

APPENDIX D



MEMORANDUM

Date: October 5, 2010 **Project #:** 8477.0
To: Ron Mauck, Quad Knopf
From: Andy Daleiden, PE, John Ringert, PE, and Katie Pincus
Cc: Lisa Lozier, Shasta County and Brian Huffaker, Hawkins Companies
Project: Knighton & Churn Creek Commons Retail Center
Subject: Travel Centers of America Vehicle Circulation Analysis

Kittelison & Associates, Inc. (KAI) has prepared this memorandum describing the recommended circulation plan along Knighton Road between Interstate 5 (I-5) and Churn Creek Road-Pacheco Road for vehicles accessing the existing Travel Centers of America (TA) site and proposed Knighton & Churn Creek Commons Retail Center. This memorandum addresses the following items associated with the existing and proposed circulation plans.

- Background
- Knighton Road Circulation Plan
- Traffic Operations
- Conclusions

Background

The proposed site for the Knighton & Churn Creek Commons Retail Center is bordered by I-5 to the west, Churn Creek Road-Pacheco Road to the east, and Knighton Road to the south. An existing Travel Centers of America (TA) is located on the south side of Knighton Road, between Churn Creek Road-Pacheco Road and the I-5 Northbound Off-Ramp, directly across from the proposed retail center site. Four driveways on Knighton Road currently provide access to the TA. Figure 1 shows the study area.

Currently, an *Environmental Impact Report* (EIR) is being developed for the Knighton & Churn Creek Commons Retail Center per the California Environmental Quality Act (CEQA). As part of the proposed retail center project, a reconfiguration of the access points along Knighton Road is proposed to accommodate the site circulation for the proposed retail center, improve safety of Knighton Road from the existing access maneuvers, and provide more efficient circulation along Knighton Road. A key component of the proposed access configuration improvements is the installation of a new traffic signal that will serve the TA site and the proposed retail center.

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 - ACCESS STUDY AREA

STUDY AREA
SHASTA COUNTY, CALIFORNIA

FIGURE 1

Due to the reconfiguration of access on Knighton Road, KAI has reviewed the TA site and developed a circulation plan to address vehicular access to and from the site. The remainder of this memorandum discusses the existing and proposed circulation plan and resultant traffic operations with the proposed changes.

