



**TJKM**

VISION THAT MOVES YOUR COMMUNITY

## TECHNICAL MEMORANDUM

*Date:* November 8, 2019

*To:* Jeffery Levers, San Joaquin County

*From:* Chris D. Kinzel, P.E.  
Vice President

*Subject:* **Focused Update of 2011 Traffic Study of Sikh Temple near Tracy**

The Gurdwara Gur Nanak Parkash Sikh Temple at 16215 Grant Line Road seeks to expand the capacity of its facilities from a gathering of 170 people to a gathering of 700 people. In 2011 TJKM prepared a traffic analysis for the expansion. (Originally, the capacity sought was 800 people, it is now 700.) The County has requested a focused update of the 2011 study to accommodate the slightly lower increase but also to reflect that traffic along Grant Line Road has grown due to the development of the nearby Mountain House Community and general increases in traffic in the area.

TJKM was asked to make new counts at the Temple driveways so that the desired driveway analysis updates would reflect current conditions. The new driveway analysis was conducted using these steps.

1. New turning movement counts were made at the two existing Temple driveways on Sunday September 29, from 8 a.m. to 1 p.m. These counts were primarily used to determine background 2019 volumes on Grant Line Road near the Temple. The peak hour was 11:45 a.m. to 12:45 p.m. The five hour volumes and the peak hour intersection turning movements are in **Appendix 1**. No updates were conducted for the weekday p.m. peak since the Temple has no events planned for these times.
2. Using a combination of 2011 and 2019 data, the peak hour volumes in and out of the three proposed driveways were determined. The volumes were adjusted to account for a future capacity of 700 people, down from the 800 people in the 2011 report.
3. The total in and out Temple volumes were assigned to the three proposed driveways, reflecting revised access patterns now proposed. In 2011 the western driveway was planned for right turns in and out only and the middle and east driveways were proposed for full access.

In 2019 the western driveway allows all movements except left turn exit, the central driveway allows all movements and the east driveway allows left out and right out movements only. Grant Line Road is being widened by the applicant to provide separate

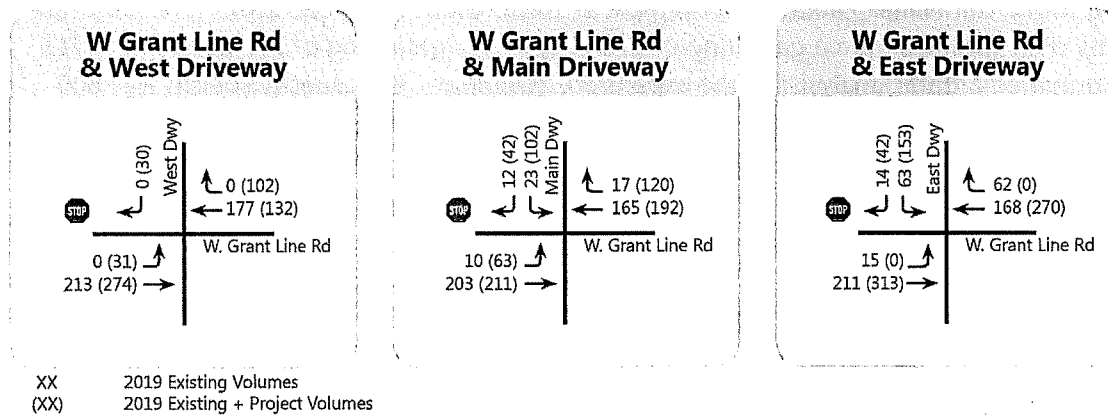


right turn lanes and left turn lanes at the two locations where each are permitted. Also, left turn acceleration lanes are provided at the two locations where left turns onto Grant Line Road are permitted. The proposed striping and lane assignment drawing is attached.

- The combined Sunday volumes at the three Temple driveways were determined using the 700 person turning movements and 2019 through volumes on Grant Line Road. The level of service and queuing results at each of the three locations were calculated using Synchro 10 software and 2010 HCM methodology. Those results are in **Appendix 2**.

**Summary of Findings**

The information below shows the calculated traffic volumes using the three driveways using a capacity of 700 persons.



The volumes were arrived at by factoring the existing turning movements at the two existing driveways to reflect a capacity of 700 people, distributing these volumes over three entrances using the proposed 2019 entrance geometrics and adding these to 2019 through traffic.

