CAMINO DIABLO TRUCK RESTRICTION STUDY

SUBJECT: Weight restriction for Camino Diablo between Marsh Creek Road and Byron Highway, based on roadway geometries and collision history.

BACKGROUND

Prior to the construction of the State Route 4 Bypass (SR4 Bypass), trucks travelled to and from Byron Highway in East Contra Costa County via SR4 (Main Street in Oakley and Brentwood Boulevard in Brentwood), passing through the cities of Oakley and Brentwood. The SR4 Bypass was constructed, in part, to provide an alternative route designed to remove large trucks from city roadways. In May of 2011, the Contra Costa County Public Works Department and State of California Department of Transportation (Caltrans) entered into a cooperative agreement for the right-of-way transfer of the SR4 Bypass from the County road system to Caltrans, along with the transfer of a portion of Marsh Creek Road from the County road system to Caltrans. In January 2012, the initial truck weight restriction imposed on the SR4 Bypass was lifted and afforded truckers a seamless truck route from SR4 to Marsh Creek Road to Byron Highway.

However, many trucks traveling in the southbound direction on SR4 en route to Byron Highway are continuing southbound onto Vasco Road, then turning left onto Camino Diablo as a shortcut to Byron Highway. Also, trucks traveling eastbound on Marsh Creek Road are proceeding eastbound onto Camino Diablo that leads to Byron Highway. Camino Diablo is currently being used as a bypass to the SR4 connection to Byron Highway. Aerials showing the shortcut routes are included in the Appendix.

A recent spike in truck traffic on Camino Diablo has resulted in numerous complaints from local residents. A common complaint is that trucks are encroaching upon opposing traffic and straying off the pavement, which has prompted the County Traffic Engineer to investigate the geometric roadway conditions. This study analyzes if trucks are able to safely maneuver turns at intersections, and to check mid-block roadway dimensions for conformance with accepted roadway design criteria. Collision history is included to provide a "before and after" comparison of collisions rates involving trucks using Camino Diablo as a bypass to Byron Highway.

CAMINO DIABLO - Road No. 7941

Camino Diablo in the Byron/Brentwood area extends easterly from the intersection of Marsh Creek Road on the west, to the intersection of Byron Highway (Junction 4) on the east, a distance of 5.27 miles. This road is a rural arterial with an average daily traffic volume that varies between 1,483 and 9,189 vehicles per day, depending on the segment of roadway. The aforementioned average daily traffic volumes on Camino Diablo were taken between Marsh Creek Road and Vasco Road (Segment 1), and Vasco Road and Byron Highway (Segment 2), respectively.

Camino Diablo is a two-lane road that generally varies between 20 and 26 ft in width. The road extends through rural hillside pastureland from Marsh Creek Road to the Los Vaqueros Dam entrance at Walnut Boulevard. Camino Diablo continues over small hills with vertical and horizontal grades through rural ranches and a sand quarry near the intersection of Vasco Road. Camino Diablo is relatively flat and straight from Vasco Road to Byron Highway.

Camino Diablo has generally unimproved shoulders with roadside swales and ditches. There are numerous segments of no passing zones. Right edge lines are used to delineate the road in foggy or dark conditions. Large farm vehicles, trucks, RVs, camping trailers, and recreational users with boats frequently use the road.

Posted speed limits on Camino Diablo are as follows:

A. 50 mph beginning at the intersection of Marsh Creek Road and extending easterly to a point 0.25 miles west of Holway Drive; and

B. 35 mph beginning at a point 0.25 miles west of Holway Drive and extending easterly to the intersection of Byron Highway

TRUCK TURNING AT INTERSECTIONS

The intersections studied are Camino Diablo at Marsh Creek Road, Walnut Boulevard, and Holway Drive. The investigation began by obtaining aerial photos of the subject intersections. A Caltrans-approved truck turning template for California Legal Trucks, which delineates the tracking wheel path of a truck, was superimposed on the aerial photos to determine the ability of the intersections to accommodate the various truck turning movements.

Results: **Camino Diablo at Marsh Creek Road:** In its present condition, this intersection is unable to accommodate truck turning movements without encroaching upon the right of way of opposing vehicles. Trucks traveling westbound from Camino Diablo to eastbound Marsh Creek Road are off-tracking onto the unpaved shoulders. Unpaved shoulders do not have the structural capacity to withstand off-tracking by heavy vehicles, which results in rutting and depressing of the shoulders.

Camino Diablo at Walnut Boulevard: In its present condition, this intersection is unable to accommodate truck turning movements without encroaching upon the right of way of opposing vehicles, or without off-tracking onto unpaved shoulders. Unpaved shoulders do not have the structural capacity to withstand off-tracking by heavy vehicles, which results in rutting and depressing of the shoulders. Off-tracking by heavy vehicles may over time result in damage to the cross-culvert drainage inlets and outlets that cross the roadway.

Camino Diablo at Holway Drive: In its present condition, this intersection is unable to accommodate truck turning movements without encroaching upon the right of way of opposing vehicles, or without off-tracking onto unpaved shoulders. Unpaved shoulders do not have the structural capacity to withstand off-tracking by heavy vehicles, which results in rutting and depressing of the shoulders. Off-tracking by heavy vehicles may over time result in damage to the cross-culvert drainage inlets and outlets that cross the roadway.

California Legal Truck Turning Templates superimposed on aerial photos are included in the Appendix.

EXISTING MID-BLOCK ROADWAY DESIGN

This investigation documented an inventory of existing lane widths, shoulder conditions, posted speed limits, and average daily traffic (ADT) volumes for Camino Diablo between Marsh Creek Road and Byron Highway to determine if they meet the minimum County roadway design criteria provided under County Standard Plan CA53i.

Results: Camino Diablo, over the limits of this study, is generally a two-lane roadway with a paved width of 20 to 26 feet, unpaved shoulders, posted speed limits of 35 to 50 miles per hour, and ADT volumes that varies between 1,483 and 9,189 vehicles per day. The 10-foot to 13-foot wide lanes, combined with unpaved shoulders, do not provide for sufficient recovery zones for large vehicles that drift off the paved roadway or encroach onto the opposing traffic lane.

COLLISION HISTORY

In January 2012, the SR4 Bypass provided a seamless truck route from SR4 to Marsh Creek Road to Byron Highway. For comparison purposes, collision rates for Camino Diablo were analyzed for periods before and after January 2012 to check if increased truck traffic has resulted in increased collision rates along Camino Diablo. Camino Diablo is divided into two segments due to the vast difference in average daily traffic volume within each segment. Camino Diablo Segment 1 is from Marsh Creek Road to Vasco Road and carries an average daily traffic volume of 1,483 vehicles per day. Camino Diablo Segment 2 is from Vasco Road to Byron Highway and carries an average daily traffic volume of 9,189 vehicles per day. The Contra Costa County Collision Report Database derived from the California Highway Patrol's State-wide Integrated Traffic Reporting System (SWITRS) was used to segregate collisions along the two segments of Camino Diablo. The database includes collision histories from 2009 through April 2015 on both segments of Camino Diablo and is included in the appendix.

Results:

Pre-January 2012, Segment 1: From 2009 through December 2011, there were a total of eight reported collisions in the 36-month period for a collision rate of 0.22 collisions per month. A large truck was involved in one of the eight reported collisions, or 12.5% of the total collisions;

Post-January 2012, Segment 1: From January 2012 through May 2015, there were a total of eight reported collisions in the 41-month period for a collision rate of 0.20 collisions per month. A large truck was involved in one of the eight reported collisions, or 12.5% of the total collisions;

Pre-January 2012, Segment 2: From 2009 through December 2011, there were a total of 12 reported collisions in the 36-month period for a collision rate of 0.33 collisions per month. A large truck was involved in two of the 12 reported collisions, or 16.7% of the total collisions;

Post-January 2012, Segment 2: From January 2012 through April 2015, there were a total of 21 reported collisions in the 41-month period for a collision rate of 0.51 collisions per month. A large truck was involved in five of the 21 reported collisions, or 23.8% of the total collisions.

