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Traffic Study

Vincent Arroyo Winery Major Modification P16-00327
Planning Commission Hearing November 15, 2017

TRAFFIC IMPACT REPORT

VINCENT ARROYO WINERY EXPANSION ALONG GREENWOOD AVENUE IN THE NORTHERN NAPA VALLEY

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I. INTRODUCTION

This traffic report has been prepared for the Vincent Arroyo Winery to determine if traffic from the winery's proposed expansion will result in any significant local circulation system impacts and the need for any mitigation measures. See **Figure 1** for project location.

II. SCOPE OF SERVICES

The scope of service for this traffic study was developed to provide analysis requested by Mr. Rick Marshall, Deputy Director of the Napa County Public Works Department. Evaluation was conducted for harvest Friday PM commute and Saturday afternoon peak traffic conditions. Existing (2016), year 2020 and year 2030 (Cumulative – General Plan Buildout) horizons were evaluated both with and without project traffic. Operating conditions at the SR 29 intersections with Tubbs Lane, Greenwood Avenue and Silverado Trail were evaluated for all analysis scenarios based upon Napa County's recently updated traffic impact significance criteria. In addition, sight line adequacy was evaluated at the winery driveway intersection with Greenwood Avenue. Significant impacts, if any, were identified and measures listed, if needed, to mitigate all impacts to a less than significant level.

III. SUMMARY OF FINDINGS

A. "WITHOUT PROJECT" OPERATING CONDITIONS

1. Existing Volumes – September 2016

The SR 29 intersections with Tubbs Lane, Greenwood Avenue and Silverado Trail have higher harvest volumes during the Friday PM peak traffic hour compared to the Saturday PM peak traffic hour (at Silverado Trail about 810 vehicles entering the intersection from 4:00-5:00 PM on Friday versus about 620 vehicles entering the intersection from 1:15-2:15 PM on Saturday, while at Tubbs Lane about 990 vehicles entering the intersection from 4:00-5:00 PM on Friday versus about 665 vehicles entering the intersection from 1:15-2:15 PM on Saturday). Greenwood Avenue, which currently dead ends about 3,000 feet west of SR 29 (at a bridge damaged in an earthquake) had a total of 14 two-way vehicles near SR 29 during the Friday PM peak hour and 19 two-way vehicles during the Saturday PM peak hour.

2. Year 2016 Harvest (Without Project) Circulation System Operation

- **SR 29/Tubbs Lane intersection** – unacceptable level of service during the Friday PM peak hour, with acceptable operation during the Saturday PM peak hour. Also, volumes meet rural peak hour signal warrant criteria levels during the Friday PM peak hour, but not during the Saturday PM peak hour.
- **SR 29/Greenwood Avenue intersection** – acceptable level of service & volumes do not meet rural peak hour signal warrant criteria levels during either the Friday or Saturday PM peak traffic hours.
- **SR 29/Silverado Trail-Lake Street intersection** – acceptable level of service & volumes do not meet rural peak hour signal warrant criteria levels during either the Friday or Saturday PM peak traffic hours.

3. Year 2020 Harvest (Without Project) Circulation System Operation

- **SR 29/Tubbs Lane intersection** – unacceptable level of service during the Friday PM peak hour, with acceptable operation during the Saturday PM peak hour. Also, volumes would meet rural peak hour signal warrant criteria levels during both the Friday and Saturday PM peak hours.
- **SR 29/Greenwood Avenue intersection** – acceptable level of service & volumes would not meet rural peak hour signal warrant criteria levels during either the Friday or Saturday PM peak traffic hours.
- **SR 29/Silverado Trail-Lake Street intersection** – acceptable level of service, but volumes would meet rural peak hour signal warrant criteria levels during both the Friday and Saturday PM peak traffic hours.

4. Year 2030 Cumulative Harvest (Without Project) Circulation System Operation

- **SR 29/Tubbs Lane intersection** – unacceptable level of service during the Friday PM peak hour, with acceptable operation during the Saturday PM peak hour. Also, volumes would meet rural peak hour signal warrant criteria levels during both the Friday and Saturday PM peak hours.
- **SR 29/Greenwood Avenue intersection** – acceptable level of service & volumes would not meet rural peak hour signal warrant criteria levels during either the Friday or Saturday PM peak traffic hours.
- **SR 29/Silverado Trail-Lake Street intersection** – acceptable level of service, but volumes would meet rural peak hour signal warrant criteria levels during both the Friday and Saturday PM peak traffic hours. With Calistoga General Plan buildout traffic projections for weekday PM peak hour conditions, level of service would be unacceptable and volumes would meet rural peak hour signal warrant criteria levels.

B. PROJECT IMPACTS

1. Project Trip Generation

The proposed Vincent Arroyo Winery expansion will result in the following trip generation during harvest Friday and Saturday PM peak traffic hours.

VINCENT ARROYO WINERY EXPANSION
TRIP GENERATION

HARVEST

FRIDAY PM PEAK HOUR* (4:00-5:00)		SATURDAY PM PEAK HOUR* (1:15-2:15)	
INBOUND TRIPS	OUTBOUND TRIPS	INBOUND TRIPS	OUTBOUND TRIPS
3	1	1	1

* Peak hour at the SR 29 intersections with Tubbs Lane and Silverado Trail.
Source: Vincent Arroyo Winery; compiled by Crane Transportation Group

Trips during the Friday and Saturday PM peak hours will be visitors by appointment.

2. Project Site Access to Greenwood Avenue

All winery expansion activities will access Greenwood Avenue via the existing Vincent Arroyo Winery unpaved driveway, which connects to Greenwood Avenue about 1,200 feet west of SR 29.

3. Year 2016 Harvest + Project Off-Cite Circulation Impacts

The proposed project would not result in any significant off-site circulation impacts at the SR 29 intersections with Tubbs Lane, Greenwood Avenue or Silverado Trail. The project would not degrade operation from acceptable to unacceptable at any analyzed location nor would the addition of project traffic to any location already operating unacceptably meet County impact significance criteria levels.

4. Year 2020 Harvest + Project Off-Site Circulation Impacts

The proposed project would not result in any significant off-site circulation impacts at the SR 29 intersections with Tubbs Lane, Greenwood Avenue or Silverado Trail (in Calistoga). The project would not degrade operation from acceptable to unacceptable at any analyzed location nor would the addition of project traffic to any location already operating unacceptably meet impact significance criteria levels.

5. Year 2030 (Cumulative) Harvest + Project Off-Site Circulation Impacts

The proposed project would not result in any significant off-site circulation impacts at the SR 29 intersections with Tubbs Lane, Greenwood Avenue or Silverado Trail (in Calistoga). The project would not degrade operation from acceptable to unacceptable at

any analyzed location nor would the addition of project traffic to any location already operating unacceptably meet impact significance criteria levels.

6. **Sight Lines at Project Driveway**
Sight lines at the existing Vincent Arroyo driveway connection to Greenwood Avenue meet minimum stopping sight distance criteria based upon the Caltrans March 2014 *Highway Design Manual* (more than 1,000 feet to the east and west).

7. **New Marketing Event Scheduling**
The project is proposing to have 20 new events per year with the following attendance levels.

12 events	20 guests (shuttle bused)
1 event	100 guests (35-40 vehicles)
4 events	130 guests (most will use shuttle buses)
3 events	200 guests (70-75 vehicles)

Marketing event times are still to be determined, but none will result in any event traffic being on the local circulation system between 3:00 and 5:30 PM.

C. MITIGATION MEASURES

- Provide a stop sign on the winery driveway intersection approach to Greenwood Avenue.

D. CONCLUSIONS & RECOMMENDATIONS

The project would result in no significant off-site circulation system operational impacts at the SR 29 intersections with Tubbs Lane, Greenwood Avenue or Silverado Trail. Also, sight lines are acceptable at the Vincent Arroyo Winery driveway connection to Greenwood Avenue. Finally, all new marketing events are scheduled to eliminate guest and event staff traffic from the local circulation system between noon and 5:00 PM. The only recommended mitigation is to provide a stop sign on the winery driveway approach to Greenwood Avenue.

IV. PROJECT LOCATION & DESCRIPTION

Vincent Arroyo Winery is located on the north side of Greenwood Avenue about 1,200 feet west of the SR 29/Greenwood Avenue intersection (see **Figure 2**).

The proposed winery expansion will have the following yearly production increase and increased employees, visitation and marketing events.

- 50,000 gallons per year production increase (from an existing 20,000 up to a maximum 70,000 gallons per year).

- Additional bottling on-site (2 days/year).
- 1 new full-time production employee on weekdays and 1 new tours & tasting employee on Saturdays & Sundays.
- 20 new tours & tasting visitors by appointment between 9:30 AM and 6:00 PM, 7 days per week (an increase from 30 up to 50 visitors per day).
- Existing visitation hours will increase from 9:30 AM-4:30 PM up to 9:30 AM-6:00 PM.
- Marketing events – 20 new events per year. Hours are to be determined, but there will be no guest traffic on the local roadway between 3:00 and 5:30 PM on any day of the week.
  - 12 new events with 20 people (1 small bus)
  - 3 open houses with 200 people (72 vehicles)
  - 4 dinners with 130 people (most shuttle bused)
  - 1 harvest event with 100 people (36 vehicles)
- 1 new grape delivery truck per year.
- Reduction of 2 outhaul grape trucks/year.
- 6 additional trucks/year with bottles, corks, etc.

V. EXISTING CIRCULATION SYSTEM EVALUATION PROCEDURES

A. ANALYSIS LOCATIONS

The following locations have been evaluated.

1. **SR 29/Tubbs Lane tee intersection. (The Tubbs Lane eastbound approach is stop sign controlled.)**

2. **SR 29/Greenwood Avenue tee intersection. (The Greenwood Avenue eastbound approach is stop sign controlled.)**

3. **SR 29/Silverado Trail-Lake Street intersection (all way stop control).**

4. **Greenwood Avenue/Vincent Arroyo Winery driveway intersection.**

B. VOLUMES

1. ANALYSIS SEASONS AND DAYS OF THE WEEK

At County request project traffic impacts have been evaluated during harvest conditions. Based upon more than four years of historical information from Caltrans PeMS (Performance Measurement System) count surveys along SR 29 in the Napa Valley, September has the highest daily volumes of the year (during harvest). Therefore, conditions during this month were selected for evaluation.

In regards to the peak traffic days of the week, the recently released Napa County Travel Behavioral Study[1] shows that the highest weekday volumes in Napa Valley occur on a Friday, with the highest weekend volumes occurring on a Saturday. In addition, historical count data from the City of Napa show that Friday has the highest volumes of any weekday, while Caltrans historical counts for SR 29 between St. Helena and Napa also show that weekday PM peak hour volumes are higher on a Friday than on either a Wednesday or Thursday. Therefore, Friday and Saturday PM peak traffic conditions were evaluated in this study.

2. COUNT RESULTS

Friday 3:00 to 6:00 PM as well as Saturday noon to 6:00 PM turn movement counts were conducted by Crane Transportation Group (CTG) on September 30 and October 1, 2016 at the SR 29 intersections with Tubbs Lane, Greenwood Avenue and Silverado Trail as well as at the Greenwood Avenue/Vincent Arroyo Winery driveway intersection. The peak traffic hours were determined to be 4:00-5:00 PM on Friday and 1:15-2:15 PM on Saturday, although most hours during Saturday afternoon had similar volume levels. Resultant September/October 2016 peak hour counts are presented in **Figure 3**. Volumes passing through the SR 29/Silverado Trail intersection were higher during the Friday PM peak hour (810 vehicles) than during the Saturday PM peak hour (620 vehicles). Likewise, volumes passing through the SR 29/Tubbs Lane intersection were also higher during the Friday PM peak hour (990 vehicles) than during the Saturday PM peak hour (665 vehicles).

C. ROADWAYS

Roadway descriptions are based upon the designation that SR 29 runs in a general north-south direction through the project area while Tubbs Lane and Greenwood Avenue run in an east-west direction. Within the City of Calistoga near the project Silverado Trail also runs in a north-south direction, while SR 29 runs in an east-west direction. The Vincent Arroyo Winery is located along the north side of Greenwood Avenue. **Figure 2** presents existing intersection geometrics and control.

State Route 29 (SR 29) provides the only access to the segment of Greenwood Avenue that now serves the winery driveway. In the project vicinity SR 29 has two well-paved 12-foot travel lanes and narrow (1- to 2-foot-wide paved shoulders. The posted speed limit is 50 miles per hour and the roadway has a gentle rolling alignment. Left turn lanes are not provided on the northbound approaches to either Greenwood Avenue or Tubbs Lane.

Tubbs Lane is a two-lane roadway running in an east-west direction between S.R. 128 on the west and S.R. 29 on the east. It is stop sign controlled on its approaches to both state highways. The roadway is level and straight and the posted speed limit is 50 miles per hour.

[1] Fehr & Peers, December 8, 2014.

Greenwood Avenue is a rural two-lane roadway extending westerly from SR 29. It currently dead ends about 3,000 feet west of SR 29 at the Garnet Creek bridge which was damaged by an earthquake. Greenwood Avenue is 19 feet wide at the project entrance and there is no posted speed limit or centerline striping. The road is level and straight except for a minor uphill grade on its approach to SR 29 where it is stop sign controlled. Greenwood Avenue is lined by shallow drainage ditches along the project frontage and dirt/gravel shoulders near the state highway.

The ***Vincent Arroyo Winery Driveway*** is unpaved. Also, there is no stop sign control on the driveway approach to Greenwood Avenue.

D. INTERSECTION LEVEL OF SERVICE

1. ANALYSIS METHODOLOGY

Transportation engineers and planners commonly use a grading system called level of service (LOS) to measure and describe the operational status of the local roadway network. LOS is a description of the quality of a roadway facility's operation, ranging from LOS A (indicating free-flow traffic conditions with little or no delay) to LOS F (representing oversaturated conditions where traffic flows exceed design capacity, resulting in long queues and delays). Intersections, rather than roadway segments between intersections, are almost always the capacity controlling locations for any circulation system.

Signalized Intersections. For signalized intersections, the 2010 *Highway Capacity Manual* (Transportation Research Board, National Research Council) methodology was utilized. With this methodology, operations are defined by the level of service and average control delay per vehicle (measured in seconds) for the entire intersection. For a signalized intersection, control delay is the portion of the total delay attributed to traffic signal operation. This includes delay associated with deceleration, acceleration, stopping, and moving up in the queue. **Table 1** summarizes the relationship between delay and LOS for signalized intersections.

Unsignalized Intersections. For unsignalized (all-way stop-controlled and side-street stop-controlled) intersections, the 2010 *Highway Capacity Manual* (Transportation Research Board, National Research Council) methodology for unsignalized intersections was utilized. For side-street stop-controlled intersections, operations are defined by the level of service and average control delay per vehicle (measured in seconds), with delay reported for the stop sign controlled approaches or turn movements, although overall delay is also typically reported for intersections along state highways. For all-way stop-controlled intersections, operations are defined by the average control delay for the entire intersection (measured in seconds per vehicle). The delay at an unsignalized intersection incorporates delay associated with deceleration, acceleration, stopping, and moving up in the queue. It should be noted that the 2010 analysis software for unsignalized intersections does not report overall intersection delay. However, the year 2000 software does report overall delay and was utilized to report overall intersection operation. **Table 2** summarizes the relationship between delay and LOS for unsignalized intersections.

2. MINIMUM ACCEPTABLE OPERATION

Napa County is currently adopting new minimum acceptable operating condition standards for unsignalized intersections. Based upon the new standards, Level of Service D (LOS D) is the poorest acceptable operation for side street stop sign controlled approaches at two-way stop intersections and for all-way-stop intersections.

E. INTERSECTION PEAK HOUR SIGNAL WARRANT EVALUATION

1. ANALYSIS METHODOLOGY

Traffic signals are used to provide an orderly flow of traffic through an intersection. Many times they are needed to offer side street traffic an opportunity to access a major road where high volumes and/or high vehicle speeds block crossing or turn movements. They do not, however, increase the capacity of an intersection (i.e., increase the overall intersection's ability to accommodate additional vehicles) and, in fact, often slightly reduce the number of total vehicles that can pass through an intersection in a given period of time. Signals can also cause an increase in traffic accidents if installed at inappropriate locations.

There are 9 possible tests for determining whether a traffic signal should be considered for installation. These tests, called "warrants", consider criteria such as actual traffic volume, pedestrian volume, presence of school children, and accident history. The intersection volume data together with the available collision histories were compared to warrants contained in the *California Manual on Uniform Traffic Control Devices* (CMUTCD) 2014. Section 4C of the MUTCD provides guidelines, or warrants, which may indicate need for a traffic signal at an unsignalized intersection. As indicated in the CMUTCD, satisfaction of one or more warrants does not necessarily require immediate installation of a traffic signal. It is merely an indication that the local jurisdiction should begin monitoring conditions at that location and that a signal may ultimately be required.

Warrant 3, the peak hour volume warrant, is often used as an initial check of signalization needs since peak hour volume data is typically available and this warrant is usually the first one to be met. Warrant 3 is based on a curve and takes only the hour with the highest volume of the day into account. Please see **Appendix Table A-1** for the rural warrant chart.

It should be noted that a “rural” warrant chart is utilized when the uncontrolled intersection approaches have vehicle speeds greater than 40 miles per hour or when the intersection is in a community with less than 10,000 population. The rural chart has been utilized for evaluation of the SR 29 intersections with Tubbs Lane and Greenwood Avenue since the speeds on SR 29 are greater than 40 miles per hour and the intersections are in a rural setting. The rural warrant has also been utilized at the all way stop SR 29/Silverado Trail intersection since Calistoga has less than a 10,000 population.

F. PLANNED IMPROVEMENTS

There are no planned and funded improvements at any location evaluated in this study.[2]

VI. FUTURE HORIZON TRAFFIC VOLUME PROJECTIONS

Traffic analysis has been conducted for existing (2016), year 2020 and year 2030 horizons at County request. The 2030 horizon reflects the County General Plan Buildout year. Traffic modeling for the General Plan shows that between 2016 and 2030 there is about a projected 35 percent growth in two-way weekday PM peak hour traffic along SR 29 near the project site and about a 45 percent growth just north of the Silverado Trail intersection. Projecting straight line traffic growth for analysis purposes, this translates into about a 10 percent growth in two-way PM peak hour traffic along SR 29 near the project site and about a 13 percent growth just north of the Silverado Trail intersection from 2016 to the year 2020. Since traffic modeling projections were only available for weekday PM peak hour conditions and not for the Saturday PM peak hour, Saturday two-way PM peak hour volumes on SR 29 were increased by the same percentages found for the weekday PM peak hour.

