



May 16, 2013

Mr. Chuck D. Conner
Senior Project Engineer
Gallo Family Vineyards, Inc.
3387 Dry Creek Road
Healdsburg, CA 95448

Subject: ***Updated Focused Traffic Analysis for the Proposed Louis M. Martini Winery Master Plan
- Located at 254 St. Helena Highway (SR-29) in St. Helena (Napa County)***

Dear Mr. Conner:

This report provides an updated traffic analysis for the proposed Louis M. Martini Winery Master Plan project located at 254 St. Helena Highway in Napa County (see Figure 1 for Project Vicinity Map). This study reflects our discussions with County Planning staff (Ms. Linda St. Claire) regarding the project analysis approach and other adjacent approved/pending projects in the study area. In addition, the analysis will build on previous work conducted by George W. Nickelson, P.E. with regard to intersection operations, current Master Plan conditions, and ultimate driveway access and use. Some of the key issues evaluated in this study include the following:

- Existing and future weekday PM and weekend mid-day peak hour operations at the Martini Winery Project Driveway intersections with State Route 29;
- Near-term (Year 2015) traffic conditions reflecting other approved/pending projects in the study area;
- Project trip generation relative to any increases related to proposed use modifications of winery production, employment, and/or visitors;
- Project site circulation and vehicle access at State Route 29 project driveways and truck circulation;
- Cumulative year 2030 (no project) conditions along State Route 29 based on the Napa County General Plan Update EIR.

The following sections outline existing and future traffic conditions with and without the proposed Louis M. Martini Winery Master Plan project. Where necessary, measures have been recommended to ensure acceptable traffic flow, circulation, and/or fair share contribution to regional cumulative traffic improvements along State Route 29. I trust that this report responds to your needs. Please review this information and call me with any questions or comments.

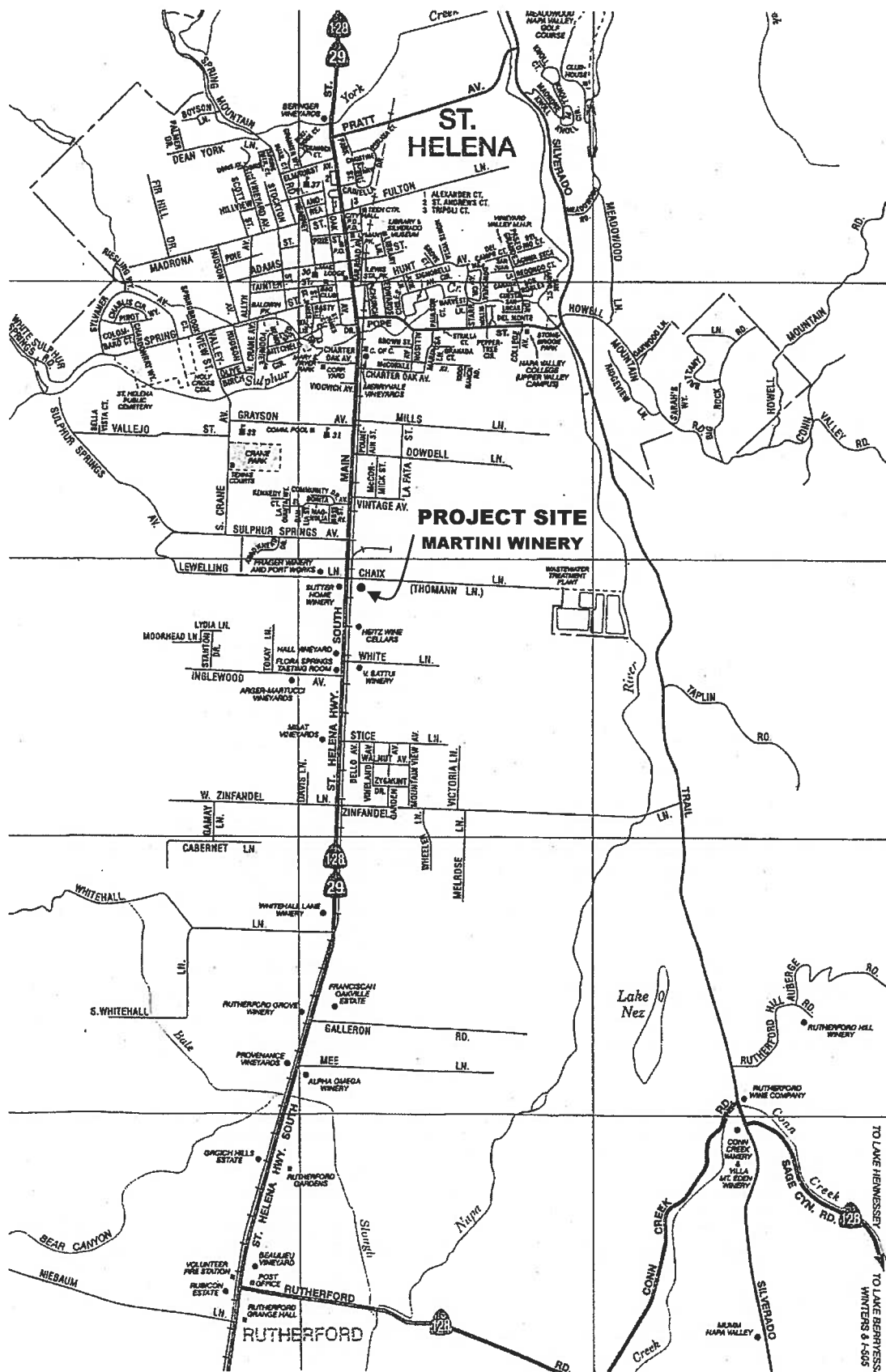
Sincerely,

A handwritten signature in cursive script, reading "George W. Nickelson".

George W. Nickelson, P.E.
OMNI-MEANS, Ltd. Engineers & Planners

Cc: Ms. Linda St. Claire, Napa County
Attachments: Appendices

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omni-means

Project Vicinity Map



figure 1

1. EXISTING TRAFFIC CONDITIONS

Roadways

The proposed Louis M. Martini Winery project is located at 254 State Route 29 (SR-29 or St. Helena Highway) on the northeast side of the highway. It is noted that SR-29 is primarily a north-south facility through the Napa Valley. However, SR-29 extends in a northwest-southeast direction immediately adjacent to the project site. A brief description of each roadway follows:

State Route 29 extends in a northwest-southeast direction between Rutherford and St. Helena in the project study area. Classified as a two-lane rural arterial roadway, SR-29 provides access northwest to St. Helena and Calistoga as well as southeast to Rutherford, Oakville, and Yountville. In the immediate project site area, SR-29 functions as a two-lane rural arterial road and has two 12-foot travel lanes with wide, 8-10 foot shoulders (striped each side) at its driveway intersections. At the proposed project's south driveway, the taper for a two-way-left-turn-lane (TWLTL) begins on SR-29 and this TWLTL extends southeast along the highway for approximately 1,800 feet serving adjacent commercial driveways. The speed limit on SR-29 is 45 mph.

Chaix Lane-Lewelling Lane extends in a southwest-northeast direction immediately northwest of the project site. From SR-29, Chaix Lane extends northeast to provide access to winery processing, agricultural, and selected residences. Lewelling Lane extends southwest directly opposite Chaix Lane (from SR-29) and provides access to residential and agricultural areas. Functioning at two-lane rural collector streets, Chaix Lane is approximately 16-foot wide (below County standards) and Lewelling Lane is approximately 20-foot wide in the study area.

Existing Roadway/Intersection Volumes

SR-29 acts as the primary north-south regional route through the Napa Valley and provides direct access to the project site. Based on the most recent Caltrans daily traffic counts conducted along SR-29 (north of Zinfandel Lane), SR-29 has a current annual average daily traffic volume of 22,500 vehicles.¹ During the peak month, the roadway carries 24,300 ADT. Based on Napa County roadway segment level-of-service (LOS) thresholds, these volumes are approaching the roadway capacity and represent LOS F conditions for a two-lane rural arterial roadway.² This would certainly be true of the peak month season (which likely occurs during the summer season), and can result in significant northbound congestion in St Helena. As this heavy northbound flow approaches the traffic signal at Pope Street, vehicle queues can extend back to the project area. During such times, the northbound flows would be categorized as LOS "F" operation.

Currently, construction for the undergrounding of utilities is occurring along segments of SR-29. Based on the Caltrans website, this construction work is currently taking place between Mee Lane and Sulphur Springs Road on SR-29 and can require lane closures, flagmen, and cause moderate to severe traffic delays. With the project site being located within this construction area, new vehicle counts at the Martini Winery project driveways at SR-29 would not be accurate for normal traffic flow. For this reason, previous weekday and weekend peak hour traffic counts conducted in 2005 for the project driveways have been used for this

¹ Caltrans, 2011 Traffic Volumes Book, State Route 29 average annual daily traffic (AADT) and peak month average daily traffic (ADT).

² Napa County Baseline Data Report, Table 11-1; Napa County Roadway Segment Daily LOS Volume Thresholds, Transportation and Circulation, November 2005.



analysis.³ As a part of that study, traffic counts were conducted (in late September and early October) on SR-29 at the winery's access intersections during a Friday PM peak commute period (4-6 PM) and the Saturday afternoon peak period (2-4 PM).⁽²⁾ These counts indicate that weekday PM peak hour

To ensure that these previous count volumes are representative of current traffic conditions, the Caltrans volume website was checked for historical volume growth between 2005 and 2011 (most current year) on the specific SR-29 segment. Based on yearly "peak hour" volumes over the last seven years, peak hour volumes on the roadway segment have undergone little if any change. In 2005, the recorded peak hour volume was 2,050 vehicles on SR-29. Peak hour volumes peaked in 2007 at 2,150 vehicles, and then declined to 1,950 vehicles for the years 2008, 2009, and 2010. For the latest calendar year, peak hour volumes have rebounded to 2,050 vehicles or the same level as 2005. Therefore, weekday PM peak hour and mid-day weekend peak hour counts conducted in 2005 would be representative of current conditions today given that historical peak hour volumes have not increased.

Finally, peak hour count volumes on SR-29 at the project driveway were increased to reflect seasonal fluctuations in traffic flows along the roadway. This amounted to an approximate 8% increase to peak hour volumes based on the ratio of annual average daily traffic and peak month average daily traffic.

Existing weekday PM peak hour and weekend mid-day peak hour intersection volumes have been shown in Figure 2.

Project Driveway/Access Operations

The site is currently served by two driveways on SR-29. The northerly driveway provides access to the visitor center and a visitor parking lot. About 600 feet to the south there is a driveway that serves a portion of the winery operations, and that area includes parking for employees. The site's visitor driveway has an existing width of about 45 feet. The southerly driveway is about 16 feet wide. At the winery site access intersections, SR-29 has two travel lanes with paved/dirt shoulders. About 25-30 feet east of the pavement is the Napa Valley Wine Train track.

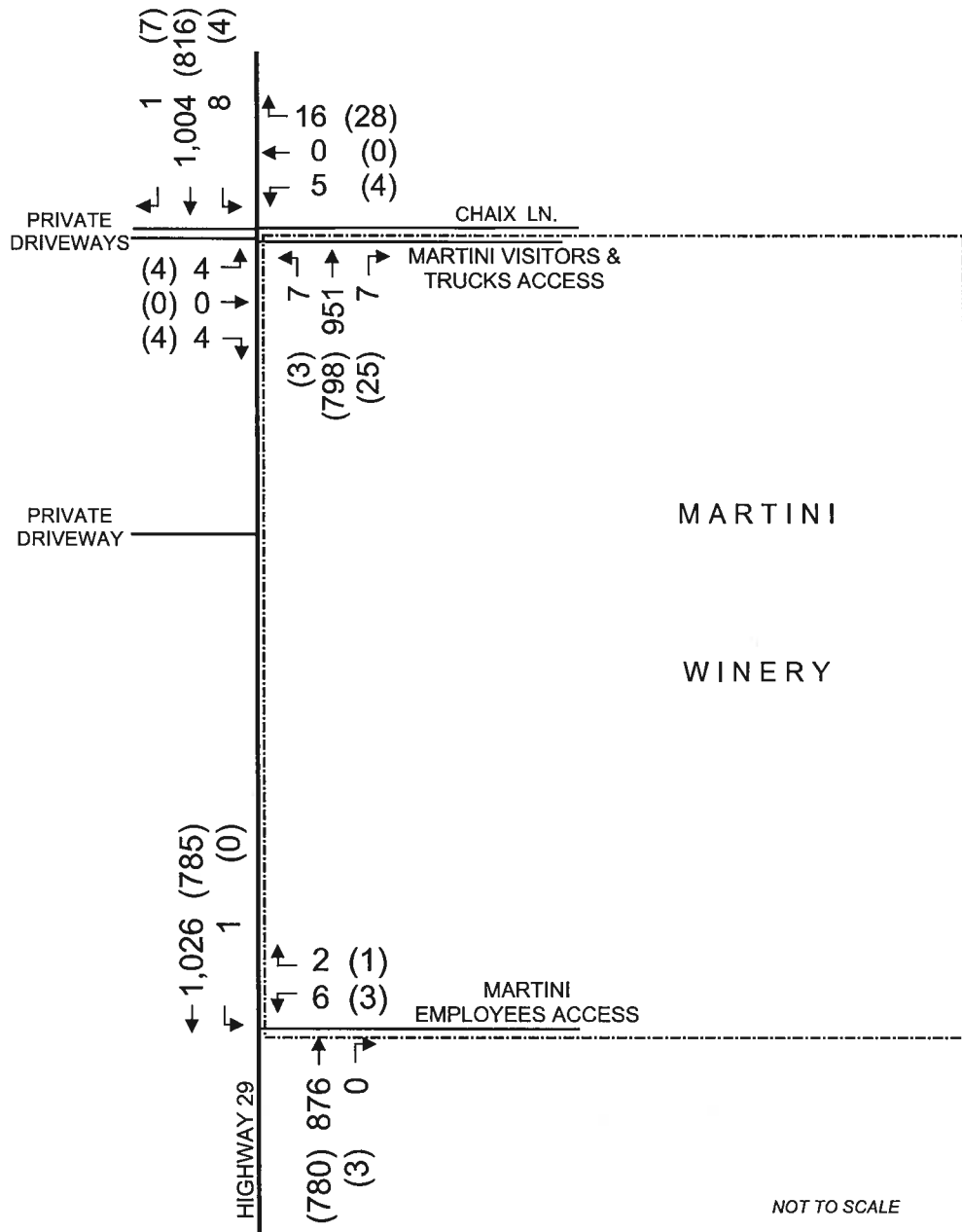
There is a narrow private road (Chaix Lane) immediately north of the winery's visitor driveway. The only use of this private road by Martini Winery is for winery trucks to gain access to the operations areas at the rear of the site. Approximately 30 feet north of the private road is another private driveway that serves a Sutter Home Winery facility. The close proximity of these three driveways can result in vehicle conflicts.

