



CITY OF LAGUNA HILLS TRAFFIC COMMISSION

REGULAR MEETING AGENDA Wednesday, September 15, 2021 – 7:00 PM

Anna Lisa Lukes - Chair

Chris Bieber - Vice Chair

Manuel Hernandez - Commissioner

Susan Caskey - Commissioner

Mark Schaff - 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 May 19, 2021, Traffic Commission Meeting.

3. PRESENTATIONS**4. ADMINISTRATIVE REPORTS****4.1 Nellie Gail Road Equestrian Crossing Update of Improvements and Consideration of a Raised Intersection**

Recommendation: That the Traffic Commission review the status of improvements made and pending at the Nellie Gail Road Equestrian Crossing at the Nellie Gail Ranch Owners Association Equestrian Center Driveway and discuss the merits of a Raised Intersection at this location.

4.2 Request for All-Way Stop Control at the Intersection of Mackenzie Street at Knotty Pine Road

Recommendation: That the Traffic Commission Receive and File.

4.3 Electric Bicycles (Ebikes)

Recommendation: That the Traffic Commission Receive and File.

4.4 SWITRS Collision Report and Collision Diagram for the Intersection of Paseo De Valencia and Los Alisos Boulevard

Recommendation: That the Traffic Commission Receive and File.

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

Recommendation: That the Traffic Commission Receive and File.

6. COMMISSIONER COMMENTS**7. ADJOURNMENT**

The next Regular Meeting of the Traffic Commission will be November 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, Interim 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 September 10, 2021, at 5:00 pm.



Interim City Manager/Director of Public Services

September 10, 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: September 15, 2021
TO: Traffic Commissioners
FROM: Kenneth H. Rosenfield P.E.
Interim City Manager/Director of Public Services
ISSUE: Minutes

RECOMMENDATION: That the Traffic Commission Approve the Minutes of the May 19, 2021, Traffic Commission Meeting.

ATTACHMENTS:

- TC Minutes May 19 2021

**CITY OF LAGUNA HILLS
TRAFFIC COMMISSION MEETING
REGULAR MEETING MINUTES
MAY 19, 2021**

CALL TO ORDER

The Regular Meeting of the Traffic Commission of the City of Laguna Hills, California, was called to order by Chair Lukes at 7:01 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 Vice Chair Bieber.

ROLL CALL OF COMMISSION MEMBERS

Present: Vice Chair Chris Bieber, Commissioner Susan Caskey, Chair Anna Lisa Lukes, and Commissioner Mark Schaff.

Absent: Commissioner Manuel Hernandez

1. PUBLIC COMMENTS

There were no public comments.

2. MINUTES

**THE TRAFFIC COMMISSION APPROVED THE MINUTES OF THE MARCH 17, 2021, REGULAR MEETING, BY M/COMMISSIONER CASKEY, S/VICE CHAIR BIEBER.
APPROVED BY A VOTE OF 4-0, COMMISSIONER HERNANDEZ ABSENT.**

3. PRESENTATIONS

There were no presentations.

4. ADMINISTRATIVE REPORTS

4.1 NELLIE GAIL RANCH EQUESTRIAN CROSSING REVIEW

Associate Engineer Amber Shah reported, Staff met with the Nellie Gail Ranch Equestrian Ad Hoc Committee (Committee) in the fall of 2020 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

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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 report was presented at the January 2021 meeting of the Traffic Commission. Public comments received via email were distributed to the Traffic Commissioners and acknowledged at the meeting. The Traffic Commission continued the matter for further data collection.

Following an update presented at the March 2021 meeting of the Traffic Commission, follow-up speed surveys were performed in April 2021. Ms. Shah indicated the vehicle speeds recorded by radar were consistent with previous radar speed surveys primarily in the reasonably expected range of 32-34 mph, commonly found on streets with a 25-mph speed limit, and not, in and of themselves, of concern. Those vehicle speeds recorded above 34 mph are should be addressed through enforcement.

Staff evaluated the implementation of speed humps in the vicinity of the Equestrian Center Crossing based upon the minimum criteria set forth in the Residential Streets Management Policy. However, the road conditions do not support, and Staff does not recommend, the installation of speed humps. Alternatively, Staff considered the feasibility of a speed table at the Equestrian Center driveway/equestrian crossing. Installation of a speed table may be feasible but additional engineering design and analysis is required before a final recommendation can be made due to the location at a driveway intersection with larger vehicles and horse trailers needing proper transitioning to ascend to the raised table, turn, and descend to/from the driveway.

Staff recommended and strongly encouraged the Equestrian Committee and Nellie Gail Ranch Owners Association pursue a solution that would improve the equestrian trail access from the Equestrian Center to the existing Nellie Gail Road equestrian tunnel to make it a more desirable route. This approach would require some retraining of the equestrian community and would positively resolve expressed traffic control issues of concern at the use of the Equestrian Center Driveway at-grade crossing. Use of the tunnel provides a protected crossing that physically eliminates vehicle/equestrian conflicts. Ms. Shah indicated the City would also cooperate with these efforts and, if needed, seek to add lighting to the tunnel.

Staff also supported the Equestrian Committee's request to install two additional Rectangular Rapid Flashing Beacons (RRFB) in the median at the Equestrian Center Crossing to enhance the visibility of the existing at-grade crossing.

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Installation of RRFB at other equestrian crossings was not recommended due to the low volume of pedestrian and equestrian crossings at the other locations.

Angela Waian, a resident and professional equestrienne, spoke in favor of additional traffic control at the equestrian center.

Paul Buller, a resident, spoke in favor of a installing a speed table.

Allison Smith, a resident, played two videos of her crossing the street with her horse, and spoke in favor of additional traffic control uphill from the equestrian center and a speed table at the equestrian center crossing.

Ryan Smith, a resident, spoke in favor of additional traffic control, and a speed table.

Jennifer Portnoff Tullis, a resident, spoke in favor of additional traffic control and a speed table.

Pamela Fraser, a resident, spoke in favor of a speed table.

THE TRAFFIC COMMISSION RECOMMENDED 1) THE EQUESTRIAN TRAIL CONNECTION FROM THE NELLIE GAIL RANCH OWNERS ASSOCIATION EQUESTRIAN CENTER TO THE NELLIE GAIL ROAD TRAIL TUNNEL SOUTHERLY OF OSO PARKWAY BE IMPROVED TO MAKE IT A MORE DESIRABLE ROUTE; 2) THERE BE AN INSTALLATION OF TWO ADDITIONAL RECTANGULAR RAPID FLASHING BEACONS IN THE MEDIAN ON NELLIE GAIL ROAD TO ENHANCE THE EXISTING EQUESTRIAN CROSSING VISIBILITY AT THE EQUESTRIAN CENTER; 3) SPEED ENFORCEMENT BE SCHEDULED ALONG NELLIE GAIL ROAD, AS RESOURCES PERMIT; 4) DIRECTED STAFF TO CONTINUE THE RESEARCH, DESIGN AND FEASIBILITY STUDY OF A SPEED TABLE INSTALLATION AT THE EQUESTRIAN CENTER. BY, M/VICE CHAIR BIEBER, S/COMMISSIONER CASKEY.

APPROVED BY A VOTE OF 4-0, COMMISSIONER HERNANDEZ ABSENT.

5. INFORMATIONAL ITEMS

5.1 SHERIFF'S DEPARTMENT VERBAL REPORT

Sergeant Scott Steinle, reported the Sheriff's Department has directed Staff to prioritize traffic enforcement in and around the equestrian center. Sgt. Steinle has a deputy transitioning to a motorcycle position to specifically enforce this area. Sgt.

Steinle indicated 50-100 citations have been issued in the area, and the violators have all been residents of the Nellie Gail community. Sgt. Steinle emphasized the narrative

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of Nellie Gail as a cut through and the speeders not living in the community is not accurate, as the citations have indicated. Sgt. Steinle assured the Commission that the Sheriff's Department takes the safety of the residents, pedestrians and horses very seriously, and they are working diligently to heavily enforce the area.

5.2 RADAR SPEED TRAILER

Staff submitted the schedule for the radar trailer.

**THE TRAFFIC COMMISSION RECEIVED AND FILED THE REPORT.
BY M/COMMISSIONER SHAFF, S/VICE CHAIR BIEBER.
APPROVED BY A VOTE OF 5-0.**

6. COMMISSIONER COMMENTS

There were no Commissioner Comments.

7. ADJOURNMENT

There being no further business before the Traffic Commission at this session, Commissioner Bieber declared the meeting adjourned at 8:33 p.m.

Prepared By:

Amber Shah, P.E.
Associate Civil Engineer

Approved By:

Chair Anna Lisa Lukes

Attachment: TC Minutes May 19 2021 (2575 : Minutes)



City of Laguna Hills

Traffic Commission

Staff Report

DATE: September 15, 2021
TO: Traffic Commissioners
FROM: Kenneth H. Rosenfield P.E.
Interim City Manager/Director of Public Services
ISSUE: Nellie Gail Road Equestrian Crossing Update of Improvements and Consideration of a Raised Intersection

RECOMMENDATION: That the Traffic Commission review the status of improvements made and pending at the Nellie Gail Road Equestrian Crossing at the Nellie Gail Ranch Owners Association Equestrian Center Driveway and discuss the merits of a Raised Intersection at this location.

SUMMARY:

At the May 19, 2021, Traffic Commission meeting, the Commission considered proposed improvements to the subject location of an equestrian crossing and passed a motion: "The Traffic Commission Recommended 1) The Equestrian Trail Connection from the Nellie Gail Ranch Owners Association Equestrian Center to the Nellie Gail Road trail tunnel southerly of Oso Parkway be improved to make it a more desirable route; 2) There be an installation of two additional Rectangular Rapid Flashing Beacons in the median island of Nellie Gail Road to enhance the existing Equestrian Crossing Visibility at the Equestrian Center; 3) Speed enforcement be scheduled along Nellie Gail Road, as resources permit; 4) Directed Staff to continue the research, design and feasibility study of a speed table installation at the Equestrian Center. By, M/Vice Chair Bieber, S/Commissioner Caskey."

This report provides the Traffic Commission with an update to these various actions as follows: 1) The evaluation of a new trail connection from the Equestrian Center to the Tunnel is still in process and will be reported upon at a future meeting. 2) The

installation of two additional Rectangular Rapid Flashing Beacons (RRFB) was completed in early August 2021. 3) Speed enforcement continues as resources permit. 4) A speed table preliminary design concept, now referred to herein as a “raised intersection”, is presented for review and comment. The anticipated area of the 67% vote for the raised intersection is also provided.

BACKGROUND:

The equestrian crossing located on Nellie Gail Road at the Nellie Gail Ranch Owners Association (NGROA) equestrian facility rear driveway, southerly of Oso Parkway, has been reviewed on several occasions by the Traffic Commission, most recently on May 19, 2021, and has been the subject of a variety of signage improvements, rectangular rapid flashing beacons installation and traffic enforcement. At the May 19, 2021, meeting, the Traffic Commission approved the evaluation of a trail enhancement for access to the existing equestrian Tunnel under Nellie Gail Road, adding two RRFBs in the median island to supplement the existing two RRFBs in the parkways, continue speed enforcement and research the design feasibility of adding a raised intersection at this location.

To provide the community and Traffic Commission with an update to these matters, this report is provided with an update summary as follows: 1) The evaluation of a new trail connection from the Equestrian Center to the Tunnel is still in process and will be reported upon at a future meeting. 2) The installation of two additional Rectangular Rapid Flashing Beacons (RRFB) in the median island was completed in early August 2021. 3) Speed enforcement continues in which Police Services has found the majority of speed offenders to be residents of the area, and 4) A raised intersection preliminary design concept is presented for review and comment. The balance of this report will focus upon the concept design of the raised intersection. The May 19, 2021, Staff Report is attached as a reference document.

EXCERPT OF RESIDENTIAL STREETS MANAGEMENT POLICY NO. 350

In consideration of the Traffic Commission’s request to evaluate a raised intersection, the below excerpt for the City’s Policy for physical roadway devices (including related improvements) is provided for information including Staff annotations as to the status of the “minimum criteria” described below relative to the raised intersection concept. Staff has deemed the raised intersection as a physical device that must meet the criteria below.

IV. PHYSICAL DEVICES (Page 7)

Physical devices will only be considered as a last use effort to resolve an identified traffic safety issue that has been documented as not being resolved by other means described in this Policy. [emphasis added] Physical devices are roadway features and may include barricades, chokers, cul-de-sacs, medians, one-way streets, semi-diverters, speed humps and related improvements.

One of the physical devices most often requested for speed or volume control is a speed hump. Speed humps have been documented in certain but not all cases, to reduce the prevailing speed of traffic depending upon their spacing and frequency of use. While not specifically designed as a traffic volume control device, speed humps can cause some reduction in traffic volumes as motorists seek other routes due to the inconvenience factor caused by speed humps.

A speed hump, in contrast to a speed bump, is an elongated, gentle roadway feature typically 12 feet across with a height of approximately 3 inches, which gives the traversing vehicle a gentle rise and fall as a reminder that the 25-mph speed for the street should be followed. A speed bump, typically two feet across with a height of approximately 4 inches, can jolt vehicles and their passenger, motorcycles, and bicycles, is to be avoided.

Speed humps are typically placed in not less than groups of three at approximately 400-foot spacings in order to achieve the desired result of addressing the upper speed of vehicles. Speed humps are always coupled with extensive signing and striping and may be objectionable to residential neighborhoods.

Physical devices, including speed humps, will only be considered for use where other appropriate traffic controls have failed to address the documented traffic safety issue, where an environmental assessment has been considered and where the following minimum criteria are met.

a. At least 67% of the affected residents of the street and adjacent area streets support the implementation of the physical device. The streets to be used to evaluate the support for the physical device will be those that reasonably can be inferred to draw traffic to the street of concern. [PENDING ISSUE]

b. The prevailing speed of traffic has been documented to be greater than 34 mph for at least two radar speed surveys taken 90 days apart as part of the follow-up

evaluation of all other traffic controls used to address the issue. [MET]

c. At least 1,500 vehicles traverse the street in a 24-hour period. [MET]

d. The location meets the approval of the Police and Fire Department related to adequate response time of safety vehicles. [PENDING]

*e. The grade of the street shall not exceed 6%. [NOT DIRECTLY MET at 7.03%, however, ITE Guidelines for the Design and Application of Speed Humps currently recommends consideration only on a street with a **grade of 8 percent or less**]*

f. The street must have a length of at least 1,300 feet and be able to accommodate a minimum of three speed humps unless otherwise directed by the City Council. [MET]

g. Other issues related to traffic engineering will be considered as deemed appropriate by the City Traffic Engineer. [PENDING]

ANALYSIS

The attached raised intersection preliminary design concept has been provided by Hartzog and Crabill, Inc. The intersection is raised by a total of three inches from curb to curb and requires additional warning signs and pavement legends to alert the drivers to this roadway feature. The design concept is in accordance with traffic calming criteria as published by the Federal Highway Administration (FHWA). The raised intersection is equivalent to a speed hump. The following Staff review comments are provided for consideration.

- 1) The raised intersection will not significantly change the motorists view of the equestrian crossing or change the equestrians view of traffic.
- 2) Eighty-fifth percentile vehicle speeds are expected to be reduced a minimum of four miles per hour at the raised intersection as reported by FHWA.
- 3) To maintain gutter drainage at this location, the equestrian will have to be aware of the differential in the grade of the street and the gutter.
- 4) Additional vehicle noise should be expected in the area of the raised intersection. This noise would be attributed to vehicle braking on approach and vehicle acceleration upon leaving the raised intersection. Commercial vehicles, with loose or unsecured loads, would be expected to cause noise as the load rises and falls

over the raised intersection. There is limited published literature on the actual noise change expected at these devices. In a 1995 publication entitled, "Traffic Calming: vehicle noise emissions alongside speed control cushions and road humps", the Transport Research Laboratory (United Kingdom) reported "...the flat-top hump causing an increase of about 6 dB(A)..." A six-decibel noise change is definitely discernable by the average person and could be disturbing to sensitive receptors.

- 5) The Orange County Sheriff's Department and the Orange County Fire Authority have been contacted to determine if the raised intersection causes any concerns for delays in emergency response to the area. Their comments are pending.
- 6) The anticipated area impacted by the proposed raised intersection is outlined on the attached map of the parcels. This area was selected to represent the reasonable number of properties that would be more likely to use Nellie Gail Road at the location of the raised intersection rather than access other ingress/egress points to the community. The mapped area represents 116 properties "directly impacted".
- 7) Neither the construction of the raised intersection nor trail improvements are included in the current fiscal year budget.

CONCLUSION AND NEXT STEPS

It is the conclusion of Hartzog and Crabill, Inc., that the construction of the roadway feature of a raised intersection at the subject location is feasible. In order to proceed further, the Traffic Commission is requested to provide comments. The next steps thereafter would be to report the request to the City Council, likely at the October 12, 2021, City Council meeting for authorization to proceed to the resident area vote. If approved by the City Council and the area residents, the City Council would then be requested to allocate funding for the project at their discretion in the current or a future budget.

FISCAL IMPACT:

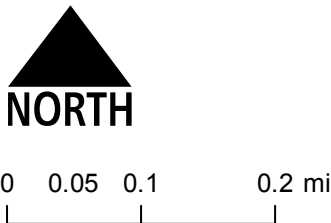
The proposed Speed Table Improvement and/or Trail Improvement is not included within the current fiscal year Budget. The Speed Table has an estimated construction cost of \$30,000. The Trail extension work cost estimate is not as yet available. This will be a topic of presentation to the City Council for direction.

ATTACHMENTS:

- Raised Intersection Preliminary Plan
- Raised Intersection Vote Area
- Nellie Gail Road Equestrian Crossing 19MAY2021



Attachment: Raised Intersection Vote Area (2562 : Nellie Gail Road Speed Table)



Raised Intersection Vote Area





City of Laguna Hills

Traffic Commission

Staff Report

DATE: May 19, 2021
TO: Traffic Commissioners
FROM: Amber M. Shah P.E.
 Associate Civil Engineer
ISSUE: Nellie Gail Ranch Equestrian Crossing Review

RECOMMENDATION: That the Traffic Commission Recommend 1) The Equestrian Trail Connection From the Nellie Gail Ranch Owners Association Equestrian Center to the Nellie Gail Road Trail Tunnel Southerly of Oso Parkway be Improved to Make it a More Desirable Route; 2) There be an Installation of two Additional Rectangular Rapid Flashing Beacons in the Median on Nellie Gail Road to Enhance the Existing Equestrian Crossing Visibility at the Equestrian Center; 3) Speed Enforcement be Scheduled Along Nellie Gail Road, as Resources Permit.

SUMMARY:

Staff met with the Nellie Gail Ranch Equestrian Ad Hoc Committee (Committee) in the fall of 2020 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 report was presented at the January 2021 meeting of the Traffic Commission. Public comments in response to the report received via email prior to the January 2021 meeting were distributed to the Traffic Commissioners in advance of the meeting and

Nellie Gail Ranch Equestrian Crossing Review

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acknowledged at the meeting. The Traffic Commission continued the matter for further data collection.

Following an update presented at the March 2021 meeting of the Traffic Commission, and in accordance with the Traffic Commission's request for further data collection at the January 2021 meeting, follow-up speed surveys were performed in April 2021. The vehicle speeds recorded by radar were consistent with previous radar speed surveys primarily in the reasonably expected range of 32-34 mph, commonly found on streets with a 25 mph speed limit, and not, in and of themselves, of concern. The vehicle speeds recorded above 34 mph are higher than desirable or appropriate for the posted speed limit and given conditions and should be address through enforcement.

