LONE OAK RANCH
TRAFFIC IMPACT STUDY

FEBRUARY 2015

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LONE OAK RANCH

TRAFFIC IMPACT STUDY
PREPARED FOR THE COUNTY OF SAN DIEGO

FEBRUARY 2015

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GLOSSARY OF TERMS AND ACRONYMS

Acronyms	Definitions
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
AWSC	All-way Stop-Controlled
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CMP	Congestion Management Program
HCM	2000 Highway Capacity Manual
ILV	Intersecting Lane Volume
PCE	Passenger Car Equivalent
PeMS	Performance Measurement Systems
pcphgpl	passenger cars per hour of green per lane
RTP	Regional Transportation Plan
SANDAG	San Diego Association of Governments
SANTEC	San Diego Traffic Engineers' Council
SR	State Route
SSSC	Side-Street Stop Controlled
TIS	Traffic Impact Study
TIF	Traffic Impact Fee
V/C	Volume-to-Capacity ratio

EXECUTIVE SUMMARY

This traffic impact analysis has been prepared for the proposed Lone Oak Ranch residential development project. The single family residential development project is proposed to consist of a total of 24 units. The project site is located on Lone Oak Road in the North County Metro Area of San Diego County, California.

The project trip generation was calculated using the SANDAG trip rates from the *(Not So) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region*, April 2002. Based on SANDAG trip rates, the traffic increase for the project is calculated at 240 ADT, 19 AM peak hour trips, and 24 PM peak hour trips. The project study area includes 4 roadway segments and 3 intersections including one project driveways.

There are no project impacts for the Lone Oak Ranch project.

CHAPTER 1.0
INTRODUCTION

This report describes the existing roadway network in the vicinity of the project site and includes a review of the existing and proposed activities for weekday peak AM and PM periods, and daily traffic conditions when the project is completed. The format of this study includes the following chapters:

1.0 Introduction
2.0 Existing Conditions
3.0 Project Impact Analysis
4.0 Impacts and Mitigation
5.0 List of Preparers and Persons and organizations Contacted

1.1 PURPOSE OF THE REPORT

This traffic impact analysis has been prepared for the proposed Lone Oak Ranch residential development project located in the North County Metro Community Planning Area of San Diego County. The project is located off Lone Oak Road and Cleveland Trail, and takes local access from Buena Creek Road.

The project is located a mile and a half northeast of SR-78 which provides regional access to the site.

1.2 PROJECT LOCATION AND DESCRIPTION

The Lone Oak Ranch project involves the development of 24 single family residential units. The project trip generation was calculated using the SANDAG trip rates from the *(Not So) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region*, April 2002. Based on SANDAG trip rates, the traffic increase for the project is calculated at 240 ADT, 19 AM peak hour trips, and 24 PM peak hour trips. The project study area includes 4 roadway segments and 3 intersections including one project driveways.

The study area for this project includes those locations that are expected to be affected by this project. The scope of the study area is based on the County of San Diego Guidelines and a working knowledge of the local transportation system developed through review of on-going traffic studies. The specific study area includes 4 roadway segments and 3 intersections, including one project driveway.

Figure 1-1 shows the project study area. Figure 1-2 shows the project site plan.

Roadway Segments

1. Lone Oak Road between Buena Creek Road and the End of Segment
2. Cleveland Trail between Buena Creek Road and the End of Segment
3. Buena Creek Road between South Santa Fe Avenue and Lone Oak Road
4. Buena Creek Road between Lone Oak Road and Monte Vista Drive

Intersections

1. Lone Oak Road and Project Driveway (side street stop)
2. Buena Creek Road and Lone Oak Road (side street stop)
3. Buena Creek Road and Cleveland Trail (side street stop)

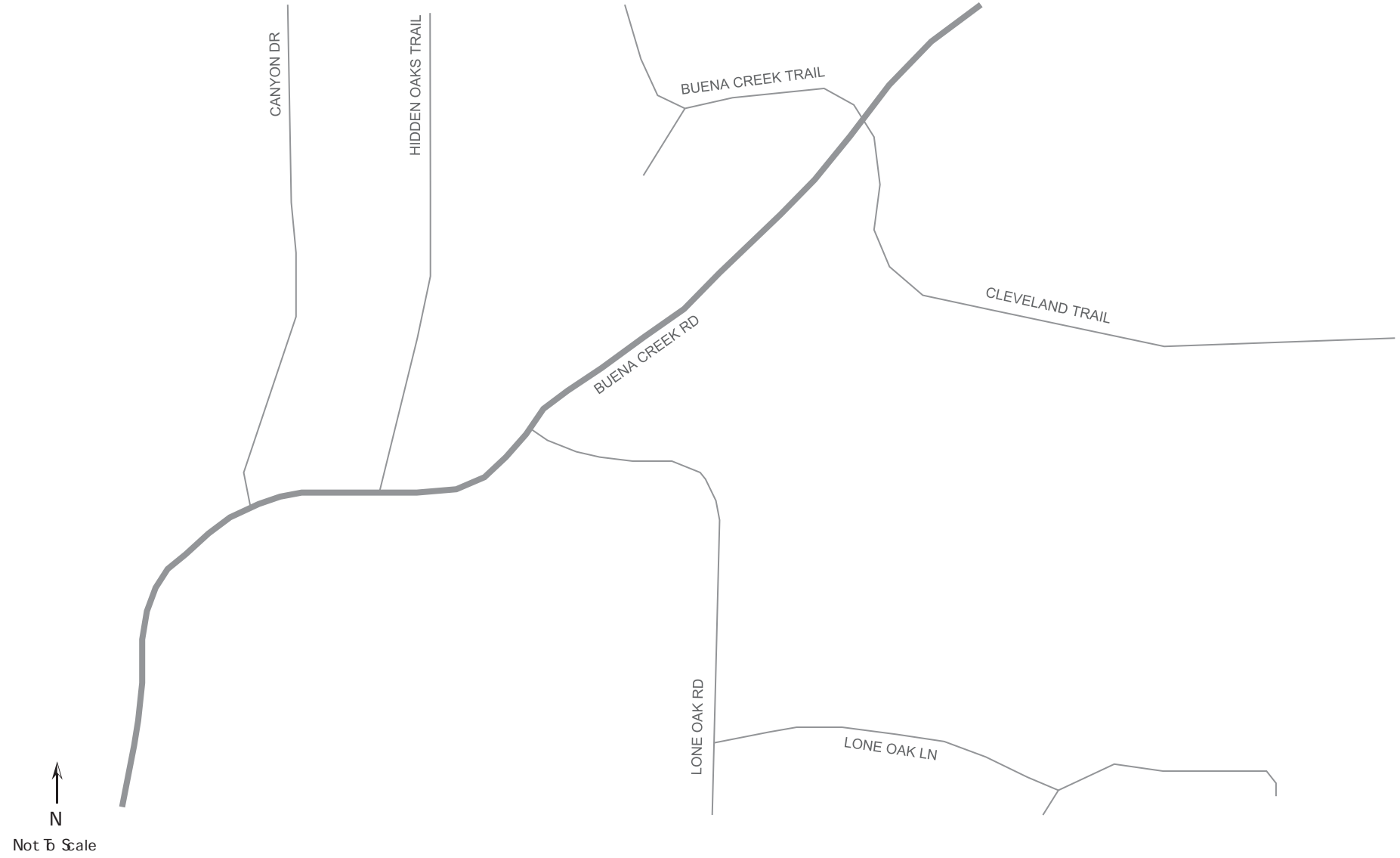

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Figure 1 - 1

Project Study Area

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SCALE 1"=60'

Figure 1 - 2
Project Site Plan

PREPARED BY:	TENTATIVE MAP COMPOSITE	SHEET
HUNSAKER & ASSOCIATES SAN DIEGO, INC.	COUNTY OF SAN DIEGO TRACT TM # 5585	1 OF 1
PLANNING 9707 Waples Street ENGINEERING San Diego, Ca. 92121 SURVEYING PH(858)558-4500 · FX(858)558-1414	**LONE OAK RANCH** COUNTY OF SAN DIEGO, CALIFORNIA	

WO# 2414-35

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1.3 PLANNING REQUIREMENTS

State Proposition 111, passed by voters in 1990, established a requirement that urbanized areas prepare a Congestion Management Program (CMP). The purpose of the CMP is to monitor the performance of the region's transportation system, develop programs to address near-term and long-term congestion, and better integrate transportation and land use planning. SANDAG has prepared the CMP for the San Diego region. It establishes significance criteria that identifies that LOS D is the minimum acceptable LOS for peak hour operation. Any roadway segment operating at LOS E or F is considered to be operating deficiently. The SANDAG Congestion Management Plan 1999 Update (CMP) requires a traffic analysis for all large-scale projects that generate at least 2,400 daily trips or 200 or more peak hour trips. The proposed project does ***not*** meet the daily and peak hour trip generation threshold, so a detailed RSA analysis is ***not*** required.

CHAPTER 2.0
EXISTING CONDITIONS

2.1 EXISTING TRANSPORTATION CONDITIONS

The principal roadways in the project study area are described briefly below. The description includes the physical characteristics, adjacent land uses, and traffic control devices along these roadways. The existing circulation network is shown in Figure 2-1.

Lone Oak Road has a functional classification as a 2-lane residential road, and is non-circulation element roadway. It serves as the access road for project trips and stems off of Buena Creek Road. Lone Oak Road operates as a north-south roadway but curves east-west as it approaches Buena Creek Road. It has direct access to the proposed project from the private gated project driveway. Based on field review, Lone Oak Road has a prima facie speed limit of 25 mph. No parking or sidewalks were observed on either side of the road during the site field review. Per the County General Plan, the classification of Lone Oak Road remains a non-circulation element road. An engineering speed survey was conducted along Lone Oak Road and can be found in Appendix F.

Cleveland Trail has a functional classification as a 2-lane residential road, and is non-circulation element roadway. It serves as the access road for project trips and stems off of Buena Creek Road. Cleveland Trail operates as an east-west roadway.. It has direct access to the proposed project from a private gated project driveway. Based on field review, Cleveland Trail has a prima facie speed limit of 25 mph. No parking or sidewalks were observed on either side of the road during the site field review. Additionally, very few trips are currently observed utilizing Cleveland Trail at this time. Per the County General Plan, the classification of Lone Oak Road remains a non-circulation element road.

Buena Creek Road has a functional classification as a 2-lane community collector with no median, which serves as the main corridor for all project trips destined for regional trips via SR-78 or locally. Buena Creek Road operates as a north-south roadway. The posted speed limit is 35 MPH. This roadway provides driveway access to adjacent land uses which include residential uses. Per the County General Plan, the ultimate classification of Buena Creek Road is a 4.1 B Major Road with intermittent turn lanes. An engineering speed survey was conducted along Buena Creek Road and can be found in Appendix F.

2.1.1 Existing Traffic Volumes and LOS Analyses

The intersection turning movement counts were conducted during the weekday morning peak period from 7:00 AM to 9:00 AM and during the weekday evening peak period from 4:00 PM to 6:00 PM in February 2014. The resultant existing weekday morning and evening peak hour intersection volumes are shown in Figure 2-2. Average daily traffic volumes were also conducted in February 2014 and were obtained through machine data collection. The daily traffic volumes are also shown in Figure 2-2. Both intersection and segment count data is included in Appendix A. The LOS calculated for the intersections and street segments are shown in Tables 1 and 2, respectively. Existing LOS calculations are included in Appendix B.

