George W. Nickelson, P.E.

Traffic Engineering – Transportation Planning

July 23, 2010

Mr. Dave Del Dotto
Yountville Vineyards, LLC
1291 West Zinfandel Lane
St. Helena, CA 94574

Subject: ***Traffic Analysis for a Proposed Ca'Nani Winery Project on State Route 29 North of Yountville in Napa County***

Dear Mr. Del Dotto:

This report summarizes a focused traffic analysis for the proposed Ca' Nani winery at 7466 St. Helena Highway – State Route 29 (SR 29) in Napa County (see Figure 1 for site location map). This study reflects our discussions regarding the project characteristics, field reviews/traffic counts at the site access and analyses of project traffic effects.

As outlined in the report, the project's trips would add minimally (about 0.4%-0.5%) to peak hour traffic flows on SR 29. Sight distance would be satisfactory at the project driveway. Although no significant conflicts are expected between traffic volumes in/out of the proposed winery and in/out of the nearby Napa Cellars driveway, it appears that the project driveway could be shifted to align with the Napa Cellars driveway. Volumes would be well below the thresholds at which a right-turn lane would be needed. We do note that the site driveway width at SR 29 should be designed to accommodate inbound and outbound truck turn paths.

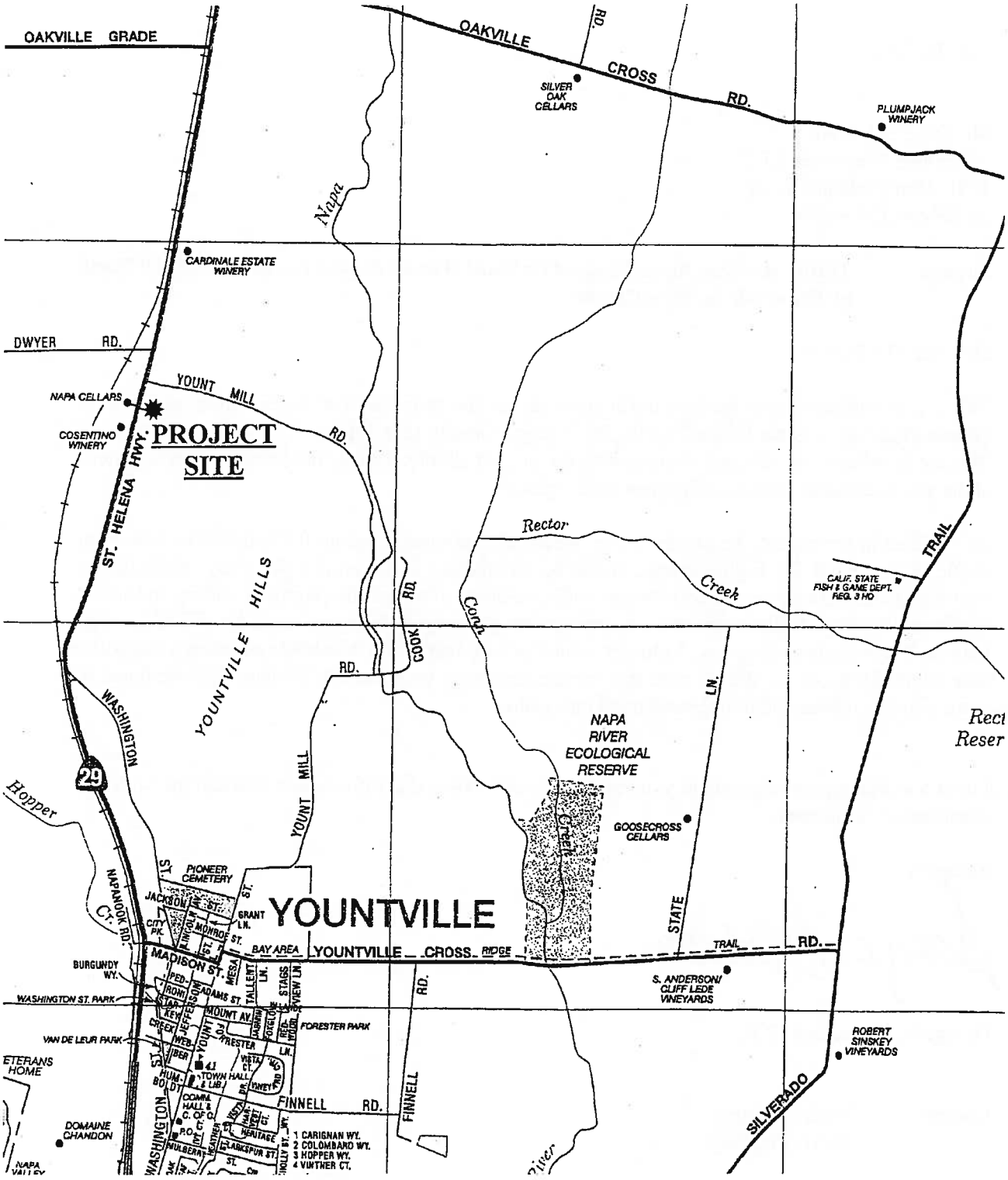
I trust that this report responds to your needs. Please review this information and call me with any questions or comments.

