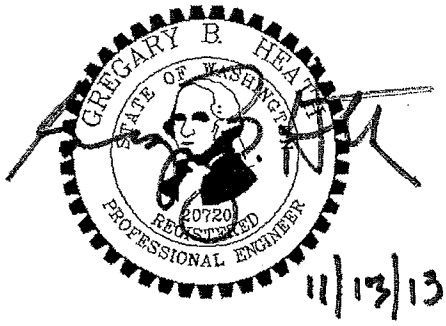
HEATH & ASSOCIATES, INC Transportation and Civil Engineering

OAK SPRINGS
TRAFFIC IMPACT ANALYSIS

THURSTON COUNTY, WA



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November 2013

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OAK SPRINGS
TRAFFIC IMPACT ANALYSIS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

OAK SPRINGS
TRAFFIC IMPACT ANALYSIS

I. 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 collection of general roadway information, road improvement information, entering sight distance data, and current delays. Forecasts of future traffic and dispersion patterns on the street system are then determined using established trip generation and distribution techniques. Next, future traffic delays are calculated and significant impacts, if any, are identified. As a final step, appropriate conclusions and mitigation measures are defined if needed.

II. PROJECT DESCRIPTION

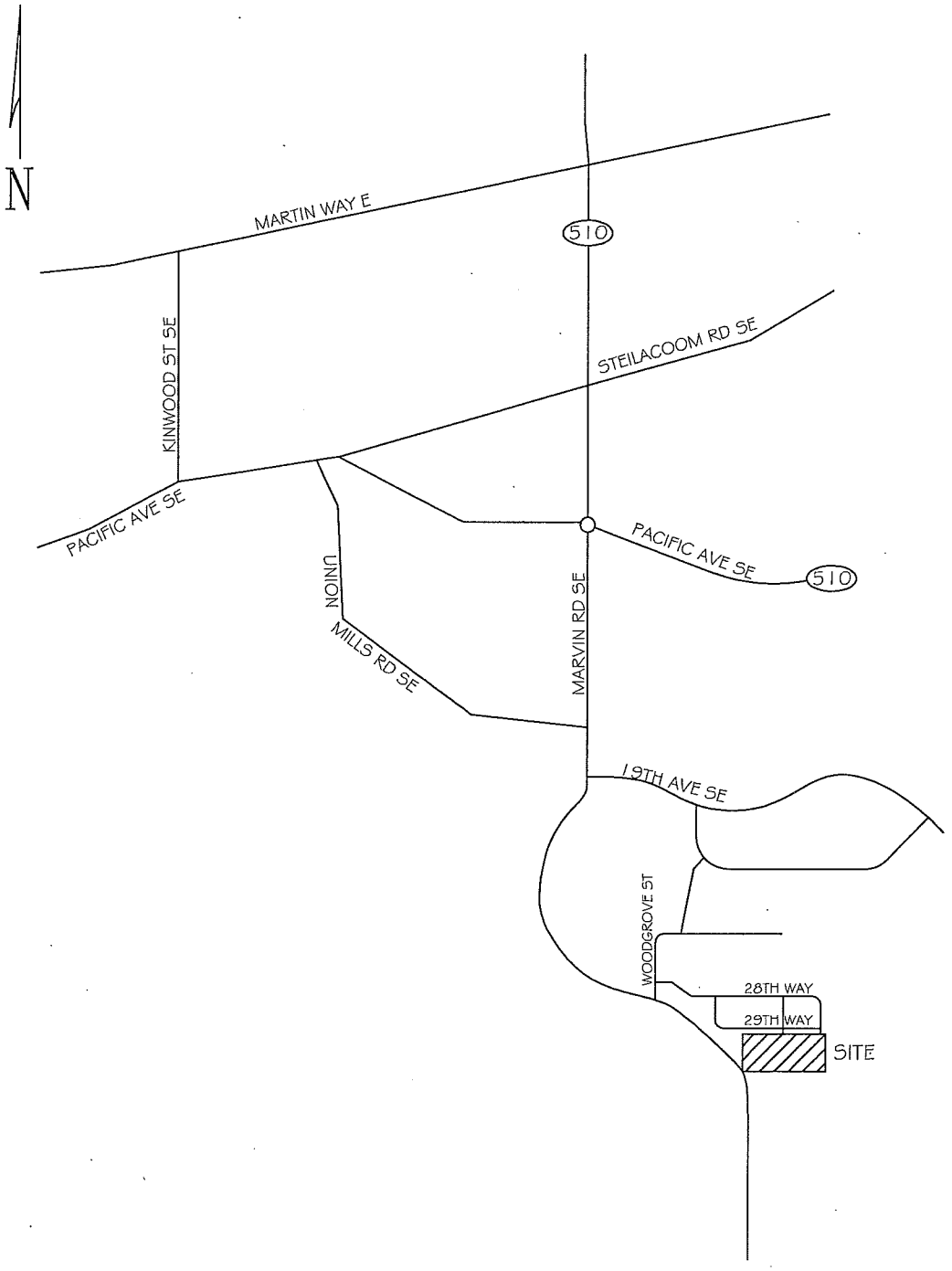
This report summarizes anticipated traffic impacts related to the proposed Oak Springs project. The proposed project is a residential subdivision consisting of 89 new units of single family detached housing in unincorporated Thurston County. The project is located on the east side of Marvin Road SE, just south of the Evergreen Heights development. Project access will be via internal road connections to 29th Way SE, which routes onto Woodgrove Drive SE for access onto Marvin Road SE.

Most development surrounding the site consists of residential land uses. Based on the management projections, full buildout of this project may be anticipated roughly in 2016. For traffic analysis purposes, 2016 was selected as the horizon analysis year. Figure 1 shows the general site location with the surrounding street network and primary arterials. A site plan illustrating the overall configuration and access locations is given in Figure 2.

III. EXISTING CONDITIONS

A. Existing Street System

Roadways serving the proposed site consist of multi-lane arterials and two-lane collector roads which vary in width, terrain, and posted speeds. As indicated by their specific arterial designations, these roadways also vary in their overall function as part of the general network. The key streets near the site are listed and described on page 6.



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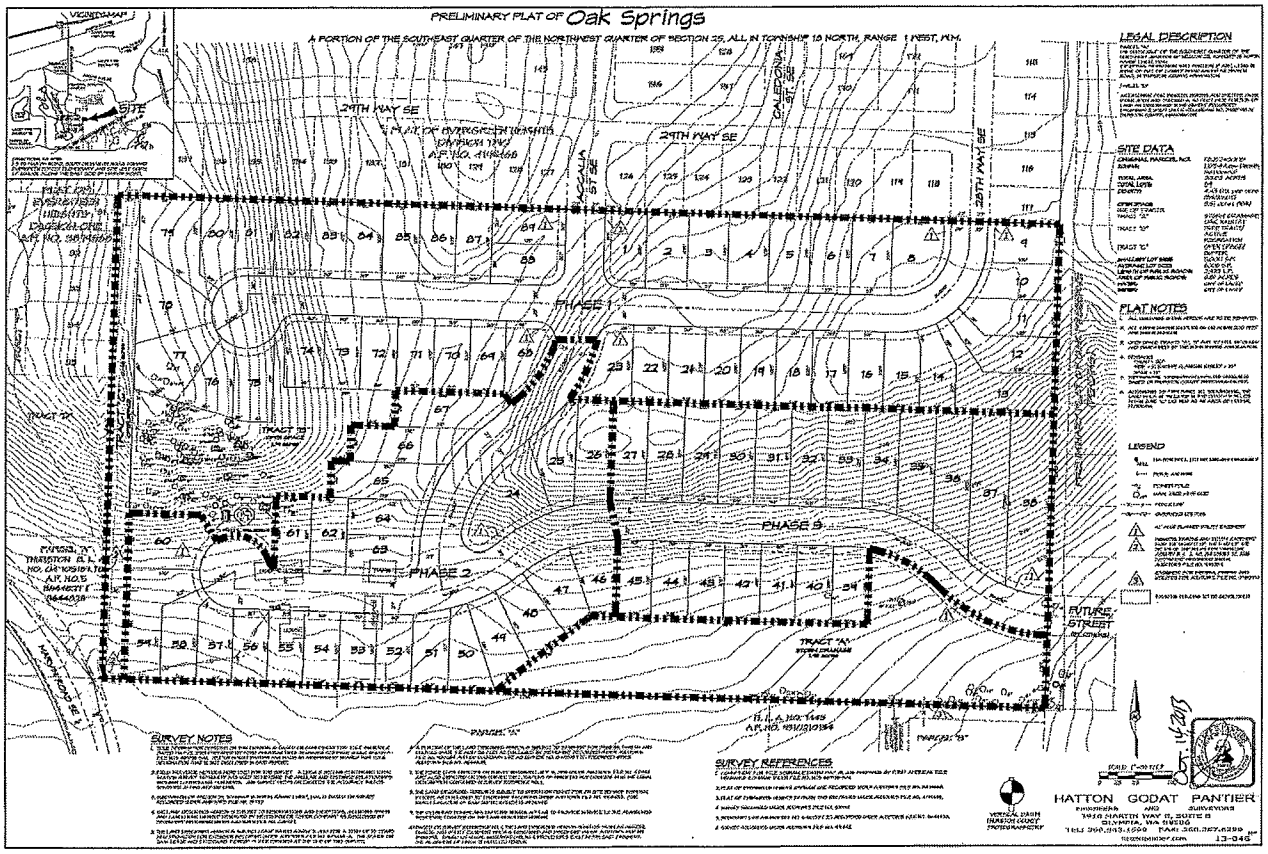
VICINITY MAP & ROADWAY SYSTEM

FIGURE 1

N



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SITE PLAN

FIGURE 2

Woodgrove Street is a north-south local road with a posted speed limit of 25 mph. Via connections to 29th Way to Woodgrove, this road provides the access point for the project onto the arterial network. Total roadway width varies from 24 to 27 feet, with a sidewalk on the east side of the road and a short section of curbing. Other shoulders are grass/gravel.

19th Avenue SE is an east-west collector that lies to the north of the project site. Total roadway width is roughly 37 feet with curbed shoulders and sidewalks. The speed limit is posted at 25 mph.

Marvin Road SE is a multi-lane, north-south major arterial that lies to the west and south of the project. Turn lanes are provided at the major intersections. A two-way left turn lane is present near the site. The posted speed limit is 35 mph in the project vicinity. Shoulders in this section are comprised of curb, gutter, and sidewalk or are paved. Grades are generally level. Bike lanes are provided along portions of the road.

Union Mills Road SE is a two-lane east-west arterial that lies to the northwest of the project. The speed limit is 35 mph, and surfacing is composed of asphalt. Shoulders are comprised of grass and gravel. Grades are rolling with slopes of 0 to 5 percent.

Pacific Avenue SE is a two-lane east-west arterial that lies to the north of the project. Surfacing is asphalt concrete with 12 foot lanes. Shoulders are around 4 to 6 feet in width with curb, gutter, and sidewalks in areas. The posted speed limit is 45 to 50 mph. Grades are generally level.

B. Roadway Improvements

A review of the draft 2014 to 2019 Thurston County Six Year Transportation Improvement Program shows several projects currently planned in the vicinity of the project.

Steilacoom Road, from Marvin Road to Dutterow Road: The roadway is to be widened and reconstructed, adding channelization, bike lanes, sidewalks, and other improvments. Funding is $3 million.

Steilacoom Road, from Pacific Avenue to Marvin Road: The roadway is to be reconstructed possibly with new alignment, also with a turn lane to the school, bike lanes, sidewalks, and other improvments. Funding is $3,272,000.

Kinwood Street, from Martin Way to Pacific Avenue: The roadway is to be replaced with sidewalks and bike lanes added. $2,200,000 in funding is identified.