Pre- and Post 2012 Collision Rate and Truck-Involved Rate Change by Segment:

Segment 1: The collision rate declined moderately from 0.22 to 0.20 collisions per Month, a collision rate decrease of 9.9 percent. The truck-involved collision rate did not change.

Segment 2: The collision rate increased from 0.33 to 0.51 collisions per month, a collision rate increase of 53.8 percent. The truck-involved collision rate increased from 16.7% to 23.8%, a collision rate increase of 42.5%.

RECOMMENDATION

Camino Diablo is unable to support truck turning movements without encroaching onto opposing traffic or damaging unpaved shoulders and existing facilities within the roadway right of way. The mid-block paved roadway is narrow and does not meet current design standards while providing no shoulder for sufficient recovery area for large trucks.

Since the opening of the SR4 Bypass, the collision rate and the percent of trucks involved in the reported collisions have increased substantially, 53.8 percent and 42.5 percent, respectively, on Segment 2 of Camino Diablo.

These findings, as supported by California Vehicle Code Section 35717 (included in Appendix), are the basis for recommending restriction of trucks exceeding a maximum gross weight of 14,000 pounds (7 tons) on Camino Diablo from Marsh Creek Road to Byron Highway.

APPENDIX

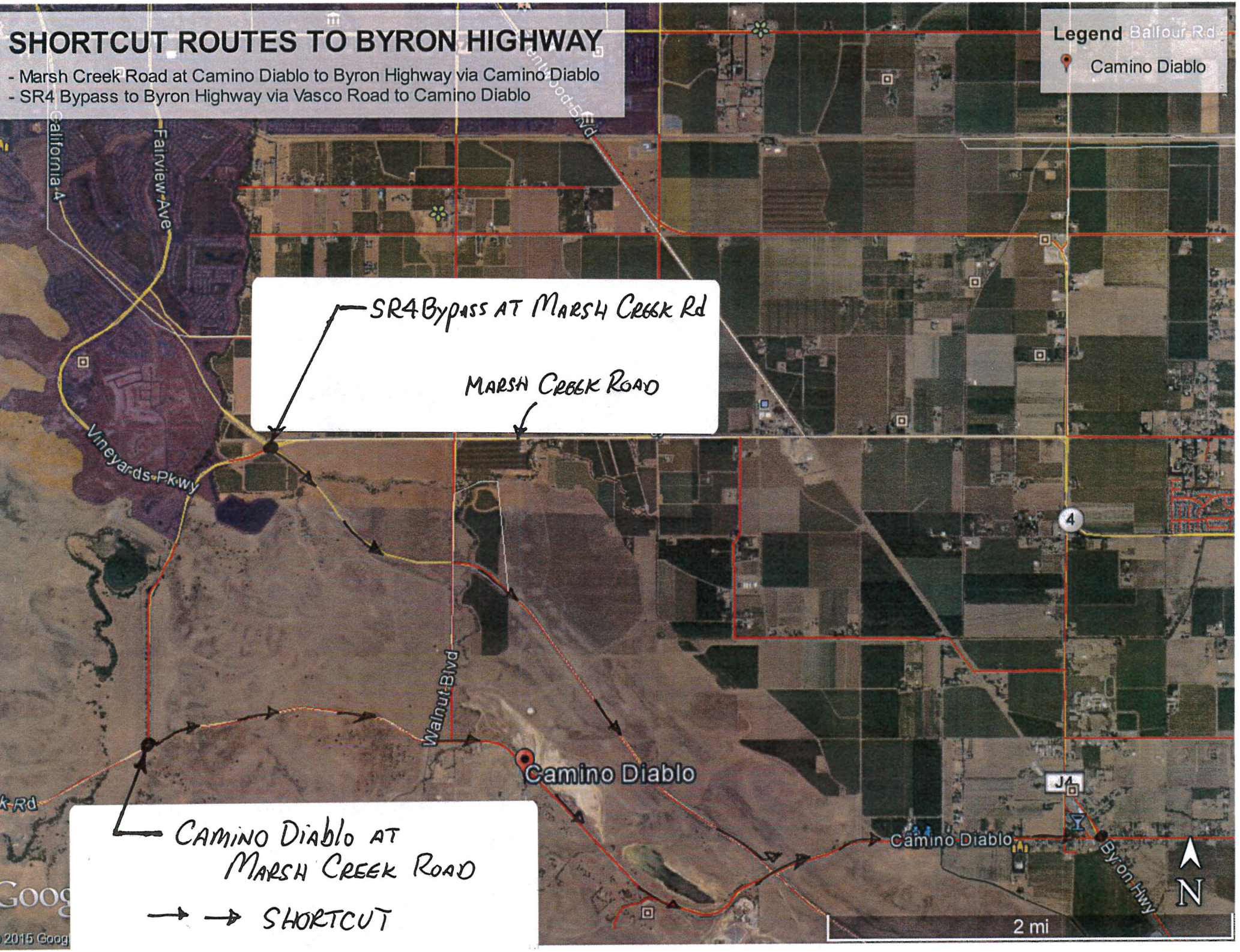
Shortcut Routes to Byron Highway

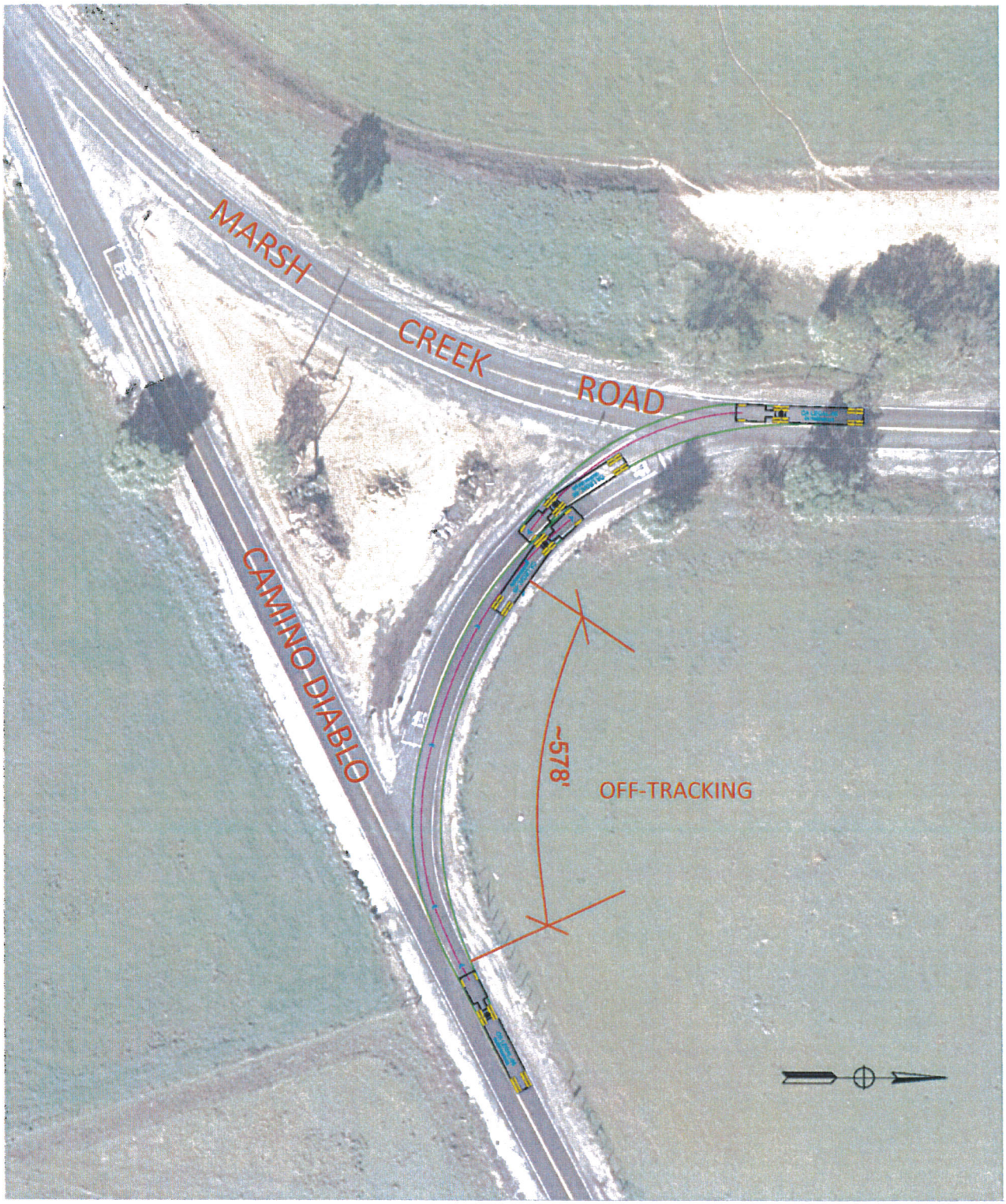
Exhibits: California Legal Truck Turning Templates Superimposed on Aerial Photos

