



CITY OF LAGUNA HILLS TRAFFIC COMMISSION

REGULAR MEETING AGENDA Wednesday, January 20, 2021 – 7:00 PM

Chris Mackey – Vice Chair

Chris Bieber - Commissioner

Anna Lisa Lukes - Commissioner

Manuel Hernandez - Commissioner

Larry Woodruff - Commissioner

Location: City Council Chamber, 24035 El Toro Road, Laguna Hills, CA 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. Completion of the form is voluntary. All persons may attend the meeting regardless of whether this form is completed.

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**2.1 Minutes**

Recommendation: That the Traffic Commission Approve the Minutes of the November 20, 2019.

3. PRESENTATIONS**4. ADMINISTRATIVE REPORTS****4.1 Nellie Gail Ranch Equestrian Crossing Reivew**

Recommendation: That the Traffic Commission Recommend to the City Council: (1) An equestrian trail connection from Nellie Gail Ranch Owners Association Equestrian Center to the Nellie Gail Road Trail Tunnel southerly of Oso Parkway be developed; and (2) There be an installation of yield line markings at the intersection of Rocking Horse Lane and Nellie Gail Road to facilitate the existing equestrian crossing at this location.

5. INFORMATIONAL ITEMS**5.1 Sheriff's Department Verbal Report****5.2 Radar Speed Trailer**

Recommendation: That the Traffic Commission Receive and File the Report.

6. COMMISSIONER COMMENTS**7. ADJOURNMENT**

The next Regular Meeting of the Traffic Commission will be March 17, 2021, at 7:00 PM in the City Council Chamber, located at 24035 El Toro Road, Laguna Hills California.

CERTIFICATION

I, KENNETH H. ROSENFELD, Assistant City Manager/Director of Public Services 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 the Courtyard at La Paz Center by January 15, 2021, at 5:00 pm.



Assistant City Manager/Director of Public Services**January 15, 2021**

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

Traffic Commission

Staff Report

DATE: January 20, 2021
TO: Traffic Commissioners
FROM: Kenneth H. Rosenfield P.E.
Assistant City Manager/Director of Public Services
ISSUE: Minutes

RECOMMENDATION: That the Traffic Commission Approve the Minutes of the November 20, 2019.

ATTACHMENTS:

- Minutes November 20 2019

**CITY OF LAGUNA HILLS
TRAFFIC COMMISSION MEETING
REGULAR MEETING MINUTES
NOVEMBER 20, 2019**

CALL TO ORDER

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

PLEDGE OF ALLEGIANCE

The Pledge of Allegiance was led by Commissioner Bieber.

ROLL CALL OF COMMISSION MEMBERS

Present: Vice Chair Chris Mackey, Commissioner Chris Bieber, Commissioner Anna Lisa Lukes, Commissioner Larry Woodruff

Absent: Chair Len Herman.

1. PUBLIC COMMENTS

Sid Hedjazi, from Optical Signs, spoke regarding his product.

Sally Cirino, from Optical Signs, spoke regarding her product.

2. MINUTES

THE TRAFFIC COMMISSION APPROVED THE MINUTES OF THE SEPTEMBER 18, 2019, REGULAR MEETING, BY M/COMMISSIONER LUKES, S/COMMISSIONER BIEBER. APPROVED BY A VOTE OF 4-0, CHAIR HERMAN ABSENT.

3. PRESENTATIONS

There were no Presentations.

4. ADMINISTRATIVE REPORTS

4.1 ESTABLISHMENT OF NO PARKING ZONE ON THE NORTHERLY SIDE OF LOS ALISOS BOULEVARD FOR SIGHT DISTANCE NEAR THE INGRESS/EGRESS OF SOFI APARTMENTS (PRIVATE DRIVEWAY) BEGINNING 670 FEET WESTERLY OF AVENIDA DE LA CARLOTA

Associate Civil Engineer Amber Shah indicated staff was contacted by a resident

Attachment: Minutes November 20 2019 (2300 : Minutes)

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NOVEMBER 20, 2019**

regarding sight distance limitations on Los Alisos Boulevard easterly of the entrance to the Sofi Laguna Hills Apartments, a private driveway. Based upon the resident's concern, staff performed a site evaluation and determined restricting parking in this location will appropriately improve sight distance for vehicles exiting the Sofi Laguna Hills Apartments onto Los Alisos Boulevard.

THE TRAFFIC COMMISSION RECOMMENDED TO THE CITY COUNCIL THE ESTABLISHMENT OF A NO PARKING ZONE ON THE NORTHERLY SIDE OF LOS ALISOS BOULEVARD FOR A DISTANCE OF 40 FEET BEGINNING 670 FEET WESTERLY OF AVENIDA DE LA CARLOTA, JUST EASTERLY OF THE INGRESS/EGRESS OF THE SOFI APARTMENTS (PRIVATE DRIVEWAY) FOR SIGHT DISTANCE PURPOSES. BY M/COMMISSIONER BIEBER, S/COMMISSIONER LUKES.

APPROVED BY A VOTE OF 4-0, CHAIR HERMAN ABSENT.

4.2 MULTI-WAY STOP SIGN EVALUATION – MULTIPLE LOCATIONS INCLUDING WILKES PLACE AT MAWSON DRIVE, MAWSON DRIVE AT VELASQUEZ ROAD AND GRISSOM ROAD AT VELASQUEZ ROAD

Associate Civil Engineer Amber Shah, indicated staff was contacted by a resident regarding traffic controls for students walking to Lomarena Elementary school at multiple locations. In accordance with the City's Residential Street Management Policy, staff initiated a multi-way stop sign evaluation at each of the three intersections including site visits and observation of the crossing locations. The stop sign analysis was performed by Hartzog and Crabill, Inc., and determined a 3-way stop sign installation was not warranted at any of the locations studied, based upon the minimum guidelines established by the California Manual on Uniform Traffic Control Devices (MUTCD) for traffic volumes, traffic collision history and site conditions. However, one-way stop sign installations are recommended as minor street stop controls for the westbound approach of Mawson Drive at Wilkes Place and for the southbound approach of Velasquez Drive at Mawson Drive to improve right-of-way assignment. An existing one way stop control is already installed on Velasquez Drive at Grissom Road. Based on the findings of the report, staff concurs with the recommendation to install side street stop signs on Mawson Drive at Wilkes Place and on Velasquez Drive at Mawson Drive to affirmatively assign right-of-way at the intersection.

THE TRAFFIC COMMISSION RECOMMENDED TO THE CITY COUNCIL THE INSTALLATION OF MINOR STREET ONE-WAY STOP SIGNS ON MAWSON DRIVE AT WILKES PLACE AND ON VELASQUEZ DRIVE AT MAWSON DRIVE. BY M/COMMISSIONER WOODRUFF, S/COMMISSIONER BIEBER.
APPROVED BY A VOTE OF 4-0, CHAIR HERMAN ABSENT.

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**4.3 EVALUATION OF LOMARENA ELEMENTARY SCHOOL ADULT CROSSING
GUARD LOCATIONS**

Associate Civil Engineer Amber Shah, indicated this item was previously presented at the May 15, 2019, meeting of the Traffic Commission. The existing conditions did not meet the State Standard Warrant criteria for crossing guards. The Traffic Commission approved the recommendation to receive and file this report. However, at the September 18, 2019, meeting of the Traffic Commission, the Traffic Commission requested this item be included on the next meeting's agenda. The previous staff report was presented as requested. The staff recommendation was unchanged.

Shawna Kozek, a resident, spoke in favor of an adult crossing guard.

**THE TRAFFIC COMMISSION RECEIVED AND FILED THE REPORT. BY
M/COMMISSIONER LUKES, S/COMMISSIONER WOODRUFF.
APPROVED BY A VOTE OF 4-0, CHAIR HERMAN ABSENT.**

**4.4 REPEAT SPEED SURVEY ON SANTA VITTORIA DRIVE BETWEEN RIDGE
ROUTE DRIVE AND LAKE FOREST DRIVE**

Associate Civil Engineer Amber Shah, indicated this item was previously presented at the September 19, 2018, and March 20, 2019, Traffic Commission meeting. In both instances, it was recommended to do a follow-up speed survey in six months' time. The current survey was performed in October 2019, and determined the prevailing speed of traffic has continued to decrease based upon previous measurements, with only the afternoon hours still slightly higher than expected for a 30mph posted speed limit. Therefore, staff recommended continued police enforcement as resources permit and continued posting of the radar trailer in this area.

**THE TRAFFIC COMMISSION RECEIVED AND FILED THE REPORT. BY
M/COMMISSIONER BIEBER, S/COMMISSIONER LUKES.
APPROVED BY A VOTE OF 4-0, CHAIR HERMAN ABSENT.**

4.5 REPEAT SPEED SURVEY ON BRIDLEWOOD DRIVE

Associate Civil Engineer Amber Shah, indicated staff was previously contacted by a resident of Moulton Ranch in April 2018, regarding concerns of vehicular speeding and collisions on Bridlewood Drive, between Vista Viejo Road and Laurel Crest Drive. Based upon the resident's concerns and in accordance with the Residential Streets Management Policy, staff initiated a traffic engineering evaluation of Bridlewood Drive between Vista Viejo Road and Laurel Crest Drive. The report presented at the July 18, 2018, meeting of the Traffic Commission concluded the 85th percentile speed measurement of Bridlewood Drive was higher than expected. Additional traffic speed enforcement and use of the radar trailer were utilized to

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address this issue. The Traffic Commission requested staff repeat the speed survey of Bridlewood Drive in six months' time.

In accordance with the Traffic Commission's request, a follow-up speed survey was performed in December 2018. Although the prevailing speed of traffic was lower than previous measurements, it was still higher than expected for a residential street. Therefore, staff recommended and subsequently installed additional signs and pavement legends on Bridlewood Drive. Continued concentrated police enforcement was also recommended in addition to a follow-up speed survey in six months' time.

In accordance with the recommendation at the January 16, 2019, meeting of the Traffic Commission, a new speed survey was performed in October 2019. This speed survey determined the prevailing speed of traffic was now in the acceptable range in the morning but remained higher than expected in the afternoon time period. The City has already taken incremental steps to address this speeding issue and implemented all non-physical traffic control devices appropriate for this location. Based upon a collision history of two collisions reported in the past 5 years with none categorized as unsafe speed, staff recommended continued concentrated police enforcement and posting of the radar trailer in this area.

**THE TRAFFIC COMMISSION RECEIVED AND FILED THE REPORT. BY
M/COMMISSIONER BIEBER, S/COMMISSIONER LUKES.
APPROVED BY A VOTE OF 4-0, CHAIR HERMAN ABSENT.**

4.6 CITYWIDE STREET MAINTENANCE PROJECT

Associate Civil Engineer Amber Shah, reported the City implements a Capital Improvement Project on a biennial basis to perform maintenance on a portion of the City's street system. The currently planned project, known as CIP No. 101-K, will perform maintenance, including an asphalt concrete overlay, on selected streets in accordance with the City's Pavement Management Plan for the preservation of this asset. CIP No. 101-K was approved as part of the Fiscal Year 2019/2020, Capital Improvement Budget. The Project was advertised for bids, and the Contract was awarded to R.J. Noble Company. Construction work recently began in late October 2019, and will continue for approximately three months.

**THE TRAFFIC COMMISSION RECEIVED AND FILED THE REPORT. BY
M/COMMISSIONER BIEBER, S/COMMISSIONER LUKES.
APPROVED BY A VOTE OF 4-0, CHAIR HERMAN ABSENT.**

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5. INFORMATIONAL ITEMS

5.1 SHERIFF'S DEPARTMENT VERBAL REPORT

Sergeant McFatridge indicated the Sheriff's Department had increased their enforcement in the areas discussed on the agenda. In addition, Sergeant Mcfatridge mentioned due to the upcoming holidays, the Department would focus on increased enforcement, in regards to driving while under the influence.

5.2 RADAR SPEED TRAILER

Staff submitted the schedule for the radar trailer.

**THE TRAFFIC COMMISSION RECEIVED AND FILED THE REPORT.
BY M/COMMISSIONER BIEBER, S/COMMISSIONER WOODRUFF.
APPROVED BY A VOTE OF 4-0, COMMISSIONER WOODRUFF ABSENT.**

6. COMMISSIONER COMMENTS

There were no Commissioner comments.

7. ADJOURNMENT

There being no further business before the Traffic Commission at this session, Vice Chair Mackey declared the meeting adjourned at 7:57 p.m.

Prepared By:

Amber Shah, P.E.
Associate Civil Engineer

Approved By:

Vice Chair Mackey

Attachment: Minutes November 20 2019 (2300 : Minutes)



City of Laguna Hills

Traffic Commission

Staff Report

DATE: January 20, 2021
TO: Traffic Commissioners
FROM: Amber M. Shah P.E.
Associate Civil Engineer
ISSUE: Nellie Gail Ranch Equestrian Crossing Reivew

RECOMMENDATION: That the Traffic Commission Recommend to the City Council: (1) An equestrian trail connection from Nellie Gail Ranch Owners Association Equestrian Center to the Nellie Gail Road Trail Tunnel southerly of Oso Parkway be developed; and (2) There be an installation of yield line markings at the intersection of Rocking Horse Lane and Nellie Gail Road to facilitate the existing equestrian crossing at this location.

SUMMARY:

Staff met with the Nellie Gail Ranch Equestrian Ad Hoc Committee (Committee) to evaluate equestrian crossings in the Nellie Gail Ranch community. The Committee requested an evaluation of the driveway crossing at the Nellie Gail Ranch Owners Association Equestrian Center on Nellie Gail Road southerly of Oso Parkway and expressed concerns about traffic controls at nearby intersections. Based upon the Committee's concerns and in accordance with the Residential Streets Management Policy, staff initiated a review of the Nellie Gail Equestrian Center driveway/equestrian crossing and three intersections along Nellie Gail Road at Empty Saddle Drive, Hidden Trail Road and Rocking Horse Lane. The Traffic Engineers of Hartzog & Crabill, Inc., (HCI) were retained and completed a traffic control and operational review of the Nellie Gail Equestrian Center driveway/equestrian crossing and analyses of the three intersections.

The traffic control and operational review of the driveway/equestrian crossing at the Nellie Gail Equestrian Center on Nellie Gail Road, determined the existing traffic control

installations at the equestrian crossing are satisfactory and supported by a zero-collision recorded history. Access improvements to the existing equestrian tunnel under Nellie Gail Road southerly of Oso Parkway is recommended as an incentive for equestrians to use this alternate trail crossing location.

Each of the three intersection multi-way stop sign analyses along Nellie Gail Road at Empty Saddle Drive, Hidden Trail Road and Rocking Horse Lane, determined 3-way stop sign installations are not warranted at any of the intersections based upon the minimum guidelines established by the California Manual on Uniform Traffic Control Devices (MUTCD) for traffic volumes, traffic collision history and site conditions. However, it is recommended the Traffic Commission recommend installation of yield line marking at the intersection of Rocking Horse Lane and Nellie Gail Road to improve the equestrian trail crossing at this location as recommended by staff and described in this report.

BACKGROUND:

In 2012, the City Council approved the establishment of a staff directed Committee to review equestrian trail crossing markings and signage in and around the Nellie Gail Ranch community. Since the formation of the Committee, enhancements were made to numerous equestrian crossings. This effort included substantial improvements to the at-grade crossing at the Nellie Gail Equestrian Center driveway/equestrian crossing on Nellie Gail Road southerly of Oso Parkway. Recently, the Committee contacted Staff with a request for a new evaluation of the driveway/equestrian crossing at the Nellie Gail Equestrian Center due to recent safety concerns. The Committee also requested an evaluation of other traffic controls at nearby intersections.

Based upon the Committee's request and in accordance with the Residential Streets Management Policy, staff initiated a review of the Nellie Gail Equestrian Center driveway/equestrian crossing location and three intersections along Nellie Gail Road. The Traffic Engineers of Hartzog & Crabill, Inc., (HCI) were retained and completed a traffic control and operational review of the Nellie Gail Equestrian Center driveway/equestrian crossing on Nellie Gail Road and multi-way stop sign analyses of three intersections along Nellie Gail Road at 1) Empty Saddle Drive, 2) Hidden Trail Road, and 3) Rocking Horse lane. The control of traffic is based upon the application of principles of Engineering, Education of the roadway users and Enforcement of regulations. The analysis provided by HCI addresses the Engineering aspects of Traffic Control.

The traffic control and operational review of the driveway/equestrian crossing at the Nellie Gail Equestrian Center on Nellie Gail Road, performed by HCI, attached, determined the existing traffic control installations at the equestrian crossing are consistent with standards and provide appropriate traffic controls. This conclusion is partially supported by a zero-collision recorded history as well as the other determinations described in their report. No change in traffic controls is recommended. Members of the Nellie Gail Equestrian Committee did express concerns about vehicle speeds and did provide verbal reports of “near-miss” traffic collisions at the crossing location.

The analysis of the Equestrian Center driveway/equestrian crossing location included the collection of vehicular speed data. Both 24-hour speed trend data and spot speed radar study data was collected. Nellie Gail Road has a posted speed limit of 25 miles per hour (mph). Historic data collection throughout the City on 25 mph speed limit streets has found that the prevailing traffic speed, the 85th percentile speed, is typically between 32 and 34 mph without any records of adverse traffic collision history. As shown in the HCI report, the 24-hour speed trend data is in the 35-39 mph range and the radar speed studies are in the 33-34 mph range for both directions of traffic. While the radar speed studies are considered to be a more accurate measure of speeds, and those speeds are not unusual, the overall information collected on speed data indicates vehicular speeds are higher than desirable or appropriate for the given conditions.

Accordingly, as there are anecdotal reports of near miss traffic collisions and higher speeds than appropriate, Staff 1) will work with the Sherrieff’s Department on additional enforcement in this area as resources permit and 2) recommends the Equestrian Committee and Nellie Gail Ranch Owners Association work with the City to extend equestrian trail access from the Equestrian Center to the existing equestrian tunnel under Nellie Gail Road providing a separation between equestrians and vehicles when crossing Nellie Gail Road. If equestrian riders are concerned with the at-grade crossing location when leaving the Equestrian Center, they should have the opportunity to avail themselves of the existing tunnel.

The Committee also inquired about the installation of In-Roadway Warning Lights (IRWL) as a potential option to increase driver awareness at equestrian crossings. Included in HCI’s report is a review of the effectiveness of IRWL versus the existing

Rectangular Rapid Flashing Beacons (RRFB) located at the Nellie Gail Equestrian Center driveway/equestrian crossing location. RRFB have been found to be the most effective and cost-efficient crosswalk device in recent studies. Whereas, IRWL devices have been found to be difficult for drivers to see in daylight and when following other vehicles. Damage to IRWLs and malfunction issues are also a significant drawback as they are embedded into the asphalt.

Each of the three intersection multi-way stop sign analyses along Nellie Gail Road at Empty Saddle Drive, Hidden Trail Road and Rocking Horse Lane, performed by HCI, attached, determined 3-way stop sign installations are not warranted at any of the intersections based upon the minimum guidelines established by the California Manual on Uniform Traffic Control Devices (MUTCD) for traffic volumes, traffic collision history and site conditions. It is noted that Stop Signs are explicitly described in the MUTCD as not a speed control device; rather, they are only a right of way assignment control. Accordingly, the City cannot utilize Stop Signs for speed control. Existing one way stop controls are already installed on Empty Saddle Drive, Hidden Trail Road and Rocking Horse Lane at Nellie Gail Road, and additional stop sign installations were not warranted. However, installation of yield line markings at Rocking Horse Lane in both directions along Nellie Gail Road were recommended in addition to the existing Equestrian Crossing warning signs posted at this intersection to further advise motorists of the existence of this equestrian crossing location. Based upon the findings in these reports, staff concurs with the recommendation to install yield line markings at the intersection of Rocking Horse Lane and Nellie Gail Road.

FISCAL IMPACT:

The installation of yield line markings have an anticipated cost of \$300. Funds are available for this work in the 2020-2021 Fiscal Year Public Works Maintenance Budget.

