



ERICKSEN TOWNHOMES
TRAFFIC IMPACT ANALYSIS

BAINBRIDGE ISLAND, WA



RECEIVED

AUG 29 2018

Planning and
Community Development

Prepared for: Mr. John Bierly, AIA
Wing Point Properties, LLC
321 High School Rd NE, Ste D3
Bainbridge Island, WA 98110

August 2018

ERICKSEN TOWNHOMES
TRAFFIC IMPACT ANALYSIS

TABLE OF CONTENTS

1.	Introduction.....	3
2.	Project Description	3
3.	Existing Conditions	5
4.	Future Traffic Demand.....	9
5.	Conclusions and Mitigation.....	15
Appendix.....		16

LIST OF TABLES

1.	Existing Level of Service	7
2.	Accident History.....	9
3.	Project Trip Generation	9
4.	Forecast Peak Hour Level of Service	14

LIST OF FIGURES

1.	Site Vicinity – Aerial View	3
2.	Site Plan	4
3.	Existing Peak Hour Volumes	6
4.	Trip Distribution – Peak Hours.....	11
5.	Forecast 2021 Peak Hour Volumes.....	12
6.	Forecast 2035 Peak Hour Volumes.....	13

ERICKSEN TOWNHOMES TRAFFIC IMPACT ANALYSIS

1. INTRODUCTION

The main goals of this study focus on the assessment of existing roadway conditions and forecasts of newly generated project traffic. The first task includes the review of general roadway information on the roadways serving the site, baseline conditions, and entering sight distance data. Forecasts of future traffic and dispersion patterns on the street system are then determined using established trip generation and distribution techniques. As a final step, appropriate conclusions and mitigation measures are defined if needed.

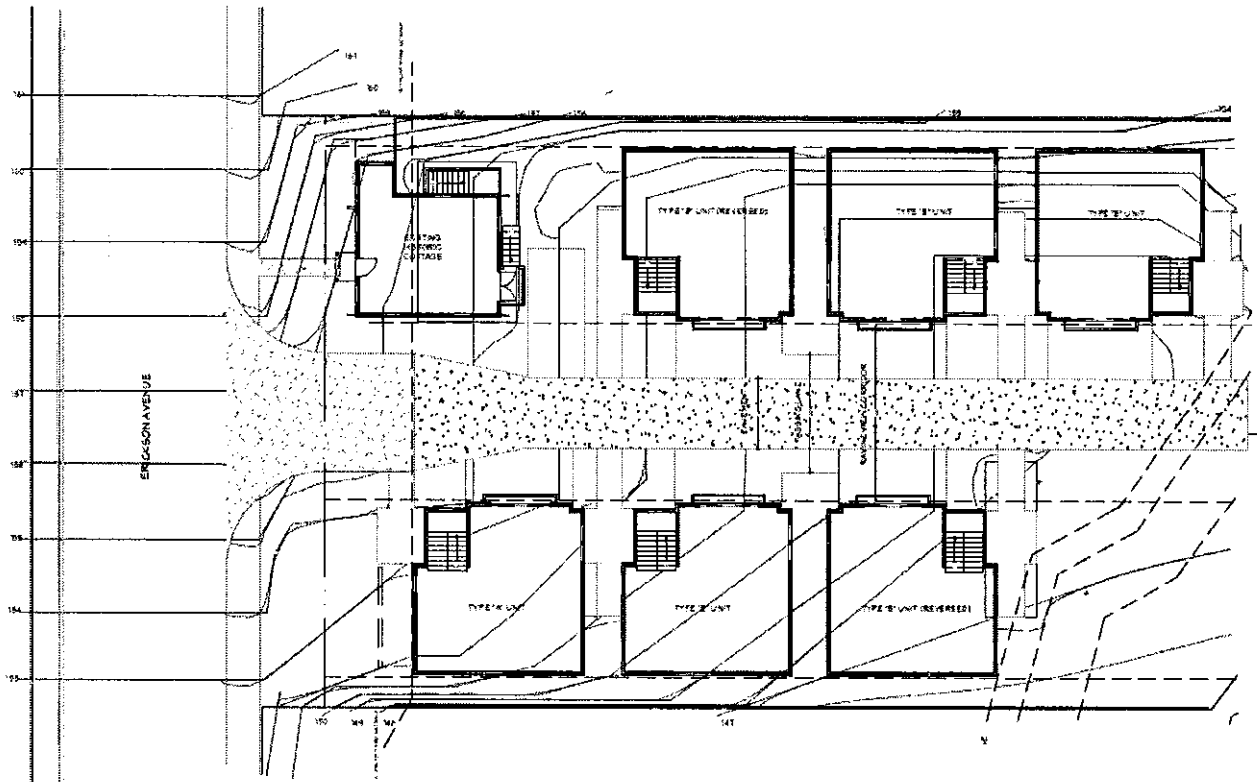
2. PROJECT DESCRIPTION

Erickson Townhomes proposes for the construction of 6 new residential units in the City of Bainbridge Island. The subject site is situated on the east side of Ericksen Avenue NE on a 0.44-acre parcel (262502-2-051-2009). The property is presently occupied with one existing cottage on the northwest corner and is proposed to remain for a total of 7 units accessing the site. The general vicinity of the site location and adjacent roadway network is illustrated in Figure 1 below.

Access to the property is proposed via one driveway extending east from Ericksen Avenue NE. A site plan illustrating the overall configuration of the project is presented in Figure 2. Horizon years of 2021 (buildout) and 2035 (long-range) were assessed to analyze future roadway conditions and potential project impacts, if any.

Figure 1: Site Vicinity – Aerial View





HEATH & ASSOCIATES
TRAFFIC AND CIVIL ENGINEERING

ERICKSEN TOWNHOMES
SITE PLAN
FIGURE 2

3. EXISTING CONDITIONS

3.1 Surrounding Roadway System

Roadways serving the site consist of arterials and local residential roadways. The key streets in the vicinity and described below.

Ericksen Avenue NE: is a two-lane, north-south collector that borders the west side of the project frontage. The roadway has a posted speed limit of 25 mph with 10-foot wide travel lanes. Bicycle facilities are offered along either side of the roadway and sidewalks are present on the west side.

Wyatt Way NE: is a two-lane, east-west collector that is located to the south of the site. The roadway has a posted speed limit of 25 mph with 10-foot wide travel lanes. Sidewalks are generally present on at least one side of the roadway. On-street parking is offered in some areas.

Knechtel Way NE: is a two lane, east-west local access that is located to the north of the site. Travel lanes are approximately 10 feet in width with curb, gutter, and sidewalk available. The local roadway has a speed limit of 25 mph and on-street parking is offered in some areas.

3.2 Existing Peak Hour Volumes and Patterns

Field data for this study was obtained and collected in August of 2018. Traffic counts were taken at the primary intersections of interest – Ericksen Avenue NE / Wyatt Way NE and Ericksen Avenue NE / Knechtel Way NE – which would receive the bulk of vehicular impacts. Field data was collected from 7:00 a.m. to 9:00 a.m. and from 4:00 p.m. to 6:00 p.m. to capture roadway volumes at peak conditions. The one-hour (peak hour) reflecting highest overall volumes for each a.m. and p.m. scenario is then used for capacity and delay analysis to depict worst case conditions. Figure 3 on the following page shows the existing weekday peak hour volumes at the intersections of study.

3.3 Roadway Improvements

A review of the 2017 to 2022 City of Bainbridge Island Capital Improvement Program indicates an improvement project is planned in the vicinity.

Wyatt Way Reconstruction Phase 1

The scope of this project intends to reconstruct and improve the existing Wyatt Way segment from Madison Avenue to Lovell Avenue. Included are sidewalk and bicycle facilities on both sides of the street and capacity improvements to the intersection of Wyatt Way/Madison Avenue. Intersection improvements are planned with either signalization or a roundabout.