C. Peak Hour Volumes

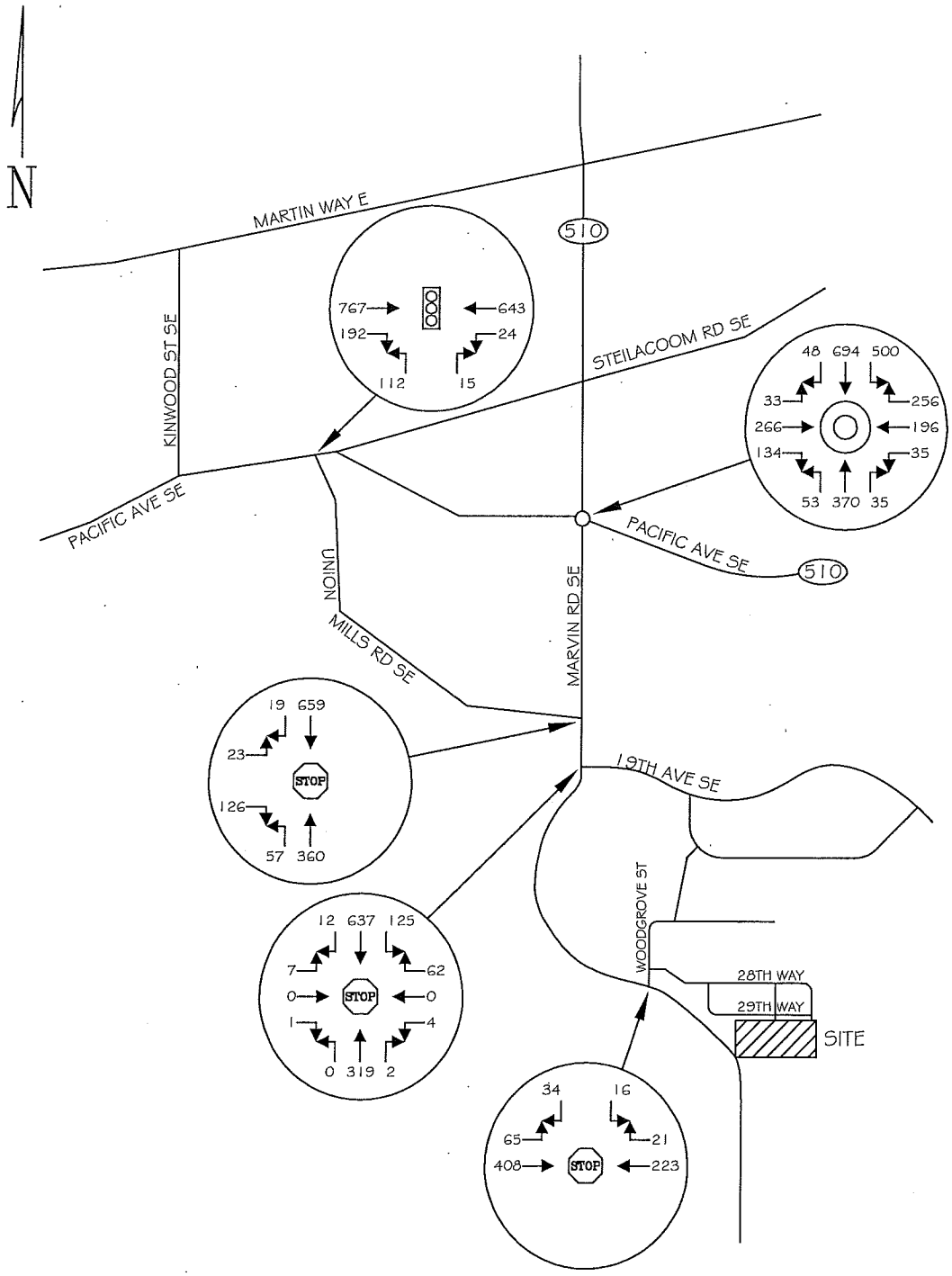
Field data for this study was collected in October of 2013. Traffic counts were taken during the evening peak period between the hours of 4 PM and 6 PM. This specific peak period was targeted for analysis purposes since it generally represents a worst case scenario for residential developments with respect to traffic conditions. This is primarily due to the common 8 AM to 5 PM work schedule and the greater number of recreation and shopping trips associated with the late afternoon period. Residents typically return home after work at approximately the same time of day, between 5 PM and 6 PM, which translates to a natural peak in intersection traffic loads. Figure 3 on the following page shows the evening peak hour counts taken at the primary intersections identified in the scoping process and expected to be most heavily influenced by project traffic.

D. Level of Service Results

Existing peak hour delays were determined through the use of the *2010 Highway Capacity Manual*. Capacity analysis is used to determine level of service (LOS) which is an established measure of congestion for transportation facilities. LOS is defined for a variety of facilities including intersections, freeways, arterials, etc. A complete definition of level of service and related criteria can be found in the HCM. The methodology for determining the LOS at signalized intersections strives to determine the volume to capacity (v/c) ratios for the various intersection movements as well as the average control delay for those movements. *Delay* is generally used to measure the degree of driver discomfort, frustration, fuel consumption, and lost time. *Control delay*, in particular, includes movements at slower speeds and stops on intersection approaches as vehicles move up in queue position or slow down upstream of an intersection. Aside from the overall quantity of traffic, three specific factors influence signalized intersection LOS. These include the type of signal operation provided, the signal phasing pattern, and the specific allocation of green time.

The methodology for determining the LOS at unsignalized intersections strives to determine the potential capacities for the various vehicle movements and ultimately determines the average total delay for each movement. *Potential Capacity* represents the number of additional vehicles that could effectively utilize a particular movement, which is essentially the equivalent of the difference between the movement capacity and the existing movement volume. *Total delay* is described as the elapsed time from when a vehicle stops at the end of a queue until the vehicle departs from the stop line. *Average total delay* is simply the mean total delay over the entire stream. A number of factors influence potential capacity and total delay including the availability/usefulness of gaps.

The range 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 2010 Highway Capacity Manual. LOS results for the key intersections can be



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EXISTING PM PEAK HOUR VOLUMES

FIGURE 3

found in Table 1. Level of service calculations were made through the use of the automated intersection analysis program Synchro 8.

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

Intersection	*Control*	*Geometry*	*LOS*	*Delay*
Pacific/Union Mills	Signal	Eastbound	A	6.3
		Westbound	A	3.6
		Northbound	B	17.1
		Overall	A	6.0
Marvin/Pacific	Round-About	Eastbound	C	19.7
		Westbound	A	8.4
		Northbound	B	11.8
		Southbound	C	17.8
		Overall	C	15.3
Marvin/Union Mills	Stop	Eastbound	C	23.5
		Northbound LT	A	9.4
		Overall	A	3.2
Marvin/19th Avenue	Stop	Eastbound	E	40.0
		Westbound	B	12.6
		Northbound LT	A	0.0
		Southbound LT	A	8.3
		Overall	A	1.9
Marvin/Woodgrove	Stop	Eastbound LT	A	7.9
		Southbound	B	10.9
		Overall	A	1.4

The results of Table 1 show that existing delays are mild to moderate in the LOS A to LOS E range. The LOS E results are for a private driveway approach onto Marvin Road SE.

E. Non-Motorist Traffic

Pedestrian and bicycle trips generated by the proposed housing project are expected to be generally mild during peak vehicular traffic periods (specifically 4 PM to 6 PM). During site visits, little pedestrian traffic was noted. Sidewalks are provided on Woodgrove Street SE, 28th Way SE, and 29th Way SE for neighborhood pedestrian traffic.

F. Public Transit

The Intercity Transit regional bus schedule was reviewed to determine whether transit service is provided in the project vicinity. According to published schedules, Intercity Transit Route 67 serves the project vicinity along Pacific Avenue and Marvin Road SE. Route 67 provides service from the Lacey Transit Center to the Tri-Lake area from roughly 6 AM to 7 PM. Refer to the Intercity Transit schedule for more information.

F. Sight Distance at Access Driveways

The intersections in this study have good sight distance and were not found to have significant geometric deficiencies. Units will have access via internal roads onto 29th Way SE, then the existing connections subsequently onto 28th Way SE, then Woodgrove Street SE, then onto Marvin Road SE. These existing connections meet AASHTO standards requiring a minimum *entering sight distance* of 280 feet for a 25 mph design speed.

IV. FUTURE TRAFFIC DEMAND

A. Project Trip Generation

Trip generation can be 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*, 9th Edition. The designated land use for this project is defined as Single Family Detached Housing (LUC 210). Fitted equations were used with dwelling units as the independent variable. Table 2 shows the trip generation values for the project. Included are the average weekday traffic volumes, AM peak hour volumes, and PM peak hour volumes.

TABLE 2
Project Trip Generation
89 Single Family Units

Time Period	*Volume*
AWDT	847 vpd
AM Peak Inbound	17 vph
AM Peak Outbound	50 vph
AM Peak Total	67 vph
PM Peak Inbound	56 vph
PM Peak Outbound	33 vph
PM Peak Total	89 vph

As the table shows, more traffic is expected during the PM peak hour compared to the AM peak. This is typical of residential communities with work based trips being combined with personal and recreation trips in the evenings. The inbound/outbound split during the critical PM peak hour is 63 percent entering and 37 percent exiting.

B. Trip Assignment and Distribution

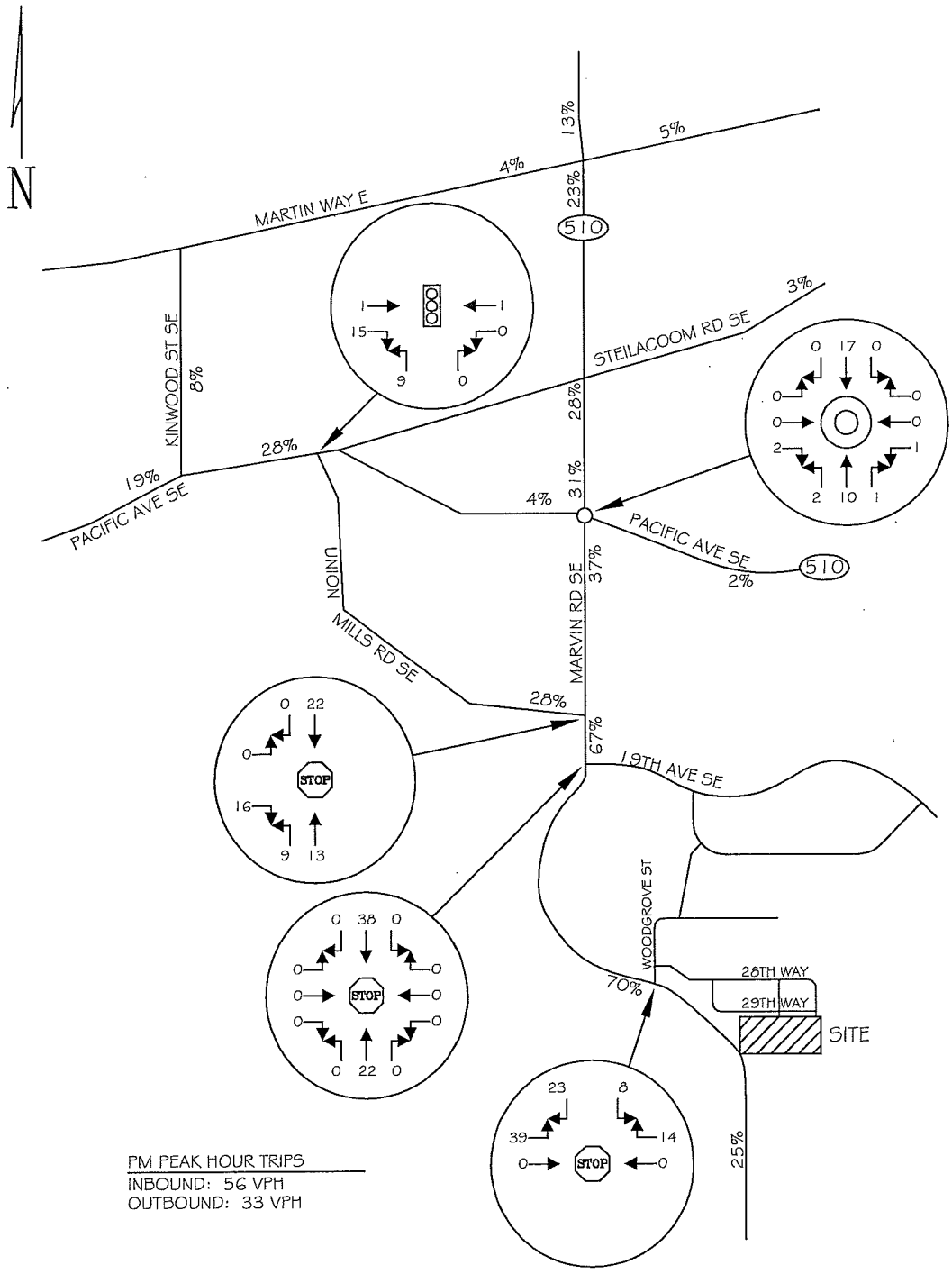
The destination and origination of future project traffic primarily influences how the driveways and nearby intersections will function as they distribute traffic to and from outlying areas. Trips generated by the project are expected to generally follow the distribution patterns shown in Figure 4 for primary trips during the PM peak hour. These percentages are based on TMODEL 2 output provided by Thurston County for Traffic Analysis Zone (TAZ) 76. The figure also shows the intersections of interest as identified in the scoping process.

