Transportation Impact Analysis

SILVER OAK ESTATES

City of Clayton

Prepared for:
Nick Pappani
Raney Planning & Management Inc.
1501 Sports Drive
Sacramento, CA 95834

Prepared by:
Abrams Associates
1875 Olympic Boulevard, Suite 210
Walnut Creek, CA 94596

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1) INTRODUCTION

Silver Oak Estates is a proposed residential project that would develop 59 residential units along Oakhurst Drive in the City of Clayton. The project location is shown in **Figure 1** and the project site plan is presented in **Figure 2**. This report describes the existing traffic and circulation system, as well as pedestrian, bicycle and transit conditions in the vicinity of the proposed project and provides an analysis of the potential impacts of the project. This transportation impact study has been conducted consistent with the requirements and methodologies required by Contra Costa County.

In Contra Costa County, a traffic study must be prepared for all projects that generate over 100 vehicle trips during a one hour period. The Silver Oak Estates, with only 59 residential units, will not meet this standard. Its trip generation will be about 50 vehicle trips on a weekday during the critical PM peak hour. However, as a part of the project application, this report is being prepared to answer questions that may arise regarding the project's traffic impacts.

2) SETTING

This section of the report 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. The hours identified as the "peak" hours are generally between7:30 a.m. and 8:30 a.m. and 5:00 p.m. and 6:00 p.m. for all of the transportation facilities described. Throughout this report, these peak hours will be identified as the AM and PM peak hours, respectively.

Project Study Intersections

Figure 1 shows the study area, which indicates the project location and the adjacent street network in this section of Clayton. For this report, two intersections have been studied in detail for capacity and delay conditions. These are the intersections of:

- Oakhurst Drive at Yolanda Circle (Unsignalized), and
- Kirker Pass Road and Concord Boulevard