Crossroads Traffic Collision Database – Collision Rate Comparison Tables

Contra Costa County Public Works Department Standard Plan CA53i

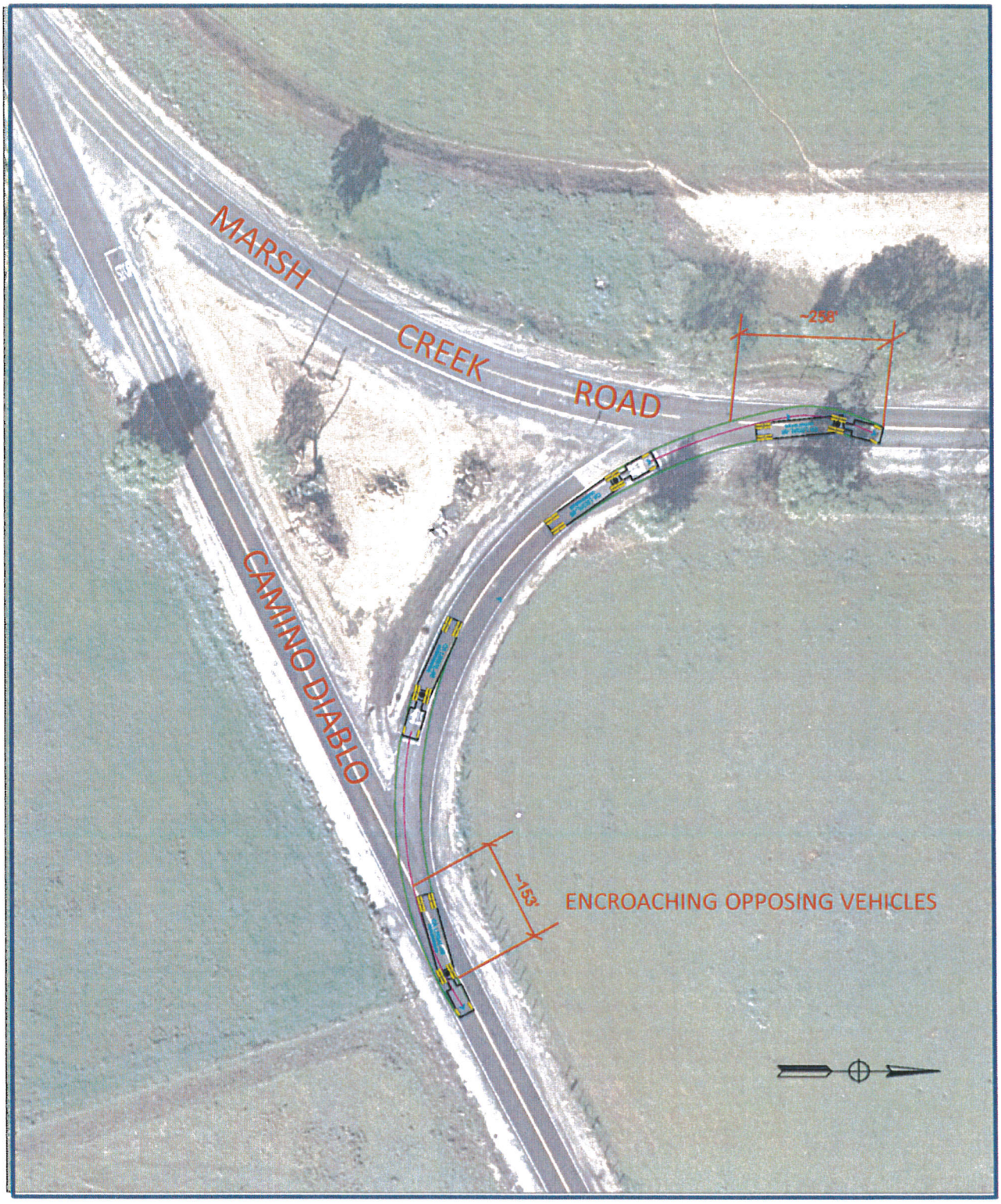
California Vehicle Code Section 35717


SHORTCUT ROUTES TO BYRON HIGHWAY
- Marsh Creek Road at Camino Diablo to Byron Highway via Camino Diablo
- SR4 Bypass to Byron Highway via Vasco Road to Camino Diablo
Legend
Balfour Rd
Camino Diablo
California
Fairview Ave
Vineyards Pkwy
SR4 Bypass at Marsh Creek Rd
Marsh Creek Road
Walnut Blvd
Camino Diablo
Camino Diablo at
Marsh Creek Road
SHORTCUT
Camino Diablo
Byron Hwy
4
N
2 mi

