

A P P E N D I X J

T R A F F I C D A T A



APPENDIX J1:
TJKM TRANSPORTATION
CONSULTANTS
TRAFFIC IMPACT ANALYSIS



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Traffic and Circulation Impact Analysis for the Proposed Terraces of Lafayette Project

For the City of Lafayette

April 18, 2012

Pleasanton
Fresno
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Santa Rosa





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Introduction and Summary

Introduction

This report presents the results of a transportation impact analysis for the proposed Terraces of Lafayette multi-family residential development in the city of Lafayette. The proposed project consists of constructing a 315-unit apartment complex in new buildings on the site, which is bounded by Deer Hill Road on the northwest, Pleasant Hill Road on the east, and SR 24 on the south. The proposed project vicinity is illustrated in Figure 1. The proposed site plan is shown in Figure 2.

This report includes a traffic analysis of study intersections that would potentially be affected by the proposed project, identification of any significant impacts on unacceptable traffic levels of service (LOS), and evaluation of potential mitigation measures to address those unacceptable traffic conditions. The report also analyzes the potential impacts of the proposed project on traffic safety, transit, pedestrian, and bicycle facilities, parking and passenger loading areas, emergency vehicle access, and Delay Indexes on Routes of Regional Significance, as well as traffic impacts during construction of the project.

Summary

TJKM has identified the following significant impacts and mitigations, which are numbered in the summary below to match their presentation in the Draft EIR for the Terraces of Lafayette project.

Impact TRAF-1: Under Existing plus Project conditions, the Deer Hill Road – Stanley Boulevard/Pleasant Hill Road intersection would operate at LOS F during the a.m. peak hour, with delay increasing by 9.0 seconds as a result of the project. The project would increase delay by more than five seconds at an intersection operating below the acceptable standard, resulting in a *significant* impact.

Mitigation Measure TRAF-1: An additional southbound lane on Pleasant Hill Road would improve traffic conditions in comparison to the Existing plus Project scenario but would result in significant secondary impacts and other undesirable effects. Therefore, this mitigation measure is not considered to be feasible.

Significance after Mitigation: Significant and Unavoidable

Impact TRAF-2: Under Existing plus Project conditions, northbound and southbound stop-controlled minor approaches on Brown Avenue at Deer Hill Road would continue operating at an unacceptable LOS F during the a.m. and p.m. peak hours, with delay increases substantially higher than five seconds. The California Manual on Uniform Traffic Control Devices (MUTCD) peak hour traffic signal warrant would be met for both peak hours under both the Existing Conditions and Existing plus Project scenarios. The project would increase delay by more than five seconds at an intersection operating below the acceptable standard, and result in inadequate emergency access to Deer Hill Road, resulting in *significant* impacts.

Mitigation Measure TRAF-2: The Project applicant shall coordinate with the City to contribute a fair share of the cost, including an in-lieu payment, to install a traffic signal at the Brown Avenue/Deer Hill Road intersection, which will be added to the City's Capital Improvement Projects (CIP) program. The traffic signal equipment shall include an emergency vehicle preemption system (Opticom), which would allow emergency response vehicles approaching the signalized intersection to activate a green signal for their travel direction. The State Route

24 freeway overpass structures on Brown Avenue could obstruct the Opticom activation device on responding emergency vehicles headed northbound on Brown Avenue from Mount Diablo Boulevard toward Deer Hill Road, which could substantially reduce the effectiveness of the traffic signal preemption. To avoid this problem, the traffic signal equipment shall include advance detection devices for the Opticom system as needed to assure effective traffic signal preemption for responding emergency vehicles on northbound Brown Avenue.

Significance after Mitigation: As shown in Table 4.13-9, with signalization, the Brown Avenue/Deer Hill Road intersection would operate at LOS C during the a.m. and p.m. peak hours under Existing plus Project conditions, and the advance detection devices for traffic signal preemption would provide adequate emergency access, reducing the project impact to a less-than-significant level.

Impact TRAF-3: Under Existing plus Project conditions, the Project would reduce the average speed on northbound Pleasant Hill Road between the State Route 24 westbound off-ramp and Acalanes Avenue during the p.m. peak hour from 4.6 miles per hour (mph) to 3.8 mph, a 17 percent reduction. This speed reduction of more than ten percent is considered an unacceptable weaving condition that would substantially increase hazards, resulting in a *significant* impact.

Mitigation Measure TRAF-3: Prohibiting the left turn from northbound Pleasant Hill Road into the Project driveway would reduce weaving impacts but would significantly exacerbate Project impacts at the Deer Hill Road – Stanley Boulevard/Pleasant Hill Road intersection. Therefore, this mitigation measure is not considered feasible.

Significance after Mitigation: No feasible mitigation measure is available to reduce the Project impact on northbound Pleasant Hill Road between the State Route 24 westbound off-ramp and the Project driveway to less-than-significant levels. Therefore, this impact is considered significant and unavoidable.

Impact TRAF-4: Project design features would increase traffic hazards because the potential for inadequate sight-distance would exist at all of the Project driveways, and the proposed location of the west Project driveway on Deer Hill Road would provide inadequate sight-distance for westbound traffic. This would be a *significant* impact.

Mitigation Measure TRAF-4: The Project applicant shall implement the following measures:

- West of the East Driveway on Deer Hill Road: All landscaping along the south side of Deer Hill Road that is located in the line of sight for eastbound traffic within 360 feet west of the east Project driveway shall be limited to plants with foliage no more than 30 inches fully mature height above the closest adjacent curb elevation, or trees with canopy foliage no less than seven feet above the closest adjacent curb elevation, or other dimensions as specified by the City Engineer. The line of sight is defined as the area between the south curb on Deer Hill Road and a straight line connecting a point 10 feet behind the back of the sidewalk on the centerline of the east driveway and a point 360 feet to the west where it intersects the south curb line, or as otherwise specified by the City Engineer.
- All other Project Driveways: All landscaping along the Project street frontage that is located in the line of sight of traffic approaching Project driveways in either direction shall be limited to plants with foliage no more than 30 inches fully mature height above the closest adjacent curb elevation, or trees with canopy foliage no less than seven feet above the closest adjacent curb elevation, or other dimensions as specified by the City Engineer.

The line of sight is defined as an area within 10 feet behind the back of the sidewalk or shared-use path and within 50 feet of the driveway edge, or as otherwise specified by the City Engineer.

- **Entryway Features:** All monument signs, walls, slopes and other vertical features that could otherwise block visibility shall be no more than three feet higher than the adjacent driveway elevation in the area within 15 feet behind the back of the sidewalk or shared-use path and within 50 feet of the driveway edge, or as otherwise specified by the City Engineer.
- The west Project driveway on Deer Hill Road shall be relocated at least 100 feet to the west of the location shown on the Project plans.

Significance after Mitigation: Less than Significant

Impact TRAF-5: Because westbound Deer Hill Road speeds increase as vehicles descend the hill east of the west Project driveway, westbound vehicles slowing or stopping in the westbound Deer Hill Road through lane before turning left into the west Project driveway would present potential safety issues. This Project design feature would substantially increase traffic hazards, resulting in a *significant* impact.

Mitigation Measure TRAF-5: The Project applicant shall either:

- Widen Deer Hill Road as needed to add a striped westbound left turn lane and appropriate taper lengths approaching the west Project driveway, and maintain appropriate widths for bike lanes, traffic lanes, and proposed sidewalks, as well as legal left-turn access at the adjacent driveway on the north side of the roadway; or
- Post signs prohibiting left turns from westbound Deer Hill Road into the west driveway. In the mouth of the driveway on the south side of Deer Hill Road, a raised island designed to physically obstruct left turns into the driveway shall be constructed, if emergency access can be maintained to the satisfaction of the Contra Costa County Fire Prevention District (CCCFFPD) and the eastbound bike lane is not obstructed. Raised centerline or median features to obstruct the westbound left turn are not recommended on Deer Hill Road at this location because of prevailing speeds, as well as potential obstruction of left turns out of the Project driveway and access at the adjacent driveway on the north side of the roadway.

Selection between these two alternative mitigation measures should be coordinated with the potential prohibition of left turns at the east Project driveway, which is not required as mitigation, but is recommended to address design and operational concerns.

Significance after Mitigation: Less than Significant

Impact TRAF-6: Under both Existing plus Project and Cumulative Year 2030 plus Project conditions, the Project's significant impact on p.m. peak-hour traffic speeds for northbound Pleasant Hill Road between the off-ramp from westbound State Route 24 and the proposed Project driveway would result in inadequate emergency access to other areas of Lafayette served by Pleasant Hill Road between State Route 24 and Rancho View Drive. The result would be a *significant* impact.

Mitigation Measure TRAF-6: The Project applicant shall install advance detection equipment for the existing Opticom system as needed to assure effective traffic signal preemption for responding emergency vehicles on northbound Pleasant Hill Road approaching the Deer Hill Road intersection and the other four signalized study intersections to the north. The advance detection system shall be designed to activate a green signal for northbound Pleasant Hill Road at Deer Hill Road with enough time before the emergency vehicle arrives to allow traffic congestion between State Route 24 and the intersection to clear sufficiently to facilitate passage of the emergency vehicle. At a minimum, the advance detection system shall allow emergency vehicles responding from CCCFPD Station 15 (located at 3338 Mount Diablo Boulevard) to activate traffic signal preemption for northbound Pleasant Hill Road at Deer Hill Road as soon as they turn north from eastbound Mount Diablo Boulevard.

Significance after Mitigation: Less than Significant

Impact TRAF-7: The emergency vehicle access shown on the Project site plans does not comply with minimum turning radius requirements at several on-site driveway locations. The restricted turning radii would result in inadequate emergency access to the project site, which would be a *significant* impact.

Mitigation Measure TRAF-7: The Project site plans shall be revised such that corner radii and medians at on-site driveway intersections provide a minimum inside turning radius of 25 feet and a minimum outside turning radius of 45 feet, per CCCFPD requirements.

Significance after Mitigation: Less than Significant

Impact TRAF-8: During the grading phase of construction on the Project site, large truck traffic on Pleasant Hill Road and Deer Hill Road and elimination of the existing passenger loading zone along the project frontage on Pleasant Hill Road would result in a temporary *significant* impact.

Mitigation Measure TRAF-8: The Project applicant shall prepare and submit a Construction Staging Plan for review and approval by the City Engineer. The Construction Staging Plan shall include elements such as flaggers for trucks entering and exiting the site, and a designated liaison to coordinate with the City, schools, and the public as needed, and shall implement the following required measures:

- Large trucks involved in the grading phase of construction shall be prohibited from arriving at or departing from the Project site during the hours of 7:00 to 9:00 a.m. and 3:00 to 7:00 p.m. on any school day, and 7:00 to 9:00 a.m. and 4:00 to 7:00 p.m. on any non-school weekday.
- Large trucks shall be prohibited from making U-turn movements from northbound to southbound Pleasant Hill Road at the Deer Hill Road intersection during construction. The Construction Staging Plan shall specify for each construction phase whether access to the Project site from northbound Pleasant Hill Road will be allowed by providing a median opening for left turns directly into the site south of Deer Hill Road, or will require a left turn onto Deer Hill Road and a subsequent left turn into the site,
- If the Construction Staging Plan allows large trucks to turn left from northbound Pleasant Hill Road to Deer Hill Road, accommodation of their turning radius may require the following temporary measures: modifications to the south median within up to 15 feet from the nose; relocation of the limit line for eastbound Deer Hill Road traffic lanes by up to 15 feet behind the existing crosswalk marking; adjustments to vehicle detectors, any other

affected traffic signal equipment, and traffic signal timing as required to maintain safe and effective operations; and, measures as otherwise specified by the City Engineer.

- The proposed locations and configuration of access points on Pleasant Hill Road and Deer Hill Road where large trucks would turn into or out of the Project site during construction shall be subject to approval by the City Engineer, to ensure consideration of sight-distance constraints and implementation of appropriate safety precautions.
- During any construction phase when access to the existing passenger loading zone on the west curb of Pleasant Hill Road along the Project frontage would be unavailable on school days, one of the following measures:
 - Provide a safe, temporary alternative loading zone in the immediate area, subject to approval by the City Engineer. Potential alternatives may include temporary use of the property on the northwest corner of Pleasant Hill Road and Deer Hill Road, which would require surface improvements to facilitate safe vehicle and pedestrian access.
 - Stage construction on the subject portion of the site such that during the school break for summer, the existing passenger loading zone would be demolished and replaced by construction of the recommended roadway configuration and passenger loading zone on the Pleasant Hill Road Project frontage.
- The Construction Staging Plan shall require restriping of bike lanes and other pavement markings at the discretion of the City Engineer to address wear from construction traffic.
- Special school events, such as swim meets, shall be addressed by the designated liaison required in the Construction Staging Plan, or any additional measures that the City Engineer may require in that Plan.

Significance after Mitigation: Less than Significant

Impact TRAF-9: Project driveways would provide inadequate truck turning radii for large trucks. The resulting improper lane use and other potential unsafe maneuvers by trucks on heavily travelled public streets would substantially increase hazards due to a design feature, which is a *significant* impact.

Mitigation Measure TRAF-9: The Project site plan shall be revised at the three Project driveways such that adequate truck turning radii are provided, by widening the portion of the entry roadway near each intersection, modifying the median configuration, and/or increasing the corner radius.

Significance After Mitigation: Less than Significant

Impact TRAF-10: Under the Cumulative Year 2030 plus Project scenario, the Brown Avenue/Deer Hill Road intersection would continue to operate at an unacceptable LOS F during the a.m. and p.m. peak hours, with delay increases substantially higher than five seconds. This would be a *significant* cumulative impact.

Mitigation Measure TRAF-10: Implement Mitigation Measure TRAF-2.

Significance after Mitigation: With signalization, the Brown Avenue/Deer Hill Road intersection would operate at Good LOS D during the a.m. peak hour and LOS C during the p.m. peak hour under Cumulative Year 2030 plus Project conditions, reducing the project impact to *less than significant*.

Impact TRAF-11: Under the Cumulative Year 2030 plus Project scenario, Project traffic exiting the west Project driveway on Deer Hill Road would experience an LOS E delay during the a.m. peak hour. Although LOS E is acceptable at a one-way stop control intersection such as the driveway, the amount of delay suggests that drivers turning left out of the driveway would have some difficulty finding an acceptable gap in traffic flow on Deer Hill Road, at a location where prevailing speeds are relatively high. This would pose a traffic hazard, resulting in a *significant* cumulative impact.

Mitigation Measure TRAF-11: Widen Deer Hill Road at the west Project driveway as needed to add a striped westbound median refuge lane to receive left turns from the driveway, provide appropriate taper lengths west of the refuge lane, and maintain appropriate widths for bike lanes, traffic lanes, and proposed sidewalks.

Significance after Mitigation: Less than Significant

Impact TRAF-12: Under the Cumulative Year 2030 plus Project scenario, the peak estimated 95th-percentile left-turn queue length for northbound traffic on Pleasant Hill Road at Deer Hill Road would be 306 feet during the a.m. peak hour, which would exceed the capacity of the existing 250-foot storage lane. This would be a *significant* cumulative impact.

Mitigation Measure TRAF-12: An additional southbound lane on Pleasant Hill Road, a continuous left-turn storage lane serving northbound Pleasant Hill Road traffic at both the Project driveway and Deer Hill Road, or a longer left-turn lane allowed by prohibiting northbound left turns into the Project driveway would have the potential to mitigate northbound left-turn queue lengths at Deer Hill Road. However, these measures would result in significant secondary impacts and other undesirable effects. Therefore, these potential mitigation measures are not considered to be feasible.

Significance after Mitigation: Significant and Unavoidable

Impact TRAF-13: Under the Cumulative Year 2030 plus Project scenario, the peak estimated 95th-percentile left-turn queue lengths for northbound traffic on Pleasant Hill Road at the Project driveway would be 124 feet and 177 feet during the school p.m. and commute p.m. peak hours, respectively, which would exceed the capacity of the 100-foot storage lane proposed in the Project plans. This would be a *significant* cumulative impact.

Mitigation Measure TRAF-13: An extended left-turn storage lane serving northbound Pleasant Hill Road traffic at the Project driveway would have the potential to reduce queue lengths. However, this measure would result in significant secondary impacts and therefore this mitigation measure is not considered to be feasible.

Significance after Mitigation: Significant and Unavoidable

Impact TRAF-14: Under Cumulative Year 2030 plus Project conditions, the Project would reduce the average speed on northbound Pleasant Hill Road between the State Route 24 westbound off-ramp and Acalanes Avenue during the p.m. peak hour from 2.7 miles per hour (mph) to 2.4 mph, an 11 percent reduction. This speed reduction of more than ten percent is considered an unacceptable weaving condition that would substantially increase hazards, resulting in a *significant* cumulative impact.

Mitigation Measure TRAF-14: Prohibiting the left turn from northbound Pleasant Hill Road into the Project driveway would reduce weaving impacts but would result in a significant cumulative Project impact at the Deer Hill Road – Stanley Boulevard/Pleasant Hill Road intersection. Therefore, this mitigation measure is not considered feasible.

Significance after Mitigation: No feasible mitigation measure is available to reduce the Project impact on northbound Pleasant Hill Road between the State Route 24 westbound off-ramp and the Project driveway to less-than-significant levels. Therefore, this impact is considered significant and unavoidable.

Impact TRAF-15: Under Cumulative Year 2030 plus Project conditions, the addition of Project trips to Pleasant Hill Road would increase the peak hour peak direction Delay Index by approximately 0.41 for southbound traffic in the a.m. peak hour and northbound traffic in the p.m. peak hour. Because the Delay Index would increase by more than 0.05 for peak hour peak direction traffic where the Delay Index exceeds 2.0 on Pleasant Hill Road, the result would be a *significant* cumulative impact.

Mitigation Measure TRAF-15: Measures to address this impact include the provision of transit service in the Pleasant Hill Road/Taylor Boulevard corridor, measures to meter traffic flow on Pleasant Hill Road to discourage its use to bypass the Interstate 680/State Route 24 interchange, or the construction of additional capacity on Pleasant Hill Road north of State Route 24. However, these measures would either fail to reduce the cumulative Project impact to less than significant or are not considered to be feasible.

Significance after Mitigation: Significant and Unavoidable

Impact TRAF-16: The Project would generate an additional weekday parking demand for up to 50 spaces at the Lafayette BART station, which represents approximately three percent of the 1,526 spaces in the lot. Because the parking lot demand already exceeds capacity on weekdays, this would be a *significant* impact.

Mitigation Measure TRAF-16: The Project applicant shall provide subsidized, frequent shuttle service between the Project site and the Lafayette BART station during the a.m. and p.m. peak commute periods, until such time that a bus route on Pleasant Hill Road serving the BART station is implemented (as called for in the Lamorinda Action Plan), at which point the Project applicant may provide transit vouchers in lieu of a shuttle.

Significance after Mitigation: Less than Significant

Impact TRAF-17: The Project site plan does not include a loading and unloading area for school bus service, and peak hour traffic congestion on Pleasant Hill Road and Deer Hill Road would be exacerbated if all traffic would be required to stop for a school bus in the traffic lane. This would be a *significant* impact.

Mitigation Measure TRAF-17: The Project applicant shall coordinate with the Lamorinda School Bus Program to determine the appropriate locations and designs for bus stop pullouts along the Project frontage, which the Project applicant shall construct as part of the Project site frontage improvements. A bus stop on the southbound Pleasant Hill Road frontage may need to be located south of the Project driveway to avoid driveway sight-distance issues as well as conflicts with passenger loading activity for Acalanes High School north of the

driveway. On eastbound Deer Hill Road, a bus stop would need to be located to avoid sight-distance issues at Project driveways.

Significance after Mitigation: Less than Significant

Impact TRAF-18: The 5-foot sidewalks proposed by the Project plans would be narrower than those existing in the immediate vicinity or recently approved by the City on arterial roadways. Therefore, the Project would be inconsistent with City guidelines for pedestrian facilities. This would be a *significant* impact.

Mitigation Measure TRAF-18: The Project applicant shall implement the following measures:

- Mitigation TRAF-18-A: On the south side of Deer Hill Road along the Project site frontage, construct new sidewalk and curb at a width of at least 6.5 feet, or as otherwise specified by the City Engineer.
- Mitigation TRAF-18-B: On the west side of Pleasant Hill Road along the Project site frontage, construct a new shared path for bicycles and pedestrians at a paved width of ten feet with a buffer strip at least four feet wide between the path and the curb, or as otherwise specified by the City Engineer. The buffer strip's surface treatment shall be appropriate to accommodate pedestrians accessing vehicles at curb parking and passenger loading areas. At the southwest corner of Pleasant Hill Road and Deer Hill Road, the path shall be designed to accommodate expected volumes of pedestrians and bicyclists waiting for the traffic signal. (This measure shall be in addition to Mitigation Measures TRAF-20, TRAF-21, TRAF-22, and TRAF-23 described below.)

Significance after Mitigation: Less than Significant

Impact TRAF-19: Project driveways on Deer Hill Road and Pleasant Hill Road would interrupt the new sidewalks and would cross existing and proposed Class II bike lanes. This would present conflicting vehicle traffic for pedestrians and bicyclists, which would be a *significant* impact.

Mitigation Measure TRAF-19: Implement Mitigation Measure TRAF-4. In addition, the Project applicant shall install stop signs for traffic exiting Project driveways, and special design treatments such as paving to be specified by the City Engineer to alert drivers exiting the Project site that they are crossing pedestrian and bicycle facilities.

Significance after Mitigation: Less than Significant

Impact TRAF-20: Proposed widening of southbound Pleasant Hill Road to add a vehicle traffic lane includes adding a 5-foot wide Class II bike lane along the west curb north of the Project driveway. South of the Project driveway, the bike lane would be forced to shift to the left side of the additional southbound traffic lane that would become a right-turn-only lane for the on-ramp to westbound State Route 24. This configuration would cause unacceptable weaving conflicts with vehicle traffic for the planned southbound bike lane, resulting in a *significant* impact.

Mitigation Measure TRAF-20: The Project shall implement an alternative configuration for widening southbound Pleasant Hill Road, which would not add a vehicle traffic lane. Southbound Pleasant Hill Road shall be widened along the Project frontage to provide a six-foot wide Class II bike lane between an 8-foot wide curb loading and parking lane and the existing traffic lanes, or dimensions otherwise specified by the City Engineer. This configuration would maintain the existing curb loading and parking lane, except for a segment extending up to 100 feet north from the Project driveway, where the roadway shall be widened to

accommodate an additional 12-foot wide right-turn lane along with the 6-foot wide Class II bike lane, or dimensions otherwise specified by the City Engineer. (This measure shall be in addition to Mitigation Measures TRAF-18-B, TRAF-21, TRAF-22, and TRAF-23.)

Significance after Mitigation: Less than Significant

Impact TRAF-21: Project plans could preclude accommodation of a planned bike path along the Project boundary, and the plans propose a narrower facility on the west side of Pleasant Hill Road than those recently constructed by the City for shared bicycle and pedestrian use. Therefore, the Project would interfere with planned bicycle facilities, resulting in a *significant impact*.

Mitigation Measure TRAF-21: Implement Mitigation Measure TRAF-18-B. In addition, the Project applicant shall coordinate with the City and Caltrans to ensure that Project site improvements adjacent to the Caltrans State Route 24 right-of-way, such as grading, drainage, retaining walls, or other structures, do not preclude construction of a Class I bicycle path meeting applicable vertical and horizontal alignment standards, at a paved width of ten feet with graded shoulders at least two feet wide on both sides, or as otherwise specified by the City Engineer. The Project applicant shall dedicate additional right-of-way as needed to ensure the feasibility of constructing such a path. The Project applicant shall coordinate with the City to develop an appropriate alignment of the path to connect with the shared bicycle/pedestrian path described in Mitigation Measure TRAF-18-B while also intersecting the Project driveway on Pleasant Hill Road as described in Mitigation Measure TRAF-22. (This measure shall be in addition to Mitigation Measures TRAF-20 and TRAF-23.)

Significance after Mitigation: Less than Significant

Impact TRAF-22: Traffic entering and exiting the proposed Project driveway on Pleasant Hill Road would interfere with the shared bicycle and pedestrian path that is planned along the west side of the roadway, causing hazards to bicyclists at the driveway intersection. This would be a *significant impact*.

Mitigation Measure TRAF-22: The Project applicant shall coordinate with the City to develop an appropriate route and dedicate right-of-way on the Project site for a bike path alignment that would intersect the driveway approximately 50 feet or more from Pleasant Hill Road. Additionally, the Project applicant shall provide the necessary grading and structural support on the site to allow for a Class I bike path that meets applicable width and slope standards, provides adequate sight-distance where it intersects the driveway, and connects with the shared bicycle/pedestrian path described in Mitigation Measure TRAF-18-B and the planned bike path described in Mitigation Measure TRAF-21 on both ends. Where the driveway intersects the bike path, the Project applicant shall also install special design treatments, such as paving, to be specified by the City Engineer, to alert drivers that they are crossing a bike path. (This measure shall be in addition to Mitigation Measures TRAF-20 and TRAF-23.)

Significance after Mitigation: Less than Significant

Impact TRAF-23: Project plans propose widening southbound Pleasant Hill Road between Deer Hill and the on-ramp to westbound State Route 24 to add a vehicle traffic lane and a bike lane along the west curb, where the plans show elimination of the existing curb parking and passenger loading zone. The proposed elimination of the existing designated spaces on the west curb of Pleasant Hill Road that are currently used for school passenger loading would result in additional hazardous passenger loading activity at unsuitable locations. The loss of these designated curb spaces used for

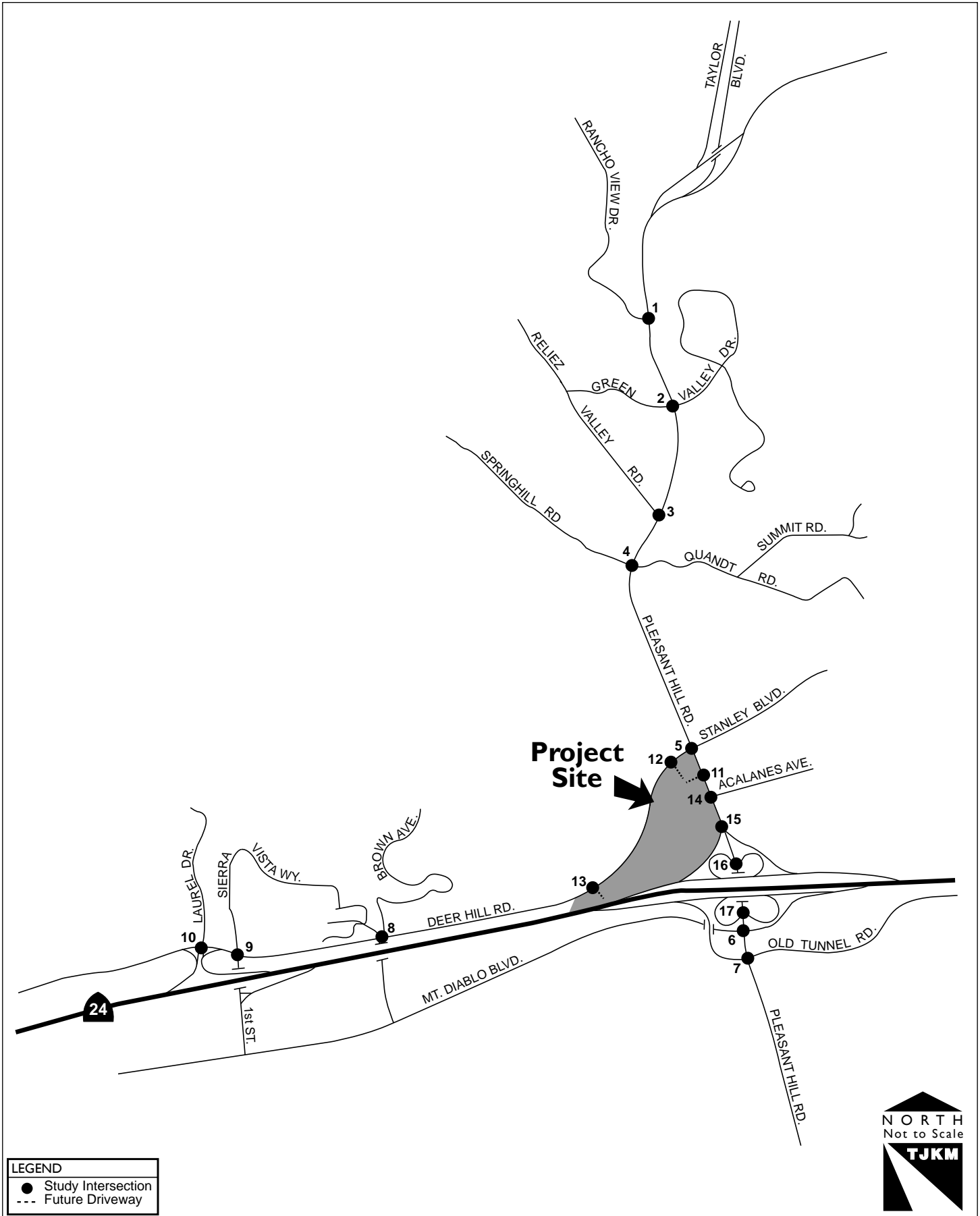
passenger loading would substantially increase hazards for school pedestrians and vehicle traffic in the immediate area, resulting in a *significant* impact.

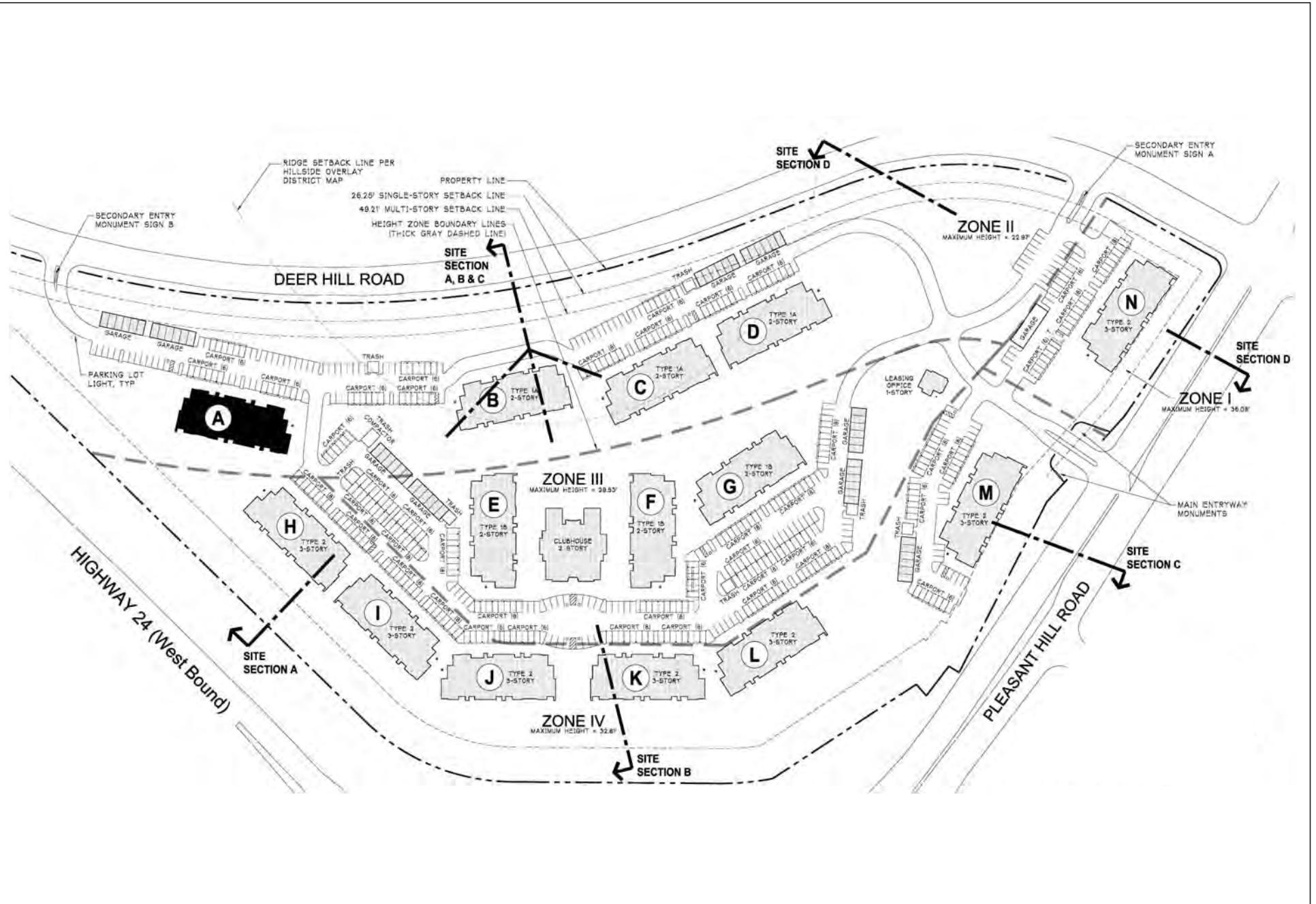
Mitigation Measure TRAF-23: Implement Mitigation Measure TRAF-20. The entire curb segment between Deer Hill Road and the recommended right-turn lane shall be designated as a passenger loading zone, which would accommodate eight cars in approximately the same location as the existing curb spaces used for passenger loading. (This measure shall be in addition to Mitigation Measures TRAF-18-B, TRAF-20, TRAF-21, and TRAF-22.)

Significance after Mitigation: This configuration would maintain the existing curb loading and parking lane, except for a segment extending up to 100 feet north from the Project driveway, and would accommodate only one vehicle less vehicle than the maximum observed curb loading space demand. This alternative configuration for widening southbound Pleasant Hill Road would reduce this impact to a *less-than-significant* level.

Although not required as mitigation for significant impacts, TJKM also recommends the following modifications to improve design and operations:

- Restrict the east Project driveway to right-turn-only access. This restriction could be implemented by posting signs prohibiting left turns to and from westbound Deer Hill Road at the east driveway, and potentially constructing a raised island designed to physically obstruct left turns at the driveway.
- TJKM reviewed the project site plans (overview in Figure 2) with regard to on-site circulation, including pedestrians. For purposes of the following description of recommendations, the term “upper loop” refers to the on-site driveway closest to Deer Hill Road that serves buildings A, B, C, and D, and connects the west project driveway on Deer Hill Road to the Pleasant Hill Road driveway. The “lower loop” refers to the on-site driveway closer to the southerly property boundary that serves buildings E through L and the Clubhouse, terminating at the east project driveway on Deer Hill Road.
 - To maintain adequate sight-distance, all landscaping within 15 feet of on-site driveway intersections shall be limited to plants with foliage no more than 30 inches fully mature height above the closest adjacent curb elevation, or trees with canopy foliage no less than seven feet above the closest adjacent curb elevation, or other dimensions as specified by the City Engineer.
 - At the on-site four-way intersection of the upper loop and lower loop driveways, which connect to Pleasant Hill Road and the east driveway on Deer Hill Road respectively, install two-way stop sign control on one of the two driveways.
 - Revise the site plan to include construction of pedestrian facilities, which may include stairs and walkways on alignments as needed, to provide more direct pedestrian connections for the following routes:
 - Between Deer Hill Road and Building A, along the west project driveway
 - Between Building D and Pleasant Hill Road near Building M, along the upper loop driveway
 - Between Building G and Deer Hill Road, along the lower loop driveway
 - Between Building L and the Leasing Office, along the lower loop driveway
 - Between Building M and the recommended facility along the upper loop driveway
 - Between Building N and the upper loop driveway, with a potential crosswalk to connect with the recommended Building M connection





Traffic Operations Analysis Methodology

Study Scenarios

The following traffic scenarios were addressed in this study:

- *Existing Conditions* – This scenario evaluates existing (2011) traffic volumes and roadway conditions based on existing peak hour turning movement counts and field surveys.
- *Existing plus Project Conditions* – This scenario is identical to Existing Conditions, but with the addition of traffic expected to be generated by the proposed project and the connection of project driveways to the adjacent roadways.
- *Cumulative Year 2030 No Project Conditions* - This scenario is based on projecting Existing Conditions traffic volumes 20 years into the future using growth factors derived from the latest Contra Costa Transportation Authority (CCTA) travel demand model for Year 2035. This model includes future land use and transportation network assumptions for the entire county, including Lafayette, Pleasant Hill, Martinez, Walnut Creek, Moraga, and unincorporated areas. The CCTA model assumes no development of the Project site.
- *Cumulative Year 2030 plus Project Conditions* – This scenario is identical to Cumulative Year 2030 No Project Conditions, but with the addition of traffic expected to be generated by the proposed project and the connection of project driveways to the adjacent roadways.

Intersection Analysis Methodology

Study Intersections

The analysis evaluated traffic conditions at study intersections that the proposed project may potentially affect by adding a considerable number of peak hour trips. The following study intersections were analyzed:

1. Pleasant Hill Road / Rancho View Drive (Signalized)
2. Pleasant Hill Road / Green Valley Drive (Signalized)
3. Pleasant Hill Road / Reliez Valley Road (Signalized)
4. Pleasant Hill Road / Springhill Road – Quandt Road (Signalized)
5. Pleasant Hill Road / Deer Hill Road – Stanley Blvd. (Signalized)
6. Pleasant Hill Road / Mt. Diablo Blvd. / SR 24 Eastbound On-ramp (Signalized)
7. Pleasant Hill Road / SR 24 Eastbound Off-ramp – Old Tunnel Rd. (Signalized)
8. Deer Hill Road / Brown Avenue (Unsignalized)
9. Deer Hill Road / First Street – Sierra Vista Way (Signalized)
10. Deer Hill Road / SR 24 Westbound Ramps – Laurel Dr. (Signalized)
11. Pleasant Hill Road / Project Driveway (Proposed – Unsignalized)
12. Deer Hill Road / Project Driveway East (Proposed – Unsignalized)
13. Deer Hill Road / Project Driveway West (Proposed – Unsignalized)

All of the study intersections are outside of the Downtown area as defined in the Lafayette General Plan Circulation Chapter (p. II-5).

Level of Service Analysis Methodology

Level of service (LOS) is a qualitative description of intersection operations and is reported using an A through F letter rating system to describe travel delay and congestion. LOS A indicates free flow conditions with little or no delay, and LOS F indicates jammed conditions with excessive delays and long back-ups. The LOS methodology is detailed in Appendix A. In most cases, the level

of service analysis is performed using intersection turning movement volumes during each of the a.m. and p.m. commute peak hours; the analysis presented herein also includes the mid-afternoon peak hour that occurs around school dismissal.

Operating conditions at the study intersections were evaluated using the 2000 Transportation Research Board Highway Capacity Manual (HCM 2000) Operations methodology. Peak hour traffic operational conditions for signalized intersections are reported as average control delay for the overall intersection in seconds per vehicle with corresponding levels of service. In addition to the control delay and level of service relationships shown in Appendix A, the City of Lafayette has the following definitions for signalized intersections as shown in Table I:

- “Good” LOS D is defined as 35 to 45 seconds of average control delay per vehicle.
- “Poor” LOS D is defined as 45 to 55 seconds of average control delay per vehicle.

Table I: Signalized Intersection Level of Service Criteria

LOS	Description	Average Control Delay (Seconds)
A	Free flow/non-congested operation. Turning movements are easily made and all queues clear in a single signal cycle.	≤ 10.0
B	Stable operation/minimal delays. An occasional approach phase is fully utilized. Drivers begin to feel somewhat restricted within platoons of vehicles.	> 10.0 to 20.0
C	Stable operation/acceptable delays. Major approach phases fully utilized. Backups may develop behind turning vehicles.	> 20.0 to 35.0
D	Approaching unstable operation/tolerable delays. Drivers may have to wait through more than one red signal indication. Queues may develop but dissipate rapidly, without excessive delays.	“Good” D: > 35.0 to 45.0
		“Poor” D: > 45.0 to 55.0
E	Unstable operation/significant delays. Volumes at or near capacity. Vehicles may wait through several signal cycles. Long queues form upstream of intersection.	> 55.0 to 80.0
F	Forced flow/excessive delays. Represents jammed conditions. Traffic demand exceeds the capacity. Queues may block upstream intersection.	> 80.0

Source: Transportation Research Board, 2000, *Highway Capacity Manual*; 2002 City of Lafayette General Plan.

For unsignalized intersections, average control delay is reported for the critical minor stop-controlled approach, with corresponding levels of service as shown in Appendix A.

Although not used to determine CEQA impacts at intersections, level of service calculations using the Contra Costa Transportation Authority (CCTA) adopted methodology for evaluating signalized intersections were also performed in order to analyze impacts against locally-adopted transportation criteria. The CCTA LOS methodology is detailed in Appendix A.

Pleasant Hill Road Corridor Traffic Simulation

The HCM 2000 LOS analysis was performed using Synchro traffic analysis software. To provide supplemental data regarding peak-hour vehicle queues, travel times and traffic delays on the Pleasant Hill Road corridor between the Rancho View Drive and SR 24 eastbound off-ramp/Old Tunnel Road intersections, the Simtraffic traffic simulation module of the Synchro software was utilized.

The Simtraffic model was developed to run simulations for the a.m. peak hour, school dismissal p.m. peak hour, and commute p.m. peak hour. The elements incorporated into the simulation model include:

- Street geometry, lane configurations and usage, allowed turning movements, and parking restrictions
- Traffic signal timing plans
- Vehicular and pedestrian volumes at intersections based on data collection
- Field observations of driver behavior and lane change parameters

Validation and calibration of the Existing conditions Simtraffic model included the following steps:

- The Existing conditions model was calibrated by adjusting certain calibration parameters provided in Simtraffic to fine-tune the model and reasonably replicate observed/measured field conditions such as travel time, delay, queues, and saturation flow rates.
- Video recording of Existing traffic conditions for both the northbound and southbound directions on Pleasant Hill Road was performed for all three analysis periods. These recordings served as an additional tool for calibrating and validating the existing model.
- TJKM calibrated the Simtraffic model to match the observed travel times within a reasonable tolerance range.

The calibrated Existing conditions model was used to develop simulations of the following scenarios:

- Existing with Project conditions (a.m. peak hour, school dismissal p.m. peak hour, and commute p.m. peak hour)
- Cumulative with Project conditions (a.m. peak hour and commute p.m. peak hour)
- Peak-hour travel times and critical queue lengths within this Pleasant Hill Road corridor, including long queues backing up through upstream intersections, were estimated for these three scenarios based on the results of the analyses described above.

Peak Hour Traffic Signal Warrant Criteria

TJKM conducted a signal warrant analysis for study intersections in which traffic signal installation is considered as a mitigation option under Existing plus Project Conditions and Cumulative 2030 plus Project Conditions. The 2010 California Manual on Uniform Traffic Control Devices (CA-MUTCD) was used to determine whether unsignalized study intersections operating at an unacceptable LOS meet the criteria for installation of a traffic signal. Installation should be considered if one or more of the warrant criteria described in the CA-MUTCD is met.

As part of this study, unsignalized study intersections operating at LOS F were evaluated using the 2010 CA-MUTCD peak hour warrant (Warrant 3). The peak hour signal warrant is intended for intersections where for a minimum of one hour of an average day, the minor-street traffic experiences undue delay when entering and crossing the major street. Entering peak hour intersection traffic volumes for a given analysis scenario are used as the basis for this evaluation.

Routes of Regional Significance Delay Index Methodology

The Contra Costa Transportation Authority (CCTA) serves as the Congestion Management Agency (CMA) for Contra Costa County. State Route 24 and Pleasant Hill Road north of State Route 24 are designated by CCTA as Routes of Regional Significance.

The Final Lamorinda Action Plan Update (DKS Associates, December, 2009) and the 2009 Countywide Comprehensive Transportation Plan (adopted June 17, 2009) establish Multimodal Traffic Service Objectives (MTSOs) for CCTA-designated routes of Regional Significance in Lamorinda. An MTSO used to measure freeway and arterial operations is the peak hour peak direction Delay Index, which is defined as the ratio of peak period peak direction travel time to off-peak period travel time on each roadway segment. For example, a Delay Index of 2.0 means that it takes twice as long to travel a particular segment during the peak commute hour than during non-commute hours when traffic moves at free-flow speeds.

Delay Indexes for Cumulative 2030 conditions were calculated on State Route 24 between St. Stephens Drive and Interstate 680 for westbound traffic during the a.m. peak hour and eastbound traffic during the p.m. peak hour. For Pleasant Hill Road between State Route 24 and Taylor Boulevard, Delay Indexes for Cumulative 2030 conditions were calculated for the southbound direction during the a.m. peak hour and northbound during the p.m. peak hour.

Pleasant Hill Road Weaving Traffic for Project Driveway Access

TJKM analyzed weaving traffic conditions on Pleasant Hill Road between the free-flow freeway ramp junctions at SR 24 and the proposed project driveway on Pleasant Hill Road. Weaving conditions involve traffic entering one side (right or left) of a roadway that must weave across traffic lanes to make a turn or exit on the opposite side of the roadway within a short distance. The standard Highway Capacity Manual methodology for weaving analysis, which is typically used for freeways, is not directly applicable to Pleasant Hill Road because of the lower prevailing speeds and the presence of traffic signals immediately upstream and downstream of the weaving section.

TJKM used CORSIM simulation software, a specialized and advanced simulation tool, to study weaving conditions at the following locations:

- Northbound Pleasant Hill Road between the off-ramps from SR 24 and the project driveway, caused by vehicles making left turns into the project driveway
- Southbound Pleasant Hill Road between the project driveway and the westbound SR 24 on-ramp, caused by vehicles making right turns out of the project driveway

The key traffic performance measure provided by the CORSIM simulation output is the average speed on the critical weaving segment. TJKM compared the average speed results for the weaving segments with and without the project to determine whether a significant reduction in speed would occur, which would indicate that the weaving traffic movements cause potentially hazardous vehicle conflicts.

Significant Impact Criteria

The project is considered to have a significant impact on traffic conditions if it would:

1. Cause a signalized “downtown” intersection (as identified in General Plan) operations to deteriorate from LOS A, B, C, or D to LOS E or F.
2. Cause operations at a signalized intersection “outside downtown” to deteriorate from LOS A, B, C, or “good” D to “poor” LOS D or to LOS E or F. “Good” LOS D is defined as 35 to 45 seconds of average control delay per vehicle. “Poor” LOS D is defined as 45 to 55 seconds of average delay.
3. Cause the overall level of service at an unsignalized all-way stop control intersection to degrade from LOS D or better to LOS E or F.
4. Cause the level of service at an unsignalized one- or two-way stop control intersection to degrade from LOS E or better for the worst movement from the side street to LOS F, where the intersection also meets at least one warrant for the installation of a traffic signal.
5. Cause a Delay Index to increase from 2.0 or less to exceed 2.0 for the peak hour peak direction on State Route 24 or Pleasant Hill Road.
6. Cause delay to increase by five or more seconds at an intersection, or the Delay Index to increase by 0.05 or more for a roadway, where subject intersection or roadway is operating below the acceptable standard that is applicable, as outlined above.
7. Substantially increase hazards due to a design feature (e.g. sharp curves; intersections or driveways with restricted visibility, or causing unacceptable weaving conditions such as decreasing average speed by ten percent or more on the weaving segment, etc.).
8. Generate added transit ridership that would increase the peak hour average ridership at a BART station by three (3) percent where average waiting time at fare gates also either:
 - a) Already exceeds one minute, or
 - b) Would exceed one minute as a result of ridership added by the project.
9. Generate added transit ridership that would increase the AM load factor on a County Connection bus line such that it would be over capacity during the AM peak hour (load factor greater than 1.0).
10. Create demand for public transit services above that which is provided or planned; disrupt or interfere with existing or planned transit services or facilities; or create inconsistencies with adopted transit system plans, guidelines, policies, or standards.
11. Disrupt existing bicycle or pedestrian facilities; interfere with planned bicycle or pedestrian facilities; or create inconsistencies with adopted bicycle or pedestrian system plans, guidelines, policies, or standards.

Mitigation measures would subsequently be evaluated that would potentially improve the impacted condition such that the subject threshold would not be exceeded.

Regarding threshold #1 above, none of the study intersections is “Downtown” as defined in the Lafayette General Plan Circulation Chapter (p. II-5).

Existing Conditions

Roadway Network

Regional roadway access to the project site is provided by Pleasant Hill Road and its interchange ramp connections with State Route 24. State Route 24 and Pleasant Hill Road north of State Route 24 are designated by the Contra Costa Transportation Authority (CCTA) as Routes of Regional Significance. Access to the project site at the local level is provided by Deer Hill Road.

The existing circulation network within the study area is composed of a State highway, as well as City arterials, collectors, and local streets. Primary roadways within the study area include the following:

- *State Route 24* is an east-west freeway that runs along the south boundary of the project site, connecting Interstate 680 in Walnut Creek with Interstate 980 and Interstate 880 in Oakland, via the Caldecott Tunnel. The freeway is an eight-lane, divided facility with BART tracks running along the median, including a BART station platform in downtown Lafayette. State Route 24 carries about 178,000 vehicles per day near the Pleasant Hill Road interchange, according to Caltrans data for year 2010. State Route 24 is a CCTA-designated Route of Regional Significance.
- *Pleasant Hill Road* is a four-lane arterial that runs north-south along the east boundary of the project site, and connects with State Route 24 at a full interchange immediately south of the project site frontage. It connects Deer Hill Road with Mount Diablo Blvd. and Olympic Blvd. to the south and the City of Pleasant Hill, City of Walnut Creek, City of Martinez, unincorporated Contra Costa County, and northeasterly areas of Lafayette to the north, and provides access to Acalanes High School and Springhill Elementary School. The road serves as an alternative route to I-680, particularly during periods of peak congestion on the freeway. Pleasant Hill Road is a CCTA-designated Route of Regional Significance north of State Route 24.
- *Deer Hill Road* is an east-west arterial street that runs along the northwesterly boundary of the project site, connecting Pleasant Hill Road on the east with Happy Valley Road on the west. It has two lanes between Pleasant Hill Road and First Street, and widens to four lanes with left-turn lanes and raised medians west of First Street, where it provides access to the Lafayette BART station and westbound State Route 24 freeway ramps. Along the northern edge of the project site, the road is at its steepest, and it curves before descending to meet Pleasant Hill Road. East of Pleasant Hill Road, the street name changes to *Stanley Boulevard*, a two-lane collector street that provides access to Acalanes High School and an alternative route to the City of Walnut Creek.
- *Mount Diablo Boulevard* is an east-west arterial street with two lanes in each direction and sections with either a center left-turn lane or dedicated left-turn lanes and raised medians, which extends from Acalanes Road on the west to Pleasant Hill Road on the east, providing access through the entire length of downtown Lafayette. At its easterly and westerly ends, Mount Diablo Boulevard connects with State Route 24 freeway ramps.
- *First Street* is a four-lane arterial between Mount Diablo Boulevard and Deer Hill Road that runs north-south and connects to State Route 24 with an eastbound freeway on-ramp. North of Deer Hill Road, First Street changes to *Sierra Vista*, which serves as a two-lane neighborhood collector.
- *Springhill Road* is a two-lane collector street extending northwesterly from its intersection from Pleasant Hill Road, providing access to Springhill Elementary school and a residential

area. The east leg of the Springhill Road/Pleasant Hill Road intersection is *Quandt Road*, a two-lane collector extending easterly to provide access to a residential area.

- *Brown Avenue* is a two-lane collector street that runs north-south, connecting Deer Hill Road and Mount Diablo Blvd. via an underpass at State Route 24. North of Deer Hill Road, Brown Avenue splits into two 2-lane neighborhood collectors: Miller Road and Brown Avenue (private).
- *Reliez Valley Road* is a two-lane collector street extending northerly from its intersection with Pleasant Hill Road, providing access to residential areas westerly of Pleasant Hill Road and Taylor Boulevard, and connecting with Alhambra Valley Road in unincorporated area near the City of Martinez.
- Collector and local streets in the study area also include the following two-lane roadways that mostly serve residential areas: Acalanes Avenue, Green Valley Drive, Rancho View Drive, and Old Tunnel Road.

The key study intersection adjacent to the Project site is Pleasant Hill Road/Deer Hill Road – Stanley Boulevard, which is signalized. The traffic signal timing sequence provides separate green signal phases for left/U-turns from Pleasant Hill Road, eastbound traffic on Deer Hill Road, and westbound traffic on Stanley Boulevard. On southbound Pleasant Hill Road approaching the intersection, the curb lane is a shared bike lane from which right turns are permitted. The existing geometry of the southwest corner curb and resulting southbound roadway width on Pleasant Hill Road south of the intersection constrains the available radius for U-turns from northbound Pleasant Hill Road, which prevents long pickup trucks and larger trucks from completing U-turns in one continuous movement. The resulting stopping and backing up movements contribute to traffic delay and queues at the intersection.

Existing Traffic Volumes

Weekday a.m. (7:00 a.m. to 9:00 a.m.), school dismissal p.m. (2:00 to 4:00 p.m.) and commute p.m. (4:00 p.m. to 6:00 p.m.) peak turning movement counts were collected mostly in May 2011 or early December 2011 at study intersections #1 to #8, with the date exceptions at the Springhill Road/Pleasant Hill Road intersection (#4) as shown in Table II. At the two more westerly intersections of Deer Hill Road - at First Street (#9) and at the SR 24 westbound ramps (#10) – counts were collected in September 2009. Counts for all three peak periods were also collected in early December 2011 at those Pleasant Hill Road junctions with SR 24 ramps that are uncontrolled merging or exiting movements. Detailed count data are provided in Appendix B. The existing peak hour turning movement volumes, as well as lane geometries and traffic controls at the study intersections, are shown in Figure 3. Note that U-turn volumes are shown separately from left-turn volumes only at those study intersections where a substantial number of U-turns were counted, and are otherwise included in the left-turn volumes shown at the intersections where U-turns are less frequent.

Table II: Dates of Peak Period Intersection Counts

ID	Intersection	Count Date		
		A.M. Peak	School P.M. Dismissal	P.M. Peak
1	Rancho View Drive/Pleasant Hill Road	May 2011	December 1, 2011	May 2011
2	Green Valley Drive/Pleasant Hill Road	May 2011	December 1, 2011	May 2011
3	Reliez Valley Road/Pleasant Hill Road	May 2011	December 1, 2011	May 2011
4	Springhill Road – Quandt Road/Pleasant Hill Road	January 10, 2012	December 1, 2011	September 2010
5	Deer Hill Road – Stanley Blvd./Pleasant Hill Road	December 1, 2011	December 1, 2011	December 1, 2011
6	Mt. Diablo Boulevard/Pleasant Hill Road	May 2011	December 1, 2011	May 2011
7	SR 24 EB Off-Ramp/Pleasant Hill Road	May 2011	December 1, 2011	May 2011
8	Deer Hill Road/Brown Avenue	May 2011	(No count)	May 2011
9	Deer Hill Road/First Street - Sierra Vista Way	September 2009		
10	Deer Hill Road/SR 24 WB Ramps - Laurel Drive			

Intersection Level of Service Analysis Results, Existing Conditions

Existing levels of service for each study intersection were calculated based on the existing intersection geometry, traffic control, and a.m., school dismissal p.m., and commute p.m. peak hour traffic volumes. Table III illustrates the results of the level of service analysis using the HCM 2000 methodology for the study intersections under Existing Conditions. Detailed level of service calculations are contained in Appendix C. Under Existing Conditions, all of the signalized study intersections are operating within acceptable City LOS standards except the following two:

- Deer Hill Road – Stanley Blvd./Pleasant Hill Road: LOS F during the a.m. peak hour, LOS E during the p.m. peak hour
- Deer Hill Road/SR 24 Westbound Ramps – Laurel Drive: Poor LOS D, a.m. and p.m. peaks

At the only Existing unsignalized study intersection, the northbound and southbound stop-controlled minor approaches on Brown Avenue at Deer Hill Road currently operate at LOS F during the a.m. and p.m. peak hours. The California Manual on Uniform Traffic Control Devices (MUTCD) peak hour traffic signal warrant is met for both peak hours under Existing conditions.

Table III: Peak Hour Intersection Levels of Service – Existing Conditions

ID	Intersection	Existing Conditions					
		A.M. Peak Hour		School P.M. Peak Hour		P.M. Peak Hour	
		Delay	LOS	Delay	LOS	Delay	LOS
1	Rancho View Drive/Pleasant Hill Road	7.3	A	6.9	A	5.3	A
2	Green Valley Drive/Pleasant Hill Road	5.8	A	7.7	A	4.9	A
3	Reliez Valley Road/Pleasant Hill Road	24.5	C	8.5	A	9.8	A
4	Springhill Road – Quandt Road/ Pleasant Hill Road	21.2	C	10.6	B	12.9	B
5	Deer Hill Road –Stanley Blvd./ Pleasant Hill Road	189.7	F	39.7	D	58.5	E
6	Mt. Diablo Boulevard - SR 24 EB On- ramp/Pleasant Hill Road	14.7	B	16.7	B	16.9	B
7	SR 24 EB Off-Ramp – Old Tunnel Road/Pleasant Hill Road	13.2	B	15.0	B	16.2	B
8	Deer Hill Road/Brown Avenue	145.5	F	NA	NA	271.1	F
9	Deer Hill Road/First Street – Sierra Vista Way	13.4	B	11.3	B	14.4	B
10	Deer Hill Road/SR 24 WB Ramps -Laurel Drive	46.6	D	35.7	D	45.3	D

- Notes: 1) LOS=Level of Service, Delay = Average control delay per vehicle in seconds
2) Signalized and all-way stop controlled intersections - Delay / LOS is for overall intersection
3) Unsignalized one- and two-way stop controlled intersections - Delay / LOS is for critical minor stop-controlled approach.
4) **Bold** indicates unacceptable operational conditions based on applicable City standards.
5) NA=Not analyzed. At intersection #8, a.m. and p.m. commute peaks provide worst-case results.

Pleasant Hill Road Corridor Traffic Simulation

Existing conditions along the Pleasant Hill Road study corridor were observed, and the Existing conditions model was calibrated in Simtraffic and CORSIM to replicate observed/measured field conditions such as travel time, delay, queues, and saturation flow rates for both directions on Pleasant Hill Road for all three peak periods. The results presented as follows provide important information to supplement the intersection LOS results, and the traffic conditions described were reflected in the Simtraffic and CORSIM simulation runs.

During the a.m. peak hour, traffic on southbound Pleasant Hill Road backs up from the intersection at Deer Hill Road – Stanley Boulevard and the queue extends past the intersection at Green Valley Drive. In effect, the LOS F conditions at the Deer Hill Road – Stanley Boulevard intersection also occur upstream at the Springhill Road/Quandt Road, Reliez Valley Road, and Green Valley Drive intersections, which impacts southbound Pleasant Hill Road traffic and other traffic movements that conflict with southbound traffic at each intersection. For example, at the Springhill Road - Quandt Road intersection, left turns from northbound Pleasant Hill Road, left turns and through movements from westbound Quandt Road, and all traffic movements from eastbound Springhill Road, as well as southbound movements stuck in the queue, experience long delays and queues. However, the City’s intersection LOS standards described in the previous Level of Service Analysis Methodology section are based on the LOS results calculated at each intersection individually, which are the results shown in Table III for existing conditions and presented subsequently in this

report for the other analysis scenarios. This evaluation standard is appropriate because the actual traffic capacity constraint, or bottleneck, occurs at a single intersection. Although the bottleneck backs up traffic into upstream intersections, any capacity-increasing improvement or mitigation would need to address the actual bottleneck location to be effective, because capacity increases at upstream locations would not relieve that bottleneck. In the case of southbound Pleasant Hill Road during the AM peak, the Deer Hill Road – Stanley Boulevard intersection is the actual bottleneck (LOS F) and capacity-increasing improvements at that intersection would improve traffic flow, while such improvements at the upstream intersections such as Springhill Road – Quandt Road would be ineffective.

During the commute p.m. peak hour, traffic on northbound Pleasant Hill Road backs up from the intersection at Deer Hill Road – Stanley Boulevard and the queue extends past the Acalanes Avenue intersection.

TJKM also analyzed existing traffic conditions on segments of Pleasant Hill Road between the free-flow freeway ramp junctions at SR 24 and the location of the proposed project driveway on Pleasant Hill Road using CORSIM, to establish existing baseline speeds for comparison to weaving conditions with the project. The resulting peak-hour average speeds on the study segments are shown in Table IV. The p.m. peak hour average speeds for the northbound Pleasant Hill Road segments reflect the delay and queues extending back from the intersection at Deer Hill Road – Stanley Boulevard.

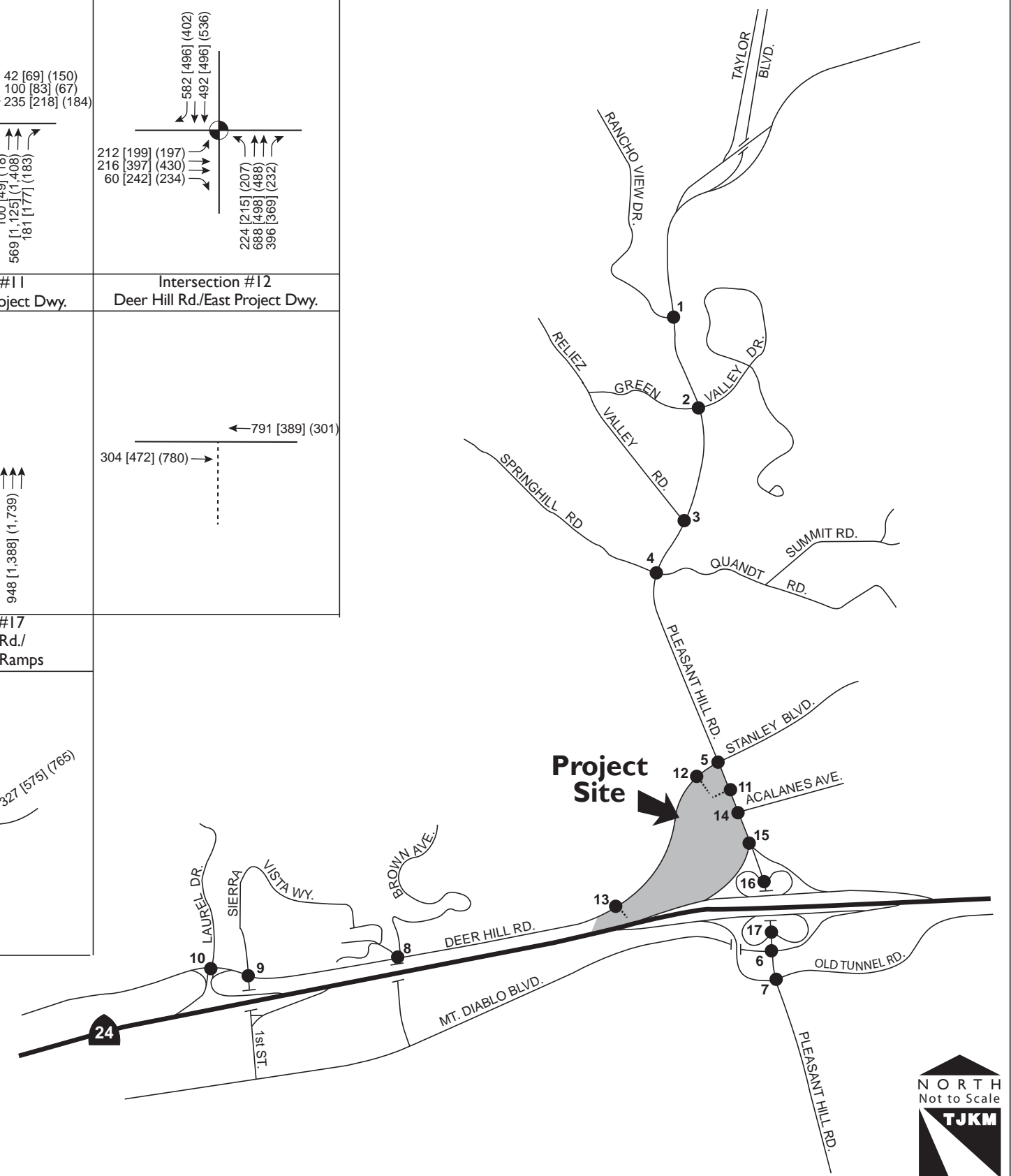
Table IV: Pleasant Hill Road Weaving Segment Speeds - Existing Conditions

Segment of Pleasant Hill Road		Existing Average Speeds (mph)		
		A.M. Peak Hour	School P.M. Peak Hour	P.M. Peak Hour
Northbound	Between SR 24 WB Off-ramp and Acalanes Ave.	29.3	29.0	4.60
	Between Acalanes Ave. and Project Driveway Location	32.3	32.3	2.80
Southbound	Between Project Driveway Location and SR 24 WB On-ramp	22.2	24.3	26.9

Note: Average speeds are CORSIM simulation model results.

TJKM also conducted field surveillance during the p.m. peak's heavily congested period on northbound Pleasant Hill Road to observe the portion of traffic turning right onto Acalanes Avenue that currently cuts through the neighborhood to avoid that congestion by using westbound Stanley Boulevard to access Deer Hill Road or continue northbound on Pleasant Hill Road. As shown on Figure 3, the existing right-turn volume from northbound Pleasant Hill Road onto Acalanes Avenue is approximately 43 vehicles during the p.m. peak hour. TJKM sampled a majority of the vehicles turning right onto Acalanes Avenue for more than an hour between approximately 4:45 and 6:00 p.m. to observe their subsequent routes through the neighborhood. A large portion of vehicles turned onto the local neighborhood streets north and south of Acalanes Avenue that have no other outlet, or into residential driveways on Acalanes Avenue, Nogales Street, and Camino Diablo, to access homes. Another significant portion turned left onto Nogales Street, then either right onto Camino Diablo toward areas to the south and east, or left onto Camino Diablo and then right onto Stanley Boulevard toward a residential neighborhood. Only one of the vehicles observed turning right onto Acalanes Avenue continued through the neighborhood to turn left onto westbound Stanley Boulevard and drive back to the Pleasant Hill Road intersection, where it turned right to continue northbound.

Intersection #1 Pleasant Hill Rd./Rancho View Dr.	Intersection #2 Pleasant Hill Rd./Green Valley Dr.	Intersection #3 Pleasant Hill Rd./Reliez Valley Rd.	Intersection #4 Pleasant Hill Rd./Springhill Rd./ Quandt Rd.	Intersection #5 Pleasant Hill Rd./Deer Hill Rd./ Stanley Blvd.	Intersection #6 Pleasant Hill Rd./Mt. Diablo Blvd./ SR 24 WB On Ramp
Intersection #7 Pleasant Hill Rd./Old Tunnel Rd./ SR 24 EB Off Ramp	Intersection #8 Brown Ave./Deer Hill Rd.	Intersection #9 First St./Sierra Vista Wy./Deer Hill Rd.	Intersection #10 SR 24 WB Ramps Laurel Dr./Deer Hill Rd.	Intersection #11 Pleasant Hill Rd./Project Dwy.	Intersection #12 Deer Hill Rd./East Project Dwy.
Intersection #13 Deer Hill Rd./West Project Dwy.	Intersection #14 Pleasant Hill Rd./Acalanes Ave.	Intersection #15 Pleasant Hill Rd./ SR 24 WB Direct Ramps	Intersection #16 Pleasant Hill Rd./ SR 24 WB Loop Ramps	Intersection #17 Pleasant Hill Rd./ SR 24 EB Loop Ramps	



LEGEND	
●	Study Intersection
---	Future Driveway
XX	AM Peak Hour Volume
[XX]	School PM Peak Hour Volume
(XX)	PM Peak Hour Volume



Recent Traffic Accident History

TJKM reviewed traffic collision data provided by City staff for the most recent four-year period available from the Statewide Integrated Traffic Records System (SWITRS). “Property damage only,” non-injury accidents were not reported in the SWITRS data for this four-year period, and were not specifically accounted for in this accident history review. Accident report files maintained by the Contra Costa County Sheriff’s Department that include non-injury accidents were not available at the time this report was prepared. However, the SWITRS data provides sufficient detail on collisions with injuries, which include collisions involving pedestrians and bicyclists, for the purpose of evaluating the potential traffic safety impacts of the proposed Project. For roadways in the Project site vicinity, the four-year traffic accident history is summarized as follows:

- Pleasant Hill Road, between State Route 24 and Taylor Boulevard: 16 collisions reported.
- Deer Hill Road, between Pleasant Hill Road and Brown Avenue: 5 collisions reported, all within 550 feet of Brown Avenue.
- Stanley Boulevard: 2 collisions reported, including one fatality. The fatal accident in 2007 killed one person and injured three others in a seven-vehicle rear-end collision that occurred 250 feet east of Pleasant Hill Road at 4:15 PM on a weekday. All parties involved were in vehicles (no pedestrians or bicyclists), and one 18-year-old was the only driver younger than age 38 involved. The person killed was a 55-year-old driver, and a 38-year-old driver was found at fault because of unsafe speed.

The collision rates based on the traffic volumes for these roadway segments are lower than the statewide average collision rates for roadways of similar types, and do not suggest any unusually hazardous traffic conditions.

Existing Transit Facilities

Public transit systems in Lafayette that are relevant to the project site, including both local bus and Bay Area Rapid Transit (BART) regional rail service, are described below.

BART

The project site is located approximately 1.5 miles east on Deer Hill Road from the Lafayette BART Station platform, which is located in the median of State Route 24 between Oak Hill Road and Happy Valley Road. The Pittsburg/Bay Point–San Francisco International Airport line serves the station seven days a week. Weekday service is provided between 4:00 a.m. and midnight, with Saturday service between 6:00 a.m. and mid-night and Sunday service between 8:00 a.m. and midnight. Weekday service ranges from 5- to 10-minute headways in the peak direction (5- to 15-minutes in the non-peak direction) during the AM and PM peak commute periods, to 15- to 20-minute headways during off-peak midday and late evening periods. On weekends, 20-minute headways are provided all day.

According to the 2008 BART Station Profile Study, parking at the Lafayette BART Station consists of 1,526 spaces, including 380 monthly permit spaces and the remaining 1,146 requiring a daily fee. The number of parking spaces includes the small parking lot on the south side of the station accessed from Happy Valley Road. In addition, 122 bicycle spaces are provided at the station, consisting of 30 bike lockers and 92 bike rack slots. Bicycle access the station’s north side has relatively gentle grade connections to adjacent roadways, including bike lanes on Deer Hill Road. Based on observations conducted in October 2011, it is estimated that all parking spaces at the Lafayette BART Station typically fill up before 8:30 a.m. on weekdays, except on Fridays when parking demand is lower than on other days.

Bus Transit

Bus service is provided locally by the Central Contra Costa Transit Authority's (CCCTA) County Connection. One fixed-route bus line, Route 25, is available at a reasonable walking distance within one-half mile of the project site at bus stops near the intersection of Pleasant Hill Road and Mount Diablo Boulevard. Route 25 provides east-west service along Mount Diablo Boulevard and Olympic Boulevard, connecting the Lafayette and Walnut Creek BART Stations. Route 25 makes several local stops along Mount Diablo Boulevard between the Lafayette BART Station and Pleasant Hill Road, and a few stops on Pleasant Hill Road and Olympic Boulevard, then uses the Interstate 680 freeway before terminating at the Walnut Creek BART Station. Route 25 is designed to provide a continuous system ride, especially for employees in downtown Lafayette, between areas to the east of Lafayette and the downtown. County Connection riders can stay on that same transit system at the Walnut Creek BART station transit hub, rather than transferring to BART and paying an additional fare, to access Downtown Lafayette. This weekday-only route operates at hourly headways in both directions between 7:30 a.m. and 6:30 p.m. Route 25 buses operate at less than capacity with seating available; CCCTA data for February 2012 shows average weekday ridership of 50 passengers per day.

In addition to Route 25, County Connection provides supplemental service for schools in the area on school days, including Route 625 along Mount Diablo Boulevard, Pleasant Hill Road, Acalanes Avenue, and Stanley Boulevard, which serves Acalanes High School. This bus operates at less than capacity with seating available. Based on TJKM field bus boarding observations on a regular school day in January 2012, approximately 15 to 20 Acalanes High School students ride Route 25 on its single morning and afternoon runs.

Other Local Transit Services

Lamorinda School Bus Program

The City of Lafayette participates in a collaborative program with the City of Orinda and Town of Moraga to provide school bus service in the Lamorinda area. The goal of the program is to mitigate traffic congestion in Lamorinda on roadways south of State Route 24 by reducing the number of drivers on these streets. The CCTA funds a significant portion of the program, with supplemental funding from fees paid by (parents of) riders and grant funding. The program serves Stanley Middle School and Springhill Elementary School, which have enrollment areas that include the project site, as well as Burton Valley School.

City of Lafayette Spirit Van

The City operates the Spirit Van program for its senior residents, with door-to-door service provided by volunteer drivers.

Existing Pedestrian and Bicycle Facilities

Pedestrian Facilities

The project site is currently served by very limited pedestrian facilities. Deer Hill Road has no sidewalks in the project vicinity, and pedestrians must use either the unimproved, irregular ground surface behind the raised curb or the Class II on-street, striped bicycle lane within the paved roadway. Pedestrian activity along Deer Hill Road is relatively light, except the section within 200 feet west of Pleasant Hill Road, where the south side of the roadway is frequently used by Acalanes High School (AHS) students being dropped off or picked up before and after school. The City's Master Walkways Plan includes adding a walkway on the north side of Deer Hill Road from Pleasant Hill Road west to Brown Avenue, but identifies this as a "Priority 4" project out of four priority categories.

The west side of Pleasant Hill Road has very limited sidewalks in the project vicinity. No sidewalk exists along the immediate project frontage south of Deer Hill Road, an area frequently used by AHS students being dropped off or picked up before and after school as well as pedestrians who have parked vehicles at the curb spaces on that segment. These pedestrians must use the unimproved, irregular ground surface behind the raised curb, which becomes very narrow next to a retaining wall along the southerly portion of the project frontage. Near the southeast corner of the project site, approximately 300 feet north of the on-ramp to westbound SR 24, a sidewalk on the west side begins and extends to the south along Pleasant Hill Road. North of Deer Hill Road, the only existing sidewalk on the west side of Pleasant Hill Road is a short segment extending approximately 150 feet north from Deer Hill Road. The City's Master Walkways Plan includes adding a walkway on the west side of Pleasant Hill Road from the SR 24 westbound on-ramp to Reliez Valley Road, and identifies this as a "Priority 2" project out of four priority categories.

Continuous sidewalk is provided on the east side of Pleasant Hill Road across from the project site, extending north along AHS and south toward Olympic Boulevard. Approximately 600 feet south of the Quandt Road/Pleasant Hill Road intersection, the sidewalk ends at a connection with Hillview Lane, and pedestrians must walk along a narrow residential access roadway parallel to Pleasant Hill Road and separated by a landscaped fence. Stanley Boulevard has continuous sidewalk on the north side along AHS frontage and extending east into a residential neighborhood, but the sidewalk on the south side extends approximately 275 feet east from Pleasant Hill Road and ends at a residential driveway. The City's Master Walkways Plan includes completion of walkways on both sides of Stanley Boulevard between Pleasant Hill Road and Camino Diablo to address missing links, and identifies this as a "Priority 2" project out of four priority categories.

Marked crosswalks and pedestrian signal indications are provided for crossing the west, south, and east legs of the signalized Deer Hill Road – Stanley Blvd./Pleasant Hill Road intersection, which is heavily used by AHS pedestrians before and after school. However, a large number of AHS pedestrians "jaywalk" across Stanley Boulevard within 100 to 275 feet east of the signalized intersection, with nearly 100 pedestrians observed crossing in this area on their way to AHS before school. Pedestrians apparently find crossing in this area more convenient than waiting for the signal to cross Stanley Boulevard at the intersection, which very few pedestrians were observed doing. Although crossing traffic in this roadway segment is somewhat hazardous, especially in the wider, multi-lane section close to the intersection, the large numbers of high school age pedestrians crossing mostly during a 20-minute period before and after school every day make them fairly visible to drivers. State-Wide Integrated Traffic Records System (SWITRS) data provided by the City's Engineering staff for a recent four-year period shows no reported accidents involving pedestrians in the project vicinity. Safer pedestrian conditions in this segment might be encouraged by installing a fence or barrier rail along the north curb of Stanley Boulevard between Pleasant Hill Road and the AHS exit driveway approximately 175 feet to the east, and installing a school crosswalk on Stanley Boulevard at that driveway. However, a fence or barrier along the curb could present a safety issue for drivers and a visual impact for the public, and installing an acceptable crosswalk design would be very challenging because of existing driveways and a drainage inlet on the north curb across from the AHS driveway.

Pedestrian safety and convenience walking along both sides of Pleasant Hill Road between the project site and Mount Diablo Boulevard is challenged at three to four crosswalks that require crossing uncontrolled free-flow traffic to and from SR 24 freeway ramps or a right turn to westbound Mount Diablo Boulevard. City staff has suggested potential improvement concepts for these crosswalks to Caltrans, which has jurisdiction over these freeway ramp junctions, but further action toward any improvements is undetermined. The City is in the process of seeking funds to conduct a corridor

study to improve pedestrian and bike access and safety between Mount Diablo Boulevard and Springhill Road/Quandt Road.

Bicycle Facilities

The project site is served reasonably well by existing bicycle facilities, but a gap exists along the project's Pleasant Hill Road frontage. A Class II (on-street, striped) bicycle lane is provided on southbound Pleasant Hill Road north of Deer Hill Road and south of Mount Diablo Boulevard, but not on the segment between those two roadways, where bicyclists must share a lane with motor vehicle traffic alongside curb parking. The City's Bikeways Master Plan shows continuous Class II bicycle lanes for this area of Pleasant Hill Road. Northbound Pleasant Hill Road and both directions on Deer Hill Road include continuous Class II bicycle lanes in the project vicinity. Stanley Boulevard has bicycle shared-lane pavement markings, known as "sharrows," which are consistent with the Bikeways Master Plan designation of Stanley Boulevard as a "Bike Boulevard." Traffic counts and observations indicate that several bicyclists per hour travel these roadways and facilities.

Steep grades on Deer Hill Road present a physical challenge for bicyclists, which may discourage potential bicycle travel. The City's Bikeways Master Plan proposes constructing a Class I (off-street) bicycle path between Pleasant Hill Road and the Brown Avenue/Deer Hill Road intersection on an alignment along the north side of the Caltrans SR 24 right-of-way. This alignment near the base of the hill that Deer Hill Road climbs over would provide much less elevation change and easier grades for bicyclists. The Bikeways Master Plan also proposes extending the Class I bike path easterly of Pleasant Hill Road, but states that the method of crossing Pleasant Hill Road is to be determined. According to City Engineering staff, the most recent discussions of the planned bike path would propose crossing Pleasant Hill Road at the Deer Hill Road/Stanley Boulevard traffic signal, with an off-street path along the west side of Pleasant Hill Road connecting between the signal and the Caltrans right-of-way.

Bicyclist safety and convenience traveling in both directions on Pleasant Hill Road between the project site and Mount Diablo Boulevard is challenged at three to four locations where bicyclists encounter conflicting uncontrolled free-flow traffic to and from SR 24 freeway ramps or a right turn to westbound Mount Diablo Boulevard. City staff has suggested potential improvement concepts for these locations to Caltrans, which has jurisdiction over the subject freeway ramp junctions, but further action toward any improvements is undetermined. The City is in the process of seeking funds to conduct a corridor study to improve bicycle and pedestrian access and safety between Mount Diablo Boulevard and Springhill Road/Quandt Road. SWITRS data provided by the City's Engineering staff for a recent four-year period shows no reported accidents involving bicyclists in the project vicinity.

Existing Parking and Passenger Loading Areas

Fronting the project site along the southbound, west side of Pleasant Hill Road south of Deer Hill Road, parallel curb parking spaces are marked, with signs posted to prohibit parking all day on Saturdays, Sundays and holidays, and from 3:00 to 6:00 a.m. Monday through Friday. However, the portion immediately south of Deer Hill Road is designated by white curb and posted signs as a "Passenger Loading Zone" for approximately 80 feet, or four car lengths. Between the loading zone and the on-ramp to the westbound SR 24 freeway, 20 curb parking spaces are designated with white pavement markings. Additionally, the project site's private property has a gravel area that is accessible to vehicles at a curb opening on southbound Pleasant Hill Road, which is occasionally used for off-street parking and passenger loading.

South of the project site frontage, another 22 curb parking spaces are marked between the westbound freeway on-ramp and Mount Diablo Boulevard. On-street parking is prohibited on both sides of the roadway on all other segments of Pleasant Hill Road, on Deer Hill Road, and on Stanley Boulevard between Pleasant Hill Road and a point approximately 200 feet west of Camino Diablo.

In late January 2012, TJKM observed the usage of the existing parking and passenger loading areas fronting the project site along the west side of Pleasant Hill Road, as well as passenger loading activity at other locations in the vicinity. Observations were conducted before and after school on regular session days at Acalanes High School (AHS) during non-rainy weather. The observations of parking occupancy along the west side of Pleasant Hill Road are summarized as follows:

- A maximum of 13 vehicles parked along the curb between the loading zone and the on-ramp to westbound SR 24. (Several of these vehicles were parked by contractors working on a roadway improvement project toward the south end of Pleasant Hill Road, based on drivers observed being dropped off from the contractor's trucks in the afternoon; the improvement project has been completed.)
- No vehicles were observed parking on the project site property except for the short-term passenger loading activity described below.
- A maximum of six vehicles parked south of the westbound freeway on-ramp, no more than two of which parked in the northerly ten spaces between the westbound on-ramp and the westbound-to-southbound loop off-ramp, with the majority parked in the spaces closest to Mount Diablo Boulevard. At the maximum occupancy observed, 16 parking spaces remained available south of the westbound on-ramp.

Observations of passenger loading activity along the west side of Pleasant Hill Road south of Deer Hill Road are summarized as follows:

- In the morning before school, a maximum of 14 vehicles dropped off students at the curb loading zone. The maximum number of vehicles present at any given time did not exceed the four-car capacity of the loading zone. No vehicles entered the project site property during the morning observations.
- In the afternoon at school dismissal, a maximum total of 23 vehicles picked up students at the curb loading zone or project site property, with no more than six of the vehicles parking for a short time on the project site property to wait for students. A maximum total of 14 vehicles was present at one time, using the loading zone to capacity (4 vehicles), the project site property (5-6), and the curb area south of the loading zone (4-5) including vehicles briefly blocking the curb opening that provides access for the project site property.
- Vehicles arrived at this loading area via U-turns from northbound Pleasant Hill Road (at the Deer Hill Road intersection), through traffic on southbound Pleasant Hill Road, and a few right turns from eastbound Deer Hill Road.

TJKM also observed passenger loading activity for AHS students occurring at several other locations, including:

- On eastbound Deer Hill Road, up to 40 students were dropped off from vehicles stopped in the traffic queue extending back from the Pleasant Hill Road signal in the morning before school, and then walked east on the roadway in the bike lane to reach the intersection corner. In the afternoon after school, a small number of students were picked up in the right traffic lane on eastbound Deer Hill Road.

- On northbound Pleasant Hill Road, at least 12 students per day were dropped off from vehicles stopped in the traffic queue extending back from the Deer Hill Road/Stanley Blvd. signal in the morning before school. Students exited from vehicles in all traffic lanes (left, through and right), in an area extending at least 150 feet south from the intersection crosswalk. Some of the students dropped off from the left-turn lane walked north on the raised median to reach the crosswalk on the south leg of the intersection, but most walked across traffic lanes between cars to reach the east side of Pleasant Hill Road. At times, students had to cross moving traffic in the northbound right-turn lane. In the afternoon after school, a small number of students were picked up in the left-turn lane on northbound Pleasant Hill Road after walking west in the crosswalk to reach the lane. This activity on northbound Pleasant Hill Road south of Stanley Boulevard clearly presents hazards for the student pedestrians involved.
- A few students were dropped off or picked up at the gas station on the southeast corner of Pleasant Hill Road and Stanley Boulevard.
- On northbound Pleasant Hill Road north of the driveway for the AHS main parking lot, some passenger loading activity occurs in the bike lane, which is posted as a no parking zone. After dropping off students at this location, some drivers turn right at the high school driveway south of the tennis courts, make a U-turn using the parking lot aisle, and exit the driveway by turning left onto southbound Pleasant Hill Road, which is a difficult movement during the morning peak hour.
- On westbound Stanley Boulevard, passenger loading along the north curb occurs mostly between the main AHS parking lot entrance driveway and the Springbrook Pool driveway, using the red curb area at the bus stop or along the traffic lane while stopped in the queue. Relatively little passenger loading activity was observed east of the Springbrook Pool driveway, and curb parking spaces remained available on the north side of Stanley Boulevard near Camino Diablo.
- A great portion of the passenger loading takes place on-campus along the AHS parking lot aisles, which are accessed at an entrance driveway and an exit driveway on Stanley Boulevard, and a right-turn-only driveway on Pleasant Hill Road. The parking lot aisles and the driveway intersections at Stanley Boulevard are congested during the peak times immediately before and after school.

Existing plus Project Conditions

This scenario uses Existing Conditions as a baseline, but adds traffic generated by the proposed project and evaluates the project's potential impacts on transportation as described below. The purpose of the Existing plus Project Conditions traffic analysis is to show the potential near-term effects of a full build-out of the proposed project for California Environmental Quality Act (CEQA) purposes.

Project Description Summary

The proposed project consists of constructing a 315-unit apartment complex in new buildings on the site, which is bounded by Deer Hill Road on the northwest, Pleasant Hill Road on the east, and SR 24 on the south. Vehicle access to the project site would be provided at a driveway on Pleasant Hill Road that is proposed to allow left turns into the site for northbound traffic along with southbound right-turn access, and two driveways on Deer Hill Road located toward the westerly and northeasterly boundaries of the site.

Project Trip Generation

TJKM estimated project trip generation based on data presented in the professional standard reference *ITE Trip Generation*, 8th Edition and the guidelines in the *ITE Trip Generation Handbook*. No trip reductions were applied because the site is not within reasonable walking distance of significant public transit services or complementary retail or employment land uses, based on published research data. "Reasonable walking distance" in the published data is typically considered to range from at least 1/4-mile to 1/2-mile. Table V below summarizes the project trip generation results.

Table V: Project Trip Generation

Land Use (ITE Code)	Size	Daily		A.M. Peak Hour			School P.M. Peak Hour			P.M. Peak Hour								
		Rate ²	Trips	Rate ²	In:Out %	In	Out	Total	Rate ³	In:Out %	In	Out	Total					
Apartments (220) ¹	315 DU	6.45	2,032	0.50	20:80	32	126	158	0.47	48:52	71	77	148	0.61	65:35	124	67	191

Notes: DU = Dwelling Units

¹ Source – *ITE Trip Generation*, 8th Edition, Regression Equations

² Rates calculated based on Total trips from regression equation divided by Size:

Daily: Total trips = 6.06 (DU) + 123.56

A.M. Peak: Total trips = 0.49 (DU) + 3.73

P.M. Peak: Total trips = 0.55 (DU) + 17.65

³ School P.M. Peak Rate is the same proportion of the Daily Rate as that used in the *Lafayette Downtown Specific Plan Draft EIR* for residential land use, based on Urban Land Institute (ULI) published data and other available traffic studies

As shown in Table V, the project is expected to generate 158 trips during the a.m. peak hour (32 inbound and 126 outbound), 148 trips during the mid-afternoon school dismissal p.m. peak hour (71 inbound and 77 outbound), and 191 trips during the commute p.m. peak hour (124 inbound and 67 outbound). The School dismissal PM peak hour trips are a percentage of the total daily trips generated by the Project, based on Urban Land Institute (ULI) published data and other available traffic studies, and assuming that nearly all of the daily trips would occur from 6:00 a.m. to 10:00 p.m.

Project Trip Distribution and Assignment

Trip distribution is a process that determines in what proportion vehicles would travel between a project site and various destinations outside the project study area. The process of trip assignment determines the various routes that vehicles would take from the project site to each destination using the calculated trip distribution.

Trips that would be generated by the proposed project were assigned to the adjacent roadway network based on the land use distribution and prevailing traffic patterns in the surrounding area, as well as the location of freeway ramp connections and the proposed project access driveways. The resulting percentage distribution of project-generated trips is presented in *The Terraces of Lafayette Traffic Impact Study* by Abrams Associates (Abrams TIS), dated June 30, 2011, and is shown in Figure 4. TJKM concurs with this project trip distribution.

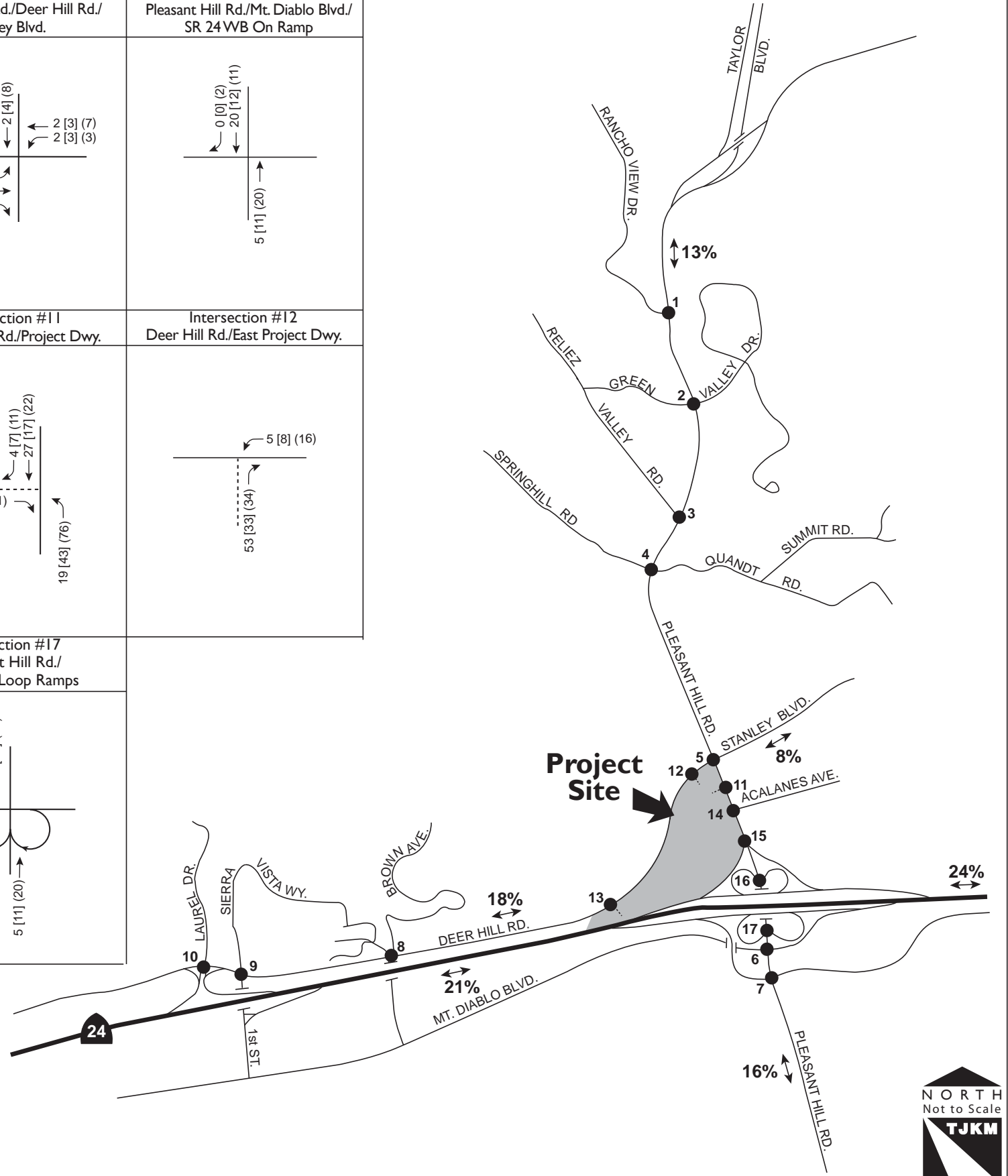
However, the assignment of project trips to the roadway network as presented herein uses the Project Trip Generation estimates described in Table V above instead of the trip generation estimates presented in the Abrams TIS. The resulting project trip assignments are shown in Figure 4. These assigned project trips were added to Existing Conditions traffic volumes to generate the Existing plus Project traffic volumes shown in Figure 5.

Intersection Lane Geometry and Traffic Controls

Figure 5 also shows the intersection lane geometries and traffic controls assumed in the analysis of Existing plus Project conditions. The key assumptions are summarized as follows:

- At the three project driveways, TJKM recommends that stop signs controlling traffic exiting the driveways shall be required as Mitigation Measure TRAF-19, as assumed in the traffic analysis.
- At the project driveway on Pleasant Hill Road, proposed access would be limited to left turns into the site from northbound Pleasant Hill Road and right turns to and from the southbound lanes. Left turns out of the site onto northbound Pleasant Hill Road would be prohibited by a raised median.
- A left-turn lane would be constructed on northbound Pleasant Hill Road in the existing raised median approaching the project driveway. Left turns into the project driveway from northbound Pleasant Hill Road would yield to conflicting southbound traffic according to California Vehicle Code rules of the road, and no other traffic control would be provided.
- TJKM recommends constructing a right-turn lane on southbound Pleasant Hill Road approaching the project driveway, which is not proposed as part of the project, but is described as part of Mitigation Measure TRAF-20. However, the results of the traffic analysis are the same with or without the right-turn lane assumed.
- A left-turn lane would be installed on westbound Deer Hill Road approaching the east project driveway.
- No other additional vehicle traffic lanes or traffic controls are assumed for the Existing plus Project base condition, but additional modifications are considered as mitigation measures for project impacts at some locations. Project plans propose adding a third lane for southbound through traffic on Pleasant Hill Road in the vicinity of the project. The proposed configuration would provide a shared lane for southbound through and right-turn movements on Pleasant Hill Road at the Deer Hill Road intersection, replacing the existing southbound curb lane that is a shared bike lane from which right turns are permitted. This report considers that modification as a potential mitigation, and not part of the baseline for Project conditions.

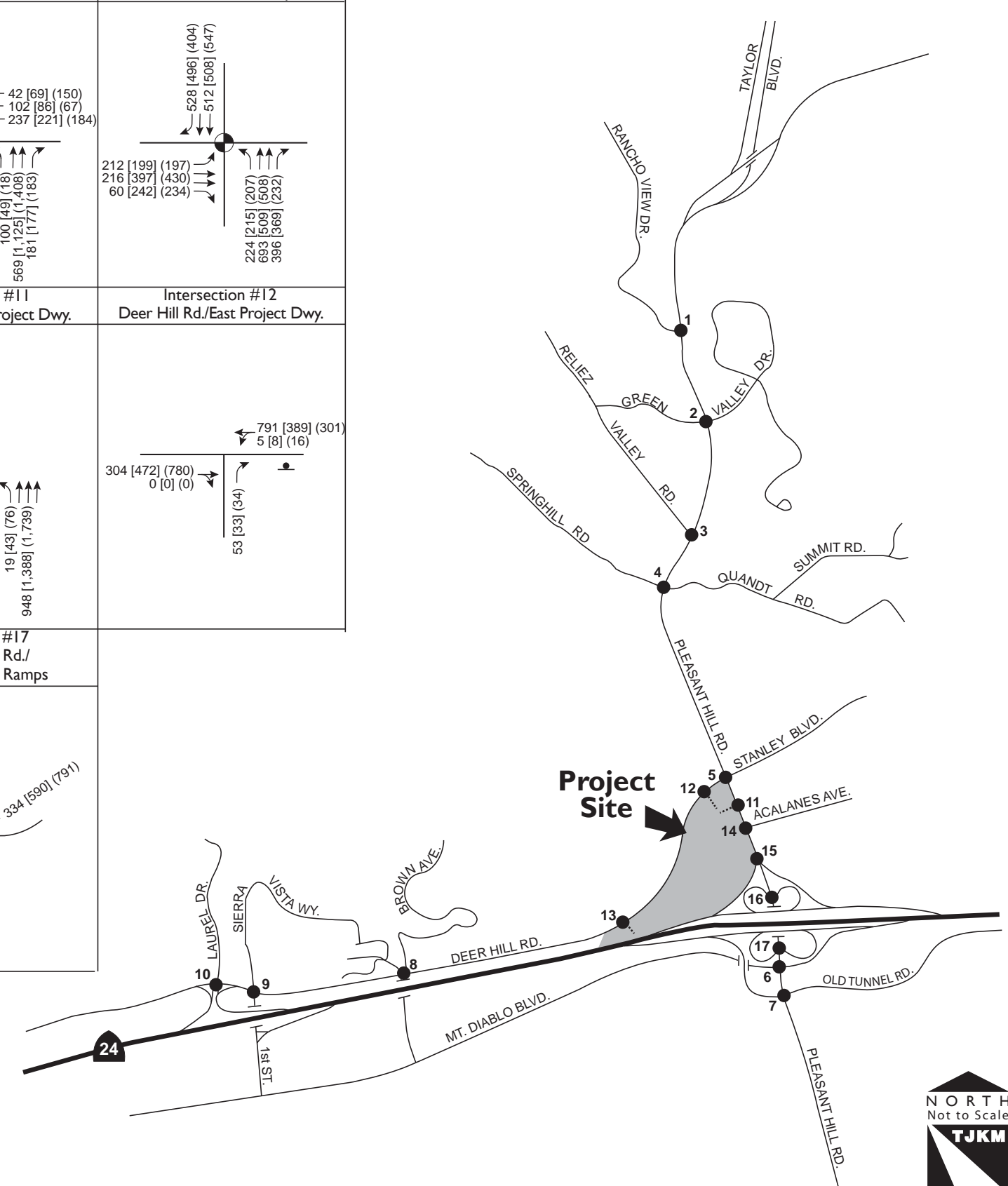
Intersection #1 Pleasant Hill Rd./Rancho View Dr.	Intersection #2 Pleasant Hill Rd./Green Valley Dr.	Intersection #3 Pleasant Hill Rd./Reliez Valley Rd.	Intersection #4 Pleasant Hill Rd./Springhill Rd./ Quandt Rd.	Intersection #5 Pleasant Hill Rd./Deer Hill Rd./ Stanley Blvd.	Intersection #6 Pleasant Hill Rd./Mt. Diablo Blvd./ SR 24 WB On Ramp
Intersection #7 Pleasant Hill Rd./Old Tunnel Rd./ SR 24 EB Off Ramp	Intersection #8 Brown Ave./Deer Hill Rd.	Intersection #9 First St./Sierra Vista Wy./Deer Hill Rd.	Intersection #10 SR 24 WB Ramps Laurel Dr./Deer Hill Rd.	Intersection #11 Pleasant Hill Rd./Project Dwy.	Intersection #12 Deer Hill Rd./East Project Dwy.
Intersection #13 Deer Hill Rd./West Project Dwy.	Intersection #14 Pleasant Hill Rd./Acalanes Ave.	Intersection #15 Pleasant Hill Rd./ SR 24 WB Direct Ramps	Intersection #16 Pleasant Hill Rd./ SR 24 WB Loop Ramps	Intersection #17 Pleasant Hill Rd./ SR 24 EB Loop Ramps	



LEGEND	
●	Study Intersection
---	Future Driveway
XX	AM Peak Hour Volume
[XX]	School PM Peak Hour Volume
(XX)	PM Peak Hour Volume



Intersection #1 Pleasant Hill Rd./Rancho View Dr.	Intersection #2 Pleasant Hill Rd./Green Valley Dr.	Intersection #3 Pleasant Hill Rd./Reliez Valley Rd.	Intersection #4 Pleasant Hill Rd./Springhill Rd./ Quandt Rd.	Intersection #5 Pleasant Hill Rd./Deer Hill Rd./ Stanley Blvd.	Intersection #6 Pleasant Hill Rd./Mt. Diablo Blvd./ SR 24 WB On Ramp
Intersection #7 Pleasant Hill Rd./Old Tunnel Rd./ SR 24 EB Off Ramp	Intersection #8 Brown Ave./Deer Hill Rd.	Intersection #9 First St./Sierra Vista Wy./Deer Hill Rd.	Intersection #10 SR 24 WB Ramps/Laurel Dr./ Deer Hill Rd.	Intersection #11 Pleasant Hill Rd./Project Dwy.	Intersection #12 Deer Hill Rd./East Project Dwy.
Intersection #13 Deer Hill Rd./West Project Dwy.	Intersection #14 Pleasant Hill Rd./Acalanes Ave.	Intersection #15 Pleasant Hill Rd./ SR 24 WB Direct Ramps	Intersection #16 Pleasant Hill Rd./ SR 24 WB Loop Ramps	Intersection #17 Pleasant Hill Rd./ SR 24 EB Loop Ramps	



LEGEND	
	Study Intersection
	Traffic Signal
	Stop Sign
	Future Driveway
	XX AM Peak Hour Volume
	[XX] School PM Peak Hour Volume
	(XX) PM Peak Hour Volume
	Mitigated Lane
	Mitigated Traffic Signal



Intersection Level of Service Analysis Results, Existing plus Project Conditions

Table VI illustrates the results of the level of service analysis for the study intersections under Existing plus Project Conditions. Detailed level of service calculations are contained in Appendix D.

Table VI: Peak Hour Intersection Levels of Service – Existing plus Project Conditions

ID	Intersection	Existing Plus Project Conditions					
		A.M. Peak Hour		School P.M. Peak Hour		P.M. Peak Hour	
		Delay	LOS	Delay	LOS	Delay	LOS
1	Rancho View Drive/Pleasant Hill Road	7.4	A	6.8	A	5.3	A
2	Green Valley Drive/Pleasant Hill Road	5.8	A	7.7	A	4.9	A
3	Reliez Valley Road/Pleasant Hill Road	24.4	C	8.4	A	9.8	A
4	Springhill Road – Quandt Road/ Pleasant Hill Road	21.3	C	10.6	B	12.9	B
5	Deer Hill Road – Stanley Blvd./ Pleasant Hill Road	198.7	F	40.4	D	59.8	E
	Mitigation Alt 1 - Add third SB thru lane	192.5	F	40.6	D	56.4	E
	Mitigation Alt 2 – No NB Left Turn at Project Driveway (NB Weaving Impact)	216.1	F	41.6	D	61.0	E
6	Mt. Diablo Boulevard – SR 24 EB On-ramp/Pleasant Hill Road	14.8	B	16.7	B	16.9	B
7	SR 24 EB Off-Ramp – Old Tunnel Road/Pleasant Hill Road	13.2	B	15.0	B	16.3	B
8	Deer Hill Road/Brown Avenue	163.0	F	NA	NA	315.1	F
	Mitigation - Signalize Intersection	23.6	C	NA	NA	24.4	C
9	Deer Hill Road/First Street – Sierra Vista Way	13.9	B	11.6	B	14.9	B
10	Deer Hill Road/SR 24 WB Ramps – Laurel Drive	47.9	D	35.8	D	45.9	D
11	Pleasant Hill Road/Project Driveway	10.5	B	9.3	A	9.1	A
	Mitigation Alt 1: Add third SB thru lane	10.6	B	11.2	B	10.7	B
12	Deer Hill Road/East Project Driveway	10.5	B	11.9	B	16.1	C
13	Deer Hill Road/ West Project Driveway	24.8	C	18.0	C	23.4	C

- Notes:
- 1) LOS=Level of Service, Delay = Average control delay per vehicle in seconds
 - 2) Signalized and all-way stop controlled intersections - Delay / LOS is for overall intersection
 - 3) Unsignalized one- and two-way stop controlled intersections - Delay / LOS is for critical minor stop-controlled approach.
 - 4) **Bold** indicates unacceptable operational conditions based on applicable City standards.
 - 5) NA=Not analyzed. At intersection #8, a.m. and p.m. commute peaks provide worst-case results.

Under Existing plus Project Conditions with the addition of proposed project traffic, all signalized intersections are expected to continue operating under acceptable City LOS standards, except the two intersections that already operate at an unacceptable LOS under Existing Conditions:

- Deer Hill Road – Stanley Blvd./Pleasant Hill Road: LOS F during the a.m. peak hour, with delay increasing by 9.0 seconds as a result of the project; LOS E during the p.m. peak hour

with delay increasing by 1.3 seconds. The project would increase delay by more than five seconds at an intersection operating below the acceptable standard, resulting in a *significant impact*.

- Deer Hill Road/SR 24 Westbound Ramps – Laurel Drive: Poor LOS D during the a.m. and p.m. peak hours, with delay increasing by 1.3 seconds and 0.6 seconds respectively. Because the project would increase delay by less than five seconds, the result would be a *less-than-significant impact*.

The unsignalized project driveway intersections would operate at an acceptable LOS C or better. However, at the only Existing unsignalized study intersection, the northbound and southbound stop-controlled minor approaches on Brown Avenue at Deer Hill Road would continue operating at an unacceptable LOS F during the a.m. and p.m. peak hours, with delay increases substantially higher than five seconds. The California Manual on Uniform Traffic Control Devices (MUTCD) peak hour traffic signal warrant would be met for both peak hours under both Existing and Existing plus Project conditions. The project would increase delay by more than five seconds at an intersection operating below the acceptable standard, resulting in a *significant impact*.

Pleasant Hill Road Corridor Traffic Simulation

Simtraffic simulation results for Existing plus Project conditions were reviewed to supplement the intersection LOS results. During the a.m. peak hour, traffic on southbound Pleasant Hill Road that backs up from the intersection at Deer Hill Road – Stanley Boulevard would extend the queue further past the intersection at Green Valley Drive with the addition of project traffic. In effect, as described for Existing conditions, the LOS F conditions at the Deer Hill Road – Stanley Boulevard intersection would also occur upstream at the Springhill Road/Quandt Road, Reliez Valley Road, and Green Valley Drive intersections, which impacts southbound Pleasant Hill Road traffic and other traffic movements that conflict with southbound traffic at each intersection. However, the City's intersection LOS standards described in the previous Level of Service Analysis Methodology section are based on the LOS results calculated at each intersection individually, which are the results shown in Table VI. Existing plus Project traffic conditions during the commute p.m. peak hour on northbound Pleasant Hill Road are addressed in the following section on weaving traffic.

Intersection Mitigation

TJKM considered potential mitigation measures for the two intersections that would have significant traffic delay impacts as a result of the project under Existing plus Project conditions.

To mitigate the Deer Hill Road – Stanley Blvd./Pleasant Hill Road intersection, project plans propose roadway widening to add a third lane for southbound through traffic on Pleasant Hill Road. The proposed configuration would provide a shared lane for southbound through and right-turn movements on Pleasant Hill Road at the Deer Hill Road intersection, along with a standard Class II bike lane, replacing the existing southbound curb lane that is shared by right-turn-only traffic and bicycles approaching the intersection. The additional southbound lane as shown on the project plans would start approximately 150 feet north of Deer Hill Road and extend south along the entire project frontage on Pleasant Hill Road to become a right-turn-only lane for the on-ramp to westbound SR 24. Traffic engineers often refer to this type of configuration with a through lane leading into a required turn lane as a “trap lane.” The proposed lane configuration would also eliminate existing curb parking and loading zones along the west curb (addressed in a subsequent section of this report.) The proposed roadway widening would increase the pedestrian crossing distance on the Pleasant Hill Road crosswalk at the Deer Hill Road – Stanley Boulevard signal, and the signal timing used in the LOS analysis of this mitigation assumed additional pedestrian crossing time.

Table VI above shows the LOS results at the Deer Hill Road – Stanley Blvd./Pleasant Hill Road intersection with this mitigation, referenced as Mitigation Alternative I. With the additional southbound lane on Pleasant Hill Road, the intersection would still operate at LOS F during the a.m. peak hour, but the delay increase with the project would be less than three seconds, resulting in a less-than-significant impact on intersection operations. During the p.m. peak hour, this mitigation could slightly reduce delay at the intersection compared to Existing conditions, but it would still operate at unacceptable LOS E.

Although the proposed additional southbound lane on Pleasant Hill Road would mitigate the project impact on delay at the Deer Hill Road – Stanley Boulevard intersection to less than significant, it would result in other impacts that would be considered significant. Right turns out of the project driveway into the additional southbound lane would be entering a right-turn-only lane for the on-ramp to westbound SR 24. Most of these project trips would merge left to continue further south on Pleasant Hill Road rather than use the westbound SR 24 on-ramp, which would introduce a weaving movement on southbound Pleasant Hill Road between the project driveway and the on-ramp. CORSIM analysis was performed for this roadway segment to compare traffic speeds for Existing conditions to Existing plus Project conditions with the additional southbound lane as mitigation. As shown in Table VII below, Existing plus Project conditions with the additional southbound lane (Mitigation Alternative I) would reduce average speed by more than ten percent in the a.m. peak hour on this segment of southbound Pleasant Hill Road compared to Existing conditions. This speed reduction is considered an unacceptable weaving condition that would substantially increase hazards, resulting in a *significant secondary impact*.

Table VII: Southbound Pleasant Hill Road Weaving Segment - Mitigation Alt I

Southbound Pleasant Hill Road between Project Driveway and SR 24 WB on-ramp	Average Speeds (mph)		Speed Reduction Percentage
	Existing	Existing + Project With Mitigation Alt I	
A.M. Peak Hr	22.24	19.87	-11%
School P.M. Peak Hr	24.3	23.6	-3%
P.M. Peak Hr	26.9	25.0	-7%

Note: Mitigation Alt I = Add southbound lane on Pleasant Hill Rd to mitigate study intersection #5.
Average speeds are CORSIM simulation model results.

Project plans for widening southbound Pleasant Hill Road also include adding a Class II bike lane along the west curb north of the project driveway, where the plans show no curb parking. South of the project driveway, the bike lane would be forced to shift to the left side of the additional southbound traffic lane that becomes a right-turn-only lane for the on-ramp to westbound SR 24. This configuration would cause unacceptable weaving conflicts with vehicle traffic for the planned southbound bike lane, which is included in the City’s Bikeways Master Plan, resulting in a *significant secondary impact*.

Adding a southbound lane also appears to conflict with the Gateway Constraint Policy elaborated by following Actions for Pleasant Hill Road specified in the Lamorinda Action Plan (adopted December 2009):

- Investigate appropriate mechanisms, including maintaining existing roadway lanes and widths and restrictive signal timing, to discourage use of Pleasant Hill Road as a substitute for freeway travel

- Work with TRANSPAC to develop a traffic management program to encourage delay in order to discourage use of westbound/southbound traffic using Pleasant Hill Road to bypass the I-680 SR 24 interchange

This conflict with the Gateway Constraint Policy of the Lamorinda Action Plan would result in a *significant secondary* impact. However, the additional southbound lane would have very little effect on the LOS F delay during the a.m. peak hour on southbound Pleasant Hill Road.

The proposed lane configuration would also eliminate existing curb parking and loading zones along the west curb, which is analyzed in more detail in the subsequent Street Parking and Passenger Loading Areas section. The loss of the designated spaces currently used for school passenger loading would cause hazardous passenger loading activity at unsuitable locations, resulting in a *significant secondary* impact.

The proposed roadway widening would increase the pedestrian crossing distance on the Pleasant Hill Road crosswalk at the Deer Hill Road – Stanley Boulevard signal, which a high volume of Acalanes High School students currently use.

Because adding a southbound lane on Pleasant Hill Road would result in significant impacts and other undesirable effects, this mitigation measure is not considered feasible. No feasible mitigations are available to reduce the project impact at the Deer Hill Road – Stanley Blvd./Pleasant Hill Road intersection to less-than-significant levels. Therefore, this impact is considered *significant and unavoidable*.

To mitigate the impact at the Deer Hill Road/Brown Avenue intersection, the project sponsor shall coordinate with the City to contribute a fair share of the cost, including an in-lieu payment, to install a traffic signal, which will be added to the City's Capital Improvement Projects (CIP) program. With signalization, the intersection would operate at LOS C during the a.m. and p.m. peak hours under Existing plus Project conditions, reducing the project impact to *less-than-significant*.

Left-Turn Queues at Project Driveways

Left-turn queue lengths on northbound Pleasant Hill Road at the project driveway and at Deer Hill Road, as well as on westbound Deer Hill Road at two project driveways, were also analyzed using Simtraffic results for Existing plus Project conditions in the a.m., school p.m., and commute p.m. peak hours. The resulting 95th-percentile queue lengths were compared with the left-turn storage lane lengths that would be provided at these intersections to determine if that queue storage capacity would be adequate to avoid spillback into other lanes. The Existing plus Project results are summarized as follows:

- Northbound Pleasant Hill Road at Deer Hill Road: The peak estimated 95th-percentile left-turn queue length of 208 feet, which would occur during the a.m. peak hour, would be accommodated by the existing 250-foot storage lane. According to the project plans, which propose construction of a northbound left-turn lane immediately to the south for access to the project driveway, the existing left-turn storage lane would not be modified.
- Northbound Pleasant Hill Road at Project Driveway: The peak estimated 95th-percentile left-turn queue length of 63 feet, which would occur during the a.m. peak hour, would be accommodated by the 100-foot storage lane proposed in the project plans. Estimated left-turn queue lengths would be similar in the school p.m. and commute p.m. peak hours.

- **Westbound Deer Hill Road at Project Driveways:** The estimated 95th-percentile left-turn queue lengths during the three peak periods would be no more than one car length at either driveway. At the west project driveway, where a minimal number of left turns into the project are expected, no storage lane is proposed in the project plans; the safety aspects of this condition are addressed in a subsequent section of this report. At the east project driveway on Deer Hill Road, a storage lane approximately 60 feet long is proposed in the project plans, which would accommodate the westbound left-turn queue, but would affect the queue storage area for eastbound left turns from Deer Hill Road to Pleasant Hill Road.

The proposed left-turn lane configuration at the east Project driveway would not change the existing striped left-turn-lane lengths on eastbound Deer Hill Road at Pleasant Hill Road, but would impact access to those lanes for approaching eastbound vehicles. This configuration would reduce the available queue storage area and result in longer eastbound queues on Deer Hill Road. However, the configuration would not change the intersection LOS results described previously or substantially increase hazards, and the resulting impact is considered *less than significant*. Note that this finding does not preclude the City from potentially requiring the Project applicant to construct an alternative configuration for the east Project driveway access on Deer Hill Road as a condition of Project approval.

Although not required as mitigation, TJKM recommends an alternative configuration for the east Project driveway access on Deer Hill Road to address design and operational concerns. Peak-hour queues on eastbound Deer Hill Road from the Pleasant Hill Road intersection would frequently extend past the location of the proposed east driveway, making left turns into and out of the driveway difficult. To address this issue, TJKM recommends restricting the east Project driveway to right-turn-only access. This restriction could be implemented by posting signs prohibiting left turns to and from westbound Deer Hill Road at the east driveway, and potentially constructing a raised island designed to physically obstruct left turns at the driveway. The relatively small number of Project trips that were expected to turn left into the east driveway would instead be expected to enter at the Pleasant Hill Road driveway via right turns, and the negligible number of trips that might have turned left out of the east driveway would do so at the west driveway. This diversion of trips would not result in any secondary impacts.

Pleasant Hill Road Weaving Traffic for Project Driveway Access

TJKM analyzed Existing plus Project weaving traffic conditions on segments of Pleasant Hill Road between the free-flow freeway ramp junctions at SR 24 and the proposed project driveway on Pleasant Hill Road using CORSIM, for comparison to the Existing speeds shown previously in Table IV. The resulting Existing plus Project peak-hour average speeds on the study segments are shown in Table VIII. The p.m. peak-hour average speeds for the northbound Pleasant Hill Road segments include the effects of delays and queues extending back from the intersection at Deer Hill Road – Stanley Boulevard past Acalanes Avenue and near the off-ramp, making weaving very difficult. Note that the southbound Pleasant Hill Road segment assumes the existing lane configuration.

Table VIII: Pleasant Hill Road Weaving Segment Speeds - Existing Plus Project

Segment of Pleasant Hill Road		Existing Plus Project					
		A.M. Peak Hour		School P.M. Peak Hour		P.M. Peak Hour	
		Average Speed (mph)	% Speed Reduction	Average Speed (mph)	% Speed Reduction	Average Speed (mph)	% Speed Reduction
Northbound	Between SR 24 WB Off-ramp and Acalanes Ave.	29.2	<1%	29.0	0%	3.80	-17%
	Between Acalanes Ave. and Project Driveway	31.1	-4%	30.0	-7%	2.60	-7%
Southbound	Between Project Driveway and SR 24 WB On-ramp	21.1	-5%	24.0	-1%	24.7	-8%

Note: Average speeds are CORSIM simulation model results.

Northbound Pleasant Hill Road weaving conditions between the SR 24 westbound off-ramp and the project driveway would be caused by vehicles merging from the right across traffic lanes to make left turns into the project driveway. As shown in Table VIII, the average speed reductions during the a.m. peak hour and the school p.m. peak hour are less than significant. However, in the p.m. peak hour, the northbound segment of Pleasant Hill Road between the SR 24 WB off-ramp and Acalanes Avenue shows a significant speed reduction percentage. Because of the persistent p.m. peak hour queues indicated by the very low average speed between Acalanes Avenue and the project driveway, project trips would effectively have to complete the weave within the segment between the SR 24 off-ramp and Acalanes Avenue to be able to make the left turn at the driveway. The project would reduce the average speed in this segment during the p.m. peak hour from 4.6 mph to 3.8 mph, a 17 percent reduction. This speed reduction of more than ten percent is considered an unacceptable weaving condition that would substantially increase hazards, resulting in a *significant impact*.

During the p.m. peak hour on northbound Pleasant Hill Road, if some drivers are unable complete the weaving movement from the SR 24 westbound off-ramp in time to make a left turn at the project driveway, they will most likely make a left or U-turn at the Deer Hill Road signal to access the project site. Some drivers may instead try the alternative of turning right on Acalanes Avenue and then using Nogales Street, Camino Diablo, and westbound Stanley Boulevard to get back to the signal at Pleasant Hill Road, where they would make a left turn or continue straight onto Deer Hill Road to access the project site. However, a typical travel time along this route, including the average delay of approximately one minute on westbound Stanley Boulevard at the Pleasant Hill Road signal, would be longer than the average delay for drivers continuing northbound on Pleasant Hill Road to make a left or U-turn at Deer Hill Road. Drivers attempting this route would quickly recognize its longer travel time and learn to avoid it.

A potential mitigation for the unacceptable weaving condition would prohibit the proposed left turn into the project driveway from northbound Pleasant Hill Road, forcing project traffic to make a left or U-turn at Deer Hill Road. Table VI above shows the LOS results at the Deer Hill Road – Stanley Blvd./Pleasant Hill Road intersection with this mitigation, referenced as Mitigation Alternative 2. Under Existing plus Project conditions, prohibiting the northbound left turn into the project driveway on Pleasant Hill Road would increase a.m. peak hour LOS F delay at the Pleasant Hill Road/Deer Hill Road intersection by 17 seconds more than with left turns allowed at the driveway, resulting in 26 seconds more delay than Existing conditions. This mitigation would significantly exacerbate the project impact at the Deer Hill Road – Stanley Blvd./Pleasant Hill Road intersection, which is considered significant and unavoidable.

Prohibiting the left turn from northbound Pleasant Hill Road at the project driveway would also impact emergency access to the project site, which would be a *significant* impact. A short median section designed to safely and effectively obstruct left turns by the public but still provide acceptable emergency vehicle access, using beveled curbs or other designs that emergency apparatus can safely cross, would be required to avoid this impact.

Because prohibiting the left turn from northbound Pleasant Hill Road into the project driveway would significantly exacerbate project impacts, this mitigation measure is not considered feasible. No feasible mitigations are available to reduce the project impact on northbound Pleasant Hill Road between the SR 24 westbound off-ramp and the project driveway to less-than-significant levels. Therefore, this impact is considered *significant and unavoidable*.

Project Driveway Sight-Distance and Safety

TJKM analyzed the sight-distance parameters at the proposed project driveway locations on Pleasant Hill Road and Deer Hill Road, which are shown on Figure 2. At the Pleasant Hill Road driveway, proposed access is limited to left turns into the site from northbound Pleasant Hill Road and right turns to and from the southbound lanes. Left turns out of the site onto northbound Pleasant Hill Road would be prohibited by a raised median. With this configuration, turning movements at the driveway would conflict with only southbound Pleasant Hill Road traffic. Visibility of the driveway along southbound Pleasant Hill Road is unobstructed for at least 750 feet, providing more than adequate sight-distance. In addition, the driveway would be located approximately 325 feet south (measured from the south side) of the intersection at Deer Hill Road – Stanley Boulevard, providing more than adequate sight-distance for vehicles turning onto southbound Pleasant Hill Road.