The existing winery driveway operations have been calculated for both the weekday and Saturday conditions. On the days of the analysis' traffic counts, winery employment (32 full time persons) was typical of the season, and no adjustments were made in the counts at the southerly employee driveway.

The winery currently has a maximum permitted visitor count of 1,500 persons per week or about 200 persons per weekday and 250 persons on each of the weekend days. In addition to public visitation, there are "trade visitors" that add about 14% to the visitor counts. The visitor volumes on the traffic count days were somewhat lower than the maximum visitors permitted at the winery.⁽³⁾ Thus, the in/out traffic volumes at the northerly visitor driveway were increased to reflect maximum potential visitor activity.

³ George W. Nickelson, P.E., *Updated Traffic Study for Master Plan Related Access, Circulation and Parking Changes at the Martini Winery on State Route 29 (Postmile 27.3)*, January 21, 2009.





LEGEND
 Weekday Volumes: XX
 Weekend Volumes: (XX)



Existing Weekday P.M. and (Weekend Mid-day)
 Peak Hour Volumes



Existing Intersection Operation

- Intersection operation is one of the primary factors in evaluating the carrying capacity of a roadway network. Traffic conditions are measured by Level of Service (LOS), which applies a letter ranking to successive levels of intersection performance. LOS 'A' represents optimum conditions with free-flow travel and no congestion. LOS 'F' represents severe congestion with long delays at the approaches. For intersections with minor street stop control, the LOS reflects the delays experienced by the minor street approach. (LOS definitions and calculation worksheets are provided in the Appendix).

The two project study locations along SR-29 are unsignalized, minor-street stop-sign controlled intersections. It is noted that the existing visitor driveway is not striped for inbound and outbound lanes, but the width (about 45 feet) is such that outbound left turn and right turn vehicles can effectively exit in separate lanes. However, the southerly employee driveway is relatively narrow (about 16 feet wide), and outbound left turn and right turn vehicles must queue in a single outbound lane. There are no turn lanes on SR-29 at either project driveway.

Based on the Highway Capacity Manual (HCM 2000) operations methodology for unsignalized intersections, existing weekday PM peak and weekend mid-day peak hour existing (no project) level-of-service has been shown in Table 1. As calculated, during the weekday PM peak hour the northerly Martini Winery visitor driveway at SR-29 is operating at LOS F for the stop-sign controlled outbound turning movements onto SR-29. During the weekend (Saturday) mid-day peak hour, the same outbound turning movement is operating at LOS C. At the southerly Martini Winery employee driveway, the weekday PM peak and weekend mid-day peak hour LOS are F and E, respectively.

Based on the California Manual on Uniform Traffic Control Devices (CAMUTCD) peak hour signal warrant criteria, the Martini Winery visitor driveway/SR-29 intersection was evaluated for signalization.⁴ The peak hour warrants are one of several standards to help determine if installation of a traffic signal is appropriate. Qualifying for signalization using the peak hour warrants does not necessarily mean a signal should be installed. The Martini N. Driveway/SR-29 intersection does not qualify for signalization under the peak hour warrants using existing volumes (the warrant graphs are provided in the Appendix). It is noted that the remaining southerly Martini Winery employee driveway/SR-29 does not experience the minimum peak hour volume levels (too low) for signal warrant evaluation.

TABLE 1
EXISTING AND NEAR-TERM (NO PROJECT) CONDITIONS: INTERSECTION LEVELS-OF-SERVICE
WEEKDAY PM PEAK AND WEEKEND MID-DAY PEAK HOUR

#	Intersection	Control Type	Wkdy. PM LOS/Delay		Wknd. Mid-Day LOS/Delay	
			Existing (No Project)	Near-Term (No Project)	Existing (No Project)	Near-Term (No Project)
1	Martini N. Driveway/SR-29	Stop	F 51.3 secs.	C 23.8 secs.	C 24.5 secs.	C 19.4 secs.
2	Martini S. Driveway/SR-29	Stop	F 59.6 secs.	C 21.5 secs.	E 35.3 secs.	C 18.1 secs.

Based on Highway Capacity Manual (HCM) 2000, Operations methodology for stop-sign controlled (unsignalized) intersections using Synchro-Simtraffic software. Intersection calculation yields an LOS and vehicle delay in seconds. Stated LOS refers to the minor street (stop-sign) controlled movement. Near-Term (No Project) conditions reflect installation of a planned two-way-left-turn-lane on State Route 29 along the entire project frontage (and beyond).

⁴ California Manual on Uniform Traffic Control Devices (CAMUTCD), Chapter 4C, Peak hour signal warrant (#3), 2012.



Vehicle Speeds/Sight Distance

The primary issues for access design are the vehicle visibility and operation relative to vehicles traveling on SR-29 and vehicles turning 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."⁵ Based on radar surveys conducted in the vicinity of the Martini Winery, the "critical" vehicle speed (85% of all surveyed vehicles travel at or below the critical speed) along SR-29 at the winery were observed to be 40-45 miles per hour (mph).⁶ Based on Caltrans design standards, these vehicle speeds require a stopping sight distance of 300-360 feet, measured along the travel lanes on SR-29.⁷

The winery access intersections are located on a straight section of SR-29. Field observations indicate sight distances to the north and south are well in excess of the 360 feet needed for the measured vehicle speeds.

Current Site Traffic/Entitlements

To accurately assess the proposed project's trip generation and impacts, the existing site traffic was counted and/or has been documented to establish its current traffic generation under existing County use permit conditions. Based on field observations and existing site data provided by the project applicant, current uses on the site include the following based on proposed project use permit application provided by the County:⁸

Current Site Uses:

- Retail Sales – 7 days a week, 10:00 a.m. – 5:00 p.m.;
- Visitors – Tours and tastings 7 days a week, 1,500 visitors per week

Winery Production:

- 2,000,000 gallons per year;

Employees

- 32 full-time, 10 part-time

With regard to current site uses, all vehicle traffic related to these uses were accounted for in previous existing peak period intersection counts conducted at the Martini Winery north and south driveway intersections at State Route 29.

⁵ Caltrans, *Highway Design Manual, Sixth Edition, July 1, 2009.*

⁶ George W. Nickelson, P.E., *Radar speed surveys on State Route 29 at Martini Winery driveway(s), October 30 and November 5, 2009*

⁷ Caltrans, *Ibid....*

⁸ Ms. Linda St. Claire, Planner III, Napa County Planning, Building, and Environmental Services Department, *Personal communication, Martini Winery Use Permit Modification (dated 6-6-12), April 15, 2013..*



2. NEAR-TERM (NO PROJECT) CONDITIONS

Near-Term (Approved/Pending Projects)

Near-term (no project) conditions represent a reasonable period of time in which the proposed project could be approved and/or constructed. Based on discussions with County staff, a two-year period to the year 2015 has been established for near-term (no project) conditions representing all approved/pending projects within the study area. In addition, recent approved/pending projects within the City of St. Helena are included in the overall project list. To generate near-term (no project) conditions, approved and pending projects provided by both Napa County and City of St. Helena Planning staff for other recent traffic analyses in the area have been used.^{9 10} These projects are located both north and south of the project site off of State Route 29, in the City of St. Helena, or east of the project site off northern crossroad(s) that connect SR-29 with Silverado Trail and are described as follows:

City of St. Helena:

Crocker & Starr Winery	Production: 25,000 gallons per year
700 Dowdell Lane	Visitors: 16 visitors/day
St. Helena, CA 94574	Employees: 7 full-time, 3 part-time

Napa County:

Raymond Winery	Production: 1,500,000 gallons per year
849 Zinfandel Lane	Visitors: 500 visitors/day
St. Helena, CA 94575	Employees: 90 full-time

Kelham Winery	Production: 75,000 gallons per year
360 Zinfandel Lane	Visitors: 140 visitors/week
St. Helena, CA 94575	Employees: 6 full-time

The Ranch Winery	Production: 12,500,000 gallons per year
105 Zinfandel Lane	Visitors: 15 visitors/week
St. Helena, CA 94575	Employees: 85 full-time

Del Dotto Family Winery	Production: 48,000 gallons per year
1455 St. Helena Hwy.	Visitors: 15 visitors/week
St. Helena, CA 94575	Employees: 5 full-time

Whitehall Lane Winery	Production: 50,000 gallons
1563 St. Helena Hwy.	Visitors: 500 visitors/week
St. Helena, CA 94575	Employees: 5 full-time

The Sullivan Family Estate	Production: 22,500 gallons per year
1090 Galleron Road	Visitors: 7 visitors/week
St. Helena, CA 04575	Employees: 4 full-time

⁹ Mr. Greg Desmond, Interim Planning Director, City of St. Helena, Personal communication; Crocker & Starr Winery project, April 12, 2013.

¹⁰ Ms. Linda St. Clair, Planner III, Planning, Building, and Environmental Services Department, Personal communication, Martini Winery Use Permit Modification (dated 6-6-12), April 15, 2013.



Franciscan Winery 1178 Galleron Road St. Helena, CA 94575	Production: 1,200,000 gallons per year Visitors: 3,500 visitors/week Employees: 65 full-time
Flynnville Winery 1184 Maple Lane Calistoga, CA 94515	Production: 300,000 gallons per year Visitors: 500 visitors/day Employees: 30 full-time

Near-Term (No Project) Trip Generation

Near-term (approved/pending) projects' weekday PM hour, weekend mid-day peak hour, and daily traffic volumes have been taken directly from previous transportation analyses performed for those projects and these include the following:

- *Omni-Means Engineers & Planners, Updated Traffic Study for the Proposed Raymond Winery Use Permit Application (#P11-00156), Napa County, Draft Report, April 5, 2013;*
- *Omni-Means Engineers & Planners, Focused Trip Generation Analysis for the Proposed Crocker & Starr Winery Project at 700 Dowdell Lane (APN 009-120-059), City of St. Helena, Draft Report, April 12, 2013;*
- *Omni-Means Engineers & Planners, Focused Traffic Analysis for the Proposed Flynnville Winery Project, Located at State Route 29/Maple Lane in Napa County, January 15, 2013.*

For all approved/pending projects, daily and peak hour trip generation was calculated using employee peaking factors, auto occupancy rates for visitors, and production ratios based on recent winery research conducted by the Napa County Conservation, Development, and Planning Department. Near-term projects would generate 167 weekday PM peak hour trips and 189 mid-day weekend peak hour trips on SR-29 adjacent to the Martini Winery. On a daily basis, near-term projects would generate 600 ADT and 684 ADT on a weekday and weekend, respectively.

Near-term (no project) daily and peak hour volumes for the weekday and weekend have been added to existing intersection volumes on State Route 29 based on previous transportation analyses conducted in the area. Near-term (no project) volumes for weekday PM peak hour and weekend mid-day peak hour have been shown in Figure 3.