ATTACHMENTS:

- Vicinity Map
- Hartzog and Crabill Traffic Control Operational Review - Nellie Gail at Equestrian Center - 12-03-20
- Hartzog and Crabill Multi Way Stop Sign Analysis - Nellie Gail at Empty Saddle - 11-23-20
- Hartzog and Crabill Multi Way Stop Sign Analysis - Nellie Gail at Hidden Trail - 11-24-20

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- Hartzog and Crabill Multi Way Stop Sign Analysis - Nellie Gail at Rocking Horse - 11-25-20



Attachment: Vicinity Map (2302 : Nellie Gail Ranch Equestrian Crossing Reivew)



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VICINITY MAP - NELLIE GAIL EQUESTRIAN CROSSINGS



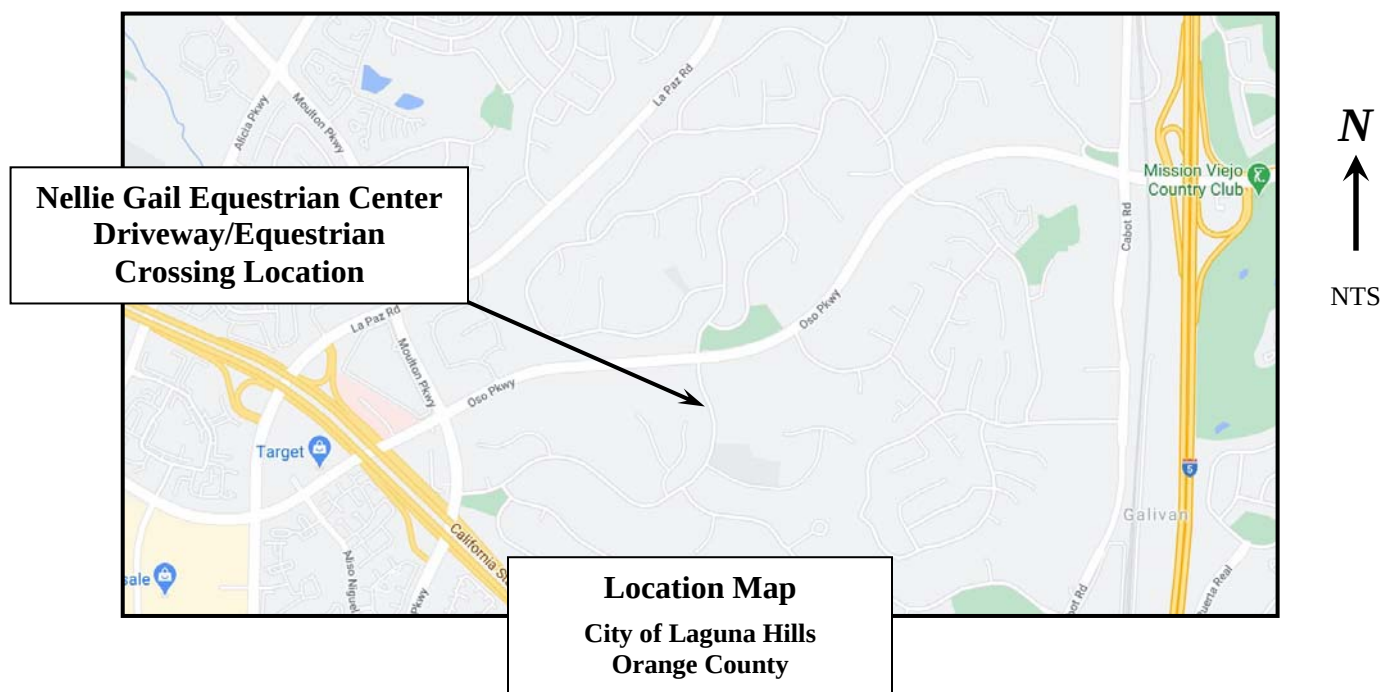
TRAFFIC CONTROL AND OPERATIONAL REVIEW

NELLIE GAIL ROAD AT THE EQUESTRIAN CENTER (S/O OSO PARKWAY) IN THE CITY OF LAGUNA HILLS, CA DECEMBER 3, 2020

INTRODUCTION

The City of Laguna Hills requested Hartzog & Crabill, Inc. (HCI) to complete a Traffic Control and Operational Review at the Nellie Gail Equestrian Center driveway/equestrian crossing location. This location is along Nellie Gail Road, approximately 450 feet south of Oso Parkway.

The location is a typical driveway intersection with Nellie Gail Road running in the north-south directions and the Equestrian Center driveway running in the east-west directions, on the east side of Nellie Gail Road. The intersection is located west of the I-5 Freeway and south of Oso Parkway (*see Location Map below*). The location is entirely within the City of Laguna Hills jurisdiction. At the present time, there are no stop controls on Nellie Gail Road (i.e., it is uncontrolled); however, there is an existing Rectangular Rapid Flashing Beacon (RRFB) push-button warning light crossing system for the equestrian crossing location.



Traffic Control & Operational Review:
Nellie Gail Equestrian Center Driveway/Equestrian Crossing Location, in Laguna Hills, CA

BACKGROUND

Nellie Gail Road is a north-south local-collector roadway with single-family residential properties on both sides of the street, along with an equestrian center on the east side of the street near Oso Parkway. At the intersection with the Equestrian Center driveway/equestrian crossing location, the roadway is approximately 60 feet wide, and the 2-lane roadway provides for one lane of traffic in each direction, which are separated by a raised landscaped center median. There are no marked crosswalks across Nellie Gail Road at or near the intersection. The roadway does have curb, gutter, sidewalk, and parkway improvements on the east side, and curb, gutter and parkway on the west side. There is a north-south equestrian path along the west side of the roadway. Nellie Gail Road has a posted speed limit of 25 MPH. On-street parking is prohibited on both sides of the street via No Parking Anytime signs. Currently, there are no STOP signs on Nellie Gail Road (i.e., uncontrolled) at its intersection with the Equestrian Center driveway/equestrian crossing location. As mentioned, there is an existing solar-powered Rectangular Rapid Flashing Beacon (RRFB) push-button warning light crossing system supplementing the equestrian crossing warning signs and yield line markings at this location.

The Equestrian Center Driveway is an east-west local driveway leading into the equestrian center parking lot and property. At the T-intersection with Nellie Gail Road, the driveway is approximately 20 feet wide. The 2-lane roadway provides for one lane of traffic in each direction, which are not separated by any centerline striping. There are no marked crosswalks across the Equestrian Center driveway/equestrian crossing location. The driveway does not have curb, gutter, and sidewalk improvements on either side. There is no STOP sign or 'STOP' pavement marking, or white limit line on the westbound approach of the Equestrian Center driveway at its intersection with Nellie Gail Road (i.e., uncontrolled). However, being a driveway, and not a public street, a STOP sign is not required or expected to be installed at this Equestrian Center location, for the same reason most other driveways are not typically posted with a STOP sign.

Traffic Control & Operational Review:
Nellie Gail Equestrian Center Driveway/Equestrian Crossing Location in Laguna Hills, CA

DATA COLLECTION

As part of this particular review, the City requested collision history, a 24-hour speed count, and radar spot surveys to be included in the data collection.

Collision History

The latest available collision history for the driveway/equestrian crossing location was gathered by HCI from the State of California Highway Patrol (CHP) Statewide Integrated Traffic Records System website (*i-SWITRS*). A comprehensive 5-year traffic collision history summary report was prepared for this intersection and reviewed for collisions. Table 1 below provides the most recent summary of collision history occurring at or near this intersection.

TABLE 1
SWITRS COLLISION SUMMARY

Intersection	2015-16		2017-18		2019		2020	
	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?
Nellie Gail Road at Equestrian Center driveway / Equestrian Crossing Location (450' S/o of Oso Pkwy)		<i>None reported</i>		<i>None reported</i>		<i>None reported</i>		<i>None reported</i>

Notes: Information above is derived per the latest 5-year intersection traffic collision database report gathered from CHP-SWITRS (*i-SWITRS website*).

As shown above, there have been no (0) reported collisions, at or near this location over the past (5) years of available SWITRS collision data. ***The SWITRS traffic collision data report prepared for this location is included in Appendix A.***

Traffic Control & Operational Review:
Nellie Gail Equestrian Center Driveway/Equestrian Crossing Location in Laguna Hills, CA

DATA COLLECTION (continued)

24-hour Speed Counts

This 5 consecutive day speed count was taken via machine counter and road tubes on Nellie Gail Road, north of Empty Saddle, just south of the raised landscaped center median. The results are summarized below:

<i>Thursday, October 29, 2020</i>	<u>Average Speed (mph)</u>	<u>85th percentile Speed (mph)</u>
Northbound	30	35
Southbound	32	38
Both Directions	31	37

<i>Friday, October 30, 2020</i>	<u>Average Speed (mph)</u>	<u>85th percentile Speed (mph)</u>
Northbound	30	36
Southbound	33	39
Both Directions	32	38

<i>Saturday, October 31, 2020</i>	<u>Average Speed (mph)</u>	<u>85th percentile Speed (mph)</u>
Northbound	30	35
Southbound	32	39
Both Directions	31	37

<i>Sunday, November 1, 2020</i>	<u>Average Speed (mph)</u>	<u>85th percentile Speed (mph)</u>
Northbound	30	36
Southbound	32	39
Both Directions	31	38

<i>Monday, November 2, 2020</i>	<u>Average Speed (mph)</u>	<u>85th percentile Speed (mph)</u>
Northbound	30	35
Southbound	33	38
Both Directions	31	37

As shown above, the speeds were relatively consistent each day, and are higher than the posted speed limit of 25 mph. The southbound speeds were also consistently higher than northbound. ***The actual speed count data can be found attached in Appendix B.***

Traffic Control & Operational Review:
Nellie Gail Equestrian Center Driveway/Equestrian Crossing Location in Laguna Hills, CA

DATA COLLECTION (continued)

Spot Speed Radar Surveys

As a comparison, these one-hour spot speed radar surveys were taken via a person certified to use a radar speed gun at three (3) different locations along Nellie Gail Road. In general, radar results are shown to be more accurate than road tubes. The results are summarized below:

1. Nellie Gail Road, 470 feet South of Oso Parkway (at/near the Equestrian Center)

Thursday, October 29, 2020 from 11:00am to Noon

	<u>50th percentile Speed (mph)</u>	<u>85th percentile Speed (mph)</u>
Northbound	28	33
Southbound	28	32
Both Directions	28	33

2. Nellie Gail Road, north of Empty Saddle Drive, just south of Raised Median

Thursday, October 29, 2020 from 12:30pm to 1:30pm

	<u>50th percentile Speed (mph)</u>	<u>85th percentile Speed (mph)</u>
Northbound	28	33
Southbound	28	35
Both Directions	28	34

3. Nellie Gail Road, between Empty Saddle Drive and Hidden Trail Road

Thursday, October 29, 2020 from 2:00pm to 3:00pm

	<u>50th percentile Speed (mph)</u>	<u>85th percentile Speed (mph)</u>
Northbound	31	36
Southbound	26	31
Both Directions	29	34

As shown above, the radar speeds were relatively consistent each day, and the 85th percentile speeds are higher than the posted speed limit of 25 mph. ***The actual radar spot speed study data can be found attached in Appendix C.***

***Traffic Control & Operational Review:
Nellie Gail Equestrian Center Driveway/Equestrian Crossing Location in Laguna Hills, CA***

TRAFFIC CONTROL REVIEW

Traffic Signing & Striping

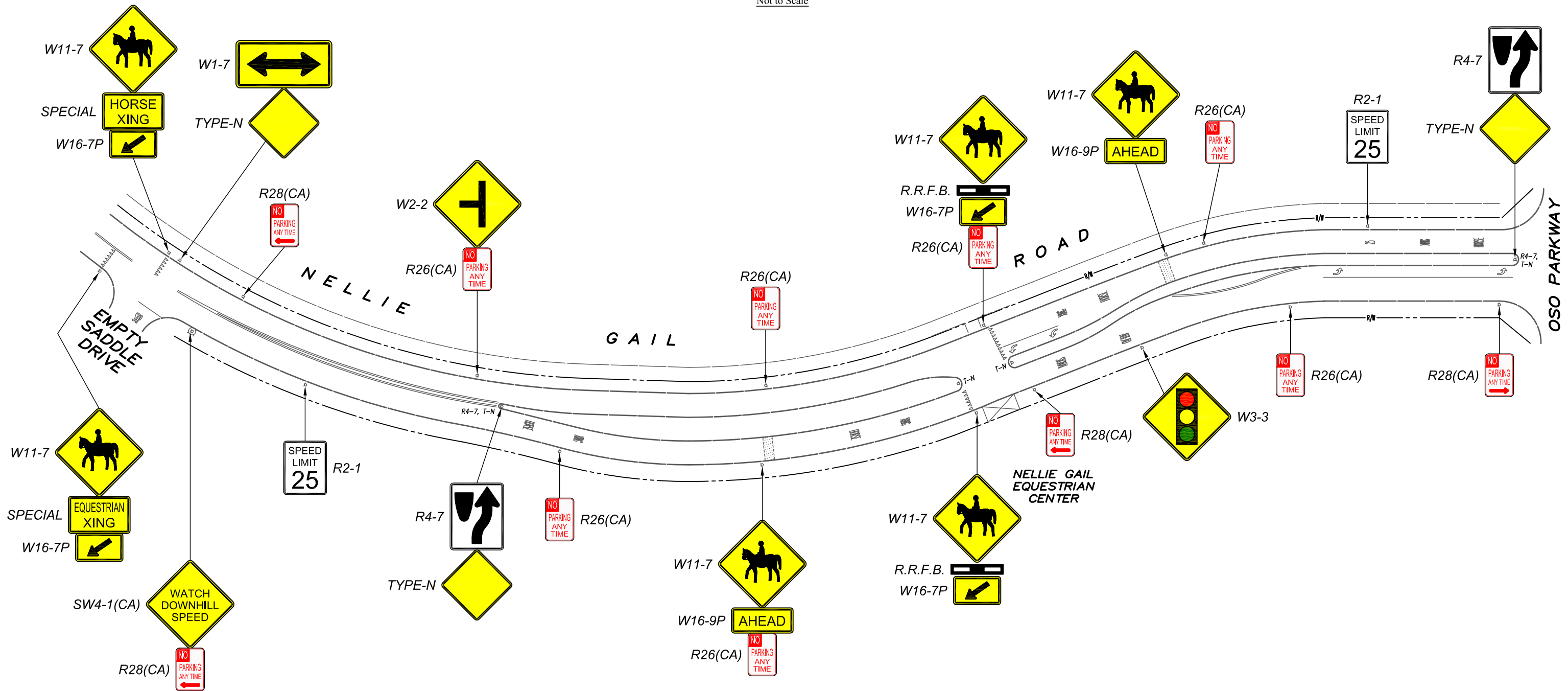
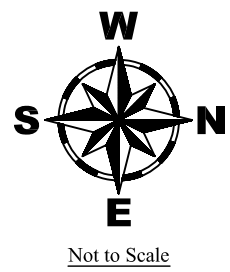
During our field-review on Wednesday, November 18, HCI staff walked Nellie Gail Road at/near the Equestrian Center driveway in both directions in order to review all the traffic signing & striping, including rumble strips, and RRFBs. The following page contains an exhibit of all the signing & striping improvements. Below is a summary:

Southbound Starting at Oso Parkway Heading towards Equestrian Entrance:

- “HORSE XING” advanced white pavement markings at/near Oso Parkway.
- “25” white pavement marking, along with a posted 25 MPH Speed Limit sign.
- “Notice 24-hour Security Patrol” sign posted on side of road.
- “No Parking Any Time” regulatory sign posted on side of road.
- “Equestrian Xing Ahead” advanced warning signs posted on side of road.
- Rumble strips composed of 4 rows of white raised pavement markers located at the above advanced sign posting.
- “HORSE XING” white pavement markings, with white yield line pavement markings at the Equestrian Center driveway.
- RRFB post with “Equestrian Xing” warning sign, Arrow pointing down, w/push buttons, and a “No Parking Any Time” sign.
- “No Parking Any Time” regulatory sign posted on side of road.
- “Side Road” T-intersection advance warning sign posted on side of road in advance of Empty Saddle, and a “No Parking Any Time” regulatory sign.
- “No Parking Any Time” regulatory sign posted on side of road.
- “Horse Xing” warning signs, Arrow pointing down, with white yield line pavement markings at Empty Saddle Drive.

Northbound Starting at Empty Saddle Dr Heading towards Oso Parkway:

- “Equestrian Xing” warning signs, Arrow pointing down, with white yield line pavement markings at Empty Saddle Drive.
- “WATCH DOWNHILL SPEED” warning sign, and a “No Parking Any Time” sign posted on side of road.
- “25 MPH Speed Limit” regulatory sign posted on side of road.
- “Raised Center Median” regulatory and warning signs posted in center of road.
- “No Parking Any Time” regulatory sign posted on side of road.
- “HORSE XING” advanced white pavement markings north of Empty Saddle.
- “Equestrian Xing Ahead” advanced warning signs posted on side of road, along with a “No Parking Any Time” sign.
- Rumble strips composed of 4 rows of white raised pavement markers located at the above advanced sign posting.
- “HORSE XING” white pavement markings, and white yield line pavement markings at the Equestrian Center driveway.
- Solar-powered RRFB post with “Equestrian Xing” warning sign, Arrow pointing down, and with push buttons.
- “No Parking Any Time” regulatory sign posted on side of road.
- “SIGNAL AHEAD” white pavement markings, along with a “Signal Ahead” sign posted on the side of the road.
- “No Parking Any Time” regulatory sign posted on side of road.
- “No Parking Any Time” regulatory sign posted on traffic signal pole located at Oso Parkway.



FILE: NELLIE GAIL ROAD.DWG

*Traffic Control & Operational Review:
Nellie Gail Equestrian Center Driveway/Equestrian Crossing Location in Laguna Hills, CA*

OPERATIONAL REVIEW

RRFB System

During our field-review on Wednesday, November 18, HCI staff physically activated all the push-buttons at the Equestrian Center driveway/equestrian crossing location (both pedestrian and equestrian buttons), and verified that the existing solar-powered Rectangular Rapid Flashing Beacon (RRFB) system was working properly. All push buttons and RRFB LED yellow warning lights were operating as intended. The actual RRFB LED light bar that has two alternating yellow warning lights is located on the post just under the “Equestrian Crossing” warning sign on each side of the roadway.

In summary, when either a pedestrian or equestrian push one of the buttons at this equestrian crossing location, the post-mounted RRFB LED yellow warning light bars on each side of the roadway activate and continue to flash away toward drivers on Nellie Gail Road for at least 30 seconds, giving warning that someone is crossing the street. Staff tested the time to cross Nellie Gail Road several times by foot, and was able to cross the street each time within the 30 seconds of flashing yellow warning.

*Traffic Control & Operational Review:
Nellie Gail Equestrian Center Driveway/Equestrian Crossing Location in Laguna Hills, CA*

OPERATIONAL REVIEW (continued)

Visibility

Impaired visibility, or restricted sight distance, due to the geometry of the intersection and possible obstructions was carefully considered during our field-review of the surrounding property environment. The geometry of the driveway intersection includes an approximate 90° angle, and northbound Nellie Gail Road has a gradual vertical curvature (downgrade) heading into and beyond the Equestrian Center driveway.

Driver sight distance was measured from the side-street approach, as westbound traffic on the Equestrian Center driveway is required to stop, before proceeding to make a left or right-turn onto Nellie Gail Road. The measured distance was 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. However, as shown, the 85th percentile speeds exceed the 25 MPH posted speed limit. Therefore, a 30 MPH speed limit was used as a more conservative measure, which has a minimum sight distance of 200 feet. This distance was used when looking towards approaching, uncontrolled traffic along Nellie Gail Road. More specifically, this stopping sight distance was field-measured from a typical ‘stopped’ vehicle location at the Equestrian Center driveway looking towards the oncoming lanes of cross-traffic on Nellie Gail Road. An orange cone was placed at this distance and a photograph was taken from a stopped driver’s perspective (i.e., approximately 4.5’ high above ground).

(See sight distance photos in Exhibits 1 & 2 on the following pages).

As the exhibits show, when looking from the Equestrian Center driveway, a driver does have a clear line of sight to the minimum 200-foot sight distance when looking both ways on Nellie Gail Road. It is important to note, since this location is an equestrian crossing, it is expected that equestrians having a higher field of view than a vehicle (i.e., approximately 8.5 feet above ground) also have a clear line of sight to the minimum sight distance of 200 feet along Nellie Gail Road, which was also verified in the field.

*Traffic Control & Operational Review:
Nellie Gail Equestrian Center Driveway/Equestrian Crossing Location in Laguna Hills, CA*

EXHIBIT 1



*Traffic Control & Operational Review:
Nellie Gail Equestrian Center Driveway/Equestrian Crossing Location in Laguna Hills, CA*

EXHIBIT 2



Eastbound EQUESTRIAN CENTER DRIVEWAY (Looking North) @ NELLIE GAIL ROAD



Eastbound EQUESTRIAN CENTER DRIVEWAY (Looking South) @ NELLIE GAIL ROAD

*Traffic Control & Operational Review:
Nellie Gail Equestrian Center Driveway/Equestrian Crossing Location in Laguna Hills, CA*

OPERATIONAL REVIEW (continued)

Equestrian Tunnel

There is an existing equestrian tunnel perpendicular under Nellie Gail Road, located just north of the Equestrian Center driveway/equestrian crossing location, and south of Oso Parkway. There is no direct equestrian path to the tunnel from the east side of Nellie Gail Road. HCI staff field-checked this tunnel path from the west side of the Equestrian Center driveway intersection, and followed the equestrian path northerly down towards the tunnel. The concrete and corrugated metal tunnel was large enough for equestrians to pass safely from the west side of Nellie Gail Road to the east side, and back. HCI staff walked back the equestrian path from the east side of Nellie Gail Road, through the tunnel to the west side of Nellie Gail Road, and continued back to the Equestrian Center driveway/equestrian crossing location. The entire time it took to complete the tunnel path on foot was approximately 2 minutes and 15 seconds.

