

City of Sumner, WA



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## TABLE OF CONTENTS

1.	Introduction	3
2.	Project Description	3
3.	Existing Conditions	5
4.	Forecast Traffic Demand and Analysis	.11
5.	Conclusions & Mitigation	.18
Арр	endix	.19

## LIST OF TABLES

1.	Roadway Network	5
2.	Transportation Improvement Projects	9
3.	Existing PM Peak Hour Level of Service	.10
4.	Project Trip Generation	.11
5.	Forecast 2027 PM Peak Hour Level of Service	.17

## LIST OF FIGURES

1.	Vicinity Map	3
2.	Site Plan	4
3.	Existing PM Peak Hour Volumes	6
4.	Existing PM Peak Hour Non-Motorist Volumes	8
5а.	PM Peak Hour Trip Distribution & Assignment	13
5b.	Forecast 2026 PM Peak Hour Background Volumes	14
7.	Forecast 2027 PM Peak Hour Volumes without Project	15
7.	Forecast 2027 PM Peak Hour Volumes with Project	16

## 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 streets serving the subject site and gathering existing vehicular volumes within a defined study area. 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

7-Eleven Sumner is a proposed 8-positon fueling station with an ancillary, 3,616 square foot convenience market to be constructed within the city of Sumner. The subject site is situated on the southeast corner of the Main Street & Valley Avenue intersection on three parcels for a collective site area of approximately 0.72-acres. The site is primarily undeveloped with one parcel containing an existing single-family home of which would be removed for new construction.

Access to the subject site is proposed via three points of ingress and egress. A new driveway is proposed from Main Street which would be restricted to right-in/right-out only. A second new driveway is proposed from Bock Avenue on the east side of the property. The third access would be achieved via an existing shared driveway from Valley Avenue. A site map of the general vicinity is illustrated in Figure 1. A conceptual site plan is presented in Figure 2 which highlights the access configuration.



Figure 2: Site Plan



## 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 defined in the study area are listed and described below.

Functional Classification	Roadway	Speed Limit	Lanes	Street Parking	Sidewalk	Bike Facilities
Minor Artorial	Valley Ave	25 mph	2	Some	Yes	Yes
Minor Artenar	Main St E	25 mph	3	Some	Yes	No
Local	Bock Ave	25 mph*	2	Some	Some	No

Table	1:	Roadway	Network
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\* No posted speed limit observed so the City standard 25 mph applies.

## 3.2 Existing Peak Hour Volumes and Travel Patterns

Field data for this study was obtained and collected in February of 2022. Traffic counts were performed at the following outlying study intersections:

- Main Street & Valley Avenue
- Valley Avenue & Access

• Main Street & Bock Avenue

Field data for all outlying study intersections was collected between 4:00–6:00 PM, which generally reflects the highest levels of congestion with respect to traffic and delays during a 24-hour period. The one hour reflecting highest overall roadway volumes (peak hour) was then derived from these counts.

It should also be noted that due to the ongoing COVID-19 pandemic, travel patterns may have been altered when compared to pre-pandemic conditions. Therefore, a pre-COVID count at the intersection of Valley Avenue & Main Street (Feb, 2018) was examined and compared to the existing volumes. The comparison indicated current traffic volumes to be approximately 14 percent lower from the historic counterpart. Therefore, an adjustment factor of 1.18 (18%) was applied to all baseline volumes to reflect pre-COVID conditions. Existing PM peak hour volumes observed on-site and at the study intersections are illustrated in Figure 3. Full-count sheets have been included in the appendix.



### 3.3 Non-Motorist Traffic

Pedestrian and bicycle activity were observed on the nearby street segments studied for this project. Observations were made during routine peak hour movement counts at the intersections listed above. Pedestrian volumes are shown in Figure 4 on the following page. Frontage improvements shall be required as part of site development to all project frontage along Main Street, Valley Avenue & Bick Avenue. All improvements shall be constructed in accordance with City standards.

## 3.4 Transit Service

A review of the Pierce and Sound Transit service systems indicates that bus service is provided within walking distance of the proposed 7-Eleven Sumner development. Sumner Station, located approximately 0.83 miles southwest of the subject site, provides service via Routes 578, 596 and the Sounder South Train. Sumner Station offers 302 parking spaces, leased bike lockers and free bike racks, providing park and ride options to visitors of the proposed 7-Eleven Sumner development.



The Sounder South Train provides weekday service from King Street Station in Seattle to the Lakewood Station.

Weekday train service is provided between 4:36 AM – 7:46 PM with 20-minute headways during peak travel times. Route 578 provides service from Puyallup to Seattle, with weekday service provided from 4:56 AM – 12:16 AM. Route 596 provides service from Sumner to Bonney Lake from 4:50 AM – 7:28 PM. Given the nature of the proposed project, transit use is not expected, but may be utilized. Refer to the Sound Transit routes and schedules for more detailed information.

## 3.5 Access & Sight Distance

A total of three driveways is proposed to serve site ingress and egress. One access is proposed from Main Street, restricted to right-in/right out only. A second access is proposed via Bock Avenue. Lastly, a shared driveway currently providing access to a Jack in the Box would also be available. All fronting roadways have a speed limit of 25-mph which would require 280-feet of entering sight distance per AASHTO standards. In review of all proposed access locations, sight lines appear to meet minimum standards. No visibility deficiencies are identified.



### 3.6 Roadway Improvements

A review of the proposed City of Sumner 2022-2027 Capital Improvement Program indicates that improvement projects are currently planned in the vicinity of the site. Descriptions of the nearest projects are provided below in Table 2 below.

Name	Location	Improvement	Cost
A3-Main St & Wood Ave	Intersection	Construct pedestrian improvements and upgrade signal to current standards.	\$2,000,000
A6-160th Ave E	Main St to 64th St E	Improve and widen street to minor arterial standards with bike paths and sidewalks.	\$1,000,000
A11-Valley Ave	From SR-410 to Main St	Overlay existing roadway surface, complete required ADA upgrades.	\$1,500,000
A13-SR-410/SR-162 Interchange	Interchange ramps at SR-410	Construct a one-lane roundabout configuration at each of the interchange ramps.	\$6,650,000
A14-Hwy. 162 Improvements	Southern city limits to southbound lane on SR-410	Construct one additional southbound lane on SR-162	\$7,400,000
A15-Main St & 160th Intersection Improvements	Intersection	Evaluate intersection for an upgrade to a signal and provide sidewalks/ADA improvements.	\$2,000,000
C1-Academy St Bicycle Lanes	Narrow St to Wood Ave	Improve and reconfigure existing Academy St to accommodate dedicated bike lanes.	\$750,000
C2-160th Ave E	Elm St to Main St	Improve 160th Ave E to collector street standards with curb, gutter, and sidewalks on each side.	\$2,700,000
C5-Parker Rd	Main St to Elm St	Reconstruct Parker Rd to collector street standards with curb, gutter, sidewalks, and drainage utilities.	\$1,300,000
C7-162nd Ave E Segment Extension	64th St E to 60th St E	Construct new two-lane roadway section with sidewalks.	\$3,000,000
C9-164th Ave Ct E Segment Extension	160th Ave E to Existing 164th Ave Ct E	Construct new two-lane roadway section with sidewalks.	\$2,000,000

## Table 2: Transportation Improvement Projects

### 3.7 Existing Level of Service

Peak hour delays were determined through the use of the *Highway Capacity Manual* 6th Edition. Capacity analysis is used to determine level of service (LOS) which is an established measure of congestion for transportation facilities. The 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 11* analysis program. Signalized intersection LOS is determined by overall average delay for all approaches. For side-street stop-controlled intersections, LOS and delays for the key intersections of study.