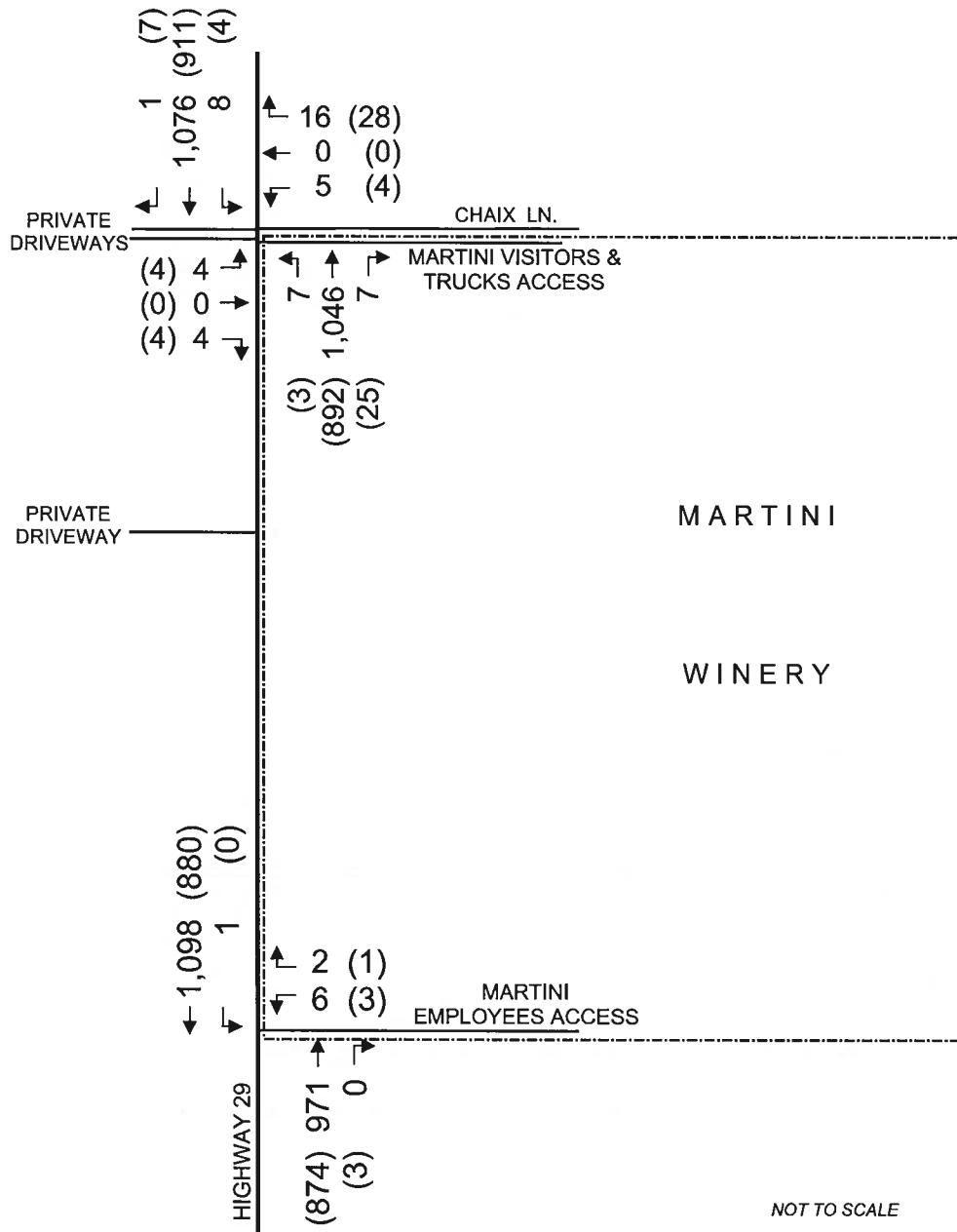
Near-Term (No Project) Roadway Circulation Improvements

The Master Plan indicates that "associated improvements to be installed with the proposed project include a left-turn lane (two-way) in St. Helena Highway."¹¹ Both of the proposed Martini Winery driveways are in a segment of SR-29 that does not currently have a two-way-left-turn-lane (TWLTL). A TWLTL does exist beginning several hundred feet north of the north driveway. A TWLTL exists south of the south driveway, and the TWLTL taper exists with a 6-foot striped median width opposite the Martini southerly driveway. A plan has been developed by Caltrans to complete the TWLTL improvement through this segment of SR-29. Based on recent information, the actual two-way-left-turn-lane project goes to bid in late 2013 with construction expected to begin in the year 2014.¹² The plan for these improvements was also approved by Napa County and, in fact, the Martini Winery contributed a "fair share" toward the cost

¹¹ *Napa County Conservation, Development, and Planning Department, Martini Winery Use Permit Modification (6-6-12), April 15, 2013*

¹² *Mr. Chuck Conner, Senior Project Engineer, E&J Gallo Family Wineries, Communication with Caltrans Administrative Director staff (Mr. Ahmad Rahimi, Project Engineer, Caltrans District 4), Personal communication on April 26, 2013.*





LEGEND

Weekday Volumes: XX
Weekend Volumes: (XX)



Near Term Weekday P.M. and (Weekend Mid-day)
Peak Hour Volumes



of this improvement.¹³ With construction expected to begin in the year 2014 for the TWLTL on SR-29, this improvement has been assumed for all near-term (no project) traffic analyses.

Near-Term (No Project) Intersection/Roadway Operation

With near-term (no project) volumes, study intersection LOS has been calculated and are shown in Table 1. With installation of a two-way-left-turn-lane on SR-29 along the proposed project's frontage (and beyond), intersection operation at the Martini Winery north and south driveways at SR-29 would improve compared to existing traffic conditions. During the weekday PM peak hour, the north driveway would change from LOS F (51.3 seconds) to LOS C (23.8 seconds). The south driveway would change from LOS F (59.6 seconds) to LOS C (21.5 seconds). Weekend mid-day peak hour operation would also improve at the two project driveways. Vehicle delays at the Martini Winery north driveway would improve from LOS C (24.5 seconds) to LOS C (19.4 seconds). The south driveway would improve from LOS E (35.3 seconds) to LOS C (18.1 seconds). (All referenced intersection LOS refers to the stop-sign controlled outbound turning movements from the two project driveways).

Based on CAMUTCD peak hour signal warrant criteria (Warrant #3), the Martini Winery north driveway/SR-29 intersection would not qualify for signalization with near-term (no project) volumes.

AADT volumes on SR-29 would increase from 22,500 to 23,100 vehicle under near-term (no project) conditions. Based on Napa County roadway thresholds, this would continue to represent LOS F conditions as under existing conditions.

3. NAPA COUNTY SIGNIFICANCE CRITERIA

The County of Napa's significance criteria has been based on a review of the Napa County Transportation and Planning Agency and Napa County General Plan documentation on roadway and intersection operations. Specifically, the Circulation Element of the County's General Plan outlines the following significance criteria specific to intersection operation:

Intersections

- The County shall seek to maintain a Level of Service D or better at all intersections, except where the level of service already exceeds this standard (i.e. Level of Service E or F) and where increased intersection capacity is not feasible without substantial additional right-of-way.
- No single level of service standard is appropriate for un-signalized intersections, which shall be evaluated on a case-by-case basis to determine if signal warrants are met.

Further significance criteria are based on County and CEQA guidelines and apply mainly to intersection operation and access. A significant impact occurs if project traffic would result in the following:

- Cause an increase in traffic which is substantial in relation to existing traffic load and capacity of the street system (i.e. result in a substantial increase in either the number of vehicle trips, the volume capacity ratio on roads, or congestion at intersections);
- Exceed either individually or cumulatively, any LOS standard established by the county congestion management agency for designated roads or highways;

¹³ Napa County Inter-Office Memo from William E. Bickell, Director of Public Works to the Board of Supervisors, June 2, 1993.



- Result in a change of traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- Substantially increase hazards due to a design feature (e.g. sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment);
- Result in inadequate emergency vehicle access;
- Project site or internal circulation on the site is not adequate to accommodate pedestrians and bicycles;

4. PROPOSED PROJECT IMPACTS

Project Components

Proposed winery operations would primarily include changes to employees, special event components, driveway access, and circulation improvements on State Route 29. Fruit production would remain unchanged and drop-in (casual) visitor levels would be reduced from 1,500 visitors to 1,400 visitors per week. However, visitor counts would change slightly to reflect actual drop-in public visitation and trade visitor activity. These changes could be described as follows:

- Public Visitors (Monday-Sunday): 1,400
- Trade Visitors (Monday-Saturday): 296

As shown above, there would be a total of 1,696 weekly visitors made up of public drop-in and trade persons. On a daily basis, it is projected that there would be 229 weekday visitors (180 public and 49 trade) and 299 weekend (Saturday) visitors (250 public and 49 trade).

Employee activity would increase slightly from existing levels. Currently, there are 32 full-time employees and 10 part-time employees on a weekday. Employee totals are expected to increase to 54 full-time and 15 part-time employees during the same period. During a weekend, full-time employment would be reduced from 54 employees to 19 employees. Part-time employees would be reduced from 15 employees to 2 employees.

Special event activity is proposed to increase to allow the winery to provide “enhanced experiences for visitors and provide opportunity for educational programs for smaller groups in intimate settings.” Based on the project applicant’s Master Plan, the winery would add four (4) annual larger events with attendance ranging from 75 to 500 guests that would total 1,000 guests added over the course of a year. This would include one event with 75 guests (weekday), one event with 200 guests (weekday), one event with 225 guests (weekend), and the largest event (The Vintage Release) would have up to 500 visitors (weekend). All new marketing events would only be held during off-peak hours.¹⁴

Annual winery production would remain unchanged from existing levels at 2,000,000 gallons. With regard to truck activity, the winery currently experiences approximately 30 truck deliveries per week and six (6) deliveries on its busiest day. With new event and employee activity, the winery would experience approximately 40 truck deliveries per week with eight (8) deliveries on its busiest day.

¹⁴Ms. Linda St. Clair, Planner III, Planning, Building, and Environmental Services Department, Personal communication, Martini Winery Use Permit Modification (dated 6-6-12), April 15, 2013



Planned Project Circulation Improvements

The winery proposes to modify the access and internal circulation in an effort to reduce vehicle conflicts and segregate visitor traffic from the employee/truck traffic. The existing driveway adjacent to Chaix Lane would be closed, and all visitor traffic would shift to a new driveway about 180 feet south of Chaix Lane. The existing southerly driveway would serve employee and truck access needs. The southerly driveway would be widened to accommodate truck turn paths.

On site, the new northerly access would have a circular drop-off area. An on-site roadway would direct visitors to a new 56-space visitor parking lot south of the winery buildings. The southerly access would extend to the east and north sides of the site where two new employee lots (containing 56 spaces) would be provided.

Project Trip Generation/Distribution

The proposed project's weekday and weekend peak hour and daily traffic volumes have been calculated and are shown in Table 3. With no changes in production and winery visitation, proposed project activity has focused on employees and marketing events. Overall trip generation calculations have been based on employee peaking factors and auto occupancy rates for event visitors based on recent winery research conducted by the Napa County Conservation, Development, and Planning Department and existing driveway volumes.¹⁵ Based on increases in employees and marketing activity, the project would be expected to generate 194 daily weekday trips with 41 PM peak hour trips. During a typical weekend (Saturday), the project would be expected to generate 60 daily trips with 15 mid-day (afternoon) peak hour trips (8 in, 7 out).

During the six-week harvest crush season, the proposed project is expected to generate an average of 382 daily trips. This daily trip total would represent 299 visitors, 26 full-time employees on-site during weekend periods (17 production, 3 exempt, 6 non-exempt and 15 part-time [seasonal] employees), 2,000,000 gallons of wine production, and 276 daily tons (on-haul) of grapes.

Based on the largest marketing event attendance of 500 persons (twice per year), there would total generation of 385 event trips.

To determine traffic conditions with the proposed project, the calculated project trips were added to existing volumes. Based on observed turning percentages, the project trips were distributed 25% to/from the north and 75% to/from the south on State Route 29.

The existing visitor traffic was reallocated to the new northerly winery driveway. This driveway would be almost directly opposite the north visitor driveway for the existing Sutter Home Winery. The south driveway would only carry employee and truck traffic. The projected peak hour driveway traffic was also adjusted to reflect the employee and visitor projections outlined in the project description.

Existing plus project and near-term plus project volumes have been shown in Figure 4 and 5.

¹⁵County of Napa, Conservation, Development, and Planning Department, "Use Permit Application Package," Napa County Winery Traffic Generation Characteristics, 2012.