Table 1
Existing Segment ADT Volumes and Level of Service

Roadway Segment	Lanes/ Class	LOS E Capacity	Existing	
			ADT	LOS
Buena Creek Road				
Santa Fe Avenue to Lone Oak Road	2 lane – Community Collector w/ No Median	16,200	10,274	D
Lone Oak Road to Monte Vista Drive	2 lane – Community Collector w/ No Median	16,200	9,214	D
Lone Oak Road				
Buena Creek Road to End of Segment	2 lane – Residential Road	<1500	681	Better than C
Cleveland Trail				
Buena Creek Road to End of Segment	2 lane – Residential Road	<1500	10*	Better than C

* Assumed based on single residence on Cleveland Trail

Table 2
Existing Intersection Level of Service

Intersection	Without Project	
	Delay	LOS
AM Peak Hour		
Buena Creek Road and Lone Oak Road	34.9	D
Buena Creek Road and Cleveland Trail	Negligible	A
PM Peak Hour		
Buena Creek Road and Lone Oak Road	44.9	E
Buena Creek Road and Cleveland Trail	Negligible	A

Based on Table 1, there are currently no segment deficiencies as all study segments currently operate at LOS D or better. However, Table 2 indicates that in the PM Peak Hour, the intersection of Buena Creek Road and Lone Oak Road is already deficient, operating at an LOS E.

2.2 EXISTING PARKING, TRANSIT & ON-SITE CIRCULATION

Parking does not currently exist along the principal roadways in the project study area. Existing transit routes are described briefly below.

2.2.1 Existing Transit Routes

This area of the North County Metro Region is served by the BREEZE Bus Routes, 332 and 305. Bus Route 332 has a stop at the intersection of Buena Creek Road/Sycamore Avenue and South Santa Fe Avenue. Bus Route 305 runs along South Santa Fe Avenue, crossing Buena Creek Road. Both bus routes provide access through the North County Metro area. Additionally, the Sprinter service runs parallel to South Santa Fe Avenue with a stop located at Buena Creek Road. The Sprinter service provides greater regional access. The project is not expected to negatively affect any of these transit facilities.

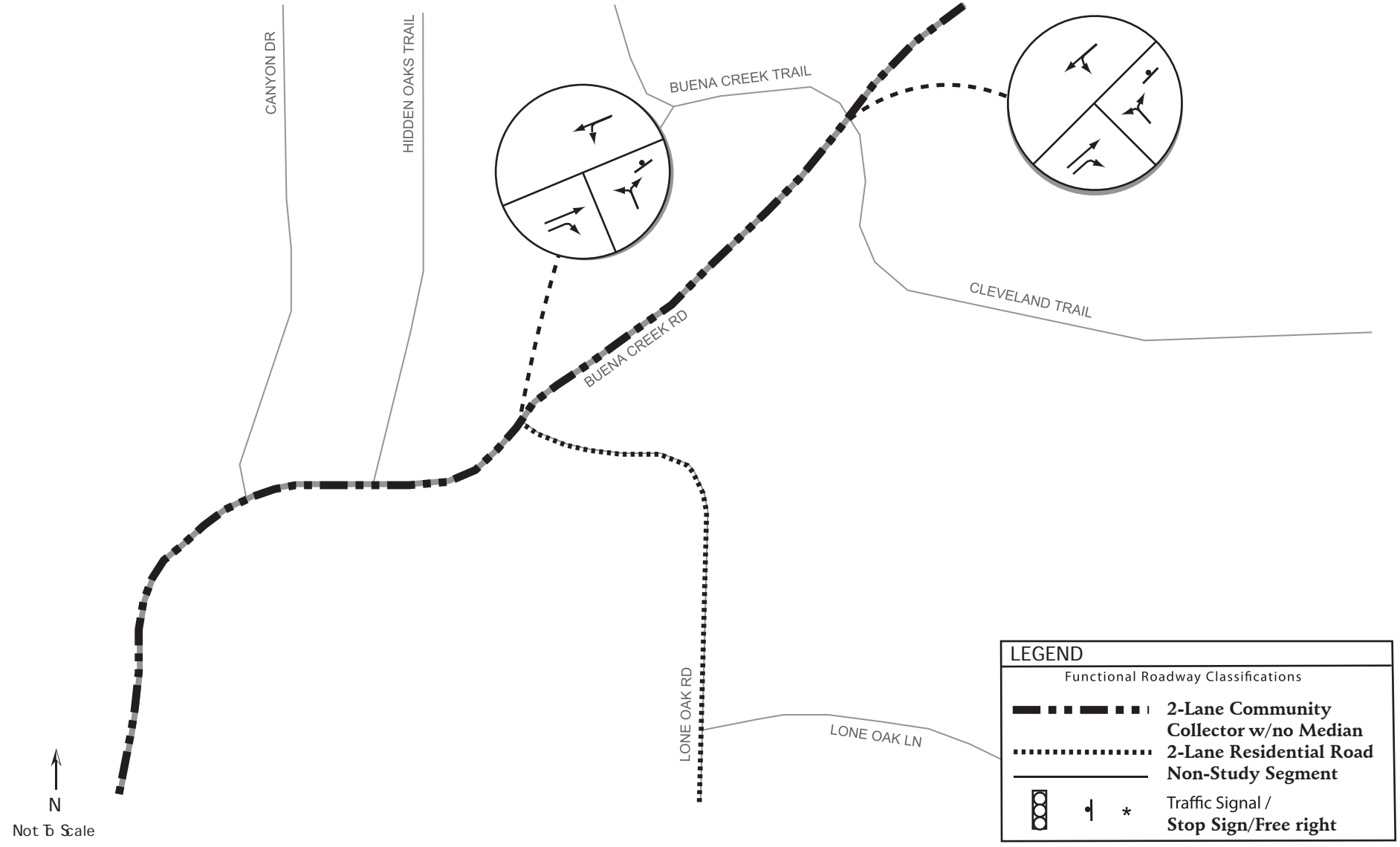

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Figure 2 - 1

Existing Circulation Network

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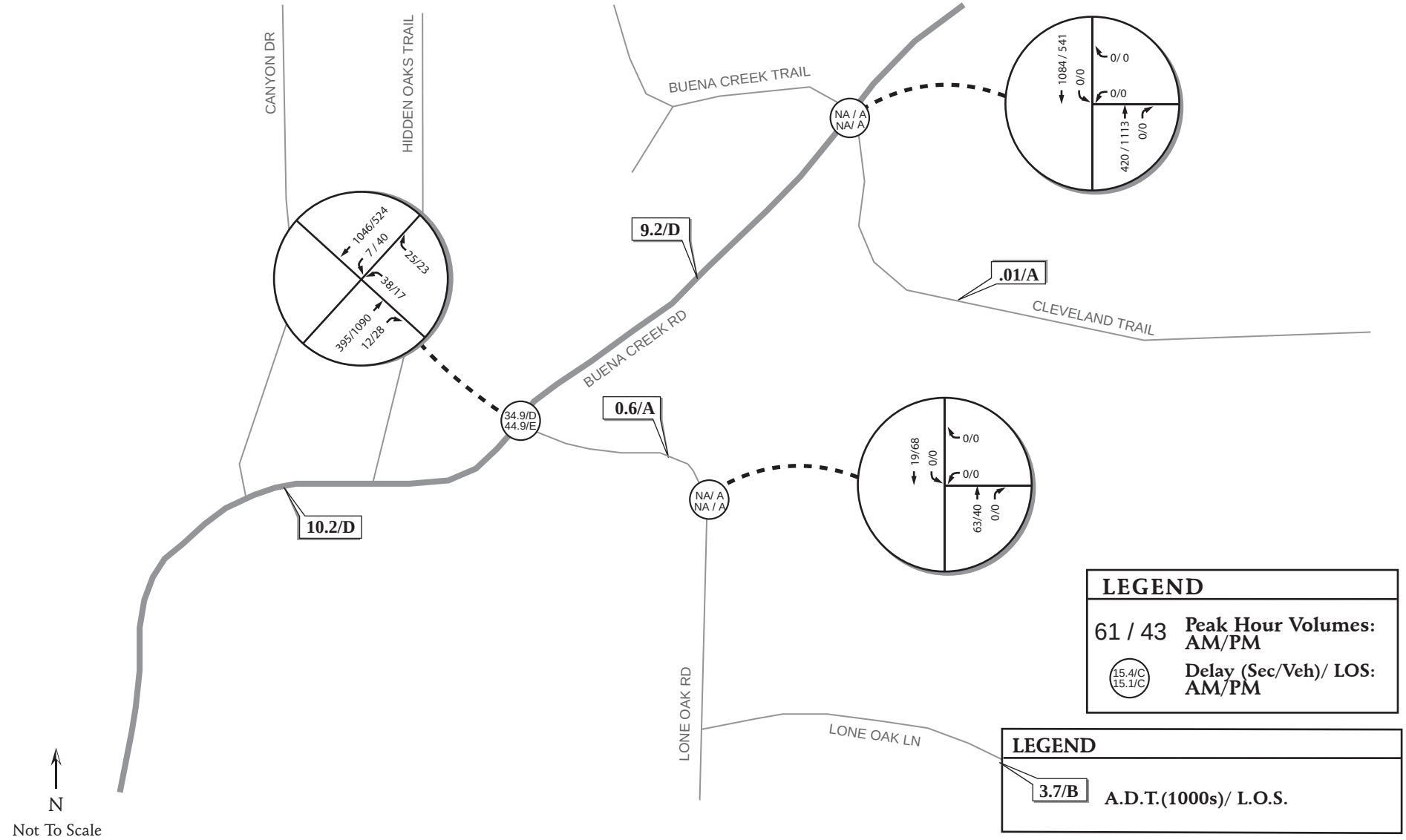

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Figure 2 - 2

Existing Daily Roadway Segment Conditions &
Existing Peak Hour Intersection Conditions

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Lone Oak Ranch Vista
Traffic Analysis

CHAPTER 3.0
PROJECT IMPACT ANALYSIS

3.1 ANALYSIS METHODOLOGIES

The project study area is generally determined by the limits or extent of where 25 or more peak hour trips would travel from the proposed project, as required by the County of San Diego as set forth in County of San Diego *Report Format & Content Requirements Transportation and Traffic*, August 24, 2011.

The traffic analyses prepared for this study were based on the 2000 Highway Capacity Manual (HCM) operations analysis using Level of Service (LOS) evaluation criteria. The operating conditions of the study intersections, street segments, and highway segments are measured using the HCM LOS designations, which ranges from A through F. LOS A represents the best operating conditions and LOS F denotes the worst operating condition. The individual LOS criteria for each roadway component are described below.

3.1.1 Intersection Capacity Analysis

The analysis of peak hour intersection performance was conducted using the Synchro analysis software program, which uses methodologies defined in the 2000 Highway Capacity Manual (HCM) to calculate results. Level of service (LOS) for intersections is determined by control delay. Control delay is defined as the total elapsed time from when a vehicle stops at the end of a queue to the time the vehicle departs from the stop line. The total elapsed time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position, including deceleration of vehicles from free-flow speed to the speed of vehicles in the queue.

Street system operating conditions are typically described in terms of "level of service." Level of service is a report-card scale used to indicate the quality of traffic flow on roadway segments and at intersections. Level of service (LOS) ranges from LOS A (free flow, little congestion) to LOS F (forced flow, extreme congestion). The HCM LOS for the range of delay by seconds for unsignalized and signalized intersections is described in Table 3.

Table 3
Unsignalized and Signalized Intersection Level of Service (HCM 2000)

Level of Service	Unsignalized Average Control Delay (seconds/vehicle)	Signalized Average Control Delay (seconds/vehicle)
A	0-10	0-10
B	> 10-15	> 10-20
C	> 15-25	> 20-35
D	> 25-35	> 35-55
E	> 35-50	> 55-80
F	>50	> 80

Source: Highway Capacity Manual 2000.

