
**TRAFFIC
COMMISSION
REGULAR
MEETING**



**MAY 15, 2013
7:00 PM**

AGENDA

Ed Rowe - Chair

Donald Froelich – Vice Chair

Michael Caputo - Commissioner

Steven Beeuwsaert - Commissioner

Rick Frazier - Commissioner

Location: City Council Chamber, 24035 El Toro Road, Laguna Hills, California 92653

Any person wishing to address the Traffic Commission on any matter, whether or not it appears on this Agenda, is asked to complete a "Request to Speak" form available on the table at the back of the Chamber. The completed form is to be submitted to the Recording Secretary prior to an individual being heard by the Traffic Commission.

Members of the public wishing to address the Traffic Commission can do so during the Public Comments portion of the Agenda with a time limitation of three minutes per person, an overall time limit of ten minutes for any one subject, and a total time limit of thirty minutes for Public Comments. If you are commenting on an Agenda item, your comments will be heard at the time that item is scheduled on the Agenda. If you are addressing the Commission on an item not listed on the Agenda, the Traffic Commission is prohibited by law from discussing or taking any action on that item.

CALL TO ORDER

Resolution No. 96-04-09-1 established rules of decorum for public meetings held by the City of Laguna Hills. Resolution No. 96-04-09-1 is available on the table at the back of the City Council Chamber.

PLEDGE OF ALLEGIANCE

ROLL CALL OF COMMISSION MEMBERS

1. PUBLIC COMMENTS

This is the time to address the Traffic Commission on any matter not listed on this Agenda that is within the subject matter jurisdiction of the Commission. Public Comments are limited to three minutes per person, an overall time limit of ten minutes for any one subject, and a total time limit of thirty minutes.

2. MINUTES**3. PRESENTATIONS****4. ADMINISTRATIVE REPORTS****4.1 EVALUATION OF TRAFFIC SPEEDS ON EMPTY SADDLE DRIVE**

RECOMMENDATION: THAT THE TRAFFIC COMMISSION RECOMMEND TO THE CITY COUNCIL ADDITIONAL TRAFFIC ENFORCEMENT AND CONTINUED USE OF THE RADAR SPEED TRAILER ALONG EMPTY SADDLE DRIVE BETWEEN NELLIE GAIL ROAD AND SPOTTED PONY LANE WITH A FOLLOW-UP REVIEW IN SIX MONTHS.

4.2 ANALYSIS OF VEHICLE AND PEDESTRIAN INTERACTION AT THE SOUTHERLY CROSSWALK AT THE INTERSECTION OF PASEO DE VALENCIA AT CALLE DE LA PLATA

RECOMMENDATION: THAT THE TRAFFIC COMMISSION RECEIVE AND FILE THIS REPORT.

4.3 EQUESTRIAN TRAIL CROSSING SAFETY ENHANCEMENTS

RECOMMENDATION: THAT THE TRAFFIC COMMISSION RECOMMEND TO THE CITY COUNCIL SAFETY ENHANCEMENTS RECOMMENDED BY STAFF AS DESCRIBED IN THIS REPORT.

5. INFORMATIONAL ITEMS**5.1 RADAR SPEED TRAILER****5.2 SHERIFF'S DEPARTMENT VERBAL REPORT****6. COMMISSIONER COMMENTS****7. ADJOURNMENT**

The next Regular Meeting of the Traffic Commission will be July 17, 2013, at Not Scheduled, in the City Council Chamber, located at 24035 El Toro Road, Laguna Hills, California.

CERTIFICATION

I, HUMZA JAVED, Traffic Engineer of the City of Laguna Hills, do hereby certify that a copy of the foregoing Agenda was posted at Laguna Hills City Hall, Laguna Hills Community Center, and La Paz Center by , at 5:00PM.



HUMZA JAVED
ASSOCIATE CIVIL ENGINEER

DATE

In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this meeting, you should contact the office of the City Engineer at (714) 707-2650. Notification 48 hours prior to the meeting will enable the City to make reasonable arrangements to assure access.

Materials related to an item on this Agenda submitted to the Commission after distribution of the Agenda packet are available for public inspection in the Public Services Department at 24035 El Toro Road, Laguna Hills, California, during normal business hours.

**CITY OF LAGUNA HILLS, CALIFORNIA
TRAFFIC COMMISSION MEETING
MINUTES
MARCH 20, 2013**

CALL TO ORDER

The Regular Meeting of the Traffic Commission of the City of Laguna Hills, California, was called to order by Vice Chair Ed Rowe at 7:00 p.m. in the Laguna Hills City Council Chamber, 24035 El Toro Road, Laguna Hills.

PLEDGE OF ALLEGIANCE:

Vice Chair Ed Rowe led the Pledge of Allegiance.

ROLL CALL OF COMMISSION MEMBERS:

Present: Ed Rowe, Vice Chair
 Steven Beeuwsaert, Commissioner
 Michael Caputo, Commissioner
 Rick Frazier, Commissioner
 Donald Froelich, Commissioner

Absent:

Staff Present: Humza Javed, Associate Civil Engineer; Luke South,
 Sergeant; Cindy Sands, Administrative Assistant

1. ELECTION OF CHAIR

Motion was made by Vice Chair Ed Rowe to open nominations to elect a new Chair. Commissioner Rick Frazier nominated Vice Chair Ed Rowe. The nomination was seconded by Commissioner Donald Froelich. Nominations were closed. Vote was unanimous.

2. ELECTION OF VICE CHAIR

Motion was made by Chair Ed Rowe to open nominations to elect a new Vice Chair. Commissioner Rick Frazier nominated Commissioner Donald Froelich. The nomination was seconded by Commissioner Michael Caputo. Nominations were closed. Vote was unanimous.

3. PUBLIC COMMENTS

4. MINUTES

APPROVAL OF MINUTES

IT WAS MOVED BY VICE CHAIR DONALD FROELICH, SECONDED BY COMMISSIONER RICK FRAZIER, TO APPROVE THE MINUTES OF THE JANUARY 16, 2013, TRAFFIC COMMISSION MEETING.

The motion carried by the following vote:

AYES: Commissioner Frazier, Vice Chair Froelich, and Chair Rowe
NOES:
ABSTAIN: Commissioners Beeuwsaert, Caputo

5. PRESENTATIONS

None

6. ADMINISTRATIVE REPORTS

6.1 "NO RIGHT TURN ON RED" SIGN ON SOUTHERLY BOUND AVENIDA DE LA CARLOTA AT PASEO DE VALENCIA

Staff stated that a resident of Laguna Woods had contacted the City with concerns regarding traffic safety on southerly bound Avenida de la Carlota at Paseo de Valencia, and requested that the City install a "No Right Turn on Red" restriction. The resident's concern was that while making a right turn onto Paseo de Valencia from south bound Avenida de la Carlota there is inadequate sight distance to observe traffic exiting the I-5 southbound off-ramp. As a result of this concern, staff evaluated sight distance in accordance with the California Manual on Uniform Traffic Control Devices (MUTCD) and the State Manual for Highway Design, and determined inadequate stopping sight distance does exist due to roadway curvature. A motorist along southbound Avenida de la Carlota turning right onto Paseo de Valencia needs to have a clear line of sight of a minimum of 250 feet towards the left prior to safely making the right turn. The existing condition only allows 180 feet; therefore, staff is recommending the installation of "No Right Turn on Red" signs on south bound Avenida de la Carlota at Paseo de Valencia.

MOTION WAS MADE BY COMMISSIONER STEVEN BEEUWSAERT, SECONDED BY COMMISSIONER MICHAEL CAPUTO, TO RECOMMEND TO THE CITY COUNCIL THE

INSTALLATION OF TWO "NO RIGHT TURN ON RED" SIGNS ON
AVENIDA DE LA CARLOTA AT PASEO DE VALENCIA.

The motion carried by the following vote:

AYES: Commissioners Beeuwsaert, Caputo, Frazier, Vice
Chair Froelich, and Chair Rowe

NOES:

ABSENT:

6.2 ANALYSIS OF VEHICLE AND PEDESTRIAN CONFLICT ALONG THE
SOUTHERLY CROSSWALK AT THE INTERSECTION OF PASEO DE
VALENCIA AT CALLE DE LA PLATA

Staff stated Ms. Ruth, a resident of the San Sebastian Apartments in Laguna Woods, had contacted the City with concerns regarding pedestrian safety along the southerly crosswalk at the intersection of Paseo de Valencia and Calle de la Plata. Staff reported that this concern was addressed at the Traffic Commission meeting of May 18, 2011. Staff also briefly reviewed the background information and history of the City's actions including the installation of "Turning Traffic Must Yield to Pedestrians" signs along westbound Calle de la Plata at Paseo de Valencia. Staff stated that additional concerns have been received in the past few months and as a result, a left-turn phasing analysis is underway. The analysis will review traffic and pedestrian activity and determine if a protected left-turn is warranted. Results of the analysis will be brought back to the Traffic Commission meeting of May 15, 2013. Staff is recommending that the Traffic Commission receive and file this report.

Ms. Laura Martinez, a resident of the San Sebastian Apartments, thanked the Traffic Commission for the opportunity and discussed her experiences and concerns regarding this intersection. Ms. Martinez is in favor of the installation of a "No Turn on Red" sign and left-turn phasing at this location.

Ms. Katrina Rasmussen, Community Director at San Sebastian Apartments, stated that she is familiar with the study performed in May 2011, and reported that at that time the complex was only 57% occupied with approximately 90 residents; however, they have now reached full capacity at 96.3% occupancy with approximately 194 residents. Ms. Rasmussen stated that she has received numerous complaints about pedestrian safety at this intersection and reported that a resident of the San Sebastian Apartments had been hit in the intersection last month.

Ms. Rasmussen strongly supports the initiative to have a protected left-turn and would support a “No Right Turn on Red” sign coming out of Wells Fargo.

MOTION WAS MADE BY COMMISSIONER FRAZIER, SECONDED BY COMMISSIONER CAPUTO, TO RECEIVE AND FILE THIS REPORT AND REVIEW THE ENGINEERING REPORT AT THE MEETING OF MAY 15, 2013.

The motion carried by the following vote:

AYES: Commissioners Beeuwsaert, Caputo, Frazier, Vice Chair Froelich, and Chair Rowe

NOES:

ABSENT:

6.3 EQUESTRIAN TRAIL CROSSING EVALUATION UPDATE

Staff reported that this item is an evolving issue introduced to the Traffic Commission approximately one year ago. Staff also stated that the City Council, at its October 9, 2012 meeting, approved the formation of a staff organized Ad Hoc Committee. The General Manager of the Nellie Gail Ranch Owner's Association recommended five members of the community to serve on the Nellie Gail Ranch Equestrian Crossing Ad Hoc Committee (Committee). The Committee has met with staff on five occasions and has selected eight priority trail crossing locations for review. Staff reported that one crossing location, Nellie Gail Road at Gallup Circle, has a traffic study scheduled for March 22nd and 30th. Staff will review pedestrian and traffic counts, sight distance, and accident history to determine the need for a multi-way stop sign, along with the option to shift the equestrian trail at this location. Staff will return to the Traffic Commission on May 15, 2013, with results of the analysis and additional recommendations. Staff is recommending that the Traffic Commission receive and file this report.

Commissioner Caputo inquired as to what the Committee is actually looking for in addition to the signs that are already posted. Staff reviewed the history of the City's actions dating back to 2007, at which time an Ad Hoc Committee performed a safety analysis and came up with a standard Equestrian Sign Package consisting of equestrian advanced signage, a sign at the actual crossing, horse crossing ahead striping, and yield lines at the actual crossing locations. The Equestrian Sign Package was installed at various locations based on comments from the Ad Hoc

Committee; however, some locations have been brought back to the City with concerns that the Equestrian Sign Package is inadequate at some locations. The Committee is now looking at each location individually to determine what improvements are needed to improve equestrian trail crossing safety.

Mr. Jim Anderson, a resident of the Nellie Gail Ranch community and member of the Ad Hoc Committee, addressed the Commission and stated that in his opinion traffic speed is also a concern that needs to be addressed.

Ms. Lulu Hallenbeck, a resident of the Nellie Gail Ranch community and member of the Ad Hoc Committee, addressed the Commission discussed and stated that the changes will not only be for equestrian safety but also for the safety of pedestrians. Ms. Hallenbeck also voiced her concerns regarding the speed of traffic in the community.

The Commission engaged in a discussion with staff regarding the various issues, options, and concerns regarding equestrian trail crossing safety.

MOTION WAS MADE BY COMMISSIONER FROELICH,
SECONDED BY COMMISSIONER BEEUWSAERT, TO RECEIVE
AND FILE THIS REPORT.

The motion carried by the following vote:

AYES: Commissioners Beeuwsaert, Caputo, Frazier, Vice
Chair Froelich, and Chair Rowe

NOES:

ABSENT:

6.4 PROPOSED BUDGET FOR FISCAL YEARS 2013-2015

Staff reported that the City is currently working on the Operating Budget for Fiscal Years 2013-2015, and is updating its six-year Capital Improvement Project Budget. Staff requested that the Traffic Commission review the budget for street, signals, and lighting, and present any comments or suggestions to staff for presentation to City Council. Staff responded to Commissioner questions about the Capital Improvement Project Budget.

MOTION WAS MADE BY COMMISSIONER FRAZIER,
SECONDED BY COMMISSIONER CAPUTO, THAT TRAFFIC

COMMISSION REVIEW THE FISCAL YEAR 2013-2014 CAPITAL IMPROVEMENT PROGRAM BUDGET FOR STREET, SIGNALS, AND LIGHTING AND PROVIDE SUGGESTIONS FOR NEW CAPITAL IMPROVEMENT PROJECTS FOR THE 2013-2015 FISCAL YEARS.

The motion carried by the following vote:

AYES: Commissioners Beeuwsaert, Caputo, Frazier, Vice
Chair Froelich, and Chair Rowe
NOES:
ABSENT:

7. INFORMATIONAL ITEMS

7.1 SPEEDING COMPLAINT ON TERRA BELLA AVENUE AT LA CUESTA AVENUE

Staff stated that a resident had expressed concerns about traffic speeds in the neighborhood of Terra Bella Avenue at La Cuesta Avenue. As a result of this concern, the City placed the radar trailer on Terra Bella Avenue on March 12, 2013, from 7:00 a.m. to 3:15 p.m. Results determined that the 85th percentile speed was approximately 30 miles per hour which is typical for a residential neighborhood. The City informed the resident to contact the Sheriff's Department to report excessive speeding.

7.2 RADAR TRAILER SCHEDULE FOR APRIL/MAY

Staff briefly reviewed the use of the radar trailer and submitted the schedule for review by the Traffic Commission.

7.3 SHERIFF'S DEPARTMENT VERBAL REPORT

Sergeant Luke South introduced himself to the Traffic Commission and reported he will be attending the Traffic Commission meetings on a regular basis.

8. COMMISSIONER COMMENTS

No comments.

9. ADJOURNMENT

There being no further business before the Traffic Commission at this session, Chair Rowe declared the meeting adjourned at 8:10 p.m. to the meeting of May 15, 2013.

Prepared by:

Approved by:

Humza Javed, P.E.
Associate Civil Engineer

Ed Rowe
Chair

**CITY OF LAGUNA HILLS
TRAFFIC COMMISSION
AGENDA REPORT
TRAFFIC ENGINEER DEPARTMENT**

ISSUE: EVALUATION OF TRAFFIC SPEEDS ON EMPTY SADDLE DRIVE

SUMMARY:

A resident of the community contacted staff concerning traffic speeds on Empty Saddle Drive. Staff implemented a standard evaluation of the traffic speeds by taking radar speed surveys during the morning peak period on March 11, 2013. The results of the speed survey indicate the 85th percentile speed is 34.5 mph in the eastbound direction, and 33.7 mph in the westbound direction. The speeds are higher than what would be expected in a typical residential neighborhood. Traffic volumes on the street were very low. Staff is recommending additional law enforcement, as resources permit, along with the placement of the radar speed trailer at this location.

BACKGROUND:

Empty Saddle Drive is a local residential street in the southern portion of the City which traverses between Nellie Gail Road and Spotted Pony Lane in a curvilinear fashion; see attached vicinity map. The speed limit is posted at 25 mph. Ms. Nicole Cavaricci, resident of 25381 Empty Saddle Drive, expressed concerns about the speed of traffic travelling westbound on Empty Saddle Drive past her residence. In accordance with the Residential Streets Management Policy, staff implemented the standard practices of data collection for the traffic conditions on the street.

On March 11, 2013, the City's Traffic Consulting Engineering Firm, Hartzog & Crabill, Inc., performed a radar speed survey of the subject location during the morning peak hours of 7:00 a.m. to 9:00 a.m. The data revealed the 85th percentile speed, or the speed at which 85 percent of the vehicles are travelling at or lower, is 34.5 mph in the eastbound direction and 33.7 mph in the westbound direction. According to the City of Laguna Hills Residential Streets Management Policy, vehicle speeds on residential roadways in excess of 34 mph are subject to review for traffic controls.

In addition to the survey performed by Hartzog & Crabill, Inc., City staff placed the radar speed trailer along the north side of Empty Saddle Drive from 7:15 a.m. to 4:15 p.m. on March 19, 2013. The data obtained from the radar speed trailer showed an 85th percentile speed of 30 mph.

Traffic volume was also collected for a 24-hour period, which revealed 198 vehicles in the eastbound direction and 154 vehicles in the westbound direction. These numbers are

very low for a typical residential roadway.

The traffic speeds are slightly higher than what would be expected on a residential roadway. In accordance with the City's incremental approach to resolving traffic speeding, staff is recommending increased law enforcement along with the placement of the radar speed trailer during the morning peak hours on a regular basis.

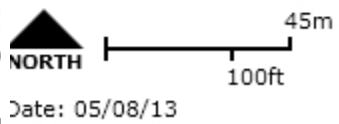
FISCAL IMPACT:

There is no fiscal impact with the current recommendation.

RECOMMENDATION: THAT THE TRAFFIC COMMISSION RECOMMEND TO THE CITY COUNCIL ADDITIONAL TRAFFIC ENFORCEMENT AND CONTINUED USE OF THE RADAR SPEED TRAILER ALONG EMPTY SADDLE DRIVE BETWEEN NELLIE GAIL ROAD AND SPOTTED PONY LANE.

ATTACHMENTS:

- Vicinity Map
- April 12, 2013 Hartzog & Crabill, Inc. Report



Date: 05/08/13

VICINITY MAP





Trammell Hartzog, President
Jerry Crabill, P.E. (Retired)
Gerald J. Stock, P.E.,
Executive Vice President

17772 E. 17th Street
Suite 101
Tustin, CA 92780

Phone: (714) 731-9455
FAX: (714) 731-9498

www.hartzog-crabill.com

April 12, 2013

Mr. Kenneth H. Rosenfield, P.E.
Director of Public Services
City of Laguna Hills
24045 El Toro Road
Laguna Hills, CA 92653

Subject: Empty Saddle Drive Residential Neighborhood Traffic Analyses

Dear Mr. Rosenfield:

Pursuant to your request, Hartzog & Crabill, Inc. (HCI) has prepared a neighborhood traffic study in the vicinity of 25381 Empty Saddle Drive. It is our understanding that concerns have been raised regarding neighborhood travel speeds and traffic volumes. In response to these concerns HCI conducted a radar speed survey at the subject location to determine travel speeds in both travel directions between the hours of 7:00 AM and 9:00 AM. During the same time period HCI collected traffic volume counts. The results of the analysis are summarized below.

SPEED

DIRECTION	85TH PERCENTILE	50TH PERCENTILE
East bound	34.5 mph	30.5 mph
West bound	33.7 mph	29.3 mph

The radar speed survey determined that speeds are higher than expected for this segment of Empty Saddle Drive when compared against other residential streets of similar characteristics. HCI recommends that the City take an incremental approach to control traffic by increasing speed enforcement and to place a portable radar speed feedback trailer.

VOLUME

DIRECTION	7:00 AM TO 9:00 AM	TOTAL (24 HOURS)
East bound	17 vehicles	198 vehicles
West bound	38 vehicles	154 vehicles

The data show that traffic volumes along this segment of Empty Saddle Drive are typical of a residential street of this character.

Mr. Kenneth H. Rosenfield, P.E.

April 12, 2013

Page 2 of 2

It has been our pleasure to prepare these traffic studies for your review. If you have any questions or need additional information, please call us at (714) 731-9455.

Sincerely,

Hartzog & Crabill, Inc.



Gerald Stock, P.E.

Executive Vice President

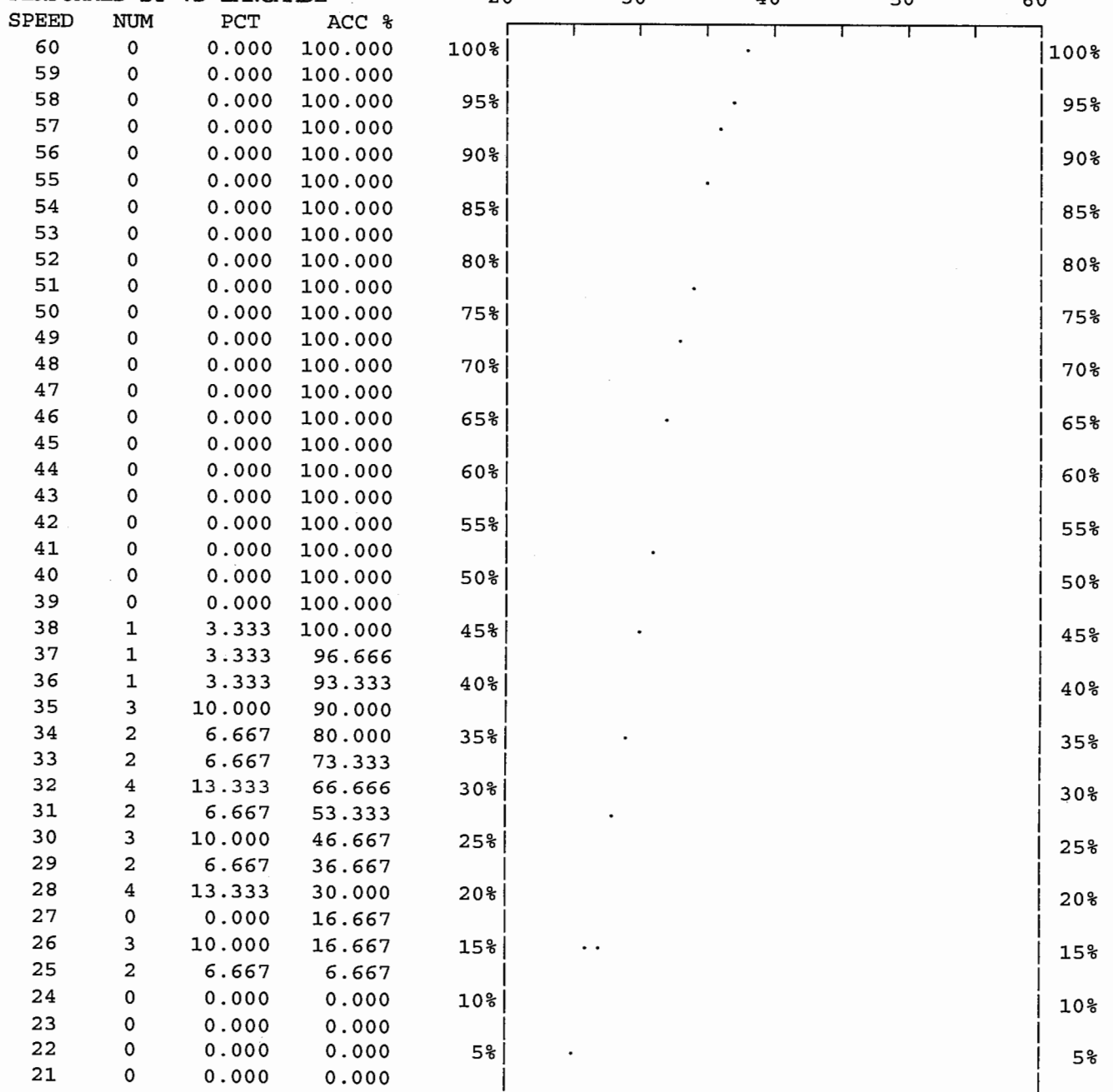
City & Traffic Engineering Services

Attachments

Empty Saddle Neighborhood Study

RADAR SURVEY STATISTICS

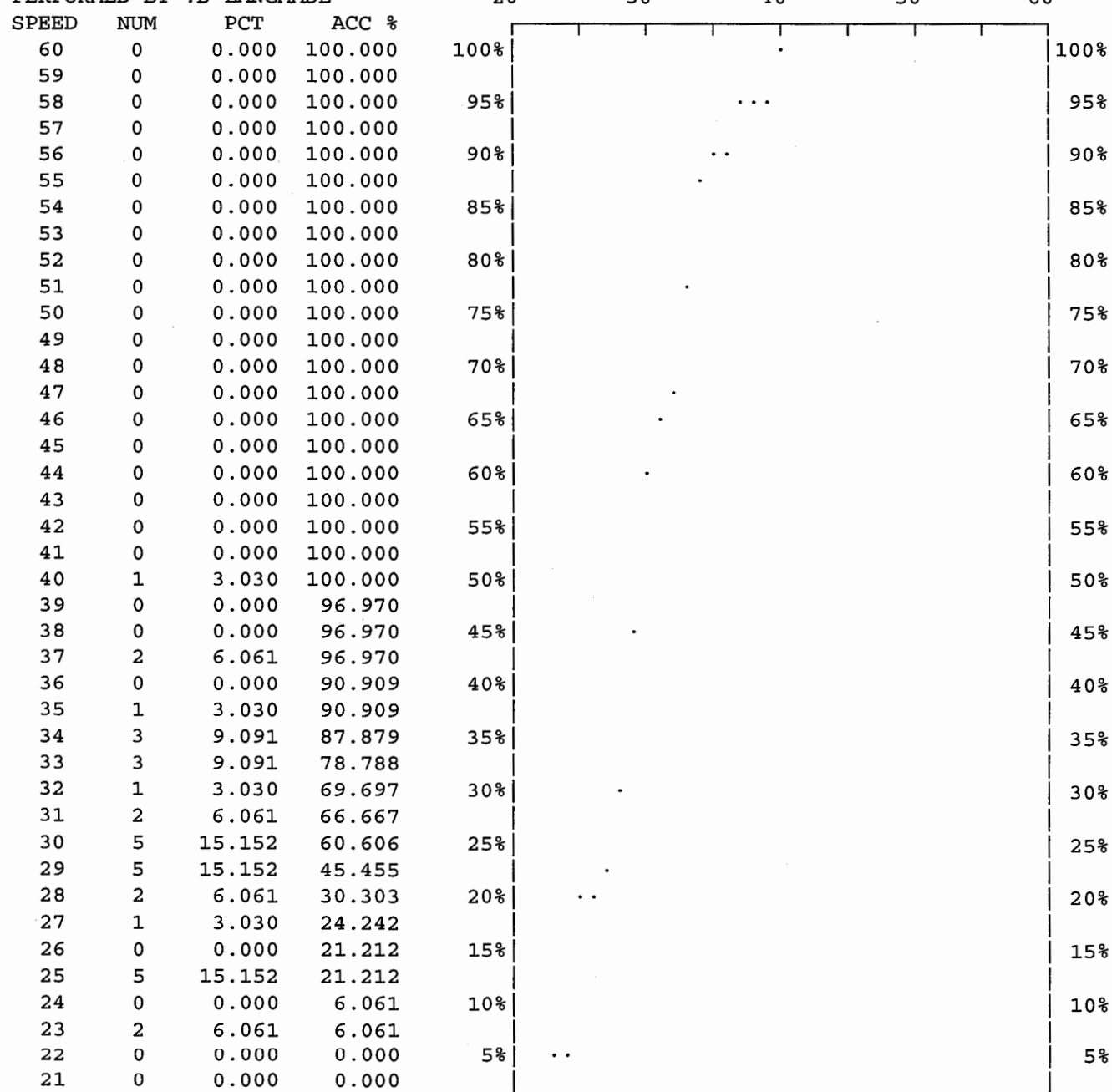
CITY	LAGUNA HILLS		
LOCATION	EMPTY SADDLE DR	25381 EMPTY SADDLE DR	
DIRECTION	EASTBOUND	15th PERCENTILE SPEED	25.83
DATE	03-11-13	50th PERCENTILE SPEED	30.50
DAY OF WEEK	Monday	85th PERCENTILE SPEED	34.50
TIME OF DAY	08:15AM - 10:15AM	95th PERCENTILE SPEED	36.50
POSTED SPEED LIMIT	25	RANGE OF SPEEDS	25 TO 38
NUMBER OF LANES	2	10 MPH PACE SPEEDS	26 TO 35
DEVELOPMENT	RESIDENTIAL	PERCENT IN PACE	83.33
WEATHER	CLEAR	CALCULATED MEAN	30.93
ROAD CONDITION	PAVED	STANDARD DEVIATION	6.79
95% CONFIDENCE GAP	28.56 TO 33.30	SKEWNESS INDEX	0.01
PERFORMED BY	:D LANGMADE		



30 VEHICLES OBSERVED

Prepared by Newport Traffic Studies

RADAR SURVEY STATISTICS			
CITY	LAGUNA HILLS		
LOCATION	EMPTY SADDLE DR 25381 EMPTY SADDLE DR		
DIRECTION	WESTBOUND	15th PERCENTILE SPEED	24.59
DATE	03-11-13	50th PERCENTILE SPEED	29.30
DAY OF WEEK	Monday	85th PERCENTILE SPEED	33.68
TIME OF DAY	08:15AM - 10:15AM	95th PERCENTILE SPEED	36.68
POSTED SPEED LIMIT	25	RANGE OF SPEEDS	23 TO 40
NUMBER OF LANES	2	10 MPH PACE SPEEDS	25 TO 34
DEVELOPMENT	RESIDENTIAL	PERCENT IN PACE	81.82
WEATHER	CLEAR	CALCULATED MEAN	30.09
ROAD CONDITION	PAVED	STANDARD DEVIATION	6.74
95% CONFIDENCE GAP	27.85 TO 32.33	SKEWNESS INDEX	-0.15
PERFORMED BY	:D LANGMADE	20	30 40 50 60



Prepared by Newport Traffic Studies

RADAR SURVEY STATISTICS

CITY	LAGUNA HILLS		
LOCATION	EMPTY SADDLE DR 25381 EMPTY SADDLE DR		
DIRECTION	TOTAL	15th PERCENTILE SPEED	25.15
DATE	03-11-13	50th PERCENTILE SPEED	29.69
DAY OF WEEK	Monday	85th PERCENTILE SPEED	34.14
TIME OF DAY	08:15AM - 10:15AM	95th PERCENTILE SPEED	36.62
POSTED SPEED LIMIT	25	RANGE OF SPEEDS	23 TO 40
NUMBER OF LANES	2	10 MPH PACE SPEEDS	25 TO 34
DEVELOPMENT	RESIDENTIAL	PERCENT IN PACE	80.95
WEATHER	CLEAR	CALCULATED MEAN	30.49
ROAD CONDITION	PAVED	STANDARD DEVIATION	5.49
95% CONFIDENCE GAP	29.17 TO 31.81	SKEWNESS INDEX	-0.10
PERFORMED BY	:D LANGMADE	20	30 40 50 60