C. Peak Hour Volumes

The owners of the project anticipate a completion and occupancy date for the project around 2016, therefore 2016 was selected as the horizon analysis year. Future 2016 traffic volumes without the project were derived by applying a 2.7 percent annual growth rate to the volumes of Figure 5. This growth rate was chosen based on data in the WSDOT Annual Traffic Report for SR-510 at Pacific Avenue. In addition, pipeline volumes from projects identified by Thurston County were compiled. McAllister Meadows pipeline volumes were also added. These pipeline volumes at the key intersections are shown in Figure 5. Freestone Ridge pipeline volumes are separated and shown in parenthesis, due to their huge effect on future volumes. Figure 6 shows future PM peak hour volumes without project traffic. Figure 7 gives future 2016 PM peak hour volumes with Oak Springs traffic included.

D. Level of Service

A level of service analysis was made of the future peak hour volumes with and without project generated trips added to the primary intersections and entrance nodes. A summary of the LOS results is shown in Table 3 on page 16. It should be noted that Freestone Ridge volumes were not incorporated into the results of Table 3. The addition of Freestone Ridge would create very heavy delays at the key intersections along the Marvin Road corridor, with a further horizon year and more extensive mitigation strategies likely associated with the project.



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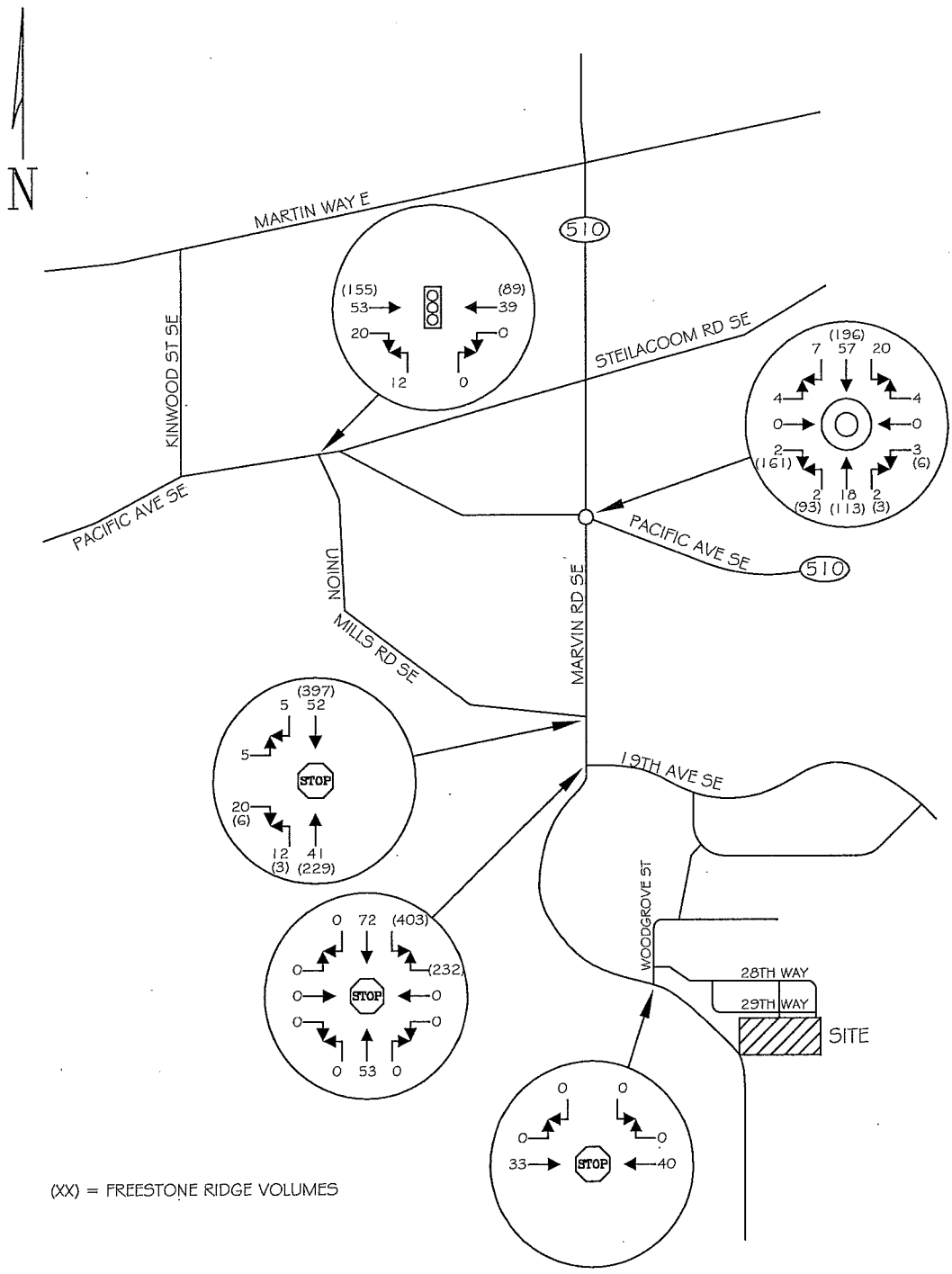
PROJECT TRIP DISTRIBUTION & ASSIGNMENT

FIGURE 4



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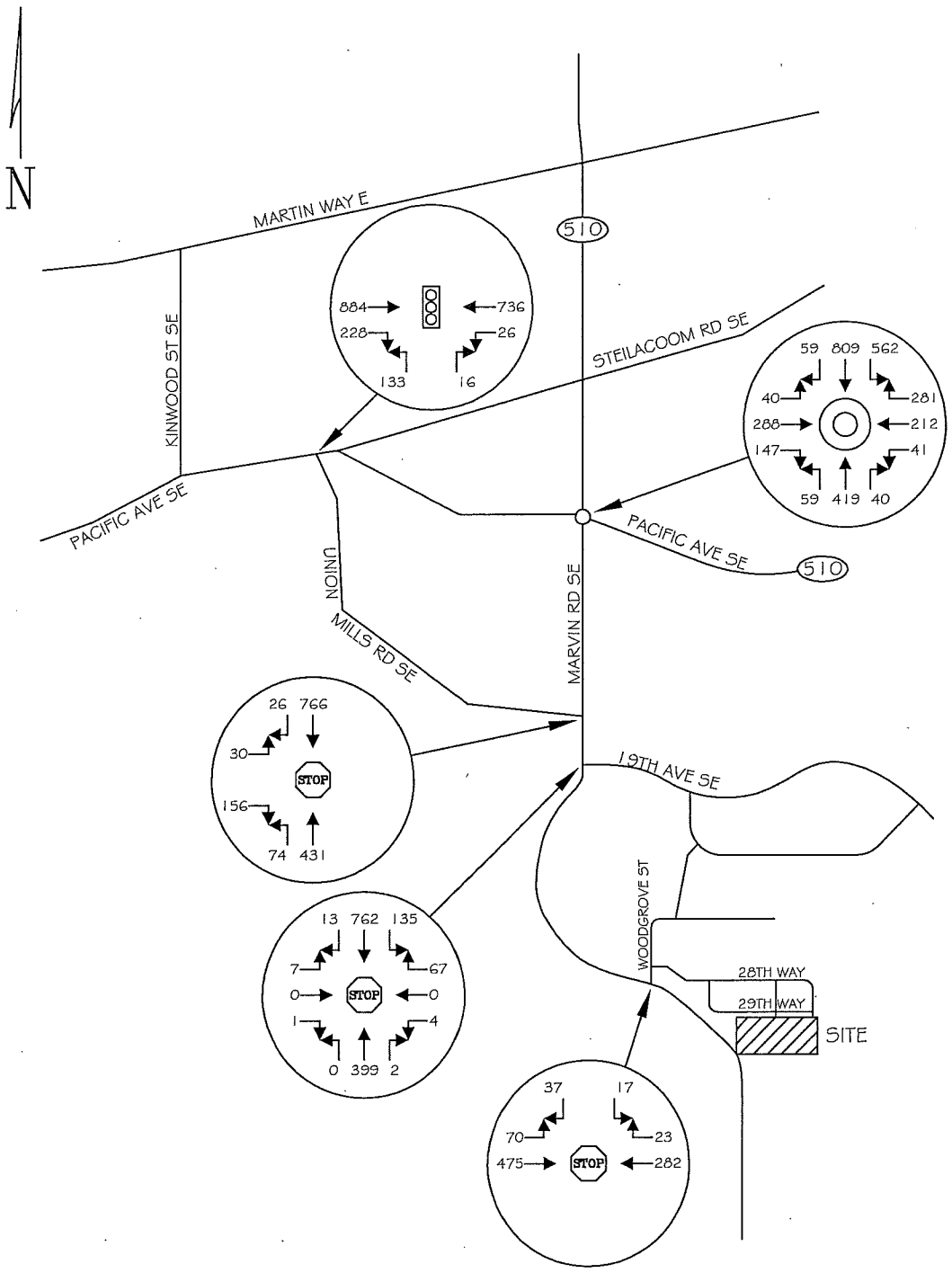
PIPELINE VOLUMES

FIGURE 5



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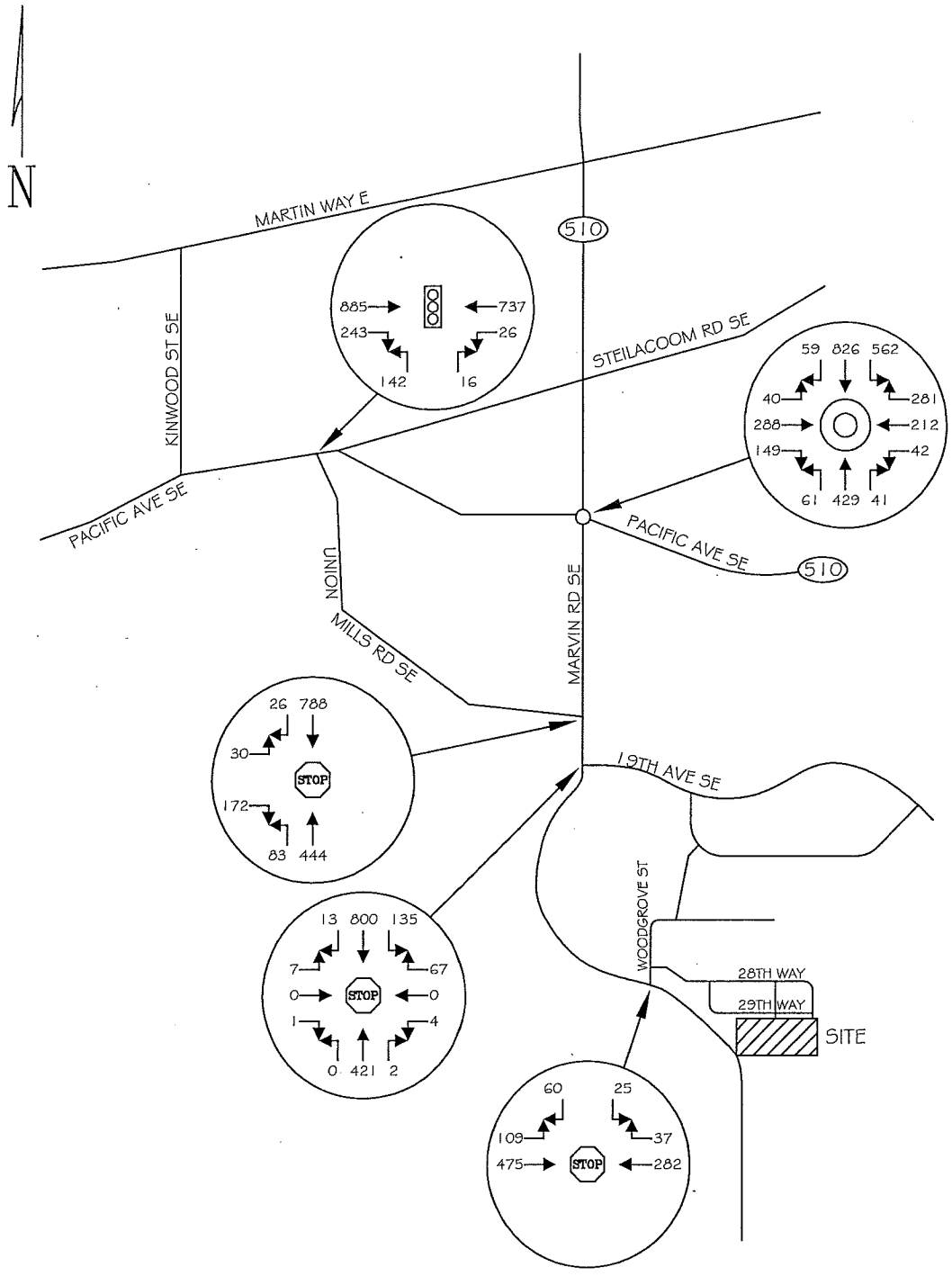
2016 PM PEAK HOUR VOLUMES WITHOUT PROJECT