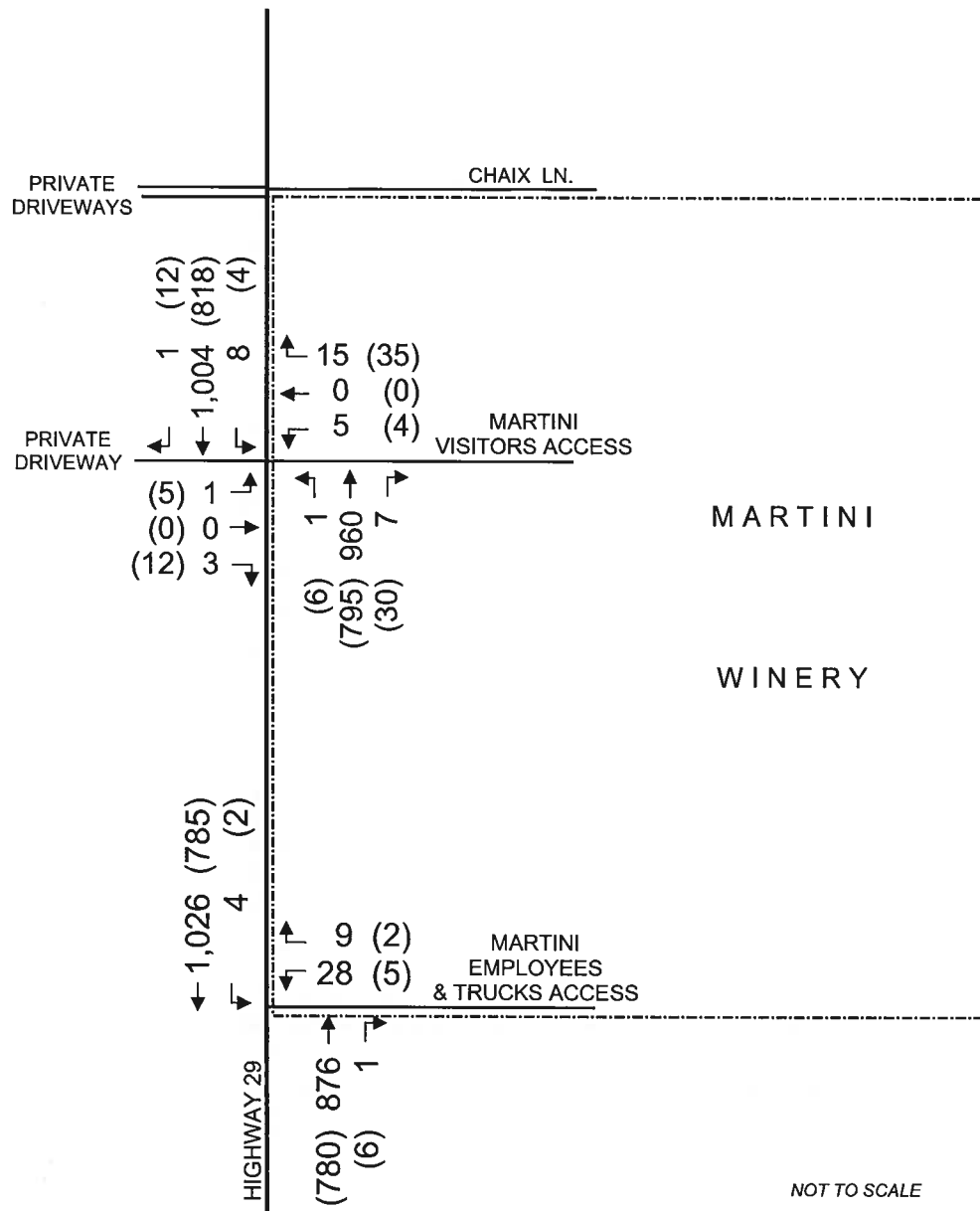


TABLE 3
PEAK HOUR AND DAILY TRIP GENERATION:
PROPOSED LOUIS M. MARTINI WINERY PROJECT

<u>Weekday Daily Traffic:</u>		
54 full time employees x 3.05 one-way trips	=	165 daily trips
15 part-time employees x 1.90 one-way trips	=	<u>29 daily trips</u>
Total Weekday Daily Trips	=	194 daily trips
<u>Weekday PM Peak Hour Traffic:</u>		
194 daily employee trips x 21% peak	=	<u>41 peak hour trips</u>
Total Weekday PM Peak Hour Trips	=	41 trips (4 in, 37 out)
<u>Weekend (Saturday) Daily Traffic:</u>		
19 full time employees x 3.05 one-way trips	=	56 daily trips
2 part-time employees x 1.90 one-way trips	=	<u>4 daily trips</u>
Total Weekend (Saturday) Daily Trips	=	60 daily trips
<u>Weekend (Saturday) Peak Hour Traffic:</u>		
60 daily employee trips x 25% peak	=	<u>15 peak hour trips</u>
Total Weekend (Saturday) Peak Hour Trips	=	15 trips (8 in, 7 out)
<u>Weekend (Saturday) Daily Harvest/Crush Traffic:</u>		
299 visitors/2.8 persons per vehicle x 2 one-way trips	=	214 daily trips
26 full time employees x 3.05 one-way trips	=	79 daily trips
15 part-time employees x 1.90 one-way trips	=	29 daily trips
2,000,000 gallons/1,000 x .009 daily trucks x 2 o-w trips	=	36 daily trips
276 tons daily grapes (=12 daily trucks) x 2 o-w trips	=	<u>24 daily trips</u>
Total Weekend (Saturday) Daily Harvest/Crush Trips	=	382 daily trips
<u>Largest Marketing Event – Additional Traffic:</u>		
6 event staff x 2 one-way trips per person	=	12 event trips
500 visitors / 2.8 visitors per vehicle x 2 o-w trips	=	357 event trips
8 trucks x 2 one-way trips	=	<u>16 event trips</u>
Total Largest Event Marketing Trips:	=	385 event trips

Source: Production, employee, and visitor data provided by Mr. Chuck Conner (project applicant) and the Martini Winery Use Permit Modification (June 12, 2012). Daily and peak hour calculations based on County of Napa, Conservation, Development, and Planning Department, "Use Permit Application Package," Napa County Winery Traffic Generation Characteristics, 2012.



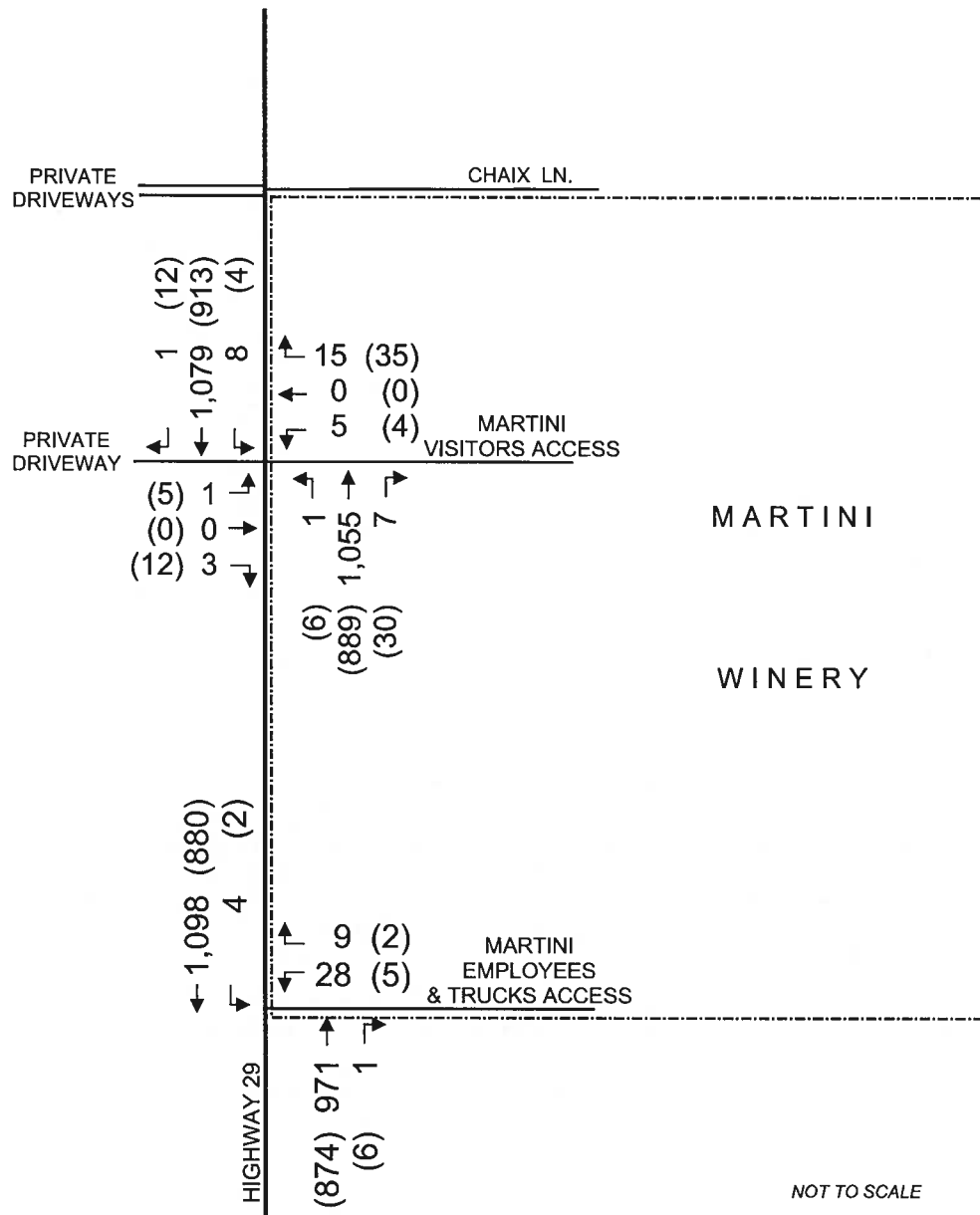


LEGEND
 Weekday Volumes: XX
 Weekend Volumes: (XX)



Existing + Project Weekday P.M. and (Weekend Mid-day)
 Peak Hour Volumes





Near Term + Project Weekday P.M. and (Weekend Mid-day)
Peak Hour Volumes



Project Effects on Roadway/Intersection Operation

A. Existing Plus Project Conditions

The project would be expected to add approximately 146 daily trips south of the site and 48 daily trips north of the site on State Route 29. This would represent an addition of less than 1 percent (0.008) to the daily volumes on the highway. The combined existing plus project volume of 22,694 daily trips would remain at LOS F operating conditions for a two-lane rural arterial roadway based on established County thresholds.

During the peak winery activity periods, the project would generate 41 weekday PM peak hour and 15 Saturday mid-day peak hour trips. Weekday PM peak hour and weekend mid-day peak hour intersection levels of service were evaluated with proposed project traffic and are shown in Table 4.

With existing plus project traffic volumes, the two project study intersections would continue to operate at unacceptable levels (LOS E or F) during both the weekday PM peak hour and weekend mid-day peak hour periods. As shown in Table 4, intersection LOS would remain unchanged from existing conditions with proportional increases in overall vehicle delay.

The existing and existing plus project volumes were compared with the Napa County guidelines for installing a left turn lane on State Route 29 at the proposed Martini driveways.¹⁶ (The warrant graphs for weekday and Saturday conditions are provided in the Appendix). With over 20 daily weekday/weekend trips at the proposed project driveways and 22,694 daily trips on State Route 29, left-turn lanes would be warranted at both driveways.

B. Near-Term Plus Project Conditions

With near-term plus project conditions, daily traffic volumes on State Route 29 would increase to 23,294 ADT. Again, this would represent LOS F conditions for a two-lane, rural arterial roadway based on County thresholds. However, the addition of the continuous two-way-left-turn-lane on SR-29 would improve overall vehicle delay and add some additional capacity to the roadway.

Both driveway study intersections would operate at acceptable levels (LOS C or better) during both the weekday PM peak hour and weekend mid-day peak hour under near-term with project conditions. As noted with near-term (no project) conditions, the planned installation of a two-way-left-turn-lane on State Route 29 along the proposed project frontage (and beyond) would improve minor street driveway operations at the project site.

TABLE 4
EXISTING PLUS PROJECT AND NEAR-TERM PLUS PROJECT CONDITIONS:
INTERSECTION LEVELS-OF-SERVICE
WEEKDAY PM PEAK AND WEEKEND MID-DAY PEAK HOUR

#	Intersection	Control Type	Wkdy. PM LOS/Delay		Wknd. Mid-Day LOS/Delay	
			Existing + Project	Near-Term + Project	Existing + Project	Near-Term + Project
1	Martini N. Driveway/SR-29	Stop	F 51.9 secs.	C 23.8 secs.	C 24.3 secs.	C 19.8 secs.
2	Martini S. Driveway/SR-29	Stop	F 103.0 secs.	C 24.4 secs.	E 35.5 secs.	C 18.3 secs.

Based on Highway Capacity Manual (HCM) 2000, Operations methodology for stop-sign controlled (unsignalized) intersections using Synchro-Simtraffic software. Intersection calculation yields an LOS and vehicle delay in seconds. Stated LOS refers to the minor street (stop-sign) controlled movement.

5. SITE ACCESS/DESIGN PARAMETERS

¹⁶ Napa County, Adopted Road and Street Standards, revised November 21, 2006.



Sight Distance

As noted in the discussion of existing conditions, sight distances to the north and the south are well in excess of the minimum sight distances needed for the measured vehicle speeds. Based on radar surveys conducted in the vicinity of the Martini Winery, the "critical" vehicle speed (85% of all surveyed vehicles travel at or below the critical speed) along SR-29 at the winery were observed to be 40-45 miles per hour (mph).¹⁷ Based on Caltrans design standards, these vehicle speeds require a stopping sight distance of 300-360 feet, measured along the travel lanes on SR-29.¹⁸

The winery access intersections are located on a straight section of SR-29. Field observations indicate sight distances to the north and south are well in excess of the 360 feet needed for the measured vehicle speeds with the existing southerly and new northern driveway locations.

Project Access and Circulation

Based on the new project description, the existing Martini Winery driveway functions would be shifted and the driveways would be improved (see Figure 6--Project Site Plan). The existing southerly driveway would serve the employee and truck access. The new northerly driveway (located 180 feet south of its current location) would provide a separation from the multiple driveways and Chaix Lane at the north edge of the winery. As a result, fewer vehicle conflicts are expected at the new Martini Winery visitor driveway.

The proposed project driveways have been evaluated for right-turn lane warrants. Caltrans guidelines suggest that the combination of northbound through volumes on SR-29 and the expected inbound right turn volumes would not warrant separate right turn lanes at the site driveways. However, the new visitor driveway would have inbound right turn volumes that could warrant a right turn taper (not a separate right turn lane). The right turn volume would just meet the minimum volume threshold during only the Saturday afternoon peak hour (with visitor activity at the maximum permitted levels).

The proposed access plan (together with on-site improvements) would accommodate visitor traffic at a new north driveway about 180 feet south of Chaix Lane. An enlarged visitor parking lot would be served by this driveway. Employees and trucks would use an improved south driveway and would be directed to a new separate parking lot in the east portion of the site nearer the operational areas of the winery. The overall site access and internal circulation would be substantially improved by the driveway and circulation design.

The Napa County Transportation & Planning Agency (NCTPA) in cooperation with Napa County and local City agencies is developing bicycle routes as outlined in the Napa Countywide Bicycle Plan.¹⁹ The plan encourages new developments to incorporate bicycle friendly design. State Route 29 has wide striped shoulder areas (unofficial Class II bike lanes) in both directions. Some visitors may utilize bicycles to access the proposed project. The project would provide bicycle racks for visitors to the proposed winery.

