



TECHNICAL MEMORANDUM

Date: November 20, 2019

To: Roger A. Montes
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Project No.: Amendment 2 - Newell
Bridge Supplemental
Traffic Analysis

From: Ruta Jariwala
Project Manager

Jurisdiction: City of Palo Alto

Subject: **Comparison of Peak Hour Volumes at Newell Road/Woodland Avenue for Vehicles, Pedestrian, and Bikes**

The purpose of this memorandum is to compare the peak hour turning movement counts conducted at the intersection of Newell Road/Woodland Avenue. The analysis will compare vehicular, pedestrian and bicycle counts conducted in February 2016 and August 2019 for the a.m. and p.m. peak hours. The purpose is also to determine if the conclusions of the EIR analysis would change or remain the same with the updated data collection.

DATA COLLECTION

TJKM collected the intersection turning movement counts at Newell Road/Woodland Avenue for vehicles, pedestrians, and bicycles on Wednesday, February 24, 2016 on a typical weekday. The turning movement counts were collected for the weekday a.m. (7:00 a.m. – 9:00 a.m.) and p.m. (4:00 p.m. – 6:00 p.m.) peak periods. The City of Palo Alto collected the turning movement counts at Newell Road/Woodland Avenue on Wednesday, August 28, 2019 for the same a.m. and p.m. peak periods. **Appendix A** contains the turning movement counts for Newell Road/Woodland Avenue from 2016 and 2019.

VEHICULAR VOLUME COMPARISON

Tables 1 and **2** summarize the comparison between the 2016 and 2019 vehicular counts at the intersection of Newell Road/Woodland Avenue for the a.m. and p.m. peak hour, respectively.

Table 1: A.M. Peak Hour Vehicular Volume Comparison

Intersection	Year	Movement											Total Entering Volume	
		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT		WBR
Newell Road/Woodland Avenue	2016	43	8	10	9	53	37	21	19	138	34	31	7	410
	2019	48	11	11	9	65	39	18	32	123	44	47	8	455
Percent Difference		12%	38%	10%	0%	23%	5%	-14%	68%	-11%	29%	52%	14%	11%

Notes: NB – Northbound
 SB – Southbound
 EB – Eastbound
 WB – Westbound
 L, T, R – Left, Through, Right, respectively

Table 2: P.M. Peak Hour Vehicular Volume Comparison

Intersection	Year	Movement											Total Entering Volume	
		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT		WBR
Newell Road/Woodland Avenue	2016	240	61	19	9	26	53	31	21	41	10	40	16	567
	2019	194	47	30	9	20	23	40	24	39	10	19	12	467
Percent Difference		-19%	-23%	58%	0%	-23%	-57%	29%	14%	-5%	0%	-53%	-25%	-18%

Notes: NB – Northbound
 SB – Southbound
 EB – Eastbound
 WB – Westbound
 L, T, R – Left, Through, Right, respectively

PEDESTRIAN AND BICYCLE VOLUME COMPARISON

Tables 3 and 4 summarize the comparison between the pedestrian counts at the study intersection for the a.m. and p.m. peak hour, respectively.

Table 3: A.M. Peak Hour Pedestrian Volume Comparison

Intersection	Year	Crossing Leg				Total Entering Volume
		North	South	East	West	
Newell Road/Woodland Avenue	2016	8	3	2	3	16
	2019	22	2	2	9	35

Notes: **Bold** indicates pedestrians using Newell Bridge.

Table 4: P.M. Peak Hour Pedestrian Volume Comparison

Intersection	Year	Crossing Leg				Total Entering Volume
		North	South	East	West	
Newell Road/Woodland Avenue	2016	6	3	1	0	10
	2019	19	3	7	3	32

Notes: **Bold** indicates pedestrians using Newell Bridge.

Tables 5 and 6 summarize the comparison between the bicycle counts at the study intersection for the a.m. and p.m. peak hour respectively.

Table 5: A.M. Peak Hour Bicycle Volume Comparison

Intersection	Year	Movement											Total Entering Volume	
		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT		WBR
Newell Road/Woodland Avenue	2016	0	0	0	0	2	1	0	0	10	1	0	0	14
	2019	1	5	1	0	38	1	0	2	7	8	1	0	64

Notes: NB – Northbound, SB – Southbound, EB – Eastbound, WB – Westbound
L, T, R – Left, Through, Right, respectively.
Bold indicates bicyclists using Newell Bridge.