3.1.2 Side-street Stop Controlled (SSSC) Intersections

The HCM analysis methodology for evaluating two-way Stop-controlled (SSSC) intersections, is based on gap acceptance and conflicting traffic for vehicles stopped on the minor-street approaches. The critical gap (or minimum gap that would be acceptable) is defined as the minimum time interval in the major-street traffic stream that allows intersection entry for one minor-street vehicle. Average control delay and LOS for the "worst approach" are reported. Level of service is not defined for the intersection as a whole.

3.1.3 Roadway Segment Capacity Analysis

The County of San Diego has published daily traffic volume standards for roadways within its jurisdiction. To determine service levels on study area roadway segments, we compared the appropriate average daily traffic thresholds for level of service to the daily capacity of the study area roadway segments, and the existing and future volumes in the study area. The thresholds for determining level of service used in this analysis are summarized in Table 4.

Table 4
Street Segment Daily Capacity and LOS (County of San Diego)
Average Daily Vehicle Trips*

Road Classification		# of Travel Lanes	Maximum Recommended ADT by LOS				
			A Free Flow	B Steady Flow	C Stable Flow	D Approach Unstable	E Unstable Flow
Expressway (6.1)		6	<36,000	<54,000	<70,000	<86,000	<108,000
Prime Arterial (6.2)		6	<22,200	<37,000	<44,600	<50,000	<57,000
Major Road	w/ Raised Median (4.1A)	4	<14,800	<24,700	<29,600	<33,400	<37,000
	w/ Intermittent Turn Lanes (4.1B)	4	<13,700	<22,800	<27,400	<30,800	<34,200
Boulevard	w/ Raised Median (4.2A)	4	<18,000	<21,000	<24,000	<27,000	<30,000
	w/ Intermittent Turn Lanes (4.2B)	4	<16,800	<19,600	<22,500	<25,000	<28,000
Community Collector	w/ Raised Median (2.1A)	2	<10,000	<11,700	<13,400	<15,000	<19,000
	w/ Continuous Left Turn Lane (2.1B)	2	<3,000	<6,000	<9,500	<13,500	<19,000
	w/ Intermittent Turn Lane (2.1C)	2	<3,000	<6,000	<9,500	<13,500	<19,000
	w/ Passing Lane (2.1D)	2	<3,000	<6,000	<9,500	<13,500	<19,000
	No Median (2.1E)	2	<1,900	<4,100	<7,100	<10,900	<16,200
Light Collector	w/ Raised Median (2.2A)	2	<3,000	<6,000	<9,500	<13,500	<19,000
	w/ Continuous Left Turn Lane (2.2B)	2	<3,000	<6,000	<9,500	<13,500	<19,000
	w/ Intermittent Turn Lane (2.2C)	2	<3,000	<6,000	<9,500	<13,500	<19,000
	w/ Passing Lane (2.2D)	2	<3,000	<6,000	<9,500	<13,500	<19,000
	No Median (2.2E)	2	<1,900	<4,100	<7,100	<10,900	<16,200
	w/ Reduced Shoulder (2.2F)	2	<5,800	<6,800	<7,800	<8,700	<9,700
Minor Collector	w/ Raised Median (2.3A)	2	<3,000	<6,000	<7,000	<8,000	<9,000
	w/ Intermittent Turn Lane (2.3B)	2	<3,000	<6,000	<7,000	<8,000	<9,000
	No Median (2.3C)	2	<1,900	<4,100	<6,000	<7,000	<8,000
NON-CIRCULATION ELEMENT ROADS**		**LEVELS OF SERVICE**					
Residential Collector		2	-	-	<4,500	-	-
Rural Residential Collector***		2	-	-	<4,500	-	-
Residential Road		2	-	-	<1,500	-	-
Rural Residential Road***		2	-	-	<1,500	-	-
Residential Cul-de-Sac or Loop Road		2	-	-	<200	-	-

Source: County of San Diego Department of Public Works *Public Road Standards* February 9, 2010

* The values shown are subject to adjustment based on the geometry of the roadway, side frictions, and other relevant factors as determined by the Director, Department of Public Works

** Levels of service are not applied to residential streets since their primary purpose is to serve abutting lots, not carry through traffic. Levels of service normally apply to roads carrying through traffic between major trip generators and attractors.

*** Rural Residential Collectors and Rural Residential Roads are intended to serve areas with lot sizes of 2 acres or more which do not have a demand for on-street parking. On-street parking is not assured for these cross sections. Additional right-of-way is needed if on-street parking is in paved area.

3.1.4 County of San Diego Guidelines for Determining Significance

Based on the San Diego County *Report Format & Content Requirements Transportation and Traffic*, August 24, 2011, a project may have a direct impact if the significance criteria are exceeded, as shown in Table 5.

Table 5
County of San Diego Significant Traffic Impact Thresholds

Measures of Significant Project Impacts to Congestion Allowable Increases on Congested Roads and Intersections					
	Road Segments			Intersections	
Operations	2-Lane Road	4-Lane Road	6-Lane Road	Signalized	Unsignalized
LOS E	200 ADT	400 ADT	600 ADT	Delay of 2 seconds	20 peak hour trips on a critical movement
LOS F	100 ADT	200 ADT	300 ADT	Delay of 1 second, or 5 peak hour trips on a critical movement	5 peak hour trips on a critical movement

Notes:
1. A Critical movement is one that is experiencing excessive queues.
2. By adding proposed project trips to all other trips from a list of projects, these same tables are used to determine if total cumulative impacts are significant. If cumulative impacts are found to be significant, each project that contributes any trips must mitigate a share of the cumulative impacts.
3. The County may also determine impacts have occurred on roads even when a project's traffic or cumulative impacts do not trigger an unacceptable level of service, when such traffic uses a significant amount of remaining road capacity.

A direct impact would occur when the significance criteria are exceeded. If the proposed project exceeds the values provided in the above table, then the individually proposed project would result in a direct traffic impact. In such case, specific improvements to mitigate direct impacts must be identified.

3.2 PROJECT TRIP GENERATION

Trip generation is a measure or forecast of the number of trips that begin or end at the project site. The traffic generated is a function of the extent and type of development proposed for the site. These trips will result in some traffic increases on the streets where they occur. Vehicular traffic generation characteristics for projects are estimated based on established rates. These rates identify the probable traffic generation of various land uses based studies of developments in comparable settings. The rates used in this analysis were determined based on rates contained in the (SANDAG) (Not So) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region (2002) This manual provides standards and recommendations for the probable traffic generation of various land uses based upon local, regional and nationwide studies of existing developments in comparable settings. Appendix C contains excerpts from this manual.

Table 6
Project Trip Generation

Land Use	Intensity	Units	Rate/Trips	Daily	AM Peak Hour			PM Peak Hour		
					Total	In	Out	Total	In	Out
Single Family Detached	24	Dwelling Units	Rate	10	8%	30%	70%	10%	70%	30%
			Trips	240	19	6	13	24	17	7

Source: SANDAG (Not So) Brief Guide to Trip Generation (2002)

3.3 PROJECT TRIP DISTRIBUTION

Trip distribution and assignment is the process of identifying the probable destinations, directions and traffic routes that project related traffic will likely affect. Trip distribution and assignment information can be estimated from observed traffic patterns, experience or through use of a computerized travel forecast model. Once the proposed developments trips have been estimated, they are assigned to the study area network. The trip distribution and assignment for this project is based on the existing turning movement counts at the studied intersections (see Figure 2-2), as all the properties on Lone Oak Road are residential in nature. To account for both project driveways, the trips were distributed out of each driveway according to the distribution of the existing trips.
The project trips therefore mimic the same distribution of existing trips already within the study area.

3.4 ROAD SEGMENTS

This section will summarize the analysis for the addition of project traffic onto the existing background traffic for ADT conditions. The traffic analysis criteria are the same as outlined in section 2.1.

3.4.1 Existing + Project Conditions

Daily traffic volumes for existing plus project are shown in Figure 3-1. The LOS calculated for street segments is shown in Table 7. Existing + project LOS calculations are included in Appendix D

Table 7
Existing + Project Segment ADT Volumes Level of Service

Roadway Segment	Lanes/ Class	LOS E Capacity	Existing		With Project		Δ Traffic	Direct Impact?
			ADT	LOS	ADT	LOS		
Buena Creek Road								
Santa Fe Avenue to Lone Oak Road	2CCnM	16,200	10,274	D	10,406	D	132	N
Lone Oak Road to Monte Vista Drive	2CCnM	16,200	9,214	D	9,322	D	108	N
Lone Oak Road								
Buena Creek Road to End of Segment	2RR		681		921		240	N
Cleveland Trail								
Buena Creek Road to End of Segment	2RR		10*		118		108	N

* Assumed based on single residence on Cleveland Trail

Based on Table 5, two-lane roadway segments operating at LOS E and F will be impacted if the added project related trips exceed 200 and 100 trips respectively. As shown in Table 7, project related traffic along all analyzed roadway segments do not operate at LOS E or F and therefore not considered significantly impacted by the project.

3.5 INTERSECTIONS

This section will summarize the analysis for the addition of project traffic onto the existing background traffic for ADT conditions. The traffic analysis criteria are the same as outlined in section 2.1.

It should be noted that a project feature of the Lone Oak Ranch residential development is a reconfiguration of the intersection of Buena Creek Road and Lone Oak Road. As part of the project, the east leg of the subject intersection will be restriped to have both left and right turn lanes from Lone Oak Road onto Buena Creek Road. This project feature is designed to pre-emptively improve delay in advance of the project's construction.

3.5.1 Existing + Project Conditions

AM and PM peak hour intersection volumes are shown in Figure 3-1 as well. The intersection delay and associated LOS scores calculated for intersections are shown in Table 8. Existing + project LOS calculations are included in Appendix D. All of these tables, figures and calculations include the Lone Oak Road and Buena Creek Road intersection improvement as a project feature.

Table 8
Existing + Project Intersection Level of Service

Intersection	Without Project		With Project		Δ Delay	PH Trips on Critical Movement	Significant
	Delay	LOS	Delay	LOS			
AM Peak Hour							
Buena Creek Road and Lone Oak Road	34.9	D	35.9	E	1.0	7	No
Buena Creek Road and Cleveland Trail		A	10.9	B	10.9	6	No
Lone Oak Road and Project Driveway		A	8.6	A	8.6	7	No
PM Peak Hour							
Buena Creek Road and Lone Oak Road	44.9	E	42.6	E	-2.3	4	No
Buena Creek Road and Cleveland Trail		A	20.6	C	20.6	8	No
Lone Oak Road and Project Driveway		A	8.5	A	8.5	9	No

*** Intersection is SSSC**

Based on Table 5, unsignalized intersections operating at LOS E and F will be impacted if the number of peak hour trips on a critical movement exceeds 20 and 5 trips respectively. As shown in table 8, without the project, the intersection of Buena Creek Road and Lone Oak Road operates at an LOS grade of E. With the project expected to introduce additional projects to the intersection, critical movement analysis will be required. At this intersection, the critical movement is defined as traffic that is turning left, from Lone Oak road to southbound Buena Creek Road. As shown in Table 8, project related traffic on Lone Oak Road approaching Buena Creek Road improves the delay at the intersection by over 2 seconds and remains at an LOS score of E. This improvement is a result of the project feature that improves the intersection Lone Oak Road and Buena Creek Road. Additionally, the project produces only 4 peak hour trips on the critical movement. Therefore, the intersection of Buena Creek Road and Lone Oak Road ***is not*** considered ***significantly impacted*** by the project.

