George W. Nickelson, P.E.

Traffic Engineering – Transportation Planning

December 16, 2010

Mr. Kent Rasmussen
Kent Rasmussen Winery
1001 Silverado Trail South
St. Helena, CA 94574

Subject: ***Updated Traffic Analysis for a Proposed Production/Visitor Expansion at the Ramsay Winery on Silverado Trail in Napa County***

Dear Mr. Rasmussen:

The attached updated report summarizes our traffic analysis of the proposed winery expansion on Silverado Trail in Napa County (see Figure 1 for site location map). This updated analysis reflects revisions in the winery's proposed production and visitor characteristics.

Our analysis has determined that the proposed winery expansion would not significantly impact traffic conditions. The available sight distance along Silverado Trail would be adequate, and traffic increases at the access road intersection with Silverado Trail would not have a measurable effect on the intersection's operation. The traffic volumes on the Winery driveway and on Silverado Trail would, however exceed the threshold at which a left turn lane would be warranted in Silverado Trail.

I trust that this report responds to your needs. Please review this information and call me with any questions or comments.

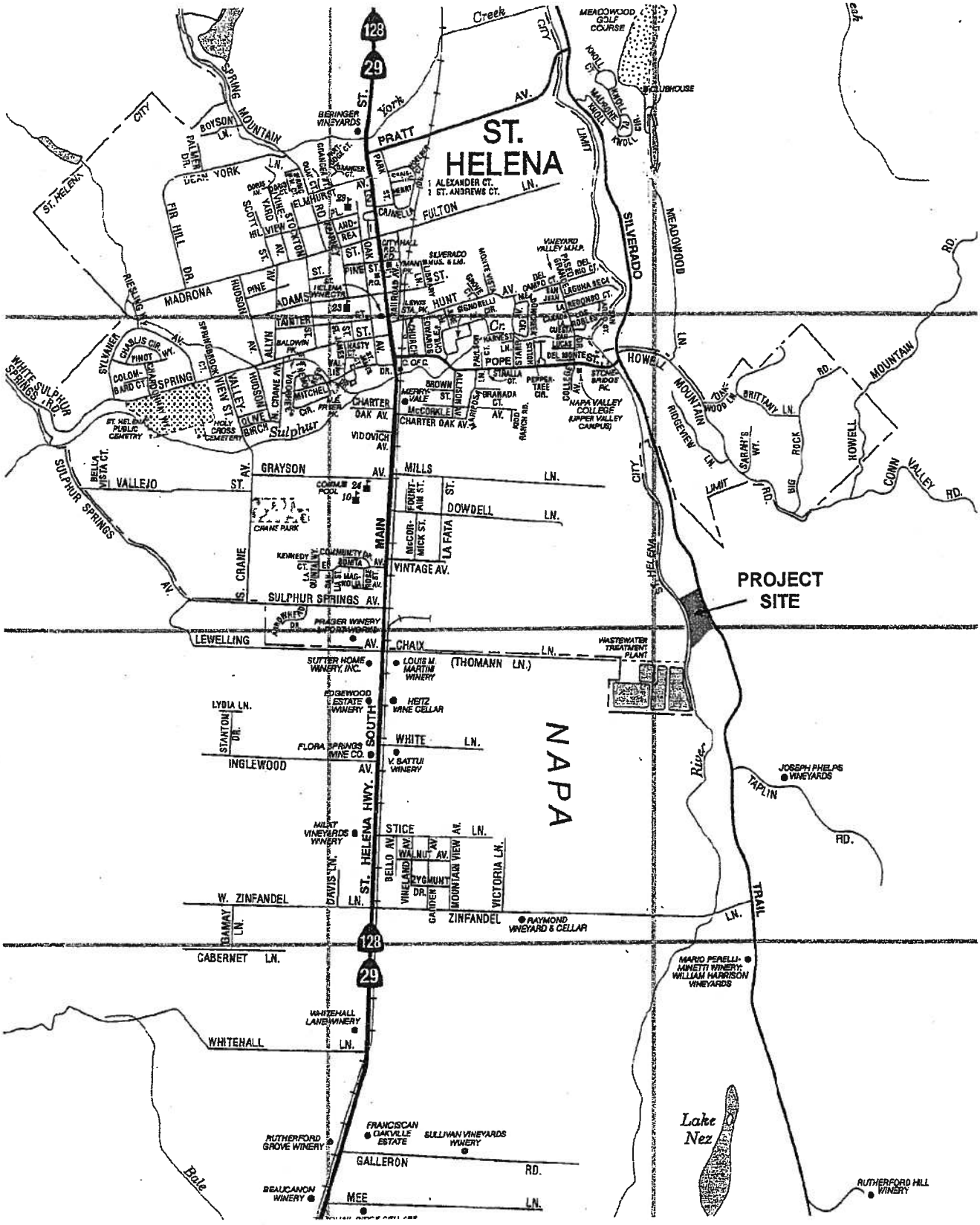
Sincerely,

George Nickelson

George W. Nickelson, P.E.