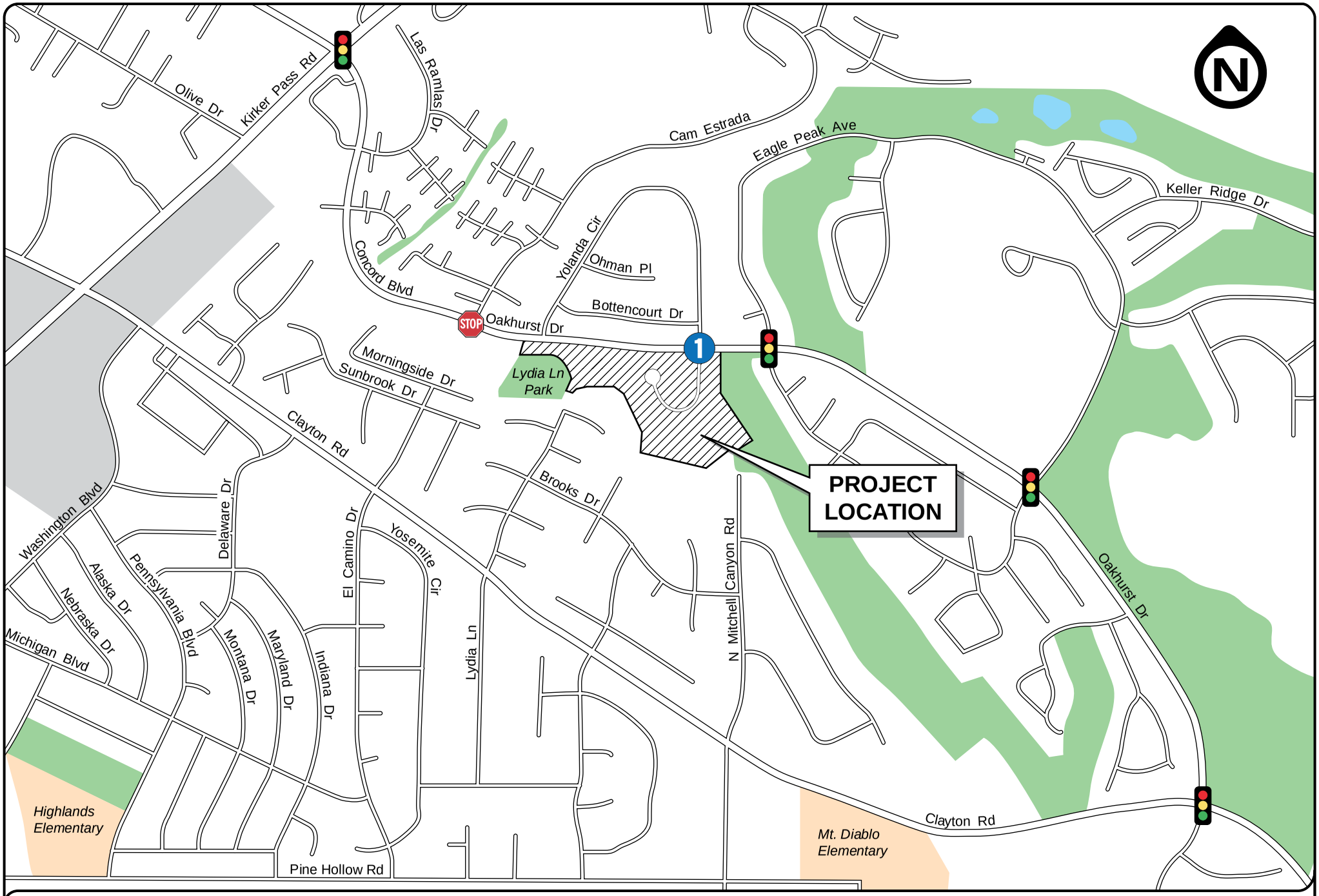

FIGURE 1 | PROJECT LOCATION
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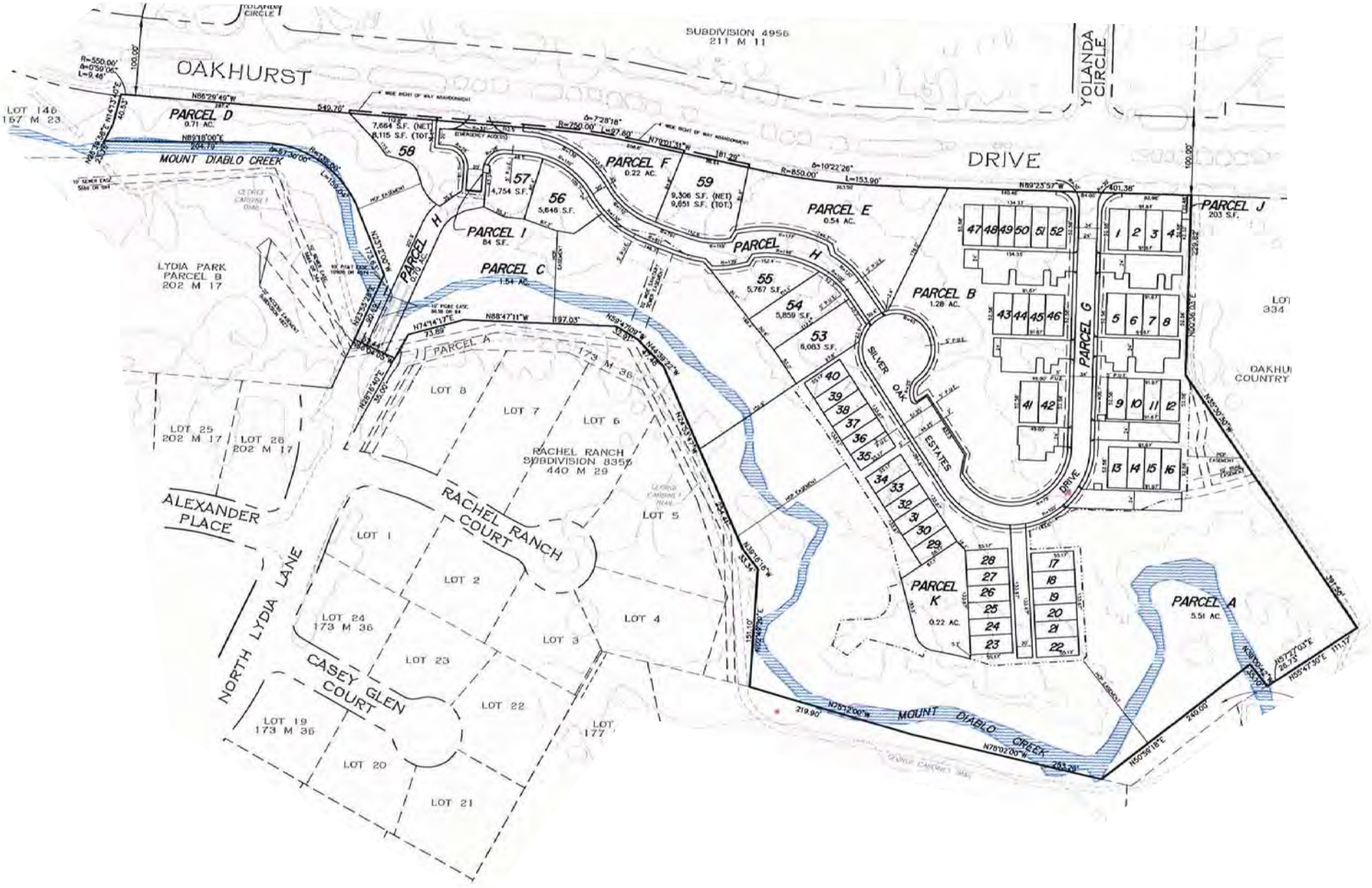

FIGURE 2 | PROJECT LOCATION
TRAFFIC IMPACT STUDY
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A review has also been made of the existing traffic conditions on Oakhurst Drive by analyzing the nearby signalized intersections. This evaluation included the intersections of Oakhurst Drive with both Eagle Peak Avenue and Clayton Road and also the intersection of Kirker Pass Road with Concord Boulevard.

The affected intersections on Yolanda Circle, along with the segment of Oakhurst Drive between Kirker Pass Road and Clayton Road, have also been analyzed in this report. Based on the existing level of service and comments received on the draft report the intersection of Kirker Pass Road with Concord Boulevard has now been analyzed in more detail to determine the potential for project impacts to the current traffic operations. The traffic conditions on the internal roadways and the proposed access to Lydia Lane (for only seven of the proposed homes) have also been evaluated.

Traffic Analysis Scenarios

In accordance with Contra Costa County standards, the study intersection were evaluated for the following scenarios:

- Scenario 1: Existing Conditions – Level of Service (LOS) based on existing peak hour volumes and the existing intersection configuration.
- Scenario 2: Baseline Conditions – Existing traffic plus anticipated traffic from approved developments in the study area.
- Scenario 3: Baseline Conditions Plus Project – Baseline conditions peak-hour volumes plus trips from the proposed project.
- Scenario 4: Cumulative Conditions (Year 2030) per the Certified General Plan EIR
- Scenario 5 Cumulative Conditions (Year 2030) plus the project

Existing Roadway Network

The project location and the surrounding roadway network have been illustrated in Figure 1. The primary roadways that would be affected by the project include:

- **Oakhurst Drive –** Oakhurst Drive is a four-lane divided arterial roadway and is one of the most important roadways in the City of Clayton. It is named Concord Boulevard at Kirker Pass Road and changes names to Oakhurst Drive at the City Limits with Concord. It has about a 20-foot landscaped median throughout with left turns at each intersection. There are sidewalks on each side of the street, and there is a 5-foot bike lane in each direction. There is no on-street parking on any segment of Oakhurst Drive.

