
PURPLE SAGE MEADOWS

Soap Lake, WA

TRAFFIC IMPACT ANALYSIS (TIA)

December 21, 2023



HEATH&ASSOCIATES

Transportation Planning & Engineering

PURPLE SAGE MEADOWS TRAFFIC IMPACT ANALYSIS

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PURPLE SAGE MEADOWS TRAFFIC IMPACT ANALYSIS

INTRODUCTION

The intent of this assessment serves to provide a Traffic Impact Analysis for a proposed residential development comprising 236 manufactured homes in the city of Soap Lake. A description of the proposed project is provided below.

PROJECT DESCRIPTION

The Purple Sage Meadows project proposes to develop 236 manufactured homes located in the city of Soap Lake. The subject site, bordered to the east by Division Street S, comprises 38.92-acres tax parcel #: 080381100. Access to the site is proposed via one roadway extending west from Division Street S. Surrounding land use is a mixture of residential, agriculture and undeveloped area. Figure 1 below provides an aerial vicinity image of the surrounding roadway system. A site plan illustrating the overall project configuration is presented in Figure 2.

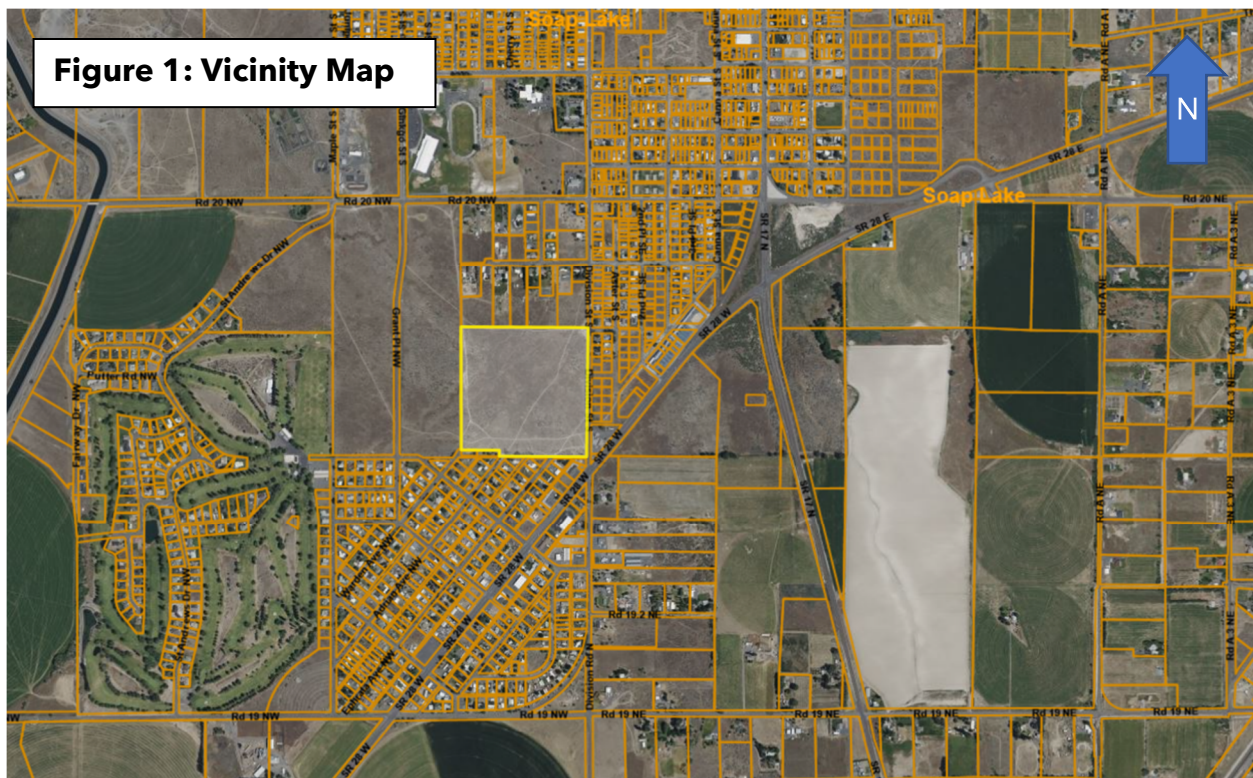
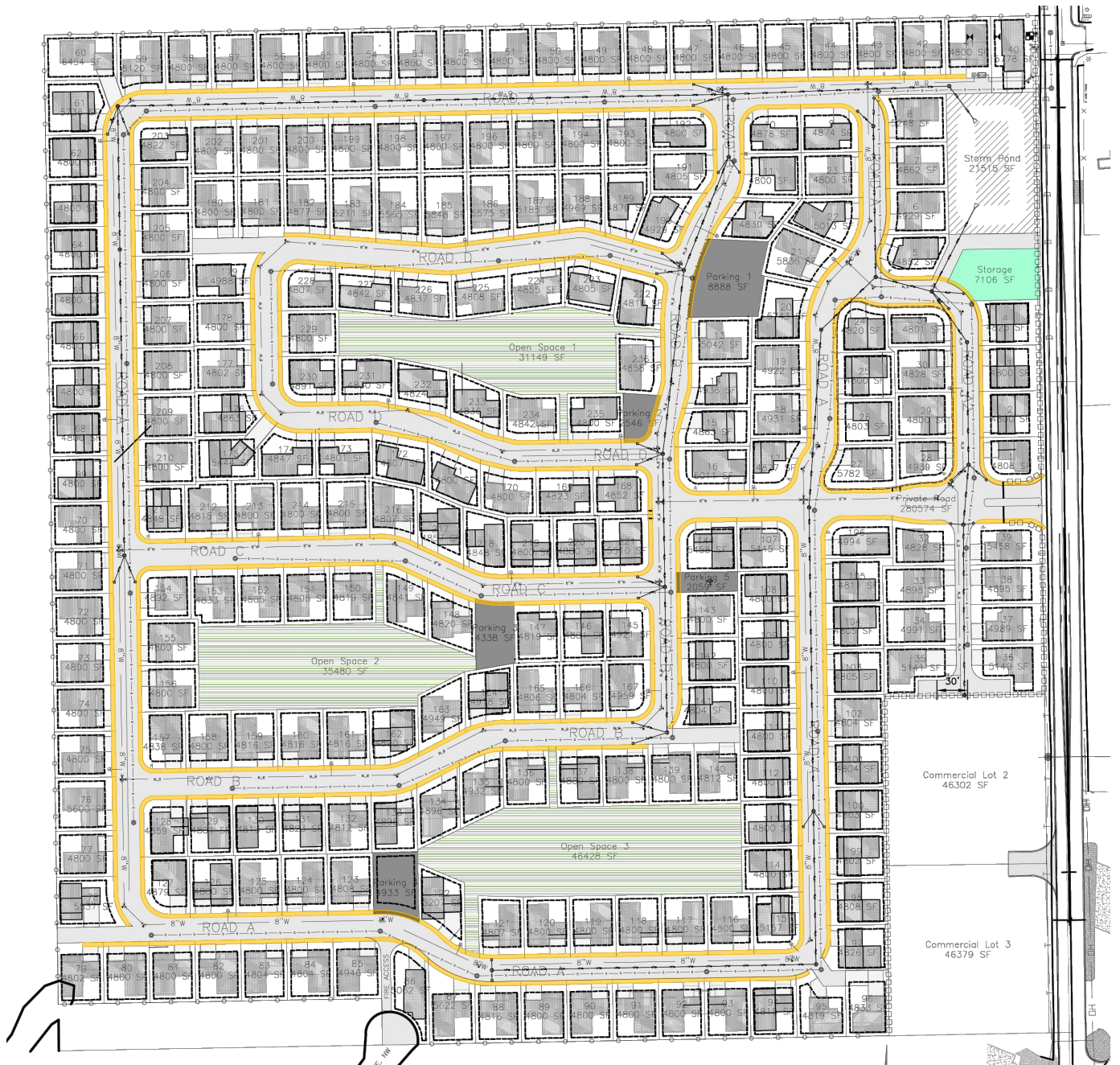


Figure 1: Vicinity Map





EXISTING STREET SYSTEM & CHARACTERISTICS

The primary roadway serving the subject site is *Division Street S*, a two-lane, north-south rural major collector roadway bordering the subject site to the east. Travel lanes are approximately 9- to 10-feet in width. Curb and gutter are provided along both sides of the roadway. A paved, two-way non-motorist pathway is provided along the east side of the roadway. The multi-use pathway is approximately 10-feet wide and detached from the roadway. Bus stops are available along the roadway in the vicinity of the subject site north of SR 28, south of 8th Avenue SE and north of 6th Avenue SE. The posted speed limit is 25-mph.