Sincerely,

George W. Nickelson, P.E.

Copies: Sash Williams
Tom Atterbury

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



Project Site Location Map

North

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figure 1

1. Existing Traffic Conditions

a. Traffic Operations

State Route 29 (SR 29) provides the primary north-south Napa County access and is essentially a two-lane rural road near the proposed winery. Based on Caltrans 2008 records, SR 29 has an average daily traffic volume (south of Oakville Grade Road) of 24,900 vehicles and a daily volume during a peak month of 26,500 vehicles.(1) Based on Caltrans count data, the peak hour volumes would be about 8% of the daily total or about 2,000 peak hour vehicles on a typical day.

As a part of this study, traffic counts were conducted on SR 29 at the proposed winery's access intersection during a weekday PM peak commute period (4-6 PM) and the Saturday afternoon peak period (1-3 PM).(2) (Winery visitor activity is expected to be highest during a Saturday afternoon.) These counts indicate a weekday PM peak hour flow of 1,782 vehicles and a Saturday afternoon peak hour flow of 1,607 vehicles. The counted peak hour volumes are somewhat lower than the expected typical day peak hour flow based on Caltrans data. To simulate "typical" peak conditions as indicated by Caltrans data, the volumes counted as a part of this analysis were increased by 10% These volumes reflect a two-way SR 29 operation that would be categorized as in the Level of Service (LOS) "E" range.

At the winery site access intersection, SR 29 has two travel lanes, paved shoulders and a standard two-way-left-turn-lane (TWLTL). Immediately to the north, the TWLTL provides access for the Napa Cellars Winery driveway on the west side of SR 29. The distance between the centerline of the project site driveway and the centerline side of the Napa Cellars Winery driveway is only about 35 feet. As a result, the site driveway and Napa Cellars driveway at SR 29 have been analyzed as a single four-way intersection.

The winery site currently has one residence and a small second unit that gain access via the site driveway. The existing residence traffic activity is very low – during each peak hour, there were no outbound vehicle trips and only one inbound vehicle trip counted at the site driveway. However, the Napa Cellars driveway on the west side of SR 29 does experience peak hour trips. As outlined in Table 1, the Napa Cellars driveway operation (for outbound driveway traffic) is LOS "D" during the weekday PM peak hour and LOS "C" during the Saturday afternoon peak hour (LOS definitions and calculations are attached as appendices).

b. Vehicle Speeds and Sight Distance on SR 29

The primary issues for access design are the vehicle visibility and operation relative to vehicles traveling on SR 29 and vehicles turning in/out of the winery access. The required vehicle visibility or "corner sight distance" is a function of the travel speeds on SR 29. 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.".(3) Based on radar surveys conducted as a part of a prior study, the "critical" vehicle speeds (85% of all surveyed vehicles travel at or below the critical speed) along SR 29 at the proposed winery were observed to be about 49-54 miles per hour (mph) during the weekday PM peak period and the Saturday afternoon peak period.(4) Based

TABLE 1
EXISTING AND PROJECTED OPERATION AT THE
CA' NANI WINERY DRIVEWAY ON SR 29
LEVEL OF SERVICE (LOS) AND SECONDS OF DELAY