Marketing Events

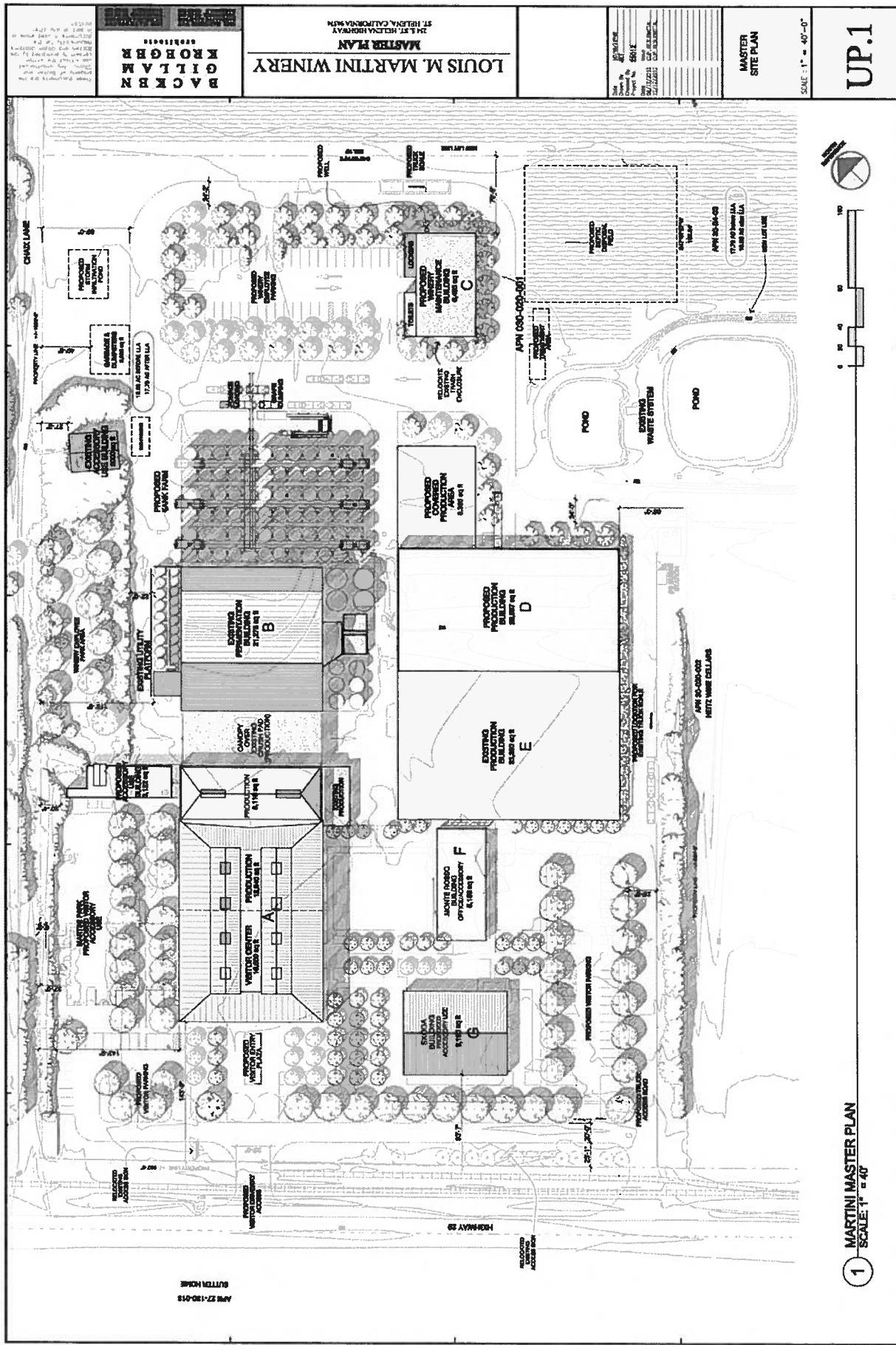
With regard to special event traffic, these events would only occur four times annually. The largest (500 visitor) event would be an all day event on a weekend. This event would involve visitors arriving and

¹⁷ George W. Nickelson, P.E., *Radar speed surveys on State Route 29 at Martini Winery driveway(s), October 30 and November 5, 2009*

¹⁸ Caltrans, *Ibid....*

¹⁹ Napa County, *Countywide Bicycle Plan (2012), Planning Area-North Valley, May 2012.*





departing throughout the entire day. The event would be scheduled to ensure that the majority of visitor arrivals and/or departures would not coincide with the Saturday afternoon peak hour background traffic flows on SR-29.

Based on standard auto occupancy rates, the largest special event (500 people) would generate up to 385 trips (193 in, 192 out). As noted, these events are typically of sufficient duration in length that the inbound and outbound trips occur in separate hours, thus the number of trips on the street network at one time are half of the total volume. These events are usually held outside of typical peak traffic periods (throughout the entire day or later than 6:00 p.m.) and therefore generally do not impact peak hour operations during the weekday/weekend peak periods.

6. CUMULATIVE CONDITIONS

Cumulative Year 2030 Projections

Model Forecast

Cumulative (Year 2030) volume projections on State Route 29 (SR-29) were derived from the Napa County Transportation & Planning Agency's traffic volume forecasts in the Napa County General Plan Update EIR. The forecast increase in volume-to-capacity (v/c) ratio from Year 2003 to Year 2030 on SR-29 in the project vicinity was applied to the provided Year 2003 peak hour two-way volume (1,943 trips) on SR-29, yielding a volume of 3,759 weekday PM peak hour trips on SR-29 in Year 2030.

The projected PM peak hour cumulative volume on SR-29 represents a large (198%) increase compared to the existing (Year 2013) peak hour counted volume of 1,902 trips on SR-29 at the project driveway(s). With projected cumulative forecasts, the existing daily volume on SR-29 would increase from 22,500 trips to 44,550 daily trips.

Historical Data

For comparison, average annual daily traffic volumes on SR-29 between Zinfandel Lane and Chaix Lane over the previous twenty years were reviewed. The average annual daily traffic (AADT) on SR-29 in 1992 was 20,000 trips. By comparison, AADT on SR-29 2011 was 24,300 trips. Daily volumes were highest in the year 2007, reaching 27,000 AADT. Daily volumes on SR-29 have since declined and are lower today than they were in 1998. Increases in daily volumes between year 1992 and the highest year of 2007 equates to an annual increase of 2% per year on SR-29. Applying the same annual increase to the current ADT on SR-29 of 22,500 results in about 32,130 ADT in year 2030 (2% per year added for 18 years).

Cumulative volumes based on historical data are approximately 72% of the model forecast volumes on SR-29. The difference between the model numbers and historical growth trends indicates volumes are not increasing to the model's forecasted levels. However, in order to proactively address potential traffic volumes under cumulative conditions, the County has adopted several measures identified in the General Plan to improve the street network and also reduce vehicle trips.

In order to identify weekend cumulative conditions, the General Plan Update provides a ratio of weekday to weekend peak hour volumes on key streets within the valley. Several segments on SR-29 in the vicinity of the project were shown to have an average ratio of 0.76-0.80, indicating weekend peak hour volumes are expected to be about 80% of weekday volumes. Therefore the future weekend peak hour



volumes would be expected to remain roughly in the same ratio as the existing volumes and lower than the weekday volume projections.

Cumulative Operating Conditions

The County's forecasted transportation model volumes on SR-29 under Year 2030 conditions are very tenuous given that the highway is essentially at or near capacity today. A more reasonable projection based on historical growth suggests that SR-29 would continue to operate near capacity levels with increased congestion during peak times of the day with longer peak periods during the day typically at unacceptable conditions (LOS E-F) for all minor street approaches and/or driveways at SR-29. Again, the installation of continuous two-way-left-turn-lane would improve overall vehicle delays from minor street/driveways and as some additional capacity to the roadway.

Additional improvements to the street network are anticipated and have been included in the General Plan's Improved 2030 Network model. As noted, the County has also adopted several measures identified in the General Plan to reduce vehicle trips through public transit and Transportation Demand Management (TDM) strategies: "The project should support programs to reduce single occupant vehicle use and encourage alternative travel modes."

- In keeping with the policy, the winery project will provide bicycle racks for visitors who may arrive by bike. The project should also promote the use of public transportation and carpooling of employees (by adjusting work schedules, etc.) to facilitate the use of other transportation modes.

The County has identified other mitigation policies, including development of a traffic impact fee (TIF) to be developed in cooperation with the NCTPA (Mitigation Measure 4.4.1C). This would require new projects to pay their "fair share" of countywide traffic improvements they contribute the need for. Examples of such improvements could include construction of a two-way left turn lane on SR-29 (specific segments should be under construction by the year 2014) or signaling major cross street intersections along the SR-29 corridor. The concept is under development but presumably the fee would be applied on a "per trip" basis if/when implemented.

7. SUMMARY AND CONCLUSIONS

Daily and Peak Hour Operations

The proposed Louis M. Martini Winery project would generate 60-194 net new daily trips during the weekend and weekday periods (respectively). The project traffic would represent an increase of less than 1% (0.008) over the existing SR-29 volume of 22,500 daily trips. All project study intersections would continue to operate at LOS E-F under existing plus project conditions during both weekday and weekend peak hour conditions.

With near-term (approved/pending) development traffic volumes, circulation improvements would occur on State Route 29 along the project frontage (and beyond) that would dramatically improve overall intersection LOS from existing and existing plus project conditions. A two-way-left-turn-lane would be installed along the project frontage that would reduce overall vehicle delays and improve intersection LOS. Both project driveway intersection LOS would improve from LOS F to LOS C under both near-term (no project) and near-term plus project conditions. Daily volumes on SR-29 would continue to operate at or near capacity with 23,100 ADT (near-term no project) and 23,294 ADT with near-term plus project volumes but would be aided with the addition of the continuous two-way-left-turn-lane.



Based on standard auto occupancy rates, the largest special event (500 people) would generate up to 385 trips (193 in, 192 out). As noted, these events are typically of sufficient duration in length that the inbound and outbound trips occur in separate hours, thus the number of trips on the street network at one time are half of the total volume. These events are usually held outside of typical peak traffic periods (throughout the entire day or later than 6:00 p.m.) and therefore generally do not impact peak hour operations during the weekday/weekend peak periods.

Vehicle Sight Distance

Vehicle sight distances to the north and the south on SR-29 are well in excess of the minimum sight distances needed for the measured vehicle speeds. Based on radar surveys conducted in the vicinity of the Martini Winery, the "critical" vehicle speed (85% of all surveyed vehicles travel at or below the critical speed) along SR-29 at the winery were observed to be 40-45 miles per hour (mph).²⁰ Based on Caltrans design standards, these vehicle speeds require a stopping sight distance of 300-360 feet, measured along the travel lanes on SR-29.²¹

The winery access intersections are located on a straight section of SR-29. Field observations indicate sight distances to the north and south are well in excess of the 360 feet needed for the measured vehicle speeds with the existing southerly and new northern driveway locations.

Vehicle Circulation/Site Access

With the winery's current access/internal circulation, most of the site traffic is focused at the northerly driveway. As noted in the description of existing conditions, there is a private road (Chaix Lane) and another winery driveway immediately north of the existing northerly Martini driveway. This close proximity can result in vehicle conflicts between visitor vehicles, employee/service vehicles and vehicle trips in/out of the other nearby access points.

The proposed access plan (together with on site improvements) would accommodate visitor traffic at a new north driveway about 180 feet south of Chaix Lane. An enlarged visitor parking lot would be served by this driveway. Employees and trucks would use an improved south driveway and would be directed to a new separate parking lot in the east portion of the site nearer the operational areas of the winery. The overall site access and internal circulation would be substantially improved by the driveway and circulation design.

Based on design guidelines, the northerly visitor driveway would have inbound right turn volumes that could warrant a right turn taper (not a separate right turn lane), but the right turn volume would just meet the minimum volume threshold during only the Saturday afternoon peak hour (with visitor activity at the maximum permitted levels).

Cumulative Year 2030 Conditions

As noted under cumulative model forecasts, the County's forecasted transportation model volumes on SR-29 under Year 2030 conditions are very tenuous given that the highway is essentially at or near capacity today. A more reasonable projection based on historical growth suggests that SR-29 would continue to operate near capacity levels with increased congestion during peak times of the day with longer peak periods during the day typically at unacceptable conditions (LOS E-F) for all minor street approaches and/or driveways at SR-29.

²⁰ George W. Nickelson, P.E., *Radar speed surveys on State Route 29 at Martini Winery driveway(s), October 30 and November 5, 2009*

²¹ Caltrans, *Ibid....*



The County has identified other mitigation policies, including development of a traffic impact fee (TIF) to be developed in cooperation with the NCTPA (Mitigation Measure 4.4.1C). This would require new projects to pay their “fair share” of countywide traffic improvements they contribute the need for. Examples of such improvements could include construction of a two-way left turn lane on SR-29 (specific segments should be under construction by the year 2014) or signaling major cross street intersections along the SR-29 corridor. The concept is under development but presumably the fee would be applied on a “per trip” basis if/when implemented.



