM - 7:15 AM	0	0	0	7	0	5	3	1	0	0	0	0	16	63
7:15 AM - 7:30 AM	0	1	0	4	0	7	2	2	0	0	0	0	16	67
7:30 AM - 7:45 AM	0	0	0	2	0	6	2	2	0	0	0	0	12	83
7:45 AM - 8:00 AM	0	0	1	6	0	9	1	2	0	0	0	0	19	
8:00 AM - 8:15 AM	0	0	0	4	0	6	3	7	0	0	0	0	20	
8:15 AM - 8:30 AM	0	0	0	10	0	16	5	1	0	0	0	0	32	
Phf	#DIV/0!	#DIV/0!	0.250	0.550	#DIV/0!	0.578	0.550	0.429	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	Peak	Phf
7:30 AM - 8:30 AM	0	0	1	22	0	37	11	12	0	0	0	0	83	1.038

Peak Hour

7:30 AM - 8:30 AM



PARSONS
BRINCKERHOFF

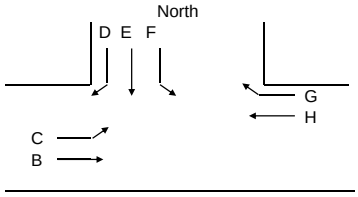
PM COUNT SHEET

Intersection: Waimanu St and Drier St

Date: 11/7/2013

By: Phil Matsunaga

Weather: Rainy



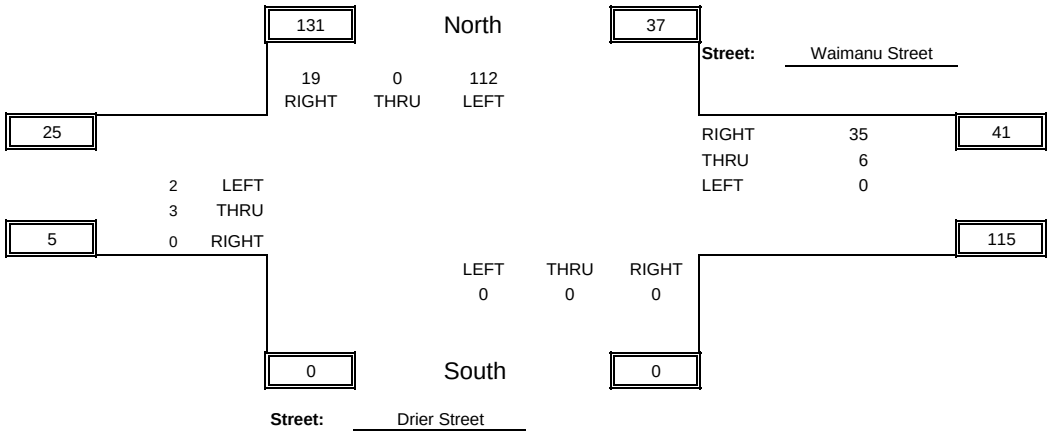
Street: Waimanu Street

South
Street: Drier Street

TIME	A	B	C	D	E	F	G	H	I	J	K	L	Total Mvmt	Total Hour
4:00 PM - 4:15 PM	0	0	0	10	0	22	9	2	0	0	0	0	43	172
4:15 PM - 4:30 PM	0	0	0	7	0	27	11	2	0	0	0	0	47	177
4:30 PM - 4:45 PM	0	1	0	5	0	29	7	0	0	0	0	0	42	186
4:45 PM - 5:00 PM	0	0	2	5	0	24	6	3	0	0	0	0	40	179
5:00 PM - 5:15 PM	0	2	0	2	0	32	11	1	0	0	0	0	48	170
5:15 PM - 5:30 PM	0	1	0	5	0	35	13	2	0	0	0	0	56	
5:30 PM - 5:45 PM	0	0	0	2	0	21	9	3	0	0	0	0	35	
5:45 PM - 6:00 PM	0	0	0	2	0	14	12	3	0	0	0	0	31	
Phf	#DIV/0!	0.375	0.250	0.679	#DIV/0!	0.875	0.795	0.500	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	Peak	Phf
4:15 PM - 5:15 PM	0	3	2	19	0	112	35	6	0	0	0	0	177	0.941

Peak Hour

4:15 PM - 5:15 PM



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APPENDIX B LEVEL OF SERVICE DEFINITIONS

The Highway Capacity Manual defines six Intersection Levels of Service (LOS), labeled A through F, from free flow to congested conditions.