PROJECT DRIVEWAY

Intersection Scenario	Weekday PM Peak Hour		Saturday Afternoon Peak Hour	
	Outbound	Inbound Left Turn	Outbound	Inbound Left Turn
Existing	N.A.(1)	N.A.(1)	N.A.(1)	N.A.(1)
Existing + Project	LOS C/ 20.3 seconds	LOS A/ 9.5 seconds	LOS C/ 20.5 seconds	LOS B/ 10.6 seconds
Cumulative Base	N.A.(1)	N.A.(1)	LOS F/ 80+ seconds	LOS D/ 28.7 seconds
Cumulative + Project	LOS F/ 80+ seconds	LOS D/ 28.8 seconds	LOS F/ 80+ seconds	LOS C/ 23.8 seconds

NAPA CELLARS DRIVEWAY

Intersection Scenario	Weekday PM Peak Hour		Saturday Afternoon Peak Hour	
	Outbound	Inbound Left Turn	Outbound	Inbound Left Turn
Existing	LOS D/ 28.2 seconds	LOS B/ 12.1 seconds	LOS C/ 20.4 seconds	LOS A/ 9.8 seconds
Existing + Project	LOS D/ 28.4 seconds	LOS B/ 12.1 seconds	LOS C/ 20.8 seconds	LOS A/ 9.8 seconds
Cumulative Base	LOS F/ 80+ seconds	LOS C/ 22.7 seconds	LOS F/ 80+ seconds	LOS C/ 19.5 seconds
Cumulative + Project	LOS F/ 80+ seconds	LOS C/ 22.7 seconds	LOS F/ 80+ seconds	LOS C/ 19.5 seconds

(1) There were no existing outbound or inbound left turn vehicles counted at the site driveway during either peak hour. Thus, LOS calculations are not applicable for the existing or cumulative base scenarios.

on Caltrans design standards, these vehicle speeds require a sight distance of about 450-500 feet, measured along the travel lanes on SR 29.[5]

2. Traffic Effects of the Proposed Winery

a. Project Description

The proposed project would involve a new winery with a maximum annual production of 48,000 gallons.[6] About 90% of the fruit/juice would be delivered from other vineyards. The winery's access would be via the existing driveway on SR 29. A secondary emergency vehicle only access (EVA) would connect the winery with Yount Mill Road. Winery traffic would be prohibited from using this EVA.

The winery visitors (by appointment only) are expected to include a maximum of 40 persons on a weekday and 75 persons on a Saturday or Sunday. The total winery employment of 13 persons would include those employees working in administration and production for the winery. There would be an additional 5 persons on-site during the harvest season. Table 1 outlines the winery's maximum daily traffic generation on a weekday, a Saturday and a day during the harvest season.

It is noted that the winery would also have various events during the year. Most of these events would have attendance levels comparable to (or less than) the peak daily visitor totals cited above. Thus, the events' traffic effects would be comparable to those assessed in this report. A once annual event is proposed to have up to 300 persons attending. However, that event would employ shuttle service to reduce the trip generation to/from the site.

b. Changes in Traffic Operations

As outlined in Table 1, the winery would generate 59 maximum daily trips on a weekday, 82 maximum daily trips on a Saturday and 71 maximum daily trips during the 6-week harvest season. Even if it were conservatively assumed that 20% of the trips occur during the peak hours, this would amount to 12 trips during the weekday PM peak hour and 16 trips during the Saturday afternoon peak hour. The weekday and Saturday peak hour volumes (with the project trips) are outlined in Figure 2.

When distributed north and south on SR 29, the project trips would add about 0.4%-0.5% to the existing peak hour volumes. This change in traffic would not be measurable within typical daily fluctuations in traffic flows. At the proposed project driveway, the outbound project traffic would operate at LOS "C" during both the weekday and Saturday peak hours (LOS definitions and calculations are attached as appendices)

c. Site Access Design Issues

The site's driveway intersects SR 29 at a point where a TWLTL exists. As shown on Figure 2, the driveway would have 4 inbound left-turns during a weekday PM peak hour and 6 inbound left turns during a Saturday afternoon peak hour. During these same periods, the inbound left turns counted

at the Napa Cellars driveway were 2 vehicles and 5 vehicles respectively. Based on Caltrans guidelines for left turn queuing, the project volumes would require a maximum of one vehicle storage during the peak hours.[7] During the Saturday afternoon peak hour, there would be 6 inbound left turn volumes at the project driveway and 5 existing inbound left turns at the Napa Cellars driveway (a left turn into either driveway every 10-12 minutes). These low volumes would not be expected to result in significant conflicts between the two driveways. However, the proposed project driveway could be shifted to align with the Napa Cellars driveway. It is noted that the realignment would require removal of a portion of the existing vineyard and could be constrained somewhat by an existing power pole.