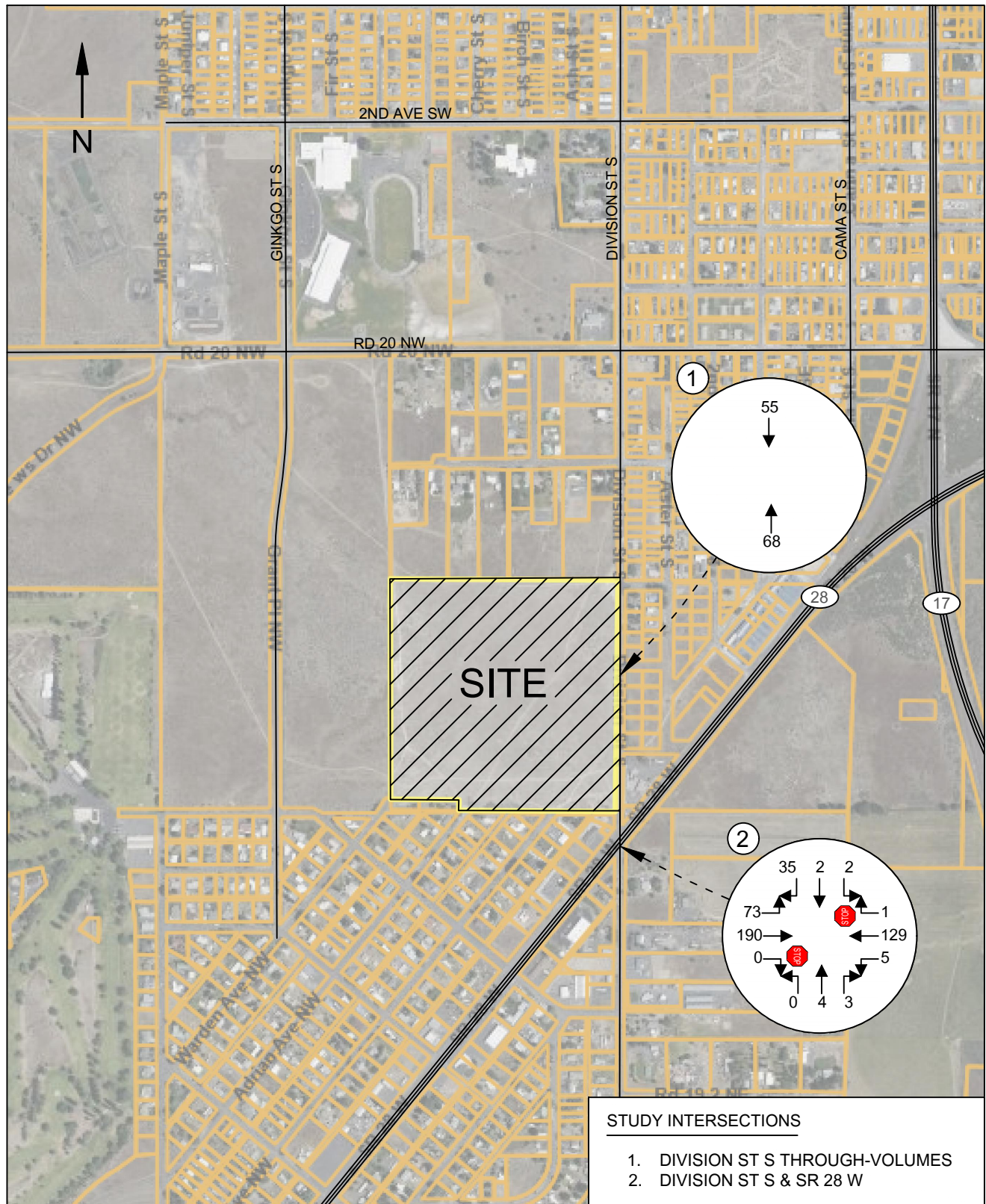
EXISTING PM PEAK HOUR VOLUMES

Field data for this study was collected by our firm in December of 2023. The following intersections were included in analysis:

1. Division Street S through-volumes at the proposed access
2. Division Street S & SR 28

Counts were performed between the PM peak period of 3:00 PM - 6:00 PM. 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 existing PM peak hour volumes. Full count sheets have been attached in the appendix for reference.





TRIP GENERATION & DISTRIBUTION

Trip generation is defined as the number of vehicle movements that enter or exit the respective project site during a designated time period such as the PM peak hour or an entire day. The magnitude of the anticipated vehicle trip generation for the proposed project was derived from the Institute of Transportation Engineers (ITE) publication, *Trip Generation*, 11th Edition. It should be noted that all dwelling units are proposed as manufactured homes. As such, the proposed land use utilized for analysis is defined under ITE's Land Use Code (LUC) 240 - Mobile Home Park. Dwelling units were used as the input variable and ITE equations were used to determine trip ends. Table 1 below summarizes anticipated vehicular movements for the average weekday daily trips (AWDT) and the AM and PM peak hours.

Table 1: Project Trip Generation

Land Use	Size	AWDT	AM Peak-Hour Trips			PM Peak-Hour Trips		
			In	Out	Total	In	Out	Total
Manufactured Home (LUC 220)	236 DU's	1350	18	67	85	84	51	135

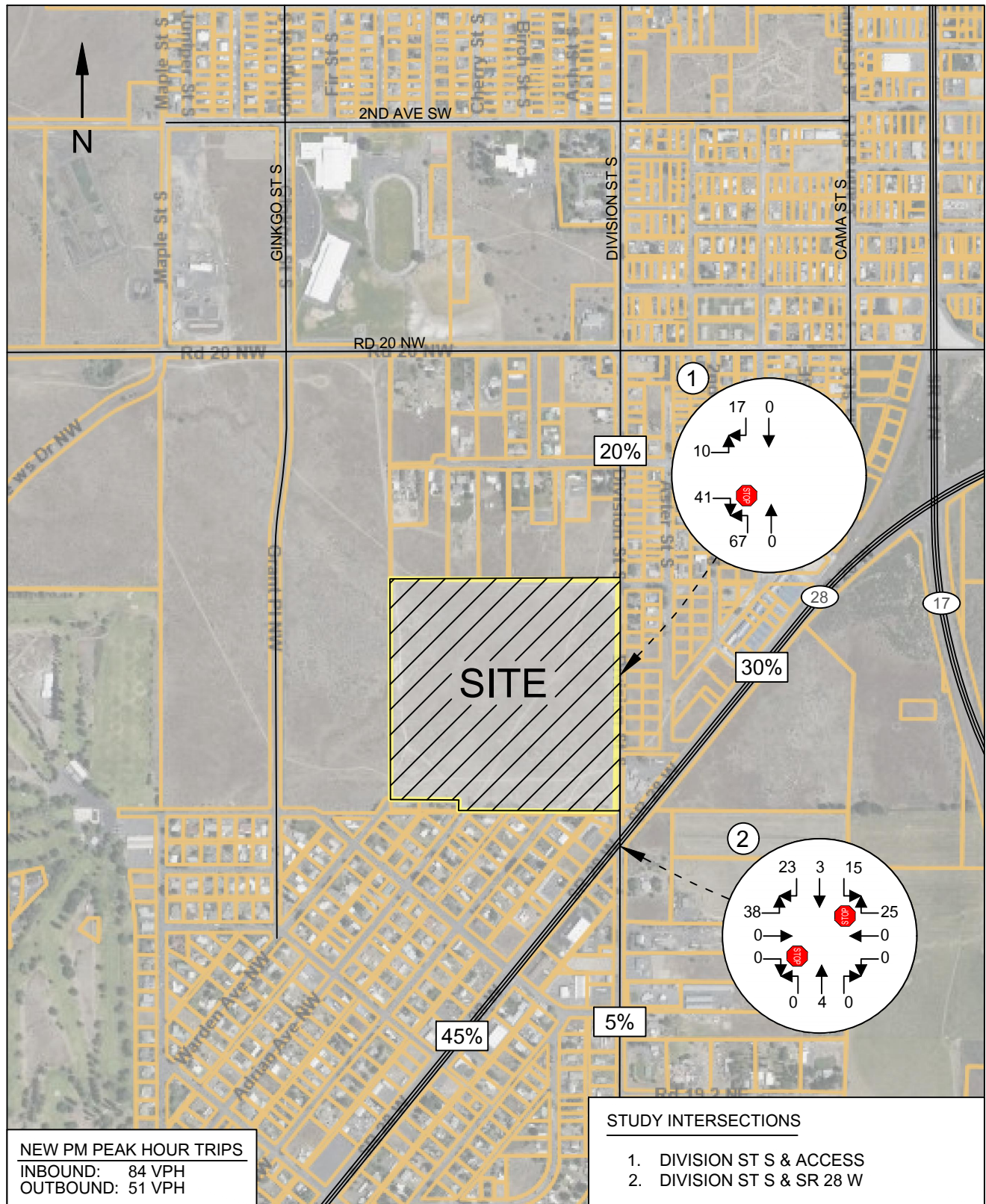
Based on ITE data, approximately 1350 average weekday daily trips can be anticipated as a result of the proposed development with 85 AM (18 inbound/67 outbound) and 135 PM (84 inbound/51 outbound) peak hour trips.