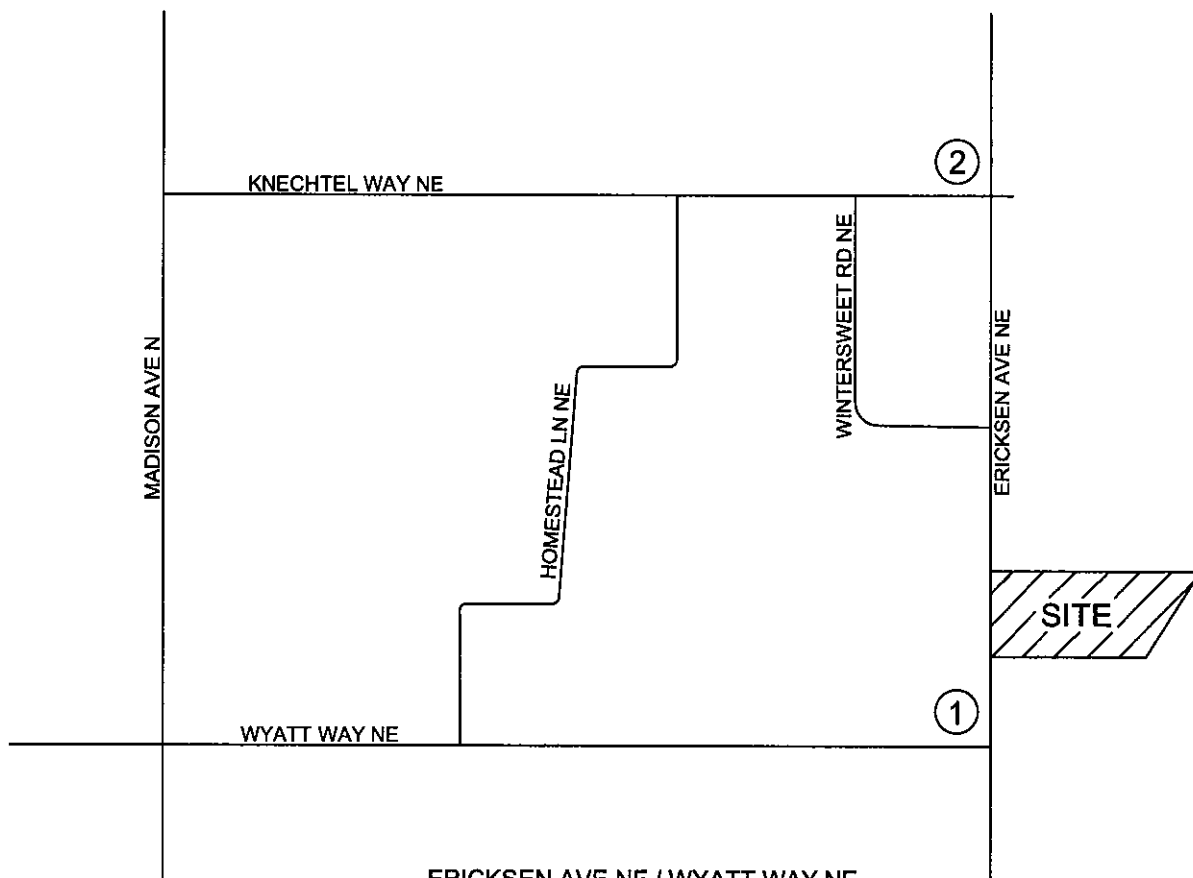
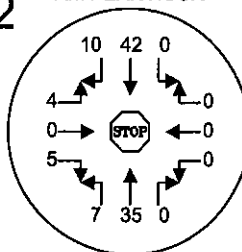
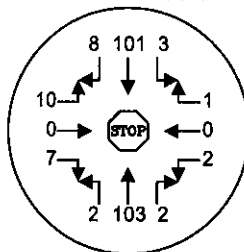


ERICKSEN AVE NE / KNECHTEL WAY NE

PM PEAK HOUR

2

AM PEAK HOUR

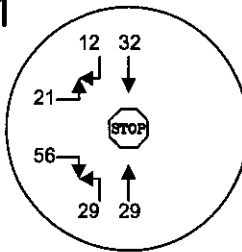
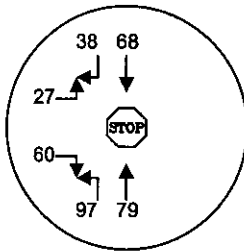


ERICKSEN AVE NE / WYATT WAY NE

PM PEAK HOUR

1

AM PEAK HOUR



HEATH & ASSOCIATES
TRAFFIC AND CIVIL ENGINEERING

ERICKSEN TOWNHOMES
EXISTING PEAK HOUR VOLUMES
FIGURE 3

3.4 Existing Level of Service

Peak hour delays were determined through the use of the *Highway Capacity Manual* 6th Edition. Capacity analysis is used to determine level of service (LOS) which is an established measure of congestion for transportation facilities. The range¹ for intersection level of service is LOS A to LOS F with the former indicating the best operating conditions with low control delays and the latter indicating the worst conditions with heavy control delays. Detailed descriptions of intersection LOS are given in the 2016 Highway Capacity Manual. Level of service calculations were made through the use of the Synchro 10 analysis program. Table 1 below summarizes LOS calculated for the key intersections serving the site.

Table 1
Existing Level of Service
Delays given in seconds per vehicle

Erickson Avenue NE at	Control	AM Peak Hour		PM Peak Hour	
		LOS	Delay	LOS	Delay
Wyatt Way NE	AWSC	A	7.3	A	8.5
Knechtel Way NE	Stop	A	9.1	A	9.8

(AWSC: All-Way Stop Control)

As shown in the table, existing peak hour delays operate at LOS A for all scenarios indicating intersections operating satisfactorily. Drivers would experience minimal wait times before proceeding through the intersection control. The subject property is situated within the City's Winslow area which has an adopted LOS standard of LOS D for arterials and collectors and LOS C for local roadways². Based on the analysis above intersections currently meet the City standards.

¹ Signalized Intersections - Level of Service

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

Highway Capacity Manual, 6th Edition

Stop Controlled Intersections - Level of Service

Level of Service	Control Delay per Vehicle (sec)
	Vehicle (sec)
A	≤ 10
B	> 10 and ≤ 15
C	> 15 and ≤ 25
D	> 25 and ≤ 35
E	> 35 and ≤ 50
F	> 50

² Island Wide Transportation Study, Chapter 3: Operations and Mobility. Bainbridge Island, 2016

3.5 Pedestrian and Bicycle Activity

A significant amount of non-motorist activity was observed during field data acquisition. Notably, Ericksen Avenue NE was shown to support high volumes of bicycle activity; however, the roadway offers 4-5-foot wide shoulders along either side to minimize conflicts between motorists. In addition, the surrounding area offers a robust network of pedestrian infrastructure. The vehicular volumes captured in the field data suggests no adverse impacts are anticipated to pedestrian and bicycle safety and/or level of service.

3.6 Public Transit

A review of the Kitsap Transit regional bus schedule indicates transit is provided to the area. The nearest stop is located at the intersection of Madison Avenue N / Knechtel Way NE via Routes 90, 98 and 99 approximately 1,200 feet to the west of the subject site. Route 90 provides service from the Bainbridge Island Ferry Terminal to the North Viking Transit Center in Poulsbo from 6:15 AM to 7:50 PM. Route 98 provides service from the Fort Ward & State Park Entrance intersection to the Bainbridge Island Ferry from 5:42 AM to 8:10 PM. Route 99 provides service from the Eagle Harbor Drive NE & New Sweden Road NE intersection to the Bainbridge Island Ferry from 4:29 AM to 7:27 PM. Refer to the Kitsap Transit schedule for detailed route information. In addition, the Bainbridge Island Ferry Terminal is located approximately half a mile from the site.

3.7 Sight Distance at Access Driveways

As shown in the site plan (see Figure 2), one entrance on Ericksen Avenue NE is proposed for all 7 units. Assessments of the approximate driveway location were made to determine whether adequate entering sight (ESD) can be met for project traffic to safely enter the roadway. Sight distance requirements were obtained from the *American Association of State Highway and Transportation Officials* (AASHTO) standards for left- and right-turn movements. Based on the 25 mph speed limit on Ericksen Avenue NE, 280 and 240 feet of unobstructed view would be needed for left- and right turn movements, respectively. Preliminary examinations indicate that sight distance would be met at the proposed access location with distances exceeding 300 feet in either direction. Slight vertical grades existing along Ericksen Avenue NE become the limiting factor when looking north. No safety issues are detected with the proposed entrance layout.

3.8 Accident History

A list of the recorded accident history from 2015 through July of 2018 for the intersections of study was provided by WSDOT. A summary of the accident totals per year is given below in Table 2.

Table 2
Accident History
2015-2018 (WSDOT)

Ericksen Avenue NE at	2015	2016	2017	2018 Thru July	Avg/yr
Wyatt Way NE	2	0	0	1	0.84
Knechtel Way NE	1	1	0	0	0.56

Reviewing descriptions from the report summaries indicate the types of crashes were in the form of: left turn maneuvers (2), parking related (2), and pedestrian related (1). No fatalities were recorded. The collision with the pedestrian was attributed to driver inattention and failure to grant right-of-way to the pedestrian as opposed to inefficient visibility or other roadway design aspect. The number of recorded accidents does not suggest any safety-related inefficiencies with respect to the surrounding roadway network.

4. FUTURE TRAFFIC DEMAND

4.1 Trip Generation

Trip generation is used to determine the magnitude of project impacts on the surrounding street system. Data presented in this report was taken from the Institute of Transportation Engineer's publication *Trip Generation*, 10th Edition. The designated land use for the site is defined as Single-Family Detached Housing (LUC 210). Dwelling units was used at the independent variable and average rates were used for trip determination. Data for the peak hours are shown below in Table 3. It should be noted that the existing unit on-site was include in calculations. Given are average weekday daily traffic (AWDT), AM peak hour, and PM peak hour volumes.

Table 3
Project Trip Generation

Land Use	Units	AWDT	AM Peak-Hour Trips			PM Peak-Hour Trips		
			In	Out	Total	In	Out	Total
Residential	7	66	1	4	5	4	3	7

4.2 Trip Distribution

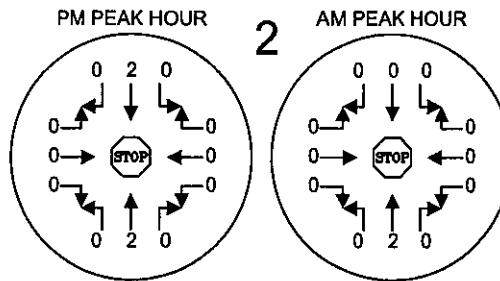
Trip distribution describes the process by which project generated trips are dispersed on the street network surrounding the site. The specific destinations and origins of the generated traffic primarily influences the key intersections, which will effectively receive the bulk of project impacts. The trips generated by the project are expected to follow the general trip pattern as shown in Figure 4. Percentages are primarily based on existing travel patterns identified from the field counts and location of nearby major arterials. Roughly half of the trips are anticipated to travel to/from the north and half to/from the south.