SPEED	NUM	PCT	ACC %					
60	0	0.000	100.000	100%				100%
59	0	0.000	100.000					
58	0	0.000	100.000	95%				95%
57	0	0.000	100.000					
56	0	0.000	100.000	90%				90%
55	0	0.000	100.000					
54	0	0.000	100.000	85%				85%
53	0	0.000	100.000					
52	0	0.000	100.000	80%				80%
51	0	0.000	100.000					
50	0	0.000	100.000	75%				75%
49	0	0.000	100.000					
48	0	0.000	100.000	70%				70%
47	0	0.000	100.000					
46	0	0.000	100.000	65%				65%
45	0	0.000	100.000					
44	0	0.000	100.000	60%				60%
43	0	0.000	100.000					
42	0	0.000	100.000	55%				55%
41	0	0.000	100.000					
40	1	1.587	100.000	50%				50%
39	0	0.000	98.413					
38	1	1.587	98.413	45%				45%
37	3	4.762	96.825					
36	1	1.587	92.063	40%				40%
35	4	6.349	90.476					
34	5	7.937	84.127	35%				35%
33	5	7.937	76.190					
32	5	7.937	68.254	30%				30%
31	4	6.349	60.317					
30	8	12.698	53.968	25%				25%
29	7	11.111	41.270					
28	6	9.524	30.159	20%				20%
27	1	1.587	20.635					
26	3	4.762	19.048	15%				15%
25	7	11.111	14.286					
24	0	0.000	3.175	10%				10%
23	2	3.175	3.175					
22	0	0.000	0.000	5%				5%
21	0	0.000	0.000					

63 VEHICLES OBSERVED

Prepared by Newport Traffic Studies

24 HOUR VOLUMES			
STREET : EMPTY SADDLE DR		LH	
LOCATION : 25381 EMPTY SADDLE DR		DATE : 03-14-13	
AM 			

Prepared by NEWPORT TRAFFIC STUDIES

15 MINUTE COUNTS						
STREET : EMPTY SADDLE DR				LH		
LOCATION : 25381 EMPTY SADDLE DR				DATE : 03-14-13		
AM				PM		
EAST BOUND	WEST BOUND	TOTAL TOTAL		EAST BOUND	WEST BOUND	TOTAL TOTAL
0	0	0	12:00	4	3	7
0	0	0		1	1	2
0	0	0		5	2	7
0	0	0		4	2	6
0	0	0	1:00	2	1	3
0	0	0		3	2	5
0	0	0		2	3	5
0	0	0		4	3	7
0	0	0	2:00	7	1	8
0	0	0		9	0	9
0	0	0		5	2	7
0	0	0		6	0	6
0	0	0	3:00	4	0	4
0	0	0		3	5	8
0	0	0		3	2	5
0	0	0		2	1	3
0	0	0	4:00	4	3	7
1	0	1		3	2	5
0	1	1		3	3	6
0	0	0		4	2	6
0	0	0	5:00	6	2	8
0	0	0		7	4	11
0	1	1		4	2	6
0	3	3		3	2	5
0	0	0	6:00	4	2	6
0	0	0		2	1	3
0	3	3		4	5	9
0	1	1		5	5	10
3	0	3	7:00	7	3	10
0	3	3		0	1	1
1	5	6		6	1	7
7	7	14		0	1	1
1	6	7	8:00	1	2	3
1	6	7		3	1	4
4	3	7		4	0	4
0	8	8		1	1	2
7	5	12	9:00	4	2	6
1	6	7		3	0	3
1	2	3		1	1	2
1	0	1		0	1	1
3	1	4	10:00	2	0	2
1	1	2		1	0	1
3	1	4		1	0	1
1	2	3		0	0	0
5	2	7	11:00	0	1	1
4	3	7		0	0	0
2	6	8		0	0	0
4	2	6		0	0	0
				Prepared by NEWPORT TRAFFIC STUDIES		

**CITY OF LAGUNA HILLS
TRAFFIC COMMISSION
AGENDA REPORT
TRAFFIC ENGINEER DEPARTMENT**

ISSUE: ANALYSIS OF VEHICLE AND PEDESTRIAN INTERACTION AT THE SOUTHERLY CROSSWALK AT THE INTERSECTION OF PASEO DE VALENCIA AT CALLE DE LA PLATA

SUMMARY:

Upon receiving complaints from Laguna Woods' residents regarding pedestrian safety along the southerly crosswalk at the signalized intersection of Paseo de Valencia at Calle de la Plata, staff had the intersection evaluated for traffic safety. An analysis of traffic collision history along with left-turn phasing was performed. Based on traffic collision history and traffic movements, it was determined that the location does not pose a traffic safety concern and does not meet State standards for the implementation of left-turn traffic signal phasing. Previously, the City added two "Turning Traffic Must Yield to Pedestrians" signs for traffic along Calle de la Plata turning left onto southbound Paseo de Valencia. Both the pedestrian and the motorist have obligations under the California Vehicle Code to safely operate at the intersection. Based upon the data and study results no changes to the traffic signal phasing are recommended. However, staff is recommending the installation of two pedestrian countdown timer heads on the south leg of Paseo de Valencia at Calle de la Plata intersection to enhance pedestrian compliance with crossing procedures.

BACKGROUND:

Paseo de Valencia is an arterial highway running north-south, and Calle de la Plata is a minor collector private street running east-west. There are marked crosswalks at all legs of the intersection except the northerly leg on Paseo de Valencia. The traffic signal on Paseo de Valencia provides for protected left-turn phasing for traffic on Paseo de Valencia; however, the traffic signal on Calle de la Plata provides for permissive operations for left-turning traffic from Calle de la Plata. Paseo de Valencia has a posted speed limit of 40 mph and on-street parking is prohibited on both sides at this intersection.

Since 2011, staff has been contacted multiple times by residents of the San Sebastian Apartments located in the City of Laguna Woods expressing concerns regarding their use of the southerly crosswalk of Paseo de Valencia at Calle de la Plata. Due to the increase in occupancy at the San Sebastian Apartment complex, pedestrian activity at this intersection has increased. In response to the concerns raised, staff retained the City's Consulting Traffic Engineers of Hartzog & Crabill, Inc., to evaluate the intersection with particular attention being paid to whether or not left-turn phasing was appropriate to be added to the Calle de la Plata traffic movements.

Attached is a full report from Hartzog & Crabill, Inc., with all of the appurtenant data with regards to traffic movements and traffic collision histories at the location. The report

concludes that the addition of left-turn phasing at the subject traffic signal is not justified based upon the standards for the installation of left-turn phasing. In addition, there are only two recorded traffic collision incidents involving a pedestrian at this intersection in a recent five-year history, which, while unfortunate, does not trigger the standards for which the installation of left-turn phasing is appropriate.

Initially, upon receiving the complaint in 2011, Hartzog & Crabill, Inc. performed a similar evaluation at this intersection. Staff reported the results at the May 18, 2011 Traffic Commission meeting. The report did not justify any changes at that time. However, in order to remind motorists of their legal responsibility as a driver, two "Turning Traffic Must Yield to Pedestrians" signs were installed for westbound Calle de la Plata traffic turning left (southbound) onto Paseo de Valencia.

At the March 20, 2013 Traffic Commission meeting, staff also reported results of a "No Right Turn on Red" evaluation for eastbound Calle de la Plata traffic at Paseo de Valencia. This evaluation was also based on a request from a resident of San Sebastian Apartments. According to the report, the right turn on red restriction was not justified based on State guidelines.

In consideration of pedestrian and traffic volumes, traffic speeds, sight distance, roadway geometrics, traffic signal operations, etc. this intersection is not considered to be an adverse intersection from a traffic engineering perspective. However, in order to enhance pedestrian compliance with crossing procedures and notify them of the crossing time within the crosswalk, staff is recommending the installation of two pedestrian countdown timer heads on the south leg of the Paseo de Valencia at Calle de la Plata intersection. The pedestrian countdown timer heads will not only assist the pedestrians in judging whether there is sufficient time to cross legally, but also provide an additional visual to the motorists notifying them of pedestrians in the crosswalk.

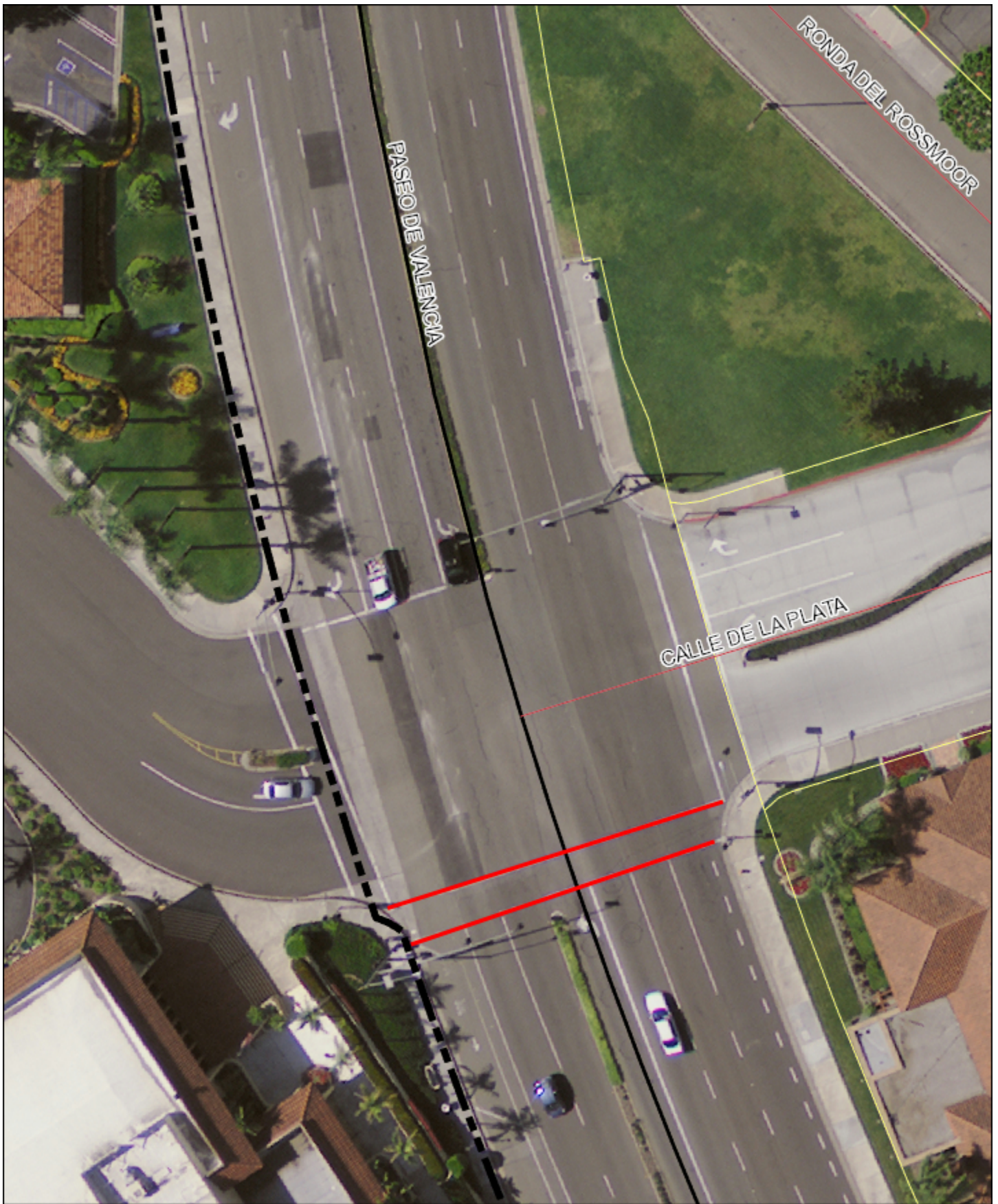
FISCAL IMPACT:

The cost of installing two pedestrian countdown timer heads is approximately \$800. Funds are available for this work in the Fiscal Year 2013-2014 Public Works Maintenance Budget.

RECOMMENDATION: THAT THE TRAFFIC COMMISSION RECEIVE AND FILE THIS REPORT.

ATTACHMENTS:

- Vicinity Map
- May 8, 2013 Hartzog & Crabill, Inc. Left-Turn Phasing Report



 NORTH
10m
40ft
Date: 03/14/13

Vicinity Map



5/15/2013 ITEM NO. 4.2



Trammell Hartzog, President
Jerry Crabill, P.E. (Retired)
Gerald J. Stock, P.E., Executive
Vice-President

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May 8, 2013

Mr. Kenneth H. Rosenfield, P.E.
Director of Public Services
City of Laguna Hills
24035 El Toro Road
Laguna Hills, CA 92653

**Subject: Left-Turn Phasing Analysis for the Intersection of
Paseo de Valencia and Calle de La Plata**

Dear Mr. Rosenfield:

Hartzog & Crabill, Inc. (HCI) has completed a Left-Turn Phasing Warrant Analysis at the subject intersection. As you will see in the attached report, the findings of this study show the installation of fully-protected left-turn phasing, or even split-phasing the east-west approaches is not recommended.

The analysis was completed in response to the City's request to verify if left-turn phasing is warranted, and recommended based on meeting standard guidelines. At the present time, the intersection is signalized with a 6-phase operation with protected left-turn phasing for the north-south approaches and permissive operations on the east-west approaches. The California Manual of Uniform Traffic Control Devices (*California MUTCD*) was used for defining the requirements for left-turn phasing. Highway Capacity Manual (*HCM*) and Institute of Transportation Engineers (*ITE*) left-turn phasing guidelines were also reviewed. Based on these State guidelines, there are four conditions considered for left-turn phasing: 1) Accident History; 2) Delay; 3) Traffic Volumes; and 4) Miscellaneous (*i.e., impaired sight distance, roadway curvature, etc.*). Of these (4) conditions, none were warranted. There are no other recommendations for this intersection at this time.

It has been our pleasure to prepare this analysis for the City of Laguna Hills. If you have any questions or need more information please call (714) 731-9455.

Very truly yours,
HARTZOG & CRABILL, INC.

A handwritten signature in blue ink, appearing to read 'Gerald J. Stock', is written over a horizontal line.

Gerald J. Stock, P.E.
Vice President

City & Traffic Engineering Services

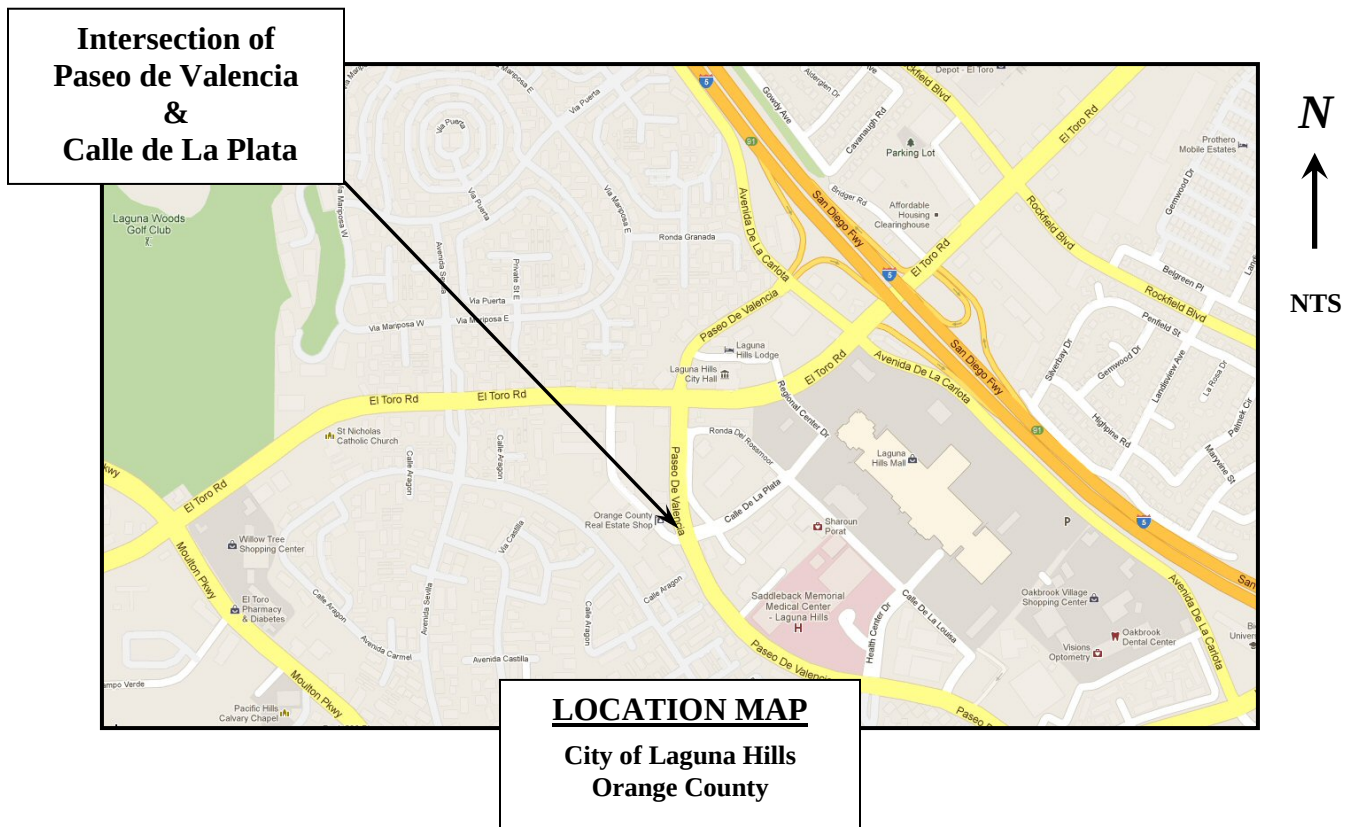
Attach: Left-Turn Phasing Analysis Report

LEFT-TURN PHASING ANALYSIS:

INTERSECTION OF PASEO DE VALENCIA AND CALLE DE LA PLATA IN THE CITY OF LAGUNA HILLS, CA

INTRODUCTION

The City of Laguna Hills requested Hartzog & Crabill, Inc. (HCI) complete a Left-Turn Phasing Warrant Analysis at the intersection of Paseo de Valencia and Calle de La Plata. This analysis was completed in order to verify if left-turn phasing is warranted for the east-west approaches (Calle de La Plata), and recommended based on meeting standard guidelines. The intersection is considered a standard, four-legged, urbanized-commercial intersection with Paseo de Valencia running in the north-south directions and Calle de La Plata in the east-west directions. The intersection is located southwest of the Interstate 5 (I-5) San Diego Freeway, just south of El Toro Road (see *Location Map below*). At the present time, the intersection is signalized with a 6-phase operation with protected-left-turn phasing on Paseo de Valencia and permissive left-turns on Calle de La Plata.



BACKGROUND

Paseo de Valencia is a 96-foot wide north-south major collector with primarily commercial frontage (banks & office buildings) on both sides of the roadway. The raised landscaped center median provides for two (2) southbound through-lanes and three (3) northbound through-lanes of traffic, with bicycle lanes on both sides, and a dedicated left-turn lane for each approach to the intersection of Calle de La Plata. There is a marked white crosswalk across the south leg of Paseo de Valencia only (no marked crosswalk across the north leg). There are curb, gutter, and sidewalk improvements along both sides of the roadway. Paseo de Valencia has a posted speed limit of 40 MPH. On-street parking is restricted on both sides of the roadway. Currently, the traffic signal provides for protected left-turn phasing for traffic on Paseo de Valencia.

See Exhibit 1 (next page) for photo images of Paseo de Valencia.

Calle de La Plata is a 74-foot wide minor collector on the east leg of the intersection with Paseo de Valencia, with primarily commercial frontage on both sides of the roadway. On the west leg, the roadway is a 62 foot wide local roadway that narrows further away from the intersection and includes residential land use. The roadway provides for one through-lane of traffic on each approach and an exclusive left-turn lane at the intersection with Paseo de Valencia. On the east leg, the striping also provides for a dedicated right-turn lane. The directions are separated by a raised landscaped center median along the east leg and a combination of a small raised landscaped median and yellow centerline striping on the west leg. There are marked white crosswalks across both east and west legs of Calle de La Plata, and curb, gutter, and sidewalk improvements along both sides of the roadway. Calle de La Plata has a posted speed limit of 30 MPH. On-street parking is restricted on both sides of the roadway along the east leg only. Currently, the traffic signal provides for permissive operations for left-turning traffic on Calle de La Plata.

See Exhibit 2 (following page) for photo images of Calle de La Plata.

EXHIBIT 1



Paseo de Valencia (Looking Northbound) @ Calle de La Plata



Paseo de Valencia (Looking Southbound) @ Calle de La Plata

EXHIBIT 2



LEFT-TURN PHASING ANALYSIS

As is common practice with many municipal agencies, the City of Laguna Hills has an adopted practice for using State guidelines as reference standards in order to provide uniformity and consistency in terms of traffic control. Therefore, the following three prevailing sources that address this topic were considered: 1) State of California Manual of Uniform Traffic Control Devices (*California MUTCD*); 2) State of California Highway Capacity Manual (*HCM*); and the 3) Institute of Traffic Engineers (ITE) Traffic Engineering Handbook. These sources were referenced because some diversity exists between them regarding left-turn phasing guidelines (*see Appendix A for all three applicable guidelines*).

Based on the comprehensive State guidelines found in the California MUTCD, which are most-typically referenced, there are four conditions that are considered for left-turn phasing: 1) Collision History; 2) Volume; 3) Delay; and 4) Miscellaneous. If any one of these conditions is met, then protected left-turn phasing should be considered.

Collision history, traffic volume data, and sight distance (visibility) are the conditions most often studied by HCI for this type of analysis, since they provide a good overall picture of the intersection characteristics. Consequently, the following analysis has focused on these three conditions to determine if protected left-turn phasing is warranted and recommended for the east-west approaches to the intersection.

Collision History

The guidelines for left-turn phasing contained in the California MUTCD regarding collisions require a minimum of five (5) left-turn collisions for a particular left-turn movement during a recent 12-month period. The HCM does not include guidelines on collisions; however, the ITE guidelines do call for a minimum of (8) left-turn-related collisions occurring within the last three years at any one approach with permissive-only phasing.

Collision History (continued)

The available accident history for the intersection of Paseo de Valencia and Calle de La Plata was gathered from the California Highway Patrol (CHP) - Statewide Integrated Traffic Records System (SWITRS) and reviewed to determine whether there were accidents susceptible to correction by the installation of left-turn phasing. Typically, left-turn type collisions are categorized as 'Broadside' or 'Head-On'. Pedestrian-vehicular type collisions are also considered correctible, as they would occur separately under protected left-turn phasing. Table 1 below provides a recent 5-year summary of the reported east-west left-turn accident history susceptible to correction at this intersection.

As can be seen below, there were a total of (6) left-turn or pedestrian/vehicle type collisions reported during the last five years of available collision data. But, there were only two correctible collisions in a recent 12-month period. The collisions not considered correctible were verified as occurring in the north or south directions, and not in the east and west directions. Therefore, the minimum requirement of five (5) collisions susceptible to correction is not satisfied for consideration of protected left-turn phasing in the east-west directions per the California MUTCD guidelines.

A more-comprehensive 5-year traffic collision history report is included in Appendix B.

**TABLE 1
LEFT-TURN COLLISION HISTORY SUMMARY**

Intersection	2006 - 2008		2009		2010		2011	
	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?
Paseo de Valencia at Calle de La Plata	08/27/06	Broadside / No	02/19	Broadside / No		<i>No LTs Reported</i>	01/22	Head-On / No
	12/29/07	Veh.-Ped. / Yes	11/03	Veh.-Ped. / No				
	10/14/08	Veh.-Ped. / Yes						

Traffic Volumes

As noted below and in the California MUTCD, left-turn phasing should be considered when the following left-turn traffic volume criteria are met:

For a pretimed signal or a background-cycle-controlled actuated signal, a left turn volume of more than two vehicles per approach per cycle for a peak hour; or for a traffic-actuated signal, 50 or more left turning vehicles per hour in one direction with the product of the turning and conflicting through traffic during the peak hour of 100,000 or more.

This particular intersection is a semi-actuated traffic signal since it has vehicle detection loops on each side-street approach and on the left-turn lanes. Therefore, (50) or more left-turning vehicles per hour in one direction are required, along with the left/conflicting-through vehicle product of 100,000. Intersection peak-hour turning movement counts were gathered at the intersection of Paseo de Valencia and Calle de La Plata to determine the activity level during a typical mid-week time period. The traffic volumes were collected on Wednesday, April 24, 2013. The morning peak-hour was determined to start at 7:45 AM and the afternoon peak-hour at 4:15 PM. Table 2 below summarizes the weekday peak-hour traffic counts. ***All peak-hour traffic volume data is included in Appendix C.***

**TABLE 2
INTERSECTION WEEKDAY
PEAK-HOUR VEHICLE TURNING MOVEMENT COUNTS**

Intersection	Peak Hour	Northbound			Southbound			Eastbound			Westbound		
		L	T	R	L	T	R	L	T	R	L	T	R
Paseo de Valencia and Calle de La Plata	AM	86	600	142	269	594	28	51	11	38	34	7	64
	PM	125	671	103	170	814	26	92	26	80	109	28	166

L = Left-turning vehicles
T = Through vehicles
R = Right-turning vehicles

Traffic Volumes (continued)

As can be seen from Table 2 above, all left-turn movements meet the minimum (50) left-turning vehicles per hour in one direction that is needed to partially satisfy the Traffic Volume guideline described above, with exception to westbound in the AM peak hour.

The remaining portion of the guideline specifies that the product of the left-turning movement and the conflicting-through traffic during the peak-hour equal 100,000 or greater. It should be noted that the conflicting-through (or opposing) traffic does include opposing right-turning traffic since many left-turning vehicles can be expected to yield until the opposing right-turns complete their movement before proceeding. As shown in Table 3 below, this portion of the guideline is not met in either eastbound or westbound approach to the intersection. Therefore, the minimum traffic volume condition is not satisfied for Calle de La Plata per the California MUTCD guidelines.

**TABLE 3
LEFT-TURN PHASING CROSS-PRODUCT CHECK
PASEO DE VALENCIA AT CALLE DE LA PLATA**

Product of Left-Turns and Opposing Through Movements	Peak Hour	Northbound			Southbound			Eastbound			Westbound		
		Left	Opposing	Product	Left	Opposing	Product	Left	Opposing	Product	Left	Opposing	Product
	AM	86	622	53,492	269	742	199,598	51	71	3,621	34	49	1,666
	PM	125	840	105,000	170	774	131,580	92	194	17,848	109	106	11,554

In comparison to the California MUTCD, the guidelines given in the Highway Capacity Manual (HCM), 2000 edition, have lower minimum cross-products associated with the number of opposing through-lanes. The threshold set by the HCM establishes a minimum cross-product of 50,000 for left-turns opposed by one (1) through-lane, 90,000 when opposed by (2) lanes, and 110,000 with (3) opposing lanes. Similarly, from Table 3 above, the minimum traffic volume condition is not satisfied for either east-west approach of Calle de La Plata per the HCM guidelines (*see Appendix A for completed HCM Left-Turn Treatment Worksheet*).

Delay

The left-turn delay condition per the California MUTCD guidelines calls for one or more vehicles, which were waiting at the beginning of the green interval and are still remaining in the left-turn lane at the end of yellow, for at least 80% of the total number of cycles in one hour. A delay study was included in the data collection on Wednesday, April 24, 2013 during the AM and PM peak-periods with the results summarized below:

AM Peak-Hour

During the two (2) hours of delay study in the morning peak period (7-9am), there were no cycles that were reported as having vehicles at the beginning of green and remaining at the end of the yellow interval.

PM Peak-Hour

During the two (2) hours of delay study in the afternoon peak period (4-6pm), the highest approach in the east-west directions that experienced any left-turn delay was westbound. There were only (2) cycles (*out of 56*) that were reported as having vehicles at the beginning of green and remaining at the end of the yellow interval during the 4:00 PM hour. This calculates to approximately 4% of the cycles, which does not satisfy the 80% required.

Therefore, the left-turn delay data for the east-west approaches at this intersection does not meet the minimum requirements of 80% delayed cycles per the California MUTCD guidelines for either peak period.

Peak-hour delay data is included in Appendix D.

Miscellaneous

The geometry of the intersection of Paseo de Valencia and Calle de La Plata provides for an approximate 90-degree angle at its intersection, and horizontal roadway curvature on both streets just beyond the intersection. There is also gradual vertical roadway curvature inclining in the northbound direction along Paseo de Valencia. In consideration of the surrounding urbanized commercial environment, this intersection geometry was field-reviewed and determined to not require special traffic signal head locations for improved visibility or advanced signage for impaired sight distance. As shown in Exhibits 1 and 2, both streets have a slight incline at the intersection, and field observations also showed that a driver's visibility is not restricted due to any existing roadway design, curvature, or physical obstruction.

Driver visibility was verified from the side-streets (Calle de La Plata) and shown to be unrestricted for left-turn maneuvers. In other terms, the visibility between left-turning drivers and opposing traffic and/or pedestrians using the crosswalk across the south leg of Paseo de Valencia is not restricted.

ANALYSIS SUMMARY

Based on left-turn accidents in the east-west approaches, the intersection accident history did not satisfy the California MUTCD requirements for installation of left-turn phasing, as there were (2) collisions (*not* 5) considered susceptible to correction by protected left-turn phasing in a recent 12-month period.

Based on the minimum traffic volume guidelines set forth in the California MUTCD and Highway Capacity Manual, this analysis showed that existing traffic volumes did not satisfy the guidelines for installation of protected left-turn phasing on the east-west approaches. In other words, traffic volumes on Calle de La Plata did not meet the minimum volume requirements for the amount of left-turns with opposing through-movements during both peak traffic periods. Using the ITE guidelines, permissive phasing is recommended.

ANALYSIS SUMMARY (continued)

In terms of vehicular delay on Calle de La Plata at Paseo de Valencia, a delay study was performed which showed that vehicles using Calle de La Plata did not experience any delay, as the amount of cycles where vehicles experienced left-turn delay were well below the minimum guidelines of 80% of peak-hour cycles. Also, as shown in Table 2, the peak-hour traffic volumes on Calle de La Plata are significantly less when compared to those using the major street (Paseo de Valencia). Therefore, eastbound and westbound vehicular queuing was also field-verified and not considered significant to warrant protected left-turn phasing.