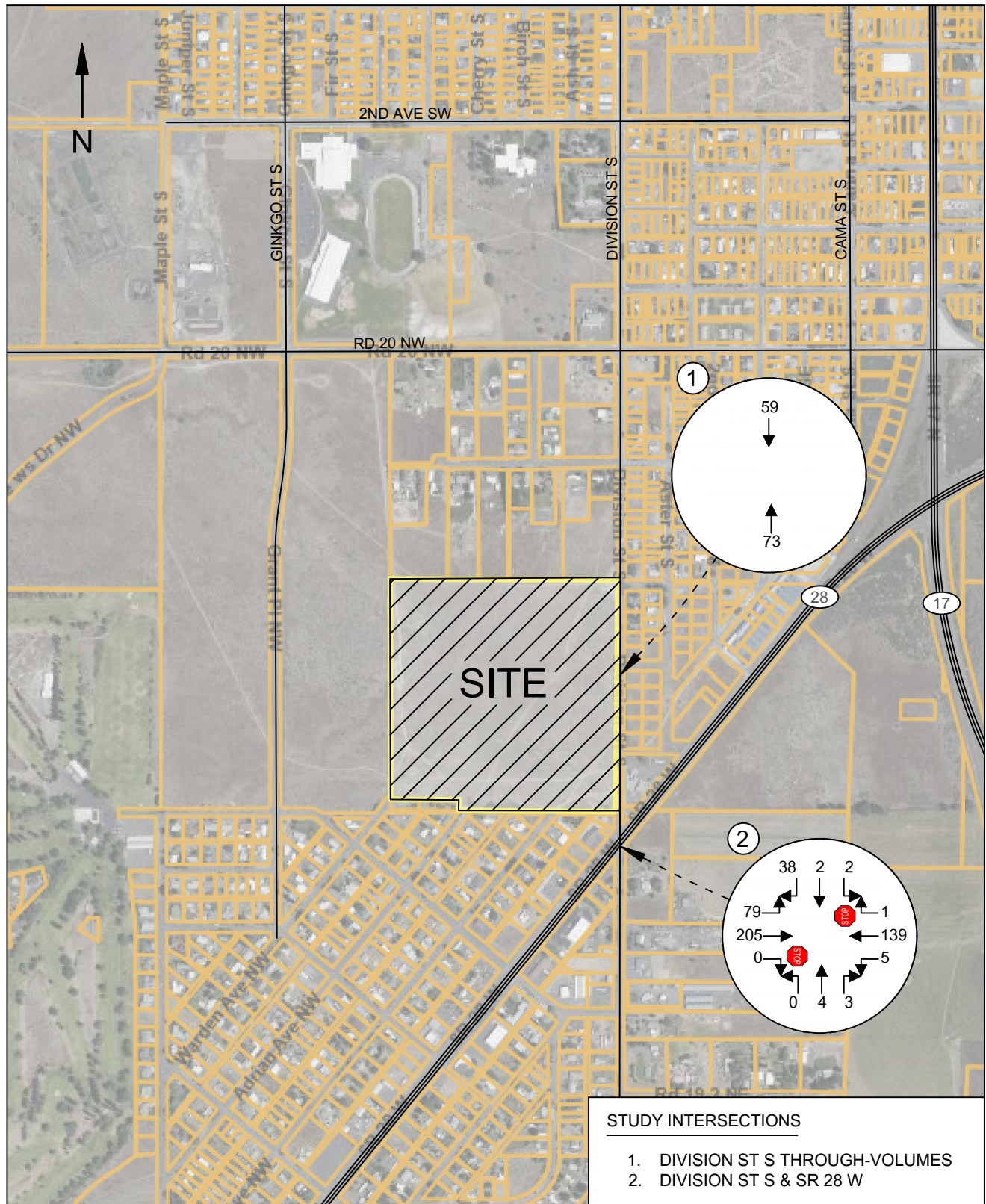
The Purple Sage Meadows's PM peak hour vehicular trip distribution & assignment is illustrated in Figure 4 on the following page. All project-generated traffic was assigned to the proposed access on Division Street S. Trip distribution percentages were based on travel patterns identified within baseline PM peak hour counts.

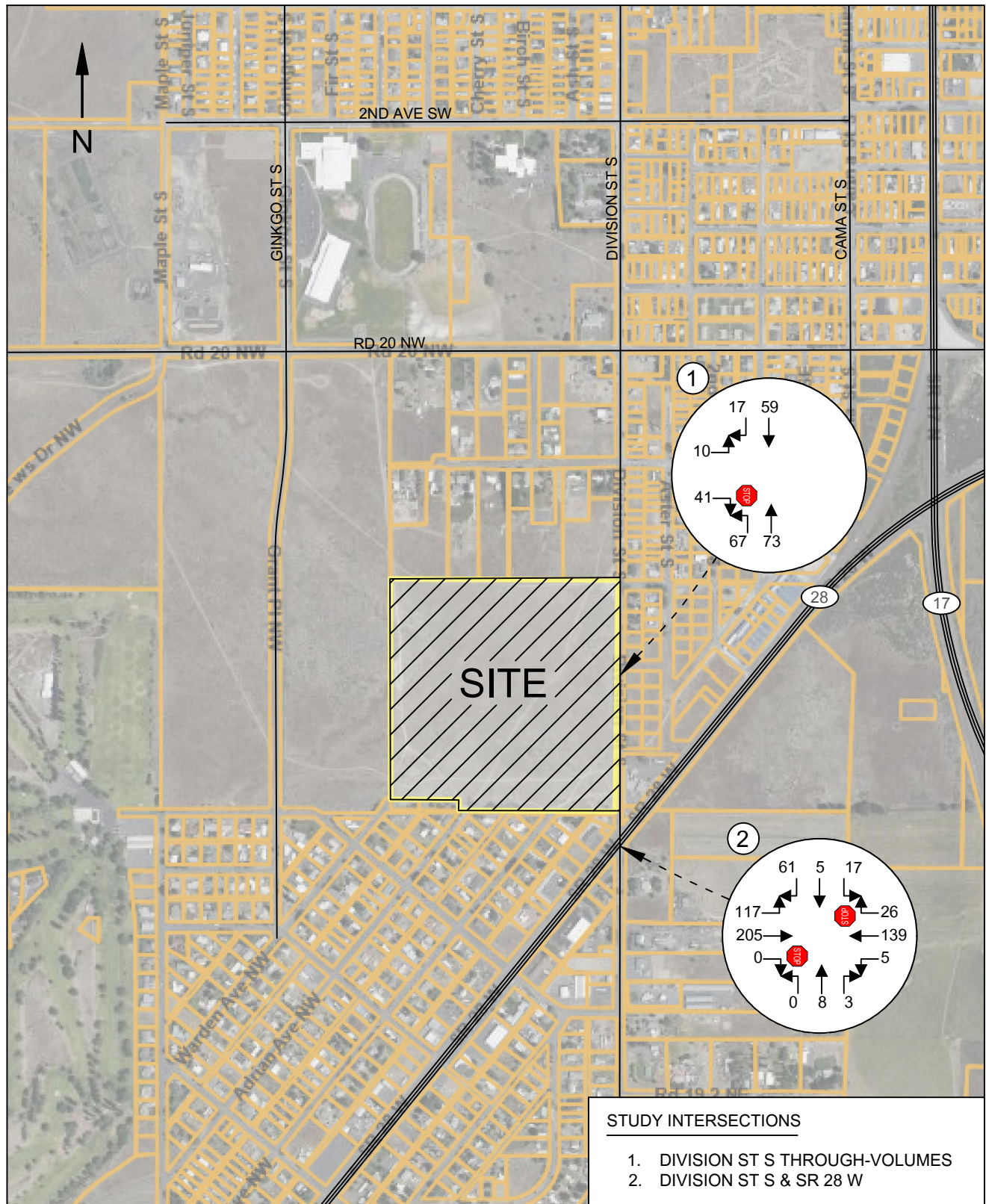
FUTURE PEAK HOUR VOLUMES

A 5-year horizon of 2029 was used for future traffic delay analysis. Forecast 2029 background traffic volumes were derived by applying a 1.5% compound annual growth rate to the existing volumes of Figure 3. Historic volumes on SR 28 northeast of Division Street S indicated a compound annual growth rate of ~1.2% from 2014 (3,900 AADT) to 2022 (4,300 AADT). Therefore, a growth rate of 1.5% is anticipated to capture miscellaneous background growth. Forecast 2029 PM peak hour volumes without and with the addition of project-generated traffic are shown in Figures 5 and 6, respectively.