4.3 Future Traffic Volumes With and Without the Project

A horizon year of 2021 was used for future traffic delay analysis to reflect conditions at the time of project buildout. A long-term horizon year of 2035 was used to assess, if any, potential adverse impacts to the intersections of study. Forecast background volumes were derived by applying a one percent compound annual growth rate to the existing volumes shown in Figure 3. This growth rate has been determined appropriate for the area and has been used in similar projects in the past. Forecast 2021 peak hour volumes with the addition of project traffic are illustrated in Figure 5. Forecast 2035 peak hour volumes with project traffic are illustrated in Figure 6.



ERICKSEN AVE NE / KNECHTEL WAY NE



MADISON AVE N

KNECHTEL WAY NE

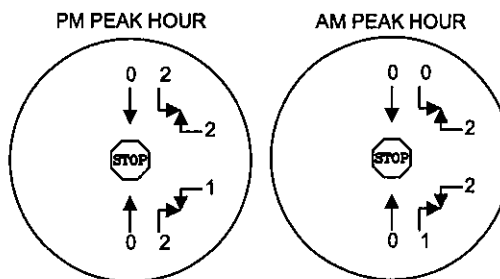
②

50%

WINTERSWEET RD NE

ERICKSEN AVE NE

PROJECT ENTRANCE



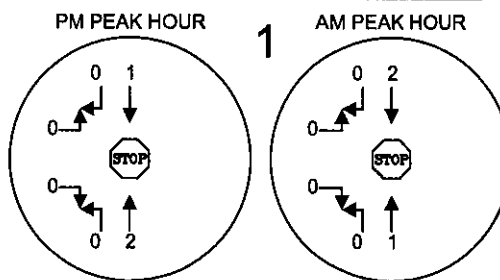
①

50%

SITE

WYATT WAY NE

ERICKSEN AVE NE / WYATT WAY NE



AM PEAK HOUR TRIPS

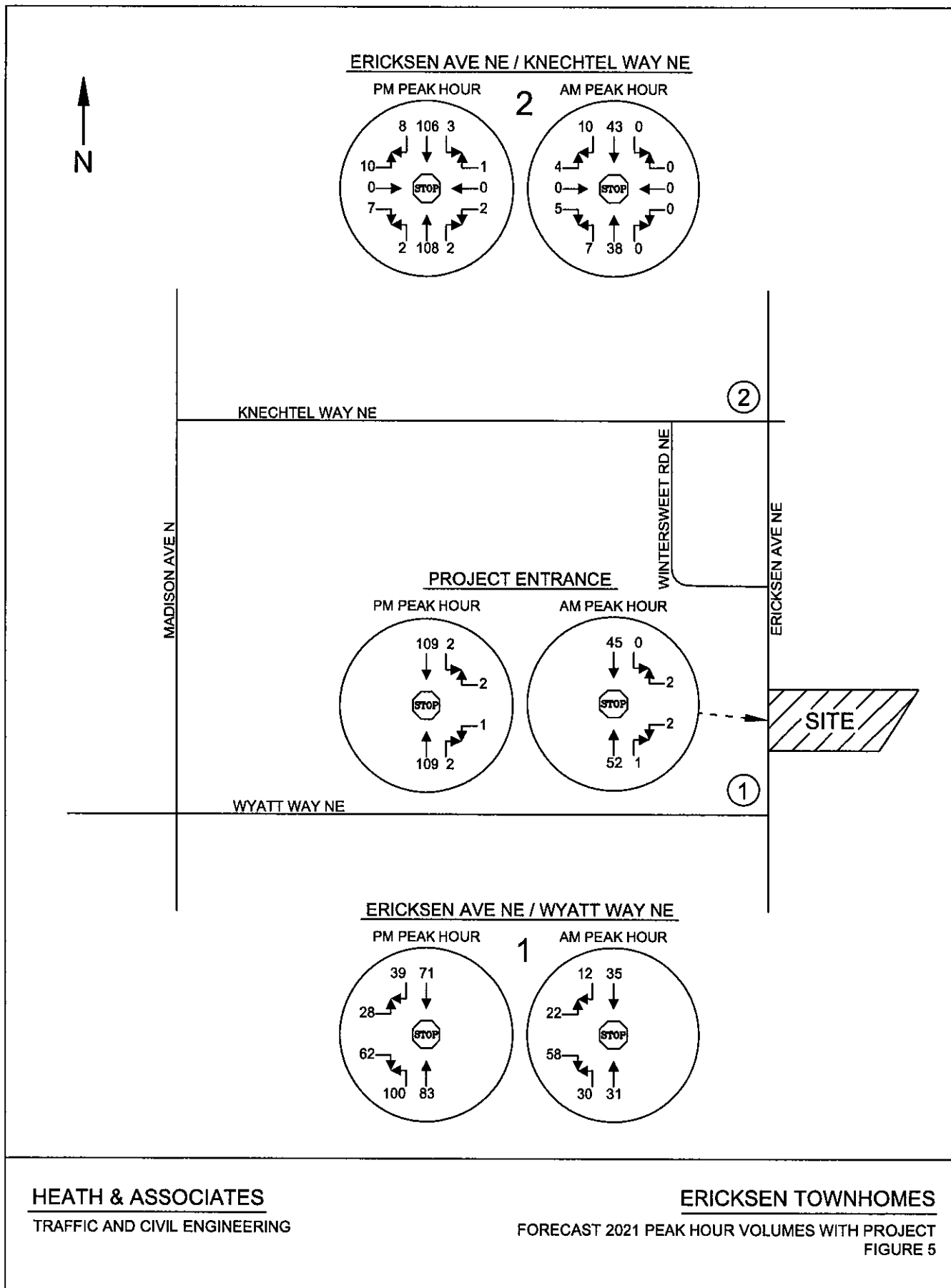
INBOUND: 1 VPH
OUTBOUND: 4 VPH

PM PEAK HOUR TRIPS

INBOUND: 4 VPH
OUTBOUND: 3 VPH

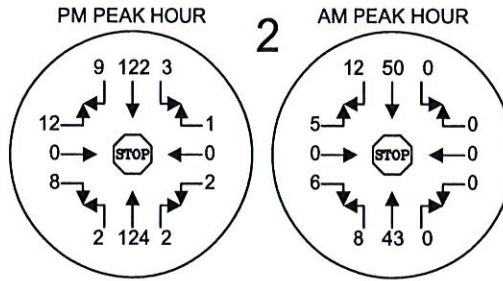
HEATH & ASSOCIATES
TRAFFIC AND CIVIL ENGINEERING

ERICKSEN TOWNHOMES
TRIP DISTRIBUTION - PEAK HOURS
FIGURE 4





ERICKSEN AVE NE / KNECHTEL WAY NE



MADISON AVE N

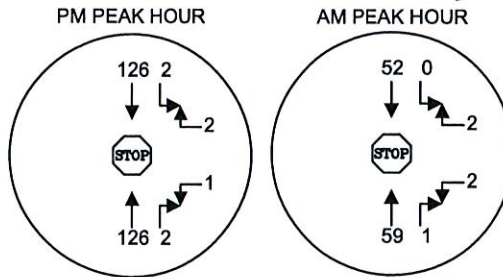
KNECHTEL WAY NE

②

WINTERSWEET RD NE

ERICKSEN AVE NE

PROJECT ENTRANCE

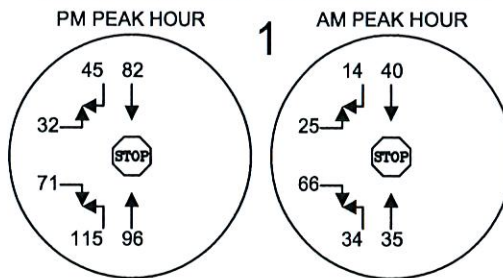


SITE

①

WYATT WAY NE

ERICKSEN AVE NE / WYATT WAY NE



HEATH & ASSOCIATES
TRAFFIC AND CIVIL ENGINEERING

ERICKSEN TOWNHOMES
FORECAST 2035 PEAK HOUR VOLUMES WITH PROJECT
FIGURE 6

4.4 Future Level of Service

Level of service analyses were made of the future AM and PM peak hour volumes with project-generated trips for the 2021 and 2035 horizon years. This analysis once again involved the use of the Synchro 10 analysis program. Delays for the key intersections under future conditions are shown below in Table 4 for the 2021 build-out scenario the long-term 2035 horizon year.

Table 4
Forecast Level of Service with Project
Delays given in seconds per vehicle

Ericksen Avenue NE at	Horizon Year	Control	AM Peak Hour		PM Peak Hour	
			LOS	Delay	LOS	Delay
Wyatt Way NE	2021	AWSC	A	7.4	A	8.7
	2035		A	7.4	A	9.1
Knechtel Way NE	2021	Stop	A	9.2	A	9.9
	2035		A	9.3	B	10.1
Project Access	2021	Stop	A	8.9	A	9.5
	2035		A	9.0	A	9.7

(AWSC: All-Way Stop Control)

As shown in Table 4, forecast delays are anticipated to remain mild for all scenarios and intersections of study. The intersections are shown to have adequate capacity to support the incoming project's vehicular demands with little to no adverse impacts. Forecast LOS will continue meeting City standards.

4.5 Turn Lane Warrants

Left turn warrants were analyzed at the project's entrance on Ericksen Avenue NE to determine if storage capacity is needed for left turning vehicles. Procedures described in WSDOT's Design Manual (Figure 1310-7a) were used to ascertain left turn requirements under forecast 2035 PM peak hour conditions. Based on the assessment criteria, a left turn lane *would not be warranted*. The applicable warrant sheet has been included in the appendix.

5. CONCLUSIONS AND MITIGATION

Ericksen Townhomes proposes for the construction of 6 new residential units in the City of Bainbridge Island. The subject property is located on the east side of Ericksen Avenue NE on parcel 262502-2-051-2009. An existing dwelling unit will remain for a total of 7 units on-site. Access is proposed via one entrance on Ericksen Avenue NE as shown in the site plan (Figure 2). The project is anticipated to generate approximately 66 average weekday daily trips, 5 AM peak hour and 7 PM peak hour trips.

