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# LOGAN'S LANDING

Woodland, WA

TRAFFIC IMPACT ANALYSIS (TIA)

July 31, 2023

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**HEATH**&ASSOCIATES

Transportation Planning & Engineering

# LOGAN'S LANDING TRAFFIC IMPACT ANALYSIS

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# LOGAN'S LANDING TRAFFIC IMPACT ANALYSIS

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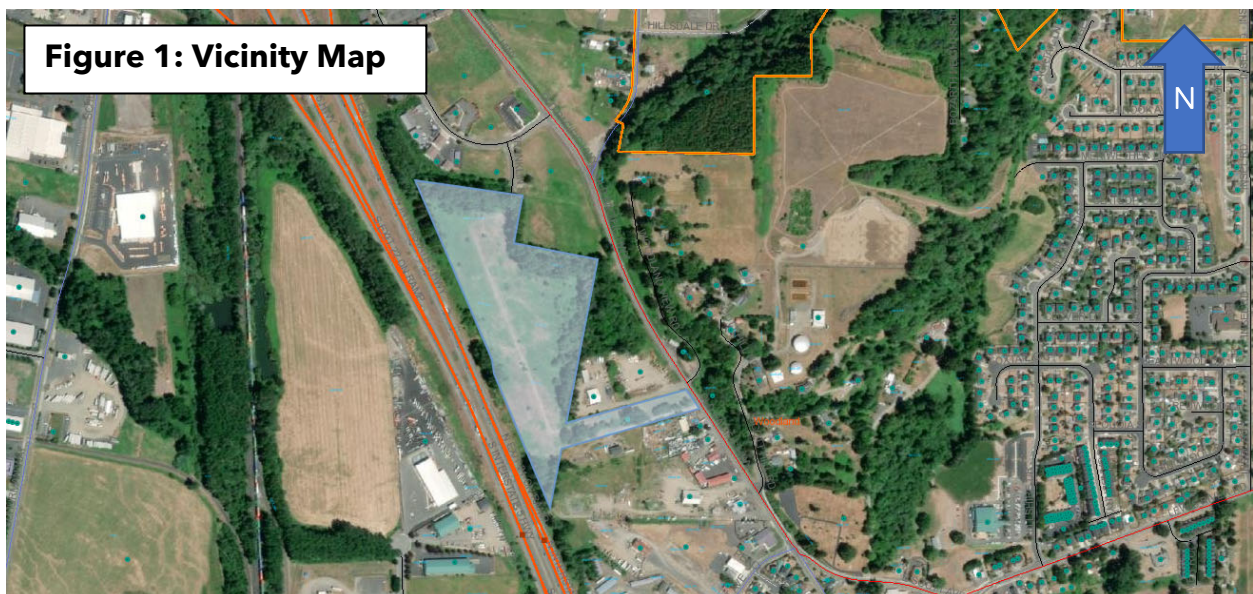
# LOGAN'S LANDING TRAFFIC IMPACT ANALYSIS

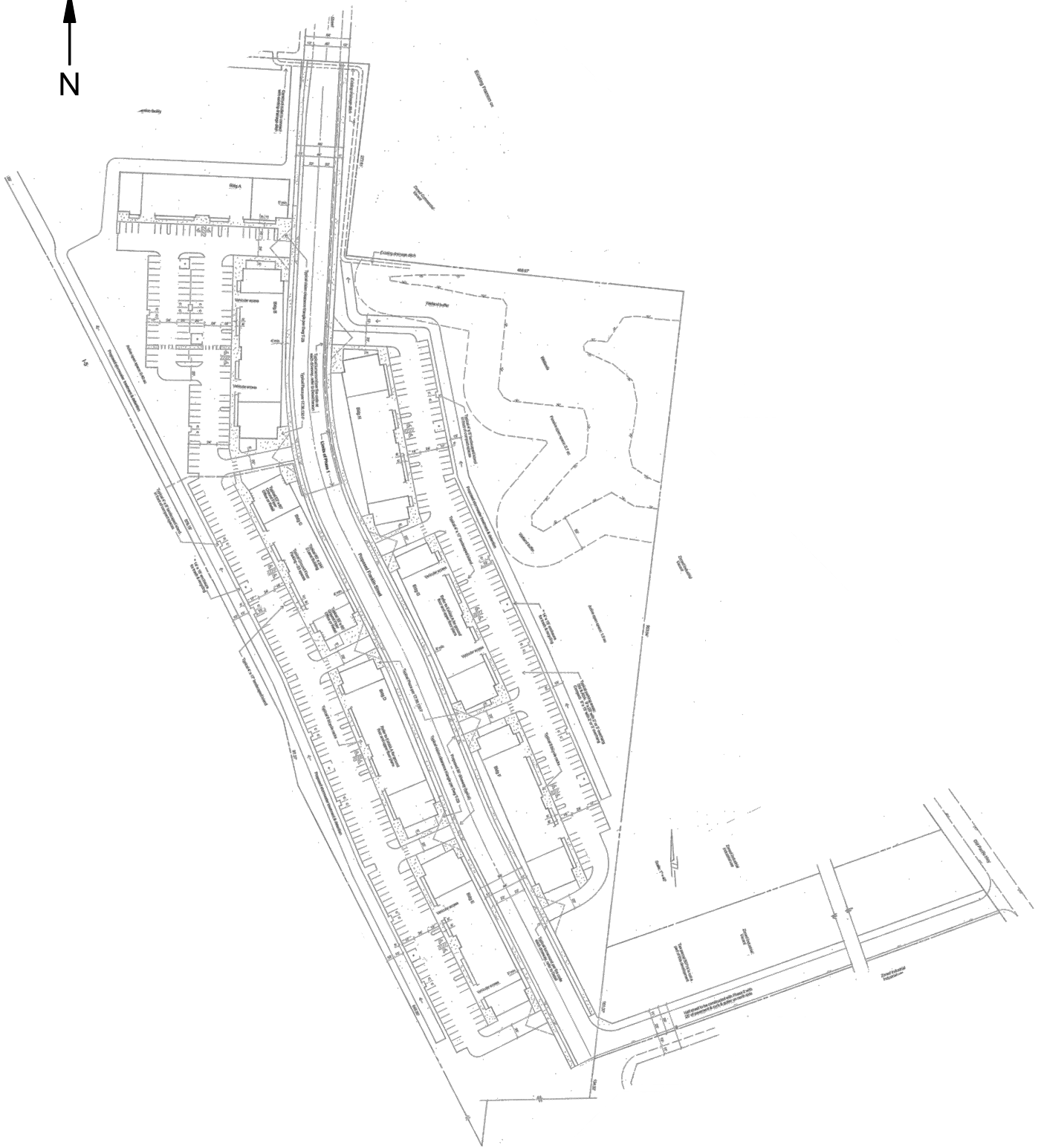
## 1. INTRODUCTION

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 adjacent street system and baseline vehicular volumes. 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

Logan's Landing is a proposed mixed-use development located within the city of Woodland. The subject site is located west of Old Pacific Highway and south of Belmont Loop. The subject site, comprised of four parcels (#: 50680023, 50714, 50729 and a portion of 50730), is situated on approximately 20 acres of undeveloped land. Development is proposed to consist of eight buildings, each with 5,080 square feet of office/retail space on the bottom floor (40,640 square feet total) and the top floors will consist of a total of 34 apartments units (272 total units on-site). Access to and from the subject site is proposed via a southerly extension of Franklin Street by way of Belmont Loop. Moreover, this Franklin Street roadway extension is proposed to provide direct connection to Old Pacific Highway via parcel #: 50714 upon full site build-out. Figure 1 below depicts the roadway network servicing the subject site. Figure 2 on the following page highlights the site layout.





### 3. EXISTING CONDITIONS

#### 3.1 Existing Street System

The street network serving the proposed project consists of a variety of roadways. The major roadways and arterials surrounding the site are listed and described in Table 1 below.

**Table 1: Roadway Network**

Functional Classification	Roadway	Speed Limit	Travel Lanes	Street Parking	Sidewalk	Bike Facilities
<b>Minor Arterial</b>	Dike Access Rd	35-mph	2	No	Discontinuous	No
	Old Pacific Hwy	35-mph	2	No	Discontinuous	No
	Lewis River Rd	35-mph	2	No	Discontinuous	No
<b>Local</b>	Belmont Loop	25-mph*	2	Yes	Discontinuous	No

\* No posted speed limit observed so 25 mph assumed.

#### 3.2 Transit Service

No transit is available within walking-distance of the subject site. The nearest public transit is provided at the Woodland Park & Ride, located ~1.5-miles south of the subject site. The Lower Columbia CAP (Community Action Program) provides weekday transit service from Longview to Vancouver, with stops in Woodland and Kalama. Service is available from 6:35 AM - 6:28 PM with approximately 120-minute headways. Refer to the CAP schedule for more detailed information.

Given the proximity of the Woodland Park & Ride to the proposed development, residents may utilize transit services.

#### 3.3 Non-Motorist Infrastructure

Discontinuous segments of sidewalk are available along Belmont Loop, adjacent developed tax parcels. The surrounding area, including Old Pacific Highway, is rural in nature with minimal non-motorist infrastructure available. The Franklin Street roadway extension will be constructed as part of site development, providing sidewalk infrastructure.



### 3.4 Roadway Improvements

A review of the City of Woodland’s Six-Year Transportation Improvement Program (2023-2028) indicates that the following projects are currently planned in the vicinity of Logan’s Landing development.

**Table 2: Transportation Improvement Projects**

Name	Location	Improvement	Cost
SR 503 Bypass (WA-11289)	Lewis River Rd to OPH	Construct a new roadway to bypass SR 503 extending from Lewis River Rd to OPH thereby providing a more direct route with access via I-5/Dike Access Rd	TBD
OPH Sidewalks (WA-14418)	OPH: Belmont Loop to E Scott	Install sidewalks and ADA ramps along roadway	TBD
Hillsdale OPH Ext. (WA-11272)	OPH to Green Mtn.	Extend Hillsdale Dr from its current terminus point at Green Mtn Rd easterly to OPH (roughly mid-point btw Belmont Lp N and S). Phase 1 is expected to begin in 2026. Project cost/funding status are TBD.	TBD
Green Mt./OPH (WA-11271)	Intersection	Construct intersection improvements	TBD
Franklin Loop/OPH (WA-11269)	Franklin Loop	Extend Franklin southerly from its current terminus point ~275’ s/o Belmont, jogging easterly to tie into OPH at Woodland View. A portion of this project would be constructed as part of Logan’s Landing.	TBD
Franklin/E Scott Ext. (WA-11270)	Franklin Loop	Extend Franklin southerly from the above project to E Scott. Phase 1 is expected to commence in 2027. Project cost/funding status are TBD.	TBD
E Scott/OPH (WA-05177)	Intersection	Construct intersection improvements. Final design is TBD.	\$3,200,000
W Scott Ave Full Depth Reclamation (WA-05176)	W. Scott Ave: Schurman Way to Pac. Ave.	Full depth reclamation and sidewalks. Project will coordinate with separately funded Pedestrian and Water line RR crossing projects.	\$2,207,996
SR-503 Safety Project (WA-12751)	N Goerig to Gun Club Rd	Install sidewalk, planter strips, curb & gutter, bike route, crosswalk w/ signage & RRFBs	\$1,514,080
W Scott/Pacific Slip Lane (WA -11286)	W Scott/Pacific	Construct a slip lane	TBD
Scott Hill Connectors (WA-11288)	Scott Hill	Provide roadway connections between Meriwether and Scott Hill	TBD
Scott Ave Reconnection (WA-06621)	Scott Ave	Engineering, design, and construction of Scott Avenue crossing at I-5	\$81,000,000



### 3.5 Existing Peak Hour Volumes

Field data for this study was obtained and collected by our firm in June of 2023 at the following study intersections:

1. Dike Access Road & I-5 Southbound Ramps
2. Dike Access Road & I-5 Northbound Ramps
3. Old Pacific Highway & Belmont Loop N
4. Old Pacific Highway & Belmont Loop S
5. Old Pacific Highway & Green Mountain Road
6. Old Pacific Highway & E Scott Avenue
7. Lewis River Road & E Scott Avenue

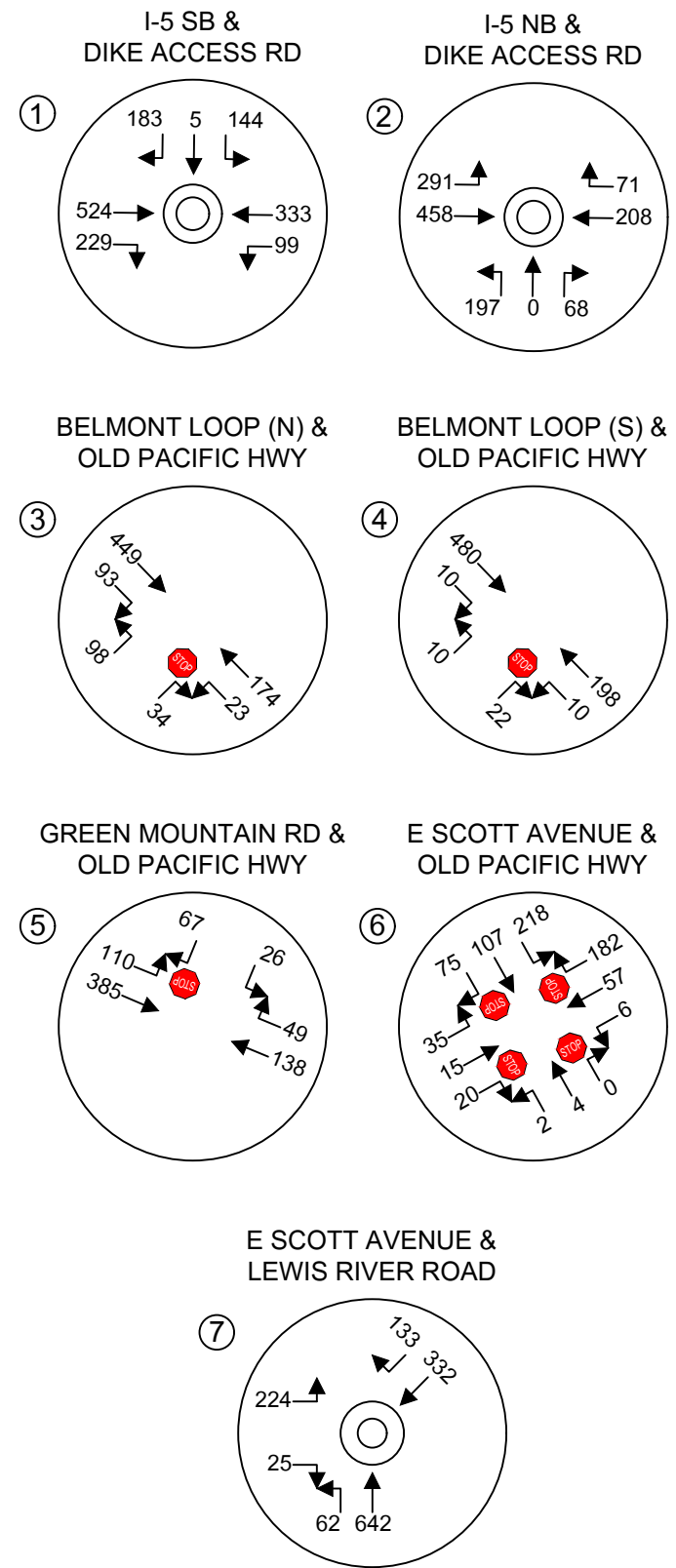
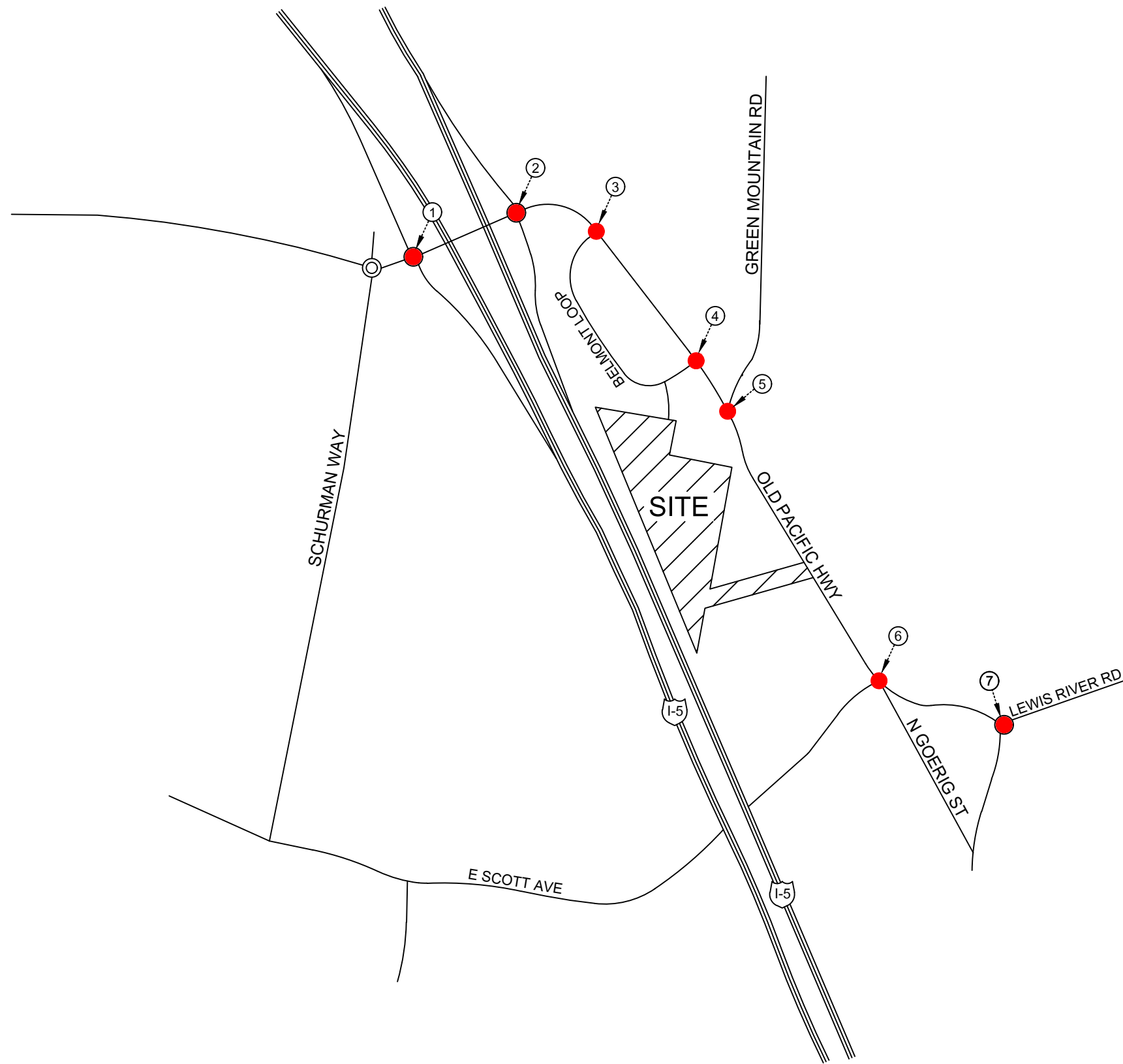
Counts were performed between the PM peak period of 4:00 PM - 6:00 PM, which generally represents peak roadway conditions during a typical 24-hour period. The single hour exhibiting highest overall intersection volumes is then derived (peak hour) and is used for analysis for each respective location. Figure 3 on the following page identifies baseline PM peak hour volumes. Full count sheets have been attached in the appendix for reference.