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 range¹ for intersection level of service is LOS A to LOS F with the former indicating the best operating conditions with low control delays and the latter indicating the worst conditions with heavy control delays. Detailed descriptions of intersection LOS are given in the 2016 Highway Capacity Manual. Level of service calculations were made through the use of the *Synchro 12* analysis program. Side-street stop-controlled intersection LOS is determined by the approach with the highest delay. Table 1 presents existing and forecast 2029 PM peak hour LOS delays for the key intersection of study and proposed access on Division Street S.

Table 1: Existing & Forecast 2029 Weekday PM Peak Hour LOS

Delays given in seconds per vehicle

Ref. #	Intersection	Control	Movement	Existing		2029 w/o Proj.		2029 w/ Proj.	
				LOS	Delay	LOS	Delay	LOS	Delay
1	Division St S & Access	Stop	EB	-	-	-	-	A	9.3
2	Division St S & SR 28	Stop	NB	B	11.6	B	11.9	B	13.9

The WSDOT LOS standard for SR 28 at Division Street S is LOS C. Moreover, the city of Soap Lake's Comprehensive Plan has identified a LOS standard of C.

As illustrated in Table 1, the outlying study intersection is shown to operate with LOS B delays under all analysis scenarios, meeting WSDOT and city service level standards. Moreover, the proposed access is shown to operate with minimal delays at LOS A.

¹Signalized Intersections - Level of Service

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

Highway Capacity Manual, 7th Edition

Stop Controlled Intersections - Level of Service

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



4.5 Project Access

Sight Distance

Primary access to/from the subject site is proposed via one new roadway extending east from Railroad Avenue NW. Sight distance was examined at the proposed access using AASHTO² standards. Approximately 280-feet of sight distance would be required at the Division Street S access based on the 25-mph posted speed limit. Preliminary examinations of the access location indicate that sight lines are available in excess of 500-feet in either direction. No sight distance deficiencies are identified at this time.

Left-Turn Warrant Analysis

WSDOT's Design Manual was used to ascertain left turn requirements (Exhibit 1310-7a) under forecast 2029 PM peak hour conditions with full project build-out as illustrated in Figure 6. Given warrant threshold criteria, a left-turn lane was not found to be warranted at the proposed project access on Division Street S.

To further corroborate left-turn storage needs at the proposed Division Street S access, procedures described in the Highway Research Record publication, "Volume Warrants for Left-Turn Storage Lanes at Unsignalized Intersections" HRR 211 were additionally evaluated. Under forecast 2029 PM peak hour with-project conditions, a left-turn lane was found *not warranted*. Warrant calculation sheets are available in the appendix are the for reference.

² American Association of State Highway and Transportation Officials (AASHTO).



CONCLUSION

The proposed Purple Sage Meadows development consists of 236 manufactured homes units located within the city of Soap Lake. The subject site is located on 38.92-acres within undeveloped tax parcel #: 080381100. Access to the development is proposed via one new roadway extending west from Division Street S.

Existing PM peak hour volumes adjacent the proposed project access on Division Street S and at Division Street S & SR 28 W are shown in Figure 3. Based on ITE data, the proposed development is estimated to generate 1350 average weekday daily trips with 85 trips occurring in the AM peak hour and 135 trips in the PM peak hour. Service levels at the outlying study intersection were shown to operate with LOS B conditions under existing and forecast 2029 PM peak hour conditions. Moreover, the proposed project access was shown to operate with LOS A, indicating minimal delays.

A comprehensive left-turn lane warrant analysis was conducted under full build-out conditions. The analysis indicated that the warrant thresholds were not met according to both WSDOT (Exhibit 1310-7a) and HRR 211 requirements. Additionally, minimal delays are anticipated at the access, resulting in a Level of Service (LOS) A.

Please call if you require anything further.

Sincerely,
Aaron Van Aken, P.E., PTOE



PURPLE SAGE MEADOWS LEVEL ONE TRAFFIC IMPACT ANALYSIS

APPENDIX



Heath & Associates

PO Box 397 Puyallup, WA 98371

File Name : 5265a
 Site Code : 00005265
 Start Date : 12/6/2023
 Page No : 1

Groups Printed- Passenger + - Heavy

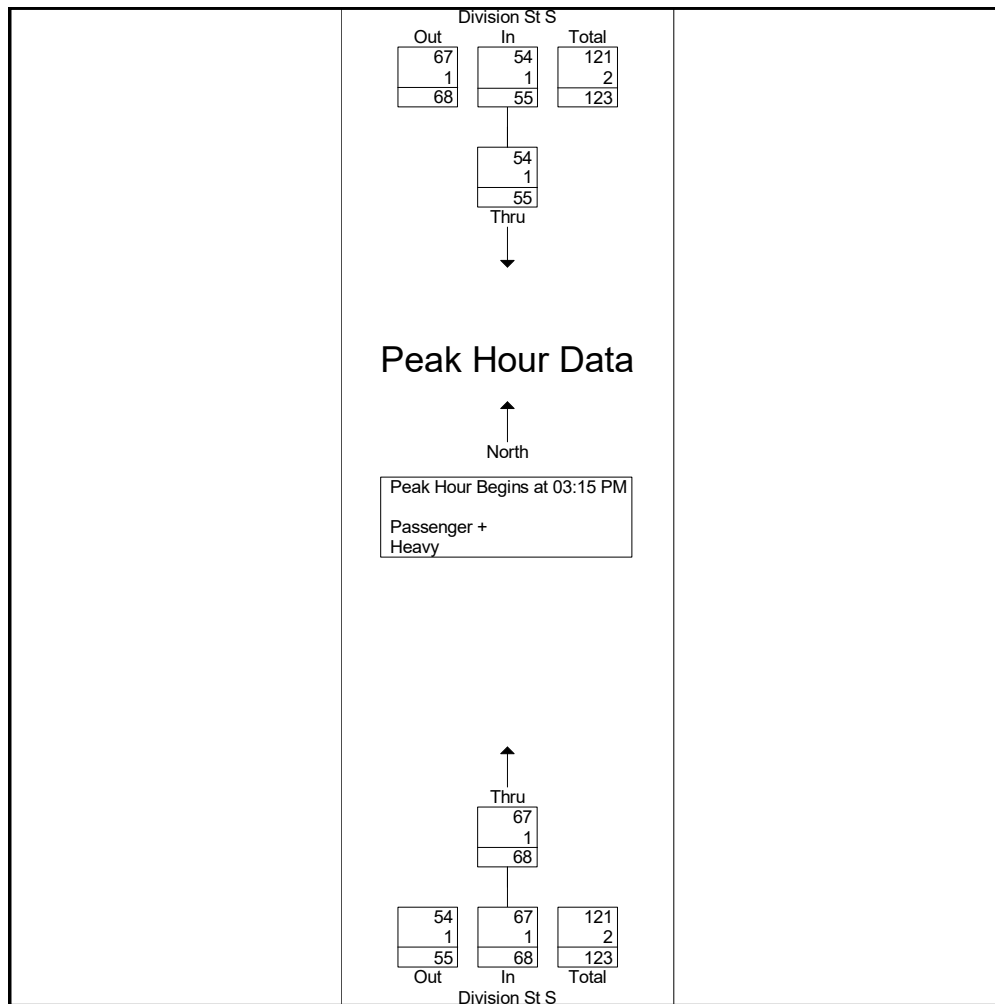
	Division St S Southbound	Division St S Northbound	
Start Time	Thru	Thru	Int. Total
03:00 PM	18	10	28
03:15 PM	20	16	36
03:30 PM	16	13	29
03:45 PM	9	15	24
Total	63	54	117
04:00 PM	10	24	34
04:15 PM	10	14	24
04:30 PM	12	17	29
04:45 PM	8	21	29
Total	40	76	116
05:00 PM	4	12	16
05:15 PM	14	18	32
05:30 PM	10	21	31
05:45 PM	8	17	25
Total	36	68	104
Grand Total	139	198	337
Apprch %	100	100	
Total %	41.2	58.8	
Passenger +	134	195	329
% Passenger +	96.4	98.5	97.6
Heavy	5	3	8
% Heavy	3.6	1.5	2.4

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File Name : 5265a
 Site Code : 00005265
 Start Date : 12/6/2023
 Page No : 2

	Division St S Southbound		Division St S Northbound		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 03:15 PM					
03:15 PM	20	20	16	16	36
03:30 PM	16	16	13	13	29
03:45 PM	9	9	15	15	24
04:00 PM	10	10	24	24	34
Total Volume	55	55	68	68	123
% App. Total	100		100		
PHF	.688	.688	.708	.708	.854
Passenger +	54	54	67	67	121
% Passenger +	98.2	98.2	98.5	98.5	98.4
Heavy	1	1	1	1	2
% Heavy	1.8	1.8	1.5	1.5	1.6



