



1970 Broadway, Suite 740
Oakland, CA 94612
510.763.2061
www.dksassociates.com

MEMORANDUM

DATE: November 15, 2013

TO: Town of Moraga

FROM: Thomas Krakow, DKS Associates

SUBJECT: Moraga Road – Existing Traffic Conditions

P# 13130-000

Introduction

The Town of Moraga is located just south of Highway 24 in Contra Costa County. Moraga Road is a popular route for residents of Moraga traveling to Lafayette or accessing Highway 24. Moraga Road is mostly four lanes through the Town of Moraga. This study will focus on the portion of Moraga Road between Campolindo Drive and St. Mary’s Road. Additionally, the intersections at Campolindo Drive, Rheem Blvd and St. Mary’s Rd will be evaluated for level-of-service. Figure 1 shows the general locations of the roadway segment as well as each study intersection.

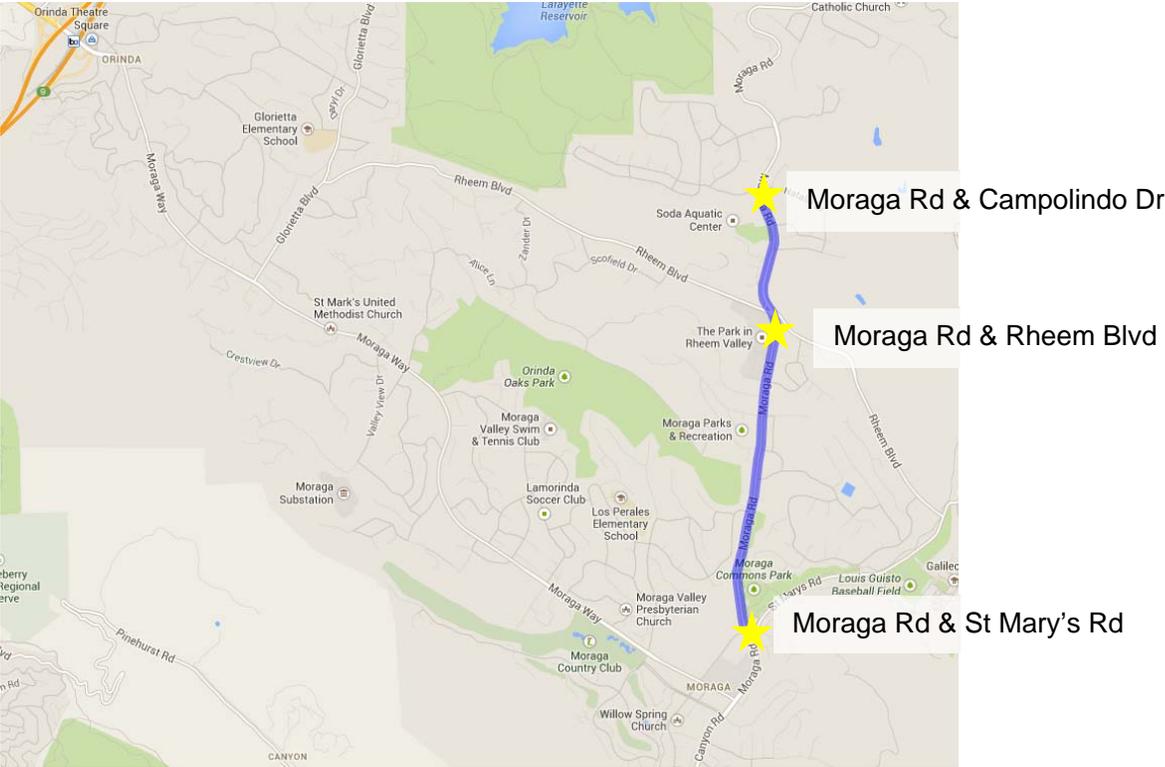


Figure 1: Site Map with Study Intersections



Road Description

Moraga Road extends approximately 3.6 miles between the northerly town limits and Moraga Way. It is the major north-south arterial road within the Town of Moraga. It has sections of two-lane as well as four-lane roadway. Marked pedestrian crosswalks spanning Moraga Rd are located at the following intersections: Campolindo Dr, Woodford Dr, Rheem Blvd, Lucas Dr, Ascot Dr, Donald Dr, Corliss Dr and St. Mary's Rd.