The winery access intersection is located on a straight section of SR 29. Field observations indicate sight distances to the north and south are generally well in excess of the 450-500 feet needed for the measured vehicle speeds. The projected volumes in/out of the site driveway are well below minimum thresholds at which right-turn lanes (deceleration and acceleration) would be required.[8]

The winery driveway would be located about 400 feet south of the SR 29/Yount Mill Road intersection. This separation would be ample – no significant conflicts would be expected between driveway volumes and volumes at this intersection.

The winery development would include a paved driveway which would meet the Napa County standards (18 feet of pavement plus a 2-foot shoulder for two-way traffic flow).[9] At its intersection with SR 29, the driveway design should also accommodate turn paths for inbound and outbound right-turns by trucks.

3. Cumulative Traffic Conditions

a. Cumulative Projections

Cumulative buildout (year 2030) projections for SR 29 were obtained from technical studies prepared as a part of the Napa County General Plan Update.[10] These projections indicate significant increases in through traffic on SR 29 (two-way peak hour volumes of about 4,500 vehicles). Again, the project driveway currently has no outbound traffic nor any inbound left turns. However, with the cumulative base traffic increases, the Napa Cellars outbound driveway traffic would experience extreme delays characteristic of LOS "F".

b. Project Effects

The proposed Ca' Nani winery project would add minimally to the cumulative buildout volumes. The outbound project driveway traffic would operate at LOS "F".

4. Conclusions and Recommendations

The following are conclusions and recommendations relative to the traffic analysis:

- The project's trips would add minimally (about 0.4%) to traffic flows on SR 29.
- Sight distance on SR 29 would be adequate at the site driveway.
- The existing TWLTL could accommodate the project trips and trips in/out of the existing Napa Cellars driveway (on the west side of SR 29). However, a project driveway realignment with the Napa Cellars driveway could be considered, subject to constraints that include an existing vineyard and a power pole.
- Driveway volumes would be well below the thresholds at which a right-turn lane would be needed.
- The site driveway would be widened/improved to meet County standards. The driveway width at SR 29 should be designed to accommodate inbound and outbound truck turn paths.

References:

(1) Caltrans website, traffic volumes for SR 29 based on 2008 count data.

(2) George W. Nickelson, P.E., traffic counts on Friday June 18, 2010 and Saturday June 19, 2010.

(3) Caltrans, *Highway Design Manual*, July 1, 2008.

(4) George W. Nickelson, P.E., *Traffic Analysis for a Proposed Winery Project at 7400 St. Helena Highway (State Route 29) North of Yountville in Napa County (Postmile 21.41*, August 19, 2009.

(5) Caltrans, ibid...

(6) Production, employee and visitor data provided by Mr. Tom Atterbury, Atterbury Associates, project engineer, June 21, 2010..

(7) Caltrans, *Guidelines for Reconstruction of Intersections,* August 1985. The maximum peak hour southbound left turn volume is 6 vehicles, requiring a maximum 1 vehicle storage, calculated as follows:
- 6 hourly vehicles/60 x 2 minutes of storage = 0.2 or 1 vehicle.

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

(9) Napa County, *Adopted Road & Street Standards*, August 2, 1999.

(10) Dowling Associates, *The Napa County General Plan Update EIR – Technical Memorandum for Traffic and Circulation Supporting the Findings and Recommendations*, February 9, 2007.

TABLE 1
DAILY TRIP GENERATION FOR
THE PROPOSED CA' NANI WINERY

Maximum Daily Traffic on a Weekday:

• 40 visitors/2.6 per vehicle x 2 one-way trips	=	31 daily trips
• 13 employees x 2 one-way trips per employee	=	26 daily trips
• 1 truck x 2 one-way trips per truck[1]	=	2 daily trips
		59 daily trips

Maximum Daily Traffic on a Typical Saturday:

• 75 visitors/2.8 per vehicle x 2 one-way trips	=	54 daily trips
• 13 employees x 2 one-way trips per employee	=	26 daily trips
• 1 truck x 2 one-way trips per truck[1]	=	2 daily trips
		82 daily trips

Maximum Daily Traffic During Harvest Season (6 weeks):

• 40 visitors/2.6 per vehicle x 2 one-way trips	=	31 daily trips
• 18 employees x 2 one-way trips per employee	=	36 daily trips
• 2 trucks x 2 one-way trips per truck[2]	=	4 daily trips
		71 daily trips

(1) During the 46-week non-harvest season, a maximum of 1 daily truck would be generated related to routine deliveries associated with the winery production (48,000 gallons/2.38 gallons per case = 20,168 cases).