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File Name : 5265b
 Site Code : 00005265
 Start Date : 12/6/2023
 Page No : 1

Groups Printed- Passenger + - Heavy

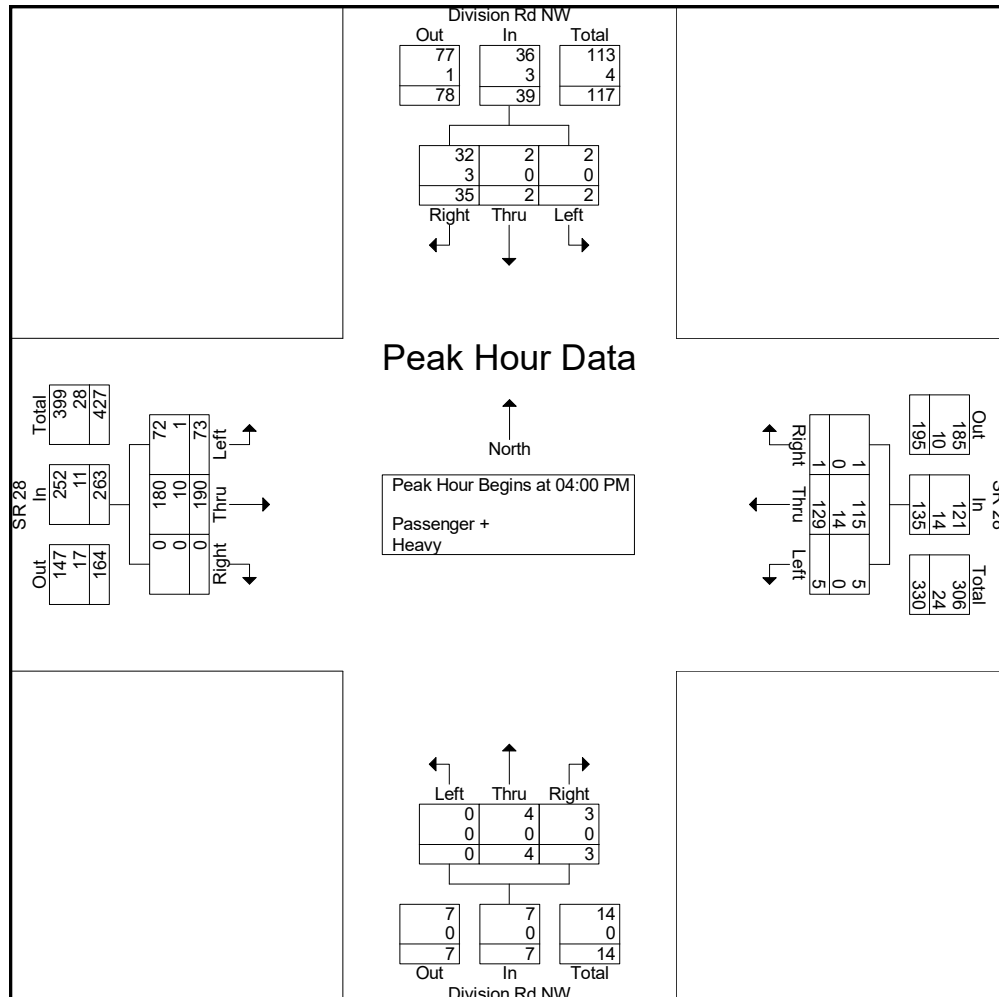
	Division Rd NW Southbound				SR 28 Westbound				Division Rd NW Northbound				SR 28 Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
03:00 PM	14	3	1	18	1	36	1	38	2	1	0	3	2	37	10	49	108
03:15 PM	18	3	0	21	1	31	1	33	0	1	0	1	0	43	12	55	110
03:30 PM	14	2	1	17	0	28	1	29	4	1	0	5	2	46	13	61	112
03:45 PM	9	0	0	9	0	30	0	30	1	2	0	3	1	34	12	47	89
Total	55	8	2	65	2	125	3	130	7	5	0	12	5	160	47	212	419
04:00 PM	9	1	1	11	1	30	1	32	0	0	0	0	0	44	25	69	112
04:15 PM	9	0	0	9	0	34	2	36	1	1	0	2	0	33	16	49	96
04:30 PM	10	0	1	11	0	33	1	34	1	2	0	3	0	56	14	70	118
04:45 PM	7	1	0	8	0	32	1	33	1	1	0	2	0	57	18	75	118
Total	35	2	2	39	1	129	5	135	3	4	0	7	0	190	73	263	444
05:00 PM	2	2	0	4	0	27	0	27	2	2	0	4	1	47	16	64	99
05:15 PM	9	3	1	13	0	23	3	26	1	1	0	2	0	35	16	51	92
05:30 PM	10	1	0	11	0	23	1	24	0	1	1	2	1	46	23	70	107
05:45 PM	6	2	0	8	0	26	0	26	0	1	1	2	1	24	19	44	80
Total	27	8	1	36	0	99	4	103	3	5	2	10	3	152	74	229	378
Grand Total	117	18	5	140	3	353	12	368	13	14	2	29	8	502	194	704	1241
Apprch %	83.6	12.9	3.6		0.8	95.9	3.3		44.8	48.3	6.9		1.1	71.3	27.6		
Total %	9.4	1.5	0.4	11.3	0.2	28.4	1	29.7	1	1.1	0.2	2.3	0.6	40.5	15.6	56.7	
Passenger +	110	18	5	133	3	328	12	343	13	14	2	29	7	479	192	678	1183
% Passenger +	94	100	100	95	100	92.9	100	93.2	100	100	100	100	87.5	95.4	99	96.3	95.3
Heavy	7	0	0	7	0	25	0	25	0	0	0	0	1	23	2	26	58
% Heavy	6	0	0	5	0	7.1	0	6.8	0	0	0	0	12.5	4.6	1	3.7	4.7

Heath & Associates

PO Box 397 Puyallup, WA 98371

File Name : 5265b
 Site Code : 00005265
 Start Date : 12/6/2023
 Page No : 2

	Division Rd NW Southbound				SR 28 Westbound				Division Rd NW Northbound				SR 28 Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	9	1	1	11	1	30	1	32	0	0	0	0	0	44	25	69	112
04:15 PM	9	0	0	9	0	34	2	36	1	1	0	2	0	33	16	49	96
04:30 PM	10	0	1	11	0	33	1	34	1	2	0	3	0	56	14	70	118
04:45 PM	7	1	0	8	0	32	1	33	1	1	0	2	0	57	18	75	118
Total Volume	35	2	2	39	1	129	5	135	3	4	0	7	0	190	73	263	444
% App. Total	89.7	5.1	5.1		0.7	95.6	3.7		42.9	57.1	0		0	72.2	27.8		
PHF	.875	.500	.500	.886	.250	.949	.625	.938	.750	.500	.000	.583	.000	.833	.730	.877	.941
Passenger +	32	2	2	36	1	115	5	121	3	4	0	7	0	180	72	252	416
% Passenger +	91.4	100	100	92.3	100	89.1	100	89.6	100	100	0	100	0	94.7	98.6	95.8	93.7
Heavy	3	0	0	3	0	14	0	14	0	0	0	0	0	10	1	11	28
% Heavy	8.6	0	0	7.7	0	10.9	0	10.4	0	0	0	0	0	5.3	1.4	4.2	6.3



Mobile Home Park (240)