FIGURE 6



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2016 PM PEAK HOUR VOLUMES WITH PROJECT

FIGURE 7

TABLE 3
Future 2016 Level of Service
Delays given in seconds per vehicle

			Without Project		With Project	
Intersection	*Control*	*Geometry*	*LOS*	*Delay*	*LOS*	*Delay*
Pacific/Union	Signal	Eastbound	A	7.0	A	7.2
		Westbound	A	3.8	A	3.9
		Northbound	B	18.7	B	18.9
		Overall	**A**	**6.6**	**A**	**6.9**
Marvin/Pacific	Round-About	Eastbound	D	29.8	D	31.0
		Westbound	A	9.5	A	9.7
		Northbound	B	14.6	C	15.0
		Southbound	D	28.1	D	29.5
		Overall	**C**	**22.7**	**C**	**23.6**
Marvin/Union Mills	Stop	Eastbound	E	45.4	F	57.9
		Northbound LT	B	10.1	B	10.3
		Overall	**A**	**6.2**	**A**	**8.1**
Marvin/19th Ave	Stop	Eastbound	F	61.3	F	68.9
		Westbound	B	14.5	C	15.1
		Northbound LT	A	0.0	A	0.0
		Southbound LT	A	8.6	A	8.7
		Overall	**A**	**1.9**	**A**	**1.9**
Marvin/Woodgrove	Stop	Eastbound LT	A	8.1	A	8.3
		Southbound	B	11.6	B	12.4
		Overall	**A**	**1.3**	**A**	**2.0**

As shown in Table 3, future traffic conditions are expected to range from LOS A to LOS F for intersection approaches, while intersection overall delays are in the LOS A to LOS C range. The minimum required threshold is LOS D within the urban growth area (UGA).

Marvin Road SE & Union Mills Road SE shows LOS F for the eastbound approach with project traffic included. The improvement of separating the eastbound left and right turn movements would reduce eastbound delays to LOS D. The proximity of the railroad to the south may limit widening options however. It should be noted that there is median width on the north leg for a two-step left turn maneuver for the eastbound to northbound left turn. However, pavement striping on the north leg discourages this maneuver. As a T-intersection, there should be minor safety drawback in making this maneuver. If two-step left turns are assumed, eastbound delays would be at LOS D. Regardless, overall delays at this intersection would be at LOS A.

Marvin Road SE & 19th Avenue SE is expected to have overall delays of LOS A for the intersection with LOS F delays for the eastbound approach. The total traffic eastbound is estimated at 8 vehicles during the PM peak hour indicating very little traffic affected.

The eastbound leg of the intersection is a private entrance that is gated for security purposes and serves a senior housing community, which is a very low generator of traffic.

V. CONCLUSIONS AND MITIGATION

The Oak Springs project will add 89 single family units to unincorporated Thurston County. On a daily basis, roughly 847 total project trip movements into and out of the site would be expected. Of this total daily traffic, 89 movements are expected during the PM peak hour, with 67 movements expected during the AM peak hour.

Existing delays are outlined in Table 1. Existing delays are mild to moderate in the LOS A to LOS E range. Currently PM peak hour volumes along Marvin Road SE and Pacific Avenue SE are heavy. Pedestrian traffic was found to have minimal impact on vehicular traffic. The availability of pedestrian facilities in the area helps alleviate potential impacts in the future.

Future traffic created by the project would be expected to increase intersection delays for some approaches. Level of Service results for future conditions were given in Table 3. As shown overall delays will be in the LOS A to LOS F range, with highest delays noted for the eastbound approach of Union Mills Road SE at Marvin Road SE and the eastbound private drive approach at Marvin Road SE & 19th Avenue SE.

Potential mitigation for the Oak Springs project are as follows:

If required by Thurston County, provide pro-rata contribution towards possible future improvements at the Marvin Road SE & Union Mills Road SE intersection. Separating the eastbound left and right turn movements would reduce delays, however proximity to the railroad may limit options. Restriping to allow two-step left turns would also reduce eastbound delays to LOS D. Oak Springs is expected to add approximately 60 PM peak hour trips to this intersection.

If required by Thurston County, provide pro-rata contribution towards future improvements at the Marvin Road SE & 19th Avenue SE intersection. It should be noted again that the approach with high LOS is a private driveway access for a senior housing development with only 8 PM peak eastbound trips, and mitigation is therefore not recommended.

OAK SPRINGS
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.

The following tables describe levels of service for signalized and unsignalized intersections. Level of service for signalized intersections is defined in terms of average control delay. Delay is a measure of driver discomfort, frustration, fuel consumption and lost travel time, as well as time from movements at slower speeds and stops on intersection approaches as vehicles move up in queue position or slow down upstream of an intersection. Level of service for unsignalized intersections is determined by the computed or measured control delay and is determined for each minor movement.

Signalized Intersections - Level of Service

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

Unsignalized Intersections - Level of Service

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

As described in the 2010 Highway Capacity Manual, level of service breakpoints for all-way stop controlled (AWSC) intersections are somewhat different than the criteria used for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from distinct kinds of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an AWSC intersection. Thus a higher level of control delay is acceptable at a signalized intersection for the same level of service.

AWSC Intersections - Level of Service

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

Detailed Average Rate Trip Calculations
For 89 Dwelling Units of Single Family Detached Housing(210) - [R]

Project: Open Date:
Phase: Analysis Date:

Description:

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	9.52	3.70	1.00	847
7-9 AM Peak Hour Enter	0.19	0.00	1.00	17
7-9 AM Peak Hour Exit	0.56	0.00	1.00	50
7-9 AM Peak Hour Total	0.75	0.90	1.00	67
4-6 PM Peak Hour Enter	0.63	0.00	1.00	56
4-6 PM Peak Hour Exit	0.37	0.00	1.00	33
4-6 PM Peak Hour Total	1.00	1.05	1.00	89
AM Pk Hr, Generator, Enter	0.20	0.00	1.00	18
AM Pk Hr, Generator, Exit	0.57	0.00	1.00	51
AM Pk Hr, Generator, Total	0.77	0.91	1.00	69
PM Pk Hr, Generator, Enter	0.65	0.00	1.00	58
PM Pk Hr, Generator, Exit	0.37	0.00	1.00	33
PM Pk Hr, Generator, Total	1.02	1.05	1.00	91
Saturday 2-Way Volume	9.91	3.72	1.00	882
Saturday Peak Hour Enter	0.50	0.00	1.00	45
Saturday Peak Hour Exit	0.43	0.00	1.00	38
Saturday Peak Hour Total	0.93	0.99	1.00	83
Sunday 2-Way Volume	8.62	3.36	1.00	767
Sunday Peak Hour Enter	0.46	0.00	1.00	41
Sunday Peak Hour Exit	0.40	0.00	1.00	36
Sunday Peak Hour Total	0.86	0.95	1.00	77

Note: A zero indicates no data available.
Source: Institute of Transportation Engineers
Trip Generation Manual, 9th Edition, 2012

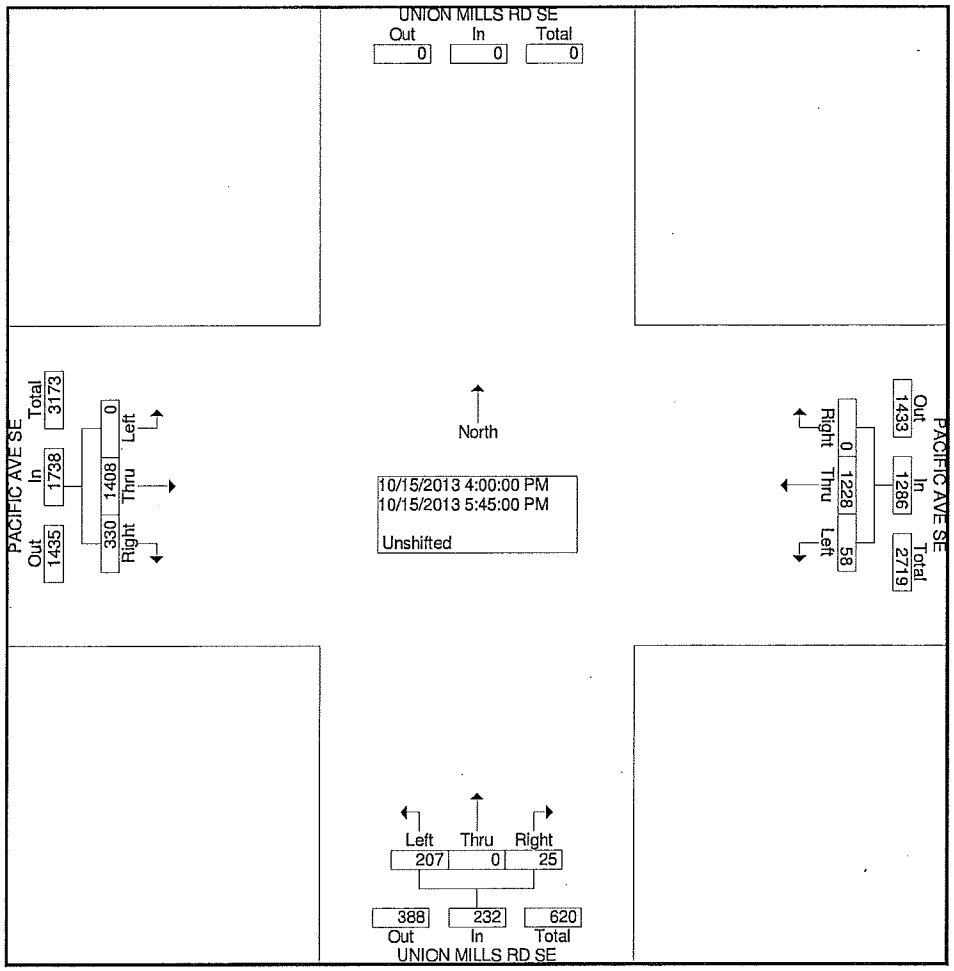
TRIP GENERATION 2013, TRAFFICWARE, LLC

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

File Name : 3415d
Site Code : 00003415
Start Date : 10/15/2013
Page No : 1

Groups Printed- Unshifted

	PACIFIC AVE SE Westbound			UNION MILLS RD SE Northbound			PACIFIC AVE SE Eastbound			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
04:00 PM	0	148	9	2	0	24	30	156	0	369
04:15 PM	0	164	11	2	0	22	31	152	0	382
04:30 PM	0	135	9	3	0	28	38	175	0	388
04:45 PM	0	138	5	3	0	21	39	158	0	364
Total	0	585	34	10	0	95	138	641	0	1503
05:00 PM	0	163	4	2	0	29	43	205	0	446
05:15 PM	0	152	8	3	0	30	56	195	0	444
05:30 PM	0	139	6	4	0	30	56	198	0	433
05:45 PM	0	189	6	6	0	23	37	169	0	430
Total	0	643	24	15	0	112	192	767	0	1753
Grand Total	0	1228	58	25	0	207	330	1408	0	3256
Apprch %	0.0	95.5	4.5	10.8	0.0	89.2	19.0	81.0	0.0	
Total %	0.0	37.7	1.8	0.8	0.0	6.4	10.1	43.2	0.0	