For unsignalized intersections, the Highway Capacity Manual evaluates gaps in the major street traffic flow and calculates available gaps for left-turns across oncoming traffic and for the left and right-turns onto the major roadway from the minor street. Average control delay, based on these factors, is still used to define the levels of service.

LEVEL-OF-SERVICE A: Low control delay, up to 10 s/veh.

LEVEL-OF-SERVICE B: Control delay greater than 10 and up to 15 s/veh.

LEVEL-OF-SERVICE C: Control delay greater than 15 and up to 25 s/veh.

LEVEL-OF-SERVICE D: Control delay greater than 25 and up to 35 s/veh.

LEVEL-OF-SERVICE E: Control delay greater than 35 and up to 50 s/veh.

LEVEL-OF-SERVICE F: Control delay in excess of 50 s/veh.

APPENDIX C INTERSECTION CAPACITY ANALYSIS WORKSHEETS

Intersection	
Intersection Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	28	15	36	30	44	53	55	142	28	26	300	203
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	30	16	39	33	48	58	60	154	30	28	326	221

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	835	797	273	517	892	170	547	0	0	185	0	0
Stage 1	493	493	-	289	289	-	-	-	-	-	-	-
Stage 2	342	304	-	228	603	-	-	-	-	-	-	-
Follow-up Headway	3.519	4.019	3.319	3.519	4.019	3.319	2.22	-	-	2.218	-	-
Pot Capacity-1 Maneuver	273	319	725	455	281	873	1018	-	-	1390	-	-
Stage 1	527	546	-	718	672	-	-	-	-	-	-	-
Stage 2	672	662	-	755	487	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	203	289	725	383	255	873	1018	-	-	1390	-	-
Mov Capacity-2 Maneuver	203	289	-	383	255	-	-	-	-	-	-	-
Stage 1	492	530	-	671	628	-	-	-	-	-	-	-
Stage 2	542	618	-	672	472	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.7	18.3	2.1	0.4
HCM LOS	C	C		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1018	-	-	266	725	408	1390	-	-
HCM Lane V/C Ratio	0.059	-	-	0.225	0.036	0.338	0.02	-	-
HCM Control Delay (s)	8.757	0	-	22.4	10.2	18.3	7.644	0.1	-
HCM Lane LOS	A	A		C	B	C	A	A	
HCM 95th %tile Q(veh)	0.187	-	-	0.842	0.112	1.47	0.062	-	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	684	42	25	1459	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	743	46	27	1586	0	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	789	0	1455	395
Stage 1	-	-	-	-	766	-
Stage 2	-	-	-	-	689	-
Follow-up Headway	-	-	2.22	-	3.67	3.32
Pot Capacity-1 Maneuver	-	-	827	-	148	604
Stage 1	-	-	-	-	408	-
Stage 2	-	-	-	-	430	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	827	-	107	604
Mov Capacity-2 Maneuver	-	-	-	-	107	-
Stage 1	-	-	-	-	408	-
Stage 2	-	-	-	-	312	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	11
HCM LOS			B