**Table 1: Sunday Delays and Levels of Service (LOS)**

Scenario	West		Main		East	
	Delay, Seconds	LOS	Delay, Seconds	LOS	Delay, Seconds	LOS
<b>2011 Existing</b>	--	--	10.1	B	10.7	B
<b>2011 Existing plus Project</b>	9.5	A	14.8	B	16.7	C
<b>2019 Existing</b>	--	--	10.9	B	12.3	B
<b>2019 Existing plus Project</b>	9.1	A	14.8	C	18.0	C

**Table 1** reflects 2011 and 2019 conditions at the three driveways with and without the project. Note that in 2011 the permitted driveway movements were different than currently proposed. Bullet point 3 above describes the changes. Also, 2011 volumes reflect a capacity of 800 people and the 2019 volumes reflect a capacity of 700 people. Also, 2011 calculations are derived from Synchro 6 software while 2019 calculations are based on Synchro 10 software. In addition, levels



of service are based on a single exit lane at all three driveways. The southbound exit delays are greater than any of the delays related to entering left or right turns and are those included in the table above. The calculations sheets are shown in the **Appendix**.

**Table 2: 2019 Existing plus Project Queues (nearest highest 5 feet) on Sunday peak hour**

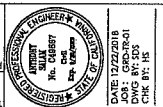
West driveway:	Eastbound left: 30 feet (storage 228 feet) Westbound Right: 5 feet (storage 100 feet) Southbound exit: 35 feet
Main driveway:	Eastbound left: 45 feet (storage 50 feet) Westbound right: 15 feet (storage 100 feet) Southbound exit: 75 feet
East driveway:	Southbound exit: 80 feet

**Table 2** shows queues at all approaches to the three driveways during the busiest Sunday hour. Queues were calculated using SimTraffic simulation, which is a more accurate method than using Synchro 10 results, which tends to underestimate queues. It can be seen that the longest queues at each intersection occur at the southbound single lane exit. The eastbound left turn queues, 30 feet at the west driveway and 45 feet at the main driveway, fit within the available left turn lanes. The southbound exit queues fit within project parking aisles, and create no on-site issues. While as a worse-case scenario, TJKM assumed that more arriving eastbound vehicles would use the second entrance with a shorter left turn lane, in reality most traffic arriving from the west is likely to use the much longer first left turn lane at the west driveway.

Southbound to east bound exit movements are equipped with 50 foot long acceleration lanes on eastbound Grant Line Road, which allow the exits to be made in two stages. These also appear to be suitable for satisfactory operations.

**Conclusions**

Based on the proposed site plan and the geometric design for entering and exiting volumes, TJKM concludes that the three driveways proposed for the 700 person capacity design will operate very satisfactorily from the standpoint of motorist delays, level of service, and available queuing space.



CSS

DATE: 12/22/2018  
 JOB: 160026  
 CHN BY: R.C.

PROJECT: STRIPING PLAN  
 16101 W. GRANT LINE ROAD TRACY, CA 95304  
 GURDWARA GUR NANK PARKASH (SKH PLACE OF WORKSHIP)