It should be noted that the prior *Logan's Landing TIA (3/10/2022)* derived baseline PM peak hour volumes consistent with methodologies utilized in the *Oak Village Apartments TIA (8/19/2021)* by Lancaster Mobley. Traffic patterns and volumes were presumably depressed by the ongoing COVID-19 pandemic at the time both reports were conducted. As such, baseline intersection volumes were established by grossing up historic 2019 pre-COVID counts by a compound annual growth rate of 2.3 percent, as well as by adjusting up 2021 counts by a derived factor of 1.3881. However, as traffic conditions are presumed to now have stabilized in 2023, all new counts have been gathered, which are anticipated to accurately reflect baseline conditions. This is corroborated by 2023 total intersection volumes gathered by our firm at the Dike Access Road I-5 Ramps, which comprise similar travel patterns and volumes to pre-COVID counts utilized for the *Oak Village Apartments TIA*.

Lastly, non-motorist volumes were observed at the Old Pacific Highway intersections located in closest proximity to the subject site. No pedestrians or bicycle transport were observed along Old Pacific Highway at Belmont Loop (North or South) or at Green Mountain Road. Given the rural nature of surrounding development, the subject site is not anticipated to be a significant generator of non-motorist traffic.







### 3.6 Level of Service

Existing intersection delays were determined through the use of the *Highway Capacity Manual* 7th Edition. Capacity analysis is used to determine level of service (LOS) which is an established measure of congestion for transportation facilities. The range<sup>1</sup> 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 12* and *SIDRA 9.1* analysis programs. For roundabouts and all-way stop-controlled (AWSC) intersections, LOS is determined by the intersection's overall weighted average delay for each approaching leg. Side-street stop-controlled intersection LOS is determined by the approach with the highest delay. Table 3 presents existing PM peak hour LOS delays for the key intersections of study.

**Table 3: Existing Weekday PM Peak Hour Level of Service**

*Delays given in seconds per vehicle*

Intersection	Control	Movement	LOS	Delay
I-5 SB Ramps & Dike Access Rd	RAB	Overall	A	7.6
I-5 NB Ramps & Dike Access Rd	RAB	Overall	A	8.2
Belmont Loop N & Old Pacific Hwy	TWSC	EB	C	16.32
Belmont Loop S & Old Pacific Hwy	TWSC	EB	B	12.96
Green Mtn Rd & Old Pacific Hwy	TWSC	WB	B	12.67
E Scott Ave & Old Pacific Hwy	AWSC	Overall	B	11.6
E Scott Ave & Lewis River Rd	RAB	Overall	A	6.9

The City of Woodland has adopted LOS D standards. Existing PM peak hour conditions at the study intersections are shown to operate with delays at LOS C or better. As such, the study intersections meet City standards under existing conditions.

<sup>1</sup>*Signalized Intersections - Level of Service*  
Control Delay per

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

*Stop Controlled Intersections - Level of Service*  
Control Delay per

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

Highway Capacity Manual, 7th Edition



## 4. FORECAST TRAFFIC DEMAND & ANALYSIS

### 4.1 Project Trip Generation

Trip generation is used to determine the magnitude of project impacts on the surrounding street system. This is usually denoted by the quantity or specific number of new trips that enter and exit a project during a designated time period, such as a specific peak hour (AM or PM) or an entire day. Data presented in this report was taken from the Institute of Transportation Engineer's publication Trip Generation, 11th Edition. It should be noted that the ground-level commercial space users are unknown at this time. The commercial space is anticipated to be split roughly half between general office and half as general retail. As such, the designated land uses for this project are defined under Land Use Code (LUC) 220 - Multi-Family (Low-Rise) Apartments (272 dwelling units), LUC 710 - General Office (20,320 square feet) and LUC 821 - Strip Retail Plaza (<40k: 20,320 square feet).

It should be noted that the proposed project is anticipated to generate trips from internal capture (i.e., customers/residents already on-site) and pass-by (i.e., customers already on the adjacent street system) in addition to new trips. Concerning internal capture, a single trip entering the site for one facility may subsequently use a variety of other services offered on-site. Moreover, residents within the multi-family space may utilize commercial/retail services on-site. The complimentary uses on-site are anticipated to generate an internal trip capture reduction of 5.1% in the AM peak hour and 21.5% in the PM peak hour as derived via the NCHRP 8-51 Internal Trip Capture Estimation Tool. Also considered are pass-by trips, or motorists already passing by the site who decide to make an intermediate stop before proceeding to their primary destination. Pass-by percentages were applied to the proposed 20,320 square feet of strip retail space on-site based on ITE data. These trips are not considered as new trips but will impact the site's access points.

Table 4 on the following page summarizes the estimated aggregate project trip generation. Included are the average weekday daily traffic (AWDT) and the AM and PM peak hours. Available in the appendix is a use-specific breakdown including rates used for calculations.



**Table 4: Project Trip Generation**

Trip Type	AWDT	AM Peak-Hour Trips			PM Peak-Hour Trips		
		In	Out	Total	In	Out	Total
Total Trips	3160	82	106	<b>188</b>	159	143	<b>302</b>
Internal Link Reduction <sup>2</sup>	-420	-6	-4	<b>-10</b>	-34	-31	<b>-65</b>
Pass-By Reduction <sup>3</sup>	-384	-9	-9	<b>-18</b>	-21	-21	<b>-42</b>
<b>Total New Primary</b>	2356	67	93	<b>160</b>	104	91	<b>195</b>

As summarized in Table 4, trips to and from the site are broken into internal capture, pass-by and primary. In total, 2,356 new primary vehicular trips per weekday are expected as a result of the proposed development with 160 primary trips occurring during the AM peak hour and 195 primary trips occurring during the PM peak hour. Moreover, approximately 18 AM peak hour and 42 PM peak hour trips are anticipated to be generated from the development in the form of pass-by.

#### 4.2 Distribution & Assignment

Trip distribution describes the anticipated travel routes for inbound and outbound project traffic during the peak hour study period. PM peak hour trips are primarily comprised of commuter-based (returning home) and recreational-based trips. Primary and pass-by PM peak hour trips generated by the project are expected to follow the general pattern as shown in Figure 4. Percentages emulate prior submittals for the Logan’s Landing project. An approximate 75/25 north/south split is anticipated for both primary and pass-by trips. Trips were assigned to the Belmont Loop South & Old Pacific Highway intersection via the Franklin Street extension. Moreover, trips were additionally assigned to the newly proposed Franklin Street extension connection to Old Pacific Highway via tax parcel #: 50714.

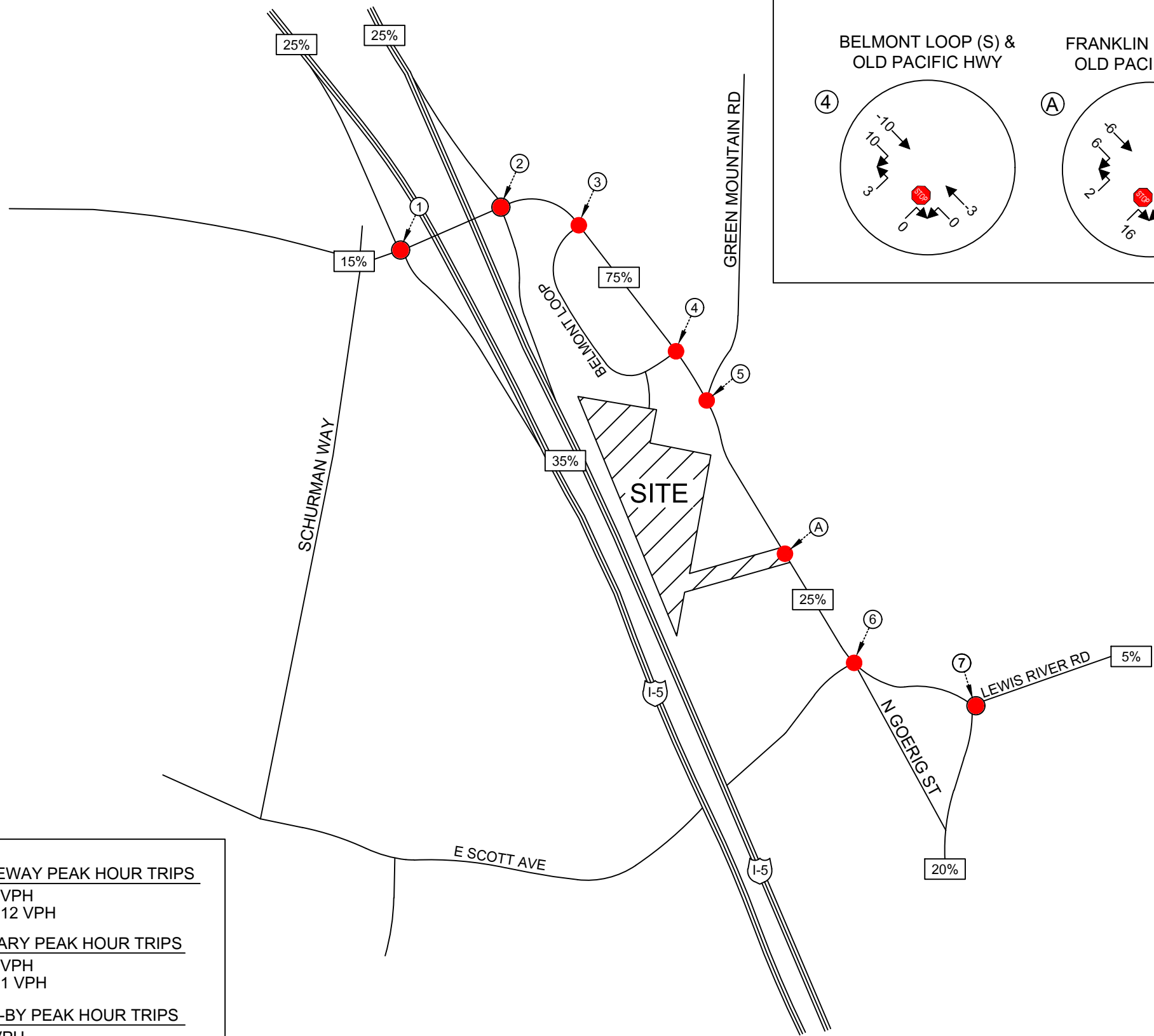
#### 4.3 Future Peak Hour Volumes

A three-year horizon of 2026 was used to analyze future conditions. Background volumes at the intersections of study were derived by applying a 2.3 percent compound annual growth rate to the existing volumes illustrated in Figure 3. This growth rate was derived from the City’s Comprehensive Plan based on their population growth forecasts. Moreover, pipeline volumes from the Oak Village Apartments project were accounted for in forecast volumes. Figures 5 and 6 represent forecast 2026 PM peak hour volumes without and with project traffic.

<sup>2</sup> An internal link reduction of 5.1% was applied to all proposed on-site land uses for the AM peak hour and 21.5% for the PM peak hour, which was derived via the NCHRP 8-51 Internal Trip Capture Estimation Tool. ADT internal capture rates were derived by taking the average of the AM and PM peak hours (13.3%).

<sup>3</sup> Pass-by rates were derived from the Institute of Transportation Engineers, *2021 Pass-By Tables for ITE Trip Gen Appendices* (2021). As no pass-by data is available for LUC 822 - Strip Retail Plaza (<40k), data for LUC 821 - Shopping Plaza (40 - 150k) was utilized. PM Rate: 40%. This rate was applied to ADT and AM.



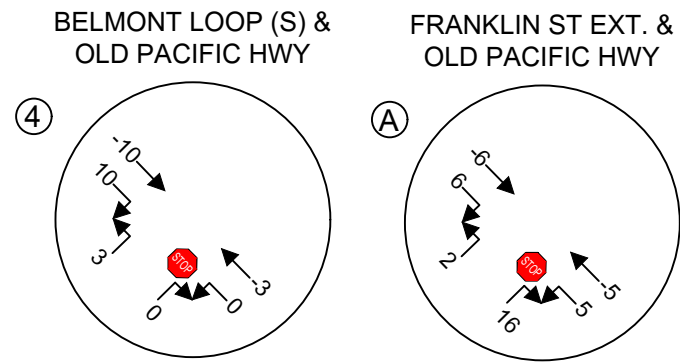


**NEW PM DRIVEWAY PEAK HOUR TRIPS**  
 INBOUND: 125 VPH  
 OUTBOUND: 112 VPH

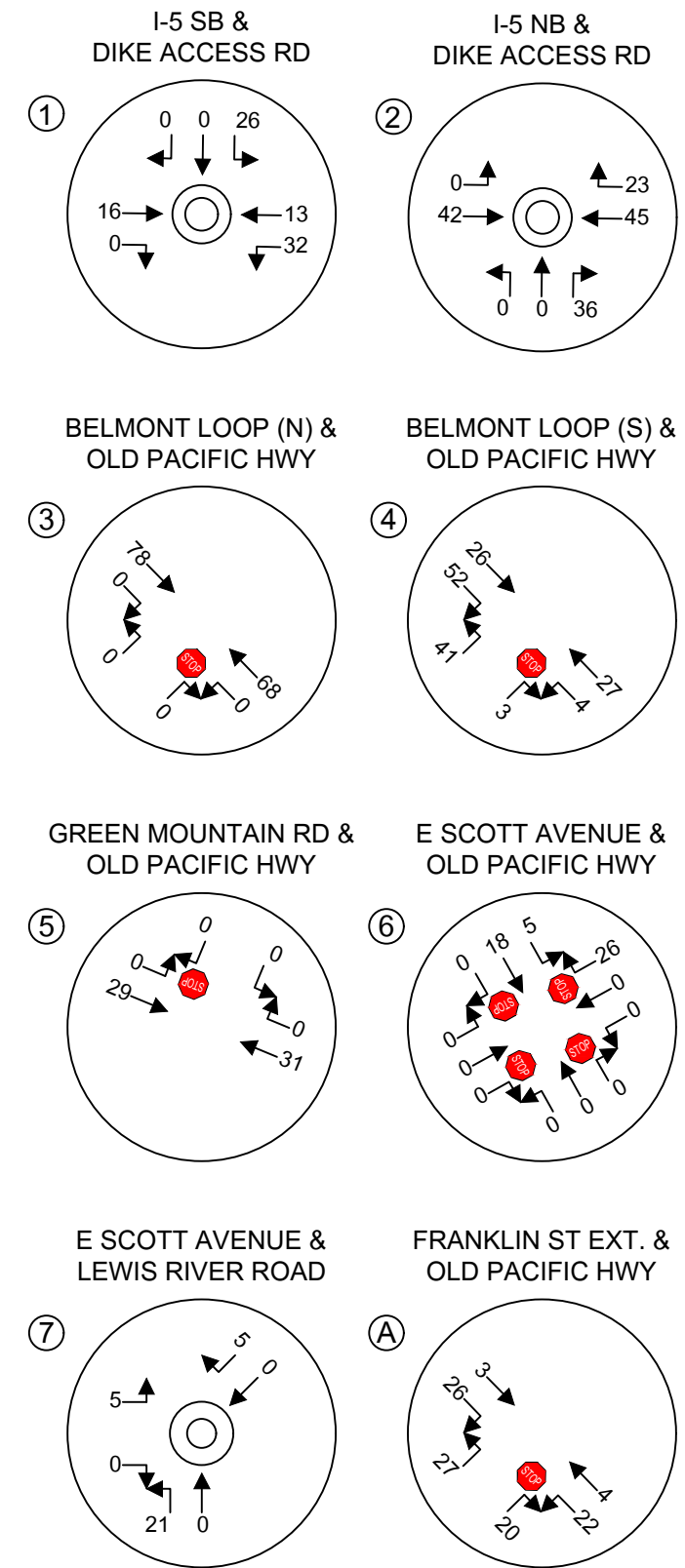
**NEW PM PRIMARY PEAK HOUR TRIPS**  
 INBOUND: 104 VPH  
 OUTBOUND: 91 VPH

