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Traffic Impact Report

Beaulieu Vineyards P17-00192-MOD
Planning Commission Hearing June 6, 2018

TRAFFIC IMPACT REPORT

BV WINERY
ALONG SR 29 IN RUTHERFORD, CA
2017 USE PERMIT MODIFICATION

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I. INTRODUCTION

This traffic report has been prepared for BV Winery to determine if traffic from the winery's proposed 2017 use permit modification will result in any significant local circulation system impacts and the need for any mitigation measures. The winery is located in the northeast quadrant of the SR 29-128/Rutherford Road (SR 128) intersection – see **Figure 1**.

II. SCOPE OF SERVICES

The scope of service for this traffic study was developed to provide analysis requested by the Napa County Public Works Department. Evaluation was conducted for harvest Friday and Saturday PM peak hour traffic conditions. Existing (2017), year 2020 and year 2030 (Cumulative – General Plan Buildout) horizons were evaluated both with and without project traffic. Operating conditions at the SR 29 intersection with Rutherford Road were evaluated for all analysis scenarios based upon County traffic significance criteria. In addition, sight line adequacy was evaluated at the existing driveway intersection with SR 29 at the north end of the BV site that will serve a new visitor parking lot. 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 – Year 2017 Harvest

Peak traffic hours at the SR 29/Rutherford Road intersection were determined to be 3:00-4:00 PM on both Friday and Saturday afternoon based upon recent traffic counts. The intersection is projected to have slightly higher volumes during a harvest Saturday PM peak traffic hour compared to a harvest Friday PM peak traffic hour (about 2,380 peak hour vehicles expected to enter the intersection during a harvest Saturday PM peak hour versus about 2,295 vehicles during a Friday PM peak hour). The driveway connecting to SR 29 at the north end of the BV site that will serve the proposed guest parking lot is now gated and during recent traffic counts had a total of 6 two-way vehicles during the Friday PM peak hour and 2 two-way vehicles during the Saturday PM peak hour.

2. Year 2017 Harvest (Without Project) Circulation System Operation

- **SR 29/Rutherford Road intersection** – unacceptable levels of service + volumes meet peak hour signal warrant criteria levels during both the Friday and Saturday PM peak traffic hours.

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

- **SR 29/Rutherford Road intersection** – unacceptable levels of service + volumes would meet peak hour signal warrant criteria levels during both the Friday and Saturday PM peak traffic hours.

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

- **SR 29/Rutherford Road intersection** – unacceptable levels of service + volumes would meet peak hour signal warrant criteria levels during both the Friday and Saturday PM peak traffic hours.

B. PROJECT IMPACTS

1. Project Trip Generation

The proposed project (100 new guests/day by appointment between 10:00 AM and 6:00 PM) will result in the following new trip generation on the local circulation system during the Friday and Saturday ambient peak traffic hours.

PROJECT TRIP GENERATION

HARVEST

FRIDAY PM PEAK HOUR* (3:00-4:00)		SATURDAY PM PEAK HOUR* (3:00-4:00)	
INBOUND TRIPS	OUTBOUND TRIPS	INBOUND TRIPS	OUTBOUND TRIPS
6	10	6	10

* Peak hours at the SR 29 intersection with Rutherford Road.
Source: BV Winery; compiled by Crane Transportation Group

2. New Guest Parking Lot

A new paved visitor parking lot will be provided as part of the project along the east side of SR 29 just north of the existing BV Winery building. In addition, a left turn lane will be provided on the southbound SR 29 approach to the existing driveway that will serve the new lot. This driveway is now gated. The new lot will serve most of the new 100 guests by appointment as well as some of the existing tours & tasting visitors (without appointments) who are now parking in the lot shared with Rutherford Grill and the U.S. Post Office just south of the winery. The new lot will also provide parking for marketing event guests, none of whom will be on the local roadway network between 3:00 and 5:30 PM. A median refuge area will also be provided south of the driveway on the state highway to assist drivers turning left from the site to southbound SR 29.

3. **BV Access to SR 29 and Rutherford Road**

SR 29: In conjunction with the driveway at the north end of the site serving the new guest parking lot, an existing gated driveway adjacent to the north end of the winery building will be eliminated. The two driveways providing access to BV offices as well as the driveways providing access to BV visitors, Rutherford Grill and the U.S. Post Office parking will remain.

Rutherford Road: All driveways along Rutherford Road will remain and service their current functions. The shipping/receiving driveway which serves all employee in/out traffic as well as all inbound truck traffic will maintain the same volume levels.

4. **Year 2017 Harvest Existing + Project Off-Cite Circulation Impacts**

The proposed project would not result in any significant off-site circulation impacts at the SR 29 intersection with Rutherford Road, which would already be operating unacceptably without project traffic. The percent increase in traffic due to the project would not meet the County's impact significance criteria limit.

5. **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 intersection with Rutherford Road, which would already be operating unacceptably without project traffic. The percent increase in traffic due to the project would not meet the County's impact significance criteria limit.

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

The proposed project would not result in any significant off-site circulation impacts at the SR 29 intersection with Rutherford Road, which would already be operating unacceptably without project traffic. The percent increase in traffic due to the project would not meet the County's new impact significance criteria limit.

7. **Sight Lines at Project Driveway**

Sight lines at the existing driveway connection to SR 29 that will provide access to the new guest parking lot meet minimum stopping sight distance criteria based upon the Caltrans March 2014 *Highway Design Manual*.

8. **New Marketing Event Scheduling**

Ten approved large attendance events (with 150 to 500 guests) will be replaced by 206 smaller attendance events. Also, while all new events will occur between 10:00 AM and 10:00 PM, they will be scheduled to preclude adding any new guest traffic to the local circulation system between 3:00 and 5:00 PM. In contrast, the existing 10 large events have no such restrictions.

9. **Rutherford Road**

All driveways along Rutherford Road will remain and serve their current functions. The shipping/receiving driveway which serves all employee in/out traffic as well as all inbound truck traffic will maintain the same volume levels.

C. MITIGATION MEASURES

No circulation system mitigations are required.

D. CONCLUSIONS & RECOMMENDATIONS

The project would result in no significant off-site circulation system operational impacts to the SR 29 intersection with Rutherford Road. In addition, a left turn lane will be provided on the southbound SR 29 approach to the driveway serving the new guest parking lot along with a median refuge area just south of the driveway for left turns from BV. Sight lines are acceptable at this location. No mitigation measures are required.

IV. PROJECT LOCATION & DESCRIPTION

The BV Winery is located on the east side of SR 29 just north of the SR 29/Rutherford Road intersection (see **Figure 2**). Employee and truck access is via Rutherford Road. Currently, BV visitors use the shared parking lot with Rutherford Grill and the U.S. Post Office which is accessed via two driveway connections to Rutherford Road and one driveway connection to SR 29.

There are an additional four driveway connections to SR 29: two along the winery building which access a small parking area serving the BV offices; and two gated driveways, one just north of the winery building and one at the north end of the site.

The proposed BV Winery 2017 use permit modification will have the following components (see **Figure 3**).

- No change in production.
- No change in employees and no change to employee access (via the shipping/receiving driveway on Rutherford Road).
- No change in number of trucks (grape delivery, product shipment, etc.) and no change to truck access (inbound via the shipping/receiving driveway on Rutherford Road and outbound via the next driveway to the west along Rutherford Road opposite Grape Lane).
- The BV visitor center will be moved to the north end of the winery adjacent to the new guest parking lot.
- A new guest parking lot will be built along the east side of SR 29 at the north end of the BV property. Access will be to/from SR 29 only. The lot will be used by some new guests by appointment, some existing guests without appointment now using the lot

shared with the Rutherford Grill restaurant and most guests associated with new marketing events.

- The gated driveway connection to SR 29 just north of the winery building will be eliminated.

- 100 new guests by appointment between 10:00 AM & 6:00 PM (36 new weekend vehicles & 39 new weekday vehicles); 50% from 2:00-4:00 PM. All appointment-related guest vehicles are assumed newly added to the local roadway network. It would be expected that some of the vehicles associated with 100 new guests by appointment will park in the shared lot with Rutherford Grill.

  Resultant new vehicles added to the local circulation system during the PM peak traffic hours.

  Friday PM peak hour (6 in & 10 outbound vehicles)
  Saturday PM peak hour (6 in & 9 outbound vehicles)

- New marketing events.

  - The currently approved BV marketing plan has 10 large attendance events per year and will be replaced by 206 lower attendance events. The approved marketing plan to be discontinued is as follows.

    - "Heublein" lunches/dinners:
      - 3 per year with 150 attendees
    - Beaulieu Wine Society:
      - 4 per year 500 attendees
      - 2 dinners and 2 lunches
    - Winery/Employee functions:
      - 3 per year with 250 attendees
      - 2 lunches and 1 dinner

    The proposed marketing plan would contain the following number and size of events.

    - Marketing Event #1 40 guests 50 times/year
    - Marketing Event #2 50 guests 100 times/year
    - Marketing Event #3 75 guests 30 times/year
    - Marketing Event #4 100 guests 20 times/year
    - Marketing Event #5 250 guests 4 times/year
    - Marketing Event #6 300 guests 2 times/year

  - All new events would occur between 10:00 AM and 10:00 PM, but would be scheduled to preclude traffic on the local roadway system between 3:00 and 5:30 PM. The 10 large existing marketing events each year have no such restrictions.

V. EXISTING CIRCULATION SYSTEM EVALUATION PROCEDURES

A. ANALYSIS LOCATIONS

The following locations have been evaluated.

1. **SR 29-128/Rutherford Road (SR 128) intersection. (The Rutherford Road westbound approach is stop sign controlled.)**

2. **SR 29/Winery driveway intersection that will serve the new guest parking lot.**

B. VOLUMES

1. ANALYSIS SEASONS AND DAYS OF THE WEEK

At County request project traffic impacts have been evaluated during harvest conditions. Based upon 2015 and 2016 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 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 2:30 to 6:00 PM as well as Saturday 1:00 to 6:00 PM turn movement counts were conducted by Crane Transportation Group (CTG) on June 23 & 24, 2017 at the SR 29 intersection with Rutherford Road and all of the driveways serving the BV property (5 along SR 29 and 3 along Rutherford Road). The peak traffic hours were determined to be 3:00-4:00 PM on Friday and 3:00-4:00 PM on Saturday. Resultant May Friday and Saturday PM peak hour volumes are presented in **Appendix Figures A1 & A2**.

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

3. SEASONAL ADJUSTMENTS

Seasonal factors were developed using the Caltrans PeMS Friday and Saturday PM peak period count data to adjust the June 2017 volumes to harvest 2017 conditions. Overall, June PM peak hour volumes along SR 29 would be expected to increase by about 10 percent on Friday and 7.5 percent on Saturday to reflect harvest (September) conditions. The SR 29 intersection with Rutherford Road would have higher harvest volumes during the Saturday PM peak traffic hour compared to the Friday PM peak traffic hour (about 2,380 peak hour vehicles entering the Rutherford Road intersection during the Saturday PM peak hour versus about 2,295 vehicles during the Friday PM peak hour). The driveway connection to SR 29 at the north end of the BV site that will serve the proposed guest parking lot is now gated and during recent traffic counts had a total of 6 two-way vehicles during the Friday PM peak hour and 2 two-way vehicles during the Saturday PM peak hour.

Resultant 2017 harvest Friday and Saturday PM peak hour volumes are presented in **Figures 4** & **5**.

C. ROADWAYS

Roadway descriptions are based upon the designation that SR 29 runs in a general north-south direction through the project area while Rutherford Road runs in an east-west direction. The project site is along the east side of SR 29 in the northeast quadrant of the Rutherford Road intersection. **Figure 2** presents existing intersection geometrics and control.

State Route 29 (SR 29) provides the only major regional access to the west side of the Napa Valley. In the vicinity of the BV Winery it has two well-paved 12-foot travel lanes and eight-foot-wide paved shoulders. A continuous two-way left turn lane is needed in the southbound approach to Rutherford Road. The posted speed limit is 40 miles per hour and the roadway is level with a minor horizontal curve north of Rutherford Road. SR 29 is not controlled on its approach to Rutherford Road. It is also designated SR 128 to the north of Rutherford Road.

Rutherford Road is a two-lane arterial road extending east of SR 29 to Silverado Trail (with a name change to Conn Creek Road near Silverado Trail). It is designated State Route 128. The Rutherford Road single lane westbound approach to SR 29 is stop sign controlled. Just east of SR 29 the posted speed limit is 30 miles per hour and on-street parking is allowed in most locations. However, left turn lanes are not provided on the approach to any driveway connections.

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 uses Level of Service D (LOS D) as 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 10 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, 2014, Revision 2 (2014 CMUTCD Rev. 2)*. Section 4C of the 2014 CMUTCD Rev. 2 provides guidelines, or warrants, which may indicate need for a traffic signal at an unsignalized intersection. As indicated in the 2014 CMUTCD Rev. 2, 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 logarithmic curve and takes only the hour with the highest volume of the day into account. For intersections in rural locations (with local area population less than 10,000 people or where the posted speed limit or 85th percentile speed on the uncontrolled intersection approaches is greater than 40 miles per hour) a 70 percent warrant is applied. The regular and 70 percent warrants are typically referred to as the urban and rural peak hour warrants. Please see the **Appendix** for the warrant charts.

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 Silverado Trail intersections with Oak Knoll Avenue, Soda Canyon Road and Hardman Avenue since the speeds along Silverado Trail are greater than 40 miles per hour and the intersections are in rural settings.

F. PLANNED IMPROVEMENTS

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

[2] Ms. Michelle Melonakis, Napa County Public Works Department, July 2017.

VI. FUTURE HORIZON TRAFFIC VOLUME PROJECTIONS

Traffic analysis has been conducted for existing (2017), year 2020 and year 2030 harvest conditions. The 2030 horizon reflects the cumulative County General Plan Buildout year. At County request traffic projections were initially developed for a list of five new or expanding winery projects already approved but not built in the vicinity of BV Winery. The list and the traffic studies used to obtain their projections are as follows

- Caymus Winery – Amended to Caymus Winery Traffic Impact Study by W-Trans, April 2015
- Opus One Winery – Focused Traffic Analysis for the Proposed Opus One Use Modification Project by Omni Means, February 2016
- Frogs Leap Winery – Focused Traffic Analysis for the Proposed Frogs Leap Winery Modifications Project by Omni Means, July 2016
- Swanson Winery Traffic Impact Study by George Nicholson, May 2008
- LMR Rutherford Estate Winery – LMR Rutherford Estate Traffic Study by Crane Transportation Group, January 2014

Traffic modeling projections were then compared to projections from the five nearby projects. While mainline volume increases along SR 29 appeared reasonable from the model, traffic increases expected from the County's list of five approved nearby projects were greater than increases projected by the model along Rutherford Road and for various turn movements at the SR 29/Rutherford Road intersection. Model results were therefore modified to reflect these increases. After adjustments, cumulative two-way weekday volumes along SR 29 would be expected to grow about 19 to 20 percent from 2017 to 2030. Assuming development of the five nearby projects over the next three years as well as regional growth, there would be about a 6 to 7 percent growth in two-way PM peak hour traffic along SR 29 from 2017 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.

General Plan weekday PM peak hour traffic modeling projections were also available for Rutherford Road, but did not fully reflect traffic from the five nearby projects. After inclusion of traffic from these five developments Rutherford Road would be expected to receive about a 33 percent increase between 2017 and 2030 and about a 20 percent increase between 2017 and 2020.

Resultant year 2020 harvest "Without Project" Friday and Saturday peak hour volumes are presented in **Figures 6** & **7**, while year 2030 (Cumulative) harvest "Without Project" Friday and Saturday peak hour volumes are presented in **Figures 8** & **9**.

VII. OFF-SITE (WITHOUT PROJECT) CIRCULATION SYSTEM OPERATION

A. YEAR 2017 HARVEST (WITHOUT PROJECT) OPERATING CONDITIONS

1. INTERSECTION LEVEL OF SERVICE – Table 3 & See Worksheets in the Appendix

SR 29/Rutherford Road

1) Friday PM Peak Hour

Unacceptable Rutherford Road stop sign controlled operation: LOS F

2) Saturday PM Peak Hour

Unacceptable Rutherford Road stop sign controlled operation: LOS F

2. INTERSECTION PEAK HOUR SIGNAL WARRANT EVALUATION – Table 4

SR 29/Rutherford Road

1) Friday PM Peak Hour

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

2) Saturday PM Peak Hour

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

B. YEAR 2020 HARVEST (WITHOUT PROJECT) OPERATING CONDITIONS

1. INTERSECTION LEVEL OF SERVICE – Table 3 & See Worksheets in the Appendix

SR 29/Rutherford Road

1) Friday PM Peak Hour

Unacceptable Rutherford Road stop sign controlled operation: LOS F

2) Saturday PM Peak Hour

Unacceptable Rutherford Road stop sign controlled operation: LOS F

2. INTERSECTION PEAK HOUR SIGNAL WARRANT EVALUATION – Table 4

SR 29/Rutherford Road

1) Friday PM Peak Hour

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

2) Saturday PM Peak Hour

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

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

1. INTERSECTION LEVEL OF SERVICE – Table 3 & See Worksheets in the Appendix

SR 29/Rutherford Road

1) Friday PM Peak Hour

Unacceptable Rutherford Road stop sign controlled operation: LOS F

2) Saturday PM Peak Hour

Unacceptable Rutherford Road stop sign controlled operation: LOS F

2. INTERSECTION PEAK HOUR SIGNAL WARRANT EVALUATION – Table 4

b. SR 29/Rutherford Road

1) Friday PM Peak Hour

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

2) Saturday PM Peak Hour

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

VIII. PROJECT IMPACT EVALUATION SIGNIFICANCE CRITERIA

A. COUNTY OF NAPA SIGNIFICANCE CRITERIA

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,

[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.