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	604	-	-	827	-
HCM Lane V/C Ratio	0.009	-	-	0.033	-
HCM Control Delay (s)	11	-	-	9.501	0.8
HCM Lane LOS	B			A	A
HCM 95th %tile Q(veh)	0.027	-	-	0.102	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	7.1
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	0	12	11	37	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	0	13	12	40	24
Number of Lanes	0	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.3	6.9	7.2
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	100%	0%	63%
Vol Thru, %	0%	52%	0%
Vol Right, %	0%	48%	37%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	1	23	59
LT Vol	0	12	0
Through Vol	0	11	22
RT Vol	1	0	37
Lane Flow Rate	1	25	64
Geometry Grp	1	1	1
Degree of Util (X)	0.001	0.026	0.069
Departure Headway (Hd)	4.266	3.76	3.881
Convergence, Y/N	Yes	Yes	Yes
Cap	839	952	927
Service Time	2.293	1.784	1.888
HCM Lane V/C Ratio	0.001	0.026	0.069
HCM Control Delay	7.3	6.9	7.2
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.1	0.2

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	28	15	36	30	44	53	55	142	28	26	300	203
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	30	16	39	33	48	58	60	154	30	28	326	221

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	835	797	273	517	892	170	547	0	0	185	0	0
Stage 1	493	493	-	289	289	-	-	-	-	-	-	-
Stage 2	342	304	-	228	603	-	-	-	-	-	-	-
Follow-up Headway	3.519	4.019	3.319	3.519	4.019	3.319	2.22	-	-	2.218	-	-
Pot Capacity-1 Maneuver	273	319	725	455	281	873	1018	-	-	1390	-	-
Stage 1	527	546	-	718	672	-	-	-	-	-	-	-
Stage 2	672	662	-	755	487	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	203	289	725	383	255	873	1018	-	-	1390	-	-
Mov Capacity-2 Maneuver	203	289	-	383	255	-	-	-	-	-	-	-
Stage 1	492	530	-	671	628	-	-	-	-	-	-	-
Stage 2	542	618	-	672	472	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.7	18.3	2.1	0.4
HCM LOS	C	C		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1018	-	-	266	725	408	1390	-	-
HCM Lane V/C Ratio	0.059	-	-	0.225	0.036	0.338	0.02	-	-
HCM Control Delay (s)	8.757	0	-	22.4	10.2	18.3	7.644	0.1	-
HCM Lane LOS	A	A		C	B	C	A	A	
HCM 95th %tile Q(veh)	0.187	-	-	0.842	0.112	1.47	0.062	-	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	684	42	25	1459	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	743	46	27	1586	0	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	789	0	1455	395
Stage 1	-	-	-	-	766	-
Stage 2	-	-	-	-	689	-
Follow-up Headway	-	-	2.22	-	3.67	3.32
Pot Capacity-1 Maneuver	-	-	827	-	148	604
Stage 1	-	-	-	-	408	-
Stage 2	-	-	-	-	430	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	827	-	107	604
Mov Capacity-2 Maneuver	-	-	-	-	107	-
Stage 1	-	-	-	-	408	-
Stage 2	-	-	-	-	312	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	11
HCM LOS			B

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	604	-	-	827	-
HCM Lane V/C Ratio	0.009	-	-	0.033	-
HCM Control Delay (s)	11	-	-	9.501	0.8
HCM Lane LOS	B			A	A
HCM 95th %tile Q(veh)	0.027	-	-	0.102	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	7.1
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	0	12	11	37	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	0	13	12	40	24
Number of Lanes	0	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.3	6.9	7.2
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	100%	0%	63%
Vol Thru, %	0%	52%	0%
Vol Right, %	0%	48%	37%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	1	23	59
LT Vol	0	12	0
Through Vol	0	11	22
RT Vol	1	0	37
Lane Flow Rate	1	25	64
Geometry Grp	1	1	1
Degree of Util (X)	0.001	0.026	0.069
Departure Headway (Hd)	4.266	3.76	3.881
Convergence, Y/N	Yes	Yes	Yes
Cap	839	952	927
Service Time	2.293	1.784	1.888
HCM Lane V/C Ratio	0.001	0.026	0.069
HCM Control Delay	7.3	6.9	7.2
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.1	0.2