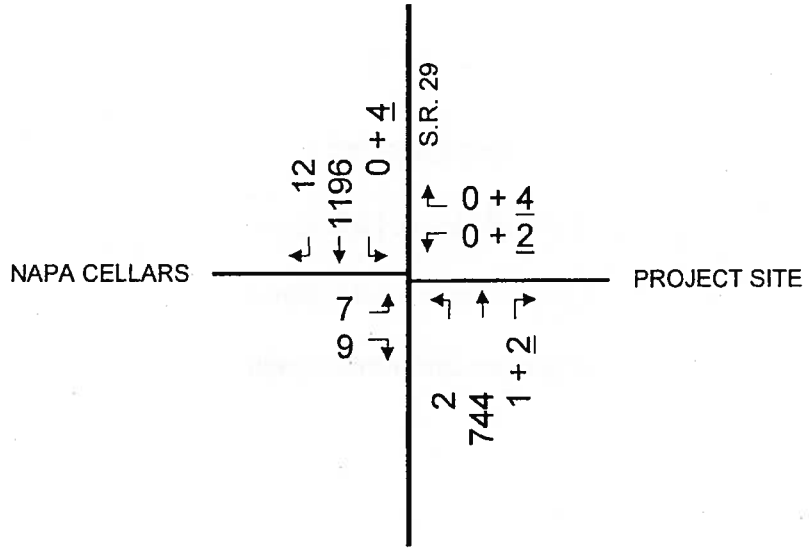
• 20,168 cases/2,310 cases per truck	=	9 glass delivery trucks
• 20,168 cases/1,232 cases per truck	=	16 wine shipment trucks
• 5 miscellaneous weekly deliveries	=	230 miscellaneous trucks
		255 annual trucks

255 trucks/46 weeks = 6 weekly trucks or 1 truck per day.

(2) During the 6-week harvest season, a maximum of 1 daily grape delivery truck would be generated, calculated as follows (calculation assumes production uses 90% off-site grapes):

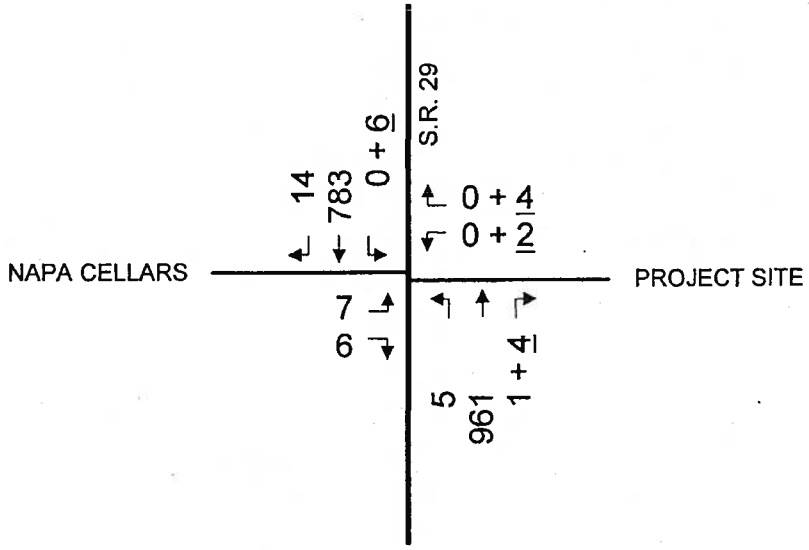
- 43,200 gallons/165 gallons per ton = 262 tons of off-site grapes
- 262 tons of off-site grapes/10 tons per truck/6 weeks = 4-5 trucks/week or a maximum of one truck per day (assume truck would also pick up an empty bin)

WEEKDAY EXISTING + PROJECT PEAK HOUR VOLUMES:



PROJECT TRIPS:
Weekday = 12 (6 in, 6 out)
Saturday = 16 (10 in, 6 out)