Table 6: P.M. Peak Hour Bicycle Volume Comparison

Intersection	Year	Movement											Total Entering Volume	
		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT		WBR
Newell Road/Woodland Avenue	2016	0	0	2	0	0	0	0	1	0	1	2	0	6
	2019	0	10	3	1	8	0	1	0	6	0	3	0	32

Notes: NB – Northbound, SB – Southbound, EB – Eastbound, WB – Westbound
L, T, R – Left, Through, Right, respectively.
Bold indicates bicyclists using Newell Bridge.

Based on the recently collected turning movement counts, the number of pedestrians using Newell Bridge has increased. In the a.m. peak, the number of pedestrians using the bridge increased from 5 to 11 pedestrians and in the p.m. peak, pedestrians increased from 1 to 10 pedestrians. Similarly, the number of bicyclists using Newell Bridge have also increased. In the a.m. peak, the number of bicyclists increased from 13 to 60 bicycles and in the p.m. peak, bicyclists increased from 3 to 27 bicycles. The increase in pedestrian and bicycle traffic can be attributed to the recent opening of the Clarke Avenue-Hwy 101 Bicycle/Pedestrian Overcross Bridge.

The observed bicycle volumes in 2019 are well below the practical capacity of Class 2 bicycle lanes or Class 3 shared travel lanes. The 2019 counts indicated 64 bicycles during the a.m. peak



hour (thus an average of one bicycle every 56 seconds, or approximately one bicycle per minute) and 32 bicycles during the p.m. peak hour (thus an average of one bicycle every 112 seconds, or slightly more than one bicycle every two minutes). Based on that data, gaps of approximately one to two minutes typically occur between bicyclists under existing conditions.

SUMMARY

Traffic impacts would remain less than significant based on the 2019 volume counts. The 2019 counts found that p.m. peak hour traffic volumes were 18 percent lower than the 2016 counts (total intersection volume reduced from 567 to 467 vehicles, thus a net reduction of 100 vehicles). During the a.m. peak hour, the 2019 counts found that a.m. peak hour traffic volumes were 11 percent higher than 2016 counts (total intersection volume increased from 410 to 455 vehicles— thus still a lower volume than the 2016 p.m. peak hour counts that found impacts to be less than significant), which is a net increase of just 45 vehicles spread among all four approaches. Traffic increases of less than 100 vehicles are unlikely to result in traffic impacts and would not change the LOS for the proposed alternative.

In the three years since the last time turning movement counts were conducted, the number of pedestrians and bicyclists using Newell Bridge has increased. This increase can be attributed to the Bicycle/Pedestrian Overcross Bridge that connects Palo Alto/East Palo Alto to East Palo Alto, north of US 101. Based on the collected data, bicycle and pedestrian impacts would remain less than significant.



TJKM

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APPENDIX A – TURNING MOVEMENT COUNTS



Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Woodland Ave				Woodland Ave				Newell Rd				Newell Rd				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		
7:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	
7:15 AM	0	1	2	2	0	0	3	0	0	0	0	0	0	0	0	8	0	
7:30 AM	0	1	0	0	0	0	1	0	0	0	0	0	2	4	0	8	0	
7:45 AM	0	2	0	0	0	0	2	0	0	0	0	0	0	2	1	7	24	
8:00 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	4	27	
8:15 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	20	
8:30 AM	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	3	15	
8:45 AM	0	1	0	3	0	0	0	0	0	0	0	0	0	0	2	6	14	
Count Total	0	7	2	6	0	0	9	0	0	0	0	0	2	8	4	38	0	
Peak Hour	0	5	0	1	0	0	3	0	0	0	0	0	2	8	1	20	0	