## Table 3: Existing PM Peak Hour Level of Service

Intersection	Control	Movement	LOS	Delay
Main St E & Valley Ave	Signal	Overall	С	29.0
Main St E & Bock Ave	Stop	NB	С	16.3
Valley Ave & Access	Stop	EB	С	15.7

Delays given in seconds per vehicle

The city of Sumner has adopted LOS D or better conditions for the outlying study intersections with the exception of Main Street & Valley Avenue which may operate with up to LOS F conditions.

Existing PM peak hour conditions are shown to operate at LOS C or better—meeting city standards.

<sup>1</sup> Signalized Interse	ections - Level of Service	Stop Controlled Intersections – Level of Servic						
	Control Delay per		Control Delay per					
Level of Service	Vehicle (sec)	Level of Service	Vehicle (sec)					
А	$\leq 10$	А	$\leq 10$					
В	$>$ 10 and $\leq$ 20	В	$>$ 10 and $\leq$ 15					
С	$>$ 20 and $\leq$ 35	С	$>$ 15 and $\leq$ 25					
D	$>$ 35 and $\leq$ 55	D	$>$ 25 and $\leq$ 35					
E	$>$ 55 and $\leq$ 80	E	$>$ 35 and $\leq$ 50					
F	> 80	F	> 50					
Highway Capacity Man	ual, 6th Edition							

## 4. FORECAST TRAFFIC DEMAND AND ANALYSIS

## 4.1 Project Trip Generation

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. The proposed land use is defined under ITE's Land Use Code (LUC) 945 – Convenience Store/Gas Station. Vehicle Fueling Positions (VFP) and square footage was used as the input variables and average rates were used in determining trip ends. Table 4 below summarizes anticipated vehicular movements for the average weekday daily trips (AWDT) and the AM and PM peak hours.

	Sa Et	Independent		AM Pe	ak-Hou	ır Trips	PM Peak-Hour Trips		
Lanu Use	ЗЧ. ГΙ.	Variable	AWDI	In	Out	Total	In	Out	Total
Convenience Store/Gas Station	3,616	8 VFP	2121	64	64	128	73	74	147
		Pass-By₂	(1251)	(39)	(40)	(79)	(41)	(41)	(82)
	New	Primary Trips	870	25	24	49	32	33	65

## Table 4: Project Trip Generation

Based on the data presented in Table 4, the project is anticipated to generate a total of 2,121 average weekday daily trips with 147 trips occurring in the PM peak hour. However, over half (59%) of these trips are expected to be in the form of pass-by. Pass-by trips are considered as motorists already traveling along the roadway who make an intermediate stop en route to their final destination. Gas stations are largely convenience based and attract passerby. With the site fronted by two arterials, (Main Street & Valley Avenue), a significant portion of driver's already on the road can be expected to frequent the proposed site. These trips are not considered as new trips but will impact the site's access point. New trips are estimated with 870 daily trips and 65 trips in the PM peak hour.

<sup>&</sup>lt;sup>2</sup> Trip Generation Handbook 3rd Edition LUC-945 AM Pass-by-62%, PM Pass-by-56%, ADT Pass-by- (Average of AM & PM) – 59%

### 4.2 Distribution & Assignment

Trip distribution describes the process by which project generated trips are dispersed on the street network surrounding the site. As mentioned in the preceding section, a significant amount of traffic is estimated to be in the form of pass-by. Pass-by trips typically arrive and depart in the same direction (e.g., turn right into the site to enter and turn right out of the site to exit in the same travel direction). Pass-by and primary trip percentages are illustrated in Figure 5a. Combined total driveway trips are summarized in Figure 5b.

At the subject site is a corner lot, during times of peak congestion, left-turn movements may be difficult to negotiate. As observed in the existing traffic counts, most traffic at the adjacent driveways were observed making right-turns. Given the Valley Avenue shared access driveway's proximity to the signal at Main Street, northbound queues will, at times, block the driveway. However, these are momentary and clear upon a full cycle phase at the signal. For these reasons, pass-by trips are weighted higher for right-turn movements. Right-turns are generally easier to perform with lower delays when compared to left-turns and are more convenient for passing motorists. Moreover, a gas station is present on the north side of Main Street which could limit the number of left turns into the site as drivers tend to visit the most convenient location.

## 4.3 Future Peak Hour Volumes

A 5-year horizon of 2027 was used for future traffic delay analysis. Forecast 2027 background traffic volumes were derived by applying a 1.5 percent compound annual growth rate to the existing volumes shown in Figure 3. This growth rate has been determined adequate for the area and utilized for similar past projects. Moreover, pipeline volumes associated with the nearby Timberland Sumner project were included in forecast analysis (see appendix for pipeline volumes). Forecast 2027 PM peak hour volumes without project are shown in Figure 7 while Figure 8 illustrates forecast 2027 volumes with the addition of project-generated traffic.



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## 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 11* analysis program. Delays for the outlying study intersections and proposed accesses under future conditions are shown below in Table 5.

		<u>Witho</u>	<u>ut Project</u>	With	Project
Intersection	Control	LOS	Delay	LOS	Delay
Main St & Valley Ave	Signal	D	37.2	D	38.5
Main St & Access (RIRO)	Stop	-	-	В	11.8
Main St & Bock Ave	Stop	С	17.9	С	19.6
Valley Ave & Shared Access	Stop	С	16.9	С	21.2
Bock Ave & Access	Stop	-	-	А	8.8

### Table 5: Forecast 2027 PM Peak Hour Level of Service

Delays given in Seconds Per Vehicle

RIRO: Right-in, right-out

Forecast 2027 PM peak hour delays are shown to operate with LOS D conditions with or without the proposed project at the signalized intersection of Main Street & Valley Avenue. Again, the city has an allowable LOS F standard at this location as stated in their Comprehensive Plan in order to maintain Main Street as a two-lane street with parking to promote the downtown design characteristics.