SATURDAY EXISTING + PROJECT PEAK HOUR VOLUMES:



Existing + Project Peak Hour Volumes
Weekday and Weekend

North

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figure 2

APPENDICES

Level of Service Definitions

Level of Service Calculations

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 6/21/2010
Agency or Company	GWN	Major Street	SR 29
Analysis Period/Year	PM 2010	Minor Street	DRIVEWAY
Comment	EXISTING PM PEAK		

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	TR	TR	LTR	LTR
Lane 2	L	L		
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)	0	1196	12	2	744	1	7	0	9	0	0	0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	0	1329	13	2	827	1	8	0	10	0	0	0
Flare storage (# of vehs)												
Median storage (# of vehs)							2			2		

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	LTR	18	173	0.104	0	28.2	D	28.2
	2								D
	3								
WB	1	LTR							
	2								
	3								
SB		①	0	799	0.000	0	9.5	A	
NB		④	2	510	0.004	0	12.1	B	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information		*Site Information*	
Analyst	GWN	Jurisdiction/Date	NAPA COUNTY 6/21/2010
Agency or Company	GWN	Major Street	SR 29
Analysis Period/Year	SAT 2010	Minor Street	DRIVEWAY
Comment	EXISTING SATURDAY PEAK		

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	TR	TR	LTR	LTR
Lane 2	L	L		
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)	0	783	14	5	961	1	7	0	6	0	0	0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	0	870	16	6	1068	1	8	0	7	0	0	0
Flare storage (# of vehs)												
Median storage (# of vehs)							2			2		

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	LTR	15	249	0.060	0	20.4	C	20.4
	2								C
	3								
WB	1	LTR							
	2								
	3								
SB		(1)	0	648	0.000	0	10.6	B	
NB		(4)	6	760	0.007	0	9.8	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information		*Site Information*	
Analyst	GWN	Jurisdiction/Date	NAPA COUNTY 6/22/2010
Agency or Company	GWN	Major Street	SR 29
Analysis Period/Year	PM 2010	Minor Street	DRIVEWAY
Comment	EXISTING + PROJECT PM PEAK		

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	TR	TR	LTR	LTR
Lane 2	L	L		
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)	4	1196	12	2	744	3	7	0	9	2	0	4
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	4	1329	13	2	827	3	8	0	10	2	0	4
Flare storage (# of vehs)												
Median storage (# of vehs)							2			2		

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	LTR	18	172	0.105	0	28.4	D	28.4 D
	2								
	3								
WB	1	LTR	6	246	0.024	0	20.0	C	20.0 C
	2								
	3								
SB		①	4	798	0.006	0	9.5	A	
NB		④	2	510	0.004	0	12.1	B	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information		*Site Information*	
Analyst	GWN	Jurisdiction/Date	NAPA COUNTY 6/22/2010
Agency or Company	GWN	Major Street	SR 29
Analysis Period/Year	SAT 2010	Minor Street	DRIVEWAY
Comment	EXISTING + PROJECT SATURDAY PEAK		

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	TR	TR	LTR	LTR
Lane 2	L	L		
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)	6	783	14	5	961	5	7	0	6	2	0	4
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	7	870	16	6	1068	6	8	0	7	2	0	4
Flare storage (# of vehs)												
Median storage (# of vehs)							2			2		

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	LTR	15	242	0.062	0	20.8	C	20.8
	2								C
	3								
WB	1	LTR	6	238	0.025	0	20.5	C	20.5
	2								C
	3								
SB	(1)		7	646	0.010	0	10.6	B	
NB	(4)		6	760	0.007	0	9.8	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information		*Site Information*		
Analyst	GWN	Jurisdiction/Date	NAPA COUNTY	6/23/2010
Agency or Company	GWN	Major Street	SR 29	
Analysis Period/Year	PM 2030	Minor Street	DRIVEWAY	
Comment	CUMULATIVE PM PEAK			

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	TR	TR	LTR	LTR
Lane 2	L	L		
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)	0	2108	12	2	2392	1	7	0	9	0	0	0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	0	2342	13	2	2658	1	8	0	10	0	0	0
Flare storage (# of vehs)												
Median storage (# of vehs)							2			2		