APPENDIX

- Level of Service Definitions
- Level of Service Calculations
- Turn Lane Warrant Graphs
- Signal Warrant Sheets

LEVEL-OF-SERVICE CRITERIA FOR INTERSECTIONS













LEVEL OF SERVICE	TYPE OF FLOW	DELAY	MANEUVERABILITY	CONTROL DELAY (SECONDS/VEHICLE)		
				SIGNALIZED	UNSIGNALIZED	ALL-WAY STOP
A	Stable Flow	Very slight delay. Progression is very favorable, with most vehicles arriving during the green phase not stopping at all.	Turning movements are easily made, and nearly all drivers find freedom of operation.	≤ 10.0 secs.	≤ 10.0	≤ 10.0
B	Stable Flow	Good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.	Vehicle platoons are formed. Many drivers begin to feel somewhat restricted within groups of vehicles.	> 10 and ≤ 20.0 secs.	> 10 and ≤ 15.0	> 10 and ≤ 15.0
C	Stable Flow	Higher delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, although many still pass through the intersection without stopping.	Back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted	> 20 and ≤ 35.0 secs.	> 15 and ≤ 25.0	> 15 and ≤ 25.0
D	Approaching Unstable Flow	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume-to-capacity ratios. Many vehicles stop, and the proportion of vehicles of stopping declines. Individual cycle failures are noticeable.	Maneuverability is severely limited during short periods due to temporary back-ups.	> 35 and ≤ 55.0 secs.	> 25 and ≤ 35.0	> 25 and ≤ 35.0
E	Unstable Flow	Generally considered to be the limit of acceptable delay. Indicative of poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures are frequent occurrences.	There are typically long queues of vehicles waiting upstream of the intersection.	> 55 and ≤ 80.0 secs.	> 35 and ≤ 50.0	> 35 and ≤ 50.0
F	Forced Flow	Generally considered to be unacceptable to most drivers. Often occurs with over saturation. May also occur at high volume-to-capacity ratios. There are many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors.	Jammed conditions. Back-ups from other locations restrict or prevent movement. Volumes may vary widely, depending principally on the downstream back-up conditions.	> 80.0 secs.	> 50.0	> 50.0

References: 1. Highway Capacity Manual, Fourth Edition, Transportation Research Board, 2000.

HCM Unsignalized Intersection Capacity Analysis







1: Martini-Chaix Ln. & SR-29

PM Wkdy. Existing Conditions
4/17/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NB	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Volume (veh/h)	4	0	4	5	0	16	7	951	7	8	1004	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	0	4	5	0	17	8	1034	8	9	1091	
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage veh												
Upstream signal (ft)	603											
pX, platoon unblocked												
vC, conflicting volume	2179	2166	1092	2166	2162	1038	1092				1041	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2179	2166	1092	2166	2162	1038	1092				1041	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	86	100	98	83	100	94	99				99	
cM capacity (veh/h)	31	46	261	33	46	281	639				668	
Direction, Lane #	EB	WB	NB	SB								
Volume tota	9	23	1049	1101								
Volume Left	4	5	8	9								
Volume Right	4	17	8	1								
cSH	55	100	639	668								
Volume to Capacity	0.16	0.23	0.01	0.01								
Queue Length 95th (ft)	13	20	1	1								
Control Delay (s)	82.8	51.3	0.4	0.5								
Lane LOS	F	F	A	A								
Approach Delay (s)	82.8	51.3	0.4	0.5								
Approach LOS	F	F										
Intersection Summary												
Average Delay				1.3								
Intersection Capacity Utilization				68.1%			ICU Level of Service			C		
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis
2: Martini S. Drive & SR-29

PM Wkdy. Existing Conditions
4/17/2013













						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	T		T			T
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	6	2	876	0	1	1026
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	2	952	0		1115
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2070	952			952	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2070	952			952	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	89	99			100	
cM capacity (veh/h)	59	315			722	
Direction, Lane #	WB	NB	SB			
Volume Total	9	952	1116			
Volume Left	7	0	1			
Volume Right	2	0	0			
cSH	75	1700	722			
Volume to Capacity	0.12	0.56	0.00			
Queue Length 95th (ft)	9	0	0			
Control Delay (s)	59.6	0.0	0.1			
Lane LOS	F		A			
Approach Delay (s)	59.6	0.0	0.1			
Approach LOS	F					
Intersection Summary						
Average Delay	0.3					
Intersection Capacity Utilization	64.8%					
ICU Level of Service	C					
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

1: Martini-Chaix Ln. & SR-29

Mid-Day Wknd. Existing Conditions

4/17/2013

																	
Movement	EB	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SEL	SBT	SBR					
Lane Configurations	↕			↕			↕			↕							
Sign Control	Stop			Stop			Free			Free							
Grade	0%			0%			0%			0%							
Volume (veh/h)	4	0	4	4	0	28	3	798	25	4	816	7					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92					
Hourly flow rate (vph)		0	4	4	0	30	3	867	27	4	887	8					
Pedestrians																	
Lane Width (ft)																	
Walking Speed (ft/s)																	
Percent Blockage																	
Right turn flare (veh)																	
Median type	None			None													
Median storage (veh)																	
Upstream signal (ft)	603																
pX, platoon unblocked																	
vC, conflicting volume	1817	1801	891	1791	1791	881	895			895							
vC1, stage 1 conf vol																	
vC2, stage 2 conf vol																	
vCu, unblocked vol	1817	1801	891	1791	1791	881	895			895							
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1							
tC, 2 stage (s)																	
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2							
p0 queue free %	92	100	99	93	100	91	100			99							
cM capacity (veh/h)	54	79	31	61	80	36	758			758							
Direction, Lane #	EB 1	WB 1	NB 1	SB													
Volume Total	9	35	898	899													
Volume Left	4	4	3	4													
Volume Right	4	30	27	8													
cSH	94	219	758	758													
Volume to Capacity	0.09	0.16	0.00	0.01													
Queue Length 95th (ft)	7	14	0	0													
Control Delay (s)	47.2	24.5	0.1	0.2													
Lane LOS	E	C	A	A													
Approach Delay (s)	47.2	24.5	0.1	0.2													
Approach LOS	E	C															
Intersection Summary																	
Average Delay				0.8													
Intersection Capacity Utilization				56.2%									ICU Level of Service				B
Analysis Period (min)				15													


HCM Unsignalized Intersection Capacity Analysis 2: Martini S. Drive & SR-29

Mid-Day Wknd. Existing Conditions
4/17/2013

Movement	WBL	WBR	NBT	NBR	SBL	SB
Lane Configurations	T		T			T
Signal Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	3	1	780	3	0	785
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	1	848	3	0	853
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1703	849			851	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1703	849			851	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			100	
cM capacity (veh/h)	101	361			787	
Direction, Lane #	WB 1	NB 1	SB			
Volume Total	4	851	853			
Volume Left	3	0	0			
Volume Right	1	3	0			
cSH	123	1700	787			
Volume to Capacity	0.04	0.50	0.00			
Queue Length 95th (ft)	3	0	0			
Control Delay (s)	35.3	0.0	0.0			
Lane LOS	E					
Approach Delay (s)	35.3	0.0	0.0			
Approach LOS	E					
Intersection Summary						
Average Delay	0.1					
Intersection Capacity Utilization	51.3%					
ICU Level of Service	A					
Analysis Period (min)	15					







HCM Unsignalized Intersection Capacity Analysis 1: Martini-Chaix Ln. & SR-29

PM Wkdy. Near-Term (NP) Conditions
4/30/2013

												
Move	EB	EBT	EBR	WBL	WB	WBR	NBL	NBT	NBR	SB	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Volume (veh/h)	4	0	4	5	0	16	7	1046	7	8	1076	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	0	4	5	0	17	8	1137	8	9	170	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	TWLTL			TWLTL								
Median storage (veh)	2			2								
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2361	2347	1170	2348	2344	1141	1171			1145		
vC1, stage 1 conf vol	1188	1188		1156	1156							
vC2, stage 2 conf vol	173	1160		1192	1188							
vCu, unblocked vol	2361	2347	1170	2348	2344	1141	1171			1145		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	98	96	100	93	99			99		
cM capacity (veh/h)	147	179	235	154	180	244	597			610		
Direction, Lane #	B 1	B 1	NB	SB								
Volume Total	9	23	1152	1179								
Volume Left	4	5	8	9								
Volume Right	4	17	8	1								
cSH	181	214	597	610								
Volume to Capacity	0.05	0.11	0.01	0.01								
Queue Length 95th (ft)	4	9	1	1								
Control Delay (s)	25.9	23.8	0.5	0.6								
Lane LOS	D	C	A	A								
Approach Delay (s)	25.9	23.8	0.5	0.6								
Approach LOS	D	C										
Intersection Summary												
Average Delay	0.9											
Intersection Capacity Utilization	72.0%			ICU Level of Service			C					
Analysis Period (min)	15											


HCM Unsignalized Intersection Capacity Analysis
2: Martini S. Drive & SR-29

PM Wkdy. Near-Term (NP) Conditions
4/30/2013

						
Mov men	WB	WBR	NBT	BR	SBL	SBT
Lane Configurations	↰		↑			↱
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	6	2	971	0	1	1098
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	2	1055	0	1	1193
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLT					
Median storage veh	2					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2251	1055			1055	
vC1, stage 1 conf vol	1055					
vC2, stage 2 conf vol	196					
vCu, unblocked vol	2251	1055			1055	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			100	
cM capacity (veh/h)	215	274			660	
Direction, Lane #	WB	NB 1	SB			
Volume Total	9	1055	1195			
Volume Left	7	0	1			
Volume Right	2	0	0			
cSH	227	1700	660			
Volume to Capacity	0.04	0.62	0.00			
Queue Length 95th (ft)	3	0	0			
Control Delay (s)	21.5	0.0	0.1			
Lane LOS	C		A			
Approach Delay (s)	21.5	0.0	0			
Approach LOS	C					
Intersection Summary						
Average Delay		0.1				
Intersection Capacity Utilization		68.6%		ICU Level of Service	G	
Analysis Period (min)		15				







HCM Unsignalized Intersection Capacity Analysis 1: Martini-Chaix Ln. & SR-29

M-D Wknd. Near-Term (NP) Conditions
4/30/2013

																				
Movement	EBL	EB	EBR	WBL	WB	WBR	NB	NBT	NBR	SBL	SB	SBR								
Lane Configurations	↕			↕			↕			↕										
Sign Control	Stop			Stop			Free			Free										
Grade	0%			0%			0%			0%										
Volume (veh/h)	4	0	4	4	0	28	3	892	25	4	911	7								
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92								
Hourly flow rate (vph)	4	0	4	4	0	30	3	970	27	4	990	8								
Pedestrians																				
Lane Width (ft)																				
Walking Speed (ft/s)																				
Percent Blockage																				
Right turn flare (veh)																				
Median type	TWLTL			TWLTL																
Median storage (veh)	2			2																
Upstream signal (ft)																				
pX, platoon unblocked																				
vC, conflicting volume	2023	2006	994	1997	1996	983	998				997									
vC1, stage 1 conf vol	1003	1003		990	990															
vC2, stage 2 conf vol	1020	1003		1007	1007															
vCu, unblocked vol	2023	2006	994	1997	1996	983	998				997									
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1									
tC, 2 stage (s)	6.1	5.5		6.1	5.5															
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2									
p0 queue free %	98	100	99	98	100	90	100				99									
cM capacity (veh/h)	187	225	297	202	226	302	694				694									
Direction Lane #	EB 1	WB 1	NB 1	SB 1																
Volume Total	9	35	1000	1002																
Volume Left	4	4	3	4																
Volume Right	4	30	27	8																
cSH	230	284	694	694																
Volume to Capacity	0.04	0.12	0.00	0.01																
Queue Length 95th (ft)	3	10	0	0																
Control Delay (s)	21.3	19.4	0.1	0.2																
Lane LOS	C	C	A	A																
Approach Delay (s)	21.3	19.4	0.1	0.2																
Approach LOS	C	C																		
Intersection Summary																				
Average Delay	0.6																			
Intersection Capacity Utilization	61.3%			ICU Level of Service			B													
Analysis Period (min)	15																			

HCM Unsignalized Intersection Capacity Analysis
2: Martini S. Drive & SR-29

M-D Wknd. Near-Term (NP) Conditions
4/30/2013

									
Movement	WBL	WBR	NBT	NBR	SBL	SB			
Lane Configurations	T		T		T	T			
Sign Control	Stop		Free			Free			
Grade	0%		0%			0%			
Volume (veh/h)	3	1	874	3	0	880			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92			
Hourly flow rate (vph)	3	1	950	3	0	957			
Pedestrians									
Lane Width (ft)									
Walking Speed (ft/s)									
Percent Blockage									
Right turn flare (veh)									
Median type	TWLTL								
Median storage (veh)	2								
Upstream signal (ft)									
pX, platoon unblocked									
vC, conflicting volume	1908	952			953				
vC1, stage 1 conf vol	952								
vC2, stage 2 conf vol	957								
vCu, unblocked vol	1908	952			953				
tC, single (s)	6.4	6.2			4.1				
tC, 2 stage (s)	5.4								
tF (s)	3.5	3.3			2.2				
p0 queue free %	99	100			100				
cM capacity (veh/h)	268	315			721				
Direction, Lane #	WB	NB 1	SB 1						
Volume Total	4	953	957						
Volume Left	3	0	0						
Volume Right	1	3	0						
cSH	278	1700	721						
Volume to Capacity	0.02	0.56	0.00						
Queue Length 95th (ft)	1	0	0						
Control Delay (s)	18.1	0.0	0.0						
Lane LOS	C								
Approach Delay (s)	18.1	0.0	0.0						
Approach LOS	C								
Intersection Summary									
Average Delay		0.0							
Intersection Capacity Utilization		56.3%	ICU Level of Service		B				
Analysis Period (min)		15							