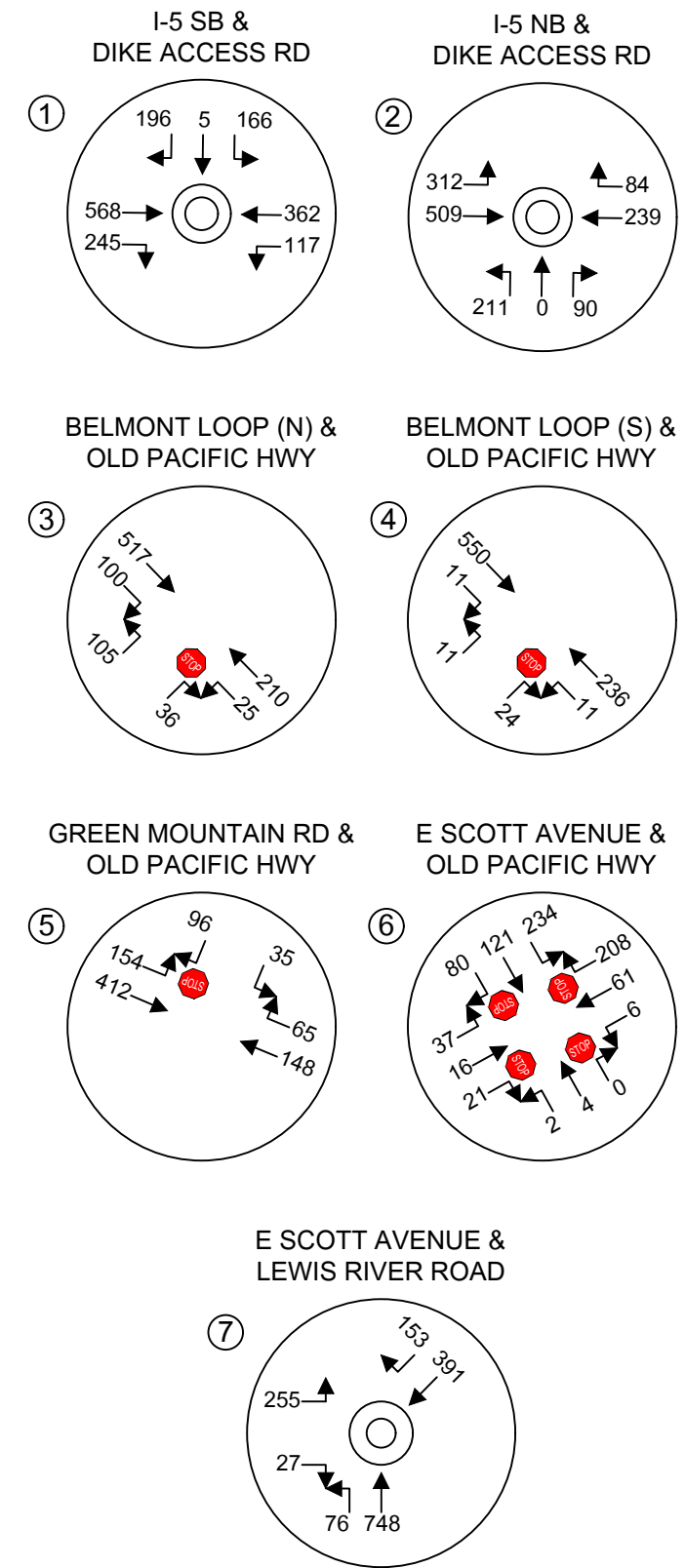
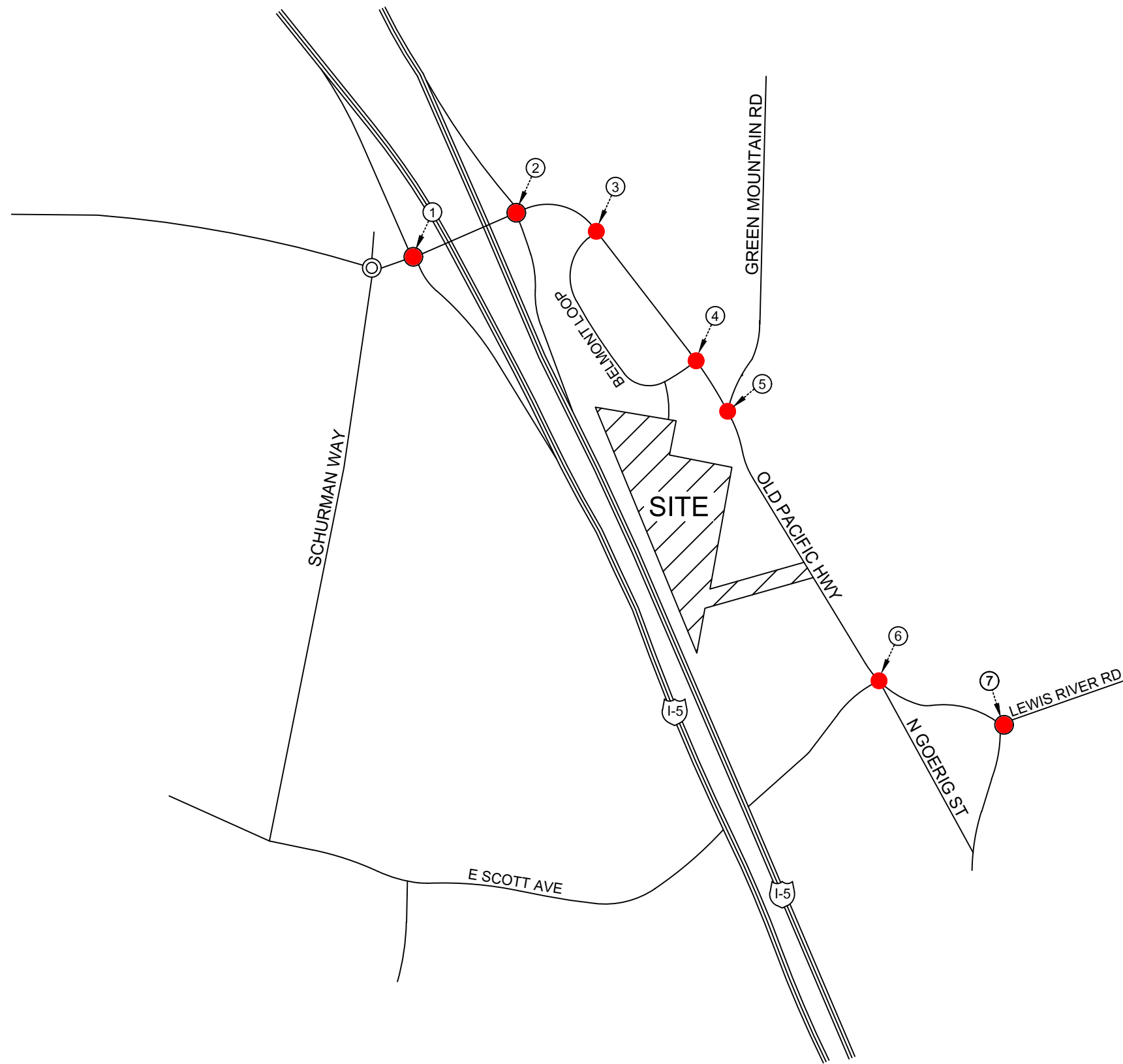
**NEW PM PASS-BY PEAK HOUR TRIPS**  
 INBOUND: 21 VPH  
 OUTBOUND: 21 VPH

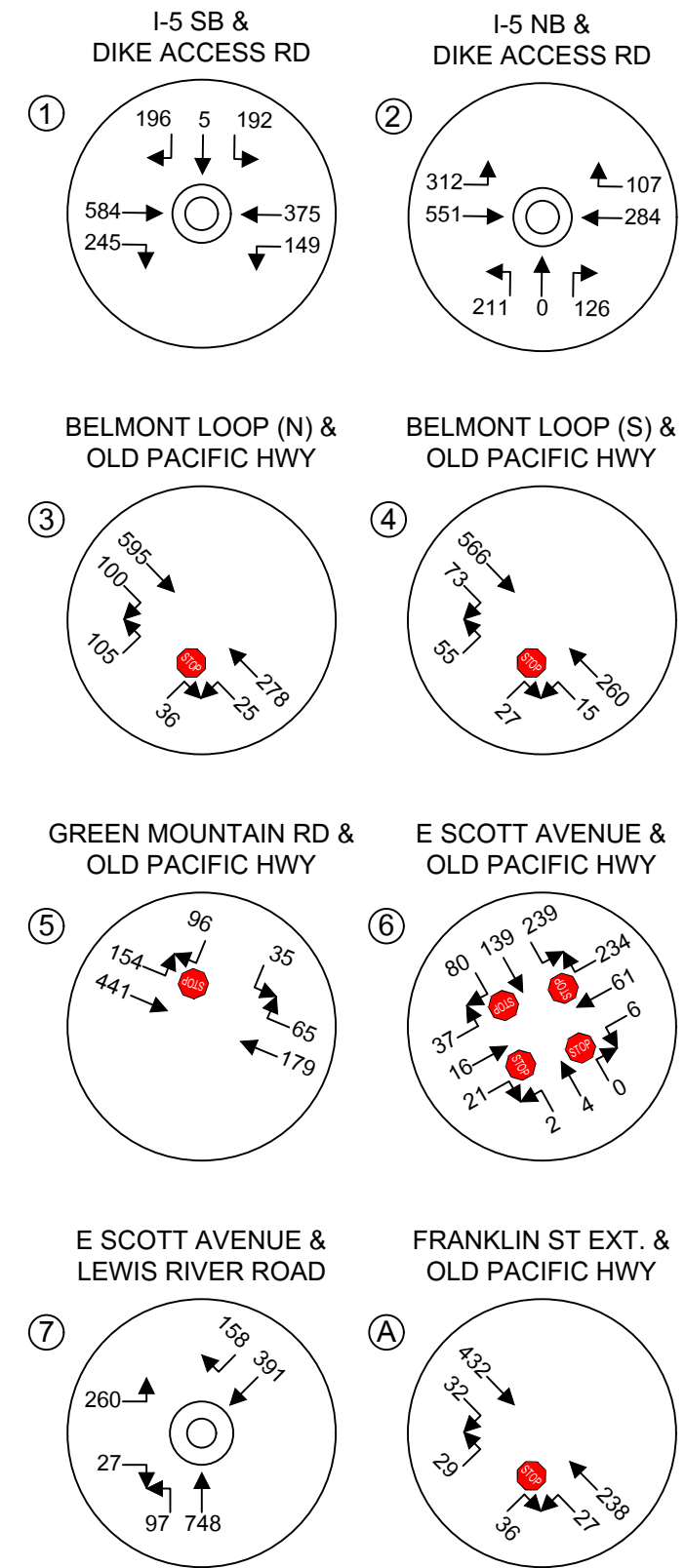
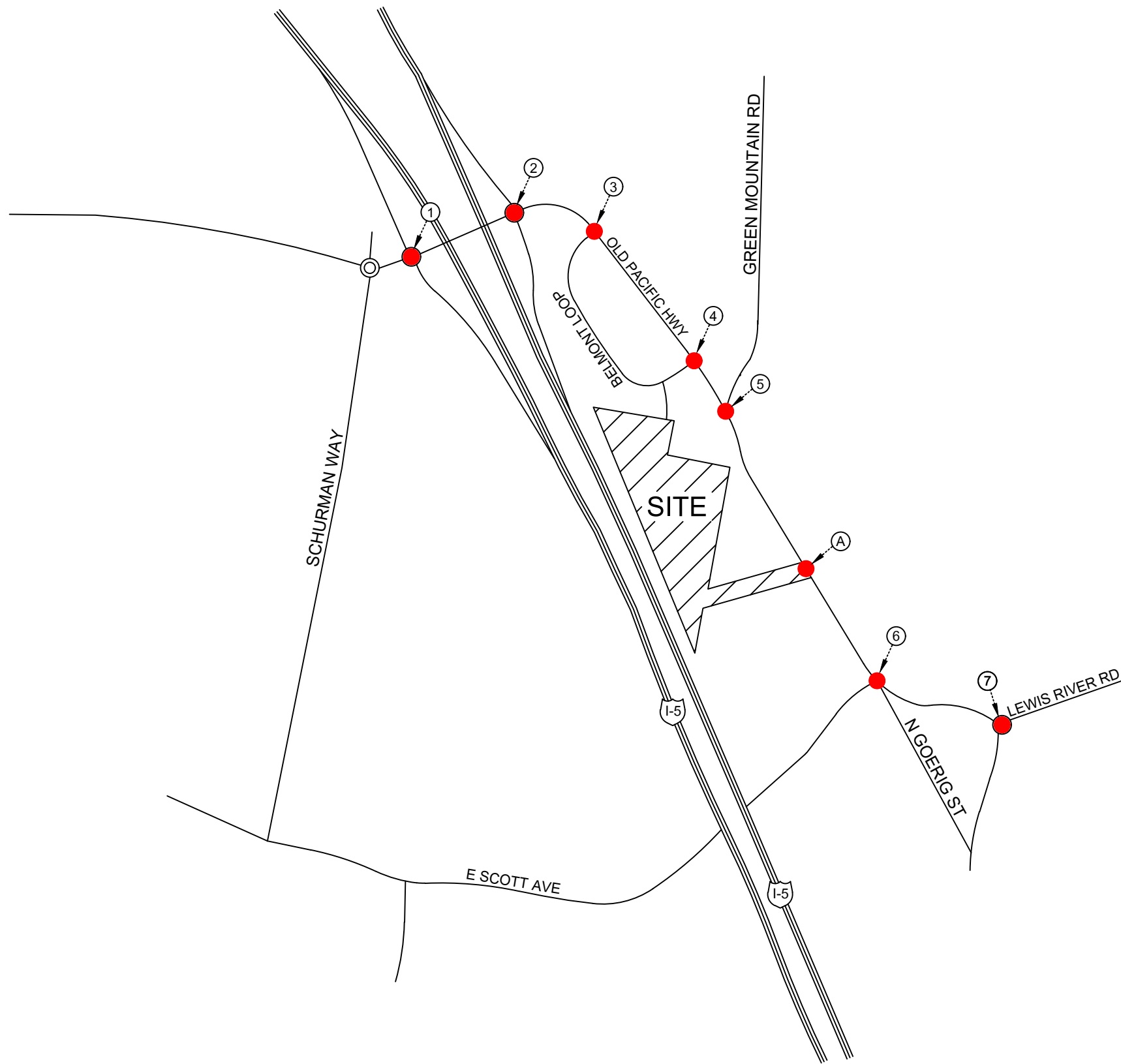
**PASS-BY PM PEAK HOUR TRIPS**



**PRIMARY PM PEAK HOUR TRIPS**







#### 4.4 Future Level of Service

Level of service analyses were made of the future PM peak hour volumes without (background) and with project related trips added to the key roadways and intersections. This analysis once again involved the use of the *Synchro 12* and *SIDRA 9.1* analysis programs. Delays for the study intersections under future conditions are shown below in Table 5.

**Table 5: Forecast 2026 Weekday Peak Hour Level of Service**

*Delays Given in Seconds per Vehicle*

Intersection	Control	Peak Hour	<u>Without Project</u>		<u>With Project</u>	
			LOS	Delay	LOS	Delay
I-5 SB Ramps & Dike Access Rd	RAB	Overall	A	9.3	B	11.7
I-5 NB Ramps & Dike Access Rd	RAB	Overall	A	9.0	A	9.8
Belmont Loop N & Old Pacific Hwy	TWSC	EB	C	19.27	C	24.13
Belmont Loop S & Old Pacific Hwy	TWSC	EB	B	14.13	C	18.89
Green Mtn Rd & Old Pacific Hwy	TWSC	WB	C	15.01	C	16.11
E Scott Ave & Old Pacific Hwy	AWSC	Overall	B	12.7	B	13.8
E Scott Ave & Lewis River Rd	RAB	Overall	A	8.1	A	8.5
Franklin St Ext. & Old Pacific Hwy	TWSC	EB	-	-	B	14.69

Forecast 2026 weekday peak hour delays are shown to operate with up to LOS C conditions with or without the proposed development at all study intersections. As such, no level of service deficiencies are identified and all intersections meet City standards.

It should be noted that the City's Six-Year Transportation Improvement Plan has budgeted approximately \$3,200,000 for improvements at E Scott Avenue & Old Pacific Highway. While specific improvements were not identified under their current plan, conditions would likely subsequently improve by reducing delays and increasing capacity. Moreover, several City-planned projects were additionally identified within the study area that would result in improved conditions. These include intersection improvements at Old Pacific Highway & Green Mountain Road, the SR 503 Bypass project and other street connections and extensions, which are anticipated to further expand travel routes and provide relief along certain corridors.





#### **4.5 Project Access & Sight Distance**

The primary access intersections of Belmont Loop Road & Franklin Street as well as newly proposed connection of Old Pacific Highway & Franklin Street were examined in terms of available sight lines. The established city of Woodland sight distance standards for controlled intersections were utilized. With no observed posted speed on Belmont Loop, the local access roadway was assumed to comprise a 25-mph speed limit. As such, approximately 250-feet of visibility would be required for traffic departing Franklin Street entering Belmont Loop. Based on a review of the existing intersection geometry, sight lines are available to 280-feet in the east/west directions with clear visibility to Old Pacific Highway. No sight distance deficiencies are identified at the intersection.

Moreover, approximately 350 feet of entering sight distance would be required at Old Pacific Highway & Franklin Street based on the 35-mph posted speed limit. Preliminary measurements at the access intersection indicate sight lines are available north and south in excess of 500 feet. No sight distance deficiencies are identified at this time.

#### **4.6 Left Turn Warrant Analysis**

Turn lanes are a means of providing necessary storage space for left turning vehicles at intersections. For this impact study, procedures described by the WSDOT Design Manual Exhibit 1310-7a were used to ascertain storage requirements at a newly proposed roadway connection of Old Pacific Highway & Franklin Street. Based on the criteria set forth in the warrant calculations, a left turn lane *would not be warranted* under forecast 2026 PM peak hour conditions at the proposed study intersection. Turn lane exhibit sheets have been included in the appendix.



## 5. CONCLUSIONS & MITIGATION

Logan's Landing proposes for the development of 272 multi-family dwelling units and approximately 40,640 square feet of retail/office space within the city of Woodland. The subject site comprises approximately 20-acres within tax parcel #'s: 50680023, 50714, 50729 and a portion of 50730. Access to the subject site is proposed via a southerly extension of Franklin Street from Belmont Loop, which bisects the subject site. This extension is proposed to jog easterly, connecting to Old Pacific Highway. A conceptual site plan illustrating the overall configuration of the project and access proposal is provided in Figure 2.

Based on ITE data, the proposed development is anticipated to generate approximately 2356 average weekday daily primary trips with 160 (67 in / 93 out) AM peak hour primary trips and 195 (104 in / 91 out) PM peak hour primary trips. A level of service (LOS) analysis was performed using a three-year horizon which included a background growth rate, pipeline development and project-generated traffic added to the roadway network.

Existing and forecast level of service (LOS) at the outlying study intersections are shown operate acceptably with LOS C or better conditions, meeting City standards. The proposed development is shown to minimally impact the surrounding roadway system. Lastly, a left turn lane warrant analysis was evaluated for the newly proposed connection of Old Pacific Highway & Franklin Street. A left-turn lane was found to not be warranted at the intersection.

Based on the analysis herein, and with the city planned project, no project-specific mitigation is identified at this time.



# LOGAN'S LANDING TRAFFIC IMPACT ANALYSIS

## *APPENDIX*



# Heath & Associates

PO Box 397 Puyallup, WA 98371

Roundabout

File Name : 4855aa  
 Site Code : 00004855  
 Start Date : 6/27/2023  
 Page No : 1

Groups Printed- Passenger + - Heavy

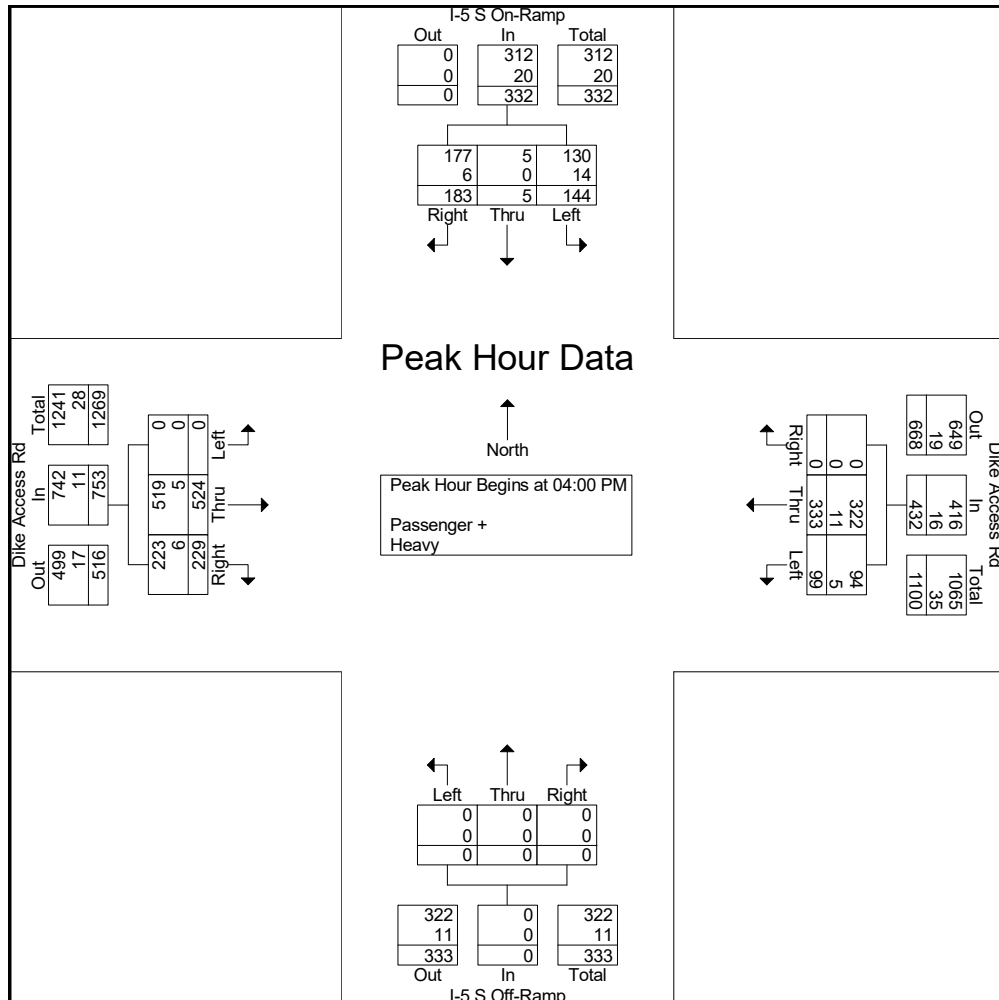
Start Time	I-5 S On-Ramp Southbound				Dike Access Rd Westbound				I-5 S Off-Ramp Northbound				Dike Access Rd Eastbound				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
04:00 PM	55	1	47	103	0	73	14	87	0	0	0	0	66	127	0	193	383
04:15 PM	37	1	33	71	0	89	29	118	0	0	0	0	56	104	0	160	349
04:30 PM	50	1	35	86	0	88	29	117	0	0	0	0	62	139	0	201	404
04:45 PM	41	2	29	72	0	83	27	110	0	0	0	0	45	154	0	199	381
Total	183	5	144	332	0	333	99	432	0	0	0	0	229	524	0	753	1517
05:00 PM	37	1	30	68	0	58	28	86	0	0	0	0	50	140	0	190	344
05:15 PM	43	0	40	83	0	69	21	90	0	0	0	0	48	127	0	175	348
05:30 PM	64	1	34	99	0	86	21	107	0	0	0	0	47	85	0	132	338
05:45 PM	50	1	26	77	0	60	22	82	0	0	0	0	45	80	0	125	284
Total	194	3	130	327	0	273	92	365	0	0	0	0	190	432	0	622	1314
Grand Total	377	8	274	659	0	606	191	797	0	0	0	0	419	956	0	1375	2831
Apprch %	57.2	1.2	41.6		0	76	24		0	0	0		30.5	69.5	0		
Total %	13.3	0.3	9.7	23.3	0	21.4	6.7	28.2	0	0	0	0	14.8	33.8	0	48.6	
Passenger +	367	8	259	634	0	584	181	765	0	0	0	0	405	942	0	1347	2746
% Passenger +	97.3	100	94.5	96.2	0	96.4	94.8	96	0	0	0	0	96.7	98.5	0	98	97
Heavy	10	0	15	25	0	22	10	32	0	0	0	0	14	14	0	28	85
% Heavy	2.7	0	5.5	3.8	0	3.6	5.2	4	0	0	0	0	3.3	1.5	0	2	3

