

# CROW CANYON ROAD SAFETY REPORT

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**Greenridge Road to the Alameda/Contra Costa County Line  
MP 0.95 to MP 6.85**

MAY 2016

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ALAMEDA COUNTY PUBLIC WORKS AGENCY  
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## 1.0 EXECUTIVE SUMMARY

Crow Canyon Road is a major rural arterial roadway linking central Alameda County with major employment and residential areas in southwestern Contra Costa County. The roadway has served as an alternate route for commuters seeking to avoid the heavy peak hour congestion along both I-580 and I-680 and at the I-580/I-680 interchange.

Crow Canyon Road has long stretches of two-lane undivided highway with limited horizontal sight distance around curves and only three controlled intersections within the study area. Drivers tend to overlook these rural characteristics, resulting in speeding and a significant number of accidents. The scope of this Study included the identification and recommendation of future roadway safety improvements at the conceptual level. The scope did not include activities associated with either preliminary engineering design or final design plans.

### PURPOSE OF THE SAFETY STUDY

This Study was prepared to identify safety issues, through the analyses of reported vehicle accidents and input from the Crow Canyon Road corridor community, that are possibly contributing to reported accidents. Once identified, the Study recommended and prioritized potential future roadway improvements to mitigate these issues. Through the completion of this Study, Alameda County's Public Works Agency is positioned to compete for highly competitive funding grants

### SAFETY STUDY GOALS

The goals of this Study were to:

- Improve safety and traffic flow along the Crow Canyon Road corridor for all modes and all users.
- Recommend potential safety improvements that maintained the rural characteristics of the roadway corridor.

### EXISTING TRAFFIC AND CORRIDOR CONDITIONS

Existing motor vehicle traffic conditions within the study limits were observed and collected during November/December 2012. Bicycle volumes were subsequently counted in March 2013. Based upon similar roadway characteristics, the study corridor was divided into 5 segments.

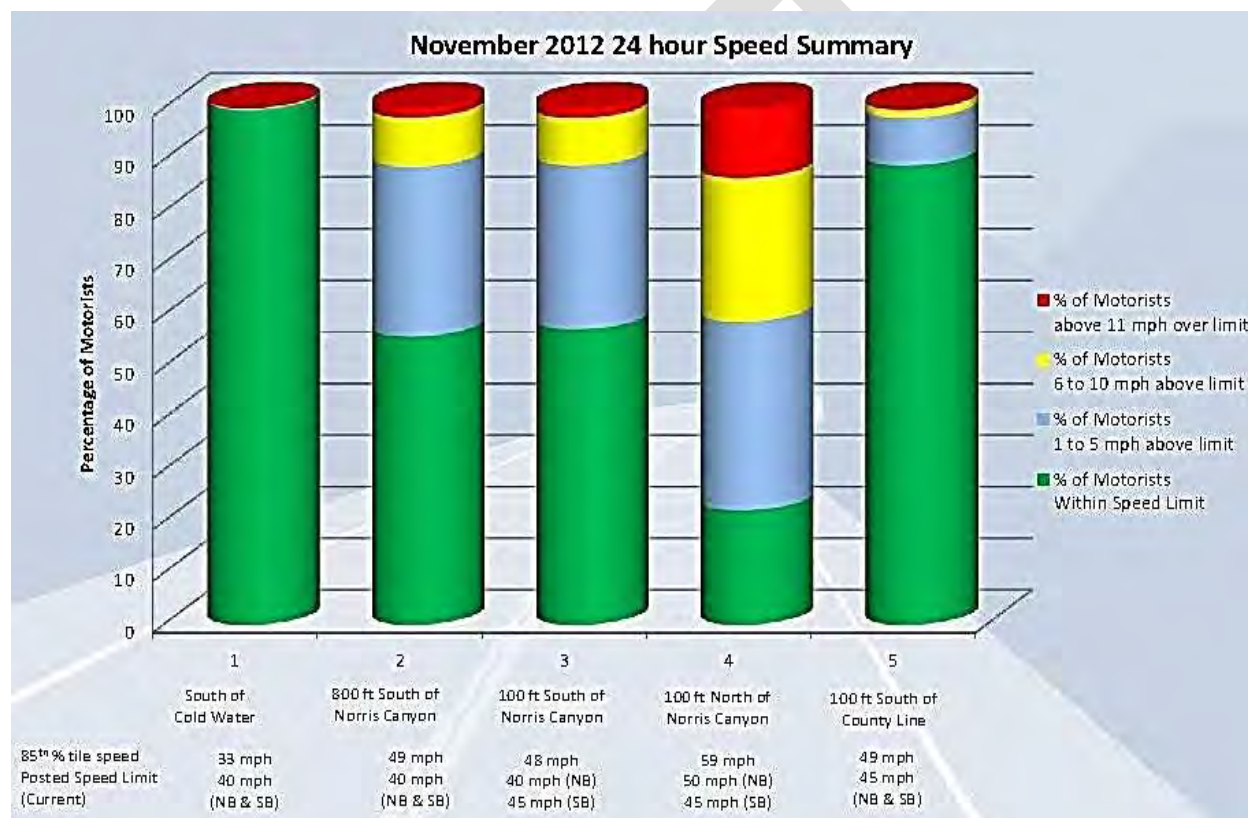
Daily traffic volumes ranged from approximately 16,000 vehicles per day to over 18,000 vehicles per day, with the higher volumes recorded on the southernmost segments (Segments 1, 2 and 3). The 24-hour traffic volumes by segment are summarized below:

**Daily Traffic Volume by Segment**

Segment	Daily Traffic Volume
1	15,968
2	18,165
3	17,995
4	16,112
5	15,804

**VEHICLE SPEEDS**

Vehicle speeds were determined through the use of road tube vehicle counters at strategic locations, as well as a series of travel time runs within the study limits. Results of the speed surveys are shown below.



The majority of vehicles within the study limits were travelling no more than 5 miles per hour in excess of the posted speed limit. The one exception is Segment 4, where nearly 50% of the vehicles were travelling at 6 or more miles per hour above the posted limit, with approximately 20% travelling 11 miles per hour or more above the limit.

**COMPARATIVE TRAVEL TIMES: CROW CANYON ROAD VERSUS I-680 & I-580**

Comparative travel time runs along both Crow Canyon Road and the I-580 and I-680 freeways were performed between East Castro Valley Boulevard and I-680 to determine what time savings, if any, might be achieved by motorists using Crow Canyon Road. It is felt by many of the residents along Crow

Canyon Road that a significant number of commuters use the County arterial because its use reduces travel time as compared to using both I-580 and I-680.

### Comparative Travel Time – Crow Canyon Road vs. I-580 and I-680

Peak Hour	Roadway	Direction	Distance, Miles	Travel Time, Min:Sec	Average Speed, mph	Crow Canyon Road Advantage, Min:Sec
AM	Crow Canyon Rd	SB	8.40	13:30	37.3	-2:52
	I-680 & I-580	SB	14.40	16:22	52.8	
PM	Crow Canyon Rd	SB	8.40	13:58	36.1	-0:19
	I-680 & I-580	SB	14.40	14:17	56.3	
AM	Crow Canyon Rd	NB	8.40	15:22	32.6	-3:48
	I-680 & I-580	NB	14.40	19:10	43.8	
PM	Crow Canyon Rd	NB	8.40	14:40	33.9	-4:52
	I-680 & I-580	NB	14.40	19:32	43.0	

Note:

Travel time runs were conducted for 2 two-hour peak periods.

AM peak period was considered 7:00 a.m. - 9:00 a.m. AM peak direction is westbound.

PM peak period was considered 4:00 p.m. - 6:00 p.m. PM peak direction is eastbound.

Distance, Travel Time and Average Speed have been averaged from the results of two bi-directional runs on each corridor.

“Crow Canyon Road Advantage” is the difference in travel time between the two routes in favor of Crow Canyon Road.

As illustrated above, the peak direction of travel on Crow Canyon Road has a 3 to 5 minute advantage in travel time over the freeways during morning and evening peak periods.

### VEHICLE CLASSIFICATION

Existing motor vehicle types using Crow Canyon Road within the study limits were classified using axle counts. The following table illustrates the mix of motor vehicle traffic utilizing Crow Canyon Road.



**Observed Vehicle Classification Results**

Segment	Location	Direction	Total Vehicle	Motor-cycles	Cars & Trailer	Pickup Truck	Buses	2 Axle Single	3 Axle Single	<5 Axle Double	5 Axle Double	Not Classified *
1	Greenridge Rd to Cold Water Dr	NB	8,151	308	7,168	106	6	12	28	11	21	493
		SB	7,807	452	6,701	58	2	11	27	5	6	541
		NB+SB	15,968	760	13,869	164	8	23	55	16	27	1,034
		%	100	4.8	86.9	1.0	0.1	0.1	0.3	0.1	0.2	6.5
2	Cold Water Dr to MP 2.25	NB	9,530	162	6,932	1,573	14	213	38	26	10	561
		SB	8,635	174	6,375	1,235	3	213	52	23	6	551
		NB+SB	18,165	336	13,307	2,808	17	426	90	49	16	1,112
		%	100	1.8	73.3	15.5	0.1	2.3	0.5	0.3	0.1	6.1
3	MP 2.25 to Norris Canyon Rd	NB	9,486	155	7,031	1,449	9	206	30	25	7	574
		SB	8,509	134	6,241	1,270	5	209	54	26	4	566
		NB+SB	17,995	289	13,272	2,719	14	415	84	51	11	1,140
		%	100	1.6	73.8	15.1	0.1	2.3	0.5	0.3	0.1	6.3
4	Norris Canyon Rd to MP 4.45	NB	8,604	3	6,352	1,380	9	272	10	22	7	549
		SB	7,508	11	5,989	1,261	11	185	12	17	8	14
		NB+SB	16,112	14	12,341	2,641	20	457	22	39	15	563
		%	100	0.1	76.6	16.4	0.1	2.8	0.1	0.2	0.1	3.5
5	MP 4.45 to Alameda County Line	NB	8,231	50	6,036	1,341	10	206	12	23	5	548
		SB	7,573	56	5,657	1,155	8	191	17	33	5	450
		NB+SB	15,804	106	11,693	2,496	18	397	29	56	10	998
		%	100	0.7	74.0	15.8	0.1	2.5	0.2	0.4	0.1	6.3

\* Vehicles that crossed the road tube counters which resulted in ambiguous data were not classified.

Generally, it appears that approximately 75 to 80 % of all vehicles observed were passenger vehicles. Slightly over 15 % of the observed vehicles were 2-axle trucks, with motorcycles, buses and large trucks accounting for the remainder. Crow Canyon Road within the study limits does not appear to be an attractive route for large trucks.

**INTERSECTION COUNTS/INTERSECTION LEVEL OF SERVICE**

Existing peak hour turning movement counts were collected at the two road intersections within the study limits—Crow Canyon Road and Cold Water Drive and Crow Canyon Road and Norris Canyon Road.

Level of Service (LOS) calculations show that the two intersections are currently operating within acceptable conditions. At the Cold Water Drive intersection, the morning peak hour average delay is 11.1 seconds, or LOS B. During the afternoon peak hour, this intersection operates at LOS A with 6.0 seconds of delay. Similarly, at the Norris Canyon Road intersection, both morning and afternoon peak periods operate at LOS A with 5.8 seconds and 8.0 seconds of delay, respectively.

**FUTURE VOLUMES**

The Alameda County Transportation Commission's traffic forecasting model anticipates Crow Canyon Road daily traffic volumes (for the Year 2035) of approximately 20,000 vehicles per day between Norris Canyon Road and the Alameda / Contra Costa County line. South of Norris Canyon Road, the model is

forecasting approximately 25,000 vehicles per day. These forecasted volumes are well in excess of the upper desirable capacity limits for 2-lane arterial roadways.

## **BICYCLE VOLUMES**

12-hour bicycle counts were recorded along Crow Canyon Road in late March 2013. The Saturday count shows 127 bicyclists counted on the south side of Norris Canyon Road, but only 17 continuing on Crow Canyon Road north of the Norris Canyon Road intersection. The remaining 110 bicyclists continued northbound on Norris Canyon Road.

Based upon the counts collected, it appears that bicyclists travelling from San Ramon to Castro Valley used Norris Canyon Road, rather than Crow Canyon Road, for the first portion of their trip. This reinforces comments received at the first public meeting describing the difficulties of bicycle travel on the northern segment (Segment 5) of Crow Canyon Road due to roadway curvature and lack of adequate shoulder width.

## **ACCIDENT HISTORY**

Over the 10-year period between January 2003 and December 2012, a total of 342 accidents were reported on Crow Canyon Road within the study limits. Within the last 4 years, 3 fatal accidents have occurred within this 6-mile study corridor.

A summary of the existing average daily traffic, collision or crash data, and speed data for each of the 5 segments is shown in the following table.

**Summary of Average Daily Traffic, Speed and Collision Data**

Segment	Location	Number of Lanes	Posted Speed Limit (mph)	Average Daily Traffic (ADT)	Collisions			Speed Data				
					Collisions (1/2003 to 12/2012)	Length (mi)	Segment Collision Rate (R <sub>SE</sub> )	10 MPH Pace	Number in Pace	% in Pace	Average Speed	85 <sup>th</sup> percentile Speed
1	Greenridge Road to Cold Water Drive	2	40	15,968	40	0.52	1.03	26-35	13,193	64%	28	33
2	Cold Water Drive to MP 2.25	2	40	18,165	93	0.81	1.73	41-50	12,595	69%	42	49
3	MP 2.25 to Norris Canyon Rd.	2	45	17,995	65	1.17	0.85	41-50	12,285	68%	41	48
4	Norris Canyon Rd. to MP 4.45	4	50	16,112	52	1.11	0.80	51-60	10,355	64%	53	59
5	MP 4.45 to Alameda Co. Line	2	45	15,804	92	2.27	0.70	41-50	10,555	67%	42	49

**Notes:**

Posted speed limits were limits in place during 2015

$R_{SE} = 1000000 * A / (365 * T * ADT * L)$ ,  $R_{SE}$  = Observed collision rate: # of acc./mil. vehicle miles,

A = Number of collisions over ten year study period, T = Total number of years over which accidents were collected, L = Length of study corridor (in miles)

PACE = 10 mph increments including the greatest number of speed measurements.

The table illustrates that the worst accident rate was within Segment 2, which includes the sharp horizontal curve at Mile Post 2.15. This rate of 1.73 collisions per million vehicle miles exceeds the state-wide rate of 1.03 collisions per million vehicle miles for a roadway of this type.

**EXISTING ROADWAY CONDITIONS**

The existing alignment of Crow Canyon Road roughly parallels Crow Creek as it winds through the canyon. The roadway crosses over Crow Creek at five locations within the study corridor and is generally located west of the creek. A roadway cross section of 12-foot travel lanes and 4 to 6-foot paved shoulders exist throughout much of the study corridor as a result of the completion of the 2012/2013 resurfacing improvements. Existing roadway right of way varies from 60 feet to more than 250 feet.

Throughout Segments 1 through 5 both the horizontal and vertical alignment components of Crow Canyon Road vary significantly. These significant variations in both horizontal and vertical alignment lead to increased speed differentials along the corridor, increasing the odds of a potential collision.

The presence of sharp horizontal curves with reduced speeds, narrow or nonexistent shoulders and significant numbers of driveways providing direct access to Crow Canyon Road necessitates varying speed zones through the study corridor.

## **BICYCLE INFRASTRUCTURE**

Crow Canyon Road, and in particular that portion of the roadway south of Norris Canyon Road, is a popular route for weekend cyclists

The 7-mile stretch of Crow Canyon Road from Cull Canyon Road to the Alameda/Contra Costa County line is included in the April 2012, "Alameda County Bicycle and Pedestrian Master Plan for Unincorporated Areas" as a "Medium Priority" bicycle lane to be completed within 10 years. The improvements are to include signing and shoulder striping/pavement markings only.

## **ENVIRONMENTAL RESOURCES**

Although much of the land within the project area has been developed for urban and other human uses, there are still significant areas of natural habitat within the project area that could support a number of special-status species.

The project site is located in areas in and/or near known occurrences of California red-legged frog, California tiger salamander, vernal pool fairy shrimp, Alameda whipsnake, San Francisco dusky-footed wood rat, western pond turtle, sharp-shinned hawk, pallid bat, golden eagle, great blue heron, western mastiff bat, hoary bat, and yellow warbler.

Potential wetlands and/or waters of the U.S., as well as potential waters of the State are present within the project area, primarily along Crow Creek and its tributaries.

## PUBLIC OUTREACH PLAN

In an effort to solicit residents' input to the Study, three public meetings were held as the Study progressed. These meetings were highly publicized through the local media and individual mailings to 262, 366 and XXX addresses for Public Meeting No. 1, Public Meeting No. 2 and Public Meeting No.3, respectively. The meetings were held at strategic times during the study process to present initial findings, the identification of potential future safety improvements and the prioritization of the recommended improvements.

All public comments relating to the focus of this safety study have been considered and addressed within the Study. A number of ideas or comments received were considered, but determined to either be unachievable or beyond the scope of this document.

## STUDY APPROACH AND METHODOLOGY

### APPROACH

The Safety Study's approach focused on identifying, recommending and prioritizing future corridor improvements within the study limits that met the following criteria:

- Consideration of Crow Canyon Road as a multi-use/multi-modal corridor.
- Consideration of locations with a high frequency of accidents.
- Preservation of the roadway's rural character/minimization of environmental impacts.
- Broad support from the local residents.

The Study recommends potential future safety improvements, or more commonly referred to as countermeasures, through the combination of both a Systemic Approach as well as a Spot Location Approach within the study corridor.

### *SYSTEMIC APPROACH*

The Systemic Approach is based upon addressing a particular safety issue, or multiple issues, within the entire study corridor. A benefit of the systemic approach is the ability to address locations where high numbers of accidents or crashes have not occurred, but have similar roadway or roadside conditions that have been identified as high crash concentration locations.

### *SPOT LOCATION APPROACH*

The Spot Location Approach is based upon treating specific locations having a significantly higher frequency of crashes. This approach does, however, assume that these locations will continue to experience these same numbers and types of crashes.

### METHODOLOGY

The methodology used to analyze and review existing locations with safety issues and locations of potential future safety concerns included site observations within the study corridor; consideration of

the safety concerns brought forward in the community meetings; and collision or crash frequency and pattern evaluation.

Field observations of the existing conditions within the study corridor were identified through a “windshield” reconnaissance of the roadway performed during late 2012 and early 2013. These are summarized below:

- Numerous curves have limited horizontal sight distance and narrow or no shoulders, especially the curve at Mile Post 2.15.
- Speed management throughout study corridor.
- Bicycle safety and accommodation - no bike lane or adequate shoulders.
- Limited sight distance on several crest vertical curves.
- Passing zone north of Norris Canyon Road promotes high-speed southbound approach to signalized intersection.
- Limitations in areas for CHP enforcement and maintenance pullouts.
- Cut retaining walls within clear recovery zone without safety shape.
- Fill retaining walls along creek at edge of shoulder without railing.
- Shoulder widths are not consistent and non-existent at some locations.
- Debris on shoulders such as loose rocks, vegetation, dead animals, etc.
- No safe (or designated) locations to make U-turns.
- Difficulties accessing in and out of driveways.
- Insufficient shoulder width for deceleration into driveways, and for acceleration out of driveways (turning right).
- Limited turn lanes / sight distance to protect left turning vehicles accessing driveways from rear end accidents.
- Vehicles following a vehicle slowing down to access a driveway (on the right) often pass to the left, crossing double yellow lines.
- Vehicles following a vehicle slowing down or stopped to access a driveway (to the left) are often forced to stop or pass on the right via the shoulder.
- Wildlife (mainly deer) and farm animals on roadway.
- Limited clear recovery zone provisions (critical side slopes, fixed objects - power poles, fire hydrants, drainage structures, trees, fences, etc.).
- Long uphill northbound grade (near San Ramon) promotes illegal passing.
- Posted speed limit at curves exceeds design standards (sight distance).
- Mud slides / Rock falls / Flooding.
- Pavement edge drop-offs.
- Crosswalk at Cold Water Drive connects into a vegetated slope.

The methodology used to identify and evaluate the risk levels of potential collisions associated with the observed existing safety issues was adapted from the Australian “Guide to Roadway Safety: Part 6 Road Safety Audit.” This adopted methodology relies solely upon professional judgment and, although not scientific, has been found to be useful in providing a level of risk and a suggested treatment approach of safety issues.

The Australian approach is based upon, “how often the safety issue is likely to lead to a collision,” and “potential severity of the resulting crash.” The following tables establish criteria regarding the frequency that an issue is likely to cause a collision and the severity of the collision that would result from the safety issue.

#### How Often is the Safety Deficiency Likely to Lead to a Crash

Frequency	Description
Frequent	Once or more per week
Probable	Once or more per year (but less than once a week)
Occasional	Once every 5 to 10 years
Improbable	Less often than every 10 years

#### Likely Severity of the Resulting Crash Type

Severity	Description	Examples
Catastrophic	Likely multiple deaths	High-speed, multi-vehicle crash
Serious	Likely death or serious injury	High or medium-speed vehicle/vehicle collision High or medium-speed collision with a fixed roadside object Pedestrian or cyclist struck by a car
Minor	Likely minor injury	Some low-speed vehicle collisions Cyclist falls from bicycle at low speed Left-turn/rear end crash
Limited	Likely trivial injury or property damage only	Some low-speed vehicle collisions

The criteria from these tables are then combined to illustrate the resulting level of risk associated with a particular issue, and then how to respond to that risk.

**Resulting Level of Risk**

<b>Severity</b>	<b>Frequent</b>	<b>Probable</b>	<b>Occasional</b>	<b>Improbable</b>
Catastrophic	Very High	Very High	Very High	High
Serious	Very High	Very High	High	Medium
Minor	Very High	High	Medium	Low
Limited	High	Medium	Low	Low

**Treatment Approach**

<b>Risk</b>	<b>Suggested Treatment Approach</b>
Very High	Must be corrected.
High	Should be corrected or the risk significantly reduced, even if the treatment cost is high.
Medium	Should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high.
Low	Should be corrected or the risk reduced, if the treatment cost is low.

Applying this methodology to the existing safety issues observed during the field visits results in the "Risk Assessment" shown in the following table.

**CRASH FREQUENCY AND PATTERN EVALUATION**

Crash frequency analysis is one of the two main quantitative crash analysis methods used to determine the selection and prioritization of potential safety improvement countermeasures. The numbers of crashes within the study corridor over the period from January 2003 to December 2012 were determined using the State crash database called SWITRS, or Statewide Integrated Traffic Records System. These accidents are shown in the following figure. Through the analysis of the crash data, accident locations and crash characteristics with the highest frequency were determined.



**Risk Assessment of Observed Existing Safety Issues**

<b>Observed Existing Safety Issues</b>	<b>Frequency*</b>	<b>Severity</b>	<b>Risk</b>
Numerous curves have limited horizontal sight distance and narrow or no shoulders, especially the curve at Mile Post 2.15.	Probable	Serious	Very High
Speed management throughout study corridor.	Probable	Serious	Very High
Bicycle safety and accommodation – no bike lane or adequate shoulders.	Probable	Serious	Very High
Limited sight distance on several crest vertical curves.	Probable	Minor	High
Passing zone north of Norris Canyon Road promotes high-speed southbound approach to signalized intersection.	Probable	Serious	Very High
Limitations in areas for police enforcement and maintenance pullouts.	Probable	Minor	High
Cut retaining walls within clear recovery zone without safety shape.	Probable	Serious	Very High
Fill retaining walls along creek at edge of shoulder without railing.	Probable	Serious	Very High
Shoulder widths are not consistent, and non-existent at some locations.	Probable	Minor	High
Debris on shoulders such as loose rocks, vegetation, dead animals, etc.	Probable	Limited	Medium
No safe (or designated) locations to make U-turns.	Probable	Minor	High
Insufficient shoulder width for deceleration into driveways, and for acceleration out of driveways (turning right).	Occasional	Minor	Medium
Limited turn lanes / sight distance to protect left turning vehicles accessing driveways from rear end accidents.	Probable	Minor	High
Vehicles following a vehicle slowing down to access a driveway (on the right) often pass to the left, crossing double yellow lines.	Probable	Serious	Very High
Vehicles following a vehicle slowing down or stopped to access a driveway (to the left) are often forced to stop or pass on the right via the shoulder.	Probable	Minor	High
Wildlife (mainly deer) and farm animals on roadway.	Occasional	Serious	High
Limited clear recovery zone provisions (critical side slopes, fixed objects - power poles, fire hydrants, drainage structures, trees, fences, etc.).	Probable	Serious	Very High
Long uphill northbound grade (near San Ramon) promotes illegal passing.	Probable	Serious	Very High
Posted speed limit at curves exceeds design standards (sight distance).	Occasional	Minor	Medium
Mud slides / Rock falls / Flooding.	Occasional	Limited	Low
Pavement edge drop-offs.	Occasional	Minor	Medium
Crosswalk at Cold Water Drive connects into vegetated slope.	Improbable	Minor	Low

\*Likelihood that observed safety issue will lead to an accident. See Table 11 for descriptions

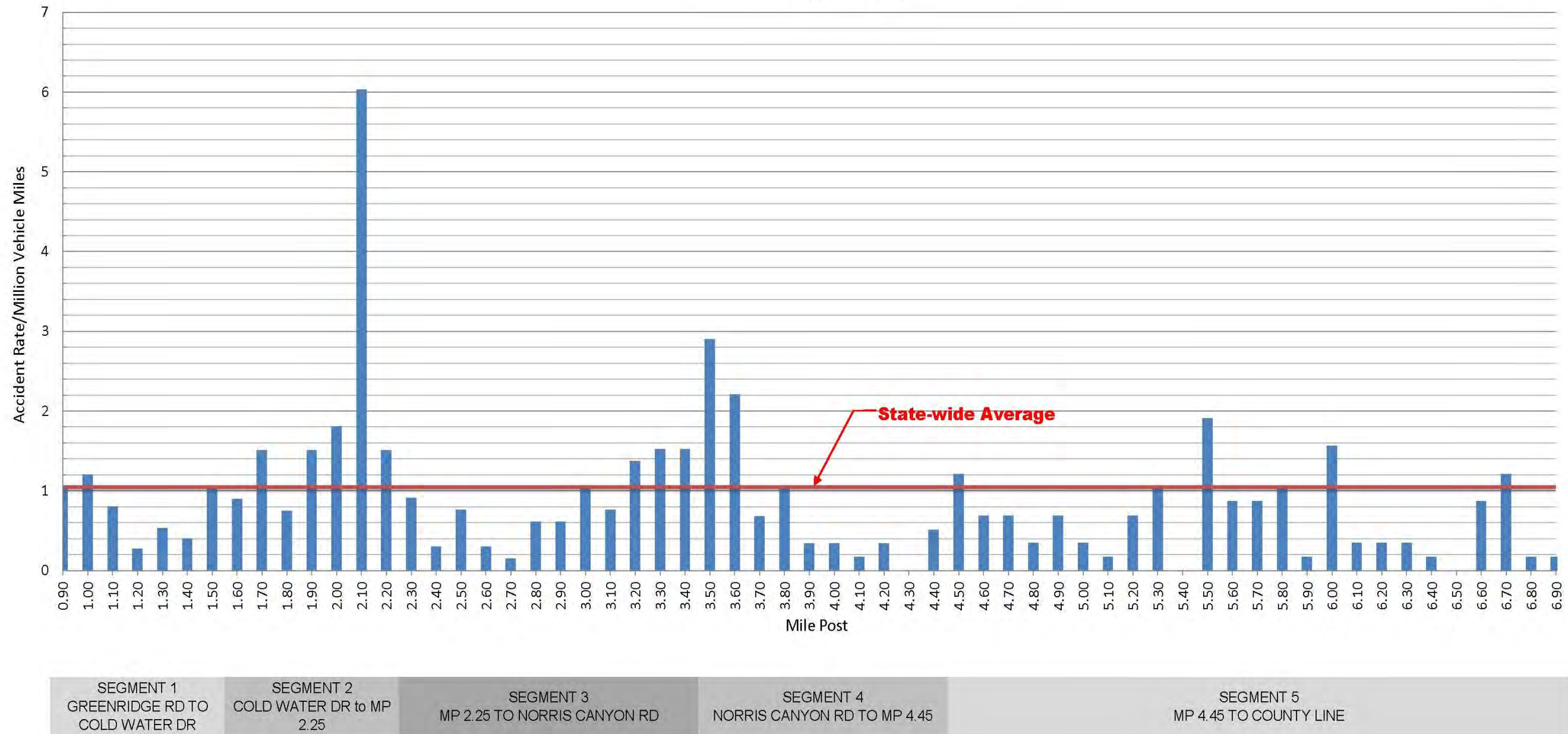


## CRASH RATE ANALYSIS

Crash rate analysis is the other main quantitative crash analysis method used to select and prioritize countermeasures. Crash rate analysis compares how a specific segment of roadway compares with similar roadway segments or types. The following figure illustrates the comparison of Crow Canyon Road's crash rate (by 0.10 Mile Post increments) to the statewide average for similar roadways.

DRAFT

### ACCIDENT RATE BY LOCATION 2003 - 2013



Accident Rate by Location

## STUDY CORRIDOR ANALYSIS

An analysis of accident data within the study limits shows that 342 accidents were reported over the 10-year period from January 1, 2003 to December 31, 2012. The total number of accidents within the corridor over this study period is likely somewhat higher, since not all accidents are reported to the CHP.

This section describes the general observations and subsequent accident analyses and safety evaluations for each roadway study segment. It should be noted that this analysis was limited to the evaluation of high accident locations and areas of concern brought forward by the local residents during the public outreach sessions.

### SEGMENT 1 EVALUATION: GREENRIDGE ROAD (MP 0.95) TO COLD WATER DRIVE (MP 1.45)

- Fixed objects within the clear recovery zone should be protected or relocated.
- Although the horizontal curve at Mile Post 1.30 was rated as a “High” risk from field observations, crash data indicated that the area is significantly below the state-wide accident rate.
- Pavement restriping to increase shoulder width should be considered, similar to the 2012/2013 Cold Water Drive to Mile Post 5.30 Improvements discussed under “STUDY CORRIDOR BACKGROUND.”
- Construction of areas for police enforcement should be considered.
- Shoulder “backing” should be constructed where feasible.
- Routine maintenance is recommended where roadway ponding is observed.

### SEGMENT 2 EVALUATION: COLD WATER DRIVE (MP 1.45) TO MILE POST 2.25

- Although the horizontal curve at Mile Post 2.15 was rated as a “Very High” risk from field observations, crash data indicated that following the completion of pavement grooving, resurfacing and median rumble strip installation in late summer of 2010, the crash rate for non-DUI related accidents was reduced to 0.66 collisions per million vehicle miles.
- The presence of retaining walls without safety shapes observed during field observations suggested a “Very High” risk potential. However, analysis of 10 years of SWITRS’ crash data did not indicate that the presence of the walls contributed to the cause or severity of crashes.
- Fixed objects within the clear recovery zone should be protected or relocated.
- Provide wider roadway shoulders where feasible.
- Construction of areas for police enforcement should be considered.
- Shoulder “backing” should be constructed where feasible.
- Analysis of crash data and field observations did not suggest additional signing or lighting at Mile Post 2.15 appeared warranted.

## SEGMENT 3 EVALUATION: MILE POST 2.25 TO NORRIS CANYON ROAD (MP 3.44)

- Although the horizontal curves at Mile Posts 2.30 and 3.25 were rated as a “Very High” risk from field observations, analysis of the SWITRS’ crash data did not suggest that the existing sight distance contributed to the cause or severity of crashes. However, it is recommended to study installing a reduced speed warning sign in the vicinity of Mile Post 2.30.
- Provisions for protected turning lanes and acceleration/deceleration areas adjacent to driveways are recommended.
- Fixed objects within the clear recovery zone should be protected or relocated.
- From review of the SWITRS data, the limited sight distance at the vertical curves near Mile Posts 2.50, 3.15 and the approach to the intersection with Norris Canyon Road do not appear to have contributed to the cause or severity of crashes.
- Provide wider roadway shoulders where feasible.
- Construction of areas for police enforcement should be considered.
- Shoulder “backing” should be constructed where feasible.
- Trucks exceeding 3 axles accounted for less than 1% of the total daily traffic.

## SEGMENT 4 EVALUATION: NORRIS CANYON ROAD (MP 3.44) TO MILE POST 4.45

- Although the passing zone in advance of the signalized intersection at Norris Canyon Road promotes high speeds approaching the intersection, only two non-animal related crashes have been recorded since the traffic signal was installed.
- Fixed objects within the clear recovery zone should be protected or relocated.
- Construction of additional areas for drivers to complete legal U-turns is recommended.
- Construction of areas for police enforcement should be considered.
- Shoulder “backing” should be constructed where feasible.
- Routine maintenance is recommended where mud and silt cover roadway shoulder.

## SEGMENT 5 EVALUATION: MILE POST 4.45 TO ALAMEDA COUNTY LINE (MP 6.85)

- Although the horizontal curves at Mile Posts 4.90, 5.65 and 5.85 were rated as a “Very High” risk from field observations, analysis of the SWITRS’ crash data did not suggest that the existing sight distance contributed to the cause or severity of crashes.
- Provisions for protected turning lanes and acceleration/deceleration areas adjacent to driveways are recommended.
- Fixed objects within the clear recovery zone should be protected or relocated.
- The presence of a retaining wall without safety shape at Mile Post 5.75 observed during field observations suggested a “Very High” risk potential. However, analysis of 10 years of SWITRS’ crash data did not indicate that the presence of the wall contributed to the cause or severity of crashes.

- The presence of a retaining wall without railing at Mile Post 4.70 observed during field observations suggested a “Very High” risk potential. However, analysis of 10 years of crash data did not indicate that the presence of the wall contributed to the cause or severity of crashes.
- Provide wider roadway shoulders where feasible. As a minimum, pavement resurfacing and restriping to increase shoulder width should be considered from Mile Post 5.30 to the Contra Costa County line (similar to the 2012/2013 Cold Water Drive to Mile Post 5.30 Improvements discussed under “STUDY CORRIDOR BACKGROUND”).
- From review of the SWITRS data, the limited sight distance at the vertical curves near Mile Posts 4.80, 5.25, 5.65, 6.00, 6.15 and 6.70 do not appear to have contributed to the cause or severity of crashes.
- Construction of areas for police enforcement should be considered.
- Shoulder “backing” should be constructed where feasible.
- Routine maintenance is recommended to trim trees and overgrown vegetation.

A summary of the study corridor safety evaluation, on a segment by segment basis, is shown in the following table.

### Summary of Study Corridor Safety Evaluation

Potential Safety Issue	Study Corridor Segment				
	1	2	3	4	5
Fixed Objects Within Clear Recovery Zone	YES	YES	YES	YES	YES
Narrow Shoulder Width	YES	YES	YES		YES
Shoulder "Drop-Off"	YES	YES	YES	YES	YES
Limited Police Enforcement Areas	YES	YES	YES	YES	YES
Unsafe Speed	YES	YES	YES	YES	YES
Limited Sight Distance for Horizontal Curves	YES (MP 1.30)	YES (MP 2.15)	YES (MP 2.30, 3.25)		YES (MP 4.90, 5.65, 5.85)
Limited Sight Distance for Vertical Curves			YES (MP 2.50, 3.15, Norris Cyn. I/S)		YES (MP 4.80, 5.25, 5.65, 6.00, 6.15, 6.70)
Difficult Driveway Ingress/Egress			YES	YES	YES
Inadequate Roadway Lighting					YES (MP 4.52, 5.23, 6.20)
Retaining Walls Without Safety Shape		YES (MP 1.60, 1.80, 1.90)			YES (MP 5.75)
Retaining Walls Without Railing					YES (MP 4.70)
Limited Routine Maintenance	YES			YES	YES

### COUNTERMEASURE CONSIDERATIONS

Selection of countermeasures is focused on crash history and roadway characteristics of a particular site or area along the roadway. For a particular countermeasure to be effective, it must meet several criteria including:

- Technical feasibility – Is the countermeasure a likely answer for the identified safety problem?
- Cost effectiveness – Will the proposed countermeasure produce safety benefits that exceed the cost of the countermeasure?
- Acceptability – Will the proposed countermeasure be readily understood and accepted by the local community?
- Practicability – Will there be a problem of non-compliance, i.e. can the countermeasure work as intended without unreasonable enforcement effort?



The potential countermeasures for this Safety Study were further evaluated and selected based upon their ability to address the following specific criteria identified during the public meetings:

- Consideration of Crow Canyon Road as a multi-use, multi-modal corridor.
- Historical areas of accident locations and maintenance issues.
- Minimization of environmental impact and incorporation of “context sensitive” solutions.
- Broad community support.
- Conform to established guidelines for safety improvements.
- Potential to compete for federal, State and local funding sources.

Additionally, the proposed countermeasures were selected based upon their ability to meet both an immediate goal (upon installation) of reducing speeds, improving safe ingress and egress to/from properties fronting the roadway and improving multi-modal safety; and a long term goal of decreasing accident frequency and severity.

Whereas these proposed projects can be implemented as stand-alone countermeasures, many can be used in combination to achieve greater safety benefits. The countermeasures addressed both corridor-wide and segment-specific safety issues, and have been presented in near-term, medium-term or long-term categories based upon the level of project development effort and cost of installation or construction. This near-term, medium-term and long-term categories are defined as follows:

**Near-Term Countermeasures** - Straightforward safety improvement projects with minimal environmental and right of way impact that could be constructed within a two-year timeframe. These countermeasures would consist of projects addressing features such as improved guidance for drivers and bicyclists, removing or protecting roadside hazards and improved identification of roadside hazards. The estimated construction cost of these improvements would be in the range of \$1M to \$2M for each project.

**Medium-Term Countermeasures** - These improvement projects likely involve more significant impacts to environmental resources and adjacent private property due to minor roadway or shoulder widening. These improvements require more project development time and effort, and are estimated to cost between \$2M and \$5M for each construction contract. The medium-term countermeasures would be expected to be in construction within a five-year timeframe.

**Long-Term Countermeasures** - Large, complex improvements that have significant environmental and/or right of way impacts due to geometry or roadway typical section modifications. The proposed long-term countermeasures should be considered if necessary, following the implementation of the near-term and medium-term countermeasures. These projects require significant project development effort, and consequently would not be expected to be in construction until 2025. The estimated construction cost of these improvements would be in the range of \$5M to \$10M or more.

#### PROPOSED NEAR-TERM COUNTERMEASURES

##### *CM #1 VEHICLE SPEED FEEDBACK SIGNS (ENTIRE STUDY CORRIDOR)*

This countermeasure consists of installing nine speed feedback signs at locations along the entire corridor where speed surveys indicated a large percentage of drivers exceeding the speed limit and at

locations in advance of horizontal curves with limited sight distance. These installations would be solar powered and have minimal impact to the roadside environment.

#### *CM# 2 POLICE ENFORCEMENT AREAS (ENTIRE STUDY CORRIDOR)*

This countermeasure consists of paving 20 areas adjacent to the existing roadway, in most locations providing pervious pavement over the existing graded shoulder area. The paved areas would be 8 feet in width and of a sufficient length to allow vehicles to decelerate safely off, and accelerate safely into the traveled way. The exact location of the paved areas could be sited to avoid the removal of any trees and to impart minimal impact to the roadside environment.

#### *CM #4 INCREASED ANNUAL SHOULDER MAINTENANCE (ENTIRE STUDY CORRIDOR)*

This countermeasure would increase the annual County budget for shoulder maintenance along Crow Canyon Road to repair cracks and potholes, replace shoulder backing, and remove debris from the roadway shoulder. This countermeasure could also reduce the potential for bicyclists to veer into the traveled way to avoid obstacles and reduce ponding of water into the traveled way after a storm.

#### *CM #16 PAVEMENT REHABILITATION AND RESTRIPIING FOR WIDER SHOULDERS (SEGMENT5)*

This countermeasure consists of a combination of milling and overlaying 80 percent of the pavement to restore the existing roadway to a serviceable condition and complete base repair of the remaining 20 percent of the pavement. This improvement would extend the pavement rehabilitation and resurfacing work performed in 2012/2013 (See Section 2.4.8) from MP 5.3 to the Alameda/Contra Costa County line (MP 6.85). After pavement rehabilitation, the roadway would be restriped within the construction limits, providing 12-foot lanes and 4 to 6-foot shoulders where feasible. This work would be completed within the road right of way and would have minimal impact to the roadside environment.

### PROPOSED MEDIUM TERM COUNTERMEASURES

#### *CM #5 ADDITIONAL LIGHTING (SEGMENT 5)*

Based upon the review of accidents and geometric conditions, new street lights are recommended in the vicinity of PM 4.52, 5.23 and 6.20. Each location would consist of the installation of three light standards at 200 foot to 300 foot spacing with luminaires of sufficient wattage to provide appropriate illumination. The installation of roadway lighting will have minimal impact to the roadside environment.

#### *CM # 6 GUARDRAILS (WHERE NEEDED) (SEGMENTS 2, 3, 4 & 5)*

This countermeasure consists of installation of metal beam guardrail at locations where the existing roadway embankment on the downslope side of the roadway is within 30 feet from the edge of travelled way. This countermeasure also includes metal beam guardrail at the 66 utility poles that are located in close proximity to the edge of travelled way. Installation of guardrail would have minimal impact to the roadside environment.

#### *CM #10 SHOULDER WIDENING - 8' AT DRIVEWAYS - ACCELERATION /DECELERATION AREAS (SEGMENT 3)*

This countermeasure consists of widening the shoulders to 8 feet on both sides of each driveway. The wider shoulder will provide areas for vehicles to gradually accelerate or decelerate while outside of the

traveled way, thereby reducing their impact on through traffic. The construction of these acceleration/deceleration areas has the potential to reduce the crash frequency and severity within the study corridor where driveways are located. These paved areas are within the road right of way and would have minimal impact to the roadside environment.

#### *CM #12 LEFT TURN LANE (LEFT-IN/ LEFT-OUT) (SPOT LOCATIONS) (SEGMENT 4)*

This countermeasure consists of providing left turn lanes at certain locations within the 4-lane segment of Crow Canyon Road to provide refuge for vehicles turning left-in and left-out of driveways. The turn lanes would provide areas for vehicles to gradually decelerate while outside of the traveled way, thereby reducing their impact on through traffic. These lanes would also provide an area in the median where left turning vehicles exiting the driveways will have an area to gradually accelerate into the stream of through traffic. The turn lanes would be constructed within the existing median and the number of through lanes would not be reduced. This improvement would have minimal impact to the roadside environment.

#### PROPOSED LONG TERM COUNTERMEASURES

##### *CM #3 ROUNDABOUTS (ENTIRE STUDY CORRIDOR)*

Speed management is a significant issue within several segments of the study corridor. This issue has been the paramount concern voiced by the local residents at the outreach meetings and further documented in the speed survey performed as part of this Safety Study.

Police visibility and increased enforcement typically results in only temporary compliance. A more long-term or permanent solution to reduce the speed of vehicles is to change the character of the roadway itself. By changing the look or function of the roadway, drivers are encouraged to reduce the speed of their vehicles as they approach the change in the roadway. This technique of changing the character of the roadway is called traffic calming.

There are many traffic-calming treatments that are effective in reducing the speed of vehicles. One such treatment is the construction of a modern roundabout. A roundabout is a circular intersection where vehicles travel counterclockwise around a center island. The traffic operational features include:

- Roadway geometry that results in a low-speed environment.
- Operational benefits resulting from entering traffic yielding to vehicles in the circulatory roadway.
- Reduction in vehicle conflicts due to channelization at the entrance and deflection around a center island.

This countermeasure consists of constructing four roundabouts at the following locations:

- MP 2.00
- MP 2.50
- MP 3.45 (Intersection with Norris Canyon Road)
- MP 5.10

Where locations are not at existing intersections, the roundabouts are intended to act as traffic calming devices to reduce the speed of vehicles travelling through the study corridor.

The construction of roundabouts proposed by this countermeasure would have a significant impact to the roadway environment.

#### *CM #7 MEDIAN RUMBLE STRIP WITH 6-FT SHOULDERS (SEGMENT 2)*

A median or centerline rumble strip provides an audible warning and a tactile rumble when driven on to alert drivers that they are drifting out of their lane and possibly crossing the centerline into the opposing direction of traffic.

This countermeasure consists of widening the roadway to include a 4-foot wide median rumble strip and a 12-foot travel lane and 6-foot shoulder in both the northbound and southbound directions of travel.

The 6-foot shoulders on each side of the roadway would provide safe refuge for disabled vehicles, recovery room for a “run-off-the-roadway” driver, safe areas for bicyclists and pedestrians, room for roadway and roadside maintenance, and police and first responders. The widened shoulders would also improve stopping sight distance in the vicinity of sharp curves.

Where shoulder widening is impractical due to the natural topography adjacent to the roadway, there may be opportunities to pave the existing gravel base adjacent to the road to provide an incremental benefit.

The widening of Crow Canyon Road to provide a median rumble strip and 6-foot shoulders in both the northbound and southbound directions of travel would have a significant impact to the roadside environment.

#### *CM #8 TUNNEL AT MP 2.15 – NORTHBOUND (SEGMENT 2)*

This countermeasure consists of a northbound one-lane tunnel at MP 2.15. Southbound traffic would remain on the existing roadway alignment. This would improve horizontal sight distance in the northbound direction and would be expected to reduce the number of accidents in the vicinity of MP 2.15, without any impact to Crow Creek. This project would have a significant impact to the roadway environment.

#### *CM #9 TUNNEL AT MP 2.15 - BOTH DIRECTIONS (SEGMENT 2)*

This improvement project consists of a two-way (northbound and southbound) tunnel at MP 2.15. With the construction of this countermeasure, the existing roadway alignment would be abandoned. This project would provide widened shoulders in each direction, thereby improving horizontal sight distance and overall safety in each direction of travel without impact to Crow Creek. This countermeasure would have a significant impact to the roadway environment.

*CM #11 TWO-WAY LEFT TURN LANE (SEGMENT 3)*

The purpose of a two-way left turn lane is to remove left-turning vehicles from the through lane and provide storage for those vehicles in the median area until an adequate gap in the opposing traffic appears. In areas where two-way left turn lanes are in use, the severity and frequency of vehicle accidents has been reduced. Accident frequency is reduced since the stopped, or slow left turning vehicle, has been removed from the through lanes of traffic. Accident severity is reduced since additional perception time is available, thereby reducing left-turn crossing conflicts. In order to discourage utilizing the two-way left turn lane for passing of slower vehicles, raised planted medians would be constructed between driveway openings. The construction of a two-way left turn lane would have limited impact to the roadway environment.

*CM # 13 REDUCE 4-LANE TO 2-LANE NB AND 1-LANE SB (SEGMENT 4)*

This countermeasure consists of widening the existing median in Segment 4 to the west, resulting in the removal of the inside southbound lane. This would have the potential to reduce the number of high-speed vehicles approaching the lower-speed curves following the signalized intersection with Norris Canyon Road. The countermeasure would also have the effect of reducing the number of lanes that a northbound vehicle, and a vehicle that is exiting a driveway, would have to cross when making a left turn. This project would have a minimal impact to the roadway environment.

*CM #14 REDUCE 4-LANE TO 2-LANE (WITH TURN-OUTS) - OPTION 1 (WIDEN MEDIANS) (SEGMENT 4)*

This countermeasure, suggested by local residents to discourage speeding in Segment 4, consists of widening the existing median to the east and west, thereby removing one northbound and one southbound lane. Turn pockets would be provided in the northbound direction to provide refuge for vehicles turning left into and left out of driveways. The turn pockets would provide areas for vehicles to gradually decelerate while outside of the traveled way, thereby reducing their impact on through traffic. These pockets would also provide an area in the median where left turning vehicles exiting the driveways will have an area to gradually accelerate into the stream of through traffic. The construction of this countermeasure would, however, eliminate the only passing zone within the study limits. This project would have a minimal impact to the roadway environment.

*CM #15 REDUCE 4-LANE TO 2-LANE (WITH TURN-OUTS) - OPTION 2 (REMOVE OUTSIDE PAVEMENT) (SEGMENT 4)*

This countermeasure, an alternative to Countermeasure #14, consists of removing the existing outside travel lane on each side of the roadway in order to provide one northbound and one southbound lane. Turn pockets would be provided in the northbound direction to provide refuge for vehicles turning left into and left out of driveways. The construction of this countermeasure will, however, eliminate the only passing zone within the study limits. This project would have a minimal impact to the roadway environment.

*CM # 17 LEFT TURN LANE (LEFT-IN / LEFT-OUT) WITH ACCELERATION/DECELERATION AREAS (SEGMENT 5)*

This countermeasure consists of providing left turn lanes at certain locations within Segment 5 of Crow Canyon Road to provide refuge for vehicles turning left-in and left-out of driveways. The turn lanes

would provide areas for vehicles to gradually decelerate while outside of the traveled way, thereby reducing their impact on through traffic. These lanes would also provide an area in the median where left turning vehicles exiting the driveways will have an area to gradually accelerate into the stream of through traffic. This improvement would have significant impact to the roadside environment.

#### *CM #18 MEDIAN RUMBLE STRIP WITH 6-FT SHOULDERS (SEGMENT 5)*

A median or centerline rumble strip provides an audible warning and a tactile rumble when driven on to alert drivers that they are drifting out of their lane and possibly crossing the centerline into the opposing direction of traffic.

This countermeasure consists of widening the roadway to include a 4-foot wide median rumble strip and a 12-foot travel lane and 6-foot shoulder in both the northbound and southbound directions of travel.

The 6-foot shoulders on each side of the roadway would provide safe refuge for disabled vehicles, recovery room for a “run-off-the-roadway” driver, safe areas for bicyclists and pedestrians, room for roadway and roadside maintenance, and police and first responders. The widened shoulders would also improve stopping sight distance in the vicinity of sharp curves.

Where shoulder widening is impractical due to the natural topography adjacent to the roadway, there may be opportunities to pave the existing gravel base adjacent to the road to provide an incremental benefit.

The widening of Crow Canyon Road to provide a median rumble strip and 6-foot shoulders in both the northbound and southbound directions of travel would have a significant impact to the roadside environment.

#### PROPOSED COUNTERMEASURES DETERMINED NOT FEASIBLE

A number of ideas or comments were received at the public meetings for this Safety Study, but were determined to either be unachievable or beyond the scope of this document. These ideas or comments follow.

- Convert Crow Canyon Road To A Toll Road
- Develop Crow Canyon Road Into A ‘Parkway’ With Limited Access
- Designate Crow Canyon Road As A “Scenic Route”
- Develop Crow Canyon Road As A Major Boulevard In The Future To Support Increased Development
- Limit Truck Traffic On Crow Canyon Road
- Improve I-580 And I-680 To Reduce Attractiveness Of Crow Canyon Road To Commuters
- Eliminate Driveways Along Crow Canyon Road By Providing A Common “Access Road”
- Provide Barrier-Separated Bike Lanes Along Crow Canyon Road
- Install Traffic Signals to Reduce Vehicle Speeds On Crow Canyon Road
- Road Install Speed Bumps Along Crow Canyon

- Enforce a 35 Mph Speed Limit Throughout the Crow Canyon Road Corridor

## COUNTERMEASURE PROJECT COST

Conceptual designs of the 18 countermeasures were developed in order to provide the framework for completing preliminary estimates of construction cost for each project

A summary of the conceptual costs for all the proposed countermeasures is shown in the following table.

CM	Description	Cost
<b>Proposed Corridor-Wide Countermeasures</b>		
1	Vehicle Speed Feedback Signs (Entire Study Corridor)	\$236,000
2	Police Enforcement Area (Entire Study Corridor)	\$2,460,000
3	Roundabouts (4 Total)	\$9,213,000
4	Increase Annual Shoulder Maintenance	\$447,000
5	Additional Lighting/Signage (Where Needed)	\$295,000
6	Guardrails (Where Needed)	\$2,860,000
<b>Proposed Segment 2 Countermeasures</b>		
7	Median Rumble Strip with 6-ft Shoulders	\$1,140,000
8	Tunnel at MP 2.15 - NB	\$24,526,000
9	Tunnel at MP 2.15 - Both Directions	\$30,504,000
<b>Proposed Segment 3 Countermeasures</b>		
10	Shoulder Widening - 8-ft Wide Driveways	\$3,090,000
11	Two-Way Left Turn Lane	\$2,243,000
<b>Proposed Segment 4 Countermeasures</b>		
12	Left Turn Lane (Left-In/Left Out)(Spot Locations)	\$731,000
13	Reduce 4-Lane to 2-Lane NB and 1-Lane SB	\$392,000
14	Reduce 4-Lane to 2 Lane (with turn-outs) Option 1 (Widen Median)	\$1,578,000
15	Reduce 4-Lane to 2-Lane (with turn-outs) Option 2 (Remove Outside Pavement)	\$848,000
<b>Proposed Segment 5 Countermeasures</b>		
16	Pavement Rehab and Restriping for Wider Shoulders	\$566,000
17	Left Turn Lane (Left-in/Left-out) with Accel/Deccel Areas	\$3,227,000
18	Median Rumble Strip with 6-ft Shoulders	\$1,730,000

## RECOMMENDED COUNTERMEASURE PRIORITIZATION

The 18 proposed countermeasures were evaluated to establish a recommended prioritization for implementation. The evaluation criteria included community, environmental and engineering aspects and impacts of each countermeasure. These criteria are described as follows:

- COMMUNITY ASPECTS/IMPACTS
  - Right of Way Impacts
    - Loss of frontage property
    - Potential driveway impacts
  - Improves Non-Motorized Mobility
    - Encourages bicycle use
  - Emergency services
    - Impacts to response time
- ENVIRONMENTAL ASPECTS/IMPACTS
  - Minimizes Environmental Impact
    - Crow Creek
    - Wetlands
    - Threatened/endangered species
    - Historical property/archaeological sites
    - Noise
    - Stormwater impacts
    - Permitting requirements
    - Preserves rural character
- ENGINEERING ASPECTS/IMPACTS
  - Improves Safety
    - Addresses problem locations
    - Improves corridor safety
    - Provides enhanced enforcement
    - Potential for reducing speeds
    - Increases off-road recovery space
    - Addresses MP 2.15
  - Traffic Circulation
    - Improves regional mobility
    - Improves local traffic access
  - Traffic Operations
    - Improves corridor operations
  - Construction Impacts
    - Constructability
    - Utility impacts
    - Maintenance of traffic
  - Fiscal Impacts
    - Range of total cost
    - Cost effectiveness (B/C)
    - Fundable (meets HSIP/HR3/ACTC criteria)

## COUNTERMEASURE EFFECTIVENESS

The proposed projects were also evaluated regarding countermeasure effectiveness, measured by the percentage of crashes the proposed treatment is expected to reduce. This expected percentage is known as the Crash Reduction Factor or CRF. Crash Reduction Factors for the proposed countermeasures are shown in the following table.



CM	Description	REDUCTION IN EXPECTED AVERAGE ACCIDENT FREQUENCY	
		Range	CT Value*
	<b>Corridor-Wide Countermeasures</b>		
1	Vehicle Speed Feedback Signs	0-41%	30%
2	Police Enforcement Area	17%	N/A
3	Roundabouts (4 Total)	N/A	N/A
4	Increase Annual Shoulder Maintenance (Construct Safety-Edge)	25%	N/A
5	Additional Lighting/Signage (Where Needed)	18-69%/20-30%	35%/25%
6	Guardrails (Where Needed)	11-78%	25%
	<b>Segment 2 Countermeasures</b>		
7	Medium Rumble Strip with 6-ft Shoulders	N/A	20%
8	Tunnel at MP 2.15 – NB	24-90%	50%
9	Tunnel at MP 2.15 – Both Directions	24-90%	50%
	<b>Segment 3 Countermeasures</b>		
10	Shoulder Widening – 8-ft Wide Driveways	10-78%	25%
11	Two-Way Left Turn Lane	8-50%	30%
	<b>Segment 4 Countermeasures</b>		
12	Left Turn Lane (Left-in / Left-out)(Spot Locations)	9-55%	35-50%
13	Reduce 4-Lane to 2-Lane NB and 1-Lane SB	N/A	N/A
14	Reduce 4-Lane to 2-Lane (with turn-outs) Option 1(Widen Medians)	N/A	N/A
15	Reduce 4-Lane to 2-Lane (with turn-outs) Option 2 (Remove Outside Pavement)	N/A	N/A
	<b>Segment 5 Countermeasures</b>		
16	Pavement Rehab and Restriping for Wider Shoulders	20%	N/A
17	Left Turn Lane (Left-in/Left-out) with Accel/Decel Areas	25%	N/A
18	Median Rumble Strip with 6-ft Shoulders	15-75%	25%

\*Caltrans Value

## COUNTERMEASURE COST EFFECTIVENESS

When combining the Crash Reduction Factor of a particular countermeasure with the total project cost of that improvement and crash cost data associated with particular accident “types”, a Benefit-to-Cost Ratio (B/C) can be determined. This B/C ratio is known as the countermeasure’s cost effectiveness. For a safety improvement to be cost effective, the B/C ratio must be greater than 1.0.

To determine each countermeasure’s B/C ratio; crash data, the proposed safety countermeasure and total project costs (administration costs, project development costs and construction costs) were input into SafeTREC’S Transportation Injury Mapping System (TIMS) Benefit/Cost Calculator Tool. The TIMS calculator takes into account accident data consisting of crash type and the level of injury or property damage.

The following table presents the evaluation of each proposed safety countermeasure recommended for implementation in the short-term, medium-term and long-term timeframes in regards to community impacts, environmental impacts and engineering aspects.

The following table presents the overall project cost and B/C ratio of each countermeasure.

CM	Description	Cost	B/C Ratio
	<b>Proposed Corridor-Wide Countermeasures</b>		
1	Vehicle Speed Feedback Signs (Entire Study Corridor)	\$236,000	44
2	Police Enforcement Area (Entire Study Corridor)	\$2,460,000	6
3	Roundabouts (4 Total)	\$9,213,000	6
4	Increase Annual Shoulder Maintenance	\$447,000	15
5	Additional Lighting/Signage (Where Needed)	\$295,000	3
6	Guardrails (Where Needed)	\$2,860,000	3
	<b>Proposed Segment 2 Countermeasures</b>		
7	Median Rumble Strip with 6-ft Shoulders	\$1,140,000	11
8	Tunnel at MP 2.15 - NB	\$24,526,000	1
9	Tunnel at MP 2.15 - Both Directions	\$30,504,000	1
	<b>Proposed Segment 3 Countermeasures</b>		
10	Shoulder Widening - 8-ft Wide Driveways	\$3,090,000	7
11	Two-Way Left Turn Lane	\$2,243,000	6
	<b>Proposed Segment 4 Countermeasures</b>		
12	Left Turn Lane (Left-In/Left Out)(Spot Locations)	\$731,000	9
13	Reduce 4-Lane to 2-Lane NB and 1-Lane SB	\$392,000	9
14	Reduce 4-Lane to 2 Lane (with turn-outs) Option 1 (Widen Median)	\$1,578,000	7
15	Reduce 4-Lane to 2-Lane (with turn-outs) Option 2 (Remove Outside Pavement)	\$848,000	12
	<b>Proposed Segment 5 Countermeasures</b>		
16	Pavement Rehab and Restriping for Wider Shoulders	\$566,000	5
17	Left Turn Lane (Left-in/Left-out) with Accel/Deccel Areas	\$3,227,000	2
18	Median Rumble Strip with 6-ft Shoulders	\$1,730,000	3

## RECOMMENDED COUNTERMEASURE PRIORITIZATION

Evaluating each countermeasure against the community, environmental and engineering criteria discussed above, and considering each countermeasure cost effectiveness, the recommended project prioritization is presented in the following table.

CM	Description	Location
<b>Near-Term Implementation</b>		
1	Vehicle Speed Feedback Signs	Corridor-Wide
2	Police Enforcement Area	Corridor-Wide
4	Increase Annual Shoulder Maintenance	Corridor-Wide
16	Pavement Rehab and Restriping for Wider Shoulders	Segment 5
<b>Medium-Term Implementation</b>		
5	Additional Lighting/Signage (Where Needed)	Segment 5
6	Guardrails (Where Needed)	Corridor-Wide
10	Shoulder Widening – 8-ft Wide Driveways	Segment 3
12	Left Turn Lane (Left-In/Left-Out)	Segment 4
<b>Long-Term Implementation</b>		
3	Roundabouts (4 Total)	Corridor-Wide
7	Median Rumble Strip with 6-ft Shoulders	Segment 2
8	Tunnel at MP 2.15 - NB	Segment 2
9	Tunnel at MP 2.15 – Both Directions	Segment 2
11	Two-Way Left Turn Lane	Segment 3
13	Reduce 4-Lane to 2-Lane NB and 1-Lane SB	Segment 4
14	Reduce 4-Lane to 2-Lane (with turn-outs) Option 1 (Widen Median)	Segment 4
15	Reduce 4-Lane to 2-Lane (with turn-outs) Option 2 (Remove Outside Pavement)	Segment 4
17	Left Turn Lane (Left-in/Left-out) with Accel/Decel Areas	Segment 5
18	Median Rumble Strip with 6-ft Shoulders	Segment 5

## COUNTERMEASURE SCHEDULES

Schedules for implementing the countermeasures are found on the following pages. The schedules include all project development steps from preliminary engineering to completion of construction.



		Duration (months)																																																								
ID	Task Name	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44												
151	Countermeasure 16: Pavement Rehabilitation and Restriping for Wider Shoulders		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■								
160																																																										
161	Countermeasure 17: Left Turn Lane (Left-in / Left-out) with Acceleration / Deceleration Areas		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
170																																																										
171	Countermeasure 18: Median Rumble Strip with 6-ft Shoulders		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

## FUNDING FOR FUTURE IMPROVEMENTS

Funding for local transportation projects has declined significantly since the approval of Proposition 1B Transportation Bonds by California voters nearly a decade ago. Most traditional sources of revenue have all but dried up, with the few remaining programs sought after in a highly competitive arena.

The following remaining revenue sources could potentially provide funding for the recommended safety improvements identified for Crow Canyon Road.

### FEDERAL-AID HIGHWAY PROGRAMS

#### *SURFACE TRANSPORTATION PROGRAM (STP)*

The Alameda County Transportation Commission (ACTC) is responsible for soliciting and prioritizing projects in Alameda County to receive STP funding. The ACTC receives funding for allocation to the County and cities within the County from the Metropolitan Transportation Commission's (MTC) One Bay Area Grant Program.

#### *CONGESTION MITIGATION & AIR QUALITY PROGRAM (CMAQ)*

The ACTC, through allocations from MTC's One Bay Area Grant Program, is responsible for soliciting and prioritizing projects that are eligible for CMAQ funds. Eligible projects are transportation improvements that would provide an air quality benefit.

#### *HIGHWAY SAFETY IMPROVEMENT PROGRAM (HSIP)*

The Highway Safety Improvement Program, administered through Caltrans' Office of Local Assistance, is available to cities and counties for the funding of projects with the purpose of achieving a significant reduction in traffic fatalities and serious injuries on all public roads.

### STATE FUNDING SOURCES

#### *STATE TRANSPORTATION IMPROVEMENT PROGRAM (STIP)*

The State Transportation Improvement Program (or STIP), adopted by the California Transportation Commission during even-numbered years, identifies transportation capital improvement projects selected to be funded with fuel tax revenues from the State Highway Account.

#### *TRANSPORTATION DEVELOPMENT ACT (TDA)*

The Transportation Development Act (TDA) allows each county to collect a ¼ percent sales tax for public transportation purposes. In Alameda County, 2 percent of these funds are allocated for bicycle and pedestrian projects.

#### *TRANSPORTATION FUND FOR CLEAN AIR PROGRAM (TFCA)*

The Transportation Fund for Clean Air Program (TFCA) is funded through a portion of the vehicle registration fees collected in the Bay Area. These funds are allocated by the ACTC to projects and

programs that help reduce vehicle emissions. Five percent of the vehicle registration fee (VRF) is allocated to the Pedestrian and Bicyclist Access and Safety Program.

#### LOCAL FUNDING SOURCES

##### *MEASURE B AND BB PROGRAM FUNDS*

The Alameda County Transportation Commission allocates County sales tax dollars (Measures B and BB) and vehicle registration fee (VRF) revenue to public agencies within the County through Master Program Funding Agreements. The funds are allocated through discretionary grant programs or via direct pass-through funds.

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## 2.0 INTRODUCTION

Crow Canyon Road is a major rural arterial roadway linking central Alameda County with major employment and residential areas in southwestern Contra Costa County. The road connects the unincorporated community of Castro Valley in the south to the City of San Ramon in Contra Costa County in the north. See Figure 1. Given Crow Canyon Road's proximity to both I-580 and I-680, the roadway has served as an alternate route for commuters seeking to avoid the heavy peak hour congestion along both I-580 and I-680 and at the I-580/I-680 interchange.



**Figure 1. Regional Location Map**

Crow Canyon Road has a rural character; consisting of long stretches of two-lane undivided highway with limited horizontal sight distance around curves and only three controlled intersections within the study area at Greenridge Road, Cold Water Drive, and Norris Canyon Road. Drivers tend to overlook these rural characteristics, resulting in speeding and a significant number of accidents. The California Highway Patrol (CHP), which provides traffic enforcement and patrol functions along Crow Canyon Road, has indicated that speeding continues to be a problem, especially on tight curves with limited sight distance. The CHP has also indicated the potential for head-on collisions where vehicles drift across double yellow pavement striping at areas with minimal shoulder width.

An additional safety issue identified during early discussions with the CHP involved numerous rear-end accidents where vehicles were stopped in the roadway, attempting to make a left turn into a driveway. As the stopped vehicle waits for gaps to safely turn against the on-coming traffic, the travel lane is blocked and thereby forcing vehicles travelling behind them to either stop or maneuver around them.

Vehicle speeds, unsafe driving maneuvers and high volumes of traffic along Crow Canyon Road have created significant problems for the safety of drivers, “active” transportation users, (i.e. bicyclists, pedestrian and equestrians) and local residents who live and work within the Crow Canyon corridor.

## 2.1 PURPOSE OF THE SAFETY STUDY

The purpose of this Crow Canyon Road Safety Study was to:

- Identify safety issues that are possibly contributing to reported accidents along the roadway corridor within Alameda County.
- Solicit community input regarding roadway safety issues.
- Identify and recommend potential future improvements to mitigate these issues.
- Prioritize preferred improvements with community input, and
- Position Alameda County’s Public Works Agency to compete for highly competitive funding grants.

## 2.2 SAFETY STUDY GOALS

The existing Crow Canyon Road corridor is a multi-use corridor consisting of residential, commercial, agricultural, ranching and institutional/religious land uses. The roadway carries a wide variety of traffic types, including both vehicular and “active” transportation modes.

The goals of this study were to improve safety and traffic flow along the Crow Canyon Road corridor for all users of the roadway; including motorists, cyclists, pedestrians, and equestrians. While the goals of the study include improving safety for motor vehicles, it is also important to note the rural characteristics of the roadway and the strong desires of the local residents to maintain those characteristics.

## 2.3 CROW CANYON ROAD CORRIDOR

Crow Canyon Road is a major rural arterial roadway linking central Alameda County with southwestern Contra Costa County. The majority of the roadway corridor consists of a narrow 2-lane road winding through hilly terrain, with residential and ranching/livestock grazing uses fronting both sides of the roadway. In addition to ranching operations, a number of properties provide horse-stabling services to the public.

At its southern terminus in the community of Castro Valley, Crow Canyon Road intersects with East Castro Valley Boulevard, providing access to both Interstate 580 and Interstate 880 freeways. Travelling northbound, the roadway begins as a divided 4-lane urban arterial with a major signalized intersection at Cull Canyon Road. A community park and residential uses predominate on both sides of the roadway through this initial segment.

Continuing in the northbound direction, and prior to the road narrowing to a 2-lane facility, there are existing signalized intersections at Crow Creek Road, Greenridge Road/Waterford Place, Greenridge Road/Shadow Creek Circle and San Simeon Place. Land use adjacent to the roadway is again predominately residential with a small number of commercial parcels fronting the road.

Crow Canyon Road continues as a narrow, winding 2-lane highway for approximately 1.5 miles with an existing signalized intersection at Cold Water Drive and a sharp horizontal curve at Mile Post 2.15. Much of the roadway in this segment is flanked by steep, rocky or tree-lined slopes as well as the environmentally sensitive Crow Creek.

Approximately 2000 feet northerly of Mile Post 2.15, the roadway alignment straightens as it passes residential and ranching uses on both sides of the highway. The road continues following a generally straight alignment for slightly more than 0.5 mile, then travels through a reversing curve as it approaches the signalized intersection with Niles Canyon Road.

As Crow Canyon Road departs its signalized intersection with Norris Canyon Road, the roadway widens to a 4-lane divided highway for approximately 1 mile. Median openings and turn pockets are provided at several locations to facilitate ingress and egress from adjacent properties. Rolling pasture land fronts the northbound side of the highway, while residential and ranching properties dot the southbound roadside frontage.

Northerly of this 4-lane divided segment, the road once again transitions to a narrow and winding 2-lane facility. The roadway continues with this general alignment for approximately 2.4 miles where it crosses the Alameda / Contra Costa County line. Within this 2.4 mile segment, Crow Creek flanks the roadway on the west, while steep, rocky or tree-lined slopes rise immediately beyond the northbound roadway shoulder. A few residential and ranching properties, as well as a large religious facility at Mile Post 5.1, have driveway access to the road in this segment.

## 2.4 STUDY CORRIDOR BACKGROUND

Due to its significance as an interregional arterial, Crow Canyon Road has been the subject of several traffic/engineering studies. These studies, performed over the last 20 years, have evaluated the roadway corridor from both a safety, as well as an overall high volume arterial standpoint.

### 2.4.1 1992 PROJECT STUDY REPORT

During the latter part of the 1980's, the Alameda County Public Works Agency was concerned that, due to the continual increase in inter-regional traffic volumes on Crow Canyon Road, the roadway was being used as an alternate route to the I-580 and I-680 freeways. As a result of this concern, the County approached Caltrans with the concept of transferring Crow Canyon Road to state ownership. Considering this request, State Senator William Lockyer sponsored SB 1149 authorizing Caltrans (via the California Transportation Commission) to conduct a transportation study of Crow Canyon Road between I-580 and I-680. In January 1990, the Commission requested Caltrans and the County to jointly prepare a Project Study Report with the scope of the study limited to "looking at widening of shoulders, straightening of curves, and adding of passing lanes, aimed at improving traffic flow and safety".

The Project Study Report focused on alternatives to improve traffic safety and traffic flow without significantly increasing the capacity of Crow Canyon Road. Improvements proposed for the rural 2-lane segments of Crow Canyon Road included 8-foot shoulders; climbing lanes; and road realignments to eliminate or modify existing short radii curves, to achieve a design speed of 45 to 50 miles per hour. No improvements were proposed for the four-lane segment of Crow Canyon Road north of Norris Canyon Road.

#### 2.4.2 MILE POST 2.15 IMPROVEMENTS 1993/1994

This safety project focused on improvement of the tight horizontal curve at Mile Post 2.15. The improvements included shoulder widening for both the northbound and southbound sides of the roadway, pavement overlay of both travel lanes and installation of a flashing beacon with 30 mph signing for both directions of travel.

#### 2.4.3 MILE POST 2.2 TO ALAMEDA COUNTY LINE IMPROVEMENTS: 1996

In 1996, the County Public Works Agency completed pavement repairs at various locations along Crow Canyon Road and a pavement overlay of both travel lanes from Mile Post 2.2 to the Alameda/Contra Costa County line.

#### 2.4.4 MILE POST 2.15 IMPROVEMENTS: 1998/1999

During late 1998, the County completed design plans for the installation of signing and striping improvements at Mile Post 2.15. Construction was completed in early 1999.

#### 2.4.5 PRELIMINARY DESIGN ENGINEERING: 2003 TO 2009

During the early 2000's, County Public Works staff began preliminary design engineering based upon the recommendations identified within the 1992 Project Study Report, including new horizontal and vertical alignment (including the curve at Mile Post 2.15); passing/climbing lanes; wider shoulders to meet current design standards and mitigate existing tight roadway curves; and grading improvements to eliminate non-standard sight distance. In general, the proposed improvements required extensive grading on both the uphill and downhill sides of Crow Canyon Road, as well as retained embankment fills along the east bank of Crow Creek. The approach was to prepare improvement plans for a single roadway construction project since, at the time, there was anticipation of possible state funding availability. This preliminary engineering design effort also included a geotechnical design report, a geotechnical data report and several environmental studies. In early 2009, with no potential construction funding source identified and the identification of significant environmental and local community concerns regarding the proposed improvements, County staff discontinued the preliminary design engineering effort.

#### 2.4.6 MILE POST 2.15 IMPROVEMENTS: 2010

In early 2010, the County began safety improvements at Mile Post 2.15 that included pavement grooving and resurfacing of both travel lanes as well as installation of a median rumble strip. Construction was completed in September of 2010.

#### 2.4.7 INTERSECTION IMPROVEMENTS AT NORRIS CANYON ROAD: 2010/2011

Intersection geometric improvements, including traffic signalization and safety lighting installation, were completed during the summer of 2011 at the Crow Canyon Road/Norris Canyon Road intersection.

#### 2.4.8 COLD WATER DRIVE TO MILE POST 5.3 IMPROVEMENTS: 2012/2013

Pavement rehabilitation and resurfacing improvements between Cold Water Drive and Mile Post 5.3 were completed in the summer of 2013. The project did not include improvements at Mile Post 2.15,

**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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since pavement grooving/resurfacing had been completed in 2010. The project restriped the roadway within the construction limits, providing 12-foot lanes and 4 to 6-foot shoulders where feasible.

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## 3.0 EXISTING CORRIDOR FEATURES

### 3.1 TRAFFIC CONDITIONS

In order to efficiently analyze the 6.3 mile Crow Canyon Road study corridor, the corridor was divided into 5 segments based upon similar roadway characteristics. These segments, shown on Figure 2, are described as follows:

- Segment 1: Greenridge Road to Cold Water Drive—This 0.52 mile segment begins as a 4-lane roadway before transitioning down to 2-lanes approximately 800 feet northerly of Greenridge Road. The posted speed limit is 40 mph. There are existing traffic signals at the intersections of Greenridge Road/Waterford Place, Greenridge Road/Shadow Creek Circle and San Simeon Place. The area immediately adjacent to Crow Canyon Road is a mix of residential and commercial development. Traffic flow in Segment 1 is controlled by traffic signals at both its northerly and southerly ends.
- Segment 2: Cold Water Drive to Mile Post 2.25—This 2-lane segment extends for a distance of approximately 0.8 mile. The posted speed limit is 40 mph. The roadway alignment traverses through a series of sharp curves in the vicinity of Mile Post 2.15. The area immediately adjacent to the roadway is heavily wooded and undeveloped.
- Segment 3: Mile Post 2.25 to Norris Canyon Road—Segment 3 extends along Crow Canyon Road from Mile Post 2.25 to its signalized intersection with Norris Canyon Road, a distance of approximately 1.2 miles. The posted speed limit of this 2-lane roadway segment ranges from 40 to 45 mph. The alignment is generally straight in nature, with reversing curves as the roadway approaches the signalized intersection and Segment 4 to the north. The area on both sides of the roadway is developed with rural residential, ranching/livestock grazing and commercial uses. As a result of these land uses, driveway access to the adjacent parcels is provided throughout Segment 3
- Segment 4: Norris Canyon Road to Mile Post 4.45—Segment 4 consists of approximately 1 mile of 4-lane divided roadway with a wide center median. The roadway alignment is generally straight, with a transition from 4-lanes back to 2-lanes at the segment's northerly end. The posted speed limit ranges from 45 to 50 mph. The area adjacent to the west side of the roadway is generally developed with rural residential and commercial uses. The east side of the roadway is largely undeveloped. Numerous driveways exist along the west side of the roadway.
- Segment 5: Mile Post 4.45 to Alameda/Contra Costa County Line—The alignment of this 2-lane segment consists of numerous horizontal and vertical curves for a distance of approximately 2.4 miles. The posted speed limit is 45 mph. The area immediately adjacent to the roadway is partially developed with driveway access to rural residential and commercial uses. The remainder is rolling grasslands or heavily wooded.

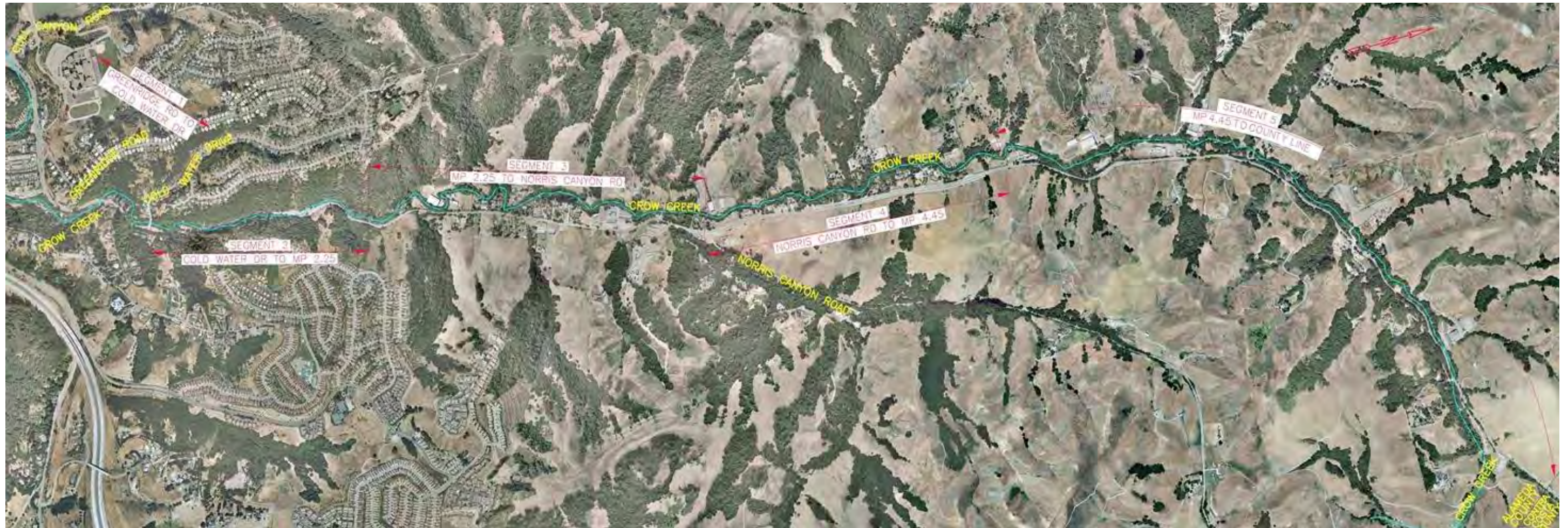


Figure 2. Project Limits

Existing motor vehicle traffic conditions within the study limits were observed and collected during November/December 2012. Bicycle volumes were subsequently counted in March 2013.

The following information regarding motor vehicle and bicycle traffic characteristics was presented within a report titled, "Existing Conditions Report, Crow Canyon Road from Greenridge Road to Contra Costa County Line, in the County of Alameda", prepared by TJKM Transportation Consultants dated May 3, 2013. This report has been included in Appendix A.

### 3.1.1 EXISTING DAILY TRAFFIC VOLUMES

24-hour traffic counts were obtained for each of the five study segments through the use of road tube vehicle counters at strategic locations. Daily traffic volumes ranged from approximately 16,000 vehicles per day to over 18,000 vehicles per day, with the higher volumes recorded on the southernmost segments (Segments 1, 2 and 3). The 24-hour traffic volumes by segment are summarized below:

**Table 1: Daily Traffic Volume by Segment**

Segment	Daily Traffic Volume
1	15,968
2	18,165
3	17,995
4	16,112
5	15,804

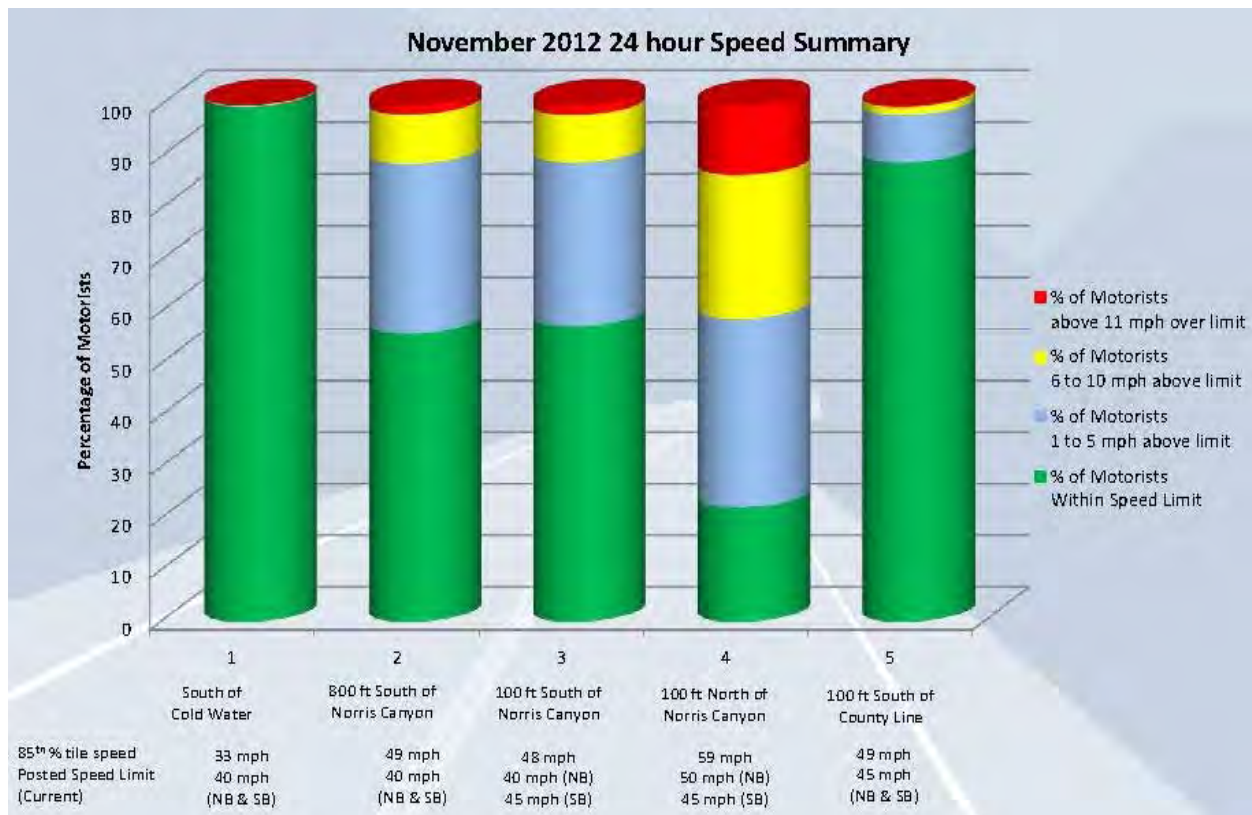
It should be noted that these daily traffic volumes are higher than recommended criteria for 2-lane arterial roadways, with typical volume ranges of 12,000 to 16,000 vehicles per day (Florida DOT studies).

A more in-depth review of the traffic data presented in the TJKM Transportation Consultants report shows that there is approximately 10% more northbound (from Castro Valley to San Ramon) traffic than southbound traffic, and that more vehicles travel during the 3-hour afternoon peak (4:00 p.m. to 7:00 p.m.) than the morning peak (7:00 a.m. to 10:00 a.m.) for both directions of travel. This could be an indication that commuters are using Crow Canyon Road in the afternoon to avoid the I-580/I-680 interchange, since the eastbound direction of I-580 in the Pleasanton/Livermore area has historically been more congested during the afternoon commute hours.

### 3.1.2 VEHICLE SPEEDS

The use of road tube vehicle counters at strategic locations, as well as a series of travel time runs within the study limits were used to estimate existing vehicle speeds within each of the 5 segments. Locations of the road tube vehicle counters on Crow Canyon Road, as well as speed profiles and recorded 85<sup>th</sup> %-tile speeds for the 5 study segments are shown in Figure 3.





**Figure 3. Vehicle Spot Speeds**

A total of 6 round-trip travel time runs were made in early December 2012 (two round-trip runs during each of the a.m. peak, mid-day and p.m. peak periods). The observed travel times and corresponding vehicle speeds were as follows:

**Table 2: Observed Vehicle Travel Time and Vehicle Speeds**

Segment	Peak Hour	Direction	Observed Travel Time (s)	Observed Speed (mph)
1	AM	NB	56	33
		SB	54	35
	Mid-Day	NB	49	38
		SB	46	41
	PM	NB	49	39
		SB	64	30
2	AM	NB	75	39
		SB	82	36
	Mid-Day	NB	74	39
		SB	63	46
	PM	NB	66	45
		SB	81	36

Segment	Peak Hour	Direction	Observed Travel Time (s)	Observed Speed (mph)
3	AM	NB	111	39
		SB	105	40
	Mid-Day	NB	103	41
		SB	90	47
	PM	NB	94	45
		SB	114	37
4	AM	NB	72	56
		SB	74	54
	Mid-Day	NB	66	61
		SB	75	54
	PM	NB	68	59
		SB	71	56
5	AM	NB	204	40
		SB	194	42
	Mid-Day	NB	199	41
		SB	189	43
	PM	NB	198	41
		SB	190	43

Note: Each entry represents an average of two runs.

Since vehicle speeds estimated from travel time runs represent speed conditions over the entire roadway segment, and speeds measured by the road tube vehicle counters represent vehicle speeds at a specific single location in the segment, it is not unusual for two speed measurements in the same segment to be different.

As can be seen from Figure 3 and Table 2, the majority of vehicles within the study limits were travelling no more than 5 miles per hour in excess of the posted speed limit. The one exception is Segment 4, where nearly 50% of the vehicles were travelling at 6 or more miles per hour above the posted limit, with approximately 20% travelling 11 miles per hour or more above the limit.

### 3.1.3 COMPARATIVE TRAVEL TIMES: CROW CANYON ROAD VERSUS I-680 AND I-580

Comparative travel time runs along both Crow Canyon Road and the I-580 and I-680 freeways were performed between East Castro Valley Boulevard (southern terminus of Crow Canyon Road) and I-680 (in the City of San Ramon) to determine what time savings, if any, might be achieved by motorists using Crow Canyon Road. It is felt by many of the residents along Crow Canyon Road that a significant number of commuters use the County arterial because its use reduces travel time as compared to using both I-580 and I-680. The distance between East Castro Valley Boulevard and I-680 is approximately 14.4 miles via the two freeways and approximately 8.4 miles via Crow Canyon Road itself.

**Table 3: Comparative Travel Time – Crow Canyon Road vs. I-580 and I-680**

Peak Hour	Roadway	Northbound + Southbound	Distance, Miles	Travel Time, Min:Sec	Average Speed, mph	Crow Canyon Road Advantage, Min:Sec
AM	Crow Canyon Rd	SB	8.40	13:30	37.3	-2:52
	I-680 & I-580	SB	14.40	16:22	52.8	
PM	Crow Canyon Rd	SB	8.40	13:58	36.1	-0:19
	I-680 & I-580	SB	14.40	14:17	56.3	
AM	Crow Canyon Rd	NB	8.40	15:22	32.6	-3:48
	I-680 & I-580	NB	14.40	19:10	43.8	
PM	Crow Canyon Rd	NB	8.40	14:40	33.9	-4:52
	I-680 & I-580	NB	14.40	19:32	43.0	

**Note:**

Travel time runs were conducted for 2 two-hour peak periods.

AM peak period was considered 7:00 a.m. – 9:00 a.m. AM peak direction is southbound.

PM peak period was considered 4:00 p.m. – 6:00 p.m. PM peak direction is northbound.

Distance, Travel Time and Average Speed have been averaged from the results of two bi-directional runs on each corridor.

“Crow Canyon Road Advantage” is the difference in travel time between the two routes in favor of Crow Canyon Road.

As illustrated in Table 3, the peak direction of travel on Crow Canyon Road has a 3 to 5 minute advantage in travel time over the freeways during morning and evening peak periods.

#### 3.1.4 VEHICLE CLASSIFICATION

Existing motor vehicle types using Crow Canyon Road within the study limits were classified using axle counts. Table 4 illustrates the mix of motor vehicle traffic utilizing Crow Canyon Road during a 2-day classification count performed during early November 2012:

**Table 4: Observed Vehicle Classification Results**

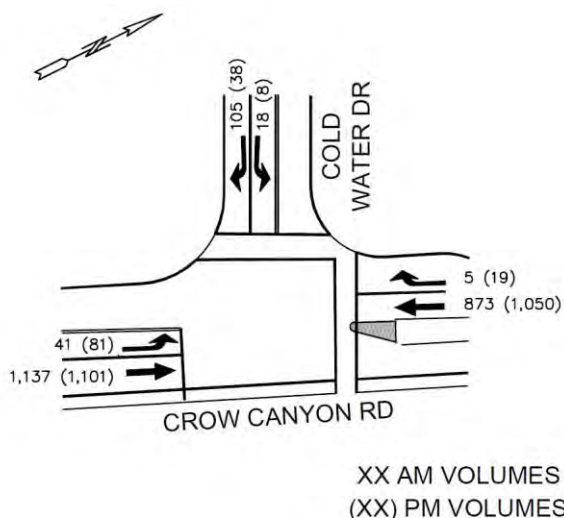
Segment	Location	Direction	Total Vehicle	Motor-cycles	Cars & Trailer	Pickup Truck	Buses	2 Axle Single	3 Axle Single	<5 Axle Double	5 Axle Double	Not Classified *
1	Greenridge Rd to Cold Water Dr	NB	8,151	308	7,168	106	6	12	28	11	21	493
		SB	7,807	452	6,701	58	2	11	27	5	6	541
		NB+SB	15,968	760	13,869	164	8	23	55	16	27	1,034
		%	100	4.8	86.9	1.0	0.1	0.1	0.3	0.1	0.2	6.5
2	Cold Water Dr to MP 2.25	NB	9,530	162	6,932	1,573	14	213	38	26	10	561
		SB	8,635	174	6,375	1,235	3	213	52	23	6	551
		NB+SB	18,165	336	13,307	2,808	17	426	90	49	16	1,112
		%	100	1.8	73.3	15.5	0.1	2.3	0.5	0.3	0.1	6.1
3	MP 2.25 to Norris Canyon Rd	NB	9,486	155	7,031	1,449	9	206	30	25	7	574
		SB	8,509	134	6,241	1,270	5	209	54	26	4	566
		NB+SB	17,995	289	13,272	2,719	14	415	84	51	11	1,140
		%	100	1.6	73.8	15.1	0.1	2.3	0.5	0.3	0.1	6.3
4	Norris Canyon Rd to MP 4.45	NB	8,604	3	6,352	1,380	9	272	10	22	7	549
		SB	7,508	11	5,989	1,261	11	185	12	17	8	14
		NB+SB	16,112	14	12,341	2,641	20	457	22	39	15	563
		%	100	0.1	76.6	16.4	0.1	2.8	0.1	0.2	0.1	3.5
5	MP 4.45 to Alameda County Line	NB	8,231	50	6,036	1,341	10	206	12	23	5	548
		SB	7,573	56	5,657	1,155	8	191	17	33	5	450
		NB+SB	15,804	106	11,693	2,496	18	397	29	56	10	998
		%	100	0.7	74.0	15.8	0.1	2.5	0.2	0.4	0.1	6.3

\* Vehicles that crossed the road tube counters which resulted in ambiguous data were not classified.

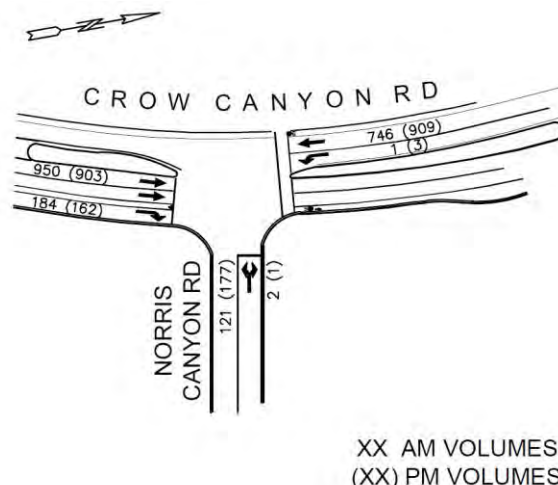
Generally, it appears that approximately 75 to 80 % of all vehicles observed were passenger vehicles. Slightly over 15 % of the observed vehicles were 2-axle trucks, with motorcycles, buses and large trucks accounting for the remainder. Crow Canyon Road within the study limits does not appear to be an attractive route for large trucks.

### 3.1.5 INTERSECTION COUNTS/INTERSECTION LEVEL OF SERVICE

Existing peak hour turning movement counts were collected at the two road intersections within the study limits—Crow Canyon Road and Cold Water Drive and Crow Canyon Road and Norris Canyon Road. The morning peak hours for the Cold Water Drive and Norris Canyon Road intersections were 7:20 a.m. to 8:20 a.m. and 7:15 a.m. to 8:15 a.m., respectively. The corresponding afternoon peak hours were 4:40 p.m. to 5:40 p.m. and 4:50 p.m. to 5:50 p.m. Figures 4 and 5 indicate the observed intersection volumes.



**Figure 4. Existing Peak Hour Volumes for Crow Canyon Rd./Cold Water Dr. Intersection**



**Figure 5. Existing Peak Hour Volumes for Crow Canyon Rd./Norris Canyon Rd. Intersection**

Level of Service (LOS) is a qualitative description of intersection operations and is reported using an A through F letter rating system to describe travel delay and congestion. LOS A indicates free flow conditions with little or no delay, whereas LOS F indicates jammed conditions with excessive delays and long back-ups.

**Table 5: Signalized Intersection Level of Service Criteria**

LOS	Description	Average Control Delay (Seconds)
A	Free flow/non-congested operation. Turning movements are easily made and all queues clear in a single signal cycle.	≤ 10.0
B	Stable operation/minimal delays. An occasional approach phase is fully utilized. Drivers begin to feel somewhat restricted within platoons of vehicles.	> 10.0 to 20.0
C	Stable operation/acceptable delays. Major approach phases fully utilized. Backups may develop behind turning vehicles.	> 20.0 to 35.0
D	Approaching unstable operation/tolerable delays. Drivers may have to wait through more than one red signal indication. Queues may develop but dissipate rapidly, without excessive delays.	> 35.0 to 55.0
E	Unstable operation/significant delays. Volumes at or near capacity. Vehicles may wait through several signal cycles. Long queues form upstream of intersection.	> 55.0 to 80.0
F	Forced flow/excessive delays. Represents jammed conditions. Traffic demand exceeds the capacity. Queues may block upstream intersection.	> 80.0

Source: Transportation Research Board, 2000, *Highway Capacity Manual*

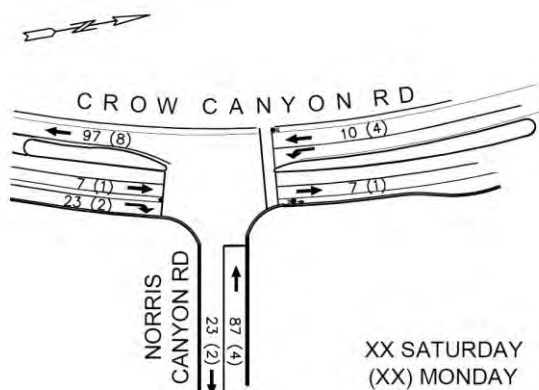
Level of Service (LOS) calculations show that the two intersections are currently operating within acceptable conditions. At the Cold Water Drive intersection, the morning peak hour average delay is 11.1 seconds, or LOS B. During the afternoon peak hour, this intersection operates at LOS A with 6.0 seconds of delay. Similarly, at the Norris Canyon Road intersection, both morning and afternoon peak periods operate at LOS A with 5.8 seconds and 8.0 seconds of delay, respectively.

### 3.1.6 FUTURE VOLUMES

The Alameda County Transportation Commission (Alameda CTC) maintains a traffic model for traffic forecasting purposes. The most recent model results are available through the Alameda CTC website. For the forecast year 2035, the model anticipates daily traffic volumes of approximately 20,000 vehicles per day between Norris Canyon Road and the Alameda / Contra Costa County line. South of Norris Canyon Road, the model is forecasting approximately 25,000 vehicles per day. These forecasted volumes are well in excess of the upper desirable capacity limits for 2-lane arterial roadways, noted earlier as 12,000 to 16,000 vehicles per day. Crow Canyon Road is able to carry somewhat higher volumes because the 2-lane portion of the roadway has no major intersections.

### 3.1.7 BICYCLE VOLUMES

12-hour bicycle counts were recorded along Crow Canyon Road in late March 2013. The counts were performed both north and south of the Norris Canyon Road intersection between 6:00 a.m. and 6:00 p.m. on a Saturday and the following Monday. Counts were collected on a weekday and a weekend to gauge the comparative level of bicycle activity within the study limits. Counts were also made on Norris Canyon Road at its intersection with Crow Canyon Road. As shown on Figure 6, the Saturday count shows 127 bicyclists counted on the south side of Norris Canyon Road, but only 17 continuing on Crow Canyon Road north of the Norris Canyon Road intersection. The remaining 110 bicyclists continued northbound on Norris Canyon Road.



**Figure 6: 12-Hour Bicycle (6:00 AM to 6:00 PM) Volumes for Crow Canyon Rd./Norris Canyon Rd. Intersection**

Based upon the counts collected, it appears that bicyclists travelling from San Ramon to Castro Valley used Norris Canyon Road, rather than Crow Canyon Road, for the first portion of their trip. This reinforces comments received at the first public meeting describing the difficulties of bicycle travel on the northern segment (Segment 5) of Crow Canyon Road due to roadway curvature and lack of adequate shoulder width.

## 3.1.8 ACCIDENT HISTORY

Over the 10-year period between January 2003 and December 2012, a total of 342 accidents were reported on Crow Canyon Road within the study limits. Within the last 4 years, 3 fatal accidents have occurred within this 6-mile study corridor. The number of accidents per roadway segment is shown in Table 6, with the locations identified in Appendix B.

**Table 6: Summary of Accidents per Study Segment  
January 1, 2003 to December 31, 2012**

Segment	Location	Number of Collisions
1	Greenridge Road to Cold Water Drive	40 (>50% occurred at the 3 signalized intersections)
2	Cold Water Drive to MP 2.25	93 (>55% occurred at the curve at MP 2.15)
3	MP 2.25 to Norris Canyon Road	65
4	Norris Canyon Road to MP 4.45	52
5	MP 4.45 to Alameda County Line	92
Total		342

During the 10-year analysis period, 63 of 93 accidents (68%) occurred within Segment 2 when the road surface was wet. The number of collisions dropped substantially following a roadway resurfacing project completed in late 2010. That construction project, as previously described under “STUDY CORRIDOR BACKGROUND”, performed pavement grooving and resurfacing of both the northbound and southbound lanes in the vicinity of Mile Post 2.15. A median rumble strip was also installed as part of the project. Since completion of the resurfacing, only 3 accidents have occurred within the limits of the 2010 project.

Improvements at the intersection of Crow Canyon Road and Norris Canyon Road have similarly reduced the number of collisions reported within Segment 3. Following signalization of the intersection in July 2011 (described under “STUDY CORRIDOR BACKGROUND”), only 1 collision had been reported in the last 18 months of the study period.

The accident or collision type per roadway segment for this 10-year period was as follows:

**Table 7: Accident or Collision Type by Segment**

Segment	Accident or Collision Type							Segment Total
	Animal-Involved	Broadside	Head-On	Hit Object	Overtaken	Rear-End	Sideswipe	
1	3 (8%)	5 (13%)	2 (5%)	15 (38%)	3 (8%)	7 (18%)	5 (13%)	40
2	3 (3%)	14 (15%)	20 (22%)	33 (35%)	4 (4%)	10 (11%)	9 (10%)	93
3	1 (2%)	6 (9%)	5 (8%)	22 (34%)	2 (3%)	26 (40%)	3 (5%)	65
4	3 (6%)	9 (17%)	1 (2%)	24 (46%)	3 (6%)	8 (15%)	4 (8%)	52
5	4 (4%)	14 (15%)	6 (7%)	29 (32%)	8 (9%)	24 (26%)	7 (8%)	92

Table 8 provides a summary of the existing average daily traffic, collision or crash data, and speed data for each of the 5 segments.

**Table 8: Summary of Average Daily Traffic, Speed and Collision Data**

Segment	Location	Number of Lanes	Posted Speed Limit (mph)	Average Daily Traffic (ADT)	Collisions			Speed Data				
					Collisions (1/2003 to 12/2012)	Length (mi)	Segment Collision Rate (R <sub>SE</sub> )	10 MPH Pace	Number in Pace	% in Pace	Average Speed	85 <sup>th</sup> percentile Speed
1	Greenridge Road to Cold Water Drive	2	40	15,968	40	0.52	1.03	26-35	13,193	64 %	28	33
2	Cold Water Drive to MP 2.25	2	40	18,165	93	0.81	1.73	41-50	12,595	69 %	42	49
3	MP 2.25 to Norris Canyon Rd.	2	45	17,995	65	1.17	0.85	41-50	12,285	68 %	41	48
4	Norris Canyon Rd. to MP 4.45	4	50	16,112	52	1.11	0.80	51-60	10,355	64 %	53	59
5	MP 4.45 to Alameda Co. Line	2	45	15,804	92	2.27	0.70	41-50	10,555	67 %	42	49

Notes:

Posted speed limits were limits in place during 2015

$R_{SE} = 1000000 * A / (365 * T * ADT * L)$ ,  $R_{SE}$  = Observed collision rate: # of acc./mil. Vehicle miles,

A = Number of collisions over ten year study period, T = Total number of years over which accidents were collected, L = Length of study corridor (in miles)

PACE = 10 mph increments including the greatest number of speed measurements.

The table illustrates that the worst accident rate was within Segment 2, which includes the sharp horizontal curve at Mile Post 2.15. This rate of 1.73 collisions per million vehicle miles exceeds the state-wide rate of 1.03 collisions per million vehicle miles for a roadway of this type. This segment of roadway includes curves with reduced speed signing and narrow shoulders with steep slopes, guardrails and Crow Creek immediately adjacent to the edge of shoulder. This segment of Crow Canyon Road has been described as “unforgiving,” evidenced in vehicles running off the road and hitting a fixed object or having a head-on collision.

### 3.2 EXISTING ROADWAY CONDITIONS

General roadway conditions within the study area are discussed below. As previously noted, the existing alignment of Crow Canyon Road roughly parallels Crow Creek as it winds through the canyon. A roadway cross section of 12-foot travel lanes and 4 to 6-foot paved shoulders exist throughout much of the study corridor as a result of the completion of the 2012/2013 resurfacing improvements described under



“STUDY CORRIDOR BACKGROUND.” The roadway climbs from an elevation of about 330 feet at the southern end of the study corridor to an elevation of about 760 feet at the northern end. Occasional side roads and driveways connect Crow Canyon Road to tracts of residential development and ranch properties along either side of the roadway.

### 3.2.1 ROADWAY ALIGNMENT

Throughout Segments 1 through 5 both the horizontal and vertical alignment components of Crow Canyon Road vary significantly. Numerous curves have limited horizontal sight distance, particularly in areas where shoulders are narrow or nonexistent. A number of crest vertical curves with reduced stopping sight distance are also present. These significant variations in both horizontal and vertical alignment lead to increased speed differentials along the corridor, increasing the odds of a potential collision.

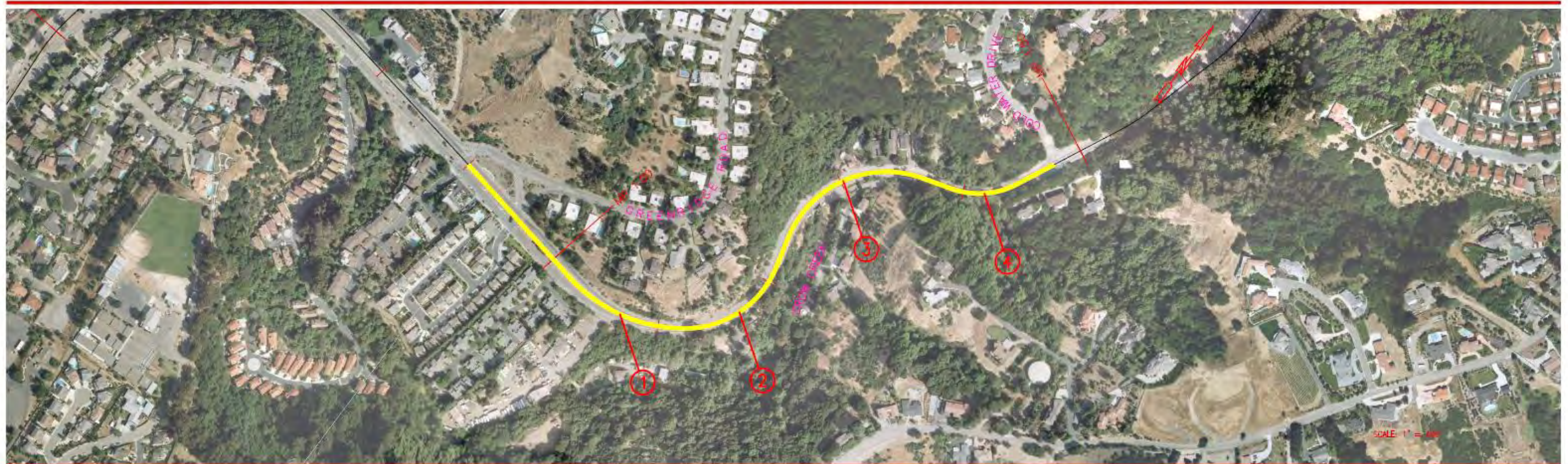
Figures 7 through 11 identify the various horizontal and vertical curves, along with their design criteria, within the 6-mile study corridor.

### 3.2.2 ROADWAY SIGNAGE

A comprehensive inventory of all traffic signs along Crow Canyon Road was performed by TJKM as part of an earlier study. The roadway within the study corridor appears to be adequately signed. The TJKM sign inventory is included in Appendix C.

### 3.2.3 NUMEROUS SPEED ZONES

The presence of sharp horizontal curves with reduced speeds (many of the horizontal curves within the study limits are posted with reduced speed advisory signs, some as low as 30 miles per hour), narrow or nonexistent shoulders and significant numbers of driveways providing direct access to Crow Canyon Road necessitates varying speed zones through the study corridor. These existing speed zones are shown on Figure 12.



**LEGEND:**

- CURVE NUMBER CALLOUT
- SSD: STOPPING SIGHT DISTANCE
- VDESIGN: DESIGN SPEED LIMIT
- VC: VERTICAL CURVE

APPROX MILE POST	CURVE NUMBER	RADIUS ft.	LENGTH ft.	Vdesign Standard mph	POSTED SPEED mph	SSD STANDARD ft.	Exist Horizontal SSD ft.	Vdesign Standard mph	Exist Superelevation %	Max Comf Speed mph	Exist Crest VC Sight Distance ft.	Vdesign Standard mph
1.10	1	650.00	532.17	43	40	300	0		no dtm available			
1.20	2	410.00	495.50	35	40	300			no dtm available			
1.35	3	440.00	677.32	36	40	300	217	32	no dtm available			
1.40	4	334.65	278.87	31	40	300			9.5%, 5.5%	34		

Figure 7. Segment 1 Existing Geometric Alignment



**LEGEND:**

CURVE NUMBER CALLOUT

SSD: STOPPING SIGHT DISTANCE

VDESIGN: DESIGN SPEED LIMIT

VC: VERTICAL CURVE

APPROX MILE POST	CURVE NUMBER	RADIUS ft	LENGTH ft	Vdesign Standard mph	POSTED SPEED mph	SSD STANDARD ft	Exist Horizontal SSD ft	Vdesign Standard mph	Exist Superelevation %	Max Comf Speed mph	Exist Crest VC Sight Distance ft	Vdesign Standard mph
1.55	5	820.21	142.00	49	40	300			6%, 4%			
1.65	6	656.17	195.47	43	40	300	300	40	1.8%, -1.5%			
1.72	7	1312.33	154.17	62	40	300			1.8%, -0.8%			
1.74	8	1968.50	82.02	69	40	300			4.2%, -6%			
1.75	9	328.08	56.57	31	40	300			2.7%, -2.3%			
1.78	10	984.25	107.27	54	40	300			-1.3%, -4.4%			
1.82	11	410.10	119.02	35	40	300	193	29	-6%, -9%	35, 37		
1.85	12	1640.42	90.14	65	40	300					364	45
1.9	13	1640.42	114.40	65	40	300			2.6%, -3.3%			
2.05	14	574.15	235.82	41	40	300			3.5%, 2.5%	40		
2.11	15	278.87	360.89	28	30 - warning sign		142	23	-10.7%	30		
2.15	16	328.08	209.35	31	40	300			11.5%, 6%	35, 32		

Figure 8. Segment 2 Existing Geometric Alignment



SCALE: 1" = 400'

**LEGEND:**

- CURVE NUMBER CALLOUT
- SSD: STOPPING SIGHT DISTANCE
- VDESIGN: DESIGN SPEED LIMIT
- VC: VERTICAL CURVE

APPROX MILE POST	CURVE NUMBER	RADIUS ft	LENGTH ft	Vdesign Standard mph	POSTED SPEED mph	SSD STANDARD ft	Exist Horizontal SSD ft	Vdesign Standard mph	Exist Superelevation %	Max Comf Speed mph	Exist Crest VC Sight Distance ft	Vdesign Standard mph
2.30	17	426.51	345.79	35	40	300	200	30	12.5%, 5%	42, 35		
2.41	18	541.34	379.42	40	40	300			-5%, -11%	42, 45		
2.52	19	820.21	145.53	49	40	300			8%, 2.5%	47, 52	277	38
2.70	20	1312.33	229.32	62	45	360						
3.10	21	3280.83	91.91	66	45	360					337	43
3.20	22	426.51	283.99	35	30 - warning sign NB				8.8%	38		
3.32	23	590.55	532.20	41	40 - warning sign SB		336	43	-14%, -13%	47		
3.46	24	984.25	707.44	54	45	360						
					45	360					372	46

Figure 9: Segment 3 Existing Geometric Alignment



SCALE: 1" = 400'

**LEGEND:**

 CURVE NUMBER CALLOUT

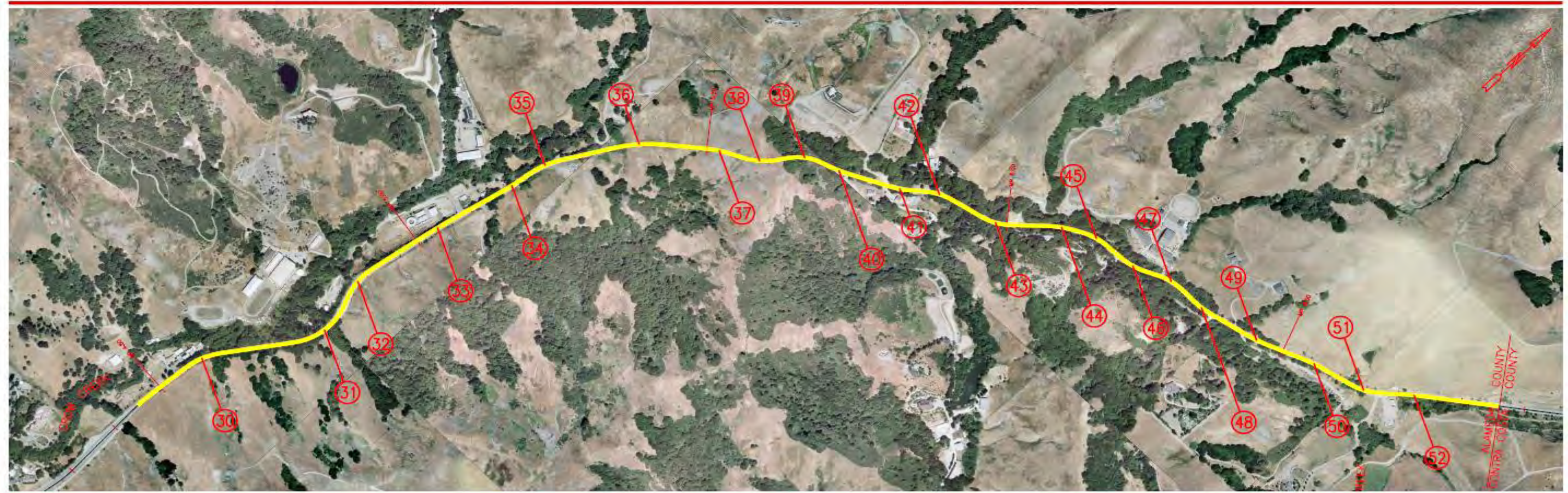
SSD: STOPPING SIGHT DISTANCE

VDESIGN: DESIGN SPEED LIMIT

VC: VERTICAL CURVE

APPROX MILE POST	CURVE NUMBER	RADIUS ft	LENGTH ft	Vdesign Standard mph	POSTED SPEED mph	SSD STANDARD ft	Exist Horizontal SSD ft	Vdesign Standard mph	Exist Superelevation %	Max Comf Speed mph	Exist Crest VC Sight Distance ft	Vdesign Standard mph
3.60	25	984.25	224.52	54	45 / 50	360 / 430						
3.92	26	2296.58	204.22	71	50	430						
4.12	27	2296.58	269.21	71	50	430						
4.32	28	984.25	202.81	54	50	430						
4.45	29	1640.42	219.89	65	45 / 50	360 / 430						

Figure 10: Segment 4 Existing Geometric Alignment



**LEGEND:**

- CURVE NUMBER CALLOUT
- SSD: STOPPING SIGHT DISTANCE
- VDESIGN: DESIGN SPEED LIMIT
- VC: VERTICAL CURVE

APPROX MILE POST	CURVE NUMBER	RADIUS ft	LENGTH ft	Vdesign Standard mph	POSTED SPEED mph	SSD STANDARD ft	Exist Horizontal SSD ft	Vdesign Standard mph	Exist Superelevation %	Max Comf Speed mph	Exist Crest VC Sight Distance ft	Vdesign Standard mph
4.60	30	590.55	315.49	41	45 - warning sign NB				-5%, -1.0%	42, 46		
4.72	31	541.34	559.83	40	45	360			5.5%, 3.5%	40	329	42
4.80	32	590.55	347.85	41	45	360	300	40	-7%, -5.5%	43		
5.10	33	3280.83	181.62	66	45	360						
5.18	34	1640.42	153.54	65	45	360						
5.30	35	738.19	295.49	46	45	360			-3.5%, 9.5%	44, 50	321	42
5.42	36	1148.29	396.90	60	45	360						
5.59	37	902.23	226.43	52	45	360						
5.62	38	590.55	326.06	41	45	360			5.0%, 1.0%	42, 46		
5.70	39	410.10	281.24	34	45	360	210	31	-7%, -8%	44	300	40
5.78	40	902.23	147.09	52	45	360			5%, 3%	48, 50		
5.82	41	820.21	194.12	49	45	360			6%, 8%	50, 51		
5.84	42	557.74	270.50	40	45	360	262	36	-6%, -4%	40, 42		
5.97	43	492.13	269.10	38	45	360			9.7%, 4.4%	42, 37		
											223	32
6.10	44	951.44	293.48	53	45	360						
6.13	45	524.93	222.42	39	45	360			-7%, -7.6%	42	244	34
6.20	46	606.95	254.98	42	45	360			8%, 1.3%	40, 45		
6.3	47	541.34	261.74	40	45	360			-7.4%, -8.4%	42		
6.38	48	688.98	172.35	45	45	360			7.7%, 6.2%	43, 45		
6.45	49	1312.33	207.24	62	45	360						
6.59	50	1148.29	174.15	60	45	360						
6.66	51	508.53	246.58	38	35 - warning sign SB				4.6%, 9.8%	38, 43		
6.7	52	1722.44	118.67	66	45	360					306	40

SCALE: 1" = 800'

Figure 11: Segment 5 Existing Geometric Alignment

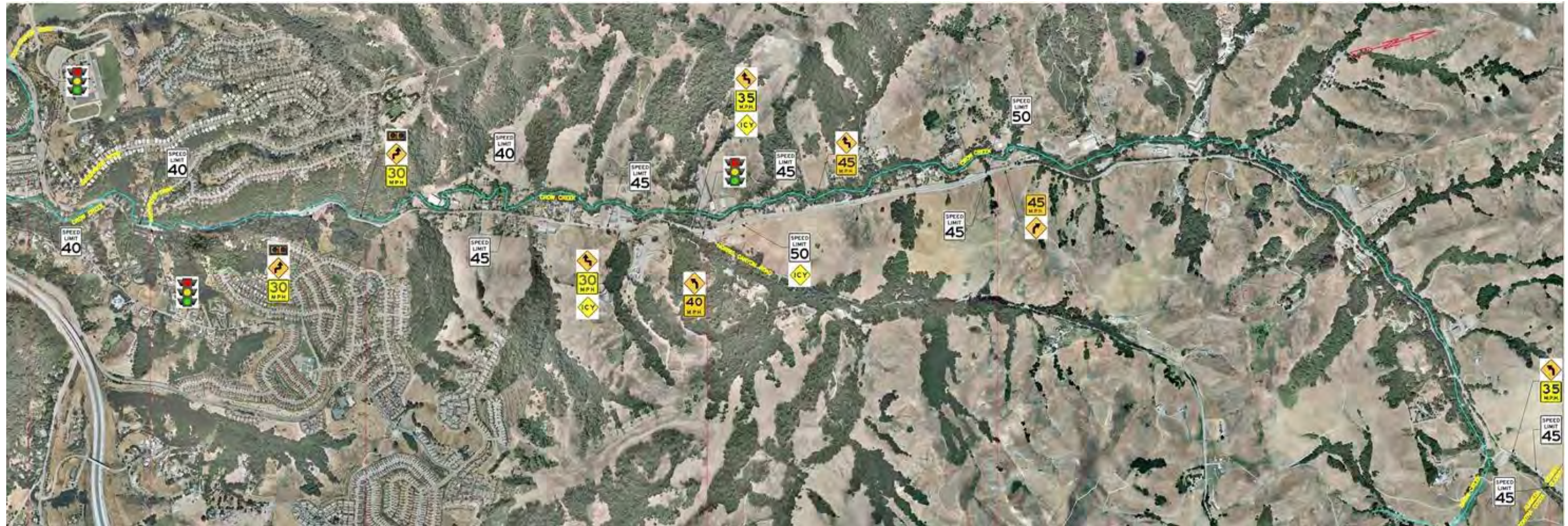


Figure 12: Existing Speed Limit Signage and Signalization

### 3.2.4 LIMITED SHOULDER WIDTH/OFF-ROAD RECOVERY SPACE

Prior to the 2012/2013 resurfacing project previously discussed, shoulder widths were narrow, inconsistent and in some locations, nonexistent. The only exception was within Segment 4, where existing shoulders were approximately 8-feet wide. Within Segments 1, 2, 3 and 5, shoulder widths were narrow or unpaved, providing minimal space outside the traveled way for bicycles, pedestrian or equestrians. In the absence of minimal shoulders, the safety of maintenance crews or drivers and passengers of disabled vehicles is at risk. The resurfacing project narrowed the existing lane width in each direction to approximately 12-feet, allowing for a shoulder width of approximately 4 to 6-feet (where feasible) from Cold Water Drive to Mile Post 5.3.