Sight-distance analysis at the two proposed Deer Hill Road driveway locations accounted for the visibility obstructions presented by the horizontal and vertical curvature of the roadway and roadside features such as adjacent hillsides and vegetation, as well as the effect of steep grades on prevailing vehicle speeds. At the request of TJKM and City staff, the project applicant's engineering team marked the proposed driveway locations in the field to facilitate sight-distance measurements. TJKM and City Engineering staff's traffic engineering consultant met with the project applicant's engineering team at the site to identify the critical limitation points for available sight-distance in each direction on Deer Hill Road at both proposed driveway locations. The critical limitation points for sight-distance are the locations where driveway visibility would no longer be obstructed for vehicles approaching on Deer Hill Road. For example, on westbound Deer Hill Road approaching the west project driveway, the critical limitation point for visibility is just west and downhill from the crest of the hill east of the driveway, as shown on Figure 6

City Engineering staff confirmed that observed 85th-percentile speeds on Deer Hill Road would be used to determine the required sight-distance at the proposed driveway locations. Speed data was collected at several locations on Deer Hill Road when local schools were in regular session, including the relevant critical limitation points for available sight-distance. Caltrans *Highway Design Manual* standards for stopping sight-distance based on speed were used to determine the required sight-distance at both driveways for the observed 85th-percentile speed in each direction at the critical limitation points.

Table IX shows the results of the sight-distance analysis for the proposed Deer Hill Road driveway locations.

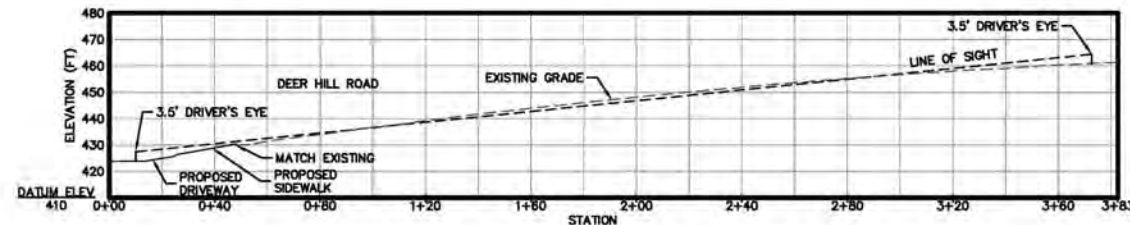
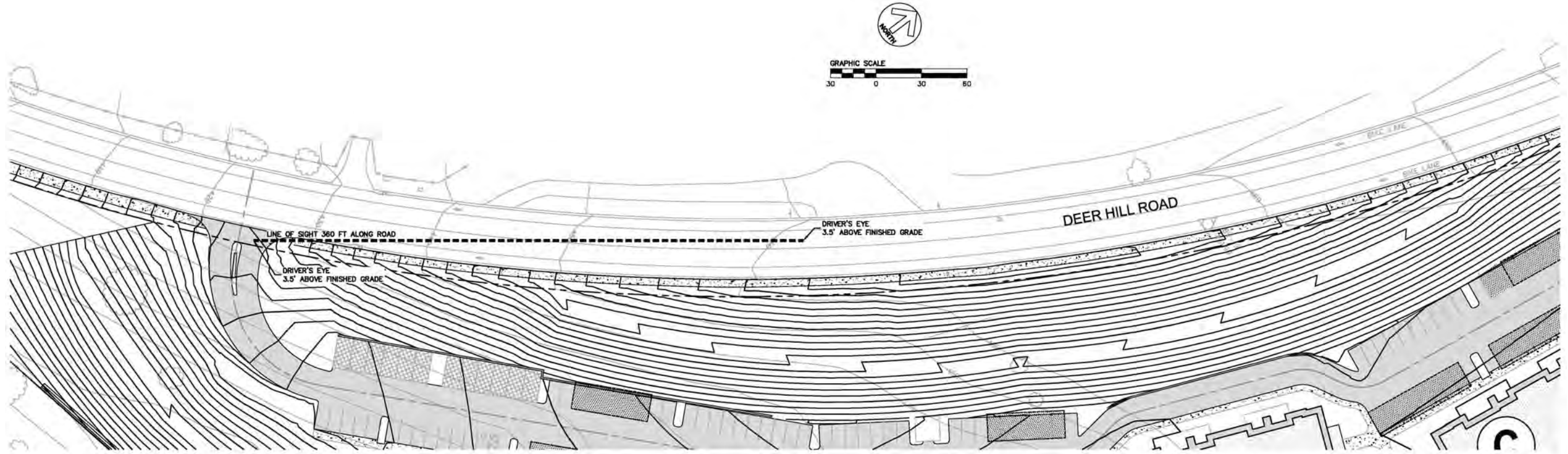
Table IX: Deer Hill Road Project Driveway Sight-Distance

<i>Driveway</i>	<i>Approach Direction</i>	<i>85th-Percentile Speed (mph)</i>	<i>Required Sight-Distance (feet)</i>	<i>Available Sight-Distance (feet)</i>	<i>Meets Standard?</i>
West	Eastbound	56	516	>525	Yes
	Westbound	44	350	<300	No
East	Eastbound	38	300	360 ¹	Yes ¹
	Westbound	<40	<300	>300 ²	Yes

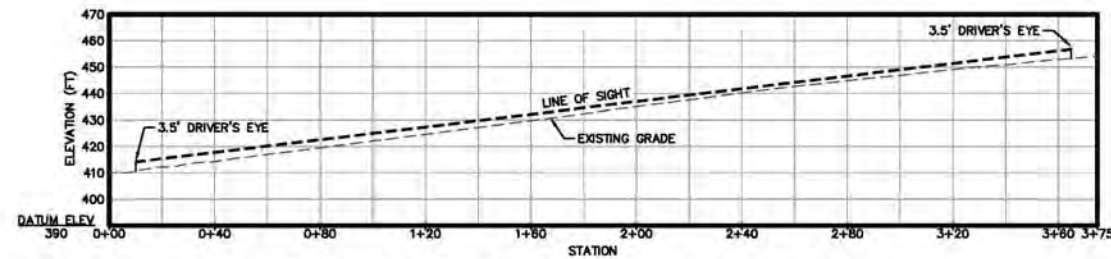
1. Assumes vegetation in creek bed will be trimmed as needed to maintain sight-distance.
2. At east driveway, available sight-distance is for westbound through traffic from Stanley Blvd. See text description.

As shown in the table, visibility of the east driveway for westbound traffic from Stanley Boulevard continuing through onto Deer Hill Road provides more than adequate sight-distance. In addition, the driveway would be located approximately 225 feet west (measured from the west side) of the intersection at Pleasant Hill Road, providing adequate sight-distance for the lower speeds of vehicles turning onto westbound Deer Hill Road.

The field review of the east driveway location indicated adequate sight-distance for eastbound Deer Hill Road traffic visibility of all turning movements at the driveway, including westbound left turns into the driveway. However, at the time of year observed, some trees or brush in the creek bed west of the driveway did not have foliage, and the understory area of trees further west up the hill was also relatively clear. As shown in Figure 7, when foliage grows on the higher branches of some trees or brush in the portion of the creek bed closest to Deer Hill Road, or in the understory of trees further west up the hill, it could obstruct visibility and significantly reduce the available sight-distance at the east driveway for eastbound traffic. Lower branches and vegetation in the creek bed are not an issue because the higher elevation of Deer Hill Road west of the creek bed provides a line of sight over the top of such plant material between eastbound traffic and the east driveway. This sight-distance analysis applies to all turning movements at the east driveway, but sight-distance for westbound left turns into the driveway would be slightly better because their line of sight near the roadway centerline is not restricted quite as much by the potential vegetation obstructions. (Although not required as mitigation, prohibiting left turns at the east driveway is recommended to address other design and operational concerns as described in the previous section on Left-Turn Queues at Project Driveways.)



PROFILE - WEST DRIVEWAY
 SCALE V: 1"=30'
 H: 1"=30'



PROFILE - WEST DRIVEWAY (IF RELOCATED 100' TO THE WEST)
 SCALE V: 1"=30'
 H: 1"=30'

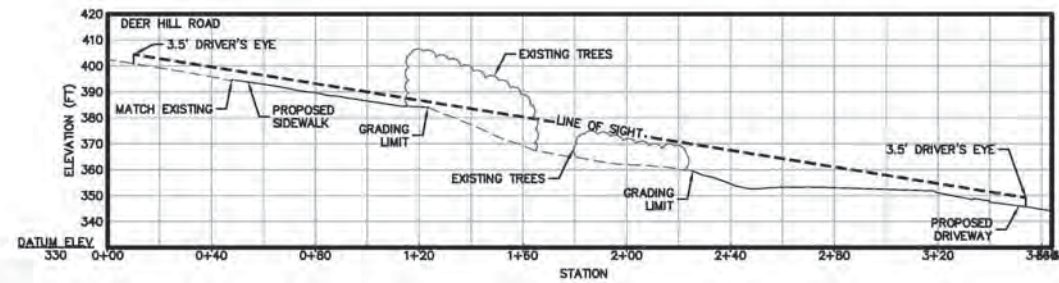
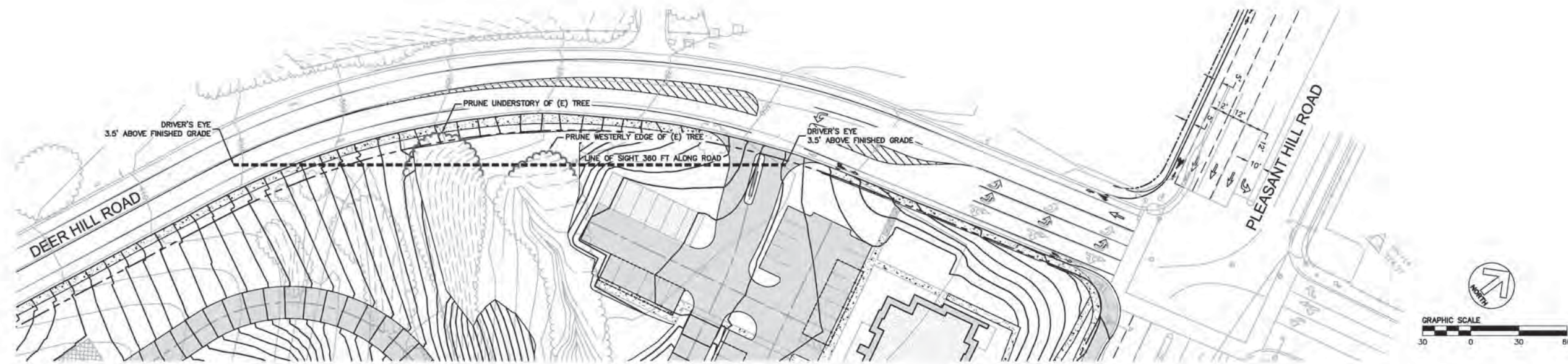
- MITIGATION OPTIONS**
1. RELOCATE PROPOSED DRIVEWAY WEST ALONG DEER HILL ROAD.
 2. PROVIDE WESTBOUND ACCELERATION LANE.

SIGHT DISTANCE EXHIBIT - DEER HILL ROAD
 THE TERRACES OF LAFAYETTE
 LAFAYETTE, CA
 3/8/2012



1646 N CALIFORNIA BLVD
 SUITE 400
 WALNUT CREEK, CA 94598
 925-940-2200
 925-940-2299 (FAX)





PROFILE - EAST DRIVEWAY

SCALE V: 1"=30'
 H: 1"=30'

MITIGATION OPTION
 TREES AND FOLIAGE TO BE TRIMMED AND MAINTAINED TO PROVIDE
 ADEQUATE LINE OF SIGHT.

SIGHT DISTANCE EXHIBIT - DEER HILL ROAD

THE TERRACES OF LAFAYETTE

LAFAYETTE, CA

3/8/2012



1646 N CALIFORNIA BLVD
 SUITE 400
 WALNUT CREEK, CA 94596
 925-940-2200
 925-940-2299 (FAX)



As shown in Table IX and Figure 6, sight-distance at the west Project driveway would be inadequate for westbound traffic on Deer Hill Road, which would present a substantial hazard, resulting in a *significant* impact. To mitigate this impact, TJKM recommends that the west Project driveway on Deer Hill Road shall be relocated at least 100 feet to the west of the location shown on the Project plans. Implementation of all of this measure would result in a *less-than-significant impact*.

The project site plans also propose significant additional landscaping along Deer Hill Road and Pleasant Hill Road, as well as entry monument signs and other vertical features near those roadways at all three project driveways, which would be in the line of sight of traffic approaching each driveway. These project design features present a higher potential for inadequate sight-distance west of the east driveway on Deer Hill Road because of the roadway curvature. Because of the potential for inadequate sight-distance at all of the project driveways, these project design features would substantially increase traffic hazards, resulting in a *significant impact*.

To mitigate this impact, TJKM recommends the following measures:

- *West of the East Driveway on Deer Hill Road:* All landscaping along the south side of Deer Hill Road that is located in the line of sight for eastbound traffic within 360 feet west of the east project driveway shall be limited to plants with foliage no more than 30 inches fully mature height above the closest adjacent curb elevation, or trees with canopy foliage no less than seven feet above the closest adjacent curb elevation, or other dimensions as specified by the City Engineer. The line of sight is defined as the area between the south curb on Deer Hill Road and a straight line connecting a point 10 feet behind the back of the sidewalk on the centerline of the east driveway and a point 360 feet to the west where it intersects the south curb line, or as otherwise specified by the City Engineer.
- *All other Project Driveways:* All landscaping along the project street frontage that is located in the line of sight of traffic approaching project driveways in either direction shall be limited to plants with foliage no more than 30 inches fully mature height above the closest adjacent curb elevation, or trees with canopy foliage no less than seven feet above the closest adjacent curb elevation, or other dimensions as specified by the City Engineer. The line of sight is defined as an area within 10 feet behind the back of the sidewalk or shared-use path and within 50 feet of the driveway edge, or as otherwise specified by the City Engineer.
- *Monument Signs, etc.:* All monument signs, walls, slopes and other vertical features that could otherwise block visibility shall be no more than three feet higher than the adjacent driveway elevation in the area within 15 feet behind the back of the sidewalk or shared-use path and within 50 feet of the driveway edge, or as otherwise specified by the City Engineer.

Implementation of all of these measures would result in a *less-than-significant impact*.

Although the west driveway location would provide adequate sight-distance for westbound traffic on Deer Hill Road, westbound speeds increase as vehicles descend the hill, and vehicles slowing or stopping in the westbound through lane before turning left into the driveway would present potential safety issues. This project design feature would substantially increase traffic hazards, resulting in a *significant impact*.

To mitigate this impact, TJKM recommends either of the following two measures:

- Widen Deer Hill Road as needed to add a striped westbound left turn lane and appropriate taper lengths approaching the west project driveway, and maintain appropriate widths for

bike lanes, traffic lanes, and proposed sidewalks, as well as legal left-turn access at the adjacent driveway on the north side of the roadway; or

- Post signs prohibiting left turns from westbound Deer Hill Road into the west driveway. In the mouth of the driveway on the south side of Deer Hill Road, a raised island designed to physically obstruct left turns into the driveway should be constructed, if emergency access can be maintained to the satisfaction of the Contra Costa County Fire Prevention District and the eastbound bike lane is not obstructed. Raised centerline or median features to obstruct the westbound left turn are not recommended on Deer Hill Road at this location because of prevailing speeds, as well as potential obstruction of left turns out of the project driveway and access at the adjacent driveway on the north side of the roadway.

Implementation of either of these two measures would result in a *less-than-significant impact*.

Transit Facilities

Potential project impacts on public transit systems in Lafayette, including both local bus and Bay Area Rapid Transit (BART) regional rail service, are described below. The project would potentially increase ridership on these systems, particularly during commute peak hours. Note that regardless of the estimated potential number of transit trips generated by the project that is described below, no vehicle-trip reductions were assumed in the traffic analyses presented in this report because the Project site is not within reasonable walking distance of significant public transit services, based on published research data. “Reasonable walking distance” in the published data is typically considered to range from at least ¼-mile to ½-mile.

Survey data from the 2010 Census for Lafayette residents citywide indicates that approximately 12 percent use of transit for commuting. Assuming that 12 percent of the commute peak-hour project trip generation shown in Table V would use transit, the project would add 19 transit trips during the a.m. peak hour and 23 transit trips during the p.m. peak hour.

BART

The 2008 BART Station Profile Study and online BART ridership figures were reviewed for the available ridership data to determine the potential impacts of the proposed project on BART. Based on the BART data sources, average weekday passenger entries and exits at the Lafayette BART Station totaled approximately 6,900 trips in January 2012.

Using a conservative assumption that all of the expected peak-hour transit trip generation from the project would use BART in the peak-hour peak direction, it is estimated that the project would generate 19 new BART Station passenger entries during the a.m. peak hour and 23 new passengers exiting during the p.m. peak hour. These project-generated BART trips would add approximately 3.5 percent to existing average weekday peak period ridership entering and exiting at the Lafayette station. Table X shows the results of the project-added BART trip share analysis.

Table X: Estimated Project-Added Trips at Lafayette BART Station

	<i>Existing Average Weekday BART Trips</i>	<i>Project-Added BART Trips</i>	<i>% Increase</i>
AM Peak Hour	575	19	3.3%
PM Peak Hour	665	23	3.5%

Source: Based on BART Station Profile Study (2008), BART ridership data (2012),

The project is expected to increase the peak hour average ridership at the Lafayette BART Station by more than 3 percent during peak hours, which is one of the two thresholds that must both be met to result in a significant impact on BART. The other threshold is peak hour average waiting time at fare gates that would exceed one minute. Based on observations by TJKM at the Lafayette BART station, the peak hour average waiting time at fare gates is less than 15 seconds, including the worst-case p.m. peak hour when passengers exit in large groups from arriving trains. The 23 new p.m. peak hour BART passengers added by the project, who would be distributed among ten eastbound (p.m. peak direction) and six westbound (p.m. off-peak direction) arriving trains, are not expected to increase the average waiting at fare gates to more than one minute. Because the peak hour average waiting time at the Lafayette BART Station fare gates is not expected to exceed one minute with the project, the result would be a *less-than-significant impact*.

TJKM used observations conducted in October 2011 to estimate that all parking spaces at the Lafayette BART Station typically fill up before 8:30 a.m. on weekdays, except on Fridays when parking demand is lower. Based on the previously cited Census data on transit use by Lafayette resident commuters and the project-generated peak one-hour BART trips shown in Table X, TJKM estimates that the project would generate additional weekday parking demand for up to 50 spaces, which is approximately three percent of the 1,526 spaces in the lot. Because the parking lot demand already exceeds capacity on weekdays, the project would create demand for a public transit facility above that which is provided, resulting in a *significant impact*.

To mitigate this impact, TJKM recommends the following measure:

- The project sponsor shall provide subsidized, frequent shuttle service between the project site and the Lafayette BART station during the a.m. and p.m. peak commute periods, until such time that a bus route on Pleasant Hill Road serving the BART station is implemented as called for in the Lamorinda Action Plan, at which point the project sponsor could provide transit vouchers in lieu of a shuttle.

Implementation of this measure would result in a *less-than-significant impact*.

Bus Transit

The ridership data presented in the 2008 Central Contra Costa County Transportation Authority (County Connection, or CCCTA) Short Range Transit Plan (SRTP), 2008 BART Station Profile Study and online BART ridership figures were reviewed to estimate the portion of transit riders generated by the project that are expected to use County Connection's Route 25 bus line. Average weekday passenger entries and exits at the Lafayette BART Station were compared with the number of average weekday riders on fixed-route County Connection services in Lafayette. Based on the relative proportions of average weekday transit ridership of BART and County Connection, BART comprises 87 percent of this ridership in Lafayette, with County Connection riders comprising the remaining 13 percent. This County Connection rider percentage was applied to the project-generated transit trips described previously to determine the potential impacts to County Connection bus service.

Route 25 is the only fixed-route bus line with stops within reasonable walking distance of the project site. According to 2009 data provided by County Connection staff, Route 25 had an average weekday ridership of approximately 60 passengers in Spring 2009. The January 2011 County Connection Mini SRTP indicates that average weekday ridership on Route 25 amounted to 47 passengers in November 2010. The project is expected to add two to three trips to this route for the a.m. peak hour and three trips for the p.m. peak hour. The County Connection ridership

data indicates that this route currently operates well below capacity during peak periods. The addition of three trips during any peak hour would not be significant so as to increase the load factor above 1.0 (seats full).

Route 625 is the County Connection bus route service for Acalanes High School students, with one bus arriving before school in the morning and one bus leaving after school in the afternoon using streets near the project site to access the bus stop on the north side of Stanley Boulevard. Because project residents attending Acalanes High School could easily walk or bike to the campus across the street from the site, the project would not add riders to Route 625.

No existing bus stops are located on the project site's street frontage, and the only existing bus route that runs along the project frontage is Route 625 with two bus trips per school day passing by on southbound Pleasant Hill Road. Therefore, the project impact on existing County Connection bus service and facilities would be *less than significant*.

The Lamorinda Action Plan (adopted December 2009) includes a Multimodal Transportation Service Objective (MTSO) for Pleasant Hill Road to "Establish CCCTA bus service on Pleasant Hill Road and/or Taylor Boulevard that has a composite frequency of at least two buses per hour during peak commute and school times (6:30 – 9:30 a.m. and 3:30 – 6:30 p.m.) and direct connection to the Lafayette BART station." It also includes as an Action for Pleasant Hill Road, "support the provision of" such service, for which the City of Lafayette is identified as the responsible party. If implemented, such future bus service would likely attract riders from the project and Acalanes High School, and include a new bus stop along the project frontage on Pleasant Hill Road and/or Deer Hill Road near the intersection of those roadways. However, neither CCCTA nor the City has adopted specific plans or identified funding for implementation of such new bus service on Pleasant Hill Road. Additionally, possible bus stop locations might be on either Pleasant Hill Road or Deer Hill Road along the project frontage, depending on which of those roadways would be on the bus route eventually selected to provide the "direct connection to the Lafayette BART station" specified in the Lamorinda Action Plan. If a future bus route includes southbound Pleasant Hill Road along the project frontage, a bus stop could be accommodated at the passenger loading zone along the west curb south of Deer Hill Road described subsequently as mitigation in the Street Parking and Passenger Loading Areas section (Mitigation Measure TRAF-23). Because no specific plan or funding has been identified for the bus service and the locations of bus stops are not yet determined, the result is a *less-than-significant* impact.

Other Local Transit Services

Lamorinda School Bus Program

With the addition of residential units in the Lafayette School District, the proposed project has the potential to add to the rider demand for the Lamorinda School Bus Program. The program includes service to Stanley Middle School and Springhill and Burton Valley Elementary Schools. The project is expected to generate approximately 63 middle school and 63 elementary school grade students. Most of the project's elementary school students are expected to attend Springhill Elementary School, and the bus program would not be available to them because the school is located within walking distance approximately one-half mile north of the project site. For the project's assumed 63 Stanley Middle School students, applying the current 20 percent ratio of bus program annual passes for the Stanley Routes vs. total Stanley Middle School enrollment would result in approximately 13 additional riders on the bus program's Stanley Routes.

The Lamorinda School Bus Program Manager¹ recently indicated that up to 30 additional riders could be accommodated on the Stanley Routes, although possible funding issues could affect future service capacity. Participation in the program requires Lamorinda parents to submit an application for their children to be added to the school bus service and to prepay for that service for the school year. These annual passes fund approximately one-third of the program budget, with Measure J County sales tax allocations funding most of the remainder. Because additional seat capacity is available and parents would pay a significant amount of the program cost if they choose to subscribe, the additional ridership demand from the project is expected to have minor effects that the Lamorinda School bus program can accommodate.

However, accommodations for the forty-foot buses to stop for passenger loading and unloading at locations reasonably convenient to the project site would be needed. These school buses must be able to pull off to the side of the road completely out of traffic lanes for passenger loading activity, or else they must activate flashing red lights requiring all traffic on the adjacent roadway to stop. Morning buses to Stanley Middle School would arrive at the project site on southbound Pleasant Hill Road, and afternoon buses would arrive on either northbound Pleasant Hill Road or eastbound Deer Hill Road. Northbound Pleasant Hill Road across from the project site does not have room for a bus to pull out of traffic lanes, and the project site plans do not propose such accommodation along the site frontage on southbound Pleasant Hill Road and eastbound Deer Hill Road. Because peak hour traffic congestion on those roadways would be exacerbated if all traffic is required to stop for a school bus in the traffic lane, the project-generated demand for school bus service would result in a *significant impact*.

To mitigate this impact, TJKM recommends the following measure:

- The project sponsor shall coordinate with the Lamorinda School Bus Program to determine the appropriate locations and designs for bus stop pullouts along the project frontage, which the project sponsor shall construct as part of the site frontage improvements. A bus stop on the southbound Pleasant Hill Road frontage may need to be located south of the project driveway to avoid driveway sight-distance issues as well as conflicts with passenger loading activity for Acalanes High School north of the driveway (described in a subsequent section of this report). On eastbound Deer Hill Road, a bus stop would need to be located to avoid sight-distance issues at project driveways.

Implementation of this measure would result in a *less-than-significant impact*.

City of Lafayette Spirit Van

With the addition of residential units within Lafayette, the project has the potential to add senior residents to the rider demand for the Spirit Van program. Because precise senior resident numbers are not yet known for the project, it is speculative to quantify the potential impacts to the Spirit Van service that would result from additional riders.

¹ Hansen, Juliet. Program Manager, Lamorinda School Bus Program. Personal communication with Rich Haygood, TJKM. February 2012.

Pedestrian and Bicycle Facilities

Pedestrian Facilities

The project site plans propose constructing a five-foot wide sidewalk along the project site frontage on the south side of Deer Hill Road and on the west side of Pleasant Hill Road extending south to conform with existing sidewalk near the on-ramp to westbound SR 24. The added sidewalk on the west side of Pleasant Hill Road from SR 24 to Deer Hill Road would provide a portion of the walkway specified for completion in the City's Master Walkways Plan. Although the Master Walkways plan specifies adding a walkway on the north side of Deer Hill Road, the proposed sidewalk on the south side would improve pedestrian access for the public as well as project residents.

However, the proposed five-foot sidewalk widths are not consistent with the six-foot widths of most existing sidewalks on Pleasant Hill Road and Stanley Boulevard in the immediate vicinity or the walkway widths required by the City in recent project approvals. The City recently required a 6.5-foot wide curb and sidewalk alongside curb parking with tree bulb-outs between spaces, to fill a sidewalk gap on Mount Diablo Boulevard east of the Veterans Building (Risa Road) as part of frontage improvements for a new development. On Pleasant Hill Road north of Olympic Boulevard, the City recently completed construction of a shared path for pedestrians and bicycles that is ten feet wide with a four- to five-foot wide landscape strip between the path and the roadside curb. The City is also seeking grant funding to conduct a corridor study of Pleasant Hill Road between Mount Diablo Boulevard and Springhill Road to develop a cross section including improved pedestrian and bicycle facilities. This corridor section would be an extension of the improvements to the south on Pleasant Hill Road. Because the project plans propose narrower sidewalks than those existing in the immediate vicinity, those recently approved by the City on arterial roadways, and those anticipated along the Project frontage on Pleasant Hill Road, the project would be inconsistent with City guidelines for pedestrian facilities, resulting in a *significant impact*.

To mitigate this impact, TJKM recommends the following measures:

- On the south side of Deer Hill Road along the project site frontage, construct new sidewalk and curb at a width of at least 6.5 feet, or as otherwise specified by the City Engineer.
- On the west side of Pleasant Hill Road along the project site frontage, construct a new shared path for bicycles and pedestrians at a paved width of ten feet with a buffer strip at least four feet wide between the path and the curb, or as otherwise specified by the City Engineer. The buffer strip's surface treatment shall be appropriate to accommodate pedestrians accessing vehicles at curb parking and passenger loading areas. At the southwest corner of Pleasant Hill Road and Deer Hill Road, the path shall be designed to accommodate expected volumes of pedestrians and bicyclists waiting for the traffic signal. (An alternative alignment for bicyclists using this path where it would intersect the project driveway on Pleasant Hill Road is recommended as a mitigation measure in the Bicycle Facilities section below. This path would be in addition to other improvements recommended as mitigations in the Bicycle Facilities and Street Parking and Passenger Loading Areas sections below.)

Implementation of these measures would result in a *less-than-significant impact*.

Project driveways on Deer Hill Road and Pleasant Hill Road would interrupt the new sidewalks and present conflicting vehicle traffic for pedestrians. This would be a *significant* impact. To mitigate this impact, TJKM recommends the following measures:

- Implement the driveway sight-distance mitigations recommended in a previous section of this report, which would provide adequate visibility between pedestrians and drivers.
- Install stop signs for traffic exiting the driveways, and special design treatments such as paving to be specified by the City Engineer to alert drivers exiting the Project site that they are crossing pedestrian and bicycle facilities.

With these mitigations, project driveways would not disrupt or result in unusual hazards for pedestrian facilities, and the project impact would be *less than significant*.

The project would generate additional pedestrians in the vicinity of the site. The Acalanes Union High School District anticipates that between 53 and 78 additional high school students would be generated from the proposed residential development. Most of these students would be expected to walk to and from the project site to attend Acalanes High School (AHS), crossing at the signalized Pleasant Hill Road/Deer Hill Road/Stanley Boulevard intersection. The traffic level of service analysis presented in other sections of this report already assumes the maximum condition of pedestrians crossing this intersection on every signal cycle during peak hours, and the additional pedestrians would not affect intersection traffic operations.

The project-generated pedestrians would likely join the existing large number of AHS pedestrians (nearly 100 each morning) that “jaywalk” across Stanley Boulevard within 100 to 275 feet east of the signalized intersection. Although crossing traffic in this roadway segment is somewhat hazardous, the large numbers of high school age pedestrians crossing mostly during a 20-minute period before and after school every day make them fairly visible to drivers, and accident data provided by the City’s Engineering staff for a recent four-year period shows no reported accidents involving pedestrians in this area. As suggested previously in the report to address this existing condition, safer pedestrian conditions in this segment might be encouraged by installing a fence or barrier rail along the north curb of Stanley Boulevard between Pleasant Hill Road and the AHS exit driveway approximately 175 feet to the east, and installing a school crosswalk on Stanley Boulevard at that driveway. However, a fence or barrier along the curb could present a safety issue for drivers and a visual impact for the public, and installing an acceptable crosswalk design would be very challenging because of existing driveways and a drainage inlet on the north curb across from the AHS driveway. Because of the nature of this existing condition, additional high school pedestrians generated by the project would not substantially increase hazards, and the project impact is considered *less than significant*.

The project is expected to generate approximately 63 additional elementary school (K-5) students, and most are expected to attend Springhill Elementary School, which is approximately one-half mile north of the project site on Pleasant Hill Road. A substantial portion of these students could walk this distance to and from Springhill School, accompanied by a parent as appropriate, if a more direct walkway connection was provided. However, no walkway exists on the west side of Pleasant Hill Road between Deer Hill Road and Springhill School. To make this trip on improved walkways, pedestrians must cross Pleasant Hill Road at the Deer Hill Road signal and at the Springhill Road/Quandt Road signal to use the sidewalk on the east side, which has a gap of approximately 500 feet between Quandt Road and Hillview Lane where pedestrians must walk along a narrow residential access roadway. A crossing guard is provided before and after school at the Springhill Road/Quandt Road signal, but not at the Deer Hill Road signal. These existing obstacles are likely to significantly limit the number of project-generated Springhill students walking to and from school.

The City's Master Walkways Plan includes adding a walkway on the west side of Pleasant Hill Road in this area. The existing topography between Deer Hill Road and Springhill Elementary School includes an area where a steep embankment slopes up immediately adjacent to the roadway, presenting a significant engineering challenge for an acceptable walkway design. Construction of a walkway on a relatively flat area along the top of the embankment approximately 25 feet west of the Pleasant Hill Road curb, with connections to typical curbside elevations at the north and south ends, appears feasible. However, ADA accessibility and acquisition of right-of-way are potential issues.

The project would contribute to the need for a walkway on the west side of Pleasant Hill Road between Deer Hill Road and Springhill Elementary School, but a safe alternative is provided by the existing sidewalk on the east side, and this condition would not substantially increase hazards or disrupt existing or planned pedestrian facilities. Because this condition does not meet the significant impact criteria based on CEQA guidelines, this project impact is considered *less than significant*. This finding does not preclude the City from potentially requiring the project sponsor to contribute toward detailed study and possible construction of a walkway on the west side of Pleasant Hill Road as a condition of project approval.

Data from the 2010 U.S. Census shows that approximately 1.4 percent of Lafayette residents and 1.6 percent of Contra Costa County residents commuting to work did so by walking. Assuming that 1.5 percent of the commute peak-hour project trip generation shown in Table V would walk, the project would generate two to three walking trips during the a.m. peak hour and three walking trips during the p.m. peak hour commuting to and from work. If these additional pedestrians walk to and from the south on Pleasant Hill Road to access employment sites on Mt. Diablo Boulevard, and are added to those expected to walk to and from County Connection bus stops as described in a previous section, the combined total would be approximately five pedestrians in the a.m. peak hour and six in the p.m. peak hour. This number of project-generated pedestrians would not contribute significantly to the need for pedestrian improvements along Pleasant Hill Road at the uncontrolled SR 24 freeway ramp crossings, and the resulting project impact on pedestrian facilities would be *less than significant*.

Project-generated vehicle traffic would increase existing traffic volumes on adjacent roadways by the following percentages:

- Pleasant Hill Road south of the project driveway - less than five percent
- Deer Hill Road west of the project driveways – less than four percent
- Stanley Boulevard - approximately two percent
- Pleasant Hill Road north of Deer Hill Road - less than two percent

These increases are within the range of typical daily fluctuations in traffic volumes, which can vary by five to ten percent from day to day, and would not significantly impact the pedestrian experience on adjacent sidewalks. Additionally, the two percent increase on Stanley Boulevard would not significantly impact the AHS pedestrian "jaywalking" condition described above. The project would increase traffic volumes on Deer Hill Road immediately west of Pleasant Hill Road by a somewhat higher percentage, mostly for eastbound traffic. However, the potential impact on pedestrians would be offset by the project's proposed construction of sidewalk on the south side of Deer Hill Road, adjacent to eastbound traffic. The resulting project impacts on the pedestrian experience on adjacent sidewalks would be *less than significant*.

Bicycle Facilities

The project site plans propose to add a Class II bike lane along the project site frontage on the west side of Pleasant Hill Road and extending south to a point near the on-ramp to westbound SR 24. This added bike lane on southbound Pleasant Hill Road from Deer Hill Road to the westbound SR 24 on-ramp would provide a portion of the bike lanes included in the City's Bikeways Master Plan that is currently missing, but a gap would remain between the westbound on-ramp and Mount Diablo Boulevard.

Project plans that propose widening of southbound Pleasant Hill Road to add a vehicle traffic lane include adding a five-foot wide Class II bike lane along the west curb north of the project driveway, where the plans show no curb parking. South of the project driveway, the bike lane would be forced to shift to the left side of the additional southbound traffic lane that would become a right-turn-only lane for the on-ramp to westbound SR 24. This configuration would cause unacceptable weaving conflicts with vehicle traffic for the planned southbound bike lane, resulting in a *significant impact*.

To mitigate this impact, TJKM recommends an alternative configuration for widening southbound Pleasant Hill Road, which would not add a vehicle traffic lane. The recommended mitigation would widen the southbound roadway along the project frontage to provide a six-foot wide Class II bike lane between an eight-foot wide curb loading and parking lane and the existing traffic lanes, or dimensions otherwise specified by the City Engineer. This configuration would maintain the existing curb loading and parking lane, except for a segment extending up to 100 feet north from the project driveway, where TJKM recommends additional widening to accommodate a 12-foot wide right-turn lane along with the six-foot wide Class II bike lane, or dimensions otherwise specified by the City Engineer. (This configuration would be in addition to the other improvements recommended as mitigations in the Bicycle Facilities and Street Parking and Passenger Loading Areas sections below.) Implementation of these measures to mitigate the impact of the configuration shown on the project site plans would result in a *less-than-significant impact*. An appropriate bike lane striping treatment or other accommodation for southbound bicyclists on Pleasant Hill Road crossing vehicle traffic at the on-ramp to westbound SR 24 remains to be developed, but the project would not contribute significantly to the need for such facility, as further discussed below.

Traffic entering and exiting project driveways on Deer Hill Road and Pleasant Hill Road would cross the existing and proposed Class II bike lanes and present conflicting vehicle traffic for bicyclists. This would be a *significant impact*. To mitigate this impact, TJKM recommends the following measures:

- Implement the driveway sight-distance mitigations recommended in a previous section of this report, which would provide adequate visibility between bicyclists and drivers.
- Install stop signs for traffic exiting the driveways, and special design treatments such as paving to be specified by the City Engineer to alert drivers exiting the Project site that they are crossing pedestrian and bicycle facilities.

With these mitigations, project driveways would not disrupt or result in unusual hazards for Class II bike lanes, and the project impact would be *less than significant*.

The City's Bikeways Master Plan proposes constructing a Class I (off-street) bicycle path between Pleasant Hill Road and the Brown Avenue/Deer Hill Road intersection on an alignment along the north side of the Caltrans SR 24 right-of-way. The Bikeways Master Plan also proposes extending

the Class I bike path easterly of Pleasant Hill Road, and the most recent City discussions propose crossing Pleasant Hill Road at the Deer Hill Road/Stanley Boulevard traffic signal, with an off-street path along the west side of Pleasant Hill Road connecting between the signal and the Caltrans right-of-way. The project site borders the north side of the Caltrans right-of-way and the west side of Pleasant Hill Road where these bicycle facilities are planned.

The project site plans do not specify the Caltrans SR 24 right-of-way as a planned bike path, and it cannot be ascertained whether the proposed grading and improvements along the property boundary adjacent to Caltrans right-of-way could preclude reasonable accommodation of the bike path. On the west side of Pleasant Hill Road, the project site plans propose constructing a five-foot wide sidewalk along the project site frontage, extending south to conform with existing sidewalk near the on-ramp to westbound SR 24. However, the proposed five-foot sidewalk width is not appropriate for the shared bicycle/pedestrian path planned by the City. On Pleasant Hill Road north of Olympic Boulevard, the City recently completed construction of a shared path for pedestrians and bicycles that is ten feet wide with a four- to five-foot wide landscape strip between the path and the roadside curb. The City is also seeking grant funding to conduct a corridor study of Pleasant Hill Road between Mount Diablo Boulevard and Springhill Road to develop a cross section including improved bicycle and pedestrian facilities. This corridor section would be an extension of the improvements to the south on Pleasant Hill Road. Because the project plans might preclude accommodation of the planned bike path along the project boundary, and propose a narrower facility on the west side of Pleasant Hill Road than those recently constructed by the City for shared bicycle and pedestrian use and those anticipated at that location, the project would interfere with planned bicycle facilities, resulting in a *significant impact*.

To mitigate this impact, TJKM recommends the following measures:

- On the west side of Pleasant Hill Road along the project site frontage, as recommended in the previous Pedestrian Facilities section of this report, construct a new shared path for bicycles and pedestrians at a paved width of ten feet with a buffer strip at least four feet wide between the path and the curb, or as otherwise specified by the City Engineer. The buffer strip's surface treatment shall be appropriate to accommodate pedestrians accessing vehicles at curb parking and passenger loading areas. At the southwest corner of Pleasant Hill Road and Deer Hill Road, the path shall be designed to accommodate expected volumes of pedestrians and bicyclists waiting for the traffic signal. An alternative alignment for bicyclists using this path where it would intersect the project driveway on Pleasant Hill Road is recommended as a mitigation measure in the following section. (This path would be in addition to other improvements recommended as mitigations in the Bicycle Facilities and Street Parking and Passenger Loading Areas sections.)
- The project sponsor shall coordinate with the City and Caltrans to ensure that project site improvements adjacent to the Caltrans SR 24 right-of-way, such as grading, drainage, retaining walls or other structures, would in no way preclude construction of a Class I bicycle path meeting applicable vertical and horizontal alignment standards, at a paved width of ten feet with graded shoulders at least two feet wide on both sides, or as otherwise specified by the City Engineer. Project sponsor shall dedicate additional right-of-way as needed to ensure the feasibility of constructing such a path. The Project sponsor shall coordinate with the City to develop an appropriate alignment of the path to connect with the shared bicycle/pedestrian path on the west side of Pleasant Hill Road described immediately above while also intersecting the Project driveway on Pleasant Hill Road as described in the mitigation measure recommended in the following section. (This path

would be in addition to other improvements recommended as mitigations in the Bicycle Facilities and Street Parking and Passenger Loading Areas sections.)

Implementation of these measures would result in a *less-than-significant impact*.

Traffic entering and exiting the proposed project driveway on Pleasant Hill Road would interfere with the shared bicycle and pedestrian path that is planned along the west side of the roadway, causing hazards to bicyclists at the driveway intersection and resulting in a *significant impact*.

To mitigate this impact, TJKM considered the following two measures:

- If left turns into driveway from northbound Pleasant Hill Road are allowed (i.e. traffic Mitigation Alternative 2 prohibiting the left turns as described in a previous section is not implemented), install a traffic signal to safely control the driveway intersection with the bike path by providing separate signal phases for: 1) left turns in and right turns out of the driveway, and 2) bikes and pedestrians on the path and traffic on southbound Pleasant Hill Road. The right turn out of the driveway should be posted for no right turn on the red signal. The traffic signal would not stop northbound through traffic, which would not conflict with other traffic at the driveway.
- Regardless of whether left turns into the driveway from northbound Pleasant Hill Road are allowed, the project sponsor shall coordinate with the City to develop an appropriate route and dedicate right-of-way on the project site for a bike path alignment that would intersect the driveway approximately 50 feet or more from Pleasant Hill Road. Additionally, the project sponsor shall provide the necessary grading and structural support on the site to allow for a Class I bike path that meets applicable width and slope standards, provides adequate sight-distance where it intersects the driveway, and connects with the shared bicycle/pedestrian path on the west side of Pleasant Hill Road and the planned Class I bike path described as mitigation in the previous section on both ends. Where the driveway intersects the bike path, the Project applicant shall also install special design treatments, such as paving, to be specified by the City Engineer, to alert drivers that they are crossing a bike path.

TJKM recommends the second mitigation measure above based on greater convenience for bicyclists, lower maintenance and operations costs, and probably less accident risk exposure compared to a traffic signal that may not meet standard warrants. (This measure would be in addition to other improvements recommended as mitigations in the Bicycle Facilities and Street Parking and Passenger Loading Areas sections.) Implementation of either one of these measures would result in a *less-than-significant impact*.

Data from the 2010 U.S. Census shows approximately 0.72 percent of Lafayette residents and 0.7 percent of Contra Costa County residents commuting to work by bicycle. Assuming that one percent of the commute peak-hour project trip generation shown in Table V would be bike trips, the project would generate two bike trips during the a.m. peak hour and two bike trips during the p.m. peak hour commuting to and from work. This number of project-generated bike trips would not contribute significantly to the need for bicycle facilities, including improvements along Pleasant Hill Road at the uncontrolled SR 24 freeway ramp crossings, and the resulting project impact on bicycle facilities would be *less than significant*.

Project-generated vehicle traffic would increase existing traffic volumes on adjacent roadways by the following percentages:

- Pleasant Hill Road south of the project driveway - less than five percent
- Deer Hill Road west of the project driveways – less than four percent
- Stanley Boulevard - approximately two percent
- Pleasant Hill Road north of Deer Hill Road - less than two percent

These increases are within the range of typical daily fluctuations in traffic volumes, which can vary by five to ten percent from day to day, and would not significantly impact bicyclist operations or safety on adjacent bike lanes or the Bike Boulevard on Stanley Boulevard. The project would increase traffic volumes on Deer Hill Road immediately west of Pleasant Hill Road by a somewhat higher percentage, mostly for eastbound traffic. However, the potential impact on bicyclists would be offset by the project's proposed construction of sidewalk on the south side of Deer Hill Road adjacent to the bike lane and eastbound traffic, which would provide better visibility and roadside clearance for bicyclists than existing roadside slopes and vegetation. The resulting project impacts on bicyclist operations and safety on bicycle facilities would be *less than significant*.

Street Parking and Passenger Loading Areas

Project plans propose widening of southbound Pleasant Hill Road between Deer Hill and the on-ramp to westbound SR 24 to add a vehicle traffic lane and a bike lane along the west curb, where the plans show elimination of the existing curb parking and passenger loading zone. The maximum observed parking demand of 13 vehicles in the 20 curb parking spaces proposed for elimination would be accommodated by the minimum of 16 curb spaces observed to remain available south of the westbound on-ramp, where a total of 22 spaces are marked.

A maximum accumulation of nine vehicles at one time was observed at the existing designated passenger loading zone and adjacent curb parking on Pleasant Hill Road, waiting to pick up Acalanes High School students after school. The proposed elimination of the existing designated spaces on the west curb of Pleasant Hill Road that are currently used for school passenger loading would result in additional hazardous passenger loading activity at unsuitable locations, which already occurs as described in the Existing conditions section. The loss of these designated curb spaces used for passenger loading would substantially increase hazards for school pedestrians and vehicle traffic in the immediate area, resulting in a *significant impact*.

To mitigate this impact, TJKM recommends the same alternative configuration for widening southbound Pleasant Hill Road that was described in the previous section as mitigation for the bike lane impact, a configuration which would not add a vehicle traffic lane. The recommended mitigation would widen the southbound roadway along the project frontage to provide an eight-foot wide curb loading and parking lane and a six-foot wide bike lane alongside the existing traffic lanes, or dimensions otherwise specified by the City Engineer. This configuration would maintain the existing curb loading and parking lane along the project frontage, except for a segment extending up to 100 feet north from the project driveway, where TJKM recommends additional widening to accommodate a 12-foot wide right-turn lane along with the six-foot wide bike lane, or dimensions otherwise specified by the City Engineer. TJKM recommends that the entire curb segment between Deer Hill Road and the recommended right-turn lane be designated as a passenger loading zone, which would accommodate eight cars in approximately the same location as the existing curb spaces used for passenger loading, only one vehicle less than the maximum observed curb loading space demand. (This measure would be in addition to other improvements

recommended as mitigations in the Bicycle Facilities section.) Implementation of these measures to mitigate the impact of the configuration shown on the project site plans would result in a *less-than-significant impact*.

The project would also eliminate current use of the site's private property for passenger loading activity, where the maximum observed demand was six vehicles parking for a short time to wait for students. These six vehicles can easily be accommodated at curbside parking space that is currently vacant on Stanley Boulevard or Camino Diablo immediately east of the high school.

Emergency Vehicle Access

TJKM consulted with the Contra Costa County Fire Protection District (CCCFFPD) to assist in evaluating the project impacts on emergency vehicle access. The evaluation considered the additional traffic delay impacts resulting from the project under Existing plus Project conditions, as well as the proposed configuration of project access driveways.

A CCCFFPD Fire Inspector reviewed the additional traffic delay impacts described in the preceding sections of this report². Station 15 at 3338 Mount Diablo Boulevard, approximately one-half mile west of Pleasant Hill Road, is the primary responding station for the project vicinity. Emergency response to the project site could be routed to the proposed driveways on Deer Hill Road via Brown Avenue, or from Pleasant Hill Road via the proposed left turn access into the project driveway.

On the Deer Hill Road response route, the project's significant impact on delay at the Brown Avenue/Deer Hill Road intersection would result in inadequate emergency access, which would be a *significant impact*. The impact on traffic delay would be mitigated to less-than-significant by requiring the project sponsor to coordinate with the City to contribute a fair share of the cost, including an in-lieu payment, to install a traffic signal, which will be added to the City's Capital Improvement Projects (CIP) program, as described in a previous section of this report. To mitigate the impact on emergency access, the traffic signal equipment would be required to include an emergency vehicle preemption system (Opticom), which allows emergency response vehicles approaching a signalized intersection to activate a green signal for their travel direction. However, the SR 24 freeway overpass structures on Brown Avenue could obstruct the Opticom activation device on responding emergency vehicles headed northbound on Brown Avenue from Mount Diablo Boulevard toward Deer Hill Road, which could substantially reduce the effectiveness of the traffic signal preemption. To avoid this problem, TJKM recommends that the installation of traffic signal equipment to mitigate the project's delay impact at the Brown Avenue/Deer Hill Road intersection shall include advance detection devices for the Opticom system as needed to assure effective traffic signal preemption for responding emergency vehicles on northbound Brown Avenue. With this mitigation, the project impact on emergency access routes using Brown Avenue or Deer Hill Road would be *less than significant*.

The primary emergency response route along Pleasant Hill Road would be northbound from Mount Diablo Boulevard, originating from Station 15. Because the primary response route is northbound, the project's significant impact on a.m. peak-hour traffic delay for southbound Pleasant Hill Road extending north from Deer Hill Road is considered a less-than-significant impact on emergency access. However, the project's significant impact on p.m. peak-hour traffic speeds for northbound Pleasant Hill Road between the off-ramp from westbound SR 24 and the proposed project

² Leach, Ted. Fire Inspector, Contra Costa County Fire Protection District. Personal communication with Rich Haygood, TJKM. February 22 and March 8, 2012.

driveway would result in inadequate emergency access to areas of Lafayette served by Pleasant Hill Road between SR 24 and Rancho View Drive. (Areas north of Rancho View Drive would be served adequately by Station 2, located on Geary Road at Larkey Lane.) The result would be a *significant impact*.

To mitigate this impact, TJKM recommends installation of advance detection equipment for the existing Opticom system as needed to assure effective traffic signal preemption for responding emergency vehicles on northbound Pleasant Hill Road approaching the Deer Hill Road intersection and the other four signalized study intersections to the north. The advance detection system should be designed to activate a green signal for northbound Pleasant Hill Road at Deer Hill Road with enough time before the emergency vehicle arrives to allow traffic congestion between SR 24 and the intersection to clear sufficiently to facilitate passage of the emergency vehicle. At minimum, the advance detection system should allow emergency vehicles responding from Station 15 to activate traffic signal preemption for northbound Pleasant Hill Road at Deer Hill Road as soon as they turn north from eastbound Mount Diablo Boulevard. With this mitigation, the project impact on emergency access routes using Pleasant Hill Road would be *less than significant*.

CCCCFPD had previously reviewed the project site plans regarding emergency access. According to a letter from CCCFPD Fire Inspector Ted Leach dated April 25, 2011, which is included as Appendix G, the emergency vehicle access shown on the project site plans does not comply with minimum turning radius requirements at several on-site driveway locations. Detailed review of the site plan identified 12 corners and one median nose at five on-site driveway intersections that would not provide adequate turning radii. The restricted turning radii would result in inadequate emergency access to the project site, which is a *significant impact*.

To mitigate this impact, TJKM recommends revising the project site plans such that corner radii and medians at on-site driveway intersections provide a minimum inside turning radius of 25 feet and a minimum outside turning radius of 45 feet, per CCCFPD requirements. Implementation of this measure to mitigate inadequate emergency access to the site would result in a *less-than-significant impact*.

On-Site Circulation and Parking

TJKM reviewed the project site plans with regard to on-site circulation, including pedestrian and truck access, as well as parking. Figure 2 shows an overview of the site plan. For purposes of the following discussion, the term “upper loop” refers to the on-site driveway closest to Deer Hill Road that serves buildings A, B, C, and D, and connects the west project driveway on Deer Hill Road to the Pleasant Hill Road driveway. The “lower loop” refers to the on-site driveway closer to the southerly property boundary that serves buildings E through L and the Clubhouse, terminating at the east project driveway on Deer Hill Road.

The vehicle circulation plan appears adequate for passenger cars and light-duty trucks. To maintain adequate sight-distance, TJKM recommends that all landscaping within 15 feet of on-site driveway intersections shall be limited to plants with foliage no more than 30 inches fully mature height above the closest adjacent curb elevation, or trees with canopy foliage no less than seven feet above the closest adjacent curb elevation, or other dimensions as specified by the City Engineer. At the on-site four-way intersection of the upper loop and lower loop driveways, which connect to Pleasant Hill Road and the east driveway on Deer Hill Road respectively, TJKM recommends installation of two-way stop sign control on one of the two driveways.

TJKM reviewed exhibits dated January 24, 2012 that the project architect provided, which depict the turning paths for a 26-foot moving truck (total length of 32.5 feet, single-unit with no trailer) accessing the site driveways. For determining the adequacy of site access driveways, the vehicle depicted in the exhibits is representative of the largest vehicle expected for the great majority of delivery and service vehicles and moving trucks that would access the site. However, a very large moving van, which typically consists of a tractor truck with a trailer up to 53 feet long, has significantly larger turning radius requirements, which were not depicted on the exhibits provided to TJKM. According to the project architect, very large moving vans can access the upper loop driveway and stage loading/unloading for other buildings on the project site from that location.

Based on TJKM's review of the exhibits provided by the project architect, the on-site circulation driveways appear to provide adequate turning radii for truck access as described above. However, the truck turning paths depicted at the three project driveway intersections with public streets showed the following problems:

- Southbound Pleasant Hill Road, right turn into driveway: The proposed entry driveway width would not reasonably accommodate a large truck, despite an assumed wide right turn starting from the second through lane on Pleasant Hill Road rather than starting from the right-turn-only lane that is recommended in previous sections of this report.
- Westbound Deer Hill Road, left turn into east driveway: The proposed entry driveway width would not accommodate a large truck making this left turn. (Although not required as mitigation, prohibiting left turns at the east driveway is recommended to address other design and operational concerns as described in the previous section on Left-Turn Queues at Project Driveways.)
- Deer Hill Road eastbound right turn or westbound left turn into west driveway: A large truck turning right into the driveway would be required to cross into the oncoming westbound traffic lane on Deer Hill Road and make a wide turn in order to complete the turn within the proposed entry driveway width. Additionally, although not depicted on the exhibits provided by the project architect, the proposed entry driveway width would not accommodate a large truck making a left turn into this driveway, based on the similar configuration depicted for a truck turning left into the east driveway.

The inadequate truck turning radii at the project entry driveways and the resulting improper lane use and other potential unsafe maneuvers by trucks on heavily travelled public streets would substantially increase hazards due to a design feature, which is a *significant impact*.

To mitigate this impact, TJKM recommends revising the project site plans at the three project access driveways such that adequate truck turning radii are provided, by widening the portion of the entry roadway near each intersection, modifying the median configuration, and/or increasing the corner radius. Implementation of this measure to mitigate inadequate truck turning radius provisions at the project entry driveways would result in a *less-than-significant impact*.

TJKM reviewed pedestrian access on the site, especially between on-site recreation/activity centers and residential units, and connections to and from public sidewalks.

The site plan proposes walkways that would connect residential units with on-site activity centers and public sidewalk. However, the proposed plan would force many pedestrians to use either circuitous routes along walkways with multiple switchbacks, which are designed to avoid steep grades while accommodating the elevation differences on the site, or walk in the on-site

driveways. The most notable locations missing pedestrian facilities for direct connections include:

- At the west end of the site, no direct connection to the proposed public sidewalk on Deer Hill Road.
- Building M (near Pleasant Hill Road south of the project driveway) has no direct connection to the rest of the site or to the nearby public sidewalk on Pleasant Hill Road.
- Building N (near the corner of Pleasant Hill Road and Deer Hill Road) has no direct pedestrian connection to the rest of the site.

Additionally, the majority of the project site area that consists of Buildings A through L provides good pedestrian facilities connecting those buildings and on-site activity centers, but lacks pedestrian facilities to connect more directly to public sidewalks on Pleasant Hill Road and Deer Hill Road. Although more direct connections would require combinations of stairs, steep walkways, and occasional serpentine alignments to accommodate the elevation changes along those routes, many project residents would likely prefer such facilities instead of walking in driveways or on the circuitous routes that the site plans would provide.

TJKM recommends that the site plan be revised to include construction of pedestrian facilities, which may include stairs and walkways on alignments as needed, to provide more direct pedestrian connections for the following routes:

- Between Deer Hill Road and Building A, along the west project driveway
- Between Building D and Pleasant Hill Road near Building M, along the upper loop driveway
- Between Building G and Deer Hill Road, along the lower loop driveway
- Between Building L and the Leasing Office, along the lower loop driveway
- Between Building M and the recommended facility along the upper loop driveway
- Between Building N and the upper loop driveway, with a potential crosswalk to connect with the recommended Building M connection

TJKM evaluated the proposed parking supply based on review of the project site plan and City code requirements. The Project Description specifies use of the City's parking requirements for Mixed Density Residential (M-R-B) Zones. Table XI below shows: the parking supply requirements for each unit type based on number of bedrooms, plus guest parking for the total number of units; the proposed number of units of each type; the resulting number of spaces required; and the proposed total number of spaces to be supplied. As shown in the table, the required parking supply of 511 spaces would be more than satisfied by the proposed 567 spaces to be supplied.

To provide an additional reference point for the project's potential parking demand, TJKM reviewed data presented in *Parking Generation, 4th Edition* published by the Institute of Transportation Engineers. In that publication, the land use category applicable to the project is Low/Mid-Rise Apartments, which presents data from suburban study sites with an average size of 311 dwelling units, nearly identical to the project size. The data for suburban locations shows an average peak parking demand of 1.23 vehicles per dwelling unit, and the upper limit of the 95% confidence interval for peak demand is 1.37 vehicles per dwelling unit. The proposed project parking supply ratio of 1.8 spaces per unit would exceed these parking demand ratios. Additionally, an average parking supply ratio of one space per bedroom was reported for study sites; for the proposed 525 bedrooms in the project, this would equate to a supply of 525 spaces, which the proposed 567 spaces would exceed. Based on this analysis, the proposed parking supply for the project would be adequate to accommodate peak parking demand on-site.

Table XI: Project Parking Supply

<i>Unit Type/ No. of Bedrooms</i>	<i>Units</i>	<i>Required Spaces/Unit</i>	<i>Spaces Required</i>	<i>Spaces Supplied</i>
1	140	1.2	168	
2	140	1.5	210	
3	35	2.0	70	
Guest	315	0.2	63	
TOTAL			511	567
Overall Spaces/Unit			1.62	1.80

TJKM also reviewed the parking dimensions proposed on the project site plans. All of the proposed parking would be at a 90-degree angle to the aisles, for which the City’s off-street parking dimensions require a minimum aisle width of 26 feet and a minimum stall depth of 18 feet. All parking aisles appear to meet the minimum width standard. Many of the parking stalls are labeled with a depth of 16 feet between the back of the stall markings and the raised curb near the front of the vehicle, which is acceptable if the remaining two feet that is assumed for vehicle front overhang is a flat area with approximately the same height as the curb (typically six inches). Although many of the stalls shown with this depth are located along proposed sidewalks that would provide the necessary vehicle front overhang area, others are located where the height of the front overhang area could not be ascertained. Additionally, the sidewalks where the vehicle front overhang would encroach may require additional width to meet minimum clearance standards, which exclude such encroachment area from the required width.

The proposed parking design features would not substantially increase hazards, and the resulting impact would be less-than-significant. TJKM recommends that the site plan be revised to address the potential issues related to stall depth and vehicle front overhang during the design review process.

Construction

According to the Project Description, grading on the project site during construction would result in approximately 25,000 to 30,000 haul trips distributed over a nine-month period. Assuming five-day work weeks, this would result in an average of approximately 150 haul trips per day, for a total of 300 truck trips (150 arriving empty, 150 leaving full) per day. Assuming eight hours per work day for active hauling operations, an average of approximately 40 truck trips per hour would result. All truck trips for this hauling operation are expected to arrive at and depart from the project vicinity using the SR 24 freeway and ramps at the Pleasant Hill Road interchange, in compliance with the City’s truck route ordinance and standard requirements of a Construction Staging Plan that would be a condition of approval of the project. As a result, truck trips for this hauling operation are expected to be prohibited on Deer Hill Road west of the project site boundary.

Based on the analysis of Existing and Existing plus Project traffic conditions presented in the previous sections of this report, the truck trips generated during the grading phase of construction on the project site could result in the following conditions:

- Potential large truck turning movements during the a.m. peak hour at the Deer Hill Road/Pleasant Hill Road intersection would conflict with congested southbound Pleasant Hill Road traffic and significantly increase delay at the intersection.
- Large trucks potentially attempting U-turn movements from northbound to southbound Pleasant Hill Road at the Deer Hill Road intersection would be forced into stopping and

backing up movements because of the constrained intersection geometry, contributing to traffic delay and queues at the intersection.

- Large trucks potentially attempting left turns from northbound Pleasant Hill Road to Deer Hill Road could be forced into stopping and backing up movements, or possibly drive over the south raised median on Pleasant Hill Road or conflict with eastbound vehicles stopped at the crosswalk limit line on Deer Hill Road, because of the constrained intersection geometry. These conditions would contribute to traffic delay and queues at the intersection and substantially increase hazards.
- Large trucks are expected to enter northbound Pleasant Hill Road from the westbound SR 24 off-ramp and weave across northbound lanes to turn left at Deer Hill Road, or possibly at a proposed median opening that would provide direct access to the project site south of Deer Hill Road. During the p.m. peak hour when this segment of northbound Pleasant Hill Road is congested, these large truck weaving movements would significantly reduce traffic speeds and substantially increase hazards.
- Potential large truck turning movements on Deer Hill Road to access the project site could occur at locations with inadequate sight-distance, which would substantially increase hazards.
- Potential large truck traffic during the a.m. and school p.m. peak hours on Pleasant Hill Road and Deer Hill Road would conflict with pedestrians and passenger loading activity generated by Acalanes High School on school days, substantially increasing hazards for school pedestrians.
- Elimination of the existing passenger loading zone on the west curb of Pleasant Hill Road along the project frontage would substantially increase hazards for school pedestrians and vehicle traffic.

During the grading phase of construction on the project site, these conditions would result in *temporary significant impacts*.

To mitigate these construction impacts, TJKM recommends that the project sponsor prepare and submit a Construction Staging Plan for review and approval by the City Engineer. The Construction Staging Plan shall include elements such as flaggers for trucks entering and exiting the site, and a designated liaison to coordinate with the City, schools, and the public as needed, and shall implement the following required measures:

- Large trucks involved in the grading phase of construction shall be prohibited from arriving at or departing from the project site during the hours of 7:00 to 9:00 a.m. and 3:00 to 7:00 p.m. on any school day, and 7:00 to 9:00 a.m. and 4:00 to 7:00 p.m. on any non-school weekday.
- Large trucks shall be prohibited from making U-turn movements from northbound to southbound Pleasant Hill Road at the Deer Hill Road intersection during construction. The Construction Staging Plan shall specify for each construction phase whether access to the Project site from northbound Pleasant Hill Road will be allowed by providing a median opening for left turns directly into the site south of Deer Hill Road, or will require a left turn onto Deer Hill Road and a subsequent left turn into the site,
- If the Construction Staging Plan allows large trucks to turn left from northbound Pleasant Hill Road to Deer Hill Road, accommodation of their turning radius may require the following temporary measures: modifications to the south median within up to 15 feet from the nose; relocation of the limit line for eastbound Deer Hill Road traffic lanes by up to

15 feet behind the existing crosswalk marking; adjustments to vehicle detectors, any other affected traffic signal equipment, and traffic signal timing as required to maintain safe and effective operations; and, measures as otherwise specified by the City Engineer.

- The proposed locations and configuration of access points on Pleasant Hill Road and Deer Hill Road where large trucks would turn into or out of the project site during construction shall be subject to approval by the City Engineer, to ensure consideration of sight-distance constraints and implementation of appropriate safety precautions.
- During any construction phase when access to the existing passenger loading zone on the west curb of Pleasant Hill Road along the project frontage would be unavailable on school days, one of the following measures:
 - Provide a safe, temporary alternative loading zone in the immediate area, subject to approval by the City Engineer. Potential alternatives may include temporary use of the property on the northwest corner of Pleasant Hill Road and Deer Hill Road, which would require surface improvements to facilitate safe vehicle and pedestrian access.
 - Stage construction on the subject portion of the site such that during the school break for summer, the existing passenger loading zone would be demolished and replaced by construction of the recommended roadway configuration and passenger loading zone on the Pleasant Hill Road project frontage.
- The Construction Staging Plan shall require restriping of bike lanes and other pavement markings at the discretion of the City Engineer to address wear from construction traffic.
- Special school events, such as swim meets, shall be addressed by the designated liaison required in the Construction Staging Plan, or any additional measures that the City Engineer may require in that Plan.

Implementation of these measures would result in a *less-than-significant impact*.

Cumulative Year 2030 No Project Conditions

Future Traffic Conditions

This section details expected traffic conditions under Cumulative Year 2030 No Project Conditions for the study intersections and roadways in the project vicinity. For purposes of this traffic analysis, the Cumulative Year 2030 No Project Condition represents no change from existing conditions at the project site. This scenario provides a basis of comparison for expected traffic generated by the project under Cumulative Year 2030 plus Project Conditions.

In terms of land use and roadway network assumptions for the project vicinity, TJKM used the latest approved version of the Contra Costa Transportation Authority (CCTA) travel demand model, which assumes no development of the project site. The CCTA model estimates traffic growth between a base year of 2005 and future cumulative year of 2035. TJKM used a linear interpolation method to factor 30-year traffic growth from the model down to 20-year growth factors, to represent the approximate growth period between the Existing Conditions traffic counts performed in 2011 and the 2030 horizon year. The 20-year growth factors were applied to the Existing Conditions volumes at the study intersections based on knowledge of the study area to generate Cumulative Year 2030 No Project Conditions volumes. Approximately two percent growth per year over the 20-year period was added to the Existing Conditions through volumes on Pleasant Hill Road to generate Cumulative Year 2030 No Project Condition peak-hour volumes at the study intersections.

The traffic forecasting methodology described above was used for all study intersections except intersection #9 - Deer Hill Road/First Street – Sierra Vista Way and #10 - Deer Hill Road/SR 24 WB Ramps -Laurel Drive, where the Cumulative volumes from the Lafayette Downtown Specific Plan (DSP) EIR traffic section were used. The DSP Cumulative traffic forecasts are based on a more detailed model of projected growth in Downtown Lafayette, which is more accurate for use at these two study intersections that are closer to Downtown.

The Cumulative Year 2030 No Project Conditions turning movement volumes at the study intersections resulting from application of the growth factors described above are shown in Figure 8. Anticipated traffic controls and lane geometries for the study intersections, which are the same as Existing Conditions, are also included in the figure.

Intersection Level of Service Analysis Results, Cumulative Year 2030 No Project

Table XII illustrates the results of the level of service analysis for the study intersections in the under Cumulative Year 2030 No Project Conditions. Detailed level of service calculations are contained in Appendix E. Under Cumulative Year 2030 No Project Conditions, all of the signalized study intersections would operate within acceptable City LOS standards except the following three:

- Springhill Road – Quandt Road/Pleasant Hill Road: LOS E during the a.m. peak hour
- Deer Hill Road – Stanley Blvd./Pleasant Hill Road: LOS F during the a.m. and p.m. peak hours, Poor LOS D during the school p.m. peak hour
- Deer Hill Road/SR 24 Westbound Ramps – Laurel Drive: LOS E, a.m. and p.m. peak hours

At the only unsignalized study intersection in the Cumulative Year 2030 No Project Condition, the northbound and southbound stop-controlled minor approaches on Brown Avenue at Deer Hill Road would operate at LOS F with extreme delays during the a.m. and p.m. peak hours. The California Manual on Uniform Traffic Control Devices (MUTCD) peak hour traffic signal warrant would be met for both peak hours under Cumulative Year 2030 No Project Condition, which is also the case under Existing conditions.

Table XII: Peak Hour Intersection Levels of Service – Cumulative 2030 No Project

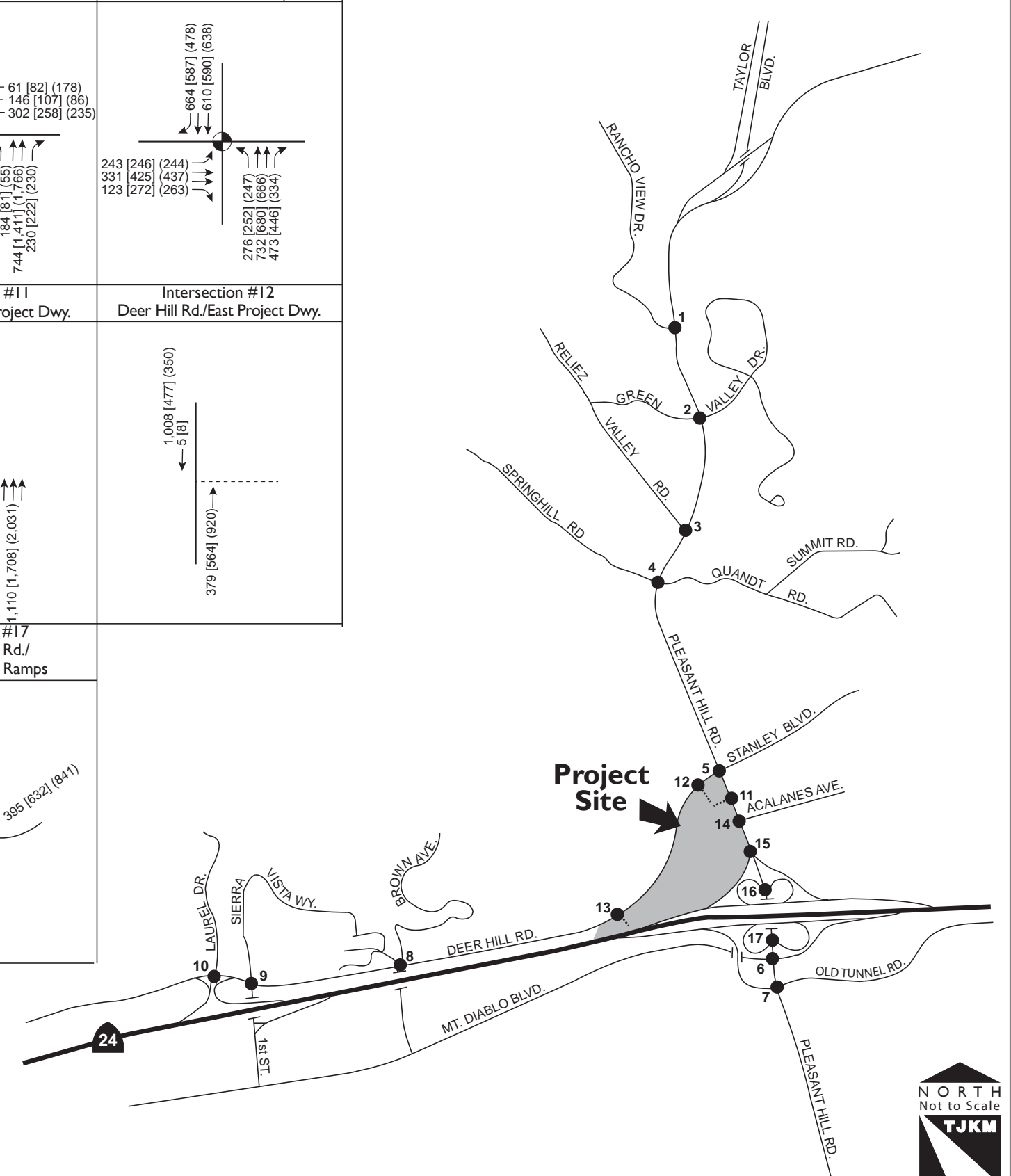
ID	Intersection	Cumulative Year 2030 No Project Conditions					
		A.M. Peak Hour		School P.M. Peak Hour		P.M. Peak Hour	
		Delay	LOS	Delay	LOS	Delay	LOS
1	Rancho View Drive/Pleasant Hill Road	8.5	A	6.7	A	7.7	A
2	Green Valley Drive/Pleasant Hill Road	7.2	A	7.9	A	8.2	A
3	Reliez Valley Road/Pleasant Hill Road	33.5	C	10.7	B	15.4	B
4	Springhill Road – Quandt Road/ Pleasant Hill Road	69.5	E	14.7	B	40.8	D
5	Deer Hill Road –Stanley Blvd./ Pleasant Hill Road	224.1	F	47.4	D	139.8	F
6	Mt. Diablo Boulevard - SR 24 EB On- ramp/Pleasant Hill Road	17.3	B	17.3	B	17.6	B
7	SR 24 EB Off-Ramp – Old Tunnel Road/Pleasant Hill Road	22.3	C	17.5	B	18.5	B
8	Deer Hill Road/Brown Avenue	>300	F	NA	NA	>300	F
9	Deer Hill Road/First Street – Sierra Vista Way	19.2	B	17.3	B	25.2	C
10	Deer Hill Road/SR 24 WB Ramps -Laurel Drive	57.6	E	43.8	D	66.2	E

- Notes: 1) LOS=Level of Service, Delay = Average control delay per vehicle in seconds
 2) Signalized and all-way stop controlled intersections - Delay / LOS is for overall intersection
 3) Unsignalized one- and two-way stop controlled intersections - Delay / LOS is for critical minor stop-controlled approach.
 4) **Bold** indicates unacceptable operational conditions based on applicable City standards.
 5) NA=Not analyzed. At intersection #8, a.m. and p.m. commute peaks provide worst-case results.

Pleasant Hill Road Corridor Traffic Simulation

Simtraffic simulation results for Cumulative Year 2030 No Project Conditions were reviewed to supplement the intersection LOS results. During the a.m. peak hour, traffic on southbound Pleasant Hill Road would back up from the intersections at Deer Hill Road – Stanley Boulevard and Springhill Road – Quandt Road, extending the queue past the junction at Taylor Boulevard. This back up would extend much further than the queue that extends past Green Valley Drive under Existing Conditions. In effect, as described for Existing conditions, the LOS F conditions at the Deer Hill Road – Stanley Boulevard intersection would also occur upstream at the Springhill Road/Quandt Road, Reliez Valley Road, Green Valley Drive, and Rancho View Drive intersections, which impacts southbound Pleasant Hill Road traffic and other traffic movements that conflict with southbound traffic at each intersection. However, the City’s intersection LOS standards described in the previous Level of Service Analysis Methodology section are based on the LOS results calculated at each intersection individually, which are the results shown in Table XII.

Intersection #1 Pleasant Hill Rd./Rancho View Dr.	Intersection #2 Pleasant Hill Rd./Green Valley Dr.	Intersection #3 Pleasant Hill Rd./Reliez Valley Rd.	Intersection #4 Pleasant Hill Rd./Springhill Rd./ Quandt Rd.	Intersection #5 Pleasant Hill Rd./Deer Hill Rd./ Stanley Blvd.	Intersection #6 Pleasant Hill Rd./Mt. Diablo Blvd./ SR 24 WB On Ramp
Intersection #7 Pleasant Hill Rd./Old Tunnel Rd./ SR 24 EB Off Ramp	Intersection #8 Brown Ave./Deer Hill Rd.	Intersection #9 First St./Sierra Vista Wy./Deer Hill Rd.	Intersection #10 SR 24 WB Ramps/ Laurel Dr./Deer Hill Rd.	Intersection #11 Pleasant Hill Rd./Project Dwy.	Intersection #12 Deer Hill Rd./East Project Dwy.
Intersection #13 Deer Hill Rd./West Project Dwy.	Intersection #14 Pleasant Hill Rd./Acalanes Ave.	Intersection #15 Pleasant Hill Rd./ SR 24 WB Direct Ramps	Intersection #16 Pleasant Hill Rd./ SR 24 WB Loop Ramps	Intersection #17 Pleasant Hill Rd./ SR 24 EB Loop Ramps	



LEGEND	
●	Study Intersection
---	Future Driveway
XX	AM Peak Hour Volume
[XX]	School PM Peak Hour Volume
(XX)	PM Peak Hour Volume



During the commute p.m. peak hour, traffic on northbound Pleasant Hill Road would continue to back up from the intersection at Deer Hill Road – Stanley Boulevard and the queue would extend past the off-ramp from westbound SR 24 as well as onto that off-ramp toward the freeway mainline.

TJKM also analyzed Cumulative Year 2030 No Project traffic conditions on segments of Pleasant Hill Road between the free-flow freeway ramp junctions at SR 24 and the location of the proposed project driveway on Pleasant Hill Road using CORSIM, to establish future baseline speeds for comparison to weaving conditions with the project. The resulting peak-hour average speeds on the study segments are shown in Table XIII. The p.m. peak hour average speeds for the northbound Pleasant Hill Road segments are very low, which indicates long delays and queues that would extend back from the intersection at Deer Hill Road – Stanley Boulevard past the off-ramp from westbound SR 24.

Table XIII: Pleasant Hill Road Weaving Segment Speeds – Cumulative 2030 No Project

Segment of Pleasant Hill Road		Cumulative Year 2030 No Project Average Speeds (mph)	
		A.M. Peak Hour	P.M. Peak Hour
Northbound	Between SR 24 WB Off-ramp and Acalanes Ave.	29.1	2.70
	Between Acalanes Ave. and Project Driveway Location	32.0	2.40
Southbound	Between Project Driveway Location and SR 24 WB On-ramp	21.3	24.8

Note: Average speeds are CORSIM simulation model results.

Routes of Regional Significance Delay Index Results

For the CCTA-designated Routes of Regional Significance, the CCTA traffic model was used for Cumulative Year 2030 No Project forecasts. Delay Indexes on State Route 24 and Pleasant Hill Road north of State Route 24 during the a.m. and p.m. peak hours were determined for the Cumulative Year 2030 No Project scenario. The Delay Index measures travel congestion and is expressed as the ratio of time required to travel between two points during the peak hour (the congested travel time) versus the time required during uncongested off-peak times. A Delay Index of 2.0, which is the acceptable standard of significance for peak hour peak direction travel on State Route 24 and Pleasant Hill Road north of State Route 24, means that congested travel time is twice as long as during an off-peak travel time. The travel times on State Route 24 between St. Stephen’s Drive and Interstate 680 for uncongested, off-peak conditions are approximately 5.1 minutes for eastbound traffic and 5.3 minutes for westbound traffic. These travel times were calculated based on the free-flow freeway speed and the length of the subject freeway segment.

The Delay Indexes in the Cumulative Year 2030 No Project scenario were calculated during the a.m. and p.m. peak hours on State Route 24 in both the eastbound and westbound direction between St. Stephens Drive and Interstate 680, and are summarized in Table XIV. As noted in the table, State Route 24 will operate with an unacceptable Delay Index of over 2.0 for westbound traffic in the a.m. peak hour and eastbound traffic in the p.m. peak hour under the Cumulative Year 2030 No Project scenario. The table also includes the peak-hour densities and resulting LOS for SR 24, based on parameters that apply to freeway facilities.

For Pleasant Hill Road in both the northbound and southbound direction between State Route 24 and Taylor Boulevard, the Delay Indexes in the Cumulative Year 2030 No Project scenario were calculated during the a.m. and p.m. peak hours, and are summarized in Table XV. As noted in the table, Pleasant Hill Road will operate with an unacceptable Delay Index of over 2.0 for southbound traffic in the a.m. peak hour and northbound traffic in the p.m. peak hour under the Cumulative Year 2030 No Project scenario.

Table XIV: Cumulative Year 2030 No Project Delay Index - State Route 24 (Between St. Stephens Drive and I-680)

Peak Hour	2030 Volume		Travel Time (minutes)		Delay Index		Density (vehicles/mile/lane)		LOS	
	East-bound	West-bound	East-bound	West-bound	East-bound	West-bound	East-bound	West-bound	East-bound	West-bound
A.M.	8,524	11,370	7.74	18.59	1.512	3.503	31.3	>45.0	D	F
P.M.	11,916	9,531	20.49	9.84	4.000	1.853	>45.0	37.9	F	E

Table XV: Cumulative Year 2030 No Project Delay Index - Pleasant Hill Road (Between State Route 24 and Taylor Boulevard)

Peak Hour	2030 Volume		Travel Time (minutes)		Delay Index	
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
A.M.	1,972	2,859	2.89	9.61	1.003	3.337
P.M.	2,939	2,412	10.71	6.52	3.719	2.264

Cumulative Year 2030 plus Project Conditions

This scenario is similar to Cumulative Year 2030 No Project Conditions, but with the addition of traffic generated by the proposed project as described in the Existing plus Project section of this report. Except for the project and its proposed driveways, the assumed roadway network and nearby area development is the same under this analysis scenario as for Cumulative Year 2030 No Project Conditions.

Project Trip Generation, Distribution, and Assignment

The proposed project trip generation, distribution, and assignment assumed under Cumulative Year 2030 plus Project Conditions is identical to that assumed under Existing plus Project Conditions. The resulting assigned project trips were added to the Cumulative Year 2030 No Project Conditions traffic volumes to generate Cumulative Year 2030 plus Project traffic volumes. Figure 9 illustrates the resulting traffic volumes under Cumulative Year 2030 plus Project Conditions.

Intersection Level of Service Analysis Results, Cumulative Year 2030 plus Project

Table XVI presents the results of the level of service analysis for the study intersections in the project under Cumulative Year 2030 plus Project Conditions. Detailed level of service calculations are contained in Appendix F.

Under Cumulative Year 2030 plus Project Conditions with the addition of proposed project traffic, all signalized intersections are expected to continue operating under acceptable City LOS standards, except the three intersections that would also operate at an unacceptable LOS under Cumulative Year 2030 No Project Conditions:

- Springhill Road – Quandt Road/Pleasant Hill Road: LOS E during the a.m. peak hour, with delay increasing by 0.5 seconds. Because the project would increase delay by less than five seconds, the result would be a *less-than-significant impact*.
- Deer Hill Road – Stanley Blvd./Pleasant Hill Road: LOS F during the a.m. and p.m. peak hours, with delay increasing by 1.9 seconds and 2.2 seconds respectively; Poor LOS D during the school p.m. peak hour, with delay increasing by 1.4 seconds. Because the project would increase delay by less than five seconds, the result would be a *less-than-significant impact*.
- Deer Hill Road/SR 24 Westbound Ramps – Laurel Drive: LOS E during the a.m. and p.m. peak hours, with delay increasing by 1.6 seconds and 0.2 seconds respectively. Because the project would increase delay by less than five seconds, the result would be a *less-than-significant impact*.

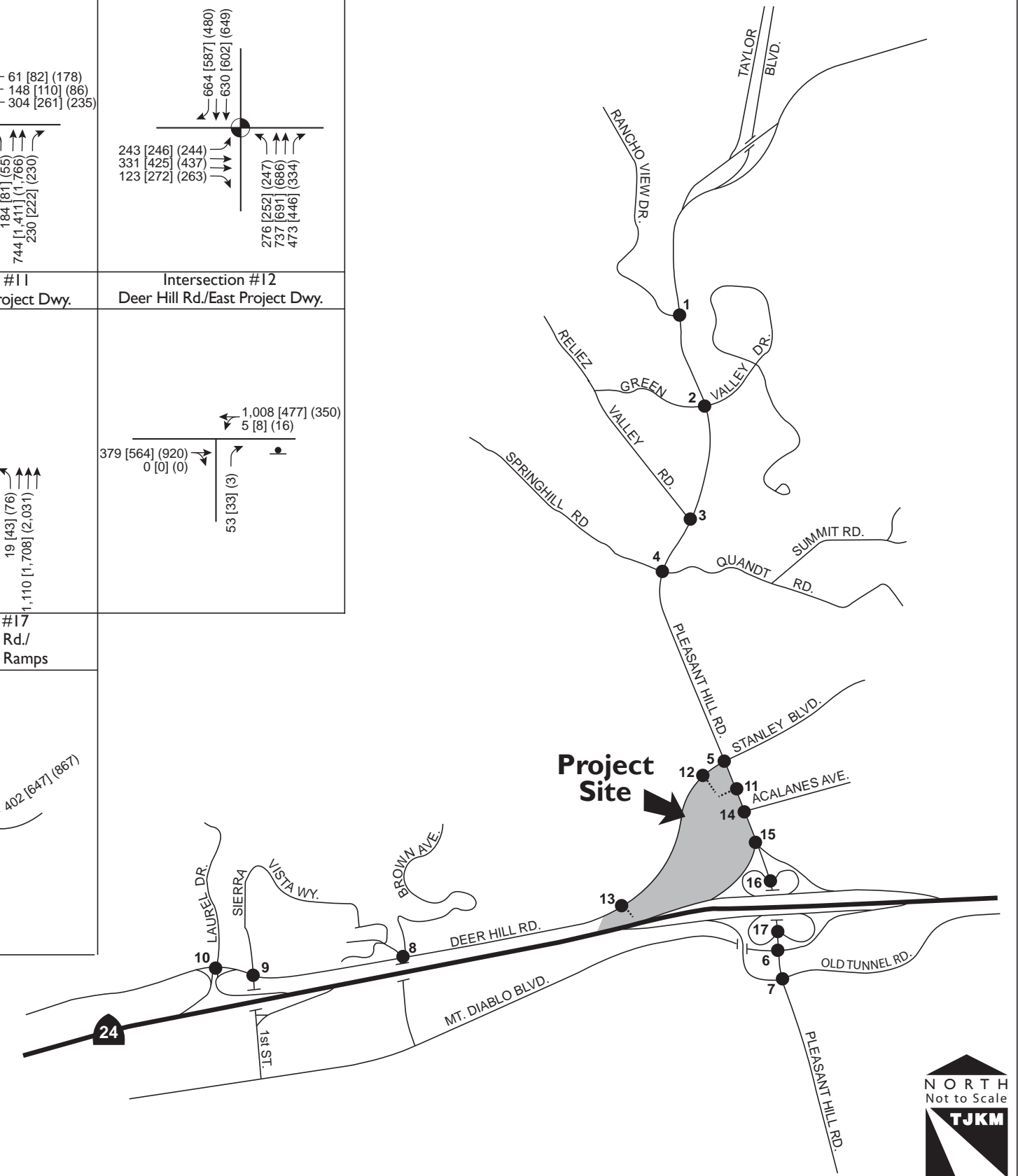
The unsignalized project driveway intersections would operate at LOS E or better, which is acceptable for these one-way stop control intersections. However, at the only unsignalized study intersection existing in the No Project condition, the northbound and southbound stop-controlled minor approaches on Brown Avenue at Deer Hill Road would continue operating at an unacceptable LOS F during the a.m. and p.m. peak hours, with delay increases substantially higher than five seconds. The California Manual on Uniform Traffic Control Devices (MUTCD) peak hour traffic signal warrant is met for both peak hours under both Cumulative Year 2030 No Project and Cumulative Year 2030 plus Project conditions. The project would increase delay by more than five seconds at an intersection operating below the acceptable standard, resulting in a *significant impact*.

Table XVI: Peak Hour Intersection Levels of Service – Cumulative 2030 plus Project

ID	Intersection	Cumulative Year 2030 Plus Project Conditions					
		A.M. Peak Hour		School P.M. Peak Hour		P.M. Peak Hour	
		Delay	LOS	Delay	LOS	Delay	LOS
1	Rancho View Drive/Pleasant Hill Road	8.6	A	6.8	A	7.8	A
2	Green Valley Drive/Pleasant Hill Road	7.2	A	8.0	A	8.4	A
3	Reliez Valley Road/Pleasant Hill Road	33.7	C	10.7	B	15.6	B
4	Springhill Road – Quandt Road/ Pleasant Hill Road	70.0	E	14.8	B	41.7	D
5	Deer Hill Road –Stanley Blvd./ Pleasant Hill Road	226.0	F	48.8	D	142.0	F
	Mitigation Alt 1 - Add third SB thru lane	216.5	F	47.9	D	109.1	F
	Mitigation Alt 2 – No NB Left Turn at Project Driveway (NB Weaving Impact)	231.4	F	51.9	D	143.6	F
6	Mt. Diablo Boulevard - SR 24 EB On- ramp/Pleasant Hill Road	17.4	B	17.3	B	17.6	B
7	SR 24 EB Off-Ramp – Old Tunnel Road/Pleasant Hill Road	22.2	C	17.6	B	18.6	B
8	Deer Hill Road/Brown Avenue	>300	F	NA	NA	>300	F
	Mitigation - Signalize Intersection	36.8	D	NA	NA	31.8	C
9	Deer Hill Road/First Street – Sierra Vista Way	20.0	C	18.5	B	25.7	C
10	Deer Hill Road/SR 24 WB Ramps -Laurel Drive	59.2	E	43.8	D	66.4	E
11	Pleasant Hill Road/Project Driveway	12.6	B	10.0	B	9.5	A
	Mitigation Alt 1: Add third SB thru lane	10.5	B	12.1	B	9.0	A
12	Deer Hill Road/East Project Driveway	11.2	B	12.9	B	18.9	C
13	Deer Hill Road/ West Project Driveway	38.4	E	21.7	C	30.1	D

- Notes: 1) LOS=Level of Service, Delay = Average control delay per vehicle in seconds
2) Signalized and all-way stop controlled intersections - Delay / LOS is for overall intersection
3) Unsignalized one- and two-way stop controlled intersections - Delay / LOS is for critical minor stop-controlled approach.
4) **Bold** indicates unacceptable operational conditions based on applicable City standards.
5) NA=Not analyzed. At intersection #8, a.m. and p.m. commute peaks provide worst-case results.

Intersection #1 Pleasant Hill Rd./Rancho View Dr.	Intersection #2 Pleasant Hill Rd./Green Valley Dr.	Intersection #3 Pleasant Hill Rd./Reliez Valley Rd.	Intersection #4 Pleasant Hill Rd./Springhill Rd./ Quandt Rd.	Intersection #5 Pleasant Hill Rd./Deer Hill Rd./ Stanley Blvd.	Intersection #6 Pleasant Hill Rd./Mt. Diablo Blvd./ SR 24 WB On Ramp
Intersection #7 Pleasant Hill Rd./Old Tunnel Rd./ SR 24 EB Off Ramp	Intersection #8 Brown Ave./Deer Hill Rd.	Intersection #9 First St./Sierra Vista Wy./Deer Hill Rd.	Intersection #10 SR 24 WB Ramps/ Laurel Dr./Deer Hill Rd.	Intersection #11 Pleasant Hill Rd./Project Dwy.	Intersection #12 Deer Hill Rd./East Project Dwy.
Intersection #13 Deer Hill Rd./West Project Dwy.	Intersection #14 Pleasant Hill Rd./Acalanes Ave.	Intersection #15 Pleasant Hill Rd./ SR 24 WB Direct Ramps	Intersection #16 Pleasant Hill Rd./ SR 24 WB Loop Ramps	Intersection #17 Pleasant Hill Rd./ SR 24 EB Loop Ramps	



LEGEND	
	Study Intersection
	Traffic Signal
	Stop Sign
	Future Driveway
	XX AM Peak Hour Volume
	[XX] School PM Peak Hour Volume
	(XX) PM Peak Hour Volume
	Mitigated Lane
	Mitigated Traffic Signal



Pleasant Hill Road Corridor Traffic Simulation

Simtraffic simulation results for Cumulative Year 2030 plus Project conditions were reviewed to supplement the intersection LOS results. During the a.m. peak hour under Cumulative Year 2030 No Project conditions, traffic on southbound Pleasant Hill Road would back up from the intersections at Deer Hill Road – Stanley Boulevard and Springhill Road – Quandt Road, with the queue extending past the junction at Taylor Boulevard. The addition of project traffic would result in a minor increase in this queue length. In effect, as described for Cumulative Year 2030 No Project conditions, the LOS F conditions at the Deer Hill Road – Stanley Boulevard intersection would also occur upstream at the Springhill Road/Quandt Road, Reliez Valley Road, Green Valley Drive, and Rancho View Drive intersections, which impacts southbound Pleasant Hill Road traffic and other traffic movements that conflict with southbound traffic at each intersection. However, the City's intersection LOS standards described in the previous Level of Service Analysis Methodology section are based on the LOS results calculated at each intersection individually, which are the results shown in Table XVI. Cumulative Year 2030 plus Project traffic conditions during the commute p.m. peak hour on northbound Pleasant Hill Road are addressed in the following section on weaving traffic.

Intersection Mitigation

TJKM considered potential mitigation measures for the intersection that would have significant traffic delay impacts as a result of the project under Cumulative Year 2030 plus Project conditions, as well as potential improvements at other intersections.

To mitigate the impact at the Deer Hill Road/Brown Avenue intersection, the project sponsor shall coordinate with the City to contribute a fair share of the cost, including an in-lieu payment, to install a traffic signal, which will be added to the City's Capital Improvement Projects (CIP) program. With signalization, the intersection would operate at Good LOS D during the a.m. peak hour and LOS C during the p.m. peak hour under Cumulative Year 2030 plus Project conditions, reducing the project impact to *less-than-significant*.

For project traffic exiting the west project driveway on Deer Hill Road, LOS E delay is expected during the a.m. peak hour. Although LOS E is acceptable at a one-way stop control intersection such as the driveway, the amount of delay suggests that drivers turning left out of the driveway would have some difficulty finding an acceptable gap in traffic flow on Deer Hill Road, at a location where prevailing speeds are relatively high. This would pose a traffic hazard, resulting in a *significant* impact. To mitigate this impact, TJKM recommends widening Deer Hill Road at the west driveway as needed to add a striped westbound median refuge lane to receive left turns from the driveway, provide appropriate taper lengths west of the refuge lane, and maintain appropriate widths for bike lanes, traffic lanes, and proposed sidewalks. With this mitigation, the resulting project impact would be less than significant.

Although the project would not result in a significant impact under Cumulative Year 2030 plus Project conditions at the Deer Hill Road – Stanley Blvd./Pleasant Hill Road intersection, TJKM also analyzed traffic conditions in this future scenario with roadway widening to add a third lane for southbound through traffic on Pleasant Hill Road as shown in the project plans. The proposed configuration would provide a shared lane for southbound through and right-turn movements on Pleasant Hill Road at the Deer Hill Road intersection, replacing the existing southbound curb lane that is a shared bike lane from which right turns are permitted. The additional southbound lane as shown on the project plans would start approximately 150 feet north of Deer Hill Road and extend south along the entire project frontage on Pleasant Hill Road to become a right-turn-only lane for

the on-ramp to westbound SR 24. Traffic engineers often refer to this type of configuration with a through lane leading into a required turn lane as a “trap lane.” The proposed roadway widening would increase the pedestrian crossing distance on the Pleasant Hill Road crosswalk at the Deer Hill Road – Stanley Boulevard signal, and the signal timing used in the LOS analysis of this configuration assumed additional pedestrian crossing time. Other details of the configuration with this additional southbound lane on Pleasant Hill Road are described in the Existing plus Project section of this report.

Table XVI above shows the LOS results under Cumulative Year 2030 plus Project conditions at the Deer Hill Road – Stanley Blvd./Pleasant Hill Road intersection with this mitigation, referenced as Mitigation Alternative I. With the additional southbound lane on Pleasant Hill Road, the intersection would still operate at LOS F during the a.m. and p.m. peak hours and Poor LOS D during the school p.m. peak. However, the delay with the project would be reduced from Cumulative Year 2030 No Project conditions by approximately eight seconds in the a.m. peak and 30 seconds in the p.m. peak.

Although the proposed additional southbound lane on Pleasant Hill Road would reduce delay at the Deer Hill Road – Stanley Boulevard intersection under Cumulative Year 2030 plus Project conditions, it would result in other impacts that would be considered significant. Right turns out of the project driveway into the additional southbound lane would be entering a right-turn-only lane for the on-ramp to westbound SR 24. Most of these project trips would merge left to continue further south on Pleasant Hill Road rather than use the westbound SR 24 on-ramp, which would introduce a weaving movement on southbound Pleasant Hill Road between the project driveway and the on-ramp. CORSIM analysis was performed for this roadway segment to compare traffic speeds for Cumulative Year 2030 No Project conditions to Cumulative Year 2030 plus Project conditions with the additional southbound lane. As shown in Table XVII below, Cumulative Year 2030 plus Project conditions with the additional southbound lane (Mitigation Alternative I) would reduce average speed by more than ten percent in the a.m. peak hour on this segment of southbound Pleasant Hill Road compared to Cumulative Year 2030 No Project conditions. This speed reduction is considered an unacceptable weaving condition that would substantially increase hazards, resulting in a *significant impact*.

Table XVII: Southbound Pleasant Hill Road Weaving Segment - Mitigation Alt I

Southbound Pleasant Hill Road between Project Driveway and SR 24 WB on-ramp	Average Speeds (mph)		Speed Reduction Percentage
	Cumulative 2030 No Project	Cumulative 2030 Plus Project With Mitigation Alt I	
A.M .Peak Hr	21.3	18.3	-14%
P.M. Peak Hr	24.8	23.3	-6%

Note: Mitigation Alt I = Add southbound lane on Pleasant Hill Rd to improve study intersection #5.
Average speeds are CORSIM simulation model results.

As described previously in the Existing plus Project section of this report, the configuration for widening southbound Pleasant Hill Road shown in the project plans would also cause unacceptable weaving conflicts with vehicle traffic for the planned southbound bike lane, resulting in a *significant impact*. The proposed roadway widening would increase the pedestrian crossing distance on the Pleasant Hill Road crosswalk at the Deer Hill Road – Stanley Boulevard signal.

Adding a southbound lane also appears to be inconsistent with the following Actions for Pleasant Hill Road specified in the Lamorinda Action Plan (adopted December 2009):

- Investigate appropriate mechanisms, including maintaining existing roadway lanes and widths and restrictive signal timing, to discourage use of Pleasant Hill Road as a substitute for freeway travel
- Work with TRANSPAC to develop a traffic management program to encourage delay in order to discourage use of westbound/southbound traffic using Pleasant Hill Road to bypass the I-680 SR 24 interchange

However, the additional southbound lane would have relatively little effect on the LOS F delay during the a.m. peak hour on southbound Pleasant Hill Road.

Left-Turn Queues at Project Driveways

Left-turn queue lengths on northbound Pleasant Hill Road at the project driveway and at Deer Hill Road, as well as on westbound Deer Hill Road at two project driveways, were also analyzed using Simtraffic results for Cumulative Year 2030 plus Project conditions in the a.m., school p.m., and commute p.m. peak hours. The resulting 95th-percentile queue lengths were compared with the left-turn storage lane lengths that would be provided at these intersections to determine if that queue storage capacity would be adequate to avoid spillback into other lanes. The Cumulative Year 2030 plus Project results are summarized as follows:

- Northbound Pleasant Hill Road at Deer Hill Road: The peak estimated 95th-percentile left-turn queue length of 306 feet, which would occur during the a.m. peak hour, would exceed the capacity of the existing 250-foot storage lane. The left-turn queue would occasionally extend back far enough to obstruct the northbound through lane on Pleasant Hill Road during the a.m. peak hour, at a location and time period in which various traffic conditions, including those related to the nearby high school, would make this obstruction a substantial hazard. Immediately south of this left-turn storage lane, project plans propose construction of a northbound left-turn lane for access to the project driveway, which would preclude extending the length of the existing left-turn storage lane to mitigate the queue and its resulting hazard. The project design would substantially increase hazards by precluding a potential mitigation of the traffic obstruction caused by the excess queue length, resulting in a *significant impact*.
- Northbound Pleasant Hill Road at Project Driveway: The peak estimated 95th-percentile left-turn queue lengths of 124 feet and 177 feet, which would occur during the school p.m. and commute p.m. peak hours respectively, would exceed the capacity of the 100-foot storage lane proposed in the project plans. The left-turn queue would occasionally extend back far enough to obstruct the northbound through lane on Pleasant Hill Road during the school p.m. and commute p.m. peak hours, at a location and time periods in which various traffic conditions, including those related to the nearby high school, would make this obstruction a substantial hazard. The project design would substantially increase hazards by causing the excess queue length and traffic obstruction, resulting in a *significant impact*.
- Westbound Deer Hill Road at Project Driveways: The estimated 95th-percentile left-turn queue lengths during the three peak periods would be no more than one car length at either driveway. At the west project driveway, where a minimal number of left turns into the project are expected, no storage lane is proposed in the project plans; the safety aspects of this condition are addressed in the Existing plus Project section of this report. At the east project driveway on Deer Hill Road, a storage lane approximately 60 feet long is proposed in the project plans, which would accommodate the westbound left-turn

queue. This configuration would reduce the available queue storage area for eastbound left turns from Deer Hill Road to Pleasant Hill Road and result in longer eastbound queues on Deer Hill Road. However, the configuration would not change the intersection LOS results described previously or substantially increase hazards. Therefore, the impact at the east driveway would be *less than significant*. Although not required as mitigation, prohibiting left turns at the east driveway is recommended to address other design and operational concerns as described in the Existing plus Project section.

TJKM considered potential measures to mitigate the excessive left turn queue conditions on northbound Pleasant Hill Road under Cumulative Year 2030 plus Project Conditions. For the northbound left turn at Deer Hill Road, the following mitigations were considered:

- Because the excess queue occurs during the a.m. peak hour, the possibility that the additional southbound lane on Pleasant Hill Road proposed in the project plans could increase southbound traffic capacity enough to allow more green signal time for the conflicting northbound left turn was explored. However, widening to add the southbound lane would increase the pedestrian crossing distance, which also requires more signal time, and the resulting signal timing adjustments tend to increase the northbound left turn delay and queue. The additional southbound lane would also result in significant impacts, and is not considered a feasible mitigation.
- A potential alternative configuration for left-turn storage on northbound Pleasant Hill Road at the project driveway and Deer Hill Road would be a continuous left-turn lane serving both locations. Vehicles entering the continuous northbound left-turn lane could either turn at the driveway or continue north to turn left at Deer Hill Road, and the storage lane could be constructed with enough length to accommodate the peak combined queue length. However, because left turns into the driveway must frequently wait for gaps in oncoming southbound Pleasant Hill Road traffic, those waiting vehicles would block traffic headed further north to turn left at Deer Hill Road. This configuration would tend to result in rear-end collisions and hazardous lane-changing maneuvers that could be a significant impact, and is not considered a feasible mitigation.
- Prohibiting northbound left turns into the project driveway on Pleasant Hill Road would eliminate the need for the proposed left-turn lane at the driveway, which would allow construction of a longer left-turn storage lane approaching the Deer Hill Road intersection. However, as described in the following section for potential mitigation of Pleasant Hill Road weaving traffic, prohibiting northbound left turns into the project driveway would result in a significant impact at the Deer Hill Road – Stanley Blvd./Pleasant Hill Road intersection, and is not considered feasible mitigation.

No feasible mitigations are available to reduce the Cumulative Year 2030 plus Project impact on northbound left turn queue conditions approaching the Deer Hill Road – Stanley Blvd./Pleasant Hill Road intersection to less-than-significant levels. Therefore, this impact is considered *significant and unavoidable*.

For the northbound left turn from Pleasant Hill Road at the project driveway under Cumulative Year 2030 plus Project Conditions, TJKM considered mitigation of the excessive queue condition by extending the left-turn storage lane to accommodate the peak queue length. The additional 75 to 100 feet of left-turn storage length extending south from the proposed 100 foot lane would be constructed by widening Pleasant Hill Road on project frontage. However, extending the entrance to the left-turn lane further south toward the off-ramp from westbound SR 24 would exacerbate the project impact on northbound Pleasant Hill Road weaving traffic for the left turn at

the project driveway, as described in the following section, which is considered significant and unavoidable. Therefore, extending the left-turn storage length for the project driveway is not considered feasible mitigation.

No feasible mitigations are available to reduce the Cumulative Year 2030 plus Project impact on northbound left turn queue conditions approaching the project driveway on Pleasant Hill Road to less-than-significant levels. Therefore, this impact is considered *significant and unavoidable*.

Pleasant Hill Road Weaving Traffic for Project Driveway Access

TJKM analyzed Cumulative Year 2030 plus Project weaving traffic conditions on segments of Pleasant Hill Road between the free-flow freeway ramp junctions at SR 24 and the proposed project driveway on Pleasant Hill Road using CORSIM, for comparison to the Cumulative Year 2030 No Project speeds shown previously in Table XIII. The resulting Cumulative Year 2030 plus Project peak-hour average speeds on the study segments are shown in Table XVIII. The p.m. peak-hour average speeds for the northbound Pleasant Hill Road segments include the effects of delays and queues extending back from the intersection at Deer Hill Road – Stanley Boulevard past both Acalanes Avenue and the off-ramp from westbound State Route 24, making weaving very difficult. The northbound queue would also extend back onto the off-ramp toward the freeway mainline, similar to Cumulative No Project conditions. Note that the southbound Pleasant Hill Road segment assumes the existing lane configuration.

Table XVIII: Pleasant Hill Rd. Weaving Segment Speeds - Cumulative 2030 Plus Project

Segment of Pleasant Hill Road		Cumulative Year 2030 Plus Project			
		A.M. Peak Hour		P.M. Peak Hour	
		Average Speed (mph)	% Speed Reduction	Average Speed (mph)	% Speed Reduction
Northbound	Between SR 24 WB Off-ramp and Acalanes Ave.	29.0	<1%	2.40	-11%
	Between Acalanes Ave. and Project Driveway	30.7	-4%	2.30	-4%
Southbound	Between Project Driveway and SR 24 WB On-ramp	20.9	-2%	23.9	-4%

Note: Average speeds are CORSIM simulation model results.

Northbound Pleasant Hill Road weaving conditions between the SR 24 westbound off-ramp and the project driveway would be caused by vehicles merging from the right across traffic lanes to make left turns into the project driveway. As shown in Table XVIII, the average speed reductions during the a.m. peak hour are less than significant. However, in the p.m. peak hour, the northbound segment of Pleasant Hill Road between the SR 24 WB off-ramp and Acalanes Avenue shows a significant speed reduction percentage. Because of the persistent p.m. peak hour queues indicated by the very low average speeds on both northbound segments between the SR 24 off-ramp and the project driveway, project trips would have great difficulty completing the weave to be able to make the left turn at the driveway. On the segment between Acalanes Avenue and the project driveway, the speed reduction resulting from the project is less than ten percent because the segment is already expected to operate at very low speed during the p.m. peak hour under Cumulative Year 2030 No Project conditions. However, the project would reduce the average speed on the segment between the SR 24 off-ramp and Acalanes Avenue during the p.m. peak hour from 2.7 mph

to 2.4 mph, an 11 percent reduction. This speed reduction of more than ten percent is considered an unacceptable weaving condition that would substantially increase hazards, resulting in a *significant impact*.

During the p.m. peak hour on northbound Pleasant Hill Road, if some drivers are unable complete the weaving movement from the SR 24 westbound off-ramp in time to make a left turn at the project driveway, they will most likely make a left or U-turn at the Deer Hill Road signal to access the project site. Some drivers may instead try the alternative of turning right on Acalanes Avenue and then using Nogales Street, Camino Diablo, and westbound Stanley Boulevard to get back to the signal at Pleasant Hill Road, where they would make a left turn or continue straight onto Deer Hill Road to access the project site. Under Cumulative Year 2030 plus Project conditions, a typical travel time along this route, including the average delay of approximately one minute on westbound Stanley Boulevard at the Pleasant Hill Road signal, could be similar to the average delay for drivers continuing northbound on Pleasant Hill Road to make a left or U-turn at Deer Hill Road. As a result, a few of the 30 p.m. peak hour project trips from the SR 24 westbound off-ramp might use this route on local residential streets as an alternative to making a left turn from northbound Pleasant Hill Road to access the project site. However, this small potential increase in traffic volume on the local streets would be within the range of typical day-to-day fluctuations in volume on such streets, and furthermore it would be speculative to determine that such traffic diversion is likely to occur at all.

A potential mitigation for the unacceptable weaving condition would prohibit the proposed left turn into the project driveway from northbound Pleasant Hill Road, forcing project traffic to make a left or U-turn at Deer Hill Road. Table XVI above shows the LOS results at the Deer Hill Road – Stanley Blvd./Pleasant Hill Road intersection with this mitigation, referenced as Mitigation Alternative 2. Under Cumulative Year 2030 plus Project conditions, prohibiting the northbound left turn into the project driveway on Pleasant Hill Road would increase a.m. peak hour LOS F delay at the Deer Hill Road/Pleasant Hill Road intersection by 5.4 seconds more than with left turns allowed at the driveway, resulting in 7.3 seconds more delay than Cumulative Year 2030 No Project conditions. It would also increase delay at this intersection by less than five seconds during the school p.m. and commute p.m. peak hours. Because prohibiting northbound left turns into the project driveway on Pleasant Hill Road would increase delay by more than five seconds at an intersection operating at unacceptable LOS, this mitigation would result in a significant impact.

The additional southbound lane on Pleasant Hill Road proposed in the project plans, referenced as Mitigation Alternative 1 in Table XVI above, could reduce the delay at the Deer Hill Road/Pleasant Hill Road intersection that would result with the left turn prohibited at the project driveway, resulting in a less-than-significant impact for Mitigation Alternative 2. However, the additional southbound lane would also result in significant impacts as described in the previous section on intersection mitigation, and is not considered a feasible mitigation. Mitigation Alternative 1, prohibiting left turns from northbound Pleasant Hill Road into the project driveway, would result in a significant impact at the Deer Hill Road – Stanley Blvd./Pleasant Hill Road intersection under Cumulative Year 2030 plus Project conditions.

Prohibiting the left turn from northbound Pleasant Hill Road at the project driveway would also impact emergency access to the project site, which would be a *significant impact*. A short median section designed to safely and effectively obstruct left turns by the public but still provide acceptable emergency vehicle access, using beveled curbs or other designs that emergency apparatus can safely cross, would be required to avoid this impact.

Because prohibiting the left turn from northbound Pleasant Hill Road into the project driveway would result in a significant impact, this mitigation measure is not considered feasible. No feasible mitigations are available to reduce the project impact on northbound Pleasant Hill Road between the SR 24 westbound off-ramp and the project driveway to less-than-significant levels. Therefore, this impact is considered *significant and unavoidable*.

As described in the previous Emergency Vehicle Access section, the primary emergency response route along Pleasant Hill Road would be northbound from Mount Diablo Boulevard, originating from Station 15. As under Existing plus Project conditions, under Cumulative Year 2030 plus Project conditions the Project's impact on p.m. peak-hour traffic speeds for northbound Pleasant Hill Road between the off-ramp from westbound State Route 24 and the proposed Project driveway would result in inadequate emergency access to other areas of Lafayette served by Pleasant Hill Road between State Route 24 and Rancho View Drive. The result would be a *significant* cumulative impact.

To mitigate this impact, TJKM recommends installation of advance detection equipment for the existing Opticom system as needed to assure effective traffic signal preemption for responding emergency vehicles on northbound Pleasant Hill Road, as described previously for mitigation under Existing plus Project conditions. With this mitigation, the project impact on emergency access routes using Pleasant Hill Road would be *less than significant*.

Routes of Regional Significance Delay Index Results

Delay Indexes on the State Route 24 freeway and Pleasant Hill Road north of State Route 24 during the a.m. and p.m. peak hours were determined for the Cumulative Year 2030 plus Project scenario. For this analysis of the CCTA-designated Routes of Regional Significance, the additional trips generated by the project were added to traffic forecasts from the CCTA traffic model for Cumulative Year 2030 No Project conditions.

The Delay Indexes in the Cumulative Year 2030 plus Project scenario were calculated during the a.m. and p.m. peak hours on State Route 24 in both the eastbound and westbound direction between St. Stephens Drive and Interstate 680, and are summarized in Table XIX. As noted in the table, State Route 24 will operate with an unacceptable Delay Index of over 2.0 for westbound traffic in the a.m. peak hour and eastbound traffic in the p.m. peak hour under the Cumulative Year 2030 plus Project scenario. The table also includes the peak-hour densities and resulting LOS for SR 24, based on parameters that apply to freeway facilities. The addition of project trips to SR 24 would increase the peak hour peak direction Delay Index by 0.006 for westbound traffic in the a.m. peak hour and by 0.012 for eastbound traffic in the p.m. peak hour under Cumulative Year 2030 plus Project conditions. Because the Delay Index would increase by less than 0.05 for peak hour peak direction traffic where the Delay Index exceeds 2.0 on SR 24, the resulting impact would be a *less than significant*.

For Pleasant Hill Road in both the northbound and southbound direction between State Route 24 and Taylor Boulevard, the Delay Indexes in the Cumulative Year 2030 plus Project scenario were calculated during the a.m. and p.m. peak hours, and are summarized in Table XX. As noted in the table, Pleasant Hill Road will operate with an unacceptable peak hour peak direction Delay Index of over 2.0 for southbound traffic in the a.m. peak hour and northbound traffic in the p.m. peak hour under the Cumulative Year 2030 plus Project scenario. The addition of project trips to Pleasant Hill Road would increase the peak hour peak direction Delay Index by approximately 0.41 for southbound traffic in the a.m. peak hour and northbound traffic in the p.m. peak hour under Cumulative Year 2030 plus Project conditions. Because the Delay Index would increase by more

than 0.05 for peak hour peak direction traffic where the Delay Index exceeds 2.0 on Pleasant Hill Road, the result would be a *significant impact*.

Table XIX: Cumulative Year 2030 plus Project Delay Index - State Route 24 (Between St. Stephens Drive and I-680)

Peak Hour	2030 Volume		Travel Time (minutes)		Delay Index		Density (vehicles/mile/lane)		LOS	
	East-bound	West-bound	East-bound	West-bound	East-bound	West-bound	East-bound	West-bound	East-bound	West-bound
A.M.	8,554	11,406	7.84	18.62	1.529	3.509	31.3	>45.0	D	F
P.M.	11,942	9,561	20.56	9.92	4.012	1.870	>45.0	38.1	F	E

Table XX: Cumulative Year 2030 plus Project Delay Index - Pleasant Hill Road (Between State Route 24 and Taylor Boulevard)

Peak Hour	2030 Volume		Travel Time (minutes)		Delay Index	
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
A.M.	1,991	2,936	3.19	10.78	1.108	3.743
P.M.	3,015	2,455	11.88	7.18	4.125	2.493

The Lamorinda Action Plan proposes several measures to address traffic congestion on Pleasant Hill Road. Provision of public transit service in the Pleasant Hill Road/Taylor Boulevard corridor with connections to other transit services in Lafayette is proposed. However, the potential number of peak-hour vehicle trips diverted to transit is not likely to reduce travel times significantly in the corridor, and funding for such service is uncertain. The Action Plan also suggests measures to meter traffic flow on Pleasant Hill Road to discourage its use to bypass the I-680/SR 24 interchange. However, the potential number of peak-hour vehicle trips that could be metered without resulting in significant impacts at upstream locations outside of the City of Lafayette's jurisdiction is not likely to reduce travel times significantly in the corridor, and acceptance of such metering by other affected agencies is uncertain and would require a lengthy political process. Although these measures could reduce peak-hour traffic volumes and improve the Delay Index somewhat on Pleasant Hill Road, they are very unlikely to cut the peak-direction travel times by about half to attain a Delay Index no higher than the 2.0 threshold, and the impact would remain significant. Therefore, these measures proposed in the Lamorinda Action Plan are not sufficient to mitigate the Project impact.

Constructing the additional capacity needed to mitigate the peak hour delay impacts on Pleasant Hill Road north of State Route 24, such as widening for additional through lanes, etc., would likely be prohibitively expensive and disruptive because of the topography of the roadway alignment, as well as the negative impacts on and the cost to acquire adjacent properties. Additional capacity would also be contrary to the Action Plan measures to meter traffic flow on Pleasant Hill Road. No capacity expanding project is currently under consideration by the responsible regional transportation agencies.

No feasible mitigations are available to reduce this impact to less-than-significant levels. Therefore, this impact is considered *significant and unavoidable*.

Alternatives

TJKM analyzed how the impacts on traffic, transit, pedestrian, and bicycle facilities with each of the three alternatives to the Project would be different from the impacts of the proposed Project. The three alternatives considered are as follows:

- No Project Alternative: Project site remains in its existing condition
- Mitigated Project Alternative: Multi-family residential buildings with a total of 153 units
- Office Development Alternative: Office buildings with a total of 112,000 gross square feet

No Project Alternative

The No Project Alternative would generate no additional trips to or from the site, and no additional traffic volumes on adjacent streets. No new driveways would be constructed on Pleasant Hill Road or Deer Hill Road to access the site. Near-term transportation conditions would be the same as those described in the Existing Conditions section of this report, and future conditions would be the same as described in the Cumulative Year 2030 No Project Conditions section.

Impacts on traffic, transit, pedestrian, and bicycle facilities with the No Project Alternative would be different from the impacts of the proposed Project as follows:

- At the Deer Hill Road – Stanley Boulevard/Pleasant Hill Road intersection, a significant and unavoidable impact on existing a.m. peak-hour traffic delay would not occur. However, the intersection would still operate at an unacceptable level of service (LOS) F with very long delays and queues for southbound Pleasant Hill Road traffic during the a.m. peak hour.
- At the Deer Hill Road/Brown Avenue intersection, a significant impact on existing and Cumulative Year 2030 traffic delay during peak hours, which would require the Project sponsor to contribute a fair share to the cost of installing a traffic signal at the intersection as mitigation, would not occur. However, the intersection would still operate at an unacceptable level of service (LOS) F and meet signal warrants during peak hours under Existing and Cumulative Year 2030 No Project conditions with the existing two-way stop control on Brown Avenue.
- On northbound Pleasant Hill Road between the State Route 24 westbound off-ramp and Acalanes Avenue, a significant and unavoidable impact on traffic safety during the p.m. peak hour under existing and Cumulative Year 2030 conditions, which would result from weaving movements needed to make left turns at the proposed Project driveway, would not occur.
- Significant impacts to traffic safety on Deer Hill Road at new driveway locations with the proposed Project, which would be mitigated to less than significant by implementing specified design features and requirements, would not occur.
- Significant impacts to emergency vehicle access because of the proposed Project's impact on p.m. peak hour traffic speeds for northbound Pleasant Hill Road and inadequate turning radii on-site, which would be mitigated to less than significant by installing advance detection for emergency vehicle preemption of traffic signals and implementing specified site plan revisions, would not occur.
- Significant impacts on traffic delay and safety for school pedestrians and vehicle traffic during construction of the proposed Project, which would be mitigated to less than significant by implementing a Construction Staging Plan including specified restrictions on large trucks and site access, would not occur.

- On northbound Pleasant Hill Road at the proposed Project driveway and at Deer Hill Road, significant and unavoidable impacts during peak hours under Cumulative Year 2030 conditions, which would result from left-turn queue lengths exceeding available storage lane capacities, would not occur.
- On Pleasant Hill Road, significant and unavoidable impacts on the peak-hour peak direction Delay Index under Cumulative Year 2030 conditions would not occur. However, Pleasant Hill Road would also operate at unacceptable Delay Indexes far exceeding 2.0 for the peak-hour peak direction under Cumulative Year 2030 No Project conditions.
- Significant transit impacts because of increased parking demand at the Lafayette BART station and lack of a loading area for school bus service, which would be mitigated to less than significant by implementing shuttle service to the BART station and construction of bus stop pullouts, would not occur.
- Significant impacts on existing and planned pedestrian and bicycle facilities, which would be mitigated to less than significant by implementing specified design features and accommodation requirements for such facilities, would not occur.
- Significant impacts on safety for school pedestrians and vehicle traffic because of elimination of existing designated spaces on the west curb of Pleasant Hill Road that are currently used for school passenger loading, which would be mitigated to less than significant by implementing specific measures to replace most of the existing loading capacity, would not occur.

Overall, the impacts of the No Project Alternative on traffic, transit, pedestrian, and bicycle facilities would be a *substantial improvement* compared to the impacts of the proposed Project.

Mitigated Project Alternative

With slightly less than half the number units as in the proposed Project, the Mitigated Project Alternative would generate approximately half as many trips. Table XXI summarizes the Mitigated Project Alternative trip generation results.

Table XXI: Mitigated Project Alternative Trip Generation

Land Use (ITE Code)	Size	Daily		A.M. Peak Hour				School P.M. Peak Hour				P.M. Peak Hour						
		Rate ²	Trips	Rate ²	In:Out %	In	Out	Total	Rate ³	In:Out %	In	Out	Total	Rate ²	In:Out %	In	Out	Total
Apartments (220) ¹	153 DU	6.86	1,050	0.52	20:80	16	63	79	0.50	48:52	37	40	77	0.67	65:35	66	36	102

Notes: DU = Dwelling Units

¹ Source – *ITE Trip Generation*, 8th Edition, Regression Equations

² Rates calculated based on Total trips from regression equation divided by Size:

Daily: Total trips = 6.06 (DU) + 123.56

A.M. Peak: Total trips = 0.49 (DU) + 3.73

P.M. Peak: Total trips = 0.55 (DU) + 17.65

³ School P.M. Peak Rate is the same proportion of the Daily Rate as that used in the *Lafayette Downtown Specific Plan Draft EIR* for residential land use, based on Urban Land Institute (ULI) published data and other available traffic studies

The expected directional distribution of the Mitigated Project Alternative trips would be the same as the proposed Project. This Alternative assumes the same driveway locations on Pleasant Hill Road and Deer Hill Road as the proposed Project, except the west driveway on Deer Hill Road would be located 100 feet further west to incorporate mitigation of the proposed Project's impact

on traffic safety resulting from inadequate sight-distance. Based on these assumptions, the Mitigated Project Alternative trip assignments to all study intersection traffic movements and roadway segment volumes would be the same fraction of the proposed Project trip assignments (Figure 4) as the ratio between the Alternative and the proposed Project trip generation, which is approximately one-half for each of the peak hours.