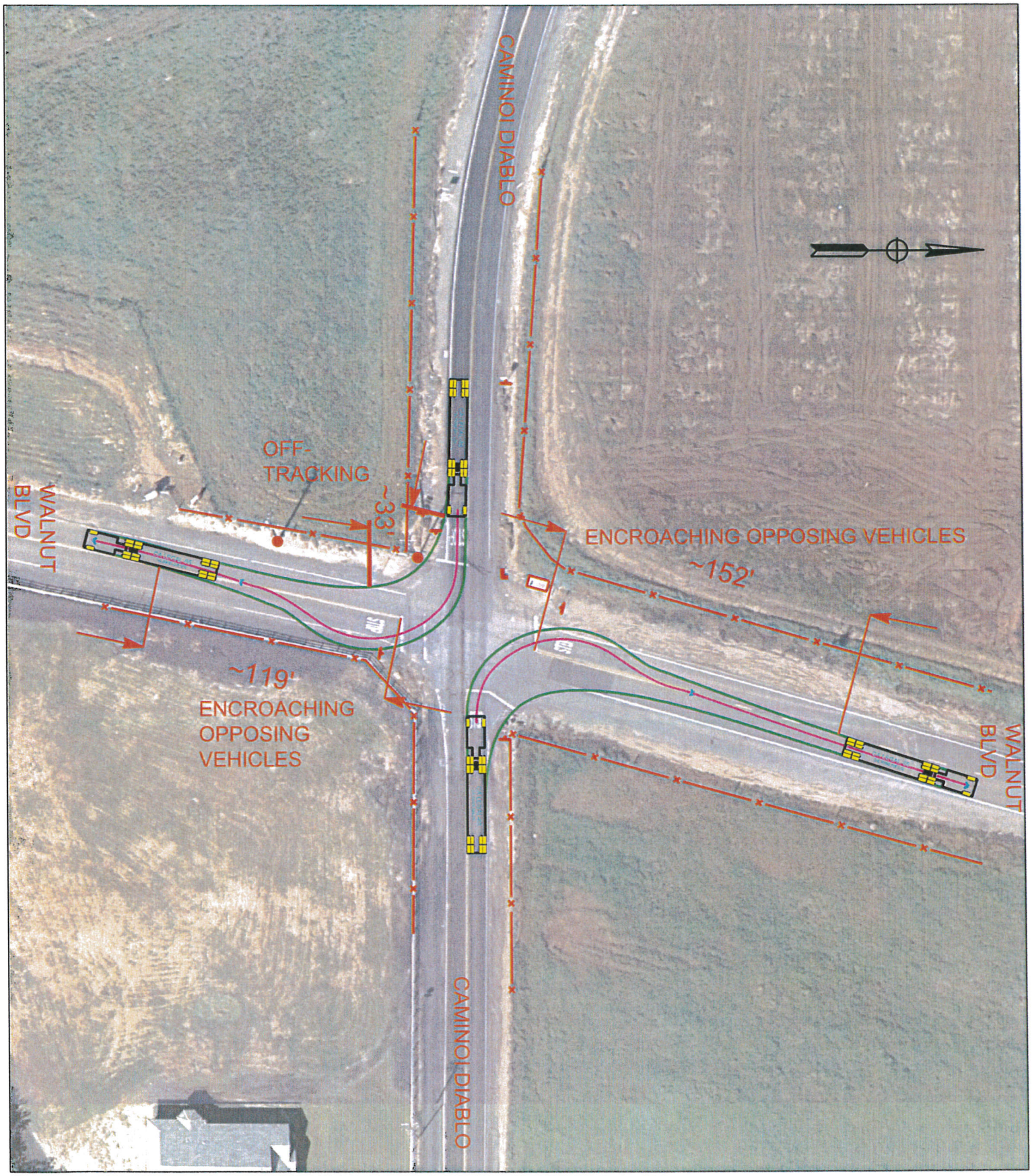


TURNING MOVEMENTS AT THE INTERSECTION OF

MARSH CREEK ROAD AND CAMINO DIABLO

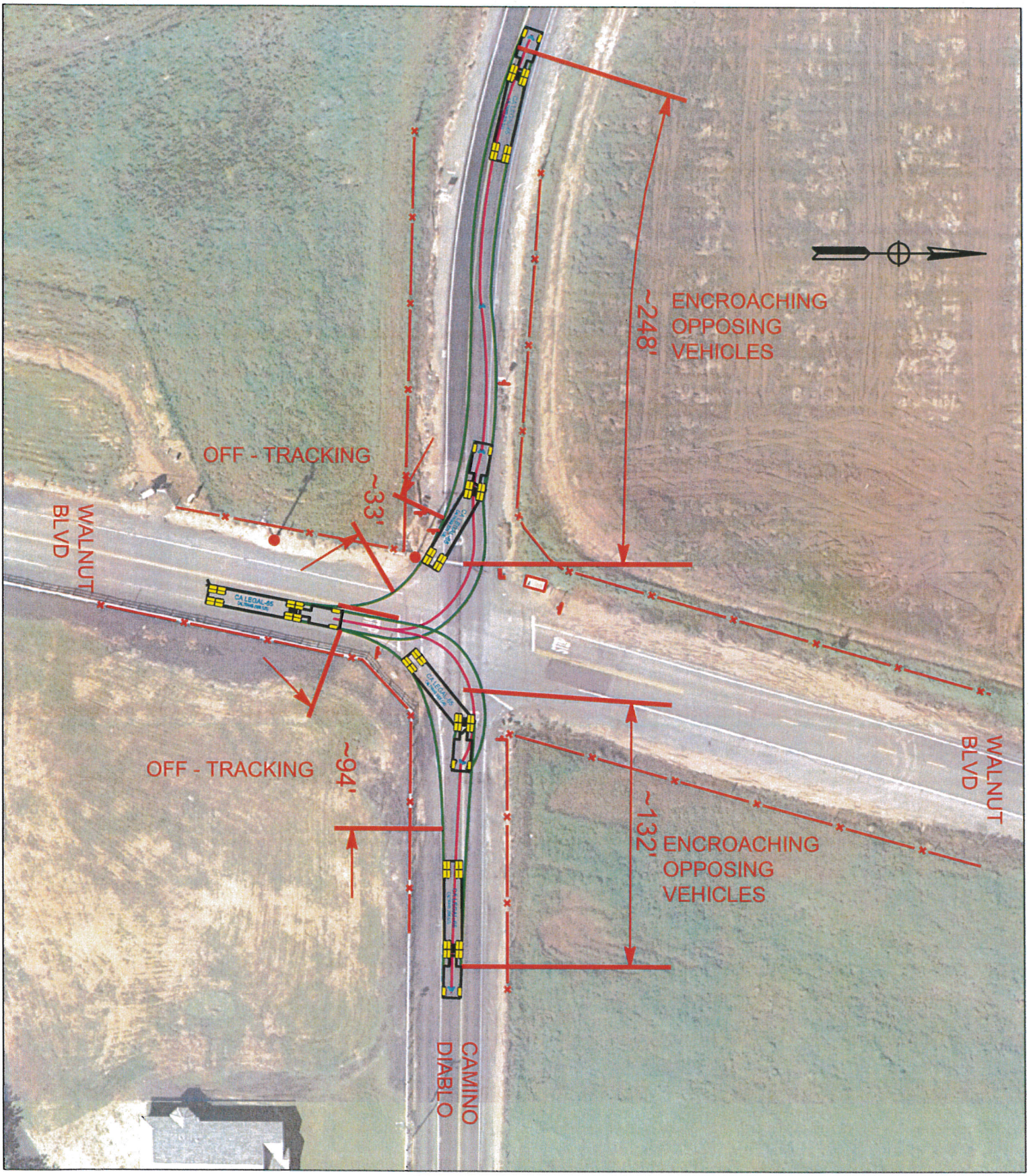


TURNING MOVEMENTS AT THE INTERSECTION OF MARSH CREEK ROAD AND CAMINO DIABLO