Throughout the study corridor, roadside recovery space for errant vehicles and for the safety of bicyclists and pedestrians is limited due to the presence of existing above-ground utilities (power poles, fire hydrants and drainage structures), guardrails and bridge railings, retaining walls and private property fencing.

A table summarizing obstructions within the clear recovery zone is included in a separate "Documentation" volume.

### 3.2.5 SIDE SLOPES AND DRAINAGE DITCHES

Steep roadside slopes, limiting "clear recovery zone" provisions, are present throughout the study corridor. Many of these areas would be classified as "marginally recoverable," with an increased chance of a roadside crash. Existing rock formations, historic landslide and erosion areas, and pavement edge drop-offs exasperate this lack of off-road clear recovery space. Crow Creek running alongside a significant length of the study corridor, as well as both lined and unlined ditches immediately adjacent to the roadway, contribute to severely limiting the available recovery areas.

A table summarizing side slope inclinations along the roadway is included in a separate "Documentation" volume

### 3.2.6 DRIVEWAYS

Numerous driveways exist in 4 of the 5 roadway segments within the study corridor (Segment 2 being the exception) providing access to both residential and ranching/commercial parcels. The existing traffic volumes, the speed of the vehicles and the limited sight lines at many of the driveways affect safe ingress and egress at these frontage access points.

### 3.2.7 BICYCLE INFRASTRUCTURE

Crow Canyon Road, and in particular that portion of the roadway south of Norris Canyon Road, is a popular route for weekend cyclists. It is expected that bicycle volumes through the corridor will continue to increase into the future.

The existing sharp horizontal curves, discontinuities in shoulder widths and high speed vehicular traffic pose significant risks to even the most experienced cyclists.



The 7-mile stretch of Crow Canyon Road from Cull Canyon Road to the Alameda/Contra Costa County line is included in the April 2012, "Alameda County Bicycle and Pedestrian Master Plan for Unincorporated Areas" as a "Medium Priority" bicycle lane to be completed within 10 years. The improvements are to include signing and shoulder striping/pavement markings only.

### 3.2.8 GEOLOGY

Geologic materials along the corridor include recent alluvial deposits, landslide deposits, and sedimentary rocks of the Non-Marine Tertiary Age Formation, the Marine Tertiary Age Formations, and the Unnamed Formation of the Castro Valley Area. The Non-Marine Tertiary Age Formation consists principally of poorly consolidated, lenticular, interbedded siltstone, sandstone, and conglomerate. The Non-Marine Tertiary Age Formation consists of moderately consolidated, thick-bedded to massive sandstone, with minor thin bedded sandy shell hash beds, and black shale units. The Unnamed Formation of the Castro Valley Area consists of well-consolidated, well-bedded and laminated to thin-bedded and massive sandstone with minor thin-bedded siltstone and a single hard pebble to cobble conglomerate bed. The geologic formations along the road alignment have been tilted, folded, fractured, and faulted.

### 3.2.9 UTILITIES

The types of existing utility facilities within the roadway corridor vary dependent upon the study segment. See Figures 13 through 18. However, overhead electric lines and telephone lines, and the East Bay Municipal Utilities District (EBMUD) water transmission pipeline are present throughout the study limits. In many areas, the pipeline is directly beneath the travel way or shoulder of the existing roadway. In other areas, the pipeline is located just off the roadway. The depth of the pipeline varies. At the north end of the study, the pipeline is in a tunnel which is up to 50 feet below the ground surface while in other areas the pipeline is in a trench which is less than 10 feet deep.

Above ground utility facilities along Crow Canyon Road also include telephone and television. Underground or sub-surface facilities include PG&E gas and electric lines, sanitary sewer, storm drain, street light and traffic signal conduits. Additionally, water wells and leach fields/septic system subsurface improvements are present on properties adjacent to the roadway.

Any proposed future safety improvements will need to address protection or relocation of impacted existing utilities as a component of the overall cost of the improvement project.

### 3.2.10 ROADWAY DRAINAGE

The existing drainage system consists of curbs, dikes, and ditches that convey runoff to inlets, cross culverts, and down drains that eventually outfall into Crow Creek. At locations where a median ditch is present, the roadway runoff drains toward the median ditch, this conveys runoff to inlets and into culverts that discharge to Crow Creek.

Crow Canyon Road crosses over Crow Creek at five locations within the study corridor and is generally located west of the creek. Within the vicinity of the study corridor, Crow Creek remains in natural channels and enters closed culverts at roadway crossings. According to the Federal Emergency Management Agency's Flood Insurance Rate Maps, the creek has the capacity to contain the 500 year flood event.

A more detailed description of the study corridor's roadway drainage, and potential impacts of proposed future safety improvements are included in a memorandum titled, "Crow Canyon Road Improvements – Floodplain, Stormwater Quality and Drainage Technical Memorandum," prepared by WRECO dated November 10, 2014. This memorandum has been included in Appendix D.

### 3.2.11 EXISTING RIGHT-OF-WAY

Figures 13 through 18 show the existing road right-of-way through the study corridor. As can be seen from the figures, the existing right-of-way width varies widely throughout the corridor. The minimum right-of-way width is approximately 60 feet, with the maximum width exceeding 250 feet.

### 3.2.12 ENVIRONMENTAL FEATURES

A report prepared by ICF International entitled, "Crow Canyon Road Safety Improvements Project Preliminary Environmental Analysis," dated June 2015, is included in Appendix E. A brief summary of that report is presented below.

#### 3.2.12.1 ENVIRONMENTAL RESOURCES

The biological resources setting of the project area is the roadway itself surrounded by Crow Creek, agricultural lands, large residential developments, and rural development, including ranchettes and horse stables. Extensive residential and other urban development has occurred further afield in the hills along either side of Crow Creek. Access to these areas is through Crow Canyon Road and its connecting roadways. Although much of the land within the project area has been developed for urban and other human uses, there are still significant areas of natural habitat within the project area that could support a number of special-status species.

Biological resources were evaluated for their potential to occur within the project area after an examination of the U.S. Geological Survey 7.5-minute Las Trampas Ridge and Hayward quadrangles and aerial photographs as well as a review of pertinent literature. Lists of special-status species were obtained from the U.S. Fish and Wildlife Service (USFWS) list of federal endangered and threatened species that occur in or may be affected by projects in the quadrangles requested,<sup>6</sup> CDFW California Natural Diversity Database (CNDDDB),<sup>7</sup> and California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants.

After the CNDDDB and CNPS lists were queried, 17 plant and 23 wildlife species with the potential to occur in the project area were identified. These plant and wildlife species are summarized below and described in detail in Attachment E of this document.

#### 3.2.12.2 PLANTS

The project site is located in an area in and/or near known occurrences of Diablo helianthella, Loma Prieta hoita, woodland woolly threads, Congdon's tarplant, Santa Cruz tar plant, bent-flowered fiddleneck, hairless popcornflower, San Joaquin spearscale, alkali milk-vetch, western leatherwood, fragrant fritillary, most beautiful jewel-flower, round-leaved filaree, Mt. Diablo fairy lantern, Northern California black walnut, oval-leaved viburnum, and big-scale balsamroot.

### 3.2.12.3 WILDLIFE (NON-FISH)

The project site is located in areas in and/or near known occurrences of California red-legged frog (federally threatened and a state species of special concern), California tiger salamander (federally and state threatened), vernal pool fairy shrimp (federally threatened), Alameda whipsnake (federally and state threatened), San Francisco dusky-footed wood rat (a state species of special concern), western pond turtle (a state species of special concern), sharp-shinned hawk (active nests protected by the Migratory Bird Treaty Act [MBTA] and California Fish and Game Code 3503), pallid bat (a species of special concern), golden eagle (active nests protected by MBTA and Fish and Game Code 3503), great blue heron (active nests protected by MBTA and Fish and Game Code 3503), western mastiff bat (a species of special concern), hoary bat (a Western Bat Working Group species of medium priority), and yellow warbler (a species of special concern). Other species that have been identified as occurring within the Hayward sandal Trampas quadrangles, but are not expected to have suitable habitat within the project area, include western snowy plover, California brown pelican, California clapper rail, California least tern, and salt marsh harvest mouse.

### 3.2.12.4 FISH

As previously described, the project site includes crossings over Crow Creek. Historically, central California coast steelhead occurred in Crow Creek. Currently, there are many partial barriers and one full barrier on Crow Creek downstream of the project site. This precludes steelhead from migrating upstream into the project site. Impacts on water quality could potentially occur during construction of potential future safety improvements. These would be temporary effects, and water quality measures to minimize effects on Crow Creek will be addressed in the NPDES and Stormwater Pollution Prevention Program (SWPPP), which would be required for all improvements that involve one acre or more of land disturbance activities. Land disturbance activities include grading, excavation, storage and use of materials/equipment in staging areas, demolition of concrete, paving/re-paving, and other similar activities. As part of the SWPPP, storm drains and nearby receiving water bodies, such as Crow Creek, would need to be protected from potential discharge of contaminants, such as sediments, trash, concrete, and hazardous materials. Other species that have been identified as occurring within the Hayward and Las Trampas quadrangles, but that are not expected to have suitable habitat within the project area, include delta smelt, coho salmon, Central Valley springrun Chinook salmon, and Sacramento River winter-run Chinook salmon.

### 3.2.12.5 WETLANDS/WATERS OF THE U.S. AND WATERS OF THE STATE

Potential wetlands and/or waters of the U.S., as well as potential waters of the State are present within the project area, primarily along Crow Creek and its tributaries. Some potential future projects include crossing and drainage modifications near and/or in Crow Creek and its tributaries and has the potential to affect wetlands and waters of the U.S. under the jurisdiction of the USACE and waters of the State under the jurisdiction of the San Francisco RWQCB.

### 3.2.12.6 RARE NATURAL COMMUNITIES

Valley needle grass grassland is listed by CDFW as a rare natural community and it is known to occur within the Las Trampas Ridge and Hayward quadrangles.

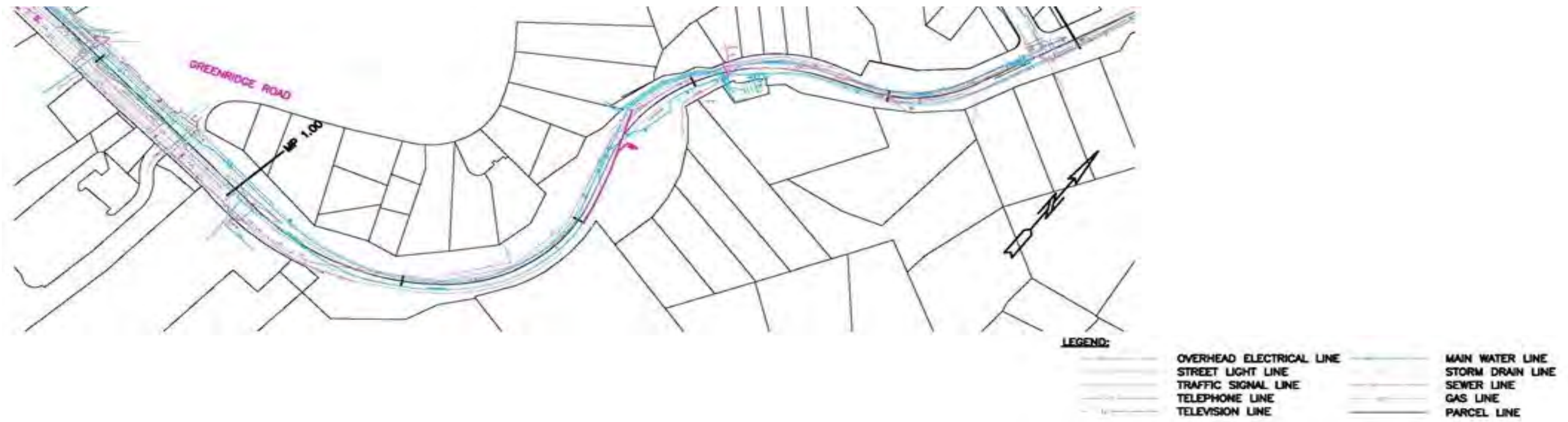


Figure 13: Segment 1 Existing Right of Way and Utilities

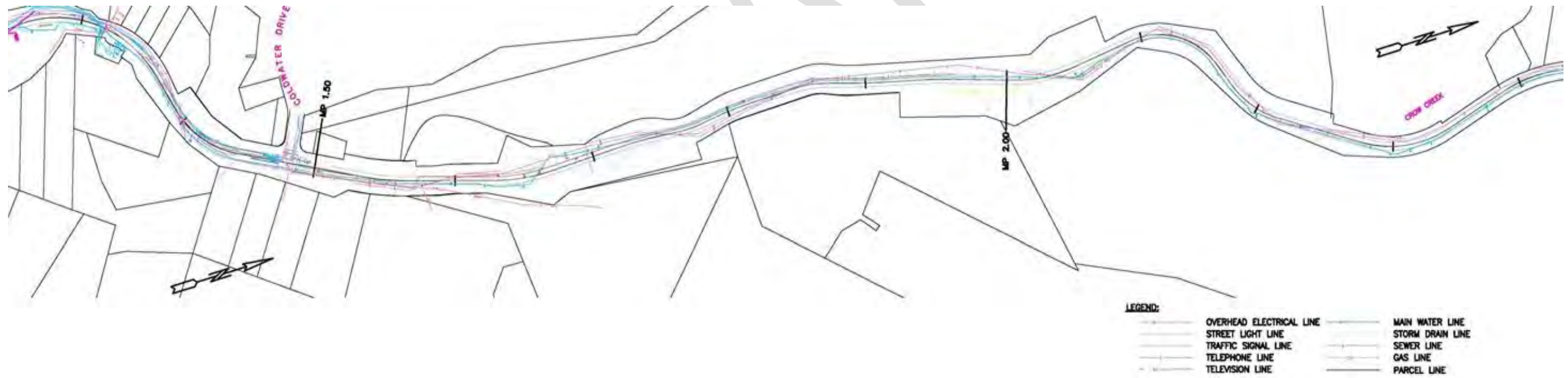


Figure 14: Segment 1 Existing Right of Way and Utilities



Figure 15: Segment 3 Existing Right of Way and Utilities

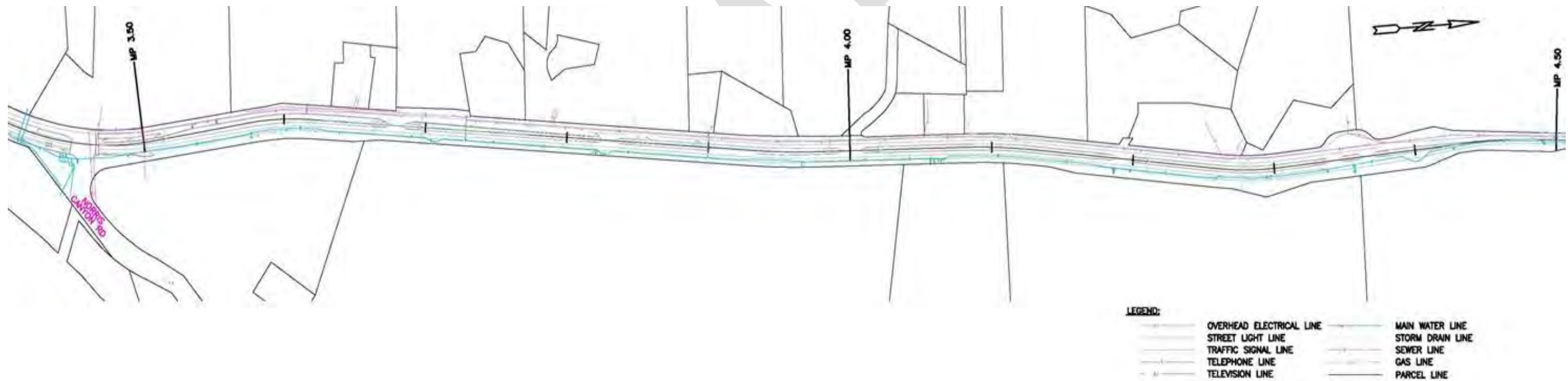


Figure 16: Segment 4 Existing Right of Way and Utilities

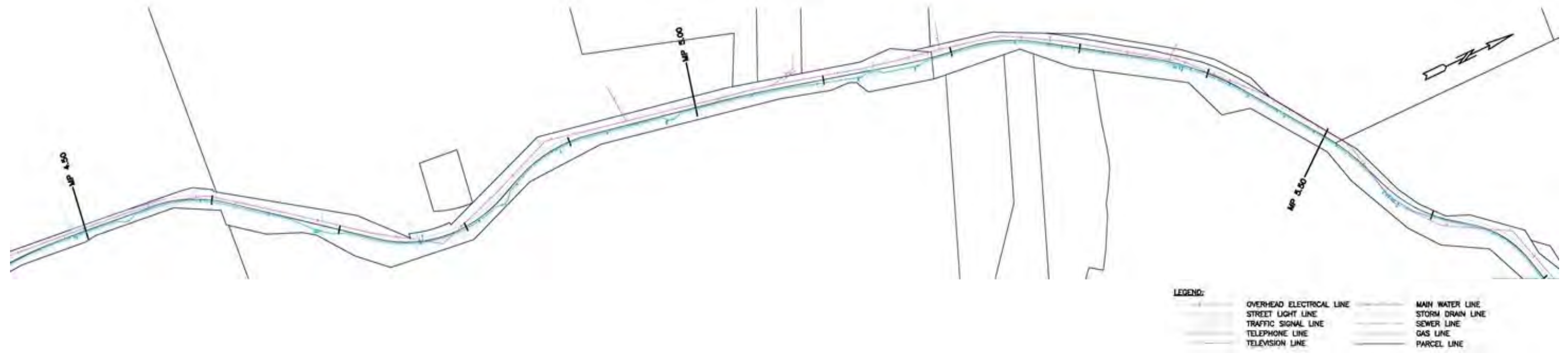


Figure 17: Segment 5 Existing Right of Way and Utilities

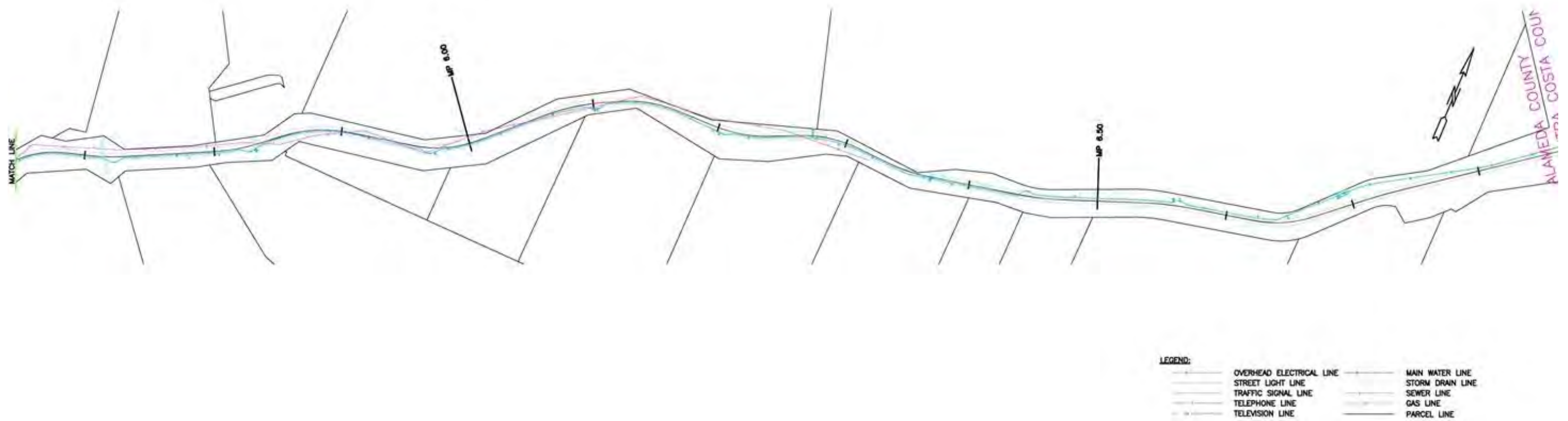


Figure 18: Segment 5 Existing Right of Way and Utilities

## 4.0 COMMUNITY INVOLVEMENT

### 4.1 PUBLIC OUTREACH PLAN

An important element of the Safety Study was the identification, consideration and analysis of the safety concerns held by local residents living or working within the study limits. In an effort to solicit residents' input to the study, a fact sheet was provided to residents in close proximity to the study corridor and three public meetings were held as the Study progressed. These meetings were highly publicized through the local media and individual mailings to 262, 366 and XXX addresses for Public Meeting No. 1, Public Meeting No. 2 and Public Meeting No.3, respectively. The meetings were held at strategic times during the study process to present initial findings, the identification of potential future safety improvements and the prioritization of the recommended improvements. Comment forms were made available to the public. The fact sheet, presentation slides, and comment form are included in Appendices F through J.

### 4.2 PUBLIC INPUT OPPORTUNITIES

#### 4.2.1 PUBLIC MEETING NO. 1

The first public meeting was held on February 13, 2013 at 6:00 pm at the Canyon Middle School in Castro Valley. There were approximately 60 people in attendance, including staff from Supervisor Nate Miley's office, the California Highway Patrol, The Daily Review, and bicycle advocates. The meeting's presentation focused upon the need for a safety study; the goals of the safety study; the existing traffic and roadside conditions; and community participation opportunities. Comment forms were made available to the public. The fact sheet, presentation slides, and comment form are included in Appendix B.

A summary of the comments voiced at the meeting included:

- Excessive speeding on Crow Canyon Road, and that the project should make the road safer, not faster.
- Strong feelings to not improve the alignment of the road.
- Tailgating is a major and frequent problem. Cars routinely cross double yellow lines to pass.
- A strong desire to maintain the rural characteristic of the area.
- A few residents complained of high truck traffic and high traffic noise.
- Several residents were concerned that there is not enough CHP enforcement on the road. Speeders go unchecked.
- Difficulty getting in and out of driveways due to high traffic volumes and speeding.
- Some residents expressed concern that they may lose some of their frontage property if the roadway is improved.
- Many acknowledged the "S" curve at Post Mile 2.15 as a high accident area.
- Concerns raised for the safety of bicyclists due to narrow shoulders and speeding vehicles.

- A few individuals complained that the road is used as a bypass between I-580 and I-680. They stated that a new highway connector to the north should be built to take traffic off this rural/residential road.

Numerous questions and comments were received by the County within a month following the meeting, with the majority of these comments from cyclists urging for wider, continuous shoulders and lower motor vehicle speeds on the road. The general context of the comments was that Crow Canyon Road is too dangerous for commuting or recreational use by the cycling community.



#### 4.2.2 PUBLIC MEETING NO. 2

The second public meeting was held on May 28, 2014 at 6:00 pm at the Castro Valley Public Library. Approximately 35 people attended this second meeting. Representatives from both the California Highway Patrol and Supervisor Miley's office were again in attendance. The focus of this second public meeting was directed towards presenting a summary of the issues and concerns received from local residents and cycling advocates as a result of the first meeting; identification of safety improvement locations; and identification of potential future safety improvements. Comment forms were again made available to the public.

A general summary of the comments or concerns received at the meeting are listed below:

- Decrease vehicle speeds. Reduce speed limit, even if the posted speed limit is unenforceable.



- Limit truck usage of Crow Canyon Road.
- Protect Crow Creek and mitigate environmental impacts of any proposed improvements.
- Both acceptance and concern regarding the proposed roundabouts.
- Have the State study a bypass route to accommodate commuters.
- Concern that two-way-left-turn lanes or left turn pockets will be used for passing slower vehicles.
- Provide left turn lanes in Segment 4 to accommodate vehicles pulling horse trailers.
- Concern that pavement widening for the proposed improvements will require property acquisitions.
- Provide enough time between near-term improvements and implementation of medium/long-term improvements to assess the effectiveness of the initial projects.
- Approved new housing developments in San Ramon will increase traffic on the road.
- Daylight portions of Crow Creek that have been previously undergrounded.
- Construct a roadway bridge near Mile Post 2.15 to reduce speeding.

A number of questions were also raised by the meeting participants. The following is a summary of those questions:

- How will CHP enforcement improve, and at what locations?
- When can the speed feedback signs be installed? How much do they cost? Are they solar powered?
- Can the number of speed limit signs be increased, particularly in Segment 5?
- What will be the configuration of left turn lanes?
- Why reduce the number of lanes in Segment 4?
- Has an environmental assessment been conducted? Noise and traffic studied? Storm water management considered?
- How will improvements be paid for or funded?
- Will community feedback be sought for long-term versus near-term improvements?



### 4.2.3 PUBLIC MEETING NO. 3

The third and final public meeting was held on June 2, 2016 at 6:00pm at the Castro Valley Public Library.

All public comments relating to the focus of this Safety Study have been considered and addressed within the Study. Comments and responses to the Crow Canyon Road Safety Study are included in Appendix K. A number of ideas or comments received were considered, but determined to either be unachievable or beyond the scope of this document. These ideas are included and evaluated under the "COUNTERMEASURES CONSIDERATIONS" section of the Study.

## 5.0 ROADWAY DESIGN CRITERIA

### 5.1 DESIGN CRITERIA

Standard highway design criteria, suitable for major rural arterial roadways, were used in evaluating safety issues that were identified as possibly contributing to reported accidents along the roadway. This design criteria was also used in assessing concerns that local residents living or working along the corridor felt were related to roadway safety. A partial listing of highway design criteria referenced included the following:

- A Policy on Geometric Design of Highways and Streets, 2011, 6<sup>th</sup> edition; American Association of State Highway and Transportation Officials (AASHTO)
- Guide for the Development of Bicycle Facilities, 2012, 4<sup>th</sup> Edition (AASHTO)
- FHWA Road Safety Audit Guidelines
- Alameda County Public Works – Engineering Design Guideline
- Caltrans Highway Design Manual, 6<sup>th</sup> Edition, 2012 (HDM)
- Caltrans Local Assistance Procedures Manual (LAPM)

### 5.2 PUBLIC INPUT

The public attending the first and second community meetings clearly expressed a strong desire to see safety improvements focus on reduction of speeding, while maintaining the rural characteristics of the corridor. As a result of this strong desire, this study focused on proposed safety improvements that generally maintained the existing roadway alignment rather than recommending design criteria to meet higher vehicle speeds. Common concerns heard throughout the community involvement portion of the study were related to vehicle speeds and safe access to adjacent properties.

### 5.3 ENVIRONMENTAL CONSTRAINTS

In evaluating potential safety issues, and recommending future roadway improvements within the Crow Canyon Road corridor, this study focused upon improvements that would protect Crow Creek and minimize any environmental impacts within the study corridor.

The creek and surrounding landscape is home to many biological species, including a number of sensitive species. Cultural and archeological resources are also present within the study corridor. Design criteria for recommended future roadway safety improvements was selected that kept the rural character and the minimization of environmental impacts in mind.

### 5.4 CONTEXT SENSITIVE SOLUTIONS

As defined by the Federal Highway Administration (FHWA), “Context sensitive solutions (CSS) is a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility. CSS is an approach that considers the total context within which a transportation improvement project will exist.”

Throughout the process of identifying potential safety improvements within the study corridor, this study focused upon an approach that preserved the scenic, aesthetic, community and environmental characteristics and resources of Crow Canyon.

In order to involve all stakeholders and incorporate a collaborative and community-sensitive approach, this Safety Study considered the ideas and opinions voiced during three community meetings in the identification, evaluation and recommendation of safety improvement projects.

## 5.5 “COMPLETE STREETS”

The Alameda County Public Works Agency, in collaboration with all cities within the County, has adopted a Complete Streets Resolution. As part of this resolution, the County has expressed its commitment to considering accommodation of all users and all modes of transportation in the development of all projects

As identified in Section 2.2, “Safety Study Goals,” the goals of this study were to improve safety and traffic flow along the Crow Canyon Road corridor for all users of the roadway; including motorists, cyclists, pedestrians, and equestrians. In consideration of these goals, all recommended potential safety improvements accommodate all modes of transportation and all users of the roadway corridor.

## 6.0 STUDY APPROACH AND METHODOLOGY

### 6.1 APPROACH

The Safety Study's approach focused on identifying, recommending and prioritizing future corridor improvements within the study limits that met the following criteria:

- Consideration of Crow Canyon Road as a multi-use and multi-modal corridor.
- Consideration of locations with a high frequency of accidents.
- Preservation of the roadway's rural character and the minimization of environmental impacts.
- Broad support from the local residents.

#### 6.1.1 CONSIDERATION OF CROW CANYON ROAD AS A MULTI-USE AND MULTI-MODAL CORRIDOR

As previously discussed, Crow Canyon Road functions as both an arterial route for inter-county commuters as well as local access to the numerous residents, ranches and businesses throughout the canyon. Although motor vehicles account for the vast majority of traffic using the roadway, recreational use by cyclists has a high probability of increasing in the future. The identification of future roadway improvements needs to consider accommodation of the multi-use and multi-modal nature of the road.

#### 6.1.2 CONSIDERATION OF LOCATIONS WITH A HIGH FREQUENCY OF ACCIDENTS

Locations for future roadway safety improvements were selected based, in large part, upon roadway segments or sites with a history of high accident frequency. Specific attention was focused upon locations with a high occurrence of accidents, or accident "clusters," over the 10-year study period. These areas are known as high crash concentration locations or HCCLs.

#### 6.1.3 PRESERVE RURAL CHARACTER AND MINIMIZATION OF ENVIRONMENTAL IMPACTS

Throughout the public input process, a strong recurring theme or concern voiced by the majority of the local residents was the desire to preserve the rural nature and characteristics of the existing roadway. There was also the strong desire to maintain the existing geometric alignment of the road, fearing that any alignment improvements at the numerous horizontal curves would just encourage additional speeding.

The Crow Canyon Road corridor is populated by numerous environmental features. The most significant of these features is Crow Creek, which is located generally parallel to Crow Canyon Road. The creek runs adjacent to the roadway throughout Segments 2 and 5, and crosses the roadway in several locations within the study limits. The creek and surrounding landscape is home to many biological species, including a number of sensitive species. Cultural and archeological resources are also present within the study corridor. Future roadway safety improvements need to protect Crow Creek and minimize any environmental impacts that may be associated with the improvement project.

#### 6.1.4 BROAD SUPPORT FROM THE LOCAL RESIDENTS

The Safety Study included a significant public outreach and participation component in an effort to identify existing safety issues that concerned the local residents and property owners within the study

limits. A general description of this outreach effort, and reported concerns from the residents were presented within the “COMMUNITY INVOLVEMENT” section of the Study. The most prevalent concerns were:

- Slow down traffic.
- Provide safer access to adjacent properties.
- Reduce amount of motor vehicle traffic.
- Preserve private property.

In order to gain broad, local community support for the recommended potential improvements, these safety concerns held by many of the corridor residents need to be considered.

## 6.2 COUNTERMEASURE IMPLEMENTATION

The Study recommends potential future safety improvements, or more commonly referred to as countermeasures, through the combination of both a Systemic Approach as well as a Spot Location Approach within the study corridor.

### 6.2.1 SYSTEMIC APPROACH

The Systemic Approach is based upon addressing a particular safety issue, or multiple issues, within the entire study corridor. This approach recommends proven safety countermeasures at several crash sites or locations along the roadway corridor. A benefit of the Systemic Approach is the ability to address locations where high numbers of accidents or crashes have not occurred, but have similar roadway or roadside conditions that have been identified as HCCLs.

### 6.2.2 SPOT LOCATION APPROACH

The Spot Location Approach is based upon treating specific locations having a significantly higher frequency of crashes. This approach does, however, assume that these locations will continue to experience these same numbers and types of crashes. The use of 10 years of accident history within the study corridor, emphasizing the random nature of roadway crashes, has the influence of mitigating this drawback.

## 6.3 METHODOLOGY

The methodology used to analyze and review existing locations with safety issues and locations of potential future safety concerns included site observations within the study corridor; consideration of the safety concerns brought forward in the community meetings; and collision or crash frequency and pattern evaluation.

### 6.3.1 EXISTING ROADWAY SAFETY ISSUES FROM SITE OBSERVATIONS

Field observations of the existing conditions within the study corridor were identified through a “windshield” reconnaissance of the roadway performed during late 2012 and early 2013. Additionally, both preliminary engineering and “as-built” construction documents provided by the Public Works staff

were reviewed. A number of potential safety concerns were noticed during these site visits. These are summarized in the list below:

Observed Existing Safety Issues

- Numerous curves have limited horizontal sight distance and narrow or no shoulders, especially the curve at Mile Post 2.15.
- Speed management throughout study corridor.
- Bicycle safety and accommodation – no bike lane or adequate shoulders.
- Limited sight distance on several crest vertical curves.
- Passing zone north of Norris Canyon Road promotes high-speed southbound approach to signalized intersection.
- Limitations in areas for CHP enforcement and maintenance pullouts.
- Cut retaining walls within clear recovery zone without safety shape.
- Fill retaining walls along creek at edge of shoulder without railing.
- Shoulder widths are not consistent and non-existent at some locations.
- Debris on shoulders such as loose rocks, vegetation, dead animals, etc.
- No safe (or designated) locations to make U-turns.
- Difficulties accessing in and out of driveways.
- Insufficient shoulder width for deceleration into driveways, and for acceleration out of driveways (turning right).
- Limited turn lanes / sight distance to protect left turning vehicles accessing driveways from rear end accidents.
- Vehicles following a vehicle slowing down to access a driveway (on the right) often pass to the left, crossing double yellow lines.
- Vehicles following a vehicle slowing down or stopped to access a driveway (to the left) are often forced to stop or pass on the right via the shoulder.
- Wildlife (mainly deer) and farm animals on roadway.
- Limited clear recovery zone provisions (critical side slopes, fixed objects – power poles, fire hydrants, drainage structures, trees, fences, etc.).
- Long uphill northbound grade (near San Ramon) promotes illegal passing.
- Posted speed limit at curves exceeds design standards (sight distance).
- Mud slides / Rock falls / Flooding.
- Pavement edge drop-offs.
- Crosswalk at Cold Water Drive connects into a vegetated slope.

### 6.3.2 RISK EVALUATION OF OBSERVED EXISTING SAFETY ISSUES

The methodology used to identify and evaluate the risk levels of potential collisions associated with the observed existing safety issues was adapted from the Australian “Guide to Roadway Safety: Part 6 Road Safety Audit.” This same methodology was used for the Road Safety Audit for State Route 84 between Mission Boulevard and Interstate 680 prepared by Delphi MRC in August 2012. This adopted methodology relies solely upon professional judgment and, although not scientific, has been found to be useful in providing a level of risk and a suggested treatment approach of safety issues.

The Australian approach is based upon, “how often the safety issue is likely to lead to a collision,” and “potential severity of the resulting crash.” The following tables establish criteria regarding the frequency that an issue is likely to cause a collision and the severity of the collision that would result from the safety issue.

**Table 9: Frequency of which Safety Deficiency Leads to a Crash**

Frequency	Description
Frequent	Once or more per week
Probable	Once or more per year (but less than once a week)
Occasional	Once every 5 to 10 years
Improbable	Less often than every 10 years

**Table 10: Likely Severity of the Resulting Crash Type**

Severity	Description	Examples
Catastrophic	Likely multiple deaths	High-speed, multi-vehicle crash
Serious	Likely death or serious injury	High or medium-speed vehicle/vehicle collision High or medium-speed collision with a fixed roadside object Pedestrian or cyclist struck by a car
Minor	Likely minor injury	Some low-speed vehicle collisions Cyclist falls from bicycle at low speed Left-turn/rear end crash
Limited	Likely trivial injury or property damage only	Some low-speed vehicle collisions

The criteria from Tables 9 and 10 are then combined to illustrate the resulting level of risk associated with a particular issue, and then how to respond to that risk.



**Table 11: Resulting Level of Risk**

<b>Severity</b>	<b>Frequent</b>	<b>Probable</b>	<b>Occasional</b>	<b>Improbable</b>
Catastrophic	Very High	Very High	Very High	High
Serious	Very High	Very High	High	Medium
Minor	Very High	High	Medium	Low
Limited	High	Medium	Low	Low

**Table 12: Treatment Approach**

<b>Risk</b>	<b>Suggested Treatment Approach</b>
Very High	Must be corrected.
High	Should be corrected or the risk significantly reduced, even if the treatment cost is high.
Medium	Should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high.
Low	Should be corrected or the risk reduced, if the treatment cost is low.

Applying this methodology to the existing safety issues observed during the field visits results in the "Risk Assessment" shown in Table 13 on the following page.

### 6.3.3 CRASH FREQUENCY AND PATTERN EVALUATION

Crash frequency analysis is one of the two main quantitative crash analysis methods used to determine the selection and prioritization of potential safety improvement countermeasures. The numbers of crashes within the study corridor over the period from January 2003 to December 2012 were determined using the State crash database called SWITRS, or Statewide Integrated Traffic Records System. Table 7 and Figure 19 show all reported accidents within the study corridor over the 10-year timeframe. More detailed information of each crash is documented in Appendix B. Through the analysis of the crash data, accident locations and crash characteristics with the highest frequency were determined.

**Table 13: Risk Assessment of Observed Existing Safety Issues**

<b>Observed Existing Safety Issues</b>	<b>Frequency*</b>	<b>Severity</b>	<b>Risk</b>
Numerous curves have limited horizontal sight distance and narrow or no shoulders, especially the curve at Mile Post 2.15.	Probable	Serious	Very High
Speed management throughout study corridor.	Probable	Serious	Very High
Bicycle safety and accommodation – no bike lane or adequate shoulders.	Probable	Serious	Very High
Limited sight distance on several crest vertical curves.	Probable	Minor	High
Passing zone north of Norris Canyon Road promotes high-speed southbound approach to signalized intersection.	Probable	Serious	Very High
Limitations in areas for police enforcement and maintenance pullouts.	Probable	Minor	High
Cut retaining walls within clear recovery zone without safety shape.	Probable	Serious	Very High
Fill retaining walls along creek at edge of shoulder without railing.	Probable	Serious	Very High
Shoulder widths are not consistent and non-existent at some locations.	Probable	Minor	High
Debris on shoulders such as loose rocks, vegetation, dead animals, etc.	Probable	Limited	Medium
No safe (or designated) locations to make U-turns.	Probable	Minor	High
Insufficient shoulder width for deceleration into driveways, and for acceleration out of driveways (turning right).	Occasional	Minor	Medium
Limited turn lanes / sight distance to protect left turning vehicles accessing driveways from rear end accidents.	Probable	Minor	High
Vehicles following a vehicle slowing down to access a driveway (on the right) often pass to the left, crossing double yellow lines.	Probable	Serious	Very High
Vehicles following a vehicle slowing down or stopped to access a driveway (to the left) are often forced to stop or pass on the right via the shoulder.	Probable	Minor	High
Wildlife (mainly deer) and farm animals on roadway.	Occasional	Serious	High
Limited clear recovery zone provisions (critical side slopes, fixed objects – power poles, fire hydrants, drainage structures, trees, fences, etc.).	Probable	Serious	Very High
Long uphill northbound grade (near San Ramon) promotes illegal passing.	Probable	Serious	Very High
Posted speed limit at curves exceeds design standards (sight distance).	Occasional	Minor	Medium
Mud slides / Rock falls / Flooding.	Occasional	Limited	Low
Pavement edge drop-offs.	Occasional	Minor	Medium
Crosswalk at Cold Water Drive connects into vegetated slope.	Improbable	Minor	Low

\*Likelihood that observed safety issue will lead to an accident. See Table 9 for descriptions

#### 6.3.4 CRASH RATE ANALYSIS

Crash rate analysis is the other main quantitative crash analysis method used to select and prioritize countermeasures. Crash rate analysis compares how a specific segment of roadway compares with similar roadway segments or types. A crash rate for a particular segment of roadway is expressed as “crashes per million vehicle miles of travel”. The crash rate for intersections is expressed as “accidents per million entering vehicles.” This analysis method allows the crash rate of a particular road or roadway segment to be compared with the average crash rate of similar roads around the state. Figure 20 illustrates the comparison of Crow Canyon Road’s crash rate (by 0.10 Mile Post increments) to the statewide average for similar roadways.



### ACCIDENT RATE BY LOCATION 2003 - 2013

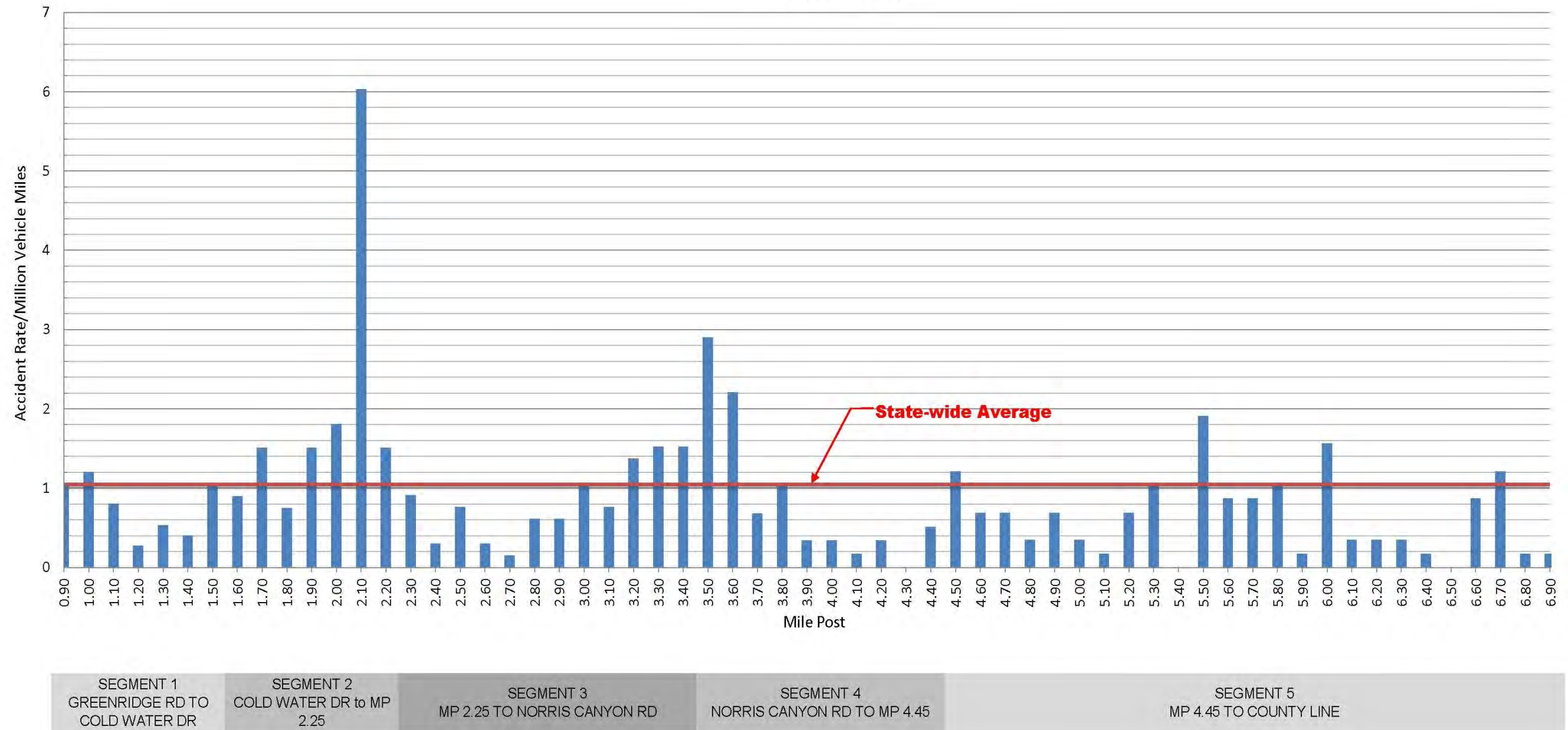


Figure 20: Accident Rate by Location

## 7.0 STUDY CORRIDOR ANALYSIS

An analysis of accident data within the study limits shows that 342 accidents were reported over the 10-year period from January 1, 2003 to December 31, 2012. The total number of accidents within the corridor over this study period is likely somewhat higher, since not all accidents are reported to the police.

This section describes the general observations and subsequent accident analyses and safety evaluations for each roadway study segment. These observations include; the compilation of the risk assessment of field-observed existing safety issues; the safety concerns perceived by local residents; and the results of the collision frequency and collision pattern analyses.

It should be noted that this analysis was limited to the evaluation of high accident locations and areas of concern brought forward by the local residents during the public outreach sessions. The scope of this Study included the identification and recommendation of future roadway safety improvements at the conceptual level. The scope did not include activities associated with either preliminary engineering design or final design plans.

### 7.1 SEGMENT 1: GREENRIDGE ROAD (MP 0.95) TO COLD WATER DRIVE (MP 1.45)

#### 7.1.1 SEGMENT 1 OBSERVATIONS

##### 7.1.1.1 *FIELD-OBSERVED SAFETY ISSUES*

- A number of curves with narrow shoulders.
- Limited horizontal sight distance at the second curve north of the transition from 4 lanes to 2 lanes (Mile Post 1.30).
- Numerous power poles within clear recovery zone.
- Inconsistent shoulder widths.
- Lack of enforcement areas.
- Pavement edge drop-offs at edge of shoulder.

##### 7.1.1.2 *PERCEIVED SAFETY ISSUES IDENTIFIED BY LOCAL RESIDENTS*

- Need increased speed limit enforcement. Many drivers exceeding the posted speed limit.
- Drivers crossing the double yellow line to pass slower vehicles.
- Narrow shoulders in the southbound direction as the road transitions from 2 lanes to 1 lane.
- Many fixed objects along roadside.
- Ponding of storm water on roadway at creek crossing following heavy rainfall.

## 7.1.1.3 COLLISION PATTERN ANALYSIS

- As shown in Table 14, Segment 1 experienced a higher percentage of “Hit Object” and “Rear-end” crashes as compared to other accidents in this segment. Of the total 40 accidents that occurred, fifteen crashes involved hitting a roadside object and seven crashes were rear-end collisions.
- “Unsafe Speed” or “Improper Turning” were the primary collision factors most cited by the responding officer. Although 64% of vehicles were recorded as travelling below the posted speed limit, the available accident information suggests that approximately 30% of reported crashes were speed related.
- The crash rate in this segment slightly exceeded the state-wide average over the 10-year study period.
- Over 50% of the crashes occurred at the signalized intersections of San Simeon Place, Greenridge Road and Cold Water Drive.

**Table 14: Segment 1 Collision Pattern**

Segment	Accident or Collision Type							Segment Total
	Animal-Involved	Broadside	Head-On	Hit Object	Overtaken	Rear-End	Sideswipe	
1	3 (8%)	5 (13%)	2 (5%)	15 (38%)	3 (8%)	7 (18%)	5 (13%)	40

## 7.1.2 SEGMENT 1 ANALYSIS

- Field observed safety conditions that would rate as “Very High” in the risk evaluation include:
  - Numerous fixed objects within the clear recovery zone.
  - Speed management throughout segment.
  - Bicycle safety and accommodation.
- Field observed safety conditions that would rate as “High” in the risk evaluation include:
  - Limited horizontal sight distance at the second curve north of the transition from 4 lanes to 2 lanes (Mile Post 1.30).
  - Inconsistent shoulder widths.
- Crash frequency analysis indicates that 15 collisions or 38% of the total collisions within Segment 1 involved a fixed object.
- Speeding was the primary collision factor for over 30% of the total collisions.
- With the exception of the signalized intersection at Greenridge Road, the crash rate within the segment did not exceed the state-wide average for similar facilities.

## 7.1.3 SEGMENT 1 EVALUATION

- Fixed objects within the clear recovery zone should be protected or relocated.

- Although the horizontal curve at Mile Post 1.30 was rated as a “High” risk from field observations, crash data indicated that the area is significantly below the state-wide accident rate.
- Pavement restriping to increase shoulder width should be considered, similar to the 2012/2013 Cold Water Drive to Mile Post 5.30 Improvements discussed under “STUDY CORRIDOR BACKGROUND.”
- Construction of areas for police enforcement should be considered.
- Shoulder “backing” should be constructed where feasible.
- Routine maintenance is recommended where roadway ponding is observed.

## 7.2 SEGMENT 2: COLD WATER DRIVE (MP 1.45) TO MILE POST 2.25

### 7.2.1 SEGMENT 2 OBSERVATIONS

#### 7.2.1.1 *FIELD-OBSERVED SAFETY ISSUES*

- A number of curves with narrow shoulders.
- Limited horizontal sight distance at curves in the vicinity of Mile Post 2.15.
- Retaining walls without safety shape within clear recovery zone.
- Numerous fixed objects (power poles, fire hydrant, tree, fence) within clear recovery zone.
- Inconsistent shoulder widths.
- Lack of enforcement areas.
- Pavement edge drop-offs at edge of shoulder.

#### 7.2.1.2 *PERCEIVED SAFETY ISSUES IDENTIFIED BY LOCAL RESIDENTS*

- Need increased speed limit enforcement. Many drivers exceeding the posted speed limit.
- Drivers crossing the double yellow line to pass slower vehicles.
- Narrow or no shoulders.
- Many fixed objects along roadside.
- Inadequate signing and lighting at Mile Post 2.15.
- Unsafe for bicycle riders.

#### 7.2.1.3 *COLLISION PATTERN ANALYSIS*

- As shown in Table 15, “Hit Object” (35%), “Head-on” (22%) and “Broadside” (15%) crashes account for the highest percentages of accidents within Segment 2.
- Of the 93 total crashes in this segment, over 50 occurred at, or in the vicinity of MP 2.15—the site of a sharp horizontal curve with limited shoulder width and an “unforgiving” roadside area consisting of a steep hillside in the northbound direction and guardrail protecting the steep bank of Crow Creek in the southbound direction.

- Approximately 50% of the accidents within the study period were reported as speed-related. The 85<sup>th</sup>-tile speed was recorded as 49 mph, 9 mph above the posted speed. Nearly 70% of vehicles were recorded as exceeding the posted speed limit of 40 mph.
- In 63 of the total 93 accidents studied, the road surface was reported as “wet”
- The crash rate for the majority of the segment length exceeds the state-wide average for similar facilities. The above average crash numbers appear to relate to the existing narrow width of the roadway and the sharp roadway curvature, particularly at MP 2.15.
- Within the study period timeframe, the County has constructed safety improvements at MP 2.15 in response to the high accident rate. In September, 2010 the County completed pavement grooving and resurfacing of both the northbound and southbound travel lanes, as well as the installation of a median rumble strip. Since completion of this improvement, only 3 accidents have occurred in the vicinity. Two of the accidents involved drunk drivers hitting fixed objects off the road. The third crash was a head-on collision resulting in a fatality.

**Table 15: Segment 2 Collision Pattern**

Segment	Accident or Collision Type							Segment Total
	Animal-Involved	Broadside	Head-On	Hit Object	Overturned	Rear-End	Sideswipe	
2	3	14	20	33	4	10	9	93
	(3%)	(15%)	(22%)	(35%)	(4%)	(11%)	(10%)	

### 7.2.2 SEGMENT 2 ANALYSIS

- Field observed safety conditions that would rate as “Very High” in the risk evaluation include:
  - Limited horizontal sight distance at curves in the vicinity of Mile Post 2.15.
  - Retaining walls without safety shape within clear recovery zone at Mile Posts 1.60, 1.80 and 1.90.
  - Numerous fixed objects within the clear recovery zone.
  - Speed management throughout segment.
  - Bicycle safety and accommodation.
- Field observed safety conditions that would rate as “High” in the risk evaluation include:
  - Inconsistent shoulder widths.
- Local residents also mentioned the need for additional signing and lighting at Mile Post 2.15.

### 7.2.3 SEGMENT 2 EVALUATION

- Although the horizontal curve at Mile Post 2.15 was rated as a “Very High” risk from field observations, crash data indicated that following the completion of pavement grooving, resurfacing and median rumble strip installation in late summer of 2010, the crash rate for non-DUI related accidents was reduced to 0.66 collisions per million vehicle miles.



- The presence of retaining walls without safety shapes observed during field observations suggested a “Very High” risk potential. However, analysis of 10 years of SWITRS’ crash data did not indicate that the presence of the walls contributed to the cause or severity of crashes.
- Fixed objects within the clear recovery zone should be protected or relocated.
- Provide wider roadway shoulders where feasible.
- Construction of areas for police enforcement should be considered.
- Shoulder “backing” should be constructed where feasible.
- Analysis of crash data and field observations did not suggest additional signing or lighting at Mile Post 2.15 appeared warranted.

### 7.3 SEGMENT 3: MILE POST 2.25 TO NORRIS CANYON ROAD (MP 3.44)

#### 7.3.1 SEGMENT 3 OBSERVATIONS

##### 7.3.1.1 *FIELD-OBSERVED SAFETY ISSUES*

- Driveway connections throughout Segment 3.
- Narrow shoulders and limited horizontal sight distance at curve at southern end of segment.
- Limited vertical sight distance near northern end of segment.
- Numerous fixed objects (power poles, fire hydrant, fence) within clear recovery zone.
- Inconsistent shoulder widths.
- Lack of enforcement areas.
- Pavement edge drop-offs at edge of shoulder.

##### 7.3.1.2 *PERCEIVED SAFETY ISSUES IDENTIFIED BY LOCAL RESIDENTS*

- Need increased speed limit enforcement. Many drivers exceeding the posted speed limit.
- Drivers crossing the double yellow line or running off shoulder to pass vehicles waiting to turn into adjacent driveways.
- Narrow or no shoulders.
- Very difficult to enter or exit driveways due to the high volumes of traffic.
- High truck traffic.
- Many fixed objects along roadside.
- Unsafe for bicycle riders.

##### 7.3.1.3 *COLLISION PATTERN ANALYSIS*

- As shown in Table 16, accidents involving “rear-end” and “hit object” crashes account for over 70% of the total collisions. Crashes reported as “broadside” account for 9% of the total collisions in Segment 3.

- With the exception of the northerly end of Segment 3, the crash rate within the segment is below the state-wide average.
- The “rear-end” and “broadside” crashes are likely a result of stopped vehicles attempting to enter or leave adjacent driveways. The “hit object” crashes are likely a result of vehicles attempting to pass stopped vehicles that are waiting for gaps in the opposing traffic stream to complete their turns into adjacent driveways.
- Narrow shoulders, the limited roadside recovery area, and lack of protected turning lanes are factors in nearly 90% of the reported crashes.
- Although the 85<sup>th</sup>-tile speed is just slightly above the posted limit, the primary collision factor of nearly 35% of the reported crashes was listed as “unsafe speed.”

**Table 16: Segment 3 Collision Pattern**

Segment	Accident or Collision Type							Segment Total
	Animal-Involved	Broadside	Head-On	Hit Object	Overtaken	Rear-End	Sideswipe	
3	1	6	5	22	2	26	3	65
	(2%)	(9%)	(8%)	(34%)	(3%)	(40%)	(5%)	

### 7.3.2 SEGMENT 3 ANALYSIS

- Field observed safety conditions that would rate as “Very High” in the risk evaluation include:
  - Limited horizontal sight distance at curves at Mile Posts 2.30 and 3.25.
  - Vehicles crossing over the double yellow line to pass stopped vehicles waiting to turn into driveways.
  - Numerous fixed objects within the clear recovery zone.
  - Speed management throughout segment.
  - Bicycle safety and accommodation.
- Field observed safety conditions that would rate as “High” in the risk evaluation include:
  - Inconsistent shoulder widths.
  - Limited sight distance at the vertical curves near Mile Posts 2.50, 3.15 and the approach to the intersection with Norris Canyon Road.
  - No protected turn lane for vehicles attempting to access driveways
  - Vehicles using the roadway shoulder to pass vehicles waiting to turn into driveways.

### 7.3.3 SEGMENT 3 EVALUATION

- Although the horizontal curves at Mile Posts 2.30 and 3.25 were rated as a “Very High” risk from field observations, analysis of the SWITRS’ crash data did not suggest that the existing sight distance contributed to the cause or severity of crashes. However, it is recommended to study installing a reduced speed warning sign in the vicinity of Mile Post 2.30.
- Provisions for protected turning lanes and acceleration/deceleration areas adjacent to driveways are recommended.

- Fixed objects within the clear recovery zone should be protected or relocated.
- From review of the SWITRS data, the limited sight distance at the vertical curves near Mile Posts 2.50, 3.15 and the approach to the intersection with Norris Canyon Road do not appear to have contributed to the cause or severity of crashes.
- Provide wider roadway shoulders where feasible.
- Construction of areas for police enforcement should be considered.
- Shoulder “backing” should be constructed where feasible.
- Trucks exceeding 3 axles accounted for less than 1% of the total daily traffic.

## 7.4 SEGMENT 4: NORRIS CANYON ROAD (MP 3.44) TO MILE POST 4.45

### 7.4.1 SEGMENT 4 OBSERVATIONS

#### 7.4.1.1 FIELD-OBSERVED SAFETY ISSUES

- Driveway connections on west side of roadway throughout Segment 4.
- Numerous fixed objects (power poles, fire hydrant, fence) within clear recovery zone.
- Lack of enforcement areas.
- Pavement edge drop-offs at edge of shoulder.

#### 7.4.1.2 PERCEIVED SAFETY ISSUES IDENTIFIED BY LOCAL RESIDENTS

- Need increased speed limit enforcement. Many drivers exceeding the posted speed limit.
- Drivers “tailgating” slower vehicles.
- Limited locations for U-turns necessary to access driveways.
- Many fixed objects along roadside.
- Silt debris on south side roadway shoulder at north end of segment.

#### 7.4.1.3 COLLISION PATTERN ANALYSIS

- As shown in Table 17, a high percentage (46%) of “hit object” crashes occurred within Segment 4. The next largest percentages of the total crashes reported involved “broadside” (17%) and “rear-end” (15%) crashes.
- With the exception of the area in the vicinity of the intersection with Norris Canyon Road, the crash rate for the segment is below the state-wide average of 1.03 collisions per million vehicle miles.
- Similar to Segment 3, the “Broadside” and “rear-end” crashes seem to be related to a lack of protected turning lanes.
- The 85<sup>th</sup>-tile speed was recorded as 59 mph, nearly 10 mph above the posted speed limit. “Unsafe speed” was the primary collision factor in over 25% of the reported crashes.

- In July, 2011 the County constructed intersection geometric improvements, including installation of a traffic signal and intersection safety lighting, at the Norris Canyon Road intersection. Since completion of these improvements, only 3 accidents were reported prior to the end of the study period. Two accidents involved a vehicle hitting a fixed object. The third crash involved a collision with a deer.

**Table 17: Segment 4 Collision Pattern**

Segment	Accident or Collision Type							Segment Total
	Animal-Involved	Broadside	Head-On	Hit Object	Overturned	Rear-End	Sideswipe	
4	3	9	1	24	3	8	4	52
	(6%)	(17%)	(2%)	(46%)	(6%)	(15%)	(8%)	

#### 7.4.2 SEGMENT 4 ANALYSIS

- Field observed safety conditions that would rate as “Very High” in the risk evaluation include:
  - Numerous fixed objects within the clear recovery zone.
  - Southbound passing zone in advance of the signalized intersection with Norris Canyon Road promotes high speed approach to the intersection.
  - Speed management throughout segment.
- Field observed safety conditions that would rate as “High” in the risk evaluation include:
  - Limited locations to complete legal U-turns to access driveways.

#### 7.4.3 SEGMENT 4 EVALUATION

- Although the passing zone in advance of the signalized intersection at Norris Canyon Road promotes high speeds approaching the intersection, only two non-animal related crashes have been recorded since the traffic signal was installed.
- Fixed objects within the clear recovery zone should be protected or relocated.
- Construction of additional areas for drivers to complete legal U-turns is recommended.
- Construction of areas for police enforcement should be considered.
- Shoulder “backing” should be constructed where feasible.
- Routine maintenance is recommended where mud and silt cover roadway shoulder.

### 7.5 SEGMENT 5: MILE POST 4.45 TO ALAMEDA COUNTY LINE (MP 6.85)

#### 7.5.1 SEGMENT 5 OBSERVATIONS

##### 7.5.1.1 FIELD-OBSERVED SAFETY ISSUES

- A number of curves with narrow shoulders and limited sight distance.
- Limited vertical sight distance near Contra Costa County line.
- Retaining walls without safety shape within clear recovery zone.

- Retaining wall without railing within the clear recovery zone.
- Many driveways throughout segment.
- Numerous fixed objects (power poles and fire hydrants) within clear recovery zone.
- Inconsistent shoulder widths.
- Overgrown vegetation at some locations.
- Lack of enforcement areas.
- Pavement edge drop-offs and steep slopes at edge of shoulder.
- Additional roadway lighting would enhance safety.

#### 7.5.1.2 *PERCEIVED SAFETY ISSUES IDENTIFIED BY LOCAL RESIDENTS*

- Need increased speed limit enforcement. Many drivers exceeding the posted speed limit.
- Drivers “tailgating” slower vehicles.
- Drivers crossing the double yellow line to pass slower vehicles.
- Narrow or no shoulders.
- Difficult to safely enter or exit driveways.
- Many fixed objects along roadside.
- Extremely unsafe for bicyclists.

#### 7.5.1.3 *COLLISION PATTERN ANALYSIS*

- Similar to Segments 1, 3 and 4, Segment 5 experienced a high percentage of “rear-end” and “hit object” crashes as shown in Table 18. These two types of crashes combined accounted for nearly 60% of the total crashes that were reported within the study period. Additionally, “broadside” crashes accounted for another 15% of the total crashes studied.
- The majority of Segment 5 had a crash rate below the state-wide average of 1.03. The exceptions are in the vicinity of Mile Posts 4.50, 5.50, 6.00 and 6.70.
- The curvature of the roadway, limited roadside recovery areas and stopped vehicles waiting to turn into adjacent driveways appear to explain the high crash frequency of “rear-end,” “hit object” and “broadside” crash types within these limits.
- 67% of the vehicles were travelling below the posted speed limit.
- “Unsafe speed” was the primary collision factor in approximately 20% of the crashes.

**Table 18: Segment 5 Collision Pattern**

Segment	Accident or Collision Type							Segment Total
	Animal-Involved	Broadside	Head-On	Hit Object	Overturned	Rear-End	Sideswipe	
5	4	14	6	29	8	24	7	92
	(4%)	(15%)	(7%)	(32%)	(9%)	(26%)	(8%)	

### 7.5.2 SEGMENT 5 ANALYSIS

- Field observed safety conditions that would rate as “Very High” in the risk evaluation include:
  - Limited horizontal sight distance at curves in the vicinity of Mile Posts 4.90, 5.65 and 5.85.
  - Retaining wall without railing within the clear recovery zone in the vicinity of Mile Post 4.70.
  - Retaining wall without safety shape within the clear recovery zone at Mile Post 5.75.
  - Vehicles crossing over the double yellow line to pass stopped vehicles waiting to turn into driveways.
  - Long uphill grade at north end of Segment 5 promotes illegal passing for northbound traffic.
  - Numerous fixed objects within the clear recovery zone.
  - Speed management throughout segment.
  - Bicycle safety and accommodation.
- Field observed safety conditions that would rate as “High” in the risk evaluation include:
  - Inconsistent shoulder widths.
  - Limited sight distance at the vertical curves near Mile Posts 4.80, 5.25, 5.65, 6.00, 6.15 and 6.70.
  - No protected turn lanes for vehicles attempting to access driveways.
  - Vehicles using the roadway shoulder to pass vehicles waiting to turn into driveways.
- Residents had significant difficulties entering and exiting their driveways.

### 7.5.3 SEGMENT 5 EVALUATION

- Although the horizontal curves at Mile Posts 4.90, 5.65 and 5.85 were rated as a “Very High” risk from field observations, analysis of the SWITRS’ crash data did not suggest that the existing sight distance contributed to the cause or severity of crashes.
- Provisions for protected turning lanes and acceleration/deceleration areas adjacent to driveways are recommended.
- Fixed objects within the clear recovery zone should be protected or relocated.
- The presence of a retaining wall without safety shape at Mile Post 5.75 observed during field observations suggested a “Very High” risk potential. However, analysis of 10 years of SWITRS’ crash data did not indicate that the presence of the wall contributed to the cause or severity of crashes.

- The presence of a retaining wall without railing at Mile Post 4.70 observed during field observations suggested a “Very High” risk potential. However, analysis of 10 years of crash data did not indicate that the presence of the wall contributed to the cause or severity of crashes.
- Provide wider roadway shoulders where feasible. As a minimum, pavement resurfacing and restriping to increase shoulder width should be considered from Mile Post 5.30 to the Contra Costa County line (similar to the 2012/2013 Cold Water Drive to Mile Post 5.30 Improvements discussed under “STUDY CORRIDOR BACKGROUND”).
- From review of the SWITRS data, the limited sight distance at the vertical curves near Mile Posts 4.80, 5.25, 5.65, 6.00, 6.15 and 6.70 do not appear to have contributed to the cause or severity of crashes.
- Construction of areas for police enforcement should be considered.
- Installation of roadway lighting at Mile Posts 4.52, 5.23, and 6.20 should be considered.
- Shoulder “backing” should be constructed where feasible.
- Routine maintenance is recommended to trim trees and overgrown vegetation.

## 7.6 CORRIDOR EVALUATION SUMMARY

A summary of the study corridor safety evaluation, on a segment by segment basis, is shown in Table 19.

**Table 19: Summary of Study Corridor Safety Evaluation**

Potential Safety Issue	Study Corridor Segment				
	1	2	3	4	5
Fixed Objects Within Clear Recovery Zone	YES	YES	YES	YES	YES
Narrow Shoulder Width	YES	YES	YES		YES
Shoulder “Drop-Off”	YES	YES	YES	YES	YES
Limited Police Enforcement Areas	YES	YES	YES	YES	YES
Unsafe Speed	YES	YES	YES	YES	YES
Limited Sight Distance for Horizontal Curves	YES (MP 1.30)	YES (MP 2.15)	YES (MP 2.30, 3.25)		YES (MP 4.90, 5.65, 5.85)
Limited Sight Distance for Vertical Curves			YES (MP 2.50, 3.15, Norris Cyn. I/S)		YES (MP 4.80, 5.25, 5.65, 6.00, 6.15, 6.70)
Difficult Driveway Ingress/Egress			YES	YES	YES
Inadequate Roadway Lighting					YES (MP 4.52, 5.23, 6.20)
Retaining Walls Without Safety Shape		YES (MP 1.60, 1.80, 1.90)			YES (MP 5.75)
Retaining Walls Without Railing					YES (MP 4.70)
Limited Routine Maintenance	YES			YES	YES

## 8.0 COUNTERMEASURE CONSIDERATIONS

At the completion of the study corridor analysis (involving the observations, analysis and evaluation of each roadway segment), consideration of appropriate safety improvements was undertaken to reduce the likelihood of future vehicle crashes. Individual standard safety improvements are referred to as countermeasures. Each of these countermeasures typically has a Crash Reduction Factor (CRF) to help identify the expected percentage reduction in vehicle crashes the proposed countermeasures would achieve.

Selection of countermeasures is focused on crash history and roadway characteristics of a particular site or area along the roadway. For a particular countermeasure to be effective, it must meet several criteria including:

- Technical feasibility – Is the countermeasure a likely answer for the identified safety problem?
- Cost effectiveness – Will the proposed countermeasure produce safety benefits that exceed the cost of the countermeasure?
- Acceptability – Will the proposed countermeasure be readily understood and accepted by the local community?
- Practicability – Will there be a problem of non-compliance, i.e. can the countermeasure work as intended without unreasonable enforcement effort?

The potential countermeasures for this Safety Study were further evaluated and selected based upon their ability to address the following specific criteria identified during the public meetings:

- Consideration of Crow Canyon Road as a multi-use, multi-modal corridor.
- Historical areas of accident locations and maintenance issues.
- Minimization of environmental impact and incorporation of “context sensitive” solutions.
- Broad community support.
- Conform to established guidelines for safety improvements.
- Potential to compete for federal, State and local funding sources.

Additionally, the proposed countermeasures were selected based upon their ability to meet both an immediate goal (upon installation) of reducing speeds, improving safe ingress and egress to/from properties fronting the roadway and improving multi-modal safety; and a long-term goal of decreasing accident frequency and severity.

### 8.1 PROPOSED COUNTERMEASURES

The potential safety issues identified and discussed in Section 7.0, “STUDY CORRIDOR ANALYSIS,” were evaluated for standard countermeasure application. Table 20 identifies those potential safety issues where countermeasure(s) have been recommended as future improvement projects. In cases where countermeasures were not recommended, the rationale for the decision is noted.



**Table 20: Proposed Safety Improvements**

Potential Safety Issue	Recommend Countermeasure
Fixed Objects Within Clear Recovery Zone	✓
Narrow Shoulder Width	✓
Shoulder "Drop-Off"	✓
Limited Police Enforcement Areas	✓
Unsafe Speed	✓
Limited Sight Distance for Horizontal Curves	✓
Limited Sight Distance for Vertical Curves	*
Difficult Driveway Ingress/Egress	✓
Inadequate Roadway Lighting	✓
Retaining Walls Without Safety Shape	*
Retaining Walls Without Railing	*
Limited Routine Maintenance	✓

\*Accident data does not suggest that modifying the retaining walls would improve safety.

The following discussion describes 17 countermeasures that are proposed as future construction projects, and 1 countermeasure relating to routine maintenance. Where proposed signing or pavement markings have been recommended, these countermeasures are intended to comply with the California Manual on Uniform Traffic Control Devices (CAMUTCD). The CAMUTCD provides the minimum standard requirements for traffic control devices on all roadways open to public travel.

Whereas these proposed projects can be implemented as stand-alone countermeasures, many can be used in combination to achieve greater safety benefits. The countermeasures addressed both corridor-wide and segment-specific safety issues, and have been presented in near-term, medium-term or long-term categories based upon the level of project development effort and cost of installation or construction. These near-term, medium-term, and long-term categories are defined as follows:

**Near-Term Countermeasures** – Straightforward safety improvement projects with minimal environmental and right of way impact that could be constructed within a two-year timeframe. These countermeasures would consist of projects addressing features such as improved guidance for drivers and bicyclists, removing or protecting roadside hazards and improved identification of roadside hazards. The estimated construction cost of these improvements would be in the range of \$1M to \$2M for each project.

**Medium-Term Countermeasures** – These improvement projects likely involve more significant impacts to environmental resources and adjacent private property due to minor roadway or shoulder widening. These improvements require more project development time and effort, and are estimated to cost between \$2M and \$5M for each construction contract. The medium-term countermeasures would be expected to be in construction within a five-year timeframe.

**Long-Term Countermeasures** – Large, complex improvements that have significant environmental and/or right of way impacts due to geometry or roadway typical section modifications. The proposed long-term countermeasures should be considered if necessary, following the implementation of the near-term and medium-term countermeasures. These projects require significant project development effort, and consequently would not be expected to be in construction until 2025. The estimated construction cost of these improvements would be in the range of \$5M to \$10M or more.

## 8.2 PROPOSED CORRIDOR-WIDE COUNTERMEASURES

### 8.2.1 CM 01: VEHICLE SPEED FEEDBACK SIGNS (NEAR-TERM)

A vehicle speed feedback sign displays to approaching drivers the speed at which they are traveling. The purpose of the sign is to slow vehicles down by alerting drivers they are travelling at an unsafe speed.



The signs are typically installed as an alternative to physical devices (speed bumps, speed tables, etc.), where traffic volume and vehicle speeds would make the installation of physical devices unsafe. The sign is an interactive sign, generally constructed of a series of LEDs. These signs are typically installed in conjunction with an R-2 Speed Limit Sign. Numerous studies have shown that the signs are effective at reducing the average speed of vehicles.

This countermeasure consists of installing nine speed feedback signs at locations along the entire corridor where speed surveys indicated a large percentage of drivers exceeding the speed limit and at locations in advance of horizontal curves with limited sight distance. These locations are shown in Figure 21. These installations would be solar powered and have minimal impact to the roadside environment.

### 8.2.2 CM 02: POLICE ENFORCEMENT AREA (NEAR-TERM)

Police enforcement areas provide widened paved shoulder areas at strategic spacing where an officer can sit and observe motorists and a place where the officer can have a targeted vehicle pull over for enforcement of traffic (particularly speeding) infractions. This safety element has the potential of reducing accidents resulting from speeding (by the presence of a police officer) and by moving parked vehicles further from the edge of the traveled way.



This countermeasure consists of paving 20 areas adjacent to the existing roadway, in most locations providing pervious pavement over the existing graded shoulder area. The paved areas would be 8 feet in width and of a sufficient length to allow vehicles to decelerate safely off, and accelerate safely into the traveled way. The pavement edge should be constructed at a 30 degree angle to provide a "Safety Edge" as described in Countermeasure 4. The exact location of the paved areas could be sited to avoid the removal of any trees and to impart minimal impact to the roadside environment. The proposed enforcement areas are shown in Figure 21.

### 8.2.3 CM 03: ROUNDABOUTS (LONG-TERM)

Speed management is a significant issue within several segments of the study corridor. This issue has been the paramount concern voiced by the local residents at the outreach meetings and further documented in the speed survey performed as part of this Safety Study.

Police visibility and increased enforcement typically results in only temporary compliance. A more long-term or permanent solution to reduce the speed of vehicles is to change the character of the roadway

itself. By changing the look or function of the roadway, drivers are encouraged to reduce the speed of their vehicles as they approach the change in the roadway. This technique of changing the character of the roadway is called traffic calming.

There are many traffic-calming treatments that are effective in reducing the speed of vehicles. One such treatment is the construction of a modern roundabout. A roundabout is a circular intersection where vehicles travel counterclockwise around a center island. The traffic operational features include:

- Roadway geometry that results in a low-speed environment.
- Operational benefits resulting from entering traffic yielding to vehicles in the circulatory roadway.
- Reduction in vehicle conflicts due to channelization at the entrance and deflection around a center island.

This countermeasure consists of constructing four roundabouts at the following locations (See Figure 31):

- MP 2.00
- MP 2.50
- MP 3.45 (Intersection with Norris Canyon Road)
- MP 5.10

Where locations are not at existing intersections, the roundabouts are intended to act as traffic calming devices to reduce the speed of vehicles travelling through the study corridor.

The construction of roundabouts proposed by this countermeasure would have a significant impact to the roadway environment, and may require permits and approvals from the following agencies:

- San Francisco Regional Water Quality Control Board – National Pollutant Discharge Elimination System (NPDES) Construction General Permit and Clean Water Act (CWA) Section 401 Water Quality Certification.
- U.S. Fish and Wildlife Service – Section 7 Consultation (California red-legged frog).
- California Department of Fish and Wildlife – Section 1602 Streambed Alteration Agreement.
- California Department of Fish and Wildlife – California Endangered Species Act Incidental Take Permit.
- U.S. Army Corps of Engineers – Clean Water Act Section 404 Permit.

#### 8.2.4 CM 04: INCREASE ANNUAL SHOULDER MAINTENANCE (NEAR-TERM)

This countermeasure would increase the annual County budget for shoulder maintenance along Crow Canyon Road to repair cracks and potholes, replace shoulder backing, and remove debris from the roadway shoulder. This countermeasure could also reduce the potential for bicyclists to veer into the traveled way to avoid obstacles and reduce ponding of water into the traveled way after a storm.

The shoulder “drop-off,” resulting from the subsidence of shoulder backing over time, can cause a driver to lose control of their vehicle if they should run off the pavement and then attempt to return to the

travelled way. To reduce pavement-edge related crashes, it is recommended that a “Safety Edge” be constructed in lieu of a vertical drop-off at the edge of the roadway pavement. The “Safety Edge” is a construction technique that shapes the edge of the pavement to 30 degrees, reducing the potential for drivers to lose control as they steer back onto the roadway. The “Safety Edge” is one of the Federal Highway Administration’s *Nine Proven Safety Countermeasures*. It is a relatively new feature in recent years and it is currently being implemented by the County in appropriate circumstances.

#### 8.2.5 CM 05: ADDITIONAL LIGHTING/SIGNAGE (WHERE NEEDED) (MEDIUM-TERM)

Based upon the review of accidents and geometric conditions, new street lights are recommended in the vicinity of PM 4.52, 5.23 and 6.20. Each location would consist of the installation of three light standards at 200 foot to 300 foot spacing, with luminaires of sufficient wattage to provide appropriate illumination. Adding lighting can improve nighttime visibility and provide necessary guidance to those that are unfamiliar with the route. The installation of roadway lighting will have minimal impact to the roadside environment.

#### 8.2.6 CM 06: GUARDRAILS (WHERE NEEDED) (SEGMENTS 2, 3, 4 & 5) (MEDIUM-TERM)

Ideally, a roadside should be free of any fixed objects or slopes that would have the potential to increase the severity of an accident, should a crash occur. In such an environment, drivers who had run off the road would have enough space to safely regain control of their vehicles and come to a stop without hitting any fixed objects or experiencing the vehicle rolling over as a result of a steep slope. This space or recovery area is known as the Clear Recovery Zone. Given the roadside constraints associated with most conventional highways, Caltrans advises a minimum traversable clear recovery area of 20 feet. The nationally recognized American Association of State Highway and Transit Officials (AASHTO) recommend a range of 20-22 feet or more.

Unfortunately, given the natural and man-made features occupying the roadside of Crow Canyon Road, providing such a continuous area free of hazards is not possible without significant environmental, private property and cost impacts.

Where providing the full 20-22 foot or more clear recovery zone is not possible, and removal or relocation of the fixed object is impractical due to cost or other reasons, shielding the object or hazard with guardrail is a possible countermeasure that can provide an incremental improvement in safety.

This countermeasure consists of consideration of the installation of metal beam guardrail at locations where the existing roadway embankment on the downslope side of the roadway is within 30 feet from the edge of travelled way. This countermeasure could also include metal beam guardrail at the 66 utility poles that are located in close proximity to the edge of travelled way. Any proposed new locations of guardrail should be thoroughly evaluated through the completion of a preliminary engineering analysis. See Figures 22-26. Installation of guardrail would have minimal impact to the roadside environment.

### 8.3 PROPOSED SEGMENT 2 COUNTERMEASURES

#### 8.3.1 CM 07: MEDIAN RUMBLE STRIP WITH 6-FT SHOULDERS (LONG-TERM)

A median or centerline rumble strip provides an audible warning and a tactile rumble when driven on to alert drivers that they are drifting out of their lane and possibly crossing the centerline into the opposing direction of traffic.

This countermeasure, shown on Figure 32, consists of widening the roadway to include a 4-foot wide median rumble strip and a 12-foot travel lane and 6-foot shoulder in both the northbound and southbound directions of travel.

The 6-foot shoulders on each side of the roadway would provide safe refuge for disabled vehicles, recovery room for a “run-off-the-roadway” driver, safe areas for bicyclists and pedestrians, room for roadway and roadside maintenance, and police and first responders. The widened shoulders would also improve stopping sight distance in the vicinity of sharp curves.

Where shoulder widening is impractical due to the natural topography adjacent to the roadway, there may be opportunities to pave the existing gravel base adjacent to the road to provide an incremental benefit.

The widening of Crow Canyon Road to provide a median rumble strip and 6-foot shoulders in both the northbound and southbound directions of travel would have a significant impact to the roadside environment, and may require permits and approvals from the following agencies:

- San Francisco Regional Water Quality Control Board – National Pollutant Discharge Elimination System (NPDES) Construction General Permit and Clean Water Act (CWA) Section 401 Water Quality Certification.
- U.S. Fish and Wildlife Service – Section 7 Consultation (California red-legged frog).
- California Department of Fish and Wildlife – Section 1602 Streambed Alteration Agreement.
- California Department of Fish and Wildlife – California Endangered Species Act Incidental Take Permit.
- U.S. Army Corps of Engineers – Clean Water Act Section 404 Permit.

### 8.3.2 CM 08: TUNNEL AT MP 2.15 – NORTHBOUND (LONG-TERM)

This countermeasure consists of a northbound one-lane tunnel at MP 2.15. See Figure 33. Southbound traffic would remain on the existing roadway alignment. This would improve horizontal sight distance in the northbound direction and would be expected to reduce the number of accidents in the vicinity of MP 2.15, without any impact to Crow Creek.

This project would have a significant impact to the roadway environment, and may require permits and approvals from the following agencies:

- San Francisco Regional Water Quality Control Board – National Pollutant Discharge Elimination System (NPDES) Construction General Permit and Clean Water Act (CWA) Section 401 Water Quality Certification.
- U.S. Fish and Wildlife Service – Section 7 Consultation (California red-legged frog).
- California Department of Fish and Wildlife – Section 1602 Streambed Alteration Agreement.
- California Department of Fish and Wildlife – California Endangered Species Act Incidental Take Permit.
- U.S. Army Corps of Engineers – Clean Water Act Section 404 Permit.

### 8.3.3 CM 09: TUNNEL AT MP 2.15 – BOTH DIRECTIONS (LONG-TERM)

This improvement project consists of a two-way (northbound and southbound) tunnel at MP 2.15. With the construction of this countermeasure, the existing roadway alignment would be abandoned. This project would provide widened shoulders in each direction, thereby improving horizontal sight distance and overall safety in each direction of travel without impact to Crow Creek. This countermeasure, shown on Figure 34, would have a significant impact to the roadway environment, and may require permits and approvals from the following agencies:

- San Francisco Regional Water Quality Control Board – National Pollutant Discharge Elimination System (NPDES) Construction General Permit and Clean Water Act (CWA) Section 401 Water Quality Certification.
- U.S. Fish and Wildlife Service – Section 7 Consultation (California red-legged frog).
- California Department of Fish and Wildlife – Section 1602 Streambed Alteration Agreement.
- California Department of Fish and Wildlife – California Endangered Species Act Incidental Take Permit.
- U.S. Army Corps of Engineers – Clean Water Act Section 404 Permit.

## 8.4 PROPOSED SEGMENT 3 COUNTERMEASURES

### 8.4.1 CM 10: SHOULDER WIDENING – 8’ AT DRIVEWAYS – ACCELERATION /DECELERATION AREAS (MEDIUM-TERM)

This countermeasure consists of widening the shoulders to 8 feet on both sides of each driveway. See Figure 27. The wider shoulder will provide areas for vehicles to gradually accelerate or decelerate while outside of the traveled way, thereby reducing their impact on through traffic. The pavement edge should be constructed at a 30 degree angle to provide a “Safety Edge” as described in Countermeasure 04. The construction of these acceleration/deceleration areas has the potential to reduce the crash frequency and severity within the study corridor where driveways are located. These paved areas are within the road right of way and would have minimal impact to the roadside environment.

### 8.4.2 CM 11: TWO-WAY LEFT TURN LANE (LONG-TERM)

The purpose of a two-way left turn lane is to remove left-turning vehicles from the through lane and provide storage for those vehicles in the median area until an adequate gap in the opposing traffic appears. In areas where two-way left turn lanes are in use, the severity and frequency of vehicle accidents has been reduced. Accident frequency is reduced since the stopped, or slow left turning vehicle, has been removed from the through lanes of traffic. Accident severity is reduced since additional perception time is available, thereby reducing left-turn crossing conflicts. In order to discourage utilizing the two-way left turn lane for passing of slower vehicles, raised planted medians would be constructed between driveway openings as shown on Figure 30. The construction of a two-way left turn lane would have limited impact to the roadway environment.

## 8.5 PROPOSED SEGMENT 4 COUNTERMEASURES

### 8.5.1 CM 12: LEFT TURN LANE (LEFT-IN/ LEFT-OUT) (SPOT LOCATIONS) (MEDIUM-TERM)

This countermeasure, shown on Figure 29, consists of providing left turn lanes at certain locations within the 4-lane segment of Crow Canyon Road to provide refuge for vehicles turning left-in and left-out of driveways. The turn lanes would provide areas for vehicles to gradually decelerate while outside of the traveled way, thereby reducing their impact on through traffic. These lanes would also provide an area in the median where left turning vehicles exiting the driveways will have an area to gradually accelerate into the stream of through traffic. The turn lanes would be constructed within the existing median and the number of through lanes would not be reduced. This improvement would have minimal impact to the roadside environment.

### 8.5.2 CM 13: REDUCE 4-LANE TO 2-LANE NB AND 1-LANE SB (LONG-TERM)

This countermeasure consists of widening the existing median in Segment 4 to the west, resulting in the removal of the inside southbound lane. This would have the potential to reduce the number of high-speed vehicles approaching the lower-speed curves following the signalized intersection with Norris Canyon Road. The countermeasure would also have the effect of reducing the number of lanes that a northbound vehicle, and a vehicle that is exiting a driveway, would have to cross when making a left turn. This project would have a minimal impact to the roadside environment.

### 8.5.3 CM 14: REDUCE 4-LANE TO 2-LANE (WITH TURN-OUTS) – OPTION 1 (WIDEN MEDIANS) (LONG-TERM)

This countermeasure, suggested by local residents to discourage speeding in Segment 4, consists of widening the existing median to the east and west, thereby removing one northbound and one southbound lane. Turn pockets, as shown on Figure 35, would be provided in the northbound direction to provide refuge for vehicles turning left into and left out of driveways. The turn pockets would provide areas for vehicles to gradually decelerate while outside of the traveled way, thereby reducing their impact on through traffic. These pockets would also provide an area in the median where left turning vehicles exiting the driveways will have an area to gradually accelerate into the stream of through traffic. The construction of this countermeasure would, however, eliminate the only passing zone within the study limits. This project would have a minimal impact to the roadway environment.

### 8.5.4 CM 15: REDUCE 4-LANE TO 2-LANE (WITH TURN-OUTS) – OPTION 2 (REMOVE OUTSIDE PAVEMENT) (LONG-TERM)

This Countermeasure, an alternative to Countermeasure 14, consists of removing the existing outside travel lane on each side of the roadway in order to provide one northbound and one southbound lane. Turn pockets would be provided in the northbound direction to provide refuge for vehicles turning left into and left out of driveways. The turn pockets would provide areas for vehicles to gradually decelerate while outside of the traveled way, thereby reducing their impact on through traffic. These pockets would also provide an area in the median where left turning vehicles exiting the driveways will have an area to gradually accelerate into the stream of through traffic. See Figure 36. The construction of this countermeasure will, however, eliminate the only passing zone within the study limits. This project would have a minimal impact to the roadway environment.

## 8.6 PROPOSED SEGMENT 5 COUNTERMEASURES

### 8.6.1 CM 16: PAVEMENT REHABILITATION AND RESTRIPING FOR WIDER SHOULDERS (NEAR-TERM)

This countermeasure, shown in Figure 28, consists of a combination of milling and overlaying 80 percent of the pavement to restore the existing roadway to a serviceable condition and complete base repair of the remaining 20 percent of the pavement. This improvement would extend the pavement rehabilitation and resurfacing work performed in 2012/2013 (See Section 2.4.8) from MP 5.3 to the Alameda/Contra Costa County line (MP 6.85). After pavement rehabilitation, the roadway would be restriped within the construction limits, providing 12-foot lanes and 4 to 6-foot shoulders where feasible. It is recommended to minimize sharp drop-offs at the edge of pavement by incorporating an asphalt wedge (“Safety Edge” described in Countermeasure 04). This work would be completed within the road right of way and would have minimal impact to the roadside environment.

### 8.6.2 CM 17: LEFT TURN LANE (LEFT-IN / LEFT-OUT) WITH ACCELERATION/DECELERATION AREAS (LONG-TERM)

This countermeasure, shown on Figure 37, consists of providing left turn lanes at certain locations within Segment 5 of Crow Canyon Road to provide refuge for vehicles turning left-in and left-out of driveways. The turn lanes would provide areas for vehicles to gradually decelerate while outside of the traveled way, thereby reducing their impact on through traffic. These lanes would also provide an area in the median where left turning vehicles exiting the driveways will have an area to gradually accelerate into the stream of through traffic.

This proposed improvement project consists of widening the pavement to accommodate two left turn pockets in the northbound direction, three left turn pockets in the southbound direction and an approximately 800-foot long two-way left turn lane in the center of the roadway.

This improvement would have significant impact to the roadside environment, and may require permits and approvals from the following agencies:

- San Francisco Regional Water Quality Control Board – National Pollutant Discharge Elimination System (NPDES) Construction General Permit and Clean Water Act (CWA) Section 401 Water Quality Certification.
- U.S. Fish and Wildlife Service – Section 7 Consultation (California red-legged frog).
- California Department of Fish and Wildlife – Section 1602 Streambed Alteration Agreement.
- California Department of Fish and Wildlife – California Endangered Species Act Incidental Take Permit.
- U.S. Army Corps of Engineers – Clean Water Act Section 404 Permit.

### 8.6.3 CM 18: MEDIAN RUMBLE STRIP WITH 6-FT SHOULDERS (LONG-TERM)

A median or centerline rumble strip provides an audible warning and a tactile rumble when driven on to alert drivers that they are drifting out of their lane and possibly crossing the centerline into the opposing direction of traffic.



This countermeasure, shown on Figure 32, consists of widening the roadway to include a 4-foot wide median rumble strip and a 12-foot travel lane and 6-foot shoulder in both the northbound and southbound directions of travel.

The 6-foot shoulders on each side of the roadway would provide safe refuge for disabled vehicles, recovery room for a “run-off-the-roadway” driver, safe areas for bicyclists and pedestrians, room for roadway and roadside maintenance, and police and first responders. The widened shoulders would also improve stopping sight distance in the vicinity of sharp curves.

Where shoulder widening is impractical due to the natural topography adjacent to the roadway, there may be opportunities to pave the existing gravel base adjacent to the road to provide an incremental benefit.

The widening of Crow Canyon Road to provide a median rumble strip and 6-foot shoulders in both the northbound and southbound directions of travel would have a significant impact to the roadside environment, and may require permits and approvals from the following agencies:

- San Francisco Regional Water Quality Control Board – National Pollutant Discharge Elimination System (NPDES) Construction General Permit and Clean Water Act (CWA) Section 401 Water Quality Certification.
- U.S. Fish and Wildlife Service – Section 7 Consultation (California red-legged frog).
- California Department of Fish and Wildlife – Section 1602 Streambed Alteration Agreement.
- California Department of Fish and Wildlife – California Endangered Species Act Incidental Take Permit.
- U.S. Army Corps of Engineers – Clean Water Act Section 404 Permit.

## 8.7 PROPOSED COUNTERMEASURES DETERMINED NOT FEASIBLE

A number of ideas or comments were received at the public meetings for this Safety Study, but were determined to either be unachievable or beyond the scope of this document. These ideas or comments follow, with an explanation as to the reasoning determining them infeasible.

### 8.7.1 CONVERT CROW CANYON ROAD TO A TOLL ROAD

Given the political, social and economic issues associated with the conversion of Crow Canyon Road to a toll road, investigation of the merits of such a proposal is beyond the scope of this safety study.

### 8.7.2 DEVELOP CROW CANYON ROAD INTO A ‘PARKWAY’ WITH LIMITED ACCESS

While the conversion of Crow Canyon Road into a limited access parkway would address a number of existing safety issues, it would require significant property acquisition from adjacent properties and require existing driveways to connect to new “frontage roads”. Construction of such a parkway concept would cause tremendous disruption to existing parcels and properties (including Crow Creek) fronting the roadway. This concept would also not meet this Study’s criteria of “minimization of environmental impacts” and achieving “broad support from the local residents”. Consequently, this concept was determined to be unachievable.

### 8.7.3 DESIGNATE CROW CANYON ROAD AS A "SCENIC ROUTE"

Official designation as a County Scenic Highway requires authorization by the Director of the State Department of Transportation (Caltrans).

County highways that are nominated for scenic designation must meet the following criteria:

- The highway consists of a scenic corridor with memorable landscape that highlights the scenic beauty or agriculture of the State.
- The scenic corridor is not significantly impacted by existing visual intrusions.
- Strong local support exists for the proposed scenic highway designation.

When these qualifications are satisfied, based upon an evaluation and determination by Caltrans, the County must adopt a Corridor Protection Program consisting of:

- Regulation of land use and density of development.
- Detailed land use and site planning.
- Control of outdoor advertising.
- Ordinances and permits controlling grading and landscaping
- Appearance and design of structures and equipment.

Given that the focus of this study is the identification of existing safety issues that are possibly contributing to accidents on Crow Canyon Road, and the identification, recommendation and prioritization of potential future improvements to mitigate these issues, designation of Crow Canyon Road as a Scenic Route is determined to be beyond the scope of this document.

### 8.7.4 DEVELOP CROW CANYON ROAD AS A MAJOR BOULEVARD IN THE FUTURE TO SUPPORT INCREASED DEVELOPMENT

In November 2000, the voters of Alameda County passed Measure D which amended the Alameda County General Plan to, among other things, revise the urban growth boundary in rural Castro Valley. The approved Measure required the reservation of less land for urban growth and more land for agriculture and open space. Any change to the adopted ordinance would require approval through a County-wide vote.

Considering the comments voiced by a majority of the local residents at this Study's public meetings, and the policies established by the passage of Measure D, it is determined that the widening and realignment of Crow Canyon Road into a major boulevard to support increased urban development would be unachievable.

### 8.7.5 LIMIT TRUCK TRAFFIC ON CROW CANYON ROAD

The California Vehicle Code allows any county, by ordinance, to prohibit the use of any highway located in an unincorporated residential area by any commercial vehicle exceeding a gross vehicle weight of 14,000 pounds. The Vehicle Code does, however, exempt a variety of vehicles and trip purposes from this prohibition.

It is highly likely that, given the continuation of Crow Canyon Road travels into Contra Costa County and the City of San Ramon, both those jurisdictions would also need to approve the prohibition of commercial vehicles in excess of 14,000 pounds of gross vehicle weight from using the roadway.

Given the issues associated with the prohibition of truck traffic from Crow Canyon Road, investigation of the merits of such a proposal is beyond the scope of this Safety Study.

#### 8.7.6 IMPROVE I-580 AND I-680 TO REDUCE ATTRACTIVENESS OF CROW CANYON ROAD TO COMMUTERS

I-580 and I-680 are both federal Interstate Freeways operated and maintain by the State Department of Transportation (Caltrans). As such, any potential improvements to these facilities require rigorous and lengthy project development procedures and funding of project costs through the State Transportation Improvement Program or STIP. Any proposed freeway capacity improvements would most likely require the programming of several hundred million dollars into the STIP, which is admittedly severely underfunded.

Considering the underfunded state of the STIP, and the fact that the County of Alameda has no jurisdiction over these State facilities, investigation and recommendation of improvements to either I-580 or I-680 are beyond the scope of this document.

#### 8.7.7 ELIMINATE DRIVEWAYS ALONG CROW CANYON ROAD BY PROVIDING A COMMON "ACCESS ROAD"

This suggestion was determined to be infeasible for reasons similar to those given for "Develop Crow Canyon Road into a 'Parkway' with limited access".

#### 8.7.8 PROVIDE BARRIER-SEPARATED BIKE LANES ALONG CROW CANYON ROAD

Providing a concrete barrier to separate bicyclists from vehicular traffic was determined to be unachievable for the following reasons:

- Without widening the existing roadway, construction of the barrier would eliminate vehicular access to the roadway shoulders, thereby creating unsafe conditions for vehicles through reducing the vehicle "recovery area".
- With widening of the existing roadway, significant amounts of property acquisition from residents and Crow Creek would be required for new road right of way.
- Achieving safe barrier "end-treatment" would magnify property/Creek impacts given the large number of existing driveways.

This concept would also not meet this Study's criteria of "minimization of environmental impacts" and achieving "broad support from the local residents". Consequently, this concept was determined to be unachievable.

#### 8.7.9 INSTALL TRAFFIC SIGNALS TO REDUCE VEHICLE SPEEDS ON CROW CANYON ROAD

The California Manual of Uniform Traffic Control Devices (MUTCD) governs guidance regarding the justification of the installation of a traffic signal at a particular location. The MUTCD requires an engineering study of traffic conditions, pedestrian conditions and physical characteristics of the location

under consideration. This engineering study must include an analysis of the applicable factors contained within 8 traffic signal warrants identified within the MUTCD. The MUTCD guidance also includes that, "A traffic control signal should not be installed if it will seriously disrupt progressive traffic flow".

None of the 8 traffic signal warrants address vehicle speed reduction and installation of traffic signals at non-intersection locations along Crow Canyon Road would seriously disrupt progressive traffic flow. Consequently, this idea was determined to be infeasible.

#### 8.7.10 INSTALL SPEED BUMPS ALONG CROW CANYON ROAD

National research on speed management techniques has recommended that speed bumps and speed humps be incorporated as speed reducing countermeasures on local/residential streets only. Given that Crow Canyon Road is functionally classified as a rural arterial roadway, these concepts were determined to be infeasible countermeasures.

#### 8.7.11 ENFORCE A 35 MPH SPEED LIMIT THROUGHOUT THE CROW CANYON ROAD CORRIDOR

The California Vehicle Code (CVC) establishes criteria under which a local authority can reduce prima facie speed limits on roadways under their jurisdiction. This criteria includes the completion of an engineering and traffic survey to establish a maximum speed limit most appropriate to facilitate the orderly movement of traffic, and that is reasonable and is safe.

CVC Section 22349 sets a maximum speed of 55 mph on two-lane undivided roadways. Any deviation of speed limits downward from this limit must be justified by an engineering and traffic survey. The determination of speed limits rely on the premise that a reasonable speed limit is based upon the actual behavior of a majority of drivers. Consequently, speed limits set by engineering and traffic surveys are normally set near the 85<sup>th</sup> percentile speed, the speed at or below 85 percent of the traffic is travelling. Empirical data from federal studies have shown that setting the speed limit too low can increase collisions. Speed limits set near the 85<sup>th</sup> percentile speed of free flowing traffic are considered safer and produce less variance in vehicle speeds.

Given the criteria noted within the CVC, and the empirical data from several federal studies, the concept of a 35 mph speed limit restriction throughout the Crow Canyon Corridor was determined to be unachievable.