  North of Yolanda Circle on Oakhurst Drive there is a four-way stop intersection at Cam-Estrada, and side street stop signs at other cross streets. These intersections are all within the City of

Concord. South of Yolanda Circle within the City of Clayton there is a signalized intersection with Eagle Peak Avenue and Indian Wells Way, a second signal at Eagle Peak Avenue which also includes a golf cart crossing, and a third traffic signal (three-way) at Indianhead Way. All three of these signals have fairly light side street traffic serving residential areas, and there are no significant congestion or delay problems at any of them.

- **Yolanda Circle –** Yolanda Circle is a residential collector street that connects to Oakhurst Drive at two locations, each with a side street stop control. There are left turn lanes for each intersection. There are no pedestrian crosswalks.

Intersection Analysis Methodology

Existing operational conditions at the study intersection has been evaluated using Synchro Software based on the 2000 *Highway Capacity Manual* (*HCM*) Level of Service (LOS) methodology.[1] 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 it at any given time. The level of service scale describes traffic flow with six ratings ranging from A to 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 it.

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.

For unsignalized (all-way stop controlled and two-way stop controlled) intersections, the average control delay and LOS operating conditions are calculated by approach (e.g., northbound) and 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.

[1] *Highway Capacity Manual*, Transportation Research Board, Washington D.C., 2000

Level of Service Policies

The Contra Costa Level of Service policy is set forth in the County's 2002 General Plan. In addition, Transportation Improvement Measures C and J and the Growth Management Plan (GMP) both require the use of the CCTA methods to determine LOS conditions.

The time of stopped delay used in this technical evaluation is based on the HCM 2000 procedures to calculate LOS. The HCM procedures used in the 2002 General Plan were based on the definitions from the 1994 Highway Capacity Manual. The resultant LOS letter grade is the same using either the 1994 or the 2000 HCM procedures. The LOS standards and V/C ratios are consistent with the requirements of the CCTA Measure C GMP.

Significance Criteria

Signalized Intersections – Based on standard established by the City of Clayton a project-related operational impact on a signalized intersection is considered significant if project-related traffic causes the Level of Service (LOS) rating to deteriorate from LOS D or better to LOS E or F, or from LOS E to LOS F. Please note that the intersection of Kirker Pass Road and Concord Boulevard is located in the City of Concord and LOS D is considered the maximum acceptable LOS according to the Growth Management Element of the City of Concord General Plan.

Unsignalized Intersections - Project-related operational impacts on unsignalized intersections are considered significant if project generated traffic causes the worst-case movement (or average of all movements for all-way stop-controlled intersections and roundabouts) to deteriorate from LOS D or better to LOS E or F.

According to CEQA guidelines, a project would have a significant impact if it would:

- Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, including, but not limited to, intersections, streets, highways and freeways, pedestrian and bicycle paths and mass transit.
- Conflict with an applicable congestion management program, including, but not limited to, level-of-service standards, and travel demand measures, or other standards established by a county congestion management agency for designated roads or highways.
- Result in inadequate emergency vehicle access.
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.
- Result in a projected future over-capacity freeway condition where current long-range planning studies show an under-capacity condition.
- Result in an internal circulation system design that does not meet City standards.

TABLE 1
SIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS

Level of Service	Description of Operations	Average Delay (sec/veh)
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.

[1]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.

TABLE 2
UNSIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS

Level of Service	Description of Operations	Average Delay (seconds/vehicle)
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.

Existing Intersection Capacity Conditions

The existing intersection geometry and traffic counts for weekday AM and PM peak hours used at each of the project study intersection are presented in the *Traffic Analysis Appendix*. AM and PM peak hour turning movement counts were conducted at each of the study intersections in August of 2013. It should be noted that schools were not in session at the time of the counts. However, other recent counts were available on Oakhurst Drive that were taken when schools were in session and it was verified the differences would not affect the results of the analysis.

Table 3
A) Existing Intersection Capacity Conditions

	INTERSECTION	CONTROL	PEAK HOUR	EXISTING	
				Delay	LOS
1	Oakhurst Drive and Yolanda Circle *(will also be the future access to the Silver Oak Estates)*	Stop Sign	AM	13.1	B
			PM	12.2	B
2	Kirker Pass Road and Concord Blvd	Traffic Signal	AM	34.5	C
			PM	30.0	C

B) Other Nearby Intersections on Oakhurst Drive

	INTERSECTION	CONTROL	PEAK HOUR	EXISTING	
				Delay	LOS
3	Oakhurst Drive and Eagle Peak Avenue	Stop Sign	AM	14.6	B
			PM	10.5	B
4	Oakhurst Drive and Clayton Road	Traffic Signal	AM	11.2	B
			PM	7.3	A

SOURCE: Abrams Associates, 2014

NOTES: HCM LOS results are presented in terms of average intersection delay in seconds per vehicle. For stop controlled intersections, the results reflect the delay for side street movement.

Figure 3 presents the traffic volume information for the most critical intersection with Yolanda Circle where the project entrance is proposed. It also includes the existing lane configuration at the intersection and the traffic volumes that will be added by the project. Table 3 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 *Traffic Analysis Appendix*).