Engineering judgment should always be included in any decision regarding traffic safety improvements. Further information observed in the field in regards to pedestrian activity describes a moderate-to-high activity, as a 12-hour pedestrian count (6am-6pm) for crossing the south leg of Paseo de Valencia totaled 251 pedestrians, or on average approximately 21 per hour. The highest hourly pedestrian volume crossing Paseo de Valencia was 41. As Paseo de Valencia has bicycle lanes, bicyclists were also counted using this crossing during this same 12-hour period, totaling 14, or on average 1 per hour.

The intersection geometry was field-reviewed and determined to not require special traffic signal head locations for improved visibility or advanced signage for impaired sight distance. Field observations also showed that a driver's visibility was not restricted due to any existing roadway design, curvature, or physical obstruction. Driver visibility was also verified from the Calle de La Plata approaches to the intersection and shown to be unrestricted, especially visibility between left-turning drivers and opposing traffic or pedestrians using the crosswalk across the south leg.

ANALYSIS SUMMARY (continued)

Per our proposed tasks, should protected left-turn phasing be warranted, HCI was to conduct an intersection evaluation using SYNCHRO traffic signal software. As this was not the case, HCI did not review any proposed conditions but did review the existing conditions for the AM and PM peak hours in Synchro, including traffic counts, pedestrian and bicycle activity, and all applicable signal timing parameters. Both peak hours resulted in an acceptable level-of-service (LOS=C), with no significant vehicular queuing for any approach to the signal.

Split-phasing the east-west approaches (east and west phases occur separately) was considered by the City as an evaluation option for this intersection. The report findings do not support split-phasing at this time, since it would require adding more time to Calle de La Plata and subtracting it from Paseo de Valencia. This would be detrimental to the existing signal synchronization and traffic flow on Paseo de Valencia. If the City desires to further evaluate the impacts of split-phasing this intersection, this option may be studied more in depth in the corridor analysis for the OCTA's Regional Paseo de Valencia Traffic Signal Synchronization Program (TSSP) Project 'P' that is currently being completed under the City's administration.

CONCLUSION

Based on the findings of this analysis, the installation of fully-protected left-turn phasing, or even split-phasing, is not warranted for the east-west approaches on Calle de La Plata at its intersection with Paseo de Valencia. There are no further intersection recommendations at this time.

APPENDIX A

LEFT-TURN PHASING GUIDELINES:

**CALIFORNIA MUTCD,
HIGHWAY CAPACITY MANUAL,
and
ITE TRAFFIC ENGINEERING HANDBOOK**

CALIFORNIA MUTCD

5/15/2013 ITEM NO. 4.2

CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn **GREEN ARROW** signal indications for a protected left-turn movement.

E. A supplementary sign shall not be required. If used, it shall be a ~~LEFT TURN YIELD ON FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).~~

Option:

⁰⁶ The requirements of Item A in Paragraph 5 may be met by a vertically-arranged signal face with a horizontal cluster of two left-turn **RED ARROW** signal indications, the left-most of which displays a steady indication and the right-most of which displays a flashing indication (see Figure 4D-8).

Section 4D.19 Signal Indications for Protected Only Mode Left-Turn Movements

Standard:

⁰¹ A shared signal face shall not be used for protected only mode left turns unless the **CIRCULAR GREEN** and left-turn **GREEN ARROW** signal indications always begin and terminate together. If a shared signal face is provided for a protected only mode left turn, it shall meet the following requirements (see Figure 4D-9):

- A. It shall be capable of displaying the following signal indications: steady CIRCULAR RED, steady CIRCULAR YELLOW, CIRCULAR GREEN, and left-turn GREEN ARROW. Only one of the three colors shall be displayed at any given time.**
- B. During the protected left-turn movement, the shared signal face shall simultaneously display both a CIRCULAR GREEN signal indication and a left-turn GREEN ARROW signal indication.**
- C. The shared signal face shall always simultaneously display the same color of circular indication that the adjacent through signal face or faces display.**
- D. If the protected only mode is not the only left-turn mode used for the approach, the signal face shall be the same shared signal face that is used for the protected/permissive mode (see Section 4D.20).**

Option:

⁰² A straight-through **GREEN ARROW** signal indication may be used instead of the **CIRCULAR GREEN** signal indication in Items A and B in Paragraph 1 on an approach where right turns are prohibited and a straight-through **GREEN ARROW** signal indication is also used instead of a **CIRCULAR GREEN** signal indication in the other signal face(s) for through traffic.

Standard:

⁰³ If a separate left-turn signal face is provided for a protected only mode left turn, it shall meet the following requirements (see Figure 4D-10):

- A. It shall be capable of displaying, the following signal indications: steady left-turn RED ARROW, steady left-turn YELLOW ARROW, and left-turn GREEN ARROW. Only one of the three indications shall be displayed at any given time. A signal instruction sign shall not be required with this set of signal indications. If used, it shall be a LEFT ON GREEN ARROW ONLY (R10-5) sign (see Figure 2B-27).**
- B. During the protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed.**
- C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the left-turn GREEN ARROW signal indication.**
- D. If the protected only mode is not the only left-turn mode used for the approach, the signal face shall be the same separate left-turn signal face that is used for the protected/permissive mode (see Section 4D.20 and Figures 4D-8 and 4D-12) except that the flashing left-turn YELLOW ARROW or flashing left-turn RED ARROW signal indication shall not be displayed when operating in the protected only mode.**

Guidance:

⁰⁴ *Since separate signal phases for protected left turns will reduce the green time available for other phases, alternate means of handling left turn conflicts should be considered first.*

Support:

⁰⁵ The most likely possibilities are:

1. Prohibition of left turns. This can be done only if there are convenient alternate means of making the movement. Typical alternate means are:
 - a. A series of right and/or left turns around a block to permit getting to the desired destination; or
 - b. Making the left turn at an adjacent unsignalized intersection during gaps in the opposing through traffic.
2. Geometric changes to eliminate the left turn. An effective change would be a complete separation or a complete or partial "clover leaf" at grade. Any of these, while eliminating left turns, requires additional cost and right of way.
3. Provide protected-permissive or permissive-protected left turn operation. The protected left turn interval may be prohibited during certain periods of the day to allow only permissive intervals for left turn movement in order to increase the green time available for other phases. Refer to Section 4D.20 for the requirements of protected-permissive or permissive-protected left turn operation.

Guidance:

⁰⁶ Protected left turn phases should be considered where such alternatives couldn't be utilized, and one or more of the following conditions exist:

1. Collisions - Five or more left turn collisions for a particular left turn movement during a recent 12-month period.
2. Delay - Left-turn delay of one or more vehicles, which were waiting at the beginning of the green interval and are still remaining in the left turn lane after at least 80% of the total number of cycles for one hour.
3. Volume - At new intersections where only estimated volumes are available, the following criteria may be used. For pretimed signal or a background-cycle-controlled actuated signal, a left turn volume of more than two vehicles per approach per cycle for a peak hour; or for a traffic-actuated signal, 50 or more left turning vehicles per hour in one direction with the product of the turning and conflicting through traffic during the peak hour of 100,000 or more.
4. Miscellaneous. Other factors that might be considered include but are not limited to: impaired sight distance due to horizontal or vertical curvature, or where there are a large percentage of buses and trucks.

Section 4D.20 Signal Indications for Protected/Permissive Mode Left-Turn Movements

Standard:

⁰¹ If a shared signal face is provided for a protected/permissive mode left turn, it shall meet the following requirements (see Figure 4D-11):

- A. It shall be capable of displaying the following signal indications: steady CIRCULAR RED, steady CIRCULAR YELLOW, CIRCULAR green, steady left-turn YELLOW ARROW, and left-turn GREEN ARROW. Only one of the three circular indications shall be displayed at any given time. Only one of the two arrow indications shall be displayed at any given time. If the left-turn GREEN ARROW signal indication and the CIRCULAR GREEN signal indication(s) for the adjacent through movement are always terminated together, the steady left-turn YELLOW ARROW signal indication shall not be required.
- B. During the protected left-turn movement, the shared signal face shall simultaneously display a left-turn GREEN ARROW signal indication and a circular signal indication that is the same color as the signal indication for the adjacent through lane on the same approach as the protected left turn.
- C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the left-turn GREEN ARROW signal indication, unless the left-turn GREEN ARROW signal indication and the CIRCULAR GREEN signal indication(s) for the adjacent through movement are being terminated together. When the left-turn GREEN ARROW and CIRCULAR GREEN signal indications are being terminated together, the required display following the left-turn GREEN ARROW signal indication shall be either the display of a CIRCULAR YELLOW signal indication alone or the simultaneous display of the CIRCULAR YELLOW and left-turn YELLOW ARROW signal indications.
- D. During the permissive left-turn movement, the shared signal face shall display only a CIRCULAR GREEN signal indication.
- E. A protected/permissive shared signal face, regardless of where it is positioned and regardless of how many adjacent through signal faces are provided, shall always simultaneously display the same color of circular indication that the adjacent through signal face or faces display.

F. A supplementary sign shall not be required. If used, it shall be a LEFT TURN YIELD ON GREEN (symbolic circular green) (R10-12) sign (see Figure 2B-27).

⁰² If a separate left-turn signal face is being operated in a protected/permissive left-turn mode, a CIRCULAR GREEN signal indication shall not be used in that face.

⁰³ If a separate left-turn signal face is being operated in a protected/permissive left-turn mode and a flashing left-turn yellow arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-12):

A. It shall be capable of displaying the following signal indications: steady left-turn RED ARROW, steady left-turn YELLOW ARROW, flashing left-turn YELLOW ARROW, and left-turn GREEN ARROW. Only one of the four indications shall be displayed at any given time.

B. During the protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed.

C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the left-turn GREEN ARROW signal indication.

D. During the permissive left-turn movement, a flashing left-turn YELLOW ARROW signal indication shall be displayed.

E. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing left-turn YELLOW ARROW signal indication if the permissive left-turn movement is being terminated and the separate left-turn signal face will subsequently display a steady left-turn RED ARROW indication.

F. It shall be permitted to display a flashing left-turn YELLOW ARROW signal indication for a permissive left-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement.

G. When a permissive left-turn movement is changing to a protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed immediately upon the termination of the flashing left-turn YELLOW ARROW signal indication. A steady left-turn YELLOW ARROW signal indication shall not be displayed between the display of the flashing left-turn YELLOW ARROW signal indication and the display of the steady left-turn GREEN ARROW signal indication.

H. The display shall be a four-section signal face except that a three-section signal face containing a dual-arrow signal section shall be permitted where signal head height limitations (or lateral positioning limitations for a horizontally-mounted signal face) will not permit the use of a four-section signal face. The dual-arrow signal section, where used, shall display a GREEN ARROW for the protected left-turn movement and a flashing YELLOW ARROW for the permissive left-turn movement.

I. During steady mode (stop-and-go) operation, the signal section that displays the steady left-turn YELLOW ARROW signal indication during change intervals shall not be used to display the flashing left-turn YELLOW ARROW signal indication for permissive left turns.

J. During flashing mode operation (see Section 4D.30), the display of a flashing left-turn YELLOW ARROW signal indication shall be only from the signal section that displays a steady left-turn YELLOW ARROW signal indication during steady mode (stop-and-go) operation.

Option:

⁰⁴ A separate left-turn signal face with a flashing left-turn RED ARROW signal indication during the permissive left-turn movement may be used for unusual geometric conditions, such as wide medians with offset left-turn lanes, but only when an engineering study determines that each and every vehicle must successively come to a full stop before making a permissive left turn.

Standard:

⁰⁵ If a separate left-turn signal face is being operated in a protected/permissive left-turn mode and a flashing left-turn RED arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-8):

A. It shall be capable of displaying the following signal indications: steady or flashing left-turn RED ARROW, steady left-turn YELLOW ARROW, and left-turn GREEN ARROW. Only one of the three indications shall be displayed at any given time.

- B. During the protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed.**
- C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the left-turn GREEN ARROW signal indication.**
- D. During the permissive left-turn movement, a flashing left-turn RED ARROW signal indication shall be displayed.**
- E. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing left-turn RED ARROW signal indication if the permissive left-turn movement is being terminated and the separate left-turn signal face will subsequently display a steady left-turn RED ARROW indication.**
- F. When a permissive left-turn movement is changing to a protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed immediately upon the termination of the flashing left-turn RED ARROW signal indication. A steady left-turn YELLOW ARROW signal indication shall not be displayed between the display of the flashing left-turn RED ARROW signal indication and the display of the steady left-turn GREEN ARROW signal indication.**
- G. It shall be permitted to display a flashing left-turn RED ARROW signal indication for a permissive left-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement.**
- H. A supplementary sign shall not be required. ~~If used, it shall be a LEFT TURN YIELD ON FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).~~**

Option:

⁰⁶ The requirements of Item A in Paragraph 5 may be met by a vertically-arranged signal face with a horizontal cluster of two left-turn RED ARROW signal indications, the left-most of which displays a steady indication and the right-most of which displays a flashing indication (see Figure 4D-8).

Standard:

⁰⁷ **Protected/permissive mode left-turn shall not be used for left turn movements that oppose phases that require preemption for rail traffic.**

Section 4D.21 Signal Indications for Right-Turn Movements – General

Standard:

⁰¹ **In Sections 4D.21 through 4D.24, provisions applicable to right-turn movements and right-turn lanes shall also apply to signal indications for U-turns to the right that are provided at locations where right turns are prohibited or not geometrically possible.**

Support:

⁰² Right-turning traffic is controlled by one of four modes as follows:

- A. Permissive Only Mode—turns made on a CIRCULAR GREEN signal indication, a flashing right-turn YELLOW ARROW signal indication, or a flashing right-turn RED ARROW signal indication after yielding to pedestrians, if any.
- B. Protected Only Mode—turns made only when a right-turn GREEN ARROW signal indication is displayed.
- C. Protected/Permissive Mode—both modes occur on an approach during the same cycle.
- D. Variable Right-Turn Mode—the operating mode changes among the protected only mode and/or the protected/permissive mode and/or the permissive only mode during different periods of the day or as traffic conditions change.

Standard:

⁰³ **During a permissive right-turn movement, the signal faces, if any, that exclusively control U-turn traffic that conflicts with the permissive right-turn movement (see Item F.1 in Section 4D.05) shall simultaneously display steady U-turn RED ARROW signal indications. If pedestrians crossing the lane or lanes used by the permissive right-turn movement to depart the intersection are controlled by pedestrian signal heads, the signal indications displayed by those pedestrian signal heads shall not be limited to any particular display during the permissive right-turn movement.**

⁰⁴ **During a protected right-turn movement, the signal faces for left-turn traffic, if any, on the opposing approach shall not simultaneously display a steady left-turn GREEN ARROW or steady left-turn**

HIGHWAY CAPACITY MANUAL

5/15/2013 ITEM NO. 4.2

QUICK ESTIMATION LEFT-TURN TREATMENT WORKSHEET				
General Information				
Description <u>Paseo de Valencia at Calle de La Plata, Laguna Hills, CA</u>				
Check # 1. Left-Turn Lane Check				
Approach	EB	WB	NB	SB
Number of left-turn lanes	<u>1</u>	<u>1</u>	<u>N/A</u>	<u>N/A</u>
Protect left turn (Y or N)?	<u>N</u>	<u>N</u>		
If the number of left-turn lanes on any approach exceeds 1, then it is recommended that the left turns on that approach be protected. Those approaches with protected left turns need not be evaluated in subsequent checks.				
Check # 2. Minimum Volume Check				
Approach	EB	WB	NB	SB
Left-turn volume	<u>92</u>	<u>109</u>	<u>N/A</u>	<u>N/A</u>
Protect left turn (Y or N)?	<u>N</u>	<u>N</u>		
If left-turn volume on any approach exceeds 240 veh/h, then it is recommended that the left turns on that approach be protected. Those approaches with protected left turns need not be evaluated in subsequent checks.				
Check # 3. Minimum Cross-Product Check				
Approach	EB	WB	NB	SB
Left-turn volume, V_L (veh/h)	<u>92</u>	<u>109</u>	<u>N/A</u>	<u>N/A</u>
Opposing mainline volume, V_o (veh/h)	<u>194</u>	<u>106</u>		
Cross-product ($V_L * V_o$)	<u>17,848</u>	<u>11,554</u>		
Opposing through lanes	<u>1</u>	<u>1</u>		
Protected left turn (Y or N)?	<u>N</u>	<u>N</u>		
Minimum Cross-Product Values for Recommending Left-Turn Protection				
Number of Through Lanes		Minimum Cross-Product		
<u>1</u>		<u>50,000</u>		
2		90,000		
3		110,000		
If the cross-product on any approach exceeds the above values, then it is recommended that the left turns on that approach be protected. Those approaches with protected left turns need not be evaluated in subsequent checks.				
Check # 4. Sneaker Check				
Approach	EB	WB	NB	SB
Left-turn volume, V_L (veh/h)	<u>92</u>	<u>109</u>	<u>N/A</u>	<u>N/A</u>
Sneaker capacity, c_s (veh/h) $c_s = 7200/C$	<u>55</u>	<u>55</u>		
Equivalence factor, E_{LT}	<u>1.6</u>	<u>1.45</u>		
Protected left turn (Y or N)?	<u>N</u>	<u>N</u>		
If the equivalence factor is 3.5 or higher (computed in the Quick Estimation Lane Volume Worksheet) and the unadjusted left turn is greater than the sneaker capacity, then it is recommended that the left turns on that approach be protected.				
Notes				
1. If any approach is recommended for left-turn protection but the analyst evaluates it as having permitted operation, then this quick estimation method may give overly optimistic results. The analyst should instead use the methodology described in Chapter 18, Signalized Intersections.				
2. All volumes used in this worksheet are unadjusted hourly volumes.				

Exhibit 31-38
Quick Estimation Left-Turn
Treatment Worksheet

Note:
N-S Directions Already
Have Protected Left-Turns.
Therefore, N/A to this
evaluation.

Step 2: Determine Lane Volume

The lane volume worksheet is shown in Exhibit 31-39. Its purpose is to establish the individual lane flow rate (in veh/h/ln) on each intersection approach. This information is then used in the control delay and level-of-service worksheet to synthesize the signal-timing plan. The directional designations (e.g., RT = right turn, LT = left turn) refer to the traffic movements as they approach the intersection.

The number of through lanes N_{TH} includes any lane that serves through vehicles. Exclusive turn lanes should be excluded.

For an unopposed shared lane, the total approach volume V_{tot} is the sum of the shared-lane right-turn volume, through volume, and left-turn volume.

D. Compute Lane Volume for Through Movement with Exclusive Turn Lane

For approaches with an exclusive left-turn lane (or lanes), the through-lane volume V_{TH} is computed by dividing total approach volume by the number of through lanes.

The critical lane volume V_{CL} is normally the same as the through-lane volume, unless the right turn has an exclusive lane or the left turn is not opposed and either of these movements is more critical than the through movement. If both conditions apply, the critical lane volume will be the largest of the left-lane volume, exclusive right-lane volume, and through-lane volume.

E. Compute Lane Volume for Through Movement with Shared Lane

The computation of critical lane volume in the case of shared left-turn lanes is more complicated and requires a more detailed computational procedure. The equivalence factor E_{L1} for a permitted left turn is obtained from Exhibit 31-40 or computed with Equation 31-152.

Exhibit 31-40
Through-Car Equivalents for
Permitted Left Turns

Type of Left-Turn Lane	Through-Car Equivalent E_{L1} as a Function of Opposing Flow Rate (veh/h)						
	1	200	400	600	800	1,000	1,200 ^a
Shared	1.4	1.7	2.1	2.5	3.1	3.7	4.5
Exclusive	1.3	1.6	1.9	2.3	2.8	3.3	4.0

Note: ^a Use Equation 31-152, with Equation 31-153, for opposing flow in excess of 1,200 veh/h; v_o must be ≥ 0.1 veh/h.

Equation 31-152

$$E_{L1} = \frac{S_o}{S_p} - I_{sh}$$

with

Equation 31-153

$$S_p = \frac{v_o e^{-v_o t_{cg}/3,600}}{1 - e^{-v_o t_{sh}/3,600}}$$

where

E_{L1} = equivalent number of through cars for a permitted left-turning vehicle,

s_o = base saturation flow rate (pc/h/ln),

s_p = saturation flow rate of a permitted left-turn movement (veh/h/ln),

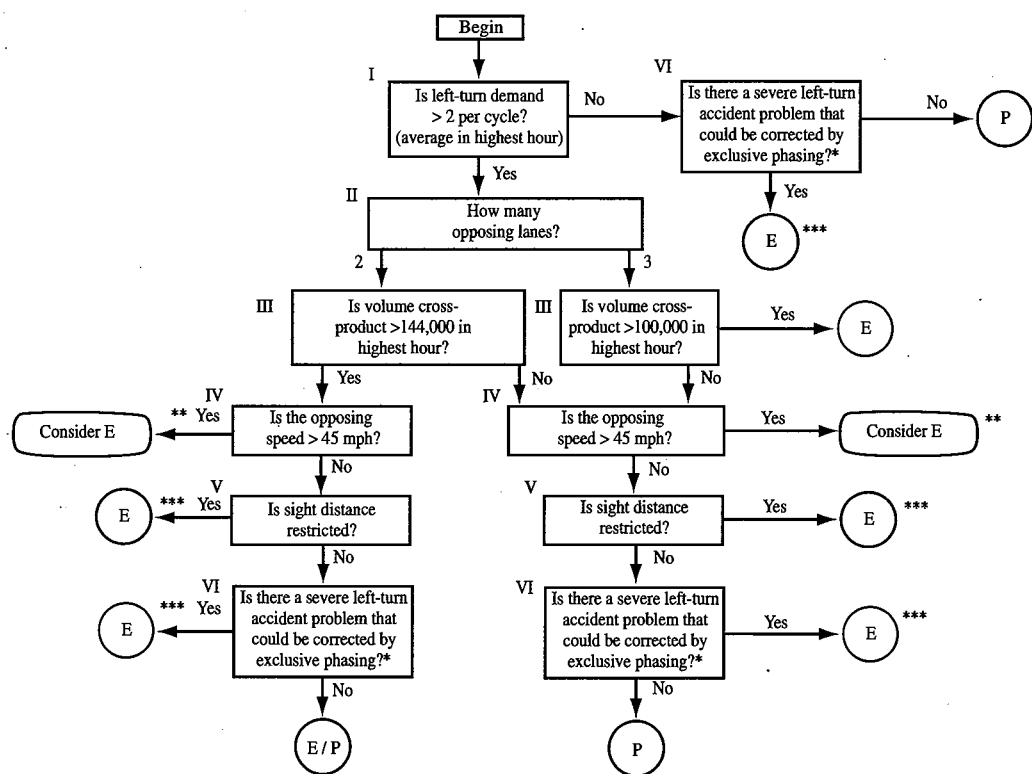
I_{sh} = indicator variable for shared lane (= 1.0 if the subject left turn is served in a shared lane, 0 if the subject left turn is served in an exclusive lane),

v_o = opposing demand flow rate (veh/h),

t_{cg} = critical headway = 4.5 (s), and

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- (P) – Permissive
- (E/P) – Exclusive/Permissive
- (E) – Exclusive

Note: This procedure applies to locations with a separate left-turn lane.

Restrictive Sight Distance is:

< 250 ft when speeds are 35 mph or less;

< 400 ft when speeds are 40 mph or more.

* See text for definition of severe left-turn accident problem.

** An opposing speed > 45 mph indicates a potential left-turn accident problem. Consider exclusive phasing, realizing that non-left-turn accidents may increase.

*** Use exclusive phasing with the understanding that non-left-turn accidents may increase.

Figure 13–7 Recommended Procedure for Determining Type of Left-Turn Phasing

Source: J.E. Upchurch, "Guidelines for Selecting Type of Left-Turn Phasing," *Traffic Control Devices and Rail-Highway Crossings*, Transportation Research Record 1069, Washington, D.C.: Transportation Research Board, National Research Council, 1986, p. 30.

The University of Texas at Arlington has developed guidelines for left-turn phasing based on research, actual field data, easy-to-use quantitative measures, and statistical analysis of most suitable left-turn options. The process favors the least restrictive option—permitted left-turn—unless traffic and geometrics warrant a more restrictive control.¹⁶ The decisions to be made are classified into three levels summarized as follows and shown in Figure 13–8.

Level 1: Permissive-Only Versus Some Protection

The permissive option should be used only if all of the following conditions exist:

¹⁶ S.A. Asante, S.A. Ardekani, and J.C. Williams, "Selection Criteria for Left-Turn Phasing and Indication Sequence," *Traffic Control Devices, Visibility, and Traffic Signal Systems*, Transportation Research Record 1421 (Washington, D.C.: Transportation Research Board, National Research Council, 1993), p. 11.

APPENDIX B

INTERSECTION COLLISION HISTORY DATA

**SWITRS COLLISION DATABASE
CITY OF LAGUNA HILLS
INTERSECTION OF PASEO DE VALENCIA AND CALLE DE LA PLATA
JAN. 1, 2006 - DEC. 31, 2011**

5/15/2013 ITEM NO. 4.2

ITEM ID	COLL. DATE	COLL. TIME	PRIMARY ROAD	SECONDARY ROAD	DIST.	DIR.	INTER.	WEATH. 1	COLL. SEVERITY	PRIM. COLL.	PCF VIOL	HIT AND RUN	TYPE OF COLL.	MOTOR VEHICLE INVOLVED WITH	ROAD SURF.
										FACT.	CAT.				
644	20060306	1215	PASEO DE VALENCIA	LA PLATA DR	300	S	N	A	0	A	7	N	B	C	A
064	20060827	1345	PASEO DE VALENCIA	CALLE DE LA PLATA	0		Y	A	0	A	12	N	D	C	A
720	20061206	2110	PASEO DE VALENCIA	LA PLATA DR	187	N	N	A	0	A	21	N	H	E	A
208	20070503	835	PASEO DE VALENCIA	LA PLATA	29	S	N	A	4	A	3	N	C	C	A
989	20071229	1130	PASEO DE VALENCIA	CALLE DE LA PLATA	14	S	N	A	3	A	10	N	G	B	A
715	20080303	1705	PASEO DE VALENCIA	LA PLATA DR	204	S	N	A	0	A	7	N	B	C	A
215	20080328	1600	PASEO DE VALENCIA	CALLE DE LA PLATA	18	S	N	A	3	A	7	N	C	C	A
3988307	20081014	959	PASEO DE VALENCIA	CALLE DE LA PLATA	0		Y	A	3	A	10	N	G	B	A
4080706	20090108	1340	PASEO DE VALENCIA	CALLE DE LA PLATA	0		Y	A	0	A	21	N	H	C	A
4129164	20090219	1115	PASEO DE VALENCIA	CALLE DE LA PLATA	0		Y	A	2	A	12	N	D	C	A
4173781	20090328	1040	PASEO DE VALENCIA	CALLE DE LA PLATA	181	S	N	A	4	A	3	N	C	C	A
4466956	20091103	623	CALLE DE LA PLATA	PASEO DE VALENCIA	5	E	N	A	0	D	0	N	G	B	A
4552139	20091121	1230	PASEO DE VALENCIA	CALLE DE LA PLATA	225	N	N	A	4	A	8	N	D	E	A
4539618	20091230	1200	PASEO DE VALENCIA	CALLE DE LA PLATA	0		Y	A	0	A	3	N	C	C	A
4739826	20100519	1640	PASEO DE VALENCIA	CALLE DE LA PLATA	31	N	N	A	3	A	3	N	C	C	A
4803372	20100617	1600	PASEO DE VALENCIA	CALLE DE LA PLATA	287	N	N	A	0	A	7	N	B	C	A
4895805	20100914	1530	PASEO DE VALENCIA	CALLE DE LA PLATA	197	S	N	A	0	A	7	N	C	C	A
5057628	20110122	1920	PASEO DE VALENCIA	CALLE DE LA PLATA	0		Y	A	3	A	12	N	A	C	A

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Weather 1	Collision Severity	Primary Collision Factor	PCF Violation Category	Hit and Run	Type of Collision
A - Clear	1 - Fatal	A - (Vehicle) Code Violation	01 - Driving or Bicycling Under Influence	F - Felony	A - Head-On
B - Cloudy	2 - Injury (Severe)	B - Other Improper Driving	02 - Impeding Traffic	M - Misdemeanor	B - Sideswipe
C - Raining	3 - Injury (Other Visible)	C - Other Than Driver	03 - Unsafe Speed	N - Not Hit & Run	C - Rear-End
D - Snowing	4 - Injury (Complaint of Pain)	D - Unknown	04 - Following Too Closely		D - Broadside
E - Fog	0 - PDO (Property Damage Only)	E - Fell Asleep	05 - Wrong Side of Road		E - Hit Object
F - Other		- - Not Stated	06 - Improper Passing		F - Overturned
G - Wind			07 - Unsafe Lane Change		G - Vehicle/Pedestrian
- - Not Stated			08 - Improper Turning		H - Other
			09 - Automobile ROW		- - Not Stated
			10 - Pedestrian ROW		
			11 - Pedestrian Violation	Road Surface	
			12 - Traffic Signals and Signs	A - Dry	
			13 - Hazardous Parking	B - Wet	
			14 - Lights	C - Snowy or Icy	
			15 - Brakes	D - Slippery	
			16 - Other Equipment	- - Not Stated	
			17 - Other Hazardous Violation		
			18 - Other Than Driver (or Ped)		
			19 -		
			20 -		
			21 - Unsafe Starting or Backing		
			22 - Other Improper Driving		
			23 - Pedestrian or "Other" Under the Influence		
			24 - Fell Asleep		
			00 - Unknown		
			- - Not Stated		
	Motor Vehicle Involved With:				
	A - Non-Collision				
	B - Pedestrian				
	C - Other Motor Vehicle				
	D - Motor Vehicle on Other Roadway				
	E - Parked Motor Vehicle				
	F - Train				
	G - Bicycle				
	H - Animal				
	I - Fixed Object				
	J - Other Object				
	- - Not Stated				