Copies: Donna Oldford
Paul Bartelt

1901 Olympic Blvd., Suite 120 Walnut Creek, CA 94596 (925) 935-5014 Fax (925) 935-2247



George W. Nickelson, P.E.

figure 1

1. Existing Traffic Conditions

a. Traffic Operations

Silverado Trail provides a primary north-south Napa County access along the east side of the Napa Valley and is a two-lane rural road in the area of the Ramsay Winery. In the vicinity of the proposed project, Silverado Trail has two travel lanes and paved shoulders/bike lanes on both sides of the road.

Based on Napa County records, Silverado Trail has an average daily traffic volume of about 8,500 vehicles and a weekday PM peak hour volume of 866 vehicles between Pope Street and Taplin Road.[1] Based on the volume and observed vehicle speeds, the operation would be categorized as in the Level of Service (LOS) "B" range.[2][3]

New traffic counts were conducted at the Silverado Trail site access during a weekday PM peak commute period (4-6 PM) and the Saturday afternoon peak period (1-3 PM).[4] The counted two-way volume on Silverado Trail was 750 vehicles on a Saturday and 800 vehicles on a weekday. Because the counts for this study were conducted in March, the volumes reflect traffic flows during the somewhat lighter late winter travel season. It is projected that peak season two-way volumes would be about 5-10% higher or 860 weekday peak hour vehicles and 810 Saturday peak hour vehicles.

The existing traffic in/out of the site is very low with only 2 inbound/outbound vehicles counted during the weekday PM peak hour. During the Saturday afternoon peak hour, a total of 4 inbound/outbound vehicles were counted. On a daily basis, there are an estimated 25 weekday and Saturday trips in/out of the winery (assuming the two existing residential units generate 10 trips each and the winery employees and miscellaneous activities generate 5 trips). As outlined in Table 1, the delays for vehicles outbound from the access are comparable during both the weekday PM peak hour and Saturday afternoon peak hour - the outbound traffic operation was calculated at LOS "B" with short delays (LOS definitions and calculations are attached as appendices).

b. Vehicle Speeds and Sight Distance on Silverado Trail

The primary issues for access design are the vehicle visibility and operation relative to vehicles traveling on Silverado Trail and vehicles turning in/out of the access road. The required vehicle visibility or "corner sight distance" is a function of the travel speeds on Silverado Trail. Caltrans design standards indicate that for appropriate corner sight distance, "a substantially clear line of sight should be maintained between the driver of a vehicle waiting at the cross road and the driver of an approaching vehicle in the right lane of the main highway.".[5] Caltrans design guidelines also indicate that at private access intersections the minimum corner sight distance "shall be equal to the stopping sight distance".

Based on new radar surveys at the site access, the "critical" vehicle speeds (85% of all surveyed

TABLE 1
EXISTING AND PROJECTED OPERATION AT THE RAMSAY WINERY ACCESS ON SILVERADO TRAIL LEVEL OF SERVICE (LOS) AND SECONDS OF DELAY

Intersection Scenario	Weekday PM Peak Hour		Saturday Afternoon Peak Hour	
	Outbound	Inbound Left Turn	Outbound	Inbound Left Turn
Existing	LOS B/ 14.6 seconds	N.A.[1]	LOS B/ 10.9 seconds	LOS A/ 8.3 seconds
Existing + Project	LOS B/ 14.7 seconds	N.A.[1]	LOS B/ 13.0 seconds	LOS A/ 8.3 seconds

(1) During the weekday PM peak hour, there were no inbound left turns counted at the winery driveway. The projected traffic increase would also represent outbound trips during this peak hour.

vehicles travel at or below the critical speed) along Silverado Trail were measured (in both directions) at about 53-54 mph.[6] Caltrans' design standards indicate that a 55 mph vehicle speed requires a stopping sight distance of about 500 feet, measured along the travel lanes on Silverado Trail.[7] Our preliminary field measurements indicate about 500 feet of visibility to the north, meeting the Caltrans standard. To the south, visibility is somewhat impaired by a fence and tree immediately south of the driveway, but with removal/pruning of this tree and a slight relocation of the fence, it appears that the necessary 500 feet could be provided to the south.

c. Internal Circulation

The project would be served by the existing paved driveway which connects with Silverado Trail. The driveway is about 20 feet wide at its narrowest, flaring to about a 35 foot width at its intersection with Silverado Trail. This pavement width would exceed the Napa County standard of 18 feet for a driveway of this type.[8]

2. Traffic Effects of the Proposed Project

a. Traffic Operations Impacts of the Proposed Winery

A key element of this analysis is to clearly identify the new traffic associated with the proposed production increases and new visitor program at the winery. The typical traffic that would be added to the roadways would represent visitor trips as well as those activities associated with the importation and processing of grapes and bottling/shipping of wine, deliveries of equipment and supplies, employees and other periodic deliveries.

In addition to a production increase (from 40,000 gallons to 100,000 gallons), the winery is proposing a visitor program. Public visitation would be by appointment with a maximum of 48 visitors per day (the analysis assumes typically 24 people on a weekday and 48 people on a Saturday). It is also noted that the existing guest cottage (a full time rental unit) on the site would be converted to a winery hospitality facility. Based on Institute of Transportation Engineers (ITE) trip rates, elimination of the guest cottage would reduce the trip generation by 10 daily trips and 1 trip in each peak hour.[9]

The net increase in traffic generation due to the proposed winery expansion and elimination of the guest cottage has been calculated in Table 2. On a typical weekday 10 added daily trips would be generated and on a typical Saturday 26 added daily trips would be generated. During the 6-week harvest season, the traffic increase would be 16 daily trips.