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	4.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	29	15	37	31	45	54	56	145	29	27	307	208
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	32	16	40	34	49	59	61	158	32	29	334	226

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	854	816	280	529	913	173	560	0	0	189	0	0
Stage 1	505	505	-	295	295	-	-	-	-	-	-	-
Stage 2	349	311	-	234	618	-	-	-	-	-	-	-
Follow-up Headway	3.519	4.019	3.319	3.519	4.019	3.319	2.22	-	-	2.218	-	-
Pot Capacity-1 Maneuver	265	311	718	446	273	870	1007	-	-	1385	-	-
Stage 1	519	539	-	713	668	-	-	-	-	-	-	-
Stage 2	666	658	-	749	480	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	194	281	718	373	246	870	1007	-	-	1385	-	-
Mov Capacity-2 Maneuver	194	281	-	373	246	-	-	-	-	-	-	-
Stage 1	484	522	-	665	623	-	-	-	-	-	-	-
Stage 2	533	613	-	663	465	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19.4	19.1	2.1	0.4
HCM LOS	C	C		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1007	-	-	256	718	396	1385	-	-
HCM Lane V/C Ratio	0.06	-	-	0.239	0.037	0.357	0.021	-	-
HCM Control Delay (s)	8.805	0	-	23.4	10.2	19.1	7.656	0.1	-
HCM Lane LOS	A	A		C	B	C	A	A	
HCM 95th %tile Q(veh)	0.193	-	-	0.909	0.116	1.585	0.065	-	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	700	43	26	1493	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	761	47	28	1623	0	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	808	0	1490	404
Stage 1	-	-	-	-	784	-
Stage 2	-	-	-	-	706	-
Follow-up Headway	-	-	2.22	-	3.67	3.32
Pot Capacity-1 Maneuver	-	-	813	-	141	596
Stage 1	-	-	-	-	399	-
Stage 2	-	-	-	-	421	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	813	-	92	596
Mov Capacity-2 Maneuver	-	-	-	-	92	-
Stage 1	-	-	-	-	399	-
Stage 2	-	-	-	-	274	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	11.1
HCM LOS			B

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	596	-	-	813	-
HCM Lane V/C Ratio	0.009	-	-	0.035	-
HCM Control Delay (s)	11.1	-	-	9.587	1.1
HCM Lane LOS	B			A	A
HCM 95th %tile Q(veh)	0.028	-	-	0.108	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	7.1
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	0	12	11	38	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	0	13	12	41	24
Number of Lanes	0	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.3	6.9	7.2
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	100%	0%	63%
Vol Thru, %	0%	52%	0%
Vol Right, %	0%	48%	37%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	1	23	60
LT Vol	0	12	0
Through Vol	0	11	22
RT Vol	1	0	38
Lane Flow Rate	1	25	65
Geometry Grp	1	1	1
Degree of Util (X)	0.001	0.026	0.07
Departure Headway (Hd)	4.268	3.762	3.886
Convergence, Y/N	Yes	Yes	Yes
Cap	838	951	925
Service Time	2.295	1.786	1.893
HCM Lane V/C Ratio	0.001	0.026	0.07
HCM Control Delay	7.3	6.9	7.2
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.1	0.2

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	38	20	39	39	31	75	29	450	61	24	320	74
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	41	22	42	42	34	82	32	489	66	26	348	80