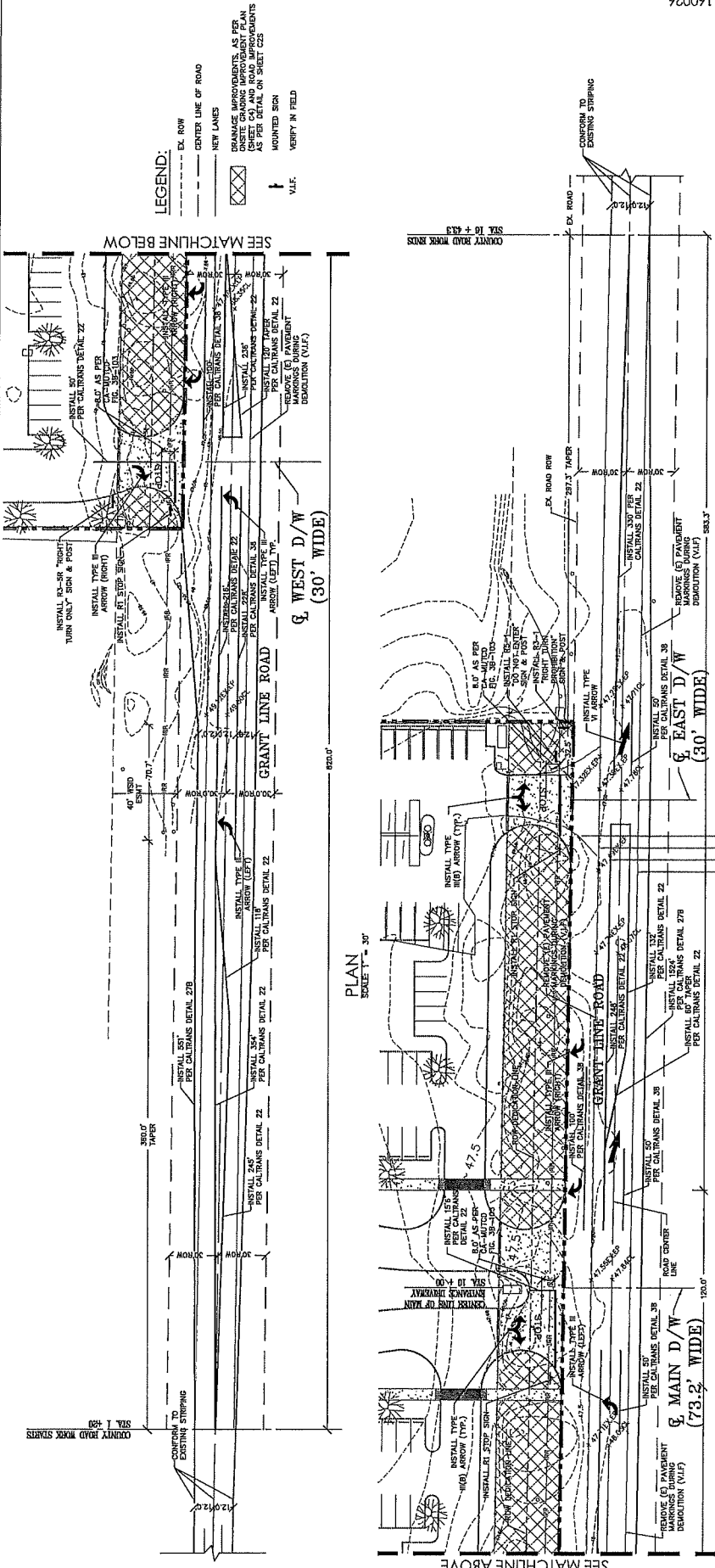
473 W Lake Mead Blvd, Ste 100, Las Vegas, NV 89128  
 Phone (702) 878-3347 FAX (702) 664-4227  
 Email: info@cdcc.com  
 Cd Consulting & Construction Inc.  
 Civil Engineering-Planning and Construction Consulting  
 Building Design and Improvements-Construction Consulting

REVISIONS	DATE	ISSUE

# Proposed Striping Plan

SCALE: 1" = 30'