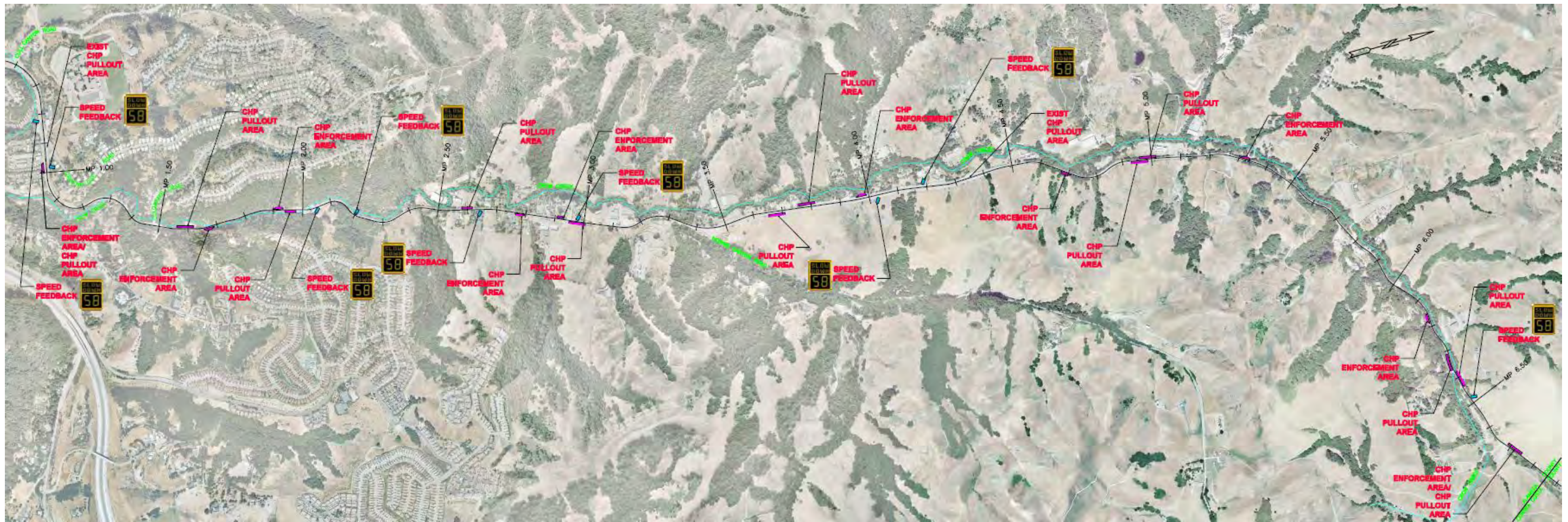


Figure 21. Vehicle Speed Feedback Signs and Police Enforcement Areas (Entire Study Corridor)

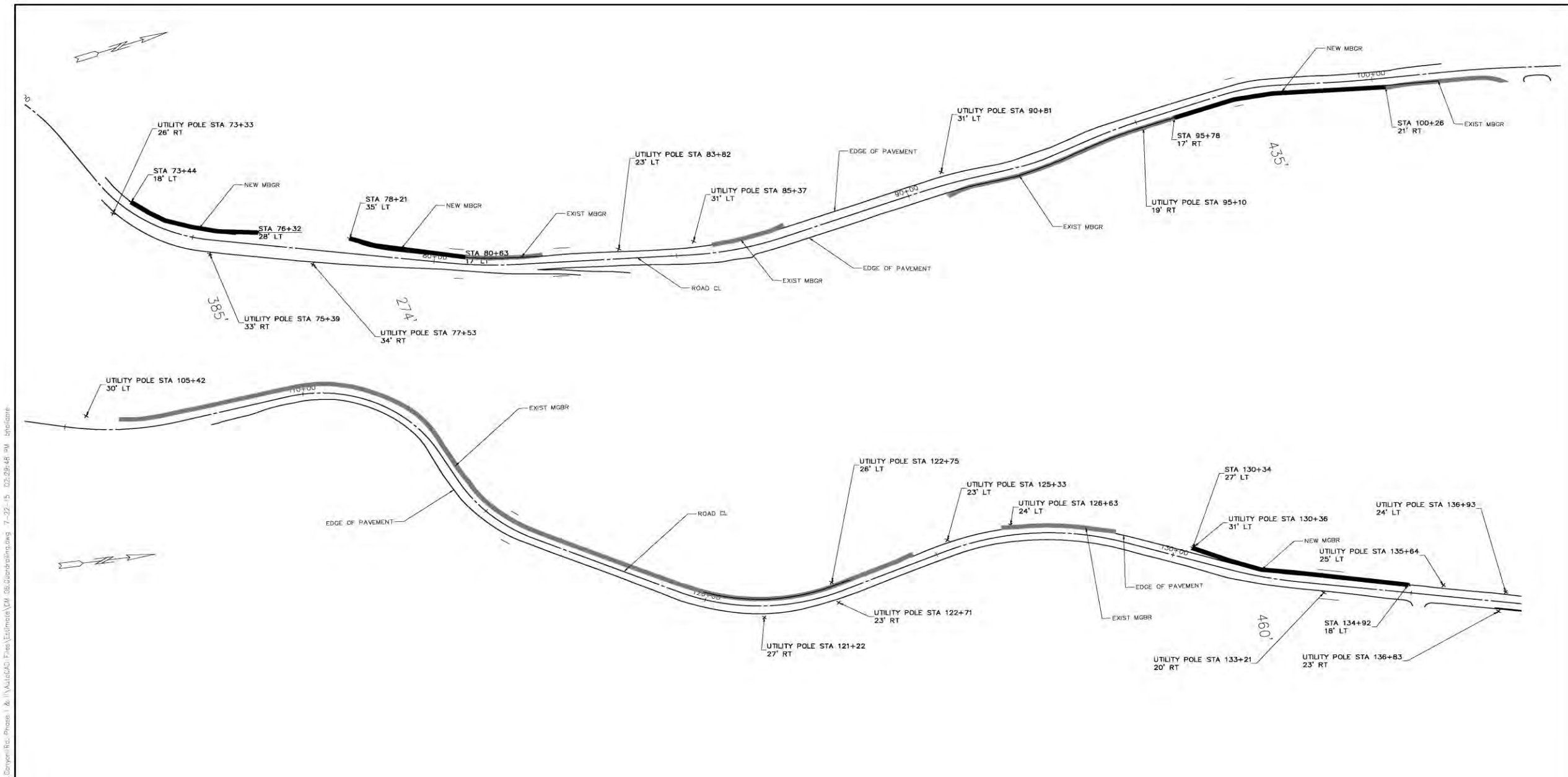


Figure 22. Guardrails (Where Needed) (Corridor-Wide)

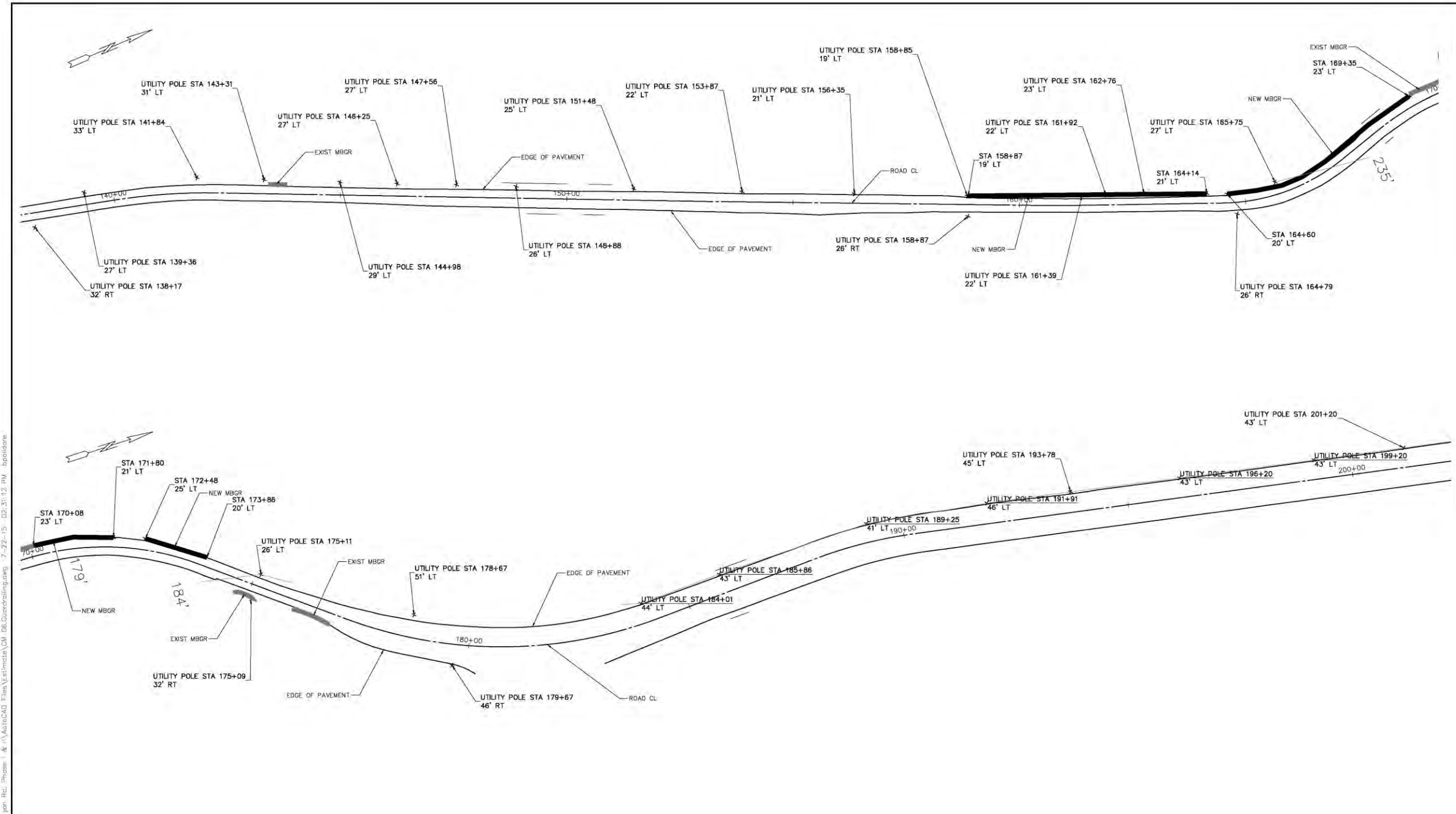


Figure 23. Guardrails (Where Needed)(Corridor-Wide)

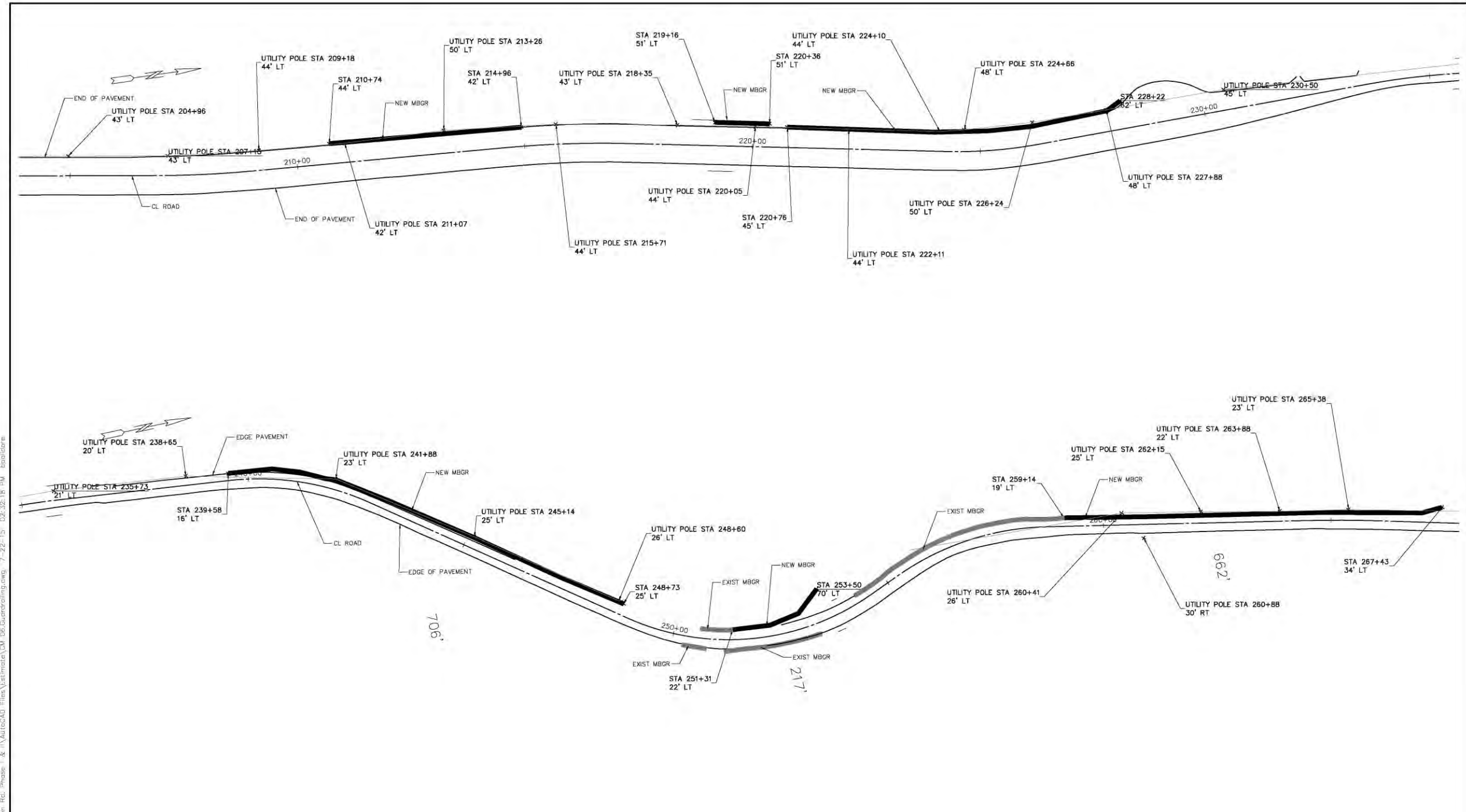


Figure 24. Guardrails (Where Needed) (Corridor-Wide)



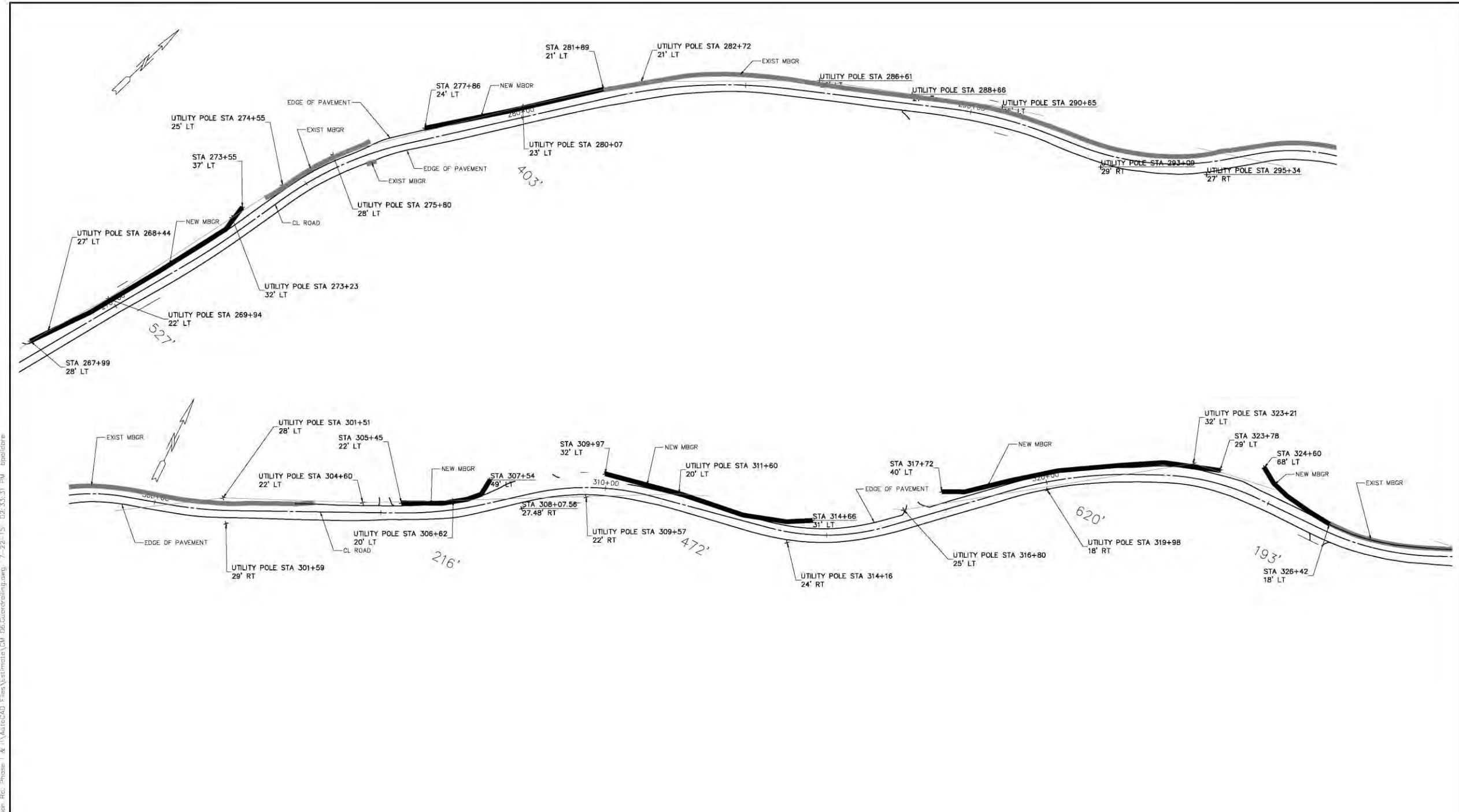


Figure 25. Guardrails (Where Needed) (Corridor-Wide)

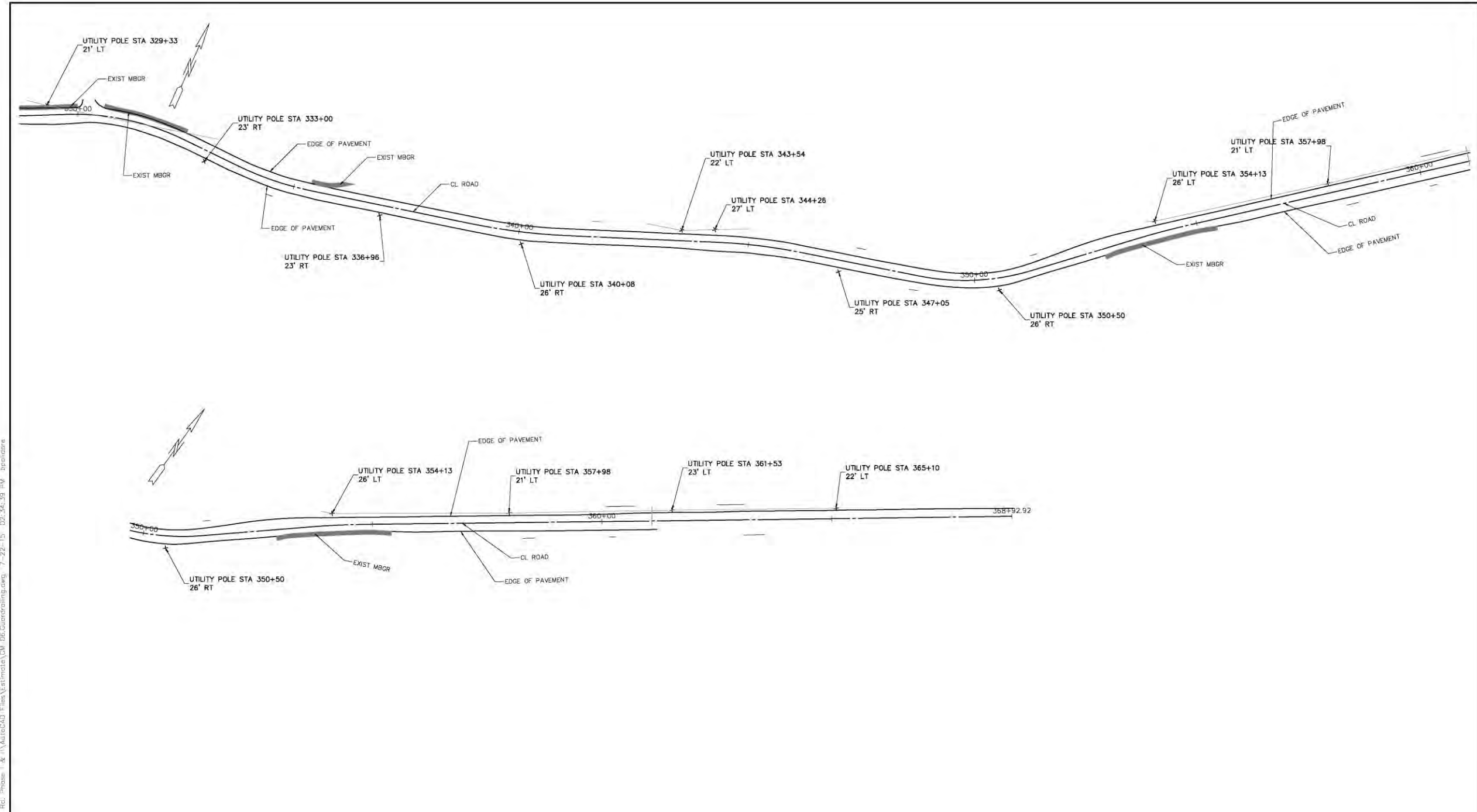


Figure 26. Guardrails (Where Needed) (Corridor-Wide)



Figure 27. Shoulder Widening - 8' at Driveways - Acceleration / Deceleration Areas (Segment 3)

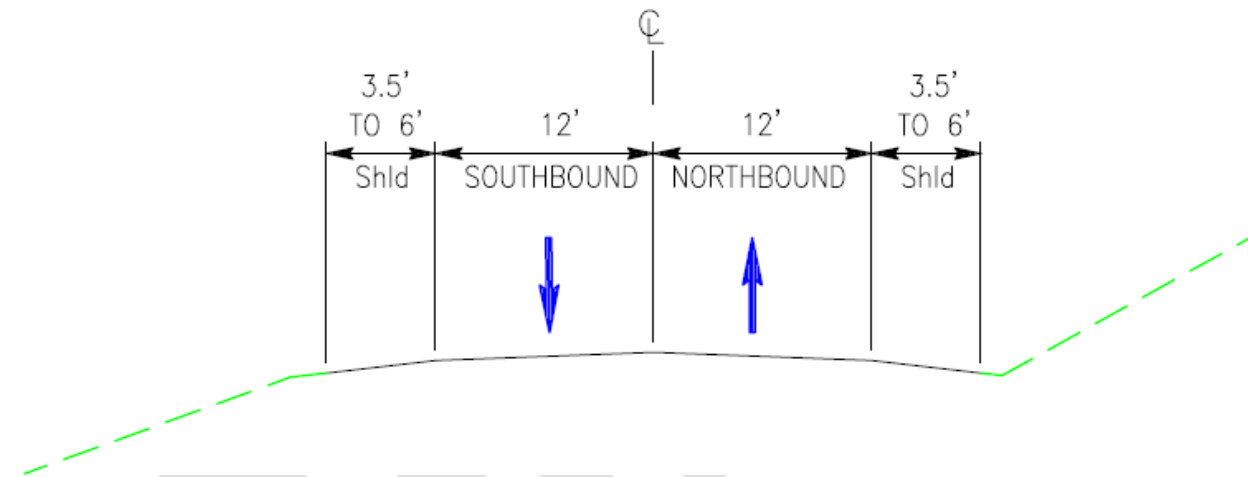


Figure 28. Pavement Rehabilitation and Restriping for Wider Shoulders (Segment 5)



Figure 29. Left Turn Lane (Left-In/ Left-Out) (Spot Locations) (Segment 4)



Figure 30. Two-Way Left Turn Lane (Segment 3)

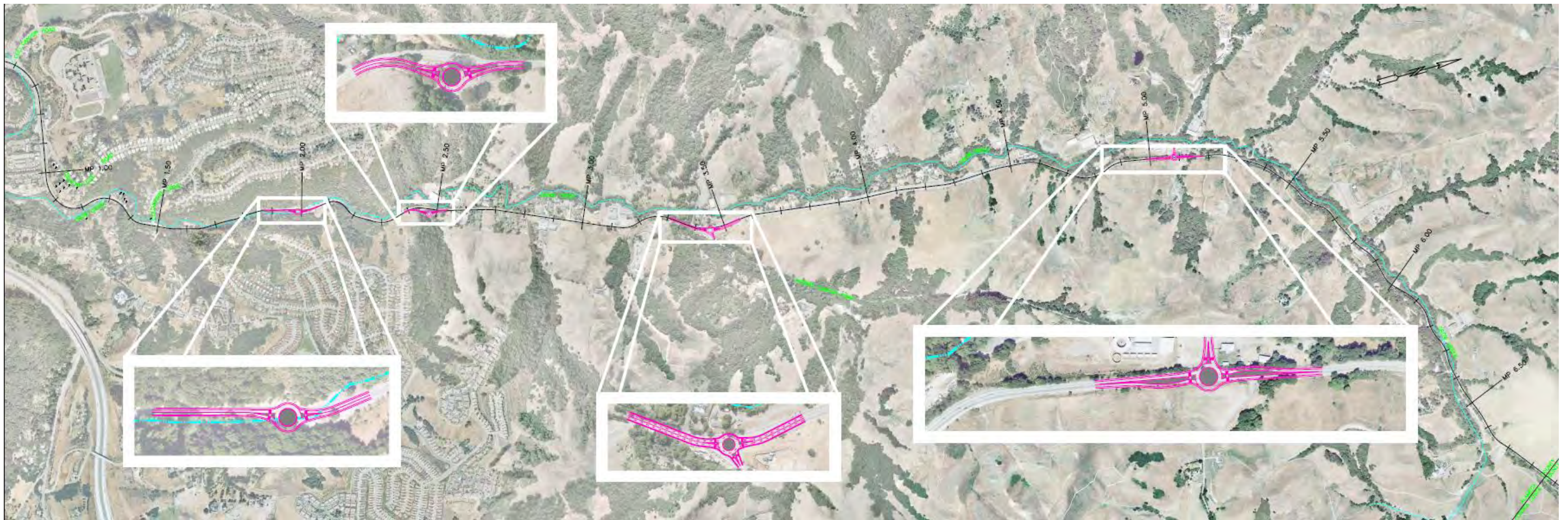


Figure 31. Roundabouts (Entire Study Corridor)

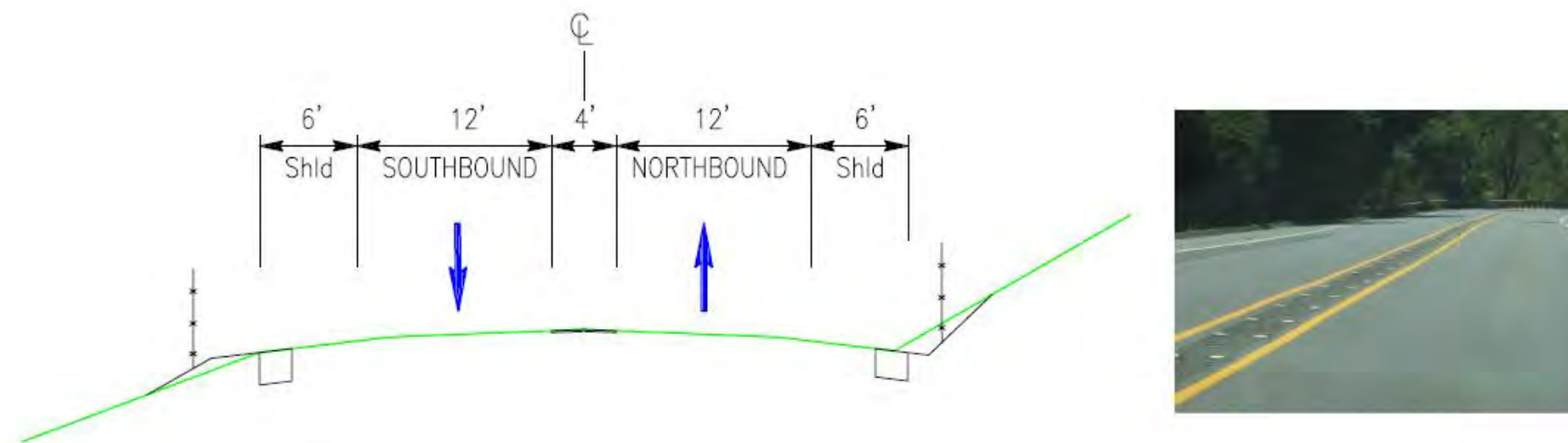


Figure 32. Median Rumble Strip with 6-Ft Shoulders (Segments 2 and 5)

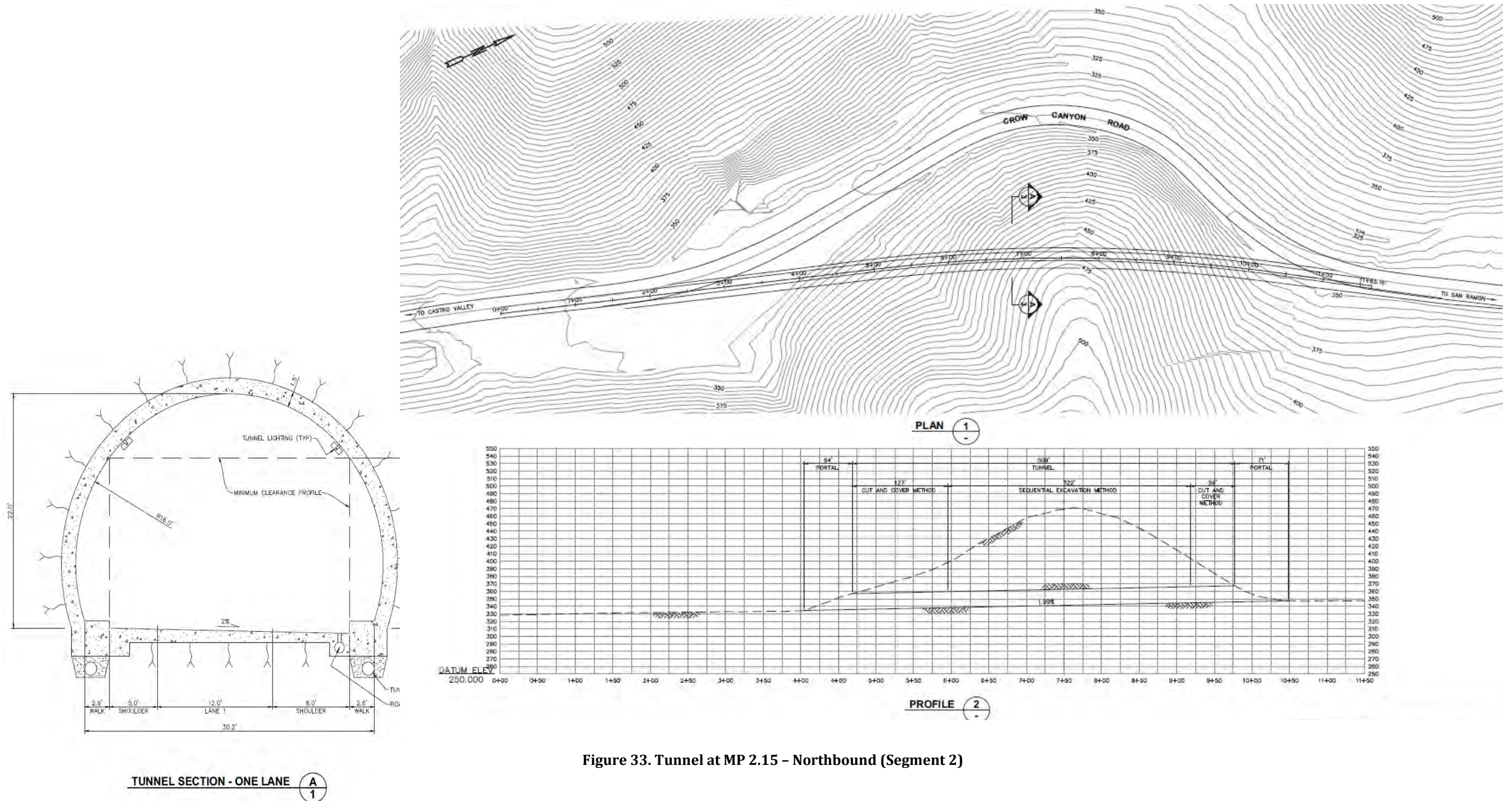


Figure 33. Tunnel at MP 2.15 - Northbound (Segment 2)

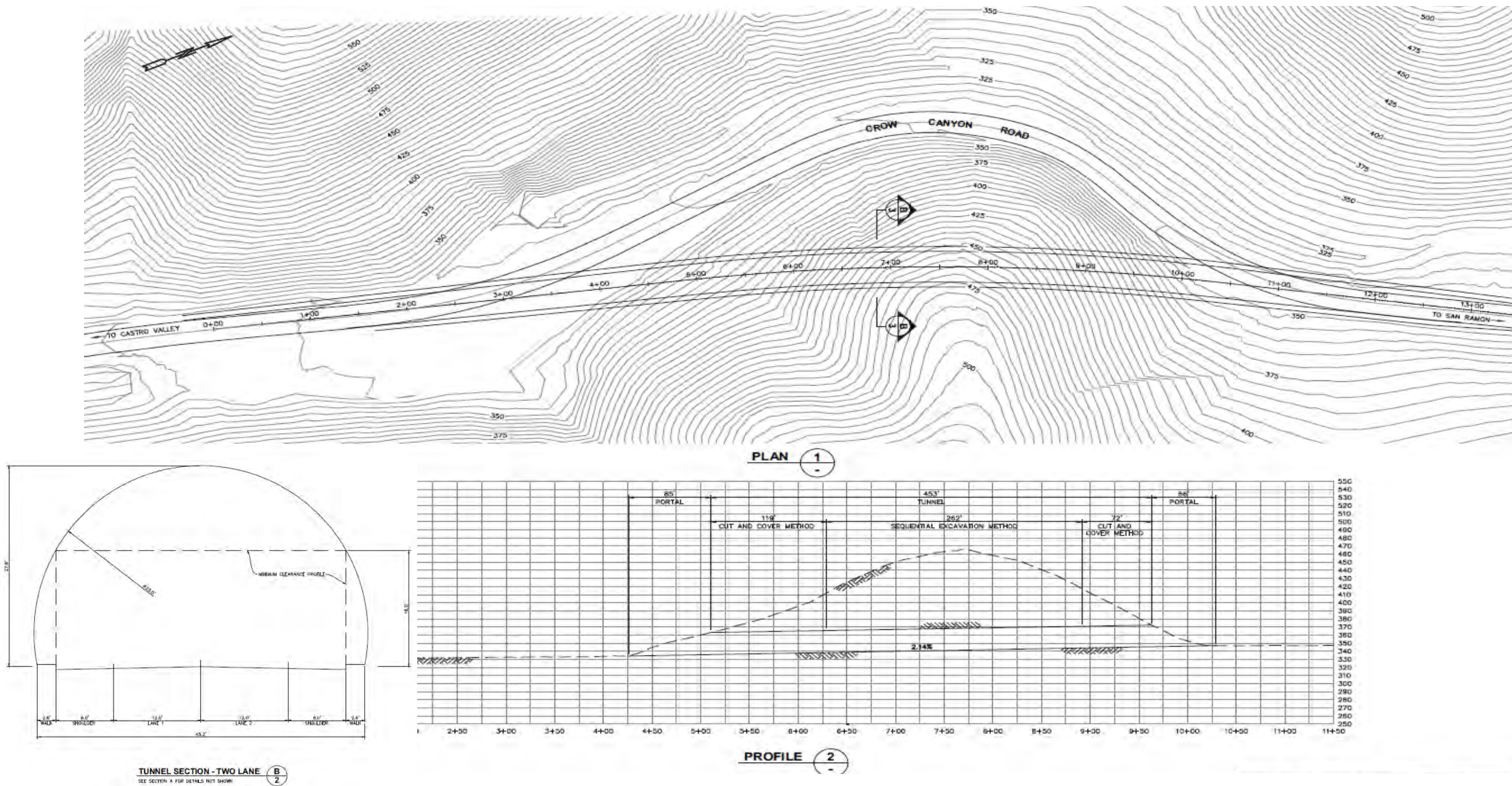


Figure 34. Tunnel at Mp 2.15 - Both Directions (Segment2)



Figure 35. Reduce 4-Lane To 2-Lane (With Turn-Outs) - Option 1 (Widen Medians) (Segment 4)



Figure 36. Reduce 4-Lane to 2-Lane (With Turn-Outs) - Option 2 (Remove Outside Pavement) (Segment 4)



Figure 37. Left Turn Lane (Left-In / Left-Out) with Acceleration/Deceleration Areas (Segment 5)



## 9.0 COUNTERMEASURE PROJECT COSTS

Conceptual designs of the 18 countermeasures were developed in order to provide the framework for completing preliminary estimates of construction cost for each project.

A summary of the conceptual costs for all the proposed countermeasures is shown in Table 21, followed by individual summary sheets for each separate countermeasure.

Detailed cost estimates are provided in a separate “Documentation” Volume.

**Table 21: Summary of Countermeasure Conceptual Costs**

CM	Description	Cost
<b>Proposed Corridor-Wide Countermeasures</b>		
1	Vehicle Speed Feedback Signs	\$236,000
2	Police Enforcement Area	\$2,460,000
3	Roundabouts (4 Total)	\$9,213,000
4	Increase Annual Shoulder Maintenance	\$447,000
5	Additional Lighting/Signage (Where Needed)	\$295,000
6	Guardrails (Where Needed)	\$2,860,000
<b>Proposed Segment 2 Countermeasures</b>		
7	Median Rumble Strip with 6-ft Shoulders	\$1,140,000
8	Tunnel at MP 2.15 – NB	\$24,526,000
9	Tunnel at MP 2.15 – Both Directions	\$30,504,000
<b>Proposed Segment 3 Countermeasures</b>		
10	Shoulder Widening – 8-ft Wide Driveways	\$3,090,000
11	Two-Way Left Turn Lane	\$2,243,000
<b>Proposed Segment 4 Countermeasures</b>		
12	Left Turn Lane (Left-In/Left Out) (Spot Locations)	\$731,000
13	Reduce 4-Lane to 2-Lane NB and 1-Lane SB	\$392,000
14	Reduce 4-Lane to 2 Lane (with turn-outs) Option 1 (Widen Medians)	\$1,578,000
15	Reduce 4-Lane to 2-Lane (with turn-outs) Option 2 (Remove Outside Pavement)	\$848,000
<b>Proposed Segment 5 Countermeasures</b>		
16	Pavement Rehab and Restriping for Wider Shoulders	\$566,000
17	Left Turn Lane (Left-in/Left-out) with Accel/Decel Areas	\$3,227,000
18	Median Rumble Strip with 6-ft Shoulders	\$1,730,000

ALAMEDA COUNTY PUBLIC WORKS AGENCY  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE: 04-A1a  
 PSR, PR, etc.:  
 Program Code:  
 PM:  
 EA:  
 PP No.:

**Project Description:** CONSTRUCT COUNTERMEASURES TO IMPROVE CROW  
 CANYON ROAD SAFETY  
**Limits:** FROM GREENRIDGE ROAD TO COUNTY LINE (ALL SEGMENTS)

**Proposed Improvement:** CM 01: Vehicle Speed Feedback Signs  
**(Scope)**

SUMMARY OF PROJECT COST ESTIMATE

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)			<u>\$170,000</u> (1)
ESCALATION TO 2017 FOR:	<u>NEAR TERM PROJECT</u>	(3.5% INTEREST)	\$9,000
<b>TOTAL ESCALATED CONSTRUCTION COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$179,000</u></b>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))			\$9,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))			\$17,000
		<b>SUBTOTAL</b>	<b><u>\$26,000</u></b>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))			\$24,000
ESCALATION TO 2017 FOR:	<u>NEAR TERM PROJECT</u>	(3.5% INTEREST)	\$2,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$26,000</u></b>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)			
ENVIRONMENTAL MITIGATION COST			\$15,000
LAND, EASEMENTS, RIGHT OF WAY COSTS			\$0
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>			<b><u>\$246,000</u></b>

ALAMEDA COUNTY PUBLIC WORKS AGENCY  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE: 04-A1a  
 PSR, PR, etc.:  
 Program Code:  
 PM:  
 EA:  
 PP No.:

**Project Description:** CONSTRUCT COUNTERMEASURES TO IMPROVE CROW  
 CANYON ROAD SAFETY  
**Limits:** FROM GREENRIDGE ROAD TO COUNTY LINE (ALL SEGMENTS)

**Proposed Improvement:** CM 02: Police Enforcement Areas  
**(Scope)**

SUMMARY OF PROJECT COST ESTIMATE

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)			<u>\$1,810,000</u> (1)
ESCALATION TO 2017 FOR:	<u>NEAR TERM PROJECT</u>	(3.5% INTEREST)	\$96,000
<b>TOTAL ESCALATED CONSTRUCTION COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$1,906,000</u></b>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))			\$91,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))			\$181,000
		<b>SUBTOTAL</b>	<b><u>\$272,000</u></b>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))			\$253,000
ESCALATION TO 2017 FOR:	<u>NEAR TERM PROJECT</u>	(3.5% INTEREST)	\$14,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$267,000</u></b>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)			
ENVIRONMENTAL MITIGATION COST			\$15,000
LAND, EASEMENTS, RIGHT OF WAY COSTS			
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>			<b><u>\$2,460,000</u></b>

ALAMEDA COUNTY PUBLIC WORKS AGENCY  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE: 04-A1a  
 PSR, PR, etc.:  
 Program Code:  
 PM:  
 EA:  
 PP No.:

**Project Description: CONSTRUCT COUNTERMEASURES TO IMPROVE CROW CANYON ROAD SAFETY**  
**Limits: FROM GREENRIDGE ROAD TO COUNTY LINE (ALL SEGMENTS)**

**Proposed Improvement:** CM 03: Roundabouts (Total 4)  
**(Scope)**

**SUMMARY OF PROJECT COST ESTIMATE**

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)			<u>\$5,370,000</u> (1)
ESCALATION TO 2025 FOR:	<u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$1,087,000
<b>TOTAL ESCALATED CONSTRUCTION COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$6,457,000</u></b>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))			\$269,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))			\$537,000
		<b>SUBTOTAL</b>	<b><u>\$806,000</u></b>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))			\$752,000
ESCALATION TO 2025 FOR:	<u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$153,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$905,000</u></b>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)			
ENVIRONMENTAL MITIGATION COST			\$275,000
LAND, EASEMENTS, RIGHT OF WAY COSTS	Cost per Sq Ft \$ 20.00	SQUARE FEET 38,500	\$770,000
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>			<b><u>\$9,213,000</u></b>

ALAMEDA COUNTY PUBLIC WORKS AGENCY  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE 04-A1a  
 PSR,PR, etc. \_\_\_\_\_  
 Program Code: \_\_\_\_\_  
 PM: \_\_\_\_\_  
 EA: \_\_\_\_\_  
 PP No. : \_\_\_\_\_

**Project Description:** CONSTRUCT COUNTERMEASURES TO IMPROVE CROW  
 CANYON ROAD SAFETY  
**Limits:** FROM GREENRIDGE ROAD TO COUNTY LINE (ALL SEGMENTS)

**Proposed Improvement:** CM 04: Increase Annual Shoulder Maintenance  
**(Scope)** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

SUMMARY OF PROJECT COST ESTIMATE

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)			<u>\$330,000</u> (1)
ESCALATION TO 2017 FOR:	<u>NEAR TERM PROJECT</u>	(3.5% INTEREST)	\$18,000
<b>TOTAL ESCALATED CONSTRUCTION COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$348,000</u></b>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))			\$17,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))			\$33,000
		<b>SUBTOTAL</b>	<b><u>\$50,000</u></b>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))			\$46,000
ESCALATION TO 2017 FOR:	<u>NEAR TERM PROJECT</u>	(3.5% INTEREST)	\$3,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$49,000</u></b>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)			
ENVIRONMENTAL MITIGATION COST			\$0
LAND, EASEMENTS, RIGHT OF WAY COSTS			
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>			<b><u>\$447,000</u></b>

ALAMEDA COUNTY PUBLIC WORKS AGENCY  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE 04-A1a  
 PSR,PR, etc. \_\_\_\_\_  
 Program Code: \_\_\_\_\_  
 PM: \_\_\_\_\_  
 EA: \_\_\_\_\_  
 PP No. : \_\_\_\_\_

**Project Description:** CONSTRUCT COUNTERMEASURES TO IMPROVE CROW  
 CANYON ROAD SAFETY  
**Limits:** FROM GREENRIDGE ROAD TO COUNTY LINE (ALL SEGMENTS)

**Proposed Improvement:** CM 05: Additional Lighting/Signing (where needed)  
**(Scope)** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**SUMMARY OF PROJECT COST ESTIMATE**

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)		<u>\$210,000</u> (1)
ESCALATION TO 2017 FOR: <u>NEAR TERM PROJECT</u>	(3.5% INTEREST)	\$12,000
<b>TOTAL ESCALATED CONSTRUCTION COSTS</b>	<b>SUBTOTAL</b>	<b><u>\$222,000</u></b>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))		\$11,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))		\$21,000
	<b>SUBTOTAL</b>	<b><u>\$32,000</u></b>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))		\$29,000
ESCALATION TO 2017 FOR: <u>NEAR TERM PROJECT</u>	(3.5% INTEREST)	\$2,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>	<b>SUBTOTAL</b>	<b><u>\$31,000</u></b>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)		
ENVIRONMENTAL MITIGATION COST		\$10,000
LAND, EASEMENTS, RIGHT OF WAY COSTS		\$0
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>		<b><u>\$295,000</u></b>

ALAMEDA COUNTY PUBLIC WORKS AGENCY  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE: 04-A1a  
 PSR, PR, etc.:  
 Program Code:  
 PM:  
 EA:  
 PP No.:

**Project Description:** CONSTRUCT COUNTERMEASURES TO IMPROVE CROW  
 CANYON ROAD SAFETY  
**Limits:** FROM GREENRIDGE ROAD TO COUNTY LINE (ALL SEGMENTS)

**Proposed Improvement:** CM 06: Guardrails (where necessary)  
**(Scope)**

SUMMARY OF PROJECT COST ESTIMATE

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)			<u>\$2,110,000</u> (1)
ESCALATION TO 2017 FOR:	<u>NEAR TERM PROJECT</u>	(3.5% INTEREST)	\$112,000
<b>TOTAL ESCALATED CONSTRUCTION COSTS</b>		<b>SUBTOTAL</b>	<u>\$2,222,000</u>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))			\$106,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))			\$211,000
		<b>SUBTOTAL</b>	<u>\$317,000</u>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))			\$295,000
ESCALATION TO 2017 FOR:	<u>NEAR TERM PROJECT</u>	(3.5% INTEREST)	\$16,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>		<b>SUBTOTAL</b>	<u>\$311,000</u>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)			
ENVIRONMENTAL MITIGATION COST			\$10,000
LAND, EASEMENTS, RIGHT OF WAY COSTS			
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>			<u>\$2,860,000</u>

ALAMEDA COUNTY PUBLIC WORKS AGENCY  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE: 04-A1a  
 PSR, PR, etc.: \_\_\_\_\_  
 Program Code: \_\_\_\_\_  
 PM: \_\_\_\_\_  
 EA: \_\_\_\_\_  
 PP No.: \_\_\_\_\_

**Project Description:** CONSTRUCT COUNTERMEASURES TO IMPROVE CROW  
 CANYON ROAD SAFETY  
**Limits:** FROM COLD WATER DRIVE TO MILE POST 2.25 (SEGMENT 2)

**Proposed Improvement:** CM 07: Median Rumble Strip with 6-ft Shoulders  
**(Scope)** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**SUMMARY OF PROJECT COST ESTIMATE**

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)		<u>\$700,000</u> (1)
ESCALATION TO 2020 FOR: <u>MEDIUM TERM PROJECT</u>	(3.5% INTEREST)	\$76,000
<b>TOTAL ESCALATED CONSTRUCTION COSTS</b>	<b>SUBTOTAL</b>	<b><u>\$776,000</u></b>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))		\$35,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))		\$70,000
	<b>SUBTOTAL</b>	<b><u>\$105,000</u></b>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))		\$98,000
ESCALATION TO 2020 FOR: <u>MEDIUM TERM PROJECT</u>	(3.5% INTEREST)	\$11,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>	<b>SUBTOTAL</b>	<b><u>\$109,000</u></b>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)		
ENVIRONMENTAL MITIGATION COST		\$150,000
LAND, EASEMENTS, RIGHT OF WAY COSTS		
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>		<b><u>\$1,140,000</u></b>



ALAMEDA COUNTY PUBLIC WORKS AGENCY  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE     04-Ala  
 PSR,PR, etc.     \_\_\_\_\_  
 Program Code:     \_\_\_\_\_  
 PM:                 \_\_\_\_\_  
 EA:                 \_\_\_\_\_  
 PP No.:             \_\_\_\_\_

**Project Description: CONSTRUCT COUNTERMEASURES TO IMPROVE CROW  
 CANYON ROAD SAFETY**  
**Limits: FROM COLD WATER DRIVE TO MILE POST 2.25 (SEGMENT 2)**

**Proposed Improvement:** CM 08: Tunnel at MP 2.15 – NB  
**(Scope)** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**SUMMARY OF PROJECT COST ESTIMATE**

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)			<u>\$15,740,000</u> (1)
ESCALATION TO 2025 FOR:	<u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$3,186,000
<b><u>TOTAL ESCALATED CONSTRUCTION COSTS</u></b>		<b>SUBTOTAL</b>	<b><u>\$18,926,000</u></b>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))			\$787,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))			\$1,574,000
		<b>SUBTOTAL</b>	<b><u>\$2,361,000</u></b>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))			\$2,204,000
ESCALATION TO 2025 FOR:	<u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$447,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$2,651,000</u></b>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)			
ENVIRONMENTAL MITIGATION COST			\$200,000
LAND, EASEMENTS, RIGHT OF WAY COSTS	Cost per Sq Ft \$ 20.00	SQUARE FEET 19,400	\$388,000
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>			<b><u>\$24,526,000</u></b>

ALAMEDA COUNTY PUBLIC WORKS AGENCY  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE     04-Ala  
 PSR,PR, etc.     \_\_\_\_\_  
 Program Code:     \_\_\_\_\_  
 PM:                \_\_\_\_\_  
 EA:                \_\_\_\_\_  
 PP No.:            \_\_\_\_\_

**Project Description: CONSTRUCT COUNTERMEASURES TO IMPROVE CROW  
 CANYON ROAD SAFETY**  
**Limits: FROM COLD WATER DRIVE TO MILE POST 2.25 (SEGMENT 2)**

**Proposed Improvement:** CM 09: Tunnel at MP 2.15 - Both Directions  
**(Scope)** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**SUMMARY OF PROJECT COST ESTIMATE**

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)			<u>\$19,450,000</u> (1)
ESCALATION TO 2025 FOR:	<u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$3,937,000
<b>TOTAL ESCALATED CONSTRUCTION COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$23,387,000</u></b>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))			\$973,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))			\$1,945,000
		<b>SUBTOTAL</b>	<b><u>\$2,918,000</u></b>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))			\$2,723,000
ESCALATION TO 2025 FOR:	<u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$552,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$3,275,000</u></b>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)			
ENVIRONMENTAL MITIGATION COST			\$375,000
LAND, EASEMENTS, RIGHT OF WAY COSTS	Cost per Sq Ft \$ 20.00	SQUARE FEET 27,450	\$549,000
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>			<b><u>\$30,504,000</u></b>

**ALAMEDA COUNTY PUBLIC WORKS AGENCY**  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE: 04-A1a  
 PSR, PR, etc.: \_\_\_\_\_  
 Program Code: \_\_\_\_\_  
 PM: \_\_\_\_\_  
 EA: \_\_\_\_\_  
 PP No.: \_\_\_\_\_

**Project Description: CONSTRUCT COUNTERMEASURES TO IMPROVE CROW CANYON ROAD SAFETY**  
**Limits: FROM MILE POST 2.25 TO NORRIS CANYON ROAD (SEGMENT 3)**

**Proposed Improvement:** CM 10: Shoulder Widening - 8' Wide Driveways  
**(Scope)** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**SUMMARY OF PROJECT COST ESTIMATE**

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)		<u>\$2,180,000</u> (1)
ESCALATION TO 2020 FOR: <u>MEDIUM TERM PROJECT</u>	(3.5% INTEREST)	\$235,000
<b>TOTAL ESCALATED CONSTRUCTION COSTS</b>	<b>SUBTOTAL</b>	<b><u>\$2,415,000</u></b>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))		\$109,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))		\$218,000
	<b>SUBTOTAL</b>	<b><u>\$327,000</u></b>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))		\$305,000
ESCALATION TO 2020 FOR: <u>MEDIUM TERM PROJECT</u>	(3.5% INTEREST)	\$33,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>	<b>SUBTOTAL</b>	<b><u>\$338,000</u></b>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)		
ENVIRONMENTAL MITIGATION COST		\$10,000
LAND, EASEMENTS, RIGHT OF WAY COSTS		
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>		<b><u>\$3,090,000</u></b>

ALAMEDA COUNTY PUBLIC WORKS AGENCY  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE     04-Ala  
 PSR,PR, etc.     \_\_\_\_\_  
 Program Code:     \_\_\_\_\_  
 PM:                 \_\_\_\_\_  
 EA:                 \_\_\_\_\_  
 PP No.:             \_\_\_\_\_

**Project Description: CONSTRUCT COUNTERMEASURES TO IMPROVE CROW  
 CANYON ROAD SAFETY**  
**Limits: FROM MILE POST 2.25 TO NORRIS CANYON ROAD (SEGMENT 3)**

**Proposed Improvement:** CM 11: Two-Way Left Turn Lane  
**(Scope)** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**SUMMARY OF PROJECT COST ESTIMATE**

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)			<u>\$1,410,000</u> (1)
ESCALATION TO 2025 FOR:	<u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$286,000
<b>TOTAL ESCALATED CONSTRUCTION COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$1,696,000</u></b>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))			\$71,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))			\$141,000
		<b>SUBTOTAL</b>	<b><u>\$212,000</u></b>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))			\$197,000
ESCALATION TO 2025 FOR:	<u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$40,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$237,000</u></b>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)			
ENVIRONMENTAL MITIGATION COST			\$10,000
LAND, EASEMENTS, RIGHT OF WAY COSTS	Cost per Sq Ft \$ 20.00	SQUARE FEET 4,400	\$88,000
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>			<b><u>\$2,243,000</u></b>

ALAMEDA COUNTY PUBLIC WORKS AGENCY  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE: 04-A1a  
 PSR, PR, etc.:  
 Program Code:  
 PM:  
 EA:  
 PP No.:

**Project Description:** CONSTRUCT COUNTERMEASURES TO IMPROVE CROW  
 CANYON ROAD SAFETY  
**Limits:** FROM NORRIS CANYON ROAD TO MILE POST 4.45 (SEGMENT 4)

**Proposed Improvement:** CM 12: Left Turn Lane (Left-In/Left-Out) (Spot Locations)  
**(Scope)**

SUMMARY OF PROJECT COST ESTIMATE

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)		<u>\$510,000</u> (1)
ESCALATION TO 2020 FOR: <u>MEDIUM TERM PROJECT</u>	(3.5% INTEREST)	\$55,000
<b>TOTAL ESCALATED CONSTRUCTION COSTS</b>	<b>SUBTOTAL</b>	<b><u>\$565,000</u></b>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))		\$26,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))		\$51,000
	<b>SUBTOTAL</b>	<b><u>\$77,000</u></b>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))		\$71,000
ESCALATION TO 2020 FOR: <u>MEDIUM TERM PROJECT</u>	(3.5% INTEREST)	\$8,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>	<b>SUBTOTAL</b>	<b><u>\$79,000</u></b>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)		
ENVIRONMENTAL MITIGATION COST		\$10,000
LAND, EASEMENTS, RIGHT OF WAY COSTS		
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>		<b><u>\$731,000</u></b>

ALAMEDA COUNTY PUBLIC WORKS AGENCY  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE: 04-A1a  
 PSR, PR, etc.:  
 Program Code:  
 PM:  
 EA:  
 PP No.:

**Project Description:** CONSTRUCT COUNTERMEASURES TO IMPROVE CROW  
 CANYON ROAD SAFETY  
**Limits:** FROM NORRIS CANYON ROAD TO MILE POST 4.45 (SEGMENT 4)

**Proposed Improvement:** CM 13: Reduce 4-Lane to 2-Lane NB and 1-Lane SB  
**(Scope)**

SUMMARY OF PROJECT COST ESTIMATE

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)			<u>\$250,000</u> (1)
ESCALATION TO 2025 FOR:	<u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$51,000
<b>TOTAL ESCALATED CONSTRUCTION COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$301,000</u></b>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))			\$13,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))			\$25,000
		<b>SUBTOTAL</b>	<b><u>\$38,000</u></b>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))			\$35,000
ESCALATION TO 2025 FOR:	<u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$8,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$43,000</u></b>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)			
ENVIRONMENTAL MITIGATION COST			\$10,000
LAND, EASEMENTS, RIGHT OF WAY COSTS			
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>			<b><u>\$392,000</u></b>

ALAMEDA COUNTY PUBLIC WORKS AGENCY  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE: 04-A1a  
 PSR, PR, etc.:  
 Program Code:  
 PM:  
 EA:  
 PP No.:

**Project Description:** CONSTRUCT COUNTERMEASURES TO IMPROVE CROW  
 CANYON ROAD SAFETY  
**Limits:** FROM NORRIS CANYON ROAD TO MILE POST 4.45 (SEGMENT 4)

**Proposed Improvement:** CM 14: Reduce 4-Lane to 2-Lane (with turn-outs) Option 1 (Widen Med  
 (Scope)

SUMMARY OF PROJECT COST ESTIMATE

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)			<u>\$1,030,000</u> (1)
ESCALATION TO 2025 FOR:	<u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$209,000
<b>TOTAL ESCALATED CONSTRUCTION COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$1,239,000</u></b>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))			\$52,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))			\$103,000
		<b>SUBTOTAL</b>	<b><u>\$155,000</u></b>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))			\$144,000
ESCALATION TO 2025 FOR:	<u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$30,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$174,000</u></b>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)			
ENVIRONMENTAL MITIGATION COST			\$10,000
LAND, EASEMENTS, RIGHT OF WAY COSTS			
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>			<b><u>\$1,578,000</u></b>

ALAMEDA COUNTY PUBLIC WORKS AGENCY  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE 04-Ala  
 PSR,PR, etc. \_\_\_\_\_  
 Program Code: \_\_\_\_\_  
 PM: \_\_\_\_\_  
 EA: \_\_\_\_\_  
 PP No.: \_\_\_\_\_

**Project Description:** CONSTRUCT COUNTERMEASURES TO IMPROVE CROW  
 CANYON ROAD SAFETY  
**Limits:** FROM NORRIS CANYON ROAD TO MILE POST 4.45 (SEGMENT 4)

**Proposed Improvement:** CM 15: Reduce 4-Lane to 2-Lane (with turn-outs) Option 2 (remove outside pavement)  
**(Scope)** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

SUMMARY OF PROJECT COST ESTIMATE

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)		<u>\$550,000</u> (1)
ESCALATION TO 2025 FOR: <u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$112,000
<b><u>TOTAL ESCALATED CONSTRUCTION COSTS</u></b>	<b>SUBTOTAL</b>	<b><u>\$662,000</u></b>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))		\$28,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))		\$55,000
	<b>SUBTOTAL</b>	<b><u>\$83,000</u></b>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))		\$77,000
ESCALATION TO 2025 FOR: <u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$16,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>	<b>SUBTOTAL</b>	<b><u>\$93,000</u></b>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)		
ENVIRONMENTAL MITIGATION COST		\$10,000
LAND, EASEMENTS, RIGHT OF WAY COSTS		
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>		<b><u>\$848,000</u></b>



ALAMEDA COUNTY PUBLIC WORKS AGENCY  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE 04-A1a  
 PSR,PR, etc. \_\_\_\_\_  
 Program Code: \_\_\_\_\_  
 PM: \_\_\_\_\_  
 EA: \_\_\_\_\_  
 PP No. : \_\_\_\_\_

**Project Description:** CONSTRUCT COUNTERMEASURES TO IMPROVE CROW  
 CANYON ROAD SAFETY

**Limits:** FROM MILE POST 4.45 TO COUNTY LINE (SEGMENT 5)

**Proposed Improvement:** CM 16: Pavement Rehab and Restriping for Wider Shoulders

**(Scope)**

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**SUMMARY OF PROJECT COST ESTIMATE**

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)			<u>\$400,000</u> (1)
ESCALATION TO 2017 FOR:	<u>NEAR TERM PROJECT</u>	(3.5% INTEREST)	\$22,000
<b>TOTAL ESCALATED CONSTRUCTION COSTS</b>		<b>SUBTOTAL</b>	<u><b>\$422,000</b></u>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))			\$20,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))			\$40,000
		<b>SUBTOTAL</b>	<u><b>\$60,000</b></u>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))			\$56,000
ESCALATION TO 2017 FOR:	<u>NEAR TERM PROJECT</u>	(3.5% INTEREST)	\$3,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>		<b>SUBTOTAL</b>	<u><b>\$59,000</b></u>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)			
ENVIRONMENTAL MITIGATION COST			\$0
LAND, EASEMENTS, RIGHT OF WAY COSTS			
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>			<u><u><b>\$541,000</b></u></u>

ALAMEDA COUNTY PUBLIC WORKS AGENCY  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE     04-Ala  
 PSR,PR, etc.     \_\_\_\_\_  
 Program Code:     \_\_\_\_\_  
 PM:                 \_\_\_\_\_  
 EA:                 \_\_\_\_\_  
 PP No.:             \_\_\_\_\_

**Project Description: CONSTRUCT COUNTERMEASURES TO IMPROVE CROW CANYON ROAD SAFETY**

**Limits:** FROM MILE POST 4.45 TO COUNTY LINE (SEGMENT 5)

**Proposed Improvement:** CM 17: Left Turn Lane (Left-in/Left-out) with Accel/Decel Areas

**(Scope)**

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**SUMMARY OF PROJECT COST ESTIMATE**

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)			<u>\$2,070,000</u> (1)
ESCALATION TO 2025 FOR:	<u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$419,000
<b>TOTAL ESCALATED CONSTRUCTION COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$2,489,000</u></b>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))			\$104,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))			\$207,000
		<b>SUBTOTAL</b>	<b><u>\$311,000</u></b>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))			\$290,000
ESCALATION TO 2025 FOR:	<u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$59,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>		<b>SUBTOTAL</b>	<b><u>\$349,000</u></b>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)			
ENVIRONMENTAL MITIGATION COST			\$10,000
LAND, EASEMENTS, RIGHT OF WAY COSTS	Cost per Sq Ft \$ 20.00	SQUARE FEET 3,400	\$68,000
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>			<b><u>\$3,227,000</u></b>

ALAMEDA COUNTY PUBLIC WORKS AGENCY  
 ACCIDENT COUNTERMEASURES CONCEPTUAL COST ESTIMATES  
 6 December 2015

DIST-CO-RTE     04-Ala  
 PSR,PR, etc.     \_\_\_\_\_  
 Program Code:     \_\_\_\_\_  
 PM:                 \_\_\_\_\_  
 EA:                 \_\_\_\_\_  
 PP No.:             \_\_\_\_\_

**Project Description: CONSTRUCT COUNTERMEASURES TO IMPROVE CROW CANYON ROAD SAFETY**

**Limits:** FROM MILE POST 4.45 TO COUNTY LINE (SEGMENT 5)

**Proposed Improvement:** CM 18: Median Rumble Strip with 6-Ft Shoulders

**(Scope)** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**SUMMARY OF PROJECT COST ESTIMATE**

TOTAL CONSTRUCTION COSTS (2015 DOLLARS)			<u>\$1,050,000</u> (1)
ESCALATION TO 2025 FOR:	<u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$213,000
<b>TOTAL ESCALATED CONSTRUCTION COSTS</b>		<b>SUBTOTAL</b>	<u><b>\$1,263,000</b></u>
PLANNING/ENVIRONMENTAL DOCUMENTS (5% OF (1))			\$53,000
DESIGN ENGINEERING AND MANAGEMENT (10% OF (1))			\$105,000
		<b>SUBTOTAL</b>	<u><b>\$158,000</b></u>
CONSTRUCTION ENGINEERING AND MANAGEMENT (14% OF (1))			\$147,000
ESCALATION TO 2025 FOR:	<u>LONG TERM PROJECT</u>	(3.5% INTEREST)	\$30,000
<b>ESCALATED CONSTRUCTION MANAGEMENT SUPPORT COSTS</b>		<b>SUBTOTAL</b>	<u><b>\$177,000</b></u>
UTILITY RELOCATION (INCLUDED IN CONSTRUCTION COST)			
ENVIRONMENTAL MITIGATION COST			\$20,000
LAND, EASEMENTS, RIGHT OF WAY COSTS	Cost per Sq Ft \$ 20.00	SQUARE FEET 5,600	\$112,000
<b>TOTAL CONSTRUCTION, PLANNING, ENGINEERING AND ROW COST =</b>			<u><u><b>\$1,730,000</b></u></u>

## 10.0 RECOMMENDED COUNTERMEASURE PRIORITIZATION

The 18 proposed countermeasures were evaluated to establish a recommended prioritization for implementation. The evaluation criteria included community, environmental and engineering aspects and impacts of each countermeasure. These criteria are described as follows:

- COMMUNITY ASPECTS/IMPACTS
  - Right of Way Impacts
    - Loss of frontage property
    - Potential driveway impacts
  - Improves Non-Motorized Mobility
    - Encourages bicycle use
  - Emergency services
    - Impacts to response time
- ENVIRONMENTAL ASPECTS/IMPACTS
  - Minimizes Environmental Impact
    - Crow Creek
    - Wetlands
    - Threatened/endangered species
    - Historical property/archaeological sites
    - Noise
    - Stormwater impacts
    - Permitting requirements
    - Preserves rural character
- ENGINEERING ASPECTS/IMPACTS
  - Improves Safety
    - Addresses problem locations
    - Improves corridor safety
    - Provides enhanced enforcement
    - Potential for reducing speeds
    - Increases off-road recovery space
    - Addresses MP 2.15
  - Traffic Circulation
    - Improves regional mobility
    - Improves local traffic access
  - Traffic Operations
    - Improves corridor operations
  - Construction Impacts
    - Constructability
    - Utility impacts
    - Maintenance of traffic
  - Fiscal Impacts
    - Range of total cost
    - Cost effectiveness (B/C)
    - Fundable (meets HSIP/HR3/ACTC criteria)

**Table 22: Countermeasure Effectiveness**

CM	Description	REDUCTION IN EXPECTED AVERAGE ACCIDENT FREQUENCY	
		Range	CT Value*
	<b>Corridor-Wide Countermeasures</b>		
1	Vehicle Speed Feedback Signs	0-41%	30%
2	Police Enforcement Area	17%	N/A
3	Roundabouts (4 Total)	N/A	N/A
4	Increase Annual Shoulder Maintenance (Construct Safety-Edge)	25%	N/A
5	Additional Lighting/Signage (Where Needed)	18-69% / 20-30%	35% / 25%
6	Guardrails (Where Needed)	11-78%	25%
	<b>Segment 2 Countermeasures</b>		
7	Medium Rumble Strip with 6-ft Shoulders	7%	N/A
8	Tunnel at MP 2.15 – NB	24-90%	50%
9	Tunnel at MP 2.15 – Both Directions	24-90%	50%
	<b>Segment 3 Countermeasures</b>		
10	Shoulder Widening – 8-ft Wide Driveways	10-78%	25%
11	Two-Way Left Turn Lane	8-50%	30%
	<b>Segment 4 Countermeasures</b>		
12	Left Turn Lane (Left-in / Left-out) (Spot Locations)	9-55%	35-50%
13	Reduce 4-Lane to 2-Lane NB and 1-Lane SB	N/A	N/A
14	Reduce 4-Lane to 2-Lane (with turn-outs) (Option 1) (Widen Median)	N/A	N/A
15	Reduce 4-Lane to 2-Lane (with turn-outs) Option 2 (Remove Outside Pavement)	N/A	N/A
	<b>Segment 5 Countermeasures</b>		
16	Pavement Rehab and Restriping for Wider Shoulders	20%	N/A
17	Left Turn Lane (Left-in/Left-out) with Accel/Deccel Areas	25%	N/A
18	Median Rumble Strip with 6-ft Shoulders	15-75%	25%

\*Caltrans Value

Source: Local Roadway Safety: A Manual for California's Local Road Owners, Version 1.0 April 2012

## 10.1 COUNTERMEASURE EFFECTIVENESS

The proposed projects were also evaluated regarding “countermeasure effectiveness”, measured by the percentage of crashes the proposed treatment is expected to reduce. This expected percentage is known as the Crash Reduction Factor or CRF. Crash Reduction Factors for the proposed countermeasures are shown in Table 22.

## 10.2 COUNTERMEASURE COST EFFECTIVENESS

When combining the Crash Reduction Factor of a particular countermeasure with the total project cost of that improvement and crash cost data associated with particular accident “types”, a Benefit-to-Cost Ratio (B/C) can be determined. This B/C ratio is known as the countermeasure’s cost effectiveness. For a safety improvement to be cost effective, the B/C ratio must be greater than 1.0.

To determine each countermeasure’s B/C ratio; crash data, the proposed safety countermeasure and total project costs (administration costs, project development costs and construction costs) were input into SafeTREC’S Transportation Injury Mapping System (TIMS) Benefit/Cost Calculator Tool. The TIMS calculator takes into account accident data consisting of crash type and the level of injury or property damage. As previously discussed, accident data was obtained from the Statewide Integrated Traffic Records System (SWITRS) and Alameda County records for accidents that occurred between January 2003 and December 2012. For the B/C calculation, accidents that occurred in 2003 were omitted due to time limitations build into the TIMS calculator. Accidents that occurred after December 2010 were omitted since the database did not contain the level of injury information required by the TIMS calculator. Therefore, seven years of accident data between January 1, 2004 and December 31, 2010 was utilized for the countermeasure cost effectiveness. The B/C ratio of each countermeasure is shown in Table 23.

## 10.3 RECOMMENDED COUNTERMEASURE PRIORITIZATION

As discussed in the following Section 12.0, “FUNDING FOR FUTURE IMPROVEMENTS,” Caltrans currently relies solely on the B/C ratio in selecting projects to receive federal funding (HSIP, HR3) in a Caltrans call-for-projects. Consequently, priority should be given to implementing those countermeasures with highest benefit/cost ratios along segments with higher than average accident occurrences.

Evaluating each countermeasure against the community, environmental and engineering criteria discussed above, and considering each countermeasure’s cost effectiveness, the recommended project prioritization is presented in Table 24.

**Table 23: Countermeasure Cost Effectiveness**

CM	Description	Cost	B/C Ratio
	<b>Proposed Corridor-Wide Countermeasures</b>		
1	Vehicle Speed Feedback Signs (Entire Study Corridor)	\$236,000	44
2	California Highway Patrol Enforcement Area (Entire Study Corridor)	\$2,460,000	6
3	Roundabouts (4 Total)	\$9,213,000	6
4	Increase Annual Shoulder Maintenance 25 Percent	\$447,000	15
5	Additional Lighting/Signage (Where Needed)	\$295,000	3
6	Guardrails (Where Needed)	\$2,860,000	3
	<b>Proposed Segment 2 Countermeasures</b>		
7	Median Rumble Strip with 6-ft Shoulders	\$1,140,000	11
8	Tunnel at MP 2.15 - NB	\$24,526,000	1
9	Tunnel at MP 2.15 - Both Directions	\$30,504,000	1
	<b>Proposed Segment 3 Countermeasures</b>		
10	Shoulder Widening - 8-ft Wide Driveways	\$3,090,000	7
11	Two-Way Left Turn Lane	\$2,243,000	6
	<b>Proposed Segment 4 Countermeasures</b>		
12	Left Turn Lane (Left-In/Left Out) (Spot Locations)	\$731,000	9
13	Reduce 4-Lane to 2-Lane NB and 1-Lane SB	\$392,000	9
14	Reduce 4-Lane to 2 Lane (with turn-outs) Option 1 (Widen Median)3	\$1,578,000	7
15	Reduce 4-Lane to 2-Lane (with turn-outs) Option 2 (Remove Outside Pavement)	\$848,000	12
	<b>Proposed Segment 5 Countermeasures</b>		
16	Pavement Rehab and Restriping for Wider Shoulders	\$566,000	5
17	Left Turn Lane (Left-in/Left-out) with Accel/Deccel Areas	\$3,227,000	2
18	Median Rumble Strip with 6-ft Shoulders	\$1,730,000	3

**Table 24: Recommended Countermeasure Prioritization**

CM	Description	Location
<b>Near-Term Implementation</b>		
1	Vehicle Speed Feedback Signs	Corridor-Wide
2	Police Enforcement Area	Corridor-Wide
4	Increase Annual Shoulder Maintenance	Corridor-Wide
16	Pavement Rehab and Restriping for Wider Shoulders	Segment 5
<b>Medium-Term Implementation</b>		
5	Additional Lighting/Signage (Where Needed)	Segment 5
6	Guardrails (Where Needed)	Corridor-Wide
10	Shoulder Widening – 8-ft Wide Driveways	Segment 3
12	Left Turn Lane (Left-In/Left-Out) (Spot Locations)	Segment 4
<b>Long-Term Implementation</b>		
3	Roundabouts (4 Total)	Corridor-Wide
7	Median Rumble Strip with 6-ft Shoulders	Segment 2
8	Tunnel at MP 2.15 - NB	Segment 2
9	Tunnel at MP 2.15 – Both Directions	Segment 2
11	Two-Way Left Turn Lane	Segment 3
13	Reduce 4-Lane to 2-Lane NB and 1-Lane SB	Segment 4
14	Reduce 4-Lane to 2-Lane (with turn-outs) Option 1 (Widen Median)	Segment 4
15	Reduce 4-Lane to 2-Lane (with turn-outs) Option 2 (Remove Outside Pavement)	Segment 4
17	Left Turn Lane (Left-in/Left-out) with Accel/Decel Areas	Segment 5
18	Median Rumble Strip with 6-ft Shoulders	Segment 5

It should be understood that this Safety Study is the first step in identifying potential future improvement projects to address existing safety needs along Crow Canyon Road. Prior to the implementation of any countermeasure, a detailed engineering study should be undertaken to further evaluate the engineering design details, environmental impacts and cost implications of the proposed project. These elements were beyond the scope of this document.

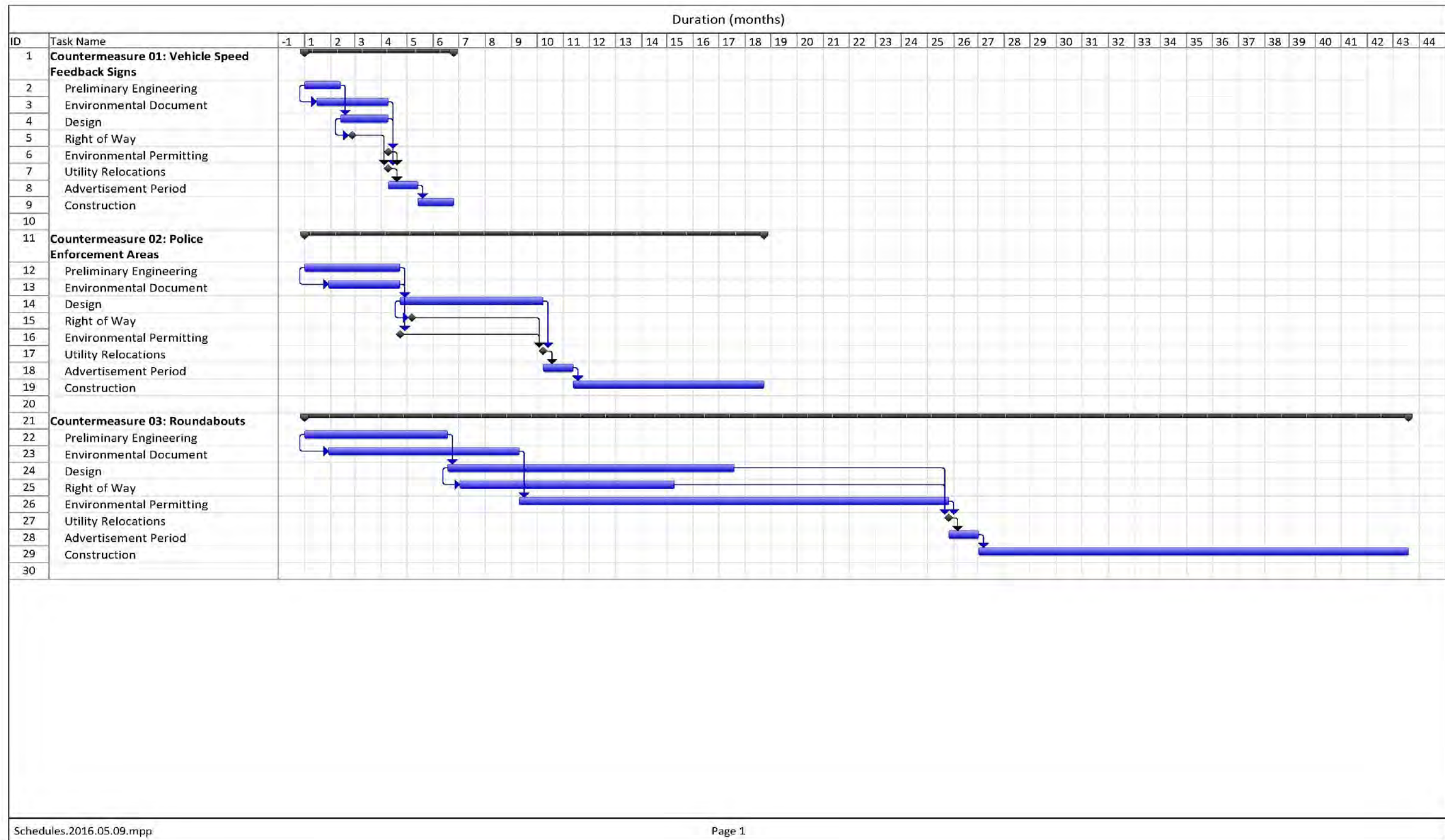
Furthermore, it was the intent of this study to present lower cost, “Near-Term” countermeasures as the first step in addressing the safety needs within the study corridor. Once selected “Near Term” countermeasures have been implemented, it is suggested that the safety performance of the roadway be reassessed to determine if the implementation of additional countermeasures would be warranted.

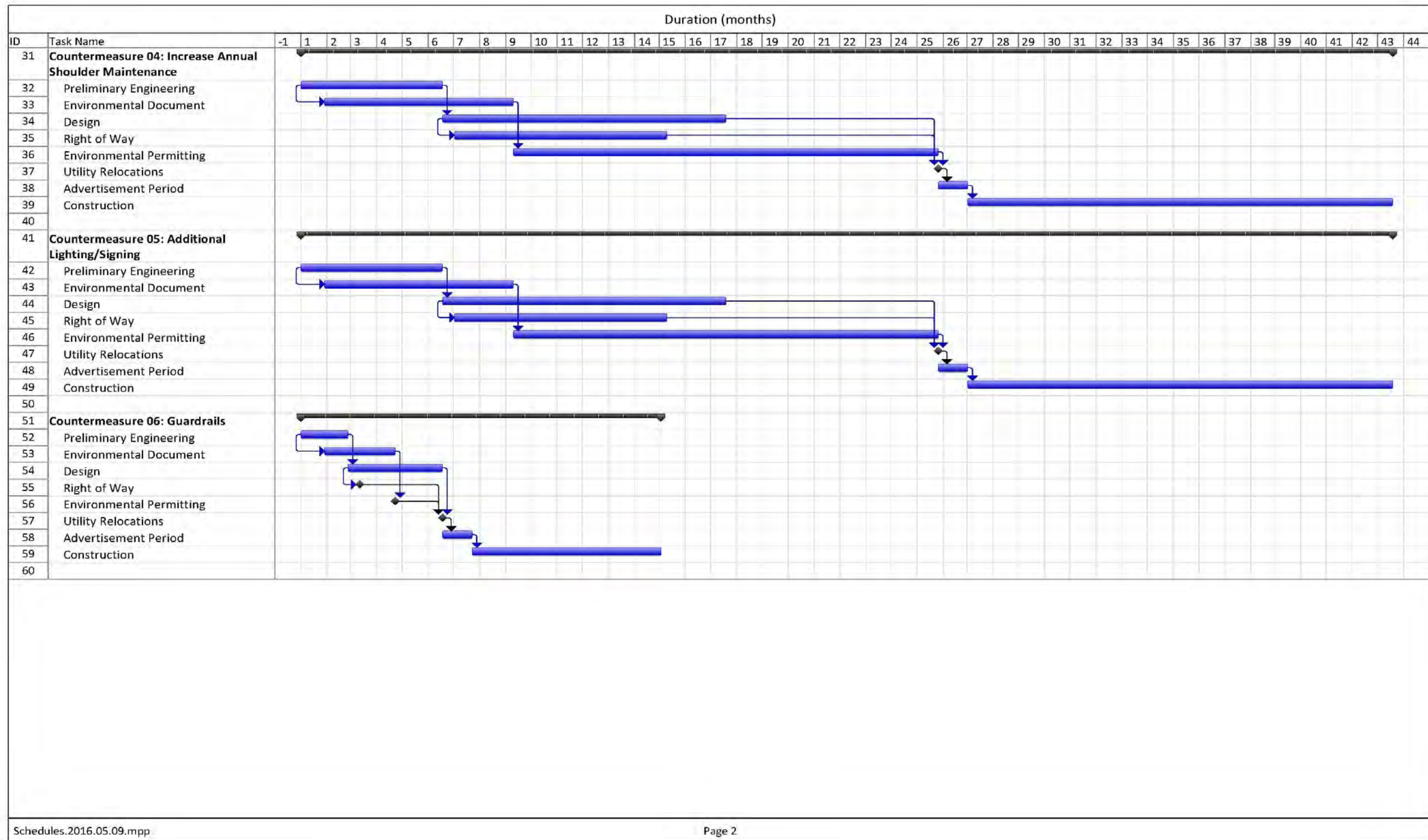


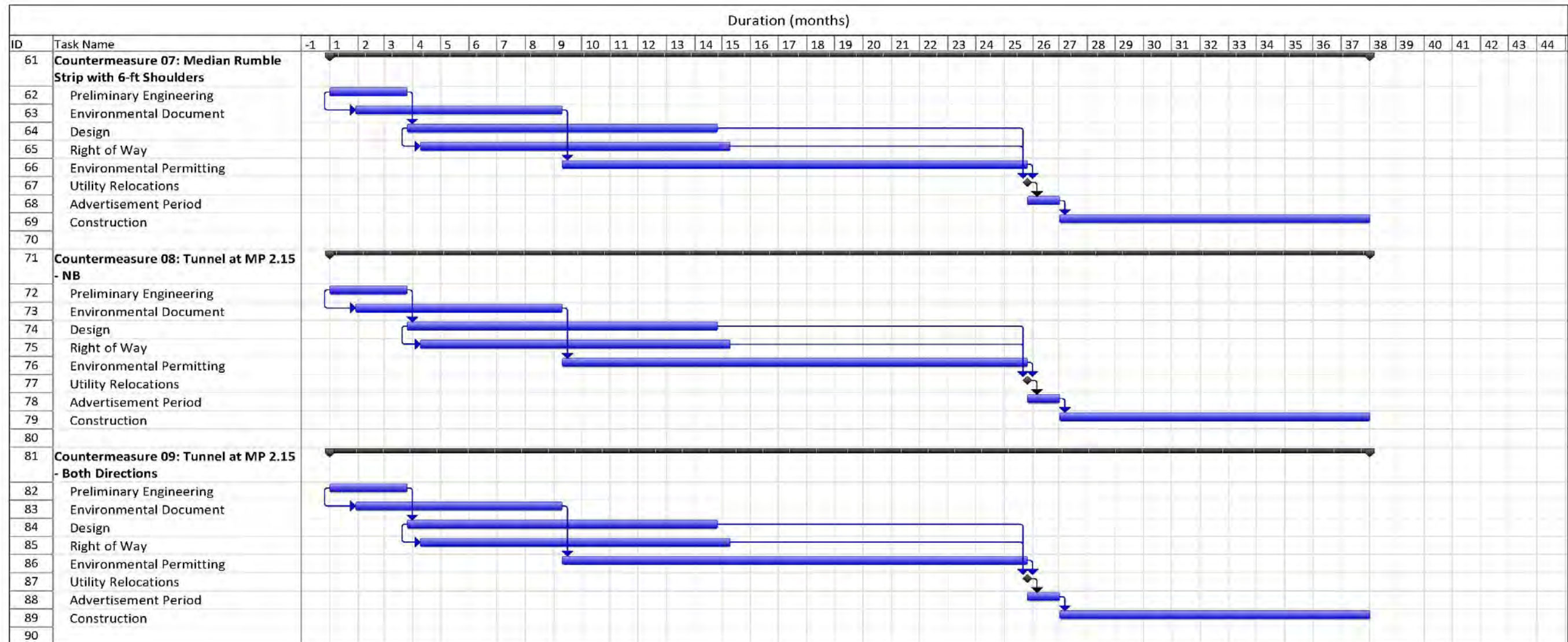
## 11.0 COUNTERMEASURE SCHEDULES

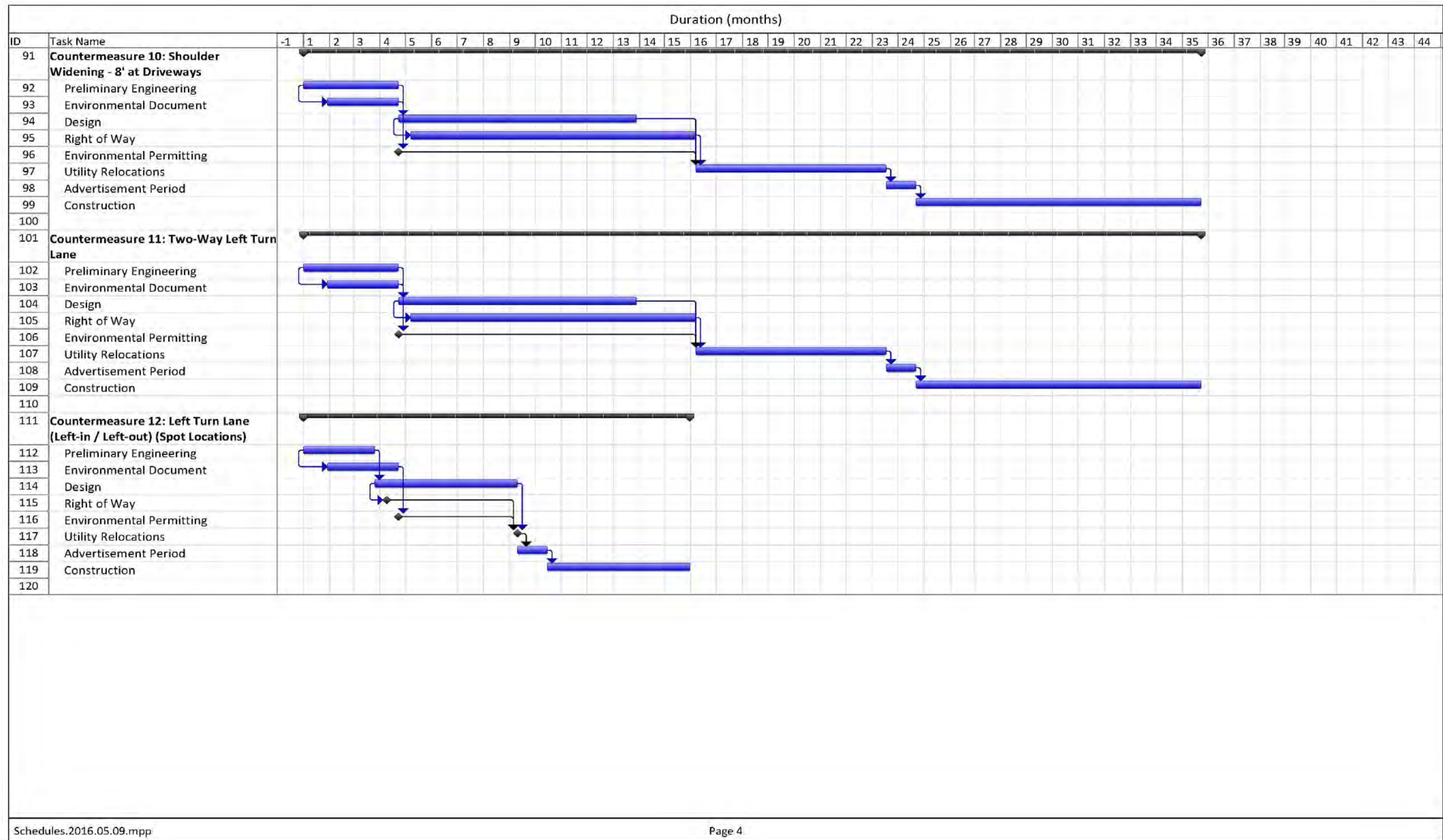
Schedules for implementing the countermeasures are found on the following pages. The schedules include all project development steps from preliminary engineering to completion of construction.

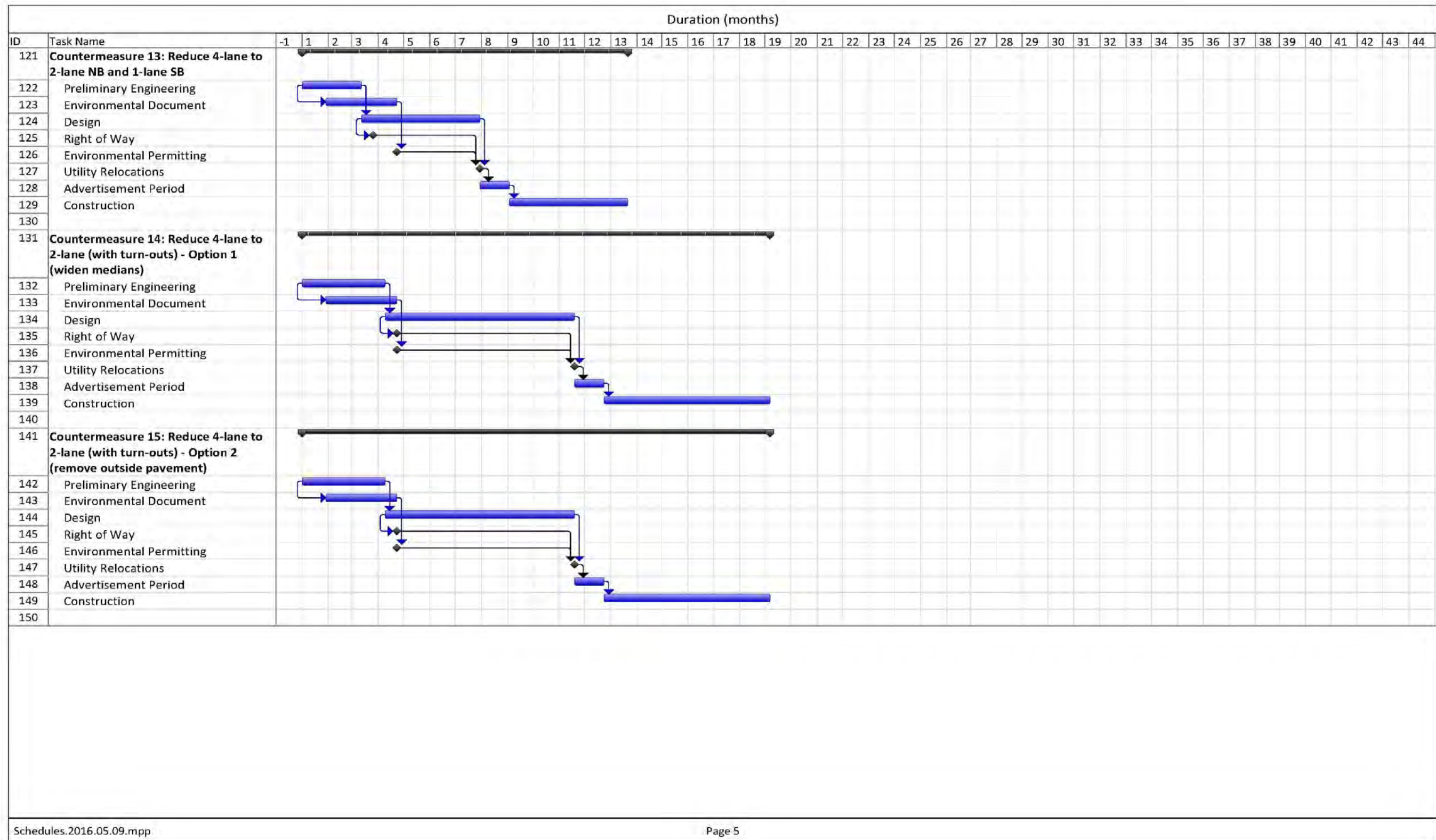
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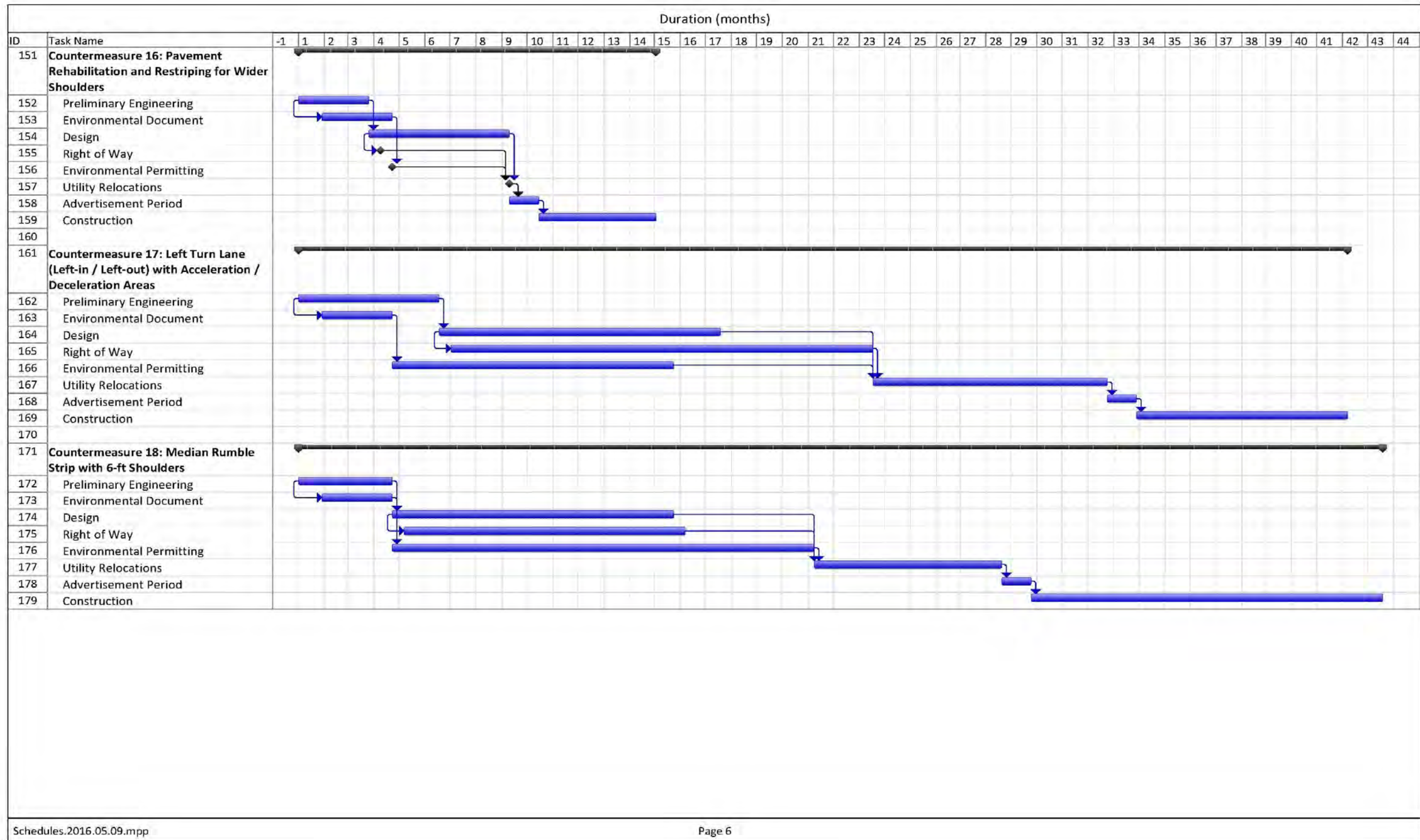












## 12.0 FUNDING FOR FUTURE IMPROVEMENTS

Funding for local transportation projects has declined significantly since the approval of Proposition 1B Transportation Bonds by California voters nearly a decade ago. Most traditional sources of revenue have all but dried up, with the few remaining programs sought after in a highly competitive arena.

The following remaining revenue sources could potentially provide funding for the recommended safety improvements identified for Crow Canyon Road.

### 12.1 FEDERAL-AID HIGHWAY PROGRAMS

#### 12.1.1 SURFACE TRANSPORTATION PROGRAM (STP)

The Surface Transportation Program (STP) receives funding from the Congressional reauthorization of federal funding for surface transportation. The Alameda County Transportation Commission (ACTC) is responsible for soliciting and prioritizing projects in Alameda County to receive STP funding. The ACTC receives funding for allocation to the County and cities within the County from the Metropolitan Transportation Commission's (MTC) One Bay Area Grant Program.

#### 12.1.2 CONGESTION MITIGATION & AIR QUALITY PROGRAM (CMAQ)

The ACTC, through allocations from MTC's One Bay Area Grant Program, is responsible for soliciting and prioritizing projects that are eligible for CMAQ funds. Eligible projects are transportation improvements that would provide an air quality benefit.

#### 12.1.3 HIGHWAY SAFETY IMPROVEMENT PROGRAM (HSIP)

The Highway Safety Improvement Program, administered through Caltrans' Office of Local Assistance, is available to cities and counties for the funding of projects with the purpose of achieving a significant reduction in traffic fatalities and serious injuries on all public roads.

In order to meet the most critical needs on local roadways, Caltrans places an additional restriction on the eligibility of projects in that the safety projects be designed and constructed expeditiously. Projects requiring the acquisition of significant rights of way, or projects with extensive environmental review and environmental mitigation are not eligible for funding.

The total funding available through Local Assistance for 2015 was \$150 million, with each project application limited between \$100,000 and \$10 million. The maximum amount an agency could receive in the 2015 Cycle-7 HSIP Call-for-Projects was \$10 million. Applications were due at the end of July.

For 2015, all applications considered during the selection process will have had a Benefit to Cost (B/C) ratio of at least 5.0, calculated with SafeTREC's TIMS B/C calculator.

Successful applications in the past have included:

- Rural projects that have shown an expected benefit to all modes (For example, widened paved shoulders).



- Countermeasures that have exhibited a low cost holist approach to improving safety in a rural corridor.
- Use of multiple countermeasures along a corridor.
- Projects that address high crash locations along an entire corridor and that have included community involvement in selecting the countermeasures.

## 12.2 STATE FUNDING SOURCES

### 12.2.1 STATE TRANSPORTATION IMPROVEMENT PROGRAM (STIP)

The State Transportation Improvement Program (or STIP), adopted by the California Transportation Commission during even-numbered years, identifies transportation capital improvement projects selected to be funded with fuel tax revenues from the State Highway Account.

The majority of programming of projects into the STIP has been delegated to the regional transportation planning agencies (RTPAs). The RTPA for Alameda County is the Metropolitan Transportation Commission (MTC), which covers the nine Bay Area counties. The ACTC works with agencies within the County to solicit and prioritize transportation projects for inclusion in the STIP. Included among the projects eligible to be programmed into the STIP by the RTPAs are local streets and roads and bicycle and pedestrian facilities.

### 12.2.2 TRANSPORTATION DEVELOPMENT ACT (TDA)

The Transportation Development Act (TDA) allows each county to collect a ¼ percent sales tax for public transportation purposes. In Alameda County, 2 percent are allocated for bicycle and pedestrian projects.

### 12.2.3 TRANSPORTATION FUND FOR CLEAN AIR PROGRAM (TFCA)

The Transportation Fund for Clean Air Program (TFCA) is funded through a portion of the vehicle registration fees collected in the Bay Area. These funds are allocated by the ACTC to projects and programs that help reduce vehicle emissions. Five percent of the vehicle registration fee (VRF) is allocated to the Pedestrian and Bicyclist Access and Safety Program.

Crow Canyon Road countermeasures that include improvements to bicycle facilities would be eligible for funding under this Program.

## 12.3 LOCAL FUNDING SOURCES

### 12.3.1 MEASURE B AND BB PROGRAM FUNDS

The Alameda County Transportation Commission allocates County sales tax dollars (Measures B and BB) and vehicle registration fee (VRF) revenue to public agencies within the County through Master Program Funding Agreements. The funds are allocated through discretionary grant programs or via direct pass-through funds.

Safety improvements identified within this Study have potential to receive funding through the Alameda County Transportation Expenditure Plan (TEP). Funding priority for fully defined capital projects will be

**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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determined as part of the development of the Capital Improvement Program. The Capital Improvement Program is developed through a public process and adopted by ACTC every two years.

DRAFT

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

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## APPENDIX A TJKM EXISTING CONDITIONS REPORT

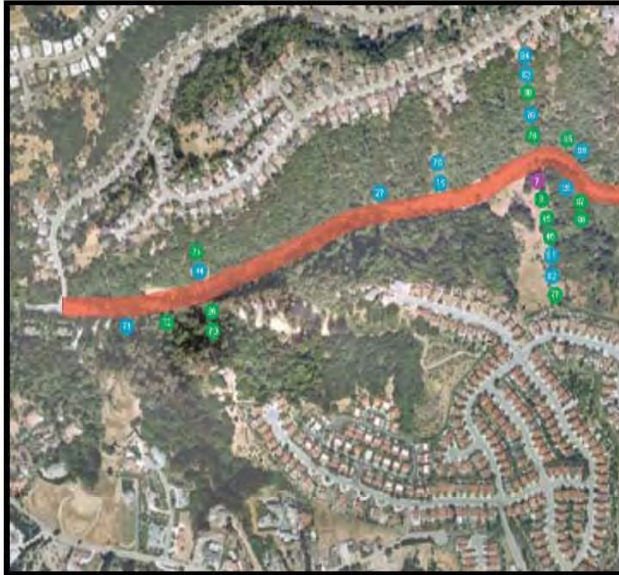
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MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

TJKM  
Transportation  
Consultants

Vision That Moves Your Community



Existing Conditions  
Report

**Crow Canyon Road  
from Greenridge  
Road to Contra  
Costa County Line**

In The County of Alameda

May 3, 2013

Pleasanton  
Fresno  
Sacramento  
Santa Rosa



[www.tjkm.com](http://www.tjkm.com)

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TJKM  
Transportation  
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Vision That Moves Your Community

Existing Conditions Report

**Crow Canyon Road from  
Greenridge Road to  
Contra Costa County Line**

In The County of Alameda

May 3, 2013



[www.tjkm.com](http://www.tjkm.com)

Prepared by:  
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## CROW CANYON ROAD EXISTING CONDITIONS REPORT

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## Existing Conditions on Crow Canyon Road from Greenridge Road to the Contra Costa Line In Alameda County

### Introduction

TJKM Transportation Consultants has prepared this compilation of existing traffic conditions along Crow Canyon Road between Greenridge Road and the Contra Costa County Line in the County of Alameda. TJKM is part of the Transportation Infrastructure Group team to recommend improvements for this section of Crow Canyon Road. TJKM investigated several traffic issues.

Figure 1 depicts the five segments that are used in this analysis. These segments are summarized as follows:

- Segment 1 – Greenridge Road to Coldwater Road – This two lane segment is 0.56 miles in length and has signals at both end points.
- Segment 2 – Coldwater Road to Alameda County mile marker (MM) 2.25 – This segment is 0.77 miles in length and is characterized by narrow shoulders and reduced speed curves.
- Segment 3 – MM 2.25 to Norris Canyon Road – This 1.19 mile segment also has two lanes with wider shoulders than segment 2 but with numerous private driveways.
- Segment 4 – Norris Canyon Road to MM 4.45. This segment is 1.01 miles in length and has four lanes. There are some driveways and speeds are higher in this segment.
- Segment 5 – MM 4.45 to County Line. This two lane segment is 2.40 miles in length with some horizontal and vertical curves.

### Intersection Counts and Level of Service

Peak hour turning movement counts were conducted at the two study intersections – Crow Canyon Road at Coldwater Drive and Crow Canyon Road at Norris Canyon Road – and the levels of service (LOS) for the a.m. and p.m. peak hours were calculated. The results of the calculations are shown in **Appendix A**. Both intersections operate with acceptable conditions. At Coldwater Creek the a.m. average control delay is 11.1 seconds, or LOS B. In the p.m. the intersection operates at LOS A with 6.0 seconds of delay. At Norris Canyon Road both time periods operate at LOS A with 5.8 seconds and 8.0 seconds of delay during the a.m. and p.m. periods, respectively.

### Accident History

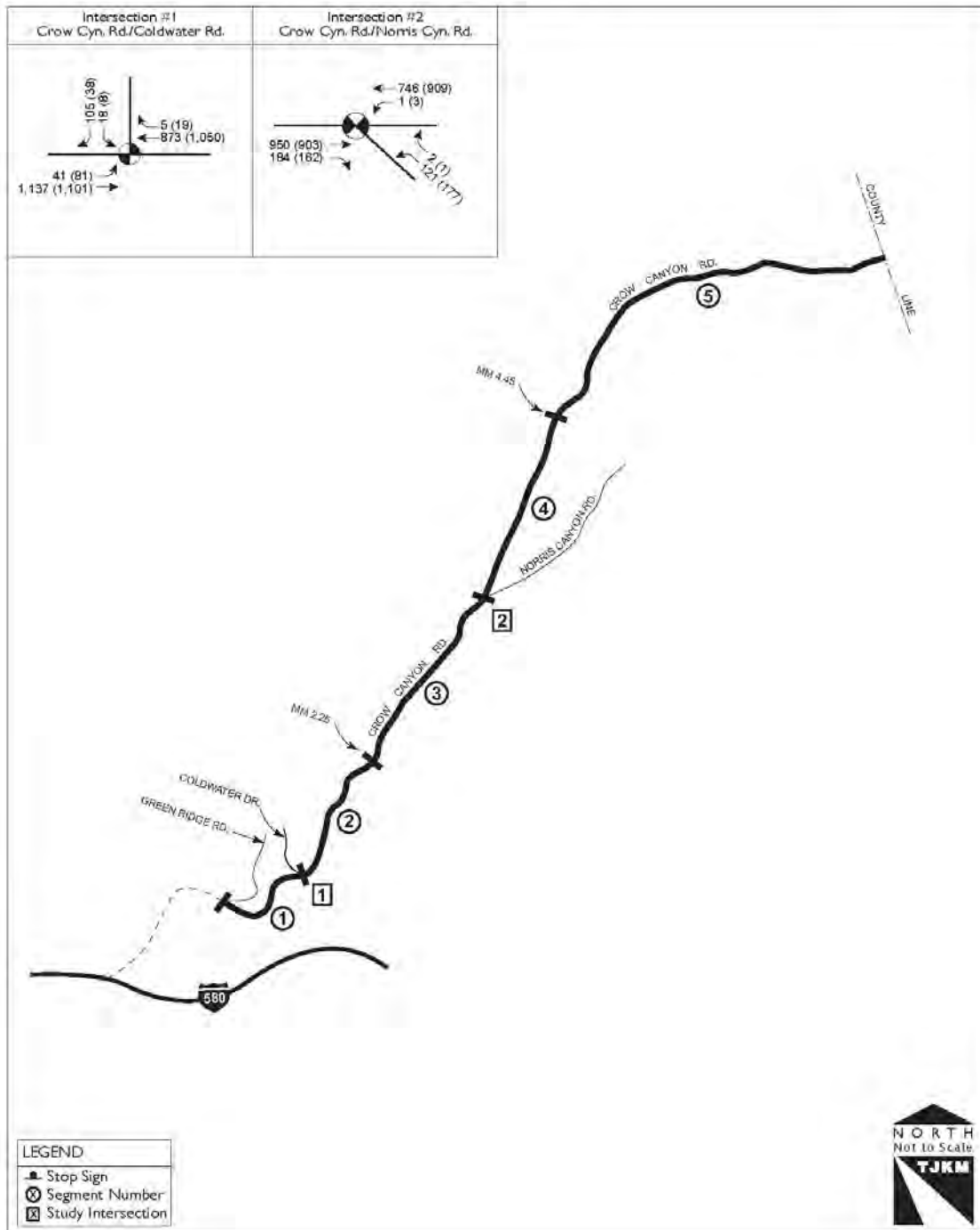
The County supplied traffic accident information for the four year period from January 2009 to December 2012. During this time the study area experienced 93 accidents, which are summarized on Table 1 by study segment.

Table 1 also lists, among other items, the accident rate, or number of collisions per million vehicle miles. This table shows that the worst rate, by far, is segment 2 which has a rate of 1.27 accidents per million vehicle miles, which is greater than the statewide rate for a facility of this type of 1.03 accidents per million vehicle miles. This section has curves with reduced speeds, and much of the roadway has narrow shoulders with guardrails or a creek on one side of the road and steep banks on the other side. This road can be described as 'unforgiving' resulting in motorists running off the road and hitting a fixed object or having a head-on collision.

The second worst segment, based on accident rates, is segment 3 with a rate of 0.77. Based on the officers' frequent characterization of rear end, unsafe speed or improper turning, TJKM theorizes that motorists making left turns to or from the numerous driveways are experiencing difficulties. An initial observation is that a two-way left turn lane in this area may be useful. **Figure 2** is a detailed multi-page

Alameda County - Crow Canyon Road PSR  
 Existing Intersection Volumes and Study Segments

Figure  
 1





segment by segment summary of accident conditions along Crow Canyon Road. This is a PowerPoint illustration that was presented at a public information meeting held on February 13, 2013.

#### Daily Volumes

Daily traffic counts were obtained for each of the five study segments. The counts were obtained by using road tubes stretched across the roadway. Traffic speeds as well as axle classification counts were also obtained at the same time. Daily traffic volumes by segment are summarized on Table 1. Daily traffic volumes vary from about 16,000 vehicles per day (vpd) to about 20,000 vpd, with higher counts on the southern segments. It is noted that these volumes are higher than desirable volumes for two lane highways, with typical volume ranges of 12,000 to 16,000 vpd. See **Appendix B** for detailed counts and **Appendix C** for speed information.

#### Travel Time Runs

Travel time runs are another way of measuring speeds in the Crow Canyon Road segments. The results of travel time runs are shown in **Table 2**. TJKM conducted six round trip travel time runs on December 5, 2012. Two round trip runs were made during the a.m. peak, mid-day and p.m. peak periods. Travel time is recorded for each segment, and the resulting average speed for each segment is calculated. These speeds represent the conditions over the entire segment; the speeds measured by the road tubes represent speeds at a single point in the segment, so it is not unusual for two speed measurements in the same segment to be different. **Appendix D** includes travel time run details.

#### Vehicle Classification

The purpose of vehicle classification counts is to classify the vehicle types – autos, motorcycles, two-axle trucks, five axle trucks, etc. **Table 3** shows the results of those counts for each of the five study segments. Generally, it appears about 75 to 80 percent of all vehicles are passenger cars, about 15 percent are 2 axle trucks, and the rest are motorcycles, buses and larger trucks. Crow Canyon Road does not appear to be an attractive route for large trucks. See **Appendix E** for details.

#### Bicycle Volumes

Bicycle counts were made on Saturday March 23 and Monday March 25, 2013. Counts were made on a weekday and a weekend in order to gauge the comparative level of bicycle activity along Crow Canyon Road. Counts were made on Crow Canyon Road both north and south of Norris Canyon Road. Counts were also made on Norris Canyon Road itself at the intersection. On the Saturday count there were 127 bicyclists counted on the south side of the intersection, but only 17 north of the intersection. The other 110 used Norris Canyon Road itself. It appeared that bicyclists were traveling from San Ramon toward Castro Valley but used Norris Canyon Road for the first portion of their trip. At the public meeting comments were made about the difficulty of bicycle travel on the northern section of Crow Canyon Road due to curves, shoulder width and parked vehicles. See **Table 4** and **Appendix F** for details.

#### Comparative Travel Times

At the first public meeting in February, comments were made that many of the commuters used Crow Canyon Road because it is a short cut between San Ramon and Castro Valley, as compared with the use of I-680 and I-580. The distance between Crow Canyon Road and I-680 in San Ramon and Crow Canyon Road and I-580 in Castro Valley is 14.0 miles via the two freeways and 8.68 miles via Crow Canyon Road itself. In one observation in March travel time on eastbound Crow Canyon Road in the p.m. peak took 13 minutes and 27 seconds, an average of about 38 miles per hour. On that same day, travel time was measured on eastbound I-580 and northbound I-680. It turned out that both freeways

experienced unusually light traffic and the freeway travel time was 14 minutes and 10 seconds, or about 60 miles per hour, with nearly the same travel time as the surface route. If the freeway travel speeds would have been in the more expected range of 40 to 45 miles per hour, the freeway travel speeds would be at least 19 minutes. In this scenario, it appears the use of Crow Canyon Road itself could result in travel time savings of over 5 minutes. The idea expressed by the public was to reduce speeds on Crow Canyon to make its travel time comparable to the time using the freeways. It would seem to be difficult to add five minutes to the Crow Canyon travel time through the use of traffic calming techniques or other measures.

#### **Future Volumes**

The Alameda County Transportation Commission (Alameda CTC) maintains a traffic model for traffic forecasting purposes. The most recent model results are available through the Alameda CTC website. For 2035, the model forecasts daily volumes of about 20,000 vpd between Norris Canyon Road and the Contra Costa County line and about 25,000 vpd south of Norris Canyon Road. These volumes are well above the upper desirable capacity limits for two-lane roadways, noted above as 12,000 to 16,000 vpd. Crow Canyon Road is able to carry somewhat higher volumes because the two lane portion of Crow Canyon Road has no major intersections.

#### **Sign Inventory**

A comprehensive inventory of all traffic signs along Crow Canyon Road was made for Alameda County in an earlier study. The inventory is included as **Appendix G**.

#### **Summary**

The major portion of Crow Canyon Road in the study area carries close to 20,000 vpd on a two-lane roadway. These volumes are close to the capacity of the roadway. Due to terrain, right of way, and cost considerations it is likely to be impractical to widen Crow Canyon Road to four lanes. Instead, localized improvements should be considered, focused on safety. It appears that segment 2 should be considered a high priority for improvement, followed by segment 3. These priorities are suggested due to a combination of traffic statistics, but are primarily driven by accident histories.

**Figure 2**

**Segment by Segment Analysis  
Of  
Collision History  
2009-2012**

**Segment 1: Greenridge Road to Coldwater Drive**

**Segment 2: Coldwater Drive to Mile Marker 2.25**

**Segment 3: Mile Marker 2.25 to Norris Canyon Road**

**Segment 4: Norris Canyon Road to Mile Marker 4.45**

**Segment 5: Mile Marker 4.45 to County Line**



## Segment 1: Greenridge Rd. to Coldwater Dr.



DR



## EXISTING TRAFFIC CONDITIONS

### Segment 1: Greenridge Rd. to Coldwater Dr.

- 0.56 mile in length with signals at both end points
- Roadway transitions from 4 to 2 lanes
- About 20,000 vehicles per day, 40 mph speed limit

DR



## TRAFFIC COLLISIONS (2009 – 2012)

### Segment 1: Greenridge Rd. to Coldwater Dr.

- 5 accidents within 4 year period
- Most accidents were rear-enders at signalized intersections at San Simeon Place, Greenridge Road, and Coldwater Drive.

DR



## Segment 2: Coldwater Dr. to Mile Marker 2.25



DR



## EXISTING TRAFFIC CONDITIONS

### Segment 2: Coldwater Dr. to Mile Marker 2.25

- 2 lane roadway, 0.77 mile in length
- About 18,000 vehicles per day, 30 to 40 mph speed limit

DR





## TRAFFIC COLLISIONS

(2009 – 2012)

### Segment 2: Coldwater Dr. to Mile Marker 2.25

- 26 accidents with the last 4 years
  - Drivers ran off road and hit guard rail, pole or other fixed object; some head-on collisions
- In 55% of accidents, road surface was “wet”
  - Over 80% of accidents within resurfacing limits occurred before resurfacing, only 3 accidents after completion

DR



### Segment 3: Mile Marker 2.25 to Norris Canyon Rd.



DR



## EXISTING TRAFFIC CONDITIONS

### Segment 3: Mile Marker 2.25 to Norris Canyon Rd.

- 1.19 miles in length
- 2 lane roadway with signal at Norris Canyon Rd intersection
- About 18,000 vehicles per day, 30 to 45 mph speed limit

DR



## TRAFFIC COLLISIONS

(2009 – 2012)

### Segment 3: Mile Marker 2.25 to Norris Canyon Rd.

- 24 accidents within 4 year period
- 6 multi-vehicle accidents dealt with vehicle turns at private driveways or making U-turns
- Over 80% of accidents at the intersection of Norris Canyon Road and Crow Canyon Road occurred before signalization in July 2011.
  - Only 1 accident near intersection after signal installation

DRM



## Segment 4: Norris Canyon Rd. to Mile Marker 4.45



DR



## EXISTING TRAFFIC CONDITIONS

### Segment 4: Norris Canyon Rd. to Mile Marker 4.45

- 4-lane divided roadway with wide center median
- Transitions from 4 to 2 lanes at northerly end
- 1.01 miles in length
- About 16,000 vehicles per day, 45 to 50 mph speed limit

DR



## TRAFFIC COLLISIONS (2009-2012)

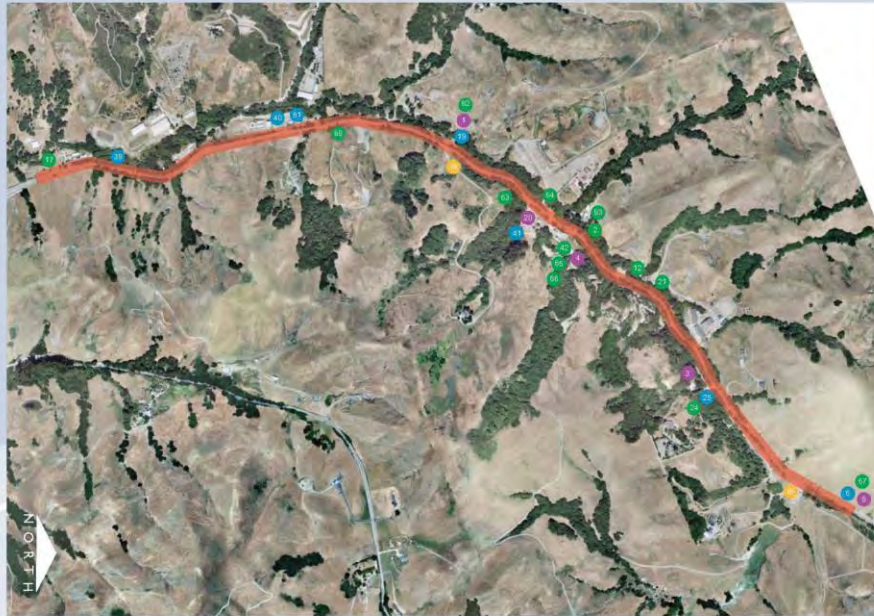
### Segment 4: Norris Canyon Rd. to Mile Marker 4.45

- 10 accidents within 4 year period
- The majority of accidents dealt with high speeds of drivers.

DR



## Segment 5: Mile Marker 4.45 to County Line



DR





## EXISTING TRAFFIC CONDITIONS

### Segment 5: Mile Marker 4.45 to County Line

- 2 lane roadway, approximately 2.4 miles in length
- About 16,000 vehicles per day, 35 to 50 mph speed limit
- Various horizontal and vertical curves

DR



## TRAFFIC COLLISIONS (2009 – 2012)

### Segment 5: Mile Marker 4.45 to County Line

- 28 accidents within 4 year period
- 20% were multi-vehicle accidents that dealt with vehicle turns at private driveways or making U-turns
- 15% accidents involved deer

DR

Table I: Summary of ADT, Speed, and Collision Data

Segment	Location	Roadway Type	Number of Lanes	Posted Speed Limit (mph)	ADT		Collisions			Speed Data			
					ADT	Number of Collisions (Jan 2009 - Dec 2012)	Length (mi)	Segment Collision Rate (R <sub>SE</sub> )	10 MPH Pace	Number in Pace	% in Pace	Average Speed	85 <sup>th</sup> ile Speed
1	Greenridge Road to Coldwater Drive	Arterial	2	40	15,968	5	0.56	0.30	26-35	13,193	64%	28	33
2	Coldwater Drive to MM 2.25	Arterial	2	40	18,165	26	0.77	1.27	41-50	12,595	69%	42	49
3	MM 2.25 to Norris Canyon Road	Arterial	2	45	17,995	24	1.19	0.77	41-50	12,285	68%	41	48
4	Norris Canyon Road to MM 4.45	Arterial	4	50	16,112	10	1.01	0.42	51-60	10,355	64%	53	59
5	MM 4.45 to Alameda County Line	Arterial	2	50	15,804	28	2.40	0.51	41-50	10,555	67%	42	49

Note:  
 $R_{SE} = 1000000 * A / (365 * T * ADT * L)$ , R<sub>SE</sub> = Observed collision rate; # of acc./mil. vehicle miles, A = Number of collisions over study period, T = Total number of years over which intersection accidents were collected; Jan 06 - Dec 12 = 5 years, ADT = Average Daily Traffic, L = Length of study corridor (in miles)



**Table 2: Results of Travel Time Runs - December 5, 2012**

<b>Segment</b>	<b>Location</b>	<b>Peak Hour</b>	<b>Direction</b>	<b>Observed Travel Time (s)</b>	<b>Observed Speed (mph)</b>
1	Greenridge Road to Coldwater Drive	AM	NB	56	33
			SB	54	35
		MD	NB	49	38
			SB	46	41
		PM	NB	49	39
			SB	64	30
2	Coldwater Drive to MM 2.25	AM	NB	75	39
			SB	82	36
		MD	NB	74	39
			SB	63	46
		PM	NB	66	45
			SB	81	36
3	MM 2.25 to Norris Canyon Road	AM	NB	111	39
			SB	105	40
		MD	NB	103	41
			SB	90	47
		PM	NB	94	45
			SB	114	37
4	Norris Canyon Road to MM 4.45	AM	NB	72	56
			SB	74	54
		MD	NB	66	61
			SB	75	54
		PM	NB	68	59
			SB	71	56
5	MM 4.45 to Alameda County Line	AM	EB	204	40
			WVB	194	42
		MD	EB	199	41
			WVB	189	43
		PM	EB	198	41
			WVB	190	43

Note: Each entry represents an average of two runs.

Table 3: Vehicle Classification

Segment	Location	Direction	Total Vehicles	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	<5 Axle Double	5 Axle Double	Not Classified
1	Greenridge Road to Coldwater Drive	NB	8,151	308	7,168	106	6	12	28	11	21	493
		SB	7,807	452	6,701	58	2	11	27	5	6	541
		<b>NB/SB</b>	<b>15,968</b>	<b>760</b>	<b>13,869</b>	<b>164</b>	<b>8</b>	<b>23</b>	<b>55</b>	<b>16</b>	<b>27</b>	<b>1,034</b>
		%	<b>100.0</b>	<b>4.8</b>	<b>86.9</b>	<b>1.0</b>	<b>0.0</b>	<b>0.1</b>	<b>0.3</b>	<b>0.1</b>	<b>0.2</b>	<b>6.5</b>
2	Coldwater Drive to MM 2.25	NB	9,530	162	6,932	1,573	14	213	38	26	10	561
		SB	8,635	174	6,375	1,235	3	213	52	23	6	551
		<b>NB/SB</b>	<b>18,165</b>	<b>336</b>	<b>13,307</b>	<b>2,808</b>	<b>17</b>	<b>426</b>	<b>90</b>	<b>49</b>	<b>16</b>	<b>1,112</b>
		%	<b>100.0</b>	<b>1.8</b>	<b>73.3</b>	<b>15.5</b>	<b>0.1</b>	<b>2.3</b>	<b>0.5</b>	<b>0.3</b>	<b>0.1</b>	<b>6.1</b>
3	MM 2.25 to Norris Canyon Road	NB	9,486	155	7,031	1,449	9	206	30	25	7	574
		SB	8,509	134	6,241	1,270	5	209	54	26	4	566
		<b>NB/SB</b>	<b>17,995</b>	<b>289</b>	<b>13,272</b>	<b>2,719</b>	<b>14</b>	<b>415</b>	<b>84</b>	<b>51</b>	<b>11</b>	<b>1,140</b>
		%	<b>100.0</b>	<b>1.6</b>	<b>73.7</b>	<b>15.1</b>	<b>0.1</b>	<b>2.3</b>	<b>0.5</b>	<b>0.3</b>	<b>0.1</b>	<b>6.3</b>
4	Norris Canyon Road to MM 4.45	NB	8,604	3	6,352	1,380	9	272	10	22	7	549
		SB	7,508	11	5,989	1,261	11	185	12	17	8	14
		<b>NB/SB</b>	<b>16,112</b>	<b>14</b>	<b>12,341</b>	<b>2,641</b>	<b>20</b>	<b>457</b>	<b>22</b>	<b>39</b>	<b>15</b>	<b>563</b>
		%	<b>100.0</b>	<b>0.1</b>	<b>76.6</b>	<b>16.4</b>	<b>0.1</b>	<b>2.8</b>	<b>0.1</b>	<b>0.2</b>	<b>0.1</b>	<b>3.5</b>
5	MM 4.45 to Alameda County Line	EB	8,231	50	6,036	1,341	10	206	12	23	5	548
		WB	7,573	56	5,657	1,155	8	191	17	33	5	450
		<b>EB/WB</b>	<b>15,804</b>	<b>106</b>	<b>11,693</b>	<b>2,496</b>	<b>18</b>	<b>397</b>	<b>29</b>	<b>56</b>	<b>10</b>	<b>998</b>
		%	<b>100.0</b>	<b>0.7</b>	<b>74.0</b>	<b>15.8</b>	<b>0.1</b>	<b>2.5</b>	<b>0.2</b>	<b>0.4</b>	<b>0.1</b>	<b>6.3</b>



**Table 4: Summary of Bicycle Counts**

Saturday March 23 and Monday March 25, 2013

Count period: 6 a.m. to 6 p.m.