Equestrian Input

During our field review, HCI staff was able to speak with an equestrian that had just crossed Nellie Gail Road at the Equestrian Center driveway/equestrian crossing location. When discussing the tunnel, the equestrian mentioned that it is a viable alternative path for access to the Equestrian Center from the west side of Nellie Gail Road, and is “just less convenient” than to use than the Equestrian Center driveway/equestrian crossing location.

In discussing the Equestrian Center driveway crossing location, the equestrian provided the following couple of quotes: “Drivers are speeding over the speed limit, especially in the northbound direction” and “Drivers are on their phones, especially at night”. Meaning that certain drivers are speeding over the posted 25 MPH speed limit, distracted and not paying enough attention to safely slow/stop for the equestrians crossing.

Traffic Control & Operational Review:
Nellie Gail Equestrian Center Driveway/Equestrian Crossing Location in Laguna Hills, CA

IN-ROADWAY WARNING LIGHT REVIEW

The City also received a question by the public regarding the possibility of adding ground flashing pavement lights, or In-Roadway Warning Lights (IRWL). These traffic control devices are typically installed along both sides of a marked crosswalk and operate upon pedestrian activation.

The State of California Manual on Uniform Traffic Control Devices (CA MUTCD) describes this type of traffic control device as follows:

In-Roadway Lights are special types of highway traffic signals installed in the roadway surface to warn users that they are approaching a condition on or adjacent to the roadway that might not be readily apparent and might require the road users to slow down and/or come to a stop.

Below are some of the applicable guidelines found in the California MUTCD for installation of this type of traffic control device:

Section 4N.02 In-Roadway Warning Lights at Crosswalks

Standard:

- *If used, In-Roadway Warning Lights at crosswalks shall be installed only at marked crosswalks with applicable warning signs. They shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic signals.*
- *They shall display a flashing yellow light when actuated.*
- *Consideration for whether the crossing is controlled or uncontrolled.*

Traffic Control & Operational Review:
Nellie Gail Equestrian Center Driveway/Equestrian Crossing Location in Laguna Hills, CA

IN-ROADWAY WARNING LIGHT REVIEW (continued)

- *An engineering traffic study to determine if In-Roadway Warning Lights are compatible with the safety and operation of nearby intersections, which may or may not be, controlled by traffic signals or STOP/YIELD signs.*
- *At least 40 pedestrians regularly use the crossing during each of any two hours (not necessarily consecutive) during a 24-hour period.*
- *The vehicular volume through the crossing exceeds 200 vehicles per hour in urban areas or 140 vehicles per hour in rural areas during peak-hour pedestrian usage.*
- *The critical approach speed (85th percentile speed) is 45 mph or less.*
- *In-Roadway Warning Lights are visible to drivers at the minimum stopping sight distance for the posted speed limit.*
- *Public education on In-Roadway Warning Lights is conducted for new installations.*

The California MUTCD guidelines in Chapter 4N. In-Roadway Lights can be found in Appendix E.

It is important to note, the existing Equestrian Center driveway/equestrian crossing location does not have a marked crosswalk across Nellie Gail Road, but only Yield line pavement markings where vehicles are to wait on each approach lane when the RRFBs are activated. However, if the location was modified with a marked crosswalk, the addition of IRWLs at this existing RRFB warning location is a possible traffic control device that may be considered appropriate upon the completion of an IRWL evaluation.

*Traffic Control & Operational Review:
Nellie Gail Equestrian Center Driveway/Equestrian Crossing Location in Laguna Hills, CA*

IN-ROADWAY WARNING LIGHT REVIEW (continued)

In summary, if there is further interest in the addition/installation of IRWLs at this RRFB location, a site specific evaluation should be completed. If so, IRWLs may be considered at this Equestrian Center driveway/equestrian crossing location, upon completion of the following:

- Design and Installation of a Marked Crosswalk.
- Conduct and Engineering Traffic Study for IRWLs, which also includes:
- At least 40 pedestrians/equestrians crossing during each of any 2 hours in a day.
- At least 200 vehicles during each of the same 2 hours in a day.

RRFB VS. IRWL OPINION

Since an IRWL evaluation was not completed as part of this evaluation report, the following opinion as to the relative effectiveness of the existing RRFB installation versus the addition of the IRWL is offered for the City's consideration:

- Recent studies of the top three safety beacons rank the RRFB as the most effective and cost-efficient crosswalk device.
- Tests prove the RRFB can heighten driver yield rates by up to 96% and reduce pedestrian crashes by 47%.
- Due to the high-intensity LEDs installed at heights to capture drivers' awareness from greater distances day and night, RRFBs outperform traditional crosswalk warning lights.
- Drivers react sooner at the sight of a flashing RRFB, even under challenging conditions, such as inclement weather, headlight glare, and limited visibility.
- Studies find two RRFB devices work well; however, safety margins improve with four or more RRFB devices on roadways with heavy traffic or higher speed limits with multiple lanes.

The cost to furnish and install an RRFB system can vary depending on site conditions and the number and type of RRFBs used. An average cost for an RRFB complete system is \$22,250 including installation, labor, and materials.

*Traffic Control & Operational Review:
Nellie Gail Equestrian Center Driveway/Equestrian Crossing Location in Laguna Hills, CA*

RRFB VS. IRWL OPINION (continued)

In comparison to RRFBs, research shows the IRWLs did decline motorists' speeds; however, the rate of yielding became less over time in some cases as drivers became more familiar with the crosswalk treatment. Also, drivers have difficulty seeing the devices in daylight, and the flashing lights are also difficult to see when following other vehicles.

Damage to the IRWLs and malfunction issues remain a significant drawback as they are embedded into the asphalt. Several jurisdictions are removing IRWL systems due to unreliability, maintenance costs, and ineffectiveness compared with other safety beacons.

The cost to furnish and install an IRWL system can vary depending on the manufacturer, roadway widths, and project specific installation factors. An average cost for an IRWL complete system is \$17,620.

Therefore, it is our opinion that the existing RRFB system located at the Equestrian Center driveway/equestrian crossing location works well. If the City desires to improve the location, adding 2 more RRFBs in the median would work better than adding IRWLs.

Several RRFB related published studies are provided below:

1. **US Department of Transportation:** Sept – Oct [Innovator newsletter](#) – *States Step up to Enhance Pedestrian Safety, Spectacular Seven*. (2019).
2. **Carmanah:** <https://carmanah.com/articles/an-overview-of-the-most-effective-crosswalk-treatments/>. (October 7, 2019)
3. **Federal Highway Administration** – The National Academies of Sciences, Engineering, Medicine – *Crash Modification Factors Clearinghouse* – [Study Details for Uncontrolled Pedestrian Crossing Treatments](#). (2017).
4. **Federal Highway Administration**– *Evaluation of Pedestrian Hybrid Beacons and Rapid Flashing Beacon* – [report](#). (2016) (PDF).
5. **Federal Highway Administration** – [Effects of Yellow Rectangular Rapid-Flashing Beacons on Yielding Multilane Uncontrolled Crosswalks](#). (2010).
6. **Transportation Research Board** – *An Analysis of the Effects of Stutter Flash LED Beacons to Increase Yielding to Pedestrians Using Multilane Crosswalks*. (2009). [RRFB](#)

*Traffic Control & Operational Review:
Nellie Gail Equestrian Center Driveway/Equestrian Crossing Location in Laguna Hills, CA*

OVERALL RESULTS & FINDINGS

Nellie Gail Road at the Equestrian Center Driveway/Equestrian Crossing Location

Collision Data Results = 0 in past five years

24-hour Speed Count – 85th Percentile Results = 37 MPH

Spot Speed Radar Survey – 85th Percentile Results = 33 MPH

Traffic Control Review:

- ✓ “HORSE XING” advanced white pavement markings.
- ✓ “25” white pavement marking, along with a posted 25 MPH Speed Limit sign.
- ✓ “Equestrian Xing Ahead” advanced warning signs posted on side of road.
- ✓ Rumble strips composed of 4 rows of white raised pavement markers located at the above advanced sign posting.
- ✓ “HORSE XING” white pavement markings, along with white yield line pavement markings at the Equestrian Center driveway location.
- ✓ Solar-powered RRFB system on posts with “Equestrian Xing” warning signs and Arrow pointing downward, with push buttons.

HCI staff physically activated all the push-buttons at this Equestrian Center driveway/equestrian crossing location (both pedestrian and equestrian buttons), and verified that the RRFB system was working properly. All push buttons and RRFB LED yellow warning lights were operating as intended. Also, when looking from the Equestrian Center driveway/equestrian crossing location, a driver does have a clear line of sight to the minimum 200-foot sight distance when looking both ways on Nellie Gail Road. Since this location is an equestrian crossing, it is expected that equestrians, having a higher field of view than a vehicle (i.e., approximately 8.5 feet above ground vs. 4.5 feet), also have a clear line of sight to the minimum sight distance of 200 feet along Nellie Gail Road. There is also an existing equestrian tunnel that is located under Nellie Gail Road, just north of Equestrian Center driveway/equestrian crossing location and south of Oso Parkway, which is a viable alternative. Finally, in regards to RRFB vs IRWL, it is our opinion that the existing RRFB system works well. If the City desires to improve the location, adding 2 RRFBs in the center median is better than IRWLs.

RECOMMENDATIONS

In overall consideration of the traffic control and operational review of the Nellie Gail Road Equestrian Center driveway/equestrian crossing location, the existing traffic control installations are satisfactory and supported by the zero collision history. There are no other recommendations at this time.

APPENDIX A

SWITRS COLLISION HISTORY

CITY OF LAGUNA HILLS
5-YEAR SWITRS COLLISION DATABASE
INTERSECTION OF NELLIE GAIL RD AT EQUESTRIAN CENTER S/o OSO PKWY
JAN. 1, 2015 - SEPTEMBER 30, 2020

CASE ID	COLL. DATE	COLL. TIME	PRIMARY ROAD	SECONDARY ROAD	DIST.	DIR.	INTERS.	WEATH. 1	COLL. SEVERITY	PRIM. COLL. FACT.	PCF VIOL. CAT.	PCF VIOL.	HIT AND RUN	TYPE OF COLL.	MOTOR VEHICLE INVOLVED WITH	ROA SURF
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None reported.

NOTES:

Weather 1

A - Clear
 B - Cloudy
 C - Raining
 D - Snowing
 E - Fog
 F - Other
 G - Wind
 - - Not Stated

Collision Severity

1 - Fatal
 2 - Injury (Severe)
 3 - Injury (Other Visible)
 4 - Injury (Complaint of Pain)
 0 - PDO (Property Damage Only)

Primary Collision Factor

A - (Vehicle) Code Violation
 B - Other Improper Driving
 C - Other Than Driver
 D - Unknown
 E - Fell Asleep
 - - Not Stated

PCF Violation Category

01 - Driving or Bicycling Under Influenza
 02 - Impeding Traffic
 03 - Unsafe Speed
 04 - Following Too Closely
 05 - Wrong Side of Road
 06 - Improper Passing
 07 - Unsafe Lane Change
 08 - Improper Turning
 09 - Automobile ROW
 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

Hit and Run

F - Felony
 M - Misdemeanor
 N - Not Hit & Run

Type of Collision

A - Head-On
 B - Sideswipe
 C - Rear-End
 D - Broadside
 E - Hit Object
 F - Overturned
 G - Vehicle/Pedestrian
 H - Other
 - - 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 B

24-HOUR SPEED COUNT DATA

SPEED

Nellie Gail Rd Bet. Empty Saddle Dr & Oso Pkwy

4.1.b

Day: Thursday
Date: 10/29/2020

City: Laguna Hills
Project #: CA20_010022_010

Summary

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	1	5	2	4	0	0	0	0	0	0	0	12
01:00	0	0	0	0	0	2	0	1	0	0	0	0	0	3
02:00	0	0	2	1	0	0	0	0	0	0	0	0	0	3
03:00	0	0	0	0	2	0	0	0	0	0	0	0	0	2
04:00	0	0	0	1	2	0	0	0	0	0	0	0	0	3
05:00	0	0	1	4	5	2	1	0	0	0	0	0	0	13
06:00	0	0	4	9	21	10	0	0	0	0	0	0	0	44
07:00	0	0	10	36	47	29	5	0	0	0	0	0	0	127
08:00	0	1	13	44	63	22	9	1	0	0	0	0	0	153
09:00	0	1	7	42	64	35	1	0	0	0	0	0	0	150
10:00	0	5	16	34	44	22	2	2	0	0	0	0	0	125
11:00	3	6	18	58	70	30	3	1	0	0	0	0	0	189
12:00 PM	0	4	16	61	57	28	4	0	0	0	0	0	0	170
13:00	0	2	14	50	50	35	4	1	0	0	0	0	0	156
14:00	0	3	23	45	54	25	5	2	0	0	0	0	0	157
15:00	1	2	17	60	80	43	8	1	0	0	0	0	0	212
16:00	0	2	19	72	102	51	4	0	0	0	0	0	0	250
17:00	1	1	35	73	74	38	6	1	1	0	0	0	0	230
18:00	1	2	24	53	84	30	13	0	1	0	0	0	0	208
19:00	0	1	5	44	52	30	5	2	0	0	0	0	0	139
20:00	0	1	10	22	26	15	7	2	1	0	0	0	0	84
21:00	0	0	5	11	13	13	5	2	0	0	0	0	0	49
22:00	0	1	3	4	9	6	0	2	0	0	0	0	0	25
23:00	0	0	4	2	3	4	0	0	0	0	0	0	0	13
Totals	6	32	247	731	924	474	82	18	3					2517
% of Totals	0%	1%	10%	29%	37%	19%	3%	1%	0%					100%

AM Volumes	3	13	72	234	320	156	21	5	0	0	0	0	0	824
% AM	0%	1%	3%	9%	13%	6%	1%	0%						33%
AM Peak Hour	11:00	11:00	11:00	11:00	11:00	09:00	08:00	10:00						11:00
Volume	3	6	18	58	70	35	9	2						189
PM Volumes	3	19	175	497	604	318	61	13	3	0	0	0	0	1693
% PM	0%	1%	7%	20%	24%	13%	2%	1%	0%					67%
PM Peak Hour	15:00	12:00	17:00	17:00	16:00	16:00	18:00	14:00	17:00					16:00
Volume	1	4	35	73	102	51	13	2	1					250
Directional Peak Periods All Speeds			AM 7-9			NOON 12-2			PM 4-6			Off Peak Volumes		
			Volume		%	Volume		%	Volume		%	Volume		%
			280	↔	11%	326	↔	13%	480	↔	19%	1431	↔	57%

Street Name	Direction	Percentiles					
		15th	50th	Average	85th	95th	98th
Nellie Gail Rd	Summary	26	31	31	37	40	29

SPEED

4.1.b

Nellie Gail Rd Bet. Empty Saddle Dr & Oso Pkwy

Day: Friday

City: Laguna Hills

Date: 10/30/2020

Project #: CA20_010022_010

Summary

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	1	1	0	0	0	0	0	0	0	0	2
02:00	0	0	0	1	1	0	0	0	0	0	0	0	0	2
03:00	0	0	0	1	0	0	0	0	0	0	0	0	0	1
04:00	0	0	0	5	1	0	0	0	0	0	0	0	0	6
05:00	0	0	1	6	11	2	1	0	0	0	0	0	0	21
06:00	0	2	2	13	20	4	3	0	0	0	0	0	0	44
07:00	0	1	6	30	32	26	5	0	0	0	0	0	0	100
08:00	0	3	7	46	52	30	4	0	0	0	0	0	0	142
09:00	0	6	8	32	47	28	14	3	0	0	0	0	0	138
10:00	1	8	11	38	38	34	8	5	0	0	0	0	0	143
11:00	1	3	15	53	51	24	6	5	0	0	0	0	0	158
12:00 PM	0	8	13	53	42	40	5	2	0	0	0	0	0	163
13:00	0	2	16	24	53	34	11	1	0	0	0	0	0	141
14:00	1	5	14	47	61	33	7	3	0	0	0	0	0	171
15:00	0	2	21	51	73	43	11	0	0	0	0	0	0	201
16:00	0	0	13	57	82	29	6	2	1	0	0	0	0	190
17:00	0	5	12	45	64	45	12	1	0	1	0	0	0	185
18:00	1	3	14	41	63	29	7	1	0	0	0	0	0	159
19:00	0	5	16	43	45	33	5	0	1	0	0	0	0	148
20:00	1	0	8	22	31	13	4	1	2	0	0	0	0	82
21:00	0	1	6	17	15	7	2	0	0	0	0	0	0	48
22:00	0	0	1	6	13	10	2	1	0	1	0	0	0	34
23:00	0	0	2	8	8	6	4	1	1	0	0	0	0	30
Totals	5	54	186	640	804	470	117	26	5	2				2309
% of Totals	0%	2%	8%	28%	35%	20%	5%	1%	0%	0%				100%

AM Volumes	2	23	50	226	254	148	41	13	0	0	0	0	0	757
% AM	0%	1%	2%	10%	11%	6%	2%	1%						33%
AM Peak Hour	10:00	10:00	11:00	11:00	08:00	10:00	09:00	10:00						11:00
Volume	1	8	15	53	52	34	14	5						158
PM Volumes	3	31	136	414	550	322	76	13	5	2	0	0	0	1552
% PM	0%	1%	6%	18%	24%	14%	3%	1%	0%	0%				67%
PM Peak Hour	14:00	12:00	15:00	16:00	16:00	17:00	17:00	14:00	20:00	17:00				15:00
Volume	1	8	21	57	82	45	12	3	2	1				201
Directional Peak Periods			AM 7-9			NOON 12-2			PM 4-6			Off Peak Volumes		
All Speeds			Volume		%	Volume		%	Volume		%	Volume		%
			242	↔	10%	304	↔	13%	375	↔	16%	1388	↔	60%

Street Name	Direction	Percentiles				
		15th	50th	Average	85th	95th
Nellie Gail Rd	Summary	26	32	32	38	41

SPEED

Nellie Gail Rd Bet. Empty Saddle Dr & Oso Pkwy

4.1.b

Day: Saturday

Date: 10/31/2020

City: Laguna Hills

Project #: CA20_010022_010

Summary

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	0	2	2	2	1	0	0	0	0	0	0	7
01:00	0	0	2	2	0	0	0	0	0	0	0	0	0	4
02:00	0	0	0	0	0	1	0	0	0	0	0	0	0	1
03:00	0	0	0	1	1	0	0	0	0	0	0	0	0	2
04:00	0	0	0	1	0	0	0	0	0	0	0	0	0	1
05:00	0	0	2	1	5	3	0	0	0	0	0	0	0	11
06:00	1	1	4	6	19	5	4	0	0	0	0	0	0	40
07:00	0	1	6	18	33	17	3	0	0	0	0	0	0	78
08:00	0	2	13	35	33	11	2	2	0	0	0	0	0	98
09:00	2	4	13	37	45	21	5	3	0	0	0	0	0	130
10:00	1	5	11	48	42	23	6	3	1	0	0	0	0	140
11:00	0	3	20	38	62	30	9	1	0	0	0	0	0	163
12:00 PM	0	4	16	47	66	36	5	1	0	0	0	0	0	175
13:00	0	2	7	36	53	27	13	1	0	0	0	0	0	139
14:00	1	5	14	44	53	18	6	0	0	0	0	0	0	141
15:00	0	3	11	49	60	22	7	0	1	0	0	0	0	153
16:00	2	6	8	57	56	24	9	1	0	0	0	0	0	163
17:00	0	1	19	47	61	27	8	3	0	0	0	0	0	166
18:00	0	4	18	49	52	28	8	1	1	0	0	0	0	161
19:00	1	5	25	52	47	22	4	1	0	0	0	0	0	157
20:00	1	4	12	43	31	10	2	1	1	0	0	0	0	105
21:00	1	5	4	17	33	13	4	0	0	0	0	0	0	77
22:00	0	1	3	15	31	6	6	2	0	0	0	0	0	64
23:00	0	2	3	12	9	7	2	0	0	0	0	0	0	35
Totals	10	58	211	657	794	353	104	20	4					2211
% of Totals	0%	3%	10%	30%	36%	16%	5%	1%	0%					100%

AM Volumes	4	16	71	189	242	113	30	9	1	0	0	0	0	675
% AM	0%	1%	3%	9%	11%	5%	1%	0%	0%					31%
AM Peak Hour	09:00	10:00	11:00	10:00	11:00	11:00	11:00	09:00	10:00					11:00
Volume	2	5	20	48	62	30	9	3	1					163
PM Volumes	6	42	140	468	552	240	74	11	3	0	0	0	0	1536
% PM	0%	2%	6%	21%	25%	11%	3%	0%	0%					69%
PM Peak Hour	16:00	16:00	19:00	16:00	12:00	12:00	13:00	17:00	15:00					12:00
Volume	2	6	25	57	66	36	13	3	1					175
Directional Peak Periods			AM 7-9			NOON 12-2			PM 4-6			Off Peak Volumes		
All Speeds			Volume		%	Volume		%	Volume		%	Volume		%
			176	↔	8%	314	↔	14%	329	↔	15%	1392	↔	63%