As shown in Table 3, the intersection capacity results reveal that the intersection of Oakhurst Drive and Yolanda Circle currently has acceptable conditions. The average vehicle delay for traffic on Yolanda Circle entering Oakhurst Drive is 13.1 seconds in the AM and 12.2 seconds in

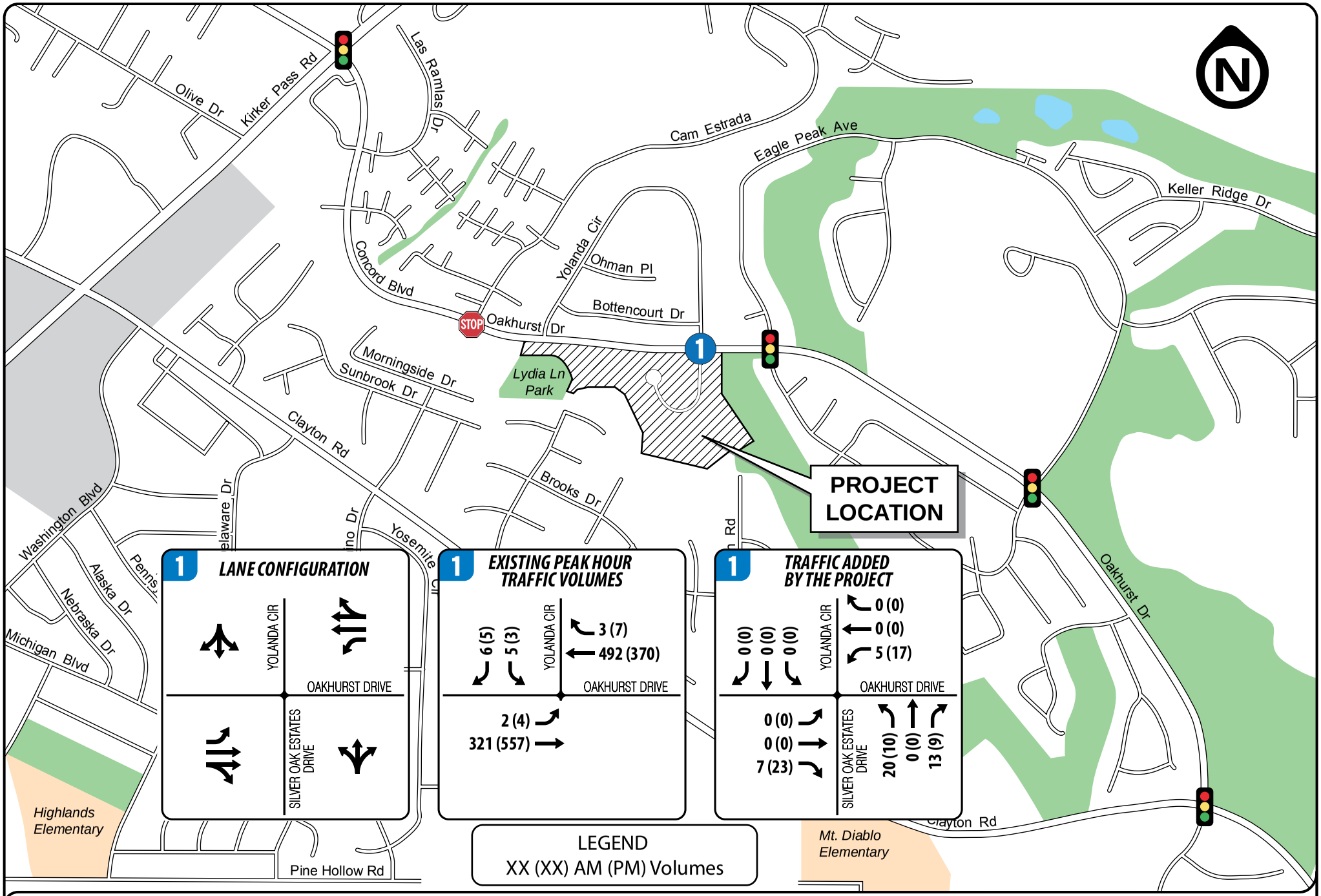

FIGURE 3 | TRAFFIC ANALYSIS DATA
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the PM. This is without the addition of project traffic. It should be noted that this is well below the standards where a traffic signal installation would be considered.[2]

Table 3 also shows the intersection capacity conditions at Kirker Pass Road/ and Concord Boulevard. The existing conditions show a Level of Service "C" during both the AM and PM peak periods (the corresponding LOS analysis calculation sheets are presented in the *Traffic Analysis Appendix*). The results show that although the overall intersection has acceptable operations (i.e. the average delay is well within the established standards).

It should be noted that the queue in the westbound left turn lane has been observed to extend back beyond the left-turn pocket in the AM peak period to the point where it blocks one of the two through lanes, thereby increasing delay. However, while this condition is frustrating to motorists it does not cause any significant safety problems or cause any adjacent intersections to exceed any established standards. The City of Concord currently only has standards for the *overall* intersection delay and has not established any standards for side street delay at a signalized intersection. Therefore, since the overall delay and LOS still meets the established standards (and there are no other related significant impacts) the queuing that occurs on the Concord Boulevard approach to Kirker Pass Road is *not* considered a violation of any established standards. It is our understanding that the City of Clayton has expressed interest in addressing the operational concerns and queuing at this intersection but the final decision on any improvements at this intersection would rest with the City of Concord.

The second part of Table 3 shows the capacity results for other nearby intersections. As shown in this table these intersections have acceptable operations and would not have a large enough contribution of traffic from the project to warrant further analysis. The results are shown to illustrate that these intersections operate well within established standards and would not be adversely affected by the amount of traffic that could be generated by the proposed project.

Planned Roadway Improvements

There are no significant planned roadway improvements at any of the project study intersections and there are no significant planned roadway network changes that would be expected to alter the travel patterns in the area.