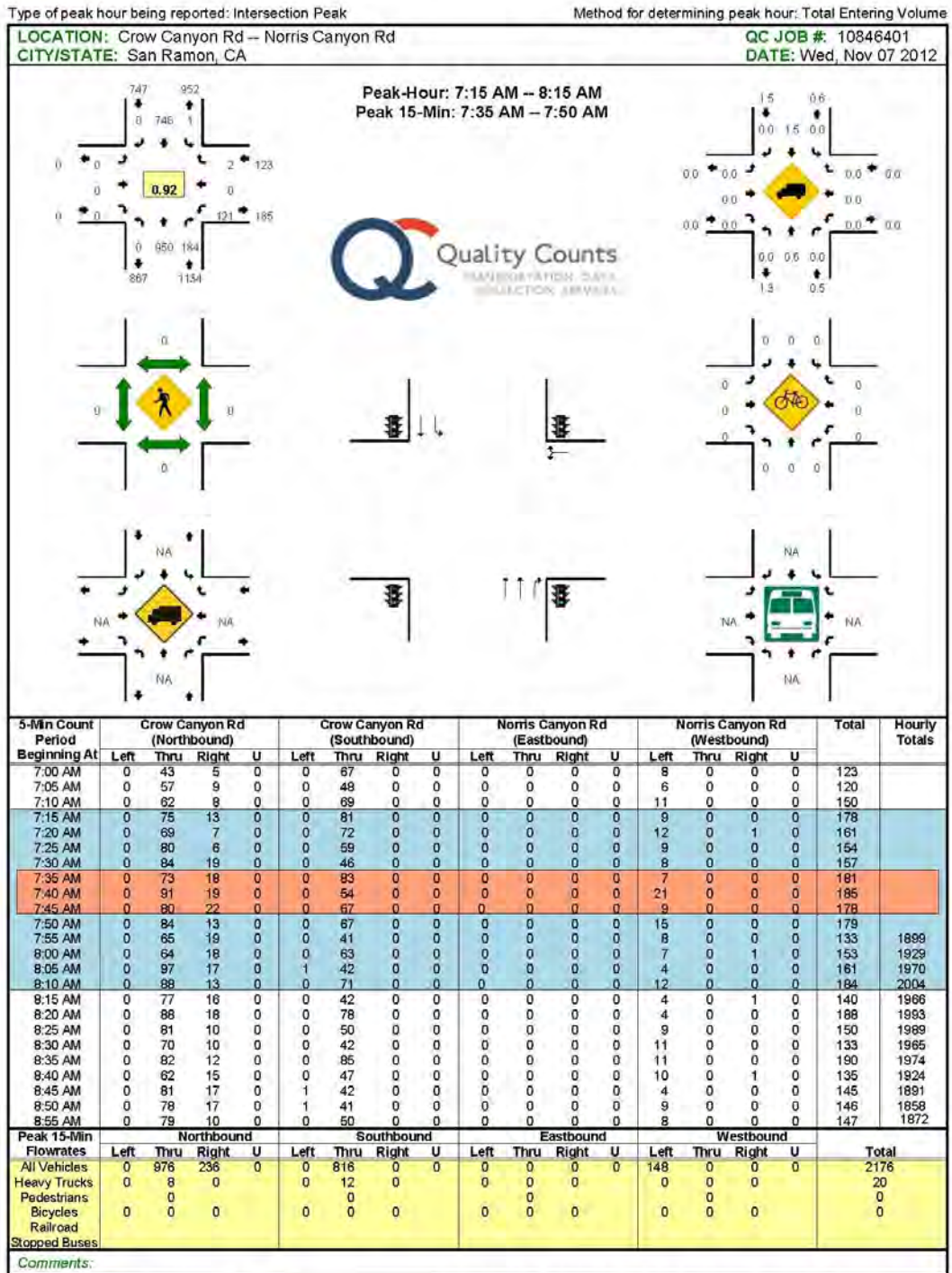
	Saturday	Monday
<b>Crow Canyon Road north of Norris Canyon Road</b>		
Northbound	7	4
Southbound	10	1
Total	17	5
<b>Crow Canyon Road south of Norris Canyon Road</b>		
Northbound	30	8
Southbound	97	3
Total	127	11
<b>Norris Canyon Road east of Crow Canyon Road</b>		
Eastbound	23	2
Westbound	87	4
Total	110	6

**MAY 11, 2016**

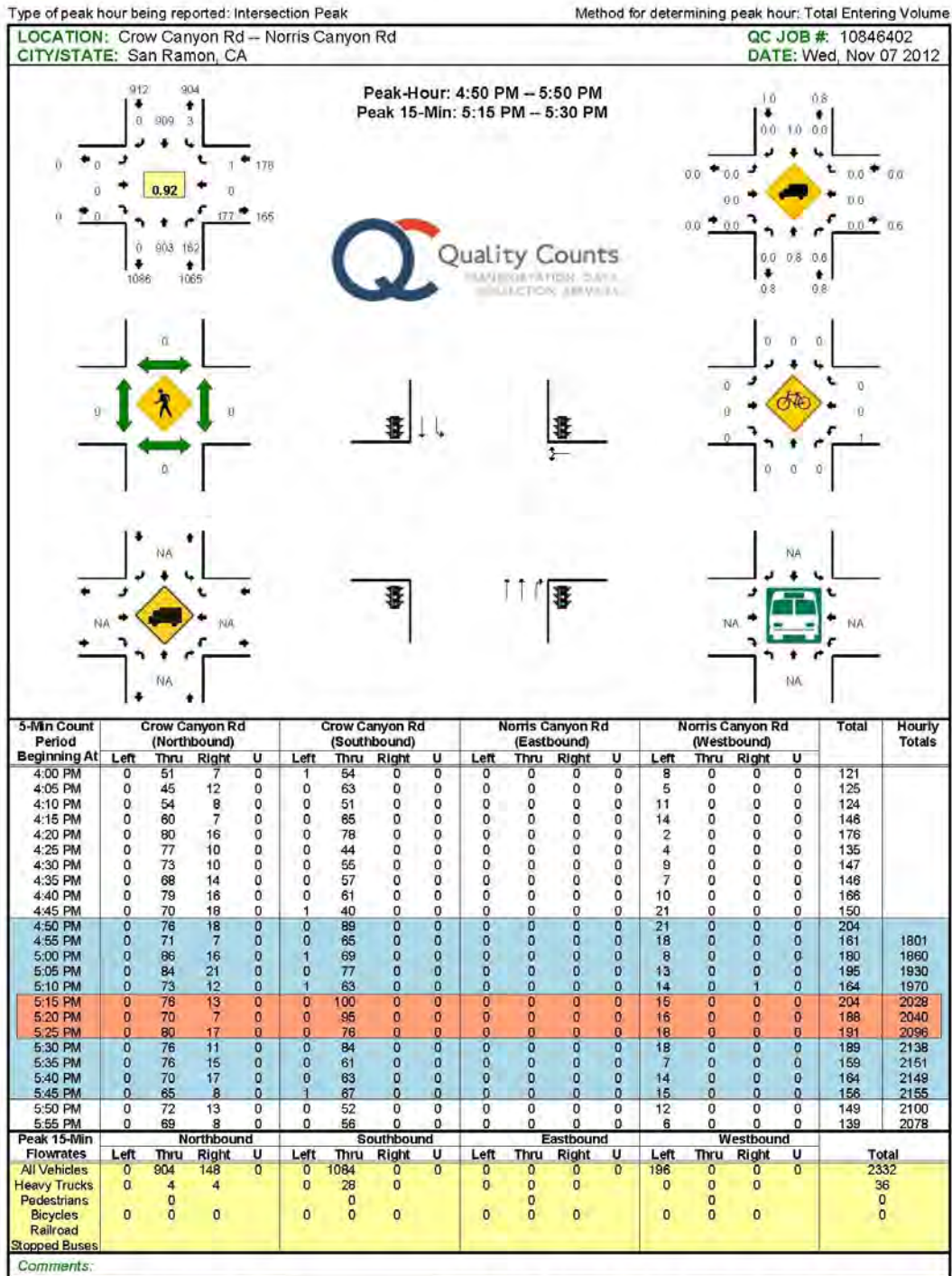
**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

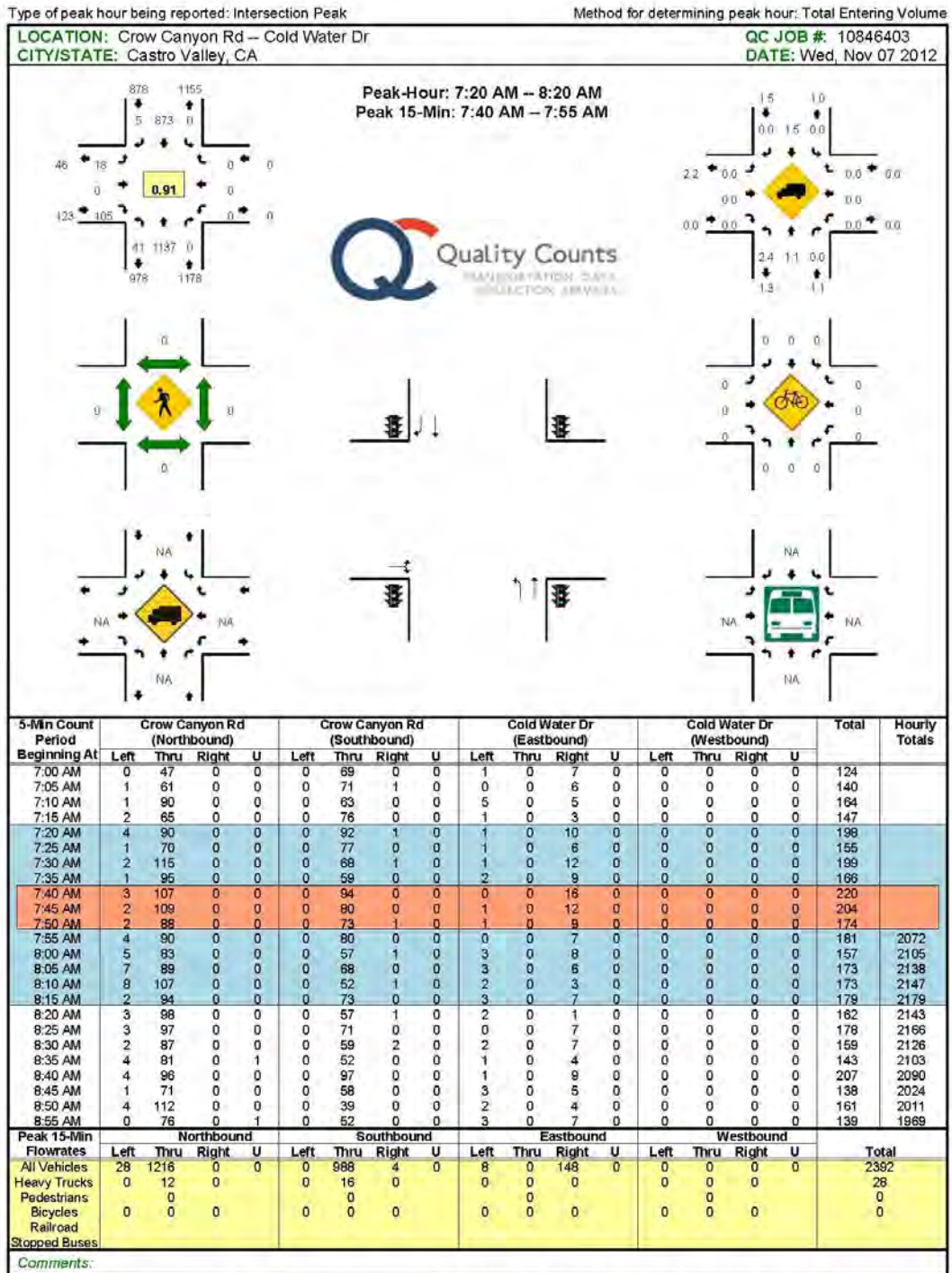
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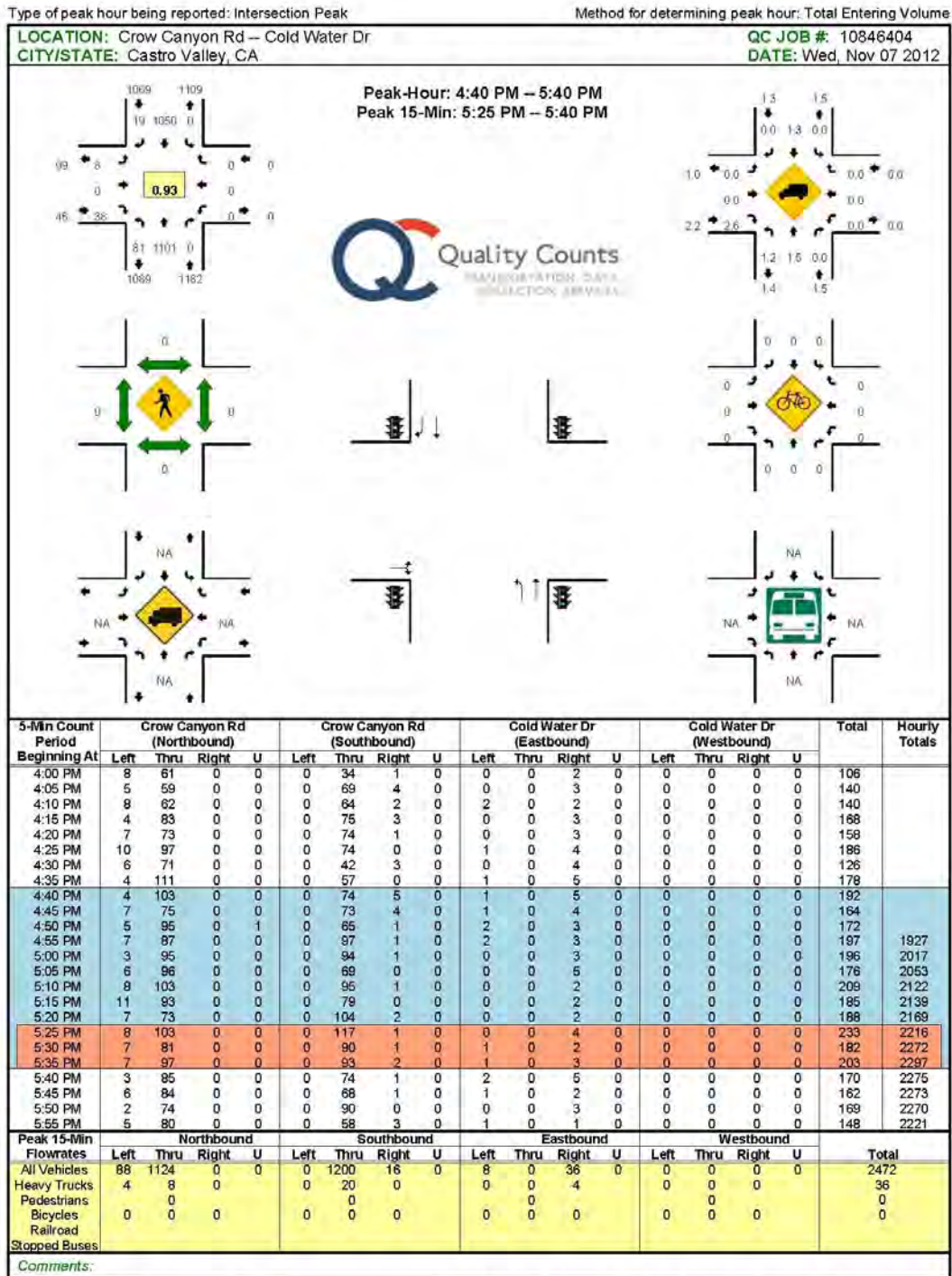
**Appendix A – Intersection Counts**











**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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**Appendix B – Average Daily Traffic**

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Volume Data Page 1 of 1

Start Time	Mon	Tue	Wed 07-Nov-12	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM			23			23			23	
1:00 AM			15			15			15	
2:00 AM			9			9			9	
3:00 AM			16			16			16	
4:00 AM			37			37			37	
5:00 AM			102			102			102	
6:00 AM			291			291			291	
7:00 AM			695			695			695	
8:00 AM			<b>880</b>			<b>880</b>			<b>880</b>	
9:00 AM			624			624			624	
10:00 AM			379			379			379	
11:00 AM			318			318			318	
12:00 PM			329			329			329	
1:00 PM			359			359			359	
2:00 PM			417			417			417	
3:00 PM			466			466			466	
4:00 PM			737			737			737	
5:00 PM			<b>824</b>			<b>824</b>			<b>824</b>	
6:00 PM			723			723			723	
7:00 PM			459			459			459	
8:00 PM			212			212			212	
9:00 PM			139			139			139	
10:00 PM			125			125			125	
11:00 PM			52			52			52	
<b>Day Total</b>			8231			8231			8231	
% Weekday Average			100.0%							
% Week Average			100.0%			100.0%				
AM Peak Volume			8:00 AM 880			8:00 AM 880			8:00 AM 880	
PM Peak Volume			5:00 PM 824			5:00 PM 824			5:00 PM 824	
<i>Comments:</i>										

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Volume Data Page 1 of 1

LOCATION: Crow Canyon Rd West of Bollinger Canyon Rd										QC JOB #: 10846405	
SPECIFIC LOCATION: 100 ft from										DIRECTION: EB/WB	
CITY/STATE: San Ramon, CA										DATE: Nov 07 2012 - Nov 07 2012	
Start Time	Mon	Tue	Wed 07-Nov-12	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile	
12:00 AM			46			46			46		
1:00 AM			32			32			32		
2:00 AM			27			27			27		
3:00 AM			27			27			27		
4:00 AM			76			76			76		
5:00 AM			243			243			243		
6:00 AM			690			690			690		
7:00 AM			1405			1405			1405		
8:00 AM			1481			1481			1481		
9:00 AM			1131			1131			1131		
10:00 AM			734			734			734		
11:00 AM			620			620			620		
12:00 PM			653			653			653		
1:00 PM			714			714			714		
2:00 PM			787			787			787		
3:00 PM			968			968			968		
4:00 PM			1378			1378			1378		
5:00 PM			1653			1653			1653		
6:00 PM			1311			1311			1311		
7:00 PM			761			761			761		
8:00 PM			392			392			392		
9:00 PM			329			329			329		
10:00 PM			245			245			245		
11:00 PM			101			101			101		
<b>Day Total</b>			15804			15804			15804		
% Weekday Average			100.0%								
% Week Average			100.0%			100.0%					
AM Peak Volume			8:00 AM 1481			8:00 AM 1481			8:00 AM 1481		
PM Peak Volume			5:00 PM 1653			5:00 PM 1653			5:00 PM 1653		
<i>Comments:</i>											

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Volume Data Page 1 of 1

LOCATION: Crow Canyon Rd West of Bollinger Canyon Rd							QC JOB #: 10846405			
SPECIFIC LOCATION: 100 ft from							DIRECTION: WB			
CITY/STATE: San Ramon, CA							DATE: Nov 07 2012 - Nov 07 2012			
Start Time	Mon	Tue	Wed 07-Nov-12	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM			23			23			23	
1:00 AM			17			17			17	
2:00 AM			18			18			18	
3:00 AM			11			11			11	
4:00 AM			39			39			39	
5:00 AM			141			141			141	
6:00 AM			399			399			399	
7:00 AM			710			710			710	
8:00 AM			601			601			601	
9:00 AM			507			507			507	
10:00 AM			355			355			355	
11:00 AM			302			302			302	
12:00 PM			324			324			324	
1:00 PM			355			355			355	
2:00 PM			370			370			370	
3:00 PM			502			502			502	
4:00 PM			641			641			641	
5:00 PM			829			829			829	
6:00 PM			588			588			588	
7:00 PM			302			302			302	
8:00 PM			180			180			180	
9:00 PM			190			190			190	
10:00 PM			120			120			120	
11:00 PM			49			49			49	
Day Total			7573			7573			7573	
% Weekday Average			100.0%							
% Week Average			100.0%			100.0%				
AM Peak Volume			7:00 AM 710			7:00 AM 710			7:00 AM 710	
PM Peak Volume			5:00 PM 829			5:00 PM 829			5:00 PM 829	

Comments:

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Volume Data Page 1 of 1

LOCATION: Crow Canyon Rd North of Norris Canyon Rd						QC JOB #: 10846406				
SPECIFIC LOCATION: 100 ft from						DIRECTION: NB				
CITY/STATE: San Ramon, CA						DATE: Nov 08 2012 - Nov 08 2012				
Start Time	Mon	Tue	Wed	Thu	Fri	Average Weekday	Sat	Sun	Average Week	Average Week Profile
				08-Nov-12		Hourly Traffic			Hourly Traffic	
12:00 AM				34		34			34	
1:00 AM				13		13			13	
2:00 AM				16		16			16	
3:00 AM				13		13			13	
4:00 AM				32		32			32	
5:00 AM				80		80			80	
6:00 AM				240		240			240	
7:00 AM				527		527			527	
8:00 AM				<b>807</b>		<b>807</b>			<b>807</b>	
9:00 AM				738		738			738	
10:00 AM				453		453			453	
11:00 AM				343		343			343	
12:00 PM				320		320			320	
1:00 PM				359		359			359	
2:00 PM				426		426			426	
3:00 PM				522		522			522	
4:00 PM				678		678			678	
5:00 PM				<b>849</b>		<b>849</b>			<b>849</b>	
6:00 PM				839		839			839	
7:00 PM				628		628			628	
8:00 PM				317		317			317	
9:00 PM				162		162			162	
10:00 PM				138		138			138	
11:00 PM				70		70			70	
<b>Day Total</b>				8604		8604			8604	
% Weekday Average				100.0%						
% Week Average				100.0%		100.0%				
AM Peak Volume				8:00 AM 807		8:00 AM 807			8:00 AM 807	
PM Peak Volume				5:00 PM 849		5:00 PM 849			5:00 PM 849	
Comments:										

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)





MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Volume Data Page 1 of 1

LOCATION: Crow Canyon Rd North of Norris Canyon Rd										QC JOB #: 10846406	
SPECIFIC LOCATION: 100 ft from										DIRECTION: SB	
CITY/STATE: San Ramon, CA										DATE: Nov 08 2012 - Nov 08 2012	
Start Time	Mon	Tue	Wed	Thu	Fri	Average Weekday	Sat	Sun	Average Week	Average Week Profile	
				08-Nov-12		Hourly Traffic			Hourly Traffic		
12:00 AM				34		34			34		
1:00 AM				20		20			20		
2:00 AM				16		16			16		
3:00 AM				18		18			18		
4:00 AM				36		36			36		
5:00 AM				124		124			124		
6:00 AM				333		333			333		
7:00 AM				536		536			536		
8:00 AM				<b>615</b>		<b>615</b>			<b>615</b>		
9:00 AM				487		487			487		
10:00 AM				360		360			360		
11:00 AM				304		304			304		
12:00 PM				334		334			334		
1:00 PM				343		343			343		
2:00 PM				378		378			378		
3:00 PM				455		455			455		
4:00 PM				585		585			585		
5:00 PM				<b>740</b>		<b>740</b>			<b>740</b>		
6:00 PM				634		634			634		
7:00 PM				405		405			405		
8:00 PM				265		265			265		
9:00 PM				230		230			230		
10:00 PM				172		172			172		
11:00 PM				84		84			84		
<b>Day Total</b>				7508		7508			7508		
% Weekday Average				100.0%							
% Week Average				100.0%		100.0%					
AM Peak Volume				8:00 AM 615		8:00 AM 615			8:00 AM 615		
PM Peak Volume				5:00 PM 740		5:00 PM 740			5:00 PM 740		
Comments:											

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Volume Data Page 1 of 1

LOCATION: Crow Canyon Rd North of Norris Canyon Rd										QC JOB #: 10846406	
SPECIFIC LOCATION: 100 ft from										DIRECTION: NB/SB	
CITY/STATE: San Ramon, CA										DATE: Nov 08 2012 - Nov 08 2012	
Start Time	Mon	Tue	Wed	Thu	Fri	Average Weekday	Sat	Sun	Average Week	Average Week Profile	
				08-Nov-12		Hourly Traffic			Hourly Traffic		
12:00 AM				68		68			68		
1:00 AM				33		33			33		
2:00 AM				32		32			32		
3:00 AM				31		31			31		
4:00 AM				68		68			68		
5:00 AM				204		204			204		
6:00 AM				573		573			573		
7:00 AM				1063		1063			1063		
8:00 AM				1422		1422			1422		
9:00 AM				1225		1225			1225		
10:00 AM				813		813			813		
11:00 AM				647		647			647		
12:00 PM				654		654			654		
1:00 PM				702		702			702		
2:00 PM				804		804			804		
3:00 PM				977		977			977		
4:00 PM				1269		1269			1269		
5:00 PM				1589		1589			1589		
6:00 PM				1473		1473			1473		
7:00 PM				1033		1033			1033		
8:00 PM				582		582			582		
9:00 PM				392		392			392		
10:00 PM				310		310			310		
11:00 PM				154		154			154		
Day Total				16112		16112			16112		
% Weekday Average				100.0%							
% Week Average				100.0%		100.0%					
AM Peak Volume				8:00 AM 1422		8:00 AM 1422			8:00 AM 1422		
PM Peak Volume				5:00 PM 1589		5:00 PM 1589			5:00 PM 1589		
Comments:											

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Volume Data Page 1 of 1

Start Time	Mon	Tue	Wed 07-Nov-12	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM			22			22			22	
1:00 AM			18			18			18	
2:00 AM			10			10			10	
3:00 AM			30			30			30	
4:00 AM			53			53			53	
5:00 AM			141			141			141	
6:00 AM			395			395			395	
7:00 AM			922			922			922	
8:00 AM			<b>1043</b>			<b>1043</b>			<b>1043</b>	
9:00 AM			603			603			603	
10:00 AM			431			431			431	
11:00 AM			339			339			339	
12:00 PM			385			385			385	
1:00 PM			377			377			377	
2:00 PM			477			477			477	
3:00 PM			617			617			617	
4:00 PM			868			868			868	
5:00 PM			<b>964</b>			<b>964</b>			<b>964</b>	
6:00 PM			789			789			789	
7:00 PM			442			442			442	
8:00 PM			219			219			219	
9:00 PM			163			163			163	
10:00 PM			123			123			123	
11:00 PM			55			55			55	
<b>Day Total</b>			<b>9486</b>			<b>9486</b>			<b>9486</b>	
% Weekday Average			100.0%							
% Week Average			100.0%			100.0%				
AM Peak Volume			8:00 AM 1043			8:00 AM 1043			8:00 AM 1043	
PM Peak Volume			5:00 PM 964			5:00 PM 964			5:00 PM 964	
<i>Comments:</i>										

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Volume Data Page 1 of 1

Start Time	Mon	Tue	Wed 07-Nov-12	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM			28			28			28	
1:00 AM			17			17			17	
2:00 AM			21			21			21	
3:00 AM			15			15			15	
4:00 AM			56			56			56	
5:00 AM			171			171			171	
6:00 AM			445			445			445	
7:00 AM			<b>807</b>			<b>807</b>			<b>807</b>	
8:00 AM			684			684			684	
9:00 AM			546			546			546	
10:00 AM			408			408			408	
11:00 AM			328			328			328	
12:00 PM			361			361			361	
1:00 PM			392			392			392	
2:00 PM			413			413			413	
3:00 PM			563			563			563	
4:00 PM			749			749			749	
5:00 PM			<b>942</b>			<b>942</b>			<b>942</b>	
6:00 PM			656			656			656	
7:00 PM			328			328			328	
8:00 PM			203			203			203	
9:00 PM			198			198			198	
10:00 PM			123			123			123	
11:00 PM			57			57			57	
<b>Day Total</b>			8511			8511			8511	
% Weekday Average			100.0%							
% Week Average			100.0%			100.0%				
AM Peak Volume			7:00 AM 807			7:00 AM 807			7:00 AM 807	
PM Peak Volume			5:00 PM 942			5:00 PM 942			5:00 PM 942	
Comments:										

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Volume Data Page 1 of 1

Start Time	Mon	Tue	Wed 07-Nov-12	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM			50			50			50	
1:00 AM			35			35			35	
2:00 AM			31			31			31	
3:00 AM			45			45			45	
4:00 AM			109			109			109	
5:00 AM			312			312			312	
6:00 AM			840			840			840	
7:00 AM			1729			1729			1729	
8:00 AM			1727			1727			1727	
9:00 AM			1149			1149			1149	
10:00 AM			839			839			839	
11:00 AM			667			667			667	
12:00 PM			746			746			746	
1:00 PM			769			769			769	
2:00 PM			890			890			890	
3:00 PM			1180			1180			1180	
4:00 PM			1617			1617			1617	
5:00 PM			1906			1906			1906	
6:00 PM			1445			1445			1445	
7:00 PM			770			770			770	
8:00 PM			422			422			422	
9:00 PM			361			361			361	
10:00 PM			246			246			246	
11:00 PM			112			112			112	
Day Total			17997			17997			17997	
% Weekday Average			100.0%							
% Week Average			100.0%			100.0%				
AM Peak Volume			7:00 AM 1729			7:00 AM 1729			7:00 AM 1729	
PM Peak Volume			5:00 PM 1906			5:00 PM 1906			5:00 PM 1906	

Comments:

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Volume Data Page 1 of 1

Start Time	Mon	Tue	Wed 07-Nov-12	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM			25			25			25	
1:00 AM			18			18			18	
2:00 AM			10			10			10	
3:00 AM			29			29			29	
4:00 AM			53			53			53	
5:00 AM			133			133			133	
6:00 AM			390			390			390	
7:00 AM			897			897			897	
8:00 AM			<b>1040</b>			<b>1040</b>			<b>1040</b>	
9:00 AM			617			617			617	
10:00 AM			431			431			431	
11:00 AM			336			336			336	
12:00 PM			392			392			392	
1:00 PM			390			390			390	
2:00 PM			486			486			486	
3:00 PM			606			606			606	
4:00 PM			865			865			865	
5:00 PM			<b>981</b>			<b>981</b>			<b>981</b>	
6:00 PM			785			785			785	
7:00 PM			467			467			467	
8:00 PM			231			231			231	
9:00 PM			165			165			165	
10:00 PM			125			125			125	
11:00 PM			58			58			58	
<b>Day Total</b>			<b>9530</b>			<b>9530</b>			<b>9530</b>	
% Weekday Average			100.0%							
% Week Average			100.0%			100.0%				
AM Peak Volume			8:00 AM 1040			8:00 AM 1040			8:00 AM 1040	
PM Peak Volume			5:00 PM 981			5:00 PM 981			5:00 PM 981	

Comments:

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Volume Data Page 1 of 1

LOCATION: Crow Canyon Rd further South of Norris Canyon Rd										QC JOB #: 10846408	
SPECIFIC LOCATION: 800 ft from										DIRECTION: SB	
CITY/STATE: San Ramon, CA										DATE: Nov 07 2012 - Nov 07 2012	
Start Time	Mon	Tue	Wed 07-Nov-12	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile	
12:00 AM			31			31			31		
1:00 AM			19			19			19		
2:00 AM			20			20			20		
3:00 AM			15			15			15		
4:00 AM			51			51			51		
5:00 AM			158			158			158		
6:00 AM			452			452			452		
7:00 AM			<b>794</b>			<b>794</b>			<b>794</b>		
8:00 AM			737			737			737		
9:00 AM			554			554			554		
10:00 AM			412			412			412		
11:00 AM			332			332			332		
12:00 PM			363			363			363		
1:00 PM			391			391			391		
2:00 PM			432			432			432		
3:00 PM			552			552			552		
4:00 PM			717			717			717		
5:00 PM			<b>979</b>			<b>979</b>			<b>979</b>		
6:00 PM			689			689			689		
7:00 PM			340			340			340		
8:00 PM			202			202			202		
9:00 PM			211			211			211		
10:00 PM			128			128			128		
11:00 PM			56			56			56		
<b>Day Total</b>			8635			8635			8635		
% Weekday Average			100.0%								
% Week Average			100.0%			100.0%					
AM Peak Volume			7:00 AM 794			7:00 AM 794			7:00 AM 794		
PM Peak Volume			5:00 PM 979			5:00 PM 979			5:00 PM 979		
Comments:											

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Volume Data Page 1 of 1

Start Time	Mon	Tue	Wed 07-Nov-12	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM			56			56			56	
1:00 AM			37			37			37	
2:00 AM			30			30			30	
3:00 AM			44			44			44	
4:00 AM			104			104			104	
5:00 AM			291			291			291	
6:00 AM			842			842			842	
7:00 AM			1691			1691			1691	
8:00 AM			1777			1777			1777	
9:00 AM			1171			1171			1171	
10:00 AM			843			843			843	
11:00 AM			668			668			668	
12:00 PM			755			755			755	
1:00 PM			781			781			781	
2:00 PM			918			918			918	
3:00 PM			1158			1158			1158	
4:00 PM			1582			1582			1582	
5:00 PM			1960			1960			1960	
6:00 PM			1474			1474			1474	
7:00 PM			807			807			807	
8:00 PM			433			433			433	
9:00 PM			376			376			376	
10:00 PM			253			253			253	
11:00 PM			114			114			114	
Day Total			18165			18165			18165	
% Weekday Average			100.0%							
% Week Average			100.0%			100.0%				
AM Peak Volume			8:00 AM 1777			8:00 AM 1777			8:00 AM 1777	
PM Peak Volume			5:00 PM 1960			5:00 PM 1960			5:00 PM 1960	
Comments:										

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)





MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Volume Data Page 1 of 1

Start Time	Mon	Tue	Wed 07-Nov-12	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM			24			24			24	
1:00 AM			18			18			18	
2:00 AM			9			9			9	
3:00 AM			30			30			30	
4:00 AM			55			55			55	
5:00 AM			149			149			149	
6:00 AM			406			406			406	
7:00 AM			972			972			972	
8:00 AM			<b>1152</b>			<b>1152</b>			<b>1152</b>	
9:00 AM			615			615			615	
10:00 AM			472			472			472	
11:00 AM			369			369			369	
12:00 PM			438			438			438	
1:00 PM			432			432			432	
2:00 PM			534			534			534	
3:00 PM			740			740			740	
4:00 PM			1002			1002			1002	
5:00 PM			<b>1141</b>			<b>1141</b>			<b>1141</b>	
6:00 PM			843			843			843	
7:00 PM			480			480			480	
8:00 PM			267			267			267	
9:00 PM			207			207			207	
10:00 PM			135			135			135	
11:00 PM			65			65			65	
<b>Day Total</b>			<b>10555</b>			<b>10555</b>			<b>10555</b>	
% Weekday Average			100.0%							
% Week Average			100.0%			100.0%				
AM Peak Volume			8:00 AM 1152			8:00 AM 1152			8:00 AM 1152	
PM Peak Volume			5:00 PM 1141			5:00 PM 1141			5:00 PM 1141	
<i>Comments:</i>										

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Volume Data Page 1 of 1

LOCATION: Crow Canyon Rd South of Cold Water Dr										QC JOB #: 10846409	
SPECIFIC LOCATION: 100 ft from										DIRECTION: SB	
CITY/STATE: Castro Valley, CA										DATE: Nov 07 2012 - Nov 07 2012	
Start Time	Mon	Tue	Wed 07-Nov-12	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile	
12:00 AM			31			31			31		
1:00 AM			19			19			19		
2:00 AM			20			20			20		
3:00 AM			15			15			15		
4:00 AM			58			58			58		
5:00 AM			183			183			183		
6:00 AM			503			503			503		
7:00 AM			1033			1033			1033		
8:00 AM			866			866			866		
9:00 AM			655			655			655		
10:00 AM			452			452			452		
11:00 AM			406			406			406		
12:00 PM			407			407			407		
1:00 PM			453			453			453		
2:00 PM			487			487			487		
3:00 PM			619			619			619		
4:00 PM			822			822			822		
5:00 PM			1142			1142			1142		
6:00 PM			782			782			782		
7:00 PM			368			368			368		
8:00 PM			209			209			209		
9:00 PM			215			215			215		
10:00 PM			139			139			139		
11:00 PM			56			56			56		
Day Total			9940			9940			9940		
% Weekday Average			100.0%								
% Week Average			100.0%			100.0%					
AM Peak Volume			7:00 AM 1033			7:00 AM 1033			7:00 AM 1033		
PM Peak Volume			5:00 PM 1142			5:00 PM 1142			5:00 PM 1142		
Comments:											

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Volume Data Page 1 of 1

LOCATION: Crow Canyon Rd South of Cold Water Dr										QC JOB #: 10846409	
SPECIFIC LOCATION: 100 ft from										DIRECTION: NB/SB	
CITY/STATE: Castro Valley, CA										DATE: Nov 07 2012 - Nov 07 2012	
Start Time	Mon	Tue	Wed 07-Nov-12	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile	
12:00 AM			55			55			55		
1:00 AM			37			37			37		
2:00 AM			29			29			29		
3:00 AM			45			45			45		
4:00 AM			113			113			113		
5:00 AM			332			332			332		
6:00 AM			909			909			909		
7:00 AM			2005			2005			2005		
8:00 AM			<b>2018</b>			<b>2018</b>			<b>2018</b>		
9:00 AM			1270			1270			1270		
10:00 AM			924			924			924		
11:00 AM			775			775			775		
12:00 PM			845			845			845		
1:00 PM			885			885			885		
2:00 PM			1021			1021			1021		
3:00 PM			1359			1359			1359		
4:00 PM			1824			1824			1824		
5:00 PM			<b>2283</b>			<b>2283</b>			<b>2283</b>		
6:00 PM			1625			1625			1625		
7:00 PM			848			848			848		
8:00 PM			476			476			476		
9:00 PM			422			422			422		
10:00 PM			274			274			274		
11:00 PM			121			121			121		
Day Total			20495			20495			20495		
% Weekday Average			100.0%								
% Week Average			100.0%			100.0%					
AM Peak Volume			8:00 AM 2018			8:00 AM 2018			8:00 AM 2018		
PM Peak Volume			5:00 PM 2283			5:00 PM 2283			5:00 PM 2283		
Comments:											

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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**Appendix C – Speed Data**

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data

Page 1 of 2

LOCATION: Crow Canyon Rd West of Bollinger Canyon Rd															QC JOB #: 10846405		
SPECIFIC LOCATION: 100 ft from															DIRECTION: EB		
CITY/STATE: San Ramon, CA															DATE: Nov 07 2012		
Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	Total	Pace	Number
	15	20	25	30	35	40	45	50	55	60	65	70	75	999		Speed	in Pace
12:00 AM	0	0	0	0	0	2	5	6	4	6	0	0	0	0	23	48-57	10
1:00 AM	0	0	0	0	1	2	4	7	0	1	0	0	0	0	15	42-51	10
2:00 AM	0	0	0	0	0	2	1	3	1	1	0	0	1	0	9	41-50	4
3:00 AM	0	0	0	0	0	0	5	7	3	1	0	0	0	0	16	43-52	11
4:00 AM	1	0	0	0	2	6	10	11	4	2	1	0	0	0	37	41-50	21
5:00 AM	1	0	0	0	0	19	35	30	12	4	1	0	0	0	102	41-50	65
6:00 AM	8	0	0	1	5	30	89	101	48	6	0	2	0	1	291	41-50	189
7:00 AM	68	0	0	7	11	86	269	189	51	13	1	0	0	0	695	41-50	457
8:00 AM	78	0	0	1	9	79	331	327	50	3	0	1	1	0	880	41-50	658
9:00 AM	33	0	1	1	4	81	281	173	43	6	1	0	0	0	624	41-50	454
10:00 AM	21	0	2	6	14	69	112	121	24	6	4	0	0	0	379	41-50	232
11:00 AM	17	0	0	0	2	9	91	138	50	9	2	0	0	0	318	41-50	229
12:00 PM	14	0	0	0	0	28	98	134	42	9	4	0	0	0	329	41-50	232
1:00 PM	12	0	1	2	2	18	94	152	62	15	0	1	0	0	359	41-50	245
2:00 PM	14	0	0	0	2	24	112	184	66	13	1	0	0	1	417	41-50	296
3:00 PM	27	0	0	1	5	24	122	207	66	13	1	0	0	0	466	41-50	328
4:00 PM	60	0	0	1	6	120	281	225	44	0	0	0	0	0	737	41-50	506
5:00 PM	111	0	1	8	53	282	236	79	12	1	1	0	0	0	824	36-45	518
6:00 PM	52	0	1	10	91	256	231	68	10	3	0	0	1	0	723	36-45	487
7:00 PM	16	0	0	0	8	77	178	129	38	13	0	0	0	0	459	41-50	307
8:00 PM	4	0	0	0	4	26	64	69	34	8	2	1	0	0	212	41-50	133
9:00 PM	2	0	0	1	0	16	40	46	26	6	0	2	0	0	139	41-50	85
10:00 PM	2	0	0	0	3	9	31	44	29	6	1	0	0	0	125	41-50	75
11:00 PM	1	0	0	0	1	4	17	11	14	3	1	0	0	0	52	41-50	28
Day Total	542	0	6	39	263	1269	2737	2461	733	148	21	7	3	2	8231	41-50	5198
Percent	6.6%	0.0%	0.1%	0.5%	3.2%	15.4%	33.3%	29.9%	8.9%	1.8%	0.3%	0.1%	0.0%	0.0%			
ADT																	
AM Peak Volume	8:00 AM	10:00 AM	7:00 AM	10:00 AM	7:00 AM	8:00 AM	8:00 AM	7:00 AM	7:00 AM	10:00 AM	6:00 AM	2:00 AM	6:00 AM		8:00 AM		
	78	2	7	14	86	331	327	51	13	4	2	1	1		880		
PM Peak Volume	5:00 PM	1:00 PM	6:00 PM	5:00 PM	5:00 PM	4:00 PM	4:00 PM	2:00 PM	1:00 PM	12:00 PM	9:00 PM	6:00 PM	2:00 PM		5:00 PM		
	111	1	10	93	282	281	225	66	15	4	2	1	1		824		

Comments:

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data Page 2 of 2

**SUMMARY - Tube Count - Speed Data**

<b>LOCATION:</b> Crow Canyon Rd West of Bollinger Canyon Rd <b>SPECIFIC LOCATION:</b> 100 ft from <b>CITY/STATE:</b> San Ramon, CA													<b>QC JOB #:</b> 10846405 <b>DIRECTION:</b> EB <b>DATE:</b> Nov 07 2012 - Nov 07 2012																			
Start Time	15	16	20	21	25	26	30	31	35	36	40	41	45	46	50	51	55	56	60	61	65	66	70	71	75	76	999	Total	Pace Speed	Number in Pace		
<b>Grand Total</b>	542	0	6	39	263	1269	2737	2461	733	148	21	7	3	2	8231	41-50	5198															
<b>Percent</b>	6.6%	0.0%	0.1%	0.5%	3.2%	15.4%	33.3%	29.9%	8.9%	1.8%	0.3%	0.1%	0.0%	0.0%																		
<b>Cumulative Percent</b>	6.6%	6.6%	6.7%	7.1%	10.3%	25.7%	59.0%	88.9%	97.8%	99.6%	99.9%	99.9%	100.0%	100.0%																		
<b>ADT 8231</b>																									<b>85th Percentile</b> 49 MPH <b>Mean Speed(Average):</b> 41 MPH <b>Median</b> 43 MPH <b>Mode:</b> 43 MPH							
<i>Comments:</i>																																

Report generated on 11/27/2012 12:35 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



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MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data

Page 1 of 2

LOCATION: Crow Canyon Rd West of Bollinger Canyon Rd														QC JOB #: 10846405			
SPECIFIC LOCATION: 100 ft from														DIRECTION: EB/WB			
CITY/STATE: San Ramon, CA														DATE: Nov 07 2012			
Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 AM	0	0	0	0	0	4	11	15	8	8	0	0	0	0	46	41-50	26
1:00 AM	0	0	0	0	1	2	10	15	3	1	0	0	0	0	32	41-50	25
2:00 AM	0	0	0	0	0	4	5	12	4	1	0	0	1	0	27	41-50	17
3:00 AM	0	0	0	0	0	0	7	14	4	2	0	0	0	0	27	41-50	21
4:00 AM	2	0	0	0	2	9	23	22	14	3	1	0	0	0	76	41-50	45
5:00 AM	2	0	0	1	2	27	72	100	29	9	1	0	0	0	243	41-50	172
6:00 AM	16	0	0	1	6	46	217	278	109	13	1	2	0	1	690	41-50	495
7:00 AM	114	0	0	7	11	128	548	456	117	22	2	0	0	0	1405	41-50	1004
8:00 AM	142	0	0	1	12	127	530	539	118	9	1	1	1	0	1481	41-50	1069
9:00 AM	61	0	2	3	7	107	490	347	95	16	2	0	1	0	1131	41-50	837
10:00 AM	37	0	2	6	21	103	223	254	72	11	5	0	0	0	734	41-50	476
11:00 AM	28	0	4	7	3	28	205	253	75	15	2	0	0	0	620	41-50	458
12:00 PM	21	1	0	1	3	54	200	274	80	14	5	0	0	0	653	41-50	473
1:00 PM	20	0	1	2	3	50	216	293	106	21	1	1	0	0	714	41-50	509
2:00 PM	27	0	1	2	12	65	251	302	111	14	1	0	0	1	787	41-50	553
3:00 PM	51	0	0	1	8	75	317	395	99	21	1	0	0	0	968	41-50	712
4:00 PM	109	3	1	2	10	174	571	412	89	4	3	0	0	0	1378	41-50	983
5:00 PM	206	0	5	23	142	481	558	212	22	2	2	0	0	0	1653	36-45	1038
6:00 PM	89	1	7	18	120	366	486	183	33	6	0	0	2	0	1311	36-45	852
7:00 PM	26	0	0	0	10	102	287	242	75	18	1	0	0	0	761	41-50	529
8:00 PM	5	0	0	0	5	38	125	150	55	11	2	1	0	0	392	41-50	275
9:00 PM	4	0	0	1	0	33	96	121	51	16	2	5	0	0	329	41-50	216
10:00 PM	3	0	0	0	3	14	68	88	55	12	1	1	0	0	245	41-50	156
11:00 PM	2	0	0	0	1	6	27	35	23	5	1	1	0	0	101	41-50	62
Day Total	965	5	23	76	382	2043	5543	5012	1447	254	35	12	5	2	15804	41-50	10555
Percent	6.1%	0.0%	0.1%	0.5%	2.4%	12.9%	35.1%	31.7%	9.2%	1.6%	0.2%	0.1%	0.0%	0.0%			
ADT	15804																
AM Peak Volume	8:00 AM 142	11:00 AM 4	7:00 AM 7	10:00 AM 21	7:00 AM 128	7:00 AM 548	8:00 AM 539	8:00 AM 118	7:00 AM 22	10:00 AM 5	6:00 AM 2	2:00 AM 1	6:00 AM 1	8:00 AM 1481			
PM Peak Volume	5:00 PM 206	4:00 PM 3	6:00 PM 7	5:00 PM 23	5:00 PM 142	5:00 PM 481	4:00 PM 571	4:00 PM 412	2:00 PM 111	1:00 PM 21	12:00 PM 5	9:00 PM 5	6:00 PM 2	2:00 PM 1	5:00 PM 1653		
Comments:																	

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data Page 2 of 2

**SUMMARY - Tube Count - Speed Data**

<b>LOCATION:</b> Crow Canyon Rd West of Bollinger Canyon Rd													<b>QC JOB #:</b> 10846405				
<b>SPECIFIC LOCATION:</b> 100 ft from													<b>DIRECTION:</b> EB/WB				
<b>CITY/STATE:</b> San Ramon, CA													<b>DATE:</b> Nov 07 2012 - Nov 07 2012				
<b>Start Time</b>	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	<b>Total</b>	<b>Pace Speed</b>	<b>Number in Pace</b>
<b>Grand Total</b>	965	5	23	76	382	2043	5543	5012	1447	254	35	12	5	2	15804	41-50	10555
<b>Percent</b>	6.1%	0.0%	0.1%	0.5%	2.4%	12.9%	35.1%	31.7%	9.2%	1.6%	0.2%	0.1%	0.0%	0.0%			
<b>Cumulative Percent</b>	6.1%	6.1%	6.3%	6.8%	9.2%	22.1%	57.2%	88.9%	98.1%	99.7%	99.9%	100.0%	100.0%	100.0%			
<b>ADT 15804</b>															<b>85th Percentile</b> 49 MPH <b>Mean Speed(Average):</b> 42 MPH <b>Median</b> 43 MPH <b>Mode:</b> 43 MPH		
<i>Comments:</i>																	

Report generated on 11/27/2012 12:35 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



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MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data

Page 1 of 2

LOCATION: Crow Canyon Rd West of Bollinger Canyon Rd														QC JOB #: 10846405				
SPECIFIC LOCATION: 100 ft from														DIRECTION: WB				
CITY/STATE: San Ramon, CA														DATE: Nov 07 2012				
Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	999	Total	Pace	Number
	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85		41-50	in Pace
12:00 AM	0	0	0	0	0	2	6	9	4	2	0	0	0	0	0	23	41-50	15
1:00 AM	0	0	0	0	0	0	6	8	3	0	0	0	0	0	0	17	41-50	14
2:00 AM	0	0	0	0	0	2	4	9	3	0	0	0	0	0	0	18	41-50	13
3:00 AM	0	0	0	0	0	0	2	7	1	1	0	0	0	0	0	11	41-50	9
4:00 AM	1	0	0	0	0	3	13	11	10	1	0	0	0	0	0	39	41-50	24
5:00 AM	1	0	0	1	2	8	37	70	17	5	0	0	0	0	0	141	41-50	107
6:00 AM	8	0	0	0	1	16	128	177	61	7	1	0	0	0	0	399	41-50	304
7:00 AM	46	0	0	0	0	42	279	267	66	9	1	0	0	0	0	710	41-50	546
8:00 AM	64	0	0	0	3	48	199	212	68	6	1	0	0	0	0	601	41-50	410
9:00 AM	26	0	1	2	3	26	209	174	52	10	1	0	1	0	0	507	41-50	382
10:00 AM	16	0	0	0	7	34	111	133	48	5	1	0	0	0	0	355	41-50	244
11:00 AM	11	0	4	7	1	19	114	115	25	6	0	0	0	0	0	302	41-50	229
12:00 PM	7	1	0	1	3	26	102	140	38	5	1	0	0	0	0	324	41-50	242
1:00 PM	8	0	0	0	1	32	122	141	44	6	1	0	0	0	0	355	41-50	263
2:00 PM	13	0	1	2	10	41	139	118	45	1	0	0	0	0	0	370	41-50	257
3:00 PM	24	0	0	0	3	51	195	188	33	8	0	0	0	0	0	502	41-50	383
4:00 PM	49	3	1	1	4	54	290	187	45	4	3	0	0	0	0	641	41-50	476
5:00 PM	95	0	4	15	49	199	322	133	10	1	1	0	0	0	0	829	36-45	521
6:00 PM	37	1	6	9	29	110	255	115	23	3	0	0	1	0	0	588	41-50	370
7:00 PM	10	0	0	0	2	25	109	113	37	5	1	0	0	0	0	302	41-50	222
8:00 PM	1	0	0	0	1	12	61	81	21	3	0	0	0	0	0	180	41-50	141
9:00 PM	2	0	0	0	0	17	56	75	25	10	2	3	0	0	0	190	41-50	131
10:00 PM	1	0	0	0	0	5	37	44	26	6	0	1	0	0	0	120	41-50	81
11:00 PM	1	0	0	0	0	2	10	24	9	2	0	1	0	0	0	49	41-50	34
Day Total	423	5	17	37	119	774	2806	2551	714	106	14	5	2	0	0	7573	41-50	5357
Percent	5.6%	0.1%	0.2%	0.5%	1.6%	10.2%	37.1%	33.7%	9.4%	1.4%	0.2%	0.1%	0.0%	0.0%				
ADT																		
AM Peak Volume	8:00 AM	11:00 AM	11:00 AM	10:00 AM	8:00 AM	7:00 AM	7:00 AM	8:00 AM	9:00 AM	6:00 AM	9:00 AM					7:00 AM		
PM Peak Volume	5:00 PM	4:00 PM	6:00 PM	5:00 PM	5:00 PM	5:00 PM	3:00 PM	2:00 PM	9:00 PM	4:00 PM	9:00 PM	6:00 PM				5:00 PM		
Comments:																		

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data Page 2 of 2

**SUMMARY - Tube Count - Speed Data**

<b>LOCATION:</b> Crow Canyon Rd West of Bollinger Canyon Rd													<b>QC JOB #:</b> 10846405				
<b>SPECIFIC LOCATION:</b> 100 ft from													<b>DIRECTION:</b> WB				
<b>CITY/STATE:</b> San Ramon, CA													<b>DATE:</b> Nov 07 2012 - Nov 07 2012				
<b>Start Time</b>	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	<b>Total</b>	<b>Pace Speed</b>	<b>Number in Pace</b>
<b>Grand Total</b>	423	5	17	37	119	774	2806	2551	714	106	14	5	2	0	7573	41-50	5357
<b>Percent</b>	5.6%	0.1%	0.2%	0.5%	1.6%	10.2%	37.1%	33.7%	9.4%	1.4%	0.2%	0.1%	0.0%	0.0%			
<b>Cumulative Percent</b>	5.6%	5.7%	5.9%	6.4%	7.9%	18.2%	55.2%	88.9%	98.3%	99.7%	99.9%	100.0%	100.0%	100.0%			
<b>ADT 7573</b>															<b>85th Percentile</b> 49 MPH <b>Mean Speed(Average):</b> 42 MPH <b>Median</b> 44 MPH <b>Mode:</b> 43 MPH		
<i>Comments:</i>																	

Report generated on 11/27/2012 12:35 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



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MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data

Page 1 of 2

LOCATION: Crow Canyon Rd North of Norris Canyon Rd														QC JOB #: 10846406			
SPECIFIC LOCATION: 100 ft from														DIRECTION: NB			
CITY/STATE: San Ramon, CA														DATE: Nov 08 2012			
Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	Total	Pace Speed	Number in Pace
	15	20	25	30	35	40	45	50	55	60	65	70	75	999			
12:00 AM	0	0	0	0	0	0	1	4	4	13	8	3	1	0	34	56-65	21
1:00 AM	1	0	0	0	0	0	1	1	4	2	1	3	0	0	13	51-60	6
2:00 AM	0	0	0	0	0	0	0	0	3	6	3	4	0	0	16	52-61	9
3:00 AM	2	0	0	0	0	0	0	2	1	4	3	0	0	1	13	57-66	6
4:00 AM	6	0	0	0	0	0	3	0	12	7	2	1	1	0	32	51-60	18
5:00 AM	20	0	0	0	0	1	1	5	12	19	15	5	1	1	80	56-65	34
6:00 AM	59	0	0	0	0	0	0	11	48	74	29	14	4	1	240	51-60	122
7:00 AM	90	0	0	0	0	1	6	40	126	143	85	23	10	3	527	51-60	269
8:00 AM	62	0	0	0	0	0	7	57	209	278	134	45	14	1	807	51-60	487
9:00 AM	25	0	0	0	1	0	5	52	240	267	114	23	10	1	738	51-60	506
10:00 AM	14	0	0	0	0	3	9	56	166	146	40	14	2	3	453	51-60	312
11:00 AM	14	0	0	0	0	0	5	54	125	95	35	10	3	2	343	51-60	220
12:00 PM	13	0	0	1	1	0	5	34	128	97	31	9	0	1	320	51-60	224
1:00 PM	7	1	0	0	0	0	13	87	120	98	25	5	3	0	359	51-60	218
2:00 PM	11	0	0	0	0	0	10	75	157	125	32	13	3	0	426	51-60	282
3:00 PM	17	0	0	0	0	2	10	75	214	156	40	6	2	0	522	51-60	370
4:00 PM	31	0	0	1	4	4	9	71	267	197	79	12	2	1	678	51-60	463
5:00 PM	30	0	0	0	0	3	18	94	287	277	116	22	2	0	849	51-60	564
6:00 PM	32	0	0	0	0	3	27	125	312	246	79	15	0	0	839	51-60	558
7:00 PM	30	0	0	0	2	0	25	88	239	182	47	9	5	1	628	51-60	420
8:00 PM	40	0	0	0	0	0	11	25	108	83	32	14	3	1	317	51-60	191
9:00 PM	19	0	0	0	0	0	1	16	54	42	19	5	4	2	162	51-60	96
10:00 PM	19	0	0	0	0	0	0	13	44	32	24	4	1	1	138	51-60	76
11:00 PM	7	0	0	0	0	0	1	4	18	21	11	6	1	1	70	51-60	39
Day Total	549	1	0	2	8	17	168	989	2898	2610	1004	265	72	21	8604	51-60	5508
Percent	6.4%	0.0%	0.0%	0.0%	0.1%	0.2%	2.0%	11.5%	33.7%	30.3%	11.7%	3.1%	0.8%	0.2%			
ADT 8604																	
AM Peak Volume	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 AM	8:00 AM	8:07		
PM Peak Volume	8:00 PM	1:00 PM	12:00 PM	4:00 PM	4:00 PM	6:00 PM	6:00 PM	6:00 PM	5:00 PM	5:00 PM	5:00 PM	7:00 PM	9:00 PM	5:00 PM	849		

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data Page 2 of 2

**SUMMARY - Tube Count - Speed Data**

<b>LOCATION:</b> Crow Canyon Rd North of Norris Canyon Rd													<b>QC JOB #:</b> 10846406				
<b>SPECIFIC LOCATION:</b> 100 ft from													<b>DIRECTION:</b> NB				
<b>CITY/STATE:</b> San Ramon, CA													<b>DATE:</b> Nov 08 2012 - Nov 08 2012				
<b>Start Time</b>	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	<b>Total</b>	<b>Pace Speed</b>	<b>Number in Pace</b>
<b>Grand Total</b>	549	1	0	2	8	17	168	989	2898	2610	1004	265	72	21	8604	51-60	5508
<b>Percent</b>	6.4%	0.0%	0.0%	0.0%	0.1%	0.2%	2.0%	11.5%	33.7%	30.3%	11.7%	3.1%	0.8%	0.2%			
<b>Cumulative Percent</b>	6.4%	6.4%	6.4%	6.4%	6.5%	6.7%	8.7%	20.2%	53.8%	84.2%	95.8%	98.9%	99.8%	100.0%			
<b>ADT 8604</b>															<b>85th Percentile</b> 60 MPH <b>Mean Speed(Average):</b> 53 MPH <b>Median</b> 54 MPH <b>Mode:</b> 53 MPH		
<i>Comments:</i>																	

Report generated on 11/27/2012 12:35 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)





MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data Page 2 of 2

**SUMMARY - Tube Count - Speed Data**

<b>LOCATION:</b> Crow Canyon Rd North of Norris Canyon Rd <b>SPECIFIC LOCATION:</b> 100 ft from <b>CITY/STATE:</b> San Ramon, CA													<b>QC JOB #:</b> 10846406 <b>DIRECTION:</b> SB <b>DATE:</b> Nov 08 2012 - Nov 08 2012				
<b>Start Time</b>	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	<b>Total</b>	<b>Pace Speed</b>	<b>Number in Pace</b>
<b>Grand Total</b>	13	8	9	5	3	16	204	1598	2979	1869	603	149	38	14	7508	51-60	4847
<b>Percent</b>	0.2%	0.1%	0.1%	0.1%	0.0%	0.2%	2.7%	21.3%	39.7%	24.9%	8.0%	2.0%	0.5%	0.2%			
<b>Cumulative Percent</b>	0.2%	0.3%	0.4%	0.5%	0.5%	0.7%	3.4%	24.7%	64.4%	89.3%	97.3%	99.3%	99.8%	100.0%			
<b>ADT 7508</b>															<b>85th Percentile: 59 MPH</b> <b>Mean Speed (Average): 54 MPH</b> <b>Median: 53 MPH</b> <b>Mode: 53 MPH</b>		
<i>Comments:</i>																	

Report generated on 11/27/2012 12:35 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



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MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data

Page 1 of 2

LOCATION: Crow Canyon Rd North of Norris Canyon Rd															QC JOB #: 10846406			
SPECIFIC LOCATION: 100 ft from															DIRECTION: NB/SB			
CITY/STATE: San Ramon, CA															DATE: Nov 08 2012			
Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	999	Total	Pace Speed	Number in Pace
12:00 AM	1	0	0	0	0	0	2	10	17	19	13	5	1	0		68	52-61	35
1:00 AM	1	0	0	0	0	0	1	4	10	7	5	4	1	0		33	51-60	16
2:00 AM	0	0	0	0	0	0	0	4	7	11	5	5	0	0		32	51-60	18
3:00 AM	2	0	0	0	0	0	3	6	6	7	5	1	0	1		31	55-64	12
4:00 AM	7	0	0	0	0	0	3	11	29	13	3	1	1	0		68	51-60	41
5:00 AM	20	0	0	0	0	1	5	24	51	54	37	8	2	2		204	51-60	105
6:00 AM	60	0	1	1	0	0	2	44	187	172	67	29	6	4		573	51-60	358
7:00 AM	90	1	1	0	0	1	9	100	333	315	148	42	17	6		1063	51-60	648
8:00 AM	62	0	0	0	0	0	10	129	454	474	215	59	17	2		1422	51-60	927
9:00 AM	27	1	0	0	1	0	9	137	426	411	169	31	12	1		1225	51-60	837
10:00 AM	15	1	1	0	1	4	21	123	304	241	74	23	2	3		813	51-60	545
11:00 AM	15	0	0	1	0	2	13	108	254	172	55	20	5	2		647	51-60	425
12:00 PM	13	0	0	1	1	2	16	113	273	170	47	16	2	1		654	51-60	443
1:00 PM	8	1	1	0	0	1	36	190	247	160	47	7	3	1		702	46-55	436
2:00 PM	12	0	3	0	0	0	26	186	318	192	47	16	3	1		804	51-60	509
3:00 PM	18	4	2	0	0	6	30	211	360	242	69	12	3	0		977	51-60	622
4:00 PM	32	0	0	2	4	4	17	204	530	335	114	18	2	1		1263	51-60	865
5:00 PM	31	0	0	1	0	5	45	310	581	429	145	35	6	1		1589	51-60	1009
6:00 PM	32	0	0	0	1	4	40	279	588	387	116	23	2	1		1473	51-60	975
7:00 PM	31	0	0	1	3	1	41	176	389	294	72	16	7	2		1033	51-60	682
8:00 PM	40	0	0	0	0	1	25	82	204	151	53	20	4	2		582	51-60	355
9:00 PM	19	0	0	0	0	1	12	81	131	93	38	8	7	2		392	51-60	224
10:00 PM	19	1	0	0	0	0	4	45	105	81	43	8	3	1		310	51-60	185
11:00 PM	7	0	0	0	0	0	3	10	53	49	20	7	4	1		154	51-60	102
Day Total	562	9	9	7	11	33	372	2587	5877	4479	1607	414	110	35		16112	51-60	10355
Percent	3.5%	0.1%	0.1%	0.0%	0.1%	0.2%	2.3%	16.1%	36.5%	27.8%	10.0%	2.6%	0.7%	0.2%				
ADT 16112																		
AM Peak Volume	7:00 AM	7:00 AM	8:00 AM	8:00 AM	9:00 AM	10:00 AM	10:00 AM	9:00 AM	8:00 AM	8:00 AM	8:00 AM	8:00 AM	7:00 AM	7:00 AM		8:00 AM		
	90	1	1	1	1	4	21	137	454	474	215	59	17	6		1422		
PM Peak Volume	8:00 PM	3:00 PM	2:00 PM	4:00 PM	4:00 PM	3:00 PM	5:00 PM	5:00 PM	6:00 PM	5:00 PM	5:00 PM	5:00 PM	7:00 PM	7:00 PM		5:00 PM		
	40	4	3	2	4	6	45	310	588	429	145	35	7	2		1589		
Comments:																		

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data Page 2 of 2

**SUMMARY - Tube Count - Speed Data**

<b>LOCATION:</b> Crow Canyon Rd North of Norris Canyon Rd													<b>QC JOB #:</b> 10846406				
<b>SPECIFIC LOCATION:</b> 100 ft from													<b>DIRECTION:</b> NB/SB				
<b>CITY/STATE:</b> San Ramon, CA													<b>DATE:</b> Nov 08 2012 - Nov 08 2012				
<b>Start Time</b>	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	<b>Total</b>	<b>Pace Speed</b>	<b>Number in Pace</b>
<b>Grand Total</b>	562	9	9	7	11	33	372	2587	5877	4479	1607	414	110	35	16112	51-60	10355
<b>Percent</b>	3.5%	0.1%	0.1%	0.0%	0.1%	0.2%	2.3%	16.1%	36.5%	27.8%	10.0%	2.6%	0.7%	0.2%			
<b>Cumulative Percent</b>	3.5%	3.5%	3.6%	3.6%	3.7%	3.9%	6.2%	22.3%	58.8%	86.6%	96.5%	99.1%	99.8%	100.0%			
<b>ADT 16112</b>															<b>85th Percentile: 59 MPH</b> <b>Mean Speed (Average): 53 MPH</b> <b>Median: 53 MPH</b> <b>Mode: 53 MPH</b>		
<i>Comments:</i>																	

Report generated on 11/27/2012 12:35 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



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MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data

Page 1 of 2

LOCATION: Crow Canyon Rd South of Norris Canyon Rd														QC JOB #: 10846407					
SPECIFIC LOCATION: 100 ft from														DIRECTION: NB					
CITY/STATE: San Ramon, CA														DATE: Nov 07 2012					
Start Time	15	16	20	25	30	35	40	45	50	55	60	65	70	75	76	999	Total	Pace Speed	Number in Pace
12:00 AM	1	0	0	0	0	1	0	3	9	6	2	0	0	0	0	0	22	46-55	14
1:00 AM	0	0	0	0	0	2	0	7	6	1	2	0	0	0	0	0	18	41-50	12
2:00 AM	0	0	0	0	0	0	2	1	4	2	1	0	0	0	0	0	10	46-55	6
3:00 AM	0	0	0	0	0	0	1	4	12	7	3	3	0	0	0	0	30	46-55	18
4:00 AM	0	0	0	0	0	2	15	12	14	7	2	1	0	0	0	0	53	40-49	26
5:00 AM	3	0	0	0	0	0	9	52	36	36	4	1	0	0	0	0	141	41-50	87
6:00 AM	19	0	0	0	1	6	16	99	174	74	4	0	1	1	0	0	395	41-50	273
7:00 AM	75	0	0	2	9	88	402	265	70	9	1	1	0	0	0	0	922	41-50	667
8:00 AM	54	0	1	3	17	131	432	328	88	7	0	1	0	1	1	0	1043	41-50	759
9:00 AM	35	0	2	3	19	76	213	191	52	9	2	0	1	0	0	0	603	41-50	404
10:00 AM	19	0	0	0	3	33	146	188	39	3	0	0	0	0	0	0	431	41-50	334
11:00 AM	13	0	0	1	1	17	79	171	48	4	3	1	0	0	1	0	339	41-50	249
12:00 PM	16	0	0	1	1	19	94	168	75	9	2	0	0	0	0	0	385	41-50	262
1:00 PM	12	0	0	2	1	19	103	147	79	10	4	0	0	0	0	0	377	41-50	249
2:00 PM	31	0	0	1	8	20	120	218	72	6	0	1	0	0	0	0	477	41-50	338
3:00 PM	31	0	1	1	2	25	176	293	78	9	2	0	0	0	0	0	617	41-50	468
4:00 PM	66	2	0	6	27	104	331	272	49	10	1	0	0	0	0	0	868	41-50	603
5:00 PM	93	1	9	7	28	248	417	142	16	2	0	0	1	0	0	0	964	36-45	665
6:00 PM	62	0	1	3	18	149	324	208	22	2	0	0	0	0	0	0	789	41-50	532
7:00 PM	11	0	3	2	2	28	154	170	56	13	3	0	0	0	0	0	442	41-50	324
8:00 PM	9	0	0	0	1	11	70	81	34	10	2	1	0	0	0	0	219	41-50	150
9:00 PM	2	0	0	0	2	11	38	69	37	4	0	0	0	0	0	0	163	41-50	107
10:00 PM	1	0	0	0	0	6	20	56	30	6	2	2	0	0	0	0	123	46-55	86
11:00 PM	0	0	0	0	0	2	0	8	23	17	5	0	0	0	0	0	55	46-55	40
<b>Day Total</b>	553	3	17	33	162	1028	3304	3245	975	136	27	8	3	2			9486	41-50	6549
<b>Percent</b>	5.8%	0.0%	0.2%	0.3%	1.6%	10.8%	34.8%	34.2%	10.3%	1.4%	0.3%	0.1%	0.0%	0.0%					
<b>ADT</b>																			
<b>AM Peak Volume</b>	7:00 AM	9:00 AM	8:00 AM	9:00 AM	8:00 AM	8:00 AM	8:00 AM	6:00 AM	7:00 AM	3:00 AM	6:00 AM	8:00 AM	8:00 AM						
	75	2	3	19	131	432	328	74	9	3	1	1	1	8:00 AM	1043				
<b>PM Peak Volume</b>	5:00 PM	4:00 PM	5:00 PM	5:00 PM	5:00 PM	5:00 PM	5:00 PM	3:00 PM	1:00 PM	7:00 PM	1:00 PM	10:00 PM	5:00 PM						
	93	2	9	7	28	248	417	293	79	13	4	2	1	5:00 PM	964				

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data Page 2 of 2

**SUMMARY - Tube Count - Speed Data**

<b>LOCATION:</b> Crow Canyon Rd South of Norris Canyon Rd													<b>QC JOB #:</b> 10846407					
<b>SPECIFIC LOCATION:</b> 100 ft from													<b>DIRECTION:</b> NB					
<b>CITY/STATE:</b> San Ramon, CA													<b>DATE:</b> Nov 07 2012 - Nov 07 2012					
<b>Start Time</b>	15	16	20	25	30	35	40	45	50	55	60	65	70	75	999	<b>Total</b>	<b>Pace</b>	<b>Number in Pace</b>
<b>Grand Total</b>	553	3	17	33	152	1028	3304	3245	975	136	27	8	3	2	9486	41-50	6549	
<b>Percent</b>	5.8%	0.0%	0.2%	0.3%	1.6%	10.8%	34.8%	34.2%	10.3%	1.4%	0.3%	0.1%	0.0%	0.0%				
<b>Cumulative Percent</b>	5.8%	5.9%	6.0%	6.4%	8.0%	18.8%	53.7%	87.9%	98.1%	99.6%	99.9%	99.9%	100.0%	100.0%				
<b>ADT</b> 9486															<b>85th Percentile</b> 49 MPH <b>Mean Speed(Average):</b> 42 MPH <b>Median</b> 44 MPH <b>Mode:</b> 43 MPH			
<i>Comments:</i>																		

Report generated on 11/27/2012 12:35 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



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MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data

Page 1 of 2

LOCATION: Crow Canyon Rd South of Norris Canyon Rd														QC JOB #: 10846407																
SPECIFIC LOCATION: 100 ft from														DIRECTION: SB																
CITY/STATE: San Ramon, CA														DATE: Nov 07 2012																
Start Time	15	16	20	21	25	26	30	31	35	36	40	41	45	46	50	51	55	56	60	61	65	66	70	71	75	76	999	Total	Pace	Number
12:00 AM	0	0	0	0	0	0	2	4	7	11	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	41-50	18	
1:00 AM	0	0	0	0	0	0	0	2	7	5	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	41-50	12	
2:00 AM	1	0	0	0	0	0	0	2	7	8	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	41-50	15	
3:00 AM	0	0	0	0	0	1	1	4	8	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	41-50	12	
4:00 AM	1	0	0	0	0	0	0	8	23	16	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56	41-50	39	
5:00 AM	2	0	0	0	0	3	8	50	76	28	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	171	41-50	125	
6:00 AM	14	0	0	0	0	1	35	154	176	61	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	445	41-50	330	
7:00 AM	54	0	0	2	25	140	384	173	24	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	807	41-50	557	
8:00 AM	55	0	0	5	16	92	335	159	18	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	684	41-50	493	
9:00 AM	24	0	0	0	0	75	245	180	21	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	546	41-50	425	
10:00 AM	17	0	0	1	9	49	179	125	23	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	408	41-50	304	
11:00 AM	16	0	0	0	1	22	145	114	25	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	328	41-50	259	
12:00 PM	9	0	0	0	10	42	142	135	21	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	361	41-50	277	
1:00 PM	18	0	0	3	3	58	154	144	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	392	41-50	298	
2:00 PM	25	0	0	0	5	55	174	130	21	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	413	41-50	304	
3:00 PM	40	0	0	5	10	100	271	116	19	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	563	41-50	387	
4:00 PM	87	1	0	9	30	143	318	140	18	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	749	36-45	461	
5:00 PM	90	2	0	6	100	324	341	72	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	942	36-45	665	
6:00 PM	53	0	0	14	42	198	269	66	8	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	656	36-45	466	
7:00 PM	13	0	0	0	5	57	140	98	12	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	328	41-50	238	
8:00 PM	7	0	0	1	2	21	85	69	14	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	203	41-50	154	
9:00 PM	3	0	0	0	3	23	74	74	15	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	198	41-50	148	
10:00 PM	1	0	0	0	1	13	44	44	18	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	123	41-50	88	
11:00 PM	0	0	0	0	0	1	23	23	9	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57	41-50	45	
Day Total	530	3	0	46	269	1473	3575	2162	387	53	4	5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8511	41-50	5736	
Percent	6.2%	0.0%	0.0%	0.5%	3.2%	17.3%	42.0%	25.4%	4.5%	0.6%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ADT	8511																													
AM Peak Volume	8:00 AM	8:00 AM			7:00 AM	7:00 AM	7:00 AM	9:00 AM	6:00 AM	10:00 AM	5:00 AM	7:00 AM					7:00 AM													
	55	5	25	140	384	180	61	5	1	2							807													
PM Peak Volume	5:00 PM	5:00 PM	6:00 PM	5:00 PM	5:00 PM	5:00 PM	1:00 PM	12:00 PM	6:00 PM	6:00 PM	7:00 PM	9:00 PM	2:00 PM					5:00 PM												
	90	2	14	100	324	341	144	21	5	1	1	2	1					942												
Comments:																														

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data Page 2 of 2

**SUMMARY - Tube Count - Speed Data**

<b>LOCATION:</b> Crow Canyon Rd South of Norris Canyon Rd													<b>QC JOB #:</b> 10846407				
<b>SPECIFIC LOCATION:</b> 100 ft from													<b>DIRECTION:</b> SB				
<b>CITY/STATE:</b> San Ramon, CA													<b>DATE:</b> Nov 07 2012 - Nov 07 2012				
<b>Start Time</b>	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	<b>Total</b>	<b>Pace Speed</b>	<b>Number in Pace</b>
<b>Grand Total</b>	530	3	0	46	269	1473	3575	2162	387	53	4	5	2	2	8511	41-50	5736
<b>Percent</b>	6.2%	0.0%	0.0%	0.5%	3.2%	17.3%	42.0%	25.4%	4.5%	0.6%	0.0%	0.1%	0.0%	0.0%			
<b>Cumulative Percent</b>	6.2%	6.3%	6.3%	6.8%	10.0%	27.3%	69.3%	94.7%	99.2%	99.8%	99.9%	100.0%	100.0%	100.0%			
<b>ADT 8511</b>															<b>85th Percentile</b> 48 MPH <b>Mean Speed(Average):</b> 41 MPH		
<i>Comments:</i>															<b>Median</b> 42 MPH <b>Mode:</b> 43 MPH		

Report generated on 11/27/2012 12:35 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



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MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data

Page 1 of 2

LOCATION: Crow Canyon Rd South of Norris Canyon Rd														QC JOB #: 10846407			
SPECIFIC LOCATION: 100 ft from														DIRECTION: NB/SB			
CITY/STATE: San Ramon, CA														DATE: Nov 07 2012			
Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 AM	1	0	0	0	3	4	10	20	9	3	0	0	0	0	50	41-50	30
1:00 AM	0	0	0	0	2	2	14	11	3	3	0	0	0	0	35	41-50	25
2:00 AM	1	0	0	0	0	4	8	12	5	1	0	0	0	0	31	42-51	19
3:00 AM	0	0	0	0	1	2	8	20	7	4	3	0	0	0	45	41-50	28
4:00 AM	1	0	0	0	2	23	35	30	14	3	1	0	0	0	109	41-50	65
5:00 AM	5	0	0	0	3	17	102	112	64	7	2	0	0	0	312	41-50	213
6:00 AM	33	0	0	1	7	51	253	350	135	8	0	1	1	0	840	41-50	603
7:00 AM	129	0	0	4	34	228	786	438	94	12	1	3	0	0	1729	41-50	1223
8:00 AM	109	0	1	8	33	223	767	487	86	10	0	2	0	1	1727	41-50	1254
9:00 AM	59	0	2	3	19	151	458	371	73	10	2	0	1	0	1149	41-50	829
10:00 AM	36	0	0	1	12	82	325	313	62	8	0	0	0	0	839	41-50	637
11:00 AM	29	0	0	1	2	39	224	285	73	8	3	2	0	1	667	41-50	509
12:00 PM	25	0	0	1	11	61	236	303	96	11	2	0	0	0	746	41-50	539
1:00 PM	30	0	0	5	4	77	257	291	91	10	4	0	0	0	769	41-50	548
2:00 PM	56	0	0	1	13	75	294	348	93	8	0	1	0	1	890	41-50	642
3:00 PM	71	0	1	6	12	125	446	409	97	11	2	0	0	0	1180	41-50	854
4:00 PM	153	3	0	15	57	247	649	412	67	12	1	0	0	1	1617	41-50	1061
5:00 PM	183	3	9	13	128	572	758	214	21	4	0	0	1	0	1906	36-45	1329
6:00 PM	115	0	1	17	60	347	593	274	30	7	1	0	0	0	1445	36-45	939
7:00 PM	24	0	3	2	7	85	294	268	68	15	3	1	0	0	770	41-50	562
8:00 PM	16	0	0	1	3	32	155	150	48	13	3	1	0	0	422	41-50	305
9:00 PM	5	0	0	0	5	34	112	143	52	8	0	0	2	0	361	41-50	255
10:00 PM	2	0	0	0	1	19	64	100	48	8	2	2	0	0	246	41-50	164
11:00 PM	0	0	0	0	2	1	31	46	26	5	1	0	0	0	112	41-50	77
Day Total	1083	6	17	79	421	2501	6879	5407	1362	189	31	13	5	4	17997	41-50	12286
Percent	6.0%	0.0%	0.1%	0.4%	2.3%	13.9%	38.2%	30.0%	7.6%	1.1%	0.2%	0.1%	0.0%	0.0%			
ADT	17997																
AM Peak Volume	7:00 AM 129	9:00 AM 2	8:00 AM 8	7:00 AM 34	7:00 AM 228	7:00 AM 786	8:00 AM 487	6:00 AM 135	7:00 AM 12	3:00 AM 3	7:00 AM 3	6:00 AM 1	8:00 AM 1	7:00 AM 1729			
PM Peak Volume	5:00 PM 183	4:00 PM 3	5:00 PM 9	6:00 PM 17	5:00 PM 128	5:00 PM 572	4:00 PM 758	3:00 PM 412	7:00 PM 97	1:00 PM 15	10:00 PM 4	9:00 PM 2	2:00 PM 1	5:00 PM 1906			
Comments:																	

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data Page 2 of 2

**SUMMARY - Tube Count - Speed Data**

<b>LOCATION:</b> Crow Canyon Rd South of Norris Canyon Rd														<b>QC JOB #:</b> 10846407			
<b>SPECIFIC LOCATION:</b> 100 ft from														<b>DIRECTION:</b> NB/SB			
<b>CITY/STATE:</b> San Ramon, CA														<b>DATE:</b> Nov 07 2012 - Nov 07 2012			
<b>Start Time</b>	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	<b>Total</b>	<b>Pace Speed</b>	<b>Number in Pace</b>
<b>Grand Total</b>	1083	6	17	79	421	2501	6879	5407	1362	189	31	13	5	4	17997	41-50	12286
<b>Percent</b>	6.0%	0.0%	0.1%	0.4%	2.3%	13.9%	38.2%	30.0%	7.6%	1.1%	0.2%	0.1%	0.0%	0.0%			
<b>Cumulative Percent</b>	6.0%	6.1%	6.1%	6.6%	8.9%	22.8%	61.0%	91.1%	98.7%	99.7%	99.9%	99.9%	100.0%	100.0%			
<b>ADT 17997</b>															<b>85th Percentile</b> 48 MPH <b>Mean Speed(Average):</b> 41 MPH		
<i>Comments:</i>															<b>Median</b> 43 MPH <b>Mode:</b> 43 MPH		

Report generated on 11/27/2012 12:35 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



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MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data

Page 1 of 2

LOCATION: Crow Canyon Rd further South of Norris Canyon Rd														QC JOB #: 10846408				
SPECIFIC LOCATION: 800 ft from														DIRECTION: NB				
CITY/STATE: San Ramon, CA														DATE: Nov 07 2012				
Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	999	Total	Pace Speed	Number in Pace
12:00 AM	0	0	0	0	1	1	5	5	11	2	0	0	0	0	0	25	47-56	15
1:00 AM	0	0	0	0	0	2	3	7	4	2	0	0	0	0	0	18	46-55	11
2:00 AM	0	0	0	0	0	1	2	2	4	1	0	0	0	0	0	10	46-55	6
3:00 AM	0	0	0	0	0	0	4	9	11	4	1	0	0	0	0	29	46-55	20
4:00 AM	0	0	0	0	0	1	11	22	16	1	2	0	0	0	0	53	46-55	38
5:00 AM	0	0	0	0	0	3	27	65	28	8	2	0	0	0	0	133	46-55	92
6:00 AM	13	0	0	0	2	12	74	186	89	14	0	0	0	0	0	390	46-55	275
7:00 AM	70	0	0	0	5	81	357	285	73	20	4	1	1	0	0	897	41-50	642
8:00 AM	66	0	0	1	8	106	422	368	53	10	5	1	0	0	0	1040	41-50	789
9:00 AM	35	0	2	7	13	83	213	192	65	6	1	0	0	0	0	617	41-50	404
10:00 AM	15	2	4	2	8	50	136	164	45	5	0	0	0	0	0	431	41-50	300
11:00 AM	15	1	1	0	0	16	119	149	30	5	0	0	0	0	0	336	41-50	268
12:00 PM	13	0	4	5	3	22	108	175	57	5	0	0	0	0	0	392	41-50	283
1:00 PM	16	1	8	1	5	24	96	155	70	13	1	0	0	0	0	390	41-50	251
2:00 PM	23	1	1	2	1	52	148	176	74	6	2	0	0	0	0	486	41-50	324
3:00 PM	39	2	3	3	5	41	188	250	68	3	4	0	0	0	0	606	41-50	438
4:00 PM	65	0	1	12	26	81	357	257	55	9	1	1	0	0	0	865	41-50	614
5:00 PM	105	1	6	9	28	211	457	137	24	2	0	0	1	0	0	981	36-45	668
6:00 PM	49	1	1	0	36	170	337	161	22	6	1	1	0	0	0	785	36-45	506
7:00 PM	18	2	2	5	5	42	159	159	64	9	1	1	0	0	0	467	41-50	318
8:00 PM	2	0	0	0	0	3	75	107	35	7	1	1	0	0	0	231	41-50	181
9:00 PM	5	1	0	0	0	6	41	70	34	7	1	0	0	0	0	165	41-50	111
10:00 PM	0	0	0	0	0	1	20	62	33	8	1	0	0	0	0	125	46-55	94
11:00 PM	0	0	0	0	1	2	11	21	17	6	0	0	0	0	0	58	46-55	38
Day Total	549	12	33	47	147	1011	3370	3184	982	159	28	6	2	0	0	9530	41-50	6553
Percent	5.8%	0.1%	0.3%	0.5%	1.5%	10.6%	35.4%	33.4%	10.3%	1.7%	0.3%	0.1%	0.0%	0.0%	0.0%			
ADT 9530																		
AM Peak Volume	7:00 AM	10:00 AM	10:00 AM	9:00 AM	9:00 AM	8:00 AM	8:00 AM	8:00 AM	6:00 AM	7:00 AM	8:00 AM	7:00 AM	7:00 AM			8:00 AM		
	70	2	4	7	13	106	422	368	89	20	5	1	1			1040		
PM Peak Volume	5:00 PM	3:00 PM	1:00 PM	4:00 PM	6:00 PM	5:00 PM	5:00 PM	4:00 PM	2:00 PM	1:00 PM	3:00 PM	4:00 PM	5:00 PM			5:00 PM		
	105	2	8	12	36	211	457	257	74	13	4	1	1			981		

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data Page 2 of 2

**SUMMARY - Tube Count - Speed Data**

<b>LOCATION:</b> Crow Canyon Rd further South of Norris Canyon Rd													<b>QC JOB #:</b> 10846408				
<b>SPECIFIC LOCATION:</b> 800 ft from													<b>DIRECTION:</b> NB				
<b>CITY/STATE:</b> San Ramon, CA													<b>DATE:</b> Nov 07 2012 - Nov 07 2012				
<b>Start Time</b>	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	<b>Total</b>	<b>Pace</b>	<b>Number in Pace</b>
<b>Grand Total</b>	549	12	33	47	147	1011	3370	3184	982	159	28	6	2	0	9530	41-50	6553
<b>Percent</b>	5.8%	0.1%	0.3%	0.5%	1.5%	10.6%	35.4%	33.4%	10.3%	1.7%	0.3%	0.1%	0.0%	0.0%			
<b>Cumulative Percent</b>	5.8%	5.9%	6.2%	6.7%	8.3%	18.9%	54.2%	87.6%	98.0%	99.6%	99.9%	100.0%	100.0%	100.0%			
<b>ADT</b> 9530															<b>85th Percentile</b> 49 MPH <b>Mean Speed(Average):</b> 42 MPH <b>Median</b> 44 MPH <b>Mode:</b> 43 MPH		
<i>Comments:</i>																	

Report generated on 11/27/2012 12:35 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



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MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data

Page 1 of 2

LOCATION: Crow Canyon Rd further South of Norris Canyon Rd															QC JOB #: 10846408															
SPECIFIC LOCATION: 800 ft from															DIRECTION: SB															
CITY/STATE: San Ramon, CA															DATE: Nov 07 2012															
Start Time	15	16	20	21	25	26	30	31	35	36	40	41	45	46	50	51	55	56	60	61	65	66	70	71	75	76	999	Total	Pace	Number in Pace
12:00 AM	1	1	0	0	0	0	0	1	6	10	7	4	1	0	0	0	0	31	46-55	16										
1:00 AM	0	0	0	0	0	0	0	0	6	7	4	2	0	0	0	0	19	43-52	12											
2:00 AM	0	0	0	0	0	0	0	1	5	8	5	1	0	0	0	0	20	42-51	13											
3:00 AM	0	0	0	0	0	1	0	1	5	6	2	0	1	0	0	0	15	42-51	10											
4:00 AM	1	0	0	0	0	0	0	5	16	13	14	2	0	0	0	0	51	41-50	29											
5:00 AM	1	0	0	0	0	1	5	23	70	45	9	2	2	0	0	0	158	46-55	115											
6:00 AM	18	1	0	0	1	12	113	223	69	15	0	0	0	0	0	452	41-50	336												
7:00 AM	67	2	0	0	2	61	377	237	40	7	1	0	0	0	0	794	41-50	614												
8:00 AM	74	1	0	0	9	81	264	256	48	3	0	1	0	0	0	737	41-50	520												
9:00 AM	27	1	0	3	9	54	242	188	28	2	0	0	0	0	0	554	41-50	430												
10:00 AM	20	4	2	1	2	44	173	134	27	4	1	0	0	0	0	412	41-50	307												
11:00 AM	10	1	2	2	5	18	107	142	40	5	0	0	0	0	0	332	41-50	248												
12:00 PM	8	3	2	0	4	29	125	136	51	4	0	0	1	0	0	363	41-50	261												
1:00 PM	17	5	1	1	6	23	144	155	37	2	0	0	0	0	0	391	41-50	299												
2:00 PM	15	2	1	1	3	22	173	160	50	3	2	0	0	0	0	432	41-50	333												
3:00 PM	39	0	1	0	2	47	242	187	26	8	0	0	0	0	0	552	41-50	428												
4:00 PM	69	3	2	4	18	100	276	196	46	2	1	0	0	0	0	717	41-50	472												
5:00 PM	104	1	0	2	54	276	358	164	16	2	1	1	0	0	0	979	36-45	634												
6:00 PM	36	0	0	0	14	161	305	139	29	4	1	0	0	0	0	689	36-45	466												
7:00 PM	11	4	0	0	2	33	130	123	32	3	1	0	0	0	1	340	41-50	253												
8:00 PM	2	0	0	0	3	9	58	92	34	3	1	0	0	0	0	202	41-50	150												
9:00 PM	2	1	1	0	2	12	54	92	34	9	2	0	2	0	0	211	41-50	146												
10:00 PM	0	0	0	0	0	5	37	40	41	2	3	0	0	0	0	128	46-55	80												
11:00 PM	0	0	0	0	1	0	7	19	23	6	0	0	0	0	0	56	46-55	41												
Day Total	522	30	12	15	138	999	3246	2797	748	102	18	4	3	1		8635	41-50	6042												
Percent	6.0%	0.3%	0.1%	0.2%	1.6%	11.6%	37.6%	32.4%	8.7%	1.2%	0.2%	0.0%	0.0%	0.0%																
ADT																														
AM Peak Volume	8:00 AM	10:00 AM	10:00 AM	9:00 AM	8:00 AM	8:00 AM	7:00 AM	8:00 AM	6:00 AM	6:00 AM	5:00 AM	5:00 AM					7:00 AM													
PM Peak Volume	5:00 PM	1:00 PM	12:00 PM	4:00 PM	5:00 PM	5:00 PM	5:00 PM	4:00 PM	12:00 PM	9:00 PM	10:00 PM	5:00 PM	9:00 PM	7:00 PM			5:00 PM													

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data Page 2 of 2

**SUMMARY - Tube Count - Speed Data**

<b>LOCATION:</b> Crow Canyon Rd further South of Norris Canyon Rd													<b>QC JOB #:</b> 10846408				
<b>SPECIFIC LOCATION:</b> 800 ft from													<b>DIRECTION:</b> SB				
<b>CITY/STATE:</b> San Ramon, CA													<b>DATE:</b> Nov 07 2012 - Nov 07 2012				
<b>Start Time</b>	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	<b>Total</b>	<b>Pace Speed</b>	<b>Number in Pace</b>
<b>Grand Total</b>	522	30	12	15	138	999	3246	2797	748	102	18	4	3	1	8635	41-50	6042
<b>Percent</b>	6.0%	0.3%	0.1%	0.2%	1.6%	11.6%	37.6%	32.4%	8.7%	1.2%	0.2%	0.0%	0.0%	0.0%			
<b>Cumulative Percent</b>	6.0%	6.4%	6.5%	6.7%	8.3%	19.9%	57.5%	89.9%	98.5%	99.7%	99.9%	100.0%	100.0%	100.0%			
<b>ADT</b> 8635															<b>85th Percentile</b> 49 MPH <b>Mean Speed(Average):</b> 42 MPH <b>Median</b> 44 MPH <b>Mode:</b> 43 MPH		
<i>Comments:</i>																	

Report generated on 11/27/2012 12:35 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



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MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data

Page 1 of 2

LOCATION: Crow Canyon Rd further South of Norris Canyon Rd														QC JOB #: 10846408																
SPECIFIC LOCATION: 800 ft from														DIRECTION: NB/SB																
CITY/STATE: San Ramon, CA														DATE: Nov 07 2012																
Start Time	15	16	20	21	25	26	30	31	35	36	40	41	45	46	50	51	55	56	60	61	65	66	70	71	75	76	999	Total	Pace Speed	Number in Pace
12:00 AM	1	1	0	0	0	1	2	11	15	18	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56	46-55	33	
1:00 AM	0	0	0	0	0	0	2	9	14	8	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	46-55	22	
2:00 AM	0	0	0	0	0	0	2	7	10	9	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	46-55	19	
3:00 AM	0	0	0	0	0	1	0	9	15	13	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	46-55	28	
4:00 AM	1	0	0	0	0	0	6	27	35	30	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104	46-55	65	
5:00 AM	1	0	0	0	0	1	8	50	135	73	17	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	291	46-55	208	
6:00 AM	31	1	0	0	0	3	24	187	409	158	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	842	41-50	595	
7:00 AM	137	2	0	0	0	7	142	734	522	113	27	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1691	41-50	1256	
8:00 AM	140	1	0	1	17	187	686	624	101	13	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1777	41-50	1310	
9:00 AM	62	1	2	10	22	137	455	380	93	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1171	41-50	835	
10:00 AM	35	6	6	3	10	94	309	298	72	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	843	41-50	607	
11:00 AM	25	2	3	2	5	34	226	291	70	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	668	41-50	517	
12:00 PM	21	3	6	5	7	51	233	311	108	9	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	755	41-50	544	
1:00 PM	33	6	9	2	11	47	240	310	107	15	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	781	41-50	550	
2:00 PM	38	3	2	3	4	74	321	336	124	9	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	918	41-50	657	
3:00 PM	76	2	4	3	7	88	430	437	94	11	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1158	41-50	867	
4:00 PM	134	3	3	16	44	181	633	453	101	11	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1582	41-50	1085	
5:00 PM	209	2	6	11	82	487	815	301	40	4	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1960	36-45	1302	
6:00 PM	85	1	1	0	50	331	642	300	51	10	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1474	36-45	973	
7:00 PM	29	6	2	5	7	75	289	282	96	12	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	807	41-50	571	
8:00 PM	4	0	0	0	3	12	133	199	69	10	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	433	41-50	332	
9:00 PM	7	2	1	0	2	18	95	162	68	16	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	376	41-50	257	
10:00 PM	0	0	0	0	0	6	57	102	74	10	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	253	46-55	176	
11:00 PM	0	0	0	0	1	1	2	18	40	40	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	114	46-55	80	
Day Total	1071	42	45	62	285	2010	6616	5981	1730	261	46	10	5	1	0	0	0	0	0	0	0	0	0	0	0	0	18165	41-50	12597	
Percent	5.9%	0.2%	0.2%	0.3%	1.6%	11.1%	36.4%	32.9%	9.5%	1.4%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ADT	18165																													
AM Peak Volume	8:00 AM	10:00 AM	10:00 AM	9:00 AM	9:00 AM	8:00 AM	7:00 AM	8:00 AM	6:00 AM	6:00 AM	7:00 AM	5:00 AM	7:00 AM	8:00 AM	1777															
PM Peak Volume	5:00 PM	1:00 PM	1:00 PM	4:00 PM	5:00 PM	5:00 PM	5:00 PM	4:00 PM	2:00 PM	9:00 PM	2:00 PM	4:00 PM	9:00 PM	7:00 PM	1960															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data Page 2 of 2

**SUMMARY - Tube Count - Speed Data**

<b>LOCATION:</b> Crow Canyon Rd further South of Norris Canyon Rd													<b>QC JOB #:</b> 10846408				
<b>SPECIFIC LOCATION:</b> 800 ft from													<b>DIRECTION:</b> NB/SB				
<b>CITY/STATE:</b> San Ramon, CA													<b>DATE:</b> Nov 07 2012 - Nov 07 2012				
<b>Start Time</b>	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	<b>Total</b>	<b>Pace Speed</b>	<b>Number in Pace</b>
<b>Grand Total</b>	1071	42	45	62	285	2010	6616	5981	1730	261	46	10	5	1	18165	41-50	12597
<b>Percent</b>	5.9%	0.2%	0.2%	0.3%	1.6%	11.1%	36.4%	32.9%	9.5%	1.4%	0.3%	0.1%	0.0%	0.0%			
<b>Cumulative Percent</b>	5.9%	6.1%	6.4%	6.7%	8.3%	19.4%	55.8%	88.7%	98.2%	99.7%	99.9%	100.0%	100.0%	100.0%			
<b>ADT 18165</b>															<b>85th Percentile</b> 49 MPH <b>Mean Speed(Average):</b> 42 MPH <b>Median</b> 44 MPH <b>Mode:</b> 43 MPH		
<i>Comments:</i>																	

Report generated on 11/27/2012 12:35 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



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MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data

Page 1 of 2

LOCATION: Crow Canyon Rd South of Cold Water Dr														QC JOB #: 10846409																
SPECIFIC LOCATION: 100 ft from														DIRECTION: NB																
CITY/STATE: Castro Valley, CA														DATE: Nov 07 2012																
Start Time	15	16	20	21	25	26	30	31	35	36	40	41	45	46	50	51	55	56	60	61	65	66	70	71	75	76	999	Total	Pace Speed	Number in Pace
12:00 AM	1	0	0	0	7	14	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	26-35	21	
1:00 AM	0	0	0	0	9	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	26-35	15	
2:00 AM	0	0	0	0	5	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	26-35	9	
3:00 AM	0	0	0	0	6	11	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	31-40	24	
4:00 AM	0	0	1	13	35	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	26-35	48	
5:00 AM	3	0	0	27	87	27	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	146	31-40	114	
6:00 AM	14	0	2	77	244	44	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	382	26-35	321	
7:00 AM	57	9	62	236	228	33	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	626	26-35	464	
8:00 AM	63	5	101	313	237	30	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	752	26-35	550	
9:00 AM	38	8	18	186	220	37	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	508	26-35	406	
10:00 AM	14	3	10	137	243	37	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	449	26-35	380	
11:00 AM	15	2	3	119	172	25	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	338	26-35	290	
12:00 PM	8	0	5	131	221	27	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	394	26-35	352	
1:00 PM	11	0	1	129	234	44	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	420	26-35	362	
2:00 PM	19	0	9	157	259	24	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	472	26-35	415	
3:00 PM	24	2	22	190	338	37	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	615	26-35	528	
4:00 PM	56	6	67	304	290	27	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	693	26-35	534	
5:00 PM	81	3	102	214	112	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	521	26-35	325	
6:00 PM	50	3	47	310	189	11	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	616	26-35	498	
7:00 PM	13	4	19	195	190	21	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	443	26-35	385	
8:00 PM	7	0	6	81	134	28	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	261	26-35	215	
9:00 PM	2	0	4	65	108	16	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	196	26-35	173	
10:00 PM	0	0	1	30	76	23	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	131	26-35	105	
11:00 PM	0	0	1	15	38	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61	26-35	52	
Day Total	478	45	481	2956	3631	527	36	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8161	26-35	6587	
Percent	5.9%	0.6%	5.9%	36.2%	44.5%	6.5%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ADT	8161																													
AM Peak Volume	8:00 AM	7:00 AM	8:00 AM	8:00 AM	6:00 AM	6:00 AM	10:00 AM	2:00 AM																			8:00 AM	752		
PM Peak Volume	5:00 PM	4:00 PM	5:00 PM	6:00 PM	3:00 PM	1:00 PM	6:00 PM	8:00 PM																			4:00 PM	693		
Comments:																														

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data Page 2 of 2

**SUMMARY - Tube Count - Speed Data**

<b>LOCATION:</b> Crow Canyon Rd South of Cold Water Dr <b>SPECIFIC LOCATION:</b> 100 ft from <b>CITY/STATE:</b> Castro Valley, CA													<b>QC JOB #:</b> 10846409 <b>DIRECTION:</b> NB <b>DATE:</b> Nov 07 2012 - Nov 07 2012				
Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
<b>Grand Total</b>	478	45	481	2956	3631	527	36	7	0	0	0	0	0	0	8161	26-35	6587
<b>Percent</b>	5.9%	0.6%	5.9%	36.2%	44.5%	6.5%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
<b>Cumulative Percent</b>	5.9%	6.4%	12.3%	48.5%	93.0%	99.5%	99.9%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%			
<b>ADT</b> 8161														<b>85th Percentile</b> 34 MPH <b>Mean Speed(Average)</b> 26 MPH <b>Median</b> 30 MPH <b>Mode</b> 33 MPH			
<i>Comments:</i>																	

Report generated on 11/27/2012 12:35 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



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MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data

Page 1 of 2

LOCATION: Crow Canyon Rd South of Cold Water Dr														QC JOB #: 10846409						
SPECIFIC LOCATION: 100 ft from														DIRECTION: SB						
CITY/STATE: Castro Valley, CA														DATE: Nov 07 2012						
Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace			
12:00 AM	0	0	2	13	10	5	1	0	0	0	0	0	0	0	31	26-35	23			
1:00 AM	0	0	1	8	9	1	0	0	0	0	0	0	0	0	19	26-35	17			
2:00 AM	0	0	0	7	11	2	0	0	0	0	0	0	0	0	20	26-35	18			
3:00 AM	0	0	2	8	4	1	0	0	0	0	0	0	0	0	15	26-35	12			
4:00 AM	0	0	1	25	30	1	0	0	0	0	0	0	0	0	57	26-35	55			
5:00 AM	3	0	3	81	79	9	0	0	0	0	0	0	0	0	175	26-35	160			
6:00 AM	18	0	9	197	233	11	0	1	0	0	0	0	0	0	469	26-35	430			
7:00 AM	53	1	10	400	227	4	1	0	0	0	0	0	0	0	696	26-35	627			
8:00 AM	67	0	16	318	169	4	0	0	0	0	0	0	0	0	574	26-35	486			
9:00 AM	32	2	18	355	142	1	0	1	0	0	0	0	0	0	551	26-35	496			
10:00 AM	11	0	28	276	100	3	0	0	0	0	0	0	0	0	418	26-35	376			
11:00 AM	16	0	20	202	132	3	0	1	0	0	0	0	0	0	374	26-35	333			
12:00 PM	18	0	41	222	96	3	0	0	0	0	0	0	0	0	380	26-35	318			
1:00 PM	14	0	44	244	116	3	0	0	0	0	0	0	0	0	421	26-35	360			
2:00 PM	29	0	31	235	110	2	1	0	0	0	0	0	0	0	408	26-35	345			
3:00 PM	51	1	45	291	133	4	0	0	0	0	0	0	0	0	525	26-35	424			
4:00 PM	45	2	46	345	97	3	0	0	0	0	0	0	0	0	538	26-35	441			
5:00 PM	77	4	131	419	31	0	0	0	0	0	0	0	0	0	662	21-30	550			
6:00 PM	37	1	84	367	43	2	0	0	0	0	0	0	0	0	534	21-30	450			
7:00 PM	17	4	35	213	69	3	0	0	0	0	0	0	0	0	341	26-35	282			
8:00 PM	5	0	7	132	50	3	0	0	0	0	0	0	0	0	197	26-35	182			
9:00 PM	4	3	8	123	66	7	0	1	0	0	0	0	0	0	212	26-35	188			
10:00 PM	0	0	16	60	56	3	0	0	0	0	0	0	0	0	135	26-35	115			
11:00 PM	0	0	0	20	32	3	0	0	0	0	0	0	0	0	55	26-35	52			
Day Total	497	18	598	4561	2045	81	3	4	0	0	0	0	0	0	7807	26-35	6606			
Percent	6.4%	0.2%	7.7%	58.4%	26.2%	1.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%						
ADT	7807																			
AM Peak Volume	8:00 AM 67	9:00 AM 2	10:00 AM 28	7:00 AM 400	6:00 AM 233	6:00 AM 11	12:00 AM 1	6:00 AM 1										7:00 AM 696		
PM Peak Volume	5:00 PM 77	5:00 PM 4	5:00 PM 131	5:00 PM 419	3:00 PM 133	9:00 PM 7	2:00 PM 1	9:00 PM 1										5:00 PM 662		
Comments:																				

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data Page 2 of 2

**SUMMARY - Tube Count - Speed Data**

<b>LOCATION:</b> Crow Canyon Rd South of Cold Water Dr														<b>QC JOB #:</b> 10846409			
<b>SPECIFIC LOCATION:</b> 100 ft from														<b>DIRECTION:</b> SB			
<b>CITY/STATE:</b> Castro Valley, CA														<b>DATE:</b> Nov 07 2012 - Nov 07 2012			
<b>Start Time</b>	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	<b>Total</b>	<b>Pace</b>	<b>Number</b>
<b>Grand Total</b>	497	18	598	4561	2045	81	3	4	0	0	0	0	0	0	7807	26-35	6606
<b>Percent</b>	6.4%	0.2%	7.7%	58.4%	26.2%	1.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
<b>Cumulative Percent</b>	6.4%	6.6%	14.3%	72.7%	98.9%	99.9%	99.9%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%			
<b>ADT</b> 7807															<b>85th Percentile</b> 32 MPH <b>Mean Speed(Average)</b> 27 MPH <b>Median</b> 26 MPH <b>Mode</b> 26 MPH		
<i>Comments:</i>																	

Report generated on 11/27/2012 12:35 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



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MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data

Page 1 of 2

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace			
12:00 AM	1	0	2	20	24	6	2	0	0	0	0	0	0	0	55	26-35	43			
1:00 AM	0	0	1	17	16	3	0	0	0	0	0	0	0	0	37	26-35	33			
2:00 AM	0	0	0	12	15	2	0	1	0	0	0	0	0	0	30	26-35	27			
3:00 AM	0	0	2	14	15	14	0	0	0	0	0	0	0	0	45	26-35	29			
4:00 AM	0	0	2	38	65	6	1	0	0	0	0	0	0	0	112	26-35	103			
5:00 AM	6	0	3	108	166	36	2	0	0	0	0	0	0	0	321	26-35	274			
6:00 AM	32	0	11	274	477	55	1	1	0	0	0	0	0	0	851	26-35	751			
7:00 AM	110	10	72	636	455	37	2	0	0	0	0	0	0	0	1322	26-35	1091			
8:00 AM	130	5	117	631	406	34	3	0	0	0	0	0	0	0	1326	26-35	1037			
9:00 AM	70	10	36	541	362	38	1	1	0	0	0	0	0	0	1059	26-35	903			
10:00 AM	25	3	38	413	343	40	4	1	0	0	0	0	0	0	867	26-35	755			
11:00 AM	31	2	23	321	304	28	2	1	0	0	0	0	0	0	712	26-35	624			
12:00 PM	26	0	46	353	317	30	1	1	0	0	0	0	0	0	774	26-35	670			
1:00 PM	25	0	45	373	350	47	1	0	0	0	0	0	0	0	841	26-35	723			
2:00 PM	48	0	40	392	369	26	5	0	0	0	0	0	0	0	880	26-35	760			
3:00 PM	75	3	67	481	471	41	2	0	0	0	0	0	0	0	1140	26-35	952			
4:00 PM	103	8	113	649	327	80	1	0	0	0	0	0	0	0	1231	26-35	976			
5:00 PM	158	7	233	633	143	8	1	0	0	0	0	0	0	0	1183	21-30	865			
6:00 PM	87	4	131	677	232	13	5	1	0	0	0	0	0	0	1150	26-35	909			
7:00 PM	30	8	54	408	259	24	1	0	0	0	0	0	0	0	784	26-35	666			
8:00 PM	12	0	13	213	184	31	2	3	0	0	0	0	0	0	458	26-35	396			
9:00 PM	6	3	12	188	174	23	1	1	0	0	0	0	0	0	408	26-35	361			
10:00 PM	0	0	17	90	132	26	1	0	0	0	0	0	0	0	266	26-35	221			
11:00 PM	0	0	1	35	70	10	0	0	0	0	0	0	0	0	116	26-35	105			
Day Total	975	63	1079	7517	5676	608	39	11	0	0	0	0	0	0	15968	26-35	13193			
Percent	6.1%	0.4%	6.8%	47.1%	35.5%	3.8%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%						
ADT	15968																			
AM Peak	8:00 AM	7:00 AM	8:00 AM	7:00 AM	6:00 AM	6:00 AM	10:00 AM	2:00 AM										8:00 AM		
Volume	130	10	117	636	477	55	4	1										1326		
PM Peak	5:00 PM	4:00 PM	5:00 PM	6:00 PM	3:00 PM	1:00 PM	2:00 PM	8:00 PM									4:00 PM			
Volume	158	8	233	677	471	47	5	3									1231			
Comments:																				

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Speed Data Page 2 of 2

**SUMMARY - Tube Count - Speed Data**

<b>LOCATION:</b> Crow Canyon Rd South of Cold Water Dr													<b>QC JOB #:</b> 10846409					
<b>SPECIFIC LOCATION:</b> 100 ft from													<b>DIRECTION:</b> NB/SB					
<b>CITY/STATE:</b> Castro Valley, CA													<b>DATE:</b> Nov 07 2012 - Nov 07 2012					
<b>Start Time</b>	<b>1</b>	<b>16</b>	<b>21</b>	<b>26</b>	<b>31</b>	<b>36</b>	<b>41</b>	<b>46</b>	<b>51</b>	<b>56</b>	<b>61</b>	<b>66</b>	<b>71</b>	<b>76</b>	<b>999</b>	<b>Total</b>	<b>Pace</b>	<b>Number</b>
	<b>15</b>	<b>20</b>	<b>25</b>	<b>30</b>	<b>35</b>	<b>40</b>	<b>45</b>	<b>50</b>	<b>55</b>	<b>60</b>	<b>65</b>	<b>70</b>	<b>75</b>	<b>999</b>				
<b>Grand Total</b>	975	63	1079	7517	5676	608	39	11	0	0	0	0	0	0	15968	26-35	13193	
<b>Percent</b>	6.1%	0.4%	6.8%	47.1%	35.5%	3.8%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				
<b>Cumulative</b>																		
<b>Percent</b>	6.1%	6.5%	13.3%	60.3%	95.9%	99.7%	99.9%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%				
<b>ADT</b>															<b>85th Percentile</b> 33 MPH <b>Mean Speed(Average)</b> 26 MPH <b>Median</b> 26 MPH <b>Mode</b> 26 MPH			
<i>Comments:</i>																		

Report generated on 11/27/2012 12:35 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



DRAFT

**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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DR

**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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**Appendix D – Travel Time**

7-9 NB CC

TJKM Transportation Consultants

Field Data Analysis: Speed and Delay Before (Flooding) Car Study

Alameda County Project # 260-026 Task 2 Run # 1  
 Route: Crow Canyon Road From: Greenridge Road To: Alameda County Line  
 Day: Wednesday Date: 12/5/12 Time: 7:40AM Direction: NB

Segment	Miles	Minutes	Seconds (s)	Total Time (s)	Stop Time (s)	Average Speed (mph)	Free Speed (mph)
1	0.52		55	55	0	34.04	34.04
2	0.81		74	74	0	39.41	39.41
3	1.17		99	99	0	42.52	42.52
4	1.11		73	73	0	54.74	54.74
5	2.27		220	220	0	37.15	37.15
<b>TOTALS</b>	<b>5.88</b>	<b>0</b>	<b>521</b>	<b>521</b>	<b>0</b>	<b>40.63</b>	<b>40.63</b>

1770.00  
 1490.00  
 1375.00  
 1070.00  
 555.00

- Segment 1 TO COLDWATER DRIVE
- Segment 2 TO HH-328
- Segment 3 TO NORRIS CANYON ROAD
- Segment 4 TO HH-445
- Segment 5 TO ALAMEDA/COUNTY LINE

Field Data Analysis: Speed and Delay Before (Flooding) Car Study

Alameda County Project # 260-026 Task 2 Run # 2  
 Route: Crow Canyon Road From: Greenridge Road To: Alameda County Line  
 Day: Wednesday Date: 12/5/12 Time: 8:27am Direction: NB

Segment	Miles	Minutes	Seconds (s)	Total Time (s)	Stop Time (s)	Average Speed (mph)	Free Speed (mph)
1	0.52		57	57	0	32.84	32.84
2	0.81		76	76	0	38.37	38.37
3	1.17		104	122	18	34.52	40.50
4	1.11		71	71	0	56.28	56.28
5	2.27		188	188	0	41.97	41.97
<b>TOTALS</b>	<b>5.88</b>	<b>0</b>	<b>496</b>	<b>514</b>	<b>18</b>	<b>41.12</b>	<b>41.68</b>

1770.00  
 1490.00  
 1375.00  
 1070.00  
 555.00

- Segment 1 TO COLDWATER DRIVE
- Segment 2 TO HH-328
- Segment 3 TO NORRIS CANYON ROAD
- Segment 4 TO HH-445
- Segment 5 TO ALAMEDA/COUNTY LINE

7-9 SB CC

TJKM Transportation Consultants

Field Data Analysis: Speed and Delay Before (Floating Car Study)

**Alameda County** **Project # 260-026 Task 2** **Run # 1**  
 Route: Crow Canyon Road From: Alameda County Line To: Greenridge Road  
 Day: Wednesday Date: 12/5/12 Time: 7:51AM Direction: SB

Segment	Miles	Minutes	Seconds (s)	Total Time (s)	Stop Time (s)	Average Speed (mph)	Free Speed (mph)
1	2.27		292	292	0	40.44	40.44
2	1.11		74	74	0	54.00	54.00
3	1.17		98	98	0	42.80	42.80
4	0.81		67	60	13	36.45	42.52
5	0.52		54	54	0	34.67	34.67
<b>TOTALS</b>	<b>5.88</b>	<b>0</b>	<b>495</b>	<b>508</b>	<b>13</b>	<b>41.67</b>	<b>42.76</b>

1770.00  
 1490.00  
 1375.00  
 1070.00  
 555.00

- Segment 1 TO HH 445
- Segment 2 TO NOBIS CANYON ROAD
- Segment 3 TO HH 325
- Segment 4 TO COLDWATER DRIVE
- Segment 5 TO GREENRIDGE ROAD

Field Data Analysis: Speed and Delay Before (Floating Car Study)

**Alameda County** **Project # 260-026 Task 2** **Run # 2**  
 Route: Crow Canyon Road From: Alameda County Line To: Greenridge Road  
 Day: Wednesday Date: 12/5/12 Time: 8:57am Direction: SB

Segment	Miles	Minutes	Seconds (s)	Total Time (s)	Stop Time (s)	Average Speed (mph)	Free Speed (mph)
1	2.27		186	186	0	43.94	43.94
2	1.11		73	73	0	54.74	54.74
3	1.17		111	111	0	37.95	37.95
4	0.81		81	81	0	35.13	35.13
5	0.52		54	54	0	34.67	34.67
<b>TOTALS</b>	<b>5.88</b>	<b>0</b>	<b>507</b>	<b>507</b>	<b>0</b>	<b>41.75</b>	<b>41.75</b>

1770.00  
 1490.00  
 1375.00  
 1070.00  
 555.00

- Segment 1 TO HH 445
- Segment 2 TO NOBIS CANYON ROAD
- Segment 3 TO HH 325
- Segment 4 TO COLDWATER DRIVE
- Segment 5 TO GREENRIDGE ROAD

**Crow Canyon Road**  
 NORTHBOUND AM Peak Travel Time Run 1 7:40AM

Intersection	Arrive			Depart			Stop	Segment	Total	Notes
	Min	Sec	Time(sec)	Min	Sec	Time(sec)				
Greenridge Road	0	0	0	0	0	0	0	0	0	
Coldwater Drive	0	55	55	0	55	55	0	55	55	
MM 2.25	2	9	129	2	8	129	0	74	129	
North Canyon Road	3	48	228	3	48	228	0	89	228	
MM 4.45	5	1	301	5	1	301	0	73	301	
Alameda County Line	8	41	521	8	41	521	0	220	521	

**Crow Canyon Road**  
 SOUTHBOUND AM Peak Travel Time Run 1 7:51AM

Intersection	Arrive			Depart			Stop	Segment	Total	Notes
	Min	Sec	Time(sec)	Min	Sec	Time(sec)				
Alameda County Line	0	0	0	0	0	0	0	0	0	
MM 4.45	3	22	202	3	22	202	0	92	202	
North Canyon Road	4	36	216	4	36	216	0	74	216	
MM 2.25	6	14	374	6	14	374	0	98	374	
Coldwater Drive	7	21	441	7	34	454	13	87	454	
Greenridge Road	8	28	503	8	28	503	0	54	503	

**Crow Canyon Road**  
 NORTHBOUND AM Peak Travel Time Run 2 8:27am

Intersection	Arrive			Depart			Stop	Segment	Total	Notes
	Min	Sec	Time(sec)	Min	Sec	Time(sec)				
Greenridge Road	0	0	0	0	0	0	0	0	0	
Coldwater Drive	0	57	57	0	57	57	0	57	57	
MM 2.25	2	13	133	2	13	133	0	26	133	
North Canyon Road	3	57	237	4	19	258	11	104	258	
MM 4.45	5	26	326	5	26	326	0	71	326	
Alameda County Line	8	34	514	8	34	514	0	183	514	

**Crow Canyon Road**  
 SOUTHBOUND AM Peak Travel Time Run 2 8:37am

Intersection	Arrive			Depart			Stop	Segment	Total	Notes
	Min	Sec	Time(sec)	Min	Sec	Time(sec)				
Alameda County Line	0	0	0	0	0	0	0	0	0	
MM 4.45	3	6	186	3	6	186	0	166	186	
North Canyon Road	4	19	259	4	19	259	0	53	259	
MM 2.25	6	10	370	6	10	370	0	111	370	
Coldwater Drive	7	33	453	7	33	453	0	83	453	
Greenridge Road	8	27	507	8	27	507	0	64	507	



11-1 NB CC

TJKM Transportation Consultants

Field Data Analysis: Speed and Delay Before (Floating Car Study)

Alameda County Project # 260-026 Task 2 Run # 1  
 Route: Crow Canyon Road From: Greenridge Road To: Alameda County Line  
 Day: Wednesday Date: 12/5/12 Time: 1:03pm Direction: NB

Segment	Miles	Minutes	Seconds (s)	Total Time (s)	Stop Time (s)	Average Speed (mph)	Free Speed (mph)
1	0.52		50	50	0	37.44	37.44
2	0.81		71	71	0	41.02	41.02
3	1.12		112	112	0	37.61	37.61
4	1.11		66	66	0	60.55	60.55
5	2.27		208	208	0	39.29	39.29
<b>TOTALS</b>	<b>5.83</b>	<b>0</b>	<b>507</b>	<b>507</b>	<b>0</b>	<b>41.75</b>	<b>41.75</b>

1770.00  
 1490.00  
 1375.00  
 1070.00  
 555.00

- Segment 1 TO COLDWATER DRIVE
- Segment 2 TO HH-328
- Segment 3 TO NORRIS CANYON ROAD
- Segment 4 TO HH-445
- Segment 5 TO ALAMEDA/COUNTY LINE

Field Data Analysis: Speed and Delay Before (Floating Car Study)

Alameda County Project # 260-026 Task 2 Run # 2  
 Route: Crow Canyon Road From: Greenridge Road To: Alameda County Line  
 Day: Wednesday Date: 12/5/12 Time: 12:50PM Direction: NB

Segment	Miles	Minutes	Seconds (s)	Total Time (s)	Stop Time (s)	Average Speed (mph)	Free Speed (mph)
1	0.52		48	48	0	39.00	39.00
2	0.81		77	77	0	37.87	37.87
3	1.12		94	94	0	44.81	44.81
4	1.11		66	66	0	60.55	60.55
5	2.27		190	190	0	43.01	43.01
<b>TOTALS</b>	<b>5.83</b>	<b>0</b>	<b>475</b>	<b>475</b>	<b>0</b>	<b>44.56</b>	<b>44.56</b>