Street Name	Direction	Percentiles					
		15th	50th	Average	85th	95th	98th
Nellie Gail Rd	Summary	25	31	31	37	41	22

SPEED

4.1.b

Nellie Gail Rd Bet. Empty Saddle Dr & Oso Pkwy

Day: Sunday

Date: 11/1/2020

City: Laguna Hills

Project #: CA20_010022_010

Summary

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	2	10	3	2	0	1	0	0	0	0	0	18
01:00	0	0	1	3	2	2	2	1	0	0	0	0	0	11
02:00	0	0	0	3	4	0	0	0	0	0	0	0	0	7
03:00	0	0	0	2	1	0	0	0	0	0	0	0	0	3
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	0	0	1	1	2	2	0	0	0	0	0	0	0	6
06:00	0	0	0	3	8	4	1	0	0	0	0	0	0	16
07:00	0	0	8	8	15	9	0	0	0	0	0	0	0	40
08:00	0	1	4	13	21	12	4	0	0	0	0	0	0	55
09:00	0	1	16	29	37	17	11	3	0	0	0	0	0	114
10:00	0	1	5	30	31	15	6	0	0	0	0	0	0	88
11:00	1	3	8	40	38	20	7	1	1	0	0	0	0	119
12:00 PM	0	4	12	37	46	25	9	2	0	0	0	0	0	135
13:00	2	2	9	33	43	18	3	0	0	0	0	0	0	110
14:00	0	4	12	26	48	29	6	0	0	0	0	0	0	125
15:00	1	5	19	35	41	22	6	1	0	0	0	0	0	130
16:00	1	3	14	54	33	13	8	1	0	0	0	0	0	127
17:00	1	1	14	29	39	23	5	1	0	0	0	0	0	113
18:00	0	1	6	26	29	23	4	0	0	0	0	0	0	89
19:00	1	1	5	13	25	9	6	1	0	0	0	0	0	61
20:00	0	0	8	11	20	8	3	0	1	0	0	0	0	51
21:00	0	1	1	6	7	7	2	1	0	0	0	0	0	25
22:00	0	0	2	1	7	3	3	2	0	0	0	0	0	18
23:00	0	0	0	2	3	0	1	0	0	0	0	0	0	6
Totals	7	28	147	415	503	263	87	15	2					1467
% of Totals	0%	2%	10%	28%	34%	18%	6%	1%	0%					100%

AM Volumes	1	6	45	142	162	83	31	6	1	0	0	0	0	477
% AM	0%	0%	3%	10%	11%	6%	2%	0%	0%					33%
AM Peak Hour	11:00	11:00	09:00	11:00	11:00	11:00	09:00	09:00	11:00					11:00
Volume	1	3	16	40	38	20	11	3	1					119
PM Volumes	6	22	102	273	341	180	56	9	1	0	0	0	0	990
% PM	0%	1%	7%	19%	23%	12%	4%	1%	0%					67%
PM Peak Hour	13:00	15:00	15:00	16:00	14:00	14:00	12:00	12:00	20:00					12:00
Volume	2	5	19	54	48	29	9	2	1					135
Directional Peak Periods All Speeds			AM 7-9			NOON 12-2			PM 4-6			Off Peak Volumes		
			Volume		%	Volume		%	Volume		%	Volume		%
			95	↔	6%	245	↔	17%	240	↔	16%	887	↔	60%

Street Name	Direction	Percentiles					
		15th	50th	Average	85th	95th	98th
Nellie Gail Rd	Summary	25	31	31	38	42	14

SPEED

Nellie Gail Rd Bet. Empty Saddle Dr & Oso Pkwy

4.1.b

Day: Monday
Date: 11/2/2020

City: Laguna Hills
Project #: CA20_010022_010

Summary

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	0	1	2	1	1	1	0	0	0	0	0	6
01:00	0	0	1	2	0	0	0	0	0	0	0	0	0	3
02:00	0	0	0	0	1	0	0	0	0	0	0	0	0	1
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	3	0	0	0	0	0	0	0	0	0	3
05:00	0	1	1	1	5	1	0	0	0	0	0	0	0	9
06:00	0	1	2	12	20	7	2	0	0	0	0	0	0	44
07:00	0	1	7	23	38	16	4	0	0	0	0	0	0	89
08:00	0	1	11	41	52	22	5	0	0	0	0	0	0	132
09:00	0	2	11	34	54	29	9	1	0	0	0	0	0	140
10:00	1	4	10	35	56	32	7	4	0	0	0	0	0	149
11:00	1	4	8	40	40	18	3	2	0	0	0	0	0	116
12:00 PM	0	5	18	51	55	31	5	1	0	0	0	0	0	166
13:00	1	3	9	35	59	26	5	6	0	0	0	0	0	144
14:00	0	4	22	37	49	28	4	0	0	0	0	0	0	144
15:00	0	1	19	54	57	27	1	0	1	0	0	0	0	160
16:00	0	4	18	54	83	35	5	1	0	0	0	0	0	200
17:00	0	1	17	66	90	42	11	1	0	0	0	0	0	228
18:00	0	1	15	54	53	26	7	0	0	0	0	0	0	156
19:00	0	0	15	35	34	12	5	1	0	0	0	0	0	102
20:00	0	1	9	39	25	10	4	0	1	0	0	0	0	89
21:00	0	0	3	15	12	10	1	0	1	0	0	0	0	42
22:00	0	1	3	6	6	1	1	1	0	0	0	0	0	19
23:00	0	0	0	5	1	2	2	0	0	0	0	0	0	10
Totals	3	35	199	643	792	376	82	19	3					2152
% of Totals	0%	2%	9%	30%	37%	17%	4%	1%	0%					100%

AM Volumes	2	14	51	192	268	126	31	8	0	0	0	0	0	692
% AM	0%	1%	2%	9%	12%	6%	1%	0%						32%
AM Peak Hour	10:00	10:00	08:00	08:00	10:00	10:00	09:00	10:00						10:00
Volume	1	4	11	41	56	32	9	4						149
PM Volumes	1	21	148	451	524	250	51	11	3	0	0	0	0	1460
% PM	0%	1%	7%	21%	24%	12%	2%	1%	0%					68%
PM Peak Hour	13:00	12:00	14:00	17:00	17:00	17:00	17:00	13:00	15:00					17:00
Volume	1	5	22	66	90	42	11	6	1					228
Directional Peak Periods			AM 7-9			NOON 12-2			PM 4-6			Off Peak Volumes		
All Speeds			Volume		%	Volume		%	Volume		%	Volume		%
			221	↔	10%	310	↔	14%	428	↔	20%	1193	↔	55%

Street Name	Direction	Percentiles				
		15th	50th	Average	85th	95th
Nellie Gail Rd	Summary	26	31	31	37	40

APPENDIX C

SPOT SPEED RADAR SURVEY DATA

Spot Speed Study

Prepared by: National Data & Surveying Services

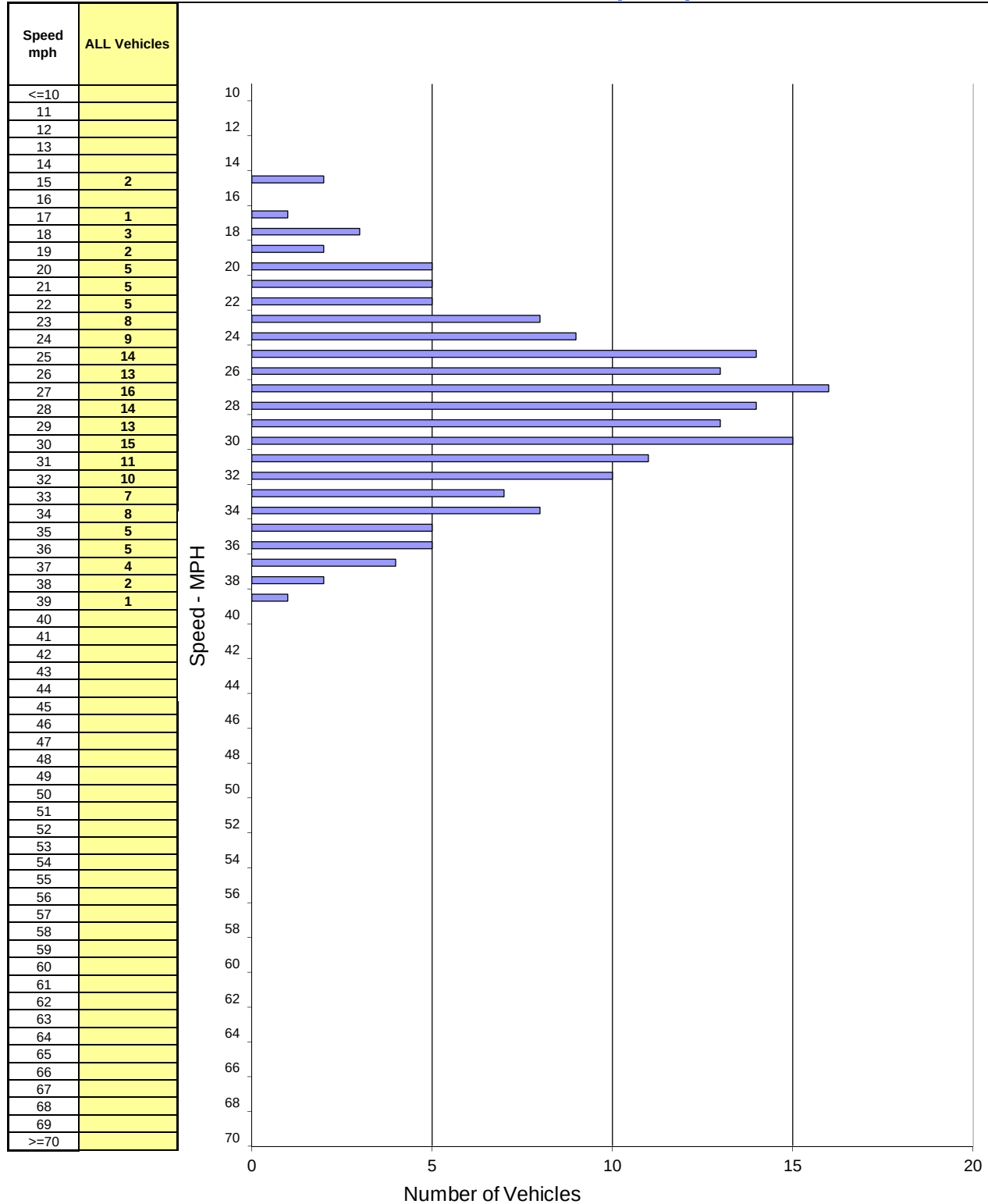
City of Laguna Hills

DATE: 10/29/2020
TIME: 11:00-12:00

Location: Nellie Gail Rd 470' S/O Oso Pkwy
Posted Speed: 25 MPH Clear/Dry

Project #: 20-010023-001

Northbound & Southbound Spot Speeds



SPEED PARAMETERS									
Class	Count	Range	50th Percentile	85th Percentile	10 MPH Pace	# in Pace	Percent in Pace	% / # Below Pace	% / # Above Pace
ALL	178	15 - 39	28 mph	33 mph	23 - 32	123	69%	12% / 23	18% / 32

Spot Speed Study

Prepared by: National Data & Surveying Services

City of Laguna Hills

DATE: 10/29/2020

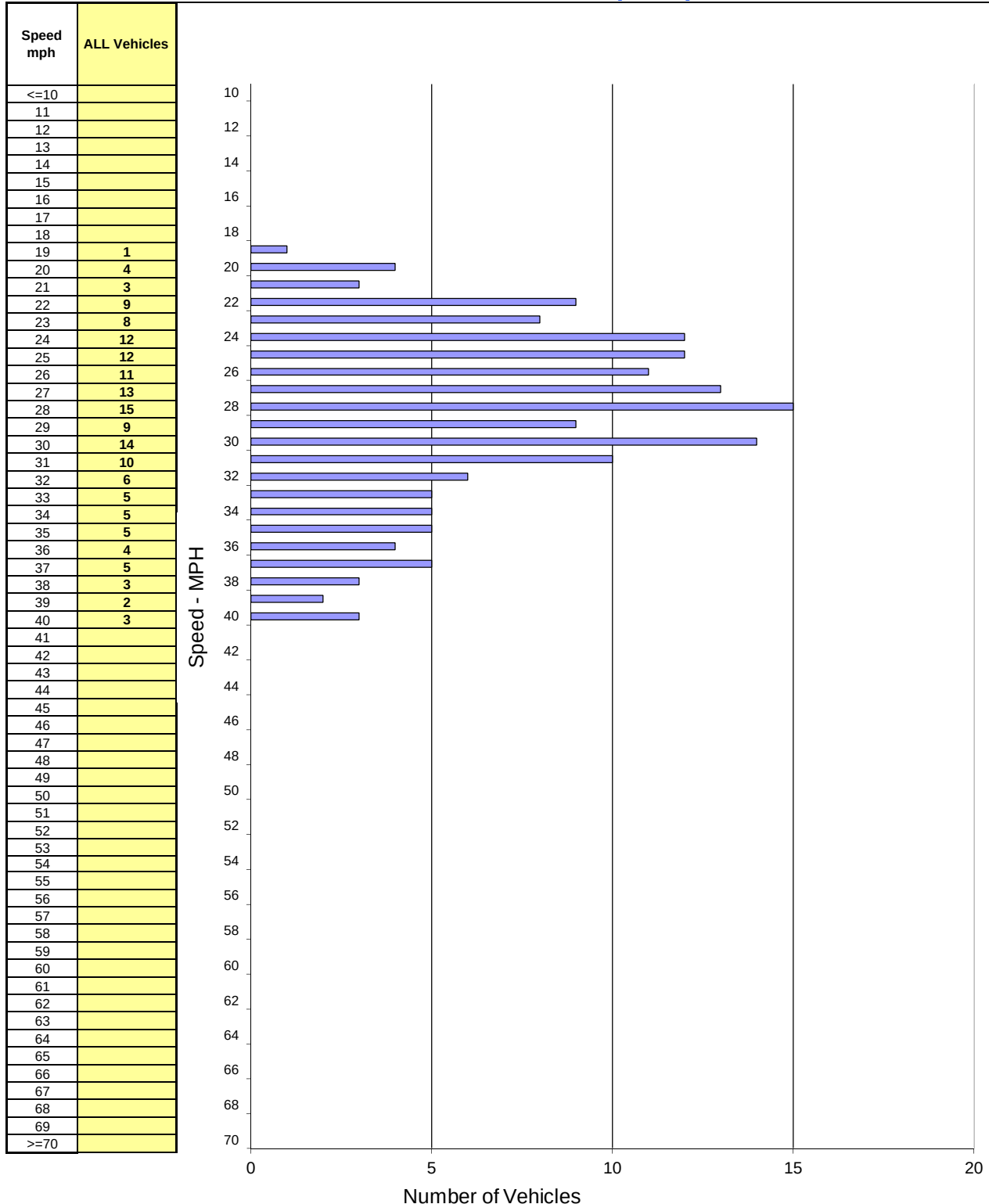
TIME: 12:30-13:30

Location: Nellie Gail Rd Bet., north of Empty Saddle, just south of raised median)

Posted Speed: 25 MPH Clear/Dry

Project #: 20-010023-002

Northbound & Southbound Spot Speeds



SPEED PARAMETERS									
Class	Count	Range	50th Percentile	85th Percentile	10 MPH Pace	# in Pace	Percent in Pace	% / # Below Pace	% / # Above Pace
ALL	159	19 - 40	28 mph	34 mph	22 - 31	113	71%	5% / 8	24% / 38

Spot Speed Study

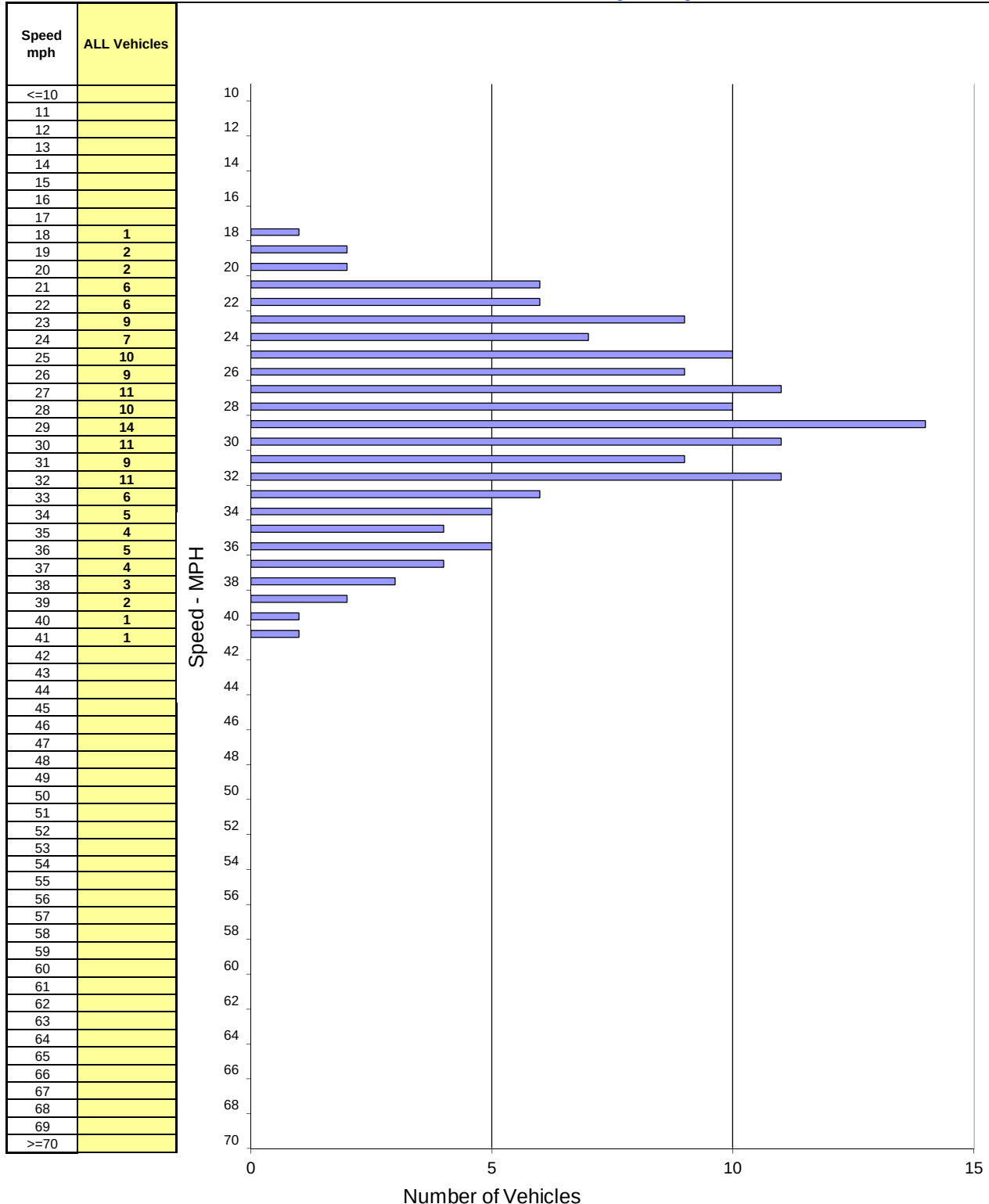
Prepared by: National Data & Surveying Services

City of Laguna Hills

DATE: 10/29/2020
TIME: 14:00-15:00

Location: Nellie Gail Rd Bet. Hidden Trail Rd & Empty Saddle Dr
Posted Speed: 25 MPH Clear/Dry Project #: 20-010023-003

Northbound & Southbound Spot Speeds



SPEED PARAMETERS									
Class	Count	Range	50th Percentile	85th Percentile	10 MPH Pace	# in Pace	Percent in Pace	% / # Below Pace	% / # Above Pace
ALL	149	18 - 41	29 mph	34 mph	23 - 32	101	68%	11% / 17	21% / 31

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

APPENDIX E

CHAPTER 4N. IN-ROADWAY LIGHTS

CALIFORNIA MUTCD

CHAPTER 4N. IN-ROADWAY LIGHTS

Section 4N.01 Application of In-Roadway Lights

Support:

⁰¹ In-Roadway Lights are special types of highway traffic signals installed in the roadway surface to warn road users that they are approaching a condition on or adjacent to the roadway that might not be readily apparent and might require the road users to slow down and/or come to a stop. This includes situations warning of marked school crosswalks, marked midblock crosswalks, marked crosswalks on uncontrolled approaches, marked crosswalks in advance of roundabouts as described in Chapter 3C, and other roadway situations involving pedestrian crossings.