Pedestrian and Bicycle Facilities

Pedestrian activity is relatively light in the vicinity of the project area with the exception of the pedestrian traffic generated in the vicinity of the nearby elementary school. Compared to other similar roads, there is a relatively significant amount of bicycle traffic on Oakhurst Drive.

[2] *Manual on Uniform Traffic Control Devices, Part 4 – Highway Traffic Signals*, *Peak Hour Volume Warrant*, Caltrans, Sacramento, CA, 2012.

Bus Transit Considerations

The nearest County Connection (CCTA) bus route that travels in the general vicinity of the project is Route 10. This route traverses Clayton Road from the Concord BART station in downtown Concord to the center of Clayton in the vicinity of Marsh Creek Road. It generally operates on 30-minute headways. There is no CCTA bus service on Oakhurst Drive.

3) IMPACTS AND MITIGATION MEASURES

Project Trip Generation

Silver Oak Estates will be a residential area with 59 single-family homes. Figure 2 shows the project site plan and the tentative layout of the proposed subdivision. Trip generation for development projects such as this are typically calculated based on rates contained in the Institute of Transportation Engineer's (ITE) publication, *Trip Generation 9th Edition*. *Trip Generation* is the standard reference used by jurisdictions throughout the country for the estimation of potential vehicular trips from all types of land use development.

The trip generation rate for the 59 units was based on the ITE category for single family homes (Land Use Category 210). The commonly used trip generation rate for single-family homes is 10 vehicle trips per unit per day, with approximately 1.0 vehicle trips per unit occurring during the peak hour. A more detailed list of the project's trip generation characteristics for each unit is shown in **Table 4**.

TABLE 4
TRIP GENERATION RATES FOR SINGLE-FAMILY HOMES
(Trips per Unit)

Land Use	*ITE Code*	*ADT*	*AM Peak Hour*			*PM Peak Hour*		
			In	*Out*	*Total*	*In*	*Out*	*Total*
Single-Family Detached Housing	LU-210	9.52	0.19	0.56	0.75	0.64	0.36	1.00

The total trip generation calculations for all 59 units in the Silver Oak Estates development are shown in Table 5. This total trip generation reflects all vehicle trips that would be attributed to the project, and includes both inbound and outbound traffic. Although there is a small potential for transit use no reduction has been applied to the project trip generation.

In addition, since the project is residential there were no adjustments applied to account for pass-by or internal trips, as would be the case for commercial projects. The Silver Oak Estates project is forecast to generate a total of 45 vehicle trips during the AM peak hour (7:30 to 8:30 AM) and 59 trips during the PM peak hour (5:00 to 6:00 PM).

TABLE 5
TRIP GENERATION CALCULATIONS FOR SILVER OAK ESTATES

Land Use	*Size*	*ADT*	*AM Peak Hour*			*PM Peak Hour*		
			In	*Out*	*Total*	*In*	*Out*	*Total*
Single Family Dwellings	59 units	562	11	34	45	38	21	59

During the AM peak hour there will be 34 vehicles exiting from the development and 11 vehicle trips entering. During the critical PM peak hour, there will be 38 vehicles entering the project and 21 vehicle trips leaving. Generally, a project would need to generate at least 100 vehicle trips per hour before a full traffic impact study is typically required. The Silver Oak Estates project falls well below this standard. The specific project trips at the intersection with Oakhurst Drive are shown on Figure 2.

As shown on the site plan (Figure 3) seven of the units in the Silver Oak Estates project will have a gated access to the cul-de-sac at the end of Silver Oak Estates Drive. There would also be a gated access at the other end at Lydia Lane, thereby eliminating any through traffic between Lydia Lane and Silver Oak Estates Drive. Since there are only seven units within the gated portion of the project, there would be at most about five vehicle trips per hour that could use Lydia Lane.

For purposes of determining the reasonable worst-case impacts of traffic on the surrounding street network from a proposed project, the trips generated by this proposed development are estimated for the peak commute hours which represent the peak of "*adjacent street traffic*". This is the time period when the project traffic would generally contribute to the greatest amount of congestion. The AM peak hour is generally considered to occur between 7:30 and 8:30 AM, while the PM peak hour generally occurs from 4:30 to 5:30 PM. These time periods can vary slightly depending on the specific location. Based on the intersection capacity counts, these were the peak hours on Oakhurst Drive.

Project Trip Distribution

For the purposes of the LOS analysis on Oakhurst Drive it was assumed that 100% of the project trips would have access to Oakhurst Drive. However, please note that as a worst case scenario for the safety analysis of the Lydia Lane entrance it was also assumed that 100% of the traffic from the seven homes with access to Lydia Lane would use exclusively use that entrance (even though they would have full access to Silver Oak Estates Drive. The trip distribution assumptions at Oakhurst Drive have been based on the project's proximity to the regional arterial street system, existing traffic volume patterns and turning movements, and the land use assumptions in the area. The existing turn movements at the intersections with Yolanda Place and Eagle Peak Avenue also assist in developing these assumptions. Based on these estimates, the project's directional distribution is expected to be as shown in Table 6.

Table 6
PROJECT TRIP DISTRIBUTION ASSUMPTIONS

Origin / Destination	***Trip Percentages***
Traffic travelling west on Oakhurst Drive	55%
Traffic travelling east on Oakhurst Drive	45%

These estimates are that the project traffic will be oriented 55% westbound in the direction of Kirker Pass Road (about 35 trips per hour) and 45% eastbound toward downtown Clayton (about 25 trips per hour). These volumes represent about a 2% to 3% increase to the existing traffic on Oakhurst Drive. At this level, there should not be a noticeable change in traffic conditions.