Existing and Forecast 2021 & 2035 delay analyses indicate that all intersections of study will remain meeting the City's LOS standards. The adjacent roadways are shown to have sufficient capacity to support the project's demands. Similarly, the proposed access is anticipated to operate at LOS A or better for all scenarios. A left turn lane on Ericksen Avenue NE at the project's entrance is not warranted based on 2035 PM peak hour volumes.

Based on the findings of the report the recommended mitigation for the site is as follows:

1. Pay traffic impacts fees per net new dwelling unit to the City of Bainbridge Island per Ordinance No. 2015-07. Exact fees and calculations will be determined by the City.

No other mitigation is identified at this time.

ERICKSEN TOWNHOMES
TRAFFIC IMPACT ANALYSIS

APPENDIX

LEVEL OF SERVICE

The following are excerpts from the *2010 Highway Capacity Manual - Transportation Research Board Special Report 209*.

Quality of service requires quantitative measures to characterize operational conditions within a traffic stream. Level of service (LOS) is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.

Six LOS are defined for each type of facility that has analysis procedures available. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each level of service represents a range of operating conditions and the driver's perception of those conditions.

Level-of-Service definitions

The following definitions generally define the various levels of service for arterials.

Level of service A represents primarily free-flow operations at average travel speeds, usually about 90 percent of the free-flow speed for the arterial classification. Vehicles are seldom impeded in their ability to maneuver in the traffic stream. Delay at signalized intersections is minimal.

Level of service B represents reasonably unimpeded operations at average travel speeds, usually about 70 percent of the free-flow speed for the arterial classification. The ability to maneuver in the traffic stream is only slightly restricted and delays are not bothersome.

Level of service C represents stable operations; however, ability to maneuver and change lanes in midblock locations may be more restricted than in LOS B, and longer queues, adverse signal coordination, or both may contribute to lower average travel speeds of about 50 percent of the average free-flow speed for the arterial classification.

Level of service D borders on a range in which small increases in flow may cause substantial increases in approach delay and hence decreases in arterial speed. LOS D may be due to adverse signal progression, inappropriate signal timing, high volumes, or some combination of these. Average travel speeds are about 40 percent of free-flow speed.

Level of service E is characterized by significant delays and average travel speeds of one-third the free-flow speed or less. Such operations are caused by some combination of

adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.

Level of service F characterizes arterial flow at extremely low speeds, from less than one-third to one-quarter of the free-flow speed. Intersection congestion is likely at critical signalized locations, with long delays and extensive queuing.

These definitions are general and conceptual in nature, and they apply primarily to uninterrupted flow. Levels of service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them.

For each type of facility, levels of service are defined based on one or more operational parameters that best describe operating quality for the subject facility type. While the concept of level of service attempts to address a wide range of operating conditions, limitations on data collection and availability make it impractical to treat the full range of operational parameters for every type of facility. The parameters selected to define levels of service for each facility type are called "measures of effectiveness" or "MOE's", and represent available measures that best describe the quality of operation on the subject facility type.

Each level of service represents a range of conditions, as defined by a range in the parameters given. Thus, a level of service is not a discrete condition, but rather a range of conditions for which boundaries are established.

Heath & Associates, Inc.
2214 Tacoma Road
Puyallup, WA 98371

Project Name: Ericksen Townhomes

Intersection: Wyatt Way NE & Ericksen Ave

Jurisdiction: City of Bainbridge

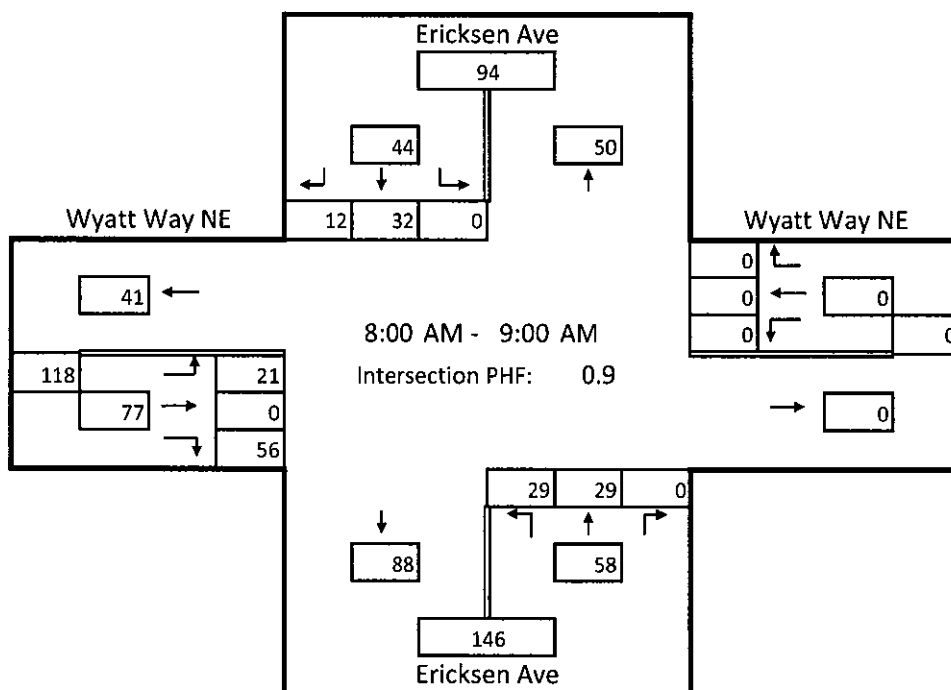
Date of Count: 8/8/2018

Project Number: 4161

Time Period	Southbound Ericksen Ave				Westbound Wyatt Way NE				Northbound Ericksen Ave				Eastbound Wyatt Way NE				Total
	HV	R	T	L	HV	R	T	L	HV	R	T	L	HV	R	T	L	
7:00 AM	0	1	3	0	0	0	0	0	0	0	3	5	0	7	0	2	21
7:15 AM	0	1	8	0	0	0	0	0	0	0	2	1	0	12	0	1	25
7:30 AM	0	2	7	0	0	0	0	0	0	0	3	5	0	27	0	2	46
7:45 AM	0	2	5	0	0	0	0	0	0	0	2	4	1	18	0	5	36
8:00 AM	0	2	9	0	0	0	0	0	0	0	6	5	0	7	0	6	35
8:15 AM	1	3	6	0	0	0	0	0	0	0	10	6	0	22	0	2	49
8:30 AM	0	5	4	0	0	0	0	0	0	0	5	12	0	21	0	3	50
8:45 AM	0	2	13	0	0	0	0	0	0	0	8	6	0	6	0	10	45

Total	1	18	55	0	0	0	0	0	0	0	39	44	1	120	0	31	307
--------------	---	----	----	---	---	---	---	---	---	---	----	----	---	-----	---	----	-----

Peak Hour	8:00 AM to 9:00 AM																Total
Peak Total	1	12	32	0	0	0	0	0	0	0	29	29	0	56	0	21	179
Heavy Veh.	1.4%				0.0%				0.0%				0.7%				
PHF	0.73				0.00				0.85				0.80				



Heath & Associates, Inc.
2214 Tacoma Road
Puyallup, WA 98371

Project Name: Ericksen Townhomes

Intersection: Knechtel Way NE & Ericksen Ave

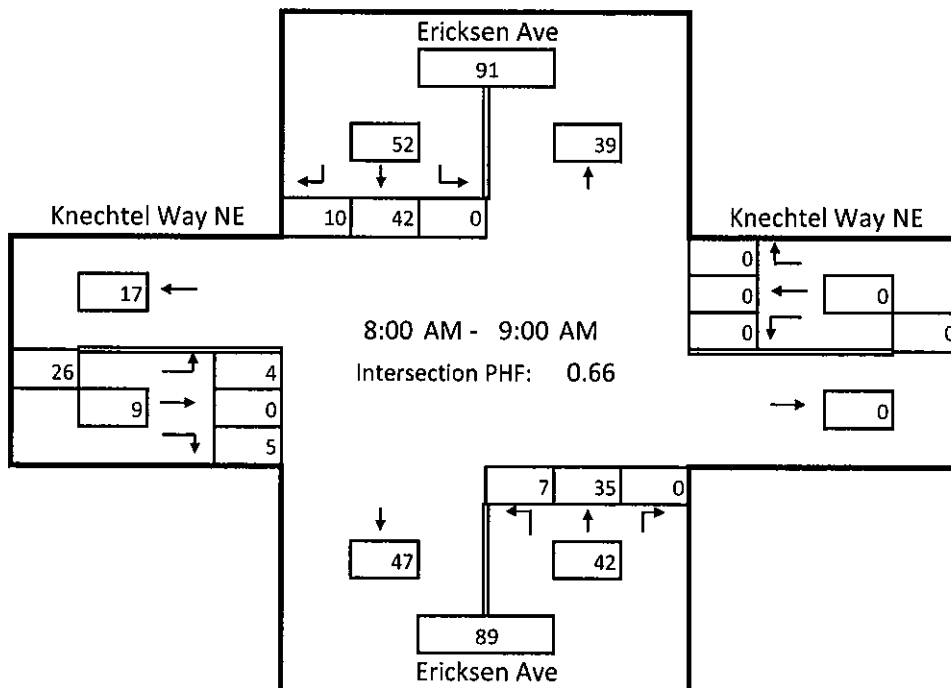
Jurisdiction: City of Bainbridge

Date of Count: 8/8/2018

Project Number: 4161

Time Period	Southbound Ericksen Ave				Westbound Knechtel Way NE				Northbound Ericksen Ave				Eastbound Knechtel Way NE				Total
	HV	R	T	L	HV	R	T	L	HV	R	T	L	HV	R	T	L	
7:00 AM	0	1	4	0	0	0	0	0	0	0	5	0	0	1	0	2	13
7:15 AM	0	0	7	0	0	0	0	0	0	0	2	1	0	2	0	1	13
7:30 AM	1	0	10	0	0	0	0	0	0	0	6	0	0	0	0	0	17
7:45 AM	0	2	8	0	0	0	0	0	0	1	6	0	0	1	0	0	18
8:00 AM	0	0	9	0	0	0	0	0	0	0	7	1	0	3	0	1	21
8:15 AM	1	4	11	0	0	0	0	0	0	0	6	3	0	0	0	0	25
8:30 AM	0	2	6	0	0	0	0	0	1	0	7	2	0	1	0	0	19
8:45 AM	0	4	16	0	0	0	0	0	0	0	15	1	0	1	0	3	40
Total	2	13	71	0	0	0	0	0	1	1	54	8	0	9	0	7	166