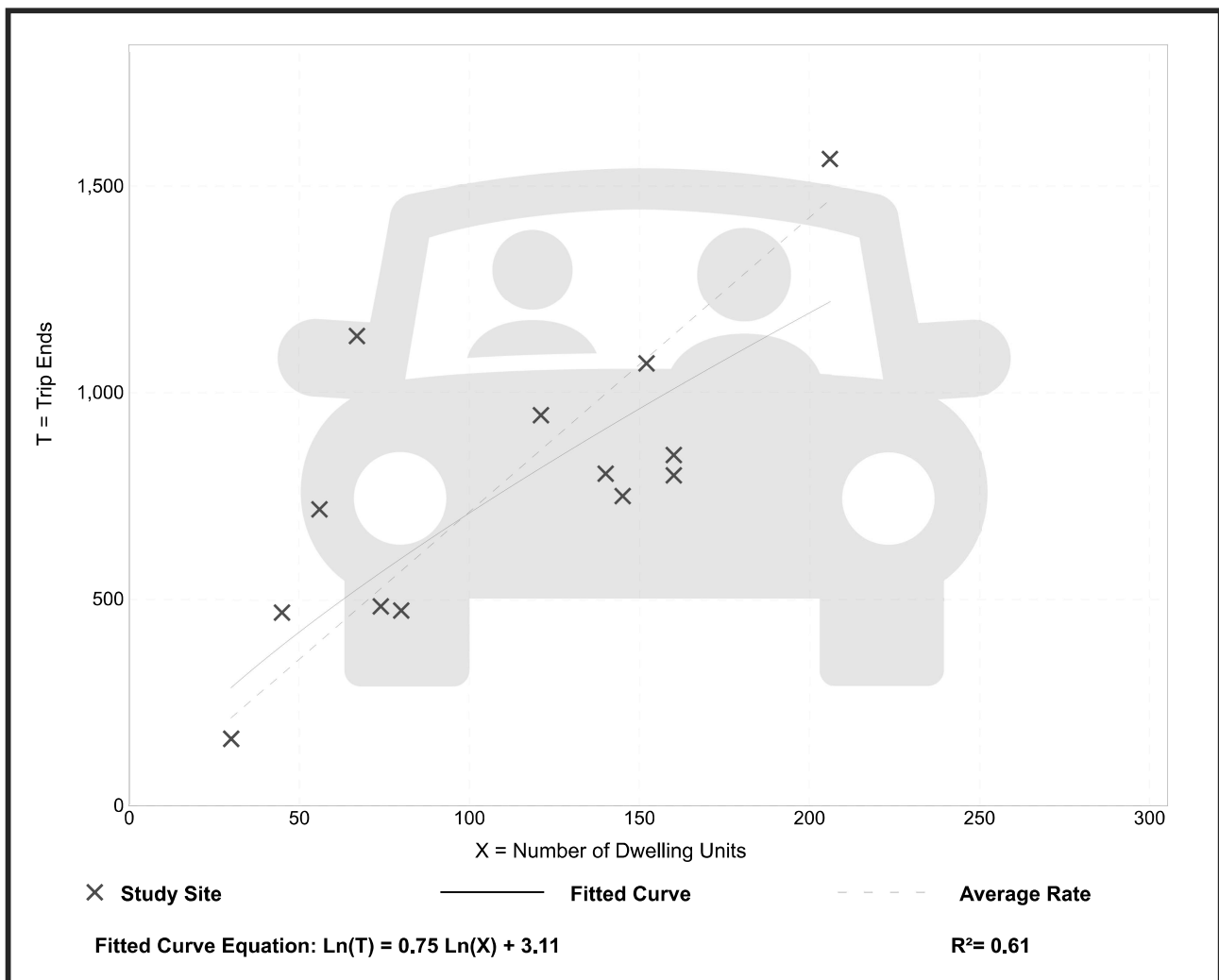
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 13
Avg. Num. of Dwelling Units: 110
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
7.12	5.00 - 16.96	2.91

Data Plot and Equation



Mobile Home Park (240)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

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

Setting/Location: General Urban/Suburban

Number of Studies: 9

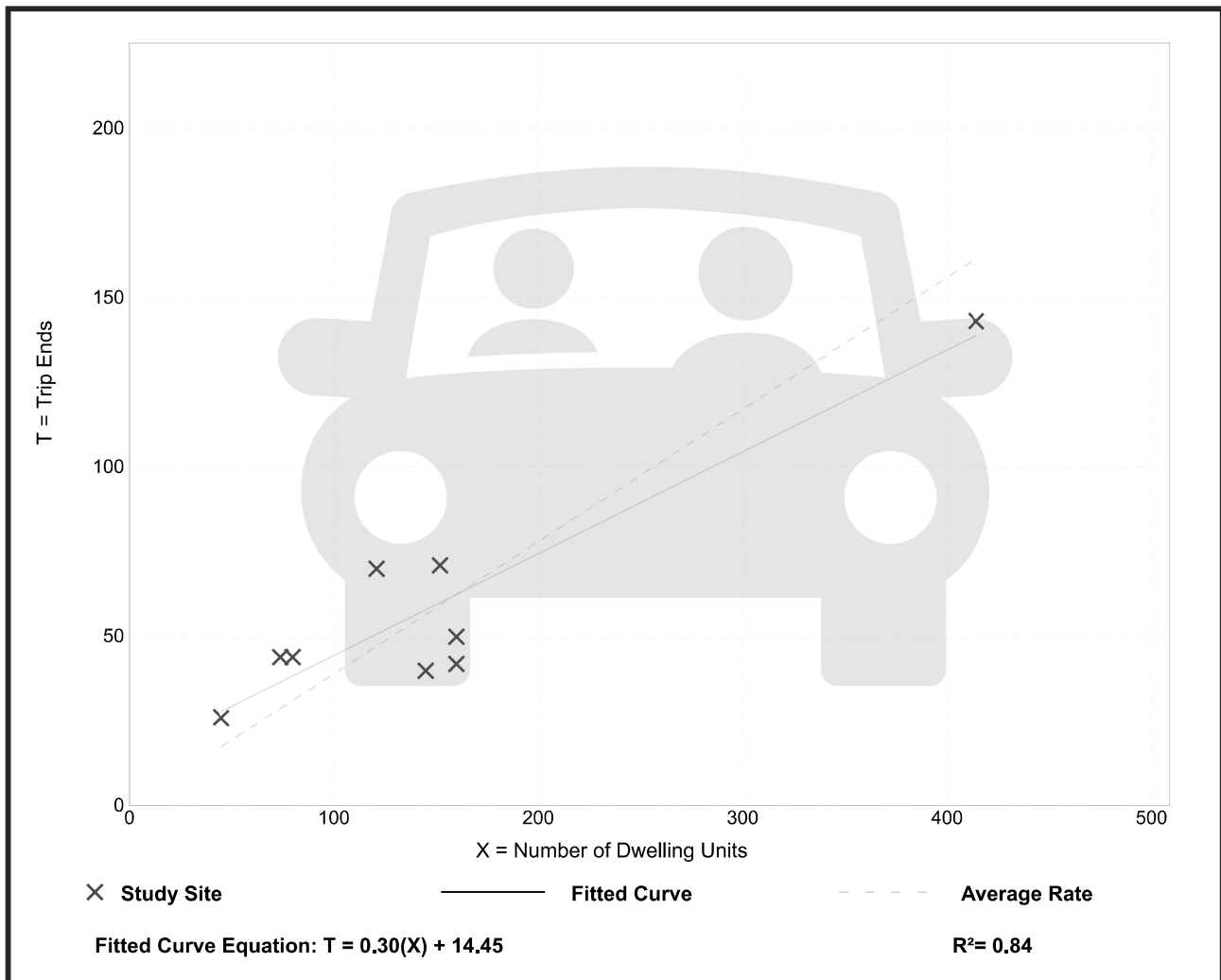
Avg. Num. of Dwelling Units: 150

Directional Distribution: 21% entering, 79% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.39	0.26 - 0.59	0.12