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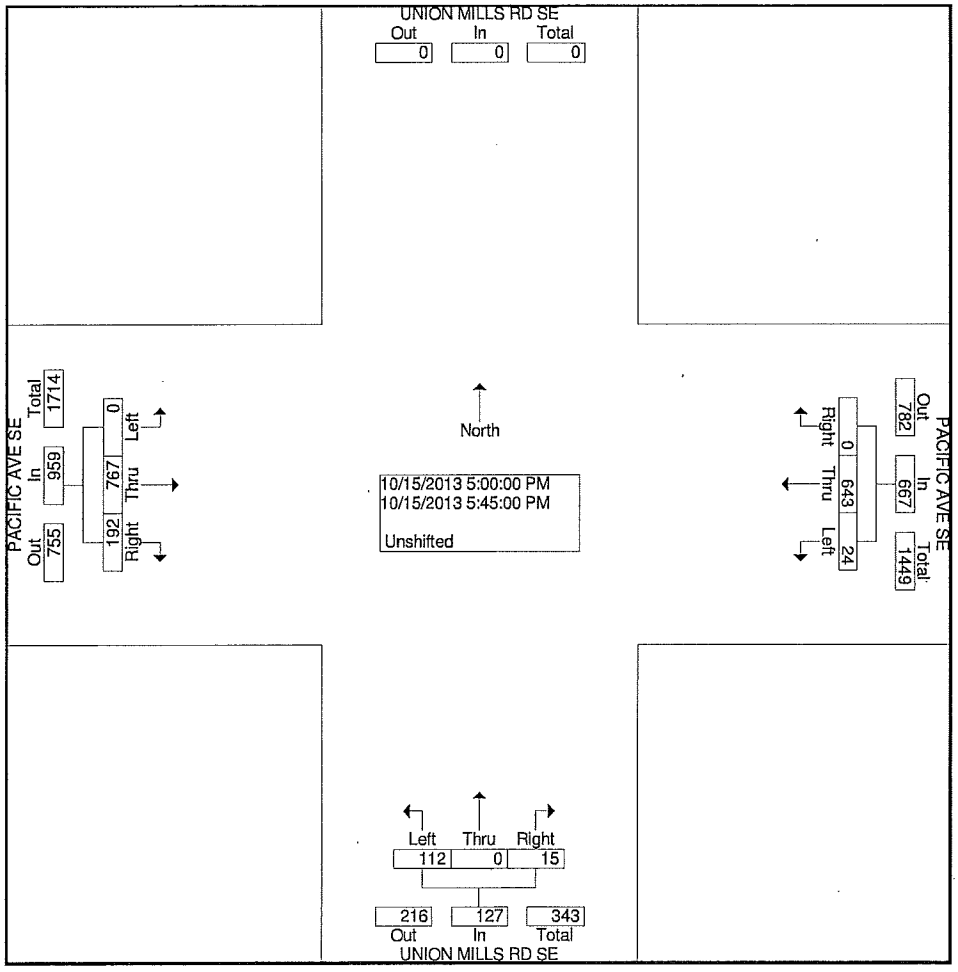
File Name : 3415d
Site Code : 00003415
Start Date : 10/15/2013
Page No : 2

	PACIFIC AVE SE Westbound				UNION MILLS RD SE Northbound				PACIFIC AVE SE Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1													
Intersection	05:00 PM												
Volume	0	643	24	667	15	0	112	127	192	767	0	959	1753
Percent	0.0	96.4	3.6		11.8	0.0	88.2		20.0	80.0	0.0		
05:00 Volume	0	163	4	167	2	0	29	31	43	205	0	248	446
Peak Factor													0.983
High Int.	05:45 PM				05:30 PM				05:30 PM				
Volume	0	189	6	195	4	0	30	34	56	198	0	254	
Peak Factor				0.855				0.934				0.944	



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2214 Tacoma Road
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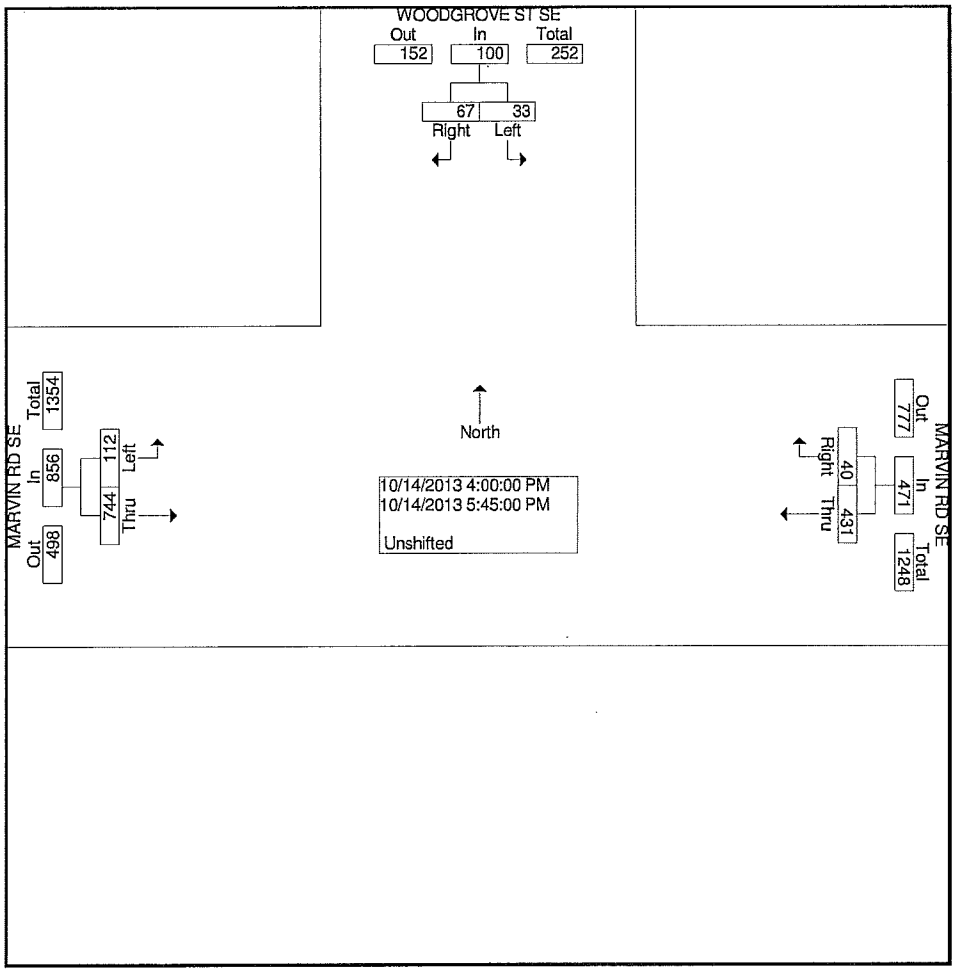
File Name : 3415b
Site Code : 00003415
Start Date : 10/14/2013
Page No : 1

Groups Printed- Unshifted

	WOODGROVE ST SE Southbound			MARVIN RD SE Westbound			MARVIN RD SE Eastbound			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
04:00 PM	5	0	3	5	53	0	0	63	11	140
04:15 PM	7	0	1	4	38	0	0	101	14	165
04:30 PM	12	0	7	3	58	0	0	84	11	175
04:45 PM	9	0	6	7	59	0	0	88	11	180
Total	33	0	17	19	208	0	0	336	47	660
05:00 PM	7	0	3	5	43	0	0	91	14	163
05:15 PM	10	0	5	6	71	0	0	100	16	208
05:30 PM	8	0	3	6	60	0	0	116	14	207
05:45 PM	9	0	5	4	49	0	0	101	21	189
Total	34	0	16	21	223	0	0	408	65	767
Grand Total	67	0	33	40	431	0	0	744	112	1427
Apprch %	67.0	0.0	33.0	8.5	91.5	0.0	0.0	86.9	13.1	
Total %	4.7	0.0	2.3	2.8	30.2	0.0	0.0	52.1	7.8	



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2214 Tacoma Road
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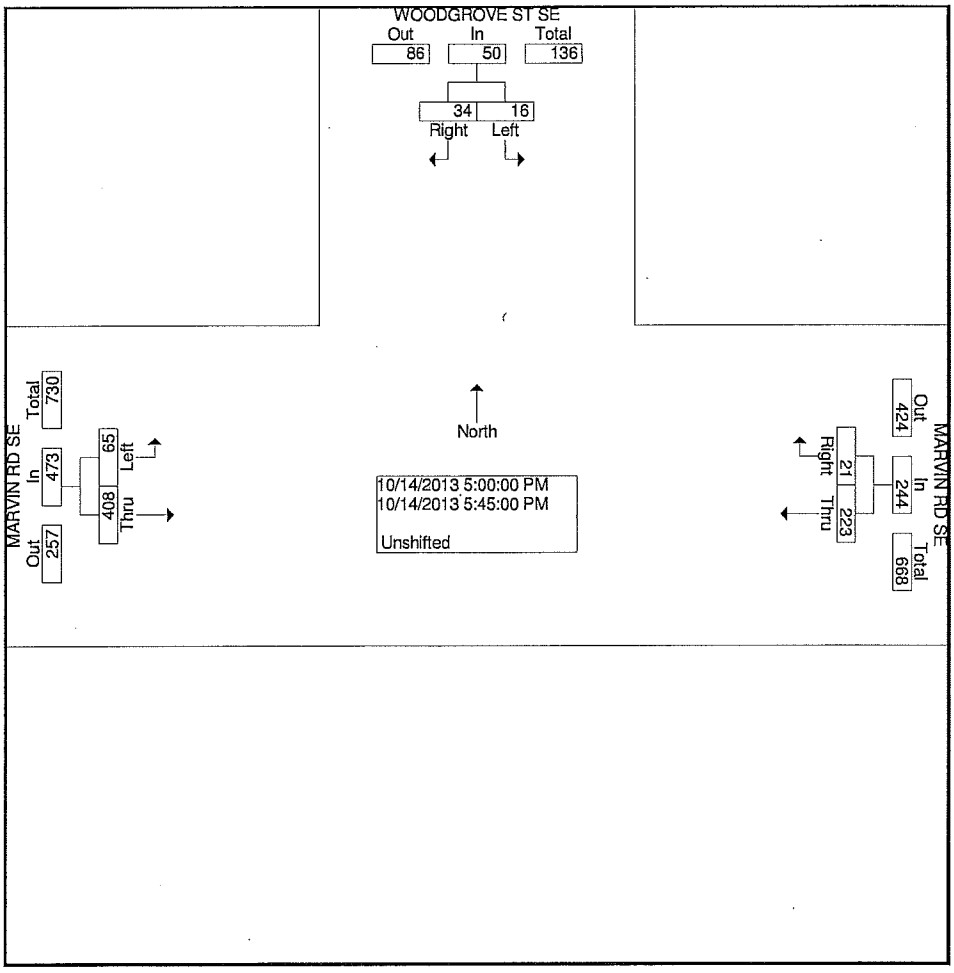
File Name : 3415b
Site Code : 00003415
Start Date : 10/14/2013
Page No : 2

	WOODGROVE ST SE Southbound				MARVIN RD SE Westbound				MARVIN RD SE Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1													
Intersection	05:00 PM												
Volume	34	0	16	50	21	223	0	244	0	408	65	473	767
Percent	68.0	0.0	32.0		8.6	91.4	0.0		0.0	86.3	13.7		
05:15 Volume	10	0	5	15	6	71	0	77	0	100	16	116	208
Peak Factor													0.922
High Int.	05:15 PM				05:15 PM				05:30 PM				
Volume	10	0	5	15	6	71	0	77	0	116	14	130	
Peak Factor				0.833				0.792				0.910	



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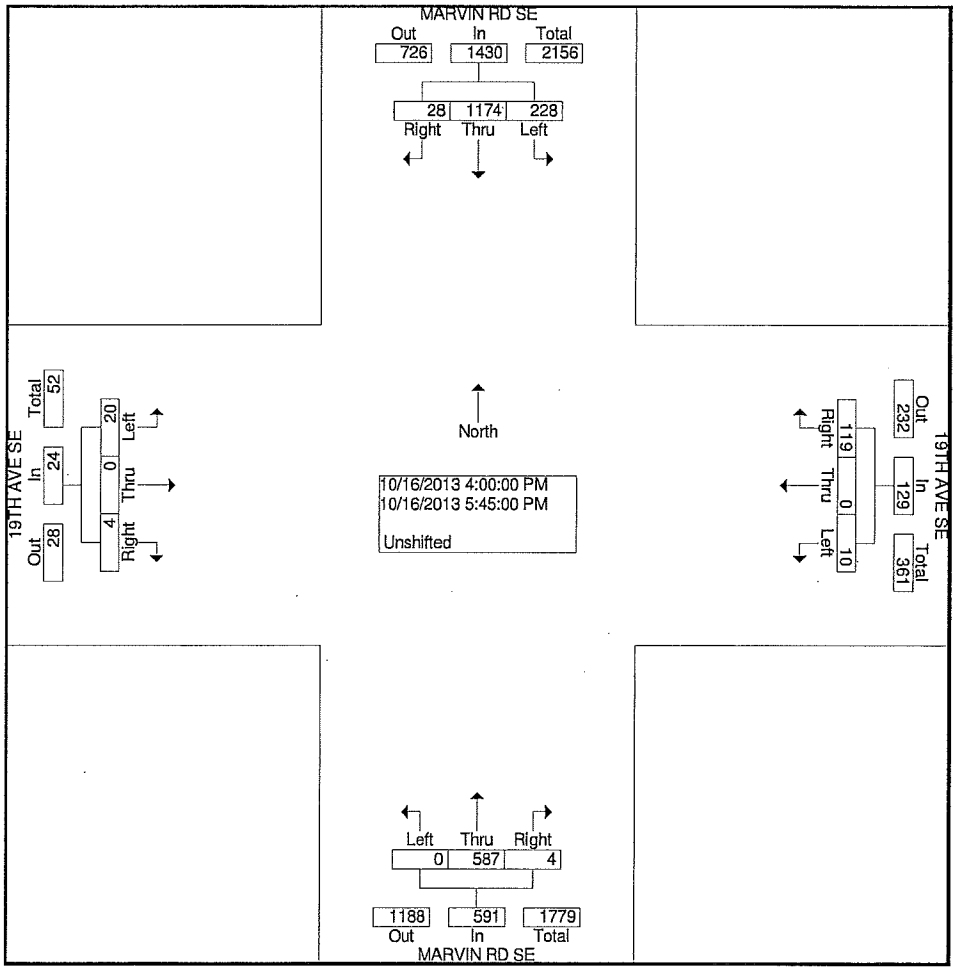
File Name : 3415e
Site Code : 00003415
Start Date : 10/16/2013
Page No : 1