Two-Hour Count Summaries - Bikes																	
Interval Start	Woodland Ave			Woodland Ave			Newell Rd			Newell Rd			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	1	0			
7:15 AM	0	0	0	0	1	0	0	0	0	0	0	1	2	0			
7:30 AM	0	0	1	0	0	0	0	0	0	0	0	0	1	0			
7:45 AM	0	0	2	0	0	0	0	0	0	0	0	0	2	6			
8:00 AM	0	0	2	0	0	0	0	0	0	0	1	0	3	8			
8:15 AM	0	0	5	1	0	0	0	0	0	0	1	1	8	14			
8:30 AM	0	0	3	0	0	0	1	0	0	0	2	0	6	19			
8:45 AM	0	0	2	1	0	0	0	0	0	0	1	0	4	21			
Count Total	0	0	15	2	1	0	1	0	0	0	6	2	27	0			
Peak Hour	0	0	10	1	0	0	0	0	0	0	2	1	14	0			

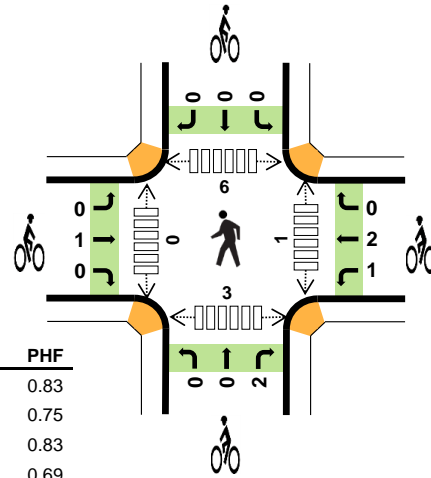
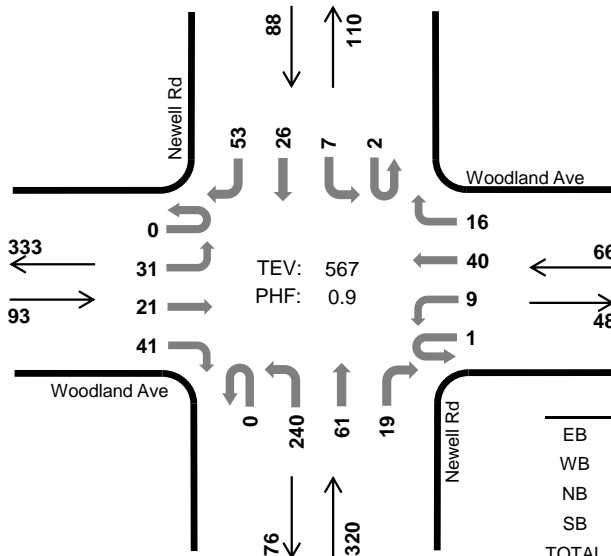
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Newell Rd Woodland Ave



Peak Hour

Date: 02/24/2016
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:00 PM to 5:00 PM



	HV %:	PHF
EB	1.1%	0.83
WB	1.5%	0.75
NB	2.2%	0.83
SB	0.0%	0.69
TOTAL	1.6%	0.90

Two-Hour Count Summaries

Interval Start	Woodland Ave Eastbound				Woodland Ave Westbound				Newell Rd Northbound				Newell Rd Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	0	5	5	8	0	2	9	5	0	66	15	3	0	0	2	15	135	0	
4:15 PM	0	11	4	10	0	2	10	3	0	72	16	8	0	3	4	14	157	0	
4:30 PM	0	9	8	11	0	2	6	5	0	56	15	5	2	2	13	15	149	0	
4:45 PM	0	6	4	12	1	3	15	3	0	46	15	3	0	2	7	9	126	567	
5:00 PM	0	7	6	10	0	2	7	0	0	50	9	6	1	4	4	7	113	545	
5:15 PM	0	6	7	12	0	5	7	5	0	38	11	9	0	3	7	11	121	509	
5:30 PM	0	2	7	18	1	2	12	6	0	35	9	6	0	3	2	5	108	468	
5:45 PM	0	4	11	12	0	5	5	3	0	49	11	7	1	1	8	9	126	468	
Count Total	0	50	52	93	2	23	71	30	0	412	101	47	4	18	47	85	1,035	0	
Peak Hour	All	0	31	21	41	1	9	40	16	0	240	61	19	2	7	26	53	567	0
	HV	0	1	0	0	0	0	1	0	0	6	1	0	0	0	0	0	9	0
	HV%	-	3%	0%	0%	0%	0%	3%	0%	-	3%	2%	0%	0%	0%	0%	0%	2%	0