Data Plot and Equation



Mobile Home Park (240)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

**Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.**

Setting/Location: General Urban/Suburban

Number of Studies: 9

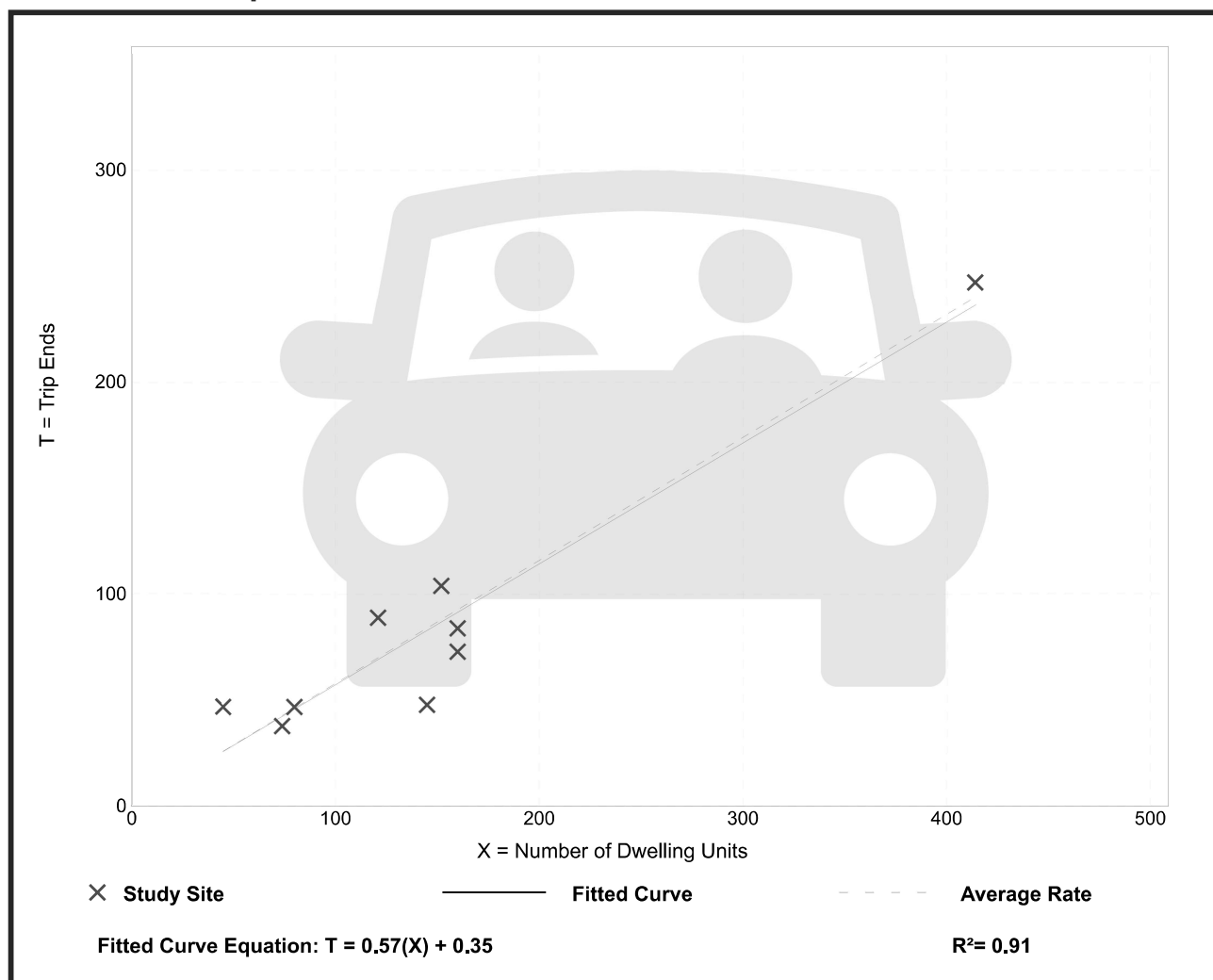
Avg. Num. of Dwelling Units: 150

Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.58	0.33 - 1.04	0.15

Data Plot and Equation



Intersection												
Int Delay, s/veh	2.4											
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↗	↘		↗	↘	
Traffic Vol, veh/h	0	4	3	2	2	35	73	190	0	5	129	1
Future Vol, veh/h	0	4	3	2	2	35	73	190	0	5	129	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	225	-	-	160	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	9	1	5	1	1	11	1
Mvmt Flow	0	4	3	2	2	37	78	202	0	5	137	1

Major/Minor	Minor1		Minor2		Major1		Major2					
Conflicting Flow All	506	506	202	508	506	138	138	0	0	202	0	0
Stage 1	357	357	-	148	148	-	-	-	-	-	-	-
Stage 2	149	149	-	360	357	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.29	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.381	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	478	470	841	477	471	892	1452	-	-	1376	-	-
Stage 1	662	630	-	857	776	-	-	-	-	-	-	-
Stage 2	856	776	-	661	630	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	430	443	841	444	444	892	1452	-	-	1376	-	-
Mov Cap-2 Maneuver	430	443	-	444	444	-	-	-	-	-	-	-
Stage 1	627	596	-	853	773	-	-	-	-	-	-	-
Stage 2	815	773	-	618	596	-	-	-	-	-	-	-

Approach	NB	SB	NE	SW
HCM Control Delay, s/v11.56		9.69	2.12	0.28
HCM LOS	B	A		

Minor Lane/Major Mvmt	NEL	NET	NER	NBLn1	SBLn1	SWL	SWT	SWR
Capacity (veh/h)	1452	-	-	556	808	1376	-	-
HCM Lane V/C Ratio	0.054	-	-	0.013	0.051	0.004	-	-
HCM Control Delay (s/veh)	7.6	-	-	11.6	9.7	7.6	-	-
HCM Lane LOS	A	-	-	B	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0	0.2	0	-	-

Intersection												
Int Delay, s/veh	2.4											
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↗	↘		↗	↘	
Traffic Vol, veh/h	0	4	3	2	2	38	79	205	0	5	139	1
Future Vol, veh/h	0	4	3	2	2	38	79	205	0	5	139	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	225	-	-	160	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	9	1	5	1	1	11	1
Mvmt Flow	0	4	3	2	2	40	84	218	0	5	148	1

Major/Minor	Minor1		Minor2		Major1		Major2					
Conflicting Flow All	546	546	218	547	545	148	149	0	0	218	0	0
Stage 1	386	386	-	159	159	-	-	-	-	-	-	-
Stage 2	160	160	-	388	386	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.29	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.381	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	450	447	824	449	447	880	1439	-	-	1357	-	-
Stage 1	639	612	-	846	768	-	-	-	-	-	-	-
Stage 2	845	768	-	638	612	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	401	419	824	416	419	880	1439	-	-	1357	-	-
Mov Cap-2 Maneuver	401	419	-	416	419	-	-	-	-	-	-	-
Stage 1	602	576	-	842	765	-	-	-	-	-	-	-
Stage 2	801	765	-	594	576	-	-	-	-	-	-	-

Approach	NB	SB	NE	SW
HCM Control Delay, s/v11.88		9.79	2.13	0.26
HCM LOS	B	A		

Minor Lane/Major Mvmt	NEL	NET	NER	NBLn1	SBLn1	SWL	SWT	SWR
Capacity (veh/h)	1439	-	-	531	796	1357	-	-
HCM Lane V/C Ratio	0.058	-	-	0.014	0.056	0.004	-	-
HCM Control Delay (s/veh)	7.7	-	-	11.9	9.8	7.7	-	-
HCM Lane LOS	A	-	-	B	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0	0.2	0	-	-

Intersection						
Int Delay, s/veh	3.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	10	41	67	73	59	17
Future Vol, veh/h	10	41	67	73	59	17
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	2	2
Mvmt Flow	11	45	73	79	64	18

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	298	73	83	0	-	0
Stage 1	73	-	-	-	-	-
Stage 2	225	-	-	-	-	-
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	693	988	1515	-	-	-
Stage 1	950	-	-	-	-	-
Stage 2	812	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	658	988	1515	-	-	-
Mov Cap-2 Maneuver	658	-	-	-	-	-
Stage 1	902	-	-	-	-	-
Stage 2	812	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	9.26	3.59	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	861	-	900	-	-
HCM Lane V/C Ratio	0.048	-	0.062	-	-
HCM Control Delay (s/veh)	7.5	0	9.3	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0.2	-	-

Intersection												
Int Delay, s/veh	3.6											
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↗	↘		↗	↘	
Traffic Vol, veh/h	0	8	3	17	5	61	117	205	0	5	139	26
Future Vol, veh/h	0	8	3	17	5	61	117	205	0	5	139	26
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	225	-	-	160	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	9	1	5	1	1	11	1
Mvmt Flow	0	9	3	18	5	65	124	218	0	5	148	28

Major/Minor	Minor1		Minor2		Major1		Major2					
Conflicting Flow All	628	653	218	644	639	162	176	0	0	218	0	0
Stage 1	467	467	-	172	172	-	-	-	-	-	-	-
Stage 2	161	186	-	471	467	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.29	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.381	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	397	388	824	387	395	865	1407	-	-	1357	-	-
Stage 1	578	563	-	832	758	-	-	-	-	-	-	-
Stage 2	843	748	-	575	563	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	329	352	824	343	359	865	1407	-	-	1357	-	-
Mov Cap-2 Maneuver	329	352	-	343	359	-	-	-	-	-	-	-
Stage 1	527	514	-	829	755	-	-	-	-	-	-	-
Stage 2	772	745	-	513	514	-	-	-	-	-	-	-