HCM Unsignalized Intersection Capacity Analysis

1: Martini N. Drive & SR-29

PM Wkdy. E+Project Conditions
4/30/2013

Movement	B	EBT	EBR	WBL	WB	WBR	NBL	NBT	NBR	SB	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	1	0	3	5	0	15	1	960	7	8	1004	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	0	3	5	0	16		1043	8	9	1091	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2175	2162	1092	2162	2159	1047	1092			1051		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2175	2162	1092	2162	2159	1047	1092			1051		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	99	84	100	94	100			99		
cM capacity (veh/h)	31	47	61	33	47	277	639			662		
Direction, Lane #	EB	WB	NB	1	SB							
Volume Total	4	22	1052	1101								
Volume Left	1	5	1	9								
Volume Right	3	16	8	1								
cSH	92	98	639	662								
Volume to Capacity	0.05	0.22	0.00	0.01								
Queue Length 95th (ft)	4	20	0	1								
Control Delay (s)	46.2	51.9	0.1	0.5								
Lane LOS	E	F	A	A								
Approach Delay (s)	46.2	51.9	0.1	0.5								
Approach LOS	E	F										
Intersection Summary												
Average Delay				0.9								
Intersection Capacity Utilization			69.1%									
Analysis Period (min)			15									
ICU Level of Service										C		

HCM Unsignalized Intersection Capacity Analysis 2: Martini S. Drive & SR-29

PM Wkdy. E+Project Conditions
4/30/2013













Movement	WBL	WBR	NBT	NBR	SBL	SB
Lane Configurations	Y		↑			↓
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	28	9	876	1	4	1026
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	10	952	1	4	1115
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflict volume	2077	953			953	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2077	953			953	
tC, single (s)	6.4	6.2			4	
tC, 2 stage (s)						
tF (s)	5.5	3.3			2.2	
p0 queue free %	48	97			99	
cM capacity (veh/h)	59	314			721	
Direction, Lane #	WB 1	NB	SB			
Volume Total	40	953	1120			
Volume Left	30	0	4			
Volume Right	10	1	0			
cSH	73	1700	721			
Volume to Capacity	0.55	0.56	0.01			
Queue Length 95th (ft)	59	0	0			
Control Delay (s)	103.0	0.0	0.2			
Lane LOS	F		A			
Approach Delay (s)	103.0	0.0	0.2			
Approach LOS	F					
Intersection Summary						
Average Delay		2.1				
Intersection Capacity Utilization		67.2%		ICU Level of Service		C
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

1: Martini N. Drive & SR-29

Mid-Day Wknd. E+Project Conditions

4/30/2013

													
Move	ent	BL	BT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SB	BR
Lane Configurations			↕			↕			↕			↕	
Sign Control			Stop			Stop			Free			Free	
Grade			0%			0%			0%			0%	
Volume (veh/h)		5	0	12	4	0	35	6	795	30	4	818	12
Peak Hour Factor		0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)		5	0	13	4	0	38	7	864	33	4	889	13
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type			None			None							
Median storage (veh)													
Upstream signal (ft)													
pX, platoon unblocked													
vC, conflicting volume		1836	1814	896	1811	1804	880	902			897		
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol		1836	1814	896	1811	1804	880	902			897		
tC, single (s)		7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)													
tF (s)		3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %		89	100	96	92	100	89	99			99		
cM capacity (veh/h)		51	77	339	58	78	346	753			757		
Direction, lane #		EB 1	WB 1	NB 1	SB 1								
Volume Total		18	42	903	907								
Volume Left		5	4	7	4								
Volume Right		13	38	33	13								
cSH		128	229	753	757								
Volume to Capacity		0.14	0.19	0.01	0.01								
Queue Length 95th (ft)		12	17	1	0								
Control Delay (s)		37.8	24.3	0.2	0.2								
Lane LOS		E	C	A	A								
Approach Delay (s)		37.8	24.3	0.2	0.2								
Approach LOS		E	C										
Intersection Summary													
Average Delay				1.1									
Intersection Capacity Utilization				57.9%									
Analysis Period (min)				15									
ICU Level of Service												B	

HCM Unsignalized Intersection Capacity Analysis
2: Martini S. Drive & SR-29

Mid-Day Wknd. E+Project Conditions
4/30/2013













Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	LT	LT	TH	TH	LT	TH
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	5	2	780	6	2	785
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	2	848	7	2	853
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1709	851			854	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1709	851			854	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	99			100	
cM capacity (veh/h)	100	360			785	
Direction	WB	B	SB	T		
ane.#						
Volume Total	8	854	855			
Volume Left	5	0	2			
Volume Right	2	7	0			
cSH	126	1700	785			
Volume to Capacity	0.06	0.50	0.00			
Queue Length 95th (ft)	5	0	0			
Control Delay (s)	35.5	0.0	0.1			
Lane LOS	E		A			
Approach Delay (s)	35.5	0.0	0.1			
Approach LOS	E					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			52.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

1: Martini N. Drive & SR-29







PM Wkdy. N-T+Project Conditions

4/30/2013

												
Movement	EBL	EB	EBR	WBL	WB	WBR	NBL	NBT	NBR	SBL	SB	SBR
Lane Configurations	⇕			⇕			⇕			⇕		
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Volume (veh/h)	1	0	3	5	0	15		1055	7	7	1079	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	0	3	5	0	16	1	1147	8	8	1173	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	TWLTL			TWLTL								
Median storage (veh)	2			2								
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2358	2345	1173	2345	2342	1151	1174				54	
vC1, stage 1 conf vol	1189	1189		1153	1153							
vC2, stage 2 conf vol	1169	1157		1192	1189							
vCu, unblocked vol	2358	2345	1173	2345	2342	1151	1174				1154	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	99	100	99	97	100	93	100				99	
cM capacity (veh/h)	150	181	234	158	183	241	595				605	
Direction Lane #	B	WB 1	NB	SB 1								
Volume Total	4	22	1155	1182								
Volume Left	1	5	1	8								
Volume Right	3	16	8	1								
cSH	205	213	595	605								
Volume to Capacity	0.02	0.10	0.00	0.01								
Queue Length 95th (ft)	2	8	0	1								
Control Delay (s)	22.9	23.8	0.1	0.5								
Lane LOS	C	C	A	A								
Approach Delay (s)	22.9	23.8	0.1	0.5								
Approach LOS	C	C										
Intersection Summary												
Average Delay				0.6								
Intersection Capacity Utilization				72.3%			ICU Level of Service			C		
Analysis Period (min)				15								













HCM Unsignalized Intersection Capacity Analysis 2: Martini S. Drive & SR-29

PM Wkdy. N-T+Project Conditions
4/30/2013

						
Movement	WBL	BR	NBT	NBR	SBL	SBT
Lane Configurations	T		T			T
Sign/Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	28	9	971	1	4	1098
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	10	1055	1	4	1193
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL					
Median storage (veh)	2					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2258	1056			1057	
vC1, stage 1 conf vol	1056					
vC2, stage 2 conf vol	1202					
vCu, unblocked vol	2258	1056			1057	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	86	96			99	
cM capacity (veh/h)	213	274			659	
Direction, Lane#	WB 1	NB 1	SB 1			
Volume-Total	40	1057	1198			
Volume Left	30	0	4			
Volume Right	10	1	0			
cSH	225	1700	659			
Volume to Capacity	0.18	0.62	0.01			
Queue Length 95th (ft)	16	0	0			
Control Delay (s)	24.4	0.0	0.3			
Lane LOS	C		A			
Approach Delay (s)	24.4	0.0	0.3			
Approach LOS	C					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			71.0%	ICU Level of Service		C
Analysis Period (min)			15			







HCM Unsignalized Intersection Capacity Analysis 1: Martini N. Drive & SR-29

M-D Wknd. N-T+Project Conditions
4/30/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	⇄			⇄			⇄			⇄		
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Volume (veh/h)	5	0	12	4	0	35	6	889	30	4	913	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	0	13	4	0	38	7	966	33	4	992	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	TWLTL			TWLTL								
Median storage (veh)	2			2								
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2041	2020	999	2016	2010	983	1005			999		
vC1, stage 1 conf vol	1008	1008		996	996							
vC2, stage 2 conf vol	1034	1012		1021	1014							
vCu, unblocked vol	2041	2020	999	2016	2010	983	1005			999		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	96	98	100	87	99			99		
cM capacity (veh/h)	181	222	296	194	223	302	689			693		
Direction Lane #	EB 1	WBT 1	NB 1	SB 1								
Volume Total	18	42	1005	1010								
Volume Left	5	4	7	4								
Volume Right	13	8	33	13								
cSH	249	286	689	693								
Volume to Capacity	0.07	0.15	0.01	0.01								
Queue Length 95th (ft)	6	13	1	0								
Control Delay (s)	20.6	19.8	0.3	0.2								
Lane LOS	C	C	A	A								
Approach Delay(s)	20.6	19.8	0.3	0.2								
Approach LOS	C	C										
Intersection Summary												
Average Delay				0.8								
Intersection Capacity Utilization				62.9%			ICU Level of Service			B		
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis 2: Martini S. Drive & SR-29

M-D Wknd. N-T+Project Conditions
4/30/2013

						
Movement	WBL	WBR	NBT	NBR	SB	SBT
Lane Configurations	Y		↑			↓
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	5	2	874	6	2	880
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	2	950	7	2	957
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL					
Median storage (veh)	2					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	914	953			957	
vC1, stage 1 conf vol	953					
vC2, stage 2 conf vol	961					
vCu, unblocked vol	1914	953			957	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			100	
cM capacity (veh/h)	266	314			719	
Direction, lane	WB 1	NB 1	SB			
Volume Total	8	957	959			
Volume Left	5	0	2			
Volume Right	2	7	0			
cSH	279	1700	719			
Volume to Capacity	0.03	0.56	0.00			
Queue Length 95th (ft)	2	0	0			
Control Delay (s)	18.3	0.0	0.1			
Lane LOS	C		A			
Approach Delay (s)	18.3	0.0	0.1			
Approach LOS	C					
Intersection Summary						
Average Delay	0.1					
Intersection Capacity Utilization	57.9%			ICU Level of Service	B	
Analysis Period (min)	15					