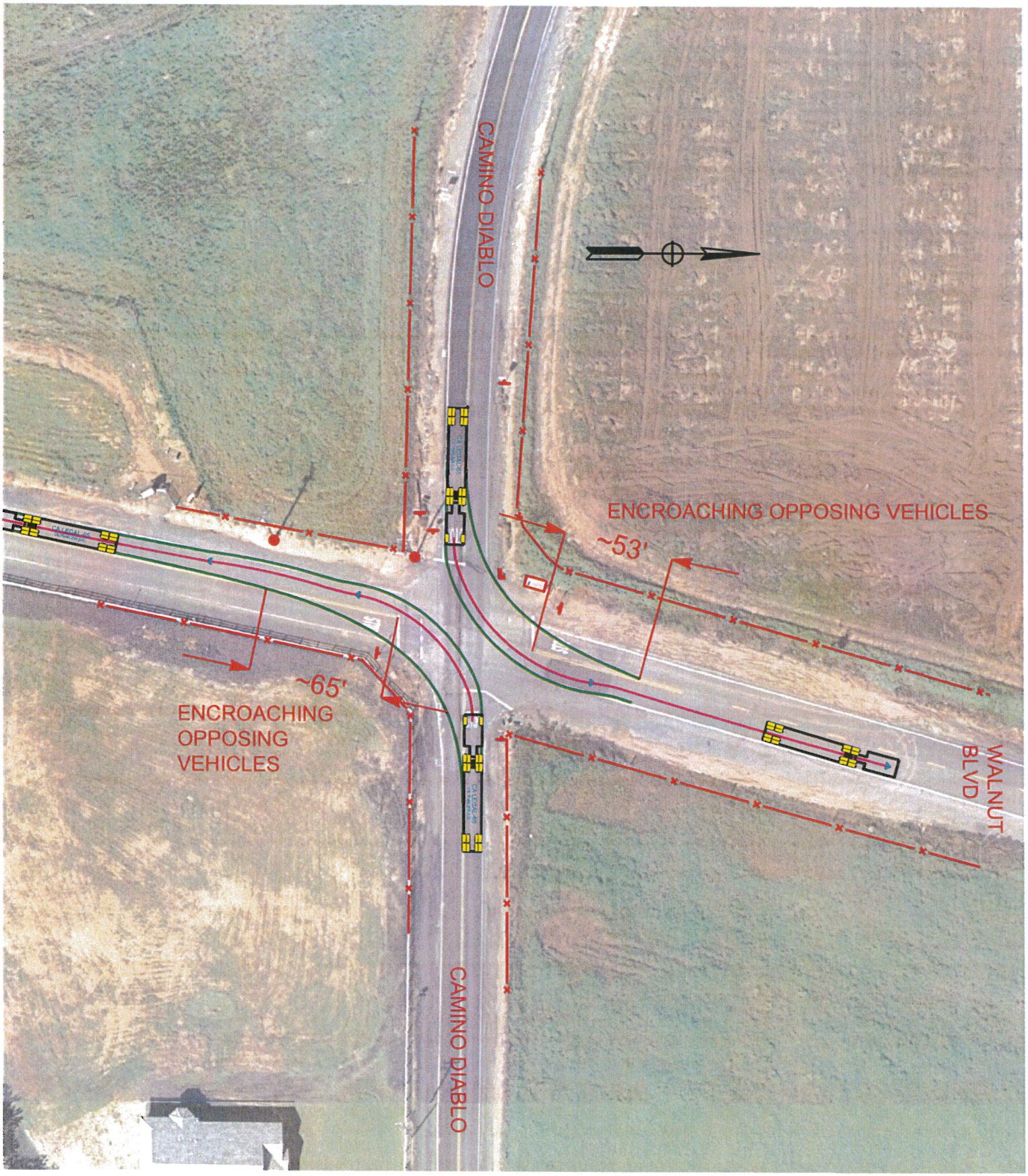
TURNING MOVEMENTS FROM CAMINO DIABLO

ONTO WALNUT BLVD



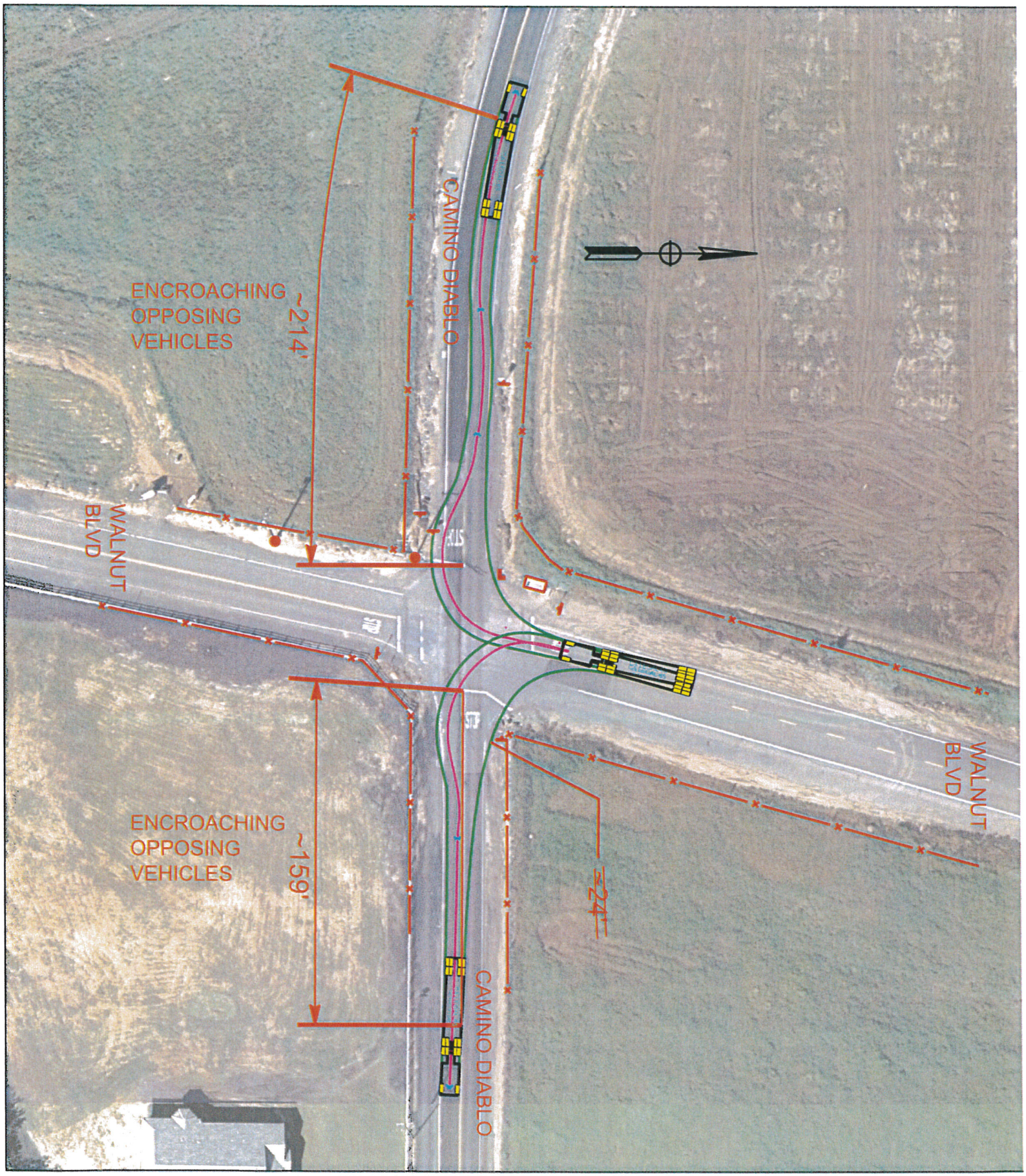
TURNING MOVEMENTS FROM NORTH-BOUND WALNUT BLVD