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	LTR	18	32	0.564	3	243.2	F	243.2 F
	2								
	3								
WB	1	LTR							
	2								
	3								
SB		(1)	0	156	0.000	0	28.1	D	
NB		(4)	2	206	0.011	0	22.7	C	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information		*Site Information*	
Analyst	GWN	Jurisdiction/Date	NAPA COUNTY 6/23/2010
Agency or Company	GWN	Major Street	SR 29
Analysis Period/Year	SAT 2030	Minor Street	DRIVEWAY
Comment	CUMULATIVE SATURDAY PEAK		

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	TR	TR	LTR	LTR
Lane 2	L	L		
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)	0	1897	14	5	2153	1	7	0	6	0	0	0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	0	2108	16	6	2392	1	8	0	7	0	0	0
Flare storage (# of vehs)												
Median storage (# of vehs)							2			2		

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	LTR	15	42	0.354	1	135.0	F	135.0
	2								F
	3								
WB	1	LTR							
	2								
	3								
SB		①	0	199	0.000	0	23.1	C	
NB		④	6	254	0.022	0	19.5	C	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information		*Site Information*	
Analyst	GWN	Jurisdiction/Date	NAPA COUNTY 6/23/2010
Agency or Company	GWN	Major Street	SR 29
Analysis Period/Year	PM 2030	Minor Street	DRIVEWAY
Comment	CUMULATIVE + PROJECT PM PEAK		

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	TR	TR	LTR	LTR
Lane 2	L	L		
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)	4	2108	12	2	2392	3	7	0	9	2	0	4
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	4	2342	13	2	2658	3	8	0	10	2	0	4
Flare storage (# of vehs)												
Median storage (# of vehs)							2			2		

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	LTR	18	27	0.672	3	344.3	F	344.3
	2								F
	3								
WB	1	LTR	6	25	0.236	1	189.2	F	189.2
	2								F
	3								
SB		①	4	156	0.029	0	28.8	D	
NB		④	2	206	0.011	0	22.7	C	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information		*Site Information*	
Analyst	GWN	Jurisdiction/Date	NAPA COUNTY 6/23/2010
Agency or Company	GWN	Major Street	SR 29
Analysis Period/Year	SAT 2030	Minor Street	DRIVEWAY
Comment	CUMULATIVE + PROJECT SATURDAY PEAK		

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	TR	TR	LTR	LTR
Lane 2	L	L		
Lane 3				
Lane 4				
Lane 5				

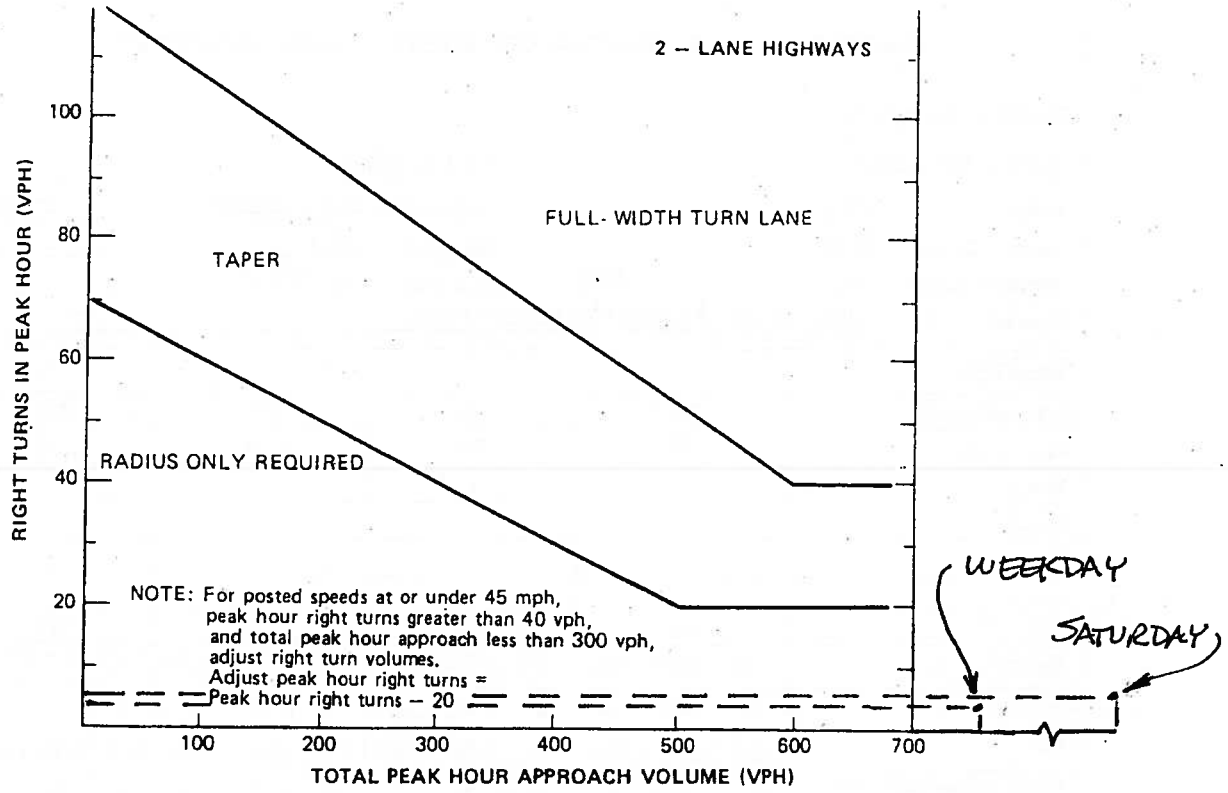
	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	6	1897	14	5	2153	5	7	0	6	2	0	4
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	7	2108	16	6	2392	6	8	0	7	2	0	4
Flare storage (# of vehs)												
Median storage (# of vehs)							2			2		