Assuming the added daily trips would be distributed equally to/from the north and south, the daily traffic due to the proposed project would add about 0.1%-0.2% to existing volumes on Silverado Trail. This change would not be measurable within the typical daily fluctuations in traffic and traffic operations would be unchanged. The peak hour LOS and delays at the access intersection would be unchanged as a result the added trips due to the proposed Ramsay Winery expansion project (see Table 1). It is also noted that the grape delivery trucks would be scheduled for evening

deliveries, well after peak traffic flow periods on Silverado Trail.

Consideration has also been given to proposed winery events. The winery visitor program would include 4 events per month with up to 24 persons, 4 annual events of up to 75 persons and 1 annual event with up to 125 persons (the annual Napa Valley Vintner's Association event). As shown in Table 2, during each of the four annual winery events (for up to 75 persons), a total of 58 added daily trips would be generated. On such event days, the winery trips would add about 0.3% to existing daily volumes on Silverado Trail (assuming a relatively even north-south distribution). This increase would not be measurable within the typical flows on Silverado Trail. It is also recognized that these events would occur in the evening hours and would not generate trips during either the weekday PM peak commute hours or the Saturday afternoon peak hours.

b. Site Access

The Ramsay Winery would continue to use the existing driveway on Silverado Trail. The driveway would serve all employee, delivery and visitor access. Again, sight distances are about 500 feet to the north and (with tree trimming/removal) about 500 feet to the south. These sight distances are adequate for the measured vehicle speeds.

The proposed Ramsay Winery project would add 5 trips to the weekday peak hour volumes and 9 trips to the Saturday peak hour at the access intersection with Silverado Trail (with the conservative assumption that peak hour volumes represent about 20% of added daily winery volumes). It is assumed that the weekday peak hour trips would all be outbound and that the Saturday trips would reflect 5 inbound and 4 outbound trips. The total peak hour volumes are shown on Figure 2. With these increases, the delays for outbound vehicles would remain very satisfactory - LOS "B" during both the weekday PM peak hour and Saturday afternoon peak hour.

With the proposed winery expansion and elimination of the existing guest cottage, the daily site traffic would be 25 weekday trips (15 existing + 10 due to the project) and 41 Saturday trips (15 existing + 26 due to the project). The combination of traffic on Silverado Trail and winery driveway traffic would exceed the Napa County warrant for providing a left turn lane in Silverado Trail (left turn lane graph attached as an appendix).[9] The peak hour inbound left turn volume would be a maximum of 3 vehicles in the Saturday afternoon peak hour. Based on Caltrans design standards, only one vehicle would be expected to queue at any given time, but Caltrans recommends a minimum 50 foot left-turn storage lane.[10]

The projected volumes in/out of the site driveway are well below minimum thresholds at which a right-turn lane would be required (right turn lane warrant attached as an appendix).[11] It is noted that the paved shoulder area widens to provide a right turn taper at the winery driveway. At its intersection with Silverado Trail, the driveway design appears satisfactory to accommodate turn paths for inbound and outbound right-turns by trucks.

c. Internal Circulation

The total traffic in/out of the winery would be 25-41 daily trips. The existing 20 foot driveway

exceeds the Napa County standard of 18 feet. The driveway could readily accommodate the expected volumes.

3. Summary and Conclusions

The traffic generated by the proposed Ramsay Winery expansion project would have no measurable effects on traffic flows along Silverado Trail. The added trips would increase Silverado Trail traffic volumes by about 0.1%-0.2% and the road's operation would be unchanged. During the winery events (four times annually), the winery traffic would add about 0.3% to Silverado Trail volumes – again, this change would not be measurable.

Based on field measurements, the available site distance along Silverado Trail would be adequate for the prevailing speeds. However, it is recommended that the project's design engineer confirm the adequacy of sight distance.

Traffic increases at the access road intersection with Silverado Trail would not have a measurable effect on the intersection's operation. The daily traffic volumes would warrant a left turn lane on Silverado Trail, and a 50 foot lane would provide adequate storage for existing and project vehicles. Driveway volumes would be well below the threshold at which a right turn lane would be warranted.

The winery is served by a 20-foot wide access road, designed to exceed the Napa County standard of 18 feet. Overall, the access road would reflect an appropriate design (as determined by Napa County) to accommodate the existing and projected traffic flows.

References:

(1) Napa County, traffic volumes for Silverado Trail based on April 2003 count data.

(2) Transportation Research Board (TRB), *Highway Capacity Manual - Special Report 209*, 1994.

(3) TRB, *Highway Capacity Manual*, 2000.

(4) George W. Nickelson, P.E., traffic counts on March 4, 2010 and March 6, 2010.

(5) Caltrans, *Highway Design Manual – Fifth Edition*, July 1, 2004.

(6) George W. Nickelson, P.E., radar surveys on March 4, 2010 and March 6, 2010.

(7) Caltrans, ibid.

(8) Napa County, *Adopted Road and Street Standards*, revised August 31, 2004.