Impacts on traffic, transit, pedestrian, and bicycle facilities with the Mitigated Project Alternative in comparison to the impacts of the proposed Project would be as follows:

- At the Deer Hill Road – Stanley Boulevard/Pleasant Hill Road intersection, a significant and unavoidable impact on existing a.m. peak-hour traffic delay would probably occur for the Mitigated Project Alternative as well as the proposed Project. However, the increase in average delay during the a.m. peak hour with the Mitigated Project Alternative would be close to the five-second threshold for a significant impact, compared to a nine-second delay increase with the proposed Project.
- At the Deer Hill Road/Brown Avenue intersection, a significant impact on existing and Cumulative Year 2030 traffic delay during peak hours, which would require the Project sponsor to contribute a fair share to the cost of installing a traffic signal at the intersection as mitigation, would occur with either the Mitigated Project Alternative or the proposed Project.
- On northbound Pleasant Hill Road between the State Route 24 westbound off-ramp and Acalanes Avenue, a significant and unavoidable impact on traffic safety during the p.m. peak hour would probably occur for the Mitigated Project Alternative as well as the proposed Project under existing conditions. However, under Cumulative Year 2030 conditions, a significant and unavoidable impact on this roadway segment with the proposed Project would be less than significant with the Mitigated Project Alternative. These impacts are based on reduced speeds that would result from weaving movements needed to make left turns at the Pleasant Hill Road driveway proposed with both the Mitigated Project Alternative and the Project. Under existing conditions, the reduction in average speed during the p.m. peak hour with the Mitigated Project Alternative could be close to the 10 percent threshold for a significant impact, compared to a 17 percent speed reduction with the proposed Project.
- Significant impacts to traffic safety on Deer Hill Road at new driveway locations proposed with both the Mitigated Project Alternative and the Project, which would be mitigated to less than significant by implementing specified design features and requirements, would occur with either the Mitigated Project Alternative or the proposed Project. The exception would be the west driveway on Deer Hill Road, which would be located 100 feet further west with the Mitigated Project Alternative than with the proposed Project. The driveway relocation assumed with this Alternative incorporates one of the mitigations for the proposed Project's impact on traffic safety caused by inadequate sight-distance at the west driveway, resulting in a less than significant impact.
- Significant impacts to emergency vehicle access because of the impacts on p.m. peak-hour traffic speeds for northbound Pleasant Hill Road, which would be mitigated to less than significant by installing advance detection for emergency vehicle preemption of traffic signals, would probably occur for the Mitigated Project Alternative as well as the proposed Project under existing conditions. However, under Cumulative Year 2030 conditions, a significant emergency vehicle access impact caused by speed reduction on this roadway segment with the proposed Project would be less than significant with the Mitigated Project Alternative. Significant impacts to emergency vehicle access because of the proposed

Project's inadequate turning radii on-site, which would be mitigated to less than significant by implementing specified site plan revisions, would not occur with the Mitigated Project Alternative because the site plan would incorporate adequate turning radii.

- Significant impacts on traffic delay and safety for school pedestrians and vehicle traffic during construction of both the Mitigated Project Alternative and the proposed Project, which would be mitigated to less than significant by implementing a Construction Staging Plan including specified restrictions on large trucks and site access, would occur with either the Mitigated Project Alternative or the proposed Project.
- On northbound Pleasant Hill Road at the driveway proposed with both the Mitigated Project Alternative and the Project, and at Deer Hill Road, significant and unavoidable impacts during peak hours under Cumulative Year 2030 conditions with the proposed Project, which would result from left-turn queue lengths exceeding available storage lane capacities, would also probably occur with Mitigated Project Alternative. However, the peak 95th-percentile left-turn queue length at the proposed driveway with the Mitigated Project Alternative could be close to the proposed 100-foot storage lane length, compared to a peak estimated 95th-percentile left-turn queue length of 177 feet with the proposed Project.
- On Pleasant Hill Road, significant and unavoidable impacts on the peak-hour peak direction Delay Index under Cumulative Year 2030 conditions would occur with either the Mitigated Project Alternative or the proposed Project.
- Significant transit impacts because of increased parking demand at the Lafayette BART station and lack of a loading area for school bus service, which would be mitigated to less than significant by implementing shuttle service to the BART station and construction of bus stop pullouts, would occur with either the Mitigated Project Alternative or the proposed Project.
- Significant impacts on existing and planned pedestrian and bicycle facilities, which would be mitigated to less than significant by implementing specified design features and accommodation requirements for such facilities, would occur with either the Mitigated Project Alternative or the proposed Project.
- Significant impacts on safety for school pedestrians and vehicle traffic because of elimination of existing designated spaces on the west curb of Pleasant Hill Road that are currently used for school passenger loading, which would be mitigated to less than significant by implementing specific measures to replace most of the existing loading capacity, would occur with either the Mitigated Project Alternative or the proposed Project.

Overall, the impacts of the Mitigated Project Alternative on traffic, transit, pedestrian, and bicycle facilities would be a *substantial improvement* compared to the impacts of the proposed Project.

Office Development Alternative

Office land uses have different trip generation characteristics than residential uses, particularly concerning the relative proportions of entering and exiting traffic during peak commute hours. Table XXII summarizes the Office Development Alternative trip generation results.

Table XXII: Office Development Alternative Trip Generation

Land Use (ITE Code)	Size	Daily		A.M. Peak Hour				School P.M. Peak Hour				P.M. Peak Hour						
		Rate ²	Trips	Rate ²	In:Out %	In	Out	Total	Rate ³	In:Out %	In	Out	Total	Rate ²	In:Out %	In	Out	Total
General Office Building (710) ¹	112 KSF	13.00	1,456	1.83	88:12	181	24	205	0.55	41:59	25	36	61	1.82	17:83	35	169	204

Notes: KSF = thousand square feet

1. Source – ITE Trip Generation, 8th Edition, Regression Equations

2. Rates calculated based on Total trips from regression equation divided by Size:

Daily: $\ln(\text{Total trips}) = 0.77 \ln(\text{KSF}) + 3.65$

A.M. Peak: $\ln(\text{Total trips}) = 0.80 \ln(\text{KSF}) + 1.55$

P.M. Peak: $\text{Total trips} = 1.12 (\text{KSF}) + 78.81$

3. School P.M. Peak Rate is the same proportion of the P.M. Peak Rate as that used in the Lafayette Downtown Specific Plan Draft EIR for office land use, based on Urban Land Institute (ULI) published data and other available traffic studies

For the purposes of this alternatives analysis, the directional distribution of the Office Development Alternative trips is assumed to be approximately the same as the proposed Project. This Alternative assumes the same driveway locations on Pleasant Hill Road and Deer Hill Road as the proposed Project, except the west driveway on Deer Hill Road would be located 100 feet further west to incorporate mitigation of the proposed Project’s impact on traffic safety resulting from inadequate sight-distance. Based on these assumptions, the Office Development Alternative trip assignments to all study intersection traffic movements and roadway segment volumes would be the same proportions of the proposed Project trip assignments (Figure 4) as the ratios between the Alternative and the proposed Project generation of in and out trips for each of the peak hours.

Impacts on traffic, transit, pedestrian, and bicycle facilities with the Office Development Alternative in comparison to the impacts of the proposed Project would be as follows:

- At the Deer Hill Road – Stanley Boulevard/Pleasant Hill Road intersection, a significant and unavoidable impact on existing a.m. peak-hour traffic delay would occur for the Office Development Alternative as well as the proposed Project. Additionally, under Cumulative Year 2030 conditions at this intersection, a significant and unavoidable impact on a.m. peak-hour traffic delay would occur for the Office Development Alternative, where the Cumulative impact with the proposed Project would be less than significant.
- At the Deer Hill Road/Brown Avenue intersection, a significant impact on existing and Cumulative Year 2030 traffic delay during peak hours, which would require the Project sponsor to contribute a fair share to the cost of installing a traffic signal at the intersection as mitigation, would occur with either the Office Development Alternative or the proposed Project.
- On northbound Pleasant Hill Road between the State Route 24 westbound off-ramp and Acalanes Avenue, a significant and unavoidable impact on traffic safety during the p.m. peak hour under existing and Cumulative Year 2030 conditions with the proposed Project would instead occur during the a.m. peak hour with the Office Development Alternative. These impacts are based on reduced speeds that would result from weaving movements needed

to make left turns at the Pleasant Hill Road driveway proposed with both the Office Development Alternative and the Project.

- Significant impacts to traffic safety on Deer Hill Road at new driveway locations proposed with both the Office Development Alternative and the Project, which would be mitigated to less than significant by implementing specified design features and requirements, would occur with either the Office Development Alternative or the proposed Project. The exception would be the west driveway on Deer Hill Road, which would be located 100 feet further west with the Office Development Alternative than with the proposed Project. The driveway relocation assumed with this Alternative incorporates one of the mitigations for the proposed Project's impact on traffic safety caused by inadequate sight-distance at the west driveway, resulting in a less than significant impact.
- Significant impacts to emergency vehicle access because of impacts on p.m. peak-hour traffic speeds for northbound Pleasant Hill Road with the proposed Project could instead occur during the a.m. peak hour with the Office Development Alternative, under existing and Cumulative Year 2030 conditions. However, the northbound traffic speeds during the a.m. peak hour with the Office Development Alternative would still provide much better emergency access than the very low p.m. peak-hour speeds on this roadway segment under any scenario. The significant impacts to emergency vehicle access would be mitigated to less than significant by installing advance detection for emergency vehicle preemption of traffic signals with either the Office Development Alternative or the proposed Project. Significant impacts to emergency vehicle access because of the proposed Project's inadequate turning radii on-site, which would be mitigated to less than significant by implementing specified site plan revisions, would not occur with the Office Development Alternative because the site plan would incorporate adequate turning radii.
- Significant impacts on traffic delay and safety for school pedestrians and vehicle traffic during construction of both the Office Development Alternative and the proposed Project, which would be mitigated to less than significant by implementing a Construction Staging Plan including specified restrictions on large trucks and site access, would occur with either the Office Development Alternative or the proposed Project.
- On northbound Pleasant Hill Road at the driveway proposed with both the Office Development Alternative and the Project, and at Deer Hill Road, significant and unavoidable impacts during peak hours under Cumulative Year 2030 conditions with the proposed Project, which would result from left-turn queue lengths exceeding available storage lane capacities, would also occur with Office Development Alternative. However, the excessive left-turn queue length at the proposed driveway with the Office Development Alternative would occur during the a.m. peak hour instead of during the p.m. peak hours as found with the proposed Project. Additionally, under existing conditions on northbound Pleasant Hill Road at the proposed driveway, a significant and unavoidable impact resulting from excessive left-turn queue lengths during the a.m. peak-hour would occur for the Office Development Alternative, where the existing conditions impact with the proposed Project would be less than significant.
- On Pleasant Hill Road, significant and unavoidable impacts on the peak-hour peak direction Delay Index under Cumulative Year 2030 conditions with the proposed Project would probably also occur with the Office Development Alternative.
- Significant transit impacts because of increased parking demand at the Lafayette BART station and lack of a loading area for school bus service with the proposed Project, which would be mitigated to less than significant by implementing shuttle service to the BART

station and construction of bus stop pullouts, would not occur with the Office Development Alternative.

- Significant impacts on existing and planned pedestrian and bicycle facilities, which would be mitigated to less than significant by implementing specified design features and accommodation requirements for such facilities, would occur with either the Office Development Alternative or the proposed Project.
- Significant impacts on safety for school pedestrians and vehicle traffic because of elimination of existing designated spaces on the west curb of Pleasant Hill Road that are currently used for school passenger loading, which would be mitigated to less than significant by implementing specific measures to replace most of the existing loading capacity, would occur with either the Office Development Alternative or the proposed Project.

Overall, the impacts of the Office Development Alternative on traffic, transit, pedestrian, and bicycle facilities would be a *slight deterioration* compared to the impacts of the proposed Project.

Study Participants

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9. *Master Walkways Plan*, City of Lafayette
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12. *2008 Central Contra Costa County Transportation Authority Short Range Transit Plan (SRTP)*
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Appendix A – Level of Service Methodology

APPENDIX A LEVEL OF SERVICE

The description and procedures for calculating capacity and level of service (LOS) are found in Transportation Research Board, *Highway Capacity Manual 2000*. *Highway Capacity Manual 2000* represents the latest research on capacity and quality of service for transportation facilities.

Quality of service requires quantitative measures to characterize operational conditions within a traffic stream. LOS is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.

Six levels of service are defined for each type of facility that has analysis procedures available. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each LOS represents a range of operating conditions and the driver's perception of these conditions. Safety is not included in the measures that establish service levels.

A general description of service levels for various types of facilities is shown in Table A-I

Table A-I: Level of Service Description

Facility Type	<i>Uninterrupted Flow</i>	<i>Interrupted Flow</i>
		Freeways Multi-lane Highways Two-lane Highways Urban Streets
LOS		
A	Free-flow	Very low delay.
B	Stable flow. Presence of other users noticeable.	Low delay.
C	Stable flow. Comfort and convenience starts to decline.	Acceptable delay.
D	High-density stable flow.	Tolerable delay.
E	Unstable flow.	Limit of acceptable delay.
F	Forced or breakdown flow.	Unacceptable delay

Source: *Highway Capacity Manual 2000*

Urban Streets

The term "urban streets" refers to urban arterials and collectors, including those in downtown areas.

Arterial streets are roads that primarily serve longer through trips. However, providing access to abutting commercial and residential land uses is also an important function of arterials.

Collector streets provide both land access and traffic circulation within residential, commercial and industrial areas. Their access function is more important than that of arterials, and unlike arterials their operation is not always dominated by traffic signals.

Downtown streets are signalized facilities that often resemble arterials. They not only move through traffic but also provide access to local businesses for passenger cars, transit buses, and trucks.

Pedestrian conflicts and lane obstructions created by stopping or standing buses, trucks and parking vehicles that cause turbulence in the traffic flow are typical of downtown streets.

The speed of vehicles on urban streets is influenced by three main factors, street environment, interaction among vehicles and traffic control. As a result, these factors also affect quality of service.

The street environment includes the geometric characteristics of the facility, the character of roadside activity and adjacent land uses. Thus, the environment reflects the number and width of lanes, type of median, driveway density, spacing between signalized intersections, existence of parking, level of pedestrian activity and speed limit.

The interaction among vehicles is determined by traffic density, the proportion of trucks and buses, and turning movements. This interaction affects the operation of vehicles at intersections and, to a lesser extent, between signals.

Traffic control (including signals and signs) forces a portion of all vehicles to slow or stop. The delays and speed changes caused by traffic control devices reduce vehicle speeds, however, such controls are needed to establish right-of-way.

The average travel speed for through vehicles along an urban street is the determinant of the operating LOS. The travel speed along a segment, section or entire length of an urban street is dependent on the running speed between signalized intersections and the amount of control delay incurred at signalized intersections.

LOS A describes primarily free-flow operations. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Control delay at signalized intersections is minimal.

LOS B describes reasonably unimpeded operations. The ability to maneuver within the traffic stream is only slightly restricted, and control delays at signalized intersections are not significant.

LOS C describes stable operations, however, ability to maneuver and change lanes in midblock location may be more restricted than at LOS B. Longer queues, adverse signal coordination, or both may contribute to lower travel speeds.

LOS D borders on a range in which in which small increases in flow may cause substantial increases in delay and decreases in travel speed. LOS D may be due to adverse signal progression, inappropriate signal timing, high volumes, or a combination of these factors.

LOS E is characterized by significant delays and lower travel speeds. Such operations are caused by a combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.

LOS F is characterized by urban street flow at extremely low speeds. Intersection congestion is likely at critical signalized locations, with high delays, high volumes, and extensive queuing.

The methodology to determine LOS stratifies urban streets into four classifications. The classifications are complex, and are related to functional and design categories. Table A-II describes the functional and design categories, while Table A-III relates these to the urban street classification.

Once classified, the urban street is divided into segments for analysis. An urban street segment is a one-way section of street encompassing a series of blocks or links terminating at a signalized intersection. Adjacent segments of urban streets may be combined to form larger street sections, provided that the segments have similar demand flows and characteristics.

Levels of service are related to the average travel speed of vehicles along the urban street segment or section.

Travel times for existing conditions are obtained by field measurements. The maximum-car technique is used. The vehicle is driven at the posted speed limit unless impeded by actual traffic conditions. In the maximum-car technique, a safe level of vehicular operation is maintained by observing proper following distances and by changing speeds at reasonable rates of acceleration and deceleration. The maximum-car technique provides the best base for measuring traffic performance.

An observer records the travel time and locations and duration of delay. The beginning and ending points are the centers of intersections. Delays include times waiting in queues at signalized intersections. The travel speed is determined by dividing the length of the segment by the travel time. Once the travel speed on the arterial is determined, the LOS is found by comparing the speed to the criteria in Table A-IV. LOS criteria vary for the different classifications of urban street, reflecting differences in driver expectations.

Table A-II: Functional and Design Categories for Urban Streets

Criterion	Functional Category			
	Principal Arterial		Minor Arterial	
Mobility function	Very important		Important	
Access function	Very minor		Substantial	
Points connected	Freeways, important activity centers, major traffic generators		Principal arterials	
Predominant trips served	Relatively long trips between major points and through trips entering, leaving, and passing through city		Trips of moderate length within relatively small geographical areas	
Criterion	Design Category			
	High-Speed	Suburban	Intermediate	Urban
Driveway access density	Very low density	Low density	Moderate density	High density
Arterial type	Multilane divided; undivided or two-lane with shoulders	Multilane divided; undivided or two-lane with shoulders	Multilane divided or undivided; one way, two lane	Undivided one way; two way, two or more lanes
Parking	No	No	Some	Usually
Separate left-turn lanes	Yes	Yes	Usually	Some
Signals per mile	0.5 to 2	1 to 5	4 to 10	6 to 12
Speed limits	45 to 55 mph	40 to 45 mph	30 to 40 mph	25 to 35 mph
Pedestrian activity	Very little	Little	Some	Usually
Roadside development	Low density	Low to medium density	Medium to moderate density	High density

Source: Highway Capacity Manual 2000

Table A-III: Urban Street Class based on Function and Design Categories

Design Category	Functional Category	
	Principal Arterial	Minor Arterial
High-Speed	I	Not applicable
Suburban	II	II
Intermediate	II	III or IV
Urban	III or IV	IV

Source: Highway Capacity Manual 2000

Table A-IV: Urban Street Levels of Service by Class

Urban Street Class	I	II	III	IV
Range of Free Flow Speeds (mph)	45 to 55	35 to 45	30 to 35	25 to 35
Typical Free Flow Speed (mph)	50	40	33	30
LOS	Average Travel Speed (mph)			
A	>42	>35	>30	>25
B	>34	>28	>24	>19
C	>27	>22	>18	>13
D	>21	>17	>14	>9
E	>16	>13	>10	>7
F	≤16	≤13	≤10	≤7

Source: Highway Capacity Manual 2000

Interrupted Flow

One of the more important elements limiting, and often interrupting the flow of traffic on a highway is the intersection. Flow on an interrupted facility is usually dominated by points of fixed operation such as traffic signals, stop and yield signs. These all operate quite differently and have differing impacts on overall flow.

Signalized Intersections

The capacity of a highway is related primarily to the geometric characteristics of the facility, as well as to the composition of the traffic stream on the facility. Geometrics are a fixed, or non-varying, characteristic of a facility.

At the signalized intersection, an additional element is introduced into the concept of capacity: time allocation. A traffic signal essentially allocates time among conflicting traffic movements seeking use of the same physical space. The way in which time is allocated has a significant impact on the operation of the intersection and on the capacity of the intersection and its approaches.

LOS for signalized intersections is defined in terms of control delay, which is a measure of driver discomfort, frustration, fuel consumption, and increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, traffic and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions, *i. e.*, in the absence of traffic control, geometric delay, any incidents, and any other vehicles. Specifically, LOS criteria for traffic signals are stated in terms of average control delay per vehicle, typically for a 15-minute analysis period. Delay is a complex measure and depends on a number of variables, including the quality of progression, the cycle length, the ratio of green time to cycle length and the volume to capacity ratio for the lane group.

For each intersection analyzed the average control delay per vehicle per approach is determined for the peak hour. A weighted average of control delay per vehicle is then determined for the intersection. A LOS designation is given to the control delay to better describe the level of operation. A description of levels of service for signalized intersections can be found in Table A-V

Table A-V: Description of Level of Service for Signalized Intersections

LOS	Description
A	Very low control delay, up to 10 seconds per vehicle. Progression is extremely favorable, and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.
B	Control delay greater than 10 and up to 20 seconds per vehicle. There is good progression or short cycle lengths or both. More vehicles stop causing higher levels of delay.
C	Control delay greater than 20 and up to 35 seconds per vehicle. Higher delays are caused by fair progression or longer cycle lengths or both. Individual cycle failures may begin to appear. Cycle failure occurs when a given green phase does not serve queued vehicles, and overflow occurs. The number of vehicles stopping is significant, though many still pass through the intersection without stopping.
D	Control delay greater than 35 and up to 55 seconds per vehicle. The influence of congestions becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volumes. Many vehicles stop, the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	Control delay greater than 55 and up to 80 seconds per vehicle. The limit of acceptable delay. High delays usually indicate poor progression, long cycle lengths, and high volumes. Individual cycle failures are frequent.
F	Control delay in excess of 80 seconds per vehicle. Unacceptable to most drivers. Oversaturation, arrival flow rates exceed the capacity of the intersection. Many individual cycle failures. Poor progression and long cycle lengths may also be contributing factors to higher delay.

Source: *Highway Capacity Manual 2000*

The use of control delay, which may also be referred to as signal delay, was introduced in the 1997 update to the *Highway Capacity Manual*, and represents a departure from previous updates. In the third edition, published in 1985 and the 1994 update to the third edition, delay only included stopped delay. Thus, the LOS criteria listed in Table A-V differs from earlier criteria.

Unsignalized Intersections

The current procedures on unsignalized intersections were first introduced in the 1997 update to the *Highway Capacity Manual* and represent a revision of the methodology published in the 1994 update to the 1985 *Highway Capacity Manual*. The revised procedures use control delay as a measure of effectiveness to determine LOS. Delay is a measure of driver discomfort, frustration, fuel consumption, and increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, traffic and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions, *i. e.*, in the absence of traffic control, geometric delay, any incidents, and any other vehicles. Control delay is the increased time of travel for a vehicle approaching and passing through an unsignalized intersection, compared with a free-flow vehicle if it were not required to slow or stop at the intersection.

Two-Way Stop Controlled Intersections

Two-way stop controlled intersections in which stop signs are used to assign the right-of-way, are the most prevalent type of intersection in the United States. At two-way stop-controlled intersections the stop-controlled approaches are referred as the minor street approaches and can be either public streets or private driveways. The approaches that are not controlled by stop signs are referred to as the major street approaches.

The capacity of movements subject to delay are determined using the "critical gap" method of capacity analysis. Expected average control delay based on movement volume and movement capacity is calculated. A LOS designation is given to the expected control delay for each minor movement. LOS is not defined for the intersection as a whole. Control delay is the increased time of travel for a vehicle approaching and passing through a stop-controlled intersection, compared with a free-flow vehicle if it were not required to slow or stop at the intersection. A description of levels of service for two-way stop-controlled intersections is found in Table A-VI.

Table A-VI: Description of Level of Service for Two-Way Stop Controlled Intersections

LOS	Description
A	Very low control delay less than 10 seconds per vehicle for each movement subject to delay.
B	Low control delay greater than 10 and up to 15 seconds per vehicle for each movement subject to delay.
C	Acceptable control delay greater than 15 and up to 25 seconds per vehicle for each movement subject to delay.
D	Tolerable control delay greater than 25 and up to 35 seconds per vehicle for each movement subject to delay.
E	Limit of tolerable control delay greater than 35 and up to 50 seconds per vehicle for each movement subject to delay.
F	Unacceptable control delay in excess of 50 seconds per vehicle for each movement subject to delay.

Source: *Highway Capacity Manual 2000*

Appendix B – Traffic Count Data Sheets

Intersection No: 1

Location: Pleasant Hill Road at Rancho View Drive

AM Start Time 7:00 AM

PM Start Time 4:00 PM

Date: Tuesday, May 10, 2011

Collected By: Olga & Charlie

PLEASANT HILL ROAD AT RANCHO VIEW DRIVE INTERSECTION TURNING MOVEMENT SUMMARY

Location: Pleasant Hill Road at Rancho View Drive													Date: Tuesday, May 10, 2011	
1	Pleasant Hill Road			Rancho View Drive			Pleasant Hill Road			Rancho View Drive			AM	
	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND				
Time	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:30 AM	0	504	0	0	0	0	0	104	3	13	0	0	624	
7:45 AM	4	282	0	0	0	0	0	164	5	6	0	0	461	
8:00 AM	1	273	0	0	0	0	0	116	2	5	0	0	397	
8:15 AM	4	272	0	0	0	0	0	137	5	10	0	0	428	
8:30 AM	5	266	0	0	0	0	0	124	3	1	0	0	399	
8:45 AM	2	233	0	0	0	0	0	97	3	8	0	0	343	
Total	16	1830	0	0	0	0	0	742	21	43	0	0	2652	

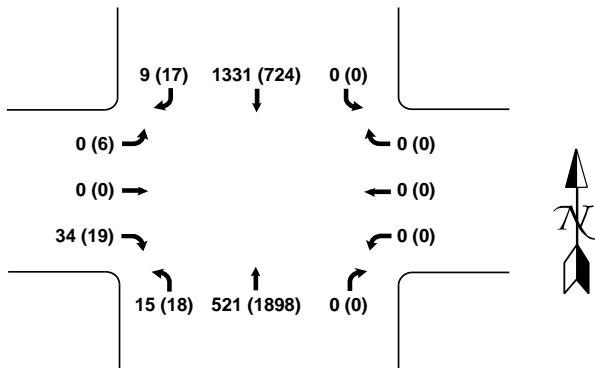
Location: Pleasant Hill Road at Rancho View Drive													Date: Tuesday, May 10, 2011	
1	Pleasant Hill Road			Rancho View Drive			Pleasant Hill Road			Rancho View Drive			PM	
	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND				
Time	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 PM	2	167	0	0	0	0	0	460	0	2	0	0	631	
4:45 PM	3	173	0	0	0	0	0	463	3	4	0	1	647	
5:00 PM	3	179	0	0	0	0	0	471	6	4	0	2	665	
5:15 PM	5	189	0	0	0	0	0	484	5	6	0	2	691	
5:30 PM	6	183	0	0	0	0	0	480	4	5	0	1	679	
5:45 PM	4	178	0	0	0	0	0	475	3	3	0	1	664	
Total	23	1069	0	0	0	0	0	2833	21	24	0	7	3977	

PEAK HOUR VOLUMES

Location: Pleasant Hill Road at Rancho View Drive													Date: Tuesday, May 10, 2011	
1	Pleasant Hill Road			Rancho View Drive			Pleasant Hill Road			Rancho View Drive			AM	
	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND				
Time	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Total	
7:30 AM	0	504	0	0	0	0	0	104	3	13	0	0	624	
7:45 AM	4	282	0	0	0	0	0	164	5	6	0	0	461	
8:00 AM	1	273	0	0	0	0	0	116	2	5	0	0	397	
8:15 AM	4	272	0	0	0	0	0	137	5	10	0	0	428	
Total	9	1331	0	0	0	0	0	521	15	34	0	0	1910	

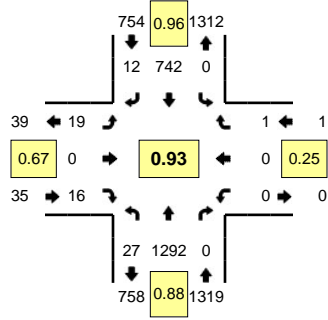
PEAK HOUR VOLUMES

Location: Pleasant Hill Road at Rancho View Drive													Date: Tuesday, May 10, 2011	
1	Pleasant Hill Road			Rancho View Drive			Pleasant Hill Road			Rancho View Drive			PM	
	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND				
Time	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Total	
4:45 PM	3	173	0	0	0	0	0	463	3	4	0	1	647	
5:00 PM	3	179	0	0	0	0	0	471	6	4	0	2	665	
5:15 PM	5	189	0	0	0	0	0	484	5	6	0	2	691	
5:30 PM	6	183	0	0	0	0	0	480	4	5	0	1	679	
Total	17	724	0	0	0	0	0	1898	18	19	0	6	2682	

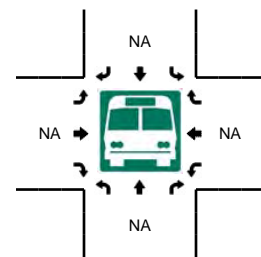
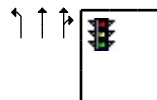
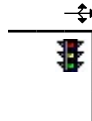
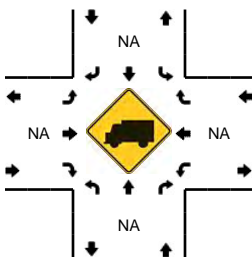
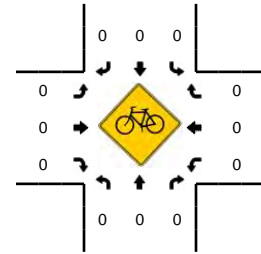
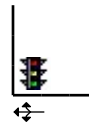
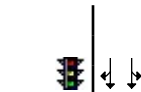
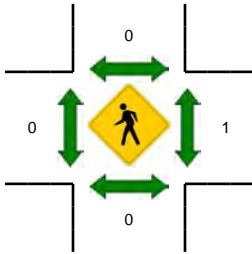
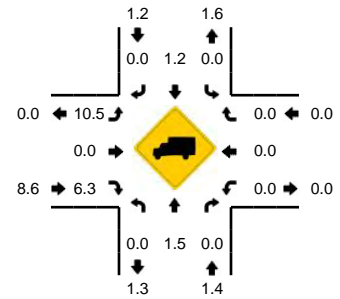


LOCATION: Pleasant Hill Rd -- Rancho View Dr
CITY/STATE: Lafayette, CA

QC JOB #: 10687121
DATE: Thu, Dec 01 2011



Peak-Hour: 3:00 PM -- 4:00 PM
Peak 15-Min: 3:45 PM -- 4:00 PM



15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				Rancho View Dr (Eastbound)				Rancho View Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
2:00 PM	7	178	0	0	0	159	5	0	2	0	5	0	0	0	0	0	356	
2:15 PM	3	240	1	1	0	178	4	0	2	0	7	0	0	0	0	0	436	
2:30 PM	5	265	0	0	0	193	6	0	3	0	5	0	0	0	0	0	477	
2:45 PM	3	222	0	0	0	179	4	1	2	0	8	0	0	0	0	0	419	1688
3:00 PM	8	264	0	0	0	186	8	0	7	0	9	0	0	0	0	0	482	1814
3:15 PM	7	332	0	0	0	183	2	0	5	0	2	0	0	0	1	0	532	1910
3:30 PM	5	329	0	0	0	186	0	0	4	0	3	0	0	0	0	0	527	1960
3:45 PM	7	367	0	0	0	187	2	0	3	0	2	0	0	0	0	0	568	2109

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	28	1468	0	0	0	748	8	0	12	0	8	0	0	0	0	0	2272
Heavy Trucks	0	12	0	0	0	8	0	0	4	0	0	0	0	0	0	0	24
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Comments:

Intersection No: 1

Location: Pleasant Hill Road at Green Valley Drive

AM Start Time 7:00 AM

PM Start Time 4:00 PM

Date: Wednesday, May 18, 2011

Collected By: Olga & Charlie

PLEASANT HILL ROAD AT GREEN VALLEY DRIVE INTERSECTION TURNING MOVEMENT SUMMARY

Location: Pleasant Hill Road at Green Valley Drive													Date: Wednesday, May 18, 2011	AM
1	Pleasant Hill Road SOUTHBOUND			Green Valley Drive WESTBOUND			Pleasant Hill Road NORTHBOUND			Green Valley Drive EASTBOUND			Total	
	Time	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	361	2	2	0	3	3	140	0	1	0	1	513	
7:30 AM	0	391	3	4	0	6	4	149	0	2	0	0	559	
7:45 AM	1	366	1	3	0	4	4	153	0	1	0	1	534	
8:00 AM	0	364	2	1	0	5	3	143	0	1	0	1	520	
8:15 AM	0	360	1	1	0	2	1	141	0	1	0	0	507	
8:30 AM	0	358	2	1	0	1	1	138	0	1	0	1	503	
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	1	2200	11	12	0	21	16	864	0	7	0	4	3136	

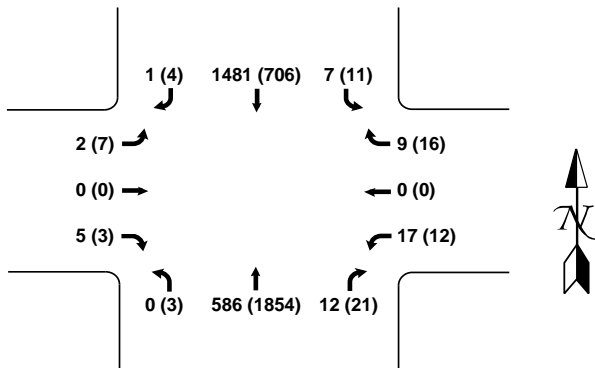
Location: Pleasant Hill Road at Green Valley Drive													Date: Wednesday, May 18, 2011	PM
1	Pleasant Hill Road SOUTHBOUND			Green Valley Drive WESTBOUND			Pleasant Hill Road NORTHBOUND			Green Valley Drive EASTBOUND			Total	
	Time	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	1	163	0	2	0	1	2	445	0	0	0	2	616	
4:45 PM	0	169	1	3	0	2	5	451	0	0	0	1	632	
5:00 PM	1	179	3	5	0	3	4	463	1	1	0	3	663	
5:15 PM	2	176	4	4	0	4	7	469	1	1	0	1	669	
5:30 PM	1	182	3	4	0	3	5	471	1	1	0	2	673	
5:45 PM	1	165	1	2	0	2	5	448	2	1	0	1	628	
Total	6	1034	12	20	0	15	28	2747	5	4	0	10	3881	

PEAK HOUR VOLUMES

Location: Pleasant Hill Road at Green Valley Drive													Date: Wednesday, May 18, 2011	AM
1	Pleasant Hill Road SOUTHBOUND			Green Valley Drive WESTBOUND			Pleasant Hill Road NORTHBOUND			Green Valley Drive EASTBOUND			Total	
	Time	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru		
7:15 AM	0	391	3	4	0	6	4	149	0	2	0	0	559	
7:30 AM	1	366	1	3	0	4	4	153	0	1	0	1	534	
7:45 AM	0	364	2	1	0	5	3	143	0	1	0	1	520	
8:00 AM	0	360	1	1	0	2	1	141	0	1	0	0	507	
Total	1	1481	7	9	0	17	12	586	0	5	0	2	2120	

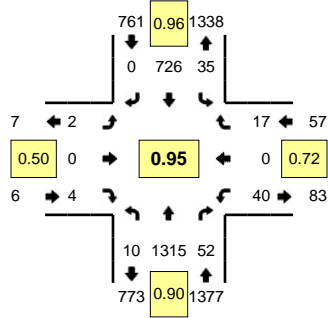
PEAK HOUR VOLUMES

Location: Pleasant Hill Road at Green Valley Drive													Date: Wednesday, May 18, 2011	PM
1	Pleasant Hill Road SOUTHBOUND			Green Valley Drive WESTBOUND			Pleasant Hill Road NORTHBOUND			Green Valley Drive EASTBOUND			Total	
	Time	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru		
4:45 PM	0	169	1	3	0	2	5	451	0	0	0	1	632	
5:00 PM	1	179	3	5	0	3	4	463	1	1	0	3	663	
5:15 PM	2	176	4	4	0	4	7	469	1	1	0	1	669	
5:30 PM	1	182	3	4	0	3	5	471	1	1	0	2	673	
Total	4	706	11	16	0	12	21	1854	3	3	0	7	2637	

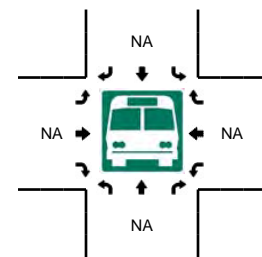
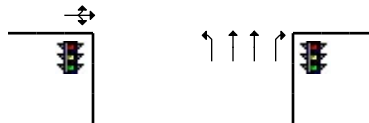
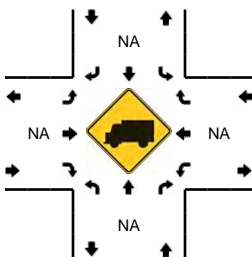
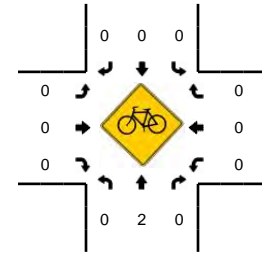
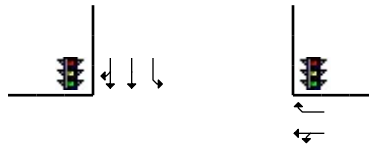
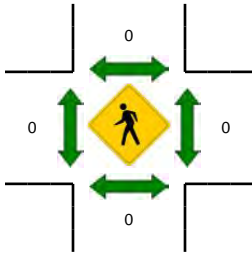
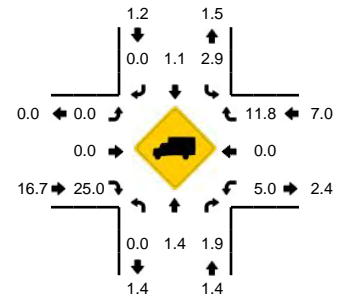


LOCATION: Pleasant Hill Rd -- Greenvalley Dr
CITY/STATE: Lafayette, CA

QC JOB #: 10687120
DATE: Thu, Dec 01 2011



Peak-Hour: 3:00 PM -- 4:00 PM
Peak 15-Min: 3:45 PM -- 4:00 PM



15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				Greenvalley Dr (Eastbound)				Greenvalley Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
2:00 PM	2	171	5	0	4	152	0	6	0	0	0	0	9	0	7	0	356	
2:15 PM	1	248	20	1	1	187	0	0	2	0	3	0	10	0	6	0	479	
2:30 PM	0	248	9	0	4	194	0	2	1	0	7	0	17	0	7	0	489	
2:45 PM	2	218	11	1	3	176	1	3	0	1	1	0	8	0	4	0	429	1753
3:00 PM	4	285	14	1	5	189	0	0	0	0	1	0	14	0	3	0	516	1913
3:15 PM	0	318	15	0	8	175	0	2	1	0	1	0	7	0	6	0	533	1967
3:30 PM	1	342	15	0	5	191	0	2	1	0	2	0	10	0	5	0	574	2052
3:45 PM	2	370	8	2	13	171	0	0	0	0	0	0	9	0	3	0	578	2201

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	8	1480	32	8	52	684	0	0	0	0	0	0	36	0	12	0	2312	
Heavy Trucks	0	12	0		4	4	0		0	0	0		4	0	0		24	
Pedestrians		0				0				0				0				0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Railroad																		0
Stopped Buses																		0

Comments:

Intersection No: 3

Location: Pleasant Hill Road at Reliez Valley Rd

AM Start Time 7:15 AM

PM Start Time 4:00 PM

Date: Tuesday, May 17, 2011

Collected By: Charlie

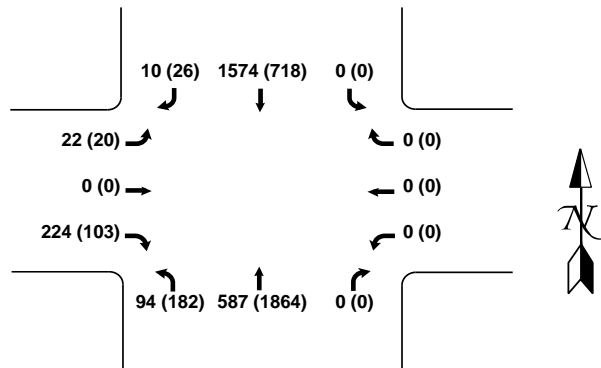
PLEASANT HILL ROAD AT RELIEZ VALLEY RD INTERSECTION TURNING MOVEMENT SUMMARY

Location: Pleasant Hill Road at Reliez Valley Rd													Date: Tuesday, May 17, 2011	
3	Pleasant Hill Road			Reliez Valley Rd			Pleasant Hill Road			Reliez Valley Rd			AM	
	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND				
Time	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Total	
7:15 AM	1	462						51	8	51		7	580	
7:30 AM	2	497						93	5	74		9	680	
7:45 AM	2	307						115	12	42		2	480	
8:00 AM	5	308						109	17	57		4	500	
8:15 AM	3	345						127	20	59		7	561	
8:30 AM													0	
8:45 AM													0	
9:00 AM													0	
Total	13	1919						495	62	283		29	2801	

Location: Pleasant Hill Road at Reliez Valley Rd													Date: Tuesday, May 17, 2011	
3	Pleasant Hill Road			Reliez Valley Rd			Pleasant Hill Road			Reliez Valley Rd			PM	
	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND				
Time	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Total	
4:00 PM	9	172						400	24	27		3	635	
4:15 PM	11	160						438	33	24		8	674	
4:30 PM	6	135						477	39	26		4	687	
4:45 PM	4	164						466	44	29		2	709	
5:00 PM	5	159						460	52	26		7	709	
5:15 PM	9	179						440	45	22		1	696	
5:30 PM	4	182						493	48	27		5	759	
5:45 PM	8	198						471	37	28		7	749	
Total	56	1349						3645	322	209		37	5618	

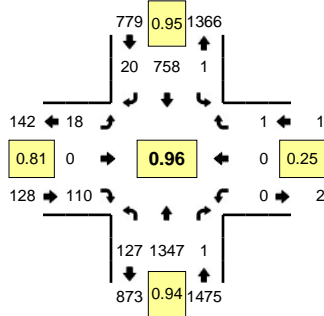
PEAK HOUR VOLUMES														
Location: Pleasant Hill Road at Reliez Valley Rd													Date: Tuesday, May 17, 2011	
3	Pleasant Hill Road			Reliez Valley Rd			Pleasant Hill Road			Reliez Valley Rd			AM	
	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND				
Time	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Total	
7:15 AM	1	462						105	21	51		7	647	
7:30 AM	2	497						144	18	74		9	744	
7:45 AM	2	307						178	25	42		2	556	
8:00 AM	5	308						160	30	57		4	564	
Total	10	1574	0	0	0	0	0	587	94	224	0	22	2511	

PEAK HOUR VOLUMES														
Location: Pleasant Hill Road at Reliez Valley Rd													Date: Tuesday, May 17, 2011	
3	Pleasant Hill Road			Reliez Valley Rd			Pleasant Hill Road			Reliez Valley Rd			PM	
	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND				
Time	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Total	
5:00 PM	5	159						460	52	26		7	709	
5:15 PM	9	179						440	45	22		1	696	
5:30 PM	4	182						493	48	27		5	759	
5:45 PM	8	198						471	37	28		7	749	
Total	26	718	0	0	0	0	0	1864	182	103	0	20	2913	

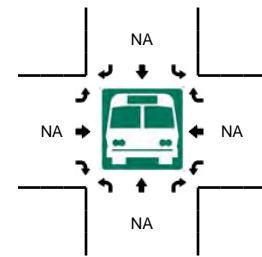
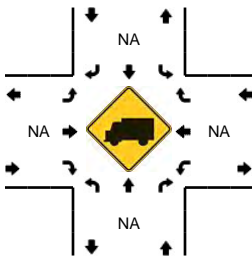
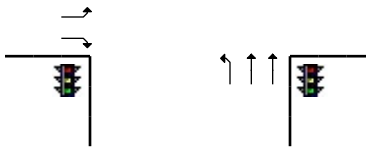
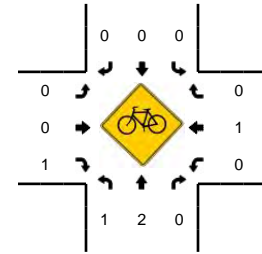
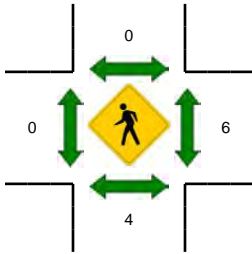
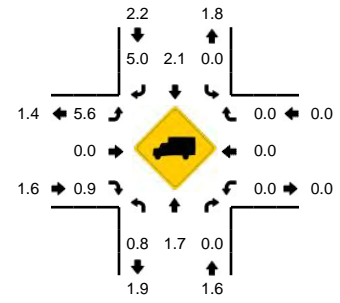


LOCATION: Pleasant Hill Rd -- Releiz Valley Rd
CITY/STATE: Lafayette, CA

QC JOB #: 10687119
DATE: Thu, Dec 01 2011



Peak-Hour: 3:00 PM -- 4:00 PM
Peak 15-Min: 3:15 PM -- 3:30 PM



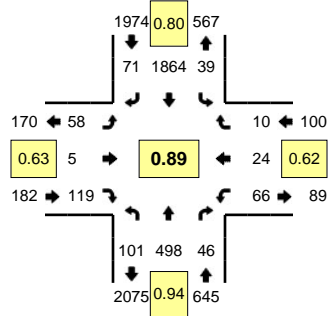
15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				Releiz Valley Rd (Eastbound)				Releiz Valley Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
2:00 PM	21	185	0	0	0	154	4	0	3	0	17	0	0	0	0	0	384	
2:15 PM	30	245	0	0	0	195	6	0	3	0	24	0	0	0	1	0	504	
2:30 PM	32	274	0	2	0	206	2	0	4	0	28	0	0	0	0	0	548	
2:45 PM	41	228	0	0	0	187	3	0	2	0	40	0	0	0	0	0	501	1937
3:00 PM	34	287	1	1	0	186	6	0	2	0	21	0	0	0	0	0	538	2091
3:15 PM	40	339	0	0	0	193	3	0	9	0	34	0	0	0	1	0	619	2206
3:30 PM	26	349	0	4	1	199	6	0	2	0	23	0	0	0	0	0	610	2268
3:45 PM	22	372	0	0	0	180	5	0	5	0	32	0	0	0	0	0	616	2383

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	160	1356	0	0	0	772	12	0	36	0	136	0	0	0	4	0	2476
Heavy Trucks	4	28	0	0	0	28	0	0	4	0	4	0	0	0	0	0	68
Pedestrians		8				0					0			12			20
Bicycles	0	1	0		0	0	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

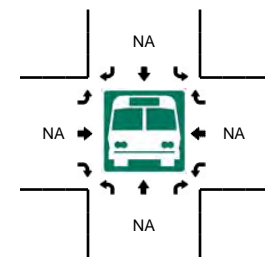
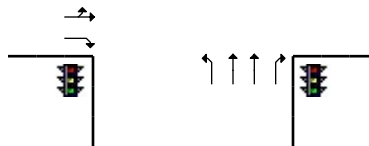
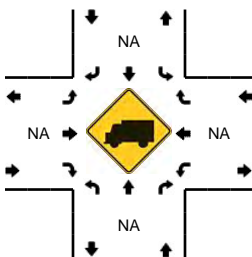
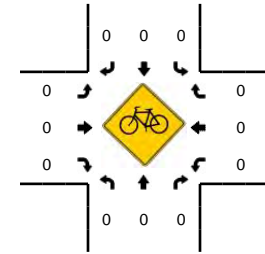
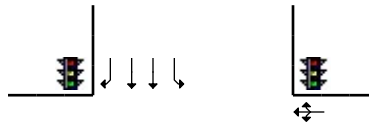
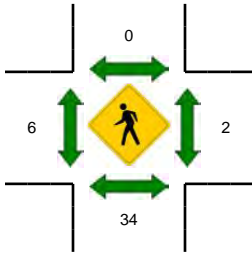
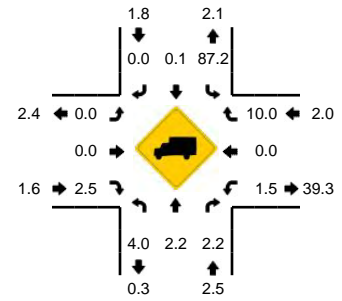
Comments:

LOCATION: Pleasant Hill Rd -- Springhill Rd
CITY/STATE: Lafayette, CA

QC JOB #: 10698404
DATE: Tue, Jan 10 2012



Peak-Hour: 8:00 AM -- 9:00 AM
Peak 15-Min: 8:15 AM -- 8:30 AM



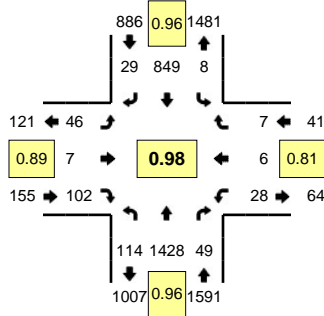
15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				Springhill Rd (Eastbound)				Springhill Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	11	43	4	2	10	550	2	0	0	0	6	0	6	0	0	0	634	
7:15 AM	9	55	3	1	3	680	5	0	1	1	12	0	4	1	3	0	778	
7:30 AM	13	100	4	3	10	538	13	1	6	0	40	0	13	1	0	0	742	
7:45 AM	22	126	10	16	7	359	12	0	7	2	52	0	20	4	3	0	640	2794
8:00 AM	27	125	15	9	7	436	18	1	6	1	22	0	12	6	1	0	686	2846
8:15 AM	17	136	23	9	8	451	39	0	31	3	56	0	22	18	1	0	814	2882
8:30 AM	16	131	4	6	16	479	7	0	16	1	28	0	10	0	4	0	718	2858
8:45 AM	15	106	4	2	7	498	7	0	5	0	13	0	22	0	4	0	683	2901

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	68	544	92	36	32	1804	156	0	124	12	224	0	88	72	4	0	3256
Heavy Trucks	8	16	0		28	4	0		0	0	4		4	0	0		64
Pedestrians		76				0				20				4			100
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

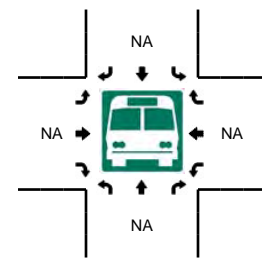
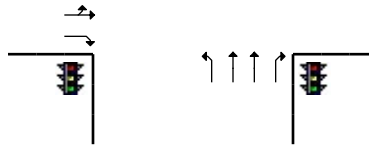
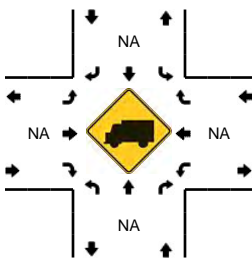
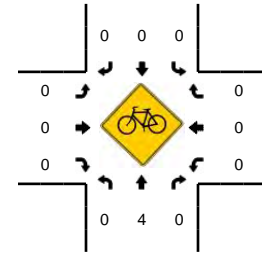
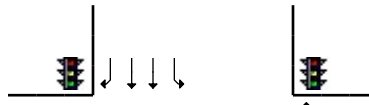
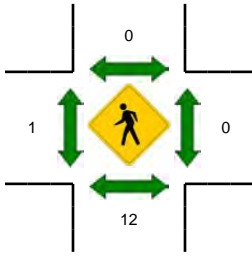
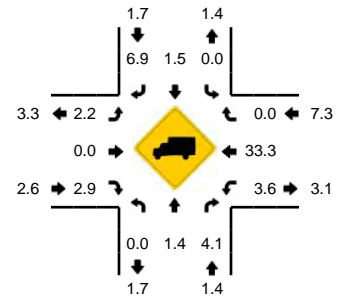
Comments:

LOCATION: Pleasant Hill Rd -- Springhill Rd
CITY/STATE: Lafayette, CA

QC JOB #: 10687118
DATE: Thu, Dec 01 2011



Peak-Hour: 3:00 PM -- 4:00 PM
Peak 15-Min: 3:45 PM -- 4:00 PM



15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				Springhill Rd (Eastbound)				Springhill Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
2:00 PM	17	201	4	5	1	163	9	0	1	0	10	0	15	0	1	0	427	
2:15 PM	40	276	3	35	2	178	20	0	6	0	21	0	5	1	1	0	588	
2:30 PM	32	276	18	22	1	218	21	0	23	0	36	0	12	2	3	0	664	
2:45 PM	42	240	9	5	3	210	23	0	24	1	33	0	10	3	5	0	608	2287
3:00 PM	25	312	12	11	1	203	10	0	16	3	34	0	8	2	2	0	639	2499
3:15 PM	23	357	11	8	2	220	5	0	13	0	26	0	7	0	2	0	674	2585
3:30 PM	19	373	19	5	4	217	6	0	7	1	19	0	4	2	2	0	678	2599
3:45 PM	19	386	7	4	1	209	8	0	10	3	23	0	9	2	1	0	682	2673

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	76	1544	28	16	4	836	32	0	40	12	92	0	36	8	4	0	2728
Heavy Trucks	0	16	0		0	12	0		4	0	4		4	0	0		40
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Intersection No: 4

Location: Pleasant Hill Road at Springhill Road

AM Start Time 7:00 AM

PM Start Time 4:00 PM

Date: Tuesday, September 28, 2010

Collected By: Olga & Charlie

PLEASANT HILL ROAD AT SPRINGHILL ROAD INTERSECTION TURNING MOVEMENT SUMMARY

Location: Pleasant Hill Road at Springhill Road													Date: Tuesday, September 28, 2010	
4	Pleasant Hill Road SOUTHBOUND			Springhill Road WESTBOUND			Pleasant Hill Road NORTHBOUND			Springhill Road EASTBOUND			AM	
	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:15 AM	3	455	1	5	1	2	2	138	17	21	1	4	650	
7:30 AM	5	471	5	7	0	3	4	143	29	39	0	6	712	
7:45 AM	7	459	2	7	0	5	5	157	25	32	0	8	707	
8:00 AM	8	450	2	8	2	8	9	148	21	35	3	9	703	
8:15 AM	2	445	1	6	1	7	7	139	19	31	0	3	661	
8:30 AM	1	436	1	2	0	6	2	132	14	29	0	4	627	
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	26	2716	12	35	4	31	29	857	125	187	4	34	4060	

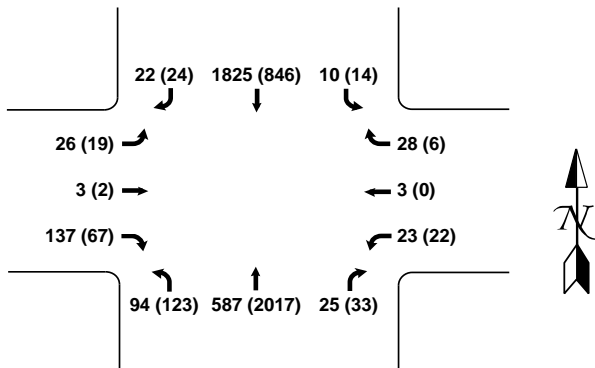
Location: Pleasant Hill Road at Springhill Road													Date: Tuesday, September 28, 2010	
4	Pleasant Hill Road SOUTHBOUND			Springhill Road WESTBOUND			Pleasant Hill Road NORTHBOUND			Springhill Road EASTBOUND			PM	
	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt		
4:00 PM	5	195	3	2	0	5	9	382	18	22	0	5	646	
4:15 PM	4	174	2	2	0	2	13	416	20	27	0	5	665	
4:30 PM	10	173	2	1	0	11	7	438	24	16	0	5	687	
4:45 PM	11	183	1	1	0	9	7	480	24	31	0	16	763	
5:00 PM	7	193	2	0	0	8	11	502	37	21	1	4	786	
5:15 PM	8	220	2	4	0	5	10	527	30	19	1	7	833	
5:30 PM	2	210	4	2	0	6	7	477	23	12	0	5	748	
5:45 PM	7	223	6	0	0	3	5	511	33	15	0	3	806	
Total	54	1571	22	12	0	49	69	3733	209	163	2	50	5934	

PEAK HOUR VOLUMES

Location: Pleasant Hill Road at Springhill Road													Date: Tuesday, September 28, 2010	
4	Pleasant Hill Road SOUTHBOUND			Springhill Road WESTBOUND			Pleasant Hill Road NORTHBOUND			Springhill Road EASTBOUND			AM	
	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt		
7:30 AM	5	471	5	7	0	3	4	143	29	39	0	6	712	
7:45 AM	7	459	2	7	0	5	5	157	25	32	0	8	707	
8:00 AM	8	450	2	8	2	8	9	148	21	35	3	9	703	
8:15 AM	2	445	1	6	1	7	7	139	19	31	0	3	661	
Total	22	1825	10	28	3	23	25	587	94	137	3	26	2783	

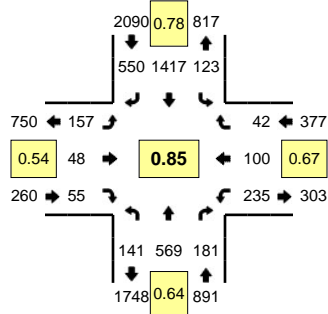
PEAK HOUR VOLUMES

Location: Pleasant Hill Road at Springhill Road													Date: Tuesday, September 28, 2010	
4	Pleasant Hill Road SOUTHBOUND			Springhill Road WESTBOUND			Pleasant Hill Road NORTHBOUND			Springhill Road EASTBOUND			PM	
	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt		
5:00 PM	7	193	2	0	0	8	11	502	37	21	1	4	786	
5:15 PM	8	220	2	4	0	5	10	527	30	19	1	7	833	
5:30 PM	2	210	4	2	0	6	7	477	23	12	0	5	748	
5:45 PM	7	223	6	0	0	3	5	511	33	15	0	3	806	
Total	24	846	14	6	0	22	33	2017	123	67	2	19	3173	

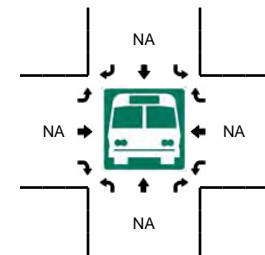
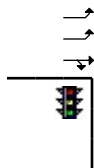
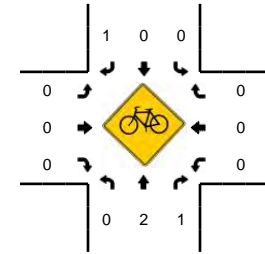
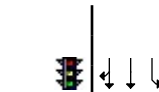
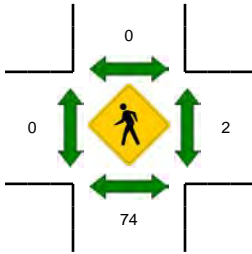
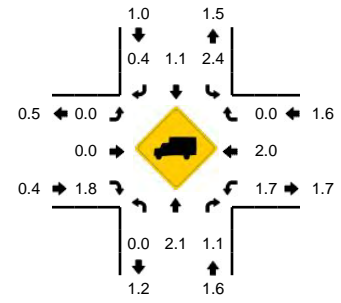


LOCATION: Pleasant Hill Rd -- Deer Hill Rd/Stanley Blvd
CITY/STATE: Lafayette, CA

QC JOB #: 10687110
DATE: Thu, Dec 01 2011



Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

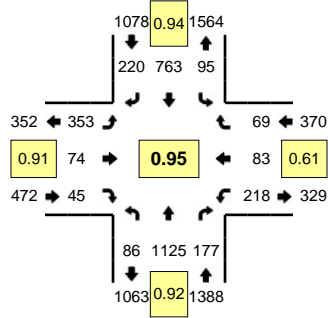


15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				Deer Hill Rd/Stanley Blvd (Eastbound)				Deer Hill Rd/Stanley Blvd (Westbound)				Total	Hourly Totals	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U			
7:00 AM	7	59	5	0	4	357	93	2	16	5	0	0	21	12	6	0	587		
7:15 AM	11	85	20	2	17	486	163	4	21	4	0	0	24	11	4	0	852		
7:30 AM	24	139	42	9	21	342	143	24	34	19	12	0	56	23	13	0	901		
7:45 AM	26	226	101	21	17	251	115	20	77	19	40	0	98	38	11	0	1060	3400	
8:00 AM	39	119	18	9	19	338	129	1	25	6	3	0	57	28	14	0	805	3618	
8:15 AM	31	120	26	8	30	395	120	0	43	4	10	0	31	7	16	0	841	3607	
8:30 AM	25	93	19	6	26	303	90	0	40	6	13	0	38	12	15	0	686	3392	
8:45 AM	30	126	27	7	30	312	106	1	38	10	14	0	45	10	6	0	762	3094	
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total		
All Vehicles	104	904	404	84	68	1004	460	80	308	76	160	0	392	152	44	0	4240		
Heavy Trucks	0	16	0		12	16	0		0	0	0		12	4	0		60		
Pedestrians		236				0				0				0				236	
Bicycles	0	1	0		0	0	0		0	0	0		0	0	0		1		
Railroad																			
Stopped Buses																			

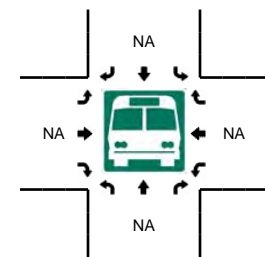
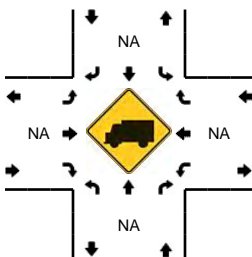
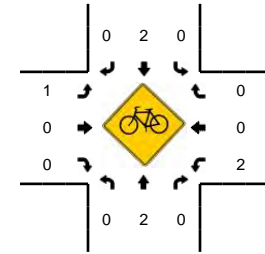
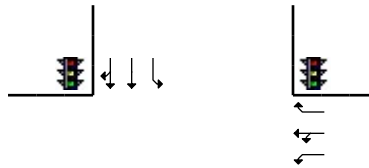
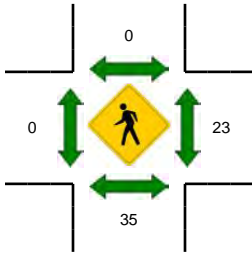
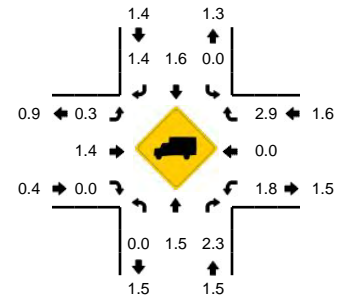
Comments:

LOCATION: Pleasant Hill Rd -- Deer Hill Rd/Stanley Blvd
CITY/STATE: Lafayette, CA

QC JOB #: 10687112
DATE: Thu, Dec 01 2011



Peak-Hour: 3:00 PM -- 4:00 PM
Peak 15-Min: 3:15 PM -- 3:30 PM



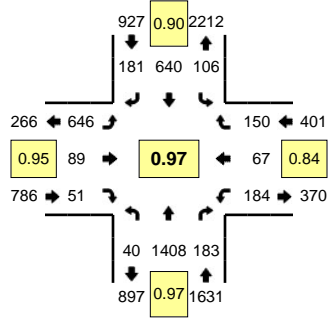
15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				Deer Hill Rd/Stanley Blvd (Eastbound)				Deer Hill Rd/Stanley Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
2:00 PM	8	154	30	8	16	147	39	4	54	6	3	0	36	10	11	0	526	
2:15 PM	7	230	22	9	16	152	57	4	69	11	7	0	87	34	31	0	736	
2:30 PM	9	209	24	9	24	159	74	14	75	6	6	0	36	6	23	0	674	
2:45 PM	14	218	28	12	26	189	81	10	66	17	10	0	32	10	23	0	736	2672
3:00 PM	11	249	52	10	23	201	61	6	93	20	8	0	45	23	21	0	823	2969
3:15 PM	10	249	52	9	16	195	63	7	96	17	17	0	91	33	14	0	869	3102
3:30 PM	17	301	38	12	17	180	55	2	85	17	11	0	48	13	17	0	813	3241
3:45 PM	11	326	35	6	22	187	41	2	79	20	9	0	34	14	17	0	803	3308

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	40	996	208	36	64	780	252	28	384	68	68	0	364	132	56	0	3476	
Heavy Trucks	0	20	4		0	24	8		4	0	0		12	0	0		72	
Pedestrians		48				0				0				36				84
Bicycles	0	1	0		0	0	0		0	0	0		0	0	0		1	
Railroad																		
Stopped Buses																		

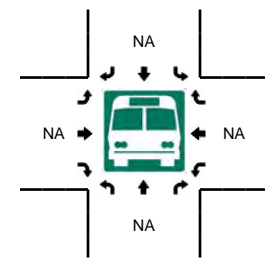
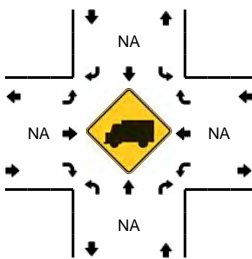
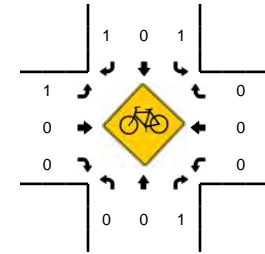
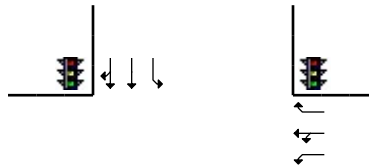
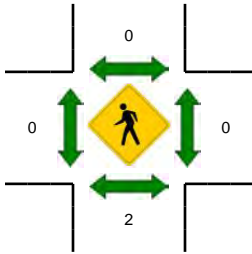
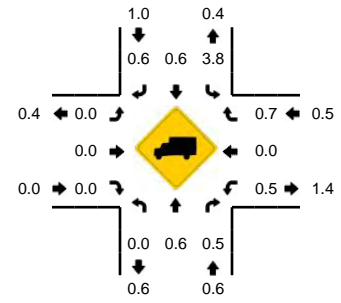
Comments:

LOCATION: Pleasant Hill Rd -- Deer Hill Rd/Stanley Blvd
CITY/STATE: Lafayette, CA

QC JOB #: 10687111
DATE: Thu, Dec 01 2011



Peak-Hour: 4:45 PM -- 5:45 PM
Peak 15-Min: 5:30 PM -- 5:45 PM



15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				Deer Hill Rd/Stanley Blvd (Eastbound)				Deer Hill Rd/Stanley Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	10	379	36	12	15	134	42	0	93	23	13	0	36	22	26	0	841	
4:15 PM	8	332	40	8	21	132	44	2	133	15	12	0	40	17	27	0	831	
4:30 PM	13	368	47	6	27	163	52	2	136	27	14	0	36	11	22	0	924	
4:45 PM	9	358	57	9	23	145	48	3	138	22	15	0	42	15	22	0	906	3502
5:00 PM	3	359	38	5	21	149	40	2	175	17	14	0	36	20	38	0	917	3578
5:15 PM	3	325	46	4	28	176	54	3	160	28	11	0	57	14	48	0	957	3704
5:30 PM	3	366	42	4	26	170	39	0	173	22	11	0	49	18	42	0	965	3745
5:45 PM	2	382	33	6	17	155	53	1	131	18	6	0	34	16	28	0	882	3721
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
All Vehicles	12	1464	168	16	104	680	156	0	692	88	44	0	196	72	168	0	3860	
Heavy Trucks	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	8	
Pedestrians		4				0				0				0			4	
Bicycles	0	0	0		0	0	0		1	0	0		0	0	0		1	
Railroad																		
Stopped Buses																		

Comments:

Intersection No: 6

Location: Pleasant Hill Road at Mt Diablo Blvd

AM Start Time 7:00 AM

PM Start Time 4:00 PM

Date: Thursday, May 19, 2011

Collected By: Olga & Charlie

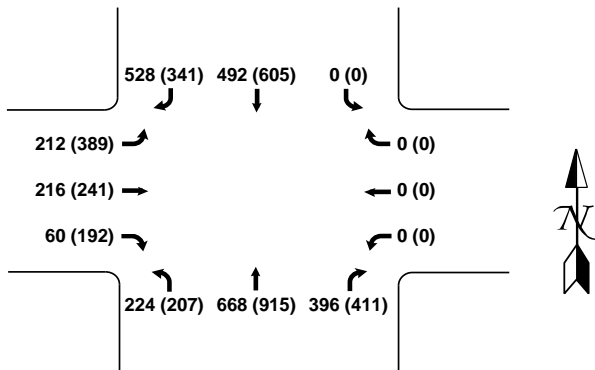
PLEASANT HILL ROAD AT MT DIABLO BLVD INTERSECTION TURNING MOVEMENT SUMMARY

Location: Pleasant Hill Road at Mt Diablo Blvd													Date: Thursday, May 19, 2011	
6	Pleasant Hill Road			Mt Diablo Blvd			Pleasant Hill Road			Mt Diablo Blvd			AM	
	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND				
Time	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:15 AM	119	113	0	0	0	0	89	151	48	9	43	42	614	
7:30 AM	122	114	0	0	0	0	92	165	52	10	50	48	653	
7:45 AM	130	120	0	0	0	0	97	167	56	17	57	51	695	
8:00 AM	140	130	0	0	0	0	105	171	59	15	60	60	740	
8:15 AM	136	128	0	0	0	0	102	165	57	18	49	53	708	
8:30 AM	139	111	0	0	0	0	91	161	51	11	45	39	648	
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	786	716	0	0	0	0	576	980	323	80	304	293	4058	

Location: Pleasant Hill Road at Mt Diablo Blvd													Date: Thursday, May 19, 2011	
6	Pleasant Hill Road			Mt Diablo Blvd			Pleasant Hill Road			Mt Diablo Blvd			PM	
	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND				
Time	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 PM	73	144	0	0	0	0	86	209	39	38	45	76	710	
4:45 PM	75	143	0	0	0	0	98	215	41	39	55	88	754	
5:00 PM	82	145	0	0	0	0	105	229	53	46	60	97	817	
5:15 PM	89	161	0	0	0	0	102	235	54	51	65	96	853	
5:30 PM	95	156	0	0	0	0	106	236	59	56	61	108	877	
5:45 PM	82	142	0	0	0	0	84	217	48	39	48	93	753	
Total	496	891	0	0	0	0	581	1341	294	269	334	558	4764	

PEAK HOUR VOLUMES														
Location: Pleasant Hill Road at Mt Diablo Blvd													Date: Thursday, May 19, 2011	
6	Pleasant Hill Road			Mt Diablo Blvd			Pleasant Hill Road			Mt Diablo Blvd			AM	
	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND				
Time	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Total	
7:30 AM	122	114	0	0	0	0	92	165	52	10	50	48	653	
7:45 AM	130	120	0	0	0	0	97	167	56	17	57	51	695	
8:00 AM	140	130	0	0	0	0	105	171	59	15	60	60	740	
8:15 AM	136	128	0	0	0	0	102	165	57	18	49	53	708	
Total	528	492	0	0	0	0	396	668	224	60	216	212	2796	

PEAK HOUR VOLUMES														
Location: Pleasant Hill Road at Mt Diablo Blvd													Date: Thursday, May 19, 2011	
6	Pleasant Hill Road			Mt Diablo Blvd			Pleasant Hill Road			Mt Diablo Blvd			PM	
	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND				
Time	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Total	
4:45 PM	75	143	0	0	0	0	98	215	41	39	55	88	754	
5:00 PM	82	145	0	0	0	0	105	229	53	46	60	97	817	
5:15 PM	89	161	0	0	0	0	102	235	54	51	65	96	853	
5:30 PM	95	156	0	0	0	0	106	236	59	56	61	108	877	
Total	341	605	0	0	0	0	411	915	207	192	241	389	3301	



Intersection No: 7

Location: Pleasant Hill Road at Old Tunnel Road

AM Start Time 7:00 AM

PM Start Time 4:00 PM

Date: Wednesday, May 11, 2011

Collected By: Olga & Charlie

PLEASANT HILL ROAD AT OLD TUNNEL ROAD INTERSECTION TURNING MOVEMENT SUMMARY

Location: Pleasant Hill Road at Old Tunnel Road													Date: Wednesday, May 11, 2011	
7	Pleasant Hill Road SOUTHBOUND			Old Tunnel Road WESTBOUND			Pleasant Hill Road NORTHBOUND			Old Tunnel Road EASTBOUND			AM	
	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt		
Time													Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:30 AM	0	107	15	28	0	2	4	243	0	28	7	2	436	
7:45 AM	0	115	20	35	0	4	5	259	0	35	8	5	486	
8:00 AM	0	115	23	39	0	4	6	263	0	37	9	6	502	
8:15 AM	0	111	22	34	0	2	5	255	0	32	8	3	472	
8:30 AM	0	108	19	29	0	1	3	236	0	29	6	2	433	
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	556	99	165	0	13	23	1256	0	161	38	18	2329	

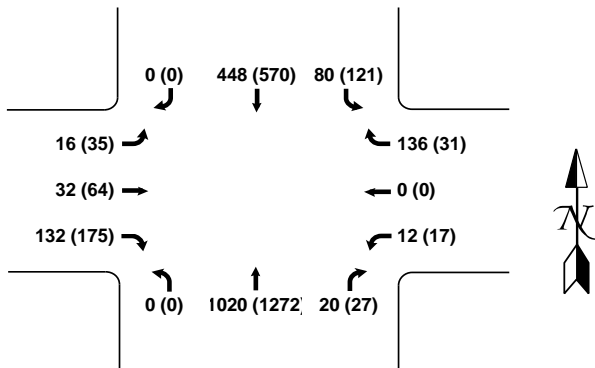
Location: Pleasant Hill Road at Old Tunnel Road													Date: Wednesday, May 11, 2011	
7	Pleasant Hill Road SOUTHBOUND			Old Tunnel Road WESTBOUND			Pleasant Hill Road NORTHBOUND			Old Tunnel Road EASTBOUND			PM	
	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt		
Time													Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 PM	0	125	24	3	0	3	5	310	0	32	11	8	521	
4:45 PM	0	136	26	6	0	3	5	316	0	39	12	7	550	
5:00 PM	0	142	29	8	0	4	6	312	0	40	17	9	567	
5:15 PM	0	155	34	9	0	5	9	321	0	45	20	10	608	
5:30 PM	0	137	32	8	0	5	7	323	0	51	15	9	587	
5:45 PM	0	136	27	6	0	4	7	309	0	41	11	8	549	
Total	0	831	172	40	0	24	39	1891	0	248	86	51	3382	

PEAK HOUR VOLUMES

Location: Pleasant Hill Road at Old Tunnel Road													Date: Wednesday, May 11, 2011	
7	Pleasant Hill Road SOUTHBOUND			Old Tunnel Road WESTBOUND			Pleasant Hill Road NORTHBOUND			Old Tunnel Road EASTBOUND			AM	
	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt		
Time													Total	
7:30 AM	0	107	15	28	0	2	4	243	0	28	7	2	436	
7:45 AM	0	115	20	35	0	4	5	259	0	35	8	5	486	
8:00 AM	0	115	23	39	0	4	6	263	0	37	9	6	502	
8:15 AM	0	111	22	34	0	2	5	255	0	32	8	3	472	
Total	0	448	80	136	0	12	20	1020	0	132	32	16	1896	

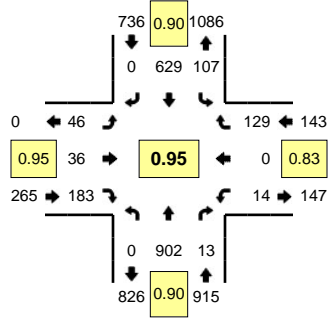
PEAK HOUR VOLUMES

Location: Pleasant Hill Road at Old Tunnel Road													Date: Wednesday, May 11, 2011	
7	Pleasant Hill Road SOUTHBOUND			Old Tunnel Road WESTBOUND			Pleasant Hill Road NORTHBOUND			Old Tunnel Road EASTBOUND			PM	
	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt		
Time													Total	
4:45 PM	0	136	26	6	0	3	5	316	0	39	12	7	550	
5:00 PM	0	142	29	8	0	4	6	312	0	40	17	9	567	
5:15 PM	0	155	34	9	0	5	9	321	0	45	20	10	608	
5:30 PM	0	137	32	8	0	5	7	323	0	51	15	9	587	
Total	0	570	121	31	0	17	27	1272	0	175	64	35	2312	

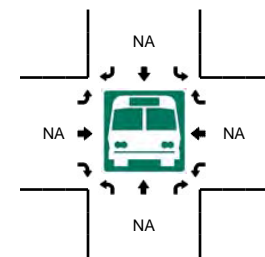
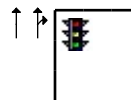
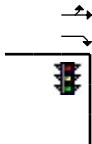
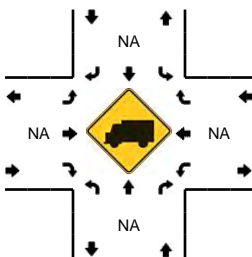
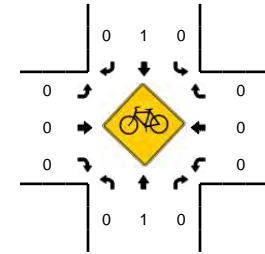
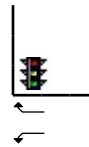
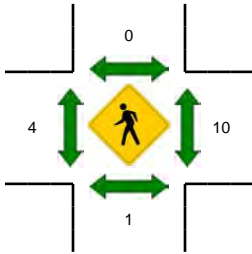
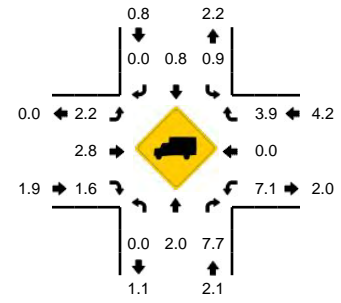


LOCATION: Pleasant Hill Rd -- SR 24 EB Off Ramp/Old Tunnel Rd
CITY/STATE: Lafayette, CA

QC JOB #: 10687116
DATE: Thu, Dec 01 2011



Peak-Hour: 3:00 PM -- 4:00 PM
Peak 15-Min: 3:30 PM -- 3:45 PM



15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				SR 24 EB Off Ramp/Old Tunnel Rd (Eastbound)				SR 24 EB Off Ramp/Old Tunnel Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
2:00 PM	0	175	5	0	16	126	0	0	9	5	57	0	4	0	34	0	431	
2:15 PM	0	163	2	0	14	171	0	2	15	10	53	0	11	0	21	0	462	
2:30 PM	0	192	4	0	19	134	0	4	12	13	55	0	7	0	31	0	471	
2:45 PM	0	212	9	0	26	138	0	3	8	15	51	0	4	0	18	0	484	1848
3:00 PM	0	215	2	0	23	150	0	2	14	8	44	0	5	0	35	0	498	1915
3:15 PM	0	220	4	0	35	167	0	2	11	6	45	0	1	0	42	0	533	1986
3:30 PM	0	254	2	0	16	157	0	5	12	10	54	0	5	0	25	0	540	2055
3:45 PM	0	213	5	0	24	155	0	0	9	12	40	0	3	0	27	0	488	2059

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1016	8	0	64	628	0	20	48	40	216	0	20	0	100	0	2160
Heavy Trucks	0	16	0		0	8	0		0	0	4		0	0	0		28
Pedestrians		0				0				4				16			20
Bicycles	0	0	0		0	1	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Intersection No: 8

Location: Brown Avenue at Deer Hill Road

AM Start Time 7:00 AM

PM Start Time 4:00 PM

Date: Tuesday, May 24, 2011

Collected By: Olga & Charlie

BROWN AVENUE AT DEER HILL ROAD INTERSECTION TURNING MOVEMENT SUMMARY

Location: Brown Avenue at Deer Hill Road													Date: Tuesday, May 24, 2011	
8	Brown Avenue SOUTHBOUND			Deer Hill Road WESTBOUND			Brown Avenue NORTHBOUND			Deer Hill Road EASTBOUND			AM	
	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:30 AM	14	3	9	10	170	47	16	4	24	10	43	7	357	
7:45 AM	14	2	8	9	163	43	19	3	22	11	53	8	355	
8:00 AM	13	2	6	8	159	39	22	2	19	15	55	6	346	
8:15 AM	11	1	5	9	153	43	19	3	20	12	49	5	330	
8:30 AM	10	1	3	7	154	41	11	2	15	9	45	5	303	
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	62	9	31	43	799	213	87	14	100	57	245	31	1691	

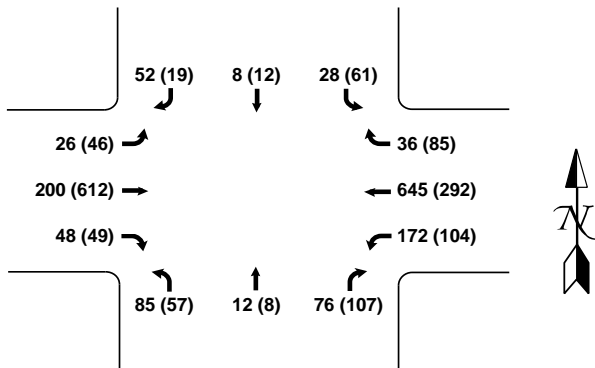
Location: Brown Avenue at Deer Hill Road													Date: Tuesday, May 24, 2011	
8	Brown Avenue SOUTHBOUND			Deer Hill Road WESTBOUND			Brown Avenue NORTHBOUND			Deer Hill Road EASTBOUND			PM	
	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 PM	4	3	14	17	62	22	20	1	9	9	129	10	300	
4:45 PM	4	2	15	18	67	24	23	1	9	8	141	9	321	
5:00 PM	3	3	17	21	75	27	30	2	16	10	149	11	364	
5:15 PM	6	4	13	23	77	27	29	3	17	18	159	13	389	
5:30 PM	6	3	16	23	73	26	25	2	15	13	163	13	378	
5:45 PM	5	3	9	15	69	20	17	3	14	11	144	9	319	
Total	28	18	84	117	423	146	144	12	80	69	885	65	2071	

PEAK HOUR VOLUMES

Location: Brown Avenue at Deer Hill Road													Date: Tuesday, May 24, 2011	
8	Brown Avenue SOUTHBOUND			Deer Hill Road WESTBOUND			Brown Avenue NORTHBOUND			Deer Hill Road EASTBOUND			AM	
	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt		
7:30 AM	14	3	9	10	170	47	16	4	24	10	43	7	357	
7:45 AM	14	2	8	9	163	43	19	3	22	11	53	8	355	
8:00 AM	13	2	6	8	159	39	22	2	19	15	55	6	346	
8:15 AM	11	1	5	9	153	43	19	3	20	12	49	5	330	
Total	52	8	28	36	645	172	76	12	85	48	200	26	1388	

PEAK HOUR VOLUMES

Location: Brown Avenue at Deer Hill Road													Date: Tuesday, May 24, 2011	
8	Brown Avenue SOUTHBOUND			Deer Hill Road WESTBOUND			Brown Avenue NORTHBOUND			Deer Hill Road EASTBOUND			PM	
	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt	Rt	Thru	Lt		
4:45 PM	4	2	15	18	67	24	23	1	9	8	141	9	321	
5:00 PM	3	3	17	21	75	27	30	2	16	10	149	11	364	
5:15 PM	6	4	13	23	77	27	29	3	17	18	159	13	389	
5:30 PM	6	3	16	23	73	26	25	2	15	13	163	13	378	
Total	19	12	61	85	292	104	107	8	57	49	612	46	1452	



All Traffic Data

(916) 771-8700
F (916) 786-2879

LAFAYETTE

File Name : 09-7331-024 SIERRA VISTA-DEER HILL-F
Site Code : 00000000
Start Date : 09/02/2009
Page No : 1

Groups Printed- Unshifted

Start Time	SIERRA VISTA WAY Southbound					DEER HILL RD. Westbound					FIRST ST. Northbound					DEER HILL RD. Eastbound					Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total			
07:00	0	6	3	0	9	15	94	0	0	109	64	2	7	0	73	0	20	132	0	152	0	343	343
07:15	0	4	2	1	6	25	105	0	0	130	56	0	13	0	69	2	30	156	0	188	1	393	394
07:30	1	5	3	1	9	43	111	0	0	154	62	2	13	0	77	1	44	154	1	199	2	439	441
07:45	2	6	3	0	11	33	127	0	0	160	82	2	19	0	103	6	36	193	2	235	2	509	511
Total	3	21	11	2	35	116	437	0	0	553	264	6	52	0	322	9	130	635	3	774	5	1684	1689
08:00	5	5	11	0	21	30	110	0	0	140	69	2	25	0	96	4	68	192	2	264	2	521	523
08:15	1	5	10	1	16	33	107	1	1	141	68	2	21	0	91	4	105	227	0	336	2	584	586
08:30	0	6	3	0	9	41	114	1	0	156	67	4	15	1	86	10	37	240	6	287	7	538	545
08:45	2	5	2	4	9	36	114	1	1	151	57	5	20	0	82	7	30	241	3	278	8	520	528
Total	8	21	26	5	55	140	445	3	2	588	261	13	81	1	355	25	240	900	11	1165	19	2163	2182
*** BREAK ***																							
11:45	0	4	0	0	4	19	52	0	0	71	42	5	17	0	64	7	54	242	0	303	0	442	442
Total	0	4	0	0	4	19	52	0	0	71	42	5	17	0	64	7	54	242	0	303	0	442	442
12:00	0	4	0	0	4	13	46	0	0	59	43	2	23	0	68	3	56	243	0	302	0	433	433
12:15	0	3	2	0	5	13	44	0	0	57	48	1	12	0	61	4	47	249	1	300	1	423	424
12:30	0	3	6	0	9	18	42	2	0	62	44	1	13	0	58	5	50	246	0	301	0	430	430
12:45	1	6	4	0	11	17	36	2	1	55	45	3	13	0	61	4	50	239	0	293	1	420	421
Total	1	16	12	0	29	61	168	4	1	233	180	7	61	0	248	16	203	977	1	1196	2	1706	1708
13:00	1	2	0	0	3	21	30	0	0	51	43	3	21	0	67	5	48	236	0	289	0	410	410
13:15	1	5	2	0	8	12	28	0	0	40	48	0	11	0	59	6	47	235	0	288	0	395	395
13:30	2	3	2	0	7	20	36	1	0	57	56	4	17	0	77	6	48	243	0	297	0	438	438
13:45	0	1	3	0	4	17	39	1	0	57	30	0	21	1	51	9	47	236	0	292	1	404	405
Total	4	11	7	0	22	70	133	2	0	205	177	7	70	1	254	26	190	950	0	1166	1	1647	1648
14:00	1	5	0	0	6	15	46	0	0	61	45	3	24	0	72	4	57	230	1	291	1	430	431
14:15	0	6	10	0	16	25	55	1	0	81	42	3	19	0	64	4	59	239	0	302	0	463	463
14:30	1	1	1	0	3	31	64	3	1	98	46	1	22	0	69	8	67	251	0	326	1	496	497
14:45	1	7	6	0	14	27	61	1	0	89	44	3	15	0	62	9	74	295	2	378	2	543	545
Total	3	19	17	0	39	98	226	5	1	329	177	10	80	0	267	25	257	1015	3	1297	4	1932	1936
15:00	1	12	2	0	15	28	44	2	0	74	52	6	30	0	88	5	80	254	2	339	2	516	518
*** BREAK ***																							
Total	1	12	2	0	15	28	44	2	0	74	52	6	30	0	88	5	80	254	2	339	2	516	518
16:00	0	8	0	0	8	14	45	0	0	59	45	1	28	0	74	5	74	284	2	363	2	504	506
16:15	0	1	1	1	2	18	44	0	0	62	38	2	34	1	74	7	73	280	0	360	2	498	500
16:30	0	3	4	0	7	15	46	0	0	61	38	9	24	0	71	7	93	295	0	395	0	534	534
16:45	1	4	4	0	9	21	50	3	0	74	45	1	28	0	74	12	115	300	0	427	0	584	584
Total	1	16	9	1	26	68	185	3	0	256	166	13	114	1	293	31	355	1159	2	1545	4	2120	2124

All Traffic Data

(916) 771-8700
F (916) 786-2879

LAFAYETTE

File Name : 09-7331-024 SIERRA VISTA-DEER HILL-F
Site Code : 00000000
Start Date : 09/02/2009
Page No : 2

Groups Printed- Unshifted

Start Time	SIERRA VISTA WAY Southbound					DEER HILL RD. Westbound					FIRST ST. Northbound					DEER HILL RD. Eastbound					Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total			
17:00	2	8	4	0	14	23	63	0	0	86	44	3	28	0	75	4	125	309	0	438	0	613	613
17:15	0	1	0	0	1	27	56	0	0	83	37	2	23	0	62	8	126	304	0	438	0	584	584
17:30	1	8	2	1	11	16	52	0	1	68	48	4	28	0	80	4	162	342	0	508	2	667	669
17:45	2	7	3	1	12	18	63	2	0	83	37	5	37	0	79	5	147	341	0	493	1	667	668
Total	5	24	9	2	38	84	234	2	1	320	166	14	116	0	296	21	560	1296	0	1877	3	2531	2534
Grand Total	26	144	93	10	263	684	1924	21	5	2629	1485	81	621	3	2187	165	2069	7428	22	9662	40	14741	14781
Apprch %	9.9	54.8	35.4			26	73.2	0.8			67.9	3.7	28.4			1.7	21.4	76.9					
Total %	0.2	1	0.6		1.8	4.6	13.1	0.1		17.8	10.1	0.5	4.2		14.8	1.1	14	50.4		65.5	0.3	99.7	

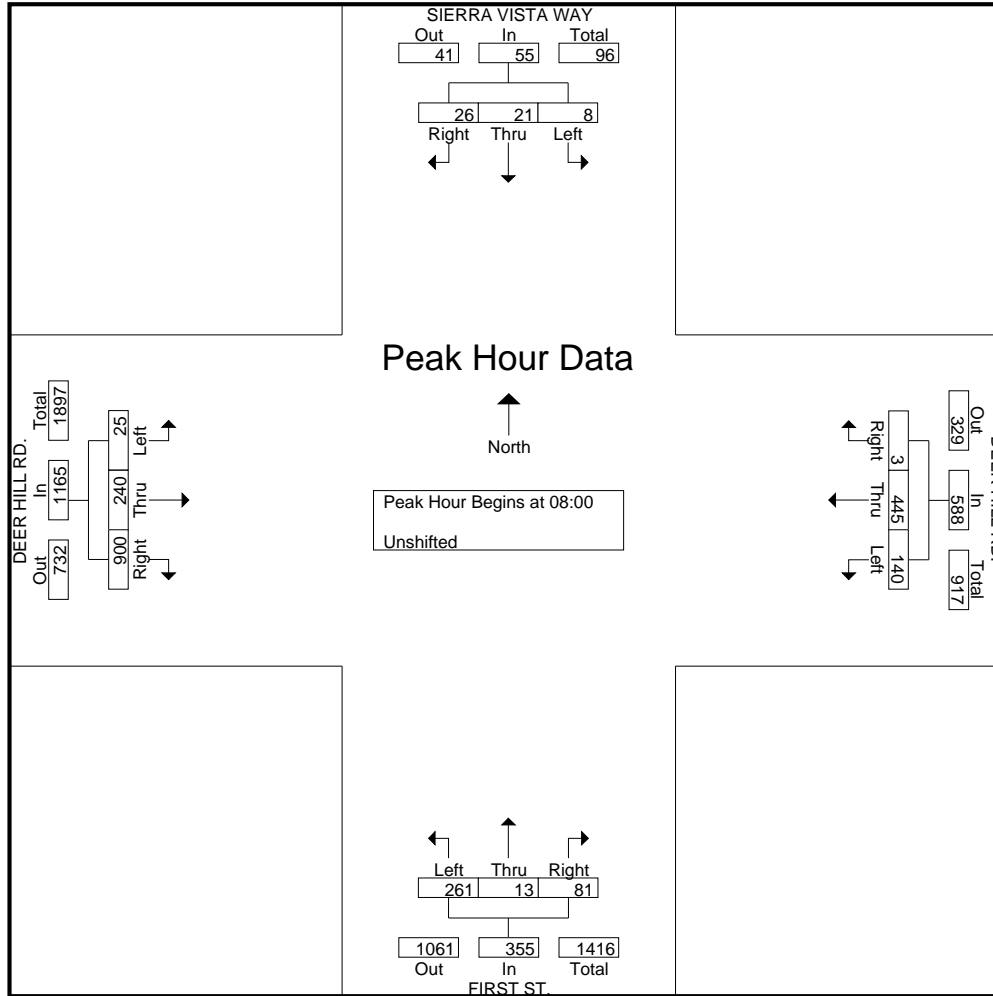
Start Time	SIERRA VISTA WAY Southbound				DEER HILL RD. Westbound				FIRST ST. Northbound				DEER HILL RD. Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	5	5	11	21	30	110	0	140	69	2	25	96	4	68	192	264	521
08:15	1	5	10	16	33	107	1	141	68	2	21	91	4	105	227	336	584
08:30	0	6	3	9	41	114	1	156	67	4	15	86	10	37	240	287	538
08:45	2	5	2	9	36	114	1	151	57	5	20	82	7	30	241	278	520
Total Volume	8	21	26	55	140	445	3	588	261	13	81	355	25	240	900	1165	2163
% App. Total	14.5	38.2	47.3		23.8	75.7	0.5		73.5	3.7	22.8		2.1	20.6	77.3		
PHF	.400	.875	.591	.655	.854	.976	.750	.942	.946	.650	.810	.924	.625	.571	.934	.867	.926

All Traffic Data

(916) 771-8700
F (916) 786-2879

LAFAYETTE

File Name : 09-7331-024 SIERRA VISTA-DEER HILL-F
Site Code : 00000000
Start Date : 09/02/2009
Page No : 3



Peak Hour Analysis From 11:15 to 15:00 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 14:15

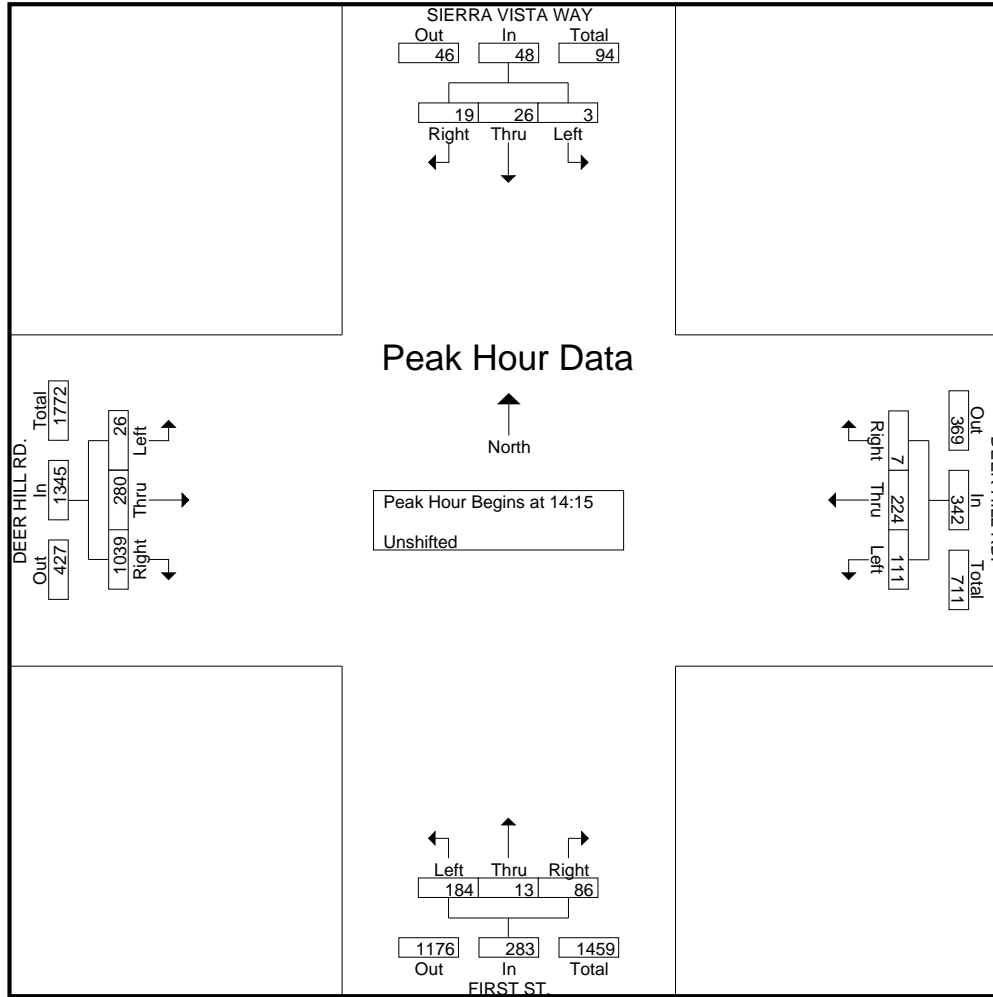
14:15	0	6	10	16	25	55	1	81	42	3	19	64	4	59	239	302	463
14:30	1	1	1	3	31	64	3	98	46	1	22	69	8	67	251	326	496
14:45	1	7	6	14	27	61	1	89	44	3	15	62	9	74	295	378	543
15:00	1	12	2	15	28	44	2	74	52	6	30	88	5	80	254	339	516
Total Volume	3	26	19	48	111	224	7	342	184	13	86	283	26	280	1039	1345	2018
% App. Total	6.2	54.2	39.6		32.5	65.5	2		65	4.6	30.4		1.9	20.8	77.2		
PHF	.750	.542	.475	.750	.895	.875	.583	.872	.885	.542	.717	.804	.722	.875	.881	.890	.929

All Traffic Data

(916) 771-8700
F (916) 786-2879

LAFAYETTE

File Name : 09-7331-024 SIERRA VISTA-DEER HILL-F
Site Code : 00000000
Start Date : 09/02/2009
Page No : 4



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

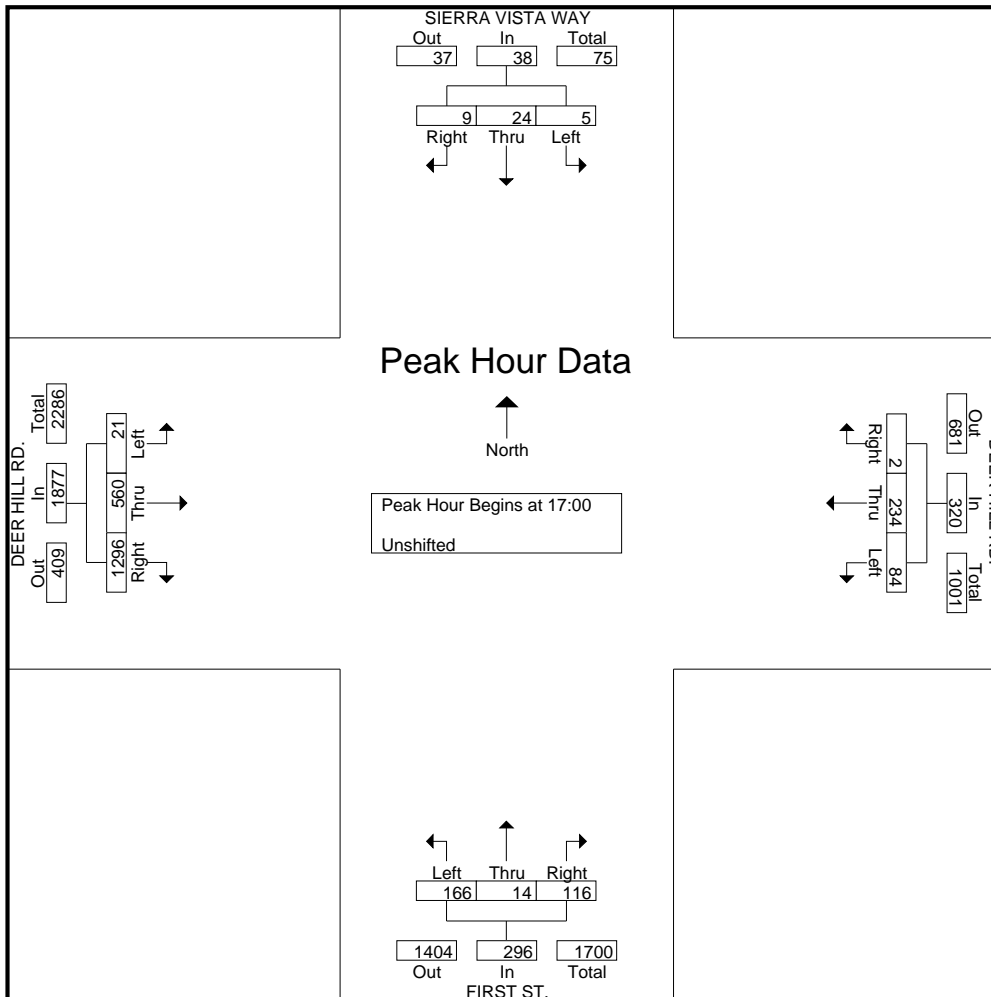
17:00	2	8	4	14	23	63	0	86	44	3	28	75	4	125	309	438	613
17:15	0	1	0	1	27	56	0	83	37	2	23	62	8	126	304	438	584
17:30	1	8	2	11	16	52	0	68	48	4	28	80	4	162	342	508	667
17:45	2	7	3	12	18	63	2	83	37	5	37	79	5	147	341	493	667
Total Volume	5	24	9	38	84	234	2	320	166	14	116	296	21	560	1296	1877	2531
% App. Total	13.2	63.2	23.7		26.2	73.1	0.6		56.1	4.7	39.2		1.1	29.8	69		
PHF	.625	.750	.563	.679	.778	.929	.250	.930	.865	.700	.784	.925	.656	.864	.947	.924	.949

All Traffic Data

(916) 771-8700
F (916) 786-2879

LAFAYETTE

File Name : 09-7331-024 SIERRA VISTA-DEER HILL-F
Site Code : 00000000
Start Date : 09/02/2009
Page No : 5



All Traffic Data

(916) 771-8700
F (916) 786-2879

LAFAYETTE

File Name : 09-7331-023 LAUREL-DEER HILL RD-F
Site Code : 00000000
Start Date : 09/02/2009
Page No : 1

Groups Printed- Unshifted

Start Time	LAUREL DR. Southbound					DEER HILL RD. Westbound					WB CA 24 RAMPS Northbound					DEER HILL RD. Eastbound					Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total			
07:00	2	2	3	0	7	59	101	1	0	161	140	1	110	0	251	3	40	71	0	114	0	533	533
07:15	1	0	2	0	3	61	105	0	0	166	132	0	104	0	236	1	76	80	0	157	0	562	562
07:30	8	1	1	1	10	69	109	2	0	180	165	0	105	1	270	3	90	74	0	167	2	627	629
07:45	4	1	0	0	5	85	132	1	0	218	201	1	121	1	323	0	108	95	0	203	1	749	750
Total	15	4	6	1	25	274	447	4	0	725	638	2	440	2	1080	7	314	320	0	641	3	2471	2474
08:00	4	1	7	0	12	69	116	2	0	187	232	1	127	0	360	0	125	69	0	194	0	753	753
08:15	5	3	1	0	9	66	113	0	0	179	211	1	128	1	340	0	144	58	0	202	1	730	731
08:30	5	1	1	0	7	68	119	0	0	187	178	5	161	0	344	1	163	62	0	226	0	764	764
08:45	4	3	4	0	11	69	101	1	0	171	172	2	168	1	342	5	109	76	0	190	1	714	715
Total	18	8	13	0	39	272	449	3	0	724	793	9	584	2	1386	6	541	265	0	812	2	2961	2963
*** BREAK ***																							
11:45	2	0	3	0	5	37	60	2	0	99	115	3	183	0	301	1	125	63	0	189	0	594	594
Total	2	0	3	0	5	37	60	2	0	99	115	3	183	0	301	1	125	63	0	189	0	594	594
12:00	7	0	0	0	7	37	46	1	0	84	101	0	182	0	283	3	129	60	0	192	0	566	566
12:15	4	1	0	0	5	45	46	1	0	92	107	6	166	0	279	0	135	48	0	183	0	559	559
12:30	2	0	1	0	3	37	48	3	0	88	101	0	162	0	263	2	136	62	0	200	0	554	554
12:45	4	0	1	0	5	37	39	0	0	76	125	1	160	0	286	3	139	58	1	200	1	567	568
Total	17	1	2	0	20	156	179	5	0	340	434	7	670	0	1111	8	539	228	1	775	1	2246	2247
13:00	2	3	2	0	7	35	36	4	0	75	126	4	162	0	292	3	126	58	1	187	1	561	562
13:15	2	1	4	0	7	40	38	1	0	79	109	1	167	0	277	2	126	64	0	192	0	555	555
13:30	1	0	2	0	3	49	46	0	0	95	104	2	175	0	281	1	114	60	0	175	0	554	554
13:45	4	3	1	0	8	30	41	1	0	72	98	3	160	1	261	1	130	43	1	174	2	515	517
Total	9	7	9	0	25	154	161	6	0	321	437	10	664	1	1111	7	496	225	2	728	3	2185	2188
14:00	3	0	3	0	6	46	46	0	0	92	107	3	162	0	272	1	134	63	0	198	0	568	568
14:15	3	3	2	0	8	43	55	5	0	103	106	2	172	0	280	0	128	59	1	187	1	578	579
14:30	7	1	0	0	8	45	65	1	0	111	108	0	173	1	281	5	151	63	1	219	2	619	621
14:45	2	3	3	0	8	48	55	1	0	104	127	4	207	1	338	1	172	53	0	226	1	676	677
Total	15	7	8	0	30	182	221	7	0	410	448	9	714	2	1171	7	585	238	2	830	4	2441	2445
15:00	7	1	1	0	9	40	56	2	0	98	122	2	173	0	297	2	175	63	0	240	0	644	644
*** BREAK ***																							
Total	7	1	1	0	9	40	56	2	0	98	122	2	173	0	297	2	175	63	0	240	0	644	644
16:00	5	1	0	1	6	45	43	2	0	90	117	1	173	0	291	1	187	64	0	252	1	639	640
16:15	5	1	0	0	6	33	48	4	0	85	127	3	192	1	322	0	168	67	0	235	1	648	649
16:30	3	2	2	0	7	36	48	2	0	86	121	1	197	0	319	5	196	71	0	272	0	684	684
16:45	3	0	1	0	4	54	41	0	0	95	138	2	218	0	358	4	204	64	0	272	0	729	729
Total	16	4	3	1	23	168	180	8	0	356	503	7	780	1	1290	10	755	266	0	1031	2	2700	2702

All Traffic Data

(916) 771-8700
F (916) 786-2879

LAFAYETTE

File Name : 09-7331-023 LAUREL-DEER HILL RD-F
Site Code : 00000000
Start Date : 09/02/2009
Page No : 2

Groups Printed- Unshifted

Start Time	LAUREL DR. Southbound					DEER HILL RD. Westbound					WB CA 24 RAMPS Northbound					DEER HILL RD. Eastbound					Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total			
17:00	4	0	1	0	5	52	57	0	0	109	117	2	199	0	318	3	240	62	0	305	0	737	737
17:15	6	0	1	0	7	37	55	1	0	93	155	2	197	0	354	8	253	68	0	329	0	783	783
17:30	8	1	2	1	11	51	49	0	0	100	115	2	193	0	310	0	317	64	0	381	1	802	803
17:45	1	0	5	1	6	36	63	2	0	101	123	0	194	0	317	6	299	54	0	359	1	783	784
Total	19	1	9	2	29	176	224	3	0	403	510	6	783	0	1299	17	1109	248	0	1374	2	3105	3107
Grand Total	118	33	54	4	205	1459	1977	40	0	3476	4000	55	4991	8	9046	65	4639	1916	5	6620	17	19347	19364
Apprch %	57.6	16.1	26.3			42	56.9	1.2			44.2	0.6	55.2			1	70.1	28.9					
Total %	0.6	0.2	0.3		1.1	7.5	10.2	0.2		18	20.7	0.3	25.8		46.8	0.3	24	9.9		34.2	0.1	99.9	

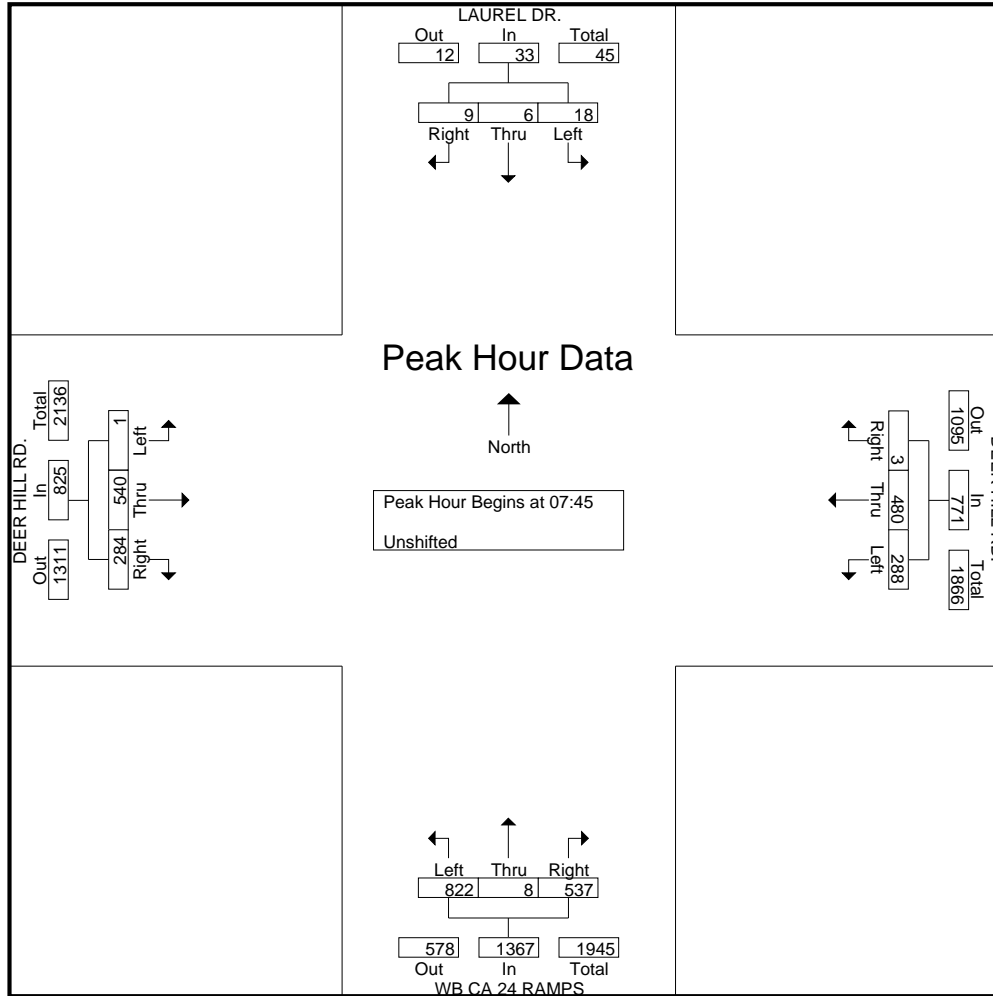
Start Time	LAUREL DR. Southbound				App. Total	DEER HILL RD. Westbound				App. Total	WB CA 24 RAMPS Northbound				App. Total	DEER HILL RD. Eastbound				Int. Total	
	Left	Thru	Right	Peds		Left	Thru	Right	Peds		Left	Thru	Right	Peds		Left	Thru	Right	Peds		
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45																					
07:45	4	1	0	5	85	132	1	218	201	1	121	323	0	108	95	203	749				
08:00	4	1	7	12	69	116	2	187	232	1	127	360	0	125	69	194	753				
08:15	5	3	1	9	66	113	0	179	211	1	128	340	0	144	58	202	730				
08:30	5	1	1	7	68	119	0	187	178	5	161	344	1	163	62	226	764				
Total Volume	18	6	9	33	288	480	3	771	822	8	537	1367	1	540	284	825	2996				
% App. Total	54.5	18.2	27.3		37.4	62.3	0.4		60.1	0.6	39.3		0.1	65.5	34.4						
PHF	.900	.500	.321	.688	.847	.909	.375	.884	.886	.400	.834	.949	.250	.828	.747	.913	.980				

All Traffic Data

(916) 771-8700
F (916) 786-2879

LAFAYETTE

File Name : 09-7331-023 LAUREL-DEER HILL RD-F
Site Code : 00000000
Start Date : 09/02/2009
Page No : 3



Peak Hour Analysis From 11:45 to 15:00 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 14:15

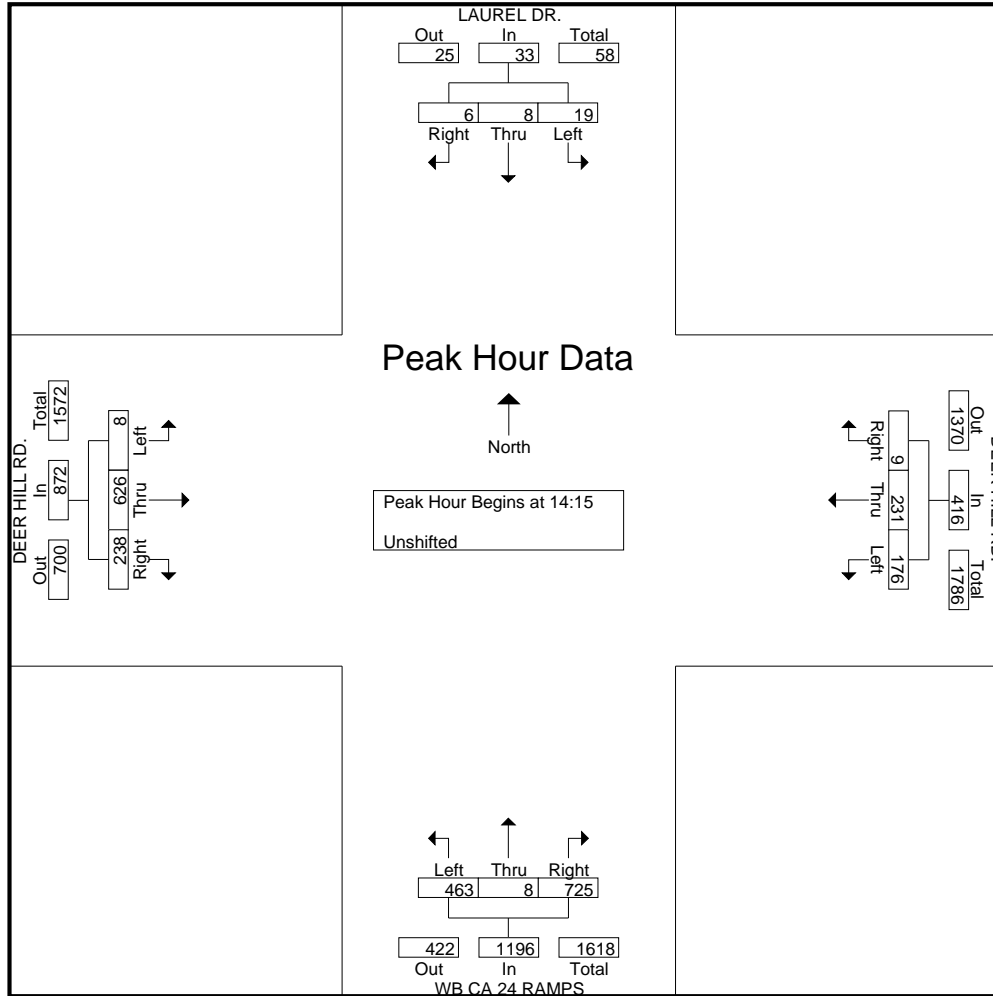
14:15	3	3	2	8	43	55	5	103	106	2	172	280	0	128	59	187	578
14:30	7	1	0	8	45	65	1	111	108	0	173	281	5	151	63	219	619
14:45	2	3	3	8	48	55	1	104	127	4	207	338	1	172	53	226	676
15:00	7	1	1	9	40	56	2	98	122	2	173	297	2	175	63	240	644
Total Volume	19	8	6	33	176	231	9	416	463	8	725	1196	8	626	238	872	2517
% App. Total	57.6	24.2	18.2	42.3	55.5	2.2	38.7	0.7	60.6	0.9	71.8	27.3	0.9	71.8	27.3		
PHF	.679	.667	.500	.917	.917	.888	.450	.937	.911	.500	.876	.885	.400	.894	.944	.908	.931

All Traffic Data

(916) 771-8700
F (916) 786-2879

LAFAYETTE

File Name : 09-7331-023 LAUREL-DEER HILL RD-F
Site Code : 00000000
Start Date : 09/02/2009
Page No : 4



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

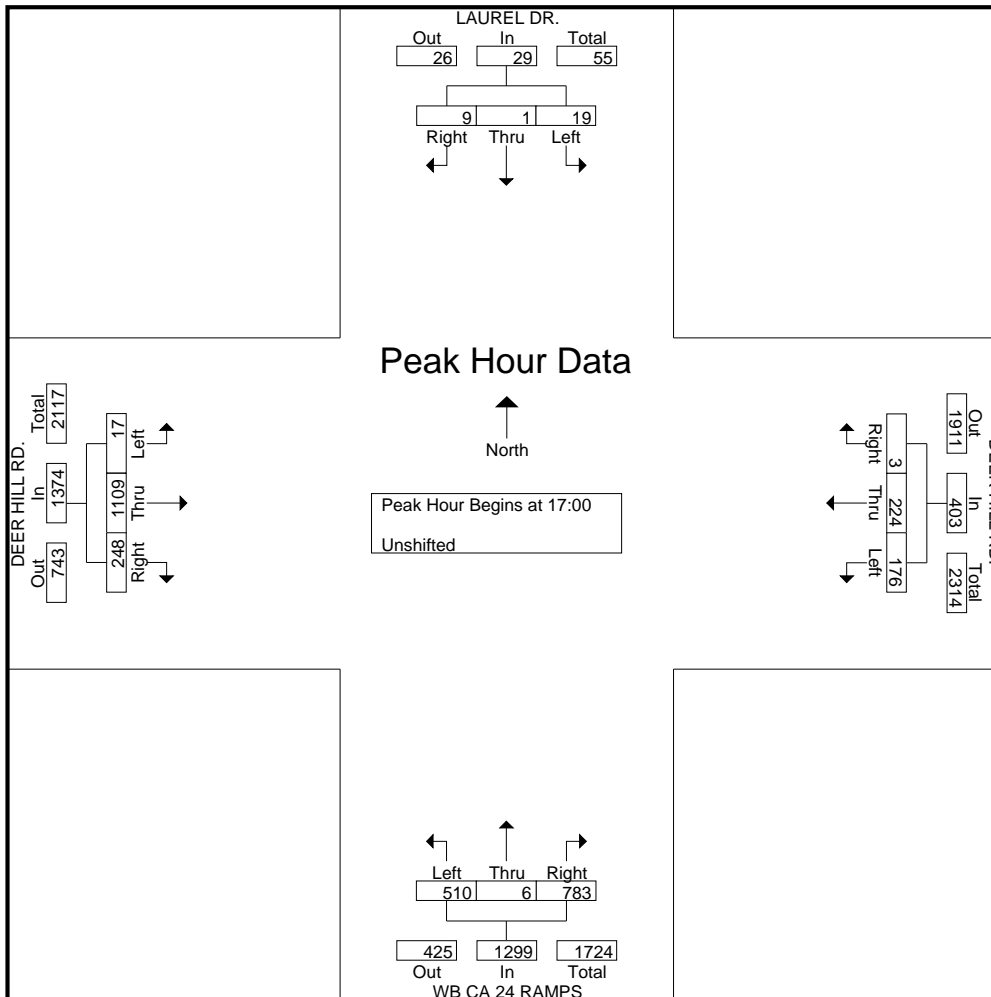
17:00	4	0	1	5	52	57	0	109	117	2	199	318	3	240	62	305	737
17:15	6	0	1	7	37	55	1	93	155	2	197	354	8	253	68	329	783
17:30	8	1	2	11	51	49	0	100	115	2	193	310	0	317	64	381	802
17:45	1	0	5	6	36	63	2	101	123	0	194	317	6	299	54	359	783
Total Volume	19	1	9	29	176	224	3	403	510	6	783	1299	17	1109	248	1374	3105
% App. Total	65.5	3.4	31		43.7	55.6	0.7		39.3	0.5	60.3		1.2	80.7	18		
PHF	.594	.250	.450	.659	.846	.889	.375	.924	.823	.750	.984	.917	.531	.875	.912	.902	.968

All Traffic Data

(916) 771-8700
F (916) 786-2879

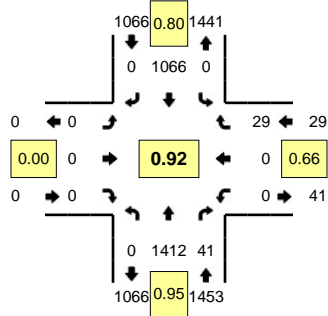
LAFAYETTE

File Name : 09-7331-023 LAUREL-DEER HILL RD-F
Site Code : 00000000
Start Date : 09/02/2009
Page No : 5