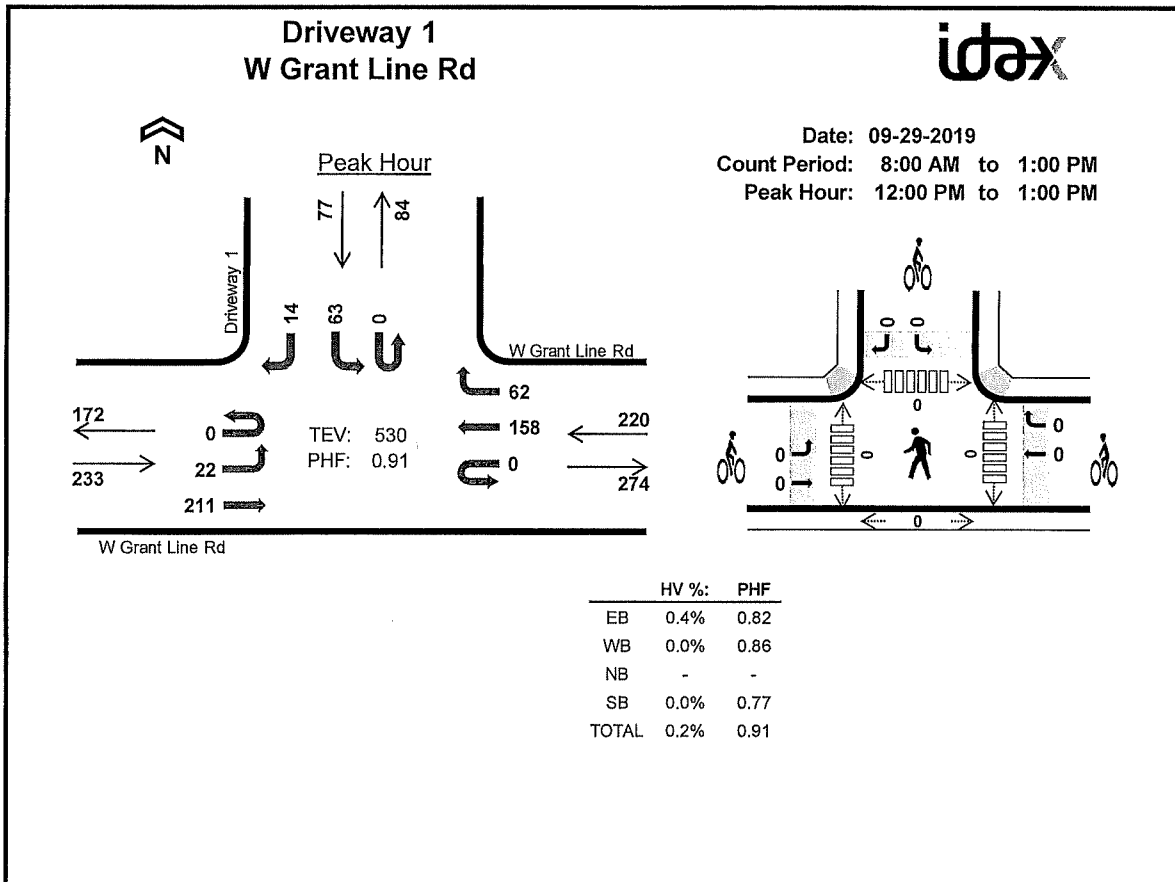
- NOTES:-**
- STRIPING, STRIPING AND PAVEMENT MARKINGS SHALL BE IN CONFORMANCE WITH THE LATEST EDITIONS OF THE CALTRANS STANDARD SPECIFICATIONS, SECTION 8A, AND THE CALTRANS STANDARD PLANS (2019).
  - REMOVAL OF EXISTING TRAFFIC STRIPES AND MARKINGS SHALL BE PER CALTRANS STD SPECIFICATION SECTIONS 15.2.02B AND 15-2.02C.
  - ALL TRAFFIC SIGNS SHALL BE INSTALLED WITH UNISTRUT POSTS, PER SAN JOAQUIN COUNTY STD 016 14-27.
  - SIGNS REMOVED SHALL BE DELIVERED TO THE SAN JOAQUIN COUNTY MAINTENANCE YARD.
  - ALL NON-METAL ARM MOUNTED SIGNS SHALL BE PROVIDED WITH AN ANTI-GRAFFITI FILM SIGNS AN OVERLAP PAUL.
  - THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND SHALL BE IN COMPLIANCE WITH ALL APPLICABLE REGULATIONS AND ORDINANCES. THESE PLANS SHALL BE PROVIDED BY THE COUNTY ENGINEER. EXISTING STRIPING AND MARKINGS SHALL BE REMOVED AND REPAVED IN CONFORMANCE WITH THE REMOVAL OF MARKS.
  - THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND SHALL BE IN COMPLIANCE WITH ALL APPLICABLE REGULATIONS AND ORDINANCES. THESE PLANS SHALL BE PROVIDED BY THE COUNTY ENGINEER. EXISTING STRIPING AND MARKINGS SHALL BE REMOVED AND REPAVED IN CONFORMANCE WITH THE REMOVAL OF MARKS.
  - THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND SHALL BE IN COMPLIANCE WITH ALL APPLICABLE REGULATIONS AND ORDINANCES. THESE PLANS SHALL BE PROVIDED BY THE COUNTY ENGINEER. EXISTING STRIPING AND MARKINGS SHALL BE REMOVED AND REPAVED IN CONFORMANCE WITH THE REMOVAL OF MARKS.
  - TRAFFIC ENGINEERING PRIOR TO THE FINAL APPLICATION OF STRIPING AND MARKINGS SHALL CONFORM TO STATE SPECIFICATIONS FOR ROADWAY (PER MARKINGS) AND PAVEMENT (PER STRIPES).
  - THE CONTRACTOR SHALL ENSURE THAT THE APPROPRIATE STRIPING AND PAVEMENT MARKINGS ARE INSTALLED AND MAINTAINED THROUGHOUT THE PROJECT. TEMPORARY STRIPING AND PAVEMENT MARKINGS SHALL BE REMOVED IMMEDIATELY AFTER THE PROJECT IS COMPLETE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STREET TO TRAFFIC.
  - ALL LINE DIMENSIONS ARE TO EDGE OF SHOULDER.
  - ALL STRIPING WITHIN THE REMOVAL AND DISPOSAL OF EXISTING ASPHALT PAVEMENT AND SHOULDER SHALL BE REMOVED. REMOVAL OF EXISTING STRIPING ALSO NOTED ON THIS SHEET.