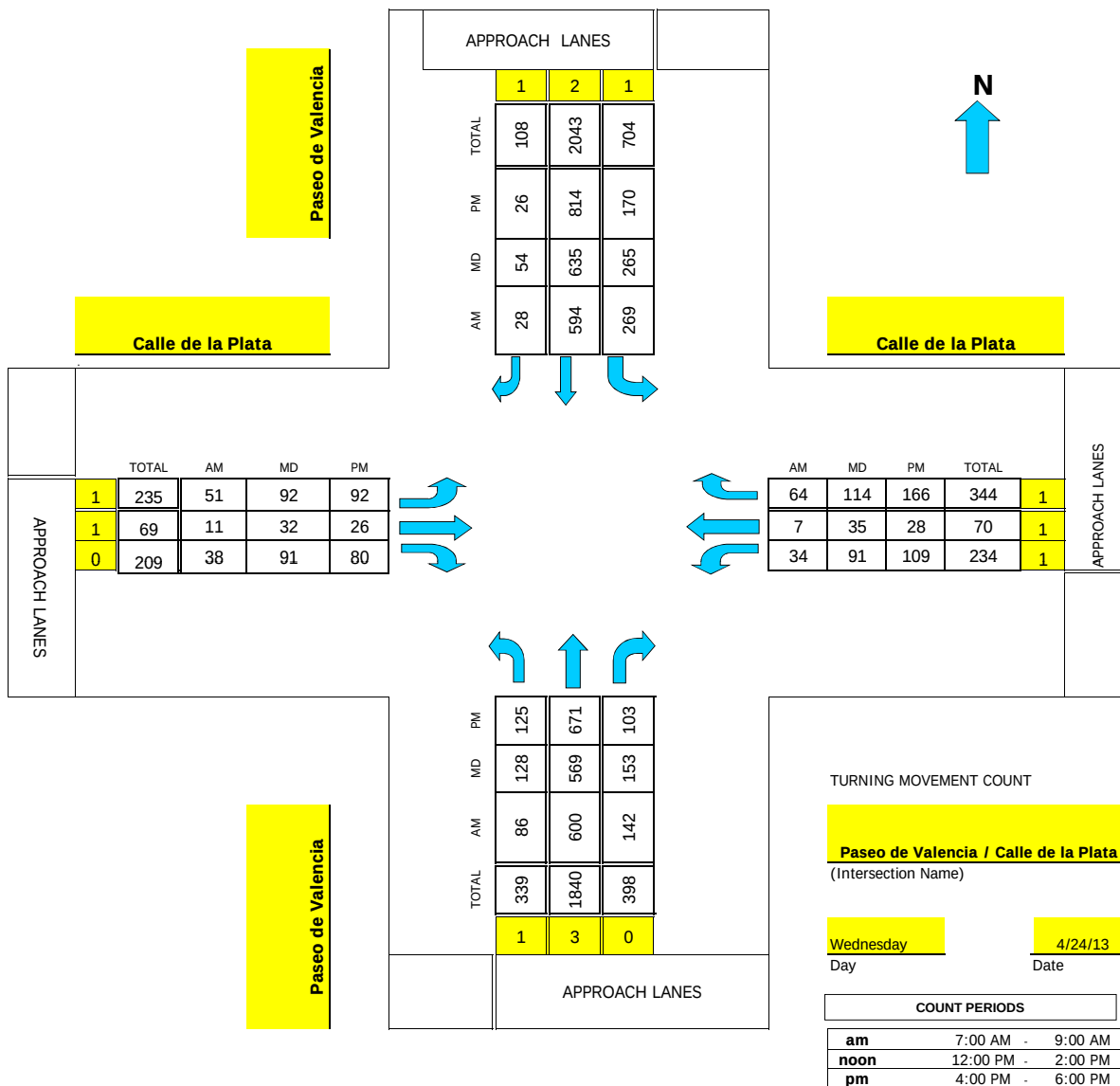
APPENDIX C

PEAK-HOUR TURNING MOVEMENT

TRAFFIC VOLUME DATA

TMC Summary of Paseo de Valencia/Calle de la Plata

Project #: 13151



AM PEAK HOUR 745 AM

NOON PEAK HOUR 100 PM

PM PEAK HOUR 415 PM

Intersection Turning Movement

Prepared by: Counts Unlimited

N-S STREET: Paseo de Valencia

DATE: 4/24/13

LOCATION: Laguna Hills

E-W STREET: Calle de la Plata

DAY: WEDNESDAY

PROJECT# 13151

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1	NT 3	NR 0	SL 1	ST 2	SR 1	EL 1	ET 1	ER 0	WL 1	WT 1	WR 1	TOTAL
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	2	94	12	25	104	3	0	1	1	3	0	7	252
7:15 AM	2	83	8	39	123	5	3	3	2	7	1	8	284
7:30 AM	6	123	17	40	135	14	8	1	3	8	2	15	372
7:45 AM	15	176	27	60	156	10	13	1	6	4	1	17	486
8:00 AM	23	151	39	60	128	4	10	5	12	9	1	14	456
8:15 AM	21	140	45	61	167	7	7	4	8	5	2	16	483
8:30 AM	27	133	31	88	143	7	21	1	12	16	3	17	499
8:45 AM	23	149	22	67	141	4	14	2	6	12	5	32	477
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 119	NT 1049	NR 201	SL 440	ST 1097	SR 54	EL 76	ET 18	ER 50	WL 64	WT 15	WR 126	TOTAL 3309

AM Peak Hr Begins at: 745 AM

PEAK VOLUMES =	86	600	142	269	594	28	51	11	38	34	7	64	1924
PEAK HR. FACTOR:	0.950			0.936			0.735			0.729			0.964

CONTROL: Signalized

Intersection Turning Movement

Prepared by: Counts Unlimited

N-S STREET: [Paseo de Valencia](#)

DATE: [4/24/13](#)

LOCATION: [Laguna Hills](#)

E-W STREET: [Calle de la Plata](#)

DAY: [WEDNESDAY](#)

PROJECT# [13151](#)

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1	NT 3	NR 0	SL 1	ST 2	SR 1	EL 1	ET 1	ER 0	WL 1	WT 1	WR 1	TOTAL
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
12:00 PM	28	153	38	57	145	9	24	6	15	17	9	32	533
12:15 PM	24	146	30	54	127	4	25	8	12	23	5	33	491
12:30 PM	25	165	26	72	142	10	25	7	12	22	8	34	548
12:45 PM	25	149	31	60	165	8	35	5	24	27	7	33	569
1:00 PM	36	145	25	59	146	12	28	10	24	23	5	26	539
1:15 PM	27	127	51	61	165	15	25	7	17	16	7	38	556
1:30 PM	33	137	31	73	170	14	27	5	30	25	13	21	579
1:45 PM	32	160	46	72	154	13	12	10	20	27	10	29	585
TOTAL VOLUMES =	NL 230	NT 1182	NR 278	SL 508	ST 1214	SR 85	EL 201	ET 58	ER 154	WL 180	WT 64	WR 246	TOTAL 4400

NOON Peak Hr Begins at: 100 PM

PEAK VOLUMES =	128	569	153	265	635	54	92	32	91	91	35	114	2259
PEAK HR. FACTOR:		0.893			0.928			0.867			0.909		0.965

CONTROL: [Signalized](#)

Intersection Turning Movement

Prepared by: Counts Unlimited

N-S STREET: [Paseo de Valencia](#)

DATE: [4/24/13](#)

LOCATION: [Laguna Hills](#)

E-W STREET: [Calle de la Plata](#)

DAY: [WEDNESDAY](#)

PROJECT# [13151](#)

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1	NT 3	NR 0	SL 1	ST 2	SR 1	EL 1	ET 1	ER 0	WL 1	WT 1	WR 1	TOTAL
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	34	175	24	50	171	7	24	5	22	22	11	46	591
4:15 PM	26	163	21	48	189	6	20	8	19	20	7	37	564
4:30 PM	34	172	24	36	216	3	20	7	13	28	7	43	603
4:45 PM	26	166	44	47	202	11	25	6	23	30	4	42	626
5:00 PM	39	170	14	39	207	6	27	5	25	31	10	44	617
5:15 PM	22	148	20	38	207	5	27	6	16	26	2	33	550
5:30 PM	19	129	11	33	227	7	24	3	21	28	8	28	538
5:45 PM	15	131	10	33	198	2	19	2	22	19	5	23	479
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL VOLUMES =	NL 215	NT 1254	NR 168	SL 324	ST 1617	SR 47	EL 186	ET 42	ER 161	WL 204	WT 54	WR 296	TOTAL 4568
--------------------	-----------	------------	-----------	-----------	------------	----------	-----------	----------	-----------	-----------	----------	-----------	---------------

PM Peak Hr Begins at: [415 PM](#)

PEAK VOLUMES =	125	671	103	170	814	26	92	26	80	109	28	166	2410
PEAK HR. FACTOR:	0.952			0.971			0.868			0.891			0.962

CONTROL: [Signalized](#)

**PEDESTRIAN & BICYCLE
TRAFFIC VOLUME DATA**

Location: City of Laguna Hills
 N/S: Paseo de Valencia
 E/W: Calle de la Plata



Date: 4/24/2013
 File : LHSPVCP

	West Leg Calle de la Plata Pedestrians	North Leg Paseo de Valencia Pedestrians	East Leg Calle de la Plata Pedestrians	South Leg Paseo de Valencia Pedestrians	TOTAL
6:00 AM	1	0	0	5	6
6:15 AM	1	0	0	4	5
6:30 AM	0	0	4	3	7
6:45 AM	0	0	0	6	6
7:00 AM	1	0	2	4	7
7:15 AM	1	0	1	7	9
7:30 AM	1	0	1	2	4
7:45 AM	1	0	1	7	9
8:00 AM	0	0	3	6	9
8:15 AM	0	0	2	2	4
8:30 AM	2	0	0	4	6
8:45 AM	4	0	6	6	16
9:00 AM	0	0	1	3	4
9:15 AM	3	0	3	8	14
9:30 AM	4	0	0	3	7
9:45 AM	0	0	0	9	9
10:00 AM	6	0	0	6	12
10:15 AM	4	0	0	11	15
10:30 AM	6	0	0	16	22
10:45 AM	0	0	1	8	9
11:00 AM	1	0	1	6	8
11:15 AM	4	0	1	8	13
11:30 AM	3	0	1	13	17
11:45 AM	1	0	0	5	6
12:00 PM	2	0	0	3	5
12:15 PM	2	0	3	4	9
12:30 PM	1	0	1	6	8
12:45 PM	2	0	1	1	4
1:00 PM	0	0	1	5	6
1:15 PM	0	0	2	0	2
1:30 PM	0	0	1	4	5
1:45 PM	3	0	1	5	9
2:00 PM	0	0	0	1	1
2:15 PM	2	0	1	8	11
2:30 PM	0	0	0	2	2
2:45 PM	0	0	5	2	7
3:00 PM	1	0	1	5	7
3:15 PM	1	0	0	3	4
3:30 PM	3	0	4	3	10
3:45 PM	1	0	0	8	9
4:00 PM	2	0	0	5	7
4:15 PM	3	0	0	12	15
4:30 PM	2	0	0	5	7
4:45 PM	0	0	2	7	9
5:00 PM	0	0	2	2	4
5:15 PM	0	0	0	3	3
5:30 PM	1	0	3	5	9
5:45 PM	0	0	0	0	0
TOTAL VOLUMES:	70	0	56	251	377

Location: City of Laguna Hills
 N/S: Paseo de Valencia
 E/W: Calle de la Plata



Date: 4/24/2013
 File : LHSPVCP

	West Leg Calle de la Plata	North Leg Paseo de Valencia	East Leg Calle de la Plata	South Leg Paseo de Valencia	TOTAL
	Bicycles	Bicycles	Bicycles	Bicycles	
6:00 AM	0	0	0	0	0
6:15 AM	0	0	0	0	0
6:30 AM	0	0	0	0	0
6:45 AM	0	0	0	0	0
7:00 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0
7:30 AM	0	0	0	1	1
7:45 AM	0	0	0	0	0
8:00 AM	0	0	0	0	0
8:15 AM	0	0	0	0	0
8:30 AM	0	0	0	0	0
8:45 AM	0	0	0	0	0
9:00 AM	0	0	0	0	0
9:15 AM	0	0	0	2	2
9:30 AM	0	0	0	1	1
9:45 AM	0	0	0	0	0
10:00 AM	0	0	0	1	1
10:15 AM	0	0	0	0	0
10:30 AM	0	0	0	0	0
10:45 AM	0	0	0	0	0
11:00 AM	0	0	0	0	0
11:15 AM	0	0	0	0	0
11:30 AM	0	0	0	1	1
11:45 AM	1	0	0	1	2
12:00 PM	0	0	0	0	0
12:15 PM	0	0	0	0	0
12:30 PM	0	0	0	1	1
12:45 PM	0	0	0	0	0
1:00 PM	0	0	0	0	0
1:15 PM	0	0	0	0	0
1:30 PM	0	0	0	0	0
1:45 PM	0	0	1	0	1
2:00 PM	0	0	0	0	0
2:15 PM	0	0	0	1	1
2:30 PM	0	0	0	0	0
2:45 PM	0	0	0	0	0
3:00 PM	0	0	0	0	0
3:15 PM	0	0	0	0	0
3:30 PM	0	0	0	0	0
3:45 PM	0	0	0	0	0
4:00 PM	0	0	0	1	1
4:15 PM	0	0	0	2	2
4:30 PM	0	0	0	1	1
4:45 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0
5:30 PM	1	0	0	0	1
5:45 PM	0	0	0	1	1
TOTAL VOLUMES:	2	0	1	14	17

APPENDIX D

LEFT-TURN DELAY DATA

Left-turn Queue Study

Location: Paseo de Valencia & Calle de la Plata
City: Laguna Hills

BOG = Vehicles counted at beginning of green
EOY = Vehicles counted at end of yellow

Day: Wednesday
Date: 4/24/2013

Cycle	Time	Northbound Left Queue				NB TOTAL	Southbound Left Queue				SB TOTAL	Eastbound Left Queue				EB TOTAL	Westbound Left Queue				WB TOTAL
		BOG	EOY	# of left turn vehicles in NB through lane			BOG	EOY	# of left turn vehicles in NB through lane			BOG	EOY	# of left turn vehicles in NB through lane			BOG	EOY	# of left turn vehicles in NB through lane		
				BOG	EOY				BOG	EOY				BOG	EOY				BOG	EOY	
1	7:00	0	0			0	3	0			3	0	0			0	0	0			0
2		0	0			0	2	0			2	0	0			0	0	0			0
3		0	0			0	1	0			1	0	0			0	0	0			0
4		0	0			0	4	0			4	0	0			0	0	0			0
5		1	0			1	1	0			1	0	0			0	1	0			1
6		0	0			0	4	0			4	0	0			0	0	0			0
7		0	0			0	1	0			1	0	0			0	0	0			0
8		1	0			1	2	0			2	0	0			0	1	0			1
9		0	0			0	1	0			1	0	0			0	0	0			0
10		0	0			0	1	0			1	0	0			0	0	0			0
11		0	0			0	1	0			1	0	0			0	0	0			0
12		0	0			0	2	0			2	0	0			0	0	0			0
13		0	0			0	2	0			2	0	0			0	1	0			1
14	7:15	0	0			0	3	0			3	0	0			0	1	0			1
15		1	0			1	2	0			2	1	0			1	0	0			0
16		0	0			0	2	0			2	0	0			0	1	0			1
17		0	0			0	1	0			1	0	0			0	0	0			0
18		0	0			0	1	0			1	2	0			2	0	0			0
19		0	0			0	5	0			5	0	0			0	0	0			0
20		0	0			0	4	0			4	0	0			0	0	0			0
21		0	0			0	3	0			3	0	0			0	0	0			0
22		0	0			0	5	0			5	0	0			0	1	0			1
23		0	0			0	2	0			2	0	0			0	0	0			0
24		0	0			0	4	0			4	0	0			0	0	0			0
25	7:30	1	0			1	6	0			6	0	0			0	1	0			1
26		0	0			0	5	1			6	0	0			0	0	0			0
27		0	0			0	1	0			1	0	0			0	0	0			0
28		0	0			0	5	0			5	1	0			1	3	0			3
29		0	0			0	6	1			7	0	0			0	0	0			0
30		1	0			1	4	0			4	0	0			0	1	0			1
31		0	0			0	3	0			3	0	0			0	1	0			1
32		2	0			2	2	0			2	0	0			0	0	0			0
33		0	0			0	3	0			3	0	0			0	0	0			0
34		1	0			1	3	0			3	0	0			0	0	0			0
35		1	0			1	3	0			3	3	0			3	1	0			1
36		0	0			0	1	0			1	0	0			0	0	0			0
37	7:45	0	0			0	4	0			4	0	0			0	2	0			2
38		0	0			0	11	3			14	1	0			1	0	0			0
39		0	0			0	5	0			5	0	0			0	0	0			0
40		2	0			2	5	0			5	0	0			0	0	0			0
41		2	0			2	8	1			9	0	0			0	0	0			0
42		0	0			0	4	0			4	0	0			0	0	0			0
43		0	0			0	11	2			13	1	0			1	3	0			3
44		2	0			2	3	0			3	0	0			0	0	0			0
45		4	0			4	2	0			2	5	0			5	0	0			0
46		2	0			2	8	0			8	1	0			1	0	0			0
47	8:00	3	0			3	9	4			13	1	0			1	0	0			0
48		0	0			0	12	5			17	0	0			0	0	0			0
49		1	0			1	7	0			7	0	0			0	3	0			3
50		2	0			2	3	0			3	0	0			0	0	0			0
51		3	0			3	2	0			2	0	0			0	0	0			0
52		4	0			4	1	0			1	2	0			2	3	0			3
53		0	0			0	7	0			7	1	0			1	0	0			0
54		5	0			5	8	0			8	2	0			2	1	0			1
55		0	0			0	5	0			5	0	0			0	0	0			0
56		3	0			3	2	0			2	0	0			0	0	0			0
57		0	0			0	2	0			2	1	0			1	0	0			0
58	8:15	5	0			5	7	0			7	2	0			2	0	0			0
59		2	0			2	8	0			8	2	0			2	1	0			1

5/15/2013 ITEM NO. 4.2

Left-turn Queue Study

Location: Paseo de Valencia & Calle de la Plata
City: Laguna Hills

BOG = Vehicles counted at beginning of green
EOY = Vehicles counted at end of yellow

Day: Wednesday
Date: 4/24/2013

Cycle	Time	Northbound Left Queue				NB TOTAL	Southbound Left Queue				SB TOTAL	Eastbound Left Queue				EB TOTAL	Westbound Left Queue				WB TOTAL
		BOG	EOY	# of left turn vehicles in NB through lane			BOG	EOY	# of left turn vehicles in NB through lane			BOG	EOY	# of left turn vehicles in NB through lane			BOG	EOY	# of left turn vehicles in NB through lane		
				BOG	EOY				BOG	EOY				BOG	EOY				BOG	EOY	
60		0	0			0	11	4			15	0	0			0	0	0			0
61		3	0			3	9	4			13	4	0			4	0	0			0
62		0	0			0	5	0			5	0	0			0	0	0			0
63		0	0			0	4	0			4	1	0			1	1	0			1
64		0	0			0	3	0			3	0	0			0	0	0			0
65		4	0			4	10	2			12	1	0			1	1	0			1
66		0	0			0	4	0			4	0	0			0	0	0			0
67		4	0			4	6	0			6	0	0			0	0	0			0
68		3	0			3	7	2			9	1	0			1	2	0			2
69		4	0			4	5	0			5	0	0			0	0	0			0
70	8:30	1	0			1	11	0			11	3	0			3	0	0			0
71		2	0			2	2	0			2	2	0			2	2	0			2
72		2	0			2	9	0			9	1	0			1	1	0			1
73		0	0			0	4	0			4	1	0			1	3	0			3
74		2	0			2	12	3			15	0	0			0	3	0			3
75		9	0			9	6	0			6	2	0			2	1	0			1
76		0	0			0	9	1			10	0	0			0	0	0			0
77		0	0			0	2	1			3	0	0			0	3	0			3
78		6	0			6	11	0			11	1	0			1	1	0			1
79		0	0			0	3	0			3	0	0			0	0	0			0
80		0	0			0	4	0			4	0	0			0	0	0			0
81		1	0			1	1	0			1	0	0			0	0	0			0
82		1	0			1	7	1			8	2	0			2	1	0			1
83	8:45	5	0			5	0	0			0	6	0			6	1	0			1
84		1	0			1	2	0			2	1	0			1	1	0			1
85		0	0			0	6	0			6	0	0			0	1	0			1
86		1	0			1	10	0			10	1	0			1	1	0			1
87		2	0			2	3	0			3	1	0			1	0	0			0
88		1	0			1	8	0			8	1	0			1	0	0			0
89		1	0			1	4	0			4	1	0			1	2	0			2
90		5	0			5	0	0			0	1	0			1	2	0			2
91		2	0			2	7	0			7	2	0			2	0	0			0
92		2	0			2	5	0			5	3	0			3	1	0			1
93		0	0			0	2	0			2	1	0			1	0	0			0
94		1	0			1	2	0			2	0	0			0	0	0			0
95		1	0			1	3	0			3	0	0			0	0	0			0
96		0	0			0	2	0			2	1	0			1	0	0			0

Left-turn Queue Study

Location: Paseo de Valencia & Calle de la Plata
City: Laguna Hills

BOG = Vehicles counted at beginning of green
EOY = Vehicles counted at end of yellow

Day: Wednesday
Date: 4/24/2013

Cycle	Time	Northbound Left Queue				NB TOTAL	Southbound Left Queue				SB TOTAL	Eastbound Left Queue				EB TOTAL	Westbound Left Queue				WB TOTAL
		BOG	EOY	# of left turn vehicles in NB through lane			BOG	EOY	# of left turn vehicles in NB through lane			BOG	EOY	# of left turn vehicles in NB through lane			BOG	EOY	# of left turn vehicles in NB through lane		
		BOG	EOY	BOG	EOY		BOG	EOY	BOG	EOY		BOG	EOY	BOG	EOY		BOG	EOY	BOG	EOY	
1	16:00	4	0			4	10	2			12	4	0			4	4	0			4
2		8	1			9	6	0			6	4	0			4	3	0			3
3		5	0			5	4	0			4	4	0			4	1	0			1
4		5	0			5	9	1			10	4	0			4	2	0			2
5		3	0			3	7	0			7	5	0			5	3	1			4
6		7	1			8	9	1			10	0	0			0	5	0			5
7		4	0			4	9	3			12	3	0			3	3	1			4
8	16:15	5	1			6	9	1			10	4	0			4	2	0			2
9		5	1			6	6	0			6	3	0			3	0	0			0
10		5	0			5	8	0			8	0	0			0	5	0			5
11		6	0			6	6	0			6	4	0			4	0	0			0
12		0	0			0	10	1			11	1	0			1	0	0			0
13		1	0			1	5	0			5	0	0			0	2	0			2
14		3	0			3	5	0			5	1	0			1	2	0			2
15	16:30	5	0			5	4	0			4	3	0			3	4	0			4
16		5	0			5	7	0			7	4	0			4	3	0			3
17		2	0			2	4	0			4	1	0			1	3	0			3
18		7	0			7	3	0			3	5	0			5	3	0			3
19		3	0			3	5	0			5	2	0			2	5	0			5
20		6	0			6	5	0			5	1	0			1	4	0			4
21		8	2			10	3	0			3	2	0			2	4	0			4
22	16:45	5	0			5	5	0			5	4	0			4	2	0			2
23		8	1			9	9	3			12	4	0			4	4	0			4
24		5	0			5	14	4			18	5	0			5	2	0			2
25		4	0			4	7	0			7	1	0			1	6	0			6
26		1	0			1	4	0			4	5	0			5	4	0			4
27		3	0			3	5	0			5	1	0			1	1	0			1
28	17:00	4	0			4	11	2			13	3	0			3	7	0			7
29		7	0			7	11	5			16	2	0			2	2	0			2
30		3	0			3	10	3			13	4	0			4	4	0			4
31		7	1			8	9	1			10	2	0			2	3	0			3
32		3	0			3	4	0			4	3	0			3	4	0			4
33		9	2			11	2	0			2	8	0			8	5	0			5
34		8	2			10	4	0			4	3	0			3	3	0			3
35	17:15	5	0			5	4	0			4	5	0			5	3	0			3
36		2	0			2	5	0			5	6	0			6	3	0			3
37		3	0			3	7	0			7	3	0			3	2	0			2
38		7	1			8	4	0			4	6	0			6	4	0			4
39		2	0			2	7	1			8	2	0			2	3	0			3
40		0	0			0	3	0			3	2	0			2	2	0			2
41		3	0			3	3	0			3	0	0			0	1	0			1
42		5	1			6	3	0			3	1	0			1	4	0			4
43	17:30	2	0			2	6	0			6	5	0			5	2	0			2
44		4	0			4	4	0			4	2	0			2	7	0			7
45		3	0			3	5	0			5	2	1			3	6	0			6
46		3	0			3	4	0			4	7	0			7	1	0			1
47		5	0			5	2	0			2	1	0			1	2	0			2
48		1	0			1	4	0			4	1	0			1	4	0			4
49		2	0			2	2	0			2	2	0			2	4	0			4
50	17:45	0	0			0	3	0			3	2	0			2	5	0			5
51		2	0			2	5	0			5	4	0			4	1	0			1
52		6	1			7	5	0			5	7	0			7	3	0			3
53		3	0			3	5	0			5	2	0			2	2	0			2
54		2	0			2	4	0			4	2	0			2	1	0			1
55		1	0			1	5	0			5	1	0			1	2	0			2
56						0	5	0			5					0	2	0			2

5/15/2013 ITEM NO. 4.2

**CITY OF LAGUNA HILLS
TRAFFIC COMMISSION
AGENDA REPORT
TRAFFIC ENGINEER DEPARTMENT**

ISSUE: EQUESTRIAN TRAIL CROSSING SAFETY ENHANCEMENTS

SUMMARY:

Upon receiving comments from concerned citizens regarding equestrian trail crossing safety throughout the Nellie Gail Ranch community, the City Council, at its October 9, 2012 meeting, approved the establishment of a staff directed Equestrian Ad Hoc Committee (Committee) to prioritize and evaluate equestrian trail crossings. Since then, staff has coordinated multiple meetings with the Committee and eight crossings have been identified and evaluated. It is recommended the Traffic Commission recommend to the City Council enhancements to the equestrian trail crossings as recommended by staff and described in this report.

BACKGROUND:

The City Council, at its October 9, 2012 meeting, approved the establishment of a staff directed Committee to review equestrian trail crossing safety in and around the Nellie Gail Ranch community. The City Council also authorized up to two locations to be identified for installation of “flashing beacon” safety lights. Since the establishment of this Committee, six meetings, including two field meetings, have been held. The Committee identified and selected eight equestrian trail crossing locations for evaluation. Each location was field reviewed and evaluated for safety by City staff and the City’s Consulting Traffic Engineering Firm of Hartzog & Crabill, Inc. Staff considered comments from the Committee and reviewed roadway geometrics, accident history, traffic volume, etc. An analysis of each trail crossing location with recommendations from the Committee and the staff analysis are as follows:

1. Nellie Gail Road 500’ south of Oso Parkway

Committee Recommendations

The Committee has requested the following: rough, scored concrete for the crossing surface; striped left-turn lane into the Equestrian Center; advanced active warning LED signage activated by equestrians; re-stripe faded yield lines; maintenance of raised pavement markers; and planting of hedges by the Nellie Gail Ranch Owner’s Association (HOA) adjacent to the Equestrian Center to reduce driver distraction.

Staff Analysis

The City previously installed the “Equestrian Standard Sign Package” at this location. An alternate route sending equestrians through an underground tunnel located adjacent to Oso Parkway, rather than crossing at the current location, was recommended to the Committee but was not supported by the HOA due to funding limitations.

Installation of rough, scored concrete at this crossing would cost approximately \$15,000. Due to the installation costs, future maintenance challenges, and uncertain liability resulting from the texture, this feature is not recommended for installation at any of the crossings. For further detail on the cost estimate please see Attachment A.

In order to improve this crossing, the following is recommended by staff:

- Maintenance of raised pavement markers - some of the markers have been lost and need replaced.
- LED flashing warning signage at crossing facing both directions - see Attachment A for products and cost.
- Addition of an "Ahead" to the advanced equestrian sign.
- Left-turn striping into Equestrian Center from southbound Nellie Gail Road. Please see Attachment B for a site exhibit.

2. Nellie Gail Road at Gallup Circle

Committee Recommendations

The Committee has requested the following: A three-way stop sign intersection; relocation of the trail crossing to the intersection; rough, scored concrete for the crossing; and a full sign package with "children and park" signage.

Staff Analysis

The City's Consulting Traffic Engineers of Hartzog & Crabill, Inc. performed a multi-way stop sign analysis at Nellie Gail Road and Gallup Circle. In accordance with the requirements of the California Manual of Uniform Traffic Control Devices (CA MUTCD), the stop sign analysis included a review of accident history, traffic speeds, traffic and pedestrian volumes, and sight visibility. Please see Attachment C for a detailed report. Based on the report, a three-way stop sign is recommended in order to provide improved sight distance for equestrians and pedestrians crossing Nellie Gail Road at Gallup Circle. In order to utilize the intersection for equestrian crossing, the HOA will need to re-grade the private trail alignment to cross at the appropriate location. Please see Attachment D for a site exhibit. Staff is recommending the following:

- Installation of a stop control on eastbound and westbound Nellie Gail Road at Gallup Circle.
- Installation of a marked crosswalk on the west leg of Nellie Gail Road at Gallup Circle.
- Access ramp modification on the north-west corner of Nellie Gail Road at Gallup Circle.
- Removal of horse crossing striping and equestrian signage.
- Addition of a "Stop Sign Ahead" warning sign on eastbound Nellie Gail Road approaching Gallup Circle.
- Install full sign package at the crossing on Gallup Circle 375' north of Nellie Gail

Road, See Attachment G.

- The requested “children and park” signage is not supported by the CA MUTCD.

3. Nellie Gail Road at Oso Parkway

Committee Recommendations

Rough, scored concrete within the crossing; pedestrian timers with longer times for equestrian riders; and community welcome signage on both sides of Oso Parkway approaching Nellie Gail Road.

Staff Analysis

This crossing is at a controlled intersection. Staff has directed the Committee to submit private signage requests to the City’s Planning Department. In order to improve this crossing, the following is recommended by staff:

- Installation of a pedestrian countdown timer at both legs of the crosswalk. See Attachment A for products and cost.

4. Nellie Gail Road 200’ north of Lost Colt Drive

Committee Recommendations

Rough, scored concrete within the crossing; trail identification on both sides with wood chips; full sign package; advanced LED signage; and modification of the private walkway of 24761 Nellie Gail Road to allow equestrian use of the trail.

Staff Analysis

The City Council, at its October 9, 2012 meeting, approved the installation of the sign package at this location. The sign package was installed in November 2012. Vehicular speeds are currently being monitored by regular placement of the radar speed trailer. The HOA is responsible for discussions with the private homeowner regarding private construction of a walkway on the equestrian easement on the west side of Nellie Gail Road. According to the Committee, the homeowner is working with the HOA to allow safe equestrian passage over the private driveway. Staff is recommending the following to improve this crossing:

- LED flashing warning signage at the crossing facing both directions - see Attachment A for products and cost.
- Add “Ahead” to the advanced equestrian sign.