All other locations and proposed driveways are shown to operate with LOS C conditions. Overall, no roadway or intersection deficiencies are identified as a result of the proposed 7-Eleven development.

## 5. CONCLUSIONS AND MITIGATION MEASURES

The development proposal evaluated herein consists of a 7-Eleven fueling station (8 pumps) and ancillary convenience market (3,616 square feet). The subject property is a primarily undeveloped, 0.72-acre site bounded to the north via Main Street, to the west via Valley Avenue and to the east via Bock Avenue. Access is proposed with one new driveway restricted to right-turn movements only by way of Main Street, an existing shared driveway from Valley Avenue and a new driveway from Bock Avenue. See Figure 2 for a site plan and overall project configuration. In total, the project is estimated to generate 2,121 average weekday daily trips with 147 trips in the PM peak hour. However, the majority of traffic is not considered new trips to the adjacent roadways but rather pass-by trips, or motorists already traveling along the corridors who make a convenience-based stop. Approximately 59 percent of site-generated traffic is estimated to be in the form of pass-by.

Three existing intersections were examined in terms of capacity and operations. Turning movements counts were collected to establish baseline peak hour volume conditions. However, given the ongoing pandemic, all collected volumes were compared to pre-pandemic conditions. To account for potential impacts, an adjustment factor of 1.18 was derived and applied to all peak hour volumes. Level of service (LOS), with the adjustment factor, was shown to be LOS C for the intersection of Main Street & Valley Avenue. A five-year horizon with a background growth rate and added pipeline development traffic found the forecast 2027 PM peak hour to operate at LOS D for Main Street & Valley and LOS C for all other locations and driveways. All study intersections were shown to meet the City of Sumner's LOS standards.

Based on the above findings, the following mitigation is identified:

 The project is subject to Traffic Impact Fees (TIF) pursuant to Sumner Municipal Code Chapter 12.36. Fees will be calculated and determined by the City based on the fee schedule in effect at such time.

Please feel free to contact me should you have any questions.

APPENDIX

### LEVEL OF SERVICE

The following are excerpts from the *2016 Highway Capacity Manual - Transportation Research Board Special Report 209.* 

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

### Level-of-Service definitions

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

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

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

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

*Level of service E* is characterized by significant delays and average travel speeds of onethird the free-flow speed or less. Such operations are caused by some combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.

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

COUNTS

APPENDIX

: 4783c
: 00004783
: 2/3/2022
:1

Groups Printed- Passenger + - Heavy																	
		Valle	y Ave		Main St E				Valley Ave					Mai	in St		
		South	bound			West	bound			North	bound			Eastl	bound		
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
04:00 PM	12	105	10	127	5	64	51	120	14	52	17	83	11	64	26	101	431
04:15 PM	12	89	19	120	10	49	42	101	19	71	23	113	20	64	37	121	455
04:30 PM	15	86	13	114	5	53	37	95	16	73	15	104	22	68	26	116	429
04:45 PM	13	89	17	119	6	52	44	102	13	66	26	105	19	56	24	99	425
Total	52	369	59	480	26	218	174	418	62	262	81	405	72	252	113	437	1740
05:00 PM	18	86	5	109	6	63	44	113	20	52	23	95	10	39	53	102	419
05:15 PM	17	104	12	133	13	62	51	126	25	66	21	112	20	69	48	137	508
05:30 PM	10	61	11	82	4	38	89	131	14	47	38	99	21	56	28	105	417
05:45 PM	17	68	10	95	11	34	31	76	10	61	13	84	16	49	27	92	347
Total	62	319	38	419	34	197	215	446	69	226	95	390	67	213	156	436	1691
Grand Total	114	688	97	899	60	415	389	864	131	488	176	795	139	465	269	873	3431
Apprch %	12.7	76.5	10.8		6.9	48	45		16.5	61.4	22.1		15.9	53.3	30.8		
Total %	3.3	20.1	2.8	26.2	1.7	12.1	11.3	25.2	3.8	14.2	5.1	23.2	4.1	13.6	7.8	25.4	
Passenger +	114	683	96	893	60	410	386	856	129	475	173	777	135	464	269	868	3394
% Passenger +	100	99.3	99	99.3	100	98.8	99.2	99.1	98.5	97.3	98.3	97.7	97.1	99.8	100	99.4	98.9
Heavy	0	5	1	6	0	5	3	8	2	13	3	18	4	1	0	5	37
% Heavy	0	0.7	1	0.7	0	1.2	0.8	0.9	1.5	2.7	1.7	2.3	2.9	0.2	0	0.6	1.1

File Name : 4783c Site Code : 00004783 Start Date : 2/3/2022 Page No : 2

		Valle	y Ave		Main St E					Valle	ey Ave		Main St				]
		South	bound			West	bound			North	nbound			East	bound		
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 Ana	alysis Fr	rom 04:	00 PM	to 05:45	PM - Pe	eak 1 of	f1										
Peak Hour for	Entire II	ntersec	tion Be	gins at 04	4:30 PN	l											
04:30 PM	15	86	13	114	5	53	37	95	16	73	15	104	22	68	26	116	429
04:45 PM	13	89	17	119	6	52	44	102	13	66	26	105	19	56	24	99	425
05:00 PM	18	86	5	109	6	63	44	113	20	52	23	95	10	39	53	102	419
05:15 PM	17	104	12	133	13	62	51	126	25	66	21	112	20	69	48	137	508
Total Volume	63	365	47	475	30	230	176	436	74	257	85	416	71	232	151	454	1781
% App. Total	13.3	76.8	9.9		6.9	52.8	40.4		17.8	61.8	20.4		15.6	51.1	33.3		
PHF	.875	.877	.691	.893	.577	.913	.863	.865	.740	.880	.817	.929	.807	.841	.712	.828	.876
Passenger +	63	362	47	472	30	228	175	433	73	247	82	402	68	231	151	450	1757
% Passenger +	100	99.2	100	99.4	100	99.1	99.4	99.3	98.6	96.1	96.5	96.6	95.8	99.6	100	99.1	98.7
Heavy	0	3	0	3	0	2	1	3	1	10	3	14	3	1	0	4	24
% Heavy	0	0.8	0	0.6	0	0.9	0.6	0.7	1.4	3.9	3.5	3.4	4.2	0.4	0	0.9	1.3