PLAN SCALE: 1" = 30'

PLAN SCALE: 1" = 30'

# Appendices



**Five-Hour Count Summaries**

Interval Start	W Grant Line Rd Eastbound				W Grant Line Rd Westbound				n/a Northbound				Driveway 1 Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
	12:00 PM	0	4	34	0	0	0	43	21	0	0	0	0	0	11	0			7
12:15 PM	0	7	51	0	0	0	42	10	0	0	0	0	0	11	0	4	125	0	
12:30 PM	0	6	60	0	0	0	36	18	0	0	0	0	0	17	0	2	139	0	
12:45 PM	0	5	66	0	0	0	37	13	0	0	0	0	0	24	0	1	146	530	
Peak Hour	All	0	22	211	0	0	0	158	62	0	0	0	0	0	63	0	14	530	0
	HV	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	HV%	-	0%	0%	-	-	-	0%	0%	-	-	-	-	-	0%	-	0%	0%	0

Note: For all three-hour count summary, see next page.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)							
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total			
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Five-Hour Count Summaries																			
Interval Start	W Grant Line Rd				W Grant Line Rd				n/a				Driveway 1				15-min Total	Rolling One Hour	
	Eastbound				Westbound				Northbound				Southbound						
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
8:00 AM	0	0	7	0	0	0	14	4	0	0	0	0	0	0	0	1	26	0	
8:15 AM	0	1	13	0	0	0	13	5	0	0	0	0	0	4	0	1	37	0	
8:30 AM	0	3	23	0	0	0	8	3	0	0	0	0	0	10	0	4	51	0	
8:45 AM	0	3	27	0	0	0	7	6	0	0	0	0	0	1	0	1	45	159	
9:00 AM	0	4	32	0	0	0	22	4	0	0	0	0	0	5	0	0	67	200	
9:15 AM	0	4	22	0	0	0	16	2	0	0	0	0	0	0	0	2	46	209	
9:30 AM	0	4	40	0	0	0	12	9	0	0	0	0	0	8	0	4	77	235	
9:45 AM	0	5	35	0	0	0	22	13	0	0	0	0	0	7	0	2	84	274	
10:00 AM	0	7	48	0	0	0	26	17	0	0	0	0	0	8	0	3	109	316	
10:15 AM	0	11	48	0	0	0	35	18	0	0	0	0	0	7	0	1	120	390	
10:30 AM	0	8	58	0	0	0	22	13	0	0	0	0	0	11	0	0	112	425	
10:45 AM	0	3	51	0	0	0	26	12	0	0	0	0	0	3	0	1	96	437	
11:00 AM	0	5	34	0	0	0	37	17	0	0	0	0	0	4	0	2	99	427	
11:15 AM	0	6	45	0	0	0	50	14	0	0	0	0	0	3	0	1	119	426	
11:30 AM	0	4	62	0	0	0	37	24	0	0	0	0	0	4	0	2	133	447	
11:45 AM	0	5	59	0	0	0	48	25	0	0	0	0	0	7	0	0	144	495	
12:00 PM	0	4	34	0	0	0	43	21	0	0	0	0	0	11	0	7	120	516	
12:15 PM	0	7	51	0	0	0	42	10	0	0	0	0	0	11	0	4	125	522	
12:30 PM	0	6	60	0	0	0	36	18	0	0	0	0	0	17	0	2	139	528	
12:45 PM	0	5	66	0	0	0	37	13	0	0	0	0	0	24	0	1	146	530	
Count Total	0	95	815	0	0	0	553	248	0	0	0	0	0	145	0	39	1,895	0	
Peak Hour	All	0	22	211	0	0	0	158	62	0	0	0	0	0	63	0	14	530	0
	HV	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	HV%	-	0%	0%	-	-	-	0%	0%	-	-	-	-	-	0%	-	0%	0%	0
Note: Five-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.																			
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)								
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total				
8:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0				
8:15 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0				
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
9:00 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0				
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
10:30 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0				
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
11:00 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0				
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
12:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0				
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Count Total	2	1	0	0	3	2	1	0	0	3	0	0	0	0	0				
Peak Hr	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0				