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	LTR	15	36	0.419	2	173.4	F	173.4
	2								F
	3								
WB	1	LTR	6	37	0.162	1	120.5	F	120.5
	2								F
	3								
SB		(1)	7	198	0.034	0	23.8	C	
NB		(4)	6	254	0.022	0	19.5	C	



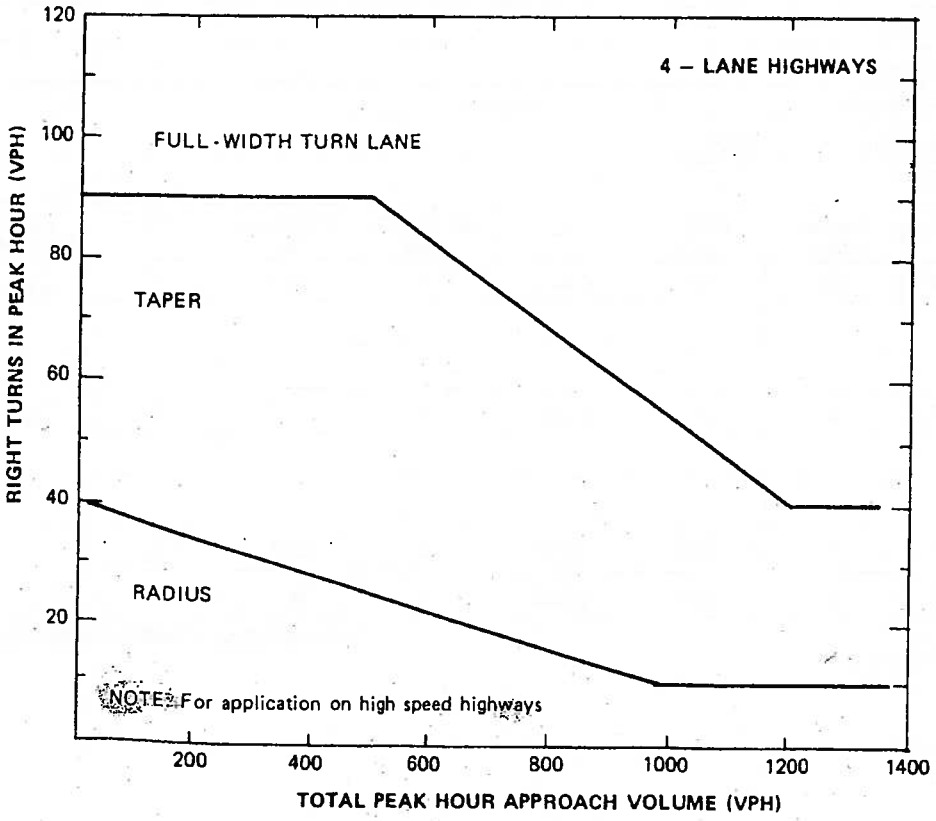


Figure 4-23. Traffic volume guidelines for design of right-turn lanes. (Source: Ref. *4-11*)