Staff evaluated the implementation of speed humps in the vicinity of the Equestrian Center Crossing based upon the minimum criteria set forth in the Residential Streets Management Policy. However, the road conditions do not support, and staff does not recommend, the installation of speed humps. Alternatively, staff evaluated the feasibility of a speed table at the Equestrian Center driveway/equestrian crossing. Installation of a speed table may be feasible but additional engineering design and analysis is required before a final recommendation can be made due to the location at a driveway intersection with larger vehicles and horse trailers needing proper transitioning to ascend to the raised table, turn, and descend to/from the driveway.

Staff recommends and strongly encourages that the Equestrian Committee and Nellie Gail Ranch Owners Association pursue a solution that would improve the equestrian trail access from the Equestrian Center to the existing Nellie Gail Road equestrian tunnel to make it a more desirable route. This approach would require some "retraining" of the equestrian community and would positively resolve expressed traffic control issues of concern at the use of the Equestrian Center Driveway at-grade crossing. Use of the tunnel provides a protected crossing that physically eliminates vehicle/equestrian conflicts. The City would also cooperate with these efforts and, if needed, seek to add lighting to the tunnel.

Staff also supports the Equestrian Committee's request to install two Rectangular Rapid Flashing Beacons (RRFB) in the median at the Equestrian Center Crossing to enhance the visibility of the existing at-grade crossing. Installation of RRFB at other equestrian crossings is not recommended at this time due to the low volume of pedestrian and equestrian crossings at the other locations.

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 including installation of an RRFB alert system. In the fall of 2020, 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 report was presented at the January 2021 meeting of the Traffic Commission. Public comments in response to the report received via email prior to the January 2021 meeting were distributed to the Traffic Commissioners in advance of the meeting and acknowledged at the meeting. The Traffic Commission continued the matter for further data collection. However, striping improvements to install yield markings at the equestrian crossing have been scheduled at Rocking Horse Lane.

Following an update presented at the March 2021 meeting of the Traffic Commission, and in accordance with the Traffic Commission's request for further data collection at the January 2021 meeting, follow-up speed surveys were performed in April 2021. The results of the follow-up speed surveys are included in the amended traffic control and operational review of the driveway/equestrian crossing at the Nellie Gail Equestrian Center on Nellie Gail Road, performed by HCI, attached. The follow-up speed surveys were performed on two days and determined the 85th percentile speeds in the 31-34 mph range for the 10:00 am to 11:00 am timeframe and for the noon to 1:00 pm timeframe on the first day are consistent with the previous radar speed surveys and are

Nellie Gail Ranch Equestrian Crossing Review

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not, in and of themselves, of concern. The radar speed surveys for the 11:00 am to noon timeframe are higher than desirable or appropriate for the posted speed limit and given conditions. On the second day, the radar speed surveys indicated mixed results with half of the speeds in the reasonably expected range of 32-34 mph, commonly found on streets with 25 mph speed limits, and the other half just slightly above this range. The vehicle speeds recorded above 34 mph are higher than desirable or appropriate for the posted speed limit and given conditions and should be address through enforcement.

In response to the public comments received and Nellie Gail Ranch Equestrian Committee's request, staff evaluated the implementation of speed humps in the vicinity of the Equestrian Center Crossing based upon the minimum criteria set forth in the Residential Streets Management Policy. However, the road conditions do not support, and staff does not recommend, the installation of speed humps due to the grade of the street exceeding 6 percent. Alternatively, staff evaluated the feasibility of a speed table at the Equestrian Center driveway/equestrian crossing. A speed table is similar to a speed hump in that it is raised in height approximately 3 inches but has a flat top long enough to accommodate the entire wheelbase of most passenger vehicles and spans the entire width of the street. They are recommended for consideration only on a street with a posted speed limit of 30 mph or less, as well as only with a grade of 8 percent or less. Installation of a speed table may be feasible but additional engineering design and analysis is required before a final recommendation can be made due to the proposed location at a driveway intersection with larger vehicles and horse trailers needing proper transitioning to ascend to the raised table, turn, and descend to/from the driveway.

There is also an existing equestrian tunnel under Nellie Gail Road with trail access that provides a viable alternate equestrian crossing to the Equestrian Center, despite expressions from equestrians that this route is not convenient or desirable. Use of the tunnel would fully eliminate traffic control issues and provide a protected crossing that physically eliminates vehicle/equestrian conflicts. Staff recommends and strongly encourages the Equestrian Committee and Nellie Gail Ranch Owners Association pursue a solution that would improve the equestrian trail access from the Equestrian Center to the existing Nellie Gail Road equestrian tunnel to make it a more desirable route. Additionally, the City would consider the installation of lighting in the tunnel, if needed, to address visibility concerns.

The Committee also requested Rectangular Rapid Flashing Beacons (RRFB) in the median at and in advance of the Equestrian Center Crossing, and at Empty Saddle Drive

Nellie Gail Ranch Equestrian Crossing Review

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and Rocking Horse Lane. Staff supports the request to install two RRFB in the median at the Equestrian Center Crossing to enhance the visibility of the at-grade crossing. Installation of RRFB at other crossings is not recommended at this time due to the low volume of pedestrian and equestrian crossings at these locations.

Two Speed Feedback Signs (SFS) along Nellie Gail Road were also requested by the Equestrian Committee. In accordance with the Residential Streets Management Policy incremental approach to resolving traffic safety issues, staff recommends the solutions currently recommended in this report be implemented before any additional measures are implemented. A literature review of SFS installations indicate they have a limited useful life meaning that motorists that frequent a route will commonly disregard the SFS over time. However, Staff does support the frequent but random placement of the City's radar trailer in this general vicinity.

FISCAL IMPACT:

The installation of two Rectangular Rapid Flashing Beacons (RRFBs) have an anticipated cost of approximately \$5,000-\$10,000. Additional funding will need to be authorized by City Council for this work in the 2021-2022 Fiscal Year Public Works Maintenance Budget.

ATTACHMENTS:

- Nellie Gail Equestrian Crossings Vicinity Map
- Traffic Control Operational Review - Nellie Gail at Equestrian Center - Revised 05-12-21



VICINITY MAP - NELLIE GAIL EQUESTRIAN CROSSINGS



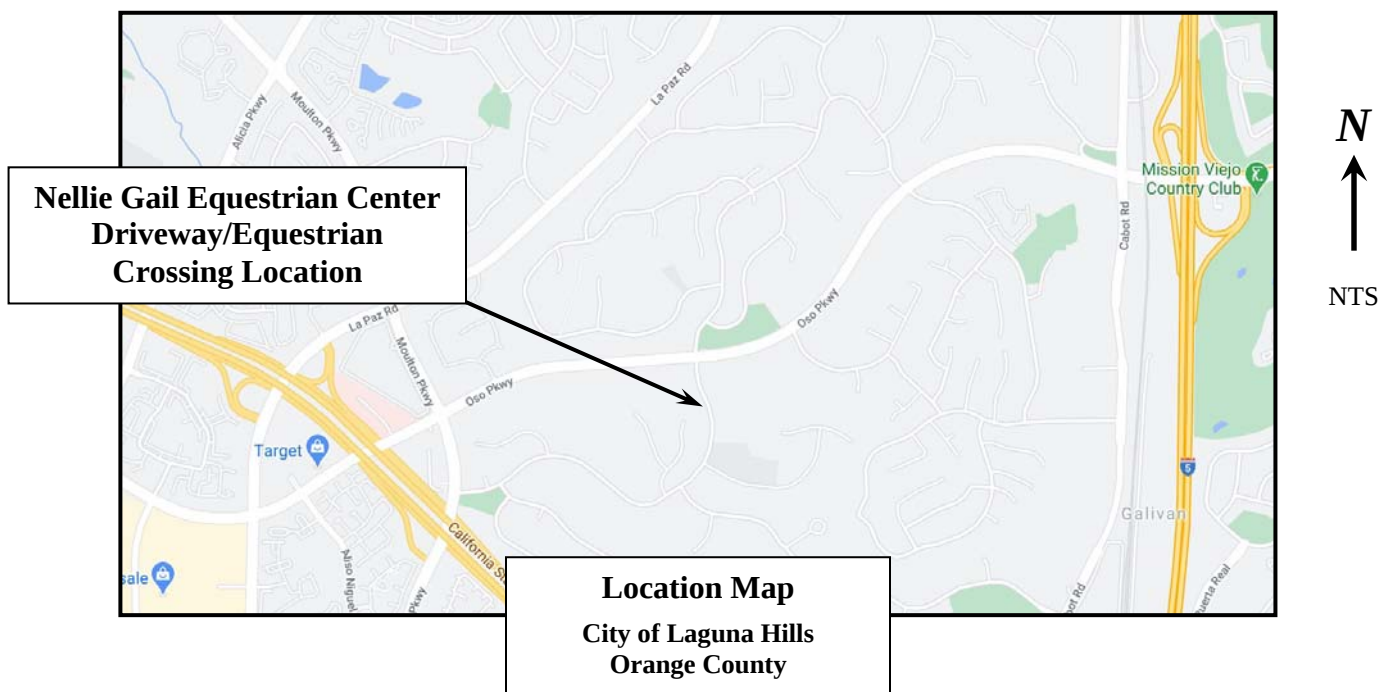
TRAFFIC CONTROL AND OPERATIONAL REVIEW

NELLIE GAIL ROAD AT THE EQUESTRIAN CENTER (S/o OSO PARKWAY) IN THE CITY OF LAGUNA HILLS, CA DECEMBER 3, 2020 (AMENDED MAY 12, 2021)

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.

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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:
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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. Road Tube Speed Counts are not as accurate as spot speed radar studies and can only be relied upon to suggest speed trends. This is currently observable when one compares the tube count 85th percentile speed to the radar measured 85th percentile speed indicating a lower prevailing speed of up to 6 mph. The speeds and Average Daily Traffic (ADT) count results are summarized below:

<i>Thursday, October 29, 2020</i>	<u>Average Speed (mph)</u>	<u>85th percentile Speed (mph)</u>	<u>ADT</u>
Northbound	30	35	
Southbound	32	38	
Both Directions	31	37	2,517
<i>Friday, October 30, 2020</i>	<u>Average Speed (mph)</u>	<u>85th percentile Speed (mph)</u>	<u>ADT</u>
Northbound	30	36	
Southbound	33	39	
Both Directions	32	38	2,309
<i>Saturday, October 31, 2020</i>	<u>Average Speed (mph)</u>	<u>85th percentile Speed (mph)</u>	<u>ADT</u>
Northbound	30	35	
Southbound	32	39	
Both Directions	31	37	2,211
<i>Sunday, November 1, 2020</i>	<u>Average Speed (mph)</u>	<u>85th percentile Speed (mph)</u>	<u>ADT</u>
Northbound	30	36	
Southbound	32	39	
Both Directions	31	38	1,467
<i>Monday, November 2, 2020</i>	<u>Average Speed (mph)</u>	<u>85th percentile Speed (mph)</u>	<u>ADT</u>
Northbound	30	35	
Southbound	33	38	
Both Directions	31	37	2,152

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 speed count data can be found attached in Appendix B.***

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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. 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

The 85th percentile speeds listed above, although higher than the 25 mph posted speed limit, is within the reasonably expected range of 32 – 34 mph commonly found on streets with 25 mph speed limits. This speed range, from a traffic engineering perspective, is not, in and of itself, of concern when taken together with zero documented traffic collisions at the study location. Speeds greater than this range, which are documented during two of the above six radar speed data collection procedures, should be addressed through enforcement.

Traffic Control & Operational Review:
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DATA COLLECTION (continued)

Spot Speed Radar Surveys (cont'd)

In order to provide further speed comparison, one-hour spot speed radar surveys were taken again at/near the same three (3) locations along Nellie Gail Road for 2 midweek days: April 27th & April 29th, 2021. The latest first day results are summarized below:

1. Nellie Gail Road, 300 feet South of Oso Parkway (at/near the Equestrian Center)

Tuesday, April 27, 2021 from Noon to 1:00pm

	<u>50th percentile Speed (mph)</u>	<u>85th percentile Speed (mph)</u>
Northbound	27	33
Southbound	28	31
Both Directions	28	32

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

Tuesday, April 27, 2021 from 11:00am to Noon

	<u>50th percentile Speed (mph)</u>	<u>85th percentile Speed (mph)</u>
Northbound	31	38
Southbound	33	38
Both Directions	32	38

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

Tuesday, April 27, 2021 from 10:00am to 11:00am

	<u>50th percentile Speed (mph)</u>	<u>85th percentile Speed (mph)</u>
Northbound	28	34
Southbound	28	32
Both Directions	28	33

The 85th percentile speeds listed above for the 10:00 am to 11:00 am timeframe and for the noon to 1:00 pm timeframe are consistent with the previous radar speed surveys shown on page 5 and are not, in and of themselves, of concern. The radar speed surveys listed above for the timeframe of 11:00 am to noon are higher than reasonably expected or desired for the posted speed limit on this street and is an aid for police services to know when to target speed enforcement.

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DATA COLLECTION (continued)

Spot Speed Radar Surveys (cont'd)

The second day results that were gathered on April 29, 2021 are summarized below:

1. Nellie Gail Road, 300 feet South of Oso Parkway (at/near the Equestrian Center)

Thursday, April 29, 2021 from 10:30am to 11:30am

	<u>50th percentile Speed (mph)</u>	<u>85th percentile Speed (mph)</u>
Northbound	28	35
Southbound	28	32
Both Directions	28	33

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

Thursday, April 29, 2021 from 11:30am to 12:30pm

	<u>50th percentile Speed (mph)</u>	<u>85th percentile Speed (mph)</u>
Northbound	31	37
Southbound	28	34
Both Directions	30	35

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

Thursday, April 29, 2021 from 12:30pm to 1:30pm

	<u>50th percentile Speed (mph)</u>	<u>85th percentile Speed (mph)</u>
Northbound	31	35
Southbound	29	34
Both Directions	30	34

The 85th percentile speeds listed above indicate mixed results in which half of the speeds are within the reasonably expected range of 32 – 34 mph, commonly found on streets with 25 mph speed limits, and the other half are just slightly above this range.

All radar spot speed study data can be found attached in Appendix C.

***Traffic Control & Operational Review:
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TRAFFIC CONTROL REVIEW

Traffic Signing & Striping

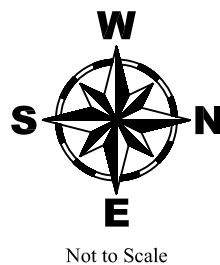
During our field-review on Wednesday, November 18, HCI staff walked Nellie Gail Road at/near the Equestrian Center driveway in both directions in order to review all the traffic signing & striping, including rumble strips, and RRFBs. The following page contains an exhibit of all signing & striping improvements.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

Southbound starting at Oso Parkway heading towards Rocking Horse Lane:

- “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.
- “Offset Side Roads” T-intersection advance warning sign posted on side of road between Empty Saddle Dr and Hidden Trail Rd.
- “Equestrian Xing” warning signs, Arrow pointing down, at Rocking Horse Lane.
- “25” white pavement marking, along with a posted 25 MPH Speed Limit sign, just past Rocking Horse Lane.

Northbound starting at Rocking Horse Lane heading towards Oso Parkway:

- “Horse Xing” warning signs, Arrow pointing down sign, at Rocking Horse Lane.
- “25 MPH Speed Limit” regulatory sign posted just past Hidden Trail Road.
- “Side Road” T-intersection advance warning sign posted on side of road in between Hidden Trail Road and Empty Saddle Drive.
- “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.



*Traffic Control & Operational Review:
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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.

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. All push buttons and RRFB LED yellow warning lights were operating as intended.

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.

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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.

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EXHIBIT 1



Attachment: Nellie Gail Road Equestrian Crossing 19MAY2021 (2562 : Nellie Gail Road Speed Table)

*Traffic Control & Operational Review:
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EXHIBIT 2



Attachment: Nellie Gail Road Equestrian Crossing 19MAY2021 (2562 : Nellie Gail Road Speed Table)

*Traffic Control & Operational Review:
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OPERATIONAL REVIEW (continued)

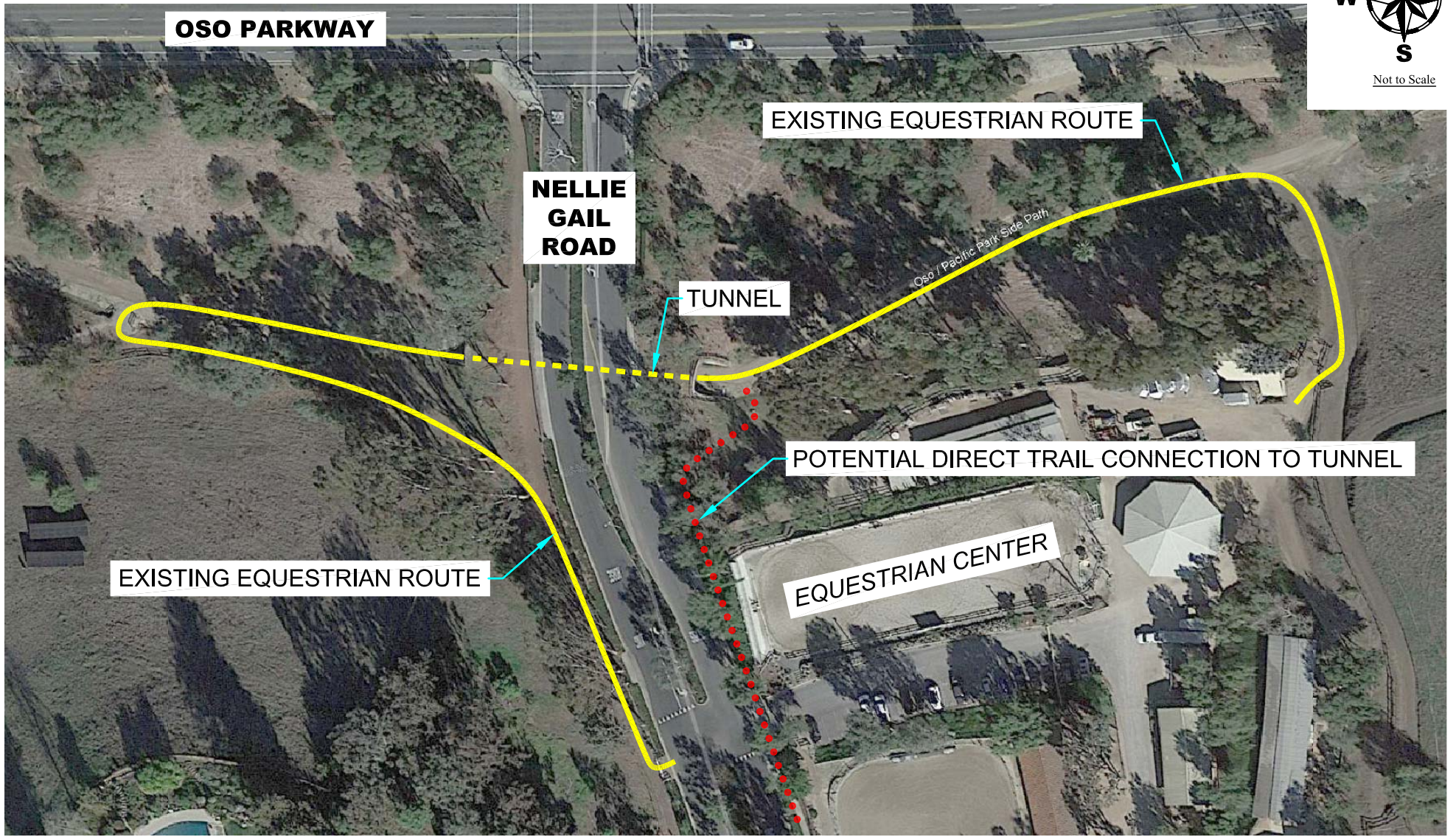
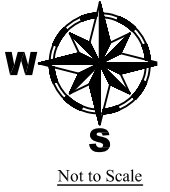
Equestrian Tunnel

There is an existing equestrian tunnel perpendicular to and under Nellie Gail Road, that is located north of the Equestrian Center driveway/equestrian crossing location, and south of Oso Parkway. There is also an existing equestrian path to access the tunnel from the west side of Nellie Gail Road from the equestrian crossing location. At this time, there is no direct equestrian path to access the tunnel from the east side of Nellie Gail Road.