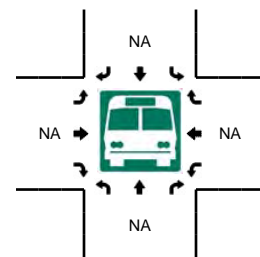
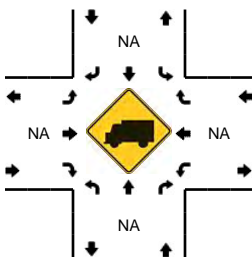
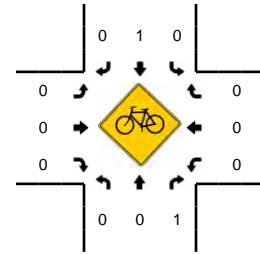
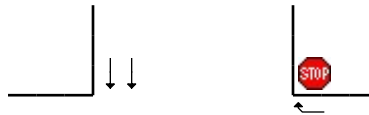
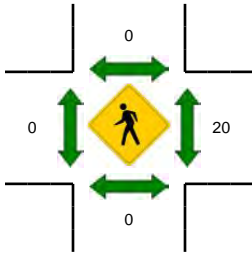
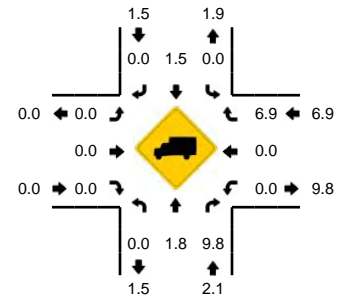


LOCATION: Pleasant Hill Rd -- Acalanes Ave
CITY/STATE: Lafayette, CA

QC JOB #: 10687109
DATE: Thu, Dec 01 2011



Peak-Hour: 3:00 PM -- 4:00 PM
Peak 15-Min: 3:15 PM -- 3:30 PM



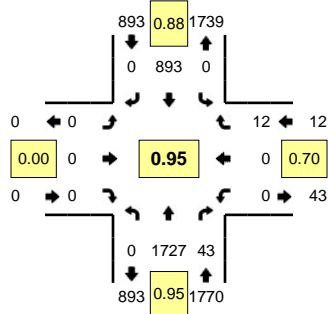
15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				Acalanes Ave (Eastbound)				Acalanes Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
2:00 PM	0	215	10	0	0	197	0	0	0	0	0	0	0	0	4	0	426	
2:15 PM	0	266	11	0	0	271	0	0	0	0	0	0	0	0	10	0	558	
2:30 PM	0	250	4	0	0	206	0	0	0	0	0	0	0	0	4	0	464	
2:45 PM	0	271	11	0	0	227	0	0	0	0	0	0	0	0	5	0	514	1962
3:00 PM	0	329	13	0	0	258	0	0	0	0	0	0	0	0	5	0	605	2141
3:15 PM	0	344	10	0	0	336	0	0	0	0	0	0	0	0	6	0	696	2279
3:30 PM	0	362	12	0	0	248	0	0	0	0	0	0	0	0	11	0	633	2448
3:45 PM	0	377	6	0	0	224	0	0	0	0	0	0	0	0	7	0	614	2548

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1376	40	0	0	1344	0	0	0	0	0	0	0	0	24	0	2784
Heavy Trucks	0	24	4	0	0	36	0	0	0	0	0	0	0	0	0	0	64
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	40
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

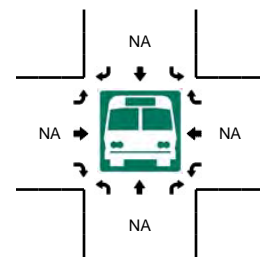
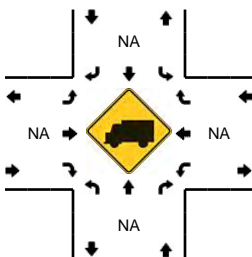
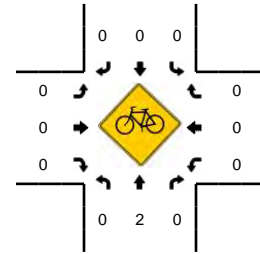
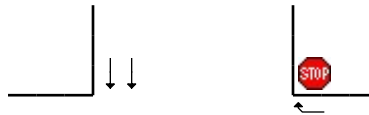
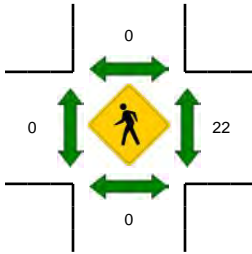
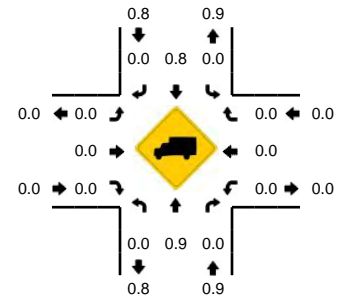
Comments:

LOCATION: Pleasant Hill Rd -- Acalanes Ave
CITY/STATE: Lafayette, CA

QC JOB #: 10687108
DATE: Thu, Dec 01 2011



Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:15 PM -- 5:30 PM



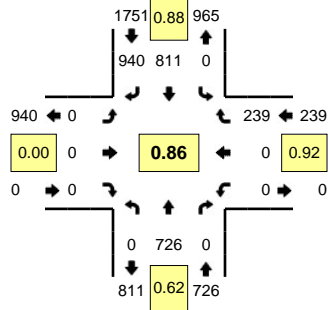
15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				Acalanes Ave (Eastbound)				Acalanes Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	430	6	0	0	202	0	0	0	0	0	0	0	0	2	0	640	
4:15 PM	0	399	8	0	0	190	0	0	0	0	0	0	0	0	3	0	600	
4:30 PM	0	455	10	0	0	210	0	0	0	0	0	0	0	0	5	0	680	
4:45 PM	0	436	9	0	0	204	0	0	0	0	0	0	0	0	3	0	652	2572
5:00 PM	0	409	10	0	0	219	0	0	0	0	0	0	0	0	3	0	641	2573
5:15 PM	0	427	14	0	0	260	0	0	0	0	0	0	0	0	1	0	702	2675
5:30 PM	0	416	9	0	0	231	0	0	0	0	0	0	0	0	5	0	661	2656
5:45 PM	0	396	13	0	0	206	0	0	0	0	0	0	0	0	3	0	618	2622

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	1708	56	0	0	1040	0	0	0	0	0	0	0	0	4	0	2808	
Heavy Trucks	0	8	0	0	0	12	0	0	0	0	0	0	0	0	0	0	20	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	12	
Bicycles	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Railroad																		
Stopped Buses																		

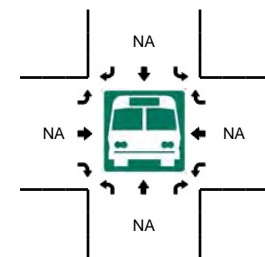
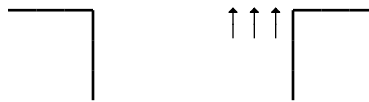
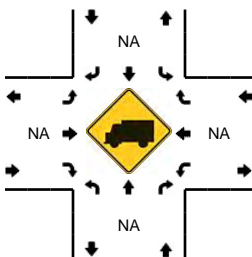
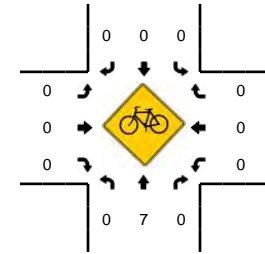
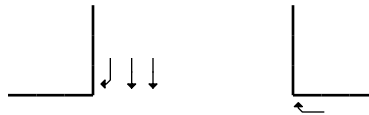
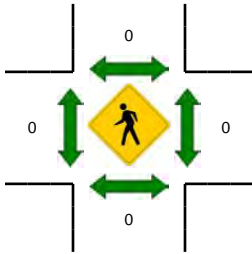
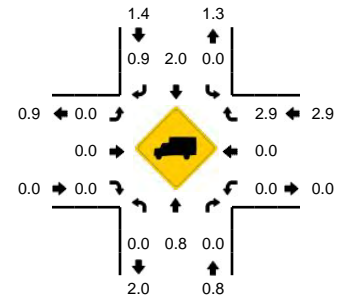
Comments:

LOCATION: Pleasant Hill Rd -- SR 24 WB Off (to NB)/WB On (from SB)
CITY/STATE: Lafayette, CA

QC JOB #: 10687104
DATE: Thu, Dec 01 2011



Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

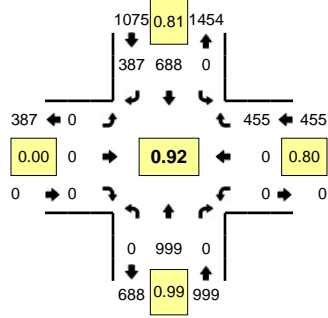


15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				SR 24 WB Off (to NB)/WB On (from SB) (Eastbound)				SR 24 WB Off (to NB)/WB On (from SB) (Westbound)				Hourly Totals	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		Total
7:00 AM	0	53	0	0	0	133	255	0	0	0	0	0	0	0	26	0	467	
7:15 AM	0	84	0	0	0	190	309	0	0	0	0	0	0	0	37	0	620	
7:30 AM	0	191	0	0	0	191	230	0	0	0	0	0	0	0	67	0	679	
7:45 AM	0	310	0	0	0	230	176	0	0	0	0	0	0	0	71	0	787	2553
8:00 AM	0	141	0	0	0	200	225	0	0	0	0	0	0	0	64	0	630	2716
8:15 AM	0	121	0	0	0	201	236	0	0	0	0	0	0	0	60	0	618	2714
8:30 AM	0	95	0	0	0	166	202	0	0	0	0	0	0	0	48	0	511	2546
8:45 AM	0	130	0	0	0	199	174	0	0	0	0	0	0	0	67	0	570	2329
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
All Vehicles	0	1240	0	0	0	920	704	0	0	0	0	0	0	0	284	0	3148	
Heavy Trucks	0	0	0	0	0	24	4	0	0	0	0	0	0	0	8	0	36	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
Railroad																		
Stopped Buses																		

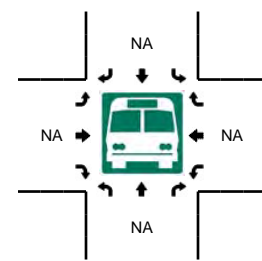
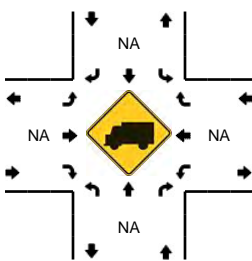
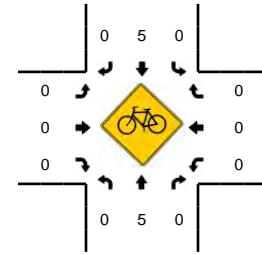
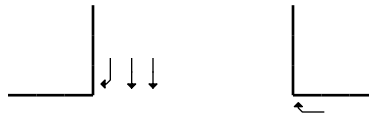
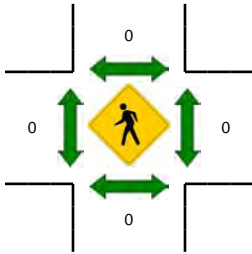
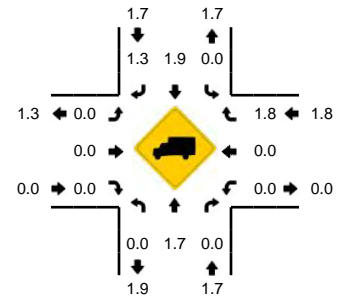
Comments:

LOCATION: Pleasant Hill Rd -- SR 24 WB Off (to NB)/WB On (from SB)
CITY/STATE: Lafayette, CA

QC JOB #: 10687106
DATE: Thu, Dec 01 2011



Peak-Hour: 3:00 PM -- 4:00 PM
Peak 15-Min: 3:15 PM -- 3:30 PM



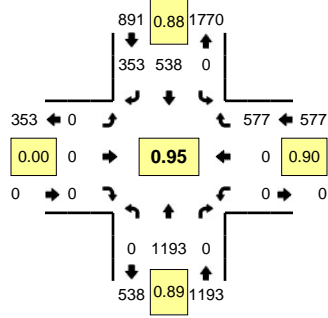
15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				SR 24 WB Off (to NB)/WB On (from SB) (Eastbound)				SR 24 WB Off (to NB)/WB On (from SB) (Westbound)				Hourly Totals	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		Total
2:00 PM	0	140	0	0	0	130	67	0	0	0	0	0	0	0	90	0	427	
2:15 PM	0	173	0	0	0	181	91	0	0	0	0	0	0	0	105	0	550	
2:30 PM	0	172	0	0	0	134	72	0	0	0	0	0	0	0	83	0	461	
2:45 PM	0	187	0	0	0	159	69	0	0	0	0	0	0	0	93	0	508	1946
3:00 PM	0	252	0	0	0	166	99	0	0	0	0	0	0	0	94	0	611	2130
3:15 PM	0	250	0	0	0	208	126	0	0	0	0	0	0	0	105	0	689	2269
3:30 PM	0	250	0	0	0	164	85	0	0	0	0	0	0	0	114	0	613	2421
3:45 PM	0	247	0	0	0	150	77	0	0	0	0	0	0	0	142	0	616	2529

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1000	0	0	0	832	504	0	0	0	0	0	0	0	420	0	2756
Heavy Trucks	0	20	0	0	0	32	8	0	0	0	0	0	0	0	12	0	72
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Railroad																	
Stopped Buses																	

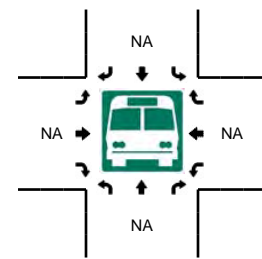
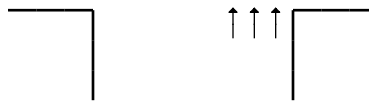
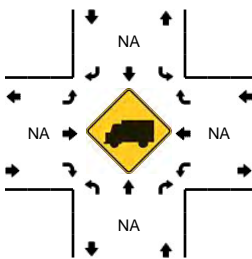
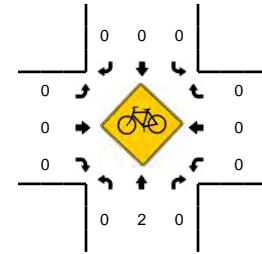
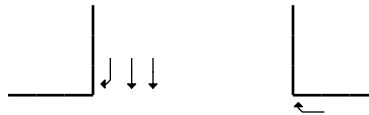
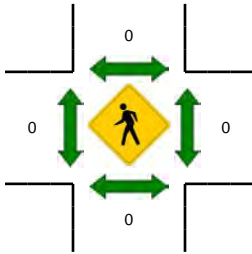
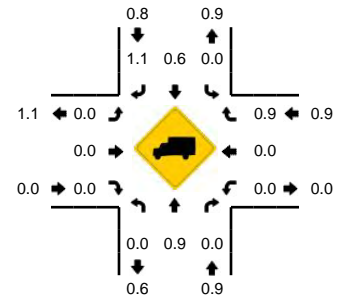
Comments:

LOCATION: Pleasant Hill Rd -- SR 24 WB Off (to NB)/WB On (from SB)
CITY/STATE: Lafayette, CA

QC JOB #: 10687105
DATE: Thu, Dec 01 2011



Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

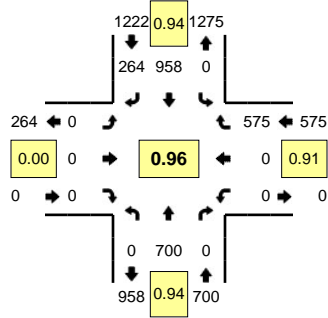


15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				SR 24 WB Off (to NB)/WB On (from SB) (Eastbound)				SR 24 WB Off (to NB)/WB On (from SB) (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	294	0	0	0	133	73	0	0	0	0	0	0	0	142	0	642	
4:15 PM	0	284	0	0	0	116	76	0	0	0	0	0	0	0	123	0	599	
4:30 PM	0	301	0	0	0	132	81	0	0	0	0	0	0	0	164	0	678	
4:45 PM	0	281	0	0	0	126	80	0	0	0	0	0	0	0	164	0	651	2570
5:00 PM	0	277	0	0	0	131	82	0	0	0	0	0	0	0	142	0	632	2560
5:15 PM	0	334	0	0	0	149	110	0	0	0	0	0	0	0	107	0	700	2661
5:30 PM	0	277	0	0	0	131	100	0	0	0	0	0	0	0	148	0	656	2639
5:45 PM	0	268	0	0	0	111	87	0	0	0	0	0	0	0	141	0	607	2595
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	1336	0	0	0	596	440	0	0	0	0	0	0	0	428	0	2800	
Heavy Trucks	0	4	0	0	0	8	4	0	0	0	0	0	0	0	4	0	20	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Railroad																		
Stopped Buses																		

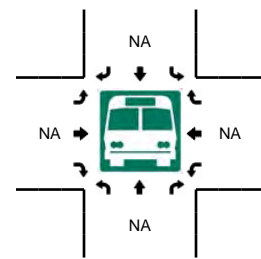
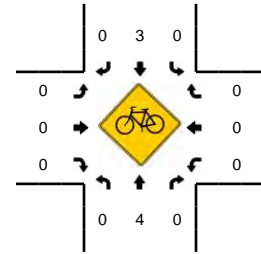
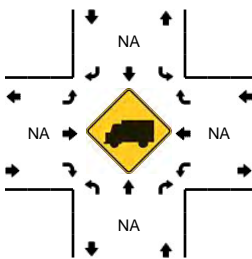
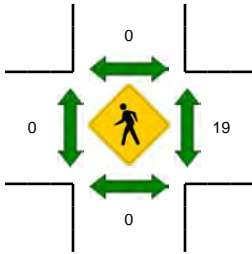
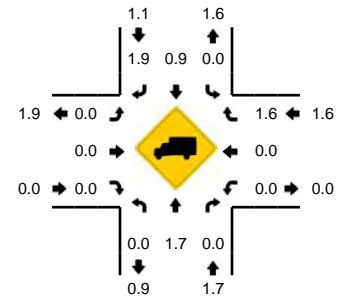
Comments:

LOCATION: Pleasant Hill Rd -- SR 24 EB Loop Ramps
CITY/STATE: Lafayette, CA

QC JOB #: 10687103
DATE: Thu, Dec 01 2011



Peak-Hour: 3:00 PM -- 4:00 PM
Peak 15-Min: 3:15 PM -- 3:30 PM



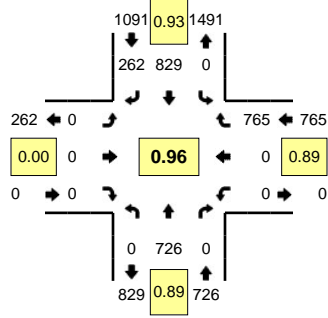
15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				SR 24 EB Loop Ramps (Eastbound)				SR 24 EB Loop Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
2:00 PM	0	137	0	0	0	193	61	0	0	0	0	0	0	0	65	0	456	
2:15 PM	0	132	0	0	0	256	61	0	0	0	0	0	0	0	98	0	547	
2:30 PM	0	125	0	0	0	190	66	0	0	0	0	0	0	0	94	0	475	
2:45 PM	0	154	0	0	0	231	73	0	0	0	0	0	0	0	107	0	565	2043
3:00 PM	0	179	0	0	0	239	53	0	0	0	0	0	0	0	130	0	601	2188
3:15 PM	0	186	0	0	0	248	79	0	0	0	0	0	0	0	140	0	653	2294
3:30 PM	0	189	0	0	0	235	65	0	0	0	0	0	0	0	147	0	636	2455
3:45 PM	0	146	0	0	0	236	67	0	0	0	0	0	0	0	158	0	607	2497

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	744	0	0	0	992	316	0	0	0	0	0	0	0	560	0	2612
Heavy Trucks	0	16	0	0	0	24	8	0	0	0	0	0	0	0	16	0	64
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	52	0	0	0	52
Bicycles	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

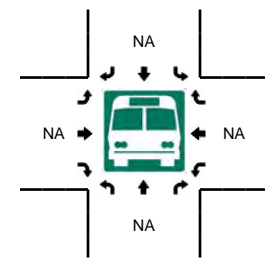
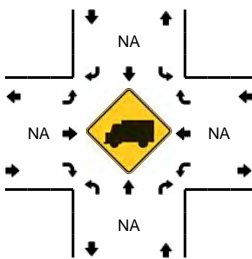
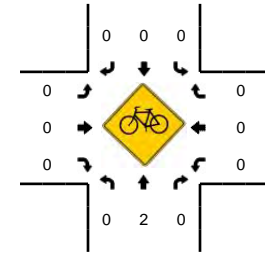
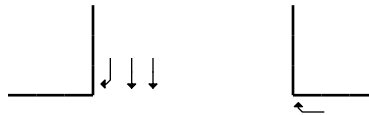
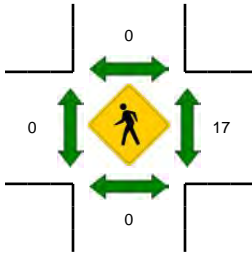
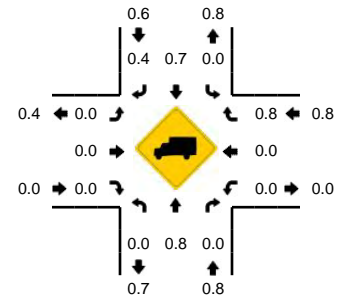
Comments:

LOCATION: Pleasant Hill Rd -- SR 24 EB Loop Ramps
CITY/STATE: Lafayette, CA

QC JOB #: 10687102
DATE: Thu, Dec 01 2011



Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

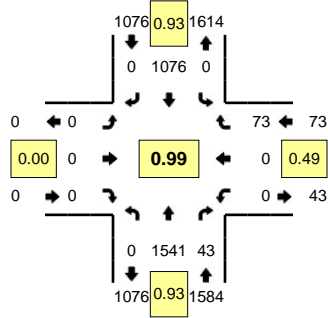


15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				SR 24 EB Loop Ramps (Eastbound)				SR 24 EB Loop Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	197	0	0	0	171	57	0	0	0	0	0	0	0	174	0	599	
4:15 PM	0	180	0	0	0	210	56	0	0	0	0	0	0	0	174	0	620	
4:30 PM	0	178	0	0	0	208	52	0	0	0	0	0	0	0	195	0	633	2467
4:45 PM	0	158	0	0	0	210	63	0	0	0	0	0	0	0	184	0	615	
5:00 PM	0	185	0	0	0	188	71	0	0	0	0	0	0	0	215	0	659	2527
5:15 PM	0	205	0	0	0	223	76	0	0	0	0	0	0	0	171	0	675	2582
5:30 PM	0	157	0	0	0	225	61	0	0	0	0	0	0	0	172	0	615	2564
5:45 PM	0	148	0	0	0	204	52	0	0	0	0	0	0	0	142	0	546	2495
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
All Vehicles	0	820	0	0	0	892	304	0	0	0	0	0	0	0	684	0	2700	
Heavy Trucks	0	4	0	0	0	12	0	0	0	0	0	0	0	0	8	0	24	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	12	
Bicycles	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

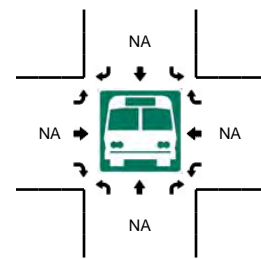
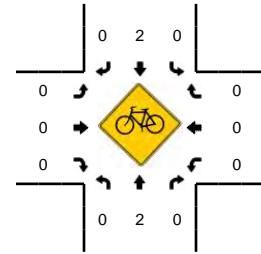
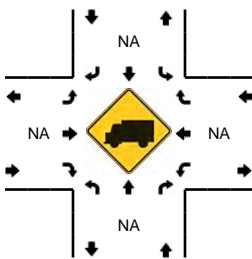
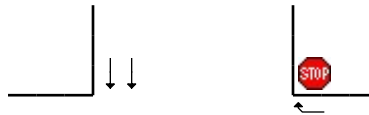
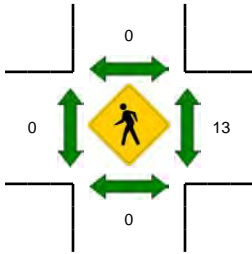
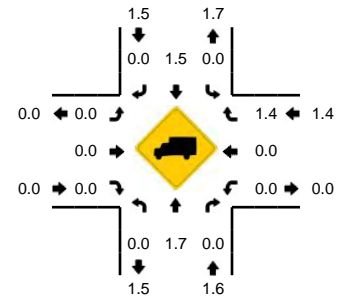
Comments:

LOCATION: Pleasant Hill Rd -- Acalanes High School Dwy
CITY/STATE: Lafayette, CA

QC JOB #: 10687115
DATE: Thu, Dec 01 2011



Peak-Hour: 3:00 PM -- 4:00 PM
Peak 15-Min: 3:15 PM -- 3:30 PM



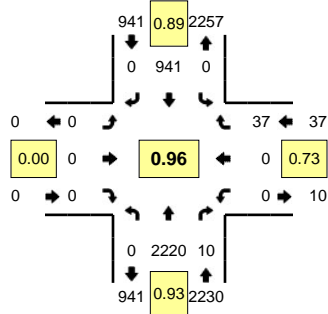
15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				Acalanes High School Dwy (Eastbound)				Acalanes High School Dwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
2:00 PM	0	225	8	0	0	204	0	0	0	0	0	0	0	0	7	0	444	
2:15 PM	0	326	7	0	0	239	0	0	0	0	0	0	0	0	42	0	614	
2:30 PM	0	303	4	0	0	273	0	0	0	0	0	0	0	0	4	0	584	
2:45 PM	0	299	11	0	0	309	0	0	0	0	0	0	0	0	4	0	623	2265
3:00 PM	0	348	20	0	0	282	0	0	0	0	0	0	0	0	32	0	682	2503
3:15 PM	0	362	12	0	0	290	0	0	0	0	0	0	0	0	26	0	690	2579
3:30 PM	0	411	5	0	0	245	0	0	0	0	0	0	0	0	11	0	672	2667
3:45 PM	0	420	6	0	0	259	0	0	0	0	0	0	0	0	4	0	689	2733

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1448	48	0	0	1160	0	0	0	0	0	0	0	0	104	0	2760
Heavy Trucks	0	24	0	0	0	28	0	0	0	0	0	0	0	0	0	0	52
Pedestrians		0				0					0			16			16
Bicycles	0	1	0		0	0	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

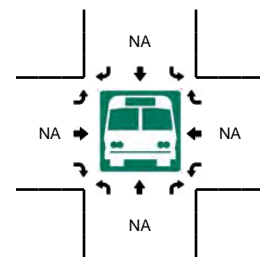
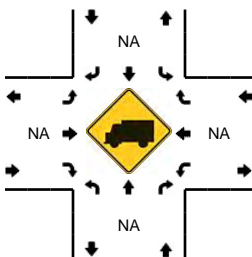
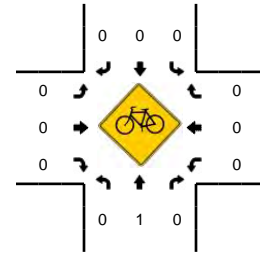
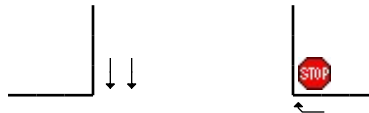
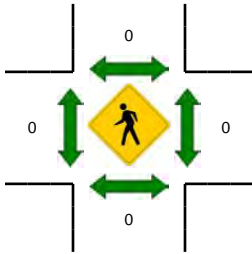
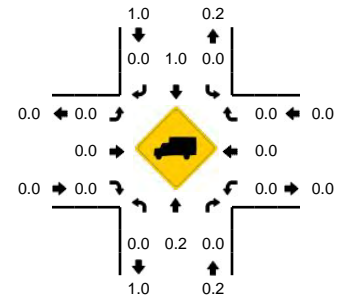
Comments:

LOCATION: Pleasant Hill Rd -- Acalanes High School Dwy
CITY/STATE: Lafayette, CA

QC JOB #: 10687114
DATE: Thu, Dec 01 2011



Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:30 PM -- 5:45 PM



15-Min Count Period Beginning At	Pleasant Hill Rd (Northbound)				Pleasant Hill Rd (Southbound)				Acalanes High School Dwy (Eastbound)				Acalanes High School Dwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	488	2	0	0	190	0	0	0	0	0	0	0	0	8	0	688	
4:15 PM	0	494	2	0	0	194	0	0	0	0	0	0	0	0	7	0	697	
4:30 PM	0	535	7	0	0	236	0	0	0	0	0	0	0	0	7	0	785	
4:45 PM	0	519	2	0	0	220	0	0	0	0	0	0	0	0	10	0	751	2921
5:00 PM	0	563	1	0	0	225	0	0	0	0	0	0	0	0	7	0	796	3029
5:15 PM	0	537	6	0	0	267	0	0	0	0	0	0	0	0	15	0	825	3157
5:30 PM	0	597	1	0	0	225	0	0	0	0	0	0	0	0	12	0	835	3207
5:45 PM	0	523	2	0	0	224	0	0	0	0	0	0	0	0	3	0	752	3208


















Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	2388	4	0	0	900	0	0	0	0	0	0	0	0	48	0	3340
Heavy Trucks	0	4	0	0	0	8	0	0	0	0	0	0	0	0	0	0	12
Pedestrians		0				0				0				0			0
Bicycles	0	1	0		0	0	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Appendix C – Level of Service Worksheets: Existing Conditions

HCM Signalized Intersection Capacity Analysis
 1: Rancho View Drive & Pleasant Hill Road

Existing AM Peak
 3/7/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	34	0	0	0	15	521	0	0	1331	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	5.0			5.0	
Lane Util. Factor		1.00					1.00	0.95			0.95	
Frt		0.86					1.00	1.00			1.00	
Flt Protected		1.00					0.95	1.00			1.00	
Satd. Flow (prot)		1611					1770	3539			3536	
Flt Permitted		1.00					0.95	1.00			1.00	
Satd. Flow (perm)		1611					1770	3539			3536	
Peak-hour factor, PHF	0.65	0.65	0.65	0.92	0.92	0.92	0.79	0.79	0.79	0.66	0.66	0.66
Adj. Flow (vph)	0	0	52	0	0	0	19	659	0	0	2017	14
RTOR Reduction (vph)	0	49	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	3	0	0	0	0	19	659	0	0	2030	0
Turn Type	Perm		Perm			Prot						
Protected Phases		8			4		5	2			6	
Permitted Phases	8			4								
Actuated Green, G (s)		3.0					1.3	50.0			44.7	
Effective Green, g (s)		3.0					1.3	50.0			44.7	
Actuated g/C Ratio		0.05					0.02	0.81			0.72	
Clearance Time (s)		4.0					4.0	5.0			5.0	
Vehicle Extension (s)		2.5					2.0	4.0			4.0	
Lane Grp Cap (vph)		78					37	2854			2549	
v/s Ratio Prot		c0.00					c0.01	0.19			c0.57	
v/s Ratio Perm												
v/c Ratio		0.03					0.51	0.23			0.80	
Uniform Delay, d1		28.1					30.0	1.4			5.7	
Progression Factor		1.00					0.85	1.21			1.00	
Incremental Delay, d2		0.1					4.9	0.2			2.7	
Delay (s)		28.2					30.4	1.9			8.4	
Level of Service		C					C	A			A	
Approach Delay (s)		28.2			0.0			2.7			8.4	
Approach LOS		C			A			A			A	
Intersection Summary												
HCM Average Control Delay			7.3				HCM Level of Service				A	
HCM Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			62.0				Sum of lost time (s)			13.0		
Intersection Capacity Utilization			47.9%				ICU Level of Service			A		
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis

2: Greenvally Drive & Pleasant Hill Road

Existing AM Peak

3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↗	↖	↕	↗	↖	↕	↗
Volume (vph)	2	0	5	17	0	9	0	586	12	7	1481	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			4.0	4.0		5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00	1.00	0.95	1.00
Frt		0.90			1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99			0.95	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1653			1770	1583		3539	1583	1770	3539	1583
Flt Permitted		0.91			1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1531			1863	1583		3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.88	0.88	0.88	0.65	0.65	0.65	0.95	0.95	0.95	0.94	0.94	0.94
Adj. Flow (vph)	2	0	6	26	0	14	0	617	13	7	1576	1
RTOR Reduction (vph)	0	6	0	0	0	13	0	0	4	0	0	0
Lane Group Flow (vph)	0	2	0	0	26	1	0	617	9	7	1576	1
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4		4			2			6
Actuated Green, G (s)		3.7			2.7	2.7		45.2	45.2	1.1	50.3	50.3
Effective Green, g (s)		3.7			2.7	2.7		45.2	45.2	1.1	50.3	50.3
Actuated g/C Ratio		0.06			0.04	0.04		0.73	0.73	0.02	0.81	0.81
Clearance Time (s)		3.0			4.0	4.0		5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5			2.0	2.0		4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)		91			81	69		2580	1154	31	2871	1284
v/s Ratio Prot								0.17		0.00	c0.45	
v/s Ratio Perm		0.00			c0.01	0.00			0.01			0.00
v/c Ratio		0.03			0.32	0.01		0.24	0.01	0.23	0.55	0.00
Uniform Delay, d1		27.5			28.8	28.4		2.8	2.3	30.0	2.0	1.1
Progression Factor		1.00			1.00	1.00		1.97	2.49	0.95	2.26	1.18
Incremental Delay, d2		0.1			0.8	0.0		0.2	0.0	1.0	0.6	0.0
Delay (s)		27.5			29.6	28.4		5.7	5.7	29.5	5.0	1.3
Level of Service		C			C	C		A	A	C	A	A
Approach Delay (s)		27.5			29.2			5.7			5.2	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	5.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Reliez Valle Road & Pleasant Hill Road

Existing AM Peak
3/7/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	22	224	94	587	1574	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.74	0.74	0.84	0.84	0.79	0.79
Adj. Flow (vph)	30	303	112	699	1992	13
RTOR Reduction (vph)	0	96	0	0	0	2
Lane Group Flow (vph)	30	207	112	699	1992	11
Turn Type		Perm	Prot			Perm
Protected Phases	8		5	2	6	
Permitted Phases		8				6
Actuated Green, G (s)	19.5	19.5	10.4	95.5	81.1	81.1
Effective Green, g (s)	19.5	19.5	10.4	95.5	81.1	81.1
Actuated g/C Ratio	0.16	0.16	0.08	0.77	0.65	0.65
Clearance Time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	2.5	2.5	2.0	4.0	4.0	4.0
Lane Grp Cap (vph)	278	249	148	2726	2315	1035
v/s Ratio Prot	0.02		c0.06	0.20	c0.56	
v/s Ratio Perm		c0.13				0.01
v/c Ratio	0.11	0.83	0.76	0.26	0.86	0.01
Uniform Delay, d1	44.8	50.7	55.6	4.1	17.0	7.5
Progression Factor	1.00	1.00	0.93	1.11	1.03	1.16
Incremental Delay, d2	0.1	20.1	17.5	0.2	4.2	0.0
Delay (s)	44.9	70.7	69.2	4.8	21.7	8.7
Level of Service	D	E	E	A	C	A
Approach Delay (s)	68.4			13.7	21.6	
Approach LOS	E			B	C	

Intersection Summary

HCM Average Control Delay	24.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

4: Springhill Road & Pleasant Hill Road

Existing AM Peak

3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↕	↗		↔			↔	↕	↗	↖	↕
Volume (vph)	58	5	119	66	24	10	26	75	498	46	39	1864
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1550	1550
Total Lost time (s)		3.5	3.5		3.5			3.5	4.1	4.1	3.5	4.1
Lane Util. Factor		1.00	1.00		1.00			*0.92	0.95	1.00	1.00	0.95
Frt		1.00	0.85		0.99			1.00	1.00	0.85	1.00	1.00
Flt Protected		0.96	1.00		0.97			0.95	1.00	1.00	0.95	1.00
Satd. Flow (prot)		1781	1583		1779			1628	3539	1583	1444	2887
Flt Permitted		0.68	1.00		0.71			0.95	1.00	1.00	0.95	1.00
Satd. Flow (perm)		1260	1583		1302			1628	3539	1583	1444	2887
Peak-hour factor, PHF	0.88	0.88	0.88	0.75	0.75	0.75	0.92	0.94	0.94	0.94	0.97	0.97
Adj. Flow (vph)	66	6	135	88	32	13	28	80	530	49	40	1922
RTOR Reduction (vph)	0	0	93	0	3	0	0	0	0	13	0	0
Lane Group Flow (vph)	0	72	42	0	130	0	0	108	530	36	40	1922
Turn Type	Perm		Perm	Perm			Prot	Prot		Perm	Prot	
Protected Phases		8			4		5	5	2		1	6
Permitted Phases	8		8	4						2		
Actuated Green, G (s)		15.7	15.7		15.7			11.7	90.6	90.6	6.6	85.5
Effective Green, g (s)		15.7	15.7		15.7			11.7	90.6	90.6	6.6	85.5
Actuated g/C Ratio		0.13	0.13		0.13			0.09	0.73	0.73	0.05	0.69
Clearance Time (s)		3.5	3.5		3.5			3.5	4.1	4.1	3.5	4.1
Vehicle Extension (s)		2.0	2.0		2.0			1.0	4.0	4.0	1.5	4.0
Lane Grp Cap (vph)		160	200		165			154	2586	1157	77	1991
v/s Ratio Prot								c0.07	0.15		0.03	c0.67
v/s Ratio Perm		0.06	0.03		c0.10					0.02		
v/c Ratio		0.45	0.21		0.78			0.70	0.20	0.03	0.52	0.97
Uniform Delay, d1		50.2	48.6		52.5			54.5	5.3	4.6	57.2	17.9
Progression Factor		1.00	1.00		1.00			0.87	1.50	2.98	1.20	0.44
Incremental Delay, d2		0.7	0.2		19.8			10.1	0.2	0.0	1.2	8.3
Delay (s)		50.9	48.8		72.3			57.6	8.1	13.7	70.1	16.1
Level of Service		D	D		E			E	A	B	E	B
Approach Delay (s)		49.5			72.3				16.3			16.6
Approach LOS		D			E				B			B

Intersection Summary

HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	11.1
Intersection Capacity Utilization	95.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR
Lane Configurations	
Volume (vph)	71
Ideal Flow (vphpl)	1550
Total Lost time (s)	4.1
Lane Util. Factor	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1292
Flt Permitted	1.00
Satd. Flow (perm)	1292
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	73
RTOR Reduction (vph)	6
Lane Group Flow (vph)	67
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	85.5
Effective Green, g (s)	85.5
Actuated g/C Ratio	0.69
Clearance Time (s)	4.1
Vehicle Extension (s)	4.0
Lane Grp Cap (vph)	891
v/s Ratio Prot	
v/s Ratio Perm	0.05
v/c Ratio	0.08
Uniform Delay, d1	6.3
Progression Factor	0.28
Incremental Delay, d2	0.1
Delay (s)	1.8
Level of Service	A
Approach Delay (s)	
Approach LOS	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Existing AM Peak
3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations	↔↔	↔		↔	↔	↔		↔	↑↑	↔		↔
Volume (vph)	157	48	55	235	100	42	41	100	569	181	49	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	0.95	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.92		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1714		1681	1734	1559		1770	3539	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1714		1681	1734	1559		1770	3539	1196		1397
Peak-hour factor, PHF	0.54	0.54	0.54	0.67	0.67	0.67	0.64	0.64	0.64	0.64	0.78	0.78
Adj. Flow (vph)	291	89	102	351	149	63	64	156	889	283	63	95
RTOR Reduction (vph)	0	37	0	0	0	52	0	0	0	166	0	0
Lane Group Flow (vph)	291	154	0	246	254	11	0	220	889	117	0	158
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	16.1	16.1		21.6	21.6	21.6		23.0	51.1	51.1		18.2
Effective Green, g (s)	16.1	16.1		21.6	21.6	21.6		23.0	51.1	51.1		18.2
Actuated g/C Ratio	0.13	0.13		0.17	0.17	0.17		0.19	0.41	0.41		0.15
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	446	223		293	302	272		328	1458	493		205
v/s Ratio Prot	0.08	c0.09		0.15	c0.15			c0.12	0.25			c0.11
v/s Ratio Perm						0.01				0.10		
v/c Ratio	0.65	0.69		0.84	0.84	0.04		0.67	0.61	0.24		0.77
Uniform Delay, d1	51.3	51.6		49.5	49.5	42.6		47.0	28.6	23.8		50.9
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		0.85
Incremental Delay, d2	2.6	7.3		17.9	18.0	0.0		4.2	1.9	1.1		10.5
Delay (s)	53.9	58.9		67.4	67.5	42.6		51.2	30.5	24.9		53.7
Level of Service	D	E		E	E	D		D	C	C		D
Approach Delay (s)		55.9			64.7				32.6			
Approach LOS		E			E				C			

Intersection Summary

HCM Average Control Delay	189.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 5: Deer Hill Road & Pleasant Hill Road

Existing AM Peak
 3/7/2012



Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	1417	550
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frbp, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2794	1250
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2794	1250
Peak-hour factor, PHF	0.78	0.78
Adj. Flow (vph)	1817	705
RTOR Reduction (vph)	0	61
Lane Group Flow (vph)	1817	644
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	46.3	46.3
Effective Green, g (s)	46.3	46.3
Actuated g/C Ratio	0.37	0.37
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	1043	467
v/s Ratio Prot	c0.65	
v/s Ratio Perm		0.51
v/c Ratio	1.74	1.38
Uniform Delay, d1	38.9	38.9
Progression Factor	1.17	1.22
Incremental Delay, d2	336.7	179.2
Delay (s)	381.9	226.5
Level of Service	F	F
Approach Delay (s)	321.7	
Approach LOS	F	
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

6: Mt. Diablo Boulevard & Pleasant Hill Road

Existing AM Peak

3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	212	216	60	0	0	0	224	688	396	0	492	528
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00				1.00	0.95	1.00		0.95	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770	3539	1583				1770	3539	1583		3539	1583
Flt Permitted	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770	3539	1583				1770	3539	1583		3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.96	0.96	0.96	0.94	0.94	0.94
Adj. Flow (vph)	236	240	67	0	0	0	233	717	412	0	523	562
RTOR Reduction (vph)	0	0	53	0	0	0	0	0	115	0	0	332
Lane Group Flow (vph)	236	240	14	0	0	0	233	717	297	0	523	230
Turn Type	Perm		Perm				Prot		Perm			Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2			6
Actuated Green, G (s)	14.3	14.3	14.3				13.5	46.2	46.2		28.7	28.7
Effective Green, g (s)	14.3	14.3	14.3				13.5	46.2	46.2		28.7	28.7
Actuated g/C Ratio	0.20	0.20	0.20				0.19	0.66	0.66		0.41	0.41
Clearance Time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	362	723	323				341	2336	1045		1451	649
v/s Ratio Prot		0.07					c0.13	0.20			c0.15	
v/s Ratio Perm	c0.13		0.01						0.19			0.15
v/c Ratio	0.65	0.33	0.04				0.68	0.31	0.28		0.36	0.36
Uniform Delay, d1	25.6	23.8	22.4				26.3	5.1	5.0		14.3	14.3
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.2	0.1	0.0				4.5	0.3	0.7		0.7	1.5
Delay (s)	28.8	23.9	22.4				30.7	5.4	5.7		15.0	15.8
Level of Service	C	C	C				C	A	A		B	B
Approach Delay (s)		25.8			0.0			9.8			15.4	
Approach LOS		C			A			A			B	

Intersection Summary

HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: SR 24 EB Off Ramp & Pleasant Hill Road

Existing AM Peak
3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖		↗		↕↕↕		↖	↕↕	
Volume (vph)	16	32	132	12	0	136	0	1020	20	80	448	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00	1.00		1.00		0.91		1.00	0.95	
Frt		1.00	0.85	1.00		0.85		1.00		1.00	1.00	
Flt Protected		0.98	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1833	1583	1770		1583		5070		1770	3539	
Flt Permitted		0.98	1.00	0.74		1.00		1.00		0.95	1.00	
Satd. Flow (perm)		1833	1583	1380		1583		5070		1770	3539	
Peak-hour factor, PHF	0.87	0.87	0.87	0.86	0.86	0.86	0.97	0.97	0.97	0.96	0.96	0.96
Adj. Flow (vph)	18	37	152	14	0	158	0	1052	21	83	467	0
RTOR Reduction (vph)	0	0	136	0	0	142	0	2	0	0	0	0
Lane Group Flow (vph)	0	55	16	14	0	16	0	1071	0	83	467	0
Turn Type	Split		Perm	custom		custom				Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4	8		8						
Actuated Green, G (s)		5.9	5.9	5.4		5.4		23.2		4.1	31.3	
Effective Green, g (s)		5.9	5.9	5.4		5.4		23.2		4.1	31.3	
Actuated g/C Ratio		0.11	0.11	0.10		0.10		0.42		0.08	0.57	
Clearance Time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		198	171	136		157		2154		133	2029	
v/s Ratio Prot		c0.03						c0.21		c0.05	0.13	
v/s Ratio Perm			0.01	c0.01		0.01						
v/c Ratio		0.28	0.10	0.10		0.10		0.50		0.62	0.23	
Uniform Delay, d1		22.4	21.9	22.4		22.4		11.4		24.5	5.7	
Progression Factor		1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2		0.8	0.2	0.3		0.3		0.2		8.8	0.1	
Delay (s)		23.2	22.2	22.7		22.7		11.6		33.3	5.8	
Level of Service		C	C	C		C		B		C	A	
Approach Delay (s)		22.4			22.7			11.6			9.9	
Approach LOS		C			C			B			A	

Intersection Summary





















HCM Average Control Delay	13.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	54.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis

8: Deer Hill Road & Brown Avenue

Existing AM Peak

3/7/2012

																		
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR						
Lane Configurations																		
Volume (veh/h)	26	200	48	172	645	36	85	12	76	28	8	52						
Sign Control		Free			Free			Stop			Stop							
Grade		0%			0%			0%			0%							
Peak Hour Factor	0.90	0.90	0.90	0.94	0.94	0.94	0.98	0.98	0.98	0.85	0.85	0.85						
Hourly flow rate (vph)	29	222	53	183	686	38	87	12	78	33	9	61						
Pedestrians																		
Lane Width (ft)																		
Walking Speed (ft/s)																		
Percent Blockage																		
Right turn flare (veh)																		
Median type	None					None												
Median storage (veh)																		
Upstream signal (ft)																		
pX, platoon unblocked																		
vC, conflicting volume	724		276				1425		1397		249		1435		1405		705	
vC1, stage 1 conf vol																		
vC2, stage 2 conf vol																		
vCu, unblocked vol	724		276				1425		1397		249		1435		1405		705	
tC, single (s)	4.1		4.1				7.1		6.5		6.2		7.1		6.5		6.2	
tC, 2 stage (s)																		
tF (s)	2.2		2.2				3.5		4.0		3.3		3.5		4.0		3.3	
p0 queue free %	97		86				0		90		90		59		92		86	
cM capacity (veh/h)	878		1287				80		117		790		81		116		436	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1											
Volume Total	29	276	183	724	99	78	104											
Volume Left	29	0	183	0	87	0	33											
Volume Right	0	53	0	38	0	78	61											
cSH	878	1700	1287	1700	83	790	164											
Volume to Capacity	0.03	0.16	0.14	0.43	1.20	0.10	0.63											
Queue Length 95th (ft)	3	0	12	0	180	8	88											
Control Delay (s)	9.2	0.0	8.3	0.0	251.6	10.1	58.4											
Lane LOS	A		A		F	B	F											
Approach Delay (s)	0.9		1.7		145.5		58.4											
Approach LOS					F		F											
Intersection Summary																		
Average Delay			22.5															
Intersection Capacity Utilization			61.5%		ICU Level of Service				B									
Analysis Period (min)			15															

HCM Signalized Intersection Capacity Analysis

9: Deer Hill Road & Sierra Vista Way

Existing AM Peak

3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	240	900	140	445	3	261	13	81	8	21	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1861		1681	1693	1583		1732	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	
Satd. Flow (perm)	1770	1863	1583	1770	1861		1681	1693	1583		1732	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	261	978	152	484	3	284	14	88	9	23	28
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	71	0	25	0
Lane Group Flow (vph)	27	261	978	152	487	0	148	150	17	0	36	0
Turn Type	Prot		Free	Prot			Split		Perm		Split	
Protected Phases	7	4		3	8		2	2			6	6
Permitted Phases			Free						2			
Actuated Green, G (s)	1.4	15.1	54.4	6.1	19.8		10.4	10.4	10.4		6.8	
Effective Green, g (s)	1.4	15.1	54.4	6.1	19.8		10.4	10.4	10.4		6.8	
Actuated g/C Ratio	0.03	0.28	1.00	0.11	0.36		0.19	0.19	0.19		0.12	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	46	517	1583	198	677		321	324	303		217	
v/s Ratio Prot	0.02	0.14		0.09	c0.26		0.09	0.09			0.02	
v/s Ratio Perm			c0.62						0.01			
v/c Ratio	0.59	0.50	0.62	0.77	0.72		0.46	0.46	0.06		0.16	
Uniform Delay, d1	26.2	16.5	0.0	23.5	14.9		19.5	19.5	18.0		21.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	17.7	0.8	1.8	16.2	3.7		1.1	1.0	0.1		0.4	
Delay (s)	43.9	17.3	1.8	39.7	18.6		20.6	20.6	18.1		21.6	
Level of Service	D	B	A	D	B		C	C	B		C	
Approach Delay (s)		5.9			23.6			20.0			21.6	
Approach LOS		A			C			B			C	

Intersection Summary

HCM Average Control Delay	13.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	54.4	Sum of lost time (s)	0.0
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 10: Deer Hill Road & Laurel Drive

Existing AM Peak
 3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑	↗	↖	↑↑		↖	↑	↗↗		↕	
Volume (vph)	1	540	284	288	480	3	822	8	537	18	6	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	0.88		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1770	3539	1583	1770	3536		1681	1687	2787		1747	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (perm)	1770	3539	1583	1770	3536		1681	1687	2787		1747	
Peak-hour factor, PHF	0.91	0.91	0.91	0.88	0.88	0.88	0.95	0.95	0.95	0.69	0.69	0.69
Adj. Flow (vph)	1	593	312	327	545	3	865	8	565	26	9	13
RTOR Reduction (vph)	0	0	248	0	1	0	0	0	407	0	11	0
Lane Group Flow (vph)	1	593	64	327	547	0	432	441	158	0	37	0
Turn Type	Prot		Perm	Prot			Split		Perm	Split		
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4						2			
Actuated Green, G (s)	0.8	19.2	19.2	16.0	34.4		26.0	26.0	26.0		16.0	
Effective Green, g (s)	0.8	19.2	19.2	16.0	34.4		26.0	26.0	26.0		16.0	
Actuated g/C Ratio	0.01	0.21	0.21	0.17	0.37		0.28	0.28	0.28		0.17	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	15	729	326	304	1305		469	471	777		300	
v/s Ratio Prot	0.00	c0.17		c0.18	0.15		0.26	c0.26			c0.02	
v/s Ratio Perm			0.04						0.06			
v/c Ratio	0.07	0.81	0.20	1.08	0.42		0.92	0.94	0.20		0.12	
Uniform Delay, d1	45.8	35.3	30.6	38.6	21.9		32.6	32.8	25.7		32.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.9	6.9	0.3	73.2	0.2		25.9	28.3	0.6		0.8	
Delay (s)	47.7	42.2	30.9	111.8	22.2		58.5	61.1	26.3		33.5	
Level of Service	D	D	C	F	C		E	E	C		C	
Approach Delay (s)		38.3			55.7			46.6			33.5	
Approach LOS		D			E			D			C	

Intersection Summary		
HCM Average Control Delay	46.6	HCM Level of Service D
HCM Volume to Capacity ratio	0.77	
Actuated Cycle Length (s)	93.2	Sum of lost time (s) 16.0
Intersection Capacity Utilization	70.5%	ICU Level of Service C
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

1: Rancho View Drive & Pleasant Hill Road

Existing School PM Peak

3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕			↕	
Volume (vph)	19	0	16	0	0	1	27	1292	0	0	742	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	5.0			5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95			0.95	
Frt		0.94			0.86		1.00	1.00			1.00	
Flt Protected		0.97			1.00		0.95	1.00			1.00	
Satd. Flow (prot)		1701			1611		1770	3539			3531	
Flt Permitted		0.83			1.00		0.95	1.00			1.00	
Satd. Flow (perm)		1449			1611		1770	3539			3531	
Peak-hour factor, PHF	0.67	0.67	0.67	0.25	0.25	0.25	0.88	0.88	0.88	0.96	0.96	0.96
Adj. Flow (vph)	28	0	24	0	0	4	31	1468	0	0	773	12
RTOR Reduction (vph)	0	22	0	0	4	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	30	0	0	0	0	31	1468	0	0	784	0
Turn Type	Perm		Perm				Prot					
Protected Phases		8			4		5	2			6	
Permitted Phases	8			4								
Actuated Green, G (s)		4.1			4.1		4.9	48.9			40.0	
Effective Green, g (s)		4.1			4.1		4.9	48.9			40.0	
Actuated g/C Ratio		0.07			0.07		0.08	0.79			0.65	
Clearance Time (s)		4.0			4.0		4.0	5.0			5.0	
Vehicle Extension (s)		2.5			2.0		2.0	4.0			4.0	
Lane Grp Cap (vph)		96			107		140	2791			2278	
v/s Ratio Prot					0.00		0.02	c0.41			0.22	
v/s Ratio Perm		c0.02										
v/c Ratio		0.31			0.00		0.22	0.53			0.34	
Uniform Delay, d1		27.6			27.0		26.8	2.4			5.0	
Progression Factor		1.00			1.00		1.34	2.37			1.00	
Incremental Delay, d2		1.3			0.0		0.3	0.6			0.4	
Delay (s)		28.9			27.0		36.2	6.2			5.4	
Level of Service		C			C		D	A			A	
Approach Delay (s)		28.9			27.0			6.8			5.4	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	6.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Greenvally Drive & Pleasant Hill Road

Existing School PM Peak

3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕↕	↕	↕	↕↕	↕
Volume (vph)	2	0	4	40	0	17	10	1315	52	35	726	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			4.0	4.0	4.0	5.0	5.0	4.0	5.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt		0.91			1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1667			1770	1583	1770	3539	1583	1770	3539	
Flt Permitted		0.90			0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1532			1774	1583	1770	3539	1583	1770	3539	
Peak-hour factor, PHF	0.50	0.50	0.50	0.72	0.72	0.72	0.90	0.90	0.90	0.96	0.96	0.96
Adj. Flow (vph)	4	0	8	56	0	24	11	1461	58	36	756	0
RTOR Reduction (vph)	0	7	0	0	0	22	0	0	19	0	0	0
Lane Group Flow (vph)	0	5	0	0	56	2	11	1461	39	36	756	0
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2		1		6
Permitted Phases	8			4		4			2			6
Actuated Green, G (s)		5.2			4.2	4.2	1.2	42.0	42.0	2.8		43.6
Effective Green, g (s)		5.2			4.2	4.2	1.2	42.0	42.0	2.8		43.6
Actuated g/C Ratio		0.08			0.07	0.07	0.02	0.68	0.68	0.05		0.70
Clearance Time (s)		3.0			4.0	4.0	4.0	5.0	5.0	4.0		5.0
Vehicle Extension (s)		2.5			2.0	2.0	2.0	4.0	4.0	2.0		4.0
Lane Grp Cap (vph)		128			120	107	34	2397	1072	80		2489
v/s Ratio Prot							0.01	c0.41		c0.02		0.21
v/s Ratio Perm		0.00			c0.03	0.00			0.02			
v/c Ratio		0.04			0.47	0.02	0.32	0.61	0.04	0.45		0.30
Uniform Delay, d1		26.1			27.8	27.0	30.0	5.5	3.3	28.8		3.5
Progression Factor		1.00			1.00	1.00	1.19	0.75	0.59	0.65		2.63
Incremental Delay, d2		0.1			1.0	0.0	1.8	1.0	0.1	1.4		0.3
Delay (s)		26.2			28.9	27.0	37.5	5.1	2.0	20.1		9.4
Level of Service		C			C	C	D	A	A	C		A
Approach Delay (s)		26.2			28.3			5.3				9.9
Approach LOS		C			C			A				A

Intersection Summary

HCM Average Control Delay	7.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Reliez Valle Road & Pleasant Hill Road

Existing School PM Peak
3/7/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	18	110	127	1347	758	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.81	0.81	0.94	0.94	0.95	0.95
Adj. Flow (vph)	22	136	135	1433	798	21
RTOR Reduction (vph)	0	124	0	0	0	9
Lane Group Flow (vph)	22	12	135	1433	798	12
Turn Type		Perm	Prot			Perm
Protected Phases	8		5	2	6	
Permitted Phases		8				6
Actuated Green, G (s)	5.5	5.5	8.0	47.5	35.5	35.5
Effective Green, g (s)	5.5	5.5	8.0	47.5	35.5	35.5
Actuated g/C Ratio	0.09	0.09	0.13	0.77	0.57	0.57
Clearance Time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	2.5	2.5	2.0	4.0	4.0	4.0
Lane Grp Cap (vph)	157	140	228	2711	2026	906
v/s Ratio Prot	c0.01		0.08	c0.40	0.23	
v/s Ratio Perm		0.01				0.01
v/c Ratio	0.14	0.09	0.59	0.53	0.39	0.01
Uniform Delay, d1	26.1	25.9	25.5	2.8	7.3	5.7
Progression Factor	1.00	1.00	0.85	1.85	0.93	0.53
Incremental Delay, d2	0.3	0.2	2.4	0.6	0.6	0.0
Delay (s)	26.4	26.1	23.9	5.9	7.3	3.1
Level of Service	C	C	C	A	A	A
Approach Delay (s)	26.2			7.4	7.2	
Approach LOS	C			A	A	

Intersection Summary

HCM Average Control Delay	8.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

4: Springhill Road & Pleasant Hill Road

Existing School PM Peak

3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↕	↗		↔			↖	↕	↗	↘	↕
Volume (vph)	46	7	102	28	6	7	28	86	1428	49	8	849
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1550	1550
Total Lost time (s)		3.5	3.5		3.5			3.5	4.1	4.1	3.5	4.1
Lane Util. Factor		1.00	1.00		1.00			1.00	0.95	1.00	1.00	0.95
Frt		1.00	0.85		0.98			1.00	1.00	0.85	1.00	1.00
Flt Protected		0.96	1.00		0.97			0.95	1.00	1.00	0.95	1.00
Satd. Flow (prot)		1785	1583		1758			1770	3539	1583	1444	2887
Flt Permitted		0.84	1.00		0.76			0.95	1.00	1.00	0.95	1.00
Satd. Flow (perm)		1563	1583		1378			1770	3539	1583	1444	2887
Peak-hour factor, PHF	0.89	0.89	0.89	0.81	0.81	0.81	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	52	8	115	35	7	9	29	90	1488	51	8	884
RTOR Reduction (vph)	0	0	104	0	8	0	0	0	0	7	0	0
Lane Group Flow (vph)	0	60	12	0	43	0	0	119	1488	44	8	884
Turn Type	Perm		Perm	Perm			Prot	Prot		Perm	Prot	
Protected Phases		8			4		5	5	2		1	6
Permitted Phases	8		8	4						2		
Actuated Green, G (s)		6.2	6.2		6.2			6.8	43.6	43.6	1.1	37.9
Effective Green, g (s)		6.2	6.2		6.2			6.8	43.6	43.6	1.1	37.9
Actuated g/C Ratio		0.10	0.10		0.10			0.11	0.70	0.70	0.02	0.61
Clearance Time (s)		3.5	3.5		3.5			3.5	4.1	4.1	3.5	4.1
Vehicle Extension (s)		2.0	2.0		2.0			1.0	4.0	4.0	1.5	4.0
Lane Grp Cap (vph)		156	158		138			194	2489	1113	26	1765
v/s Ratio Prot								c0.07	c0.42		0.01	0.31
v/s Ratio Perm		c0.04	0.01		0.03					0.03		
v/c Ratio		0.38	0.07		0.31			0.61	0.60	0.04	0.31	0.50
Uniform Delay, d1		26.1	25.3		25.9			26.3	4.7	2.8	30.1	6.8
Progression Factor		1.00	1.00		1.00			0.74	2.09	1.98	1.52	0.62
Incremental Delay, d2		0.6	0.1		0.5			3.0	0.8	0.0	2.3	1.0
Delay (s)		26.7	25.4		26.4			22.5	10.7	5.6	48.0	5.1
Level of Service		C	C		C			C	B	A	D	A
Approach Delay (s)		25.8			26.4				11.4			5.4
Approach LOS		C			C				B			A

Intersection Summary

HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR
Lane Configurations	7
Volume (vph)	29
Ideal Flow (vphpl)	1550
Total Lost time (s)	4.1
Lane Util. Factor	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1292
Flt Permitted	1.00
Satd. Flow (perm)	1292
Peak-hour factor, PHF	0.96
Adj. Flow (vph)	30
RTOR Reduction (vph)	8
Lane Group Flow (vph)	22
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	37.9
Effective Green, g (s)	37.9
Actuated g/C Ratio	0.61
Clearance Time (s)	4.1
Vehicle Extension (s)	4.0
Lane Grp Cap (vph)	790
v/s Ratio Prot	
v/s Ratio Perm	0.02
v/c Ratio	0.03
Uniform Delay, d1	4.8
Progression Factor	0.12
Incremental Delay, d2	0.1
Delay (s)	0.6
Level of Service	A
Approach Delay (s)	
Approach LOS	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis

5: Deer Hill Road & Pleasant Hill Road

Existing School PM Peak

3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	353	74	45	218	83	69	37	49	1125	177	17	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	*0.92	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.94		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1757		1681	1730	1559		1770	3427	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1757		1681	1730	1559		1770	3427	1196		1397
Peak-hour factor, PHF	0.91	0.91	0.91	0.61	0.61	0.61	0.92	0.92	0.92	0.92	0.94	0.94
Adj. Flow (vph)	388	81	49	357	136	113	40	53	1223	192	18	83
RTOR Reduction (vph)	0	19	0	0	0	68	0	0	0	77	0	0
Lane Group Flow (vph)	388	111	0	243	250	45	0	93	1223	115	0	101
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	18.7	18.7		21.4	21.4	21.4		10.4	53.9	53.9		13.0
Effective Green, g (s)	18.7	18.7		21.4	21.4	21.4		10.4	53.9	53.9		13.0
Actuated g/C Ratio	0.15	0.15		0.17	0.17	0.17		0.08	0.43	0.43		0.10
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	518	265		290	299	269		148	1490	520		146
v/s Ratio Prot	c0.11	0.06		c0.14	0.14			0.05	c0.36			c0.07
v/s Ratio Perm						0.03				0.10		
v/c Ratio	0.75	0.42		0.84	0.84	0.17		0.63	0.82	0.22		0.69
Uniform Delay, d1	50.4	47.7		49.6	49.6	43.7		54.9	30.8	21.9		53.6
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.01
Incremental Delay, d2	5.2	0.4		17.9	17.3	0.1		5.9	5.2	1.0		10.2
Delay (s)	55.6	48.1		67.5	66.9	43.8		60.8	36.0	22.9		64.3
Level of Service	E	D		E	E	D		E	D	C		E
Approach Delay (s)		53.7			62.8				35.9			
Approach LOS		D			E				D			

Intersection Summary

HCM Average Control Delay	39.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Existing School PM Peak
3/7/2012



Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	763	220
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frbp, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2794	1250
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2794	1250
Peak-hour factor, PHF	0.94	0.94
Adj. Flow (vph)	812	234
RTOR Reduction (vph)	0	41
Lane Group Flow (vph)	812	193
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	56.5	56.5
Effective Green, g (s)	56.5	56.5
Actuated g/C Ratio	0.46	0.46
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	1273	570
v/s Ratio Prot	c0.29	
v/s Ratio Perm		0.15
v/c Ratio	0.64	0.34
Uniform Delay, d1	25.9	21.7
Progression Factor	0.83	0.78
Incremental Delay, d2	2.3	1.5
Delay (s)	23.8	18.4
Level of Service	C	B
Approach Delay (s)	26.3	
Approach LOS	C	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Boulevard & Pleasant Hill Road

Existing School PM Peak
3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	199	397	242	0	0	0	215	498	369	0	496	496
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00				1.00	0.95	1.00		0.95	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770	3539	1583				1770	3539	1583		3539	1583
Flt Permitted	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770	3539	1583				1770	3539	1583		3539	1583
Peak-hour factor, PHF	0.88	0.88	0.88	0.92	0.92	0.92	0.91	0.91	0.91	0.93	0.93	0.93
Adj. Flow (vph)	226	451	275	0	0	0	236	547	405	0	533	533
RTOR Reduction (vph)	0	0	189	0	0	0	0	0	78	0	0	324
Lane Group Flow (vph)	226	451	86	0	0	0	236	547	327	0	533	209
Turn Type	Perm		Perm				Prot		Perm			Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2			6
Actuated Green, G (s)	15.9	15.9	15.9				13.2	44.6	44.6		27.4	27.4
Effective Green, g (s)	15.9	15.9	15.9				13.2	44.6	44.6		27.4	27.4
Actuated g/C Ratio	0.23	0.23	0.23				0.19	0.64	0.64		0.39	0.39
Clearance Time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	402	804	360				334	2255	1009		1385	620
v/s Ratio Prot		0.13					c0.13	0.15			c0.15	
v/s Ratio Perm	c0.13		0.05						0.21			0.13
v/c Ratio	0.56	0.56	0.24				0.71	0.24	0.32		0.38	0.34
Uniform Delay, d1	24.0	24.0	22.1				26.6	5.5	5.8		15.3	14.9
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.1	0.5	0.1				5.5	0.3	0.9		0.8	1.5
Delay (s)	25.0	24.5	22.2				32.1	5.7	6.7		16.1	16.4
Level of Service	C	C	C				C	A	A		B	B
Approach Delay (s)		24.0			0.0			11.3			16.2	
Approach LOS		C			A			B			B	

Intersection Summary

HCM Average Control Delay	16.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: SR 24 EB Off Ramp & Pleasant Hill Road

Existing School PM Peak
3/7/2012























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖		↗		↕↕↕		↖	↕↕	
Volume (vph)	46	36	183	14	0	129	0	902	13	107	629	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00	1.00		1.00		0.91		1.00	0.95	
Frt		1.00	0.85	1.00		0.85		1.00		1.00	1.00	
Flt Protected		0.97	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1812	1583	1770		1583		5075		1770	3539	
Flt Permitted		0.97	1.00	0.74		1.00		1.00		0.95	1.00	
Satd. Flow (perm)		1812	1583	1380		1583		5075		1770	3539	
Peak-hour factor, PHF	0.95	0.95	0.95	0.83	0.83	0.83	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	48	38	193	17	0	155	0	1002	14	119	699	0
RTOR Reduction (vph)	0	0	164	0	0	139	0	2	0	0	0	0
Lane Group Flow (vph)	0	86	29	17	0	16	0	1014	0	119	699	0
Turn Type	Split		Perm	custom		custom				Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4	8		8						
Actuated Green, G (s)		8.0	8.0	5.4		5.4		18.8		4.6	27.4	
Effective Green, g (s)		8.0	8.0	5.4		5.4		18.8		4.6	27.4	
Actuated g/C Ratio		0.15	0.15	0.10		0.10		0.36		0.09	0.52	
Clearance Time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		275	240	141		162		1807		154	1837	
v/s Ratio Prot		c0.05						c0.20		c0.07	0.20	
v/s Ratio Perm			0.02	c0.01		0.01						
v/c Ratio		0.31	0.12	0.12		0.10		0.56		0.77	0.38	
Uniform Delay, d1		20.0	19.4	21.5		21.5		13.7		23.6	7.6	
Progression Factor		1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2		0.7	0.2	0.4		0.3		0.4		21.0	0.1	
Delay (s)		20.6	19.6	21.9		21.8		14.1		44.6	7.7	
Level of Service		C	B	C		C		B		D	A	
Approach Delay (s)		19.9			21.8			14.1			13.1	
Approach LOS		B			C			B			B	

Intersection Summary

HCM Average Control Delay	15.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	52.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	44.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Avenue

Existing School PM Peak
3/7/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.94	0.94	0.94	0.98	0.98	0.98	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	0			0			0	0	0	0	0	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			0			0	0	0	0	0	0
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1623			1623			1023	896	1085	1023	896	1085
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1					
Volume Total	0	0	0	0	0	0	0					
Volume Left	0	0	0	0	0	0	0					
Volume Right	0	0	0	0	0	0	0					
cSH	1700	1700	1700	1700	1700	1700	1700					
Volume to Capacity	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
Queue Length 95th (ft)	0	0	0	0	0	0	0					
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Lane LOS					A	A	A					
Approach Delay (s)	0.0		0.0		0.0		0.0					
Approach LOS					A		A					
Intersection Summary												
Average Delay			0.0									
Intersection Capacity Utilization			0.0%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

9: Deer Hill Road & Sierra Vista Way

Existing School PM Peak

3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	280	1039	111	224	7	184	13	86	3	26	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1854		1681	1696	1583		1759	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		1.00	
Satd. Flow (perm)	1770	1863	1583	1770	1854		1681	1696	1583		1759	
Peak-hour factor, PHF	0.89	0.89	0.89	0.87	0.87	0.87	0.80	0.80	0.80	0.75	0.75	0.75
Adj. Flow (vph)	29	315	1167	128	257	8	230	16	108	4	35	25
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	89	0	22	0
Lane Group Flow (vph)	29	315	1167	128	264	0	122	124	19	0	42	0
Turn Type	Prot		Free	Prot			Split		Perm		Split	
Protected Phases	7	4		3	8		2	2			6	6
Permitted Phases			Free						2			
Actuated Green, G (s)	1.8	16.1	54.8	6.1	20.4		9.7	9.7	9.7		6.9	
Effective Green, g (s)	1.8	16.1	54.8	6.1	20.4		9.7	9.7	9.7		6.9	
Actuated g/C Ratio	0.03	0.29	1.00	0.11	0.37		0.18	0.18	0.18		0.13	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	58	547	1583	197	690		298	300	280		221	
v/s Ratio Prot	0.02	0.17		0.07	0.14		0.07	0.07			0.02	
v/s Ratio Perm			c0.74						0.01			
v/c Ratio	0.50	0.58	0.74	0.65	0.38		0.41	0.41	0.07		0.19	
Uniform Delay, d1	26.1	16.4	0.0	23.3	12.6		20.0	20.0	18.8		21.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	6.6	1.5	3.1	7.2	0.4		0.9	0.9	0.1		0.4	
Delay (s)	32.7	17.9	3.1	30.5	12.9		20.9	21.0	18.9		21.9	
Level of Service	C	B	A	C	B		C	C	B		C	
Approach Delay (s)		6.8			18.7			20.3			21.9	
Approach LOS		A			B			C			C	

Intersection Summary

HCM Average Control Delay	11.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	54.8	Sum of lost time (s)	0.0
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
10: Deer Hill Road & Laurel Drive

Existing School PM Peak

3/7/2012




















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗↗	↖	↖	↗↗		↖	↖	↗↗		↗↗	
Volume (vph)	8	626	238	176	231	9	463	8	725	19	8	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	0.88		1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1770	3539	1583	1770	3518		1681	1688	2787		1765	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (perm)	1770	3539	1583	1770	3518		1681	1688	2787		1765	
Peak-hour factor, PHF	0.91	0.91	0.91	0.94	0.94	0.94	0.85	0.85	0.85	0.92	0.92	0.92
Adj. Flow (vph)	9	688	262	187	246	10	545	9	853	21	9	7
RTOR Reduction (vph)	0	0	180	0	3	0	0	0	638	0	6	0
Lane Group Flow (vph)	9	688	82	187	253	0	278	276	215	0	31	0
Turn Type	Prot		Perm	Prot			Split		Perm	Split		
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4						2			
Actuated Green, G (s)	0.7	27.2	27.2	10.0	36.5		17.1	17.1	17.1		16.1	
Effective Green, g (s)	0.7	27.2	27.2	10.0	36.5		17.1	17.1	17.1		16.1	
Actuated g/C Ratio	0.01	0.31	0.31	0.12	0.42		0.20	0.20	0.20		0.19	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	14	1114	498	205	1486		333	334	552		329	
v/s Ratio Prot	0.01	c0.19		c0.11	0.07		c0.17	0.16			c0.02	
v/s Ratio Perm			0.05						0.08			
v/c Ratio	0.64	0.62	0.17	0.91	0.17		0.83	0.83	0.39		0.10	
Uniform Delay, d1	42.7	25.2	21.4	37.8	15.5		33.3	33.2	30.1		29.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	71.2	1.0	0.2	39.2	0.1		21.2	20.3	2.1		0.6	
Delay (s)	113.9	26.2	21.6	77.0	15.6		54.5	53.6	32.2		29.7	
Level of Service	F	C	C	E	B		D	D	C		C	
Approach Delay (s)		25.8			41.5			40.8			29.7	
Approach LOS		C			D			D			C	

Intersection Summary

HCM Average Control Delay	35.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	86.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Road

Existing PM Peak
3/7/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	0	19	0	0	0	18	1898	0	0	724	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	5.0			5.0	
Lane Util. Factor		1.00					1.00	0.95			0.95	
Frt		0.90					1.00	1.00			1.00	
Flt Protected		0.99					0.95	1.00			1.00	
Satd. Flow (prot)		1653					1770	3539			3527	
Flt Permitted		0.96					0.95	1.00			1.00	
Satd. Flow (perm)		1610					1770	3539			3527	
Peak-hour factor, PHF	0.79	0.79	0.79	0.92	0.92	0.92	0.98	0.98	0.98	0.95	0.95	0.95
Adj. Flow (vph)	8	0	24	0	0	0	18	1937	0	0	762	18
RTOR Reduction (vph)	0	23	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	9	0	0	0	0	18	1937	0	0	778	0
Turn Type	Perm			Perm			Prot					
Protected Phases		8			4		5	2			6	
Permitted Phases	8			4								
Actuated Green, G (s)		2.6					2.5	50.4			43.9	
Effective Green, g (s)		2.6					2.5	50.4			43.9	
Actuated g/C Ratio		0.04					0.04	0.81			0.71	
Clearance Time (s)		4.0					4.0	5.0			5.0	
Vehicle Extension (s)		2.5					2.0	4.0			4.0	
Lane Grp Cap (vph)		68					71	2877			2497	
v/s Ratio Prot							0.01	c0.55			0.22	
v/s Ratio Perm		c0.01										
v/c Ratio		0.13					0.25	0.67			0.31	
Uniform Delay, d1		28.6					28.8	2.4			3.4	
Progression Factor		1.00					1.25	1.76			1.00	
Incremental Delay, d2		0.6					0.6	1.0			0.3	
Delay (s)		29.3					36.6	5.3			3.7	
Level of Service		C					D	A			A	
Approach Delay (s)		29.3			0.0			5.5			3.7	
Approach LOS		C			A			A			A	
Intersection Summary												
HCM Average Control Delay			5.3				HCM Level of Service				A	
HCM Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			62.0				Sum of lost time (s)				9.0	
Intersection Capacity Utilization			63.3%				ICU Level of Service				B	
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis

2: Greenvally Drive & Pleasant Hill Road

Existing PM Peak

3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔	↔	↕	↔	↔	↕	↔
Volume (vph)	7	0	3	12	0	16	3	1854	21	11	706	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			4.0	4.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.96			1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.97			0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1725			1770	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.96			1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1720			1863	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.63	0.63	0.63	0.88	0.88	0.88	0.98	0.98	0.98	0.97	0.97	0.97
Adj. Flow (vph)	11	0	5	14	0	18	3	1892	21	11	728	4
RTOR Reduction (vph)	0	5	0	0	0	17	0	0	6	0	0	1
Lane Group Flow (vph)	0	11	0	0	14	1	3	1892	15	11	728	3
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2		1		6
Permitted Phases	8			4		4			2			6
Actuated Green, G (s)		3.5			2.5	2.5	1.0	45.3	45.3	1.2	45.5	45.5
Effective Green, g (s)		3.5			2.5	2.5	1.0	45.3	45.3	1.2	45.5	45.5
Actuated g/C Ratio		0.06			0.04	0.04	0.02	0.73	0.73	0.02	0.73	0.73
Clearance Time (s)		3.0			4.0	4.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5			2.0	2.0	2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)		97			75	64	29	2586	1157	34	2597	1162
v/s Ratio Prot							0.00	c0.53		c0.01	0.21	
v/s Ratio Perm		0.01			c0.01	0.00			0.01			0.00
v/c Ratio		0.12			0.19	0.01	0.10	0.73	0.01	0.32	0.28	0.00
Uniform Delay, d1		27.8			28.8	28.6	30.1	4.8	2.3	30.0	2.8	2.2
Progression Factor		1.00			1.00	1.00	1.24	0.42	0.20	0.72	2.42	2.30
Incremental Delay, d2		0.4			0.4	0.0	0.4	1.3	0.0	2.0	0.3	0.0
Delay (s)		28.2			29.2	28.6	37.7	3.4	0.5	23.7	7.0	5.1
Level of Service		C			C	C	D	A	A	C	A	A
Approach Delay (s)		28.2			28.9			3.4			7.2	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	4.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

3: Reliez Valle Road & Pleasant Hill Road

Existing PM Peak

3/7/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	20	103	182	1864	718	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.88	0.88	0.95	0.95	0.90	0.90
Adj. Flow (vph)	23	117	192	1962	798	29
RTOR Reduction (vph)	0	107	0	0	0	14
Lane Group Flow (vph)	23	10	192	1962	798	15
Turn Type		Perm	Prot			Perm
Protected Phases	8		5	2	6	
Permitted Phases		8				6
Actuated Green, G (s)	5.4	5.4	11.0	47.6	32.6	32.6
Effective Green, g (s)	5.4	5.4	11.0	47.6	32.6	32.6
Actuated g/C Ratio	0.09	0.09	0.18	0.77	0.53	0.53
Clearance Time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	2.5	2.5	2.0	4.0	4.0	4.0
Lane Grp Cap (vph)	154	138	314	2717	1861	832
v/s Ratio Prot	c0.01		0.11	c0.55	0.23	
v/s Ratio Perm		0.01				0.01
v/c Ratio	0.15	0.07	0.61	0.72	0.43	0.02
Uniform Delay, d1	26.2	26.0	23.5	3.8	9.0	7.0
Progression Factor	1.00	1.00	0.84	1.83	0.89	0.64
Incremental Delay, d2	0.3	0.2	1.6	1.1	0.7	0.0
Delay (s)	26.5	26.2	21.4	8.0	8.8	4.5
Level of Service	C	C	C	A	A	A
Approach Delay (s)	26.2			9.2	8.6	
Approach LOS	C			A	A	

Intersection Summary

HCM Average Control Delay	9.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

4: Springhill Road & Pleasant Hill Road

Existing PM Peak

3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↔		↖	↑↑	↗	↖	↑↑	↗
Volume (vph)	19	2	87	22	0	6	123	2017	33	14	846	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1550	1550	1550
Total Lost time (s)		3.5	3.5		3.5		3.5	4.1	4.1	3.5	4.1	4.1
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Fr _t		1.00	0.85		0.97		1.00	1.00	0.85	1.00	1.00	0.85
Fl _t Protected		0.96	1.00		0.96		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1781	1583		1739		1770	3539	1583	1444	2887	1292
Fl _t Permitted		0.77	1.00		0.76		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1431	1583		1368		1770	3539	1583	1444	2887	1292
Peak-hour factor, PHF	0.81	0.81	0.81	0.78	0.78	0.78	0.96	0.96	0.96	0.94	0.94	0.94
Adj. Flow (vph)	23	2	107	28	0	8	128	2101	34	15	900	26
RTOR Reduction (vph)	0	0	98	0	7	0	0	0	3	0	0	7
Lane Group Flow (vph)	0	25	9	0	29	0	128	2101	31	15	900	19
Turn Type	Perm		Perm	Perm			Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2		1		6
Permitted Phases	8		8	4					2			6
Actuated Green, G (s)		5.0	5.0		5.0		7.0	44.7	44.7	1.2	38.9	38.9
Effective Green, g (s)		5.0	5.0		5.0		7.0	44.7	44.7	1.2	38.9	38.9
Actuated g/C Ratio		0.08	0.08		0.08		0.11	0.72	0.72	0.02	0.63	0.63
Clearance Time (s)		3.5	3.5		3.5		3.5	4.1	4.1	3.5	4.1	4.1
Vehicle Extension (s)		2.0	2.0		2.0		1.0	4.0	4.0	1.5	4.0	4.0
Lane Grp Cap (vph)		115	128		110		200	2552	1141	28	1811	811
v/s Ratio Prot							c0.07	c0.59		0.01	0.31	
v/s Ratio Perm		0.02	0.01		c0.02				0.02			0.01
v/c Ratio		0.22	0.07		0.26		0.64	0.82	0.03	0.54	0.50	0.02
Uniform Delay, d ₁		26.7	26.3		26.8		26.3	5.9	2.5	30.1	6.3	4.4
Progression Factor		1.00	1.00		1.00		0.72	2.34	1.73	1.44	0.42	0.03
Incremental Delay, d ₂		0.3	0.1		0.5		2.2	1.3	0.0	9.0	0.9	0.1
Delay (s)		27.0	26.4		27.2		21.0	15.3	4.3	52.4	3.5	0.2
Level of Service		C	C		C		C	B	A	D	A	A
Approach Delay (s)		26.5			27.2			15.4			4.2	
Approach LOS		C			C			B			A	

Intersection Summary

HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

5: Deer Hill Road & Pleasant Hill Road

Existing PM Peak

3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	646	89	51	184	67	150	22	18	1408	183	8	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	*0.92	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.95		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1761		1681	1729	1557		1770	3427	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1761		1681	1729	1557		1770	3427	1196		1397
Peak-hour factor, PHF	0.95	0.95	0.95	0.84	0.84	0.84	0.97	0.97	0.97	0.97	0.90	0.90
Adj. Flow (vph)	680	94	54	219	80	179	23	19	1452	189	9	109
RTOR Reduction (vph)	0	16	0	0	0	51	0	0	0	69	0	0
Lane Group Flow (vph)	680	132	0	147	152	128	0	42	1452	120	0	118
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	29.1	29.1		15.9	15.9	15.9		6.4	48.4	48.4		13.6
Effective Green, g (s)	29.1	29.1		15.9	15.9	15.9		6.4	48.4	48.4		13.6
Actuated g/C Ratio	0.23	0.23		0.13	0.13	0.13		0.05	0.39	0.39		0.11
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	806	413		216	222	200		91	1338	467		153
v/s Ratio Prot	c0.20	0.07		0.09	c0.09			0.02	c0.42			c0.08
v/s Ratio Perm						0.08				0.10		
v/c Ratio	0.84	0.32		0.68	0.68	0.64		0.46	1.09	0.26		0.77
Uniform Delay, d1	45.3	39.3		51.6	51.7	51.3		57.1	37.8	25.6		53.7
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.08
Incremental Delay, d2	7.7	0.2		6.8	6.8	4.8		1.3	51.2	1.3		18.1
Delay (s)	53.0	39.4		58.5	58.4	56.1		58.5	89.0	26.9		75.8
Level of Service	D	D		E	E	E		E	F	C		E
Approach Delay (s)		50.6			57.6				81.3			
Approach LOS		D			E				F			

Intersection Summary

HCM Average Control Delay	58.5	HCM Level of Service	E
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	88.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 5: Deer Hill Road & Pleasant Hill Road

Existing PM Peak
 3/7/2012



Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	640	181
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frbp, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2794	1250
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2794	1250
Peak-hour factor, PHF	0.90	0.90
Adj. Flow (vph)	711	201
RTOR Reduction (vph)	0	41
Lane Group Flow (vph)	711	160
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	55.6	55.6
Effective Green, g (s)	55.6	55.6
Actuated g/C Ratio	0.45	0.45
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	1253	560
v/s Ratio Prot	0.25	
v/s Ratio Perm		0.13
v/c Ratio	0.57	0.29
Uniform Delay, d1	25.3	21.6
Progression Factor	0.82	0.85
Incremental Delay, d2	1.7	1.2
Delay (s)	22.4	19.6
Level of Service	C	B
Approach Delay (s)	28.0	
Approach LOS	C	

Intersection Summary

HCM Signalized Intersection Capacity Analysis

6: Mt. Diablo Boulevard & Pleasant Hill Road

Existing PM Peak

3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗				↘	↑↑	↗		↑↑	↗
Volume (vph)	197	430	234	0	0	0	207	488	232	0	536	402
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00				1.00	0.95	1.00		0.95	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770	3539	1583				1770	3539	1583		3539	1583
Flt Permitted	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770	3539	1583				1770	3539	1583		3539	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.92	0.92	0.92	0.96	0.96	0.96	0.94	0.94	0.94
Adj. Flow (vph)	216	473	257	0	0	0	216	508	242	0	570	428
RTOR Reduction (vph)	0	0	167	0	0	0	0	0	72	0	0	256
Lane Group Flow (vph)	216	473	90	0	0	0	216	508	170	0	570	172
Turn Type	Perm		Perm				Prot		Perm			Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2			6
Actuated Green, G (s)	16.0	16.0	16.0				12.4	44.5	44.5		28.1	28.1
Effective Green, g (s)	16.0	16.0	16.0				12.4	44.5	44.5		28.1	28.1
Actuated g/C Ratio	0.23	0.23	0.23				0.18	0.64	0.64		0.40	0.40
Clearance Time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	405	809	362				314	2250	1006		1421	635
v/s Ratio Prot		c0.13					c0.12	0.14			c0.16	
v/s Ratio Perm	0.12		0.06						0.11			0.11
v/c Ratio	0.53	0.58	0.25				0.69	0.23	0.17		0.40	0.27
Uniform Delay, d1	23.7	24.0	22.1				27.0	5.4	5.2		14.9	14.1
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.7	0.7	0.1				4.9	0.2	0.4		0.8	1.0
Delay (s)	24.4	24.7	22.2				31.9	5.7	5.6		15.8	15.1
Level of Service	C	C	C				C	A	A		B	B
Approach Delay (s)		24.0			0.0			11.5			15.5	
Approach LOS		C			A			B			B	

Intersection Summary

HCM Average Control Delay	16.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: SR 24 EB Off Ramp & Pleasant Hill Road

Existing PM Peak
3/7/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖		↗		↕↗↖		↖	↕↗	
Volume (vph)	54	49	265	26	0	160	0	739	15	106	664	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00	1.00		1.00		0.91		1.00	0.95	
Frt		1.00	0.85	1.00		0.85		1.00		1.00	1.00	
Flt Protected		0.97	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1815	1583	1770		1583		5070		1770	3539	
Flt Permitted		0.97	1.00	0.68		1.00		1.00		0.95	1.00	
Satd. Flow (perm)		1815	1583	1275		1583		5070		1770	3539	
Peak-hour factor, PHF	0.91	0.91	0.91	0.86	0.86	0.86	0.98	0.98	0.98	0.91	0.91	0.91
Adj. Flow (vph)	59	54	291	30	0	186	0	754	15	116	730	0
RTOR Reduction (vph)	0	0	238	0	0	159	0	3	0	0	0	0
Lane Group Flow (vph)	0	113	53	30	0	27	0	766	0	116	730	0
Turn Type	Split		Perm	custom		custom				Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4	8		8						
Actuated Green, G (s)		9.3	9.3	7.3		7.3		14.0		4.5	22.5	
Effective Green, g (s)		9.3	9.3	7.3		7.3		14.0		4.5	22.5	
Actuated g/C Ratio		0.18	0.18	0.14		0.14		0.27		0.09	0.44	
Clearance Time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		330	288	182		226		1389		156	1558	
v/s Ratio Prot		c0.06						0.15		c0.07	c0.21	
v/s Ratio Perm			0.03	c0.02		0.02						
v/c Ratio		0.34	0.18	0.16		0.12		0.55		0.74	0.47	
Uniform Delay, d1		18.2	17.7	19.2		19.1		15.9		22.7	10.1	
Progression Factor		1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2		0.6	0.3	0.4		0.2		0.5		17.3	0.2	
Delay (s)		18.9	18.0	19.7		19.3		16.3		40.1	10.3	
Level of Service		B	B	B		B		B		D	B	
Approach Delay (s)		18.2			19.4			16.3			14.4	
Approach LOS		B			B			B			B	





















Intersection Summary

HCM Average Control Delay	16.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	51.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis

8: Deer Hill Road & Brown Avenue

Existing PM Peak
3/7/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	612	49	104	292	85	57	8	107	61	12	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.94	0.94	0.94	0.98	0.98	0.98	0.85	0.85	0.85
Hourly flow rate (vph)	51	680	54	111	311	90	58	8	109	72	14	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None					None						
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	401			734			1371	1432	707	1473	1414	356
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	401			734			1371	1432	707	1473	1414	356
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			87			39	93	75	0	88	97
cM capacity (veh/h)	1158			871			95	112	435	65	115	688
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1					
Volume Total	51	734	111	401	66	109	108					
Volume Left	51	0	111	0	58	0	72					
Volume Right	0	54	0	90	0	109	22					
cSH	1158	1700	871	1700	97	435	86					
Volume to Capacity	0.04	0.43	0.13	0.24	0.69	0.25	1.26					
Queue Length 95th (ft)	3	0	11	0	86	25	198					
Control Delay (s)	8.3	0.0	9.7	0.0	100.3	16.0	271.1					
Lane LOS	A		A		F	C	F					
Approach Delay (s)	0.5		2.1		47.9		271.1					
Approach LOS					E		F					
Intersection Summary												
Average Delay			24.8									
Intersection Capacity Utilization			62.8%		ICU Level of Service			B				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

9: Deer Hill Road & Sierra Vista Way

Existing PM Peak

3/7/2012

























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	560	1296	84	234	2	166	14	116	5	24	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1861		1681	1698	1583		1790	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	
Satd. Flow (perm)	1770	1863	1583	1770	1861		1681	1698	1583		1790	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	609	1409	91	254	2	180	15	126	5	26	10
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	108	0	9	0
Lane Group Flow (vph)	23	609	1409	91	255	0	97	98	18	0	32	0
Turn Type	Prot		Free	Prot			Split		Perm		Split	
Protected Phases	7	4		3	8		2	2			6	6
Permitted Phases			Free						2			
Actuated Green, G (s)	1.9	28.7	65.5	5.0	31.8		9.1	9.1	9.1		6.7	
Effective Green, g (s)	1.9	28.7	65.5	5.0	31.8		9.1	9.1	9.1		6.7	
Actuated g/C Ratio	0.03	0.44	1.00	0.08	0.49		0.14	0.14	0.14		0.10	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	51	816	1583	135	904		234	236	220		183	
v/s Ratio Prot	0.01	0.33		0.05	0.14		0.06	0.06			0.02	
v/s Ratio Perm			c0.89						0.01			
v/c Ratio	0.45	0.75	0.89	0.67	0.28		0.41	0.42	0.08		0.17	
Uniform Delay, d1	31.3	15.4	0.0	29.5	10.0		25.8	25.8	24.6		26.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	6.2	3.7	7.9	12.5	0.2		1.2	1.2	0.2		0.5	
Delay (s)	37.5	19.1	7.9	42.0	10.2		27.0	27.0	24.7		27.3	
Level of Service	D	B	A	D	B		C	C	C		C	
Approach Delay (s)		11.6			18.5			26.1			27.3	
Approach LOS		B			B			C			C	

Intersection Summary

HCM Average Control Delay	14.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	65.5	Sum of lost time (s)	0.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 10: Deer Hill Road & Laurel Drive


















Existing PM Peak
 3/7/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	1109	248	176	224	3	510	6	783	19	1	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	0.88		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1770	3539	1583	1770	3533		1681	1687	2787		1727	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (perm)	1770	3539	1583	1770	3533		1681	1687	2787		1727	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	1205	270	191	243	3	554	7	851	21	1	10
RTOR Reduction (vph)	0	0	110	0	1	0	0	0	592	0	8	0
Lane Group Flow (vph)	18	1205	160	191	245	0	283	278	259	0	24	0
Turn Type	Prot		Perm	Prot			Split		Perm	Split		
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4						2			
Actuated Green, G (s)	1.6	33.4	33.4	10.0	41.8		17.0	17.0	17.0		16.0	
Effective Green, g (s)	1.6	33.4	33.4	10.0	41.8		17.0	17.0	17.0		16.0	
Actuated g/C Ratio	0.02	0.36	0.36	0.11	0.45		0.18	0.18	0.18		0.17	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	31	1279	572	192	1598		309	310	513		299	
v/s Ratio Prot	0.01	c0.34		c0.11	0.07		c0.17	0.16			c0.01	
v/s Ratio Perm			0.10						0.09			
v/c Ratio	0.58	0.94	0.28	0.99	0.15		0.92	0.90	0.50		0.08	
Uniform Delay, d1	45.1	28.6	21.0	41.2	14.9		37.0	36.8	33.9		32.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	24.7	13.6	0.3	63.1	0.0		33.6	30.5	3.5		0.5	
Delay (s)	69.8	42.2	21.2	104.3	14.9		70.6	67.3	37.4		32.5	
Level of Service	E	D	C	F	B		E	E	D		C	
Approach Delay (s)		38.7			54.0			50.0			32.5	
Approach LOS		D			D			D			C	
Intersection Summary												
HCM Average Control Delay			45.3			HCM Level of Service			D			
HCM Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			92.4			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			71.4%			ICU Level of Service			C			
Analysis Period (min)			15									
c	Critical Lane Group											

Appendix D – Level of Service Worksheets: Existing plus Project Conditions

HCM Signalized Intersection Capacity Analysis
 1: Rancho View Drive & Pleasant Hill Road

Existing+Proj AM Peak
 3/8/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	34	0	0	0	15	537	0	0	1336	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	5.0			5.0	
Lane Util. Factor		1.00					1.00	0.95			0.95	
Frt		0.86					1.00	1.00			1.00	
Flt Protected		1.00					0.95	1.00			1.00	
Satd. Flow (prot)		1611					1770	3539			3536	
Flt Permitted		1.00					0.95	1.00			1.00	
Satd. Flow (perm)		1611					1770	3539			3536	
Peak-hour factor, PHF	0.65	0.65	0.65	0.92	0.92	0.92	0.79	0.79	0.79	0.66	0.66	0.66
Adj. Flow (vph)	0	0	52	0	0	0	19	680	0	0	2024	14
RTOR Reduction (vph)	0	49	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	3	0	0	0	0	19	680	0	0	2037	0
Turn Type	Perm		Perm			Prot						
Protected Phases		8			4		5	2			6	
Permitted Phases	8			4								
Actuated Green, G (s)		3.0					1.3	50.0			44.7	
Effective Green, g (s)		3.0					1.3	50.0			44.7	
Actuated g/C Ratio		0.05					0.02	0.81			0.72	
Clearance Time (s)		4.0					4.0	5.0			5.0	
Vehicle Extension (s)		2.5					2.0	4.0			4.0	
Lane Grp Cap (vph)		78					37	2854			2549	
v/s Ratio Prot		c0.00					0.01	c0.19			c0.58	
v/s Ratio Perm												
v/c Ratio		0.03					0.51	0.24			0.80	
Uniform Delay, d1		28.1					30.0	1.4			5.7	
Progression Factor		1.00					0.86	1.30			1.00	
Incremental Delay, d2		0.1					4.9	0.2			2.7	
Delay (s)		28.2					30.7	2.1			8.4	
Level of Service		C					C	A			A	
Approach Delay (s)		28.2			0.0			2.8			8.4	
Approach LOS		C			A			A			A	
Intersection Summary												
HCM Average Control Delay			7.4				HCM Level of Service				A	
HCM Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			62.0				Sum of lost time (s)				9.0	
Intersection Capacity Utilization			48.1%				ICU Level of Service				A	
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis

2: Greenvally Drive & Pleasant Hill Road

Existing+Proj AM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕↕	↕	↕	↕↕	↕
Volume (vph)	2	0	5	17	0	9	0	602	12	7	1486	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			4.0	4.0		5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00	1.00	0.95	1.00
Frt		0.90			1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99			0.95	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1653			1770	1583		3539	1583	1770	3539	1583
Flt Permitted		0.91			1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1531			1863	1583		3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.88	0.88	0.88	0.65	0.65	0.65	0.95	0.95	0.95	0.94	0.94	0.94
Adj. Flow (vph)	2	0	6	26	0	14	0	634	13	7	1581	1
RTOR Reduction (vph)	0	6	0	0	0	13	0	0	4	0	0	0
Lane Group Flow (vph)	0	2	0	0	26	1	0	634	9	7	1581	1
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2			1	6
Permitted Phases	8			4		4			2			6
Actuated Green, G (s)		3.7			2.7	2.7		45.2	45.2	1.1	50.3	50.3
Effective Green, g (s)		3.7			2.7	2.7		45.2	45.2	1.1	50.3	50.3
Actuated g/C Ratio		0.06			0.04	0.04		0.73	0.73	0.02	0.81	0.81
Clearance Time (s)		3.0			4.0	4.0		5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5			2.0	2.0		4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)		91			81	69		2580	1154	31	2871	1284
v/s Ratio Prot								0.18		0.00	c0.45	
v/s Ratio Perm		0.00			c0.01	0.00			0.01			0.00
v/c Ratio		0.03			0.32	0.01		0.25	0.01	0.23	0.55	0.00
Uniform Delay, d1		27.5			28.8	28.4		2.8	2.3	30.0	2.0	1.1
Progression Factor		1.00			1.00	1.00		1.96	2.49	0.95	2.26	1.18
Incremental Delay, d2		0.1			0.8	0.0		0.2	0.0	1.0	0.6	0.0
Delay (s)		27.5			29.6	28.4		5.7	5.7	29.5	5.1	1.3
Level of Service		C			C	C		A	A	C	A	A
Approach Delay (s)		27.5			29.2			5.7			5.2	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	5.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

3: Reliez Valle Road & Pleasant Hill Road

Existing+Proj AM Peak

3/8/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	22	224	94	603	1579	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.74	0.74	0.84	0.84	0.79	0.79
Adj. Flow (vph)	30	303	112	718	1999	13
RTOR Reduction (vph)	0	96	0	0	0	2
Lane Group Flow (vph)	30	207	112	718	1999	11
Turn Type		Perm	Prot			Perm
Protected Phases	8		5	2	6	
Permitted Phases		8				6
Actuated Green, G (s)	19.5	19.5	10.4	95.5	81.1	81.1
Effective Green, g (s)	19.5	19.5	10.4	95.5	81.1	81.1
Actuated g/C Ratio	0.16	0.16	0.08	0.77	0.65	0.65
Clearance Time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	2.5	2.5	2.0	4.0	4.0	4.0
Lane Grp Cap (vph)	278	249	148	2726	2315	1035
v/s Ratio Prot	0.02		c0.06	0.20	c0.56	
v/s Ratio Perm		c0.13				0.01
v/c Ratio	0.11	0.83	0.76	0.26	0.86	0.01
Uniform Delay, d1	44.8	50.7	55.6	4.1	17.1	7.5
Progression Factor	1.00	1.00	0.95	0.98	1.03	1.15
Incremental Delay, d2	0.1	20.1	17.5	0.2	4.3	0.0
Delay (s)	44.9	70.7	70.3	4.2	21.9	8.6
Level of Service	D	E	E	A	C	A
Approach Delay (s)	68.4			13.2	21.8	
Approach LOS	E			B	C	

Intersection Summary

HCM Average Control Delay	24.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Springhill Road & Pleasant Hill Road

Existing+Proj AM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↕	↗		↔			↖	↑↑	↗	↖	↑↑
Volume (vph)	58	5	119	66	24	10	26	75	514	46	39	1869
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1550	1550
Total Lost time (s)		3.5	3.5		3.5			3.5	4.1	4.1	3.5	4.1
Lane Util. Factor		1.00	1.00		1.00			*0.92	0.95	1.00	1.00	0.95
Frt		1.00	0.85		0.99			1.00	1.00	0.85	1.00	1.00
Flt Protected		0.96	1.00		0.97			0.95	1.00	1.00	0.95	1.00
Satd. Flow (prot)		1781	1583		1779			1628	3539	1583	1444	2887
Flt Permitted		0.68	1.00		0.71			0.95	1.00	1.00	0.95	1.00
Satd. Flow (perm)		1260	1583		1302			1628	3539	1583	1444	2887
Peak-hour factor, PHF	0.88	0.88	0.88	0.75	0.75	0.75	0.92	0.94	0.94	0.94	0.97	0.97
Adj. Flow (vph)	66	6	135	88	32	13	28	80	547	49	40	1927
RTOR Reduction (vph)	0	0	93	0	3	0	0	0	0	13	0	0
Lane Group Flow (vph)	0	72	42	0	130	0	0	108	547	36	40	1927
Turn Type	Perm		Perm	Perm			Prot	Prot		Perm	Prot	
Protected Phases		8			4		5	5	2		1	6
Permitted Phases	8		8	4						2		
Actuated Green, G (s)		15.7	15.7		15.7			11.7	90.6	90.6	6.6	85.5
Effective Green, g (s)		15.7	15.7		15.7			11.7	90.6	90.6	6.6	85.5
Actuated g/C Ratio		0.13	0.13		0.13			0.09	0.73	0.73	0.05	0.69
Clearance Time (s)		3.5	3.5		3.5			3.5	4.1	4.1	3.5	4.1
Vehicle Extension (s)		2.0	2.0		2.0			1.0	4.0	4.0	1.5	4.0
Lane Grp Cap (vph)		160	200		165			154	2586	1157	77	1991
v/s Ratio Prot								c0.07	0.15		0.03	c0.67
v/s Ratio Perm		0.06	0.03		c0.10					0.02		
v/c Ratio		0.45	0.21		0.78			0.70	0.21	0.03	0.52	0.97
Uniform Delay, d1		50.2	48.6		52.5			54.5	5.3	4.6	57.2	18.0
Progression Factor		1.00	1.00		1.00			0.86	1.61	3.26	1.19	0.43
Incremental Delay, d2		0.7	0.2		19.8			9.9	0.2	0.0	1.2	8.5
Delay (s)		50.9	48.8		72.3			56.6	8.7	15.1	69.4	16.3
Level of Service		D	D		E			E	A	B	E	B
Approach Delay (s)		49.5			72.3				16.5			16.8
Approach LOS		D			E				B			B

Intersection Summary

HCM Average Control Delay	21.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	11.1
Intersection Capacity Utilization	95.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR
Lane Configurations	7
Volume (vph)	71
Ideal Flow (vphpl)	1550
Total Lost time (s)	4.1
Lane Util. Factor	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1292
Flt Permitted	1.00
Satd. Flow (perm)	1292
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	73
RTOR Reduction (vph)	6
Lane Group Flow (vph)	67
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	85.5
Effective Green, g (s)	85.5
Actuated g/C Ratio	0.69
Clearance Time (s)	4.1
Vehicle Extension (s)	4.0
Lane Grp Cap (vph)	891
v/s Ratio Prot	
v/s Ratio Perm	0.05
v/c Ratio	0.08
Uniform Delay, d1	6.3
Progression Factor	0.27
Incremental Delay, d2	0.1
Delay (s)	1.8
Level of Service	A
Approach Delay (s)	
Approach LOS	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Existing+Proj AM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations	↖↗	↖		↖	↖	↖		↖	↖↗	↖		↖
Volume (vph)	173	58	82	237	102	42	41	100	569	181	49	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	0.95	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.91		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1699		1681	1734	1559		1770	3539	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1699		1681	1734	1559		1770	3539	1196		1397
Peak-hour factor, PHF	0.54	0.54	0.54	0.67	0.67	0.67	0.64	0.64	0.64	0.64	0.78	0.78
Adj. Flow (vph)	320	107	152	354	152	63	64	156	889	283	63	95
RTOR Reduction (vph)	0	44	0	0	0	52	0	0	0	172	0	0
Lane Group Flow (vph)	320	215	0	248	258	11	0	220	889	111	0	158
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	19.8	19.8		21.8	21.8	21.8		20.3	48.5	48.5		16.9
Effective Green, g (s)	19.8	19.8		21.8	21.8	21.8		20.3	48.5	48.5		16.9
Actuated g/C Ratio	0.16	0.16		0.18	0.18	0.18		0.16	0.39	0.39		0.14
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	548	271		296	305	274		290	1384	468		190
v/s Ratio Prot	0.09	c0.13		0.15	c0.15			0.12	c0.25			c0.11
v/s Ratio Perm						0.01				0.09		
v/c Ratio	0.58	0.79		0.84	0.85	0.04		0.76	0.64	0.24		0.83
Uniform Delay, d1	48.3	50.1		49.4	49.5	42.4		49.5	30.7	25.3		52.2
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		0.87
Incremental Delay, d2	1.0	13.8		17.6	18.3	0.0		9.7	2.3	1.2		17.7
Delay (s)	49.3	64.0		67.0	67.7	42.4		59.2	33.0	26.5		63.2
Level of Service	D	E		E	E	D		E	C	C		E
Approach Delay (s)		55.9			64.6				35.8			
Approach LOS		E			E				D			

Intersection Summary

HCM Average Control Delay	198.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	89.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Existing+Proj AM Peak
3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	1419	553
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frbp, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2794	1250
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2794	1250
Peak-hour factor, PHF	0.78	0.78
Adj. Flow (vph)	1819	709
RTOR Reduction (vph)	0	63
Lane Group Flow (vph)	1819	646
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	45.1	45.1
Effective Green, g (s)	45.1	45.1
Actuated g/C Ratio	0.36	0.36
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	1016	455
v/s Ratio Prot	c0.65	
v/s Ratio Perm		0.52
v/c Ratio	1.79	1.42
Uniform Delay, d1	39.5	39.5
Progression Factor	1.16	1.22
Incremental Delay, d2	358.3	197.5
Delay (s)	404.3	245.5
Level of Service	F	F
Approach Delay (s)	342.3	
Approach LOS	F	
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

5: Deer Hill Road & Pleasant Hill Road

Existing+Proj AM Peak_Alt 1

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	173	58	82	237	102	42	41	100	569	181	49	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	0.95	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.91		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1699		1681	1734	1559		1770	3539	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1699		1681	1734	1559		1770	3539	1196		1397
Peak-hour factor, PHF	0.54	0.54	0.54	0.67	0.67	0.67	0.64	0.64	0.64	0.64	0.78	0.78
Adj. Flow (vph)	320	107	152	354	152	63	64	156	889	283	63	95
RTOR Reduction (vph)	0	45	0	0	0	53	0	0	0	170	0	0
Lane Group Flow (vph)	320	214	0	248	258	10	0	220	889	113	0	158
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	20.3	20.3		20.2	20.2	20.2		18.5	49.1	49.1		17.4
Effective Green, g (s)	20.3	20.3		20.2	20.2	20.2		18.5	49.1	49.1		17.4
Actuated g/C Ratio	0.16	0.16		0.16	0.16	0.16		0.15	0.40	0.40		0.14
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	562	278		274	282	254		264	1401	474		196
v/s Ratio Prot	0.09	c0.13		0.15	c0.15			c0.12	0.25			0.11
v/s Ratio Perm						0.01				0.09		
v/c Ratio	0.57	0.77		0.91	0.91	0.04		0.83	0.63	0.24		0.81
Uniform Delay, d1	47.8	49.6		51.0	51.1	43.7		51.3	30.2	25.0		51.7
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		0.86
Incremental Delay, d2	0.8	10.9		30.1	31.5	0.0		18.9	2.2	1.2		14.2
Delay (s)	48.6	60.5		81.1	82.6	43.8		70.1	32.4	26.2		58.8
Level of Service	D	E		F	F	D		E	C	C		E
Approach Delay (s)		53.9			77.6				37.1			
Approach LOS		D			E				D			

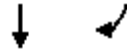
Intersection Summary

HCM Average Control Delay	192.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 5: Deer Hill Road & Pleasant Hill Road

Existing+Proj AM Peak_Alt 1
 3/8/2012

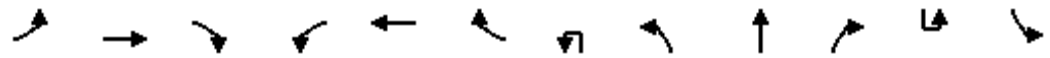


Movement	SBT	SBR
Lane Configurations	↑↑↑	↘
Volume (vph)	1419	553
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	
Lane Util. Factor	0.91	
Frbp, ped/bikes	1.00	
Flpb, ped/bikes	1.00	
Frt	0.96	
Flt Protected	1.00	
Satd. Flow (prot)	3846	
Flt Permitted	1.00	
Satd. Flow (perm)	3846	
Peak-hour factor, PHF	0.78	0.78
Adj. Flow (vph)	1819	709
RTOR Reduction (vph)	57	0
Lane Group Flow (vph)	2471	0
Confl. Peds. (#/hr)		
Turn Type		
Protected Phases	6	
Permitted Phases		
Actuated Green, G (s)	48.0	
Effective Green, g (s)	48.0	
Actuated g/C Ratio	0.39	
Clearance Time (s)	5.0	
Vehicle Extension (s)	4.0	
Lane Grp Cap (vph)	1489	
v/s Ratio Prot	c0.64	
v/s Ratio Perm		
v/c Ratio	1.66	
Uniform Delay, d1	38.0	
Progression Factor	1.19	
Incremental Delay, d2	298.8	
Delay (s)	344.0	
Level of Service	F	
Approach Delay (s)	327.2	
Approach LOS	F	
Intersection Summary		

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Existing+Proj AM Peak_Alt2

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	173	58	82	237	102	42	51	109	569	181	49	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	0.95	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.91		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1699		1681	1734	1559		1770	3539	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1699		1681	1734	1559		1770	3539	1196		1397
Peak-hour factor, PHF	0.54	0.54	0.54	0.67	0.67	0.67	0.64	0.64	0.64	0.64	0.78	0.78
Adj. Flow (vph)	320	107	152	354	152	63	80	170	889	283	63	95
RTOR Reduction (vph)	0	44	0	0	0	52	0	0	0	172	0	0
Lane Group Flow (vph)	320	215	0	248	258	11	0	250	889	111	0	158
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	19.8	19.8		21.8	21.8	21.8		22.4	48.5	48.5		16.9
Effective Green, g (s)	19.8	19.8		21.8	21.8	21.8		22.4	48.5	48.5		16.9
Actuated g/C Ratio	0.16	0.16		0.18	0.18	0.18		0.18	0.39	0.39		0.14
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	548	271		296	305	274		320	1384	468		190
v/s Ratio Prot	0.09	c0.13		0.15	c0.15			c0.14	0.25			0.11
v/s Ratio Perm						0.01				0.09		
v/c Ratio	0.58	0.79		0.84	0.85	0.04		0.78	0.64	0.24		0.83
Uniform Delay, d1	48.3	50.1		49.4	49.5	42.4		48.5	30.7	25.3		52.2
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		0.87
Incremental Delay, d2	1.0	13.8		17.6	18.3	0.0		10.9	2.3	1.2		17.7
Delay (s)	49.3	64.0		67.0	67.7	42.4		59.3	33.0	26.5		63.2
Level of Service	D	E		E	E	D		E	C	C		E
Approach Delay (s)		55.9			64.6				36.3			
Approach LOS		E			E				D			

Intersection Summary

HCM Average Control Delay	216.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	90.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 5: Deer Hill Road & Pleasant Hill Road

Existing+Proj AM Peak_Alt2
 3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	1419	553
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frbp, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2794	1250
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2794	1250
Peak-hour factor, PHF	0.78	0.78
Adj. Flow (vph)	1819	709
RTOR Reduction (vph)	0	65
Lane Group Flow (vph)	1819	644
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	43.0	43.0
Effective Green, g (s)	43.0	43.0
Actuated g/C Ratio	0.35	0.35
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	969	433
v/s Ratio Prot	c0.65	
v/s Ratio Perm		0.52
v/c Ratio	1.88	1.49
Uniform Delay, d1	40.5	40.5
Progression Factor	1.17	1.21
Incremental Delay, d2	397.4	227.9
Delay (s)	444.7	276.8
Level of Service	F	F
Approach Delay (s)	377.9	
Approach LOS	F	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Boulevard & Pleasant Hill Road

Existing+Proj AM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗				↘	↑↑	↗		↑↑	↗
Volume (vph)	212	216	60	0	0	0	224	693	396	0	512	528
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00				1.00	0.95	1.00		0.95	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770	3539	1583				1770	3539	1583		3539	1583
Flt Permitted	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770	3539	1583				1770	3539	1583		3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.96	0.96	0.96	0.94	0.94	0.94
Adj. Flow (vph)	236	240	67	0	0	0	233	722	412	0	545	562
RTOR Reduction (vph)	0	0	53	0	0	0	0	0	114	0	0	332
Lane Group Flow (vph)	236	240	14	0	0	0	233	722	298	0	545	230
Turn Type	Perm		Perm				Prot		Perm			Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2			6
Actuated Green, G (s)	14.3	14.3	14.3				13.5	46.2	46.2		28.7	28.7
Effective Green, g (s)	14.3	14.3	14.3				13.5	46.2	46.2		28.7	28.7
Actuated g/C Ratio	0.20	0.20	0.20				0.19	0.66	0.66		0.41	0.41
Clearance Time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	362	723	323				341	2336	1045		1451	649
v/s Ratio Prot		0.07					c0.13	0.20			c0.15	
v/s Ratio Perm	c0.13		0.01						0.19			0.15
v/c Ratio	0.65	0.33	0.04				0.68	0.31	0.29		0.38	0.36
Uniform Delay, d1	25.6	23.8	22.4				26.3	5.1	5.0		14.4	14.3
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.2	0.1	0.0				4.5	0.3	0.7		0.7	1.5
Delay (s)	28.8	23.9	22.4				30.7	5.4	5.7		15.1	15.8
Level of Service	C	C	C				C	A	A		B	B
Approach Delay (s)		25.8			0.0			9.8			15.5	
Approach LOS		C			A			A			B	

Intersection Summary

HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: SR 24 EB Off Ramp & Pleasant Hill Road

Existing+Proj AM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖		↗		↕↕↕		↖	↕↕	
Volume (vph)	16	32	132	12	0	136	0	1025	20	80	468	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00	1.00		1.00		0.91		1.00	0.95	
Frt		1.00	0.85	1.00		0.85		1.00		1.00	1.00	
Flt Protected		0.98	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1833	1583	1770		1583		5070		1770	3539	
Flt Permitted		0.98	1.00	0.74		1.00		1.00		0.95	1.00	
Satd. Flow (perm)		1833	1583	1380		1583		5070		1770	3539	
Peak-hour factor, PHF	0.87	0.87	0.87	0.86	0.86	0.86	0.97	0.97	0.97	0.96	0.96	0.96
Adj. Flow (vph)	18	37	152	14	0	158	0	1057	21	83	488	0
RTOR Reduction (vph)	0	0	136	0	0	142	0	2	0	0	0	0
Lane Group Flow (vph)	0	55	16	14	0	16	0	1076	0	83	488	0
Turn Type	Split		Perm	custom		custom				Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4	8		8						
Actuated Green, G (s)		5.9	5.9	5.4		5.4		23.3		4.1	31.4	
Effective Green, g (s)		5.9	5.9	5.4		5.4		23.3		4.1	31.4	
Actuated g/C Ratio		0.11	0.11	0.10		0.10		0.43		0.07	0.57	
Clearance Time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		198	171	136		156		2160		133	2032	
v/s Ratio Prot		c0.03						c0.21		c0.05	0.14	
v/s Ratio Perm			0.01	c0.01		0.01						
v/c Ratio		0.28	0.10	0.10		0.10		0.50		0.62	0.24	
Uniform Delay, d1		22.4	22.0	22.4		22.4		11.4		24.6	5.8	
Progression Factor		1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2		0.8	0.2	0.3		0.3		0.2		8.8	0.1	
Delay (s)		23.2	22.2	22.8		22.7		11.6		33.4	5.8	
Level of Service		C	C	C		C		B		C	A	
Approach Delay (s)		22.5			22.7			11.6			9.8	
Approach LOS		C			C			B			A	

Intersection Summary





















HCM Average Control Delay	13.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	54.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis

8: Deer Hill Road & Brown Avenue

Existing+Proj AM Peak

3/8/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	26	205	48	172	668	36	85	12	76	28	8	52
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.94	0.94	0.94	0.98	0.98	0.98	0.85	0.85	0.85
Hourly flow rate (vph)	29	228	53	183	711	38	87	12	78	33	9	61
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None					None						
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	749		281				1455	1427	254	1465	1435	730
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	749		281				1455	1427	254	1465	1435	730
tC, single (s)	4.1		4.1				7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2		2.2				3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97		86				0	89	90	57	92	86
cM capacity (veh/h)	860		1281				75	112	784	76	111	422
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1					
Volume Total	29	281	183	749	99	78	104					
Volume Left	29	0	183	0	87	0	33					
Volume Right	0	53	0	38	0	78	61					
cSH	860	1700	1281	1700	78	784	157					
Volume to Capacity	0.03	0.17	0.14	0.44	1.26	0.10	0.66					
Queue Length 95th (ft)	3	0	12	0	188	8	94					
Control Delay (s)	9.3	0.0	8.3	0.0	282.9	10.1	64.3					
Lane LOS	A		A		F	B	F					
Approach Delay (s)	0.9		1.6		163.0		64.3					
Approach LOS					F		F					
Intersection Summary												
Average Delay			24.5									
Intersection Capacity Utilization			62.7%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

9: Deer Hill Road & Sierra Vista Way

Existing+Proj AM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	242	900	142	466	3	261	13	84	8	21	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1861		1681	1693	1583		1732	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	
Satd. Flow (perm)	1770	1863	1583	1770	1861		1681	1693	1583		1732	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	263	978	154	507	3	284	14	91	9	23	28
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	74	0	25	0
Lane Group Flow (vph)	27	263	978	154	510	0	148	150	17	0	36	0
Turn Type	Prot		Free	Prot			Split		Perm		Split	
Protected Phases	7	4		3	8		2	2			6	6
Permitted Phases			Free						2			
Actuated Green, G (s)	1.4	15.1	54.4	6.1	19.8		10.4	10.4	10.4		6.8	
Effective Green, g (s)	1.4	15.1	54.4	6.1	19.8		10.4	10.4	10.4		6.8	
Actuated g/C Ratio	0.03	0.28	1.00	0.11	0.36		0.19	0.19	0.19		0.12	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	46	517	1583	198	677		321	324	303		217	
v/s Ratio Prot	0.02	0.14		0.09	c0.27		0.09	0.09			0.02	
v/s Ratio Perm			c0.62						0.01			
v/c Ratio	0.59	0.51	0.62	0.78	0.75		0.46	0.46	0.06		0.16	
Uniform Delay, d1	26.2	16.5	0.0	23.5	15.2		19.5	19.5	18.0		21.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	17.7	0.8	1.8	17.3	4.7		1.1	1.0	0.1		0.4	
Delay (s)	43.9	17.3	1.8	40.8	19.9		20.6	20.6	18.1		21.6	
Level of Service	D	B	A	D	B		C	C	B		C	
Approach Delay (s)		5.9			24.8			20.0			21.6	
Approach LOS		A			C			B			C	

Intersection Summary

HCM Average Control Delay	13.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	54.4	Sum of lost time (s)	0.0
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
10: Deer Hill Road & Laurel Drive

Existing+Proj AM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	542	284	297	492	3	822	8	537	18	6	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	0.88		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1770	3539	1583	1770	3536		1681	1687	2787		1747	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (perm)	1770	3539	1583	1770	3536		1681	1687	2787		1747	
Peak-hour factor, PHF	0.91	0.91	0.91	0.88	0.88	0.88	0.95	0.95	0.95	0.69	0.69	0.69
Adj. Flow (vph)	1	596	312	338	559	3	865	8	565	26	9	13
RTOR Reduction (vph)	0	0	248	0	1	0	0	0	407	0	11	0
Lane Group Flow (vph)	1	596	64	338	561	0	432	441	158	0	37	0
Turn Type	Prot		Perm	Prot			Split		Perm	Split		
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4						2			
Actuated Green, G (s)	0.8	19.2	19.2	16.0	34.4		26.0	26.0	26.0		16.0	
Effective Green, g (s)	0.8	19.2	19.2	16.0	34.4		26.0	26.0	26.0		16.0	
Actuated g/C Ratio	0.01	0.21	0.21	0.17	0.37		0.28	0.28	0.28		0.17	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	15	729	326	304	1305		469	471	777		300	
v/s Ratio Prot	0.00	c0.17		c0.19	0.16		0.26	c0.26			c0.02	
v/s Ratio Perm			0.04						0.06			
v/c Ratio	0.07	0.82	0.20	1.11	0.43		0.92	0.94	0.20		0.12	
Uniform Delay, d1	45.8	35.3	30.6	38.6	22.0		32.6	32.8	25.7		32.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.9	7.1	0.3	85.1	0.2		25.9	28.3	0.6		0.8	
Delay (s)	47.7	42.4	30.9	123.7	22.3		58.5	61.1	26.3		33.5	
Level of Service	D	D	C	F	C		E	E	C		C	
Approach Delay (s)		38.5			60.4			46.6			33.5	
Approach LOS		D			E			D			C	