Standard:

⁰² **In-Roadway Lights shall not be used for any application that is not described in this Chapter.**

⁰³ **If used, In-Roadway Lights shall not exceed a height of 3/4 inch above the roadway surface.**

⁰⁴ **When used, In-Roadway Lights shall be flashed and shall not be steadily illuminated.**

Support:

⁰⁵ Steadily illuminated lights installed in the roadway surface are considered to be internally illuminated raised pavement markers (see Section 3B.11).

Option:

⁰⁶ In-Roadway Lights may be flashed in a manner that includes a continuous flash of varying intensity and time duration that is repeated to provide a flickering effect (see Section 4N.02).

Section 4N.02 In-Roadway Warning Lights at Crosswalks

Option:

⁰¹ In-roadway lights may be installed at certain marked crosswalks, based on an engineering study or engineering judgment, to provide additional warning to road users.

Standard:

⁰² **If used, In-Roadway Warning Lights at crosswalks shall be installed only at marked crosswalks with applicable warning signs. They shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic control signals.**

⁰³ **If In-Roadway Warning Lights are used at a crosswalk, the following requirements shall apply:**

A. Except as provided in Paragraphs 7 and 8, they shall be installed along both sides of the crosswalk and shall span its entire length.

B. They shall initiate operation based on pedestrian actuation and shall cease operation at a predetermined time after the pedestrian actuation or, with passive detection, after the pedestrian clears the crosswalk.

C. They shall display a flashing yellow light when actuated. The flash rate shall be at least 50, but no more than 60, flash periods per minute. If they are flashed in a manner that includes a continuous flash of varying intensity and time duration that is repeated to provide a flickering effect, the flickers or pulses shall not repeat at a rate that is between 5 and 30 per second to avoid frequencies that might cause seizures.

D. They shall be installed in the area between the outside edge of the crosswalk line and 10 feet from the outside edge of the crosswalk.

E. They shall face away from the crosswalk if unidirectional, or shall face away from and across the crosswalk if bidirectional.

⁰⁴ **If used on one-lane, one-way roadways, a minimum of two In-Roadway Warning Lights shall be installed on the approach side of the crosswalk. If used on two-lane roadways, a minimum of three In-Roadway Warning Lights shall be installed along both sides of the crosswalk. If used on roadways with more than two lanes, a minimum of one In-Roadway Warning Light per lane shall be installed along both sides of the crosswalk.**

Guidance:

05 *If used, In-Roadway Warning Lights should be installed in the center of each travel lane, at the center line of the roadway, at each edge of the roadway or parking lanes, or at other suitable locations away from the normal tire track paths.*

06 *The location of the In-Roadway Warning Lights within the lanes should be based on engineering judgment.*

Option:

07 On one-way streets, In-Roadway Warning Lights may be omitted on the departure side of the crosswalk.

08 Based on engineering judgment, the In-Roadway Warning Lights on the departure side of the crosswalk on the left side of a median may be omitted.

09 Unidirectional In-Roadway Warning Lights installed at crosswalk locations may have an optional, additional yellow light indication in each unit that is visible to pedestrians in the crosswalk to indicate to pedestrians in the crosswalk that the In-Roadway Warning Lights are in fact flashing as they cross the street. These yellow lights may flash with and at the same flash rate as the light module in which each is installed.

Guidance:

10 *If used, the period of operation of the In-Roadway Warning Lights following each actuation should be sufficient to allow a pedestrian crossing in the crosswalk to leave the curb or shoulder and travel at a walking speed of 3.5 feet per second to at least the far side of the traveled way or to a median of sufficient width for pedestrians to wait. Where pedestrians who walk slower than 3.5 feet per second, or pedestrians who use wheelchairs, routinely use the crosswalk, a walking speed of less than 3.5 feet per second should be considered in determining the period of operation.*

Standard:

11 **If pedestrian pushbuttons are used to actuate the in-roadway lights, a Push Button To Turn On Warning Lights (with pushbutton symbol) (R10-25) sign (see Figure 2B-26) shall be mounted adjacent to immediately above or integral with each pedestrian pushbutton.**

12 **Where the period of operation is sufficient only for crossing from a curb or shoulder to a median of sufficient width for pedestrians to wait, median-mounted pedestrian actuators shall be provided.**

13 **In-Roadway Warning Lights (IRWLs) shall not be placed on or within the crosswalk markings. If the In-Roadway Warning Lights are activated by a push button, the PUSH BUTTON FOR PEDESTRIAN WARNING LIGHTS, CROSS WITH CAUTION (R62E(CA)) sign shall be used.**

14 **The following shall be considered when evaluating the need for In-Roadway Warning Lights:**

- A. **Whether the crossing is controlled or uncontrolled.**
- B. **An engineering traffic study to determine if In-Roadway Warning Lights are compatible with the safety and operation of nearby intersections, which may or may not be, controlled by traffic signals or STOP/YIELD signs.**
- C. **Standard traffic signs for crossings and crosswalk pavement markings are provided.**
- D. **At least 40 pedestrians regularly use the crossing during each of any two hours (not necessarily consecutive) during a 24-hour period.**
- E. **The vehicular volume through the crossing exceeds 200 vehicles per hour in urban areas or 140 vehicles per hour in rural areas during peak-hour pedestrian usage.**
- F. **The critical approach speed (85th percentile) is 45 mph or less.**
- G. **In-Roadway Warning Lights are visible to drivers at the minimum stopping sight distance for the posted speed limit.**
- H. **Public education on In-Roadway Warning Lights is conducted for new installations.**

Option:

15 Overhead or roadside Flashing Yellow Beacons may be installed in conjunction with In-Roadway Warning Lights. In-Roadway Warning Lights may be installed independently, but are not necessarily intended to be a substitute for standard flashing beacons. Engineering judgment should be exercised.

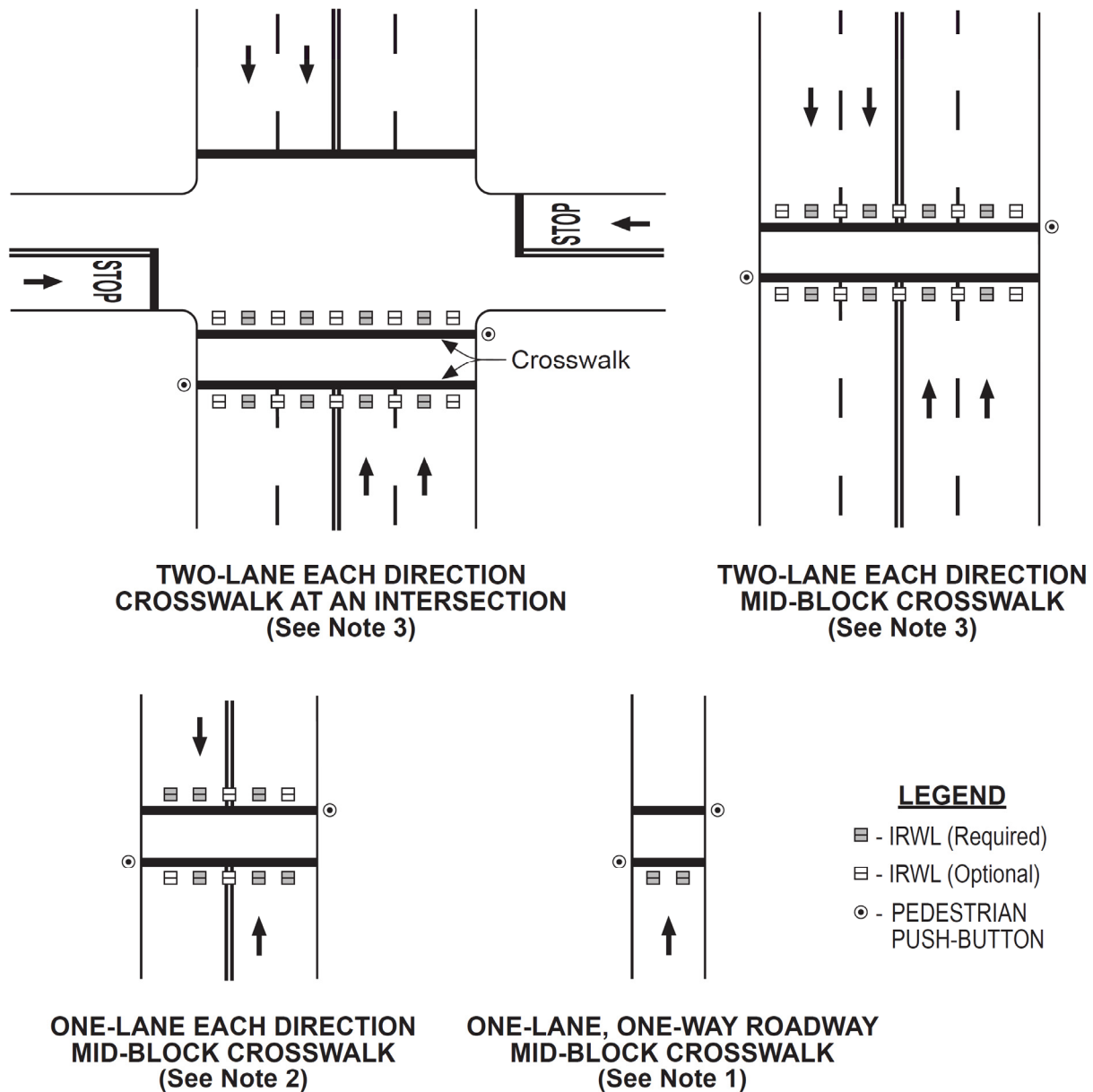
Guidance:

16 *Typical applications of In-Roadway Warning Lights are shown in Figure 4N-101(CA).*

Section 4N.101(CA) In-Roadway Warning Lights at Crosswalks Financing and Maintenance-State Highways Standard:

⁰¹ When In-Roadway Warning Lights are proposed by Caltrans on State highways, Caltrans shall pay the costs of installation and maintenance. When In-Roadway Warning Lights are proposed and installed by a local agency on State highways, the installation of In-Roadway Warning Lights shall be covered by an Encroachment Permit issued by the local Caltrans District Director. The local agency shall be responsible for installation and maintenance of the In-Roadway Warning Lights.

Figure 4N-101 (CA). Typical Layout for In-Roadway Warning Lights (IRWLs)



NOTES:

1. One-Lane, One-Way Roadways, a minimum of two IRWLs shall be installed on the approach side of the crosswalk.
2. One-Lane each direction, a minimum of three IRWLs shall be installed along both sides of the crosswalk.
3. Two-Lanes each direction, a minimum of one IRWLs per lane, shall be installed along both sides of the crosswalk.
4. IRWLs should be located off the tire tracks.

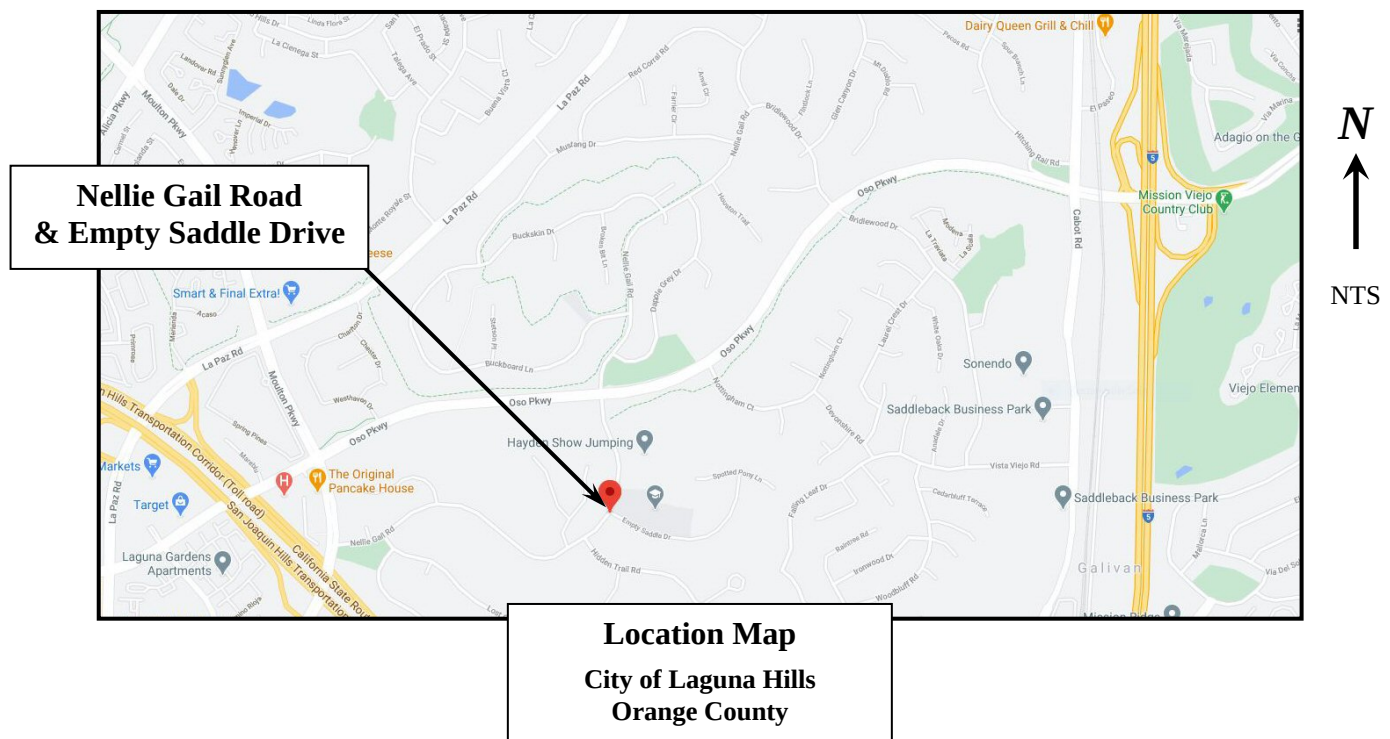
MULTIWAY STOP CONTROL WARRANTS ANALYSIS

NELLIE GAIL ROAD AT EMPTY SADDLE DRIVE IN THE CITY OF LAGUNA HILLS, CA NOVEMBER 25, 2020

INTRODUCTION

The City of Laguna Hills requested Hartzog & Crabill, Inc. (HCI) to complete a Multiway Stop Warrants Analysis at the intersection of Nellie Gail Road and Empty Saddle Drive. 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 typical T-intersection with Nellie Gail Road running in the north-south directions and Empty Saddle Drive running in the east-west directions. The intersection is located west of the I-5 Freeway and south of Oso Parkway (see *Location Map below*). The intersection is entirely within the City of Laguna Hills jurisdiction. At the present time, there is a one way stop control on Empty Saddle Drive (i.e., Nellie Gail Road is uncontrolled).



Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Empty Saddle Drive, in Laguna Hills, CA

BACKGROUND

Nellie Gail Road is a north-south local-collector roadway with single-family residential properties on both sides of the street, along with an equestrian center on the east side of the street near Oso Parkway. At the intersection with Empty Saddle Drive, the roadway is approximately 40 feet wide, and the 2-lane roadway provides for one lane of traffic in each direction, which are separated by double-yellow centerline striping. There are no marked crosswalks across Nellie Gail Road at or near the intersection. The roadway does have curb, gutter, parkway, and sidewalk improvements on the east side, and only curb and gutter on the west side. There are equestrian paths along both sides of the roadway. There are equestrian crossing warning signs posted and yield line markings along the south side of the intersection. There is a Watch Downhill Speed warning sign facing NB traffic, and an Offset Intersections warning sign facing SB traffic. Nellie Gail Road has a posted speed limit of 25 MPH. On-street parking is prohibited on both sides of the street via No Parking Anytime signs. Currently, there are no STOP signs on Nellie Gail Road (uncontrolled) at its intersection with Empty Saddle Drive. ***See Exhibit 1 (next page) for photo images of Nellie Gail Road.***

Empty Saddle Drive is a east-west local roadway with single-family residential properties on both sides of the street, along with an equestrian center on the north side of the street near Nellie Gail Road. At the T-intersection with Nellie Gail Road, which is the westerly terminus of Empty Saddle Drive, the roadway is approximately 34 feet wide. The 2-lane roadway provides for one lane of traffic in each direction, which are not separated by any centerline striping. There are no marked crosswalks across Empty Saddle Drive. The roadway does have curb, gutter, and sidewalk improvements on the north side and only curb, gutter, and parkway on the south side. Empty Saddle Drive does not have a posted speed limit; however, the residential nature of this street results in a ‘*prima facie*’ speed limit of 25 MPH and does not require posting. There is a STOP sign, a white ‘STOP’ pavement marking, and a white limit line on Empty Saddle Drive at its intersection with Nellie Gail Road. ***See Exhibit 2 (following page) for a photo image of Empty Saddle Drive.***

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Empty Saddle Drive, in Laguna Hills, CA

EXHIBIT 1



NELLIE GAIL ROAD (Looking Northbound) @ EMPTY SADDLE DRIVE



NELLIE GAIL ROAD (Looking Southbound) @ EMPTY SADDLE DRIVE

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Empty Saddle Drive, in Laguna Hills, CA

EXHIBIT 2



EMPTY SADDLE DRIVE (Looking Westbound) @ NELLIE GAIL ROAD

*Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Empty Saddle Drive, in Laguna Hills, CA***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 on 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 multi-way (3-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 multi-way stop sign installation is typically not recommended.

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.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Empty Saddle Drive, in Laguna Hills, CA

MULTIWAY 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 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... 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 this warrant. Such crashes include right- and left-turn collisions, as well as right-angle collisions (i.e., broadside, or head-on) and pedestrian-vehicle collisions. The latest available collision history for the intersection was gathered by HCI from the State of California Highway Patrol (CHP) Statewide Integrated Traffic Records System website (*i-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.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Empty Saddle Drive, in Laguna Hills, CA**Collision History (continued)**

TABLE 1
SWITRS COLLISION SUMMARY

Intersection	2015		2016		2017-18		2019-20	
	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?
Nellie Gail Road at Empty Saddle Drive		<i>None reported</i>	12/27	<i>Vehicle/Pedestrian 28' North</i>		<i>None reported</i>		<i>None reported</i>

Notes: Information above is derived per the latest 5-year intersection traffic collision database report gathered from CHP-SWITRS (*i-SWITRS website*).

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

As shown above, there has been only (1) reported collision, at or near this intersection over the past (5) years of available SWITRS collision data. 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. ***The SWITRS traffic collision data report is included in Appendix B.***

Traffic Volumes

HCI collected Average Daily Traffic (ADT) vehicular approach counts to the intersection on Thursday, October 29, 2020 in order to account for vehicles that typically use this T-intersection. The ADT approach count for Nellie Gail Road is 2,220 vehicles per day with the highest AM peak-hour approach volume having 152 vehicles, and 216 vehicles in the PM peak-hour. The ADT approach count for Empty Saddle Drive is 699 vehicles with the highest AM peak-hour approach volume having 64 vehicles, and 100 vehicles in the PM peak-hour. Table 2 (next page) provides a breakdown of the approach volumes. ***The traffic volume data collected for this intersection is included in Appendix C.***

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Empty Saddle Drive, in Laguna Hills, CA

Traffic Volumes (continued)

TABLE 2
HIGHEST 24-HOUR INTERSECTION APPROACH VEHICLE COUNTS
NELLIE GAIL ROAD AT EMPTY SADDLE DRIVE

Street	Direction	ADT Volume	Directional Split	Highest Hourly Volume
Nellie Gail Road	Northbound	966	44%	107 (3 - 4PM)
	Southbound	1,254	56%	117 (5 – 6PM)
Empty Saddle Drive				
	Westbound	699	100%	100 (4 - 5PM)

Nellie Gail Road is considered the ‘through’ or ‘major’ street at this residential T-intersection since it carries higher volumes, and drivers are not required to slow down, or even stop, before proceeding straight through the intersection. In comparison, Empty Saddle Drive is considered the ‘minor’ street as westbound drivers on Empty Saddle Drive are required to stop at Nellie Gail Road and look both ways before proceeding to make a left or right turn. It is typically expected that the traffic volumes on the minor street are significantly less than those on the major street. As can be seen from the table above, this remains the case, as Empty Saddle Drive carries approximately 24% of the entire traffic entering the intersection (Nellie Gail Road carries 76% of entering traffic).