Knighton Road Circulation Plan

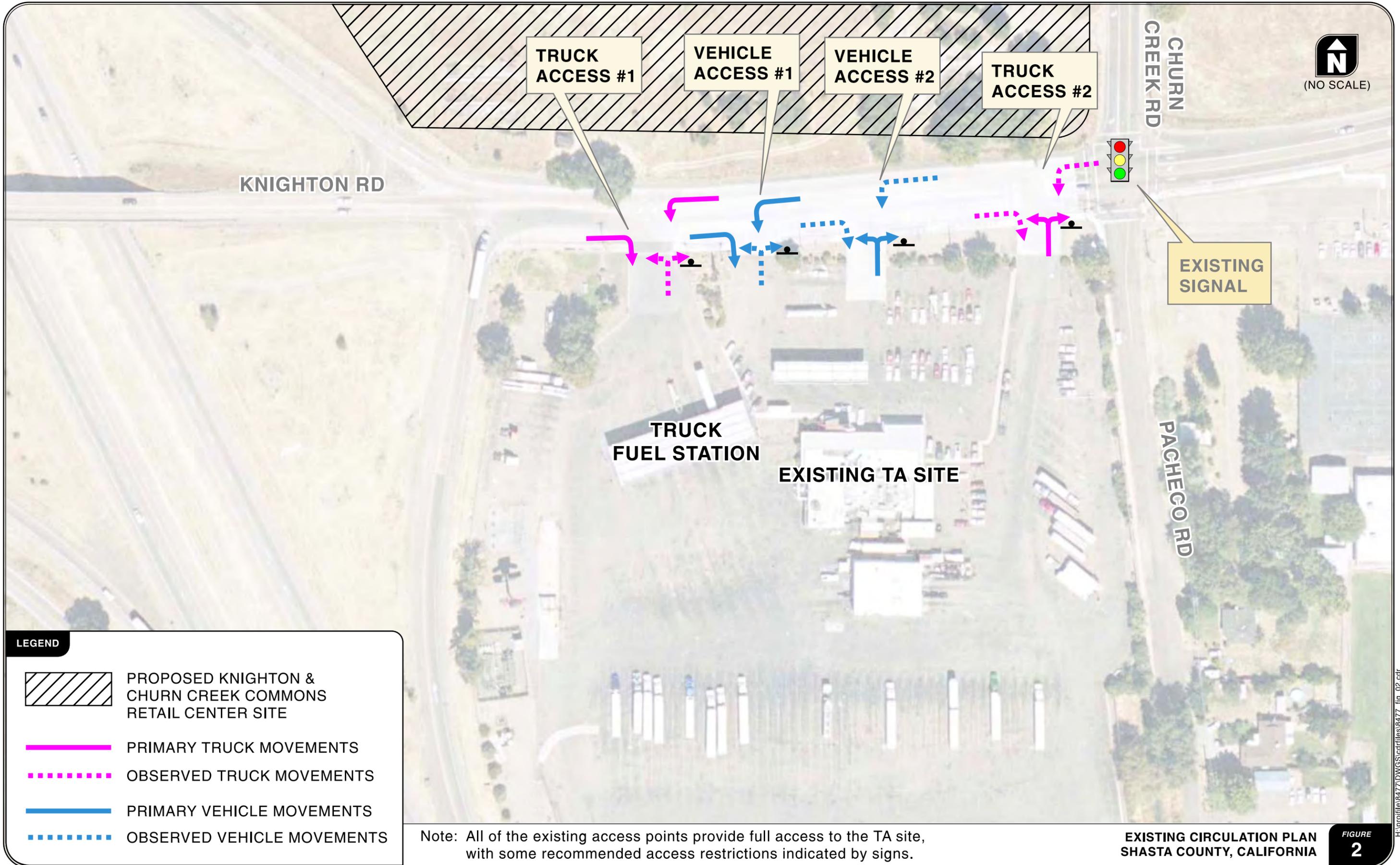
EXISTING CIRCULATION PATTERN

Figure 2 shows the existing circulation pattern along Knighton Road for the TA site. As shown in Figure 2, the existing TA site has four unsignalized access points along Knighton Road. These access points are intended to operate as two truck-only driveways and two auto-only driveways to the site. Although the driveways have recommended access restrictions indicated by signs, field visits observed autos and trucks regularly entering and exiting the site as unrestricted movements via all of the access points. No current access is provided via Churn Creek Road-Pacheco Road to the site.

The existing access points are closely spaced to each other. Truck Access #2 is located within the existing left-turn pocket of the signalized intersection of Knighton Road and Churn Creek Road-Pacheco Road. The photo below illustrates this location.



Truck Access #2 and Knighton Road/Churn Creek Road-Pacheco Road Intersection



LEGEND

-  PROPOSED KNIGHTON & CHURN CREEK COMMONS RETAIL CENTER SITE
-  PRIMARY TRUCK MOVEMENTS
-  OBSERVED TRUCK MOVEMENTS
-  PRIMARY VEHICLE MOVEMENTS
-  OBSERVED VEHICLE MOVEMENTS

Note: All of the existing access points provide full access to the TA site, with some recommended access restrictions indicated by signs.

EXISTING CIRCULATION PLAN SHASTA COUNTY, CALIFORNIA

FIGURE 2

The vast majority of the trucks traveling to and from the west access the TA site via the I-5/Knighton Road interchange. With this travel pattern, trucks leaving the site make a northbound left-turn maneuver onto Knighton Road via Truck Access #1 or #2 and travel westbound to the I-5/Knighton Road interchange. Both maneuvers occur within close proximity to an adjacent intersection creating an unsafe maneuver on Knighton Road.

As traffic increases on Knighton Road, it would be desirable to improve the access configuration for the TA site to improve the safety and operations on Knighton Road as well as the safety of the TA customers.