Resultant year 2020 harvest "Without Project" Friday and Saturday PM peak hour volumes are presented in **Figure 4**, while year 2030 harvest "Without Project" Friday and Saturday PM peak hour volumes are presented in **Figure 5**.

It should be noted that the year 2030 Napa County weekday PM peak hour traffic projections for the SR 29/Silverado Trail intersection are significantly lower than those available from City of Calistoga General Plan buildout traffic projections. Both sets of projections are presented and analyzed in this study.

[2] Mr. Rick Marshall, Napa County Public Works Department & Mr. Erik Lundquist and Mr. Michael Kirn, City of Calistoga, September 2016.

VII. OFF-SITE CIRCULATION SYSTEM OPERATION – WITHOUT PROJECT

A. YEAR 2016 HARVEST (WITHOUT PROJECT) OPERATING CONDITIONS

1. INTERSECTION LEVEL OF SERVICE – Table 3

a) SR 29/TUBBS LANE

1) Friday PM Peak Hour

Unacceptable Tubbs Lane stop sign controlled operation: LOS E

2) Saturday PM Peak Hour

Acceptable Tubbs Lane stop sign controlled operation: LOS B

b) SR 29/GREENWOOD AVENUE

1) Friday PM Peak Hour

Acceptable Greenwood Avenue stop sign controlled operation: LOS B

2) Saturday PM Peak Hour

Acceptable Greenwood Avenue stop sign controlled operation: LOS A

c) SR 29/SILVERADO TRAIL-LAKE STREET

1) Friday PM Peak Hour

Acceptable all way stop sign controlled operation: LOS B

2) Saturday PM Peak Hour

Acceptable all way stop sign controlled operation: LOS A

2. INTERSECTION PEAK HOUR SIGNAL WARRANT EVALUATION – Table 4

a) SR 29/TUBBS LANE

1) Friday PM Peak Hour

Volumes would meet rural peak hour signal warrant criteria #3.

2) Saturday PM Peak Hour

Volumes would not meet rural peak hour signal warrant criteria #3.

b) SR 29/GREENWOOD AVENUE

1) Friday PM Peak Hour

Volumes would not meet rural peak hour signal warrant criteria #3.

2) Saturday PM Peak Hour

Volumes would not meet rural peak hour signal warrant criteria #3.

c) SR 29/SILVERADO TRAIL-LAKE STREET

1) Friday PM Peak Hour

Volumes would not meet rural peak hour signal warrant criteria #3.

2) Saturday PM Peak Hour

Volumes would not meet rural peak hour signal warrant criteria #3.

B. YEAR 2020 HARVEST (WITHOUT PROJECT) OPERATING CONDITIONS

1. INTERSECTION LEVEL OF SERVICE – Table 3

a) TUBBS LANE

1) Friday PM Peak Hour

Unacceptable Tubbs Lane stop sign controlled operation: LOS F

2) Saturday PM Peak Hour

Acceptable Tubbs Lane stop sign controlled operation: LOS C

b) SR 29/GREENWOOD AVENUE

1) Friday PM Peak Hour

Acceptable Greenwood Avenue stop sign controlled operation: LOS B

2) Saturday PM Peak Hour

Acceptable Greenwood Avenue stop sign controlled operation: LOS A

c) SR 29/SILVERADO TRAIL-LAKE STREET

1) Friday PM Peak Hour

Acceptable all way stop sign controlled operation: LOS B

2) Saturday PM Peak Hour

Acceptable all way stop sign controlled operation: LOS B

2. INTERSECTION PEAK HOUR SIGNAL WARRANT EVALUATION – Table 4

a) SR 29/TUBBS LANE

1) Friday PM Peak Hour

Volumes would meet rural peak hour signal warrant criteria #3.

2) Saturday PM Peak Hour

Volumes would meet rural peak hour signal warrant criteria #3.

b) SR 29/GREENWOOD AVENUE

1) Friday PM Peak Hour

Volumes would not meet rural peak hour signal warrant criteria #3.

2) Saturday PM Peak Hour

Volumes would not meet rural peak hour signal warrant criteria #3.

c) SR 29/SILVERADO TRAIL-LAKE STREET

1) Friday PM Peak Hour

Volumes would meet rural peak hour signal warrant criteria #3.

2) Saturday PM Peak Hour

Volumes would meet rural peak hour signal warrant criteria #3.

C. YEAR 2030 CUMULATIVE (WITHOUT PROJECT) HARVEST OPERATING CONDITIONS

1. INTERSECTION LEVEL OF SERVICE – Table 3

a) TUBBS LANE

1) Friday PM Peak Hour

Unacceptable Tubbs Lane stop sign controlled operation: LOS F

2) Saturday PM Peak Hour

Acceptable Tubbs Lane stop sign controlled operation: LOS C

b) SR 29/GREENWOOD AVENUE

1) Friday PM Peak Hour

Acceptable Greenwood Avenue stop sign controlled operation: LOS B

2) Saturday PM Peak Hour

Acceptable Greenwood Avenue stop sign controlled operation: LOS B

c) SR 29/SILVERADO TRAIL-LAKE STREET (WITH COUNTY TRAFFIC PROJECTIONS)

1) Friday PM Peak Hour

Acceptable all way stop sign controlled operation: LOS C

2) Saturday PM Peak Hour

Acceptable all way stop sign controlled operation: LOS B

d) SR 29/SILVERADO TRAIL-LAKE STREET (WITH CALISTOGA GENERAL PLAN BUILDOUT TRAFFIC PROJECTIONS)

1) Friday PM Peak Hour

Unacceptable all way stop sign controlled operation: LOS F

2. INTERSECTION PEAK HOUR SIGNAL WARRANT EVALUATION – Table 4

a) SR 29/TUBBS LANE

1) Friday PM Peak Hour

Volumes would meet rural peak hour signal warrant criteria #3.

2) Saturday PM Peak Hour

Volumes would meet rural peak hour signal warrant criteria #3.

b) SR 29/GREENWOOD AVENUE

1) Friday PM Peak Hour

Volumes would not meet rural peak hour signal warrant criteria #3.

2) Saturday PM Peak Hour

Volumes would not meet rural peak hour signal warrant criteria #3.

c) SR 29/SILVERADO TRAIL-LAKE STREET

1) Friday PM Peak Hour

Volumes would meet rural peak hour signal warrant criteria #3.

2) Saturday PM Peak Hour

Volumes would meet rural peak hour signal warrant criteria #3.

VIII. PROJECT IMPACT EVALUATION SIGNIFICANCE CRITERIA

A. SIGNIFICANCE CRITERIA

1. COUNTY OF NAPA

The following criteria have recently been developed for traffic impact analyses in Napa County.

EXISTING + PROJECT CONDITIONS

A. ARTERIAL SEGMENTS

A project would cause a significant impact requiring mitigation if:

1. An arterial segment operates at LOS A, B, C or D during the selected peak hours without project trips, and deteriorates to LOS E or F with the addition of project trips, or
2. An arterial segment operates at LOS E or F during the selected peak hours without project trips, and the addition of project trips increases the total segment volume by one percent or more.

For the second criteria, the following equation should be used if the arterial operates at LOS E or F without the project:

Project Contribution % = Project Trips ÷ Existing Volumes

B. SIGNALIZED INTERSECTIONS

A project would cause a significant impact requiring mitigation if:

1. A signalized intersection operates at LOS A, B, C or D during the selected peak hours without project trips, and deteriorates to LOS E or F with the addition of project trips, or
2. A signalized intersection operates at LOS E or F during the selected peak hours without project trips, and the addition of project trips increases the total entering volume by one percent or more.

For the second criteria, the following equation should be used if the signalized intersection operates at LOS E or F without the project:

Project Contribution % = Project Trips ÷ Existing Volumes

Maintaining LOS D or better at all signalized intersections would sometimes require expanding the physical footprint of an intersection. In some locations around the County, expanding physical transportation infrastructure could be in direct conflict with the County's goals of preserving the area's rural character, improving safety, and sustaining the agricultural industry, making these potential improvements infeasible. The County's Circulation Element lists intersections that are slated for improvement or expansion in unincorporated Napa County.[3]

Transportation studies should individually consider the feasibility of potential mitigation measures with respect to right-of-way acquisition, regardless of the intersection's place in the Circulation Element's identified improvement lists, and present potential alternative mitigation measures that do not require right-of-way acquisition. County staff would then review that information and make the decision about the feasibility of the identified potential mitigations.

For intersections that cannot be improved without substantial additional right-of-way according to both the Circulation Element and the individual transportation impact study, and where other mitigations such as updating signal timing, signal phasing and operations, and/or signing and striping improvements do not improve the LOS, LOS E or F will be considered acceptable and the one percent threshold would not apply. Analysis of signalized intersection LOS should still be presented for informational purposes, and there should still be an evaluation of effects on safety and local access, per Policy CIR-18.

C. UNSIGNALIZED INTERSECTIONS (ALL WAY STOP AND SIDE STREET STOP SIGN CONTROLLED)

LOS for all way stop controlled intersections is defined as an average of the delay at all approaches. LOS for side street stop controlled intersections is defined by the delay and LOS for the worst case approach. The recommended interpretation of Policy CIR-16 regarding unsignalized intersection significance criteria is as follows:

1. An unsignalized intersection operates at LOS A, B, C or D during the selected peak hours without project trips, the LOS deteriorates to LOS E or F with the addition of project traffic, and the peak hour traffic signal warrant criteria should also be evaluated and presented for information purposes, or

[3] According to the Circulation Element dated June 8, 2008, the following intersections can be altered or expanded as a mitigation measure: SR-12/Airport Boulevard/SR-29, SR-221/SR-12/Highway 29, and several intersections along SR-29 and SR-128 north of Napa. The significance criteria shown above should apply to facilities where appropriate based upon the most recent Circulation Element chapter of the General Plan.

2. An unsignalized intersection operates at LOS E or F during the selected peak hours without project trips and the project contributes one percent or more of the total entering traffic for all way stop controlled intersections, or 10 percent or more of the traffic on a side street approach for side street stop controlled intersections; the peak hour traffic signal warrant criteria should also be evaluated and presented for informational purposes.

All Way Stop Controlled Intersections
For the second criteria at an all way stop controlled intersection, the following equation should be used if the all way stop controlled intersection operates at LOS E or F without the project.

Project Contribution % = Project Trips ÷ Existing Volumes

Side Street Stop Controlled Intersections
For the second criteria at a side street stop controlled intersection, the following equation should be used if the side street stop controlled intersection operates at LOS E or F without the project.

Project Contribution % = Project Trips ÷ Existing Volumes

Both of those volumes are for the stop controlled approaches only. Each stop controlled approach that operates at LOS E or F should be analyzed individually.

CUMULATIVE+ PROJECT CONDITIONS

A. ARTERIAL SEGMENTS, SIGNALIZED INTERSECTIONS AND UNSIGNALIZED INTERSECTIONS

A project would cause a significant cumulative impact requiring mitigation if:

1. The overall amount of expected traffic growth causes conditions to deteriorate such that any of the significance criteria described above for existing conditions are met, and
2. The project's contribution to a significant cumulative impact would be equal to or greater than five percent of the growth in traffic from existing conditions.

A project's contribution to a cumulative condition would be calculated as the project's percentage contribution to the total growth in traffic from existing conditions.

Project Contribution % = Project Trips ÷ (Cumulative Volumes - Existing Volumes)

- If projected daily volumes on the project driveway in combination with volumes on the roadway providing access to the project driveway meet County warrant criteria for provision of a left turn lane on the approach to the project entrance.

- If sight lines at project access driveways do not meet Caltrans stopping sight distance criteria based upon prevailing vehicle speeds.

IX. PROJECT TRIP GENERATION & DISTRIBUTION

A. TRIP GENERATION

Friday and Saturday PM peak hour trip generation projections were developed with the assistance of the project applicant for all components of increased employee, grape delivery, visitor activities and marketing events associated with expanded activities at the Vincent Arroyo Winery (see worksheets in the **Appendix**). Results are presented on an hourly basis in **Tables 5** and **6** for harvest Friday and Saturday conditions. A summary of the net new peak hour trips is presented in **Table 7**. During the harvest Friday PM peak traffic hour there would be a projected 3 new inbound and 1 new outbound vehicles, while during the harvest Saturday PM peak traffic hour there would be a projected 1 new inbound and 1 new outbound vehicle. As shown, new winery employees would not be expected on the local roadway network during either harvest Friday or Saturday PM peak conditions. In addition, the extension of visitation by appointment from 4:30 until 6:00 PM would delay departure of the winery's existing 2 to 3 tours and tasting employees until after 6:00 PM (seven days per week). Therefore, the only winery related vehicles expected on the local roadway network during both the Friday and Saturday PM peak traffic hours would be visitor related traffic.

B. TRIP DISTRIBUTION

Project peak hour traffic was distributed to SR 29 and all local roads in a pattern reflective of existing distribution patterns at the SR 29 intersections with Greenwood Avenue, Tubbs Lane and Silverado Trail. Most new visitor traffic would be expected to travel to/from the south on SR 29. At the SR 29/Silverado Trail intersection visitor vehicles should be about equally split between Silverado Trail and SR 29 through downtown Calistoga.

The harvest Friday and Saturday project traffic increments expected on SR 29 during the times of ambient peak traffic flows are presented in **Figure 6**. Friday and Saturday Existing "With Project" PM peak hour harvest volumes are presented in **Figure 7**, "With Project" PM peak hour harvest volumes for year 2020 conditions are presented in **Figure 8**, and "With Project" PM peak hour harvest volumes for 2030 conditions are presented in **Figure 9**.

C. PLANNED ROADWAY IMPROVEMENTS

There are no capacity increasing roadway improvements planned by Caltrans, Napa County or the City of Calistoga at any of the analysis intersections.[4] However, the Greenwood Avenue bridge across Garnet Creek is projected to be repaired between 2020 and 2030 assuming funds are available. At the direction of the Napa County Public Works Department, year 2030 traffic projections assume the one-lane Greenwood Avenue bridge is open.

X. PROJECT OFF-SITE IMPACTS

A. YEAR 2016 HARVEST (WITH PROJECT) CONDITIONS

1. SUMMARY

Project traffic would not result in any significant level of service or signal warrant impacts at the SR 29 intersections with Tubbs Lane, Greenwood Avenue or Silverado Trail during the Friday or Saturday PM peak traffic hours. ***Less than Significant***.

2. INTERSECTION LEVEL OF SERVICE – TABLE 3

The SR 29 intersections with Greenwood Avenue and Silverado Trail would maintain acceptable Friday and Saturday PM peak hour operation with the addition of project traffic. At Tubbs Lane, Saturday PM peak hour operation would also remain acceptable. While Friday "Without Project" PM peak hour conditions would be unacceptable (LOS E), project traffic would produce no measurable increase in delay and would therefore not meet County significance criteria. ***Less than Significant.***

3. SIGNALIZATION NEEDS – TABLE 4

The SR 29 intersections with Greenwood Avenue and Silverado Trail would not have Friday or Saturday PM peak hour volumes meeting peak hour signal warrant #3 criteria levels with or without project traffic. At Tubbs Lane, Saturday PM peak hour volumes would also not meet signal warrant #3 criteria levels with or without project traffic. While Friday "Without Project" PM peak hour volumes would meet signal warrant criteria levels, the project would not be expected to add more than 1 vehicle (and possibly no traffic) to the intersection during this peak hour. ***Less than Significant.***

[4] Mr. Rick Marshall, Napa County Public Works Department & Mr. Erik Lundquist and Mr. Michael Kirn, City of Calistoga, September 2016.

B. YEAR 2020 HARVEST (WITH PROJECT) CONDITIONS

1. SUMMARY

Project traffic would not result in any significant level of service or signal warrant impacts at the SR 29 intersections with Tubbs Lane, Greenwood Avenue or Silverado Trail during the Friday or Saturday PM peak traffic hours. ***Less than Significant***.

2. INTERSECTION LEVEL OF SERVICE – TABLE 3

The SR 29 intersections with Greenwood Avenue and Silverado Trail would maintain acceptable Friday and Saturday PM peak hour operation with the addition of project traffic. At Tubbs Lane, Saturday PM peak hour operation would also remain acceptable. While Friday "Without Project" PM peak hour conditions would be unacceptable (LOS F), project traffic would produce no measurable increase in delay and would therefore not meet County significance criteria. ***Less than Significant.***

3. SIGNALIZATION NEEDS – TABLE 4

The SR 29 intersection with Greenwood Avenue would not have Friday or Saturday PM peak hour volumes meeting peak hour signal warrant #3 criteria levels with or without project traffic. At Tubbs Lane and Silverado Trail, both with and without Friday and Saturday PM peak hour volumes would meet signal warrant #3 criteria levels. However, project traffic would only increase volumes at Tubbs Lane by about 0.1 percent and at Silverado Trail by about 0.3 percent, which would be less than County significance criteria limits. ***Less than Significant.***

C. YEAR 2030 CUMULATIVE HARVEST (WITH PROJECT) CONDITIONS

1. SUMMARY

Project traffic would not result in any significant level of service or signal warrant impacts at the SR 29 intersections with Tubbs Lane, Greenwood Avenue or Silverado Trail during the Friday or Saturday PM peak traffic hours. ***Less than Significant***.