## Heath & Associates, Inc

2214 Tacoma Road Puyallup, WA 98371

> File Name : 4062a Site Code : 00004067 Start Date : 2/14/2018 Page No : 2

	Valley Avenue E				Main Street E				Valley Avenue E				Main Street				
		South	bound		Westbound					North	bound			East	bound		
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 Ana	alysis Fr	om 04:0	00 PM t	o 05:15 F	PM - Pea	ak 1 of 1								·			
Peak Hour for	Entire Ir	ntersecti	on Beg	ins at 04	:15 PM												
04:15 PM	9	65	35	109	4	64	48	116	17	73	33	123	12	88	63	163	511
04:30 PM	19	81	30	130	9	67	37	113	23	84	21	128	11	104	56	171	542
04:45 PM	13	60	30	103	12	79	50	141	18	85	9	112	15	85	51	151	507
05:00 PM	21	71	21	113	8	64	60	132	26	87	19	132	12	68	58	138	515
Total Volume	62	277	116	455	33	274	195	502	84	329	82	495	50	345	228	623	2075
% App. Total	13.6	60.9	25.5		6.6	54.6	38.8		17	66.5	16.6		8	55.4	36.6		
PHF	.738	.855	.829	.875	.688	.867	.813	.890	.808	.945	.621	.938	.833	.829	.905	.911	.957



PO Box 397 Puyallup, WA 98371

File Name	: 4873b
Site Code	: 00004783
Start Date	: 2/3/2022
Page No	: 1

			Grou	ups Printed-	Passenger	+ - Heavy				
		Main St E			Bock Ave			Main St E		
		Westbound	b		Northboun	d		Eastbound	l	
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	5	0	5	5
04:15 PM	0	0	0	0	0	0	2	0	2	2
04:30 PM	0	0	0	1	4	5	1	0	1	6
04:45 PM	0	1	1	1	1	2	4	0	4	7
Total	0	1	1	2	5	7	12	0	12	20
05:00 PM	0	1	1	1	0	1	4	0	4	6
05:15 PM	0	1	1	1	0	1	1	0	1	3
05:30 PM	0	0	0	1	3	4	1	0	1	5
05:45 PM	0	2	2	1	0	1	3	0	3	6
Total	0	4	4	4	3	7	9	0	9	20
Grand Total	0	5	5	6	8	14	21	0	21	40
Apprch %	0	100		42.9	57.1		100	0		
Total %	0	12.5	12.5	15	20	35	52.5	0	52.5	
Passenger +	0	5	5	6	7	13	21	0	21	39
% Passenger +	0	100	100	100	87.5	92.9	100	0	100	97.5
Heavy	0	0	0	0	1	1	0	0	0	1
% Heavy	0	0	0	0	12.5	7.1	0	0	0	2.5

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File Name	: 4873b
Site Code	: 00004783
Start Date	: 2/3/2022
Page No	: 2

		Main St E			Bock Ave	!				
		Westbound	d		Northboun	d		Eastboun	d	
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis Fr	om 04:00 P	M to 05:45 F	PM - Peak 1 o	f 1						
Peak Hour for Entire Ir	ntersection E	Begins at 04	:30 PM							
04:30 PM	0	0	0	1	4	5	1	0	1	6
04:45 PM	0	1	1	1	1	2	4	0	4	7
05:00 PM	0	1	1	1	0	1	4	0	4	6
05:15 PM	0	1	1	1	0	1	1	0	1	3
Total Volume	0	3	3	4	5	9	10	0	10	22
% App. Total	0	100		44.4	55.6		100	0		
PHF	.000	.750	.750	1.00	.313	.450	.625	.000	.625	.786
Passenger +	0	3	3	4	5	9	10	0	10	22
% Passenger +	0	100	100	100	100	100	100	0	100	100
Heavy	0	0	0	0	0	0	0	0	0	0
% Heavy	0	0	0	0	0	0	0	0	0	0



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File Name	: 4783aa
Site Code	: 00004783
Start Date	: 2/3/2022
Page No	: 1

						Grou	ps Prin	ted- Pas	senger ·	+ - Hea	vy						
		Valle	y Ave			East A	Access			Valle	y Ave			West	Access	;	]
		South	bound			West	bound		Northbound					Eastl	bound		
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
04:00 PM	0	0	0	0	2	0	0	2	0	0	2	2	4	0	0	4	8
04:15 PM	0	0	0	0	5	0	0	5	0	0	0	0	10	0	0	10	15
04:30 PM	0	0	0	0	2	0	0	2	0	0	1	1	5	0	0	5	8
04:45 PM	0	0	0	0	3	0	0	3	0	0	2	2	6	0	0	6	11
Total	0	0	0	0	12	0	0	12	0	0	5	5	25	0	0	25	42
05:00 PM	0	0	0	0	2	0	0	2	1	0	0	1	6	0	0	6	9
05:15 PM	0	0	0	0	5	0	0	5	0	0	0	0	6	0	0	6	11
05:30 PM	0	0	0	0	3	0	3	6	1	0	2	3	5	0	1	6	15
05:45 PM	0	0	1	1	3	0	2	5	0	0	8	8	4	0	1	5	19
Total	0	0	1	1	13	0	5	18	2	0	10	12	21	0	2	23	54
Grand Total	0	0	1	1	25	0	5	30	2	0	15	17	46	0	2	48	96
Apprch %	0	0	100		83.3	0	16.7		11.8	0	88.2		95.8	0	4.2		
Total %	0	0	1	1	26	0	5.2	31.2	2.1	0	15.6	17.7	47.9	0	2.1	50	
Passenger +	0	0	1	1	25	0	5	30	2	0	15	17	46	0	2	48	96
% Passenger +	0	0	100	100	100	0	100	100	100	0	100	100	100	0	100	100	100
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

File Name	: 4783aa
Site Code	: 00004783
Start Date	: 2/3/2022
Page No	: 2

	Valley Ave				East Access					Valle	ey Ave		West Access				
		South	bound			Westbound				North	bound			East	bound		
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 Ana	alysis Fi	rom 04:	30 PM	to 05:15	PM - Pe	eak 1 of	1										
Peak Hour for	Entire I	ntersect	tion Beg	gins at 04	4:30 PN	l											
04:30 PM	0	0	0	0	2	0	0	2	0	0	1	1	5	0	0	5	8
04:45 PM	0	0	0	0	3	0	0	3	0	0	2	2	6	0	0	6	11
05:00 PM	0	0	0	0	2	0	0	2	1	0	0	1	6	0	0	6	9
05:15 PM	0	0	0	0	5	0	0	5	0	0	0	0	6	0	0	6	11
Total Volume	0	0	0	0	12	0	0	12	1	0	3	4	23	0	0	23	39
% App. Total	0	0	0		100	0	0		25	0	75		100	0	0		
PHF	.000	.000	.000	.000	.600	.000	.000	.600	.250	.000	.375	.500	.958	.000	.000	.958	.886
Passenger +	0	0	0	0	12	0	0	12	1	0	3	4	23	0	0	23	39
% Passenger +	0	0	0	0	100	0	0	100	100	0	100	100	100	0	0	100	100
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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PIPELINE