Section 1 — Town Limits to Rheem Boulevard

Moraga Road is two lanes wide from the Town limits to Dolores Court with bicycle lanes on both sides of the roadway. At Dolores Court, the roadway widens to four lanes with a raised center median approaching Rheem Blvd. From the Campolindo Drive intersection to Rheem Boulevard left-turn pockets are provided at entrances to the side streets except at Dolores Court where there is a raised median. Southbound capacity is 1,400 vehicles per hour with a peak hour utilization of 59%. The northbound capacity is 1,400 vehicles per hour with a peak hour utilization of 49%.

Section 2— Rheem Boulevard to Ascot Drive

This section of the roadway which fronts the Rheem Shopping Center is four lanes wide between Rheem Boulevard and Ascot Drive. For most of the section a two-way-left-turn lane has been added. This area qualifies as "Business District" as defined in Section 235 of the California Vehicle Code. In both northbound and southbound directions, this section of Moraga Road is designated as a bicycle route. Southbound capacity is 2,600 vehicles per hour with a peak hour utilization of 32%. The northbound capacity is 2,600 vehicles per hour with a peak hour utilization of 29%.

Section 3 — Ascot Drive to Corliss Drive

This section of Moraga Road is four lanes wide with a painted centerline and white edge lines on both sides of the road. Moraga Road is 64 feet wide at Donald Drive. Left-turn pockets are provided at Ascot Drive and Donald Drive. A dedicated southbound right turn lane is provided at Corliss Drive. In both northbound and southbound directions, this section of Moraga Road is designated as a bicycle route. Southbound capacity is 2,400 vehicles per hour with a peak hour utilization of 32%. The northbound capacity is 2,400 vehicles per hour with a peak hour utilization of 28%.

Section 4— Corliss Drive to St. Mary's Road

This section of Moraga Road is approximately 1/2 mile long and is largely undeveloped except for the Moraga Commons Recreation Area which is located to the east. Moraga Road narrows to two lanes at Corliss Drive until its intersection with St. Mary's Road. This section has a painted centerline and white edge lines on both sides of the road. There is a Class I Bike Path adjacent to this section of Moraga Road, however many bicyclists prefer to use the narrow paved shoulder just outside of the white edge lines instead of the provided Bike Path. Southbound capacity is 1,200 vehicles per hour with a peak hour utilization of 56%. The northbound capacity is 1,200 vehicles per hour with a peak hour utilization of 48%.



Section 5 — St Mary’s Road to Moraga Way

This section of Moraga Road is also designated a “Business District” according to the California Vehicle Code. The Moraga Shopping Center is located in this vicinity. The road is 90 feet wide with four through lanes, a center raised median, and white edge lines. In both northbound and southbound directions, this section of the road is designated as a bicycle route.

Moraga Road is controlled by signals at Campolindo Drive, Rheem Boulevard, Ascot Drive, Donald Drive, St. Mary’s Road, and Moraga Way. Side street traffic at all other intersections are controlled by stop signs. Moraga Road north of Rheem Boulevard is categorized as a Class II Bike Facility. The road south of Rheem Boulevard is categorized as a Class III Bike Facility.

Currently Moraga Road is posted for 35 MPH throughout, except in the vicinity of Campolindo High School where it is 25 MPH during school hours of operation.

Existing Intersection Conditions

Field observations

Moraga Road and Campolindo Drive

Traffic flow during the peak period is influenced by the high school drop offs in the morning. The intersection appears to function adequately even during the morning peak drop off. The bike lanes along Moraga Road are compromised by the southbound turning lane and the near side northbound bus stop. Long term development is likely to influence the east leg of the intersection.