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
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.

$$\textit{Project Contribution \%} = \textit{Project Trips} \div \textit{Existing Volumes}$$

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.

$$\textit{Project Contribution \%} = \textit{Project Trips} \div \textit{Existing Volumes}$$

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.

B. PROJECT TRIP GENERATION

Friday and Saturday PM peak hour trip generation projections were developed with the assistance of the project applicant. As shown, the only component of the project resulting in any net new traffic on the regional roadway network would be due to the 100 new daily guests by appointment. In the immediate vicinity of the project, the new visitor parking lot along SR 29 at the north end of the project site would result in some reassignment of existing (without appointment) visitor traffic from the shared parking lot with Rutherford Grill to the new visitor parking lot. Results are presented on an hourly basis in **Tables 5** and **6** for harvest Friday and Saturday conditions, while a summary of peak hour trips is presented in **Table 7**. During the harvest Friday 3:00-4:00 PM peak traffic hour there would be a projected 6 inbound and 10 outbound vehicles, while during the harvest Saturday 3:00-4:00 PM peak traffic hour, there would be a projected 6 inbound and 9 outbound vehicles.

The project is proposing 100 net new daily visitors by appointment. Discussion was held with Michelle Melonakis, County Traffic Engineer, during the period of report preparation regarding assumptions to be used for hourly distribution of traffic from these 100 new visitors. The visitors would be expected to result in 39 new daily vehicle trips on a weekday and 36 on a Saturday. Based upon input from BV regarding visitor scheduling for the 100 new visitors, existing BV visitation patterns and Michelle's knowledge of other wineries, she directed that 50 percent of the new visitors should be assumed to be at the winery between 2:00 and 4:00 PM. This would

result in 10 new inbound visitor vehicles just before 2:00 PM, an additional 9-10 new inbound and 10 new outbound visitor vehicles just before 3:00 PM, and 6 new inbound and 9-10 new outbound visitor vehicles just before 4:00 PM. There would be a lower number of visitors expected during the 4:00-5:00 PM period, thus the lower number of inbound vehicles just before 4:00 PM. Since the peak traffic hours on both Friday and Saturday afternoons were 3:00-4:00 PM, the 6 inbound and 9-10 outbound vehicles were used for analysis purposes.

BV would not schedule more than 25 percent of the 100 new visitors during a given hour because it would require additional staff or would result in less than acceptable service with the existing number of employees. The BV hospitality manager has submitted a letter (attached in the **Appendix**) reflecting the planned scheduling of new visitor appointments. Finally, it should be noted that even with 50 percent of new project visitors at the winery within one hour, there still would not be a significant impact at the SR 29/Rutherford Road intersection due to new visitor traffic based upon County significance criteria.

C. PROJECT TRIP DISTRIBUTION

Project traffic was distributed to/from the new visitor parking lot along SR 29 as well as to/from the existing shared parking lot with Rutherford Grill in a pattern reflective of existing distribution patterns at the existing driveways. During the Friday and Saturday PM peak hours the majority of project traffic would be expected to travel along SR 29.

The assignment of new visitor traffic to BV parking areas as well as the shifting of some existing BV visitors from the Rutherford Grill shared parking lot to the new visitor lot at the north end of the site was based upon professional judgment of the traffic study author gained through 45 years of experience conducting winery studies. It is probable that assignment percentages used may change a little on an hourly basis or even day to day. However, minor changes would not result in any significant differences in the traffic analysis nor any new significant circulation impacts. It should also be noted that the projected increase in project traffic passing through the SR 29/Rutherford Road intersection during any of the evaluated peak hours could double and still not result in a significant impact based upon County criteria.

PROJECT VISITOR BY APPOINTMENT TRAFFIC – PERCENT DISTRIBUTION
(see Figure 10)

	FRIDAY PM PEAK HOUR		SATURDAY PM PEAK HOUR	
	INBOUND	OUTBOUND	INBOUND	OUTBOUND
SR 29 North	33%	40%	33%	33%
SR 29 South	50%	50%	50%	55%
Rutherford Road	17%	10%	17%	12%

Source: Crane Transportation Group

The harvest Friday and Saturday PM peak hour project traffic increments expected on SR 29 during the times of ambient peak traffic flows are presented in **Figures 11 & 12**. Friday and Saturday Year 2017 "With Project" PM peak hour harvest volumes are presented in **Figures 13 & 14**; Year 2020 "With Project" Friday and Saturday PM peak hour harvest volumes are presented in **Figures 15 & 16**, and Cumulative (year 2030) "With Project" Friday and Saturday PM peak hour harvest volumes are presented in **Figures 17 & 18**.

D. PLANNED ROADWAY IMPROVEMENTS

There are no capacity increasing roadway improvements planned by Caltrans or the County on the local roadway network serving the project site.[4]

IX. PROJECT OFF-SITE IMPACTS

A. YEAR 2017 HARVEST (WITH PROJECT) CONDITIONS

1. HARVEST 2017

a) Summary

Project traffic would not result in any significant level of service or signal warrant impacts at the SR 29 intersection with Rutherford Road during the Friday or Saturday PM peak traffic hours. ***Less than Significant.***

b) Intersection Level of Service – Table 3 & See Worksheets in the Appendix

SR 29/Rutherford Road

The SR 29/Rutherford Road intersection would maintain unacceptable Friday and Saturday PM peak hour operation with the addition of project traffic. However, the increase in project traffic would not meet the County's recently-adopted traffic impact significance criteria requiring a 1

[4] Ms. Michelle Melonakis, Napa County Public Works Department, July 2017.

percent or greater traffic increase entering the intersection and a 10 percent or greater increase in traffic on the stop sign controlled intersection approach in order to result in a significant impact. During the Friday PM peak hour the project would result in a 0.3 percent increase in traffic entering the intersection and no increase in traffic on the Rutherford Road intersection approach, while during the Saturday PM peak hour the project would result in a 0.3 percent increase in traffic entering the intersection and no increase in traffic on the Rutherford Road intersection approach). ***Less than Significant.***

c) Signalization Needs – Table 4
SR 29/Rutherford Road

The SR 29/Rutherford Road intersection would already have ambient Friday and Saturday PM peak hour volumes exceeding rural signal warrant #3 criteria levels. However, the proposed project would result in less than a 1 percent increase in traffic passing through the intersection during the Friday and Saturday PM peak traffic hours. The project would add a 0.3 percent increase during the Friday PM peak hour, and a 0.3 percent increase during the Saturday PM peak hour. ***Less than Significant.***

B. YEAR 2020 HARVEST (WITH PROJECT) CONDITIONS

1. HARVEST 2020

a) Summary

Project traffic would not result in any significant level of service or signal warrant impacts at the SR 29 intersection with Rutherford Road during the Friday or Saturday PM peak traffic hours. ***Less than Significant.***

b) Intersection Level of Service – Table 3 & See Worksheets in the Appendix
SR 29/Rutherford Road

The SR 29/Rutherford Road intersection would maintain unacceptable Friday and Saturday PM peak hour operation with the addition of project traffic. However, the increase in project traffic would not meet the County's recently-adopted traffic impact significance criteria requiring a 1 percent or greater traffic increase entering the intersection and a 10 percent or greater increase in traffic on the stop sign controlled intersection approach in order to result in a significant impact. During the Friday PM peak hour the project would result in a 0.2 percent increase in traffic entering the intersection and no increase in traffic on the Rutherford Road intersection approach, while during the Saturday PM peak hour the project would result in a 0.2 percent increase in traffic entering the intersection and no increase in traffic on the Rutherford Road intersection approach). ***Less than Significant.***

c) Signalization Needs – Table 4
SR 29/Rutherford Road

The SR 29/Rutherford Road intersection would already have ambient Friday and Saturday PM peak hour volumes exceeding rural signal warrant #3 criteria levels. However, the proposed

project would result in less than a 1 percent increase in traffic passing through the intersection during the Friday and Saturday PM peak traffic hours. The project would add a 0.2 percent increase during the Friday PM peak hour, and 0.2 percent increase during the Saturday PM peak hour. ***Less than Significant.***

C. CUMULATIVE (YEAR 2030) HARVEST (WITH PROJECT) CONDITIONS

1. HARVEST 2030

a) Summary

Project traffic would not result in any significant level of service or signal warrant impacts at the SR 29 intersection with Rutherford Road during the Friday or Saturday PM peak traffic hours. ***Less than Significant.***

b) Intersection Level of Service – Table 3 & See Worksheets in the Appendix
SR 29/Rutherford Road

The SR 29/Rutherford Road intersection would maintain unacceptable Friday and Saturday PM peak hour operation with the addition of project traffic. However, the increase in project traffic would not meet the County's recently-adopted traffic impact significance criteria requiring a 1 percent or greater traffic increase entering the intersection and a 10 percent or greater increase in traffic on the stop sign controlled intersection approach in order to result in a significant impact. During the Friday PM peak hour the project would result in a 0.2 percent increase in traffic entering the intersection and no increase in traffic on the Rutherford Road intersection approach, while during the Saturday PM peak hour the project would result in a 0.2 percent increase in traffic entering the intersection and no increase in traffic on the Rutherford Road intersection approach). ***Less than Significant.***

c) Signalization Needs – Table 4
SR 29/Rutherford Road

The SR 29/Rutherford Road intersection would already have ambient Friday and Saturday PM peak hour volumes exceeding signal warrant #3 criteria levels. However, the proposed project would result in less than a 1 percent increase in traffic passing through the intersection during the Friday and Saturday PM peak traffic hours. The project would add a 0.2 percent increase during the Friday PM peak hour, and a 0.2 percent increase during the Saturday PM peak hour. ***Less than Significant.***

X. PROJECT ACCESS IMPACTS

A. SIGHT LINE ADEQUACY AT SR 29/BV WINERY NEW GUEST PARKING LOT DRIVEWAY INTERSECTION

Sight lines at the SR 29/BV Winery new guest parking lot driveway are acceptable to the north and south along SR 29. Existing sight lines are as follows for a driver exiting the site.

Sight line to the north along SR 29 (to see southbound vehicles) > 1,000 feet
Sight line to the south along SR 29 (to see northbound 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
50 mph	430 feet
60 mph	580 feet

Source: Caltrans Highway Design Manual, March 2014

The posted speed limit at the project entrance is 40 miles per hour, although some vehicles were observed traveling 5 to more than 10 mph higher than the posted limit during a field survey by Crane Transportation Group. However, based upon either a 50 or 60 mile per hour criteria, there are adequate sight lines to both the north and south along SR 29 for a driver exiting the winery main driveway. ***Less than Significant.***

B. PROJECT ENTRANCE LEFT TURN LANE REQUIREMENT

A two-way left turn lane will be provided on the southbound SR 29 approach to the existing driveway that will provide access to the new BV visitor parking lot. The widened median will also be extended south of the driveway to provide a refuge area for drivers turning left from the project to southbound SR 29. ***Less than Significant.***

XI. MARKETING EVENTS

The currently approved BV marketing plan has 10 large attendance events per year and will be replaced by 206 lower attendance events. The approved marketing plan to be discontinued is as follows.

- "Heublein" lunches/dinners:
  - 3 per year with 150 attendees
- Beaulieu Wine Society:
  - 4 per year 500 attendees
  - 2 dinners and 2 lunches
- Winery/Employee functions:
  - 3 per year with 250 attendees
  - 2 lunches and 1 dinner

The proposed marketing plan would contain the following number and size of events.

• Marketing Event #1	40 guests	50 times/year
• Marketing Event #2	50 guests	100 times/year
• Marketing Event #3	75 guests	30 times/year
• Marketing Event #4	100 guests	20 times/year
• Marketing Event #5	250 guests	4 times/year
• Marketing Event #6	300 guests	2 times/year

All new events would occur between 10:00 AM and 10:00 PM, but would be scheduled to preclude traffic on the local roadway system between 3:00 and 5:30 PM. The 10 large existing marketing events each year have no such restrictions.

There will be no guests by appointment during events with more than 100 attendees.

XII. CONCLUSIONS & RECOMMENDATIONS

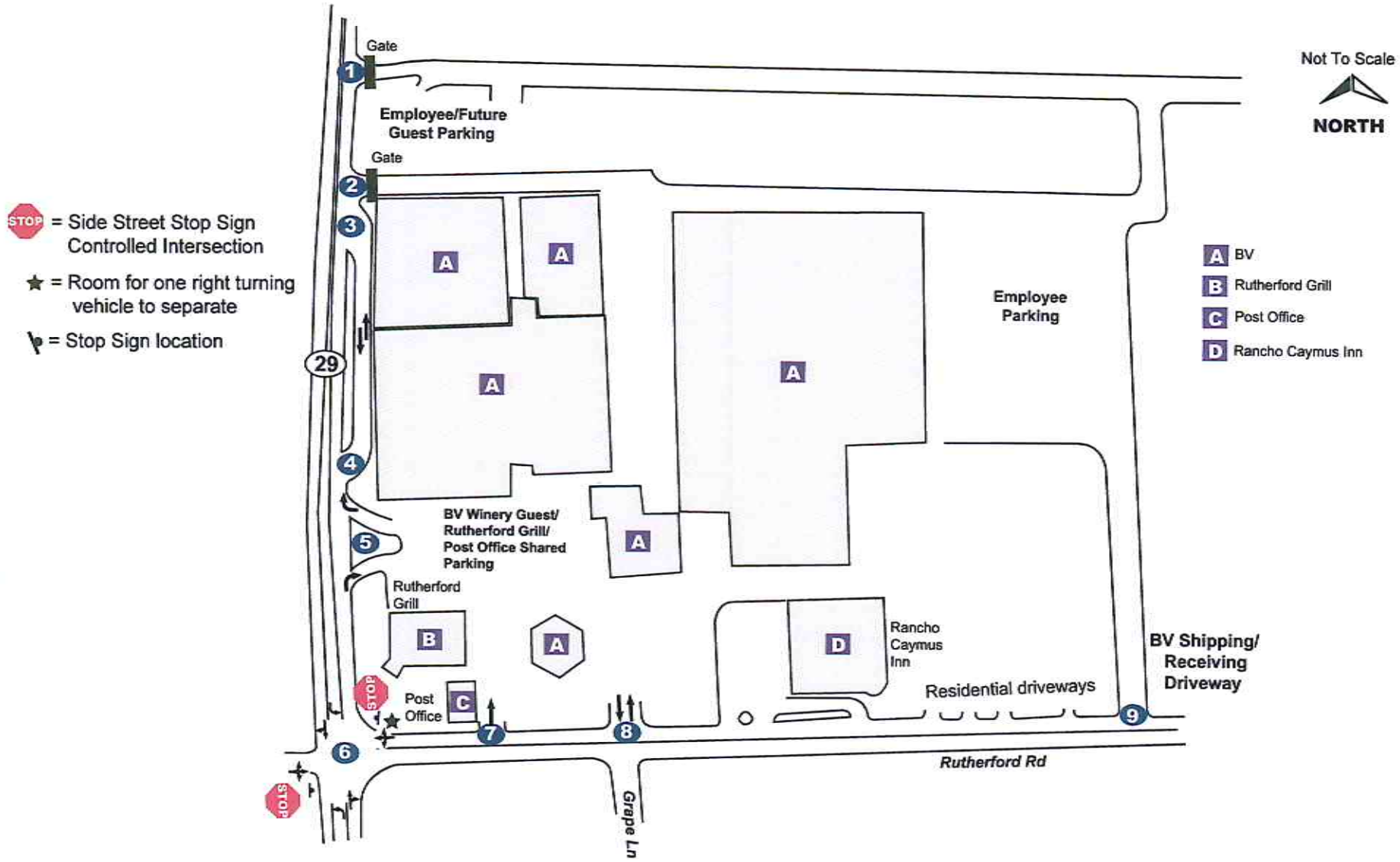
The project would result in no significant off-site circulation system operational impacts to the SR 29 intersection with Rutherford Road. In addition, a left turn lane will be provided on the southbound SR 29 approach to the driveway serving the new guest parking lot. Sight lines are acceptable at this location. No mitigation measures are required.