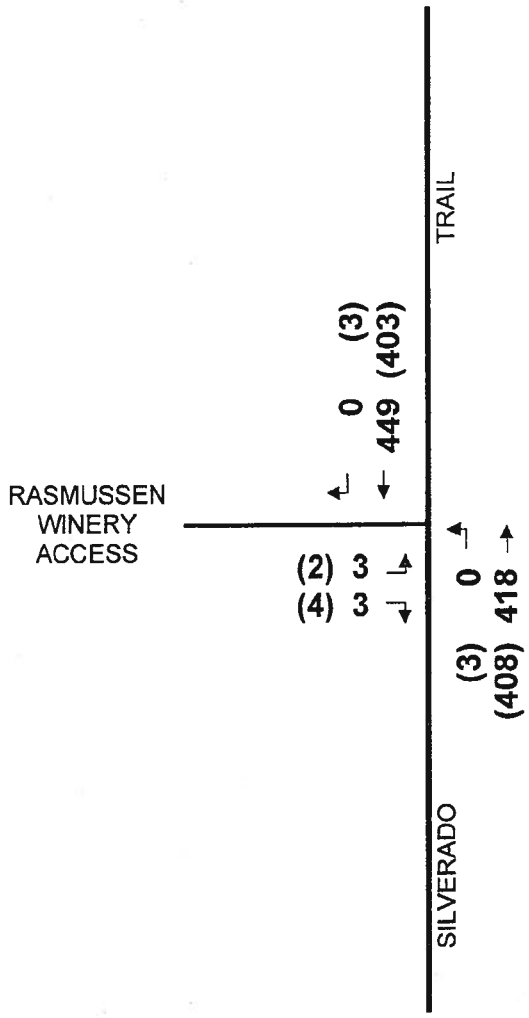
(9) ITE, *Trip Generation – An ITE Informational Report, 8th Edition*, 2008.

(10) Napa County, *Adopted Road and Street Standards*, revised August 31, 2004.

(11) Caltrans, *Guidelines for Reconstruction of Intersections,* August 1985. The maximum peak hour northbound left turn volume is 4 vehicles, requiring 1 vehicle storage, calculated as follows:

- 4 hourly vehicles/60 x 2 minutes of storage = 0.1 or 1 vehicle.

(12) Transportation Research Board, *Report 279 – Intersection Channelization Design Guide*, 1985.



NOT TO SCALE

Weekday and (Saturday) Peak Hour Traffic With Project Trips

North

George W. Nickelson, P.E.

figure 2

TABLE 2
NET INCREASE IN DAILY TRIP GENERATION
FOR THE PROPOSED RAMSAY WINERY EXPANSION

Added Daily Traffic During a Typical Weekday:		
• 24 visitors/2.6 per vehicle x 2 one-way trips	=	18 daily trips
• 1 added truck x 2 one-way trips per truck(1)	=	2 daily trips
• Less guest cottage	=	(10 daily trips)
		10 daily trips
Added Daily Traffic During a Typical Saturday:		
• 48 visitors/2.8 per vehicle x 2 one-way trips	=	34 daily trips
• 1 added truck x 2 one-way trips per truck(1)	=	2 daily trips
• Less guest cottage	=	(10 daily trips)
		26 daily trips
Added Daily Traffic During Harvest Season (6 weeks):		
• 24 added visitors/2.6 per vehicle x 2 one-way trips	=	18 daily trips
• 2 added employees x 2 one-way trips per employee	=	4 daily trips
• 2 added trucks x 2 one-way trips per truck(2)	=	4 daily trips
• Less guest cottage	=	(10 daily trips)
		16 daily trips
Daily Traffic During a Winery Event (Four Times Annually):		
• 75 visitors/2.8 per vehicle x 2 one-way trips	=	54 daily trips
• 6 added employees x 2 one-way trips per employee	=	12 daily trips
• 1 added truck x 2 one-way trips per truck	=	2 daily trips
• Less guest cottage	=	(10 daily trips)
		58 daily trips

(1) During the 46-week non-harvest season, a maximum of 1 added daily truck would be generated related to routine deliveries associated with the increased production (60,000 gallons/2.38 gallons per case = 25,210 cases).

• 25,210 cases/2,310 cases per truck	=	11 glass delivery trucks
• 25,210 cases/1,232 cases per truck	=	20 wine shipment trucks
• 5 miscellaneous weekly deliveries	=	230 miscellaneous trucks
		261 annual trucks

261 trucks/46 weeks = 5-6 weekly trucks or about 1 added truck per day.

(2) During the 6-week harvest season, 1 added daily grape delivery truck would be generated by the 60,000 gallon (364 ton) production increase, calculated as follows:

- 364 tons of off-site grapes/10 tons per truck/6 weeks = 6 trucks/week or 1 truck/day

Together with the 5-6 added weekday routine truck deliveries, the winery expansion would generate about 2 added trucks per day during the harvest season.