5. Knuckle corner of Greenfield Drive at Hidden Trail Road

Committee Recommendations

Rough, scored concrete within the crossing; full sign package; and future advanced active LED warning signage activated by horse and pedestrian buttons.

Staff Analysis

The City has previously reviewed this location. A portion of the sign package has been installed at this crossing location. Staff is recommending:

- Installation of yield lines and complete installations of the Equestrian Sign Package.

6. Hidden Trail Road 170' north of Stageline Drive

Committee Recommendations

Rough, scored concrete at the crossing; yield lines on the east side of Hidden Trail Road; full sign package; future advanced active warning LED signage activated by the rider; additional police enforcement; parking restrictions adjacent to the trail on both sides of Hidden Trail Road; relocation of advanced trail warning sign closer to the crossing; and tree trimming.

Staff Analysis

The City has reviewed this location in the past. Previously, a portion of the sign package was installed at this crossing location. Yield lines were removed in front of 27212 Hidden Trail Road due to the objections of the homeowner to the pavement markings. Staff is recommending the following:

- Add parking restrictions on the west side of Hidden Trail Road from the trail opening to 100' northerly and on the east side of Hidden Trail Road from the trail opening to 25' northerly. Please see Attachment E.
- Relocate the Advanced Equestrian Warning sign along eastbound Hidden Trail Road closer to the trail crossing.
- Utilize traffic speed enforcement as resources are available.

7. Nellie Gail Road between Dapple Grey and Houston Trail

Committee Recommendations

The Committee has requested the following: rough, scored concrete within the crossing; full sign package; creation of a trail segment on the east side of Nellie Gail Road from Houston Trail to 125' southerly; future advanced LED signage; raising the bottom of the street name sign 2' to avoid contact with equestrians; and modification of the speed limit on Nellie Gail Road from Oso Parkway to Houston Trail from 30 mph to 25 mph.

Staff Analysis

The City has previously reviewed this location and installed a portion of the sign package at this crossing location. The trail system at this location does not have direct connectivity. In order to create better connectivity, the Committee has requested the trail be extended along the south side of Nellie Gail Road, per Attachment F. There currently exists 10' of public right-of-way from the curb face (8' from back of curb) along the east and west side of Nellie Gail Road at this location. A meandering 4' sidewalk also exists at

this location. It is not feasible to create a trail on the remaining 4'. See Attachment F for a site exhibit.

The request to change the speed limit on Nellie Gail Road from Oso Parkway to Houston Trail from 30 mph to 25 mph is subject to further review. The City will be performing a city-wide speed survey in late 2013, and the location of the equestrian trail crossing will be taken into account while performing the engineering analysis in determining the speed limit in accordance with the California Vehicle Code (CVC) and the CA MUTCD.

Staff also reviewed the option of raising signage 2 feet. As the street name signage height and placement is standard per the CA MUTCD, Staff is not recommending this change. Moreover, the signage is not located in the equestrian easement.

Staff is recommending the following at this location:

- Installation of yield lines to complete the "Equestrian Sign Package."

8. Nottingham Court 200' south of Oso Parkway

Committee Recommendations

The Committee has requested the following: rough, scored concrete within the crossing; full sign package; and future LED advanced warning signage.

Staff Analysis

The City has reviewed this location twice and the City Council directed the installation of the full sign package at this location at its October 9, 2012 meeting. The City places the radar speed trailer at this location on a regular basis to monitor traffic speeds.

To improve sight distance at this equestrian trail crossing location, staff has previously recommended re-routing the trail to cross to the Oso Parkway/Nottingham Court intersection. However, the Committee has suggested that crossing the Oso Parkway intersection would create a potential conflict with east bound Oso Parkway traffic turning right onto Nottingham Court. No further changes are recommended.

FISCAL IMPACT:

The cost of the improvements as recommended by staff and listed under staff analysis is approximately \$27,700:

- | | |
|--|---------|
| • Location 1 – Maintenance of the raised pavement markers | \$1,000 |
| • Location 1 – Flashing LED signage (2) | \$7,400 |
| • Location 1 – Installation of "Ahead" sign (2) | \$300 |
| • Location 1 – Installation of left-turn striping | \$2,000 |
| • Location 2 – Mutli-way stop sign controls | \$3,500 |
| • Location 2 – Removal and replacement of ex. signage/striping | \$1,500 |

• Location 2 – Sign Package installation on Gallup Circle	\$1,000
• Location 3 - Pedestrian Countdown Timer Head (2)	\$800
• Location 4 – Flashing LED signage (2)	\$7,400
• Location 4 - Installation of “Ahead” sign (2)	\$300
• Location 5 - Installation of yield lines	\$500
• Location 6 - Addition and relocation of signage	\$1,500
• Location 7 - Installation of yield lines	\$500

Funds are available for this work in the Fiscal Year 2013-2014 Public Works Maintenance Budget.

RECOMMENDATION: THAT THE TRAFFIC COMMISSION RECOMMEND TO THE CITY COUNCIL SAFETY ENHANCEMENTS RECOMMENDED BY STAFF AS DESCRIBED IN THIS REPORT.

ATTACHMENTS:

- Attachment A, Traffic Control Devices Estimated Costs Table
- Attachment B, Nellie Gail Road at the Equestrian Center Exhibit
- Attachment C, Hartzog & Crabill, Inc. Stop Sign Analysis report dated May 3, 2013
- Attachment D, Nellie Gail Road at Gallup Circle Exhibit
- Attachment E, Hidden Trail Road Crossing Proposed No Parking Exhibit
- Attachment F, Nellie Gail Road between Dapple Grey Drive and Houston Trail Exhibit
- Attachment G, Gallup Circle north of Nellie Gail Road crossing Exhibit

ATTACHMENT A

ESTIMATED COSTS OF EQUESTRIAN RELATED TRAFFIC CONTROL DEVICES:

	TRAFFIC CONTROL DEVICE	COMPANY	PRODUCT COST \$	INSTALLATION COST \$	TOTAL COST \$
1	Smart Crosswalk	Lightguard Systems, Inc.	\$15,865	\$7,900	\$23,765
2	Active Warning Signage System with 4 blinking signs (No wireless technology – extra cost for hard wire)	Lightguard Systems, Inc.	\$9,785	\$4,900	\$14,685
3	Blinker Sign System with 4 blinking signs (wireless)	Tapco	\$8,175	\$3,000	\$11,175
4	Blinker Sign System with 2 advanced blinking signs	Tapco	\$6,770	\$2,000	\$8,770
5	Rectangular Rapid Flashing Beacon (RRFB) 4 - with 30" equestrian signs	Nextech	\$6,175	\$2,000	\$8,175
6	LED Perimeter signs – 2 at crossing	Nextech	\$5,400	\$2,000	\$7,400
7	Rough Scored concrete for crossing (~\$25/sf)	-			\$15,000
8	Countdown Pedestrian Heads	!	\$275	\$125	\$400

PRODUCT EXAMPLES:



1.



2.



3/4.



5.



6.



7.



8.

ATTACHMENT B

NELLIE GAIL ROAD AT THE EQUESTRIAN CENTER EXHIBIT



ATTACHMENT C



Trammell Hartzog, President
Jerry Crabill, P.E. (Retired)
Gerald J. Stock, P.E., Executive
Vice-President

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May 3, 2013

Mr. Kenneth H. Rosenfield, P.E.
Director of Public Services
City of Laguna Hills
24035 El Toro Road
Laguna Hills, CA 92653

**Subject: Stop Sign Analysis at the Intersection of
Nellie Gail Road and Gallup Circle**

Dear Mr. Rosenfield:

Hartzog & Crabill, Inc. (HCI) has completed a Multi-Way Stop Sign Warrant Analysis for the subject intersection. As you will see in the attached report, our recommendation is for the installation of a three-way stop sign installation at this intersection.

The analysis was completed in response to the City's request to verify if a multi-way stop sign installation is warranted, and recommended based on meeting standard guidelines. At the present time, the intersection has a one-way STOP sign sign control on the Gallup Circle approach to the intersection. The California Manual of Uniform Traffic Control Devices (*California MUTCD*) was used for defining the requirements for a multi-way stop sign installation.

In overall consideration of the existing conditions at the intersection, a three-way stop sign installation is recommended in order to provide improved sight distance for equestrians and pedestrians crossing Nellie Gail Road. In conjunction, it is also recommended to install a marked crosswalk on the west leg of Nellie Gail Road.

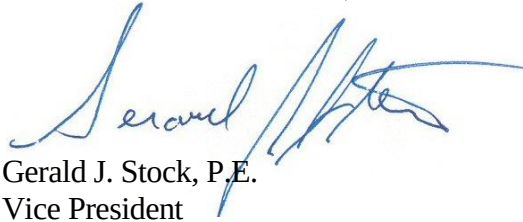
Lastly, it is recommended to post signs at the equestrian crossing across Nellie Gail Road, located 50 feet west of Gallup Circle, to lead any pedestrians, bicyclists, and equestrians to use the newly marked crosswalk at the stop-controlled intersection.

If approved, the cost to convert the one-way stop to a three-way stop sign installation, including design, administration, and construction, is estimated at \$3,500.00.

Mr. Kenneth H. Rosenfield, P.E.
May 3, 2013
Page 2

It has been our pleasure to prepare this analysis for the City of Laguna Hills. If you have any questions or need more information please call (714) 731-9455.

Very truly yours,
HARTZOG & CRABILL, INC.

A handwritten signature in blue ink, appearing to read "Gerald J. Stock", with a stylized flourish extending to the right.

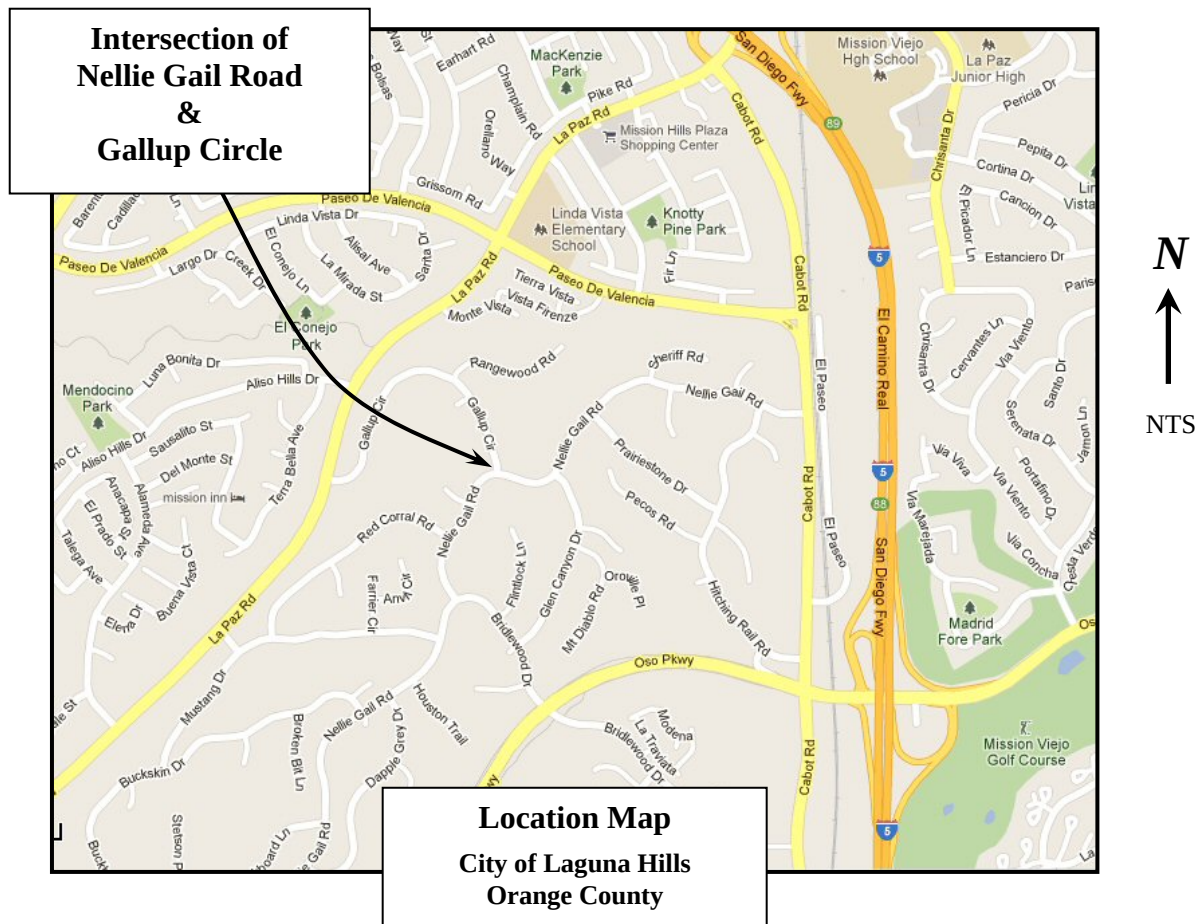
Gerald J. Stock, P.E.
Vice President
City & Traffic Engineering Services

Attach: Stop Sign Analysis Report

MULTI-WAY STOP CONTROL WARRANTS ANALYSIS NELLIE GAIL ROAD AT GALLUP CIRCLE IN THE CITY OF LAGUNA HILLS, CA

INTRODUCTION

The City of Laguna Hills requested Hartzog & Crabill, Inc. (HCI) to complete a Multi-way Stop Warrants Analysis at the intersection of Nellie Gail Road and Gallup Circle. This analysis was completed in order to verify if a three-way stop sign installation is warranted and recommended based on meeting standard guidelines. The location is a T-intersection with Nellie Gail Road running in the east-west directions and Gallup Circle running north-south (north of Nellie Gail Road). The intersection is located west of the Interstate 5 Freeway, between Paseo de Valencia and Oso Parkway (see *Location Map below*). The intersection is entirely within the City of Laguna Hills' jurisdiction. Presently, there is one STOP sign posted for controlling the Gallup Circle approach to the intersection.



BACKGROUND

Nellie Gail Road is a 40-foot wide, curvy, east-west local collector roadway with primarily residential frontage on both sides of the street. The two-lane roadway provides for one lane of traffic in each direction, which are separated by a painted double-yellow centerline stripe. The roadway is fully-improved with concrete rolled curb and gutter on both sides, and sidewalk on the south-side only. Nellie Gail Road has a posted speed limit of 25 miles per hour (MPH). On-street parking is allowed on both sides of the roadway. Gallup Park is located at the northwest corner of the intersection with Gallup Circle and has surrounding equestrian paths. Currently, there is a HORSE XING across Nellie Gail Road with applicable warning signs posted on both sides of the roadway approximately 50 feet west of Gallup Circle. There is no regulatory signage controlling traffic on Nellie Gail Road (uncontrolled) at its intersection with Gallup Circle.

See Exhibit 1 (next page) for photo images of Nellie Gail Road.

Gallup Circle is a 40-foot wide, curved, north-south local roadway with residential frontage on both sides. Gallup Circle has a southerly terminus at its intersection with Nellie Gail Road. The two-lane roadway provides for one lane of traffic in each direction, which are not separated by any striping. The roadway is fully-improved with concrete rolled curb and gutter on both sides, and sidewalk on the west-side only. Gallup Circle also has a concrete cross-gutter at its intersection with Nellie Gail Road. Gallup Circle has a posted speed limit of 25 MPH. On-street parking is allowed on both sides of the roadway. Currently, there is a posted STOP sign, along with a white STOP marking and limit line on Gallup Circle at its intersection with Nellie Gail Road.

See Exhibit 2 (following page) for a photo image of Gallup Circle.

See Exhibits 2 and 3 (following pages) for photo images of the Horse Xing located approximately 50 feet west of the intersection.

EXHIBIT 1



EXHIBIT 2



EXHIBIT 3



LOOKING AT NORTH-SIDE HORSE XING IN/OUT OF GALLUP PARK



LOOKING AT HORSE XING PATH ON SOUTH-SIDE OF NELLIE GAIL ROAD

WARRANT GUIDELINES

As is common practice with many municipal agencies, the City of Laguna Hills follows State guidelines for determining if traffic control devices, such as multi-way stop signs, should be installed. Therefore, the prevailing source used for this analysis is the State of California Manual of Uniform Traffic Control Devices (*California MUTCD*). The California MUTCD contains minimum guidelines regarding traffic volumes, collisions, speeds, visibility, and other criteria in order to satisfy the requirements, in this case, for the recommendation and installation of a two-way or multi-way stop.

The California MUTCD Multi-way Stop Applications Guidance criteria are described in the following four main parts:

- 1) As an interim measure where traffic control signals are justified;
- 2) Reported crashes – five or more in a 12-month period that are susceptible to correction by a multi-way stop installation;
- 3) Minimum traffic and pedestrian volumes, speeds, and delay; and,
- 4) Where a combination of the above criteria are all satisfied to 80 percent.

If any one, or a combination, of these criteria is met, then a multi-way stop application should be considered. If these criteria are not met, the installation of an unwarranted stop sign installation is typically not recommended as it may place the City in a position of potential liability.

The California MUTCD guidelines describing Right-of-Way at Intersections, STOP Sign Applications, Multi-way Stop Applications, and Yield Sign Applications are included in Appendix A.

MULTI-WAY STOP ANALYSIS

The California MUTCD Multi-way Stop Applications section contains guidelines, such as minimum collisions and traffic volumes necessary for the justification of multi-way stop control. The general guidelines given for a stop sign application begin with using engineering judgment for the installation of a stop sign(s) on a street entering a through highway and where high speeds on the cross street make entry difficult, or due to restricted view, or when crash records indicate a need for control by a stop sign.

Further guidance criteria found in the California MUTCD include the following important statements: ***“YIELD or STOP signs should not be used for speed control... In most cases, the street carrying the lowest volume of traffic should be controlled... A YIELD or STOP sign should not be installed on the higher volume roadway unless justified by an engineering study... Multi-way stop control is used where the volume of traffic on the intersecting roads is approximately equal.”***

Collision History

The guidelines for Multi-way Stop Applications contained in the California MUTCD regarding collisions, or crashes, require a minimum of five (5) reported crashes occurring in a 12-month period that are susceptible to correction by a multi-way stop installation in order to satisfy the collision warrant. Such crashes include right- and left-turn collisions, as well as right-angle collisions (i.e., broadside, or head-on). The available accident history for the intersection was gathered from the California Highway Patrol (CHP) Statewide Integrated Traffic Records System (SWITRS). A comprehensive 5-year traffic collision history summary report was prepared for this intersection and reviewed for collisions susceptible to correction by the installation of a multi-way stop. Table 1 (*next page*) provides the most recent summary of collision history occurring at or near this intersection.

All traffic collision data collected for this intersection is included in Appendix B.

Collision History (continued)

**TABLE 1
COLLISION SUMMARY**

Intersection	2006-08		2009		2010		2011	
	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?
Nellie Gail Road at Gallup Circle	01/18/07	Hit Object / No	01/21	Rear-End / No		None Reported		None Reported
	04/06/07	Hit Object / No						
	04/15/08	Sideswipe / No						

Notes: Information above is derived per a 5-year intersection traffic collision database report provided by the CHP SWITRS.

- 1) Type of Coll. = Type of Collision (*i.e., broadside, rear-end, etc.*)
- 2) Correctible? = Yes / No

As shown, there have been (4) reported collisions near the intersection during the past (5) years, with (0) considered correctible. It should be mentioned, all four collisions did not occur at the intersection but at a certain distance from the intersection. Since the collision warrant requires a minimum of (5) reported crashes, susceptible to correction by a multi-way stop, to occur within a 12-month period, the collision warrant is not satisfied.

Traffic Volumes

HCI collected 12-hour (6am–6pm) vehicular approach turning movement counts on Friday, March 22, 2013, and also 2-hour (9am–11am) vehicular counts on Saturday, March 30, 2013, at the City’s request, in order to account for equestrians, bicyclists, and pedestrians that typically use this intersection. The 12-hour traffic count for Nellie Gail Road is 770 vehicles with the highest AM peak-hour volume of 88 vehicles and the highest PM peak-hour volume of 104 vehicles. The 12-hour traffic count for Gallup Circle is 310 vehicles per day with the highest AM peak-hour volume of 31 vehicles and the highest PM peak-hour volume of 46 vehicles. Table 2 below provides a breakdown of the approach volumes.

All traffic volume data collected for this intersection is included in Appendix C.

Traffic Volumes (continued)

TABLE 2
FRIDAY, MARCH 22, 2013
12-HOUR (6AM – 6PM)
VEHICULAR TRAFFIC COUNT DATA

Street	Direction	12-Hour Volume	Directional Split	Highest Hourly Volume
Nellie Gail Road	Eastbound	398	52%	52 (3:15–4:15PM)
	Westbound	372	48%	59 (3:15–4:15PM)
Gallup Circle				
	Southbound	310	100%	52 (2:30–3:30PM)

Nellie Gail Road is considered the ‘through’ or ‘major’ street due intersection geometry, being the uncontrolled ‘top’ of the T-intersection, roadway traffic volumes. Moreover, Gallup Circle has a cross-gutter requiring southbound traffic to slow or stop at the intersection before proceeding left or right. It can be expected that the traffic volumes on the minor street are considerably less than those on the major street. As can be seen from the table above, this is the case, as Nellie Gail Road carries approximately (71%) of the entire traffic entering the intersection.

A part of the California MUTCD guideline criteria also calls for a reduction in the required minimum volumes when the critical approach speed (*or 85th-percentile speed*) on the major street exceeds 40 MPH. If this is the case, the minimum vehicular volumes to be met for a multiway stop installation are reduced to 70%.

As both roadways have either a posted residential speed limit of 25 MPH, the 70% minimum volumes for a multi-way stop sign analysis are not applicable.

Traffic Volumes (continued)

It is important to note that the hourly vehicle traffic counts shown in Table 2 above are given for the highest hour of traffic for each direction, and serve as a good indicator to compare with the required minimum hourly traffic volumes in the California MUTCD multi-way stop guidelines. However, it should also be mentioned that the average hourly minimum volumes for a multi-way stop application are to be satisfied for any eight (8) hours of an average day.

Table 3 below shows the California MUTCD minimum traffic volume guidelines for a Multi-way Stop Application in comparison with the highest 8-hour traffic count data at this intersection. Both Parts 1 and 2 of the minimum volume warrants below must be satisfied in order to fulfill the traffic volume warrant.

TABLE 3

**MULTIWAY STOP SIGN WARRANT FOR MINIMUM TRAFFIC VOLUMES
NELLIE GAIL ROAD AT GALLUP CIRCLE**

Part 1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any (8) hours of an average day, Results: No, average (72) vehicles per hour Meets 24% of required average major street hourly traffic volumes	<i>and</i>	Part 2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same (8) hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour, Results: No, average (38) vehicles per hour Meets 19% of required minor street hourly traffic volumes	<i>but</i>	Part 3. If the 85th -percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are (70) percent of the above values. Results: No < 40 MPH Posted 25 MPH
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As shown above, the average hourly intersection approach traffic volumes for the highest 8-hour period on Friday did not satisfy both Parts 1 and 2 required volumes (*24% major street / 19% minor street*). Pedestrians, bicycles, and horse volumes were included in the Friday data collection (Part 2) but still do not come close to meeting the minimum guidelines. The Saturday data collected for pedestrians, bicyclists, and horses was significantly more than on Friday; however, even if the Saturday volumes were added instead of the Friday counts, the traffic volume warrant is still not close to being satisfied.

Speeds

Both Nellie Gail Road and Gallup Circle have a posted speed limit of 25 MPH. The most recent E&T speed survey has the segment of Nellie Gail Road with an 85th percentile speed of 32.4 MPH and an average speed of 27.5 MPH. These speeds correspond to the expected speeds on two-lane local collector roadways. Field observations also confirmed that vehicles were not regularly speeding over this speed limit near the intersection, but were confirmed as typical for an urbanized two-lane local roadway environment.

Visibility

Impaired visibility, or sight distance, due to the geometry of the intersection was carefully considered during our field-review of the surrounding urban residential environment. The geometry of the intersection does have both horizontal and vertical curvature to account for; consequently, it was determined that special traffic signage for improved visibility of the intersection and horse crossing, or other advanced signage, should be considered if a multi-way stop installation is not approved.

Sight distance was measured from Gallup Circle, as well as from the Horse Xing. The measured distances were derived from the stopping sight distance guidelines found in the California MUTCD (*see Appendix D*). In this reference, a 25 MPH roadway speed recommends a minimum Stopping Sight Distance of 155 feet, while 30 MPH recommends 200 feet. As the 85th percentile speed was just above 30 MPH, a 200 foot sight distance was used for our evaluation. More specifically, this stopping sight distance was field-measured from a typical ‘stopped’ vehicle location on Gallup Circle, as well as from the Horse Xing, towards the oncoming lanes of traffic on Nellie Gail Road. An orange cone was set at this minimum distance. A photograph was then taken from the stopped vehicle’s perspective or as an equestrian at the horse crossing.

(See sight distance photos in Exhibits 4, 5, and 6 on the following pages).

As Exhibit 6 shows, sight distance when looking from the south-side Horse Xing did not have a clear line of sight to the cone. Consequently, the minimum stopping visibility is not met due to horizontal roadway curvature and surrounding environment.

EXHIBIT 4



GALLUP CIRCLE (NORTH-SIDE - LOOKING EAST) @ NELLIE GAIL ROAD



GALLUP CIRCLE (NORTH-SIDE - LOOKING WEST) @ NELLIE GAIL ROAD

EXHIBIT 5

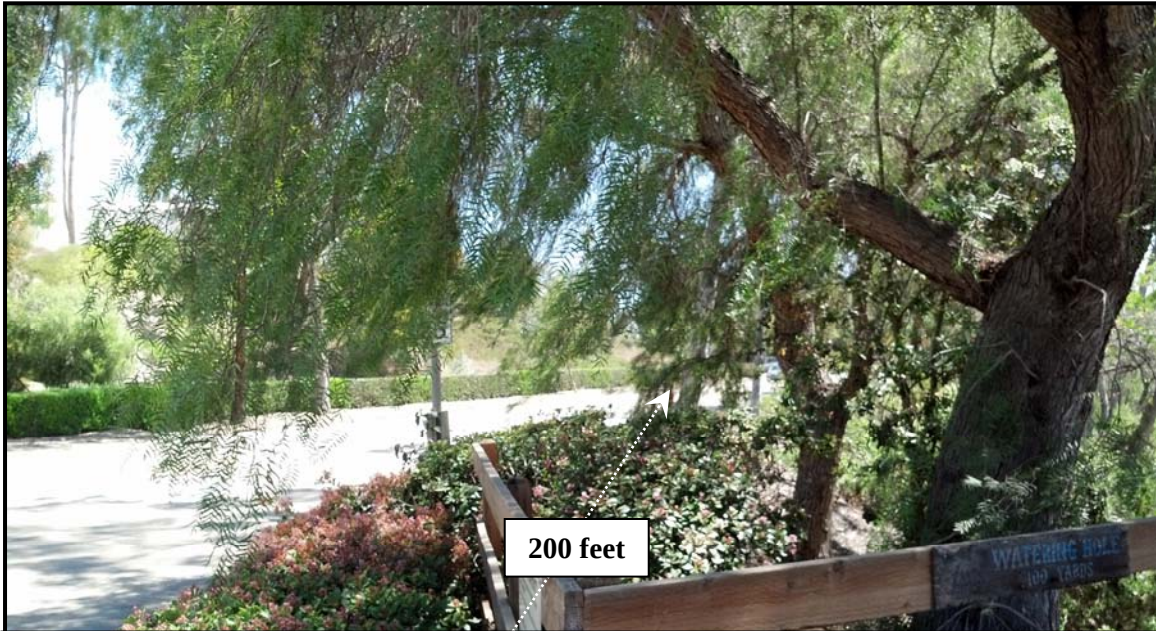


HORSE XING (NORTH-SIDE - LOOKING EAST) @ NELLIE GAIL ROAD



HORSE XING (NORTH-SIDE - LOOKING WEST) @ NELLIE GAIL ROAD

EXHIBIT 6



HORSE XING (SOUTH-SIDE - LOOKING EAST) @ NELLIE GAIL ROAD



HORSE XING (SOUTH-SIDE - LOOKING WEST) @ NELLIE GAIL ROAD

MULTIWAY STOP ANALYSIS SUMMARY

The analysis of the four (4) main criteria provided in the California MUTCD regarding Multi-way Stop Applications showed that this intersection did not meet the minimum guidelines to justify stopping the major roadway (Nellie Gail Road). The four main criteria analyzed were: 1) As an interim measure where traffic control signals are justified; 2) Reported collisions – a correctible crash problem; 3) Traffic and pedestrian volumes, speeds, and delay; and 4) Where a combination of the above criteria are satisfied to 80 percent. However, visibility/engineering judgment is included in the summary below.

In summary, the collision history at the intersection resulted in (4) collisions that were not considered correctible during the last (5) years, where the minimum guideline calls for at least five (5) correctible collisions in a 12-month period. The average minimum hourly traffic volumes for a multi-way stop that are to be satisfied for any eight (8) hours in an average day also were not satisfied. Excessive delay to the minor roadway was not observed in terms of waiting for a gap on the major roadway. Therefore, since intersection collision history and traffic volumes do not satisfy the minimum volumes, it can also be derived that a traffic signal is not justified at this intersection. The 80% combined criteria were also not met as both the collision history and minimum traffic volumes guidelines were not satisfied to this percentage.

Nonetheless, engineering judgment should always be included in any decision regarding traffic safety improvements. Intersection lighting was verified and found to be adequate as there was typical local roadway lighting on one street light pole located on the southeast corner. Further intersection information was gathered in the field in regards to pedestrian, bicycle, and equestrian activity. Count data confirmed a moderate-to-high activity of both due to the park and horse trails. Therefore, in terms of visibility and roadway curvature, it was determined that this intersection should be considered for multi-way stop control, special signage, or other traffic control measures in order to account for impaired sight distance, especially for the adjacent equestrian crossing.

CONCLUSION / RECOMMENDATION

In overall consideration of the existing conditions at the intersection of Nellie Gail Road and Gallup Circle, a three-way stop sign installation is recommended in order to provide improved sight distance for equestrians and pedestrians crossing Nellie Gail Road. In conjunction, it is also recommended to install a marked crosswalk on the west leg of Nellie Gail Road. Lastly, it is recommended to post signs at the equestrian crossing across Nellie Gail Road, located 50 feet west of Gallup Circle, to lead any pedestrians, bicyclists, and equestrians to use the newly marked crosswalk at the stop-controlled intersection.

If approved by the City, the cost to convert the one-way stop to a three-way stop sign installation, including design, administration, and construction, is estimated at \$3,500.00.

APPENDIX A

MULTIWAY STOP APPLICATIONS GUIDELINES:

CALIFORNIA MUTCD

Standard:

03 Except as provided in Paragraphs 4 and 5, the minimum sizes for regulatory signs facing traffic on multi-lane conventional roads shall be as shown in the Multi-lane column of Table 2B-1 and 2B-1(CA).