Groups Printed- Unshifted

	MARVIN RD SE Southbound			19TH AVE SE Westbound			MARVIN RD SE Northbound			19TH AVE SE Eastbound			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
04:00 PM	3	129	26	14	0	2	1	57	0	0	0	1	233
04:15 PM	7	134	18	11	0	2	0	67	0	1	0	4	244
04:30 PM	4	131	26	18	0	2	1	67	0	2	0	3	254
04:45 PM	2	143	33	14	0	0	0	77	0	0	0	5	274
Total	16	537	103	57	0	6	2	268	0	3	0	13	1005
05:00 PM	6	158	26	11	0	3	1	71	0	0	0	1	277
05:15 PM	2	160	35	15	0	0	1	101	0	1	0	1	316
05:30 PM	2	145	37	20	0	0	0	66	0	0	0	4	274
05:45 PM	2	174	27	16	0	1	0	81	0	0	0	1	302
Total	12	637	125	62	0	4	2	319	0	1	0	7	1169
Grand Total	28	1174	228	119	0	10	4	587	0	4	0	20	2174
Apprch %	2.0	82.1	15.9	92.2	0.0	7.8	0.7	99.3	0.0	16.7	0.0	83.3	
Total %	1.3	54.0	10.5	5.5	0.0	0.5	0.2	27.0	0.0	0.2	0.0	0.9	



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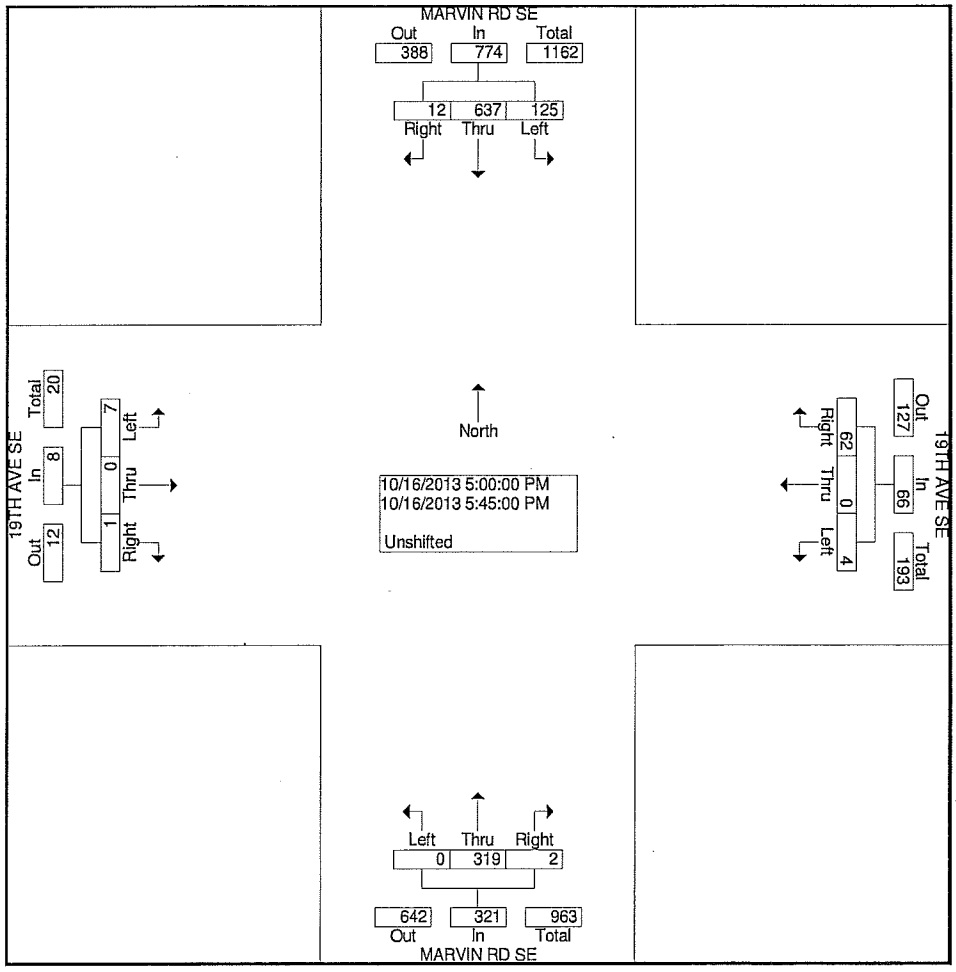
File Name : 3415e
Site Code : 00003415
Start Date : 10/16/2013
Page No : 2

	MARVIN RD SE Southbound				19TH AVE SE Westbound				MARVIN RD SE Northbound				19TH AVE SE Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Intersection 05:00 PM																	
Volume	12	637	125	774	62	0	4	66	2	319	0	321	1	0	7	8	1169
Percent	1.6	82.3	16.1		93.9	0.0	6.1		0.6	99.4	0.0		12.5	0.0	87.5		
05:15 Volume	2	160	35	197	15	0	0	15	1	101	0	102	1	0	1	2	316
Peak Factor																	0.925
High Int.	05:45 PM				05:30 PM				05:15 PM				05:30 PM				
Volume	2	174	27	203	20	0	0	20	1	101	0	102	0	0	4	4	
Peak Factor				0.953				0.825				0.787				0.500	



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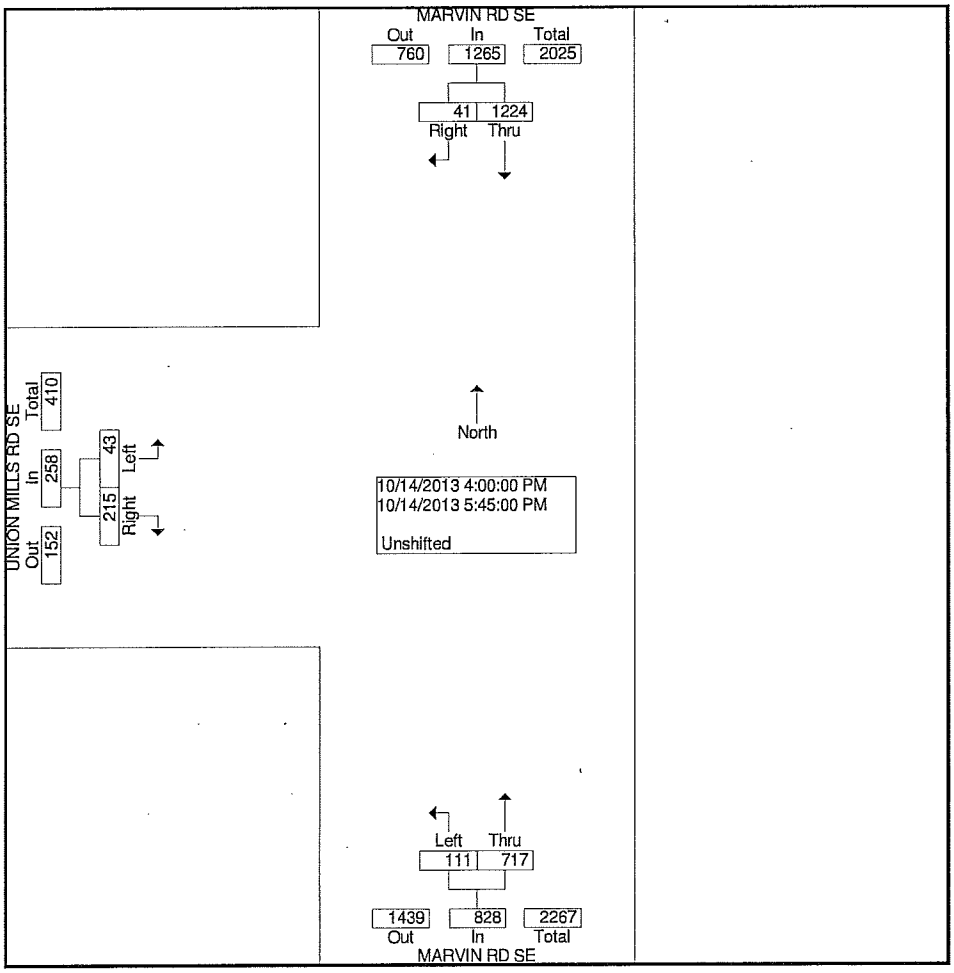
File Name : 3415c
Site Code : 00003415
Start Date : 10/14/2013
Page No : 1

Groups Printed- Unshifted

	MARVIN RD SE Southbound			MARVIN RD SE Northbound			UNION MILLS RD SE Eastbound			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
04:00 PM	8	116	0	0	84	10	12	0	6	236
04:15 PM	4	158	0	0	79	10	21	0	9	281
04:30 PM	6	144	0	0	100	16	23	0	4	293
04:45 PM	4	147	0	0	94	18	33	0	1	297
Total	22	565	0	0	357	54	89	0	20	1107
05:00 PM	5	145	0	0	84	18	17	0	2	271
05:15 PM	4	163	0	0	101	9	40	0	8	325
05:30 PM	8	183	0	0	85	17	33	0	5	331
05:45 PM	2	168	0	0	90	13	36	0	8	317
Total	19	659	0	0	360	57	126	0	23	1244
Grand Total	41	1224	0	0	717	111	215	0	43	2351
Apprch %	3.2	96.8	0.0	0.0	86.6	13.4	83.3	0.0	16.7	
Total %	1.7	52.1	0.0	0.0	30.5	4.7	9.1	0.0	1.8	



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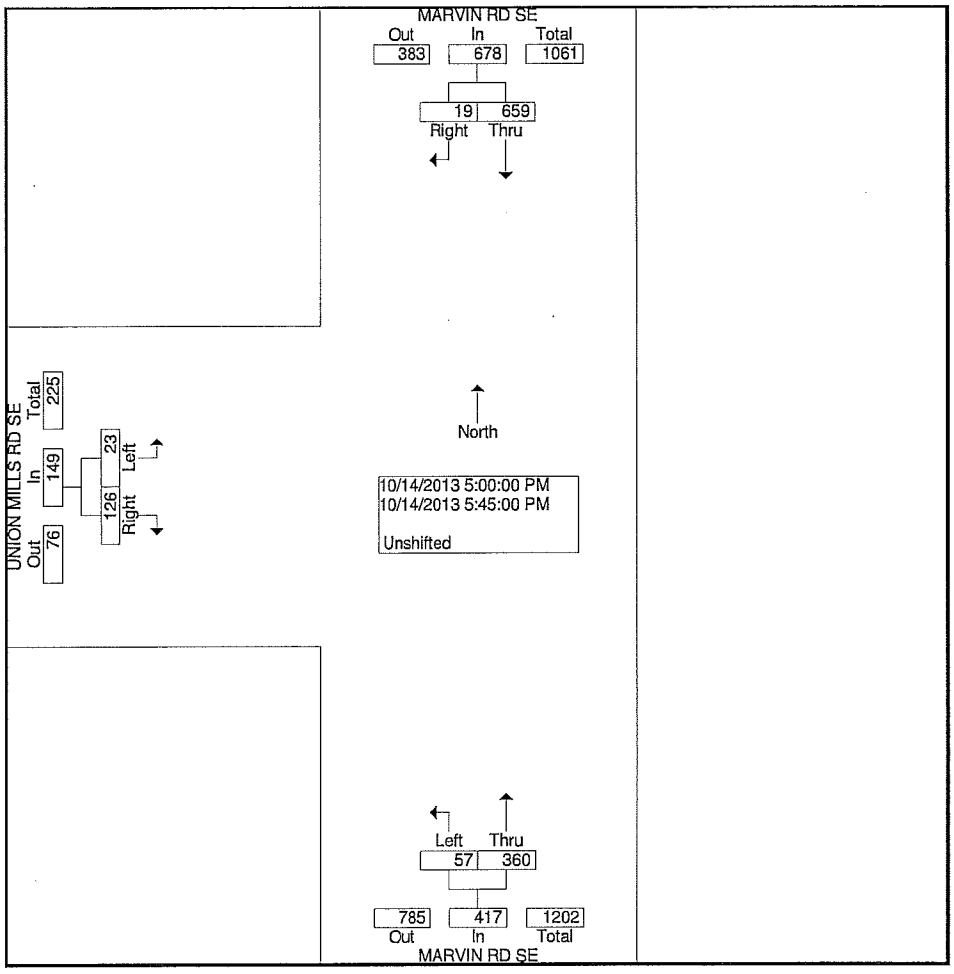
File Name : 3415c
Site Code : 00003415
Start Date : 10/14/2013
Page No : 2