Note: Two-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
4:00 PM	0	1	2	0	3	0	1	0	0	1	0	0	1	1	2
4:15 PM	0	0	1	0	1	0	0	2	0	2	0	0	1	2	3
4:30 PM	1	0	1	0	2	1	2	0	0	3	0	0	2	0	2
4:45 PM	0	0	3	0	3	0	0	0	0	0	1	0	2	0	3
5:00 PM	0	1	0	0	1	0	0	2	0	2	0	1	2	1	4
5:15 PM	0	0	0	0	0	1	0	4	0	5	0	1	2	0	3
5:30 PM	0	1	0	0	1	0	1	5	0	6	1	4	1	0	6
5:45 PM	0	0	0	2	2	0	1	2	0	3	5	2	2	0	9
Count Total	1	3	7	2	13	2	5	15	0	22	7	8	13	4	32
Peak Hour	1	1	7	0	9	1	3	2	0	6	1	0	6	3	10

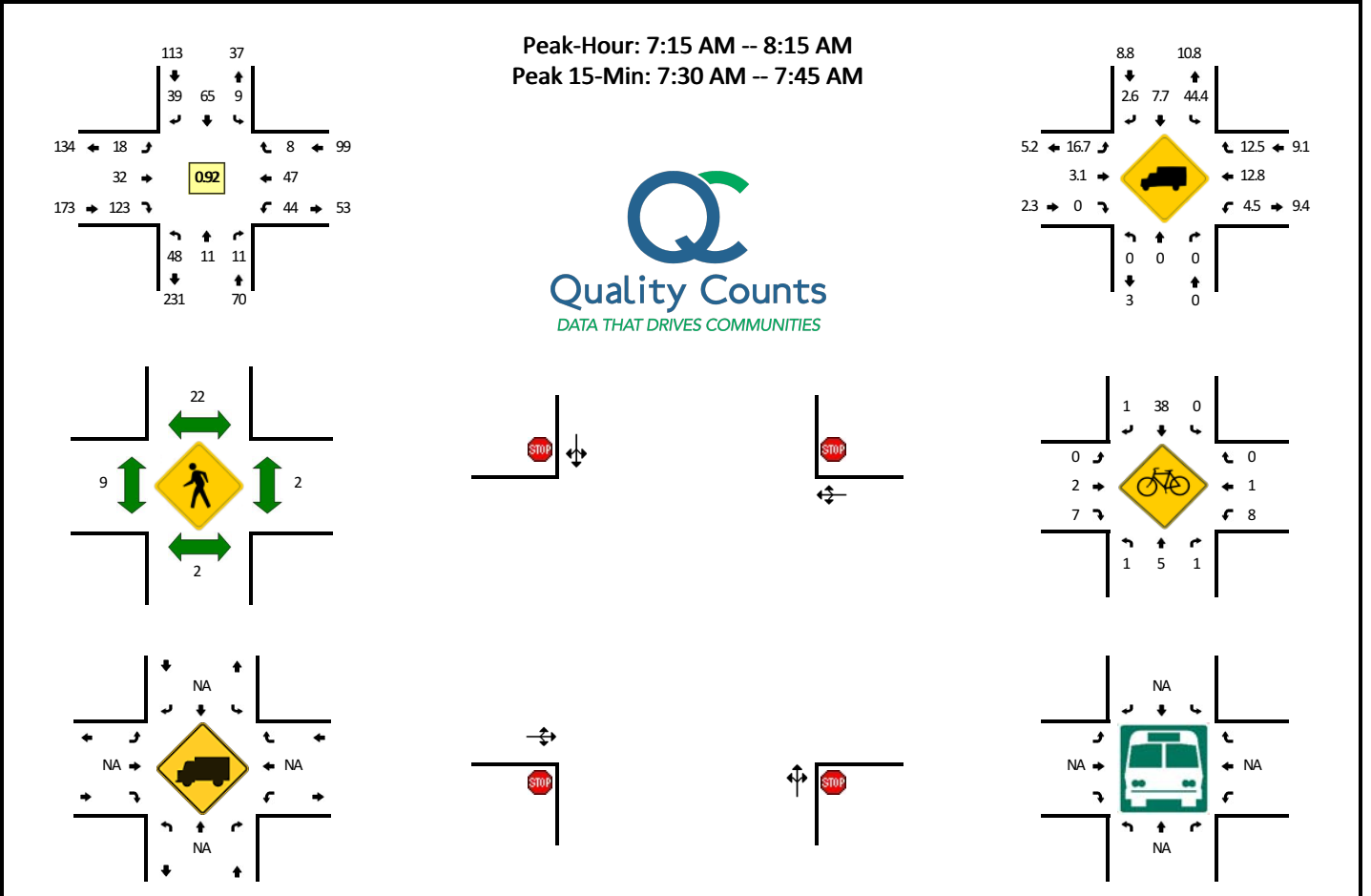
Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Woodland Ave				Woodland Ave				Newell Rd				Newell Rd				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	3	0
4:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0
4:30 PM	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0
4:45 PM	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	3	9
5:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	7
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
5:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	5
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	4
Count Total	0	1	0	0	0	0	3	0	0	6	1	0	0	0	1	1	13	0
Peak Hour	0	1	0	0	0	0	1	0	0	6	1	0	0	0	0	0	9	0