Option:

04 Where the posted speed limit is 35 mph or less on a multi-lane highway or street, other than for a STOP sign, the minimum size shown in the Single Lane column in Table 2B-1 and 2B-1(CA) may be used.

05 Where a regulatory sign, other than a STOP sign, is placed on the left-hand side of a multi-lane roadway in addition to the installation of the same regulatory sign on the right-hand side or the roadway, the size shown in the Single Lane column in Table 2B-1 and 2B-1(CA) may be used for both the sign on the right-hand side and the sign on the left-hand side of the roadway.

Standard:

06 A minimum size of 36 x 36 inches shall be used for STOP signs that face multi-lane approaches.

07 Where side roads intersect a multi-lane street or highway that has a speed limit of 45 mph or higher, the minimum size of the STOP signs facing the side road approaches, even if the side road only has one approach lane, shall be 36 x 36 inches.

08 Where side roads intersect a multi-lane street or highway that has a speed limit of 40 MPH or lower, the minimum size of the STOP signs facing the side road approaches shall be as shown in the Single Lane or Multi-lane columns of Table 2B-1 and 2B-1(CA) based on the number of approach lanes on the side street approach.

Guidance:

09 The minimum sizes for regulatory signs facing traffic on exit and entrance ramps should be as shown in the column of Table 2B-1 and 2B-1(CA) that corresponds to the mainline roadway classification (Expressway or Freeway). If a minimum size is not provided in the Freeway column, the minimum size in the Expressway column should be used. If a minimum size is not provided in the Freeway or Expressway Column, the size in the Oversized column should be used.

Section 2B.04 Right-of-Way at Intersections

Support:

01 State or local laws written in accordance with the "Uniform Vehicle Code" (see Section 1A.11) establish the right-of-way rule at intersections having no regulatory traffic control signs such that the driver of a vehicle approaching an intersection must yield the right-of-way to any vehicle or pedestrian already in the intersection. When two vehicles approach an intersection from different streets or highways at approximately the same time, the right-of-way rule requires the driver of the vehicle on the left to yield the right-of-way to the vehicle on the right. The right-of-way can be modified at through streets or highways by placing YIELD (R1-2) signs (see Sections 2B.08 and 2B.09) or STOP (R1-1) signs (see Sections 2B.05 through 2B.07) on one or more approaches.

Guidance:

02 Engineering judgment should be used to establish intersection control. The following factors should be considered:

- A. Vehicular, bicycle, and pedestrian traffic volumes on all approaches;
- B. Number and angle of approaches;
- C. Approach speeds;
- D. Sight distance available on each approach; and
- E. Reported crash experience.

03 YIELD or STOP signs should be used at an intersection if one or more of the following conditions exist:

- A. An intersection of a less important road with a main road where application of the normal right-of-way rule would not be expected to provide reasonable compliance with the law;
- B. A street entering a designated through highway or street; and/or
- C. An unsignalized intersection in a signalized area.

04 In addition, the use of YIELD or STOP signs should be considered at the intersection of two minor streets or local roads where the intersection has more than three approaches and where one or more of the following conditions exist:

- A. The combined vehicular, bicycle, and pedestrian volume entering the intersection from all approaches averages more than 2,000 units per day;*
- B. The ability to see conflicting traffic on an approach is not sufficient to allow a road user to stop or yield in compliance with the normal right-of-way rule if such stopping or yielding is necessary; and/or*
- C. Crash records indicate that five or more crashes that involve the failure to yield the right-of-way at the intersection under the normal right-of-way rule have been reported within a 3-year period, or that three or more such crashes have been reported within a 2-year period.*

05 YIELD or STOP signs should not be used for speed control.

Support:

06 Section 2B.07 contains provisions regarding the application of multi-way STOP control at an intersection.

Guidance:

07 Once the decision has been made to control an intersection, the decision regarding the appropriate roadway to control should be based on engineering judgment. In most cases, the roadway carrying the lowest volume of traffic should be controlled.

08 A YIELD or STOP sign should not be installed on the higher volume roadway unless justified by an engineering study.

Support:

09 The following are considerations that might influence the decision regarding the appropriate roadway upon which to install a YIELD or STOP sign where two roadways with relatively equal volumes and/or characteristics intersect:

- A. Controlling the direction that conflicts the most with established pedestrian crossing activity or school walking routes;*
- B. Controlling the direction that has obscured vision, dips, or bumps that already require drivers to use lower operating speeds; and*
- C. Controlling the direction that has the best sight distance from a controlled position to observe conflicting traffic.*

Standard:

10 Because the potential for conflicting commands could create driver confusion, YIELD or STOP signs shall not be used in conjunction with any traffic control signal operation, except in the following cases:

- A. If the signal indication for an approach is a flashing red at all times;**
- B. If a minor street or driveway is located within or adjacent to the area controlled by the traffic control signal, but does not require separate traffic signal control because an extremely low potential for conflict exists; or**
- C. If a channelized turn lane is separated from the adjacent travel lanes by an island and the channelized turn lane is not controlled by a traffic control signal.**

10a STOP signs shall not be erected at any entrance to an intersection controlled by traffic signals. Refer to CVC 21355(a).

11 Except as provided in Section 2B.09, STOP signs and YIELD signs shall not be installed on different approaches to the same unsignalized intersection if those approaches conflict with or oppose each other.

12 Portable or part-time STOP or YIELD signs shall not be used except for emergency and temporary traffic control zone purposes.

13 A portable or part-time (folding) STOP sign that is manually placed into view and manually removed from view shall not be used during a power outage to control a signalized approach unless the maintaining agency establishes that the signal indication that will first be displayed to that approach upon restoration of power is a flashing red signal indication and that the portable STOP sign will be manually removed from view prior to stop-and-go operation of the traffic control signal.

Option:

14 A portable or part-time (folding) STOP sign that is electrically or mechanically operated such that it only displays the STOP message during a power outage and ceases to display the STOP message upon restoration of power may be used during a power outage to control a signalized approach.

Support:

¹⁵ Section 9B.03 contains provisions regarding the assignment of priority at a shared-use path/ roadway intersection.

Section 2B.05 STOP Sign (R1-1) and ALL WAY Plaque (R1-3P)

Standard:

⁰¹ When it is determined that a full stop is always required on an approach to an intersection, a STOP (R1-1) sign (see Figure 2B-1) shall be used.

⁰² The STOP sign shall be an octagon with a white legend and border on a red background.

⁰³ Secondary legends shall not be used on STOP sign faces.

⁰⁴ At intersections where all approaches are controlled by STOP signs (see Section 2B.07), an ALL WAY supplemental plaque (R1-3P) shall be mounted below each STOP sign. The ALL WAY plaque (see Figure 2B-1) shall have a white legend and border on a red background.

⁰⁵ The ALL WAY plaque shall only be used if all intersection approaches are controlled by STOP signs.

⁰⁶ Supplemental plaques with legends such as 2-WAY, 3-WAY, 4-WAY, or other numbers of ways shall not be used with STOP signs.

Support:

⁰⁷ The use of the CROSS TRAFFIC DOES NOT STOP (W4-4P) plaque (and other plaques with variations of this word message) is described in Section 2C.59.

Guidance:

⁰⁸ *Plaques with the appropriate alternative messages of TRAFFIC FROM LEFT (RIGHT) DOES NOT STOP (W4-4aP) or ONCOMING TRAFFIC DOES NOT STOP (W4-4bP) should be used at intersections where STOP signs control all but one approach to the intersection, unless the only non-stopped approach is from a one-way street.*

Option:

⁰⁹ An EXCEPT RIGHT TURN (R1-10P) plaque (see Figure 2B-1) may be mounted below the STOP sign if an engineering study determines that a special combination of geometry and traffic volumes is present that makes it possible for right-turning traffic on the approach to be permitted to enter the intersection without stopping.

Support:

¹⁰ The design and application of Stop Beacons are described in Section 4L.05.

¹¹ A STOP (R1-1) sign is not a "cure-all" and is not a substitute for other traffic control devices. Often, the need for a STOP (R1-1) sign can be eliminated if the sight distance is increased by removing obstructions.

Through Highways

Option:

¹² STOP (R1-1) signs may be installed either at or near the entrance to a State highway, except at signalized intersections, or at any location so as to control traffic within an intersection. Refer to CVC 21352 and 21355. See Section 1A.11 for information regarding this publication.

Support:

¹³ When STOP (R1-1) signs or traffic control signals have been erected at all entrances, a highway constitutes a through highway. Refer to CVC 600.

¹⁴ Authority to place STOP (R1-1) signs facing State highway traffic is delegated to the Department of Transportation's District Directors.

Option:

¹⁵ Local authorities may designate any highway under their jurisdiction as a through highway and install STOP (R1-1) signs in a like manner. Refer to CVC 21354.

Standard:

¹⁶ No local authority shall erect or maintain any STOP (R1-1) sign or other traffic control device requiring a stop, on any State highway, except by permission of the Department of Transportation. Refer to CVC 21353.

Support:

¹⁷ The Department of Transportation will grant such permission only when an investigation indicates that the STOP (R1-1) sign will benefit traffic.

Section 2B.06 STOP Sign Applications

Guidance:

01 At intersections where a full stop is not necessary at all times, consideration should first be given to using less restrictive measures such as YIELD signs (see Sections 2B.08 and 2B.09).

02 The use of STOP signs on the minor-street approaches should be considered if engineering judgment indicates that a stop is always required because of one or more of the following conditions:

- A. The vehicular traffic volumes on the through street or highway exceed 6,000 vehicles per day;*
- B. A restricted view exists that requires road users to stop in order to adequately observe conflicting traffic on the through street or highway; and/or*
- C. Crash records indicate that three or more crashes that are susceptible to correction by the installation of a STOP sign have been reported within a 12-month period, or that five or more such crashes have been reported within a 2-year period. Such crashes include right-angle collisions involving road users on the minor-street approach failing to yield the right-of-way to traffic on the through street or highway.*

Support:

03 The use of STOP signs at grade crossings is described in Sections 8B.04 and 8B.05.

Section 2B.07 Multi-Way Stop Applications

Support:

01 Multi-way stop control can be useful as a safety measure at intersections if certain traffic conditions exist. Safety concerns associated with multi-way stops include pedestrians, bicyclists, and all road users expecting other road users to stop. Multi-way stop control is used where the volume of traffic on the intersecting roads is approximately equal.

02 The restrictions on the use of STOP signs described in Section 2B.04 also apply to multi-way stop applications.

Guidance:

03 The decision to install multi-way stop control should be based on an engineering study.

04 The following criteria should be considered in the engineering study for a multi-way STOP sign installation:

- A. Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.*
- B. Five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.*
- C. Minimum volumes:*
 - 1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day; and*
 - 2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour; but*
 - 3. If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the values provided in Items 1 and 2.*
- D. Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.*

Option:

05 Other criteria that may be considered in an engineering study include:

- A. The need to control left-turn conflicts;*
- B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;*
- C. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to negotiate the intersection unless conflicting cross traffic is also required to stop; and*
- D. An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection.*

Section 2B.08 YIELD Sign (R1-2)

Standard:

01 The YIELD (R1-2) sign (see Figure 2B-1) shall be a downward-pointing equilateral triangle with a wide red border and the legend YIELD in red on a white background.

Support:

02 The YIELD sign assigns right-of-way to traffic on certain approaches to an intersection. Vehicles controlled by a YIELD sign need to slow down to a speed that is reasonable for the existing conditions or stop when necessary to avoid interfering with conflicting traffic.

Section 2B.09 YIELD Sign Applications

Option:

01 YIELD signs may be installed:

- A. On the approaches to a through street or highway where conditions are such that a full stop is not always required.**
- B. At the second crossroad of a divided highway, where the median width at the intersection is 30 feet or greater. In this case, a STOP or YIELD sign may be installed at the entrance to the first roadway of a divided highway, and a YIELD sign may be installed at the entrance to the second roadway.**
- C. For a channelized turn lane that is separated from the adjacent travel lanes by an island, even if the adjacent lanes at the intersection are controlled by a highway traffic control signal or by a STOP sign.**
- D. At an intersection where a special problem exists and where engineering judgment indicates the problem to be susceptible to correction by the use of the YIELD sign.**
- E. Facing the entering roadway for a merge-type movement if engineering judgment indicates that control is needed because acceleration geometry and/or sight distance is not adequate for merging traffic operation.**

Standard:

02 A YIELD (R1-2) sign shall be used to assign right-of-way at the entrance to a roundabout. YIELD signs at roundabouts shall be used to control the approach roadways and shall not be used to control the circulatory roadway.

03 Other than for all of the approaches to a roundabout, YIELD signs shall not be placed on all of the approaches to an intersection.

Section 2B.10 STOP Sign or YIELD Sign Placement

Standard:

01 The STOP or YIELD sign shall be installed on the near side of the intersection on the right-hand side of the approach to which it applies. When the STOP or YIELD sign is installed at this required location and the sign visibility is restricted, a Stop Ahead sign (see Section 2C.36) shall be installed in advance of the STOP sign or a Yield Ahead sign (see Section 2C.36) shall be installed in advance of the YIELD sign.

02 The STOP or YIELD sign shall be located as close as practical to the intersection it regulates, while optimizing its visibility to the road user it is intended to regulate.

02a YIELD signs shall not be erected upon the approaches to more than one of the intersecting streets. Refer to CVC 21356.

03 STOP signs and YIELD signs shall not be mounted on the same post.

04 No items other than inventory stickers, sign installation dates, and bar codes shall be affixed to the fronts of STOP or YIELD signs, and the placement of these items shall be in the border of the sign.

05 No items other than official traffic control signs, inventory stickers, sign installation dates, anti-vandalism stickers, and bar codes shall be mounted on the backs of STOP or YIELD signs.

06 No items other than retroreflective strips (see Section 2A.21) or official traffic control signs shall be mounted on the fronts or backs of STOP or YIELD signs supports.

06a If other signs are grouped with a STOP sign, except for ONE WAY (R6-1 & R6-2) signs and Street Name (D3-1 or G7-1(CA)) signs (see Sections 2B.40 & 2D.43), they shall be installed below the STOP sign.

Guidance:

07 STOP or YIELD signs should not be placed farther than 50 feet from the edge of the pavement of the intersected roadway (see Drawing F in Figure 2A-3).

APPENDIX B

SWITRS COLLISION HISTORY

**CHP-SWITRS COLLISION DATABASE
CITY OF LAGUNA HILLS
INTERSECTION OF NELLIE GAIL ROAD AND GALLUP CIRCLE
JAN. 1, 2006 - DEC. 31, 2012**

FILE ID	COLLISION DATE	COLL. TIME	PRIMARY ROAD	SECONDARY ROAD	DIST.	DIR.	INTERS.	WEATH. 1	COLL. SEVERITY	PRIM. COLL. FACT.	PCF VIOL. CAT.	HIT AND RUN	TYPE OF COLL.	MOTOR VEHICLE INVOLVED WITH	ROAD SURF.
36054	20070118	1600	GALLUP CIR	NELLIE GAIL	140	N	N	A	0	A	3	N	E	I	A
34709	20070406	2035	NELLIE GAIL RD	GALLUP CIR	187	E	N	A	0	A	8	N	E	I	A
79911	20080415	1445	GALLUP CIR	NELLIE GAIL RD	343	N	N	A	0	A	6	N	B	C	A
33632	20090121	1645	NELLIE GAIL RD	GALLUP CIR	218	W	N	A	4	A	8	M	C	E	A

NOTES:

Weather 1	Collision Severity	Primary Collision Factor	PCF Violation Category	Hit and Run	Type of Collision
A - Clear	1 - Fatal	A - (Vehicle) Code Violation	01 - Driving or Bicycling Under Influence	F - Felony	A - Head-On
B - Cloudy	2 - Injury (Severe)	B - Other Improper Driving	02 - Impeding Traffic	M - Misdemeanor	B - Sideswipe
C - Raining	3 - Injury (Other Visible)	C - Other Than Driver	03 - Unsafe Speed	N - Not Hit & Run	C - Rear-End
D - Snowing	4 - Injury (Complaint of Pain)	D - Unknown	04 - Following Too Closely		D - Broadside
E - Fog	0 - PDO (Property Damage Only)	E - Fell Asleep	05 - Wrong Side of Road		E - Hit Object
F - Other		- - Not Stated	06 - Improper Passing		F - Overturned
G - Wind			07 - Unsafe Lane Change		G - Vehicle/Pedestrian
- - Not Stated			08 - Improper Turning		H - Other
			09 - Automobile ROW		- - Not Stated
			10 - Pedestrian ROW		
			11 - Pedestrian Violation		
			12 - Traffic Signals and Signs		
			13 - Hazardous Parking		
			14 - Lights		
			15 - Brakes		
			16 - Other Equipment		
			17 - Other Hazardous Violation		
			18 - Other Than Driver (or Ped)		
			19 -		
			20 -		
			21 - Unsafe Starting or Backing		
			22 - Other Improper Driving		
			23 - Pedestrian or "Other" Under the Influence		
			24 - Fell Asleep		
			00 - Unknown		
			- - Not Stated		

Motor Vehicle Involved With:

A - Non-Collision

B - Pedestrian

C - Other Motor Vehicle

D - Motor Vehicle on Other Roadway

E - Parked Motor Vehicle

F - Train

G - Bicycle

H - Animal

I - Fixed Object

J - Other Object

- - Not Stated

Road Surface

A - Dry

B - Wet

C - Snowy or Icy

D - Slippery

- - Not Stated

APPENDIX C

VEHICULAR, PEDESTRIAN, BICYCLE, & EQUESTRIAN INTERSECTION COUNT DATA

**FRIDAY,
MARCH 22, 2013
COUNT DATA**

VEHICLE COUNT DATA

5/15/2013 ITEM NO. 4.3

ITM Peak Hour Summary

Prepared by:



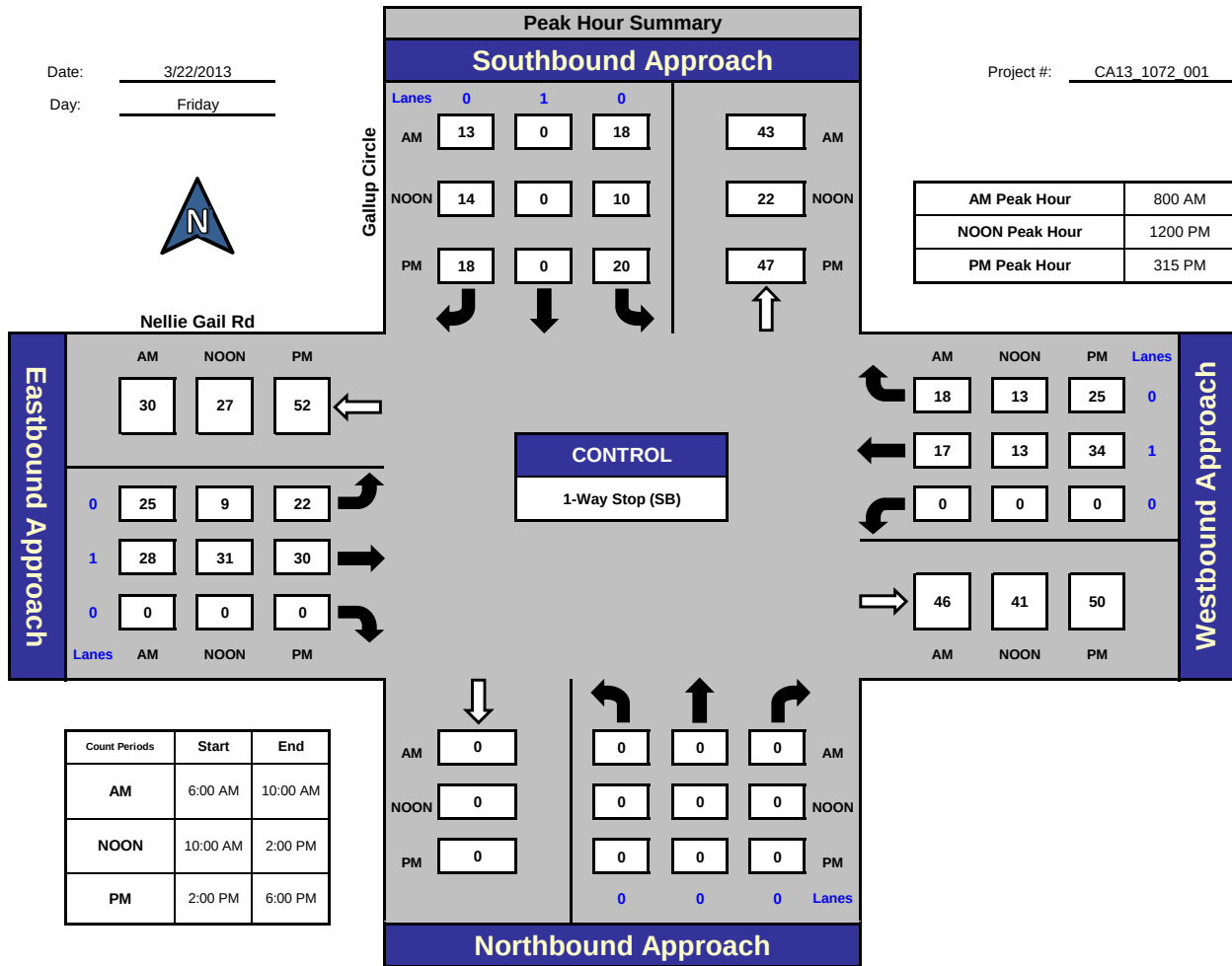
National Data & Surveying Services

Gallup Circle and Nellie Gail Rd , City of Laguna Hills

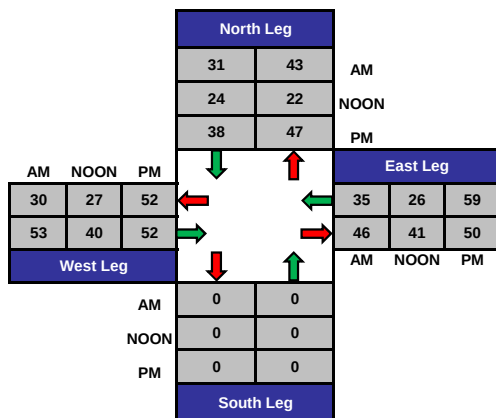
Date: 3/22/2013

Day: Friday

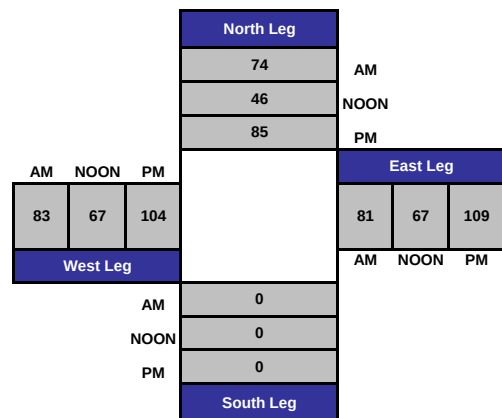
Project #: CA13 1072 001



Total Ins & Outs



Total Volume Per Leg



Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_1072_001

Day: FRIDAY

City: City of Laguna Hills

Date: 03/22/2013

AM													
NS/EW Streets:	Gallup Circle			Gallup Circle			Nellie Gail Rd			Nellie Gail Rd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	0	0	0	0	1	0	0	1	0	0	1	0	
6:00 AM				1		0	0	2			1	0	4
6:15 AM				0		1	1	1			0	1	4
6:30 AM				0		1	1	3			1	2	8
6:45 AM				2		1	0	2			1	5	11
7:00 AM				1		0	0	2			1	0	4
7:15 AM				0		1	1	1			0	1	4
7:30 AM				0		1	1	3			0	3	8
7:45 AM				2		1	0	1			1	5	10
8:00 AM				2		3	8	7			4	5	29
8:15 AM				7		7	8	10			2	5	39
8:30 AM				4		2	7	4			8	6	31
8:45 AM				5		1	2	7			3	2	20
9:00 AM				0		4	4	4			6	2	20
9:15 AM				3		3	3	1			2	1	13
9:30 AM				3		5	5	9			7	4	33
9:45 AM				1		1	3	3			10	2	20
TOTAL VOLUMES :	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
APPROACH %'s :	0	0	0	31	0	32	44	60	0	0	47	44	258
	#DIV/0!	#DIV/0!	#DIV/0!	49.21%	0.00%	50.79%	42.31%	57.69%	0.00%	0.00%	51.65%	48.35%	
PEAK HR START TIME :	800 AM												TOTAL
PEAK HR VOL :	0	0	0	18	0	13	25	28	0	0	17	18	119
PEAK HR FACTOR :	0.000			0.554			0.736			0.625			0.763

CONTROL : 1-Way Stop (SB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_1072_001

Day: FRIDAY

City: City of Laguna Hills

Date: 03/22/2013

NOON													
NS/EW Streets:	Gallup Circle			Gallup Circle			Nellie Gail Rd			Nellie Gail Rd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	0	0	0	0	1	0	0	1	0	0	1	0	
10:00 AM				2		2	7	5			5	2	23
10:15 AM				4		5	3	5			2	4	23
10:30 AM				2		2	0	3			0	3	10
10:45 AM				1		2	2	6			5	5	21
11:00 AM				4		2	5	2			8	6	27
11:15 AM				2		5	1	2			3	4	17
11:30 AM				3		4	2	7			5	4	25
11:45 AM				3		4	4	4			4	1	20
12:00 PM				4		6	1	7			3	7	28
12:15 PM				2		0	3	6			2	1	14
12:30 PM				1		5	3	9			3	3	24
12:45 PM				3		3	2	9			5	2	24
1:00 PM				4		0	1	4			4	3	16
1:15 PM				3		3	1	5			5	3	20
1:30 PM				5		1	3	6			2	3	20
1:45 PM				3		1	1	3			5	8	21
TOTAL VOLUMES :	NL 0	NT 0	NR 0	SL 46	ST 0	SR 45	EL 39	ET 83	ER 0	WL 0	WT 61	WR 59	TOTAL 333
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	50.55%	0.00%	49.45%	31.97%	68.03%	0.00%	0.00%	50.83%	49.17%	
PEAK HR START TIME :	1200 PM												TOTAL
PEAK HR VOL :	0	0	0	10	0	14	9	31	0	0	13	13	90
PEAK HR FACTOR :	0.000			0.600			0.833			0.650			0.804

CONTROL : 1-Way Stop (SB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_1072_001

Day: FRIDAY

City: City of Laguna Hills

Date: 03/22/2013

NS/EW Streets:		PM												
		Gallup Circle			Gallup Circle			Nellie Gail Rd			Nellie Gail Rd			
		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:		NL 0	NT 0	NR 0	SL 0	ST 1	SR 0	EL 0	ET 1	ER 0	WL 0	WT 1	WR 0	TOTAL
2:00 PM					3		4	7	4			4	1	23
2:15 PM					4		5	2	5			5	2	23
2:30 PM					10		5	5	5			7	4	36
2:45 PM					5		10	3	11			8	2	39
3:00 PM					4		6	3	3			5	3	24
3:15 PM					9		3	5	5			9	6	37
3:30 PM					4		6	9	14			8	6	47
3:45 PM					1		4	5	6			10	7	33
4:00 PM					6		5	3	5			7	6	32
4:15 PM					4		1	3	8			4	5	25
4:30 PM					5		2	3	6			2	5	23
4:45 PM					4		1	6	5			3	4	23
5:00 PM					6		7	6	8			4	8	39
5:15 PM					6		9	5	4			5	3	32
5:30 PM					8		2	5	3			7	4	29
5:45 PM					4		3	4	6			3	4	24
TOTAL VOLUMES :		NL 0	NT 0	NR 0	SL 83	ST 0	SR 73	EL 74	ET 98	ER 0	WL 0	WT 91	WR 70	TOTAL 489
APPROACH %'s :		#DIV/0!	#DIV/0!	#DIV/0!	53.21%	0.00%	46.79%	43.02%	56.98%	0.00%	0.00%	56.52%	43.48%	
PEAK HR START TIME :		315 PM												TOTAL
PEAK HR VOL :		0	0	0	20	0	18	22	30	0	0	34	25	149
PEAK HR FACTOR :		0.000			0.792			0.565			0.868			0.793

CONTROL : 1-Way Stop (SB)

EQUESTRIAN COUNT DATA

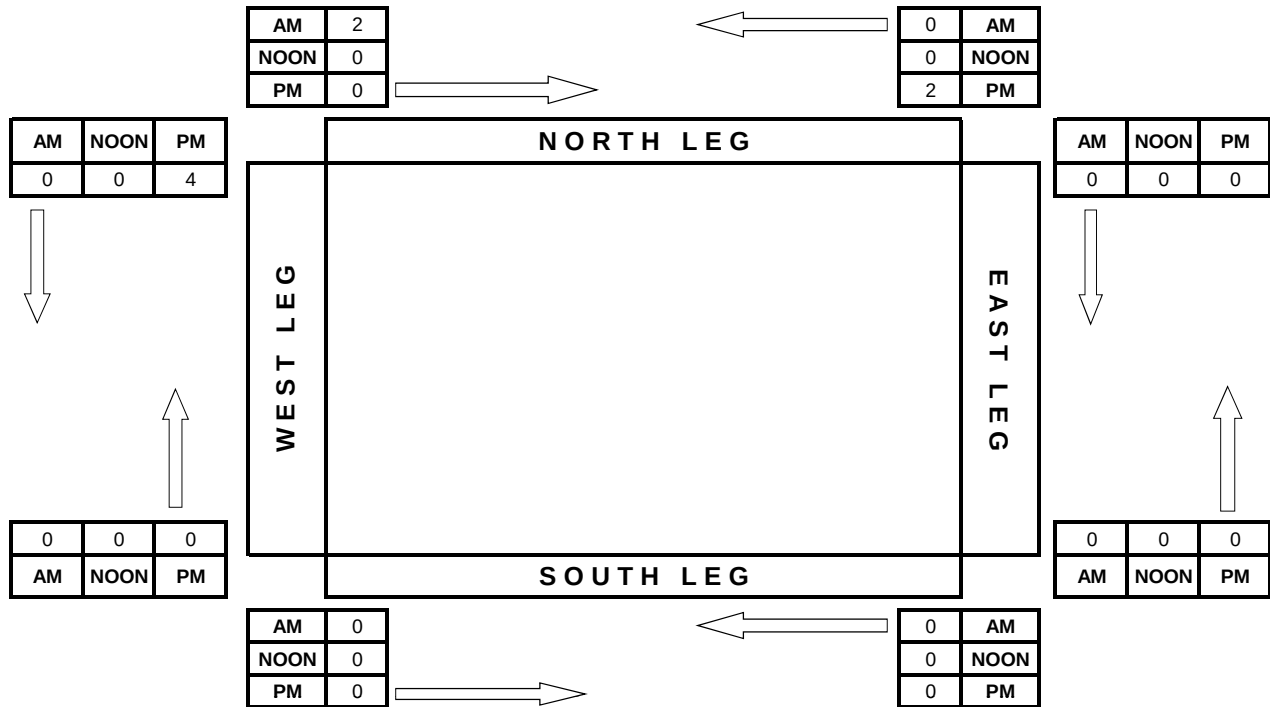
PREPARED BY NATIONAL DATA & SURVEYING SERVICES