ONTO CAMINO DIABLO



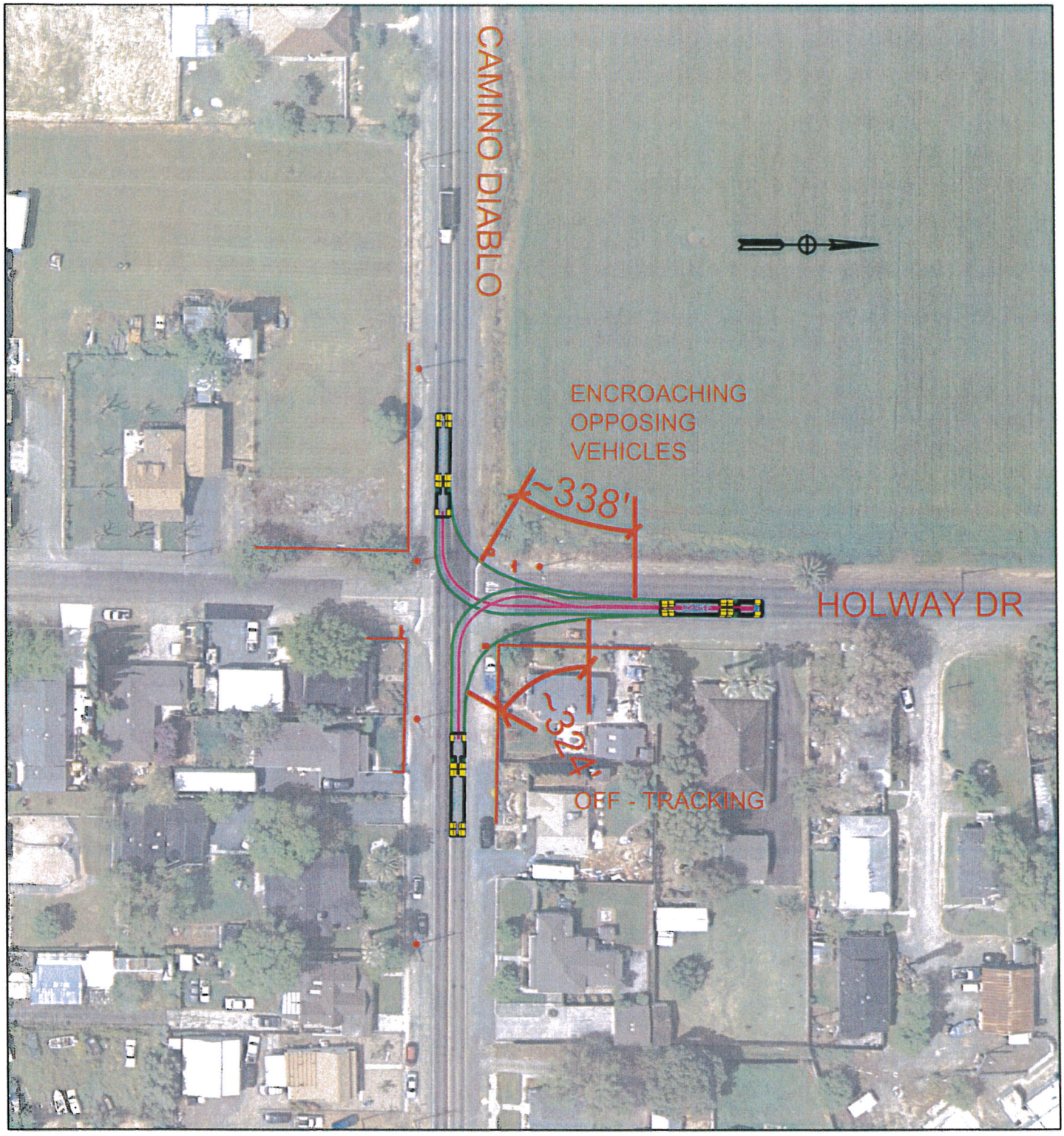
TURNING MOVEMENTS FROM CAMINO DIABLO

ONTO WALNUT BLVD

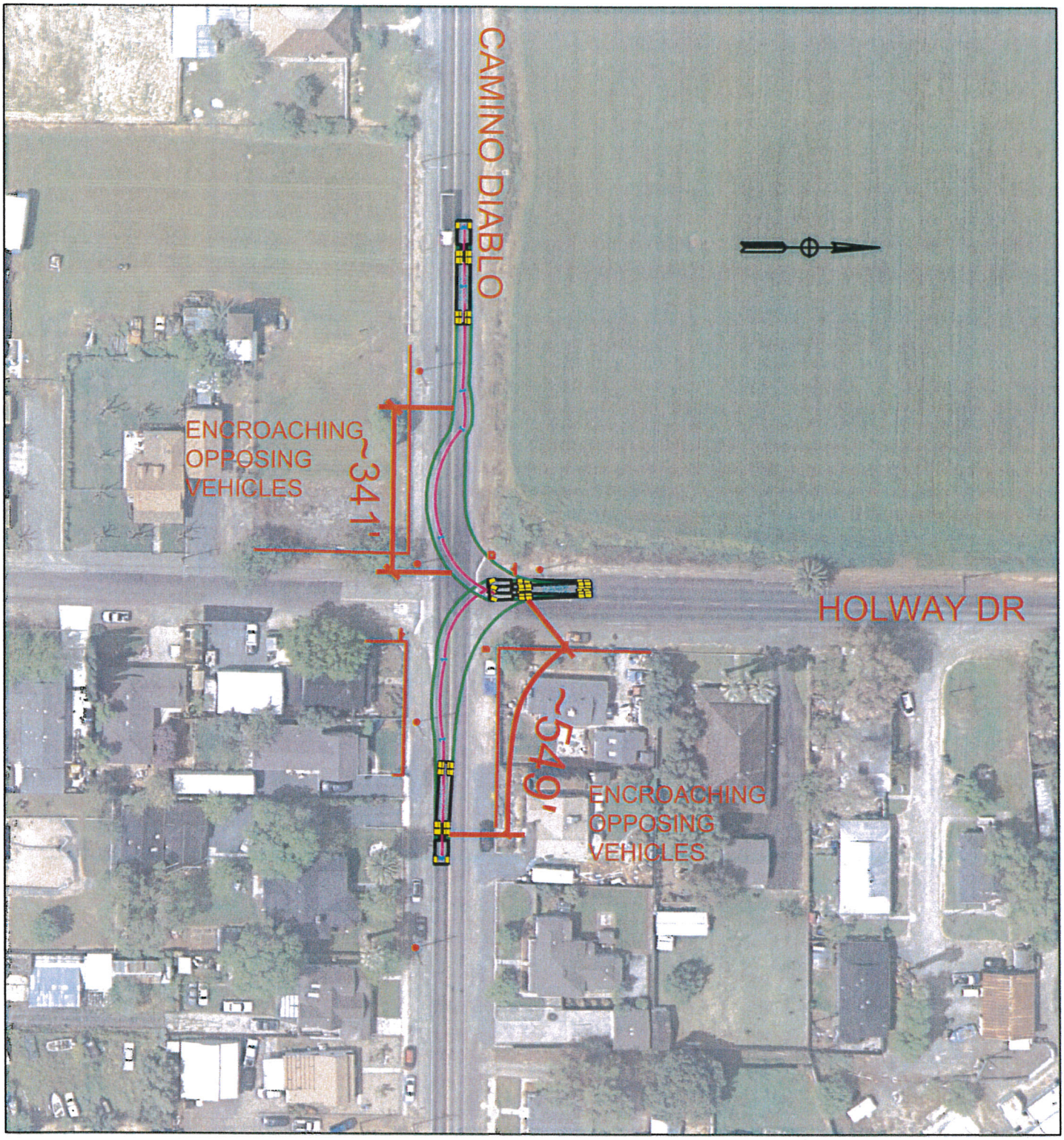


TURNING MOVEMENTS FROM SOUTH-BOUND WALNUT BLVD

ONTO CAMINO DIABLO



TURNING MOVEMENTS FROM CAMINO DIABLO ONTO HOLWAY DRIVE



TURNING MOVEMENTS FROM HOLWAY DRIVE

ONTO CAMINO DIABLO

SEGMENT 1 COLLISION RATE COMPARISON: 2009-2011 vs. 2012-MAY2015

TIME SPAN	NO. COLLISIONS	# MOS	COLLISION RATE
2009-2011	8	36	8/36 = 0.22 COLLISIONS/MONTH
2012-MAY2015	8	41	8/41 = 0.20 COLLISIONS/MONTH
NET CHANGE = {(0.20-0.22)/0.33} X 100% = -9.9%, DECREASE IN COLLISION RATE			