Peak Hour	8:00 AM to 9:00 AM																Total
Peak Total	1	10	42	0	0	0	0	0	1	0	35	7	0	5	0	4	103
Heavy Veh.	2.4%				0.0%				1.6%				0.0%				
PHF	0.65				0.00				0.66				0.56				



Heath & Associates, Inc.
2214 Tacoma Road
Puyallup, WA 98371

Project Name: Ericksen Townhomes

Intersection: Wyatt Way NE & Ericksen Ave

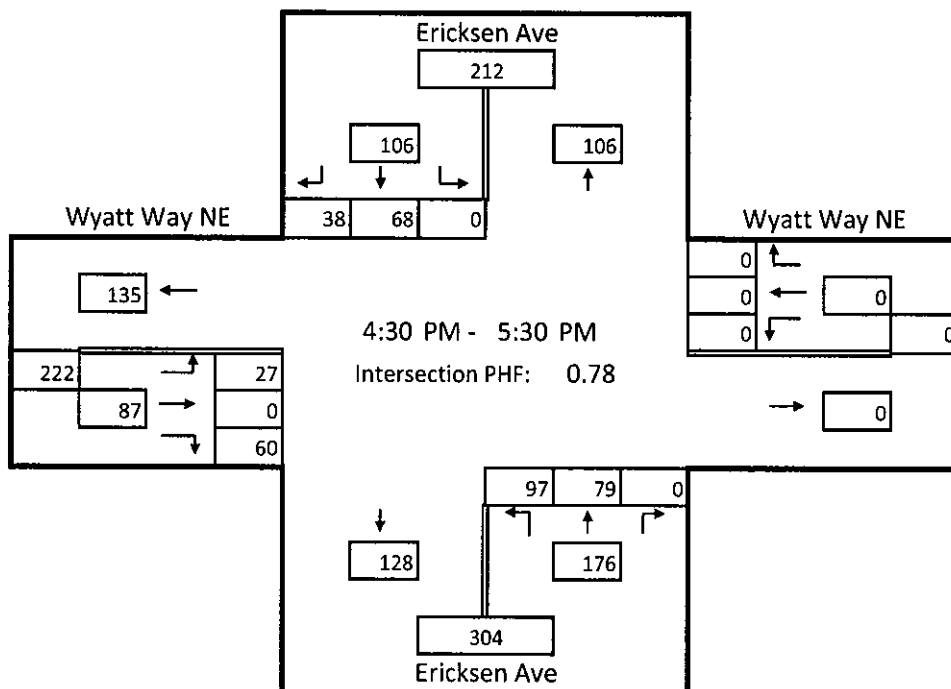
Jurisdiction: City of Bainbridge

Date of Count: 8/7/2018

Project Number: 4161

Time Period	Southbound Ericksen Ave				Westbound Wyatt Way NE				Northbound Ericksen Ave				Eastbound Wyatt Way NE				Total
	HV	R	T	L	HV	R	T	L	HV	R	T	L	HV	R	T	L	
4:00 PM	0	4	13	0	0	0	0	0	0	0	15	9	0	7	0	8	56
4:15 PM	0	10	20	0	0	0	0	0	0	0	10	18	0	14	0	6	78
4:30 PM	0	13	13	0	0	0	0	0	0	0	29	42	0	15	0	7	119
4:45 PM	0	6	23	0	0	0	0	0	0	0	22	21	0	13	0	6	91
5:00 PM	0	10	18	0	0	0	0	0	0	0	15	14	1	11	0	9	78
5:15 PM	0	9	14	0	0	0	0	0	0	0	13	20	0	21	0	5	82
5:30 PM	0	8	12	0	0	0	0	0	1	0	21	40	0	7	0	1	90
5:45 PM	0	1	10	0	0	0	0	0	0	0	6	15	0	8	0	6	46
Total	0	61	123	0	0	0	0	0	1	0	131	179	1	96	0	48	638

Peak Hour	4:30 PM to 5:30 PM																Total
Peak Total	0	38	68	0	0	0	0	0	0	0	79	97	1	60	0	27	369
Heavy Veh.	0.0%				0.0%				0.3%				0.7%				
PHF	0.91				0.00				0.62				0.84				



Heath & Associates, Inc.
2214 Tacoma Road
Puyallup, WA 98371

Project Name: Ericksen Townhomes

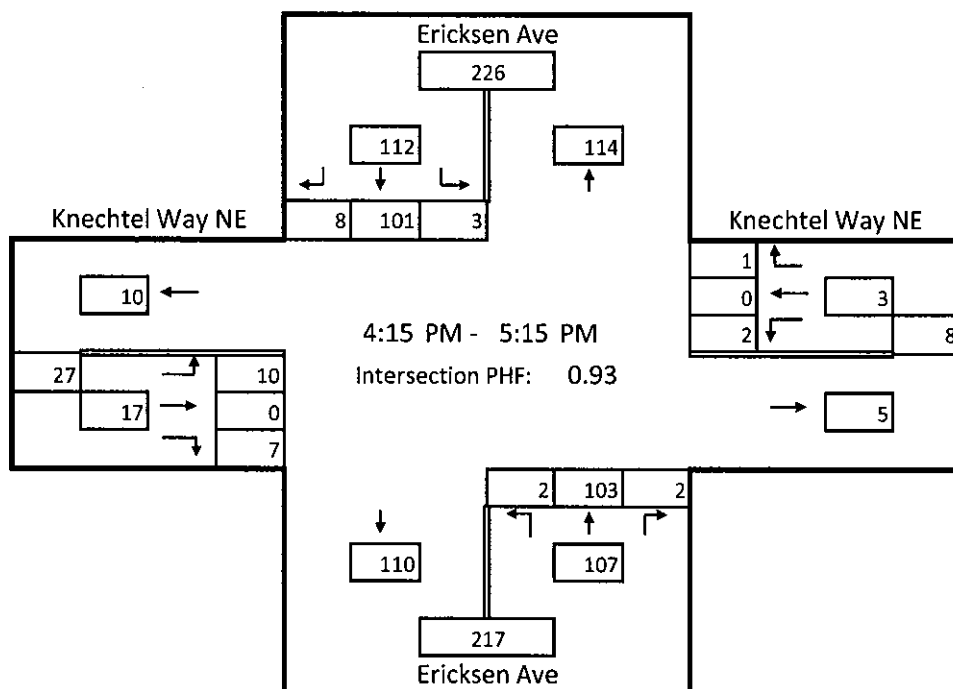
Intersection: Knechtel Way NE & Ericksen Ave

Jurisdiction: City of Bainbridge

Date of Count: 8/7/2018

Project Number: 4161

Time Period	Southbound Ericksen Ave				Westbound Knechtel Way NE				Northbound Ericksen Ave				Eastbound Knechtel Way NE				Total
	HV	R	T	L	HV	R	T	L	HV	R	T	L	HV	R	T	L	
4:00 PM	0	3	11	0	0	0	0	0	0	2	21	2	0	5	0	3	47
4:15 PM	0	5	27	2	0	0	0	0	0	0	15	0	0	1	0	3	53
4:30 PM	0	1	23	0	0	1	0	1	1	1	33	0	0	2	0	2	64
4:45 PM	0	2	25	1	0	0	0	0	0	1	27	1	0	1	0	2	60
5:00 PM	0	0	26	0	0	0	0	1	0	0	28	1	0	3	0	3	62
5:15 PM	0	2	23	0	0	1	0	1	0	0	18	4	0	0	0	0	49
5:30 PM	0	4	15	1	0	0	0	0	1	0	26	1	0	3	0	2	52
5:45 PM	0	2	10	1	0	0	0	0	0	0	10	1	0	1	0	0	25
Total	0	19	160	5	0	2	0	3	2	4	178	10	0	16	0	15	412
Peak Hour	4:15 PM to 5:15 PM																Total
Peak Total	0	8	101	3	0	1	0	2	1	2	103	2	0	7	0	10	239
Heavy Veh.	0.0%				0.0%				1.0%				0.0%				
PHF	0.82				0.38				0.79				0.71				



Single-Family Detached Housing (210)