2. INTERSECTION LEVEL OF SERVICE – TABLE 3

The SR 29 intersections with Greenwood Avenue and Silverado Trail would maintain acceptable Friday and Saturday PM peak hour operation with the addition of project traffic. At Tubbs Lane, Saturday PM peak hour operation would also remain acceptable. While Friday "Without Project" PM peak hour conditions would be unacceptable (LOS F), project traffic would produce no measurable increase in delay and would therefore not meet County significance criteria. ***Less than Significant.***

3. SIGNALIZATION NEEDS – TABLE 4

The SR 29 intersection with Greenwood Avenue would not have Friday or Saturday PM peak hour volumes meeting peak hour signal warrant #3 criteria levels with or without project traffic. At Tubbs Lane and Silverado Trail, both with and without Friday and Saturday PM peak hour volumes would meet signal warrant #3 criteria levels. However, project traffic would only increase volumes at Tubbs Lane by about 0.1 percent and at Silverado Trail by about 0.3 percent, which would be less than County significance criteria limits. ***Less than Significant.***

XI. PROJECT ACCESS IMPACTS

A. SIGHT LINE ADEQUACY AT GREENWOOD AVENUE/VINCENT ARROYO WINERY DRIVEWAY INTERSECTION

Sight lines at the Greenwood Avenue/Vincent Arroyo Winery driveway intersection would be acceptable to the east and west along Greenwood Avenue. Existing sight lines are as follows for a driver exiting the site.

Sight line to the east along Greenwood Avenue (to see westbound vehicles)
± 1,000 feet
Sight line to the west along Greenwood Avenue (to see eastbound vehicles)
± 1,000 feet

The Caltrans Design Manual (March 2014) states that stopping sight distance is the sight line criteria to be utilized at private road connections to public roadways. The minimum required stopping sight distances based upon vehicle speed and grade are as follows.

SPEED	MINIMUM REQUIRED STOPPING SIGHT DISTANCE – LEVEL ROADWAY
35 mph	250 feet
40 mph	300 feet

There is no posted speed limit at the project entrance. Vehicles were observed traveling at 25 to 35 mph during a field survey by Crane Transportation Group. Based upon either a 35 or 40 mile per hour criteria, there are adequate sight lines to both the east and west along Greenwood Avenue for a driver exiting the winery driveway. ***Less than Significant***.

B. PROJECT ENTRANCE LEFT TURN LANE REQUIREMENT

Based upon review of the existing and expected very low cumulative volumes along Greenwood Avenue and the Vincent Arroyo Winery driveway (after project completion), a left turn lane would not be warranted on the Greenwood Avenue eastbound approach to the winery driveway (with or without the Greenwood Avenue Garnet Creek bridge being open) By 2030, daily two-way volumes on Greenwood Avenue near the project would be expected to be less than 400 vehicles per day, with volumes on the winery driveway less than 160 vehicles per day. These volumes would not meet County left turn lane warrant criteria (see the **Appendix** for the left turn lane warrant chart at private driveway connections to public roads). ***Less than Significant***.

XII. MARKETING EVENTS

Table 8 presents details of the number of guests, employees and hired event staffing that would likely be present for the 20 proposed new marketing events during the year. Twelve marketing events per year would be held with up to 20 guests (with guests being shuttle bused to the winery). Three marketing events (open houses) would be held each year with up to 200 guests (producing about 70-75 vehicles). One marketing event (harvest event) would be held each year with up to 100 guests (producing about 35 vehicles). Hired staffing at each of these 16 events would result in an additional 2 vehicles accessing the winery. Times for events are still to be determined, but there would be no guest traffic on the local roadway system between 3:00 and 5:30 PM.

Four marketing events (wine members dinners) would be held each year with up to 130 guests (with most being shuttled bussed to the winery). Hired event staffing for each of these four events would result in an additional 2 vehicles accessing the winery. Times for events are still to be determined, but there would be no guest traffic on the local roadway system between 3:00 and 5:30 PM.

There will be no regular visitation allowed during any marketing event.

Less than Significant.

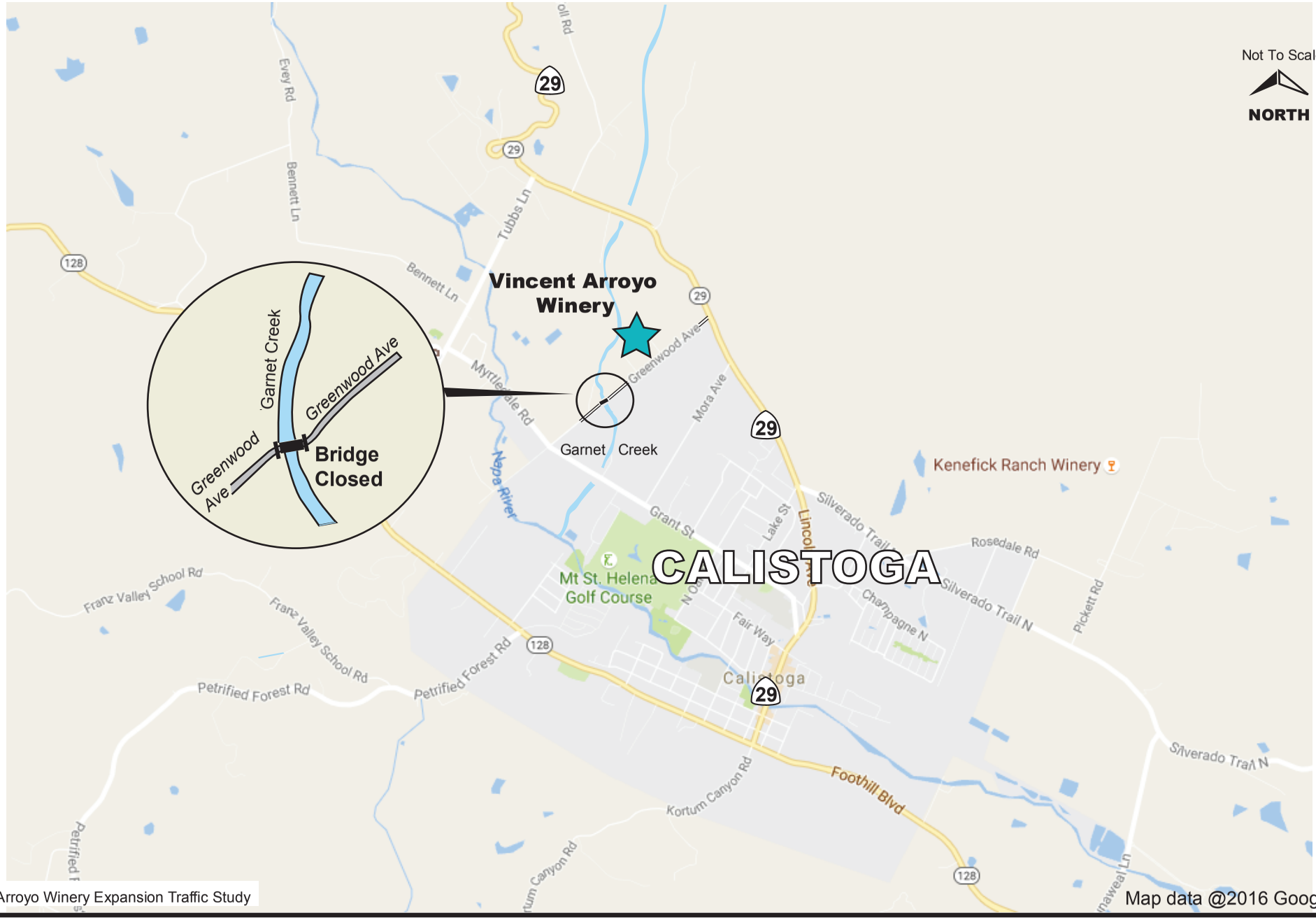
XIII. MITIGATION MEASURES

- Provide a stop sign on the winery driveway approach to Greenwood Avenue.

XIV. CONCLUSIONS & RECOMMENDATIONS

The project would result in no significant off-site circulation system operational impacts at the SR 29 intersections with Tubbs Lane, Greenwood Avenue or Silverado Trail. Also, sight lines are acceptable at the Vincent Arroyo Winery driveway connection to Greenwood Avenue. Finally, all new marketing events are scheduled to eliminate guest and event staff traffic from the local circulation system between noon and 5:00 PM. The only recommended mitigation is to provide a stop sign on the winery driveway approach to Greenwood Avenue.

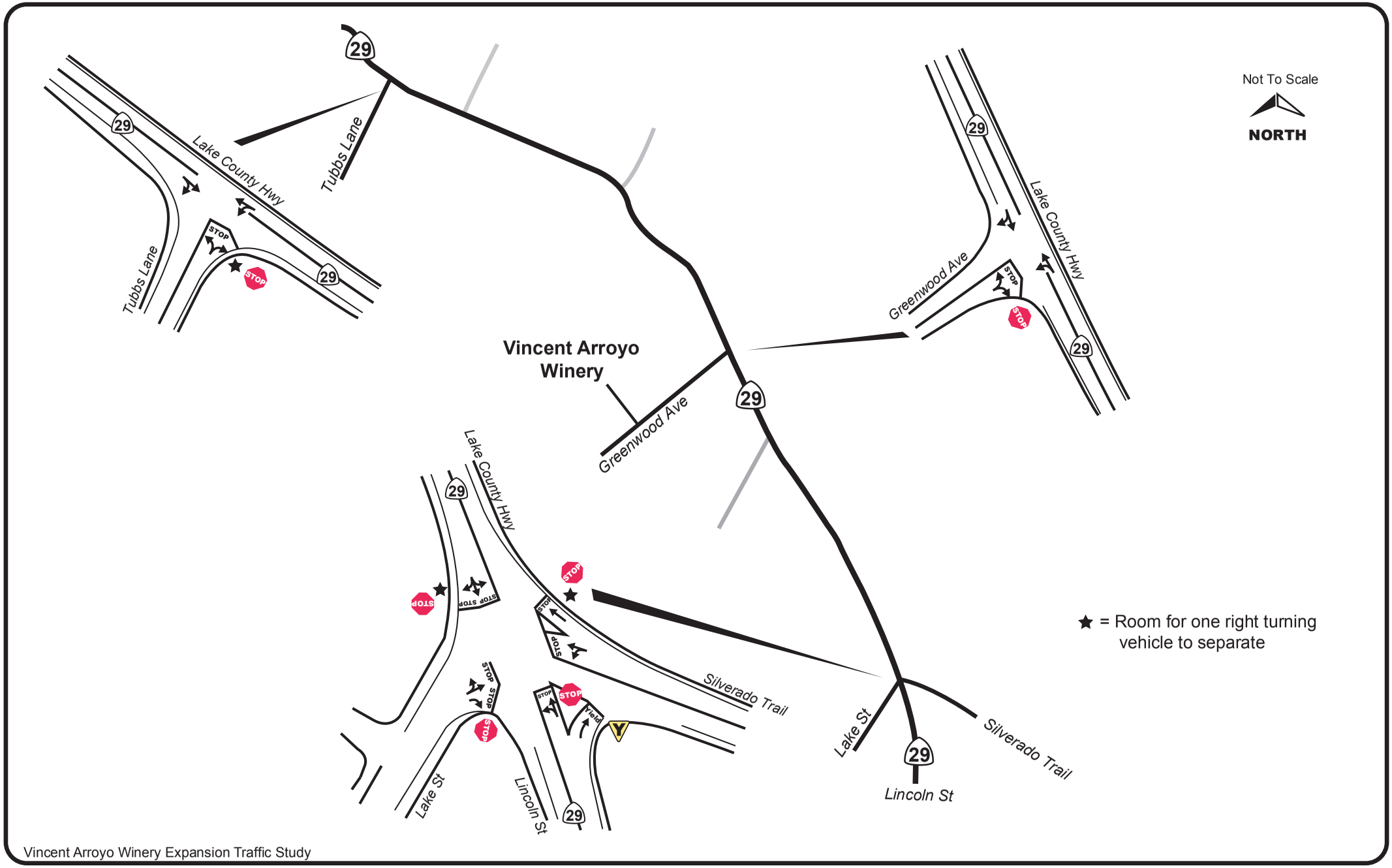
Figures



Vincent Arroyo Winery Expansion Traffic Study

CRANE TRANSPORTATION GROUP

Figure 1
Area Map

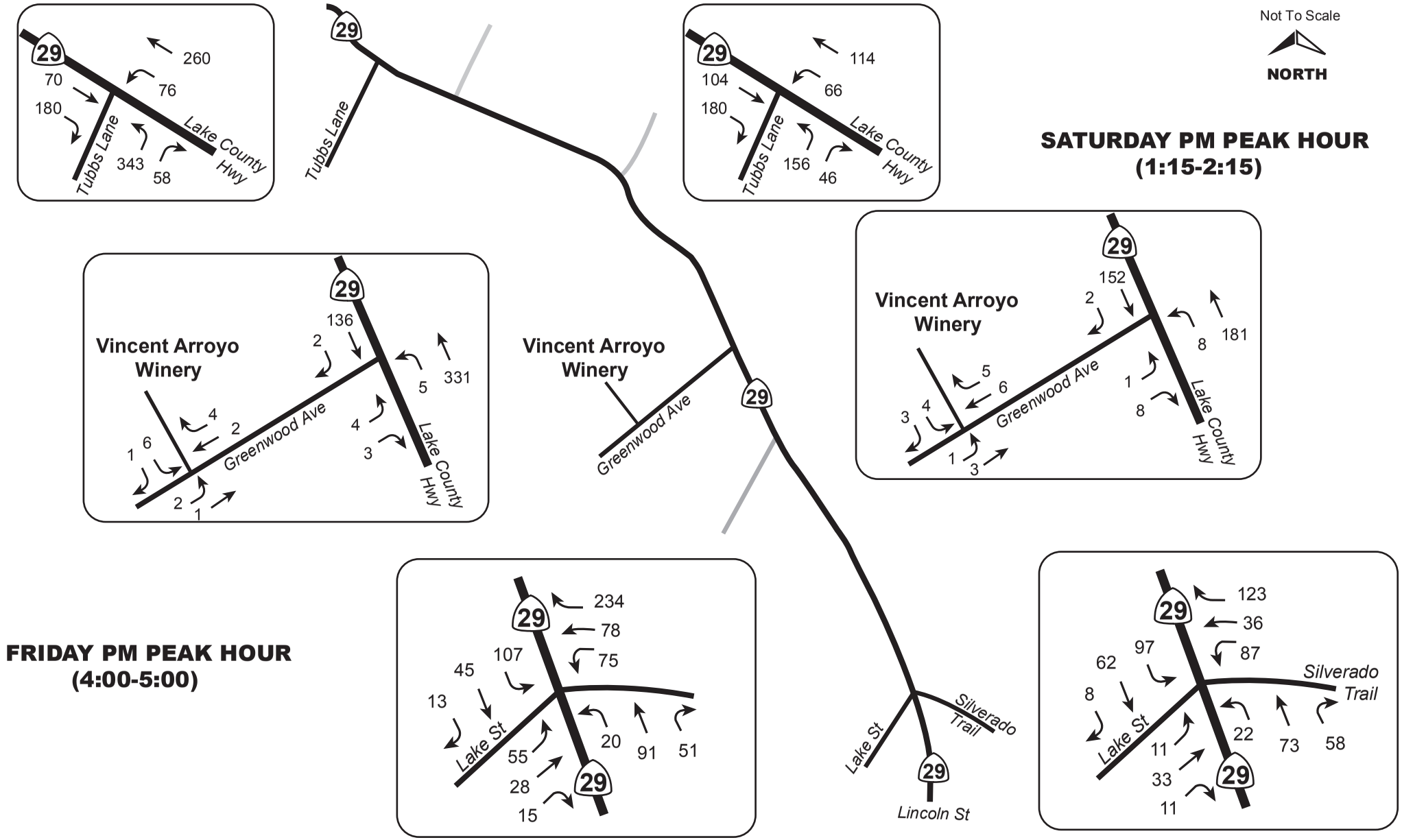


Vincent Arroyo Winery Expansion Traffic Study

CRANE TRANSPORTATION GROUP

Figure 2

Existing Lane Geometrics and Intersection Control



Vincent Arroyo Winery Expansion Traffic Study

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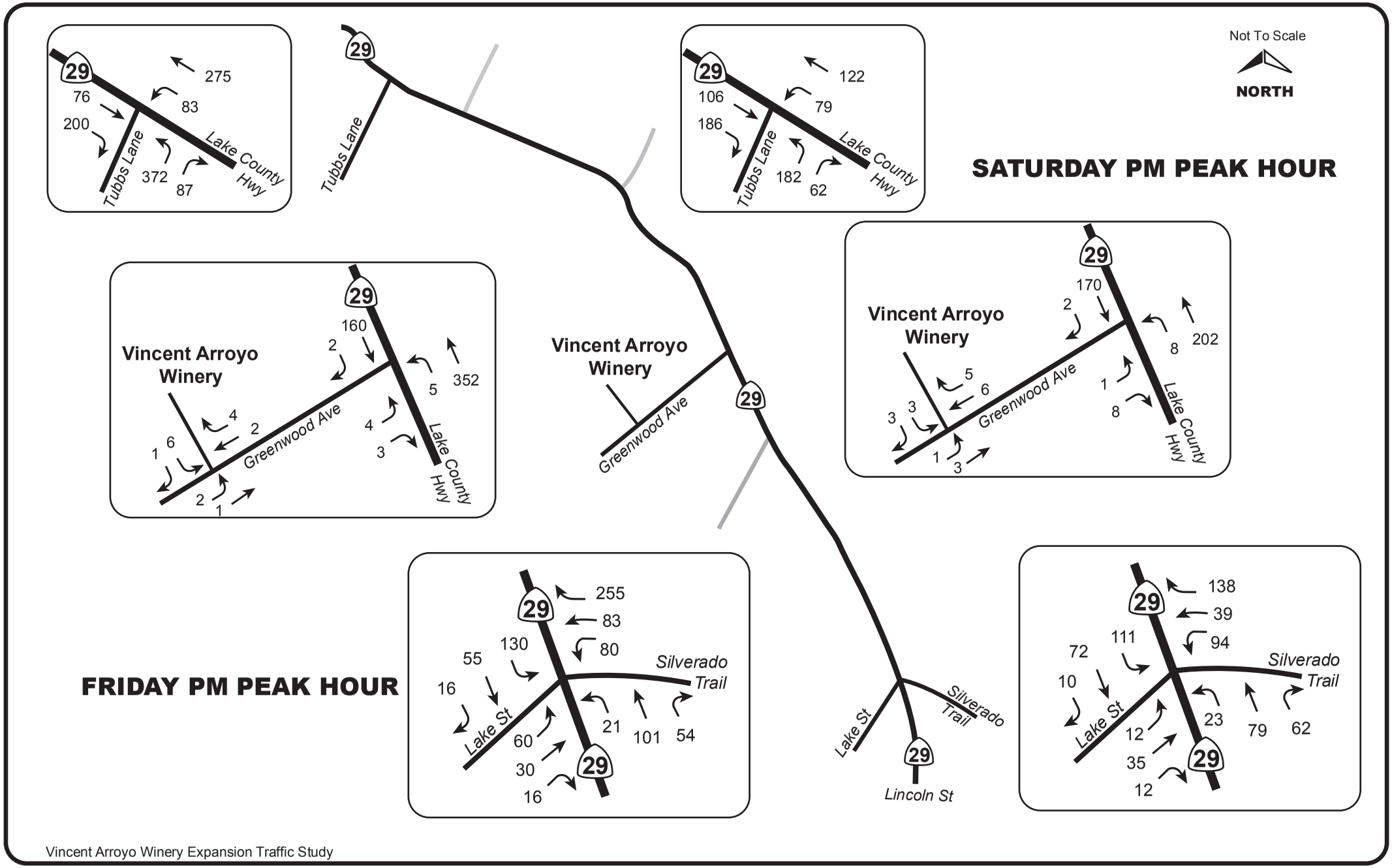
Figure 3
Existing without Project Harvest Friday and Saturday PM Peak Hour Traffic Volumes
Sept 30 and Oct 1, 2016