Figures

Figure 1

Area Map

CRANE TRANSPORTATION GROUP

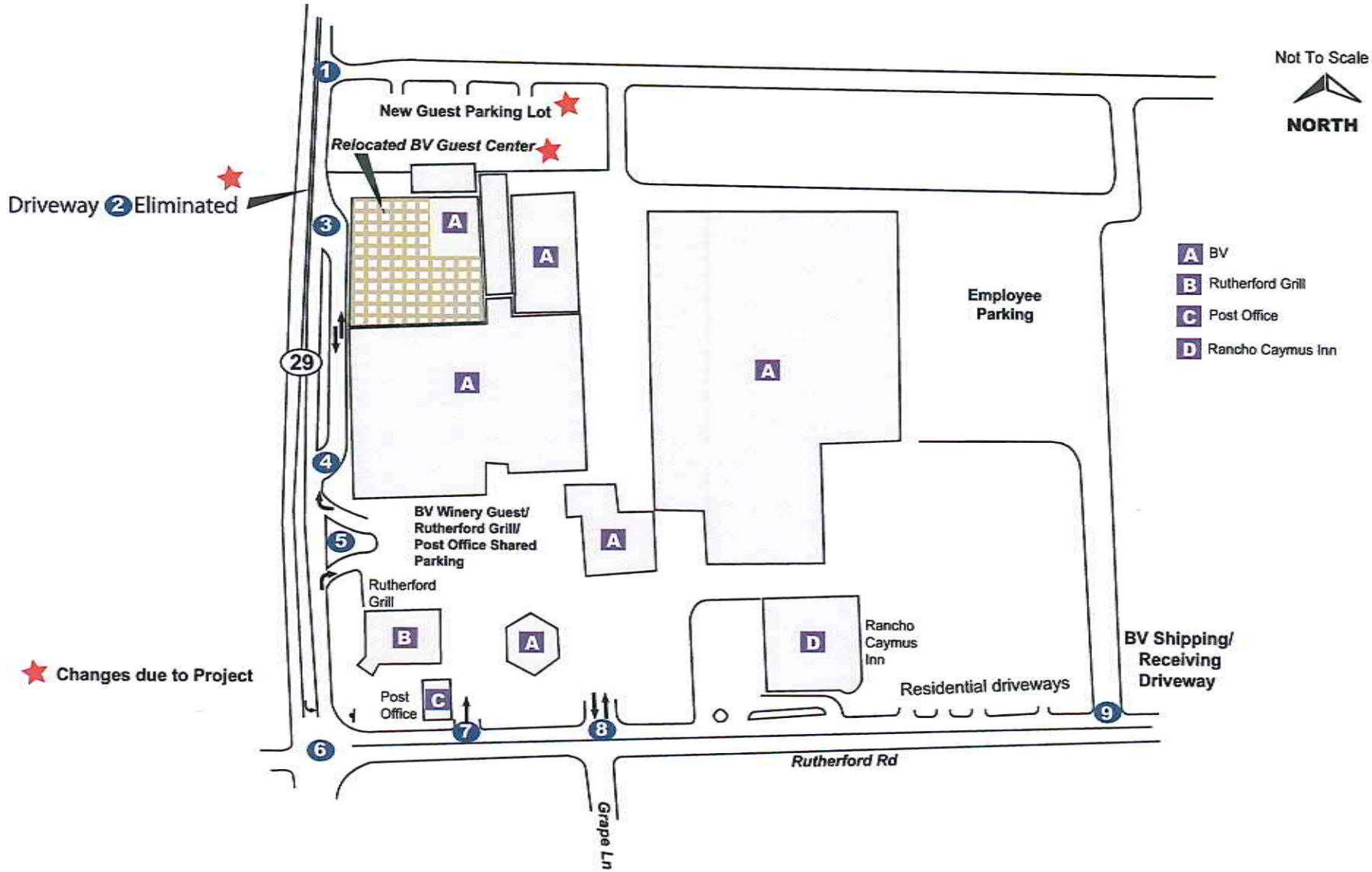


BV Winery 2017 Use Permit Modification Traffic Study

CRANE TRANSPORTATION GROUP

Figure 2

Intersection Lane Geometrics and Control & Project Site Details



BV Winery 2017 Use Permit Modification Traffic Study

CRANE TRANSPORTATION GROUP

Figure 3

Changes Due to Project

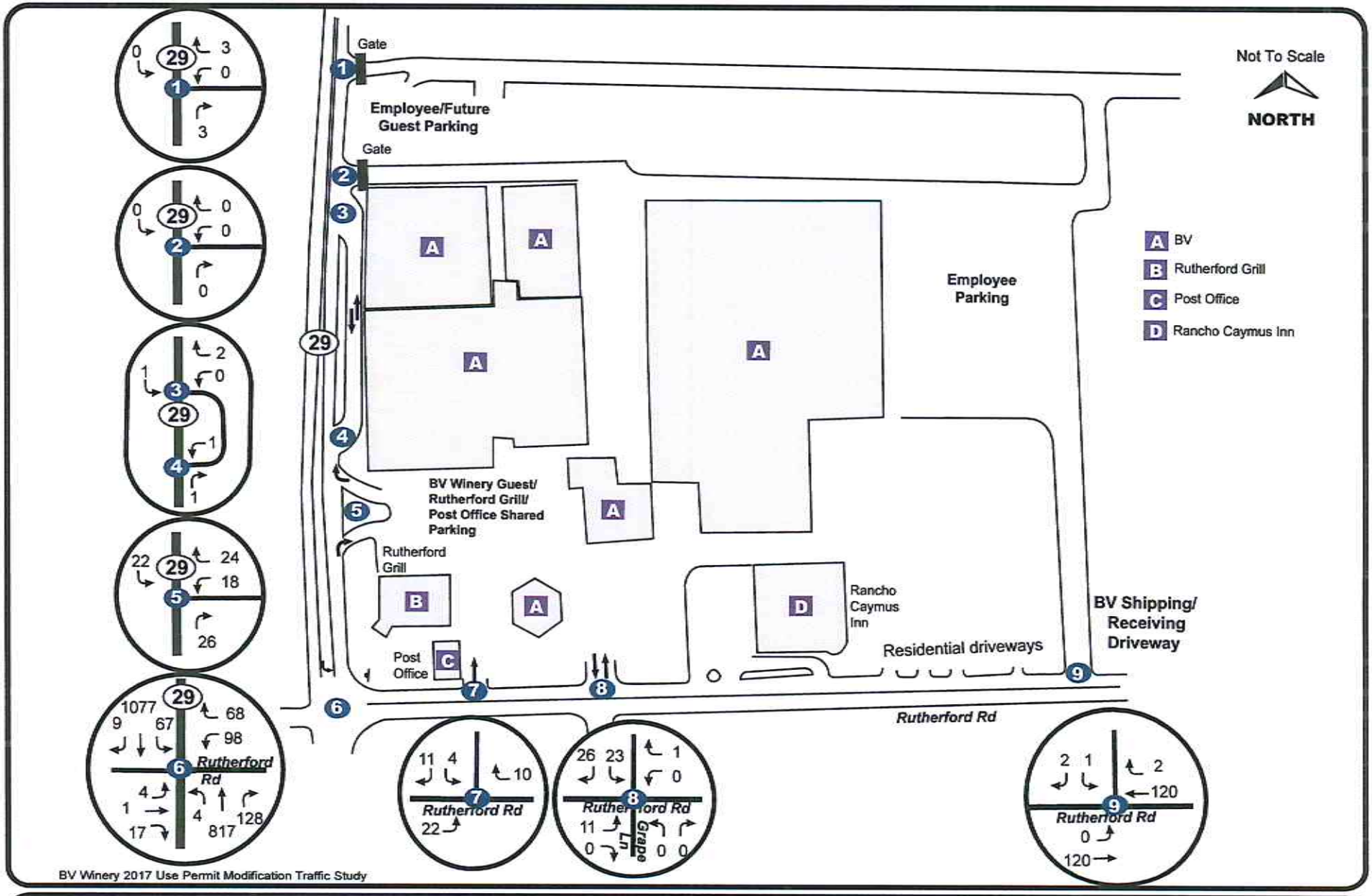


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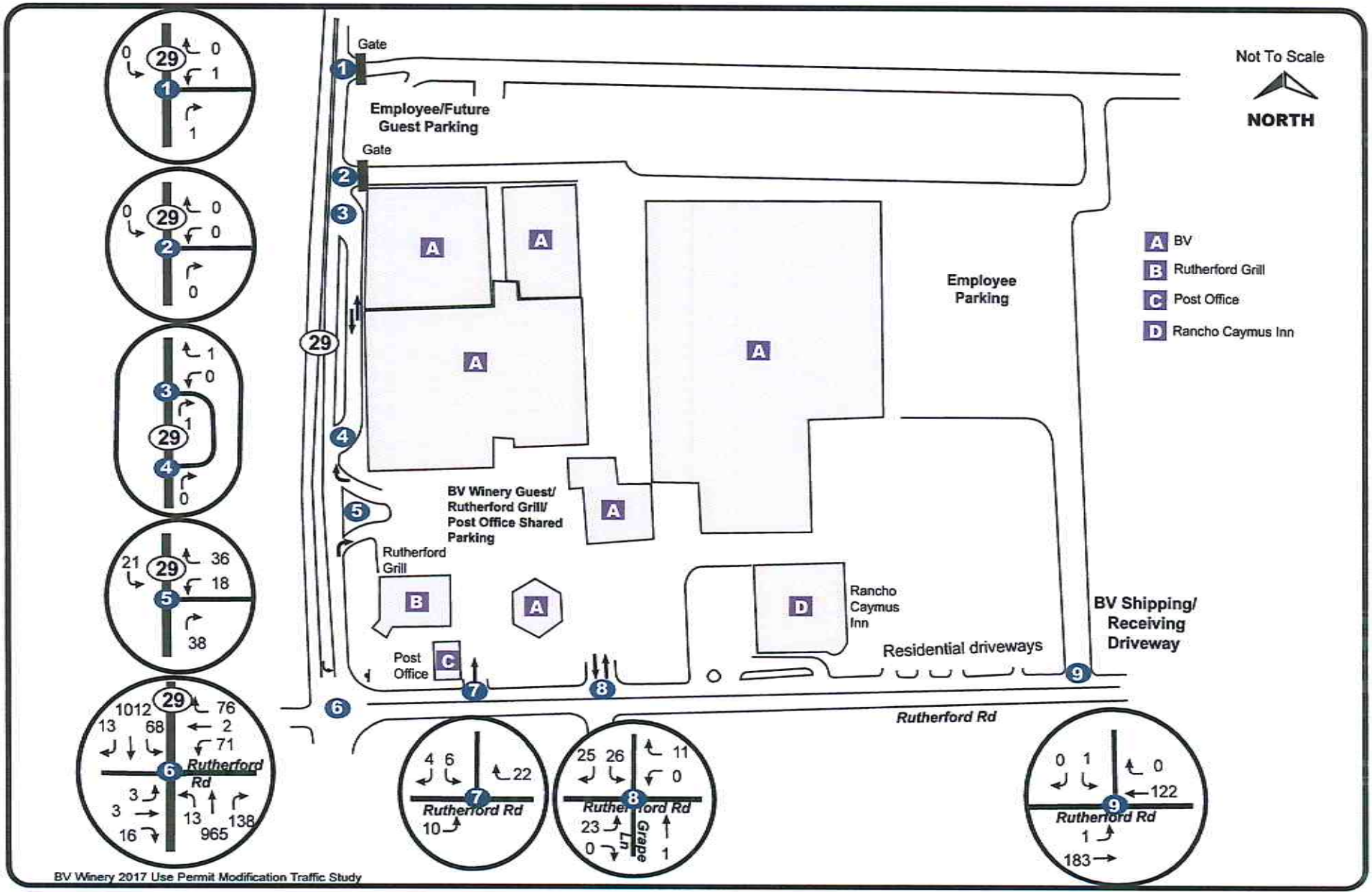
Figure 4

Existing Harvest 2017 Friday (without Project)
PM Peak Hour Volumes (3:00-4:00)