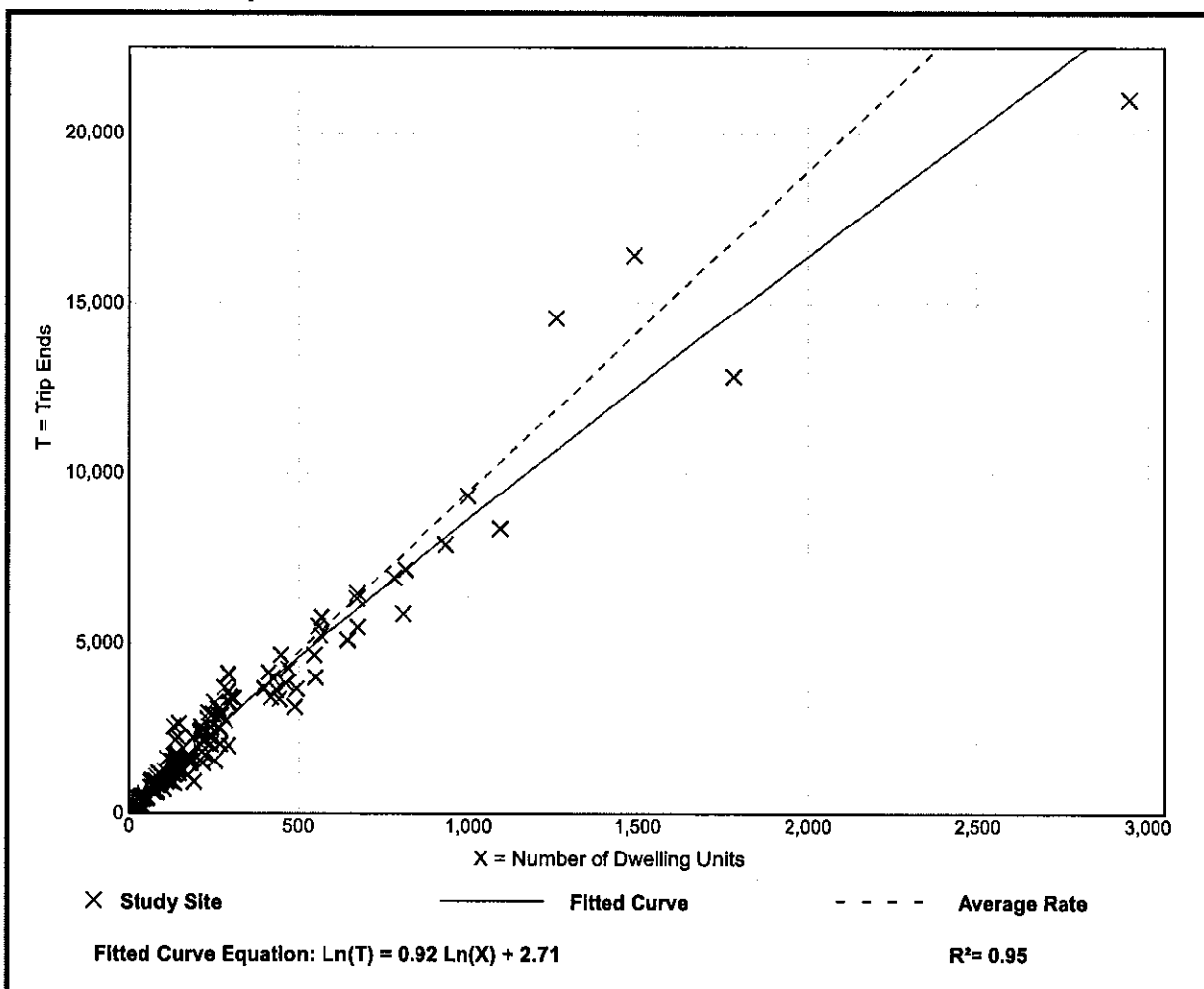
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 173