Physical Changes to Oakhurst Drive

With the development of the Silver Oak Estates project there will be changes to the access at the intersection of Oakhurst Drive and Yolanda Circle. A new roadway will be constructed to line up opposite Yolanda Circle. A left turn lane will be constructed in the median of Oakhurst Drive for traffic turning into Silver Oak Estates Drive. This will result in the removal and relocation of existing lighting poles in the median.

Silver Oak Estates Drive itself will be a 36-wide street at the intersection with Oakhurst Drive, with a single lane approaching the intersection. A stop sign and stop bar would be required as mitigations to ensure safe operations on the proposed new Silver Oak Estates Drive approach to Oakhurst Drive. In addition, the City will require the existing sidewalk on Oakhurst Drive to be modified and ADA (American's with Disabilities Act) accessible ramps will need to be constructed. Please note that it is proposed that Silver Oak Estates Drive be a private street.

Existing Plus Project Traffic Capacity Conditions

This scenario is intended to evaluate the existing traffic conditions with the addition of traffic from the proposed project. The study intersections have a small change in the average vehicle delay during the weekday AM and PM peak hours under this scenario. The change in delay for traffic on Yolanda Circle would be essentially unchanged. The average delay for traffic on Silver Oak Estates Avenue would be about 13.0 seconds per vehicle, the same as for Yolanda Circle. The traffic conditions for this scenario are shown in Table 7.

At Kirker Pass Road and Concord Boulevard the average vehicle delay would be unchanged. The project would add 27 vehicle trips during the AM peak hour to this intersection, of which about ten (10) trips would be added to the left turn movement on the westbound Concord Boulevard approach. This amount of traffic is small in comparison to the existing volumes and would not affect the capacity calculation results.

TABLE 7
EXISTING PLUS PROJECT INTERSECTION LEVEL OF SERVICE CONDITIONS

INTERSECTION	CONTROL	PEAK HOUR	EXISTING		EXISTING PLUS PROJECT	
			Delay	LOS	Delay	LOS
1. Oakhurst Drive and Yolanda Circle/Silver Oak Estates Drive	Side Street Stop	AM	13.1	B	13.4	B
		PM	12.2	B	16.0	B
2. Kirker Pass Road and Concord Blvd	Traffic Signal	AM	34.5	C	35.0	C
		PM	30.0	C	31.3	C

SOURCE: Abrams Associates, 2014

NOTES: HCM LOS results are presented in terms of average intersection delay in seconds per vehicle. For stop controlled intersections the results for the worst side street approach are presented.

Baseline Traffic Capacity Conditions

The Baseline scenario is intended to evaluate the traffic conditions with the addition of new traffic from reasonably foreseeable projects in the area at the time that the project is completed. It is assumed that the project could be completed and available for occupancy within three years, or by about 2016.

While the Clayton Community Church is reconsidering their application for the construction of a church in the downtown area, this analysis, for conservative purposes, has assumed the church project would be built in the downtown area. The EIR for this project (Clayton Community Church Project EIR, LSA Associates, 2010) estimates that there will be about 37 PM peak hour trips and 16 AM peak hour trips that would be added to Oakhurst Drive in the vicinity of the Silver Oaks Estates project. In addition to this, based on the Contra Costa Transportation Authority's (CCTA) travel demand model it has been forecast that the through traffic on Oakhurst Drive would increase by an additional 2% per year which would also account for other baseline projects outside of the immediate area.

Table 8 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 the *Traffic Analysis Appendix*). As shown, the intersections of Oakhurst Drive and Yolanda Circle/Silver Oak Estates Drive and also Kirker Pass Road at Concord Boulevard would both continue to have acceptable conditions (LOS D or better) during the weekday AM and PM peak hours. Please note that the intersection of Kirker Pass Road at Concord Boulevard is assumed to degrade to LOS D in the AM peak hour under Baseline conditions. This is a result of increases in background traffic on Kirker Pass Road and from additional traffic forecast to be generated by approved projects in the area. The intersection is forecast to operate at LOS D in the AM peak hour regardless of whether or not the proposed project is implemented. As shown in Table 7, the proposed project itself would be expected to increase the average intersection delay by no more than a couple seconds during either of the peak commute hours.

TABLE 8
BASELINE INTERSECTION LEVEL OF SERVICE CONDITIONS

INTERSECTION	CONTROL	PEAK HOUR	BASELINE		BASELINE PLUS PROJECT	
			Delay	LOS	Delay	LOS
1. Oakhurst Drive and Yolanda Circle/Silver Oak Estates Drive	Side Street Stop	AM	13.5	B	14.0	B
		PM	12.6	B	16.9	C
2. Kirker Pass Road and Concord Blvd	Traffic Signal	AM	37.1	D	37.9	D
		PM	32.5	C	33.8	C

SOURCE: Abrams Associates, 2014

NOTES: HCM LOS results are presented in terms of average intersection delay in seconds per vehicle. For stop controlled intersections the results for the worst side street approach are presented.

Baseline *Plus Project* Traffic Capacity Conditions

The Baseline plus proposed project traffic forecasts were developed by adding the project-generated traffic volumes shown in Figure 3 to the Baseline traffic volumes. Table 7 also shows 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 *Traffic Analysis Appendix*). As shown, the intersections of Oakhurst Drive and Yolanda Circle/Silver Oak Estates Drive and also Kirker Pass Road at Concord Boulevard would both continue to have acceptable conditions (LOS D or better) during the weekday AM and PM peak hours.