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	764	1058	214	822	1065	278	428	0	0	555	0	0
Stage 1	440	440	-	585	585	-	-	-	-	-	-	-
Stage 2	324	618	-	237	480	-	-	-	-	-	-	-
Follow-up Headway	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Capacity-1 Maneuver	293	223	791	266	221	719	1128	-	-	1011	-	-
Stage 1	566	576	-	464	496	-	-	-	-	-	-	-
Stage 2	662	479	-	745	553	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	215	207	791	219	205	719	1128	-	-	1011	-	-
Mov Capacity-2 Maneuver	215	207	-	219	205	-	-	-	-	-	-	-
Stage 1	543	556	-	445	476	-	-	-	-	-	-	-
Stage 2	523	459	-	654	534	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	21.9	25	0.6	0.6
HCM LOS	C	D		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1128	-	-	245	791	334	1011	-	-
HCM Lane V/C Ratio	0.028	-	-	0.315	0.036	0.472	0.026	-	-
HCM Control Delay (s)	8.283	0.2	-	26.3	9.7	25	8.655	0.1	-
HCM Lane LOS	A	A		D	A	D	A	A	
HCM 95th %tile Q(veh)	0.086	-	-	1.299	0.111	2.416	0.079	-	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	3.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1011	42	94	1195	0	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1099	46	102	1299	0	26

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1145	0	1846	572
Stage 1	-	-	-	-	1122	-
Stage 2	-	-	-	-	724	-
Follow-up Headway	-	-	3.12	-	3.82	3.92
Pot Capacity-1 Maneuver	-	-	333	-	113	397
Stage 1	-	-	-	-	204	-
Stage 2	-	-	-	-	401	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	333	-	113	397
Mov Capacity-2 Maneuver	-	-	-	-	113	-
Stage 1	-	-	-	-	204	-
Stage 2	-	-	-	-	401	-

Approach	EB	WB	NB
HCM Control Delay, s	0	6.6	14.7
HCM LOS			B

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	397	-	-	333	-
HCM Lane V/C Ratio	0.066	-	-	0.307	-
HCM Control Delay (s)	14.7	-	-	20.525	5.5
HCM Lane LOS	B			C	A
HCM 95th %tile Q(veh)	0.21	-	-	1.272	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	2	3	6	36	115	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	3	7	39	125	21
Number of Lanes	0	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.4	6.9	7.9
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	40%	0%	86%
Vol Thru, %	60%	14%	0%
Vol Right, %	0%	86%	14%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	5	42	134
LT Vol	3	6	0
Through Vol	0	36	19
RT Vol	2	0	115
Lane Flow Rate	5	46	146
Geometry Grp	1	1	1
Degree of Util (X)	0.006	0.047	0.166
Departure Headway (Hd)	4.305	3.677	4.11
Convergence, Y/N	Yes	Yes	Yes
Cap	821	961	875
Service Time	2.384	1.751	2.124
HCM Lane V/C Ratio	0.006	0.048	0.167
HCM Control Delay	7.4	6.9	7.9
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.1	0.6

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	6.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	29	15	37	41	61	73	56	145	29	27	307	208
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	32	16	40	45	66	79	61	158	32	29	334	226

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	873	816	280	529	913	173	560	0	0	189	0	0
Stage 1	505	505	-	295	295	-	-	-	-	-	-	-
Stage 2	368	311	-	234	618	-	-	-	-	-	-	-
Follow-up Headway	3.519	4.019	3.319	3.519	4.019	3.319	2.22	-	-	2.218	-	-
Pot Capacity-1 Maneuver	257	311	718	446	273	870	1007	-	-	1385	-	-
Stage 1	519	539	-	713	668	-	-	-	-	-	-	-
Stage 2	651	658	-	749	480	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	172	281	718	373	246	870	1007	-	-	1385	-	-
Mov Capacity-2 Maneuver	172	281	-	373	246	-	-	-	-	-	-	-
Stage 1	484	522	-	665	623	-	-	-	-	-	-	-
Stage 2	493	613	-	663	465	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20.8	22.2	2.1	0.4
HCM LOS	C	C		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1007	-	-	236	718	396	1385	-	-
HCM Lane V/C Ratio	0.06	-	-	0.259	0.037	0.48	0.021	-	-
HCM Control Delay (s)	8.805	0	-	25.5	10.2	22.2	7.656	0.1	-
HCM Lane LOS	A	A		D	B	C	A	A	
HCM 95th %tile Q(veh)	0.193	-	-	1.005	0.116	2.525	0.065	-	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	700	52	28	1493	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	761	57	30	1623	0	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	817	0	1499	409
Stage 1	-	-	-	-	789	-
Stage 2	-	-	-	-	710	-
Follow-up Headway	-	-	2.22	-	3.67	3.32
Pot Capacity-1 Maneuver	-	-	807	-	139	592
Stage 1	-	-	-	-	397	-
Stage 2	-	-	-	-	419	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	807	-	86	592
Mov Capacity-2 Maneuver	-	-	-	-	86	-
Stage 1	-	-	-	-	397	-
Stage 2	-	-	-	-	261	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.3	11.1
HCM LOS			B