Vincent Arroyo Winery Expansion Traffic Study

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Figure 4

2020 without Project Harvest Friday and Saturday PM Peak Hour Traffic Volumes

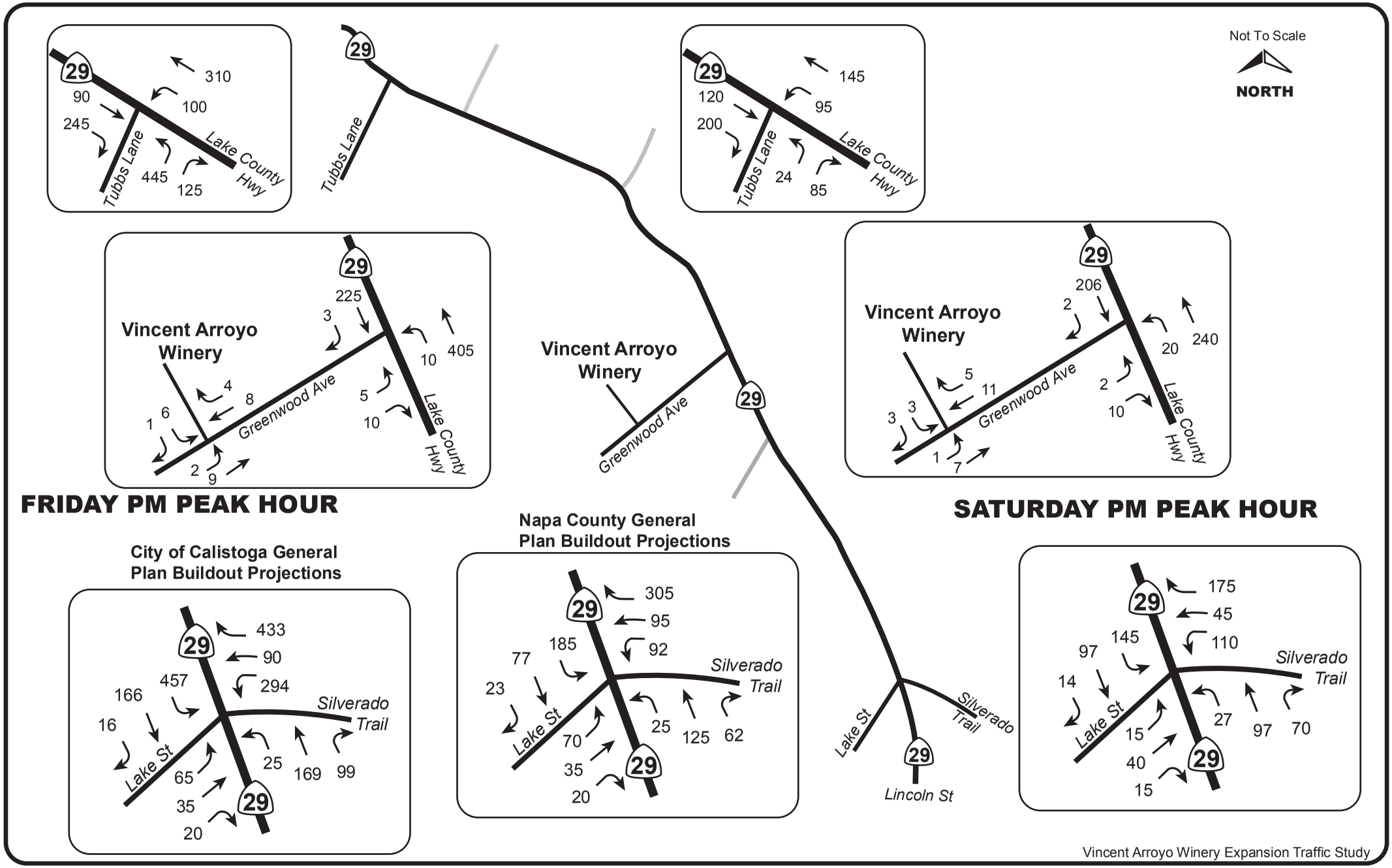

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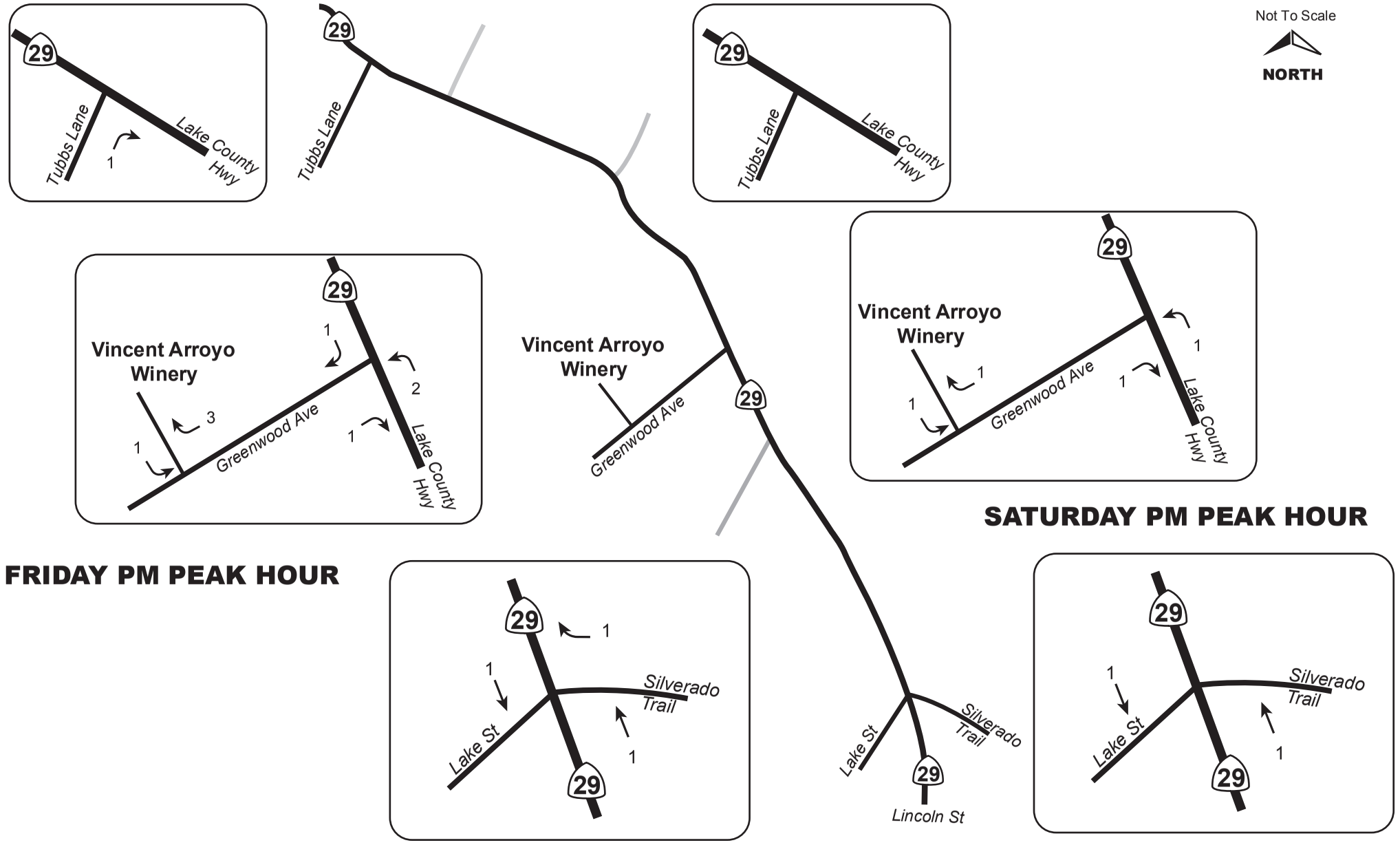
Figure 5

2030 without Project Harvest Friday and Saturday PM Peak Hour Traffic Volumes

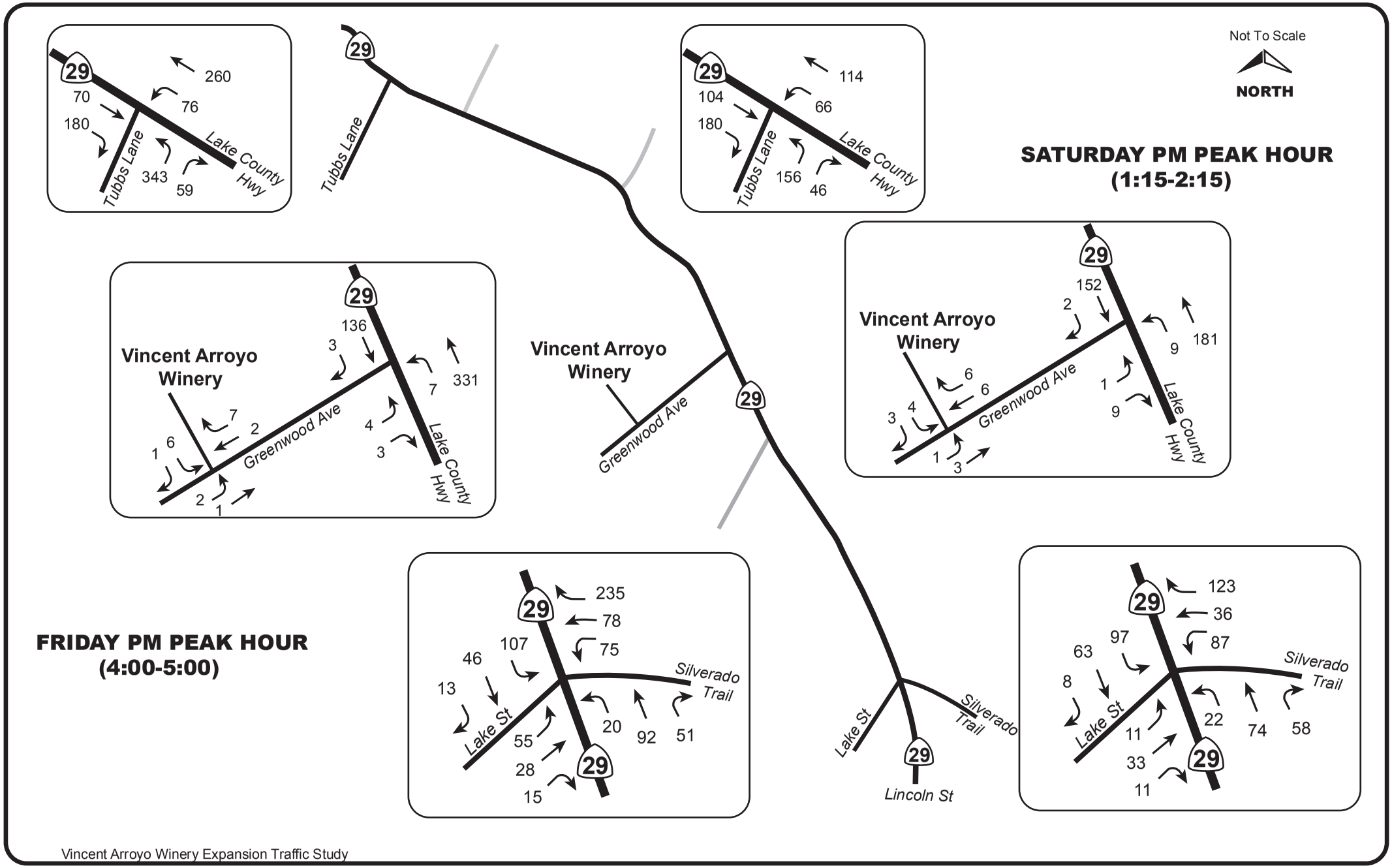


Vincent Arroyo Winery Expansion Traffic Study

CRANE TRANSPORTATION GROUP

Figure 6

Harvest Friday and Saturday PM Peak Hour Project Traffic Increment



Vincent Arroyo Winery Expansion Traffic Study

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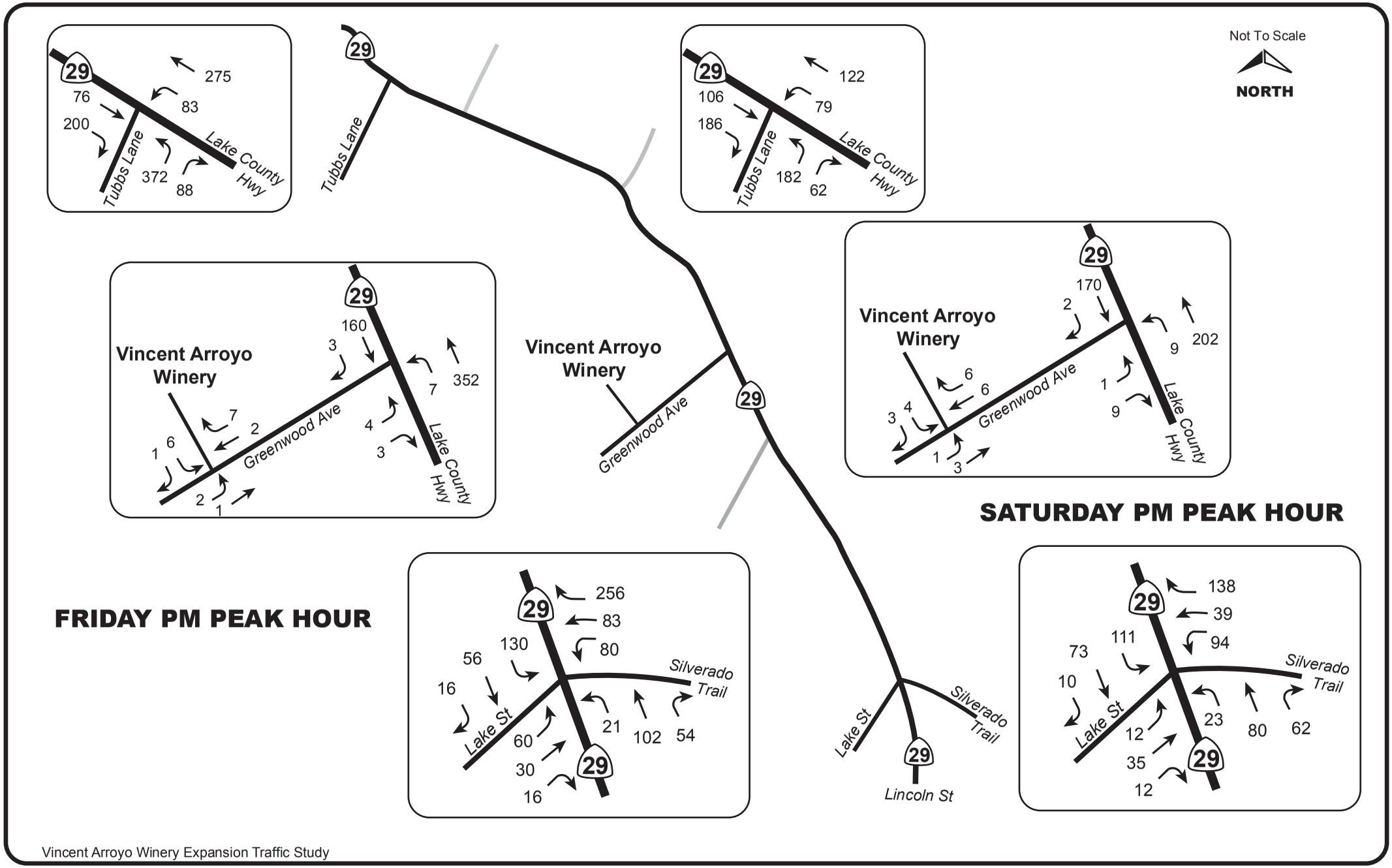
Figure 7
Existing with Project Harvest Friday and Saturday PM Peak Hour Traffic Volumes