At Kirker Pass Road and Concord Boulevard the proposed project would be expected to increase the average intersection delay by no more than a couple seconds during either of the peak commute hours. At Oakhurst Drive and Yolanda Circle the the average PM peak hour vehicle delay for side street traffic would be about 17 seconds at the project entrance intersection (intersection #1). However, it is important to note that there would be little or no change in delay on the existing Oakhurst Drive approaches and the southbound Yolanda Circle approach to this intersection. The increased delay would primarily occur within the project on the proposed new northbound (Silver Oak Estates Drive) approach to Oakhurst Drive.

Access and Safety Analysis of the Lydia Lane Connection

As shown on the site plan (Figure 3), the seven single family units in the Silver Oak Estates project will have gated access to a cul-de-sac at the end of Silver Oak Estates Drive. This portion of the project would also have a gated access at the other end at Lydia Lane but another gate within the project would eliminate any through traffic between Lydia Lane and the remaining residences on Silver Oak Estates Drive. It should also be noted that the applicant has agreed that delivery vehicles would not be allowed to use the Lydia Lane entrance. Since there are only seven units within the gated portion of the project, there would be at most about seven vehicle trips per hour that could use Lydia Lane during the AM and PM peak hours. This

estimate is based on the established ITE trip generation rates for single family homes that were discussed previously and presented in Table 4.

The access for the Lydia Lane entrance would cross a one lane bridge and then pass through the parking area of the Lydia Lane Park. Given the volume of traffic forecast to use this entrance the presence of the one lane bridge would not be expected to result in any safety or capacity problems. The Lydia Lane Park parking lot has eight head in parking spaces with a two-way parking aisle behind them. The parking lot has at least 40 feet of width, allowing for the required 18 feet for the head in parking spaces plus two 11 foot travel lanes.

The traffic from the project would be light enough so that no conflicts with vehicles backing out of parking spaces would be anticipated. As is the case with any parking lot, if a vehicle is backing out of a parking space they could temporarily block one or both of the adjacent travel lanes. However, given the number of parking spaces and traffic volumes involved in this case there is no reason to believe this will cause any significant safety or capacity problems. In general, the parking lot is of adequate dimensions and should be able to continue to safely accommodate existing park traffic along with traffic from the proposed seven residences that would have access to Lydia Lane.

It is our understanding that the City has not previously identified any specific safety improvements that would be required to continue to safely accommodate the existing traffic using the Lydia Lane Park. The traffic added by the proposed Project will not change the existing geometric conditions; therefore, the addition of the traffic from the proposed Project would not be expected to create any new or elevated safety impacts in the area

All evidence indicates that there are, in fact, no significant safety problems that would be created or substantially worsened by the traffic from the proposed project if this connection were permitted. It should be noted that this is, in part, based on the absence of any pattern of accidents that could be corrected by feasible roadway improvements.

The access would also need to cross the George Cardinet Trail and based on the treatment of trail crossings with similar light volumes it is anticipated that stop signs would need to be placed on the trail on each approach to Lydia Lane to warn trail users of the active motor vehicle crossing. In summary, the project traffic would not be expected to appreciably change the safety conditions on Lydia Lane, at the George Cardinet trail crossing, or within the parking lot for Lydia Lane Park.

Internal Circulation and Access

Abrams Associates have reviewed the project plan and the internal roadway in regard to vehicle delay and traffic safety. A safe, efficient internal circulation system has been designed. 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 since it is planned that all residential driveways will be properly designed as per City standards.

The proposed internal roadways would meet the City's minimum width requirements and have gradual curves that will allow for sufficient visibility (with proper maintenance of the landscaping). The access to the majority of townhomes would be located on side driveways with only 12 homes fronting on the main roadway. It should again be noted that only seven homes would be located beyond the gate at the end of the cul-de-sac. With only seven homes in this area there would be very little traffic (no more than about five trips per hour) at either of the gated connections to the end of Silver Oak Estates Drive or Lydia Lane.

Change in Traffic on Oakhurst Drive

When the project is completed, there will be no significant changes to the traffic conditions on Oakhurst Drive. There would a small change in the average delay on the side streets, but this change would not be noticeable.

Analysis of Queuing on Westbound Concord Boulevard at Kirker Pass Road

As mentioned previously, the queue in the westbound left turn lane has been observed to extend back beyond the left-turn pocket in the AM peak period to the point where it blocks one of the two through lanes, thereby increasing delay. However, this does not cause any significant safety problems or cause any adjacent intersections to exceed any established standards. Since the overall delay and LOS still meets the established standards (and there are no other related significant impacts) the queuing that occurs on the Concord Boulevard approach to Kirker Pass Road is *not* considered a violation of any established standards. However, it was requested that additional detail be presented on the results of the queuing analysis at this intersection.

Using the Synchro 8.0 software model that was developed for the LOS analysis a detailed review of queuing was prepared for this intersection under all scenarios that were studied in this report. The detailed calculations are included in the technical appendix to this report. Please note that the queues referred to in this section represent the 95th percentile average queues meaning that, on average, the queues should remain within the 95th percentile values for 95 percent of the time during the peak hour (and should exceed them less than 5 percent of the time).

The results indicate the existing 95th percentile queues on the westbound approach average about 440 feet during the critical AM peak hour. With the addition of project traffic the average queues are only forecast to increase by an average of about 6 feet. Under cumulative conditions the average queues on the westbound approach are forecast to increase by about 100 feet to 546 feet. This is due to the forecast increases in traffic on Kirker Pass Road and the traffic from the planned Concord Naval Weapons Station Reuse Plan. Under Cumulative Conditions the proposed project's incremental contribution would still only increase the average

queue by about 6 feet during the AM peak hour. This was verified based on the fact the proposed project is forecast to add less than one vehicle per signal cycle to the westbound approach during the morning peak hour.