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	592	-	-	807	-
HCM Lane V/C Ratio	0.009	-	-	0.038	-
HCM Control Delay (s)	11.1	-	-	9.636	1.1
HCM Lane LOS	B			A	A
HCM 95th %tile Q(veh)	0.028	-	-	0.117	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	7.1
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	0	13	11	38	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	0	14	12	41	36
Number of Lanes	0	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.3	6.9	7.2
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	100%	0%	54%
Vol Thru, %	0%	54%	0%
Vol Right, %	0%	46%	46%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	1	24	71
LT Vol	0	13	0
Through Vol	0	11	33
RT Vol	1	0	38
Lane Flow Rate	1	26	77
Geometry Grp	1	1	1
Degree of Util (X)	0.001	0.028	0.082
Departure Headway (Hd)	4.29	3.796	3.809
Convergence, Y/N	Yes	Yes	Yes
Cap	833	943	944
Service Time	2.32	1.821	1.819
HCM Lane V/C Ratio	0.001	0.028	0.082
HCM Control Delay	7.3	6.9	7.2
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.1	0.3

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	38	20	39	45	35	86	29	450	61	24	320	74
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	41	22	42	49	38	93	32	489	66	26	348	80

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	767	1058	214	822	1065	278	428	0	0	555	0	0
Stage 1	440	440	-	585	585	-	-	-	-	-	-	-
Stage 2	327	618	-	237	480	-	-	-	-	-	-	-
Follow-up Headway	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Capacity-1 Maneuver	292	223	791	266	221	719	1128	-	-	1011	-	-
Stage 1	566	576	-	464	496	-	-	-	-	-	-	-
Stage 2	660	479	-	745	553	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	206	207	791	219	205	719	1128	-	-	1011	-	-
Mov Capacity-2 Maneuver	206	207	-	219	205	-	-	-	-	-	-	-
Stage 1	543	556	-	445	476	-	-	-	-	-	-	-
Stage 2	507	459	-	654	534	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	22.4	27.6	0.6	0.6
HCM LOS	C	D		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1128	-	-	239	791	335	1011	-	-
HCM Lane V/C Ratio	0.028	-	-	0.323	0.036	0.539	0.026	-	-
HCM Control Delay (s)	8.283	0.2	-	27.1	9.7	27.6	8.655	0.1	-
HCM Lane LOS	A	A		D	A	D	A	A	
HCM 95th %tile Q(veh)	0.086	-	-	1.342	0.111	3.028	0.079	-	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	4.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1011	85	103	1195	0	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1099	92	112	1299	0	26

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1191	0	1888	596
Stage 1	-	-	-	-	1145	-
Stage 2	-	-	-	-	743	-
Follow-up Headway	-	-	3.12	-	3.82	3.92
Pot Capacity-1 Maneuver	-	-	316	-	108	383
Stage 1	-	-	-	-	197	-
Stage 2	-	-	-	-	392	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	316	-	108	383
Mov Capacity-2 Maneuver	-	-	-	-	108	-
Stage 1	-	-	-	-	197	-
Stage 2	-	-	-	-	392	-