The southern-most driveway to Campolindo campus has much more significant impact on the vehicular traffic, cyclists, and pedestrians. Northerly traveling bikes use the westerly 5-foot bike lane (against the traffic because it avoids the conflict at the driveway entrance and Woodford Drive. Southbound vehicles dropping off students cause a backup for the left turn northbound vehicles which then creates a backup for the northbound through vehicles. Students using the crosswalk have to look at several potential conflicts due to the various turning movements between Woodford Drive and the exiting driveway from the high school drop off activity.

Moraga Road and Rheem Boulevard

Traffic flow operates reasonably well. Suburban commercial land use – (Retail, entertainment mix with on-site parking) makes the southwest quadrant an important attraction for vehicular activity. The current land plan for the retail center is a strip mall with isolated out parcels. No commercial activity that relies on Moraga Road for on street parking prevails. There is a gas station at the intersection on the southwest corner with multiple driveway access at the intersection. Single and multi-family residential exists near the Rheem Boulevard – Moraga Road intersection (southeast quadrant). Office, educational and Town municipal offices exist along the northwest quadrant.

There is a dedicated right turn lane that is separated from Moraga Road and terminates at a signalized intersection with Rheem Boulevard and a private drive that connects with internal drive lanes that serve the frontages of the retail center. Pedestrian access is limited to one side of each of the intersection approaches. The northeast corner (currently undeveloped) has no pedestrian sidewalks and no crosswalk access. The geometry of the intersection is skewed with reasonably designed turning radii. The geometry appears to be reasonably designed. The spacing of the signals (Shopping Center access, and Rheem Boulevard-Moraga Road intersection) is very short but the signal timing



and phasing appears to operate adequately for the amount of peak hour traffic demand. Safety lighting exists at both intersections. There is not much pedestrian activity observed at these intersections under the current land usage.

St. Mary’s Road and Moraga Road

Currently St. Mary’s Road terminates at a signalized intersection with Moraga Road. The Lafayette Moraga Trail that runs more or less along St. Mary’s Road crosses Moraga Road and continues as the fourth leg of this intersection. The Town of Moraga multi-purpose path also connects to the Lafayette Moraga regional trail at the intersection. Pedestrian and bicycle activity is active along the two trails, especially on weekends. The alignment of the trail west of the intersection connects to School Road.

St. Mary’s Road serves St. Mary’s College. Moraga Commons Park is located at the northeast corner of the intersection. Crosswalks exist on the north side and the east side of the intersection. Single lanes of approach exist on all three legs. South of Moraga Road at the intersection the land use is mixed with storage land use with access onto School Road. School Road connects with Moraga Way to the west. Residential development north of the intersection is located approximately 0.75 miles away with access from Corliss Drive. A mix of multi-family and single family developments exist along St. Mary’s Road

Geometry and Traffic Volumes

Figure 2 shows the existing intersection lane geometry at each intersection. Figure 3 shows the AM and PM Peak hour turning movements at each intersection. Counts at Campolindo Dr and St. Mary’s Rd were conducted on September 4th, 2013. Counts at Rheem Blvd were conducted on April 17, 2012.