3.6 SITE ACCESS

This section will summarize site access, on-site parking, on-site circulation and emergency access for the proposed residential project.

3.6.1 Project Access

The proposed project will take access off Lone Oak Road and Cleveland Trail via two separate private gated driveways with approximately 120' of queuing space. The driveway off of Lone Oak Road has 210' of corner sight distance in the north direction and 419' of corner sight distance in the south direction, coming out of the project driveway. From Lone Oak Road, there is 260' of stopping sight distance looking in the southwest direction and 338' looking in the northeast direction when turning onto Buena Creek Road. Similarly, there is 338' of corner sight distance in both the northeast and southwest directions from Cleveland Trail turning onto Buena Creek Road. These sight distances are derived from speed surveys conducted on Lone Oak Road and Buena Creek Road. These speed surveys can be found in Appendix F.

Regional access is provided by State Route 78 (southwest of the project site). Buena Creek Road, South Santa Fe Avenue, and Sycamore Avenue are major roads that connect the project to the surrounding freeways.

3.6.2 Parking

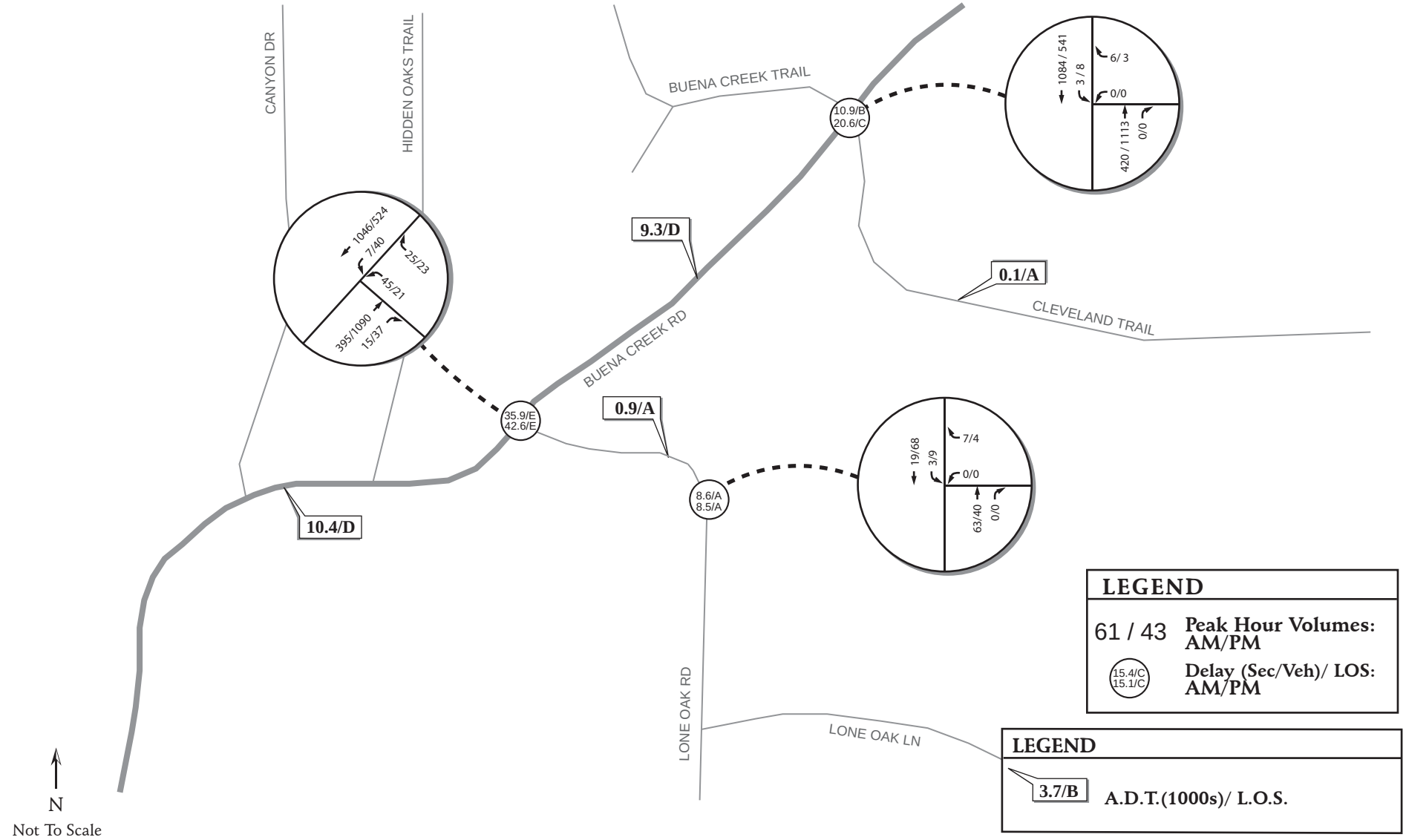
The County of San Diego requires that two parking spaces be developed per dwelling unit. Given the large parcel size and parcel layouts, parking has been deemed more than sufficient since ample driveway parking will be available to residents.

3.6.3 On-site Circulation

Within the project, 2 non-circulating roads connect all 24 single-family detached dwelling units to both project driveways. Based on Table 4, the capacity for non-circulation element roads defined as residential cul-de-sacs or loops is <200 ADT.

3.6.4 Emergency Access

The primary access point for emergency vehicles as well as evacuation of residents is through both project driveways off of Lone Oak Road and Cleveland Trail respectively.



October 2014
JB42020

Figure 3 - 1

Existing with Project Daily Roadway Segment Conditions &
Existing with Project Peak Hour Intersection Conditions

KOA CORPORATION
PLANNING & ENGINEERING

Lone Oak Ranch Vista
Traffic Analysis

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CHAPTER 4.0
GENERAL PLAN CONSISTENCY AND BUILD-OUT ANALYSIS

This chapter identifies any proposed changes to the County's General Plan or zoning and the associated build-out analysis pursuant to the County General Plan Public Facility Element. The build-out analysis must evaluate the functioning of the County's General Plan Circulation Element Roads at build-out based on the SANDAG Regional Traffic Forecast.

The proposed project does not introduce any changes to the County's General Plan or zoning, and therefore DOES NOT need a build-out analysis.

CHAPTER 5.0
IMPACTS AND MITIGATION

This chapter identifies significant impacts and describes appropriate project mitigation. A summary of the impacts and mitigation is shown in Table 9 and illustrated in Figure 5-1.

5.1 IMPACT AND MITIGATION SUMMARY

The project is calculated to have zero direct impacts.

5.2 IMPACT AND MITIGATION DISCUSSION

As stated above, the project will create zero direct impacts. Because there are no direct impacts caused by the project, no further discussion is required to discuss the impact as well as potential mitigations.

However, it is expected that the project will result in local and regional cumulative traffic impacts. The mitigation for these cumulative impacts will be payment into the County's TIF fees that is to be determined.

CHAPTER 6.0
LIST OF PREPARERS AND PERSONS AND ORGANIZATIONS CONTACTED

5.1 LIST OF PREPARERS

J. Arnold Torma, P.E. (RTE 60690), KOA Corporation, Principal Engineer
Ryan Whipple, E.I.T. KOA Corporation, Assistant Engineer

5.2 ORGANIZATIONS CONTACTED

County of San Diego

APPENDIX A
COUNT DATA

INTERSECTION TURNING MOVEMENT COUNTS

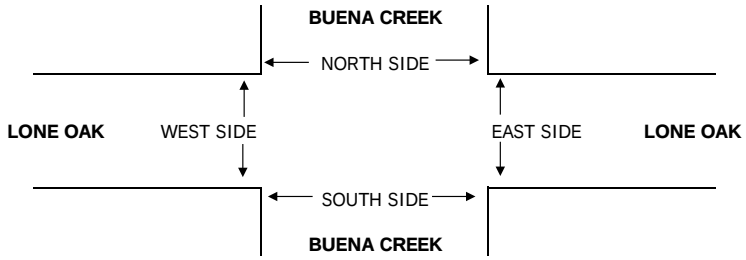
PREPARED BY: PACIFIC TECHNICAL DATA

DATE:	LOCATION:	VISTA	PROJECT #:	PTD14-0228-01
2/25/14	NORTH & SOUTH:	BUENA CREEK	LOCATION #:	2
TUESDAY	EAST & WEST:	LONE OAK	CONTROL:	1-WAY STOP (WB)

NOTES:

AM / PM / MD / OTHER / OTHER — ▲ N, ◄ W, E ►, S ▼

		NORTHBOUND BUENA CREEK			SOUTHBOUND BUENA CREEK			EASTBOUND LONE OAK			WESTBOUND LONE OAK				U-TURNS				
	LANES:	NL X	NT 1	NR 0	SL 0	ST 1	SR X	EL X	ET X	ER X	WL 0.5	WT X	WR 0.5	TOTAL	NB X	SB X	EB X	WB X	TTL
AM	7:00 AM		48	2	1	144					3		8	206					0
	7:15 AM		35	1	2	125					6		2	171					0
	7:30 AM		53	1	0	133					6		3	196					0
	7:45 AM		52	0	1	132					7		1	193					0
	8:00 AM		57	1	0	131					8		2	199					0
	8:15 AM		55	2	1	141					5		3	207					0
	8:30 AM		54	3	1	110					2		3	173					0
	8:45 AM		41	2	1	130					1		3	178					0
	VOLUMES	0	395	12	7	1,046	0	0	0	0	38	0	25	1,523	0	0	0	0	0
	APPROACH %	0%	97%	3%	1%	99%	0%	0%	0%	0%	60%	0%	40%						
	APP/DEPART	407	/	420	1,053	/	1,084	0	/	19	63	/	0	0					
	BEGIN PEAK HR		7:30 AM																
	VOLUMES	0	217	4	2	537	0	0	0	0	26	0	9	795					
	APPROACH %	0%	98%	2%	0%	100%	0%	0%	0%	0%	74%	0%	26%						
	PEAK HR FACTOR		0.953			0.949			0.000			0.875		0.960					
	APP/DEPART	221	/	226	539	/	563	0	/	6	35	/	0	0					
PM	4:00 PM		139	4	3	65					3		1	215					0
	4:15 PM		131	7	5	58					2		2	205					0
	4:30 PM		141	2	7	57					3		2	212					0
	4:45 PM		154	1	8	71					1		4	239					0
	5:00 PM		143	3	6	78					3		4	237					0
	5:15 PM		151	3	4	67					2		5	232					0
	5:30 PM		116	4	4	66					1		2	193					0
	5:45 PM		115	4	3	62					2		3	189					0
	VOLUMES	0	1,090	28	40	524	0	0	0	0	17	0	23	1,722	0	0	0	0	0
	APPROACH %	0%	97%	3%	7%	93%	0%	0%	0%	0%	43%	0%	58%						
	APP/DEPART	1,118	/	1,113	564	/	541	0	/	68	40	/	0	0					
	BEGIN PEAK HR		4:30 PM																
	VOLUMES	0	589	9	25	273	0	0	0	0	9	0	15	920					
	APPROACH %	0%	98%	2%	8%	92%	0%	0%	0%	0%	38%	0%	63%						
	PEAK HR FACTOR		0.965			0.887			0.000			0.857		0.962					
	APP/DEPART	598	/	604	298	/	282	0	/	34	24	/	0	0					