Vincent Arroyo Winery Expansion Traffic Study

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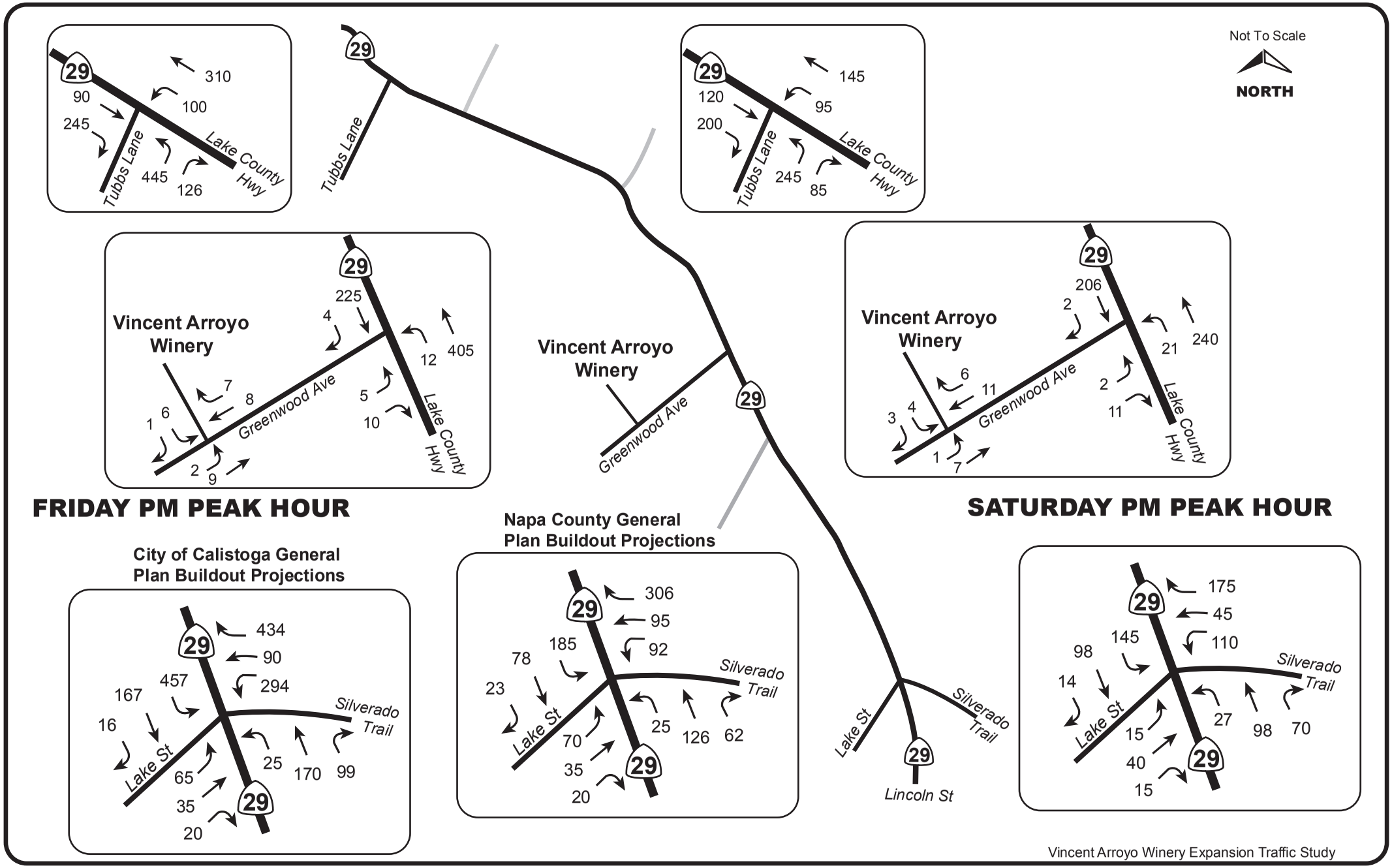
Figure 8

2020 with Project Harvest Friday and Saturday PM Peak Hour Traffic Volumes



Vincent Arroyo Winery Expansion Traffic Study

CRANE TRANSPORTATION GROUP

Figure 9

2030 with Project Harvest Friday and Saturday PM Peak Hour Traffic Volumes

Tables

Table 1

SIGNALIZED INTERSECTION LOS CRITERIA

Level of Service	Description	Average Control Delay (Seconds Per Vehicle)
A	Operations with very low delay occurring with favorable progression and/or short cycle lengths.	≤ 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	10.1 to 20.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.1 to 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, and/or high volume-to-capacity (V/C) ratios. Many vehicles stop and individual cycle failures are noticeable.	35.1 to 55.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.1 to 80.0
F	Operation with delays unacceptable to most drivers occurring due to oversaturation, poor progression, or very long cycle lengths.	> 80.0

Source: 2010 Highway Capacity Manual (Transportation Research Board).

Table 2

UNSIGNALIZED INTERSECTION LOS CRITERIA

Level of Service	Description	Average Control Delay (Seconds Per Vehicle)
A	Little or no delays	≤ 10.0
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	Extreme traffic delays with intersection capacity exceeded (for an all-way stop), or with approach/turn movement capacity exceeded (for a side street stop controlled intersection)	> 50.0

Source: 2010 Highway Capacity Manual (Transportation Research Board).

Table 3

INTERSECTION LEVEL OF SERVICE

EXISTING – 2016 HARVEST

LOCATION	FRIDAY PM PEAK HOUR (4:00-5:00)		SATURDAY PM PEAK HOUR (1:15-2:50)	
	W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
SR 29/Tubbs Lane	E-41.7[(1)]	E-41.7 [0.2%]	B-13.8	B-13.8
SR 29/Greenwood Avenue	B-10.7[(2)]	B-10.7	A-9.5	A-9.5
SR 29/Silverado Trail-Lake Street	B-11.1[(3)]	B-11.1	A-9.6	A-9.6

YEAR 2020 HARVEST

LOCATION	FRIDAY PM PEAK HOUR (4:00-5:00)		SATURDAY PM PEAK HOUR (1:15-2:50)	
	W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
SR 29/Tubbs Lane	F-66.2[(1)]	F-66.2 [0.2%]	C-15.3	C-15.3
SR 29/Greenwood Avenue	B-11.0[(2)]	B-11.0	A-9.7	A-9.7
SR 29/Silverado Trail-Lake Street	B-12.1[(3)]	B-12.2	B-10.1	B-10.2

YEAR 2030 HARVEST

LOCATION	FRIDAY PM PEAK HOUR (4:00-5:00)		SATURDAY PM PEAK HOUR (1:15-2:50)	
	W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
SR 29/Tubbs Lane	F-182.4[(1)]	F-182.4 [0.2%]	C-21.2	C-21.2
SR 29/Greenwood Avenue	B-11.0[(2)]	B-11.1	B-10.3	B-10.3
SR 29/Silverado Trail-Lake Street	C-15.5[(3)] F-131.9[(4)]	C-15.6 F-132.1 (0.2%)	B-11.5	B-11.6

(1) Unsignalized level of service – control delay in seconds for the stop sign controlled Tubbs Lane approach.
(2) Unsignalized level of service – control delay in seconds for the stop sign controlled Greenwood Avenue approach.
(3) All way stop level of service – control delay in seconds. With County volumes.
(4) All way stop level of service – control delay in seconds. With Calistoga General Plan Buildout volumes.

[%] = percent traffic increase on stop sign controlled approach
(%) = percent traffic entering intersection.

Year 2010 Highway Capacity Manual (HCM) Analysis Methodology – individual approach or turn movement results
Source: Crane Transportation Group

Table 4

INTERSECTION SIGNAL WARRANT EVALUATION
Do volumes meet Caltrans peak hour signal Warrant #3 rural condition criteria?

EXISTING – 2016 HARVEST

LOCATION	FRIDAY PM PEAK HOUR (4:00-5:00)		SATURDAY PM PEAK HOUR (1:15-2:50)	
	W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
SR 29/Tubbs Lane	Yes	Yes [0.1%]	No	No
SR 29/Greenwood Avenue	No	No	No	No
SR 29/Silverado Trail-Lake Street	No	No	No	No

YEAR 2020 HARVEST

LOCATION	FRIDAY PM PEAK HOUR (4:00-5:00)		SATURDAY PM PEAK HOUR (1:15-2:50)	
	W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
SR 29/Tubbs Lane	Yes	Yes [0.09%]	Yes	Yes [0%]
SR 29/Greenwood Avenue	No	No	No	No
SR 29/Silverado Trail-Lake Street	Yes	Yes [0.3%]	Yes	Yes [0.3%]

YEAR 2030 HARVEST

LOCATION	FRIDAY PM PEAK HOUR (4:00-5:00)		SATURDAY PM PEAK HOUR (1:15-2:50)	
	W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
SR 29/Tubbs Lane	Yes	Yes [0.07%]	Yes	Yes [0%]
SR 29/Greenwood Avenue	No	No	No	No
SR 29/Silverado Trail-Lake Street	Yes	Yes [0.3%]	Yes	Yes [0.2%]

* [Percent project traffic entering intersection.] Less than a 1% increase is not considered a significant impact.

Source: Crane Transportation Group

Table 5

PROJECT TRIP GENERATION
VINCENT ARROYO WINERY EXPANSION

HARVEST

FRIDAY

NEW OR ADJUSTED ACTIVITIES	NET NEW	HOURS	TRIPS					
			3-4 PM		4-5 PM*		5-6 PM	
			IN	OUT	IN	OUT	IN	OUT
Production Employees – Full Time	1	7:30 AM-3:00 PM	0	1	0	0	0	0
Tours/Tasting Employees (no change in number; hours change from 9:30 AM-5:00 PM to 9:30 AM-6:00 PM)	0	9:30 AM-6:00 PM	0	0	0	0	0	(-2)
Grape Delivery Trucks	1/year		0	0	0	0	0	0
Other Trucks (bottle supply/case pickup)	6/year	8:30 AM-3:00 PM	0	0	0	0	0	0
Visitors increase from 30-50/day & increase visitation hours from 9:30 AM-4:30 PM to 9:30 AM-6:00 PM	+20 visitors/day (8 vehicles/day)[(1)]	9:30 AM-6:00 PM	+1	+1	+3	+1	0	+3
TOTAL			+1	+2	+3	+1	0	+1

* Peak traffic hours at SR 29 intersections with Tubbs Lane, Greenwood Avenue & Silverado Trail.
(1) 2.6 visitors/vehicle average on weekdays per County data.

Source: Vincent Arroyo Winery project applicant; Compiled by: Crane Transportation Group

Table 6

PROJECT TRIP GENERATION
VINCENT ARROYO WINERY EXPANSION

HARVEST

SATURDAY

NEW OR ADJUSTED ACTIVITIES	NET NEW	HOURS	TRIPS											
			1-2 PM		2-3 PM		3-4 PM		4-5 PM		5-6 PM		1:15-2:15 PM*	
			IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Tours/Tasting Employees (increase from 3 to 4 employees and hours change from 9:30 AM-5:00 PM to 9:30 AM-6:00 PM for all employees)	1 new	9:30 AM-6:00 PM	0	0	0	0	0	0	0	0	0	-3	0	0
Visitors increase from 30-50/day & increase visitation hours from 9:30 AM-4:30 PM to 9:30 AM-6:00 PM	+20 visitors/day (8 vehicles/day)[(1)]	9:30 AM-6:00 PM	+1	+1	+1	+1	+1	+1	+3	+1	0	+3	+1	+1
TOTAL			+1	+1	+1	+1	+1	+1	+3	+1	0	0	+1	+1

* Peak traffic hours at SR 29 intersections with Tubbs Lane, Greenwood Avenue & Silverado Trail.
(1) 2.8 visitors/vehicle average on weekdays per County data.

Source: Vincent Arroyo Winery project applicant; Compiled by: Crane Transportation Group

Table 7

PROJECT PEAK HOUR TRIP GENERATION SUMMARY

HARVEST

FRIDAY PM PEAK HOUR* (4:00-5:00)		SATURDAY PM PEAK HOUR* (1:15-2:15)	
INBOUND TRIPS	**OUTBOUND TRIPS**	**INBOUND TRIPS**	**OUTBOUND TRIPS**
+3	+1	+1	+1

* Peak hours at the SR 29 intersection with Tubbs Lane and Silverado Trial.

Source: Vincent Arroyo Winery; compiled by Crane Transportation Group

Table 8

VINCENT ARROYO WINERY EXPANSION
NEW MARKETING EVENT TRAFFIC DETAILS

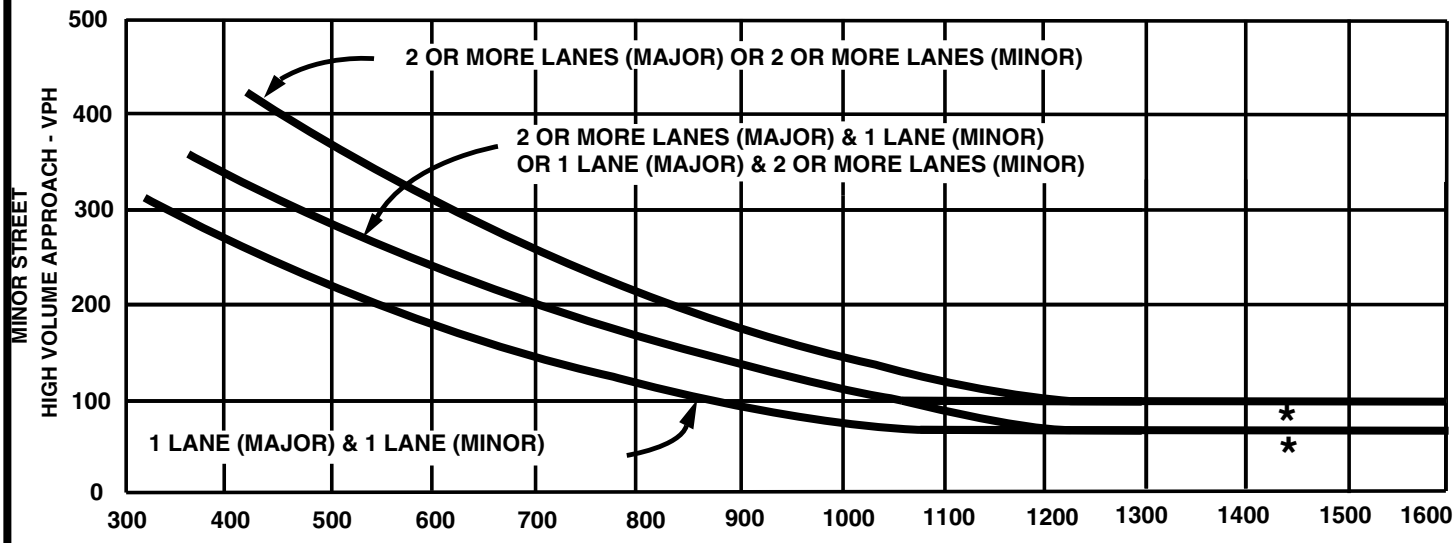
EVENTS	STAFF/GUEST CATEGORY	# OF PEOPLE	# OF VEHICLES	HOURS	REGULAR VISITATION ELIMINATED DURING MARKETING EVENT?
Marketing (12)	Guests	20	1 (small bus)	To be determined, but there will be no guest traffic on the local roadway system between 3:00 and 5:30 PM,	No
	Extra Winery Staff	0			
	Caterers	3	1		
	Entertainers	0	0		
	Delivery vehicles	2	1		
	Other?				
Marketing Open house (3)	Guests	200	70-75	To be determined, but there will be no guest traffic on the local roadway system between 3:00 and 5:30 PM.	Yes
	Extra Winery Staff	0	0		
	Caterers	3	1		
	Entertainers	0	0		
	Delivery vehicles	2	1		
	Other?				
Marketing Wine member dinner (4)	Guests	130	10-20 (most shuttled in)	To be determined, but there will be no guest traffic on the local roadway system between 3:00 and 5:30 PM.	Yes
	Extra Winery Staff	0	0		
	Caterers	3	1		
	Entertainers	0	0		
	Delivery vehicles	2	1		
	Other?				
Marketing Harvest event (1)	Guests	100	35-40	To be determined, but there will be no guest traffic on the local roadway system between 3:00 and 5:30 PM.	Yes
	Extra Winery Staff	0	0		
	Caterers	3	1		
	Entertainers	0	0		
	Delivery vehicles	2	1		
	Other?				