Approach	EB	WB	NB
HCM Control Delay, s	0	7.3	15.1
HCM LOS			C

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	383	-	-	316	-
HCM Lane V/C Ratio	0.068	-	-	0.354	-
HCM Control Delay (s)	15.1	-	-	22.514	6
HCM Lane LOS	C			C	A
HCM 95th %tile Q(veh)	0.218	-	-	1.552	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	2	3	11	36	115	71
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	3	12	39	125	77
Number of Lanes	0	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.5	7.1	8.1
HCM LOS	A	A	A

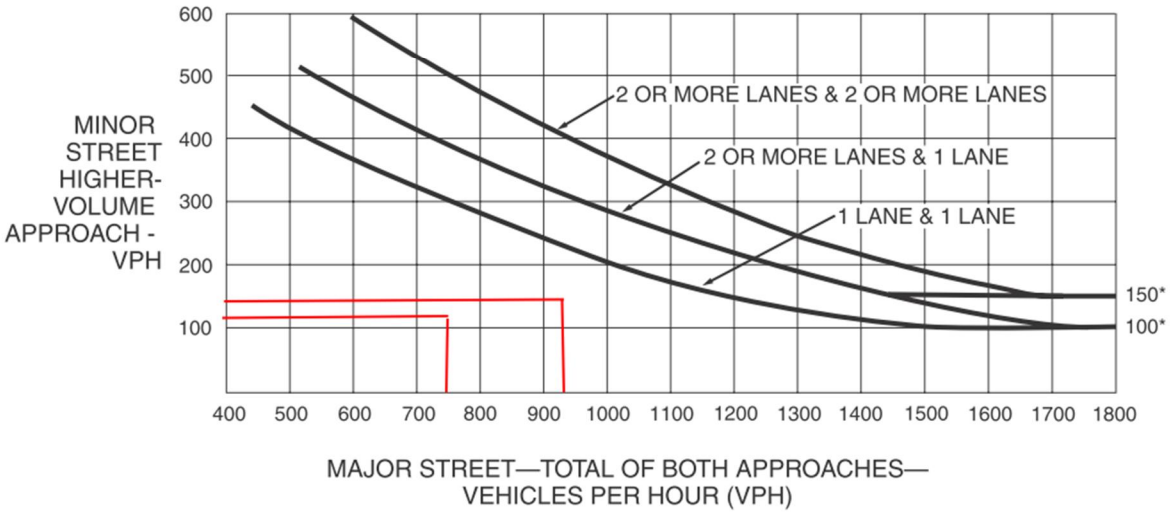
Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	40%	0%	62%
Vol Thru, %	60%	23%	0%
Vol Right, %	0%	77%	38%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	5	47	186
LT Vol	3	11	0
Through Vol	0	36	71
RT Vol	2	0	115
Lane Flow Rate	5	51	202
Geometry Grp	1	1	1
Degree of Util (X)	0.007	0.054	0.22
Departure Headway (Hd)	4.41	3.832	3.926
Convergence, Y/N	Yes	Yes	Yes
Cap	800	921	916
Service Time	2.498	1.913	1.947
HCM Lane V/C Ratio	0.006	0.055	0.221
HCM Control Delay	7.5	7.1	8.1
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.2	0.8