APPENDIX

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## INT. CALCULATIONS

APPENDIX

### Heath & Associates, Inc 7-Eleven Sumner TIA

### Peak Hour Forecast Intersection Volumes

### COVID Adjustement Factor 18 %

Annual Growth Rate: 1.5

### 2027

# of Years to Horizon: 5

PM

### 1. Main St E & Valley Ave

	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing 2022	63	365	47	30	230	176	74	257	85	71	232	151
Coivd Adjusted 2022	74	431	55	35	271	208	87	303	100	84	274	178
Project Trips	0	0	8	0	0	0	0	8	8	0	8	0
Pipeline	2	0	0	1	6	4	3	0	0	0	10	0
Without	82	464	60	39	298	228	97	327	108	90	305	192
With	82	464	68	39	298	228	97	335	116	90	313	192

%

### 2. Main St E & Bock Ave

	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing 2022	0	0	0	0	0	3	4	0	5	10	0	0
Coivd Adjusted 2022	0	0	0	0	0	4	5	0	6	12	0	0
Project Trips	0	0	0	0	-6	14	4	0	6	0	-6	0
Pipeline	0	0	0	0	11	0	0	0	0	0	16	0
Without	0	0	0	0	11	4	5	0	6	13	16	0
With	0	0	0	0	5	18	9	0	12	13	10	0

### A. Main St & Access

	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing 2022	0	0	0	0	0	0	0	0	0	0	0	0
Project Trips	0	0	0	0	0	0	20	0	0	32	-16	0
Pipeline	0	0	0	0	11	0	0	0	0	0	16	0
Without	0	0	0	0	11	0	0	0	0	0	16	0
With	0	0	0	0	11	0	20	0	0	32	0	0

### B. Valley Ave & Access

	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing 2022	0	0	0	12	0	0	1	0	3	23	0	0
Coivd Adjusted 2022	0	0	0	14	0	0	1	0	4	27	0	0
Project Trips	2	-2	0	33	0	9	23	-17	0	0	0	0
Pipeline	0	4	0	0	0	0	0	3	0	0	0	0
Without	0	4	0	15	0	0	1	3	4	29	0	0
With	2	2	0	48	0	9	24	-14	4	29	0	0

### C. Bock Ave & Access

	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing 2022	0	13	0	0	0	0	0	0	0	0	9	0
Project Trips	14	0	0	0	0	0	0	0	2	2	0	10
Pipeline	0	0	0	0	0	0	0	0	0	0	0	0
Without	0	14	0	0	0	0	0	0	0	0	10	0
With	14	14	0	0	0	0	0	0	2	2	10	10

Pipeline Projects 1. Timberland Sumner

## LEVEL OF SERVICE

APPENDIX

## HCM 6th Signalized Intersection Summary 3: Main Street & Valley Ave

	≯	-	$\mathbf{F}$	∢	+	•	1	1	1	1	Ļ	~
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	î,		5	ĥ		5	î,		5	î,	
Traffic Volume (veh/h)	178	274	84	208	271	35	100	303	87	55	431	74
Future Volume (veh/h)	178	274	84	208	271	35	100	303	87	55	431	74
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A pbT)	1.00		0.97	1.00		0.97	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1841	1885	1885	1885	1841	1841	1885	1885	1885	1885
Adj Flow Rate, veh/h	202	311	95	236	308	40	114	344	99	62	490	84
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	4	1	1	1	4	4	1	1	1	1
Cap, veh/h	382	363	111	341	454	59	239	515	148	316	564	97
Arrive On Green	0.11	0.26	0.26	0.12	0.28	0.28	0.06	0.38	0.38	0.04	0.36	0.36
Sat Flow, veh/h	1795	1373	419	1795	1627	211	1753	1364	392	1795	1560	267
Grp Volume(v), veh/h	202	0	406	236	0	348	114	0	443	62	0	574
Grp Sat Flow(s),veh/h/ln	1795	0	1793	1795	0	1839	1753	0	1756	1795	0	1827
Q Serve(g_s), s	7.4	0.0	19.9	8.6	0.0	15.5	3.7	0.0	19.4	2.0	0.0	27.0
Cycle Q Clear(g_c), s	7.4	0.0	19.9	8.6	0.0	15.5	3.7	0.0	19.4	2.0	0.0	27.0
Prop In Lane	1.00		0.23	1.00		0.11	1.00		0.22	1.00		0.15
Lane Grp Cap(c), veh/h	382	0	474	341	0	513	239	0	663	316	0	660
V/C Ratio(X)	0.53	0.00	0.86	0.69	0.00	0.68	0.48	0.00	0.67	0.20	0.00	0.87
Avail Cap(c_a), veh/h	565	0	807	525	0	855	315	0	1221	353	0	1199
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.0	0.0	32.3	22.9	0.0	29.6	21.1	0.0	23.9	18.8	0.0	27.4
Incr Delay (d2), s/veh	1.1	0.0	4.7	2.5	0.0	1.6	1.5	0.0	1.2	0.3	0.0	3.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/In	3.1	0.0	9.0	3.7	0.0	6.9	1.5	0.0	7.9	0.8	0.0	12.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.2	0.0	37.0	25.4	0.0	31.2	22.6	0.0	25.1	19.1	0.0	31.1
LnGrp LOS	С	А	D	С	А	С	С	А	С	В	Α	С
Approach Vol, veh/h		608			584			557			636	
Approach Delay, s/veh		32.4			28.8			24.6			29.9	
Approach LOS		С			С			С			С	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.5	39.3	15.5	28.9	10.0	37.8	14.2	30.2				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.9	64.1	20.5	41.5	9.5	60.5	19.1	42.9				
Max Q Clear Time (g_c+I1), s	4.0	21.4	10.6	21.9	5.7	29.0	9.4	17.5				
Green Ext Time (p_c), s	0.0	3.3	0.5	2.5	0.1	4.3	0.4	2.2				
Intersection Summary												
HCM 6th Ctrl Delay			29.0									
HCM 6th LOS			С									

### Intersection

Int Delay, s/veh

Int Delay, s/veh	0.2						
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	ef 👘			्र	- ¥		
Traffic Vol, veh/h	404	12	4	508	6	5	
Future Vol, veh/h	404	12	4	508	6	5	
Conflicting Peds, #/hr	0	5	5	0	5	5	
Sign Control	Free	Free	Free	Free	Stop	Stop	
RT Channelized	-	None	-	None	-	None	
Storage Length	-	-	-	-	0	-	
Veh in Median Storage	,# 0	-	-	0	0	-	
Grade, %	0	-	-	0	0	-	
Peak Hour Factor	88	88	88	88	88	88	
Heavy Vehicles, %	1	1	1	1	1	1	
Mvmt Flow	459	14	5	577	7	6	