Source: Vincent Arroyo Winery applicant

Appendix

Appendix Table A-1

PEAK HOUR VOLUME WARRANT #3
(Rural Area)



* NOTE

100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A 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

Source: California Manual on Uniform Traffic Control Devices, 2010

Appendix

VINCENT ARROYO WINERY EXPANSION
TRAFFIC ACTIVITY DETAILS – HARVEST

Existing Gallons/Year Production: 19,900 (2015)
Total Gallons/Year After Project: 70,000 (increase of 50,000 gallons/year)
1st Year of Expected Full Production After Project Completion: 2022

	EXISTING	PROJECT INCREMENT
A.	**Full-time admin employees** # on Weekdays __1__ # on Saturday ___0__ # on Sunday __0__ Work hours: Weekday 9:00 AM to 4:00 PM Saturday NA Sunday NA	**Net new full-time admin employees** # on Weekdays __0__ # on Saturday ___0__ # on Sunday __0__ Work hours: Weekday NA Saturday NA Sunday NA
B.	**Part-time admin employees** # on Weekdays __0__ # on Saturday __0___ # on Sunday __0_ Work hours: Weekday NA Saturday NA Sunday NA	**Net new part-time admin employees** # on Weekdays __0__ # on Saturday __0___ # on Sunday __0_ Work hours: Weekday NA Saturday NA Sunday NA
C.	**Full-time production employees** # on Weekdays __1__ # on Saturday ___0__ # on Sunday __0__ Work hours: Weekday 7:30 AM to 3:00 PM Saturday NA Sunday NA	**Net new full-time production employees** # on Weekdays __1__ # on Saturday ___0__ # on Sunday __0__ Work hours: Weekday 7:30 AM to 3:00 PM Saturday NA Sunday NA
D.	**Part-time production employees** # on Weekdays __0__ # on Saturday __0___ # on Sunday __0_ Work hours: Weekday NA Saturday NA Sunday NA	**Net neww part-time production employees** # on Weekdays __0__ # on Saturday __0___ # on Sunday __0_ Work hours: Weekday NA Saturday NA Sunday NA

Appendix

VINCENT ARROYO WINERY EXPANSION
TRAFFIC ACTIVITY DETAILS – HARVEST

	EXISTING	PROJECT INCREMENT
E.	**Tours & tasting employees** # on Weekdays __2__ # on Saturday __3___ # on Sunday ___3_ Work hours: Weekday 9:00 AM to 5:00 PM Saturday 9:00 AM to 5:00 PM Sunday 9:00 AM to 5:00 PM	**Net new tours & tasting employees** # on Weekdays __0__ # on Saturday __1___ # on Sunday ___1_ Work hours: Weekday NA Saturday 9:00 AM to 6:00 PM Sunday 9:00 AM to 6:00 PM
F.	**Field workers** # on Weekdays __0__ # on Saturday __0___ # on Sunday __0_ Work hours: Weekday NA Saturday NA Sunday NA	**Net new field workers** # on Weekdays __0__ # on Saturday __0___ # on Sunday __0_ Work hours: Weekday NA Saturday NA Sunday NA
G.	**Maximum tours/tasting visitors** # on Weekdays __30__ # on Saturday __30___ # on Sunday __30_ Tasting hours: Weekday 9:30 AM to 4:30 PM Saturday 9:30 AM to 4:30 PM Sunday 9:30 AM to 4:30 PM	**Net new tours/tasting visitors** # on Weekdays __20__ # on Saturday __20___ # on Sunday __20_ Tasting hours: Weekday 9:30 AM to 6:00 PM Saturday 9:30 AM to 6:00 PM Sunday 9:30 AM to 6:00 PM
H.	**Grape delivery trucks** # on Weekdays __1/year__ # on Saturday __0___ # on Sunday __0___ Delivery hours: Weekday 7:30 AM to 8:30 AM Saturday NA Sunday NA # days of grape delivery: __1__	**Net new grape delivery trucks** # on Weekdays __0__ # on Saturday __0___ # on Sunday __0___ Delivery hours: Weekday NA Saturday NA Sunday NA # days of grape delivery: NA

Appendix

VINCENT ARROYO WINERY EXPANSION
TRAFFIC ACTIVITY DETAILS – HARVEST

	EXISTING	PROJECT INCREMENT
I.	**Other trucks** # on Weekdays __1__ # on Saturday __0__ # on Sunday ___0__ Delivery hours: Weekday 8:30 AM to 3:00 PM Saturday NA Sunday NA **Please Detail:** UPS daily service	**Net new other trucks** # on Weekdays __5/year__ # on Saturday __0__ # on Sunday ___0__ Delivery hours: Weekday 8:30 AM to 3:00 PM Saturday NA Sunday NA **Please Detail:** Bottles/lables/corks

J. **Grape Source & Truck Routes for Any New Grape Delivery**

Percent grapes grown on site for expanded production: 90%

Grapes grown off site for expanded production – access route to winery entrance
- From the north on SR 29: 0%
- Tubbs Lane: 0%
- From the south on SR 29: 10%
- From the south on Silverado Trail: 0%

Appendix

VINCENT ARROYO WINERY EXPANSION
TRAFFIC ACTIVITY DETAILS – HARVEST

K. **Marketing Events**

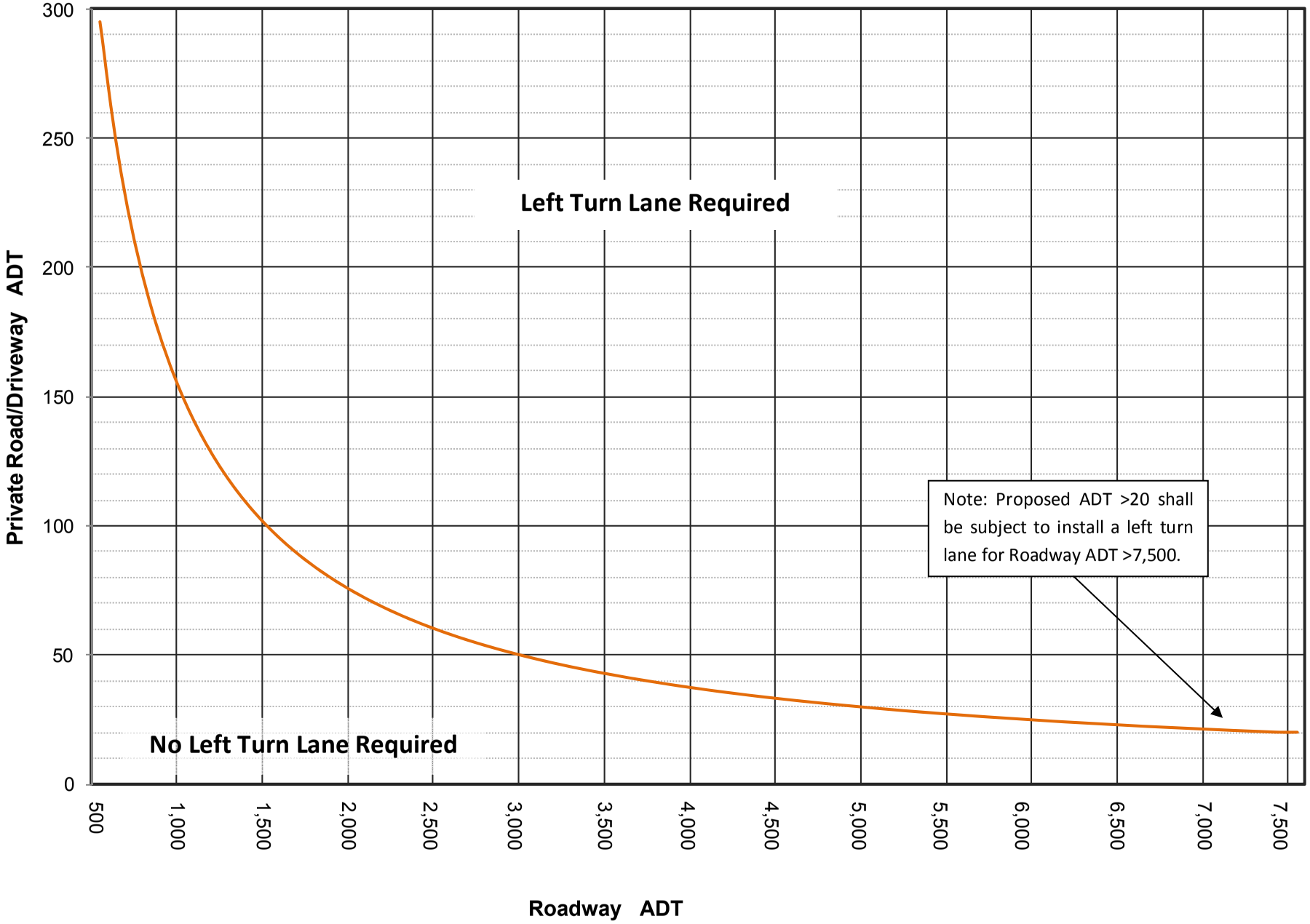
EXISTING	NEW EVENTS
# events/year: __2___ maximum # people/event: _____ typical days: Saturday typical hours 10:00 AM to 3:00 PM	# marketing events/year: __12___ maximum # people/event: _20___ typical days: Saturday typical hours Noon to 5:00 PM
	# open houses/year: __3___ maximum # people/event: _200___ typical days: Saturday typical hours Noon to 5:00 PM
	# winemaker dinners/year: __4___ maximum # people/event: _130___ typical days: Saturday typical hours 6:00 PM to 9:00 PM
	# harvest parties/year: __1___ maximum # people/event: _100___ typical days: Saturday typical hours Noon to 5:00 PM

L. **Bottling**

On-site bottling assumed for expanded production.

Existing days of on-site bottling per year: 2
Additional days per year of new on-site bottling: 3

Left Turn Lane Warrant Graph



TECHNICAL APPENDIX

Capacity Worksheets

Without Project

Intersection	
Intersection Delay, s/veh	11.1
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Vol, veh/h	0	55	28	15	0	75	78	234	0	20	91	51
Future Vol, veh/h	0	55	28	15	0	75	78	234	0	20	91	51
Peak Hour Factor	0.92	0.90	0.90	0.90	0.92	0.90	0.90	0.90	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	0	0	0	2	11	4	4	2	5	1	8
Mvmt Flow	0	61	31	17	0	83	87	260	0	22	101	57
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	10.3	11.2	10.3
HCM LOS	B	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	18%	0%	66%	0%	49%	0%	70%	0%
Vol Thru, %	82%	0%	34%	0%	51%	0%	30%	0%
Vol Right, %	0%	100%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	111	51	83	15	153	234	152	13
LT Vol	20	0	55	0	75	0	107	0
Through Vol	91	0	28	0	78	0	45	0
RT Vol	0	51	0	15	0	234	0	13
Lane Flow Rate	123	57	92	17	170	260	169	14
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.221	0.088	0.168	0.026	0.295	0.373	0.311	0.022
Departure Headway (Hd)	6.439	5.569	6.568	5.521	6.239	5.164	6.638	5.555
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	557	643	546	647	576	697	542	644
Service Time	4.179	3.308	4.313	3.265	3.973	2.897	4.379	3.295
HCM Lane V/C Ratio	0.221	0.089	0.168	0.026	0.295	0.373	0.312	0.022
HCM Control Delay	11	8.8	10.6	8.4	11.6	11	12.4	8.4
HCM Lane LOS	B	A	B	A	B	B	B	A
HCM 95th-tile Q	0.8	0.3	0.6	0.1	1.2	1.7	1.3	0.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	107	45	13
Future Vol, veh/h	0	107	45	13
Peak Hour Factor	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	3	2	7
Mvmt Flow	0	119	50	14
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	12.1
HCM LOS	B

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	3	5	331	136	2
Future Vol, veh/h	4	3	5	331	136	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	4	5	0
Mvmt Flow	4	3	5	352	145	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	509	146	147	0	-	0
Stage 1	146	-	-	-	-	-
Stage 2	363	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	528	906	1447	-	-	-
Stage 1	886	-	-	-	-	-
Stage 2	708	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	526	906	1447	-	-	-
Mov Cap-2 Maneuver	526	-	-	-	-	-
Stage 1	886	-	-	-	-	-
Stage 2	705	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.7	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1447	-	641	-	-
HCM Lane V/C Ratio	0.004	-	0.012	-	-
HCM Control Delay (s)	7.5	0	10.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	17.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	343	58	76	260	70	180
Future Vol, veh/h	343	58	76	260	70	180
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	7	6	3	3	3
Mvmt Flow	365	62	81	277	74	191

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	608	170	266	0	-	0
Stage 1	170	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Critical Hdwy	6.42	6.27	4.16	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.363	2.254	-	-	-
Pot Cap-1 Maneuver	459	861	1275	-	-	-
Stage 1	860	-	-	-	-	-
Stage 2	651	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	425	861	1275	-	-	-
Mov Cap-2 Maneuver	425	-	-	-	-	-
Stage 1	860	-	-	-	-	-
Stage 2	602	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	41.7	1.8	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1275	-	425	861	-	-
HCM Lane V/C Ratio	0.063	-	0.859	0.072	-	-
HCM Control Delay (s)	8	0	47.1	9.5	-	-
HCM Lane LOS	A	A	E	A	-	-
HCM 95th %tile Q(veh)	0.2	-	8.5	0.2	-	-

Intersection	
Intersection Delay, s/veh	9.6
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Vol, veh/h	0	11	33	11	0	87	36	123	0	22	73	58
Future Vol, veh/h	0	11	33	11	0	87	36	123	0	22	73	58
Peak Hour Factor	0.92	0.94	0.94	0.94	0.92	0.94	0.94	0.94	0.92	0.94	0.94	0.94
Heavy Vehicles, %	2	0	0	18	2	1	0	3	2	0	0	2
Mvmt Flow	0	12	35	12	0	93	38	131	0	23	78	62
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	8.9	9.4	8.9
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	23%	0%	25%	0%	71%	0%	61%	0%
Vol Thru, %	77%	0%	75%	0%	29%	0%	39%	0%
Vol Right, %	0%	100%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	95	58	44	11	123	123	159	8
LT Vol	22	0	11	0	87	0	97	0
Through Vol	73	0	33	0	36	0	62	0
RT Vol	0	58	0	11	0	123	0	8
Lane Flow Rate	101	62	47	12	131	131	169	9
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.158	0.083	0.076	0.016	0.213	0.174	0.28	0.011
Departure Headway (Hd)	5.643	4.82	5.85	5.017	5.855	4.777	5.963	4.814
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	631	736	607	705	610	746	599	736
Service Time	3.421	2.598	3.64	2.806	3.621	2.542	3.74	2.59
HCM Lane V/C Ratio	0.16	0.084	0.077	0.017	0.215	0.176	0.282	0.012
HCM Control Delay	9.5	8	9.1	7.9	10.2	8.6	11.1	7.6
HCM Lane LOS	A	A	A	A	B	A	B	A
HCM 95th-tile Q	0.6	0.3	0.2	0	0.8	0.6	1.1	0

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	97	62	8
Future Vol, veh/h	0	97	62	8
Peak Hour Factor	0.92	0.94	0.94	0.94
Heavy Vehicles, %	2	10	2	0
Mvmt Flow	0	103	66	9
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	10.9
HCM LOS	B

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	8	8	181	152	2
Future Vol, veh/h	1	8	8	181	152	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	100	0	25	2	9	50
Mvmt Flow	1	9	9	195	163	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	377	165	166	0	-	0
Stage 1	165	-	-	-	-	-
Stage 2	212	-	-	-	-	-
Critical Hdwy	7.4	6.2	4.35	-	-	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	3.3	2.425	-	-	-
Pot Cap-1 Maneuver	470	885	1284	-	-	-
Stage 1	674	-	-	-	-	-
Stage 2	637	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	466	885	1284	-	-	-
Mov Cap-2 Maneuver	466	-	-	-	-	-
Stage 1	674	-	-	-	-	-
Stage 2	632	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.5	0.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1284	-	805	-	-
HCM Lane V/C Ratio	0.007	-	0.012	-	-
HCM Control Delay (s)	7.8	0	9.5	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	156	46	66	114	104	180
Future Vol, veh/h	156	46	66	114	104	180
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	4	10	2	7	2
Mvmt Flow	166	49	70	121	111	191

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	468	206	302	0	-	0
Stage 1	206	-	-	-	-	-
Stage 2	262	-	-	-	-	-
Critical Hdwy	6.41	6.24	4.2	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.336	2.29	-	-	-
Pot Cap-1 Maneuver	555	829	1215	-	-	-
Stage 1	831	-	-	-	-	-
Stage 2	784	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	521	829	1215	-	-	-
Mov Cap-2 Maneuver	521	-	-	-	-	-
Stage 1	831	-	-	-	-	-
Stage 2	735	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.8	3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1215	-	521	829	-	-
HCM Lane V/C Ratio	0.058	-	0.319	0.059	-	-
HCM Control Delay (s)	8.1	0	15.1	9.6	-	-
HCM Lane LOS	A	A	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	1.4	0.2	-	-

Intersection	
Intersection Delay, s/veh	12.1
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Vol, veh/h	0	60	30	16	0	80	83	255	0	21	101	54
Future Vol, veh/h	0	60	30	16	0	80	83	255	0	21	101	54
Peak Hour Factor	0.92	0.90	0.90	0.90	0.92	0.90	0.90	0.90	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	0	0	0	2	11	4	4	2	5	1	8
Mvmt Flow	0	67	33	18	0	89	92	283	0	23	112	60
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	10.9	12.2	10.9
HCM LOS	B	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	17%	0%	67%	0%	49%	0%	70%	0%
Vol Thru, %	83%	0%	33%	0%	51%	0%	30%	0%
Vol Right, %	0%	100%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	122	54	90	16	163	255	185	16
LT Vol	21	0	60	0	80	0	130	0
Through Vol	101	0	30	0	83	0	55	0
RT Vol	0	54	0	16	0	255	0	16
Lane Flow Rate	136	60	100	18	181	283	206	18
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.252	0.097	0.191	0.029	0.326	0.425	0.39	0.028
Departure Headway (Hd)	6.68	5.812	6.872	5.82	6.474	5.396	6.833	5.748
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	537	614	520	612	554	666	526	620
Service Time	4.439	3.57	4.639	3.586	4.223	3.145	4.59	3.505
HCM Lane V/C Ratio	0.253	0.098	0.192	0.029	0.327	0.425	0.392	0.029
HCM Control Delay	11.7	9.2	11.3	8.8	12.3	12.1	13.9	8.7
HCM Lane LOS	B	A	B	A	B	B	B	A
HCM 95th-tile Q	1	0.3	0.7	0.1	1.4	2.1	1.8	0.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	130	55	16
Future Vol, veh/h	0	130	55	16
Peak Hour Factor	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	3	2	7
Mvmt Flow	0	144	61	18
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	13.5
HCM LOS	B

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	3	5	352	160	2
Future Vol, veh/h	4	3	5	352	160	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	4	5	0
Mvmt Flow	4	3	5	374	170	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	556	171	172	0	-	0
Stage 1	171	-	-	-	-	-
Stage 2	385	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	496	878	1417	-	-	-
Stage 1	864	-	-	-	-	-
Stage 2	692	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	494	878	1417	-	-	-
Mov Cap-2 Maneuver	494	-	-	-	-	-
Stage 1	864	-	-	-	-	-
Stage 2	689	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1417	-	608	-	-
HCM Lane V/C Ratio	0.004	-	0.012	-	-
HCM Control Delay (s)	7.5	0	11	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	28.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	372	87	83	275	76	200
Future Vol, veh/h	372	87	83	275	76	200
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	7	6	3	3	3
Mvmt Flow	396	93	88	293	81	213