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 sign installation are reduced to 70%. As mentioned, the speed limits on both streets are 25 MPH. Field observations during our site visit also confirmed vehicles were not regularly speeding over the speed limit near the intersection, but were considered typical and what may be expected for two-lane local-type roadways. As the speed limits are less than the 40 MPH limit required to reduce traffic volumes, the 70% minimum volumes for a multi-way stop sign analysis are not applicable, and the 100% minimum volumes were analyzed on the next page.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Empty Saddle Drive, in Laguna Hills, CA

Traffic Volumes (continued)

It is important to note that the highest 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. It must 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 (not just for one hour in a 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 collected 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 EMPTY SADDLE DRIVE

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 (164) vehicles per hour Meets 55% of the required hourly traffic volume	and	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 (61) vehicles per hour Meets 31% of the required hourly traffic volume	but	Part 3. If the 85th-percentile approach speed of the major-street traffic exceeds 65 km/h or exceeds 40 mph, the minimum vehicular volume warrants are (70) percent of the above values. Results: No, 85th percentile speed on major-street does not exceed 40 mph
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As shown above, the average hourly intersection approach traffic volumes for the highest 8-hour period did not satisfy both Parts 1 and 2 (55% *major street* / 31% *minor street*). Therefore, the minimum traffic volume warrant is not satisfied.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Empty Saddle Drive, in Laguna Hills, CA**Visibility**

Impaired visibility, or restricted sight distance, due to the geometry of the intersection and possible obstructions was carefully considered during our field-review of the surrounding residential property environment. The geometry of the intersection includes an approximate 90° angle, and both southbound Nellie Gail Road and Empty Saddle Drive have a gradual vertical curvature (downgrade) heading into the intersection.

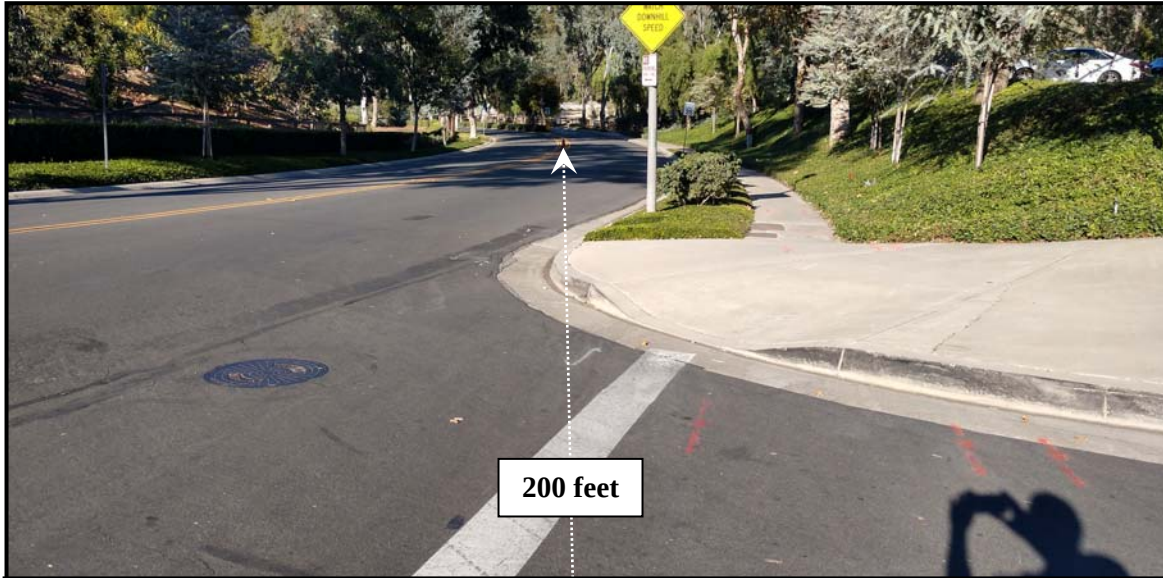
Driver sight distance was measured from the side-street approach to the intersection, as westbound traffic on Empty Saddle Drive is required to stop, before proceeding to make a left or right-turn onto Nellie Gail Road. The measured distance was derived from the stopping sight distance guidelines found in the California MUTCD (*see Appendix D*). In this reference, a 25 MPH roadway speed recommends a minimum Stopping Sight Distance of 155 feet. However, the 85th percentile speeds typically exceed the 25 MPH posted speed limit. Therefore, a 30 MPH speed limit was used as a more conservative measure, which has a minimum sight distance of 200 feet. This distance was used when looking towards approaching, uncontrolled traffic along Nellie Gail Road. More specifically, this stopping sight distance was field-measured from a typical ‘stopped’ vehicle location on Empty Saddle Drive at the intersection looking towards the oncoming lanes of cross-traffic on Nellie Gail Road. An orange cone was placed at this distance and a photograph was taken from a stopped driver’s perspective (i.e, approx. 4.5 feet).

(See sight distance photos in Exhibit 3 on the following page).

As Exhibit 3 shows, when looking from Empty Saddle Drive, a driver does have a clear line of sight to the minimum sight distance of 200 feet when looking both ways on Nellie Gail Road. It is important to note, since there is an equestrian crossing along the south side of the intersection, it is expected that equestrians having a higher field of view than a vehicle (i.e., approximately 8.5 feet above ground) also have a clear line of sight to the minimum sight distance of 200 feet along Nellie Gail Road.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Empty Saddle Drive, in Laguna Hills, CA

EXHIBIT 3



Westbound EMPTY SADDLE DRIVE (Looking North) @ NELLIE GAIL ROAD



Westbound EMPTY SADDLE DRIVE (Looking South) @ NELLIE GAIL ROAD

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Empty Saddle Drive, in Laguna Hills, CA

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.

In summary, the collision history at the intersection resulted in (1) SWITRS-reported correctible collision during the last five years of available data, where the minimum guideline calls for at least five (5) correctible collisions in a 12-month period. The average minimum hourly minor street traffic volumes required for a multi-way stop that are to be satisfied for any eight (8) hours in an average day were also not close to being satisfied. Excessive delay to any approach of the intersection was not observed in terms of vehicles stopping and waiting for a gap on the major roadway due to the overall lower traffic volumes. Therefore, since intersection collision history and traffic volumes did not satisfy the minimum guidelines, it can also be derived that a traffic signal is not justified as an interim measure at this intersection (as mentioned above). The 80% combined criteria were also not met as both the collisions and minimum traffic volumes were not satisfied to this percentage. If the California MUTCD criteria is not met, the location is typically not recommended for installation of a multi-way stop.

However, engineering judgment should always be included in any decision regarding traffic safety improvements. Intersection lighting was also verified and found to be adequate as there is one street light located on the northeast corner of the intersection. In regards to pedestrian, bicycle, and equestrian activity, field observations confirmed a low activity. It was also determined that westbound drivers and equestrians do have a clear line of sight when looking both ways at Nellie Gail Road from Empty Saddle Drive.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Empty Saddle Drive, in Laguna Hills, CA

MULTIWAY STOP ANALYSIS SUMMARY (continued)

Therefore, based upon engineering judgment, it is determined that stopping traffic on Nellie Gail Road at Empty Saddle Drive is not required to enhance the traffic safety at this intersection.

RECOMMENDATION

In overall consideration of the analysis criteria in this report, a multi-way (3-way) stop sign installation is not recommended at this time for the intersection of Nellie Gail Road and Empty Saddle Drive. There are no other recommendations at this time.

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.

APPENDIX B

SWITRS COLLISION HISTORY

CITY OF LAGUNA HILLS
5-YEAR SWITRS COLLISION DATABASE
INTERSECTION OF NELLIE GAIL RD AT EMPTY SADDLE DR
JAN. 1, 2015 - SEPTEMBER 30, 2020

CASE ID	COLL. DATE	COLL. TIME	PRIMARY ROAD	SECONDARY ROAD	DIST.	DIR.	INTERS.	WEATH. 1	COLL. SEVERITY	PRIM. COLL. FACT.	PCF VIOL. CAT.	PCF VIOL.	HIT AND RUN	TYPE OF COLL.	MOTOR VEHICLE INVOLVED WITH	ROAD SURF.
8207346	20161227	1357	NELLIE GAIL RD	EMPTY SADDLE DR	28	N	N	A	2	A	8	22107	F	G	B	A

NOTES:**Weather 1**

A - Clear
 B - Cloudy
 C - Raining
 D - Snowing
 E - Fog
 F - Other
 G - Wind
 - - Not Stated

Collision Severity

1 - Fatal
 2 - Injury (Severe)
 3 - Injury (Other Visible)
 4 - Injury (Complaint of Pain)
 0 - PDO (Property Damage Only)

Primary Collision Factor

A - (Vehicle) Code Violation
 B - Other Improper Driving
 C - Other Than Driver
 D - Unknown
 E - Fell Asleep
 - - 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

PCF Violation Category

01 - Driving or Bicycling Under Influence
 02 - Impeding Traffic
 03 - Unsafe Speed
 04 - Following Too Closely
 05 - Wrong Side of Road
 06 - Improper Passing
 07 - Unsafe Lane Change
 08 - Improper Turning
 09 - Automobile ROW
 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

Hit and Run

F - Felony
 M - Misdemeanor
 N - Not Hit & Run

Road Surface

A - Dry
 B - Wet
 C - Snowy or Icy
 D - Slippery
 - - Not Stated

Type of Collision

A - Head-On
 B - Sideswipe
 C - Rear-End
 D - Broadside
 E - Hit Object
 F - Overturned
 G - Vehicle/Pedestrian
 H - Other
 - - Not Stated

APPENDIX C

AVERAGE DAILY TRAFFIC (ADT)

COUNT DATA

Prepared by National Data & Surveying Services

VOLUME

Nellie Gail Rd & Empty Saddle Dr

Day: Thursday
Date: 10/29/2020

Highest 8 hours.

City: Laguna Hills
Project #: CA20_010022_004

DAILY TOTALS					NB	SB	EB					WB	Total		
					966	1,254						0	699	2,919	
AM Period	NB	SB	EB	WB	TOTAL		PM Period	NB	SB	EB	WB	TOTAL			
00:00	0	3		1	4		12:00	22	22		10	54			
00:15	1	1		0	2		12:15	14	20		8	42			
00:30	0	1		0	1		12:30	15	19		14	48			
00:45	1	2	1	6	0	1	12:45	19	70	22	83	13	45	54	198
01:00	0	2		0	2		13:00	18	24		9	51			
01:15	0	0		0	0		13:15	17	19		11	47			
01:30	0	0		1	1		13:30	17	19		12	48			
01:45	1	1	0	2	0	1	13:45	13	65	12	74	12	44	37	183
02:00	0	0		0	0		14:00	23	18		8	49			
02:15	1	0		0	1		14:15	19	18		11	48			
02:30	0	1		0	1		14:30	21	20		9	50			
02:45	0	1	1	2	0	1	14:45	18	81	30	86	7	35	55	202
03:00	0	0		0	0		15:00	19	18		9	46			
03:15	0	1		1	2		15:15	28	35		14	77			
03:30	0	1		0	1		15:30	26	32		14	72			
03:45	1	1	0	2	1	2	15:45	34	107	24	109	9	46	67	262
04:00	0	1		0	1		16:00	21	35		17	73			
04:15	0	0		0	0		16:15	26	31		31	88			
04:30	1	0		0	1		16:30	29	24		42	95			
04:45	0	1	1	2	1	1	16:45	22	98	24	114	10	100	56	312
05:00	0	1		0	1		17:00	18	34		26	78			
05:15	1	3		0	4		17:15	21	30		24	75			
05:30	1	0		0	1		17:30	12	26		15	53			
05:45	1	3	5	9	0	6	17:45	15	66	27	117	13	78	55	261
06:00	1	4		3	8		18:00	15	20		19	54			
06:15	1	5		1	7		18:15	10	28		13	51			
06:30	1	5		1	7		18:30	21	30		13	64			
06:45	6	9	16	30	3	8	18:45	16	62	28	106	15	60	59	228
07:00	11	22		5	38		19:00	9	15		31	55			
07:15	6	13		12	31		19:15	12	10		11	33			
07:30	10	20		4	34		19:30	11	18		6	35			
07:45	14	41	16	71	12	33	19:45	4	36	18	61	4	52	26	149
08:00	13	15		5	33		20:00	4	11		7	22			
08:15	26	18		10	54		20:15	4	10		7	21			
08:30	12	19		7	38		20:30	8	9		2	19			
08:45	21	72	28	80	8	30	20:45	5	21	8	38	5	21	18	80
09:00	23	23		6	52		21:00	3	8		1	12			
09:15	17	15		4	36		21:15	5	10		3	18			
09:30	12	17		7	36		21:30	2	5		8	15			
09:45	17	69	21	76	10	27	21:45	1	11	4	27	0	12	5	50
10:00	18	16		8	42		22:00	2	4		0	6			
10:15	20	12		8	40		22:15	4	4		2	10			
10:30	13	19		8	40		22:30	2	4		0	6			
10:45	12	63	16	63	10	34	22:45	4	12	3	15	1	3	8	30
11:00	14	18		13	45		23:00	2	2		0	4			
11:15	13	22		11	46		23:15	1	1		0	2			
11:30	22	16		19	57		23:30	0	2		2	4			
11:45	21	70	20	76	21	64	23:45	1	4	0	5	0	2	1	11
TOTALS	333	419		201	953		TOTALS	633	835		498	1966			
SPLIT %	34.9%	44.0%		21.1%	32.6%		SPLIT %	32.2%	42.5%		25.3%	67.4			

DAILY TOTALS					NB	SB					EB	WB	Total
					966	1,254					0	699	2,919
AM Peak Hour	08:15	08:15		11:00	11:15		PM Peak Hour	15:45	15:15		16:15	15:4	
AM Pk Volume	82	88		64	219		PM Pk Volume	110	126		109	323	
Pk Hr Factor	0.788	0.786		0.762	0.883		Pk Hr Factor	0.809	0.900		0.649	0.85	
7 - 9 Volume	113	151	0	63	327		4 - 6 Volume	164	231	0	178	573	
7 - 9 Peak Hour	08:00	08:00		07:45	08:00		4 - 6 Peak Hour	16:00	17:00		16:15	16:1	
7 - 9 Pk Volume	72	80	0	34	182		4 - 6 Pk Volume	98	117	0	109	317	
Pk Hr Factor	0.692	0.714	0.000	0.708	0.798		Pk Hr Factor	0.845	0.860	0.000	0.649	0.83	

Attachment: Hartzog and Crabill Multi Way Stop Sign Analysis - Nellie Gail at Empty Saddle - 11-23-20 (2302 : Nellie Gail Ranch Equestrian

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

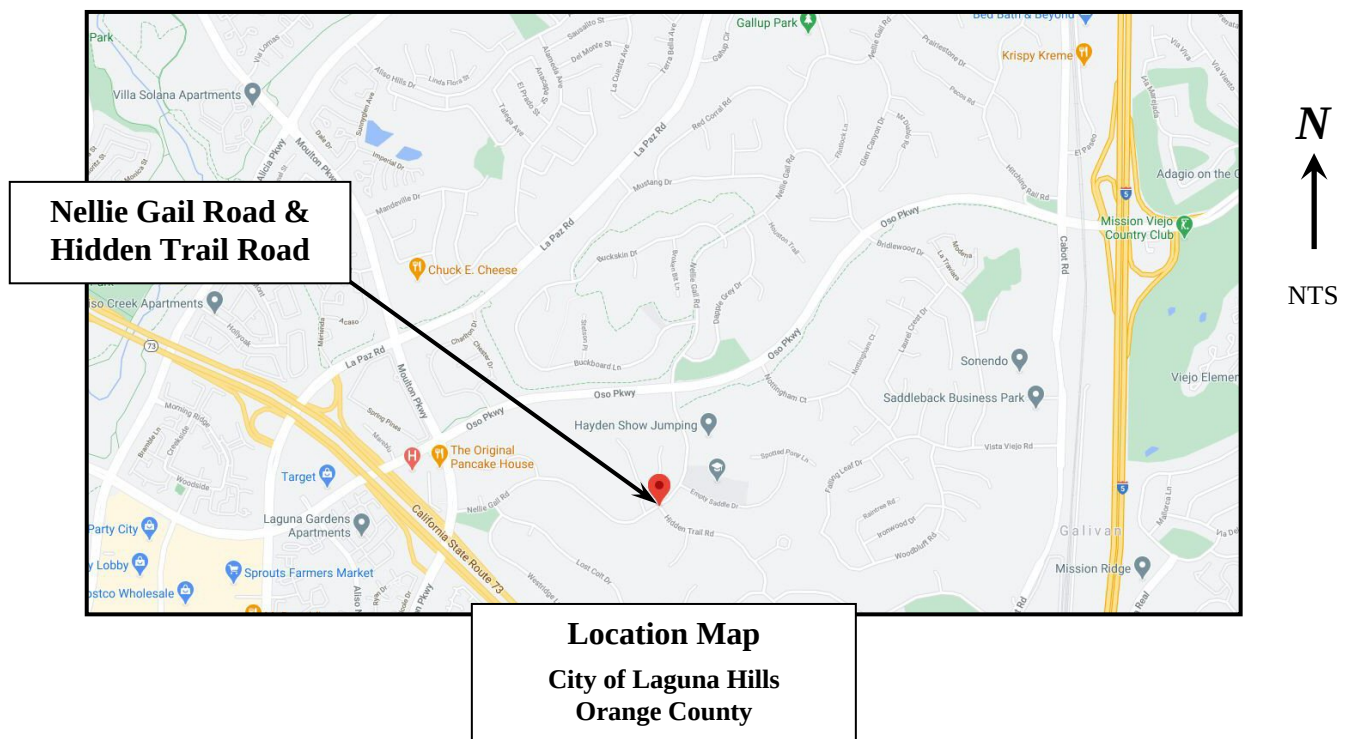
MULTIWAY STOP CONTROL WARRANTS ANALYSIS

NELLIE GAIL ROAD AT HIDDEN TRAIL ROAD IN THE CITY OF LAGUNA HILLS, CA NOVEMBER 24, 2020

INTRODUCTION

The City of Laguna Hills requested Hartzog & Crabill, Inc. (HCI) to complete a Multiway Stop Warrants Analysis at the intersection of Nellie Gail Road and Hidden Trail Road. 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 typical T-intersection with Nellie Gail Road running diagonally in the north-south directions and Hidden Trail Road running in the east-west directions. The intersection is located west of the I-5 Freeway and south of Oso Parkway (see *Location Map below*). The intersection is entirely within the City of Laguna Hills jurisdiction. At the present time, there is a one way stop control on Hidden Trail Road (i.e., Nellie Gail Road is uncontrolled).



Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Hidden Trail Road, in Laguna Hills, CA

BACKGROUND

Nellie Gail Road is a north-south local-collector roadway with single-family residential properties on both sides of the street, along with an equestrian center on the east side of the street near Oso Parkway. At the intersection with Hidden Trail Road, the roadway is approximately 40 feet wide, and the 2-lane roadway provides for one lane of traffic in each direction, which are separated by double-yellow centerline striping. There are no marked crosswalks across Nellie Gail Road at or near the intersection. The roadway does have curb, gutter, and sidewalk improvements on the east side, and only curb and gutter on the west side. There are equestrian paths along both sides of the roadway. Nellie Gail Road has a posted speed limit of 25 MPH. On-street parking is allowed on both sides of the street. Currently, there are no STOP signs on Nellie Gail Road (i.e., uncontrolled) at its intersection with Hidden Trail Road.

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

Hidden Trail Road is an east-west local roadway with single-family residential properties on both sides of the street. At the T-intersection with Nellie Gail Road, which is the westerly terminus of Hidden Trail Road, the roadway is approximately 40 feet wide. The 2-lane roadway provides for one lane of traffic in each direction, which are separated by double-yellow centerline striping. There are no marked crosswalks across Hidden Trail Road. The roadway does have curb and gutter improvements on both sides. Hidden Trail Road does have a posted speed limit of 25 MPH. There is a STOP sign, a white ‘STOP’ pavement marking, and a white limit line on Hidden Trail Road at its intersection with Nellie Gail Road.

See Exhibit 2 (following page) for a photo image of Hidden Trail Road.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Hidden Trail Road, in Laguna Hills, CA

EXHIBIT 1



NELLIE GAIL ROAD (Looking Northbound) @ HIDDEN TRAIL ROAD



NELLIE GAIL ROAD (Looking Southbound) @ HIDDEN TRAIL ROAD

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Hidden Trail Road, in Laguna Hills, CA

EXHIBIT 2



HIDDEN TRAIL ROAD (Looking Westbound) @ NELLIE GAIL ROAD

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Hidden Trail Road, in Laguna Hills, CA**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 on 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 multi-way (3-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 multi-way stop sign installation is typically not recommended.

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.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Hidden Trail Road, in Laguna Hills, CA

MULTIWAY 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 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... 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 this warrant. Such crashes include right- and left-turn collisions, as well as right-angle collisions (i.e., broadside, or head-on) and pedestrian-vehicle collisions. The latest available collision history for the intersection was gathered by HCI from the State of California Highway Patrol (CHP) Statewide Integrated Traffic Records System website (*i-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.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Hidden Trail Road, in Laguna Hills, CA

Collision History (continued)

TABLE 1
SWITRS COLLISION SUMMARY

Intersection	2015		2016		2017-18		2019-20	
	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?
Nellie Gail Road at Hidden Trail Road		<i>None reported</i>		<i>None reported</i>		<i>None reported</i>		<i>None reported</i>

Notes: Information above is derived per the latest 5-year intersection traffic collision database report gathered from CHP-SWITRS (*i-SWITRS website*).