# Heath & Associates

PO Box 397 Puyallup, WA 98371

File Name : 4855aa  
 Site Code : 00004855  
 Start Date : 6/27/2023  
 Page No : 2

Start Time	I-5 S On-Ramp Southbound				Dike Access Rd Westbound				I-5 S Off-Ramp Northbound				Dike Access Rd Eastbound				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	55	1	47	103	0	73	14	87	0	0	0	0	66	127	0	193	383
04:15 PM	37	1	33	71	0	89	29	118	0	0	0	0	56	104	0	160	349
04:30 PM	50	1	35	86	0	88	29	117	0	0	0	0	62	139	0	201	404
04:45 PM	41	2	29	72	0	83	27	110	0	0	0	0	45	154	0	199	381
Total Volume	183	5	144	332	0	333	99	432	0	0	0	0	229	524	0	753	1517
% App. Total	55.1	1.5	43.4		0	77.1	22.9		0	0	0		30.4	69.6	0		
PHF	.832	.625	.766	.806	.000	.935	.853	.915	.000	.000	.000	.000	.867	.851	.000	.937	.939
Passenger +	177	5	130	312	0	322	94	416	0	0	0	0	223	519	0	742	1470
% Passenger +	96.7	100	90.3	94.0	0	96.7	94.9	96.3	0	0	0	0	97.4	99.0	0	98.5	96.9
Heavy	6	0	14	20	0	11	5	16	0	0	0	0	6	5	0	11	47
% Heavy	3.3	0	9.7	6.0	0	3.3	5.1	3.7	0	0	0	0	2.6	1.0	0	1.5	3.1



# Heath & Associates

PO Box 397 Puyallup, WA 98371

Roundabout

File Name : 4855ab  
 Site Code : 00004855  
 Start Date : 6/27/2023  
 Page No : 1

Groups Printed- Passenger + - Heavy

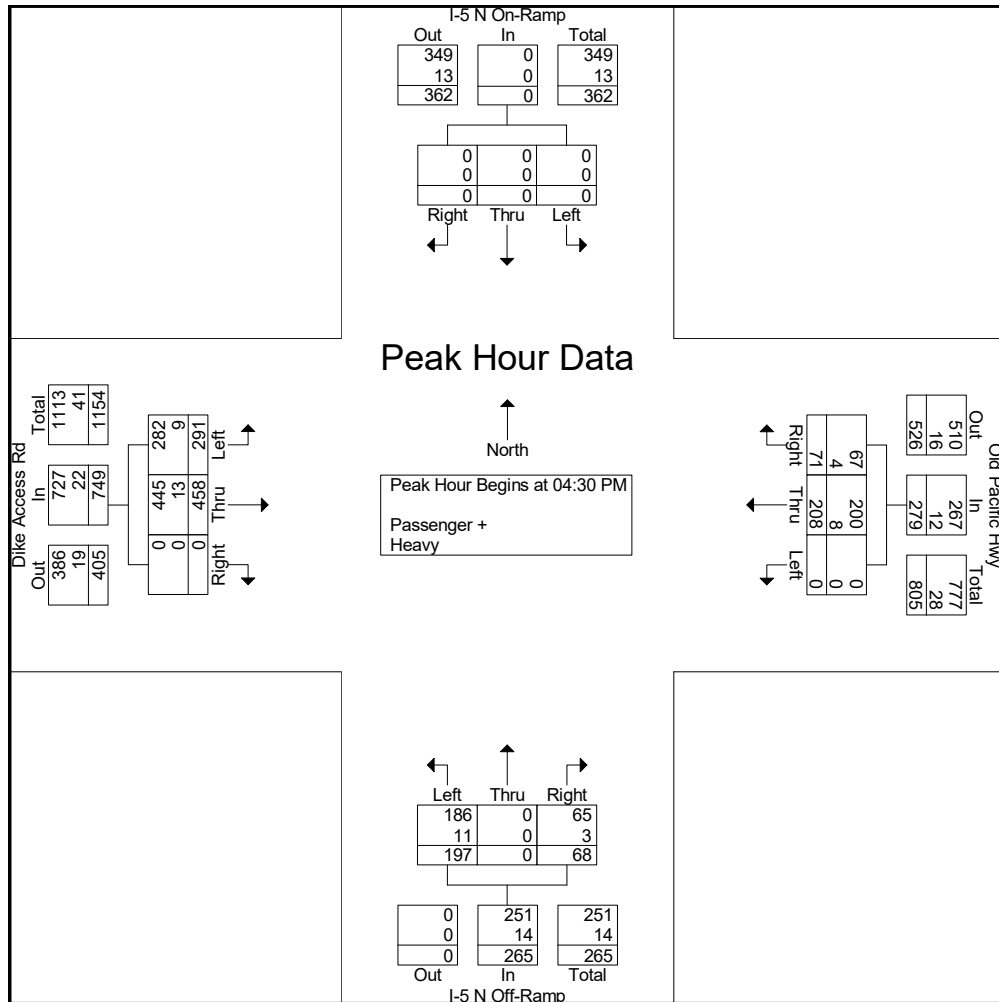
Start Time	I-5 N On-Ramp Southbound				Old Pacific Hwy Westbound				I-5 N Off-Ramp Northbound				Dike Access Rd Eastbound				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
04:00 PM	0	0	0	0	26	45	0	71	13	0	47	60	0	97	82	179	310
04:15 PM	0	0	0	0	26	64	0	90	14	0	55	69	0	82	46	128	287
04:30 PM	0	0	0	0	19	62	0	81	18	0	50	68	0	108	70	178	327
04:45 PM	0	0	0	0	15	56	0	71	15	0	52	67	0	126	81	207	345
Total	0	0	0	0	86	227	0	313	60	0	204	264	0	413	279	692	1269
05:00 PM	0	0	0	0	23	48	0	71	14	0	44	58	0	101	78	179	308
05:15 PM	0	0	0	0	14	42	0	56	21	0	51	72	0	123	62	185	313
05:30 PM	0	0	0	0	12	53	0	65	18	0	52	70	0	91	42	133	268
05:45 PM	0	0	0	0	18	47	0	65	7	0	40	47	0	76	42	118	230
Total	0	0	0	0	67	190	0	257	60	0	187	247	0	391	224	615	1119
Grand Total	0	0	0	0	153	417	0	570	120	0	391	511	0	804	503	1307	2388
Apprch %	0	0	0		26.8	73.2	0		23.5	0	76.5		0	61.5	38.5		
Total %	0	0	0	0	6.4	17.5	0	23.9	5	0	16.4	21.4	0	33.7	21.1	54.7	
Passenger +	0	0	0	0	143	403	0	546	114	0	373	487	0	780	490	1270	2303
% Passenger +	0	0	0	0	93.5	96.6	0	95.8	95	0	95.4	95.3	0	97	97.4	97.2	96.4
Heavy	0	0	0	0	10	14	0	24	6	0	18	24	0	24	13	37	85
% Heavy	0	0	0	0	6.5	3.4	0	4.2	5	0	4.6	4.7	0	3	2.6	2.8	3.6

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File Name : 4855ab  
 Site Code : 00004855  
 Start Date : 6/27/2023  
 Page No : 2

Start Time	I-5 N On-Ramp Southbound				Old Pacific Hwy Westbound				I-5 N Off-Ramp Northbound				Dike Access Rd Eastbound				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	0	0	0	19	<b>62</b>	0	<b>81</b>	18	0	50	68	0	108	70	178	327
04:45 PM	0	0	0	0	15	56	0	71	15	0	<b>52</b>	67	0	<b>126</b>	<b>81</b>	<b>207</b>	<b>345</b>
05:00 PM	0	0	0	0	<b>23</b>	48	0	71	14	0	44	58	0	101	78	179	308
05:15 PM	0	0	0	0	14	42	0	56	<b>21</b>	0	51	<b>72</b>	0	123	62	185	313
Total Volume	0	0	0	0	71	208	0	279	68	0	197	265	0	458	291	749	1293
% App. Total	0	0	0	0	25.4	74.6	0		25.7	0	74.3		0	61.1	38.9		
PHF	.000	.000	.000	.000	.772	.839	.000	.861	.810	.000	.947	.920	.000	.909	.898	.905	.937
Passenger +	0	0	0	0	67	200	0	267	65	0	186	251	0	445	282	727	1245
% Passenger +	0	0	0	0	94.4	96.2	0	95.7	95.6	0	94.4	94.7	0	97.2	96.9	97.1	96.3
Heavy	0	0	0	0	4	8	0	12	3	0	11	14	0	13	9	22	48
% Heavy	0	0	0	0	5.6	3.8	0	4.3	4.4	0	5.6	5.3	0	2.8	3.1	2.9	3.7



# Heath & Associates

PO Box 397 Puyallup, WA 98371

File Name : 4855ac  
 Site Code : 00004855  
 Start Date : 6/27/2023  
 Page No : 1

Groups Printed- Passenger + - Heavy

Start Time	Old Pacific Hwy Southbound			Old Pacific Hwy Northbound			Belmont Loop (North) Eastbound			Int. Total
	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	
04:00 PM	24	97	121	52	4	56	11	17	28	205
04:15 PM	10	92	102	63	4	67	7	25	32	201
04:30 PM	27	103	130	54	8	62	4	25	29	221
04:45 PM	18	123	141	47	3	50	8	24	32	223
Total	79	415	494	216	19	235	30	91	121	850
05:00 PM	30	94	124	39	7	46	11	23	34	204
05:15 PM	18	129	147	34	5	39	11	26	37	223
05:30 PM	20	85	105	39	4	43	8	31	39	187
05:45 PM	16	76	92	45	7	52	7	19	26	170
Total	84	384	468	157	23	180	37	99	136	784
Grand Total	163	799	962	373	42	415	67	190	257	1634
Apprch %	16.9	83.1		89.9	10.1		26.1	73.9		
Total %	10	48.9	58.9	22.8	2.6	25.4	4.1	11.6	15.7	
Passenger +	161	776	937	353	39	392	66	184	250	1579
% Passenger +	98.8	97.1	97.4	94.6	92.9	94.5	98.5	96.8	97.3	96.6
Heavy	2	23	25	20	3	23	1	6	7	55
% Heavy	1.2	2.9	2.6	5.4	7.1	5.5	1.5	3.2	2.7	3.4

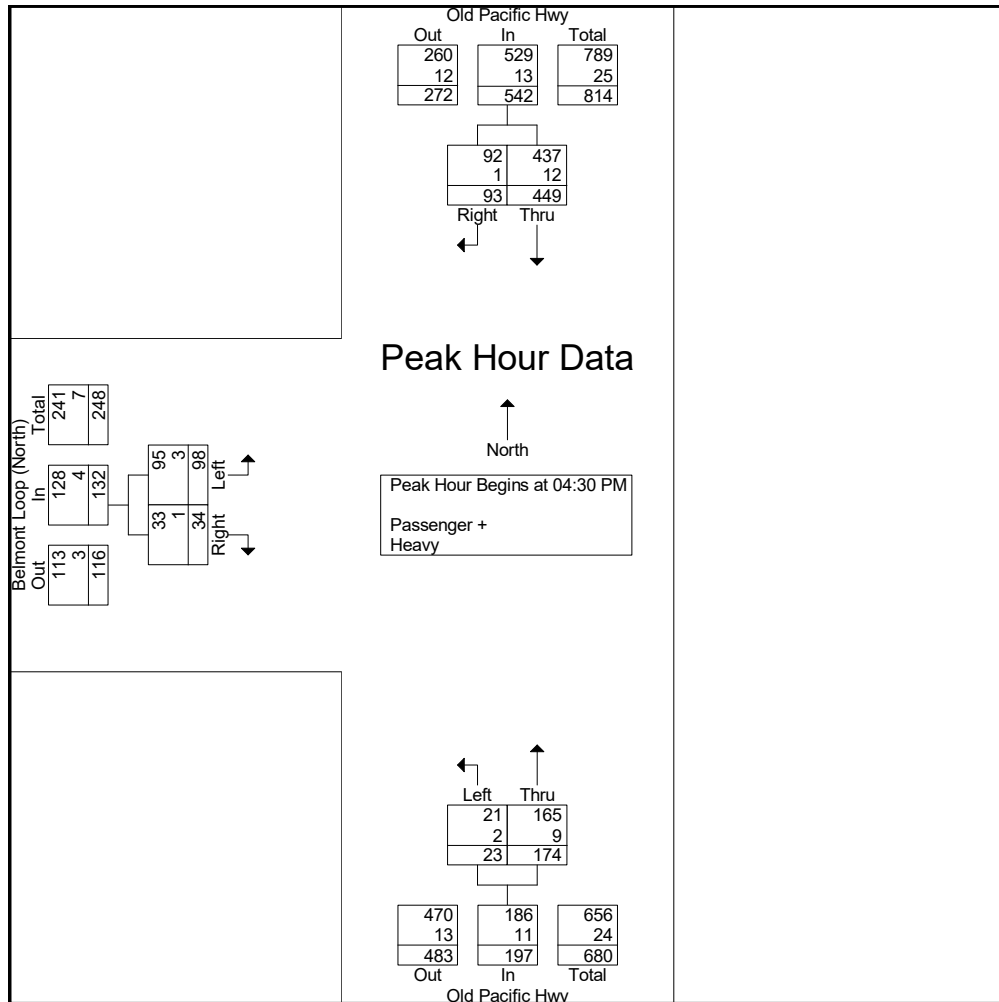


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File Name : 4855ac  
 Site Code : 00004855  
 Start Date : 6/27/2023  
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Start Time	Old Pacific Hwy Southbound			Old Pacific Hwy Northbound			Belmont Loop (North) Eastbound			Int. Total
	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	27	103	130	54	8	62	4	25	29	221
04:45 PM	18	123	141	47	3	50	8	24	32	223
05:00 PM	30	94	124	39	7	46	11	23	34	204
05:15 PM	18	129	147	34	5	39	11	26	37	223
Total Volume	93	449	542	174	23	197	34	98	132	871
% App. Total	17.2	82.8		88.3	11.7		25.8	74.2		
PHF	.775	.870	.922	.806	.719	.794	.773	.942	.892	.976
Passenger +	92	437	529	165	21	186	33	95	128	843
% Passenger +	98.9	97.3	97.6	94.8	91.3	94.4	97.1	96.9	97.0	96.8
Heavy	1	12	13	9	2	11	1	3	4	28
% Heavy	1.1	2.7	2.4	5.2	8.7	5.6	2.9	3.1	3.0	3.2



# Heath & Associates

PO Box 397 Puyallup, WA 98371

File Name : 4855ad  
 Site Code : 00004855  
 Start Date : 6/27/2023  
 Page No : 1

Groups Printed- Passenger + - Heavy

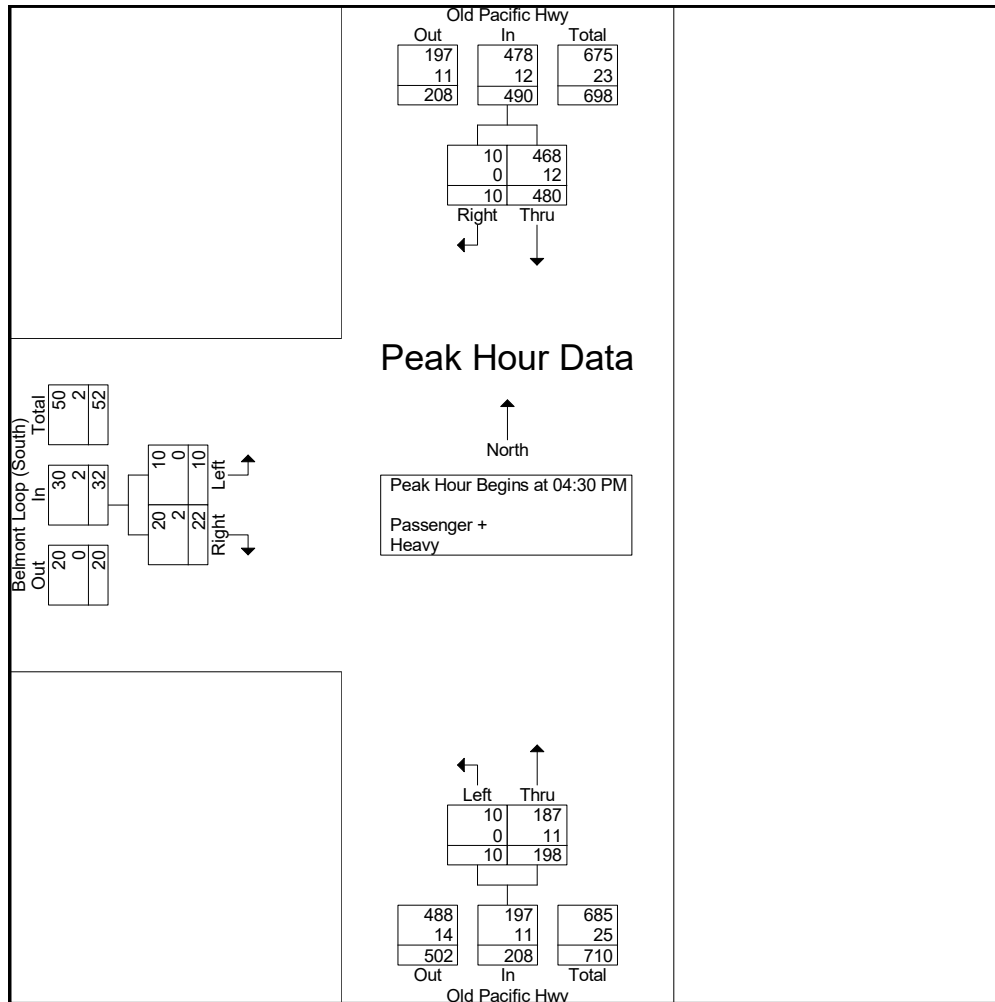
Start Time	Old Pacific Hwy Southbound			Old Pacific Hwy Northbound			Belmont Loop (South) Eastbound			Int. Total
	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	
04:00 PM	8	99	107	57	5	62	7	3	10	179
04:15 PM	2	96	98	62	4	66	4	3	7	171
04:30 PM	4	100	104	60	4	64	6	4	10	178
04:45 PM	2	134	136	50	2	52	9	1	10	198
Total	16	429	445	229	15	244	26	11	37	726
05:00 PM	2	103	105	49	3	52	3	2	5	162
05:15 PM	2	143	145	39	1	40	4	3	7	192
05:30 PM	0	99	99	39	1	40	11	2	13	152
05:45 PM	1	80	81	46	1	47	3	4	7	135
Total	5	425	430	173	6	179	21	11	32	641
Grand Total	21	854	875	402	21	423	47	22	69	1367
Apprch %	2.4	97.6		95	5		68.1	31.9		
Total %	1.5	62.5	64	29.4	1.5	30.9	3.4	1.6	5	
Passenger +	21	833	854	383	21	404	45	22	67	1325
% Passenger +	100	97.5	97.6	95.3	100	95.5	95.7	100	97.1	96.9
Heavy	0	21	21	19	0	19	2	0	2	42
% Heavy	0	2.5	2.4	4.7	0	4.5	4.3	0	2.9	3.1