APPENDICES

- Level of Service Definitions
- Level of Service Calculations
    - Radar Surveys
    - Left Turn Lane Warrant Graph
- Right Turn Lane Warrant Graph

LEVEL OF SERVICE DEFINITIONS

LEVEL OF SERVICE	SIGNALIZED INTERSECTIONS	UNSIGNALIZED INTERSECTIONS*
"A"	Uncongested operations, all queues clear in a single-signal cycle. (Average stopped delay less than 10 seconds per vehicle; V/C less than or = 0.60).	Little or no delay. (Average delay of ≤ 10 seconds)
"B"	Uncongested operations, all queues clear in a single cycle. (Average delay of 10-20 seconds; V/C=0.61-0.70).	Short traffic delays. (Average delay of >10 and ≤15 secs.)
"C"	Light congestion, occasional backups on critical approaches. (Average delay of 20-35 seconds; V/C=0.71-0.80).	Average traffic delay. (Average delay of >15 and ≤25 secs.)
"D"	Significant congestion of critical approaches but intersection functional. Cars required to wait through more than one cycle during short peaks. No long queues formed. (Average delay of 35-55 seconds; V/C=0.81-0.90).	Long traffic delays for some approaches. (Average delay of >25 and ≤35 secs.)
"E"	Severe congestion with some long standing queues on critical approaches. Blockage of intersection may occur if traffic signal does not provide for protected turning movements. Traffic queue may block nearby intersection(s) upstream of critical approach(es). (Average delay of 55-80 seconds; V/C=0.91-1.00).	Very long traffic delays for some approaches. (Average delay of >35 and ≤50 secs.)
"F"	Total breakdown, stop-and-go operation. (Average delay in excess of 80 seconds; V/C of 1.01 or greater).	Extreme traffic delays for some approaches (intersection may be blocked by external causes--delays >50 seconds).

* Level of Service refers to delays encountered by certain stop sign controlled approaches. Other approaches may operate with little delay.

Source: Transportation Research Board, Highway Capacity Manual, 2000.

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information		*Site Information*	
Analyst	GWN	Jurisdiction/Date	NAPA COUNTY 3/9/2010
Agency or Company	GWN	Major Street	SILVERADO
Analysis Period/Year	WEEKDAY 2010	Minor Street	RASMUSSEN DRIVEWAY
Comment	EXISTING WEEKDAY		

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	TR	LT	LR	
Lane 2				
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)		449	0	0	418		1		1			
PHF		0.90	0.90	0.90	0.90		0.90		0.90			
Percent of heavy vehicles, HV		3	3	3	3		3		3			
Flow rate		499	0	0	464		1		1			
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 1.00

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1	LR	2	377	0.005	0	14.6	B	14.6
	2								B
	3								
WB	1								
	2								
	3								
SB		(1)							
NB		(4)	0	1060	0.000	0	8.4	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information

Analyst	GWN
Agency or Company	GWN
Analysis Period/Year	WEEKDAY 2010
Comment	EXISTING + PROJECT WEEKDAY

Site Information

Jurisdiction/Date	NAPA COUNTY 4/16/2010
Major Street	SILVERADO
Minor Street	RASMUSSEN DRIVEWAY

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	TR	LT	LR	
Lane 2				
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)		449	0	0	418		3		3			
PHF		0.90	0.90	0.90	0.90		0.90		0.90			
Percent of heavy vehicles, HV		3	3	3	3		3		3			
Flow rate		499	0	0	464		3		3			
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 1.00

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1	LR	6	377	0.016	0	14.7	B	14.7
	2								B
	3								
WB	1								
	2								
	3								
SB	(1)								
NB	(4)		0	1060	0.000	0	8.4	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information

Analyst	GWN
Agency or Company	GWN
Analysis Period/Year	SATURDAY 2010
Comment	EXISTING SATURDAY

Site Information

Jurisdiction/Date	NAPA COUNTY 3/9/2010
Major Street	SILVERADO
Minor Street	RASMUSSEN DRIVEWAY

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	TR	LT	LR	
Lane 2				
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)		403	2	1	408		0		1			
PHF		0.90	0.90	0.90	0.90		0.90		0.90			
Percent of heavy vehicles, HV		3	3	3	3		3		3			
Flow rate		448	2	1	453		0		1			
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 1.00

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1	LR	1	608	0.002	0	10.9	B	10.9
	2								B
	3								
WB	1								
	2								
	3								
SB		①							
NB		④	1	1105	0.001	0	8.3	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information		*Site Information*	
Analyst	GWN	Jurisdiction/Date	NAPA COUNTY 4/16/2010
Agency or Company	GWN	Major Street	SILVERADO
Analysis Period/Year	SATURDAY 2010	Minor Street	RASMUSSEN DRIVEWAY
Comment	EXISTING + PROJECT SATURDAY		

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	TR	LT	LR	
Lane 2				
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)		403	3	3	408		2		4			
PHF		0.90	0.90	0.90	0.90		0.90		0.90			
Percent of heavy vehicles, HV		3	3	3	3		3		3			
Flow rate		448	3	3	453		2		4			
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 1.00

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1	LR	6	455	0.013	0	13.0	B	13.0
	2								B
	3								
WB	1								
	2								
	3								
SB		①							
NB		④	3	1104	0.003	0	8.3	A	

OMNI—MEANS LTD.