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

As shown above, there have been (0) reported collisions, at or near this intersection over the past (5) years of available SWITRS collision data. 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. ***The SWITRS traffic collision data report is included in Appendix B.***

Traffic Volumes

HCI collected Average Daily Traffic (ADT) vehicular approach counts to the intersection on Thursday, October 29, 2020 in order to account for vehicles that typically use this T-intersection. The ADT approach count for Nellie Gail Road is 1,612 vehicles per day with the highest AM peak-hour approach volume having 134 vehicles, and 142 vehicles in the PM peak-hour. The ADT approach count for Hidden Trail Road is 807 vehicles with the highest AM peak-hour approach volume having 74 vehicles, and 85 vehicles in the PM peak-hour. Table 2 (next page) provides a breakdown of the approach volumes. ***The traffic volume data collected for this intersection is included in Appendix C.***

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Hidden Trail Road, in Laguna Hills, CA

Traffic Volumes (continued)

TABLE 2
HIGHEST 24-HOUR INTERSECTION APPROACH VEHICLE COUNTS
NELLIE GAIL ROAD AT HIDDEN TRAIL ROAD

Street	Direction	ADT Volume	Directional Split	Highest Hourly Volume
Nellie Gail Road	Northbound	648	40%	67 (4 - 5PM)
	Southbound	964	60%	84 (12 - 1PM)
Hidden Trail Road				
	Westbound	807	100%	85 (3 - 4PM)

Nellie Gail Road is considered the ‘through’ or ‘major’ street at this residential T-intersection since it carries higher volumes from both approaches, and drivers are not required to slow down, or even stop, before proceeding straight through the intersection. In comparison, Hidden Trail Road is considered the ‘minor’ street as westbound drivers on Hidden Trail Road are required to stop at Nellie Gail Road and look both ways before proceeding to make a left or right turn. It is typically expected that the traffic volumes on the minor street are significantly less than those on the major street. As can be seen from the table above, this is not really the case, as Hidden Trail Road carries approximately 33% of the entire traffic entering the intersection (Nellie Gail Road carries 67% of entering traffic).

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 sign installation are reduced to 70%. As mentioned, the speed limits on both streets are 25 MPH. Field observations during our site visit also confirmed vehicles were not regularly speeding over the speed limit near the intersection, but were considered typical and what may be expected for two-lane local-type roadways. As the speed limits are less than the 40 MPH limit required to reduce traffic volumes, the 70% minimum volumes for a multi-way stop sign analysis are not applicable, and the 100% minimum volumes were analyzed on the next page.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Hidden Trail Road, in Laguna Hills, CA

Traffic Volumes (continued)

It is important to note that the highest 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. It must 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 (not just for one hour in a 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 collected 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 HIDDEN TRAIL ROAD

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 (107) vehicles per hour Meets 36% of the required hourly traffic volume	and	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 (70) vehicles per hour Meets 35% of the required hourly traffic volume	but	Part 3. If the 85th-percentile approach speed of the major-street traffic exceeds 65 km/h or exceeds 40 mph, the minimum vehicular volume warrants are (70) percent of the above values. Results: No, 85th percentile speed on major-street does not exceed 40 mph
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As shown above, the average hourly intersection approach traffic volumes for the highest 8-hour period did not satisfy both Parts 1 and 2 (36% *major street* / 35% *minor street*). Therefore, the minimum traffic volume warrant is not satisfied.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Hidden Trail Road, in Laguna Hills, CA**Visibility**

Impaired visibility, or restricted sight distance, due to the geometry of the intersection and possible obstructions was carefully considered during our field-review of the surrounding residential property environment. The geometry of the intersection includes an approximate 90° angle, and both northbound Nellie Gail Road and Hidden Trail Road have a gradual vertical curvature (downgrade) heading into the intersection.

Driver sight distance was measured from the side-street approach to the intersection, as westbound traffic on Hidden Trail Road is required to stop, before proceeding to make a left or right-turn onto Nellie Gail Road. The measured distance was 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. However, the 85th percentile speeds typically exceed the 25 MPH posted speed limit. Therefore, a 30 MPH speed limit was used as a more conservative measure, which has a minimum sight distance of 200 feet. This distance was used when looking towards approaching, uncontrolled traffic along Nellie Gail Road. More specifically, this stopping sight distance was field-measured from a typical ‘stopped’ vehicle location on Hidden Trail Road at the intersection looking towards the oncoming lanes of cross-traffic on Nellie Gail Road. An orange cone was placed at this distance and a photograph was taken from a stopped driver’s perspective (i.e, approx. 4.5 feet).

(See sight distance photos in Exhibit 3 on the following page).

As Exhibit 3 shows, when looking from Hidden Trail Road, a driver does have a clear line of sight to the minimum sight distance of 200 feet when looking both ways on Nellie Gail Road. It is important to note, there is not a marked and posted equestrian crossing across Nellie Gail Road at this location. If there was an equestrian crossing at this intersection, it is expected that equestrians having a higher field of view than a vehicle (i.e., approximately 8.5 feet above ground) would also have a clear line of sight to the minimum sight distance of 200 feet along Nellie Gail Road.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Hidden Trail Road, in Laguna Hills, CA

EXHIBIT 3



Westbound HIDDEN TRAIL ROAD (Looking North) @ NELLIE GAIL ROAD



Westbound HIDDEN TRAIL ROAD (Looking South) @ NELLIE GAIL ROAD

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Hidden Trail Road, in Laguna Hills, CA**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.

In summary, the collision history at the intersection resulted in (0) SWITRS-reported correctible collisions during the last five years of available data, where the minimum guideline calls for at least five (5) correctible collisions in a 12-month period. The average minimum hourly street volumes required for a multi-way stop to be satisfied for any eight (8) hours in an average day were also not satisfied; however, they were approximate equal volumes per leg. Excessive delay to any approach was not observed in terms of vehicles stopping and waiting for a gap on the major roadway due to the overall lower traffic volumes. Therefore, since intersection collision history and traffic volumes did not satisfy the minimum guidelines, it can also be derived that a traffic signal is not justified as an interim measure at this intersection (as mentioned above). The 80% combined criteria were also not met as both the collisions and minimum traffic volumes were not satisfied to this percentage. If the California MUTCD criteria is not met, the location is typically not recommended for installation of a multi-way stop.

However, engineering judgment should always be included in any decision regarding traffic safety improvements. Intersection lighting was also verified and found to be adequate as there is one street light located on the northeast corner of the intersection. In regards to pedestrian, bicycle, and equestrian activity, field observations confirmed a low activity. There were 2 equestrians observed using the east side path during our field review. It was also determined that westbound drivers and equestrians do have a clear line of sight when looking both ways at Nellie Gail Road from Hidden Trail Road.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Hidden Trail Road, in Laguna Hills, CA

MULTIWAY STOP ANALYSIS SUMMARY (continued)

Therefore, based upon engineering judgment, it is determined that stopping traffic on Nellie Gail Road at Hidden Trail Road is not required to enhance the traffic safety at this intersection.

RECOMMENDATION

In overall consideration of the analysis criteria in this report, a multi-way (3-way) stop sign installation is not recommended at this time for the intersection of Nellie Gail Road and Hidden Trail Road. There are no other recommendations at this time.

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.*

APPENDIX B

SWITRS COLLISION HISTORY

CITY OF LAGUNA HILLS
5-YEAR SWITRS COLLISION DATABASE
INTERSECTION OF NELLIE GAIL RD AT HIDDEN TRAIL RD
JAN. 1, 2015 - SEPTEMBER 30, 2020

CASE ID	COLL. DATE	COLL. TIME	PRIMARY ROAD	SECONDARY ROAD	DIST.	DIR.	INTERS.	WEATH. 1	COLL. SEVERITY	PRIM. COLL. FACT.	PCF VIOL. CAT.	PCF VIOL.	HIT AND RUN	TYPE OF COLL.	MOTOR VEHICLE INVOLVED WITH	ROAD SURF
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None reported.

NOTES:

Weather 1

A - Clear
 B - Cloudy
 C - Raining
 D - Snowing
 E - Fog
 F - Other
 G - Wind
 - - Not Stated

Collision Severity

1 - Fatal
 2 - Injury (Severe)
 3 - Injury (Other Visible)
 4 - Injury (Complaint of Pain)
 0 - PDO (Property Damage Only)

Primary Collision Factor

A - (Vehicle) Code Violation
 B - Other Improper Driving
 C - Other Than Driver
 D - Unknown
 E - Fell Asleep
 - - Not Stated

PCF Violation Category

01 - Driving or Bicycling Under Influence
 02 - Impeding Traffic
 03 - Unsafe Speed
 04 - Following Too Closely
 05 - Wrong Side of Road
 06 - Improper Passing
 07 - Unsafe Lane Change
 08 - Improper Turning
 09 - Automobile ROW
 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

Hit and Run

F - Felony
 M - Misdemeanor
 N - Not Hit & Run

Type of Collision

A - Head-On
 B - Sideswipe
 C - Rear-End
 D - Broadside
 E - Hit Object
 F - Overturned
 G - Vehicle/Pedestrian
 H - Other
 - - 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

AVERAGE DAILY TRAFFIC (ADT)

COUNT DATA

Prepared by National Data & Surveying Services

VOLUME

Hidden Trail Rd & Nellie Gail Rd

Day: Thursday
Date: 10/29/2020

Highest 8 hours.

City: Laguna Hills
Project #: CA20_010022_007

DAILY TOTALS					NB	SB	EB				WB	Total		
					807	0					648	964	2,419	
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL			
00:00	0		0	3	3	12:00	23		11	20	54			
00:15	1		2	0	3	12:15	10		9	19	38			
00:30	0		1	0	1	12:30	19		11	23	53			
00:45	0	1	1	4	1	12:45	24	76	12	43	22	84	58	203
01:00	0		0	0	0	13:00	19		10	18	47			
01:15	0		0	0	0	13:15	20		12	19	51			
01:30	0		0	2	2	13:30	16		12	15	43			
01:45	0		1	1	0	13:45	14	69	18	52	14	66	46	187
02:00	0		0	0	0	14:00	19		17	20	56			
02:15	0		1	0	1	14:15	11		15	18	44			
02:30	0		0	0	0	14:30	11		12	22	45			
02:45	0		0	1	0	14:45	16	57	9	53	21	81	46	191
03:00	0		0	0	0	15:00	15		11	17	43			
03:15	0		0	0	0	15:15	24		17	25	66			
03:30	0		0	0	0	15:30	17		17	21	55			
03:45	1	1	0	1	1	15:45	29	85	19	64	15	78	63	227
04:00	0		0	1	1	16:00	13		16	20	49			
04:15	0		0	0	0	16:15	21		14	14	49			
04:30	0		1	0	1	16:30	19		23	27	69			
04:45	1	1	1	2	2	16:45	18	71	14	67	13	74	45	212
05:00	0		1	0	1	17:00	17		9	10	36			
05:15	0		2	0	2	17:15	25		9	17	51			
05:30	0		1	0	1	17:30	12		9	20	41			
05:45	1	1	2	6	2	17:45	15	69	8	35	16	63	39	167
06:00	1		1	1	3	18:00	19		5	20	44			
06:15	1		1	3	5	18:15	8		6	23	37			
06:30	2		1	2	5	18:30	19		14	23	56			
06:45	4	8	5	8	8	18:45	7	53	12	37	10	76	29	166
07:00	8		9	17	34	19:00	8		5	20	33			
07:15	6		7	12	25	19:15	8		6	9	23			
07:30	5		13	11	29	19:30	7		5	8	20			
07:45	11	30	11	40	11	19:45	6	29	2	18	10	47	18	94
08:00	7		6	14	27	20:00	3		5	10	18			
08:15	18		15	11	44	20:15	4		2	10	16			
08:30	11		8	14	33	20:30	4		4	10	18			
08:45	16	52	13	42	18	20:45	2	13	5	16	6	36	13	65
09:00	19		16	15	50	21:00	0		5	3	8			
09:15	18		7	10	35	21:15	7		1	10	18			
09:30	8		5	16	29	21:30	1		3	3	7			
09:45	11	56	12	40	14	21:45	1	9	1	10	3	19	5	38
10:00	9		11	11	31	22:00	1		2	3	6			
10:15	9		17	9	35	22:15	2		1	2	5			
10:30	11		8	20	39	22:30	3		1	3	7			
10:45	11	40	7	43	14	22:45	2	8	3	7	3	11	8	26
11:00	11		15	15	41	23:00	1		2	2	5			
11:15	15		10	23	48	23:15	1		0	1	2			
11:30	29		13	17	59	23:30	2		2	1	5			
11:45	19	74	15	53	26	23:45	0	4	2	6	1	5	3	15
TOTALS	264		240		20	324	828	TOTALS	543		408		640	159
SPLIT %	31.9%		29.0%		39.1%	34.2%	SPLIT %	34.1%		25.6%		40.2%	65.8	

DAILY TOTALS					NB	SB	EB				WB	Total
					807	0	648				964	2,419
AM Peak Hour	11:15		11:00	11:45	11:15	PM Peak Hour	15:00		15:45	14:30	15:15	
AM Pk Volume	86		53	88	221	PM Pk Volume	85		72	85	233	
Pk Hr Factor	0.741		0.883	0.846	0.921	Pk Hr Factor	0.733		0.783	0.850	0.88	
7 - 9 Volume	82	0	82	108	272	4 - 6 Volume	140	0	102	137	379	
7 - 9 Peak Hour	08:00		07:30	08:00	08:00	4 - 6 Peak Hour	16:30		16:00	16:00	16:00	
7 - 9 Pk Volume	52	0	45	57	151	4 - 6 Pk Volume	79	0	67	74	212	
Pk Hr Factor	0.722	0.000	0.750	0.792	0.803	Pk Hr Factor	0.790	0.000	0.728	0.685	0.76	

Attachment: Hartzog and Crabill Multi Way Stop Sign Analysis - Nellie Gail at Hidden Trail - 11-24-20 (2302 : Nellie Gail Ranch Equestrian

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

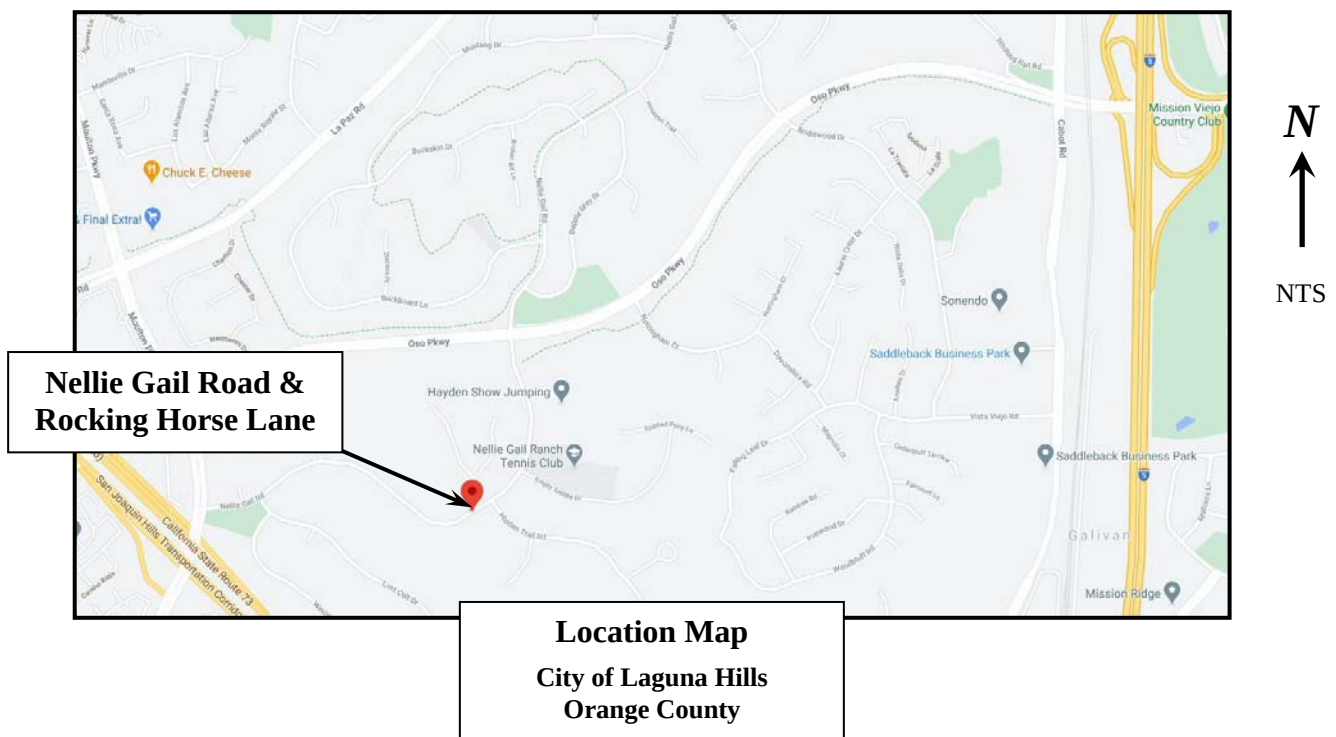
MULTIWAY STOP CONTROL WARRANTS ANALYSIS

NELLIE GAIL ROAD AT ROCKING HORSE LANE IN THE CITY OF LAGUNA HILLS, CA NOVEMBER 25, 2020

INTRODUCTION

The City of Laguna Hills requested Hartzog & Crabill, Inc. (HCI) to complete a Multiway Stop Warrants Analysis at the intersection of Nellie Gail Road and Rocking Horse Lane. 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 typical T-intersection with Nellie Gail Road running diagonally in the north-south directions and Rocking Horse Lane running diagonally in the east-west directions. The intersection is located west of the I-5 Freeway and south of Oso Parkway (see *Location Map below*). The intersection is entirely within the City of Laguna Hills jurisdiction. At the present time, there is a one way stop control on Rocking Horse Lane (i.e., Nellie Gail Road is uncontrolled).



Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Rocking Horse Lane, in Laguna Hills, CA

BACKGROUND

Nellie Gail Road is a north-south local-collector roadway with single-family residential properties on both sides of the street, along with an equestrian center on the east side of the street near Oso Parkway. At the intersection with Rocking Horse Lane, the roadway is approximately 40 feet wide, and the 2-lane roadway provides for one lane of traffic in each direction, which are separated by double-yellow centerline striping. There are no marked crosswalks across Nellie Gail Road at or near the intersection. It was also field-verified that there is no existing school bus stop located at/near Rocking Horse Lane. The roadway does have curb, gutter, parkway, and sidewalk improvements on the east side, and only curb and gutter on the west side. There are equestrian paths along both sides of the roadway. There are equestrian crossing warning signs posted at the intersection (without yield line markings). There is also an Offset Intersections warning sign facing NB traffic. Nellie Gail Road has a posted speed limit of 25 MPH, along with a ‘25’ pavement marking. On-street parking is allowed on both sides of the street. Currently, there are no STOP signs on Nellie Gail Road (i.e., uncontrolled) at its intersection with Rocking Horse Lane. ***See Exhibit 1 (next page) for photo images of Nellie Gail Road.***

Rocking Horse Lane is an east-west local roadway with single-family residential properties on both sides of the street. At the T-intersection with Nellie Gail Road, which is the easterly terminus of Rocking Horse Lane, the roadway is approximately 34 feet wide. The 2-lane curvy roadway provides for one lane of traffic in each direction, which are separated by centerline striping at the intersection. There are no marked crosswalks across Rocking Horse Lane. The roadway does have curb, gutter, and parkway improvements on both sides. Rocking Horse Lane does not have a posted speed limit; however, the residential nature of this street results in a ‘*prima facie*’ speed limit of 25 MPH and does not require posting. On-street parking is allowed on both sides of the street. There is a STOP sign, a white ‘STOP’ pavement marking, and a white limit line on Rocking Horse Lane at its intersection with Nellie Gail Road. ***See Exhibit 2 (following page) for a photo image of Rocking Horse Lane.***

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Rocking Horse Lane, in Laguna Hills, CA

EXHIBIT 1



NELLIE GAIL ROAD (Looking Northbound) @ ROCKING HORSE LANE



NELLIE GAIL ROAD (Looking Southbound) @ ROCKING HORSE LANE

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Rocking Horse Lane, in Laguna Hills, CA

EXHIBIT 2



ROCKING HORSE LANE (Looking Eastbound) @ NELLIE GAIL ROAD

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Rocking Horse Lane, in Laguna Hills, CA**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 on 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 multi-way (3-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 multi-way stop sign installation is typically not recommended.

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.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Rocking Horse Lane, in Laguna Hills, CA

MULTIWAY 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 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... 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 this warrant. Such crashes include right- and left-turn collisions, as well as right-angle collisions (i.e., broadside, or head-on) and pedestrian-vehicle collisions. The latest available collision history for the intersection was gathered by HCI from the State of California Highway Patrol (CHP) Statewide Integrated Traffic Records System website (*i-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.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Rocking Horse Lane, in Laguna Hills, CA**Collision History (continued)**

TABLE 1
SWITRS COLLISION SUMMARY

Intersection	2015		2016		2017-18		2019-20	
	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?
Nellie Gail Road at Rocking Horse Lane		<i>None reported</i>		<i>None reported</i>		<i>None reported</i>		<i>None reported</i>

Notes: Information above is derived per the latest 5-year intersection traffic collision database report gathered from CHP-SWITRS (*i-SWITRS website*).