Intersection Summary

HCM Average Control Delay	47.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	93.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 11: Project Driveway & Pleasant Hill Road

Existing+Proj AM Peak
 3/8/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗	↖	↑↑↑	↑↑	↖
Volume (veh/h)	0	50	19	948	1707	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	54	21	1030	1855	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					352	
pX, platoon unblocked	0.66	0.66	0.66			
vC, conflicting volume	2240	928	1860			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1843	0	1264			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	92	94			
cM capacity (veh/h)	41	712	358			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	54	21	343	343	343	928	928	4
Volume Left	0	21	0	0	0	0	0	0
Volume Right	54	0	0	0	0	0	0	4
cSH	712	358	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.08	0.06	0.20	0.20	0.20	0.55	0.55	0.00
Queue Length 95th (ft)	6	5	0	0	0	0	0	0
Control Delay (s)	10.5	15.7	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B	C						
Approach Delay (s)	10.5	0.3				0.0		
Approach LOS	B							

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization	60.4%		ICU Level of Service B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 12: Deer Hill Road & Project Driveway Northeast

Existing+Proj AM Peak
 3/8/2012



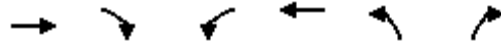
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩		↩	↩	↩	
Volume (veh/h)	304	0	5	791	0	53
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	330	0	5	860	0	58
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				642		
pX, platoon unblocked						
vC, conflicting volume			330		1201	330
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			330		1201	330
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	92
cM capacity (veh/h)			1229		203	711

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	330	5	860	58
Volume Left	0	5	0	0
Volume Right	0	0	0	58
cSH	1700	1229	1700	711
Volume to Capacity	0.19	0.00	0.51	0.08
Queue Length 95th (ft)	0	0	0	7
Control Delay (s)	0.0	7.9	0.0	10.5
Lane LOS		A		B
Approach Delay (s)	0.0	0.0		10.5
Approach LOS				B

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization		51.6%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 13: Deer Hill Road & Project Driveway Southwest

Existing+Proj AM Peak
 3/8/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←	↔	↔
Volume (veh/h)	304	5	0	791	23	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	330	5	0	860	25	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			336		1193	333
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			336		1193	333
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		88	100
cM capacity (veh/h)			1223		206	709

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	336	860	25
Volume Left	0	0	25
Volume Right	5	0	0
cSH	1700	1223	206
Volume to Capacity	0.20	0.00	0.12
Queue Length 95th (ft)	0	0	10
Control Delay (s)	0.0	0.0	24.8
Lane LOS			C
Approach Delay (s)	0.0	0.0	24.8
Approach LOS			C

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization		51.6%	ICU Level of Service A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Road

Existing+Proj School PM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕			↕	
Volume (vph)	19	0	16	0	0	1	27	1302	0	0	751	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	5.0			5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95			0.95	
Frt		0.94			0.86		1.00	1.00			1.00	
Flt Protected		0.97			1.00		0.95	1.00			1.00	
Satd. Flow (prot)		1701			1611		1770	3539			3531	
Flt Permitted		0.83			1.00		0.95	1.00			1.00	
Satd. Flow (perm)		1449			1611		1770	3539			3531	
Peak-hour factor, PHF	0.67	0.67	0.67	0.25	0.25	0.25	0.88	0.88	0.88	0.96	0.96	0.96
Adj. Flow (vph)	28	0	24	0	0	4	31	1480	0	0	782	12
RTOR Reduction (vph)	0	22	0	0	4	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	30	0	0	0	0	31	1480	0	0	793	0
Turn Type	Perm		Perm				Prot					
Protected Phases		8			4		5	2			6	
Permitted Phases	8			4								
Actuated Green, G (s)		4.1			4.1		5.0	48.9			39.9	
Effective Green, g (s)		4.1			4.1		5.0	48.9			39.9	
Actuated g/C Ratio		0.07			0.07		0.08	0.79			0.64	
Clearance Time (s)		4.0			4.0		4.0	5.0			5.0	
Vehicle Extension (s)		2.5			2.0		2.0	4.0			4.0	
Lane Grp Cap (vph)		96			107		143	2791			2272	
v/s Ratio Prot					0.00		0.02	c0.42			0.22	
v/s Ratio Perm		c0.02										
v/c Ratio		0.31			0.00		0.22	0.53			0.35	
Uniform Delay, d1		27.6			27.0		26.7	2.4			5.1	
Progression Factor		1.00			1.00		1.34	2.30			1.00	
Incremental Delay, d2		1.3			0.0		0.2	0.6			0.4	
Delay (s)		28.9			27.0		35.9	6.1			5.5	
Level of Service		C			C		D	A			A	
Approach Delay (s)		28.9			27.0			6.7			5.5	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	6.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Greenvally Drive & Pleasant Hill Road

Existing+Proj School PM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕	↕	↕	↕	↕
Volume (vph)	2	0	4	40	0	17	10	1325	52	35	735	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			4.0	4.0	4.0	5.0	5.0	4.0	5.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt		0.91			1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1667			1770	1583	1770	3539	1583	1770	3539	
Flt Permitted		0.90			0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1532			1774	1583	1770	3539	1583	1770	3539	
Peak-hour factor, PHF	0.50	0.50	0.50	0.72	0.72	0.72	0.90	0.90	0.90	0.96	0.96	0.96
Adj. Flow (vph)	4	0	8	56	0	24	11	1472	58	36	766	0
RTOR Reduction (vph)	0	7	0	0	0	22	0	0	19	0	0	0
Lane Group Flow (vph)	0	5	0	0	56	2	11	1472	39	36	766	0
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2		1		6
Permitted Phases	8			4		4			2			6
Actuated Green, G (s)		5.2			4.2	4.2	1.2	42.0	42.0	2.8		43.6
Effective Green, g (s)		5.2			4.2	4.2	1.2	42.0	42.0	2.8		43.6
Actuated g/C Ratio		0.08			0.07	0.07	0.02	0.68	0.68	0.05		0.70
Clearance Time (s)		3.0			4.0	4.0	4.0	5.0	5.0	4.0		5.0
Vehicle Extension (s)		2.5			2.0	2.0	2.0	4.0	4.0	2.0		4.0
Lane Grp Cap (vph)		128			120	107	34	2397	1072	80		2489
v/s Ratio Prot							0.01	c0.42		c0.02		0.22
v/s Ratio Perm		0.00			c0.03	0.00			0.02			
v/c Ratio		0.04			0.47	0.02	0.32	0.61	0.04	0.45		0.31
Uniform Delay, d1		26.1			27.8	27.0	30.0	5.5	3.3	28.8		3.5
Progression Factor		1.00			1.00	1.00	1.20	0.75	0.59	0.64		2.66
Incremental Delay, d2		0.1			1.0	0.0	1.8	1.1	0.1	1.4		0.3
Delay (s)		26.2			28.9	27.0	37.9	5.2	2.0	19.9		9.6
Level of Service		C			C	C	D	A	A	B		A
Approach Delay (s)		26.2			28.3			5.3				10.0
Approach LOS		C			C			A				B

Intersection Summary

HCM Average Control Delay	7.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

3: Reliez Valle Road & Pleasant Hill Road

Existing+Proj School PM Peak

3/8/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	18	110	127	1357	767	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.81	0.81	0.94	0.94	0.95	0.95
Adj. Flow (vph)	22	136	135	1444	807	21
RTOR Reduction (vph)	0	124	0	0	0	9
Lane Group Flow (vph)	22	12	135	1444	807	12
Turn Type		Perm	Prot			Perm
Protected Phases	8		5	2	6	
Permitted Phases		8				6
Actuated Green, G (s)	5.5	5.5	8.0	47.5	35.5	35.5
Effective Green, g (s)	5.5	5.5	8.0	47.5	35.5	35.5
Actuated g/C Ratio	0.09	0.09	0.13	0.77	0.57	0.57
Clearance Time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	2.5	2.5	2.0	4.0	4.0	4.0
Lane Grp Cap (vph)	157	140	228	2711	2026	906
v/s Ratio Prot	c0.01		0.08	c0.41	0.23	
v/s Ratio Perm		0.01				0.01
v/c Ratio	0.14	0.09	0.59	0.53	0.40	0.01
Uniform Delay, d1	26.1	25.9	25.5	2.9	7.3	5.7
Progression Factor	1.00	1.00	0.84	1.83	0.89	0.52
Incremental Delay, d2	0.3	0.2	2.4	0.7	0.6	0.0
Delay (s)	26.4	26.1	23.8	5.9	7.1	3.0
Level of Service	C	C	C	A	A	A
Approach Delay (s)	26.2			7.4	7.0	
Approach LOS	C			A	A	

Intersection Summary

HCM Average Control Delay	8.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

4: Springhill Road & Pleasant Hill Road

Existing+Proj School PM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↕	↗		↔			↖	↕	↗	↘	↕
Volume (vph)	46	7	102	28	6	7	28	86	1438	49	8	858
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1550	1550
Total Lost time (s)		3.5	3.5		3.5			3.5	4.1	4.1	3.5	4.1
Lane Util. Factor		1.00	1.00		1.00			1.00	0.95	1.00	1.00	0.95
Frt		1.00	0.85		0.98			1.00	1.00	0.85	1.00	1.00
Flt Protected		0.96	1.00		0.97			0.95	1.00	1.00	0.95	1.00
Satd. Flow (prot)		1785	1583		1758			1770	3539	1583	1444	2887
Flt Permitted		0.84	1.00		0.76			0.95	1.00	1.00	0.95	1.00
Satd. Flow (perm)		1563	1583		1378			1770	3539	1583	1444	2887
Peak-hour factor, PHF	0.89	0.89	0.89	0.81	0.81	0.81	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	52	8	115	35	7	9	29	90	1498	51	8	894
RTOR Reduction (vph)	0	0	104	0	8	0	0	0	0	7	0	0
Lane Group Flow (vph)	0	60	12	0	43	0	0	119	1498	44	8	894
Turn Type	Perm		Perm	Perm			Prot	Prot		Perm	Prot	
Protected Phases		8			4		5	5	2		1	6
Permitted Phases	8		8	4						2		
Actuated Green, G (s)		6.2	6.2		6.2			6.8	43.6	43.6	1.1	37.9
Effective Green, g (s)		6.2	6.2		6.2			6.8	43.6	43.6	1.1	37.9
Actuated g/C Ratio		0.10	0.10		0.10			0.11	0.70	0.70	0.02	0.61
Clearance Time (s)		3.5	3.5		3.5			3.5	4.1	4.1	3.5	4.1
Vehicle Extension (s)		2.0	2.0		2.0			1.0	4.0	4.0	1.5	4.0
Lane Grp Cap (vph)		156	158		138			194	2489	1113	26	1765
v/s Ratio Prot								c0.07	c0.42		0.01	0.31
v/s Ratio Perm		c0.04	0.01		0.03					0.03		
v/c Ratio		0.38	0.07		0.31			0.61	0.60	0.04	0.31	0.51
Uniform Delay, d1		26.1	25.3		25.9			26.3	4.7	2.8	30.1	6.8
Progression Factor		1.00	1.00		1.00			0.73	2.09	1.97	1.52	0.61
Incremental Delay, d2		0.6	0.1		0.5			3.0	0.8	0.0	2.3	1.0
Delay (s)		26.7	25.4		26.4			22.3	10.7	5.6	48.1	5.2
Level of Service		C	C		C			C	B	A	D	A
Approach Delay (s)		25.8			26.4				11.4			5.4
Approach LOS		C			C				B			A

Intersection Summary

HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	SBR
Lane Configurations	7
Volume (vph)	29
Ideal Flow (vphpl)	1550
Total Lost time (s)	4.1
Lane Util. Factor	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1292
Flt Permitted	1.00
Satd. Flow (perm)	1292
Peak-hour factor, PHF	0.96
Adj. Flow (vph)	30
RTOR Reduction (vph)	8
Lane Group Flow (vph)	22
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	37.9
Effective Green, g (s)	37.9
Actuated g/C Ratio	0.61
Clearance Time (s)	4.1
Vehicle Extension (s)	4.0
Lane Grp Cap (vph)	790
v/s Ratio Prot	
v/s Ratio Perm	0.02
v/c Ratio	0.03
Uniform Delay, d1	4.8
Progression Factor	0.12
Incremental Delay, d2	0.1
Delay (s)	0.6
Level of Service	A
Approach Delay (s)	
Approach LOS	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Existing+Proj School PM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	363	80	62	221	86	69	37	49	1125	177	17	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1600	1600
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	*0.92	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.93		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1741		1681	1731	1559		1770	3427	1196		1490
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1741		1681	1731	1559		1770	3427	1196		1490
Peak-hour factor, PHF	0.91	0.91	0.91	0.61	0.61	0.61	0.92	0.92	0.92	0.92	0.94	0.94
Adj. Flow (vph)	399	88	68	362	141	113	40	53	1223	192	18	83
RTOR Reduction (vph)	0	24	0	0	0	66	0	0	0	77	0	0
Lane Group Flow (vph)	399	132	0	250	253	47	0	93	1223	115	0	101
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	19.1	19.1		21.8	21.8	21.8		10.3	53.5	53.5		12.6
Effective Green, g (s)	19.1	19.1		21.8	21.8	21.8		10.3	53.5	53.5		12.6
Actuated g/C Ratio	0.15	0.15		0.18	0.18	0.18		0.08	0.43	0.43		0.10
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	529	268		296	304	274		147	1479	516		151
v/s Ratio Prot	c0.12	0.08		c0.15	0.15			0.05	c0.36			c0.07
v/s Ratio Perm						0.03				0.10		
v/c Ratio	0.75	0.49		0.84	0.83	0.17		0.63	0.83	0.22		0.67
Uniform Delay, d1	50.2	48.0		49.5	49.3	43.4		55.0	31.2	22.2		53.7
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.01
Incremental Delay, d2	5.4	0.5		18.6	16.7	0.1		6.4	5.4	1.0		7.9
Delay (s)	55.6	48.5		68.1	66.0	43.5		61.4	36.6	23.2		62.0
Level of Service	E	D		E	E	D		E	D	C		E
Approach Delay (s)		53.6			62.7				36.4			
Approach LOS		D			E				D			

Intersection Summary

HCM Average Control Delay	39.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Existing+Proj School PM Peak
3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	767	225
Ideal Flow (vphpl)	1600	1600
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frbp, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2980	1333
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2980	1333
Peak-hour factor, PHF	0.94	0.94
Adj. Flow (vph)	816	239
RTOR Reduction (vph)	0	42
Lane Group Flow (vph)	816	197
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	55.8	55.8
Effective Green, g (s)	55.8	55.8
Actuated g/C Ratio	0.45	0.45
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	1341	600
v/s Ratio Prot	0.27	
v/s Ratio Perm		0.15
v/c Ratio	0.61	0.33
Uniform Delay, d1	25.8	22.0
Progression Factor	0.83	0.78
Incremental Delay, d2	1.9	1.4
Delay (s)	23.2	18.5
Level of Service	C	B
Approach Delay (s)	25.7	
Approach LOS	C	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Existing+Proj School PM Peak_Alt1
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	363	80	62	221	86	69	37	49	1125	177	17	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	*0.92	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.93		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1741		1681	1731	1559		1770	3427	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1741		1681	1731	1559		1770	3427	1196		1397
Peak-hour factor, PHF	0.91	0.91	0.91	0.61	0.61	0.61	0.92	0.92	0.92	0.92	0.94	0.94
Adj. Flow (vph)	399	88	68	362	141	113	40	53	1223	192	18	83
RTOR Reduction (vph)	0	25	0	0	0	75	0	0	0	77	0	0
Lane Group Flow (vph)	399	131	0	250	253	38	0	93	1223	115	0	101
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	19.1	19.1		20.6	20.6	20.6		10.9	54.0	54.0		13.3
Effective Green, g (s)	19.1	19.1		20.6	20.6	20.6		10.9	54.0	54.0		13.3
Actuated g/C Ratio	0.15	0.15		0.17	0.17	0.17		0.09	0.44	0.44		0.11
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	529	268		279	288	259		156	1492	521		150
v/s Ratio Prot	c0.12	0.08		c0.15	0.15			0.05	c0.36			c0.07
v/s Ratio Perm						0.02				0.10		
v/c Ratio	0.75	0.49		0.90	0.88	0.15		0.60	0.82	0.22		0.67
Uniform Delay, d1	50.2	48.0		50.7	50.5	44.2		54.4	30.7	21.9		53.3
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Incremental Delay, d2	5.4	0.5		27.9	24.0	0.1		4.0	5.2	1.0		8.5
Delay (s)	55.6	48.5		78.6	74.5	44.3		58.5	35.9	22.8		61.5
Level of Service	E	D		E	E	D		E	D	C		E
Approach Delay (s)		53.6			70.6				35.6			
Approach LOS		D			E				D			

Intersection Summary

HCM Average Control Delay	40.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	SBT	SBR
Lane Configurations	↑↑↑	↔
Volume (vph)	767	225
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	
Lane Util. Factor	0.91	
Frbp, ped/bikes	1.00	
Flpb, ped/bikes	1.00	
Frt	0.97	
Flt Protected	1.00	
Satd. Flow (prot)	3878	
Flt Permitted	1.00	
Satd. Flow (perm)	3878	
Peak-hour factor, PHF	0.94	0.94
Adj. Flow (vph)	816	239
RTOR Reduction (vph)	37	0
Lane Group Flow (vph)	1018	0
Confl. Peds. (#/hr)		
Turn Type		
Protected Phases	6	
Permitted Phases		
Actuated Green, G (s)	56.4	
Effective Green, g (s)	56.4	
Actuated g/C Ratio	0.45	
Clearance Time (s)	5.0	
Vehicle Extension (s)	4.0	
Lane Grp Cap (vph)	1764	
v/s Ratio Prot	0.26	
v/s Ratio Perm		
v/c Ratio	0.58	
Uniform Delay, d1	25.0	
Progression Factor	0.81	
Incremental Delay, d2	1.3	
Delay (s)	21.5	
Level of Service	C	
Approach Delay (s)	25.0	
Approach LOS	C	
Intersection Summary		

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Existing+Proj School PM Peak_Alt2
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations	↔↔	↔		↔	↔	↔		↔	↑↑	↔		↔
Volume (vph)	363	80	62	221	86	69	60	69	1125	177	17	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	*0.92	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.93		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1741		1681	1731	1559		1770	3427	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1741		1681	1731	1559		1770	3427	1196		1397
Peak-hour factor, PHF	0.91	0.91	0.91	0.61	0.61	0.61	0.92	0.92	0.92	0.92	0.94	0.94
Adj. Flow (vph)	399	88	68	362	141	113	65	75	1223	192	18	83
RTOR Reduction (vph)	0	24	0	0	0	66	0	0	0	78	0	0
Lane Group Flow (vph)	399	132	0	250	253	47	0	140	1223	114	0	101
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	19.1	19.1		21.8	21.8	21.8		14.3	53.2	53.2		12.9
Effective Green, g (s)	19.1	19.1		21.8	21.8	21.8		14.3	53.2	53.2		12.9
Actuated g/C Ratio	0.15	0.15		0.18	0.18	0.18		0.12	0.43	0.43		0.10
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	529	268		296	304	274		204	1470	513		145
v/s Ratio Prot	c0.12	0.08		c0.15	0.15			c0.08	c0.36			0.07
v/s Ratio Perm						0.03				0.10		
v/c Ratio	0.75	0.49		0.84	0.83	0.17		0.69	0.83	0.22		0.70
Uniform Delay, d1	50.2	48.0		49.5	49.3	43.4		52.7	31.4	22.3		53.7
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.01
Incremental Delay, d2	5.4	0.5		18.6	16.7	0.1		7.4	5.6	1.0		10.5
Delay (s)	55.6	48.5		68.1	66.0	43.5		60.1	37.1	23.4		64.9
Level of Service	E	D		E	E	D		E	D	C		E
Approach Delay (s)		53.6			62.7				37.5			
Approach LOS		D			E				D			

Intersection Summary

HCM Average Control Delay	41.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Existing+Proj School PM Peak_Alt2
3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	767	225
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frbp, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2794	1250
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2794	1250
Peak-hour factor, PHF	0.94	0.94
Adj. Flow (vph)	816	239
RTOR Reduction (vph)	0	45
Lane Group Flow (vph)	816	194
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	51.8	51.8
Effective Green, g (s)	51.8	51.8
Actuated g/C Ratio	0.42	0.42
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	1167	522
v/s Ratio Prot	0.29	
v/s Ratio Perm		0.16
v/c Ratio	0.70	0.37
Uniform Delay, d1	29.7	24.9
Progression Factor	0.84	0.78
Incremental Delay, d2	3.3	1.9
Delay (s)	28.3	21.2
Level of Service	C	C
Approach Delay (s)	30.0	
Approach LOS	C	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Boulevard & Pleasant Hill Road

Existing+Proj School PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	199	397	242	0	0	0	215	509	369	0	508	496
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00				1.00	0.95	1.00		0.95	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770	3539	1583				1770	3539	1583		3539	1583
Flt Permitted	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770	3539	1583				1770	3539	1583		3539	1583
Peak-hour factor, PHF	0.88	0.88	0.88	0.92	0.92	0.92	0.91	0.91	0.91	0.93	0.93	0.93
Adj. Flow (vph)	226	451	275	0	0	0	236	559	405	0	546	533
RTOR Reduction (vph)	0	0	189	0	0	0	0	0	78	0	0	324
Lane Group Flow (vph)	226	451	86	0	0	0	236	559	327	0	546	209
Turn Type	Perm		Perm				Prot		Perm			Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2			6
Actuated Green, G (s)	15.9	15.9	15.9				13.2	44.6	44.6		27.4	27.4
Effective Green, g (s)	15.9	15.9	15.9				13.2	44.6	44.6		27.4	27.4
Actuated g/C Ratio	0.23	0.23	0.23				0.19	0.64	0.64		0.39	0.39
Clearance Time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	402	804	360				334	2255	1009		1385	620
v/s Ratio Prot		0.13					c0.13	0.16			c0.15	
v/s Ratio Perm	c0.13		0.05						0.21			0.13
v/c Ratio	0.56	0.56	0.24				0.71	0.25	0.32		0.39	0.34
Uniform Delay, d1	24.0	24.0	22.1				26.6	5.5	5.8		15.3	14.9
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.1	0.5	0.1				5.5	0.3	0.9		0.8	1.5
Delay (s)	25.0	24.5	22.2				32.1	5.7	6.7		16.2	16.4
Level of Service	C	C	C				C	A	A		B	B
Approach Delay (s)		24.0			0.0			11.2			16.3	
Approach LOS		C			A			B			B	

Intersection Summary

HCM Average Control Delay	16.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: SR 24 EB Off Ramp & Pleasant Hill Road

Existing+Proj School PM Peak

3/8/2012























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖		↗		↕↕↕		↖	↕↕	
Volume (vph)	46	36	183	14	0	129	0	913	13	107	641	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00	1.00		1.00		0.91		1.00	0.95	
Frt		1.00	0.85	1.00		0.85		1.00		1.00	1.00	
Flt Protected		0.97	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1812	1583	1770		1583		5075		1770	3539	
Flt Permitted		0.97	1.00	0.74		1.00		1.00		0.95	1.00	
Satd. Flow (perm)		1812	1583	1380		1583		5075		1770	3539	
Peak-hour factor, PHF	0.95	0.95	0.95	0.83	0.83	0.83	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	48	38	193	17	0	155	0	1014	14	119	712	0
RTOR Reduction (vph)	0	0	164	0	0	139	0	2	0	0	0	0
Lane Group Flow (vph)	0	86	29	17	0	16	0	1026	0	119	712	0
Turn Type	Split		Perm	custom		custom				Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4	8		8						
Actuated Green, G (s)		8.0	8.0	5.4		5.4		18.8		4.6	27.4	
Effective Green, g (s)		8.0	8.0	5.4		5.4		18.8		4.6	27.4	
Actuated g/C Ratio		0.15	0.15	0.10		0.10		0.36		0.09	0.52	
Clearance Time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		275	240	141		162		1807		154	1837	
v/s Ratio Prot		c0.05						c0.20		c0.07	0.20	
v/s Ratio Perm			0.02	c0.01		0.01						
v/c Ratio		0.31	0.12	0.12		0.10		0.57		0.77	0.39	
Uniform Delay, d1		20.0	19.4	21.5		21.5		13.7		23.6	7.6	
Progression Factor		1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2		0.7	0.2	0.4		0.3		0.4		21.0	0.1	
Delay (s)		20.6	19.6	21.9		21.8		14.1		44.6	7.8	
Level of Service		C	B	C		C		B		D	A	
Approach Delay (s)		19.9			21.8			14.1			13.1	
Approach LOS		B			C			B			B	

Intersection Summary

HCM Average Control Delay	15.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	52.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Avenue

Existing+Proj School PM Peak
3/8/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	13	0	0	14	0	0	0	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.94	0.94	0.94	0.98	0.98	0.98	0.85	0.85	0.85
Hourly flow rate (vph)	0	14	0	0	15	0	0	0	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	15			14			29	29	14	29	29	15
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	15			14			29	29	14	29	29	15
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1603			1604			980	864	1065	980	864	1065
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1					
Volume Total	0	14	0	15	0	0	0					
Volume Left	0	0	0	0	0	0	0					
Volume Right	0	0	0	0	0	0	0					
cSH	1700	1700	1700	1700	1700	1700	1700					
Volume to Capacity	0.00	0.01	0.00	0.01	0.00	0.00	0.00					
Queue Length 95th (ft)	0	0	0	0	0	0	0					
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Lane LOS					A	A	A					
Approach Delay (s)	0.0		0.0		0.0		0.0					
Approach LOS					A		A					
Intersection Summary												
Average Delay			0.0									
Intersection Capacity Utilization			6.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

9: Deer Hill Road & Sierra Vista Way

Existing+Proj School PM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	286	1039	118	231	7	184	13	93	3	26	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1855		1681	1696	1583		1759	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		1.00	
Satd. Flow (perm)	1770	1863	1583	1770	1855		1681	1696	1583		1759	
Peak-hour factor, PHF	0.89	0.89	0.89	0.87	0.87	0.87	0.80	0.80	0.80	0.75	0.75	0.75
Adj. Flow (vph)	29	321	1167	136	266	8	230	16	116	4	35	25
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	96	0	22	0
Lane Group Flow (vph)	29	321	1167	136	273	0	122	124	20	0	42	0
Turn Type	Prot		Free	Prot			Split		Perm		Split	
Protected Phases	7	4		3	8		2	2			6	6
Permitted Phases			Free						2			
Actuated Green, G (s)	1.8	16.3	55.0	6.1	20.6		9.7	9.7	9.7		6.9	
Effective Green, g (s)	1.8	16.3	55.0	6.1	20.6		9.7	9.7	9.7		6.9	
Actuated g/C Ratio	0.03	0.30	1.00	0.11	0.37		0.18	0.18	0.18		0.13	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	58	552	1583	196	695		296	299	279		221	
v/s Ratio Prot	0.02	0.17		0.08	0.15		0.07	0.07			0.02	
v/s Ratio Perm			c0.74						0.01			
v/c Ratio	0.50	0.58	0.74	0.69	0.39		0.41	0.41	0.07		0.19	
Uniform Delay, d1	26.2	16.5	0.0	23.6	12.6		20.1	20.1	18.9		21.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	6.6	1.6	3.1	10.2	0.4		0.9	0.9	0.1		0.4	
Delay (s)	32.8	18.0	3.1	33.7	13.0		21.1	21.1	19.0		22.0	
Level of Service	C	B	A	C	B		C	C	B		C	
Approach Delay (s)		6.8			19.9			20.4			22.0	
Approach LOS		A			B			C			C	

Intersection Summary

HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
10: Deer Hill Road & Laurel Drive

Existing+Proj School PM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗↗	↖	↖	↗↗		↖	↖	↗↗		↗↗	
Volume (vph)	8	632	238	176	238	9	463	8	725	19	8	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	0.88		1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1770	3539	1583	1770	3519		1681	1688	2787		1765	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (perm)	1770	3539	1583	1770	3519		1681	1688	2787		1765	
Peak-hour factor, PHF	0.91	0.91	0.91	0.94	0.94	0.94	0.85	0.85	0.85	0.92	0.92	0.92
Adj. Flow (vph)	9	695	262	187	253	10	545	9	853	21	9	7
RTOR Reduction (vph)	0	0	179	0	3	0	0	0	636	0	6	0
Lane Group Flow (vph)	9	695	83	187	260	0	278	276	217	0	31	0
Turn Type	Prot		Perm	Prot			Split		Perm	Split		
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4						2			
Actuated Green, G (s)	0.7	27.4	27.4	10.0	36.7		17.1	17.1	17.1		16.1	
Effective Green, g (s)	0.7	27.4	27.4	10.0	36.7		17.1	17.1	17.1		16.1	
Actuated g/C Ratio	0.01	0.32	0.32	0.12	0.42		0.20	0.20	0.20		0.19	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	14	1120	501	204	1491		332	333	550		328	
v/s Ratio Prot	0.01	c0.20		c0.11	0.07		c0.17	0.16			c0.02	
v/s Ratio Perm			0.05						0.08			
v/c Ratio	0.64	0.62	0.17	0.92	0.17		0.84	0.83	0.39		0.10	
Uniform Delay, d1	42.8	25.2	21.4	37.9	15.5		33.4	33.3	30.2		29.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	71.2	1.1	0.2	40.1	0.1		21.6	20.6	2.1		0.6	
Delay (s)	114.0	26.3	21.5	78.0	15.6		55.0	54.0	32.3		29.8	
Level of Service	F	C	C	E	B		D	D	C		C	
Approach Delay (s)		25.8			41.5			41.1			29.8	
Approach LOS		C			D			D			C	

Intersection Summary

HCM Average Control Delay	35.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	86.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 11: Project Driveway & Pleasant Hill Road

Existing+Proj School PM Peak
 3/8/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗	↖	↑↑↑	↑↑	↗
Volume (veh/h)	0	30	43	1388	1043	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	33	47	1509	1134	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					352	
pX, platoon unblocked	0.82	0.82	0.82			
vC, conflicting volume	1730	567	1141			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1443	17	721			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	96	93			
cM capacity (veh/h)	94	863	715			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	33	47	503	503	503	567	567	8
Volume Left	0	47	0	0	0	0	0	0
Volume Right	33	0	0	0	0	0	0	8
cSH	863	715	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.04	0.07	0.30	0.30	0.30	0.33	0.33	0.00
Queue Length 95th (ft)	3	5	0	0	0	0	0	0
Control Delay (s)	9.3	10.4	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	A	B						
Approach Delay (s)	9.3	0.3				0.0		
Approach LOS	A							

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization	40.8%		ICU Level of Service A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 12: Deer Hill Road & Project Driveway Northeast

Existing+Proj School PM Peak
 3/8/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→		←	→	↔	
Volume (veh/h)	472	0	8	389	0	33
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	513	0	9	423	0	36
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)	642					
pX, platoon unblocked						
vC, conflicting volume			513		953	513
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			513		953	513
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	94
cM capacity (veh/h)			1052		285	561

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	513	9	423	36
Volume Left	0	9	0	0
Volume Right	0	0	0	36
cSH	1700	1052	1700	561
Volume to Capacity	0.30	0.01	0.25	0.06
Queue Length 95th (ft)	0	1	0	5
Control Delay (s)	0.0	8.4	0.0	11.9
Lane LOS		A		B
Approach Delay (s)	0.0	0.2		11.9
Approach LOS				B

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization	34.8%		ICU Level of Service A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 13: Deer Hill Road & Project Driveway Southwest

Existing+Proj School PM Peak
 3/8/2012




















Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←	↙	↘
Volume (veh/h)	472	13	0	389	14	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	513	14	0	423	15	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			527		943	520
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			527		943	520
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		95	100
cM capacity (veh/h)			1040		291	556

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	527	423	15
Volume Left	0	0	15
Volume Right	14	0	0
cSH	1700	1040	291
Volume to Capacity	0.31	0.00	0.05
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.0	0.0	18.0
Lane LOS			C
Approach Delay (s)	0.0	0.0	18.0
Approach LOS			C

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization		35.6%	ICU Level of Service A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Road

Existing+Proj PM Peak
3/8/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	0	19	0	0	0	18	1904	0	0	741	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	5.0			5.0	
Lane Util. Factor		1.00					1.00	0.95			0.95	
Frt		0.90					1.00	1.00			1.00	
Flt Protected		0.99					0.95	1.00			1.00	
Satd. Flow (prot)		1653					1770	3539			3527	
Flt Permitted		0.96					0.95	1.00			1.00	
Satd. Flow (perm)		1610					1770	3539			3527	
Peak-hour factor, PHF	0.79	0.79	0.79	0.92	0.92	0.92	0.98	0.98	0.98	0.95	0.95	0.95
Adj. Flow (vph)	8	0	24	0	0	0	18	1943	0	0	780	18
RTOR Reduction (vph)	0	23	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	9	0	0	0	0	18	1943	0	0	796	0
Turn Type	Perm			Perm			Prot					
Protected Phases		8			4		5	2			6	
Permitted Phases	8			4								
Actuated Green, G (s)		2.6					2.4	50.4			44.0	
Effective Green, g (s)		2.6					2.4	50.4			44.0	
Actuated g/C Ratio		0.04					0.04	0.81			0.71	
Clearance Time (s)		4.0					4.0	5.0			5.0	
Vehicle Extension (s)		2.5					2.0	4.0			4.0	
Lane Grp Cap (vph)		68					69	2877			2503	
v/s Ratio Prot							0.01	c0.55			0.23	
v/s Ratio Perm		c0.01										
v/c Ratio		0.13					0.26	0.68			0.32	
Uniform Delay, d1		28.6					28.9	2.4			3.4	
Progression Factor		1.00					1.24	1.76			1.00	
Incremental Delay, d2		0.6					0.6	1.0			0.3	
Delay (s)		29.3					36.6	5.3			3.7	
Level of Service		C					D	A			A	
Approach Delay (s)		29.3			0.0			5.6			3.7	
Approach LOS		C			A			A			A	
Intersection Summary												
HCM Average Control Delay			5.3				HCM Level of Service				A	
HCM Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			62.0				Sum of lost time (s)				9.0	
Intersection Capacity Utilization			63.5%				ICU Level of Service				B	
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis

2: Greenvalley Drive & Pleasant Hill Road

Existing+Proj PM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔	↔	↑↑	↔	↔	↑↑	↔
Volume (vph)	7	0	3	12	0	16	3	1860	21	11	723	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			4.0	4.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.96			1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.97			0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1725			1770	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.96			1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1720			1863	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.63	0.63	0.63	0.88	0.88	0.88	0.98	0.98	0.98	0.97	0.97	0.97
Adj. Flow (vph)	11	0	5	14	0	18	3	1898	21	11	745	4
RTOR Reduction (vph)	0	5	0	0	0	17	0	0	6	0	0	1
Lane Group Flow (vph)	0	11	0	0	14	1	3	1898	15	11	745	3
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2		1		6
Permitted Phases	8			4		4			2			6
Actuated Green, G (s)		3.5			2.5	2.5	1.0	45.3	45.3	1.2	45.5	45.5
Effective Green, g (s)		3.5			2.5	2.5	1.0	45.3	45.3	1.2	45.5	45.5
Actuated g/C Ratio		0.06			0.04	0.04	0.02	0.73	0.73	0.02	0.73	0.73
Clearance Time (s)		3.0			4.0	4.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5			2.0	2.0	2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)		97			75	64	29	2586	1157	34	2597	1162
v/s Ratio Prot							0.00	c0.54		c0.01	0.21	
v/s Ratio Perm		0.01			c0.01	0.00			0.01			0.00
v/c Ratio		0.12			0.19	0.01	0.10	0.73	0.01	0.32	0.29	0.00
Uniform Delay, d1		27.8			28.8	28.6	30.1	4.8	2.3	30.0	2.8	2.2
Progression Factor		1.00			1.00	1.00	1.24	0.42	0.20	0.73	2.40	2.28
Incremental Delay, d2		0.4			0.4	0.0	0.4	1.4	0.0	2.0	0.3	0.0
Delay (s)		28.2			29.2	28.6	37.7	3.4	0.5	24.0	7.0	5.0
Level of Service		C			C	C	D	A	A	C	A	A
Approach Delay (s)		28.2			28.9			3.4			7.2	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	4.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

3: Reliez Valle Road & Pleasant Hill Road

Existing+Proj PM Peak

3/8/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	20	103	182	1870	735	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.88	0.88	0.95	0.95	0.90	0.90
Adj. Flow (vph)	23	117	192	1968	817	29
RTOR Reduction (vph)	0	107	0	0	0	14
Lane Group Flow (vph)	23	10	192	1968	817	15
Turn Type		Perm	Prot			Perm
Protected Phases	8		5	2	6	
Permitted Phases		8				6
Actuated Green, G (s)	5.4	5.4	11.0	47.6	32.6	32.6
Effective Green, g (s)	5.4	5.4	11.0	47.6	32.6	32.6
Actuated g/C Ratio	0.09	0.09	0.18	0.77	0.53	0.53
Clearance Time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	2.5	2.5	2.0	4.0	4.0	4.0
Lane Grp Cap (vph)	154	138	314	2717	1861	832
v/s Ratio Prot	c0.01		0.11	c0.56	0.23	
v/s Ratio Perm		0.01				0.01
v/c Ratio	0.15	0.07	0.61	0.72	0.44	0.02
Uniform Delay, d1	26.2	26.0	23.5	3.8	9.1	7.0
Progression Factor	1.00	1.00	0.84	1.83	0.89	0.63
Incremental Delay, d2	0.3	0.2	1.6	1.1	0.7	0.0
Delay (s)	26.5	26.2	21.4	8.0	8.8	4.5
Level of Service	C	C	C	A	A	A
Approach Delay (s)	26.2			9.2	8.7	
Approach LOS	C			A	A	

Intersection Summary

HCM Average Control Delay	9.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

4: Springhill Road & Pleasant Hill Road

Existing+Proj PM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↔		↖	↕	↗	↖	↕	↗
Volume (vph)	19	2	87	22	0	6	123	2023	33	14	863	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1550	1550	1550
Total Lost time (s)		3.5	3.5		3.5		3.5	4.1	4.1	3.5	4.1	4.1
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Fr _t		1.00	0.85		0.97		1.00	1.00	0.85	1.00	1.00	0.85
Fl _t Protected		0.96	1.00		0.96		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1781	1583		1739		1770	3539	1583	1444	2887	1292
Fl _t Permitted		0.77	1.00		0.76		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1431	1583		1368		1770	3539	1583	1444	2887	1292
Peak-hour factor, PHF	0.81	0.81	0.81	0.78	0.78	0.78	0.96	0.96	0.96	0.94	0.94	0.94
Adj. Flow (vph)	23	2	107	28	0	8	128	2107	34	15	918	26
RTOR Reduction (vph)	0	0	98	0	7	0	0	0	3	0	0	7
Lane Group Flow (vph)	0	25	9	0	29	0	128	2107	31	15	918	19
Turn Type	Perm		Perm	Perm			Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2		1		6
Permitted Phases	8		8	4					2			6
Actuated Green, G (s)		5.0	5.0		5.0		7.0	44.7	44.7	1.2	38.9	38.9
Effective Green, g (s)		5.0	5.0		5.0		7.0	44.7	44.7	1.2	38.9	38.9
Actuated g/C Ratio		0.08	0.08		0.08		0.11	0.72	0.72	0.02	0.63	0.63
Clearance Time (s)		3.5	3.5		3.5		3.5	4.1	4.1	3.5	4.1	4.1
Vehicle Extension (s)		2.0	2.0		2.0		1.0	4.0	4.0	1.5	4.0	4.0
Lane Grp Cap (vph)		115	128		110		200	2552	1141	28	1811	811
v/s Ratio Prot							c0.07	c0.60		0.01	0.32	
v/s Ratio Perm		0.02	0.01		c0.02				0.02			0.01
v/c Ratio		0.22	0.07		0.26		0.64	0.83	0.03	0.54	0.51	0.02
Uniform Delay, d ₁		26.7	26.3		26.8		26.3	6.0	2.5	30.1	6.3	4.4
Progression Factor		1.00	1.00		1.00		0.71	2.35	1.72	1.44	0.42	0.03
Incremental Delay, d ₂		0.3	0.1		0.5		2.1	1.3	0.0	8.9	1.0	0.1
Delay (s)		27.0	26.4		27.2		20.8	15.3	4.3	52.4	3.6	0.2
Level of Service		C	C		C		C	B	A	D	A	A
Approach Delay (s)		26.5			27.2			15.5			4.3	
Approach LOS		C			C			B			A	

Intersection Summary

HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Existing+Proj PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	652	95	73	184	67	150	22	18	1408	183	8	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	*0.92	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.93		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1741		1681	1729	1557		1770	3427	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1741		1681	1729	1557		1770	3427	1196		1397
Peak-hour factor, PHF	0.95	0.95	0.95	0.84	0.84	0.84	0.97	0.97	0.97	0.97	0.90	0.90
Adj. Flow (vph)	686	100	77	219	80	179	23	19	1452	189	9	109
RTOR Reduction (vph)	0	21	0	0	0	51	0	0	0	69	0	0
Lane Group Flow (vph)	686	156	0	147	152	128	0	42	1452	120	0	118
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	29.6	29.6		15.9	15.9	15.9		6.4	47.9	47.9		13.6
Effective Green, g (s)	29.6	29.6		15.9	15.9	15.9		6.4	47.9	47.9		13.6
Actuated g/C Ratio	0.24	0.24		0.13	0.13	0.13		0.05	0.39	0.39		0.11
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	819	416		216	222	200		91	1324	462		153
v/s Ratio Prot	c0.20	0.09		0.09	c0.09			0.02	c0.42			c0.08
v/s Ratio Perm						0.08				0.10		
v/c Ratio	0.84	0.37		0.68	0.68	0.64		0.46	1.10	0.26		0.77
Uniform Delay, d1	44.9	39.5		51.6	51.7	51.3		57.1	38.0	25.9		53.7
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.08
Incremental Delay, d2	7.2	0.2		6.8	6.8	4.8		1.3	55.6	1.4		18.0
Delay (s)	52.1	39.7		58.5	58.4	56.1		58.5	93.6	27.3		75.8
Level of Service	D	D		E	E	E		E	F	C		E
Approach Delay (s)		49.5			57.6				85.3			
Approach LOS		D			E				F			

Intersection Summary

HCM Average Control Delay	59.8	HCM Level of Service	E
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Existing+Proj PM Peak
3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	648	190
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frbp, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2794	1250
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2794	1250
Peak-hour factor, PHF	0.90	0.90
Adj. Flow (vph)	720	211
RTOR Reduction (vph)	0	43
Lane Group Flow (vph)	720	168
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	55.1	55.1
Effective Green, g (s)	55.1	55.1
Actuated g/C Ratio	0.44	0.44
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	1242	555
v/s Ratio Prot	0.26	
v/s Ratio Perm		0.13
v/c Ratio	0.58	0.30
Uniform Delay, d1	25.8	22.1
Progression Factor	0.82	0.85
Incremental Delay, d2	1.8	1.3
Delay (s)	22.9	20.0
Level of Service	C	C
Approach Delay (s)	28.2	
Approach LOS	C	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Existing+Proj PM Peak_Alt1
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	652	95	73	184	67	150	22	18	1408	183	8	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	*0.92	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.93		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1741		1681	1729	1557		1770	3427	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1741		1681	1729	1557		1770	3427	1196		1397
Peak-hour factor, PHF	0.95	0.95	0.95	0.84	0.84	0.84	0.97	0.97	0.97	0.97	0.90	0.90
Adj. Flow (vph)	686	100	77	219	80	179	23	19	1452	189	9	109
RTOR Reduction (vph)	0	22	0	0	0	52	0	0	0	68	0	0
Lane Group Flow (vph)	686	155	0	147	152	127	0	42	1452	121	0	118
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	28.8	28.8		15.6	15.6	15.6		6.4	49.0	49.0		13.6
Effective Green, g (s)	28.8	28.8		15.6	15.6	15.6		6.4	49.0	49.0		13.6
Actuated g/C Ratio	0.23	0.23		0.13	0.13	0.13		0.05	0.40	0.40		0.11
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	797	404		211	218	196		91	1354	473		153
v/s Ratio Prot	c0.20	0.09		0.09	c0.09			0.02	c0.42			c0.08
v/s Ratio Perm						0.08				0.10		
v/c Ratio	0.86	0.38		0.70	0.70	0.65		0.46	1.07	0.26		0.77
Uniform Delay, d1	45.7	40.1		51.9	51.9	51.6		57.1	37.5	25.2		53.7
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.07
Incremental Delay, d2	9.1	0.2		7.8	7.6	5.4		1.3	46.4	1.3		18.0
Delay (s)	54.8	40.3		59.8	59.5	56.9		58.5	83.9	26.5		75.3
Level of Service	D	D		E	E	E		E	F	C		E
Approach Delay (s)		51.8			58.6				76.8			
Approach LOS		D			E				E			

Intersection Summary

HCM Average Control Delay	56.4	HCM Level of Service	E
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 5: Deer Hill Road & Pleasant Hill Road

Existing+Proj PM Peak_Alt1
 3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑↑	↔
Volume (vph)	648	190
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	
Lane Util. Factor	0.91	
Frbp, ped/bikes	1.00	
Flpb, ped/bikes	1.00	
Frt	0.97	
Flt Protected	1.00	
Satd. Flow (prot)	3878	
Flt Permitted	1.00	
Satd. Flow (perm)	3878	
Peak-hour factor, PHF	0.90	0.90
Adj. Flow (vph)	720	211
RTOR Reduction (vph)	37	0
Lane Group Flow (vph)	894	0
Confl. Peds. (#/hr)		
Turn Type		
Protected Phases	6	
Permitted Phases		
Actuated Green, G (s)	56.2	
Effective Green, g (s)	56.2	
Actuated g/C Ratio	0.45	
Clearance Time (s)	5.0	
Vehicle Extension (s)	4.0	
Lane Grp Cap (vph)	1758	
v/s Ratio Prot	0.23	
v/s Ratio Perm		
v/c Ratio	0.51	
Uniform Delay, d1	24.1	
Progression Factor	0.80	
Incremental Delay, d2	1.0	
Delay (s)	20.3	
Level of Service	C	
Approach Delay (s)	26.5	
Approach LOS	C	
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

5: Deer Hill Road & Pleasant Hill Road

Existing+Proj PM Peak_Alt2

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	652	95	73	184	67	150	60	56	1408	183	8	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	*0.92	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.93		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1741		1681	1729	1557		1770	3427	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1741		1681	1729	1557		1770	3427	1196		1397
Peak-hour factor, PHF	0.95	0.95	0.95	0.84	0.84	0.84	0.97	0.97	0.97	0.97	0.90	0.90
Adj. Flow (vph)	686	100	77	219	80	179	62	58	1452	189	9	109
RTOR Reduction (vph)	0	21	0	0	0	51	0	0	0	69	0	0
Lane Group Flow (vph)	686	156	0	147	152	128	0	120	1452	120	0	118
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	29.6	29.6		15.9	15.9	15.9		10.9	47.9	47.9		13.6
Effective Green, g (s)	29.6	29.6		15.9	15.9	15.9		10.9	47.9	47.9		13.6
Actuated g/C Ratio	0.24	0.24		0.13	0.13	0.13		0.09	0.39	0.39		0.11
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	819	416		216	222	200		156	1324	462		153
v/s Ratio Prot	c0.20	0.09		0.09	c0.09			0.07	c0.42			c0.08
v/s Ratio Perm						0.08				0.10		
v/c Ratio	0.84	0.37		0.68	0.68	0.64		0.77	1.10	0.26		0.77
Uniform Delay, d1	44.9	39.5		51.6	51.7	51.3		55.3	38.0	25.9		53.7
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.08
Incremental Delay, d2	7.2	0.2		6.8	6.8	4.8		18.3	55.6	1.4		18.0
Delay (s)	52.1	39.7		58.5	58.4	56.1		73.6	93.6	27.3		75.8
Level of Service	D	D		E	E	E		E	F	C		E
Approach Delay (s)		49.5			57.6				85.1			
Approach LOS		D			E				F			

Intersection Summary

HCM Average Control Delay	61.0	HCM Level of Service	E
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Existing+Proj PM Peak_Alt2
3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	648	190
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frbp, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2794	1250
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2794	1250
Peak-hour factor, PHF	0.90	0.90
Adj. Flow (vph)	720	211
RTOR Reduction (vph)	0	46
Lane Group Flow (vph)	720	165
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	50.6	50.6
Effective Green, g (s)	50.6	50.6
Actuated g/C Ratio	0.41	0.41
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	1140	510
v/s Ratio Prot	c0.26	
v/s Ratio Perm		0.13
v/c Ratio	0.63	0.32
Uniform Delay, d1	29.3	25.0
Progression Factor	0.83	0.85
Incremental Delay, d2	2.5	1.5
Delay (s)	26.8	22.8
Level of Service	C	C
Approach Delay (s)	31.5	
Approach LOS	C	
Intersection Summary		

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Boulevard & Pleasant Hill Road

Existing+Proj PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	197	430	234	0	0	0	207	508	232	0	547	404
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00				1.00	0.95	1.00		0.95	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770	3539	1583				1770	3539	1583		3539	1583
Flt Permitted	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770	3539	1583				1770	3539	1583		3539	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.92	0.92	0.92	0.96	0.96	0.96	0.94	0.94	0.94
Adj. Flow (vph)	216	473	257	0	0	0	216	529	242	0	582	430
RTOR Reduction (vph)	0	0	167	0	0	0	0	0	72	0	0	257
Lane Group Flow (vph)	216	473	90	0	0	0	216	529	170	0	582	173
Turn Type	Perm		Perm				Prot		Perm			Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2			6
Actuated Green, G (s)	16.0	16.0	16.0				12.4	44.5	44.5		28.1	28.1
Effective Green, g (s)	16.0	16.0	16.0				12.4	44.5	44.5		28.1	28.1
Actuated g/C Ratio	0.23	0.23	0.23				0.18	0.64	0.64		0.40	0.40
Clearance Time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	405	809	362				314	2250	1006		1421	635
v/s Ratio Prot		c0.13					c0.12	0.15			c0.16	
v/s Ratio Perm	0.12		0.06						0.11			0.11
v/c Ratio	0.53	0.58	0.25				0.69	0.24	0.17		0.41	0.27
Uniform Delay, d1	23.7	24.0	22.1				27.0	5.5	5.2		15.0	14.1
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.7	0.7	0.1				4.9	0.2	0.4		0.9	1.1
Delay (s)	24.4	24.7	22.2				31.9	5.7	5.6		15.9	15.1
Level of Service	C	C	C				C	A	A		B	B
Approach Delay (s)		24.0			0.0			11.4			15.6	
Approach LOS		C			A			B			B	

Intersection Summary

HCM Average Control Delay	16.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: SR 24 EB Off Ramp & Pleasant Hill Road

Existing+Proj PM Peak
3/8/2012























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖		↗		↕↗↖		↖	↕↗	
Volume (vph)	54	49	265	26	0	160	0	759	15	106	675	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00	1.00		1.00		0.91		1.00	0.95	
Frt		1.00	0.85	1.00		0.85		1.00		1.00	1.00	
Flt Protected		0.97	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1815	1583	1770		1583		5071		1770	3539	
Flt Permitted		0.97	1.00	0.68		1.00		1.00		0.95	1.00	
Satd. Flow (perm)		1815	1583	1275		1583		5071		1770	3539	
Peak-hour factor, PHF	0.91	0.91	0.91	0.86	0.86	0.86	0.98	0.98	0.98	0.91	0.91	0.91
Adj. Flow (vph)	59	54	291	30	0	186	0	774	15	116	742	0
RTOR Reduction (vph)	0	0	238	0	0	159	0	3	0	0	0	0
Lane Group Flow (vph)	0	113	53	30	0	27	0	786	0	116	742	0
Turn Type	Split		Perm	custom		custom				Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4	8		8						
Actuated Green, G (s)		9.3	9.3	7.3		7.3		14.1		4.5	22.6	
Effective Green, g (s)		9.3	9.3	7.3		7.3		14.1		4.5	22.6	
Actuated g/C Ratio		0.18	0.18	0.14		0.14		0.28		0.09	0.44	
Clearance Time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		330	288	182		226		1397		156	1562	
v/s Ratio Prot		c0.06						c0.16		c0.07	0.21	
v/s Ratio Perm			0.03	c0.02		0.02						
v/c Ratio		0.34	0.18	0.16		0.12		0.56		0.74	0.48	
Uniform Delay, d1		18.3	17.7	19.3		19.1		15.9		22.8	10.1	
Progression Factor		1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2		0.6	0.3	0.4		0.2		0.5		17.3	0.2	
Delay (s)		18.9	18.0	19.7		19.4		16.4		40.1	10.3	
Level of Service		B	B	B		B		B		D	B	
Approach Delay (s)		18.3			19.4			16.4			14.4	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	51.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Avenue

Existing+Proj PM Peak
3/8/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	634	49	104	304	85	57	8	107	61	12	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.94	0.94	0.94	0.98	0.98	0.98	0.85	0.85	0.85
Hourly flow rate (vph)	51	704	54	111	323	90	58	8	109	72	14	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	414			759			1408	1469	732	1510	1451	369
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	414			759			1408	1469	732	1510	1451	369
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			87			34	92	74	0	87	97
cM capacity (veh/h)	1145			853			88	106	421	60	109	677
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1					
Volume Total	51	759	111	414	66	109	108					
Volume Left	51	0	111	0	58	0	72					
Volume Right	0	54	0	90	0	109	22					
cSH	1145	1700	853	1700	90	421	80					
Volume to Capacity	0.04	0.45	0.13	0.24	0.73	0.26	1.36					
Queue Length 95th (ft)	4	0	11	0	93	26	210					
Control Delay (s)	8.3	0.0	9.9	0.0	114.6	16.5	315.1					
Lane LOS	A		A		F	C	F					
Approach Delay (s)	0.5		2.1		53.6		315.1					
Approach LOS					F		F					
Intersection Summary												
Average Delay			27.8									
Intersection Capacity Utilization			63.9%		ICU Level of Service		B					
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

9: Deer Hill Road & Sierra Vista Way

Existing+Proj PM Peak

3/8/2012






























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	572	1296	90	240	2	166	14	126	5	24	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1861		1681	1698	1583		1790	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	
Satd. Flow (perm)	1770	1863	1583	1770	1861		1681	1698	1583		1790	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	622	1409	98	261	2	180	15	137	5	26	10
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	118	0	9	0
Lane Group Flow (vph)	23	622	1409	98	262	0	97	98	19	0	32	0
Turn Type	Prot		Free	Prot			Split		Perm		Split	
Protected Phases	7	4		3	8		2	2			6	6
Permitted Phases			Free						2			
Actuated Green, G (s)	1.9	29.3	66.2	5.0	32.4		9.2	9.2	9.2		6.7	
Effective Green, g (s)	1.9	29.3	66.2	5.0	32.4		9.2	9.2	9.2		6.7	
Actuated g/C Ratio	0.03	0.44	1.00	0.08	0.49		0.14	0.14	0.14		0.10	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	51	825	1583	134	911		234	236	220		181	
v/s Ratio Prot	0.01	0.33		0.06	0.14		0.06	0.06			0.02	
v/s Ratio Perm			c0.89						0.01			
v/c Ratio	0.45	0.75	0.89	0.73	0.29		0.41	0.42	0.09		0.18	
Uniform Delay, d1	31.6	15.4	0.0	29.9	10.0		26.0	26.0	24.8		27.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	6.2	3.9	7.9	18.5	0.2		1.2	1.2	0.2		0.5	
Delay (s)	37.9	19.4	7.9	48.4	10.2		27.2	27.2	25.0		27.7	
Level of Service	D	B	A	D	B		C	C	C		C	
Approach Delay (s)		11.7			20.6			26.3			27.7	
Approach LOS		B			C			C			C	

Intersection Summary

HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	66.2	Sum of lost time (s)	0.0
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
10: Deer Hill Road & Laurel Drive

Existing+Proj PM Peak
3/8/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 				 		 	 
Volume (vph)	17	1121	248	176	230	3	510	6	783	19	1	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	0.88		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1770	3539	1583	1770	3533		1681	1687	2787		1727	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (perm)	1770	3539	1583	1770	3533		1681	1687	2787		1727	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	1218	270	191	250	3	554	7	851	21	1	10
RTOR Reduction (vph)	0	0	109	0	1	0	0	0	592	0	8	0
Lane Group Flow (vph)	18	1218	161	191	252	0	283	278	259	0	24	0
Turn Type	Prot		Perm	Prot			Split		Perm		Split	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4						2			
Actuated Green, G (s)	1.6	33.4	33.4	10.0	41.8		17.0	17.0	17.0		16.0	
Effective Green, g (s)	1.6	33.4	33.4	10.0	41.8		17.0	17.0	17.0		16.0	
Actuated g/C Ratio	0.02	0.36	0.36	0.11	0.45		0.18	0.18	0.18		0.17	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	31	1279	572	192	1598		309	310	513		299	
v/s Ratio Prot	0.01	c0.34		c0.11	0.07		c0.17	0.16			c0.01	
v/s Ratio Perm			0.10						0.09			
v/c Ratio	0.58	0.95	0.28	0.99	0.16		0.92	0.90	0.51		0.08	
Uniform Delay, d1	45.1	28.7	21.0	41.2	14.9		37.0	36.8	33.9		32.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	24.7	15.2	0.3	63.1	0.0		33.6	30.5	3.5		0.5	
Delay (s)	69.8	43.9	21.2	104.3	15.0		70.6	67.3	37.5		32.5	
Level of Service	E	D	C	F	B		E	E	D		C	
Approach Delay (s)		40.1			53.4			50.0			32.5	
Approach LOS		D			D			D			C	
Intersection Summary												
HCM Average Control Delay			45.9			HCM Level of Service			D			
HCM Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			92.4			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			71.7%			ICU Level of Service			C			
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Unsignalized Intersection Capacity Analysis
 11: Project Driveway & Pleasant Hill Road

Existing+Proj PM Peak
 3/8/2012



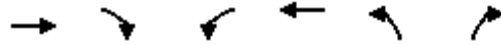
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗	↖	↑↑↑	↑↑	↘
Volume (veh/h)	0	21	76	1739	915	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	23	83	1890	995	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					352	
pX, platoon unblocked	0.83	0.83	0.83			
vC, conflicting volume	1790	497	1007			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1539	0	594			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	97	90			
cM capacity (veh/h)	79	898	810			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	23	83	630	630	630	497	497	12
Volume Left	0	83	0	0	0	0	0	0
Volume Right	23	0	0	0	0	0	0	12
cSH	898	810	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.03	0.10	0.37	0.37	0.37	0.29	0.29	0.01
Queue Length 95th (ft)	2	8	0	0	0	0	0	0
Control Delay (s)	9.1	9.9	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	A	A						
Approach Delay (s)	9.1	0.4				0.0		
Approach LOS	A							

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization	37.9%		ICU Level of Service A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 12: Deer Hill Road & Project Driveway Northeast

Existing+Proj PM Peak
 3/8/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩		↩	↩	↩	
Volume (veh/h)	780	0	16	301	0	34
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	848	0	17	327	0	37
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				642		
pX, platoon unblocked						
vC, conflicting volume			848		1210	848
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			848		1210	848
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		100	90
cM capacity (veh/h)			790		197	361

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	848	17	327	37
Volume Left	0	17	0	0
Volume Right	0	0	0	37
cSH	1700	790	1700	361
Volume to Capacity	0.50	0.02	0.19	0.10
Queue Length 95th (ft)	0	2	0	8
Control Delay (s)	0.0	9.7	0.0	16.1
Lane LOS		A		C
Approach Delay (s)	0.0	0.5		16.1
Approach LOS				C

Intersection Summary			
Average Delay		0.6	
Intersection Capacity Utilization		51.1%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 13: Deer Hill Road & Project Driveway Southwest

Existing+Proj PM Peak
 3/8/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←	↔	↔
Volume (veh/h)	780	22	0	301	12	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	848	24	0	327	13	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			872		1187	860
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			872		1187	860
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		94	100
cM capacity (veh/h)			774		208	356


















Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	872	327	13
Volume Left	0	0	13
Volume Right	24	0	0
cSH	1700	774	208
Volume to Capacity	0.51	0.00	0.06
Queue Length 95th (ft)	0	0	5
Control Delay (s)	0.0	0.0	23.4
Lane LOS			C
Approach Delay (s)	0.0	0.0	23.4
Approach LOS			C

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization		52.4%	ICU Level of Service
Analysis Period (min)		15	A

Appendix E – Level of Service Worksheets: Cumulative Year 2030 No Project Conditions

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Road

2030 AM Peak
3/8/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	37	0	0	0	23	788	0	0	1708	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	5.0			5.0	
Lane Util. Factor		1.00					1.00	0.95			0.95	
Frt		0.86					1.00	1.00			1.00	
Flt Protected		1.00					0.95	1.00			1.00	
Satd. Flow (prot)		1611					1770	3539			3536	
Flt Permitted		1.00					0.95	1.00			1.00	
Satd. Flow (perm)		1611					1770	3539			3536	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	0	0	41	0	0	0	29	985	0	0	2135	12
RTOR Reduction (vph)	0	40	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1	0	0	0	0	29	985	0	0	2147	0
Turn Type	Perm		Perm				Prot					
Protected Phases		8			4		5	2			6	
Permitted Phases	8			4								
Actuated Green, G (s)		2.0					2.7	51.0			44.3	
Effective Green, g (s)		2.0					2.7	51.0			44.3	
Actuated g/C Ratio		0.03					0.04	0.82			0.71	
Clearance Time (s)		4.0					4.0	5.0			5.0	
Vehicle Extension (s)		2.5					2.0	4.0			4.0	
Lane Grp Cap (vph)		52					77	2911			2527	
v/s Ratio Prot		c0.00					0.02	c0.28			c0.61	
v/s Ratio Perm												
v/c Ratio		0.03					0.38	0.34			0.85	
Uniform Delay, d1		29.1					28.8	1.4			6.4	
Progression Factor		1.00					0.93	2.23			1.00	
Incremental Delay, d2		0.1					1.1	0.3			3.8	
Delay (s)		29.2					27.8	3.3			10.2	
Level of Service		C					C	A			B	
Approach Delay (s)		29.2			0.0			4.0			10.2	
Approach LOS		C			A			A			B	
Intersection Summary												
HCM Average Control Delay			8.5				HCM Level of Service				A	
HCM Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			62.0				Sum of lost time (s)				9.0	
Intersection Capacity Utilization			58.4%				ICU Level of Service				B	
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis

2: Greenvally Drive & Pleasant Hill Road

2030 AM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕↕	↕	↕	↕↕	↕
Volume (vph)	2	0	5	23	0	12	0	807	18	8	1839	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			4.0	4.0		5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00	1.00	0.95	1.00
Frt		0.90			1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99			0.95	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1653			1770	1583		3539	1583	1770	3539	1583
Flt Permitted		0.91			1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1531			1863	1583		3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	2	0	6	26	0	13	0	897	20	9	2043	1
RTOR Reduction (vph)	0	6	0	0	0	12	0	0	5	0	0	0
Lane Group Flow (vph)	0	2	0	0	26	1	0	897	15	9	2043	1
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2		1		6
Permitted Phases	8			4		4			2			6
Actuated Green, G (s)		3.7			2.7	2.7		45.2	45.2	1.1	50.3	50.3
Effective Green, g (s)		3.7			2.7	2.7		45.2	45.2	1.1	50.3	50.3
Actuated g/C Ratio		0.06			0.04	0.04		0.73	0.73	0.02	0.81	0.81
Clearance Time (s)		3.0			4.0	4.0		5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5			2.0	2.0		4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)		91			81	69		2580	1154	31	2871	1284
v/s Ratio Prot								0.25		0.01	c0.58	
v/s Ratio Perm		0.00			c0.01	0.00			0.01			0.00
v/c Ratio		0.03			0.32	0.01		0.35	0.01	0.29	0.71	0.00
Uniform Delay, d1		27.5			28.8	28.4		3.0	2.3	30.1	2.6	1.1
Progression Factor		1.00			1.00	1.00		1.78	2.40	1.02	2.35	0.97
Incremental Delay, d2		0.1			0.8	0.0		0.4	0.0	1.3	1.1	0.0
Delay (s)		27.5			29.6	28.4		5.8	5.5	31.9	7.2	1.1
Level of Service		C			C	C		A	A	C	A	A
Approach Delay (s)		27.5			29.2			5.8			7.3	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	7.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

3: Reliez Valle Road & Pleasant Hill Road

2030 AM Peak
3/8/2012
























Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	24	242	102	809	1952	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	28	285	120	952	2296	13
RTOR Reduction (vph)	0	91	0	0	0	2
Lane Group Flow (vph)	28	194	120	952	2296	11
Turn Type		Perm	Prot			Perm
Protected Phases	8		5	2	6	
Permitted Phases		8				6
Actuated Green, G (s)	18.8	18.8	11.5	96.2	80.7	80.7
Effective Green, g (s)	18.8	18.8	11.5	96.2	80.7	80.7
Actuated g/C Ratio	0.15	0.15	0.09	0.78	0.65	0.65
Clearance Time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	2.5	2.5	2.0	4.0	4.0	4.0
Lane Grp Cap (vph)	268	240	164	2746	2303	1030
v/s Ratio Prot	0.02		c0.07	0.27	c0.65	
v/s Ratio Perm		c0.12				0.01
v/c Ratio	0.10	0.81	0.73	0.35	1.00	0.01
Uniform Delay, d1	45.3	50.9	54.7	4.3	21.5	7.6
Progression Factor	1.00	1.00	0.93	1.12	1.07	1.26
Incremental Delay, d2	0.1	17.5	13.3	0.3	16.4	0.0
Delay (s)	45.5	68.3	64.4	5.1	39.3	9.6
Level of Service	D	E	E	A	D	A
Approach Delay (s)	66.3			11.8	39.1	
Approach LOS	E			B	D	

Intersection Summary

HCM Average Control Delay	33.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Springhill Road & Pleasant Hill Road

2030 AM Peak
3/8/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	64	5	131	66	24	10	101	686	46	47	2252	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1550	1550	1550
Total Lost time (s)		3.5	3.5		3.5		3.5	4.1	4.1	3.5	4.1	4.1
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85		0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1780	1583		1779		1770	3539	1583	1444	2887	1292
Flt Permitted		0.68	1.00		0.68		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1258	1583		1254		1770	3539	1583	1444	2887	1292
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	70	5	142	72	26	11	110	746	50	51	2448	93
RTOR Reduction (vph)	0	0	124	0	4	0	0	0	12	0	0	5
Lane Group Flow (vph)	0	75	18	0	105	0	110	746	38	51	2448	88
Turn Type	Perm		Perm	Perm			Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2		1		6
Permitted Phases	8		8	4					2			6
Actuated Green, G (s)		13.5	13.5		13.5		11.1	91.8	91.8	7.6	88.3	88.3
Effective Green, g (s)		13.5	13.5		13.5		11.1	91.8	91.8	7.6	88.3	88.3
Actuated g/C Ratio		0.11	0.11		0.11		0.09	0.74	0.74	0.06	0.71	0.71
Clearance Time (s)		3.5	3.5		3.5		3.5	4.1	4.1	3.5	4.1	4.1
Vehicle Extension (s)		2.0	2.0		2.0		1.0	4.0	4.0	1.5	4.0	4.0
Lane Grp Cap (vph)		137	172		137		158	2620	1172	89	2056	920
v/s Ratio Prot							c0.06	c0.21		0.04	c0.85	
v/s Ratio Perm		0.06	0.01		c0.08				0.02			0.07
v/c Ratio		0.55	0.11		0.77		0.70	0.28	0.03	0.57	1.19	0.10
Uniform Delay, d1		52.4	49.8		53.7		54.8	5.3	4.3	56.6	17.9	5.5
Progression Factor		1.00	1.00		1.00		0.78	1.70	3.50	1.17	0.36	0.24
Incremental Delay, d2		2.4	0.1		20.5		9.1	0.2	0.0	1.7	87.4	0.1
Delay (s)		54.7	49.9		74.3		51.9	9.2	15.0	68.0	93.8	1.4
Level of Service		D	D		E		D	A	B	E	F	A
Approach Delay (s)		51.6			74.3			14.7			90.0	
Approach LOS		D			E			B			F	
Intersection Summary												
HCM Average Control Delay			69.5				HCM Level of Service			E		
HCM Volume to Capacity ratio			1.12									
Actuated Cycle Length (s)			124.0				Sum of lost time (s)			15.2		
Intersection Capacity Utilization			102.9%				ICU Level of Service			G		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

2030 AM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations	↔↔	↔		↔	↔	↔		↔	↑↑	↔		↔
Volume (vph)	229	70	80	302	146	61	43	184	744	230	20	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	0.95	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.92		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1714		1681	1738	1559		1770	3539	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1714		1681	1738	1559		1770	3539	1196		1397
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	249	76	87	328	159	66	47	200	809	250	22	174
RTOR Reduction (vph)	0	37	0	0	0	55	0	0	0	155	0	0
Lane Group Flow (vph)	249	126	0	239	248	11	0	247	809	95	0	196
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	14.3	14.3		21.2	21.2	21.2		27.5	47.0	47.0		24.5
Effective Green, g (s)	14.3	14.3		21.2	21.2	21.2		27.5	47.0	47.0		24.5
Actuated g/C Ratio	0.12	0.12		0.17	0.17	0.17		0.22	0.38	0.38		0.20
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	396	198		287	297	267		393	1341	453		276
v/s Ratio Prot	0.07	c0.07		0.14	c0.14			0.14	c0.23			c0.14
v/s Ratio Perm						0.01				0.08		
v/c Ratio	0.63	0.64		0.83	0.84	0.04		0.63	0.60	0.21		0.71
Uniform Delay, d1	52.3	52.4		49.7	49.7	42.9		43.6	31.0	26.0		46.4
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		0.81
Incremental Delay, d2	2.2	4.8		17.6	17.3	0.0		2.3	2.0	1.0		0.7
Delay (s)	54.6	57.2		67.3	67.0	42.9		45.9	33.0	27.0		38.4
Level of Service	D	E		E	E	D		D	C	C		D
Approach Delay (s)		55.6			64.2				34.3			
Approach LOS		E			E				C			

Intersection Summary

HCM Average Control Delay	224.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	107.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 5: Deer Hill Road & Pleasant Hill Road

2030 AM Peak
 3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	1704	677
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2794	1250
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2794	1250
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	1852	736
RTOR Reduction (vph)	0	65
Lane Group Flow (vph)	1852	671
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	44.0	44.0
Effective Green, g (s)	44.0	44.0
Actuated g/C Ratio	0.35	0.35
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	991	444
v/s Ratio Prot	c0.66	
v/s Ratio Perm		0.54
v/c Ratio	1.87	1.51
Uniform Delay, d1	40.0	40.0
Progression Factor	1.22	1.27
Incremental Delay, d2	391.3	231.0
Delay (s)	439.9	281.7
Level of Service	F	F
Approach Delay (s)	369.8	
Approach LOS	F	
Intersection Summary		

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Boulevard & Pleasant Hill Road

2030 AM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	243	331	123	0	0	0	276	732	473	0	610	664
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00				1.00	0.95	1.00		0.95	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770	3539	1583				1770	3539	1583		3539	1583
Flt Permitted	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770	3539	1583				1770	3539	1583		3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	264	360	134	0	0	0	300	796	514	0	663	722
RTOR Reduction (vph)	0	0	103	0	0	0	0	0	111	0	0	480
Lane Group Flow (vph)	264	360	31	0	0	0	300	796	403	0	663	242
Turn Type	Perm		Perm				Prot		Perm			Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2			6
Actuated Green, G (s)	16.1	16.1	16.1				16.9	44.4	44.4		23.5	23.5
Effective Green, g (s)	16.1	16.1	16.1				16.9	44.4	44.4		23.5	23.5
Actuated g/C Ratio	0.23	0.23	0.23				0.24	0.63	0.63		0.34	0.34
Clearance Time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	407	814	364				427	2245	1004		1188	531
v/s Ratio Prot		0.10					c0.17	0.22			c0.19	
v/s Ratio Perm	c0.15		0.02						0.25			0.15
v/c Ratio	0.65	0.44	0.08				0.70	0.35	0.40		0.56	0.46
Uniform Delay, d1	24.4	23.1	21.2				24.3	6.0	6.3		19.0	18.2
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.7	0.1	0.0				4.2	0.4	1.2		1.9	2.8
Delay (s)	27.1	23.2	21.2				28.5	6.5	7.5		20.9	21.1
Level of Service	C	C	C				C	A	A		C	C
Approach Delay (s)		24.2			0.0			10.9			21.0	
Approach LOS		C			A			B			C	

Intersection Summary

HCM Average Control Delay	17.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: SR 24 EB Off Ramp & Pleasant Hill Road

2030 AM Peak
3/8/2012























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖		↗		↕↕↕		↖	↕↕	
Volume (vph)	75	35	143	26	0	151	0	1213	22	121	542	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00	1.00		1.00		0.91		1.00	0.95	
Frt		1.00	0.85	1.00		0.85		1.00		1.00	1.00	
Flt Protected		0.97	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1801	1583	1770		1583		5072		1770	3539	
Flt Permitted		0.97	1.00	0.68		1.00		1.00		0.95	1.00	
Satd. Flow (perm)		1801	1583	1266		1583		5072		1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	38	155	28	0	164	0	1318	24	132	589	0
RTOR Reduction (vph)	0	0	131	0	0	144	0	2	0	0	0	0
Lane Group Flow (vph)	0	120	24	28	0	20	0	1340	0	132	589	0
Turn Type	Split		Perm	custom		custom				Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4	8		8						
Actuated Green, G (s)		9.6	9.6	7.3		7.3		23.8		4.1	31.9	
Effective Green, g (s)		9.6	9.6	7.3		7.3		23.8		4.1	31.9	
Actuated g/C Ratio		0.16	0.16	0.12		0.12		0.39		0.07	0.52	
Clearance Time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		284	250	152		190		1985		119	1857	
v/s Ratio Prot		c0.07						c0.26		c0.07	0.17	
v/s Ratio Perm			0.02	c0.02		0.01						
v/c Ratio		0.42	0.10	0.18		0.10		0.67		1.11	0.32	
Uniform Delay, d1		23.1	21.9	24.1		23.8		15.3		28.3	8.2	
Progression Factor		1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2		1.0	0.2	0.6		0.2		0.9		114.9	0.1	
Delay (s)		24.1	22.1	24.7		24.1		16.2		143.2	8.3	
Level of Service		C	C	C		C		B		F	A	
Approach Delay (s)		23.0			24.2			16.2			33.0	
Approach LOS		C			C			B			C	

Intersection Summary

HCM Average Control Delay	22.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	60.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Avenue

2030 AM Peak
3/8/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	38	291	70	200	750	42	124	17	111	28	8	52
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	41	316	76	217	815	46	135	18	121	30	9	57
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	861			392			1748	1733	354	1802	1748	838
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	861			392			1748	1733	354	1802	1748	838
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			81			0	73	83	9	87	85
cM capacity (veh/h)	781			1166			42	68	689	33	66	366
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1					
Volume Total	41	392	217	861	153	121	96					
Volume Left	41	0	217	0	135	0	30					
Volume Right	0	76	0	46	0	121	57					
cSH	781	1700	1166	1700	44	689	80					
Volume to Capacity	0.05	0.23	0.19	0.51	3.46	0.17	1.20					
Queue Length 95th (ft)	4	0	17	0	Err	16	176					
Control Delay (s)	9.9	0.0	8.8	0.0	Err	11.3	256.6					
Lane LOS	A		A		F	B	F					
Approach Delay (s)	0.9		1.8		5599.7		256.6					
Approach LOS					F		F					
Intersection Summary												
Average Delay			829.5									
Intersection Capacity Utilization			69.8%	ICU Level of Service	C							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
9: Deer Hill Road & Sierra Vista Way

2030 AM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	270	1020	180	508	3	377	13	96	8	22	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	
Satd. Flow (prot)	1770	1676	1583	1770	1861		1681	1691	1583		1732	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	
Satd. Flow (perm)	1770	1676	1583	1770	1861		1681	1691	1583		1732	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	27	284	1074	189	535	3	397	14	101	8	23	28
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	80	0	25	0
Lane Group Flow (vph)	27	284	1074	189	538	0	206	205	21	0	34	0
Parking (#/hr)		0										
Turn Type	Prot		Free	Prot			Split		Perm		Split	
Protected Phases	7	4		3	8		2	2			6	6
Permitted Phases			Free						2			
Actuated Green, G (s)	1.4	16.4	57.5	6.1	21.1		12.2	12.2	12.2		6.8	
Effective Green, g (s)	1.4	16.4	57.5	6.1	21.1		12.2	12.2	12.2		6.8	
Actuated g/C Ratio	0.02	0.29	1.00	0.11	0.37		0.21	0.21	0.21		0.12	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	43	478	1583	188	683		357	359	336		205	
v/s Ratio Prot	0.02	0.17		c0.11	c0.29		0.12	0.12			0.02	
v/s Ratio Perm			c0.68						0.01			
v/c Ratio	0.63	0.59	0.68	1.01	0.79		0.58	0.57	0.06		0.17	
Uniform Delay, d1	27.8	17.7	0.0	25.7	16.2		20.3	20.3	18.1		22.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	25.3	2.0	2.4	67.0	6.0		2.3	2.2	0.1		0.4	
Delay (s)	53.1	19.7	2.4	92.7	22.2		22.6	22.5	18.2		23.2	
Level of Service	D	B	A	F	C		C	C	B		C	
Approach Delay (s)		6.9			40.5			21.7			23.2	
Approach LOS		A			D			C			C	

Intersection Summary

HCM Average Control Delay	19.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	57.5	Sum of lost time (s)	0.0
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 10: Deer Hill Road & Laurel Drive

2030 AM Peak
 3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑	↗	↖	↑↑		↖	↑	↗↘		↕	
Volume (vph)	1	603	372	404	515	3	962	8	622	19	6	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	0.88		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1770	3539	1583	1770	3536		1681	1687	2787		1748	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (perm)	1770	3539	1583	1770	3536		1681	1687	2787		1748	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	655	404	439	560	3	1046	9	676	21	7	10
RTOR Reduction (vph)	0	0	290	0	1	0	0	0	467	0	9	0
Lane Group Flow (vph)	1	655	114	439	562	0	523	532	209	0	29	0
Turn Type	Prot		Perm	Prot			Split		Perm		Split	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4						2			
Actuated Green, G (s)	0.8	19.2	19.2	16.0	34.4		26.0	26.0	26.0		6.9	
Effective Green, g (s)	0.8	19.2	19.2	16.0	34.4		26.0	26.0	26.0		6.9	
Actuated g/C Ratio	0.01	0.23	0.23	0.19	0.41		0.31	0.31	0.31		0.08	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	17	808	361	337	1446		520	522	862		143	
v/s Ratio Prot	0.00	c0.19		c0.25	0.16		0.31	c0.32			c0.02	
v/s Ratio Perm			0.07						0.07			
v/c Ratio	0.06	0.81	0.32	1.30	0.39		1.01	1.02	0.24		0.20	
Uniform Delay, d1	41.3	30.7	27.0	34.0	17.5		29.0	29.0	21.7		36.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.5	6.2	0.5	156.2	0.2		40.9	44.3	0.1		0.7	
Delay (s)	42.7	36.9	27.5	190.3	17.6		70.0	73.4	21.8		36.7	
Level of Service	D	D	C	F	B		E	E	C		D	
Approach Delay (s)		33.3			93.3			52.2			36.7	
Approach LOS		C			F			D			D	

Intersection Summary

HCM Average Control Delay	57.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	84.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Road

2030 School PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕			↕	
Volume (vph)	19	0	16	0	0	1	32	1597	0	0	882	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	5.0			5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95			0.95	
Frt		0.94			0.86		1.00	1.00			1.00	
Flt Protected		0.97			1.00		0.95	1.00			1.00	
Satd. Flow (prot)		1702			1611		1770	3539			3531	
Flt Permitted		0.83			1.00		0.95	1.00			1.00	
Satd. Flow (perm)		1451			1611		1770	3539			3531	
Peak-hour factor, PHF	0.75	0.75	0.75	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.96	0.96
Adj. Flow (vph)	25	0	21	0	0	1	35	1736	0	0	919	14
RTOR Reduction (vph)	0	20	0	0	1	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	26	0	0	0	0	35	1736	0	0	932	0
Turn Type	Perm		Perm			Prot						
Protected Phases		8			4		5	2			6	
Permitted Phases	8			4								
Actuated Green, G (s)		4.0			4.0		4.2	49.0			40.8	
Effective Green, g (s)		4.0			4.0		4.2	49.0			40.8	
Actuated g/C Ratio		0.06			0.06		0.07	0.79			0.66	
Clearance Time (s)		4.0			4.0		4.0	5.0			5.0	
Vehicle Extension (s)		2.5			2.0		2.0	4.0			4.0	
Lane Grp Cap (vph)		94			104		120	2797			2324	
v/s Ratio Prot					0.00		0.02	c0.49			0.26	
v/s Ratio Perm		c0.02										
v/c Ratio		0.28			0.00		0.29	0.62			0.40	
Uniform Delay, d1		27.6			27.1		27.5	2.7			4.9	
Progression Factor		1.00			1.00		1.27	2.04			1.00	
Incremental Delay, d2		1.2			0.0		0.4	0.8			0.5	
Delay (s)		28.8			27.1		35.2	6.2			5.4	
Level of Service		C			C		D	A			A	
Approach Delay (s)		28.8			27.1			6.8			5.4	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	6.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	60.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Greenvally Drive & Pleasant Hill Road

2030 School PM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔	↔	↑↑	↔	↔	↑↑	↔
Volume (vph)	2	0	4	40	0	17	10	1650	59	38	863	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			4.0	4.0	4.0	5.0	5.0	4.0	5.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt		0.91			1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1667			1770	1583	1770	3539	1583	1770	3539	
Flt Permitted		0.91			0.98	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1546			1817	1583	1770	3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	0	4	43	0	18	11	1793	64	41	938	0
RTOR Reduction (vph)	0	4	0	0	0	17	0	0	21	0	0	0
Lane Group Flow (vph)	0	2	0	0	43	1	11	1793	43	41	938	0
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2		1		6
Permitted Phases	8			4		4			2			6
Actuated Green, G (s)		5.1			4.1	4.1	1.2	42.0	42.0	2.9		43.7
Effective Green, g (s)		5.1			4.1	4.1	1.2	42.0	42.0	2.9		43.7
Actuated g/C Ratio		0.08			0.07	0.07	0.02	0.68	0.68	0.05		0.70
Clearance Time (s)		3.0			4.0	4.0	4.0	5.0	5.0	4.0		5.0
Vehicle Extension (s)		2.5			2.0	2.0	2.0	4.0	4.0	2.0		4.0
Lane Grp Cap (vph)		127			120	105	34	2397	1072	83		2494
v/s Ratio Prot							0.01	c0.51		c0.02		0.27
v/s Ratio Perm		0.00			c0.02	0.00			0.03			
v/c Ratio		0.02			0.36	0.01	0.32	0.75	0.04	0.49		0.38
Uniform Delay, d1		26.1			27.7	27.1	30.0	6.5	3.3	28.8		3.7
Progression Factor		1.00			1.00	1.00	1.25	0.71	0.39	0.68		2.39
Incremental Delay, d2		0.0			0.7	0.0	1.4	1.6	0.1	1.6		0.4
Delay (s)		26.2			28.4	27.1	38.9	6.2	1.3	21.3		9.2
Level of Service		C			C	C	D	A	A	C		A
Approach Delay (s)		26.2			28.0			6.3				9.7
Approach LOS		C			C			A				A

Intersection Summary

HCM Average Control Delay	7.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Reliez Valle Road & Pleasant Hill Road

2030 School PM Peak
3/8/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	32	193	127	1690	885	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	210	138	1837	962	24
RTOR Reduction (vph)	0	186	0	0	0	10
Lane Group Flow (vph)	35	24	138	1837	962	14
Turn Type		Perm	Prot			Perm
Protected Phases	8		5	2	6	
Permitted Phases		8				6
Actuated Green, G (s)	7.0	7.0	8.1	46.0	33.9	33.9
Effective Green, g (s)	7.0	7.0	8.1	46.0	33.9	33.9
Actuated g/C Ratio	0.11	0.11	0.13	0.74	0.55	0.55
Clearance Time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	2.5	2.5	2.0	4.0	4.0	4.0
Lane Grp Cap (vph)	200	179	231	2626	1935	866
v/s Ratio Prot	c0.02		0.08	c0.52	0.27	
v/s Ratio Perm		0.01				0.01
v/c Ratio	0.17	0.13	0.60	0.70	0.50	0.02
Uniform Delay, d1	24.9	24.8	25.4	4.3	8.7	6.4
Progression Factor	1.00	1.00	0.79	1.89	0.88	0.48
Incremental Delay, d2	0.3	0.2	1.9	1.1	0.9	0.0
Delay (s)	25.2	25.0	22.0	9.2	8.6	3.1
Level of Service	C	C	C	A	A	A
Approach Delay (s)	25.0			10.1	8.4	
Approach LOS	C			B	A	

Intersection Summary

HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Springhill Road & Pleasant Hill Road

2030 School PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↔		↖	↑↑	↗	↖	↑↑	↗
Volume (vph)	51	7	174	28	6	7	120	1765	55	9	1045	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1550	1550	1550
Total Lost time (s)		3.5	3.5		3.5		3.5	4.1	4.1	3.5	4.1	4.1
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85		0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1785	1583		1759		1770	3539	1583	1444	2887	1292
Flt Permitted		0.77	1.00		0.78		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1433	1583		1419		1770	3539	1583	1444	2887	1292
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	8	189	30	7	8	130	1918	60	10	1136	36
RTOR Reduction (vph)	0	0	167	0	7	0	0	0	7	0	0	8
Lane Group Flow (vph)	0	63	22	0	38	0	130	1918	53	10	1136	28
Turn Type	Perm		Perm	Perm			Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2		1		6
Permitted Phases	8		8	4					2			6
Actuated Green, G (s)		7.2	7.2		7.2		7.1	42.6	42.6	1.1	36.6	36.6
Effective Green, g (s)		7.2	7.2		7.2		7.1	42.6	42.6	1.1	36.6	36.6
Actuated g/C Ratio		0.12	0.12		0.12		0.11	0.69	0.69	0.02	0.59	0.59
Clearance Time (s)		3.5	3.5		3.5		3.5	4.1	4.1	3.5	4.1	4.1
Vehicle Extension (s)		2.0	2.0		2.0		1.0	4.0	4.0	1.5	4.0	4.0
Lane Grp Cap (vph)		166	184		165		203	2432	1088	26	1704	763
v/s Ratio Prot							c0.07	c0.54		0.01	0.39	
v/s Ratio Perm		c0.04	0.01		0.03				0.03			0.02
v/c Ratio		0.38	0.12		0.23		0.64	0.79	0.05	0.38	0.67	0.04
Uniform Delay, d1		25.3	24.6		24.9		26.2	6.6	3.1	30.1	8.6	5.3
Progression Factor		1.00	1.00		1.00		0.75	2.39	1.97	1.46	0.68	0.12
Incremental Delay, d2		0.5	0.1		0.3		2.6	1.4	0.0	3.1	1.9	0.1
Delay (s)		25.9	24.7		25.1		22.2	17.2	6.2	46.9	7.7	0.7
Level of Service		C	C		C		C	B	A	D	A	A
Approach Delay (s)		25.0			25.1			17.2			7.8	
Approach LOS		C			C			B			A	

Intersection Summary

HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

2030 School PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	410	98	56	258	107	82	37	81	1411	222	17	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	0.95	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.95		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1761		1681	1733	1558		1770	3539	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1761		1681	1733	1558		1770	3539	1196		1397
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	446	107	61	280	116	89	40	88	1534	241	18	99
RTOR Reduction (vph)	0	17	0	0	0	60	0	0	0	80	0	0
Lane Group Flow (vph)	446	151	0	196	200	29	0	128	1534	161	0	117
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	20.8	20.8		18.8	18.8	18.8		12.7	53.6	53.6		13.8
Effective Green, g (s)	20.8	20.8		18.8	18.8	18.8		12.7	53.6	53.6		13.8
Actuated g/C Ratio	0.17	0.17		0.15	0.15	0.15		0.10	0.43	0.43		0.11
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	576	295		255	263	236		181	1530	517		155
v/s Ratio Prot	c0.13	0.09		c0.12	0.12			0.07	c0.43			c0.08
v/s Ratio Perm						0.02				0.13		
v/c Ratio	0.77	0.51		0.77	0.76	0.12		0.71	1.00	0.31		0.75
Uniform Delay, d1	49.4	47.0		50.5	50.4	45.5		53.9	35.2	23.1		53.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		0.97
Incremental Delay, d2	5.9	0.6		11.8	11.0	0.1		9.8	23.6	1.6		14.3
Delay (s)	55.2	47.6		62.3	61.5	45.5		63.7	58.8	24.7		66.1
Level of Service	E	D		E	E	D		E	E	C		E
Approach Delay (s)		53.1			58.9				54.8			
Approach LOS		D			E				D			

Intersection Summary

HCM Average Control Delay	47.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 5: Deer Hill Road & Pleasant Hill Road

2030 School PM Peak
 3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	943	252
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frbp, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2794	1250
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2794	1250
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	1025	274
RTOR Reduction (vph)	0	39
Lane Group Flow (vph)	1025	235
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	54.7	54.7
Effective Green, g (s)	54.7	54.7
Actuated g/C Ratio	0.44	0.44
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	1233	551
v/s Ratio Prot	0.37	
v/s Ratio Perm		0.19
v/c Ratio	0.83	0.43
Uniform Delay, d1	30.6	23.8
Progression Factor	0.80	0.75
Incremental Delay, d2	5.6	2.0
Delay (s)	30.1	19.9
Level of Service	C	B
Approach Delay (s)	31.1	
Approach LOS	C	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Boulevard & Pleasant Hill Road

2030 School PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	246	425	272	0	0	0	252	680	446	0	590	587
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00				1.00	0.95	1.00		0.95	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770	3539	1583				1770	3539	1583		3539	1583
Flt Permitted	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770	3539	1583				1770	3539	1583		3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	262	452	289	0	0	0	268	723	474	0	628	624
RTOR Reduction (vph)	0	0	192	0	0	0	0	0	83	0	0	402
Lane Group Flow (vph)	262	452	97	0	0	0	268	723	391	0	628	222
Turn Type	Perm		Perm				Prot		Perm			Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2			6
Actuated Green, G (s)	17.4	17.4	17.4				14.2	43.1	43.1		24.9	24.9
Effective Green, g (s)	17.4	17.4	17.4				14.2	43.1	43.1		24.9	24.9
Actuated g/C Ratio	0.25	0.25	0.25				0.20	0.62	0.62		0.36	0.36
Clearance Time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	440	880	393				359	2179	975		1259	563
v/s Ratio Prot		0.13					c0.15	0.20			c0.18	
v/s Ratio Perm	c0.15		0.06						0.25			0.14
v/c Ratio	0.60	0.51	0.25				0.75	0.33	0.40		0.50	0.39
Uniform Delay, d1	23.2	22.7	21.1				26.2	6.5	6.9		17.7	16.9
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.4	0.2	0.1				7.2	0.4	1.2		1.4	2.1
Delay (s)	24.6	22.9	21.2				33.4	6.9	8.1		19.1	19.0
Level of Service	C	C	C				C	A	A		B	B
Approach Delay (s)		22.8			0.0			12.1			19.0	
Approach LOS		C			A			B			B	

Intersection Summary

HCM Average Control Delay	17.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: SR 24 EB Off Ramp & Pleasant Hill Road

2030 School PM Peak
3/8/2012























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖		↗		↕↕↕		↖	↕↕	
Volume (vph)	89	43	202	23	0	149	0	1131	20	131	725	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00	1.00		1.00		0.91		1.00	0.95	
Frt		1.00	0.85	1.00		0.85		1.00		1.00	1.00	
Flt Protected		0.97	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1802	1583	1770		1583		5072		1770	3539	
Flt Permitted		0.97	1.00	0.71		1.00		1.00		0.95	1.00	
Satd. Flow (perm)		1802	1583	1331		1583		5072		1770	3539	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	95	46	215	24	0	159	0	1203	21	139	771	0
RTOR Reduction (vph)	0	0	176	0	0	142	0	2	0	0	0	0
Lane Group Flow (vph)	0	141	39	24	0	17	0	1222	0	139	771	0
Turn Type	Split		Perm	custom		custom				Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4	8		8						
Actuated Green, G (s)		9.7	9.7	5.6		5.6		16.5		6.1	26.6	
Effective Green, g (s)		9.7	9.7	5.6		5.6		16.5		6.1	26.6	
Actuated g/C Ratio		0.18	0.18	0.10		0.10		0.31		0.11	0.49	
Clearance Time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		324	285	138		164		1553		200	1747	
v/s Ratio Prot		c0.08						c0.24		c0.08	0.22	
v/s Ratio Perm			0.02	c0.02		0.01						
v/c Ratio		0.44	0.14	0.17		0.10		0.79		0.69	0.44	
Uniform Delay, d1		19.7	18.6	22.0		21.9		17.1		23.0	8.8	
Progression Factor		1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2		0.9	0.2	0.6		0.3		2.7		10.0	0.2	
Delay (s)		20.6	18.8	22.6		22.1		19.8		33.0	9.0	
Level of Service		C	B	C		C		B		C	A	
Approach Delay (s)		19.5			22.2			19.8			12.7	
Approach LOS		B			C			B			B	

Intersection Summary

HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	53.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Avenue

2030 School PM Peak
3/8/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	0			0			0	0	0	0	0	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			0			0	0	0	0	0	0
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1623			1623			1023	896	1085	1023	896	1085
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1					
Volume Total	0	0	0	0	0	0	0					
Volume Left	0	0	0	0	0	0	0					
Volume Right	0	0	0	0	0	0	0					
cSH	1700	1700	1700	1700	1700	1700	1700					
Volume to Capacity	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
Queue Length 95th (ft)	0	0	0	0	0	0	0					
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Lane LOS					A	A	A					
Approach Delay (s)	0.0		0.0		0.0		0.0					
Approach LOS					A		A					
Intersection Summary												
Average Delay			0.0									
Intersection Capacity Utilization			0.0%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

9: Deer Hill Road & Sierra Vista Way

2030 School PM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	318	1200	172	256	11	303	18	114	3	26	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1851		1681	1695	1583		1753	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		1.00	
Satd. Flow (perm)	1770	1863	1583	1770	1851		1681	1695	1583		1753	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	346	1304	187	278	12	329	20	124	3	28	22
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	99	0	19	0
Lane Group Flow (vph)	29	346	1304	187	288	0	174	175	25	0	34	0
Turn Type	Prot		Free	Prot			Split		Perm		Split	
Protected Phases	7	4		3	8		2	2			6	6
Permitted Phases			Free						2			
Actuated Green, G (s)	1.4	16.9	57.0	6.1	21.6		11.3	11.3	11.3		6.7	
Effective Green, g (s)	1.4	16.9	57.0	6.1	21.6		11.3	11.3	11.3		6.7	
Actuated g/C Ratio	0.02	0.30	1.00	0.11	0.38		0.20	0.20	0.20		0.12	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	43	552	1583	189	701		333	336	314		206	
v/s Ratio Prot	0.02	0.19		0.11	0.16		0.10	0.10			0.02	
v/s Ratio Perm			c0.82						0.02			
v/c Ratio	0.67	0.63	0.82	0.99	0.41		0.52	0.52	0.08		0.16	
Uniform Delay, d1	27.6	17.3	0.0	25.4	13.0		20.4	20.4	18.6		22.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	34.5	2.2	5.0	61.7	0.4		1.5	1.5	0.1		0.4	
Delay (s)	62.1	19.6	5.0	87.1	13.4		21.9	21.9	18.7		23.0	
Level of Service	E	B	A	F	B		C	C	B		C	
Approach Delay (s)		9.0			42.3			21.1			23.0	
Approach LOS		A			D			C			C	

Intersection Summary

HCM Average Control Delay	17.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
10: Deer Hill Road & Laurel Drive

2030 School PM Peak
3/8/2012



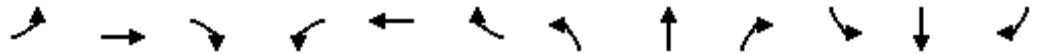
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	681	364	267	268	9	612	12	845	19	8	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	0.88		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1770	3539	1583	1770	3522		1681	1688	2787		1765	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (perm)	1770	3539	1583	1770	3522		1681	1688	2787		1765	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	740	396	290	291	10	665	13	918	21	9	7
RTOR Reduction (vph)	0	0	255	0	3	0	0	0	608	0	6	0
Lane Group Flow (vph)	17	740	141	290	298	0	339	339	310	0	31	0
Turn Type	Prot		Perm	Prot			Split		Perm	Split		
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4						2			
Actuated Green, G (s)	0.7	27.6	27.6	10.1	37.0		17.1	17.1	17.1		6.9	
Effective Green, g (s)	0.7	27.6	27.6	10.1	37.0		17.1	17.1	17.1		6.9	
Actuated g/C Ratio	0.01	0.36	0.36	0.13	0.48		0.22	0.22	0.22		0.09	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	16	1257	562	230	1677		370	371	613		157	
v/s Ratio Prot	0.01	c0.21		c0.16	0.08		c0.20	0.20			c0.02	
v/s Ratio Perm			0.09						0.11			
v/c Ratio	1.06	0.59	0.25	1.26	0.18		0.92	0.91	0.51		0.20	
Uniform Delay, d1	38.5	20.4	17.7	33.8	11.6		29.6	29.6	26.6		32.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	246.4	0.7	0.2	147.5	0.1		26.7	26.2	0.7		0.6	
Delay (s)	284.9	21.1	18.0	181.3	11.7		56.3	55.8	27.2		33.4	
Level of Service	F	C	B	F	B		E	E	C		C	
Approach Delay (s)		23.9			94.9			39.5			33.4	
Approach LOS		C			F			D			C	

Intersection Summary

HCM Average Control Delay	43.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	77.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Road

2030 PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕			↕	
Volume (vph)	6	0	19	0	0	0	21	2287	0	0	861	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	5.0			5.0	
Lane Util. Factor		1.00					1.00	0.95			0.95	
Frt		0.90					1.00	1.00			1.00	
Flt Protected		0.99					0.95	1.00			1.00	
Satd. Flow (prot)		1653					1770	3539			3528	
Flt Permitted		0.96					0.95	1.00			1.00	
Satd. Flow (perm)		1610					1770	3539			3528	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	7	0	21	0	0	0	23	2541	0	0	957	21
RTOR Reduction (vph)	0	20	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	8	0	0	0	0	23	2541	0	0	977	0
Turn Type	Perm			Perm			Prot					
Protected Phases		8			4		5	2			6	
Permitted Phases	8			4								
Actuated Green, G (s)		2.6					1.6	50.4			44.8	
Effective Green, g (s)		2.6					1.6	50.4			44.8	
Actuated g/C Ratio		0.04					0.03	0.81			0.72	
Clearance Time (s)		4.0					4.0	5.0			5.0	
Vehicle Extension (s)		2.5					2.0	4.0			4.0	
Lane Grp Cap (vph)		68					46	2877			2549	
v/s Ratio Prot							0.01	c0.72			0.28	
v/s Ratio Perm		c0.00										
v/c Ratio		0.12					0.50	0.88			0.38	
Uniform Delay, d1		28.6					29.8	3.8			3.3	
Progression Factor		1.00					1.19	1.61			1.00	
Incremental Delay, d2		0.6					1.7	2.5			0.4	
Delay (s)		29.1					37.3	8.7			3.7	
Level of Service		C					D	A			A	
Approach Delay (s)		29.1			0.0			9.0			3.7	
Approach LOS		C			A			A			A	

Intersection Summary

HCM Average Control Delay	7.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Greenvally Drive & Pleasant Hill Road

2030 PM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕↕	↕	↕	↕↕	↕
Volume (vph)	7	0	3	12	0	16	3	2326	24	12	839	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			4.0	4.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.96			1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96			0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1731			1770	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		1.00			1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1794			1863	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	0	3	13	0	17	3	2528	26	13	912	4
RTOR Reduction (vph)	0	3	0	0	0	16	0	0	5	0	0	1
Lane Group Flow (vph)	0	8	0	0	13	1	3	2528	21	13	912	3
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2			1	6
Permitted Phases	8			4		4			2			6
Actuated Green, G (s)		3.4			2.4	2.4	1.0	45.4	45.4	1.2	45.6	45.6
Effective Green, g (s)		3.4			2.4	2.4	1.0	45.4	45.4	1.2	45.6	45.6
Actuated g/C Ratio		0.05			0.04	0.04	0.02	0.73	0.73	0.02	0.74	0.74
Clearance Time (s)		3.0			4.0	4.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5			2.0	2.0	2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)		98			72	61	29	2591	1159	34	2603	1164
v/s Ratio Prot							0.00	c0.71		c0.01	0.26	
v/s Ratio Perm		0.00			c0.01	0.00			0.01			0.00
v/c Ratio		0.08			0.18	0.01	0.10	0.98	0.02	0.38	0.35	0.00
Uniform Delay, d1		27.8			28.8	28.7	30.1	7.8	2.3	30.0	2.9	2.2
Progression Factor		1.00			1.00	1.00	1.29	0.32	0.12	0.77	2.25	1.93
Incremental Delay, d2		0.3			0.4	0.0	0.2	5.8	0.0	2.5	0.4	0.0
Delay (s)		28.1			29.3	28.7	38.9	8.2	0.3	25.6	6.9	4.2
Level of Service		C			C	C	D	A	A	C	A	A
Approach Delay (s)		28.1			28.9			8.2			7.2	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	8.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	81.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Reliez Valle Road & Pleasant Hill Road

2030 PM Peak
3/8/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	35	181	182	2338	775	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	197	198	2541	842	30
RTOR Reduction (vph)	0	175	0	0	0	15
Lane Group Flow (vph)	38	22	198	2541	842	15
Turn Type		Perm	Prot			Perm
Protected Phases	8		5	2	6	
Permitted Phases		8				6
Actuated Green, G (s)	7.0	7.0	11.2	46.0	30.8	30.8
Effective Green, g (s)	7.0	7.0	11.2	46.0	30.8	30.8
Actuated g/C Ratio	0.11	0.11	0.18	0.74	0.50	0.50
Clearance Time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	2.5	2.5	2.0	4.0	4.0	4.0
Lane Grp Cap (vph)	200	179	320	2626	1758	786
v/s Ratio Prot	c0.02		0.11	c0.72	0.24	
v/s Ratio Perm		0.01				0.01
v/c Ratio	0.19	0.12	0.62	0.97	0.48	0.02
Uniform Delay, d1	24.9	24.7	23.4	7.3	10.3	7.9
Progression Factor	1.00	1.00	0.79	1.56	0.86	0.68
Incremental Delay, d2	0.3	0.2	0.8	4.7	0.9	0.0
Delay (s)	25.3	25.0	19.2	16.1	9.8	5.5
Level of Service	C	C	B	B	A	A
Approach Delay (s)	25.0			16.4	9.6	
Approach LOS	C			B	A	

Intersection Summary

HCM Average Control Delay	15.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Springhill Road & Pleasant Hill Road

2030 PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↔		↖	↑↑	↗	↖	↑↑	↗
Volume (vph)	21	2	94	22	0	6	129	2493	37	16	966	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1550	1550	1550
Total Lost time (s)		3.5	3.5		3.5		3.5	4.1	4.1	3.5	4.1	4.1
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85		0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.96		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1781	1583		1739		1770	3539	1583	1444	2887	1292
Flt Permitted		0.78	1.00		0.76		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1460	1583		1369		1770	3539	1583	1444	2887	1292
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	2	102	24	0	7	140	2710	40	17	1050	29
RTOR Reduction (vph)	0	0	94	0	6	0	0	0	3	0	0	6
Lane Group Flow (vph)	0	25	8	0	25	0	140	2710	37	17	1050	23
Turn Type	Perm		Perm	Perm			Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2		1		6
Permitted Phases	8		8	4					2			6
Actuated Green, G (s)		4.9	4.9		4.9		7.5	44.7	44.7	1.3	38.5	38.5
Effective Green, g (s)		4.9	4.9		4.9		7.5	44.7	44.7	1.3	38.5	38.5
Actuated g/C Ratio		0.08	0.08		0.08		0.12	0.72	0.72	0.02	0.62	0.62
Clearance Time (s)		3.5	3.5		3.5		3.5	4.1	4.1	3.5	4.1	4.1
Vehicle Extension (s)		2.0	2.0		2.0		1.0	4.0	4.0	1.5	4.0	4.0
Lane Grp Cap (vph)		115	125		108		214	2552	1141	30	1793	802
v/s Ratio Prot							c0.08	c0.77		0.01	0.36	
v/s Ratio Perm		0.02	0.01		c0.02				0.02			0.02
v/c Ratio		0.22	0.06		0.23		0.65	1.06	0.03	0.57	0.59	0.03
Uniform Delay, d1		26.8	26.4		26.8		26.0	8.6	2.5	30.1	7.0	4.5
Progression Factor		1.00	1.00		1.00		0.74	3.31	1.66	1.34	0.50	0.12
Incremental Delay, d2		0.3	0.1		0.4		0.5	28.9	0.0	12.8	1.3	0.1
Delay (s)		27.1	26.5		27.2		19.8	57.6	4.1	52.9	4.8	0.6
Level of Service		C	C		C		B	E	A	D	A	A
Approach Delay (s)		26.6			27.2			55.0			5.5	
Approach LOS		C			C			E			A	

Intersection Summary

HCM Average Control Delay	40.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	11.1
Intersection Capacity Utilization	90.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

2030 PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	750	118	63	235	86	178	9	55	1766	230	6	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.5	4.5		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	*0.92	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.95		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1766		1681	1729	1558		1770	3427	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1766		1681	1729	1558		1770	3427	1196		1397
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.97	0.97	0.97	0.97	0.95	0.95
Adj. Flow (vph)	789	124	66	247	91	187	9	57	1821	237	6	127
RTOR Reduction (vph)	0	15	0	0	0	50	0	0	0	75	0	0
Lane Group Flow (vph)	789	175	0	168	170	137	0	66	1821	162	0	133
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	33.8	33.8		17.2	17.2	17.2		7.3	42.2	42.2		14.3
Effective Green, g (s)	33.8	33.8		17.2	17.2	17.2		7.3	42.2	42.2		14.3
Actuated g/C Ratio	0.27	0.27		0.14	0.14	0.14		0.06	0.34	0.34		0.12
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.5	4.5		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	936	481		233	240	216		104	1166	407		161
v/s Ratio Prot	c0.23	0.10		c0.10	0.10			0.04	c0.53			c0.10
v/s Ratio Perm						0.09				0.14		
v/c Ratio	0.84	0.36		0.72	0.71	0.63		0.63	1.56	0.40		0.83
Uniform Delay, d1	42.6	36.4		51.1	51.0	50.4		57.0	40.9	31.2		53.6
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.11
Incremental Delay, d2	6.7	0.2		8.9	7.6	4.4		9.0	257.0	2.9		24.3
Delay (s)	49.3	36.6		60.1	58.6	54.9		66.0	297.9	34.1		83.8
Level of Service	D	D		E	E	D		E	F	C		F
Approach Delay (s)		46.8			57.7				261.3			
Approach LOS		D			E				F			

Intersection Summary

HCM Average Control Delay	139.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	104.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 5: Deer Hill Road & Pleasant Hill Road

2030 PM Peak
 3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	791	207
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frbp, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2794	1250
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2794	1250
Peak-hour factor, PHF	0.95	0.95
Adj. Flow (vph)	833	218
RTOR Reduction (vph)	0	42
Lane Group Flow (vph)	833	176
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	48.7	48.7
Effective Green, g (s)	48.7	48.7
Actuated g/C Ratio	0.39	0.39
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	1097	491
v/s Ratio Prot	0.30	
v/s Ratio Perm		0.14
v/c Ratio	0.76	0.36
Uniform Delay, d1	32.6	26.6
Progression Factor	0.80	0.79
Incremental Delay, d2	4.4	1.8
Delay (s)	30.6	22.8
Level of Service	C	C
Approach Delay (s)	35.1	
Approach LOS	D	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Boulevard & Pleasant Hill Road

2030 PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	244	437	263	0	0	0	247	666	334	0	638	478
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00				1.00	0.95	1.00		0.95	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770	3539	1583				1770	3539	1583		3539	1583
Flt Permitted	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770	3539	1583				1770	3539	1583		3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	265	475	286	0	0	0	268	724	363	0	693	520
RTOR Reduction (vph)	0	0	181	0	0	0	0	0	76	0	0	336
Lane Group Flow (vph)	265	475	105	0	0	0	268	724	287	0	693	184
Turn Type	Perm		Perm				Prot		Perm			Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2			6
Actuated Green, G (s)	17.5	17.5	17.5				14.2	43.0	43.0		24.8	24.8
Effective Green, g (s)	17.5	17.5	17.5				14.2	43.0	43.0		24.8	24.8
Actuated g/C Ratio	0.25	0.25	0.25				0.20	0.61	0.61		0.35	0.35
Clearance Time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	443	885	396				359	2174	972		1254	561
v/s Ratio Prot		0.13					c0.15	0.20			c0.20	
v/s Ratio Perm	c0.15		0.07						0.18			0.12
v/c Ratio	0.60	0.54	0.27				0.75	0.33	0.29		0.55	0.33
Uniform Delay, d1	23.1	22.7	21.1				26.2	6.5	6.4		18.1	16.5
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.5	0.3	0.1				7.2	0.4	0.8		1.8	1.6
Delay (s)	24.6	23.1	21.2				33.4	7.0	7.1		19.9	18.1
Level of Service	C	C	C				C	A	A		B	B
Approach Delay (s)		22.9			0.0			12.2			19.1	
Approach LOS		C			A			B			B	

Intersection Summary

HCM Average Control Delay	17.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: SR 24 EB Off Ramp & Pleasant Hill Road

2030 PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖		↗		↕↗↖		↖	↕↗	
Volume (vph)	114	58	293	28	0	185	0	927	19	130	812	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00	1.00		1.00		0.91		1.00	0.95	
Frt		1.00	0.85	1.00		0.85		1.00		1.00	1.00	
Flt Protected		0.97	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1803	1583	1770		1583		5070		1770	3539	
Flt Permitted		0.97	1.00	0.64		1.00		1.00		0.95	1.00	
Satd. Flow (perm)		1803	1583	1192		1583		5070		1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	124	63	318	30	0	201	0	1008	21	141	883	0
RTOR Reduction (vph)	0	0	254	0	0	175	0	3	0	0	0	0
Lane Group Flow (vph)	0	187	64	30	0	26	0	1026	0	141	883	0
Turn Type	Split		Perm	custom		custom				Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4	8		8						
Actuated Green, G (s)		11.4	11.4	7.3		7.3		15.8		6.1	25.9	
Effective Green, g (s)		11.4	11.4	7.3		7.3		15.8		6.1	25.9	
Actuated g/C Ratio		0.20	0.20	0.13		0.13		0.28		0.11	0.46	
Clearance Time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		363	319	154		204		1415		191	1619	
v/s Ratio Prot		c0.10						c0.20		c0.08	0.25	
v/s Ratio Perm			0.04	c0.03		0.02						
v/c Ratio		0.52	0.20	0.19		0.13		0.73		0.74	0.55	
Uniform Delay, d1		20.1	18.8	22.0		21.8		18.4		24.5	11.1	
Progression Factor		1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2		1.2	0.3	0.6		0.3		1.9		13.8	0.4	
Delay (s)		21.4	19.1	22.6		22.1		20.3		38.3	11.5	
Level of Service		C	B	C		C		C		D	B	
Approach Delay (s)		20.0			22.2			20.3			15.2	
Approach LOS		B			C			C			B	

Intersection Summary

HCM Average Control Delay	18.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	56.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Avenue

2030 PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	62	662	66	115	320	92	68	9	127	61	12	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	720	72	125	348	100	74	10	138	66	13	21
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	448			791			1515	1588	755	1645	1574	398
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	448			791			1515	1588	755	1645	1574	398
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			85			0	89	66	0	85	97
cM capacity (veh/h)	1112			829			71	86	408	41	88	652

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	67	791	125	448	84	138	100
Volume Left	67	0	125	0	74	0	66
Volume Right	0	72	0	100	0	138	21
cSH	1112	1700	829	1700	73	408	55
Volume to Capacity	0.06	0.47	0.15	0.26	1.15	0.34	1.81
Queue Length 95th (ft)	5	0	13	0	158	37	238
Control Delay (s)	8.4	0.0	10.1	0.0	252.1	18.3	546.1
Lane LOS	A		B		F	C	F
Approach Delay (s)	0.7		2.2		106.5		546.1
Approach LOS					F		F

Intersection Summary		
Average Delay		45.7
Intersection Capacity Utilization	67.1%	ICU Level of Service C
Analysis Period (min)		15

HCM Signalized Intersection Capacity Analysis
9: Deer Hill Road & Sierra Vista Way

2030 PM Peak
3/8/2012

























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	636	1497	150	299	3	300	19	154	5	24	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1860		1681	1695	1583		1793	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	
Satd. Flow (perm)	1770	1863	1583	1770	1860		1681	1695	1583		1793	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	23	669	1576	158	315	3	316	20	162	5	25	9
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	136	0	8	0
Lane Group Flow (vph)	23	669	1576	158	318	0	167	169	26	0	31	0
Turn Type	Prot		Free	Prot			Split		Perm		Split	
Protected Phases	7	4		3	8		2	2			6	6
Permitted Phases			Free						2			
Actuated Green, G (s)	1.9	34.7	79.6	9.0	41.8		13.0	13.0	13.0		6.9	
Effective Green, g (s)	1.9	34.7	79.6	9.0	41.8		13.0	13.0	13.0		6.9	
Actuated g/C Ratio	0.02	0.44	1.00	0.11	0.53		0.16	0.16	0.16		0.09	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	42	812	1583	200	977		275	277	259		155	
v/s Ratio Prot	0.01	0.36		0.09	0.17		0.10	0.10			0.02	
v/s Ratio Perm			c1.00						0.02			
v/c Ratio	0.55	0.82	1.00	0.79	0.33		0.61	0.61	0.10		0.20	
Uniform Delay, d1	38.4	19.8	0.0	34.4	10.8		30.9	30.9	28.3		33.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	13.8	6.8	21.6	18.8	0.2		3.8	3.9	0.2		0.6	
Delay (s)	52.2	26.6	21.6	53.2	11.0		34.7	34.9	28.5		34.4	
Level of Service	D	C	C	D	B		C	C	C		C	
Approach Delay (s)		23.4			25.0			32.7			34.4	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	25.2	HCM Level of Service	C
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	79.6	Sum of lost time (s)	0.0
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 10: Deer Hill Road & Laurel Drive

2030 PM Peak
 3/8/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	1206	379	307	260	3	674	9	934	19	1	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	0.88		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1770	3539	1583	1770	3534		1681	1688	2787		1727	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (perm)	1770	3539	1583	1770	3534		1681	1688	2787		1727	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	1311	412	334	283	3	733	10	1015	21	1	10
RTOR Reduction (vph)	0	0	145	0	1	0	0	0	573	0	9	0
Lane Group Flow (vph)	36	1311	267	334	285	0	374	369	442	0	23	0
Turn Type	Prot		Perm	Prot			Split		Perm		Split	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4						2			
Actuated Green, G (s)	2.4	32.7	32.7	10.0	40.3		17.0	17.0	17.0		6.7	
Effective Green, g (s)	2.4	32.7	32.7	10.0	40.3		17.0	17.0	17.0		6.7	
Actuated g/C Ratio	0.03	0.40	0.40	0.12	0.49		0.21	0.21	0.21		0.08	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	52	1404	628	215	1728		347	348	575		140	
v/s Ratio Prot	0.02	c0.37		c0.19	0.08		c0.22	0.22			c0.01	
v/s Ratio Perm			0.17						0.16			
v/c Ratio	0.69	0.93	0.43	1.55	0.17		1.08	1.06	0.77		0.16	
Uniform Delay, d1	39.6	23.8	18.0	36.2	11.7		32.7	32.7	30.8		35.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	33.0	11.6	0.5	270.7	0.0		70.6	65.1	6.1		0.5	
Delay (s)	72.6	35.4	18.5	306.9	11.7		103.3	97.8	37.0		35.8	
Level of Service	E	D	B	F	B		F	F	D		D	
Approach Delay (s)		32.2			170.7			63.9			35.8	
Approach LOS		C			F			E			D	
Intersection Summary												
HCM Average Control Delay			66.2			HCM Level of Service			E			
HCM Volume to Capacity ratio			0.99									
Actuated Cycle Length (s)			82.4			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			85.9%			ICU Level of Service			E			
Analysis Period (min)			15									
c	Critical Lane Group											

Appendix F – Level of Service Worksheets: Cumulative Year 2030 plus Project Conditions

HCM Signalized Intersection Capacity Analysis
 1: Rancho View Drive & Pleasant Hill Road

2030+Proj AM Peak
 3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕			↕	
Volume (vph)	0	0	37	0	0	0	23	804	0	0	1713	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	5.0			5.0	
Lane Util. Factor		1.00					1.00	0.95			0.95	
Frt		0.86					1.00	1.00			1.00	
Flt Protected		1.00					0.95	1.00			1.00	
Satd. Flow (prot)		1611					1770	3539			3536	
Flt Permitted		1.00					0.95	1.00			1.00	
Satd. Flow (perm)		1611					1770	3539			3536	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	0	0	41	0	0	0	29	1005	0	0	2141	12
RTOR Reduction (vph)	0	40	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1	0	0	0	0	29	1005	0	0	2153	0
Turn Type	Perm		Perm				Prot					
Protected Phases		8			4		5	2			6	
Permitted Phases	8			4								
Actuated Green, G (s)		2.0					2.7	51.0			44.3	
Effective Green, g (s)		2.0					2.7	51.0			44.3	
Actuated g/C Ratio		0.03					0.04	0.82			0.71	
Clearance Time (s)		4.0					4.0	5.0			5.0	
Vehicle Extension (s)		2.5					2.0	4.0			4.0	
Lane Grp Cap (vph)		52					77	2911			2527	
v/s Ratio Prot		c0.00					0.02	c0.28			c0.61	
v/s Ratio Perm												
v/c Ratio		0.03					0.38	0.35			0.85	
Uniform Delay, d1		29.1					28.8	1.4			6.5	
Progression Factor		1.00					0.93	2.22			1.00	
Incremental Delay, d2		0.1					1.1	0.3			3.9	
Delay (s)		29.2					27.9	3.3			10.3	
Level of Service		C					C	A			B	
Approach Delay (s)		29.2			0.0			4.0			10.3	
Approach LOS		C			A			A			B	

Intersection Summary

HCM Average Control Delay	8.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Greenvalley Drive & Pleasant Hill Road

2030+Proj AM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕↕	↕	↕	↕↕	↕
Volume (vph)	2	0	5	23	0	12	0	823	18	8	1844	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			4.0	4.0		5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00	1.00	0.95	1.00
Frt		0.90			1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99			0.95	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1653			1770	1583		3539	1583	1770	3539	1583
Flt Permitted		0.91			1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1531			1863	1583		3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	2	0	6	26	0	13	0	914	20	9	2049	1
RTOR Reduction (vph)	0	6	0	0	0	12	0	0	5	0	0	0
Lane Group Flow (vph)	0	2	0	0	26	1	0	914	15	9	2049	1
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2			1	6
Permitted Phases	8			4		4			2			6
Actuated Green, G (s)		3.7			2.7	2.7		45.2	45.2	1.1	50.3	50.3
Effective Green, g (s)		3.7			2.7	2.7		45.2	45.2	1.1	50.3	50.3
Actuated g/C Ratio		0.06			0.04	0.04		0.73	0.73	0.02	0.81	0.81
Clearance Time (s)		3.0			4.0	4.0		5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5			2.0	2.0		4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)		91			81	69		2580	1154	31	2871	1284
v/s Ratio Prot								0.26		0.01	c0.58	
v/s Ratio Perm		0.00			c0.01	0.00			0.01			0.00
v/c Ratio		0.03			0.32	0.01		0.35	0.01	0.29	0.71	0.00
Uniform Delay, d1		27.5			28.8	28.4		3.1	2.3	30.1	2.6	1.1
Progression Factor		1.00			1.00	1.00		1.78	2.41	1.02	2.34	0.97
Incremental Delay, d2		0.1			0.8	0.0		0.4	0.0	1.3	1.1	0.0
Delay (s)		27.5			29.6	28.4		5.8	5.6	31.9	7.2	1.1
Level of Service		C			C	C		A	A	C	A	A
Approach Delay (s)		27.5			29.2			5.8			7.3	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	7.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Reliez Valle Road & Pleasant Hill Road