MARTINI NORTH DRIVEWAY

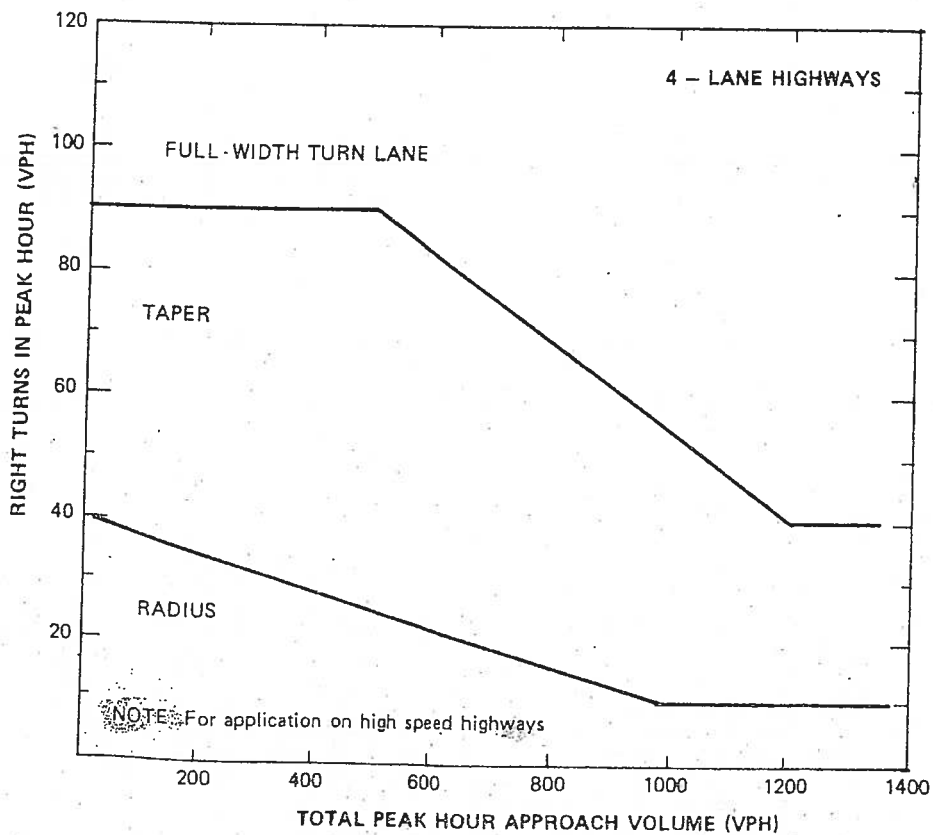
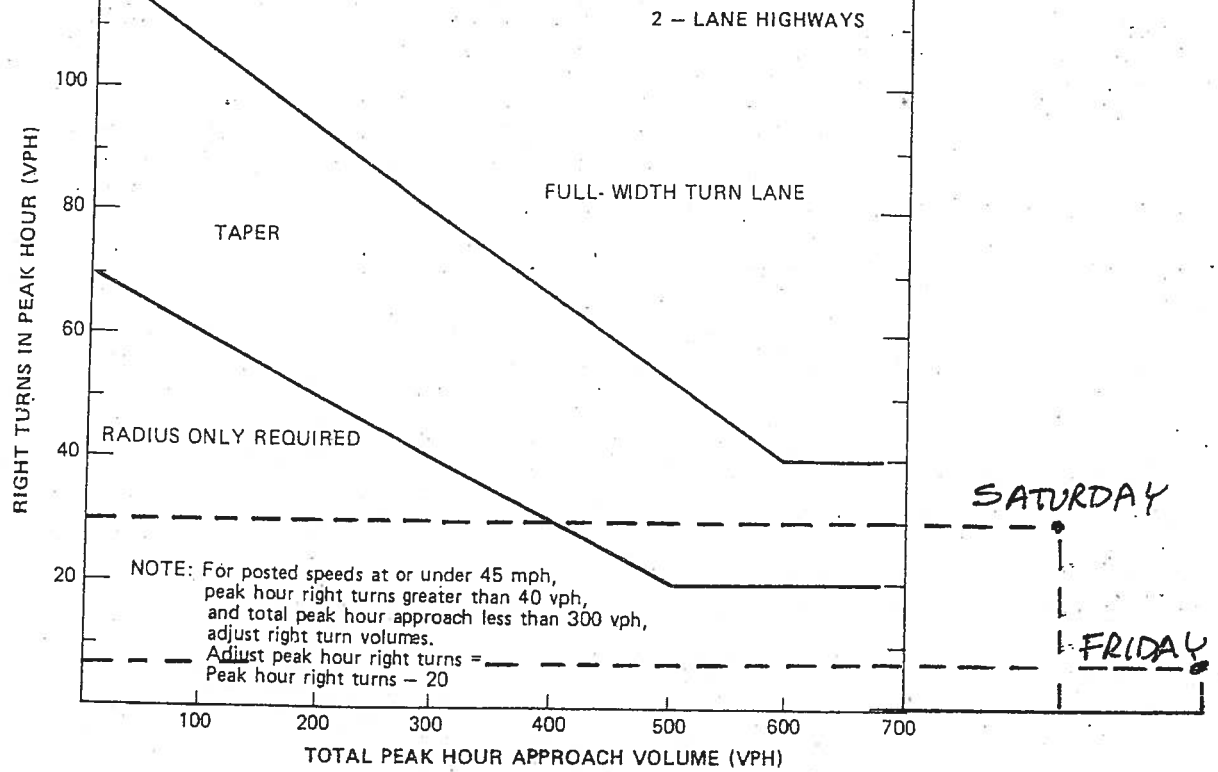
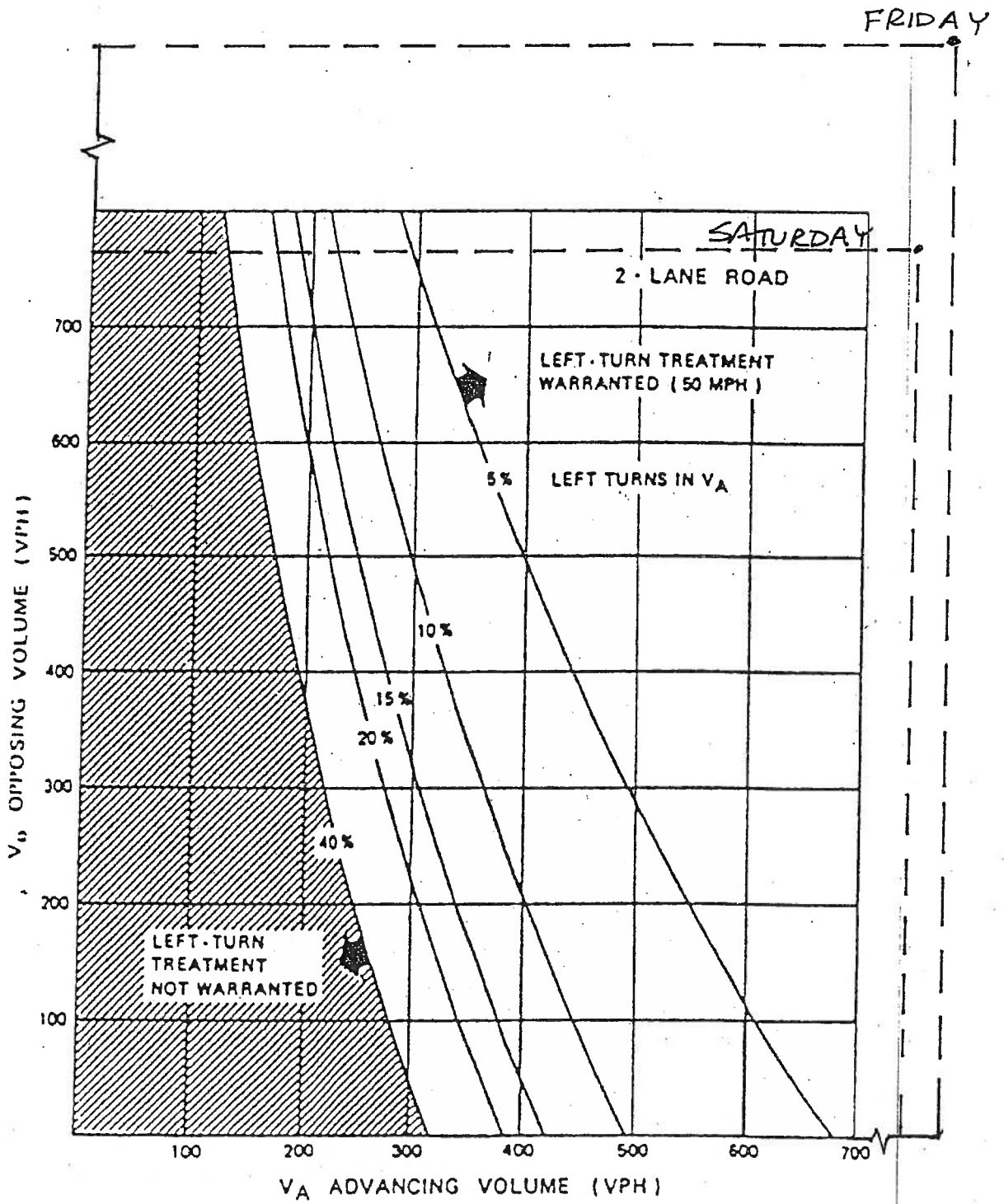


Figure 4-23. Traffic volume guidelines for design of right-turn lanes. (Source: Ref. 4-11)

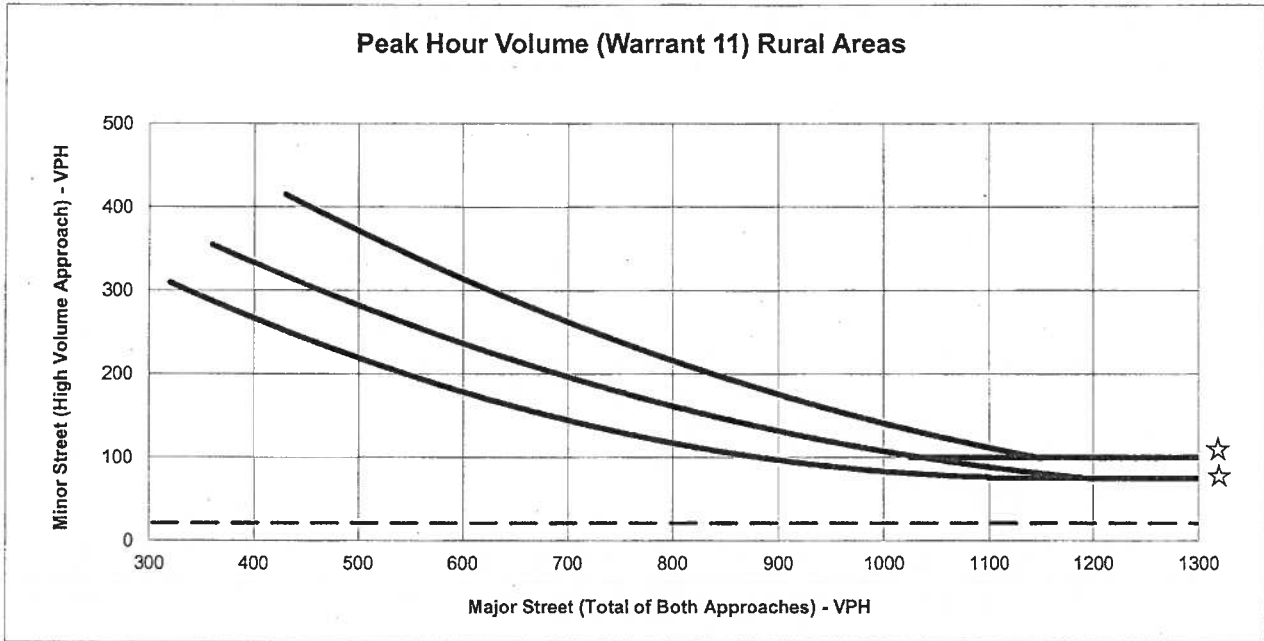
SOUTHBOUND SR 29



NORTHBOUND SR 29

Both 1 Lane Approaches		2 or more Lane and One Lane Approaches		Both 2 or more Lane Approaches	
Major Street Total of Both Approaches	Minor Street High Volume Approach	Major Street Total of Both Approaches	Minor Street High Volume Approach	Major Street Total of Both Approaches	Minor Street High Volume Approach
370	280				
400	270	460	297	430	410
500	215	500	290	500	380
600	185	600	230	600	310
700	140	700	198	700	265
800	115	800	170	800	210
900	99	900	125	900	180
1000	85	1000	105	1000	140
1100	75	1100	90	1100	110
1200	75	1200	75	1150	100
1300	75	1300	75	1300	100

* Note: Values in Table are approximate, actual curves based upon 2nd order polynomial equation

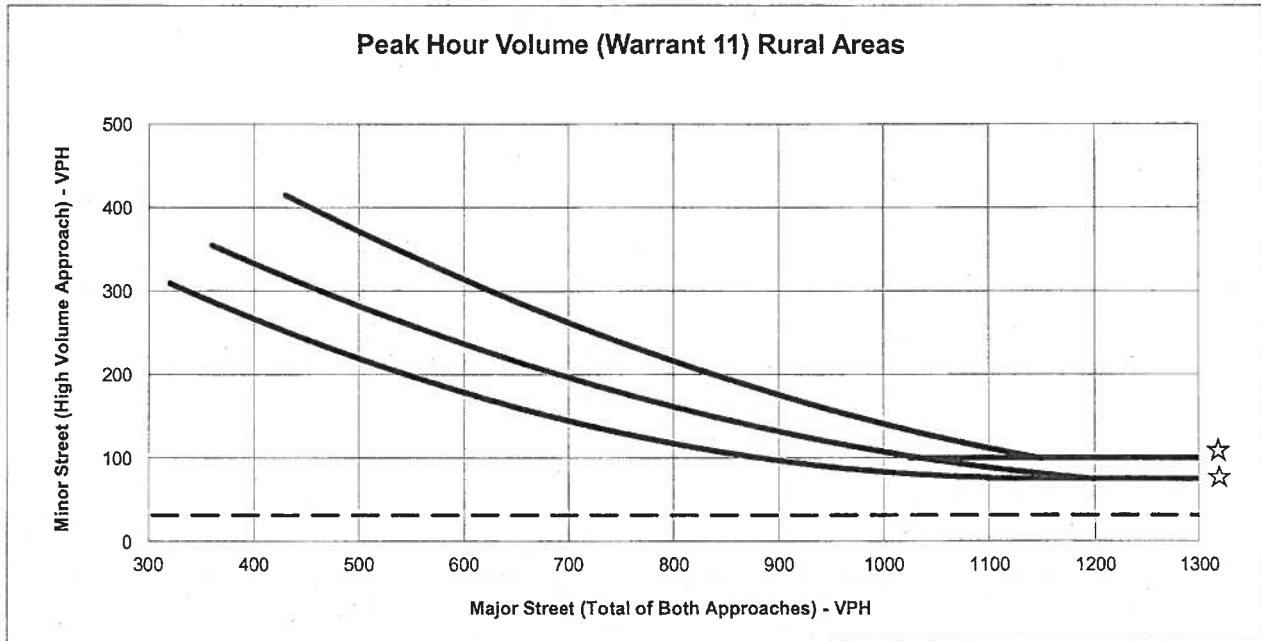


☆ NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Intersection: Martini N. Driveway / SR-29
Scenario: Existing Wkdy. PM Peak Hour Conditions
Minor St. Volume: 21
Major St. Volume: 1978
Warrant Met?: NO

Both 1 Lane Approaches		2 or more Lane and One Lane Approaches		Both 2 or more Lane Approaches	
Major Street Total of Both Approaches	Minor Street High Volume Approach	Major Street Total of Both Approaches	Minor Street High Volume Approach	Major Street Total of Both Approaches	Minor Street High Volume Approach
370	280				
400	270	460	297	430	410
500	215	500	290	500	380
600	185	600	230	600	310
700	140	700	198	700	265
800	115	800	170	800	210
900	99	900	125	900	180
1000	85	1000	105	1000	140
1100	75	1100	90	1100	110
1200	75	1200	75	1150	100
1300	75	1300	75	1300	100

* Note: Values in Table are approximate, actual curves based upon 2nd order polynomial equation



☆ NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Intersection: Martini N. Driveway / SR-29
Scenario: Existing Wknd. Mid-Day Peak Hour Conditions
Minor St. Volume: 32
Major St. Volume: 1653
Warrant Met?: NO