1770.00  
 1490.00  
 1375.00  
 1070.00  
 555.00

- Segment 1 TO COLDWATER DRIVE
- Segment 2 TO HH-328
- Segment 3 TO NORRIS CANYON ROAD
- Segment 4 TO HH-445
- Segment 5 TO ALAMEDA/COUNTY LINE



11-1 SB CC

TJKM Transportation Consultants

Field Data Analysis: Speed and Delay Before (Floating Car Study)

**Alameda County** Project # 260-026 Task 2 Run # 1  
 Route: Crow Canyon Road From: Alameda County Line To: Greenridge Road  
 Day: Wednesday Date: 12/5/12 Time: 10:41am Direction: SB

Segment	Miles	Minutes	Seconds (s)	Total Time (s)	Stop Time (s)	Average Speed (mph)	Free Speed (mph)
1	0.227		86	186	0	43.94	47.94
2	1.11		77	77	0	51.30	51.50
3	1.17		51	51	0	46.29	49.09
4	0.81		64	64	0	45.56	45.56
5	0.52		45	45	0	41.60	41.60
<b>TOTALS</b>	<b>3.88</b>	<b>0</b>	<b>463</b>	<b>463</b>	<b>0</b>	<b>45.72</b>	<b>45.72</b>

1770.00  
 1490.00  
 1375.00  
 1070.00  
 555.00

- Segment 1 TO HH 445
- Segment 2 TO NOBIS CANYON ROAD
- Segment 3 TO HH 325
- Segment 4 TO COLDWATER DRIVE
- Segment 5 TO GREENRIDGE ROAD

Field Data Analysis: Speed and Delay Before (Floating Car Study)

**Alameda County** Project # 260-026 Task 2 Run # 2  
 Route: Crow Canyon Road From: Alameda County Line To: Greenridge Road  
 Day: Wednesday Date: 12/5/12 Time: 1:00pm Direction: SB

Segment	Miles	Minutes	Seconds (s)	Total Time (s)	Stop Time (s)	Average Speed (mph)	Free Speed (mph)
1	0.227		192	192	0	42.56	42.56
2	1.11		72	72	0	55.50	55.50
3	1.17		89	89	0	47.33	47.33
4	0.81		62	62	0	47.03	47.03
5	0.52		47	47	0	35.80	39.83
<b>TOTALS</b>	<b>3.88</b>	<b>0</b>	<b>462</b>	<b>462</b>	<b>0</b>	<b>45.82</b>	<b>45.82</b>

1770.00  
 1490.00  
 1375.00  
 1070.00  
 555.00

- Segment 1 TO HH 445
- Segment 2 TO NOBIS CANYON ROAD
- Segment 3 TO HH 325
- Segment 4 TO COLDWATER DRIVE
- Segment 5 TO GREENRIDGE ROAD

**Crow Canyon Road**  
 MD Peak Travel Time Run 1 10:30am

Intersection	Arrive			Depart			Stop	Segment	Total		Notes
	Min	Sec	Time(sec)	Min	Sec	Time(sec)			Time	Time	
Greenridge Road	0	0	0	0	0	0	0	0	0	0	
Cookwater Drive	0	50	50	0	50	50	0	50	50	50	
MM 2.25	2	1	121	2	1	121	0	71	121	121	
North Canyon Road	3	53	233	3	53	233	0	112	233	233	
MM 4.45	4	55	259	4	55	259	0	56	259	259	
Alameda County Line	8	27	507	8	27	507	0	293	507	507	

**Crow Canyon Road**  
 MD Peak Travel Time Run 1 10:41am

Intersection	Arrive			Depart			Stop	Segment	Total		Notes
	Min	Sec	Time(sec)	Min	Sec	Time(sec)			Time	Time	
Alameda County Line	0	0	0	0	0	0	0	0	0	0	
MM 4.45	3	6	186	3	6	186	0	166	186	186	
North Canyon Road	4	22	252	4	22	252	0	77	252	252	
MM 2.25	5	54	354	5	54	354	0	91	354	354	
Cookwater Drive	6	58	418	6	58	418	0	64	418	418	
Greenridge Road	7	43	463	7	43	463	0	45	463	463	

**Crow Canyon Road**  
 MD Peak Travel Time Run 2 12:50PM

Intersection	Arrive			Depart			Stop	Segment	Total		Notes
	Min	Sec	Time(sec)	Min	Sec	Time(sec)			Time	Time	
Greenridge Road	0	0	0	0	0	0	0	0	0	0	
Cookwater Drive	0	45	45	0	45	45	0	45	45	45	
MM 2.25	2	5	125	2	5	125	0	77	125	125	
North Canyon Road	3	39	219	3	39	219	0	64	219	219	
MM 4.45	4	45	255	4	45	255	0	56	255	255	
Alameda County Line	7	55	475	7	55	475	0	199	475	475	

**Crow Canyon Road**  
 MD Peak Travel Time Run 2 1:33pm

Intersection	Arrive			Depart			Stop	Segment	Total		Notes
	Min	Sec	Time(sec)	Min	Sec	Time(sec)			Time	Time	
Alameda County Line	0	0	0	0	0	0	0	0	0	0	
MM 4.45	3	12	192	3	12	192	0	192	192	192	
North Canyon Road	4	24	264	4	24	264	0	72	264	264	
MM 2.25	5	53	353	5	53	353	0	89	353	353	
Cookwater Drive	6	55	415	6	55	415	0	62	415	415	
Greenridge Road	7	42	462	7	42	462	0	47	462	462	



4-6 NB CC

TJKM Transportation Consultants

Field Data Analysis: Speed and Delay Before (Floating Car Study)

Alameda County Project # 260-026 Task 2 Run # 1  
 Route: Crow Canyon Road From: Greenridge Road To: Alameda County Line  
 Day: Wednesday Date: 12/5/12 Time: 4:13pm Direction: NB

Segment	Miles	Minutes	Seconds (s)	Total Time (s)	Stop Time (s)	Average Speed (mph)	Free Speed (mph)
1	0.52		49	49	0	38.29	38.29
2	0.81		64	64	0	45.56	45.56
3	1.17		91	91	0	45.29	45.29
4	1.11		66	66	0	60.55	60.55
5	2.27		190	190	0	43.01	43.01
<b>TOTALS</b>	<b>5.88</b>	<b>0</b>	<b>462</b>	<b>462</b>	<b>0</b>	<b>45.82</b>	<b>45.82</b>

1770.00  
 1490.00  
 1375.00  
 1070.00  
 565.00

- Segment 1 TO COLDWATER DRIVE
- Segment 2 TO HH-328
- Segment 3 TO NORRIS CANYON ROAD
- Segment 4 TO HH-445
- Segment 5 TO ALAMEDA/COUNTY LINE

Field Data Analysis: Speed and Delay Before (Floating Car Study)

Alameda County Project # 260-026 Task 2 Run # 2  
 Route: Crow Canyon Road From: Greenridge Road To: Alameda County Line  
 Day: Wednesday Date: 12/5/12 Time: 5:21pm Direction: NB

Segment	Miles	Minutes	Seconds (s)	Total Time (s)	Stop Time (s)	Average Speed (mph)	Free Speed (mph)
1	0.52		48	48	0	39.00	39.00
2	0.81		67	67	0	43.52	43.52
3	1.17		95	95	0	44.34	44.34
4	1.11		70	70	0	57.09	57.09
5	2.27		205	205	0	35.86	35.86
<b>TOTALS</b>	<b>5.88</b>	<b>0</b>	<b>486</b>	<b>486</b>	<b>0</b>	<b>43.65</b>	<b>43.65</b>

1770.00  
 1490.00  
 1375.00  
 1070.00  
 565.00

- Segment 1 TO COLDWATER DRIVE
- Segment 2 TO HH-328
- Segment 3 TO NORRIS CANYON ROAD
- Segment 4 TO HH-445
- Segment 5 TO ALAMEDA/COUNTY LINE

4-6 SB CC

TJKM Transportation Consultants

Field Data Analysis: Speed and Delay Before (Floating Car Study)

**Alameda County** **Project # 260-026 Task 2** **Run # 1**  
 Route: Crow Canyon Road From: Alameda County Line To: Greenridge Road  
 Day: Wednesday Date: 12/5/12 Time: 4:42pm Direction: SB

Segment	Miles	Minutes	Seconds (s)	Total Time (s)	Stop Time (s)	Average Speed (mph)	Free Speed (mph)
1	0.227		191	191	0	42.79	42.79
2	1.11		68	68	0	58.76	58.76
3	1.17		107	107	0	35.36	35.36
4	0.81		69	69	11	36.45	42.26
5	0.52		53	69	16	27.13	35.32
<b>TOTALS</b>	<b>5.88</b>	<b>0</b>	<b>488</b>	<b>515</b>	<b>27</b>	<b>41.10</b>	<b>43.38</b>

1770.00  
 1490.00  
 1375.00  
 1070.00  
 555.00

- Segment 1 TO HH 445
- Segment 2 TO NOBBS CANYON ROAD
- Segment 3 TO HH 325
- Segment 4 TO COLDWATER DRIVE
- Segment 5 TO GREENRIDGE ROAD

Field Data Analysis: Speed and Delay Before (Floating Car Study)

**Alameda County** **Project # 260-026 Task 2** **Run # 2**  
 Route: Crow Canyon Road From: Alameda County Line To: Greenridge Road  
 Day: Wednesday Date: 12/5/12 Time: 5:00pm Direction: SB

Segment	Miles	Minutes	Seconds (s)	Total Time (s)	Stop Time (s)	Average Speed (mph)	Free Speed (mph)
1	0.227		189	189	0	43.28	43.28
2	1.11		74	74	0	54.00	54.00
3	1.17		126	126	0	33.10	33.10
4	0.81		82	82	0	35.54	35.56
5	0.52		58	58	0	32.28	37.28
<b>TOTALS</b>	<b>5.88</b>	<b>0</b>	<b>523</b>	<b>523</b>	<b>0</b>	<b>40.47</b>	<b>40.47</b>

1770.00  
 1490.00  
 1375.00  
 1070.00  
 555.00

- Segment 1 TO HH 445
- Segment 2 TO NOBBS CANYON ROAD
- Segment 3 TO HH 325
- Segment 4 TO COLDWATER DRIVE
- Segment 5 TO GREENRIDGE ROAD

**Crow Canyon Road**  
 NORTHBOUND PM Peak Travel Time Run 1 4:18pm

Intersection	Arrive			Depart			Stop	Segment	Total	Notes
	Min	Sec	Time(sec)	Min	Sec	Time(sec)				
Greenridge Road	0	0	0	0	0	0	0	0	0	
Cookwater Drive	0	49	49	0	49	49	0	49	49	
MM 2.25	1	53	113	1	53	113	0	84	113	
North Canyon Road	3	26	236	3	26	236	0	83	236	
MM 4.45	4	32	272	4	32	272	0	86	272	
Alameda County Line	7	42	482	7	42	462	0	190	462	

**Crow Canyon Road**  
 SOUTHBOUND PM Peak Travel Time Run 1 4:42pm

Intersection	Arrive			Depart			Stop	Segment	Total	Notes
	Min	Sec	Time(sec)	Min	Sec	Time(sec)				
Alameda County Line	0	0	0	0	0	0	0	0	0	
MM 4.45	3	11	181	3	11	191	0	181	181	
North Canyon Road	4	19	229	4	19	229	0	85	229	
MM 2.25	6	6	366	6	6	366	0	107	366	
Cookwater Drive	7	15	435	7	26	446	11	88	446	
Greenridge Road	8	19	493	8	35	515	10	83	515	

**Crow Canyon Road**  
 NORTHBOUND PM Peak Travel Time Run 2 5:21pm

Intersection	Arrive			Depart			Stop	Segment	Total	Notes
	Min	Sec	Time(sec)	Min	Sec	Time(sec)				
Greenridge Road	0	0	0	0	0	0	0	0	0	
Cookwater Drive	0	45	45	0	45	45	0	45	45	
MM 2.25	1	55	115	1	55	115	0	87	115	
North Canyon Road	3	39	219	3	30	219	0	85	219	
MM 4.45	4	40	280	4	40	280	0	76	280	
Alameda County Line	8	5	485	8	5	485	0	293	485	

**Crow Canyon Road**  
 SOUTHBOUND PM Peak Travel Time Run 2 5:30pm

Intersection	Arrive			Depart			Stop	Segment	Total	Notes
	Min	Sec	Time(sec)	Min	Sec	Time(sec)				
Alameda County Line	0	0	0	0	0	0	0	0	0	
MM 4.45	3	9	189	3	9	189	0	189	189	
North Canyon Road	4	23	283	4	23	283	0	74	283	
MM 2.25	6	23	383	6	23	383	0	130	383	
Cookwater Drive	7	45	485	7	45	485	0	82	485	
Greenridge Road	8	43	523	8	43	523	0	88	523	



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Corridor Summary - AM  
 Crow Canyon Road

Segment	Name	Run # 1		Run # 2	
		NB	SB	NB	SB
		Stop	Stop	Stop	Stop
Segment 1	GREENRIDGE ROAD TO COLDWATER DRIVE				
Segment 2	COLDWATER DRIVE TO MM 2.25				
Segment 3	MM 2.25 TO NORRIS CANYON ROAD				
Segment 4	NORRIS CANYON ROAD TO MM 4.45				
Segment 5	MM 4.45 TO ALAMEDA COUNTY LINE				
<b>Total number of stops</b>		<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>
<b>Average number of stops</b>	0.50		<b>NB</b>		
<b>Average number of stops</b>	0.50		<b>SB</b>		
<b>Probability of Stopping at a signal</b>	0.05	5%	<b>NB</b>		
<b>Probability of Stopping at a signal</b>	0.05	5%	<b>SB</b>		
<b>Average Signal Spacing</b>	<b>0.980 miles/signal or</b> 5174 feet/signal				
<b>Average Speed (mph)</b>		40.91	<b>NB</b>		
		41.71	<b>SB</b>		
<b>Average Free Speed (mph)</b>		41.65	<b>NB</b>		
		42.26	<b>SB</b>		
<b>Average Signal Delay (sec)</b>		9.00	<b>NB</b>		
		6.50	<b>SB</b>		
<b>Average Travel Time (sec)</b>		517.50	<b>NB</b>	0:08:38	
		507.50	<b>SB</b>	0:08:28	



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CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Corridor Summary - MD  
 Crow Canyon Road

Segment	Name	Run # 1		Run # 2	
		NB Stop	SB Stop	NB Stop	SB Stop
Segment 1	GREENRIDGE ROAD TO COLDWATER DRIVE				
Segment 2	COLDWATER DRIVE TO MM 2.25				
Segment 3	MM 2.25 TO NORRIS CANYON ROAD				
Segment 4	NORRIS CANYON ROAD TO MM 4.45				
Segment 5	MM 4.45 TO ALAMEDA COUNTY LINE				
<b>Total number of stops</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Average number of stops</b>		0.00			<b>NB</b>
<b>Average number of stops</b>		0.00			<b>SB</b>
<b>Probability of Stopping at a signal</b>		0.00	0%		<b>NB</b>
<b>Probability of Stopping at a signal</b>		0.00	0%		<b>SB</b>
<b>Average Signal Spacing</b>		0.980 miles/signal or 5174 feet/signal			
<b>Average Speed (mph)</b>		43.16			<b>NB</b>
<b>Average Speed (mph)</b>		45.77			<b>SB</b>
<b>Average Free Speed (mph)</b>		28.77			<b>NB</b>
<b>Average Free Speed (mph)</b>		45.77			<b>SB</b>
<b>Average Signal Delay (sec)</b>		0.00			<b>NB</b>
<b>Average Signal Delay (sec)</b>		0.00			<b>SB</b>
<b>Average Travel Time (sec)</b>		491.00		0:08:11	<b>NB</b>
<b>Average Travel Time (sec)</b>		462.50		0:07:43	<b>SB</b>



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CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Corridor Summary - PM  
 Crow Canyon Road

Segment	Name	Run # 1		Run # 2	
		NB	SB	NB	SB
		Stop	Stop	Stop	Stop
Segment 1	GREENRIDGE ROAD TO COLDWATER DRIVE				
Segment 2	COLDWATER DRIVE TO MM 2.25				
Segment 3	MM 2.25 TO NORRIS CANYON ROAD				
Segment 4	NORRIS CANYON ROAD TO MM 4.45		1		
Segment 5	MM 4.45 TO ALAMEDA COUNTY LINE		1		
<b>Total number of stops</b>		<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>
<b>Average number of stops</b>		0.00			<b>NB</b>
<b>Average number of stops</b>		1.00			<b>SB</b>
<b>Probability of Stopping at a signal</b>		0.00	0%		<b>NB</b>
<b>Probability of Stopping at a signal</b>		0.10	10%		<b>SB</b>
<b>Average Signal Spacing</b>		0.980 miles/signal or 5174 feet/signal			
<b>Average Speed (mph)</b>		44.73			<b>NB</b>
<b>Average Speed (mph)</b>		40.79			<b>SB</b>
<b>Average Free Speed (mph)</b>		44.73			<b>NB</b>
<b>Average Free Speed (mph)</b>		41.93			<b>SB</b>
<b>Average Signal Delay (sec)</b>		0.00			<b>NB</b>
<b>Average Signal Delay (sec)</b>		13.50			<b>SB</b>
<b>Average Travel Time (sec)</b>		473.50		0:07:53	<b>NB</b>
<b>Average Travel Time (sec)</b>		519.00		0:08:39	<b>SB</b>





Summary Table for Report

Peak Period	Direction	Average Signal Delay [min:sec]	Average Travel Time [min:sec]	Average # of Stops	Probability of stopping [%]	Average Speed <sup>1</sup> [mph]	Average Free Flow Speed <sup>2</sup> [mph]
A.M.	NORTHBOUND	0:9	8:37	0.50	0.05	40.91	41.65
	SOUTHBOUND	0:6	8:27	0.50	0.05	41.71	42.26
Midday	NORTHBOUND	0:0	8:11	0.00	0.00	43.16	28.77
	SOUTHBOUND	0:0	7:42	0.00	0.00	45.77	45.77
P.M.	NORTHBOUND	0:0	7:53	0.00	0.00	44.73	44.73
	SOUTHBOUND	0:13	8:39	1.00	0.10	40.79	41.93

<sup>1</sup>Average speed along the corridor including stop delays.

<sup>2</sup>Average free flow speed along the corridor excluding stop delays.

**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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## **Appendix E – Vehicle Classification**

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data

Page 1 of 2

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	0	20	2	0	1	0	0	0	0	0	0	0	0	0	23
1:00 AM	0	12	3	0	0	0	0	0	0	0	0	0	0	0	15
2:00 AM	0	7	2	0	0	0	0	0	0	0	0	0	0	0	9
3:00 AM	0	12	3	0	1	0	0	0	0	0	0	0	0	0	16
4:00 AM	0	28	6	0	1	0	0	0	0	0	0	0	0	2	37
5:00 AM	0	85	15	0	1	0	0	0	0	0	0	0	0	1	102
6:00 AM	2	217	52	0	8	1	0	0	3	0	0	0	0	8	291
7:00 AM	6	496	102	0	18	1	0	3	0	0	0	0	0	69	695
8:00 AM	6	664	110	2	15	1	0	3	1	0	0	0	0	78	880
9:00 AM	5	469	98	0	14	2	0	2	0	0	0	0	0	34	624
10:00 AM	2	278	68	1	9	0	0	0	0	0	0	0	0	21	379
11:00 AM	1	225	63	0	6	1	0	4	1	0	0	0	0	17	318
12:00 PM	1	244	60	0	8	0	0	2	0	0	0	0	0	14	329
1:00 PM	6	248	78	0	15	0	0	0	0	0	0	0	0	12	359
2:00 PM	1	289	95	1	15	0	0	1	0	0	0	0	0	15	417
3:00 PM	3	322	98	0	17	0	0	4	0	0	0	0	0	27	466
4:00 PM	4	503	136	2	29	1	0	0	0	0	0	0	0	62	737
5:00 PM	4	571	116	3	17	2	0	1	0	0	0	0	0	110	824
6:00 PM	7	546	104	0	11	2	0	0	0	0	0	0	0	53	723
7:00 PM	1	366	63	0	10	1	0	2	0	0	0	0	0	16	459
8:00 PM	0	176	23	1	7	0	0	1	0	0	0	0	0	4	212
9:00 PM	1	112	21	0	3	0	0	0	0	0	0	0	0	2	139
10:00 PM	0	105	18	0	0	0	0	0	0	0	0	0	0	2	125
11:00 PM	0	41	10	0	0	0	0	0	0	0	0	0	0	1	52
<b>Day Total</b>	50	6036	1341	10	206	12	0	23	5	0	0	0	0	548	8231
<b>Percent</b>	0.6%	73.3%	16.3%	0.1%	2.5%	0.1%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	6.7%	
<b>ADT 8231</b>															
<b>AM Peak Volume</b>	7:00 AM 6	8:00 AM 664	8:00 AM 110	8:00 AM 2	7:00 AM 18	9:00 AM 2		11:00 AM 4	6:00 AM 3					8:00 AM 78	8:00 AM 880
<b>PM Peak Volume</b>	6:00 PM 7	5:00 PM 571	4:00 PM 136	5:00 PM 3	4:00 PM 29	5:00 PM 2		3:00 PM 4						5:00 PM 110	5:00 PM 824

Comments:

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)




MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data **SUMMARY - Tube Count - Vehicle Classification Data** Page 2 of 2

<b>LOCATION:</b> Crow Canyon Rd West of Bollinger Canyon Rd											<b>QC JOB #:</b> 10846405				
<b>SPECIFIC LOCATION:</b> 100 ft from											<b>DIRECTION:</b> EB				
<b>CITY/STATE:</b> San Ramon, CA											<b>DATE:</b> Nov 07 2012 - Nov 07 2012				
Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
<b>Grand Total</b>	50	6036	1341	10	206	12	0	23	5	0	0	0	0	548	8231
<b>Percent</b>	0.6%	73.3%	16.3%	0.1%	2.5%	0.1%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	6.7%	

<b>ADT 8231</b>	
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*Comments:*

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



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MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data

Page 1 of 2

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	1	41	3	0	1	0	0	0	0	0	0	0	0	0	46
1:00 AM	0	22	9	0	1	0	0	0	0	0	0	0	0	0	32
2:00 AM	0	20	7	0	0	0	0	0	0	0	0	0	0	0	27
3:00 AM	0	22	4	0	1	0	0	0	0	0	0	0	0	0	27
4:00 AM	1	52	18	0	3	0	0	0	0	0	0	0	0	2	76
5:00 AM	1	192	42	0	5	0	0	0	1	0	0	0	0	2	243
6:00 AM	4	515	129	0	20	2	0	1	3	0	0	0	0	16	690
7:00 AM	16	1023	198	2	38	3	0	9	0	0	0	0	0	116	1405
8:00 AM	9	1110	178	3	28	3	0	4	1	0	1	0	0	144	1481
9:00 AM	9	824	169	0	36	3	0	3	1	0	0	0	0	66	1131
10:00 AM	5	528	141	1	17	3	0	2	0	0	0	0	0	37	734
11:00 AM	3	454	111	0	14	2	0	6	1	0	0	0	0	29	620
12:00 PM	3	476	128	0	19	0	0	5	0	0	0	0	0	22	653
1:00 PM	10	520	135	1	25	2	0	1	0	0	0	0	0	20	714
2:00 PM	4	559	159	1	29	1	0	5	0	0	0	0	0	29	787
3:00 PM	6	685	183	1	33	0	0	6	1	0	0	0	0	53	968
4:00 PM	8	968	234	3	44	2	0	4	0	0	0	0	0	115	1378
5:00 PM	11	1174	218	4	27	4	0	4	1	0	0	0	0	210	1653
6:00 PM	11	1007	170	1	21	3	0	2	1	0	0	0	0	95	1311
7:00 PM	2	607	105	0	16	1	0	2	0	0	0	0	0	28	761
8:00 PM	1	329	45	1	10	0	0	1	0	0	0	0	0	5	392
9:00 PM	1	281	38	0	4	0	0	1	0	0	0	0	0	4	329
10:00 PM	0	202	37	0	3	0	0	0	0	0	0	0	0	3	245
11:00 PM	0	82	15	0	2	0	0	0	0	0	0	0	0	2	101
<b>Day Total</b>	106	11693	2496	18	397	29	0	56	10	0	1	0	0	998	15804
<b>Percent</b>	0.7%	74.0%	15.8%	0.1%	2.5%	0.2%	0.0%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	6.3%	
<b>ADT</b>															
<b>AM Peak Volume</b>	7:00 AM 16	8:00 AM 1110	7:00 AM 198	8:00 AM 3	7:00 AM 38	7:00 AM 3		7:00 AM 9	6:00 AM 3		8:00 AM 1			8:00 AM 144	8:00 AM 1481
<b>PM Peak Volume</b>	5:00 PM 11	5:00 PM 1174	4:00 PM 234	5:00 PM 4	4:00 PM 44	5:00 PM 4		3:00 PM 6	3:00 PM 1					5:00 PM 210	5:00 PM 1653
<b>Comments:</b>															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)


MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data **SUMMARY - Tube Count - Vehicle Classification Data** Page 2 of 2

<b>LOCATION:</b> Crow Canyon Rd West of Bollinger Canyon Rd											<b>QC JOB #:</b> 10846405				
<b>SPECIFIC LOCATION:</b> 100 ft from											<b>DIRECTION:</b> EB/WB				
<b>CITY/STATE:</b> San Ramon, CA											<b>DATE:</b> Nov 07 2012 - Nov 07 2012				
Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
<b>Grand Total</b>	106	11693	2496	18	397	29	0	56	10	0	1	0	0	998	15804
<b>Percent</b>	0.7%	74.0%	15.8%	0.1%	2.5%	0.2%	0.0%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	6.3%	

<b>ADT</b> 15804	
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*Comments:*

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



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MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data

Page 1 of 2

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	1	21	1	0	0	0	0	0	0	0	0	0	0	0	23
1:00 AM	0	10	6	0	1	0	0	0	0	0	0	0	0	0	17
2:00 AM	0	13	5	0	0	0	0	0	0	0	0	0	0	0	18
3:00 AM	0	10	1	0	0	0	0	0	0	0	0	0	0	0	11
4:00 AM	1	24	12	0	2	0	0	0	0	0	0	0	0	0	39
5:00 AM	1	107	27	0	4	0	0	0	1	0	0	0	0	1	141
6:00 AM	2	298	77	0	12	1	0	1	0	0	0	0	0	8	399
7:00 AM	10	527	96	2	20	2	0	6	0	0	0	0	0	47	710
8:00 AM	3	446	68	1	13	2	0	1	0	0	1	0	0	66	601
9:00 AM	4	355	91	0	22	1	0	1	1	0	0	0	0	32	507
10:00 AM	3	250	73	0	8	3	0	2	0	0	0	0	0	16	355
11:00 AM	2	229	48	0	8	1	0	2	0	0	0	0	0	12	302
12:00 PM	2	232	68	0	11	0	0	3	0	0	0	0	0	8	324
1:00 PM	4	272	57	1	10	2	0	1	0	0	0	0	0	8	355
2:00 PM	3	270	64	0	14	1	0	4	0	0	0	0	0	14	370
3:00 PM	3	363	90	1	16	0	0	2	1	0	0	0	0	26	502
4:00 PM	4	465	98	1	15	1	0	4	0	0	0	0	0	53	641
5:00 PM	7	603	102	1	10	2	0	3	1	0	0	0	0	100	829
6:00 PM	4	461	66	1	10	1	0	2	1	0	0	0	0	42	568
7:00 PM	1	241	42	0	6	0	0	0	0	0	0	0	0	12	302
8:00 PM	1	153	22	0	3	0	0	0	0	0	0	0	0	1	180
9:00 PM	0	169	17	0	1	0	0	1	0	0	0	0	0	2	190
10:00 PM	0	97	19	0	3	0	0	0	0	0	0	0	0	1	120
11:00 PM	0	41	5	0	2	0	0	0	0	0	0	0	0	1	49
Day Total	56	5657	1156	8	191	17	0	33	5	0	1	0	0	450	7573
Percent	0.7%	74.7%	15.3%	0.1%	2.5%	0.2%	0.0%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	5.9%	
ADT 7573															
AM Peak Volume	7:00 AM 10	7:00 AM 527	7:00 AM 96	7:00 AM 2	9:00 AM 22	10:00 AM 3		7:00 AM 6	5:00 AM 1		8:00 AM 1			8:00 AM 66	7:00 AM 710
PM Peak Volume	5:00 PM 7	5:00 PM 603	5:00 PM 102	1:00 PM 1	3:00 PM 16	1:00 PM 2		2:00 PM 4	3:00 PM 1					5:00 PM 100	5:00 PM 829

Comments:

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data **SUMMARY - Tube Count - Vehicle Classification Data** Page 2 of 2

<b>LOCATION:</b> Crow Canyon Rd West of Bollinger Canyon Rd											<b>QC JOB #:</b> 10846405				
<b>SPECIFIC LOCATION:</b> 100 ft from											<b>DIRECTION:</b> WB				
<b>CITY/STATE:</b> San Ramon, CA											<b>DATE:</b> Nov 07 2012 - Nov 07 2012				
Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
<b>Grand Total</b>	56	5667	1155	8	191	17	0	33	5	0	1	0	0	450	7573
<b>Percent</b>	0.7%	74.7%	15.3%	0.1%	2.5%	0.2%	0.0%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	5.9%	
<b>ADT</b> 7573															
<i>Comments:</i>															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



DR



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data

Page 1 of 2

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	0	29	5	0	0	0	0	0	0	0	0	0	0	0	34
1:00 AM	0	8	3	0	1	0	0	0	0	0	0	0	0	1	13
2:00 AM	1	12	3	0	0	0	0	0	0	0	0	0	0	0	16
3:00 AM	0	9	1	0	1	0	0	0	0	0	0	0	0	2	13
4:00 AM	0	23	3	0	0	0	0	0	0	0	0	0	0	6	32
5:00 AM	0	44	12	0	3	1	0	0	0	0	0	0	0	20	80
6:00 AM	0	139	36	0	6	0	0	0	0	0	0	0	0	59	240
7:00 AM	0	346	67	0	20	0	0	3	1	0	0	0	0	90	527
8:00 AM	0	619	109	2	13	1	0	0	1	0	0	0	0	62	807
9:00 AM	1	589	100	2	18	0	0	2	1	0	0	0	0	25	738
10:00 AM	0	338	85	1	10	1	0	2	2	0	0	0	0	14	453
11:00 AM	0	249	63	0	15	2	0	0	0	0	0	0	0	14	343
12:00 PM	0	229	56	1	18	1	0	0	2	0	0	0	0	13	320
1:00 PM	0	254	78	0	18	1	0	1	0	0	0	0	0	7	359
2:00 PM	0	288	110	0	13	2	0	2	0	0	0	0	0	11	426
3:00 PM	1	366	108	0	26	1	0	3	0	0	0	0	0	17	522
4:00 PM	0	493	119	0	32	0	0	3	0	0	0	0	0	31	678
5:00 PM	0	640	142	2	32	0	0	3	0	0	0	0	0	30	849
6:00 PM	0	675	107	0	23	0	0	2	0	0	0	0	0	32	839
7:00 PM	0	496	87	1	14	0	0	0	0	0	0	0	0	30	628
8:00 PM	0	225	47	0	4	0	0	1	0	0	0	0	0	40	317
9:00 PM	0	124	18	0	1	0	0	0	0	0	0	0	0	19	162
10:00 PM	0	103	14	0	2	0	0	0	0	0	0	0	0	19	138
11:00 PM	0	54	7	0	2	0	0	0	0	0	0	0	0	7	70
Day Total	3	6352	1380	9	272	10	0	22	7	0	0	0	0	549	8604
Percent	0.0%	73.8%	16.0%	0.1%	3.2%	0.1%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	6.4%	
ADT 8604															
AM Peak Volume	2:00 AM 1	8:00 AM 619	8:00 AM 109	8:00 AM 2	7:00 AM 20	11:00 AM 2		7:00 AM 3	10:00 AM 2					7:00 AM 90	8:00 AM 807
PM Peak Volume	3:00 PM 1	6:00 PM 675	5:00 PM 142	5:00 PM 2	4:00 PM 32	2:00 PM 2		3:00 PM 3	12:00 PM 2					8:00 PM 40	5:00 PM 849
Comments:															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data **SUMMARY - Tube Count - Vehicle Classification Data** Page 2 of 2

<b>LOCATION:</b> Crow Canyon Rd North of Norris Canyon Rd											<b>QC JOB #:</b> 10846406				
<b>SPECIFIC LOCATION:</b> 100 ft from											<b>DIRECTION:</b> NB				
<b>CITY/STATE:</b> San Ramon, CA											<b>DATE:</b> Nov 08 2012 - Nov 08 2012				
Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
<b>Grand Total</b>	3	6352	1380	9	272	10	0	22	7	0	0	0	0	549	8604
<b>Percent</b>	0.0%	73.8%	16.0%	0.1%	3.2%	0.1%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	6.4%	
<b>ADT 8604</b>															
<i>Comments:</i>															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



DR

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data

Page 1 of 2

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	0	28	4	0	1	0	0	0	0	0	0	0	0	1	34
1:00 AM	0	17	2	0	1	0	0	0	0	0	0	0	0	0	20
2:00 AM	0	12	4	0	0	0	0	0	0	0	0	0	0	0	16
3:00 AM	0	15	3	0	0	0	0	0	0	0	0	0	0	0	18
4:00 AM	0	25	8	0	2	0	0	0	0	0	0	0	0	1	36
5:00 AM	0	98	20	0	6	0	0	0	0	0	0	0	0	0	124
6:00 AM	1	237	76	2	12	2	0	1	1	0	0	0	0	1	333
7:00 AM	1	425	88	2	12	1	0	5	2	0	0	0	0	0	536
8:00 AM	2	500	92	0	18	3	0	0	0	0	0	0	0	0	615
9:00 AM	1	386	80	1	12	1	0	2	2	0	0	0	0	2	487
10:00 AM	1	287	62	0	8	1	0	0	0	0	0	0	0	1	360
11:00 AM	0	243	51	0	6	0	0	1	2	0	0	0	0	1	304
12:00 PM	1	261	67	0	3	2	0	0	0	0	0	0	0	0	334
1:00 PM	0	266	62	2	17	2	0	2	1	0	0	0	0	1	343
2:00 PM	1	276	81	1	17	0	0	1	0	0	0	0	0	1	378
3:00 PM	0	347	91	1	14	0	0	1	0	0	0	0	0	1	455
4:00 PM	1	458	108	0	17	0	0	0	0	0	0	0	0	1	585
5:00 PM	1	607	113	1	16	0	0	1	0	0	0	0	0	1	740
6:00 PM	0	529	95	0	9	0	0	1	0	0	0	0	0	0	634
7:00 PM	0	339	58	0	4	0	0	2	0	0	0	0	0	2	405
8:00 PM	1	229	28	1	6	0	0	0	0	0	0	0	0	0	265
9:00 PM	0	194	36	0	0	0	0	0	0	0	0	0	0	0	230
10:00 PM	0	147	21	0	4	0	0	0	0	0	0	0	0	0	172
11:00 PM	0	73	11	0	0	0	0	0	0	0	0	0	0	0	84
Day Total	11	5989	1261	11	185	12	0	17	8	0	0	0	0	14	7508
Percent	0.1%	79.8%	16.8%	0.1%	2.5%	0.2%	0.0%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.2%	
ADT 7508															
AM Peak Volume	8:00 AM 2	8:00 AM 500	8:00 AM 92	6:00 AM 2	8:00 AM 18	8:00 AM 3		7:00 AM 5	7:00 AM 2					9:00 AM 2	8:00 AM 615
PM Peak Volume	12:00 PM 1	5:00 PM 607	5:00 PM 113	1:00 PM 2	1:00 PM 17	12:00 PM 2		1:00 PM 2	1:00 PM 1					7:00 PM 2	5:00 PM 740

Comments:

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data      **SUMMARY - Tube Count - Vehicle Classification Data**      Page 2 of 2

<b>LOCATION:</b> Crow Canyon Rd North of Norris Canyon Rd													<b>QC JOB #:</b> 10846406		
<b>SPECIFIC LOCATION:</b> 100 ft from													<b>DIRECTION:</b> SB		
<b>CITY/STATE:</b> San Ramon, CA													<b>DATE:</b> Nov 08 2012 - Nov 08 2012		
Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
<b>Grand Total</b>	11	5989	1261	11	185	12	0	17	8	0	0	0	0	14	7508
<b>Percent</b>	0.1%	79.8%	16.8%	0.1%	2.5%	0.2%	0.0%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.2%	
<b>ADT</b> 7508															
<i>Comments:</i>															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



DR

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data

Page 1 of 2

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	0	57	9	0	1	0	0	0	0	0	0	0	0	1	68
1:00 AM	0	25	5	0	2	0	0	0	0	0	0	0	0	1	33
2:00 AM	1	24	7	0	0	0	0	0	0	0	0	0	0	0	32
3:00 AM	0	24	4	0	1	0	0	0	0	0	0	0	0	2	31
4:00 AM	0	48	11	0	2	0	0	0	0	0	0	0	0	7	68
5:00 AM	0	142	32	0	9	1	0	0	0	0	0	0	0	20	204
6:00 AM	1	376	112	2	18	2	0	1	1	0	0	0	0	60	573
7:00 AM	1	771	155	2	32	1	0	8	3	0	0	0	0	90	1063
8:00 AM	2	1119	201	2	31	4	0	0	1	0	0	0	0	62	1422
9:00 AM	2	975	180	3	30	1	0	4	3	0	0	0	0	27	1225
10:00 AM	1	625	147	1	18	2	0	2	2	0	0	0	0	15	813
11:00 AM	0	492	114	0	21	2	0	1	2	0	0	0	0	15	647
12:00 PM	1	490	123	1	21	3	0	0	2	0	0	0	0	13	654
1:00 PM	0	510	140	2	35	3	0	3	1	0	0	0	0	8	702
2:00 PM	1	564	191	1	30	2	0	3	0	0	0	0	0	12	804
3:00 PM	1	713	199	1	40	1	0	4	0	0	0	0	0	18	977
4:00 PM	1	951	227	0	49	0	0	3	0	0	0	0	0	32	1263
5:00 PM	1	1247	255	3	48	0	0	4	0	0	0	0	0	31	1589
6:00 PM	0	1204	202	0	32	0	0	3	0	0	0	0	0	32	1473
7:00 PM	0	835	145	1	18	0	0	2	0	0	0	0	0	32	1033
8:00 PM	1	454	75	1	10	0	0	1	0	0	0	0	0	40	582
9:00 PM	0	318	54	0	1	0	0	0	0	0	0	0	0	19	392
10:00 PM	0	250	35	0	6	0	0	0	0	0	0	0	0	19	310
11:00 PM	0	127	18	0	2	0	0	0	0	0	0	0	0	7	154
Day Total	14	12341	2641	20	457	22	0	39	15	0	0	0	0	563	16112
Percent	0.1%	76.6%	16.4%	0.1%	2.8%	0.1%	0.0%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	3.5%	
ADT 16112															
AM Peak Volume	8:00 AM 2	8:00 AM 1119	8:00 AM 201	9:00 AM 3	7:00 AM 32	8:00 AM 4		7:00 AM 8	7:00 AM 3					7:00 AM 90	8:00 AM 1422
PM Peak Volume	12:00 PM 1	5:00 PM 1247	5:00 PM 255	5:00 PM 3	4:00 PM 49	12:00 PM 3		3:00 PM 4	12:00 PM 2					8:00 PM 40	5:00 PM 1589

Comments:

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data      **SUMMARY - Tube Count - Vehicle Classification Data**      Page 2 of 2

<b>LOCATION:</b> Crow Canyon Rd North of Norris Canyon Rd											<b>QC JOB #:</b> 10846406				
<b>SPECIFIC LOCATION:</b> 100 ft from											<b>DIRECTION:</b> NB/SB				
<b>CITY/STATE:</b> San Ramon, CA											<b>DATE:</b> Nov 08 2012 - Nov 08 2012				
Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
<b>Grand Total</b>	14	12341	2641	20	457	22	0	39	15	0	0	0	0	563	16112
<b>Percent</b>	0.1%	76.6%	16.4%	0.1%	2.8%	0.1%	0.0%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	3.5%	
<b>ADT 16112</b>															
<i>Comments:</i>															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



DR

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data

Page 1 of 2

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	0	18	3	0	0	0	0	0	0	0	0	0	0	1	22
1:00 AM	1	15	2	0	0	0	0	0	0	0	0	0	0	0	18
2:00 AM	1	8	1	0	0	0	0	0	0	0	0	0	0	0	10
3:00 AM	0	24	6	0	0	0	0	0	0	0	0	0	0	0	30
4:00 AM	0	45	8	0	0	0	0	0	0	0	0	0	0	0	53
5:00 AM	0	112	23	0	2	0	0	0	0	0	0	0	0	4	141
6:00 AM	4	303	58	0	9	1	0	0	1	0	0	0	0	19	395
7:00 AM	18	680	124	0	16	4	0	3	0	0	0	0	0	77	922
8:00 AM	14	815	127	2	22	3	0	3	1	0	0	0	0	56	1043
9:00 AM	8	463	72	0	19	4	0	1	1	0	0	0	0	35	603
10:00 AM	2	319	79	1	9	1	0	0	1	0	0	0	0	19	431
11:00 AM	3	243	71	0	7	1	0	0	0	0	0	0	0	14	339
12:00 PM	6	289	62	0	7	1	0	3	1	0	0	0	0	16	385
1:00 PM	6	267	78	1	11	1	0	0	0	0	0	0	0	13	377
2:00 PM	3	330	91	0	14	0	0	4	1	0	0	0	0	34	477
3:00 PM	8	431	122	1	13	5	0	4	1	0	0	0	0	32	617
4:00 PM	21	614	136	0	26	2	0	1	0	0	0	0	0	68	868
5:00 PM	26	682	132	4	14	4	0	2	0	0	0	0	0	100	964
6:00 PM	23	576	107	0	17	2	0	1	0	0	0	0	0	63	789
7:00 PM	5	341	67	0	14	1	0	3	0	0	0	0	0	11	442
8:00 PM	2	172	31	0	5	0	0	0	0	0	0	0	0	9	219
9:00 PM	3	133	25	0	0	0	0	0	0	0	0	0	0	2	163
10:00 PM	1	107	13	0	1	0	0	0	0	0	0	0	0	1	123
11:00 PM	0	44	11	0	0	0	0	0	0	0	0	0	0	0	55
<b>Day Total</b>	155	7031	1449	9	206	30	0	25	7	0	0	0	0	574	9486
<b>Percent</b>	1.6%	74.1%	15.3%	0.1%	2.2%	0.3%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	6.1%	
<b>ADT 9486</b>															
<b>AM Peak Volume</b>	7:00 AM 18	8:00 AM 815	8:00 AM 127	8:00 AM 2	8:00 AM 22	7:00 AM 4		7:00 AM 3	6:00 AM 1					7:00 AM 77	8:00 AM 1043
<b>PM Peak Volume</b>	5:00 PM 26	5:00 PM 682	4:00 PM 136	5:00 PM 4	4:00 PM 26	3:00 PM 5		2:00 PM 4	12:00 PM 1					5:00 PM 100	5:00 PM 964
<b>Comments:</b>															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)




MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data **SUMMARY - Tube Count - Vehicle Classification Data** Page 2 of 2

<b>LOCATION:</b> Crow Canyon Rd South of Norris Canyon Rd											<b>QC JOB #:</b> 10846407				
<b>SPECIFIC LOCATION:</b> 100 ft from											<b>DIRECTION:</b> NB				
<b>CITY/STATE:</b> San Ramon, CA											<b>DATE:</b> Nov 07 2012 - Nov 07 2012				
Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
<b>Grand Total</b>	155	7031	1449	9	206	30	0	25	7	0	0	0	0	574	9486
<b>Percent</b>	1.6%	74.1%	15.3%	0.1%	2.2%	0.3%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	6.1%	

<b>ADT</b> 9486	
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Comments:

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



DRAFT



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data

Page 1 of 2

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	0	23	4	0	0	0	0	1	0	0	0	0	0	0	28
1:00 AM	0	10	6	0	1	0	0	0	0	0	0	0	0	0	17
2:00 AM	0	15	4	0	0	1	0	0	0	0	0	0	0	1	21
3:00 AM	0	13	2	0	0	0	0	0	0	0	0	0	0	0	15
4:00 AM	0	39	14	0	2	0	0	0	0	0	0	0	0	1	56
5:00 AM	0	133	27	0	6	1	0	0	1	0	0	0	0	3	171
6:00 AM	6	325	84	0	13	1	0	1	0	0	0	0	0	15	445
7:00 AM	22	595	102	0	18	6	0	5	0	0	1	0	0	58	807
8:00 AM	7	517	81	0	17	2	0	1	0	0	0	0	0	59	684
9:00 AM	10	378	98	0	23	4	0	0	1	0	0	0	0	32	546
10:00 AM	1	284	88	0	10	4	0	1	0	0	0	0	0	20	408
11:00 AM	2	248	48	0	12	0	0	1	0	0	0	0	0	17	328
12:00 PM	1	267	68	0	12	2	0	0	1	0	0	0	0	10	361
1:00 PM	7	287	59	1	11	3	0	5	0	0	0	0	0	19	392
2:00 PM	4	293	72	0	14	2	0	1	1	0	1	0	0	25	413
3:00 PM	11	402	91	0	12	5	0	1	0	0	0	0	0	41	563
4:00 PM	16	515	109	3	12	4	0	2	0	0	0	0	0	88	749
5:00 PM	29	672	113	1	18	10	0	4	0	0	0	0	0	95	942
6:00 PM	12	483	82	0	11	9	0	1	0	0	0	0	0	58	656
7:00 PM	3	296	50	0	5	0	0	1	0	0	0	0	0	13	328
8:00 PM	3	168	20	0	5	0	0	0	0	0	0	0	0	7	203
9:00 PM	0	170	22	0	2	0	0	1	0	0	0	0	0	3	198
10:00 PM	0	100	19	0	3	0	0	0	0	0	0	0	0	1	123
11:00 PM	0	48	7	0	2	0	0	0	0	0	0	0	0	0	57
<b>Day Total</b>	134	6241	1270	5	209	54	0	26	4	0	2	0	0	566	8511
<b>Percent</b>	1.6%	73.3%	14.9%	0.1%	2.5%	0.6%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	6.7%	
<b>ADT 8511</b>															
<b>AM Peak Volume</b>	7:00 AM 22	7:00 AM 595	7:00 AM 102		9:00 AM 23	7:00 AM 6		7:00 AM 5	5:00 AM 1		7:00 AM 1			8:00 AM 59	7:00 AM 807
<b>PM Peak Volume</b>	5:00 PM 29	5:00 PM 672	5:00 PM 113	4:00 PM 3	5:00 PM 18	5:00 PM 10		1:00 PM 5	12:00 PM 1		2:00 PM 1			5:00 PM 95	5:00 PM 942
<i>Comments:</i>															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data      **SUMMARY - Tube Count - Vehicle Classification Data**      Page 2 of 2

<b>LOCATION:</b> Crow Canyon Rd South of Norris Canyon Rd											<b>QC JOB #:</b> 10846407				
<b>SPECIFIC LOCATION:</b> 100 ft from											<b>DIRECTION:</b> SB				
<b>CITY/STATE:</b> San Ramon, CA											<b>DATE:</b> Nov 07 2012 - Nov 07 2012				
Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
<b>Grand Total</b>	134	6241	1270	5	209	54	0	26	4	0	2	0	0	566	8511
<b>Percent</b>	1.6%	73.3%	14.9%	0.1%	2.5%	0.6%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	6.7%	
<b>ADT 8511</b>															
<i>Comments:</i>															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



DR

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data

Page 1 of 2

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	0	41	7	0	0	0	0	1	0	0	0	0	0	1	50
1:00 AM	1	25	8	0	1	0	0	0	0	0	0	0	0	0	35
2:00 AM	1	23	5	0	0	1	0	0	0	0	0	0	0	1	31
3:00 AM	0	37	8	0	0	0	0	0	0	0	0	0	0	0	45
4:00 AM	0	84	22	0	2	0	0	0	0	0	0	0	0	1	109
5:00 AM	0	245	50	0	8	1	0	0	1	0	0	0	0	7	312
6:00 AM	10	628	142	0	22	2	0	1	1	0	0	0	0	34	840
7:00 AM	40	1275	226	0	34	10	0	8	0	0	1	0	0	135	1729
8:00 AM	21	1332	208	2	39	5	0	4	1	0	0	0	0	115	1727
9:00 AM	18	841	170	0	42	8	0	1	2	0	0	0	0	67	1149
10:00 AM	3	603	167	1	19	5	0	1	1	0	0	0	0	39	839
11:00 AM	5	491	119	0	19	1	0	1	0	0	0	0	0	31	667
12:00 PM	7	556	130	0	19	3	0	3	2	0	0	0	0	26	746
1:00 PM	13	554	137	2	22	4	0	5	0	0	0	0	0	32	769
2:00 PM	7	623	163	0	28	2	0	5	2	0	1	0	0	59	890
3:00 PM	19	833	213	1	25	10	0	5	1	0	0	0	0	73	1180
4:00 PM	37	1129	245	3	38	6	0	3	0	0	0	0	0	156	1617
5:00 PM	55	1354	245	5	32	14	0	6	0	0	0	0	0	195	1906
6:00 PM	35	1059	189	0	28	11	0	2	0	0	0	0	0	121	1445
7:00 PM	8	597	117	0	19	1	0	4	0	0	0	0	0	24	770
8:00 PM	5	340	51	0	10	0	0	0	0	0	0	0	0	16	422
9:00 PM	3	303	47	0	2	0	0	1	0	0	0	0	0	5	361
10:00 PM	1	207	32	0	4	0	0	0	0	0	0	0	0	2	246
11:00 PM	0	92	18	0	2	0	0	0	0	0	0	0	0	0	112
Day Total	289	13272	2719	14	415	84	0	51	11	0	2	0	0	1140	17997
Percent	1.6%	73.7%	15.1%	0.1%	2.3%	0.5%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	6.3%	
ADT 17997															
AM Peak Volume	7:00 AM 40	8:00 AM 1332	7:00 AM 226	8:00 AM 2	9:00 AM 42	7:00 AM 10		7:00 AM 8	9:00 AM 2		7:00 AM 1			7:00 AM 135	7:00 AM 1729
PM Peak Volume	5:00 PM 55	5:00 PM 1354	4:00 PM 245	5:00 PM 5	4:00 PM 38	5:00 PM 14		5:00 PM 6	12:00 PM 2		2:00 PM 1			5:00 PM 195	5:00 PM 1906
Comments:															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data      **SUMMARY - Tube Count - Vehicle Classification Data**      Page 2 of 2

<b>LOCATION:</b> Crow Canyon Rd South of Norris Canyon Rd											<b>QC JOB #:</b> 10846407				
<b>SPECIFIC LOCATION:</b> 100 ft from											<b>DIRECTION:</b> NB/SB				
<b>CITY/STATE:</b> San Ramon, CA											<b>DATE:</b> Nov 07 2012 - Nov 07 2012				
Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
<b>Grand Total</b>	289	13272	2719	14	415	84	0	51	11	0	2	0	0	1140	17997
<b>Percent</b>	1.6%	73.7%	15.1%	0.1%	2.3%	0.5%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	6.3%	

<b>ADT</b> 17997	
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Comments:

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



DR

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data Page 1 of 2

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	1	21	3	0	0	0	0	0	0	0	0	0	0	0	25
1:00 AM	1	15	2	0	0	0	0	0	0	0	0	0	0	0	18
2:00 AM	0	8	2	0	0	0	0	0	0	0	0	0	0	0	10
3:00 AM	0	23	5	0	1	0	0	0	0	0	0	0	0	0	29
4:00 AM	0	45	8	0	0	0	0	0	0	0	0	0	0	0	53
5:00 AM	0	109	21	0	3	0	0	0	0	0	0	0	0	0	133
6:00 AM	5	297	66	0	7	1	0	0	1	0	0	0	0	13	390
7:00 AM	15	643	136	1	21	4	0	2	1	0	0	0	0	74	897
8:00 AM	20	778	143	2	20	6	0	3	0	0	0	0	0	68	1040
9:00 AM	8	455	92	0	19	4	0	1	2	0	0	0	0	36	617
10:00 AM	4	307	93	1	10	1	0	0	1	0	0	0	0	14	431
11:00 AM	4	236	68	0	7	2	0	3	0	0	0	0	0	16	336
12:00 PM	6	284	76	1	8	0	0	3	1	0	0	0	0	13	392
1:00 PM	8	268	82	1	12	1	0	0	0	0	0	0	0	18	390
2:00 PM	6	334	103	0	16	1	0	2	0	0	0	0	0	24	486
3:00 PM	15	410	111	1	16	4	0	5	3	0	0	0	0	41	606
4:00 PM	18	607	141	2	24	2	0	2	1	0	0	0	0	68	865
5:00 PM	31	665	148	5	19	6	1	2	0	0	0	0	0	104	981
6:00 PM	13	588	120	0	10	4	0	0	0	0	0	0	0	50	765
7:00 PM	4	359	70	0	13	1	0	3	0	0	0	0	0	17	467
8:00 PM	1	190	33	0	5	0	0	0	0	0	0	0	0	2	231
9:00 PM	1	134	26	0	1	0	0	0	0	0	0	0	0	3	165
10:00 PM	1	111	12	0	1	0	0	0	0	0	0	0	0	0	125
11:00 PM	0	45	12	0	0	1	0	0	0	0	0	0	0	0	58
<b>Day Total</b>	162	6932	1573	14	213	38	1	26	10	0	0	0	0	561	9530
<b>Percent</b>	1.7%	72.7%	16.5%	0.1%	2.2%	0.4%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	5.9%	
<b>ADT 9530</b>															
<b>AM Peak Volume</b>	8:00 AM 20	8:00 AM 778	8:00 AM 143	8:00 AM 2	7:00 AM 21	8:00 AM 6		8:00 AM 3	9:00 AM 2					7:00 AM 74	8:00 AM 1040
<b>PM Peak Volume</b>	5:00 PM 31	5:00 PM 665	5:00 PM 148	5:00 PM 5	4:00 PM 24	5:00 PM 6	5:00 PM 1	3:00 PM 5	3:00 PM 3					5:00 PM 104	5:00 PM 981

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data **SUMMARY - Tube Count - Vehicle Classification Data** Page 2 of 2

<b>LOCATION:</b> Crow Canyon Rd further South of Norris Canyon Rd											<b>QC JOB #:</b> 10846408				
<b>SPECIFIC LOCATION:</b> 800 ft from											<b>DIRECTION:</b> NB				
<b>CITY/STATE:</b> San Ramon, CA											<b>DATE:</b> Nov 07 2012 - Nov 07 2012				
Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
<b>Grand Total</b>	162	6932	1573	14	213	38	1	26	10	0	0	0	0	561	9530
<b>Percent</b>	1.7%	72.7%	16.5%	0.1%	2.2%	0.4%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	5.9%	
<b>ADT 9530</b>															
<i>Comments:</i>															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



DR

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data

Page 1 of 2

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	1	25	4	0	0	0	0	0	0	0	0	0	0	1	31
1:00 AM	0	13	5	0	1	0	0	0	0	0	0	0	0	0	19
2:00 AM	0	15	5	0	0	0	0	0	0	0	0	0	0	0	20
3:00 AM	0	13	2	0	0	0	0	0	0	0	0	0	0	0	15
4:00 AM	1	35	13	0	2	0	0	0	0	0	0	0	0	0	51
5:00 AM	0	122	28	0	6	0	0	0	1	0	0	0	0	1	158
6:00 AM	7	326	85	0	10	3	0	2	0	0	0	0	0	19	452
7:00 AM	20	581	96	0	16	7	1	4	1	0	0	0	0	68	794
8:00 AM	21	540	73	0	18	4	0	1	0	0	1	0	0	79	737
9:00 AM	20	377	96	0	22	6	0	1	1	0	0	0	0	31	554
10:00 AM	6	290	62	0	10	2	0	2	0	0	0	0	0	20	412
11:00 AM	7	251	49	0	13	0	0	1	1	0	0	0	0	10	332
12:00 PM	5	267	69	0	10	2	0	1	1	0	0	0	0	8	363
1:00 PM	9	286	60	1	14	2	0	2	0	0	0	0	0	17	391
2:00 PM	9	314	73	0	16	1	0	1	1	0	1	0	0	16	432
3:00 PM	16	391	81	0	15	6	0	0	0	0	0	0	0	43	552
4:00 PM	18	491	113	1	14	4	0	4	0	0	0	0	0	72	717
5:00 PM	20	700	115	1	18	12	0	2	0	0	0	0	0	111	979
6:00 PM	9	553	73	0	10	3	0	2	0	0	0	0	0	39	689
7:00 PM	2	277	43	0	6	0	0	0	0	0	0	0	0	12	340
8:00 PM	2	171	23	0	4	0	0	0	0	0	0	0	0	2	202
9:00 PM	0	186	20	0	3	0	0	0	0	0	0	0	0	2	211
10:00 PM	0	105	21	0	2	0	0	0	0	0	0	0	0	0	128
11:00 PM	1	46	6	0	3	0	0	0	0	0	0	0	0	0	56
<b>Day Total</b>	174	6375	1235	3	213	52	1	23	6	0	2	0	0	551	8635
<b>Percent</b>	2.0%	73.8%	14.3%	0.0%	2.5%	0.6%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	6.4%	
<b>ADT 8635</b>															
<b>AM Peak Volume</b>	8:00 AM 21	7:00 AM 581	7:00 AM 96		9:00 AM 22	7:00 AM 7	7:00 AM 1	7:00 AM 4	5:00 AM 1		8:00 AM 1			8:00 AM 79	7:00 AM 794
<b>PM Peak Volume</b>	5:00 PM 20	5:00 PM 700	5:00 PM 115	1:00 PM 1	5:00 PM 18	5:00 PM 12		4:00 PM 4	12:00 PM 1		2:00 PM 1			5:00 PM 111	5:00 PM 979
<b>Comments:</b>															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data **SUMMARY - Tube Count - Vehicle Classification Data** Page 2 of 2

<b>LOCATION:</b> Crow Canyon Rd further South of Norris Canyon Rd													<b>QC JOB #:</b> 10846408		
<b>SPECIFIC LOCATION:</b> 800 ft from													<b>DIRECTION:</b> SB		
<b>CITY/STATE:</b> San Ramon, CA													<b>DATE:</b> Nov 07 2012 - Nov 07 2012		
Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
<b>Grand Total</b>	174	6375	1235	3	213	52	1	23	6	0	2	0	0	551	8635
<b>Percent</b>	2.0%	73.8%	14.3%	0.0%	2.5%	0.6%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	6.4%	
<b>ADT</b> 8635															
<i>Comments:</i>															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



DR



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data

Page 1 of 2

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	2	46	7	0	0	0	0	0	0	0	0	0	0	1	56
1:00 AM	1	28	7	0	1	0	0	0	0	0	0	0	0	0	37
2:00 AM	0	23	7	0	0	0	0	0	0	0	0	0	0	0	30
3:00 AM	0	36	7	0	1	0	0	0	0	0	0	0	0	0	44
4:00 AM	1	80	21	0	2	0	0	0	0	0	0	0	0	0	104
5:00 AM	0	231	49	0	9	0	0	0	1	0	0	0	0	1	291
6:00 AM	12	623	151	0	17	4	0	2	1	0	0	0	0	32	842
7:00 AM	35	1224	232	1	37	11	1	6	2	0	0	0	0	142	1691
8:00 AM	41	1318	216	2	38	10	0	4	0	0	1	0	0	147	1777
9:00 AM	28	832	188	0	41	10	0	2	3	0	0	0	0	67	1171
10:00 AM	10	597	175	1	20	3	0	2	1	0	0	0	0	34	843
11:00 AM	11	487	117	0	20	2	0	4	1	0	0	0	0	26	668
12:00 PM	11	551	145	1	18	2	0	4	2	0	0	0	0	21	755
1:00 PM	17	554	142	2	26	3	0	2	0	0	0	0	0	35	781
2:00 PM	15	648	176	0	32	2	0	3	1	0	1	0	0	40	918
3:00 PM	31	801	192	1	31	10	0	5	3	0	0	0	0	84	1158
4:00 PM	36	1098	254	3	38	6	0	6	1	0	0	0	0	140	1582
5:00 PM	51	1365	263	6	37	18	1	4	0	0	0	0	0	215	1960
6:00 PM	22	1141	193	0	20	7	0	2	0	0	0	0	0	89	1474
7:00 PM	6	636	113	0	19	1	0	3	0	0	0	0	0	29	807
8:00 PM	3	361	56	0	9	0	0	0	0	0	0	0	0	4	433
9:00 PM	1	320	46	0	4	0	0	0	0	0	0	0	0	5	376
10:00 PM	1	216	33	0	3	0	0	0	0	0	0	0	0	0	253
11:00 PM	1	91	18	0	3	1	0	0	0	0	0	0	0	0	114
<b>Day Total</b>	336	13307	2808	17	426	90	2	49	16	0	2	0	0	1112	18165
<b>Percent</b>	1.8%	73.3%	15.5%	0.1%	2.3%	0.5%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	6.1%	
<b>ADT 18165</b>															
<b>AM Peak Volume</b>	8:00 AM 41	8:00 AM 1318	7:00 AM 232	8:00 AM 2	9:00 AM 41	7:00 AM 11	7:00 AM 1	7:00 AM 6	9:00 AM 3	8:00 AM 1				8:00 AM 147	8:00 AM 1777
<b>PM Peak Volume</b>	5:00 PM 51	5:00 PM 1365	5:00 PM 263	5:00 PM 6	4:00 PM 38	5:00 PM 18	5:00 PM 1	4:00 PM 6	3:00 PM 3	2:00 PM 1				5:00 PM 215	5:00 PM 1960

Comments:

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data      **SUMMARY - Tube Count - Vehicle Classification Data**      Page 2 of 2

<b>LOCATION:</b> Crow Canyon Rd further South of Norris Canyon Rd													<b>QC JOB #:</b> 10846408		
<b>SPECIFIC LOCATION:</b> 800 ft from													<b>DIRECTION:</b> NB/SB		
<b>CITY/STATE:</b> San Ramon, CA													<b>DATE:</b> Nov 07 2012 - Nov 07 2012		
Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
<b>Grand Total</b>	336	13307	2808	17	426	90	2	49	16	0	2	0	0	1112	18165
<b>Percent</b>	1.8%	73.3%	15.5%	0.1%	2.3%	0.5%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	6.1%	
<b>ADT</b> 18165															
<i>Comments:</i>															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



DR

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data

Page 1 of 2

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	3	21	0	0	0	0	0	0	0	0	0	0	0	0	24
1:00 AM	2	16	0	0	0	0	0	0	0	0	0	0	0	0	18
2:00 AM	1	9	0	0	0	0	0	0	0	0	0	0	0	0	10
3:00 AM	0	30	0	0	0	0	0	0	0	0	0	0	0	0	30
4:00 AM	1	53	1	0	0	0	0	0	0	0	0	0	0	0	55
5:00 AM	4	135	2	0	1	0	0	0	0	0	0	0	0	0	146
6:00 AM	17	345	5	0	0	1	0	1	1	0	0	0	0	0	382
7:00 AM	26	516	10	2	1	3	0	1	2	0	0	1	1	0	626
8:00 AM	27	642	4	1	1	3	1	3	5	1	0	0	0	64	752
9:00 AM	21	438	5	1	0	4	0	1	3	0	0	0	0	0	508
10:00 AM	18	405	5	0	1	1	0	0	2	1	0	0	0	0	449
11:00 AM	11	301	5	0	2	2	0	0	1	0	0	0	0	0	338
12:00 PM	13	363	4	0	1	1	0	0	1	0	0	1	0	0	394
1:00 PM	22	379	6	0	1	1	0	0	1	0	0	0	0	0	420
2:00 PM	15	421	10	0	1	0	0	4	1	0	0	0	0	0	472
3:00 PM	16	552	11	1	1	3	0	2	0	0	0	0	0	0	615
4:00 PM	19	597	9	0	0	3	0	1	1	0	0	0	1	0	693
5:00 PM	21	406	7	0	1	5	0	0	0	0	0	0	1	0	521
6:00 PM	26	530	7	1	0	0	0	0	1	0	0	0	0	0	616
7:00 PM	16	404	10	0	1	1	0	0	0	0	0	0	0	0	443
8:00 PM	12	238	4	0	0	0	0	0	0	0	0	0	0	0	261
9:00 PM	7	185	1	0	0	0	0	0	0	0	0	0	0	0	196
10:00 PM	6	125	0	0	0	0	0	0	0	0	0	0	0	0	131
11:00 PM	4	57	0	0	0	0	0	0	0	0	0	0	0	0	61
<b>Day Total</b>	308	7168	106	6	12	28	1	11	21	2	0	2	3	498	8161
<b>Percent</b>	3.8%	87.8%	1.3%	0.1%	0.1%	0.3%	0.0%	0.1%	0.3%	0.0%	0.0%	0.0%	0.0%	6.0%	
<b>ADT 8161</b>															
<b>AM Peak Volume</b>	8:00 AM 27	8:00 AM 642	7:00 AM 10	7:00 AM 2	11:00 AM 2	9:00 AM 4	8:00 AM 1	8:00 AM 3	8:00 AM 5	8:00 AM 1	7:00 AM 1	7:00 AM 1	8:00 AM 64	8:00 AM 752	
<b>PM Peak Volume</b>	6:00 PM 26	4:00 PM 597	3:00 PM 11	3:00 PM 1	12:00 PM 1	5:00 PM 5	2:00 PM 4	3:00 PM 2	12:00 PM 1	4:00 PM 1	5:00 PM 80	4:00 PM 693			

Comments:

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data      **SUMMARY - Tube Count - Vehicle Classification Data**      Page 2 of 2

<b>LOCATION:</b> Crow Canyon Rd South of Cold Water Dr													<b>QC JOB #:</b> 10846409		
<b>SPECIFIC LOCATION:</b> 100 ft from													<b>DIRECTION:</b> NB		
<b>CITY/STATE:</b> Castro Valley, CA													<b>DATE:</b> Nov 07 2012 - Nov 07 2012		
Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
<b>Grand Total</b>	308	7168	106	6	12	28	1	11	21	2	0	2	3	493	8161
<b>Percent</b>	3.8%	87.8%	1.3%	0.1%	0.1%	0.3%	0.0%	0.1%	0.3%	0.0%	0.0%	0.0%	0.0%	6.0%	
<b>ADT 8161</b>															
<i>Comments:</i>															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



DR

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data

Page 1 of 2

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	2	29	0	0	0	0	0	0	0	0	0	0	0	0	31
1:00 AM	1	17	1	0	0	0	0	0	0	0	0	0	0	0	19
2:00 AM	2	18	0	0	0	0	0	0	0	0	0	0	0	0	20
3:00 AM	2	13	0	0	0	0	0	0	0	0	0	0	0	0	15
4:00 AM	3	53	1	0	0	0	0	0	0	0	0	0	0	0	57
5:00 AM	9	159	1	0	0	0	0	0	1	0	0	0	0	5	175
6:00 AM	28	410	4	0	0	2	0	0	0	0	0	0	0	25	469
7:00 AM	44	593	4	0	0	1	0	1	1	0	0	0	0	52	696
8:00 AM	40	456	2	0	1	3	0	0	2	0	0	0	0	70	574
9:00 AM	45	458	6	0	0	2	0	0	0	0	0	0	0	40	551
10:00 AM	23	372	3	0	2	2	0	1	0	0	0	0	0	15	418
11:00 AM	24	323	6	0	2	0	0	1	1	0	0	0	0	17	374
12:00 PM	16	341	2	0	0	1	0	0	0	0	0	0	1	19	380
1:00 PM	19	375	6	0	1	2	0	0	0	0	0	0	0	18	421
2:00 PM	26	344	3	0	1	3	0	0	0	0	0	0	0	31	408
3:00 PM	25	441	3	0	0	2	0	0	0	0	0	0	0	54	525
4:00 PM	24	455	5	2	1	3	0	1	0	0	0	0	0	47	538
5:00 PM	36	534	5	0	1	4	0	0	1	0	0	0	0	81	662
6:00 PM	33	456	3	0	1	1	0	0	0	2	0	0	0	38	534
7:00 PM	17	304	1	0	1	0	0	0	0	0	0	0	0	18	341
8:00 PM	10	180	1	0	0	0	0	0	0	1	0	0	0	5	197
9:00 PM	13	192	1	0	0	1	0	1	0	0	0	0	0	4	212
10:00 PM	8	125	0	0	0	0	0	0	0	0	0	0	0	2	135
11:00 PM	2	53	0	0	0	0	0	0	0	0	0	0	0	0	55
<b>Day Total</b>	452	6701	58	2	11	27	0	5	6	3	0	0	1	541	7807
<b>Percent</b>	5.8%	85.8%	0.7%	0.0%	0.1%	0.3%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	6.9%	
<b>ADT 7807</b>															
<b>AM Peak Volume</b>	9:00 AM 45	7:00 AM 593	9:00 AM 6		10:00 AM 2	8:00 AM 3		7:00 AM 1	8:00 AM 2					8:00 AM 70	7:00 AM 696
<b>PM Peak Volume</b>	5:00 PM 36	5:00 PM 534	1:00 PM 6	4:00 PM 2	1:00 PM 1	5:00 PM 4		4:00 PM 1	5:00 PM 1	6:00 PM 2			12:00 PM 1	5:00 PM 81	5:00 PM 662

Comments:

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data **SUMMARY - Tube Count - Vehicle Classification Data** Page 2 of 2

<b>LOCATION:</b> Crow Canyon Rd South of Cold Water Dr													<b>QC JOB #:</b> 10846409		
<b>SPECIFIC LOCATION:</b> 100 ft from													<b>DIRECTION:</b> SB		
<b>CITY/STATE:</b> Castro Valley, CA													<b>DATE:</b> Nov 07 2012 - Nov 07 2012		
Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
<b>Grand Total</b>	452	6701	58	2	11	27	0	5	6	3	0	0	1	541	7807
<b>Percent</b>	5.8%	85.8%	0.7%	0.0%	0.1%	0.3%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	6.9%	
<b>ADT 7807</b>															
<i>Comments:</i>															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



DR

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data

Page 1 of 2

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	5	50	0	0	0	0	0	0	0	0	0	0	0	0	55
1:00 AM	3	33	1	0	0	0	0	0	0	0	0	0	0	0	37
2:00 AM	3	27	0	0	0	0	0	0	0	0	0	0	0	0	30
3:00 AM	2	43	0	0	0	0	0	0	0	0	0	0	0	0	45
4:00 AM	4	106	2	0	0	0	0	0	0	0	0	0	0	0	112
5:00 AM	13	294	3	0	1	0	0	0	1	0	0	0	0	9	321
6:00 AM	45	755	9	0	0	3	0	1	1	0	0	0	0	37	851
7:00 AM	70	1109	14	2	1	4	0	2	3	0	0	1	1	115	1322
8:00 AM	67	1098	6	1	2	6	1	3	7	1	0	0	0	134	1326
9:00 AM	66	896	11	1	0	6	0	1	3	0	0	0	0	75	1059
10:00 AM	41	777	8	0	3	3	0	1	2	1	0	0	0	31	867
11:00 AM	35	624	11	0	4	2	0	1	2	0	0	0	0	33	712
12:00 PM	29	704	6	0	1	2	0	0	1	0	0	1	1	29	774
1:00 PM	41	754	12	0	2	3	0	0	1	0	0	0	0	28	841
2:00 PM	41	765	13	0	2	3	0	4	1	0	0	0	0	51	880
3:00 PM	41	993	14	1	1	5	0	2	0	0	0	0	0	33	1140
4:00 PM	43	1052	14	2	1	6	0	2	1	0	0	0	1	109	1231
5:00 PM	57	940	12	0	2	9	0	0	1	0	0	0	1	161	1183
6:00 PM	59	986	10	1	1	1	0	0	1	2	0	0	0	89	1150
7:00 PM	33	708	11	0	2	1	0	0	0	0	0	0	0	29	784
8:00 PM	22	418	5	0	0	0	0	0	0	1	0	0	0	12	458
9:00 PM	20	377	2	0	0	1	0	1	0	0	0	0	0	7	408
10:00 PM	14	250	0	0	0	0	0	0	0	0	0	0	0	2	266
11:00 PM	6	110	0	0	0	0	0	0	0	0	0	0	0	0	116
<b>Day Total</b>	760	13869	164	8	23	55	1	16	27	5	0	2	4	1034	15968
<b>Percent</b>	4.8%	86.9%	1.0%	0.1%	0.1%	0.3%	0.0%	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	6.5%	
<b>ADT 15968</b>															
<b>AM Peak Volume</b>	7:00 AM 70	7:00 AM 1109	7:00 AM 14	7:00 AM 2	11:00 AM 4	8:00 AM 6	8:00 AM 1	8:00 AM 3	8:00 AM 7	8:00 AM 1	7:00 AM 1	7:00 AM 1	8:00 AM 134	8:00 AM 1326	
<b>PM Peak Volume</b>	6:00 PM 59	4:00 PM 1052	3:00 PM 14	4:00 PM 2	1:00 PM 2	5:00 PM 9	2:00 PM 4	3:00 PM 2	6:00 PM 2	12:00 PM 1	12:00 PM 1	5:00 PM 161	4:00 PM 1231		
<i>Comments:</i>															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Type of report: Tube Count - Vehicle Classification Data **SUMMARY - Tube Count - Vehicle Classification Data** Page 2 of 2

<b>LOCATION:</b> Crow Canyon Rd South of Cold Water Dr													<b>QC JOB #:</b> 10846409		
<b>SPECIFIC LOCATION:</b> 100 ft from													<b>DIRECTION:</b> NB/SB		
<b>CITY/STATE:</b> Castro Valley, CA													<b>DATE:</b> Nov 07 2012 - Nov 07 2012		
Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
<b>Grand Total</b>	760	13869	164	8	23	55	1	16	27	5	0	2	4	1034	15968
<b>Percent</b>	4.8%	86.9%	1.0%	0.1%	0.1%	0.3%	0.0%	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	6.5%	
<b>ADT 15968</b>															
<i>Comments:</i>															

Report generated on 11/27/2012 12:35 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)



DR



**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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DR

**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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**Appendix F - Bicycle Counts**

**Summary of Crow Canyon Road Bicycle Counts**

Saturday March 23 and Monday March 25, 2013

Count period: 6 a.m. to 6 p.m.

	Saturday	Monday
<b>Crow Canyon Road north of Norris Canyon Road</b>		
Northbound	7	4
Southbound	10	1
Total	17	5
<b>Crow Canyon Road south of Norris Canyon Road</b>		
Northbound	30	8
Southbound	97	3
Total	127	11
<b>Norris Canyon Road east of Crow Canyon Road</b>		
Eastbound	23	2
Westbound	87	4
Total	110	6

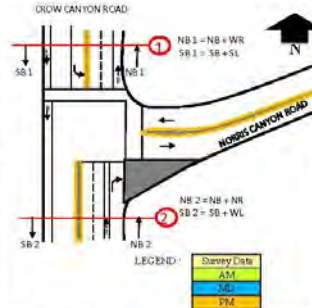
**B.A.Y.M.E.T.R.I.C.S.**  
 BICYCLE MOVEMENT SUMMARY

PROJECT:	BICYCLE LANE STUDY						
LOCATION:	ALONG CROW CANYON ROAD		SURVEY DATE:	3/23/2015	SURVEY DAY:	SATURDAY	
SURVEY TIME:	6:00 AM	TO	6:00 PM	JURISDICTION:	SAN RAMON	FILE:	3303032 SAT

S U M M A R Y

1. NORTH OF NORRIS CANYON ROAD							
PEAK 15 MINUTE	NB2	SB2	TOTAL	PEAK HOUR	NB2	SB2	TOTAL
AM PEAK							
8:30 AM to 8:45 AM	1	0	1	8:00 AM to 9:00 AM	2	0	2
MD PEAK							
12:00 AM to 12:00 PM	0	3	3	12:00 PM to 3:00 PM	2	4	6
PM PEAK							
1:30 PM to 1:45 PM	0	1	1	2:45 PM to 3:45 PM	1	1	2

2. SOUTH OF NORRIS CANYON ROAD							
PEAK 15 MINUTE	NB2	SB2	TOTAL	PEAK HOUR	NB2	SB2	TOTAL
AM PEAK							
9:30 AM to 9:45 AM	1	14	15	8:45 AM to 9:45 AM	3	14	17
MD PEAK							
12:00 AM to 12:00 PM	0	21	21	12:00 AM to 12:00 PM	1	43	44
PM PEAK							
1:00 PM to 1:15 PM	1	1	2	2:30 PM to 3:30 PM	4	1	5



TIME PERIOD	CROW CANYON ROAD / NORRIS CANYON ROAD					
	1	2	3	4	5	6
From To	ST	SL	WR	WL	NR	NT
SURVEY DATA (15 MINUTE TOTAL)						
6:00 AM to 6:15 AM						
6:15 AM to 6:30 AM						
6:30 AM to 6:45 AM						
6:45 AM to 7:00 AM						
7:00 AM to 7:15 AM						
7:15 AM to 7:30 AM						
7:30 AM to 7:45 AM						
7:45 AM to 8:00 AM						
8:00 AM to 8:15 AM						
8:15 AM to 8:30 AM						
8:30 AM to 8:45 AM					1	1
8:45 AM to 9:00 AM					1	1
9:00 AM to 9:15 AM						
9:15 AM to 9:30 AM						
9:30 AM to 9:45 AM				14		1
9:45 AM to 10:00 AM						
10:00 AM to 10:15 AM				8		
10:15 AM to 10:30 AM				21		
10:30 AM to 10:45 AM						
10:45 AM to 11:00 AM						
11:00 AM to 11:15 AM					1	
11:15 AM to 11:30 AM				4	2	
11:30 AM to 11:45 AM				7	1	
11:45 AM to 12:00 PM	3					
12:00 PM to 12:15 PM				2	2	
12:15 PM to 12:30 PM				3	1	
12:30 PM to 12:45 PM	2			12		
12:45 PM to 1:00 PM						
1:00 PM to 1:15 PM	1			4	2	2
1:15 PM to 1:30 PM	1			7	4	
1:30 PM to 1:45 PM				1	5	
1:45 PM to 2:00 PM				2	1	
2:00 PM to 2:15 PM					1	
2:15 PM to 2:30 PM						
2:30 PM to 2:45 PM						1
2:45 PM to 3:00 PM						1
3:00 PM to 3:15 PM				1	1	
3:15 PM to 3:30 PM					1	
3:30 PM to 3:45 PM	1					
3:45 PM to 4:00 PM						
4:00 PM to 4:15 PM	1			1		
4:15 PM to 4:30 PM						
4:30 PM to 4:45 PM						
4:45 PM to 5:00 PM	1					
5:00 PM to 5:15 PM						
5:15 PM to 5:30 PM						
5:30 PM to 5:45 PM						
5:45 PM to 6:00 PM						
TOTAL	10	0	0	37	25	7

ALONG CROW CANYON ROAD						
1. NORTH OF NORRIS CANYON RD			2. SOUTH OF NORRIS CANYON RD			
NB1	SB1	TOTAL	NB2	SB2	TOTAL	TOTAL
S U M M A R Y (15 MINUTE TOTAL)						
6:00 AM to 6:15 AM	0	0	0	0	0	0
6:15 AM to 6:30 AM	0	0	0	0	0	0
6:30 AM to 6:45 AM	0	0	0	0	0	0
6:45 AM to 7:00 AM	0	0	0	0	0	0
7:00 AM to 7:15 AM	0	0	0	0	0	0
7:15 AM to 7:30 AM	0	0	0	0	0	0
7:30 AM to 7:45 AM	0	0	0	0	0	0
7:45 AM to 8:00 AM	0	0	0	0	0	0
8:00 AM to 8:15 AM	0	0	0	0	0	0
8:15 AM to 8:30 AM	0	0	0	0	0	0
8:30 AM to 8:45 AM	1	0	1	1	0	1
8:45 AM to 9:00 AM	1	0	1	2	0	2
9:00 AM to 9:15 AM	0	0	0	0	0	0
9:15 AM to 9:30 AM	0	0	0	0	0	0
9:30 AM to 9:45 AM	1	0	1	1	14	15
9:45 AM to 10:00 AM	0	0	0	0	0	0
10:00 AM to 10:15 AM	0	0	0	0	8	8
10:15 AM to 10:30 AM	0	0	0	9	21	21
10:30 AM to 10:45 AM	0	0	0	0	0	0
10:45 AM to 11:00 AM	0	0	0	0	0	0
11:00 AM to 11:15 AM	0	0	0	1	0	1
11:15 AM to 11:30 AM	0	0	0	2	4	6
11:30 AM to 11:45 AM	0	0	0	1	7	8
11:45 AM to 12:00 PM	0	0	0	0	3	3
12:00 PM to 12:15 PM	0	0	0	2	2	4
12:15 PM to 12:30 PM	0	0	0	1	3	4
12:30 PM to 12:45 PM	0	2	2	0	14	14
12:45 PM to 1:00 PM	0	0	0	0	0	0
1:00 PM to 1:15 PM	0	5	5	4	5	9
1:15 PM to 1:30 PM	0	1	1	4	8	12
1:30 PM to 1:45 PM	0	0	0	5	1	6
1:45 PM to 2:00 PM	0	0	0	1	2	3
2:00 PM to 2:15 PM	0	0	0	1	0	1
2:15 PM to 2:30 PM	0	0	0	0	0	0
2:30 PM to 2:45 PM	1	0	1	1	0	1
2:45 PM to 3:00 PM	1	0	1	1	0	1
3:00 PM to 3:15 PM	0	0	0	1	0	1
3:15 PM to 3:30 PM	0	0	0	1	0	1
3:30 PM to 3:45 PM	0	0	0	0	1	1
3:45 PM to 4:00 PM	0	0	0	0	0	0
4:00 PM to 4:15 PM	0	0	0	1	2	2
4:15 PM to 4:30 PM	0	0	0	0	0	0
4:30 PM to 4:45 PM	0	0	0	0	0	0
4:45 PM to 5:00 PM	0	0	0	0	0	0
5:00 PM to 5:15 PM	0	0	0	0	0	0
5:15 PM to 5:30 PM	0	0	0	0	0	0
5:30 PM to 5:45 PM	0	0	0	0	0	0
5:45 PM to 6:00 PM	0	0	0	0	0	0
TOTAL	7	10	17	30	97	127

		SUMMARY (HOURLY TOTALS)									
6:00 AM	to 7:00 AM	0	0	0	0	0	0	0	0	0	0
6:15 AM	to 7:15 AM	0	0	0	0	0	0	0	0	0	0
6:30 AM	to 7:30 AM	0	0	0	0	0	0	0	0	0	0
6:45 AM	to 7:45 AM	0	0	0	0	0	0	0	0	0	0
7:00 AM	to 8:00 AM	0	0	0	0	0	0	0	0	0	0
7:15 AM	to 8:15 AM	0	0	0	0	0	0	0	0	0	0
7:30 AM	to 8:30 AM	0	0	0	0	0	0	0	0	0	0
7:45 AM	to 8:45 AM	0	0	0	0	0	0	1	1	0	1
8:00 AM	to 9:00 AM	0	0	0	0	0	1	2	2	0	3
8:15 AM	to 9:15 AM	0	0	0	0	0	1	2	2	0	3
8:30 AM	to 9:30 AM	0	0	0	0	0	1	2	2	0	3
8:45 AM	to 9:45 AM	0	0	0	14	1	2	2	0	2	14
9:00 AM	to 10:00 AM	0	0	0	14	0	1	1	0	1	15
9:15 AM	to 10:15 AM	0	0	0	22	0	1	1	0	1	23
9:30 AM	to 10:30 AM	0	0	0	43	0	1	1	0	1	44
9:45 AM	to 10:45 AM	0	0	0	29	0	0	0	0	0	29
10:00 AM	to 11:00 AM	0	0	0	29	0	0	0	0	0	29
10:15 AM	to 11:15 AM	0	0	0	21	1	0	0	0	0	22
10:30 AM	to 11:30 AM	0	0	0	4	3	0	0	0	0	7
10:45 AM	to 11:45 AM	0	0	0	11	4	0	0	0	0	15
11:00 AM	to 12:00 PM	3	0	0	11	4	0	0	3	3	18
11:15 AM	to 12:15 PM	3	0	0	13	5	0	0	3	3	21
11:30 AM	to 12:30 PM	3	0	0	12	4	0	0	3	3	19
11:45 AM	to 12:45 PM	5	0	0	17	3	0	0	5	5	25
12:00 PM	to 1:00 PM	2	0	0	17	3	0	0	2	2	22
12:15 PM	to 1:15 PM	3	0	0	19	3	2	2	3	3	27
12:30 PM	to 1:30 PM	4	0	0	23	6	2	2	4	4	35
12:45 PM	to 1:45 PM	2	0	0	12	11	2	2	2	2	27
1:00 PM	to 2:00 PM	2	0	0	14	12	2	2	2	2	30
1:15 PM	to 2:15 PM	1	0	0	10	11	0	0	1	1	22
1:30 PM	to 2:30 PM	0	0	0	3	7	0	0	0	0	10
1:45 PM	to 2:45 PM	0	0	0	2	2	1	1	0	0	5
2:00 PM	to 3:00 PM	0	0	0	0	1	2	2	0	0	3
2:15 PM	to 3:15 PM	0	0	0	1	1	2	2	0	0	4
2:30 PM	to 3:30 PM	0	0	0	1	2	2	2	0	0	5
2:45 PM	to 3:45 PM	1	0	0	1	2	1	1	1	1	5
3:00 PM	to 4:00 PM	1	0	0	1	2	0	0	1	1	4
3:15 PM	to 4:15 PM	2	0	0	1	1	0	0	2	2	4
3:30 PM	to 4:30 PM	2	0	0	1	0	0	0	2	2	3
3:45 PM	to 4:45 PM	1	0	0	1	0	0	0	1	1	2
4:00 PM	to 5:00 PM	2	0	0	1	0	0	0	2	2	3
4:15 PM	to 5:15 PM	1	0	0	0	0	0	0	1	1	1
4:30 PM	to 5:30 PM	1	0	0	0	0	0	0	1	1	1
4:45 PM	to 5:45 PM	1	0	0	0	0	0	0	1	1	1
5:00 PM	to 6:00 PM	0	0	0	0	0	0	0	0	0	0

TEL: (510) 232 - 1271

FAX: (510) 232 - 1272



		SUMMARY (HOURLY TOTALS)											
6:00 AM	to 7:00 AM	0	0	0	0	1	0	0	0	0	1	0	1
6:15 AM	to 7:15 AM	0	0	0	0	1	0	0	0	0	1	0	1
6:30 AM	to 7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
6:45 AM	to 7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
7:00 AM	to 8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	to 8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	to 8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	to 8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	to 9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	to 9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	to 9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	to 9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
9:00 AM	to 10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
9:15 AM	to 10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
9:30 AM	to 10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
9:45 AM	to 10:45 AM	0	0	0	0	1	0	0	0	0	1	0	1
10:00 AM	to 11:00 AM	0	0	0	0	1	0	0	0	0	1	0	1
10:15 AM	to 11:15 AM	0	0	0	0	1	0	0	0	0	1	0	1
10:30 AM	to 11:30 AM	0	0	0	0	1	0	0	0	0	1	0	1
10:45 AM	to 11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	to 12:00 PM	0	0	0	0	0	1	1	0	1	1	0	1
11:15 AM	to 12:15 PM	0	0	0	0	0	1	1	0	1	1	0	1
11:30 AM	to 12:30 PM	0	0	0	0	1	1	1	0	1	2	0	2
11:45 AM	to 12:45 PM	0	0	0	0	1	2	2	0	2	3	0	3
12:00 PM	to 1:00 PM	0	0	0	0	1	1	1	0	1	2	0	2
12:15 PM	to 1:15 PM	0	0	0	0	1	2	2	0	2	3	0	3
12:30 PM	to 1:30 PM	0	0	0	1	0	2	2	0	2	3	1	3
12:45 PM	to 1:45 PM	1	0	0	1	0	1	2	1	2	3	2	3
1:00 PM	to 2:00 PM	1	0	0	1	0	1	2	1	2	3	2	3
1:15 PM	to 2:15 PM	1	0	0	1	0	0	0	1	1	0	2	2
1:30 PM	to 2:30 PM	1	0	0	0	1	0	0	1	1	1	1	2
1:45 PM	to 2:45 PM	0	0	0	0	1	0	0	0	0	1	0	1
2:00 PM	to 3:00 PM	0	0	0	0	1	0	0	0	0	1	0	1
2:15 PM	to 3:15 PM	0	0	0	0	1	0	0	0	0	1	0	1
2:30 PM	to 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	to 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM	to 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	to 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	to 4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	to 4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	to 5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	to 5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	to 5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	to 5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	to 6:00 PM	0	0	0	1	0	1	1	0	1	1	1	2

TEL: (510) 232 - 1271

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**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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**Appendix G – Traffic Sign Inventory**



Crow Canyon Road Traffic Signs

Road Name	Direction	Nearest Address	Distance to Nearest Intersection	Direction	Intersection	Sign Type	Sign Description	Code	Condition of Sign
Crow Canyon Rd	EB	0	920	S/O	MM 1.66	Regulatory	No Ped Crossing-Use Crosswalk	R49 (CA)	Good
Crow Canyon Rd	EB	0	915	S/O	MM 1.66	Regulatory	No Ped Crossing-Use Crosswalk	R49 (CA)	Good
Crow Canyon Rd	EB	0	890	S/O	MM 1.66	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	EB	0	890	S/O	MM 1.66	Regulatory	One Way Left	R6-1L	Good
Crow Canyon Rd	EB	0	890	S/O	MM 1.66	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	EB	0	2	S/O	Norris Canyon Rd	Regulatory	No Pedestrians	R9-3a	Good
Crow Canyon Rd	EB	0	2	S/O	Norris Canyon Rd	Regulatory	Use Crosswalk	IS69 (CA)	Good
Crow Canyon Rd	EB	5355	3	W/O	San Simeone Pl	Guide	Truck	M4-4	Good
Crow Canyon Rd	EB	5357	18	E/O	San Simeone Pl	Parking	No Parking Vehicles Over 20FT	R28D (CA)	Good
Crow Canyon Rd	EB	5355	3	W/O	San Simeone Pl	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	EB	5359	58	E/O	San Simeone Pl	Regulatory	Speed Checked By Radar	R48 (CA)	Good
Crow Canyon Rd	EB	5359	58	E/O	San Simeone Pl	Speed Limit	Speed Limit 40 MPH	R2-1	Good
Crow Canyon Rd	EB	5357	12	E/O	San Simeone Pl	Warning	Two Way Traffic	W44A (CA)	Damg
Crow Canyon Rd	EB	5357	15	E/O	San Simeone Pl	Warning	Two Way Traffic	W44A (CA)	Damg
Crow Canyon Rd	EB	5357	12	E/O	San Simeone Pl	Warning	Two Way Traffic	W6-3	Good
Crow Canyon Rd	EB	5357	15	E/O	San Simeone Pl	Warning	Two Way Traffic	W6-3	Damg
Crow Canyon Rd	EB	5353	22	E/O	Shadow Creek Ct	Regulatory	Do Not Pass	R4-1	Good
Crow Canyon Rd	EB	5353	22	E/O	Shadow Creek Ct	Regulatory	Do Not Pass	R4-1	Damg
Crow Canyon Rd	EB	5351	1	E/O	Shadow Creek Ct	Regulatory	Keep Right	R4-7	Good
Crow Canyon Rd	EB	5281	2	W/O	Shadow Creek Ct	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	EB	5291	4	E/O	Shadow Creek Ct	Street Name	Shadow Creek/Greenridge	D1-2	Good
Crow Canyon Rd	EB	5353	22	E/O	Shadow Creek Ct	Warning	Lane Ends Merge Left	W4-2R	Good
Crow Canyon Rd	EB	5353	22	E/O	Shadow Creek Ct	Warning	Lane Ends Merge Right	W4-2R	Good
Crow Canyon Rd	EB	5351	1	E/O	Shadow Creek Ct	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	EB	5269	4	W/O	Waterford Pl	Regulatory	No Left or U-Turn	R3-18	Good
Crow Canyon Rd	EB	5263	4	E/O	Waterford Pl	Regulatory	No Left or U-Turn	R3-18	Good
Crow Canyon Rd	EB	5269	4	E/O	Waterford Pl	Street Name	Waterford Pl	D3	Good
Crow Canyon Rd	NB	0	5	W/O	Greenridge Rd	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	NB	0	5	E/O	Greenridge Rd	Regulatory	One Way Left	R6-1L	Good
Crow Canyon Rd	NB	0	5	E/O	Greenridge Rd	Regulatory	Wrong Way	R5-1a	Good
Crow Canyon Rd	NB	0	5	W/O	Greenridge Rd	Street Name	Crow Canyon Rd	D3	Good
Crow Canyon Rd	NB	0	0	at	MM 1.20	Mile Post Marker	MM 1.20	D10-3	Good
Crow Canyon Rd	NB	0	0	at	MM 1.66	Mile Post Marker	MM 1.66	D10-3	Good
Crow Canyon Rd	NB	0	0	at	MM 2.06	Mile Post Marker	MM 2.06	D10-3	Good
Crow Canyon Rd	NB	0	0	at	MM 2.70	Mile Post Marker	MM 2.70	D10-3	Good
Crow Canyon Rd	NB	7575	0	at	MM 3.10	Mile Post Marker	MM 3.10	D10-3	Good
Crow Canyon Rd	NB	8018	0	at	MM 3.45	Mile Post Marker	MM 3.45	D10-3	Good
Crow Canyon Rd	NB	8018	158	N/O	MM 3.45	Regulatory	Speed Checked By Radar	R48 (CA)	Good
Crow Canyon Rd	NB	8018	158	N/O	MM 3.45	Speed Limit	Speed Limit 50 MPH	R2-1	Good
Crow Canyon Rd	NB	0	0	at	MM 4.10	Mile Post Marker	MM 4.10	D10-3	Good
Crow Canyon Rd	NB	0	529	S/O	MM 4.10	Regulatory	Speed Enforced By Aircraft	R49 2 (CA)	Damg
Crow Canyon Rd	NB	0	168	S/O	MM 4.10	Warning	Divided Highway Ends	W6-2	Good
Crow Canyon Rd	NB	0	168	S/O	MM 4.10	Warning	Divided Highway Ends	W6-2a (Mod)	Good
Crow Canyon Rd	NB	0	240	N/O	MM 4.10	Warning	Lane Ends Merge Left	W9-2L	Good
Crow Canyon Rd	NB	9232	1054	S/O	MM 4.10	Warning	Slide Area	W38 (CA)	Good
Crow Canyon Rd	NB	9232	1145	S/O	MM 4.10	Warning	Slide Area	W38 (CA)	Good
Crow Canyon Rd	NB	0	81	S/O	MM 4.32	Regulatory	Do Not Pass	R4-1	Good
Crow Canyon Rd	NB	0	188	S/O	MM 4.32	Regulatory	Speed Enforced By Radar	R48 (CA)	Good
Crow Canyon Rd	NB	0	188	S/O	MM 4.32	Speed Limit	Speed Limit 50 MPH	R2-1	Good
Crow Canyon Rd	NB	0	81	S/O	MM 4.32	Warning	Lane Ends Right	W11 (CA)	Good
Crow Canyon Rd	NB	0	296	N/O	MM 4.42	Curve Warning	Curve (Right)	W1-2R	Good
Crow Canyon Rd	NB	0	1408	N/O	MM 4.42	Curve Warning	Winding Road (Left)	W1-5L	Good
Crow Canyon Rd	NB	0	0	at	MM 4.42	Mile Post Marker	MM 4.42	D10-3	Good
Crow Canyon Rd	NB	0	296	N/O	MM 4.42	Warning	Advisory Speed Limit 45 MPH	W13-1	Good
Crow Canyon Rd	NB	0	1408	N/O	MM 4.42	Warning	Next 2 Miles	W16-4	Good
Crow Canyon Rd	NB	9999	605	N/O	MM 4.42	Warning	Soft Shoulder	W8-4	Good
Crow Canyon Rd	NB	0	38	N/O	MM 4.42	Warning	Two Way Traffic	W6-3	Good
Crow Canyon Rd	NB	0	38	N/O	MM 4.42	Warning	Two Way Traffic	W6-3	Good
Crow Canyon Rd	NB	0	0	at	MM 5.25	Mile Post Marker	MM 5.25	D10-3	Good
Crow Canyon Rd	NB	10700	0	at	MM 5.83	Mile Post Marker	MM 5.83	D10-3	Good
Crow Canyon Rd	NB	0	950	S/O	MM 5.83	Warning	Chevron Right	W1-8R	Good
Crow Canyon Rd	NB	0	914	S/O	MM 5.83	Warning	Chevron Right	W1-8R	Good
Crow Canyon Rd	NB	0	892	S/O	MM 5.83	Warning	Chevron Right	W1-8R	Good
Crow Canyon Rd	NB	0	861	S/O	MM 5.83	Warning	Chevron Right	W1-8R	Good
Crow Canyon Rd	NB	0	838	S/O	MM 5.83	Warning	Chevron Right	W1-8R	Good
Crow Canyon Rd	NB	0	409	N/O	MM 5.83	Warning	Object Marker	OM1-3R	Good
Crow Canyon Rd	NB	0	0	at	MM 6.38	Mile Post Marker	MM 6.38	D10-3	Good
Crow Canyon Rd	NB	0	1254	W/O	MM 6.38	Warning	Large Arrow (Right)	W1-6R	Good
Crow Canyon Rd	NB	0	463	W/O	MM 6.38	Warning	Large Arrow (Right)	W1-6R	Good
Crow Canyon Rd	NB	0	1254	W/O	MM 6.38	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	0	463	W/O	MM 6.38	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	0	0	at	MM 6.77	Mile Post Marker	MM 6.77	D10-3	Good
Crow Canyon Rd	NB	0	357	E/O	MM 6.77	Speed Limit	40 MPH Zone Ahead	R2-4 (CA)	Good

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Road Name	Direction	Nearest Address	Distance to Nearest Intersection	Direction	Intersection	Sign Type	Sign Description	Code	Condition of Sign
Crow Canyon Rd	NB	0	634	W/O	MM 6.77	Warning	Large Arrow (Left)	W1-6L	Good
Crow Canyon Rd	NB	0	634	W/O	MM 6.77	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	0	124	S/O	MM1.20	Curve Warning	Winding Road (Left)	W1-5L	Good
Crow Canyon Rd	NB	0	328	N/O	MM1.20	Non Standard	Crow Creek San Lorenzo Creek W	CRK	Good
Crow Canyon Rd	NB	0	616	S/O	MM1.20	Parking	No Parking Vehicle Over 20 Ft	R283 (CA)	Good
Crow Canyon Rd	NB	0	364	N/O	MM1.20	Street Name	Cold Water Rd	D3	Valid
Crow Canyon Rd	NB	0	725	S/O	MM1.20	Warning	Large Arrow (Left)	W1-6L	Good
Crow Canyon Rd	NB	0	124	S/O	MM1.20	Warning	Next 1 Miles	W16-4	Good
Crow Canyon Rd	NB	0	725	S/O	MM1.20	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	0	558	N/O	MM1.20	Warning	Signal Ahead	W3-3	Damg
Crow Canyon Rd	NB	0	497	N/O	MM1.66	Non Standard	Crow Creek San Lorenzo Creek W	CRK	Good
Crow Canyon Rd	NB	0	838	S/O	MM1.66	Regulatory	Keep Right	R4-7	Damg
Crow Canyon Rd	NB	0	813	S/O	MM1.66	Regulatory	Speed Enforced by Aircraft	R48-2 (CA)	Good
Crow Canyon Rd	NB	0	33	N/O	MM1.66	Regulatory	Speed Enforced by Radar	R48 (CA)	Good
Crow Canyon Rd	NB	0	33	N/O	MM1.66	Speed Limit	Speed Limit 40 MPH	R2-1	Good
Crow Canyon Rd	NB	0	306	S/O	MM1.66	Street Name	Cold Water Dr	D3	Good
Crow Canyon Rd	NB	0	874	S/O	MM1.66	Street Name	Cote Water Dr	D3	Good
Crow Canyon Rd	NB	0	469	N/O	MM1.66	Warning	Deer	W11-3	Valid
Crow Canyon Rd	NB	0	264	N/O	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	283	N/O	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	325	N/O	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	351	N/O	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	386	N/O	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	404	N/O	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	426	N/O	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	453	N/O	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	475	N/O	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	480	N/O	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	25	S/O	MM2.06	Curve Warning	Reverse Turn (Right)	W1-3R	Damg
Crow Canyon Rd	NB	0	310	N/O	MM2.06	Curve Warning	Right Reverse Turn w/Advisory	W1-3R(Mod)	Damg
Crow Canyon Rd	NB	0	25	S/O	MM2.06	Warning	Advisory Speed 30 MPH	W13-1	Damg
Crow Canyon Rd	NB	0	1210	N/O	MM2.06	Warning	Large Arrow (Left)	W1-6L	Good
Crow Canyon Rd	NB	0	1210	N/O	MM2.06	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	0	101	N/O	MM2.06	Warning	Rock Slide Area	W50 (CA)	Good
Crow Canyon Rd	NB	6651	75	N/O	MM2.70	Speed Limit	Speed Limit 45 MPH	R2-1	Good
Crow Canyon Rd	NB	0	1642	S/O	MM2.70	Warning	Large Arrow (Right)	W1-6R	Good
Crow Canyon Rd	NB	0	1642	S/O	MM2.70	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	0	46	S/O	MM3.02	Curve Warning	Reverse Turn (Left)	W1-3L	Good
Crow Canyon Rd	NB	0	46	S/O	MM3.02	Warning	Advisory Speed 30 MPH	W13-1	Good
Crow Canyon Rd	NB	7575	28	N/O	MM3.10	Curve Warning	Left Reverse Turn w/Advisory 5	W1-3L(Mod)	Good
Crow Canyon Rd	NB	7575	78	N/O	MM3.10	Warning	Large Arrow (Left)	W1-6L	Good
Crow Canyon Rd	NB	7575	78	N/O	MM3.10	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	7825	476	S/O	Norris Canyon Rd	Curve Warning	Curve (Left)	W1-2L	Good
Crow Canyon Rd	NB	0	263	S/O	Norris Canyon Rd	Parking	No Parking Any Time	R26 (CA)	Good
Crow Canyon Rd	NB	0	168	S/O	Norris Canyon Rd	Parking	No Parking Any Time	R26 (CA)	Good
Crow Canyon Rd	NB	0	368	S/O	Norris Canyon Rd	Parking	No Parking Any Time	R28 (CA)	Damg
Crow Canyon Rd	NB	8018	2	N/O	Norris Canyon Rd	Regulatory	Keep Right	R4-7	Good
Crow Canyon Rd	NB	0	143	S/O	Norris Canyon Rd	Regulatory	Keep Right	R4-7	Good
Crow Canyon Rd	NB	0	14	N/O	Norris Canyon Rd	Regulatory	No Left or U-Turn	R3-1R	Good
Crow Canyon Rd	NB	0	14	N/O	Norris Canyon Rd	Street Name	Norris Canyon Road	D3	Good
Crow Canyon Rd	NB	7825	476	S/O	Norris Canyon Rd	Warning	Advisory Speed Limit 40 MPH	W13-1	Good
Crow Canyon Rd	NB	7324	932	S/O	Norris Canyon Rd	Warning	Large Arrow (Right)	W1-6R	Good
Crow Canyon Rd	NB	7324	932	S/O	Norris Canyon Rd	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	8018	2	N/O	Norris Canyon Rd	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	0	143	S/O	Norris Canyon Rd	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	0	462	S/O	Norris Canyon Rd	Warning	Signal Ahead	W3-3	Good
Crow Canyon Rd	NB	0	402	S/O	Norris Canyon Rd	Warning	Signal Ahead	W3-3	Good
Crow Canyon Rd	NB	5357	1	N/O	San Simeone Pl	Regulatory	Do Not Enter	R5-1	Good
Crow Canyon Rd	NB	5357	4	W/O	San Simeone Pl	Regulatory	No Ped Crossing	R49 (CA)	Good
Crow Canyon Rd	NB	5357	6	E/O	San Simeone Pl	Regulatory	No Ped Crossing	R49 (CA)	Good
Crow Canyon Rd	NB	5355	1	N/O	San Simeone Pl	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	NB	5355	1	N/O	San Simeone Pl	Regulatory	No U-Turn	R3-4A (CA)	Good
Crow Canyon Rd	NB	5355	3	W/O	San Simeone Pl	Regulatory	One Way Arrow (Right)	R6-1R	Good
Crow Canyon Rd	NB	5357	1	N/O	San Simeone Pl	Regulatory	Wrong Way	R5-1a	Good
Crow Canyon Rd	NB	5281	22	W/O	Shadow Creek Ct	Regulatory	No Ped Crossing	R48 (CA)	Good
Crow Canyon Rd	NB	5269	8	E/O	Waterford Pl	Regulatory	No Ped Crossing	R49 (CA)	Good
Crow Canyon Rd	NB	5269	4	W/O	Waterford Pl	Regulatory	One Way Arrow (Right)	R6-1R	Good
Crow Canyon Rd	SB	0	305	E/O	Greenridge Rd	Regulatory	No Ped Crossing-Use Crosswalk	R49 (CA)	Good
Crow Canyon Rd	SB	0	252	E/O	Greenridge Rd	Regulatory	No Ped Crossing-Use Crosswalk	R49 (CA)	Good
Crow Canyon Rd	SB	0	6	W/O	Greenridge Rd	Regulatory	No Ped Crossing-Use Crosswalk	R49 (CA)	Valid
Crow Canyon Rd	SB	0	37	E/O	Greenridge Rd	Regulatory	No Ped Crossing-Use Crosswalk	R49 (CA)	Valid
Crow Canyon Rd	SB	0	0	at	MM 1.20	Mile Post Marker	MM 1.20	D10-3	Damg
Crow Canyon Rd	SB	0	0	at	MM 1.66	Mile Post Marker	MM 1.66	D10-3	Good
Crow Canyon Rd	SB	0	0	at	MM 2.06	Mile Post Marker	MM 2.06	D10-3	Good
Crow Canyon Rd	SB	0	0	at	MM 2.70	Mile Post Marker	MM 2.70	D10-9	Good

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Road Name	Direction	Nearest Address	Distance to Nearest Intersection	Direction	Intersection	Sign Type	Sign Description	Code	Condition of Sign
Crow Canyon Rd	SB	0	0	at	MM 3.02	Mile Post Marker	MM 3.02	D10-3	Good
Crow Canyon Rd	SB	0	1012	N/A	MM 3.45	Curve Warning	Reverse Curve (Left)	W1-4L	Good
Crow Canyon Rd	SB	0	969	N/A	MM 3.45	Curve Warning	Reverse Curve (Left)	W1-4L	Good
Crow Canyon Rd	SB	0	0	at	MM 3.45	Mile Post Marker	MM 3.45	D10-3	Good
Crow Canyon Rd	SB	8018	63	N/A	MM 3.45	Regulatory	Keep Right	R4-7	Good
Crow Canyon Rd	SB	0	1410	N/A	MM 3.45	Speed Limit	45 MPH Zone Ahead	R2-4 (CA)	Good
Crow Canyon Rd	SB	0	1410	N/A	MM 3.45	Speed Limit	45 MPH Zone Ahead	R2-4 (CA)	Good
Crow Canyon Rd	SB	8018	88	N/A	MM 3.45	Speed Limit	Speed Limit 45 MPH	R2-1	Good
Crow Canyon Rd	SB	8160	590	N/A	MM 3.45	Street Name	Norris Cyn	D3	Good
Crow Canyon Rd	SB	0	1012	N/A	MM 3.45	Warning	Advisory Speed Limit 45 MPH	W13-1	Damg
Crow Canyon Rd	SB	0	969	N/A	MM 3.45	Warning	Advisory Speed Limit 45 MPH	W13-1	Good
Crow Canyon Rd	SB	0	957	N/A	MM 3.45	Warning	Divided Highway Ends	W6-2	Good
Crow Canyon Rd	SB	0	950	N/A	MM 3.45	Warning	Divided Highway Ends	W6-2	Good
Crow Canyon Rd	SB	0	957	N/A	MM 3.45	Warning	Divided Highway Ends	W6-2a (Mod)	Good
Crow Canyon Rd	SB	0	950	N/A	MM 3.45	Warning	Divided Highway Ends	W6-2a (Mod)	Good
Crow Canyon Rd	SB	8018	63	N/A	MM 3.45	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	8160	590	N/A	MM 3.45	Warning	Signe Road Left	W2-2L	Good
Crow Canyon Rd	SB	8018	245	N/A	MM 3.45	Warning	Signal Ahead	W3-3	Good
Crow Canyon Rd	SB	8018	245	N/A	MM 3.45	Warning	Signal Ahead	W3-3	Good
Crow Canyon Rd	SB	0	0	at	MM 4.10	Mile Post Marker	MM 4.10	D10-3	Good
Crow Canyon Rd	SB	0	1381	S/A	MM 4.10	Regulatory	Do Not Pass	R4-1	Good
Crow Canyon Rd	SB	0	1396	S/A	MM 4.10	Regulatory	Do Not Pass	R4-1	Good
Crow Canyon Rd	SB	0	1381	S/A	MM 4.10	Warning	Lane Ends Left	W4-2L	Good
Crow Canyon Rd	SB	0	1396	S/A	MM 4.10	Warning	Lane Ends Left	W4-2L	Good
Crow Canyon Rd	SB	0	698	S/A	MM 4.10	Warning	Lane Ends Merge Right	W4-7	Good
Crow Canyon Rd	SB	0	0	at	MM 4.32	Mile Post Marker	MM 4.32	D10-3	Good
Crow Canyon Rd	SB	0	185	S/A	MM 4.32	Regulatory	Speed Checked By Radar	R48 (CA)	Good
Crow Canyon Rd	SB	0	185	S/A	MM 4.32	Speed Limit	Speed Limit 50 MPH	R2-1	Good
Crow Canyon Rd	SB	0	37	N/A	MM 4.42	Regulatory	Keep Right	R4-7	Vand
Crow Canyon Rd	SB	0	37	N/A	MM 4.42	Regulatory	Keep Right	R4-7a (Mod)	Good
Crow Canyon Rd	SB	9998	589	N/A	MM 4.42	Warning	Divided Road	W6-1b	Damg
Crow Canyon Rd	SB	0	37	N/A	MM 4.42	Warning	Object Marker	OM1-3	Vand
Crow Canyon Rd	SB	0	0	at	MM 5.25	Mile Post Marker	MM 5.25	D10-3	Good
Crow Canyon Rd	SB	0	1660	S/A	MM 5.25	Non Standard	School Bus Stop 400 FT	SPW	Good
Crow Canyon Rd	SB	0	955	S/A	MM 5.25	Regulatory	Speed Enforced By Aircraft	R18-2 (CA)	Good
Crow Canyon Rd	SB	10700	0	at	MM 5.83	Mile Post Marker	MM 5.83	D10-3	Good
Crow Canyon Rd	SB	0	950	S/A	MM 5.83	Warning	Chevron Left	W1-8L	Good
Crow Canyon Rd	SB	0	814	S/A	MM 5.83	Warning	Chevron Left	W1-8L	Good
Crow Canyon Rd	SB	0	892	S/A	MM 5.83	Warning	Chevron Left	W1-8L	Good
Crow Canyon Rd	SB	0	861	S/A	MM 5.83	Warning	Chevron Left	W1-8L	Good
Crow Canyon Rd	SB	0	838	S/A	MM 5.83	Warning	Chevron Left	W1-8L	Good
Crow Canyon Rd	SB	0	431	N/A	MM 5.83	Warning	Object Marker	OM 3L	Damg
Crow Canyon Rd	SB	0	0	at	MM 6.38	Mile Post Marker	MM 6.38	D10-3	Good
Crow Canyon Rd	SB	0	20	E/A	MM 6.38	Non Standard	Crow Creek San Lorenzo Creek W	CRK	Good
Crow Canyon Rd	SB	0	464	W/A	MM 6.38	Warning	Large Arrow (Left)	W1-6L	Good
Crow Canyon Rd	SB	0	464	W/A	MM 6.38	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	0	10	W/A	MM 6.77	Curve Warning	Curve (Left)	W1-2L	Good
Crow Canyon Rd	SB	0	926	W/A	MM 6.77	Curve Warning	Winding Road (Left)	W1-5L	Good
Crow Canyon Rd	SB	0	388	E/A	MM 6.77	Guide	Alameda County Line	G10 (CA)	Damg
Crow Canyon Rd	SB	0	0	at	MM 6.77	Mile Post Marker	MM 6.77	D10-3	Good
Crow Canyon Rd	SB	0	305	E/A	MM 6.77	Non Standard	CHP Sign	CHP	Damg
Crow Canyon Rd	SB	0	488	E/A	MM 6.77	Non Standard	Entering San Lorenzo Creek Wat	CRK	Good
Crow Canyon Rd	SB	0	307	E/A	MM 6.77	Regulatory	No Trucks	R5-2	Good
Crow Canyon Rd	SB	0	307	E/A	MM 6.77	Regulatory	Over 15 Tons	R20D-1 (CA)	Good
Crow Canyon Rd	SB	0	366	E/A	MM 6.77	Regulatory	Speed Checked By Radar	R48 (CA)	Good
Crow Canyon Rd	SB	0	366	E/A	MM 6.77	Speed Limit	Speed Limit 50 MPH	R2-1	Good
Crow Canyon Rd	SB	0	10	W/A	MM 6.77	Warning	Advisory Speed Limit 35 MPH	W13-1	Good
Crow Canyon Rd	SB	0	260	W/A	MM 6.77	Warning	Deer	W11-3	Vand
Crow Canyon Rd	SB	0	660	W/A	MM 6.77	Warning	Large Arrow (Right)	W1-6R	Good
Crow Canyon Rd	SB	0	926	W/A	MM 6.77	Warning	Next 2 Miles	W16-4	Good
Crow Canyon Rd	SB	0	660	W/A	MM 6.77	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	0	585	S/A	MM1.20	Non Standard	Caution Pedestrians On Shoulder	SPW	Good
Crow Canyon Rd	SB	0	187	S/A	MM1.20	Non Standard	Caution Pedestrians On Shoulder	SPW	Damg
Crow Canyon Rd	SB	0	276	N/A	MM1.20	Non Standard	Caution Pedestrians On Shoulder	SPW	Good
Crow Canyon Rd	SB	0	448	N/A	MM1.20	Non Standard	Crow Creek San Lorenzo Creek W	CRK	Good
Crow Canyon Rd	SB	0	650	S/A	MM1.20	Parking	No Parking Any Time	R26 (CA)	Good
Crow Canyon Rd	SB	0	694	S/A	MM1.20	Regulatory	Keep Right	R4-7	Damg
Crow Canyon Rd	SB	0	694	S/A	MM1.20	Regulatory	Keep Right	R4-7a	Good
Crow Canyon Rd	SB	0	187	S/A	MM1.20	Street Name	San Simeon Place	D3	Damg
Crow Canyon Rd	SB	0	6	N/A	MM1.20	Warning	Divided Road	W6-1b	Vand
Crow Canyon Rd	SB	0	694	S/A	MM1.20	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	0	160	S/A	MM1.20	Warning	Signal Ahead	W3-3	Good
Crow Canyon Rd	SB	0	160	S/A	MM1.20	Warning	Signal Ahead	W3-3a (CA)	Damg
Crow Canyon Rd	SB	0	984	S/A	MM1.66	Non Standard	Caution Pedestrians On Shoulder	SPW	Good
Crow Canyon Rd	SB	0	845	S/A	MM1.66	Regulatory	No U-Turn	R3-4	Good