2030+Proj AM Peak
3/8/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	24	242	102	825	1957	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	28	285	120	971	2302	13
RTOR Reduction (vph)	0	91	0	0	0	2
Lane Group Flow (vph)	28	194	120	971	2302	11
Turn Type		Perm	Prot			Perm
Protected Phases	8		5	2	6	
Permitted Phases		8				6
Actuated Green, G (s)	18.8	18.8	11.5	96.2	80.7	80.7
Effective Green, g (s)	18.8	18.8	11.5	96.2	80.7	80.7
Actuated g/C Ratio	0.15	0.15	0.09	0.78	0.65	0.65
Clearance Time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	2.5	2.5	2.0	4.0	4.0	4.0
Lane Grp Cap (vph)	268	240	164	2746	2303	1030
v/s Ratio Prot	0.02		c0.07	0.27	c0.65	
v/s Ratio Perm		c0.12				0.01
v/c Ratio	0.10	0.81	0.73	0.35	1.00	0.01
Uniform Delay, d1	45.3	50.9	54.7	4.3	21.6	7.6
Progression Factor	1.00	1.00	0.94	1.06	1.07	1.26
Incremental Delay, d2	0.1	17.5	13.3	0.4	16.9	0.0
Delay (s)	45.5	68.3	64.9	4.9	40.0	9.6
Level of Service	D	E	E	A	D	A
Approach Delay (s)	66.3			11.5	39.8	
Approach LOS	E			B	D	

Intersection Summary

HCM Average Control Delay	33.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Springhill Road & Pleasant Hill Road

2030+Proj AM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↗	↕	↗	↗	↕	↗
Volume (vph)	64	5	131	66	24	10	101	702	46	47	2257	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1550	1550	1550
Total Lost time (s)		3.5	3.5		3.5		3.5	4.1	4.1	3.5	4.1	4.1
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Flt		1.00	0.85		0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1780	1583		1779		1770	3539	1583	1444	2887	1292
Flt Permitted		0.68	1.00		0.68		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1258	1583		1254		1770	3539	1583	1444	2887	1292
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	70	5	142	72	26	11	110	763	50	51	2453	93
RTOR Reduction (vph)	0	0	124	0	4	0	0	0	12	0	0	5
Lane Group Flow (vph)	0	75	18	0	105	0	110	763	38	51	2453	88
Turn Type	Perm		Perm	Perm			Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2		1		6
Permitted Phases	8		8	4					2			6
Actuated Green, G (s)		13.5	13.5		13.5		11.1	91.8	91.8	7.6	88.3	88.3
Effective Green, g (s)		13.5	13.5		13.5		11.1	91.8	91.8	7.6	88.3	88.3
Actuated g/C Ratio		0.11	0.11		0.11		0.09	0.74	0.74	0.06	0.71	0.71
Clearance Time (s)		3.5	3.5		3.5		3.5	4.1	4.1	3.5	4.1	4.1
Vehicle Extension (s)		2.0	2.0		2.0		1.0	4.0	4.0	1.5	4.0	4.0
Lane Grp Cap (vph)		137	172		137		158	2620	1172	89	2056	920
v/s Ratio Prot							c0.06	c0.22		0.04	c0.85	
v/s Ratio Perm		0.06	0.01		c0.08				0.02			0.07
v/c Ratio		0.55	0.11		0.77		0.70	0.29	0.03	0.57	1.19	0.10
Uniform Delay, d1		52.4	49.8		53.7		54.8	5.3	4.3	56.6	17.9	5.5
Progression Factor		1.00	1.00		1.00		0.78	1.73	3.47	1.17	0.36	0.24
Incremental Delay, d2		2.4	0.1		20.5		9.0	0.2	0.0	1.6	88.4	0.1
Delay (s)		54.7	49.9		74.3		52.0	9.5	14.9	68.0	94.9	1.4
Level of Service		D	D		E		D	A	B	E	F	A
Approach Delay (s)		51.6			74.3			14.8			91.0	
Approach LOS		D			E			B			F	

Intersection Summary

HCM Average Control Delay	70.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	15.2
Intersection Capacity Utilization	102.9%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

2030+Proj AM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations	↔↔	↔		↔	↔	↔		↔	↑↑	↔		↔
Volume (vph)	245	80	107	304	148	61	43	184	744	230	20	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	0.95	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.91		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1703		1681	1739	1559		1770	3539	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1703		1681	1739	1559		1770	3539	1196		1397
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	266	87	116	330	161	66	47	200	809	250	22	174
RTOR Reduction (vph)	0	43	0	0	0	55	0	0	0	157	0	0
Lane Group Flow (vph)	266	160	0	241	250	11	0	247	809	93	0	196
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	16.3	16.3		21.3	21.3	21.3		25.7	46.1	46.1		23.3
Effective Green, g (s)	16.3	16.3		21.3	21.3	21.3		25.7	46.1	46.1		23.3
Actuated g/C Ratio	0.13	0.13		0.17	0.17	0.17		0.21	0.37	0.37		0.19
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	451	224		289	299	268		367	1316	445		263
v/s Ratio Prot	0.08	c0.09		0.14	c0.14			0.14	0.23			c0.14
v/s Ratio Perm						0.01				0.08		
v/c Ratio	0.59	0.72		0.83	0.84	0.04		0.67	0.61	0.21		0.75
Uniform Delay, d1	50.7	51.6		49.6	49.7	42.8		45.3	31.7	26.5		47.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		0.83
Incremental Delay, d2	1.3	8.7		17.6	17.3	0.0		3.8	2.2	1.1		0.9
Delay (s)	52.0	60.4		67.2	66.9	42.9		49.1	33.9	27.6		40.4
Level of Service	D	E		E	E	D		D	C	C		D
Approach Delay (s)		55.6			64.2				35.5			
Approach LOS		E			E				D			

Intersection Summary

HCM Average Control Delay	226.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	109.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 5: Deer Hill Road & Pleasant Hill Road

2030+Proj AM Peak
 3/8/2012

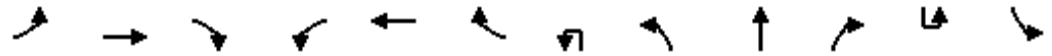


Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	1706	680
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frbp, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2794	1250
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2794	1250
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	1854	739
RTOR Reduction (vph)	0	65
Lane Group Flow (vph)	1854	674
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	43.7	43.7
Effective Green, g (s)	43.7	43.7
Actuated g/C Ratio	0.35	0.35
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	985	441
v/s Ratio Prot	c0.66	
v/s Ratio Perm		0.54
v/c Ratio	1.88	1.53
Uniform Delay, d1	40.1	40.1
Progression Factor	1.22	1.27
Incremental Delay, d2	397.4	238.4
Delay (s)	446.1	289.4
Level of Service	F	F
Approach Delay (s)	376.1	
Approach LOS	F	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

2030+Proj AM Peak_Alt1
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	245	80	107	304	148	61	43	184	744	230	20	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	0.95	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.91		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1703		1681	1739	1559		1770	3539	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1703		1681	1739	1559		1770	3539	1196		1397
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	266	87	116	330	161	66	47	200	809	250	22	174
RTOR Reduction (vph)	0	42	0	0	0	55	0	0	0	152	0	0
Lane Group Flow (vph)	266	161	0	241	250	11	0	247	809	98	0	196
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	16.4	16.4		21.3	21.3	21.3		22.3	48.4	48.4		20.9
Effective Green, g (s)	16.4	16.4		21.3	21.3	21.3		22.3	48.4	48.4		20.9
Actuated g/C Ratio	0.13	0.13		0.17	0.17	0.17		0.18	0.39	0.39		0.17
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	454	225		289	299	268		318	1381	467		235
v/s Ratio Prot	0.08	c0.09		0.14	c0.14			0.14	0.23			c0.14
v/s Ratio Perm						0.01				0.08		
v/c Ratio	0.59	0.72		0.83	0.84	0.04		0.78	0.59	0.21		0.83
Uniform Delay, d1	50.6	51.6		49.6	49.7	42.8		48.5	29.9	25.1		49.9
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		0.81
Incremental Delay, d2	1.2	8.7		17.6	17.3	0.0		10.4	1.8	1.0		2.3
Delay (s)	51.9	60.3		67.2	66.9	42.9		58.8	31.7	26.1		42.9
Level of Service	D	E		E	E	D		E	C	C		D
Approach Delay (s)		55.5			64.2				35.8			
Approach LOS		E			E				D			

Intersection Summary

HCM Average Control Delay	216.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	110.9%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 5: Deer Hill Road & Pleasant Hill Road

2030+Proj AM Peak_Alt1
 3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑↑	↔
Volume (vph)	1706	680
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	
Lane Util. Factor	0.91	
Frbp, ped/bikes	1.00	
Flpb, ped/bikes	1.00	
Frt	0.96	
Flt Protected	1.00	
Satd. Flow (prot)	3843	
Flt Permitted	1.00	
Satd. Flow (perm)	3843	
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	1854	739
RTOR Reduction (vph)	58	0
Lane Group Flow (vph)	2535	0
Confl. Peds. (#/hr)		
Turn Type		
Protected Phases	6	
Permitted Phases		
Actuated Green, G (s)	47.0	
Effective Green, g (s)	47.0	
Actuated g/C Ratio	0.38	
Clearance Time (s)	5.0	
Vehicle Extension (s)	4.0	
Lane Grp Cap (vph)	1457	
v/s Ratio Prot	c0.66	
v/s Ratio Perm		
v/c Ratio	1.74	
Uniform Delay, d1	38.5	
Progression Factor	1.28	
Incremental Delay, d2	333.3	
Delay (s)	382.5	
Level of Service	F	
Approach Delay (s)	358.7	
Approach LOS	F	
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

5: Deer Hill Road & Pleasant Hill Road

2030+Proj AM Peak_Alt2

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	245	80	107	304	148	61	53	193	744	230	20	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	0.95	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.91		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1703		1681	1739	1559		1770	3539	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1703		1681	1739	1559		1770	3539	1196		1397
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	266	87	116	330	161	66	58	210	809	250	22	174
RTOR Reduction (vph)	0	43	0	0	0	55	0	0	0	157	0	0
Lane Group Flow (vph)	266	160	0	241	250	11	0	268	809	93	0	196
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	16.3	16.3		21.3	21.3	21.3		26.3	46.1	46.1		23.3
Effective Green, g (s)	16.3	16.3		21.3	21.3	21.3		26.3	46.1	46.1		23.3
Actuated g/C Ratio	0.13	0.13		0.17	0.17	0.17		0.21	0.37	0.37		0.19
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	451	224		289	299	268		375	1316	445		263
v/s Ratio Prot	0.08	c0.09		0.14	c0.14			c0.15	c0.23			0.14
v/s Ratio Perm						0.01				0.08		
v/c Ratio	0.59	0.72		0.83	0.84	0.04		0.71	0.61	0.21		0.75
Uniform Delay, d1	50.7	51.6		49.6	49.7	42.8		45.4	31.7	26.5		47.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		0.83
Incremental Delay, d2	1.3	8.7		17.6	17.3	0.0		5.3	2.2	1.1		0.9
Delay (s)	52.0	60.4		67.2	66.9	42.9		50.7	33.9	27.6		40.4
Level of Service	D	E		E	E	D		D	C	C		D
Approach Delay (s)		55.6			64.2				36.1			
Approach LOS		E			E				D			

Intersection Summary

HCM Average Control Delay	231.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	110.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 5: Deer Hill Road & Pleasant Hill Road

2030+Proj AM Peak_Alt2
 3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	1706	680
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2794	1250
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2794	1250
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	1854	739
RTOR Reduction (vph)	0	66
Lane Group Flow (vph)	1854	673
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	43.1	43.1
Effective Green, g (s)	43.1	43.1
Actuated g/C Ratio	0.35	0.35
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	971	434
v/s Ratio Prot	c0.66	
v/s Ratio Perm		0.54
v/c Ratio	1.91	1.55
Uniform Delay, d1	40.5	40.5
Progression Factor	1.21	1.27
Incremental Delay, d2	409.6	249.0
Delay (s)	458.7	300.3
Level of Service	F	F
Approach Delay (s)	387.3	
Approach LOS	F	
Intersection Summary		

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Boulevard & Pleasant Hill Road

2030+Proj AM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	243	331	123	0	0	0	276	737	473	0	630	664
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00				1.00	0.95	1.00		0.95	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770	3539	1583				1770	3539	1583		3539	1583
Flt Permitted	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770	3539	1583				1770	3539	1583		3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	264	360	134	0	0	0	300	801	514	0	685	722
RTOR Reduction (vph)	0	0	103	0	0	0	0	0	111	0	0	480
Lane Group Flow (vph)	264	360	31	0	0	0	300	801	403	0	685	242
Turn Type	Perm		Perm				Prot		Perm			Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2			6
Actuated Green, G (s)	16.1	16.1	16.1				16.9	44.4	44.4		23.5	23.5
Effective Green, g (s)	16.1	16.1	16.1				16.9	44.4	44.4		23.5	23.5
Actuated g/C Ratio	0.23	0.23	0.23				0.24	0.63	0.63		0.34	0.34
Clearance Time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	407	814	364				427	2245	1004		1188	531
v/s Ratio Prot		0.10					c0.17	0.23			c0.19	
v/s Ratio Perm	c0.15		0.02						0.25			0.15
v/c Ratio	0.65	0.44	0.08				0.70	0.36	0.40		0.58	0.46
Uniform Delay, d1	24.4	23.1	21.2				24.3	6.1	6.3		19.2	18.2
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.7	0.1	0.0				4.2	0.4	1.2		2.0	2.8
Delay (s)	27.1	23.2	21.2				28.5	6.5	7.5		21.2	21.1
Level of Service	C	C	C				C	A	A		C	C
Approach Delay (s)		24.2			0.0			10.9			21.1	
Approach LOS		C			A			B			C	

Intersection Summary

HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: SR 24 EB Off Ramp & Pleasant Hill Road

2030+Proj AM Peak
3/8/2012























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖		↗		↕↕↕		↖	↕↕	
Volume (vph)	75	35	143	26	0	151	0	1218	22	121	562	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00	1.00		1.00		0.91		1.00	0.95	
Frt		1.00	0.85	1.00		0.85		1.00		1.00	1.00	
Flt Protected		0.97	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1801	1583	1770		1583		5072		1770	3539	
Flt Permitted		0.97	1.00	0.68		1.00		1.00		0.95	1.00	
Satd. Flow (perm)		1801	1583	1266		1583		5072		1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	38	155	28	0	164	0	1324	24	132	611	0
RTOR Reduction (vph)	0	0	131	0	0	144	0	2	0	0	0	0
Lane Group Flow (vph)	0	120	24	28	0	20	0	1346	0	132	611	0
Turn Type	Split		Perm	custom		custom				Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4	8		8						
Actuated Green, G (s)		9.6	9.6	7.3		7.3		23.9		4.1	32.0	
Effective Green, g (s)		9.6	9.6	7.3		7.3		23.9		4.1	32.0	
Actuated g/C Ratio		0.16	0.16	0.12		0.12		0.39		0.07	0.53	
Clearance Time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		284	250	152		190		1990		119	1860	
v/s Ratio Prot		c0.07						c0.27		c0.07	0.17	
v/s Ratio Perm			0.02	c0.02		0.01						
v/c Ratio		0.42	0.10	0.18		0.10		0.68		1.11	0.33	
Uniform Delay, d1		23.1	21.9	24.1		23.9		15.3		28.4	8.3	
Progression Factor		1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2		1.0	0.2	0.6		0.2		0.9		114.9	0.1	
Delay (s)		24.2	22.1	24.7		24.1		16.2		143.3	8.4	
Level of Service		C	C	C		C		B		F	A	
Approach Delay (s)		23.0			24.2			16.2			32.4	
Approach LOS		C			C			B			C	

Intersection Summary

HCM Average Control Delay	22.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	60.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Avenue

2030+Proj AM Peak
3/8/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	38	296	70	200	773	42	124	17	111	28	8	52
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	41	322	76	217	840	46	135	18	121	30	9	57
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	886			398			1778	1763	360	1832	1778	863
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	886			398			1778	1763	360	1832	1778	863
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			81			0	71	82	3	86	84
cM capacity (veh/h)	764			1161			40	65	685	31	63	354
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1					
Volume Total	41	398	217	886	153	121	96					
Volume Left	41	0	217	0	135	0	30					
Volume Right	0	76	0	46	0	121	57					
cSH	764	1700	1161	1700	42	685	75					
Volume to Capacity	0.05	0.23	0.19	0.52	3.68	0.18	1.27					
Queue Length 95th (ft)	4	0	17	0	Err	16	185					
Control Delay (s)	10.0	0.0	8.8	0.0	Err	11.4	289.7					
Lane LOS	A		A		F	B	F					
Approach Delay (s)	0.9		1.7		5599.7		289.7					
Approach LOS					F		F					
Intersection Summary												
Average Delay			817.9									
Intersection Capacity Utilization			71.0%		ICU Level of Service		C					
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

9: Deer Hill Road & Sierra Vista Way

2030+Proj AM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	272	1020	182	529	3	377	13	99	8	22	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	
Satd. Flow (prot)	1770	1676	1583	1770	1861		1681	1691	1583		1732	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	
Satd. Flow (perm)	1770	1676	1583	1770	1861		1681	1691	1583		1732	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	27	286	1074	192	557	3	397	14	104	8	23	28
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	82	0	25	0
Lane Group Flow (vph)	27	286	1074	192	560	0	206	205	22	0	34	0
Parking (#/hr)		0										
Turn Type	Prot		Free	Prot			Split		Perm		Split	
Protected Phases	7	4		3	8		2	2			6	6
Permitted Phases			Free						2			
Actuated Green, G (s)	1.4	16.4	57.5	6.1	21.1		12.2	12.2	12.2		6.8	
Effective Green, g (s)	1.4	16.4	57.5	6.1	21.1		12.2	12.2	12.2		6.8	
Actuated g/C Ratio	0.02	0.29	1.00	0.11	0.37		0.21	0.21	0.21		0.12	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	43	478	1583	188	683		357	359	336		205	
v/s Ratio Prot	0.02	0.17		c0.11	c0.30		0.12	0.12			0.02	
v/s Ratio Perm			c0.68						0.01			
v/c Ratio	0.63	0.60	0.68	1.02	0.82		0.58	0.57	0.07		0.17	
Uniform Delay, d1	27.8	17.7	0.0	25.7	16.5		20.3	20.3	18.1		22.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	25.3	2.0	2.4	71.3	7.6		2.3	2.2	0.1		0.4	
Delay (s)	53.1	19.7	2.4	97.0	24.1		22.6	22.5	18.2		23.2	
Level of Service	D	B	A	F	C		C	C	B		C	
Approach Delay (s)		6.9			42.7			21.7			23.2	
Approach LOS		A			D			C			C	

Intersection Summary

HCM Average Control Delay	20.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	57.5	Sum of lost time (s)	0.0
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Deer Hill Road & Laurel Drive

2030+Proj AM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗↗	↖	↖	↗↗		↖	↖	↗↗		↗↗	
Volume (vph)	1	605	372	413	527	3	962	8	622	19	6	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	0.88		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1770	3539	1583	1770	3536		1681	1687	2787		1748	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (perm)	1770	3539	1583	1770	3536		1681	1687	2787		1748	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	658	404	449	573	3	1046	9	676	21	7	10
RTOR Reduction (vph)	0	0	289	0	1	0	0	0	467	0	9	0
Lane Group Flow (vph)	1	658	115	449	575	0	523	532	209	0	29	0
Turn Type	Prot		Perm	Prot			Split		Perm		Split	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4						2			
Actuated Green, G (s)	0.8	19.2	19.2	16.0	34.4		26.0	26.0	26.0		6.9	
Effective Green, g (s)	0.8	19.2	19.2	16.0	34.4		26.0	26.0	26.0		6.9	
Actuated g/C Ratio	0.01	0.23	0.23	0.19	0.41		0.31	0.31	0.31		0.08	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	17	808	361	337	1446		520	522	862		143	
v/s Ratio Prot	0.00	c0.19		c0.25	0.16		0.31	c0.32			c0.02	
v/s Ratio Perm			0.07						0.07			
v/c Ratio	0.06	0.81	0.32	1.33	0.40		1.01	1.02	0.24		0.20	
Uniform Delay, d1	41.3	30.8	27.0	34.0	17.5		29.0	29.0	21.7		36.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.5	6.3	0.5	168.6	0.2		40.9	44.3	0.1		0.7	
Delay (s)	42.7	37.1	27.5	202.6	17.7		70.0	73.4	21.8		36.7	
Level of Service	D	D	C	F	B		E	E	C		D	
Approach Delay (s)		33.4			98.7			52.2			36.7	
Approach LOS		C			F			D			D	

Intersection Summary

HCM Average Control Delay	59.2	HCM Level of Service	E
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	84.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 11: Project Driveway & Pleasant Hill Road

2030+Proj AM Peak
 3/8/2012



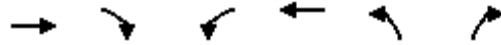
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗	↖	↑↑↑	↑↑	↗
Volume (veh/h)	0	50	19	1110	2095	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	54	21	1207	2277	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					352	
pX, platoon unblocked	0.67	0.67	0.67			
vC, conflicting volume	2721	1139	2282			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2582	214	1925			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	90	90			
cM capacity (veh/h)	12	528	202			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	
Volume Total	54	21	402	402	402	1139	1139	4	
Volume Left	0	21	0	0	0	0	0	0	
Volume Right	54	0	0	0	0	0	0	4	
cSH	528	202	1700	1700	1700	1700	1700	1700	
Volume to Capacity	0.10	0.10	0.24	0.24	0.24	0.67	0.67	0.00	
Queue Length 95th (ft)	9	8	0	0	0	0	0	0	
Control Delay (s)	12.6	24.8	0.0	0.0	0.0	0.0	0.0	0.0	
Lane LOS	B	C							
Approach Delay (s)	12.6	0.4					0.0		
Approach LOS	B								

Intersection Summary			
Average Delay			0.3
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)			15

HCM Unsignalized Intersection Capacity Analysis
 12: Deer Hill Road & Project Driveway Northeast

2030+Proj AM Peak
 3/8/2012



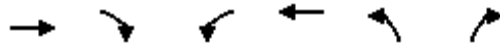
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩		↩	↩	↩	
Volume (veh/h)	379	0	5	1008	0	53
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	412	0	5	1096	0	58
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				642		
pX, platoon unblocked					0.93	
vC, conflicting volume			412		1518	412
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			412		1520	412
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	91
cM capacity (veh/h)			1147		121	640

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	412	5	1096	58
Volume Left	0	5	0	0
Volume Right	0	0	0	58
cSH	1700	1147	1700	640
Volume to Capacity	0.24	0.00	0.64	0.09
Queue Length 95th (ft)	0	0	0	7
Control Delay (s)	0.0	8.2	0.0	11.2
Lane LOS		A		B
Approach Delay (s)	0.0	0.0		11.2
Approach LOS				B

Intersection Summary			
Average Delay		0.4	
Intersection Capacity Utilization		63.1%	ICU Level of Service B
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 13: Deer Hill Road & Project Driveway Southwest

2030+Proj AM Peak
 3/8/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	379	5	0	1008	23	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	412	5	0	1096	25	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			417		1510	415
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			417		1510	415
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		81	100
cM capacity (veh/h)			1142		132	638

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	417	1096	25
Volume Left	0	0	25
Volume Right	5	0	0
cSH	1700	1142	132
Volume to Capacity	0.25	0.00	0.19
Queue Length 95th (ft)	0	0	17
Control Delay (s)	0.0	0.0	38.4
Lane LOS	E		
Approach Delay (s)	0.0	0.0	38.4
Approach LOS	E		

Intersection Summary			
Average Delay			0.6
Intersection Capacity Utilization	63.1%		ICU Level of Service
Analysis Period (min)	15		B

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Road

2030+Proj School PM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕			↕	
Volume (vph)	19	0	16	0	0	1	32	1607	0	0	891	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	5.0			5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95			0.95	
Frt		0.94			0.86		1.00	1.00			1.00	
Flt Protected		0.97			1.00		0.95	1.00			1.00	
Satd. Flow (prot)		1702			1611		1770	3539			3531	
Flt Permitted		0.83			1.00		0.95	1.00			1.00	
Satd. Flow (perm)		1451			1611		1770	3539			3531	
Peak-hour factor, PHF	0.75	0.75	0.75	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.96	0.96
Adj. Flow (vph)	25	0	21	0	0	1	35	1747	0	0	928	14
RTOR Reduction (vph)	0	20	0	0	1	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	26	0	0	0	0	35	1747	0	0	941	0
Turn Type	Perm		Perm				Prot					
Protected Phases		8			4		5	2			6	
Permitted Phases	8			4								
Actuated Green, G (s)		4.0			4.0		4.2	49.0			40.8	
Effective Green, g (s)		4.0			4.0		4.2	49.0			40.8	
Actuated g/C Ratio		0.06			0.06		0.07	0.79			0.66	
Clearance Time (s)		4.0			4.0		4.0	5.0			5.0	
Vehicle Extension (s)		2.5			2.0		2.0	4.0			4.0	
Lane Grp Cap (vph)		94			104		120	2797			2324	
v/s Ratio Prot					0.00		0.02	c0.49			0.27	
v/s Ratio Perm		c0.02										
v/c Ratio		0.28			0.00		0.29	0.62			0.40	
Uniform Delay, d1		27.6			27.1		27.5	2.7			4.9	
Progression Factor		1.00			1.00		1.26	2.06			1.00	
Incremental Delay, d2		1.2			0.0		0.4	0.8			0.5	
Delay (s)		28.8			27.1		35.1	6.3			5.5	
Level of Service		C			C		D	A			A	
Approach Delay (s)		28.8			27.1			6.9			5.5	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	6.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Greenvally Drive & Pleasant Hill Road

2030+Proj School PM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕↕	↕	↕	↕↕	↕
Volume (vph)	2	0	4	40	0	17	10	1660	59	38	872	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			4.0	4.0	4.0	5.0	5.0	4.0	5.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt		0.91			1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1667			1770	1583	1770	3539	1583	1770	3539	
Flt Permitted		0.91			0.98	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1546			1817	1583	1770	3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	0	4	43	0	18	11	1804	64	41	948	0
RTOR Reduction (vph)	0	4	0	0	0	17	0	0	21	0	0	0
Lane Group Flow (vph)	0	2	0	0	43	1	11	1804	43	41	948	0
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2		1		6
Permitted Phases	8			4		4			2			6
Actuated Green, G (s)		5.1			4.1	4.1	1.2	42.0	42.0	2.9		43.7
Effective Green, g (s)		5.1			4.1	4.1	1.2	42.0	42.0	2.9		43.7
Actuated g/C Ratio		0.08			0.07	0.07	0.02	0.68	0.68	0.05		0.70
Clearance Time (s)		3.0			4.0	4.0	4.0	5.0	5.0	4.0		5.0
Vehicle Extension (s)		2.5			2.0	2.0	2.0	4.0	4.0	2.0		4.0
Lane Grp Cap (vph)		127			120	105	34	2397	1072	83		2494
v/s Ratio Prot							0.01	c0.51		c0.02		0.27
v/s Ratio Perm		0.00			c0.02	0.00			0.03			
v/c Ratio		0.02			0.36	0.01	0.32	0.75	0.04	0.49		0.38
Uniform Delay, d1		26.1			27.7	27.1	30.0	6.6	3.3	28.8		3.7
Progression Factor		1.00			1.00	1.00	1.24	0.72	0.38	0.68		2.37
Incremental Delay, d2		0.0			0.7	0.0	1.4	1.6	0.1	1.6		0.4
Delay (s)		26.2			28.4	27.1	38.8	6.3	1.3	21.3		9.2
Level of Service		C			C	C	D	A	A	C		A
Approach Delay (s)		26.2			28.0			6.4				9.7
Approach LOS		C			C			A				A

Intersection Summary

HCM Average Control Delay	8.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

3: Reliez Valle Road & Pleasant Hill Road

2030+Proj School PM Peak

3/8/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	32	193	127	1700	894	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	210	138	1848	972	24
RTOR Reduction (vph)	0	186	0	0	0	10
Lane Group Flow (vph)	35	24	138	1848	972	14
Turn Type		Perm	Prot			Perm
Protected Phases	8		5	2	6	
Permitted Phases		8				6
Actuated Green, G (s)	7.0	7.0	8.1	46.0	33.9	33.9
Effective Green, g (s)	7.0	7.0	8.1	46.0	33.9	33.9
Actuated g/C Ratio	0.11	0.11	0.13	0.74	0.55	0.55
Clearance Time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	2.5	2.5	2.0	4.0	4.0	4.0
Lane Grp Cap (vph)	200	179	231	2626	1935	866
v/s Ratio Prot	c0.02		0.08	c0.52	0.27	
v/s Ratio Perm		0.01				0.01
v/c Ratio	0.17	0.13	0.60	0.70	0.50	0.02
Uniform Delay, d1	24.9	24.8	25.4	4.3	8.8	6.4
Progression Factor	1.00	1.00	0.79	1.89	0.87	0.47
Incremental Delay, d2	0.3	0.2	1.9	1.1	0.9	0.0
Delay (s)	25.2	25.0	22.0	9.2	8.6	3.0
Level of Service	C	C	C	A	A	A
Approach Delay (s)	25.0			10.1	8.4	
Approach LOS	C			B	A	

Intersection Summary

HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

4: Springhill Road & Pleasant Hill Road

2030+Proj School PM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↔		↖	↕	↗	↖	↕	↗
Volume (vph)	51	7	174	28	6	7	120	1775	55	9	1054	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1550	1550	1550
Total Lost time (s)		3.5	3.5		3.5		3.5	4.1	4.1	3.5	4.1	4.1
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Fr _t		1.00	0.85		0.98		1.00	1.00	0.85	1.00	1.00	0.85
Fl _t Protected		0.96	1.00		0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1785	1583		1759		1770	3539	1583	1444	2887	1292
Fl _t Permitted		0.77	1.00		0.78		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1433	1583		1419		1770	3539	1583	1444	2887	1292
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	8	189	30	7	8	130	1929	60	10	1146	36
RTOR Reduction (vph)	0	0	167	0	7	0	0	0	7	0	0	8
Lane Group Flow (vph)	0	63	22	0	38	0	130	1929	53	10	1146	28
Turn Type	Perm		Perm	Perm			Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2		1		6
Permitted Phases	8		8	4					2			6
Actuated Green, G (s)		7.2	7.2		7.2		7.1	42.6	42.6	1.1	36.6	36.6
Effective Green, g (s)		7.2	7.2		7.2		7.1	42.6	42.6	1.1	36.6	36.6
Actuated g/C Ratio		0.12	0.12		0.12		0.11	0.69	0.69	0.02	0.59	0.59
Clearance Time (s)		3.5	3.5		3.5		3.5	4.1	4.1	3.5	4.1	4.1
Vehicle Extension (s)		2.0	2.0		2.0		1.0	4.0	4.0	1.5	4.0	4.0
Lane Grp Cap (vph)		166	184		165		203	2432	1088	26	1704	763
v/s Ratio Prot							c0.07	c0.55		0.01	0.40	
v/s Ratio Perm		c0.04	0.01		0.03				0.03			0.02
v/c Ratio		0.38	0.12		0.23		0.64	0.79	0.05	0.38	0.67	0.04
Uniform Delay, d ₁		25.3	24.6		24.9		26.2	6.7	3.1	30.1	8.6	5.3
Progression Factor		1.00	1.00		1.00		0.74	2.40	1.95	1.46	0.67	0.12
Incremental Delay, d ₂		0.5	0.1		0.3		2.6	1.4	0.0	3.1	1.9	0.1
Delay (s)		25.9	24.7		25.1		21.9	17.4	6.2	46.9	7.7	0.7
Level of Service		C	C		C		C	B	A	D	A	A
Approach Delay (s)		25.0			25.1			17.3			7.9	
Approach LOS		C			C			B			A	

Intersection Summary

HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

2030+Proj School PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	420	104	73	261	110	82	37	81	1411	222	17	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	0.95	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.94		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1748		1681	1734	1558		1770	3539	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1748		1681	1734	1558		1770	3539	1196		1397
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	457	113	79	284	120	89	40	88	1534	241	18	99
RTOR Reduction (vph)	0	22	0	0	0	58	0	0	0	81	0	0
Lane Group Flow (vph)	457	170	0	199	205	31	0	128	1534	160	0	117
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	21.1	21.1		19.0	19.0	19.0		12.6	53.1	53.1		13.8
Effective Green, g (s)	21.1	21.1		19.0	19.0	19.0		12.6	53.1	53.1		13.8
Actuated g/C Ratio	0.17	0.17		0.15	0.15	0.15		0.10	0.43	0.43		0.11
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	584	297		258	266	239		180	1515	512		155
v/s Ratio Prot	c0.13	0.10		c0.12	0.12			0.07	c0.43			c0.08
v/s Ratio Perm						0.02				0.13		
v/c Ratio	0.78	0.57		0.77	0.77	0.13		0.71	1.01	0.31		0.75
Uniform Delay, d1	49.3	47.3		50.4	50.4	45.3		53.9	35.5	23.4		53.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		0.98
Incremental Delay, d2	6.3	1.7		12.2	11.8	0.1		10.5	26.3	1.6		14.2
Delay (s)	55.5	49.0		62.6	62.2	45.4		64.4	61.7	25.0		66.3
Level of Service	E	D		E	E	D		E	E	C		E
Approach Delay (s)		53.6			59.4				57.2			
Approach LOS		D			E				E			

Intersection Summary

HCM Average Control Delay	48.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 5: Deer Hill Road & Pleasant Hill Road

2030+Proj School PM Peak
 3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	947	257
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2794	1250
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2794	1250
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	1029	279
RTOR Reduction (vph)	0	40
Lane Group Flow (vph)	1029	239
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	54.3	54.3
Effective Green, g (s)	54.3	54.3
Actuated g/C Ratio	0.44	0.44
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	1224	547
v/s Ratio Prot	0.37	
v/s Ratio Perm		0.19
v/c Ratio	0.84	0.44
Uniform Delay, d1	31.0	24.2
Progression Factor	0.80	0.75
Incremental Delay, d2	5.9	2.1
Delay (s)	30.8	20.2
Level of Service	C	C
Approach Delay (s)	31.6	
Approach LOS	C	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

2030+Proj School PM Peak_Alt1
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations	↔↔	↔		↔	↔	↔		↔	↕↕	↔		↔
Volume (vph)	420	104	73	261	110	82	37	81	1411	222	17	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	0.95	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.94		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1748		1681	1734	1558		1770	3539	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1748		1681	1734	1558		1770	3539	1196		1397
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	457	113	79	284	120	89	40	88	1534	241	18	99
RTOR Reduction (vph)	0	22	0	0	0	58	0	0	0	81	0	0
Lane Group Flow (vph)	457	170	0	199	205	31	0	128	1534	160	0	117
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	21.1	21.1		19.0	19.0	19.0		12.6	53.1	53.1		13.8
Effective Green, g (s)	21.1	21.1		19.0	19.0	19.0		12.6	53.1	53.1		13.8
Actuated g/C Ratio	0.17	0.17		0.15	0.15	0.15		0.10	0.43	0.43		0.11
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	584	297		258	266	239		180	1515	512		155
v/s Ratio Prot	c0.13	0.10		c0.12	0.12			0.07	c0.43			c0.08
v/s Ratio Perm						0.02				0.13		
v/c Ratio	0.78	0.57		0.77	0.77	0.13		0.71	1.01	0.31		0.75
Uniform Delay, d1	49.3	47.3		50.4	50.4	45.3		53.9	35.5	23.4		53.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		0.98
Incremental Delay, d2	6.3	1.7		12.2	11.8	0.1		10.5	26.3	1.6		14.2
Delay (s)	55.5	49.0		62.6	62.2	45.4		64.4	61.7	25.0		66.3
Level of Service	E	D		E	E	D		E	E	C		E
Approach Delay (s)		53.6			59.4				57.2			
Approach LOS		D			E				E			

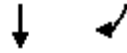
Intersection Summary

HCM Average Control Delay	47.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 5: Deer Hill Road & Pleasant Hill Road

2030+Proj School PM Peak_Alt1
 3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑↑	↔
Volume (vph)	947	257
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	
Lane Util. Factor	0.91	
Frbp, ped/bikes	1.00	
Flpb, ped/bikes	1.00	
Frt	0.97	
Flt Protected	1.00	
Satd. Flow (prot)	3886	
Flt Permitted	1.00	
Satd. Flow (perm)	3886	
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	1029	279
RTOR Reduction (vph)	35	0
Lane Group Flow (vph)	1273	0
Confl. Peds. (#/hr)		
Turn Type		
Protected Phases	6	
Permitted Phases		
Actuated Green, G (s)	54.3	
Effective Green, g (s)	54.3	
Actuated g/C Ratio	0.44	
Clearance Time (s)	5.0	
Vehicle Extension (s)	4.0	
Lane Grp Cap (vph)	1702	
v/s Ratio Prot	0.33	
v/s Ratio Perm		
v/c Ratio	0.75	
Uniform Delay, d1	29.1	
Progression Factor	0.78	
Incremental Delay, d2	2.5	
Delay (s)	25.4	
Level of Service	C	
Approach Delay (s)	28.7	
Approach LOS	C	
Intersection Summary		

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

2030+Proj School PM Peak_Alt2
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations	↔↔	↔		↔	↔	↔		↔	↑↑	↔		↔
Volume (vph)	420	104	73	261	110	82	60	101	1411	222	17	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	0.95	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.94		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1748		1681	1734	1558		1770	3539	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1748		1681	1734	1558		1770	3539	1196		1397
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	457	113	79	284	120	89	65	110	1534	241	18	99
RTOR Reduction (vph)	0	22	0	0	0	58	0	0	0	81	0	0
Lane Group Flow (vph)	457	170	0	199	205	31	0	175	1534	160	0	117
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	21.1	21.1		19.0	19.0	19.0		18.4	53.1	53.1		13.8
Effective Green, g (s)	21.1	21.1		19.0	19.0	19.0		18.4	53.1	53.1		13.8
Actuated g/C Ratio	0.17	0.17		0.15	0.15	0.15		0.15	0.43	0.43		0.11
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	584	297		258	266	239		263	1515	512		155
v/s Ratio Prot	c0.13	0.10		c0.12	0.12			0.10	c0.43			c0.08
v/s Ratio Perm						0.02				0.13		
v/c Ratio	0.78	0.57		0.77	0.77	0.13		0.67	1.01	0.31		0.75
Uniform Delay, d1	49.3	47.3		50.4	50.4	45.3		49.9	35.5	23.4		53.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		0.98
Incremental Delay, d2	6.3	1.7		12.2	11.8	0.1		4.9	26.3	1.6		14.2
Delay (s)	55.5	49.0		62.6	62.2	45.4		54.7	61.7	25.0		66.3
Level of Service	E	D		E	E	D		D	E	C		E
Approach Delay (s)		53.6			59.4				56.5			
Approach LOS		D			E				E			

Intersection Summary

HCM Average Control Delay	51.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

2030+Proj School PM Peak_Alt2

3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	947	257
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frbp, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2794	1250
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2794	1250
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	1029	279
RTOR Reduction (vph)	0	43
Lane Group Flow (vph)	1029	236
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	48.5	48.5
Effective Green, g (s)	48.5	48.5
Actuated g/C Ratio	0.39	0.39
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	1093	489
v/s Ratio Prot	0.37	
v/s Ratio Perm		0.19
v/c Ratio	0.94	0.48
Uniform Delay, d1	36.4	28.3
Progression Factor	0.83	0.75
Incremental Delay, d2	14.3	2.8
Delay (s)	44.5	24.1
Level of Service	D	C
Approach Delay (s)	42.3	
Approach LOS	D	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Boulevard & Pleasant Hill Road

2030+Proj School PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	246	425	272	0	0	0	252	691	446	0	602	587
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00				1.00	0.95	1.00		0.95	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770	3539	1583				1770	3539	1583		3539	1583
Flt Permitted	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770	3539	1583				1770	3539	1583		3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	262	452	289	0	0	0	268	735	474	0	640	624
RTOR Reduction (vph)	0	0	192	0	0	0	0	0	83	0	0	402
Lane Group Flow (vph)	262	452	97	0	0	0	268	735	391	0	640	222
Turn Type	Perm		Perm				Prot		Perm			Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2			6
Actuated Green, G (s)	17.4	17.4	17.4				14.2	43.1	43.1		24.9	24.9
Effective Green, g (s)	17.4	17.4	17.4				14.2	43.1	43.1		24.9	24.9
Actuated g/C Ratio	0.25	0.25	0.25				0.20	0.62	0.62		0.36	0.36
Clearance Time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	440	880	393				359	2179	975		1259	563
v/s Ratio Prot		0.13					c0.15	0.21			c0.18	
v/s Ratio Perm	c0.15		0.06						0.25			0.14
v/c Ratio	0.60	0.51	0.25				0.75	0.34	0.40		0.51	0.39
Uniform Delay, d1	23.2	22.7	21.1				26.2	6.5	6.9		17.7	16.9
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.4	0.2	0.1				7.2	0.4	1.2		1.5	2.1
Delay (s)	24.6	22.9	21.2				33.4	6.9	8.1		19.2	19.0
Level of Service	C	C	C				C	A	A		B	B
Approach Delay (s)		22.8			0.0			12.1			19.1	
Approach LOS		C			A			B			B	

Intersection Summary

HCM Average Control Delay	17.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: SR 24 EB Off Ramp & Pleasant Hill Road

2030+Proj School PM Peak
3/8/2012























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖		↗		↕↕↕		↖	↕↕	
Volume (vph)	89	43	202	23	0	149	0	1142	20	131	737	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00	1.00		1.00		0.91		1.00	0.95	
Frt		1.00	0.85	1.00		0.85		1.00		1.00	1.00	
Flt Protected		0.97	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1802	1583	1770		1583		5072		1770	3539	
Flt Permitted		0.97	1.00	0.71		1.00		1.00		0.95	1.00	
Satd. Flow (perm)		1802	1583	1331		1583		5072		1770	3539	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	95	46	215	24	0	159	0	1215	21	139	784	0
RTOR Reduction (vph)	0	0	176	0	0	142	0	2	0	0	0	0
Lane Group Flow (vph)	0	141	39	24	0	17	0	1234	0	139	784	0
Turn Type	Split		Perm	custom		custom				Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4	8		8						
Actuated Green, G (s)		9.7	9.7	5.6		5.6		16.5		6.1	26.6	
Effective Green, g (s)		9.7	9.7	5.6		5.6		16.5		6.1	26.6	
Actuated g/C Ratio		0.18	0.18	0.10		0.10		0.31		0.11	0.49	
Clearance Time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		324	285	138		164		1553		200	1747	
v/s Ratio Prot		c0.08						c0.24		c0.08	0.22	
v/s Ratio Perm			0.02	c0.02		0.01						
v/c Ratio		0.44	0.14	0.17		0.10		0.79		0.69	0.45	
Uniform Delay, d1		19.7	18.6	22.0		21.9		17.1		23.0	8.9	
Progression Factor		1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2		0.9	0.2	0.6		0.3		2.9		10.0	0.2	
Delay (s)		20.6	18.8	22.6		22.1		20.0		33.0	9.1	
Level of Service		C	B	C		C		C		C	A	
Approach Delay (s)		19.5			22.2			20.0			12.7	
Approach LOS		B			C			C			B	

Intersection Summary

HCM Average Control Delay	17.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	53.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Avenue

2030+Proj School PM Peak
3/8/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	13	0	0	14	0	0	0	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	14	0	0	15	0	0	0	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	15			14			29	29	14	29	29	15
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	15			14			29	29	14	29	29	15
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1603			1604			980	864	1066	980	864	1064
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1					
Volume Total	0	14	0	15	0	0	0					
Volume Left	0	0	0	0	0	0	0					
Volume Right	0	0	0	0	0	0	0					
cSH	1700	1700	1700	1700	1700	1700	1700					
Volume to Capacity	0.00	0.01	0.00	0.01	0.00	0.00	0.00					
Queue Length 95th (ft)	0	0	0	0	0	0	0					
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Lane LOS					A	A	A					
Approach Delay (s)	0.0		0.0		0.0		0.0					
Approach LOS					A		A					
Intersection Summary												
Average Delay			0.0									
Intersection Capacity Utilization			6.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

9: Deer Hill Road & Sierra Vista Way

2030+Proj School PM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	324	1200	179	263	11	303	18	121	3	26	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1851		1681	1695	1583		1753	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		1.00	
Satd. Flow (perm)	1770	1863	1583	1770	1851		1681	1695	1583		1753	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	352	1304	195	286	12	329	20	132	3	28	22
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	106	0	19	0
Lane Group Flow (vph)	29	352	1304	195	296	0	174	175	26	0	34	0
Turn Type	Prot		Free	Prot			Split		Perm		Split	
Protected Phases	7	4		3	8		2	2			6	6
Permitted Phases			Free						2			
Actuated Green, G (s)	1.4	17.1	57.2	6.1	21.8		11.3	11.3	11.3		6.7	
Effective Green, g (s)	1.4	17.1	57.2	6.1	21.8		11.3	11.3	11.3		6.7	
Actuated g/C Ratio	0.02	0.30	1.00	0.11	0.38		0.20	0.20	0.20		0.12	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	43	557	1583	189	705		332	335	313		205	
v/s Ratio Prot	0.02	0.19		0.11	0.16		0.10	0.10			0.02	
v/s Ratio Perm			c0.82						0.02			
v/c Ratio	0.67	0.63	0.82	1.03	0.42		0.52	0.52	0.08		0.16	
Uniform Delay, d1	27.7	17.3	0.0	25.6	13.0		20.5	20.5	18.7		22.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	34.5	2.3	5.0	74.0	0.4		1.5	1.5	0.1		0.4	
Delay (s)	62.2	19.7	5.0	99.6	13.4		22.0	22.0	18.8		23.1	
Level of Service	E	B	A	F	B		C	C	B		C	
Approach Delay (s)		9.0			47.5			21.1			23.1	
Approach LOS		A			D			C			C	

Intersection Summary

HCM Average Control Delay	18.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	57.2	Sum of lost time (s)	0.0
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
10: Deer Hill Road & Laurel Drive

2030+Proj School PM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	687	364	267	275	9	612	12	845	19	8	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	0.88		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1770	3539	1583	1770	3522		1681	1688	2787		1765	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (perm)	1770	3539	1583	1770	3522		1681	1688	2787		1765	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	747	396	290	299	10	665	13	918	21	9	7
RTOR Reduction (vph)	0	0	255	0	2	0	0	0	607	0	6	0
Lane Group Flow (vph)	17	747	141	290	307	0	339	339	311	0	31	0
Turn Type	Prot		Perm	Prot			Split		Perm	Split		
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4						2			
Actuated Green, G (s)	0.7	27.7	27.7	10.1	37.1		17.1	17.1	17.1		6.9	
Effective Green, g (s)	0.7	27.7	27.7	10.1	37.1		17.1	17.1	17.1		6.9	
Actuated g/C Ratio	0.01	0.36	0.36	0.13	0.48		0.22	0.22	0.22		0.09	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	16	1260	564	230	1680		369	371	613		157	
v/s Ratio Prot	0.01	c0.21		c0.16	0.09		c0.20	0.20			c0.02	
v/s Ratio Perm			0.09						0.11			
v/c Ratio	1.06	0.59	0.25	1.26	0.18		0.92	0.91	0.51		0.20	
Uniform Delay, d1	38.5	20.4	17.7	33.9	11.7		29.7	29.6	26.7		32.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	246.4	0.8	0.2	147.5	0.1		27.1	26.2	0.7		0.6	
Delay (s)	285.0	21.2	17.9	181.3	11.7		56.8	55.9	27.3		33.5	
Level of Service	F	C	B	F	B		E	E	C		C	
Approach Delay (s)		24.0			93.8			39.6			33.5	
Approach LOS		C			F			D			C	

Intersection Summary

HCM Average Control Delay	43.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	77.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 11: Project Driveway & Pleasant Hill Road

2030+Proj School PM Peak
 3/8/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗	↖	↑↑↑	↑↑	↗
Volume (veh/h)	0	30	43	1708	1281	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	33	47	1857	1392	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					352	
pX, platoon unblocked	0.69	0.69	0.69			
vC, conflicting volume	2105	696	1400			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1702	0	681			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	96	93			
cM capacity (veh/h)	53	748	626			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	33	47	619	619	619	696	696	8
Volume Left	0	47	0	0	0	0	0	0
Volume Right	33	0	0	0	0	0	0	8
cSH	748	626	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.04	0.07	0.36	0.36	0.36	0.41	0.41	0.00
Queue Length 95th (ft)	3	6	0	0	0	0	0	0
Control Delay (s)	10.0	11.2	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B	B						
Approach Delay (s)	10.0	0.3				0.0		
Approach LOS	B							

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization	47.8%		ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 12: Deer Hill Road & Project Driveway Northeast

2030+Proj School PM Peak
 3/8/2012



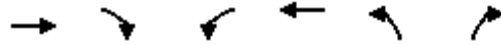
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩		↩	↩	↩	
Volume (veh/h)	564	0	8	477	0	33
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	613	0	9	518	0	36
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				642		
pX, platoon unblocked						
vC, conflicting volume			613		1149	613
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			613		1149	613
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	93
cM capacity (veh/h)			966		218	492

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	613	9	518	36
Volume Left	0	9	0	0
Volume Right	0	0	0	36
cSH	1700	966	1700	492
Volume to Capacity	0.36	0.01	0.30	0.07
Queue Length 95th (ft)	0	1	0	6
Control Delay (s)	0.0	8.8	0.0	12.9
Lane LOS		A		B
Approach Delay (s)	0.0	0.1		12.9
Approach LOS				B

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization		39.7%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 13: Deer Hill Road & Project Driveway Southwest

2030+Proj School PM Peak
 3/8/2012



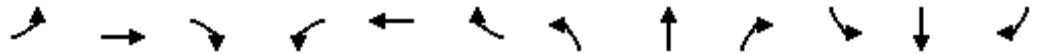
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	
Volume (veh/h)	564	13	0	452	14	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	613	14	0	491	15	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			627		1111	620
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			627		1111	620
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		93	100
cM capacity (veh/h)			955		231	488

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	627	491	15
Volume Left	0	0	15
Volume Right	14	0	0
cSH	1700	955	231
Volume to Capacity	0.37	0.00	0.07
Queue Length 95th (ft)	0	0	5
Control Delay (s)	0.0	0.0	21.7
Lane LOS			C
Approach Delay (s)	0.0	0.0	21.7
Approach LOS			C

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization		40.5%	ICU Level of Service
Analysis Period (min)		15	A

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Road

2030+Proj PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕			↕	
Volume (vph)	6	0	19	0	0	0	21	2293	0	0	878	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	5.0			5.0	
Lane Util. Factor		1.00					1.00	0.95			0.95	
Frt		0.90					1.00	1.00			1.00	
Flt Protected		0.99					0.95	1.00			1.00	
Satd. Flow (prot)		1653					1770	3539			3528	
Flt Permitted		0.96					0.95	1.00			1.00	
Satd. Flow (perm)		1610					1770	3539			3528	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	7	0	21	0	0	0	23	2548	0	0	976	21
RTOR Reduction (vph)	0	20	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	8	0	0	0	0	23	2548	0	0	996	0
Turn Type	Perm			Perm			Prot					
Protected Phases		8			4		5	2			6	
Permitted Phases	8			4								
Actuated Green, G (s)		2.6					1.6	50.4			44.8	
Effective Green, g (s)		2.6					1.6	50.4			44.8	
Actuated g/C Ratio		0.04					0.03	0.81			0.72	
Clearance Time (s)		4.0					4.0	5.0			5.0	
Vehicle Extension (s)		2.5					2.0	4.0			4.0	
Lane Grp Cap (vph)		68					46	2877			2549	
v/s Ratio Prot							0.01	c0.72			0.28	
v/s Ratio Perm		c0.00										
v/c Ratio		0.12					0.50	0.89			0.39	
Uniform Delay, d1		28.6					29.8	3.9			3.3	
Progression Factor		1.00					1.19	1.62			1.00	
Incremental Delay, d2		0.6					1.7	2.6			0.5	
Delay (s)		29.1					37.2	8.8			3.8	
Level of Service		C					D	A			A	
Approach Delay (s)		29.1			0.0			9.1			3.8	
Approach LOS		C			A			A			A	

Intersection Summary

HCM Average Control Delay	7.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Greenvalley Drive & Pleasant Hill Road

2030+Proj PM Peak

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕↕	↕	↕	↕↕	↕
Volume (vph)	7	0	3	12	0	16	3	2332	24	12	856	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			4.0	4.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.96			1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96			0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1731			1770	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		1.00			1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1794			1863	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	0	3	13	0	17	3	2535	26	13	930	4
RTOR Reduction (vph)	0	3	0	0	0	16	0	0	5	0	0	1
Lane Group Flow (vph)	0	8	0	0	13	1	3	2535	21	13	930	3
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2		1		6
Permitted Phases	8			4		4			2			6
Actuated Green, G (s)		3.4			2.4	2.4	1.0	45.4	45.4	1.2	45.6	45.6
Effective Green, g (s)		3.4			2.4	2.4	1.0	45.4	45.4	1.2	45.6	45.6
Actuated g/C Ratio		0.05			0.04	0.04	0.02	0.73	0.73	0.02	0.74	0.74
Clearance Time (s)		3.0			4.0	4.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5			2.0	2.0	2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)		98			72	61	29	2591	1159	34	2603	1164
v/s Ratio Prot							0.00	c0.72		c0.01	0.26	
v/s Ratio Perm		0.00			c0.01	0.00			0.01			0.00
v/c Ratio		0.08			0.18	0.01	0.10	0.98	0.02	0.38	0.36	0.00
Uniform Delay, d1		27.8			28.8	28.7	30.1	7.8	2.3	30.0	2.9	2.2
Progression Factor		1.00			1.00	1.00	1.29	0.32	0.12	0.77	2.24	1.92
Incremental Delay, d2		0.3			0.4	0.0	0.2	6.0	0.0	2.5	0.4	0.0
Delay (s)		28.1			29.3	28.7	38.9	8.5	0.3	25.5	7.0	4.2
Level of Service		C			C	C	D	A	A	C	A	A
Approach Delay (s)		28.1			28.9			8.5			7.2	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	8.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	82.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

3: Reliez Valle Road & Pleasant Hill Road

2030+Proj PM Peak

3/8/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	35	181	182	2344	792	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	197	198	2548	861	30
RTOR Reduction (vph)	0	175	0	0	0	15
Lane Group Flow (vph)	38	22	198	2548	861	15
Turn Type		Perm	Prot			Perm
Protected Phases	8		5	2	6	
Permitted Phases		8				6
Actuated Green, G (s)	7.0	7.0	11.2	46.0	30.8	30.8
Effective Green, g (s)	7.0	7.0	11.2	46.0	30.8	30.8
Actuated g/C Ratio	0.11	0.11	0.18	0.74	0.50	0.50
Clearance Time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	2.5	2.5	2.0	4.0	4.0	4.0
Lane Grp Cap (vph)	200	179	320	2626	1758	786
v/s Ratio Prot	c0.02		0.11	c0.72	0.24	
v/s Ratio Perm		0.01				0.01
v/c Ratio	0.19	0.12	0.62	0.97	0.49	0.02
Uniform Delay, d1	24.9	24.7	23.4	7.4	10.4	7.9
Progression Factor	1.00	1.00	0.77	1.56	0.86	0.67
Incremental Delay, d2	0.3	0.2	0.8	5.0	0.9	0.0
Delay (s)	25.3	25.0	18.9	16.5	9.9	5.3
Level of Service	C	C	B	B	A	A
Approach Delay (s)	25.0			16.7	9.7	
Approach LOS	C			B	A	

Intersection Summary

HCM Average Control Delay	15.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	75.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Springhill Road & Pleasant Hill Road

2030+Proj PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↔		↖	↕	↗	↖	↕	↗
Volume (vph)	21	2	94	22	0	6	129	2499	37	16	983	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1550	1550	1550
Total Lost time (s)		3.5	3.5		3.5		3.5	4.1	4.1	3.5	4.1	4.1
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Fr _t		1.00	0.85		0.97		1.00	1.00	0.85	1.00	1.00	0.85
Fl _t Protected		0.96	1.00		0.96		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1781	1583		1739		1770	3539	1583	1444	2887	1292
Fl _t Permitted		0.78	1.00		0.76		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1460	1583		1369		1770	3539	1583	1444	2887	1292
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	2	102	24	0	7	140	2716	40	17	1068	29
RTOR Reduction (vph)	0	0	94	0	6	0	0	0	3	0	0	6
Lane Group Flow (vph)	0	25	8	0	25	0	140	2716	37	17	1068	23
Turn Type	Perm		Perm	Perm			Prot		Perm	Prot		Perm
Protected Phases		8			4		5	2		1		6
Permitted Phases	8		8	4					2			6
Actuated Green, G (s)		4.9	4.9		4.9		7.5	44.7	44.7	1.3	38.5	38.5
Effective Green, g (s)		4.9	4.9		4.9		7.5	44.7	44.7	1.3	38.5	38.5
Actuated g/C Ratio		0.08	0.08		0.08		0.12	0.72	0.72	0.02	0.62	0.62
Clearance Time (s)		3.5	3.5		3.5		3.5	4.1	4.1	3.5	4.1	4.1
Vehicle Extension (s)		2.0	2.0		2.0		1.0	4.0	4.0	1.5	4.0	4.0
Lane Grp Cap (vph)		115	125		108		214	2552	1141	30	1793	802
v/s Ratio Prot							c0.08	c0.77		0.01	0.37	
v/s Ratio Perm		0.02	0.01		c0.02				0.02			0.02
v/c Ratio		0.22	0.06		0.23		0.65	1.06	0.03	0.57	0.60	0.03
Uniform Delay, d ₁		26.8	26.4		26.8		26.0	8.6	2.5	30.1	7.1	4.5
Progression Factor		1.00	1.00		1.00		0.75	3.37	1.64	1.34	0.50	0.11
Incremental Delay, d ₂		0.3	0.1		0.4		0.5	29.9	0.0	12.7	1.3	0.1
Delay (s)		27.1	26.5		27.2		20.1	59.1	4.1	52.9	4.9	0.6
Level of Service		C	C		C		C	E	A	D	A	A
Approach Delay (s)		26.6			27.2			56.5			5.5	
Approach LOS		C			C			E			A	

Intersection Summary

HCM Average Control Delay	41.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	11.1
Intersection Capacity Utilization	90.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

2030+Proj PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations	↔↔	↔		↔	↔	↔		↔	↕↕	↔		↔
Volume (vph)	756	124	85	235	86	178	9	55	1766	230	6	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	*0.92	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.94		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1750		1681	1729	1558		1770	3427	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1750		1681	1729	1558		1770	3427	1196		1397
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.97	0.97	0.97	0.97	0.95	0.95
Adj. Flow (vph)	796	131	89	247	91	187	9	57	1821	237	6	127
RTOR Reduction (vph)	0	18	0	0	0	50	0	0	0	75	0	0
Lane Group Flow (vph)	796	202	0	168	170	137	0	66	1821	162	0	133
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	33.8	33.8		17.2	17.2	17.2		7.3	41.7	41.7		14.3
Effective Green, g (s)	33.8	33.8		17.2	17.2	17.2		7.3	41.7	41.7		14.3
Actuated g/C Ratio	0.27	0.27		0.14	0.14	0.14		0.06	0.34	0.34		0.12
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	936	477		233	240	216		104	1152	402		161
v/s Ratio Prot	c0.23	0.12		c0.10	0.10			0.04	c0.53			c0.10
v/s Ratio Perm						0.09				0.14		
v/c Ratio	0.85	0.42		0.72	0.71	0.63		0.63	1.58	0.40		0.83
Uniform Delay, d1	42.7	37.1		51.1	51.0	50.4		57.0	41.1	31.6		53.6
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.09
Incremental Delay, d2	7.2	0.2		8.9	7.6	4.4		9.0	265.5	3.0		24.1
Delay (s)	49.9	37.3		60.1	58.6	54.9		66.0	306.7	34.6		82.7
Level of Service	D	D		E	E	D		E	F	C		F
Approach Delay (s)		47.2			57.7				268.8			
Approach LOS		D			E				F			

Intersection Summary

HCM Average Control Delay	142.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	104.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 5: Deer Hill Road & Pleasant Hill Road

2030+Proj PM Peak
 3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	799	216
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frbp, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2794	1250
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2794	1250
Peak-hour factor, PHF	0.95	0.95
Adj. Flow (vph)	841	227
RTOR Reduction (vph)	0	43
Lane Group Flow (vph)	841	184
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	48.7	48.7
Effective Green, g (s)	48.7	48.7
Actuated g/C Ratio	0.39	0.39
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	1097	491
v/s Ratio Prot	0.30	
v/s Ratio Perm		0.15
v/c Ratio	0.77	0.37
Uniform Delay, d1	32.7	26.8
Progression Factor	0.80	0.78
Incremental Delay, d2	4.5	1.9
Delay (s)	30.6	22.8
Level of Service	C	C
Approach Delay (s)	34.9	
Approach LOS	C	

Intersection Summary

HCM Signalized Intersection Capacity Analysis

5: Deer Hill Road & Pleasant Hill Road

2030+Proj PM Peak_Alt1

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations	↔↔	↔		↔	↔	↔		↔	↑↑	↔		↔
Volume (vph)	756	124	85	235	86	178	9	55	1766	230	6	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	*0.92	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.94		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1750		1681	1729	1558		1770	3427	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1750		1681	1729	1558		1770	3427	1196		1397
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.97	0.97	0.97	0.97	0.95	0.95
Adj. Flow (vph)	796	131	89	247	91	187	9	57	1821	237	6	127
RTOR Reduction (vph)	0	19	0	0	0	5	0	0	0	76	0	0
Lane Group Flow (vph)	796	201	0	168	170	182	0	66	1821	161	0	133
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	31.3	31.3		18.7	18.7	18.7		7.3	49.0	49.0		8.0
Effective Green, g (s)	31.3	31.3		18.7	18.7	18.7		7.3	49.0	49.0		8.0
Actuated g/C Ratio	0.25	0.25		0.15	0.15	0.15		0.06	0.40	0.40		0.06
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	867	442		254	261	235		104	1354	473		90
v/s Ratio Prot	c0.23	0.12		0.10	0.10			0.04	c0.53			c0.10
v/s Ratio Perm						c0.12				0.13		
v/c Ratio	0.92	0.46		0.66	0.65	0.77		0.63	1.34	0.34		1.48
Uniform Delay, d1	45.1	39.2		49.7	49.6	50.6		57.0	37.5	26.2		58.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.09
Incremental Delay, d2	14.1	0.3		4.9	4.4	13.4		9.0	160.2	1.9		260.0
Delay (s)	59.2	39.4		54.6	54.0	64.1		66.0	197.7	28.1		323.0
Level of Service	E	D		D	D	E		E	F	C		F
Approach Delay (s)		54.9			57.8				174.7			
Approach LOS		D			E				F			

Intersection Summary

HCM Average Control Delay	109.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	104.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

2030+Proj PM Peak_Alt1
3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑↑	↔
Volume (vph)	799	216
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	
Lane Util. Factor	0.91	
Frbp, ped/bikes	1.00	
Flpb, ped/bikes	1.00	
Frt	0.97	
Flt Protected	1.00	
Satd. Flow (prot)	3887	
Flt Permitted	1.00	
Satd. Flow (perm)	3887	
Peak-hour factor, PHF	0.95	0.95
Adj. Flow (vph)	841	227
RTOR Reduction (vph)	38	0
Lane Group Flow (vph)	1030	0
Confl. Peds. (#/hr)		
Turn Type		
Protected Phases	6	
Permitted Phases		
Actuated Green, G (s)	49.7	
Effective Green, g (s)	49.7	
Actuated g/C Ratio	0.40	
Clearance Time (s)	5.0	
Vehicle Extension (s)	4.0	
Lane Grp Cap (vph)	1558	
v/s Ratio Prot	0.27	
v/s Ratio Perm		
v/c Ratio	0.66	
Uniform Delay, d1	30.3	
Progression Factor	0.89	
Incremental Delay, d2	2.0	
Delay (s)	28.9	
Level of Service	C	
Approach Delay (s)	61.4	
Approach LOS	E	
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

5: Deer Hill Road & Pleasant Hill Road

2030+Proj PM Peak_Alt2

3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	756	124	85	235	86	178	47	93	1766	230	6	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1500	1500
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00		1.00	*0.92	1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00	1.00	0.76		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
Frt	1.00	0.94		1.00	1.00	0.85		1.00	1.00	0.85		1.00
Flt Protected	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (prot)	3433	1750		1681	1729	1558		1770	3427	1196		1397
Flt Permitted	0.95	1.00		0.95	0.98	1.00		0.95	1.00	1.00		0.95
Satd. Flow (perm)	3433	1750		1681	1729	1558		1770	3427	1196		1397
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.97	0.97	0.97	0.97	0.95	0.95
Adj. Flow (vph)	796	131	89	247	91	187	48	96	1821	237	6	127
RTOR Reduction (vph)	0	18	0	0	0	50	0	0	0	75	0	0
Lane Group Flow (vph)	796	202	0	168	170	137	0	144	1821	162	0	133
Confl. Peds. (#/hr)	2					2				74		74
Turn Type	Split			Split		Perm	Prot	Prot		Perm	Prot	Prot
Protected Phases	8	8		4	4		5	5	2		1	1
Permitted Phases						4				2		
Actuated Green, G (s)	33.8	33.8		17.2	17.2	17.2		10.0	41.7	41.7		14.3
Effective Green, g (s)	33.8	33.8		17.2	17.2	17.2		10.0	41.7	41.7		14.3
Actuated g/C Ratio	0.27	0.27		0.14	0.14	0.14		0.08	0.34	0.34		0.12
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	5.0		4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	3.0	3.0		2.0
Lane Grp Cap (vph)	936	477		233	240	216		143	1152	402		161
v/s Ratio Prot	c0.23	0.12		c0.10	0.10			c0.08	c0.53			c0.10
v/s Ratio Perm						0.09				0.14		
v/c Ratio	0.85	0.42		0.72	0.71	0.63		1.01	1.58	0.40		0.83
Uniform Delay, d1	42.7	37.1		51.1	51.0	50.4		57.0	41.1	31.6		53.6
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.09
Incremental Delay, d2	7.2	0.2		8.9	7.6	4.4		77.1	265.5	3.0		24.1
Delay (s)	49.9	37.3		60.1	58.6	54.9		134.1	306.7	34.6		82.7
Level of Service	D	D		E	E	D		F	F	C		F
Approach Delay (s)		47.2			57.7				266.1			
Approach LOS		D			E				F			

Intersection Summary

HCM Average Control Delay	143.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	104.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 5: Deer Hill Road & Pleasant Hill Road

2030+Proj PM Peak_Alt2
 3/8/2012



Movement	SBT	SBR
Lane Configurations	↑↑	↑
Volume (vph)	799	216
Ideal Flow (vphpl)	1500	1500
Total Lost time (s)	5.0	5.0
Lane Util. Factor	0.95	1.00
Frbp, ped/bikes	1.00	1.00
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2794	1250
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2794	1250
Peak-hour factor, PHF	0.95	0.95
Adj. Flow (vph)	841	227
RTOR Reduction (vph)	0	45
Lane Group Flow (vph)	841	182
Confl. Peds. (#/hr)		
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	46.0	46.0
Effective Green, g (s)	46.0	46.0
Actuated g/C Ratio	0.37	0.37
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	4.0	4.0
Lane Grp Cap (vph)	1036	464
v/s Ratio Prot	0.30	
v/s Ratio Perm		0.15
v/c Ratio	0.81	0.39
Uniform Delay, d1	35.1	28.7
Progression Factor	0.81	0.78
Incremental Delay, d2	6.1	2.2
Delay (s)	34.6	24.6
Level of Service	C	C
Approach Delay (s)	38.0	
Approach LOS	D	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Boulevard & Pleasant Hill Road

2030+Proj PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	244	437	263	0	0	0	247	686	334	0	649	480
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00				1.00	0.95	1.00		0.95	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770	3539	1583				1770	3539	1583		3539	1583
Flt Permitted	0.95	1.00	1.00				0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770	3539	1583				1770	3539	1583		3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	265	475	286	0	0	0	268	746	363	0	705	522
RTOR Reduction (vph)	0	0	181	0	0	0	0	0	76	0	0	337
Lane Group Flow (vph)	265	475	105	0	0	0	268	746	287	0	705	185
Turn Type	Perm		Perm				Prot		Perm			Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2			6
Actuated Green, G (s)	17.5	17.5	17.5				14.2	43.0	43.0		24.8	24.8
Effective Green, g (s)	17.5	17.5	17.5				14.2	43.0	43.0		24.8	24.8
Actuated g/C Ratio	0.25	0.25	0.25				0.20	0.61	0.61		0.35	0.35
Clearance Time (s)	4.5	4.5	4.5				4.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	443	885	396				359	2174	972		1254	561
v/s Ratio Prot		0.13					c0.15	0.21			c0.20	
v/s Ratio Perm	c0.15		0.07						0.18			0.12
v/c Ratio	0.60	0.54	0.27				0.75	0.34	0.29		0.56	0.33
Uniform Delay, d1	23.1	22.7	21.1				26.2	6.6	6.4		18.2	16.5
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.5	0.3	0.1				7.2	0.4	0.8		1.8	1.6
Delay (s)	24.6	23.1	21.2				33.4	7.0	7.1		20.0	18.1
Level of Service	C	C	C				C	A	A		C	B
Approach Delay (s)		22.9			0.0			12.2			19.2	
Approach LOS		C			A			B			B	

Intersection Summary

HCM Average Control Delay	17.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: SR 24 EB Off Ramp & Pleasant Hill Road

2030+Proj PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖		↗		↕↕↕		↖	↕↕	
Volume (vph)	114	58	293	28	0	185	0	947	19	130	823	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00	1.00		1.00		0.91		1.00	0.95	
Frt		1.00	0.85	1.00		0.85		1.00		1.00	1.00	
Flt Protected		0.97	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1803	1583	1770		1583		5070		1770	3539	
Flt Permitted		0.97	1.00	0.64		1.00		1.00		0.95	1.00	
Satd. Flow (perm)		1803	1583	1192		1583		5070		1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	124	63	318	30	0	201	0	1029	21	141	895	0
RTOR Reduction (vph)	0	0	254	0	0	175	0	3	0	0	0	0
Lane Group Flow (vph)	0	187	64	30	0	26	0	1047	0	141	895	0
Turn Type	Split		Perm	custom		custom				Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4	8		8						
Actuated Green, G (s)		11.4	11.4	7.3		7.3		15.9		6.1	26.0	
Effective Green, g (s)		11.4	11.4	7.3		7.3		15.9		6.1	26.0	
Actuated g/C Ratio		0.20	0.20	0.13		0.13		0.28		0.11	0.46	
Clearance Time (s)		4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		363	318	153		204		1422		190	1623	
v/s Ratio Prot		c0.10						c0.21		c0.08	0.25	
v/s Ratio Perm			0.04	c0.03		0.02						
v/c Ratio		0.52	0.20	0.20		0.13		0.74		0.74	0.55	
Uniform Delay, d1		20.2	18.9	22.1		21.9		18.5		24.5	11.1	
Progression Factor		1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2		1.2	0.3	0.6		0.3		2.0		14.4	0.4	
Delay (s)		21.4	19.2	22.7		22.2		20.5		39.0	11.5	
Level of Service		C	B	C		C		C		D	B	
Approach Delay (s)		20.0			22.2			20.5			15.3	
Approach LOS		C			C			C			B	

Intersection Summary

HCM Average Control Delay	18.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	56.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Avenue

2030+Proj PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	62	684	66	115	332	92	68	9	127	61	12	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	743	72	125	361	100	74	10	138	66	13	21
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	461			815			1552	1625	779	1682	1611	411
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	461			815			1552	1625	779	1682	1611	411
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			85			0	88	65	0	84	97
cM capacity (veh/h)	1100			812			66	81	396	37	83	641

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	67	815	125	461	84	138	100
Volume Left	67	0	125	0	74	0	66
Volume Right	0	72	0	100	0	138	21
cSH	1100	1700	812	1700	68	396	51
Volume to Capacity	0.06	0.48	0.15	0.27	1.23	0.35	1.96
Queue Length 95th (ft)	5	0	14	0	167	38	248
Control Delay (s)	8.5	0.0	10.2	0.0	289.8	18.9	623.3
Lane LOS	A		B		F	C	F
Approach Delay (s)	0.6		2.2		121.2		623.3
Approach LOS					F		F

Intersection Summary		
Average Delay		50.9
Intersection Capacity Utilization	68.2%	ICU Level of Service
Analysis Period (min)		15
		C

HCM Signalized Intersection Capacity Analysis

9: Deer Hill Road & Sierra Vista Way

2030+Proj PM Peak

3/8/2012



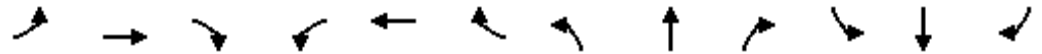
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	648	1497	156	305	3	300	19	164	5	24	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1860		1681	1695	1583		1793	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	
Satd. Flow (perm)	1770	1863	1583	1770	1860		1681	1695	1583		1793	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	23	682	1576	164	321	3	316	20	173	5	25	9
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	145	0	8	0
Lane Group Flow (vph)	23	682	1576	164	324	0	167	169	28	0	31	0
Turn Type	Prot		Free	Prot			Split		Perm	Split		
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			Free						2			
Actuated Green, G (s)	1.9	34.7	79.7	9.0	41.8		13.1	13.1	13.1		6.9	
Effective Green, g (s)	1.9	34.7	79.7	9.0	41.8		13.1	13.1	13.1		6.9	
Actuated g/C Ratio	0.02	0.44	1.00	0.11	0.52		0.16	0.16	0.16		0.09	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	42	811	1583	200	976		276	279	260		155	
v/s Ratio Prot	0.01	0.37		0.09	0.17		0.10	0.10			0.02	
v/s Ratio Perm			c1.00						0.02			
v/c Ratio	0.55	0.84	1.00	0.82	0.33		0.61	0.61	0.11		0.20	
Uniform Delay, d1	38.5	20.0	0.0	34.6	10.9		30.9	30.9	28.3		33.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	13.8	7.9	21.6	22.4	0.2		3.7	3.7	0.2		0.6	
Delay (s)	52.3	27.9	21.6	56.9	11.1		34.6	34.6	28.5		34.5	
Level of Service	D	C	C	E	B		C	C	C		C	
Approach Delay (s)		23.8			26.5			32.5			34.5	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	25.7	HCM Level of Service	C
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	79.7	Sum of lost time (s)	0.0
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
10: Deer Hill Road & Laurel Drive

2030+Proj PM Peak
3/8/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	1218	379	307	266	3	674	9	934	19	1	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	0.88		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1770	3539	1583	1770	3534		1681	1688	2787		1727	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (perm)	1770	3539	1583	1770	3534		1681	1688	2787		1727	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	1324	412	334	289	3	733	10	1015	21	1	10
RTOR Reduction (vph)	0	0	144	0	1	0	0	0	573	0	9	0
Lane Group Flow (vph)	36	1324	268	334	291	0	374	369	442	0	23	0
Turn Type	Prot		Perm	Prot			Split		Perm		Split	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4						2			
Actuated Green, G (s)	2.4	32.7	32.7	10.0	40.3		17.0	17.0	17.0		6.7	
Effective Green, g (s)	2.4	32.7	32.7	10.0	40.3		17.0	17.0	17.0		6.7	
Actuated g/C Ratio	0.03	0.40	0.40	0.12	0.49		0.21	0.21	0.21		0.08	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	52	1404	628	215	1728		347	348	575		140	
v/s Ratio Prot	0.02	c0.37		c0.19	0.08		c0.22	0.22			c0.01	
v/s Ratio Perm			0.17						0.16			
v/c Ratio	0.69	0.94	0.43	1.55	0.17		1.08	1.06	0.77		0.16	
Uniform Delay, d1	39.6	24.0	18.1	36.2	11.7		32.7	32.7	30.8		35.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	33.0	12.8	0.5	270.7	0.0		70.6	65.1	6.1		0.5	
Delay (s)	72.6	36.7	18.5	306.9	11.8		103.3	97.8	37.0		35.8	
Level of Service	E	D	B	F	B		F	F	D		D	
Approach Delay (s)		33.2			169.2			63.9			35.8	
Approach LOS		C			F			E			D	

Intersection Summary

HCM Average Control Delay	66.4	HCM Level of Service	E
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	82.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 11: Project Driveway & Pleasant Hill Road

2030+Proj PM Peak
 3/8/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗	↖	↑↑↑	↑↑	↗
Volume (veh/h)	0	21	76	2031	1122	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	23	83	2208	1220	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					352	
pX, platoon unblocked	0.76	0.76	0.76			
vC, conflicting volume	2121	610	1232			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1837	0	660			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	97	88			
cM capacity (veh/h)	45	820	698			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	
Volume Total	23	83	736	736	736	610	610	12	
Volume Left	0	83	0	0	0	0	0	0	
Volume Right	23	0	0	0	0	0	0	12	
cSH	820	698	1700	1700	1700	1700	1700	1700	
Volume to Capacity	0.03	0.12	0.43	0.43	0.43	0.36	0.36	0.01	
Queue Length 95th (ft)	2	10	0	0	0	0	0	0	
Control Delay (s)	9.5	10.8	0.0	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A	B							
Approach Delay (s)	9.5	0.4					0.0		
Approach LOS	A								

Intersection Summary			
Average Delay			0.3
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)			15

HCM Unsignalized Intersection Capacity Analysis
 12: Deer Hill Road & Project Driveway Northeast

2030+Proj PM Peak
 3/8/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻		↻	↻	↻	
Volume (veh/h)	920	0	16	350	0	34
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1000	0	17	380	0	37
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				642		
pX, platoon unblocked						
vC, conflicting volume			1000	1415	1000	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1000	1415	1000	
tC, single (s)			4.1	6.4	6.2	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			97	100	87	
cM capacity (veh/h)			692	148	295	

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	1000	17	380	37
Volume Left	0	17	0	0
Volume Right	0	0	0	37
cSH	1700	692	1700	295
Volume to Capacity	0.59	0.03	0.22	0.13
Queue Length 95th (ft)	0	2	0	11
Control Delay (s)	0.0	10.3	0.0	18.9
Lane LOS		B		C
Approach Delay (s)	0.0	0.5		18.9
Approach LOS				C

Intersection Summary			
Average Delay		0.6	
Intersection Capacity Utilization		58.4%	ICU Level of Service B
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 13: Deer Hill Road & Project Driveway Southwest

2030+Proj PM Peak
 3/8/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←	←	↘
Volume (veh/h)	920	22	0	350	12	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1000	24	0	380	13	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1024		1392	1012
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1024		1392	1012
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		92	100
cM capacity (veh/h)			678		156	290

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1024	380	13
Volume Left	0	0	13
Volume Right	24	0	0
cSH	1700	678	156
Volume to Capacity	0.60	0.00	0.08
Queue Length 95th (ft)	0	0	7
Control Delay (s)	0.0	0.0	30.1
Lane LOS			D
Approach Delay (s)	0.0	0.0	30.1
Approach LOS			D

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization	59.8%		ICU Level of Service B
Analysis Period (min)		15	

Appendix G – CCCFPD Site Plan Review Letter

Contra Costa County



Fire Protection District

April 25, 2011

Mr. Norm Dyer
LCA Architects
245 Ygnacio Valley Road, Suite 200
Walnut Creek, CA 94596

RECEIVED

APR 28 2011

LCA ARCHITECTS, INC.

Subject: The Terraces of Lafayette
3233 Deer Hill Road, Lafayette
APN 232-150-027
CCCFPD Project No.: P-C05-11-0496

Dear Mr. Dyer:

We have reviewed the site improvement plans, dated 3/21/11, for a proposed multifamily apartment complex consisting of fourteen (14) two and three story residential buildings, a two-story clubhouse, and a leasing office. The following is required for Fire District approval in accordance with the 2010 California Fire Code (CFC), the 2010 California Building Code (CBC), the California Vehicle Code (CVC), and adopted ordinances:

1. Emergency vehicle access, as shown on Sheets A1, GD-1, GD-2 and GD-3, **does not comply** with the minimum required inside turning radius of 25 feet and the minimum outside turning radius of 45 feet.

Emergency apparatus access roadways with a driving surface of not less than 20-feet unobstructed width shall be provided to within 150 feet of travel distance to all portions of the exterior walls of every building. Access roadways shall not exceed 20% grade. **Grades exceeding 16% shall be constructed of grooved concrete per the attached Fire District standard.** (503) CFC

2. All access roadways shall have signs posted or curbs painted red with the words **NO PARKING – FIRE LANE** clearly marked. (503.3) CFC
3. The dead-end emergency apparatus access roadway at **Building M** shall be provided with approved provisions for the turning around of Fire District apparatus. Contact the Fire District for approved designs. (503.2.5) CFC
4. The developer shall provide an adequate and reliable water supply for fire protection with a minimum fire flow of 1,500 GPM. Required flow must be delivered from not more than one (1) hydrant flowing for a duration of 180 minutes while maintaining 20-pounds residual pressure in the main. (507.1), (B105) CFC
5. The developer shall provide a minimum of nine (9) hydrants of the East Bay type. **Refer to the returned plans for approved hydrant locations.** (C103.1) CFC
6. The developer shall submit three (3) copies of **revised** site improvement plans indicating approved hydrant locations and corrected fire apparatus access for review and approval prior to obtaining a building permit. (501.3) CFC
7. **Emergency apparatus access roadways and hydrants shall be installed, in service, and inspected by the Fire District prior to construction or combustible storage on site.** (501.4) CFC

Note: A temporary aggregate base or asphalt grindings roadway is not considered an all-weather surface for emergency apparatus access. The first lift of asphalt concrete paving shall be installed as the minimum roadway material and must be engineered to support the designated gross vehicle weight of 37 tons.

8. The buildings as proposed shall be protected with an approved automatic fire sprinkler system. Submit three (3) sets of plans to this office for review and approval prior to installation. (903.2) CFC, Contra Costa County Ordinance 2010-15

Note: Fire department connections (FDC) shall be fronting the buildings they serve and shall be accessible to fire apparatus devoid of any visual or physical obstruction between the FDC and the access roadway.

9. The developer shall provide traffic signal pre-emption systems (Opticom) on any new or modified traffic signals installed with this development. (21351) CVC
10. The developer shall submit a computer-aided design (CAD) digital file copy of the subject project to the Fire District upon final approval of the site improvement plans or subdivision map. CAD file shall be saved in the latest AutoCAD® .DXF file format. (501) CFC
11. The developer shall submit three (3) complete sets of building plans and specifications for each building type, including plans for the following required deferred submittals, to the Fire District for review and approval **prior to** construction to ensure compliance with minimum requirements related to fire and life safety. Plan review and inspection fees shall be submitted at the time of plan review submittal. (105.4.1), (901.2) CFC, (107) CBC
 - Private underground fire service water mains
 - Fire sprinklers
 - Fire alarm

Our preliminary review comments shall not be construed to encompass the complete project. Additional plans and specifications may be required after further review.

If you have any questions regarding this matter, please contact this office at (925) 941-3300.

Sincerely,

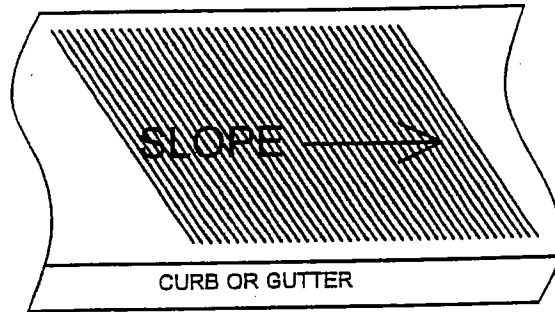
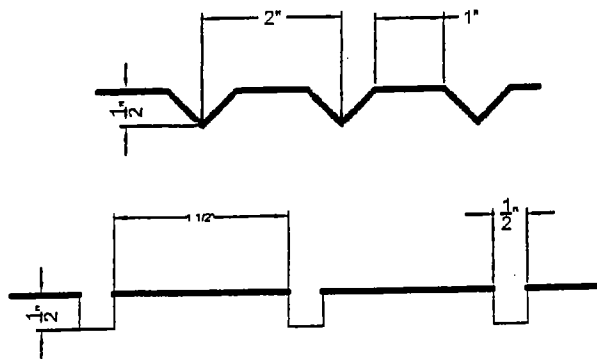


Ted Leach
Fire Inspector

TL/cm

Attachment: Grooved Concrete Detail

c: City of Lafayette
Planning Services Division
3675 Mt. Diablo Boulevard, Suite 210
Lafayette, CA 94549



GROOVES SHALL BE ANGLED TO PROVIDE DRAINAGE WHERE NECESSARY. 10-45 DEGREES

NOTES:

- 1) GRADE DIFFERENCE BETWEEN INTERSECTING STREET CROSS SLOPE AND CENTERLINE OF PROPOSED ACCESS ROAD IS TO BE NO GREATER THAN 10% FOR 10 FEET STARTING FROM FACE OF CURB OR EDGE OF PAVEMENT. IN NO CASE SHALL GRADE FROM FACE OF CURB OR EDGE OF PAVEMENT BE GREATER THAN 10% WITHIN THE FIRST 10 FEET.
- 2) WHEN APPROVED BY THE FIRE DISTRICT ACCESS ROADS SERVING NOT MORE THAN TWO (2) SINGLE FAMILY RESIDENTIAL UNITS ACCESSIBLE SOLELY BY ENGINE COMPANY RESPONSE AND COMPLETELY PROTECTED BY AN APPROVED AUTOMATIC FIRE SPRINKLER SYSTEM, THE MAX. GRADE MAY BE INCREASED BUT NOT EXCEED 20%
- 3) GROOVED CONCRETE IS REQUIRED ON ALL ACCESS ROADS OR DRIVEWAYS OVER 16% GRADE.
- 4) DIMENSIONS SHOWN ARE APPROXIMATE.
- 5) FINAL DRIVEWAY INSPECTION IS DONE BY THE FIRE DISTRICT. FINAL PUBLIC AND PRIVATE ROADWAYS INSPECTION IS DONE BY LOCAL BUILDING AND GRADING DEPARTMENT.

GROOVED CONCRETE DRIVEWAY DETAIL

APPROVED BY:	CONTRA COSTA COUNTY FIRE PROTECTION DISTRICT 2010 GEARY ROAD, PLEASANT HILL, CA 94523 (925) 941-3300	DATE: 03/25/05
		SCALE: NONE
		DWG NO.: FPS-001-D3

APPENDIX J2:

ABRAMS ASSOCIATES
TRAFFIC IMPACT STUDY



THE TERRACES OF LAFAYETTE
TRAFFIC IMPACT STUDY

June 30, 2011

Abrams Associates, Inc.
1875 Olympic Boulevard, Suite 210
Walnut Creek, CA 94596

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Figure 1: Project Location

Figure 2: Site Plan

Figure 3: Existing Lane Configurations

Figure 4: Existing AM (PM) Peak Hour Volumes

Figure 5: Project Trip Generation

Figure 6: Baseline AM (PM) Peak Hour Volumes

Figure 7: Baseline Plus Project AM (PM) Peak Hour Volumes

Figure 8: Cumulative AM (PM) Peak Hour Volumes

TECHNICAL APPENDIX

I. INTRODUCTION AND SUMMARY OF FINDINGS

A. Introduction

This Traffic Impact Study (“Study”) reviews the potential traffic impacts of The Terraces of Lafayette, a proposed multifamily residential apartment project, consisting of 315 units, with a mixture of one, two and three bedroom apartments (the “Project”). As shown on **Figure 1/Project Location**, the Project site is located at the western terminus of Deer Hill Road, at the northwest corner of the Highway 24/Pleasant Hill Road intersection.

As shown on **Figure 2/Site Plan**, the Project site consists of approximately 22 acres. The proposed apartments are contained within two and three-story building structures, identified as “A” through “M,” predominantly on the “flat shelf” area of the Project site. The Project includes 569 on-site parking spaces. The main Project entrance is off Pleasant Hill Road, with two secondary entrances off Deer Hill road, and with interior circulation as shown on **Figure 2/Site Plan**.

The Project applicant has proposed significant road and circulation improvements to address traffic circulation on Pleasant Hill Road. These road and circulation improvements include: (i) construction of a northbound turn lane on Pleasant Hill Road, enabling vehicles to turn left into the main Project entrance; and (ii) a new southbound through-lane on Pleasant Hill Road from north of Deer Hill to the Highway 24 freeway on ramp. As detailed in this Study, the proposed northbound turn lane virtually eliminates the addition of Project vehicles from turning left at Deer Hill Road during the PM peak hour. Further, the proposed southbound through-lane on Pleasant Hill Road will result in a significant increase in capacity during the AM peak hour.

This Study: (i) describes the existing traffic and circulation system, parking conditions, and pedestrian and transit conditions in the vicinity of the Project, together with existing City and regional policies and standards regarding traffic impacts; and (ii) provides an analysis of the potential traffic impacts of the Project. This Study has been conducted consistent with the requirements and methodologies required by the City of Lafayette.

B. Summary of Findings

While a total of eight (8) intersections and several roadways are analyzed in this Study, it is clear that the area with the greatest potential for impacts from Project traffic is along Pleasant Hill Road, and specifically the Pleasant Hill Road and Deer Hill Road/Stanley Boulevard intersection. Currently, the Pleasant Hill Road and Deer Hill Road/Stanley Boulevard intersection operates at an acceptable Level of Service during both the AM and PM peak hours. However, there is a concern regarding future traffic travelling southbound through the intersection during the AM peak hour, and northbound through the intersection during the PM peak hour. Without the Project, such increasing traffic (from regional traffic growth and future build-out within the City) is expected to eventually degrade the referenced Level of Service.

The construction of the Project (including proposed traffic-related improvements) is not expected to have any significant adverse impact on traffic levels and/or the current or future Levels of Service at the studied intersections. Additionally, the Project-related traffic

improvements will actually expand the capacity of Pleasant Hill Road to better accommodate cumulative future traffic increases.

The Project, with the proposed road and circulation improvements, will significantly improve the traffic conditions along Pleasant Hill Road and at the Pleasant Hill Road and Deer Hill Road/Stanley Boulevard intersection. This is primarily due to the construction of the additional southbound through-lane along Pleasant Hill Road.

The Project, with the proposed road and circulation improvements, is consistent with the standards set by the Contra Costa Transportation Authority, and specifically the Multi-modal Transportation Service Objectives (MTSOs) as listed in the Lamorinda Action Plan and the Pleasant Hill Road Action Plan.

For these and other reasons set forth in this Study, the Project traffic will not have a significant adverse effect or impact on existing and future traffic conditions.

II. CURRENT PROJECT SETTING

This section of the Study describes the roadways, traffic conditions and other existing transportation characteristics in the vicinity of the Project. The primary basis of the analysis is the peak hour level of service for the key intersections identified herein. The hours identified as the “peak” hours are generally between 8:00 a.m. and 9:00 a.m. and 5:00 p.m. and 6:00 p.m. for all of the transportation facilities described. Throughout this Study, these peak hours will be identified as the AM and PM peak hours, respectively.

A. Project Study Intersections

A traffic study must be prepared for the Contra Costa Transportation Authority (CCTA) for all projects that generate over 100 trips during a one-hour period. With 315 residential units it is estimated that the proposed Project could generate as many as 185 vehicle trips on a weekday during the critical PM peak hour. Based on the project’s trip generation and the potential for traffic impacts, the study area was defined, and a preliminary list of Project study intersections was prepared.

Generally, the efficiency of street systems can be objectively measured by focusing on conditions at identified “key intersections” – those intersections which are potentially impacted by Project-generated traffic. Eight such key intersections are set forth below. (Project traffic generation at intersections other than the noted key intersections is projected at fewer than 50 trips during the peak hour, thereby requiring no further capacity analysis.)

The key intersections that are analyzed in this Study are identified in **Figure 1/Project Location** as follows:

- Intersection #1: Pleasant Hill Road and Rancho View Drive
- Intersection #2: Pleasant Hill Road and Green Valley Drive
- Intersection #3: Pleasant Hill Road and Reliez Valley Road
- Intersection #4: Pleasant Hill Road and Springhill Road/Quandt Road
- Intersection #5: Pleasant Hill Road and Deer Hill Road/Stanley Boulevard
- Intersection #6: Pleasant Hill Road and Mt. Diablo Blvd/Hwy 24 EB On-Ramp
- Intersection #7: Pleasant Hill Road and Old Tunnel Road/Hwy 24 EB Off-Ramp
- Intersection #8: Deer Hill Road and Brown Avenue

All of these intersections are signalized with the exception of Brown Avenue.

B. Traffic Analysis Scenarios

The key intersections were evaluated for the following scenarios:

- Scenario 1: Existing Conditions – Level of Service (LOS) based on existing peak hour volumes and existing intersection configurations.
- Scenario 2: Baseline Conditions – Existing traffic plus anticipated traffic from approved developments in the study area.¹
- Scenario 3: Baseline Conditions Plus Project – Baseline conditions peak hour volumes plus trips from the Project with the Project’s road and circulation improvements.
- Scenario 4: Cumulative Conditions (Year 2030) per the Certified General Plan EIR (without the Project; and with the Project).

C. Existing Roadway Network

The project location and the surrounding roadway network are illustrated in **Figure 1/Project Location**. The primary roadways that would be affected by the project include:

- **Pleasant Hill Road** – Pleasant Hill Road is a four-lane arterial roadway located on the east side of Lafayette. It has an interchange with the State Highway 24 freeway just south of the Project.
- **Deer Hill Road** – Deer Hill Road is a two-lane roadway that travels generally in a west-east direction, located on the north side of Highway 24. At Pleasant Hill Road, the name changes to Stanley Boulevard which provides the principal access to Acalanes High School.
- **Mt. Diablo Boulevard** – Mt Diablo Boulevard is a four-lane arterial on the south side of Highway 24, and connects with Lafayette’s downtown commercial district.

¹ This Study assumes approximately four (4) years of growth for Scenario 2, as opposed to growth to the year 2030 in Scenario 4.

- Other streets that appear in this traffic analysis include **Springhill Road, Quandt Road, Reliez Valley Road, Green Valley Drive, Rancho View Drive, Brown Avenue** and **Old Tunnel Road**. These are all two-lane local streets serving primarily residential uses. Brown Avenue also includes some commercial development and an underpass crossing of Highway 24, where it connects to Mt. Diablo Boulevard in Downtown Lafayette.

III. INTERSECTION ANALYSIS METHODOLOGY

A. Highway Capacity Manual (HCM) Level of Service Methodology

Existing operational conditions at the eight key intersections have been evaluated using Synchro Software to implement the 2000 *Highway Capacity Manual (HCM)* Level of Service (LOS) methodology.² “Level of Service” is an expression, in the form of a scale, of the relationship between the capacity of an intersection (or roadway segment) to accommodate the volume of traffic moving through the intersection at any given time. The Level of Service scale describes traffic flow with six ratings ranging from “A” through “F,” with “A” indicating relatively free flow of traffic and “F” indicating stop-and-go traffic characterized by traffic jams.

As the amount of traffic moving through a given intersection or roadway segment increases, the traffic flow conditions that motorists experience rapidly deteriorate as the capacity of the intersection or roadway segment is reached. Under such conditions, there is general instability in the traffic flow, which means that relatively small incidents (e.g., momentary engine stall) can cause considerable fluctuations in speeds and delays that lead to traffic congestion. This near-capacity situation is labeled Level of Service (LOS) “E.” Beyond LOS “E,” the intersection or roadway segment capacity has been exceeded, and arriving traffic will exceed the ability of the intersection to accommodate the traffic.

For *signalized intersections*, the HCM methodology determines the capacity of each lane group approaching the intersection. The LOS is then based on average control delay (in seconds per vehicle) for the various movements within the intersection. A combined weighted average control delay and LOS are presented for the intersection.

Table 1 summarizes the relationship between LOS and average control delay at signalized intersections, using the HCM methodology as set forth in **Appendix Section 1**. Please note that, per the requirements set forth by the Contra Costa County Transportation Authority (CCTA), all signalized intersections have also been analyzed using the methodology set forth in the Final Technical Procedures Update (dated July 19, 2006). The CCTA LOS printouts have been included in **Appendix Section 2** to allow verification that these results are the same or better when compared to the HCM results.

² *Highway Capacity Manual*, Transportation Research Board, Washington D.C., 2000. As part of the *HCM methodology*, adjustments are typically made for various factors that reduce the ability of the streets to accommodate vehicles (such as the downtown nature of the area, number of pedestrians, vehicle types, lane widths, grades, on-street parking and queues). These adjustments are performed to ensure that the LOS analysis results reflect the operating conditions that are observed in the field.

For *unsignalized intersections* (all-way stop controlled and two-way stop controlled), the average control delay and LOS operating conditions are calculated by: (i) approach (e.g., northbound) and (ii) movement (e.g., northbound left-turn) for those movements that are subject to delay. In general, the operating conditions for unsignalized intersections are presented for the worst approach. **Table 2** summarizes the relationship between LOS and average control delay at unsignalized intersections, using the HCM methodology.

TABLE 1
SIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS (HCM)

<u>Level of Service</u>	<u>Description of Operations</u>	<u>Average Delay (sec/veh)</u>
A	Insignificant Delays: No approach phase is fully used and no vehicle waits longer than one red indication.	≤ 10
B	Minimal Delays: An occasional approach phase is fully used. Drivers begin to feel restricted.	> 10 to 20
C	Acceptable Delays: Major approach phase may become fully used. Most drivers feel somewhat restricted.	> 20 to 35
D	Tolerable Delays: Drivers may wait through no more than one red indication. Queues may develop but dissipate rapidly without excessive delays.	> 35 to 55
E	Significant Delays: Volumes approaching capacity. Vehicles may wait through several signal cycles and long vehicle queues from upstream.	> 55 to 80
F	Excessive Delays: Represents conditions at capacity, with extremely long delays. Queues may block upstream intersections.	> 80

SOURCE: *Highway Capacity Manual*, Transportation Research Board, 2000

TABLE 2
UNSIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS (HCM)

<u>Level of Service</u>	<u>Description of Operations</u>	<u>Average Delay (secs/veh)</u>
A	No delay for stop-controlled approaches.	0 to 10
B	Operations with minor delays.	> 10 to 15
C	Operations with moderate delays.	> 15 to 25
D	Operations with some delays.	> 25 to 35
E	Operations with high delays and long queues.	> 35 to 50
F	Operation with extreme congestion, with very high delays and long queues unacceptable to most drivers.	> 50

SOURCE: *Highway Capacity Manual*, Transportation Research Board, 2000

B. The City of Lafayette Level of Service Policy

The City of Lafayette General Plan, adopted in 2002 (the “General Plan”) confirms that the City uses both the Contra Costa Transportation Authority (CCTA) and the Highway Capacity Manual (HCM) methods for calculation LOS on roadways and intersections.³ Because it has been found that in Lafayette the HCM procedures produce a more accurate estimate of actual operating conditions, it is the preferred methodology.

The length of time a vehicle is delayed at a signalized intersection as used in this Study is based on the year 2000 HCM. The HCM procedures used in the 2002 Lafayette General Plan were based on the 1994 HCM. The resultant LOS letter grade is the same using either HCM.

C. Contra Costa Transportation Authority and Related Requirements

1. Contra Costa Transportation Authority/Growth Management Program/Action Plans

The Contra Costa Transportation Authority (CCTA) was originally formed to manage the funds for transportation and related infrastructure improvements generated by the half-cent sales tax enacted by the voters of Contra Costa County in 1988 under Measure C. In 2004, through Measure J, the voters extended the sales tax through the year 2034.

The CCTA carries out all implementing programs of Measures C and J, including the Growth Management Program (GMP). The CCTA further serves as the Congestion Management Agency (CMA). In such capacity, the CCTA prepares and updates the Congestion Management Program (CMP). The CMP contains several components, including: (i) traffic level of service standards for State highways and principle arterials; and (ii) multi-modal performance measures to evaluate transportation systems.

A primary component of the CCTA’s Growth Management Program is the requirement that local jurisdictions engage in “cooperative, multi-jurisdictional planning.” Such multi-jurisdictional planning in turn requires that Regional Transportation Planning Commissions (“RTMCs”) prepare “Action Plans for Routes of Regional Significance” (“Action Plans”). These Action Plans provide for “Multi-modal Transportation Service Objectives” (“MTSOs”) that establish quantifiable measures of effectiveness and include dates for attaining the stated objectives.

2. Lamorinda Action Plan Update

In the Lamorinda area, the Southwest Area Transportation Committee (“SWAT”) serves as the RTMC for purposes of preparation of an Action Plans for Lamorinda and the Tri-Valley areas. The Lamorinda Program Management Committee (LPMC) is a sub-group of SWAT for the Lamorinda area. In 1995, the LPMC adopted an Action Plan for Routes of Regional Significance, primarily focusing on State Route 24/BART corridor. In 1998, a separate Action Plan for Pleasant Hill Road was prepared. The Lamorinda Action plan was updated in

³ See City General Plan at p. II-4, and at Table 2.

2000 and most recently by Final Report prepared by DKS Associates dated December 2009 (the “Lamorinda Action Plan Update”).

The Lamorinda Action Plan Update identifies Pleasant Hill Road as a Route of Regional Significance. The MTSOs for Pleasant Hill Road set forth several objectives, including the following:

- Maintain peak hour peak direction delay index of 2.0 or lower.

The delay index (“DI”) is the ratio of the travel time during the peak hour to the travel time that would be experienced during off-peak, free-flow periods.

Abrams Associates measured the travel time conditions on Pleasant Hill Road during May 2011. Average measured test results indicated a delay index (DI) of approximately 1.7 and 1.6 during AM and PM peak hours. The average southbound AM travel time was measured to be 18.5 mph, while the northbound PM travel time was measured at 16.5 mph. The measurements confirm that existing conditions at Pleasant Hill Road are within the CCTA/MTSO standards. For the reasons set forth in this Study, the addition of Project traffic should have no significant impact on the DI and, therefore, conditions should remain consistent with applicable standards.

IV. PROJECT AND ROAD IMPROVEMENTS

A. Proposed Project

The proposed project will be a mixture of one-bedroom, two-bedroom and three-bedroom apartments, with a total of 315 units. There will also be about 9,000 square feet for the clubhouse, and a small leasing office. The project will have a total of 569 parking spaces, with 376 spaces in garages and carports, and 193 uncovered.

1. Driveway Locations and Site Access

As shown on the site plan, there are three driveways that will serve the project. At the main project entrance on Pleasant Hill Road, the applicant is proposing that a northbound left turn lane be constructed for traffic turning into the project. The proposed driveways on Deer Hill Road will each operate with all turning movements.

Driveway 1 – This is a secondary entrance on Deer Hill Road. It is located about 275 feet from the western property line. The sight distance is adequate, and this location is a good choice for access.

Driveway 2 – This is a secondary entrance on Deer Hill Road about 275 feet west of Pleasant Hill Road. Due to the combination of the downgrade and the vertical curve on Deer Hill Road, sight distance for this driveway was carefully reviewed. Field studies show that the sight distance between a vehicle on eastbound Deer Hill Road and a vehicle that is exiting the project is about 400 feet. This is sufficient to meet the standards for a 35 mph vehicle speed on Deer Hill Road. Both driveways on Deer Hill Road will provide direct access to Downtown and the BART Station without impacting any Pleasant Hill Road intersections.

Driveway 3 – This driveway is located on Pleasant Hill Road and will be the main entrance to the site. It is located about 380 feet south of Deer Hill Road. A northbound left turn lane will be constructed within the existing median on Pleasant Hill Road. This driveway location will operate safely and effectively as located. This sight distance is adequate. The driveway will result in the removal of some on-street parking spaces on Pleasant Hill Road.

The proposed northbound left turn-in-only lane is well removed from and will not affect the existing turn lane at Deer Hill Road. Preliminary engineering indicates that the new turn lane, in conjunction with the new southbound through lane, can be constructed within the existing right-of-way and a minor dedication from the Project property.

B. Project Circulation and Road Improvements

The Project includes several significant roadway, bicycle and pedestrian improvements to Pleasant Hill Road (“road and circulation improvements”), which will significantly enhance transportation conditions when the Project is built. Average vehicle delay at the Pleasant Hill and Deer Hill Road/Stanley Boulevard intersection will be reduced, even with the inclusion of Project traffic. Stated another way, if the Project is *not* built, average delay at this intersection will increase to a greater extent than if the Project *is* built. The significant Project road and circulation improvements include:

1. Project entry on Pleasant Hill Road. The Project entry includes a protected left-turn-in pocket for northbound vehicles. This improvement will keep Project traffic from having to make a left or U-turn at Deer Hill Road. Direct access to Pleasant Hill Road is designed to keep a significant amount of Project traffic from impacting the Pleasant Hill Road and Deer Hill Road/Stanley Boulevard intersection. The Pleasant Hill Road driveway provides direct access to the freeway without passing through any signalized intersections on Pleasant Hill Road.

2. Additional southbound lane on Pleasant Hill Road from north of Deer Hill Road to the freeway onramp. This improvement will add 50% more southbound capacity through the Pleasant Hill and Deer Hill Road/Stanley Boulevard intersection. In the AM peak hour, this additional capacity will have the added benefit of providing more pedestrian crossing time for Acalanes students and will help reduce traffic backup toward Springhill Road. During the PM peak hour, the additional southbound capacity will help increase time available for northbound left turns from Pleasant Hill Road to Deer Hill Road, which will have a positive impact on overall northbound traffic as well.

3. Sidewalk on Deer Hill Road from Pleasant Hill road to the western edge of the Property (approximately 2,000 LF). This improvement will provide pedestrian access to Acalanes High School for the neighborhood along and near Deer Hill Road approximately 3/4 miles to the west of Pleasant Hill Road.

4. Sidewalk from Deer Hill Road along the west side of Pleasant Hill Road to the existing sidewalk at the westbound freeway onramp. This sidewalk will provide direct pedestrian access from the project to Mt. Diablo Boulevard and the Downtown Area.

5. Extension of bike lane on the west side of Pleasant Hill Road from Deer Hill road, along the project frontage to the freeway. Bike lanes currently exist on the east side of Pleasant

Hill Road and on both sides of Deer Hill Road. There is no bike lane on the west side of Pleasant Hill Road, at the project frontage, but one does exist north of Deer Hill Road. The project includes extending that bike lane along the project frontage to the freeway.

C. Project Trip Generation

The trip generation calculations are shown in **Table 3**. They are based on the trip generation for Apartments (Land Use Code 220) from ITE’s Trip Generation (8th Edition).

**TABLE 3
 TRIP GENERATION CALCULATIONS**

Land Use	ITE Code	Size	ADT	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Apartments	220	315 units	1,981	43	109	152	113	72	185

Based on the ITE, the trip generation rate for this apartment project is 0.59 PM peak hour trips per unit. This is consistent with the estimates of trip rates that have been made in other recent traffic studies in Walnut Creek and Pleasant Hill for similar apartment projects of this size and located roughly the same distance from BART.

The Project would have two driveways on Deer Hill Road, and one driveway on Pleasant Hill Road where these trips will enter and exit the project. The total trip generation reflects all vehicle trips that that would be generated at these three driveways. Since this Project would be all residential land uses, there were no adjustments applied to account for pass-by or internal trips. In summary, the Project is forecast to generate a total of 152 vehicle trips during the AM peak hour and about 185 trips during the PM peak hour.

The site traffic is assumed to be split between the three driveways, which will reduce the concentration of traffic at any one location. The trips generated by this proposed development are estimated for the typical peak commute hours of 8:00 to 9:00 AM and 5:00 to 6:00 PM. This represents the peak hour of “adjacent street traffic” during the time periods when the uses generally contribute to the greatest amount of congestion.

D. Project Trip Distribution

The trip distribution assumptions have been based on the project’s proximity to freeway interchanges, the existing directional split at other local driveways and intersections, and the overall land use patterns in the area. **Figure 5** presents the trip distribution percentages estimated by Abrams Associates to be used in the analysis and the AM and PM peak hour trips generated by the proposed Project at each key intersection, including the three Project driveways.

E. Project Directional Split

The percentage distribution of traffic to each of the access roadways is assumed to be as follows:

Direction	Percent	PM Trips
Pleasant Hill Road to the north	13%	24 trips
Deer Hill Road to the west	18%	33 trips
Stanley Boulevard to the east	8%	15 trips
Highway 24 to the west	21%	39 trips
Pleasant Hill Road to the south	16%	30 trips
Highway 24 to the east	24%	44 trips

V. STUDY INTERSECTIONS AND TRAFFIC ANALYSIS SCENARIOS

The eight study intersections were evaluated based on four scenarios: Existing Conditions; Baseline Conditions; Baseline Conditions Plus Project; and Cumulative Conditions, as set forth below.

A. Scenario 1: Existing Conditions

For purposes of this Study, for Scenario 1 (Existing Conditions) Abrams Associates measured the existing intersection geometry and traffic counts at the study intersections for weekday AM and PM peak hours. The results are presented in Appendix Section 1 and are summarized below.

AM and PM peak hour turning movement counts were conducted at each of the Project study intersections in 2010 and 2011 at times when local schools were in session. **Figure 3** presents the existing lane configurations at the project study intersections and **Figure 4** presents the existing traffic volumes. **Table 4** summarizes the associated LOS computation results for the existing weekday AM and PM peak hour conditions (the corresponding LOS analysis calculation sheets are presented in the Appendix Section 1).

**TABLE 4
 EXISTING INTERSECTION LEVEL OF SERVICE CONDITIONS**

INTERSECTION	CONTROL	PEAK HOUR	EXISTING	
			DELAY (sec/veh)	LOS
1 Pleasant Hill Road and Rancho View Drive	Traffic Signal	AM	3.7	A
		PM	8.1	A
2 Pleasant Hill Road and Green Valley Drive	Traffic Signal	AM	5.7	A
		PM	8.9	A
3 Pleasant Hill Road and Reliez Valley Road	Traffic Signal	AM	12.1	B
		PM	10.4	B
4 Pleasant Hill Road and Springhill Road/Quandt Road	Traffic Signal	AM	9.4	A
		PM	8.2	A
5 Pleasant Hill Road and Deer Hill Road/Stanley Boulevard	Traffic Signal	AM	26.3	C
		PM	49.4	D

6	Pleasant Hill Road and Mt Diablo Blvd/EB Hwy 24 On-ramp	Traffic Signal	AM	19.5	B
			PM	22.8	C
7	Pleasant Hill Road and EB Hwy 24 Off-ramp/Old Tunnel Road	Traffic Signal	AM	10.0	A
			PM	11.6	B
8	Deer Hill Road and Brown Avenue	Stop Sign Control	AM	163.9	F
			PM	172.9	F

SOURCE: Abrams Associates, 2011

NOTE: At traffic signals, the delay is the average for all vehicles at the intersection is presented in terms of seconds per vehicle. At an unsignalized intersection, the delay is for the most critical single movement.

As shown in **Table 4**, the intersection capacity results reveal that all of the signalized intersections currently have acceptable conditions (LOS “D” or better) during the weekday AM and PM peak hours. The two-way stop on Deer Hill Road at Brown Avenue is quite different. While the overall LOS is “B” (23.2 sec), the side street movements have particularly high delay, and operate at LOS “F”. This problem could be mitigated by the use of a traffic signal.

There are seven signalized intersections on Pleasant Hill Road. The intersections at the Highway 24 ramps operate at LOS “B” and “C”, and are well below the capacity threshold. At all other intersections there is considerable excess capacity.

Of all the intersections studied, the Pleasant Hill Road and Deer Hill Road/Stanley Boulevard is the most critical, with: (i) LOS “C” during the AM peak hour; and (ii) LOS “D” during the PM peak hour. In the AM peak hour, this intersection is affected by the traffic patterns at Acalanes High School, as well as commute traffic. In the PM peak hour, the primary factor is homeward-bound commute traffic.

To check findings in this Study, Abram Associates reviewed several City documents, including: (i) the Lafayette General Plan (2002) and its accompanying EIR; and (ii) the proposed 2009 Addendum to the Lafayette General Plan Revision Final EIR for GP02-08/RZ02-08 (the “2009 Addendum”).⁴ A review of the Lafayette General Plan in 2002; the 2009 Addendum; and the Abrams Associates “existing conditions” data prepared for this Study (in 2011), shows certain consistencies and trends in the traffic data -- specifically with regard to the Pleasant Hill Road and Deer Hill Road/Stanley Boulevard intersection. A review of the documents and information generally shows higher traffic at the referenced intersection in 2002; somewhat reduced traffic in 2009; and a minor increase in such traffic in 2011. (These fluctuations do not necessarily impact the corresponding LOS for the intersections for the referenced time periods.) The reasons for the fluctuations likely include the following: (i) the economy in 2002 was much more robust than during the recessionary years (including 2009), resulting in lower traffic during 2009 (and perhaps increasing during the “recovery” of 2010-2011); and (ii) minor fluctuations in traffic counts can result from the time of year data is taken;

⁴ The 2009 Addendum was prepared by Leonard Charles and Associates for the City of Lafayette as part of a proposed General Plan Amendment and Rezoning that ultimately was not adopted by the City. The 2009 Addendum was not certified or adopted by the City; however, certain background traffic data from the 2009 Addendum was reviewed by Abrams Associates to check results of this Study.

the methodology of the acquisition of data; the duration of each study and averages derived therefrom; and the interpretation/presentation of the data.

B. Scenario 2: Baseline Conditions

For purposes of this Study, for Scenario 2 (Baseline Conditions) Abrams Associates evaluated the existing traffic conditions (set forth in Scenario 1) together with the reasonably foreseeable projects in the area. The method used to project future year traffic for the baseline is based on the travel forecasts produced by the Central County ICMP computer traffic model. The County model includes trips generated in Lafayette as well as in nearby jurisdictions. The traffic projection procedures are described in detail in the Lafayette General Plan 2002 EIR.

At least two new relatively small residential projects have been identified within the study area, including the Mt. Diablo Court multi-family housing project; and a similar project on the Hungry Hunter site. These projects individually will not have significant traffic impacts; however there is expected to be continuous growth in the through traffic on Pleasant Hill Road given its regional nature. The trips added for the Baseline traffic are assumed to be at a growth rate of one-and-one-half percent per year, based on standard practice. However, based on the lack of historical growth in Lafayette and the surrounding area, and the fact that traffic actually decreased between 2002 and 2009, Abrams Associates believes that growth rate is overstated – and as a result, service levels for any scenario including this assumption is likely to be overstated.

Figure 6 shows the estimated Baseline AM and PM peak hour volumes. **Table 5**, below, summarizes the associated LOS computation results for the Baseline weekday AM and PM peak hour conditions (the corresponding LOS analysis calculation sheets are presented in Appendix Section 1). As shown in **Table 5**, all of the signalized study intersections would continue to have acceptable conditions (LOS “D” or better) during the weekday AM and PM peak hours.

**TABLE 5
 BASELINE INTERSECTION LEVEL OF SERVICE CONDITIONS**

	INTERSECTION	CONTROL	PEAK HOUR	EXISTING	
				DELAY (sec/veh)	LOS
1	Pleasant Hill Road and Rancho View Drive	Traffic Signal	AM	3.8	A
			PM	8.7	A
2	Pleasant Hill Road and Green Valley Drive	Traffic Signal	AM	5.9	A
			PM	9.5	A
3	Pleasant Hill Road and Reliez Valley Road	Traffic Signal	AM	12.4	B
			PM	10.6	B
4	Pleasant Hill Road and Springhill Road/Quandt Road	Traffic Signal	AM	9.6	A
			PM	8.1	A
5	Pleasant Hill Road and Deer Hill Road/Stanley Boulevard	Traffic Signal	AM	26.9	C
			PM	51.1	D
6	Pleasant Hill Road and Mt Diablo Blvd/EB Hwy 24 On-ramp	Traffic Signal	AM	19.5	B
			PM	22.9	C
7	Pleasant Hill Road and EB Hwy 24 Off-ramp/Old Tunnel Road	Traffic Signal	AM	9.8	A
			PM	11.5	B

8	Deer Hill Road and Brown Avenue	Stop Sign	AM	163.9	F
		Control	PM	172.9	F

SOURCE: Abrams Associates, 2011

NOTE: At traffic signals, the delay is the average for all vehicles at the intersection, and is presented in terms of seconds per vehicle. At an unsignalized intersection (stop sign), the delay is for the most critical single movement.

The results of these baseline traffic conditions are that there are small changes in the average delay, but not enough change to affect the Levels of Service.⁵

C. Scenario 3: Baseline Conditions Plus Project Traffic

For purposes of this Study, for Scenario 3 (Baseline Conditions Plus Project Traffic) Abrams Associates added the Project-generated traffic volumes shown in **Figure 5** to the Baseline traffic volumes shown in **Figure 6**.

Figure 7 shows the Baseline Plus Project Traffic AM and PM peak hour volumes that were used in this Study to evaluate the turning movements at each study intersection.

Table 6 summarizes the LOS results for the Baseline Plus Project weekday AM and PM peak hour conditions (the corresponding LOS analysis calculation sheets are presented in the **Appendix Section 1**). **Table 6** assumes that the Project road and circulation improvements as set forth in Section IV of this Study are constructed. As shown in **Table 6**, the LOS ratings of all of the signalized study intersections would remain unaffected by the addition of Project traffic and would continue to operate at acceptable levels during AM and PM peak hours. (Project traffic would also have no effect on the LOS at Deer Hill Road and Brown Avenue since the intersection presently operates at an unsatisfactory LOS; however, the LOS could be improved with the addition of a traffic signal. At that point, the intersection would operate at an acceptable LOS.)

**TABLE 6
BASELINE + PROJECT INTERSECTION LEVEL OF SERVICE CONDITIONS**

INTERSECTION	CONTROL	PEAK HOUR	EXISTING	
			DELAY (sec/veh)	LOS
1 Pleasant Hill Road and Rancho View Drive	Traffic Signal	AM	3.7	A
		PM	8.8	A
2 Pleasant Hill Road and Green Valley Drive	Traffic Signal	AM	6.0	A
		PM	9.5	A
3 Pleasant Hill Road and Reliez Valley Road	Traffic Signal	AM	12.3	B
		PM	10.6	B
4 Pleasant Hill Road and Springhill Road/Quandt Road	Traffic Signal	AM	9.7	A
		PM	8.1	A

⁵ The reader will note that in some cases in each of these Tables the Delay may decrease by a small amount (e.g., by .10) even with a small amount of additional assumed traffic. This anomaly occurs where the underlying model automatically shifts slightly.

5	Pleasant Hill Road and Deer Hill Road/Stanley Boulevard	Traffic Signal	AM	23.7	C
			PM	52.0	D
6	Pleasant Hill Road and Mt Diablo Blvd/EB Hwy 24 On-ramp	Traffic Signal	AM	19.5	B
			PM	22.8	C
7	Pleasant Hill Road and EB Hwy 24 Off-ramp/Old Tunnel Road	Traffic Signal	AM	9.7	A
			PM	11.4	B
8	Deer Hill Road and Brown Avenue	Stop Sign Control	AM	182.5	F
			PM	202.5	F

SOURCE: Abrams Associates, 2011

NOTE: At traffic signals, the delay is the average for all vehicles at the intersection is presented in terms of seconds per vehicle. At an unsignalized intersection, the delay is for the most critical single movement.

1. Conditions with Pedestrian Actuation

The City of Lafayette has requested that as part of this Study the AM peak hour intersection capacity conditions at Deer Hill Road be tested with the condition that there would be a pedestrian actuation during each signal phase. This would apply for the AM peak hour during the period when there is maximum activity in the vicinity of Acalanes High School. The results of this analysis are that the intersection will operate at LOS “C” with an average delay of 26.9 seconds per vehicle. (This is in comparison to the LOS “C”, average vehicle delay of 23.7 seconds, which occurs with the normal calculations. It is more likely that there would be pedestrian actuation for only a few cycles during the AM peak hour which is the assumption which was used throughout this Study).

2. Roadway and Intersection Mitigation Measures

With the addition of Project traffic and the proposed Project road and circulation improvements along Pleasant Hill Road, all of the signalized intersection delay results are similar or less than without the Project, and meet the City of Lafayette and CCTA standards. The Pleasant Hill Road and Deer Hill/Stanley intersection will experience a significant (12%) reduction in delay during the AM peak hour, with the proposed project improvements. Therefore, no mitigation measures are required as a result of Project traffic.