It should be noted that Clayton, like most cities, does not have an established exacerbation standard for a significant impact on a queue that already extends beyond the existing turn pocket storage area. However, some cities have established 25 feet (approximately one car length) as the threshold for a significant impact, but only for existing plus project and baseline plus project conditions. Cumulative forecasts involve more uncertainty and are generally excluded from the queuing impact analysis.[3]

Cumulative Traffic Analysis

The Cumulative scenario in intended to evaluate the traffic conditions at the time when the General Plan development in the City of Clayton has been projected to be in place. For the cumulative conditions, the intersection traffic volumes have been based on the existing turning movements plus the addition of growth estimated by the County's traffic demand model which is updated by the CCTA. Based on the CCTA's model forecasts the 2030 cumulative traffic volumes have been developed to be consistent with the model by applying a 1.2%/year increase to the background traffic volumes**.** This equates to an increase in the traffic stream of 23% for the 17-year period through 2030. The traffic from the Clayton Community Church project in downtown Clayton is assumed to be included in this estimate.

Cumulative Traffic Capacity Conditions

Table 9 summarizes the associated LOS computation results for the Cumulative (Year 2030) weekday AM and PM peak hour traffic conditions both and without the proposed project. The corresponding LOS analysis calculation sheets are presented in the *Traffic Analysis Appendix*. As shown, the intersections of Oakhurst Drive and Yolanda Circle/Silver Oak Estates Drive and also Kirker Pass Road at Concord Boulevard would both continue to have acceptable conditions (LOS D or better) during the weekday AM and PM peak hours.

Cumulative Plus Project Traffic Capacity Conditions

Table 9 also summarizes the associated LOS computation results for the Cumulative (Year 2030) weekday AM and PM peak hour traffic conditions with the addition of the proposed project. The corresponding LOS analysis calculation sheets are presented in the *Traffic Analysis Appendix*. As shown, in Table 9, the intersections of Oakhurst Drive and Yolanda Circle/Silver Oak Estates Drive and also Kirker Pass Road at Concord Boulevard would both continue to have acceptable conditions (LOS D or better) during the weekday AM and PM peak hours. The average vehicle delay for side street traffic would be about 20 seconds per vehicle in the PM peak.

[3] *City of Oakland Transportation Impact Study Guidelines*, City of Oakland Transportation Planning and Funding Division, Oakland, CA, April 4, 2013.

It is important to again note that there would be little or no change in delay on the existing Oakhurst Drive approaches or the southbound Yolanda Circle approach to this intersection. The increased delay (i.e. LOS C conditions) would primarily occur within the project on the proposed new northbound (Silver Oak Estates Drive) approach to Oakhurst Drive.

The City of Concord only has standards for the *overall* intersection delay and has not established any standards for side street delay at a signalized intersection. Therefore, since the overall delay and LOS still meets the established standards (and there are no other related significant impacts) the queuing that occurs on the Concord Boulevard approach to Kirker Pass Road is *not* considered a violation of any established standards. Therefore, even if this intersection were forecast to exceed the established standards (which it is not) the small amount of traffic added by the project to this particular approach (less than a three percent increase) would still not be considered a significant impact under CEQA. More importantly, the proposed project would increase the overall traffic volumes at this intersection by less than one percent.

It is important to again note that the increased delay at the intersection of Kirker Pass Road and Concord is a result of forecast increases to through traffic on Kirker Pass Road and also from additional traffic forecast to be generated by future projects in the area such as the Concord Naval Weapons Station Reuse Plan. The intersection is forecast to operate at LOS D in the future regardless of whether or not the proposed project is implemented. While increases in background traffic are forecast to increase the overall peak hour delay by as much as 10 seconds (a 30 percent increase) the proposed project itself is forecast to increase the average intersection delay by no more than about one to two seconds during either of the peak commute hours.

TABLE 9
CUMULATIVE INTERSECTION LEVEL OF SERVICE CONDITIONS

INTERSECTION	CONTROL	PEAK HOUR	CUMULATIVE		CUMULATIVE PLUS PROJECT	
			Delay	LOS	Delay	LOS
1. Oakhurst Drive and Yolanda Circle/Silver Oak Estates Drive	Side Street Stop	AM	15.7	C	16.2	C
		PM	14.4	B	21.0	C
2. Kirker Pass Road and Concord Blvd	Traffic Signal	AM	45.4	D	46.9	D
		PM	39.0	D	40.4	D

SOURCE: Abrams Associates, 2014

NOTES: HCM LOS results are presented in terms of average intersection delay in seconds per vehicle. For stop controlled intersections the results for the worst side street approach are presented.

Roadway and Intersection Mitigation Measures

With the addition of project traffic, the intersection capacity results will continue to meet the City of Clayton and the Contra Costa County or CCTA traffic standards with three exceptions. Beyond the three items listed below there are no other off-site mitigation measures that would be required as a result of the project traffic.

1) Installation of a stop sign and stop bar pavement markings would be required as mitigations to ensure safe traffic operations with the proposed new Silver Oak Estates Drive approach to Oakhurst Drive.

2) To maintain safety at the proposed project entrance a separate westbound left turn pocket will need to be constructed to provide for a safe left turn movement into the proposed project entrance. It should be noted that construction of this left turn lane will require removal of up to six trees which may require coordination with the City to plan for replacement trees. It appears that some of the trees in this area may have trunks over 6 inches in diameter and also may have been part of a previously approved landscape plan.

3) As part of the reconstruction of the intersection of Oakhurst Drive and Yolanda Cicle to accommodate the proposed project entrance the City will require the existing sidewalk on Oakhurst Drive to be modified and ADA accessible ramps will need to be constructed.