# Heath & Associates

PO Box 397 Puyallup, WA 98371

File Name : 4855ad  
 Site Code : 00004855  
 Start Date : 6/27/2023  
 Page No : 2

Start Time	Old Pacific Hwy Southbound			Old Pacific Hwy Northbound			Belmont Loop (South) Eastbound			Int. Total
	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	4	100	104	60	4	64	6	4	10	178
04:45 PM	2	134	136	50	2	52	9	1	10	198
05:00 PM	2	103	105	49	3	52	3	2	5	162
05:15 PM	2	143	145	39	1	40	4	3	7	192
Total Volume	10	480	490	198	10	208	22	10	32	730
% App. Total	2	98		95.2	4.8		68.8	31.2		
PHF	.625	.839	.845	.825	.625	.813	.611	.625	.800	.922
Passenger +	10	468	478	187	10	197	20	10	30	705
% Passenger +	100	97.5	97.6	94.4	100	94.7	90.9	100	93.8	96.6
Heavy	0	12	12	11	0	11	2	0	2	25
% Heavy	0	2.5	2.4	5.6	0	5.3	9.1	0	6.3	3.4



# Heath & Associates

PO Box 397 Puyallup, WA 98371

File Name : 4855ae  
 Site Code : 00004855  
 Start Date : 6/27/2023  
 Page No : 1

Groups Printed- Passenger + - Heavy

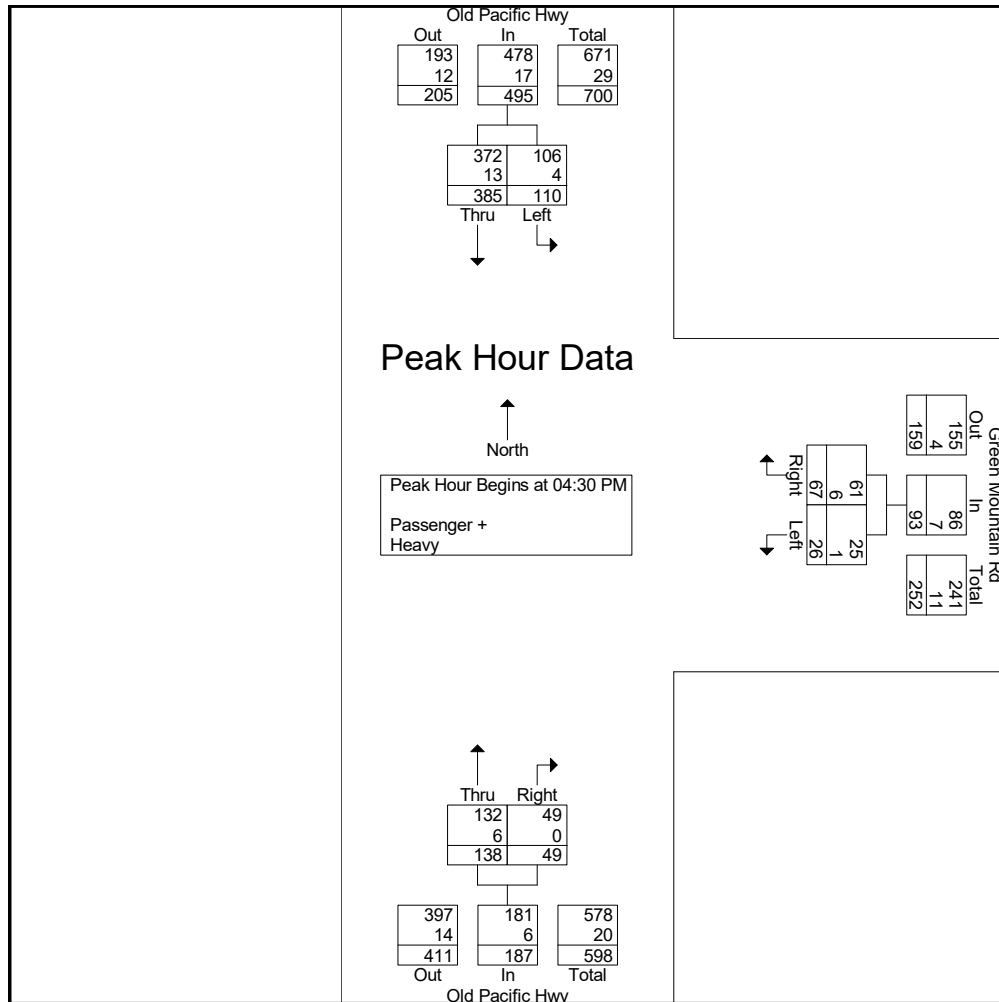
Start Time	Old Pacific Hwy Southbound			Green Mountain Rd Westbound			Old Pacific Hwy Northbound			Int. Total
	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	
04:00 PM	88	17	105	9	8	17	14	56	70	192
04:15 PM	78	21	99	20	4	24	9	47	56	179
04:30 PM	84	20	104	20	5	25	14	43	57	186
04:45 PM	113	28	141	18	7	25	8	33	41	207
Total	363	86	449	67	24	91	45	179	224	764
05:00 PM	79	26	105	15	5	20	16	35	51	176
05:15 PM	109	36	145	14	9	23	11	27	38	206
05:30 PM	87	23	110	16	8	24	10	24	34	168
05:45 PM	65	21	86	12	12	24	11	34	45	155
Total	340	106	446	57	34	91	48	120	168	705
Grand Total	703	192	895	124	58	182	93	299	392	1469
Apprch %	78.5	21.5		68.1	31.9		23.7	76.3		
Total %	47.9	13.1	60.9	8.4	3.9	12.4	6.3	20.4	26.7	
Passenger +	681	185	866	116	57	173	90	286	376	1415
% Passenger +	96.9	96.4	96.8	93.5	98.3	95.1	96.8	95.7	95.9	96.3
Heavy	22	7	29	8	1	9	3	13	16	54
% Heavy	3.1	3.6	3.2	6.5	1.7	4.9	3.2	4.3	4.1	3.7

# Heath & Associates

PO Box 397 Puyallup, WA 98371

File Name : 4855ae  
 Site Code : 00004855  
 Start Date : 6/27/2023  
 Page No : 2

Start Time	Old Pacific Hwy Southbound			Green Mountain Rd Westbound			Old Pacific Hwy Northbound			Int. Total
	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	84	20	104	20	5	25	14	43	57	186
04:45 PM	113	28	141	18	7	25	8	33	41	207
05:00 PM	79	26	105	15	5	20	16	35	51	176
05:15 PM	109	36	145	14	9	23	11	27	38	206
Total Volume	385	110	495	67	26	93	49	138	187	775
% App. Total	77.8	22.2		72	28		26.2	73.8		
PHF	.852	.764	.853	.838	.722	.930	.766	.802	.820	.936
Passenger +	372	106	478	61	25	86	49	132	181	745
% Passenger +	96.6	96.4	96.6	91.0	96.2	92.5	100	95.7	96.8	96.1
Heavy	13	4	17	6	1	7	0	6	6	30
% Heavy	3.4	3.6	3.4	9.0	3.8	7.5	0	4.3	3.2	3.9



# Heath & Associates

PO Box 397 Puyallup, WA 98371

File Name : 4855af  
 Site Code : 00004855  
 Start Date : 6/27/2023  
 Page No : 1

## Groups Printed- Passenger + - Heavy

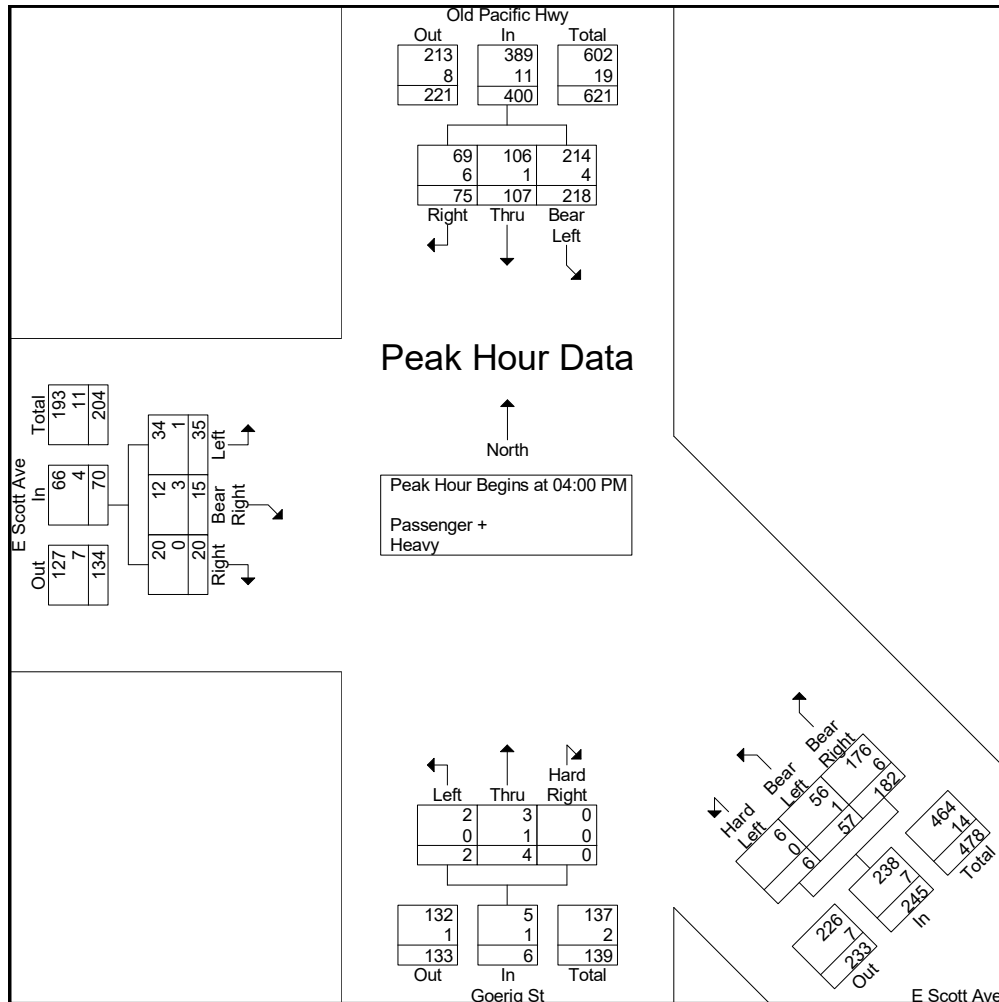
Start Time	Old Pacific Hwy Southbound				E Scott Ave Northwestbound				Goerig St Northbound				E Scott Ave Eastbound				Int. Total
	Right	Thru	Bear Left	App. Total	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Thru	Left	App. Total	Right	Bear Right	Left	App. Total	
04:00 PM	22	26	49	97	54	11	1	66	0	2	0	2	5	3	11	19	184
04:15 PM	16	24	50	90	48	12	1	61	0	0	0	0	6	6	7	19	170
04:30 PM	17	28	50	95	44	21	3	68	0	1	2	3	6	3	11	20	186
04:45 PM	20	29	69	118	36	13	1	50	0	1	0	1	3	3	6	12	181
Total	75	107	218	400	182	57	6	245	0	4	2	6	20	15	35	70	721
05:00 PM	12	17	55	84	42	17	0	59	0	0	0	0	2	6	8	16	159
05:15 PM	11	36	69	116	23	13	1	37	0	0	2	2	3	5	12	20	175
05:30 PM	11	29	58	98	28	17	1	46	0	0	0	0	5	4	6	15	159
05:45 PM	16	23	38	77	36	10	4	50	0	1	0	1	6	1	8	15	143
Total	50	105	220	375	129	57	6	192	0	1	2	3	16	16	34	66	636
Grand Total	125	212	438	775	311	114	12	437	0	5	4	9	36	31	69	136	1357
Apprch %	16.1	27.4	56.5		71.2	26.1	2.7		0	55.6	44.4		26.5	22.8	50.7		
Total %	9.2	15.6	32.3	57.1	22.9	8.4	0.9	32.2	0	0.4	0.3	0.7	2.7	2.3	5.1	10	
Passenger +	116	209	432	757	304	111	12	427	0	4	4	8	35	28	63	126	1318
% Passenger +	92.8	98.6	98.6	97.7	97.7	97.4	100	97.7	0	80	100	88.9	97.2	90.3	91.3	92.6	97.1
Heavy	9	3	6	18	7	3	0	10	0	1	0	1	1	3	6	10	39
% Heavy	7.2	1.4	1.4	2.3	2.3	2.6	0	2.3	0	20	0	11.1	2.8	9.7	8.7	7.4	2.9

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File Name : 4855af  
 Site Code : 00004855  
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Start Time	Old Pacific Hwy Southbound				E Scott Ave Northwestbound				Goerig St Northbound				E Scott Ave Eastbound				Int. Total
	Right	Thru	Bear Left	App. Total	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Thru	Left	App. Total	Right	Bear Right	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	22	26	49	97	54	11	1	66	0	2	0	2	5	3	11	19	184
04:15 PM	16	24	50	90	48	12	1	61	0	0	0	0	6	6	7	19	170
04:30 PM	17	28	50	95	44	21	3	68	0	1	2	3	6	3	11	20	186
04:45 PM	20	29	69	118	36	13	1	50	0	1	0	1	3	3	6	12	181
Total Volume	75	107	218	400	182	57	6	245	0	4	2	6	20	15	35	70	721
% App. Total	18.8	26.8	54.5		74.3	23.3	2.4		0	66.7	33.3		28.6	21.4	50		
PHF	.852	.922	.790	.847	.843	.679	.500	.901	.000	.500	.250	.500	.833	.625	.795	.875	.969
Passenger +	69	106	214	389	176	56	6	238	0	3	2	5	20	12	34	66	698
% Passenger +	92.0	99.1	98.2	97.3	96.7	98.2	100	97.1	0	75.0	100	83.3	100	80.0	97.1	94.3	96.8
Heavy	6	1	4	11	6	1	0	7	0	1	0	1	0	3	1	4	23
% Heavy	8.0	0.9	1.8	2.8	3.3	1.8	0	2.9	0	25.0	0	16.7	0	20.0	2.9	5.7	3.2



# Heath & Associates

PO Box 397 Puyallup, WA 98371

Roundabout

File Name : 4855ag  
 Site Code : 00004855  
 Start Date : 6/27/2023  
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Groups Printed- Passenger + - Heavy

Start Time	Lewis River Rd Westbound			Lewis River Rd Northbound			E Scott Ave Eastbound			Int. Total
	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	
04:00 PM	55	82	137	141	26	167	1	54	55	359
04:15 PM	44	75	119	143	20	163	5	51	56	338
04:30 PM	50	80	130	155	15	170	3	50	53	353
04:45 PM	35	93	128	122	14	136	8	61	69	333
Total	184	330	514	561	75	636	17	216	233	1383
05:00 PM	45	82	127	138	17	155	5	58	63	345
05:15 PM	30	76	106	173	15	188	7	70	77	371
05:30 PM	27	97	124	161	12	173	9	55	64	361
05:45 PM	31	77	108	170	18	188	4	41	45	341
Total	133	332	465	642	62	704	25	224	249	1418
Grand Total	317	662	979	1203	137	1340	42	440	482	2801
Apprch %	32.4	67.6		89.8	10.2		8.7	91.3		
Total %	11.3	23.6	35	42.9	4.9	47.8	1.5	15.7	17.2	
Passenger +	310	650	960	1187	134	1321	41	434	475	2756
% Passenger +	97.8	98.2	98.1	98.7	97.8	98.6	97.6	98.6	98.5	98.4
Heavy	7	12	19	16	3	19	1	6	7	45
% Heavy	2.2	1.8	1.9	1.3	2.2	1.4	2.4	1.4	1.5	1.6

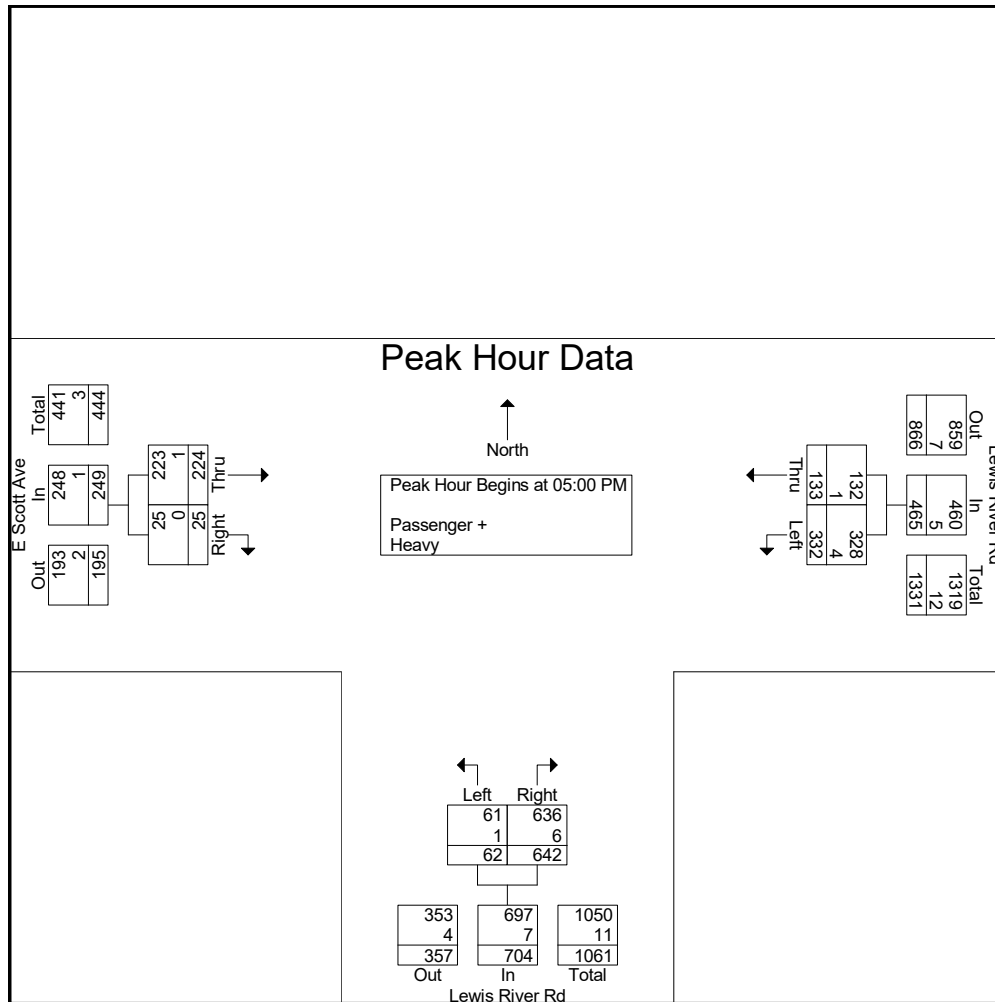


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File Name : 4855ag  
 Site Code : 00004855  
 Start Date : 6/27/2023  
 Page No : 2