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Road Name	Direction	Nearest Address	Distance to Nearest Intersection	Direction	Intersection	Sign Type	Sign Description	Code	Condition of Sign
Crow Canyon Rd	SB	0	838	S/O	MM1.66	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	SB	0	1046	S/O	MM1.66	Regulatory	Speed Checked By Radar	R48 (CA)	Damg
Crow Canyon Rd	SB	0	1046	S/O	MM1.66	Speed Limit	Speed Limit 40 MPH	R2-1	Good
Crow Canyon Rd	SB	0	945	S/O	MM1.66	Street Name	Cold Water Dr	D3	Faded
Crow Canyon Rd	SB	0	945	S/O	MM1.66	Street Name	Cold Water Dr	D3	Good
Crow Canyon Rd	SB	0	945	S/O	MM1.66	Street Name	Crow Canyon Rd	D3	Good
Crow Canyon Rd	SA	0	9	N/O	MM1.66	Warning	Signal Ahead	W3-3	Vand
Crow Canyon Rd	SB	0	268	N/O	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Faded
Crow Canyon Rd	SB	0	310	N/O	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Good
Crow Canyon Rd	SB	0	331	N/O	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Faded
Crow Canyon Rd	SB	0	357	N/O	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Good
Crow Canyon Rd	SB	0	388	N/O	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Good
Crow Canyon Rd	SB	0	404	N/O	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Vand
Crow Canyon Rd	SB	0	438	N/O	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Vand
Crow Canyon Rd	SB	0	471	N/O	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Vand
Crow Canyon Rd	SB	0	492	N/O	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Vand
Crow Canyon Rd	SB	0	890	N/O	MM2.06	Curve Warning	Reverse Turn (Right)	W1-3R	Good
Crow Canyon Rd	SB	0	1481	N/O	MM2.06	Curve Warning	Winding Road (Left)	W1-5L	Good
Crow Canyon Rd	SB	0	3	N/O	MM2.06	Parking	No Parking Any Time	R26 (CA)	Vand
Crow Canyon Rd	SB	0	592	N/O	MM2.06	Parking	No Parking Any Time	R26 (CA)	Good
Crow Canyon Rd	SB	0	121	S/O	MM2.06	Parking	No Parking Any Time w/Right Arr	R28 (CA)	Good
Crow Canyon Rd	SB	0	890	N/O	MM2.06	Warning	Advisory Speed 30 MPH	W13-1	Good
Crow Canyon Rd	SB	0	597	N/O	MM2.06	Warning	Large Arrow (Right)	W1-6R	Good
Crow Canyon Rd	SB	0	1213	N/O	MM2.06	Warning	Large Arrow (Right)	W1-6R	Good
Crow Canyon Rd	SB	0	1481	N/O	MM2.06	Warning	Next 1 Miles	W16-4	Good
Crow Canyon Rd	SB	0	597	N/O	MM2.06	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	0	1213	N/O	MM2.06	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	6776	641	N/O	MM2.70	Non Standard	DriveWay	SPW	Good
Crow Canyon Rd	SB	0	634	S/O	MM2.70	Speed Limit	Speed Limit 40 MPH	R2-1	Damg
Crow Canyon Rd	SB	0	1484	S/O	MM2.70	Warning	Large Arrow (Left)	W1-6L	Good
Crow Canyon Rd	SB	0	1484	S/O	MM2.70	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	6776	641	N/O	MM2.70	Warning	Side Road Right	W2-2R	Good
Crow Canyon Rd	SB	0	208	N/O	MM3.02	Regulatory	Speed Checked By Radar	R48 (CA)	Good
Crow Canyon Rd	SB	0	176	S/O	MM3.02	Regulatory	Speed Enforced By Aircraft	R48-2 (CA)	Good
Crow Canyon Rd	SB	0	208	N/O	MM3.02	Speed Limit	Speed Limit 35 MPH	R2-1	Good
Crow Canyon Rd	SB	8000	240	S/O	Norris Canyon Rd	Curve Warning	Reverse Turn (Left)	W1-3L	Good
Crow Canyon Rd	SB	7570	711	S/O	Norris Canyon Rd	Non Standard	No Dumping & No Parking	DMP	Good
Crow Canyon Rd	SB	7570	633	S/O	Norris Canyon Rd	Non Standard	No Dumping & No Parking	DMP	Good
Crow Canyon Rd	SB	8018	63	N/O	Norris Canyon Rd	Non Standard	On Norris Can Rd in Contra Co	SR	Good
Crow Canyon Rd	SB	8018	63	N/O	Norris Canyon Rd	Regulatory	Commercial Vehicles Over 7 Ton	R36 (CA)	Good
Crow Canyon Rd	SB	0	4	S/O	Norris Canyon Rd	Regulatory	Keep Right	R4-7	Good
Crow Canyon Rd	SB	0	3	N/O	Norris Canyon Rd	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	SB	8018	2	N/O	Norris Canyon Rd	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	SB	0	3	N/O	Norris Canyon Rd	Street Name	Norris Canyon Road	D3	Good
Crow Canyon Rd	SB	8000	240	S/O	Norris Canyon Rd	Warning	Advisory Speed Limit 35 MPH	W13-1	Good
Crow Canyon Rd	SB	7534	761	S/O	Norris Canyon Rd	Warning	Deer	W11-3	Vand
Crow Canyon Rd	SB	7570	617	S/O	Norris Canyon Rd	Warning	Large Arrow (Left)	W1-6L	Good
Crow Canyon Rd	SB	7570	617	S/O	Norris Canyon Rd	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	0	4	S/O	Norris Canyon Rd	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	5351	1	E/O	Shadow Creek Ct	Regulatory	One Way Arrow (Right)	R6-1R	Good
Crow Canyon Rd	SB	5263	6	W/O	Waterford Pl	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	SB	5269	2	E/O	Waterford Pl	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	SB	5263	8	W/O	Waterford Pl	Regulatory	No U-Turn	R34A (CA)	Good
Crow Canyon Rd	SB	5263	4	E/O	Waterford Pl	Regulatory	One Way Arrow (Right)	R6-1R	Good
Crow Canyon Rd	SB	5263	6	W/O	Waterford Pl	Regulatory	One Way Left	R6-1L	Good
Crow Canyon Rd	SB	5263	6	W/O	Waterford Pl	Street Name	Waterford Pl	D3	Damg
Crow Canyon Rd	WB	0	97	E/O	Greenridge Rd	Regulatory	No Public Parking	R101 (CA) M	Good
Crow Canyon Rd	WB	0	5	E/O	Greenridge Rd	Regulatory	No Right Turn	R3-1	Good
Crow Canyon Rd	WB	0	5	W/O	Greenridge Rd	Regulatory	One Way Left	R6-1L	Good
Crow Canyon Rd	WB	0	6	W/O	Greenridge Rd	Street Name	Greenridge Rd	D3	Good
Crow Canyon Rd	WB	0	5	W/O	Greenridge Rd	Street Name	Greenridge Rd	D3	Good
Crow Canyon Rd	WB	0	5	W/O	Greenridge Rd	Street Name	Waterford Pl	D3	Good
Crow Canyon Rd	WB	0	197	N/O	MM2.06	Parking	No Parking Any Time	R26 (CA)	Good
Crow Canyon Rd	WB	0	850	N/O	MM2.06	Parking	No Parking Any Time w/Left Arr	R28L (CA)	Faded
Crow Canyon Rd	WB	0	2	S/O	Norris Canyon Rd	Regulatory	No Pedestrians	R9-3a	Good
Crow Canyon Rd	WB	0	2	N/O	Norris Canyon Rd	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	WB	0	4	S/O	Norris Canyon Rd	Regulatory	One Way Arrow (Right)	R6-1R	Good
Crow Canyon Rd	WB	0	4	N/O	Norris Canyon Rd	Regulatory	One Way Left	R6-1L	Good
Crow Canyon Rd	WB	0	2	S/O	Norris Canyon Rd	Regulatory	Use Crosswalk	H66A (CA)	Good
Crow Canyon Rd	WB	0	2	N/O	Norris Canyon Rd	Street Name	Crow Canyon Road	D3	Good
Crow Canyon Rd	WB	0	4	N/O	Norris Canyon Rd	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	WB	5355	1	W/O	San Simone Pl	Regulatory	Keep Right	R4-7	Good
Crow Canyon Rd	WB	5355	1	W/O	San Simone Pl	Regulatory	Keep Right	R4-7A	Damg
Crow Canyon Rd	WB	5281	2	W/O	Shadow Creek Ct	Regulatory	No Left or U-Turn	R3-1B	Good
Crow Canyon Rd	WB	5351	1	E/O	Shadow Creek Ct	Regulatory	No Left or U-Turn	R3-1B	Damg

**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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## **APPENDIX B SWITRS ACCIDENT DATA**

**DRAFT**

ID	Segment	collision type	distance	direction	Date	Time	primary collision factor	Direction of Travel 1	Direction of Travel 2	Movement Preceding Collision 1	Movement Preceding Collision 2	party sobriety 1	party sobriety 2	Segment	MP (calculated)	collision type (actual)
62	1	Sideswipe	78	South	8/25/2004	2:25:00 AM	Improper Turning	North	North	Straight	Parked	HNBD		1	0.90	Hit Object
78	1	Hit Object	3168	South	1/11/2005	1:50:00 AM	or Ped	South		Straight		HNBD		1	0.90	Hit Object
100	1	Hit Object	50	South	7/27/2005	4:40:00 PM	or Ped	North		Straight		HNBD		1	0.91	Hit Object
281	1	Sideswipe	36	South	4/20/2010	3:15:00 PM	Improper Turning	North	North	Turning	Parked	HNBD	Applicabl	1	0.91	Hit Object
291	1	Rear-End	30	South	9/18/2010	8:00:00 PM	Improper Turning	North	North	Straight	Parked	HNBD	Applicabl	1	0.91	Hit Object
32	1	Hit Object	10	North	11/13/2003	11:45:00 PM	Not Driver	North		Straight		HNBD		1	0.92	Animal-Involved
37	1	Rear-End	15	South	12/4/2003	6:00:00 PM	Unsafe Speed	North	North	Stopped	Straight	HNBD	HNBD	1	0.92	Rear-end
3	1	Hit Object	150	North	1/9/2003	6:54:00 AM	Improper Turning	South		Straight		HNBD		1	0.95	Hit Object
11	1	Broadside	0		3/6/2003	9:35:00 PM	Auto R/W Violation	East	North	Straight	Straight	HNBD	HNBD	1	0.98	Broadside
81	1	Broadside	0		1/26/2005	8:03:00 PM	Unknown	South	West	Straight	Straight	HNBD	HNBD	1	0.98	Broadside
203	1	Head-On	0	In Int.	2/14/2008	6:00:00 PM	influence	South	North	Turn	Straight	Under	HNBD	1	0.98	Head-on
289	1	Rear-End	10	North	9/14/2010	11:00:00 AM	Unsafe Speed	South	South	Straight	Road	HNBD	HNBD	1	0.98	Rear-end
106	1	Rear-End	40	North	10/17/2005	12:50:00 PM	Unsafe Speed	South	South	Straight	Stopped	HNBD	HNBD	1	0.99	Rear-end
177	1	Overturned	2640	South	9/3/2007	12:30:00 AM	Improper Turning	North		Turning		nt Not		1	1.00	Overturned
10	1	Rear-End	92	East	3/2/2003	12:40:00 PM	Unsafe Speed	East	East/East	Straight	ped	HNBD	HNBD	1	1.00	Rear-end
202	1	Broadside	0	In Int.	2/14/2008	2:00:00 PM	Improper Turning	West	North	Turn	Straight	HNBD	HNBD	1	1.03	Broadside
324	1	Rear-End	20	South	4/4/2012	1514		NB		Stopped, Slowing		Hit not seen		1	1.03	Rear-end
98	1	Hit Object	200	North	7/17/2005	12:03:00 AM	Improper Turning	North		Ran Off Road		HNBD		1	1.07	Hit Object
321	1	Hit Object	212	North	1/22/2012	0250		NB		Proceeding straight		HNBD		1	1.07	Hit Object
68	1	Hit Object	277	North	11/1/2004	8:45:00 AM	Improper Turning	North		Straight		Fatigued		1	1.08	Hit Object
111	1	Hit Object	300	North	10/29/2005	11:15:00 PM	influence	North	South	Turning	Parked	Under		1	1.09	Hit Object
146	1	Overturned	351	North	11/30/2006	11:15:00 PM	Unsafe Speed	North		Turning		HNBD		1	1.10	Overturned
154	1	Hit Object	508	North	1/12/2007	4:49:00 PM	influence	North		Straight		Under		1	1.13	Hit Object
117	1	Sideswipe	1584	South	12/17/2005	4:30:00 PM	Not Stated	South	North	Opposing Lane	Straight		HNBD	1	1.20	Sideswipe
1	1	Sideswipe	927	North	1/5/2003	6:00:00 AM	Wrong Side of Road	North	h	Straight	Straight/Proce	HNBD	HNBD	1	1.21	Sideswipe
93	1	Broadside	1056	South	5/2/2005	12:40:00 PM	Auto R/W Violation	South	North	Turn	Straight	HNBD	HNBD	1	1.30	Broadside
73	1	Hit Object	1056	South	12/6/2004	5:15:00 PM	Improper Turning	South		Turning		HNBD		1	1.30	Hit Object
249	1	Broadside	1584	North	7/3/2009	6:30:00 AM	Auto R/W Violation	West	North	Traffic	Straight	HNBD	HNBD	1	1.33	Broadside
113	1	Sideswipe	1584	North	11/14/2005	1:00:00 PM	Unsafe Speed	South	South	Passing	Straight	HNBD	HNBD	1	1.33	Sideswipe
213	1	Overturned	585	South	6/7/2008	5:20:00 PM	Unsafe Speed	South		Straight		HNBD		1	1.39	Overturned
195	1	Rear-End	500	South	12/21/2007	3:57:00 PM	Unsafe Speed	South	South	Straight	Straight	HNBD	HNBD	1	1.41	Rear-end
297	1	Head-On	403	South	11/8/2010	10:10:00 AM	Unsafe Speed	North		Straight		HNBD		1	1.43	Hit Object

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ID	Segment	collision type	distance	direction	Date	Time	primary collision factor	Direction of Travel 1	Direction of Travel 2	Movement Preceding Collision 1	Movement Preceding Collision 2	party sobriety 1	party sobriety 2	Segment	MP (calculated)	collision type (actual)
104	1	Other	200	South	9/23/2005	7:25:00 AM	or Ped	North		Straight		HNBD		1	1.47	Animal-Involved
79	1	Hit Object	10560	South	1/11/2005	6:30:00 AM	Improper Turning	North		Ran Off Road		HNBD		1	1.48	Hit Object
136	1	Sideswipe	62	South	8/10/2006	5:45:00 PM	Improper Turning	North	North	Turning	Road	HNBD	HNBD	1	1.49	Sideswipe
38	1	Hit Object	40	South	12/12/2003	7:10:00 AM	Not Driver	North		Straight		HNBD		1	1.50	Animal-Involved
9	1	Head-On	0		3/1/2003	10:25:00 AM	influence	North	South	Turn	Straight	Under	HNBD	1	1.50	Head-on
75	2	Hit Object	1	North	12/29/2004	9:50:00 AM	Improper Turning	South		Ran Off Road		HNBD		1	1.50	Hit Object
229	1	Rear-End	20	South	1/14/2009	3:50:00 PM	Unsafe Speed	North	North	Road	Straight	HNBD	HNBD	1	1.50	Rear-end
71	1	Sideswipe	0	South	11/16/2004	5:15:00 PM	Unsafe Speed	North	North	Straight	ed	HNBD	HNBD	1	1.50	Sideswipe
58	2	Other	400	North	8/10/2004	2:00:00 PM	Not Driver	South		Straight		HNBD		2	1.58	Animal-Involved
280	2	Not Stated	500	North	9/24/2009	10:20:00 AM	or Ped	North		Straight		HNBD		2	1.60	Animal-Involved
169	2	Rear-End	525	North	6/4/2007	5:25:00 PM	Unsafe Speed	South	South	Straight	Road	HNBD	HNBD	2	1.60	Rear-end
235	2	Rear-End	528	East	2/14/2009	9:10:00 AM	Unsafe Speed	West	East	Straight	Straight	nt Not	HNBD	2	1.60	Rear-end
208	2	Hit Object	580	North	3/17/2008	5:45:00 PM	or Ped	North		Straight		HNBD		2	1.61	Animal-Involved
206	2	Broadside	600	North	3/11/2008	11:20:00 AM	Improper Turning	North	North	Making U Turn	Straight	HNBD	HNBD	2	1.62	Broadside
312	2	Rear-End	946	North	10/27/2011	1230		NB		Ran off road		HNBD		2	1.68	Hit Object
140	2	Sideswipe	1000	North	11/1/2006	10:40:00 PM	Wrong Side of Road	South	North	Opposing Lane	Straight	HNBD	HNBD	2	1.68	Sideswipe
170	2	Sideswipe	1000	North	6/9/2007	12:50:00 PM	Wrong Side of Road	North	South	Opposing Lane	Straight	nt Not	HNBD	2	1.69	Sideswipe
227	2	Head-On	1056	North	1/5/2009	2:30:00 PM	Unsafe Speed	North	South	Opposing Lane	Straight	HNBD	HNBD	2	1.70	Head-on
263	2	Head-On	1056	North	10/19/2009	6:15:00 PM	Unsafe Speed	South	North	Straight	Straight	HNBD	HNBD	2	1.70	Head-on
138	2	Hit Object	1056	North	9/21/2006	6:30:00 PM	Improper Turning	South		Turning		HNBD		2	1.70	Hit Object
189	2	Sideswipe	1056	North	11/19/2007	6:30:00 PM	Unsafe Speed	South		Straight		HNBD		2	1.70	Hit Object
290	2	Hit Object	1056	North	9/17/2010		Improper Turning	South		Turning		nt Not		2	1.70	Hit Object
228	2	Rear-End	1056	North	1/5/2009	2:31:00 PM	Unsafe Speed	South	South	Straight	Road	HNBD	HNBD	2	1.70	Rear-end
135	2	Sideswipe	1056	North	8/3/2006	6:22:00 PM	Wrong Side of Road	South	North	Turning	Straight	HNBD	HNBD	2	1.70	Sideswipe
112	2	Head-On	1584	North	10/29/2005	7:05:00 AM	Wrong Side of Road	North	South	Straight	Opposing Lane	HNBD	HNBD	2	1.80	Head-on
226	2	Head-On	1584	North	11/26/2008	1:45:00 PM	Unsafe Speed	South	North	Straight	Straight	HNBD	HNBD	2	1.80	Head-on
24	2	Sideswipe	1584	North	8/30/2003	11:10:00 AM	Improper Turning	North	North	Parked	Turning	HNBD	HNBD	2	1.80	Hit Object
198	2	Hit Object	1584	North	1/4/2008	3:00:00 PM	Unsafe Speed	South		Ran Off Road		HNBD		2	1.80	Hit Object
187	2	Rear-End	1584	North	11/10/2007	6:15:00 PM	Unsafe Speed	South	South	Straight	Road	HNBD	HNBD	2	1.80	Rear-end
161	2	Sideswipe	1950	North	4/9/2007	3:00:00 AM	Wrong Side of Road	South	North	Straight	Straight	nt Not	HNBD	2	1.87	Sideswipe
174	2	Broadside	2000	North	7/18/2007	6:15:00 AM	Unsafe Speed	South	North	Turning	Straight	HNBD	HNBD	2	1.88	Broadside
188	2	Broadside	2000	North	11/31/2007	8:30:00 AM	Unsafe Speed	North	South	Straight	Opposing Lane	HNBD	HNBD	2	1.88	Broadside
157	2	Head-On	2000	North	2/9/2007	7:30:00 PM	Unsafe Speed	South	North	Straight	Straight	HNBD	HNBD	2	1.88	Head-on

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ID	Segment	collision type	distance	direction	Date	Time	primary collision factor	Direction of Travel 1	Direction of Travel 2	Movement Preceding Collision 1	Movement Preceding Collision 2	party sobriety 1	party sobriety 2	Segment	MP (calculated)	collision type (actual)
158	2	Hit Object	2000	North	2/10/2007	9:00:00 AM	Unsafe Speed	South		Straight		HNBD		2	1.88	Hit Object
148	2	Overtuned	2000	North	12/10/2006	11:45:00 AM	Unsafe Speed	South		Straight		HNBD		2	1.88	Overtuned
5	2	Head-On	2112	North	2/12/2003	1:30:00 PM	Wrong Side of Road	South	North	Opposing Lane	Straight	HNBD	HNBD	2	1.80	Head-on
217	2	Head-On	2112	North	7/8/2008	7:50:00 AM	Wrong Side of Road	South	North	Opposing Lane	Straight	HNBD	HNBD	2	1.90	Head-on
319	2	Hit Object	2112	North	12/25/2011	1645		SB		Proceeding Straight		HNBD		2	1.90	Hit Object
185	2	Rear-End	2112	North	11/1/2007	7:20:00 PM	Unsafe Speed	South	South	Straight	ing	HNBD	HNBD	2	1.90	Rear-end
131	2	Hit Object	2376	North	7/15/2006	8:00:00 PM	or Ped	South		Straight		HNBD		2	1.95	Hit Object
159	2	Broadside	2640	North	2/26/2007	7:15:00 AM	Unsafe Speed	South	North	Straight	Straight	HNBD	HNBD	2	2.00	Broadside
83	2	Head-On	2640	North	2/1/2005	9:10:00 AM	Wrong Side of Road	South	North	Opposing Lane	Straight	HNBD	HNBD	2	2.00	Head-on
70	2	Sideswipe	2640	North	11/10/2004	10:35:00 AM	Unsafe Speed	North	South	Straight	Opposing Lane	HNBD	HNBD	2	2.00	Hit Object
121	2	Hit Object	2640	North	3/14/2006	9:08:00 PM	Influence	South		Straight		Under		2	2.00	Hit Object
239	2	Hit Object	2640	North	4/9/2009	12:35:00 PM	Unsafe Speed	South		Straight		HNBD		2	2.00	Hit Object
270	2	Hit Object	2640	North	12/21/2009	6:20:00 PM	Unsafe Speed	South		Straight		HNBD		2	2.00	Hit Object
275	2	Hit Object	2640	North	3/13/2010	12:45:00 AM	Unsafe Speed	South		Straight		nt Not		2	2.00	Hit Object
127	2	Overtuned	2640	North	5/25/2006	7:30:00 AM	Unsafe Speed	North		Turning		HNBD		2	2.00	Overtuned
199	2	Overtuned	2640	North	1/21/2008	5:00:00 PM	Unsafe Speed	South		Straight		HNBD		2	2.00	Overtuned
6	2	Rear-End	2640	North	2/12/2003	1:40:00 PM	Unsafe Speed	South	South	Straight	ing	HNBD	HNBD	2	2.00	Rear-end
115	2	Rear-End	2640	North	12/5/2005	6:30:00 PM	Unsafe Speed	North	North	Straight	Stopped	HNBD	HNBD	2	2.00	Rear-end
84	2	Sideswipe	2960	North	2/28/2005	7:45:00 AM	Unsafe Speed	South	North	Straight	Straight	HNBD	HNBD	2	2.08	Sideswipe
108	2	Broadside	3000	North	10/26/2005	8:10:00 AM	Improper Turning	South	North	Opposing Lane	Straight	HNBD	HNBD	2	2.07	Broadside
55	2	Sideswipe	3000	North	6/21/2004	10:15:00 AM	Unsafe Speed	North	South	Straight	Straight	nt Not	HNBD	2	2.07	Sideswipe
87	2	Other	3120	North	3/18/2005	10:30:00 AM	Unsafe Speed	South	North	Turning	Stopped	HNBD	HNBD	2	2.09	Broadside
35	2	Broadside	3168	North	11/30/2003	8:44:00 PM	Unsafe Speed	South	North	Straight	Straight	HNBD	HNBD	2	2.10	Broadside
40	2	Broadside	3168	North	2/16/2004	4:20:00 PM	Unsafe Speed	South	North	Opposing Lane	Straight	HNBD	HNBD	2	2.10	Broadside
67	2	Broadside	3168	North	10/19/2004	11:38:00 AM	Wrong Side of Road	East	West	Opposing Lane	Straight	HNBD	HNBD	2	2.10	Broadside
114	2	Broadside	3168	North	11/29/2005	1:25:00 PM	Unsafe Speed	South	North	Straight	Straight	HNBD	HNBD	2	2.10	Broadside
130	2	Broadside	3168	North	7/4/2006	8:00:00 AM	Improper Turning	North	South	Turning	Straight	HNBD	HNBD	2	2.10	Broadside
196	2	Broadside	3168	North	12/24/2007	8:00:00 AM	Unsafe Speed	North	North	Straight	Straight	HNBD	HNBD	2	2.10	Broadside
271	2	Broadside	3168	North	1/26/2010	12:05:00 PM	Wrong Side of Road	South	North	Straight	Straight	HNBD	HNBD	2	2.10	Broadside
273	2	Broadside	3168	North	2/24/2010	12:25:00 PM	Improper Turning	South	North	Turning	Straight	HNBD	HNBD	2	2.10	Broadside
141	2	Head-On	3168	North	11/3/2006	7:45:00 AM	Unsafe Speed	South	North	Turning	Straight	HNBD	HNBD	2	2.10	Head-on
181	2	Head-On	3168	North	10/10/2007	7:05:00 AM	Other	South	North	Opposing Lane	Straight	HNBD	HNBD	2	2.10	Head-on
183	2	Head-On	3168	North	10/12/2007	11:15:00 AM	Wrong Side of Road	South	North	Opposing Lane	Straight	HNBD	HNBD	2	2.10	Head-on

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194	2	Head-On	3168	North	12/18/2007	8:30:00 AM	Wrong Side of Road	South	North	Opposing Lane	Straight	Stated	Stated	2	2.10	Head-on
224	2	Head-On	3168	North	10/30/2008	4:30:00 PM	Unsafe Speed	South	North	Opposing Lane	Straight	HNBD	HNBD	2	2.10	Head-on
242	2	Head-On	3168	North	5/1/2009	1:05:00 PM	Wrong Side of Road	North	South	Straight	Straight	HNBD	HNBD	2	2.10	Head-on
269	2	Head-On	3127	North	12/13/2009	2:20:00 PM	Wrong Side of Road	South	North	Turning	Straight	HNBD	HNBD	2	2.10	Head-on
274	2	Head-On	3168	North	3/12/2010	1:30:00 PM	Wrong Side of Road	South	North	Straight	Straight	HNBD	HNBD	2	2.10	Head-on
283	2	Head-On	3168	North	4/27/2010	1:00:00 PM	Improper Turning	South	North	Straight	Straight	HNBD	HNBD	2	2.10	Head-on
36	2	Hit Object	3168	North	12/2/2003	4:30:00 AM	Unsafe Speed	South		Straight		HNBD		2	2.10	Hit Object
120	2	Hit Object	3168	North	2/14/2006	2:45:00 AM	Unsafe Speed	North		Straight		HNBD		2	2.10	Hit Object
166	2	Hit Object	3168	North	5/2/2007	7:50:00 AM	Unsafe Speed	South	North	Turning	Straight	HNBD	HNBD	2	2.10	Hit Object
167	2	Hit Object	3168	North	5/4/2007	7:00:00 AM	Unsafe Speed	South		Turning		HNBD		2	2.10	Hit Object
180	2	Hit Object	3168	North	9/22/2007	10:50:00 AM	Unsafe Speed	South		Ran Off Road		HNBD		2	2.10	Hit Object
197	2	Hit Object	3168	North	1/4/2008	2:35:00 AM	Unsafe Speed	South		Straight		HNBD		2	2.10	Hit Object
241	2	Hit Object	3168	North	5/1/2009	11:45:00 AM	Unsafe Speed	South		Straight		HNBD		2	2.10	Hit Object
251	2	Hit Object	3168	North	7/30/2009	2:40:00 PM	Improper Turning	North		Not Stated		Stated		2	2.10	Hit Object
252	2	Hit Object	3168	North	8/18/2009	8:00:00 AM	Improper Turning	North		Turning		HNBD		2	2.10	Hit Object
255	2	Hit Object	3168	North	9/12/2009	8:45:00 AM	Improper Turning	South		Turn		HNBD		2	2.10	Hit Object
276	2	Hit Object	3168	North	3/25/2010	8:15:00 AM	Improper Turning	South		Turning		HNBD		2	2.10	Hit Object
335	2	Hit Object	3168	North	9/23/2012	0310		NB		Crossing into Opposing Lane		HNBD		2	2.10	Hit Object
74	2	Rear-End	3168	North	12/24/2004	12:50:00 PM	Unsafe Speed	North		Straight	Straight/Stopped	HNBD	HNBD	2	2.10	Rear-end
109	2	Rear-End	3168	North	10/26/2005	8:10:00 AM	Closely	North	North	ing	Straight	HNBD	HNBD	2	2.10	Rear-end
160	2	Rear-End	3168	North	3/20/2007	8:15:00 AM	Unsafe Speed	South	North	Turning	Straight	HNBD	HNBD	2	2.10	Rear-end
152	2	Sideswipe	3168	North	12/26/2006	4:42:00 PM	Unsafe Speed	South	North	Opposing Lane	Straight	HNBD	HNBD	2	2.10	Sideswipe
232	2	Sideswipe	3168	North	2/6/2009	9:15:00 AM	Wrong Side of Road	South	North	Opposing Lane	Straight	HNBD	HNBD	2	2.10	Sideswipe
231	2	Hit Object	3221	North	2/6/2009	9:00:00 AM	Unsafe Speed	South	South	Straight	Parked	HNBD	Applicabl	2	2.11	Hit Object
119	2	Overtuned	3208	North	1/21/2006	5:50:00 AM	Influence	North		Turning		Under		2	2.11	Overtuned
322	2	Head-On	3432	North	3/3/2012	0742		NB		Proceeding Straight		nt Not		2	2.15	Head-on
243	2	Hit Object	3432	North	5/1/2009	3:20:00 PM	Improper Turning	South	North	Ran Off Road	Straight	nt Not	HNBD	2	2.15	Hit Object
156	2	Hit Object	11141	North	2/9/2007	3:45:00 PM	Unsafe Speed	South	North	Straight	Straight	HNBD	HNBD	2	2.17	Hit Object
314	2	Hit Object	3538	North	11/15/2011	2005		NB		Unsafe turning		HNBD		2	2.17	Hit Object
256	2	Hit Object	3643	North	9/13/2009	1:29:00 AM	Improper Turning	South		Straight		HNBD		2	2.19	Hit Object
30	2	Head-On	3696	North	10/31/2003	3:10:00 AM	Improper Turning	North	South	Opposing Lane	Straight	HNBD	HNBD	2	2.20	Head-on
46	2	Head-On	3696	North	3/25/2004	3:35:00 PM	Unsafe Speed	South	h	Straight	Straight/Proce	HNBD	HNBD	2	2.20	Head-on
192	2	Hit Object	3696	North	12/4/2007	7:32:00 AM	Improper Turning	South		Turning		HNBD		2	2.20	Hit Object

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145	2	Hit Object	3696	North	12/11/2009	0805		NB/SB		Proceeding straight	Stopped in Road	had not been	Not Applicabl	2	2.20	Hit Object
257	2	Vehicle - Pedestrian	3696	North	9/14/2009	1:30:00 AM	Unsafe Speed	North	South	Proceeding Straight	Stopped in Road	HNBD	Not Applicabl	2	2.20	Sideswipe
42	3	Hit Object	3960	North	3/1/2004	11:10:00 PM	Improper Turning	South		Straight		HNBD		3	2.25	Hit Object
15	3	Broadside	4224	North	5/2/2003	6:40:00 PM	Unsafe Speed	South	North	Straight	Straight	HNBD	HNBD	3	2.30	Broadside
287	3	Head-On	4224	North	6/24/2010	2:35:00 PM	Wrong Side of Road	South	North	Opposing Lane	Straight	HNBD	HNBD	3	2.30	Head-on
223	3	Not Stated	4224	North	10/27/2008	12:15:00 AM	Influence	South	South	Turning	Parked	Under	Applicabl	3	2.30	Hit Object
320	3	Hit Object	4224	North	1/13/2012	2115		NB		making right		had not been		3	2.30	Hit Object
330	3	Hit Object	4382	North	6/13/2012	2252		NB		Proceeding Straight		had not been		3	2.33	Hit Object
57	3	Broadside	4752	North	8/3/2004	4:15:00 PM	Backing	West	North	Traffic	Straight	HNBD	HNBD	3	2.40	Broadside
285	3	Rear-End	4752	North	6/19/2010	4:20:00 PM	Unsafe Speed	South	South	Road	Straight	HNBD	Under	3	2.40	Rear-end
279	3	Head-On	5280	North	4/12/2010	7:40:00 PM	Wrong Side of Road	South	North	Vehicle	Straight	HNBD	HNBD	3	2.50	Head-on
149	3	Hit Object	5280	North	12/13/2006	11:45:00 PM	Unsafe Speed	South		Straight		HNBD		3	2.50	Hit Object
175	3	Hit Object	5280	North	7/25/2007	12:15:00 PM	Improper Turning	East		Ran Off Road		HNBD		3	2.50	Hit Object
110	3	Rear-End	5280	North	10/26/2005	8:35:00 AM	Unsafe Speed	South	South	Straight	ing	HNBD	HNBD	3	2.50	Rear-end
288	3	Rear-End	5280	North	7/21/2010	2:45:00 PM	Unsafe Speed	North	North	Road	Straight	HNBD	HNBD	3	2.50	Rear-end
323	3	Broadside	4752	South	3/15/2012	1155		NB/SB		Proceeding straight		had not been		3	2.58	Broadside
179	3	Sideswipe	4752	South	9/20/2007	10:10:00 AM	Improper Turning	South	South	Ran Off Road	Parked	HNBD	Applicabl	3	2.58	Hit Object
333	3	Broadside	6336	North	8/15/2012	1335		NB		making U-Turn		had not been		3	2.70	Broadside
125	3	Hit Object	3696	South	5/17/2006	1:10:00 AM	Improper Turning	South	South	Ran Off Road	Parked	HNBD	Applicabl	3	2.78	Hit Object
133	3	Hit Object	3696	South	7/23/2006	3:00:00 AM	Improper Turning	South		Ran Off Road		Under		3	2.78	Hit Object
253	3	Broadside	6864	North	8/18/2009	5:40:00 PM	Closely	North	North	Straight	Turn	HNBD	HNBD	3	2.80	Broadside
50	3	Hit Object	6864	North	4/17/2004	2:05:00 PM	Improper Turning	North		Ran Off Road		ipped		3	2.80	Hit Object
222	3	Hit Object	3168	South	9/14/2008	3:45:00 PM	Improper Turning	South		Ran Off Road		Stated		3	2.88	Hit Object
64	3	Rear-End	3168	South	8/26/2004	5:05:00 PM	Unsafe Speed	North	h	Straight	Stopped	HNBD	HNBD	3	2.88	Rear-end
126	3	Rear-End	3168	South	5/23/2006	4:05:00 PM	Unsafe Speed	North	North	Straight	Straight	HNBD	HNBD	3	2.88	Rear-end
172	3	Sideswipe	7392	North	6/16/2007	7:00:00 PM	Improper Passing	North	North	Vehicle	Turn	HNBD	HNBD	3	2.90	Sideswipe
302	3	Head-On	2640	South	1/18/2011	1750		NB/SB		Proceeding straight		had not been		3	2.98	Head-on
334	3	Hit Object	2640	South	9/7/2012	1555		SB		Proceeding straight		had not been		3	2.98	Hit Object
137	3	Overturned	2640	South	8/21/2006	11:00:00 PM	Influence	North		Turning		Under		3	2.98	Overturned
12	3	Rear-End	2640	South	4/9/2003	6:05:00 PM	Unsafe Speed	North	North	Turn	Straight	HNBD	HNBD	3	2.98	Rear-end
48	3	Rear-End	2640	South	4/13/2004	3:15:00 PM	Unsafe Speed	South	South	Straight	Straight	HNBD	nt Not	3	2.98	Rear-end
102	3	Rear-End	2640	South	8/17/2005	4:00:00 PM	Unsafe Speed	South	h	Stopped	eeding	HNBD	BD	3	2.98	Rear-end
61	3	Hit Object	2500	South	8/23/2004	9:15:00 AM	Improper Turning	North		Turning		HNBD		3	3.01	Hit Object

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ID	Segment	collision type	distance	direction	Date	Time	primary collision factor	Direction of Travel 1	Direction of Travel 2	Movement Preceding Collision 1	Movement Preceding Collision 2	party sobriety 1	party sobriety 2	Segment	MP (calculated)	collision type (actual)
129	3	Hit Object	2112	South	6/14/2006	4:55:00 PM	Improper Turning	North		Turning		HNBD		3	3.08	Hit Object
238	3	Rear-End	2112	South	4/3/2009	5:45:00 PM	Unsafe Speed	North	North	Straight	ing	HNBD	HNBD	3	3.08	Rear-end
318	3	Rear-End	2112	South	12/22/2011	1515		SB		Proceeding straight		had not been		3	3.08	Rear-end
173	3	Rear-End	8448	North	6/21/2007	2:05:00 PM	Unsafe Speed	South	South	Straight	Road	HNBD	HNBD	3	3.10	Rear-end
142	3	Rear-End	1800	South	11/3/2006	7:45:00 AM	Unsafe Speed	South	South	Straight	road	HNBD	HNBD	3	3.14	Rear-end
292	3	Rear-End	1637	South	10/5/2010	11:00:00 AM	Unsafe Speed	North	North	Straight	ing	HNBD	HNBD	3	3.17	Rear-end
277	3	Broadside	1584	South	3/31/2010	5:36:00 PM	Improper Turning	North	South	Turning	Straight	HNBD	HNBD	3	3.18	Broadside
280	3	Hit Object	1584	South	4/16/2010	8:30:00 AM	Improper Turning	North		Ran Off Road		HNBD		3	3.18	Hit Object
294	3	Hit Object	1584	South	10/11/2010	10:20:00 AM	Improper Turning	North		Ran Off Road		HNBD	Under	3	3.18	Hit Object
305	3	Hit Object	1584	South	6/13/2011	1745		NB		with unsafe turning		stopped		3	3.18	Hit Object
116	3	Rear-End	1584	South	12/7/2005	6:45:00 AM	Unsafe Speed	North	North	Stopped	Straight	HNBD	HNBD	3	3.18	Rear-end
210	3	Rear-End	1584	South	4/19/2008	10:00:00 AM	Unsafe Speed	North	North	Road	Straight	HNBD	HNBD	3	3.18	Rear-end
343	3	Rear-end	1584	South	3/17/2010	0650		NB		Proceeding straight		had not been		3	3.18	Rear-end
76	3	Rear-End	1430	South	1/3/2005	2:50:00 PM	Unsafe Speed	North	North	Straight	Stopped	HNBD	HNBD	3	3.21	Rear-end
209	3	Rear-End	1200	South	4/10/2008	9:45:00 AM	Unsafe Speed	North	North	Straight	Road	HNBD	HNBD	3	3.26	Rear-end
293	3	Head-On	1109	South	10/10/2010	10:00:00 AM	Unsafe Speed	North	South	Opposing Lane	Straight	HNBD	HNBD	3	3.27	Head-on
27	3	Other	1056	South	10/2/2003	6:30:00 PM	Not Driver	North		Straight		HNBD		3	3.28	Animal-Involved
95	3	Hit Object	1056	South	6/17/2005	9:45:00 PM	Influence	North		Straight		Under		3	3.28	Hit Object
132	3	Rear-End	1056	South	7/17/2006	4:20:00 PM	Unsafe Speed	North	North	Straight	ing	HNBD	HNBD	3	3.28	Rear-end
234	3	Rear-End	1056	West	2/10/2009	11:03:00 AM	Unsafe Speed	East	East	Straight	ing	HNBD	HNBD	3	3.28	Rear-end
309	3	Rear-End	1000	South	10/22/2011	2240		NB		Proceeding straight		had not been		3	3.29	Rear-end
313	3	Rear-End	1011	South	11/14/2011	1235		NB		stopped		had not been		3	3.29	Rear-end
246	3	Head-On	9504	North	5/29/2009	3:30:00 PM	Wrong Side of Road	South	North	Turn	Turn	HNBD	HNBD	3	3.30	Head-on
2	3	Hit Object	792	South	1/5/2003	4:45:00 PM	Improper Turning	North		Straight		HNBD	had not been	3	3.33	Hit Object
325	3	Rear-End	650	South	4/13/2012	1020		SB		stopped		had not been		3	3.36	Rear-end
230	3	Rear-End	594	South	1/16/2009	10:10:00 AM	Unsafe Speed	North	North	Straight	Turn	HNBD	HNBD	3	3.37	Rear-end
16	3	Hit Object	528	South	5/14/2003	3:40:00 AM	Improper Turning	South		Ran Off Road		HNBD		3	3.38	Hit Object
90	3	Hit Object	530	South	4/10/2005	4:25:00 AM	Influence	South		Ran Off Road		Under		3	3.38	Hit Object
220	3	Overturned	532	South	8/24/2008	9:51:00 PM	Influence	North		Opposing Lane		Under		3	3.38	Overturned
69	3	Rear-End	500	South	11/3/2004	8:05:00 AM	Unsafe Speed	North	North	ing	Straight	HNBD	HNBD	3	3.39	Rear-end
89	3	Rear-End	500	South	4/9/2005	7:50:00 PM	Unsafe Speed	North	North	Straight	ing	HNBD	HNBD	3	3.39	Rear-end
82	3	Sideswipe	500	South	1/27/2005	9:30:00 PM	Wrong Side of Road	North	South	Opposing Lane	Straight	nt Not	HNBD	3	3.39	Sideswipe
268	4	Hit Object	461	South	11/25/2009	1:30:00 PM	Unsafe Speed	South		Straight		HNBD		3	3.40	Hit Object

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ID	Segment	collision type	distance	direction	Date	Time	primary collision factor	Direction of Travel 1	Direction of Travel 2	Movement Preceding Collision 1	Movement Preceding Collision 2	party sobriety 1	party sobriety 2	Segment	MP (calculated)	collision type (actual)
97	3	Sideswipe	295	South	7/13/2005	5:15:00 PM	Auto R/W Violation	South	South	Turn	Straight	HNBD	HNBD	3	3.41	Sideswipe
47	3	Hit Object	150	South	4/11/2004	8:08:00 PM	Improper Turning	North		Turning		HNBD		3	3.45	Hit Object
23	3	Overturned	158	South	8/20/2003	9:30:00 PM	Improper Turning	North		Straight		HNBD		4	3.45	Overturned
45	3	Rear-End	158	South	3/20/2004	1:15:00 PM	Unsafe Speed	North	North	Straight	Stopped	HNBD	HNBD	4	3.45	Rear-end
17	3	Broadside	0		6/4/2003	12:20:00 PM	Auto R/W Violation	South	West/North	Turn	Turn/Proceed	nt Not	HNBD	4	3.48	Broadside
43	3	Broadside	1	South	3/2/2004	5:45:00 PM	Auto R/W Violation	East	h	Traffic	Straight/Proce	HNBD	HNBD	4	3.48	Broadside
94	3	Broadside	0		5/23/2005	3:50:00 PM	Auto R/W Violation	West	North	Turn	Straight	HNBD	HNBD	4	3.48	Broadside
101	4	Broadside	2	North	8/15/2005	5:50:00 PM	or Ped	South	South	Straight	Stopped	HNBD	HNBD	4	3.48	Broadside
103	3	Broadside	0		9/12/2005	3:30:00 PM	Auto R/W Violation	West	North	Straight	Straight	HNBD	HNBD	4	3.48	Broadside
123	3	Broadside	0	In Int.	4/17/2006	5:35:00 PM	Auto R/W Violation	West	North	Turn	Straight	HNBD	HNBD	4	3.48	Broadside
134	3	Broadside	0	In Int.	7/24/2006	6:20:00 PM	Auto R/W Violation	West	North	Turn	Straight	HNBD	HNBD	4	3.48	Broadside
143	3	Broadside	0	In Int.	11/3/2006	10:40:00 AM	Auto R/W Violation	South	North	Straight	Straight	HNBD	HNBD	4	3.48	Broadside
31	3	Hit Object	1	South	11/9/2003	2:30:00 AM	Unsafe Speed	South		ing		HNBD		4	3.48	Hit Object
51	3	Hit Object	10	South	4/28/2004	9:32:00 AM	Improper Turning	South		Straight		HNBD		4	3.48	Hit Object
96	4	Hit Object	2	North	7/7/2005	3:00:00 AM	Unsafe Speed	North		Straight		HNBD		4	3.48	Hit Object
153	4	Hit Object	3	North	1/4/2007	8:50:00 PM	Improper Turning	North		Turn		HNBD		4	3.48	Hit Object
205	3	Hit Object	8	South	3/8/2008	7:05:00 AM	Improper Turning	South		Ran Off Road		HNBD		4	3.48	Hit Object
221	3	Hit Object	0	In Int.	8/28/2008	3:40:00 PM	Unsafe Speed	North		Straight		nt Not		4	3.48	Hit Object
72	4	Rear-End	1	North	11/20/2004	3:40:00 PM	Closely	North	h	Straight	ped	Under	HNBD	4	3.48	Rear-end
267	3	Rear-End	0	In Int.	11/21/2009	10:45:00 PM	Closely	North	North	ing	Straight	HNBD	HNBD	4	3.48	Rear-end
41	3	Hit Object	10560	North	2/16/2004	1:10:00 PM	Unsafe Speed	South		Straight		HNBD		4	3.50	Hit Object
344	4	Sideswipe	150	North	2/12/2010	0615		NB		Straight		HNBD		4	3.51	Sideswipe
190	4	Rear-End	300	North	11/29/2007	6:30:00 AM	Improper Turning	North	North	Turning	ing	HNBD	HNBD	4	3.54	Rear-end
310	4	Other Animal	347	North	10/24/2011	1845		NB		proceeding		HNBD		4	3.55	Animal-Involved
21	4	Hit Object	350	North	7/26/2003	11:00:00 PM	Influence	South		Ran Off Road		DRUG		4	3.55	Hit Object
19	4	Hit Object	413	North	7/5/2003	5:35:00 AM	Improper Turning	South		Straight		HNBD		4	3.56	Hit Object
233	3	Hit Object	10877	North	2/8/2009	11:30:00 AM	Unsafe Speed	South		Straight		HNBD		4	3.56	Hit Object
272	4	Other	485	North	2/4/2010	6:20:00 AM	or Ped	South		Straight		HNBD		4	3.57	Animal-Involved
211	4	Hit Object	600	North	4/24/2008	6:05:00 AM	or Ped	South		Straight		HNBD		4	3.60	Animal-Involved
91	4	Hit Object	625	North	4/22/2005	7:20:00 AM	Improper Turning	South		Turning		HNBD		4	3.60	Hit Object
20	4	Hit Object	680	North	7/25/2003	3:40:00 AM	Improper Turning	South		Ran Off Road		nt Not		4	3.61	Hit Object
303	4	Hit Object	665	North	2/22/2011	1310		SB		Ran off road		HNBD		4	3.61	Hit Object
155	4	Hit Object	720	North	1/19/2007	4:45:00 AM	Improper Turning	South		Straight		HNBD		4	3.62	Hit Object

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ID	Segment	collision type	distance	direction	Date	Time	primary collision factor	Direction of Travel 1	Direction of Travel 2	Movement Preceding Collision 1	Movement Preceding Collision 2	party sobriety 1	party sobriety 2	Segment	MP (calculated)	collision type (actual)
49	4	Hit Object	1056	North	4/15/2004	10:50:00 PM	Improper Turning	North		Straight		nt Not		4	3.68	Hit Object
214	4	Hit Object	1056	North	6/9/2008	6:45:00 AM	Unsafe Speed	North		Ran Off Road		HNBD		4	3.68	Hit Object
66	4	Rear-End	1056	North	10/12/2004	3:36:00 PM	Unsafe Speed	North	North	Stopped	Straight	HNBD	HNBD	4	3.68	Rear-end
191	4	Rear-End	1200	North	11/29/2007	7:00:00 PM	Unsafe Speed	North	North	Straight	Straight	HNBD	HNBD	4	3.71	Rear-end
85	4	Hit Object	1500	North	3/4/2005	4:15:00 AM	Influence	South		Ran Off Road		Under		4	3.77	Hit Object
39	4	Head-On	1584	North	1/19/2004	12:10:00 PM	Improper Turning	North	South	Turning	Straight	HNBD	HNBD	4	3.78	Head-on
284	4	Broadside	1584	North	5/10/2010	2:15:00 PM	Improper Turning	South		Straight		HNBD		4	3.78	Hit Object
248	4	Overturned	1557	North	6/19/2009	8:10:00 PM	Influence	North		Turning		Under		4	3.78	Overturned
7	4	Rear-End	1584	North	2/12/2003	11:45:00 AM	Unsafe Speed	North	North	Straight	Stopped	HNBD	HNBD	4	3.78	Rear-end
8	4	Rear-End	1584	North	2/12/2003	11:50:00 AM	Unsafe Speed	South	South	Straight	Straight	HNBD	HNBD	4	3.78	Rear-end
99	4	Hit Object	2112	North	7/24/2005	5:10:00 AM	Influence	North		Ran Off Road		Under		4	3.88	Hit Object
282	4	Hit Object	2110	North	4/20/2010	7:20:00 PM	Improper Turning	South		Straight		HNBD		4	3.88	Hit Object
304	4	Hit Object	2640	North	4/20/2011	1330		SB		Under unsafe		HNBD		4	3.98	Hit Object
128	4	Hit Object	13200	North	5/25/2006	5:40:00 PM	Improper Turning	South		Ran Off Road		HNBD		4	4.00	Hit Object
245	4	Sideswipe	3000	North	5/12/2009	4:55:00 PM	Improper Turning	North	North	Straight	Straight	nt Not	HNBD	4	4.05	Sideswipe
341	3	Overturned	3696	North	12/1/2012	1505		SB		Ran off Road		HNBD		4	4.18	Overturned
139	4	Sideswipe	3960	North	10/19/2006	7:30:00 AM	Improper Turning	North	North	Merging	Straight	HNBD	HNBD	4	4.23	Sideswipe
204	4	Hit Object	4752	East	2/19/2008	5:00:00 PM	Other	West		Turning		HNBD		4	4.38	Hit Object
33	4	Sideswipe	4752	North	11/14/2003	8:00:00 AM	Lane Change	South	South	Lanes	Straight	HNBD	HNBD	4	4.38	Sideswipe
60	4	Broadside	5028	North	8/20/2004	2:40:00 PM	Auto R/W Violation	East	North	Turn	Straight	HNBD	HNBD	4	4.44	Broadside
34	4	Hit Object	5280	North	11/23/2003	3:20:00 PM	Unsafe Speed	South		Turning		HNBD		5	4.48	Hit Object
225	4	Hit Object	5280	North	11/13/2008	11:05:00 PM	Influence	South		Opposing Lane		Under		5	4.48	Hit Object
307	4	Hit Object	5280	North	7/19/2011	0605		SB		Other unsafe		HNBD		5	4.48	Hit Object
311	4	Hit Object	5280	North	10/24/2011	0530		NB		Wrong right		HNBD		5	4.48	Hit Object
56	4	Rear-End	5280	North	8/2/2004	5:15:00 PM	Unsafe Speed	South	h	Stopped	eeding	HNBD	HNBD	5	4.48	Rear-end
218	4	Rear-End	5280	North	7/29/2008	2:50:00 PM	Unsafe Speed	South	South	Straight	Road	HNBD	HNBD	5	4.48	Rear-end
244	4	Rear-End	5280	North	5/3/2009	3:55:00 PM	Unsafe Speed	North	North	Straight	Road	HNBD	HNBD	5	4.48	Rear-end
18	5	Broadside	5808	North	7/1/2003	5:35:00 PM	Auto R/W Violation	South	East	Straight	Traffic	HNBD	HNBD	5	4.58	Broadside
219	5	Hit Object	5808	North	8/10/2008	12:37:00 AM	Improper Turning	North		Turning		HNBD		5	4.58	Hit Object
259	5	Hit Object	5808	North	9/23/2009	4:20:00 PM	Improper Turning	North		Turning	proppa	HNBD		5	4.68	Hit Object
338	5	Rear-End	5808	North	10/25/2012	1035		SB		proceeding		HNBD		5	4.68	Rear-end
118	5	Broadside	6336	North	1/11/2006	4:40:00 AM	Unsafe Speed	South	East	Straight	Turn	HNBD	HNBD	5	4.68	Broadside
144	5	Broadside	6336	North	11/20/2006	7:45:00 PM	Auto R/W Violation	East	South	Turn	Straight	HNBD	HNBD	5	4.68	Broadside

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22	5	Hit Object	6336	North	8/9/2003	5:00:00 PM	Improper Turning	South		Ran Off Road		HNBD		5	4.68	Hit Object
151	5	Rear-End	6336	North	12/19/2006	2:57:00 PM	Closely	South	South	Straight	Straight	HNBD	HNBD	5	4.68	Rear-end
286	5	Head-On	6864	North	6/19/2010	1:20:00 AM	Influence	South	North	Opposing Lane	Straight	Under	HNBD	5	4.78	Head-on
124	5	Other	6864	North	5/12/2006	1:45:00 PM	Backing	North	North	Parked		HNBD	Applicabl	5	4.78	Hit Object
26	5	Other	7392	North	9/30/2003	7:30:00 PM	Not Driver	North		Straight		HNBD		5	4.88	Animal-Involved
63	5	Head-On	7392	North	8/25/2004	11:20:00 AM	Improper Turning	South	North	Ran Off Road	Straight	HNBD	HNBD	5	4.88	Head-on
301	5	Hit Object	7392	North	1/4/2011	0800		SB		Ran off road		Hit Not base		5	4.88	Hit Object
13	5	Rear-End	7392	North	4/12/2003	5:00:00 PM	Closely	North	North	Straight	ing	HNBD	Under	5	4.88	Rear-end
165	5	Hit Object	7920	North	4/27/2007	11:10:00 PM	Improper Turning	South		Turning		nt Not		5	4.98	Hit Object
300	5	Hit Object	8026	North	12/31/2010	1:45:00 AM	Improper Turning	South		Turning		nt Not		5	5.00	Hit Object
80	5	Sideswipe	8448	North	1/20/2005	6:40:00 AM	Unsafe Speed	North	h	Stopped	Straight/Proce	HNBD	BD	5	5.08	Sideswipe
315	5	Hit Object	8976	North	11/22/2011	1721		SB		Proceeding Straigh		Hit Not base		5	5.18	Hit Object
178	5	Sideswipe	8976	North	9/18/2007	10:05:00 AM	Improper Turning	North	North	Opposing Lane	Straight	HNBD	HNBD	5	5.18	Sideswipe
261	5	Other	9240	North	9/25/2009	9:08:00 PM	Other Than Driver or Ped	North		Proceeding Straight		HNBD		5	5.23	Animal-Involved
186	5	Broadside	9240	North	11/8/2007	5:30:00 PM	Auto R/W Violation	East	South	Traffic	Straight	HNBD	HNBD	5	5.23	Broadside
212	5	Head-On	9504	North	5/31/2008	3:00:00 PM	Wrong Side of Road	North	South	Straight	Straight	HNBD	HNBD	5	5.28	Head-on
163	5	Hit Object	9504	North	4/21/2007	1:23:00 AM	Unsafe Speed	South		Turning		HNBD		5	5.28	Hit Object
262	5	Hit Object	9504	North	10/11/2009	2:30:00 AM	Improper Turning	Not Stated		Turning		nt Not		5	5.28	Hit Object
147	5	Sideswipe	9504	North	12/9/2006	9:36:00 PM	Influence	North	South	Opposing Lane	Straight	Under	HNBD	5	5.28	Sideswipe
171	5	Sideswipe	9504	North	6/12/2007	12:30:00 AM	Wrong Side of Road	North	South	Wrong Way	Straight	HNBD	HNBD	5	5.28	Sideswipe
164	5	Hit Object	25	North	4/22/2007	1:15:00 PM	Improper Turning	South		Turning		HNBD		5	5.29	Hit Object
342	5	Hit Object	925	North	12/15/2012	0150		SB		Under Unsafe		Hit Not base		5	5.46	Hit Object
327	5	Other: Deer	10560	North	5/7/2012	0545		SB		Proceeding Straigh		Hit Not base		5	5.48	Animal-Involved
107	5	Broadside	10560	North	10/24/2005	7:17:00 PM	Auto R/W Violation	East	South	Traffic	Straight	HNBD	HNBD	5	5.48	Broadside
184	5	Broadside	10560	North	10/16/2007	2:00:00 PM	Wrong Side of Road	North	South	Opposing Lane	Straight	HNBD	HNBD	5	5.48	Broadside
278	5	Broadside	10560	North	4/6/2010	2:00:00 PM	Auto R/W Violation	West	South	Making U Turn	Straight	HNBD	HNBD	5	5.48	Broadside
247	5	Hit Object	10560	North	6/15/2009	9:00:00 AM	Hazardous Parking	North		Other		HNBD		5	5.48	Hit Object
264	5	Hit Object	10560	North	10/24/2009		Improper Turning	South		Ran Off Road		nt Not		5	5.48	Hit Object
240	5	Overturned	10560	North	4/28/2009	7:58:00 AM	Improper Turning	North		Ran Off Road		HNBD		5	5.48	Overturned
326	5	Overturned	10560	North	4/13/2012	0545		NB		Proceeding Straigh		Hit Not base		5	5.48	Overturned
168	5	Rear-End	10560	North	5/10/2007	5:51:00 PM	Unsafe Speed	South	South	Straight	Road	HNBD	HNBD	5	5.48	Rear-end
266	5	Rear-End	10560	North	11/8/2009	4:00:00 PM	Unsafe Speed	South	South	ing	ing	HNBD	HNBD	5	5.48	Rear-end
145	5	Hit Object	11088	North	11/23/2006	3:00:00 AM	Improper Turning	South		Other		impairme		5	5.58	Hit Object

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ID	Segment	collision type	distance	direction	Date	Time	primary collision factor	Direction of Travel 1	Direction of Travel 2	Movement Preceding Collision 1	Movement Preceding Collision 2	party sobriety 1	party sobriety 2	Segment	MP (calculated)	collision type (actual)
308	5	Overturned	11088	North	9/23/2011	0800		NB		Ran off road		Hit Not base		5	5.58	Overturned
162	5	Rear-End	11088	North	4/19/2007	6:10:00 PM	Unsafe Speed	South	South	Road	Straight	HNBD	HNBD	5	5.58	Rear-end
298	5	Rear-End	11088	North	11/20/2010	11:30:00 AM	Unsafe Speed	North	North	Straight	ing	HNBD	HNBD	5	5.58	Rear-end
332	5	Hit Object	150	South	7/22/2012	0215		NB		Proceeding Straigh		Hit Not base		5	5.64	Hit Object
29	5	Broadside	11616	North	10/29/2003	6:40:00 PM	Not Stated	South	North	Traffic		HNBD	HNBD	5	5.68	Broadside
337	5	Hit Object	11616	North	10/6/2012	1556		NB		Other Unsafe		Hit Not base		5	5.68	Hit Object
86	5	Rear-End	11616	North	3/15/2005	6:15:00 PM	Unsafe Speed	South	South	Straight	ped/Stopped	HNBD	HNBD	5	5.68	Rear-end
176	5	Rear-End	11616	North	8/24/2007	3:00:00 PM	Unsafe Speed	South	South	Straight	Straight	HNBD	HNBD	5	5.68	Rear-end
295	5	Rear-End	11616	North	10/13/2010	6:10:00 PM	Unsafe Speed	South	South	Straight	Road	HNBD	HNBD	5	5.68	Rear-end
52	5	Rear-End	5808	South	4/30/2004	8:25:00 AM	Closely	South	South	Stopped	Straight	HNBD	HNBD	5	5.78	Rear-end
77	5	Rear-End	12144	North	1/4/2005	12:35:00 PM	Unsafe Speed	South	h	Stopped	Straight/Proce	HNBD	pairment	5	5.78	Rear-end
215	5	Rear-End	5808	South	6/12/2008	6:15:00 AM	Unsafe Speed	North	North	Straight	Straight	HNBD	HNBD	5	5.78	Rear-end
250	5	Rear-End	8448	South	7/10/2009	3:55:00 PM	Unsafe Speed	North	South	Straight	ing	HNBD	HNBD	5	5.78	Rear-end
258	5	Rear-End	12144	North	9/22/2009	5:40:00 PM	Unsafe Speed	North	North	Straight	ing	nt Not	HNBD	5	5.78	Rear-end
336	5	Rear-End	2640	East	9/28/2012	1635		WB		Stopped		Hit Not base		5	5.78	Rear-end
306	5	Sideswipe	12672	North	6/20/2011	1315		NB/SB		Proceeding Straigh		Hit Not base		5	5.88	Sideswipe
200	5	Hit Object	25	North	2/9/2008	6:20:00 AM	Improper Turning	South		Ran Off Road		HNBD		5	5.90	Hit Object
201	5	Hit Object	39	South	2/10/2008	6:21:00 AM	Unsafe Speed	South		Straight		HNBD		5	5.99	Hit Object
299	5	Broadside	13200	North	12/26/2010	11:45:00 AM	Auto R/W Violation	East	South	Traffic	Straight	HNBD	HNBD	5	5.98	Broadside
54	5	Rear-End	13200	North	5/20/2004	3:15:00 PM	Unsafe Speed	North	North	Straight	Turn	HNBD	HNBD	5	5.98	Rear-end
105	5	Rear-End	13200	North	10/11/2005	5:00:00 PM	Unsafe Speed	South	South	Stopped	Straight	HNBD	HNBD	5	5.98	Rear-end
193	5	Rear-End	13200	North	12/4/2007	6:40:00 PM	Unsafe Speed	South	South	Straight	Road	HNBD	HNBD	5	5.98	Rear-end
328	5	Rear-End	13200	North	5/23/2012	1730		SB		Stopped		Hit Not base		5	5.98	Rear-end
296	5	Sideswipe	13200	North	10/22/2010	1:20:00 PM	Wrong Side of Road	North	South	Opposing Lane	Straight	nt Not	HNBD	5	5.98	Sideswipe
122	5	Hit Object	23760	North	3/16/2006		Improper Turning	South		Ran Off Road		nt Not		5	6.00	Hit Object
216	5	Broadside	6864	South	6/26/2008	7:30:00 AM	Improper Turning	North	South	Opposing Lane	Straight	HNBD	HNBD	5	6.08	Broadside
254	5	Overturned	4224	South	8/27/2009	4:45:00 AM	Improper Turning	North		Straight		HNBD		5	6.08	Overturned
340	5	Hit Object	4752	North	11/9/2012	1700		NB		Under Unsafe		Hit Not base		5	6.18	Hit Object
329	5	Head-On	2244	South	6/2/2012	1715		NB/SB		Proceeding Straigh		Hit Not base		5	6.25	Head-on
316	5	Hit Object	5808	South	11/23/2011	1917		NB		Ran off road		Hit Not base		5	6.28	Hit Object
317	5	Hit Object	5808	West	11/27/2011	1230		EB		Ran off road		Hit Not base		5	6.28	Hit Object
236	5	Broadside	1584	South	2/23/2009	7:45:00 AM	Improper Turning	North	South	Turning	Straight	HNBD	HNBD	5	6.37	Broadside
25	5	Broadside	528	South	9/27/2003	2:00:00 AM	Improper Turning	South	South	Straight	Turning	Under	nt Not	5	6.57	Broadside

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ID	Segment	collision type	distance	direction	Date	Time	primary collision factor	Direction of Travel 1	Direction of Travel 2	Movement Preceding Collision 1	Movement Preceding Collision 2	party sobriety 1	party sobriety 2	Segment	MP (calculated)	collision type (actual)
53	5	Rear-End	475	South	5/20/2004	4:15:00 PM	Unsafe Speed	North	n	Stopped	Straight/Proce	HNBD	pairment	5	6.58	Rear-end
4	5	Overtumed	390	South	2/11/2003	6:20:00 PM	Unsafe Speed	South		Straight		HNBD		5	6.60	Overtumed
28	5	Broadside	333	South	10/28/2003	5:38:00 PM	Wrong Side of Road	South	North	Straight	Straight	HNBD	HNBD	5	6.61	Broadside
331	5	Hit Object	3960	South	7/19/2012	0420		SB		other unsafe turning		HNBD		5	6.63	Hit Object
182	5	Broadside	1056	South	10/10/2007	6:35:00 AM	Improper Turning	East	South	Making U Turn	Straight	HNBD	HNBD	5	6.68	Broadside
14	5	Overtumed	3696	South	4/22/2003	6:50:00 PM	Unsafe Speed	South		Straight		HNBD		5	6.68	Overtumed
59	5	Overtumed	3696	South	8/13/2004	5:15:00 PM	Unknown	North	South	Straight	Turn	HNBD	HNBD	5	6.68	Overtumed
265	5	Overtumed	30	North	11/8/2009	2:45:00 AM	Influence	North		Straight		Under		5	6.68	Overtumed
88	5	Sideswipe	1056	South	3/21/2005	10:55:00 PM	Unsafe Speed	North	North	Straight	Straight	HNBD	HNBD	5	6.68	Sideswipe
150	5	Hit Object	1000	South	12/14/2006	11:20:00 PM	Influence	North		Straight		Under		5	6.69	Hit Object
44	5	Head-On	941	South	3/11/2004	2:18:00 AM	Influence	South	North	Opposing Lane	Straight	Under	HNBD	5	6.70	Head-on
237	5	Head-On	390	South	3/18/2009	10:30:00 PM	Improper Turning	North	South	Turning	Straight	HNBD	HNBD	5	6.81	Head-on
65	5	Other	2640	South	9/1/2004	4:45:00 AM	Not Driver	South		Straight		HNBD		5	6.88	Animal-involved
67	5	Hit Object	3624	South	4/8/2007	11:03:00 AM	Unsafe Speed	South		other unsafe turning		Under		5	6.88	Hit Object
109	5	Overturned	1000	South	10/27/2012	9:30						Under		5	6.88	Overturned



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CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

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## APPENDIX C EXISTING SIGN INVENTORY

DRAFT

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

*reorganized 3/22*

Crow Canyon Road Traffic Signs

Road Name	Direction	Nearest Address	Distance to Nearest Intersection	Direction	Intersection	Sign Type	Sign Description	Code	Condition of Sign
Crow Canyon Rd	EB	0	920	S/o	MM 1.66	Regulatory	No Ped Crossing-Use Crosswalk	R49 (CA)	Good
Crow Canyon Rd	EB	0	915	S/o	MM 1.66	Regulatory	No Ped Crossing-Use Crosswalk	R49 (CA)	Good
Crow Canyon Rd	EB	0	890	S/o	MM 1.66	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	EB	0	890	S/o	MM 1.66	Regulatory	One Way Left	R6-1L	Good
Crow Canyon Rd	EB	0	890	S/o	MM 1.66	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	EB	0	2	S/o	Norris Canyon Rd	Regulatory	No Pedestrians	R9-3a	Good
Crow Canyon Rd	EB	0	2	S/o	Norris Canyon Rd	Regulatory	Use Crosswalk	R96B (CA)	Good
Crow Canyon Rd	EB	5355	3	W/o	San Simeone Pl	Guide	Truck	M4-4	Good
Crow Canyon Rd	EB	5357	18	E/o	San Simeone Pl	Parking	No Parking Vehicles Over 20Ft	R28D (CA)	Good
Crow Canyon Rd	EB	5355	3	W/o	San Simeone Pl	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	EB	5359	58	E/o	San Simeone Pl	Regulatory	Speed Checked By Radar	R48 (CA)	Good
Crow Canyon Rd	EB	5359	58	E/o	San Simeone Pl	Speed Limit	Speed Limit 40 MPH	R2-1	Good
Crow Canyon Rd	EB	5357	12	E/o	San Simeone Pl	Warning	Two Way Traffic	W44A (CA)	Damg
Crow Canyon Rd	EB	5357	15	E/o	San Simeone Pl	Warning	Two Way Traffic	W44A (CA)	Damg
Crow Canyon Rd	EB	5357	12	E/o	San Simeone Pl	Warning	Two Way Traffic	W6-3	Good
Crow Canyon Rd	EB	5357	15	E/o	San Simeone Pl	Warning	Two Way Traffic	W6-3	Damg
Crow Canyon Rd	EB	5353	22	E/o	Shadow Creek Ct	Regulatory	Do Not Pass	R4-1	Good
Crow Canyon Rd	EB	5353	22	E/o	Shadow Creek Ct	Regulatory	Do Not Pass	R4-1	Damg
Crow Canyon Rd	EB	5351	1	E/o	Shadow Creek Ct	Regulatory	Keep Right	R4-7	Good
Crow Canyon Rd	EB	5281	2	W/o	Shadow Creek Ct	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	EB	5281	4	E/o	Shadow Creek Ct	Street Name	Shadow Creek/Greenridge	D1-2	Good
Crow Canyon Rd	EB	5353	22	E/o	Shadow Creek Ct	Warning	Lane Ends Merge Left	W4-2R	Good
Crow Canyon Rd	EB	5353	22	E/o	Shadow Creek Ct	Warning	Lane Ends Merge Right	W4-2R	Good
Crow Canyon Rd	EB	5351	1	E/o	Shadow Creek Ct	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	EB	5269	4	W/o	Waterford Pl	Regulatory	No Left or U-Turn	R3-18	Good
Crow Canyon Rd	EB	5263	4	E/o	Waterford Pl	Regulatory	No Left or U-Turn	R3-18	Good
Crow Canyon Rd	EB	5269	4	E/o	Waterford Pl	Street Name	Waterford Pl	D3	Good
Crow Canyon Rd	NB	0	5	W/o	Greenridge Rd	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	NB	0	5	E/o	Greenridge Rd	Regulatory	One Way Left	R6-1L	Good
Crow Canyon Rd	NB	0	5	E/o	Greenridge Rd	Regulatory	Wrong Way	R5-1a	Good
Crow Canyon Rd	NB	0	5	W/o	Greenridge Rd	Street Name	Crow Canyon Rd	D3	Good
Crow Canyon Rd	NB	0	0	at	MM 1.20	Mile Post Marker	MM 1.20	D10-3	Good
Crow Canyon Rd	NB	0	0	at	MM 1.66	Mile Post Marker	MM 1.66	D10-3	Good
Crow Canyon Rd	NB	0	0	at	MM 2.06	Mile Post Marker	MM 2.06	D10-3	Good
Crow Canyon Rd	NB	0	0	at	MM 2.70	Mile Post Marker	MM 2.70	D10-3	Good
Crow Canyon Rd	NB	7575	0	at	MM 3.10	Mile Post Marker	MM 3.10	D10-3	Good
Crow Canyon Rd	NB	8018	0	at	MM 3.45	Mile Post Marker	MM 3.45	D10-3	Good
Crow Canyon Rd	NB	8018	158	N/o	MM 3.45	Regulatory	Speed Checked By Radar	R48 (CA)	Good
Crow Canyon Rd	NB	8018	158	N/o	MM 3.45	Speed Limit	Speed Limit 50 MPH	R2-1	Good
Crow Canyon Rd	NB	0	0	at	MM 4.10	Mile Post Marker	MM 4.10	D10-3	Good
Crow Canyon Rd	NB	0	529	S/o	MM 4.10	Regulatory	Speed Enforced By Aircraft	R48-2 (CA)	Damg
Crow Canyon Rd	NB	0	168	S/o	MM 4.10	Warning	Divided Highway Ends	W6-2	Good
Crow Canyon Rd	NB	0	168	S/o	MM 4.10	Warning	Divided Highway Ends	W6-2a (Mod)	Good
Crow Canyon Rd	NB	0	240	N/o	MM 4.10	Warning	Lane Ends Merge Left	W9-2L	Good
Crow Canyon Rd	NB	9232	1054	S/o	MM 4.10	Warning	Slide Area	W38 (CA)	Good
Crow Canyon Rd	NB	9232	1145	S/o	MM 4.10	Warning	Slide Area	W38 (CA)	Good
Crow Canyon Rd	NB	0	81	S/o	MM 4.32	Regulatory	Do Not Pass	R4-1	Good
Crow Canyon Rd	NB	0	188	S/o	MM 4.32	Regulatory	Speed Enforced By Radar	R48 (CA)	Good
Crow Canyon Rd	NB	0	188	S/o	MM 4.32	Speed Limit	Speed Limit 50 MPH	R2-1	Good
Crow Canyon Rd	NB	0	81	S/o	MM 4.32	Warning	Lane Ends Right	W11 (CA)	Good
Crow Canyon Rd	NB	0	296	N/o	MM 4.42	Curve Warning	Curve (Right)	W1-2R	Good
Crow Canyon Rd	NB	0	1408	N/o	MM 4.42	Curve Warning	Winding Road (Left)	W1-5L	Good
Crow Canyon Rd	NB	0	0	at	MM 4.42	Mile Post Marker	MM 4.42	D10-3	Good
Crow Canyon Rd	NB	0	296	N/o	MM 4.42	Warning	Advisory Speed Limit 45 MPH	W13-1	Good
Crow Canyon Rd	NB	0	1408	N/o	MM 4.42	Warning	Next 2 Miles	W16-4	Good
Crow Canyon Rd	NB	9998	605	N/o	MM 4.42	Warning	Soft Shoulder	W8-4	Good
Crow Canyon Rd	NB	0	38	N/o	MM 4.42	Warning	Two Way Traffic	W6-3	Good
Crow Canyon Rd	NB	0	38	N/o	MM 4.42	Warning	Two Way Traffic	W6-3	Good
Crow Canyon Rd	NB	0	0	at	MM 5.25	Mile Post Marker	MM 5.25	D10-3	Good
Crow Canyon Rd	NB	10700	0	at	MM 5.83	Mile Post Marker	MM 5.83	D10-3	Good
Crow Canyon Rd	NB	0	950	S/o	MM 5.83	Warning	Chevron Right	W1-8R	Good
Crow Canyon Rd	NB	0	914	S/o	MM 5.83	Warning	Chevron Right	W1-8R	Good
Crow Canyon Rd	NB	0	892	S/o	MM 5.83	Warning	Chevron Right	W1-8R	Good
Crow Canyon Rd	NB	0	861	S/o	MM 5.83	Warning	Chevron Right	W1-8R	Good
Crow Canyon Rd	NB	0	838	S/o	MM 5.83	Warning	Chevron Right	W1-8R	Good
Crow Canyon Rd	NB	0	409	N/o	MM 5.83	Warning	Object Marker	OM-3R	Good
Crow Canyon Rd	NB	0	0	at	MM 6.38	Mile Post Marker	MM 6.38	D10-3	Good
Crow Canyon Rd	NB	0	1254	W/o	MM 6.38	Warning	Large Arrow (Right)	W1-6R	Good
Crow Canyon Rd	NB	0	463	W/o	MM 6.38	Warning	Large Arrow (Right)	W1-6R	Good
Crow Canyon Rd	NB	0	1254	W/o	MM 6.38	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	0	463	W/o	MM 6.38	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	0	0	at	MM 6.77	Mile Post Marker	MM 6.77	D10-3	Good
Crow Canyon Rd	NB	0	357	E/o	MM 6.77	Speed Limit	40 MPH Zone Ahead	R2-4 (CA)	Good

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CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Road Name	Direction	Nearest Address	Distance to Nearest Intersection	Direction	Intersection	Sign Type	Sign Description	Code	Condition of Sign
Crow Canyon Rd	NB	0	634	W/o	MM 6.77	Warning	Large Arrow (Left)	W1-6L	Good
Crow Canyon Rd	NB	0	634	W/o	MM 6.77	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	0	124	S/o	MM1.20	Curve Warning	Winding Road (Left)	W1-5L	Good
Crow Canyon Rd	NB	0	328	N/o	MM1.20	Non Standard	Crow Creek San Lorenzo Creek W	CRK	Good
Crow Canyon Rd	NB	0	616	S/o	MM1.20	Parking	No Parking Vehicle Over 20 Ft	R28B (CA)	Good
Crow Canyon Rd	NB	0	944	N/o	MM1.20	Street Name	Cold Water Rd	D3	Vand
Crow Canyon Rd	NB	0	725	S/o	MM1.20	Warning	Large Arrow (Left)	W1-6L	Good
Crow Canyon Rd	NB	0	124	S/o	MM1.20	Warning	Next 1 Miles	W16-4	Good
Crow Canyon Rd	NB	0	725	S/o	MM1.20	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	0	558	N/o	MM1.20	Warning	Signal Ahead	W3-3	Damg
Crow Canyon Rd	NB	0	497	N/o	MM1.66	Non Standard	Crow Creek San Lorenzo Creek W	CRK	Good
Crow Canyon Rd	NB	0	838	S/o	MM1.66	Regulatory	Keep Right	R4-7	Damg
Crow Canyon Rd	NB	0	813	S/o	MM1.66	Regulatory	Speed Enforced By Aircraft	R48-2 (CA)	Good
Crow Canyon Rd	NB	0	33	N/o	MM1.66	Regulatory	Speed Enforced By Radar	R48 (CA)	Good
Crow Canyon Rd	NB	0	33	N/o	MM1.66	Speed Limit	Speed Limit 40 MPH	R2-1	Good
Crow Canyon Rd	NB	0	906	S/o	MM1.66	Street Name	Cold Water Dr	D3	Good
Crow Canyon Rd	NB	0	874	S/o	MM1.66	Street Name	Cold Water Dr	D3	Good
Crow Canyon Rd	NB	0	469	N/o	MM1.66	Warning	Deer	W13-3	Vand
Crow Canyon Rd	NB	0	264	N/o	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	283	N/o	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	325	N/o	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	351	N/o	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	386	N/o	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	404	N/o	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	426	N/o	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	453	N/o	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	475	N/o	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	490	N/o	MM2.06	Curve Warning	Chevron (Right)	W1-8R	Good
Crow Canyon Rd	NB	0	25	S/o	MM2.06	Curve Warning	Reverse Turn (Right)	W1-3R	Damg
Crow Canyon Rd	NB	0	310	N/o	MM2.06	Curve Warning	Right Reverse Turn w/Advisory	W1-9R(Mod)	Damg
Crow Canyon Rd	NB	0	25	S/o	MM2.06	Warning	Advisory Speed 30 MPH	W13-1	Damg
Crow Canyon Rd	NB	0	1210	N/o	MM2.06	Warning	Large Arrow (Left)	W1-6L	Good
Crow Canyon Rd	NB	0	1210	N/o	MM2.06	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	0	101	N/o	MM2.06	Warning	Rock Slide Area	W50 (CA)	Good
Crow Canyon Rd	NB	6651	75	N/o	MM2.70	Speed Limit	Speed Limit 45 MPH	R2-1	Good
Crow Canyon Rd	NB	0	1642	S/o	MM2.70	Warning	Large Arrow (Right)	W1-6R	Good
Crow Canyon Rd	NB	0	1642	S/o	MM2.70	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	0	46	S/o	MM3.02	Curve Warning	Reverse Turn (Left)	W1-3L	Good
Crow Canyon Rd	NB	0	46	S/o	MM3.02	Warning	Advisory Speed 30 MPH	W13-1	Good
Crow Canyon Rd	NB	7575	28	N/o	MM3.10	Curve Warning	Left Reverse Turn w/Advisory 5	W1-3L(Mod)	Good
Crow Canyon Rd	NB	7575	78	N/o	MM3.10	Warning	Large Arrow (Left)	W1-6L	Good
Crow Canyon Rd	NB	7575	78	N/o	MM3.10	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	7825	476	S/o	Norris Canyon Rd	Curve Warning	Curve (Left)	W1-2L	Good
Crow Canyon Rd	NB	0	263	S/o	Norris Canyon Rd	Parking	No Parking Any Time	R26 (CA)	Good
Crow Canyon Rd	NB	0	168	S/o	Norris Canyon Rd	Parking	No Parking Any Time	R26 (CA)	Good
Crow Canyon Rd	NB	0	368	S/o	Norris Canyon Rd	Parking	No Parking Any Time	R28 (CA)	Damg
Crow Canyon Rd	NB	8018	2	N/o	Norris Canyon Rd	Regulatory	Keep Right	R4-7	Good
Crow Canyon Rd	NB	0	143	S/o	Norris Canyon Rd	Regulatory	Keep Right	R4-7	Good
Crow Canyon Rd	NB	0	14	N/o	Norris Canyon Rd	Regulatory	No Left or U-Turn	R3-18	Good
Crow Canyon Rd	NB	0	14	N/o	Norris Canyon Rd	Street Name	Norris Canyon Road	D3	Good
Crow Canyon Rd	NB	7825	476	S/o	Norris Canyon Rd	Warning	Advisory Speed Limit 40 MPH	W13-1	Good
Crow Canyon Rd	NB	7324	932	S/o	Norris Canyon Rd	Warning	Large Arrow (Right)	W1-6R	Good
Crow Canyon Rd	NB	7324	932	S/o	Norris Canyon Rd	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	8018	2	N/o	Norris Canyon Rd	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	0	143	S/o	Norris Canyon Rd	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	NB	0	462	S/o	Norris Canyon Rd	Warning	Signal Ahead	W3-3	Good
Crow Canyon Rd	NB	0	462	S/o	Norris Canyon Rd	Warning	Signal Ahead	W3-3	Good
Crow Canyon Rd	NB	5357	1	N/o	San Simeone Pl	Regulatory	Do Not Enter	R5-1	Good
Crow Canyon Rd	NB	5357	4	W/o	San Simeone Pl	Regulatory	No Ped Crossing	R49 (CA)	Good
Crow Canyon Rd	NB	5357	6	E/o	San Simeone Pl	Regulatory	No Ped Crossing	R49 (CA)	Good
Crow Canyon Rd	NB	5355	1	N/o	San Simeone Pl	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	NB	5355	1	N/o	San Simeone Pl	Regulatory	No U-Turn	R34A (CA)	Good
Crow Canyon Rd	NB	5355	3	W/o	San Simeone Pl	Regulatory	One Way Arrow (Right)	R6-1R	Good
Crow Canyon Rd	NB	5357	1	N/o	San Simeone Pl	Regulatory	Wrong Way	R5-1a	Good
Crow Canyon Rd	NB	5281	22	W/o	Shadow Creek Ct	Regulatory	No Ped Crossing	R49 (CA)	Good
Crow Canyon Rd	NB	5269	8	E/o	Waterford Pl	Regulatory	No Ped Crossing	R49 (CA)	Good
Crow Canyon Rd	NB	5269	4	W/o	Waterford Pl	Regulatory	One Way Arrow (Right)	R6-1R	Good
Crow Canyon Rd	SB	0	305	E/o	Greenridge Rd	Regulatory	No Ped Crossing-Use Crosswalk	R49 (CA)	Good
Crow Canyon Rd	SB	0	252	E/o	Greenridge Rd	Regulatory	No Ped Crossing-Use Crosswalk	R49 (CA)	Good
Crow Canyon Rd	SB	0	6	W/o	Greenridge Rd	Regulatory	No Ped Crossing-Use Crosswalk	R49 (CA)	Vand
Crow Canyon Rd	SB	0	37	E/o	Greenridge Rd	Regulatory	No Ped Crossing-Use Crosswalk	R49 (CA)	Vand
Crow Canyon Rd	SB	0	0	at	MM 1.20	Mill Post Marker	MM 1.20	D10-3	Damg
Crow Canyon Rd	SB	0	0	at	MM 1.66	Mill Post Marker	MM 1.66	D10-3	Good
Crow Canyon Rd	SB	0	0	at	MM 2.06	Mill Post Marker	MM 2.06	D10-3	Good
Crow Canyon Rd	SB	0	0	at	MM 2.70	Mill Post Marker	MM 2.70	D10-3	Good

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

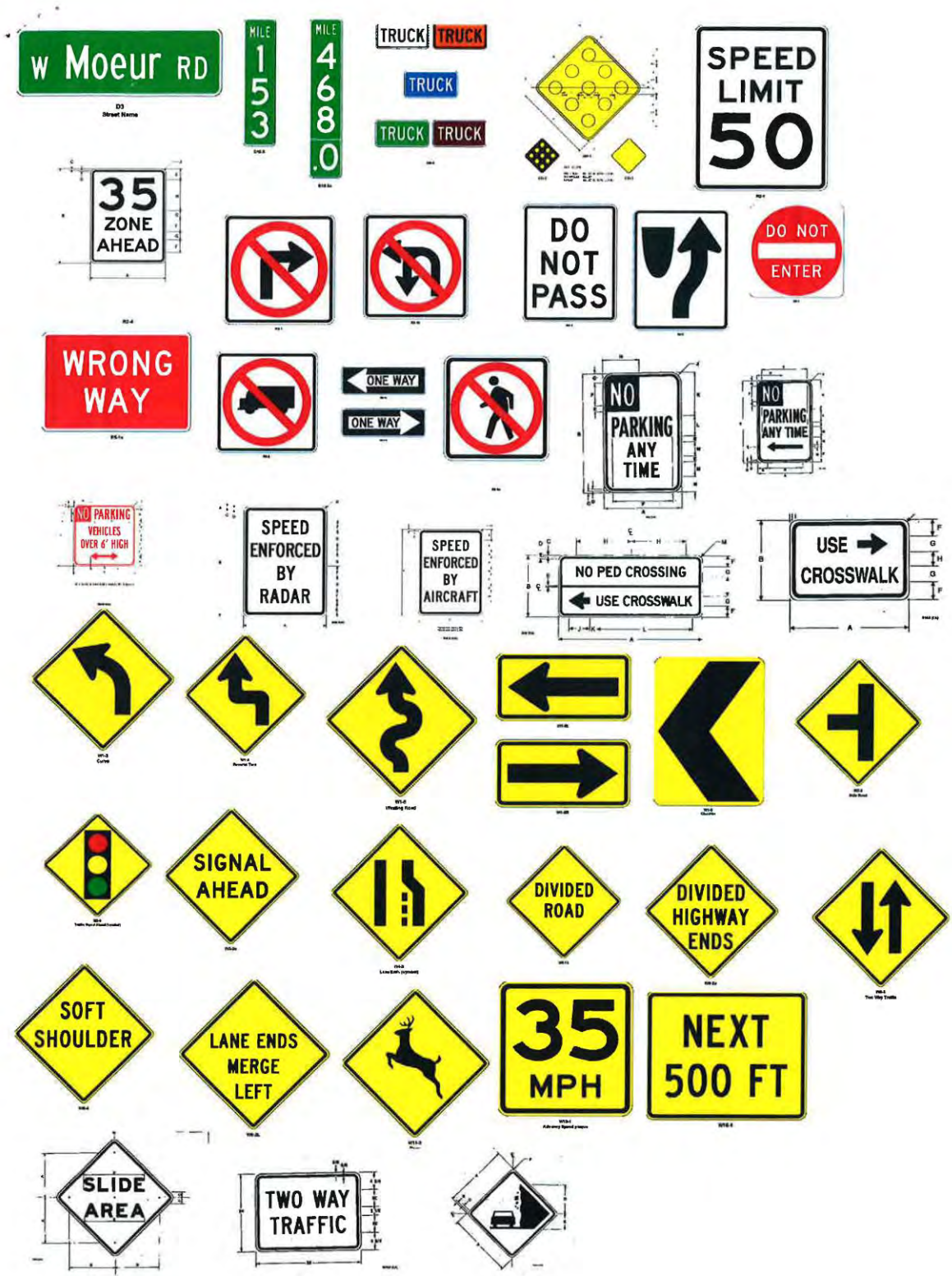
Road Name	Direction	Nearest Address	Distance to Nearest Intersection	Direction	Intersection	Sign Type	Sign Description	Code	Condition of Sign
Crow Canyon Rd	SB	0	0	at	MM 3.02	Mile Post Marker	MM 3.02	D10-3	Good
Crow Canyon Rd	SB	0	1012	N/o	MM 3.45	Curve Warning	Reverse Curve (Left)	W1-4L	Good
Crow Canyon Rd	SB	0	969	N/o	MM 3.45	Curve Warning	Reverse Curve (Left)	W1-4L	Good
Crow Canyon Rd	SB	0	0	at	MM 3.45	Mile Post Marker	MM 3.45	D10-3	Good
Crow Canyon Rd	SB	8018	63	N/o	MM 3.45	Regulatory	Keep Right	R4-7	Good
Crow Canyon Rd	SB	0	1410	N/o	MM 3.45	Speed Limit	45 MPH Zone Ahead	R2-4 (CA)	Good
Crow Canyon Rd	SB	0	1410	N/o	MM 3.45	Speed Limit	45 MPH Zone Ahead	R2-4 (CA)	Good
Crow Canyon Rd	SB	8018	89	N/o	MM 3.45	Speed Limit	Speed Limit 45 MPH	R2-1	Good
Crow Canyon Rd	SB	8160	590	N/o	MM 3.45	Street Name	Norris Cyn	D3	Good
Crow Canyon Rd	SB	0	1012	N/o	MM 3.45	Warning	Advisory Speed Limit 45 MPH	W13-1	Damg
Crow Canyon Rd	SB	0	969	N/o	MM 3.45	Warning	Advisory Speed Limit 45 MPH	W13-1	Good
Crow Canyon Rd	SB	0	957	N/o	MM 3.45	Warning	Divided HighWay Ends	W6-2	Good
Crow Canyon Rd	SB	0	950	N/o	MM 3.45	Warning	Divided HighWay Ends	W6-2	Good
Crow Canyon Rd	SB	0	957	N/o	MM 3.45	Warning	Divided HighWay Ends	W6-2a (Mod)	Good
Crow Canyon Rd	SB	0	950	N/o	MM 3.45	Warning	Divided HighWay Ends	W6-2a (Mod)	Good
Crow Canyon Rd	SB	8018	63	N/o	MM 3.45	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	8160	590	N/o	MM 3.45	Warning	Side Road Left	W2-2L	Good
Crow Canyon Rd	SB	8018	245	N/o	MM 3.45	Warning	Signal Ahead	W3-3	Good
Crow Canyon Rd	SB	8018	245	N/o	MM 3.45	Warning	Signal Ahead	W3-3	Good
Crow Canyon Rd	SB	0	0	at	MM 4.10	Mile Post Marker	MM 4.10	D10-3	Good
Crow Canyon Rd	SB	0	1381	S/o	MM 4.10	Regulatory	Do Not Pass	R4-1	Good
Crow Canyon Rd	SB	0	1396	S/o	MM 4.10	Regulatory	Do Not Pass	R4-1	Good
Crow Canyon Rd	SB	0	1381	S/o	MM 4.10	Warning	Lane Ends Left	W4-2L	Good
Crow Canyon Rd	SB	0	1396	S/o	MM 4.10	Warning	Lane Ends Left	W4-2L	Good
Crow Canyon Rd	SB	0	698	S/o	MM 4.10	Warning	Lane Ends Merge Right	W4-7	Good
Crow Canyon Rd	SB	0	0	at	MM 4.32	Mile Post Marker	MM 4.32	D10-3	Good
Crow Canyon Rd	SB	0	185	S/o	MM 4.32	Regulatory	Speed Checked By Radar	R48 (CA)	Good
Crow Canyon Rd	SB	0	185	S/o	MM 4.32	Speed Limit	Speed Limit 50 MPH	R2-1	Good
Crow Canyon Rd	SB	0	37	N/o	MM 4.42	Regulatory	Keep Right	R4-7	Vand
Crow Canyon Rd	SB	0	37	N/o	MM 4.42	Regulatory	Keep Right	R4-7a (Mod)	Good
Crow Canyon Rd	SB	9998	589	N/o	MM 4.42	Warning	Divided Road	W6-1b	Damg
Crow Canyon Rd	SB	0	37	N/o	MM 4.42	Warning	Object Marker	OM1-3	Vand
Crow Canyon Rd	SB	0	0	at	MM 5.25	Mile Post Marker	MM 5.25	D10-3	Good
Crow Canyon Rd	SB	0	1660	S/o	MM 5.25	Non Standard	School Bus Stop 400 FT	SPW	Good
Crow Canyon Rd	SB	0	955	S/o	MM 5.25	Regulatory	Speed Enforced By Aircraft	R48-2 (CA)	Good
Crow Canyon Rd	SB	10700	0	at	MM 5.83	Mile Post Marker	MM 5.83	D10-3	Good
Crow Canyon Rd	SB	0	950	S/o	MM 5.83	Warning	Chevron Left	W1-8L	Good
Crow Canyon Rd	SB	0	914	S/o	MM 5.83	Warning	Chevron Left	W1-8L	Good
Crow Canyon Rd	SB	0	892	S/o	MM 5.83	Warning	Chevron Left	W1-8L	Good
Crow Canyon Rd	SB	0	861	S/o	MM 5.83	Warning	Chevron Left	W1-8L	Good
Crow Canyon Rd	SB	0	838	S/o	MM 5.83	Warning	Chevron Left	W1-8L	Good
Crow Canyon Rd	SB	0	431	N/o	MM 5.83	Warning	Object Marker	OM-3L	Damg
Crow Canyon Rd	SB	0	0	at	MM 6.38	Mile Post Marker	MM 6.38	D10-3	Good
Crow Canyon Rd	SB	0	20	E/o	MM 6.38	Non Standard	Crow Creek San Lorenzo Creek W	CRK	Good
Crow Canyon Rd	SB	0	464	W/o	MM 6.38	Warning	Large Arrow (Left)	W1-6L	Good
Crow Canyon Rd	SB	0	464	W/o	MM 6.38	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	0	10	W/o	MM 6.77	Curve Warning	Curve (Left)	W1-2L	Good
Crow Canyon Rd	SB	0	926	W/o	MM 6.77	Curve Warning	Winding Road (Left)	W1-5L	Good
Crow Canyon Rd	SB	0	385	E/o	MM 6.77	Guide	Alameda County Line	G10 (CA)	Damg
Crow Canyon Rd	SB	0	0	at	MM 6.77	Mile Post Marker	MM 6.77	D10-3	Good
Crow Canyon Rd	SB	0	305	E/o	MM 6.77	Non Standard	CHP Sign	CHP	Damg
Crow Canyon Rd	SB	0	386	E/o	MM 6.77	Non Standard	Entering San Lorenzo Creek Wat	CRK	Good
Crow Canyon Rd	SB	0	307	E/o	MM 6.77	Regulatory	No Trucks	R5-2	Good
Crow Canyon Rd	SB	0	307	E/o	MM 6.77	Regulatory	Over 15 Tons	R200-1 (CA)	Good
Crow Canyon Rd	SB	0	366	E/o	MM 6.77	Regulatory	Speed Checked By Radar	R48 (CA)	Good
Crow Canyon Rd	SB	0	366	E/o	MM 6.77	Speed Limit	Speed Limit 50 MPH	R2-1	Good
Crow Canyon Rd	SB	0	10	W/o	MM 6.77	Warning	Advisoty Speed Limit 35 MPH	W13-1	Good
Crow Canyon Rd	SB	0	260	W/o	MM 6.77	Warning	Deer	W11-3	Vand
Crow Canyon Rd	SB	0	660	W/o	MM 6.77	Warning	Large Arrow (Right)	W1-6R	Good
Crow Canyon Rd	SB	0	926	W/o	MM 6.77	Warning	Next 2 Miles	W16-4	Good
Crow Canyon Rd	SB	0	660	W/o	MM 6.77	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	0	585	S/o	MM1.20	Non Standard	Caution Pedestrians On Shoulde	SPW	Good
Crow Canyon Rd	SB	0	187	S/o	MM1.20	Non Standard	Caution Pedestrians On Shoulde	SPW	Damg
Crow Canyon Rd	SB	0	276	N/o	MM1.20	Non Standard	Caution Pedestrians On Shoulde	SPW	Good
Crow Canyon Rd	SB	0	448	N/o	MM1.20	Non Standard	Crow Creek San Lorenzo Creek W	CRK	Good
Crow Canyon Rd	SB	0	650	S/o	MM1.20	Parking	No Parking Any Time	R26 (CA)	Good
Crow Canyon Rd	SB	0	694	S/o	MM1.20	Regulatory	Keep Right	R4-7	Damg
Crow Canyon Rd	SB	0	694	S/o	MM1.20	Regulatory	Keep Right	R4-7a	Good
Crow Canyon Rd	SB	0	187	S/o	MM1.20	Street Name	San Simeon Place	D3	Damg
Crow Canyon Rd	SB	0	6	N/o	MM1.20	Warning	Divided Road	W6-1b	Vand
Crow Canyon Rd	SB	0	694	S/o	MM1.20	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	0	160	S/o	MM1.20	Warning	Signal Ahead	W3-3	Good
Crow Canyon Rd	SB	0	160	S/o	MM1.20	Warning	Signal Ahead	W3-3a (CA)	Damg
Crow Canyon Rd	SB	0	984	S/o	MM1.66	Non Standard	Caution Pedestrians On Shoulde	SPW	Good
Crow Canyon Rd	SB	0	945	S/o	MM1.66	Regulatory	No U-Turn	R3-4	Good

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
 GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

Road Name	Direction	Nearest Address	Distance to Nearest Intersection	Direction	Intersection	Sign Type	Sign Description	Code	Condition of Sign
Crow Canyon Rd	SB	0	838	S/o	MM1.66	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	SB	0	1046	S/o	MM1.66	Regulatory	Speed Checked By Radar	R48 (CA)	Damg
Crow Canyon Rd	SB	0	1046	S/o	MM1.66	Speed Limit	Speed Limit 40 MPH	R2-1	Good
Crow Canyon Rd	SB	0	945	S/o	MM1.66	Street Name	Cold Water Dr	D3	Faded
Crow Canyon Rd	SB	0	945	S/o	MM1.66	Street Name	Cold Water Dr	D3	Good
Crow Canyon Rd	SB	0	945	S/o	MM1.66	Street Name	Crow Canyon Rd	D3	Good
Crow Canyon Rd	SB	0	9	N/o	MM1.66	Warning	Signal Ahead	W3-3	Vand
Crow Canyon Rd	SB	0	268	N/o	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Faded
Crow Canyon Rd	SB	0	310	N/o	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Good
Crow Canyon Rd	SB	0	331	N/o	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Faded
Crow Canyon Rd	SB	0	357	N/o	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Good
Crow Canyon Rd	SB	0	388	N/o	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Good
Crow Canyon Rd	SB	0	404	N/o	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Vand
Crow Canyon Rd	SB	0	438	N/o	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Vand
Crow Canyon Rd	SB	0	471	N/o	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Vand
Crow Canyon Rd	SB	0	492	N/o	MM2.06	Curve Warning	Chevron (Left)	W1-8L	Vand
Crow Canyon Rd	SB	0	890	N/o	MM2.06	Curve Warning	Reverse Turn (Right)	W1-3R	Good
Crow Canyon Rd	SB	0	1481	N/o	MM2.06	Curve Warning	Winding Road (Left)	W1-5L	Good
Crow Canyon Rd	SB	0	3	N/o	MM2.06	Parking	No Parking Any Time	R26 (CA)	Vand
Crow Canyon Rd	SB	0	592	N/o	MM2.06	Parking	No Parking Any Time	R26 (CA)	Good
Crow Canyon Rd	SB	0	121	S/o	MM2.06	Parking	No Parking Any Time w/Right Ar	R28R (CA)	Good
Crow Canyon Rd	SB	0	890	N/o	MM2.06	Warning	Advisory Speed 30 MPH	W13-1	Good
Crow Canyon Rd	SB	0	597	N/o	MM2.06	Warning	Large Arrow (Right)	W1-6R	Good
Crow Canyon Rd	SB	0	1213	N/o	MM2.06	Warning	Large Arrow (Right)	W1-6R	Good
Crow Canyon Rd	SB	0	1481	N/o	MM2.06	Warning	Next 1 Miles	W16-4	Good
Crow Canyon Rd	SB	0	597	N/o	MM2.06	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	0	1213	N/o	MM2.06	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	6776	641	N/o	MM2.70	Non Standard	DriveWay	SPW	Good
Crow Canyon Rd	SB	0	634	S/o	MM2.70	Speed Limit	Speed Limit 40 MPH	R2-1	Damg
Crow Canyon Rd	SB	0	1494	S/o	MM2.70	Warning	Large Arrow (Left)	W1-6L	Good
Crow Canyon Rd	SB	0	1494	S/o	MM2.70	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	6776	641	N/o	MM2.70	Warning	Slide Road Right	W2-2R	Good
Crow Canyon Rd	SB	0	208	N/o	MM3.02	Regulatory	Speed Checked By Radar	R48 (CA)	Good
Crow Canyon Rd	SB	0	176	S/o	MM3.02	Regulatory	Speed Enforced By Aircraft	R48-2 (CA)	Good
Crow Canyon Rd	SB	0	208	N/o	MM3.02	Speed Limit	Speed Limit 45 MPH	R2-1	Good
Crow Canyon Rd	SB	8000	240	S/o	Norris Canyon Rd	Curve Warning	Reverse Turn (Left)	W1-3L	Good
Crow Canyon Rd	SB	7570	711	S/o	Norris Canyon Rd	Non Standard	No Dumping & No Parking	DMP	Good
Crow Canyon Rd	SB	7570	683	S/o	Norris Canyon Rd	Non Standard	No Dumping & No Parking	DMP	Good
Crow Canyon Rd	SB	8018	63	N/o	Norris Canyon Rd	Non Standard	On Norris Cyn Rd in Contra Co	SR	Good
Crow Canyon Rd	SB	8018	63	N/o	Norris Canyon Rd	Regulatory	Commercial Vehicles Over 7 Ton	R36 (CA)	Good
Crow Canyon Rd	SB	0	4	S/o	Norris Canyon Rd	Regulatory	Keep Right	R4-7	Good
Crow Canyon Rd	SB	0	3	N/o	Norris Canyon Rd	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	SB	8018	2	N/o	Norris Canyon Rd	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	SB	0	3	N/o	Norris Canyon Rd	Street Name	Norris Canyon Road	D3	Good
Crow Canyon Rd	SB	8000	240	S/o	Norris Canyon Rd	Warning	Advisoty Speed Limit 35 MPH	W13-1	Good
Crow Canyon Rd	SB	7534	761	S/o	Norris Canyon Rd	Warning	Deer	W11-3	Vand
Crow Canyon Rd	SB	7570	617	S/o	Norris Canyon Rd	Warning	Large Arrow (Left)	W1-6L	Good
Crow Canyon Rd	SB	7570	617	S/o	Norris Canyon Rd	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	0	4	S/o	Norris Canyon Rd	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	SB	5351	1	E/o	Shadow Creek Ct	Regulatory	One Way Arrow (Right)	R6-1R	Good
Crow Canyon Rd	SB	5263	6	W/o	Waterford Pl	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	SB	5269	2	E/o	Waterford Pl	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	SB	5263	8	W/o	Waterford Pl	Regulatory	No U-Turn	R34A (CA)	Good
Crow Canyon Rd	SB	5263	4	E/o	Waterford Pl	Regulatory	One Way Arrow (Right)	R6-1R	Good
Crow Canyon Rd	SB	5263	6	W/o	Waterford Pl	Regulatory	One Way Left	R6-1L	Good
Crow Canyon Rd	SB	5263	6	W/o	Waterford Pl	Street Name	Waterford Pl	D3	Damg
Crow Canyon Rd	WB	0	97	E/o	Greenridge Rd	Regulatory	No Public Parking	R101 (CA) M	Good
Crow Canyon Rd	WB	0	5	E/o	Greenridge Rd	Regulatory	No Right Turn	R3-1	Good
Crow Canyon Rd	WB	0	5	W/o	Greenridge Rd	Regulatory	One Way Left	R6-1L	Good
Crow Canyon Rd	WB	0	6	W/o	Greenridge Rd	Street Name	Greenridge Rd	D3	Good
Crow Canyon Rd	WB	0	5	W/o	Greenridge Rd	Street Name	Greenridge Rd	D3	Good
Crow Canyon Rd	WB	0	5	W/o	Greenridge Rd	Street Name	Waterford Pl	D3	Good
Crow Canyon Rd	WB	0	197	N/o	MM2.06	Parking	No Parking Any Time	R26 (CA)	Good
Crow Canyon Rd	WB	0	850	N/o	MM2.06	Parking	No Parking Any Time w/Left Arr	R28L (CA)	Faded
Crow Canyon Rd	WB	0	2	S/o	Norris Canyon Rd	Regulatory	No Pedestrians	R9-3a	Good
Crow Canyon Rd	WB	0	2	N/o	Norris Canyon Rd	Regulatory	No U-Turn	R3-4	Good
Crow Canyon Rd	WB	0	4	S/o	Norris Canyon Rd	Regulatory	One Way Arrow (Right)	R6-1R	Good
Crow Canyon Rd	WB	0	4	N/o	Norris Canyon Rd	Regulatory	One Way Left	R6-1L	Good
Crow Canyon Rd	WB	0	2	S/o	Norris Canyon Rd	Regulatory	Use Crosswalk	R96B (CA)	Good
Crow Canyon Rd	WB	0	2	N/o	Norris Canyon Rd	Street Name	Crow Canyon Road	D3	Good
Crow Canyon Rd	WB	0	4	N/o	Norris Canyon Rd	Warning	Object Marker	OM1-3	Good
Crow Canyon Rd	WB	5355	1	W/o	San Simeone Pl	Regulatory	Keep Right	R4-7	Good
Crow Canyon Rd	WB	5355	1	W/o	San Simeone Pl	Regulatory	Keep Right	R4-7A	Damg
Crow Canyon Rd	WB	5281	2	W/o	Shadow Creek Ct	Regulatory	No Left or U-Turn	R3-18	Good
Crow Canyon Rd	WB	5351	1	E/o	Shadow Creek Ct	Regulatory	No Left or U-Turn	R3-18	Damg





**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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## **APPENDIX D WRECO FLOODPLAIN, STORMWATER QUALITY, AND DRAINAGE TECHNICAL MEMORANDUM**

**DRAFT**



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## ***Draft Memorandum***

**Date:** November 10, 2014  
**To:** Tom Wintch – Quincy Engineering, Inc.  
**From:** Garrett Low / James Go – WRECO  
**Subject:** Crow Canyon Road Improvements – Floodplain, Stormwater Quality, and Drainage Technical Memorandum (Draft)

### **1. INTRODUCTION**

The purpose of this memorandum is to identify potential floodplain, stormwater quality, and drainage impacts and requirements for the Crow Canyon Road Improvements Project (Project) from Greenridge Road to the Contra Costa/Alameda County line. This memorandum includes the regulatory requirements, existing conditions, and the potential improvements and impacts associated with floodplain, stormwater quality, and drainage within the Project limits. This memorandum does not include any detailed analysis or calculations and is based on preliminary descriptions and conceptual layouts of potential short-term and long-term improvements and countermeasures provided by Quincy Engineering, Inc. Short-term speed-reduction countermeasures include California Highway Patrol (CHP) pullouts and speed feedback signs at multiple locations along the Project limits. Long-term speed-reduction countermeasures include potential roundabout design at various locations, a tunnel option, and various realignment options to Crow Canyon Road.

The majority of Crow Canyon Road consists of a narrow 2-lane road winding through hilly terrain with narrow shoulders, no median, and varying 30-45 mph posted speed limits. The roadway widens to a 4-lane divided highway for approximately 1 mile after its signalized intersection with Norris Canyon Road where the posted speed limit is 50 mph. Median openings and turn pockets are provided at several locations to facilitate ingress and egress from adjacent properties. Northerly of this 4-lane divided segment, the road once again transitions to a narrow and winding 2-lane facility until it reaches the end of the Project limit.

A location map of the Project is shown on Figure 1 and the potential countermeasures are shown in Attachment A.





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Figure 1. Location Map

Source: Caltrans Water Quality Planning Tool

## 2. REGULATORY SETTING AND REQUIREMENTS

### Floodplain

#### Federal Emergency Management Agency

The Project spans through two Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panels: 06001C0285G and 06013C0445F. According to the FIRMs, the 0.2% annual chance flood discharge is contained within the Crow Creek channel. See Attachment B for the FEMA FIRMette panels that cover the Project limits.

### Stormwater Quality

#### California Clean Water Act (CWA) Section 303(d) List

The CWA Section 303(d) List (State Water Resources Control Boards [SWRCB] 2010) is a compiled list of waters within California that have not attained water quality standards established by the United States Environmental Protection Agency (EPA). The CWA Section 303(d) list outlines the





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impacted waters as well as identifies the water body type, pollutant, and potential origin of the pollutant.

The stormwater runoff directly discharges to Crow Creek, which is not a water listed on the CWA 303(d) list; however, Crow Creek is a tributary to San Lorenzo Creek and San Lorenzo Creek is on the 303(d) list for diazinon. It was moved to the "being addressed" list by an EPA-approved Total Maximum Daily Load, which is identified as a contributor from urban runoff. Because the Project is in mountainous and semi-rural areas, and is at least a mile from the confluence of Crow Creek and San Lorenzo Creek, the Project is not anticipated to negatively affect the downstream waters. No additional requirements are anticipated to meet CWA guidelines.

### C.3 Stormwater Requirements

Stormwater runoff for the Project is permitted under the San Francisco Bay Municipal Regional Stormwater Permit (MRP) as issued by the National Pollutant Discharge Elimination System (NPDES). Under the MRP, stormwater treatment requirements are set forth and governed by the San Francisco Bay Regional Water Quality Control (SFBRWQCB). Alameda County is responsible for enforcement and interpretation of the regulations set forth by the SFBRWQCB for the Projects under their jurisdiction. Alameda County is a member of the Alameda Countywide Clean Water Program (ACCWP) and abides by the guidelines set forth in the ACCWP's *C.3 Stormwater Technical Guidance* (May 2014). Per Provision C.3 of the MRP, projects that create and/or replace 10,000 square feet or more of impervious roadway surface must comply and implement "appropriate source control, site design, and stormwater treatment measures to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects" (NPDES MRP 17). If 10,000 square feet or more of impervious surfaces are created and/or replaced, the Project will be required to implement stormwater treatment measures. As a general guideline, if the Project is required to implement stormwater treatment measures, an area approximately the size of 4% of the created and/or replaced impervious surface area shall be designated for stormwater treatment measures.

### Hydromodification Requirements

There are also requirements for hydromodification management. If the Project creates and/or replaces 1 or more acre of impervious surface and is not exempted per the MRP, it must comply with hydromodification management requirements. Additional stormwater requirements are outlined in the MRP C.3 Provision.

### Construction General Permit Order 2009-009-DWQ

Projects that are deemed as "covered" under the SWRCB Construction General Permit (CGP) Order 2009-0009-DWQ (amended by 2010-0014-DWQ and 2012-0006-DWQ) must conform to requirements outlined in the CGP, including the implementation of Storm Water Pollution Prevention Plans (SWPPP), among other requirements. Section II.B.1 of the CGP defines covered





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construction activities as: “Any construction or demolition activity, including, but not limited to, clearing, grading, grubbing, or excavation, or any other activity that results in a land disturbance of equal to or greater than one acre” (CGP Fact Sheet 7).

If the Project is not covered by the CGP, then the Project will need to comply with the requirements of Alameda County or Section C.6 of the San Francisco Bay MRP, whichever is more stringent.

### 3. EXISTING CONDITIONS

#### Summary of Receiving Waters

The Project alignment is parallel to Crow Creek, which originates in the hills northeast of Castro Valley, California. Crow Creek flows to the southwest and is a tributary to San Lorenzo Creek. San Lorenzo Creek flows west and ultimately discharges to the San Francisco Bay (see Figure 1). Crow Canyon Road crosses over Crow Creek at five locations within the Project limits and is generally located west of the creek as the road travels north. Within the vicinity of the Project limits, Crow Creek remains in natural channels and enters closed culverts at roadway crossings.

#### Existing Drainage System

The existing drainage system within the Project limits consists of curbs, dikes, and ditches that convey runoff to inlets, cross culverts, and downdrains that eventually outfall into Crow Creek. At locations where a median ditch is present, the roadway runoff drains toward the median ditch, which conveys runoff to inlets and into culverts that discharge to Crow Creek.

Photos 1 through 6 provide site photos of existing drainage features along the Project limits.



Photo 1. Curb and Inlet (PM 1.30, Rt)



Photo 2. Sheet Flow to Roadside Ditch (PM 5.83, Lt)





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Photo 3. Ditch at Median (PM 3.85)



Photo 4. Lined Ditch to Drop Inlet (PM 1.66, Lt)



Photo 5. Box Culvert for Crow Creek (PM 1.66, Lt)



Photo 6. Box Culvert for Crow Creek (PM 1.96, Rt)

#### 4. PROPOSED IMPROVEMENTS

##### *Floodplain Assessment*

FEMA panels 06001C0285G and 06013C0445F show floodplain areas. It appears that the Project is not within the base floodplain and the 0.2% annual chance flood discharge is contained within the Crow Creek channel; therefore, no special requirements for projects within floodplains are anticipated.





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## **Stormwater Quality Assessment**

### **C.3 Stormwater and Hydromodification**

The Project is expected to require implementation of the C.3 stormwater requirements, including stormwater treatment and hydromodification management. At a minimum, it is anticipated that the Project would need to supply erosion control plans demonstrating effective BMPs. Section C.6.c of the MRP notes that effective BMPs shall be provided in six categories: erosion control, run-on and run-off control, sediment control, active treatment systems (as necessary), good site management, and non-stormwater management. For short-term countermeasures, BMPs may not be feasible due to the limited right-of-way. For certain long-term countermeasures, potential bioretention areas may be feasible at the medians where the roadway would be widened, or on the outside of the future pavement where the roadway would be narrowed (see Attachment A for exhibits).

### **Construction General Permit Order 2009-009-DWQ**

It is currently anticipated that the Project would disturb more than 1 acre of land for the short-term and long-term improvements. Therefore, the Project will need to conform to the requirements outlined in the CGP including stormwater effluent monitoring. Meeting requirements of the CGP includes electronically filing of the Permit Registration Documents (PRDs) prior to commencement of construction activity. As part of the PRDs, a Notice of Intent (NOI), SWPPP, and additional applicable documents must be submitted. The CGP also requires that "all projects that are enrolled for more than one continuous three-month period to submit information and annually certify that their site is in compliance with these requirements" (CGP Fact Sheet 6). The Project would be required to perform quarterly, non-stormwater visual inspections, which "the discharger must visually observe each drainage area for the presence of (or indications of prior) unauthorized and authorized non-stormwater discharges and their sources" (CGP Fact Sheet 21). The Project would also need to perform and maintain post-storm event inspections as outlined in Section II.I.1.a. of the CGP.

A project's risk level is determined by the project's receiving water risk and sediment risk factors. The receiving water risk factor is low since the Project does not directly discharge into a 303(d)-listed waterbody. The sediment risk factor is estimated using the following equation:

$$\text{Sediment Risk Factor} = \text{LS Factor} \times \text{R Factor} \times \text{K Factor}$$

The LS factor is comprised of the slope length (L) factor and the slope steepness (S), and since the Project is located on steep and mountainous terrain, the LS factor is high. The rainfall erosivity (R) factor is based on the construction period which was assumed to be a minimum of 1 year and the soil erosion (K) factor was determined based on existing soil data within the Project vicinity per the United States Geological Survey (USGS) Web Soil Survey.







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With a low receiving water risk factor and a high sediment risk factor, the Project is anticipated to be Risk Level 2.

For Risk Level 2, the Project would have to visually inspect for the following:

- Daily – Inspection of Access Roads
- Pre-storm-event – Conditions for both baseline 48 hours before the anticipated qualifying storm event (storm event producing precipitation of 1/2 inch or more at the time of discharge [CGP Fact Sheet 23]) and the Rain Event Action Plan (REAP)
- Once each 24-hr period: During qualifying storm events
- Post-storm-event – Conditions 48 hours after qualifying storm events
- Weekly – Best Management Practices (BMPs)
- Quarterly – Non-stormwater discharges.