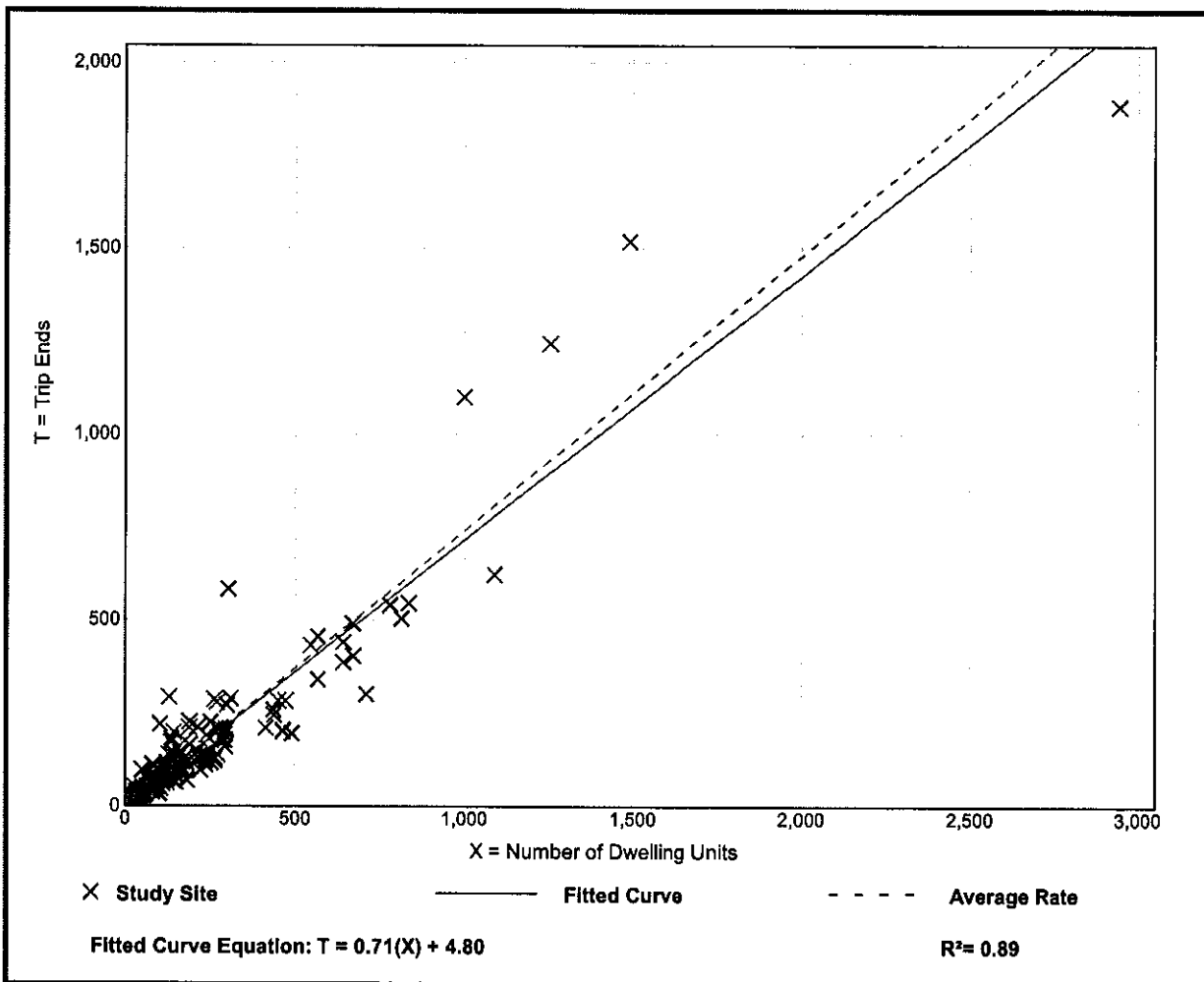
Avg. Num. of Dwelling Units: 219

Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.74	0.33 - 2.27	0.27

Data Plot and Equation



Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 190

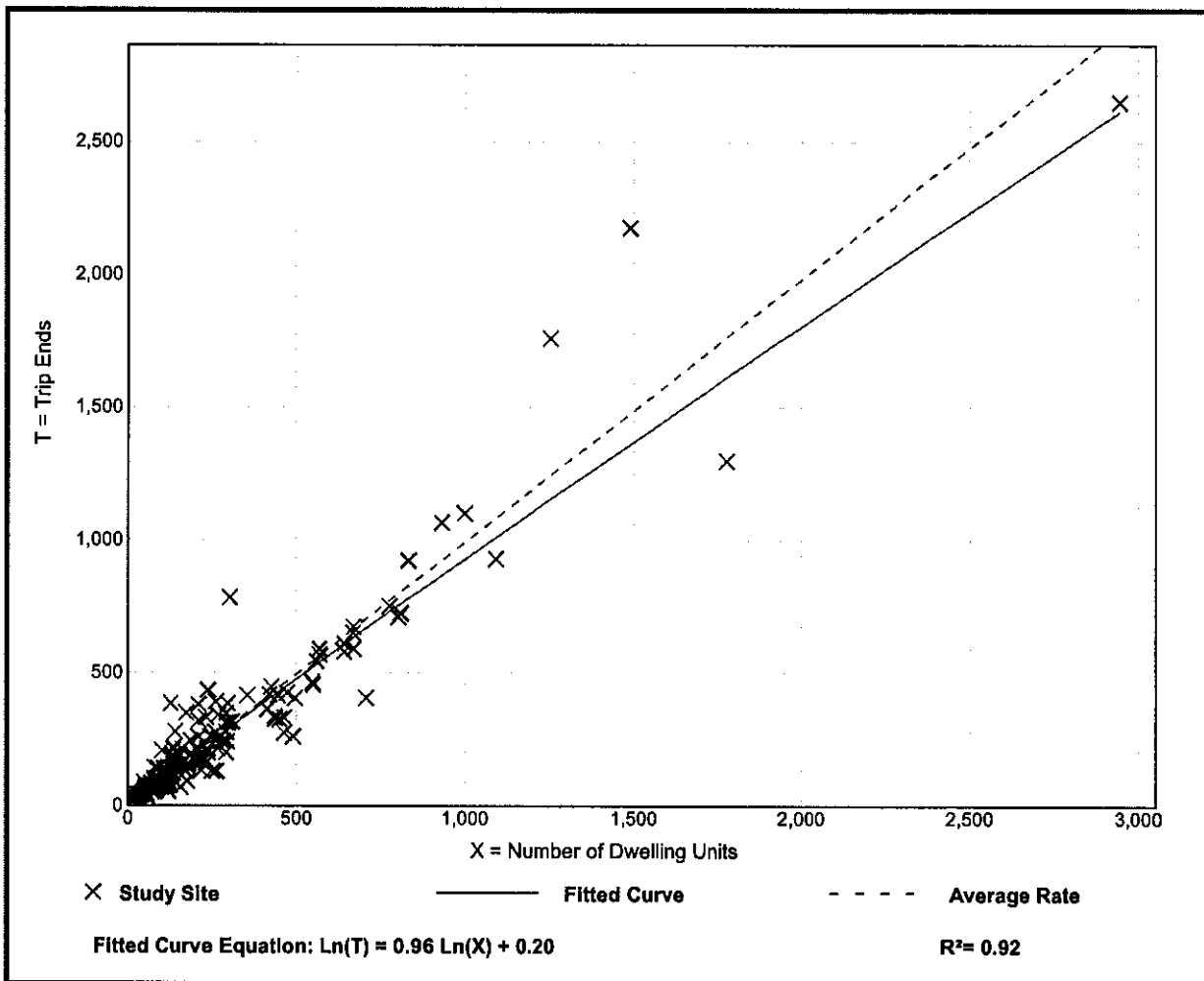
Avg. Num. of Dwelling Units: 242

Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit




Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

Intersection	
Intersection Delay, s/veh	7.3
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	21	56	29	29	32	12
Future Vol, veh/h	21	56	29	29	32	12
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	23	62	32	32	36	13
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.2	7.6	7.2
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	50%	27%	0%
Vol Thru, %	50%	0%	73%
Vol Right, %	0%	73%	27%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	58	77	44
LT Vol	29	21	0
Through Vol	29	0	32
RT Vol	0	56	12
Lane Flow Rate	64	86	49
Geometry Grp	1	1	1
Degree of Util (X)	0.075	0.089	0.054
Departure Headway (Hd)	4.204	3.728	3.952
Convergence, Y/N	Yes	Yes	Yes
Cap	850	952	902
Service Time	2.24	1.784	1.994
HCM Lane V/C Ratio	0.075	0.09	0.054
HCM Control Delay	7.6	7.2	7.2
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.2	0.3	0.2

HCM 6th TWSC
1: Ericksen Ave NE & Knechtel Way NE/Driveway

Existing AM Peak Hour
08/22/2018

Intersection												
Int Delay, s/veh	1.3											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	4	0	5	0	0	0	7	35	0	0	42	10
Future Vol, veh/h	4	0	5	0	0	0	7	35	0	0	42	10
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	66	66	66	66	66	66	66	66	66	66	66	66
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	6	0	8	0	0	0	11	53	0	0	64	15

Major/Minor	Minor2		Minor1		Major1				Major2			
Conflicting Flow All	157	157	82	161	164	63	84	0	0	58	0	0
Stage 1	77	77	-	80	80	-	-	-	-	-	-	-
Stage 2	80	80	-	81	84	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	811	737	980	807	730	1004	1519	-	-	1553	-	-
Stage 1	934	833	-	931	830	-	-	-	-	-	-	-
Stage 2	931	830	-	930	827	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	799	724	971	789	718	994	1512	-	-	1546	-	-
Mov Cap-2 Maneuver	799	724	-	789	718	-	-	-	-	-	-	-
Stage 1	923	829	-	920	820	-	-	-	-	-	-	-
Stage 2	920	820	-	918	823	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.1	0	1.2	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1512	-	-	886	-	1546	-
HCM Lane V/C Ratio	0.007	-	-	0.015	-	-	-
HCM Control Delay (s)	7.4	0	-	9.1	0	0	-
HCM Lane LOS	A	A	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-	0	-

Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			Y	Y	
Traffic Vol, veh/h	27	60	97	79	68	38
Future Vol, veh/h	27	60	97	79	68	38
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	35	77	124	101	87	49
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.1	9.1	8
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	55%	31%	0%
Vol Thru, %	45%	0%	64%
Vol Right, %	0%	69%	36%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	176	87	106
LT Vol	97	27	0
Through Vol	79	0	68
RT Vol	0	60	38
Lane Flow Rate	226	112	136
Geometry Grp	1	1	1
Degree of Util (X)	0.278	0.135	0.158
Departure Headway (Hd)	4.435	4.365	4.196
Convergence, Y/N	Yes	Yes	Yes
Cap	815	823	856
Service Time	2.435	2.385	2.215
HCM Lane V/C Ratio	0.277	0.136	0.159
HCM Control Delay	9.1	8.1	8
HCM Lane LOS	A	A	A
HCM 95th-tile Q	1.1	0.5	0.6

HCM 6th TWSC
1: Ericksen Ave NE & Knechtel Way NE/Driveway

Existing PM Peak Hour
08/22/2018

Intersection												
Int Delay, s/veh	1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	10	0	7	2	0	1	2	103	2	3	101	8
Future Vol, veh/h	10	0	7	2	0	1	2	103	2	3	101	8
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	11	0	8	2	0	1	2	111	2	3	109	9

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	247	247	124	250	250	122	123	0	0	118	0	0
Stage 1	125	125	-	121	121	-	-	-	-	-	-	-
Stage 2	122	122	-	129	129	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	709	657	929	706	655	932	1470	-	-	1476	-	-
Stage 1	881	794	-	886	798	-	-	-	-	-	-	-
Stage 2	885	797	-	877	791	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	700	648	920	692	646	923	1463	-	-	1469	-	-
Mov Cap-2 Maneuver	700	648	-	692	646	-	-	-	-	-	-	-
Stage 1	876	788	-	881	793	-	-	-	-	-	-	-
Stage 2	879	792	-	864	785	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.8	9.8	0.1	0.2
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1463	-	-	776 755	1469	-	-
HCM Lane V/C Ratio	0.001	-	-	0.024 0.004	0.002	-	-
HCM Control Delay (s)	7.5	0	-	9.8 9.8	7.5	0	-
HCM Lane LOS	A	A	-	A A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1 0	0	-	-

Intersection	
Intersection Delay, s/veh	7.4
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			Y	Y	
Traffic Vol, veh/h	22	58	30	31	35	12
Future Vol, veh/h	22	58	30	31	35	12
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	24	64	33	34	39	13
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.2	7.6	7.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	49%	28%	0%
Vol Thru, %	51%	0%	74%
Vol Right, %	0%	72%	26%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	61	80	47
LT Vol	30	22	0
Through Vol	31	0	35
RT Vol	0	58	12
Lane Flow Rate	68	89	52
Geometry Grp	1	1	1
Degree of Util (X)	0.079	0.092	0.058
Departure Headway (Hd)	4.211	3.742	3.971
Convergence, Y/N	Yes	Yes	Yes
Cap	849	948	898
Service Time	2.248	1.801	2.014
HCM Lane V/C Ratio	0.08	0.094	0.058
HCM Control Delay	7.6	7.2	7.3
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.3	0.3	0.2

HCM 6th TWSC
1: Ericksen Ave NE & Knechtel Way NE/Driveway

2021 AM Peak Hour with Project
08/22/2018

Intersection												
Int Delay, s/veh	1.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	4	0	5	0	0	0	7	38	0	0	43	10
Future Vol, veh/h	4	0	5	0	0	0	7	38	0	0	43	10
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	66	66	66	66	66	66	66	66	66	66	66	66
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	6	0	8	0	0	0	11	58	0	0	65	15

Major/Minor	Minor2		Minor1		Major1		Major2	
Conflicting Flow All	163	163	83	167	170	68	85	0
Stage 1	78	78	-	85	85	-	-	-
Stage 2	85	85	-	82	85	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-
Pot Cap-1 Maneuver	804	731	979	799	725	998	1518	-
Stage 1	933	832	-	925	826	-	-	-
Stage 2	925	826	-	929	826	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	791	718	970	781	712	989	1511	-
Mov Cap-2 Maneuver	791	718	-	781	712	-	-	-
Stage 1	921	828	-	913	815	-	-	-
Stage 2	913	815	-	917	822	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.2	0	1.2	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1511	-	-	881	-	1539	-
HCM Lane V/C Ratio	0.007	-	-	0.015	-	-	-
HCM Control Delay (s)	7.4	0	-	9.2	0	0	-
HCM Lane LOS	A	A	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-	0	-

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Vol, veh/h	2	2	52	1	0	45
Future Vol, veh/h	2	2	52	1	0	45
Conflicting Peds, #/hr	5	5	0	5	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	2	2	58	1	0	50

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	119	69	0
Stage 1	64	-	-
Stage 2	55	-	-
Critical Hdwy	6.41	6.21	4.11
Critical Hdwy Stg 1	5.41	-	-
Critical Hdwy Stg 2	5.41	-	-
Follow-up Hdwy	3.509	3.309	2.209
Pot Cap-1 Maneuver	879	997	1545
Stage 1	961	-	-
Stage 2	970	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	870	988	1538
Mov Cap-2 Maneuver	870	-	-
Stage 1	956	-	-
Stage 2	965	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	925	1538	-
HCM Lane V/C Ratio	-	0.005	-	-
HCM Control Delay (s)	-	8.9	0	-
HCM Lane LOS	-	A	A	-
HCM 95th %tile Q(veh)	-	0	0	-