Silverado Trail approaching Rasmussen Winery

DATE: 3/4/10 Th TIME START: 4:00 pm TIME END: 6:00 pm WEATHER: Clear ROAD TYPE: 2 lanes

DIRECTION: NB SPEED LIMIT: 55 mph OBSERVER: GWN Assocs CALIBRATION TEST: Yes

SPEED	FREQUENCY	ACUM %	PERCENTAGE BREAKDOWN
42	2	2.0	**
43	2	4.0	****
44	0	4.0	****
45	2	6.0	****5*
46	8	14.0	****5****1****
47	8	22.0	****5****1****5****2**
48	6	28.0	****5****1****5****2****5***
49	4	32.0	****5****1****5****2****5****3**
50	10	42.0	****5****1****5****2****5****3****5****4**
51	12	54.0	****5****1****5****2****5****3****5****4****5****5****
52	10	64.0	****5****1****5****2****5****3****5****4****5****5****6****
53	8	72.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7**
54	18	90.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9
55	2	92.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9**
56	0	92.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9**
57	6	98.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9****5***
58	2	100.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9****5****0

100

AVERAGE SPEED = 50.8
50th PERCENTILE = 50.6
85th PERCENTILE = 53.7
90th PERCENTILE = 54
95th PERCENTILE = 56.5

PACE = 45 - 54
% IN PACE = 86
VEHICLES IN PACE = 86

SAMPLE VARIANCE = 13.30745
STANDARD DEVIATION = 3.647938
RANGE 1*S = 68
RANGE 2*S = 96
RANGE 3*S = 100

RADAR SPEED SURVEY

OMNI-MEANS LTD.

Silverado Trail approaching Rasmussen Winery

DATE: 3/4/10 Th TIME START: 4:00 pm TIME END: 6:00 pm WEATHER: Clear ROAD TYPE: 2 lanes

DIRECTION: SB SPEED LIMIT: 55 mph OBSERVER: GWN Assocs CALIBRATION TEST: Yes

SPEED	FREQUENCY	ACUM %	PERCENTAGE BREAKDOWN
43	1	1.0	*
44	1	2.0	**
45	3	5.0	****5
46	3	8.0	****5***
47	10	18.0	****5****1****5***
48	6	24.0	****5****1****5****2****
49	8	32.0	****5****1****5****2****5****3**
50	7	39.0	****5****1****5****2****5****3****5****
51	11	50.0	****5****1****5****2****5****3****5****4****5****5
52	12	62.0	****5****1****5****2****5****3****5****4****5****5****5****6**
53	10	72.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7**
54	10	82.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8**
55	11	93.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9***
56	5	98.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9****5***
57	1	99.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9****5****
58	1	100.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9****5****0

0--------10--------20--------30--------40--------50--------60--------70--------80--------90--------100

100

AVERAGE SPEED = 51.1
50th PERCENTILE = 51
85th PERCENTILE = 54.2
90th PERCENTILE = 54.7
95th PERCENTILE = 55.4

PACE = 47 - 56
% IN PACE = 90
VEHICLES IN PACE = 90

SAMPLE VARIANCE = 10.85622
STANDARD DEVIATION = 3.294878
RANGE 1*S = 64
RANGE 2*S = 97
RANGE 3*S = 100

OMNI-MEANS LTD.

Silverado Trail approaching Rasmussen Winery

DATE: 3/6/10 Sat TIME START: 1:00 pm TIME END: 3:00 pm WEATHER: Clear ROAD TYPE: 2 lanes

DIRECTION: NB SPEED LIMIT: 55 mph OBSERVER: GWN Assocs CALIBRATION TEST: Yes

SPEED	FREQUENCY	ACUM %	PERCENTAGE BREAKDOWN
38	1	1.0	*
39	0	1.0	*
40	0	1.0	*
41	0	1.0	*
42	2	3.0	***
43	2	5.0	****5
44	1	6.0	****5*
45	5	11.0	****5****1*
46	3	14.0	****5****1****
47	8	22.0	****5****1****5****2**
48	8	30.0	****5****1****5****2****5****3
49	15	45.0	****5****1****5****2****5****3****5****4****5
50	13	58.0	****5****1****5****2****5****3****5****4****5****5****5***
51	11	69.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****
52	9	78.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5***
53	7	85.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5
54	4	89.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****
55	3	92.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9**
56	6	98.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9****5***
57	1	99.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9****5****
58	1	100.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9****5****0

100

AVERAGE SPEED = 49.9
50th PERCENTILE = 49.3
85th PERCENTILE = 53
90th PERCENTILE = 54.3
95th PERCENTILE = 55.5

PACE = 47 - 56
% IN PACE = 84
VEHICLES IN PACE = 84

SAMPLE VARIANCE = 12.88242
STANDARD DEVIATION = 3.589209
RANGE 1*S = 71
RANGE 2*S = 96
RANGE 3*S = 99

RADAR SPEED SURVEY

OMNI—MEANS LTD.

Silverado Trail approaching Rasmussen Winery

DATE: 3/6/10 Sat TIME START: 1:00 pm TIME END: 3:00 pm WEATHER: Clear ROAD TYPE: 2 lanes