Stormwater effluent monitoring must be collected for Risk Level 2 projects. A “Minimum of 3 samples per day during qualifying rain event characterizing discharges associated with construction activity from the entire project disturbed area” shall be gathered (CGP Fact Sheet 23). Additionally, sampling collection requirements will have to be met and need to be performed for pH and turbidity levels when any of the following occurs:

- During a breach, malfunction, leakage, or spill of any non-stormwater discharges
- Stormwater discharges

### ***Drainage Impact Assessment***

#### **Drainage Criteria**

The design of storm drain facilities needs to conform to the requirements established in the Alameda County *Engineering Design Guidelines* (April 2009), standard drawings, and the Alameda County Flood Control and Water Conservation District's *Hydrology and Hydraulics Criteria Summary* manual (August 1989). According to the *Hydrology and Hydraulics Criteria Summary* manual, Crow Canyon Road is considered a secondary facility; therefore, the proposed drainage improvements must be designed for a design storm with a 10-year recurrence interval.

#### **Drainage Improvements to the Potential Countermeasures**

The following sections describe the potential drainage improvements to the short-term and long-term improvements and countermeasures proposed by Quincy Engineering, Inc, see Attachment A for exhibits.





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### **Segment 1**

#### Short-Term - Enhanced Speed Enforcement

The pavement would need to be graded at the proposed CHP pullout area to drain towards the existing roadway flow line whenever feasible to avoid creating low points that would result in localized ponding. There are no existing drainage facilities that will be impacted by the pullout area in Segment 1. Crow Creek enters two culverts in Segment 1, but they are not affected by the proposed improvements.

### **Segment 2**

#### Short-Term - Enhanced Speed Enforcement

The pavement would need to be graded at proposed CHP pullout areas to drain towards the existing roadway flow line whenever feasible to avoid creating low points that would result in localized ponding. The pullout areas will affect existing drainage systems, such as roadside ditches, cross culverts, and inlets that will need to be relocated and/or modified. Crow Creek enters two culverts in Segment 2, but they are not affected by the short-term improvements.

#### Medium-Term - Median Rumble Strip with 6-ft Shoulders

For the potential median rumble strip with 6-ft shoulders, the widening of the roadway will affect existing drainage systems, such as roadside ditches, cross culverts, inlets, and downdrains that will need to be relocated and/or modified. Crow Creek enters two culverts in Segment 2 and may be affected by the widening of the roadway.

#### Long-Term - Tunnel

For the potential tunnel countermeasure, sag vertical curves inside the tunnel should be avoided. Drainage inlets would need to be proposed at the upstream end of the tunnel to minimize runoff entering the tunnel. Lined gutters, drainage inlets, and pipes would need to be proposed inside the tunnel to capture and convey potential runoff. An underdrain system may be required based on geotechnical recommendations during the design phase. Existing inlets and downdrains along the old alignment will need to be removed and/or relocated. Crow Creek enters two culverts in Segment 2; the northern box culvert (near MP 2.00) will be impacted by the potential tunnel countermeasure.

### **Segment 3**

#### Short-Term - Enhanced Speed Enforcement

The pavement would need to be graded at proposed CHP pullout areas to drain towards the existing roadway flow line whenever feasible to avoid creating low points that would result in localized ponding. At one of the proposed pullout areas, a headwall and cross culvert may be impacted; therefore, it would need to be relocated and/or modified.





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#### Medium-Term - Driveway Acceleration / Deceleration Area

The pavement would need to be graded for any additional driveway paving to drain towards the existing roadway flow line whenever feasible to avoid creating low points that would result in localized ponding. The widening of the roadway would impact inlets, downdrains, driveway culverts, cross culverts, and roadside ditches which would need to be relocated and/or modified.

#### Long-Term - Two-Way Left-Turn Lane

For the two-way left-turn lane countermeasures, the widening of the roadway would impact inlets, downdrains, driveway culverts, cross culverts, and roadside ditches which would need to be relocated and/or modified.

### **Segment 4**

#### Short-Term - Enhanced Speed Enforcement

The pavement would need to be graded at proposed CHP pullout areas to drain towards the existing roadway flow line whenever feasible to avoid creating low points that would result in localized ponding. The pullout areas will affect existing drainage systems, such as roadside ditches, cross culverts, and inlets that will need to be relocated and/or modified.

#### Medium-Term - 4-Lane Left-Turn In and Out

The left-turn in and out countermeasure will add new pavement on top of the existing ditch at the median; therefore, roadside ditches, cross culverts, and inlets will need to be relocated and/or modified.

#### Long-Term - Two-Lane Left-Turn In and Out - Option 1

For the two-lane left-turn in and out countermeasures, the proposed improvement appear to pave over the existing ditch at the median; therefore, roadside ditches and inlets on the outside shoulder will need to be relocated and/or modified and the cross culverts will need to be extended.

#### Long-Term - Two-Lane Left-Turn In and Out - Option 2

For the two-lane left-turn in and out countermeasures, the proposed improvement would narrow the roadway; therefore, roadside ditches and inlets on the outside shoulder will need to be relocated and/or modified and the cross culverts will need to be shortened.

### **Segment 5**

#### Short-Term - Enhanced Speed Enforcement

The pavement would need to be graded at proposed CHP pullout areas to drain towards the existing roadway flow line whenever feasible to avoid creating low points that would result in localized ponding. There are no existing drainage facilities that will be impacted by the pullout area in Segment 5.





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#### Medium-Term - Pavement Rehabilitation and Restriping for Wider Shoulders

For the pavement rehabilitation and restriping for wider shoulders countermeasure, there appears to be no existing drainage facilities that will be impacted since the roadway alignment and cross-slope will remain the same as existing.

#### Long-Term - Left-Turn Lane with Driveway Acceleration/Deceleration Area

The pavement would need to be graded for any additional left-turn lane and driveway paving to drain towards the existing roadway flow line whenever feasible to avoid creating low points that would result in localized ponding. The widening of the roadway would impact inlets, downdrains, driveway culverts, cross culverts, and roadside ditches which would need to be relocated and/or modified.

#### Long-Term - Median Rumble Strip with 6-ft Shoulders

For the potential median rumble strip with 6-ft shoulders, the widening of the roadway will affect existing drainage systems, such as roadside ditches, cross culverts, inlets, and downdrains that will need to be relocated and/or modified.

#### **Long-Term - Roundabouts**

There are 4 potential roundabout countermeasures within the Project limits and the pavement would need to be graded away from the center of the roundabout whenever feasible. Curbs, gutters, ditches, inlets, and pipes would need to be proposed to capture and convey the runoff. Existing inlets and drainage culverts would need to be relocated and/or modified if they are impacted by the proposed roundabouts. At the most southern roundabout (approx. MP 2.00), the existing Crow Creek culvert is impacted; therefore, a culvert will need to be proposed for Crow Creek at this location.

#### **Short-Term – Additional CHP Pullout Areas**

The pavement would need to be graded at proposed CHP pullout areas to drain towards the existing roadway flow line whenever feasible to avoid creating low points that would result in localized ponding. Existing drainage inlets and culverts would need to be relocated and/or modified if they are impacted by the proposed CHP pullouts.





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## 5. REFERENCES

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- Alameda County Department of Public Works. (April 2009). *Engineering Design Guidelines*.  
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<[http://www.waterboards.ca.gov/water\\_issues/programs/tmdl/integrated2010.shtml](http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml)>

## 6. ATTACHMENTS

- Attachment A: Potential Drainage and Water Quality Improvements on Proposed Speed Reduction Countermeasures
- Attachment B: FEMA FIRMette Panels 06001C0285G and 06013C0445F



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CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

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**Attachment A      Potential Drainage Impacts and Water Quality  
Improvements on Proposed Speed Reduction  
Countermeasures**



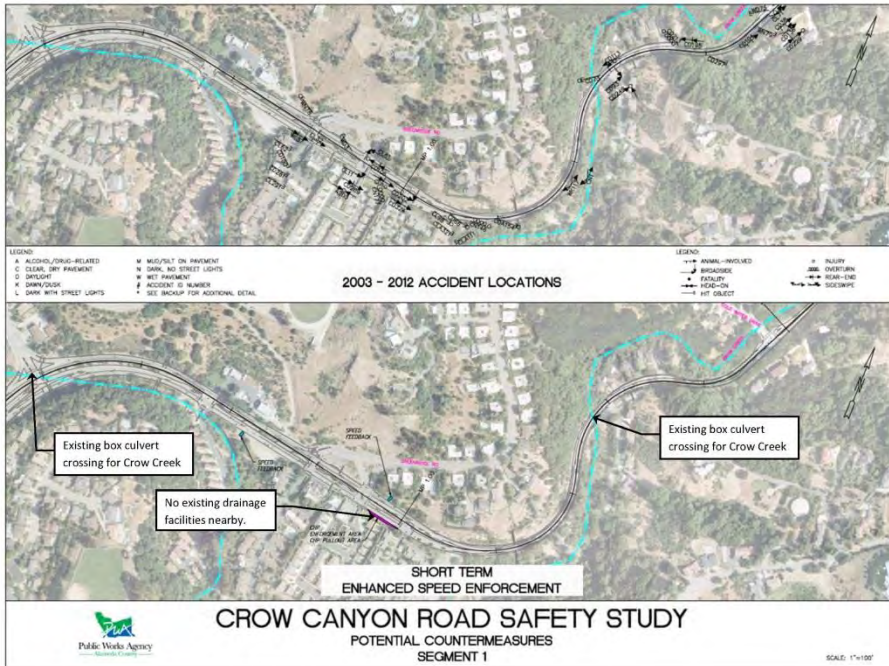


Exhibit 1. Potential Drainage Impacts for Segment 1

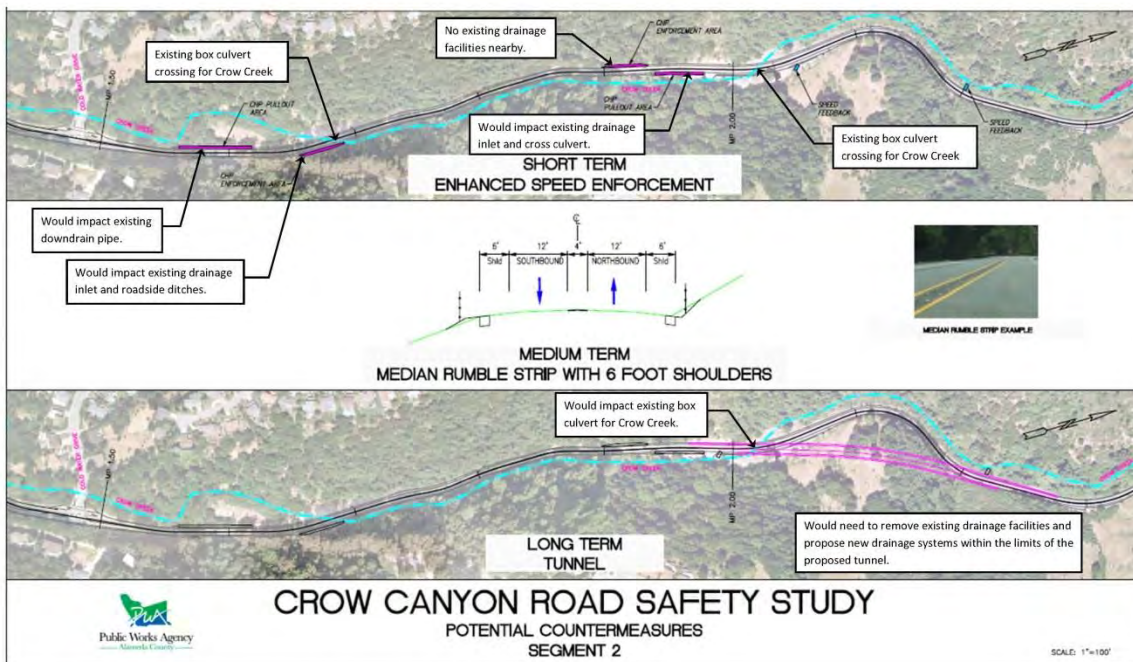


Exhibit 2. Potential Drainage Impacts for Segment 2

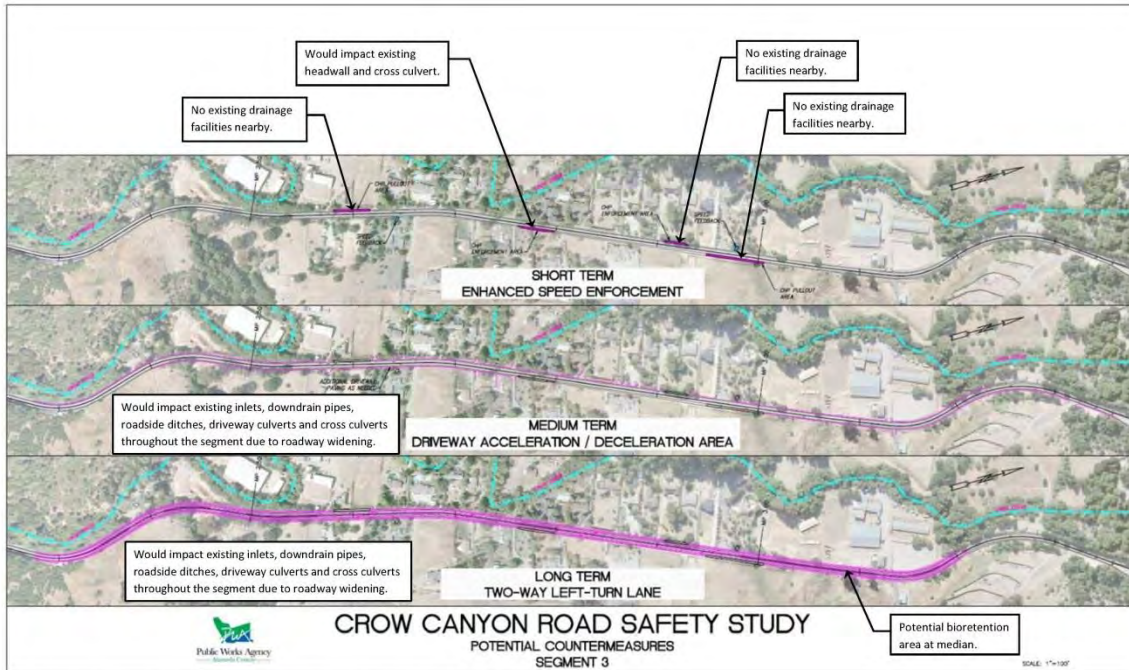


Exhibit 3. Potential Drainage Impacts and Stormwater BMPs for Segment 3

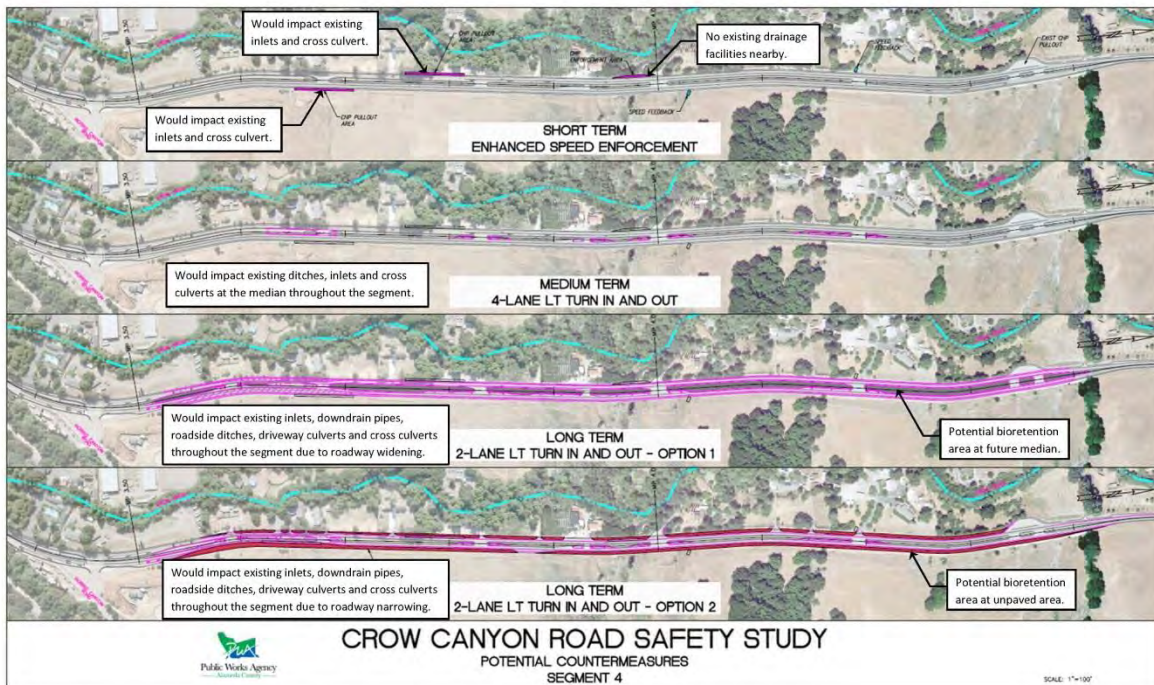


Exhibit 4. Potential Drainage Impacts and Stormwater BMPs for Segment 4



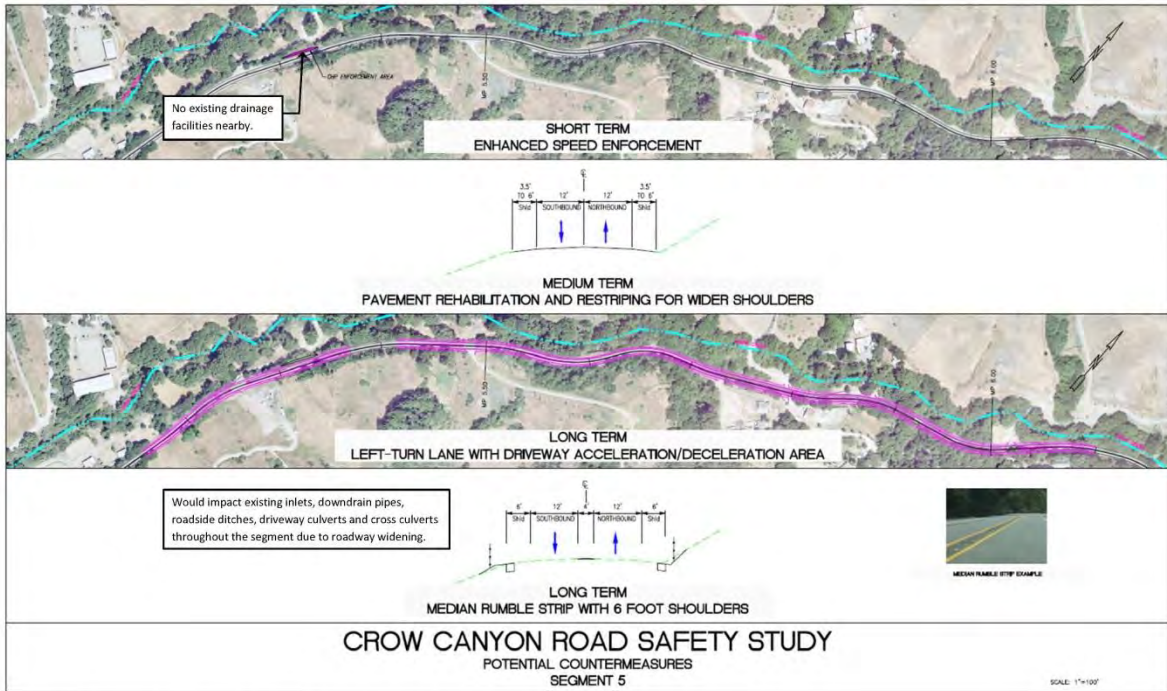


Exhibit 5. Potential Drainage Impacts for Segment 5

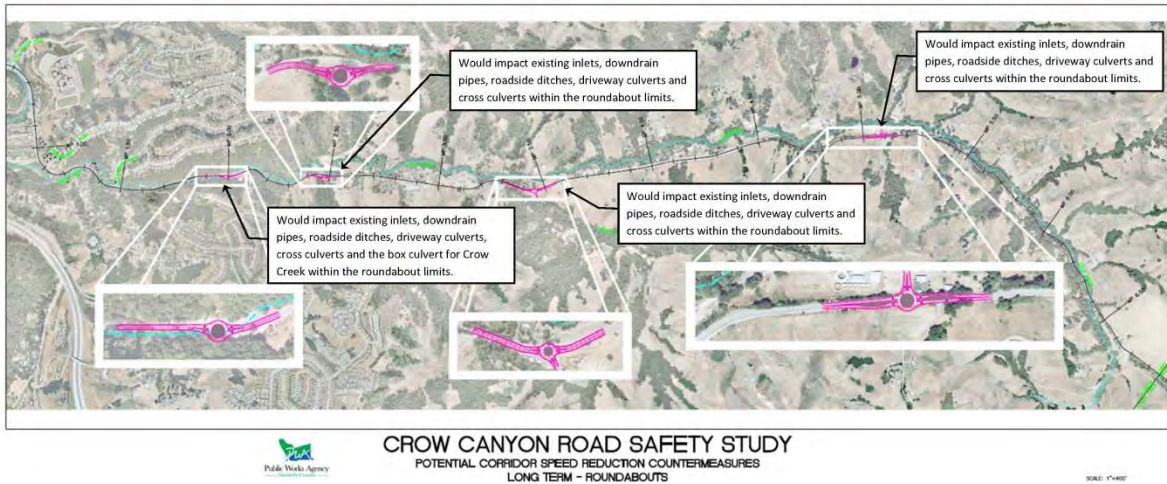


Exhibit 6. Potential Drainage Impacts for Roundabouts

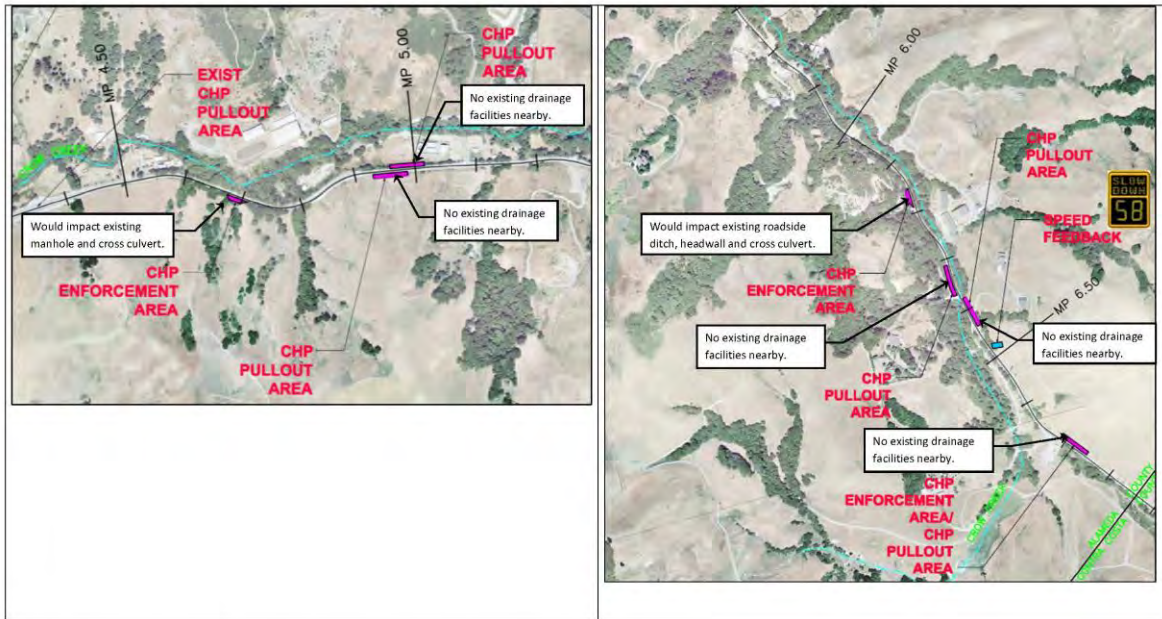


Exhibit 7. Potential Drainage Impacts for Additional CHP Pullout Areas

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GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

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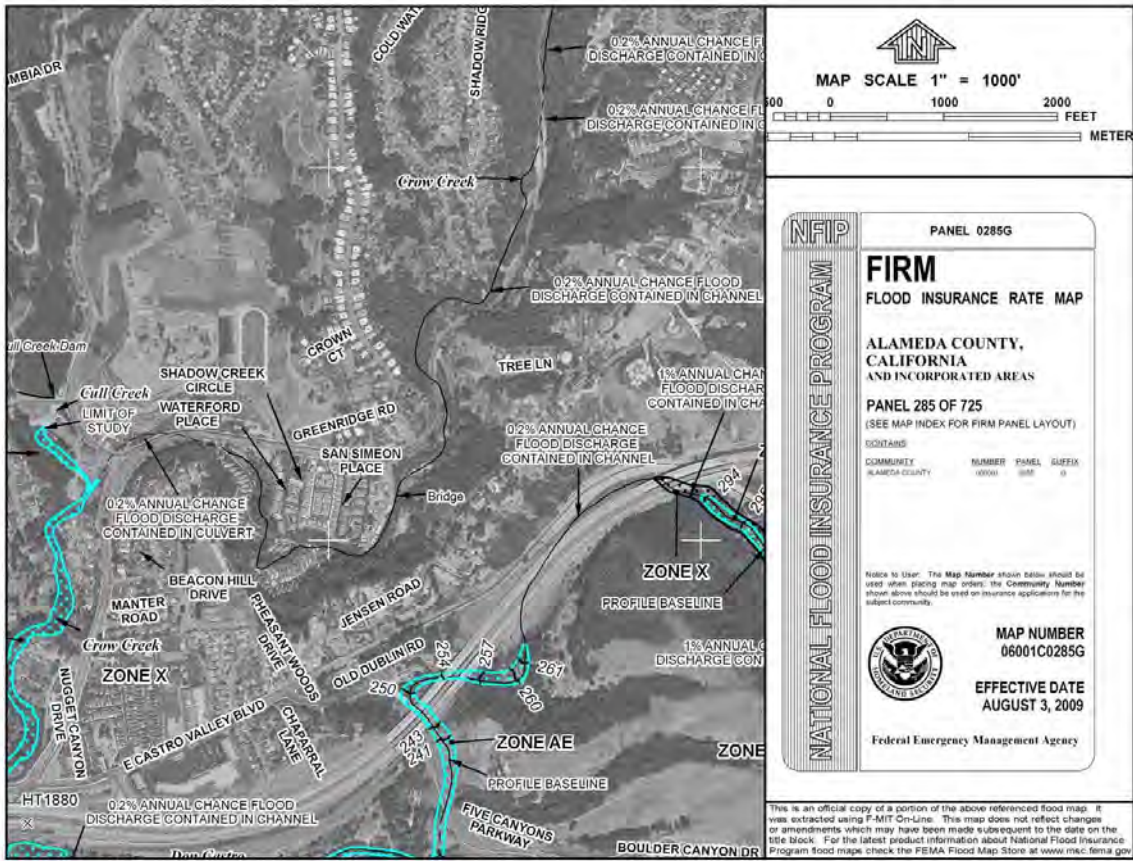
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**Attachment B      FEMA FIRMette Panels**



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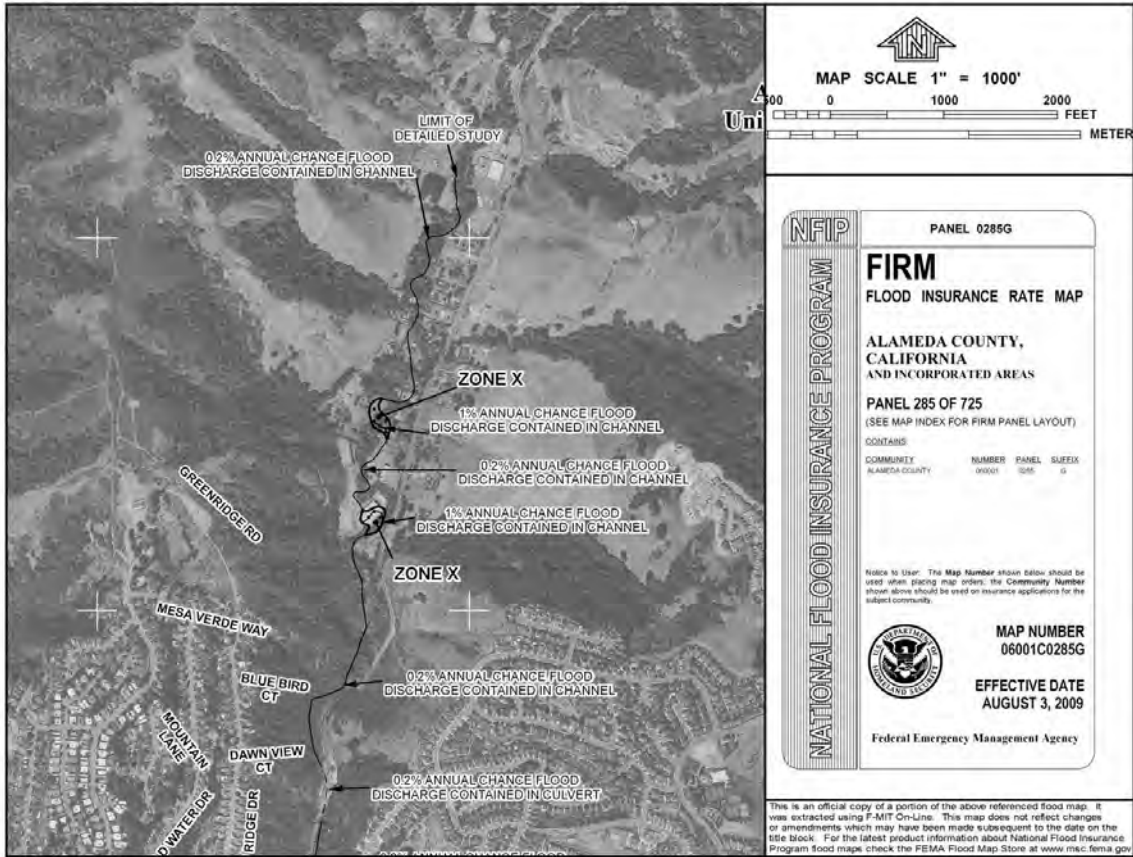
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## **APPENDIX E ICF PRELIMINARY ENVIROMENTAL ANALYSIS**

**DRAFT**

**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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## **CROW CANYON ROAD SAFETY IMPROVEMENTS PROJECT**

### **PRELIMINARY ENVIRONMENTAL ANALYSIS**

**PREPARED FOR:**

Alameda County Public Works Agency  
399 Elmhurst Street, #113  
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Contact: Amber Lo, P.E.  
(510) 670-5485

**PREPARED BY:**

ICF International  
620 Folsom Street, 2nd Floor  
San Francisco, CA 94107  
Contact: Aaron Carter, Project Manager  
(415) 677-7162

**June 2015**



**1.0 PROJECT INFORMATION**

County of Alameda, Public Works Agency	
Project Title: Crow Canyon Road Safety Improvements Project	
Project Manager Amber Lo, P.E., Alameda County Public Works Agency	Phone # (510) 670-5485
Project Engineer Michele Johnson, P.E., Quincy Engineering	Phone # (925) 939-7100
PEAR Preparers Karin Bouler, Environmental Planner (ICF International) Aaron Carter, Project Manager (ICF International)	Phone # (415) 677-7157 (415) 677-7162

**2.0 PROJECT DESCRIPTION****2.1 Purpose and Need**

This section summarizes the purpose and need for the Crow Canyon Road Safety Improvements Project (project). The Alameda County Public Works Agency (ACPWA) would be the implementing agency for the project approval/environmental document (PA/ED) and would act as lead agency for the California Environmental Quality Act (CEQA). If federal funding is pursued, the California Department of Transportation (Caltrans) is anticipated to be the lead agency for the National Environmental Policy Act (NEPA). In this event, Caltrans may require additional approvals and preparation of an environmental document in accordance with the Caltrans Standard Environmental Reference (SER) guidelines.

Refer to the *Crow Canyon Road Safety Report (2014)* for more information about the project, including a description of the existing features of the project site, community involvement in the project, applicable roadway design criteria, identification and recommendations/prioritization of proposed countermeasures.

**2.2 Purpose**

The purpose of this project is to:

- Improve safety on Crow Canyon Road from Greenridge Road in Alameda County to the Contra Costa County Line.
- Consider mobility for all travel modes in the area.
- Consider context-sensitive improvements where the rural character of the corridor is maintained.

The scope and scale of the project as defined in this document is intended to identify federally fundable transportation safety improvements (hereinafter referred to as *countermeasures*) in the short-, medium-, and long-term that address existing deficiencies in a cost-effective manner.

**Short-Term Countermeasures** – Short-term countermeasures are straightforward safety improvement projects with minimal environmental and right-of-way impact that could be constructed within a two-year timeframe. These countermeasures would consist of projects addressing features such as improved guidance for drivers and bicyclists and improved identification of roadside hazards. The estimated construction cost of these improvements could range from \$1 million to \$2 million for each project.

**Medium-Term Countermeasures** – Medium-term countermeasures are more complex improvement projects than short-term countermeasures and when working in conjunction with the recommended short-term countermeasures should have a direct impact on safety for all travel modes. These improvement projects likely involve a higher degree of impacts to environmental resources and adjacent properties due to minor changes to vertical or horizontal geometry of the roadway. These improvements require more time and effort for project development, and are estimated to cost between \$2 million and \$5 million for each construction contract.

**Long-Term Countermeasures** – Long-term countermeasures are large, complex improvements that have potentially substantial environmental and/or right-of-way impacts due to geometry or roadway modifications. These projects require a high level of project development effort. The estimate construction cost of these improvements could range from \$5 million to \$10 million.

### 2.3 Need

Crow Canyon Road is a major rural arterial roadway linking central Alameda County with major employment and residential areas in southwestern Contra Costa County. The road connects the unincorporated community of Castro Valley in the south to the City of San Ramon in Contra Costa County in the north. Given Crow Canyon Road's proximity to both Interstate 580 (I-580) and Interstate 680 (I-680), the roadway has historically served as an alternate route for commuters seeking to avoid the heavy peak hour congestion along both I-580 and I-680 and at the I-580/I-680 interchange.

The project is needed for the following reasons:

**Safety** – Segment 1<sup>1</sup> of Crow Canyon Road in the project site carries approximately 20,000 vehicles per day on a two-lane roadway.<sup>2</sup> These volumes are close to the capacity of the roadway. Segment 2 of Crow Canyon Road has a rate of 1.27 accidents per million vehicle miles, which is greater than the statewide rate for a facility of this type, which is 1.03 accidents per million vehicle miles. In addition, the California Highway Patrol (CHP) has indicated that speeding continues to be a problem, especially on tight curves with limited sight distance.<sup>3</sup> The CHP has also indicated the potential for

<sup>1</sup> The specific segments of Crow Canyon Road considered in this analysis are described in the Description of Work below.

<sup>2</sup> TJKM. 2013. Existing Conditions Report: Crow Canyon Road from Greenridge Road to Contra Costa County Line In The County of Alameda. May 3, 2013.

<sup>3</sup> Transportation Infrastructure Group/Quincy Engineering. 2014. Crow Canyon Road Safety Report (Draft). December 2014.

head-on collisions where vehicles drift across double yellow pavement striping at areas with minimal shoulder width. In addition, throughout the public input process, a strong reoccurring theme or concern voiced by the majority of the local residents was the desire to preserve the rural nature and characteristics of the existing roadway. As such, to improve safety, there is a need to implement safety countermeasures on Crow Canyon Road, ideally including context-sensitive countermeasures where the rural character of the corridor is maintained. Refer to the *Crow Canyon Road Safety Report* for more information on existing traffic conditions.

**Multi-modal** – There is a desire to implement countermeasures to improve the accessibility and safety of other travel modes, particularly bicycle travel. Segment 5 of Crow Canyon Road is not easily accessible or safe for bicyclists as result of tight curves, limited shoulder width, and parked vehicles. In late March 2013, bicycle counts were conducted on Crow Canyon Road both north and south of Norris Canyon Road.<sup>4</sup> A total of 97 bicyclists heading south were counted on the south side of the intersection; however, only 10 bicyclists heading south were counted on Crow Canyon Road on the north side of the intersection and 87 bicyclists heading south were counted on Norris Canyon Road north of the intersection. These bicycle counts indicate that most bicyclists travelling from San Ramon to Castro Valley used Norris Canyon Road, rather than Crow Canyon Road within the project site, for the first portion of their trip.

#### 2.4 Description of Work

The project proposes countermeasures on a 5.9-mile segment of Crow Canyon Road between Greenridge Road in Alameda County to the Contra Costa County Line.

The segments of Crow Canyon Road used in this analysis are summarized as follows:

- Segment 1: Greenridge Road to Cold Water Drive. This two-lane segment is 0.52 mile in length.
- Segment 2: Cold Water Drive to Alameda County postmile (PM) 2.25. This segment is 0.8 mile in length.
- Segment 3: PM 2.25 to Norris Canyon Road. This segment is 1.2 miles in length.
- Segment 4: Norris Canyon Road to PM 4.45. This segment is 1.0 mile in length.
- Segment 5: PM 4.45 to County Line. This segment is 2.4 miles in length.

Refer to Figure 1 for an aerial photograph of the segments of Crow Canyon Road within the project site.

A public outreach process was undertaken to develop a range of countermeasures. The Project Team received input from Alameda County Public Works Agency staff and the public. Public outreach has thus far included two workshops, with a third planned for mid-June 2015.

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<sup>4</sup> TJKM, op. cit.

Each of the 18 countermeasures are summarized in Table 1, below, and are more fully described in the *Crow Canyon Road Safety Report* (Alameda County, 2014).

**Table 1. Countermeasure Descriptions**

Project Countermeasure	Description	Implementation Timeframe	Estimated Construction Duration
<b>Corridor-wide</b>			
1. Speed Feedback Signs	Nine feedback signs that could be solar-powered. Signs would be pole-mounted and installed in the road shoulder at locations along the entire corridor where speed surveys indicated a large percentage of drivers exceeding the speed limit and at locations in advance of horizontal curves with limited sight distance.	Short-term	1–2 months
2. California Highway Patrol (CHP) Enforcement Areas	21 areas adjacent to the existing roadway paved to allow a CHP car to sit and observe traffic. The additional paving would also provide an area further from the edge of traveled way for a vehicle to pull over.	Short-term	3 months
3. Roundabouts: • Roundabout #1: MP 2.00 • Roundabout #2: MP 2.50 • Roundabout #3: MP 3.45 • Roundabout #4: MP 5.10	Four one-way, circular intersections without traffic signal equipment that would include pervious hardscape in the center.	Long-term	9–12 months
4. Increase Shoulder Maintenance	Increases the annual amount of shoulder maintenance by 25 percent to repair cracks, replace shoulder backing, and remove debris from the roadway shoulder. This countermeasure can reduce the potential for bicycles to veer into the traveled way to avoid obstacles.	Short-term	Ongoing
5. Additional Lighting/Signing	Lighting and signing to improve visibility and clarify roadway characteristics for drivers.	Short-term	2–3 months
6. Guardrails	Installs metal beam guardrail at locations where the existing roadway embankment on the downslope side of the roadway is	Short-term	3–4 months

Project Countermeasure	Description	Implementation Timeframe	Estimated Construction Duration
	within 30 feet from the edge of travelled way. This countermeasure also includes metal beam guardrail at the 66 utility poles that are located in close proximity to the edge of travelled way.		
<b>Segment 2</b>			
7. Median Rumble Strip with 6-foot Shoulders	Widen the roadway to include a 4 foot wide median rumble strip, 12 foot travel lanes, and 6 foot shoulders.	Medium-term	9–12 months
8. Tunnel at mile post 2.15 (Northbound)	A one-lane tunnel at MP 2.15. Southbound traffic would remain on the existing roadway alignment. This will improve horizontal sight distance in the north bound direction.	Long-term	18–24 months
9. Tunnel at mile post 2.15 (Both Directions)	A two-way tunnel at MP 2.15 and abandoning the existing roadway alignment. This will improve horizontal sight distance in both directions.	Long-term	18–24 months
<b>Segment 3</b>			
10. Shoulder Widening – 8 feet at Driveways – Acceleration/ Deceleration Areas	Widen the shoulders to 8 feet on both sides of each driveway. The wider shoulder will provide areas for the vehicle to accelerate or decelerate while outside of the traveled way.	Medium-term	4–6 months
11. Two-Way Left-Turn Lane	Add a lane in the middle of the roadway that is shared by northbound and southbound traffic to provide a safe refuge when turning left.	Long-term	8–9 months
<b>Segment 4</b>			
12. Left-Turn Lane (Left-in/ Left-out) (Spot Locations)	Left turn lanes at certain locations to provide safer access to adjacent parcels by removing stopped traffic waiting to turn from the through lanes.	Medium-term	3–4 months

Project Countermeasure	Description	Implementation Timeframe	Estimated Construction Duration
13. Reduce from 4- to 2-lane Northbound and 1-lane Southbound	Widen the existing median to the west in order to remove one of the southbound lanes. This would reduce the number of lanes that a northbound vehicle and a vehicle that is existing a driveway would have to cross when making a left turn.	Long-term	8–10 months
14. Reduce from 4- to 2-lane (with turn-outs) Option 1: Widen medians	Widen the existing median to the east and west in order to remove one northbound and one southbound lane. Turn pockets would be added in the northbound direction to provide refuge for vehicles turning into and out of driveways.	Long-term	8–10 months
15. Reduce from 4- to 2-lane (with turn-outs) Option 2: Remove outside pavement	Remove the existing pavement on both sides of the road in order to remove one northbound and one southbound lane. Turn pockets would be added in the northbound direction to provide refuge for vehicles turning into and out of driveways.	Long-term	8–10 months
<b>Segment 5</b>			
16. Pavement Rehabilitation and Restriping for Wider Shoulders	A combination of milling and filling 80 percent of the pavement to restore the existing roadway to a serviceable condition and complete base repair of the remaining 20 percent of the pavement. After pavement rehabilitation, the white edge lines would be restriped to 12 feet lanes which would result in wider shoulders.	Medium-term	4–6 months
17. Left-Turn Lane (Left-in/ Left-out) with Acceleration/ Deceleration Areas	Widen the pavement to accommodate 2 left turn pockets in the northbound direction, 3 left turn pockets in the southbound direction and approximately 800 foot long two-way left turn lane in the center of the roadway.	Long-term	4–6 months
18. Median Rumble Strip	Widen the roadway to include a 4	Long-term	9–12 months



Project Countermeasure	Description	Implementation Timeframe	Estimated Construction Duration
with 6-foot Shoulders	foot wide median rumble strip, 12-foot travel lanes, and 6-foot shoulders. Gaps in the rumble strip would be provided at driveways.		

### 3.0 ANTICIPATED ENVIRONMENTAL APPROVAL

Each countermeasure, if funded for construction, would proceed as separate and independent projects and would require separate environmental documentation under CEQA and NEPA (assuming federal funds are identified for each countermeasure). The likely environmental documentation that may be required as a result of the potential impacts on sensitive environmental resources that may occur from the implementation of each countermeasure influences the anticipated level of documentation. Refer to Table 2, below, for a summary of the anticipated environmental documentation and the timeframe to prepare the documentation for each countermeasure.

Table 2. Potential Environmental Documentation for Each Countermeasure

Project Countermeasure	Potential CEQA/NEPA Documents	Document Timeframe
1. Speed Feedback Signs	Categorical Exemption/Categorical Exclusion (CE/CE)	< 3 months
2. California Highway Patrol (CHP) Enforcement Areas	CE/CE	< 3 months
3. Roundabouts: • Roundabout #1: MP 2.00 • Roundabout #2: MP 2.50 • Roundabout #3: MP 3.45 • Roundabout #4: MP 5.10	MND/Routine EA	3-9 months
4. Increase Shoulder Maintenance	Not Applicable (N/A) <sup>5</sup>	N/A
5. Additional Lighting/Signing	CE/CE	< 3 months
6. Guardrails	CE/CE	< 3 months
<b>Segment 2</b>		
7. Median Rumble Strip with	MND/Routine EA	6-9 months

<sup>5</sup> Increased shoulder maintenance would be a continuation of existing activity that would occur within the existing right-of-way. This activity is not anticipated to result in potential environmental impacts that warrant environmental documentation under CEQA or NEPA.

Project Countermeasure	Potential CEQA/NEPA Documents	Document Timeframe
6-foot Shoulders		
8. Tunnel at mile post 2.15 (Northbound)	MND/Routine EA	8-12 months
9. Tunnel at mile post 2.15 (Both Directions)	MND/Routine EA	8-12 months
<b>Segment 3</b>		
10. Shoulder Widening – 8 feet at Driveways – Acceleration/Deceleration Areas	CE/CE	< 3 months
11. Two-Way Left-Turn Lane	CE/CE	< 3 months
<b>Segment 4</b>		
12. Left-Turn Lane (Left-in/Left-out) (Spot Locations)	CE/CE	< 3 months
13. Reduce from 4- to 2-lane Northbound and 1-lane Southbound	CE/CE	< 3 months
14. Reduce from 4- to 2-lane (with turn-outs) – widen medians	CE/CE	< 3 months
15. Reduce from 4- to 2-lane (with turn-outs) – remove outside pavement	CE/CE	< 3 months
<b>Segment 5</b>		
16. Pavement Rehabilitation and Restriping for Wider Shoulders	CE/CE	< 3 months
17. Left-Turn Lane (Left-in/Left-out) with Acceleration/Deceleration Areas	CE/CE	< 3 months
18. Median Rumble Strip with 6-foot Shoulders	CE/CE	< 3 months

#### 4.0 SPECIAL ENVIRONMENTAL CONSIDERATIONS

Most countermeasures have limited potential to impact sensitive environmental resources and are anticipated to satisfy CEQA and NEPA with a Categorical Exemption and Categorical Exclusion (CE/CE), respectively. Countermeasures that have the potential to impact sensitive environmental resources would require the level of environmental documentation under CEQA and NEPA as identified in Table 2. This level of documentation is based on the assumption that the countermeasures would be able to avoid most or all sensitive environmental resources. Where sensitive resources cannot be fully avoided, such countermeasures may require further evaluation to

determine the extent of the impact as well as potential mitigation and consultation with resource agencies, as discussed further in the following sections.

## 5.0 ANTICIPATED ENVIRONMENTAL COMMITMENTS

This preliminary analysis considers proposed modifications to Crow Canyon Road from Greenridge Road to the Contra Costa County Line in the County of Alameda. It is anticipated that any potential impacts on environmentally sensitive resources that could occur as a result of the project would be able to be avoided, minimized, or mitigated to a less-than-significant level. As such, the anticipated level of environmental documentation for the project ranges from a CE/CE to a Mitigated Negative Declaration/Environmental Assessment (MND/EA).

Each countermeasure has independent utility and logical termini. No countermeasure is anticipated to have an individual Section 4(f) determination or result in significant visual resource impacts. Lastly, there do not appear to be significant cumulative impacts or comparatively high mitigation costs associated with the project. For these reasons it is assumed the NEPA class of action for the document would range from a CE to a Routine EA.

Preparation of each CE/CE or MND/EA, including technical studies, is anticipated to take from three to 12 months, after receiving information necessary to begin the environmental analysis. This schedule includes Caltrans review (if federal funding is pursued), but does not include permit review and issuance by regulatory agencies.

Implementation of most countermeasures could result in (but would not be limited to) air quality, biological resources, geology and soils, hydrology and water quality, noise, and traffic/transportation effects.

## 6.0 PERMITS AND APPROVALS

Given the available information regarding each countermeasure and the environmental resources in the project area, the following permits and approvals may be required:

- San Francisco Regional Water Quality Control Board (RWQCB): National Pollutant Discharge Elimination System (NPDES) Construction General Permit and Clean Water Act (CWA) Section 401 Water Quality Certification. While impacts to aquatic and water resources would be avoided and/or minimized to the extent feasible, if sensitive resources cannot be fully avoided, the following countermeasures may be required to comply with these permits: countermeasures 3, 7, 8, and 9.
- U.S. Fish and Wildlife Service (USFWS): Section 7 Consultation regarding California red-legged frog. While impacts to California red-legged frog species and habitat would be avoided and/or minimized to the extent feasible, if sensitive resources cannot be fully avoided, the following countermeasures may require formal Section 7 consultation: countermeasures 3, 7, 8, and 9.
- California Department of Fish and Wildlife (CDFW) Section 1602 Streambed Alteration Agreement. While impacts to streambeds and CDFW resources would be avoided and/or minimized to the extent feasible, if sensitive resources cannot be

fully avoided, the following countermeasures may require this permit:  
countermeasures 3, 7, 8, and 9.

- CDFW California Endangered Species Act (CESA) Incidental Take Permit. While impacts to CESA protected resources would be avoided and/or minimized to the extent feasible, if sensitive resources cannot be fully avoided, the following countermeasures may require an Incidental Take Permit from CDFW: countermeasures 3, 7, 8, and 9.
- U.S. Army Corps of Engineers (USACE): CWA Section 404 permit (for features that are considered to be waters of the United States). (While impacts to aquatic resources would be avoided and/or minimized to the extent feasible, if sensitive resources cannot be fully avoided, the following countermeasures may require a Nationwide Permit or Individual Permit to comply with Section 404 of the CWA: countermeasures 3, 7, 8, and 9.
- State Historic Preservation Office (SHPO): Section 106 Consultation. Section 106 consultation may be required if records searches and field surveys identify potential cultural resources that may be impacted by a countermeasure.

These permits/approvals may take an additional 12 months for completion after completion of environmental documentation.

#### 7.0 LEVEL OF EFFORT: RISKS AND ASSUMPTIONS

The following assumptions are used in the preparation of this analysis:

- The study area limits will not change.
- Each of the countermeasures has federal nexus (funding, permitting, etc.).
- Other project schedule elements will not delay environmental progress
- There is an informal or formal public workshop/open house/hearing opportunity for those countermeasures with potentially significant impacts to biological and cultural resources.
- Native American consulting parties do not object to methods/findings.

Future risks for the project include the following:

- Biological resources effects (surveys and consultation).
- Cultural resources effects (surveys and consultation).
- Unanticipated changes to the project description and/or Build Alternative description.
- Unanticipated changes to technical studies or environmental document format requirements.
- Delay in delivery of engineering details that affect environmental analysis or permitting.

- Delays in review schedule for any of the environmental documents or permit applications by the resource agencies.

## 8.0 TECHNICAL SUMMARIES

The preliminary evaluations of potential environmental constraints, described below, are based on the environmental study area that encompasses each of the proposed countermeasures. Each evaluation includes an analysis of potential impacts resulting from implementation of the countermeasures. In addition, potential measures that may be considered to reduce impacts, cost of the mitigation measures, and required future studies for each countermeasure are indicated below, as necessary.

### 8.1 Land Use

The general setting of the project area includes an environment that consists of agricultural lands, large residential developments, and rural development, including ranchettes and horse stables, along Crow Canyon Road between the City of Castro Valley and the boundary between Alameda County and Contra Costa County. There is a mixture of rural homes and ranches along Crow Canyon Road in the less rugged northern and central portions of the canyon.<sup>6</sup> Much of the land use along this portion of Crow Canyon Road is used for livestock grazing. The southern portion of the canyon along Crow Canyon Road is too rugged for residential development in its current natural state. An ACPWA equipment yard is located along a previously widened portion of Crow Canyon Road at the south end of Crow Canyon. The land along the existing roadway and in the project area is used for a combination of rural residential housing and for ranching and livestock grazing. Much of the area directly adjacent to the existing road is largely undeveloped. However, within and adjacent to the roadway, there are several human-made features that the project would potentially affect during construction. The primary existing above-ground (non-roadway) features include, but are not limited to, residential and farming improvements consisting of driveways, private access roads, buildings, fences, storage sheds, water tanks, fences, and barns. In addition to these features, several unpaved roads used to access ranch property intersect Crow Canyon Road in the project site.

Publicly owned parks, recreational facilities, and historic resources are considered Section 4(f) resources. The nearest public park/recreation facility to the project area is the City of Castro Valley's Greenridge Park, approximately 0.3 mile from the project area; the project would not require any land from this property. If the cultural resources assessment identifies land that is of national, state, or local significance that would be used or impacted by the project, SHPO coordination for the project will be required.

Countermeasures 3, 7, 8, 9, and 10 would require permanent right-of-way (ROW) acquisitions and/or temporary easements to construct the improvements. No relocations would be required for any of the proposed countermeasures. An encroachment permit

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<sup>6</sup> Cal Engineering & Geology, Inc., op. cit.

from Caltrans may be required and would be determined as design progresses for each of the countermeasures.

## 8.2 Growth

Per Caltrans guidance (2006), in conjunction with the Federal Highway Administration (FHWA) and the U.S. Environmental Protection Agency (USEPA), a "first cut screening" evaluation will be done to determine if the project requires further analysis regarding potential growth impacts. If further analysis is required, then the growth analysis will follow a six-step evaluation process that would be documented in the Community Impacts Assessment (CIA) technical memorandum prepared for the project, and incorporated in the environmental document.

Transportation projects that reduce the time-cost of travel, thus enhancing the attractiveness of surrounding land to developers and consumers, can be considered growth-inducing. Further, the project would consist of safety improvements, which could result in changes to commuter patterns in the project area. The frontage land (the land that is not part of the road and shoulder) adjacent to the project area is mostly private property and classified as rural residential, hillside residential, or small lot residential<sup>7</sup>. Measure D<sup>8</sup> was passed by Alameda County voters in 2000 and established an urban growth boundary, effectively restricting development access in and around the canyon areas surrounding Castro Valley; limiting development to infill. Therefore, the project would not likely be found to induce growth, which will be documented in the project CIA.

## 8.3 Farmlands/Timberlands

No farmlands or timberlands are present within the project area. However, rangelands exist adjacent to a portion of the project site, primarily north of the intersection of Crow Canyon Road and Norris Canyon Road. Potential impacts to rangelands will be discussed in the CIA technical memorandum.

No timberlands are known to exist within or adjacent to the project site. Therefore, a timberland evaluation would not be required.

## 8.4 Community Impacts

The project does not involve converting any land uses. Right-of-way required for the project includes land that is currently adjacent to the road way and designated for transportation use.

It is not anticipated that properties in the project area would be affected by acquisitions or relocations. However, construction of the project, although temporary, would take

<sup>7</sup> Alameda County. 2012. Castro Valley General Plan. Available: [http://www.acgov.org/oda/planning/generalplans/documents/CastroValleyGeneralPlan\\_2012\\_FINAL.pdf](http://www.acgov.org/oda/planning/generalplans/documents/CastroValleyGeneralPlan_2012_FINAL.pdf). Accessed: May 21, 2015

<sup>8</sup> Alameda County. 2000. Measure D. Available: <http://acgov.org/oda/planning/generalplans/documents/Appendix-A-Measure-D-Text.pdf>. Accessed: May 21, 2015

place in phases over a period of 20 years or more and could be disruptive to the local area. While no detours or road closures would be necessary, temporary disruptions would include traffic control measures. Potential disruptions will be addressed in a CIA technical memorandum. The project would not alter community cohesion nor significantly impact public utilities, facilities, and/or emergency services.

Data from the U.S. Census Bureau were studied to determine potentially disproportionate effects on environmental justice populations. The project area for the Build Alternative is within two Census Tracts (CT): CT 4301.01 and CT 4301.02. Data for the two CTs were compared with average data for the County as a whole to determine if the two affected CTs are composed of disproportionately high populations of minorities or people living below the poverty level. With respect to minority populations, the percentage of the population that is not classified as white is 58.5 percent in CT 4301.01, the percentage of the population that is not classified as white is 26.8 percent in CT 4301.02, and the percentage of the population that is not classified as white is 57 percent in the County.<sup>9,10</sup> As shown by the data, the size of the minority population is similar in CT 4301.01 compared to the County as a whole and the size of the minority population is substantially less in CT 4301.02 compared to the County as a whole. Therefore, with the current demographic mix, it is not anticipated that the Build Alternative would disproportionately affect a minority population. With respect to poverty status, the percentage of the population below the poverty level within the past year was 4.4 percent in CT 4301.01, 0.1 percent in CT 4301.02, and 11.4 percent in the County.<sup>11,12</sup> As shown by the data, the percentage of the population living in poverty is substantially lower in CT 4301.01 and CT 4301.02 compared to the County as a whole. Therefore, with the current demographic mix, it is not anticipated that the Build Alternative would disproportionately affect a population in poverty.

Nonetheless, community impacts will be further evaluated and documented in a CIA technical memorandum, as described above.

### 8.5 Visual/Aesthetics

The topography of the project area can be generally characterized by rolling hills in the northern portion, an elongated alluvial plain in the central portion, and a steep-sided canyon in the southern portion. The hills and valley floors are covered predominantly by grasslands and scattered chaparral vegetation. A variety of trees, including oaks, are located along the drainages and shaded slopes throughout the project area.

<sup>9</sup> U.S. Census Bureau. 2010. American FactFinder. Table DP-1 from the 2010 Census (2010 SF1 100% Data) for Census Tract 4301.01 and Census Tract 4301.02. Available: <<http://factfinder2.census.gov>>. Accessed: October 22, 2014.

<sup>10</sup> Bay Area Census. Alameda County. Available:

<<http://www.bayareacensus.ca.gov/counties/AlamedaCounty.htm>>. Accessed: October 22, 2014.

<sup>11</sup> U.S. Census Bureau. 2010. American Factfinder. Table S1701 from the 2008-2012 American Community Survey 5-Year Estimates for Census Tract 4301.01 and Census Tract 4301.02. Available: <<http://factfinder2.census.gov>>. Accessed: October 22, 2014.

<sup>12</sup> Bay Area Census, op. cit.

Crow Canyon Road is an existing two-lane roadway in Alameda County, and it is not a state- or county-designated scenic highway.<sup>13</sup> The Build Alternative is not expected to significantly impact visual resources, although some new lighting, signing, roundabouts, guardrails, a tunnel, and other grade-separated structures may be introduced into the current viewshed. An Abbreviated Visual Impact Assessment (AVIA) will be prepared for the project.

In order to minimize visual effects associated with tree and/or vegetation removal, and any other potential effects related to construction of the project, Alameda County design standards would be followed and mitigation for aesthetic treatments, potential light and glare impacts, and replacement plantings will be incorporated, as necessary.

## 8.6 Cultural Resources

This discussion of cultural resources is based on a background records search conducted at the Northwest Information Center (NWIC) at Sonoma State University in Rohnert Park.

An area of potential effect (APE) for the project must include the entire project footprint for both archaeology and historical architecture. The architectural APE boundary may include properties adjacent to the project footprint that are subject to indirect effects. None of the proposed safety improvements are expected to result in the demolition of any buildings or structures. However, additional research will be conducted to determine both the history and age of any buildings or structures in the architectural APE. Properties 50 or more years of age will be evaluated for eligibility to the California Register of Historical Resources (CRHR) and the National Register of Historic Places (NRHP). Consultation with Native Americans, historical societies, and other interested parties will be conducted as needed. Additionally, archaeological and architectural history surveys of the APE will be completed. Technical reports, including a Historic Property Survey Report (HPSR), a Historic Resources Evaluation Report (HRER), and an Archaeological Survey Report (ASR), will be prepared for the project to document the findings.

### 8.6.1 Archaeological Resources

The cultural resources investigation will be conducted in accordance with the procedures identified in *Caltrans Environment Handbook, Volume 2: Cultural Resources*. The NWIC records search identified one historic-era archaeological resource within the project area. However, the Build Alternative is not expected to impact this resource, which will be documented in further detail in the ASR.

### 8.6.2 Historic Architectural Resources

To identify potential issues and constraints relative to historic architectural resources, it is necessary to consider NRHP-listed and NRHP-eligible buildings, structures, and

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<sup>13</sup> California Department of Transportation. 2014. Officially Designated State Scenic Highways. Available: <<http://www.dot.ca.gov/hq/LandArch/scenic/schwy.htm>>. Accessed: October 13, 2014.



districts within the APE. No property acquisitions would occur, and the Build Alternative would likely not impact any architectural resources. An HPSR and HRER will be prepared to document any potentially eligible architectural resources within the APE.

### **8.7 Hydrology and Floodplain**

This discussion of hydrology and floodplain is based on a review of the readily available documentation of surface water resources within the project area.

Crow Creek is the dominant drainage within the project area as Crow Canyon Road roughly parallels Crow Creek. Crow Canyon Road traverses Crow Creek at four locations within the project site. In some areas where the creek veers away from the road, there are culverts alongside Crow Canyon Road that lead to Crow Creek. Crow Creek joins with Cull Creek at the mouth of Cull Canyon to form the southwest-flowing San Lorenzo Creek in Castro Valley, south and west of the project area. Surface drainage along the existing roadway and within the project area flows along natural drainages or human-made structures into Crow Creek.

According to the Federal Emergency Management Agency (FEMA), the project area is not located within a 100-year FEMA Flood Zone. The majority of the project area is located within FEMA Flood Zone X. Zone X corresponds to the flood insurance rate zone that indicates an area of minimal flood hazard, usually depicted on Flood Insurance Rate Maps (FIRMs) as above the 500-year flood level. There is a portion of the project area that is not mapped by FEMA. This area primarily covers Segment 5 of the project site. A FEMA map that shows the project site is included as Attachment B of this document.

Hydrologic conditions could be affected in areas of construction. The Build Alternative would result in land disturbance and new impervious surface area. However, there may also be an increase in pervious surfaces associated with the countermeasures involving lane reductions and roundabouts (Countermeasures 3, 13, 14, and 15). As a result, Low Impact Development (LID) measures (e.g., vegetated swales and retention basins and minimizing impermeable surfaces) will be incorporated into the project design to manage stormwater to maintain a site's predevelopment runoff rates and volumes.

A Location Hydraulic Study (LHS) would be prepared to provide a preliminary study of base floodplain encroachments and would determine if there are impacts or encroachments to the floodplain. Because the project would modify existing intersections and/or roadways that are outside of the 100-year floodplain, it is unlikely that encroachment or impacts on the floodplain would occur; and a Summary Floodplain Encroachment Report would be prepared.

### **8.8 Water Quality and Stormwater Runoff**

This discussion of water quality and stormwater runoff is based on a review of the readily available documentation within the project area.

Crow Creek is actively down-cutting and eroding its channel.<sup>14</sup> This has caused oversteepening of the creek banks along Crow Creek and adversely affected the stability of portions of Crow Canyon Road adjacent to these areas. The majority of the surficial soils along the length of the project site are highly erodible. Surface erosion is evident on both natural slopes and road cuts along the length of the project. The depth of the erosional gullies varies with material type and the length of the drainage path. In some areas, the erosional gullies on the uphill (east) side of the road are up to 2 meters deep. Also, some of the gullies appear to have been cyclically filled with colluvial soil and then evacuated due to erosion.

The Build Alternative involves construction activities, such as grading and paving for CHP enforcement areas, shoulder widening, and excavation for guardrails, lighting, and signage. These activities would cause soil disturbance that could result in erosion and sedimentation into nearby surface waters or storm drain inlets. In addition, road widening would result in construction of catch basins, drainage, and culverts. Therefore, a CWA Section 401 Certification and 404 permit would be required for these countermeasures.

The project must comply with the Caltrans Statewide NPDES Permit (No. 2012-0011-DWQ), which requires that temporary and permanent Best Management Practices (BMPs) be applied to the project. These BMPs will be presented in the Stormwater Data Report.

The project would result in more than an acre of soil disturbance for construction. As such, the project must comply with the regulations of stormwater discharges laid out in the Statewide Construction General Permit (No. 2009-0009-DWQ, as modified by 2010-0014-DWQ and 2012-0006-DWG). The Caltrans NPDES Permit references the Construction General Permit for regulation of stormwater discharges from all Caltrans construction projects. To comply with the conditions of the Caltrans NPDES Permit and to address temporary water quality impacts resulting from construction activities for the project, a Stormwater Pollution Prevention Plan (SWPPP) would need to be implemented. Implementation of a SWPPP would include BMPs that would be incorporated into this project to reduce the amount of pollutants discharged during and after construction to the maximum extent practicable. The project should consider and incorporate BMPs in accordance with the May 2012 version of the *Project Planning and Design Guide* (PPDG) of the *Stormwater Quality Handbooks* and other Caltrans stormwater guidance resources, which can be obtained from the Caltrans website: <http://www.dot.ca.gov/hq/oppd/stormwtr/>. The PPDG provides specific design guidance for incorporating BMPs, including design pollution prevention BMPs, construction site and treatment BMPs, and a Stormwater Data Report (SWDR).

Because the project would result in the addition of impervious area, measures to provide permanent stormwater treatment and minimize hydromodification impacts on receiving water bodies would be required. The stormwater treatment measures would be required to be designed in accordance with the Caltrans PPDG, and the

<sup>14</sup> Cal Engineering & Geology, Inc., *op. cit.*

hydromodification analysis and any mitigation measures would need to be in compliance with the San Francisco Bay RWQCB Municipal Regional Stormwater NPDES Permit (No. R2-2009-0074).

### 8.9 Geology, Soils, Seismic and Topography

This discussion of geologic, soils, seismic, and topographical resources is based on a review of the readily available documentation of geological resources within the project area.

The most significant natural feature that could affect the Build Alternative is Crow Creek, which generally parallels the southern two thirds of Crow Canyon Road within the project site. The creek banks encroach into the embankments and natural slopes that support the existing roadway in numerous areas. In several areas, downcutting by the creek has required construction of remedial structures to stabilize the creek. The structures consist primarily of unengineered retaining walls or revetments.

Crow Canyon Road follows the south-southwest draining Crow Creek through the central portion of the Coast Ranges geomorphic province of California, an area characterized by northwest-trending mountains and valleys formed by movements along the San Andreas Fault and the San Andreas system of faults.<sup>15</sup> Geologic materials within the project site include recent alluvial deposits, landslide deposits, and sedimentary rocks of the Non-Marine Tertiary Age Formation, the Marine Tertiary Age Formations, and the Unnamed Formation of the Castro Valley Area.<sup>16</sup> The Non-Marine Tertiary Age Formation consists principally of poorly consolidated, lenticular, interbedded siltstone, sandstone, and conglomerate. The Marine Tertiary Age Formation consists of moderately consolidated, thick-bedded to massive sandstone, with minor thin bedded sandy shell hash beds and black shale units. The Unnamed Formation of the Castro Valley area consists of well-consolidated, well-bedded and laminated to thin-bedded and massive sandstone with minor thin-bedded siltstone and a single hard pebble to cobble conglomerate bed.

Five soil types have been identified along Crow Canyon Road within the project site.<sup>17</sup> These include the Danville silty clay loam, Diablo clay, Los Gatos-Los Osos Complex, Los Osos silty clay loam, and the Millsholm silty loam. Generally, these types of soil are erodible and have various degrees of expansiveness.<sup>18</sup> Each of the soils identified, except for the Danville silty clay loam, is highly to severely erodible. Deep rilling of the soils is evident on many of the natural hillslopes along Crow Canyon Road.

The project site is situated between the Hayward and Calaveras faults. The Calaveras fault is closest to the project site, approximately 2 kilometers east of the northern segment of the project site. Other nearby active fault systems that could induce strong

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<sup>15</sup> Cal Engineering & Geology, Inc., *op. cit.*

<sup>16</sup> Cal Engineering & Geology, Inc., *op. cit.*

<sup>17</sup> Cal Engineering & Geology, Inc., *op. cit.*

<sup>18</sup> Soil Survey of Alameda County, 1966. Available:  
[http://www.nrcs.usda.gov/Internet/FSE\\_MANUSCRIPTS/california/](http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/california/).

ground shaking at the project site include the Concord-Green Valley, Hayward, Greenville, Rodgers Creek, and San Andreas faults. A large magnitude earthquake on any of these fault systems has the potential to cause significant ground shaking at the project site. The intensity of ground shaking that is likely to occur would generally be dependent upon the magnitude of the earthquake and the distance to the epicenter. In addition, there are several minor faults that have been mapped as passing through the project area. Although these faults are not considered to be active, some secondary movement is possible during severe earthquake shaking from the nearby active faults. Therefore, secondary ground rupture from minor faults is considered to be a significant hazard. However, the project would be designed in accordance with the Caltrans Seismic Design Criteria available at: [http://www.dot.ca.gov/hq/esc/earthquake\\_engineering/sdc/](http://www.dot.ca.gov/hq/esc/earthquake_engineering/sdc/). Additionally, during the Plans, Specifications, and Estimates (PS&E) phase of the project, additional data would be collected to confirm site conditions and determine appropriate construction measures based on the geologic conditions.

Geotechnical data from the Association of Bay Area Governments (ABAG) was reviewed to preliminarily identify existing conditions within and near the project site. This review also indicates that the southern portion of the project site would be located in a liquefaction hazard zone.<sup>19</sup> Finally, this review indicates the site would be located near areas that consist of many landslides.<sup>20</sup> Both sets of options under the Build Alternative would be located within the same topographical area.

A project-specific Preliminary Geological Assessment (PGA) would be prepared to identify the potential for the project to result in impacts on existing soil and/or seismic conditions.

Geotechnical reports were prepared for a previously proposed safety improvement project along Crow Canyon Road within the project site. Because geologic and soil conditions are not likely to have changed since the preparation of these reports, the following work and design recommendations would avoid, minimize, and/or compensate for impacts related to geology, soils, seismicity, and topography:

- Additional subsurface exploration work should be completed in the locations identified in Table 5-2 of the *Geotechnical Data Report: Crow Canyon Road, Safety Improvement Project, Alameda County, California* (prepared by Cal Engineering & Geology, Inc. in December 2008), before final design of the improvements is completed.
- The *Geotechnical Data Report: Crow Canyon Road, Safety Improvement Project, Alameda County, California* should be consulted for design recommendations for the

<sup>19</sup> Association of Bay Area Governments Earthquake and Hazards Program, CGS Liquefaction Study Zones. Available: < <http://gis.abag.ca.gov/website/Hazards/?hlyr=cgsLndslZones#nogo1> >. Accessed: October 13, 2014.

<sup>20</sup> Association of Bay Area Governments Earthquake and Hazards Program, Existing Landslides. Available: < <http://gis.abag.ca.gov/website/Hazards/?hlyr=cgsLndslZones#nogo1> >. Accessed: October 13, 2014.

project and the *Geotechnical Data Report: Crow Canyon Road, Safety Improvement Project, Alameda County, California* should be consulted for construction considerations that influence design.

### 8.10 Paleontology

A project-specific PGA will be prepared for the Build Alternative, as discussed above. If so determined in the PGA, a site-specific Paleontological Identification Report (PIR) will be prepared in order to determine the likelihood for the project to result in adverse impacts on paleontological resources. If the findings of the PIR conclude that the Build Alternative could affect known paleontological resources, or paleontological resources with a high sensitivity status, a qualified paleontologist will need to prepare a Paleontological Evaluation Report (PER) and possibly a Paleontological Mitigation Plan (PMP). The PER and PMP reports, if necessary, are typically completed as a part of the draft environmental document/determination and draft project report.

### 8.11 Hazardous Waste/Materials

Some of the parcels adjacent to the project site appear to have historically been used for agriculture. Therefore, some of the adjacent parcels may have been subject to the application of pesticides and herbicides that potentially contained arsenic and other toxic materials. In addition, Crow Canyon Road was constructed prior to 1947. Until vehicle gasoline/fuel was reformulated to exclude lead, Crow Canyon Road and adjacent parcels likely received aerial deposits of lead from vehicular tail pipe emissions. Based upon the moderate volume of traffic along this road, aerially deposited lead from vehicular traffic along Crow Canyon Road may be present in soils within public ROW areas and private parcels.<sup>21</sup> An aerially deposited lead assessment work plan and site health and safety plan was prepared for a previous incarnation of the project along Crow Canyon Road within the project site. Because conditions related to aerially deposited lead are not likely to have changed since the preparation of that report—the *Aerially Deposited Lead Assessment Work Plan and Site Health and Safety Plan, Crow Canyon Road Safety Improvement Project, Alameda County, California* prepared by Vertex Engineering Services, Inc. in April 2004—the practices noted therein should be followed during the course of aerially deposited lead assessment activities planned in association with the project.

An Initial Site Assessment (ISA) will be prepared for the project during the PA/ED phase to determine if the project has the potential to disturb contaminated sites in the project area. Additional studies should be conducted to determine if existing roadways that require demolition or modification have the potential to contain lead-based paint and/or asbestos-containing materials, and if naturally occurring asbestos (NOA) is present in areas where surface materials would be disturbed. NOA materials are not known to

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<sup>21</sup> Vertex Engineering Services, Inc. 2004. *Aerially Deposited Lead Assessment Workplan and Site Health and Safety Plan, Crow Canyon Road Safety Improvement Project, Alameda County, California*. April 2004.

occur in the project area.<sup>22</sup> However, presence cannot be confirmed until a detailed site investigation is performed. In addition, preliminary site investigations (PSIs) would be needed for all proposed acquisition/ROW areas. The results of these studies will dictate the work practices that must be followed.

### 8.12 Air Quality

The project site is located in Alameda County within the San Francisco Bay Area Basin (SFBAB). The Bay Area Air Quality Management District (BAAQMD) has jurisdiction over air quality in Alameda County. Alameda County is designated as a nonattainment area by the USEPA for the federal 8-hour ozone and fine particulate matter (PM<sub>2.5</sub>) standards and as a maintenance area for the federal carbon monoxide (CO) standard, while the California Air Resources Board (ARB) lists the County as a nonattainment area for the state ozone, PM<sub>10</sub>, and PM<sub>2.5</sub> standards. The current federal and state attainment statuses for Alameda County are listed in Table 3.

**Table 3. Federal and State Attainment Status of the Project Area (Alameda County)**

Pollutant	National Ambient Air Quality Standards	California Ambient Air Quality Standards
8-hour ozone	Marginal Nonattainment	Nonattainment
CO	Maintenance (P)	Attainment
PM <sub>10</sub>	Attainment	Nonattainment
PM <sub>2.5</sub>	Moderate Nonattainment	Nonattainment

Sources: California Air Resources Board 2014; USEPA 2014.  
(P) = designation applies to a portion of the County in which this project is located.

Land uses in the project area include residential, commercial, and industrial. Residential land uses are directly adjacent to the intersection of Crow Canyon Road and Greenridge Road, while additional scattered residences are along Crow Canyon Road out to the County Line dividing Alameda and Contra Costa counties.

There are certain corridor countermeasures that are exempt from conformity per Code of Federal Regulations (CFR), title 40, section 93.126 (e.g., guardrails, median rumble strips, speed feedback signs, etc.). Consequently, these countermeasures are not subject to transportation conformity. However, certain countermeasures, such as roundabouts, would be exempt from regional conformity but would be required to undergo project-level conformity analyses per 40 CFR 93.127. Finally, there are other countermeasures (e.g., tunnels, lane reductions) that are subject to regional and project-level conformity. For these countermeasures, an air quality study report (AQSR) consistent with Caltrans, USEPA, and FHWA requirements would need to be prepared

<sup>22</sup> Department of Conservation. 2000. *A General Guide for Ultramafic Rocks in California – Areas More Likely to Contain Naturally Occurring Asbestos*. (Open-File Report 2000-19.) August. Division of Mines and Geology.

to document conformity requirements and evaluate the environmental impacts associated with the project.

Because regional conformity requires the project description listed in the most recently adopted and conforming regional transportation plan (RTP) and transportation improvement program (TIP) match that of the project, the AQSRS must verify that the project satisfies regional conformity requirements by analyzing and documenting that the finalized project description, scope, and open-to-traffic year match the listing in the Metropolitan Transportation Commission (MTC)/ABAG 2040 RTP, *Plan Bay Area*,<sup>23</sup> and MTC's 2013 TIP.<sup>24</sup>

The project is included in *Plan Bay Area* as project ID 240094:

- Implement Crow Canyon Road Safety Improvements Project (includes roadway realignment, shoulder widening, retaining wall systems, and guardrail modifications along Crow Canyon Road between E. Castro Valley Blvd. and the Alameda/Contra Costa county line).<sup>25</sup>

The project is included in MTC's 2013 TIP as project ID ALA010003:

- Alameda County: On Crow Canyon Road: from I-580 north to the Alameda/Contra Costa County line; Safety improvements, shoulder widening and curve realignment.<sup>26</sup>

MTC/ABAG's *Plan Bay Area* and MTC's 2013 TIP were found to conform to the Clean Air Act State Implementation Plan (SIP) by the FHWA and Federal Transit Administration (FTA) on August 12, 2013.<sup>27</sup>

As noted above, the project is located in a maintenance area for the federal CO standard. A project-level CO transportation conformity assessment pursuant to the Clean Air Act would therefore be required. Additionally, localized CO hot spot analyses must be performed to evaluate impacts under CEQA and NEPA. An analysis of

<sup>23</sup> *Plan Bay Area* includes the region's Sustainable Communities Strategy (SCS) and the 2040 Regional Transportation Plan, approved on July 18, 2013 jointly by MTC and ABAG.

<sup>24</sup> MTC adopted the 2013 TIP on July 18, 2013, and FHWA/Federal Transit Administration (FTA) approved the 2013 TIP on August 12, 2013. On September 24, 2014, MTC adopted the 2015 TIP, which has been forwarded to Caltrans for inclusion in the Draft 2015 Federal Statewide Transportation Improvement Program (FSTIP). Currently, FHWA has not approved the 2015 TIP, and the 2013 TIP is the currently approved TIP as of October 2014.

<sup>25</sup> One Bay Area. 2013. *Plan Bay Area*. July 2013. Available: <[http://onebayarea.org/pdf/final\\_supplemental\\_reports/FINAL\\_PBA\\_Project\\_List.pdf](http://onebayarea.org/pdf/final_supplemental_reports/FINAL_PBA_Project_List.pdf)>. Accessed: October 21, 2014.

<sup>26</sup> MTC. 2014. 2013 TIP. October 07, 2014. Available: <[http://www.mtc.ca.gov/funding/tip/2013/2013-00\\_Single\\_Line\\_Project\\_Listing.pdf](http://www.mtc.ca.gov/funding/tip/2013/2013-00_Single_Line_Project_Listing.pdf)>. Accessed: October 21, 2014.

<sup>27</sup> MTC. 2014. 2013 TIP. October 07, 2014. Available: <[http://www.mtc.ca.gov/funding/tip/2013/2013\\_TIP\\_Approval\\_Documentation.pdf](http://www.mtc.ca.gov/funding/tip/2013/2013_TIP_Approval_Documentation.pdf)>. Accessed: October 21, 2014.

localized CO impacts would be required using the methodology contained within Caltrans' *Transportation Project-Level Carbon Monoxide Protocol*.<sup>28</sup>

The project is also located in a nonattainment area for the federal and state PM2.5 standards. Therefore, the project must be shown to not cause or contribute to any new localized PM2.5 violations or increase the frequency or severity of any existing PM2.5 violations. The assessment of localized PM2.5 impacts would be evaluated using USEPA's November 2013 PM hot-spot guidance, *Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas*.<sup>29</sup>

In addition, it is possible that the project would need to be evaluated for its potential emissions of mobile source air toxics (MSATs). FHWA's 2012 *Interim Guidance Update on Air Toxic Analysis in NEPA Documents* would be used to evaluate the project's MSAT impacts.<sup>30</sup> If a quantitative analysis of MSAT emissions is required, the analysis would be conducted using ARB's EMFAC or CT-EMFAC emissions models.

The project would not require permits because road construction is not considered a stationary source. However, the following avoidance measures would be required pursuant to Caltrans and BAAQMD rules and regulations:

- Caltrans Standard Specification 14-9
- BAAQMD Mitigation Measures

In addition to the preparation of an AQSR, applicable conformity documentation is required. Because the project is located in a federal PM2.5 nonattainment area and PM2.5 conformity requirements must be met, appropriate Interagency Consultation (IAC) documentation is required to be submitted to MTC's Air Quality Conformity Task Force through their Fund Management System to determine whether the project is a project of air quality concern (POAQC) and must undergo a quantitative analysis of PM2.5 hot-spots.<sup>31</sup> It is also anticipated the document would be processed as an Environmental Assessment under NEPA under U.S. Code, title 23, section 327—NEPA Assignment. Consequently, a separate Air Quality Conformity Analysis and documentation checklist would need to be prepared and submitted to FHWA to assist with their issuance of a conformity determination for the project.

<sup>28</sup> Garza, V. J., P. Graney, and D. Sperling. 1997. *Transportation Project-Level Carbon Monoxide Protocol*. Revised December, 1997. Available: [http://www.dot.ca.gov/hq/env/air/documents/COProtocol\\_searchable.pdf](http://www.dot.ca.gov/hq/env/air/documents/COProtocol_searchable.pdf).

<sup>29</sup> U.S. Environmental Protection Agency. 2013. *Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas*. November 2013. Available: <http://www.epa.gov/oaq/stateresources/transconf/projectlevel-hotspot.htm#pm-hotspot>. Accessed: October 21, 2014.

<sup>30</sup> Federal Highway Administration. 2012. *Memorandum: Subject: Information: Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA*. December 6, 2012. Available: [https://www.fhwa.dot.gov/environment/air\\_quality/air\\_toxics/policy\\_and\\_guidance/qintguidmem.cfm](https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/qintguidmem.cfm). Accessed: October 21, 2014.

<sup>31</sup> EPA's 2006 final conformity rule stipulates a quantitative particulate matter hot-spot analysis is required only for POAQCs.



### 8.13 Noise and Vibration

Federal or federally funded highway projects must comply with the procedures for preparing operational and construction noise studies specified in 23 CFR 772 and the Caltrans Traffic Noise Analysis Protocol (Protocol). The Protocol is Caltrans' policy document for implementing 23 CFR 772, which defines a Type I project as a new highway construction or reconstruction project that increases capacity or results in a substantial horizontal or vertical alteration. As defined in the Protocol a substantial horizontal alteration is considered to occur when the project halves the distance between the traffic noise source and the closest receptor between the existing condition to the future build condition. A substantial vertical alteration is considered to occur when a project removes shielding thereby exposing the line-of-sight between a receptor and the traffic noise source. This is done by altering either the vertical alignment of the highway or the topography between the highway traffic noise source and the receptor.

The project is not considered to be a Type I project under 23 CFR 772 because it is primarily a safety improvement project and will not increase capacity. Several project elements are anticipated to result in some localized shifting of the roadway alignment. This will occur at the four roundabout locations and the tunnel location. However, none of these alignment shifts are anticipated to cut the distance between the roadway and sensitive receptor locations by more than half and are not anticipated to remove shielding. Because the project is not a Type I project, a traffic noise impact and abatement analysis is not required. An evaluation of construction noise and vibration impacts, however, will be conducted in accordance with the requirements of 23 CFR 772 and the Caltrans Protocol. It is anticipated that noise sensitive areas located along the alignment will be exposed to elevated noise levels during construction. These areas include residential subdivisions located within about 1.5 miles for the southern project limit and rural residential locations located throughout the project area. An abbreviated noise study memorandum will be prepared to summarize the construction noise and vibration impact assessment and to identify construction noise abatement if necessary.

### 8.14 Energy and Climate Change

The Build Alternative has been developed to reduce safety hazards and improve multi-modal access along Crow Canyon Road. Safety hazards can result in traffic congestion, which can lead to an increase in carbon dioxide (CO<sub>2</sub>) emissions. In addition, reducing the difficulty of bicycle travel can lead to a decrease in CO<sub>2</sub> emissions. Therefore, it is anticipated that the Build Alternative would lead to reduced greenhouse gas (GHG) emissions, specifically CO<sub>2</sub> emission reductions. A qualitative discussion relative to GHG emissions, energy, and climate change effects will be conducted in accordance with current Caltrans' guidelines on the SER at the time of preparation and will be included in the environmental document.

## 8.15 Biological Environment

### 8.15.1 Environmental Resources

The biological resources setting of the project area is the roadway itself surrounded by Crow Creek, agricultural lands, large residential developments, and rural development, including ranchettes and horse stables. Extensive residential and other urban development has occurred further afield in the hills along either side of Crow Creek. Access to these areas is through Crow Canyon Road and its connecting roadways. Although much of the land within the project area has been developed for urban and other human uses, there are still significant areas of natural habitat within the project area that could support a number of special-status species. Crow Canyon Road traverses Crow Creek at four locations within the project site at the following locations: between Greenridge Road and Coldwater Drive, near PM 1.7, near PM 2.0, and near PM 6.4.

Biological resources were evaluated for their potential to occur within the project area after an examination of the U.S. Geological Survey 7.5-minute Las Trampas Ridge and Hayward quadrangles and aerial photographs as well as a review of pertinent literature. Lists of special-status species were obtained from the U.S. Fish and Wildlife Service (USFWS) list of federal endangered and threatened species that occur in or may be affected by projects in the quadrangles requested,<sup>32</sup> CDFW California Natural Diversity Database (CNDDDB),<sup>33</sup> and California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants.<sup>34</sup>

After the CNDDDB and CNPS lists were queried, 17 plant and 23 wildlife species with the potential to occur in the project area were identified. These plant and wildlife species are summarized below and described in detail in Attachment C of this document.

#### 8.15.1.1 Plants

The project site is located in an area in and/or near known occurrences of Diablo helianthella, Loma Prieta hoita, woodland woollythreads, Congdon's tarplant, Santa Cruz tarplant, bent-flowered fiddleneck, hairless popcornflower, San Joaquin spearscale, alkali milk-vetch, western leatherwood, fragrant fritillary, most beautiful jewel-flower, round-leaved filaree, Mt. Diablo fairy lantern, Northern California black walnut, oval-leaved viburnum, and big-scale balsamroot. While impacts to plants would be avoided and/or minimized to the extent feasible, the following countermeasures may result in impacts to special-status plants: 3, 7, 8, and 9.

<sup>32</sup> U.S. Fish and Wildlife Service. 2015. IPaC Trust Resource Report for the Counties for the U.S.G.S 7.5-minute Quads you requested. Project Code: SMJRB-DSDHN-EA7JQ-HK4WG-IRBANM Available: [http://www.fws.gov/sacramento/ES\\_Species/Lists/es\\_species\\_lists-form.cfm](http://www.fws.gov/sacramento/ES_Species/Lists/es_species_lists-form.cfm).

<sup>33</sup> California Natural Diversity Data Base (CNDDDB). 2015. Rarefind 5. California Department of Fish and Game. Accessed: 5-8-15. Available: <http://www.dfg.ca.gov/biogeodata/cnddb/mapsanddata.asp>

<sup>34</sup> California Native Plant Society. 2015. Inventory of Rare and Endangered Plant. 7th Edition v7-14 5-8-15 Available: [http://cnps.site.aplus.net/cgi-bin/inv/inventory.cgi/Html?item=checkbox\\_9.htm](http://cnps.site.aplus.net/cgi-bin/inv/inventory.cgi/Html?item=checkbox_9.htm).

#### 8.15.1.2 Wildlife (non-fish)

The project site is located in areas in and/or near known occurrences of California red-legged frog (federally threatened and a state species of special concern), California tiger salamander (federally and state threatened), vernal pool fairy shrimp (federally threatened), Alameda whipsnake (federally and state threatened), San Francisco dusky-footed woodrat (a state species of special concern), western pond turtle (a state species of special concern), sharp-shinned hawk (active nests protected by the Migratory Bird Treaty Act [MBTA] and California Fish and Game Code 3503), pallid bat (a species of special concern), golden eagle (active nests protected by MBTA and Fish and Game Code 3503), great blue heron (active nests protected by MBTA and Fish and Game Code 3503), western mastiff bat (a species of special concern), hoary bat (a Western Bat Working Group species of medium priority), and yellow warbler (a species of special concern). Other species that have been identified as occurring within the Hayward and Las Trampas quadrangles, but are not expected to have suitable habitat within the project area, include western snowy plover, California brown pelican, California clapper rail, California least tern, and salt marsh harvest mouse. While impacts to wildlife would be avoided and/or minimized to the extent feasible, the following countermeasures may result in impacts to special-status wildlife: 3, 7, 8, and 9.

#### 8.15.1.3 Fish

As previously described, the project site includes four crossings over Crow Creek. Historically, central California coast steelhead occurred in the Crow Creek. Currently, there are many partial and one full barrier on Crow Creek downstream of the project site.<sup>35</sup> This precludes steelhead from migrating upstream into the project site. As discussed under Section 8.8, *Water Quality and Stormwater Runoff*, impacts on water quality would potentially occur during construction of countermeasures 3, 7, 8, and 9. These would be temporary effects, and water quality measures to minimize effects on Crow Creek will be addressed in the NPDES and Stormwater Pollution Prevention Program (SWPPP), which would be required for all countermeasures that involve one acre or more of land disturbance activities. Land disturbance activities include grading, excavation, storage and use of materials/equipment in staging areas, demolition of concrete, paving/re-paving, and other similar activities. As part of the SWPPP, storm drains and nearby receiving water bodies, such as Crow Creek, would need to be protected from potential discharge of contaminants, such as sediments, trash, concrete, and hazardous materials. Other species that have been identified as occurring within the Hayward and Las Trampas quadrangles, but that are not expected to have suitable habitat within the project area, include delta smelt, coho salmon, Central Valley spring-run Chinook salmon, and Sacramento River winter-run Chinook salmon.

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<sup>35</sup> Calfish, 2014. Available: <http://www.calfish.org/>.

**8.15.1.4 Wetlands/Waters of the U.S. and Waters of the State**

Potential wetlands and/or waters of the U.S., as well as potential waters of the State are present within the project area, primarily along Crow Creek and its tributaries. The project includes crossing and drainage modifications near and/or in Crow Creek and its tributaries and has the potential to affect wetlands and waters of the U.S. under the jurisdiction of the USACE and waters of the State under the jurisdiction of the San Francisco RWQCB. While impacts to wetlands and waters would be avoided and/or minimized to the extent feasible, the following countermeasures may result in impacts to wetlands and/or waters: 3, 7, 8, and 9.

**8.15.1.5 Rare Natural Communities**

Valley needlegrass grassland is listed by CDFW as a rare natural community<sup>36</sup> and it is known to occur within the Las Trampas Ridge and Hayward quadrangles. While impacts to valley needlegrass would be avoided and/or minimized to the extent feasible, the following countermeasures may result in impacts: 3, 7, 8, and 9.

**8.15.2 Potential Environmental Effects**

As previously discussed, the project involves the implementation of a combination or all of the countermeasures. Refer to Table 4, below, for a summary of the potential environmental effects to biological resources, the potential requirements/actions, and the cost of complying with the potential requirements/actions of each countermeasure.

**Table 4. Potential Biological Effects, Requirements/Actions, and Cost of Compliance for each Countermeasure**

Project Countermeasure	Potential Effects on Biological Resources	Potential Requirements/ Actions	Duration to Obtain Regulatory Compliance	Cost of Complying with Potential Requirements/ Actions <sup>37</sup>
<b>Corridor-wide</b>				
1. Speed Feedback Signs	Potential environmental effects related to biological resources would likely be minimal.	Potential requirements/ actions would likely be minimal.	N/A	Low <\$25K
2. California Highway Patrol (CHP) Enforcement Areas	It is assumed that the locations of this countermeasure are flexible and can be designed to avoid environmentally sensitive	Potential requirements/ actions would likely be minimal.	N/A	Low <\$25

<sup>36</sup> California Department of Fish and Wildlife. 2014. *Natural Communities—List*. Available: [http://www.dfg.ca.gov/bioeodata/vegcamp/natural\\_comm\\_list.asp](http://www.dfg.ca.gov/bioeodata/vegcamp/natural_comm_list.asp). Accessed: October 30, 2014.

Project Countermeasure	Potential Effects on Biological Resources	Potential Requirements/ Actions	Duration to Obtain Regulatory Compliance	Cost of Complying with Potential Requirements/ Actions <sup>37</sup>
<p>3. Roundabouts:</p> <ul style="list-style-type: none"> <li>• Roundabout #1: MP 2.00</li> <li>• Roundabout #2: MP 2.50</li> <li>• Roundabout #3: MP 3.45</li> <li>• Roundabout #4: MP 5.10</li> </ul>	<p>resources.</p> <p>The footprint of the roundabouts can be designed to avoid environmentally sensitive resources to the extent feasible. However, if impact areas are not avoided, then potential environmental impacts include:</p> <ul style="list-style-type: none"> <li>• Multiple species of special-status plants and wildlife could potentially be affected by this countermeasure.</li> <li>• Multiple locations of wetlands and waters could be potentially affected by this countermeasure.</li> </ul> <p>Based on the 2004 NES, it is anticipated that Roundabout #4 would have the fewest potential impacts, followed by Roundabout #1, then Roundabout #3, with Roundabout #2 having the greatest potential impacts to biological resources. Refer to Table D-2 in Attachment D.</p>	<ul style="list-style-type: none"> <li>• Updated NES</li> <li>• Habitat assessment surveys</li> <li>• Floristic surveys</li> <li>• Sensitive vegetation communities survey</li> <li>• Arborists survey and report</li> <li>• Section 7 consultation</li> <li>• Section 1600 streambed alteration agreement</li> <li>• CDFW incidental take permits for multiple plant and wildlife species would likely be required</li> <li>• Compliance with the CWA</li> <li>• Avoidance measures</li> <li>• Species-specific mitigation</li> <li>• Wetland delineation as well as on-site and off-site wetland and waters mitigation</li> </ul>	<p>24 months</p>	<p>Medium \$75-150K</p>
<p>4. Increase Shoulder Maintenance</p>	<p>As long as shoulder maintenance stays within existing County right-of-way, as it currently does, then potential environmental effects related to biological resources would likely be minimal.</p>	<p>Potential requirements/ actions would likely be minimal.</p>	<p>N/A</p>	<p>Low &lt;\$25K</p>

Project Countermeasure	Potential Effects on Biological Resources	Potential Requirements/ Actions	Duration to Obtain Regulatory Compliance	Cost of Complying with Potential Requirements/ Actions <sup>37</sup>
5. Additional Lighting/ Signing	Potential environmental effects related to biological resources would likely be minimal.	Potential requirements/ actions would likely be minimal.	N/A	Low <\$25K
6. Guardrails	Guardrails would be installed within the existing County right-of-way. Some locations may require clearing of vegetation adjacent to the roadway. It is assumed that sensitive areas can be avoided and potential environmental effects related to biological resources would likely be minimal.	Potential requirements/ actions would likely be minimal.	N/A	Low <\$25K

Project Countermeasure	Potential Effects on Biological Resources	Potential Requirements/ Actions	Duration to Obtain Regulatory Compliance	Cost of Complying with Potential Requirements/ Actions <sup>37</sup>
<b>Segment 2</b>				
7. Median Rumble Strip with 6-foot Shoulders	Some widening within the existing County right-of-way would be required to employ this countermeasure and may require the replacement and/or extension of existing culverts at locations where the road traverses the creek.	<ul style="list-style-type: none"> <li>• Updated NES</li> <li>• Habitat assessment surveys</li> <li>• Floristic surveys</li> <li>• Sensitive vegetation communities survey</li> <li>• Arborists survey and report</li> <li>• Section 7 consultation</li> <li>• Section 1600 streambed alteration agreement</li> <li>• CDFW incidental take permits for multiple plant and wildlife species would likely be required</li> <li>• Compliance with the CWA</li> <li>• Avoidance measures</li> <li>• Species-specific mitigation</li> <li>• Wetland delineation as well as on-site and off-site wetland and waters mitigation</li> </ul>	24 months	High \$125-175K
8. Tunnel at mile post 2.15 (Northbound)	<p>Multiple species of special-status plants and wildlife could potentially be affected by this countermeasure.</p> <p>Multiple locations of wetlands and waters could be potentially affected by this countermeasure.</p>	<ul style="list-style-type: none"> <li>• Updated NES</li> <li>• Habitat assessment</li> <li>• Floristic surveys</li> <li>• Sensitive vegetation communities survey</li> <li>• Arborists survey and report</li> <li>• Section 7 consultation</li> <li>• Section 1600 streambed alteration agreement</li> </ul>	24 months	High \$145-225K

Project Countermeasure	Potential Effects on Biological Resources	Potential Requirements/ Actions	Duration to Obtain Regulatory Compliance	Cost of Complying with Potential Requirements/ Actions <sup>37</sup>
		<ul style="list-style-type: none"> <li>• CDFW incidental take permits for multiple plant and wildlife species would likely be required</li> <li>• Compliance with the CWA</li> <li>• Avoidance measures</li> <li>• Species-specific mitigation</li> <li>• Wetland delineation as well as on-site and off-site wetland and waters mitigation</li> </ul>		
9. Tunnel at mile post 2.15 (Both Directions)	<p>Multiple species of special-status plants and wildlife could potentially be affected by this countermeasure.</p> <p>Multiple locations of wetlands and waters could be potentially affected by this countermeasure.</p>	Same as Countermeasure 8.	24 months	High \$240-370K
<b>Segment 3</b>				
10. Shoulder Widening – 8 feet at Driveways – Acceleration/Deceleration Areas	Locations for shoulder widening would be selected from within existing County right-of-way and previously cleared areas to the extent feasible. It is assumed that sensitive areas can be avoided and potential environmental effects related to biological resources would likely be minimal.	Potential requirements/ actions would likely be minimal.	N/A	Low <\$25K
11. Two-Way Left-	The footprint of the two-	Potential requirements/	N/A	Low



Project Countermeasure	Potential Effects on Biological Resources	Potential Requirements/ Actions	Duration to Obtain Regulatory Compliance	Cost of Complying with Potential Requirements/ Actions <sup>37</sup>
Turn Lane	way left turn lane can be designed to avoid environmentally sensitive resources to the extent feasible. It is assumed that sensitive areas can be avoided and potential environmental effects related to biological resources would likely be minimal.	actions would likely be minimal.		<\$25K
<b>Segment 4</b>				
12. Left-Turn Lane (Left-in/ Left-out) (Spot Locations)	All work is planned within the existing median, so no widening or clearing would be required. Potential environmental effects related to biological resources would likely be minimal.	Potential requirements/ actions would likely be minimal.	N/A	Low <\$25K
13. Reduce from 4-to 2-lane Northbound and 1-lane Southbound	All work is planned within the existing median, so no widening or clearing would be required. Potential environmental effects related to biological resources would likely be minimal.	Potential requirements/ actions would likely be minimal.	N/A	Low <\$25K
14. Reduce from 4-to 2-lane (with turn-outs) – widen medians	All work is planned within the existing median, so no widening or clearing would be required. Potential environmental effects related to biological resources would likely be minimal.	Potential requirements/ actions would likely be minimal.	N/A	Low <\$25K
15. Reduce from 4-to 2-lane (with turn-outs) – remove outside pavement	All work is planned within the existing median, so no widening or clearing would be required. Potential environmental effects related to biological resources	Potential requirements/ actions would likely be minimal.	N/A	Low <\$25K

Project Countermeasure	Potential Effects on Biological Resources	Potential Requirements/ Actions	Duration to Obtain Regulatory Compliance	Cost of Complying with Potential Requirements/ Actions <sup>37</sup>
	would likely be minimal.			
<b>Segment 5</b>				
16. Pavement Rehabilitation and Restriping for Wider Shoulders	The extent of pavement rehabilitation and restriping would occur within existing County right-of-way. It is assumed that sensitive areas can be avoided and potential environmental effects related to biological resources would likely be minimal.	Potential requirements/ actions would likely be minimal.	N/A	Low <\$25K
17. Left-Turn Lane (Left-in/Left-out) with Acceleration/Deceleration Areas	The footprint of the two-way left turn lane can be designed to avoid environmentally sensitive resources to the extent feasible. It is assumed that sensitive areas can be avoided and potential environmental effects related to biological resources would likely be minimal.	Potential requirements/ actions would likely be minimal.	N/A	Low <\$25K
18. Median Rumble Strip with 6-foot Shoulders	Some widening within the existing County right-of-way would be required to employ this countermeasure, but the extent of widening can be designed to avoid environmentally sensitive resources to the extent feasible. It is assumed that sensitive areas can be avoided and potential environmental effects related to biological resources would likely be minimal.	Potential requirements/ actions would likely be minimal.	N/A	Low <\$25K
* The comparative cost of complying with requirements/actions for each countermeasure has been ranked as either Low, Medium				

Project Countermeasure	Potential Effects on Biological Resources	Potential Requirements/ Actions	Duration to Obtain Regulatory Compliance	Cost of Complying with Potential Requirements/ Actions <sup>37</sup>
<p>or High with a range of dollar values based on an assessment of the complexity of the potential requirements/actions that would likely be triggered by each countermeasure. These costs were developed using the following assumptions on the number of staff hours required to complete each action at an average of \$120 per hour. These estimates were based on a desktop assessment and review of the study area; no field work or reconnaissance surveys were conducted. Changes to the study area, project description, agency regulatory requirements, and new information that may surface through subsequent research may change the anticipated level of effort for each requirement listed below.</p> <p>In addition, in the event that impacts on species habitat and waters and wetlands are found to occur, mitigation for such impacts would be required by the resource agencies and would be added to the costs shown above. Such mitigation would depend upon the acreage of impact and ratio of mitigation negotiated with the resource agencies. Refer to Attachment D for an estimate of mitigation costs associated with countermeasures that are anticipated to require compensatory mitigation.</p> <p><u>Assumptions:</u></p> <p>Updated Natural Environment Study [80 hours]                      Habitat assessment field surveys [30 hours]                      Floristic field surveys [80 hours]                      Sensitive vegetation communities field survey [20 hours]                      Arborists survey and report [50 hours]                      Section 7 consultation (including preparation of a biological assessment) [250 hours]                      Section 1600 streambed alteration agreement [120 hours]                      CDFW incidental take permits for multiple plant and wildlife species [160 hours]                      Wetland delineation [50 hours delineation only]</p>				

**8.15.3 Future Impact Analyses and Mitigation**

The following analysis is anticipated to comply with CEQA and Caltrans' guidelines as a result of implementation of some of the countermeasures, as indicated in Table 3:

- The 2004 NES would need to be updated for the project to document which species, if any, are likely to be found within the project area. Numerous protected plant species have potential to occur within habitat affected by the countermeasures. Central California steelhead, California red-legged frog, California tiger salamander, vernal pool fairy shrimp, Alameda whipsnake, San Francisco dusky-footed woodrat, western pond turtle, and multiple bat species have potential to occur within natural habitats in or near the project site. The NES would identify avoidance and minimization measures to avoid impacts on protected species. If impacts on protected species or federally protected species' habitat cannot be avoided, the NES would identify compensatory mitigation for impacts on these resources. Additionally, migratory bird nests, protected under the MBTA and California Fish and Game Code 3503, have potential to occur within vegetation adjacent to the project area. The NES would identify avoidance and minimization measures to avoid impacts on any protected active bird nests.
- The countermeasures would be designed to avoid environmentally sensitive resources to the extent feasible. Therefore, the project is not expected require formal Section 7 consultation in order to comply with the federal Endangered Species Act (ESA), and a "No Effect" determination would be requested. However, if federally protected special-status species are found in the project area and would be

potentially impacted by the project, then Section 7 compliance would be sought through approvals from the USFWS and CDFW with the preparation of a Biological Assessment and issuance of a Biological Opinion.

- If impacts to CESA-listed plant and/or wildlife species could not be avoided, incidental take permits would likely be required from CDFW.

The following surveys and mitigation measures would be anticipated to avoid, minimize, and/or compensate for impacts on legally protected biological resources as a result of implementation of some of the countermeasures, as indicated in Table 3, if the associated sensitive resource could not be avoided:

- Habitat assessment surveys for nesting birds, special-status plant species, and special-status wildlife species including California red-legged frog, California tiger salamander, Alameda whipsnake, and western pond turtle.
- Two or more floristic surveys conducted by qualified botanists at the appropriate time of year (typically during the reported blooming period for each species) would be required to evaluate the effect of the countermeasure on special-status plant species.
- Survey for sensitive vegetation communities as defined by the CNDDDB and further described in *Preliminary Descriptions of the Terrestrial Natural Communities of California* by Robert F. Holland, Ph.D., October 1986, including coast live oak forest, central coast sycamore-cottonwood riparian, northern coastal scrub, and nonnative annual grassland.
- An arborists survey and report prior to the initiation of each phase of the project, according to the Alameda County Tree Ordinance (Ordinance No. 0-2004-23). All trees located within the County ROW are protected. "Tree" or "trees" means any tree that meets the following criteria: any woody perennial plant characterized by having a single trunk or multi-trunk structure at least ten feet high and having a single or multiple trunk structure with a major trunk that is at least two inches in diameter taken at breast height (DBH) taken at 4.5 feet from the ground. It also includes those plants generally designated as trees and any trees that have been planted as replacement trees under the County Tree Ordinance or any trees planted by the County. Mitigation through planting compensation trees may be required if determined by Alameda County.
- If the removal of riparian habitat is necessary near Crow Creek in order to construct any of the countermeasures, a Section 1602 (of the California Fish and Wildlife Code) streambed alteration agreement would be required prior to such impacts on riparian habitat or stream banks. The agreement is expected to require compensatory mitigation of permanent impacts at a minimum 2:1 (replacement to impact) ratio and mitigation of temporary impacts at a minimum 1:1 ratio.
- Typical impact avoidance measures are expected to apply to all construction near waterways, such as the following avoidance constraint: At no point during the construction, operation and maintenance phase of any countermeasure will any

equipment, material, debris, or other project-related matter be allowed to enter the water of Crow Creek. Furthermore, a Debris/Materials Containment Plan must be prepared by the contractor and approved by Caltrans and the San Francisco RWQCB.

- If a wetland delineation is required for any countermeasure, it would need to be conducted in accordance with the methodology outlined in the USACE 1987 *Wetland Delineation Manual*.<sup>38</sup> This delineation must be conducted prior to project construction and will require access to all properties where ground disturbance will occur. Upon completion, the wetland delineation report will be submitted to the USACE for verification.
- Preconstruction surveys for nesting migratory birds, including raptors, will be necessary if construction is to occur between February 1 and August 31. If active nests are found during the survey, no-disturbance species-specific buffer zones will be established by a qualified biologist.

The potential mitigation measure costs identified in Attachment D were derived from the preceding analysis, a query of the CNDDDB and USFWS Endangered Species List, and the impacts identified in the *Natural Environmental Study for Crow Canyon Road Improvement Project, dated May 2004* (Alameda County, 2004). A reassessment of the 2004 NES based on the current project will be necessary to determine if the impacts to biological resources are still valid. Other potential species impacts could come out of those studies. To estimate the potential costs associated with the mitigation measures, the current rate of mitigation bank credits were applied to the impacts to biological resources identified in the 2004 NES. For impacts that mitigation bank credits were not available for, estimates were based on conservative estimates of potential on-site mitigation costs. The assumptions that were made to calculate the estimated mitigation measure costs are described in Attachment D.

### 8.16 Cumulative Impacts

During the PA/ED phase, the potential for cumulative impacts on biological, cultural, or visual resources, or related to traffic, noise, or air quality will be evaluated; and mitigation will be recommended, as applicable. It is anticipated that compliance with regulations and standard mitigation measures will avoid and minimize potential impacts.

### 8.17 Context Sensitive Solutions

Context Sensitive Solutions (CSS) are applied to achieve transportation goals that are in sync with community goals and natural environments. CSS are reached through a collaborative and interdisciplinary approach that involves all stakeholders and relies on early coordination with agencies through early outreach. These efforts, which will be pursued during the PA/ED phase, include consideration of appropriate treatments for

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<sup>38</sup> Environmental Laboratory, 1987, Corps of Engineers Wetlands Delineation Manual. Available: <http://el.erdc.usace.army.mil/elpubs/pdf/Wlman87.pdf>. Accessed: October 30, 2104.

any structures resulting from construction of the project. The primary focus of CSS would primarily be on visual effects and accessibility.

Crow Canyon Road Safety Study Public Workshop No. 1 was held on February 13, 2013, at Canyon Creek Middle School. The study was introduced to the public who were then invited to provide input. Crow Canyon Road Safety Study Public Workshop No. 2 was held on May 28, 2014, at the Castro Valley Library. The Alameda County Public Works Agency presented the preliminary findings and recommendations, the schedule, the next steps, and information to the public about how to participate in the process. Crow Canyon Road Safety Study Public Workshop No. 3, which is anticipated to occur in Summer 2015, will introduce the preliminary report and the next steps.

### 9.0 SUMMARY STATEMENT FOR PSR OR PSR-PDS

ACPWA would be the implementing agency for the PA/ED phase and would act as lead agency for CEQA. If federal funding is pursued, Caltrans would act as the lead agency for NEPA under its assumption of responsibility pursuant to 23 USC 326. Past experience with similar actions and information provided to date indicate that, as indicated in Table 2, environmental clearance would be obtained with either a CE or an IS/MND under CEQA and a CE or Routine EA/FONSI under NEPA. This decision is based on review of the issues and anticipated mitigation (costs). Estimated time for the PA/ED phase is ranges from 3 to 24 months depending on countermeasure (see Table 2). Agency coordination for traffic, air quality, cultural resources, and the biological environment is anticipated to be a lengthy process that could affect the project schedule. Permanent ROW acquisition is potentially required for countermeasures 3, 7, 8, 9 and 10. Substantial changes to the project description will require additional review and could have implications on the schedule.

### 10.0 DISCLAIMER

This preliminary analysis provides information to support programming of the project. It is not an environmental determination or document. Preliminary analysis, determinations, and estimates of mitigation costs are based on the project description provided in the Safety Study included as Attachment C of this document. The estimates and conclusions in this preliminary analysis are approximate and are based on cursory analyses of probable effects. A reevaluation of this preliminary analysis will be needed for changes in project scope or the Build Alternative, or in environmental laws, regulations, or guidelines.

### 11.0 LIST OF PREPARERS

Cultural Resources specialist: Joanne Grant	Date: November 2014
Biologists: Eric Christensen and Theresa Engle	Date: May 2015
Community Impacts specialist: Jessica Viramontes	Date: November 2014
Noise and Vibration specialist: Dave Buehler	Date: November 2014

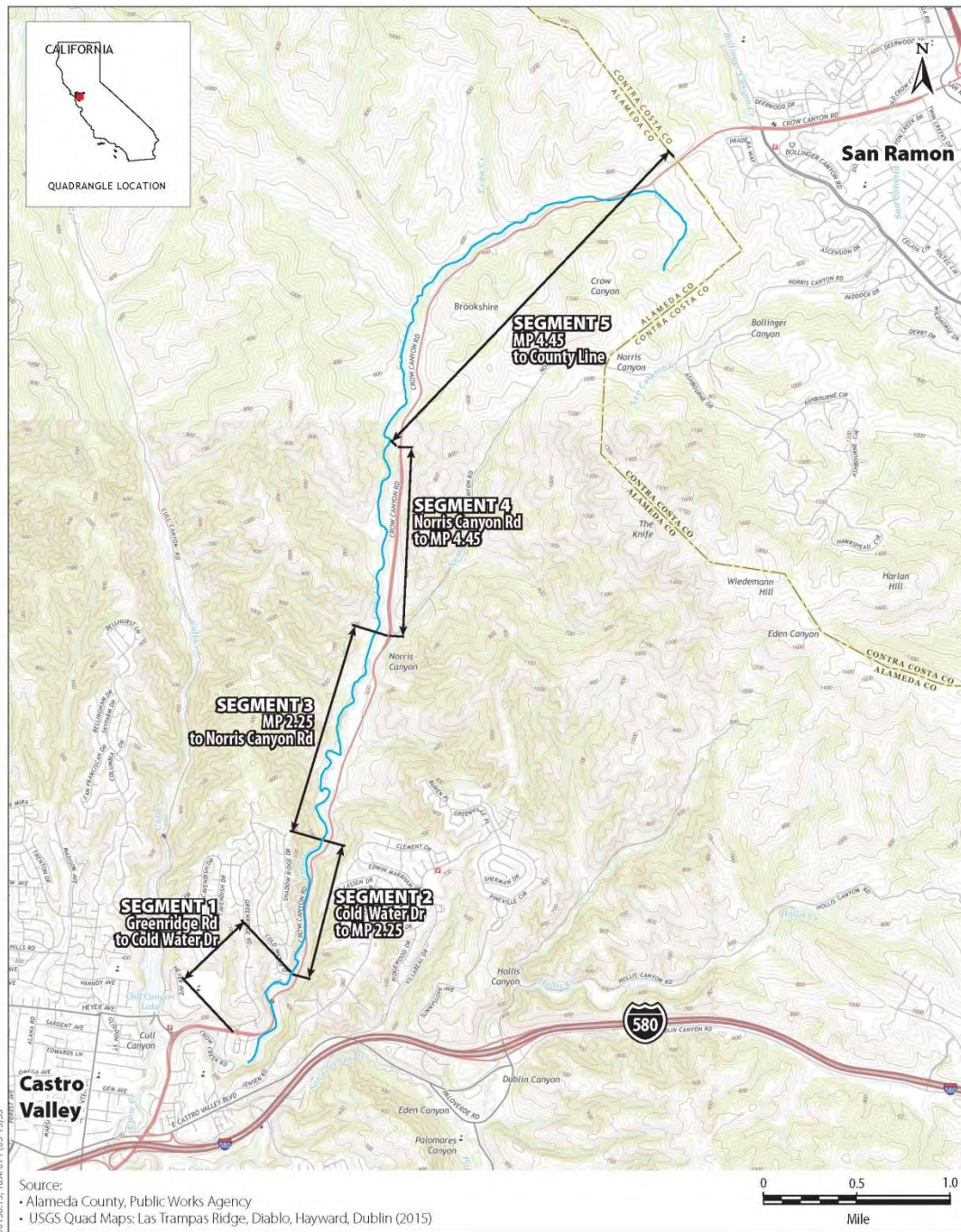
Air Quality specialist: Shannon Hatcher	Date: November 2014
Paleontology specialist/liaison: Jessica Viramontes	Date: November 2014
Water Quality specialist: Alexa La Plante	Date: November 2014
Hydrology and Floodplain specialist: Alexa La Plante	Date: November 2014
Hazardous Waste/Materials specialist: Jessica Viramontes	Date: November 2014
Visual/Aesthetics specialist: Jessica Viramontes	Date: November 2014
Energy and Climate Change specialist: Shannon Hatcher	Date: November 2014
PEAR Preparer (Name and Title)	Date: June 2015
Karin Bouler, Project Coordinator	
Aaron Carter, Project Manager	

**Document Author**

\_\_\_\_\_ Date: \_\_\_\_\_  
Aaron Carter, Project Manager  
ICF International

**ATTACHMENTS:**

- Attachment A: Crow Canyon Road Safety Report
- Attachment B: FEMA 100-Year Flood Zone Map
- Attachment C: Biological Resource Database Searches
- Attachment D: Mitigation Cost Estimate



00138113, Task 071 (05-15)SS



**Figure 1**  
**Project Limits**  
Crow Canyon Road Safety Improvements Project



**MAY 11, 2016**

CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

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Attachment A  
**Crow Canyon Road Safety Report**

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**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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**Attachment B  
FEMA 100-Year Flood Zone Map**

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DRAFT

**MAY 11, 2016**

CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

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Attachment C  
**Biological Resource Database Searches**

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MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

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## United States Department of the Interior



### FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office  
2800 Cottage Way, Room W-2605  
Sacramento, California 95825



October 21, 2014

Document Number: 141021034157

Eric Christensen  
ICF International  
620 Folsom St. 2nd Floor  
San Francisco, CA 94107

Subject: Species List for Crow Canyon Road Improvements

Dear: Mr. Christensen

We are sending this official species list in response to your October 21, 2014 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be January 19, 2015.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found [http://www.fws.gov/sacramento/es/Branch-Contacts/es\\_branch-contacts.htm](http://www.fws.gov/sacramento/es/Branch-Contacts/es_branch-contacts.htm).

Endangered Species Division



**U.S. Fish & Wildlife Service**  
**Sacramento Fish & Wildlife Office**  
**Federal Endangered and Threatened Species that Occur in**  
**or may be Affected by Projects in the Counties and/or**  
**U.S.G.S. 7 1/2 Minute Quads you requested**

Document Number: 141021034157

Current as of: October 21, 2014

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Quad Lists

## Listed Species

## Invertebrates

*Branchinecta lynchi*  
vernal pool fairy shrimp (T)

## Fish

*Hypomesus transpacificus*  
delta smelt (T)

*Oncorhynchus kisutch*  
coho salmon - central CA coast (E) (NMFS)

*Oncorhynchus mykiss*  
Central California Coastal steelhead (T) (NMFS)  
Central Valley steelhead (T) (NMFS)

*Oncorhynchus tshawytscha*  
Central Valley spring-run chinook salmon (T) (NMFS)  
winter-run chinook salmon, Sacramento River (E) (NMFS)

## Amphibians

*Ambystoma californiense*  
California tiger salamander, central population (T)

*Rana draytonii*  
California red-legged frog (T)  
Critical habitat, California red-legged frog (X)

## Reptiles

*Masticophis lateralis euryxanthus*  
Alameda whipsnake [=striped racer] (T)  
Critical habitat, Alameda whipsnake (X)

## Birds

*Charadrius alexandrinus nivosus*  
western snowy plover (T)

*Pelecanus occidentalis californicus*  
California brown pelican (E)

*Rallus longirostris obsoletus*  
California clapper rail (E)

*Sternula antillarum* (= *Sterna*, = *albifrons*) *browni*  
California least tern (E)

## Mammals

*Reithrodontomys raviventris*  
salt marsh harvest mouse (E)

## Plants

*Holocarpha macradenia*  
Santa Cruz tarplant (T)

## Quads Containing Listed, Proposed or Candidate Species:

HAYWARD (447A)

LAS TRAMPAS RIDGE (465D)

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### County Lists

No county species lists requested.

**Key:**

- (E) *Endangered* - Listed as being in danger of extinction.
- (T) *Threatened* - Listed as likely to become endangered within the foreseeable future.
- (P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.
- (NMFS) Species under the Jurisdiction of the [National Oceanic & Atmospheric Administration Fisheries Service](#). Consult with them directly about these species.
- Critical Habitat* - Area essential to the conservation of a species.
- (PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.
- (C) *Candidate* - Candidate to become a proposed species.
- (V) *Vacated by a court order*. Not currently in effect. Being reviewed by the Service.
- (X) *Critical Habitat designated for this species*

### Important Information About Your Species List

#### How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

#### Plants

Any plants on your list are ones that have actually been observed in the area covered by the

list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online [Inventory of Rare and Endangered Plants](#).

### Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. See our [Protocol](#) and [Recovery Permits](#) pages.

For plant surveys, we recommend using the [Guidelines for Conducting and Reporting Botanical Inventories](#). The results of your surveys should be published in any environmental documents prepared for your project.

### Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal [consultation](#) with the Service.

During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

### Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.



Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our [Map Room](#) page.

#### Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

#### Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. [More info](#)

#### Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6520.

#### Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be January 19, 2015.

Print View

<https://map.dfg.ca.gov/rarefind/view/QuickElementListView.html>

CALIFORNIA DEPARTMENT OF  
**FISH and WILDLIFE RareFind**

Query Summary:  
Quad 18 (Hayward (3712261) DR Las Trampas Ridge (3712271))

Print Close

CNDDB Element Query Results

Scientific Name	Common Name	Taxonomic Group	Element Code	Total Docs	Returned Docs	Federal Status	State Status	Global Rank	State Rank	CA Rare Plant Rank	Other Status	Habitats
<i>Accipiter striatus</i>	sharp-shinned hawk	Birds	ABNKC12020	21	1	None	None	G5	S3	null	CDFW_WL-Watch List	Ce montane woodland   Lower montane coniferous forest   Riparian forest   Riparian woodland
<i>Amblykia lunaris</i>	bent-flowered fiddleneck	Dicots	PDBORO1070	64	3	None	None	G27	S27	1B.2	BLM_S-Sensitive	Ce montane woodland   Valley & foothill grassland
<i>Anomobryum julaceum</i>	slender silver-moss	Bryophytes	NBMJSS0010	13	1	None	None	G495	S2	4.2	null	Broadleaved upland forest   Lower montane coniferous forest   North coast coniferous forest
<i>Antrozous pallidus</i>	pallid bat	Mammals	AMACC10010	402	6	None	None	G5	S3	null	BLM_S-Sensitive   CDFW_SSC-Species of Special Concern   IUCN_LC-Least Concern   USFS_S-Sensitive   WBGW_H-High Priority	Chaparral   Coastal scrub   Desert wash   Great Basin grassland   Great Basin scrub   Mojave desert scrub   Riparian woodland   Sonoran desert scrub   Upper montane coniferous forest   Valley & foothill grassland
<i>Aquila chrysaetos</i>	golden eagle	Birds	ABNKC22010	308	1	None	None	G5	S3	null	BLM_S-Sensitive   CDFW_FF-Fully Protected   CDFW_WL-Watch List   IUCN_LC-Least Concern   USFWS_BCC-Birds of Conservation Concern	Broadleaved upland forest   Ce montane woodland   Coastal prairie   Great Basin grassland   Great Basin scrub   Lower montane coniferous forest   Pinon & juniper woodlands   Upper montane coniferous forest   Valley & foothill grassland
<i>Ardea herodias</i>	great blue heron	Birds	ABNGA04010	132	1	None	None	G5	S4	null	CDFW_S-Sensitive   IUCN_LC-Least Concern	Brackish marsh   Estuary   Freshwater marsh   Marsh & swamp   Riparian forest   Wetland
<i>Astragalus tener</i> var. <i>tener</i>	akalmik-vetch	Dicots	PDFABOF8R1	65	2	None	None	G2T2	S2	1B.2	null	Alkali playa   Valley & foothill grassland   Vernal pool   Wetland
<i>Atriplex joaquina</i>	San Joaquin spearcale	Dicots	PDCHE041F3	109	1	None	None	G2	S2	1B.2	BLM_S-Sensitive   SB_RSAB6-Rancho Santa Ana Botanic Garden	Alkali playa   Chenopod scrub   Meadow & seep   Valley & foothill grassland
<i>Balsamorhiza macrolepis</i>	big-salt balsamroot	Dicots	PDAST11061	43	2	None	None	G2	S2	1B.2	BLM_S-Sensitive   USFS_S-Sensitive	Chaparral   Ce montane woodland   Ultramarine   Valley & foothill grassland
<i>Dalochortus pulchellus</i>	Mt. Diablo fairy lantern	Mono cots	PMLILD160	40	1	None	None	G2	S2	1B.2	null	Chaparral   Ce montane woodland   Riparian woodland   Valley & foothill grassland
<i>Centromadia parryi</i> ssp. <i>congdonii</i>	Congdon's tarplant	Dicots	PDAST4RDP1	91	1	None	None	G3T2	S2	1B.1	BLM_S-Sensitive   SB_RSAB6-Rancho Santa Ana Botanic Garden	Valley & foothill grassland
<i>Efferia antiochi</i>	Antioch efferian robberly	Insects	IDIP07010	4	1	None	None	G192	S1S2	null	null	Interior dunes



Print View

<https://map.dfg.ca.gov/rarefind/view/QuickElementListView.html>

<i>Emys marmorata</i>	western pond turtle	Reptiles	ARAAD02030	1139	1	None	None	G3G4	S3	null	BLM_S-Sensitive   CDFW_SSC-Species of Special Concern   IJCN_VU-Vulnerable   USFS_S-Sensitive	Aquatic   Artificial flowing waters   Klamath/North coast flowing waters   Marsh & swamp   Sacramento/San Joaquin flowing waters   South coast flowing waters   South coast standing waters   Wetland
<i>Eumops perotis californicus</i>	western mastiff bat	Mammals	AWACD02011	293	1	None	None	G5T4	S4	null	BLM_S-Sensitive   CDFW_SSC-Species of Special Concern   WBSWG_H-High Priority	Chaparral   Cismontane woodland   Coastal scrub   Valley & foothill grassland
<i>Fritillaria liliacea</i>	fragrant fritillary	Monocots	PMULL0V0C0	77	5	None	None	G2	S2	1B.2	USFS_S-Sensitive	Coastal prairie   Coastal scrub   Ultramafic   Valley & foothill grassland
<i>Helianthella castanea</i>	Diablo helianthella	Dicots	PDAST4M020	96	19	None	None	G2	S2	1B.2	BLM_S-Sensitive	Broadleaved upland forest   Chaparral   Cismontane woodland   Coastal scrub   Valley & foothill grassland
<i>Hoita strobilina</i>	Loma Prieta hoita	Dicots	PDFAB5Z030	30	1	None	None	G2	S2	1B.1	null	Chaparral   Cismontane woodland   Riparian woodland   Ultramafic
<i>Holocarpha macradenia</i>	Santa Cruz tarplant	Dicots	PDAST4X020	37	1	Threatened	Endangered	G1	S1	1B.1	SB_RSABG-Rancho Santa Ana Botanic Garden	Coastal prairie   Coastal scrub   Valley & foothill grassland
<i>Juglans hindsii</i>	Northern California black walnut	Dicots	PDJUG02040	5	1	None	None	G1	S1	1B.1	SB_USDA-US Dept of Agriculture	Riparian forest   Riparian woodland
<i>Lasiurus cinereus</i>	hoary bat	Mammals	AWACC05030	235	1	None	None	G5	S4?	null	IJCN_LC-Least Concern   WBSWG_M-Medium Priority	Broadleaved upland forest   Cismontane woodland   Lower montane coniferous forest   North coast coniferous forest
<i>Masticophis lateralis euryxanthus</i>	Alameda whipsnake	Reptiles	ARADB21031	145	34	Threatened	Threatened	G4T2	S2	null	null	Chaparral   Cismontane woodland   Coastal scrub   Valley & foothill grassland
<i>Microcina lumi</i>	Lum's micro-blind harvestman	Arachnids	ILARA47050	2	2	None	None	G1	S1	null	null	Ultramafic   Valley & foothill grassland
<i>Monolopia gracilens</i>	woodland woollythreads	Dicots	PDAST6G010	51	1	None	None	G2G3	S2S3	1B.2	null	Broadleaved upland forest   Chaparral   Cismontane woodland   North coast coniferous forest   Ultramafic   Valley & foothill grassland
<i>Neotoma fuscipes-annectens</i>	San Francisco dusky-footed woodrat	Mammals	AWAFF08082	11	1	None	None	G5T2T3	S2S3	null	CDFW_SSC-Species of Special Concern	Chaparral   Redwood
<i>Plagiobothrys glaber</i>	hairless popcornflower	Dicots	PDBOR0V0B0	9	1	None	None	G4	S4	1A	null	Marsh & swamp   Salt marsh   Vernal pool   Wetland
<i>Rana draytoni</i>	California red-legged frog	Amphibians	AAABH01022	1334	9	Threatened	None	G2G3	S2S3	null	CDFW_SSC-Species of Special Concern   IJCN_VU-Vulnerable	Aquatic   Artificial flowing waters   Artificial standing waters   Freshwater marsh   Marsh & swamp   Riparian forest   Riparian scrub   Riparian woodland   Sacramento/San Joaquin flowing waters   Sacramento/San Joaquin standing waters   South coast flowing waters   South coast standing waters   Wetland
<i>Setophaga petechia</i>	yellow warbler	Birds	ABPBX03010	50	1	None	None	G5	S3S4	null	CDFW_SSC-Species of Special Concern   USFWS_BCC-Birds of Conservation Concern	Riparian forest   Riparian scrub   Riparian woodland




Print View

<https://map.dfg.ca.gov/rarefind/view/QuickElementListView.html>

Streptanthus albidus ssp. peramoenus	most beautiful jewelflower	Dicots	PDBRA2G012	98	2	None	None	G2T2	S2	1B.2	SB_RSABG-Rancho Santa Ana Botanic Garden   USFS_S-Sensitive	Chaparral   Cismontane woodland   Ultramafic   Valley & foothill grassland
Valley Needlegrass Grassland	Valley Needlegrass Grassland	Herbaceous	CTT42110CA	45	1	None	None	G3	S3.1	null	null	Valley & foothill grassland
Viburnum ellipticum	oval-leaved viburnum	Dicots	PDCPR07080	29	1	None	None	G5	S3	2B.3	null	Chaparral   Cismontane woodland   Lower montane coniferous forest





**Inventory of Rare and Endangered Plants** - 7th edition  
 interface  
v7-14od 10-10-14

Status: search results - Tue, Oct 21, 2014 17:35 ET c

**Tip:** +Lathyrus + "coastal dunes" returns only those Lathyrus in coastal dunes. Note the "+" and quotes. [\[all tips and help\]](#) [\[search history\]](#)

**Your Quad Selection:** Hayward (447A) 3712261

Hits 1 to 10 of 10  
**Requests that specify topo quads will return only Lists 1-3.**

To save selected records for later study, click the ADD button.



Selections will appear in a new window.

open	save	hits	scientific	common	family	CNPS
	<input type="checkbox"/>	1	<a href="#">Amsinckia lunaris</a>	bent-flowered fiddleneck	Boraginaceae	List 1B.2
	<input type="checkbox"/>	1	<a href="#">Astragalus tener</a> var. <a href="#">tener</a>	alkali milk-vetch	Fabaceae	List 1B.2
	<input type="checkbox"/>	1	<a href="#">Balsamorhiza macrolepis</a>	big-scale balsamroot	Asteraceae	List 1B.2
	<input type="checkbox"/>	1	<a href="#">Centromadia parryi</a> ssp. <a href="#">congdonii</a>	Congdon's tarplant	Asteraceae	List 1B.1
	<input type="checkbox"/>	1	<a href="#">Dirca occidentalis</a>	western leatherwood	Thymelaeaceae	List 1B.2
	<input type="checkbox"/>	1	<a href="#">Fritillaria liliacea</a>	fragrant fritillary	Liliaceae	List 1B.2
	<input type="checkbox"/>	1	<a href="#">Helianthella castanea</a>	Diablo helianthella	Asteraceae	List 1B.2
	<input type="checkbox"/>	1	<a href="#">Holocarpha macradenia</a>	Santa Cruz tarplant	Asteraceae	List 1B.1
	<input type="checkbox"/>	1	<a href="#">Plagiobothrys glaber</a>	hairless popcorn-flower	Boraginaceae	List 1A
	<input type="checkbox"/>	1	<a href="#">Streptanthus albidus</a> ssp. <a href="#">peramoenus</a>	most beautiful jewel-flower	Brassicaceae	List 1B.2


To save selected records for later study, click the ADD button.

Selections will appear in a new window.

No more hits.





**Inventory of Rare and Endangered Plants** - 7th edition  
 interface  
v7-14od 10-10-14

Status: search results - Tue, Oct 21, 2014 17:36 ET c

**Tip:** Want to search by habitat? Try the [Checkbox and Preset](#) search page. [all tips and help.] [search history]

**Your Quad Selection:** Las Trampas Ridge (465D) 3712271

Hits 1 to 9 of 9  
**Requests that specify topo quads will return only Lists 1-3.**

To save selected records for later study, click the ADD button.



Selections will appear in a new window.

open	save	hits	scientific	common	family	CNPS
	<input type="checkbox"/>	1	<a href="#">Amsinckia lunaris</a>	bent-flowered fiddleneck	Boraginaceae	List 1B.2
	<input type="checkbox"/>	1	<a href="#">Atriplex joaquinana</a>	San Joaquin sparscale	Chenopodiaceae	List 1B.2
	<input type="checkbox"/>	1	<a href="#">California macrophylla</a>	round-leaved filaree	Geraniaceae	List 1B.1
	<input type="checkbox"/>	1	<a href="#">Calochortus pulchellus</a>	Mt. Diablo fairy-lantern	Liliaceae	List 1B.2
	<input type="checkbox"/>	1	<a href="#">Dirca occidentalis</a>	western leatherwood	Thymelaeaceae	List 1B.2
	<input type="checkbox"/>	1	<a href="#">Helianthella castanea</a>	Diablo helianthella	Asteraceae	List 1B.2
	<input type="checkbox"/>	1	<a href="#">Juglans hindsii</a>	Northern California black walnut	Juglandaceae	List 1B.1
	<input type="checkbox"/>	1	<a href="#">Streptanthus albidus ssp. peramoenus</a>	most beautiful jewel-flower	Brassicaceae	List 1B.2
	<input type="checkbox"/>	1	<a href="#">Viburnum ellipticum</a>	oval-leaved viburnum	Adoxaceae	List 2B.3

To save selected records for later study, click the ADD button.

Selections will appear in a new window.

No more hits.



**MAY 11, 2016**

CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

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Attachment D  
**Mitigation Cost Estimate**

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The estimated mitigation costs in Table D-1, below, are derived from Section 8.15 Biological Environment of the preliminary environmental analysis for the Crow Canyon Road Safety Improvements Project (project), a query of the California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDDB) and United States Fish and Wildlife Service (USFWS) Endangered Species Lists, and the impacts identified in the *Natural Environmental Study for Crow Canyon Road Improvement Project* prepared in 2004 (2004 NES). A reassessment of the 2004 NES based on the current project will be necessary to determine if the impacts to biological resources are still valid. Other potential species impacts could come out of those studies.

The following assumptions were made in developing the mitigation table below.

- Mitigation for impacts to California red legged frog, California Tiger Salamander, and Alameda Whipsnake habitat will be mitigated through the purchase of credits from a USFWS-approved mitigation bank.
  - Cost estimates are based on the mitigation credit rates for these species in Alameda County in May 2015.
- It is assumed the slopes that will be cut and graded to accommodate the roadway modifications are too steep to support burrowing owl habitat. As such, no mitigation is proposed for burrowing owls.
- A wetland delineation will need to be conducted for the project to determine impacts to wetlands and waters.
- There are currently no wetland mitigation banks that cover the project area, but there are two wetland mitigation banks in Livermore scheduled to come online in the next 1-2 years.
- Wetland credits previously acquired in the project area were priced at \$300,000 per acre.
- A fish passage assessment was conducted in 2003 for Crow Creek. It was determined that steelhead and rainbow trout historically migrated up Crow Creek but, given the fish passage barriers downstream of the project, it is unlikely fish passage restoration will be required as mitigation for the project.
- Mitigation proposed for rare plant species are based on the species that have the potential to be impacts and the current cost of listed plant species mitigation bank credits in Alameda County.
- Botanical surveys will need to be conducted during the appropriate blooming periods to determine what species would be impacted by the project and the mitigation costs associated with them.
- The native plant seed mix that will be used to hydroseed disturbed slopes will include Valley Needlegrass seeds to mitigate for impacts to this species.
- Native grassland mitigation assumptions include:
  - \$200 per pound of seed and
  - 30 pounds of seed per acre.
- Mitigation for native and oak woodland trees will be negotiated during the permitting process and accomplished through riparian and woodland planting to compensate for impacts to native trees and upland vegetation.
- Tree mitigation will occur on-site to the greatest extent feasible.



- Riparian Mitigation assumptions include:
  - A one-year plant establishment maintenance period.
  - Roughly 435 trees/shrubs and 600 forbs per acre.
  - Typical species consisting of valley oak, live oak, black walnut, elderberry, coyote brush, redbud, ceonothus, buckwheat, sage, deer grass, and creeping wild rye.
- Oak tree mitigation assumptions include the following:
  - Cluster include 6 trees/shrubs and 20 forbs per cluster.
  - Cluster is approximately 2,500 square feet in size.
  - Typical species include valley oak, live oak, black walnut, elderberry, coyote brush, redbud, coffeeberry, rose, buckwheat, sage, deer grass, and creeping wild rye.

Table D-1. Estimated Mitigation Costs for the Crow Canyon Road Safety Improvements Project

Biological Resource	Counter Measure 3 Estimated Cost	Counter Measure 7 Estimated Cost	Counter Measure 8 Estimated Cost	Counter Measure 9 Estimated Cost	Mitigation Type
California Red legged Frog (CRLF) Alameda Whipsnake (AWS) California Tiger Salamander (CTS)	\$37,000- \$74,000	\$37,000	\$37,000	\$37,000	Multi-Species Mitigation Bank Credits
Western Pond Turtle (WPT)	\$0	\$0	\$0	\$0	Covered in Riparian Mitigation
Sharp Skinned hawk	\$0	\$0	\$0	\$0	Covered in Riparian Mitigation
Special-Status Plants	\$7,500- \$20,000	\$7,500	\$11,000	\$11,000	On-site
<b>Natural Communities</b>					
Riparian Trees (Central Coast Cottonwood-Sycamore Riparian)	\$0- \$115,000	\$57,000	\$57,000	\$100,000	Replanting On and Off site
Native Trees (Coast Live Oak Forest)	\$32,000- \$75,000	\$48,000- \$128,000	\$48,000- \$128,000	\$90,000- \$260,000	Replanting On and Off site
<b>Total</b>	<b>\$76,500 - \$284,000</b>	<b>\$98,200- \$178,200</b>	<b>\$153,000 - \$233,000</b>	<b>\$238,000- \$408,000</b>	



Counter Measures Key	Wetland Mitigation Bank Credits	Riparian Trees	Oak Trees	Native Grassland
3. Roundabouts #1-4 7. Medium Rumble Strip with 6-foot Shoulders 8. Tunnel at mile post 2.15 (Northbound) 9. Tunnel at mile post 2.15 (Both Directions)	There are two banks in Livermore that are scheduled to come online in the next couple years:  <b>Collier Canyon Mitigation Bank</b> - 1-2 years out from having approved credits for sale  <b>Springtown Mitigation Bank</b> - possibly 3 years out from having approved credits for sale	Installation- \$47,245/ acre  Maintenance for One year (Plant Establishment Period)- \$9,000/ acre  <b>Total – \$56,254/ acre</b>  Mitigation Ratios: 1:1 Onsite 3:1 Off-site	Installation-\$3,320 / cluster (Cluster- 6 trees /shrubs and 20 forbs per cluster)  Maintenance for One Year (PEP)- \$13,000/cluster  <b>Total- \$16,320/cluster</b>  Mitigation Ratios: 1:1 Onsite 3:1 Off-site	\$7,500/ acre
<b>Species Mitigation Bank Credits</b>	<b>Fletcher Conservation Lands- CRLF, CTS, AWS</b>			
1576 Catalina Ct Livermore, CA 94550 PH: 925-447-2344 FAX: 925-447-2355 Contact: Joseph DiDonato, Biologist PH: 510-326-8175 Joe@FCLands.com	Fletcher Conservation Lands will have multi-species credits available in late 2015  \$37,525 - \$39,500 up to 10 acres  \$35,550 over 10 acres  Prices Draft, Final Cost TBD at time of purchase		<ul style="list-style-type: none"> <li>• Mitigation Ratio: 1:1</li> <li>• Reservation of Credits Available</li> <li>• Discount for buying in bulk</li> <li>• 20% additional to extend reservation</li> <li>• 20% deposit good for 180 days</li> <li>• Deposit used towards final purchase price</li> <li>• 1 Credit = 1 acre</li> </ul>	



**Table D-2. Ranking of Proposed Roundabouts by Impacts to Biological Resources**

Roundabout Number/Mile Post	Biological Resources Impacted	Acres Impacted	Ranking
Roundabout #1: MP 2.00	CRLF Habitat WPT Habitat SS Hawk Habitat Rare Plant Habitat Riparian Corridor Trees	0.5 ac CRLF Habitat 0.5 ac WPT Habitat 1.4 ac SS Hawk Habitat 0.9 ac Rare Plant habitat 0.5 ac Riparian Corridor 5-10 Oak Woodland trees	2
Roundabout #2: MP 2.50	CRLF Habitat AWS Habitat CTS Habitat SS Hawk Habitat Rare Plant Habitat Riparian Corridor Oak Woodland	1 ac CRLF Habitat 10 ac AWS Habitat 8 ac CTS Habitat 1 ac SS Hawk Habitat 0.2 ac Rare Plant habitat 1 ac Riparian Corridor 20-30 Oak Woodland trees	4
Roundabout #3: MP 3.45	CRLF Habitat CTS Habitat WPT Habitat SS Hawk Habitat Rare Plant Habitat Riparian Corridor Oak Woodland	1.1 ac CRLF Habitat 0.7 ac CTS Habitat 0.11 ac WPT habitat 0.1 ac SS Hawk Habitat 0.7 ac Rare Plant habitat 0.11 ac Riparian Corridor 15-20 Oak Woodland trees	3
Roundabout #4: MP 5.10	SS Hawk Rare Plant Habitat Oak woodlands	1.5 ac SS Hawk Habitat 1.3 ac Rare Plant habitat 10-15 Oak woodland trees	1
Assumptions: The impacts to biological resources were based on the 2004 NES for the Crow Canyon Roadway Improvements Project. The 2004 NES will need to be updated and the impacts identified could change. The rankings were rated by lowest environmental impacts and associated costs (#1) to highest (#4).			

**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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## **APPENDIX F PROJECT FACT SHEET**

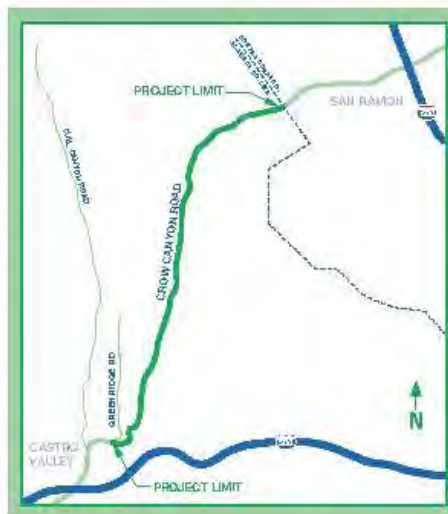
**DRAFT**



# CROW CANYON ROAD

## SAFETY STUDY FACTSHEET

Crow Canyon Road, an arterial roadway connecting Alameda County and Contra Costa County, serves residents and businesses as a vital transportation corridor. The Alameda County Public Works Agency is conducting a safety study on Crow Canyon Road from Greenridge Road in Castro Valley to the County Line. The study will identify and prioritize safety needs based on several factors including traffic conditions, accident history, roadway features, land use, and public concerns. A final report of the findings and recommendations will be published and available after the study is complete. The study will provide the guide for Public Works to establish priorities for roadway safety improvements. The objective of this study is to identify projects that allow different modes of transportation to share the corridor safely, while improving the overall efficiency along Crow Canyon Road.



### SCHEDULE



**Schedule subject to change**

### PUBLIC INPUT

Three public meetings are planned as part of the safety study. An initial public meeting will introduce the study to the community. After collecting public input, conducting research and investigation, and performing preliminary design studies and analysis, a second meeting will be held to present the findings and recommended safety countermeasures. The County will then prepare a Project Study Report of the corridor and assessment of the viable and constructible countermeasures. The public will have an opportunity to review the preliminary report before the third public meeting.

#### FOR MORE INFORMATION

To learn more about the study:

- Visit: [www.ACPWA.org](http://www.ACPWA.org)
- Call: 510-670-5485
- Email: [info@acpwa.org](mailto:info@acpwa.org)

**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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## **APPENDIX G PUBLIC MEETING #1**

**DRAFT**

# CROW CANYON ROAD SAFETY STUDY



## PUBLIC MEETING #1

- 6:00pm Open House
- 6:30pm Presentation
- 7:00pm Input session

February 13, 2013





# CROW CANYON ROAD SAFETY STUDY



## Welcome

---

## Purpose of Meeting

# WHY A SAFETY STUDY?

## History of Accidents





## WHY A SAFETY STUDY?

- 93 reported accidents within last 4 years
  - 2 fatal accidents
- 30% of accidents involved speeding
- 53% of accidents involved multiple vehicles
- 47% involved single vehicle
  - Hit object (Unforgiving roadside)
  - Wildlife – Deer / Wild turkeys / Cattle



**WHY A SAFETY STUDY?**

## Prevention of Future Accidents





## WHY A SAFETY STUDY?

- **Identify/Prioritize potential safety improvements for future construction**
  - Accommodate all modes
    - Bicycle
    - Pedestrian
    - Equestrian
    - Motor vehicle
- **Position PWA to compete for highly competitive funding grants**



## WHY A PUBLIC MEETING?

- **Inform community about beginning the Safety Study**
  - Communicate Study goals
  - Share information gathered thus far
  - Provide schedule for Study
- **Engage community in participating in the Safety Study**
  - Provide a forum to ask questions and provide input as Safety Study proceeds



## PUBLIC MEETING #1 AGENDA

- **Existing Corridor Characteristics**
- **Existing Traffic Conditions**
- **Crow Canyon Road Safety Study Goals**
- **Proposed Safety Improvement Criteria**
- **Safety Study Tasks / Preliminary Schedule**
- **Community Participation Opportunities**
  - **Gather public input / comments**

**CROW CANYON ROAD  
SAFETY STUDY**



**Existing Corridor Characteristics**





## EXISTING CORRIDOR CHARACTERISTICS

- Multi-use corridor
  - Residential
  - Commercial
  - Agricultural
  - Institutional/Religious
  - Recreational
  - Inter-County  
Commuter
- Multi-modal traffic
  - Bicycles
  - Motorcycles
  - Automobiles / Trucks
  - Pedestrians
  - Equestrians



## EXISTING CORRIDOR CHARACTERISTICS

- Varying roadway alignment
  - Tight curves
  - Blind spots
  - Varying speed zones
  - Multiple driveways





Public Works Agency  
Alameda County

## EXISTING CORRIDOR CHARACTERISTICS

- Limited shoulder width
  - Narrow or unpaved
  - Minimal space outside of traveled way for bicycles / pedestrians / equestrians
  - Minimal space beyond traveled way for maintenance crews
  - Minimal refuge areas for vehicle break-downs
- Constrained roadside conditions
  - Steep side slopes and/or ditches
  - Slide/erosion areas
  - Crow Creek running alongside and underneath roadway





Public Works Agency  
Alameda County

## EXISTING CORRIDOR CHARACTERISTICS

- Limited off-road recovery space
  - Above ground utilities
    - Poles, hydrants and drainage structures
  - Rock formations
  - Lined and unlined ditches
  - Guard rail and bridge railings
  - Retaining walls / fences
  - Steep slopes





## EXISTING CORRIDOR CHARACTERISTICS

- Environmental
  - Crow Creek
  - Biological
    - Sensitive species
  - Cultural Resources
    - Archeological
    - Historical
  - Vegetation/Trees
  - Local wildlife

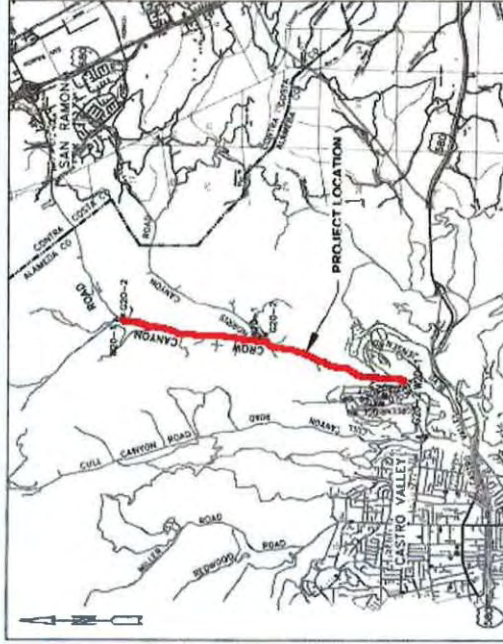




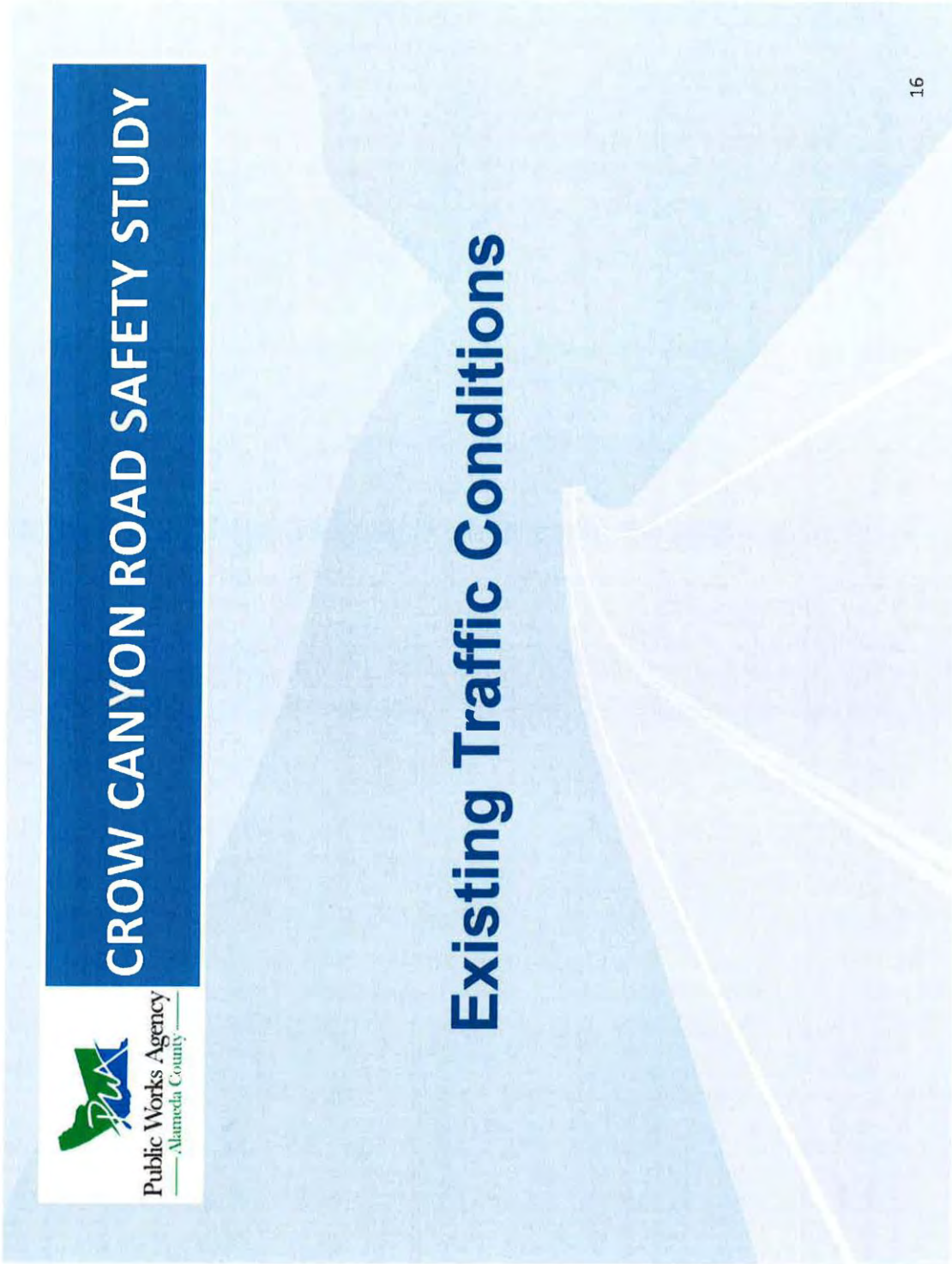
# CROW CANYON ROAD RESURFACING PROJECT

## Resurfacing, striping modifications and drainage improvements

- **Work Limits**
  - Along Crow Canyon Road from north of Coldwater Drive intersection to 1.8 miles north of Norris Canyon Road intersection
- **Construction Underway**
  - Through end of April 2013



LOCATION MAP  
NO SCALE



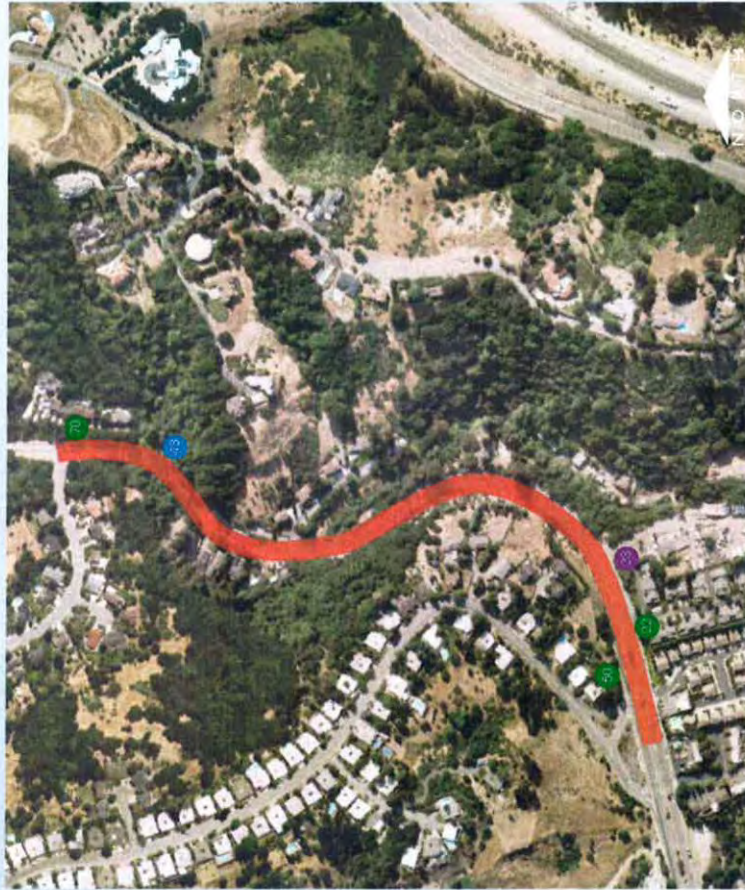


## EXISTING TRAFFIC CONDITIONS

- **Study Corridor divided into 5 segments**
- **Identified existing conditions**
  - **Traffic volumes**
  - **Accident locations**



# Segment 1: Greenridge Rd. to Coldwater Dr.





## EXISTING TRAFFIC CONDITIONS

### Segment 1: Greenridge Rd. to Coldwater Dr.

- 0.56 mile in length with signals at both end points
- Roadway transitions from 4 to 2 lanes
- About 20,000 vehicles per day, 40 mph speed limit



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## TRAFFIC COLLISIONS

(2009 – 2012)

### Segment 1: Greenridge Rd. to Coldwater Dr.

- 5 accidents within 4 year period
- Most accidents were rear-enders at signalized intersections at San Simeon Place, Greenridge Road, and Coldwater Drive.

## Segment 2: Coldwater Dr. to Mile Marker 2.25





## EXISTING TRAFFIC CONDITIONS

### Segment 2: Coldwater Dr. to Mile Marker 2.25

- 2 lane roadway, 0.77 mile in length
- About 18,000 vehicles per day, 30 to 40 mph speed limit



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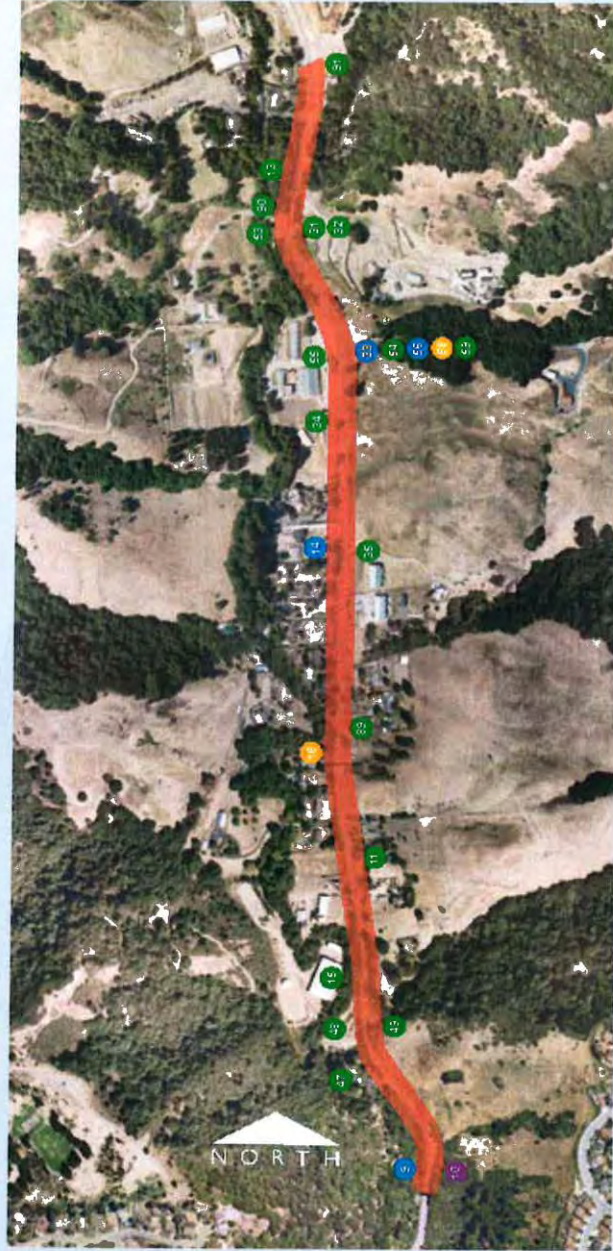
## TRAFFIC COLLISIONS

(2009 – 2012)

### Segment 2: Coldwater Dr. to Mile Marker 2.25

- 26 accidents with the last 4 years
  - Drivers ran off road and hit guard rail, pole or other fixed object; some head-on collisions
- In 55% of accidents, road surface was “wet”
  - Over 80% of accidents within resurfacing limits occurred before resurfacing, only 3 accidents after completion

## Segment 3: Mile Marker 2.25 to Norris Canyon Rd.





## EXISTING TRAFFIC CONDITIONS

### Segment 3: Mile Marker 2.25 to Norris Canyon Rd.

- 1.19 miles in length
- 2 lane roadway with signal at Norris Canyon Rd intersection
- About 18,000 vehicles per day, 30 to 45 mph speed limit





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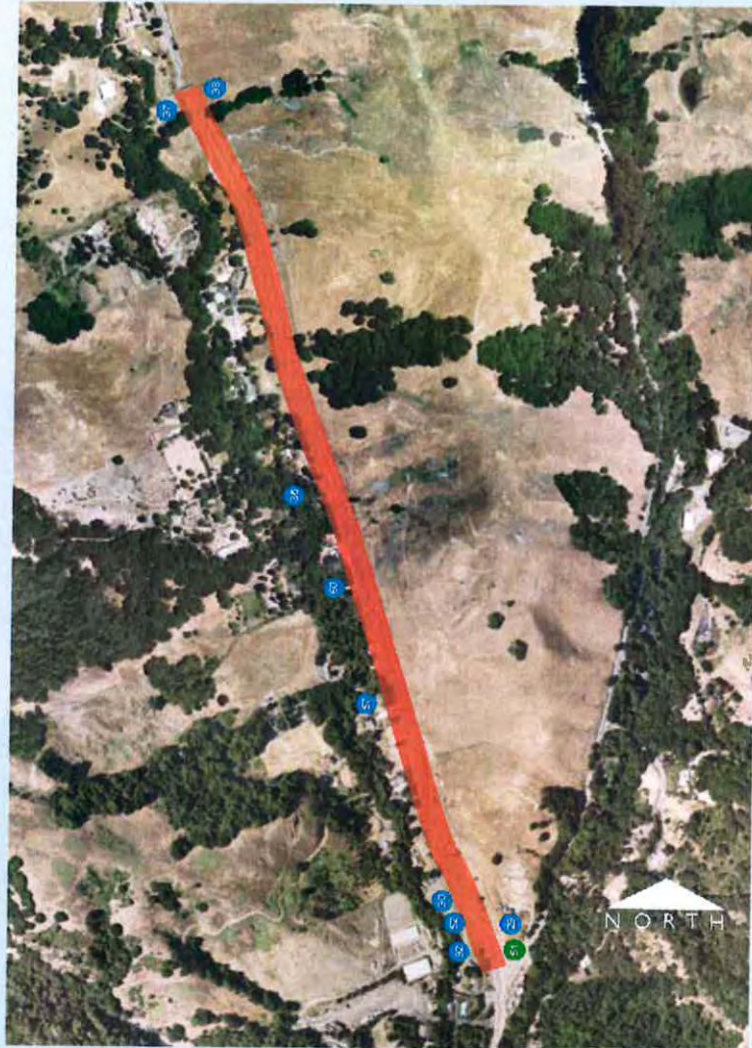
## TRAFFIC COLLISIONS

(2009 – 2012)

### Segment 3: Mile Marker 2.25 to Norris Canyon Rd.

- 24 accidents within 4 year period
- 6 multi-vehicle accidents dealt with vehicle turns at private driveways or making U-turns
- Over 80% of accidents at the intersection of Norris Canyon Road and Crow Canyon Road occurred before signalization in July 2011.
  - Only 1 accident near intersection after signal installation

**Segment 4: Norris Canyon Rd.  
to Mile Marker 4.45**





## EXISTING TRAFFIC CONDITIONS

### Segment 4: Norris Canyon Rd. to Mile Marker 4.45

- 4-lane divided roadway with wide center median
- Transitions from 4 to 2 lanes at northerly end
- 1.01 miles in length
- About 16,000 vehicles per day, 45 to 50 mph speed limit



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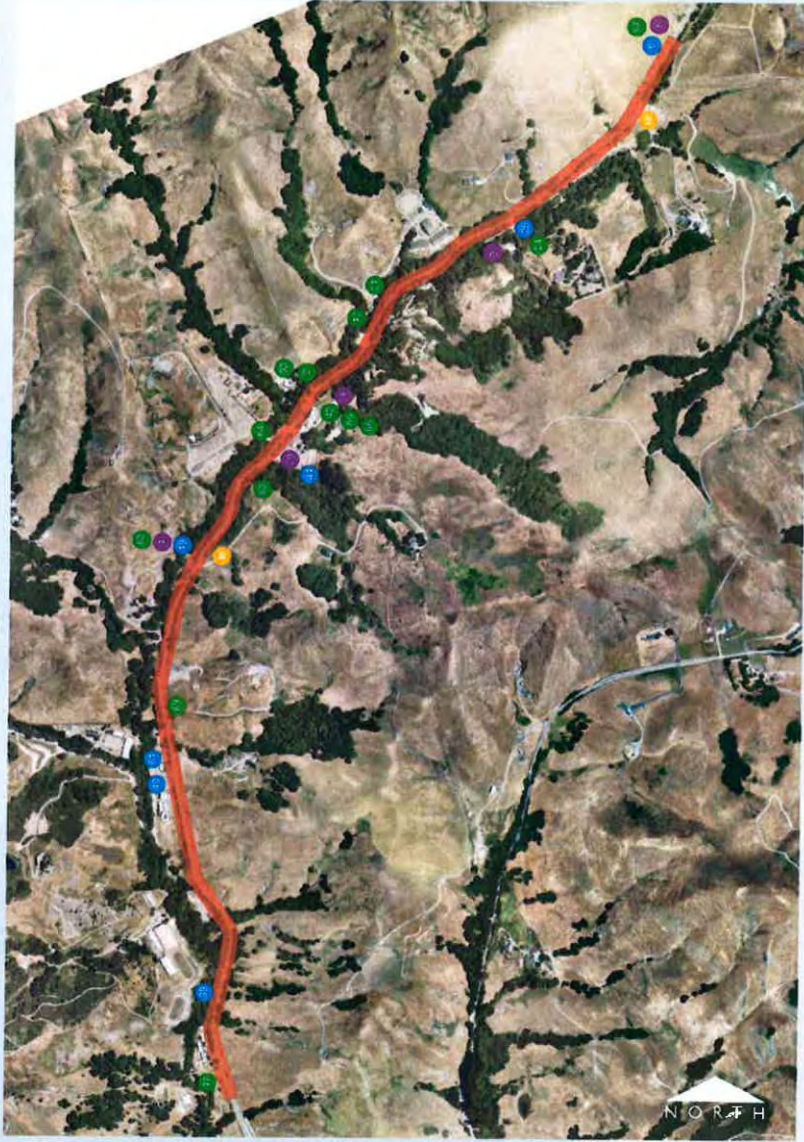
## TRAFFIC COLLISIONS

(2009-2012)

### Segment 4: Norris Canyon Rd. to Mile Marker 4.45

- 10 accidents within 4 year period
- The majority of accidents dealt with high speeds of drivers.

# Segment 5: Mile Marker 4.45 to County Line





## EXISTING TRAFFIC CONDITIONS

### Segment 5: Mile Marker 4.45 to County Line

- 2 lane roadway, approximately 2.4 miles in length
- About 16,000 vehicles per day, 35 to 50 mph speed limit
- Various horizontal and vertical curves



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## TRAFFIC COLLISIONS

(2009 – 2012)

### Segment 5: Mile Marker 4.45 to County Line

- 28 accidents within 4 year period
- 20% were multi-vehicle accidents that dealt with vehicle turns at private driveways or making U-turns
- 15% accidents involved deer

**CROW CANYON ROAD  
SAFETY STUDY**



**Safety Study Elements**





## SAFETY STUDY GOALS

- Identify / Recommend potential safety improvements
- Prioritize preferred improvements with community input
- Document preferred improvements in a Project Study Report



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## PROPOSED SAFETY IMPROVEMENTS CRITERIA

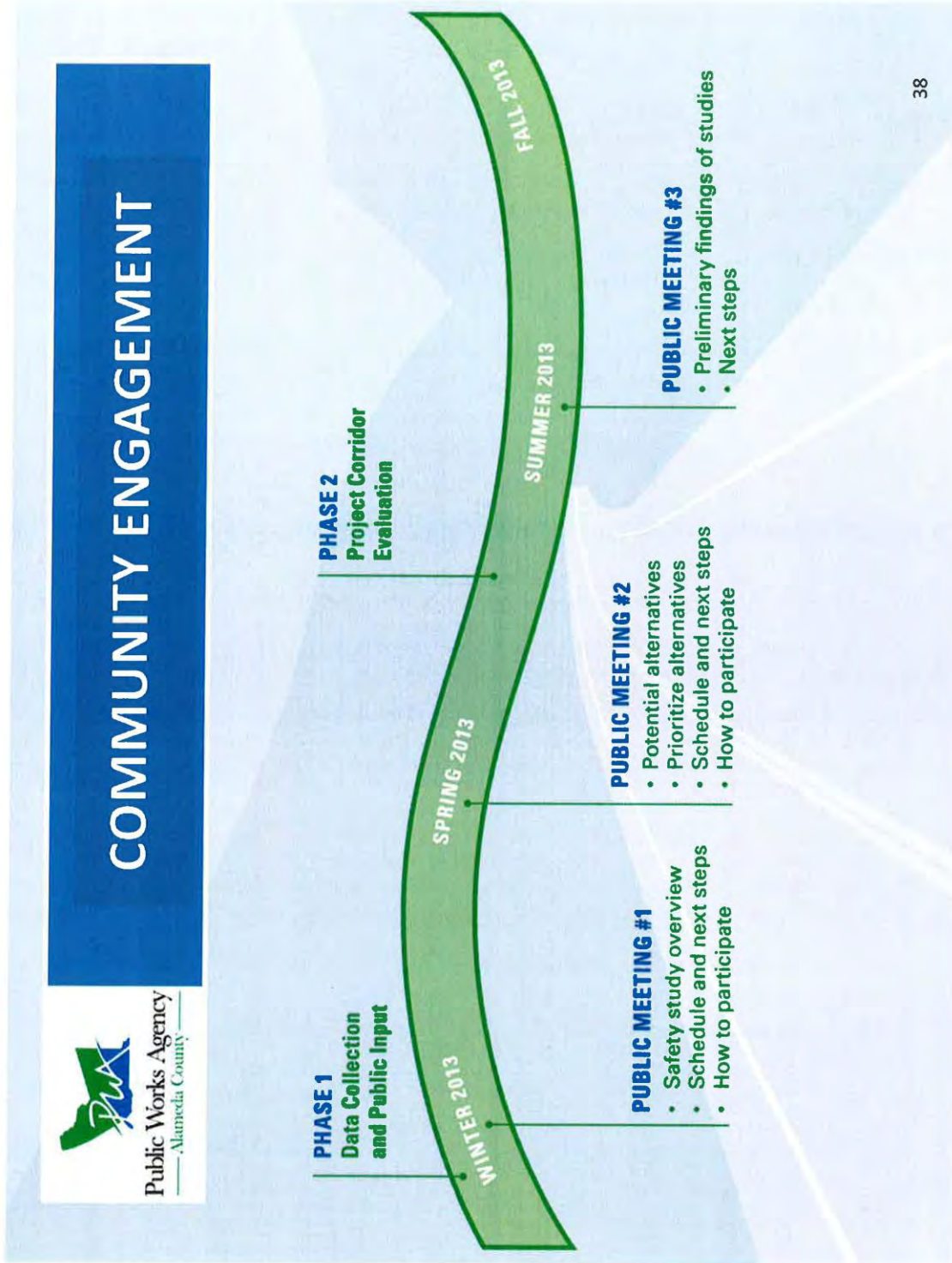
- **Consideration of multi-use corridor**
- **Accommodation of multi-modal traffic**
- **Address historical areas of concern**
  - **Accident locations**
  - **Maintenance issues**
- **Minimize environmental impact**
- **Incorporate “Context Sensitive” solutions**
- **Broad Community Support**

SAFETY STUDY TASKS & PRELIMINARY SCHEDULE	
TASK	TIMEFRAME
Begin Study	Fall 2012
Collect & Review Existing Data	Fall 2012 – Winter 2013
★ <b>Public Meeting #1</b>	<b>Winter 2013</b>
Traffic Studies & Analyses	Fall 2012 – Winter 2013
<i>Receive/Collect public input</i>	<i>Winter 2013</i>
Identify Potential Improvements	Winter 2013 – Spring 2013
Right-of-Way & Utilities	
Environmental & Permit Assessment	
<b>Public Meeting #2</b>	<b>Spring 2013</b>
<i>Receive/Collect public input</i>	<i>Spring 2013</i>
Preliminary Plans & Draft Project Study Report	Winter 2013 – Summer 2013
<b>Public Meeting #3</b>	<b>Summer 2013</b>
<i>Receive/Collect public input</i>	<i>Summer 2013</i>
Final Project Study Report	Summer 2013 – Fall 2013



# CROW CANYON ROAD SAFETY STUDY

## Public Participation

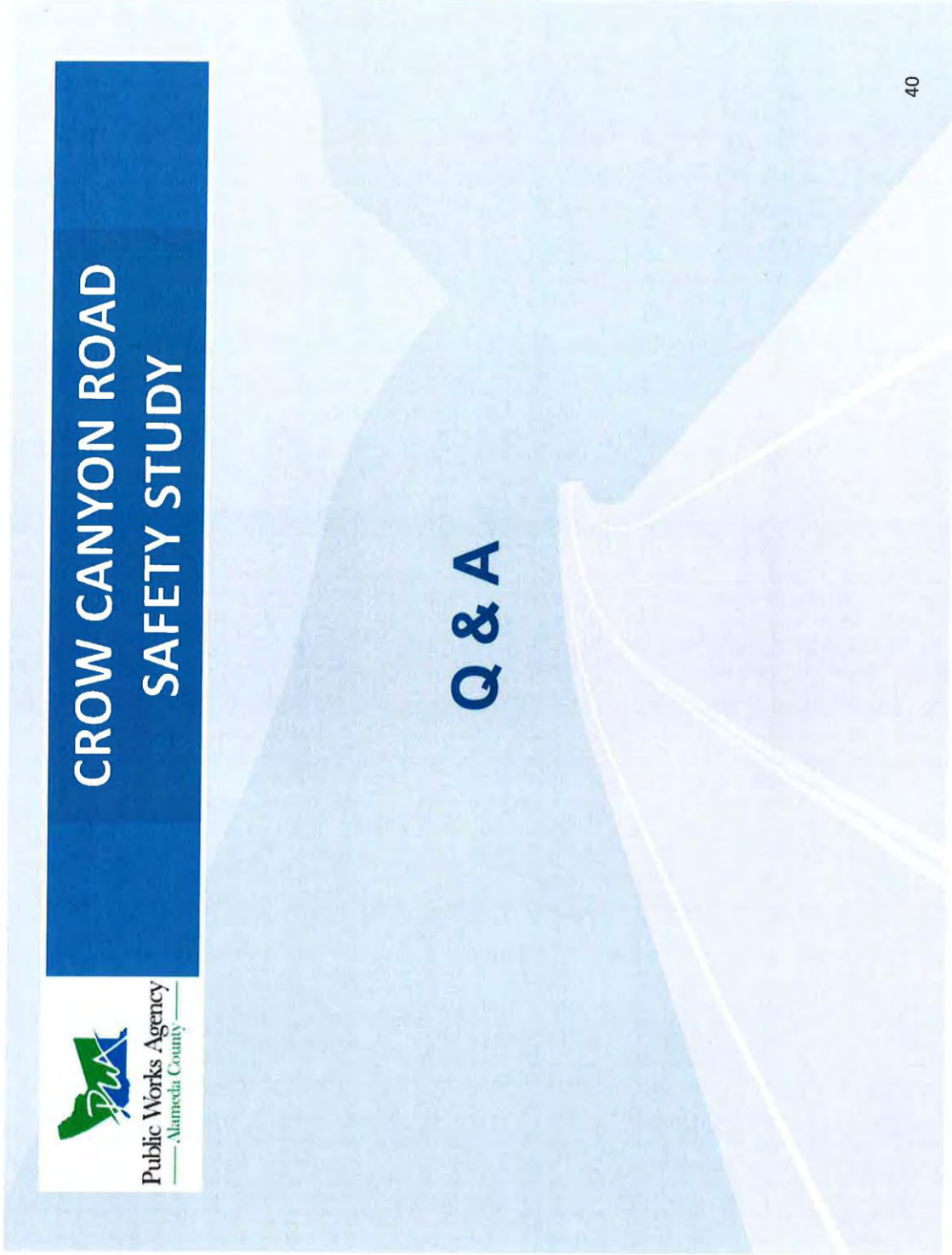




## COMMUNITY PARTICIPATION OPPORTUNITIES

### We want your feedback!

- **At this meeting**
  - Talk now with Alameda County Public Works Staff and the Study Team, and give your input
- **Online**
  - Materials are posted online at : [www.ACPWA.org](http://www.ACPWA.org)
  - Download a comment form or email [info@acpwa.org](mailto:info@acpwa.org) with your thoughts
- **Mail / Phone**
  - Pre-printed comment cards
  - (510) 670-5485
- **At future public meetings**
  - Spring 2013
  - Summer 2013



**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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## **APPENDIX H PUBLIC MEETING #2**

**DRAFT**



# CROW CANYON ROAD SAFETY STUDY



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## PUBLIC MEETING #2

6:00pm Open House  
6:30pm Presentation  
7:15pm Q&A

May 28, 2014



# CROW CANYON ROAD SAFETY STUDY



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## Welcome

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## Introductions



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## BRIEF SUMMARY OF PUBLIC MEETING #1

- **Established that a Safety Study to identify *future* safety improvements was warranted:**
  - 93 accidents reported –2 fatal (2009-2012)
  - 30% of accidents were the result of unsafe speed
  - Over 50% of accidents involved multiple vehicles
  - Need to address safety issues to prevent future accidents
- **Discussed existing corridor characteristics**
  - Multi-use rural arterial
  - Varying alignment / constrained roadside conditions
- **Reviewed existing traffic conditions**
  - Study corridor divided into 5 segments
  - Identified traffic volumes and accident locations



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## BRIEF SUMMARY OF PUBLIC MEETING #1

- **Goals of the Safety Study / Identified improvement criteria**
- **Preliminary schedule for the Study**
- **Opportunities for community participation**
- **Received community input**

# SAFETY STUDY GOALS



- Identify safety needs**
- Identify / Recommend potential safety improvements**
- Prioritize preferred improvements with community input**
- Document potential improvements in a Project Study Report**



## PURPOSE OF THIS SECOND PUBLIC MEETING

- **Summarize community input received to date**
- **Identify potential safety improvement locations**
- **Present potential safety improvements**

**CROW CANYON ROAD  
SAFETY STUDY**



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**Community Input Received to Date**



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## SUMMARY OF COMMUNITY CONCERNS FROM PUBLIC MEETING #1

- **Concern**
  - **Speeding**
    - Most vehicles exceeding speed limits
    - Tailgating
    - Illegal Passing/Crossing double yellow line





## SUMMARY OF COMMUNITY CONCERNS FROM PUBLIC MEETING #1

- **Public Suggestions for Reducing Speeds**
  - Increase CHP enforcement/Alternate locations
  - Traffic signals for metering
  - Maintain existing roadway alignment
  - Rumble strips/speed bumps/textured pavement
  - Reduce 4-lane section to 2 lanes
  - Speed trailers pulling limit signs
  - Electronic speed monitors along road
  - 35 mph speed limit throughout corridor



## SUMMARY OF COMMUNITY CONCERNS FROM PUBLIC MEETING #1

- **Concern**
  - **Safety**
    - MP 2.15 is high accident location
    - Fixed objects along roadside
    - Sight lines around curves (trees, fences, poles)
    - Narrow shoulders
    - Bicyclists
    - Animal casualties



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## SUMMARY OF COMMUNITY CONCERNS FROM PUBLIC MEETING #1

- **Public Suggestions for Improving Safety**

- Lighting/Signing at MP 2.15
- Two signals at MP 2.15
- Widen shoulders
- “Share the Road” signs
- Barrier-separated bike lanes



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## SUMMARY OF COMMUNITY CONCERNS FROM PUBLIC MEETING #1

- **Concern**
  - **Driveway Access**
    - Safety/U-turns
    - Delays



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## SUMMARY OF COMMUNITY CONCERNS FROM PUBLIC MEETING #1

- **Public Suggestions for Improving Property Access**
  - Common access road for several parcels
  - Turn lanes at major driveways
  - Two-way-left-turn lanes



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## SUMMARY OF COMMUNITY CONCERNS FROM PUBLIC MEETING #1

- **Concern**
  - **Maintain Rural Character of Road/Corridor**
    - Truck traffic
    - Traffic noise
    - Loss of property frontage
    - By-pass for 680 to 580



## SUMMARY OF COMMUNITY CONCERNS FROM PUBLIC MEETING #1

- **Public Suggestions for Maintaining Rural Features**

- Limit truck traffic
- Soundwalls
- Have State improve 680,580

**SUMMARY OF COMMUNITY CONCERNS  
FROM PUBLIC MEETING #1**



- **Concern**
  - **Maintenance of Roadway**
    - Potholes
    - Shoulders
    - Erosion
    - Ponding





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## SUMMARY OF COMMUNITY CONCERNS FROM PUBLIC MEETING #1

- **Public Suggestions for Routine Maintenance**
  - Patch potholes
  - Maintain/clean shoulders
  - Address drainage problems



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## SUMMARY OF COMMUNITY CONCERNS FROM PUBLIC MEETING #1

- **Public Suggestions Concerning “Character” of Crow Canyon Road**
  - **Convert to a toll road**
  - **Convert to a “Parkway” with limited access**
  - **Designate as a “Scenic Route”**
  - **Develop “major boulevard” in future around commercial/ residential development**



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## SUMMARY OF COMMUNITY CONCERNS FROM PUBLIC MEETING #1

- **Most Common Community Concerns**
  - **Slow Down Traffic**
  - **Provide Safer Access to Adjacent Properties**
  - **Reduce Amount of Motor-Vehicle Traffic**

**CROW CANYON ROAD  
SAFETY STUDY**



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**Identifying Locations for Potential  
Safety Improvements**



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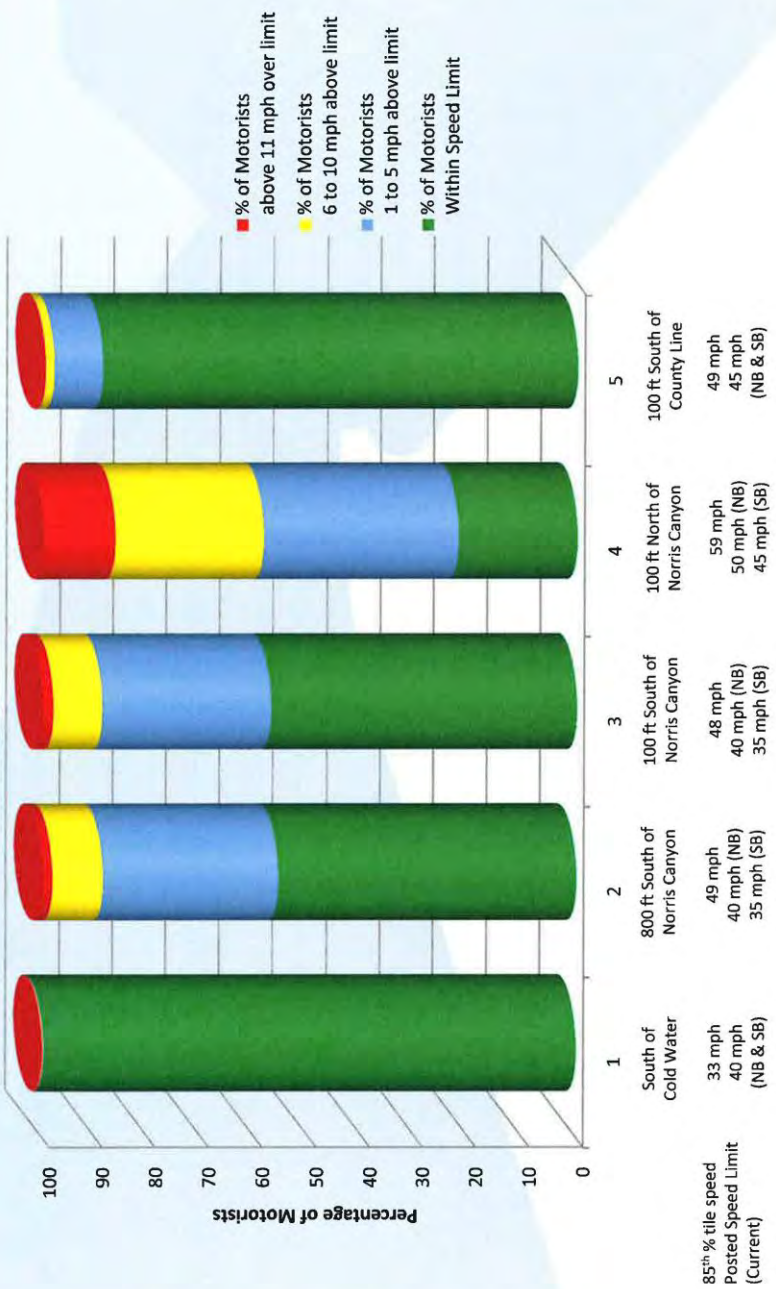
## IDENTIFYING LOCATIONS FOR POTENTIAL SAFETY IMPROVEMENTS

- **Analyzed locations identified from community input/ concerns**
  - Safety
  - Driveway access
  - Speeding
- **Reviewed 10 years of accident statistics**
  - Years 2003 to 2012
  - 342 total accidents
  - Plotted accident frequency by location and type of collision
- **Identified locations of accident “clusters”**
  - Evaluated “Type/Cause” of accidents within clusters
  - Studied roadway characteristics at cluster locations
  - Identified crash patterns/possible contributing factors

# CROW CANYON ROAD VEHICLE SPOT SPEEDS



November 2012 24 hour Speed Summary





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## IDENTIFYING LOCATIONS FOR POTENTIAL SAFETY IMPROVEMENTS

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  - Identified crash patterns/possible contributing factors



**CROW CANYON ROAD  
SAFETY STUDY**



**Selection of Potential Safety  
Improvements**



## SELECTION OF POTENTIAL SAFETY IMPROVEMENTS

- **Criteria for safety improvements or “Countermeasures”**
- **Countermeasure goals**
- **Established guidelines for safety improvements**
- **Potential to receive project funding**



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## SELECTION OF POTENTIAL SAFETY IMPROVEMENTS

- **Criteria for safety improvements or “Countermeasures”**
- **Countermeasure goals**
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- **Potential to receive project funding**



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## PROPOSED SAFETY IMPROVEMENTS CRITERIA

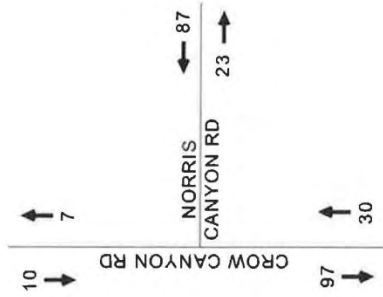
- **Consideration of multi-use corridor**
- **Accommodation of multi-modal traffic**
- **Address historical areas of concern**
  - Accident locations
  - Maintenance issues
- **Minimize environmental impact**
- **Incorporate “Context Sensitive” solutions**
- **Community Support**

# CROW CANYON ROAD SAFETY STUDY

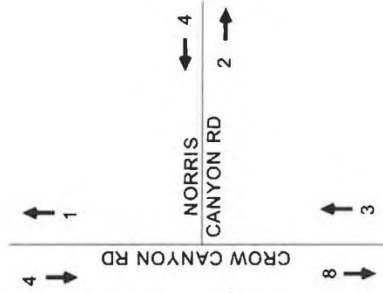


## BICYCLE COUNTS MARCH 2013

SATURDAY



MONDAY





## PROPOSED SAFETY IMPROVEMENTS CRITERIA

- **Consideration of multi-use corridor**
- **Accommodation of multi-modal traffic**
- **Address historical areas of concern**
  - **Accident locations**
  - **Maintenance issues**
- **Minimize environmental impact**
- **Incorporate “Context Sensitive” solutions**
- **Community Support**



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## SELECTION OF POTENTIAL SAFETY IMPROVEMENTS

- **Criteria for safety improvements or “Countermeasures”**
- **Countermeasure goals**
- **Established guidelines for safety improvements**
- **Potential to receive project funding**



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## CROW CANYON ROAD SAFETY STUDY

- **Countermeasure Goals**
  - **Address “unsafe speed”**
  - **Improve safe ingress/egress**
  - **Improve multi-modal safety**
  - **Decrease accident frequency and severity**



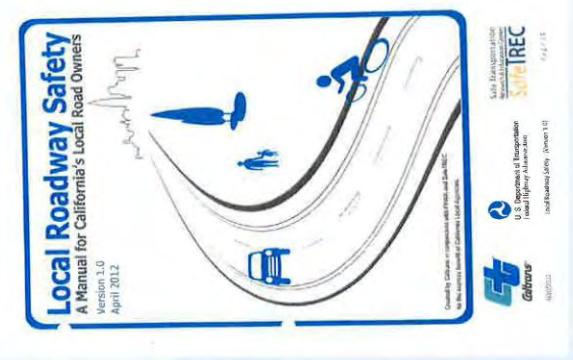


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## SELECTION OF POTENTIAL SAFETY IMPROVEMENTS

- **Criteria for safety improvements or “Countermeasures”**
- **Countermeasure goals**
- **Established guidelines for safety improvements**
- **Potential to receive project funding**

# ROADWAY SAFETY GUIDELINES





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## SELECTION OF POTENTIAL SAFETY IMPROVEMENTS

- **Criteria for safety improvements or “Countermeasures”**
- **Countermeasure goals**
- **Established guidelines for safety improvements**
- **Potential to receive project funding**

# POTENTIAL PROJECT FUNDING SOURCES



## Federal / State Programs:

- Highway Safety Improvement Program (HSIP)
- High Risk Rural Roads (HR3)

Projects selected based upon: Accident rates for fatalities/serious injuries exceeds statewide average

Benefit/Cost (B/C) > 1



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## POTENTIAL PROJECT FUNDING SOURCES

### Local Programs:

#### Alameda County Transportation Commission (ACTC)

Projects selected based upon: “Complete Streets” elements in project design



## CROW CANYON ROAD SAFETY STUDY

### Timeline to implement potential improvements

- **Short-Term:** 2 years to 4 years
- **Medium-Term:** 4 years to 10 years
- **Long-Term:** Beyond 10 years

**CROW CANYON ROAD  
SAFETY STUDY**



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**Proposed Potential  
Countermeasures**



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# CROW CANYON ROAD SAFETY STUDY

## • Proposed Potential Countermeasures

- Speed Feedback Signs
- CHP Enforcement Areas
- Two-Way Left Turn Lane
- Left Turn Lane (Left-in / Left-out) (Spot Locations)
- Shoulder Widening – 8' at Driveways
- Additional Lighting/Signing (where needed)
- Increase Shoulder Maintenance
- Reduce from 4-lane to 2-lane (with turn-outs)
- Reduce from 4-lane to 2-lane NB / I-Lane SB
- Guardrails (where needed)
- Shoulder Widening (4' Shoulder / 2' Painted Buffer) with Median Rumble Strip
- Roundabouts
- Tunnel at MP 2.15 – NB
- Tunnel at MP 2.15 – Both Directions





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## CROW CANYON ROAD SAFETY STUDY

- **Proposed Countermeasures Determined Not Feasible**
  - Convert to a toll road
  - Convert to a “Parkway” with limited access
  - Designate as a “Scenic Route”
  - Develop “Major Boulevard” in future around increased development
  - Limit truck traffic
  - Improve I-680 and I-580 (by State)
  - Common “Access Road” for several parcels
  - Barrier-separated bike lanes
  - Traffic signals to control speeds
  - Speed bumps
  - 35 mph speed limit throughout corridor

**CROW CANYON ROAD  
SAFETY STUDY**



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**Countermeasure Evaluation**



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# PROPOSED COUNTERMEASURE EFFECTIVENESS

POTENTIAL COUNTERMEASURES	REDUCTION IN EXPECTED AVERAGE ACCIDENT FREQUENCY*	
	Range	CT Value
Speed Feedback Signs	0-41%	30%
CHP Enforcement Areas	N/A	N/A
Two-Way Left Turn Lane	8-50%	30%
Left Turn Lane (Left-in / Left-out) (Spot Locations)	9-55%	35-50%
Shoulder Widening – 8’ at Driveways	10-78%	25%
Additional Lighting/Signing (where needed)	18-69% / 20-30%	35% / 25%
Increase Shoulder Maintenance	N/A	N/A
Reduce from 4-lane to 2-lane (with turn-outs)	N/A	N/A
Reduce from 4-lane to 2-lane NB / I-Lane SB	N/A	N/A
Guardrails (where needed)	11-78%	25%
Shoulder Widening (4’ Shoulder / 2’ Painted Buffer) with Median Rumble Strip	15-75%	30%
Roundabouts	N/A	N/A
Tunnel at MP 2.15 – NB (Improve horizontal align)	24-90%	50%
Tunnel at MP 2.15 – Both Directions (Improve horizontal align)	24-90%	50%

\* Local Roadway Safety: A Manual for California’s Local Road Owners Version 1.0, April 2012

# COUNTERMEASURE EVALUATION CRITERIA



## Engineering Criteria Matrix

Improves Safety	Traffic Circulation	Traffic Operations	Construction Impacts	Fiscal Impacts
Address Potential Locations			Constructability	Range of Total Cost
Improves Corridor Safety	Improves Regional Mobility		Utility Impacts	Cost Effectiveness (B/C)
Provides Enhanced Enforcement	Improves Local Traffic Access	Improves Corridor Operations	Maintenance of Traffic	Fundable (Meets HSP/HR1/ACTC Criteria)
Potential for Reducing Speeds				
Increases Off-Road Recovery Space				
Addresses MP2.15				

Identified Community Concerns

# COUNTERMEASURE EVALUATION CRITERIA



## Environmental Criteria Matrix

Minimizes Environmental Impact
Crow Creek
Wetlands
Threatened/Endangered Species
Historical Property/Archaeological Sites
Noise
Stormwater Impacts
Permitting Requirements
Preserves Rural Character

## Community Criteria Matrix

R/W Impacts	Improves Non-Motorized Mobility	Emergency Services
Loss of Frontage Property	Encourages Bicycle Use	Impacts to Response Time
Potential Driveway Impacts		

Identified Community Concerns

**CROW CANYON ROAD  
SAFETY STUDY**



**Potential Safety Improvements**



## CROW CANYON ROAD SAFETY STUDY

- **Within the 6 mile study corridor –**

***“Unsafe Speed” or “Driving too fast for roadway conditions” (weather, unforeseen obstacles, etc.) was the primary collision factor for over 35% of accidents occurring over the last 10 years.***

# CROW CANYON ROAD SAFETY STUDY



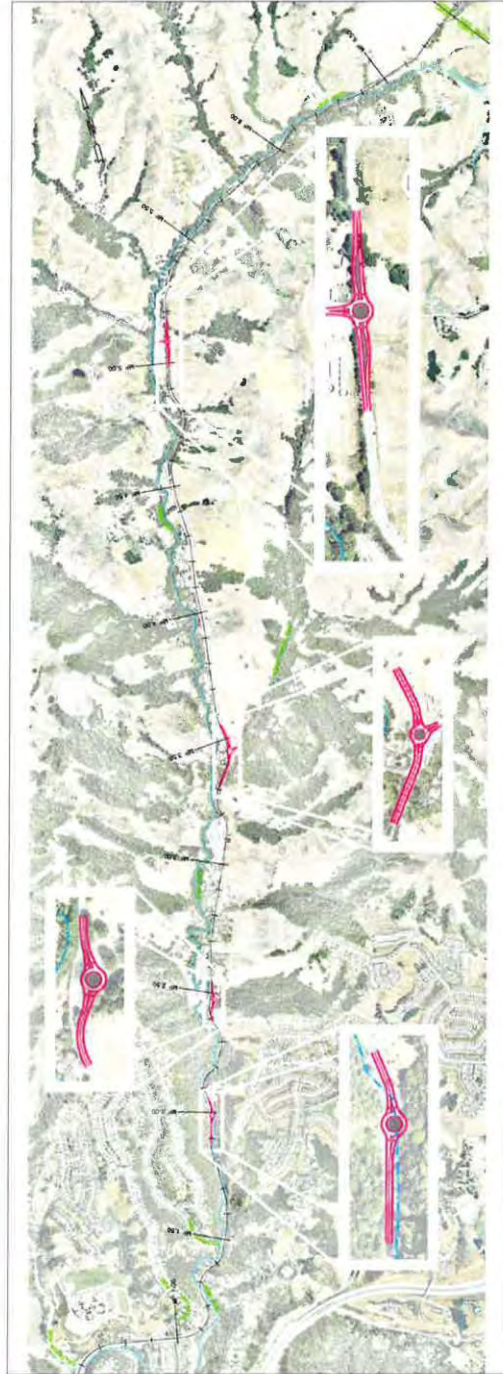
CROW CANYON ROAD SAFETY STUDY  
POTENTIAL CORRIDOR SPEED REDUCTION COUNTERMEASURES  
SHORT TERM - ENHANCED SPEED ENFORCEMENT





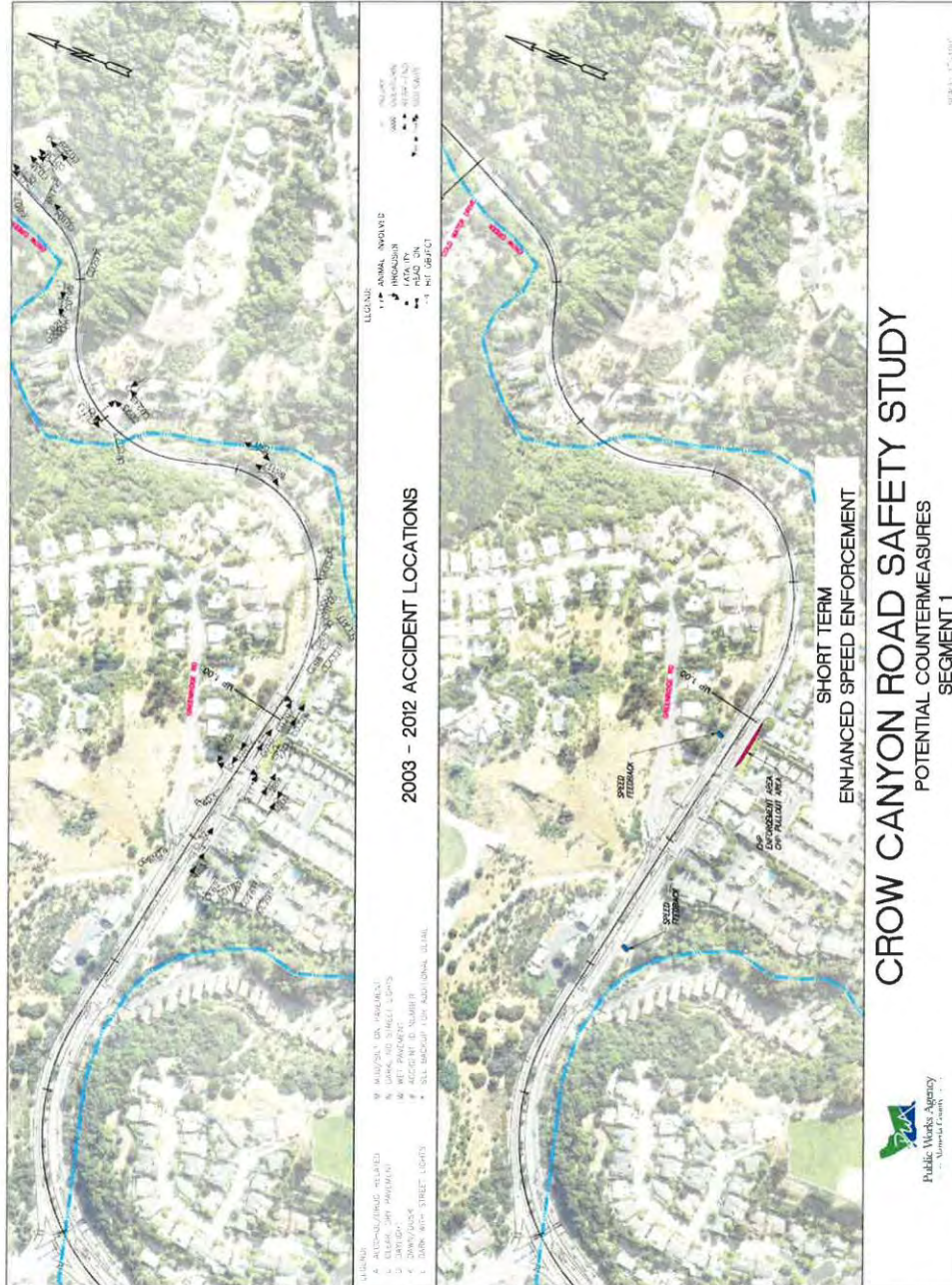


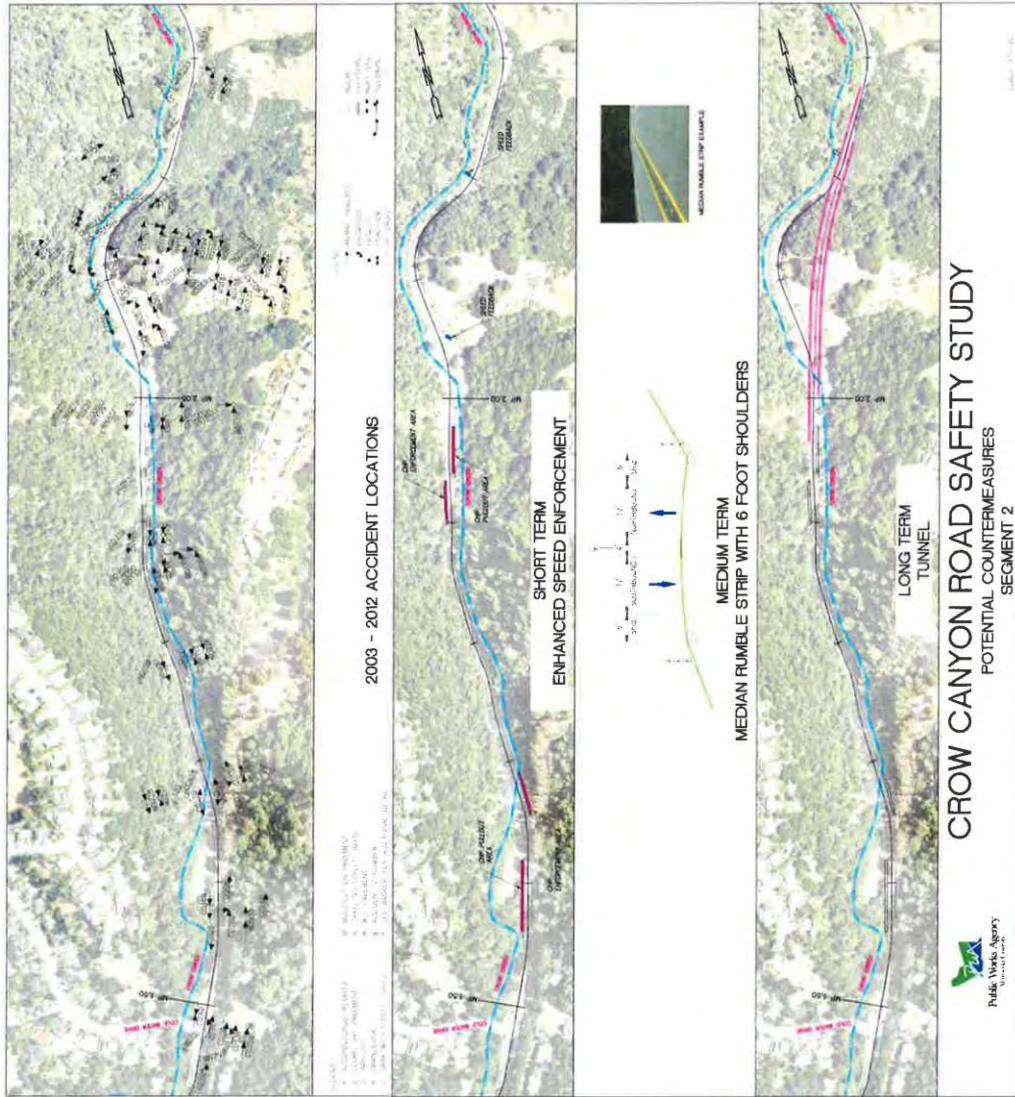
# CROW CANYON ROAD SAFETY STUDY



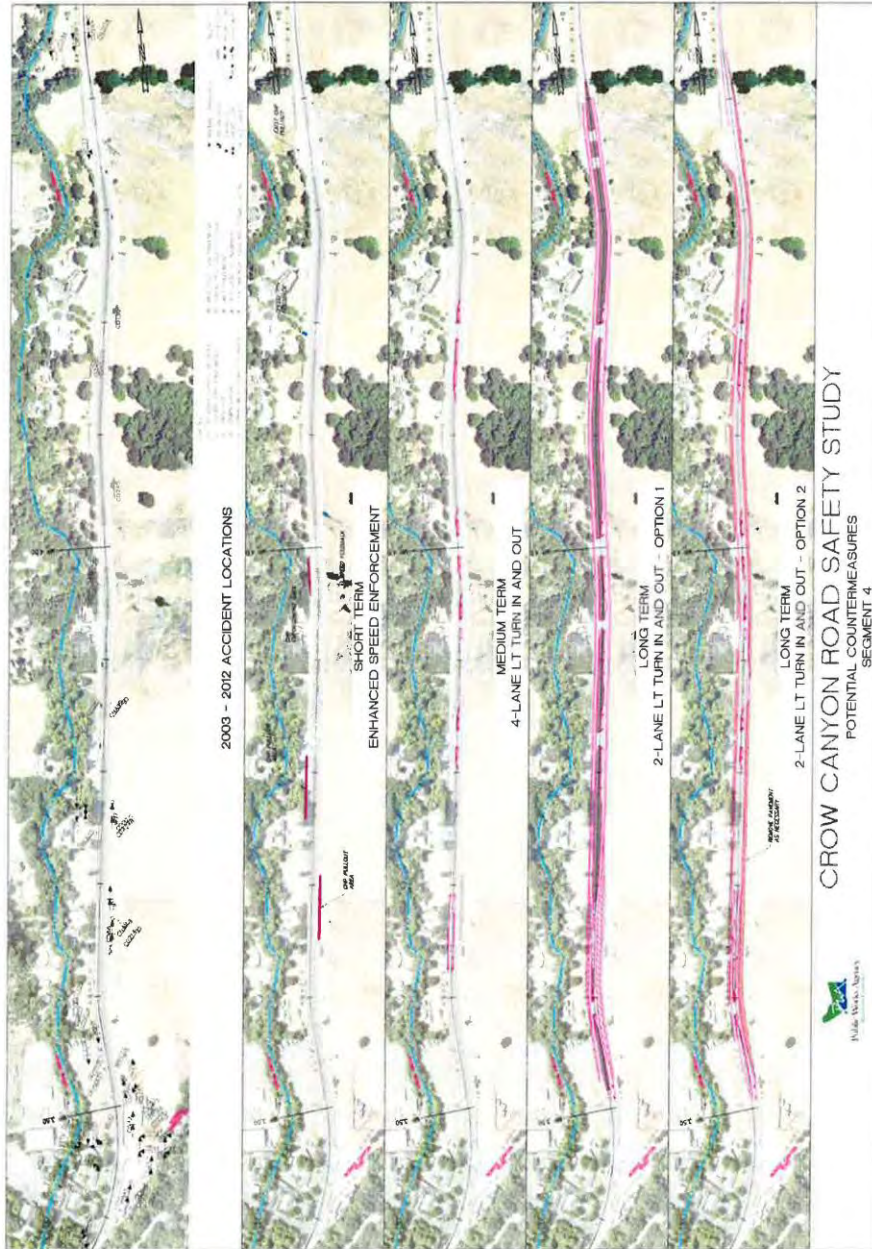
CROW CANYON ROAD SAFETY STUDY  
POTENTIAL CORRIDOR SPEED REDUCTION COUNTERMEASURES  
LONG TERM - ROUNDABOUTS













# CROW CANYON ROAD SAFETY STUDY



- **Next Steps:**
  - **Complete Countermeasure Evaluation**
  - **Recommendations/Prioritization**
  - **Draft Safety Report**
  - **Public Meeting #3**



# SAFETY STUDY TASKS & PRELIMINARY SCHEDULE



<u><b>TASK</b></u>	<u><b>TIMEFRAME</b></u>
Begin Study	Fall 2012
Collect & Review Existing Data	Fall 2012 – Winter 2013
Public Meeting #1	Winter 2013
Traffic Studies & Analyses	Fall 2012 – Winter 2013
<i>Receive/Collect public input</i>	<i>Winter 2013</i>
Identify Potential Improvements	Winter 2013 – Spring 2013
Right-of-Way & Utilities	
Environmental & Permit Assessment	
<b>Public Meeting #2</b>	<b>Spring 2014</b>
<i>Receive/Collect public input</i>	<i>Summer 2014</i>
Preliminary Plans & Draft Project Study Report	Summer 2014 – Fall 2014
<i>Receive/Collect public input on Draft Report</i>	<i>Fall 2014</i>
<b>Public Meeting #3</b>	<b>Fall 2014</b>
Present Final Project Study Report	Winter 2014

**CROW CANYON ROAD  
SAFETY STUDY**



**Continuing Public Involvement**



## COMMUNITY PARTICIPATION OPPORTUNITIES

**We want you to stay involved!**

- **At this meeting**
  - Talk now with Alameda County Public Works Staff and the Study Team, and give your input
- **Online**
  - Materials are posted online at : [www.ACPWA.org](http://www.ACPWA.org)
  - Download a comment form or email [info@acpwa.org](mailto:info@acpwa.org) with your thoughts
- **Mail / Phone**
  - Pre-printed comment cards
  - (510) 670-5485
- **At public meeting #3**
  - Fall 2014

**CROW CANYON ROAD  
SAFETY STUDY**



Public Works Agency  
Alameda County

**Community Q&A Session**

**MAY 11, 2016**

**CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)**

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## **APPENDIX I PUBLIC MEETING #3**

**DRAFT**

MAY 11, 2016

CROW CANYON ROAD SAFETY REPORT  
GREENRIDGE RD. (MP 0.95) TO THE ALAMEDA/CONTRA COSTA CO. LINE (MP 6.85)

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## APPENDIX J PUBLIC COMMENT FORM

DRAFT



## APPENDIX K PUBLIC COMMENTS AND RESPONSES

DRAFT



Item No.	Date	Source	Concern/Comment/Question	Response
1	2/13/13	T	The night of the first public meeting was Ash Wednesday. People cannot make it to the meeting because they have to go to church.	Comment noted
2	2/13/13	T	No need to change the alignment. Just fix the potholes	<p>Comment noted. In 2013, the County resurfaced 3.5 miles on Crow Canyon Road.</p> <p>The County has Maintenance staff who conduct field reviews of County roadways and perform pothole repairs when they discover them. If you should see a pothole that requires repair, please call the Public Works Agency at (510) 670-5480 or email <a href="mailto:info@acpwa.org">info@acpwa.org</a>. A smart phone application ("Mobile Citizen") is also available.</p>
3	2/13/13	T	The road needs more traffic enforcement. Get the CHP out there and they can write a lot of tickets because people are going through there 60 to 70 mph.	To notify the CHP of an issue at a specific location, you can use their online traffic complaint system at <a href="http://www.chp.ca.gov/castrovalley">www.chp.ca.gov/castrovalley</a>
4	2/13/13	T	The traffic signal at the intersection of Crow Canyon Rd. and Norris Canyon Rd. is probably the best thing that happened in recent years. It breaks up the traffic and allows people to have the chance to get out of their driveway.	Comment noted.
5	2/13/13	T	I would like to be involved and notified about the next public meeting.	Address has been added to the mailing list
6	2/13/13	T	The Norris Canyon HOA was notified, but the contact information the County had was old.	The contact information for the Norris Canyon HOA has been updated. In the future, public meeting notices will be sent to the Norris Canyon Road addresses and updated HOA P.O. Box
7	2/13/13	M, P	<p>Problems on Crow Canyon:</p> <ul style="list-style-type: none"> <li>- Speeding</li> <li>- Tailgating</li> <li>- Passing</li> <li>- High truck traffic</li> <li>- Traffic noise</li> <li>- CHP hideouts are known to commuters</li> <li>- Access in/out private property               <ul style="list-style-type: none"> <li>1) 5+ min to get out of driveway</li> <li>2) Have to make unsafe U-turns to access properties</li> </ul> </li> <li>- Power outages due to vehicles crashing into power poles</li> </ul>	<p>These concerns from the community will be considered when developing the recommendations.</p> <p>Safety improvements may include additional law enforcement areas. To notify the CHP of an issue at a specific location, you can use their online traffic complaint system at <a href="http://www.chp.ca.gov/castrovalley">www.chp.ca.gov/castrovalley</a></p>

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Item No.	Date	Source	Concern/Comment/Question	Response
8	2/13/13	M, P	Suggestions for "Construction" Improvements: <ul style="list-style-type: none"><li>- Maintaining existing curves</li><li>- Speed bumps Rumble Strips</li><li>- Metering lights</li><li>- Reduce 4-lane section to 2-lanes</li><li>- Speed trailers pulling speed limit signs</li><li>- Sound walls</li><li>- Additional area for CHP officers to park</li><li>- Electronic speed monitors along road</li><li>- Common access road for private property driveways</li><li>- Turn lanes at major driveways</li><li>- Center two-way left turn lanes at areas with numerous driveways (including 4-lane segment)</li><li>- Add lighting and signing to MM 2.15</li><li>- Add traffic signal at both ends of the MM 2.15 curve</li><li>- Wider shoulders</li><li>- Barricaded bicycle lanes</li></ul>	Comments noted. Suggestions from the community will be considered when developing the recommendations. Safety Study will include evaluation of various countermeasures to improve Crow Canyon Road for roadway users and residents/property owners.
9	2/13/13	M, P	Money should be spent on adding more traffic signals	Traffic signals are installed when they meet federal standards. (Manual of Uniform Traffic Control Devices)
10	2/13/13	M, P	Suggestions for "Policy" Improvements: <ul style="list-style-type: none"><li>- Lowering speed to 35 MPH throughout</li><li>- Make Crow Canyon Road a toll road</li><li>- Tighten regulations barring through truck traffic</li><li>- Parkway concept with limited access</li><li>- Develop Crow Canyon Road into a major boulevard with more commercial and homes as a long-term solution</li></ul>	<p>Speed limits are set to comply with State law to allow for radar enforcement and is based on the 85th percentile speed of people driving at that location. However, an Officer can still ticket a driver based on the Basic Speed Law which requires that drivers operate their vehicle at a safe speed for conditions.</p> <p>The installation of a toll collection system would require a legislative action to authorize the County to implement such a system. Toll charges would apply to all roadway users.</p> <p>Prohibiting truck traffic would require San Ramon / Contra Costa County concurrence.</p> <p>Development of properties on Crow Canyon Road is beyond the scope of this safety study and would require zoning changes.</p>

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Item No.	Date	Source	Concern/Comment/Question	Response
11	2/13/13	M, P	<p>General comments:</p> <ul style="list-style-type: none"> <li>- Making road faster is not making it safer</li> <li>- Speeders are inter-county commuters</li> <li>- Animal casualties</li> <li>- Maintain rural characteristic of area</li> <li>- It has been more difficult for a Norris Canyon Rd. resident to get out of her driveway after the Norris Canyon signal was installed</li> <li>- Concerned about losing frontage of property if roadway is improved</li> <li>- The curve at MM 2.15 is a high accident area</li> <li>- Crow Canyon Rd. is a bypass between 580 and 680. Build formal highway connector to take traffic off this rural/residential road</li> <li>- Instead of short-term solutions, use County money for other projects and have State improve the highways such that commuters won't use Crow Canyon as a bypass</li> </ul>	<p>Comments noted and will be taken into consideration for the study.</p> <p>Intent of safety study is not to increase speeds but to identify possible improvements to increase safety along Crow Canyon Road.</p> <p>The County has made improvements at MM 2.15 that has significantly reduced the rate of accidents.</p> <p>Highway improvements are beyond the scope of this study, which is to determine needed safety improvements to Crow Canyon Road.</p>
12	2/13/13	M, P	Maintain/clean shoulders to keep them free of debris and obstacles	Comment noted.
13	2/13/13	M, P	<p>Officer Morales commented that residents can help CHP with enforcement:</p> <ol style="list-style-type: none"> <li>1) Call 9-1-1 with license, make, model and direction of travel of offending vehicle</li> <li>2) Go to <a href="http://www.chp.ca.gov/castrovalley">www.chp.ca.gov/castrovalley</a> to utilize the online traffic complaint system</li> <li>3) CHP is required to patrol for 1 week following a complaint</li> </ol>	N/A
14	2/13/13	M, P	Question: Has the Norris Canyon intersection been studied since the signal was installed, to examine whether the area is safer now?	Yes. Based on CHP data, there was a decrease in the number of accidents in that area after the installation of the traffic signals.
15	2/13/13	M, P	Question: How many other roads are being considered for a safety study in Alameda County? What is the priority level of Crow Canyon Road?	<p>Patterson Pass Road and Tesla Road are currently undergoing a similar safety study as Crow Canyon Road.</p> <p>The priority of individual improvements on Crow Canyon Road will depend on the grants available and how well the proposed safety measures can compete for the funding (or how well it can satisfy the grant requirements).</p>

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16	2/13/13	M, P	If we all determine that the solutions were to lower the speed limit, add more signs; those don't seem to be very costly. So if a grant came in to cover just that small amount, we could be right up there?	This study is to put the options together to sort through what the benefits are and to prioritize them. There may be earlier projects that can be constructed and some that must be done later due to various reasons.
17	2/13/13	M, P	1) Who decides which improvements are built after the community input? 2) Who is financing this? 3) who will benefit from these decisions?	1) The safety study report will identify the individual improvements. The decision will be based on the type of improvements, the impacts of the improvements and the available funding out there.  2) The funding for this safety study comes from Road Funds.  3) Improvements identified by the safety study will benefit all roadway users, adjacent and nearby property owners and residents.
18	2/13/13	M, P	Question: Will a safety study be done for Norris Canyon Road as well?	Norris Canyon Road will be considered in future safety studies.
19	2/13/13	M, P	Question: Is there/will there be a partnership with Contra Costa County on this study and future improvements?	We are open to collaboration with surrounding jurisdictions.
20	2/13/13	M, P	Question: Are there alternative and electronic methods to monitor car speeds?	Alternatives include radar trailers, radar enforcement, and radar speed feedback signs.
21	2/13/13	M, P	Question: How much of the project area, the land bordering Crow Canyon is public land and how much is private land?	The frontage land (not part of the road and shoulder) is mostly private property.
22	2/13/13	M, P	You mentioned earlier that you are going to apply for a grant from the State?	State grants are potential funding sources.
23	2/13/13	M, P	Is the main incentive of the grant to reduce safety hazards?	Yes
24	2/13/13	M, C	1) Make Crow Canyon Rd a toll road (from Coldwater on). 2) create a turn lane for Klub K-9. The Klub K-9 across from Jalisco Ranch 3) Sound wall along the 4-lane (speedway)	Comments noted. Suggestions from the community will be considered when developing the recommendations. Safety Study will include evaluation of various countermeasures to improve Crow Canyon Road for roadway users and residents/property owners.
25	2/13/13	M, C	The material storage yard right past the curvy section is an eyesore. High fencing (with barbed wire) piles of gravel, rock, rip rap, loose sight screen.	Comments noted.

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Item No.	Date	Source	Concern/Comment/Question	Response
26	2/13/13	M, C	I commute mostly Mon-Friday from North San Ramon to work in Hayward. Overall, road traffic moves fairly well. My concerns come about turning vehicles in/out of driveways on this narrow road w/ left turns being most dangerous. Should there be more restrictions of where you can turn left, or prohibit. Study if there could be a few designated 'safe spots' to U-turn. + Hope to improve 'vision-sight lines' near many curves with obstacles: i.e. trees, fences, utility poles.  Possible: turnout zones for slower moving vehicles.	Comments noted. Comments and suggestions from the community will be considered when developing the recommendations. Safety Study will include evaluation of various countermeasures to improve Crow Canyon Road for roadway users and residents/property owners.
27	2/13/13	L	Suggest: A cut through prior to the Foothill Blvd. exit off of 580 cutting over to the border of Dublin and San Ramon at Alcosta Blvd. and San Ramon Valley Blvd.	Comments noted. A new roadway is beyond the scope of the study. The goal of the study is to improve the safety of the existing roadway for all users.
28	2/13/13	L	Suggest: Crow Canyon Road could be reduced to a wide 2-lane road at the southwest entrance to discourage traffic and improve quality of life for many residents, schools and parks in this area.	Comments noted. Suggestions from the community will be considered when developing the recommendations. Safety Study will include evaluation of various countermeasures to improve Crow Canyon Road for roadway users and residents/property owners.
29	2/13/13	L	One of the greatest dangers is the high speed and attitude of vehicles using Crow Canyon Road.	Comment noted.
30	2/13/13	L	The stoplight at Crow Canyon Road and Norris Canyon Road ... provides much needed gaps in traffic.	Comment noted.
31	2/13/13	L	Suggest: Raise road slightly in elevation at approximately mile marker 2.7 to remind people [to slow down].	Comments noted. Suggestions from the community will be considered when developing the recommendations. Safety Study will include evaluation of various countermeasures to improve Crow Canyon Road for roadway users and residents/property owners.
32	2/13/13	L	Nothing should be done to encourage more traffic. Noise is extreme for many.	Comment noted.

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Item No.	Date	Source	Concern/Comment/Question	Response
33	2/13/13	L	Larger trucks should be prohibited from using Crow Canyon road unless they have a delivery. - Cause greater damage to residences/property - Are extremely noisy - Shake the ground - Cause pavement to collapse - Have vertical clearance issues	Comment noted.
34	2/13/13	L	Suggest: Install stone-like pavement simulating a bridge before the sharp curve after Coldwater Drive.	Comments noted. Suggestions from the community will be considered when developing the recommendations. Safety Study will include evaluation of various countermeasures to improve Crow Canyon Road for roadway users and residents/property owners.
35	2/13/13	L	Plant large native trees all along the southwest section of Crow Canyon Road and along ... where there is no wire interference.	Comments noted. Suggestions from the community will be considered when developing the recommendations. Safety Study will include evaluation of various countermeasures to improve Crow Canyon Road for roadway users and residents/property owners.
36	2/13/13	L	Plant grand trees with future in mind: our native Western Sycamore, Big Leaf Maple, Coast live Oats (preferably multi-trunked), Valley Oats	Comments noted. Suggestions from the community will be considered when developing the recommendations. Safety Study will include evaluation of various countermeasures to improve Crow Canyon Road for roadway users and residents/property owners.
37	2/27/13	W	"As a cyclist I hardly ride in the area, avoid CCR due to auto speed and congestion. But do use it annually to get to Norris Canyon. Wider, continuous bike lane needed as well as control at Cull Cyn crossing."	The safety study will include evaluation of various safety measures.
38	2/27/13	W	"About Crow Canyon Road... I belong to two bicycle clubs and both clubs avoid Crow Canyon Road like the plague! It's a very dangerous road for cyclists. Really wide shoulders/bike lanes would help. Lower motor vehicle speed limits would help. Thanks."	The safety study will include evaluation of various safety measures.
39	2/27/13	W	"As a cyclist I ride on CCR from Norris Canyon Road to Cull Canyon Road. CCR could use a clearly marked bike lane and improved road surface at the edge. Also, signs telling cars to share the road with bikes."	The safety study will include evaluation of various safety measures.

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Item No.	Date	Source	Concern/Comment/Question	Response
40	2/27/13	W	"Riding on the edge of Crow Canyon is very nerve wracking due to high traffic and narrow spaces. I would like to be able to take it from Castro Valley to ride to Mt Diablo, but rarely travel on it unless I am with a group of friends due to danger. At least make it safer to get to Norris Canyon, which is a nice bike ride. Thanks!"	The safety study will include evaluation of various safety measures.
41	2/28/13	W	"Widen Crow Canyon Rd. so there is a wide shoulder on both sides that is consistent that doesn't narrow at any point. Get rid of the "buttons" that are slippery and right where you have to ride. Completely repave the road as so many sections have bad pavement. Condense the six lane section in San Ramon to four lanes and stripe bike lanes on both sides where none presently exist. You don't and never did need six lanes. More lanes just means more cars."	The County repaved 3.5 miles of Crow Canyon Road in 2013.  The six lane section is in the City of San Ramon and is outside of Alameda County's jurisdiction.
42	3/5/13	W	"Crow Canyon Road is a vital artery for bicyclists to travel to San Ramon and up to Mt. Diablo. But this road is so dangerous that I have begun not riding at all rather than risk getting hit. Factors are speeders; inattentive drivers (often speeding on top of it); bike lane/shoulder that suddenly disappears at the worst moments; shrubbery/debris taking up the shoulder. I understand widening the road for bike safety may be economically infeasible, so simple maintenance of the shoulder would keep bicyclists out of the roadway. So would getting drivers to slow down and pay attention. Thank You!"	Comments and suggestions noted.
43	3/5/13	W	"I ride my bicycle from Hayward to the Pleasanton/Dublin/San Ramon are frequently but I do not ride on Crow Canyon Road because it is unsafe for bicycles. I would like to see the safety of bicycles considered as a part of any capital improvements on the roadway and would like to be placed on your list for future meetings. This road needs to be maintained in a condition that is safe for all modes of travel."	Comment noted.

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Item No.	Date	Source	Concern/Comment/Question	Response
44	3/5/13	L (w/Pics)	Remove cyclone fencing before sharp curve, as well as the non-native Canary Island Pine. There used to be a stone bridge prior to this curve. I really believe that simulating a bridge and a narrow passage around where the cyclone fencing begins would help to slow traffic and make the road safer. Rebuild a similar bridge, but in a way that minimizes noise.	Comment noted.
45	3/5/13	L (w/Pics)	Traffic should be lowered to 35 mph in the straightest sections of Crow Canyon Road.	Speed limits are set to comply with State law to allow for radar enforcement and is based on the 85th percentile speed of people driving at that location.
46	3/5/13	L (w/Pics)	There needs to be consistent speed limit along Crow Canyon Road; maybe 50 or 45 mph and 35 mph.	Speed limits are set to comply with State law to allow for radar enforcement and is based on the 85th percentile speed of people driving at that location.
47	3/5/13	L (w/Pics)	Remove signs that state speed is monitored by aircraft.	Comment noted.
48	3/5/13	L (w/Pics)	Noise and pollution are extreme for Crow Canyon Road residences, so planting of large native trees are all the more important. Trees have been severely damaged by PG&E trimming for wires.	Comment noted.
49	3/5/13	L (w/Pics)	Entrance to Crow Canyon Road at E. Castro Valley Blvd. lost its rustic character. Southwest section of Crow Canyon Road is extremely dreary and needs to be restored with trees native to our canyon.	Comment noted.

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Item No.	Date	Source	Concern/Comment/Question	Response
50	3/5/13	W	<p>"I ride my bicycle occasionally on Crow Canyon Road as part of a longer loop ride in Alameda and Contra Costa counties. I am certainly not the only cyclist who does: Crow Canyon Road forms a critical link between these counties for many cyclists. While parts of Crow Canyon have a shoulder wide enough to ride in, there are stretches where the shoulder disappears. Because cyclist safety depends in large part on cyclists behaving predictably on the road, the inconstancy of the shoulder creates a situation where cyclists may sometimes choose to be on the shoulder and sometimes have to be in the flow of traffic. I believe Crow Canyon could be made much safer by creating a consistent shoulder for the entire stretch. It would be even better if the shoulder could be constructed to meet the standards for a bike lane, but I believe even a consistently-available shoulder would be a substantial safety benefit. Thank you for your consideration."</p>	<p>The safety study will include evaluation of shoulder widths.</p>
51	3/7/13	W	<p>"• I think Crow Canyon Road (CCR) is very nice and scenic. We don't drive on it much because it is known to be dangerous since it is winding road and there is no center divider. • I would also like to ride my bike on CCR but I don't because there is little room on some stretches of the road for a bicyclist to ride safely, plus there are a couple of blind corners. • My dream would be for a bike lane to be built (only needed on one side) for bicyclists to safely ride in both directions. Like the bike lane built on the road that crosses in front of Pleasanton's Shadow Cliffs, there is a divider between the bike lane and the lanes for the vehicles. Thanks for seeking input...!"</p>	<p>The safety study will include evaluation of shoulder widths, currently there isn't enough continuous paved area for the improvements suggested.</p>

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Item No.	Date	Source	Concern/Comment/Question	Response
52	3/12/13	W	"I drive on Crow Canyon Rd 3 or 4 times per week to do volunteer work at 10200 CC Road My concern is that the unique environment does not take second place to traffic flow, as is too often the case. I would propose that Crow Canyon Road somehow become a Scenic Route, like others in CA. That could be an element in slowing traffic, and give a context for this unique and irreplaceable green route that could be safely enjoyed by all from commuters to bicyclists to Sunday outings. Thank you."	Comment noted.  Scenic Route designation requires an application process and the preparation and adoption of a Corridor Protection Program. A Corridor Protection Program includes: regulation of land use and density of development, detailed land and site planning, control of outdoor advertising (may include billboards and on-site signs), careful attention to and control of earthmoving and landscaping, and the design and appearance of structures and equipment. These aspects of a Corridor Protection Program are outside the scope of work.
53	3/12/13	W	Who has the final power to decide what will be done to increase Crow Canyon Road safety?	The safety study will identify and prioritize the needed improvements and their locations. The projects to be constructed will be based off the prioritization list and funding availability. Each funding program has its own requirements about what types of project it will fund.
54	3/12/13	W	Besides increasing Crow Canyon Safety for roadway users, who stands to financially benefit from these safety improvements?	Improvements identified by the safety study will benefit all roadway users, adjacent and nearby owners.
55	3/12/13	W	What has been the cost of the Safety Study from Fall 2012 to date?	As of 2/28/2013: Approximately \$87,000.
56	3/12/13	W	Given the open and transparent process you hope to engage in with the community, especially with those who live on Crow Canyon Road, what are the current Alameda County development plan(s) on the drawing board for Crow Canyon Rd?	This study will provide the guide for Public Works to establish priorities for roadway safety improvements. A summary of the comments received will be uploaded to the project website for public review. PWA has no development plans for Crow Canyon Road. Property owners on Crow Canyon may have development plans. Private property development could have impact on roadway usage.

Item No.	Date	Source	Concern/Comment/Question	Response
57	3/12/13	W	Has the TiG group already been awarded a contract for whatever "construction improvements" that are determined are needed?	TiG is contracted as our consultant for evaluating the existing condition of Crow Canyon Road, and identifying and prioritizing potential improvements on the roadway. TiG will prepare a Project Study Report documenting the process and identifying improvements which will include information such as preliminary cost estimates, right-of-way and environmental impacts. There are no construction improvement contracts for Crow Canyon Road.
58	3/12/13	W	Has an environmental protection agency's analysis and input been included in the "safety study"? Is so, I would be interested in seeing their input. If not, why not?	An environmental analysis has not been conducted at this time as no improvements have been identified. After specific improvements are identified, an environmental analysis will be conducted.
59	3/20/13	E (To JC)	I'd like to be on the e-mail list for notification of public meetings about this project. It's my understanding there are three more initial public meetings about the project. Are dates for those meetings fixed? And then what happens?	The dates for the future meetings have not been set.
60	3/20/13	E (To JC)	Since the environmental analysis for Crow Canyon Road "improvements" was done some years ago, is it still usable?	We are incorporating some of the previous work into our current study (i.e., topographic survey, preliminary assessments, etc.). The assessments are being updated with current information. Environmental documents will be prepared when projects are defined from the current study.
61	3/20/13	E (To JC)	Where are the fund for this current work coming from?	This study is paid for by Road Funds.
62	5/8/13	W	"Please decrease the noise near the Norris Canyon Road stop lights, and slow down the traffic – I can no longer safely enter or exit my property [on Crow Canyon Road]"	Comment noted.
63	9/4/13	W	Norris Canyon Road residents should be notified about future public meetings for Crow Canyon Road because whatever is done/not done affects them greatly.	Norris Canyon Rd addresses have been added to the contact list.

Item No.	Date	Source	Concern/Comment/Question	Response
64	9/4/13	W	Crow Canyon and Norris Canyon Roads receive mostly drive-through traffic. People are already speeding through these roads, widening the roads would just encourage and reinforce that behavior.	Comments noted. Suggestions from the community will be considered when developing the recommendations. Safety Study will include evaluation of various countermeasures to improve Crow Canyon Road for roadway users and residents/property owners.
65	9/4/13	W	I am glad that you are asking what the community wants.	Thank you.
66	9/4/13	W	The process of putting in the traffic light at Norris/Crow was hugely frustrating for us. Many of us didn't want that light.	Comment noted.
67	9/4/13	W	The light is triggered by traffic, but it seems that the priority is given to people coming from Norris to Crow (commuters) even if people turning left off Crow to Norris gets there first (residents on Norris). That reinforces the commuter behavior.	The goal of installing the signals is not to encourage nor increase commuters. The purpose is to efficiently and safely get motorists through the intersection.
68	9/4/13	W	During the resurfacing project on Crow in 2013, workers also used the corner of Norris/Crow to store their equipment. This attracted thieves on two occasions. Blocked driveway repeatedly. Construction workers are there late at night and on the weekends.	Comment noted.
69	9/4/13	W	Community input for the traffic light and resurfacing projects would have been helpful. We were not informed about either project. Placing the changeable message signs at the entrance only helps the commuters, not those living in the canyons.	Comment noted. The Norris Canyon Rd. addresses have been added to the contact list.
70	2/13/14	T	The main issue on Crow Canyon is excessive speed, commuters drive fast with disregard to the people living on this street. I have been hit three times trying to maneuver into my driveway.	An existing conditions report was prepared by the Traffic Engineering Consultants, which includes the traffic volume, accident history, and speed data.
71	2/13/14	T	I noticed this week that there are new speed limit signs installed near Norris Canyon	Yes, there are new speed limit signs north of Norris Canyon Rd., in both directions of Crow Canyon Rd.

(M) = Meeting; (E) = Email; (T) = Telephone; (W) = Project Website; (P) = In Person; (C) = Comment Form; (L) = Letter

Comments Noted or Suggestions Noted = The County has made note of the comment/suggestion from the community and will take them into consideration for the development of the Safety Study Report. Some comments have been summarized, but the best attempt was made to preserve the intent and meaning of those statements.