Five-Hour Count Summaries - Heavy Vehicles																		
Interval Start	W Grant Line Rd				W Grant Line Rd				n/a				Driveway 1				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:15 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
11:00 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Count Total	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	3	0	
Peak Hour	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	

Five-Hour Count Summaries - Bikes																	
Interval Start	W Grant Line Rd			W Grant Line Rd			n/a			Driveway 1			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
8:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0		
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
9:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1		
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
10:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1		
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Count Total	0	2	0	0	1	0	0	0	0	0	0	0	0	3	0		
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

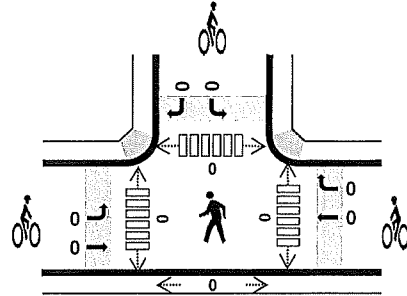
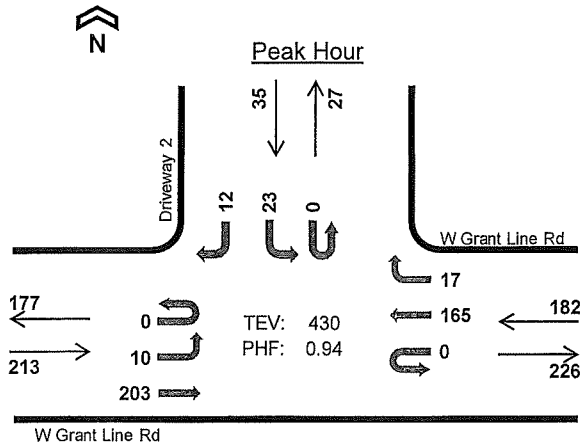
Note: U-Turn volumes for bikes are included in Left-Turn, if any.



### Driveway 2 W Grant Line Rd



Date: 09-29-2019  
 Count Period: 8:00 AM to 1:00 PM  
 Peak Hour: 11:45 AM to 12:45 PM



	HV %:	PHF
EB	0.5%	0.83
WB	0.0%	0.91
NB	-	-
SB	2.9%	0.55
TOTAL	0.5%	0.94

#### Five-Hour Count Summaries

Interval Start	W Grant Line Rd Eastbound				W Grant Line Rd Westbound				n/a Northbound				Driveway 2 Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
11:45 AM	0	2	62	0	0	0	41	7	0	0	0	0	0	2	0	0	114	0	
12:00 PM	0	3	36	0	0	0	48	2	0	0	0	0	0	2	0	2	93	0	
12:15 PM	0	2	48	0	0	0	38	8	0	0	0	0	0	10	0	6	112	0	
12:30 PM	0	3	57	0	0	0	38	0	0	0	0	0	0	9	0	4	111	430	
Peak Hour	All	0	10	203	0	0	0	165	17	0	0	0	0	0	23	0	12	430	0
	HV	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0
	HV%	-	0%	0%	-	-	-	0%	0%	-	-	-	-	-	0%	-	8%	0%	0

Note: For all three-hour count summary, see next page.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
12:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0