Start Time	Lewis River Rd Westbound			Lewis River Rd Northbound			E Scott Ave Eastbound			Int. Total
	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	45	82	127	138	17	155	5	58	63	345
05:15 PM	30	76	106	173	15	188	7	70	77	371
05:30 PM	27	97	124	161	12	173	9	55	64	361
05:45 PM	31	77	108	170	18	188	4	41	45	341
Total Volume	133	332	465	642	62	704	25	224	249	1418
% App. Total	28.6	71.4		91.2	8.8		10	90		
PHF	.739	.856	.915	.928	.861	.936	.694	.800	.808	.956
Passenger +	132	328	460	636	61	697	25	223	248	1405
% Passenger +	99.2	98.8	98.9	99.1	98.4	99.0	100	99.6	99.6	99.1
Heavy	1	4	5	6	1	7	0	1	1	13
% Heavy	0.8	1.2	1.1	0.9	1.6	1.0	0	0.4	0.4	0.9



### Trip Generation Summary: Scenario 1 - All Shopping Plaza

Average Weekday Daily																	
Development	Land Use	LUC	Variable	Value	Rate	Distribution		Total Trips			Internal Capture		Pass-by Trips		Primary Trips		
						In	Out	In	Out	Total	%	Total	%	Total	In	Out	Total
Full Build-Out	Multifamily Housing (Low-Rise)	#220	Dwelling Units	272	6.74	50%	50%	916.6	916.6	1833.3	12.0%	220.0	0.0%	0.0	806.6	806.6	1613.3
	Shopping Plaza (40-150k) - No Supermarket	#821	1,000 sq. ft.	40.64	67.52	50%	50%	1372.0	1372.0	2744.0	12.0%	329.3	40.00%	965.9	724.4	724.4	1448.8
<b>Totals</b>								<b>2288.6</b>	<b>2288.6</b>	<b>4577.3</b>	<b>Totals</b>	<b>549.3</b>	<b>Totals</b>	<b>965.9</b>	<b>1531.1</b>	<b>1531.1</b>	<b>3062.1</b>

Weekday AM Peak Hour																	
Development	Land Use	LUC	Variable	Value	Rate	Distribution		Total Trips			Internal Capture		Pass-by Trips		Primary Trips		
						In	Out	In	Out	Total	%	Total	%	Total	In	Out	Total
Full Build-Out	Multifamily Housing (Low-Rise)	#220	Dwelling Units	272	0.4	24%	76%	26.1	82.7	108.8	2.1%	2.3	0.0%	0.0	25.6	81.0	106.5
	Shopping Plaza (40-150k) - No Supermarket	#821	1,000 sq. ft.	40.64	1.73	62%	38%	43.6	26.7	70.3	2.1%	1.5	40%	27.5	25.6	15.7	41.3
<b>Totals</b>								<b>69.7</b>	<b>109.4</b>	<b>179.1</b>	<b>Totals</b>	<b>3.8</b>	<b>Totals</b>	<b>27.5</b>	<b>51.2</b>	<b>96.6</b>	<b>147.8</b>

Weekday PM Peak Hour																	
Development	Land Use	LUC	Variable	Value	Rate	Distribution		Total Trips			Internal Capture		Pass-by Trips		Primary Trips		
						In	Out	In	Out	Total	%	Total	%	Total	In	Out	Total
Full Build-Out	Multifamily Housing (Low-Rise)	#220	Dwelling Units	272	0.51	63%	37%	87.4	51.3	138.7	21.9%	30.4	0.0%	0.0	68.3	40.1	108.3
	Shopping Plaza (40-150k) - No Supermarket	#821	1,000 sq. ft.	40.64	5.19	49%	51%	103.4	107.6	210.9	21.9%	46.2	40.0%	65.9	48.4	50.4	98.8
<b>Totals</b>								<b>190.7</b>	<b>158.9</b>	<b>349.6</b>	<b>Totals</b>	<b>76.6</b>	<b>Totals</b>	<b>65.9</b>	<b>116.7</b>	<b>90.5</b>	<b>207.2</b>

Sources:  
 Institute of Transportation Engineers, *Trip Generation Manual*, 11th Edition, (2021).  
 Pass-by rates were derived from the Institute of Transportation Engineers, 2021 Pass-By Tables for ITE Trip Gen Appendices (2021)  
 NCHRP 8-51 Internal Trip Capture Estimation Too

### Trip Generation Summary: Scenario 2 - Half Office, Half Strip Retail

Average Weekday Daily																	
Development	Land Use	LUC	Variable	Value	Rate	Distribution		Total Trips			Internal Capture		Pass-by Trips		Primary Trips		
						In	Out	In	Out	Total	%	Total	%	Total	In	Out	Total
Full Build-Out	Multifamily Housing (Low-Rise)	#220	Dwelling Units	272	6.74	50%	50%	916.6	916.6	1833.3	13.3%	243.8	0.0%	0.0	794.7	794.7	1589.5
	General Office	#710	1,000 sq. ft.	20.32	10.84	50%	50%	110.1	110.1	220.3	13.3%	29.3	0.0%	0.0	95.5	95.5	191.0
	Strip Retail Plaza (<40k)	#822	1,000 sq. ft.	20.32	54.45	50%	50%	553.2	553.2	1106.4	13.3%	147.2	40.00%	383.7	287.8	287.8	575.6
<b>Totals</b>								<b>1580.0</b>	<b>1580.0</b>	<b>3160.0</b>	<b>Totals</b>	<b>420.3</b>	<b>Totals</b>	<b>383.7</b>	<b>1178.0</b>	<b>1178.0</b>	<b>2356.0</b>

Weekday AM Peak Hour																	
Development	Land Use	LUC	Variable	Value	Rate	Distribution		Total Trips			Internal Capture		Pass-by Trips		Primary Trips		
						In	Out	In	Out	Total	%	Total	%	Total	In	Out	Total
Full Build-Out	Multifamily Housing (Low-Rise)	#220	Dwelling Units	272	0.4	24%	76%	26.1	82.7	108.8	5.1%	5.5	0.0%	0.0	24.8	78.5	103.3
	General Office	#710	1,000 sq. ft.	20.32	1.52	88%	12%	27.2	3.7	30.9	5.1%	1.6	0.0%	0.0	25.8	3.5	29.3
	Strip Retail Plaza (<40k)	#822	1,000 sq. ft.	20.32	2.36	60%	40%	28.8	19.2	48.0	5.1%	2.4	40%	18.2	16.4	10.9	27.3
<b>Totals</b>								<b>82.1</b>	<b>105.6</b>	<b>187.6</b>	<b>Totals</b>	<b>9.6</b>	<b>Totals</b>	<b>18.2</b>	<b>67.0</b>	<b>92.9</b>	<b>159.9</b>

Weekday PM Peak Hour																	
Development	Land Use	LUC	Variable	Value	Rate	Distribution		Total Trips			Internal Capture		Pass-by Trips		Primary Trips		
						In	Out	In	Out	Total	%	Total	%	Total	In	Out	Total
Full Build-Out	Multifamily Housing (Low-Rise)	#220	Dwelling Units	272	0.51	63%	37%	87.4	51.3	138.7	21.5%	29.8	0.0%	0.0	68.6	40.3	108.9
	General Office	#710	1,000 sq. ft.	20.32	1.44	17%	83%	5.0	24.3	29.3	21.5%	6.3	0.0%	0.0	3.9	19.1	23.0
	Strip Retail Plaza (<40k)	#822	1,000 sq. ft.	20.32	6.59	50%	50%	67.0	67.0	133.9	21.5%	28.8	40.0%	42.0	31.5	31.5	63.1
<b>Totals</b>								<b>159.3</b>	<b>142.6</b>	<b>301.9</b>	<b>Totals</b>	<b>64.9</b>	<b>Totals</b>	<b>42.0</b>	<b>104.0</b>	<b>90.9</b>	<b>194.9</b>

Sources:  
 Institute of Transportation Engineers, *Trip Generation Manual*, 11th Edition, (2021).  
 Pass-by rates were derived from the Institute of Transportation Engineers, 2021 Pass-By Tables for ITE Trip Gen Appendices (2021)  
 NCHRP 8-51 Internal Trip Capture Estimation Too

NCHRP 8-51 Internal Trip Capture Estimation Tool					
<b>Project Name:</b>	Logan's Landing	<b>Organization:</b>	Heath & Associates		
<b>Project Location:</b>	Woodland, WA	<b>Performed By:</b>	PW		
<b>Scenario Description:</b>	Full Buildout	<b>Date:</b>	7/15/2023		
<b>Analysis Year:</b>	2025	<b>Checked By:</b>			
<b>Analysis Period:</b>	AM Street Peak Hour	<b>Date:</b>			

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips		
	ITE LUCs <sup>1</sup>	Quantity	Units	Total	Entering	Exiting
Office	710	20,320	sq. ft.	30.9	27.2	3.7
Retail	822	20,320	sq. ft.	48	28.8	19.2
Restaurant				0		
Cinema/Entertainment				0		
Residential	220	272	Dwelling Units	108.8	26.1	82.7
Hotel				0		
All Other Land Uses <sup>2</sup>				0		
<b>Total</b>				<b>187.7</b>	<b>82.1</b>	<b>105.6</b>

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses <sup>2</sup>						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office					0	0
Retail	1		0	0	1	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	1	1	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	188	82	106
Internal Capture Percentage	5%	6%	5%
External Vehicle-Trips <sup>3</sup>	178	77	101
External Transit-Trips <sup>4</sup>	0	0	0
External Non-Motorized Trips <sup>4</sup>	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	7%	25%
Retail	7%	11%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	4%	2%
Hotel	N/A	N/A

<sup>1</sup>Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

<sup>2</sup>Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

<sup>3</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

<sup>4</sup>Person-Trips

\*Indicates computation that has been rounded to the nearest whole number.

*Estimation Tool Developed by the Texas Transportation Institute*

<b>Project Name:</b>	Logan's Landing
<b>Analysis Period:</b>	AM Street Peak Hour

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	27.2	27	1.00	3.7	4
Retail	1.00	28.8	29	1.00	19.2	19
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	26.1	26	1.00	82.7	83
Hotel	1.00	0	0	1.00	0	0

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		1	3	0	0	0
Retail	6		2	0	3	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	1	17	0		0
Hotel	0	0	0	0	0	

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		9	0	0	0	0
Retail	1		0	0	1	0
Restaurant	4	2		0	1	0
Cinema/Entertainment	0	0	0		0	0
Residential	1	5	0	0		0
Hotel	1	1	0	0	0	

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles <sup>1</sup>	Transit <sup>2</sup>	Non-Motorized <sup>2</sup>
Office	2	25	27	25	0	0
Retail	2	27	29	27	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	25	26	25	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses <sup>3</sup>	0	0	0	0	0	0

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles <sup>1</sup>	Transit <sup>2</sup>	Non-Motorized <sup>2</sup>
Office	1	3	4	3	0	0
Retail	2	17	19	17	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	2	81	83	81	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses <sup>3</sup>	0	0	0	0	0	0

<sup>1</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A  
<sup>2</sup>Person-Trips  
<sup>3</sup>Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator  
\*Indicates computation that has been rounded to the nearest whole number.

NCHRP 8-51 Internal Trip Capture Estimation Tool			
<b>Project Name:</b>	Logan's Landing	<b>Organization:</b>	Heath & Associates
<b>Project Location:</b>	Woodland, WA	<b>Performed By:</b>	PW
<b>Scenario Description:</b>	Full Buildout	<b>Date:</b>	7/15/2023
<b>Analysis Year:</b>	2025	<b>Checked By:</b>	
<b>Analysis Period:</b>	PM Street Peak Hour	<b>Date:</b>	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips		
	ITE LUCs <sup>1</sup>	Quantity	Units	Total	Entering	Exiting
Office	710	20,320	sq. ft.	29.3	5	24.3
Retail	822	20,320	sq. ft.	134	67	67
Restaurant				0		
Cinema/Entertainment				0		
Residential	220	272	Dwelling Units	138.7	87.4	51.3
Hotel				0		
All Other Land Uses <sup>2</sup>				0		
<b>Total</b>				<b>302</b>	<b>159.4</b>	<b>142.6</b>

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses <sup>2</sup>						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		5	0	0	0	0
Retail	1		0	0	17	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	7	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	301	159	142
Internal Capture Percentage	21%	20%	23%
External Vehicle-Trips <sup>3</sup>	237	127	110
External Transit-Trips <sup>4</sup>	0	0	0
External Non-Motorized Trips <sup>4</sup>	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	60%	21%
Retail	18%	27%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	20%	18%
Hotel	N/A	N/A

<sup>1</sup>Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

<sup>2</sup>Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

<sup>3</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

<sup>4</sup>Person-Trips

\*Indicates computation that has been rounded to the nearest whole number.

*Estimation Tool Developed by the Texas Transportation Institute*

<b>Project Name:</b>	Logan's Landing
<b>Analysis Period:</b>	PM Street Peak Hour

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	5	5	1.00	24.3	24
Retail	1.00	67	67	1.00	67	67
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	87.4	87	1.00	51.3	51
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		5	1	0	0	0
Retail	1		19	3	17	3
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	21	11	0		2
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		5	0	0	3	0
Retail	2		0	0	40	0
Restaurant	2	34		0	14	0
Cinema/Entertainment	0	3	0		3	0
Residential	3	7	0	0		0
Hotel	0	1	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles <sup>1</sup>	Transit <sup>2</sup>	Non-Motorized <sup>2</sup>
Office	3	2	5	2	0	0
Retail	12	55	67	55	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	17	70	87	70	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses <sup>3</sup>	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles <sup>1</sup>	Transit <sup>2</sup>	Non-Motorized <sup>2</sup>
Office	5	19	24	19	0	0
Retail	18	49	67	49	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	9	42	51	42	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses <sup>3</sup>	0	0	0	0	0	0

<sup>1</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

<sup>2</sup>Person-Trips

<sup>3</sup>Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

\*Indicates computation that has been rounded to the nearest whole number.

# MOVEMENT SUMMARY

**Site: 1 [1. I-5 SB Ramps & Dike Access Road (Site Folder: General)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.3.210**

Existing 2023 PM Peak Hour  
 Site Category: (None)  
 Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ] veh/h	%	[ Total HV ] veh/h	%				[ Veh. veh	[ Dist ] ft				
East: Dike Access Road															
1	L2	All MCs	105	5.1	105	5.1	0.330	9.8	LOSA	0.0	0.0	0.00	0.47	0.00	35.1
6	T1	All MCs	354	3.3	354	3.3	0.330	3.8	LOSA	0.0	0.0	0.00	0.47	0.00	36.0
Approach			460	3.7	460	3.7	0.330	5.2	LOSA	0.0	0.0	0.00	0.47	0.00	35.8
North: I-5 SB Off-Ramp															
7	L2	All MCs	153	9.7	153	9.7	0.380	13.4	LOS B	2.3	60.3	0.64	0.67	0.64	32.7
4	T1	All MCs	5	1.0	5	1.0	0.380	6.8	LOSA	2.3	60.3	0.64	0.67	0.64	33.6
14	R2	All MCs	195	3.3	195	3.3	0.380	7.1	LOSA	2.3	60.3	0.64	0.67	0.64	33.3
Approach			353	6.0	353	6.0	0.380	9.8	LOSA	2.3	60.3	0.64	0.67	0.64	33.0
West: Dike Access Road															
2	T1	All MCs	557	1.0	557	1.0	0.717	7.9	LOSA	8.7	221.1	0.80	0.68	0.91	34.2
12	R2	All MCs	244	2.6	244	2.6	0.717	8.2	LOSA	8.7	221.1	0.80	0.68	0.91	33.9
Approach			801	1.5	801	1.5	0.717	8.0	LOSA	8.7	221.1	0.80	0.68	0.91	34.1
All Vehicles			1614	3.1	1614	3.1	0.717	7.6	LOSA	8.7	221.1	0.54	0.62	0.59	34.3

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

**SIDRA INTERSECTION 9.1 | Copyright © 2000-2023 Akcelik and Associates Pty Ltd | sidrasolutions.com**  
 Organisation: HEATH & ASSOCIATES | Licence: PLUS / 1PC | Processed: Tuesday, July 25, 2023 12:56:57 PM  
 Project: C:\Users\pwhalen\Heath and Associates\Traffic Studies - Documents\Sidra\5183\1. Existing 2023 PM.sip9

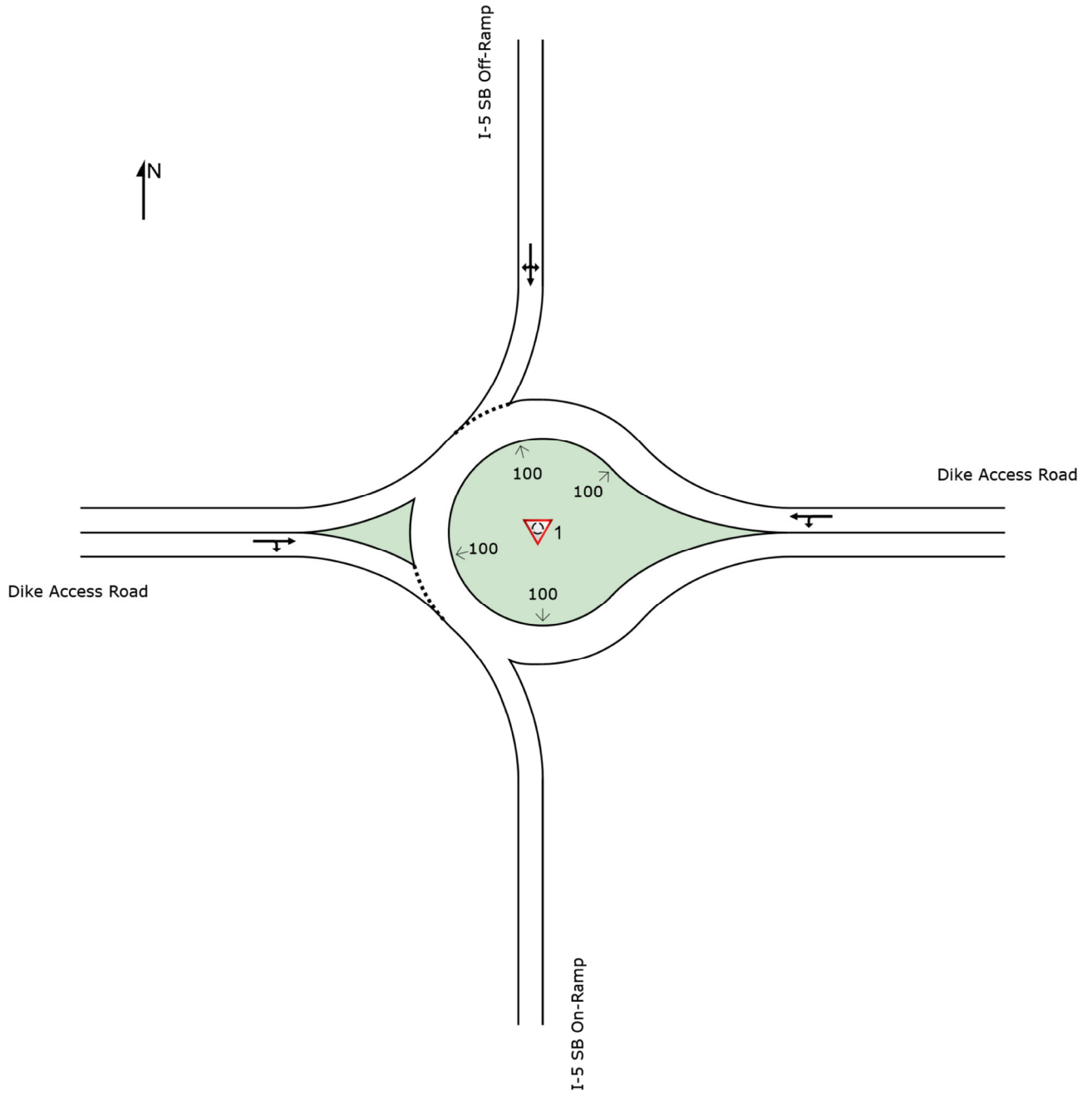


# SITE LAYOUT

 Site: 1 [1. I-5 SB Ramps & Dike Access Road (Site Folder: General)]