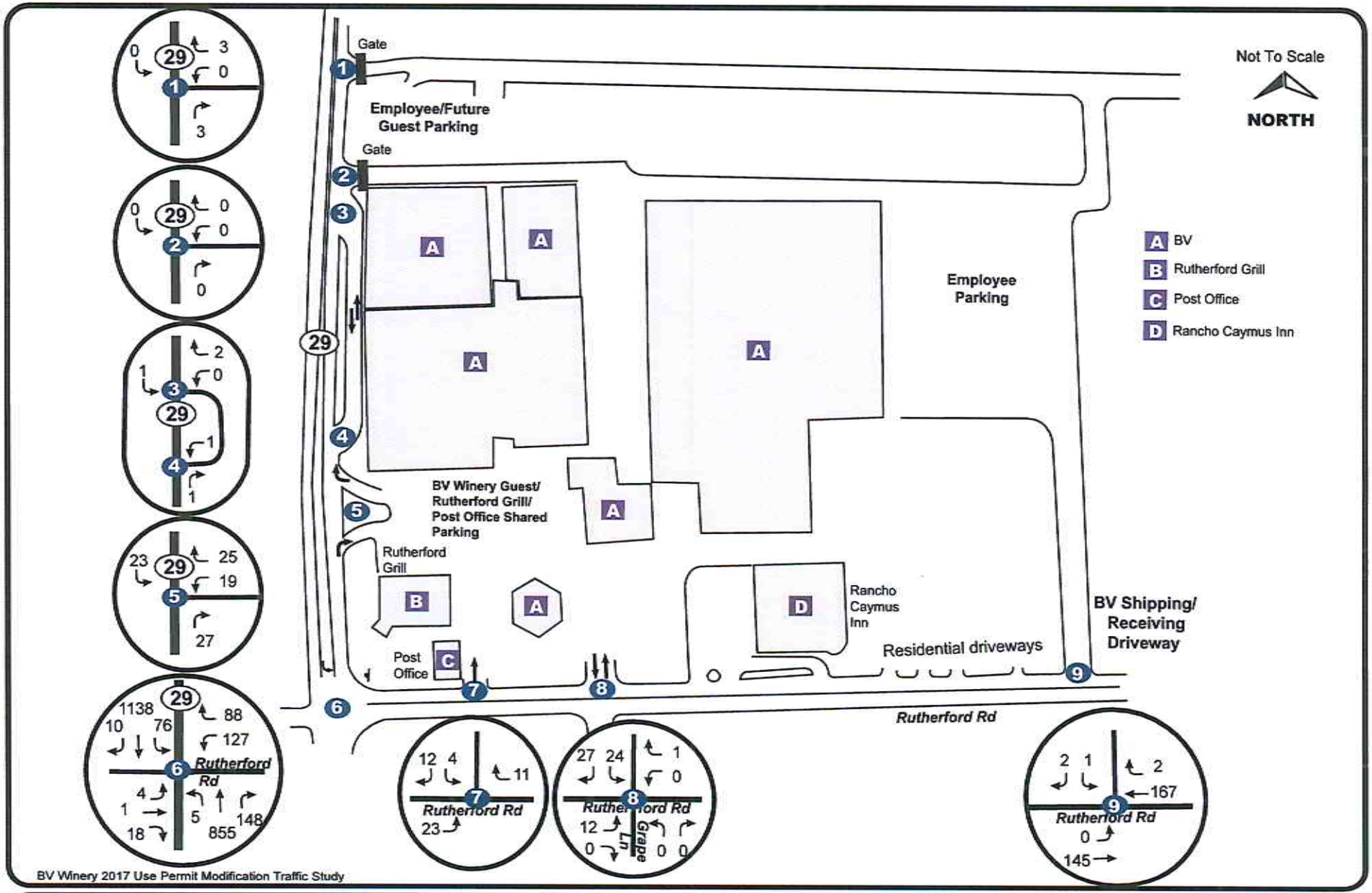


BV Winery 2017 Use Permit Modification Traffic Study

CRANE TRANSPORTATION GROUP

Figure 5

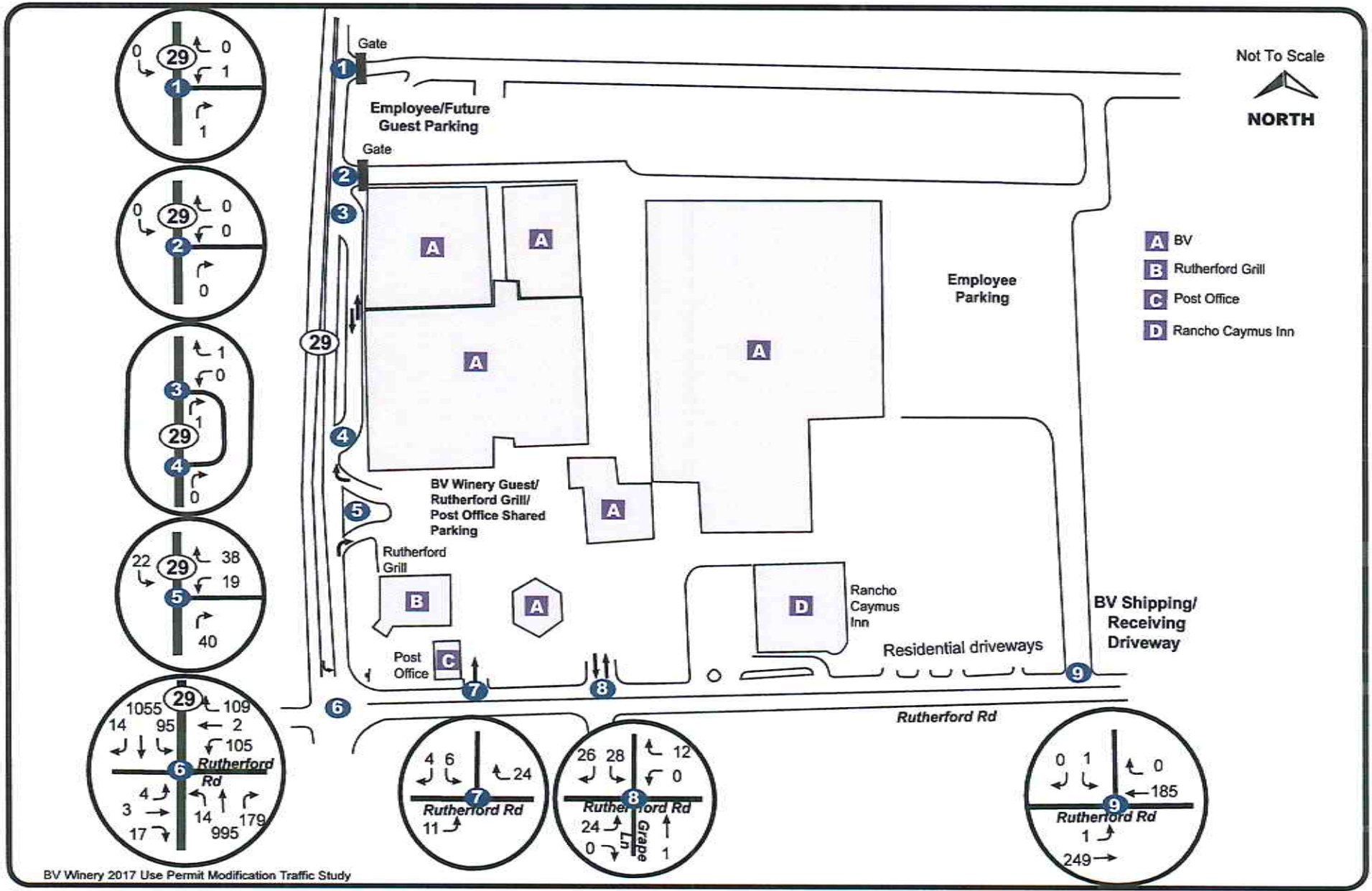
Existing Harvest 2017 Saturday (without Project)
PM Peak Hour Volumes (3:00-4:00)



CRANE TRANSPORTATION GROUP

Figure 6

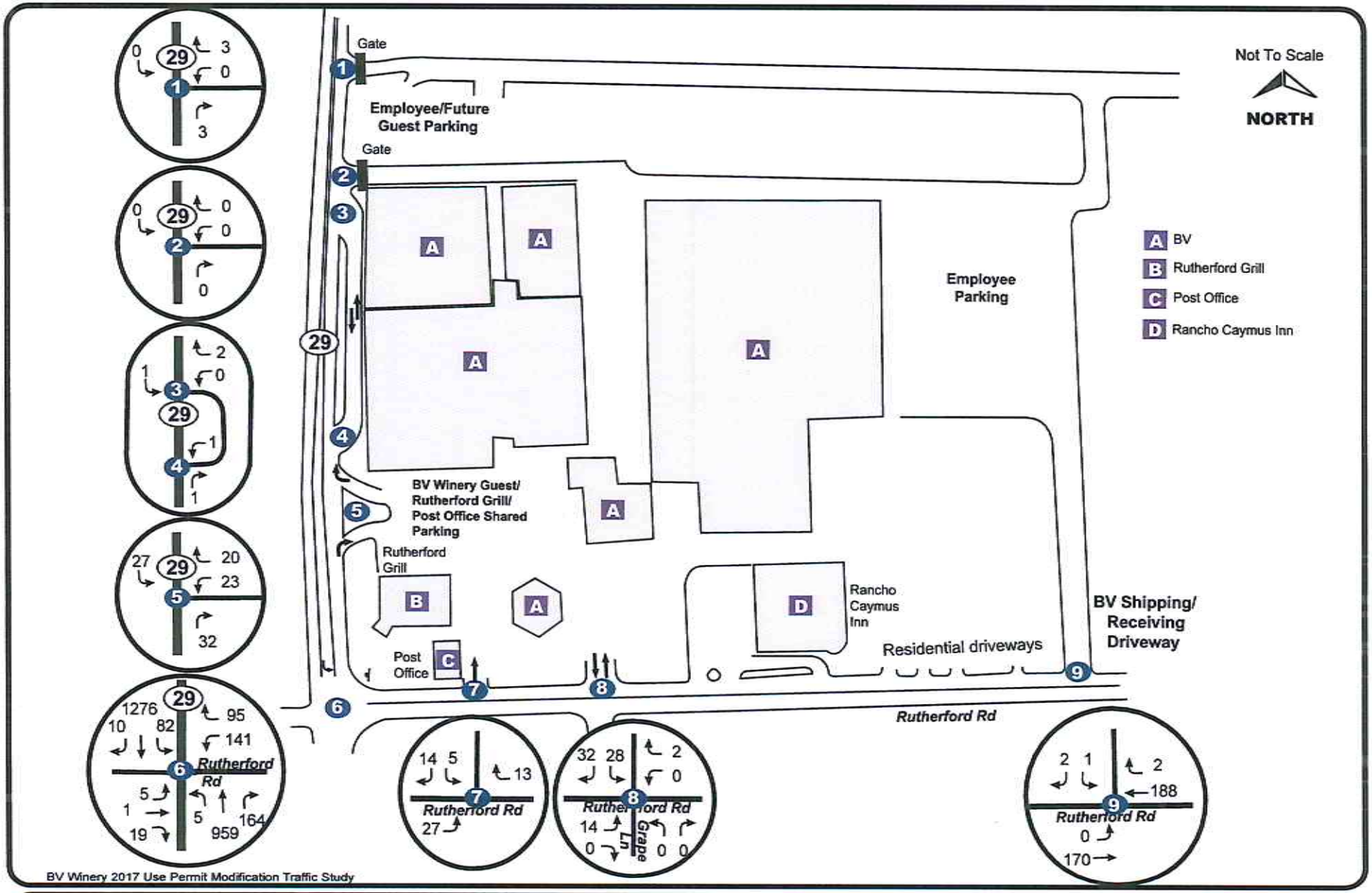
Year 2020 Harvest Friday (without Project)
PM Peak Hour Volumes (3:00-4:00)



CRANE TRANSPORTATION GROUP

Figure 7

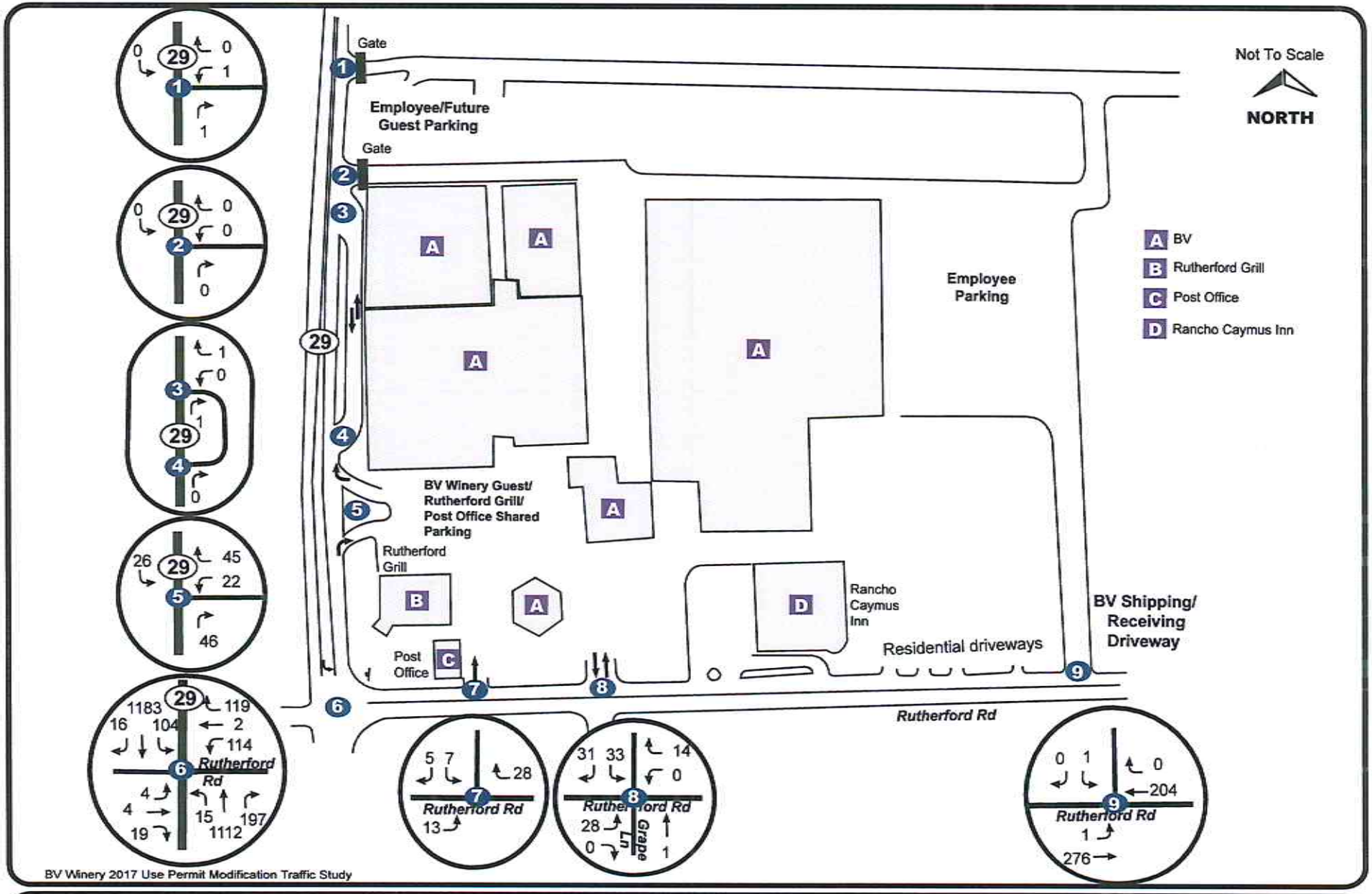
Year 2020 Harvest Saturday (without Project)
PM Peak Hour Volumes (3:00-4:00)



CRANE TRANSPORTATION GROUP

Figure 8

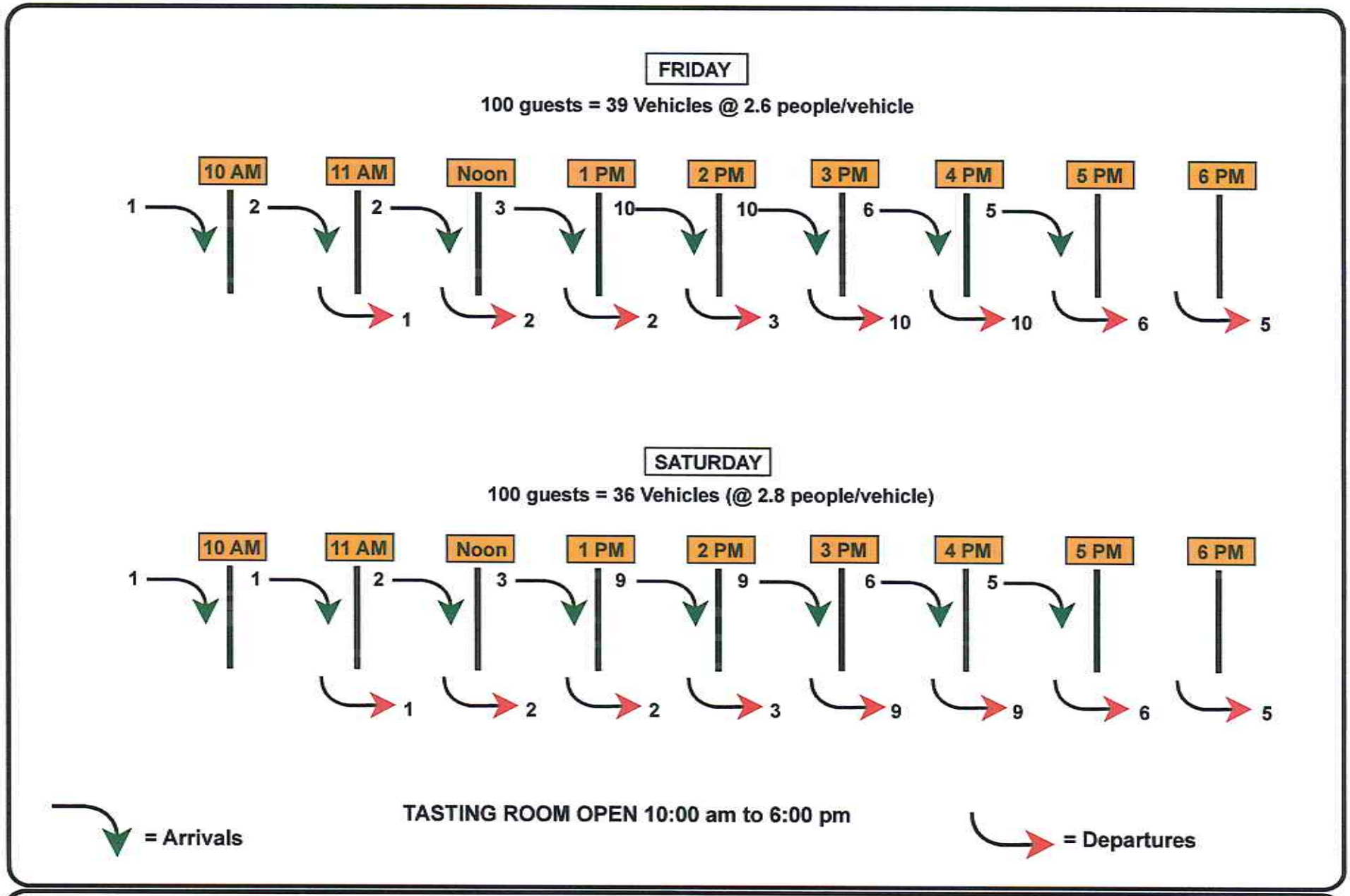
Year 2030 Harvest Friday (without Project)
PM Peak Hour Volumes (3:00-4:00)



CRANE TRANSPORTATION GROUP

Figure 9

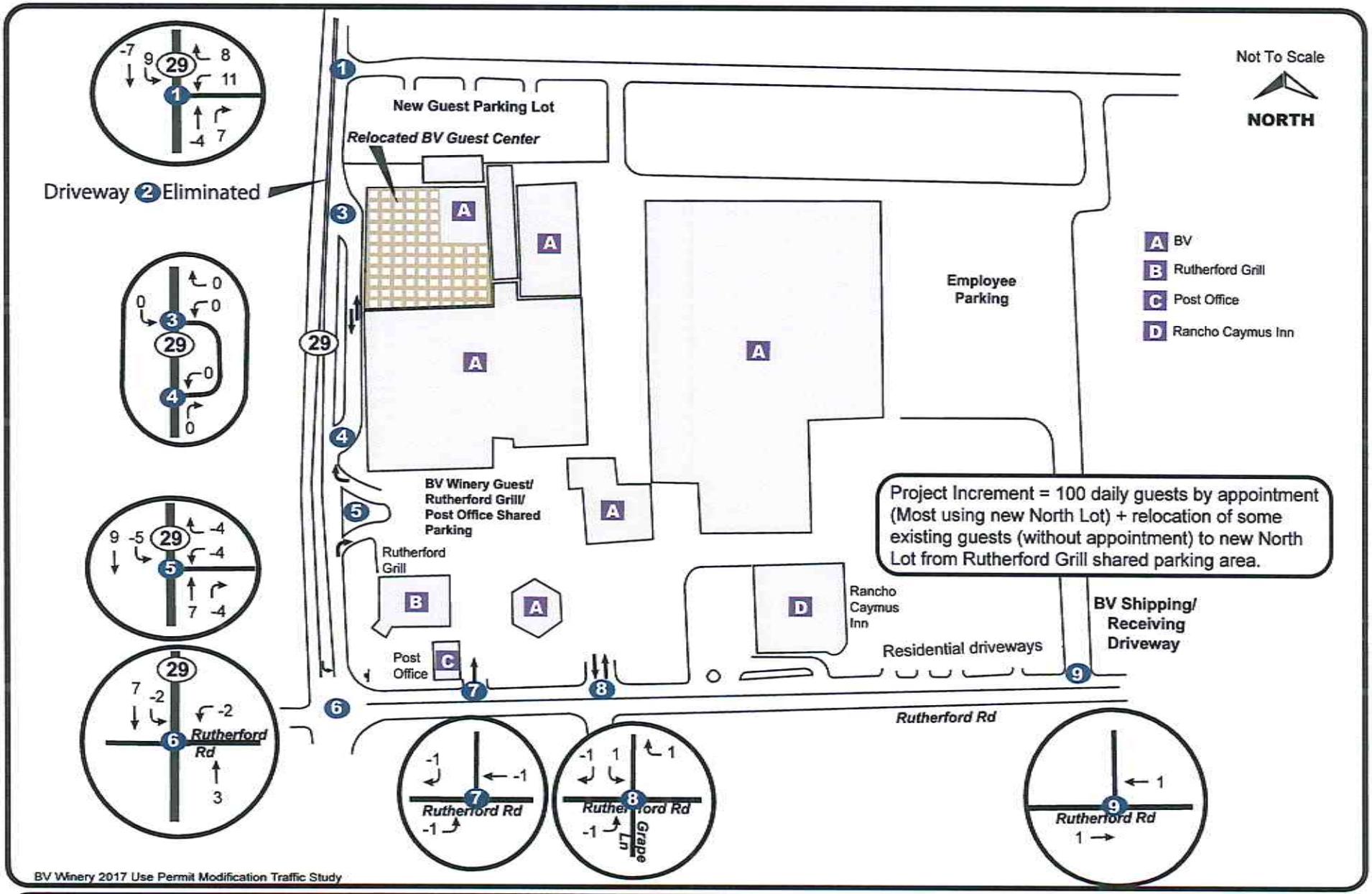
Year 2030 Harvest Saturday (without Project)
PM Peak Hour Volumes (3:00-4:00)