SEGMENT 1 - CAMINO DIABLO BETWEEN MARSH CREEK ROAD AND VASCO ROAD 2009-2011

No.	case #	date	time	street	distance	*	location	ticket	decsription	Special	Dark	Dusk Dawn	Inj.	Hit & Run	Solo	OAF2	COMMENT
1	8-215	08/26/11	1120	Camino Diablo	.6 mile	E	Longwell Ave	22107	Unsafe Turning Movement				3				
2	4-285	04/30/10	1545	Camino Diablo	1 mile	E	Longwell Ave	21460(A)	Passing over double line								
3	1-042	01/08/09	1604	Camino Diablo	330'	E	Marsh Creek Rd	22106	Unsafe Back Up								
4	5-134	05/17/10	0525	Camino Diablo	600'	E	Marsh Creek Rd	22350	Unsafe Speed			X			X		
5	11-113	11/09/11	1855	Camino Diablo	.25 mile	E	Marsh Creek Rd	22107	Unsafe Turning Movement		X				X		
6	11-160	11/18/11	1645	Camino Diablo	.3 mile	W	Vasco Rd	22350	Unsafe Speed						X		KENWORTH T800
7	8-037	08/06/11	1705	Camino Diablo	.7 mile	E	Walnut Blvd	22107	Unsafe Turning Movement						X		
8	3-202	03/15/11	0945	Camino Diablo	.2 mile	W	Walnut Blvd	22107	Unsafe Turning Movement				1		X		

SEGMENT 1 - CAMINO DIABLO BETWEEN MARSH CREEK ROAD AND VASCO ROAD 2012-MAY2015

No.	case #	date	time	street	distance	*	location	ticket	decsription	Special	Dark	Dusk Dawn	Inj.	Hit & Run	Solo	OAF2	COMMENT
1	11-036	11/05/13	0740	Camino Diablo	1 mile	E	Marsh Creek Rd	22107	Unsafe Turning Movement								
2	3-131	03/16/14	0130	Camino Diablo	1 mile	S	Marsh Creek Rd	22107	Unsafe Turning Movement		X						
3	9-051	09/06/13	1235	Camino Diablo		@	Vasco Rd	22107	Unsafe Turning Movement								FREIGHT w/TRAILER
4	8-032	08/05/13	1625	Camino Diablo	50'	W	Vasco Rd	22107	Unsafe Turning Movement	CONSTRUCTION ZONE							
5	5-174	05/21/12	1730	Camino Diablo	.2 mile	W	Vasco Rd	22107	Unsafe Turning Movement				1		X		
6	10-024	10/01/12	2045	Camino Diablo	1000'	N	Walnut Blvd	22107	Unsafe Turning Movement		X				X		
7	2-080	02/10/12	1725	Camino Diablo	.2 mile	W	Walnut Blvd	22107	Unsafe Turning Movement						X		
8	7-051	07/07/13	1410	Camino Diablo	.3 mile	W	Walnut Blvd	22107	Unsafe Turning Movement				2				

SEGMENT 2 COLLISION RATE COMPARISON: 2009-2011 vs. 2012-MAY2015

TIME SPAN	NO. COLLISIONS	# MOS	COLLISION RATE
2009-2011	12	36	12/36 = 0.33 COLLISIONS/MONTH
2012-MAY2015	21	41	21/41 = 0.51 COLLISIONS/MONTH

NET CHANGE = {(0.51-0.33)/0.33} X 100% = 53.8%, INCREASE IN COLLISION RATE

SEGMENT 2 - CAMINO DIABLO BETWEEN VASCO ROAD AND BYRON HIGHWAY 2009-2011

No.	case #	date	time	street	distance	location		ticket	decsription	Special	Dark	Dusk Dawn	Inj.	Hit & Run	Solo	Add'l Viol.	COMMENT
1	7-042	07/06/11	1705	Camino Diablo		@	600 Block	23152(A)	DUI				1		X	22107	
2	8-103	08/13/11	2020	Camino Diablo		@	Byron Hwy	21802(A)	stop and Yield to Traffic @ Stop Sign			X					MACK 3 AXLE
3	5-006	05/01/10	1557	Camino Diablo		@	Byron Hwy	21802(A)	Yield to traffic at intersection				1				
4	9-171	09/16/10	2003	Camino Diablo		@	Holway Dr	23152(A)	DUI		X					22450(A)	
5	3-014	03/03/11	1600	Camino Diablo	172'	E	Holway Dr	22350	Unsafe Speed					X	X		FORD 19000
6	8-038	08/06/11	1715	Camino Diablo		@	McCabe Rd	21460(A)	Crossing Double Yellow Line				1				
7	3-120	03/12/09	2015	Camino Diablo	25'	W	McCabe Rd	22106	Unsafe Back Up or Start Up		X						
8	5-101	05/16/11	1810	Camino Diablo	180'	W	Silver Hills Dr	21804(A)	Fail to Yield ROW				1	X			
9	3-278	03/31/11	1545	Camino Diablo	.4 mile	E	Vasco Rd	21460(A)	Crossing Double Yellow Linee				2				
10	4-123	04/16/09	1630	Camino Diablo	.5 mile	E	Vasco Rd	22107	Unsafe Turning Movement	Bicyclist							
11	10-185	10/21/10	2015	Camino Diablo	.7 mile	E	Vasco Rd	21801(A)	Fail to Yield ROW		X						
12	6-007	06/01/10	1815	Camino Diablo	1 mile	E	Vasco Rd	22350	Unsafe Speed				1				