		PEDESTRIAN CROSSINGS					PEDESTRIAN ACTIVATIONS					BICYCLE CROSSINGS				
		N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	NS	SS	ES	WS	TOTAL
AM	7:00 AM					0					0					0
	7:15 AM					0					0					0
	7:30 AM					0					0					0
	7:45 AM					0					0					0
	8:00 AM					0					0					0
	8:15 AM					0					0					0
	8:30 AM					0					0					0
	8:45 AM					0					0					0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PM	4:00 PM					0					0					0
	4:15 PM					0					0					0
	4:30 PM					0					0					0
	4:45 PM					0					0					0
	5:00 PM					0					0					0
	5:15 PM					0					0					0
	5:30 PM					0					0					0
	5:45 PM					0					0					0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TUESDAY, FEBRUARY 25TH, 2014 CITY: VISTA PROJECT: PTD14-0228-01

BUENA CREEK N-O SANTE FE

AM Period	NB		SB		EB	WB		PM Period	NB		SB		EB	WB	
00:00	5		4					12:00	56		61				
00:15	2		3					12:15	70		63				
00:30	11		3					12:30	69		85				
00:45	5	23	2	12			35	12:45	70	265	53	262			527
01:00	6		5					13:00	73		57				
01:15	3		2					13:15	82		60				
01:30	3		1					13:30	63		63				
01:45	3	15	1	9			24	13:45	61	279	65	245			524
02:00	5		1					14:00	85		68				
02:15	1		1					14:15	91		64				
02:30	2		4					14:30	75		68				
02:45	3	11	0	6			17	14:45	112	363	68	268			631
03:00	3		2					15:00	121		81				
03:15	6		1					15:15	133		65				
03:30	1		2					15:30	118		62				
03:45	3	13	8	13			26	15:45	137	509	86	294			803
04:00	2		9					16:00	150		78				
04:15	3		5					16:15	144		65				
04:30	2		10					16:30	152		68				
04:45	3	10	20	44			54	16:45	162	608	77	288			896
05:00	3		20					17:00	141		88				
05:15	8		24					17:15	152		61				
05:30	14		50					17:30	132		68				
05:45	21	46	61	155			201	17:45	111	536	66	283			819
06:00	22		92					18:00	125		80				
06:15	33		81					18:15	132		89				
06:30	26		107					18:30	134		70				
06:45	44	125	138	418			543	18:45	114	505	59	298			803
07:00	55		156					19:00	100		49				
07:15	38		141					19:15	92		48				
07:30	51		144					19:30	70		37				
07:45	58	202	148	589			791	19:45	52	314	33	167			481
08:00	59		151					20:00	60		34				
08:15	62		140					20:15	54		34				
08:30	55		108					20:30	52		26				
08:45	42	218	131	530			748	20:45	35	201	24	118			319
09:00	41		146					21:00	51		22				
09:15	51		88					21:15	40		21				
09:30	46		91					21:30	56		20				
09:45	50	188	83	408			596	21:45	39	186	14	77			263
10:00	56		84					22:00	33		14				
10:15	44		60					22:15	30		12				
10:30	54		60					22:30	18		11				
10:45	52	206	57	261			467	22:45	16	97	10	47			144
11:00	53		78					23:00	10		7				
11:15	49		55					23:15	26		7				
11:30	55		56					23:30	11		11				
11:45	52	209	75	264			473	23:45	13	60	4	29			89
Total Vol.		1266		2709			**3975**			3923		2376			**6299**

Daily Totals

NB	SB	EB	WB	**Combined**
5189	5085			**10274**

	AM			**PM**		
Split %	31.8%	68.2%	**38.7%**	62.3%	37.7%	**61.3%**
Peak Hour	11:45	07:00	**07:30**	16:00	17:45	**16:30**
Volume	247	589	**813**	608	305	**901**
P.H.F.	0.88	0.94	**0.97**	0.98	0.86	**0.94**

TUESDAY, FEBRUARY 25TH, 2014 CITY: VISTA PROJECT: PTD14-0228-01

BUENA CREEK N-O LONE OAK

AM Period	NB		SB		EB	WB		PM Period	NB		SB		EB	WB	
00:00	6		4					12:00	50		57				
00:15	3		2					12:15	71		55				
00:30	3		3					12:30	63		72				
00:45	6	18	1	10			28	12:45	64	248	55	239			487
01:00	2		5					13:00	68		54				
01:15	4		2					13:15	64		50				
01:30	5		0					13:30	59		56				
01:45	2	13	0	7			20	13:45	46	237	51	211			448
02:00	2		1					14:00	72		53				
02:15	1		2					14:15	83		57				
02:30	1		1					14:30	62		57				
02:45	3	7	2	6			13	14:45	106	323	49	216			539
03:00	3		2					15:00	111		84				
03:15	4		1					15:15	106		64				
03:30	2		2					15:30	118		62				
03:45	0	9	7	12			21	15:45	123	458	88	298			756
04:00	4		8					16:00	138		63				
04:15	2		4					16:15	140		60				
04:30	2		5					16:30	144		68				
04:45	4	12	22	39			51	16:45	162	584	77	268			852
05:00	2		15					17:00	143		95				
05:15	6		25					17:15	155		70				
05:30	14		39					17:30	123		65				
05:45	23	45	58	137			182	17:45	113	534	66	296			830
06:00	23		76					18:00	105		51				
06:15	28		68					18:15	119		40				
06:30	22		97					18:30	119		44				
06:45	37	110	131	372			482	18:45	87	430	50	185			615
07:00	55		141					19:00	80		43				
07:15	44		132					19:15	72		45				
07:30	51		135					19:30	56		30				
07:45	58	208	142	550			758	19:45	42	250	26	144			394
08:00	66		136					20:00	49		27				
08:15	52		140					20:15	43		35				
08:30	63		119					20:30	36		25				
08:45	48	229	127	522			751	20:45	25	153	21	108			261
09:00	46		129					21:00	35		22				
09:15	44		86					21:15	41		15				
09:30	46		68					21:30	39		17				
09:45	42	178	69	352			530	21:45	35	150	14	68			218
10:00	51		78					22:00	32		17				
10:15	37		49					22:15	20		12				
10:30	37		51					22:30	12		11				
10:45	39	164	43	221			385	22:45	16	80	10	50			130
11:00	38		64					23:00	9		3				
11:15	51		44					23:15	22		8				
11:30	50		40					23:30	7		10				
11:45	42	181	61	209			390	23:45	10	48	4	25			73
Total Vol.		1174		2437			**3611**			3495		2108			**5603**

Daily Totals

NB	SB	EB	WB	**Combined**
4669	4545			**9214**

	AM			**PM**		
Split %	32.5%	67.5%	**39.2%**	62.4%	37.6%	**60.8%**
Peak Hour	07:45	07:30	**07:30**	16:30	16:30	**16:30**
Volume	239	553	**780**	604	310	**914**
P.H.F.	0.91	0.97	**0.97**	0.91	0.82	**0.96**

TUESDAY, FEBRUARY 25TH, 2014 CITY: VISTA PROJECT: PTD14-0228-01

LONE OAK E-O BUENA CREEK

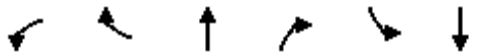
AM Period	NB	SB	EB		WB			PM Period	NB	SB	EB		WB		
00:00			1		0			12:00			8		7		
00:15			0		0			12:15			1		8		
00:30			1		0			12:30			5		1		
00:45			0	2	0	0	2	12:45			2	16	4	20	36
01:00			1		1			13:00			9		4		
01:15			0		0			13:15			9		3		
01:30			0		1			13:30			5		7		
01:45			1	2	0	2	4	13:45			3	26	7	21	47
02:00			1		0			14:00			5		2		
02:15			0		0			14:15			5		7		
02:30			0		0			14:30			9		5		
02:45			1	2	0	0	2	14:45			2	21	7	21	42
03:00			0		0			15:00			6		5		
03:15			0		0			15:15			6		5		
03:30			0		0			15:30			5		4		
03:45			1	1	1	1	2	15:45			8	25	8	22	47
04:00			0		0			16:00			8		5		
04:15			0		0			16:15			13		4		
04:30			0		0			16:30			9		5		
04:45			0	0	1	1	1	16:45			10	40	5	19	59
05:00			0		1			17:00			9		8		
05:15			0		0			17:15			8		6		
05:30			0		1			17:30			7		3		
05:45			0	0	0	2	2	17:45			7	31	5	22	53
06:00			1		1			18:00			10		5		
06:15			1		6			18:15			12		8		
06:30			3		5			18:30			3		5		
06:45			1	6	5	17	23	18:45			10	35	4	22	57
07:00			4		12			19:00			8		6		
07:15			3		9			19:15			9		7		
07:30			1		10			19:30			5		1		
07:45			2	10	8	39	49	19:45			2	24	2	16	40
08:00			1		9			20:00			5		2		
08:15			3		8			20:15			7		1		
08:30			5		6			20:30			3		1		
08:45			3	12	4	27	39	20:45			4	19	2	6	25
09:00			2		2			21:00			2		1		
09:15			4		7			21:15			1		4		
09:30			3		6			21:30			5		2		
09:45			5	14	5	20	34	21:45			2	10	0	7	17
10:00			6		6			22:00			2		0		
10:15			3		6			22:15			2		0		
10:30			6		10			22:30			4		0		
10:45			5	20	4	26	46	22:45			3	11	0	0	11
11:00			7		4			23:00			2		1		
11:15			1		7			23:15			1		0		
11:30			5		3			23:30			0		1		
11:45			2	15	7	21	36	23:45			2	5	0	2	7
Total Vol.				84		156	**240**					263		178	**441**

Daily Totals

NB	SB	EB	WB	Combined
		347	334	**681**

	AM			PM		
Split %	35.0%	65.0%	**35.2%**	59.6%	40.4%	**64.8%**
Peak Hour	10:15	07:00	**07:00**	16:15	14:15	**16:15**
Volume	21	39	**49**	41	24	**63**
P.H.F.	0.75	0.81	**0.77**	0.79	0.86	**0.93**

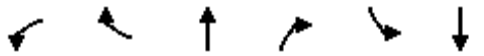
APPENDIX B
EXISTING LEVEL OF SERVICE CALCULATIONS



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	38	25	395	12	7	1046
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	40	26	416	13	7	1101
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1538	422			428	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1538	422			428	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	68	96			99	
cM capacity (veh/h)	127	632			1131	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	66	428	1108
Volume Left	40	0	7
Volume Right	26	13	0
cSH	185	1700	1131
Volume to Capacity	0.36	0.25	0.01
Queue Length 95th (ft)	38	0	0
Control Delay (s)	34.9	0.0	0.2
Lane LOS	D		A
Approach Delay (s)	34.9	0.0	0.2
Approach LOS	D		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	0	63	0	0	19
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	66	0	0	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	86	66			66	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	86	66			66	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	915	997			1535	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	66	20
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1535
Volume to Capacity	0.00	0.04	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	0	420	0	0	1084
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	442	0	0	1141
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1583	442			442	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1583	442			442	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	119	615			1118	

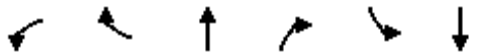
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	442	1141
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1118
Volume to Capacity	0.00	0.26	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	17	23	1090	28	40	524
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	18	24	1147	29	42	552
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1798	1162			1177	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1798	1162			1177	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	78	90			93	
cM capacity (veh/h)	82	237			593	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	42	1177	594
Volume Left	18	0	42
Volume Right	24	29	0
cSH	131	1700	593
Volume to Capacity	0.32	0.69	0.07
Queue Length 95th (ft)	32	0	6
Control Delay (s)	44.9	0.0	1.9
Lane LOS	E		A
Approach Delay (s)	44.9	0.0	1.9
Approach LOS	E		