Major/Minor	Major	.1	Major2		Vinor1		
Conflicting Flow All		0 0	478	0	1063	476	3
Stage 1			-	-	471	-	-
Stage 2			-	-	592	-	-
Critical Hdwy			4.11	-	6.41	6.21	Í .
Critical Hdwy Stg 1			-	-	5.41	-	-
Critical Hdwy Stg 2			-	-	5.41	-	-
Follow-up Hdwy			2.209	-	3.509	3.309	}
Pot Cap-1 Maneuver			1090	-	248	591	1
Stage 1			-	-	630	-	-
Stage 2			-	-	555	-	-
Platoon blocked, %				-			
Mov Cap-1 Maneuver	•		1085	-	244	585	5
Mov Cap-2 Maneuver	•		-	-	244	-	-
Stage 1			-	-	627	-	-
Stage 2			-	-	548	-	-
Approach	E	В	WB		NB		
HCM Control Delay, s	;	0	0.1		16.3		
HCM LOS		-			С		
Minor Lane/Major My	mt	NBLn1	EBT	EBR	WBL	WBT	-
Capacity (veh/h)		332	_	_	1085	_	_

	552	-	- 1005	-	
HCM Lane V/C Ratio	0.038	-	- 0.004	-	
HCM Control Delay (s)	16.3	-	- 8.3	0	
HCM Lane LOS	С	-	- A	А	
HCM 95th %tile Q(veh)	0.1	-	- 0	-	

Existing PM Peak Hour 3:10 pm 03/16/2022 Baseline

0.5

### Intersection

Int Delay, s/veh

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		\$			4			4			4	
Traffic Vol, veh/h	0	0	27	0	0	14	4	476	1	0	723	0
Future Vol, veh/h	0	0	27	0	0	14	4	476	1	0	723	0
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control S	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	<b>#</b> -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	1	1	1	1	1	1	1	4	1	1	2	1
Mvmt Flow	0	0	31	0	0	16	5	541	1	0	822	0

Major/Minor	Minor2			Vinor1			Major1			Ν	1ajor2			
Conflicting Flow All	1392	1384	832	1400	1384	552	827	C	)	0	547	0	0	
Stage 1	827	827	-	557	557	-	-	-	-	-	-	-	-	
Stage 2	565	557	-	843	827	-	-		•	-	-	-	-	
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	-	4.11	-	-	
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-		•	-	-	-	-	
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-	-	
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209		•	-	2.209	-	-	
Pot Cap-1 Maneuver	120	144	371	118	144	535	808	-	-	-	1027	-	-	
Stage 1	367	388	-	517	514	-	-		•	-	-	-	-	
Stage 2	511	514	-	360	388	-	-	-	-	-	-	-	-	
Platoon blocked, %									•	-		-	-	
Mov Cap-1 Maneuver	114	141	367	106	141	530	804	-		-	1022	-	-	
Mov Cap-2 Maneuver	114	141	-	106	141	-	-	-	•	-	-	-	-	
Stage 1	362	386	-	510	507	-	-	-	-	-	-	-	-	
Stage 2	489	507	-	328	386	-	-	-	•	-	-	-	-	

Approach	EB	WB	NB	SB	
HCM Control Delay, s	15.7	12	0.1	0	
HCM LOS	С	В			

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1V	/BLn1	SBL	SBT	SBR
Capacity (veh/h)	804	-	-	367	530	1022	-	-
HCM Lane V/C Ratio	0.006	-	-	0.084	0.03	-	-	-
HCM Control Delay (s)	9.5	0	-	15.7	12	0	-	-
HCM Lane LOS	А	А	-	С	В	А	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.1	0	-	-

Existing PM Peak Hour 3:10 pm 03/16/2022 Baseline

## HCM 6th Signalized Intersection Summary 3: Main Street & Valley Ave

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ň	eî 🕺		ľ	el el		7	eî 🗧		٦	eî 🕺	
Traffic Volume (veh/h)	192	305	90	228	298	39	108	327	97	60	464	82
Future Volume (veh/h)	192	305	90	228	298	39	108	327	97	60	464	82
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1841	1885	1885	1885	1841	1841	1885	1885	1885	1885
Adj Flow Rate, veh/h	218	347	102	259	339	44	123	372	110	68	527	93
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	4	1	1	1	4	4	1	1	1	1
Cap, veh/h	366	387	114	321	482	62	215	539	159	291	586	103
Arrive On Green	0.11	0.28	0.28	0.12	0.30	0.30	0.06	0.40	0.40	0.04	0.38	0.38
Sat Flow, veh/h	1795	1388	408	1795	1628	211	1753	1354	400	1795	1552	274
Grp Volume(v), veh/h	218	0	449	259	0	383	123	0	482	68	0	620
Grp Sat Flow(s),veh/h/ln	1795	0	1795	1795	0	1839	1753	0	1755	1795	0	1826
Q Serve(g_s), s	9.5	0.0	26.9	11.3	0.0	20.7	4.8	0.0	25.5	2.6	0.0	35.8
Cycle Q Clear(g_c), s	9.5	0.0	26.9	11.3	0.0	20.7	4.8	0.0	25.5	2.6	0.0	35.8
Prop In Lane	1.00		0.23	1.00		0.11	1.00		0.23	1.00		0.15
Lane Grp Cap(c), veh/h	366	0	501	321	0	544	215	0	698	291	0	690
V/C Ratio(X)	0.60	0.00	0.90	0.81	0.00	0.70	0.57	0.00	0.69	0.23	0.00	0.90
Avail Cap(c_a), veh/h	482	0	666	430	0	705	259	0	1005	316	0	987
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.1	0.0	38.8	27.4	0.0	35.0	25.8	0.0	27.9	22.4	0.0	32.8
Incr Delay (d2), s/veh	1.6	0.0	12.0	8.0	0.0	2.2	2.4	0.0	1.2	0.4	0.0	8.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	0.0	13.4	5.5	0.0	9.5	2.1	0.0	10.7	1.1	0.0	17.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.7	0.0	50.8	35.5	0.0	37.2	28.2	0.0	29.2	22.8	0.0	41.0
LnGrp LOS	С	A	D	D	A	D	С	A	С	С	A	D
Approach Vol, veh/h		667			642			605			688	
Approach Delay, s/veh		43.2			36.5			29.0			39.2	
Approach LOS		D			D			С			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.9	49.0	18.2	35.7	11.2	46.8	16.4	37.6				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.9	64.1	20.5	41.5	9.5	60.5	19.1	42.9				
Max Q Clear Time (g c+l1), s	4.6	27.5	13.3	28.9	6.8	37.8	11.5	22.7				
Green Ext Time (p_c), s	0.0	3.6	0.4	2.3	0.1	4.5	0.4	2.3				
Intersection Summary												
HCM 6th Ctrl Delay			37.2									
HCM 6th LOS			D									