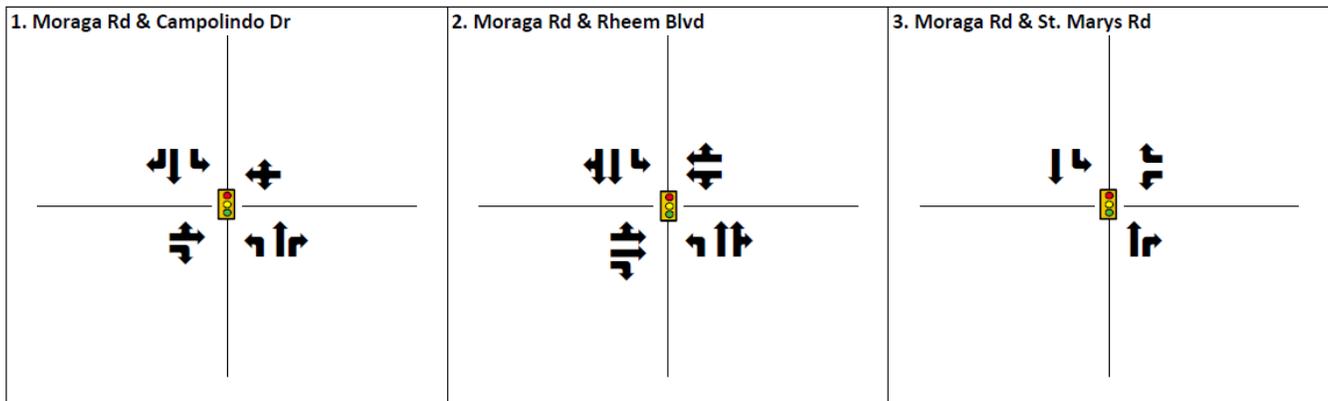


Figure 2: Existing Lane Geometry at Study Intersections



Figure 5: Existing AM and PM Peak Hour Bicycle and Pedestrian Volumes at St. Mary's Road

Existing Average Daily Traffic Flows

24-hour counts conducted along Moraga Road between September 4th through 10th, 2013 are summarized in Tables 1 and 2 below.

Table 1 Northbound Moraga Road – Summary of Hourly Vehicle Flows

Time	North of Rheem Blvd		South of Donald Dr		North of St. Mary's Rd	
	Avg Weekday	Avg Weekend	Avg Weekday	Avg Weekend	Avg Weekday	Avg Weekend
12:00-1:00 AM	26	78	26	57	22	70
1:00-2:00 AM	15	41	12	35	11	34
2:00-3:00 AM	7	22	9	17	5	15
3:00-4:00 AM	7	11	5	9	4	9
4:00-5:00 AM	16	10	19	8	14	10
5:00-6:00 AM	59	15	63	14	44	11
6:00-7:00 AM	221	66	166	37	133	41
7:00-8:00 AM	647	142	535	103	406	112
8:00-9:00 AM	690	309	607	227	484	216
9:00-10:00 AM	520	464	511	409	451	371
10:00-11:00 AM	505	616	468	539	403	547
11:00-12:00 AM	530	640	519	610	422	537
12:00-1:00 PM	552	683	508	615	473	587
1:00-2:00 PM	531	652	508	555	461	500
2:00-3:00 PM	630	573	567	573	507	460
3:00-4:00 PM	742	550	662	534	577	424
4:00-5:00 PM	636	514	594	469	519	384



5:00-6:00 PM	716	496	631	439	562	367
6:00-7:00 PM	721	474	584	394	516	399
7:00-8:00 PM	478	358	399	344	383	267
8:00-9:00 PM	308	250	268	232	252	232
9:00-10:00 PM	219	183	190	148	172	147
10:00-11:00 PM	134	172	90	115	105	103
11:00-12:00 PM	70	92	42	74	54	62

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Table 2 Southbound Moraga Road – Summary of Hourly Vehicle Flows