Two-Hour Count Summaries - Bikes																	
Interval Start	Woodland Ave			Woodland Ave			Newell Rd			Newell Rd			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
4:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0
4:15 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0
4:30 PM	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	3	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
5:00 PM	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	7
5:15 PM	0	0	1	0	0	0	0	0	3	1	0	0	0	0	0	5	10
5:30 PM	0	0	0	1	0	0	0	2	1	2	0	0	0	0	0	6	13
5:45 PM	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	3	16
Count Total	0	1	1	3	2	0	0	5	4	6	0	0	0	0	0	22	0
Peak Hour	0	1	0	1	2	0	0	0	0	2	0	0	0	0	0	6	0

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

LOCATION: Newell Rd -- Woodland Ave
CITY/STATE: Palo Alto, CA

QC JOB #: 15040101
DATE: Wed, Aug 28 2019

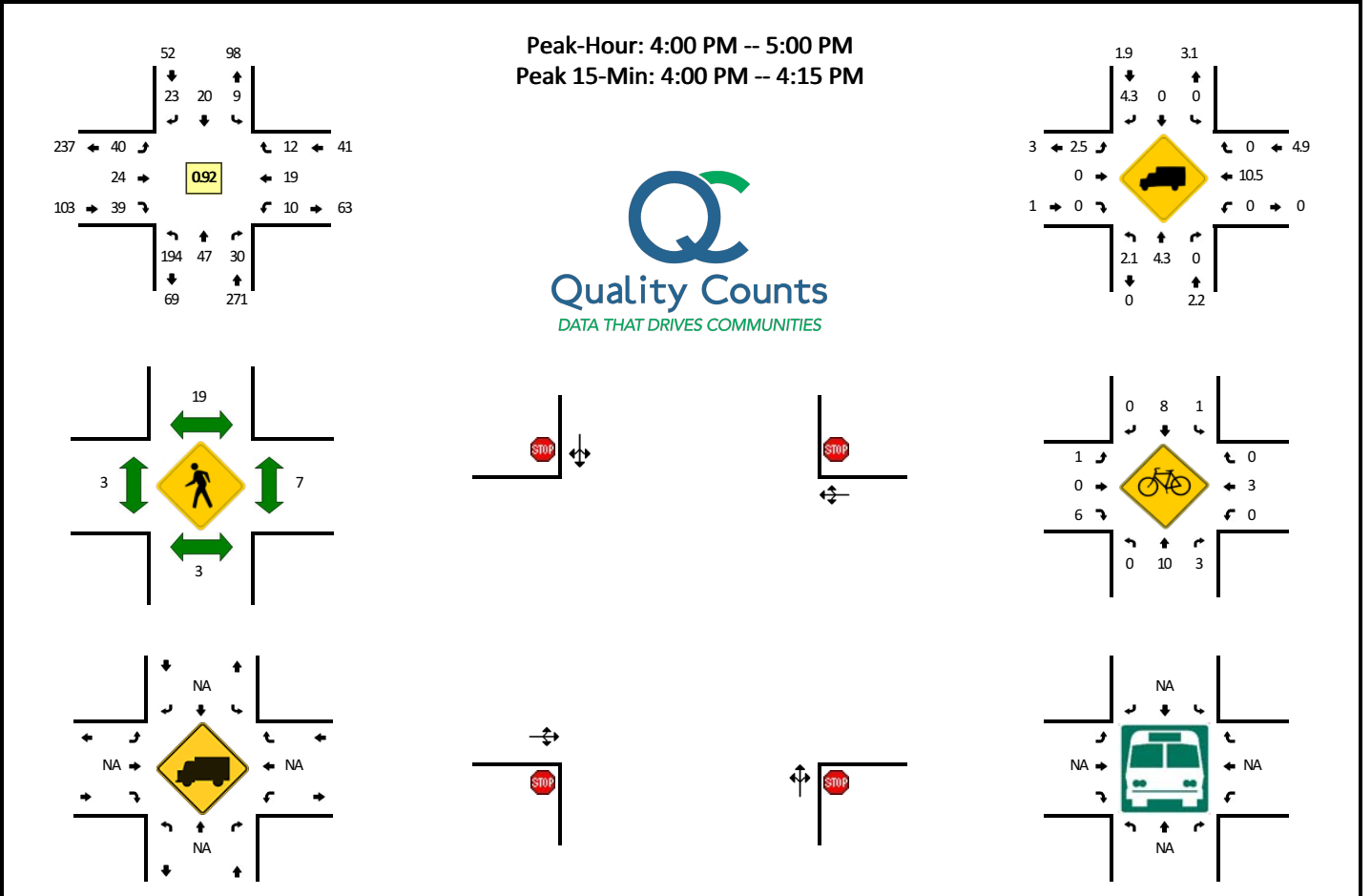


15-Min Count Period Beginning At	Newell Rd (Northbound)				Newell Rd (Southbound)				Woodland Ave (Eastbound)				Woodland Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	3	2	7	0	3	9	5	0	3	5	16	0	4	16	0	0	73	
7:15 AM	9	3	2	0	3	10	12	0	6	8	18	0	9	17	2	1	100	
7:30 AM	14	3	2	0	2	22	7	0	6	10	40	0	9	6	3	0	124	
7:45 AM	9	1	2	0	1	17	8	0	1	7	38	0	14	11	2	0	111	408
8:00 AM	16	4	5	0	3	16	12	0	5	7	27	0	11	13	1	0	120	455
