

MEMORANDUM

Engineering Division



To: Honorable Mayor Esteves and City Council Members

From: Jaime O. Rodriguez
Traffic Engineering

**Subject: Tech Memo: Multi-Way STOP Analysis at
N Hillview Dr & Horcajo St-Horcajo Cr**

Date: January 4, 2008

Recommendation:

- ① Receive traffic study report
- ② Direct staff to implement traffic safety improvements at and along the intersection of N Hillview Dr & Horcajo St-Horcajo Cr

Background:

During the November 27, 2007 City Council meeting, Mr. Jake Krommenhock requested that the City provide a Multi-Way STOP control at the intersection of N Hillview Dr & Horcajo St-Horcajo Cr. The intersection is located approximately 600-FT north of Jacklin Rd and to the west of I-680. The intersection is currently STOP-controlled on the Horcajo St and Horcajo Cr side-street movements. N Hillview Dr serves as an alternative route to the schools along Escuela Pkwy and to I-680 via Russell Ln, see *Attachment A – Project Location*.

Mr. Krommenhock indicated that this was his 4th request for this improvement. Councilmember Polanski requested a report be presented back to the City Council during the January 15, 2007 meeting; this memorandum is in response to that request.

City Clerk records confirm that Mr. Krommenhock previously made this request at the June 7, 2005, August 6, 2002, and July 2, 2002 City Council meetings. In response to the June 7, 2005 request, the City implemented several traffic safety improvements along N Hillview Dr including the installation of “25-MPH” speed limit signs, “25” pavement markings, several curve warning signs, and tree trimming. These improvements were summarized in a report presented back to the City Council on July 21, 2005 with the improvements completed that same month; see *Attachment B – N Hillview Dr Work Order Report*.

Analysis:

From November 29, 2007 through December 6, 2007, staff collected traffic volume data at the intersection to determine the Average Daily Traffic (ADT) on N Hillview Dr and to prepare a Multi-Way STOP Analysis. Vehicle speed data on N Hillview Dr was also collected during morning and afternoon school commute hours and during normal traffic patterns at midday to determine if additional traffic control measures to encourage compliance with the posted speed limit of 25-MPH are appropriate.

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Summary of Data Collection

The average ADT of each street and of the intersection are summarized below:

Table 1
 Average Daily Traffic Volumes per Street: N Hillview Dr, Horcajo St, and Horcajo Cr

Street	Average Weekday Traffic Volume	Average Weekend Traffic Volume
N Hillview Dr	2,764	1,991
Horcajo St	539	427
Horcajo Cr	99	81

Table 2
 Average Intersection Volumes: N Hillview Dr & Horcajo St-Horcajo Cr

Intersection Volume	
Avg. Weekday Volume:	3,402
Avg. Weekend Volume:	2,499

The vehicle speed data for N Hillview Dr at the Horcajo St-Horcajo Cr intersection is summarized below:

Table 3
 N Hillview Dr Vehicle Speed Data

N Hillview Dr Time	85 th Percentile/Critical Speed (MPH)	
	Northbound	Southbound
AM School Peak (7:35 – 8:50)	28.0	30.0
Midday Normal Traffic (11:40 – 2:00)	29.8	32.4
PM School Peak (2:30 – 3:30)	28.8	30.0

The data in Table 1 and Table 2 indicate that traffic volumes along N Hillview Dr are constant but light throughout the average weekday and weekend. The period where traffic volumes are heaviest is during the weekday morning commute between 7:00AM - 8:30AM with a total of about 570 vehicles or 17% of the Average Weekday Volume traveling during this period. This peak corresponds with the morning bell-schedules for the schools on Escuela Pkwy and parents trying to access Escuela Pkwy via Russell Ln as a cut-through alternative to Jacklin Rd-Escuela Pkwy. Traffic in the southbound direction of N Hillview Dr was observed to queue over 1,000-

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FT north of Jacklin Rd, or 400-FT north of Horcajo St-Horcajo Cr because of the traffic signal control at the N Hillview Dr & Jacklin Rd intersection; see *Attachment C – Existing Southbound N Hillview Dr Traffic Queue*.

A second peak in traffic volumes on N Hillview Dr occurs between 2:00 PM - 3:30PM with about 430 vehicles or 13% of the Average Weekday Volumes traveling during this period. This also corresponds with the afternoon bell-schedules for the schools on Escuela Pkwy.