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	656	187	294	0	-	0
Stage 1	187	-	-	-	-	-
Stage 2	469	-	-	-	-	-
Critical Hdwy	6.42	6.27	4.16	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.363	2.254	-	-	-
Pot Cap-1 Maneuver	430	842	1245	-	-	-
Stage 1	845	-	-	-	-	-
Stage 2	630	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 394	842	1245	-	-	-
Mov Cap-2 Maneuver	~ 394	-	-	-	-	-
Stage 1	845	-	-	-	-	-
Stage 2	577	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	66.2	1.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1245	-	394	842	-	-
HCM Lane V/C Ratio	0.071	-	1.004	0.11	-	-
HCM Control Delay (s)	8.1	0	79.4	9.8	-	-
HCM Lane LOS	A	A	F	A	-	-
HCM 95th %tile Q(veh)	0.2	-	12.3	0.4	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Intersection Delay, s/veh	10.1
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Vol, veh/h	0	12	35	12	0	94	39	138	0	23	79	62
Future Vol, veh/h	0	12	35	12	0	94	39	138	0	23	79	62
Peak Hour Factor	0.92	0.94	0.94	0.94	0.92	0.94	0.94	0.94	0.92	0.94	0.94	0.94
Heavy Vehicles, %	2	0	0	18	2	1	0	3	2	0	0	2
Mvmt Flow	0	13	37	13	0	100	41	147	0	24	84	66
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	9.1	9.8	9.2
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	23%	0%	26%	0%	71%	0%	61%	0%
Vol Thru, %	77%	0%	74%	0%	29%	0%	39%	0%
Vol Right, %	0%	100%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	102	62	47	12	133	138	183	10
LT Vol	23	0	12	0	94	0	111	0
Through Vol	79	0	35	0	39	0	72	0
RT Vol	0	62	0	12	0	138	0	10
Lane Flow Rate	109	66	50	13	141	147	195	11
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.177	0.092	0.085	0.019	0.235	0.2	0.334	0.015
Departure Headway (Hd)	5.867	5.046	6.133	5.295	6.084	5.004	6.169	5.019
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	614	713	586	678	594	722	586	717
Service Time	3.576	2.755	3.853	3.014	3.784	2.704	3.869	2.719
HCM Lane V/C Ratio	0.178	0.093	0.085	0.019	0.237	0.204	0.333	0.015
HCM Control Delay	9.8	8.3	9.4	8.1	10.6	9	11.9	7.8
HCM Lane LOS	A	A	A	A	B	A	B	A
HCM 95th-tile Q	0.6	0.3	0.3	0.1	0.9	0.7	1.5	0

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	111	72	10
Future Vol, veh/h	0	111	72	10
Peak Hour Factor	0.92	0.94	0.94	0.94
Heavy Vehicles, %	2	10	2	0
Mvmt Flow	0	118	77	11
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	11.7
HCM LOS	B

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	8	8	202	170	2
Future Vol, veh/h	1	8	8	202	170	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	100	0	25	2	9	50
Mvmt Flow	1	9	9	217	183	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	418	184	185	0	-	0
Stage 1	184	-	-	-	-	-
Stage 2	234	-	-	-	-	-
Critical Hdwy	7.4	6.2	4.35	-	-	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	3.3	2.425	-	-	-
Pot Cap-1 Maneuver	443	864	1263	-	-	-
Stage 1	659	-	-	-	-	-
Stage 2	621	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	439	864	1263	-	-	-
Mov Cap-2 Maneuver	439	-	-	-	-	-
Stage 1	659	-	-	-	-	-
Stage 2	616	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.7	0.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1263	-	780	-	-
HCM Lane V/C Ratio	0.007	-	0.012	-	-
HCM Control Delay (s)	7.9	0	9.7	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	5.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	182	62	79	122	106	186
Future Vol, veh/h	182	62	79	122	106	186
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	4	10	2	7	2
Mvmt Flow	194	66	84	130	113	198

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	510	212	311	0	-	0
Stage 1	212	-	-	-	-	-
Stage 2	298	-	-	-	-	-
Critical Hdwy	6.41	6.24	4.2	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.336	2.29	-	-	-
Pot Cap-1 Maneuver	525	823	1205	-	-	-
Stage 1	826	-	-	-	-	-
Stage 2	755	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	486	823	1205	-	-	-
Mov Cap-2 Maneuver	486	-	-	-	-	-
Stage 1	826	-	-	-	-	-
Stage 2	698	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.3	3.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1205	-	486	823	-	-
HCM Lane V/C Ratio	0.07	-	0.398	0.08	-	-
HCM Control Delay (s)	8.2	0	17.2	9.8	-	-
HCM Lane LOS	A	A	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	1.9	0.3	-	-

Intersection	
Intersection Delay, s/veh	131.9
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Vol, veh/h	0	65	35	20	0	294	90	433	0	25	169	99
Future Vol, veh/h	0	65	35	20	0	294	90	433	0	25	169	99
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
Heavy Vehicles, %	2	0	0	0	2	11	4	4	2	5	1	8
Mvmt Flow	0	71	38	22	0	320	98	471	0	27	184	108
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	16.6	59.5	18.6
HCM LOS	C	F	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	13%	0%	65%	0%	77%	0%	73%	0%
Vol Thru, %	87%	0%	35%	0%	23%	0%	27%	0%
Vol Right, %	0%	100%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	194	99	100	20	384	433	623	16
LT Vol	25	0	65	0	294	0	457	0
Through Vol	169	0	35	0	90	0	166	0
RT Vol	0	99	0	20	0	433	0	16
Lane Flow Rate	211	108	109	22	417	471	677	17
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.498	0.229	0.279	0.05	0.953	0.918	1.607	0.036
Departure Headway (Hd)	9.42	8.544	10.651	9.564	9.468	8.216	8.541	7.424
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	386	423	339	377	388	447	427	481
Service Time	7.12	6.244	8.351	7.264	7.168	5.916	6.315	5.197
HCM Lane V/C Ratio	0.547	0.255	0.322	0.058	1.075	1.054	1.585	0.035
HCM Control Delay	21.1	13.8	17.4	12.8	66.2	53.6	305.6	10.5
HCM Lane LOS	C	B	C	B	F	F	F	B
HCM 95th-tile Q	2.7	0.9	1.1	0.2	10.6	10.2	38.3	0.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	457	166	16
Future Vol, veh/h	0	457	166	16
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	3	2	7
Mvmt Flow	0	497	180	17
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	298.2
HCM LOS	F

Intersection	
Intersection Delay, s/veh	15.5
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Vol, veh/h	0	70	35	20	0	92	95	305	0	25	125	62
Future Vol, veh/h	0	70	35	20	0	92	95	305	0	25	125	62
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
Heavy Vehicles, %	2	0	0	0	2	11	4	4	2	5	1	8
Mvmt Flow	0	76	38	22	0	100	103	332	0	27	136	67
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	12.4	15.5	12.6
HCM LOS	B	C	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	17%	0%	67%	0%	49%	0%	71%	0%
Vol Thru, %	83%	0%	33%	0%	51%	0%	29%	0%
Vol Right, %	0%	100%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	150	62	105	20	187	305	262	23
LT Vol	25	0	70	0	92	0	185	0
Through Vol	125	0	35	0	95	0	77	0
RT Vol	0	62	0	20	0	305	0	23
Lane Flow Rate	163	67	114	22	203	332	285	25
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.333	0.121	0.244	0.04	0.402	0.556	0.584	0.044
Departure Headway (Hd)	7.343	6.471	7.694	6.633	7.124	6.039	7.382	6.29
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	489	554	467	539	508	600	490	571
Service Time	5.085	4.213	5.44	4.379	4.841	3.756	5.103	4.011
HCM Lane V/C Ratio	0.333	0.121	0.244	0.041	0.4	0.553	0.582	0.044
HCM Control Delay	13.7	10.1	12.9	9.7	14.6	16.1	20	9.3
HCM Lane LOS	B	B	B	A	B	C	C	A
HCM 95th-tile Q	1.4	0.4	0.9	0.1	1.9	3.4	3.7	0.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	185	77	23
Future Vol, veh/h	0	185	77	23
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	3	2	7
Mvmt Flow	0	201	84	25
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	19.1
HCM LOS	C

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	10	10	405	225	3
Future Vol, veh/h	5	10	10	405	225	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	4	5	0
Mvmt Flow	5	11	11	426	237	3

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	685	238	240	0	-	0
Stage 1	238	-	-	-	-	-
Stage 2	447	-	-	-	-	-
Critical Hdwy	7.1	6.2	4.1	-	-	-
Critical Hdwy Stg 1	6.1	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	365	806	1339	-	-	-
Stage 1	770	-	-	-	-	-
Stage 2	595	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	362	806	1339	-	-	-
Mov Cap-2 Maneuver	362	-	-	-	-	-
Stage 1	762	-	-	-	-	-
Stage 2	588	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.5	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1339	-	572	-	-
HCM Lane V/C Ratio	0.008	-	0.028	-	-
HCM Control Delay (s)	7.7	0	11.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	79.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	445	125	100	310	90	245
Future Vol, veh/h	445	125	100	310	90	245
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	7	6	3	3	3
Mvmt Flow	468	132	105	326	95	258

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	761	224	353	0	-	0
Stage 1	224	-	-	-	-	-
Stage 2	537	-	-	-	-	-
Critical Hdwy	6.42	6.27	4.16	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.363	2.254	-	-	-
Pot Cap-1 Maneuver	~ 373	803	1184	-	-	-
Stage 1	813	-	-	-	-	-
Stage 2	586	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 333	803	1184	-	-	-
Mov Cap-2 Maneuver	~ 333	-	-	-	-	-
Stage 1	813	-	-	-	-	-
Stage 2	523	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	182.4	2	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1184	-	333	803	-	-
HCM Lane V/C Ratio	0.089	-	1.407	0.164	-	-
HCM Control Delay (s)	8.3	0	230.7	10.4	-	-
HCM Lane LOS	A	A	F	B	-	-
HCM 95th %tile Q(veh)	0.3	-	24.2	0.6	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Intersection Delay, s/veh	11.5
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Vol, veh/h	0	15	40	15	0	110	45	175	0	27	97	70
Future Vol, veh/h	0	15	40	15	0	110	45	175	0	27	97	70
Peak Hour Factor	0.92	0.96	0.96	0.96	0.92	0.96	0.96	0.96	0.92	0.96	0.96	0.96
Heavy Vehicles, %	2	0	0	18	2	1	0	3	2	0	0	2
Mvmt Flow	0	16	42	16	0	115	47	182	0	28	101	73
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	9.8	10.8	10
HCM LOS	A	B	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	22%	0%	27%	0%	71%	0%	60%	0%
Vol Thru, %	78%	0%	73%	0%	29%	0%	40%	0%
Vol Right, %	0%	100%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	124	70	55	15	155	175	242	14
LT Vol	27	0	15	0	110	0	145	0
Through Vol	97	0	40	0	45	0	97	0
RT Vol	0	70	0	15	0	175	0	14
Lane Flow Rate	129	73	57	16	161	182	252	15
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.223	0.109	0.105	0.025	0.287	0.269	0.451	0.021
Departure Headway (Hd)	6.206	5.387	6.584	5.733	6.396	5.312	6.437	5.288
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	579	664	544	623	562	676	560	676
Service Time	3.947	3.127	4.335	3.484	4.135	3.05	4.174	3.025
HCM Lane V/C Ratio	0.223	0.11	0.105	0.026	0.286	0.269	0.45	0.022
HCM Control Delay	10.7	8.8	10.1	8.6	11.7	10	14.4	8.1
HCM Lane LOS	B	A	B	A	B	A	B	A
HCM 95th-tile Q	0.8	0.4	0.3	0.1	1.2	1.1	2.3	0.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	145	97	14
Future Vol, veh/h	0	145	97	14
Peak Hour Factor	0.92	0.96	0.96	0.96
Heavy Vehicles, %	2	10	2	0
Mvmt Flow	0	151	101	15
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	14.1
HCM LOS	B

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	10	20	240	206	2
Future Vol, veh/h	2	10	20	240	206	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	100	0	25	2	9	50
Mvmt Flow	2	11	21	255	219	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	518	220	221	0	-	0
Stage 1	220	-	-	-	-	-
Stage 2	298	-	-	-	-	-
Critical Hdwy	7.4	6.2	4.35	-	-	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	3.3	2.425	-	-	-
Pot Cap-1 Maneuver	381	825	1223	-	-	-
Stage 1	631	-	-	-	-	-
Stage 2	575	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	373	825	1223	-	-	-
Mov Cap-2 Maneuver	373	-	-	-	-	-
Stage 1	631	-	-	-	-	-
Stage 2	564	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.3	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1223	-	686	-	-
HCM Lane V/C Ratio	0.017	-	0.019	-	-
HCM Control Delay (s)	8	0	10.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Intersection	
Int Delay, s/veh	8.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	245	85	95	145	120	200
Future Vol, veh/h	245	85	95	145	120	200
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	4	10	2	7	2
Mvmt Flow	258	89	100	153	126	211

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	585	232	337	0	-	0
Stage 1	232	-	-	-	-	-
Stage 2	353	-	-	-	-	-
Critical Hdwy	6.41	6.24	4.2	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.336	2.29	-	-	-
Pot Cap-1 Maneuver	475	802	1179	-	-	-
Stage 1	809	-	-	-	-	-
Stage 2	713	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	431	802	1179	-	-	-
Mov Cap-2 Maneuver	431	-	-	-	-	-
Stage 1	809	-	-	-	-	-
Stage 2	647	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	21.2	3.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1179	-	431	802	-	-
HCM Lane V/C Ratio	0.085	-	0.598	0.112	-	-
HCM Control Delay (s)	8.3	0	25	10.1	-	-
HCM Lane LOS	A	A	D	B	-	-
HCM 95th %tile Q(veh)	0.3	-	3.8	0.4	-	-

With Project

Intersection	
Intersection Delay, s/veh	11.1
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Vol, veh/h	0	55	28	15	0	75	78	235	0	20	92	51
Future Vol, veh/h	0	55	28	15	0	75	78	235	0	20	92	51
Peak Hour Factor	0.92	0.90	0.90	0.90	0.92	0.90	0.90	0.90	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	0	0	0	2	11	4	4	2	5	1	8
Mvmt Flow	0	61	31	17	0	83	87	261	0	22	102	57
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	10.3	11.2	10.3
HCM LOS	B	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	18%	0%	66%	0%	49%	0%	70%	0%
Vol Thru, %	82%	0%	34%	0%	51%	0%	30%	0%
Vol Right, %	0%	100%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	112	51	83	15	153	235	153	13
LT Vol	20	0	55	0	75	0	107	0
Through Vol	92	0	28	0	78	0	46	0
RT Vol	0	51	0	15	0	235	0	13
Lane Flow Rate	124	57	92	17	170	261	170	14
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.223	0.088	0.169	0.026	0.295	0.375	0.314	0.022
Departure Headway (Hd)	6.444	5.574	6.578	5.531	6.246	5.172	6.641	5.56
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	558	642	545	646	576	695	541	643
Service Time	4.186	3.316	4.325	3.277	3.983	2.907	4.384	3.302
HCM Lane V/C Ratio	0.222	0.089	0.169	0.026	0.295	0.376	0.314	0.022
HCM Control Delay	11	8.9	10.7	8.4	11.6	11	12.4	8.4
HCM Lane LOS	B	A	B	A	B	B	B	A
HCM 95th-tile Q	0.8	0.3	0.6	0.1	1.2	1.7	1.3	0.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	107	46	13
Future Vol, veh/h	0	107	46	13
Peak Hour Factor	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	3	2	7
Mvmt Flow	0	119	51	14
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	12.1
HCM LOS	B

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	3	7	331	136	3
Future Vol, veh/h	4	3	7	331	136	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	4	5	0
Mvmt Flow	4	3	7	352	145	3

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	513	146	148	0	-	0
Stage 1	146	-	-	-	-	-
Stage 2	367	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	525	906	1446	-	-	-
Stage 1	886	-	-	-	-	-
Stage 2	705	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	522	906	1446	-	-	-
Mov Cap-2 Maneuver	522	-	-	-	-	-
Stage 1	886	-	-	-	-	-
Stage 2	701	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.7	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1446	-	638	-	-
HCM Lane V/C Ratio	0.005	-	0.012	-	-
HCM Control Delay (s)	7.5	0	10.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	17.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	343	59	76	260	70	180
Future Vol, veh/h	343	59	76	260	70	180
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	7	6	3	3	3
Mvmt Flow	365	63	81	277	74	191

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	608	170	266	0	-	0
Stage 1	170	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Critical Hdwy	6.42	6.27	4.16	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.363	2.254	-	-	-
Pot Cap-1 Maneuver	459	861	1275	-	-	-
Stage 1	860	-	-	-	-	-
Stage 2	651	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	425	861	1275	-	-	-
Mov Cap-2 Maneuver	425	-	-	-	-	-
Stage 1	860	-	-	-	-	-
Stage 2	602	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	41.6	1.8	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1275	-	425	861	-	-
HCM Lane V/C Ratio	0.063	-	0.859	0.073	-	-
HCM Control Delay (s)	8	0	47.1	9.5	-	-
HCM Lane LOS	A	A	E	A	-	-
HCM 95th %tile Q(veh)	0.2	-	8.5	0.2	-	-

Intersection	
Intersection Delay, s/veh	9.6
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Vol, veh/h	0	11	33	11	0	87	36	123	0	22	74	58
Future Vol, veh/h	0	11	33	11	0	87	36	123	0	22	74	58
Peak Hour Factor	0.92	0.94	0.94	0.94	0.92	0.94	0.94	0.94	0.92	0.94	0.94	0.94
Heavy Vehicles, %	2	0	0	18	2	1	0	3	2	0	0	2
Mvmt Flow	0	12	35	12	0	93	38	131	0	23	79	62
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	8.9	9.4	8.9
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	23%	0%	25%	0%	71%	0%	61%	0%
Vol Thru, %	77%	0%	75%	0%	29%	0%	39%	0%
Vol Right, %	0%	100%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	96	58	44	11	123	123	160	8
LT Vol	22	0	11	0	87	0	97	0
Through Vol	74	0	33	0	36	0	63	0
RT Vol	0	58	0	11	0	123	0	8
Lane Flow Rate	102	62	47	12	131	131	170	9
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.16	0.083	0.076	0.016	0.213	0.174	0.282	0.011
Departure Headway (Hd)	5.643	4.822	5.856	5.023	5.86	4.782	5.962	4.815
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	631	735	606	704	610	745	599	736
Service Time	3.421	2.6	3.648	2.814	3.628	2.549	3.74	2.592
HCM Lane V/C Ratio	0.162	0.084	0.078	0.017	0.215	0.176	0.284	0.012
HCM Control Delay	9.5	8	9.1	7.9	10.2	8.6	11.1	7.6
HCM Lane LOS	A	A	A	A	B	A	B	A
HCM 95th-tile Q	0.6	0.3	0.2	0	0.8	0.6	1.2	0

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	97	63	8
Future Vol, veh/h	0	97	63	8
Peak Hour Factor	0.92	0.94	0.94	0.94
Heavy Vehicles, %	2	10	2	0
Mvmt Flow	0	103	67	9
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	10.9
HCM LOS	B