Approach	NB	SB	NE	SW
HCM Control Delay, s/v13.87		11.78	2.84	0.23
HCM LOS	B	B		

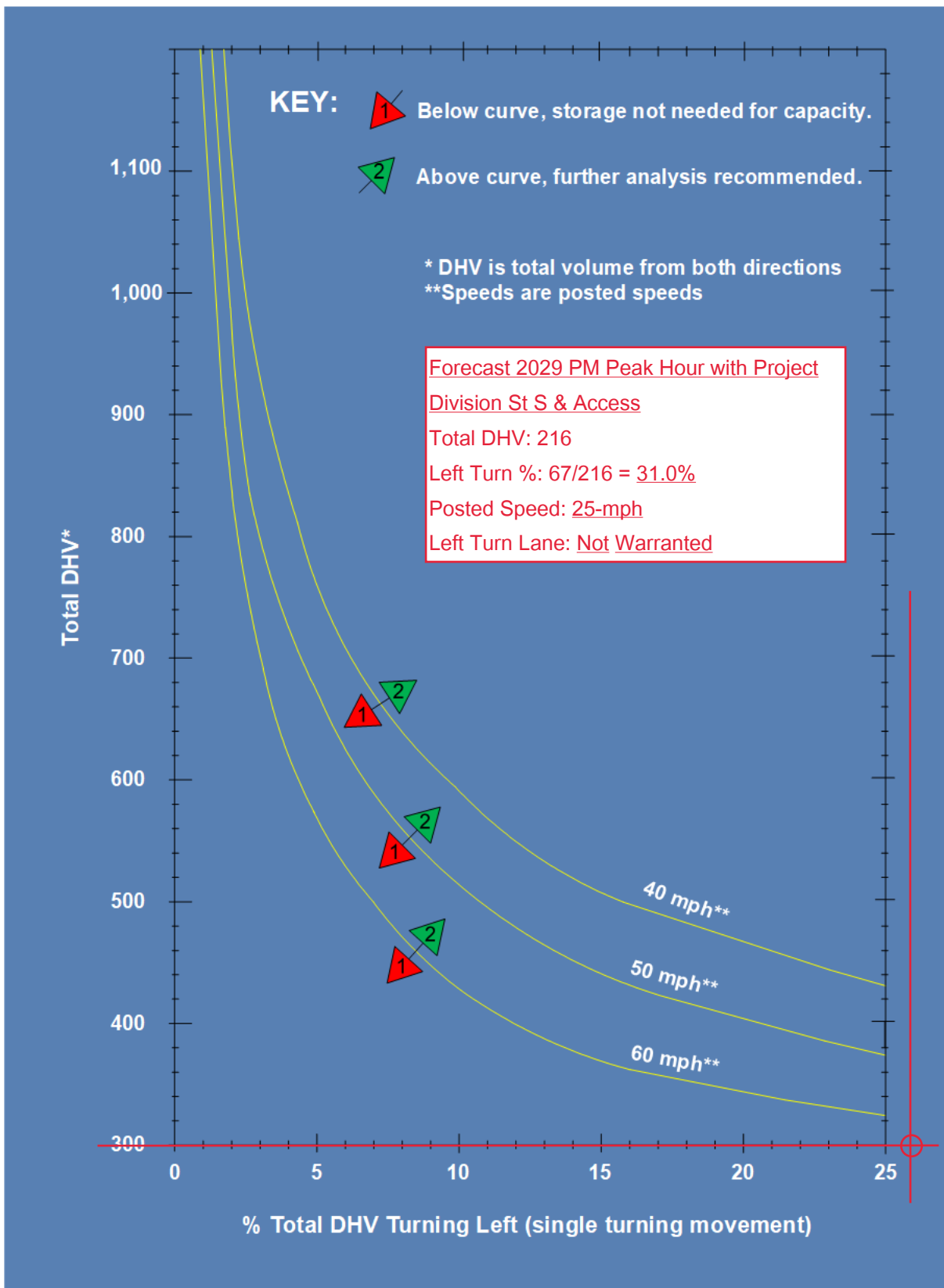
Minor Lane/Major Mvmt	NEL	NET	NER	NBLn1	SBLn1	SWL	SWT	SWR
Capacity (veh/h)	1407	-	-	417	619	1357	-	-
HCM Lane V/C Ratio	0.088	-	-	0.028	0.143	0.004	-	-
HCM Control Delay (s/veh)	7.8	-	-	13.9	11.8	7.7	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	0.1	0.5	0	-	-

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
T R I P S S Y S T E M
ANNUAL TRAFFIC REPORT

STATE ROUTE	STATE ROUTE MILEPOST	LOCATION	COUPLET	FUNCT CLASS	TRUCK PERCENTAGES SNGL DBL TRIPLE TOTAL	AVERAGE DAILY TRAFFIC VOLUME				2022 UNITS
						2013 UNITS	2014 UNITS	2015 UNITS	2016 UNITS	
028	004.19B	AFTER FRED MEYER		C 1				10000*	10000	
028	004.31B	AFTER GRANT RD		C 1		5900*	5800*	6400*	6600	
028	004.82B	AFTER 3RD ST		C 1			3700*	4200*	4300	
028	002.30	BEFORE ROCK ISLAND HYDRO PARK		1		12000*	12000*	13000*	13000	
028	008.10	AFTER JCT ROCK ISLAND DR WYE CONN		1		8100	8400	8400*	8700	
028	014.44	BEFORE JCT NELSON SIDING*PALISADES		1		7400	7700	8600*	8900	
028	014.44	AFTER JCT NELSON SIDING*PALISADES		1		7200	7400	8400*	8600	
028	022.03	ENTERING GRANT COUNTY		1		7100	7300	8000*	8300	
028	025.73	BEFORE JCT U NW*WHITE TRAIL RD		1		7800	8000	9200*	9400	
028	028.73	BEFORE JCT 13TH AVE SW*R NW		1		9400	9700	9000*	9300	
028	028.73	AFTER JCT 13TH AVE SW*R NW		1		11000	11000	11000*	12000	
028	029.23	BEFORE JCT 7TH AVE SW		1		12000	12000	12000*	12000	
028	029.26	AFTER JCT 7TH AVE SW		1		13000	13000	13000*	14000	
028	029.77	BEFORE JCT SR 281*CENTRAL AVE S		2		15000	15000*	15000	16000	
028	029.77	AFTER JCT SR 281*CENTRAL AVE S		2		11000	13000*	13000	14000	
028	030.60	AFTER JCT P NW		2		6000	6900*	7100	7300	
028	033.79	BEFORE JCT ADAMS RD		2		5300	5800*	6000	6200	
028	033.79	AFTER JCT ADAMS RD		2		4300	4900*	5000	5200	
028	041.96	BEFORE RAMP SR 28 WB		2		4000	4700*	4800	4900	
028	042.25	AFTER RAMP SR 28 WB		2		6300	6900*	7100	7300	
028	044.57	AFTER JCT MARTIN RD		2		7200	7900*	8100	8300	
028	046.61	BEFORE JCT SR 282 WYE CONN		2		10000	11000*	11000	12000	
028	046.63	AFTER JCT SR 282		2		11000	12000*	12000	13000	
028	047.65	AFTER JCT FIRST AVE NW		2			9600*	9800	10000	
028	048.07	AFTER JCT 7TH AVE NW		2		6700	6900*	7100	7300	
028	051.77	AFTER JCT 19 NW		2		5500	5200*	5400	5500	
028	052.51	BEFORE RAMP SR 17 SB		2		4200	3900*	4000	4100	4,300
028	052.92	AFTER JCT SR 17 WYE CONN		2		1400	1400*	1400	1500	

* BASED ON ACTUAL COUNT
+ SOURCE OF TRUCK PERCENTAGES

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



Left Turn Warrant Calculation

Intersection: Division St S & Access

Project: Purple Sage Meadows

Speed Limit:

Peak Period: Forecast 2029 PM Peak Hour With Project

Inputs:

$V_a =$	140 vph	Volume Advancing (Per Hour)
$V_o =$	76 vph	Volume Opposing (Per Hour)
$V_L =$	67 vph	Volume Left Turns (Per Hour)
$T =$	3.0 seconds	Average Time to Make Left Turn
$t_g =$	5.0 seconds	Critical Gap
$t_e =$	1.9 sec	Left Turn Time to Clear or Exit

Calculations:

Percent Left Turns in Advancing Stream

$L = 47.9\% \quad V_L / V_a$

Average Headway: Advancing Stream

$t_a = 25.714 \text{ seconds} \quad 3600 / V_a$

Opposing Vehicle Flow Rate

$\lambda_o = 0.021 \text{ veh/sec} \quad V_o / 3600$

Average Time That a Left Turning Vehicle Must Wait For a Suitable Gap

$t_w = 0.273 \text{ sec} \quad [3600 / (V_o e^{-(V_o t_g / 3600)})] - (3600 / V_o) - t_g$ -0.10556
0.899824

Number of Arrivals/Hour of Through Vehicles Behind Left Turning Vehicles

$\lambda_1 =$	4.429	$[L(1 - L)V_a](t_w - t_e) / [(2/3)t_a]$	-0.10556
$\beta =$	0.995	$e^{-\lambda_o t_g} (\lambda_o t_g + 1)$	0.899824
$A =$	18.699	$(1 - \beta)3600$	
$B =$	9.349	$A/2$	

Average Service Rate (Number of Left Turns That Can be Made in One Hour)

$\mu = 1190.651 \quad (3600 - A - B)/T$
 $\rho = 0.004 \quad \lambda_1 / \mu$

$\rho_{\text{threshold}}$

$\rho = 0.020, 40 \text{ mph}$
 $\rho = 0.015, 50 \text{ mph}$
 $\rho = 0.010, 60 \text{ mph}$

Left Turn Lane **IS NOT WARRANTED**