Time	North of Rheem Blvd		South of Donald Dr		North of St. Mary's Rd	
	Avg Weekday	Avg Weekend	Avg Weekday	Avg Weekend	Avg Weekday	Avg Weekend
12:00-1:00 AM	40	112	29	77	26	70
1:00-2:00 AM	21	55	16	50	16	46
2:00-3:00 AM	11	26	12	18	10	16
3:00-4:00 AM	8	12	6	9	6	8
4:00-5:00 AM	19	15	10	10	9	10
5:00-6:00 AM	61	24	34	17	24	17
6:00-7:00 AM	168	67	137	41	119	41
7:00-8:00 AM	473	122	456	129	392	122
8:00-9:00 AM	726	271	623	273	565	253
9:00-10:00 AM	491	423	458	459	439	429
10:00-11:00 AM	451	526	444	521	395	487
11:00-12:00 AM	491	601	503	605	436	548
12:00-1:00 PM	555	635	571	612	504	554
1:00-2:00 PM	547	653	552	635	480	568
2:00-3:00 PM	738	616	692	569	611	477
3:00-4:00 PM	819	579	752	553	660	472
4:00-5:00 PM	666	549	660	513	564	452
5:00-6:00 PM	748	509	699	512	599	438
6:00-7:00 PM	766	456	690	450	578	392
7:00-8:00 PM	584	366	528	385	454	318
8:00-9:00 PM	408	319	370	300	313	261
9:00-10:00 PM	283	236	243	217	216	184
10:00-11:00 PM	164	177	143	148	124	123
11:00-12:00 PM	86	107	66	81	56	66

DKS Associates, 2013

Intersection Level-Of-Service

Level of Service (LOS) is a measure of the degree of vehicle congestion that occurs during peak travel periods and is the traditional measure of roadway and intersection performance. Level of Service can range from “A” representing free-flow conditions, to “F” representing extremely long delays. LOS B and C signify stable conditions with acceptable delays. LOS D is typically considered acceptable for a peak hour in urban areas. LOS E is approaching capacity and LOS F represents conditions at or above capacity.

Traffic operational impacts were measured by looking at peak hour level-of-service (LOS) and average delay for three signalized intersections along Moraga Road. This analysis was performed using Synchro 8 and the procedures from the 2010 Highway Capacity Manual (HCM) Operational methodology. Synchro is a macroscopic analysis and



optimization software package used for optimizing and coordinating intersection signal-timing. LOS results for the AM and PM peak hours are summarized below in Table 3.

Table 3 Intersections Level of Service Summary

#	Intersection	Peak	Existing Condition	
			Delay	LOS
1.	Moraga Rd / Campolindo Dr	A.M.	12.7	B
		P.M.	12.2	B
2.	Moraga Rd / Rheem Blvd	A.M.	9.1	A
		P.M.	9.3	A
5.	Moraga Rd / St. Mary's Rd	A.M.	11.6	B
		P.M.	13.3	B
Source: DKS Associates, 2013 Notes: Average Delay (seconds per vehicle), LOS: Level of Service				

Collision Summary

Recent traffic collision data was requested through the Moraga Police Department in October 2013. As of October 24th, Police Department Staff has yet to respond to the request. In the absence of more recent collision data, we will instead use available data from the Town of Moraga Engineering and Traffic Survey dated March 2013 for the period between 2009 and 2011, as summarized in Moraga's edition of the Statewide Integrated Traffic Records System (SWITRS). A review of the collision data shows that 34 collisions occurred on Moraga Road during the study period. Major accident types were rear-end collisions and broadside collisions. Unsafe speed was the primary factor for approximately 41% (14 out of 34) of these collisions. There were no collisions involving a pedestrian or bicycle during the study period. A summary of these collisions is located in Tables 4 and 5.



Table 4 Collision Summary by Type

Location	No. of Sideswipe	No. of Broadside	No. of Head-On	No. Of Rear-End	Other	Total
Moraga Rd & Campolindo Rd	1	0	0	1	2	4
Moraga Rd & Rheem Blvd	0	0	0	0	0	0
Moraga Rd & St. Mary's Rd	0	1	0	1	1	3
All other portions of Moraga Rd	1	5	0	13	8	27
Total	2	6	0	15	11	34

Table 5 Collision Summary by Primary Collision Factor

Location	Unsafe Speed	Involving Pedestrian/Bike
Moraga Rd & Campolindo Rd	1	0
Moraga Rd & Rheem Blvd	0	0
Moraga Rd & St. Mary's Rd	1	0
All other portions of Moraga Rd	12	0
Total	14	0