CRANE TRANSPORTATION GROUP

Figure 10

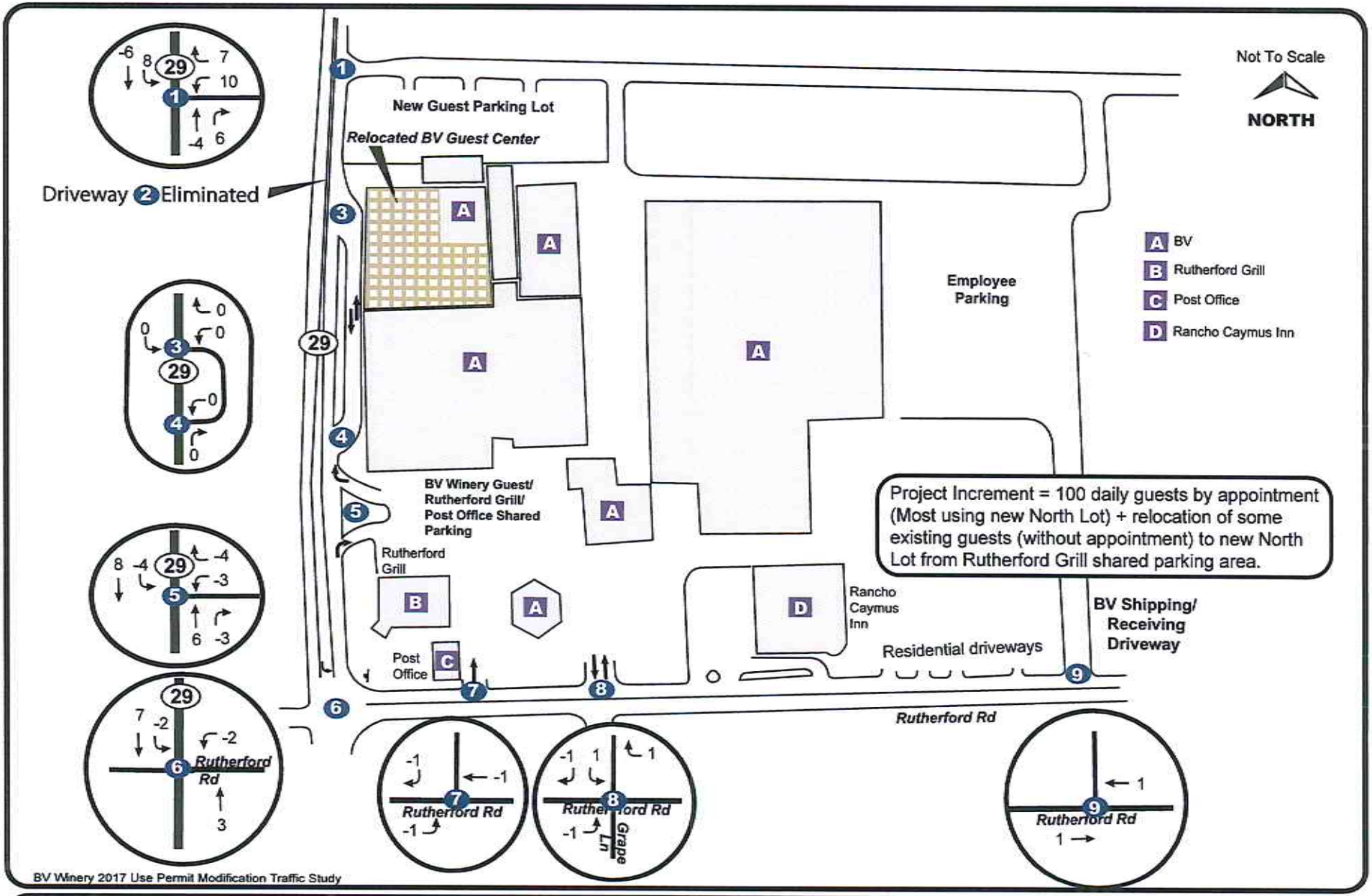
BV Winery
Distribution of New Guests by Appointment



BV Winery 2017 Use Permit Modification Traffic Study

CRANE TRANSPORTATION GROUP

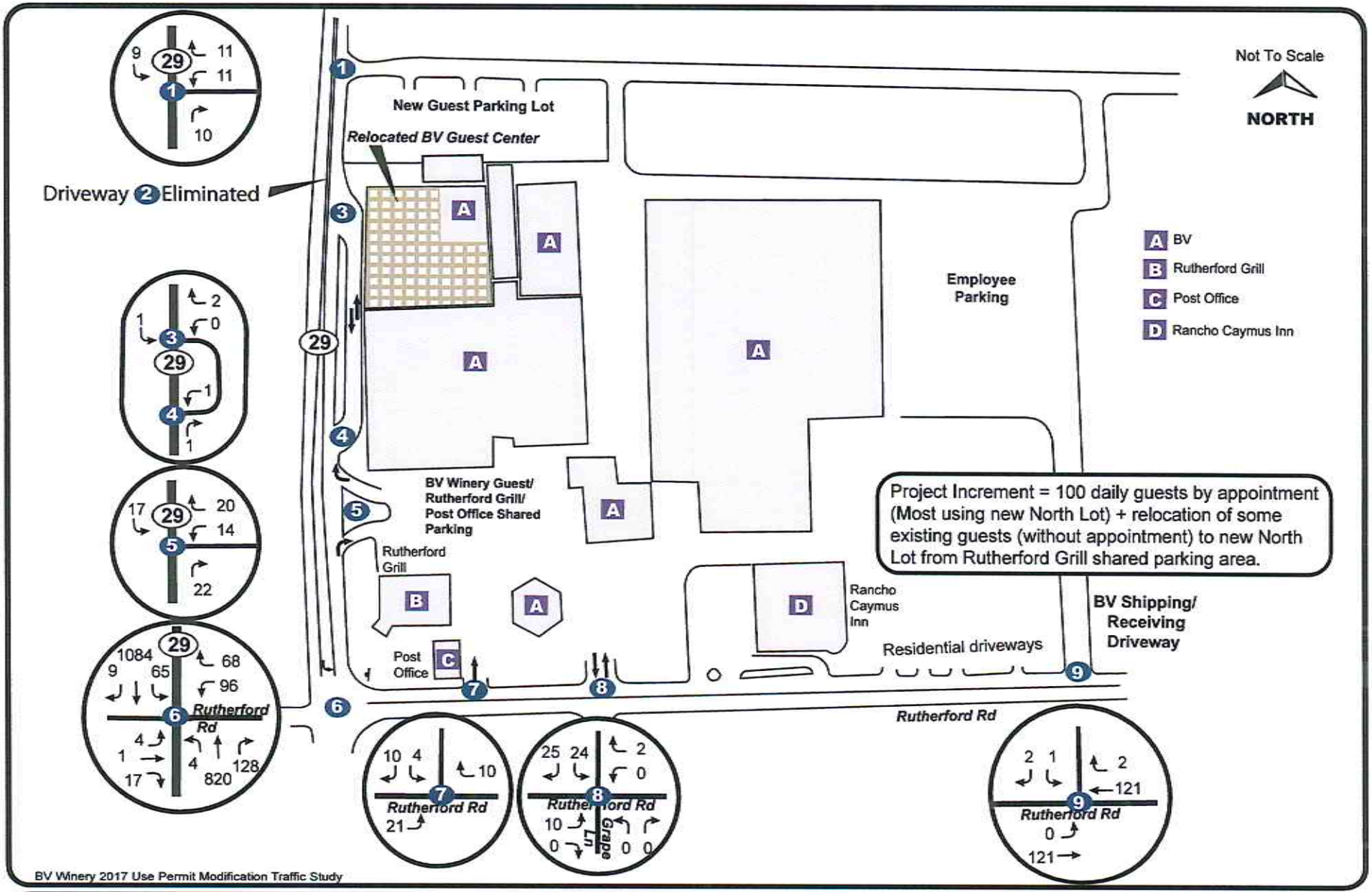
Figure 11
Friday Harvest
PM Peak Hour Project Increment
(3:00-4:00 PM)



BV Winery 2017 Use Permit Modification Traffic Study

CRANE TRANSPORTATION GROUP

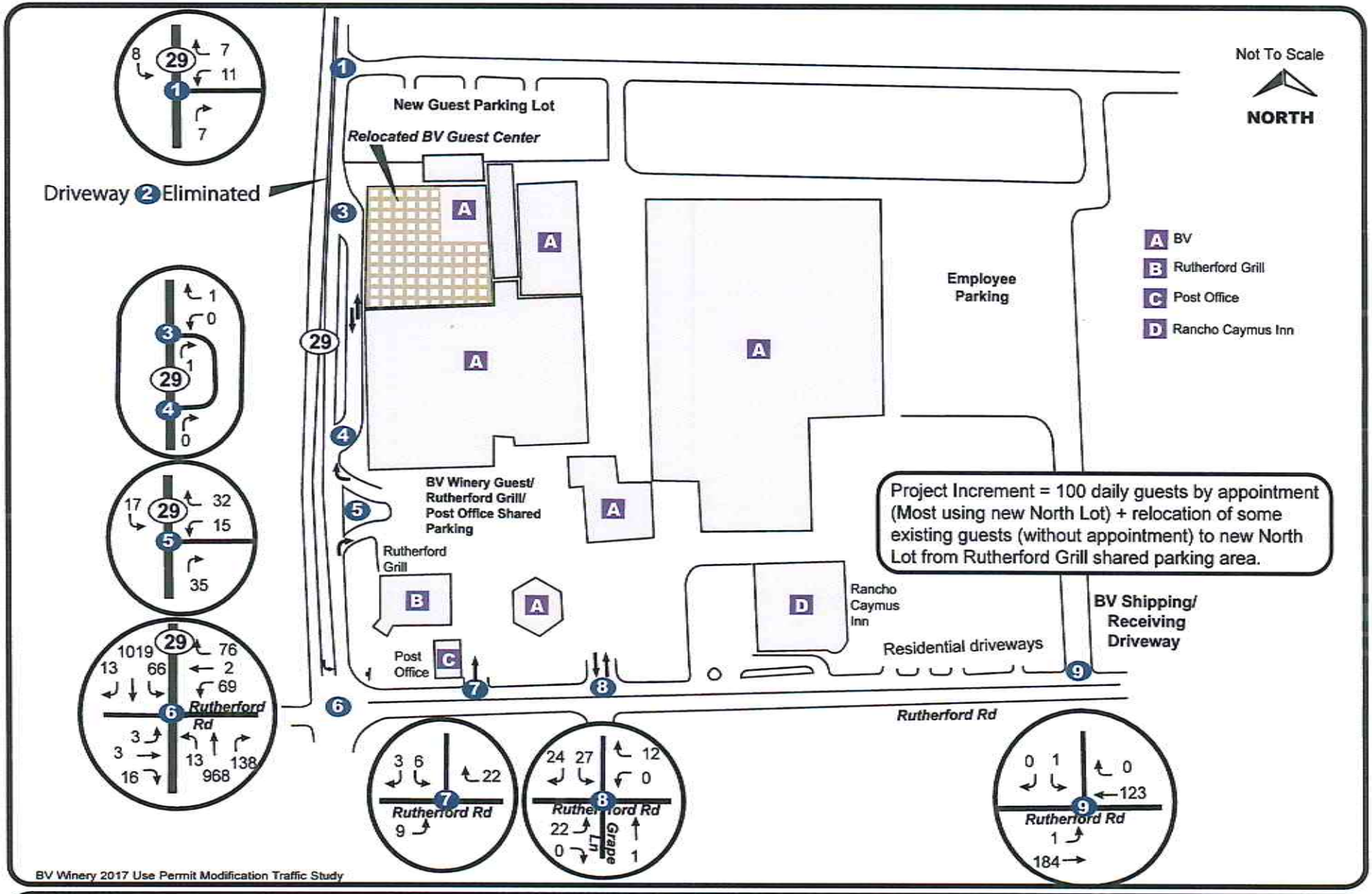
Figure 12
Saturday Harvest
PM Peak Hour Project Increment
(3:00-4:00 PM)



CRANE TRANSPORTATION GROUP

Figure 13

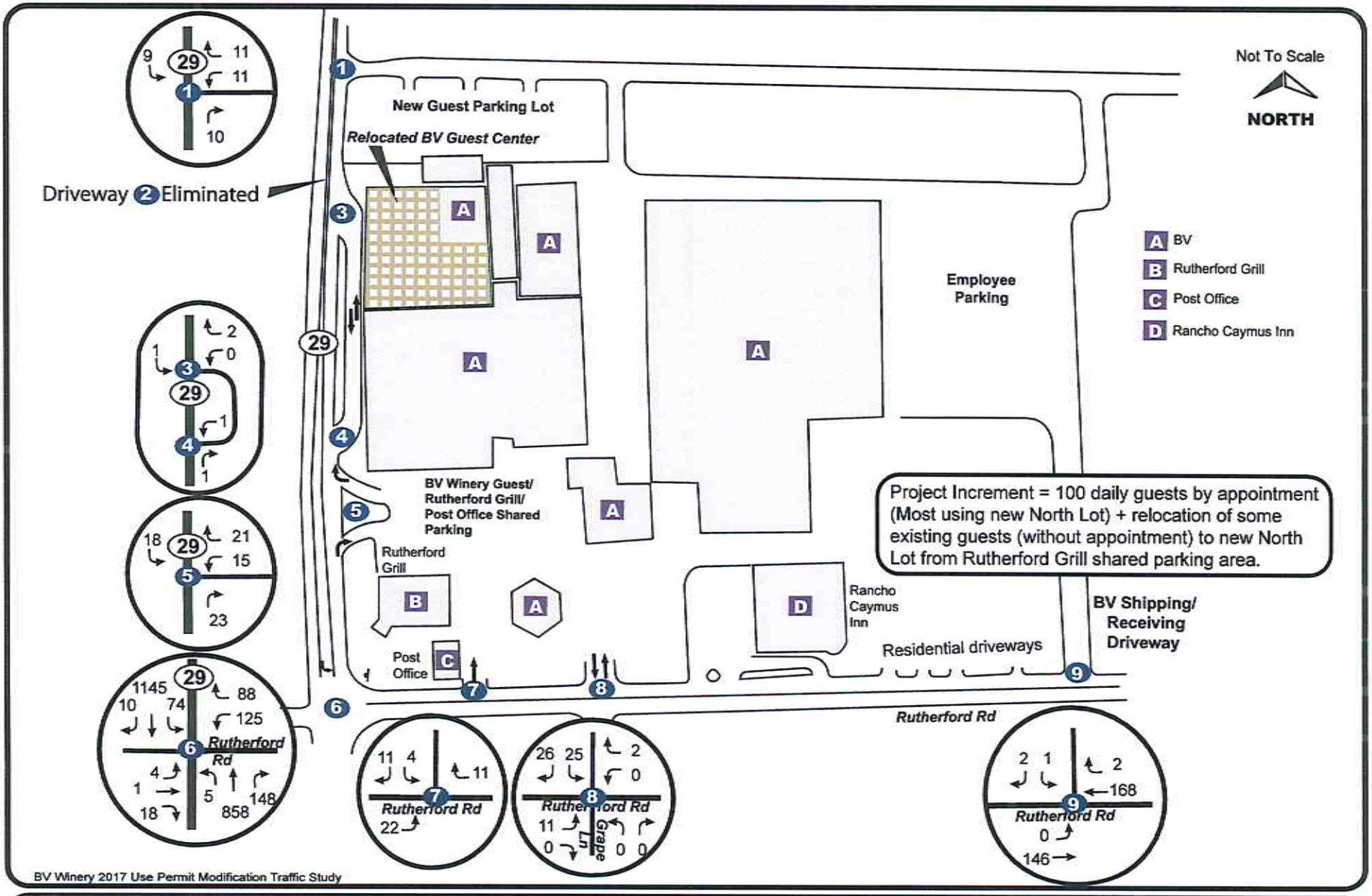
Existing Harvest 2017 Friday (with Project)
PM Peak Hour Volumes (3:00-4:00)