SEGMENT 2 - CAMINO DIABLO BETWEEN VASCO ROAD AND BYRON HIGHWAY 2012-May 2015

No.	case #	date	time	street	distance	location		ticket	decsription	Special	Dark	Dusk Dawn	Inj.	Hit & Run	Solo	OAF2	COMMENT
1	12-132	12/13/13	1800	Camino Diablo	40'	W	Byron Hwy	23152(A)	DUI		X		2			22350 A	
2	10-270	10/24/14	1736	Camino Diablo	0.1 mile	W	Byron Hwy	22350	Unsafe Speed								
3	4-062	04/06/14	1450	Camino Diablo		@	Holway Dr	21801 A	Fail to Yield ROW								
4	12-186	12/19/14	2004	Camino Diablo	100	W	Holway Dr	22350	Unsafe Speed	CLOUDY/WET	X		3				
5	9-071	09/08/14	0830	Camino Diablo	250'	W	Holway Dr	22350	Unsafe Speed				1				
6	7-069	07/09/13	1850	Camino Diablo	300'	W	Holway Dr	22107	Unsafe Turning Movement								
7	10-204	10/20/14	1810	Camino Diablo	500'	W	Holway Dr	22350	Unsafe Speed								
8	10-204	10/22/13	0655	Camino Diablo	0.3 mile	W	Holway Dr	21650	No Driving On Right Side of Rd.			X	1	X			
9	9-027	09/06/12	1445	Camino Diablo	1500'	E	McCabe Rd	22350	Unsafe Speed								
10	9-051	09/06/13	1235	Camino Diablo		@	Vasco Rd	22107	Unsafe Turning Movement								FREIGHT w/TRAILER
11	12-218	12/22/13	0410	Camino Diablo	20'	E	Vasco Rd	22350	Unsafe Speed		X						
12	8-145	08/20/10	1440	Camino Diablo	75'	E	Vasco Rd	22350	Unsafe Speed								MACK 2007
13	1-056	01/06/12	1125	Camino Diablo	2400'	E	Vasco Rd	21460(A)	Passing over double line								
14	1-170	01/20/12	1748	Camino Diablo	2640'	E	Vasco Rd	22350	Unsafe Speed		X						
15	2-138	02/12/15	1620	Camino Diablo	2,855'	E	Vasco Rd	23152(A)	DUI				1			22107	
16	8-068	08/09/13	1840	Camino Diablo	0.2 mile	E	Vasco Rd	22107	Unsafe Turning Movement	OVER TURNED			1				
17	3-305	03/30/15	1615	Camino Diablo	0.4 mile	E	Vasco Rd	22350	Unsafe Speed								
18	10-293	10/27/14	0725	Camino Diablo	0.5 mile	E	Vasco Rd	22350	Unsafe Speed				3				
19	8-205	08/25/14	0625	Camino Diablo	0.5 mile	E	Vasco Rd	21460(A)	Crossing Double Yellow Line								KENWORTH RIG
20	11-155	11/14/14	1438	Camino Diablo	0.7 mile	E	Vasco Rd	22107	Unsafe Turning Movement				1				FREIGHT TRUCK
21	31-898	05/11/15	1700	Camino Diablo	0.8 mile	E	Vasco Rd		Right of Way								ITN'L FREIGHT TRUCK

PUBLIC WORKS DIRECTOR

2-28-02

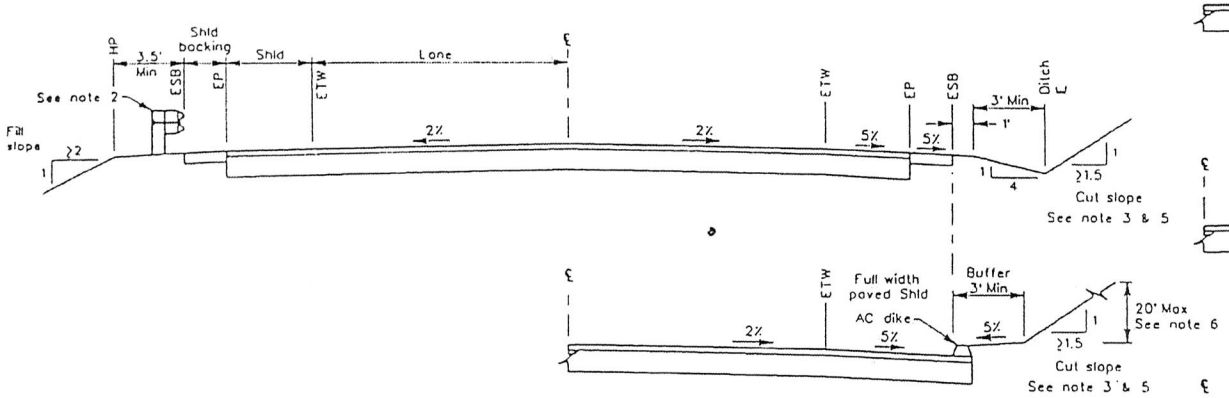
PLANS APPROVAL DATE

The County of Contra Costa or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

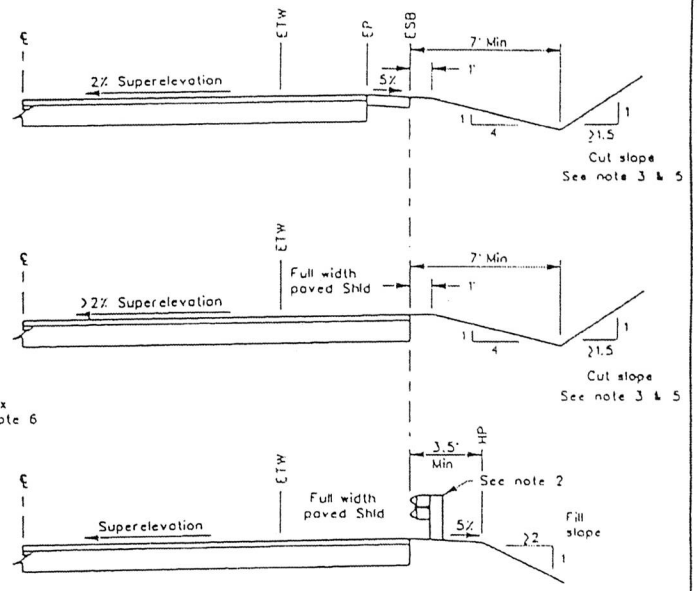
REGISTERED PROFESSIONAL ENGINEER
R. MITCH AVALON
No. 31422
Exp. 12/31/04
CIVIL
STATE OF CALIFORNIA

TWO LANE RURAL SHOULDER/LANE WIDTHS

	ADT<250	<400	<1000	<3000	<6000	>6000
MINIMUM (Shld backing/Shld/Lane)	1.5'/0/11'	0'/1'/11'	2'/1'/11'	2'/2'/12'	3'/4'/12'	3'/5'/12'
DESIRABLE[4] (Shld backing/Shld/Lane)	0'/1'/11'	2'/1'/11'	2'/4'/12'	2'/5'/12'	2'/6'/12'	0'/8'/12'



TYPICAL RURAL 2-LANE ROAD SECTION



TYPICAL RURAL 2-LANE ROAD SUPERELEVATED SECTION

NOTES:

1. These guidelines do not override County Ordinance Code requirements for development projects.
2. Guardrail may be required, depending on embankment height and slope. (See Caltrans Guidelines)
3. Distance to cut slope from ETW may be increased for sight distance in curves. (See Caltrans Design Manual)
4. Use desirable if it does not significantly increase R/W or construction costs, especially where there is high percentage of trucks.
5. A wider swale and/or buffer between toe of slope and roadway should be considered where there is potential rock fall, the slope is highly erosive or there is significant longitudinal surface flows.
6. If cut slope is > 20' to bench or top of cut, buffer width shall be increased.
7. Design ADT shall be approved by the Public Works Department.

NO.	DATE	REVISION DESCRIPTION	BY
1	2-02	Supersedes Standard Plan CA53 dated 11-99	P.W.

COUNTY OF CONTRA COSTA
PUBLIC WORKS DEPARTMENT
MARTINEZ, CALIFORNIA

STANDARD PLAN

TWO LANE RURAL ROAD GUIDELINES

SCALE: NO SCALE | DATE: 2-02

DRAWN BY: L. COSTA | PLAN NO. CA53i

CHECKED BY: M. HOLLINGSWORTH

STD. PLAN CA53i

VEHICLE CODE - VEH

DIVISION 15. SIZE, WEIGHT, AND LOAD [35000 - 35796] *(Division 15 enacted by Stats. 1959, Ch. 3.)*

CHAPTER 5. Weight [35550 - 35796] *(Chapter 5 enacted by Stats. 1959, Ch. 3.)*

ARTICLE 4. Local Authorities [35700 - 35722] *(Article 4 enacted by Stats. 1959, Ch. 3.)*

35717. Notwithstanding any provision to the contrary, any county may by ordinance prohibit the use of any street, road or highway by any commercial vehicle exceeding a maximum gross weight of 14,000 pounds if, by accepted engineering standards, the street, road or highway cannot support such vehicle.

(Added by Stats. 1959, Ch. 1732.)