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

As shown above, there have been (0) reported collisions, at or near this intersection over the past (5) years of available SWITRS collision data. 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. ***The SWITRS traffic collision data report is included in Appendix B.***

Traffic Volumes

HCI collected Average Daily Traffic (ADT) vehicular approach counts to the intersection on Thursday, October 29, 2020 in order to account for vehicles that typically use this T-intersection. The ADT approach count for Nellie Gail Road is 1,144 vehicles per day with the highest AM peak-hour approach volume having 90 vehicles, and 99 vehicles in the PM peak-hour. The ADT approach count for Rocking Horse Lane is 152 vehicles with the highest AM peak-hour approach volume having 13 vehicles, and 16 vehicles in the PM peak-hour. Table 2 (next page) provides a breakdown of the approach volumes. ***The traffic volume data collected for this intersection is included in Appendix C.***

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Rocking Horse Lane, in Laguna Hills, CA

Traffic Volumes (continued)

TABLE 2
HIGHEST 24-HOUR INTERSECTION APPROACH VEHICLE COUNTS
NELLIE GAIL ROAD AT ROCKING HORSE LANE

Street	Direction	ADT Volume	Directional Split	Highest Hourly Volume
Nellie Gail Road	Westbound	597	52%	60 (12 - 1PM)
	Eastbound	547	48%	57 (4 – 5PM)
Rocking Horse Lane				
	Southbound	152	100%	16 (1 - 2PM)

Nellie Gail Road is considered the ‘through’ or ‘major’ street at this residential T-intersection since it carries higher volumes, and drivers are not required to slow down, or even stop, before proceeding straight through the intersection. In comparison, Rocking Horse Lane is considered the ‘minor’ street as eastbound drivers on Rocking Horse Lane are required to stop at Nellie Gail Road and look both ways before proceeding to make a left or right turn. It is typically expected that the traffic volumes on the minor street are significantly less than those on the major street. As can be seen from the table above, this is the case, as Rocking Horse Lane carries approximately 12% of the entire traffic entering the intersection (Nellie Gail Road carries 88% of entering traffic).

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 sign installation are reduced to 70%. As mentioned, the speed limits on both streets are 25 MPH. Field observations during our site visit also confirmed vehicles were not regularly speeding over the speed limit near the intersection, but were considered typical and what may be expected for two-lane local-type roadways. As the speed limits are less than the 40 MPH limit required to reduce traffic volumes, the 70% minimum volumes for a multi-way stop sign analysis are not applicable, and the 100% minimum volumes were analyzed on the next page.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Rocking Horse Lane, in Laguna Hills, CA

Traffic Volumes (continued)

It is important to note that the highest 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. It must 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 (not just for one hour in a 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 collected 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 ROCKING HORSE LANE

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 (82) vehicles per hour Meets 27% of the required hourly traffic volume	and	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 (13) vehicles per hour Meets 7% of the required hourly traffic volume	but	Part 3. If the 85th-percentile approach speed of the major-street traffic exceeds 65 km/h or exceeds 40 mph, the minimum vehicular volume warrants are (70) percent of the above values. Results: No, 85th percentile speed on major-street does not exceed 40 mph
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As shown above, the average hourly intersection approach traffic volumes for the highest 8-hour period did not satisfy both Parts 1 and 2 (27% *major street* / 7% *minor street*). Therefore, the minimum traffic volume warrant is not satisfied.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Rocking Horse Lane, in Laguna Hills, CA

Visibility

Impaired visibility, or restricted sight distance, due to the geometry of the intersection and possible obstructions was carefully considered during our field-review of the surrounding residential property environment. The geometry of the intersection includes an approximate 90° angle, and both northbound Nellie Gail Road and Rocking Horse Lane have a gradual vertical curvature (downgrade) heading into the intersection.

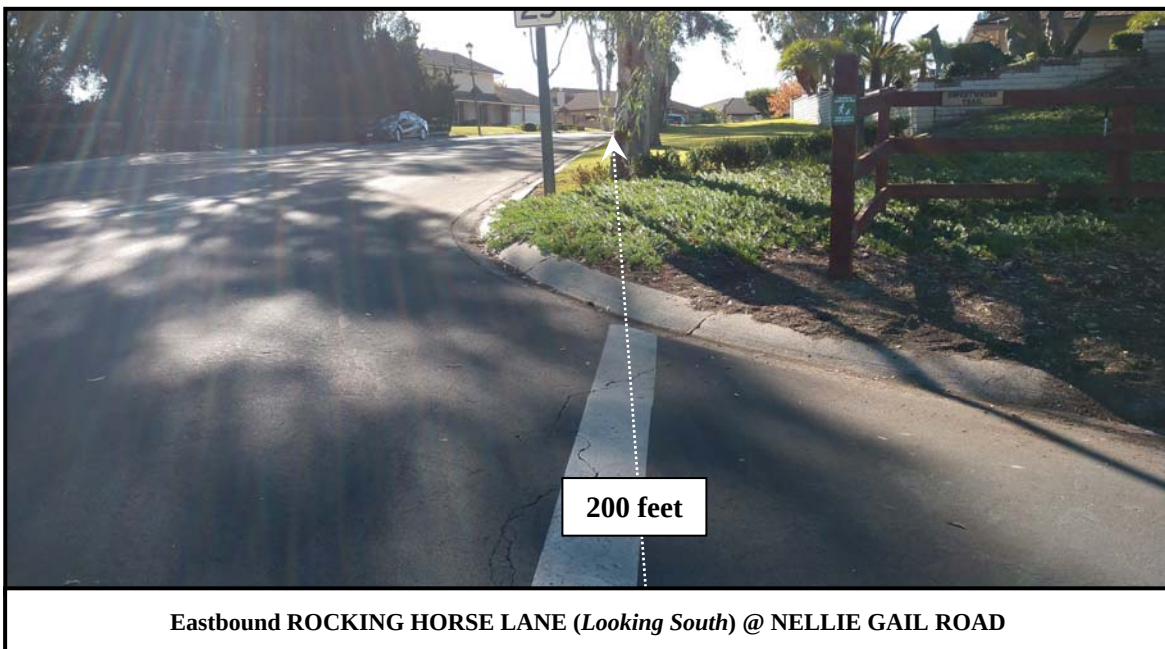
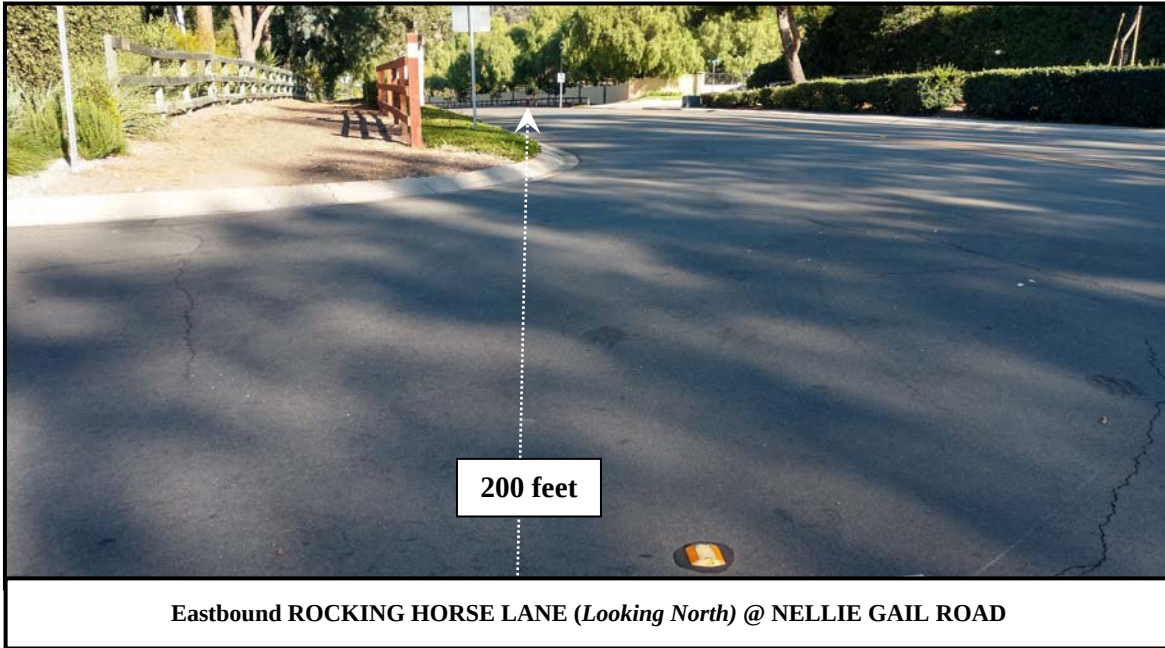
Driver sight distance was measured from the side-street approach to the intersection, as eastbound traffic on Rocking Horse Lane is required to stop, before proceeding to make a left or right-turn onto Nellie Gail Road. The measured distance was derived from the stopping sight distance guidelines found in the California MUTCD (*see Appendix D*). In this reference, a 25 MPH roadway speed recommends a minimum Stopping Sight Distance of 155 feet. However, the 85th percentile speeds typically exceed the 25 MPH posted speed limit. Therefore, a 30 MPH speed limit was used as a more conservative measure, which has a minimum sight distance of 200 feet. This distance was used when looking towards approaching, uncontrolled traffic along Nellie Gail Road. More specifically, this stopping sight distance was field-measured from a typical ‘stopped’ vehicle location on Rocking Horse Lane at the intersection looking towards the oncoming lanes of cross-traffic on Nellie Gail Road. An orange cone was placed at this distance and a photograph was taken from a stopped driver’s perspective (i.e, approx. 4.5 feet).

(See sight distance photos in Exhibit 3 on the following page).

As Exhibit 3 shows, when looking from Rocking Horse Lane, a driver does have a clear line of sight to the minimum sight distance of 200 feet when looking both ways on Nellie Gail Road. It is important to note, since there are equestrian crossing warning signs posted at the intersection, it is expected that equestrians having a higher field of view than a vehicle (i.e., approximately 8.5 feet above ground) also have a clear line of sight to the minimum sight distance of 200 feet along Nellie Gail Road.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Rocking Horse Lane, in Laguna Hills, CA

EXHIBIT 3



*Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Rocking Horse Lane, in Laguna Hills, CA***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.

In summary, the collision history at the intersection resulted in (0) SWITRS-reported correctible collisions during the last five years of available data, where the minimum guideline calls for at least five (5) correctible collisions in a 12-month period. The average minimum hourly minor street traffic volumes required for a multi-way stop that are to be satisfied for any eight (8) hours in an average day were also not close to being met. Excessive delay to any approach was not observed in terms of vehicles stopping and waiting for a gap on the major roadway due to the overall lower traffic volumes. Therefore, since intersection collision history and traffic volumes did not satisfy the minimum guidelines, it can also be derived that a traffic signal is not justified as an interim measure at this intersection (as mentioned above). The 80% combined criteria were also not met as both the collisions and minimum traffic volumes were not satisfied to this percentage. If the California MUTCD criteria is not met, the location is typically not recommended for installation of a multi-way stop.

However, engineering judgment should always be included in any decision regarding traffic safety improvements. Intersection lighting was also verified and found to be adequate as there is one street light located on the southwest corner of the intersection. In regards to pedestrian, bicycle, and equestrian activity, field observations confirmed a low activity. It was also determined that eastbound drivers and equestrians do have a clear line of sight when looking both ways at Nellie Gail Road from Rocking Horse Lane.

Multiway Stop Sign Warrants Analysis – Nellie Gail Road at Rocking Horse Lane, in Laguna Hills, CA

MULTIWAY STOP ANALYSIS SUMMARY (continued)

Therefore, based upon engineering judgment, it is determined that stopping traffic on Nellie Gail Road at Rocking Horse Lane is not required to enhance the traffic safety at this intersection.

RECOMMENDATION

In overall consideration of the analysis criteria in this report, a multi-way (3-way) stop sign installation is not recommended at this time for the intersection of Nellie Gail Road and Rocking Horse Lane. Since there are Equestrian Crossing warning signs posted at this intersection, it is recommended to install yield line markings in both directions along Nellie Gail Road where vehicles should stop when an equestrian is crossing Nellie Gail Road.

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.*

APPENDIX B

SWITRS COLLISION HISTORY

CITY OF LAGUNA HILLS
5-YEAR SWITRS COLLISION DATABASE
INTERSECTION OF NELLIE GAIL RD AT ROCKING HORSE LN
JAN. 1, 2015 - SEPTEMBER 30, 2020

CASE ID	COLL. DATE	COLL. TIME	PRIMARY ROAD	SECONDARY ROAD	DIST.	DIR.	INTERS.	WEATH. 1	COLL. SEVERITY	PRIM. COLL. FACT.	PCF VIOL. CAT.	PCF VIOL.	HIT AND RUN	TYPE OF COLL.	MOTOR VEHICLE INVOLVED WITH	ROAD SURF
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None reported.

NOTES:

Weather 1

A - Clear
 B - Cloudy
 C - Raining
 D - Snowing
 E - Fog
 F - Other
 G - Wind
 - - Not Stated

Collision Severity

1 - Fatal
 2 - Injury (Severe)
 3 - Injury (Other Visible)
 4 - Injury (Complaint of Pain)
 0 - PDO (Property Damage Only)

Primary Collision Factor

A - (Vehicle) Code Violation
 B - Other Improper Driving
 C - Other Than Driver
 D - Unknown
 E - Fell Asleep
 - - Not Stated

PCF Violation Category

01 - Driving or Bicycling Under Influe
 02 - Impeding Traffic
 03 - Unsafe Speed
 04 - Following Too Closely
 05 - Wrong Side of Road
 06 - Improper Passing
 07 - Unsafe Lane Change
 08 - Improper Turning
 09 - Automobile ROW
 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

Hit and Run

F - Felony
 M - Misdemeanor
 N - Not Hit & Run

Type of Collision

A - Head-On
 B - Sideswipe
 C - Rear-End
 D - Broadside
 E - Hit Object
 F - Overturned
 G - Vehicle/Pedestrian
 H - Other
 - - 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

AVERAGE DAILY TRAFFIC (ADT)

COUNT DATA

Prepared by National Data & Surveying Services

VOLUME

Rocking Horse Ln & Nellie Gail Rd

Day: Thursday
Date: 10/29/2020

Highest 8 hours.

City: Laguna Hills
Project #: CA20_010022_001

DAILY TOTALS					NB	SB	EB				WB	Total			
					0	152					547	597	1,296		
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL				
00:00		0	0	2	2	12:00		3	10	13	26				
00:15		1	0	1	2	12:15		5	6	15	26				
00:30		2	0	0	2	12:30		2	11	16	29				
00:45		0	3	1	1	2	5	3	12	9	36	27	108		
01:00		0	0	0	0	13:00		3	7	8	18				
01:15		0	0	0	0	13:15		4	10	14	28				
01:30		0	0	1	1	13:30		3	14	10	27				
01:45		0	1	1	0	1	1	6	16	15	46	6	38	27	100
02:00		0	0	0	0	14:00		3	12	8	23				
02:15		1	1	0	2	14:15		4	12	8	24				
02:30		0	0	0	0	14:30		3	10	12	25				
02:45		0	1	0	1	0	2	2	12	7	41	8	36	17	89
03:00		0	0	0	0	15:00		4	8	13	25				
03:15		0	0	0	0	15:15		2	8	20	30				
03:30		0	0	0	0	15:30		2	12	12	26				
03:45		0	0	1	1	15:45		3	11	14	42	12	57	29	110
04:00		1	0	0	1	16:00		1	17	14	32				
04:15		0	0	0	0	16:15		0	14	10	24				
04:30		0	1	0	1	16:30		4	15	20	39				
04:45		0	1	0	1	1	1	4	9	11	57	7	51	22	117
05:00		0	2	0	2	17:00		2	10	9	21				
05:15		1	2	0	3	17:15		0	12	15	27				
05:30		1	0	0	1	17:30		1	8	13	22				
05:45		0	2	2	6	1	1	3	6	8	38	11	48	22	92
06:00		1	0	1	2	18:00		0	7	14	21				
06:15		1	1	1	3	18:15		2	7	10	19				
06:30		0	1	2	3	18:30		2	12	11	25				
06:45		0	2	4	6	1	5	2	6	11	37	7	42	20	85
07:00		2	4	11	17	19:00		2	3	13	18				
07:15		1	7	9	17	19:15		0	6	5	11				
07:30		3	10	5	18	19:30		2	6	3	11				
07:45		1	7	12	33	7	32	0	4	2	17	6	27	8	48
08:00		3	5	6	14	20:00		1	5	5	11				
08:15		5	13	7	25	20:15		0	2	4	6				
08:30		2	7	11	20	20:30		1	4	5	10				
08:45		2	12	12	37	14	38	2	4	4	15	3	17	9	36
09:00		4	13	6	23	21:00		2	3	2	7				
09:15		2	7	9	18	21:15		0	2	9	11				
09:30		3	4	8	15	21:30		2	3	3	8				
09:45		3	12	9	33	11	34	1	5	2	10	1	15	4	30
10:00		3	9	4	16	22:00		0	1	0	1				
10:15		5	13	8	26	22:15		1	1	2	4				
10:30		1	8	14	23	22:30		0	1	1	2				
10:45		4	13	4	34	10	36	2	3	2	5	2	5	6	13
11:00		2	12	11	25	23:00		0	2	0	2				
11:15		5	8	9	22	23:15		0	0	0	0				
11:30		2	11	10	23	23:30		0	2	2	4				
11:45		1	10	14	45	15	45	1	1	1	5	0	2	2	8
TOTALS		63	198	199	460	TOTALS		89	349	398	836				
SPLIT %		13.7%	43.0%	43.3%	35.5%	SPLIT %		10.6%	41.7%	47.6%	64.5				

DAILY TOTALS					NB	SB	EB			WB	Total
					0	152				547	597
AM Peak Hour	09:30	08:15	11:45	11:45	PM Peak Hour	13:00	15:45	12:00	15:4		
AM Pk Volume	14	45	59	111	PM Pk Volume	16	60	60	124		
Pk Hr Factor	0.700	0.865	0.922	0.925	Pk Hr Factor	0.667	0.882	0.938	0.79		
7 - 9 Volume	0	19	70	70	159	4 - 6 Volume	0	15	95	99	209
7 - 9 Peak Hour	07:30	07:30	08:00	08:00	4 - 6 Peak Hour	16:15	16:00	16:00	16:0		
7 - 9 Pk Volume	0	12	40	38	87	4 - 6 Pk Volume	0	10	57	51	117
Pk Hr Factor	0.000	0.600	0.769	0.679	0.777	Pk Hr Factor	0.000	0.625	0.838	0.638	0.75

Attachment: Hartzog and Crabill Multi Way Stop Sign Analysis - Nellie Gail at Rocking Horse - 11-25-20 (2302 : Nellie Gail Ranch Equestrian

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



City of Laguna Hills

Traffic Commission

Staff Report

DATE: January 20, 2021
TO: Traffic Commissioners
FROM: Kenneth H. Rosenfield P.E.
Assistant City Manager/Director of Public Services
ISSUE: Radar Speed Trailer

RECOMMENDATION: That the Traffic Commission Receive and File the Report.

ATTACHMENTS:

- Radar Trailer Calendar January 20 2021

CITY OF LAGUNA HILLS

JANUARY 2021

RADAR TRAILER SCHEDULE (RAINY DAYS EXCLUDED)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 HOLIDAY	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19 Linda Vista N/O Alisal 25 MPH	20 Bentley E/O Valerie 25 MPH	21 Largo W/O Sunburst 25 MPH	22	23
24 31	25	26	27	28	29	30

Attachment: Radar Trailer Calendar January 20 2021 (2301 : Radar Speed Trailer)

CITY OF LAGUNA HILLS

FEBRUARY 2021
RADAR TRAILER SCHEDULE (RAINY DAYS EXCLUDED)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
7	8	9 Nellie Gail E/O Desert Trail 25 MPH	10 Rapid Falls W/O Sundowner 25 MPH	11 Hidden Trail Across from 27783 25 MPH	12	13
14	15 HOLIDAY	16	17	18	19	20
21	22	23 Nellie Gail W/O Empty Saddle 25 MPH	24 Rapid Falls W/O Sundowner 25 MPH	25 Hidden Trail Across from 27783 25 MPH	26	27
28						

Attachment: Radar Trailer Calendar January 20 2021 (2301 : Radar Speed Trailer)

CITY OF LAGUNA HILLS

MARCH 2021

RADAR TRAILER SCHEDULE (RAINY DAYS EXCLUDED)

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

Attachment: Radar Trailer Calendar January 20 2021 (2301 : Radar Speed Trailer)