HCI staff walked and field-checked the access from the west side of the Equestrian Center driveway intersection, and followed the equestrian path northerly down towards the tunnel. At the bottom of the path, just in front of 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. Staff noticed the tunnel did not have existing lighting fixtures. Once on the east side of the tunnel, it appeared that equestrians can take the designated trail path to access the equestrian center, which also runs along the south side of Oso Parkway from Nellie Gail Road easterly to Cabot Road.

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 up the path 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.

Equestrians have expressed a concern about the potential of vehicle versus equestrian conflicts at the equestrian center driveway/equestrian crossing that is the subject of this report. Given this concern, it is reasonable and appropriate for the equestrians to seek an alternate route which is provided by the Tunnel. The next page (page 15) contains an aerial exhibit showing how the tunnel is accessed going to and from the equestrian center.



Attachment: Nellie Gail Road Equestrian Crossing 19MAY2021 (2562 : Nellie Gail Road Speed Table)

ALTERNATE EQUESTRIAN CROSSING ROUTE
 Nellie Gail Road
 CITY OF LAGUNA HILLS

***Traffic Control & Operational Review:
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OPERATIONAL REVIEW (continued)

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”
- “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.

Overview of Equestrian Tunnel Access

Staff’s field observations confirmed the potential for the use of this tunnel as a viable alternate equestrian trail ‘tunnel’ crossing, despite the lack of convenience; and if utilized, would resolve traffic controls issues that have been raised at the Equestrian Center driveway/equestrian crossing location. Moreover, the existing path to the tunnel from the west-side of Nellie Gail Road does not appear different or ‘less convenient’ than any other designated equestrian paths found behind homes throughout the City. Therefore, in our overall review of the existing tunnel, we find that it provides a protected crossing that physically eliminates vehicle/equestrian conflicts.

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OPERATIONAL REVIEW (continued)

Overview of Equestrian Tunnel Access (cont'd)

The following improvements could be considered in order to make it more of a preferred crossing:

- Install equestrian tunnel lighting fixtures at/near the tunnel, since equestrians prefer to cross when the line of sight is clear, and it is helpful for horses to see light at the end of the tunnel.
- Install equestrian fencing to better delineate the existing path.
- The City in partnership with the Equestrian Center may consider improving the east side of Nellie Gail Road in front of the equestrian center, in order to provide a direct equestrian path towards the tunnel along the east side, as well as connect to the existing equestrian path south of the equestrian center (see proposed path shown in red on Page 15).

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IN-ROADWAY WARNING LIGHTS 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 in the pavement along both sides of a marked crosswalk and operate flashing yellow lights towards oncoming vehicles 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.*

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IN-ROADWAY WARNING LIGHTS 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 the installation of 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.

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IN-ROADWAY WARNING LIGHTS EVALUATION

Upon City request, HCI collected pedestrian/bicycle/equestrian and vehicular count data, at the Equestrian Center driveway/equestrian crossing location, on Saturday, January 9, 2021. The count data was collected between the hours of 7:00am – 4:00pm. In brief summary, below is a site specific IRWL evaluation for the City's consideration:

- At least 40 pedestrians regularly use the crossing during each of any two hours (not necessarily consecutive) during a 24-hour period.
The highest 2 hours were: 11am – Noon with 15 pedestrians/bicyclists/equestrians; and 3 – 4pm with 10 pedestrians/bicyclists/equestrians.
- The vehicular volume through the crossing exceeds 200 vehicles per hour in urban areas during peak-hour pedestrian usage.
The highest 2 hours were: 11am – Noon with 160 vehicles; and 3 – 4pm with 163 vehicles.
- The critical approach speed (85th percentile speed) is 45 mph or less.
Yes.
- In-Roadway Warning Lights are visible to drivers at the minimum stopping sight distance for the posted speed limit.
IRWLs are expected to be visible to the minimum stopping sight distance.

In review of the above IRWL evaluation factors, the minimum pedestrians/bicyclists/equestrians, as well as the minimum traffic volumes, were not met for the highest 2 hours of the day.

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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.

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.

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

RRFB VS. IRWL OPINION (continued)

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 and/or in advance of the Equestrian Center driveway/equestrian crossing location could be considered.

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*

SPEED TABLE

The City also requested HCI to discuss the potential for a speed table to be installed at this Equestrian Center driveway/equestrian crossing location. According to the US Department of Transportation, Federal Highway Administration (FHWA), Traffic Calming ePrimer Module 3,¹ a speed table is a raised area placed across the roadway designed to physically limit the speed at which a vehicle can traverse it. Speed tables typically extend across the roadway, and have a flat top (typically 10 feet) long enough to accommodate the entire wheelbase of most passenger vehicles. The longer longitudinal depth in the direction of travel enables comfortable and safe vehicle operating speeds. Speed tables are designed to produce sufficient discomfort to a motorist driving above the speed table design speed in order to discourage speeding. Speed tables have a less jarring effect on long, stiff-bodied emergency service vehicles.

In addition, when a speed table is designated as a crosswalk through the use of striping, it is known as a raised crosswalk. Speed tables are generally not appropriate when the 85th percentile speed is 45 MPH or more. Speed tables are typically installed with an urban cross-section (i.e., curb & gutter) but an open section can be acceptable. They can be applied both with and without sidewalks or bicycle facilities. If the street does not have curbing, an obstruction such as signing, flexible delineator posts or bollards may be acceptable to prevent a motorist from driving around the table.

Institute of Transportation Engineers (ITE) Guidelines have recommendations for consideration of speed tables only on a street with a posted speed limit of 30 mph or less, as well as only with a grade of 8 percent or less.

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

SPEED TABLE (continued)

Most agencies implement speed tables with a height between 3 and 3.5 inches, and an overall travel length of 22 feet. The most common speed table consists of a 10 foot plateau with 6 foot approaches on both sides that can be straight, parabolic, or sinusoidal in profile.

Speed tables with heights as great as 6 inches, ramps of up to 10 feet, and plateaus between 18 and 23 feet in length have been tested and found to better accommodate large vehicles with long wheelbases (such as fire trucks and transit buses).

A speed table should be clearly marked, so all roadway users are able to anticipate it and reduce their speeds appropriately.

Placement factors include consideration of vertical and horizontal alignment of street, proximity to the nearest intersection, location of driveways and on-street parking, presence or absence of street lighting, location of designated pedestrian crossings, drainage, and utility access points (i.e., drains, valves, etc.). Typically, the placement does not interfere with drainage because the table does not extend from curb to curb; however, if drainage gutter or flow of water is in the center of the roadway, drainage and hydraulic impacts need to be evaluated.

There is potential for increased noise due to vehicle braking and accelerating, and to the vibration of loose items in truck beds or trailers.

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

SPEED TABLE (continued)

Whether to consider if a speed table may be installed at the Nellie Gail Equestrian Center Driveway/Equestrian Crossing location, since the posted speed limit is less than 30 mph, 85th percentile speeds are under 45 MPH, and there may be a grade of 8 percent or less, if the City desires to install a speed table, it is considered feasible.

However, as this location is a driveway intersection serving the Equestrian Center, certain factors will need to be decided and designed, such as how wide or long to make the actual flat top part (i.e, 10 feet or greater) and approaches, since a higher amount of trucks with horse trailers are expected to turn into the Equestrian Center driveway. These larger vehicles will need proper transitioning to ascend to the raised table, turn, and descend to/from the driveway. As mentioned, a plateau of up to 23 feet, or even longer, may be considered at this location to try and cover the majority of the driveway intersection (i.e., this may now be referred to as a raised intersection).

Another factor that will need to be evaluated is the possible interference with drainage, not only along Nellie Gail Road but the driveway as well, since the speed table will need to include transition towards the driveway approach.

It is also important to note, a speed table is expected to reduce 85th percentile speeds to the range of 25 to 35 MPH when crossing the table. It has been shown through recent radar data that the 85th percentile speeds are in the range of 32 – 35 at/near this location.

1. **US Department of Transportation:** Federal Highway Administration, Traffic Calming ePrimer Module 3, 3.12 Speed Table (website page last modified February 15, 2017).

*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 Average Results = 37 MPH

Spot Speed Radar Survey – 85th Percentile Average Results = 34 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 & 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 along 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. A few improvements are provided to consider.

A speed table was also discussed for possible installation at the Nellie Gail Equestrian Center Driveway/Equestrian Crossing location. If the City desires to install a speed table, it is considered feasible and would have to be properly designed as a raised intersection.

Finally, in regards to RRFBs vs IRWLs, the IRWL evaluation did not meet the minimum guidelines for installation at this location, and it is our opinion that the existing RRFB system works well. The placement of two additional RRFBs in the median island is a potential consideration.

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

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 specific recommendations at this time.

A few options that the City may desire to consider:

- Improve visibility by removing certain trees near equestrian driveway location.
- Install equestrian tunnel lighting fixtures at/near the tunnel, since equestrians prefer to cross when the line of sight is clear, and it is helpful for horses to see light at the end of the tunnel.
- Install equestrian fencing on west side of Nellie Gail Road to better delineate the existing path to tunnel.
- The City in partnership with the Equestrian Center may consider improving the east side of Nellie Gail Road in front of the equestrian center, in order to provide a direct equestrian path towards the tunnel along the east side, as well as connect to the existing equestrian trail south of the equestrian center (see proposed path shown in red on Page 15).
- A speed table is shown to be viable if the City desires to consider a raised intersection.

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 SUR
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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.c

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

Nellie Gail Rd Bet. Empty Saddle Dr & Oso Pkwy

4.1.c

Day: Friday

Date: 10/30/2020

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	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	98th
Nellie Gail Rd	Summary	26	32	32	38	41	23

SPEED

Nellie Gail Rd Bet. Empty Saddle Dr & Oso Pkwy

4.1.c

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	%	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	21

SPEED

Nellie Gail Rd Bet. Empty Saddle Dr & Oso Pkwy

4.1.c

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.c

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	98th
Nellie Gail Rd	Summary	26	31	31	37	40	21

APPENDIX C

SPOT SPEED RADAR SURVEY DATA

Spot Speed Study

Prepared by: National Data & Surveying Services

City of Laguna Hills

DATE: 10/29/2020

Location: Nellie Gail Rd 470' S/O Oso Pkwy

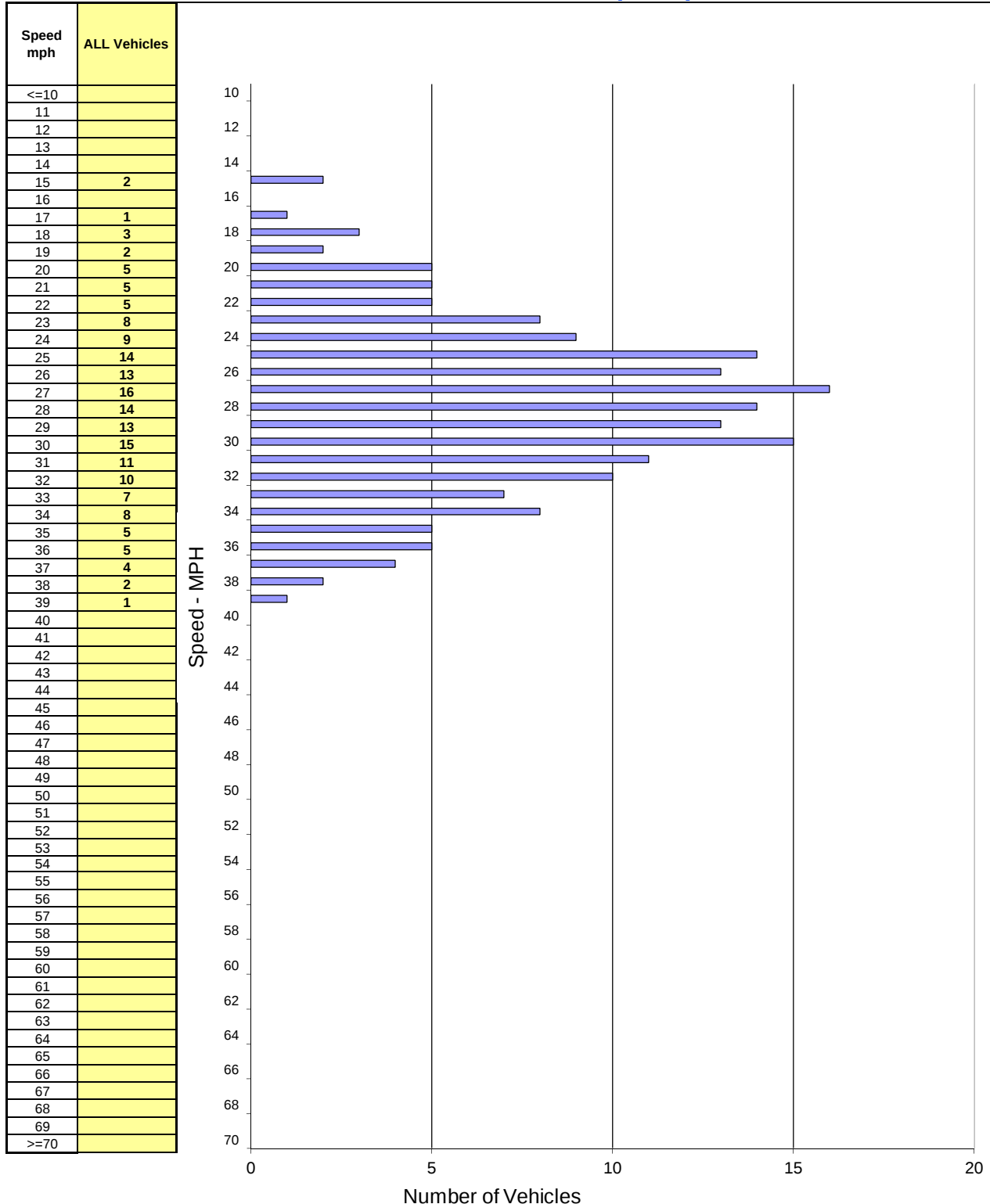
TIME: 11:00-12:00

Posted Speed: 25 MPH

Clear/Dry

Project #: 20-010023-001

Northbound & Southbound Spot Speeds



Attachment: Nellie Gail Road Equestrian Crossing 19MAY2021 (2562 : Nellie Gail Road Speed Table)

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

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

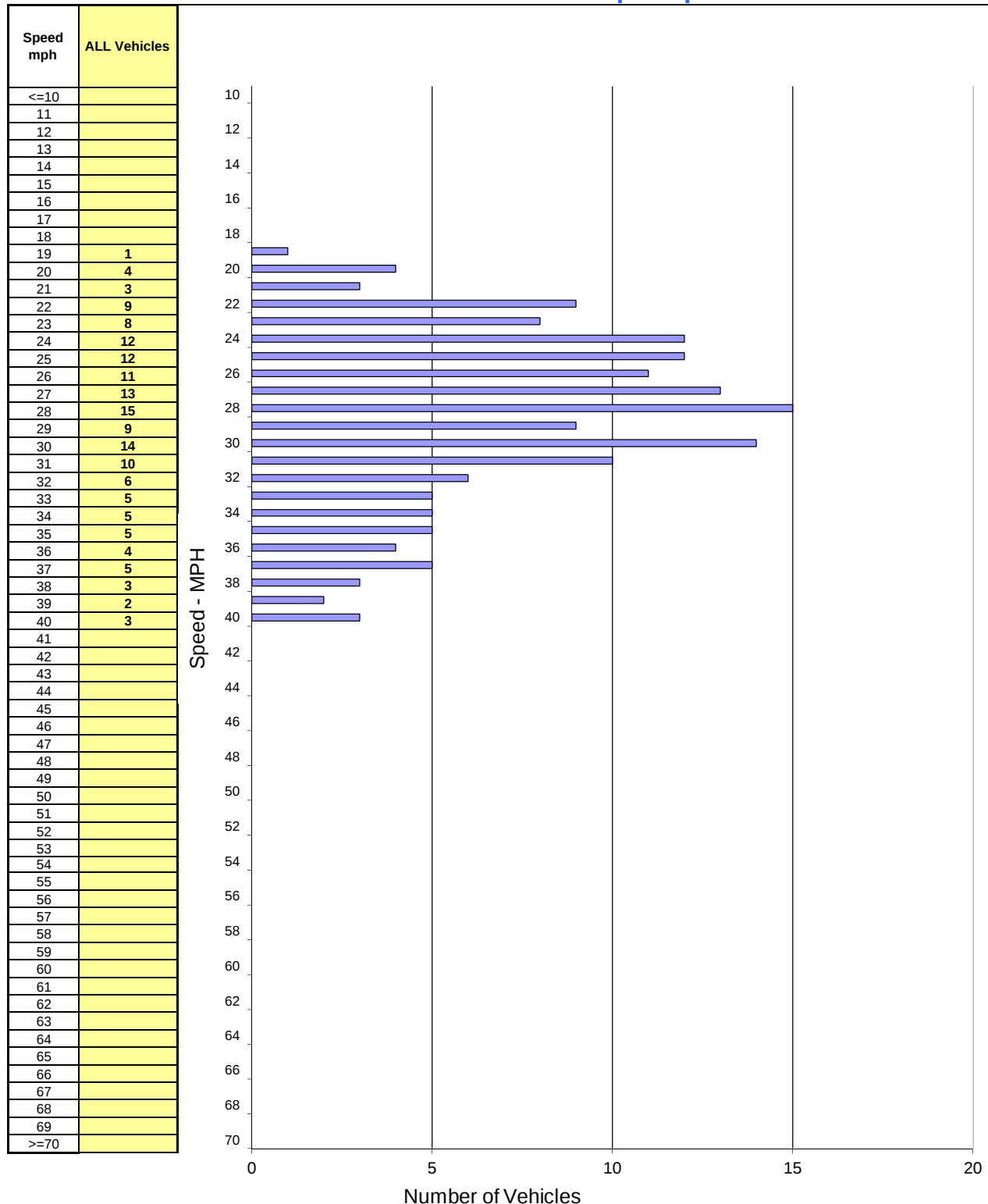
TIME: 12:30-13:30

Posted Speed: 25 MPH

Clear/Dry

Project #: 20-010023-002

Northbound & Southbound Spot Speeds



Attachment: Nellie Gail Road Equestrian Crossing 19MAY2021 (2562 : Nellie Gail Road Speed Table)