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	9	9	181	152	2
Future Vol, veh/h	1	9	9	181	152	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	100	0	25	2	9	50
Mvmt Flow	1	10	10	195	163	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	379	165	166	0	-	0
Stage 1	165	-	-	-	-	-
Stage 2	214	-	-	-	-	-
Critical Hdwy	7.4	6.2	4.35	-	-	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	3.3	2.425	-	-	-
Pot Cap-1 Maneuver	469	885	1284	-	-	-
Stage 1	674	-	-	-	-	-
Stage 2	636	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	465	885	1284	-	-	-
Mov Cap-2 Maneuver	465	-	-	-	-	-
Stage 1	674	-	-	-	-	-
Stage 2	630	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.5	0.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1284	-	812	-	-
HCM Lane V/C Ratio	0.008	-	0.013	-	-
HCM Control Delay (s)	7.8	0	9.5	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	156	46	66	114	104	180
Future Vol, veh/h	156	46	66	114	104	180
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	4	10	2	7	2
Mvmt Flow	166	49	70	121	111	191

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	468	206	302	0	-	0
Stage 1	206	-	-	-	-	-
Stage 2	262	-	-	-	-	-
Critical Hdwy	6.41	6.24	4.2	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.336	2.29	-	-	-
Pot Cap-1 Maneuver	555	829	1215	-	-	-
Stage 1	831	-	-	-	-	-
Stage 2	784	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	521	829	1215	-	-	-
Mov Cap-2 Maneuver	521	-	-	-	-	-
Stage 1	831	-	-	-	-	-
Stage 2	735	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.8	3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1215	-	521	829	-	-
HCM Lane V/C Ratio	0.058	-	0.319	0.059	-	-
HCM Control Delay (s)	8.1	0	15.1	9.6	-	-
HCM Lane LOS	A	A	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	1.4	0.2	-	-

Intersection	
Intersection Delay, s/veh	12.2
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Vol, veh/h	0	60	30	16	0	80	83	256	0	21	102	54
Future Vol, veh/h	0	60	30	16	0	80	83	256	0	21	102	54
Peak Hour Factor	0.92	0.90	0.90	0.90	0.92	0.90	0.90	0.90	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	0	0	0	2	11	4	4	2	5	1	8
Mvmt Flow	0	67	33	18	0	89	92	284	0	23	113	60
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	10.9	12.3	10.9
HCM LOS	B	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	17%	0%	67%	0%	49%	0%	70%	0%
Vol Thru, %	83%	0%	33%	0%	51%	0%	30%	0%
Vol Right, %	0%	100%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	123	54	90	16	163	256	186	16
LT Vol	21	0	60	0	80	0	130	0
Through Vol	102	0	30	0	83	0	56	0
RT Vol	0	54	0	16	0	256	0	16
Lane Flow Rate	137	60	100	18	181	284	207	18
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.254	0.097	0.191	0.029	0.326	0.427	0.393	0.028
Departure Headway (Hd)	6.686	5.818	6.883	5.831	6.481	5.403	6.838	5.755
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	536	614	519	611	554	666	525	620
Service Time	4.444	3.576	4.651	3.598	4.232	3.154	4.593	3.51
HCM Lane V/C Ratio	0.256	0.098	0.193	0.029	0.327	0.426	0.394	0.029
HCM Control Delay	11.7	9.2	11.3	8.8	12.4	12.2	14	8.7
HCM Lane LOS	B	A	B	A	B	B	B	A
HCM 95th-tile Q	1	0.3	0.7	0.1	1.4	2.1	1.9	0.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	130	56	16
Future Vol, veh/h	0	130	56	16
Peak Hour Factor	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	3	2	7
Mvmt Flow	0	144	62	18
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	13.6
HCM LOS	B

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	3	7	352	160	3
Future Vol, veh/h	4	3	7	352	160	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	4	5	0
Mvmt Flow	4	3	7	374	170	3

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	561	172	173	0	-	0
Stage 1	172	-	-	-	-	-
Stage 2	389	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	492	877	1416	-	-	-
Stage 1	863	-	-	-	-	-
Stage 2	689	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	489	877	1416	-	-	-
Mov Cap-2 Maneuver	489	-	-	-	-	-
Stage 1	863	-	-	-	-	-
Stage 2	685	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1416	-	603	-	-
HCM Lane V/C Ratio	0.005	-	0.012	-	-
HCM Control Delay (s)	7.6	0	11	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	28.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	372	88	83	275	76	200
Future Vol, veh/h	372	88	83	275	76	200
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	7	6	3	3	3
Mvmt Flow	396	94	88	293	81	213

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	656	187	294	0	-	0
Stage 1	187	-	-	-	-	-
Stage 2	469	-	-	-	-	-
Critical Hdwy	6.42	6.27	4.16	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.363	2.254	-	-	-
Pot Cap-1 Maneuver	430	842	1245	-	-	-
Stage 1	845	-	-	-	-	-
Stage 2	630	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 394	842	1245	-	-	-
Mov Cap-2 Maneuver	~ 394	-	-	-	-	-
Stage 1	845	-	-	-	-	-
Stage 2	577	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	66.1	1.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1245	-	394	842	-	-
HCM Lane V/C Ratio	0.071	-	1.004	0.111	-	-
HCM Control Delay (s)	8.1	0	79.4	9.8	-	-
HCM Lane LOS	A	A	F	A	-	-
HCM 95th %tile Q(veh)	0.2	-	12.3	0.4	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Intersection Delay, s/veh	10.2
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Vol, veh/h	0	12	35	12	0	94	39	138	0	23	80	62
Future Vol, veh/h	0	12	35	12	0	94	39	138	0	23	80	62
Peak Hour Factor	0.92	0.94	0.94	0.94	0.92	0.94	0.94	0.94	0.92	0.94	0.94	0.94
Heavy Vehicles, %	2	0	0	18	2	1	0	3	2	0	0	2
Mvmt Flow	0	13	37	13	0	100	41	147	0	24	85	66
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	9.1	9.8	9.3
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	22%	0%	26%	0%	71%	0%	60%	0%
Vol Thru, %	78%	0%	74%	0%	29%	0%	40%	0%
Vol Right, %	0%	100%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	103	62	47	12	133	138	184	10
LT Vol	23	0	12	0	94	0	111	0
Through Vol	80	0	35	0	39	0	73	0
RT Vol	0	62	0	12	0	138	0	10
Lane Flow Rate	110	66	50	13	141	147	196	11
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.179	0.092	0.085	0.019	0.235	0.2	0.335	0.015
Departure Headway (Hd)	5.868	5.048	6.141	5.303	6.089	5.009	6.169	5.021
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	615	713	586	677	593	721	587	717
Service Time	3.576	2.756	3.858	3.02	3.789	2.709	3.869	2.721
HCM Lane V/C Ratio	0.179	0.093	0.085	0.019	0.238	0.204	0.334	0.015
HCM Control Delay	9.9	8.3	9.4	8.1	10.6	9	11.9	7.8
HCM Lane LOS	A	A	A	A	B	A	B	A
HCM 95th-tile Q	0.6	0.3	0.3	0.1	0.9	0.7	1.5	0

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	111	73	10
Future Vol, veh/h	0	111	73	10
Peak Hour Factor	0.92	0.94	0.94	0.94
Heavy Vehicles, %	2	10	2	0
Mvmt Flow	0	118	78	11
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	11.7
HCM LOS	B

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	9	9	202	170	2
Future Vol, veh/h	1	9	9	202	170	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	100	0	25	2	9	50
Mvmt Flow	1	10	10	217	183	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	421	184	185	0	-	0
Stage 1	184	-	-	-	-	-
Stage 2	237	-	-	-	-	-
Critical Hdwy	7.4	6.2	4.35	-	-	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	3.3	2.425	-	-	-
Pot Cap-1 Maneuver	441	864	1263	-	-	-
Stage 1	659	-	-	-	-	-
Stage 2	618	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	437	864	1263	-	-	-
Mov Cap-2 Maneuver	437	-	-	-	-	-
Stage 1	659	-	-	-	-	-
Stage 2	612	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.6	0.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1263	-	787	-	-
HCM Lane V/C Ratio	0.008	-	0.014	-	-
HCM Control Delay (s)	7.9	0	9.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	5.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	182	62	79	122	106	186
Future Vol, veh/h	182	62	79	122	106	186
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	4	10	2	7	2
Mvmt Flow	194	66	84	130	113	198

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	510	212	311	0	-	0
Stage 1	212	-	-	-	-	-
Stage 2	298	-	-	-	-	-
Critical Hdwy	6.41	6.24	4.2	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.336	2.29	-	-	-
Pot Cap-1 Maneuver	525	823	1205	-	-	-
Stage 1	826	-	-	-	-	-
Stage 2	755	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	486	823	1205	-	-	-
Mov Cap-2 Maneuver	486	-	-	-	-	-
Stage 1	826	-	-	-	-	-
Stage 2	698	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.3	3.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1205	-	486	823	-	-
HCM Lane V/C Ratio	0.07	-	0.398	0.08	-	-
HCM Control Delay (s)	8.2	0	17.2	9.8	-	-
HCM Lane LOS	A	A	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	1.9	0.3	-	-

Intersection	
Intersection Delay, s/veh	15.6
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Vol, veh/h	0	70	35	20	0	92	95	306	0	25	126	62
Future Vol, veh/h	0	70	35	20	0	92	95	306	0	25	126	62
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
Heavy Vehicles, %	2	0	0	0	2	11	4	4	2	5	1	8
Mvmt Flow	0	76	38	22	0	100	103	333	0	27	137	67
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	12.4	15.6	12.7
HCM LOS	B	C	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	17%	0%	67%	0%	49%	0%	70%	0%
Vol Thru, %	83%	0%	33%	0%	51%	0%	30%	0%
Vol Right, %	0%	100%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	151	62	105	20	187	306	263	23
LT Vol	25	0	70	0	92	0	185	0
Through Vol	126	0	35	0	95	0	78	0
RT Vol	0	62	0	20	0	306	0	23
Lane Flow Rate	164	67	114	22	203	333	286	25
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.335	0.121	0.244	0.04	0.403	0.559	0.587	0.044
Departure Headway (Hd)	7.349	6.478	7.706	6.645	7.132	6.047	7.386	6.295
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	489	553	466	538	506	599	489	570
Service Time	5.094	4.222	5.454	4.393	4.85	3.765	5.11	4.019
HCM Lane V/C Ratio	0.335	0.121	0.245	0.041	0.401	0.556	0.585	0.044
HCM Control Delay	13.8	10.1	12.9	9.7	14.6	16.2	20.1	9.3
HCM Lane LOS	B	B	B	A	B	C	C	A
HCM 95th-tile Q	1.5	0.4	0.9	0.1	1.9	3.4	3.7	0.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	185	78	23
Future Vol, veh/h	0	185	78	23
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	3	2	7
Mvmt Flow	0	201	85	25
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	19.2
HCM LOS	C

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	10	12	405	225	4
Future Vol, veh/h	5	10	12	405	225	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	4	5	0
Mvmt Flow	5	11	13	426	237	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	691	239	241	0	-	0
Stage 1	239	-	-	-	-	-
Stage 2	452	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	413	805	1337	-	-	-
Stage 1	805	-	-	-	-	-
Stage 2	645	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	408	805	1337	-	-	-
Mov Cap-2 Maneuver	408	-	-	-	-	-
Stage 1	805	-	-	-	-	-
Stage 2	637	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1337	-	608	-	-
HCM Lane V/C Ratio	0.009	-	0.026	-	-
HCM Control Delay (s)	7.7	0	11.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	79.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	445	126	100	310	90	245
Future Vol, veh/h	445	126	100	310	90	245
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	7	6	3	3	3
Mvmt Flow	468	133	105	326	95	258

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	761	224	353	0	-	0
Stage 1	224	-	-	-	-	-
Stage 2	537	-	-	-	-	-
Critical Hdwy	6.42	6.27	4.16	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.363	2.254	-	-	-
Pot Cap-1 Maneuver	~ 373	803	1184	-	-	-
Stage 1	813	-	-	-	-	-
Stage 2	586	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 333	803	1184	-	-	-
Mov Cap-2 Maneuver	~ 333	-	-	-	-	-
Stage 1	813	-	-	-	-	-
Stage 2	523	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	182.1	2	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1184	-	333	803	-	-
HCM Lane V/C Ratio	0.089	-	1.407	0.165	-	-
HCM Control Delay (s)	8.3	0	230.7	10.4	-	-
HCM Lane LOS	A	A	F	B	-	-
HCM 95th %tile Q(veh)	0.3	-	24.2	0.6	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Intersection Delay, s/veh	132.5
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Vol, veh/h	0	65	35	20	0	294	90	434	0	25	170	99
Future Vol, veh/h	0	65	35	20	0	294	90	434	0	25	170	99
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
Heavy Vehicles, %	2	0	0	0	2	11	4	4	2	5	1	8
Mvmt Flow	0	71	38	22	0	320	98	472	0	27	185	108
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	16.6	59.7	18.7
HCM LOS	C	F	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	13%	0%	65%	0%	77%	0%	73%	0%
Vol Thru, %	87%	0%	35%	0%	23%	0%	27%	0%
Vol Right, %	0%	100%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	195	99	100	20	384	434	624	16
LT Vol	25	0	65	0	294	0	457	0
Through Vol	170	0	35	0	90	0	167	0
RT Vol	0	99	0	20	0	434	0	16
Lane Flow Rate	212	108	109	22	417	472	678	17
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.501	0.229	0.279	0.05	0.953	0.92	1.61	0.036
Departure Headway (Hd)	9.423	8.548	10.661	9.574	9.476	8.224	8.545	7.429
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	386	423	339	376	388	443	427	480
Service Time	7.123	6.248	8.361	7.274	7.176	5.924	6.318	5.201
HCM Lane V/C Ratio	0.549	0.255	0.322	0.059	1.075	1.065	1.588	0.035
HCM Control Delay	21.2	13.8	17.4	12.8	66.2	54	306.9	10.5
HCM Lane LOS	C	B	C	B	F	F	F	B
HCM 95th-tile Q	2.7	0.9	1.1	0.2	10.6	10.3	38.4	0.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	457	167	16
Future Vol, veh/h	0	457	167	16
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	3	2	7
Mvmt Flow	0	497	182	17
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	299.5
HCM LOS	F

Intersection	
Intersection Delay, s/veh	11.6
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Vol, veh/h	0	15	40	15	0	110	45	175	0	27	98	70
Future Vol, veh/h	0	15	40	15	0	110	45	175	0	27	98	70
Peak Hour Factor	0.92	0.96	0.96	0.96	0.92	0.96	0.96	0.96	0.92	0.96	0.96	0.96
Heavy Vehicles, %	2	0	0	18	2	1	0	3	2	0	0	2
Mvmt Flow	0	16	42	16	0	115	47	182	0	28	102	73
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	9.8	10.8	10.1
HCM LOS	A	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	22%	0%	27%	0%	71%	0%	60%	0%
Vol Thru, %	78%	0%	73%	0%	29%	0%	40%	0%
Vol Right, %	0%	100%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	125	70	55	15	155	175	243	14
LT Vol	27	0	15	0	110	0	145	0
Through Vol	98	0	40	0	45	0	98	0
RT Vol	0	70	0	15	0	175	0	14
Lane Flow Rate	130	73	57	16	161	182	253	15
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.225	0.109	0.105	0.025	0.287	0.269	0.453	0.021
Departure Headway (Hd)	6.209	5.39	6.592	5.742	6.403	5.319	6.439	5.292
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	578	664	543	622	562	674	559	676
Service Time	3.948	3.129	4.342	3.491	4.141	3.057	4.175	3.027
HCM Lane V/C Ratio	0.225	0.11	0.105	0.026	0.286	0.27	0.453	0.022
HCM Control Delay	10.8	8.8	10.1	8.6	11.7	10	14.4	8.1
HCM Lane LOS	B	A	B	A	B	A	B	A
HCM 95th-tile Q	0.9	0.4	0.3	0.1	1.2	1.1	2.3	0.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	145	98	14
Future Vol, veh/h	0	145	98	14
Peak Hour Factor	0.92	0.96	0.96	0.96
Heavy Vehicles, %	2	10	2	0
Mvmt Flow	0	151	102	15
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	14.1
HCM LOS	B

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	11	21	240	206	2
Future Vol, veh/h	2	11	21	240	206	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	100	0	25	2	9	50
Mvmt Flow	2	12	22	255	219	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	520	220	221	0	-	0
Stage 1	220	-	-	-	-	-
Stage 2	300	-	-	-	-	-
Critical Hdwy	7.4	6.2	4.35	-	-	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	3.3	2.425	-	-	-
Pot Cap-1 Maneuver	380	825	1223	-	-	-
Stage 1	631	-	-	-	-	-
Stage 2	573	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	372	825	1223	-	-	-
Mov Cap-2 Maneuver	372	-	-	-	-	-
Stage 1	631	-	-	-	-	-
Stage 2	561	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.3	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1223	-	695	-	-
HCM Lane V/C Ratio	0.018	-	0.02	-	-
HCM Control Delay (s)	8	0	10.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Intersection	
Int Delay, s/veh	8.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	245	85	95	145	120	200
Future Vol, veh/h	245	85	95	145	120	200
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	4	10	2	7	2
Mvmt Flow	258	89	100	153	126	211

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	585	232	337	0	-	0
Stage 1	232	-	-	-	-	-
Stage 2	353	-	-	-	-	-
Critical Hdwy	6.41	6.24	4.2	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.336	2.29	-	-	-
Pot Cap-1 Maneuver	475	802	1179	-	-	-
Stage 1	809	-	-	-	-	-
Stage 2	713	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	431	802	1179	-	-	-
Mov Cap-2 Maneuver	431	-	-	-	-	-
Stage 1	809	-	-	-	-	-
Stage 2	647	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	21.2	3.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1179	-	431	802	-	-
HCM Lane V/C Ratio	0.085	-	0.598	0.112	-	-
HCM Control Delay (s)	8.3	0	25	10.1	-	-
HCM Lane LOS	A	A	D	B	-	-
HCM 95th %tile Q(veh)	0.3	-	3.8	0.4	-	-