Multi-Way STOP Analysis

The City uses the Multi-Way STOP establishment criteria recommended in the Manual of Uniform Traffic Control Devices (MUTCD). The MUTCD recommended criteria includes three elements summarized below along with the intersection findings:

- Interim Measure Pending Traffic Signal Construction – (Criteria Not Satisfied)
The installation of a Multi-Way STOP should be considered as an interim treatment to traffic signalization if the traffic signal installation criteria is satisfied.

Traffic Signal Installation criteria at the N Hillview Dr & Horcajo St-Horcajo Cr intersection is not satisfied.

- Crash History – (Criteria Not Satisfied)
The installation of a Multi-Way STOP should be considered if 5 or more reported crashes that are susceptible to correction by a Multi-Way STOP occur in a 12-month period.

There was one (1) reported crash at this intersection on November 12, 2006 involving an illegal U-Turn movement.

- Minimum Volumes – (Criteria Not Satisfied)
The installation of a Multi-Way STOP should be considered if for the same 8-hour periods the minimum traffic volumes for the Major Street (300) and Minor Street (200) are satisfied or if vehicle speeds exceed 40-MPH then 70% of the minimum traffic volumes should be satisfied.

The minimum vehicle volumes for the major street (N Hillview Dr) were satisfied for the two hours that correspond to the Escuela Pkwy bell schedules. The minimum vehicle volumes for the minor streets (Horcajo St-Horcajo Cr) were not satisfied for any hour.

The Multi-Way STOP Analysis form for the N Hillview Dr & Horcajo St-Horcajo Cr intersection is provided in *Attachment D – Multi-Way STOP Analysis*.

Queue Analysis

Staff prepared a Queuing Analysis of AM peak period traffic to determine what the queue lengths might be if a Multi-Way STOP were installed. The analysis is provided in *Attachment E – N Hillview Dr & Horcajo St-Horcajo Cr Multi-Way STOP Queue Analysis*.

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The analysis shows that in the southbound direction coming from Escuela Pkwy/Russell Ln, the vehicle queue would extend approximately 1,300-FT north of the N Hillview Dr & Horcajo St-Horcajo Cr intersection beginning at about 8:00AM. Given that the existing queue already extends 1,000-FT north of Jacklin Rd, the southbound queue has the potential to extend almost 2,000-FT north.

In the northbound direction coming from Jacklin Rd, the analysis shows that beginning around 7:30AM that the vehicle queue can extend 1,200-FT south of the N Hillview Dr & Horcajo St-Horcajo Cr intersection which extends through the N Hillview Dr & Jacklin Rd intersection. This would result in additional back-ups on westbound traffic on Jacklin Rd, eastbound left-turn traffic on Jacklin Rd, and northbound traffic on N Hillview Dr south of Jacklin Rd.

A graphic illustrating the traffic queue's is provided in *Attachment F – N Hillview Dr Traffic Queue Illustration*.

Traffic Calming Improvements

In 2005 the City removed “chatter bars” that were installed at the N Hillview Dr & Horcajo St-Horcajo Cr intersection several years prior. The “chatter bars” were installed in series to create 2-FT wide/20-FT long median islands at the center of each approach to encourage vehicle speed reduction for vehicles turning left onto and off-of N Hillview Dr. The “chatter bars” were removed because they were determined to be a hazard to motorcycles and bicyclists since they were not of the proper height for roadway delineation per the California Highway Design Manual. Median islands should be a minimum of 6-inches in height to ensure proper visibility of the islands faces. The “chatter bars” were only about 2-inches in height which would cause a motorcyclists or bicyclists to loose control of their vehicle if they were to run over them.

In 2006, the City found a rubber curb alternative to the “chatter bars” called Flex-Curb and purchased the remaining inventory from the manufacturer, Recycled Technologies, Inc., before they were acquired by a competitor. Shortly after the acquisition, the new owner dropped the Flex-Curb product from its inventory. The City has contacted several rubber technology companies to find an interested manufacturer's but we have been unsuccessful in generating interest to develop the product.

The Flex-Curb product was the ideal alternative to the “chatter bars” because they are a forgiving roadway delineation device. If the Flex-Curb is struck by a vehicle, no property damage to the vehicle is sustained. North of the study intersection at N Hillview Dr & Russell Ln the Flex Curb product was successfully installed and has proven effective in reducing vehicle speeds of left-turning vehicles. At N Hillview Dr & Horcajo Cr, the Flex Curb product was installed only on the West leg of the intersection before the inventory was exhausted.

Concrete median islands are the only alternative to the Flex Curb product but additional outreach to the residents immediately adjacent to the original “chatter bar” locations should be pursued prior to installing. In addition alternative traffic calming treatments including the use of dynamic vehicle speed feedback signs and roadway marking treatments are viable solutions to help encourage compliance with the 25-MPH posted speed limit and are discussed further in the Recommendations section of this report. Samples of the Flex-Curb product are provided in *Attachment G – Flex Curb Installations*.

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Recommendations:

Multi-Way STOP

- The Multi-Way STOP Establishment Criteria for the intersection of N Hillview Dr & Horcajo St-Horcajo Cr is not satisfied so a Multi-Way STOP is not recommended. In addition, the resulting queues from installing a Multi-Way STOP would result in additional traffic back-ups on surrounding streets.

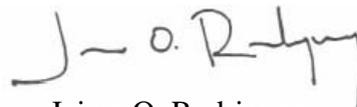
Traffic Calming Improvements

- Install a Vehicle Speed Feedback Sign for southbound N Hillview Dr traffic approximately 300-FT north of the Horcajo St-Horcajo Cr intersection to encourage vehicle speed reduction prior to reaching the intersection.
- Replace the single yellow roadway centerline marking on N Hillview Dr from Jacklin Rd to Horcajo Cr with a double-yellow centerline marking and provide a 4-inch white guide line along the east side of the street to delineate the parking area from the northbound thru-travel lane in efforts to provide a “visual choking” of the roadway and encourage vehicle speed reduction in the northbound direction.
- Install a warning sign on northbound N Hillview Dr just north of La Polama Pl to warning motorists of the approaching Horcajo St-Horcajo Cr intersection.
- Outreach to residents at N Hillview Dr & Horcajo St-Horcajo Cr to install concrete curb median islands at each intersection approach to replace the previously removed “rumble strip” devices. Preliminary outreach to residents at the four corners of the intersection yielded concerns with property damage to their vehicles if the islands were struck while backing out of their driveways; providing a rolled curb treatment to the islands may help to alleviate resident concerns.

If community support for installation is not available, the double yellow roadway centerline marking should be extended 100-FT on the north leg of the intersection to provide a visual warning to motorists of the approaching intersection.

See Attachment H – Proposed Traffic Calming Improvements – N Hillview Dr Option 1 & 2.

If you have any questions, please feel free to contact me at x3335.



Jaime O. Rodriguez
Traffic Engineer

C: Police Chief Dennis Graham, Police Department
Greg Armendariz, Public Works Director/City Engineer

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Attachment A

Project Location N Hillview Dr & Horcajo St-Horcajo Cr



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Attachment B

N Hillview Dr Work Order Report

MEMORANDUM

Engineering Division



To: Honorable Mayor and City Council
Through: Charles Lawson, City Manager
From: Greg Armendariz, City Engineer
By: Jaime O. Rodriguez, Traffic Engineering

Subject: Response to June 7, 2005 – Council Meeting Citizens Forum
Request for Two All-Way Stop Control Intersections at:
N Hillview Dr & Horcajo Cr and N Hillview Dr & Horcajo Cr

Date: July 21, 2005

During the June 7, 2005 Council Meeting, Mr. Jake Krommenhock, resident at 948 Horcajo Circle in Milpitas, requested during the Citizens Forum that the City consider installing “All-Way STOP” controls at the following intersections:

- N Hillview Dr & Horcajo Dr
- N Hillview Dr & Horcajo Cr

Mr. Krommenhock mentioned during his request that his mailbox was recently damaged as a result of speeding in the area and that he had submitted three previous requests for All-Way STOP controls at the above intersections in the past. Mr. Krommenhock also forwarded a letter to the Milpitas Post requesting the All-Way STOP controls; the letter was printed in the Opinion section of the June 9, 2005 edition. N Hillview Dr is a signed 25 MPH residential street

All previous studies resulted in findings that the All-Way STOP controls were not warranted or appropriate due to the fact that the intersections were located at the end of long horizontal and vertical curves on N Hillview Dr. Placing STOP controls at intersections that are at the end of horizontal curves may increase the potential for head-on collisions because motorists traversing the curves do not have a continuous clear line of sight to the STOP controls and may therefore, run the controls accidentally.

Staff investigated the site on June 9th and recommends implementing the following improvements on and around N Hillview Dr. A diagram summarizing the improvements is attached.

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Attachment B (Continued)

N Hillview Dr Work Order Report

July 21, 2005

1. Installation of "Curve Warning" signs on N Hillview Dr both north and south of the Horcajo Dr. The curve warning signs will help to inform motorists of the curves in the roadway ahead of them.
2. Installation of "Curve Warning" and "20 MPH" signs both north and south of the Horcajo Cr intersection. The curve warning signs will help to inform motorists of the curves in the roadway ahead of them and the reduced speed signs should help to encourage lower speeds down and up the hill approaching Russell Ln and Nieves St.
3. Installation of "Intersection Ahead" warning signs on southbound N Hillview Dr approaching Horcajo Cr.
4. Installation of three supplemental 25 MPH speed limit signs to continuously remind motorists on N Hillview Dr of the speed limit for the street. Pavement messages that read "25" will also be installed adjacent to new speed signs.
5. Notify residents to trim trees & bushes at intersections along N Hillview Dr to improve visibility for motorists.
6. Trim trees around streetlight on Horcajo Cr in front of Mr. Krommerhock's residents to improve visibility during dusk and nighttime conditions.
7. Provide increased police enforcement at the start of each school season on N. Hillview Dr.

An All-Way STOP control study will also be performed in the fall when traffic patterns are considered normal because of the additional trips that results from students being in school. Staff will notify both Mr. Krommerhock and the Council of the study results at that time.

Staff met with Mr. Krommerhock on June 10th to discuss the above concepts with him. He was happy to see that action was being taken to respond to his concern. Work orders to the Public Works Department will be prepared and improvements are schedule to be implemented this month.

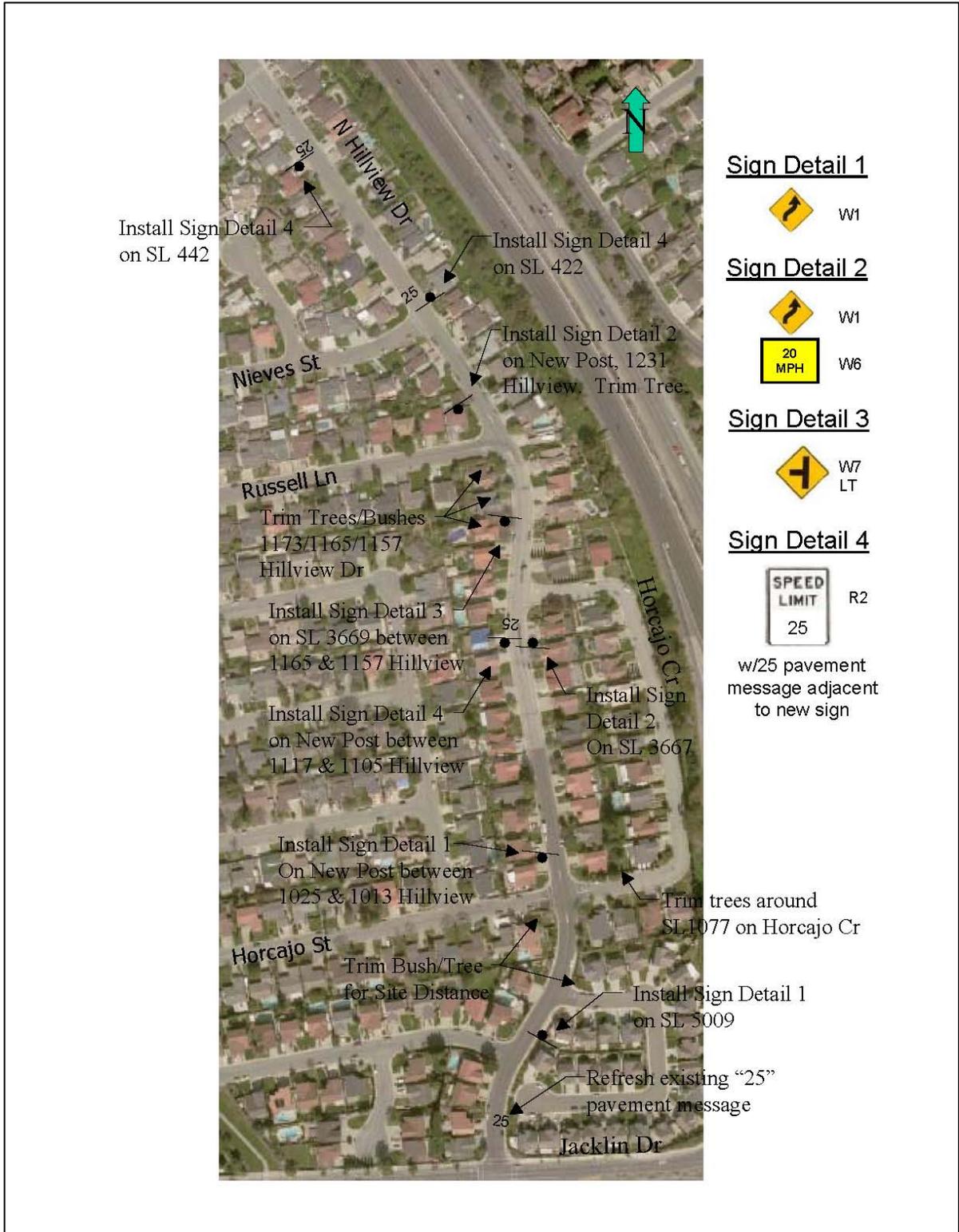
If you have any questions, please feel free to contact Jaime Rodriguez in Traffic Engineering at (408) 586-3335.

Attachment: Diagram

C: Dennis Cuciz, Public Works Director
Lt. Steve Pangelinan, Police Department – Traffic Enforcement Unit
Mary Lavelle, City Clerk

Attachment B (Continued)

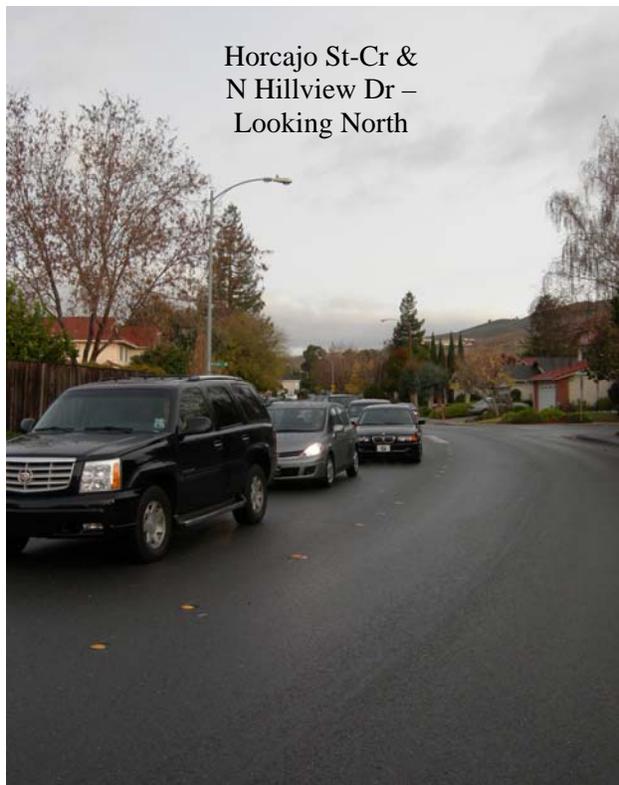
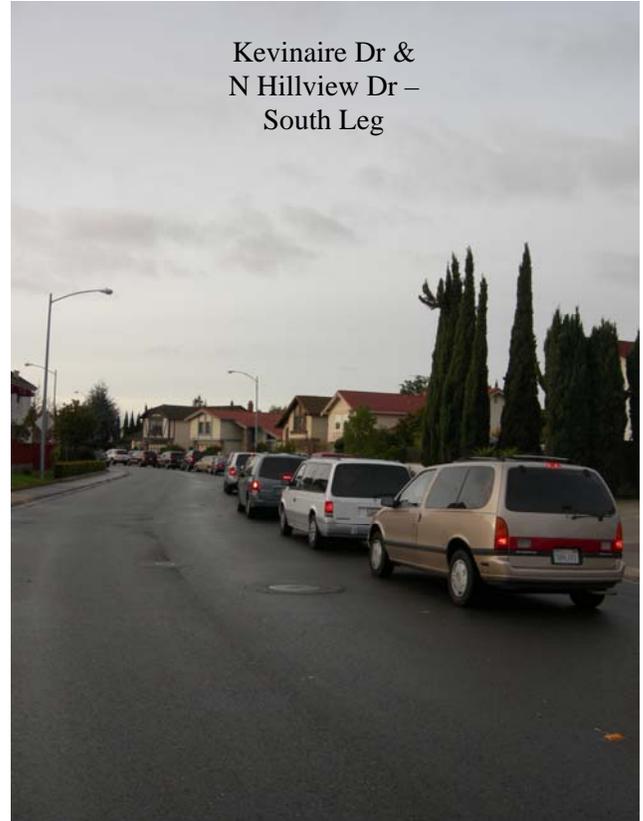
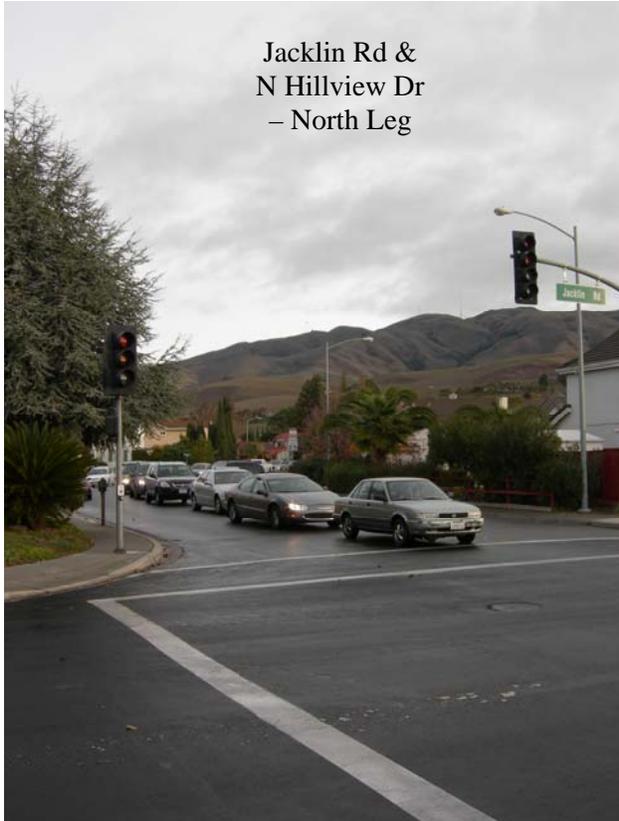
N Hillview Dr Work Order Report



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Attachment C

Existing Southbound N Hillview Dr Traffic Queue



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Attachment D

Milpitas Multi-Way STOP Analysis N Hillview Dr & Horcajo St-Horcajo Cr

City of Milpitas Multi-Way STOP Analysis

Location: N Hillview Dr & Horcajo Cir

Weather: Partly Cloudy

Date: 12/6/2007

A. Interim Measure Pending Traffic Signal Construction
 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.

Satisfied: _____ YES NO

B. Crash History
 A crash problem, as indicated by 5 or more reported crashes in a 12-month period that are susceptible to correction by a Multi-Way STOP installation. Such crashes include right and left-turn collisions as well as right-angle collisions.

Satisfied: _____ YES NO

C. Minimum Volumes

P1. The vehicular volume entering the intersection from the Major Street approaches (total of both) averages at least 300 vehicles per hour for any 8 hours of an average day.

Major Street (N Hillview Dr)		
Hour	Volume	Satisfied
0700-0800	481	YES
0800-0900	225	NO
1400-1500	177	NO
1500-1600	339	YES
1600-1700	167	NO
1700-1800	211	NO
1800-1900	144	NO
1900-2000	125	NO

P2. The combined vehicular, pedestrian, and bicycle volumes entering the intersection from the Minor Street approaches (total of both) averages at least 200 units per hour for the same 8 hours as the Major Street.

Minor Street (Horcajo Cir)		
Hour	Volume*	Satisfied
0700-0800	97	NO
0800-0900	70	NO
1400-1500	24	NO
1500-1600	80	NO
1600-1700	27	NO
1700-1800	25	NO
1800-1900	32	NO
1900-2000	36	NO

*Vehicle Volumes Only

P1 Satisfied: _____ YES NO

P2 Satisfied: _____ YES NO

P3. If the 85th percentile approach speed of the Major Street traffic exceeds 40-MPH, the Minimum Volumes in P1 and P2 are 70% of the above values.

P3 Satisfied: _____ YES NO

Major St Posted Speed Limits: NB 25 MPH
 SB 25 MPH

Major St Critical Speeds: NB 29.8 MPH
 SB 32.4 MPH

Multi-Way STOP Recommended: _____ YES NO

Analysis Performed by: George Mendoza 12/11/07
 Traffic Engineering Intern Date

Analysis Approved by: Jaime O. Rodriguez 12-11-07
 Traffic Engineer Date

Traffic Engineer's Stamp



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Attachment E

N Hillview Dr & Horcajo St-Horcajo Cr Multi-Way STOP Queue Analysis

Northbound N Hillview Dr - Queue Analysis

Hour	No. Vehicle Arriving every 5-Minutes	Length of Queue every 5 Min (FT)	Time for Dissipate Queue (min)	Does Queue Extend to Jacklin Rd
7:00	5	110	0.42	NO
:05	4	88	0.33	NO
:10	5	110	0.42	NO
7:15	1	22	0.08	NO
:20	3	66	0.25	NO
:25	17	374	1.42	NO
7:30	18	396	1.50	NO
:35	42	924	3.50	YES
:40	36	792	3.00	YES
7:45	49	1078	4.08	YES
:50	56	1232	4.67	YES
:55	42	924	3.50	YES
8:00	16	352	1.33	NO
:05	15	330	1.25	NO
:10	16	352	1.33	NO
8:15	13	286	1.08	NO
:20	23	506	1.92	NO
:25	9	198	0.75	NO
8:30	8	176	0.67	NO

Southbound N Hillview Dr - Queue Analysis

7-8:30AM	No. Vehicles Arriving every 5-Minutes	Length of Queue every minute (ft)	Time for Queue to pass (min)	Does Queue Extend to Russell Ln
7:00	5	110	0.42	NO
:05	8	176	0.67	NO
:10	7	154	0.58	NO
7:15	4	88	0.33	NO
:20	9	198	0.75	NO
:25	11	242	0.92	NO
7:30	11	242	0.92	NO
:35	17	374	1.42	NO
:40	31	682	2.58	NO
7:45	17	374	1.42	NO
:50	25	550	2.08	NO
:55	58	1276	4.83	YES
8:00	32	704	2.67	YES
:05	6	132	0.50	NO
:10	4	88	0.33	NO
8:15	9	198	0.75	NO
:20	9	198	0.75	NO
:25	3	66	0.25	NO
8:30	10	220	0.83	NO

Attachment F

N Hillview Dr Queue Impact Illustration if Multi-Way Stop at N Hillview Dr & Horcajo St-Horcajo Cr is Installed



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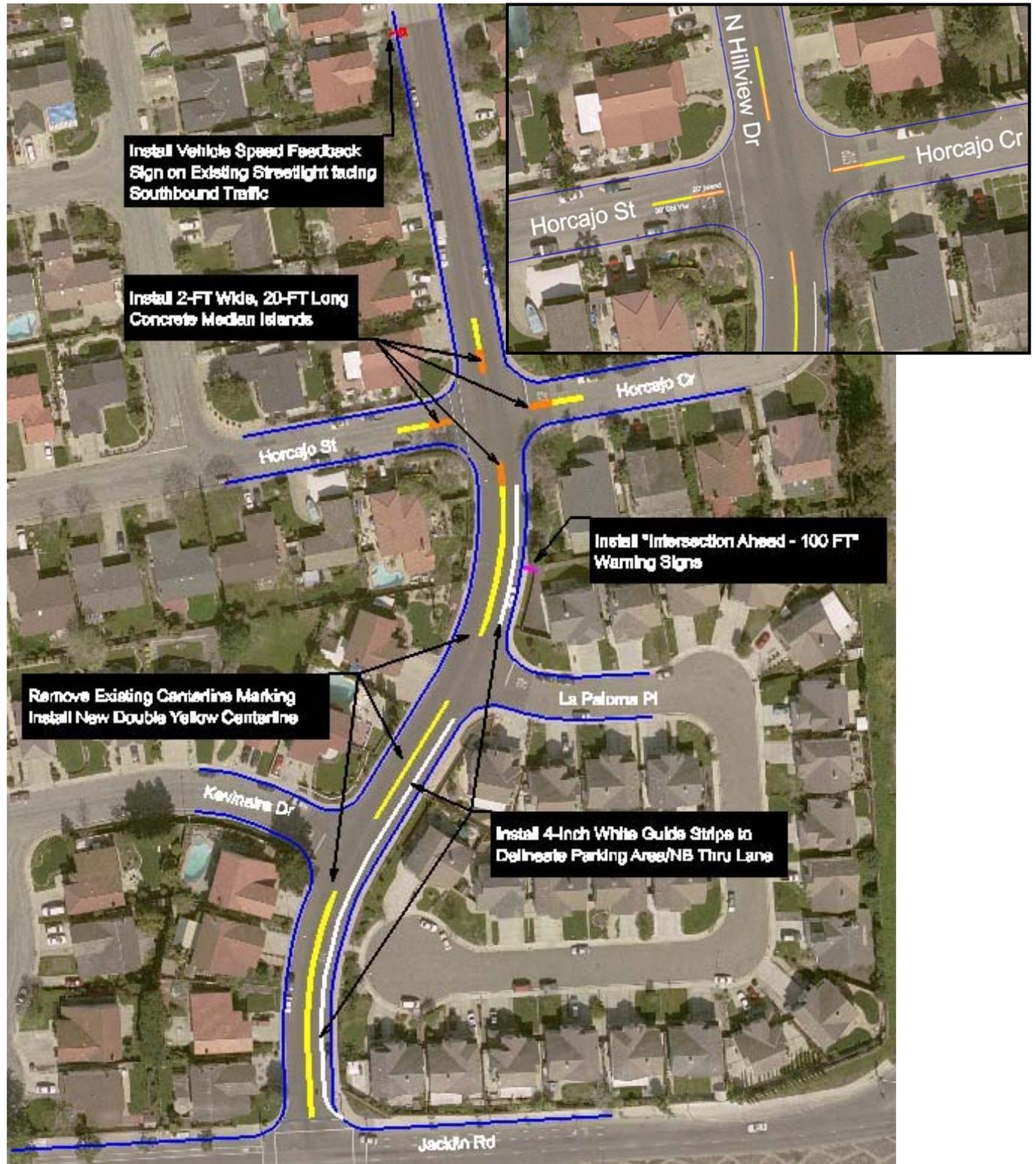
Attachment G