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

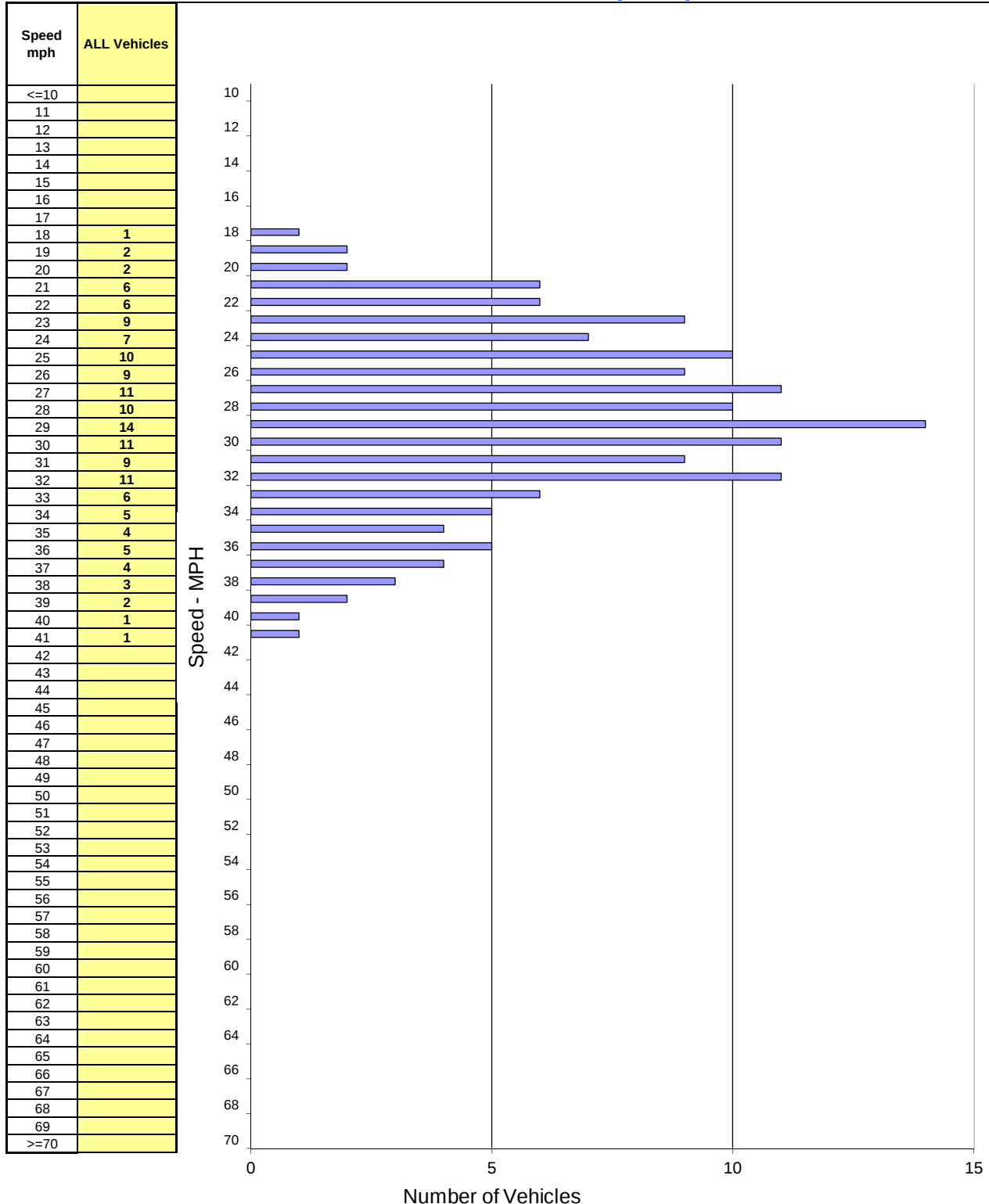
Location: Nellie Gail Rd Bet. Hidden Trail Rd & Empty Saddle Dr

TIME: 14:00-15:00

Posted Speed: 25 MPH Clear/Dry

Project #: 20-010023-003

Northbound & Southbound Spot Speeds



Attachment: Nellie Gail Road Equestrian Crossing 19MAY2021 (2562 : Nellie Gail Road Speed Table)

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

FOLLOW-UP RADAR SPEED DATA

APRIL 27, 2021

Spot Speed Study

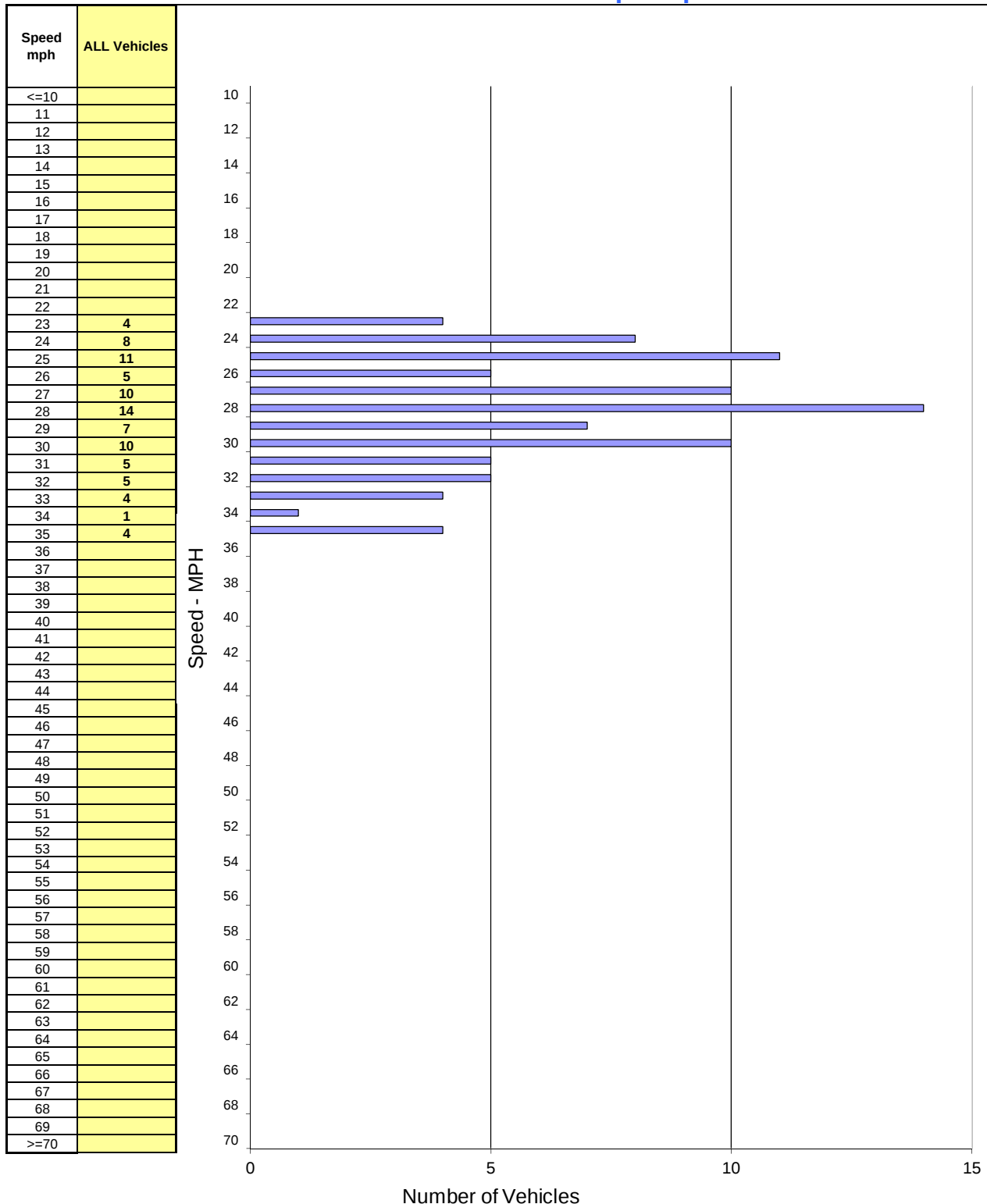
Prepared by: National Data & Surveying Services

City of Laguna Hills

DATE: 4/27/2021
TIME: 12:00-13:00

Location: Nellie Gail Rd 300' S/O Oso Pkwy
Posted Speed: 25 MPH Clear/Dry Project #: 21-010037-001

Northbound & Southbound Spot Speeds



Attachment: Nellie Gail Road Equestrian Crossing 19MAY2021 (2562 : Nellie Gail Road Speed Table)

SPEED PARAMETERS									
Class	Count	Range	50th Percentile	85th Percentile	10 MPH Pace	# in Pace	Percent in Pace	% / # Below Pace	% / # Above Pace
ALL	88	23 - 35	28 mph	32 mph	23 - 32	79	90%	0% / 0	11% / 9

Spot Speed Study

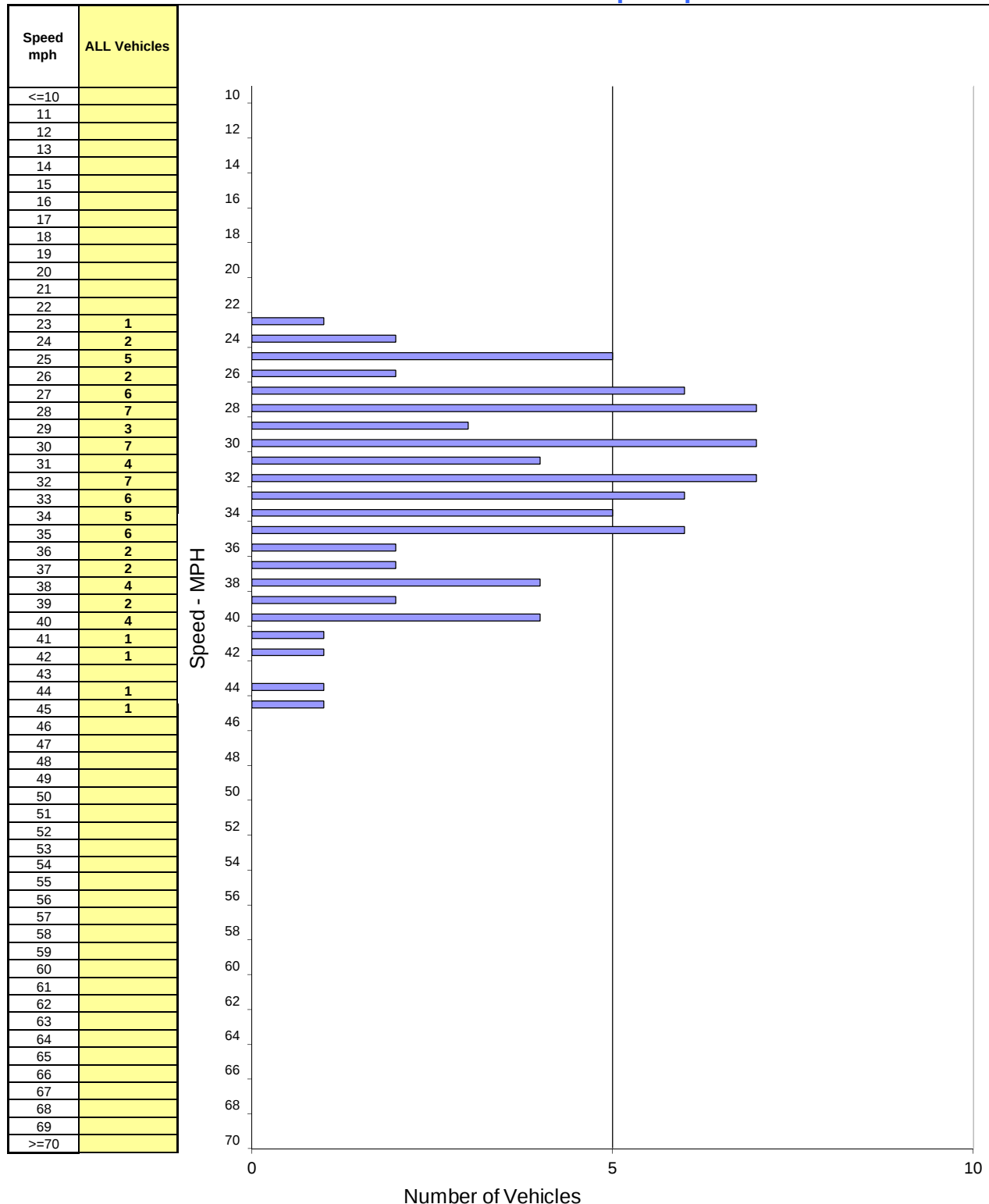
Prepared by: National Data & Surveying Services

City of Laguna Hills

DATE: 4/27/2021
TIME: 11:00-12:00

Location: Nellie Gail Rd 300' N/O Empty Saddle Dr
Posted Speed: 25 MPH Clear/Dry Project #: 21-010037-002

Northbound & Southbound Spot Speeds



Attachment: Nellie Gail Road Equestrian Crossing 19MAY2021 (2562 : Nellie Gail Road Speed Table)

SPEED PARAMETERS									
Class	Count	Range	50th Percentile	85th Percentile	10 MPH Pace	# in Pace	Percent in Pace	% / # Below Pace	% / # Above Pace
ALL	79	23 - 45	32 mph	38 mph	26 - 35	53	67%	10% / 8	23% / 18

Spot Speed Study

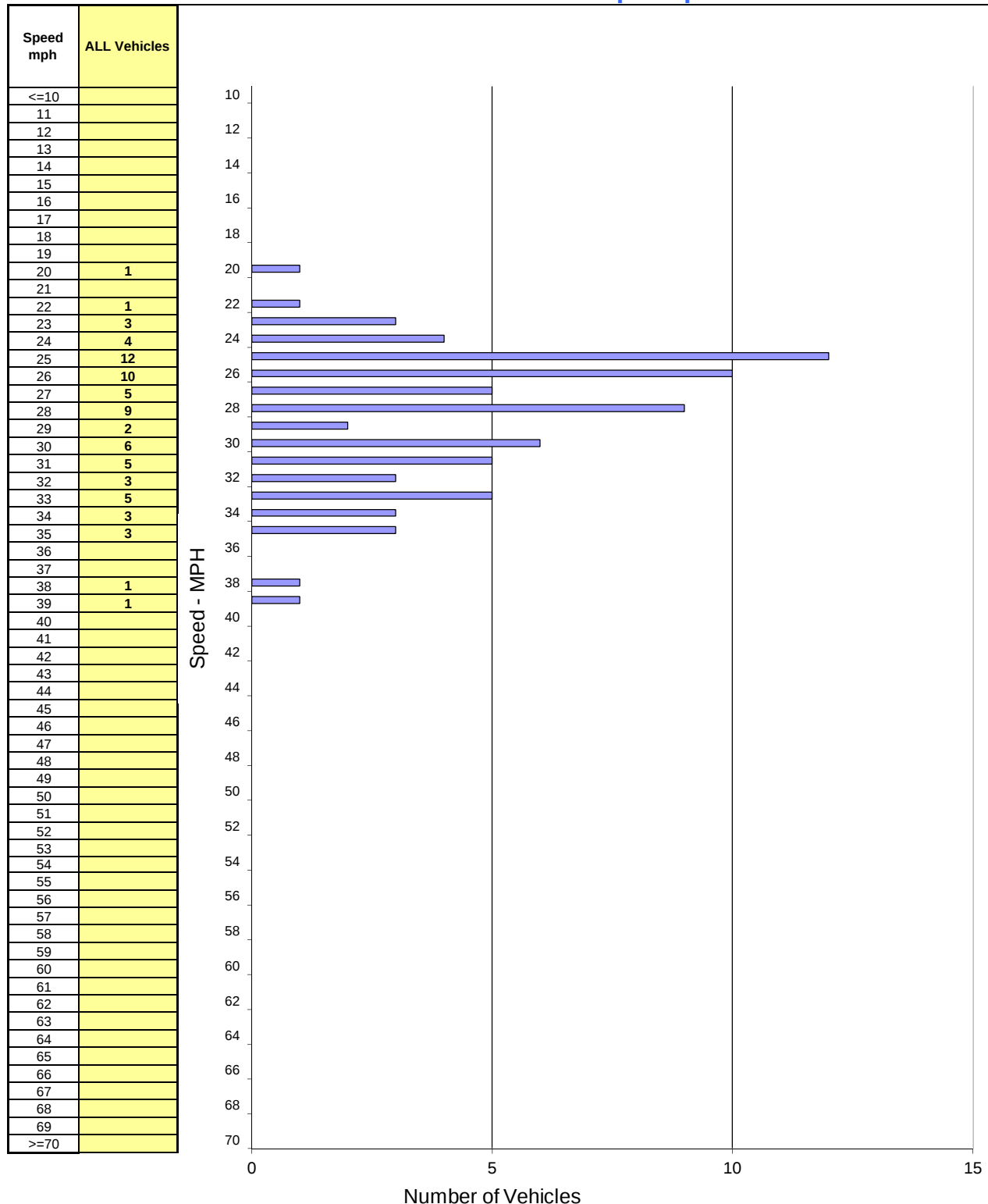
Prepared by: National Data & Surveying Services

City of Laguna Hills

DATE: 4/27/2021
TIME: 10:00-11:00

Location: Nellie Gail Rd 200' S/O Empty Saddle Dr
Posted Speed: 25 MPH Clear/Dry Project #: 21-010037-003

Northbound & Southbound Spot Speeds



Attachment: Nellie Gail Road Equestrian Crossing 19MAY2021 (2562 : Nellie Gail Road Speed Table)

SPEED PARAMETERS									
Class	Count	Range	50th Percentile	85th Percentile	10 MPH Pace	# in Pace	Percent in Pace	% / # Below Pace	% / # Above Pace
ALL	74	20 - 39	28 mph	33 mph	24 - 33	61	82%	6% / 5	11% / 8

FOLLOW-UP RADAR SPEED DATA

APRIL 29, 2021

Spot Speed Study

Prepared by: National Data & Surveying Services

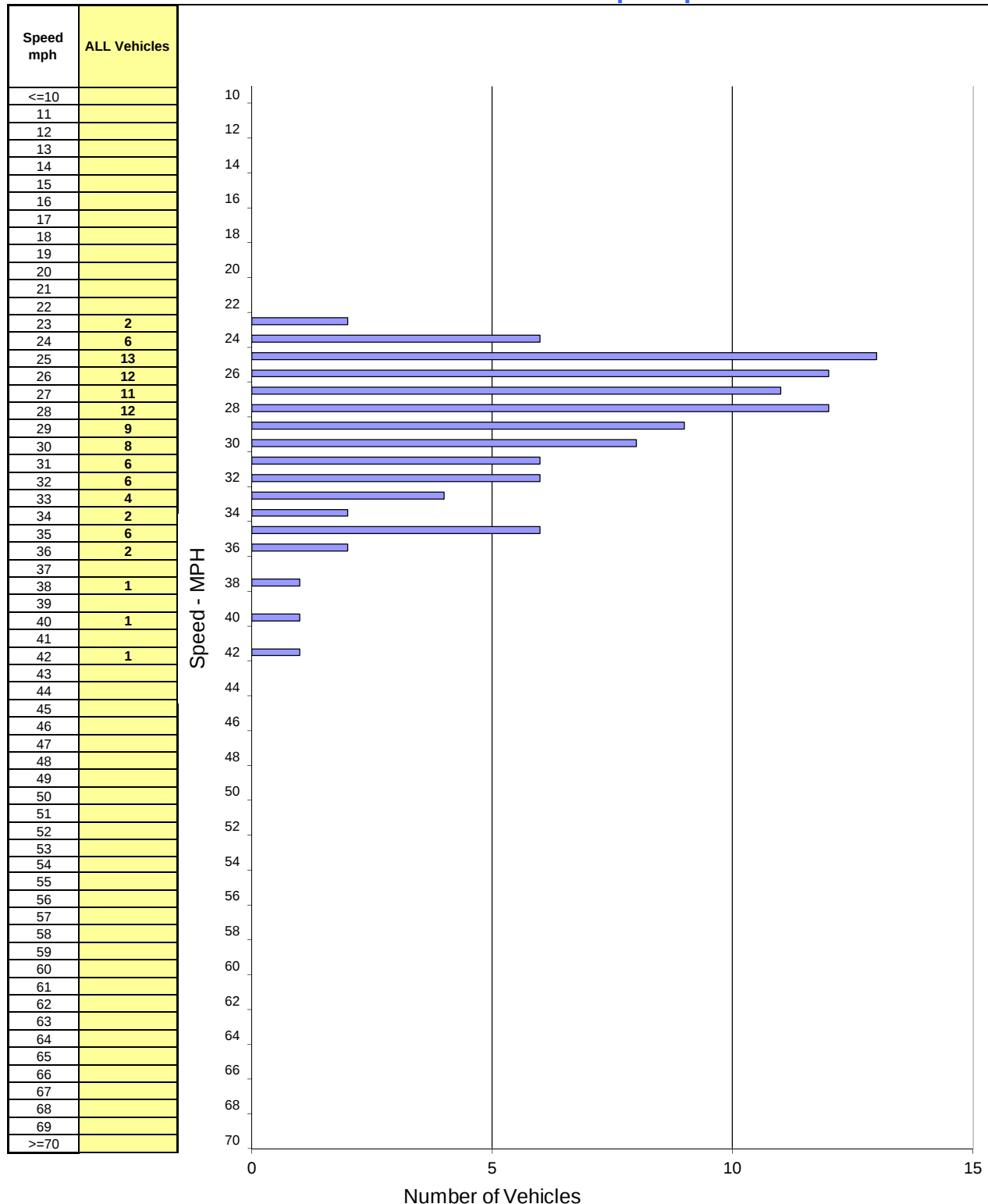
City of Laguna Hills

DATE: 4/29/2021
TIME: 10:30-11:30

Location: Nellie Gail Rd 300' S/O Oso Pkwy
Posted Speed: 25 MPH Clear/Dry

Project #: 21-010037-001

Northbound & Southbound Spot Speeds



Attachment: Nellie Gail Road Equestrian Crossing 19MAY2021 (2562 : Nellie Gail Road Speed Table)