8:15 AM	19	12	1	0	0	8	8	0	2	8	20	0	7	12	1	0	98	453
8:30 AM	13	7	5	0	1	6	7	0	6	0	19	0	2	8	1	0	75	404
8:45 AM	8	3	2	0	2	7	7	0	6	7	18	0	6	8	2	0	76	369
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	56	12	8	0	8	88	28	0	24	40	160	0	36	24	12	0	496	
Heavy Trucks	0	0	0		8	12	0		8	0	0		0	4	4		36	
Pedestrians		4				16				16				8			44	
Bicycles		1	0			6	1			0	4		3	1	0		16	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: Newell Rd -- Woodland Ave
CITY/STATE: Palo Alto, CA

QC JOB #: 15040102
DATE: Wed, Aug 28 2019



15-Min Count Period Beginning At	Newell Rd (Northbound)				Newell Rd (Southbound)				Woodland Ave (Eastbound)				Woodland Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	56	9	7	0	4	7	4	0	13	5	10	0	2	5	5	0	127	
4:15 PM	38	11	0	0	0	5	8	0	8	5	14	1	3	5	4	0	102	
4:30 PM	54	15	8	0	2	4	2	0	11	7	7	0	0	4	0	0	114	
4:45 PM	46	12	15	0	3	4	9	0	7	7	8	0	5	5	3	0	124	467
5:00 PM	34	8	2	1	3	2	3	1	7	8	11	2	5	8	1	1	97	437
5:15 PM	25	11	8	0	2	6	10	0	3	11	13	0	6	7	4	0	106	441
5:30 PM	26	10	5	0	3	6	10	0	9	7	11	0	3	9	2	0	101	428
5:45 PM	29	8	6	0	1	6	5	0	7	13	11	1	2	8	1	0	98	402
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	224	36	28	0	16	28	16	0	52	20	40	0	8	20	20	0	508	
Heavy Trucks	4	4	0		0	0	0		4	0	0		0	0	0		12	
Pedestrians		0				12				0				4			16	
Bicycles		4	2			4	0			0	0			1	0		13	
Railroad																		
Stopped Buses																		

Comments: