

REPORT TO CITY COUNCIL

DATE: SEPTEMBER 28, 2022

TO: HONORABLE MAYOR AND MEMBERS OF THE CITY COUNCIL

FROM: NATHAN HAMBURGER, CITY MANAGER

BY: JESSICA FORTE, PUBLIC WORKS DIRECTOR / CITY ENGINEER

SUBJECT: EVALUATION OF LEFT TURN RESTRICTION AT 5827 KANAN ROAD

This item presents a staff recommendation to restrict a left turn movement upon exiting 5827 Kanan Road.

Three driveways provide full access to the Twin Oaks Shopping Center on Kanan Road, north of Thousand Oaks Boulevard. This report focuses on the driveway that connects Kanan Road with the Twin Oaks Shopping Center nearest the Starbucks, the third driveway north of Thousand Oaks Boulevard (Driveway 3). Driveway 3 permits full access and has one outbound lane and one receiving lane.

Driveway 3 has the highest rate of non-intersection collisions in the City. Over the span of 2015-19, 17 crashes have been reported at this driveway (10 vehicular, 1 Pedestrian, 1 Bicycle).

In response to the high collision frequency, a study of the three Twin Oaks Shopping Center driveways was conducted by the City's Contract Traffic Engineer, Kimley-Horn. The study also analyses the impact that restricting the left turn exit from Driveway 3 might have on traffic operations at the Kanan Road and Thousand Oaks intersection. The study in its entirety is provided, omitting police reports, as Attachment A to this report.

This information was presented to the Law Enforcement / Fire / Emergency Response Subcommittee, comprised of Mayor Pro Tem Anstead and Council Member Weber, as part of the public process in developing the Local Road Safety Plan (LRSP). The item was briefly discussed with Council during the adoption of the LRSP on July 13, 2022 and staff was directed to present the recommendation to the City Council at a future meeting. Staff has also discussed the restricted left movement with the owner, and they accept the restriction as an improvement to safety.

Kimley-Horn recommends an incremental approach to improving the driveway. "Keep Clear" pavement markings were installed in 2019. The next recommended incremental improvement is to restrict the eastbound left-turn movement out of Driveway 3 through signing and pavement marking improvements. Kimley-Horn recommends the installation of a right-turn arrow pavement marking on the Driveway 3 approach and a RIGHT TURN ONLY (R3-5R) sign. Kimley-Horn recommends this driveway be considered in the

ongoing Kanan Road Corridor Safety, Operations, and Capacity Enhancement Project. If collision rates remain high future modifications could include delineators or modifications to the median to prevent the northbound left-turn movement as well.

The restriction of the eastbound left-turn movement from Driveway 3 is expected to have a minimal impact to traffic operations at the signalized intersection of Kanan Road and Thousand Oaks Boulevard. This study found the worst-case scenario for traffic operations would be if all vehicles are diverted to the southbound U-turn movement at Kanan Road and Thousand Oaks Boulevard. This scenario is anticipated to increase vehicle delay by 2.3 seconds per vehicle in the AM peak period and 8.8 seconds per vehicle in the PM peak period. The LOS is not expected to degrade as a result of restricting the eastbound left-turn movement. For Detour 3, the queue length at the intersection of Kanan Road and Thousand Oaks Boulevard is expected to increase from 14 cars to 16 cars during the PM peak hour.

It is important to note that this worst case analysis, the diversion of 100% of exiting vehicles to the southbound U-turn movement, is highly unlikely. It is expected most vehicles will divert to the Thousand Oaks driveway since over 50% of vehicles exiting the shopping center use this driveway under current conditions.

Attachment A to this report provides further information regarding Collision Analysis, Traffic Operations Analysis under current and proposed conditions, LOS analysis, Queueing Analysis.

RECOMMENDATION

Staff respectfully recommends the City Council provide feedback and direction regarding the installation of signing and striping to restrict a left turn movement exiting the Twin Oaks Plaza as described in this report. No formal action is required of the City Council in order for the City Engineer to direct striping and signage in the public right-of-way.

Attachment A: Analysis of Driveways at 5827 Kanan Road



ANALYSIS OF DRIVEWAYS AT 5827 KANAN ROAD

Laura Forinash, P.E., T.E. - City Traffic Engineer
Charis Ahn, EIT – Kimley-Horn and Associates

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Introduction

In March 2021, a resident contacted the City of Agoura Hills regarding the frequency of collisions at the intersection of Kanan Road and the full access Twin Oaks Plaza driveway (“Starbucks driveway”). The resident shared information of an incident that occurred in October 2019 where a driver traveling southbound on Kanan Road collided with her as she was making an eastbound left-turn out of the Starbucks driveway onto northbound Kanan Road. The resident is concerned with safety at the intersection and requests the City make improvements to the Starbucks driveway.

Kanan Road is a north/south arterial road with two lanes in each direction and a posted speed limit of 40 miles per hour. Three driveways provide full access to the Twin Oaks Shopping Center (See **Figure 1**). The Starbucks driveway connects Kanan Road with the Twin Oaks Shopping Center. The Starbucks driveway permits full access and has one outbound lane and one receiving lane.

The purpose of this memorandum is to determine if improvements are needed at the Starbucks driveway and the potential impacts of driveway modifications to traffic circulation. This study examined the collision history at the three driveways to the Twin Oaks Shopping Center and analyzed the impact on traffic operations at the Kanan Road and Thousand Oaks intersection if the eastbound left-turn movement out of the Starbucks driveway is restricted.



Figure 1 - Vicinity Map of Three Full Access Driveways at Twin Oaks Shopping Center

Collision Analysis

The L.A. County Sheriff's Department Collision Summary Report was reviewed for collisions that occurred between September 2016 and September 2021, during which time fifteen (15) collisions were reported at the intersection of Kanan Road and the Starbucks driveway see **Figure 2**. The October 2019 collision cited in the resident's initial inquiry was included in the LA County Sheriff's Department Collision Summary Report (919-05983-2227-471).

Additionally, a collision history was collected at the two other Twin Oak Shopping Center driveways. At the Kanan Road and Yum Yum Donuts driveway, two (2) collisions occurred over the last five years (see **Figure 2**), and at the Thousand Oaks Boulevard driveway, three (3) collisions occurred over the last five years (see **Figure 3**).

Striping improvements were made at the intersection of Kanan Road and the Starbucks driveway in August 2019. "Keep Clear" pavement markings were installed to discourage southbound drivers from blocking the intersection and high visibility green pavement markings were added to the existing southbound bike lane in front of the Starbucks driveway. To review the impact of these changes on the rate of collisions at the intersection, the number of collisions in the year preceding the changes (August 2018 to August 2019) and the year following the changes (August 2019 to August 2020) was compared. There were two (2) collisions during each time period. Although no changes in the collision rate were observed, the intersection should continue to be monitored over time to assess the effectiveness of the changes.

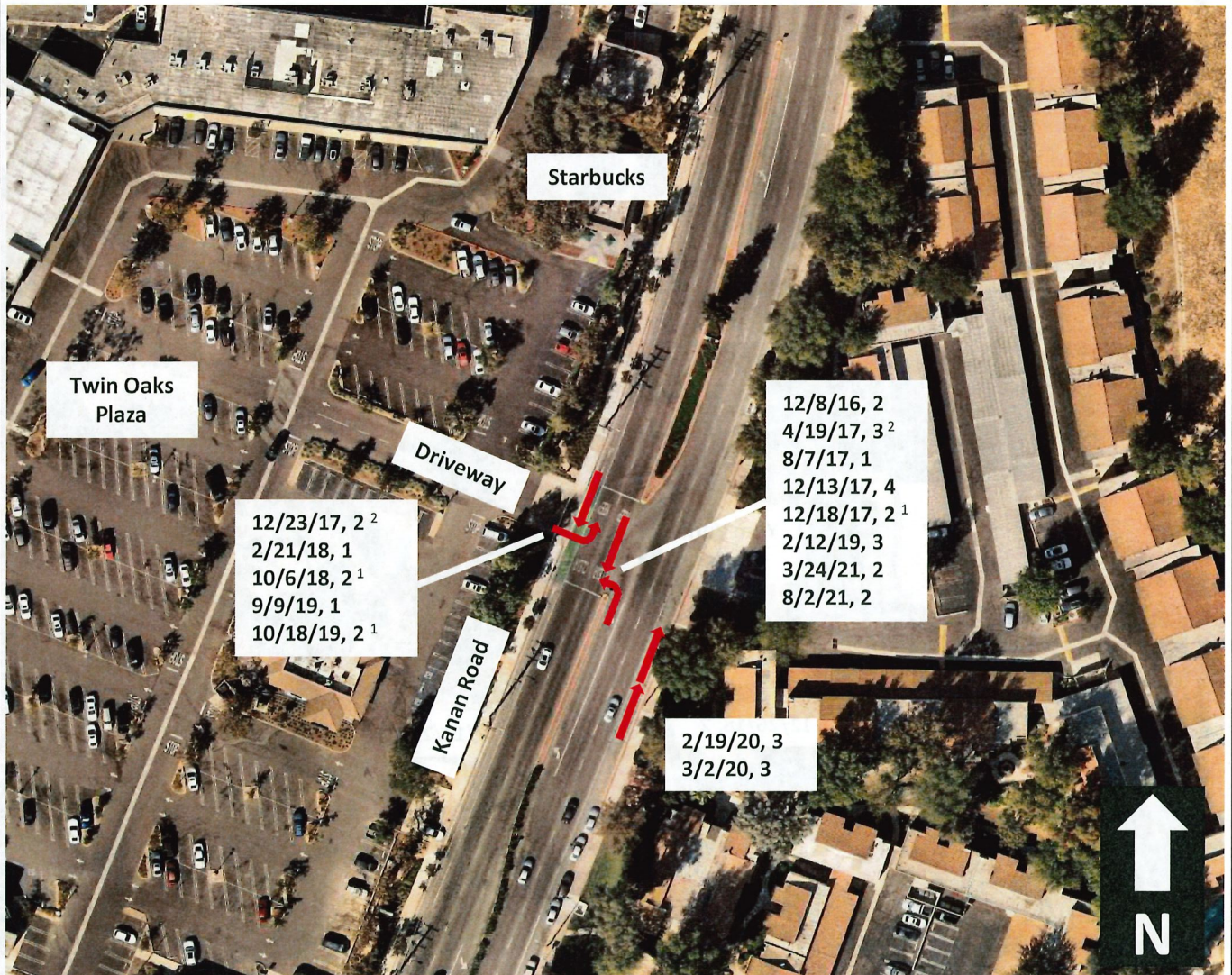
Restricting eastbound left-turns out of the Starbucks driveway onto Kanan Road would likely reduce left-turn related collisions at the intersection. However, the restriction in access at the driveway may cause an increase in left-turn collisions at other nearby intersections due to vehicles being diverted to adjacent intersections to access Kanan Road.

LA County Sheriff's Department Collision Reports are included in **Appendix A**.

Collision Diagram

Horizontal Street: Starbucks Driveway
 Vertical Street: Kanan Road

From: 9/14/2016
 To: 9/14/2021



¹ 3 vehicles were involved

² Bicycle involved

Legend

Vehicle Direction

Number of Collisions

7 Property Damage Only

8 Injury/Complaint of Pain

15 Total Collisions

Type of Collision

1. Auto R/W Violation
2. Improper Turning
3. Unsafe Speed
4. Driving Under Influence
5. Unsafe Lane Change

Figure 2. Collision Diagram for Starbucks Driveway and Kanan Road

Collision Diagram

Horizontal Street: Yum Yum Donuts Driveway
 Vertical Street: Kanan Road

From: 9/14/2016
 To: 9/14/2021



¹ 3 vehicles were involved
² Bicycle involved

Legend

 Vehicle Direction

Number of Collisions

2 Property Damage Only
0 Injury/Complaint of Pain
2 Total Collisions

Type of Collision

1. Auto R/W Violation
2. Improper Turning
3. Unsafe Speed
4. Driving Under Influence
5. Unsafe Lane Change

Figure 3. Collision Diagram for Yum Yum Donuts Driveway and Kanan Road

Collision Diagram

Horizontal Street: Thousand Oaks Driveway
 Vertical Street: Kanan Road

From: 10/13/2016
 To: 10/13/2021



¹ 3 vehicles were involved

² Bicycle involved

Legend

Vehicle Direction

Number of Collisions

3 Property Damage Only

0 Injury/Complaint of Pain

3 Total Collisions

Type of Collision

1. Auto R/W Violation
2. Improper Turning
3. Unsafe Speed
4. Driving Under Influence
5. Unsafe Lane Change

Figure 4. Collision Diagram for Thousand Oaks Blvd Driveway and Thousand Oaks Blvd

Traffic Operations Analysis

A traffic analysis was performed to assess whether restricting left-turns at the Starbucks driveway onto Kanan Road would impact the operations of the adjacent signalized intersection of Kanan Road and Thousand Oaks Boulevard.

Existing Conditions

The existing condition at the intersection of Kanan Road and the Starbucks driveway consists of permitting eastbound left, through and right-turns from the driveway. Currently, drivers can enter the Starbucks driveway from Kanan Road using the dedicated northbound left-turn lane or turning southbound right.

Existing conditions were established by using the City's Synchro traffic model with existing traffic volumes at the intersection of Kanan Road and Thousand Oaks Boulevard. Existing traffic volumes were collected at all three Twin Oaks Plaza driveways by Aim Traffic Data on September 28, 2021. In the Existing conditions, the Starbucks driveway has 5 eastbound left-turns in the AM Peak hour and 17 eastbound left-turns the PM Peak hour.

Between the three driveways that provide access to the Twin Oaks Shopping Center, the existing egress traffic distribution is split as follows: 29% at the Starbucks driveway, 16% at the Yum Yum Donuts driveway, and 55% at the Thousand Oaks driveway, while the existing ingress traffic distribution is split as follows: 44% at the Starbucks driveway, 18% at the Yum Yum Donuts driveway, and 38% at the Thousand Oaks driveway (see **Figure 5**). The Starbucks driveway is most frequently used by vehicles entering the shopping center, while the Thousand Oaks driveway is most frequently used by vehicles exiting. Drivers entering and existing the shopping center use the Yum Yum Donuts driveway significantly less compared to the Starbucks and Thousand Oaks driveways.

Proposed Conditions

The proposed condition consists of prohibiting eastbound left and through movements and only allowing right-turns out of the Starbucks driveway. An intersection operations and queue length analysis were performed, and data sheets are included in **Appendix B**.

Prohibiting left-turns from the Starbucks driveway would cause drivers to use various alternative routes to arrive at northbound Kanan Road. There are three (3) detours drivers would likely take if eastbound left-turns are prohibited. These detours include:

1. Making an eastbound left out of the shopping center's northernmost driveway near Yum Yum Donuts onto Kanan Road.
2. Making a southbound left out of the shopping center's southern driveway onto Thousand Oaks Boulevard and making an eastbound left at Kanan Road and Thousand Oaks Boulevard.
3. Making an eastbound right-turn out of the Starbucks driveway and making a southbound U-Turn at the intersection of Kanan Road and Thousand Oaks Boulevard.

Driveway Traffic Distribution



Figure 5. Twin Oaks Shopping Center Driveways – Traffic Distribution

Figure 6 shows the route for Detours 1, 2, and 3. Detours 2 and 3 divert through the intersection of Kanan Road and Thousand Oaks Boulevard increasing the number of vehicles at the signalized intersection.



Level of Service

Traffic operations at the signalized intersection of Kanan Road and Thousand Oaks Boulevard were evaluated for Existing and Proposed conditions during weekday AM and PM peak hours. To analyze the effect of the potential detours at the intersection of Thousand Oaks Boulevard and Kanan Road, the following two (2) scenarios were analyzed for the Proposed conditions:

- Scenario 1: 100% of the Starbucks driveway left-turn egress vehicles diverted to the eastbound left-turn at the Kanan Road and Thousand Oaks Boulevard intersection (Detour 2 in **Figure 6**).
- Scenario 2: 100% of the Starbucks driveway left-turn egress vehicles diverted to the southbound U-turn at the Kanan Road and Thousand Oaks Boulevard intersection (Detour 3 in **Figure 6**).

The results of the Existing and Proposed conditions analyses are presented in **Table 1**.

Table 1 - Existing & Proposed Conditions Level of Service

Intersection	AM Peak Hour						PM Peak Hour					
	Existing		Scenario 1 (Detour 2)		Scenario 2 (Detour 3)		Existing		Scenario 1 (Detour 2)		Scenario 2 (Detour 3)	
	LOS	Delay, sec.	LOS	Delay, sec.	LOS	Delay, sec.	LOS	Delay, sec.	LOS	Delay, sec.	LOS	Delay, Sec.
Kanan Rd & Thousand Oaks Blvd	E	59.3	E	59.4	E	61.6	E	57.7	E	58.0	E	66.5

If eastbound left-turn egress movement was restricted at the Starbucks driveway and 100% of those vehicles were diverted to the eastbound left-turn at Kanan Road & Thousand Oaks Boulevard, the delay at the intersection of Kanan Road and Thousand Oaks Boulevard would increase by 0.1 seconds per vehicle in the AM peak period and 0.3 seconds per vehicle in the PM Peak period as shown in **Table 1**.

If 100% of the existing eastbound left-turn vehicles at the Starbucks driveway were diverted to the southbound U-turns at Kanan Road & Thousand Oaks Boulevard, the delay at the intersection of Kanan Road and Thousand Oaks Boulevard would increase by 2.3 seconds per vehicle in the AM peak period and 8.8 seconds per vehicle in the PM peak period. Restricting left-turns at the Starbucks driveway would not degrade the level of service (LOS) in either the AM or PM Peak hours.

This study analyzed two scenarios to understand the impact of the worst-case scenario where 100% of vehicles are detoured to a single movement at the intersection of Kanan Road and Thousand Oaks Boulevard. However, the 5 AM peak hour trips and 14 weekday PM peak hour trips will likely distribute evenly across the three (3) detour routes causing negligible impacts to traffic operations intersection of Kanan Road and Thousand Oaks Boulevard.

Queueing Analysis

A queue length analysis was conducted to assess whether the existing turn pocket lengths (i.e., storage) are sufficient, if through queues are blocking access to adjacent turn pockets, and if there is queue spillback to upstream intersections. For this analysis, 95th percentile queue lengths were measured using Synchro.

95th percentile queue lengths for the southbound left-turn lane and eastbound left-turn lane at the intersection of Kanan Road and Thousand Oaks Boulevard were analyzed for existing and proposed conditions and are documented in **Table 2**.

Table 2 - Existing & Proposed Conditions Queue Lengths

Intersection Movement	Storage, cars	AM Peak Hour			PM Peak Hour		
		Existing	Scenario 1 (Detour 2)	Scenario 2 (Detour 3)	Existing	Scenario 1 (Detour 2)	Scenario 2 (Detour 3)
		Queue, cars	Queue, cars	Queue, cars	Queue, cars	Queue, cars	Queue, cars
Southbound Left	8	11	11	11	14	14	16
Eastbound Left	8	6	6	6	8	8	8

XXX = 95th percentile queue exceeds available storage

Table 2 shows that the restriction of eastbound left-turns at the intersection of Kanan Road and the Starbucks driveway would cause the 95th percentile southbound left-turn queue length at the intersection of Kanan Road and Thousand Oaks Boulevard to increase from 14 cars to 16 cars during the PM peak hour. The AM and PM peak hour 95th percentile queues would exceed the available storage under both existing conditions and restricting the eastbound left-turn movement conditions. The increased queue lengths could cause vehicles to spill out of the southbound left-turn lane into the through lanes on Kanan Road.

This study analyzed two scenarios to understand the impact of the worst-case scenario where 100% of vehicles are detoured to a single movement at the intersection of Kanan Road and Thousand Oaks Boulevard. However, the 5 AM peak hour trips and 14 weekday PM peak hour trips will likely distribute evenly across the three (3) detour routes causing negligible impacts to traffic operations at the intersection of intersection of Kanan Road and Thousand Oaks Boulevard.

Conclusions and Recommendations

The purpose of this memorandum is to determine if improvements are needed at the Starbucks driveway and the potential impacts of driveway modifications to traffic circulation on the adjacent road network. This study examined the collision history at the three driveways to the Twin Oaks Shopping Center and analyzed the impact on traffic operations at the Kanan Road and Thousand Oaks intersection if the eastbound left-turn movement out of the Starbucks driveway is restricted.

While the northbound left-turn movement into the Starbucks has more collisions than the eastbound left-turn movement, the eastbound egress movement has a higher rate of collisions. Kimley-Horn recommends continuing an incremental approach to improving the Starbucks driveway. As previously mentioned, the "Keep Clear" pavement markings were installed in 2019. The next recommended incremental improvement is to restrict the eastbound left-turn movement out of the Starbucks driveway through signing and pavement marking improvements. Kimley-Horn recommends the installation of a right-turn arrow pavement marking on the Starbucks driveway approach and a RIGHT TURN ONLY (R3-5R) sign. Future modifications may include delineators or modifications to the median to prevent not only the eastbound left-turn movement, but also the northbound left-turn movement. Kimley-Horn recommends this driveway be considered in the ongoing Kanan Road Corridor Safety, Operations, and Capacity Enhancement Project.

The restriction of the eastbound left-turn movement from the Starbucks driveway is expected to have a minimal impact to traffic operations at the signalized intersection of Kanan Road and Thousand Oaks Boulevard. This study found the worst-case scenario for traffic operations is if all vehicles are diverted to the southbound U-turn movement at Kanan Road and Thousand Oaks Boulevard (i.e., Detour 3). This study found that Detour 3 is anticipated to increase vehicle delay by 2.3 seconds per vehicle in the AM peak period and 8.8 seconds per vehicle in the PM peak period. The LOS is not expected to degrade as a result of restricting the eastbound left-turn movement. For Detour 3, the queue length at the intersection of Kanan Road and Thousand Oaks Boulevard is expected to increase from 14 cars to 16 cars during the PM peak hour. It is important to note the diversion of 100% of exiting vehicles to the southbound U-turn movement is highly unlikely. It is expected most vehicles will divert to the Thousand Oaks driveway since over 50% of vehicles exiting the shopping center use this driveway.

Appendix A: Collision Reports

Appendix B: Synchro Reports

Queues

17: Kanan Road & Thousand Oaks Boulevard

10/18/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	209	498	217	378	171	117	1182	297	102	1353	118
v/c Ratio	0.77	0.77	0.95	0.46	0.36	0.95	0.78	0.41	2.32	0.75	0.14
Control Delay	86.6	63.2	112.6	50.8	13.3	130.8	37.9	21.8	665.6	23.8	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	86.6	63.2	112.6	50.8	13.3	130.8	37.9	21.8	665.6	23.8	8.2
Queue Length 50th (ft)	105	235	213	167	25	119	514	115	~166	209	2
Queue Length 95th (ft)	147	285	#373	213	88	#242	368	150	m#269	404	m43
Internal Link Dist (ft)		998		280			711			328	
Turn Bay Length (ft)	180		210		100	150		100	190		100
Base Capacity (vph)	343	804	236	931	514	123	1509	732	44	1794	845
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.62	0.92	0.41	0.33	0.95	0.78	0.41	2.32	0.75	0.14

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.































Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

17: Kanan Road & Thousand Oaks Boulevard

10/15/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations	 	 		 	 		 	 			 	 
Traffic Volume (vph)	192	354	104	200	348	157	108	1087	273	5	89	1245
Future Volume (vph)	192	354	104	200	348	157	108	1087	273	5	89	1245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.5	4.0	4.5	4.5		4.0	4.5
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00		1.00	0.95
Flt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85		1.00	1.00
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	3433	3419		1770	3539	1583	1770	3539	1583		1593	3539
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.18	1.00
Satd. Flow (perm)	3433	3419		1770	3539	1583	1770	3539	1583		298	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	209	385	113	217	378	171	117	1182	297	5	97	1353
RTOR Reduction (vph)	0	20	0	0	0	107	0	0	57	0	0	0
Lane Group Flow (vph)	209	478	0	217	378	64	117	1182	240	0	102	1353
Parking (#/hr)												0
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	custom	Prot	NA
Protected Phases	3	8		7	4		5	2			1	6
Permitted Phases						4			2	1		
Actuated Green, G (s)	12.8	27.2		20.3	34.7	34.7	11.5	64.0	64.0		23.5	76.0
Effective Green, g (s)	11.8	27.7		19.3	35.2	34.7	10.5	64.0	64.0		22.5	76.0
Actuated g/C Ratio	0.08	0.18		0.13	0.23	0.23	0.07	0.43	0.43		0.15	0.51
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5		3.0	4.5
Vehicle Extension (s)	1.5	4.0		1.5	4.0	4.0	1.5	4.5	4.5		1.5	4.5
Lane Grp Cap (vph)	270	631		227	830	366	123	1509	675		44	1793
v/s Ratio Prot	0.06	c0.14		c0.12	0.11		c0.07	c0.33				0.38
v/s Ratio Perm						0.04			0.15		c0.34	
v/c Ratio	0.77	0.76		0.96	0.46	0.18	0.95	0.78	0.36		2.32	0.75
Uniform Delay, d1	67.8	58.0		64.9	49.2	46.2	69.5	37.0	29.1		63.8	29.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.96	0.91	1.05		1.33	0.70
Incremental Delay, d2	11.9	5.5		46.7	0.5	0.3	62.1	3.8	1.3		640.5	2.1
Delay (s)	79.7	63.5		111.6	49.7	46.5	128.6	37.5	31.8		725.5	22.8
Level of Service	E	E		F	D	D	F	D	C		F	C
Approach Delay (s)		68.3			66.5			43.1				68.3
Approach LOS		E			E			D				E
Intersection Summary												
HCM 2000 Control Delay			59.3		HCM 2000 Level of Service				E			
HCM 2000 Volume to Capacity ratio			1.06									
Actuated Cycle Length (s)			150.0		Sum of lost time (s)				16.5			
Intersection Capacity Utilization			78.3%		ICU Level of Service				D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 17: Kanan Road & Thousand Oaks Boulevard

10/15/2021

Movement	SBR
Lamp Configurations	
Traffic Volume (vph)	109
Future Volume (vph)	109
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.5
Lane Util. Factor	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1583
Flt Permitted	1.00
Satd. Flow (perm)	1583
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	118
RTOR Reduction (vph)	43
Lane Group Flow (vph)	75
Parking (#/hr)	
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	76.0
Effective Green, g (s)	76.0
Actuated g/C Ratio	0.51
Clearance Time (s)	4.5
Vehicle Extension (s)	4.5
Lane Grp Cap (vph)	802
v/s Ratio Prot	
v/s Ratio Perm	0.05
v/c Ratio	0.09
Uniform Delay, d1	19.2
Progression Factor	1.12
Incremental Delay, d2	0.2
Delay (s)	21.6
Level of Service	C
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues

17: Kanan Road & Thousand Oaks Boulevard

10/18/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	292	326	136	147	118	145	1060	165	131	941	177
v/c Ratio	0.83	0.68	0.82	0.41	0.45	0.81	0.52	0.18	2.30	0.46	0.19
Control Delay	85.8	46.7	100.7	65.4	15.0	109.9	9.8	3.8	660.6	19.5	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	85.8	46.7	100.7	65.4	15.0	109.9	9.8	3.8	660.6	19.5	11.4
Queue Length 50th (ft)	146	101	133	72	0	132	92	5	~210	208	32
Queue Length 95th (ft)	195	151	204	105	60	201	190	24	#349	430	118
Internal Link Dist (ft)		998		280			738			328	
Turn Bay Length (ft)	180		210		100	150		100	190		100
Base Capacity (vph)	434	855	224	813	450	248	2023	933	57	2066	954
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.38	0.61	0.18	0.26	0.58	0.52	0.18	2.30	0.46	0.19

Intersection Summary























~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

17: Kanan Road & Thousand Oaks Boulevard

10/15/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	
Lane Configurations													
Traffic Volume (vph)	269	168	132	125	135	109	133	975	152	18	102	866	
Future Volume (vph)	269	168	132	125	135	109	133	975	152	18	102	866	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0		4.0	4.0	4.5	4.0	4.5	4.5		4.0	4.5	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00		1.00	0.95	
Flt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3306		1770	3539	1583	1770	3539	1583		1770	3539	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.27	1.00	
Satd. Flow (perm)	3433	3306		1770	3539	1583	1770	3539	1583		503	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	292	183	143	136	147	118	145	1060	165	20	111	941	
RTOR Reduction (vph)	0	110	0	0	0	106	0	0	28	0	0	0	
Lane Group Flow (vph)	292	216	0	136	147	12	145	1060	137	0	131	941	
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	custom	Prot	NA	
Protected Phases	3	8		7	4		5	2			1	6	
Permitted Phases						4			2	1			
Actuated Green, G (s)	16.4	16.2		15.1	14.9	14.9	16.2	85.7	85.7		18.0	87.5	
Effective Green, g (s)	15.4	16.7		14.1	15.4	14.9	15.2	85.7	85.7		17.0	87.5	
Actuated g/C Ratio	0.10	0.11		0.09	0.10	0.10	0.10	0.57	0.57		0.11	0.58	
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5		3.0	4.5	
Vehicle Extension (s)	1.5	4.0		1.5	4.0	4.0	1.5	4.5	4.5		1.5	4.5	
Lane Grp Cap (vph)	352	368		166	363	157	179	2021	904		57	2064	
v/s Ratio Prot	c0.09	c0.07		0.08	0.04		c0.08	c0.30				0.27	
v/s Ratio Perm						0.01			0.09		c0.26		
v/c Ratio	0.83	0.59		0.82	0.40	0.07	0.81	0.52	0.15		2.30	0.46	
Uniform Delay, d1	66.0	63.4		66.7	63.0	61.3	66.0	19.7	15.1		66.5	17.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.25	0.43	0.34		0.89	0.96	
Incremental Delay, d2	14.2	2.8		24.8	1.0	0.3	20.0	0.9	0.3		634.7	0.7	
Delay (s)	80.2	66.2		91.5	64.0	61.6	102.4	9.3	5.4		693.6	17.7	
Level of Service	F	E		F	E	E	F	A	A		F	B	
Approach Delay (s)		72.8			72.6			18.7				88.2	
Approach LOS		E			E			B				F	
Intersection Summary													
HCM 2000 Control Delay			57.7									HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			0.82										
Actuated Cycle Length (s)			150.0									Sum of lost time (s)	16.5
Intersection Capacity Utilization			63.2%									ICU Level of Service	B
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 17: Kanan Road & Thousand Oaks Boulevard