SPEED PARAMETERS									
Class	Count	Range	50th Percentile	85th Percentile	10 MPH Pace	# in Pace	Percent in Pace	% / # Below Pace	% / # Above Pace
ALL	102	23 - 42	28 mph	33 mph	24 - 33	87	85%	1% / 2	13% / 13

Spot Speed Study

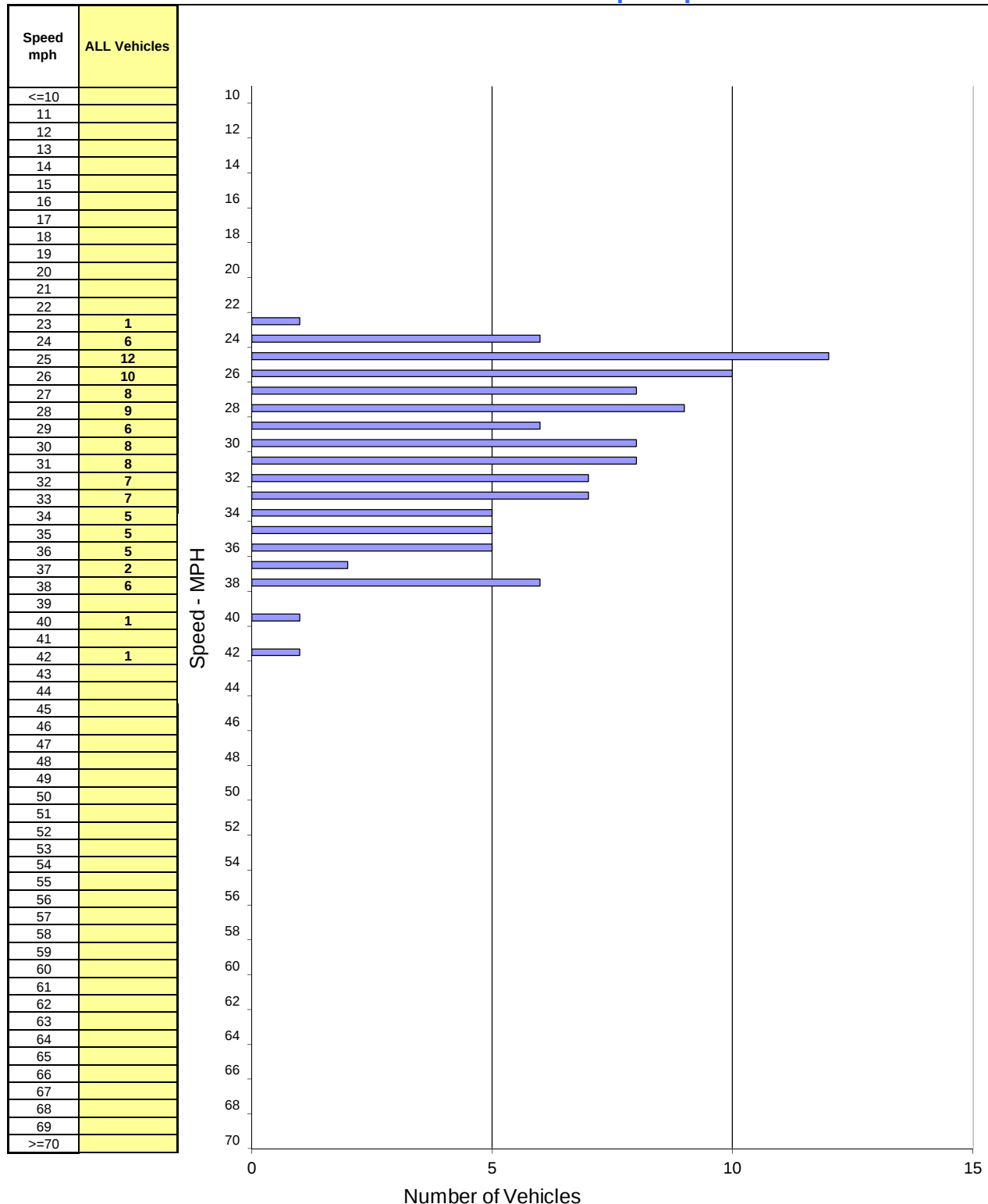
Prepared by: National Data & Surveying Services

City of Laguna Hills

DATE: 4/29/2021
TIME: 11:30-12:30

Location: Nellie Gail Rd 300' N/O Empty Saddle Dr
Posted Speed: 25 MPH Clear/Dry Project #: 21-010037-002

Northbound & Southbound Spot Speeds



Attachment: Nellie Gail Road Equestrian Crossing 19MAY2021 (2562 : Nellie Gail Road Speed Table)

SPEED PARAMETERS									
Class	Count	Range	50th Percentile	85th Percentile	10 MPH Pace	# in Pace	Percent in Pace	% / # Below Pace	% / # Above Pace
ALL	107	23 - 42	30 mph	35 mph	24 - 33	81	76%	0% / 1	24% / 25

Spot Speed Study

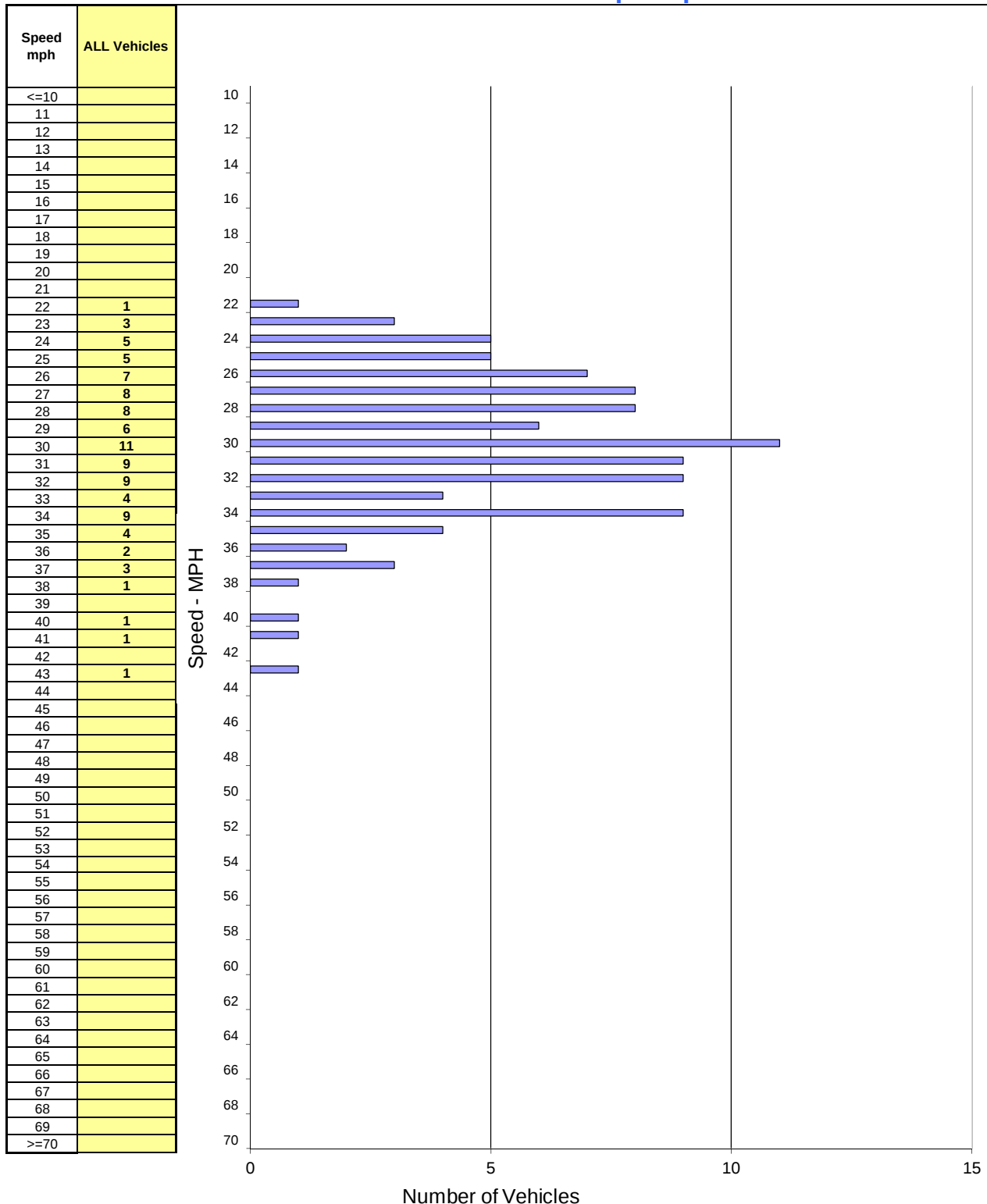
Prepared by: National Data & Surveying Services

City of Laguna Hills

DATE: 4/29/2021
TIME: 12:30-13:30

Location: Nellie Gail Rd 200' S/O Empty Saddle Dr
Posted Speed: 25 MPH Clear/Dry Project #: 21-010037-003

Northbound & Southbound Spot Speeds



Attachment: Nellie Gail Road Equestrian Crossing 19MAY2021 (2562 : Nellie Gail Road Speed Table)

SPEED PARAMETERS									
Class	Count	Range	50th Percentile	85th Percentile	10 MPH Pace	# in Pace	Percent in Pace	% / # Below Pace	% / # Above Pace
ALL	98	22 - 43	30 mph	34 mph	25 - 34	76	78%	9% / 9	14% / 13

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.

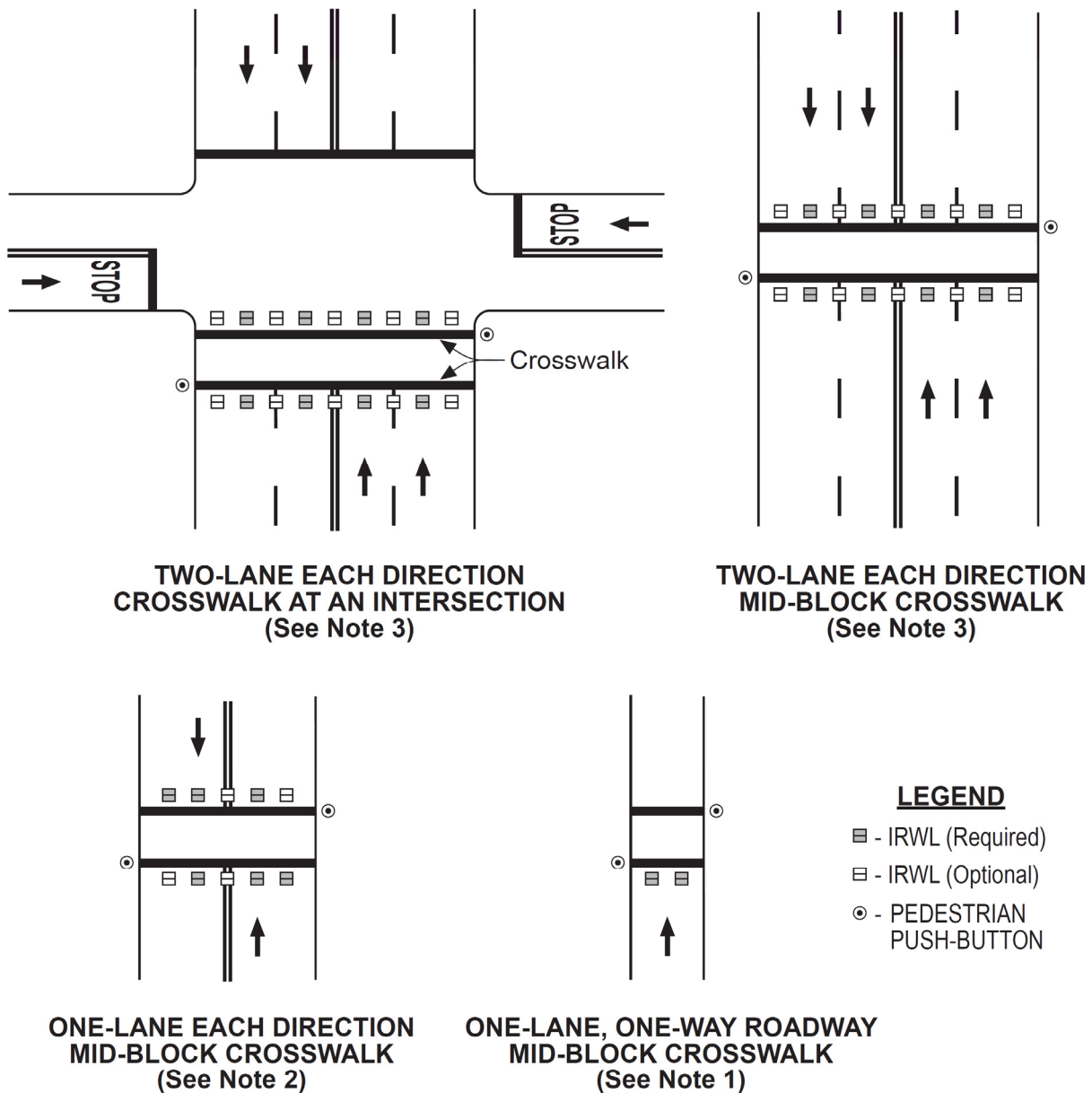
Guidance:

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.

***SATURDAY COUNT DATA
PEDESTRIANS, BICYCLES, AND EQUESTRIANS***

Prepared by National Data & Surveying Services

Crosswalk Study

Location: Nellie Gail Rd Bet. Oso Pkwy & Empty Saddle Dr

Date: 1/9/2021

City: Laguna Hills

Day: Saturday

TIME	VOLUME						TOTAL
	NORTH LEG		SOUTH LEG		EAST LEG		
	Travelling North	Travelling South	Travelling North	Travelling South	Travelling East	Travelling West	
7:00 AM	2	10	2	8	2	0	24
7:15 AM	7	5	7	4	2	1	26
7:30 AM	3	6	4	7	2	2	24
7:45 AM	14	33	14	33	1	1	96
8:00 AM	10	13	10	12	1	0	46
8:15 AM	4	13	5	11	3	0	36
8:30 AM	13	22	15	21	3	0	74
8:45 AM	11	18	11	16	3	1	60
9:00 AM	9	15	8	12	3	1	48
9:15 AM	19	23	18	23	0	1	84
9:30 AM	27	16	27	17	1	2	90
9:45 AM	12	20	12	17	3	0	64
10:00 AM	28	23	28	20	3	0	102
10:15 AM	22	25	18	17	9	5	96
10:30 AM	22	12	23	12	2	1	72
10:45 AM	18	12	17	12	2	3	64
11:00 AM	22	11	22	11	3	3	72
11:15 AM	25	10	25	11	0	1	72
11:30 AM	19	29	18	29	0	1	96
11:45 AM	28	15	30	16	3	2	94
12:00 PM	37	17	35	18	4	7	118
12:15 PM	24	16	20	14	3	5	82
12:30 PM	20	27	16	25	3	5	96
12:45 PM	20	19	18	17	3	3	80
1:00 PM	22	24	18	18	4	2	88
1:15 PM	20	25	18	18	5	0	86
1:30 PM	22	19	19	18	3	5	86
1:45 PM	18	12	18	13	0	1	62
2:00 PM	19	16	17	15	2	3	72
2:15 PM	17	18	16	16	2	1	70
2:30 PM	21	11	18	10	1	3	64
2:45 PM	20	28	17	23	5	3	96
3:00 PM	23	24	18	23	6	10	104
3:15 PM	18	19	16	16	2	1	72
3:30 PM	23	21	19	20	2	5	90
3:45 PM	23	22	24	20	4	1	94
Totals	662	649	621	593	95	80	2700

Attachment: Nellie Gail Road Equestrian Crossing 19MAY2021 (2562 : Nellie Gail Road Speed Table)

Prepared by National Data & Surveying Services

Crosswalk Study

Location: Nellie Gail Rd Bet. Oso Pkwy & Empty Saddle Dr

City: Laguna Hills

Date: 1/9/2021

Day: Saturday

TIME	PEDESTRIANS								TOTAL
	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	Travelling East	Travelling West	Travelling East	Travelling West	Travelling North	Travelling South	Travelling North	Travelling South	
7:00 AM	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	1	0	0	0	1
7:30 AM	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	2	2	0	0	4
8:15 AM	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	2	0	2
8:45 AM	0	0	0	0	0	0	0	0	0
9:00 AM	1	0	0	0	0	0	0	2	3
9:15 AM	0	0	0	0	1	1	0	0	2
9:30 AM	0	0	1	2	2	0	2	1	8
9:45 AM	0	0	0	0	0	0	0	1	1
10:00 AM	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	1	0	0	0	1
10:45 AM	0	0	1	0	2	0	0	3	6
11:00 AM	0	0	0	3	0	0	0	0	3
11:15 AM	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	1	2	0	1	0	4
12:00 PM	0	0	0	0	1	0	0	0	1
12:15 PM	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	1	0	1
12:45 PM	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	1	0	1	0	2
1:15 PM	0	0	0	0	0	1	0	0	1
1:30 PM	0	0	0	0	0	0	0	1	1
1:45 PM	0	0	0	0	0	0	0	1	1
2:00 PM	0	0	0	0	2	0	0	0	2
2:15 PM	0	0	0	0	1	0	0	0	1
2:30 PM	0	0	0	0	2	0	0	0	2
2:45 PM	0	0	0	0	0	1	0	0	1
3:00 PM	0	0	0	0	0	0	0	0	0
3:15 PM	1	0	1	1	1	0	0	1	5
3:30 PM	0	0	0	0	0	0	1	0	1
3:45 PM	0	2	0	4	4	0	4	0	14
Totals	2	2	3	11	23	5	12	10	68

Attachment: Nellie Gail Road Equestrian Crossing 19MAY2021 (2562 : Nellie Gail Road Speed Table)

Prepared by National Data & Surveying Services

Crosswalk Study

Location: Nellie Gail Rd Bet. Oso Pkwy & Empty Saddle Dr

City: Laguna Hills

Date: 1/9/2021

Day: Saturday

TIME	BICYCLES								TOTAL
	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	Travelling East	Travelling West	Travelling East	Travelling West	Travelling North	Travelling South	Travelling North	Travelling South	
7:00 AM	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	1	0	0	0	1
9:30 AM	0	0	0	0	0	0	0	0	0
9:45 AM	0	0	0	0	1	0	0	1	2
10:00 AM	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	2	2
10:30 AM	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	1	0	0	0	1
11:15 AM	0	0	0	0	0	0	0	0	0
11:30 AM	1	0	0	0	0	0	0	0	1
11:45 AM	0	0	0	0	0	0	0	4	4
12:00 PM	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	0
1:30 PM	0	0	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0
Totals	1	0	0	0	3	0	0	7	11