Horse Count Peak Hour

PROJECT#: 13-1072-001
 N/S Street: Gallup Circle
 E/W Street: Nellie Gail Rd
 DATE: 3/22/2013
 CITY: Laguna Hills

DAY: Friday

	Start:	End:
AM	6:00	10:00
NOON	10:00	14:00
PM	14:00	18:00



PREPARED BY NATIONAL DATA & SURVEYING SERVICES

PROJECT#: 13-1072-001
 N/S Street: Gallup Circle
 E/W Street: Nellie Gail Rd
 DATE: 3/22/2013
 CITY: Laguna Hills

DAY: Friday

A M

HORSES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
6:00 AM	0	0	0	0	0	0	0	0
6:15 AM	0	0	0	0	0	0	0	0
6:30 AM	0	0	0	0	0	0	0	0
6:45 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0
7:45 AM	1	0	0	0	0	0	0	0
8:00 AM	1	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0	0
9:30 AM	0	0	0	0	0	0	0	0
9:45 AM	0	0	0	0	0	0	0	0
TOTALS	2	0	0	0	0	0	0	0

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
6:00 AM								
6:15 AM								
6:30 AM								
6:45 AM								
7:00 AM								
7:15 AM								
7:30 AM								
7:45 AM								
8:00 AM								
8:15 AM								
8:30 AM								
8:45 AM								
9:00 AM								
9:15 AM								
9:30 AM								
9:45 AM								
TOTALS	0	0	0	0	0	0	0	0

N O O N

HORSES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
10:00 AM	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0
1:30 PM	0	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
10:00 AM								
10:15 AM								
10:30 AM								
10:45 AM								
11:00 AM								
11:15 AM								
11:30 AM								
11:45 AM								
12:00 PM								
12:15 PM								
12:30 PM								
12:45 PM								
1:00 PM								
1:15 PM								
1:30 PM								
1:45 PM								
TOTALS	0	0	0	0	0	0	0	0

P M

HORSES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
2:00 PM	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0
3:30 PM	0	2	0	0	0	0	0	2
3:45 PM	0	0	0	0	0	0	0	0
4:00 PM	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	2
4:45 PM	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0
TOTALS	0	2	0	0	0	0	0	4

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
2:00 PM								
2:15 PM								
2:30 PM								
2:45 PM								
3:00 PM								
3:15 PM								
3:30 PM								
3:45 PM								
4:00 PM								
4:15 PM								
4:30 PM								
4:45 PM								
5:00 PM								
5:15 PM								
5:30 PM								
5:45 PM								
TOTALS	0	0	0	0	0	0	0	0

PEAK HOURS

HORSES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
7:45 AM	2	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
11:45 PM	0	2	0	0	0	0	0	4

PEAK HOURS

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
12:00 AM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0

PEDESTRIAN & BICYCLE COUNT DATA

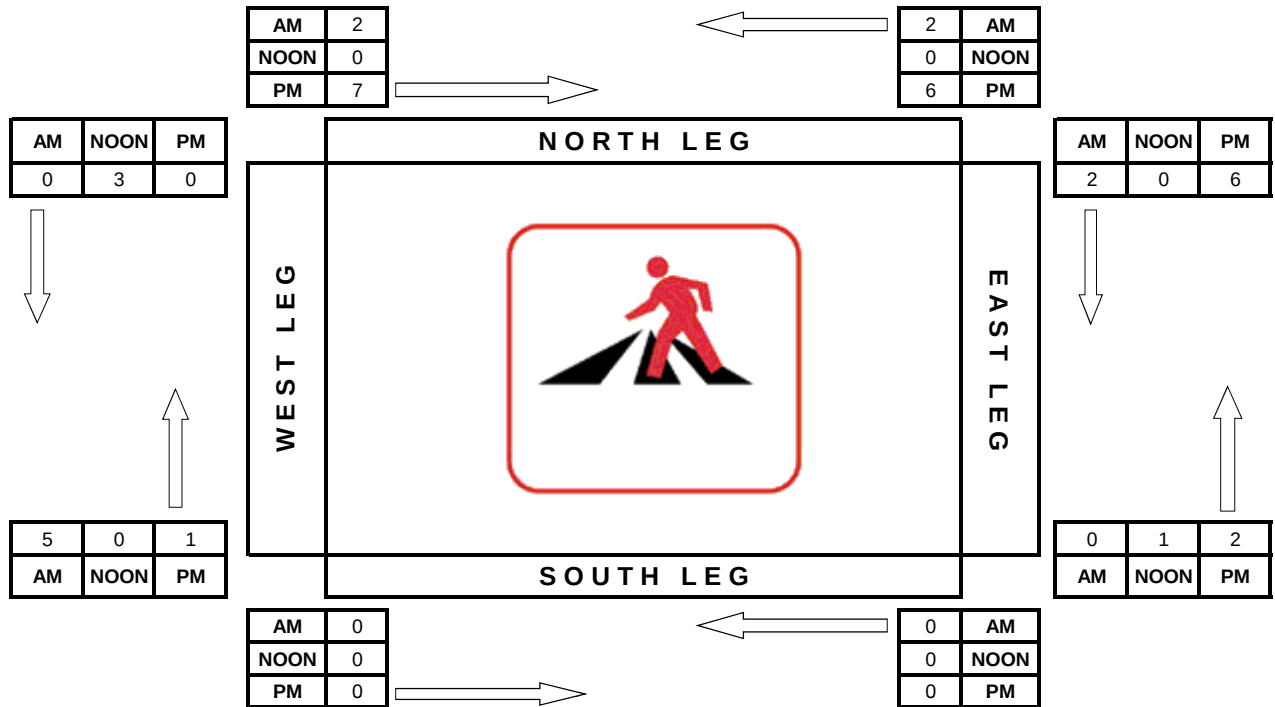
PREPARED BY NATIONAL DATA & SURVEYING SERVICES

Pedestrian Count Peak Hour

PROJECT#: 13-1072-001
 N/S Street: Gallup Circle
 E/W Street: Nellie Gail Rd
 DATE: 3/22/2013
 CITY: Laguna Hills

DAY: Friday

	Start:	End:
AM	6:00	10:00
NOON	10:00	14:00
PM	14:00	18:00



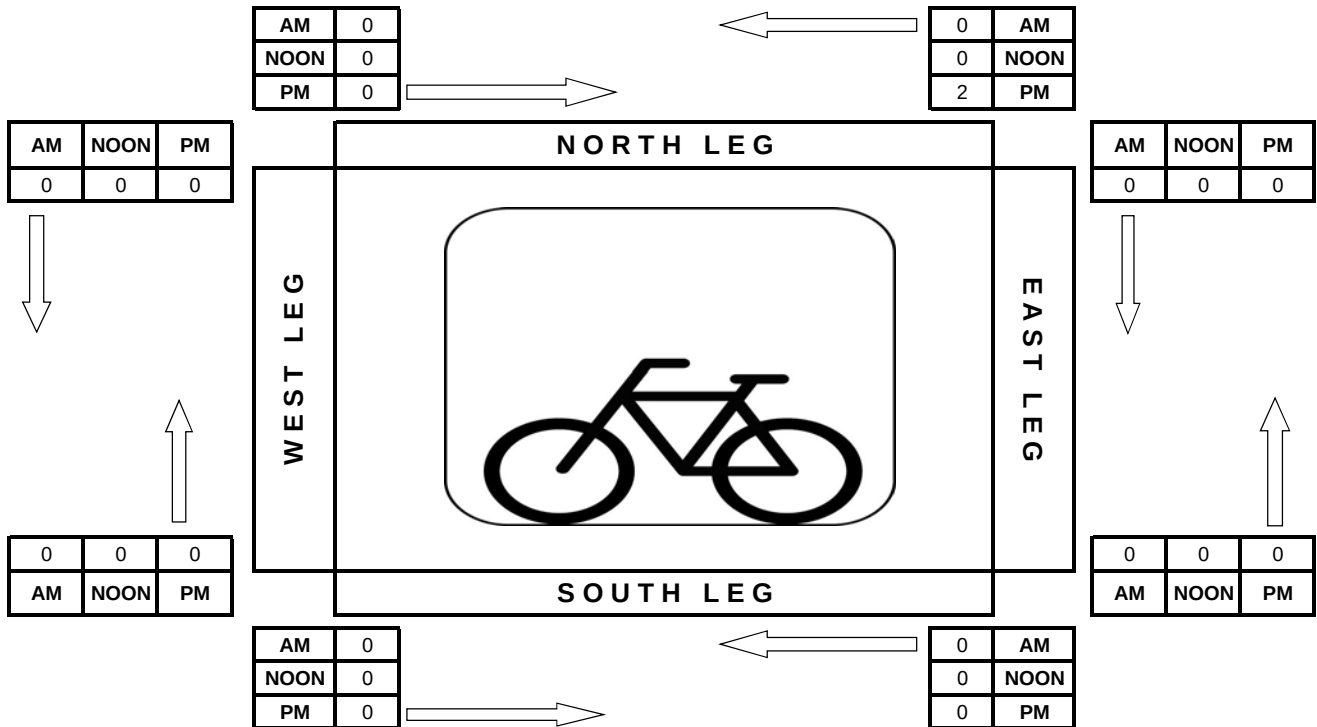
PREPARED BY NATIONAL DATA & SURVEYING SERVICES

Bicycle Count Peak Hour

PROJECT#: 13-1072-001
 N/S Street: Gallup Circle
 E/W Street: Nellie Gail Rd
 DATE: 3/22/2013
 CITY: Laguna Hills

DAY: Friday

	Start:	End:
AM	6:00	10:00
NOON	10:00	14:00
PM	14:00	18:00



PREPARED BY NATIONAL DATA & SURVEYING SERVICES

PROJECT#: 13-1072-001
 N/S Street: Gallup Circle
 E/W Street: Nellie Gail Rd
 DATE: 3/22/2013
 CITY: Laguna Hills

DAY: Friday

A M

PEDESTRIANS

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
6:00 AM	0	0	0	0	0	0	0	0
6:15 AM	0	0	0	0	0	0	0	1
6:30 AM	0	0	0	0	0	0	0	0
6:45 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	1
7:30 AM	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0
8:15 AM	0	1	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0
8:45 AM	1	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
9:15 AM	1	0	0	0	0	0	1	0
9:30 AM	0	2	0	0	0	2	4	0
9:45 AM	0	0	0	0	0	0	0	0
TOTALS	2	3	0	0	0	2	5	2

BIKES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
6:00 AM	0	0	0	0	0	0	0	0
6:15 AM	0	0	0	0	0	0	0	0
6:30 AM	0	0	0	0	0	0	0	0
6:45 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0	0
9:30 AM	0	0	0	0	0	0	0	0
9:45 AM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0

NOON

PEDESTRIANS

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
10:00 AM	0	0	0	0	0	0	0	3
10:15 AM	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	1	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	1	0
11:30 AM	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	1	0
1:30 PM	0	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	1	0	2	3

BIKES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
10:00 AM	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0
1:30 PM	0	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0

P M

PEDESTRIANS

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
2:00 PM	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	1
2:45 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0
3:30 PM	2	4	0	0	2	2	0	0
3:45 PM	1	2	0	0	0	1	0	0
4:00 PM	0	0	0	0	0	0	1	0
4:15 PM	4	0	0	0	0	3	0	0
4:30 PM	2	1	0	0	0	2	0	0
4:45 PM	0	0	0	0	0	0	4	0
5:00 PM	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	2
5:30 PM	0	0	0	0	0	0	0	5
5:45 PM	0	0	0	0	0	0	0	2
TOTALS	9	7	0	0	2	8	5	10

BIKES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
2:00 PM	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0
4:00 PM	0	1	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0
5:45 PM	0	2	0	0	0	0	0	0
TOTALS	0	3	0	0	0	0	0	1

PEAK HOURS

PEDESTRIANS

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
8:45 AM	2	2	0	0	0	2	5	0
10:00 AM	0	0	0	0	1	0	0	3
3:30 PM	7	6	0	0	2	6	1	0

PEAK HOURS

BIKES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
12:00 AM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
5:45 PM	0	2	0	0	0	0	0	0

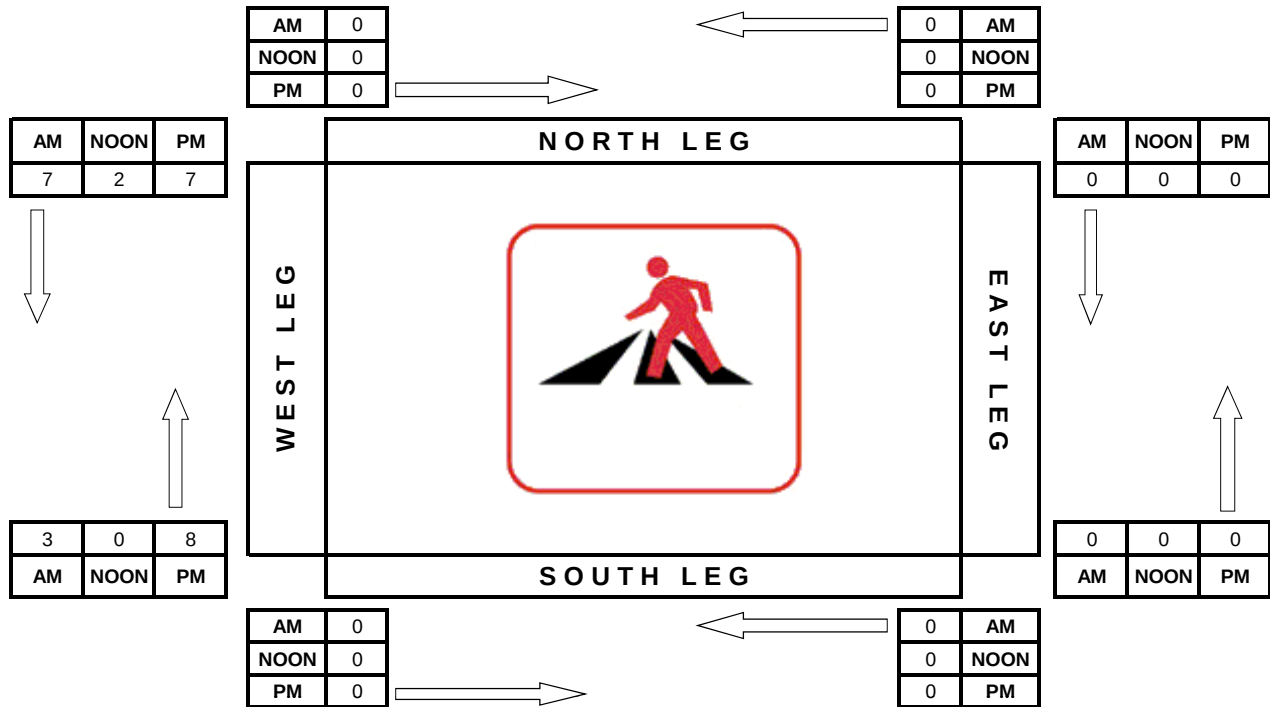
PREPARED BY NATIONAL DATA & SURVEYING SERVICES

Pedestrian Count Peak Hour

PROJECT#: 13-1072-001
 N/S Street: Gallup Circle
 E/W Street: Nellie Gail Rd
 DATE: 3/22/2013
 CITY: Laguna Hills

DAY: Friday

	Start:	End:
AM	6:00	10:00
NOON	10:00	14:00
PM	14:00	18:00



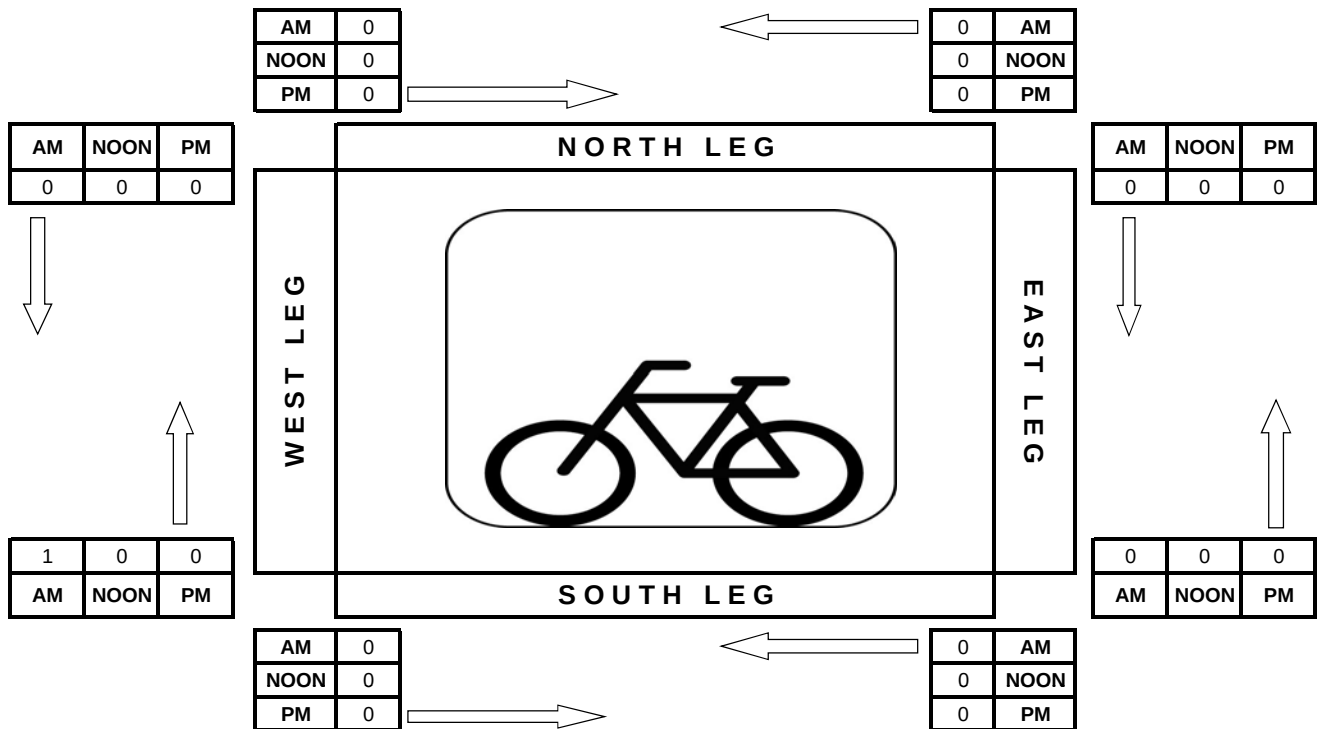
PREPARED BY NATIONAL DATA & SURVEYING SERVICES

Bicycle Count Peak Hour

PROJECT#: 13-1072-001
 N/S Street: Gallup Circle
 E/W Street: Nellie Gail Rd
 DATE: 3/22/2013
 CITY: Laguna Hills

DAY: Friday

	Start:	End:
AM	6:00	10:00
NOON	10:00	14:00
PM	14:00	18:00



PREPARED BY NATIONAL DATA & SURVEYING SERVICES

PROJECT#: 13-1072-001
N/S Street: Gallup Circle
E/W Street: Nellie Gail Rd
DATE: 3/22/2013
CITY: Laguna Hills

DAY: Friday

A M

PEDESTRIANS

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
6:00 AM	0	0	0	0	0	0	1	0
6:15 AM	0	0	0	0	0	0	0	0
6:30 AM	0	0	0	0	0	0	0	0
6:45 AM	0	0	0	0	0	0	2	0
7:00 AM	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	1	0
8:00 AM	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	1	1
8:30 AM	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	3	0
9:00 AM	0	0	0	0	0	0	1	1
9:15 AM	0	0	0	0	0	0	0	1
9:30 AM	0	0	0	0	0	0	0	2
9:45 AM	0	0	0	0	0	0	2	3
TOTALS	0	0	0	0	0	0	11	8

BIKES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
6:00 AM	0	0	0	0	0	0	0	0
6:15 AM	0	0	0	0	0	0	0	0
6:30 AM	0	0	0	0	0	0	0	0
6:45 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	1	0
8:00 AM	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0	0
9:30 AM	0	0	0	0	0	0	0	0
9:45 AM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	1	0

NOON

PEDESTRIANS

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
10:00 AM	0	0	0	0	0	0	1	0
10:15 AM	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	1
10:45 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	1	0
11:15 AM	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	1
12:15 PM	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	1
1:00 PM	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	1
1:30 PM	0	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	2	4

BIKES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
10:00 AM	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0
1:30 PM	0	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0

P M

PEDESTRIANS

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
2:00 PM	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	2	0
2:45 PM	0	0	0	0	0	0	3	2
3:00 PM	0	0	0	0	0	0	0	1
3:15 PM	0	0	0	0	0	0	1	0
3:30 PM	0	0	0	0	0	0	5	2
3:45 PM	0	0	0	0	0	0	2	2
4:00 PM	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	1	2
4:30 PM	0	0	0	0	0	0	2	2
4:45 PM	0	0	0	0	0	0	1	0
5:00 PM	0	0	0	0	0	0	2	3
5:15 PM	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	19	15

BIKES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
2:00 PM	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0
4:00 PM	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0

PEAK HOURS

PEDESTRIANS

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
9:00 AM	0	0	0	0	0	0	3	7
12:45 PM	0	0	0	0	0	0	0	2
3:30 PM	0	0	0	0	0	0	8	7

PEAK HOURS

BIKES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
7:45 AM	0	0	0	0	0	0	1	0
12:00 AM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0

AM
NOON
PM

**SATURDAY,
MARCH 30, 2013
COUNT DATA**

VEHICLE COUNT DATA

5/15/2013 ITEM NO. 4.3

ITM Peak Hour Summary

Prepared by:



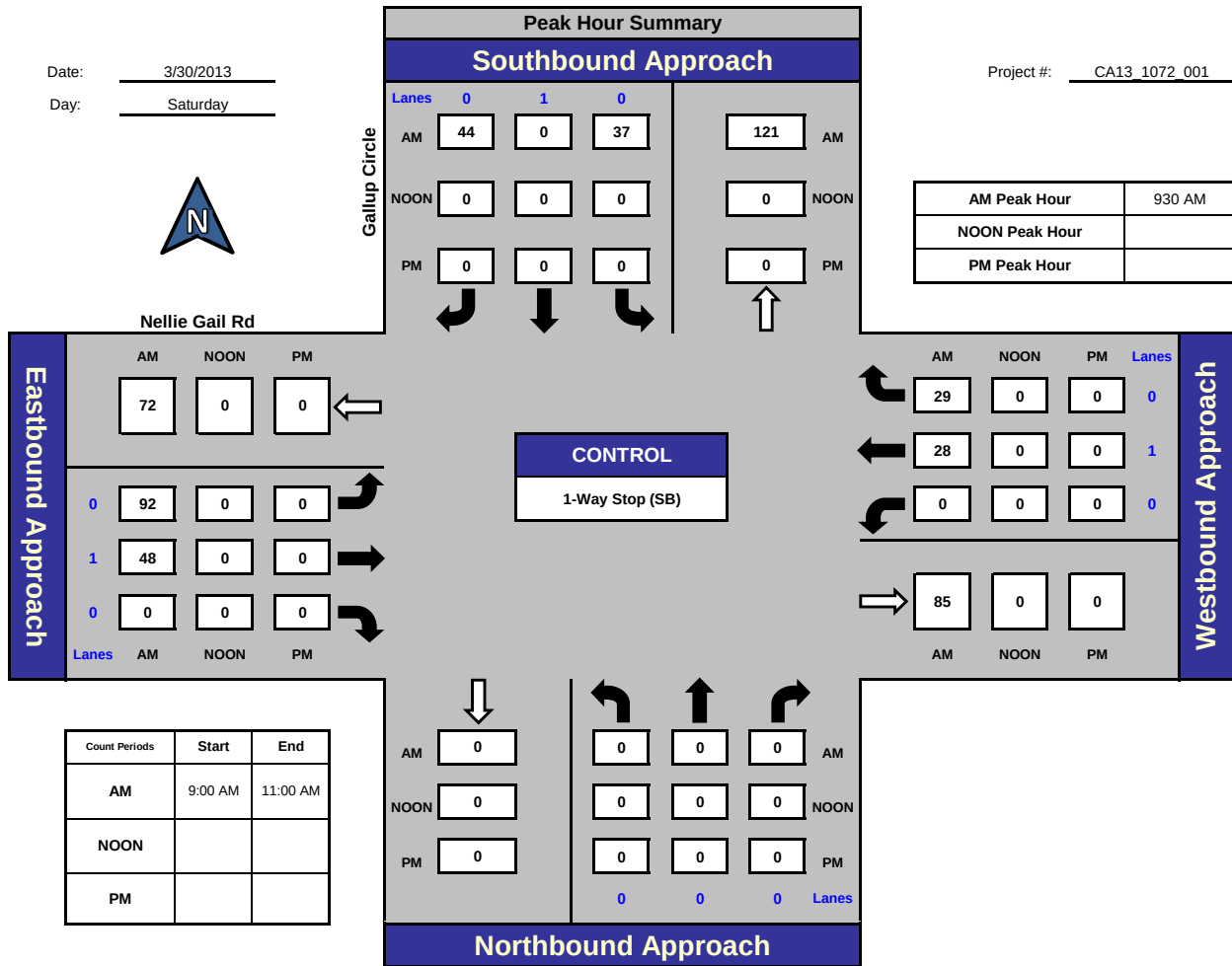
National Data & Surveying Services

Gallup Circle and Nellie Gail Rd , City of Laguna Hills

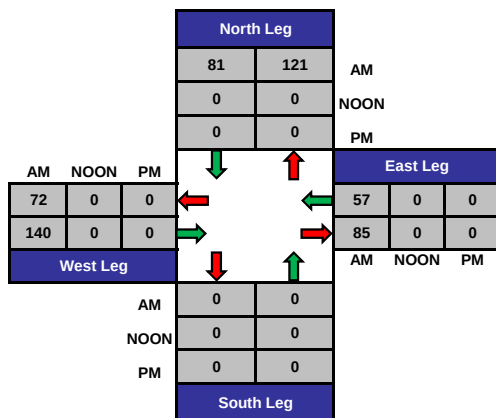
Date: 3/30/2013

Day: Saturday

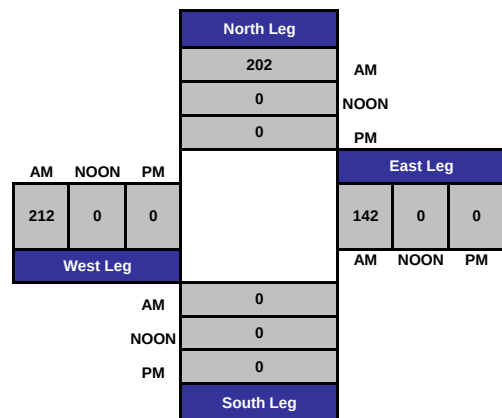
Project #: CA13 1072 001



Total Ins & Outs



Total Volume Per Leg



Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_1072_001

Day: SATURDAY

City: City of Laguna Hills

Date: 3/30/2013

NS/EW Streets:		AM												
		Gallup Circle			Gallup Circle			Nellie Gail Rd			Nellie Gail Rd			
		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:		NL 0	NT 0	NR 0	SL 0	ST 1	SR 0	EL 0	ET 1	ER 0	WL 0	WT 1	WR 0	TOTAL
9:00 AM					1		3	7	1			7	4	23
9:15 AM					2		5	12	4			4	1	28
9:30 AM					12		12	22	5			4	9	64
9:45 AM					8		8	24	13			8	7	68
10:00 AM					7		10	28	9			7	7	68
10:15 AM					10		14	18	21			9	6	78
10:30 AM					5		10	13	5			4	7	44
10:45 AM					4		22	6	8			6	2	48
TOTAL VOLUMES :		NL 0	NT 0	NR 0	SL 49	ST 0	SR 84	EL 130	ET 66	ER 0	WL 0	WT 49	WR 43	TOTAL 421
APPROACH %'s :		#DIV/0!	#DIV/0!	#DIV/0!	36.84%	0.00%	63.16%	66.33%	33.67%	0.00%	0.00%	53.26%	46.74%	
PEAK HR START TIME :		930 AM												TOTAL
PEAK HR VOL :		0	0	0	37	0	44	92	48	0	0	28	29	278
PEAK HR FACTOR :		0.000			0.844			0.897			0.950			0.891

CONTROL : 1-Way Stop (SB)

EQUESTRIAN COUNT DATA

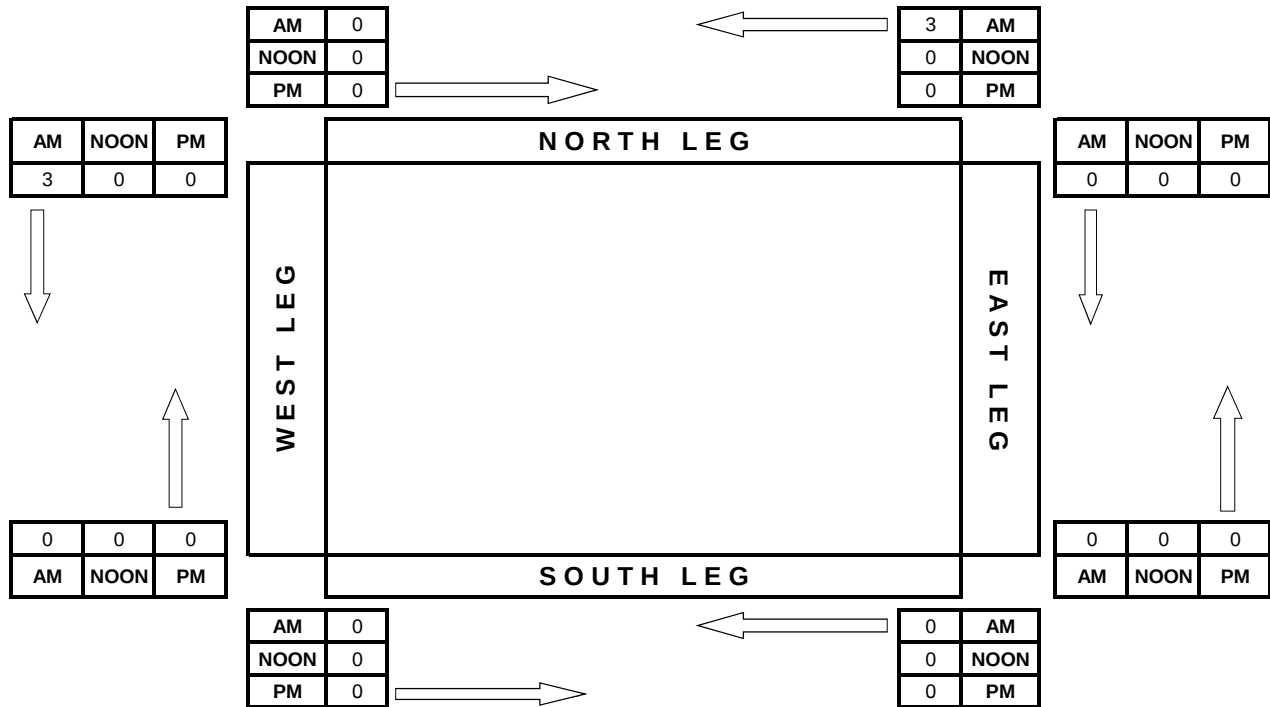
PREPARED BY NATIONAL DATA & SURVEYING SERVICES