10/15/2021

Movement	SBR
Lane Configurations	T
Traffic Volume (vph)	163
Future Volume (vph)	163
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.5
Lane Util. Factor	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1583
Flt Permitted	1.00
Satd. Flow (perm)	1583
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	177
RTOR Reduction (vph)	30
Lane Group Flow (vph)	147
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	87.5
Effective Green, g (s)	87.5
Actuated g/C Ratio	0.58
Clearance Time (s)	4.5
Vehicle Extension (s)	4.5
Lane Grp Cap (vph)	923
v/s Ratio Prot	
v/s Ratio Perm	0.09
v/c Ratio	0.16
Uniform Delay, d1	14.4
Progression Factor	1.03
Incremental Delay, d2	0.4
Delay (s)	15.2
Level of Service	B
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues

17: Kanan Road & Thousand Oaks Boulevard

10/18/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	214	498	217	378	171	117	1182	297	102	1353	118
v/c Ratio	0.78	0.77	0.95	0.46	0.36	0.95	0.78	0.41	2.32	0.75	0.14
Control Delay	87.0	63.2	112.6	50.9	13.4	130.8	37.9	21.8	665.6	23.8	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	87.0	63.2	112.6	50.9	13.4	130.8	37.9	21.8	665.6	23.8	8.2
Queue Length 50th (ft)	107	235	213	168	25	119	514	115	~166	209	2
Queue Length 95th (ft)	151	285	#373	213	88	#242	368	150	m#269	404	m43
Internal Link Dist (ft)		998		280			711			328	
Turn Bay Length (ft)	180		210		100	150		100	190		100
Base Capacity (vph)	343	804	236	931	514	123	1509	732	44	1794	845
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.62	0.92	0.41	0.33	0.95	0.78	0.41	2.32	0.75	0.14

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.























95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
 17: Kanan Road & Thousand Oaks Boulevard

10/15/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	
Lane Configurations													
Traffic Volume (vph)	197	354	104	200	348	157	108	1087	273	5	89	1245	
Future Volume (vph)	197	354	104	200	348	157	108	1087	273	5	89	1245	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0		4.0	4.0	4.5	4.0	4.5	4.5		4.0	4.5	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00		1.00	0.95	
Fr _t	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85		1.00	1.00	
Fl _t Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3419		1770	3539	1583	1770	3539	1583		1593	3539	
Fl _t Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.18	1.00	
Satd. Flow (perm)	3433	3419		1770	3539	1583	1770	3539	1583		298	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	214	385	113	217	378	171	117	1182	297	5	97	1353	
RTOR Reduction (vph)	0	20	0	0	0	107	0	0	57	0	0	0	
Lane Group Flow (vph)	214	478	0	217	378	64	117	1182	240	0	102	1353	
Parking (#/hr)												0	
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	custom	Prot	NA	
Protected Phases	3	8		7	4		5	2			1	6	
Permitted Phases						4			2	1			
Actuated Green, G (s)	13.0	27.2		20.3	34.5	34.5	11.5	64.0	64.0		23.5	76.0	
Effective Green, g (s)	12.0	27.7		19.3	35.0	34.5	10.5	64.0	64.0		22.5	76.0	
Actuated g/C Ratio	0.08	0.18		0.13	0.23	0.23	0.07	0.43	0.43		0.15	0.51	
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5		3.0	4.5	
Vehicle Extension (s)	1.5	4.0		1.5	4.0	4.0	1.5	4.5	4.5		1.5	4.5	
Lane Grp Cap (vph)	274	631		227	825	364	123	1509	675		44	1793	
v/s Ratio Prot	0.06	c0.14		c0.12	0.11		c0.07	c0.33				0.38	
v/s Ratio Perm						0.04			0.15		c0.34		
v/c Ratio	0.78	0.76		0.96	0.46	0.18	0.95	0.78	0.36		2.32	0.75	
Uniform Delay, d ₁	67.7	58.0		64.9	49.4	46.3	69.5	37.0	29.1		63.8	29.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.96	0.91	1.05		1.33	0.70	
Incremental Delay, d ₂	12.5	5.5		46.7	0.6	0.3	62.1	3.8	1.3		640.5	2.1	
Delay (s)	80.2	63.5		111.6	49.9	46.7	128.6	37.5	31.8		725.5	22.8	
Level of Service	F	E		F	D	D	F	D	C		F	C	
Approach Delay (s)		68.5			66.7			43.1				68.3	
Approach LOS		E			E			D				E	
Intersection Summary													
HCM 2000 Control Delay			59.4									HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			1.06										
Actuated Cycle Length (s)			150.0									Sum of lost time (s)	16.5
Intersection Capacity Utilization			78.3%									ICU Level of Service	D
Analysis Period (min)			15										
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis
 17: Kanan Road & Thousand Oaks Boulevard

10/15/2021

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	109
Future Volume (vph)	109
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.5
Lane Util. Factor	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1583
Flt Permitted	1.00
Satd. Flow (perm)	1583
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	118
RTOR Reduction (vph)	43
Lane Group Flow (vph)	75
Parking (#/hr)	
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	76.0
Effective Green, g (s)	76.0
Actuated g/C Ratio	0.51
Clearance Time (s)	4.5
Vehicle Extension (s)	4.5
Lane Grp Cap (vph)	802
v/s Ratio Prot	
v/s Ratio Perm	0.05
v/c Ratio	0.09
Uniform Delay, d1	19.2
Progression Factor	1.12
Incremental Delay, d2	0.2
Delay (s)	21.6
Level of Service	C
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues

17: Kanan Road & Thousand Oaks Boulevard

10/18/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	311	326	136	147	118	145	1060	165	131	941	177
v/c Ratio	0.85	0.68	0.82	0.42	0.46	0.81	0.52	0.18	2.30	0.46	0.19
Control Delay	87.0	46.4	100.7	66.1	15.3	109.8	9.9	3.8	660.6	19.5	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	87.0	46.4	100.7	66.1	15.3	109.8	9.9	3.8	660.6	19.5	11.4
Queue Length 50th (ft)	156	101	133	72	0	132	92	5	~210	208	32
Queue Length 95th (ft)	207	151	204	105	60	201	190	24	#349	430	118
Internal Link Dist (ft)		998		280			738			328	
Turn Bay Length (ft)	180		210		100	150		100	190		100
Base Capacity (vph)	434	855	224	813	450	248	2020	931	57	2062	952
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.38	0.61	0.18	0.26	0.58	0.52	0.18	2.30	0.46	0.19




























Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
 17: Kanan Road & Thousand Oaks Boulevard