Attachment: Nellie Gail Road Equestrian Crossing 19MAY2021 (2562 : Nellie Gail Road Speed Table)

Prepared by National Data & Surveying Services

Crosswalk Study

Location: Nellie Gail Rd Bet. Oso Pkwy & Empty Saddle Dr

City: Laguna Hills

Date: 1/9/2021

Day: Saturday

TIME	HORSES								TOTAL
	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	Travelling East	Travelling West	Travelling East	Travelling West	Travelling North	Travelling South	Travelling North	Travelling South	
7:00 AM	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0	0	0
9:30 AM	0	0	0	0	0	0	1	0	1
9:45 AM	0	0	0	0	0	0	2	0	2
10:00 AM	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	1	1	0	0	1	0	3
10:45 AM	0	0	1	0	0	0	2	3	6
11:00 AM	0	0	1	3	0	0	0	2	6
11:15 AM	0	0	0	1	0	0	2	1	4
11:30 AM	0	0	2	0	0	0	5	0	7
11:45 AM	0	0	2	1	0	0	1	1	5
12:00 PM	0	0	0	2	0	0	2	0	4
12:15 PM	0	0	1	0	0	0	0	0	1
12:30 PM	0	0	1	2	0	0	0	1	4
12:45 PM	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	0
1:30 PM	0	0	1	0	0	0	0	0	1
1:45 PM	0	0	0	0	0	0	0	0	0
2:00 PM	0	0	1	0	0	0	0	1	2
2:15 PM	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0
3:00 PM	0	0	1	0	0	0	1	0	2
3:15 PM	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0
Totals	0	0	12	10	0	0	17	9	48

Attachment: Nellie Gail Road Equestrian Crossing 19MAY2021 (2562 : Nellie Gail Road Speed Table)



21-010004-001

Yellow arrows are movements
travelling east

Blue arrows are movements
travelling west

East Leg

001



21-010004-001

South Leg

Yellow arrows are movements
travelling north

Blue arrows are movements
travelling south



21-010004-001

North Leg

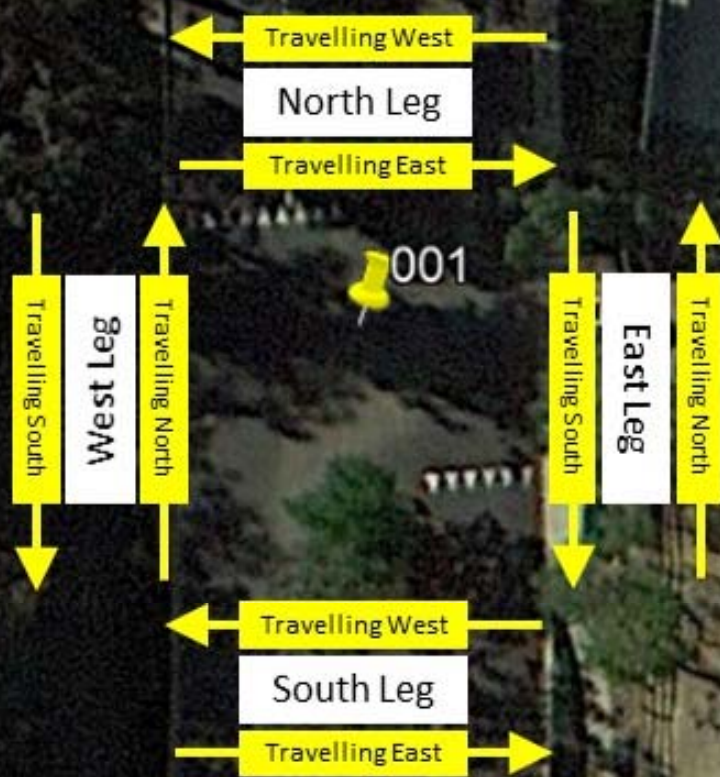
Yellow arrows are movements
travelling north

Blue arrows are movements
travelling south

001

N↑

21-010004-001





City of Laguna Hills

Traffic Commission

Staff Report

DATE: September 15, 2021
TO: Traffic Commissioners
FROM: Kenneth H. Rosenfield P.E.
Interim City Manager/Director of Public Services
ISSUE: Request for All-Way Stop Control at the Intersection of Mackenzie Street
at Knotty Pine Road

RECOMMENDATION: That the Traffic Commission Receive and File.

SUMMARY:

The City received a request to investigate the need for an all-way Stop control at the tee intersection of Mackenzie Street at Knotty Pine Road. In accordance with the Residential Streets Traffic Management Policy, the Traffic Engineers of Hartzog & Crabill, Inc., were retained to perform this evaluation, attached. The analysis of the traffic conditions at this location found appropriate sight distance exists, no traffic collision history exists at the intersection, and low traffic volumes exist consistent with a local residential intersection. Mackenzie Street is posted with signs and pavement legends with a 25-mph speed limit. The request for the Stop control did not meet any of the standards of the State issued warrants for this type of traffic control. To the extent the concern of the resident was the speed of vehicles on the street, Stop controls are not the appropriate approach as they are specifically identified in the State Traffic Manual as not being for this purpose. The street is otherwise appropriately posted for speed control. No further action is recommended.

ATTACHMENTS:

- Stop Sign Warrant Analysis - MacKenzie Street at Knotty Pine Road - 08-23-21



Trammell Hartzog, President

Gerald J. Stock, PE, TE,
Executive Vice-President

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

www.hartzog-crabill.com

August 23, 2021

Mr. Kenneth H. Rosenfield, PE
Assistant City Manager/Public Services Director
City of Laguna Hills
24035 El Toro Road
Laguna Hills, CA 92653

**Subject: Multi-way Stop Sign Analysis –
Mackenzie Street at Knotty Pine Road**

Dear Mr. Rosenfield:

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

The analysis was completed in response to the City's request to verify if a multi-way stop sign installation is warranted, and recommended based on meeting standard guidelines. The California Manual of Uniform Traffic Control Devices (California MUTCD) was used for defining the requirements for a multi-way stop sign installation. At the present time, the intersection is un-controlled on the Mackenzie Street approaches, and one-way stop controlled on Knotty Pine Road. In overall consideration of existing conditions, and no applicable warrants found satisfied, a multi-way stop sign installation is not recommended at this time.

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

Very truly yours,
HARTZOG & CRABILL, INC.

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

Gerald J. Stock, PE, TE
Executive Vice President
City & Traffic Engineering Services

Attach: Multi-way Stop Control Warrants Analysis Report

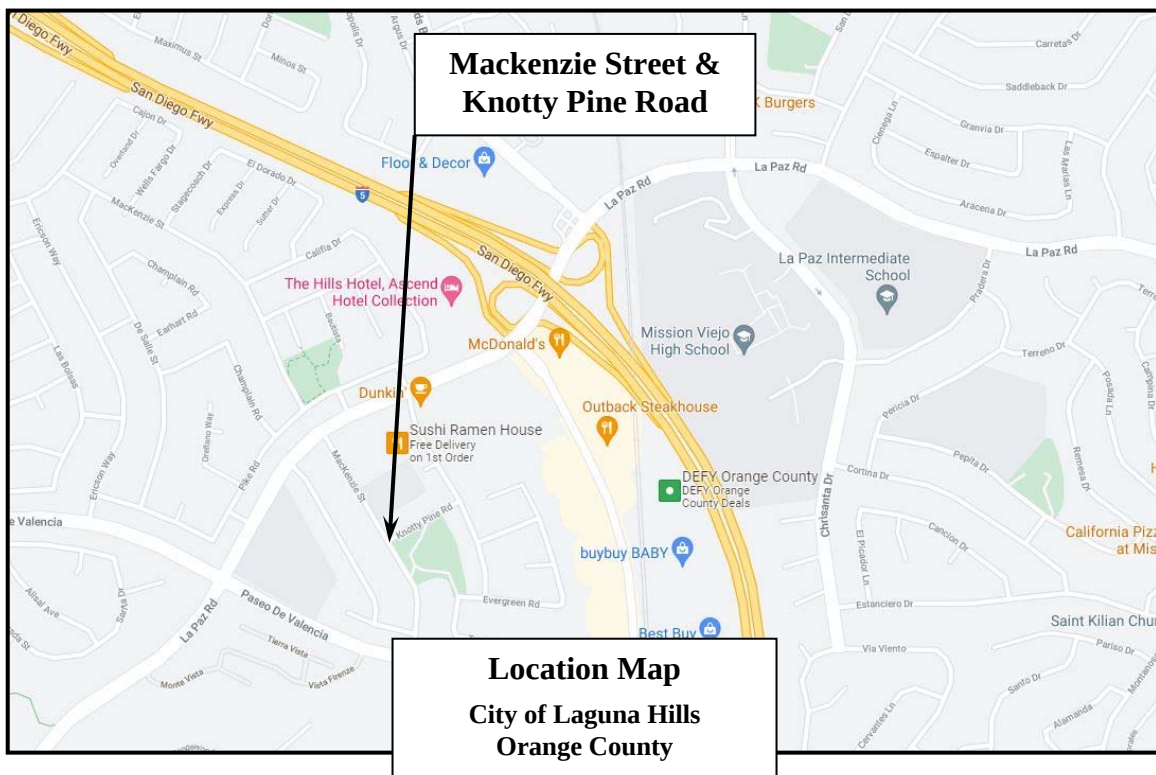
MULTIWAY STOP CONTROL WARRANTS ANALYSIS

MACKENZIE STREET AT KNOTTY PINE ROAD IN THE CITY OF LAGUNA HILLS, CA AUGUST 23, 2021

INTRODUCTION

The City of Laguna Hills requested Hartzog & Crabill, Inc. (HCI) to complete a Multiway Stop Warrants Analysis at the intersection of Mackenzie Street and Knotty Pine 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 Mackenzie Street running diagonally in the north-south directions and Knotty Pine Road running in the east-west directions. The intersection is located southwest of the I-5 San Diego Freeway and just south of La Paz Road (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 Knotty Pine Road (i.e., Mackenzie Street is uncontrolled).



Multiway Stop Sign Warrants Analysis – Mackenzie Street at Knotty Pine Road, in Laguna Hills, CA

BACKGROUND

Mackenzie Street is a north-south local-collector roadway with single-family residential properties on both sides of the street, as well as Knotty Pine Park on the east side. At the intersection with Knotty Pine Road, the roadway is approximately 40 feet wide, and the 2-lane roadway provides for one lane of traffic in each direction. There are no marked crosswalks across Mackenzie Street at or near the intersection. The roadway does have curb, gutter, and sidewalk improvements on the both sides, with landscaped parkway only on the west side. Mackenzie Street has a posted speed limit of 25 MPH, as well as ‘25’ pavement markings located at the speed limit signs and at/near the park. On-street parking is allowed on both sides of the street. Currently, there are no STOP signs on Mackenzie Street (i.e., uncontrolled) at its intersection with Knotty Pine Road.

See Exhibit 1 (next page) for photo images of Mackenzie Street.

Knotty Pine Road is an east-west local roadway with single-family residential properties on both sides of the street, as well as Knotty Pine Park on the south side. At the T-intersection with Mackenzie Street, which is the westerly terminus of Knotty Pine Road, the roadway is approximately 40 feet wide. The 2-lane roadway provides for one lane of traffic in each direction. There is one white, marked crosswalk across Knotty Pine Road at the intersection with Mackenzie Street. The roadway does have curb, gutter, and sidewalk improvements on both sides. Knotty Pine Road does have a posted speed limit of 25 MPH. There is a westbound STOP sign, a white ‘STOP’ pavement marking, and a limit line on Knotty Pine Road at its intersection with Mackenzie Street.

See Exhibit 2 (following page) for a photo image of Knotty Pine Road.

Multiway Stop Sign Warrants Analysis – Mackenzie Street at Knotty Pine Road, in Laguna Hills, CA

EXHIBIT 1



MACKENZIE STREET (Looking Northbound) @ KNOTTY PINE ROAD



MACKENZIE STREET (Looking Southbound) @ KNOTTY PINE ROAD

Multiway Stop Sign Warrants Analysis – Mackenzie Street at Knotty Pine Road, in Laguna Hills, CA

EXHIBIT 2



KNOTTY PINE ROAD (Looking Westbound) @ MACKENZIE STREET

Multiway Stop Sign Warrants Analysis – Mackenzie Street at Knotty Pine 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 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-turn 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*), which is where local jurisdictions, such as cities, report their collisions. A comprehensive 5-year traffic collision history summary report was prepared for this intersection. Table 1 (*next page*) provides the most recent summary of collision history occurring at or near this intersection.

Multiway Stop Sign Warrants Analysis – Mackenzie Street at Knotty Pine Road, in Laguna Hills, CA

Collision History (continued)

**TABLE 1
SWITRS COLLISION SUMMARY**

Intersection	2016-17		2018		2019		2020-21	
	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?	Date	Type of Coll. / Correctible?
Mackenzie Street at Knotty Pine 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, July 29, 2021 in order to account for vehicles that typically use this T-intersection. The ADT approach count for Mackenzie Street is 406 vehicles per day with the highest AM peak-hour approach volume having 37 vehicles, and 48 vehicles in the PM peak-hour. The ADT approach count for Knotty Pine Road is 155 vehicles with the highest AM peak-hour approach volume having 11 vehicles, and 18 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 – Mackenzie Street at Knotty Pine Road, in Laguna Hills, CA

Traffic Volumes (continued)

**TABLE 2
HIGHEST 24-HOUR INTERSECTION APPROACH VEHICLE COUNTS**

Street	Direction	ADT Volume	Directional Split	Highest Hourly Volume
Mackenzie Street	Northbound	278	68.5%	29 (3 - 4PM)
	Southbound	128	31.5%	19 (3 - 4PM)
Knotty Pine Road				
	Westbound	155	100%	18 (3 - 4PM)

Mackenzie Street is considered the ‘through’ or ‘major’ street at this residential/park 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, Knotty Pine Road is considered the ‘minor’ street as westbound drivers on Knotty Pine Road are required to stop at Mackenzie Street and look both ways before proceeding to make a left-turn 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 Knotty Pine Road carries approximately 28% of the entire traffic entering the intersection (Mackenzie Street carries 72% 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 – Mackenzie Street at Knotty Pine 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 one-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
MACKENZIE STREET AT KNOTTY PINE 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 (29) vehicles per hour Only 10% 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 Only 6.5% 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 (*10% major street / 6.5% minor street*). Therefore, the minimum traffic volume warrant is not satisfied.

Multiway Stop Sign Warrants Analysis – Mackenzie Street at Knotty Pine 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/park property environment. The geometry of the intersection includes an approximate 90° angle. Mackenzie Street has a consistent, gradual incline in the northbound direction. Knotty Pine Road has a slightly gradual incline in the eastbound direction as you move away from the intersection.

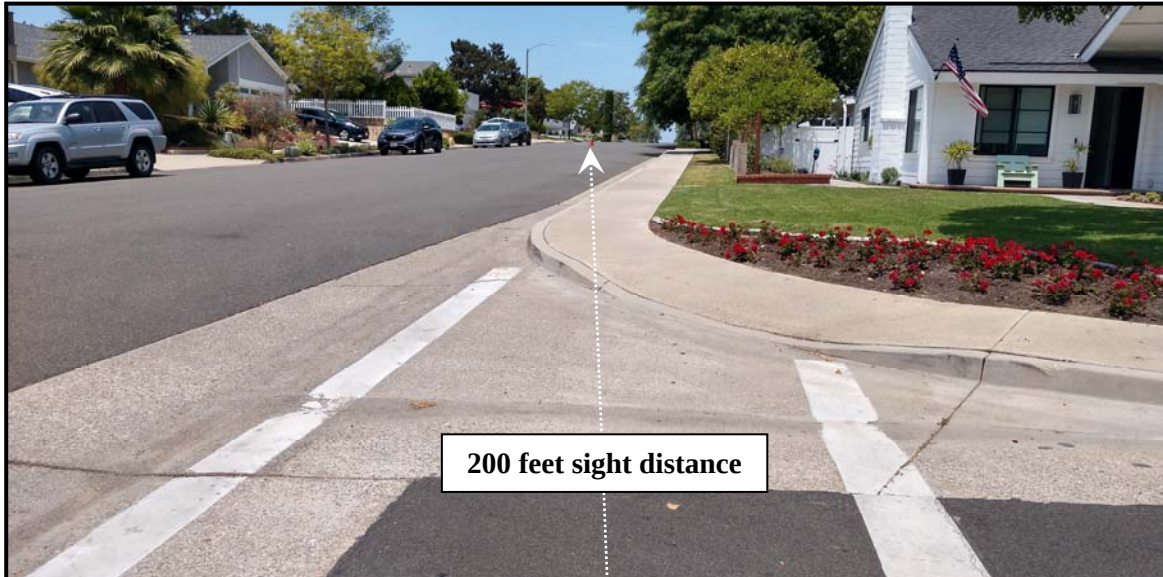
Driver sight distance was measured from the side-street approach to the intersection, as westbound traffic on Knotty Pine Road is required to stop, before proceeding to make a left-turn or right-turn onto Mackenzie Street. The measured distance was derived from the stopping sight distance guidelines 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, it is likely that 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 Mackenzie Street. More specifically, this stopping sight distance was field-measured from a typical ‘stopped’ vehicle location on Knotty Pine Road at the intersection looking towards the oncoming lanes of cross-traffic on Mackenzie Street. 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 in height).

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

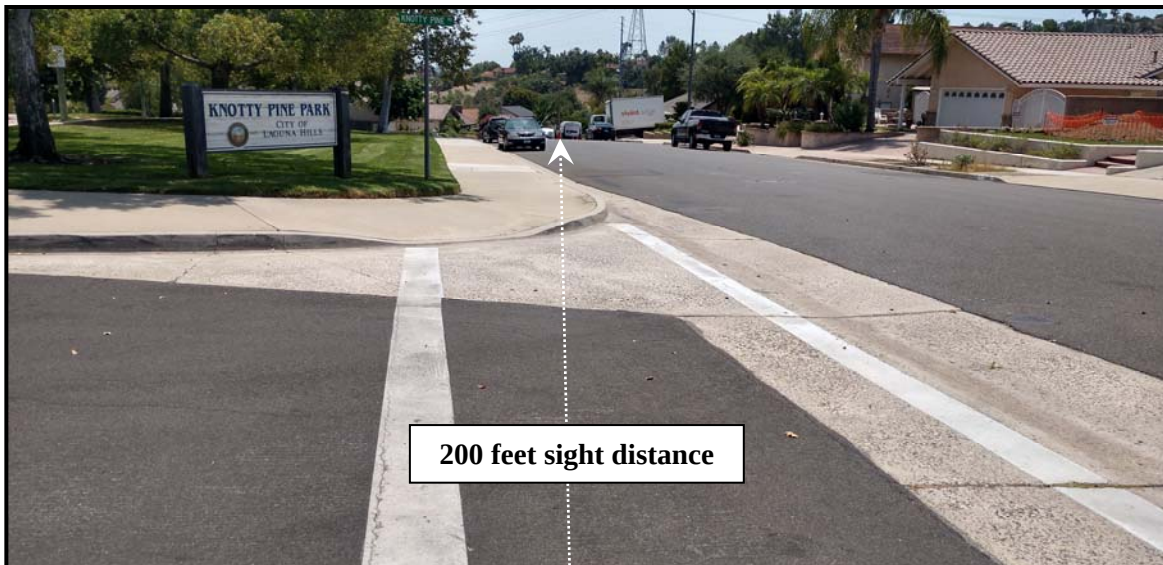
As Exhibit 3 shows, when looking from Knotty Pine Road, a driver does have a clear line of sight to the minimum sight distance of 200 feet when looking both ways on Mackenzie Street. It is noted, visibility is unrestricted when vehicles are not continuously parked one behind the other along the driver’s sight distance as shown in the exhibit.