DIRECTION: SB SPEED LIMIT: 55 mph OBSERVER: GWN Assocs CALIBRATION TEST: Yes

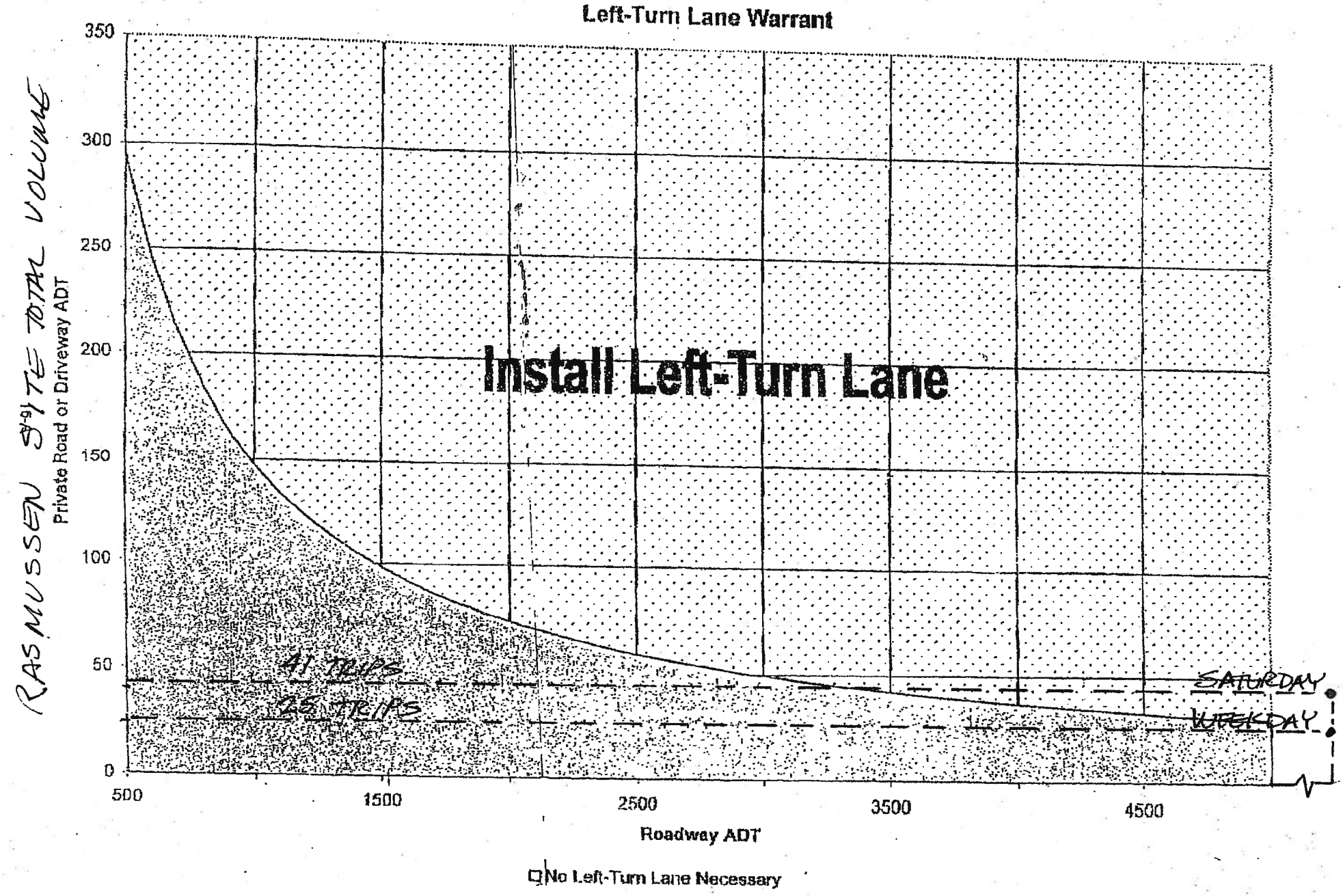
SPEED	FREQUENCY	ACUM %	PERCENTAGE BREAKDOWN
42	1	1.0	*
43	2	3.0	***
44	2	5.0	****5
45	5	10.0	****5****1
46	4	14.0	****5****1****
47	6	20.0	****5****1****5****2
48	6	26.0	****5****1****5****2****5*
49	14	40.0	****5****1****5****2****5****3****5****4
50	14	54.0	****5****1****5****2****5****3****5****4****5****5****
51	12	66.0	****5****1****5****2****5****3****5****4****5****5****5****6****5*
52	11	77.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5**
53	5	82.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8**
54	6	88.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5***
55	4	92.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9**
56	2	94.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9****
57	3	97.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9****5**
58	0	97.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9****5**
59	2	99.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9****5****
60	1	100.0	****5****1****5****2****5****3****5****4****5****5****5****6****5****7****5****8****5****9****5****0