10/15/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations	 	 			 			 				 
Traffic Volume (vph)	286	168	132	125	135	109	133	975	152	18	102	866
Future Volume (vph)	286	168	132	125	135	109	133	975	152	18	102	866
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.5	4.0	4.5	4.5		4.0	4.5
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00		1.00	0.95
Flt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85		1.00	1.00
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	3433	3306		1770	3539	1583	1770	3539	1583		1770	3539
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.27	1.00
Satd. Flow (perm)	3433	3306		1770	3539	1583	1770	3539	1583		503	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	311	183	143	136	147	118	145	1060	165	20	111	941
RTOR Reduction (vph)	0	110	0	0	0	107	0	0	28	0	0	0
Lane Group Flow (vph)	311	216	0	136	147	11	145	1060	137	0	131	941
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	custom	Prot	NA
Protected Phases	3	8		7	4		5	2			1	6
Permitted Phases						4			2	1		
Actuated Green, G (s)	17.0	16.3		15.1	14.4	14.4	16.2	85.6	85.6		18.0	87.4
Effective Green, g (s)	16.0	16.8		14.1	14.9	14.4	15.2	85.6	85.6		17.0	87.4
Actuated g/C Ratio	0.11	0.11		0.09	0.10	0.10	0.10	0.57	0.57		0.11	0.58
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5		3.0	4.5
Vehicle Extension (s)	1.5	4.0		1.5	4.0	4.0	1.5	4.5	4.5		1.5	4.5
Lane Grp Cap (vph)	366	370		166	351	151	179	2019	903		57	2062
v/s Ratio Prot	c0.09	c0.07		0.08	0.04		c0.08	c0.30				0.27
v/s Ratio Perm						0.01			0.09		c0.26	
v/c Ratio	0.85	0.58		0.82	0.42	0.08	0.81	0.53	0.15		2.30	0.46
Uniform Delay, d1	65.8	63.3		66.7	63.5	61.7	66.0	19.7	15.1		66.5	17.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.25	0.43	0.34		0.89	0.96
Incremental Delay, d2	16.0	2.8		24.8	1.1	0.3	20.0	0.9	0.3		634.7	0.7
Delay (s)	81.8	66.0		91.5	64.6	62.0	102.3	9.4	5.4		693.6	17.7
Level of Service	F	E		F	E	E	F	A	A		F	B
Approach Delay (s)		73.7			73.0			18.7				88.3
Approach LOS		E			E			B				F
Intersection Summary												
HCM 2000 Control Delay			58.0		HCM 2000 Level of Service				E			
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			150.0		Sum of lost time (s)				16.5			
Intersection Capacity Utilization			63.2%		ICU Level of Service				B			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 17: Kanan Road & Thousand Oaks Boulevard

10/15/2021

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	163
Future Volume (vph)	163
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.5
Lane Util. Factor	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1583
Flt Permitted	1.00
Satd. Flow (perm)	1583
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	177
RTOR Reduction (vph)	30
Lane Group Flow (vph)	147
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	87.4
Effective Green, g (s)	87.4
Actuated g/C Ratio	0.58
Clearance Time (s)	4.5
Vehicle Extension (s)	4.5
Lane Grp Cap (vph)	922
v/s Ratio Prot	
v/s Ratio Perm	0.09
v/c Ratio	0.16
Uniform Delay, d1	14.4
Progression Factor	1.03
Incremental Delay, d2	0.4
Delay (s)	15.3
Level of Service	B
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues

17: Kanan Road & Thousand Oaks Boulevard

10/18/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	209	498	217	378	171	117	1182	297	108	1353	118
v/c Ratio	0.77	0.77	0.95	0.46	0.36	0.95	0.78	0.41	2.45	0.75	0.14
Control Delay	86.6	63.2	112.6	50.8	13.3	130.8	37.9	21.8	723.4	23.8	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	86.6	63.2	112.6	50.8	13.3	130.8	37.9	21.8	723.4	23.8	8.2
Queue Length 50th (ft)	105	235	213	167	25	119	514	115	~179	209	2
Queue Length 95th (ft)	147	285	#373	213	88	#242	368	150	m#285	404	m43
Internal Link Dist (ft)		998		280			711			328	
Turn Bay Length (ft)	180		210		100	150		100	190		100
Base Capacity (vph)	343	804	236	931	514	123	1509	732	44	1794	845
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.62	0.92	0.41	0.33	0.95	0.78	0.41	2.45	0.75	0.14

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
 17: Kanan Road & Thousand Oaks Boulevard

10/15/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations	↖↗	↖↗		↖	↖↗	↖	↖	↖↗	↖		↖	↖↗
Traffic Volume (vph)	192	354	104	200	348	157	108	1087	273	10	89	1245
Future Volume (vph)	192	354	104	200	348	157	108	1087	273	10	89	1245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.5	4.0	4.5	4.5		4.0	4.5
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00		1.00	0.95
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85		1.00	1.00
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	3433	3419		1770	3539	1583	1770	3539	1583		1593	3539
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.18	1.00
Satd. Flow (perm)	3433	3419		1770	3539	1583	1770	3539	1583		298	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	209	385	113	217	378	171	117	1182	297	11	97	1353
RTOR Reduction (vph)	0	20	0	0	0	107	0	0	57	0	0	0
Lane Group Flow (vph)	209	478	0	217	378	64	117	1182	240	0	108	1353
Parking (#/hr)												0
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	custom	Prot	NA
Protected Phases	3	8		7	4		5	2			1	6
Permitted Phases						4			2	1		
Actuated Green, G (s)	12.8	27.2		20.3	34.7	34.7	11.5	64.0	64.0		23.5	76.0
Effective Green, g (s)	11.8	27.7		19.3	35.2	34.7	10.5	64.0	64.0		22.5	76.0
Actuated g/C Ratio	0.08	0.18		0.13	0.23	0.23	0.07	0.43	0.43		0.15	0.51
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5		3.0	4.5
Vehicle Extension (s)	1.5	4.0		1.5	4.0	4.0	1.5	4.5	4.5		1.5	4.5
Lane Grp Cap (vph)	270	631		227	830	366	123	1509	675		44	1793
v/s Ratio Prot	0.06	c0.14		c0.12	0.11		c0.07	c0.33				0.38
v/s Ratio Perm						0.04			0.15		c0.36	
v/c Ratio	0.77	0.76		0.96	0.46	0.18	0.95	0.78	0.36		2.45	0.75
Uniform Delay, d1	67.8	58.0		64.9	49.2	46.2	69.5	37.0	29.1		63.8	29.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.96	0.91	1.05		1.33	0.70
Incremental Delay, d2	11.9	5.5		46.7	0.5	0.3	62.1	3.8	1.3		700.3	2.1
Delay (s)	79.7	63.5		111.6	49.7	46.5	128.6	37.5	31.8		785.4	22.8
Level of Service	E	E		F	D	D	F	D	C		F	C
Approach Delay (s)		68.3			66.5			43.1				74.9
Approach LOS		E			E			D				E