Multiway Stop Sign Warrants Analysis – Mackenzie Street at Knotty Pine Road, in Laguna Hills, CA

EXHIBIT 3



Westbound KNOTTY PINE ROAD (Looking North) @ MACKENZIE STREET



Westbound KNOTTY PINE ROAD (Looking South) @ MACKENZIE STREET

Multiway Stop Sign Warrants Analysis – Mackenzie Street at Knotty Pine 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 (Mackenzie Street). 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 did not come close to being satisfied. 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 are 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, also one near the northeast corner. In regards to pedestrian and bicycle activity, field observations confirmed a medium activity of pedestrians, especially due to the park.

Multiway Stop Sign Warrants Analysis – Mackenzie Street at Knotty Pine Road, in Laguna Hills, CA

MULTIWAY STOP ANALYSIS SUMMARY (continued)

It was also determined that westbound Knotty Pine Road drivers do have a clear line of sight when stopped and looking both ways at Mackenzie Street traffic, when there are no continuously parked vehicles along the east side. Restricting the first couple of on-street parking spaces on the east-side of Mackenzie Street near the intersection, may be considered if restricted visibility from on-street parked vehicles becomes an issue.

Therefore, based upon engineering judgment, it is determined that stopping traffic on Mackenzie Street at Knotty Pine 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 for the intersection of Mackenzie Street and Knotty Pine 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 MACKENZIE STREET AND KNOTTY PINE ROAD
JAN. 1, 2016 - MAY 31, 2021

CASE ID	COLL. DATE	COLL. TIME	PRIMARY ROAD	SECONDARY ROAD	DIST.	DIR.	INTER.	WEATH. 1	COLL. SEVERITY	PRIM. COLL. FACT.	PCF VIOL. CAT.	PCF VIOL.	HIT AND RUN	TYPE OF COLL.	MOTOR VEHICLE INVOLVED WITH	ROAD SURF.
No Reported Collisions.																

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

Road Surface

A - Dry
 B - Wet
 C - Snowy or Icy
 D - Slippery
 - - 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

Attachment: Stop Sign Warrant Analysis - MacKenzie Street at Knotty Pine Road - 08-23-21 (2564 :

APPENDIX C

AVERAGE DAILY TRAFFIC (ADT)

COUNT DATA

Prepared by National Data & Surveying Services

VOLUME

MacKenzie St & Knotty Pine Rd

Day: Thursday
Date: 7/29/2021

Highest 8 Hours.

City: Laguna Hills
Project #: CA21_010074_001

DAILY TOTALS					NB	SB					EB	WB	Total
					278	128					0	155	561
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL		
00:00	0	0	0	1	1	12:00	7	2	0	1	10		
00:15	0	0	0	1	1	12:15	10	5	0	0	15		
00:30	0	0	0	0	0	12:30	6	4	0	3	13		
00:45	0	0	0	0	0	12:45	6	29	4	15	4	8	52
01:00	0	0	0	0	0	13:00	5	1	0	3	9		
01:15	0	0	0	0	0	13:15	5	3	0	3	11		
01:30	0	0	0	0	0	13:30	7	1	0	2	10		
01:45	0	0	0	0	0	13:45	4	21	0	5	7	11	37
02:00	0	0	0	0	0	14:00	2	1	0	4	7		
02:15	0	0	0	0	0	14:15	4	2	0	4	10		
02:30	0	0	0	0	0	14:30	1	1	0	2	4		
02:45	0	0	0	0	0	14:45	5	12	2	6	7	10	28
03:00	0	0	0	0	0	15:00	7	2	0	6	15		
03:15	0	0	0	0	0	15:15	13	8	0	5	26		
03:30	0	0	0	0	0	15:30	6	8	0	4	18		
03:45	0	0	0	0	0	15:45	3	29	1	19	7	18	66
04:00	0	0	0	0	0	16:00	5	3	0	3	11		
04:15	0	0	0	0	0	16:15	3	2	0	2	7		
04:30	0	0	0	0	0	16:30	7	3	0	4	14		
04:45	0	0	0	0	0	16:45	6	21	3	11	15	15	47
05:00	0	0	0	0	0	17:00	8	5	0	3	16		
05:15	1	0	0	1	2	17:15	9	1	0	1	11		
05:30	0	0	0	0	0	17:30	4	2	0	2	8		
05:45	2	3	0	1	3	17:45	5	26	1	9	9	9	44
06:00	0	0	0	1	1	18:00	6	2	0	3	11		
06:15	1	0	0	0	1	18:15	4	2	0	5	11		
06:30	0	0	0	1	1	18:30	4	2	0	2	8		
06:45	1	2	0	0	1	18:45	2	16	2	8	6	12	36
07:00	6	0	0	4	10	19:00	4	2	0	2	8		
07:15	3	1	0	3	7	19:15	2	2	0	3	7		
07:30	4	4	0	3	11	19:30	4	0	0	2	6		
07:45	6	19	2	7	9	19:45	5	15	2	6	9	9	30
08:00	4	4	0	1	9	20:00	1	0	0	1	2		
08:15	4	3	0	2	9	20:15	4	2	0	4	10		
08:30	3	8	0	4	15	20:30	1	1	0	0	2		
08:45	10	21	1	16	12	20:45	1	7	0	3	2	6	16
09:00	7	3	0	1	11	21:00	1	1	0	2	4		
09:15	1	0	0	1	2	21:15	2	1	0	1	4		
09:30	5	0	0	2	7	21:30	0	1	0	0	1		
09:45	4	17	2	5	11	21:45	0	3	0	3	0	3	9
10:00	0	2	0	0	2	22:00	0	1	0	0	1		
10:15	7	1	0	5	13	22:15	0	2	0	0	2		
10:30	6	0	0	3	9	22:30	1	0	0	0	1		
10:45	6	19	1	4	10	22:45	0	1	0	3	0	4	
11:00	4	0	0	1	5	23:00	0	0	0	1	1		
11:15	3	2	0	1	6	23:15	0	0	0	0	0		
11:30	4	2	0	3	9	23:30	0	1	0	1	2		
11:45	6	17	2	6	10	23:45	0	1	2	0	1	2	4
TOTALS	98	38		52	188	TOTALS	180	90		103	373		
SPLIT %	52.1%	20.2%		27.7%	33.5%	SPLIT %	48.3%	24.1%		27.6%	66.5		

DAILY TOTALS					NB	SB	EBWB				Total
					278	128					0
AM Peak Hour	11:45	07:45		09:45	11:45	PM Peak Hour	14:45	14:45		15:00	14:45
AM Pk Volume	29	17		13	48	PM Pk Volume	31	20		18	66
Pk Hr Factor	0.725	0.531		0.650	0.800	Pk Hr Factor	0.596	0.625		0.750	0.63
7 - 9 Volume	40	23	0	19	82	4 - 6 Volume	47	20	0	24	91
7 - 9 Peak Hour	08:00	07:45		07:00	08:00	4 - 6 Peak Hour	16:30	16:15		16:00	16:30
7 - 9 Pk Volume	21	17	0	11	45	4 - 6 Pk Volume	30	13	0	15	56
Pk Hr Factor	0.525	0.531	0.000	0.688	0.750	Pk Hr Factor	0.833	0.650	0.000	0.625	0.87

Attachment: Stop Sign Warrant Analysis - MacKenzie Street at Knotty Pine Road - 08-23-21 (2564 : Request for All-Way Stop Control at

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: September 15, 2021
TO: Traffic Commissioners
FROM: Kenneth H. Rosenfield P.E.
Interim City Manager/Director of Public Services
ISSUE: Electric Bicycles (Ebikes)

RECOMMENDATION: That the Traffic Commission Receive and File.

SUMMARY:

A mode of transportation gaining popularity is the use of electric bicycles (Ebikes). Ebikes are deemed to be bicycles relative to their regulation by the California Vehicle Code and the Laguna Hills Municipal Code. There may be some interest in the Traffic Commission to become familiar with this mode of travel and consider if any regulations, other otherwise encouragement of the use, of Ebikes is necessary. This information is provided for your information and discussion.

BACKGROUND:

Ebikes are electric motor assisted pedal bicycles which are required to follow the “rules of the road” for bicycles as promulgated by the California Vehicle Code and local Laguna Hills Municipal Code. A further description of the types, use and regulations associated with Ebikes is provided for the Traffic Commission’s information.

The following is an excerpt of the Publication entitled “A North American Survey of Electric Bicycle Owners” March 2018 as sponsored by the National Institute for Transportation and Communities (a U.S. Department of Transportation national university transportation center), authored by John MacArthur, Christopher R. Cherry, Michael Harpool and Daniel Schepke. This is provided to define Ebikes and to generally describe the purposes for their use.

Electric Bicycles (Ebikes)

September 15, 2021

Page 2

“Electric bicycles (e-bikes) are a new mode of transportation that could substantially improve efficiency in the transportation system if adopted, especially if they substitute for car use. Ebikes are relatively simple device and have electric motors to assist riders, generally through pedal assistance. They take different form factors and have a wide array of performance characteristics, and as such they are regulated differently across jurisdictions (MacArthur & Kobel, 2014). In recent years, there has been a movement to standardize electric bicycle regulations around the country into a three-class system that categorizes electric bicycles based on their maximum assisted speed and power assist mechanism (PeopleforBikes, 2017).

Mainstream use of ebikes in the U.S. had been hampered by small production volumes, cost and lack of knowledge about the technology. Issues affecting general bike use, such as inadequate infrastructure investments and a lack of comprehensive, integrated policies and programs to promote bicycling and cycling safety, also impact e-bike use (Pucher & Buehler, 2011). Even in a city like Portland, OR, with comprehensive, robust bicycling infrastructure, programs and policies that resulted in a six-fold increase in cycling levels from 1990 to 2010, e-bikes face difficulty in moving beyond early adopters and allowing more users to become interested in using them (Dill & Rose, 2011; Pucher & Buehler, 2011). This may be changing with a board array of e-bikes now on the market and at different price categories.

Previous research has identified that some primary barriers to encouraging new people to bicycle include inconvenience, safety and amount of effort required to bike, including distance traveled and physical limitations (Heinen et al., 2010). By providing electric assist to a rider, the potential for the role of the bicycle, especially for commuting, can be expanded by addressing the limits of trip distance and terrain. E-bikes could allow people with physical limitations, older adults and people in geographically challenging areas to participate in bicycling (Dill & Rose, 2011; MacArthur et al., 2014). There has been a growing body of literature on e-bike use and behavior. The majority of research dedicated to e-bikes focuses on Asian and European countries, in particular China (Fishman & Cherry, 2015). Conversely, only a limited amount of research exists focused on the U.S. (Fishman & Cherry, 2015; Dill & Rose, 2011). Research is needed to create a more systematic and detailed description of the range of measures, policy instruments, and technological and industry dynamics necessary to support e-bikes (Hamdouch & Depret, 2010). There is a need for a greater understanding of the early adopters and the role that e-bikes might play in household mobility decisions, particularly the potential for substituting for auto trips or supplementing 8 transit trips. In discussions with industry representatives, their perceived market for e-bikes has been older adults and people

Electric Bicycles (Ebikes)

September 15, 2021

Page 3

wanting to cycle for recreational purposes. Using surveys supplemented by GPS data collected from the first mixed e-bike and conventional bicycle sharing program in North America, Langford, Cherry et al. (2013) found e-bike users also replaced 11% of car trips compared to very few car trips replaced by users of conventional bicycles. Using instrumented bikes, Langford, Chen et al. (2015) also found e-bike and bicycle riders behave very similarly in traffic but there were some speed differences, which raises questions around safety. In a 2017 study, Ling et al. compared the discrepancies in cycling experience and perception between e-bike and standard bicycle users. They found that e-bikes play a more significant role in utilitarian travel than do standard bicycles, and that e-bike users tend to ride farther and take more trips by bicycle. They also developed a model to evaluate potential e-bike purchase intention; their results suggest that travel purpose, e-bike familiarity, reason for cycling, annual household income, and education level are all significant factors influencing interest in future e-bike ownership."

Regulations

Ebikes are regulated and are treated as bicycles. The California Vehicle Code (CVC) regulates Ebikes through a number of different laws, some of which are provided below. The State Legislature is busy proposing a number of additional regulations.

CVC 312.5. (a) An "electric bicycle" is a bicycle equipped with fully operable pedals and an electric motor of less than 750 watts.

(1) A "class 1 electric bicycle," or "low-speed pedal-assisted electric bicycle," is a bicycle equipped with a motor that provides assistance only when the rider is pedaling, and that ceases to provide assistance when the bicycle reaches the speed of 20 miles per hour.

(2) A "class 2 electric bicycle," or "low-speed throttle-assisted electric bicycle," is a bicycle equipped with a motor that may be used exclusively to propel the bicycle, and that is not capable of providing assistance when the bicycle reaches the speed of 20 miles per hour.

(3) A "class 3 electric bicycle," or "speed pedal-assisted electric bicycle," is a bicycle equipped with a motor that provides assistance only when the rider is pedaling, and that ceases to provide assistance when the bicycle reaches the speed of 28 miles per hour, and equipped with a speedometer.

Electric Bicycles (Ebikes)

September 15, 2021

Page 4

(b) A person riding an electric bicycle, as defined in this section, is subject to Article 4 (commencing with Section 21200) of Chapter 1 of Division 11.

(c) On and after January 1, 2017, manufacturers and distributors of electric bicycles shall apply a label that is permanently affixed, in a prominent location, to each electric bicycle. The label shall contain the classification number, top assisted speed, and motor wattage of the electric bicycle, and shall be printed in Arial font in at least 9-point type.

CVC 21207.5. (a) A motorized bicycle or class 3 electric bicycle shall not be operated on a bicycle path or trail, bikeway, bicycle lane established pursuant to Section 21207, equestrian trail, or hiking or recreational trail, unless it is within or adjacent to a roadway or unless the local authority or the governing body of a public agency having jurisdiction over the path or trail permits, by ordinance, that operation.

CVC 21200. (a) (1) A person riding a bicycle or operating a pedicab upon a highway has all the rights and is subject to all the provisions applicable to the driver of a vehicle by this division, including, but not limited to, provisions concerning driving under the influence of alcoholic beverages or drugs, and by Division 10 (commencing with Section 20000), Section 27400, Division 16.7 (commencing with Section 39000), Division 17 (commencing with Section 40000.1), and Division 18 (commencing with Section 42000), except those provisions which by their very nature can have no application.

CVC 21213. (a) A person under 16 years of age shall not operate a class 3 electric bicycle.

(b) A person shall not operate a class 3 electric bicycle, or ride upon a class 3 electric bicycle as a passenger, upon a street, bikeway, as defined in Section 890.4 of the Streets and Highways Code, or any other public bicycle path or trail, unless that person is wearing a properly fitted and fastened bicycle helmet that meets the standards of either the American Society for Testing and Materials (ASTM) or the United States Consumer Product Safety Commission (CPSC), or standards subsequently established by those entities. This helmet requirement also applies to a person who rides upon a class 3 electric bicycle while in a restraining seat that is attached to the bicycle or in a trailer towed by the bicycle.

CVC 21211 Bike path obstruction: No one may stop on or park a bicycle on a bicycle path.

CVC 21212(a) A person under 18 years of age shall not operate a bicycle, a nonmotorized scooter, or a skateboard, nor wear in-line or roller skates, nor ride upon a

Electric Bicycles (Ebikes)

September 15, 2021

Page 5

bicycle, a nonmotorized scooter, or a skateboard as a passenger, upon a street, bikeway, as defined in Section 890.4 of the Streets and Highways Code, or any other public bicycle path or trail unless that person is wearing a properly fitted and fastened bicycle helmet that meets the standards of either the American Society for Testing and Materials (ASTM) or the United States Consumer Product Safety Commission (CPSC), or standards subsequently established by those entities. This requirement also applies to a person who rides upon a bicycle while in a restraining seat that is at 21651.

The Laguna Hills Municipal Code (LHMC) also contains some relevant regulations as follows.

LHMC 11-04.030 Definitions.

A. California Vehicle Code Definitions to be Used. Whenever any words or phrases used herein are defined in the Vehicle Code of the state of California, and amendments thereto, such definitions shall apply if not elsewhere defined in this chapter.

B. Definitions of Words and Phrases. The following words and phrases when used in this chapter shall, for the purpose of this chapter, have the meanings respectively ascribed to them in this article.

“Bicycle lane” means a marked lane within the roadway designated by appropriate signs and markings for the one-way use of bicycles.

“Bicycle path/bicycle trail” means a specifically designated area for bicycle use physically separated from the roadway.

“Bicycle route” means any roadway designated as a bikeway pursuant to California Streets and Highways Code Section 2371 with official signs giving notice of such a bikeway.

LHMC 11-32.020 Bicycle operation.

A. Riding in Group. Persons operating bicycles within a bicycle lane or upon a bicycle path shall ride in single file except as provided for in CVC Section 21202(a).

B. Direction of Travel. Persons riding or operating a bicycle on a bicycle trail or path may proceed in either direction except on those trails or paths designated for one-way traffic by appropriate markings or signs defined by the direction of adjacent vehicular traffic.

Electric Bicycles (Ebikes)

September 15, 2021

Page 6

C. Walking Bicycles. Bicycles may be walked subject to all provisions of law applicable to pedestrians.

D. Yielding Right-of-Way. Whenever any person is riding a bicycle upon a sidewalk, such person shall yield right-of-way to any and all pedestrians. A person riding a bicycle upon entering a roadway or driveway from a sidewalk shall yield to all traffic.

Bicycle Facilities

The City operates a number of bicycle facilities defined by Class 1, Class 2 and Class 3. Ebikes can use these facilities.

Class 1 bikeways are physically separated from a road and appear as a paved trail. These exist, for example, along portions of Paseo de Valencia, Laguna Hills Drive, Alicia Parkway, La Paz Road and Oso Parkway.

Class 2 bikeways are on roadways and marked with painted striping and posted signage. These bikeways exist on most all of the City's arterial highways, as space permits.

Class 3 bikeways are on roadways where bicycle activity occurs but there is not sufficient roadway width to mark a Class 2 bikeway. The bikeway is only marked with signage. This exists, for example, along Cabot Road.

It is recommended the Traffic Commission receive and file this report.



City of Laguna Hills

Traffic Commission

Staff Report

DATE: September 15, 2021
TO: Traffic Commissioners
FROM: Kenneth H. Rosenfield P.E.
Interim City Manager/Director of Public Services
ISSUE: SWITRS Collision Report and Collision Diagram for the Intersection of
Paseo De Valencia and Los Alisos Boulevard

RECOMMENDATION: That the Traffic Commission Receive and File.

ATTACHMENTS:

- HCI Evaluation for SWITRS Collision Diagram



Trammell Hartzog, President

Gerald J. Stock, PE, TE,
Executive Vice President

17852 E. 17th Street
Suite 101
Tustin, CA 92780

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

www.hartzog-crabill.com

June 17, 2021

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

**SUBJECT: SWITRS Collision Report & Collision Diagram for the
Intersection of Paseo de Valencia and Los Alisos Boulevard**

Dear Mr. Rosenfield,

Per the City's request, Hartzog & Crabill, Inc. (HCI) has completed gathering data and preparing a SWITRS report and collision diagram for the following location:

- 1) Intersection of Paseo de Valencia and Los Alisos Boulevard

As you know, the location is 3-way traffic signalized intersection.

Data Collection / Preparation of Collision Report

HCI began these services by first requesting/gathering the latest available raw collision data via the State of California Highway Patrol (CHP) - Statewide Integrated Traffic Records System website (i- SWITRS).

HCI then prepared the attached 5-year collision report for this T-intersection, in order to assess if there is a pattern of collisions that may justify the need for installation of guardrail at this location.

In brief summary, there were a total of (30) collisions identified that occurred within 300 feet of the intersection.