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

APPENDIX D TRAFFIC SIGNAL WARRANTS

Figure 4C-3. Warrant 3, Peak Hour



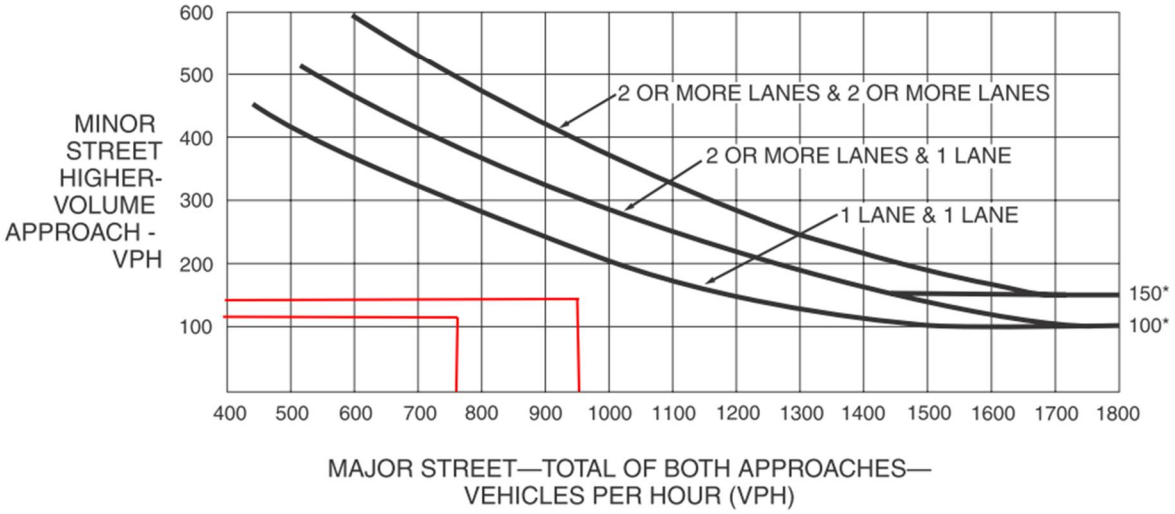
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Existing – Peak hour traffic signal warrant analysis

	AM	PM
MAJOR	754	936
EB	127	141

This intersection does not warrant a traffic signal during the AM or PM peak hour.

Figure 4C-3. Warrant 3, Peak Hour



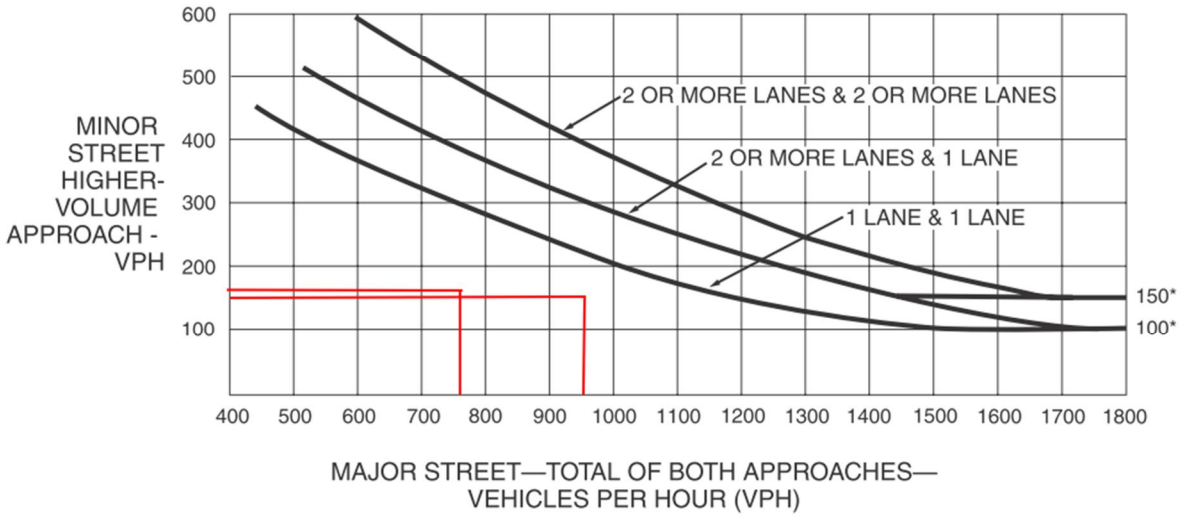
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Future without project – Peak hour traffic signal warrant analysis

	AM	PM
MAJOR	772	958
EB	130	145

This intersection does not warrant a traffic signal during the AM or PM peak hour.

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Future with project – Peak hour traffic signal warrant analysis

	AM	PM
MAJOR	772	958
EB	175	164

This intersection does not warrant a traffic signal during the AM or PM peak hour.