3. Deer Hill Road/Brown Avenue Intersection

The Terraces project will add additional traffic volumes to this intersection, as much as 33 vehicles per hour (total both directions) during the PM peak hour. This intersection is currently a two-way stop with the stops on Brown Avenue, and *could* meet the warrants for the installation of a traffic signal. However, there are a number of competing factors at this location. The traffic signal could provide some speed control for speeding cars on Deer Hill Road. Should a traffic signal be installed by the City of Lafayette, the project should make a fair share contribution.

4. Internal Circulation and Access

Abrams Associates has worked with the site planner to layout an effective internal circulation system. No internal site circulation or access issues have been identified that would

cause a traffic safety problem or any unusual traffic congestion or delay. It should be noted that the volumes on the internal roadways would be light enough so that no significant conflicts would be expected with vehicles backing out of the garages and/or parking spaces within the project.

5. Capacity Impacts at Project Driveways

Table 7 shows the results of the intersection capacity studies at the three driveways that serve the project. On Pleasant Hill Road, there will be a left turn lane for entering traffic, but the outbound left turn would be prohibited. The LOS is calculated to be “C” under this condition. There are more than enough gaps in the through traffic so the movement can operate without delay.

TABLE 7
LEVEL OF SERVICE CONDITIONS AT PROJECT DRIVEWAYS
(Existing plus project traffic)

	INTERSECTION	CONTROL	PEAK HOUR	Existing + Project	
				DELAY (sec/veh)	LOS
1	Project Entrance on Pleasant Hill Road	Stop Sign Control	AM	14.5	B
			PM	10.9	B
2	Project Driveway (East) on Deer Hill Road	Stop Sign Control	AM	18.1	C
			PM	21.2	C
3	Project Driveway (West) on Deer Hill Road (Top of the Hill)	Stop Sign Control	AM	13.6	C
			PM	18.2	C

The project driveways on Deer Hill Road will all operate at acceptable Levels of Service and will not cause any capacity or safety issues on the major street. At the Pleasant Hill Road driveway, the inbound left turn results in a significant improvement at Deer Hill Road by removing potential left turns and U-turns.

6. Parking

The proposed project would provide an adequate supply of off-street parking based on the City’s requirements. A total of 569 parking spaces are provided which equates to a parking ratio of 1.81 spaces per unit. This is consistent with other nearby projects and meets the City zoning standards.

D. Scenario 4: Cumulative Conditions

For purposes of this Study, for Scenario 4 (Cumulative Conditions) Abrams Associates evaluated the intersection traffic volumes based on the existing turning movements plus the addition of growth forecast by the County’s traffic model. For this analysis the 2030 cumulative traffic volumes were developed by applying a 0.55%/year increase to the background traffic volumes. The cumulative analyses below include results: (i) without the Project; and (ii) with the Project and its traffic and circulation improvements (using HCM and CCTA methodology).

1. Cumulative without Project

Figure 8 shows the cumulative AM and PM peak hour traffic volumes at each of the project study intersections without the Project.

Table 8 summarizes the associated LOS computation results for the cumulative (year 2030) weekday AM and PM peak hour traffic conditions without the Project. The corresponding LOS analysis calculation sheets are presented in **Appendix Section 1**.

As shown in **Table 8**, all of the signalized study intersections would continue to have acceptable conditions (LOS “D” or better) during the weekday AM and PM peak hours, with the exception of Pleasant Hill Road and Deer Hill Road/Stanley Boulevard during the PM peak hour.

TABLE 8
CUMULATIVE (2030) INTERSECTION LEVEL OF SERVICE CONDITIONS
(without Project)

	INTERSECTION	CONTROL	PEAK HOUR	CUMULATIVE (2030)	
				DELAY (sec/veh)	LOS
1	Pleasant Hill Road and Rancho View Drive	Traffic Signal	AM	4.1	A
			PM	12.1	B
2	Pleasant Hill Road and Green Valley Drive	Traffic Signal	AM	6.6	A
			PM	14.1	B
3	Pleasant Hill Road and Reliez Valley Road	Traffic Signal	AM	15.0	B
			PM	11.8	B
4	Pleasant Hill Road and Springhill Road/Quandt Road	Traffic Signal	AM	12.6	B
			PM	8.3	A
5	Pleasant Hill Road and Deer Hill Road/Stanley Boulevard	Traffic Signal	AM	32.1	C
			PM	71.1	E
6	Pleasant Hill Road and Mt Diablo Blvd/EB Hwy 24 On-ramp	Traffic Signal	AM	20.2	C
			PM	24.0	C
7	Pleasant Hill Road and EB Hwy 24 Off-ramp/Old Tunnel Road	Traffic Signal	AM	10.2	B
			PM	12.2	B
8	Deer Hill Road and Brown Avenue	Stop Sign Control	AM	295.3	F
			PM	353.4	F

SOURCE: Abrams Associates, 2011

NOTE: At traffic signals, the delay is the average for all vehicles at the intersection is presented in terms of seconds per vehicle. At an unsignalized intersection, the delay is for the most critical single movement.

2. Cumulative with the Project

Table 9 summarizes the associated LOS computation results for the Cumulative (Year 2030) weekday AM and PM peak hour traffic conditions with the Project and its traffic and circulation improvements. The corresponding LOS analysis calculation sheets are presented in the **Appendix Section 1**.

As shown in **Table 9**, all of the signalized study intersections would continue to have acceptable conditions (LOS “D” or better) during the weekday AM and PM peak hours, again with the exception of Pleasant Hill Road and Deer Hill Road/Stanley Boulevard during the PM peak hour. However, the Project will not contribute to such degradation of level of service. The Project, with its traffic and circulation improvements, will improve traffic and circulation at this intersection, and will lessen the severity of any future degradation of Level of Service based on future, cumulative traffic.

**TABLE 9
 CUMULATIVE (2030) LEVEL OF SERVICE CONDITIONS (with Project)**

	INTERSECTION	CONTROL	PEAK HOUR	CUMULATIVE (2030)	
				DELAY (sec/veh)	LOS
1	Pleasant Hill Road and Rancho View Drive	Traffic Signal	AM	4.0	A
			PM	12.2	B
2	Pleasant Hill Road and Green Valley Drive	Traffic Signal	AM	6.6	A
			PM	14.2	B
3	Pleasant Hill Road and Reliez Valley Road	Traffic Signal	AM	15.0	B
			PM	11.9	B
4	Pleasant Hill Road and Springhill Road/Quandt Road	Traffic Signal	AM	12.6	B
			PM	8.3	A
5	Pleasant Hill Road and Deer Hill Road/Stanley Boulevard	Traffic Signal	AM	30.1	C
			PM	69.4	E
6	Pleasant Hill Road and Mt Diablo Blvd/EB Hwy 24 On-ramp	Traffic Signal	AM	20.2	C
			PM	24.0	C
7	Pleasant Hill Road and EB Hwy 24 Off-ramp/Old Tunnel Road	Traffic Signal	AM	10.1	B
			PM	12.2	B
8	Deer Hill Road and Brown Avenue	Stop Sign Control	AM	324.3	F
			PM	406.5	F

3. Cumulative Capacity Using the CCTA Methodology

Table 10 shows the results of the intersection Capacity Calculations using the CCTA calculation procedures. This methodology is based on the results being reported in terms of volume to capacity ratio (v/c ratio), and generally shows less critical results than the HCM Methodology. (See **Appendix Section 2.**)

**TABLE 10
 CUMULATIVE (2030) LEVEL OF SERVICE CONDITIONS WITH THE PROJECT
 Using the CCTA Methodology**

	INTERSECTION	CONTROL	PEAK HOUR	CUMULATIVE	
				Vol/Capacity	LOS
1	Pleasant Hill Road and Rancho View Drive	Traffic Signal	AM	.486	A
			PM	.674	B
2	Pleasant Hill Road and Green Valley Drive	Traffic Signal	AM	.528	A
			PM	.664	B

3	Pleasant Hill Road and Reliez Valley Road	Traffic Signal	AM	.619	B
			PM	.659	B
4	Pleasant Hill Road and Springhill Road/Quandt Road	Traffic Signal	AM	.741	C
			PM	.738	C
5	Pleasant Hill Road and Deer Hill Road/Stanley Boulevard	Traffic Signal	AM	.725	C
			PM	.913	E
6	Pleasant Hill Road and Mt Diablo Blvd/EB Hwy 24 On-ramp	Traffic Signal	AM	.457	A
			PM	.603	B
7	Pleasant Hill Road and EB Hwy 24 Off-ramp/Old Tunnel Road	Traffic Signal	AM	.552	A
			PM	.678	B
8	Deer Hill Road and Brown Avenue	Stop Sign Control	AM	N/A	N/A
			PM		

SOURCE: Abrams Associates, 2011

NOTE: At traffic signals, the results are presented in terms of volume to capacity ratios. This methodology is not applicable to unsignalized intersections.

The data on cumulative impacts shows that the cumulative impacts of development in the area to the year 2030 will continue to degrade the Level of Service of the intersection of Pleasant Hill Road and Deer Hill Road/Stanley Boulevard. However, the Project will not contribute to such degradation of level of service. The Project, with its traffic and circulation improvements, will improve traffic and circulation at this intersection, and will lessen the severity of any future degradation of Level of Service based on future, cumulative traffic.

4. Deer Hill Road and Brown Avenue

As set forth in this Study, the Deer Hill Road and Brown Avenue intersection, which is unsignalized, operates at LOS "F" under all Scenarios (Existing through Cumulative conditions). This condition will continue with or without the Project and the Project's traffic and circulation improvements. This condition could be addressed with the construction of a traffic signal.

5. State Highway 24

The addition of traffic to State Highway 24 is problematic. State Highway 24 is impacted by regional traffic and regulated in all aspects by the State of California. The addition of Project traffic to State Highway 24 cannot be deemed to have a significant adverse impact because State Highway 24 collects and transports traffic to and from so many different jurisdictions that it is impossible for any individual project - or even jurisdiction - to effectively mitigate traffic impacts. Essentially, existing and future conditions of traffic on State Highway 24 will not be impacted in any measurable or meaningful way by traffic generated to or from this Project.

VI. FINDINGS AND CONCLUSIONS

While a total of eight (8) intersections and several roadways are analyzed in this Study, it is clear that the area with the greatest potential for impacts from Project traffic is along Pleasant Hill Road, and specifically the Pleasant Hill Road and Deer Hill Road/Stanley Boulevard

intersection. Currently, the Pleasant Hill Road and Deer Hill Road/Stanley Boulevard intersection operates at an acceptable Level of Service during both the AM and PM peak hours. However, there is a concern regarding future traffic travelling southbound through the intersection during the AM peak hour, and northbound through the intersection during the PM peak hour. Without the Project, such increasing traffic (from future build-out within the City) is expected to eventually degrade the referenced Level of Service.

With the construction of the Project's proposed road and circulation improvements, the additional Project traffic will not have a significant impact on existing traffic levels and the Pleasant Hill Road and Deer Hill Road/Stanley Boulevard intersection.

The Project, with the proposed road and circulation improvements, will significantly improve the traffic conditions along Pleasant Hill Road and at the Pleasant Hill Road and Deer Hill Road/Stanley Boulevard Intersection. This is primarily due to the construction of the additional southbound through-lane along Pleasant Hill Road.

The Project, with the proposed road and circulation improvements, is consistent with the standards set by the Contra Costa Transportation Authority, and specifically the Multi-modal Transportation Service Objectives (MTSOs) as listed in the Lamorinda Action Plan and the Pleasant Hill Road Action Plan.

The data on cumulative impacts shows that the cumulative impacts of development in the area to the year 2030 will continue to degrade the level of service of the intersection of Pleasant Hill Road and Deer Hill Road/Stanley Boulevard. However, the Project will not contribute to such degradation of level of service. The Project, with its road and circulation improvements, will improve traffic and circulation at this intersection, and will lessen the severity of any future degradation of level of service based on future, cumulative traffic.

The Deer Hill Road and Brown Avenue intersection, which is unsignalized, operates at LOS "F" under all Scenarios (Existing through Cumulative conditions). This condition will continue with or without the Project and the Project's traffic and circulation improvements. This condition could be addressed with the construction of a traffic signal.

State Highway 24 is impacted by regional traffic and regulated in all aspects by the State of California. The addition of Project traffic to State Highway 24 cannot be deemed to have a significant adverse impact because State Highway 24 collects and transports traffic to and from so many different jurisdictions that it is impossible for any individual project - or even jurisdiction - to effectively mitigate traffic impacts. Essentially, existing and future conditions of traffic on State Highway 24 will not be impacted in any measurable or meaningful way by traffic generated to or from this Project.

For these and other reasons set forth in this Study, the Project traffic will not have a significant adverse effect or impact on existing and future traffic conditions.

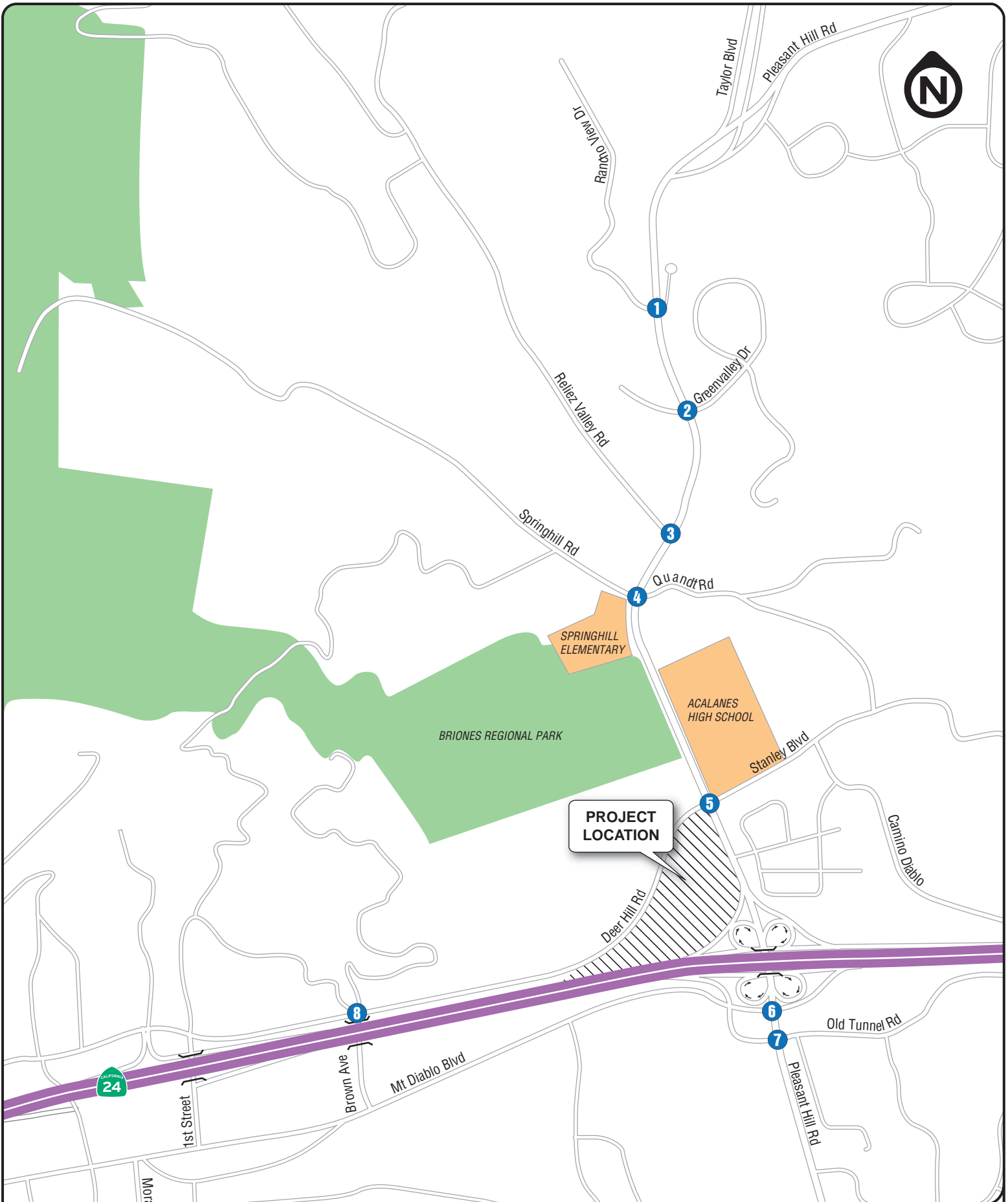


FIGURE 1 | PROJECT LOCATION
TRAFFIC IMPACT STUDY
 The Terraces of Lafayette
 City of Lafayette



LAFAYETTE ASSOCIATES, INC.
 RESTRICTED ARCHITECTURAL DRAWINGS
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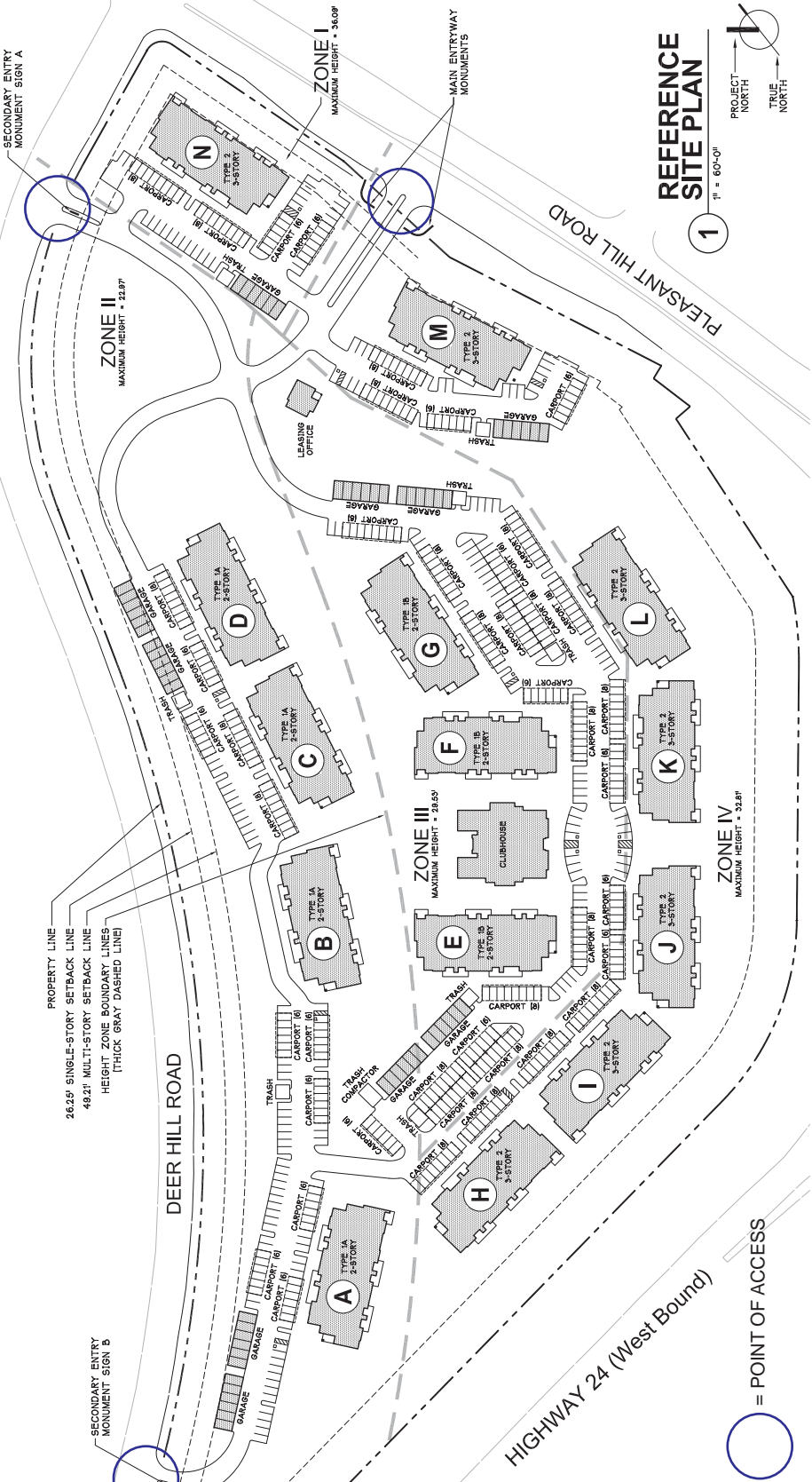
REFERENCE SITE PLAN

SCALE: 1" = 60'-0"

DATE: 3/21/2011

REVISIONS:

PROJECT NO.	10050
SHEET OF	A0.1



PROJECT DATA

SITE AREA	970,272 SF (22.27 ACRES)
TOTAL GARAGE AREA	204,832 SF (INCLUDING ACCESSORY STRUCTURES)
TOTAL BUILDING FOOTPRINT	2,111,300 SF (INCLUDING ACCESSORY STRUCTURES)
COVERAGE	21.1%
NUMBER OF UNITS	315
DENSITY	14.1 UNITS/ACRES

PARKING

REQUIRED PARKING RATIO	1.81 STALLS PER UNIT
RESIDENTIAL UNIT TYPE	REQUIRED PARKING STALLS
1-BDR	140
2-BDR	168
3-BDR	20
GUEST	0
TOTAL	315
TOTAL RATIO	511 STALLS REQUIRED (BASED ON M-F-B)

PARKING SUMMARY

GARAGES	60
TRASH COMPACTOR	16
UNCOVERED	136
TOTAL	266
TOTAL RATIO	1.81 PER UNIT

BUILDING DATA & UNIT COUNTS

DESCRIPTION	1ST FLOOR AREA (SF)	2ND FLOOR AREA (SF)	3RD FLOOR AREA (SF)	TOTAL AREA (SF)	BLDG. TYPE	MAX. HEIGHT (FEET)
APARTMENT A	9,425	9,545	9,545	18,970	1A	22.97'
APARTMENT B	9,425	9,545	9,545	18,970	1A	22.97'
APARTMENT C	9,425	9,545	9,545	18,970	1A	22.97'
APARTMENT D	9,425	9,545	9,545	18,970	1A	22.97'
APARTMENT E	9,425	9,545	9,545	18,970	1B	28.53'
APARTMENT F	9,425	9,545	9,545	18,970	1B	28.53'
APARTMENT G	9,425	9,545	9,545	18,970	1B	28.53'
APARTMENT H	9,425	9,545	9,545	18,970	1B	28.53'
APARTMENT I	9,425	9,545	9,545	18,970	2	32.81'
APARTMENT J	9,425	9,545	9,545	18,970	2	32.81'
APARTMENT K	9,425	9,545	9,545	18,970	2	32.81'
APARTMENT L	9,425	9,545	9,545	18,970	2	32.81'
APARTMENT M	9,425	9,545	9,545	18,970	2	32.81'
APARTMENT N	9,425	9,545	9,545	18,970	2	36.09'
SUBTOTAL	131,850	133,650	66,815	332,315 SF		
CLUBHOUSE	800	5,270	---	6,070	---	28.53'
LEASING OFFICE	950	---	---	950	---	---
TOTAL	140,850	138,920	66,815	346,585 SF		

REFERENCE SITE PLAN

DESCRIPTION	NUMBER	AREA (SF)	TOTAL AREA (SF)	TOTAL UNITS PER BLDG. TYPE	
GARAGES	10	1,300	13,300	18	
8-CAR CARPORTS	26	1,224	3,184	18	
TRASH COMPACTOR	8	237	1,936	27	
TRASH ENCLOSURE	1	358	358	3	
TOTAL			63,802 SF		
BUILDING TYPE	STORIES	1-BDR	2-BDR	3-BDR	TOTAL UNITS FOR PROJECT
1A	TWO	8	8	2	18
1B	TWO	8	8	2	18
2	THREE	12	12	3	27
BUILDING TYPE	AMOUNT	1-BDR	2-BDR	3-BDR	TOTAL UNITS FOR PROJECT
1A	4	32	32	8	---
1B	7	84	84	21	---
2	2	140	140	35	100.0%
TOTALS PROJECT MIX	---	44.4%	44.4%	315	100.0%

FIGURE 2 | SITE PLAN
TRAFFIC IMPACT STUDY
 The Terraces of Lafayette
 City of Lafayette

Abrams Associates
 TRAFFIC ENGINEERING, INC.

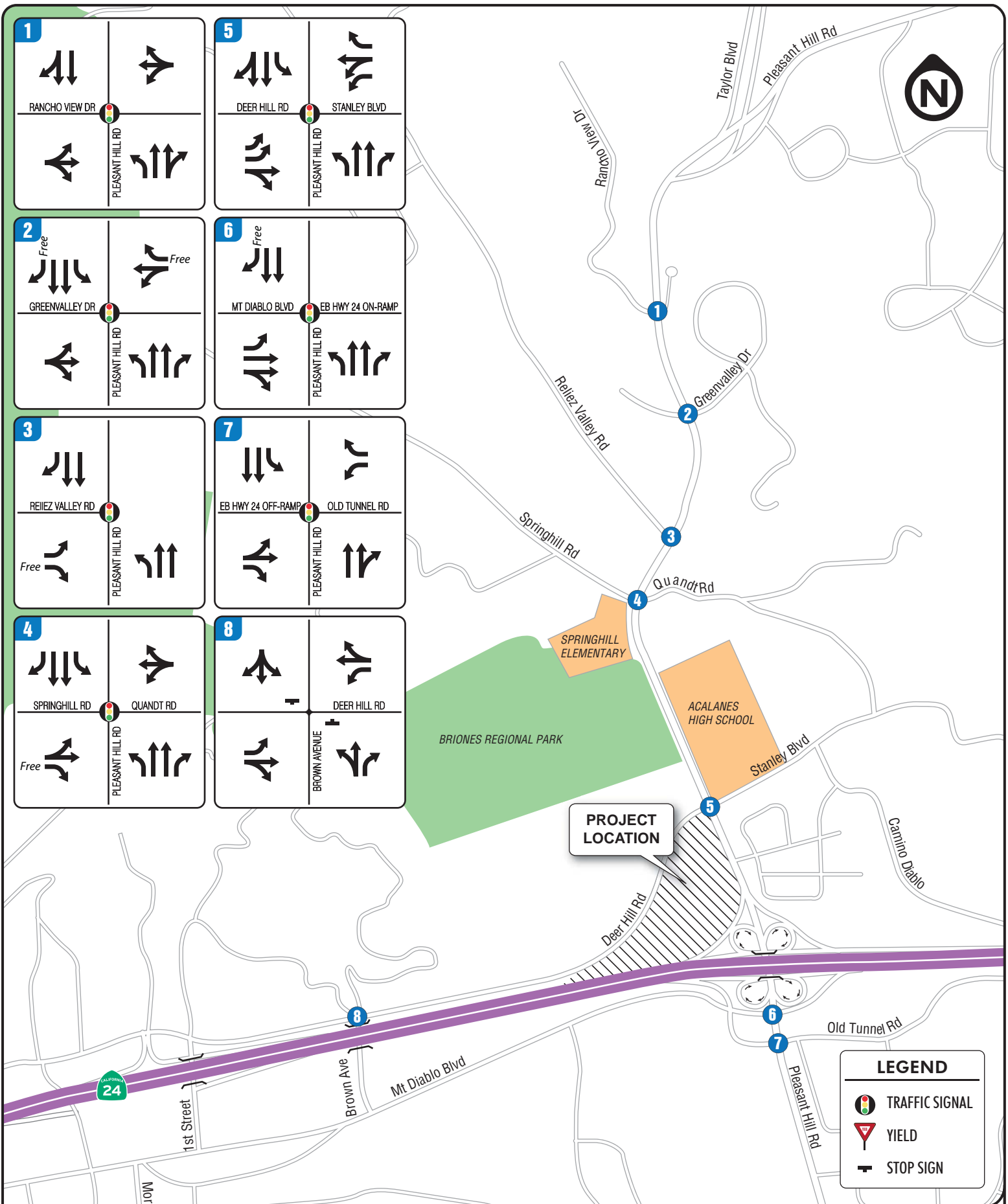


FIGURE 3 | EXISTING LANE CONFIGURATIONS
TRAFFIC IMPACT STUDY
 The Terraces of Lafayette
 City of Lafayette

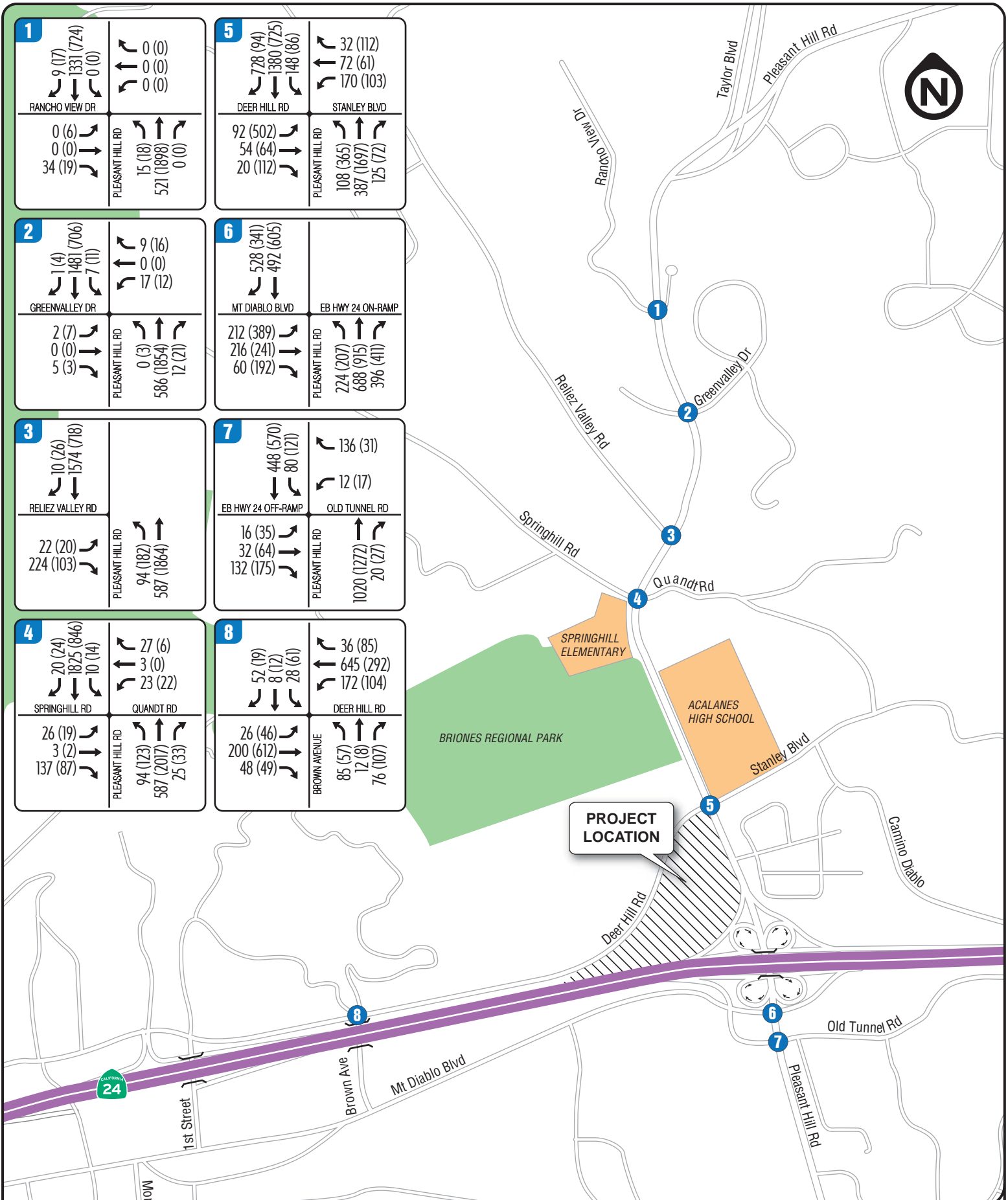


FIGURE 4 | EXISTING AM (PM) PEAK HOUR VOLUMES
TRAFFIC IMPACT STUDY
 The Terraces of Lafayette
 City of Lafayette

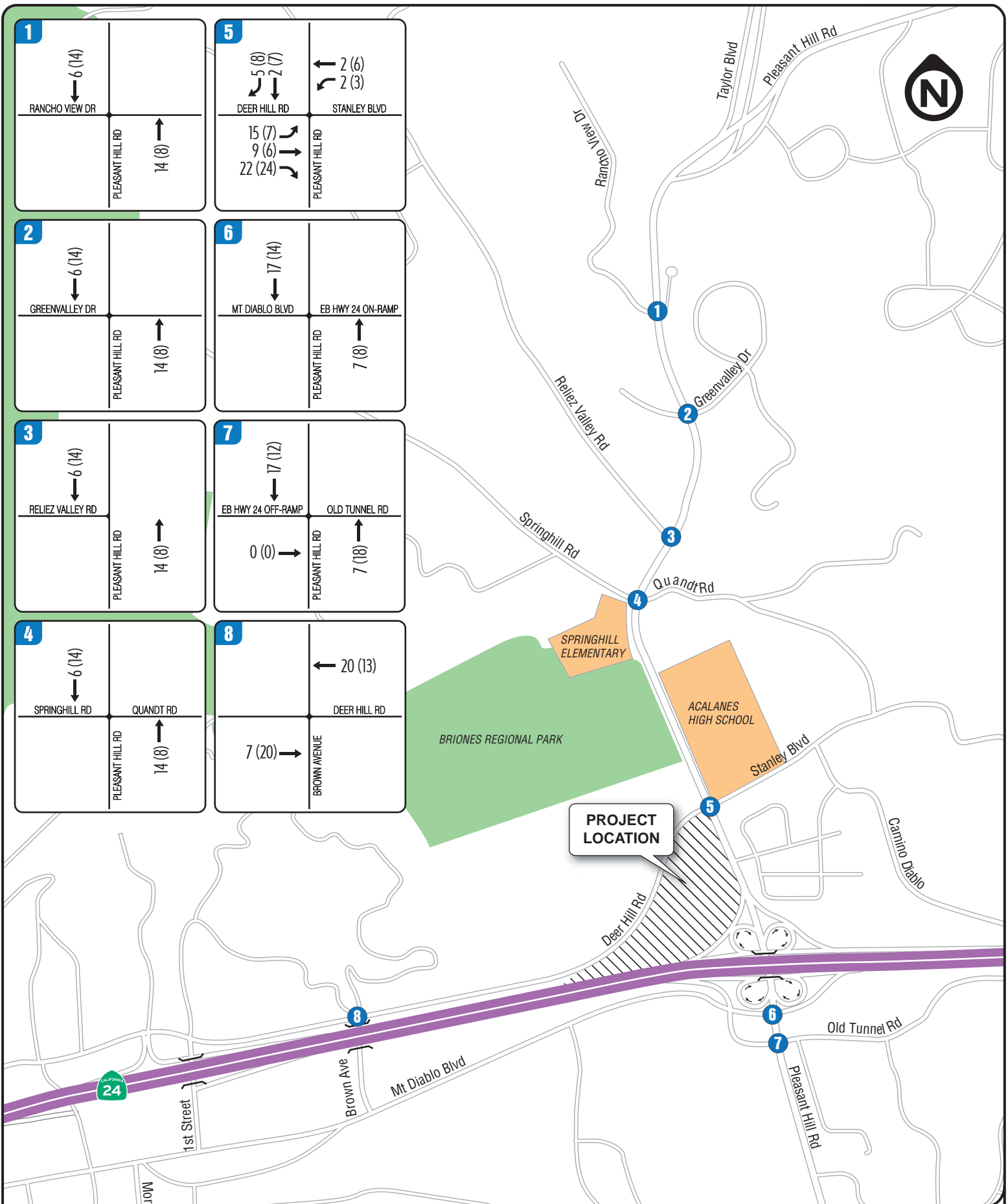


FIGURE 5 | PROJECT TRIP GENERATION
TRAFFIC IMPACT STUDY
 The Terraces of Lafayette
 City of Lafayette

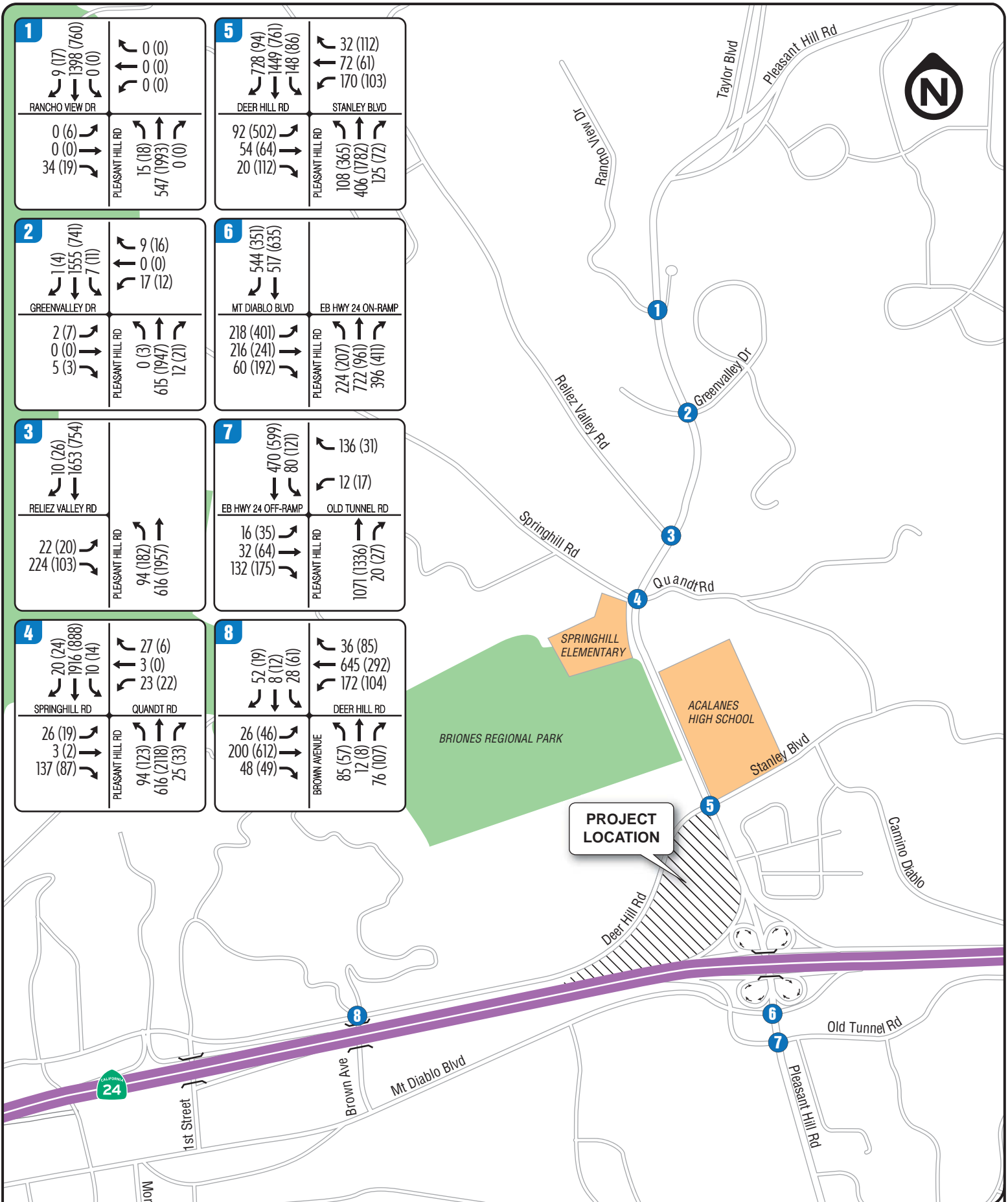


FIGURE 6 | BASELINE AM (PM) PEAK HOUR VOLUMES
TRAFFIC IMPACT STUDY
 The Terraces of Lafayette
 City of Lafayette

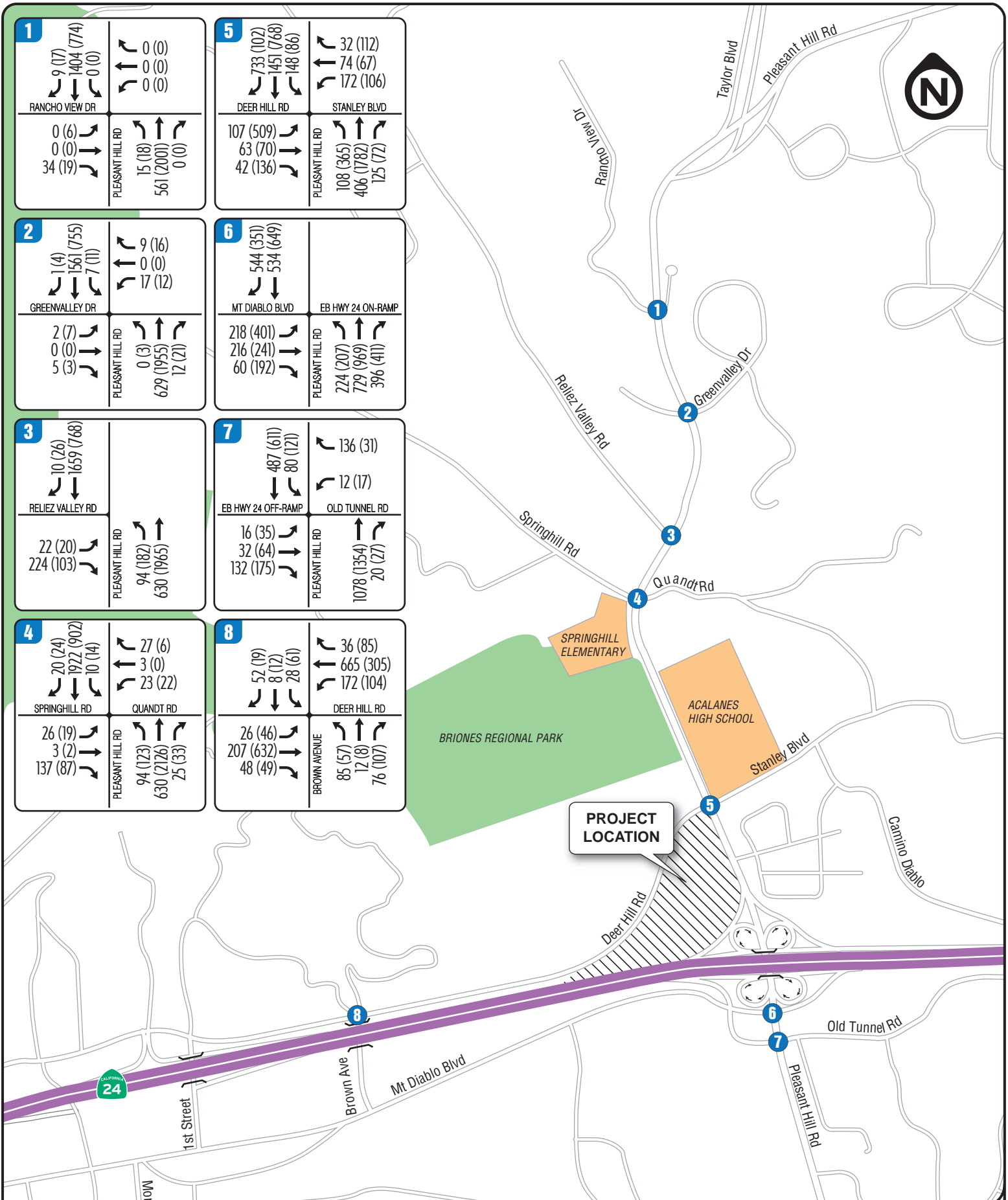


FIGURE 7 | BASELINE PLUS PROJECT AM (PM) PEAK HOUR VOLUMES

TRAFFIC IMPACT STUDY

The Terraces of Lafayette
City of Lafayette

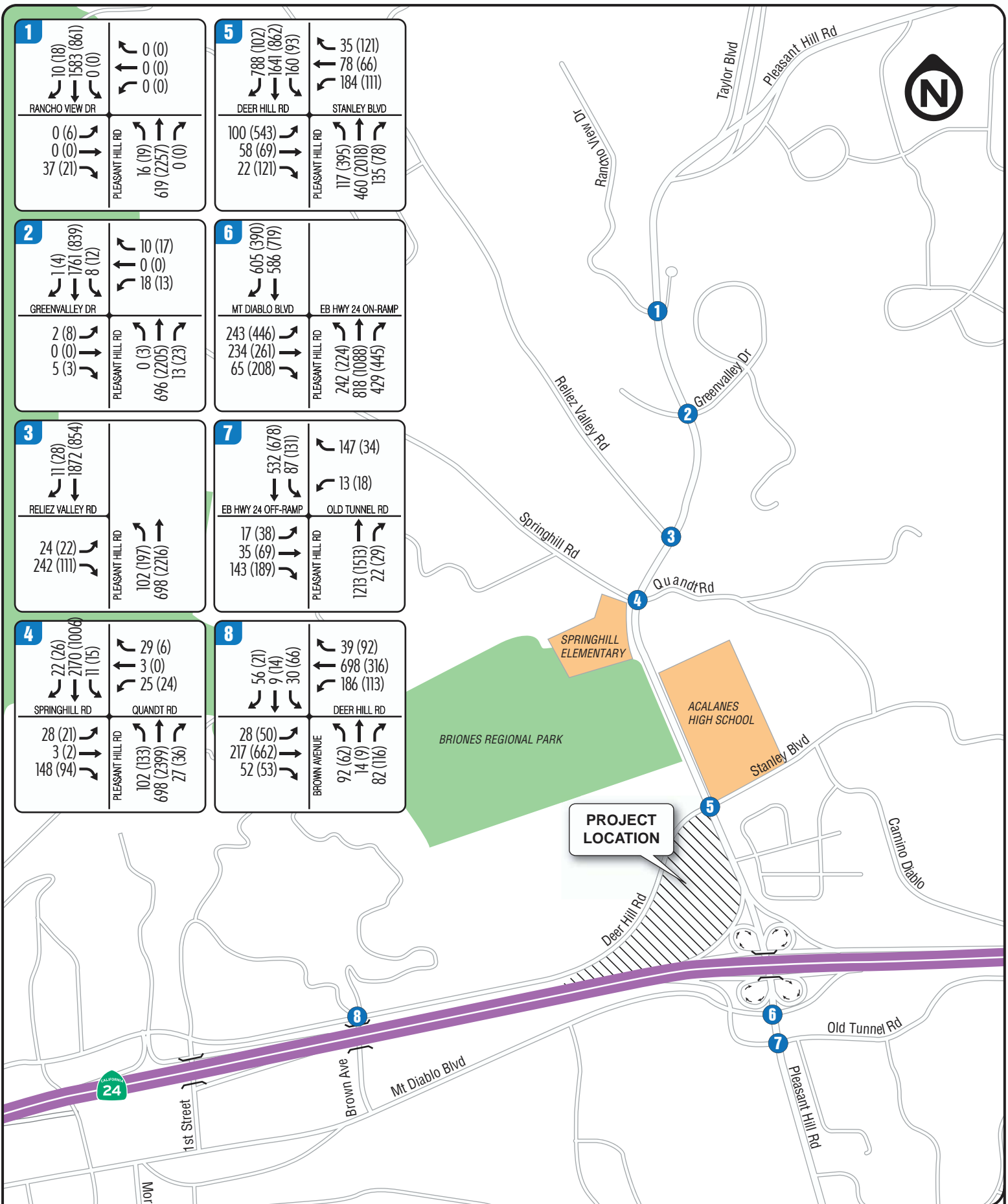


FIGURE 8 | CUMULATIVE AM (PM) PEAK HOUR VOLUMES
TRAFFIC IMPACT STUDY
 The Terraces of Lafayette
 City of Lafayette

TECHNICAL APPENDIX

THE TERRACES OF LAFAYETTE

Prepared by:
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Abrams Associates
TRAFFIC ENGINEERING, INC.

June, 2011

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Road

Existing AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		0.95		0.95		1.00		0.95	
Flt	0.86		1.00		1.00		1.00		1.00		1.00	
Flt Protected	1.00		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (prot)	1611		1770		3539		3536		3536		3536	
Flt Permitted	1.00		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (perm)	1611		1770		3539		3536		3536		3536	
Volume (vph)	0	0	34	0	0	0	15	521	0	0	1331	9
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	37	0	0	0	16	566	0	0	1447	10
RTOR Reduction (vph)	0	36	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1	0	0	0	0	16	566	0	0	1457	0
Turn Type	Prot		Prot		Prot		Prot		Prot		Prot	
Protected Phases	7	4	3		8	5		2	6			
Permitted Phases												
Actuated Green, G (s)	3.3		3.1		98.7		91.6		91.6		91.6	
Effective Green, g (s)	3.3		3.1		98.7		91.6		91.6		91.6	
Actuated g/C Ratio	0.03		0.03		0.90		0.83		0.83		0.83	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	48		50		3175		2945		2945		2945	
v/s Ratio Prot	c0.02		c0.01		0.16		c0.41		c0.41		c0.41	
v/s Ratio Perm												
v/c Ratio	0.02		0.32		0.18		0.49		0.49		0.49	
Uniform Delay, d1	51.8		52.4		0.7		2.6		2.6		2.6	
Progression Factor	1.00		0.81		0.73		1.00		1.00		1.00	
Incremental Delay, d2	0.2		3.6		0.1		0.6		0.6		0.6	
Delay (s)	52.0		46.3		0.6		3.2		3.2		3.2	
Level of Service	D		D		A		A		A		A	
Approach Delay (s)	52.0		0.0		1.9		3.2		3.2		3.2	
Approach LOS	D		A		A		A		A		A	
Intersection Summary												
HCM Average Control Delay	3.7		HCM Level of Service		A		A		A		A	
HCM Volume to Capacity ratio	0.50		Sum of lost time (s)		12.0		8.0		8.0		8.0	
Actuated Cycle Length (s)	110.0		ICU Level of Service		A		A		A		A	
Intersection Capacity Utilization	47.1%		Analysis Period (min)		15		15		15		15	
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Green Valley Drive & Pleasant Hill Road

Existing AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		1.00		0.95		1.00		0.95	
Flt	0.90		1.00		0.85		1.00		0.85		1.00	
Flt Protected	0.99		0.95		1.00		1.00		0.95		1.00	
Satd. Flow (prot)	1659		1770		1583		3539		1583		1583	
Flt Permitted	0.96		0.75		1.00		1.00		0.95		1.00	
Satd. Flow (perm)	1618		1403		1583		3539		1583		1583	
Volume (vph)	2	0	5	17	0	9	0	586	12	7	1481	1
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	0	5	18	0	10	0	637	13	8	1610	1
RTOR Reduction (vph)	0	4	0	0	0	8	0	0	4	0	0	0
Lane Group Flow (vph)	0	3	0	0	18	2	0	637	9	8	1610	1
Turn Type	Prot		Prot		Perm		Prot		Perm		Perm	
Protected Phases	7	4	3		8	5		2	1		6	
Permitted Phases					8		2		2		6	
Actuated Green, G (s)	16.8		16.8		16.8		80.0		80.0		85.2	
Effective Green, g (s)	16.8		16.8		16.8		80.0		80.0		85.2	
Actuated g/C Ratio	0.15		0.15		0.15		0.73		0.73		0.77	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	247		214		242		2574		1151		1226	
v/s Ratio Prot	0.00		c0.01		0.01		0.18		0.01		c0.45	
v/s Ratio Perm	0.01		0.08		0.01		0.25		0.01		0.00	
v/c Ratio	0.01		0.08		0.01		0.25		0.01		0.00	
Uniform Delay, d1	39.6		40.0		39.5		5.0		4.1		5.1	
Progression Factor	1.00		1.00		1.00		1.24		1.84		0.68	
Incremental Delay, d2	0.0		0.2		0.0		0.2		0.0		0.0	
Delay (s)	39.6		40.2		39.5		6.4		7.6		4.4	
Level of Service	D		D		D		A		A		A	
Approach Delay (s)	39.6		39.9		6.4		4.7		4.7		4.7	
Approach LOS	D		D		A		A		A		A	
Intersection Summary												
HCM Average Control Delay	5.7		HCM Level of Service		A		A		A		A	
HCM Volume to Capacity ratio	0.50		Sum of lost time (s)		8.0		8.0		8.0		8.0	
Actuated Cycle Length (s)	110.0		ICU Level of Service		A		A		A		A	
Intersection Capacity Utilization	50.9%		Analysis Period (min)		15		15		15		15	
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
3: Reliez Valley Road & Pleasant Hill Road

Existing AM
6/17/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕	↕	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	22	224	94	587	1574	10
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	243	102	638	1711	11
RTOR Reduction (vph)	0	180	0	0	0	3
Lane Group Flow (vph)	24	63	102	638	1711	8
Turn Type	Perm	Perm	Prot		Perm	
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	10.1	10.1	11.2	91.9	76.7	76.7
Effective Green, g (s)	10.1	10.1	11.2	91.9	76.7	76.7
Actuated g/C Ratio	0.09	0.09	0.10	0.84	0.70	0.70
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	163	145	180	2957	2468	1104
v/s Ratio Prot	0.01		c0.06	0.18	c0.48	
v/s Ratio Perm		0.15				0.01
v/c Ratio	0.15	0.44	0.57	0.22	0.69	0.01
Uniform Delay, d1	46.0	47.3	47.1	1.8	9.8	5.1
Progression Factor	1.00	1.00	0.99	0.93	0.67	0.85
Incremental Delay, d2	0.4	2.1	4.0	0.2	1.4	0.0
Delay (s)	46.4	49.3	50.7	1.9	7.9	4.3
Level of Service	D	D	D	A	A	A
Approach Delay (s)	49.1			8.6	7.9	
Approach LOS	D			A	A	
Intersection Summary						
HCM Average Control Delay			12.1		HCM Level of Service	B
HCM Volume to Capacity ratio			0.78			
Actuated Cycle Length (s)			110.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			64.0%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
4: Spring Hill Road & Pleasant Hill Road

Existing AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↕	↕	↔	↕	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.85	0.93	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.96	1.00	0.98	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1782	1583	1698	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.74	1.00	0.85	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1378	1583	1473	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	26	3	137	23	3	27	94	587	25	10	1825	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	3	149	25	3	29	102	638	27	11	1984	22
RTOR Reduction (vph)	0	0	108	0	27	0	0	0	5	0	0	6
Lane Group Flow (vph)	0	31	41	0	30	0	102	638	22	11	1984	16
Turn Type	Perm	Perm	Perm	Perm	Prot	Perm	Prot	Prot	Perm	Prot	Perm	Perm
Protected Phases		4		8		5	2		2	1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	8.9	8.9	8.9	10.3	87.9	87.9	1.2	78.8	78.8			
Effective Green, g (s)	8.9	8.9	8.9	10.3	87.9	87.9	1.2	78.8	78.8			
Actuated g/C Ratio	0.08	0.08	0.08	0.09	0.80	0.80	0.01	0.72	0.72			
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	111	128	119	166	2828	1265	19	2535	1134			
v/s Ratio Prot				c0.06	0.18		0.01	c0.56				
v/s Ratio Perm	0.02	0.09	0.04			0.02			0.01			
v/c Ratio	0.28	0.32	0.26	0.61	0.23	0.02	0.58	0.78	0.01			
Uniform Delay, d1	47.5	47.7	47.4	47.9	2.7	2.3	54.1	10.1	4.5			
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.30	0.23	0.05			
Incremental Delay, d2	1.4	1.5	1.1	6.6	0.2	0.0	28.2	1.9	0.0			
Delay (s)	48.9	49.2	48.6	54.5	2.9	2.3	98.6	4.2	0.2			
Level of Service	D	D	D	D	A	A	F	A	A			
Approach Delay (s)	49.1		48.6		9.7			4.7				
Approach LOS	D		D		A			A				
Intersection Summary												
HCM Average Control Delay			9.4		HCM Level of Service	A						
HCM Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			110.0		Sum of lost time (s)	12.0						
Intersection Capacity Utilization			75.4%		ICU Level of Service	D						
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Existing AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1787		1681	1733	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1787		1681	1733	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	92	54	20	170	72	32	108	387	125	148	1380	728
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	100	59	22	185	78	35	117	421	136	161	1500	791
RTOR Reduction (vph)	0	14	0	0	0	31	0	0	68	0	0	308
Lane Group Flow (vph)	100	67	0	128	135	4	117	421	68	161	1500	483
Turn Type	Split		Split		Perm		Prot		Perm		Perm	
Protected Phases	4	4	8		8	5		2	1		6	
Permitted Phases					8		2				6	
Actuated Green, G (s)	9.4	9.4	13.5	13.5	13.5	9.6	53.5	53.5	14.6	58.5	58.5	
Effective Green, g (s)	9.4	9.4	13.5	13.5	13.5	9.6	53.5	53.5	14.6	58.5	58.5	
Actuated g/C Ratio	0.09	0.09	0.13	0.13	0.13	0.09	0.50	0.50	0.14	0.55	0.55	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	302	157	212	219	200	159	1770	792	242	1935	865	
v/s Ratio Prot	0.03	c0.05	0.08	c0.08		0.07	0.12		c0.09	0.42		
v/s Ratio Perm					0.02			0.09				0.50
v/c Ratio	0.33	0.43	0.60	0.62	0.02	0.74	0.24	0.09	0.67	0.78	0.56	
Uniform Delay, d1	45.8	46.3	44.2	44.3	41.0	47.5	15.2	14.0	43.9	19.1	15.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	1.9	4.8	5.1	0.0	16.2	0.3	0.2	6.7	3.1	2.6	
Delay (s)	46.5	48.1	49.0	49.4	41.0	63.6	15.5	14.2	50.6	22.2	18.4	
Level of Service	D	D	D	D	D	E	B	B	D	C	B	
Approach Delay (s)	47.2		48.2		23.6		22.8					
Approach LOS	D		D		C		C					

Intersection Summary			
HCM Average Control Delay	26.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	107.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Blvd & Pleasant Hill Road

Existing AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3424		1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3424		1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	212	216	60	0	0	0	224	688	396	0	492	528
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	230	235	65	0	0	0	243	748	430	0	535	574
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	80	0	0	312
Lane Group Flow (vph)	230	274	0	0	0	0	243	748	350	0	535	262
Turn Type	Prot		Prot		Perm		Prot		Perm		Perm	
Protected Phases	7	4			5		2			6		
Permitted Phases					2						6	
Actuated Green, G (s)	18.8	18.8			29.0		83.2			50.2		
Effective Green, g (s)	18.8	18.8			29.0		83.2			50.2		
Actuated g/C Ratio	0.17	0.17			0.26		0.76			0.46		
Clearance Time (s)	4.0	4.0			4.0		4.0			4.0		
Vehicle Extension (s)	3.0	3.0			3.0		3.0			3.0		
Lane Grp Cap (vph)	303	585			467		2677			1615		
v/s Ratio Prot	c0.13	0.09			c0.14		0.21			0.15		
v/s Ratio Perm							0.27			0.36		
v/c Ratio	0.76	0.47			0.52		0.28			0.33		
Uniform Delay, d1	43.4	41.1			34.6		4.1			19.1		
Progression Factor	1.00	1.00			0.99		0.77			1.00		
Incremental Delay, d2	10.4	0.6			1.0		0.3			0.6		
Delay (s)	53.9	41.7			35.3		3.4			19.7		
Level of Service	D	D			D		A			B		
Approach Delay (s)	47.0				0.0		8.5			20.3		
Approach LOS	D				A		A			C		

Intersection Summary			
HCM Average Control Delay	19.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: EB 24 Off Ramp & Pleasant Hill Road

Existing AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Frt	1.00	0.85	1.00	0.85	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.98	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1833	1583	1770	1583	1583	1583	3529	3529	1770	1770	3539	3539
Flt Permitted	0.98	1.00	0.72	1.00	1.00	1.00	1.00	0.24	1.00	0.24	1.00	1.00
Satd. Flow (perm)	1833	1583	1347	1583	1583	1583	3529	3529	446	446	3539	3539
Volume (vph)	16	32	132	12	0	136	0	1020	20	80	448	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	35	143	13	0	148	0	1109	22	87	487	0
RTOR Reduction (vph)	0	0	131	0	0	96	0	0	0	0	0	0
Lane Group Flow (vph)	0	52	12	13	0	52	0	1131	0	87	487	0
Turn Type	Perm	Perm	custom	custom	custom	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4			8			2			6		
Permitted Phases	4			8			6			6		
Actuated Green, G (s)	9.1	9.1	9.1	9.1	9.1	9.1	92.9	92.9	92.9	92.9	92.9	92.9
Effective Green, g (s)	9.1	9.1	9.1	9.1	9.1	9.1	92.9	92.9	92.9	92.9	92.9	92.9
Actuated g/C Ratio	0.08	0.08	0.08	0.08	0.08	0.08	0.84	0.84	0.84	0.84	0.84	0.84
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	152	131	111	131	131	131	2980	2980	377	377	2989	2989
v/s Ratio Prot	0.03			0.09			0.01			0.09		
v/c Ratio	0.34	0.09	0.12	0.39	0.38	0.23	0.16	0.20	0.23	0.16	0.16	0.16
Uniform Delay, d1	47.6	46.6	46.7	47.8	2.0	1.7	1.5	1.7	1.5	1.5	1.5	1.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.75	1.75	1.75	1.75	1.75	1.75
Incremental Delay, d2	1.3	0.3	0.5	2.0	0.4	1.4	0.1	0.4	1.4	0.1	0.1	0.1
Delay (s)	49.0	46.9	47.2	49.8	2.3	4.3	0.7	2.3	4.3	0.7	0.7	0.7
Level of Service	D	D	D	D	A	A	A	A	A	A	A	A
Approach Delay (s)	47.5			49.6			2.3			1.3		
Approach LOS	D			D			A			A		
Intersection Summary												
HCM Average Control Delay	10.0			HCM Level of Service			A					
HCM Volume to Capacity ratio	0.45											
Actuated Cycle Length (s)	110.0			Sum of lost time (s)			8.0					
Intersection Capacity Utilization	52.5%			ICU Level of Service			A					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Avenue

Existing AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR												
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔												
Sign Control	Free			Free			Stop			Stop														
Grade	0%			0%			0%			0%														
Volume (veh/h)	26	200	48	172	645	36	85	12	76	28	8	52												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92												
Hourly flow rate (vph)	28	217	52	187	701	39	92	13	83	30	9	57												
Pedestrians																								
Lane Width (ft)																								
Walking Speed (ft/s)																								
Percent Blockage																								
Right turn flare (veh)																								
Median type	None						None																	
Median storage (veh)																								
Upstream signal (ft)																								
pX, platoon unblocked																								
vC, conflicting volume	740			270			1436			1414			243			1375			1421			721		
vC1, stage 1 conf vol																								
vC2, stage 2 conf vol																								
vCu, unblocked vol	740			270			1436			1414			243			1375			1421			721		
tC, single (s)	4.1			4.1			7.1			6.5			6.2			7.1			6.5			6.2		
tC, 2 stage (s)																								
tF (s)	2.2			2.2			3.5			4.0			3.3			3.5			4.0			3.3		
p0 queue free %	97			86			0			89			90			65			92			87		
cM capacity (veh/h)	866			1294			79			114			795			87			113			428		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1																	
Volume Total	28	270	187	740	105	83	96																	
Volume Left	28	0	187	0	92	0	30																	
Volume Right	0	52	0	39	0	83	57																	
cSH	866	1700	1294	1700	82	795	171																	
Volume to Capacity	0.03	0.16	0.14	0.44	1.28	0.10	0.56																	
Queue Length (ft)	3	0	13	0	198	9	73																	
Control Delay (s)	9.3	0.0	8.3	0.0	284.5	10.1	49.7																	
Lane LOS	A	A	A	F	B	E	E																	
Approach Delay (s)	0.9			1.7			163.9			49.7														
Approach LOS	D			D			F			E														
Intersection Summary																								
Average Delay	24.8																							
Intersection Capacity Utilization	61.5%			ICU Level of Service			B																	
Analysis Period (min)	15																							

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Road

Existing PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		0.95		1.00		0.95		1.00	
Frt	0.90		1.00		1.00		1.00		1.00		1.00	
Flt Protected	0.99		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (prot)	1653		1770		3539		3527		3527		3527	
Flt Permitted	0.96		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (perm)	1602		1770		3539		3527		3527		3527	
Volume (vph)	6	0	19	0	0	0	18	1898	0	0	724	17
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	0	21	0	0	0	20	2063	0	0	787	18
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	10	0	0	0	0	20	2063	0	0	804	0
Turn Type	Prot		Prot		Prot		Prot		Prot		Prot	
Protected Phases	7	4	3		8	5		2	6			
Permitted Phases												
Actuated Green, G (s)	18.0		2.8		84.0		77.2		77.2		77.2	
Effective Green, g (s)	18.0		2.8		84.0		77.2		77.2		77.2	
Actuated g/C Ratio	0.16		0.03		0.76		0.70		0.70		0.70	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	262		45		2703		2475		2475		2475	
v/s Ratio Prot			0.01		c0.58		0.23		0.23		0.23	
v/s Ratio Perm	c0.02											
v/c Ratio	0.04		0.44		0.76		0.32		0.32		0.32	
Uniform Delay, d1	38.7		52.8		7.4		6.3		6.3		6.3	
Progression Factor	1.00		0.96		0.86		1.00		1.00		1.00	
Incremental Delay, d2	0.1		4.7		1.4		0.3		0.3		0.3	
Delay (s)	38.8		55.5		7.8		6.7		6.7		6.7	
Level of Service	D		E		A		A		A		A	
Approach Delay (s)	38.8		0.0		8.3		6.7		6.7		6.7	
Approach LOS	D		A		A		A		A		A	
Intersection Summary												
HCM Average Control Delay	8.1		HCM Level of Service		A		A		A		A	
HCM Volume to Capacity ratio	0.65		Sum of lost time (s)		8.0		8.0		8.0		8.0	
Actuated Cycle Length (s)	110.0		ICU Level of Service		B		B		B		B	
Intersection Capacity Utilization	62.5%		Analysis Period (min)		15		15		15		15	
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Green Valley Drive & Pleasant Hill Road

Existing PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		1.00		0.95		1.00		0.95	
Frt	0.96		1.00		0.85		1.00		0.85		1.00	
Flt Protected	0.96		0.95		1.00		0.95		1.00		0.95	
Satd. Flow (prot)	1731		1770		1583		1770		3539		1583	
Flt Permitted	0.88		0.75		1.00		0.95		1.00		0.95	
Satd. Flow (perm)	1580		1398		1583		1770		3539		1583	
Volume (vph)	7	0	3	12	0	16	3	1854	21	11	706	4
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	0	3	13	0	17	3	2015	23	12	767	4
RTOR Reduction (vph)	0	3	0	0	0	14	0	0	5	0	0	1
Lane Group Flow (vph)	0	8	0	0	13	3	3	2015	18	12	767	3
Turn Type	Prot		Prot		Perm		Prot		Perm		Perm	
Protected Phases	7	4	3		8	5		2	1		6	
Permitted Phases					8		2		2		6	
Actuated Green, G (s)	16.8		16.8		16.8		1.2		80.0		80.0	
Effective Green, g (s)	16.8		16.8		16.8		1.2		80.0		80.0	
Actuated g/C Ratio	0.15		0.15		0.15		0.01		0.73		0.73	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	241		214		242		19		2574		1151	
v/s Ratio Prot			0.01		0.01		0.00		c0.57		0.22	
v/s Ratio Perm	0.01		0.01		0.01		0.01		0.01		0.00	
v/c Ratio	0.04		0.06		0.01		0.16		0.78		0.02	
Uniform Delay, d1	39.7		39.9		39.5		53.9		9.5		4.1	
Progression Factor	1.00		1.00		1.00		1.09		0.82		0.89	
Incremental Delay, d2	0.1		0.1		0.0		2.9		1.8		0.0	
Delay (s)	39.8		40.0		39.6		61.4		9.6		3.7	
Level of Service	D		D		E		A		A		F	
Approach Delay (s)	39.8		39.7		9.6		5.4		5.4		5.4	
Approach LOS	D		D		A		A		A		A	
Intersection Summary												
HCM Average Control Delay	8.9		HCM Level of Service		A		A		A		A	
HCM Volume to Capacity ratio	0.66		Sum of lost time (s)		12.0		12.0		12.0		12.0	
Actuated Cycle Length (s)	110.0		ICU Level of Service		C		C		C		C	
Intersection Capacity Utilization	67.9%		Analysis Period (min)		15		15		15		15	
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
3: Reliez Valley Road & Pleasant Hill Road

Existing PM
6/17/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕	↕	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	20	103	182	1864	718	26
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	112	198	2026	780	28
RTOR Reduction (vph)	0	105	0	0	0	10
Lane Group Flow (vph)	22	7	198	2026	780	18
Turn Type	Perm		Prot		Perm	
Protected Phases	4		5		2 6	
Permitted Phases	4					
Actuated Green, G (s)	7.3	7.3	19.7	94.7	71.0	71.0
Effective Green, g (s)	7.3	7.3	19.7	94.7	71.0	71.0
Actuated g/C Ratio	0.07	0.07	0.18	0.86	0.65	0.65
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	117	105	317	3047	2284	1022
v/s Ratio Prot	0.01		0.11	c0.57	0.22	
v/s Ratio Perm		0.07				0.02
v/c Ratio	0.19	0.07	0.62	0.66	0.34	0.02
Uniform Delay, d1	48.5	48.2	41.7	2.5	8.9	7.0
Progression Factor	1.00	1.00	1.00	1.00	1.33	2.64
Incremental Delay, d2	0.8	0.3	3.8	1.2	0.4	0.0
Delay (s)	49.3	48.5	45.5	3.7	12.2	18.5
Level of Service	D	D	D	A	B	B
Approach Delay (s)	48.6		7.4		12.4	
Approach LOS	D		A		B	
Intersection Summary						
HCM Average Control Delay			10.4	HCM Level of Service		B
HCM Volume to Capacity ratio			0.69			
Actuated Cycle Length (s)			110.0	Sum of lost time (s)		8.0
Intersection Capacity Utilization			61.5%	ICU Level of Service		B
Analysis Period (min)	15					
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
4: Spring Hill Road & Pleasant Hill Road

Existing PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85		0.97		1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.96	1.00		0.96		0.95	1.00	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1781	1583		1739		1770	3539	1583	1770	3539	1583	1583
Flt Permitted	0.80	1.00		0.76		0.95	1.00	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1483	1583		1371		1770	3539	1583	1770	3539	1583	1583
Volume (vph)	19	2	87	22	0	6	123	2017	33	14	846	24
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	2	95	24	0	7	134	2192	36	15	920	26
RTOR Reduction (vph)	0	0	90	0	7	0	0	0	5	0	0	7
Lane Group Flow (vph)	0	23	5	0	24	0	134	2192	31	15	920	19
Turn Type	Perm		Perm		Perm		Prot		Perm		Perm	
Protected Phases	4		4		8		5		2		1 6	
Permitted Phases	4											
Actuated Green, G (s)	8.1		8.1		8.1		25.4		126.7		104.5	
Effective Green, g (s)	8.1		8.1		8.1		25.4		126.7		104.5	
Actuated g/C Ratio	0.05		0.05		0.05		0.17		0.84		0.70	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	80		85		74		300		2989		1103	
v/s Ratio Prot							0.08		c0.62		0.01 c0.26	
v/s Ratio Perm	0.02		0.06		0.02				0.02		0.02	
v/c Ratio	0.29		0.06		0.33		0.45		0.73		0.39 0.37 0.02	
Uniform Delay, d1	68.2		67.3		68.3		56.0		4.8		72.4 9.3 7.0	
Progression Factor	1.00		1.00		1.00		0.78		0.06		0.00 1.00 1.00	
Incremental Delay, d2	2.0		0.3		2.6		0.4		0.7		0.0 6.6 0.4 0.0	
Delay (s)	70.2		67.6		70.9		44.0		1.0		0.0 79.1 9.8 7.0	
Level of Service	E		E		E		D		A		A A A	
Approach Delay (s)	68.1		70.9		3.4		10.8					
Approach LOS	E		E		A		B					
Intersection Summary												
HCM Average Control Delay			8.2		HCM Level of Service		A					
HCM Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			150.0		Sum of lost time (s)		12.0					
Intersection Capacity Utilization			77.3%		ICU Level of Service		D					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Existing PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1685		1681	1746	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1685		1681	1746	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	502	64	112	103	61	112	365	1697	72	86	725	94
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	546	70	122	112	66	122	397	1845	78	93	788	102
RTOR Reduction (vph)	0	42	0	0	0	97	0	0	21	0	0	62
Lane Group Flow (vph)	546	150	0	87	91	25	397	1845	57	93	788	40
Turn Type	Split		Split		Perm		Prot		Prot		Perm	
Protected Phases	4	4	8		8	5		2	1		6	
Permitted Phases					8		2				6	
Actuated Green, G (s)	22.0	22.0	12.6	12.6	12.6	47.0	88.4	88.4	11.0	52.4	52.4	
Effective Green, g (s)	22.0	22.0	12.6	12.6	12.6	47.0	88.4	88.4	11.0	52.4	52.4	
Actuated g/C Ratio	0.15	0.15	0.08	0.08	0.08	0.31	0.59	0.59	0.07	0.35	0.35	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	504	247	141	147	133	555	2086	933	130	1236	553	
v/s Ratio Prot	c0.16	0.11	0.05	0.05		0.22	c0.52		0.05	c0.22		
v/s Ratio Perm					0.08			0.05				0.06
v/c Ratio	1.08	0.61	0.62	0.62	0.19	0.72	0.88	0.06	0.72	0.64	0.07	
Uniform Delay, d1	64.0	60.0	66.4	66.4	63.9	45.6	26.4	13.1	68.0	40.9	32.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	0.90	0.83	1.07	0.88	0.83	1.54	
Incremental Delay, d2	64.5	4.2	7.8	7.5	0.7	4.2	5.8	0.1	16.3	2.4	0.2	
Delay (s)	128.5	64.2	74.2	73.9	64.6	45.2	27.7	14.1	76.3	36.4	50.5	
Level of Service	F	E	E	E	E	D	C	B	E	D	D	
Approach Delay (s)	111.8		70.2		30.2		41.7					
Approach LOS	F		E		C		D					
Intersection Summary												
HCM Average Control Delay	49.4		HCM Level of Service		D							
HCM Volume to Capacity ratio	0.91											
Actuated Cycle Length (s)	150.0		Sum of lost time (s)		16.0							
Intersection Capacity Utilization	83.8%		ICU Level of Service		E							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Blvd & Pleasant Hill Road

Existing PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3304		1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3304		1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	389	241	192	0	0	0	207	915	411	0	605	341
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	423	262	209	0	0	0	225	995	447	0	658	371
RTOR Reduction (vph)	0	116	0	0	0	0	0	0	140	0	0	217
Lane Group Flow (vph)	423	355	0	0	0	0	225	995	307	0	658	154
Turn Type	Prot		Prot		Perm		Prot		Perm		Perm	
Protected Phases	7	4			5		2			6		
Permitted Phases					2						6	
Actuated Green, G (s)	38.9	38.9			37.0		103.1	103.1			62.1	62.1
Effective Green, g (s)	38.9	38.9			37.0		103.1	103.1			62.1	62.1
Actuated g/C Ratio	0.26	0.26			0.25		0.69	0.69			0.41	0.41
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	459	857			437		2432	1088			1465	655
v/s Ratio Prot	c0.24	0.14			c0.13		0.28				0.19	
v/s Ratio Perm							0.28					0.23
v/c Ratio	0.92	0.41			0.51		0.41	0.28			0.45	0.23
Uniform Delay, d1	54.1	46.1			48.8		10.2	9.1			31.6	28.5
Progression Factor	1.00	1.00			0.97		0.83	0.35			0.23	0.02
Incremental Delay, d2	23.9	0.3			1.0		0.5	0.6			0.8	0.7
Delay (s)	78.0	46.4			48.0		8.9	3.8			8.1	1.2
Level of Service	E	D			D		A	A			A	A
Approach Delay (s)	61.4		0.0		12.8		5.6					
Approach LOS	E		A		B		A					
Intersection Summary												
HCM Average Control Delay	22.8		HCM Level of Service		C							
HCM Volume to Capacity ratio	0.65											
Actuated Cycle Length (s)	150.0		Sum of lost time (s)		12.0							
Intersection Capacity Utilization	59.7%		ICU Level of Service		B							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
7: EB 24 Off Ramp & Pleasant Hill Road

Existing PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95
Flt Protected	0.98	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95
Satd. Flow (prot)	1831	1583	1770	1583	1583	3528	3528	1770	3539	1770	3539	1770
Flt Permitted	0.98	1.00	0.46	1.00	1.00	1.00	1.00	0.17	1.00	0.17	1.00	0.17
Satd. Flow (perm)	1831	1583	849	1583	1583	3528	3528	322	3539	322	3539	322
Volume (vph)	35	64	175	17	0	31	0	1272	27	121	570	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	70	190	18	0	34	0	1383	29	132	620	0
RTOR Reduction (vph)	0	0	172	0	0	31	0	1	0	0	0	0
Lane Group Flow (vph)	0	108	18	18	0	3	0	1411	0	132	620	0
Turn Type	Perm	Perm	custom	custom	custom	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4			8			2			6		
Permitted Phases	4			8			6			6		
Actuated Green, G (s)	13.9			13.9			13.9			128.1		
Effective Green, g (s)	13.9			13.9			13.9			128.1		
Actuated g/C Ratio	0.09			0.09			0.09			0.85		
Clearance Time (s)	4.0			4.0			4.0			4.0		
Vehicle Extension (s)	3.0			3.0			3.0			3.0		
Lane Grp Cap (vph)	170			147			79			147		
v/s Ratio Prot	0.06			0.12			0.02			0.02		
v/c Ratio	0.64			0.12			0.23			0.02		
Uniform Delay, d1	65.6			62.4			63.1			61.9		
Progression Factor	1.00			1.00			1.00			1.00		
Incremental Delay, d2	7.5			0.4			1.5			0.1		
Delay (s)	73.2			62.8			64.5			61.9		
Level of Service	E			E			E			A		
Approach Delay (s)	66.6			62.8			62.8			3.2		
Approach LOS	E			E			E			A		
Intersection Summary												
HCM Average Control Delay	11.6			HCM Level of Service			B					
HCM Volume to Capacity ratio	0.56											
Actuated Cycle Length (s)	150.0			Sum of lost time (s)			8.0					
Intersection Capacity Utilization	64.7%			ICU Level of Service			C					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Avenue

Existing PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Volume (veh/h)	46	612	49	104	292	85	57	8	107	61	12	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	665	53	113	317	92	62	9	116	66	13	21
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	410			718			1362			1428		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	410			718			1362			1428		
tC, single (s)	4.1			4.1			7.1			6.5		
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5			4.0		
p0 queue free %	96			87			36			92		
cM capacity (veh/h)	1149			883			97			113		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1					
Volume Total	50	718	113	410	71	116	100					
Volume Left	50	0	113	0	62	0	66					
Volume Right	0	53	0	92	0	116	21					
cSH	1149	1700	883	1700	99	444	99					
Volume to Capacity	0.04	0.42	0.13	0.24	0.72	0.26	1.01					
Queue Length (ft)	3	0	11	0	92	26	155					
Control Delay (s)	8.3	0.0	9.7	0.0	103.5	16.0	172.9					
Lane LOS	A	A	A	F	C	F	F					
Approach Delay (s)	0.5			2.1			49.1			172.9		
Approach LOS	E			E			F			F		
Intersection Summary												
Average Delay	17.7											
Intersection Capacity Utilization	62.8%			ICU Level of Service			B					
Analysis Period (min)	15											

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Road

Baseline AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔		↔		↔		↔		↔	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		0.95		0.95		1.00		0.95	
Frt	0.86		1.00		1.00		1.00		1.00		1.00	
Flt Protected	1.00		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (prot)	1611		1770		3539		3536		3536		3536	
Flt Permitted	1.00		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (perm)	1611		1770		3539		3536		3536		3536	
Volume (vph)	0	0	34	0	0	0	15	547	0	0	1398	9
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	37	0	0	0	16	595	0	0	1520	10
RTOR Reduction (vph)	0	36	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1	0	0	0	0	16	595	0	0	1530	0
Turn Type	Prot		Prot		Prot		Prot		Prot		Prot	
Protected Phases	7	4	3		8	5		2	6		6	
Permitted Phases	7		4		3		8		5		2	
Actuated Green, G (s)	3.3		3.1		98.7		91.6		91.6		91.6	
Effective Green, g (s)	3.3		3.1		98.7		91.6		91.6		91.6	
Actuated g/C Ratio	0.03		0.03		0.90		0.83		0.83		0.83	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	48		50		3175		2945		2945		2945	
v/s Ratio Prot	c0.02		c0.01		0.17		c0.43		c0.43		c0.43	
v/s Ratio Perm	0.00		c0.01		0.01		0.01		0.01		0.00	
v/c Ratio	0.02		0.32		0.19		0.52		0.52		0.52	
Uniform Delay, d1	51.8		52.4		0.7		2.7		2.7		2.7	
Progression Factor	1.00		0.81		0.71		1.00		1.00		1.00	
Incremental Delay, d2	0.2		3.6		0.1		0.7		0.7		0.7	
Delay (s)	52.0		46.1		0.6		3.4		3.4		3.4	
Level of Service	D		D		A		A		A		A	
Approach Delay (s)	52.0		0.0		1.8		3.4		3.4		3.4	
Approach LOS	D		A		A		A		A		A	
Intersection Summary												
HCM Average Control Delay	3.8		HCM Level of Service		A		A		A		A	
HCM Volume to Capacity ratio	0.52		Sum of lost time (s)		12.0		8.0		8.0		8.0	
Actuated Cycle Length (s)	110.0		ICU Level of Service		A		A		A		A	
Intersection Capacity Utilization	48.9%		Analysis Period (min)		15		15		15		15	
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Green Valley Drive & Pleasant Hill Road

Baseline AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔		↔		↔		↔		↔	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		1.00		0.95		1.00		0.95	
Frt	0.90		1.00		0.85		1.00		0.85		1.00	
Flt Protected	0.99		0.95		1.00		1.00		0.95		1.00	
Satd. Flow (prot)	1659		1770		1583		3539		1583		1583	
Flt Permitted	0.96		0.75		1.00		1.00		0.95		1.00	
Satd. Flow (perm)	1618		1403		1583		3539		1583		1583	
Volume (vph)	2	0	5	17	0	9	0	615	12	7	1555	1
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	0	5	18	0	10	0	668	13	8	1690	1
RTOR Reduction (vph)	0	4	0	0	0	8	0	0	4	0	0	0
Lane Group Flow (vph)	0	3	0	0	18	2	0	668	9	8	1690	1
Turn Type	Prot		Prot		Perm		Prot		Perm		Perm	
Protected Phases	7	4	3		8	5		2	1		6	6
Permitted Phases	7		4		3		8		5		2	
Actuated Green, G (s)	16.8		16.8		16.8		80.0		80.0		85.2	
Effective Green, g (s)	16.8		16.8		16.8		80.0		80.0		85.2	
Actuated g/C Ratio	0.15		0.15		0.15		0.73		0.73		0.77	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	247		214		242		2574		1151		1226	
v/s Ratio Prot	0.00		c0.01		0.01		0.19		0.00		c0.48	
v/s Ratio Perm	0.01		c0.08		0.01		0.26		0.01		0.62	
v/c Ratio	0.01		0.08		0.01		0.26		0.01		0.62	
Uniform Delay, d1	39.6		40.0		39.5		5.0		4.1		5.4	
Progression Factor	1.00		1.00		1.00		1.25		1.85		0.68	
Incremental Delay, d2	0.0		0.2		0.0		0.2		0.0		1.0	
Delay (s)	39.6		40.2		39.5		6.5		7.6		4.6	
Level of Service	D		D		D		A		A		E	
Approach Delay (s)	39.6		39.9		6.6		5.0		5.0		5.0	
Approach LOS	D		D		A		A		A		A	
Intersection Summary												
HCM Average Control Delay	5.9		HCM Level of Service		A		A		A		A	
HCM Volume to Capacity ratio	0.53		Sum of lost time (s)		8.0		8.0		8.0		8.0	
Actuated Cycle Length (s)	110.0		ICU Level of Service		A		A		A		A	
Intersection Capacity Utilization	53.0%		Analysis Period (min)		15		15		15		15	
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
3: Reliez Valley Road & Pleasant Hill Road

Baseline AM
6/17/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	22	224	94	616	1653	10
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	243	102	670	1797	11
RTOR Reduction (vph)	0	177	0	0	0	3
Lane Group Flow (vph)	24	66	102	670	1797	8
Turn Type	Perm		Prot		Perm	
Protected Phases	4		5		2	
Permitted Phases	4		6		6	
Actuated Green, G (s)	10.2	10.2	11.2	91.8	76.6	76.6
Effective Green, g (s)	10.2	10.2	11.2	91.8	76.6	76.6
Actuated g/C Ratio	0.09	0.09	0.10	0.83	0.70	0.70
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	164	147	180	2953	2464	1102
v/s Ratio Prot	0.01		c0.06		0.19	
v/s Ratio Perm	0.15		0.23		0.01	
v/c Ratio	0.15	0.45	0.57	0.23	0.73	0.01
Uniform Delay, d1	45.9	47.2	47.1	1.9	10.3	5.1
Progression Factor	1.00	1.00	0.99	0.93	0.69	0.91
Incremental Delay, d2	0.4	2.2	4.0	0.2	1.6	0.0
Delay (s)	46.3	49.4	50.5	1.9	8.7	4.6
Level of Service	D	D	D	A	A	A
Approach Delay (s)	49.1		8.3		8.7	
Approach LOS	D		A		A	
Intersection Summary						
HCM Average Control Delay	12.4		HCM Level of Service		B	
HCM Volume to Capacity ratio	0.81		Sum of lost time (s)		12.0	
Actuated Cycle Length (s)	110.0		ICU Level of Service		C	
Intersection Capacity Utilization	66.2%		Analysis Period (min)		15	
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
4: Spring Hill Road & Pleasant Hill Road

Baseline AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	0.93	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.96	1.00	0.98	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1782	1583	1698	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.74	1.00	0.85	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1378	1583	1473	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	26	3	137	23	3	27	94	616	25	10	1916	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	3	149	25	3	29	102	670	27	11	2083	22
RTOR Reduction (vph)	0	0	108	0	27	0	0	0	5	0	0	6
Lane Group Flow (vph)	0	31	41	0	30	0	102	670	22	11	2083	16
Turn Type	Perm		Perm		Perm		Prot		Perm		Prot	
Protected Phases	4		4		8		5		2		1	
Permitted Phases	4		8		8		5		2		6	
Actuated Green, G (s)	8.9	8.9	8.9	10.3	87.9	87.9	1.2	78.8	78.8	1.2	78.8	78.8
Effective Green, g (s)	8.9	8.9	8.9	10.3	87.9	87.9	1.2	78.8	78.8	1.2	78.8	78.8
Actuated g/C Ratio	0.08	0.08	0.08	0.09	0.80	0.80	0.01	0.72	0.72	0.01	0.72	0.72
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	111	128	119	166	2828	1265	19	2535	1134	0.01	c0.59	0.01
v/s Ratio Prot	0.02		0.09		0.04		c0.06		0.19		0.01	
v/s Ratio Perm	0.28		0.32		0.26		0.61		0.24		0.02	
v/c Ratio	0.28	0.32	0.26	0.61	0.24	0.02	0.58	0.82	0.01	0.58	0.82	0.01
Uniform Delay, d1	47.5	47.7	47.4	47.9	2.7	2.3	54.1	10.8	4.5	54.1	10.8	4.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.27	0.24	0.05	1.27	0.24	0.05
Incremental Delay, d2	1.4	1.5	1.1	6.6	0.2	0.0	27.2	2.3	0.0	27.2	2.3	0.0
Delay (s)	48.9	49.2	48.6	54.5	2.9	2.3	96.1	4.9	0.2	96.1	4.9	0.2
Level of Service	D	D	D	D	A	A	F	A	A	F	A	A
Approach Delay (s)	49.1		48.6		9.5		5.3		5.3		5.3	
Approach LOS	D		D		A		A		A		A	
Intersection Summary												
HCM Average Control Delay	9.6			HCM Level of Service			A					
HCM Volume to Capacity ratio	0.83			Sum of lost time (s)			12.0					
Actuated Cycle Length (s)	110.0			ICU Level of Service			D					
Intersection Capacity Utilization	77.9%			Analysis Period (min)			15					
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Baseline AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1787		1681	1733	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1787		1681	1733	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	92	54	20	170	72	32	108	406	125	148	1449	728
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	100	59	22	185	78	35	117	441	136	161	1575	791
RTOR Reduction (vph)	0	14	0	0	0	31	0	0	68	0	0	295
Lane Group Flow (vph)	100	67	0	128	135	4	117	441	68	161	1575	496
Turn Type	Split			Split		Perm	Prot		Perm	Prot		Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			8		8		2		2		6	
Actuated Green, G (s)	9.4	9.4		13.5	13.5	13.5	9.6	53.5	53.5	14.6	58.5	58.5
Effective Green, g (s)	9.4	9.4		13.5	13.5	13.5	9.6	53.5	53.5	14.6	58.5	58.5
Actuated g/C Ratio	0.09	0.09		0.13	0.13	0.13	0.09	0.50	0.50	0.14	0.55	0.55
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	302	157		212	219	200	159	1770	792	242	1935	865
v/s Ratio Prot	0.03	c0.05		0.08	c0.08		0.07	0.12		c0.09	0.45	
v/s Ratio Perm					0.02			0.09				0.50
v/c Ratio	0.33	0.43		0.60	0.62	0.02	0.74	0.25	0.09	0.67	0.81	0.57
Uniform Delay, d1	45.8	46.3		44.2	44.3	41.0	47.5	15.3	14.0	43.9	19.8	16.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	1.9		4.8	5.1	0.0	16.2	0.3	0.2	6.7	3.9	2.8
Delay (s)	46.5	48.1		49.0	49.4	41.0	63.6	15.6	14.2	50.6	23.7	18.8
Level of Service	D	D		D	D	D	E	B	B	D	C	B
Approach Delay (s)	47.2			48.2			23.4			23.9		
Approach LOS	D			D			C			C		
Intersection Summary												
HCM Average Control Delay	26.9		HCM Level of Service				C					
HCM Volume to Capacity ratio	0.79											
Actuated Cycle Length (s)	107.0		Sum of lost time (s)				12.0					
Intersection Capacity Utilization	69.3%		ICU Level of Service				C					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Blvd & Pleasant Hill Road

Baseline AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3424		1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3424		1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	218	216	60	0	0	0	224	722	396	0	517	544
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	237	235	65	0	0	0	243	785	430	0	562	591
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	82	0	0	324
Lane Group Flow (vph)	237	274	0	0	0	0	243	785	348	0	562	267
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		5		2	2		6		6	
Permitted Phases			2		2		2		6		6	
Actuated Green, G (s)	19.3	19.3		29.0	82.7	82.7	29.0	82.7	82.7	49.7	49.7	49.7
Effective Green, g (s)	19.3	19.3		29.0	82.7	82.7	29.0	82.7	82.7	49.7	49.7	49.7
Actuated g/C Ratio	0.18	0.18		0.26	0.75	0.75	0.26	0.75	0.75	0.45	0.45	0.45
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	311	601		467	2661	1190	467	2661	1190	1599	715	715
v/s Ratio Prot	c0.13	0.09		c0.14	0.22		c0.14	0.22		0.16		
v/s Ratio Perm									0.27			0.37
v/c Ratio	0.76	0.46		0.52	0.30	0.29	0.52	0.30	0.29	0.35	0.37	0.37
Uniform Delay, d1	43.2	40.6		34.6	4.4	4.3	34.6	4.4	4.3	19.6	19.9	19.9
Progression Factor	1.00	1.00		0.99	0.76	0.39	0.99	0.76	0.39	1.00	1.00	1.00
Incremental Delay, d2	10.5	0.6		1.0	0.3	0.6	1.0	0.3	0.6	0.6	1.5	1.5
Delay (s)	53.7	41.2		35.2	3.6	2.3	35.2	3.6	2.3	20.3	21.4	21.4
Level of Service	D	D		D	A	A	D	A	A	C	C	C
Approach Delay (s)	46.7			0.0			8.5			20.8		
Approach LOS	D			A			A			C		
Intersection Summary												
HCM Average Control Delay	19.5		HCM Level of Service				B					
HCM Volume to Capacity ratio	0.72											
Actuated Cycle Length (s)	110.0		Sum of lost time (s)				12.0					
Intersection Capacity Utilization	52.8%		ICU Level of Service				A					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
7: EB 24 Off Ramp & Pleasant Hill Road

Baseline AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95
Flt Protected	0.98	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95
Satd. Flow (prot)	1833	1583	1770	1583	1583	3529	3529	1770	3539	1770	3539	1770
Flt Permitted	0.98	1.00	0.72	1.00	1.00	1.00	1.00	0.22	1.00	0.22	1.00	0.22
Satd. Flow (perm)	1833	1583	1347	1583	1583	3529	3529	418	3539	418	3539	418
Volume (vph)	16	32	132	12	0	136	0	1071	20	80	470	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	35	143	13	0	148	0	1164	22	87	511	0
RTOR Reduction (vph)	0	0	131	0	0	85	0	0	0	0	0	0
Lane Group Flow (vph)	0	52	12	13	0	63	0	1186	0	87	511	0
Turn Type	Perm	Perm	custom	custom	custom	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4			2			6			6		
Permitted Phases	4			8			6			6		
Actuated Green, G (s)	9.6			9.6			9.6			9.6		
Effective Green, g (s)	9.6			9.6			9.6			9.6		
Actuated g/C Ratio	0.09			0.09			0.09			0.09		
Clearance Time (s)	4.0			4.0			4.0			4.0		
Vehicle Extension (s)	3.0			3.0			3.0			3.0		
Lane Grp Cap (vph)	160	138	118	138	138	2964	351	2973	351	2973	351	2973
v/s Ratio Prot	0.03			0.09			0.01			0.09		
v/c Ratio	0.33			0.09			0.11			0.46		
Uniform Delay, d1	47.2			46.2			46.3			47.7		
Progression Factor	1.00			1.00			1.00			1.00		
Incremental Delay, d2	1.2			0.3			0.4			2.4		
Delay (s)	48.3			46.5			46.7			50.1		
Level of Service	D			D			D			A		
Approach Delay (s)	47.0			49.8			2.5			1.4		
Approach LOS	D			D			A			A		
Intersection Summary												
HCM Average Control Delay	9.8			HCM Level of Service			A					
HCM Volume to Capacity ratio	0.46											
Actuated Cycle Length (s)	110.0			Sum of lost time (s)			8.0					
Intersection Capacity Utilization	53.9%			ICU Level of Service			A					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Avenue

Baseline AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Volume (veh/h)	26	200	48	172	645	36	85	12	76	28	8	52
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	217	52	187	701	39	92	13	83	30	9	57
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	740			270			1436			1414		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	740			270			1436			1414		
tC, single (s)	4.1			4.1			7.1			6.5		
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5			4.0		
p0 queue free %	97			86			0			89		
cM capacity (veh/h)	866			1294			79			114		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1					
Volume Total	28	270	187	740	105	83	96					
Volume Left	28	0	187	0	92	0	30					
Volume Right	0	52	0	39	0	83	57					
cSH	866	1700	1294	1700	82	795	171					
Volume to Capacity	0.03	0.16	0.14	0.44	1.28	0.10	0.56					
Queue Length (ft)	3	0	13	0	198	9	73					
Control Delay (s)	9.3	0.0	8.3	0.0	284.5	10.1	49.7					
Lane LOS	A	A	A	A	F	B	E					
Approach Delay (s)	0.9			1.7			163.9			49.7		
Approach LOS	D			D			F			E		
Intersection Summary												
Average Delay	24.8											
Intersection Capacity Utilization	61.5%			ICU Level of Service			B					
Analysis Period (min)	15											

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Road

Baseline PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		0.95		0.95		1.00		0.95	
Frt	0.90		1.00		1.00		1.00		1.00		1.00	
Flt Protected	0.99		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (prot)	1653		1770		3539		3528		3528		3528	
Flt Permitted	0.96		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (perm)	1602		1770		3539		3528		3528		3528	
Volume (vph)	6	0	19	0	0	0	18	1993	0	0	760	17
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	0	21	0	0	0	20	2166	0	0	826	18
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	10	0	0	0	0	20	2166	0	0	843	0
Turn Type	Prot		Prot		Prot		Prot		Prot		Prot	
Protected Phases	7	4	3		8	5		2	6		6	
Permitted Phases	7		4		3		8		5		2	
Actuated Green, G (s)	18.0		2.8		84.0		77.2		77.2		77.2	
Effective Green, g (s)	18.0		2.8		84.0		77.2		77.2		77.2	
Actuated g/C Ratio	0.16		0.03		0.76		0.70		0.70		0.70	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	262		45		2703		2476		2476		2476	
v/s Ratio Prot	0.01		c0.61		0.24		0.24		0.24		0.24	
v/s Ratio Perm	c0.02		0.44		0.80		0.34		0.34		0.34	
v/c Ratio	0.04		0.06		0.01		0.16		0.82		0.02	
Uniform Delay, d1	38.7		39.9		39.5		53.9		10.2		4.1	
Progression Factor	1.00		1.00		1.08		0.81		0.89		1.10	
Incremental Delay, d2	0.1		0.1		0.0		2.8		2.2		0.0	
Delay (s)	38.8		40.0		39.6		60.7		10.5		3.7	
Level of Service	D		D		E		B		A		F	
Approach Delay (s)	38.8		39.7		39.7		10.5		5.3		5.3	
Approach LOS	D		D		D		B		A		A	
Intersection Summary												
HCM Average Control Delay	8.7		HCM Level of Service		A		A		A		A	
HCM Volume to Capacity ratio	0.68		HCM Level of Service		A		A		A		A	
Actuated Cycle Length (s)	110.0		Sum of lost time (s)		8.0		8.0		8.0		8.0	
Intersection Capacity Utilization	65.1%		ICU Level of Service		C		C		C		C	
Analysis Period (min)	15		ICU Level of Service		C		C		C		C	
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Green Valley Drive & Pleasant Hill Road

Baseline PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		1.00		0.95		1.00		0.95	
Frt	0.96		1.00		0.85		1.00		0.85		1.00	
Flt Protected	0.96		0.95		1.00		0.95		1.00		0.95	
Satd. Flow (prot)	1731		1770		1583		1770		3539		1583	
Flt Permitted	0.88		0.75		1.00		0.95		1.00		0.95	
Satd. Flow (perm)	1580		1398		1583		1770		3539		1583	
Volume (vph)	7	0	3	12	0	16	3	1947	21	11	741	4
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	0	3	13	0	17	3	2116	23	12	805	4
RTOR Reduction (vph)	0	3	0	0	0	14	0	0	5	0	0	1
Lane Group Flow (vph)	0	8	0	0	13	3	3	2116	18	12	805	3
Turn Type	Prot		Prot		Perm		Prot		Perm		Prot	
Protected Phases	7	4	3		8	5		2	1		6	
Permitted Phases	7		4		3		8		5		2	
Actuated Green, G (s)	16.8		16.8		16.8		1.2		80.0		80.0	
Effective Green, g (s)	16.8		16.8		16.8		1.2		80.0		80.0	
Actuated g/C Ratio	0.15		0.15		0.01		0.73		0.73		0.01	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	241		214		242		19		2574		1151	
v/s Ratio Prot	0.01		0.01		0.01		0.00		c0.60		c0.01	
v/s Ratio Perm	0.01		0.06		0.01		0.16		0.82		0.02	
v/c Ratio	0.04		0.06		0.01		0.16		0.82		0.02	
Uniform Delay, d1	39.7		39.9		39.5		53.9		10.2		4.1	
Progression Factor	1.00		1.00		1.08		0.81		0.89		1.10	
Incremental Delay, d2	0.1		0.1		0.0		2.8		2.2		0.0	
Delay (s)	39.8		40.0		39.6		60.7		10.5		3.7	
Level of Service	D		D		D		E		B		A	
Approach Delay (s)	39.8		39.7		39.7		10.5		5.3		5.3	
Approach LOS	D		D		D		B		A		A	
Intersection Summary												
HCM Average Control Delay	9.5		HCM Level of Service		A		A		A		A	
HCM Volume to Capacity ratio	0.69		HCM Level of Service		A		A		A		A	
Actuated Cycle Length (s)	110.0		Sum of lost time (s)		12.0		12.0		12.0		12.0	
Intersection Capacity Utilization	70.5%		ICU Level of Service		C		C		C		C	
Analysis Period (min)	15		ICU Level of Service		C		C		C		C	
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
3: Reliez Valley Road & Pleasant Hill Road

Baseline PM
6/17/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕	↕	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	20	103	182	1957	754	26
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	112	198	2127	820	28
RTOR Reduction (vph)	0	105	0	0	0	10
Lane Group Flow (vph)	22	7	198	2127	820	18
Turn Type	Perm		Prot		Perm	
Protected Phases	4		5	2	6	
Permitted Phases	4					
Actuated Green, G (s)	7.3	7.3	19.7	94.7	71.0	71.0
Effective Green, g (s)	7.3	7.3	19.7	94.7	71.0	71.0
Actuated g/C Ratio	0.07	0.07	0.18	0.86	0.65	0.65
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	117	105	317	3047	2284	1022
v/s Ratio Prot	0.01		0.11	c0.60	0.23	
v/s Ratio Perm		0.07				0.02
v/c Ratio	0.19	0.07	0.62	0.70	0.36	0.02
Uniform Delay, d1	48.5	48.2	41.7	2.7	9.0	7.0
Progression Factor	1.00	1.00	1.00	1.00	1.35	2.74
Incremental Delay, d2	0.8	0.3	3.8	1.4	0.4	0.0
Delay (s)	49.3	48.5	45.5	4.0	12.5	19.2
Level of Service	D	D	D	A	B	B
Approach Delay (s)	48.6			7.6	12.8	
Approach LOS	D			A	B	
Intersection Summary						
HCM Average Control Delay			10.6		HCM Level of Service	B
HCM Volume to Capacity ratio			0.72			
Actuated Cycle Length (s)			110.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			64.1%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
4: Spring Hill Road & Pleasant Hill Road

Baseline PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85		0.97		1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.96	1.00		0.96		0.95	1.00	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1781	1583		1739		1770	3539	1583	1770	3539	1583	1583
Flt Permitted	0.80	1.00		0.76		0.95	1.00	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1483	1583		1371		1770	3539	1583	1770	3539	1583	1583
Volume (vph)	19	2	87	22	0	6	123	2118	33	14	888	24
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	2	95	24	0	7	134	2302	36	15	965	26
RTOR Reduction (vph)	0	0	90	0	7	0	0	0	5	0	0	7
Lane Group Flow (vph)	0	23	5	0	24	0	134	2302	31	15	965	19
Turn Type	Perm		Perm		Perm		Prot		Perm		Perm	
Protected Phases	4		4		8		5		2		1	
Permitted Phases	4		4		8		5		2		1	
Actuated Green, G (s)		8.1	8.1		8.1		25.4	126.7	126.7	3.2	104.5	104.5
Effective Green, g (s)		8.1	8.1		8.1		25.4	126.7	126.7	3.2	104.5	104.5
Actuated g/C Ratio		0.05	0.05		0.05		0.17	0.84	0.84	0.02	0.70	0.70
Clearance Time (s)		4.0	4.0		4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		80	85		74		300	2989	1337	38	2466	1103
v/s Ratio Prot							0.08	c0.65		0.01	c0.27	
v/s Ratio Perm		0.02	0.06		0.02				0.02			0.02
v/c Ratio		0.29	0.06		0.33		0.45	0.77	0.02	0.39	0.39	0.02
Uniform Delay, d1		68.2	67.3		68.3		56.0	5.2	1.8	72.4	9.5	7.0
Progression Factor		1.00	1.00		1.00		0.77	0.06	0.00	1.00	1.00	1.00
Incremental Delay, d2		2.0	0.3		2.6		0.4	0.7	0.0	6.6	0.5	0.0
Delay (s)		70.2	67.6		70.9		43.7	1.0	0.0	79.1	10.0	7.0
Level of Service		E	E		E		D	A	A	E	A	A
Approach Delay (s)		68.1			70.9			3.3			10.9	
Approach LOS		E			E			A			B	
Intersection Summary												
HCM Average Control Delay					8.1					HCM Level of Service	A	
HCM Volume to Capacity ratio					0.79							
Actuated Cycle Length (s)					150.0					Sum of lost time (s)	12.0	
Intersection Capacity Utilization					80.1%					ICU Level of Service	D	
Analysis Period (min)					15							
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Baseline PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1685		1681	1746	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1685		1681	1746	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	502	64	112	103	61	112	365	1782	72	86	761	94
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	546	70	122	112	66	122	397	1937	78	93	827	102
RTOR Reduction (vph)	0	42	0	0	0	95	0	0	19	0	0	60
Lane Group Flow (vph)	546	150	0	87	91	27	397	1937	59	93	827	42
Turn Type	Split		Split		Perm		Prot		Perm		Perm	
Protected Phases	4	4	8		8	5		2	1		6	
Permitted Phases			8		8		2		2		6	
Actuated Green, G (s)	22.0	22.0	12.6	12.6	12.6	47.0	88.3	88.3	11.1	52.4	52.4	
Effective Green, g (s)	22.0	22.0	12.6	12.6	12.6	47.0	88.3	88.3	11.1	52.4	52.4	
Actuated g/C Ratio	0.15	0.15	0.08	0.08	0.08	0.31	0.59	0.59	0.07	0.35	0.35	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	504	247	141	147	133	555	2083	932	131	1236	553	
v/s Ratio Prot	c0.16	0.11	0.05	0.05		0.22	c0.55		0.05	c0.23		
v/s Ratio Perm					0.08			0.05				0.06
v/c Ratio	1.08	0.61	0.62	0.62	0.20	0.72	0.93	0.06	0.71	0.67	0.08	
Uniform Delay, d1	64.0	60.0	66.4	66.4	64.0	45.6	28.0	13.2	67.9	41.4	32.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	0.92	0.85	1.14	0.88	0.83	1.41	
Incremental Delay, d2	64.5	4.2	7.8	7.5	0.7	4.2	8.7	0.1	15.4	2.7	0.3	
Delay (s)	128.5	64.2	74.2	73.9	64.8	46.1	32.6	15.1	75.2	37.2	46.4	
Level of Service	F	E	E	E	E	D	C	B	E	D	D	
Approach Delay (s)	111.8		70.3		34.3		41.5					
Approach LOS	F		E		C		D					
Intersection Summary												
HCM Average Control Delay	51.1		HCM Level of Service		D							
HCM Volume to Capacity ratio	0.94											
Actuated Cycle Length (s)	150.0		Sum of lost time (s)		16.0							
Intersection Capacity Utilization	86.1%		ICU Level of Service		E							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Blvd & Pleasant Hill Road

Baseline PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3304		1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3304		1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	401	241	192	0	0	0	207	961	411	0	635	351
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	436	262	209	0	0	0	225	1045	447	0	690	382
RTOR Reduction (vph)	0	115	0	0	0	0	0	0	143	0	0	227
Lane Group Flow (vph)	436	356	0	0	0	0	225	1045	304	0	690	155
Turn Type	Prot		Prot		Perm		Prot		Perm		Perm	
Protected Phases	7	4			5		2			6		
Permitted Phases			2		2		2		2		6	
Actuated Green, G (s)	40.1	40.1			37.0		101.9	101.9	60.9		60.9	
Effective Green, g (s)	40.1	40.1			37.0		101.9	101.9	60.9		60.9	
Actuated g/C Ratio	0.27	0.27			0.25		0.68	0.68	0.41		0.41	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	473	883			437		2404	1075	1437		643	
v/s Ratio Prot	c0.25	0.14			c0.13		0.30		0.19			
v/s Ratio Perm								0.28			0.24	
v/c Ratio	0.92	0.40			0.51		0.43	0.28	0.48		0.24	
Uniform Delay, d1	53.4	45.1			48.8		10.9	9.5	32.9		29.3	
Progression Factor	1.00	1.00			0.96		0.83	0.32	0.25		0.05	
Incremental Delay, d2	23.5	0.3			0.9		0.5	0.6	0.9		0.7	
Delay (s)	76.9	45.4			47.9		9.6	3.7	9.2		2.1	
Level of Service	E	D			D		A	A	A		A	
Approach Delay (s)	60.6		0.0		13.1		6.6					
Approach LOS	E		A		B		A					
Intersection Summary												
HCM Average Control Delay	22.9		HCM Level of Service		C							
HCM Volume to Capacity ratio	0.67											
Actuated Cycle Length (s)	150.0		Sum of lost time (s)		12.0							
Intersection Capacity Utilization	61.2%		ICU Level of Service		B							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
7: EB 24 Off Ramp & Pleasant Hill Road

Baseline PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95
Flt Protected	0.98	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95
Satd. Flow (prot)	1831	1583	1770	1583	1583	3529	3529	1770	3539	1770	3539	1770
Flt Permitted	0.98	1.00	0.46	1.00	1.00	1.00	1.00	0.16	1.00	0.16	1.00	0.95
Satd. Flow (perm)	1831	1583	849	1583	1583	3529	3529	297	3539	297	3539	297
Volume (vph)	35	64	175	17	0	31	0	1336	27	121	599	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	70	190	18	0	34	0	1452	29	132	651	0
RTOR Reduction (vph)	0	0	172	0	0	31	0	1	0	0	0	0
Lane Group Flow (vph)	0	108	18	18	0	3	0	1480	0	132	651	0
Turn Type	Perm	Perm	custom	custom	custom	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4			8			2			6		
Permitted Phases	4	4	8	8			6			6		
Actuated Green, G (s)	13.9	13.9	13.9	13.9	13.9	128.1	128.1	128.1	128.1	128.1	128.1	128.1
Effective Green, g (s)	13.9	13.9	13.9	13.9	13.9	128.1	128.1	128.1	128.1	128.1	128.1	128.1
Actuated g/C Ratio	0.09	0.09	0.09	0.09	0.09	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	170	147	79	147	147	3014	254	3022	254	3022	254	3022
v/s Ratio Prot						0.42		0.18				
v/s Ratio Perm	0.06	0.12	0.02	0.02	0.02	c0.45		0.45				
v/c Ratio	0.64	0.12	0.23	0.02	0.02	0.49		0.52				
Uniform Delay, d1	65.6	62.4	63.1	61.9	61.9	2.8		2.9				
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.64				
Incremental Delay, d2	7.5	0.4	1.5	0.1	0.1	0.6		6.8				
Delay (s)	73.2	62.8	64.5	61.9	61.9	3.3		11.5				
Level of Service	E	E	E	E	E	A		B				
Approach Delay (s)	66.6			62.8		3.3		2.5				
Approach LOS	E			E		A		F				
Intersection Summary												
HCM Average Control Delay	11.5			HCM Level of Service			B					
HCM Volume to Capacity ratio	0.60											
Actuated Cycle Length (s)	150.0			Sum of lost time (s)			8.0					
Intersection Capacity Utilization	66.5%			ICU Level of Service			C					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Avenue

Baseline PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Volume (veh/h)	46	612	49	104	292	85	57	8	107	61	12	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	665	53	113	317	92	62	9	116	66	13	21
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						None					
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	410	718			1362			1428	692	1359	1408	364
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	410	718			1362			1428	692	1359	1408	364
tC, single (s)	4.1	4.1			7.1			6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2	2.2			3.5			4.0	3.3	3.5	4.0	3.3
p0 queue free %	96	87			36			92	74	13	89	97
cM capacity (veh/h)	1149	883			97			113	444	76	116	681
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1					
Volume Total	50	718	113	410	71	116	100					
Volume Left	50	0	113	0	62	0	66					
Volume Right	0	53	0	92	0	116	21					
cSH	1149	1700	883	1700	99	444	99					
Volume to Capacity	0.04	0.42	0.13	0.24	0.72	0.26	1.01					
Queue Length (ft)	3	0	11	0	92	26	155					
Control Delay (s)	8.3	0.0	9.7	0.0	103.5	16.0	172.9					
Lane LOS	A	A	A	F	C	F	F					
Approach Delay (s)	0.5	2.1		49.1		172.9						
Approach LOS	E	E		F		F						
Intersection Summary												
Average Delay	17.7											
Intersection Capacity Utilization	62.8%			ICU Level of Service			B					
Analysis Period (min)	15											

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Roa

Baseline + Project AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔		↔		↔		↔		↔	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		0.95		0.95		1.00		0.95	
Frt	0.86		1.00		1.00		1.00		1.00		1.00	
Flt Protected	1.00		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (prot)	1611		1770		3539		3536		3536		3536	
Flt Permitted	1.00		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (perm)	1611		1770		3539		3536		3536		3536	
Volume (vph)	0	0	34	0	0	0	15	561	0	0	1404	9
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	37	0	0	0	16	610	0	0	1526	10
RTOR Reduction (vph)	0	36	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1	0	0	0	0	16	610	0	0	1536	0
Turn Type	Prot		Prot		Prot		Prot		Prot		Prot	
Protected Phases	7	4	3		8	5		2	6		6	
Permitted Phases	7		4		3		8		5		2	
Actuated Green, G (s)	3.3		3.1		98.7		91.6		91.6		91.6	
Effective Green, g (s)	3.3		3.1		98.7		91.6		91.6		91.6	
Actuated g/C Ratio	0.03		0.03		0.90		0.83		0.83		0.83	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	48		50		3175		2945		2945		2945	
v/s Ratio Prot	c0.02		c0.01		0.17		c0.43		c0.43		c0.43	
v/s Ratio Perm	0.00		c0.01		0.01		0.01		0.01		0.00	
v/c Ratio	0.02		0.32		0.19		0.52		0.52		0.52	
Uniform Delay, d1	51.8		52.4		0.7		2.7		2.7		2.7	
Progression Factor	1.00		0.81		0.70		1.00		1.00		1.00	
Incremental Delay, d2	0.2		3.6		0.1		0.7		0.7		0.7	
Delay (s)	52.0		45.9		0.6		3.4		3.4		3.4	
Level of Service	D		D		A		A		A		A	
Approach Delay (s)	52.0		0.0		1.8		3.4		3.4		3.4	
Approach LOS	D		A		A		A		A		A	
Intersection Summary												
HCM Average Control Delay	3.7		HCM Level of Service		A		A		A		A	
HCM Volume to Capacity ratio	0.52		Sum of lost time (s)		12.0		12.0		12.0		12.0	
Actuated Cycle Length (s)	110.0		ICU Level of Service		A		A		A		A	
Intersection Capacity Utilization	49.1%		Analysis Period (min)		15		15		15		15	
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Green Valley Drive & Pleasant Hill Roa

Baseline + Project AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔		↔		↔		↔		↔	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		1.00		0.95		1.00		0.95	
Frt	0.90		1.00		0.85		1.00		0.85		1.00	
Flt Protected	0.99		0.95		1.00		1.00		0.95		1.00	
Satd. Flow (prot)	1659		1770		1583		3539		1583		1583	
Flt Permitted	0.96		0.75		1.00		1.00		0.95		1.00	
Satd. Flow (perm)	1618		1403		1583		3539		1583		1583	
Volume (vph)	2	0	5	17	0	9	0	629	12	7	1561	1
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	0	5	18	0	10	0	684	13	8	1697	1
RTOR Reduction (vph)	0	4	0	0	0	8	0	0	4	0	0	0
Lane Group Flow (vph)	0	3	0	0	18	2	0	684	9	8	1697	1
Turn Type	Prot		Prot		Perm		Prot		Perm		Perm	
Protected Phases	7	4	3		8	5		2	1		6	6
Permitted Phases	7		4		3		8		5		2	
Actuated Green, G (s)	16.8		16.8		16.8		80.0		80.0		85.2	
Effective Green, g (s)	16.8		16.8		16.8		80.0		80.0		85.2	
Actuated g/C Ratio	0.15		0.15		0.15		0.73		0.73		0.77	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	247		214		242		2574		1151		1226	
v/s Ratio Prot	0.00		c0.01		0.01		0.19		0.00		c0.48	
v/s Ratio Perm	0.00		c0.01		0.01		0.01		0.01		0.00	
v/c Ratio	0.01		0.08		0.01		0.27		0.01		0.62	
Uniform Delay, d1	39.6		40.0		39.5		5.1		4.1		5.4	
Progression Factor	1.00		1.00		1.00		1.25		1.86		0.68	
Incremental Delay, d2	0.0		0.2		0.0		0.2		0.0		1.0	
Delay (s)	39.6		40.2		39.5		6.6		7.7		4.6	
Level of Service	D		D		D		A		A		E	
Approach Delay (s)	39.6		39.9		6.6		5.0		5.0		5.0	
Approach LOS	D		D		A		A		A		A	
Intersection Summary												
HCM Average Control Delay	6.0		HCM Level of Service		A		A		A		A	
HCM Volume to Capacity ratio	0.53		Sum of lost time (s)		8.0		8.0		8.0		8.0	
Actuated Cycle Length (s)	110.0		ICU Level of Service		A		A		A		A	
Intersection Capacity Utilization	53.2%		Analysis Period (min)		15		15		15		15	
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
3: Reliez Valley Road & Pleasant Hill Roa

Baseline + Project AM
6/17/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕	↕	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	22	224	94	630	1659	10
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	243	102	685	1803	11
RTOR Reduction (vph)	0	177	0	0	0	3
Lane Group Flow (vph)	24	66	102	685	1803	8
Turn Type	Perm		Prot		Perm	
Protected Phases	4		5		2	
Permitted Phases	4		6		6	
Actuated Green, G (s)	10.2	10.2	11.2	91.8	76.6	76.6
Effective Green, g (s)	10.2	10.2	11.2	91.8	76.6	76.6
Actuated g/C Ratio	0.09	0.09	0.10	0.83	0.70	0.70
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	164	147	180	2953	2464	1102
v/s Ratio Prot	0.01		c0.06		0.19	
v/s Ratio Perm	0.15		0.19		c0.51	
v/c Ratio	0.15	0.45	0.57	0.23	0.73	0.01
Uniform Delay, d1	45.9	47.2	47.1	1.9	10.3	5.1
Progression Factor	1.00	1.00	0.99	0.93	0.69	0.92
Incremental Delay, d2	0.4	2.2	4.0	0.2	1.6	0.0
Delay (s)	46.3	49.4	50.4	1.9	8.7	4.7
Level of Service	D	D	D	A	A	A
Approach Delay (s)	49.1		8.2		8.7	
Approach LOS	D		A		A	
Intersection Summary						
HCM Average Control Delay	12.3		HCM Level of Service		B	
HCM Volume to Capacity ratio	0.81		Sum of lost time (s)		12.0	
Actuated Cycle Length (s)	110.0		ICU Level of Service		C	
Intersection Capacity Utilization	66.4%		Analysis Period (min)		15	
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
4: Spring Hill Road & Pleasant Hill Roa