	MARVIN RD SE Southbound				MARVIN RD SE Northbound				UNION MILLS RD SE Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1													
Intersection	05:00 PM												
Volume	19	659	0	678	0	360	57	417	126	0	23	149	1244
Percent	2.8	97.2	0.0		0.0	86.3	13.7		84.6	0.0	15.4		
05:30 Volume	8	183	0	191	0	85	17	102	33	0	5	38	331
Peak Factor													0.940
High Int.	05:30 PM				05:15 PM				05:15 PM				
Volume	8	183	0	191	0	101	9	110	40	0	8	48	
Peak Factor				0.887				0.948				0.776	



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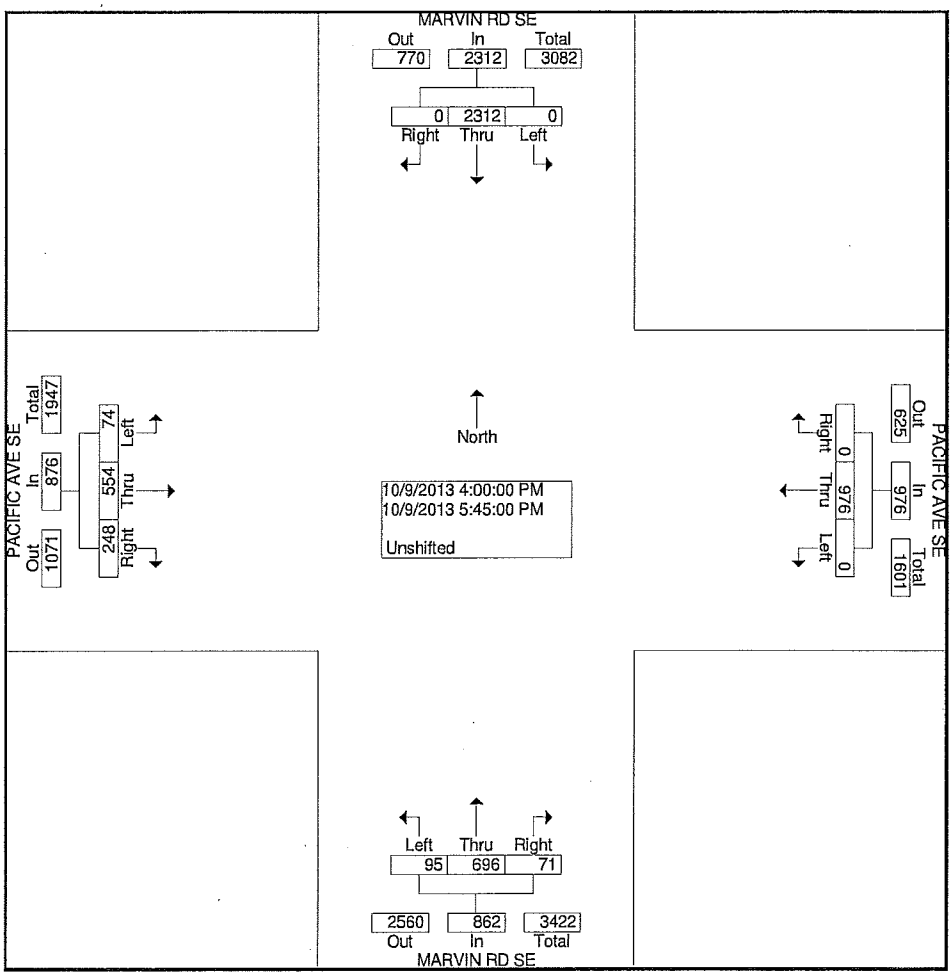
File Name : 3415a
Site Code : 00003415
Start Date : 10/9/2013
Page No : 1

Groups Printed- Unshifted

	MARVIN RD SE Southbound			PACIFIC AVE SE Westbound			MARVIN RD SE Northbound			PACIFIC AVE SE Eastbound			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
04:00 PM	0	265	0	0	121	0	8	81	16	20	76	9	596
04:15 PM	0	263	0	0	121	0	13	63	8	30	75	13	586
04:30 PM	0	273	0	0	120	0	7	88	9	37	66	11	611
04:45 PM	0	269	0	0	127	0	8	94	9	27	71	8	613
Total	0	1070	0	0	489	0	36	326	42	114	288	41	2406
05:00 PM	0	280	0	0	129	0	7	77	13	37	68	8	619
05:15 PM	0	295	0	0	121	0	9	113	12	36	88	10	684
05:30 PM	0	341	0	0	127	0	11	105	12	35	50	6	687
05:45 PM	0	326	0	0	110	0	8	75	16	26	60	9	630
Total	0	1242	0	0	487	0	35	370	53	134	266	33	2620
Grand Total	0	2312	0	0	976	0	71	696	95	248	554	74	5026
Apprch %	0.0	100.0	0.0	0.0	100.0	0.0	8.2	80.7	11.0	28.3	63.2	8.4	
Total %	0.0	46.0	0.0	0.0	19.4	0.0	1.4	13.8	1.9	4.9	11.0	1.5	



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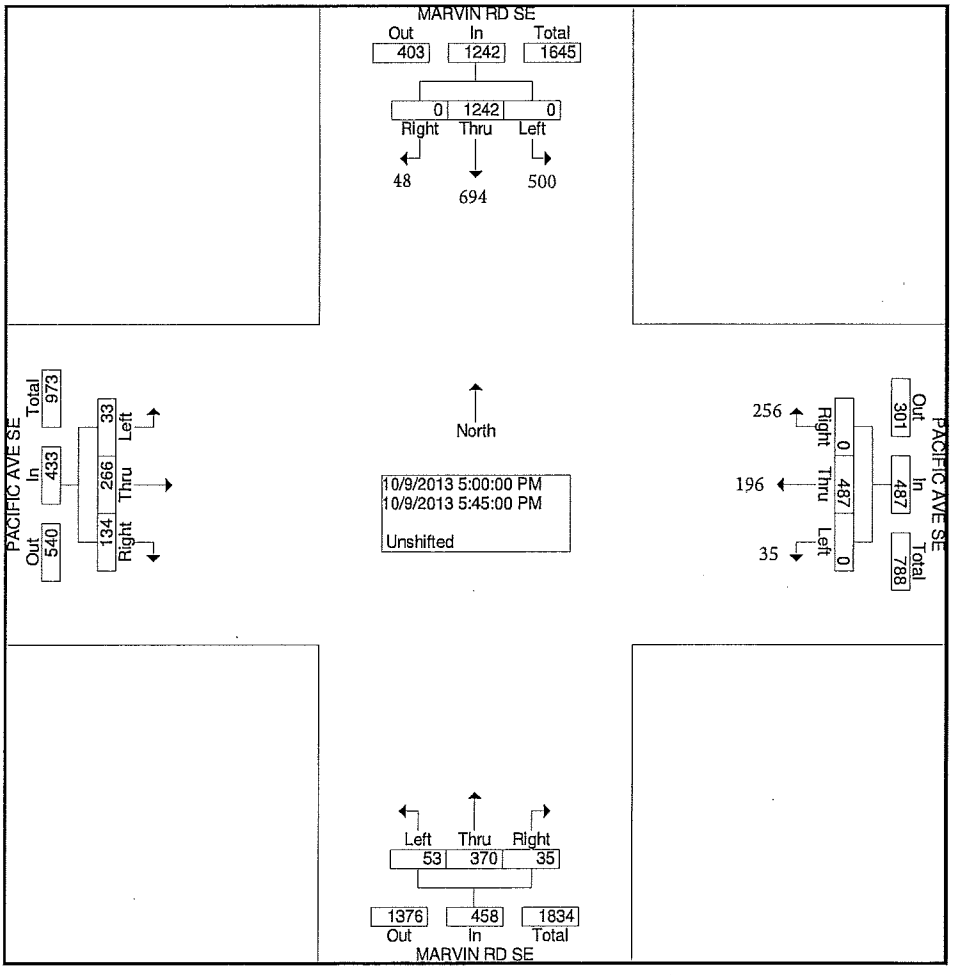
File Name : 3415a
Site Code : 00003415
Start Date : 10/9/2013
Page No : 2

	MARVIN RD SE Southbound				PACIFIC AVE SE Westbound				MARVIN RD SE Northbound				PACIFIC AVE SE Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Intersection 05:00 PM																	
Volume	0	1242	0	1242	0	487	0	487	35	370	53	458	134	266	33	433	2620
Percent	0.0	100.0	0.0		0.0	100.0	0.0		7.6	80.8	11.6		30.9	61.4	7.6		
05:30 Volume	0	341	0	341	0	127	0	127	11	105	12	128	35	50	6	91	687
Peak Factor																	0.953
High Int.	05:30 PM				05:00 PM				05:15 PM				05:15 PM				
Volume	0	341	0	341	0	129	0	129	9	113	12	134	36	88	10	134	
Peak Factor				0.911				0.944				0.854				0.808	



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	767	192	24	643	112	15
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	190.0	190.0	190.0	188.1	188.1	188.1
Lanes	2	0	1	2	1	1
Cap, veh/h	1553	389	46	2488	224	200
Arrive On Green	0.53	0.53	0.03	0.66	0.12	0.12
Sat Flow, veh/h	2935	735	1810	3762	1792	1599
Grp Volume(v), veh/h	540	503	26	699	122	16
Grp Sat Flow(s),veh/h/ln	1900	1770	1810	1881	1792	1599
Q Serve(g_s), s	7.0	7.0	0.5	2.9	2.4	0.3
Cycle Q Clear(g_c), s	7.0	7.0	0.5	2.9	2.4	0.3
Prop In Lane		0.42	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1005	937	46	2488	224	200
V/C Ratio(X)	0.54	0.54	0.57	0.28	0.55	0.08
Avail Cap(c_a), veh/h	1320	1230	193	3419	862	769
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	5.8	5.8	18.0	2.6	15.4	14.5
Incr Delay (d2), s/veh	0.4	0.5	10.6	0.1	2.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	2.4	2.2	0.3	0.7	1.0	0.1
Lane Grp Delay (d), s/veh	6.2	6.3	28.6	2.7	17.4	14.6
Lane Grp LOS	A	A	C	A	B	B
Approach Vol, veh/h	1043			725	138	
Approach Delay, s/veh	6.3			3.6	17.1	
Approach LOS	A			A	B	

Timer			
Assigned Phs	4	3	8
Phs Duration (G+Y+Rc), s	23.8	4.9	28.7
Change Period (Y+Rc), s	4.0	4.0	4.0
Max Green Setting (Gmax), s	26.0	4.0	34.0
Max Q Clear Time (g_c+I1), s	9.0	2.5	4.9
Green Ext Time (p_c), s	10.8	0.0	15.0

Intersection Summary	
HCM 2010 Ctrl Delay	6.0
HCM 2010 LOS	A

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	884	228	26	736	133	16
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	190.0	190.0	190.0	188.1	188.1	188.1
Lanes	2	0	1	2	1	1
Cap, veh/h	1589	409	48	2520	239	214
Arrive On Green	0.54	0.54	0.03	0.67	0.13	0.13
Sat Flow, veh/h	2917	751	1810	3762	1792	1599
Grp Volume(v), veh/h	625	584	28	800	145	17
Grp Sat Flow(s),veh/h/ln	1900	1768	1810	1881	1792	1599
Q Serve(g_s), s	9.1	9.1	0.6	3.6	3.1	0.4
Cycle Q Clear(g_c), s	9.1	9.1	0.6	3.6	3.1	0.4
Prop In Lane		0.42	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1035	963	48	2520	239	214
V/C Ratio(X)	0.60	0.61	0.58	0.32	0.61	0.08
Avail Cap(c_a), veh/h	1214	1129	178	3142	792	707
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	6.3	6.3	19.6	2.8	16.6	15.4
Incr Delay (d2), s/veh	0.6	0.7	10.6	0.1	2.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	3.1	2.9	0.4	0.9	1.4	0.1
Lane Grp Delay (d), s/veh	6.9	7.0	30.1	2.9	19.1	15.6
Lane Grp LOS	A	A	C	A	B	B
Approach Vol, veh/h	1209			828	162	
Approach Delay, s/veh	7.0			3.8	18.7	
Approach LOS	A			A	B	