## Intersection

Int Delay, s/veh	0.2								
Movement	EBT	EBR	WBL	WBT	NBL	NBR			
Lane Configurations	et P			<del>ب</del>	Y				
Traffic Vol, veh/h	449	13	4	559	6	5			
Future Vol, veh/h	449	13	4	559	6	5			
Conflicting Peds, #/hr	0	5	5	0	5	5			
Sign Control	Free	Free	Free	Free	Stop	Stop			
RT Channelized	-	None	-	None	-	None			
Storage Length	-	-	-	-	0	-			
Veh in Median Storage	,# 0	-	-	0	0	-			
Grade, %	0	-	-	0	0	-			
Peak Hour Factor	88	88	88	88	88	88			
Heavy Vehicles, %	1	1	1	1	1	1			
Mvmt Flow	510	15	5	635	7	6			

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0 530	0 1173	528	
Stage 1	-		- 523	-	
Stage 2	-		- 650	-	
Critical Hdwy	-	- 4.11	- 6.41	6.21	
Critical Hdwy Stg 1	-		- 5.41	-	
Critical Hdwy Stg 2	-		- 5.41	-	
Follow-up Hdwy	-	- 2.209	- 3.509	3.309	
Pot Cap-1 Maneuver	-	- 1042	- 213	552	
Stage 1	-		- 597	-	
Stage 2	-		- 521	-	
Platoon blocked, %	-	-	-		
Mov Cap-1 Maneuver	-	- 1037	- 209	547	
Mov Cap-2 Maneuver	· -		- 209	-	
Stage 1	-		- 594	-	
Stage 2	-		- 515	-	
Approach	EB	WB	NB		
HCM Control Delay, s	0	0.1	17.9		
HCM LOS			С		

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	291	-	-	1037	-	
HCM Lane V/C Ratio	0.043	-	-	0.004	-	
HCM Control Delay (s)	17.9	-	-	8.5	0	
HCM Lane LOS	С	-	-	А	Α	
HCM 95th %tile Q(veh)	0.1	-	-	0	-	

2. Forecast 2027 without 11:17 am 03/19/2022

0.5

### Intersection

Int Delay, s/veh

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		\$			\$			\$			\$	
Traffic Vol, veh/h	0	0	29	0	0	15	4	517	1	0	782	0
Future Vol, veh/h	0	0	29	0	0	15	4	517	1	0	782	0
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage,	# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	1	1	1	1	1	1	1	4	1	1	2	1
Mvmt Flow	0	0	33	0	0	17	5	588	1	0	889	0

Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	1506	1498	899	1515	1498	599	894	0	0	594	0	0	
Stage 1	894	894	-	604	604	-	-	-	-	-	-	-	
Stage 2	612	604	-	911	894	-	-	-	-	-	-	-	
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	4.11	-	-	
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-	
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-	
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-	
Pot Cap-1 Maneuver	100	123	339	99	123	503	763	-	-	987	-	-	
Stage 1	337	361	-	487	489	-	-	-	-	-	-	-	
Stage 2	482	489	-	330	361	-	-	-	-	-	-	-	
Platoon blocked, %								-	-		-	-	
Mov Cap-1 Maneuver	95	121	336	88	121	498	759	-	-	982	-	-	
Mov Cap-2 Maneuver	95	121	-	88	121	-	-	-	-	-	-	-	
Stage 1	332	359	-	480	482	-	-	-	-	-	-	-	
Stage 2	459	482	-	296	359	-	-	-	-	-	-	-	

Approach	EB	WB	NB	SB	
HCM Control Delay, s	16.9	12.5	0.1	0	
HCM LOS	С	В			

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1V	VBLn1	SBL	SBT	SBR	
Capacity (veh/h)	759	-	-	336	498	982	-	-	
HCM Lane V/C Ratio	0.006	-	-	0.098	0.034	-	-	-	
HCM Control Delay (s)	9.8	0	-	16.9	12.5	0	-	-	
HCM Lane LOS	А	А	-	С	В	А	-	-	
HCM 95th %tile Q(veh)	0	-	-	0.3	0.1	0	-	-	

2. Forecast 2027 without 11:17 am 03/19/2022

## HCM 6th Signalized Intersection Summary 3: Main Street & Valley Ave

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	eî 🕺		ľ	el el		7	eî.		٦	eî 🔒	
Traffic Volume (veh/h)	192	313	90	228	298	39	116	335	97	68	464	82
Future Volume (veh/h)	192	313	90	228	298	39	116	335	97	68	464	82
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1841	1885	1885	1885	1841	1841	1885	1885	1885	1885
Adj Flow Rate, veh/h	218	356	102	259	339	44	132	381	110	77	527	93
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	4	1	1	1	4	4	1	1	1	1
Cap, veh/h	367	395	113	316	487	63	217	544	157	286	584	103
Arrive On Green	0.11	0.28	0.28	0.12	0.30	0.30	0.06	0.40	0.40	0.04	0.38	0.38
Sat Flow, veh/h	1795	1397	400	1795	1628	211	1753	1363	393	1795	1552	274
Grp Volume(v), veh/h	218	0	458	259	0	383	132	0	491	77	0	620
Grp Sat Flow(s),veh/h/ln	1795	0	1797	1795	0	1839	1753	0	1756	1795	0	1826
Q Serve(g_s), s	9.7	0.0	28.2	11.5	0.0	21.2	5.2	0.0	26.8	3.0	0.0	36.8
Cycle Q Clear(g_c), s	9.7	0.0	28.2	11.5	0.0	21.2	5.2	0.0	26.8	3.0	0.0	36.8
Prop In Lane	1.00		0.22	1.00		0.11	1.00		0.22	1.00		0.15
Lane Grp Cap(c), veh/h	367	0	508	316	0	550	217	0	701	286	0	687
V/C Ratio(X)	0.59	0.00	0.90	0.82	0.00	0.70	0.61	0.00	0.70	0.27	0.00	0.90
Avail Cap(c_a), veh/h	477	0	650	418	0	687	252	0	981	306	0	963
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.6	0.0	39.6	28.1	0.0	35.6	26.6	0.0	28.8	23.2	0.0	33.8
Incr Delay (d2), s/veh	1.5	0.0	13.4	9.3	0.0	2.3	3.2	0.0	1.3	0.5	0.0	8.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	0.0	14.2	5.7	0.0	9.8	2.3	0.0	11.3	1.3	0.0	17.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.1	0.0	53.1	37.4	0.0	37.9	29.8	0.0	30.1	23.7	0.0	42.7
LnGrp LOS	С	A	D	D	A	D	С	A	С	С	A	D
Approach Vol, veh/h		676			642			623			697	
Approach Delay, s/veh		45.0			37.7			30.0			40.6	
Approach LOS		D			D			С			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.1	50.3	18.5	36.9	11.7	47.7	16.6	38.8				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.9	64.1	20.5	41.5	9.5	60.5	19.1	42.9				
Max Q Clear Time (g c+l1), s	5.0	28.8	13.5	30.2	7.2	38.8	11.7	23.2				
Green Ext Time (p_c), s	0.0	3.7	0.4	2.3	0.1	4.4	0.4	2.3				
Intersection Summary												
HCM 6th Ctrl Delay			38.5									
HCM 6th LOS			D									