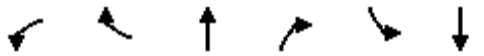
Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	70.5%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	0	40	0	0	68
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	42	0	0	72
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	114	42			42	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	114	42			42	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	883	1029			1567	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	42	72
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1567
Volume to Capacity	0.00	0.02	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	0	1113	0	0	541
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	1172	0	0	569
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1741	1172			1172	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1741	1172			1172	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	95	234			596	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	1172	569
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	596
Volume to Capacity	0.00	0.69	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		

APPENDIX C
SANDAG TRIP GENERATION RATES

(NOT SO)

BRIEF GUIDE OF VEHICULAR TRAFFIC GENERATION RATES FOR THE SAN DIEGO REGION

APRIL 2002

401 B Street, Suite 800
San Diego, California 92101
(619) 699-1900 • Fax (619) 699-1950

NOTE: This listing only represents a ***guide*** of average, or estimated, traffic generation "driveway" rates and some very general trip data for land uses (emphasis on acreage and building square footage) in the San Diego region. These rates (both local and national) are subject to change as future documentation becomes available, or as regional sources are updated. For more specific information regarding traffic data and trip rates, please refer to the San Diego Traffic Generators manual. ***Always check with local jurisdictions for their preferred or applicable rates.***

LAND USE	TRIP CATEGORIES [PRIMARY:DIVERTED:PASS-BY][P]	ESTIMATED WEEKDAY VEHICLE TRIP GENERATION RATE (DRIVEWAY)	HIGHEST PEAK HOUR % (plus IN:OUT ratio) Between 6:00-9:30 A.M.		Between 3:00-6:30 P.M.		TRIP LENGTH (Miles)[L]
AGRICULTURE (Open Space)	[80:18:2]	2/acre**					10.8
AIRPORT	[78:20:2]						12.5
Commercial		60/acre, 100/flight, 70/1000 sq. ft.* **	5%	(6:4)	6%	(5:5)	
General Aviation		6/acre, 2/flight, 6/based aircraft* **	9%	(7:3)	15%	(5:5)	
Heliports		100/acre**					
AUTOMOBILE[S]							
Car Wash							
Automatic		900/site, 600/acre**	4%	(5:5)	9%	(5:5)	
Self-serve		100/wash stall**	4%	(5:5)	8%	(5:5)	
Gasoline	[21:51:28]						2.8
with/Food Mart		160/vehicle fueling space**	7%	(5:5)	8%	(5:5)	
with/Food Mart & Car Wash		155/vehicle fueling space**	8%	(5:5)	9%	(5:5)	
Older Service Station Design		150/vehicle fueling space, 900/station**	7%	(5:5)	9%	(5:5)	
Sales (Dealer & Repair)		50/1000 sq. ft., 300/acre, 60/service stall* **	5%	(7:3)	8%	(4:6)	
Auto Repair Center		20/1000 sq. ft., 400/acre, 20/service stall*	8%	(7:3)	11%	(4:6)	
Auto Parts Sales		60/1000 sq. ft. **	4%		10%		
Quick Lube		40/service stall**	7%	(6:4)	10%	(5:5)	
Tire Store		25/1000 sq. ft., 30/service stall**	7%	(6:4)	11%	(5:5)	
CEMETERY		5/acre*					
CHURCH (or Synagogue)	[64:25:11]	9/1000 sq. ft., 30/acre** (quadruple rates for Sunday, or days of assembly)	5%	(6:4)	8%	(5:5)	5.1
COMMERCIAL/RETAIL[S]							
Super Regional Shopping Center (More than 80 acres, more than 800,000 sq. ft., w/usually 3 + major stores)		35/1000 sq. ft.,[C] 400/acre*	4%	(7:3)	10%	(5:5)	
Regional Shopping Center (40-80acres, 400,000-800,000 sq. ft., w/usually 2 + major stores)	[54:35:11]	50/1000 sq. ft.,[C] 500/acre*	4%	(7:3)	9%	(5:5)	5.2
Community Shopping Center (15-40 acres, 125,000-400,000 sq. ft., w/usually 1 major store, detached restaurant(s), grocery and drugstore)	[47:31:22]	80/1000 sq. ft., 700/acre* **	4%	(6:4)	10%	(5:5)	3.6
Neighborhood Shopping Center (Less than 15 acres, less than 125,000 sq. ft., w/usually grocery & drugstore, cleaners, beauty & barber shop, & fast food services)		120/1000 sq. ft., 1200/acre* **	4%	(6:4)	10%	(5:5)	
Commercial Shops	[45:40:15]						
Specialty Retail/Strip Commercial		40/1000 sq. ft., 400/acre*	3%	(6:4)	9%	(5:5)	4.3
Electronics Superstore		50/1000 sq. ft**			10%	(5:5)	
Factory Outlet		40/1000 sq. ft.**	3%	(7:3)	9%	(5:5)	
Supermarket		150/1000 sq. ft., 2000/acre* **	4%	(7:3)	10%	(5:5)	
Drugstore		90/1000 sq. ft.**	4%	(6:4)	10%	(5:5)	
Convenience Market (15-16 hours)		500/1000 sq. ft.**	8%	(5:5)	8%	(5:5)	
Convenience Market (24 hours)		700/1000 sq. ft.**	9%	(5:5)	7%	(5:5)	
Convenience Market (w/gasoline pumps)		850/1000 sq. ft., 550/vehicle fueling space**	6%	(5:5)	7%	(5:5)	
Discount Club		60/1000 sq. ft., 600/acre* **	1%	(7:3)	9%	(5.5)	
Discount Store		60/1000 sq. ft., 600/acre**	3%	(6:4)	8%	(5:5)	
Furniture Store		6/1000 sq. ft., 100/acre**	4%	(7:3)	9%	(5:5)	
Lumber Store		30/1000 sq. ft., 150/acre**	7%	(6:4)	9%	(5:5)	
Home Improvement Superstore		40/1000 sq. ft.**	5%	(6:4)	8%	(5:5)	
Hardware/Paint Store		60/1000 sq. ft., 600/acre**	2%	(6:4)	9%	(5:5)	
Garden Nursery		40/1000 sq. ft., 90/acre**	3%	(6:4)	10%	(5:5)	
Mixed Use: Commercial (w/supermarket)/Residential		110/1000 sq. ft., 2000/acre* (commercial only) 5/dwelling unit, 200/acre* (residential only)	3% 9%	(6:4) (3:7)	9% 13%	(5:5) (6:4)	
EDUCATION							
University (4 years)	[91:9:0]	2.4/student, 100 acre*	10%	(8:2)	9%	(3:7)	8.9
Junior College (2 years)	[92:7:1]	1.2/student, 24/1000 sq. ft., 120/acre* **	12%	(8:2)	9%	(6:4)	9.0
High School	[75:19:6]	1.3/student, 15/1000 sq. ft., 60/acre* **	20%	(7:3)	10%	(4:6)	4.8
Middle/Junior High	[63:25:12]	1.4/student, 12/1000 sq. ft. 50/acre**	30%	(6:4)	9%	(4:6)	5.0
Elementary	[57:25:10]	1.6/student, 14/1000 sq. ft., 90/acre* **	32%	(6:4)	9%	(4:6)	3.4
Day Care	[28:58:14]	5/child, 80/1000 sq. ft.**	17%	(5:5)	18%	(5:5)	3.7
FINANCIAL[S]	[35:42:23]						3.4
Bank (Walk-In only)		150/1000 sq. ft., 1000/acre* **	4%	(7:3)	8%	(4:6)	
with Drive-Through		200/1000 sq. ft., 1500/acre*	5%	(6:4)	10%	(5:5)	
Drive-Through only		250 (125 one-way)/lane*	3%	(5:5)	13%	(5:5)	
Savings & Loan		60/1000 sq. ft., 600/acre**	2%		9%		
Drive-Through only		100 (50 one-way)/lane**	4%		15%		
HOSPITAL	[73:25:2]						8.3
General		20/bed, 25/1000 sq. ft., 250/acre*	8%	(7:3)	10%	(4:6)	
Convalescent/Nursing		3/bed**	7%	(6:4)	7%	(4:6)	
INDUSTRIAL							
Industrial/Business Park (commercial included)	[79:19:2]	16/1000 sq. ft., 200/acre* **	12%	(8:2)	12%	(2:8)	9.0
Industrial Park (no commercial)		8/1000 sq. ft., 90/acre**	11%	(9:1)	12%	(2:8)	
Industrial Plant (multiple shifts)	[92:5:3]	10/1000 sq. ft., 120/acre*	14%	(8:2)	15%	(3:7)	11.7
Manufacturing/Assembly		4/1000 sq. ft., 50/acre**	19%	(9:1)	20%	(2:8)	
Warehousing		5/1000 sq. ft., 60/acre**	13%	(7:3)	15%	(4:6)	
Storage		2/1000 sq. ft., 0.2/vault, 30/acre*	6%	(5:5)	9%	(5:5)	
Science Research & Development		8/1000 sq. ft., 80/acre*	16%	(9:1)	14%	(1:9)	
Landfill & Recycling Center		6/acre	11%	(5:5)	10%	(4:6)	

(OVER)