Five-Hour Count Summaries																			
Interval Start	W Grant Line Rd				W Grant Line Rd				n/a				Driveway 2				15-min Total	Rolling One Hour	
	Eastbound				Westbound				Northbound				Southbound						
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
8:00 AM	0	0	7	0	0	0	15	0	0	0	0	0	0	0	0	0	22	0	
8:15 AM	0	0	14	0	0	0	14	0	0	0	0	0	0	0	0	0	28	0	
8:30 AM	0	0	26	0	0	0	12	0	0	0	0	0	0	0	0	0	38	0	
8:45 AM	0	4	30	0	0	0	7	1	0	0	0	0	0	0	0	1	43	131	
9:00 AM	0	2	31	0	0	0	18	4	0	0	0	0	0	0	5	0	60	169	
9:15 AM	0	1	25	0	0	0	18	0	0	0	0	0	0	0	1	0	46	187	
9:30 AM	0	1	43	0	0	0	16	0	0	0	0	0	0	0	1	0	62	211	
9:45 AM	0	2	40	0	0	0	23	1	0	0	0	0	0	0	0	0	66	234	
10:00 AM	0	2	55	0	0	0	24	5	0	0	0	0	0	0	0	0	86	260	
10:15 AM	0	3	57	0	0	0	35	1	0	0	0	0	0	0	2	0	100	314	
10:30 AM	0	0	64	0	0	0	20	2	0	0	0	0	0	0	2	0	89	341	
10:45 AM	0	3	54	0	0	0	27	0	0	0	0	0	0	0	0	1	85	360	
11:00 AM	0	0	37	0	0	0	38	1	0	0	0	0	0	0	2	0	80	354	
11:15 AM	0	4	48	0	0	0	49	2	0	0	0	0	0	0	3	0	106	360	
11:30 AM	0	3	61	0	0	0	37	2	0	0	0	0	0	0	5	0	108	379	
11:45 AM	0	2	62	0	0	0	41	7	0	0	0	0	0	2	0	0	114	408	
12:00 PM	0	3	36	0	0	0	48	2	0	0	0	0	0	2	0	2	93	421	
12:15 PM	0	2	48	0	0	0	38	8	0	0	0	0	0	10	0	6	112	427	
12:30 PM	0	3	57	0	0	0	38	0	0	0	0	0	0	9	0	4	111	430	
12:45 PM	0	2	61	0	0	0	37	1	0	0	0	0	0	10	0	2	113	429	
Count Total	0	37	856	0	0	0	555	37	0	0	0	0	0	54	0	23	1,562	0	
Peak Hour	All	0	10	203	0	0	0	165	17	0	0	0	0	0	23	0	12	430	0
	HV	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0
	HV%	-	0%	0%	-	-	-	0%	0%	-	-	-	-	-	0%	-	8%	0%	0

Note: Five-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
8:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
8:15 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
12:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	2	1	0	1	4	2	1	0	0	3	0	0	0	0	0
Peak Hr	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0

Five-Hour Count Summaries - Heavy Vehicles																		
Interval Start	W Grant Line Rd				W Grant Line Rd				n/a			Driveway 2				15-min Total	Rolling One Hour	
	Eastbound				Westbound				Northbound			Southbound						
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH			RT
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
12:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
Count Total	0	0	2	0	0	0	1	0	0	0	0	0	0	0	1	4	0	0
Peak Hour	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0

Five-Hour Count Summaries - Bikes																		
Interval Start	W Grant Line Rd				W Grant Line Rd				n/a			Driveway 2				15-min Total	Rolling One Hour	
	Eastbound				Westbound				Northbound			Southbound						
	LT	TH	RT	RT	LT	TH	RT	RT	LT	TH	RT	LT	TH	RT	RT			
8:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
9:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

HCM 2010 TWSC  
4: W Grant Line Rd & Main Driveway

11/07/2019

Intersection

Int Delay, s/veh 1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	↕
Traffic Vol, veh/h	10	203	165	17	23	12
Future Vol, veh/h	10	203	165	17	23	12
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, #	-	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	221	179	18	25	13

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	197	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	-
Pot Cap-1 Maneuver	1376	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1376	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	10.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1376	-	-	-	648
HCM Lane V/C Ratio	0.008	-	-	-	0.059
HCM Control Delay (s)	7.6	0	-	-	10.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

**Intersection**

Int Delay, s/veh 2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	↕
Traffic Vol, veh/h	15	211	168	62	63	14
Future Vol, veh/h	15	211	168	62	63	14
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, #	-	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	16	229	183	67	68	15

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	250	0	0 478 217
Stage 1	-	-	- 217 -
Stage 2	-	-	- 261 -
Critical Hdwy	4.12	-	- 6.42 6.22
Critical Hdwy Stg 1	-	-	- 5.42 -
Critical Hdwy Stg 2	-	-	- 5.42 -
Follow-up Hdwy	2.218	-	- 3.518 3.318
Pot Cap-1 Maneuver	1316	-	- 546 823
Stage 1	-	-	- 819 -
Stage 2	-	-	- 783 -
Platoon blocked, %		-	- -
Mov Cap-1 Maneuver	1316	-	- 538 823
Mov Cap-2 Maneuver	-	-	- 538 -
Stage 1	-	-	- 808 -
Stage 2	-	-	- 783 -