Intersection						
Int Delay, s/veh	0.2					
-						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	el 👘			•		1
Traffic Vol, veh/h	446	32	0	565	0	20
Future Vol, veh/h	446	32	0	565	0	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage	e, # 0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	507	36	0	642	0	23

Major/Minor	Major1	М	ajor2	М	inor1	
Conflicting Flow All	0	0	-	-	-	525
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.309
Pot Cap-1 Maneuver	-	-	0	-	0	554
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	· -	-	-	-	-	554
Mov Cap-2 Maneuver	· _	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB		WB		NB	
HCM Control Delay, s	s 0		0		11.8	

Minor Lane/Maior Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	554	-	-	-
HCM Lane V/C Ratio	0.041	-	-	-
HCM Control Delay (s)	11.8	-	-	-
HCM Lane LOS	В	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

В

2. Forecast 2027 with 11:17 am 03/19/2022

HCM LOS

Intersection						
Int Delay, s/veh	0.6					
Movement	FRT	FRR	WRI	WRT	NRI	NRR
	LDI		NDL	1101	NDL	
Lane Configurations	- <b>î</b>			- କି	- Y	
Traffic Vol, veh/h	453	13	18	553	12	9
Future Vol, veh/h	453	13	18	553	12	9
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage	e, # 0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	1	1	1	1	1	1
Mymt Flow	515	15	20	628	14	10

Major/Minor	Major1	ľ	Major2	I	Minor1	
Conflicting Flow All	0	0	535	0	1201	533
Stage 1	-	-	-	-	528	-
Stage 2	-	-	-	-	673	-
Critical Hdwy	-	-	4.11	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.209	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	1038	-	205	549
Stage 1	-	-	-	-	594	-
Stage 2	-	-	-	-	509	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1033	-	197	544
Mov Cap-2 Maneuver	-	-	-	-	197	-
Stage 1	-	-	-	-	591	-
Stage 2	-	-	-	-	491	-
Approach	ED		\//D		ND	
HCM Control Delay, s	U		0.3		19.6	
HCM LOS					C	
Minor Lane/Major Mvr	nt N	IBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		271	-	-	1033	-
HCM Lane V/C Ratio		0.088	-	-	0.02	-
HCM Control Delay (s	)	19.6	-	-	8.6	0
HCM Lane LOS	,	С	-	-	А	А

2. Forecast 2027 with 11:17 am 03/19/2022

HCM 95th %tile Q(veh)

0.3

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0.1

-

1.2

### Intersection

Int Delay, s/veh

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Vol, veh/h	0	0	29	9	0	46	4	502	24	2	780	0
Future Vol, veh/h	0	0	29	9	0	46	4	502	24	2	780	0
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage,	# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	1	1	1	1	1	1	1	4	1	1	2	1
Mvmt Flow	0	0	33	10	0	52	5	570	27	2	886	0

Major/Minor	Minor2		l	Minor1			Major1			Major2			
Conflicting Flow All	1520	1507	896	1511	1494	594	891	0	0	602	0	0	
Stage 1	895	895	-	599	599	-	-	-	-	-	-	-	
Stage 2	625	612	-	912	895	-	-	-	-	-	-	-	
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	4.11	-	-	
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-	
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-	
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-	
Pot Cap-1 Maneuver	98	121	340	99	124	507	765	-	-	980	-	-	
Stage 1	337	361	-	490	492	-	-	-	-	-	-	-	
Stage 2	474	485	-	329	361	-	-	-	-	-	-	-	
Platoon blocked, %								-	-		-	-	
Mov Cap-1 Maneuver	86	118	337	88	121	502	761	-	-	975	-	-	
Mov Cap-2 Maneuver	86	118	-	88	121	-	-	-	-	-	-	-	
Stage 1	332	358	-	483	485	-	-	-	-	-	-	-	
Stage 2	418	478	-	294	358	-	-	-	-	-	-	-	
Annroach	FR			W/R			NR			SB			

Approach	EB	WB	NB	SB	
HCM Control Delay, s	16.8	21.2	0.1	0	
HCM LOS	С	С			

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1V	/BLn1	SBL	SBT	SBR
Capacity (veh/h)	761	-	-	337	284	975	-	-
HCM Lane V/C Ratio	0.006	-	-	0.098	0.22	0.002	-	-
HCM Control Delay (s)	9.8	0	-	16.8	21.2	8.7	0	-
HCM Lane LOS	А	А	-	С	С	А	А	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.8	0	-	-

2. Forecast 2027 with 11:17 am 03/19/2022

Intersection						
Int Delay, s/veh	2.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			÷	et P	
Traffic Vol, veh/h	10	2	2	11	17	14
Future Vol, veh/h	10	2	2	11	17	14
Conflicting Peds, #/hr	3	3	3	0	0	3
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-

Storage Length	0	-	-	-	-	-	
Veh in Median Storage, #	E 0	-	-	0	0	-	
Grade, %	0	-	-	0	0	-	
Peak Hour Factor	88	88	88	88	88	88	
Heavy Vehicles, %	1	1	1	1	1	1	
Mvmt Flow	11	2	2	13	19	16	

Major/Minor	Minor2	l	Major1	Ma	jor2	
Conflicting Flow All	50	33	38	0	-	0
Stage 1	30	-	-	-	-	-
Stage 2	20	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.11	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	962	1043	1579	-	-	-
Stage 1	995	-	-	-	-	-
Stage 2	1005	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	955	1037	1574	-	-	-
Mov Cap-2 Maneuver	955	-	-	-	-	-
Stage 1	991	-	-	-	-	-
Stage 2	1002	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.8	1.1	0
HCM LOS	А		

Minor Lane/Major Mvmt	NBL	NBT E	EBLn1	SBT	SBR
Capacity (veh/h)	1574	-	968	-	-
HCM Lane V/C Ratio	0.001	-	0.014	-	-
HCM Control Delay (s)	7.3	0	8.8	-	-
HCM Lane LOS	А	А	Α	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

2. Forecast 2027 with 11:17 am 03/19/2022