CRANE TRANSPORTATION GROUP

Figure 14

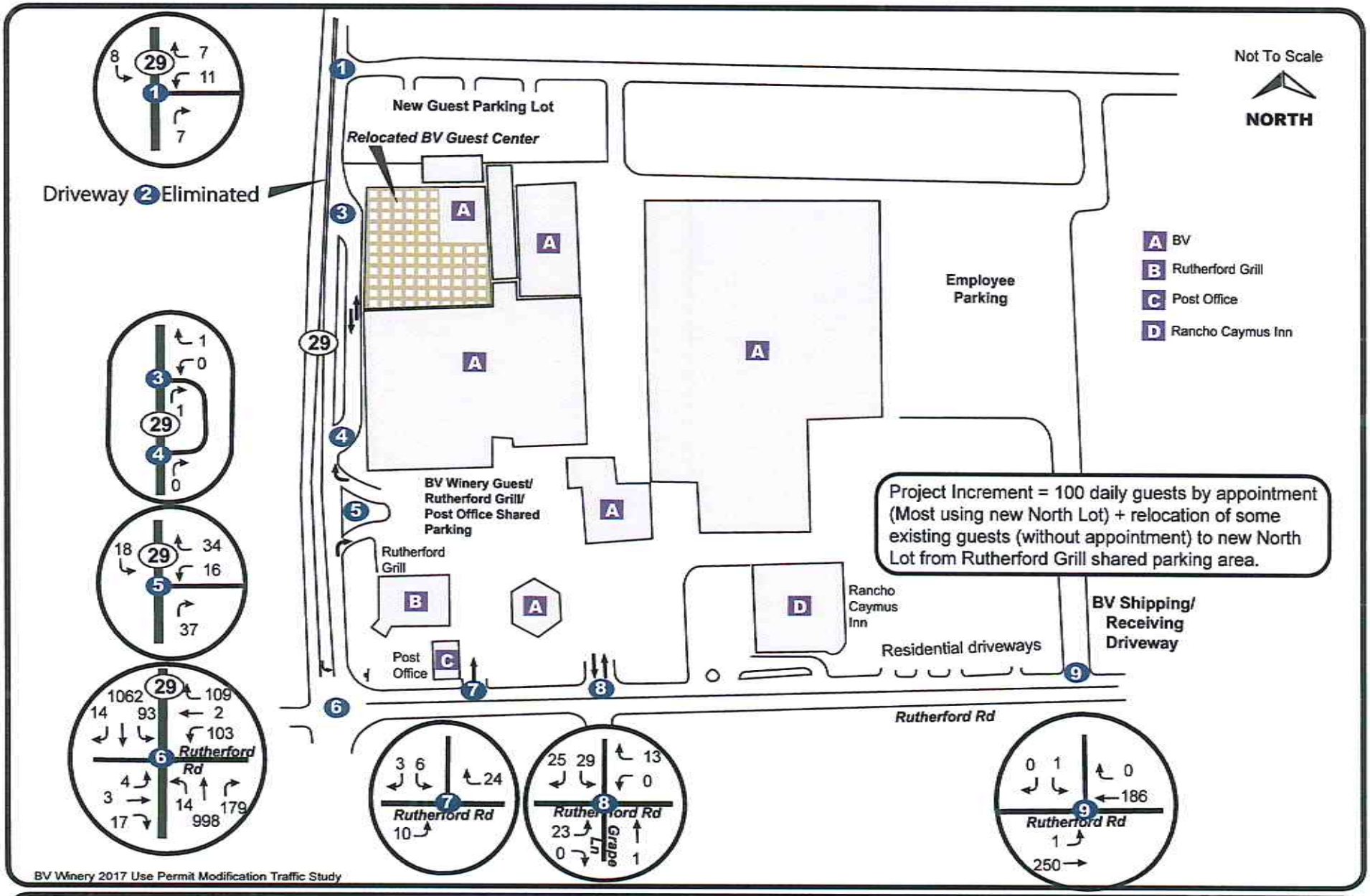
Existing Harvest 2017 Saturday (with Project)
PM Peak Hour Volumes (3:00-4:00)



CRANE TRANSPORTATION GROUP

Figure 15

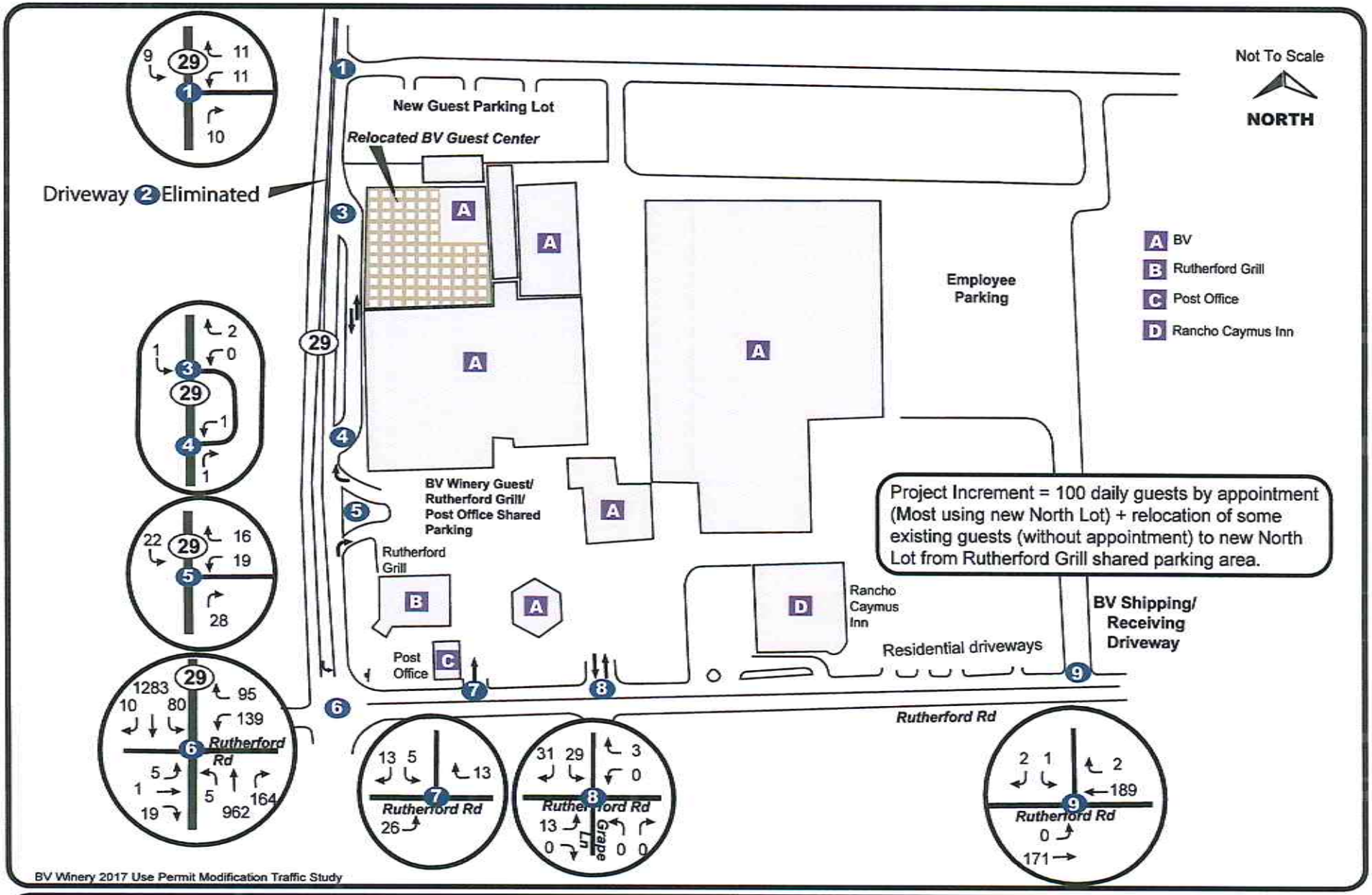
Year 2020 Harvest Friday (with Project)
PM Peak Hour Volumes (3:00-4:00)



CRANE TRANSPORTATION GROUP

Figure 16

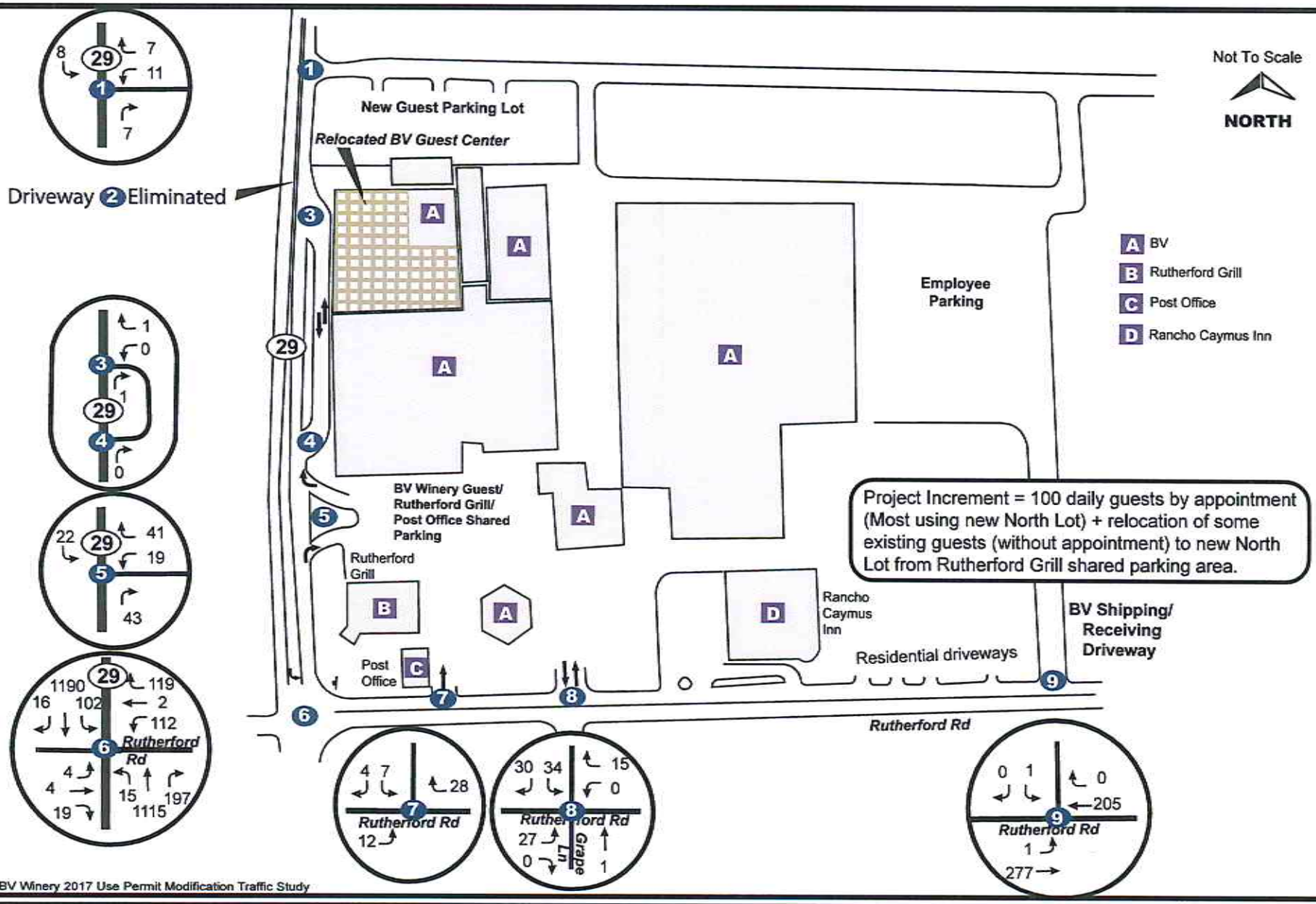
Year 2020 Harvest Saturday (with Project)
PM Peak Hour Volumes (3:00-4:00)



CRANE TRANSPORTATION GROUP

Figure 17

Year 2030 Harvest Friday (with Project)
PM Peak Hour Volumes (3:00-4:00)



BV Winery 2017 Use Permit Modification Traffic Study

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Figure 18

Year 2030 Harvest Saturday (with Project)
PM Peak Hour Volumes (3:00-4:00)

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		SATURDAY PM PEAK HOUR	
	W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
SR 29/Rutherford Road	F-76.4/F>150[1]	F-76.4/F>150	F-89.8/F>150	F-89.8/F>150

YEAR 2020 HARVEST

LOCATION	FRIDAY PM PEAK HOUR		SATURDAY PM PEAK HOUR	
	W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
SR 29/Rutherford Road	F-101.4/F>150[1]	F-101.4/F>150	F>150/F>150	F>150/F>150

YEAR 2030 (CUMULATIVE) HARVEST

LOCATION	FRIDAY PM PEAK HOUR		SATURDAY PM PEAK HOUR	
	W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
SR 29/Rutherford Road	F>150/F>150[1]	F>150/F>150	F>150/F>150	F>150/F>150

(1) Unsignalized level of service – control delay in seconds for the stop sign controlled eastbound Rutherford Road approach/westbound Rutherford Road approach.

Year 2010 Highway Capacity Manual (HCM) Analysis Methodology – Synchro software. Software results showing delays greater than 150 seconds not considered reliable.

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 (3:15-4:15)		SATURDAY PM PEAK HOUR (2:15-3:15)	
	W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
SR 29/Rutherford Road	Yes	Yes	Yes	Yes

YEAR 2020 HARVEST

LOCATION	FRIDAY PM PEAK HOUR (3:15-4:15)		SATURDAY PM PEAK HOUR (2:15-3:15)	
	W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
SR 29/Rutherford Road	Yes	Yes	Yes	Yes

YEAR 2030 (CUMULATIVE) HARVEST

LOCATION	FRIDAY PM PEAK HOUR (3:15-4:15)		SATURDAY PM PEAK HOUR (2:15-3:15)	
	W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
SR 29/Rutherford Road	Yes	Yes	Yes	Yes

Source: Crane Transportation Group

Table 5

PROJECT TRIP GENERATION
BV WINERY 2017 USE PERMIT MODIFICATION

HARVEST

FRIDAY

	NET NEW	HOURS	TRIPS					
			3-4 PM*		4-5 PM		5-6 PM	
			IN	OUT	IN	OUT	IN	OUT
Visitors	100 = 39 cars[(1)]	10:00 AM= 6:00 PM	6	10	5	6	0	5
TOTAL			6	10	5	6	0	5

* Peak traffic hour at SR 29/Rutherford Road intersection.
(1) 2.6 visitors/vehicle average on weekdays per County data.

Source: BV Winery project applicant; Compiled by: Crane Transportation Group

Table 6

PROJECT TRIP GENERATION
BV WINERY 2017 USE PERMIT MODIFICATION

HARVEST

SATURDAY

	TOTAL	HOURS	TRIPS							
			2-3 PM		3-4 PM*		4-5 PM		5-6 PM	
			IN	OUT	IN	OUT	IN	OUT	IN	OUT
Visitors	100 = 36 cars[(1)]	10:00 AM-6:00 PM	9	9	6	9	5	6	0	5
TOTAL			9	9	6	9	5	6	0	5

* Peak traffic hour at SR 29/Rutherford Road intersection.
(1) 2.8 visitors/vehicle average on weekdays per County data.