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	12.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1316	-	-	-	574
HCM Lane V/C Ratio	0.012	-	-	-	0.146
HCM Control Delay (s)	7.8	0	-	-	12.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.5

HCM 2010 TWSC  
 3: W Grant Line Rd & West Driveway

11/07/2019

Intersection

Int Delay, s/veh 0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑	↑	↗		↗
Traffic Vol, veh/h	31	274	132	102	0	30
Future Vol, veh/h	31	274	132	102	0	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	216	-	-	0	-	0
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	34	298	143	111	0	33

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	254	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	6.22
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	3.318
Pot Cap-1 Maneuver	1311	-	0
Stage 1	-	-	0
Stage 2	-	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1311	-	905
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1311	-	-	-	905
HCM Lane V/C Ratio	0.026	-	-	-	0.036
HCM Control Delay (s)	7.8	-	-	-	9.1
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

HCM 2010 TWSC  
4: W Grant Line Rd & Main Driveway

11/07/2019

**Intersection**

Int Delay, s/veh 3.6

**Movement** EBL EBT WBT WBR SBL SBR

Lane Configurations	↘	↑	↑	↗	↘	↗
Traffic Vol, veh/h	63	211	192	120	102	42
Future Vol, veh/h	63	211	192	120	102	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	116	-	-	0	0	-
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	68	229	209	130	111	46

**Major/Minor** Major1 Major2 Minor2

Conflicting Flow All	339	0	-	0	574	209
Stage 1	-	-	-	-	209	-
Stage 2	-	-	-	-	365	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1220	-	-	-	480	831
Stage 1	-	-	-	-	826	-
Stage 2	-	-	-	-	702	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1220	-	-	-	453	831
Mov Cap-2 Maneuver	-	-	-	-	453	-
Stage 1	-	-	-	-	780	-
Stage 2	-	-	-	-	702	-

**Approach** EB WB SB

HCM Control Delay, s	1.9	0	14.8
HCM LOS			B

**Minor Lane/Major Mvmt** EBL EBT WBT WBR SBLn1

Capacity (veh/h)	1220	-	-	-	522
HCM Lane V/C Ratio	0.056	-	-	-	0.3
HCM Control Delay (s)	8.1	-	-	-	14.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	1.3

**Intersection**

Int Delay, s/veh 4.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↑	↑
Traffic Vol, veh/h	0	313	270	0	153	42
Future Vol, veh/h	0	313	270	0	153	42
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, #	-	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	0	340	293	0	166	46

**Major/Minor**

	Major1	Major2	Minor2		
Conflicting Flow All	-	0	-	0	633 293
Stage 1	-	-	-	-	293 -
Stage 2	-	-	-	-	340 -
Critical Hdwy	-	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	-	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	0	-	-	0	444 746
Stage 1	0	-	-	0	757 -
Stage 2	0	-	-	0	721 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	444 746
Mov Cap-2 Maneuver	-	-	-	-	444 -
Stage 1	-	-	-	-	757 -
Stage 2	-	-	-	-	721 -

**Approach**

	EB	WB	SB
HCM Control Delay, s	0	0	18
HCM LOS			C

**Minor Lane/Major Mvmt**

	EBT	WBT	SBLn1
Capacity (veh/h)	-	-	486
HCM Lane V/C Ratio	-	-	0.436
HCM Control Delay (s)	-	-	18
HCM Lane LOS	-	-	C
HCM 95th %tile Q(veh)	-	-	2.2



Queuing and Blocking Report  
Existing + Project

11/07/2019

Intersection: 3: W Grant Line Rd & West Driveway

Movement	EB	WB	SB
Directions Served	L	R	R
Maximum Queue (ft)	37	6	42
Average Queue (ft)	7	0	13
95th Queue (ft)	29	4	35
Link Distance (ft)		249	252
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	216		
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: W Grant Line Rd & Main Driveway

Movement	EB	WB	SB
Directions Served	L	R	LR
Maximum Queue (ft)	52	28	93
Average Queue (ft)	16	1	45
95th Queue (ft)	45	11	75
Link Distance (ft)		213	309
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	120		
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: W Grant Line Rd & East Driveway

Movement	WB	SB
Directions Served	T	LR
Maximum Queue (ft)	6	91
Average Queue (ft)	0	46
95th Queue (ft)	4	78
Link Distance (ft)	154	302
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