LAND USE	TRIP CATEGORIES [PRIMARY:DIVERTED:PASS-BY][P]	ESTIMATED WEEKDAY VEHICLE TRIP GENERATION RATE (DRIVEWAY)	HIGHEST PEAK HOUR % (plus IN:OUT ratio) Between 6:00-9:30 A.M.		Between 3:00-6:30 P.M.		TRIP LENGTH (Miles)[L]
LIBRARY	[44:44:12]	50/1000 sq. ft., 400/acre**	2%	(7:3)	10%	(5:5)	3.9
LODGING	[58:38:4]						7.6
Hotel (w/convention facilities/restaurant)		10/occupied room, 300/acre	6%	(6:4)	8%	(6:4)	
Motel		9/occupied room, 200/acre*	8%	(4:6)	9%	(6:4)	
Resort Hotel		8/occupied room, 100/acre*	5%	(6:4)	7%	(4:6)	
Business Hotel		7/occupied room**	8%	(4:6)	9%	(6:4)	
MILITARY	[82:16:2]	2.5/military & civilian personnel*	9%	(9:1)	10%	(2:8)	11.2
OFFICE							
Standard Commercial Office (less than 100,000 sq. ft.)	[77:19:4]	20/1000 sq. ft.,[O] 300/acre*	14%	(9:1)	13%	(2:8)	8.8
Large (High-Rise) Commercial Office (more than 100,000 sq. ft., 6 + stories)	[82:15:3]	17/1000 sq. ft.,[O] 600/acre*	13%	(9:1)	14%	(2:8)	10.0
Office Park (400,000 + sq. ft.)		12/1000 sq.ft., 200/acre* **	13%	(9:1)	13%	(2:8)	
Single Tenant Office		14/1000 sq. ft., 180/acre*	15%	(9:1)	15%	(2:8)	8.8
Corporate Headquarters		7/1000 sq. ft., 110/acre*	17%	(9:1)	16%	(1:9)	
Government (Civic Center)	[50:34:16]	30/1000 sq. ft.**	9%	(9:1)	12%	(3:7)	6.0
Post Office							
Central/Walk-In Only		90/1000 sq. ft.**	5%		7%		
Community (not including mail drop lane)		200/1000 sq. ft., 1300/acre*	6%	(6:4)	9%	(5:5)	
Community (w/mail drop lane)		300/1000 sq. ft., 2000/acre*	7%	(5:5)	10%	(5:5)	
Mail Drop Lane only		1500 (750 one-way)/lane*	7%	(5:5)	12%	(5:5)	
Department of Motor Vehicles		180/1000 sq. ft., 900/acre**	6%	(6:4)	10%	(4:6)	
Medical-Dental	[60:30:10]	50/1000 sq. ft., 500/acre*	6%	(8:2)	11%	(3:7)	6.4
PARKS	[66:28:6]		4%		8%		5.4
City (developed w/meeting rooms and sports facilities)		50/acre*	13%	(5:5)	9%	(5:5)	
Regional (developed)		20/acre*					
Neighborhood/County (undeveloped)		5/acre (add for specific sport uses), 6/picnic site* **					
State (average 1000 acres)		1/acre, 10/picnic site**					
Amusement (Theme)		80/acre, 130/acre (summer only)**			6%	(6:4)	
San Diego Zoo		115/acre*					
Sea World		80/acre*					
RECREATION							
Beach, Ocean or Bay	[52:39:9]	600/1000 ft. shoreline, 60/acre*					6.3
Beach, Lake (fresh water)		50/1000 ft. shoreline, 5/acre*					
Bowling Center		30/1000 sq. ft., 300/acre, 30/lane **	7%	(7:3)	11%	(4:6)	
Campground		4/campsite**	4%		8%		
Golf Course		7/acre, 40/hole, 700/course* **	7%	(8:2)	9%	(3:7)	
Driving Range only		70/acre, 14/tee box*	3%	(7:3)	9%	(5:5)	
Marinas		4/berth, 20/acre* **	3%	(3:7)	7%	(6:4)	
Multi-purpose (miniature golf, video arcade, batting cage, etc.)		90/acre	2%		6%		
Racquetball/Health Club		30/1000 sq. ft., 300/acre, 40/court*	4%	(6:4)	9%	(6:4)	
Tennis Courts		16/acre, 30/court**	5%		11%	(5:5)	
Sports Facilities							
Outdoor Stadium		50/acre, 0.2/seat*					
Indoor Arena		30/acre, 0.1/seat*					
Racetrack		40/acre, 0.6 seat*					
Theaters (multiplex w/matinee)	[66:17:17]	80/1000 sq. ft., 1.8/seat, 360/screen*	1/3%		8%	(6:4)	6.1
RESIDENTIAL	[86:11:3]						7.9
Estate, Urban or Rural (average 1-2 DU/acre)		12/dwelling unit*[R]	8%	(3:7)	10%	(7:3)	
Single Family Detached (average 3-6 DU/acre)		10/dwelling unit*[R]	8%	(3:7)	10%	(7:3)	
Condominium (or any multi-family 6-20 DU/acre)		8/dwelling unit*[R]	8%	(2:8)	10%	(7:3)	
Apartment (or any multi-family units more than 20 DU/acre)		6/dwelling unit*[R]	8%	(2:8)	9%	(7:3)	
Military Housing (off-base, multi-family)							
(less than 6 DU/acre)		8/dwelling unit	7%	(3:7)	9%	(6:4)	
(6-20 DU/acre)		6/dwelling unit	7%	(3:7)	9%	(6:4)	
Mobile Home							
Family		5/dwelling unit, 40/acre*	8%	(3:7)	11%	(6:4)	
Adults Only		3/dwelling unit, 20/acre*	9%	(3:7)	10%	(6:4)	
Retirement Community		4/dwelling unit**	5%	(4:6)	7%	(6:4)	
Congregate Care Facility		2.5/dwelling unit**	4%	(6:4)	8%	(5:5)	
RESTAURANT[S]	[51:37:12]						4.7
Quality		100/1000 sq. ft., 3/seat, 500/acre* **	1%	(6:4)	8%	(7:3)	
Sit-down, high turnover		160/1000 sq. ft., 6/seat, 1000/acre* **	8%	(5:5)	8%	(6:4)	
Fast Food (w/drive-through)		650/1000 sq. ft., 20/seat, 3000/acre* **	7%	(5:5)	7%	(5:5)	
Fast Food (without drive-through)		700/1000 sq. ft.**	5%	(6:4)	7%	(5:5)	
Delicatessen (7am-4pm)		150/1000 sq. ft., 11/seat*	9%	(6:4)	3%	(3:7)	
TRANSPORTATION							
Bus Depot		25/1000 sq. ft.**					
Truck Terminal		10/1000 sq. ft., 7/bay, 80/acre**	9%	(4:6)	8%	(5:5)	
Waterport/Marine Terminal		170/berth, 12/acre**					
Transit Station (Light Rail w/parking)		300/acre, $2^{1/2}$/parking space (4/occupied)**	14%	(7:3)	15%	(3:7)	
Park & Ride Lots		400/acre (600/paved acre), 5/parking space (8/occupied)* **	14%	(7:3)	15%	(3:7)	

* Primary source: *San Diego Traffic Generators.*

* Other sources: *ITE Trip Generation Report [6th Edition]*, Trip Generation Rates (other agencies and publications), various SANDAG & CALTRANS studies, reports and estimates.

[P] Trip category percentage ratios are daily from local household surveys, often cannot be applied to very specific land uses, and do not include non-resident drivers (draft SANDAG *Analysis of Trip Diversion*, revised November, 1990):
PRIMARY - one trip directly between origin and primary destination.
DIVERTED - linked trip (having one or more stops along the way to a primary destination) whose distance compared to direct distance ≥ 1 mile.
PASS-BY - undiverted or diverted < 1 mile.

[L] Trip lengths are average weighted for all trips to and from general land use site. (All trips system-wide average length = 6.9 miles)

[C] Fitted curve equation: $Ln(T) = 0.502\ Ln(x) + 6.945$
[O] Fitted curve equation: $Ln(T) = 0.756\ Ln(x) + 3.950$
T = total trips, x = 1,000 sq. ft.

[R] Fitted curve equation: $t = -2.169\ Ln(d) + 12.85$ t = trips/DU, d = density (DU/acre), DU = dwelling unit

[S] Suggested PASS-BY [undiverted or diverted < 1 mile] percentages for trip rate reductions only during P.M. peak period (based on combination of local data/review and Other sources**):

COMMERCIAL/RETAIL	
Regional Shopping Center	20%
Community " "	30%
Neighborhood " "	40%
Specialty Retail/Strip Commercial (other)	10%
Supermarket	40%
Convenience Market	50%
Discount Club/Store	30%
FINANCIAL	
Bank	25%
AUTOMOBILE	
Gasoline Station	50%
RESTAURANT	
Quality	10%
Sit-down high turnover	20%
Fast Food	40%

[T] Trip Reductions - In order to help promote regional "smart growth" policies, and acknowledge San Diego's expanding mass transit system, consider vehicle trip rate reductions (with proper documentation and necessary adjustments for peak periods). The following are some examples:

[1] A 5% daily trip reduction for land uses with transit access or near transit stations accessible within 1/4 mile.

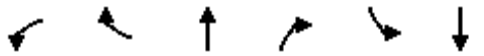
[2] Up to 10% daily trip reduction for mixed-use developments where residential and commercial retail are combined (demonstrate mode split of walking trips to replace vehicular trips).

APPENDIX D
EXISTING + PROJECT LEVEL OF SERVICE CALCULATIONS

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	45	25	395	15	7	1046
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	47	26	416	16	7	1101
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1539	424			432	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1539	424			432	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	62	96			99	
cM capacity (veh/h)	126	630			1128	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	47	26	432	1108
Volume Left	47	0	0	7
Volume Right	0	26	16	0
cSH	126	630	1700	1128
Volume to Capacity	0.38	0.04	0.25	0.01
Queue Length 95th (ft)	39	3	0	0
Control Delay (s)	49.7	11.0	0.0	0.2
Lane LOS	E	B		A
Approach Delay (s)	35.9		0.0	0.2
Approach LOS	E			

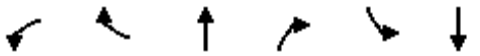
Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	7	63	0	3	19
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	7	66	0	3	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	93	66			66	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	93	66			66	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	905	997			1535	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	7	66	23
Volume Left	0	0	3
Volume Right	7	0	0
cSH	997	1700	1535
Volume to Capacity	0.01	0.04	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	8.6	0.0	1.0
Lane LOS	A		A
Approach Delay (s)	8.6	0.0	1.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	13.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	6	420	0	3	1084
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	6	442	0	3	1141
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1589	442			442	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1589	442			442	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	118	615			1118	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	6	442	1144
Volume Left	0	0	3
Volume Right	6	0	0
cSH	615	1700	1118
Volume to Capacity	0.01	0.26	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	10.9	0.0	0.1
Lane LOS	B		A
Approach Delay (s)	10.9	0.0	0.1
Approach LOS	B		

Intersection Summary			
Average Delay		0.1	
Intersection Capacity Utilization		69.4%	ICU Level of Service C
Analysis Period (min)		15	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	21	23	1090	37	40	524
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	22	24	1147	39	42	552
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1803	1167			1186	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1803	1167			1186	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	73	90			93	
cM capacity (veh/h)	81	236			589	

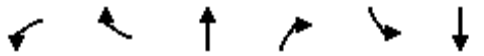
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	22	24	1186	594
Volume Left	22	0	0	42
Volume Right	0	24	39	0
cSH	81	236	1700	589
Volume to Capacity	0.27	0.10	0.70	0.07
Queue Length 95th (ft)	25	8	0	6
Control Delay (s)	65.2	22.0	0.0	2.0
Lane LOS	F	C		A
Approach Delay (s)	42.6		0.0	2.0
Approach LOS	E			

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	70.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	4	40	0	9	68
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	4	42	0	9	72
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	133	42			42	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	133	42			42	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			99	
cM capacity (veh/h)	856	1029			1567	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	4	42	81
Volume Left	0	0	9
Volume Right	4	0	0
cSH	1029	1700	1567
Volume to Capacity	0.00	0.02	0.01
Queue Length 95th (ft)	0	0	0
Control Delay (s)	8.5	0.0	0.9
Lane LOS	A		A
Approach Delay (s)	8.5	0.0	0.9
Approach LOS	A		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	20.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	3	1113	0	8	541
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	3	1172	0	8	569
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1758	1172			1172	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1758	1172			1172	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			99	
cM capacity (veh/h)	92	234			596	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	3	1172	578
Volume Left	0	0	8
Volume Right	3	0	0
cSH	234	1700	596
Volume to Capacity	0.01	0.69	0.01
Queue Length 95th (ft)	1	0	1
Control Delay (s)	20.6	0.0	0.4
Lane LOS	C		A
Approach Delay (s)	20.6	0.0	0.4
Approach LOS	C		

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		

APPENDIX F
SPEED SURVEYS

KOA CORPORATION
PLANNING & ENGINEERING

MEMORANDUM

To: Mr. Marc Perlman, Marker Company, Inc. ; Mr. John Klein, Hunsaker & Associates, Inc.

From: Arnold Torma, KOA Corporation

Re: Speed Survey Update: Buena Creek Road and Lone Oak Road

KOA No.: B42020

Date: May 5, 2015

KOA Corporation was asked to conduct speed surveys for two roadways: Buena Creek Road and Lone Oak Road in Vista, CA. The purpose behind these surveys is to assist in the determination of necessary corner sight distance from the primary access roadways of Lone Oak Road and Cleveland Trail onto Buena Creek Road, and of the primary project driveway onto Lone Oak Road.

ROADWAY GEOMETRY AND DESIGN

Buena Creek Road is primarily a north-south roadway that functions as a 2-lane community collector with no median, which serves as the main corridor for all project trips destined for regional trips via SR-78 or locally. Lone Oak Road is a 2-lane non-classified residential road with a variable existing AC pavement width that centers typically around 24'. Similarly, Cleveland Trail is also a 2-lane non-classified residential road. There is no curb and gutter along either side of Buena Creek Road, Lone Oak Road and Cleveland Trail and parking is currently not present on either side of any of these roadways.