Existing 2023 PM Peak Hour  
Site Category: (None)  
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



# MOVEMENT SUMMARY

 Site: 2 [2. I-5 NB Ramp & Dike Access Road (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Existing 2023 PM Peak Hour  
 Site Category: (None)  
 Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ] veh/h	%	[ Total HV ] veh/h	%				[ Veh. veh	[ Dist ] ft				
South: I-5 NB Off-Ramp															
3	L2	All MCs	210	5.6	210	5.6	0.393	16.9	LOS B	2.5	66.3	0.80	0.79	0.84	30.5
8	T1	All MCs	1	1.0	1	1.0	0.393	10.2	LOS B	2.5	66.3	0.80	0.79	0.84	31.2
18	R2	All MCs	72	4.4	72	4.4	0.393	10.8	LOS B	2.5	66.3	0.80	0.79	0.84	30.9
Approach			283	5.3	283	5.3	0.393	15.3	LOS B	2.5	66.3	0.80	0.79	0.84	30.6
East: Dike Access Road															
6	T1	All MCs	221	3.8	221	3.8	0.341	7.3	LOSA	2.2	56.5	0.70	0.64	0.70	34.5
16	R2	All MCs	76	5.6	76	5.6	0.341	7.6	LOSA	2.2	56.5	0.70	0.64	0.70	34.1
Approach			297	4.3	297	4.3	0.341	7.4	LOSA	2.2	56.5	0.70	0.64	0.70	34.4
West: Dike Access Road															
5	L2	All MCs	310	3.1	310	3.1	0.569	9.7	LOSA	0.0	0.0	0.00	0.53	0.00	34.7
2	T1	All MCs	487	2.8	487	2.8	0.569	3.7	LOSA	0.0	0.0	0.00	0.53	0.00	35.6
Approach			797	2.9	797	2.9	0.569	6.1	LOSA	0.0	0.0	0.00	0.53	0.00	35.2
All Vehicles			1377	3.7	1377	3.7	0.569	8.2	LOSA	2.5	66.3	0.32	0.60	0.32	34.0

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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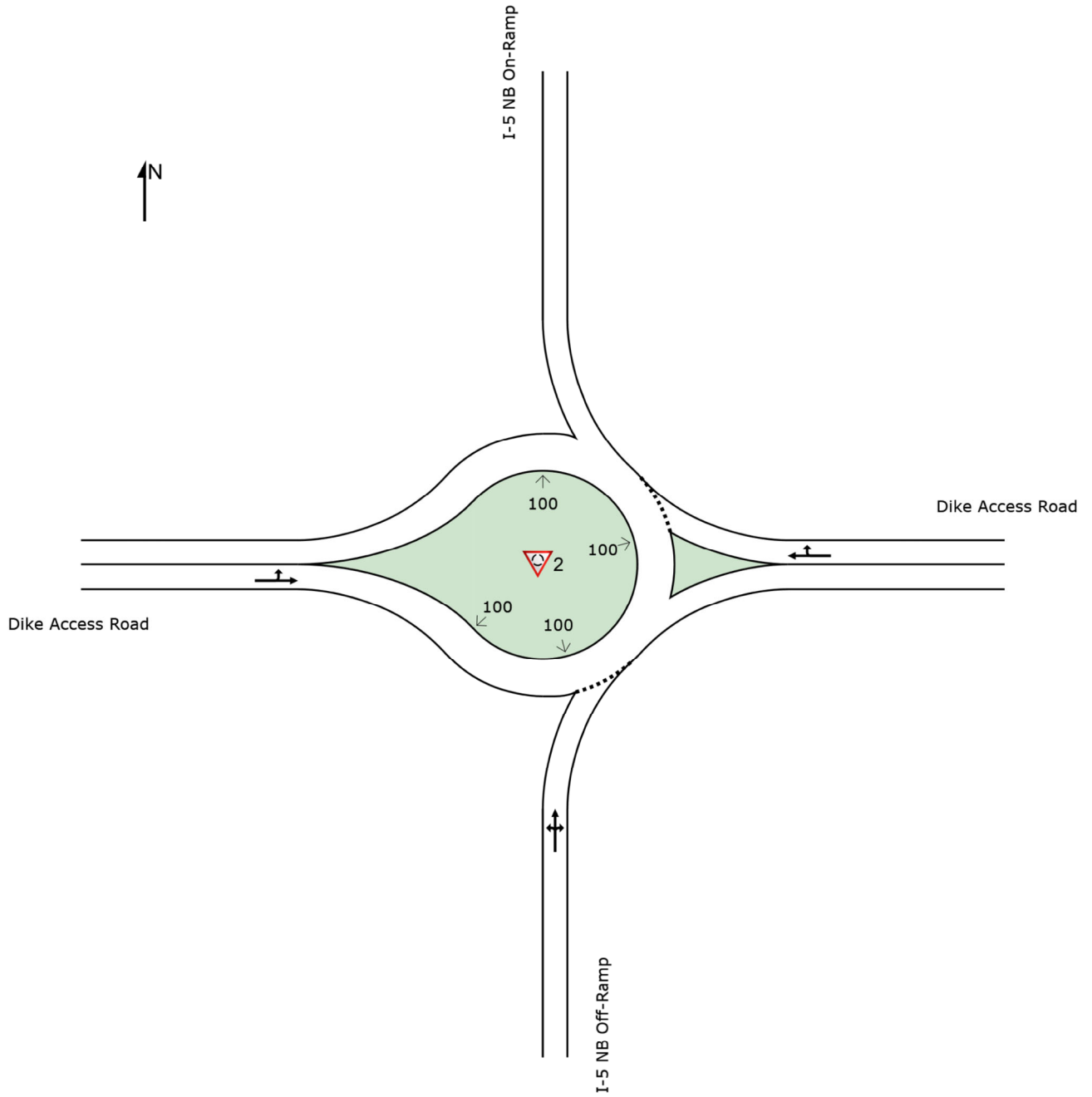
Project: C:\Users\pwhalen\Heath and Associates\Traffic Studies - Documents\Sidra\5183\1. Existing 2023 PM.sip9

# SITE LAYOUT

 Site: 2 [2. I-5 NB Ramp & Dike Access Road (Site Folder: General)]

Exsiting 2023 PM Peak Hour  
Site Category: (None)  
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Intersection						
Int Delay, s/veh	2.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↶	↷	↶	↷	↷	↷
Traffic Vol, veh/h	98	34	23	174	449	93
Future Vol, veh/h	98	34	23	174	449	93
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	80	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	3	3	9	5	3	1
Mvmt Flow	100	35	23	178	458	95

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	730	506	553	0	-	0
Stage 1	506	-	-	-	-	-
Stage 2	224	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.19	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.281	-	-	-
Pot Cap-1 Maneuver	388	565	983	-	-	-
Stage 1	604	-	-	-	-	-
Stage 2	810	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	379	565	983	-	-	-
Mov Cap-2 Maneuver	379	-	-	-	-	-
Stage 1	589	-	-	-	-	-
Stage 2	810	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	16.32	1.02	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	983	-	379	565	-	-
HCM Lane V/C Ratio	0.024	-	0.264	0.061	-	-
HCM Control Delay (s/veh)	8.8	-	17.9	11.8	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1	0.2	-	-

Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↙	↗	↙	↑	↗	
Traffic Vol, veh/h	10	22	10	198	480	10
Future Vol, veh/h	10	22	10	198	480	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	115	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	9	1	6	3	1
Mvmt Flow	11	24	11	215	522	11

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	764	527	533	0	-	0
Stage 1	527	-	-	-	-	-
Stage 2	237	-	-	-	-	-
Critical Hdwy	6.41	6.29	4.11	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.381	2.209	-	-	-
Pot Cap-1 Maneuver	373	537	1040	-	-	-
Stage 1	594	-	-	-	-	-
Stage 2	805	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	369	537	1040	-	-	-
Mov Cap-2 Maneuver	369	-	-	-	-	-
Stage 1	588	-	-	-	-	-
Stage 2	805	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	12.96	0.41	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1040	-	369	537	-	-
HCM Lane V/C Ratio	0.01	-	0.029	0.044	-	-
HCM Control Delay (s/veh)	8.5	-	15	12	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	0.1	-	-

Intersection						
Int Delay, s/veh	2.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Traffic Vol, veh/h	26	67	138	49	110	385
Future Vol, veh/h	26	67	138	49	110	385
Conflicting Peds, #/hr	0	0	0	0	0	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	94	94	94	94	94	94
Heavy Vehicles, %	4	9	4	1	4	3
Mvmt Flow	28	71	147	52	117	410

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	816	173	0	0	199	0
Stage 1	173	-	-	-	-	-
Stage 2	644	-	-	-	-	-
Critical Hdwy	6.44	6.29	-	-	4.14	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.381	-	-	2.236	-
Pot Cap-1 Maneuver	344	853	-	-	1362	-
Stage 1	852	-	-	-	-	-
Stage 2	519	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	305	853	-	-	1362	-
Mov Cap-2 Maneuver	305	-	-	-	-	-
Stage 1	852	-	-	-	-	-
Stage 2	462	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	12.67	0	1.75
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	568	1362
HCM Lane V/C Ratio	-	-	0.174	0.086
HCM Control Delay (s/veh)	-	-	12.7	7.9
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.6	0.3

Intersection	
Intersection Delay, s/veh	11.6
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	35	15	20	6	57	182	2	4	0	218	107	75
Future Vol, veh/h	35	15	20	6	57	182	2	4	0	218	107	75
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles, %	3	20	1	1	2	3	1	25	1	2	1	8
Mvmt Flow	36	15	21	6	59	188	2	4	0	225	110	77
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	8.9	9.9	8.4	13.2
HCM LOS	A	A	A	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	33%	50%	2%	55%
Vol Thru, %	67%	21%	23%	27%
Vol Right, %	0%	29%	74%	19%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	6	70	245	400
LT Vol	2	35	6	218
Through Vol	4	15	57	107
RT Vol	0	20	182	75
Lane Flow Rate	6	72	253	412
Geometry Grp	1	1	1	1
Degree of Util (X)	0.009	0.105	0.323	0.538
Departure Headway (Hd)	5.273	5.22	4.597	4.695
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	671	681	778	763
Service Time	3.366	3.296	2.653	2.756
HCM Lane V/C Ratio	0.009	0.106	0.325	0.54
HCM Control Delay, s/veh	8.4	8.9	9.9	13.2
HCM Lane LOS	A	A	A	B
HCM 95th-tile Q	0	0.4	1.4	3.3

# MOVEMENT SUMMARY

 Site: 7 [3. E Scott Ave & Lewis River Road (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Existing 2023 PM Peak Hour  
 Site Category: (None)  
 Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ] veh/h	%	[ Total HV ] veh/h	%				[ Veh. veh	Dist ] ft				
South: Lewis River Road															
3	L2	All MCs	65	1.6	65	1.6	0.613	11.7	LOS B	5.4	136.4	0.65	0.55	0.65	34.2
18a	R1	All MCs	669	1.0	669	1.0	0.613	5.0	LOS A	5.4	136.4	0.65	0.55	0.65	35.0
Approach			733	1.1	733	1.1	0.613	5.6	LOS A	5.4	136.4	0.65	0.55	0.65	34.9
NorthEast: Lewis River Road															
1ax	L1	All MCs	346	1.2	346	1.2	0.355	9.0	LOS A	2.6	64.5	0.28	0.53	0.28	33.7
16ax	R1	All MCs	139	1.0	139	1.0	0.355	3.5	LOS A	2.6	64.5	0.28	0.53	0.28	34.5
Approach			484	1.1	484	1.1	0.355	7.4	LOS A	2.6	64.5	0.28	0.53	0.28	33.9
West: E Scott Avenue															
5a	L1	All MCs	233	1.0	233	1.0	0.236	10.4	LOS B	1.4	35.4	0.53	0.64	0.53	32.6
12	R2	All MCs	26	1.0	26	1.0	0.236	5.5	LOS A	1.4	35.4	0.53	0.64	0.53	33.0
Approach			259	1.0	259	1.0	0.236	9.9	LOS A	1.4	35.4	0.53	0.64	0.53	32.7
All Vehicles			1477	1.1	1477	1.1	0.613	6.9	LOS A	5.4	136.4	0.51	0.56	0.51	34.2

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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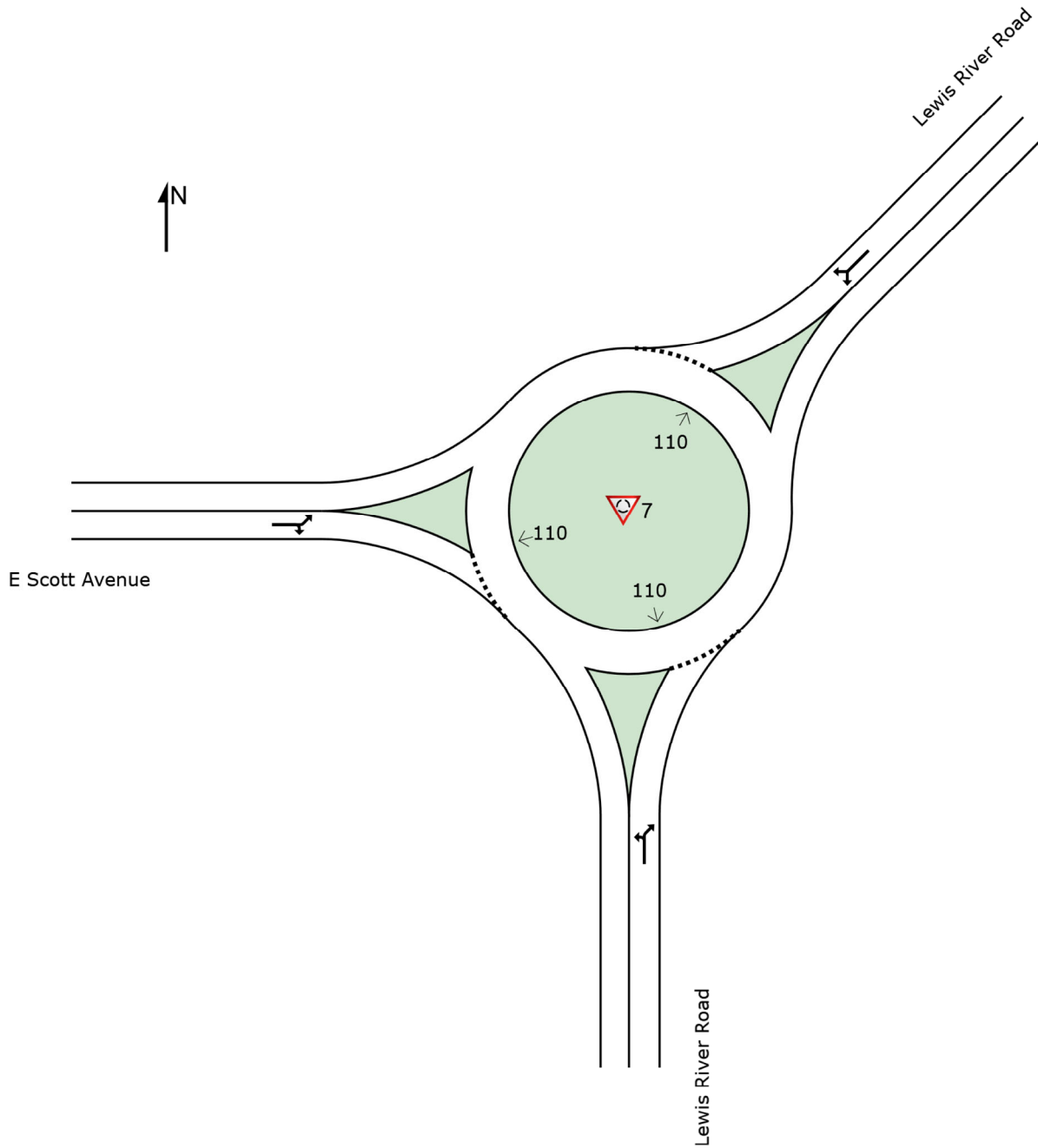


# SITE LAYOUT

Site: 7 [3. E Scott Ave & Lewis River Road (Site Folder: General)]

Existing 2023 PM Peak Hour  
Site Category: (None)  
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



# MOVEMENT SUMMARY

**Site: 1 [1. I-5 SB Ramps & Dike Access Road (Site Folder: Forecast 2026 Without Project)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.3.210**

Existing 2023 PM Peak Hour  
 Site Category: (None)  
 Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ] veh/h	%	[ Total HV ] veh/h	%				[ Veh. veh	Dist ] ft				
East: Dike Access Road															
1	L2	All MCs	124	5.1	124	5.1	0.366	9.8	LOS A	0.0	0.0	0.00	0.48	0.00	35.1
6	T1	All MCs	385	3.3	385	3.3	0.366	3.8	LOS A	0.0	0.0	0.00	0.48	0.00	36.0
Approach			510	3.7	510	3.7	0.366	5.3	LOS A	0.0	0.0	0.00	0.48	0.00	35.8
North: I-5 SB Off-Ramp															
7	L2	All MCs	177	9.7	177	9.7	0.437	14.2	LOS B	2.8	73.7	0.70	0.70	0.71	32.3
4	T1	All MCs	5	1.0	5	1.0	0.437	7.5	LOS A	2.8	73.7	0.70	0.70	0.71	33.2
14	R2	All MCs	209	3.3	209	3.3	0.437	7.8	LOS A	2.8	73.7	0.70	0.70	0.71	32.9
Approach			390	6.2	390	6.2	0.437	10.7	LOS B	2.8	73.7	0.70	0.70	0.71	32.6
West: Dike Access Road															
2	T1	All MCs	604	1.0	604	1.0	0.804	10.9	LOS B	12.7	320.7	0.93	0.83	1.20	33.0
12	R2	All MCs	261	2.6	261	2.6	0.804	11.1	LOS B	12.7	320.7	0.93	0.83	1.20	32.7
Approach			865	1.5	865	1.5	0.804	11.0	LOS B	12.7	320.7	0.93	0.83	1.20	32.9
All Vehicles			1765	3.2	1765	3.2	0.804	9.3	LOS A	12.7	320.7	0.61	0.70	0.74	33.6