Flex Curb Installations



Attachment H

Proposed Traffic Calming Improvements - N Hillview Dr Option 1 – Median Islands



Attachment H

Proposed Traffic Calming Improvements - N Hillview Dr Option 2 – No Median Islands



City of Milpitas, California

BUDGET CHANGE FORM

Type of Change	From		To	
	Account	Amount	Account	Amount
Check one:				
<input checked="" type="checkbox"/> Budget Appropriation	311-9514234153899	\$25,000	311-951423474800	\$25,000
<input type="checkbox"/> Budget Transfer	310-2940	\$25,000	310-3999	\$25,000

Explain the reason for the budget change:

During the November 27, 2007 City Council meeting the council requested staff to report on previous traffic safety improvements at the intersection of N Hillview Dr & Horcajo St-Horcajo Cr in response to a Public Forum request for the installation of a Multi-Way Stop at that intersection.

A summary of previous traffic improvements and proposed improvements in response to the Public Form request on and along N Hillview Dr are provided in the attached "Tech Memo: Multi-Way STOP Analysis at N Hillview Dr & Horcajo St-Horcajo Cr" report dated January 4, 2008. The recommendations of the report include:

- Install a Vehicle Speed Feedback Sign for southbound N Hillview Dr traffic approximately 300-FT north of the Horcajo St-Horcajo Cr intersection.
- Install a double-yellow centerline on N Hillview Dr and edge line guide strips between Horcajo St-Horcajo Cr and Jacklin Rd. This requires the removal of an existing single yellow centerline marking.
- Install an "Intersection Ahead – 100FT" warning sign
- Outreach to residents at N Hillview Dr & Horcajo St-Horcajo Cr to install a concrete curb median islands at each intersection approach to replace the previously removed "rumble strip" devices. If community support for installation is not available, the double yellow roadway marking centerline should be extended 100-FT on the north leg of the intersection to provide a visual warning to motorists of the approaching intersection.

Approve a budget appropriation of \$25,000 from the Street Fund to CP4234 – Minor Traffic Improvements for replacement of the concrete curb median islands.

Check if City Council Approval required. Meeting Date: January 15, 2008

Itemization of funds, if needed:			Amount
Requested by:	Division Head:	Date:	
	Department Head:	Date: 1/07/08	
Reviewed by:	Finance Director: <i>Flora Zang, Acting</i>	Date: 1/4/08	
Approved by:	City Manager:	Date:	
Date approved by City Council, if required:		Confirmed by:	