Intersection	
Intersection Delay, s/veh	8.7
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	YT			↑	↑	
Traffic Vol, veh/h	28	62	100	83	71	39
Future Vol, veh/h	28	62	100	83	71	39
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	36	79	128	106	91	50
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.1	9.3	8.1
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	55%	31%	0%
Vol Thru, %	45%	0%	65%
Vol Right, %	0%	69%	35%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	183	90	110
LT Vol	100	28	0
Through Vol	83	0	71
RT Vol	0	62	39
Lane Flow Rate	235	115	141
Geometry Grp	1	1	1
Degree of Util (X)	0.29	0.141	0.165
Departure Headway (Hd)	4.452	4.398	4.221
Convergence, Y/N	Yes	Yes	Yes
Cap	812	817	852
Service Time	2.452	2.419	2.24
HCM Lane V/C Ratio	0.289	0.141	0.165
HCM Control Delay	9.3	8.1	8.1
HCM Lane LOS	A	A	A
HCM 95th-tile Q	1.2	0.5	0.6

Intersection												
Int Delay, s/veh	0.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	10	0	7	2	0	1	2	108	2	3	106	8
Future Vol, veh/h	10	0	7	2	0	1	2	108	2	3	106	8
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	11	0	8	2	0	1	2	116	2	3	114	9

Major/Minor	Minor2		Minor1		Major1		Major2	
Conflicting Flow All	257	257	129	260	260	127	128	0
Stage 1	130	130	-	126	126	-	-	-
Stage 2	127	127	-	134	134	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-
Pot Cap-1 Maneuver	698	649	924	695	646	926	1464	-
Stage 1	876	791	-	880	794	-	-	-
Stage 2	879	793	-	872	787	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	689	641	915	681	638	917	1457	-
Mov Cap-2 Maneuver	689	641	-	681	638	-	-	-
Stage 1	871	785	-	875	789	-	-	-
Stage 2	873	788	-	859	781	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.8	9.9	0.1	0.2
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1457	-	-	767	745	1463	-	-
HCM Lane V/C Ratio	0.001	-	-	0.024	0.004	0.002	-	-
HCM Control Delay (s)	7.5	0	-	9.8	9.9	7.5	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑			↑
Traffic Vol, veh/h	1	2	109	2	2	109
Future Vol, veh/h	1	2	109	2	2	109
Conflicting Peds, #/hr	5	5	0	5	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	78	78	78	78	78	78
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	1	3	140	3	3	140

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	298	152	0	0	148
Stage 1	147	-	-	-	-
Stage 2	151	-	-	-	-
Critical Hdwy	6.41	6.21	-	-	4.11
Critical Hdwy Stg 1	5.41	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-
Follow-up Hdwy	3.509	3.309	-	-	2.209
Pot Cap-1 Maneuver	695	897	-	-	1440
Stage 1	883	-	-	-	-
Stage 2	879	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	687	888	-	-	1433
Mov Cap-2 Maneuver	687	-	-	-	-
Stage 1	877	-	-	-	-
Stage 2	875	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.5	0	0.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLh1	SBL	SBT
Capacity (veh/h)	-	-	809	1433
HCM Lane V/C Ratio	-	-	0.005	0.002
HCM Control Delay (s)	-	-	9.5	7.5
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0	0

Intersection	
Intersection Delay, s/veh	7.4
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↑	↑	
Traffic Vol, veh/h	25	66	34	35	40	14
Future Vol, veh/h	25	66	34	35	40	14
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	28	73	38	39	44	16
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.3	7.7	7.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	49%	27%	0%
Vol Thru, %	51%	0%	74%
Vol Right, %	0%	73%	26%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	69	91	54
LT Vol	34	25	0
Through Vol	35	0	40
RT Vol	0	66	14
Lane Flow Rate	77	101	60
Geometry Grp	1	1	1
Degree of Util (X)	0.09	0.106	0.067
Departure Headway (Hd)	4.239	3.77	3.998
Convergence, Y/N	Yes	Yes	Yes
Cap	842	939	890
Service Time	2.284	1.838	2.049
HCM Lane V/C Ratio	0.091	0.108	0.067
HCM Control Delay	7.7	7.3	7.3
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.3	0.4	0.2

HCM 6th TWSC
1: Ericksen Ave NE & Knechtel Way NE/Driveway

2035 AM Peak Hour with Project
08/22/2018

Intersection												
Int Delay, s/veh	1.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	5	0	6	0	0	0	8	43	0	0	50	12
Future Vol, veh/h	5	0	6	0	0	0	8	43	0	0	50	12
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	66	66	66	66	66	66	66	66	66	66	66	66
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	8	0	9	0	0	0	12	65	0	0	76	18

Major/Minor	Minor2		Minor1		Major1		Major2	
Conflicting Flow All	184	184	95	189	193	75	99	0
Stage 1	90	90	-	94	94	-	-	-
Stage 2	94	94	-	95	99	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-
Pot Cap-1 Maneuver	779	712	964	773	704	989	1500	-
Stage 1	920	822	-	915	819	-	-	-
Stage 2	915	819	-	914	815	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	767	699	955	754	691	980	1493	-
Mov Cap-2 Maneuver	767	699	-	754	691	-	-	-
Stage 1	908	818	-	903	808	-	-	-
Stage 2	903	808	-	901	811	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.3	0	1.2	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1493	-	-	859	-	1530	-	-
HCM Lane V/C Ratio	0.008	-	-	0.019	-	-	-	-
HCM Control Delay (s)	7.4	0	-	9.3	0	0	-	-
HCM Lane LOS	A	A	-	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	-	0	-	-

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	2	2	1	1	0	2
Traffic Vol, veh/h	2	2	59	1	0	52
Future Vol, veh/h	2	2	59	1	0	52
Conflicting Peds, #/hr	5	5	0	5	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	2	2	66	1	0	58

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	135	77	0
Stage 1	72	-	-
Stage 2	63	-	-
Critical Hdwy	6.41	6.21	4.11
Critical Hdwy Stg 1	5.41	-	-
Critical Hdwy Stg 2	5.41	-	-
Follow-up Hdwy	3.509	3.309	2.209
Pot Cap-1 Maneuver	861	987	1534
Stage 1	953	-	-
Stage 2	962	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	852	978	1527
Mov Cap-2 Maneuver	852	-	-
Stage 1	948	-	-
Stage 2	957	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	911	1527
HCM Lane V/C Ratio	-	-	0.005	-
HCM Control Delay (s)	-	-	9	0
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0	0

Intersection	
Intersection Delay, s/veh	9.1
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			4	4	
Traffic Vol, veh/h	32	71	115	96	82	45
Future Vol, veh/h	32	71	115	96	82	45
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	41	91	147	123	105	58
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.5	9.8	8.4
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	55%	31%	0%
Vol Thru, %	45%	0%	65%
Vol Right, %	0%	69%	35%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	211	103	127
LT Vol	115	32	0
Through Vol	96	0	82
RT Vol	0	71	45
Lane Flow Rate	271	132	163
Geometry Grp	1	1	1
Degree of Util (X)	0.339	0.166	0.195
Departure Headway (Hd)	4.505	4.53	4.309
Convergence, Y/N	Yes	Yes	Yes
Cap	798	791	832
Service Time	2.53	2.561	2.337
HCM Lane V/C Ratio	0.34	0.167	0.196
HCM Control Delay	9.8	8.5	8.4
HCM Lane LOS	A	A	A
HCM 95th-tile Q	1.5	0.6	0.7

Intersection												
Int Delay, s/veh	1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	12	0	8	2	0	1	2	124	2	3	122	9
Future Vol, veh/h	12	0	8	2	0	1	2	124	2	3	122	9
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	13	0	9	2	0	1	2	133	2	3	131	10

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	291	291	146	295	295	144	146	0	0	140	0	0
Stage 1	147	147	-	143	143	-	-	-	-	-	-	-
Stage 2	144	144	-	152	152	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	663	621	904	659	618	906	1442	-	-	1449	-	-
Stage 1	858	777	-	862	780	-	-	-	-	-	-	-
Stage 2	861	780	-	853	774	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	654	612	895	645	609	897	1435	-	-	1442	-	-
Mov Cap-2 Maneuver	654	612	-	645	609	-	-	-	-	-	-	-
Stage 1	852	772	-	856	775	-	-	-	-	-	-	-
Stage 2	854	775	-	839	769	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.1	10.1	0.1	0.2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1435	-	-	733	712	1442	-	-
HCM Lane V/C Ratio	0.001	-	-	0.029	0.005	0.002	-	-
HCM Control Delay (s)	7.5	0	-	10.1	10.1	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	1	2	126	2	2	126
Future Vol, veh/h	1	2	126	2	2	126
Conflicting Peds, #/hr	5	5	0	5	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	78	78	78	78	78	78
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	1	3	162	3	3	162

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	342	174	0	0	170
Stage 1	169	-	-	-	-
Stage 2	173	-	-	-	-
Critical Hdwy	6.41	6.21	-	-	4.11
Critical Hdwy Stg 1	5.41	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-
Follow-up Hdwy	3.509	3.309	-	-	2.209
Pot Cap-1 Maneuver	656	872	-	-	1413
Stage 1	863	-	-	-	-
Stage 2	860	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	648	864	-	-	1406
Mov Cap-2 Maneuver	648	-	-	-	-
Stage 1	857	-	-	-	-
Stage 2	856	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	0.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	778	1406
HCM Lane V/C Ratio	-	-	0.005	0.002
HCM Control Delay (s)	-	-	9.7	7.6
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0	0

Exhibit 1310-7a Left-Turn Storage Guidelines: Two-Lane, Unsignalized