Baseline + Project AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↕	↕	↔	↕	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	0.93	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.96	1.00	0.98	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1782	1583	1698	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.74	1.00	0.85	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1378	1583	1473	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	26	3	137	23	3	27	94	630	25	10	1922	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	3	149	25	3	29	102	685	27	11	2089	22
RTOR Reduction (vph)	0	0	108	0	27	0	0	0	5	0	0	6
Lane Group Flow (vph)	0	31	41	0	30	0	102	685	22	11	2089	16
Turn Type	Perm		Perm		Perm		Prot		Perm		Perm	
Protected Phases	4		4		8		5		2		1	
Permitted Phases	4		4		8		5		2		6	
Actuated Green, G (s)	8.9	8.9	8.9	10.3	87.9	87.9	1.2	78.8	78.8	1.2	78.8	78.8
Effective Green, g (s)	8.9	8.9	8.9	10.3	87.9	87.9	1.2	78.8	78.8	1.2	78.8	78.8
Actuated g/C Ratio	0.08	0.08	0.08	0.09	0.80	0.80	0.01	0.72	0.72	0.01	0.72	0.72
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	111	128	119	166	2828	1265	19	2535	1134	19	2535	1134
v/s Ratio Prot	0.02		0.09		0.04		c0.06		0.19		0.01	
v/s Ratio Perm	0.28		0.32		0.26		0.61		0.24		0.02	
v/c Ratio	0.28	0.32	0.26	0.61	0.24	0.02	0.58	0.82	0.01	0.58	0.82	0.01
Uniform Delay, d1	47.5	47.7	47.4	47.9	2.8	2.3	54.1	10.8	4.5	54.1	10.8	4.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.27	0.24	0.05	1.27	0.24	0.05
Incremental Delay, d2	1.4	1.5	1.1	6.6	0.2	0.0	27.1	2.3	0.0	27.1	2.3	0.0
Delay (s)	48.9	49.2	48.6	54.5	3.0	2.3	96.2	5.0	0.2	96.2	5.0	0.2
Level of Service	D	D	D	D	A	A	F	A	A	F	A	A
Approach Delay (s)	49.1		48.6		9.4		5.4		5.4		5.4	
Approach LOS	D		D		A		A		A		A	
Intersection Summary												
HCM Average Control Delay	9.7			HCM Level of Service			A					
HCM Volume to Capacity ratio	0.83			Sum of lost time (s)			12.0					
Actuated Cycle Length (s)	110.0			ICU Level of Service			D					
Intersection Capacity Utilization	78.1%			Analysis Period (min)			15					
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Baseline + Project AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	1750		1681	1734	1583	1770	3539	1583	1770	4829	
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	1750		1681	1734	1583	1770	3539	1583	1770	4829	
Volume (vph)	107	63	42	172	74	32	108	406	125	148	1451	733
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	116	68	46	187	80	35	117	441	136	161	1577	797
RTOR Reduction (vph)	0	23	0	0	0	31	0	0	71	0	71	0
Lane Group Flow (vph)	116	91	0	130	137	4	117	441	65	161	2303	0
Turn Type	Split			Split		Perm	Prot		Perm	Prot		
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases					8			2				
Actuated Green, G (s)	10.9	10.9		13.2	13.2	13.2	9.7	52.2	52.2	17.7	60.2	
Effective Green, g (s)	10.9	10.9		13.2	13.2	13.2	9.7	52.2	52.2	17.7	60.2	
Actuated g/C Ratio	0.10	0.10		0.12	0.12	0.12	0.09	0.47	0.47	0.16	0.55	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	340	173		202	208	190	156	1679	751	285	2643	
v/s Ratio Prot	0.03	c0.07		0.08	c0.08		c0.07	0.12		0.09	c0.49	
v/s Ratio Perm					0.02			0.09				
v/c Ratio	0.34	0.52		0.64	0.66	0.02	0.75	0.26	0.09	0.56	0.87	
Uniform Delay, d1	46.2	47.1		46.2	46.2	42.7	49.0	17.3	15.8	42.6	21.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.93	0.70	0.19	0.84	0.69	
Incremental Delay, d2	0.6	2.8		6.9	7.3	0.0	17.5	0.4	0.2	1.9	3.2	
Delay (s)	46.8	49.9		53.0	53.6	42.8	63.1	12.6	3.2	37.8	18.0	
Level of Service	D	D		D	D	D	E	B	A	D	B	
Approach Delay (s)	48.4			52.1			19.2			19.2		
Approach LOS	D			D			B			B		
Intersection Summary												
HCM Average Control Delay	23.7			HCM Level of Service		C						
HCM Volume to Capacity ratio	0.82											
Actuated Cycle Length (s)	110.0		Sum of lost time (s)		16.0							
Intersection Capacity Utilization	73.8%		ICU Level of Service		D							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Blvd & Pleasant Hill Road

Baseline + Project AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3424		1770	3539	1583	1770	3539	1583	1770	4829	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3424		1770	3539	1583	1770	3539	1583	1770	4829	
Volume (vph)	218	216	60	0	0	0	224	729	396	0	534	544
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	237	235	65	0	0	0	243	792	430	0	580	591
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	82	0	0	324
Lane Group Flow (vph)	237	274	0	0	0	0	243	792	348	0	580	267
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4					5	2			6	
Permitted Phases								2				6
Actuated Green, G (s)	19.3	19.3					29.0	82.7	82.7		49.7	49.7
Effective Green, g (s)	19.3	19.3					29.0	82.7	82.7		49.7	49.7
Actuated g/C Ratio	0.18	0.18					0.26	0.75	0.75		0.45	0.45
Clearance Time (s)	4.0	4.0					4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0					3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	311	601					467	2661	1190		1599	715
v/s Ratio Prot	c0.13	0.09					c0.14	0.22			0.16	
v/s Ratio Perm								0.27				0.37
v/c Ratio	0.76	0.46					0.52	0.30	0.29		0.36	0.37
Uniform Delay, d1	43.2	40.6					34.6	4.4	4.3		19.8	19.9
Progression Factor	1.00	1.00					0.99	0.76	0.38		1.00	1.00
Incremental Delay, d2	10.5	0.6					1.0	0.3	0.6		0.6	1.5
Delay (s)	53.7	41.2					35.3	3.6	2.3		20.4	21.4
Level of Service	D	D					D	A	A		C	C
Approach Delay (s)	46.7			0.0			8.4			20.9		
Approach LOS	D			A			A			C		
Intersection Summary												
HCM Average Control Delay	19.5			HCM Level of Service		B						
HCM Volume to Capacity ratio	0.72											
Actuated Cycle Length (s)	110.0		Sum of lost time (s)		12.0							
Intersection Capacity Utilization	52.8%		ICU Level of Service		A							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
7: EB 24 Off Ramp & Pleasant Hill Road

Baseline + Project AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Frt	1.00	0.85	1.00	0.85	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.98	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1833	1583	1770	1583	1833	1583	3529	3529	1770	3529	1770	3539
Flt Permitted	0.98	1.00	0.72	1.00	1.00	1.00	1.00	1.00	0.22	1.00	0.22	1.00
Satd. Flow (perm)	1833	1583	1347	1583	1833	1583	3529	3529	414	3529	414	3539
Volume (vph)	16	32	132	12	0	136	0	1078	20	80	487	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	35	143	13	0	148	0	1172	22	87	529	0
RTOR Reduction (vph)	0	0	131	0	0	83	0	0	0	0	0	0
Lane Group Flow (vph)	0	52	12	13	0	65	0	1194	0	87	529	0
Turn Type	Perm	Perm	custom	custom	custom	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4			2			6			6		
Permitted Phases	4			8			6			6		
Actuated Green, G (s)	9.6			9.6			9.6			9.6		
Effective Green, g (s)	9.6			9.6			9.6			9.6		
Actuated g/C Ratio	0.09			0.09			0.09			0.09		
Clearance Time (s)	4.0			4.0			4.0			4.0		
Vehicle Extension (s)	3.0			3.0			3.0			3.0		
Lane Grp Cap (vph)	160	138	118	138	2964	348	2973					
v/s Ratio Prot	0.03			0.09			0.01			0.09		
v/c Ratio	0.33			0.09			0.11			0.47		
Uniform Delay, d1	47.2			46.2			46.3			47.8		
Progression Factor	1.00			1.00			1.00			1.00		
Incremental Delay, d2	1.2			0.3			0.4			2.5		
Delay (s)	48.3			46.5			46.7			50.3		
Level of Service	D			D			D			A		
Approach Delay (s)	47.0			50.0			2.5			1.3		
Approach LOS	D			D			A			A		
Intersection Summary												
HCM Average Control Delay	9.7			HCM Level of Service			A					
HCM Volume to Capacity ratio	0.47											
Actuated Cycle Length (s)	110.0			Sum of lost time (s)			8.0					
Intersection Capacity Utilization	54.1%			ICU Level of Service			A					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Avenue

Baseline + Project AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Volume (veh/h)	26	207	48	172	665	36	85	12	76	28	8	52
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	225	52	187	723	39	92	13	83	30	9	57
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						None					
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	762			277			1465			1443		
vC1, stage 1 conf vol	762			277			1465			1443		
vC2, stage 2 conf vol	762			277			1465			1443		
vCu, unblocked vol	4.1			4.1			7.1			6.5		
tC, single (s)	4.1			4.1			7.1			6.5		
tC, 2 stage (s)	2.2			2.2			3.5			4.0		
tF (s)	2.2			2.2			3.5			4.0		
p0 queue free %	97			85			0			88		
cM capacity (veh/h)	850			1286			75			109		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1					
Volume Total	28	277	187	762	105	83	96					
Volume Left	28	0	187	0	92	0	30					
Volume Right	0	52	0	39	0	83	57					
cSH	850	1700	1286	1700	78	788	164					
Volume to Capacity	0.03	0.16	0.15	0.45	1.36	0.10	0.58					
Queue Length (ft)	3	0	13	0	206	9	77					
Control Delay (s)	9.4	0.0	8.3	0.0	317.6	10.1	54.1					
Lane LOS	A	A	A	F	B	F	F					
Approach Delay (s)	0.9		1.6		182.5		54.1					
Approach LOS	F		F		F		F					
Intersection Summary												
Average Delay	26.9											
Intersection Capacity Utilization	62.5%			ICU Level of Service			B					
Analysis Period (min)	15											

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Roa

Baseline + Project PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔				↕	↕		↕	↕
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0						4.0		4.0		4.0	
Lane Util. Factor	1.00						1.00		0.95		0.95	
Frt	0.90						1.00		1.00		1.00	
Flt Protected	0.99						0.95		1.00		1.00	
Satd. Flow (prot)	1653						1770		3539		3528	
Flt Permitted	0.96						0.95		1.00		1.00	
Satd. Flow (perm)	1602						1770		3539		3528	
Volume (vph)	6	0	19	0	0	0	18	2001	0	0	774	17
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	0	21	0	0	0	20	2175	0	0	841	18
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	10	0	0	0	0	20	2175	0	0	858	0
Turn Type	Prot		Prot		Prot						Prot	
Protected Phases	7	4	3		8	5		2			6	
Permitted Phases												
Actuated Green, G (s)	18.0						2.8		84.0		77.2	
Effective Green, g (s)	18.0						2.8		84.0		77.2	
Actuated g/C Ratio	0.16						0.03		0.76		0.70	
Clearance Time (s)	4.0						4.0		4.0		4.0	
Vehicle Extension (s)	3.0						3.0		3.0		3.0	
Lane Grp Cap (vph)	262						45		2703		2476	
v/s Ratio Prot							0.01		c0.61		0.24	
v/s Ratio Perm	c0.02											
v/c Ratio	0.04						0.44		0.80		0.35	
Uniform Delay, d1	38.7						52.8		8.0		6.5	
Progression Factor	1.00						0.94		0.88		1.00	
Incremental Delay, d2	0.1						4.4		1.7		0.4	
Delay (s)	38.8						54.3		8.7		6.8	
Level of Service	D						D		A		A	
Approach Delay (s)	38.8		0.0				9.1				6.8	
Approach LOS	D		A				A				A	
Intersection Summary												
HCM Average Control Delay	8.8		HCM Level of Service				A					
HCM Volume to Capacity ratio	0.68											
Actuated Cycle Length (s)	110.0		Sum of lost time (s)				8.0					
Intersection Capacity Utilization	65.3%		ICU Level of Service				C					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Green Valley Drive & Pleasant Hill Roa

Baseline + Project PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔				↕	↕		↕	↕
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0						4.0		4.0		4.0	
Lane Util. Factor	1.00						1.00		0.95		1.00	
Frt	0.96						1.00		0.85		1.00	
Flt Protected	0.96						0.95		1.00		1.00	
Satd. Flow (prot)	1731						1770		1583		1770	
Flt Permitted	0.88						0.75		1.00		0.95	
Satd. Flow (perm)	1580						1398		1583		1770	
Volume (vph)	7	0	3	12	0	16	3	1955	21	11	755	4
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	0	3	13	0	17	3	2125	23	12	821	4
RTOR Reduction (vph)	0	3	0	0	0	14	0	0	5	0	0	1
Lane Group Flow (vph)	0	8	0	0	13	3	3	2125	18	12	821	3
Turn Type	Prot		Prot		Perm		Prot		Perm		Prot	
Protected Phases	7	4	3		8	5		2	1		6	
Permitted Phases							8		2		6	
Actuated Green, G (s)	16.8				16.8		16.8		1.2		80.0	
Effective Green, g (s)	16.8				16.8		16.8		1.2		80.0	
Actuated g/C Ratio	0.15				0.15		0.15		0.01		0.73	
Clearance Time (s)	4.0				4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0				3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	241				214		242		19		2574	
v/s Ratio Prot							0.00		c0.60		c0.01	
v/s Ratio Perm	0.01				0.01		0.01		0.01		0.00	
v/c Ratio	0.04				0.06		0.01		0.16		0.83	
Uniform Delay, d1	39.7				39.9		39.5		53.9		10.2	
Progression Factor	1.00				1.00		1.00		1.08		0.81	
Incremental Delay, d2	0.1				0.1		0.0		2.7		2.3	
Delay (s)	39.8				40.0		39.6		60.8		10.6	
Level of Service	D				D		D		E		B	
Approach Delay (s)	39.8		39.7				10.5				5.3	
Approach LOS	D		D				B				A	
Intersection Summary												
HCM Average Control Delay	9.5		HCM Level of Service				A					
HCM Volume to Capacity ratio	0.69											
Actuated Cycle Length (s)	110.0		Sum of lost time (s)				12.0					
Intersection Capacity Utilization	70.7%		ICU Level of Service				C					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
3: Reliez Valley Road & Pleasant Hill Road

Baseline + Project PM
6/17/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕	↕	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	20	103	182	1965	768	26
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	112	198	2136	835	28
RTOR Reduction (vph)	0	105	0	0	0	10
Lane Group Flow (vph)	22	7	198	2136	835	18
Turn Type	Perm		Prot		Perm	
Protected Phases	4		5	2	6	
Permitted Phases	4					
Actuated Green, G (s)	7.3	7.3	19.7	94.7	71.0	71.0
Effective Green, g (s)	7.3	7.3	19.7	94.7	71.0	71.0
Actuated g/C Ratio	0.07	0.07	0.18	0.86	0.65	0.65
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	117	105	317	3047	2284	1022
v/s Ratio Prot	0.01		0.11	c0.60	0.24	
v/s Ratio Perm		0.07				0.02
v/c Ratio	0.19	0.07	0.62	0.70	0.37	0.02
Uniform Delay, d1	48.5	48.2	41.7	2.7	9.0	7.0
Progression Factor	1.00	1.00	1.00	1.00	1.35	2.76
Incremental Delay, d2	0.8	0.3	3.8	1.4	0.4	0.0
Delay (s)	49.3	48.5	45.5	4.1	12.7	19.3
Level of Service	D	D	D	A	B	B
Approach Delay (s)	48.6			7.6	12.9	
Approach LOS	D			A	B	
Intersection Summary						
HCM Average Control Delay			10.6		HCM Level of Service	B
HCM Volume to Capacity ratio			0.73			
Actuated Cycle Length (s)			110.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			64.3%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
4: Spring Hill Road & Pleasant Hill Road

Baseline + Project PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85		0.97		1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.96	1.00		0.96		0.95	1.00	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1781	1583		1739		1770	3539	1583	1770	3539	1583	1583
Flt Permitted	0.80	1.00		0.76		0.95	1.00	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1483	1583		1371		1770	3539	1583	1770	3539	1583	1583
Volume (vph)	19	2	87	22	0	6	123	2126	33	14	902	24
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	2	95	24	0	7	134	2311	36	15	980	26
RTOR Reduction (vph)	0	0	90	0	7	0	0	0	5	0	0	7
Lane Group Flow (vph)	0	23	5	0	24	0	134	2311	31	15	980	19
Turn Type	Perm		Perm		Perm		Prot		Perm		Perm	
Protected Phases	4		4		8		5		2		1	
Permitted Phases	4		4		8		5		2		1	
Actuated Green, G (s)		8.1	8.1		8.1		25.4	126.7	126.7	3.2	104.5	104.5
Effective Green, g (s)		8.1	8.1		8.1		25.4	126.7	126.7	3.2	104.5	104.5
Actuated g/C Ratio		0.05	0.05		0.05		0.17	0.84	0.84	0.02	0.70	0.70
Clearance Time (s)		4.0	4.0		4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		80	85		74		300	2989	1337	38	2466	1103
v/s Ratio Prot							0.08	c0.65		0.01	c0.28	
v/s Ratio Perm		0.02	0.06		0.02				0.02			0.02
v/c Ratio		0.29	0.06		0.33		0.45	0.77	0.02	0.39	0.40	0.02
Uniform Delay, d1		68.2	67.3		68.3		56.0	5.2	1.8	72.4	9.5	7.0
Progression Factor		1.00	1.00		1.00		0.77	0.06	0.00	1.00	1.00	1.00
Incremental Delay, d2		2.0	0.3		2.6		0.4	0.7	0.0	6.6	0.5	0.0
Delay (s)		70.2	67.6		70.9		43.5	1.0	0.0	79.1	10.0	7.0
Level of Service		E	E		E		D	A	A	E	B	A
Approach Delay (s)		68.1			70.9			3.3			11.0	
Approach LOS		E			E			A			B	
Intersection Summary												
HCM Average Control Delay					8.1							A
HCM Volume to Capacity ratio					0.79							
Actuated Cycle Length (s)					150.0						12.0	
Intersection Capacity Utilization					80.4%							D
Analysis Period (min)					15							
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Baseline + Project PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	1678		1681	1748	1583	1770	3539	1583	1770	4996	
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	1678		1681	1748	1583	1770	3539	1583	1770	4996	
Volume (vph)	509	70	136	106	67	112	365	1782	72	86	768	102
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	553	76	148	115	73	122	397	1937	78	93	835	111
RTOR Reduction (vph)	0	47	0	0	0	79	0	0	19	0	11	0
Lane Group Flow (vph)	553	177	0	91	97	43	397	1937	59	93	935	0
Turn Type	Split			Split		Perm	Prot		Perm	Prot		
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases					8			2				
Actuated Green, G (s)	25.0	25.0		13.0	13.0	13.0	47.0	88.0	88.0	8.0	49.0	
Effective Green, g (s)	25.0	25.0		13.0	13.0	13.0	47.0	88.0	88.0	8.0	49.0	
Actuated g/C Ratio	0.17	0.17		0.09	0.09	0.09	0.31	0.59	0.59	0.05	0.33	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	572	280		146	151	137	555	2076	929	94	1632	
v/s Ratio Prot	c0.16	0.13		0.05	0.06		0.22	c0.55		c0.05	0.19	
v/s Ratio Perm					0.08			0.05				
v/c Ratio	0.97	0.63		0.62	0.64	0.32	0.72	0.93	0.06	0.99	0.57	
Uniform Delay, d1	62.1	58.2		66.1	66.3	64.3	45.6	28.3	13.3	71.0	41.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	29.1	4.6		8.0	9.0	1.3	4.4	9.2	0.1	88.5	1.5	
Delay (s)	91.2	62.9		74.2	75.3	65.7	49.9	37.6	13.4	159.4	43.3	
Level of Service	F	E		E	E	E	D	D	B	F	D	
Approach Delay (s)	83.0			71.2			38.8			53.7		
Approach LOS	F			E			D			D		
Intersection Summary												
HCM Average Control Delay	52.0			HCM Level of Service			D					
HCM Volume to Capacity ratio	0.94											
Actuated Cycle Length (s)	150.0			Sum of lost time (s)			16.0					
Intersection Capacity Utilization	86.6%			ICU Level of Service			E					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Blvd & Pleasant Hill Road

Baseline + Project PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3304		1770	3539	1583	1770	3539	1583	1770	4996	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3304		1770	3539	1583	1770	3539	1583	1770	4996	
Volume (vph)	401	241	192	0	0	0	207	969	411	0	649	351
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	436	262	209	0	0	0	225	1053	447	0	705	382
RTOR Reduction (vph)	0	115	0	0	0	0	0	0	143	0	0	226
Lane Group Flow (vph)	436	356	0	0	0	0	225	1053	304	0	705	156
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases								2				6
Actuated Green, G (s)	40.1	40.1					37.0	101.9	101.9		60.9	60.9
Effective Green, g (s)	40.1	40.1					37.0	101.9	101.9		60.9	60.9
Actuated g/C Ratio	0.27	0.27					0.25	0.68	0.68		0.41	0.41
Clearance Time (s)	4.0	4.0					4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0					3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	473	883					437	2404	1075		1437	643
v/s Ratio Prot	c0.25	0.14					c0.13	0.30			0.20	
v/s Ratio Perm								0.28				0.24
v/c Ratio	0.92	0.40					0.51	0.44	0.28		0.49	0.24
Uniform Delay, d1	53.4	45.1					48.8	11.0	9.5		33.0	29.3
Progression Factor	1.00	1.00					0.96	0.83	0.32		0.26	0.05
Incremental Delay, d2	23.5	0.3					0.9	0.5	0.6		0.9	0.7
Delay (s)	76.9	45.4					47.8	9.6	3.7		9.3	2.2
Level of Service	E	D					D	A	A		A	A
Approach Delay (s)	60.6			0.0			13.0			6.8		
Approach LOS	E			A			B			A		
Intersection Summary												
HCM Average Control Delay	22.8			HCM Level of Service			C					
HCM Volume to Capacity ratio	0.67											
Actuated Cycle Length (s)	150.0			Sum of lost time (s)			12.0					
Intersection Capacity Utilization	61.6%			ICU Level of Service			B					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
7: EB 24 Off Ramp & Pleasant Hill Road

Baseline + Project PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85
Flt Protected	0.98	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95
Satd. Flow (prot)	1831	1583	1770	1583	1583	1583	3529	1770	1770	3539	1770	3539
Flt Permitted	0.98	1.00	0.46	1.00	1.00	1.00	1.00	0.16	1.00	0.16	1.00	0.16
Satd. Flow (perm)	1831	1583	849	1583	1583	1583	3529	290	3529	290	3539	290
Volume (vph)	35	64	175	17	0	31	0	1354	27	121	611	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	70	190	18	0	34	0	1472	29	132	664	0
RTOR Reduction (vph)	0	0	172	0	0	31	0	1	0	0	0	0
Lane Group Flow (vph)	0	108	18	18	0	3	0	1500	0	132	664	0
Turn Type	Perm	Perm	custom	custom	custom	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4			8			2			6		
Permitted Phases	4	4	8	8			6			6		
Actuated Green, G (s)	13.9	13.9	13.9	13.9			128.1			128.1		
Effective Green, g (s)	13.9	13.9	13.9	13.9			128.1			128.1		
Actuated g/C Ratio	0.09	0.09	0.09	0.09			0.85			0.85		
Clearance Time (s)	4.0	4.0	4.0	4.0			4.0			4.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0			3.0		
Lane Grp Cap (vph)	170	147	79	147			3014			248		
v/s Ratio Prot	0.06			0.12			0.02			0.02		
v/c Ratio	0.64	0.12	0.23	0.02			0.50			0.53		
Uniform Delay, d1	65.6	62.4	63.1	61.9			2.8			2.9		
Progression Factor	1.00	1.00	1.00	1.00			1.00			1.66		
Incremental Delay, d2	7.5	0.4	1.5	0.1			0.6			7.2		
Delay (s)	73.2	62.8	64.5	61.9			3.4			12.1		
Level of Service	E	E	E	E			A			B		
Approach Delay (s)	66.6			62.8			3.4			2.6		
Approach LOS	E			E			A			A		
Intersection Summary												
HCM Average Control Delay	11.4			HCM Level of Service			B					
HCM Volume to Capacity ratio	0.61											
Actuated Cycle Length (s)	150.0			Sum of lost time (s)			8.0					
Intersection Capacity Utilization	67.0%			ICU Level of Service			C					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Avenue

Baseline + Project PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Volume (veh/h)	46	632	49	104	305	85	57	8	107	61	12	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	687	53	113	332	92	62	9	116	66	13	21
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						None					
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	424			740			1398			1464		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	424			740			1398			1464		
tC, single (s)	4.1			4.1			7.1			6.5		
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5			4.0		
p0 queue free %	96			87			32			92		
cM capacity (veh/h)	1135			866			91			107		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1					
Volume Total	50	740	113	424	71	116	100					
Volume Left	50	0	113	0	62	0	66					
Volume Right	0	53	0	92	0	116	21					
cSH	1135	1700	866	1700	93	432	92					
Volume to Capacity	0.04	0.44	0.13	0.25	0.76	0.27	1.08					
Queue Length (ft)	3	0	11	0	99	27	166					
Control Delay (s)	8.3	0.0	9.8	0.0	118.0	16.4	202.5					
Lane LOS	A	A	A	F	C	F	F					
Approach Delay (s)	0.5			2.1			54.8			202.5		
Approach LOS	E			F			F			F		
Intersection Summary												
Average Delay	19.8											
Intersection Capacity Utilization	63.8%			ICU Level of Service			B					
Analysis Period (min)	15											

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Road

Cumulative AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔		↔		↔		↔		↔	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		1.00		0.95		0.95		0.95	
Flt	0.86		1.00		1.00		1.00		1.00		1.00	
Flt Protected	1.00		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (prot)	1611		1770		3539		3536		3536		3536	
Flt Permitted	1.00		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (perm)	1611		1770		3539		3536		3536		3536	
Volume (vph)	0	0	37	0	0	0	16	619	0	0	1583	10
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	40	0	0	0	17	673	0	0	1721	11
RTOR Reduction (vph)	0	39	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1	0	0	0	0	17	673	0	0	1732	0
Turn Type	Prot		Prot		Prot		Prot		Prot		Prot	
Protected Phases	7	4	3		8	5		2	6		6	
Permitted Phases	7		4		3		8		5		2	
Actuated Green, G (s)	3.3		3.1		98.7		91.6		91.6		91.6	
Effective Green, g (s)	3.3		3.1		98.7		91.6		91.6		91.6	
Actuated g/C Ratio	0.03		0.03		0.90		0.83		0.83		0.83	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	48		50		3175		2945		2945		2945	
v/s Ratio Prot	c0.02		c0.01		0.19		c0.49		c0.49		c0.49	
v/s Ratio Perm	0.00		c0.01		0.01		0.01		0.01		0.00	
v/c Ratio	0.03		0.34		0.21		0.59		0.59		0.59	
Uniform Delay, d1	51.8		52.4		0.7		3.0		3.0		3.0	
Progression Factor	1.00		0.79		0.61		1.00		1.00		1.00	
Incremental Delay, d2	0.2		3.9		0.1		0.9		0.9		0.9	
Delay (s)	52.0		45.6		0.6		3.9		3.9		3.9	
Level of Service	D		D		A		A		A		A	
Approach Delay (s)	52.0		0.0		1.7		3.9		3.9		3.9	
Approach LOS	D		A		A		A		A		A	
Intersection Summary												
HCM Average Control Delay	4.1		HCM Level of Service		A		A		A		A	
HCM Volume to Capacity ratio	0.59		Sum of lost time (s)		12.0		12.0		12.0		12.0	
Actuated Cycle Length (s)	110.0		ICU Level of Service		A		A		A		A	
Intersection Capacity Utilization	54.1%		Analysis Period (min)		15		15		15		15	
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Green Valley Drive & Pleasant Hill Road

Cumulative AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔		↔		↔		↔		↔	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		1.00		0.95		0.95		0.95	
Flt	0.90		1.00		0.85		1.00		0.85		1.00	
Flt Protected	0.99		0.95		1.00		1.00		0.95		1.00	
Satd. Flow (prot)	1659		1770		1583		3539		1583		1583	
Flt Permitted	0.96		0.75		1.00		1.00		0.95		1.00	
Satd. Flow (perm)	1618		1403		1583		3539		1583		1583	
Volume (vph)	2	0	5	18	0	10	0	696	13	8	1761	1
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	0	5	20	0	11	0	757	14	9	1914	1
RTOR Reduction (vph)	0	4	0	0	0	9	0	0	4	0	0	0
Lane Group Flow (vph)	0	3	0	0	20	2	0	757	10	9	1914	1
Turn Type	Prot		Prot		Perm		Prot		Perm		Perm	
Protected Phases	7	4	3		8	5		2	1		6	6
Permitted Phases	7		4		3		8		5		2	
Actuated Green, G (s)	16.8		16.8		16.8		80.0		80.0		85.2	
Effective Green, g (s)	16.8		16.8		16.8		80.0		80.0		85.2	
Actuated g/C Ratio	0.15		0.15		0.15		0.73		0.73		0.77	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	247		214		242		2574		1151		1226	
v/s Ratio Prot	0.00		c0.01		0.01		0.21		0.01		c0.54	
v/s Ratio Perm	0.01		0.09		0.01		0.29		0.01		0.70	
v/c Ratio	0.01		0.09		0.01		0.29		0.01		0.70	
Uniform Delay, d1	39.6		40.1		39.5		5.2		4.1		6.1	
Progression Factor	1.00		1.00		1.00		1.25		1.89		0.69	
Incremental Delay, d2	0.0		0.2		0.0		0.3		0.0		1.3	
Delay (s)	39.6		40.2		39.5		6.8		7.8		5.5	
Level of Service	D		D		D		A		A		F	
Approach Delay (s)	39.6		40.0		6.8		5.9		5.9		5.9	
Approach LOS	D		D		A		A		A		A	
Intersection Summary												
HCM Average Control Delay	6.6		HCM Level of Service		A		A		A		A	
HCM Volume to Capacity ratio	0.60		Sum of lost time (s)		8.0		8.0		8.0		8.0	
Actuated Cycle Length (s)	110.0		ICU Level of Service		B		B		B		B	
Intersection Capacity Utilization	58.7%		Analysis Period (min)		15		15		15		15	
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
3: Reliez Valley Road & Pleasant Hill Road

Cumulative AM
6/17/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕	↕	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	24	242	102	698	1872	11
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	263	111	759	2035	12
RTOR Reduction (vph)	0	168	0	0	0	3
Lane Group Flow (vph)	26	95	111	759	2035	9
Turn Type	Perm	Perm	Prot		Perm	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	11.5	11.5	11.4	90.5	75.1	75.1
Effective Green, g (s)	11.5	11.5	11.4	90.5	75.1	75.1
Actuated g/C Ratio	0.10	0.10	0.10	0.82	0.68	0.68
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	185	165	183	2912	2416	1081
v/s Ratio Prot	0.01		c0.06	0.21	c0.57	
v/s Ratio Perm		0.17				0.01
v/c Ratio	0.14	0.57	0.61	0.26	0.84	0.01
Uniform Delay, d1	44.8	46.9	47.2	2.2	13.0	5.6
Progression Factor	1.00	1.00	0.98	0.93	0.75	1.24
Incremental Delay, d2	0.3	4.8	5.5	0.2	3.0	0.0
Delay (s)	45.1	51.7	51.8	2.3	12.7	6.9
Level of Service	D	D	D	A	B	A
Approach Delay (s)	51.1			8.6	12.7	
Approach LOS	D			A	B	
Intersection Summary						
HCM Average Control Delay		15.0		HCM Level of Service		B
HCM Volume to Capacity ratio		0.90				
Actuated Cycle Length (s)		110.0		Sum of lost time (s)	12.0	
Intersection Capacity Utilization		73.4%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
4: Spring Hill Road & Pleasant Hill Road

Cumulative AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↕	↕	↔	↕	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	0.93	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.96	1.00	0.98	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1782	1583	1696	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.73	1.00	0.85	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1353	1583	1475	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	28	3	148	25	3	29	102	698	27	11	2170	22
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	3	161	27	3	32	111	759	29	12	2359	24
RTOR Reduction (vph)	0	0	107	0	29	0	0	0	6	0	0	6
Lane Group Flow (vph)	0	33	54	0	33	0	111	759	23	12	2359	18
Turn Type	Perm	Perm	Perm	Perm	Perm	Prot	Perm	Prot	Perm	Prot	Perm	Perm
Protected Phases		4		8		5	2		2	1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	9.5	9.5	9.5	10.2	87.6	87.6	0.9	78.3	78.3			
Effective Green, g (s)	9.5	9.5	9.5	10.2	87.6	87.6	0.9	78.3	78.3			
Actuated g/C Ratio	0.09	0.09	0.09	0.09	0.80	0.80	0.01	0.71	0.71			
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	117	137	127	164	2818	1261	14	2519	1127			
v/s Ratio Prot				c0.06	0.21		0.01	c0.67				
v/s Ratio Perm	0.02	0.10	0.04			0.02			0.02			0.02
v/c Ratio	0.28	0.39	0.26	0.68	0.27	0.02	0.86	0.94	0.02			
Uniform Delay, d1	47.1	47.5	47.0	48.3	2.9	2.3	54.5	13.7	4.6			
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.28	0.26	0.04			
Incremental Delay, d2	1.3	1.9	1.1	10.5	0.2	0.0	121.3	5.3	0.0			
Delay (s)	48.4	49.4	48.0	58.8	3.1	2.3	190.9	8.9	0.2			
Level of Service	D	D	D	E	A	A	F	A	A			
Approach Delay (s)	49.2		48.0		10.0			9.7				
Approach LOS	D		D		A			A				
Intersection Summary												
HCM Average Control Delay		12.6		HCM Level of Service		B						
HCM Volume to Capacity ratio		0.93										
Actuated Cycle Length (s)		110.0		Sum of lost time (s)	12.0							
Intersection Capacity Utilization		85.6%		ICU Level of Service		E						
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Cumulative AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔		↔		↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1786		1681	1733	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1786		1681	1733	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	100	58	22	184	78	35	117	460	135	160	1641	788
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	63	24	200	85	38	127	500	147	174	1784	857
RTOR Reduction (vph)	0	14	0	0	0	33	0	0	75	0	0	288
Lane Group Flow (vph)	109	73	0	139	146	5	127	500	72	174	1784	569
Turn Type	Split		Split		Perm		Prot		Perm		Perm	
Protected Phases	4	4	8		8	5		2	1		6	
Permitted Phases			8		8		2		2		6	
Actuated Green, G (s)	9.7	9.7	13.9	13.9	13.9	9.8	52.6	52.6	14.8	57.6	57.6	
Effective Green, g (s)	9.7	9.7	13.9	13.9	13.9	9.8	52.6	52.6	14.8	57.6	57.6	
Actuated g/C Ratio	0.09	0.09	0.13	0.13	0.13	0.09	0.49	0.49	0.14	0.54	0.54	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	311	162	218	225	206	162	1740	778	245	1905	852	
v/s Ratio Prot	0.03	c0.05	0.08	c0.08		0.07	0.14		c0.10	0.50		
v/s Ratio Perm					0.02			0.09			0.54	
v/c Ratio	0.35	0.45	0.64	0.65	0.02	0.78	0.29	0.09	0.71	0.94	0.67	
Uniform Delay, d1	45.7	46.1	44.2	44.2	40.6	47.6	16.1	14.5	44.1	23.0	17.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	2.0	6.0	6.3	0.0	21.5	0.4	0.2	9.3	10.3	4.1	
Delay (s)	46.4	48.1	50.2	50.5	40.7	69.1	16.5	14.7	53.4	33.2	22.0	
Level of Service	D	D	D	D	D	E	B	B	D	C	C	
Approach Delay (s)	47.2		49.2		24.8		31.1					
Approach LOS	D		D		C		C					
Intersection Summary												
HCM Average Control Delay	32.1		HCM Level of Service		C							
HCM Volume to Capacity ratio	0.85											
Actuated Cycle Length (s)	107.0		Sum of lost time (s)		12.0							
Intersection Capacity Utilization	75.7%		ICU Level of Service		D							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Blvd & Pleasant Hill Road

Cumulative AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔		↔		↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3423		1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3423		1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	243	234	65	0	0	0	242	818	429	0	586	605
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	264	254	71	0	0	0	263	889	466	0	637	658
RTOR Reduction (vph)	0	25	0	0	0	0	0	0	79	0	0	370
Lane Group Flow (vph)	264	300	0	0	0	0	263	889	387	0	637	288
Turn Type	Prot		Prot		Perm		Prot		Perm		Perm	
Protected Phases	7	4			5		2			6		
Permitted Phases			2		2		2		2		6	
Actuated Green, G (s)	20.9	20.9			29.0		81.1	81.1		48.1		48.1
Effective Green, g (s)	20.9	20.9			29.0		81.1	81.1		48.1		48.1
Actuated g/C Ratio	0.19	0.19			0.26		0.74	0.74		0.44		0.44
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	336	650			467		2609	1167		1548		692
v/s Ratio Prot	c0.15	0.09			c0.15		0.25	0.18				
v/s Ratio Perm							0.29	0.42				
v/c Ratio	0.79	0.46			0.56		0.34	0.33		0.41		0.42
Uniform Delay, d1	42.4	39.6			35.0		5.1	5.0		21.2		21.3
Progression Factor	1.00	1.00			0.98		0.72	0.43		1.00		1.00
Incremental Delay, d2	11.4	0.5			1.4		0.3	0.7		0.8		1.8
Delay (s)	53.9	40.1			35.8		4.0	2.9		22.0		23.1
Level of Service	D	D			D		A	A		C		C
Approach Delay (s)	46.3		0.0		8.8		22.6					
Approach LOS	D		A		A		C					
Intersection Summary												
HCM Average Control Delay	20.2		HCM Level of Service		C							
HCM Volume to Capacity ratio	0.80											
Actuated Cycle Length (s)	110.0		Sum of lost time (s)		12.0							
Intersection Capacity Utilization	57.5%		ICU Level of Service		B							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
7: EB 24 Off Ramp & Pleasant Hill Road

Cumulative AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95
Flt Protected	0.98	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95
Satd. Flow (prot)	1833	1583	1770	1583	1583	3530	3530	1770	3539	1770	3539	1770
Flt Permitted	0.98	1.00	0.72	1.00	1.00	1.00	1.00	0.18	1.00	0.18	1.00	0.18
Satd. Flow (perm)	1833	1583	1342	1583	1583	3530	3530	343	3539	343	3539	343
Volume (vph)	17	35	143	13	0	147	0	1213	22	87	532	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	38	155	14	0	160	0	1318	24	95	578	0
RTOR Reduction (vph)	0	0	139	0	0	59	0	1	0	0	0	0
Lane Group Flow (vph)	0	56	16	14	0	101	0	1341	0	95	578	0
Turn Type	Perm	Perm	custom	custom	custom	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4			2			6			6		
Permitted Phases	4	4	8	8			6			6		
Actuated Green, G (s)	11.5	11.5	11.5	11.5			90.5			90.5		
Effective Green, g (s)	11.5	11.5	11.5	11.5			90.5			90.5		
Actuated g/C Ratio	0.10	0.10	0.10	0.10			0.82			0.82		
Clearance Time (s)	4.0	4.0	4.0	4.0			4.0			4.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0			3.0		
Lane Grp Cap (vph)	192	165	140	165			2904			282		
v/s Ratio Prot	0.03			0.10			0.01			0.10		
v/c Ratio	0.29	0.10	0.10	0.61			0.46			0.34		
Uniform Delay, d1	45.5	44.6	44.6	47.1			2.8			2.4		
Progression Factor	1.00	1.00	1.00	1.00			1.00			2.07		
Incremental Delay, d2	0.8	0.3	0.3	6.6			0.5			3.0		
Delay (s)	46.3	44.8	44.9	53.7			3.3			7.9		
Level of Service	D	D	D	D			A			A		
Approach Delay (s)	45.2			53.0			3.3			1.9		
Approach LOS	D			D			A			A		
Intersection Summary												
HCM Average Control Delay	10.2			HCM Level of Service			B					
HCM Volume to Capacity ratio	0.52											
Actuated Cycle Length (s)	110.0			Sum of lost time (s)			8.0					
Intersection Capacity Utilization	58.5%			ICU Level of Service			B					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Avenue

Cumulative AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Volume (veh/h)	28	217	52	186	698	39	92	14	82	30	9	56
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	236	57	202	759	42	100	15	89	33	10	61
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	801			292			1554			1530		
vC1, stage 1 conf vol							264			1489		
vC2, stage 2 conf vol							1530			1538		
vCu, unblocked vol	801			292			1554			1530		
tC, single (s)	4.1			4.1			7.1			6.5		
tC, 2 stage (s)							6.2			7.1		
tF (s)	2.2			2.2			3.5			4.0		
p0 queue free %	96			84			0			84		
cM capacity (veh/h)	822			1269			61			95		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1					
Volume Total	30	292	202	801	115	89	103					
Volume Left	30	0	202	0	100	0	33					
Volume Right	0	57	0	42	0	89	61					
cSH	822	1700	1269	1700	64	775	140					
Volume to Capacity	0.04	0.17	0.16	0.47	1.79	0.12	0.74					
Queue Length (ft)	3	0	14	0	262	10	108					
Control Delay (s)	9.5	0.0	8.4	0.0	515.9	10.3	81.4					
Lane LOS	A	A	A	F	B	F	F					
Approach Delay (s)	0.9			1.7			295.3			81.4		
Approach LOS	D			D			F			F		
Intersection Summary												
Average Delay	43.3											
Intersection Capacity Utilization	64.9%			ICU Level of Service			C					
Analysis Period (min)	15											

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Road

Cumulative PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔		↔		↔		↔		↔	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		0.95		0.95		1.00		0.95	
Frt	0.90		1.00		1.00		1.00		1.00		1.00	
Flt Protected	0.99		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (prot)	1651		1770		3539		3528		3528		3528	
Flt Permitted	0.96		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (perm)	1602		1770		3539		3528		3528		3528	
Volume (vph)	6	0	21	0	0	0	19	2257	0	0	861	18
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	0	23	0	0	0	21	2453	0	0	936	20
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	11	0	0	0	0	21	2453	0	0	955	0
Turn Type	Prot		Prot		Prot		Prot		Prot		Prot	
Protected Phases	7	4	3		8	5		2	6		6	
Permitted Phases	7		4		3		8		5		2	
Actuated Green, G (s)	18.0		2.8		84.0		77.2		77.2		77.2	
Effective Green, g (s)	18.0		2.8		84.0		77.2		77.2		77.2	
Actuated g/C Ratio	0.16		0.03		0.76		0.70		0.70		0.70	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	262		45		2703		2476		2476		2476	
v/s Ratio Prot	0.01		c0.69		0.27		0.27		0.27		0.27	
v/s Ratio Perm	c0.02		0.01		0.01		0.01		0.01		0.01	
v/c Ratio	0.04		0.07		0.01		0.16		0.95		0.02	
Uniform Delay, d1	38.7		39.9		39.6		53.9		13.7		4.5	
Progression Factor	1.00		1.00		1.00		1.03		0.83		0.98	
Incremental Delay, d2	0.1		0.1		0.0		2.3		5.9		0.0	
Delay (s)	38.8		40.0		39.6		57.6		17.3		4.4	
Level of Service	D		D		E		B		A		A	
Approach Delay (s)	38.8		39.8		39.8		17.2		4.7		4.7	
Approach LOS	D		D		D		B		A		A	
Intersection Summary												
HCM Average Control Delay	12.1		HCM Level of Service		B		B		B		B	
HCM Volume to Capacity ratio	0.77		HCM Level of Service		B		B		B		B	
Actuated Cycle Length (s)	110.0		Sum of lost time (s)		8.0		8.0		8.0		8.0	
Intersection Capacity Utilization	72.4%		ICU Level of Service		C		C		C		C	
Analysis Period (min)	15		ICU Level of Service		C		C		C		C	
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Green Valley Drive & Pleasant Hill Road

Cumulative PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔		↔		↔		↔		↔	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		1.00		0.95		1.00		0.95	
Frt	0.97		1.00		0.85		1.00		0.85		1.00	
Flt Protected	0.96		0.95		1.00		0.95		1.00		1.00	
Satd. Flow (prot)	1735		1770		1583		1770		3539		1583	
Flt Permitted	0.87		0.75		1.00		0.95		1.00		0.95	
Satd. Flow (perm)	1571		1397		1583		1770		3539		1583	
Volume (vph)	8	0	3	13	0	17	3	2205	23	12	839	4
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	0	3	14	0	18	3	2397	25	13	912	4
RTOR Reduction (vph)	0	3	0	0	0	15	0	0	5	0	0	1
Lane Group Flow (vph)	0	9	0	0	14	3	3	2397	20	13	912	3
Turn Type	Prot		Prot		Perm		Prot		Perm		Perm	
Protected Phases	7	4	3		8	5		2	1		6	
Permitted Phases	7		4		3		8		5		2	
Actuated Green, G (s)	16.8		16.8		16.8		1.2		78.8		78.8	
Effective Green, g (s)	16.8		16.8		16.8		1.2		78.8		78.8	
Actuated g/C Ratio	0.15		0.15		0.15		0.01		0.72		0.72	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	240		213		242		19		2535		1134	
v/s Ratio Prot	0.01		0.01		0.01		0.00		c0.68		c0.01	
v/s Ratio Perm	0.01		0.01		0.01		0.02		0.02		0.00	
v/c Ratio	0.04		0.07		0.01		0.16		0.95		0.02	
Uniform Delay, d1	39.7		39.9		39.6		53.9		13.7		4.5	
Progression Factor	1.00		1.00		1.00		1.03		0.83		0.98	
Incremental Delay, d2	0.1		0.1		0.0		2.3		5.9		0.0	
Delay (s)	39.8		40.0		39.6		57.6		17.3		4.4	
Level of Service	D		D		E		B		A		A	
Approach Delay (s)	39.8		39.8		39.8		17.2		4.7		4.7	
Approach LOS	D		D		D		B		A		A	
Intersection Summary												
HCM Average Control Delay	14.1		HCM Level of Service		B		B		B		B	
HCM Volume to Capacity ratio	0.78		HCM Level of Service		B		B		B		B	
Actuated Cycle Length (s)	110.0		Sum of lost time (s)		12.0		12.0		12.0		12.0	
Intersection Capacity Utilization	77.6%		ICU Level of Service		D		D		D		D	
Analysis Period (min)	15		ICU Level of Service		D		D		D		D	
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
3: Reliez Valley Road & Pleasant Hill Road

Cumulative PM
6/17/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕	↕	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	22	111	197	2216	854	28
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	121	214	2409	928	30
RTOR Reduction (vph)	0	113	0	0	0	11
Lane Group Flow (vph)	24	8	214	2409	928	19
Turn Type	Perm		Prot		Perm	
Protected Phases	4		5		2	
Permitted Phases	4		6		6	
Actuated Green, G (s)	7.4	7.4	22.0	94.6	68.6	68.6
Effective Green, g (s)	7.4	7.4	22.0	94.6	68.6	68.6
Actuated g/C Ratio	0.07	0.07	0.20	0.86	0.62	0.62
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	119	106	354	3044	2207	987
v/s Ratio Prot	0.01		0.12		c0.68	
v/s Ratio Perm	0.08		0.26		0.02	
v/c Ratio	0.20	0.08	0.60	0.79	0.42	0.02
Uniform Delay, d1	48.5	48.1	40.0	3.4	10.6	7.9
Progression Factor	1.00	1.00	1.00	1.00	1.33	2.93
Incremental Delay, d2	0.8	0.3	2.9	2.2	0.6	0.0
Delay (s)	49.3	48.4	42.9	5.6	14.7	23.1
Level of Service	D	D	D	A	B	C
Approach Delay (s)	48.6		8.6		14.9	
Approach LOS	D		A		B	
Intersection Summary						
HCM Average Control Delay	11.8		HCM Level of Service		B	
HCM Volume to Capacity ratio	0.82		Sum of lost time (s)		8.0	
Actuated Cycle Length (s)	110.0		ICU Level of Service		C	
Intersection Capacity Utilization	71.3%		Analysis Period (min)		15	
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
4: Spring Hill Road & Pleasant Hill Road

Cumulative PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↕	↕	↔	↕	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	0.97	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.96	1.00	0.96	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1781	1583	1741	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.79	1.00	0.75	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1469	1583	1366	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	21	2	94	24	0	6	133	2399	36	15	1006	26
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	2	102	26	0	7	145	2608	39	16	1093	28
RTOR Reduction (vph)	0	0	96	0	7	0	0	0	5	0	0	7
Lane Group Flow (vph)	0	25	6	0	26	0	145	2608	34	16	1093	21
Turn Type	Perm		Perm		Perm		Prot		Perm		Perm	
Protected Phases	4		4		8		5		2		1	
Permitted Phases	4		8		8		5		2		6	
Actuated Green, G (s)	8.2		8.2		8.2		25.4		126.5		104.4	
Effective Green, g (s)	8.2		8.2		8.2		25.4		126.5		104.4	
Actuated g/C Ratio	0.05		0.05		0.05		0.17		0.84		0.70	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	80		87		75		300		2985		1102	
v/s Ratio Prot	0.02		0.06		0.02		0.08		c0.74		c0.31	
v/s Ratio Perm	0.31		0.06		0.35		0.48		0.87		0.02	
v/c Ratio	0.31		0.06		0.35		0.48		0.87		0.02	
Uniform Delay, d1	68.2		67.3		68.3		56.4		7.0		10.0	
Progression Factor	1.00		1.00		1.00		0.77		0.14		0.00	
Incremental Delay, d2	2.2		0.3		2.8		0.1		0.4		0.0	
Delay (s)	70.4		67.6		71.2		43.5		1.4		10.6	
Level of Service	E		E		E		D		A		A	
Approach Delay (s)	68.1		71.2		71.2		3.5		3.5		11.5	
Approach LOS	E		E		E		A		A		B	
Intersection Summary												
HCM Average Control Delay	8.3			HCM Level of Service			A					
HCM Volume to Capacity ratio	0.89			Sum of lost time (s)			12.0					
Actuated Cycle Length (s)	150.0			ICU Level of Service			E					
Intersection Capacity Utilization	88.0%			Analysis Period (min)			15					
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Road

Cumulative PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1685		1681	1746	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1685		1681	1746	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	543	69	121	111	66	121	395	2018	78	93	862	102
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	590	75	132	121	72	132	429	2193	85	101	937	111
RTOR Reduction (vph)	0	43	0	0	0	91	0	0	19	0	0	58
Lane Group Flow (vph)	590	164	0	94	99	41	429	2193	66	101	937	53
Turn Type	Split		Split		Perm		Prot		Prot		Perm	
Protected Phases	4	4	8		8	5		2	1		6	
Permitted Phases			8		8		2		2		6	
Actuated Green, G (s)	22.0	22.0	13.1	13.1	13.1	47.0	87.7	87.7	11.2	51.9	51.9	
Effective Green, g (s)	22.0	22.0	13.1	13.1	13.1	47.0	87.7	87.7	11.2	51.9	51.9	
Actuated g/C Ratio	0.15	0.15	0.09	0.09	0.09	0.31	0.58	0.58	0.07	0.35	0.35	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	504	247	147	152	138	555	2069	926	132	1224	548	
v/s Ratio Prot	c0.17	0.12	0.06	0.06		0.24	c0.62		0.06	c0.26		
v/s Ratio Perm					0.08			0.05				0.07
v/c Ratio	1.17	0.67	0.64	0.65	0.30	0.77	1.06	0.07	0.77	0.77	0.10	
Uniform Delay, d1	64.0	60.5	66.2	66.2	64.1	46.7	31.1	13.5	68.1	43.6	33.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.38	0.87	0.83	1.18	
Incremental Delay, d2	96.3	6.6	8.8	9.6	1.2	6.3	37.5	0.1	21.3	4.3	0.3	
Delay (s)	160.3	67.1	75.0	75.8	65.3	53.0	67.4	18.8	80.7	40.4	39.5	
Level of Service	F	E	E	E	E	D	E	B	F	D	D	
Approach Delay (s)	136.1		71.3		63.5		43.9					
Approach LOS	F		E		E		D					
Intersection Summary												
HCM Average Control Delay	71.1		HCM Level of Service		E							
HCM Volume to Capacity ratio	1.05											
Actuated Cycle Length (s)	150.0		Sum of lost time (s)		16.0							
Intersection Capacity Utilization	94.6%		ICU Level of Service		F							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Blvd & Pleasant Hill Road

Cumulative PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3304		1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3304		1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	446	261	208	0	0	0	224	1088	445	0	719	390
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	485	284	226	0	0	0	243	1183	484	0	782	424
RTOR Reduction (vph)	0	111	0	0	0	0	0	0	148	0	0	238
Lane Group Flow (vph)	485	399	0	0	0	0	243	1183	336	0	782	186
Turn Type	Prot		Prot		Perm		Prot		Perm		Perm	
Protected Phases	7	4			5		2			6		
Permitted Phases			2		2		2		2		6	
Actuated Green, G (s)	44.6	44.6			37.0		97.4	97.4	56.4		56.4	
Effective Green, g (s)	44.6	44.6			37.0		97.4	97.4	56.4		56.4	
Actuated g/C Ratio	0.30	0.30			0.25		0.65	0.65	0.38		0.38	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	526	982			437		2298	1028	1331		595	
v/s Ratio Prot	c0.27	0.15			c0.14		0.33		0.22			
v/s Ratio Perm								0.31			0.27	
v/c Ratio	0.92	0.41			0.56		0.51	0.33	0.59		0.31	
Uniform Delay, d1	51.0	42.1			49.3		13.9	11.7	37.5		33.1	
Progression Factor	1.00	1.00			0.95		0.83	0.36	0.34		0.13	
Incremental Delay, d2	21.8	0.3			1.4		0.7	0.7	1.3		0.9	
Delay (s)	72.8	42.4			48.3		12.2	5.0	13.9		5.2	
Level of Service	E	D			D		B	A	B		A	
Approach Delay (s)	57.2		0.0		15.0		10.8					
Approach LOS	E		A		B		B					
Intersection Summary												
HCM Average Control Delay	24.0		HCM Level of Service		C							
HCM Volume to Capacity ratio	0.74											
Actuated Cycle Length (s)	150.0		Sum of lost time (s)		12.0							
Intersection Capacity Utilization	67.0%		ICU Level of Service		C							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
7: EB 24 Off Ramp & Pleasant Hill Road

Cumulative PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85
Flt Protected	0.98	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95
Satd. Flow (prot)	1830	1583	1770	1583	1830	1583	1830	1583	1770	1583	1830	1583
Flt Permitted	0.98	1.00	0.43	1.00	1.00	0.12	1.00	0.12	1.00	0.12	1.00	0.12
Satd. Flow (perm)	1830	1583	804	1583	1830	804	1583	804	1583	804	1583	804
Volume (vph)	38	69	189	18	0	34	0	1513	29	131	678	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	75	205	20	0	37	0	1645	32	142	737	0
RTOR Reduction (vph)	0	0	185	0	0	33	0	1	0	0	0	0
Lane Group Flow (vph)	0	116	20	20	0	4	0	1676	0	142	737	0
Turn Type	Perm	Perm	custom	custom	custom	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4			8			2			6		
Permitted Phases	4	4	8	8			6			6		
Actuated Green, G (s)	14.5	14.5	14.5	14.5			127.5			127.5		
Effective Green, g (s)	14.5	14.5	14.5	14.5			127.5			127.5		
Actuated g/C Ratio	0.10	0.10	0.10	0.10			0.85			0.85		
Clearance Time (s)	4.0	4.0	4.0	4.0			4.0			4.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0			3.0		
Lane Grp Cap (vph)	177	153	78	153			3000			197		
v/s Ratio Prot				0.48			0.21			0.21		
v/s Ratio Perm	0.06	0.13	0.02	0.02			c0.61			c0.61		
v/c Ratio	0.66	0.13	0.26	0.02			0.56			0.72		
Uniform Delay, d1	65.3	62.0	62.8	61.3			3.2			4.4		
Progression Factor	1.00	1.00	1.00	1.00			1.00			1.99		
Incremental Delay, d2	8.4	0.4	1.7	0.1			0.8			17.6		
Delay (s)	73.8	62.4	64.5	61.4			4.0			26.3		
Level of Service	E	E	E	E			A			C		
Approach Delay (s)	66.5			62.5			4.0			4.9		
Approach LOS	E			E			A			A		
Intersection Summary												
HCM Average Control Delay	12.2			HCM Level of Service			B			B		
HCM Volume to Capacity ratio	0.78			0.78			0.78			0.78		
Actuated Cycle Length (s)	150.0			Sum of lost time (s)			8.0			8.0		
Intersection Capacity Utilization	72.4%			ICU Level of Service			C			C		
Analysis Period (min)	15			15			15			15		
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Avenue

Cumulative PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Volume (veh/h)	50	662	53	113	316	92	62	9	116	66	14	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	720	58	123	343	100	67	10	126	72	15	23
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	443			777			1477			1546		
vC1, stage 1 conf vol	443			777			1477			1546		
vC2, stage 2 conf vol	443			777			1477			1546		
vCu, unblocked vol	4.1			4.1			7.1			6.5		
tC, single (s)	4.1			4.1			7.1			6.5		
tC, 2 stage (s)	4.1			4.1			7.1			6.5		
tF (s)	2.2			2.2			3.5			4.0		
p0 queue free %	95			85			11			89		
cM capacity (veh/h)	1117			839			76			93		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1					
Volume Total	54	777	123	443	77	126	110					
Volume Left	54	0	123	0	67	0	72					
Volume Right	0	58	0	100	0	126	23					
cSH	1117	1700	839	1700	78	412	76					
Volume to Capacity	0.05	0.46	0.15	0.26	0.99	0.31	1.44					
Queue Length (ft)	4	0	13	0	134	32	221					
Control Delay (s)	8.4	0.0	10.0	0.0	193.8	17.5	353.4					
Lane LOS	A	B	B	F	C	F	F					
Approach Delay (s)	0.5		2.2		84.5		353.4					
Approach LOS	A		B		F		F					
Intersection Summary												
Average Delay	33.7			33.7			33.7			33.7		
Intersection Capacity Utilization	66.7%			66.7%			66.7%			66.7%		
Analysis Period (min)	15			15			15			15		

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Rd

Cumulative + Project AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔		↔		↔		↔		↔	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		0.95		0.95		1.00		0.95	
Flt Protected	1.00		1.00		0.95		1.00		1.00		1.00	
Satd. Flow (prot)	1611		1611		1770		3539		3536		3536	
Flt Permitted	1.00		1.00		0.95		1.00		1.00		1.00	
Satd. Flow (perm)	1611		1611		1770		3539		3536		3536	
Volume (vph)	0	0	37	0	0	0	16	633	0	0	1589	10
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	40	0	0	0	17	688	0	0	1727	11
RTOR Reduction (vph)	0	39	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1	0	0	0	0	17	688	0	0	1738	0
Turn Type	Prot		Prot		Prot		Prot		Prot		Prot	
Protected Phases	7	4	3		8	5		2	6		6	
Permitted Phases	7		4		3		8		5		2	
Actuated Green, G (s)	3.3		3.1		98.7		91.6		3.3		3.0	
Effective Green, g (s)	3.3		3.1		98.7		91.6		3.3		3.0	
Actuated g/C Ratio	0.03		0.03		0.90		0.83		0.03		0.77	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	48		50		3175		2945		48		48	
v/s Ratio Prot	c0.02		c0.01		0.19		c0.49		c0.02		c0.49	
v/s Ratio Perm	0.03		0.34		0.22		0.59		0.03		0.59	
Uniform Delay, d1	51.8		52.4		0.7		3.0		51.8		3.0	
Progression Factor	1.00		0.79		0.60		1.00		1.00		1.00	
Incremental Delay, d2	0.2		3.9		0.2		0.9		0.2		0.9	
Delay (s)	52.0		45.5		0.6		3.9		52.0		3.9	
Level of Service	D		D		A		A		D		A	
Approach Delay (s)	52.0		0.0		1.7		3.9		52.0		3.9	
Approach LOS	D		A		A		A		D		A	
Intersection Summary												
HCM Average Control Delay	4.0		HCM Level of Service		A		4.0		HCM Level of Service		A	
HCM Volume to Capacity ratio	0.59		HCM Volume to Capacity ratio		0.60		0.60		HCM Volume to Capacity ratio		0.60	
Actuated Cycle Length (s)	110.0		Sum of lost time (s)		12.0		110.0		Sum of lost time (s)		8.0	
Intersection Capacity Utilization	54.2%		ICU Level of Service		A		54.2%		ICU Level of Service		B	
Analysis Period (min)	15		Analysis Period (min)		15		15		Analysis Period (min)		15	
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Green Valley Drive & Pleasant Hill Rd

Cumulative + Project AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔		↔		↔		↔		↔	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		1.00		0.95		1.00		0.95	
Flt Protected	0.99		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (prot)	1659		1770		1583		3539		1583		1583	
Flt Permitted	0.96		0.75		1.00		1.00		0.95		1.00	
Satd. Flow (perm)	1618		1403		1583		3539		1583		1583	
Volume (vph)	2	0	5	18	0	10	0	710	13	8	1767	1
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	0	5	20	0	11	0	772	14	9	1921	1
RTOR Reduction (vph)	0	4	0	0	0	9	0	0	4	0	0	0
Lane Group Flow (vph)	0	3	0	0	20	2	0	772	10	9	1921	1
Turn Type	Prot		Prot		Perm		Prot		Perm		Perm	
Protected Phases	7	4	3		8	5		2	1		6	
Permitted Phases	7		4		3		8		5		2	
Actuated Green, G (s)	16.8		16.8		16.8		80.0		80.0		1.2	
Effective Green, g (s)	16.8		16.8		16.8		80.0		80.0		1.2	
Actuated g/C Ratio	0.15		0.15		0.15		0.73		0.73		0.01	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	247		214		242		2574		1151		19	
v/s Ratio Prot	c0.02		c0.01		0.01		0.22		0.01		c0.54	
v/s Ratio Perm	0.00		c0.01		0.01		0.01		0.01		0.00	
Uniform Delay, d1	39.6		40.1		39.5		5.2		4.1		54.1	
Progression Factor	1.00		1.00		1.00		1.25		1.89		1.21	
Incremental Delay, d2	0.0		0.2		0.0		0.3		0.0		15.3	
Delay (s)	39.6		40.2		39.5		6.8		7.8		80.7	
Level of Service	D		D		D		A		A		F	
Approach Delay (s)	39.6		40.0		6.9		5.9		39.6		5.9	
Approach LOS	D		D		A		A		D		A	
Intersection Summary												
HCM Average Control Delay	6.6		HCM Level of Service		A		6.6		HCM Level of Service		A	
HCM Volume to Capacity ratio	0.60		HCM Volume to Capacity ratio		0.60		0.60		HCM Volume to Capacity ratio		0.60	
Actuated Cycle Length (s)	110.0		Sum of lost time (s)		8.0		110.0		Sum of lost time (s)		8.0	
Intersection Capacity Utilization	58.8%		ICU Level of Service		B		58.8%		ICU Level of Service		B	
Analysis Period (min)	15		Analysis Period (min)		15		15		Analysis Period (min)		15	
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
3: Reliez Valley Road & Pleasant Hill Rd

Cumulative + Project AM
6/17/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	24	242	102	712	1878	11
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	263	111	774	2041	12
RTOR Reduction (vph)	0	168	0	0	0	3
Lane Group Flow (vph)	26	95	111	774	2041	9
Turn Type	Perm	Perm	Prot		Perm	
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	11.5	11.5	11.4	90.5	75.1	75.1
Effective Green, g (s)	11.5	11.5	11.4	90.5	75.1	75.1
Actuated g/C Ratio	0.10	0.10	0.10	0.82	0.68	0.68
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	185	165	183	2912	2416	1081
v/s Ratio Prot	0.01		c0.06	0.22	c0.58	
v/s Ratio Perm		0.17				0.01
v/c Ratio	0.14	0.57	0.61	0.27	0.84	0.01
Uniform Delay, d1	44.8	46.9	47.2	2.2	13.1	5.6
Progression Factor	1.00	1.00	0.98	0.93	0.75	1.26
Incremental Delay, d2	0.3	4.8	5.5	0.2	3.0	0.0
Delay (s)	45.1	51.7	51.8	2.3	12.8	7.0
Level of Service	D	D	D	A	B	A
Approach Delay (s)	51.1			8.5	12.8	
Approach LOS	D			A	B	
Intersection Summary						
HCM Average Control Delay		15.0		HCM Level of Service		B
HCM Volume to Capacity ratio		0.90				
Actuated Cycle Length (s)		110.0		Sum of lost time (s)	12.0	
Intersection Capacity Utilization		73.6%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
4: Spring Hill Road & Pleasant Hill Rd

Cumulative + Project AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	0.93	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.96	1.00	0.98	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1782	1583	1696	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.73	1.00	0.85	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1353	1583	1475	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	28	3	148	25	3	29	102	712	27	11	2176	22
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	3	161	27	3	32	111	774	29	12	2365	24
RTOR Reduction (vph)	0	0	107	0	29	0	0	0	6	0	0	6
Lane Group Flow (vph)	0	33	54	0	33	0	111	774	23	12	2365	18
Turn Type	Perm	Perm	Perm	Perm	Perm	Prot	Perm	Prot	Perm	Prot	Perm	Perm
Protected Phases		4		8		5	2		2	1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	9.5	9.5	9.5	10.2	87.6	87.6	0.9	78.3	78.3			
Effective Green, g (s)	9.5	9.5	9.5	10.2	87.6	87.6	0.9	78.3	78.3			
Actuated g/C Ratio	0.09	0.09	0.09	0.09	0.80	0.80	0.01	0.71	0.71			
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	117	137	127	164	2818	1261	14	2519	1127			
v/s Ratio Prot				c0.06	0.22		0.01	c0.67				
v/s Ratio Perm	0.02	0.10	0.04			0.02			0.02			0.02
v/c Ratio	0.28	0.39	0.26	0.68	0.27	0.02	0.86	0.94	0.02			
Uniform Delay, d1	47.1	47.5	47.0	48.3	2.9	2.3	54.5	13.8	4.6			
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.29	0.26	0.04			
Incremental Delay, d2	1.3	1.9	1.1	10.5	0.2	0.0	120.9	5.4	0.0			
Delay (s)	48.4	49.4	48.0	58.8	3.2	2.3	191.0	9.0	0.2			
Level of Service	D	D	D	E	A	A	F	A	A			
Approach Delay (s)	49.2		48.0		9.9			9.8				
Approach LOS	D		D		A			A				
Intersection Summary												
HCM Average Control Delay		12.6		HCM Level of Service				B				
HCM Volume to Capacity ratio		0.93										
Actuated Cycle Length (s)		110.0		Sum of lost time (s)		12.0						
Intersection Capacity Utilization		85.8%		ICU Level of Service				E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Rd

Cumulative + Project AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	1752		1681	1734	1583	1770	3539	1583	1770	4837	
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	1752		1681	1734	1583	1770	3539	1583	1770	4837	
Volume (vph)	115	67	44	186	80	35	117	460	135	160	1643	793
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	73	48	202	87	38	127	500	147	174	1786	862
RTOR Reduction (vph)	0	22	0	0	0	33	0	0	79	0	69	0
Lane Group Flow (vph)	125	99	0	141	148	5	127	500	68	174	2579	0
Turn Type	Split			Split		Perm	Prot		Perm	Prot		
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases					8			2				
Actuated Green, G (s)	11.3	11.3		13.7	13.7	13.7	9.8	51.2	51.2	17.8	59.2	
Effective Green, g (s)	11.3	11.3		13.7	13.7	13.7	9.8	51.2	51.2	17.8	59.2	
Actuated g/C Ratio	0.10	0.10		0.12	0.12	0.12	0.09	0.47	0.47	0.16	0.54	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	353	180		209	216	197	158	1647	737	286	2603	
v/s Ratio Prot	0.04	c0.07		0.08	c0.09		c0.07	0.14		0.10	c0.55	
v/s Ratio Perm					0.02			0.09				
v/c Ratio	0.35	0.55		0.67	0.69	0.02	0.80	0.30	0.09	0.61	0.99	
Uniform Delay, d1	46.0	46.9		46.0	46.1	42.3	49.2	18.3	16.4	42.9	25.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.92	0.77	0.51	0.83	0.63	
Incremental Delay, d2	0.6	3.4		8.3	8.7	0.0	23.8	0.5	0.2	2.2	11.6	
Delay (s)	46.6	50.3		54.3	54.8	42.3	69.0	14.6	8.6	37.6	27.4	
Level of Service	D	D		D	D	D	E	B	A	D	C	
Approach Delay (s)	48.4			53.1			22.4			28.0		
Approach LOS	D			D			C			C		
Intersection Summary												
HCM Average Control Delay	30.1			HCM Level of Service				C				
HCM Volume to Capacity ratio	0.91											
Actuated Cycle Length (s)	110.0			Sum of lost time (s)				16.0				
Intersection Capacity Utilization	79.9%			ICU Level of Service				D				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Blvd & Pleasant Hill Rd

Cumulative + Project AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3423		1770	3539	1583	1770	3539	1583	1770	4837	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3423		1770	3539	1583	1770	3539	1583	1770	4837	
Volume (vph)	243	234	65	0	0	0	242	825	429	0	603	605
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	264	254	71	0	0	0	263	897	466	0	655	658
RTOR Reduction (vph)	0	25	0	0	0	0	0	0	79	0	0	370
Lane Group Flow (vph)	264	300	0	0	0	0	263	897	387	0	655	288
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4					5	2			6	
Permitted Phases								2				6
Actuated Green, G (s)	20.9	20.9					29.0	81.1	81.1		48.1	48.1
Effective Green, g (s)	20.9	20.9					29.0	81.1	81.1		48.1	48.1
Actuated g/C Ratio	0.19	0.19					0.26	0.74	0.74		0.44	0.44
Clearance Time (s)	4.0	4.0					4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0					3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	336	650					467	2609	1167		1548	692
v/s Ratio Prot	c0.15	0.09					c0.15	0.25			0.19	
v/s Ratio Perm									0.29			0.42
v/c Ratio	0.79	0.46					0.56	0.34	0.33		0.42	0.42
Uniform Delay, d1	42.4	39.6					35.0	5.1	5.0		21.4	21.3
Progression Factor	1.00	1.00					0.98	0.72	0.43		1.00	1.00
Incremental Delay, d2	11.4	0.5					1.4	0.3	0.7		0.9	1.8
Delay (s)	53.9	40.1					35.8	4.0	2.9		22.2	23.1
Level of Service	D	D					D	A	A		C	C
Approach Delay (s)	46.3			0.0			8.8			22.7		
Approach LOS	D			A			A			C		
Intersection Summary												
HCM Average Control Delay	20.2			HCM Level of Service				C				
HCM Volume to Capacity ratio	0.80											
Actuated Cycle Length (s)	110.0			Sum of lost time (s)				12.0				
Intersection Capacity Utilization	57.5%			ICU Level of Service				B				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
7: EB 24 Off Ramp & Pleasant Hill Rd

Cumulative + Project AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	0.85	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00	
Flt Protected	0.98	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1833	1583	1770	1583	1770	1583	3530	3530	1770	1770	3539	3539	
Flt Permitted	0.98	1.00	0.72	1.00	1.00	1.00	1.00	1.00	0.18	1.00	0.18	1.00	
Satd. Flow (perm)	1833	1583	1342	1583	1770	1583	3530	3530	339	3539	339	3539	
Volume (vph)	17	35	143	13	0	147	0	1220	22	87	549	0	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	18	38	155	14	0	160	0	1326	24	95	597	0	
RTOR Reduction (vph)	0	0	139	0	0	58	0	1	0	0	0	0	
Lane Group Flow (vph)	0	56	16	14	0	102	0	1349	0	95	597	0	
Turn Type	Perm	Perm	custom	custom	custom	Perm	Perm	Perm	Perm	Perm	Perm	Perm	
Protected Phases	4			2			6			6			
Permitted Phases	4	4	8	8			6			6			
Actuated Green, G (s)	11.6	11.6	11.6	11.6			90.4			90.4			
Effective Green, g (s)	11.6	11.6	11.6	11.6			90.4			90.4			
Actuated g/C Ratio	0.11	0.11	0.11	0.11			0.82			0.82			
Clearance Time (s)	4.0	4.0	4.0	4.0			4.0			4.0			
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0			3.0			
Lane Grp Cap (vph)	193	167	142	167			2901			279			
v/s Ratio Prot				c0.38			0.28			0.17			
v/s Ratio Perm	0.03	0.10	0.01	0.10			0.28			0.21			
v/c Ratio	0.29	0.10	0.10	0.61			0.47			0.34			
Uniform Delay, d1	45.4	44.5	44.5	47.0			2.8			2.4			
Progression Factor	1.00	1.00	1.00	1.00			1.00			2.06			
Incremental Delay, d2	0.8	0.3	0.3	6.2			0.5			3.1			
Delay (s)	46.2	44.7	44.8	53.2			3.4			8.0			
Level of Service	D	D	D	D			A			A			
Approach Delay (s)	45.1		52.5			3.4			1.9			A	
Approach LOS	D		D			A			A			A	
Intersection Summary													
HCM Average Control Delay	10.1			HCM Level of Service			B						
HCM Volume to Capacity ratio	0.52												
Actuated Cycle Length (s)	110.0			Sum of lost time (s)			8.0						
Intersection Capacity Utilization	58.7%			ICU Level of Service			B						
Analysis Period (min)	15												
c Critical Lane Group													

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Ave

Cumulative + Project AM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Sign Control	Free			Free			Stop			Stop			
Grade	0%			0%			0%			0%			
Volume (veh/h)	28	224	52	186	718	39	92	14	82	30	9	56	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	30	243	57	202	780	42	100	15	89	33	10	61	
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type							None			None			
Median storage (veh)													
Upstream signal (ft)													
pX, platoon unblocked													
vC, conflicting volume	823			300			1583			1560			
vC1, stage 1 conf vol							272			1518			
vC2, stage 2 conf vol							1567			802			
vCu, unblocked vol	823			300			1583			1560			
tC, single (s)	4.1			4.1			7.1			6.5			
tC, 2 stage (s)							6.2			7.1			
tF (s)	2.2			2.2			3.5			4.0			
p0 queue free %	96			84			0			83			
cM capacity (veh/h)	807			1261			58			91			
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1						
Volume Total	30	300	202	823	115	89	103						
Volume Left	30	0	202	0	100	0	33						
Volume Right	0	57	0	42	0	89	61						
cSH	807	1700	1261	1700	61	767	133						
Volume to Capacity	0.04	0.18	0.16	0.48	1.89	0.12	0.77						
Queue Length (ft)	3	0	14	0	270	10	116						
Control Delay (s)	9.6	0.0	8.4	0.0	567.1	10.3	90.8						
Lane LOS	A	A	A	F	B	F	F						
Approach Delay (s)	0.9		1.7			324.3			90.8				
Approach LOS	F		F			F			F				
Intersection Summary													
Average Delay	46.7												
Intersection Capacity Utilization	66.0%			ICU Level of Service			C						
Analysis Period (min)	15												

HCM Signalized Intersection Capacity Analysis
1: Rancho View Drive & Pleasant Hill Rd

Cumulative + Project PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔		↔		↔		↔		↔	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		1.00		0.95		0.95		0.95	
Frt	0.90		1.00		1.00		1.00		1.00		1.00	
Flt Protected	0.99		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (prot)	1651		1770		3539		3528		3528		3528	
Flt Permitted	0.96		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (perm)	1602		1770		3539		3528		3528		3528	
Volume (vph)	6	0	21	0	0	0	19	2265	0	0	875	18
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	0	23	0	0	0	21	2462	0	0	951	20
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	11	0	0	0	0	21	2462	0	0	970	0
Turn Type	Prot		Prot		Prot		Prot		Prot		Prot	
Protected Phases	7	4	3		8	5		2	6		6	
Permitted Phases	7		4		3		8		5		2	
Actuated Green, G (s)	18.0		2.8		84.0		77.2		77.2		77.2	
Effective Green, g (s)	18.0		2.8		84.0		77.2		77.2		77.2	
Actuated g/C Ratio	0.16		0.03		0.76		0.70		0.70		0.70	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	262		45		2703		2476		2476		2476	
v/s Ratio Prot	0.01		c0.70		0.28		0.28		0.28		0.28	
v/s Ratio Perm	c0.02		0.47		0.91		0.39		0.39		0.39	
v/c Ratio	0.04		0.47		0.91		0.39		0.39		0.39	
Uniform Delay, d1	38.7		52.9		10.1		6.7		6.7		6.7	
Progression Factor	1.00		0.89		1.05		1.00		1.00		1.00	
Incremental Delay, d2	0.1		3.5		2.9		0.5		0.5		0.5	
Delay (s)	38.8		50.3		13.5		7.2		7.2		7.2	
Level of Service	D		D		B		A		A		A	
Approach Delay (s)	38.8		0.0		13.9		7.2		7.2		7.2	
Approach LOS	D		A		B		A		A		A	
Intersection Summary												
HCM Average Control Delay	12.2		HCM Level of Service		B		B		B		B	
HCM Volume to Capacity ratio	0.77		Sum of lost time (s)		8.0		8.0		8.0		8.0	
Actuated Cycle Length (s)	110.0		ICU Level of Service		C		C		C		C	
Intersection Capacity Utilization	72.6%		Analysis Period (min)		15		15		15		15	
Analysis Period (min)	15		c Critical Lane Group		c		c		c		c	
c Critical Lane Group	c		c		c		c		c		c	

HCM Signalized Intersection Capacity Analysis
2: Green Valley Drive & Pleasant Hill Rd

Cumulative + Project PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔		↔		↔		↔		↔	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Lane Util. Factor	1.00		1.00		1.00		0.95		0.95		0.95	
Frt	0.97		1.00		0.85		1.00		0.85		1.00	
Flt Protected	0.96		0.95		1.00		0.95		1.00		0.95	
Satd. Flow (prot)	1735		1770		1583		1770		3539		1583	
Flt Permitted	0.87		0.75		1.00		0.95		1.00		0.95	
Satd. Flow (perm)	1571		1397		1583		1770		3539		1583	
Volume (vph)	8	0	3	13	0	17	3	2213	23	12	853	4
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	0	3	14	0	18	3	2405	25	13	927	4
RTOR Reduction (vph)	0	3	0	0	0	15	0	0	5	0	0	1
Lane Group Flow (vph)	0	9	0	0	14	3	3	2405	20	13	927	3
Turn Type	Prot		Prot		Perm		Prot		Perm		Perm	
Protected Phases	7	4	3		8	5		2	1		6	
Permitted Phases	7		4		3		8		5		2	
Actuated Green, G (s)	16.8		16.8		16.8		1.2		78.8		80.0	
Effective Green, g (s)	16.8		16.8		16.8		1.2		78.8		80.0	
Actuated g/C Ratio	0.15		0.15		0.15		0.01		0.72		0.73	
Clearance Time (s)	4.0		4.0		4.0		4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	240		213		242		19		2535		1151	
v/s Ratio Prot	0.01		0.01		0.01		0.00		c0.68		0.26	
v/s Ratio Perm	0.01		0.07		0.01		0.16		0.95		0.02	
v/c Ratio	0.04		0.07		0.01		0.16		0.95		0.02	
Uniform Delay, d1	39.7		39.9		39.6		53.9		13.8		4.1	
Progression Factor	1.00		1.00		1.00		1.03		0.83		0.69	
Incremental Delay, d2	0.1		0.1		0.0		2.3		6.1		0.4	
Delay (s)	39.8		40.0		39.6		57.6		17.6		3.9	
Level of Service	D		D		D		E		B		A	
Approach Delay (s)	39.8		39.8		39.8		17.5		4.7		4.7	
Approach LOS	D		D		D		B		A		A	
Intersection Summary												
HCM Average Control Delay	14.2		HCM Level of Service		B		B		B		B	
HCM Volume to Capacity ratio	0.78		Sum of lost time (s)		12.0		12.0		12.0		12.0	
Actuated Cycle Length (s)	110.0		ICU Level of Service		D		D		D		D	
Intersection Capacity Utilization	77.8%		Analysis Period (min)		15		15		15		15	
Analysis Period (min)	15		c Critical Lane Group		c		c		c		c	
c Critical Lane Group	c		c		c		c		c		c	

HCM Signalized Intersection Capacity Analysis
3: Reliez Valley Road & Pleasant Hill Rd

Cumulative + Project PM
6/17/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	22	111	197	2224	868	28
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	121	214	2417	943	30
RTOR Reduction (vph)	0	113	0	0	0	11
Lane Group Flow (vph)	24	8	214	2417	943	19
Turn Type	Perm	Prot	Prot	Perm	Perm	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	7.4	7.4	22.0	94.6	68.6	68.6
Effective Green, g (s)	7.4	7.4	22.0	94.6	68.6	68.6
Actuated g/C Ratio	0.07	0.07	0.20	0.86	0.62	0.62
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	119	106	354	3044	2207	987
v/s Ratio Prot	0.01		0.12	c0.68	0.27	
v/s Ratio Perm		0.08				0.02
v/c Ratio	0.20	0.08	0.60	0.79	0.43	0.02
Uniform Delay, d1	48.5	48.1	40.0	3.4	10.6	7.9
Progression Factor	1.00	1.00	1.00	1.00	1.34	2.96
Incremental Delay, d2	0.8	0.3	2.9	2.2	0.6	0.0
Delay (s)	49.3	48.4	42.9	5.6	14.8	23.4
Level of Service	D	D	D	A	B	C
Approach Delay (s)	48.6			8.7	15.1	
Approach LOS	D			A	B	
Intersection Summary						
HCM Average Control Delay			11.9		HCM Level of Service	B
HCM Volume to Capacity ratio			0.82			
Actuated Cycle Length (s)			110.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			71.5%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
4: Spring Hill Road & Pleasant Hill Rd

Cumulative + Project PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	0.97	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.96	1.00	0.96	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1781	1583	1741	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.79	1.00	0.75	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1469	1583	1366	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	21	2	94	24	0	6	133	2407	36	15	1020	26
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	2	102	26	0	7	145	2616	39	16	1109	28
RTOR Reduction (vph)	0	0	96	0	7	0	0	0	5	0	0	7
Lane Group Flow (vph)	0	25	6	0	26	0	145	2616	34	16	1109	21
Turn Type	Perm	Perm	Perm	Perm	Prot	Perm	Prot	Perm	Prot	Prot	Perm	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8				2				6
Actuated Green, G (s)		8.2	8.2		8.2		25.4	126.5	126.5	3.3	104.4	104.4
Effective Green, g (s)		8.2	8.2		8.2		25.4	126.5	126.5	3.3	104.4	104.4
Actuated g/C Ratio		0.05	0.05		0.05		0.17	0.84	0.84	0.02	0.70	0.70
Clearance Time (s)		4.0	4.0		4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		80	87		75		300	2985	1335	39	2463	1102
v/s Ratio Prot							0.08	c0.74		0.01	c0.31	
v/s Ratio Perm		0.02	0.06		0.02				0.02			0.02
v/c Ratio		0.31	0.06		0.35		0.48	0.88	0.03	0.41	0.45	0.02
Uniform Delay, d1		68.2	67.3		68.3		56.4	7.1	1.9	72.4	10.1	7.0
Progression Factor		1.00	1.00		1.00		0.77	0.14	0.00	1.00	1.00	1.00
Incremental Delay, d2		2.2	0.3		2.8		0.1	0.4	0.0	6.9	0.6	0.0
Delay (s)		70.4	67.6		71.2		43.4	1.4	0.0	79.3	10.7	7.1
Level of Service		E	E		E		D	A	A	E	B	A
Approach Delay (s)		68.1			71.2			3.5			11.6	
Approach LOS		E			E			A			B	
Intersection Summary												
HCM Average Control Delay			8.3							HCM Level of Service	A	
HCM Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			150.0							Sum of lost time (s)	12.0	
Intersection Capacity Utilization			88.2%							ICU Level of Service	E	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: Deer Hill Road & Pleasant Hill Rd

Cumulative + Project PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	1679		1681	1748	1583	1770	3539	1583	1770	4999	
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	1679		1681	1748	1583	1770	3539	1583	1770	4999	
Volume (vph)	550	75	145	114	72	121	395	2018	78	93	869	110
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	598	82	158	124	78	132	429	2193	85	101	945	120
RTOR Reduction (vph)	0	46	0	0	0	75	0	0	19	0	10	0
Lane Group Flow (vph)	598	194	0	98	104	57	429	2193	66	101	1055	0
Turn Type	Split			Split		Perm	Prot		Perm	Prot		
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases					8			2				
Actuated Green, G (s)	25.0	25.0		13.3	13.3	13.3	47.0	87.7	87.7	8.0	48.7	
Effective Green, g (s)	25.0	25.0		13.3	13.3	13.3	47.0	87.7	87.7	8.0	48.7	
Actuated g/C Ratio	0.17	0.17		0.09	0.09	0.09	0.31	0.58	0.58	0.05	0.32	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	572	280		149	155	140	555	2069	926	94	1623	
v/s Ratio Prot	c0.17	0.14		0.06	0.06		0.24	c0.62		c0.06	0.21	
v/s Ratio Perm					0.08			0.05				
v/c Ratio	1.05	0.69		0.66	0.67	0.41	0.77	1.06	0.07	1.07	0.65	
Uniform Delay, d1	62.5	58.9		66.1	66.2	64.6	46.7	31.1	13.5	71.0	43.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	50.0	7.2		10.0	10.9	1.9	6.6	37.9	0.1	114.4	2.0	
Delay (s)	112.5	66.1		76.2	77.1	66.6	53.3	69.1	13.7	185.4	45.4	
Level of Service	F	E		E	E	E	D	E	B	F	D	
Approach Delay (s)	99.2				72.7		64.8				57.5	
Approach LOS	F				E		E				E	
Intersection Summary												
HCM Average Control Delay	69.4		HCM Level of Service		E							
HCM Volume to Capacity ratio	1.05											
Actuated Cycle Length (s)	150.0		Sum of lost time (s)		16.0							
Intersection Capacity Utilization	95.0%		ICU Level of Service		F							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Mt. Diablo Blvd & Pleasant Hill Rd

Cumulative + Project PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔		↔	↔		↔	↔		↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3304		1770	3539	1583	1770	3539	1583	1770	4999	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3304		1770	3539	1583	1770	3539	1583	1770	4999	
Volume (vph)	446	261	208	0	0	0	224	1096	445	0	733	390
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	485	284	226	0	0	0	243	1191	484	0	797	424
RTOR Reduction (vph)	0	111	0	0	0	0	0	0	148	0	0	234
Lane Group Flow (vph)	485	399	0	0	0	0	243	1191	336	0	797	190
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4				5	2				6	
Permitted Phases									2			6
Actuated Green, G (s)	44.6	44.6				37.0	97.4	97.4			56.4	56.4
Effective Green, g (s)	44.6	44.6				37.0	97.4	97.4			56.4	56.4
Actuated g/C Ratio	0.30	0.30				0.25	0.65	0.65			0.38	0.38
Clearance Time (s)	4.0	4.0				4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0				3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	526	982				437	2298	1028			1331	595
v/s Ratio Prot	c0.27	0.15				c0.14	0.34				0.23	
v/s Ratio Perm											0.31	0.27
v/c Ratio	0.92	0.41				0.56	0.52	0.33			0.60	0.32
Uniform Delay, d1	51.0	42.1				49.3	13.9	11.7			37.7	33.2
Progression Factor	1.00	1.00				0.95	0.83	0.36			0.34	0.13
Incremental Delay, d2	21.8	0.3				1.4	0.7	0.7			1.3	0.9
Delay (s)	72.8	42.4				48.2	12.2	4.9			14.2	5.4
Level of Service	E	D				D	B	A			B	A
Approach Delay (s)	57.2				0.0		15.0				11.1	
Approach LOS	E				A		B				B	
Intersection Summary												
HCM Average Control Delay	24.0		HCM Level of Service		C							
HCM Volume to Capacity ratio	0.74											
Actuated Cycle Length (s)	150.0		Sum of lost time (s)		12.0							
Intersection Capacity Utilization	67.4%		ICU Level of Service		C							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
7: EB 24 Off Ramp & Pleasant Hill Rd

Cumulative + Project PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	
Flt Protected	0.98	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	
Satd. Flow (prot)	1830	1583	1770	1583	1583	3529	3529	1770	3539	1770	3539	1770	
Flt Permitted	0.98	1.00	0.43	1.00	1.00	1.00	1.00	0.12	1.00	0.12	1.00	0.95	
Satd. Flow (perm)	1830	1583	804	1583	1583	3529	3529	227	3539	227	3539	1770	
Volume (vph)	38	69	189	18	0	34	0	1531	29	131	690	0	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	41	75	205	20	0	37	0	1664	32	142	750	0	
RTOR Reduction (vph)	0	0	185	0	0	33	0	1	0	0	0	0	
Lane Group Flow (vph)	0	116	20	20	0	4	0	1695	0	142	750	0	
Turn Type	Perm	Perm	custom	custom	custom	Perm	Perm	Perm	Perm	Perm	Perm	Perm	
Protected Phases	4			8			2		6			6	
Permitted Phases	4	4	8	8			6		6			6	
Actuated Green, G (s)	14.5	14.5	14.5	14.5			127.5		127.5			127.5	
Effective Green, g (s)	14.5	14.5	14.5	14.5			127.5		127.5			127.5	
Actuated g/C Ratio	0.10	0.10	0.10	0.10			0.85		0.85			0.85	
Clearance Time (s)	4.0	4.0	4.0	4.0			4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0		3.0			3.0	
Lane Grp Cap (vph)	177	153	78	153			3000		193			3008	
v/s Ratio Prot							0.48					0.21	
v/s Ratio Perm	0.06	0.13	0.02	0.02			c0.63						
v/c Ratio	0.66	0.13	0.26	0.02			0.57		0.74			0.25	
Uniform Delay, d1	65.3	62.0	62.8	61.3			3.2		4.5			2.1	
Progression Factor	1.00	1.00	1.00	1.00			1.00		2.02			0.27	
Incremental Delay, d2	8.4	0.4	1.7	0.1			0.8		18.9			0.2	
Delay (s)	73.8	62.4	64.5	61.4			4.0		28.0			0.7	
Level of Service	E	E	E	E			A		C			A	
Approach Delay (s)	66.5			62.5			4.0		5.1			5.1	
Approach LOS	E			E			A		A			A	
Intersection Summary													
HCM Average Control Delay	12.2			HCM Level of Service			B						
HCM Volume to Capacity ratio	0.80												
Actuated Cycle Length (s)	150.0			Sum of lost time (s)			8.0						
Intersection Capacity Utilization	72.9%			ICU Level of Service			C						
Analysis Period (min)	15												
c Critical Lane Group													

HCM Unsignalized Intersection Capacity Analysis
8: Deer Hill Road & Brown Ave

Cumulative + Project PM
6/17/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔		
Sign Control	Free			Free			Stop		Stop			Stop		
Grade	0%			0%			0%		0%			0%		
Volume (veh/h)	50	682	53	113	329	92	62	9	116	66	14	21		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly flow rate (vph)	54	741	58	123	358	100	67	10	126	72	15	23		
Pedestrians														
Lane Width (ft)														
Walking Speed (ft/s)														
Percent Blockage														
Right turn flare (veh)														
Median type							None			None				
Median storage veh														
Upstream signal (ft)														
pX, platoon unblocked														
vC, conflicting volume	458			799			1512		1582		770		1508	
vC1, stage 1 conf vol														
vC2, stage 2 conf vol														
vCu, unblocked vol	458			799			1512		1582		770		1508	
tC, single (s)	4.1			4.1			7.1		6.5		6.2		7.1	
tC, 2 stage (s)														
tF (s)	2.2			2.2			3.5		4.0		3.3		3.5	
p0 queue free %	95			85			5		89		69		0	
cM capacity (veh/h)	1103			824			71		88		401		53	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1							
Volume Total	54	799	123	458	77	126	110							
Volume Left	54	0	123	0	67	0	72							
Volume Right	0	58	0	100	0	126	23							
cSH	1103	1700	824	1700	73	401	71							
Volume to Capacity	0.05	0.47	0.15	0.27	1.06	0.31	1.55							
Queue Length (ft)	4	0	13	0	142	33	233							
Control Delay (s)	8.4	0.0	10.1	0.0	223.2	18.1	406.5							
Lane LOS	A	B	B	F	C	F	F							
Approach Delay (s)	0.5		2.1		95.9		406.5							
Approach LOS	A		B		F		F							
Intersection Summary														
Average Delay	37.7													
Intersection Capacity Utilization	67.7%			ICU Level of Service			C							
Analysis Period (min)	15													

Impact Analysis Report
Level Of Service

Intersection	Base		Future		Change in
	Del/ LOS Veh	V/ C	Del/ LOS Veh	V/ C	
# 1	A xxxxx	0.486	A xxxxx	0.486	+ 0.000 V/C
# 2	A xxxxx	0.528	A xxxxx	0.528	+ 0.000 V/C
# 3	B xxxxx	0.619	B xxxxx	0.619	+ 0.000 V/C
# 4	C xxxxx	0.741	C xxxxx	0.741	+ 0.000 V/C
# 5	C xxxxx	0.725	C xxxxx	0.725	+ 0.000 V/C
# 6	A xxxxx	0.457	A xxxxx	0.457	+ 0.000 V/C
# 7	A xxxxx	0.552	A xxxxx	0.552	+ 0.000 V/C

Level Of Service Computation Report
CCTALOS Method (Base Volume Alternative)

```

*****
Intersection #1
*****
Cycle (sec):          100          Critical Vol./Cap.(X):          0.486
Loss Time (sec):      0 (Y+R=4.0 sec)  Average Delay (sec/veh):      xxxxxx
Optimal Cycle:        36          Level Of Service:          A
*****
Approach:      North Bound      South Bound      East Bound      West Bound
Movement:      L - T - R      L - T - R      L - T - R      L - T - R
-----|-----|-----|-----|
Control:      Protected      Protected      Permitted      Permitted
Rights:      Include      Include      Include      Include
Min. Green:    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Lanes:        1 0 1 1 0 0 0 1 1 0 0 0 0 0 1 0 0 0
-----|-----|-----|-----|
Volume Module:
Base Vol:      16 633 0 0 0 1589 10 0 0 37 0 0 0 0
Growth Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse:    16 633 0 0 0 1589 10 0 0 37 0 0 0 0
User Adj:      1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:       1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Volume:    16 633 0 0 0 1589 10 0 0 37 0 0 0 0
Reduct Vol:    0 0 0 0 0 0 0 0 0 0 0 0 0 0
Reduced Vol:   16 633 0 0 0 1589 10 0 0 37 0 0 0 0
RTOR Reduct:   0 0 0 0 0 0 0 0 0 16 0 0 0 0
RTOR Vol:      16 633 0 0 0 1589 10 0 0 21 0 0 0 0
PCE Adj:       1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:       1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
FinalVolume:   16 633 0 0 0 1589 10 0 0 21 0 0 0 0
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane:      1720 1720 1720 1720 1720 1720 1720 1720 1720 1720 1720 1720
Adjustment:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Lanes:         1.00 2.00 0.00 0.00 1.99 0.01 0.00 0.00 1.00 0.00 1.00 0.00 1.00 0.00
Final Sat.:    1720 3440 0 0 3418 22 0 0 1720 0 1720 0
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat:       0.01 0.18 0.00 0.00 0.46 0.46 0.00 0.00 0.01 0.00 0.00 0.00 0.00
Crit Volume:   16 800 21 0
Crit Moves:    ****
*****

```

Level Of Service Computation Report
CCTALOS Method (Base Volume Alternative)

```

*****
Intersection #2
*****
Cycle (sec):      100      Critical Vol./Cap.(X):      0.528
Loss Time (sec):  0 (Y+R=4.0 sec) Average Delay (sec/veh):  xxxxxx
Optimal Cycle:   39      Level Of Service:      A
*****
Approach:      North Bound      South Bound      East Bound      West Bound
Movement:      L - T - R      L - T - R      L - T - R      L - T - R
-----|-----|-----|-----|
Control:      Protected      Protected      Permitted      Permitted
Rights:      Include      Ignore      Include      Ignore
Min. Green:    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Lanes:        1 0 2 0 1 1 0 2 0 1 0 0 1 0 0 0 0 1 0 0 1
-----|-----|-----|-----|
Volume Module:
Base Vol:      0 710 13 8 1767 1 2 0 5 18 0 10
Growth Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse:    0 710 13 8 1767 1 2 0 5 18 0 10
User Adj:      1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:       1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Volume:    0 710 13 8 1767 1 2 0 5 18 0 10
Reduct Vol:    0 0 0 0 0 0 0 0 0 0 0 0
Reduced Vol:   0 710 13 8 1767 1 2 0 5 18 0 10
RTOR Reduct:   0 0 13 0 0 0 0 0 0 0 0 0
RTOR Vol:      0 710 0 8 1767 1 2 0 5 18 0 10
PCE Adj:       1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:       1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
FinalVolume:   0 710 0 8 1767 1 2 0 5 18 0 10
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane:      1720 1720 1720 1720 1720 1720 1720 1720 1720 1720 1720
Adjustment:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Lanes:        1.00 2.00 1.00 1.00 2.00 1.00 0.29 0.00 0.71 1.00 0.00 1.00
Final Sat.:    1720 3440 1720 1720 3440 1720 491 0 1229 1720 0 1720
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat:       0.00 0.21 0.00 0.00 0.51 0.00 0.00 0.00 0.00 0.01 0.00 0.01
Crit Volume:   0 884 7 18
Crit Moves:    ****
*****

```

Level Of Service Computation Report
CCTALOS Method (Base Volume Alternative)

```

*****
Intersection #3
*****
Cycle (sec):      100      Critical Vol./Cap.(X):      0.619
Loss Time (sec):  0 (Y+R=4.0 sec) Average Delay (sec/veh):  xxxxxx
Optimal Cycle:   60      Level Of Service:      B
*****
Approach:      North Bound      South Bound      East Bound      West Bound
Movement:      L - T - R      L - T - R      L - T - R      L - T - R
-----|-----|-----|-----|
Control:      Protected      Protected      Protected      Protected
Rights:      Include      Include      Ignore      Include
Min. Green:    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Lanes:        1 0 2 0 0 0 0 2 0 1 1 0 0 0 1 0 0 0 0 0 0
-----|-----|-----|-----|
Volume Module:
Base Vol:      102 712 0 0 1878 11 24 0 242 0 0 0
Growth Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse:    102 712 0 0 1878 11 24 0 242 0 0 0
User Adj:      1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:       1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Volume:    102 712 0 0 1878 11 24 0 242 0 0 0
Reduct Vol:    0 0 0 0 0 0 0 0 0 0 0 0
Reduced Vol:   102 712 0 0 1878 11 24 0 242 0 0 0
RTOR Reduct:   0 0 0 0 0 0 11 0 0 0 0 0
RTOR Vol:      102 712 0 0 1878 0 24 0 242 0 0 0
PCE Adj:       1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:       1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
FinalVolume:   102 712 0 0 1878 0 24 0 242 0 0 0
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane:      1720 1720 1720 1720 1720 1720 1720 1720 1720 1720 1720
Adjustment:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Lanes:        1.00 2.00 0.00 0.00 2.00 1.00 1.00 0.00 1.00 0.00 0.00 0.00
Final Sat.:    1720 3440 0 0 3440 1720 1720 0 1720 0 0 0
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat:       0.06 0.21 0.00 0.00 0.55 0.00 0.01 0.00 0.14 0.00 0.00 0.00
Crit Volume:   102 939 24 0
Crit Moves:    ****
*****

```

Level Of Service Computation Report
CCTALOS Method (Base Volume Alternative)

```

*****
Intersection #4
*****
Cycle (sec):      100      Critical Vol./Cap.(X):      0.741
Loss Time (sec):  0 (Y+R=4.0 sec) Average Delay (sec/veh):  xxxxxx
Optimal Cycle:   72      Level Of Service:      C
*****
Approach:      North Bound      South Bound      East Bound      West Bound
Movement:      L - T - R      L - T - R      L - T - R      L - T - R
Control:      Protected      Protected      Permitted      Permitted
Rights:      Include      Include      Ignore      Include
Min. Green:    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Lanes:        1 0 2 0 1 1 0 2 0 1 0 1 0 0 1 0 0 1 0 0
-----|-----|-----|-----|
Volume Module:
Base Vol:      102 712 27 11 2176 22 28 3 148 25 3 29
Growth Adj:   1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse:   102 712 27 11 2176 22 28 3 148 25 3 29
User Adj:     1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:      1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Volume:   102 712 27 11 2176 22 28 3 148 25 3 29
Reduct Vol:   0 0 0 0 0 0 0 0 0 0 0 0
Reduced Vol:  102 712 27 11 2176 22 28 3 148 25 3 29
RTOR Reduct:  0 0 25 0 0 22 0 0 0 0 0 0
RTOR Vol:     102 712 2 11 2176 0 28 3 148 25 3 29
PCE Adj:     1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:     1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
FinalVolume:  102 712 2 11 2176 0 28 3 148 25 3 29
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane:     1720 1720 1720 1720 1720 1720 1720 1720 1720 1720 1720 1720
Adjustment:   1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Lanes:       1.00 2.00 1.00 1.00 2.00 1.00 0.90 0.10 1.00 0.44 0.05 0.51
Final Sat.:  1720 3440 1720 1720 3440 1720 1554 166 1720 754 91 875
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat:     0.06 0.21 0.00 0.01 0.63 0.00 0.02 0.02 0.09 0.03 0.03 0.03
Crit Volume: 102 1088 28 57
Crit Moves:  ****  ****  ****  ****
*****

```

Level Of Service Computation Report
CCTALOS Method (Base Volume Alternative)

```

*****
Intersection #5
*****
Cycle (sec):      100      Critical Vol./Cap.(X):      0.725
Loss Time (sec):  0 (Y+R=4.0 sec) Average Delay (sec/veh):  xxxxxx
Optimal Cycle:   83      Level Of Service:      C
*****
Approach:      North Bound      South Bound      East Bound      West Bound
Movement:      L - T - R      L - T - R      L - T - R      L - T - R
Control:      Protected      Protected      Split Phase      Split Phase
Rights:      Include      Include      Include      Include
Min. Green:    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Lanes:        1 0 2 0 1 1 0 2 0 1 2 0 0 1 0 1 1 0 0 1
-----|-----|-----|-----|
Volume Module:
Base Vol:      117 460 135 160 1643 793 115 67 44 186 80 35
Growth Adj:   1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse:   117 460 135 160 1643 793 115 67 44 186 80 35
User Adj:     1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:      1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Volume:   117 460 135 160 1643 793 115 67 44 186 80 35
Reduct Vol:   0 0 0 0 0 0 0 0 0 0 0 0
Reduced Vol:  117 460 135 160 1643 793 115 67 44 186 80 35
RTOR Reduct:  0 0 102 0 0 63 0 0 0 0 0 0
RTOR Vol:     117 460 33 160 1643 730 115 67 44 186 80 0
PCE Adj:     1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:     1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
FinalVolume:  117 460 33 160 1643 730 115 67 44 186 80 0
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane:     1650 1650 1650 1650 1650 1650 1650 1650 1650 1650 1650 1650
Adjustment:   1.00 1.00 1.00 1.00 1.00 1.00 0.91 1.00 1.00 0.91 1.00 1.00
Lanes:       1.00 2.00 1.00 1.00 2.00 1.00 2.00 0.60 0.40 1.40 0.60 1.00
Final Sat.:  1650 3300 1650 1650 3300 1650 3000 996 654 2098 992 1650
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat:     0.07 0.14 0.02 0.10 0.50 0.44 0.04 0.07 0.07 0.09 0.08 0.00
Crit Volume: 117 822 111 133
Crit Moves:  ****  ****  ****  ****
*****

```

Level Of Service Computation Report
CCTALOS Method (Base Volume Alternative)

Intersection #6

Cycle (sec): 100 Critical Vol./Cap.(X): 0.457
Loss Time (sec): 0 (Y+R=4.0 sec) Average Delay (sec/veh): xxxxxx
Optimal Cycle: 42 Level Of Service: A

Approach: North Bound South Bound East Bound West Bound
Movement: L - T - R L - T - R L - T - R L - T - R
-----|-----|-----|-----|
Control: Protected Protected Protected Protected
Rights: Include Ignore Include Include
Min. Green: 0 0 0 0 0 0 0 0 0 0 0 0
Lanes: 1 0 2 0 1 0 0 2 0 1 1 0 1 0 0 0 0 0
-----|-----|-----|-----|
Volume Module:
Base Vol: 242 825 429 0 603 605 243 234 65 0 0 0
Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse: 242 825 429 0 603 605 243 234 65 0 0 0
User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Volume: 242 825 429 0 603 605 243 234 65 0 0 0
Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0
Reduced Vol: 242 825 429 0 603 605 243 234 65 0 0 0
RTOR Reduct: 0 0 0 0 0 0 0 0 0 0 0 0
RTOR Vol: 242 825 429 0 603 605 243 234 65 0 0 0
PCE Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
FinalVolume: 242 825 429 0 603 605 243 234 65 0 0 0
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane: 1720 1720 1720 1720 1720 1720 1720 1720 1720 1720 1720
Adjustment: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Lanes: 1.00 2.00 1.00 0.00 2.00 1.00 1.00 1.57 0.43 0.00 0.00 0.00
Final Sat.: 1720 3440 1720 0 3440 1720 1720 2692 748 0 0 0
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat: 0.14 0.24 0.25 0.00 0.18 0.35 0.14 0.09 0.09 0.00 0.00 0.00
Crit Volume: 242 302 243 0
Crit Moves: ****

Level Of Service Computation Report
CCTALOS Method (Base Volume Alternative)

Intersection #7

Cycle (sec): 100 Critical Vol./Cap.(X): 0.552
Loss Time (sec): 0 (Y+R=4.0 sec) Average Delay (sec/veh): xxxxxx
Optimal Cycle: 51 Level Of Service: A

Approach: North Bound South Bound East Bound West Bound
Movement: L - T - R L - T - R L - T - R L - T - R
-----|-----|-----|-----|
Control: Protected Protected Split Phase Split Phase
Rights: Include Include Include Include
Min. Green: 0 0 0 0 0 0 0 0 0 0 0 0
Lanes: 0 0 1 1 0 1 0 2 0 0 0 1 0 0 0 1
-----|-----|-----|-----|
Volume Module:
Base Vol: 0 1220 22 87 549 0 17 35 143 13 0 147
Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse: 0 1220 22 87 549 0 17 35 143 13 0 147
User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Volume: 0 1220 22 87 549 0 17 35 143 13 0 147
Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0
Reduced Vol: 0 1220 22 87 549 0 17 35 143 13 0 147
RTOR Reduct: 0 0 0 0 0 0 0 0 0 0 0 0
RTOR Vol: 0 1220 22 87 549 0 17 35 143 13 0 147
PCE Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
FinalVolume: 0 1220 22 87 549 0 17 35 143 13 0 147
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane: 1650 1650 1650 1650 1650 1650 1650 1650 1650 1650 1650
Adjustment: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Lanes: 0.00 1.96 0.04 1.00 2.00 0.00 0.33 0.67 1.00 1.00 0.00 1.00
Final Sat.: 0 3242 58 1650 3300 0 539 1111 1650 1650 0 1650
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat: 0.00 0.38 0.38 0.05 0.17 0.00 0.03 0.03 0.09 0.01 0.00 0.04
Crit Volume: 621 87 143 60
Crit Moves: ****

Impact Analysis Report
Level Of Service

Intersection	Base		Future		Change in
	Del/	V/	Del/	V/	
# 1	LOS Veh	C	LOS Veh	C	+ 0.000 V/C
	B xxxxx	0.674	B xxxxx	0.674	
# 2	B xxxxx	0.664	B xxxxx	0.664	+ 0.000 V/C
# 3	B xxxxx	0.659	B xxxxx	0.659	+ 0.000 V/C
# 4	C xxxxx	0.738	C xxxxx	0.738	+ 0.000 V/C
# 5	E xxxxx	0.913	E xxxxx	0.913	+ 0.000 V/C
# 6	B xxxxx	0.603	B xxxxx	0.603	+ 0.000 V/C
# 7	B xxxxx	0.678	B xxxxx	0.678	+ 0.000 V/C

Level Of Service Computation Report
CCTALOS Method (Base Volume Alternative)

```

*****
Intersection #1
*****
Cycle (sec):          100          Critical Vol./Cap.(X):          0.674
Loss Time (sec):      0 (Y+R=4.0 sec)  Average Delay (sec/veh):      xxxxxx
Optimal Cycle:        57          Level Of Service:          B
*****
Approach:      North Bound      South Bound      East Bound      West Bound
Movement:      L - T - R      L - T - R      L - T - R      L - T - R
-----|-----|-----|-----|
Control:      Protected      Protected      Permitted      Permitted
Rights:      Include      Include      Include      Include
Min. Green:      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Lanes:      1 0 1 1 0 0 0 1 1 0 0 0 1 0 0 0
-----|-----|-----|-----|
Volume Module:
Base Vol:      19 2265 0 0 875 18 6 0 21 0 0 0
Growth Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse:    19 2265 0 0 875 18 6 0 21 0 0 0
User Adj:      1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:       1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Volume:    19 2265 0 0 875 18 6 0 21 0 0 0
Reduct Vol:    0 0 0 0 0 0 0 0 0 0 0 0
Reduced Vol:   19 2265 0 0 875 18 6 0 21 0 0 0
RTOR Reduct:   0 0 0 0 0 0 0 0 0 0 0 0
RTOR Vol:      19 2265 0 0 875 18 6 0 21 0 0 0
PCE Adj:       1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:       1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
FinalVolume:   19 2265 0 0 875 18 6 0 21 0 0 0
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane:      1720 1720 1720 1720 1720 1720 1720 1720 1720 1720 1720
Adjustment:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Lanes:         1.00 2.00 0.00 0.00 1.96 0.04 0.22 0.00 0.78 0.00 1.00 0.00
Final Sat.:    1720 3440 0 0 3371 69 382 0 1338 0 1720 0
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat:       0.01 0.66 0.00 0.00 0.26 0.26 0.02 0.00 0.02 0.00 0.00 0.00
Crit Volume:   1133 0
Crit Moves:    **** **
*****

```

Level Of Service Computation Report
CCTALOS Method (Base Volume Alternative)

```

*****
Intersection #2
*****
Cycle (sec):      100      Critical Vol./Cap.(X):      0.664
Loss Time (sec):  0 (Y+R=4.0 sec) Average Delay (sec/veh):  xxxxxx
Optimal Cycle:    55      Level Of Service:      B
*****
Approach:  North Bound  South Bound  East Bound  West Bound
Movement:  L - T - R    L - T - R    L - T - R    L - T - R
-----|-----|-----|-----|
Control:    Protected    Protected    Permitted    Permitted
Rights:      Include      Ignore      Include      Ignore
Min. Green:  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Lanes:      1 0 2 0 1 1 0 2 0 1 0 0 1 0 0 0 1 0 0 1
-----|-----|-----|-----|
Volume Module:
Base Vol:    3 2213 23 12 853 4 8 0 3 13 0 0 17
Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse: 3 2213 23 12 853 4 8 0 3 13 0 0 17
User Adj:   1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Volume: 3 2213 23 12 853 4 8 0 3 13 0 0 17
Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0 0
Reduced Vol: 3 2213 23 12 853 4 8 0 3 13 0 0 17
RTOR Reduct: 0 0 13 0 0 0 0 0 0 0 0 0 0
RTOR Vol:   3 2213 10 12 853 4 8 0 3 13 0 0 17
PCE Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
FinalVolume: 3 2213 10 12 853 4 8 0 3 13 0 0 17
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane:   1720 1720 1720 1720 1720 1720 1720 1720 1720 1720 1720
Adjustment: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Lanes:      1.00 2.00 1.00 1.00 2.00 1.00 0.73 0.00 0.27 1.00 0.00 1.00
Final Sat.: 1720 3440 1720 1720 3440 1720 1251 0 469 1720 0 1720
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat:    0.00 0.64 0.01 0.01 0.25 0.00 0.01 0.00 0.01 0.01 0.00 0.01
Crit Volume: 1107 12 11 13
Crit Moves: **** **
*****

```

Level Of Service Computation Report
CCTALOS Method (Base Volume Alternative)

```

*****
Intersection #3
*****
Cycle (sec):      100      Critical Vol./Cap.(X):      0.659
Loss Time (sec):  0 (Y+R=4.0 sec) Average Delay (sec/veh):  xxxxxx
Optimal Cycle:    67      Level Of Service:      B
*****
Approach:  North Bound  South Bound  East Bound  West Bound
Movement:  L - T - R    L - T - R    L - T - R    L - T - R
-----|-----|-----|-----|
Control:    Protected    Protected    Protected    Protected
Rights:      Include      Include      Ignore      Include
Min. Green:  0 0 0 0 0 0 0 0 0 0 0 0 0 0
Lanes:      1 0 2 0 0 0 0 2 0 1 1 0 0 0 1 0 0 0 0 0
-----|-----|-----|-----|
Volume Module:
Base Vol:    197 2224 0 0 868 28 22 0 111 0 0 0 0
Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse: 197 2224 0 0 868 28 22 0 111 0 0 0 0
User Adj:   1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Volume: 197 2224 0 0 868 28 22 0 111 0 0 0 0
Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0 0
Reduced Vol: 197 2224 0 0 868 28 22 0 111 0 0 0 0
RTOR Reduct: 0 0 0 0 0 0 22 0 0 0 0 0 0
RTOR Vol:   197 2224 0 0 868 6 22 0 111 0 0 0 0
PCE Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
FinalVolume: 197 2224 0 0 868 6 22 0 111 0 0 0 0
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane:   1720 1720 1720 1720 1720 1720 1720 1720 1720 1720 1720
Adjustment: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Lanes:      1.00 2.00 0.00 0.00 2.00 1.00 1.00 0.00 1.00 0.00 0.00 0.00
Final Sat.: 1720 3440 0 0 3440 1720 1720 0 1720 0 0 0 0
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat:    0.11 0.65 0.00 0.00 0.25 0.00 0.01 0.00 0.06 0.00 0.00 0.00
Crit Volume: 1112 0 22
Crit Moves: **** **
*****

```

Level Of Service Computation Report
CCTALOS Method (Base Volume Alternative)

```

*****
Intersection #4
*****
Cycle (sec):      100          Critical Vol./Cap.(X):      0.738
Loss Time (sec):  0 (Y+R=4.0 sec) Average Delay (sec/veh):  xxxxxx
Optimal Cycle:    71          Level Of Service:          C
*****
Approach:         North Bound   South Bound   East Bound   West Bound
Movement:         L - T - R     L - T - R     L - T - R     L - T - R
-----|-----|-----|-----|
Control:          Protected     Protected     Permitted     Permitted
Rights:           Include       Include       Ignore         Include
Min. Green:       0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Lanes:            1 0 2 0 1 1 0 2 0 1 0 1 0 0 1 0 0 1 0 0
-----|-----|-----|-----|
Volume Module:
Base Vol:         133 2407 36 15 1020 26 21 2 94 24 0 6
Growth Adj:      1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse:     133 2407 36 15 1020 26 21 2 94 24 0 6
User Adj:        1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:         1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Volume:      133 2407 36 15 1020 26 21 2 94 24 0 6
Reduct Vol:      0 0 0 0 0 0 0 0 0 0 0 0 0
Reduced Vol:     133 2407 36 15 1020 26 21 2 94 24 0 6
RTOR Reduct:     0 0 24 0 0 21 0 0 0 0 0 0 0
RTOR Vol:        133 2407 12 15 1020 5 21 2 94 24 0 6
PCE Adj:         1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:         1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
FinalVolume:     133 2407 12 15 1020 5 21 2 94 24 0 6
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane:        1720 1720 1720 1720 1720 1720 1720 1720 1720 1720 1720
Adjustment:      1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Lanes:           1.00 2.00 1.00 1.00 2.00 1.00 0.91 0.09 1.00 0.80 0.00 0.20
Final Sat.:      1720 3440 1720 1720 3440 1720 1570 150 1720 1376 0 344
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat:         0.08 0.70 0.01 0.01 0.30 0.00 0.01 0.01 0.05 0.02 0.00 0.02
Crit Volume:     1204 15 21 30
Crit Moves:      **** **** **** ****
*****

```

Level Of Service Computation Report
CCTALOS Method (Base Volume Alternative)

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*****
Intersection #5
*****
Cycle (sec):      100          Critical Vol./Cap.(X):      0.913
Loss Time (sec):  0 (Y+R=4.0 sec) Average Delay (sec/veh):  xxxxxx
Optimal Cycle:    180         Level Of Service:          E
*****
Approach:         North Bound   South Bound   East Bound   West Bound
Movement:         L - T - R     L - T - R     L - T - R     L - T - R
-----|-----|-----|-----|
Control:          Protected     Protected     Split Phase    Split Phase
Rights:           Include       Include       Include         Include
Min. Green:       0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Lanes:            1 0 2 0 1 1 0 2 0 1 2 0 0 1 0 1 1 0 0 1
-----|-----|-----|-----|
Volume Module:
Base Vol:         395 2018 78 93 869 110 550 75 145 114 72 121
Growth Adj:      1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse:     395 2018 78 93 869 110 550 75 145 114 72 121
User Adj:        1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:         1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Volume:      395 2018 78 93 869 110 550 75 145 114 72 121
Reduct Vol:      0 0 0 0 0 0 0 0 0 0 0 0 0
Reduced Vol:     395 2018 78 93 869 110 550 75 145 114 72 121
RTOR Reduct:     0 0 63 0 0 110 0 0 0 0 0 0 93
RTOR Vol:        395 2018 15 93 869 0 550 75 145 114 72 28
PCE Adj:         1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:         1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
FinalVolume:     395 2018 15 93 869 0 550 75 145 114 72 28
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane:        1650 1650 1650 1650 1650 1650 1650 1650 1650 1650 1650
Adjustment:      1.00 1.00 1.00 1.00 1.00 1.00 0.91 1.00 1.00 0.91 1.00 1.00
Lanes:           1.00 2.00 1.00 1.00 2.00 1.00 2.00 0.34 0.66 1.23 0.77 1.00
Final Sat.:      1650 3300 1650 1650 3300 1650 3000 563 1087 1839 1277 1650
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat:         0.24 0.61 0.01 0.06 0.26 0.00 0.18 0.13 0.13 0.06 0.06 0.02
Crit Volume:     1009 93 275 93
Crit Moves:      **** **** **** ****
*****

```

Level Of Service Computation Report
CCTALOS Method (Base Volume Alternative)

```

*****
Intersection #6
*****
Cycle (sec):      100      Critical Vol./Cap.(X):      0.603
Loss Time (sec):  0 (Y+R=4.0 sec) Average Delay (sec/veh):  xxxxxx
Optimal Cycle:    57      Level Of Service:      B
*****
Approach:  North Bound  South Bound  East Bound  West Bound
Movement:  L - T - R    L - T - R    L - T - R    L - T - R
-----|-----|-----|-----|
Control:   Protected   Protected   Protected   Protected
Rights:    Include     Ignore     Include     Include
Min. Green: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Lanes:     1 0 2 0 1  0 0 2 0 1  1 0 1 1 0  0 0 0 0 0 0
-----|-----|-----|-----|
Volume Module:
Base Vol:   224 1096 445  0 733 390 446 261 208  0 0 0 0 0
Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse: 224 1096 445  0 733 390 446 261 208  0 0 0 0 0
User Adj:   1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Volume: 224 1096 445  0 733 390 446 261 208  0 0 0 0 0
Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Reduced Vol: 224 1096 445  0 733 390 446 261 208  0 0 0 0 0
RTOR Reduct: 0 0 0 0 0 0 0 0 0 0 0 0 0 0
RTOR Vol:   224 1096 445  0 733 390 446 261 208  0 0 0 0 0
PCE Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
FinalVolume: 224 1096 445  0 733 390 446 261 208  0 0 0 0 0
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane:   1720 1720 1720 1720 1720 1720 1720 1720 1720 1720 1720 1720
Adjustment: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Lanes:      1.00 2.00 1.00 1.00 2.00 1.00 1.00 1.11 0.89 0.00 0.00 0.00
Final Sat.: 1720 3440 1720  0 3440 1720 1720 1914 1526  0 0 0 0 0
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat:    0.13 0.32 0.26 0.00 0.21 0.23 0.26 0.14 0.14 0.00 0.00 0.00 0.00
Crit Volume: 224 367 446 0
Crit Moves: ****
*****

```

Level Of Service Computation Report
CCTALOS Method (Base Volume Alternative)

```

*****
Intersection #7
*****
Cycle (sec):      100      Critical Vol./Cap.(X):      0.678
Loss Time (sec):  0 (Y+R=4.0 sec) Average Delay (sec/veh):  xxxxxx
Optimal Cycle:    71      Level Of Service:      B
*****
Approach:  North Bound  South Bound  East Bound  West Bound
Movement:  L - T - R    L - T - R    L - T - R    L - T - R
-----|-----|-----|-----|
Control:   Protected   Protected   Split Phase  Split Phase
Rights:    Include     Include     Include     Include
Min. Green: 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Lanes:     0 0 1 1 0  1 0 2 0 0  0 1 0 0 1  1 0 0 0 1
-----|-----|-----|-----|
Volume Module:
Base Vol:   0 1531 29 131 690 0 38 69 189 18 0 34
Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse: 0 1531 29 131 690 0 38 69 189 18 0 34
User Adj:   1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Volume: 0 1531 29 131 690 0 38 69 189 18 0 34
Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0 0
Reduced Vol: 0 1531 29 131 690 0 38 69 189 18 0 34
RTOR Reduct: 0 0 0 0 0 0 0 0 0 0 0 0 0
RTOR Vol:   0 1531 29 131 690 0 38 69 189 18 0 34
PCE Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
FinalVolume: 0 1531 29 131 690 0 38 69 189 18 0 34
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane:   1650 1650 1650 1650 1650 1650 1650 1650 1650 1650 1650 1650
Adjustment: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Lanes:      0.00 1.96 0.04 1.00 2.00 0.00 0.36 0.64 1.00 1.00 0.00 1.00
Final Sat.: 0 3239 61 1650 3300 0 586 1064 1650 1650 0 1650
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat:    0.00 0.47 0.47 0.08 0.21 0.00 0.06 0.06 0.11 0.01 0.00 0.00
Crit Volume: 780 131 0
Crit Moves: ****
*****

```