Intersection Summary

HCM 2000 Control Delay	61.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 17: Kanan Road & Thousand Oaks Boulevard

10/15/2021

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	109
Future Volume (vph)	109
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.5
Lane Util. Factor	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1583
Flt Permitted	1.00
Satd. Flow (perm)	1583
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	118
RTOR Reduction (vph)	43
Lane Group Flow (vph)	75
Parking (#/hr)	
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	76.0
Effective Green, g (s)	76.0
Actuated g/C Ratio	0.51
Clearance Time (s)	4.5
Vehicle Extension (s)	4.5
Lane Grp Cap (vph)	802
v/s Ratio Prot	
v/s Ratio Perm	0.05
v/c Ratio	0.09
Uniform Delay, d1	19.2
Progression Factor	1.12
Incremental Delay, d2	0.2
Delay (s)	21.6
Level of Service	C
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues

17: Kanan Road & Thousand Oaks Boulevard

10/18/2021






























Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	292	326	136	147	118	145	1060	165	149	941	177
v/c Ratio	0.83	0.68	0.82	0.41	0.45	0.81	0.52	0.18	2.61	0.46	0.19
Control Delay	85.8	46.7	100.7	65.4	15.0	109.9	9.8	3.8	796.2	19.5	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	85.8	46.7	100.7	65.4	15.0	109.9	9.8	3.8	796.2	19.5	11.4
Queue Length 50th (ft)	146	101	133	72	0	132	92	5	~248	209	32
Queue Length 95th (ft)	195	151	204	105	60	201	190	24	#390	430	118
Internal Link Dist (ft)		998		280			738			328	
Turn Bay Length (ft)	180		210		100	150		100	190		100
Base Capacity (vph)	434	855	224	813	450	248	2023	933	57	2066	954
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.38	0.61	0.18	0.26	0.58	0.52	0.18	2.61	0.46	0.19

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
 17: Kanan Road & Thousand Oaks Boulevard

10/15/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	
Lane Configurations	 	 			 			 				 	
Traffic Volume (vph)	269	168	132	125	135	109	133	975	152	35	102	866	
Future Volume (vph)	269	168	132	125	135	109	133	975	152	35	102	866	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0		4.0	4.0	4.5	4.0	4.5	4.5		4.0	4.5	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00		1.00	0.95	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3306		1770	3539	1583	1770	3539	1583		1770	3539	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.27	1.00	
Satd. Flow (perm)	3433	3306		1770	3539	1583	1770	3539	1583		503	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	292	183	143	136	147	118	145	1060	165	38	111	941	
RTOR Reduction (vph)	0	110	0	0	0	106	0	0	28	0	0	0	
Lane Group Flow (vph)	292	216	0	136	147	12	145	1060	137	0	149	941	
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	custom	Prot	NA	
Protected Phases	3	8		7	4		5	2			1	6	
Permitted Phases						4			2	1			
Actuated Green, G (s)	16.4	16.2		15.1	14.9	14.9	16.2	85.7	85.7		18.0	87.5	
Effective Green, g (s)	15.4	16.7		14.1	15.4	14.9	15.2	85.7	85.7		17.0	87.5	
Actuated g/C Ratio	0.10	0.11		0.09	0.10	0.10	0.10	0.57	0.57		0.11	0.58	
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5		3.0	4.5	
Vehicle Extension (s)	1.5	4.0		1.5	4.0	4.0	1.5	4.5	4.5		1.5	4.5	
Lane Grp Cap (vph)	352	368		166	363	157	179	2021	904		57	2064	
v/s Ratio Prot	c0.09	c0.07		0.08	0.04		c0.08	c0.30				0.27	
v/s Ratio Perm						0.01			0.09		c0.30		
v/c Ratio	0.83	0.59		0.82	0.40	0.07	0.81	0.52	0.15		2.61	0.46	
Uniform Delay, d1	66.0	63.4		66.7	63.0	61.3	66.0	19.7	15.1		66.5	17.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.25	0.43	0.34		0.89	0.96	
Incremental Delay, d2	14.2	2.8		24.8	1.0	0.3	20.0	0.9	0.3		773.4	0.7	
Delay (s)	80.2	66.2		91.5	64.0	61.6	102.4	9.3	5.4		832.4	17.7	
Level of Service	F	E		F	E	E	F	A	A		F	B	
Approach Delay (s)		72.8			72.6			18.7				113.1	
Approach LOS		E			E			B				F	
Intersection Summary													
HCM 2000 Control Delay			66.5	HCM 2000 Level of Service					E				
HCM 2000 Volume to Capacity ratio			0.86										
Actuated Cycle Length (s)			150.0	Sum of lost time (s)					16.5				
Intersection Capacity Utilization			64.1%	ICU Level of Service					C				
Analysis Period (min)			15										
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis
 17: Kanan Road & Thousand Oaks Boulevard

10/15/2021



Movement	SBR
Lane Configurations	T
Traffic Volume (vph)	163
Future Volume (vph)	163
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.5
Lane Util. Factor	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1583
Flt Permitted	1.00
Satd. Flow (perm)	1583
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	177
RTOR Reduction (vph)	30
Lane Group Flow (vph)	147
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	87.5
Effective Green, g (s)	87.5
Actuated g/C Ratio	0.58
Clearance Time (s)	4.5
Vehicle Extension (s)	4.5
Lane Grp Cap (vph)	923
v/s Ratio Prot	
v/s Ratio Perm	0.09
v/c Ratio	0.16
Uniform Delay, d1	14.4
Progression Factor	1.03
Incremental Delay, d2	0.4
Delay (s)	15.2
Level of Service	B
Approach Delay (s)	
Approach LOS	
Intersection Summary	