In addition, HCI reviewed the Orange County Sheriff's traffic collision call history for this location (provided by the City), as supplemental confirmation to the SWITRS report.

Preparation of Collision Diagram

Using the collision report, HCI also prepared a collision diagram for the subject location. With the number of entries, the collision diagram is shown on the attached two exhibits (A & B).

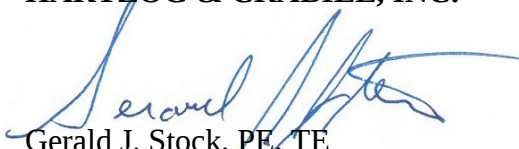
Mr. Kenneth H. Rosenfield, P.E.
June 17, 2021
Page 2 of 2

Findings & Conclusions

Based on the overall review of the attached findings, a pattern of collisions was not confirmed to justify the recommendation for the installation of a guard rail along the west side of Paseo de Valencia at Los Alisos Boulevard.

On behalf of HCI, we appreciate the opportunity to prepare this evaluation report letter, and hope it provides the City with sufficient decision-making information. Should you have any questions or desire additional information, please feel free to contact us at (714) 731-9455.

Sincerely,
HARTZOG & CRABILL, INC.



Gerald J. Stock, PE, TE
Executive Vice President
City and Traffic Engineering Services

5-Year SWITRS Report

CITY OF LAGUNA HILLS
5-YEAR SWITRS COLLISION DATABASE
INTERSECTION OF PASEO DE VALENCIA AND LOS ALISOS BOULEVARD (WITHIN 300')
JAN. 1, 2015 - JAN. 31, 2021

	CASE ID	COLL.	COLL.	PRIMARY ROAD	SECONDARY ROAD	DIST.	DIR.	INTER.	WEATH.	COLL.	PRIM.	PCF		HIT	TYPE	MOTOR	RO.
		DATE	TIME						1	SEVERITY	COLL.	VIOL	PCF	AND	OF	VEHICLE	
											FACT.	CAT.	VIOL.	RUN	COLL.	INVOLVED	SUI
1	6831576	20150118	1735	PASEO DE VALENCIA	LOS ALISOS	14	W	N	A	0	A	4	21703	N	C	C	A
2	6975163	20150602	2100	LOS ALISOS BL	PASEO DE VALENCIA	34	E	N	A	0	A	-		N	C	C	A
3	6992794	20150719	1530	PASEO DE VALENCIA	LOS ALISOS BL	0		Y	B	3	A	12	21453	N	D	C	A
4	7104009	20151005	1530	LOS ALISOS	PASEO DE VALENCIA	39	E	N	A	0	A	3	22350	M	C	C	A
5	8011324	20160317	2023	PASEO DE VALENCIA	LOS ALISOS BL	58	N	N	A	4	A	3	22350	N	C	C	A
6	8044450	20160504	903	LOS ALISOS BL	PASEO DE VALENCIA	0		Y	A	0	D	0		N	A	C	A
7	8110377	20160819	632	PASEO DE VALENCIA	LOS ALISOS	48	S	N	A	4	D	0		N	A	C	A
8	8325490	20170128	847	PASEO DE VALENCIA	LOS ALISOS BL	0		Y	A	4	A	12	21453	N	D	C	A
9	8341329	20170308	740	PASEO DE VALENCIA	LOS ALISOS BL	0		Y	A	0	D	0		M	B	C	A
10	8350429	20170321	1540	PASEO DE VALENCIA	LOS ALISOS BL	28	S	N	B	4	A	1	23152	N	A	-	A
11	8369151	20170415	134	PASEO DE VALENCIA	LOS ALISOS BL	33	S	N	A	2	A	1	23152	N	E	I	A
12	8368148	20170501	1050	PASEO DE VALENCIA	LOS ALISOS BL	0		Y	A	4	A	12	21453	N	D	C	A
13	8369173	20170509	1315	LOS ALISOS BL	PASEO DE VALENCIA	30	E	N	A	4	A	3	22350	N	C	C	A
14	8413991	20170620	1920	PASEO DE VALENCIA	LOS ALISOS BL	0		Y	A	3	A	12	21453	N	D	C	A
15	8551135	20180105	1940	LOS ALISOS BL	PASEO DE VALENCIA	100	E	N	B	0	D	0		N	B	C	A
16	8587000	20180326	2045	LOS ALISOS BL	PASEO DE VALENCIA	40	E	N	A	0	A	3	22350	N	C	C	A
17	8709321	20180914	1410	PASEO DE VALENCIA	LOS ALISOS BL	16	S	N	A	3	A	8	22107	N	E	I	A
18	8759380	20181104	1510	PASEO DE VALENCIA	LOS ALISOS BL	0		Y	A	4	A	12	21453	N	D	C	A
19	8806715	20190115	1300	PASEO DE VALENCIA	LOS ALISOS BL	78	N	N	B	0	A	8	22107	N	B	C	E
20	8786946	20190116	1000	PASEO DE VALENCIA	LOS ALISOS BL	151	S	N	C	4	A	8	22107	N	B	I	E
21	8865387	20190415	1424	PASEO DE VALENCIA	LOS ALISOS BL	0		Y	A	3	A	12	21453	N	D	C	A
22	8941762	20190806	1600	LOS ALISOS BL	PASEO DE VALENCIA	125	E	N	A	0	A	3	22350	M	C	C	A
23	9001343	20191106	1815	LOS ALISOS BL	PASEO DE VALENCIA	275	E	N	A	4	A	3	22350	N	C	C	A
24	9031659	20191207	1412	PASEO DE VALENCIA	LOS ALISOS BL	22	S	N	B	3	A	8	22107	N	E	I	E
25	9042051	20191212	1305	PASEO DE VALENCIA	LOS ALISOS	0		Y	-	4	D	0		N	D	C	-
26	9075701	20200209	1339	LOS ALISOS BL	PASEO DE VALENCIA	0		Y	C	3	D	0		N	D	C	E
27	9085104	20200220	1102	PASEO DE VALENCIA	LOS ALISOS BL	0		Y	A	0	A	12	21453	N	H	G	A
28	9148852	20200728	1710	LOS ALISOS	PASEO DE VALENCIA	0		Y	A	4	A	8	22107	N	B	C	A
29	9156750	20200916	1216	PASEO DE VALENCIA	LOS ALISOS	0		Y	A	4	A	9	21453	N	D	C	A
30	9205945	20201031	722	LOS ALISOS BL	PASEO DE VALENCIA	0		Y	A	4	A	12	21453	N	B	C	A

Attachment: HCI Evaluation for SWITRS Collision Diagram (2577 : SWITRS Report for Intersection of

CITY OF LAGUNA HILLS
5-YEAR SWITRS COLLISION DATABASE
INTERSECTION OF PASEO DE VALENCIA AND LOS ALISOS BOULEVARD (WITHIN 300')
JAN. 1, 2015 - JAN. 31, 2021

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	RO. SUI
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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

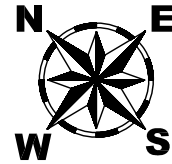
A - Dry
 B - Wet
 C - Snowy or Icy
 D - Slippery
 - - Not Stated

Collision Diagram (2 Exhibits)

LOS ALISOS BOULEVARD

L E G E N D:

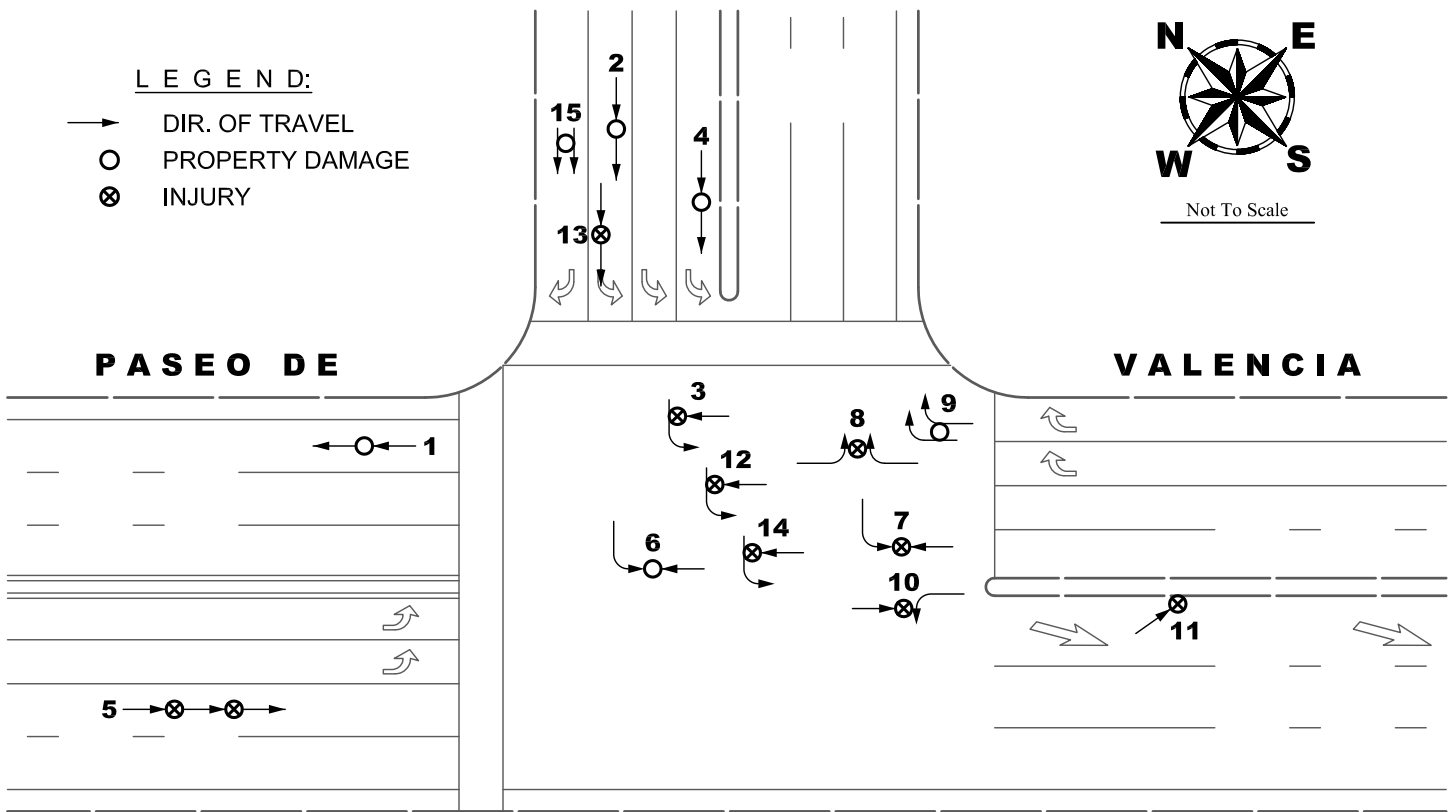
- DIR. OF TRAVEL
 ○ PROPERTY DAMAGE
 ⊗ INJURY



Not To Scale

PASEO DE

VALENCIA



No.	DATE	TIME	CHARACTERISTICS	WEATHER
1	01-18-15	17:35	Rear End; Following too close	Clear
2	06-02-15	21:00	Rear End; Not stated	Clear
3	07-19-15	15:30	Broadside; Traffic signals & signs	Clouds
4	10-05-15	15:30	Rear End; Unsafe speed	Clear
5	03-17-16	20:23	Rear End; Unsafe speed	Clear
6	05-04-16	9:03	Head On	Clear
7	08-19-16	6:32	Head On	Clear
8	01-28-17	8:47	Broadside; Traffic signals & signs	Clear
9	03-08-17	7:40	Sideswipe	Clear
10	03-21-17	15:40	Head On; Under the influence	Clouds
11	04-15-17	1:34	Hit Object; Under the influence	Clear
12	05-01-17	10:50	Broadside; Traffic signals & signs	Clear
13	05-09-17	13:15	Rear End; Unsafe speed	Clear
14	06-20-17	19:20	Broadside; Traffic signals & signs	Clear
15	01-05-18	19:40	Sideswipe	Clouds

ACCIDENT HISTORY

Paseo De Valencia & Los Alisos Boulevard

CITY OF LAGUNA HILLS

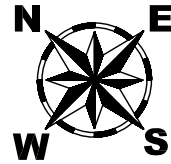
EXHIBIT 'A'

Packet Pg. 125

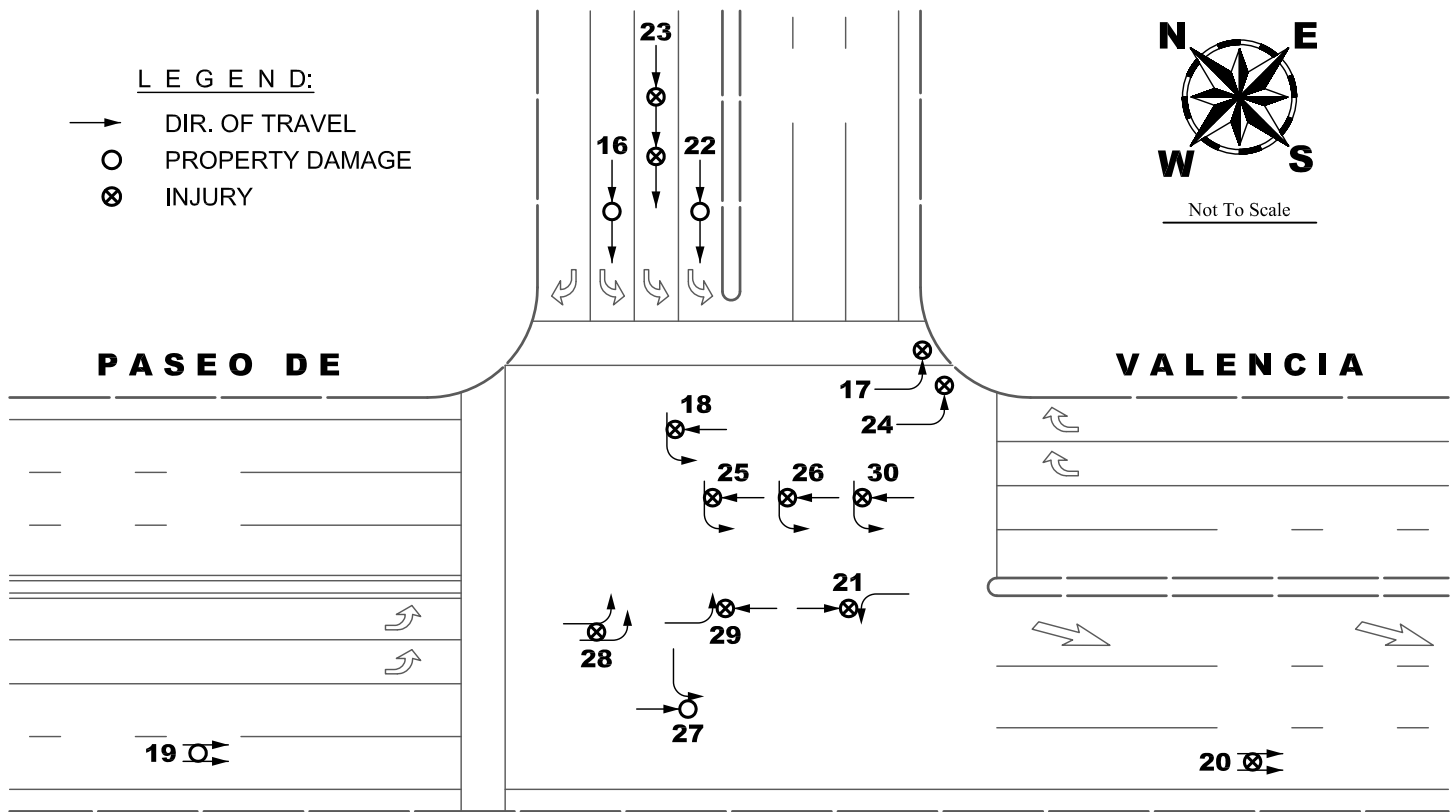
LOS ALISOS BOULEVARD

L E G E N D:

- DIR. OF TRAVEL
 ○ PROPERTY DAMAGE
 ⊗ INJURY



Not To Scale



No.	DATE	TIME	CHARACTERISTICS	WEATHER
16	03-26-18	20:45	Rear End; Unsafe speed	Clear
17	09-14-18	14:10	Hit Object; Improper turning	Clear
18	11-04-18	15:10	Broadside; Traffic signals & signs	Clear
19	01-15-19	13:00	Sideswipe; Improper turning	Clouds
20	01-16-19	10:00	Sideswipe; Improper turning	Rain
21	04-15-19	14:24	Broadside; Traffic signals & signs	Clear
22	08-06-19	16:00	Rear End; Unsafe speed	Clear
23	11-06-19	18:15	Rear End; Unsafe speed	Clear
24	12-07-19	14:12	Hit Object; Improper turning	Clouds
25	12-12-19	13:05	Broadside	—
26	02-09-20	13:39	Broadside	Rain
27	02-20-20	11:02	Unknown; Traffic signals & signs	Clear
28	07-28-20	17:10	Sideswipe; Improper turning	Clear
29	09-16-20	12:16	Broadside; Automobile ROW	Clear
30	10-31-20	7:22	Sideswipe; Traffic signals & signs	Clear

ACCIDENT HISTORY

Paseo De Valencia & Los Alisos Boulevard

CITY OF LAGUNA HILLS

EXHIBIT 'D'

Packet Pg. 126



City of Laguna Hills

Traffic Commission

Staff Report

DATE: September 15, 2021
TO: Traffic Commissioners
FROM: Kenneth H. Rosenfield P.E.
Interim City Manager/Director of Public Services
ISSUE: Radar Trailer Calendar

RECOMMENDATION: That the Traffic Commission Receive and File.

ATTACHMENTS:

- Radar Trailer Calendar September 15 2021

CITY OF LAGUNA HILLS

SEPTEMBER 2021

RADAR TRAILER SCHEDULE (RAINY DAYS EXCLUDED)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4
5	6 HOLIDAY	7 Rapid Falls W/O Sundowner 25 MPH	8 Bridlewood S/O Laurel Crest 25 MPH	9 Mustang E/O Appaloosa 25 MPH	10	11
12	13	14	15	16	17	18
19	20	21 Mill Creek S/O Lake Forest	22 Mill Creek S/O Lake Forest	23 Santa Maria at San Remo	24	25
26	27	28	29	30		

Attachment: Radar Trailer Calendar September 15 2021 (2576 : Radar Trailer Calendar)

CITY OF LAGUNA HILLS

OCTOBER 2021

RADAR TRAILER SCHEDULE (RAINY DAYS EXCLUDED)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4	5 Nellie Gail E/O Empty Saddle 25 MPH	6 Rapid Falls W/O Sundowner 25 MPH	7 Glen Canyon S/O Nellie Gail 25 MPH	8	9
10	11	12	13	14	15	16
17	18	19 Santa Vittoria N/O Ridge Route	20 Santa Vittoria N/O Ridge Route	21 Santa Maria at San Remo	22	23
24 31	25	26	27	28	29	30

Attachment: Radar Trailer Calendar September 15 2021 (2576 : Radar Trailer Calendar)

CITY OF LAGUNA HILLS

NOVEMBER 2021

RADAR TRAILER SCHEDULE (RAINY DAYS EXCLUDED)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
7	8	9 Bridlewood S/O Laurel Crest 25 MPH	10 HOLIDAY	11 Nellie Gail E/O Empty Saddle 25 MPH	12	13
14	15	16	17	18	19	20
21	22 Woodbluff S/O Middleridge 25 MPH	23 Glen Canyon W/O Nellie Gail 25 MPH	24 Lost Colt E/O Beargrass 25 MPH	25 HOLIDAY	26 HOLIDAY	27
28	29	30				

Attachment: Radar Trailer Calendar September 15 2021 (2576 : Radar Trailer Calendar)