Timer				
Assigned Phs	4		3	8
Phs Duration (G+Y+Rc), s	26.2		5.1	31.3
Change Period (Y+Rc), s	4.0		4.0	4.0
Max Green Setting (Gmax), s	26.0		4.0	34.0
Max Q Clear Time (g_c+I1), s	11.1		2.6	5.6
Green Ext Time (p_c), s	11.0		0.0	17.6

Intersection Summary	
HCM 2010 Ctrl Delay	6.6
HCM 2010 LOS	A

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	885	243	26	737	142	16
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	190.0	190.0	190.0	188.1	188.1	188.1
Lanes	2	0	1	2	1	1
Cap, veh/h	1564	428	48	2512	248	221
Arrive On Green	0.54	0.54	0.03	0.67	0.14	0.14
Sat Flow, veh/h	2875	786	1810	3762	1792	1599
Grp Volume(v), veh/h	635	591	28	801	154	17
Grp Sat Flow(s),veh/h/ln	1900	1761	1810	1881	1792	1599
Q Serve(g_s), s	9.4	9.5	0.6	3.7	3.3	0.4
Cycle Q Clear(g_c), s	9.4	9.5	0.6	3.7	3.3	0.4
Prop In Lane		0.45	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1033	958	48	2512	248	221
V/C Ratio(X)	0.61	0.62	0.58	0.32	0.62	0.08
Avail Cap(c_a), veh/h	1199	1112	176	3105	783	699
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	6.4	6.5	19.8	2.9	16.7	15.5
Incr Delay (d2), s/veh	0.7	0.8	10.6	0.1	2.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	3.4	3.2	0.4	0.9	1.5	0.1
Lane Grp Delay (d), s/veh	7.2	7.3	30.4	3.0	19.3	15.6
Lane Grp LOS	A	A	C	A	B	B
Approach Vol, veh/h	1226			829	171	
Approach Delay, s/veh	7.2			3.9	18.9	
Approach LOS	A			A	B	

Timer			
Assigned Phs	4	3	8
Phs Duration (G+Y+Rc), s	26.4	5.1	31.5
Change Period (Y+Rc), s	4.0	4.0	4.0
Max Green Setting (Gmax), s	26.0	4.0	34.0
Max Q Clear Time (g_c+I1), s	11.5	2.6	5.7
Green Ext Time (p_c), s	10.9	0.0	17.7

Intersection Summary	
HCM 2010 Ctrl Delay	6.9
HCM 2010 LOS	A

Notes

Intersection	
Intersection Delay, s/veh	15.3
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	456	512	482	1308
Demand Flow Rate, veh/h	460	517	487	1321
Vehicles Circulating, veh/h	1306	485	849	302
Vehicles Exiting, veh/h	317	851	917	700
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	19.7	8.4	11.8	17.8
Approach LOS	C	A	B	C

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.474	0.526	0.470	0.530	0.470	0.530
Critical Headway, s	4.293	4.113	4.293	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	216	244	245	272	229	258	621	700
Cap Entry Lane, veh/h	424	453	785	805	598	624	901	915
Entry HV Adj Factor	0.993	0.991	0.992	0.989	0.989	0.990	0.990	0.990
Flow Entry, veh/h	214	242	243	269	227	256	615	693
Cap Entry, veh/h	421	449	779	796	591	618	892	906
V/C Ratio	0.509	0.539	0.312	0.338	0.383	0.414	0.689	0.765
Control Delay, s/veh	19.6	19.7	8.3	8.5	11.7	11.9	15.9	19.5
LOS	C	C	A	A	B	B	C	C
95th %tile Queue, veh	3	3	1	1	2	2	6	8

Intersection	
Intersection Delay, s/veh	22.7
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	500	562	545	1506
Demand Flow Rate, veh/h	505	567	550	1522
Vehicles Circulating, veh/h	1502	550	946	331
Vehicles Exiting, veh/h	351	946	1061	786
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	29.8	9.5	14.6	28.1
Approach LOS	D	A	B	D

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.469	0.531	0.473	0.527	0.469	0.531	0.470	0.530
Critical Headway, s	4.293	4.113	4.293	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	237	268	268	299	258	292	715	807
Cap Entry Lane, veh/h	366	395	748	769	556	583	882	896
Entry HV Adj Factor	0.992	0.989	0.992	0.990	0.992	0.988	0.990	0.989
Flow Entry, veh/h	235	265	266	296	256	289	708	798
Cap Entry, veh/h	363	390	742	761	551	576	873	887
V/C Ratio	0.647	0.679	0.358	0.389	0.464	0.501	0.811	0.900
Control Delay, s/veh	29.6	30.0	9.3	9.7	14.4	14.9	23.2	32.5
LOS	D	D	A	A	B	B	C	D
95th %tile Queue, veh	4	5	2	2	2	3	9	13

Intersection	
Intersection Delay, s/veh	23.6
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	502	563	559	1523
Demand Flow Rate, veh/h	507	568	565	1539
Vehicles Circulating, veh/h	1520	564	946	334
Vehicles Exiting, veh/h	353	947	1081	798
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	31.0	9.7	15.0	29.5
Approach LOS	D	A	C	D

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.469	0.531	0.474	0.526	0.471	0.529	0.470	0.530
Critical Headway, s	4.293	4.113	4.293	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	238	269	269	299	266	299	723	816
Cap Entry Lane, veh/h	361	390	740	761	556	583	880	894
Entry HV Adj Factor	0.991	0.989	0.992	0.990	0.989	0.992	0.990	0.989
Flow Entry, veh/h	236	266	267	296	263	297	716	807
Cap Entry, veh/h	358	386	734	754	549	578	871	885
V/C Ratio	0.659	0.690	0.363	0.393	0.479	0.513	0.822	0.912
Control Delay, s/veh	30.8	31.1	9.5	9.8	14.8	15.2	24.2	34.3
LOS	D	D	A	A	B	C	C	D
95th %tile Queue, veh	4	5	2	2	3	3	9	13

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	23	126	57	360	659	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	137	62	391	716	21
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1242	727	737			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1242	727	737			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	86	68	93			
cM capacity (veh/h)	181	428	878			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	162	62	391	737
Volume Left	25	62	0	0
Volume Right	137	0	0	21
cSH	353	878	1700	1700
Volume to Capacity	0.46	0.07	0.23	0.43
Queue Length 95th (ft)	58	6	0	0
Control Delay (s)	23.5	9.4	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	23.5	1.3		0.0
Approach LOS	C			

Intersection Summary				
Average Delay	3.2			
Intersection Capacity Utilization	58.2%	ICU Level of Service		B
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	30	156	74	431	766	26
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	170	80	468	833	28
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1476	847	861			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1476	847	861			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	74	54	90			
cM capacity (veh/h)	126	365	789			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	202	80	468	861
Volume Left	33	80	0	0
Volume Right	170	0	0	28
cSH	280	789	1700	1700
Volume to Capacity	0.72	0.10	0.28	0.51
Queue Length 95th (ft)	128	8	0	0
Control Delay (s)	45.4	10.1	0.0	0.0
Lane LOS	E	B		
Approach Delay (s)	45.4	1.5		0.0
Approach LOS	E			

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	30	172	83	444	788	26
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	187	90	483	857	28
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1534	871	885			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1534	871	885			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	72	47	88			
cM capacity (veh/h)	114	354	773			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	220	90	483	885
Volume Left	33	90	0	0
Volume Right	187	0	0	28
cSH	270	773	1700	1700
Volume to Capacity	0.81	0.12	0.28	0.52
Queue Length 95th (ft)	162	10	0	0
Control Delay (s)	57.9	10.3	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	57.9	1.6		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	8.1		
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	0	1	4	0	62	0	319	2	125	637	12
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	1	4	0	67	0	347	2	136	692	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1385	1320	699	1313	1325	348	705			349		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1385	1320	699	1313	1325	348	705			349		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	100	100	97	100	90	100			89		
cM capacity (veh/h)	101	141	443	125	140	700	902			1221		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	9	72	0	349	136	705
Volume Left	8	4	0	0	136	0
Volume Right	1	67	0	2	0	13
cSH	112	547	1700	1700	1221	1700
Volume to Capacity	0.08	0.13	0.00	0.21	0.11	0.41
Queue Length 95th (ft)	6	11	0	0	9	0
Control Delay (s)	40.0	12.6	0.0	0.0	8.3	0.0
Lane LOS	E	B			A	
Approach Delay (s)	40.0	12.6	0.0		1.3	
Approach LOS	E	B				

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	51.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	0	1	4	0	67	0	399	2	135	762	13
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	1	4	0	73	0	434	2	147	828	14
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1635	1565	835	1558	1571	435	842			436		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1635	1565	835	1558	1571	435	842			436		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	88	100	100	95	100	88	100			87		
cM capacity (veh/h)	65	98	370	83	97	626	802			1135		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	9	77	0	436	147	842
Volume Left	8	4	0	0	147	0
Volume Right	1	73	0	2	0	14
cSH	72	457	1700	1700	1135	1700
Volume to Capacity	0.12	0.17	0.00	0.26	0.13	0.50
Queue Length 95th (ft)	10	15	0	0	11	0
Control Delay (s)	61.3	14.5	0.0	0.0	8.6	0.0
Lane LOS	F	B			A	
Approach Delay (s)	61.3	14.5	0.0		1.3	
Approach LOS	F	B				

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	58.5%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	0	1	4	0	67	0	421	2	135	800	13
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	1	4	0	73	0	458	2	147	870	14
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1701	1630	877	1623	1636	459	884			460		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1701	1630	877	1623	1636	459	884			460		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	87	100	100	94	100	88	100			87		
cM capacity (veh/h)	58	89	351	75	88	606	774			1112		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	9	77	0	460	147	884
Volume Left	8	4	0	0	147	0
Volume Right	1	73	0	2	0	14
cSH	65	433	1700	1700	1112	1700
Volume to Capacity	0.13	0.18	0.00	0.27	0.13	0.52
Queue Length 95th (ft)	11	16	0	0	11	0
Control Delay (s)	68.9	15.1	0.0	0.0	8.7	0.0
Lane LOS	F	C			A	
Approach Delay (s)	68.9	15.1	0.0		1.2	
Approach LOS	F	C				

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	60.5%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	65	408	223	21	16	34
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	71	443	242	23	17	37
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	None			
Median storage veh)		2				
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	265				839	254
vC1, stage 1 conf vol					254	
vC2, stage 2 conf vol					585	
vCu, unblocked vol	265				839	254
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	95				96	95
cM capacity (veh/h)	1310				493	790

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	71	443	265	54
Volume Left	71	0	0	17
Volume Right	0	0	23	37
cSH	1310	1700	1700	662
Volume to Capacity	0.05	0.26	0.16	0.08
Queue Length 95th (ft)	4	0	0	7
Control Delay (s)	7.9	0.0	0.0	10.9
Lane LOS	A			B
Approach Delay (s)	1.1		0.0	10.9
Approach LOS				B

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	31.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	70	475	282	23	17	37
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	76	516	307	25	18	40
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	None			
Median storage veh)		2				
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	332				988	319
vC1, stage 1 conf vol					319	
vC2, stage 2 conf vol					668	
vCu, unblocked vol	332				988	319
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	94				96	94
cM capacity (veh/h)	1239				443	726

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	76	516	332	59
Volume Left	76	0	0	18
Volume Right	0	0	25	40
cSH	1239	1700	1700	604
Volume to Capacity	0.06	0.30	0.20	0.10
Queue Length 95th (ft)	5	0	0	8
Control Delay (s)	8.1	0.0	0.0	11.6
Lane LOS	A			B
Approach Delay (s)	1.0		0.0	11.6
Approach LOS				B

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	35.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	109	475	282	37	25	60
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	118	516	307	40	27	65
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	None			
Median storage veh)		2				
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	347				1080	327
vC1, stage 1 conf vol					327	
vC2, stage 2 conf vol					753	
vCu, unblocked vol	347				1080	327
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	90				93	91
cM capacity (veh/h)	1223				393	719

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	118	516	347	92
Volume Left	118	0	0	27
Volume Right	0	0	40	65
cSH	1223	1700	1700	578
Volume to Capacity	0.10	0.30	0.20	0.16
Queue Length 95th (ft)	8	0	0	14
Control Delay (s)	8.3	0.0	0.0	12.4
Lane LOS	A			B
Approach Delay (s)	1.5		0.0	12.4
Approach LOS				B

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		