METHODOLOGY

Across varying dates and times, engineering radar speed surveys were conducted on Buena Creek Road near Cleveland Trail, Buena Creek Road near Lone Oak Road, and Lone Oak Road near the proposed main project driveway. For information on the dates, times, radar gun location, and number of vehicles recorded in the attachment to this memo. For all cases the radar gun was calibrated at 35 mph.

The survey taken near Cleveland Trail recorded eastbound and westbound traffic along Buena Creek Road. Because Cleveland Trail is less than 1000' from Lone Oak Road and the roadway doesn't change dramatically between these two intersections, westbound speeds are assumed the same at the intersection of Lone Oak Road and Buena Creek Road. Due to roadway curve on Buena Creek Road just west of Lone Oak Road, an additional speed survey was conducted analyzing eastbound moving vehicles to record their speeds coming out of that curve

On Lone Oak Road both northbound and southbound vehicles were recorded as they approached the proposed project driveway. Southbound vehicles were recorded rounding the curvature in the road towards the proposed driveway, while northbound vehicles were recorded separately along the straightaway road portion.

RESULTS

After collecting the data from the speed survey the data was compiled and statistical calculations were conducted to determine the average speed, standard deviation and 85th percentile of the speeds observed. A summary of these statistical findings for each direction are found in **Table 1.** Additionally, Attachment A found at the conclusion of this memo contains the data collection forms for this study.

TABLE 1- Summary of Radar Survey Results

Direction	Average Speed (mph)	Standard Deviation (mph)	85th Percentile (mph)
Northbound on Lone Oak Rd; s/o proposed driveway	37.1	6.03	41.9
Southbound on Lone Oak Rd; n/o proposed driveway	19.0	1.91	21.0
Westbound / Eastbound on Buena Creek Road; between Lone Oak Road and Cleveland Trail	39.0	4.46	43.0
Eastbound on Buena Creek Road; w/o Lone Oak Road	32.0	3.41	35.9

CONCLUSIONS

Based on the analysis conducted, we recommend that the 85th percentile speed observed be used as the basis for corner sight distance calculations conducted for the intersections of Cleveland Trail and Lone Oak Road with Buena Creek Road and for Lone Oak Road and the main project driveway.

PREPARED BY

J. Arnold Torma, TE – Principal Engineer
Ryan Whipple, EIT – Assistant Engineer

APPENDIX A

Speed Survey Results

Radar Speed Survey Data Collection Form

Jurisdiction: *County of San Diego*
Street: *Lone Oak Road*
Between: *Lone Oak Lane / Buena Creek Road* (nearest cross streets between)
Posted Speed: *25 mph (Prima Facie)* (regulatory or warning speed)
Direction: *Northbound* (Northbound or Eastbound)
Observer: *Ryan Whipple*
Unusual Conditions: *N/A* (weather, visibility, accidents, other)
Date: *12/23/14*

Note Time:	Veh.	Speed (mph)	Note Time:	Veh.	Speed (mph)	Note Time:	Veh.	Speed (mph)
15:45	1	*38*		36			71	
	2	*37*		37			72	
	3	*36*		38			73	
	4	*29*		39			74	
	5	*35*		40			75	
	6	*51*		41			76	
	7	*39*		42			77	
	8	*42*		43			78	
	9	*36*		44			79	
	10	*41*		45			80	
	11	*39*		46			81	
	12	*25*		47			82	
	13	*33*		48			83	
	14	*34*		49			84	
16:46	15	*42*		50			85	
	16			51			86	
	17			52			87	
	18			53			88	
	19			54			89	
	20			55			90	
	21			56			91	
	22			57			92	
	23			58			93	
	24			59			94	
	25			60			95	
	26			61			96	
	27			62			97	
	28			63			98	
	29			64			99	
	30			65			100	
	31			66				
	32			67				
	33			68				
	34			69				
	35			70				

Katz, Okitsu & Associates
Traffic Engineers and Transportation Planners
2251 San Diego Avenue, Suite A-270
San Diego, CA 92110

Average=	**37.13333333**	**mph**
Standard Deviation=	**6.03**	**mph**
85th %-ile=	**41.9**	**mph**
10 mph Pace=	**33 - 43**	**mph**
Current Posting=		**mph**
Recommended Posting=		**mph**

Radar Speed Survey Data Collection Form

Jurisdiction: *San Diego County*
Street: *Lone Oak Road*
Between: *Lone Oak Ln. & Buena Creek Rd* (nearest cross streets between)
Posted Speed: *N/A* (regulatory or warning speed)
Direction: *Southbound* (Northbound or Eastbound)
Observer: *Robert Frederick*
Unusual Conditions: *Sunny* (weather, visibility, accidents, other)
Date: *04 / 28 / 2015*
Calibrated: 35 mph

Note Time:	Veh.	Speed (mph)	Note Time:	Veh.	Speed (mph)	Note Time:	Veh.	Speed (mph)
11:30	1	*18*		36			71	
	2	*21*		37			72	
	3	*20*		38			73	
	4	*15*		39			74	
	5	*19*		40			75	
	6	*21*		41			76	
	7	*18*		42			77	
	8	*17*		43			78	
	9	*19*		44			79	
	10	*22*		45			80	
	11	*17*		46			81	
	12	*16*		47			82	
	13	*17*		48			83	
	14	*17*		49			84	
	15	*20*		50			85	
	16	*20*		51			86	
	17	*22*		52			87	
	18	*20*		53			88	
	19	*18*		54			89	
	20	*16*		55			90	
	21	*20*		56			91	
	22	*18*		57			92	
	23	*22*		58			93	
	24	*20*		59			94	
	25	*21*		60			95	
	26	*19*		61			96	
	27	*20*		62			97	
	28	*18*		63			98	
	29	*18*		64			99	
13:25	30	*21*		65			100	
	31			66		Calibrated:		*35 mph*
	32			67				
	33			68				
	34			69				
	35			70				

KOA CORPORATION
PLANNING & ENGINEERING
5095 Murphy Canyon Road, Suite 330
San Diego, California 92123
Tel: (619) 683-2933 Fax: (619) 683-7982

Average=	**19**	**mph**
Standard Deviation=	**1.91**	**mph**
85th %-ile=	**21.0**	**mph**
10 mph Pace=	**15 - 25**	**mph**
Current Posting=	**N/A**	**mph**
Recommended Posting=		**mph**

Radar Speed Survey Data Collection Form

Jurisdiction: *City of San Diego*
Street: *Buena Creek Road*
Between: *Lone Oak Road and Cleveland Trail* (nearest cross streets between)
Posted Speed: *35 mph* (regulatory or warning speed)
Direction: *EB and WB* (Southbound or Westbound)
Observer: *Randolf Trajano*
Unusual Conditions: *Sunny and Clear* (weather, visibility, accidents, other)
Date: *8/1/14*
Calibrated: 35 mph

Note Time:	Veh.	Speed (mph)	Note Time:	Veh.	Speed (mph)	Note Time:	Veh.	Speed (mph)
START 10:20:	1	*39*		36	*39*		71	*35*
	2	*38*		37	*40*		72	*37*
	3	*35*		38	*32*		73	*42*
	4	*38*		39	*36*		74	*41*
	5	*40*		40	*37*		75	*36*
	6	*34*		41	*38*		76	*43*
	7	*33*		42	*39*		77	*40*
	8	*37*		43	*44*		78	*36*
	9	*36*		44	*45*		79	*38*
	10	*38*		45	*40*		80	*38*
	11	*39*		46	*43*		81	*35*
	12	*38*		47	*37*		82	*38*
	13	*39*		48	*50*		83	*43*
	14	*28*		49	*42*		84	*28*
	15	*40*		50	*40*		85	*36*
	16	*37*		51	*41*		86	*37*
	17	*33*		52	*42*		87	*38*
	18	*50*		53	*35*		88	*44*
	19	*40*		54	*42*		89	*38*
	20	*47*		55	*36*		90	*42*
	21	*37*		56	*39*		91	*43*
	22	*37*		57	*42*		92	*48*
	23	*36*		58	*48*		93	*47*
	24	*41*		59	*41*		94	*41*
	25	*38*		60	*40*		95	*30*
	26	*39*		61	*38*		96	*34*
	27	*36*		62	*52*		97	*37*
	28	*37*		63	*46*		98	*44*
	29	*39*		64	*39*		99	*33*
	30	*33*		65	*40*	*END 10:54:*	100	*41*
	31	*38*		66	*41*	Calibrated:		*35*
	32	*40*		67	*37*			
	33	*42*		68	*31*			
	34	*43*		69	*35*			
	35	*42*		70	*30*			

KOA CORPORATION
PLANNING & ENGINEERING

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Average=	**38.97 mph**
Standard Deviation=	**4.46 mph**
85th %-ile=	**43.0 mph**
10 mph Pace=	**33 - 43 mph**
Current Posting=	**35 mph**
Recommended Posting=	**N/A mph**

Radar Speed Survey Data Collection Form

Jurisdiction: *San Diego County*
Street: *Buena Creek Road*
Between: *Hidden Oak Trail & Buena Creek Trail* (nearest cross streets between)
Posted Speed: *20 mph Warning Speed* (regulatory or warning speed)
Direction: *Eastbound* (Southbound or Westbound)
Observer: *Robert Frederick*
Unusual Conditions: *Cloudy/ Overcast* (weather, visibility, accidents, other)
Date: *04 / 25 / 2015*
Calibrated: 35 mph

Note Time:	Veh.	Speed (mph)	Note Time:	Veh.	Speed (mph)	Note Time:	Veh.	Speed (mph)
13:05	1	*35*		36	*38*		71	*38*
	2	*29*		37	*33*		72	*31*
	3	*34*		38	*28*		73	*40*
	4	*31*		39	*31*		74	*31*
	5	*31*		40	*29*		75	*41*
	6	*30*		41	*31*		76	*35*
	7	*33*		42	*38*		77	*36*
	8	*30*		43	*32*		78	*30*
	9	*35*		44	*27*		79	*28*
	10	*36*		45	*31*		80	*33*
	11	*30*		46	*32*		81	*32*
	12	*37*		47	*33*		82	*34*
	13	*33*		48	*34*		83	*27*
	14	*25*		49	*37*		84	*26*
	15	*32*		50	*31*		85	*33*
	16	*35*		51	*32*		86	*25*
	17	*31*		52	*30*		87	*31*
	18	*35*		53	*31*		88	*31*
	19	*37*		54	*34*		89	*20*
	20	*32*		55	*31*		90	*30*
	21	*34*		56	*40*		91	*31*
	22	*28*		57	*37*		92	*27*
	23	*22*		58	*33*		93	*27*
	24	*36*		59	*31*		94	*32*
	25	*29*		60	*25*		95	*32*
	26	*33*		61	*33*		96	*36*
	27	*32*		62	*32*		97	*31*
	28	*31*		63	*34*		98	*34*
	29	*36*		64	*28*		99	*30*
	30	*29*		65	*30*	*14:30*	100	*31*
	31	*34*		66	*20*	Calibrated:		*35 mph*
	32	*28*		67	*32*			
	33	*33*		68	*34*			
	34	*32*		69	*29*			
	35	*30*		70	*35*			

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Average=	**32.04761905 mph**
Standard Deviation=	**3.41 mph**
85th %-ile=	**35.9 mph**
10 mph Pace=	**27 - 37 mph**
Current Posting=	**35 mph**
Recommended Posting=	**0 mph**