Source: BV Winery project applicant; Compiled by: Crane Transportation Group

Table 7

PROJECT PEAK HOUR TRIP GENERATION SUMMARY

HARVEST

FRIDAY PM PEAK HOUR* (3:00-4:00)		SATURDAY PM PEAK HOUR* (3:00-4:00)	
INBOUND TRIPS	OUTBOUND TRIPS	INBOUND TRIPS	OUTBOUND TRIPS
6	10	6	9

* Peak hour at the SR 29/Rutherford Road intersection.
Source: BV Winery; compiled by Crane Transportation Group

Appendix

TREASURY
WINE ESTATES

From
DAVID G. M. DEARIE

Mr. Mike Hawkins, Interim Transportation Engineer
Department of Public Works
County of Napa
1195 Third Street, Suite 101
Napa, CA 94559

Re: Beaulieu Vineyard – Major Modification Use Permit No. P17-00192
1960 St. Helena Highway; APN 030-110-019

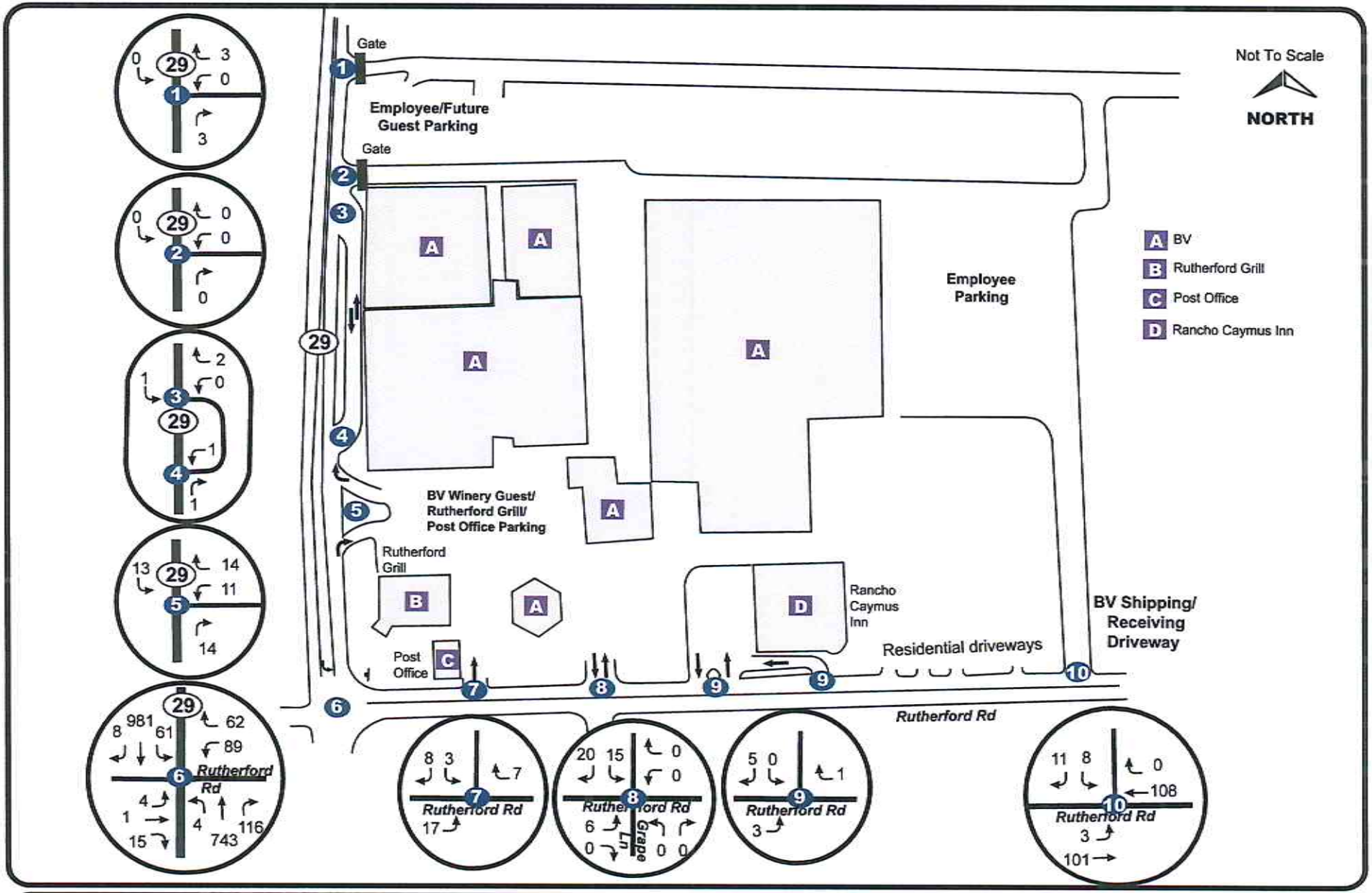
Dear Mr. Hawkins,

After reviewing your comments in regards to the Major Modification at Beaulieu Vineyard I do concur that peak visitation is between 2:00pm and 4:00pm. However I do not agree that 57% should be "assumed during the weekend peak hour". The additional 100 visitors/day being requested are all by appointment only, and even if we could handle the 50 by appointment only visitors within an hour time frame, we would never schedule that amount of people at one time. Not only will we not have the staff available to handle such an onslaught, it is not the best way to sell a high end wines such as Beaulieu produces. Moreover, we will be limited by physical constraints of the design plan. The intention of the new facility is focusing on high-end personalized experiences, which will mandate traffic coming throughout the day and week.

Best Regards,
Jen Locke

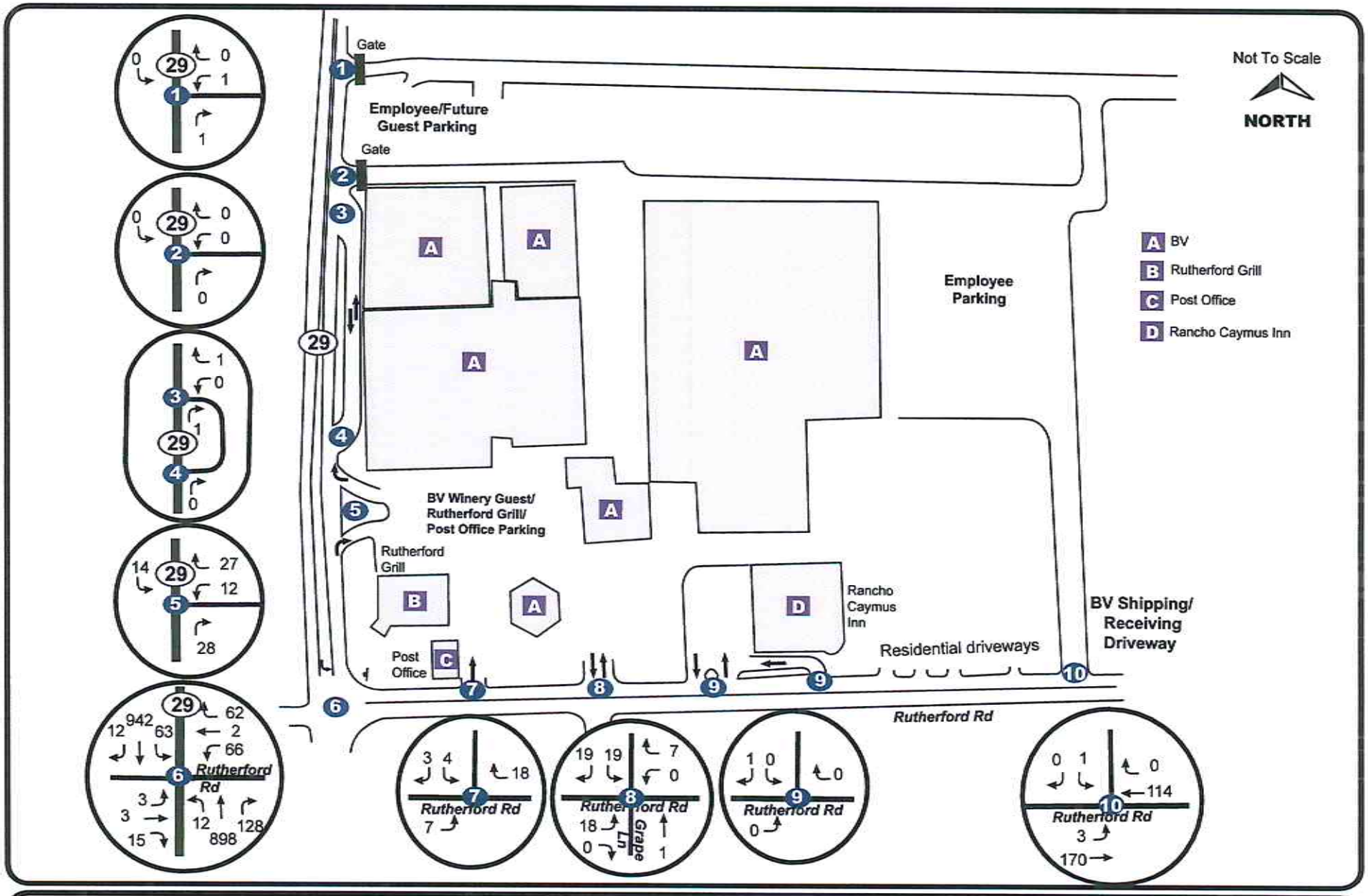
Jen Locke
SVP, DTC

TREASURY WINE ESTATES
555 GATEWAY DRIVE
NAPA, CA 94558
WWW.TWEGLOBAL.COM
[redacted]



CRANE TRANSPORTATION GROUP

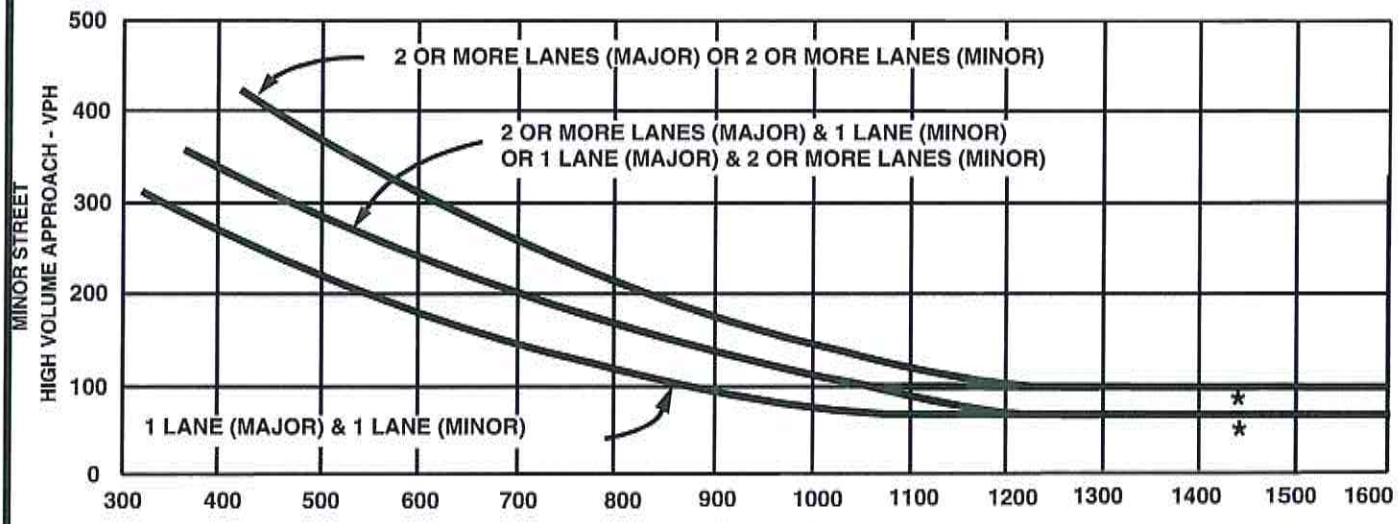
Figure A-1
Existing Friday PM Peak Hour Volumes
3:00-4:00 June 23 - 2017



CRANE TRANSPORTATION GROUP

Figure A-2
Existing Saturday PM Peak Hour Volumes
3:00-4:00 June 24 - 2017

PEAK HOUR VOLUME WARRANT #3
(Rural Area)

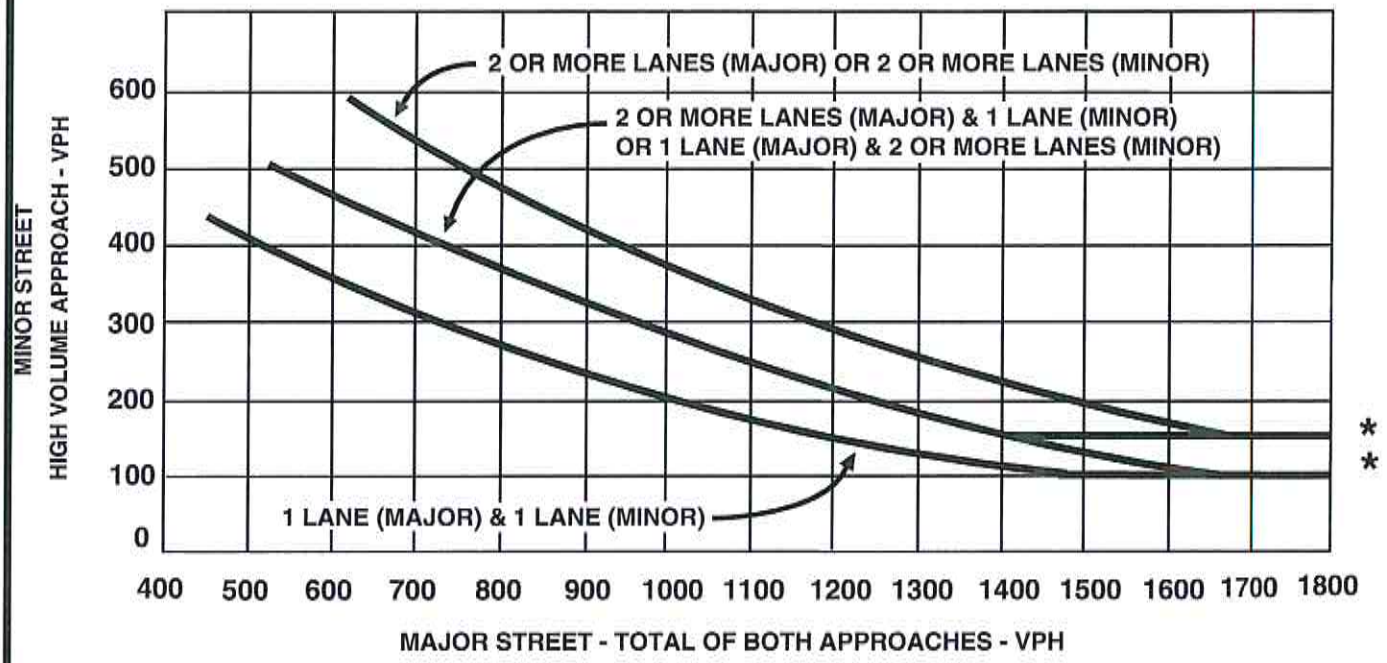


* NOTE

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

PEAK HOUR VOLUME WARRANT #3
(Urban Area)



* NOTE

150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE

Source: California Manual on Uniform Traffic Control Devices, 2010

TECHNICAL APPENDIX

Capacity Worksheets

Intersection	
Int Delay, s/veh	85.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↰	↱	↰	↱		↰	↱	
Traffic Vol, veh/h	4	1	17	98	0	68	4	817	128	67	1077	9
Future Vol, veh/h	4	1	17	98	0	68	4	817	128	67	1077	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	25	200	-	-	200	-	-
Veh in Median Storage, #		0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	3	0	0	0	1	3	0	1	0
Mvmt Flow	4	1	18	105	0	73	4	878	138	72	1158	10

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2263	2332	1163	2273	2268	947	1168	0	0	1016	0	0
Stage 1	1307	1307	-	956	956	-	-	-	-	-	-	-
Stage 2	956	1025	-	1317	1312	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.13	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.527	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	29	37	239	~ 28	41	319	605	-	-	691	-	-
Stage 1	198	232	-	309	339	-	-	-	-	-	-	-
Stage 2	313	315	-	193	230	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	20	33	239	~ 23	36	319	605	-	-	691	-	-
Mov Cap-2 Maneuver	20	33	-	~ 23	36	-	-	-	-	-	-	-
Stage 1	197	208	-	307	337	-	-	-	-	-	-	-
Stage 2	240	313	-	159	206	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	76.4	$ 1161.2	0	0.6
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	605	-	-	73	23	319	691	-	-
HCM Lane V/C Ratio	0.007	-	-	0.324	4.582	0.229	0.104	-	-
HCM Control Delay (s)	11	-	-	76.4	953.3	19.6	10.8	-	-
HCM Lane LOS	B	-	-	F	F	C	B	-	-
HCM 95th %tile Q(veh)	0	-	-	1.2	13.3	0.9	0.3	-	-

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

Intersection	
Int Delay, s/veh	49.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↑	↱	↰	↑		↰	↑	
Traffic Vol, veh/h	3	3	16	71	2	76	13	965	138	68	1012	13
Future Vol, veh/h	3	3	16	71	2	76	13	965	138	68	1012	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	25	200	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	0	0	1	1	0	1	0
Mvmt Flow	3	3	17	74	2	79	14	1005	144	71	1054	14