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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# MOVEMENT SUMMARY

**Site: 2 [2. I-5 NB Ramp & Dike Access Road (Site Folder: Forecast 2026 Without Project)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.3.210**

Exsiting 2023 PM Peak Hour  
 Site Category: (None)  
 Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ] veh/h	%	[ Total HV ] veh/h	%				[ Veh. veh	[ Dist ] ft				
South: I-5 NB Off-Ramp															
3	L2	All MCs	224	5.6	224	5.6	0.477	19.9	LOS B	3.7	96.7	0.86	0.87	1.06	29.4
8	T1	All MCs	1	1.0	1	1.0	0.477	13.2	LOS B	3.7	96.7	0.86	0.87	1.06	30.0
18	R2	All MCs	96	4.4	96	4.4	0.477	13.8	LOS B	3.7	96.7	0.86	0.87	1.06	29.7
Approach			321	5.2	321	5.2	0.477	18.1	LOS B	3.7	96.7	0.86	0.87	1.06	29.5
East: Dike Access Road															
6	T1	All MCs	254	3.8	254	3.8	0.410	7.8	LOSA	2.8	71.5	0.76	0.67	0.76	34.3
16	R2	All MCs	89	5.6	89	5.6	0.410	8.1	LOSA	2.8	71.5	0.76	0.67	0.76	33.9
Approach			344	4.3	344	4.3	0.410	7.9	LOSA	2.8	71.5	0.76	0.67	0.76	34.2
West: Dike Access Road															
5	L2	All MCs	332	3.1	332	3.1	0.623	9.7	LOSA	0.0	0.0	0.00	0.52	0.00	34.8
2	T1	All MCs	541	2.8	541	2.8	0.623	3.7	LOSA	0.0	0.0	0.00	0.52	0.00	35.6
Approach			873	2.9	873	2.9	0.623	6.0	LOSA	0.0	0.0	0.00	0.52	0.00	35.3
All Vehicles			1538	3.7	1538	3.7	0.623	9.0	LOSA	3.7	96.7	0.35	0.63	0.39	33.6

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Intersection						
Int Delay, s/veh	3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↙	↗	↙	↑	↗	
Traffic Vol, veh/h	105	36	25	210	517	100
Future Vol, veh/h	105	36	25	210	517	100
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	80	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	3	3	9	5	3	1
Mvmt Flow	107	37	26	214	528	102

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	844	579	630	0	-	0
Stage 1	579	-	-	-	-	-
Stage 2	265	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.19	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.281	-	-	-
Pot Cap-1 Maneuver	332	513	920	-	-	-
Stage 1	559	-	-	-	-	-
Stage 2	777	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	323	513	920	-	-	-
Mov Cap-2 Maneuver	323	-	-	-	-	-
Stage 1	543	-	-	-	-	-
Stage 2	777	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v19.27		0.96	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	920	-	323	513	-	-
HCM Lane V/C Ratio	0.028	-	0.332	0.072	-	-
HCM Control Delay (s/veh)	9	-	21.6	12.6	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.4	0.2	-	-

Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↙	↗	↙	↑	↗	
Traffic Vol, veh/h	11	24	11	236	550	11
Future Vol, veh/h	11	24	11	236	550	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	115	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	9	1	6	3	1
Mvmt Flow	12	26	12	257	598	12

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	884	604	610	0	-	0
Stage 1	604	-	-	-	-	-
Stage 2	280	-	-	-	-	-
Critical Hdwy	6.41	6.29	4.11	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.381	2.209	-	-	-
Pot Cap-1 Maneuver	317	486	974	-	-	-
Stage 1	548	-	-	-	-	-
Stage 2	769	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	313	486	974	-	-	-
Mov Cap-2 Maneuver	313	-	-	-	-	-
Stage 1	541	-	-	-	-	-
Stage 2	769	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	14.13	0.39	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	974	-	313	486	-	-
HCM Lane V/C Ratio	0.012	-	0.038	0.054	-	-
HCM Control Delay (s/veh)	8.7	-	17	12.8	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	0.2	-	-

Intersection						
Int Delay, s/veh	3.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	35	96	148	65	154	412
Future Vol, veh/h	35	96	148	65	154	412
Conflicting Peds, #/hr	0	0	0	0	0	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	94	94	94	94	94	94
Heavy Vehicles, %	4	9	4	1	4	3
Mvmt Flow	37	102	157	69	164	438

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	958	192	0	0	227
Stage 1	192	-	-	-	-
Stage 2	766	-	-	-	-
Critical Hdwy	6.44	6.29	-	-	4.14
Critical Hdwy Stg 1	5.44	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-
Follow-up Hdwy	3.536	3.381	-	-	2.236
Pot Cap-1 Maneuver	283	832	-	-	1330
Stage 1	836	-	-	-	-
Stage 2	455	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	237	832	-	-	1330
Mov Cap-2 Maneuver	237	-	-	-	-
Stage 1	836	-	-	-	-
Stage 2	381	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v15.01		0	2.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	498	1330
HCM Lane V/C Ratio	-	-	0.28	0.123
HCM Control Delay (s/veh)	-	-	15	8.1
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	1.1	0.4

Intersection	
Intersection Delay, s/veh	12.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	37	16	21	6	61	208	2	4	0	234	121	80
Future Vol, veh/h	37	16	21	6	61	208	2	4	0	234	121	80
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles, %	3	20	1	1	2	3	1	25	1	2	1	8
Mvmt Flow	38	16	22	6	63	214	2	4	0	241	125	82
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	9.2	10.5	8.6	14.8
HCM LOS	A	B	A	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	33%	50%	2%	54%
Vol Thru, %	67%	22%	22%	28%
Vol Right, %	0%	28%	76%	18%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	6	74	275	435
LT Vol	2	37	6	234
Through Vol	4	16	61	121
RT Vol	0	21	208	80
Lane Flow Rate	6	76	284	448
Geometry Grp	1	1	1	1
Degree of Util (X)	0.01	0.114	0.37	0.596
Departure Headway (Hd)	5.551	5.376	4.701	4.787
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	649	659	760	749
Service Time	3.551	3.472	2.772	2.862
HCM Lane V/C Ratio	0.009	0.115	0.374	0.598
HCM Control Delay, s/veh	8.6	9.2	10.5	14.8
HCM Lane LOS	A	A	B	B
HCM 95th-tile Q	0	0.4	1.7	4

# MOVEMENT SUMMARY

**Site: 7 [3. E Scott Ave & Lewis River Road (Site Folder: Forecast 2026 Without Project)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.3.210**

Existing 2023 PM Peak Hour  
 Site Category: (None)  
 Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ] veh/h	%	[ Total HV ] veh/h	%				[ Veh. veh	Dist ] ft				
South: Lewis River Road															
3	L2	All MCs	79	1.6	79	1.6	0.742	13.8	LOS B	9.4	238.0	0.81	0.67	0.91	33.6
18a	R1	All MCs	779	1.0	779	1.0	0.742	7.1	LOS A	9.4	238.0	0.81	0.67	0.91	34.4
Approach			858	1.1	858	1.1	0.742	7.7	LOS A	9.4	238.0	0.81	0.67	0.91	34.3
NorthEast: Lewis River Road															
1ax	L1	All MCs	407	1.2	407	1.2	0.423	9.1	LOS A	3.4	86.3	0.35	0.53	0.35	33.5
16ax	R1	All MCs	159	1.0	159	1.0	0.423	3.7	LOS A	3.4	86.3	0.35	0.53	0.35	34.3
Approach			567	1.1	567	1.1	0.423	7.6	LOS A	3.4	86.3	0.35	0.53	0.35	33.8
West: E Scott Avenue															
5a	L1	All MCs	266	1.0	266	1.0	0.283	10.9	LOS B	1.8	44.7	0.60	0.66	0.60	32.5
12	R2	All MCs	28	1.0	28	1.0	0.283	6.0	LOS A	1.8	44.7	0.60	0.66	0.60	32.9
Approach			294	1.0	294	1.0	0.283	10.4	LOS B	1.8	44.7	0.60	0.66	0.60	32.5
All Vehicles			1719	1.1	1719	1.1	0.742	8.1	LOS A	9.4	238.0	0.62	0.62	0.67	33.8

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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# MOVEMENT SUMMARY

**Site: 1 [1. I-5 SB Ramps & Dike Access Road (Site Folder: Forecast 2026 With Project)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.3.210**

Forecast 2026 PM Peak Hour With Project  
 Site Category: (None)  
 Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ] veh/h	%	[ Total HV ] veh/h	%				[ Veh. veh	[ Dist ] ft				
East: Dike Access Road															
1	L2	All MCs	159	5.1	159	5.1	0.401	9.8	LOS A	0.0	0.0	0.00	0.49	0.00	35.0
6	T1	All MCs	399	3.3	399	3.3	0.401	3.8	LOS A	0.0	0.0	0.00	0.49	0.00	35.9
Approach			557	3.8	557	3.8	0.401	5.5	LOS A	0.0	0.0	0.00	0.49	0.00	35.6
North: I-5 SB Off-Ramp															
7	L2	All MCs	204	9.7	204	9.7	0.488	15.6	LOS B	3.6	93.5	0.75	0.76	0.84	31.6
4	T1	All MCs	5	1.0	5	1.0	0.488	8.7	LOS A	3.6	93.5	0.75	0.76	0.84	32.5
14	R2	All MCs	209	3.3	209	3.3	0.488	9.0	LOS A	3.6	93.5	0.75	0.76	0.84	32.2
Approach			418	6.4	418	6.4	0.488	12.2	LOS B	3.6	93.5	0.75	0.76	0.84	31.9
West: Dike Access Road															
2	T1	All MCs	621	1.0	621	1.0	0.868	15.2	LOS D	16.8	424.6	1.00	1.03	1.52	31.0
12	R2	All MCs	261	2.6	261	2.6	0.868	15.5	LOS D	16.8	424.6	1.00	1.03	1.52	30.7
Approach			882	1.5	882	1.5	0.868	15.3	LOS B	16.8	424.6	1.00	1.03	1.52	30.9
All Vehicles			1857	3.3	1857	3.3	0.868	11.7	LOS B	16.8	424.6	0.64	0.81	0.91	32.4

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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# MOVEMENT SUMMARY

**Site: 2 [2. I-5 NB Ramp & Dike Access Road (Site Folder: Forecast 2026 With Project)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.3.210**

Forecast 2028 PM Peak Hour With Project  
 Site Category: (None)  
 Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ] veh/h	%	[ Total HV ] veh/h	%				[ Veh. veh	[ Dist ] ft				
South: I-5 NB Off-Ramp															
3	L2	All MCs	224	5.6	224	5.6	0.556	23.1	LOS C	5.0	131.1	0.91	0.95	1.27	28.4
8	T1	All MCs	1	1.0	1	1.0	0.556	16.3	LOS B	5.0	131.1	0.91	0.95	1.27	29.0
18	R2	All MCs	134	4.4	134	4.4	0.556	17.0	LOS B	5.0	131.1	0.91	0.95	1.27	28.7
Approach			360	5.1	360	5.1	0.556	20.8	LOS C	5.0	131.1	0.91	0.95	1.27	28.5
East: Dike Access Road															
6	T1	All MCs	302	3.8	302	3.8	0.498	9.0	LOS A	4.0	102.2	0.80	0.73	0.89	33.9
16	R2	All MCs	114	5.6	114	5.6	0.498	9.2	LOS A	4.0	102.2	0.80	0.73	0.89	33.5
Approach			416	4.3	416	4.3	0.498	9.0	LOS A	4.0	102.2	0.80	0.73	0.89	33.8
West: Dike Access Road															
5	L2	All MCs	332	3.1	332	3.1	0.655	9.7	LOS A	0.0	0.0	0.00	0.52	0.00	34.8
2	T1	All MCs	586	2.8	586	2.8	0.655	3.7	LOS A	0.0	0.0	0.00	0.52	0.00	35.6
Approach			918	2.9	918	2.9	0.655	5.9	LOS A	0.0	0.0	0.00	0.52	0.00	35.3
All Vehicles			1694	3.7	1694	3.7	0.655	9.8	LOS A	5.0	131.1	0.39	0.66	0.49	33.3

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Intersection						
Int Delay, s/veh	3.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↙	↗	↙	↑	↗	
Traffic Vol, veh/h	105	36	25	278	595	100
Future Vol, veh/h	105	36	25	278	595	100
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	80	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	3	3	9	5	3	1
Mvmt Flow	107	37	26	284	607	102

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	993	658	709	0	-	0
Stage 1	658	-	-	-	-	-
Stage 2	335	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.19	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.281	-	-	-
Pot Cap-1 Maneuver	271	462	858	-	-	-
Stage 1	513	-	-	-	-	-
Stage 2	723	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	263	462	858	-	-	-
Mov Cap-2 Maneuver	263	-	-	-	-	-
Stage 1	498	-	-	-	-	-
Stage 2	723	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	24.13	0.77	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	858	-	263	462	-	-
HCM Lane V/C Ratio	0.03	-	0.407	0.079	-	-
HCM Control Delay (s/veh)	9.3	-	27.8	13.5	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.9	0.3	-	-

Intersection						
Int Delay, s/veh	1.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↙	↗	↙	↑	↗	
Traffic Vol, veh/h	55	27	15	260	566	73
Future Vol, veh/h	55	27	15	260	566	73
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	115	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	9	1	6	3	1
Mvmt Flow	60	29	16	283	615	79

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	970	655	695	0	-	0
Stage 1	655	-	-	-	-	-
Stage 2	315	-	-	-	-	-
Critical Hdwy	6.41	6.29	4.11	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.381	2.209	-	-	-
Pot Cap-1 Maneuver	282	454	906	-	-	-
Stage 1	519	-	-	-	-	-
Stage 2	742	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	277	454	906	-	-	-
Mov Cap-2 Maneuver	277	-	-	-	-	-
Stage 1	509	-	-	-	-	-
Stage 2	742	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	18.89	0.49	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	906	-	277	454	-	-
HCM Lane V/C Ratio	0.018	-	0.216	0.065	-	-
HCM Control Delay (s/veh)	9	-	21.5	13.5	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.8	0.2	-	-

Intersection						
Int Delay, s/veh	3.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	35	96	179	65	154	441
Future Vol, veh/h	35	96	179	65	154	441
Conflicting Peds, #/hr	0	0	0	0	0	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	94	94	94	94	94	94
Heavy Vehicles, %	4	9	4	1	4	3
Mvmt Flow	37	102	190	69	164	469

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1022	225	0	0	260	0
Stage 1	225	-	-	-	-	-
Stage 2	797	-	-	-	-	-
Critical Hdwy	6.44	6.29	-	-	4.14	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.381	-	-	2.236	-
Pot Cap-1 Maneuver	259	797	-	-	1293	-
Stage 1	808	-	-	-	-	-
Stage 2	440	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	215	797	-	-	1293	-
Mov Cap-2 Maneuver	215	-	-	-	-	-
Stage 1	808	-	-	-	-	-
Stage 2	365	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	16.11	0	2.12
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	462	1293
HCM Lane V/C Ratio	-	-	0.301	0.127
HCM Control Delay (s/veh)	-	-	16.1	8.2
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	1.3	0.4

Intersection	
Intersection Delay, s/veh	13.8
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	37	16	21	6	61	234	2	4	0	239	139	80
Future Vol, veh/h	37	16	21	6	61	234	2	4	0	239	139	80
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles, %	3	20	1	1	2	3	1	25	1	2	1	8
Mvmt Flow	38	16	22	6	63	241	2	4	0	246	143	82
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	9.4	11.2	8.8	16.2
HCM LOS	A	B	A	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	33%	50%	2%	52%
Vol Thru, %	67%	22%	20%	30%
Vol Right, %	0%	28%	78%	17%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	6	74	301	458
LT Vol	2	37	6	239
Through Vol	4	16	61	139
RT Vol	0	21	234	80
Lane Flow Rate	6	76	310	472
Geometry Grp	1	1	1	1
Degree of Util (X)	0.01	0.119	0.41	0.637
Departure Headway (Hd)	5.689	5.604	4.762	4.859
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	632	644	748	737
Service Time	3.696	3.604	2.846	2.948
HCM Lane V/C Ratio	0.009	0.118	0.414	0.64
HCM Control Delay, s/veh	8.8	9.4	11.2	16.2
HCM Lane LOS	A	A	B	C
HCM 95th-tile Q	0	0.4	2	4.6

# MOVEMENT SUMMARY

**Site: 7 [3. E Scott Ave & Lewis River Road (Site Folder: Forecast 2026 With Project)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.3.210**

Forecast 2028 PM Peak Hour With Project  
 Site Category: (None)  
 Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ] veh/h	%	[ Total HV ] veh/h	%				[ Veh. veh	Dist ] ft				
South: Lewis River Road															
3	L2	All MCs	101	1.6	101	1.6	0.764	14.3	LOS B	10.4	262.2	0.85	0.70	0.97	33.5
18a	R1	All MCs	779	1.0	779	1.0	0.764	7.6	LOSA	10.4	262.2	0.85	0.70	0.97	34.2
Approach			880	1.1	880	1.1	0.764	8.3	LOSA	10.4	262.2	0.85	0.70	0.97	34.1
NorthEast: Lewis River Road															
1ax	L1	All MCs	407	1.2	407	1.2	0.436	9.2	LOSA	3.5	89.5	0.40	0.54	0.40	33.4
16ax	R1	All MCs	165	1.0	165	1.0	0.436	3.8	LOSA	3.5	89.5	0.40	0.54	0.40	34.2
Approach			572	1.1	572	1.1	0.436	7.7	LOSA	3.5	89.5	0.40	0.54	0.40	33.7
West: E Scott Avenue															
5a	L1	All MCs	271	1.0	271	1.0	0.289	10.9	LOS B	1.8	46.4	0.61	0.66	0.61	32.5
12	R2	All MCs	28	1.0	28	1.0	0.289	6.0	LOSA	1.8	46.4	0.61	0.66	0.61	32.9
Approach			299	1.0	299	1.0	0.289	10.4	LOS B	1.8	46.4	0.61	0.66	0.61	32.5
All Vehicles			1751	1.1	1751	1.1	0.764	8.5	LOSA	10.4	262.2	0.66	0.64	0.72	33.7

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\Users\pwhalen\Heath and Associates\Traffic Studies - Documents\Sidra\5183\3. Forecast 2026 With Project.sip9

Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	29	36	27	238	432	32
Future Vol, veh/h	29	36	27	238	432	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	3	2
Mvmt Flow	32	39	29	259	470	35

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	804	487	504	0	0
Stage 1	487	-	-	-	-
Stage 2	317	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	352	581	1060	-	-
Stage 1	618	-	-	-	-
Stage 2	738	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	341	581	1060	-	-
Mov Cap-2 Maneuver	341	-	-	-	-
Stage 1	598	-	-	-	-
Stage 2	738	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	14.69	0.87	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1060	-	442	-	-
HCM Lane V/C Ratio	0.028	-	0.16	-	-
HCM Control Delay (s/veh)	8.5	0	14.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.6	-	-



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