Horse Count Peak Hour

PROJECT#: 13-1072-001
 N/S Street: Gallup Circle
 E/W Street: Nellie Gail Rd
 DATE: 3/30/2013
 CITY: Laguna Hills

DAY: Saturday

	Start:	End:
AM	9:00	11:00
NOON		
PM		



PREPARED BY NATIONAL DATA & SURVEYING SERVICES

PROJECT#: 13-1072-001
 N/S Street: Gallup Circle
 E/W Street: Nellie Gail Rd
 DATE: 3/30/2013
 CITY: Laguna Hills

DAY: Saturday

A M

HORSES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
9:00 AM	0	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0	0
9:30 AM	0	0	0	0	0	0	0	0
9:45 AM	0	3	0	0	0	0	0	3
10:00 AM	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0
TOTALS	0	3	0	0	0	0	0	3

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
9:00 AM								
9:15 AM								
9:30 AM								
9:45 AM								
10:00 AM								
10:15 AM								
10:30 AM								
10:45 AM								
TOTALS	0	0	0	0	0	0	0	0

PEAK HOURS

HORSES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
9:45 AM	0	3	0	0	0	0	0	3
12:00 AM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0

PEAK HOURS

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
12:00 AM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0

AM
 NOON
 PM

PEDESTRIAN & BICYCLE COUNT DATA

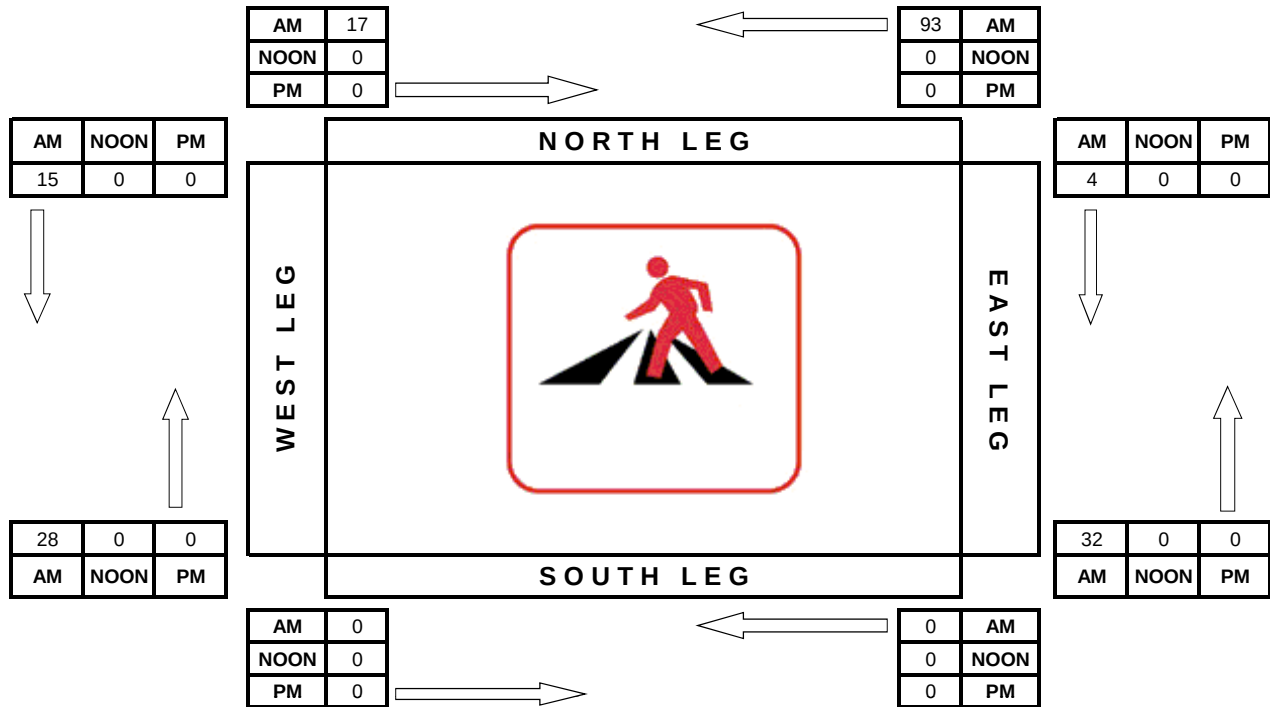
PREPARED BY NATIONAL DATA & SURVEYING SERVICES

Pedestrian Count Peak Hour

PROJECT#: 13-1072-001
 N/S Street: Gallup Circle
 E/W Street: Nellie Gail Rd
 DATE: 3/30/2013
 CITY: Laguna Hills

DAY: Saturday

	Start:	End:
AM	9:00	11:00
NOON		
PM		



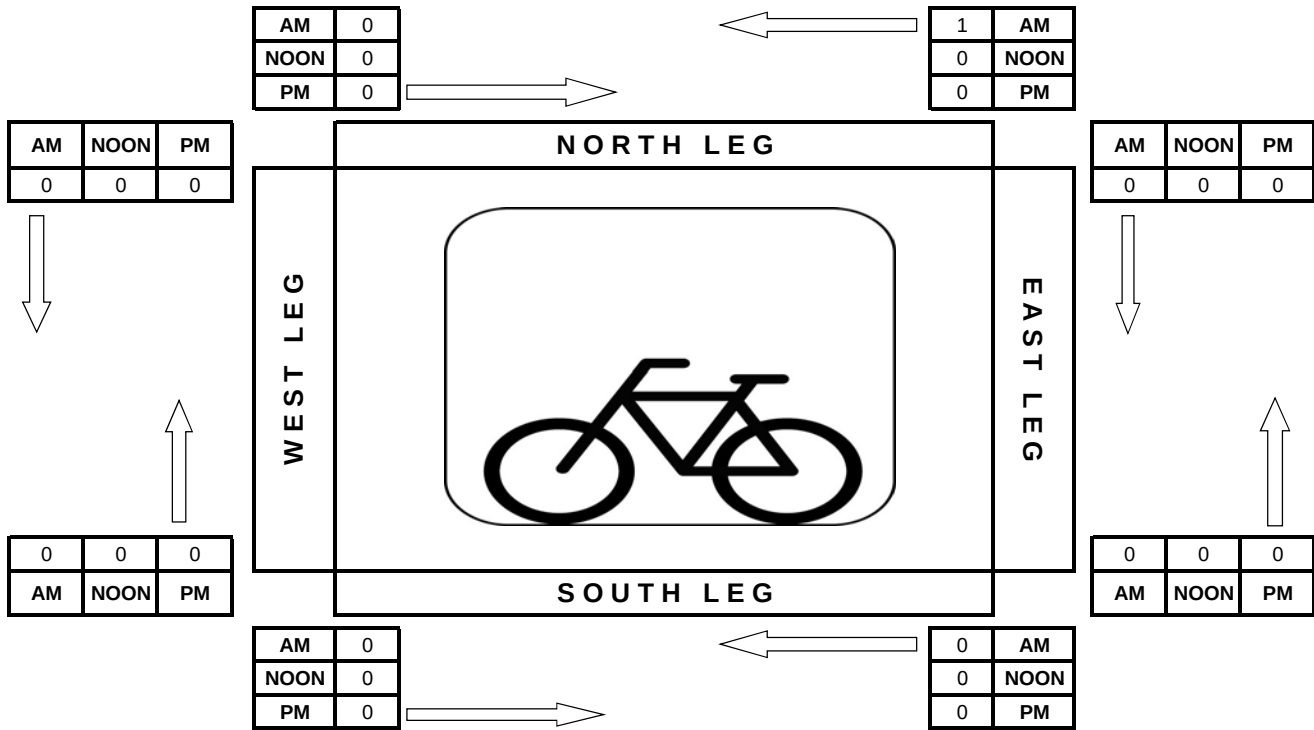
PREPARED BY NATIONAL DATA & SURVEYING SERVICES

Bicycle Count Peak Hour

PROJECT#: 13-1072-001
 N/S Street: Gallup Circle
 E/W Street: Nellie Gail Rd
 DATE: 3/30/2013
 CITY: Laguna Hills

DAY: Saturday

	Start:	End:
AM	9:00	11:00
NOON		
PM		



PREPARED BY NATIONAL DATA & SURVEYING SERVICES

PROJECT#: 13-1072-001
N/S Street: Gallup Circle
E/W Street: Nellie Gail Rd
DATE: 3/30/2013
CITY: Laguna Hills

DAY: Saturday

A M

PEDESTRIANS

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
9:00 AM	2	2	0	0	0	0	0	2
9:15 AM	0	0	0	0	1	0	3	0
9:30 AM	6	7	0	0	0	2	13	12
9:45 AM	2	45	0	0	5	1	17	0
10:00 AM	9	17	0	0	5	0	5	0
10:15 AM	0	16	0	0	11	0	6	2
10:30 AM	6	15	0	0	11	3	0	13
10:45 AM	9	7	0	0	6	4	0	10
TOTALS	34	109	0	0	39	10	44	39

BIKES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
9:00 AM	0	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0	0
9:30 AM	0	0	0	0	0	0	0	0
9:45 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
10:15 AM	0	1	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0
TOTALS	0	1	0	0	0	0	0	0

PEAK HOURS

PEDESTRIANS

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
9:45 AM	17	93	0	0	32	4	28	15
12:00 AM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0

PEAK HOURS

BIKES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
10:15 AM	0	1	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0

AM
NOON
PM

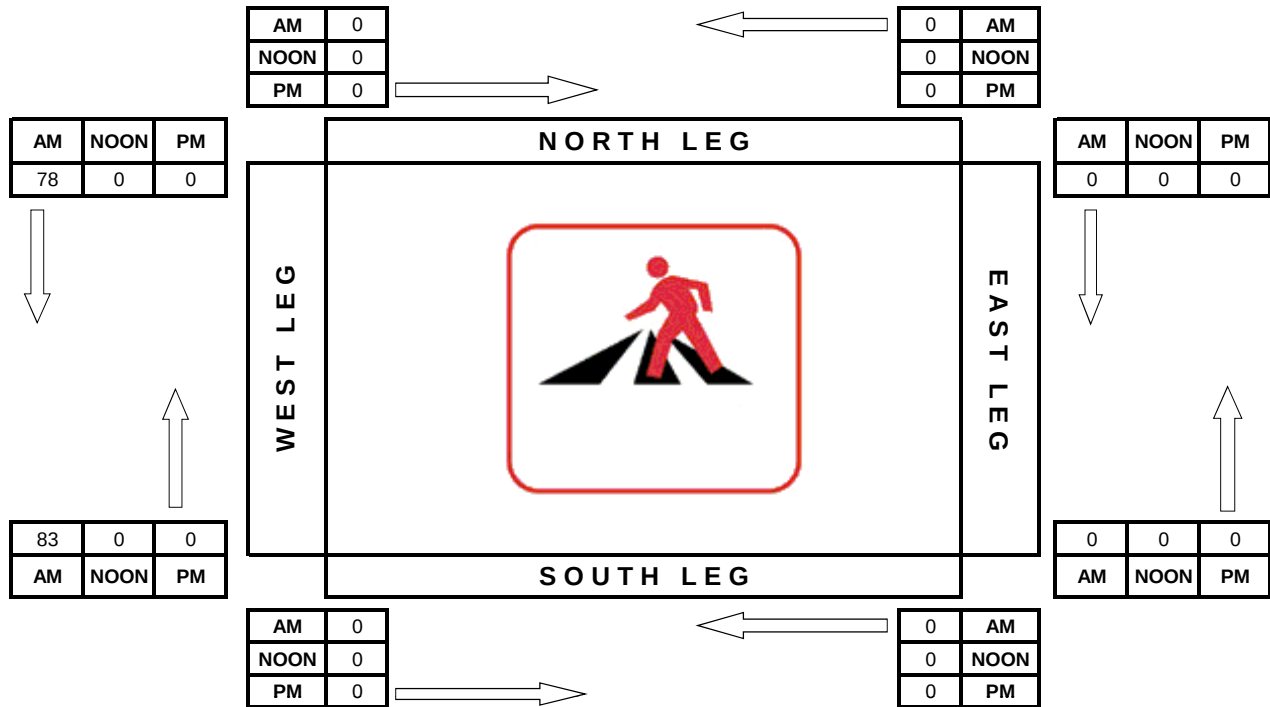
PREPARED BY NATIONAL DATA & SURVEYING SERVICES

Pedestrian Count Peak Hour

PROJECT#: 13-1072-001
 N/S Street: Gallup Circle
 E/W Street: Nellie Gail Rd
 DATE: 3/30/2013
 CITY: Laguna Hills

DAY: Saturday

	Start:	End:
AM	9:00	11:00
NOON		
PM		



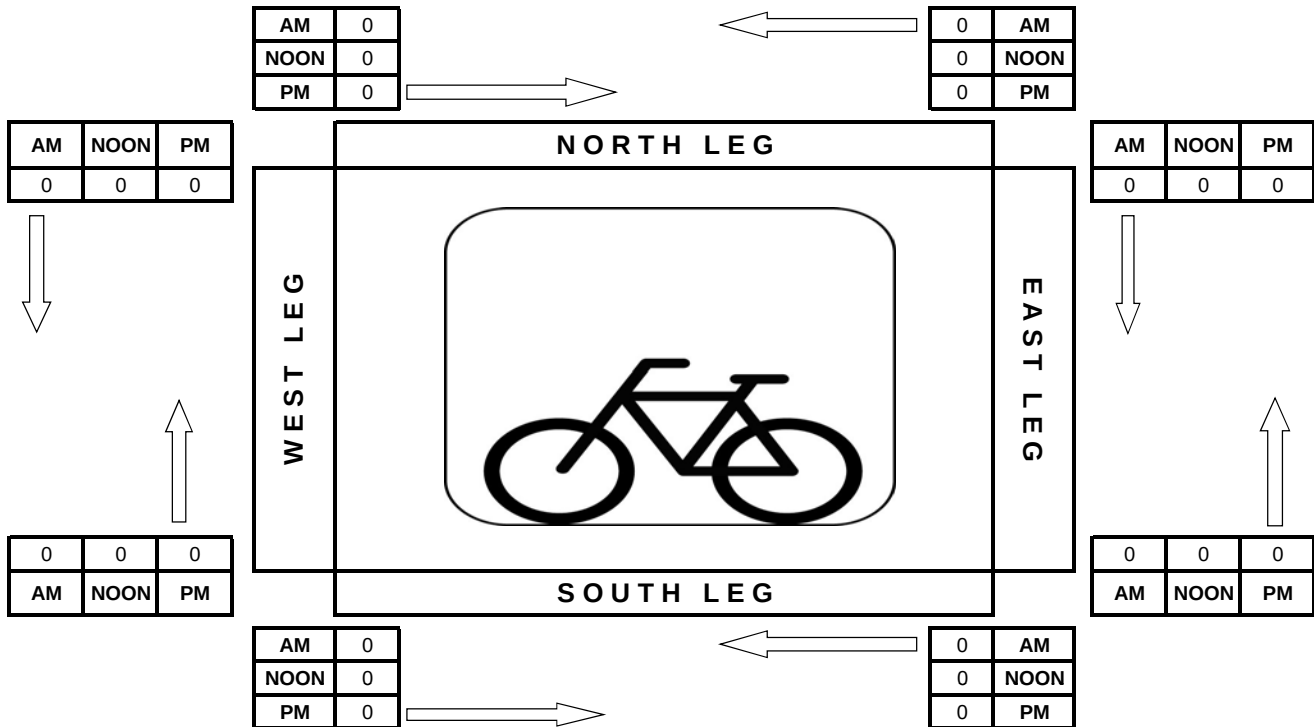
PREPARED BY NATIONAL DATA & SURVEYING SERVICES

Bicycle Count Peak Hour

PROJECT#: 13-1072-001
 N/S Street: Gallup Circle
 E/W Street: Nellie Gail Rd
 DATE: 3/30/2013
 CITY: Laguna Hills

DAY: Saturday

	Start:	End:
AM	9:00	11:00
NOON		
PM		



PREPARED BY NATIONAL DATA & SURVEYING SERVICES

PROJECT#: 13-1072-001
 N/S Street: Gallup Circle
 E/W Street: Nellie Gail Rd
 DATE: 3/30/2013
 CITY: Laguna Hills

DAY: Saturday

A M

PEDESTRIANS

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
9:00 AM	0	0	0	0	0	0	0	1
9:15 AM	0	0	0	0	0	0	0	2
9:30 AM	0	0	0	0	0	0	20	0
9:45 AM	0	0	0	0	0	0	22	0
10:00 AM	0	0	0	0	0	0	46	3
10:15 AM	0	0	0	0	0	0	27	1
10:30 AM	0	0	0	0	0	0	1	26
10:45 AM	0	0	0	0	0	0	9	48
TOTALS	0	0	0	0	0	0	125	81

BIKES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
9:00 AM	0	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0	0
9:30 AM	0	0	0	0	0	0	0	0
9:45 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0

PEAK HOURS

PEDESTRIANS

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
10:00 AM	0	0	0	0	0	0	83	78
12:00 AM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0

PEAK HOURS

BIKES

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
12:00 AM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0

AM
 NOON
 PM

APPENDIX D

STOPPING SIGHT DISTANCE AS A FUNCTION OF SPEED

CALIFORNIA MUTCD

Table 6C-1. Recommended Advance Warning Sign ~~Minimum~~ Spacing

Road Type	Distance Between Signs*		
	A	B	C
Urban (low speed) - 25 mph or less	100 feet	100 feet	100 feet
Urban (high speed) - more than 25 mph to 40 mph	250 feet	250 feet	250 feet
Urban (high speed) - more than 40 mph	350 feet	350 feet	350 feet
Rural	500 feet	500 feet	500 feet
Expressway / Freeway	1,000 feet	1,500 feet	2,640 feet

* ~~Speed category to be determined by the highway agency.~~

** The column headings A, B, and C are the dimensions shown in Figures 6H-1 through 6H-46. The A dimension is the distance from the transition or point of restriction to the first sign. The B dimension is the distance between the first and second signs. The C dimension is the distance between the second and third signs. (The "first sign" is the sign in a three-sign series that is closest to the TTC zone. The "third sign" is the sign that is furthest upstream from the TTC zone.)

**Table 6C-2. Stopping Sight Distance
as a Function of Speed**

Speed*	Distance
20 mph	115 feet
25 mph	155 feet
30 mph	200 feet
35 mph	250 feet
40 mph	305 feet
45 mph	360 feet
50 mph	425 feet
55 mph	495 feet
60 mph	570 feet
65 mph	645 feet
70 mph	730 feet
75 mph	820 feet

* Posted speed, off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed.

Can also be used as Stopping Sight Distance as suggested buffer space length or location for flagger station.

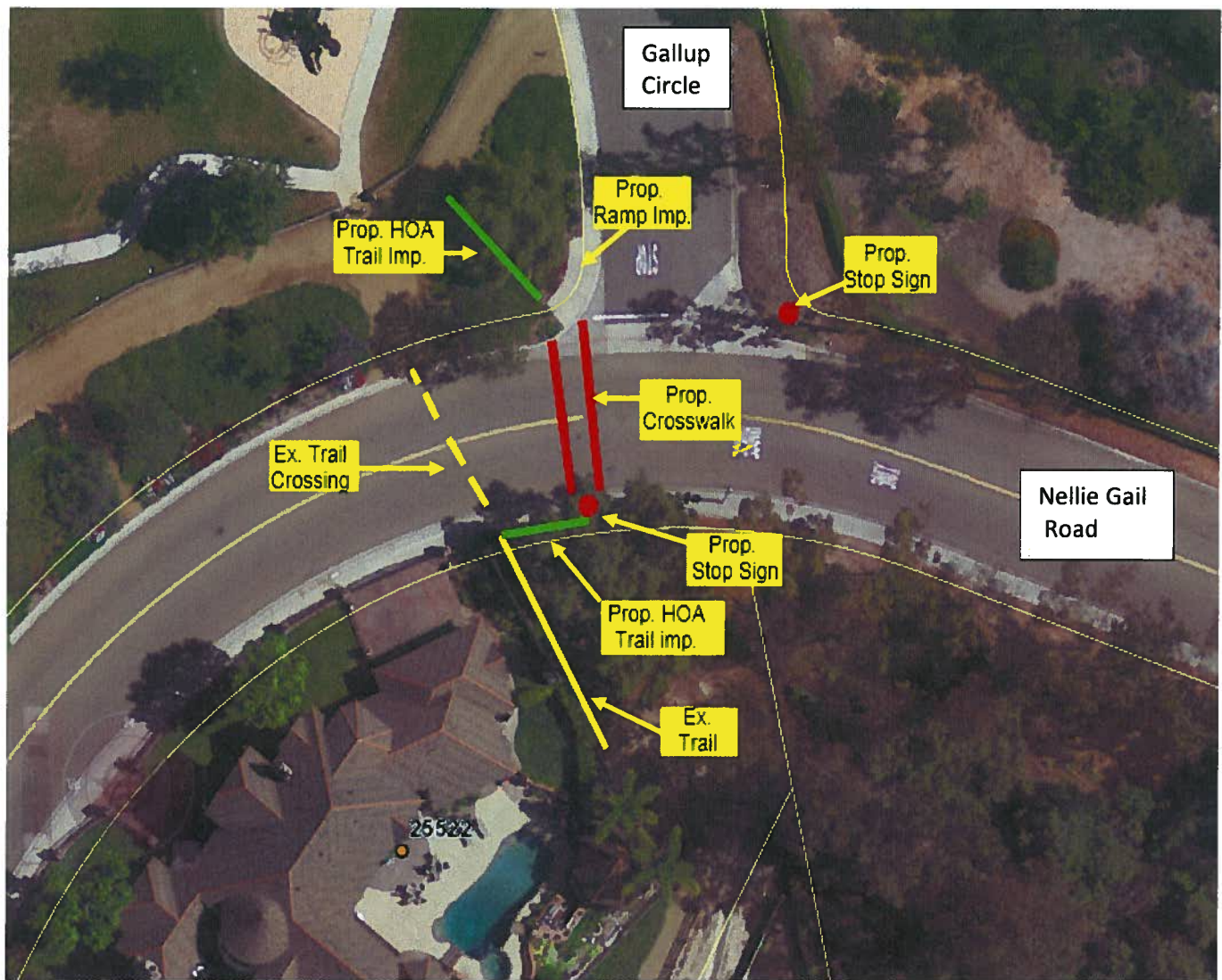
**Table 6C-3. Taper Length Criteria for
Temporary Traffic Control Zones**

Type of Taper	Taper Length
Merging Taper	at least L
Shifting Taper	at least 0.5 L
Shoulder Taper	at least 0.33 L
One-Lane, Two-Way Traffic Taper	50 feet minimum, 100 feet maximum
Downstream Taper	50 feet minimum, 100 feet maximum

Note: Use Table 6C-4 to calculate L

ATTACHMENT D

NELLIE GAIL ROAD AT GALLUP CIRCLE EXHIBIT



ATTACHMENT E

HIDDEN TRAIL ROAD CROSSING PROPOSED NO PARKING RESTRICTION



ATTACHMENT F

NELLIE GAIL ROAD AT HOUSTON TRAIL CROSSING

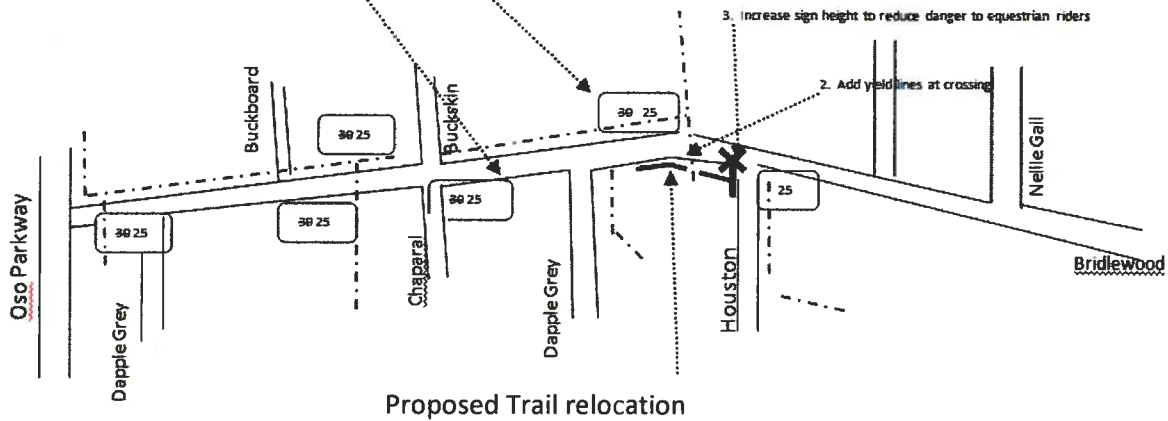
Committee Recommendations

4. a. Change speed limit signs on Nellie Gail Road to 25 mph.

(if all signs cannot be changed:

b. Change location of 30 mph sign just past the trail crossing to be closer to Oso Parkway. This sign causes cars to accelerate when approaching the trail crossing from Nellie Gail Road.

c. Change 30 mph sign on south side of Nellie Gail to 25 mph since it is the sign just before the trail crossing.



Key:

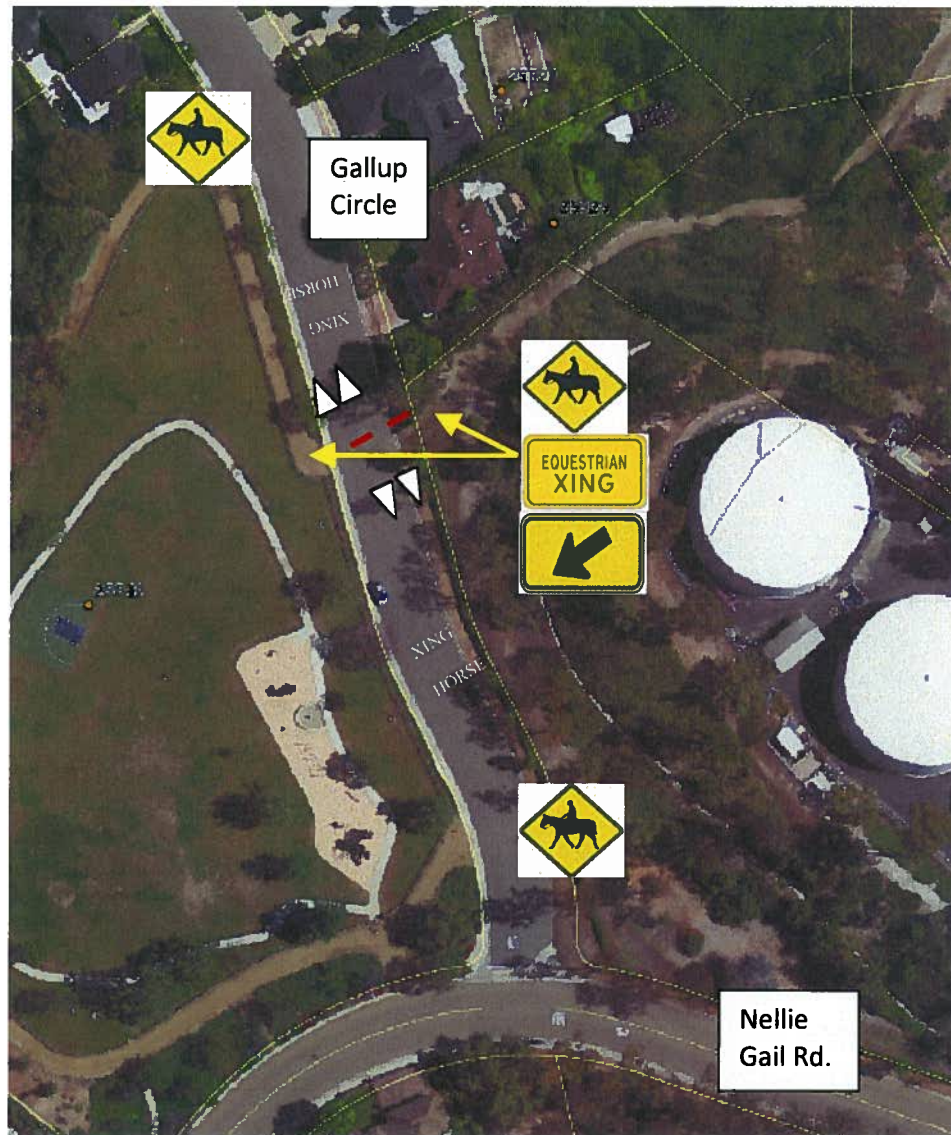
Trail: - - - - -

Existing Condition



ATTACHMENT G

GALLUP CIRCLE NORTH OF NELLIE GAIL ROAD EXHIBIT



CITY OF LAGUNA HILLS

June 2013

RADAR TRAILER SCHEDULE

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5	6	7	8
9	10	11 Nellie Gail N/O Empty Saddle 25 MPH	12 Bridlewood S/O Laurel crest 25 MPH	13 Rapid Falls W/O Sundowner 25 MPH	14	15
16	17	18	19	20	21	22
23	24	25 Woodbluff W/O Middle ridge 25 MPH	26 Ashland Mid-Block 25 MPH	27 San Vittoria N/O Ridge Route 30 MPH	28	29
30						

Rainy Days Excluded

Radar Trailer Calendar 2013 Bi-weekly
5/9/2013

CITY OF LAGUNA HILLS

July 2013

RADAR TRAILER SCHEDULE

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4 Holiday	5	6
7	8 Clarrington Mid-Block 25 MPH	9 Nellie Gail W/O Empty Saddle 25 MPH	10 Mustang W/O Farrier 25 MPH	11	12	13
14	15	16	17	18	19	20
21	22 Lost Colt E/O Beargrass 25 MPH	23 Rapid Falls W/O Sundowner 25 MPH	24 Bridlewood S/O Laurel Crest 25 MPH	25	26	27
28	29	30	31			