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2308	2379	1061	2317	2313	1077	1068	0	0	1149	0	0
Stage 1	1203	1203	-	1104	1104	-	-	-	-	-	-	-
Stage 2	1105	1176	-	1213	1209	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	27	35	274	~ 27	38	269	660	-	-	615	-	-
Stage 1	227	260	-	258	289	-	-	-	-	-	-	-
Stage 2	258	267	-	224	258	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	16	30	274	~ 21	33	269	660	-	-	615	-	-
Mov Cap-2 Maneuver	16	30	-	~ 21	33	-	-	-	-	-	-	-
Stage 1	222	230	-	253	283	-	-	-	-	-	-	-
Stage 2	177	261	-	184	228	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay	$ 9.8	$ 775.6	0.1	0.7
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	660	-	-	64	21	269	615	-	-
HCM Lane V/C Ratio	0.021	-	-	0.358	3.621	0.294	0.115	-	-
HCM Control Delay (s)	10.6	-	-	$ 89.8	$ 558.1	23.9	11.6	-	-
HCM Lane LOS	B	-	-	F	F	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.3	9.8	1.2	0.4	-	-

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

Intersection	
Int Delay, s/veh	174.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↰	↱	↰	↑		↰	↑	
Traffic Vol, veh/h	4	1	18	127	0	88	5	855	148	76	1138	10
Future Vol, veh/h	4	1	18	127	0	88	5	855	148	76	1138	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	25	200	-	-	200	-	-
Veh in Median Storage, #		0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	3	0	0	0	1	3	0	1	0
Mvmt Flow	4	1	19	135	0	94	5	910	157	81	1211	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2377	2456	1216	2387	2382	988	1221	0	0	1067	0	0
Stage 1	1378	1378	-	999	999	-	-	-	-	-	-	-
Stage 2	999	1078	-	1388	1383	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.13	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.527	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	24	31	223	~ 23	35	303	578	-	-	661	-	-
Stage 1	181	214	-	292	324	-	-	-	-	-	-	-
Stage 2	296	297	-	176	213	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	15	27	223	~ 18	30	303	578	-	-	661	-	-
Mov Cap-2 Maneuver	15	27	-	~ 18	30	-	-	-	-	-	-	-
Stage 1	179	188	-	289	321	-	-	-	-	-	-	-
Stage 2	203	294	-	140	187	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 1404.4	$ 1986.5	0.1	0.7
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	578	-	-	60	18	303	661	-	-
HCM Lane V/C Ratio	0.009	-	-	0.408	7.506	0.309	0.122	-	-
HCM Control Delay (s)	11.3	-	-	101.4	$ 347.6	22.1	11.2	-	-
HCM Lane LOS	B	-	-	F	F	C	B	-	-
HCM 95th %tile Q(veh)	0	-	-	1.5	17.5	1.3	0.4	-	-

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

Intersection	
Int Delay, s/veh	143.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	3	17	105	2	109	14	995	179	95	1055	14
Future Vol, veh/h	4	3	17	105	2	109	14	995	179	95	1055	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	25	200	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	0	0	1	1	0	1	0
Mvmt Flow	4	3	18	109	2	114	15	1036	186	99	1099	15

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2464	2556	1106	2474	2470	1130	1114	0	0	1223	0	0
Stage 1	1304	1304	-	1159	1159	-	-	-	-	-	-	-
Stage 2	1160	1252	-	1315	1311	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	21	27	258	~ 21	31	250	634	-	-	577	-	-
Stage 1	199	232	-	241	272	-	-	-	-	-	-	-
Stage 2	240	246	-	196	231	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	9	22	258	~ 15	25	250	634	-	-	577	-	-
Mov Cap-2 Maneuver	9	22	-	~ 15	25	-	-	-	-	-	-	-
Stage 1	194	192	-	235	266	-	-	-	-	-	-	-
Stage 2	127	240	-	149	191	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	216.2	$ 1696.6	0.1	1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	634	-	-	37	15	250	577	-	-
HCM Lane V/C Ratio	0.023	-	-	0.676	7.431	0.454	0.172	-	-
HCM Control Delay (s)	10.8	-	-	216.2	$ 3393.6	30.8	12.5	-	-
HCM Lane LOS	B	-	-	F	F	D	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	2.4	14.9	2.2	0.6	-	-

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

Intersection	
Int Delay, s/veh	293.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↰	↱	↰	↑		↰	↑	
Traffic Vol, veh/h	5	1	19	141	0	95	5	959	164	82	1276	10
Future Vol, veh/h	5	1	19	141	0	95	5	959	164	82	1276	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	25	200	-	-	200	-	-
Veh in Median Storage, #		0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	3	0	0	0	1	3	0	1	0
Mvmt Flow	5	1	20	147	0	99	5	999	171	85	1329	10

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2600	2685	1334	2611	2605	1084	1340	0	0	1170	0	0
Stage 1	1505	1505	-	1095	1095	-	-	-	-	-	-	-
Stage 2	1095	1180	-	1516	1510	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.13	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.527	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	17	22	190	~ 16	25	266	521	-	-	604	-	-
Stage 1	153	186	-	258	292	-	-	-	-	-	-	-
Stage 2	261	266	-	148	185	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	9	19	190	~ 12	21	266	521	-	-	604	-	-
Mov Cap-2 Maneuver	9	19	-	~ 12	21	-	-	-	-	-	-	-
Stage 1	152	160	-	256	289	-	-	-	-	-	-	-
Stage 2	162	263	-	~ 113	159	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	244.6	$ 3398.6	0.1	0.7
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	521	-	-	35	12	266	604	-	-
HCM Lane V/C Ratio	0.01	-	-	0.744	12.24	0.372	0.141	-	-
HCM Control Delay (s)	12	-	-	244.6	$ 567	0.8	26.3	11.9	-	-
HCM Lane LOS	B	-	-	F	F	D	B	-	-
HCM 95th %tile Q(veh)	0	-	-	2.6	19.7	1.6	0.5	-	-

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

Intersection	
Int Delay, s/veh	296.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↰	↱	↰	↑		↰	↑	
Traffic Vol, veh/h	4	4	19	114	2	119	15	1112	197	104	1183	16
Future Vol, veh/h	4	4	19	114	2	119	15	1112	197	104	1183	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	25	200	-	-	200	-	-
Veh in Median Storage, #		0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	0	0	0	0	1	1	0	1	0
Mvmt Flow	4	4	20	118	2	123	15	1146	203	107	1220	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2722	2822	1228	2733	2730	1248	1236	0	0	1349	0	0
Stage 1	1442	1442	-	1279	1279	-	-	-	-	-	-	-
Stage 2	1280	1380	-	1454	1451	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	14	18	219	~ 13	21	213	571	-	-	517	-	-
Stage 1	166	199	-	206	239	-	-	-	-	-	-	-
Stage 2	206	214	-	164	197	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	4	14	219	~ 8	16	213	571	-	-	517	-	-
Mov Cap-2 Maneuver	4	14	-	~ 8	16	-	-	-	-	-	-	-
Stage 1	162	158	-	201	233	-	-	-	-	-	-	-
Stage 2	84	208	-	~ 115	156	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 9028.3	$ 3566.6	0.1	1.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	571	-	-	20	8	213	517	-	-
HCM Lane V/C Ratio	0.027	-	-	1.392	14.948	0.576	0.207	-	-
HCM Control Delay (s)	11.5	-	-	$ 6265.7	$ 3181.8	42.6	13.8	-	-
HCM Lane LOS	B	-	-	F	F	E	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	3.8	16.6	3.2	0.8	-	-

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

Intersection	
Int Delay, s/veh	81.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↱	↰	↑		↰	↑	
Traffic Vol, veh/h	4	1	17	96	0	68	4	820	128	65	1084	9
Future Vol, veh/h	4	1	17	96	0	68	4	820	128	65	1084	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	25	200	-	-	200	-	-
Veh in Median Storage, #		0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	3	0	0	0	1	3	0	1	0
Mvmt Flow	4	1	18	103	0	73	4	882	138	70	1166	10

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2269	2338	1170	2279	2274	951	1175	0	0	1019	0	0
Stage 1	1310	1310	-	959	959	-	-	-	-	-	-	-
Stage 2	959	1028	-	1320	1315	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.13	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.527	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	29	37	237	~ 28	41	318	602	-	-	689	-	-
Stage 1	198	231	-	308	338	-	-	-	-	-	-	-
Stage 2	311	314	-	192	230	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	20	33	237	~ 23	37	318	602	-	-	689	-	-
Mov Cap-2 Maneuver	20	33	-	~ 23	37	-	-	-	-	-	-	-
Stage 1	197	208	-	306	336	-	-	-	-	-	-	-
Stage 2	238	312	-	158	207	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay	76.4	$ 1127.3	0	0.6
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	602	-	-	73	23	318	689	-	-
HCM Lane V/C Ratio	0.007	-	-	0.324	4.488	0.23	0.101	-	-
HCM Control Delay (s)	11	-	-	76	$ 911.8	19.7	10.8	-	-
HCM Lane LOS	B	-	-	F	F	C	B	-	-
HCM 95th %tile Q(veh)	0	-	-	1.2	13	0.9	0.3	-	-

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

Intersection	
Int Delay, s/veh	47

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	3	16	69	2	76	13	968	138	66	1019	13
Future Vol, veh/h	3	3	16	69	2	76	13	968	138	66	1019	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	25	200	-	-	200	-	-
Veh in Median Storage, #		0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	0	0	1	1	0	1	0
Mvmt Flow	3	3	17	72	2	79	14	1008	144	69	1061	14

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2314	2385	1068	2323	2320	1080	1075	0	0	1152	0	0
Stage 1	1206	1206	-	1107	1107	-	-	-	-	-	-	-
Stage 2	1108	1179	-	1216	1213	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	27	35	272	~ 27	38	268	656	-	-	614	-	-
Stage 1	226	259	-	257	288	-	-	-	-	-	-	-
Stage 2	257	267	-	223	257	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	16	30	272	~ 21	33	268	656	-	-	614	-	-
Mov Cap-2 Maneuver	16	30	-	~ 21	33	-	-	-	-	-	-	-
Stage 1	221	230	-	252	282	-	-	-	-	-	-	-
Stage 2	176	261	-	183	228	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay	$ 9.8	$ 743.8	0.1	0.7
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	656	-	-	64	21	268	614	-	-
HCM Lane V/C Ratio	0.021	-	-	0.358	3.522	0.295	0.112	-	-
HCM Control Delay (s)	10.6	-	-	$ 89.8	$ 514.3	24	11.6	-	-
HCM Lane LOS	B	-	-	F	F	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.3	9.5	1.2	0.4	-	-

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

Intersection	
Int Delay, s/veh	168.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↑	↱	↰	↑		↰	↑	
Traffic Vol, veh/h	4	1	18	125	0	88	5	858	148	74	1145	10
Future Vol, veh/h	4	1	18	125	0	88	5	858	148	74	1145	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	25	200	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	3	0	0	0	1	3	0	1	0
Mvmt Flow	4	1	19	133	0	94	5	913	157	79	1218	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2383	2462	1223	2393	2388	991	1229	0	0	1070	0	0
Stage 1	1381	1381	-	1002	1002	-	-	-	-	-	-	-
Stage 2	1002	1081	-	1391	1386	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.13	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.527	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	24	31	221	~ 23	34	301	574	-	-	659	-	-
Stage 1	180	213	-	291	323	-	-	-	-	-	-	-
Stage 2	295	296	-	175	212	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	15	27	221	~ 18	30	301	574	-	-	659	-	-
Mov Cap-2 Maneuver	15	27	-	~ 18	30	-	-	-	-	-	-	-
Stage 1	178	187	-	288	320	-	-	-	-	-	-	-
Stage 2	201	293	-	140	187	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 1414.4	$ 1942.7	0.1	0.7
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	574	-	-	60	18	301	659	-	-
HCM Lane V/C Ratio	0.009	-	-	0.408	7.388	0.311	0.119	-	-
HCM Control Delay (s)	11.3	-	-	$ 1414.4	$ 4294.7	22.3	11.2	-	-
HCM Lane LOS	B	-	-	F	F	C	B	-	-
HCM 95th %tile Q(veh)	0	-	-	1.5	17.3	1.3	0.4	-	-

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

Intersection	
Int Delay, s/veh	149.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↑	↱	↰	↑		↰	↑	
Traffic Vol, veh/h	4	3	17	103	2	109	14	998	179	93	1062	14
Future Vol, veh/h	4	3	17	103	2	109	14	998	179	93	1062	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	25	200	-	-	200	-	-
Veh in Median Storage, #		0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	0	0	1	1	0	1	0
Mvmt Flow	4	3	18	107	2	114	15	1040	186	97	1106	15

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2470	2562	1114	2480	2477	1133	1121	0	0	1226	0	0
Stage 1	1307	1307	-	1162	1162	-	-	-	-	-	-	-
Stage 2	1163	1255	-	1318	1315	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	21	27	256	~ 20	30	249	631	-	-	576	-	-
Stage 1	198	232	-	240	272	-	-	-	-	-	-	-
Stage 2	239	245	-	196	230	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	9	22	256	~ 14	24	249	631	-	-	576	-	-
Mov Cap-2 Maneuver	9	22	-	~ 14	24	-	-	-	-	-	-	-
Stage 1	193	193	-	234	266	-	-	-	-	-	-	-
Stage 2	126	239	-	149	191	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	216.2	$ 1781.5	0.1	1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	631	-	-	37	14	249	576	-	-
HCM Lane V/C Ratio	0.023	-	-	0.676	7.813	0.456	0.168	-	-
HCM Control Delay (s)	10.8	-	-	216.2	$ 3598.7	31	12.5	-	-
HCM Lane LOS	B	-	-	F	F	D	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	2.4	14.7	2.2	0.6	-	-

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

Intersection												
Int Delay, s/veh	284.9											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↱	↰	↑		↰	↑	
Traffic Vol, veh/h	5	1	19	139	0	95	5	962	164	80	1283	10
Future Vol, veh/h	5	1	19	139	0	95	5	962	164	80	1283	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	25	200	-	-	200	-	-
Veh in Median Storage, #		0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	3	0	0	0	1	3	0	1	0
Mvmt Flow	5	1	20	145	0	99	5	1002	171	83	1336	10

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2606	2691	1342	2617	2612	1088	1347	0	0	1173	0	0
Stage 1	1508	1508	-	1098	1098	-	-	-	-	-	-	-
Stage 2	1098	1183	-	1519	1514	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.13	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.527	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	17	22	188	~ 16	25	265	518	-	-	603	-	-
Stage 1	152	185	-	257	291	-	-	-	-	-	-	-
Stage 2	260	265	-	148	184	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	9	19	188	~ 12	21	265	518	-	-	603	-	-
Mov Cap-2 Maneuver	9	19	-	~ 12	21	-	-	-	-	-	-	-
Stage 1	151	160	-	255	288	-	-	-	-	-	-	-
Stage 2	161	262	-	~ 113	159	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	944.6	$ 3332.9	0.1	0.7
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	518	-	-	35	12	265	603	-	-
HCM Lane V/C Ratio	0.01	-	-	0.744	12.066	0.373	0.138	-	-
HCM Control Delay (s)	12	-	-	244.6	$ 592.7	26.5	11.9	-	-
HCM Lane LOS	B	-	-	F	F	D	B	-	-
HCM 95th %tile Q(veh)	0	-	-	2.6	19.4	1.7	0.5	-	-

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

Intersection	
Int Delay, s/veh	286.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↑	↱	↰	↑		↰	↑	
Traffic Vol, veh/h	4	4	19	112	2	119	15	1115	197	102	1190	16
Future Vol, veh/h	4	4	19	112	2	119	15	1115	197	102	1190	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	25	200	-	-	200	-	-
Veh in Median Storage, #		0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	0	0	0	0	1	1	0	1	0
Mvmt Flow	4	4	20	115	2	123	15	1149	203	105	1227	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2728	2829	1235	2739	2736	1251	1243	0	0	1353	0	0
Stage 1	1445	1445	-	1282	1282	-	-	-	-	-	-	-
Stage 2	1283	1384	-	1457	1454	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	14	18	217	~ 13	21	213	567	-	-	515	-	-
Stage 1	165	199	-	205	238	-	-	-	-	-	-	-
Stage 2	205	213	-	163	197	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 4	14	217	~ 8	16	213	567	-	-	515	-	-
Mov Cap-2 Maneuver	~ 4	14	-	~ 8	16	-	-	-	-	-	-	-
Stage 1	161	158	-	200	232	-	-	-	-	-	-	-
Stage 2	84	207	-	~ 115	157	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 9628.3	$ 3478.8	0.1	1.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	567	-	-	20	8	213	515	-	-
HCM Lane V/C Ratio	0.027	-	-	1.392	14.691	0.576	0.204	-	-
HCM Control Delay (s)	11.5	-	-	$ 626	$ 7065.8	42.6	13.8	-	-
HCM Lane LOS	B	-	-	F	F	E	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	3.8	16.4	3.2	0.8	-	-

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