100

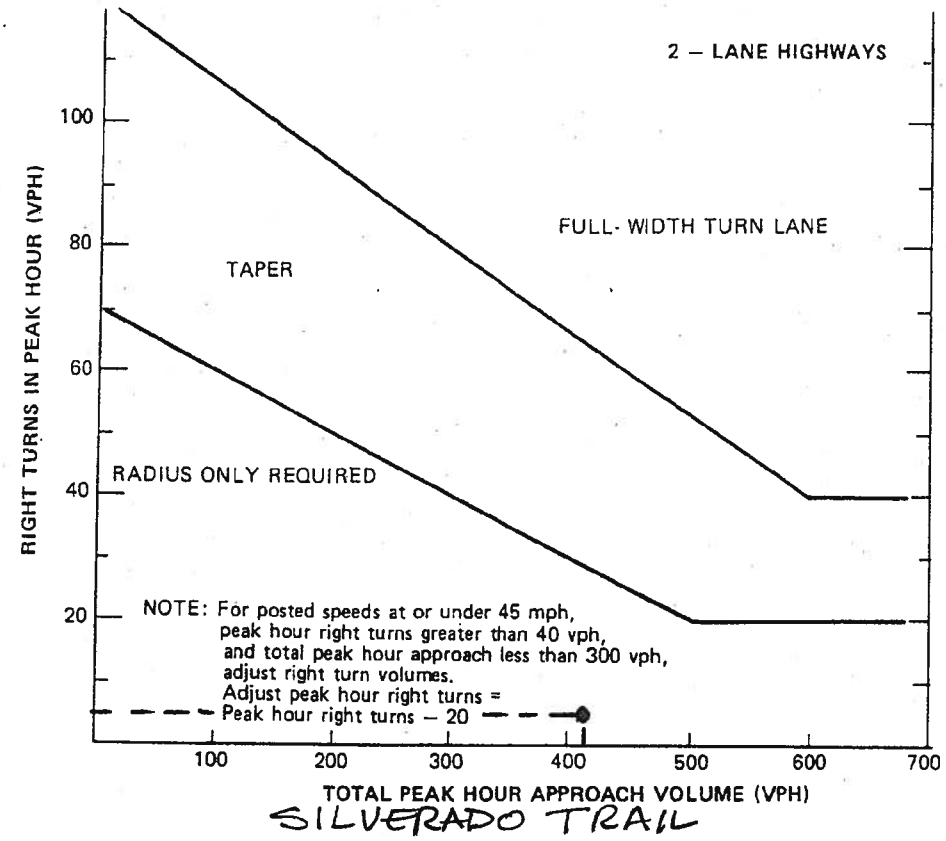
AVERAGE SPEED = 50.3
50th PERCENTILE = 49.7
85th PERCENTILE = 53.5
90th PERCENTILE = 54.5
95th PERCENTILE = 56.3

PACE = 45 - 54
% IN PACE = 83
VEHICLES IN PACE = 83

SAMPLE VARIANCE = 12.93703
STANDARD DEVIATION = 3.596808
RANGE 1*S = 68
RANGE 2*S = 94
RANGE 3*S = 100


Left-Turn Lane Warrant
350
300
250
200
150
100
50
0
Private Road or Driveway ADT
Install Left-Turn Lane
41 TRIPS
25 TRIPS
SATURDAY
WEEKDAY
500
1500
2500
3500
4500
Roadway ADT
No Left-Turn Lane Necessary
RASMUSSEN SITE TOTAL VOLUMES
SILVERADO TRAIL

RASMUSSEN DRIVEWAY



SILVERADO TRAIL

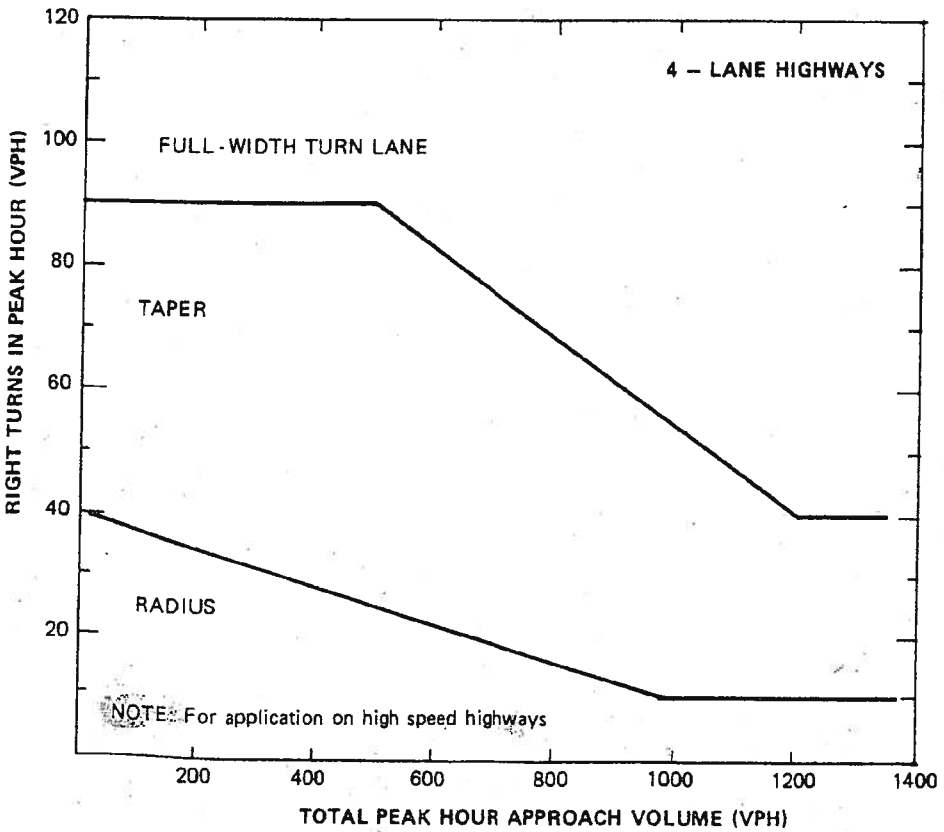


Figure 4-23. Traffic volume guidelines for design of right-turn lanes. (Source: Ref. *4-11*)