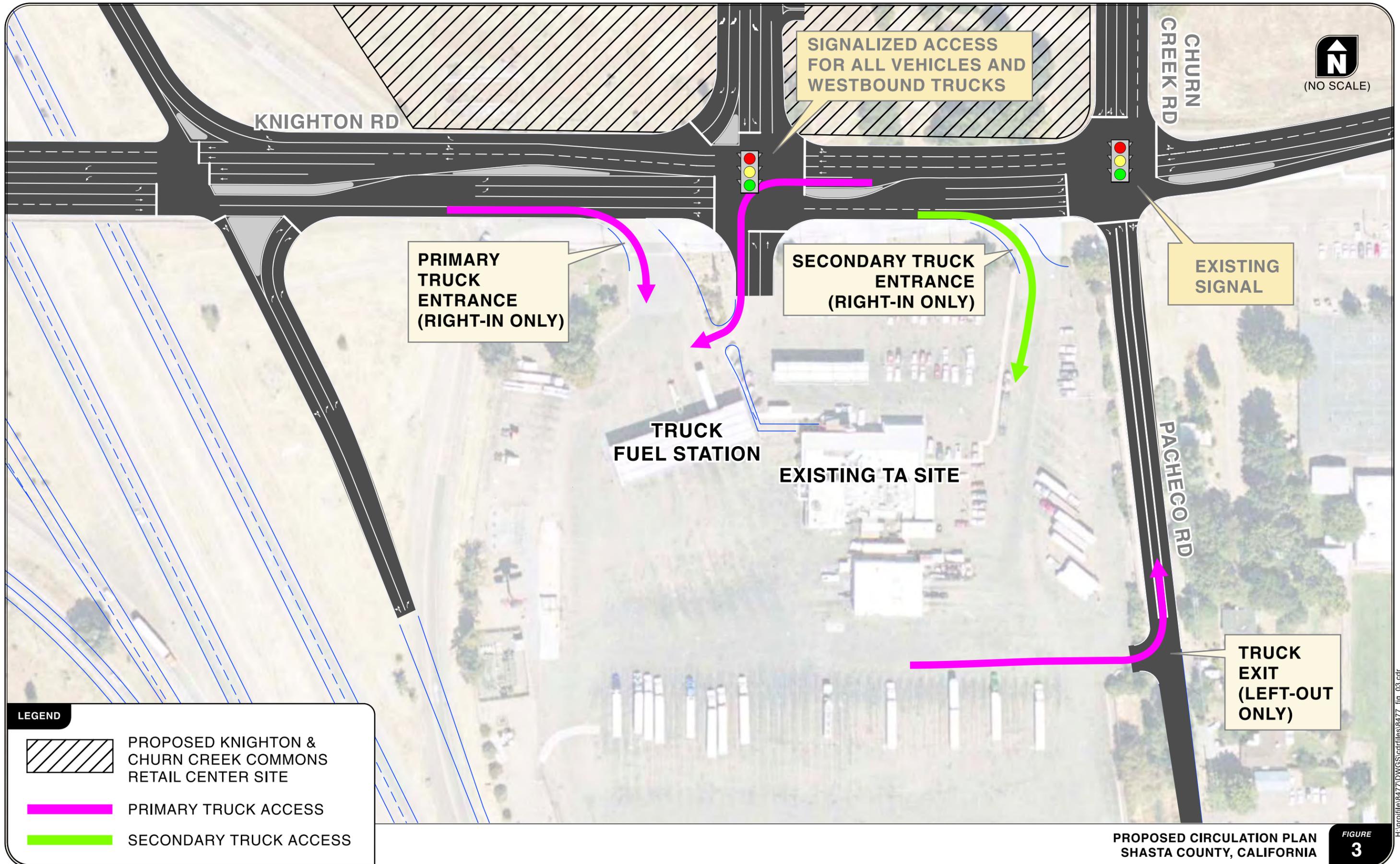
PROPOSED CIRCULATION PATTERN

Figure 3 shows the proposed circulation pattern for the TA site and proposed Retail Center. The proposed circulation plan provides a single, signalized access point for autos and westbound trucks. In addition, the existing two truck-only driveways would be constructed as right-in only truck accesses. Finally, a new outbound access point for trucks would be provided on Churn Creek Road-Pacheco Road.

As shown in Figure 3, the reconfiguration provides two entrances for eastbound trucks to make a right turn into the TA site. The primary truck access serves trucks using the fuel station. The second (eastern) truck access is provided as another option if trucks miss the first access, and it eliminates trucks using Churn Creek-Pacheco Road to enter the TA site. The auto access points are consolidated into a single, signalized access point that serves entering and exiting vehicles as well as minimal trucks entering from the east. All trucks leaving the site would travel via an exit-only access on Churn Creek Road-Pacheco Road and turn onto Knighton Road via the signalized intersection of Knighton Road and Churn Creek Road-Pacheco Road.

Figure 3 also shows the truck exit relocated onto Churn Creek Road-Pacheco Road, eliminating the existing unsafe westbound and eastbound maneuvers of trucks turning onto Knighton Road in the vicinity of an adjacent intersection. Based on existing traffic count data for the TA site, it is anticipated that approximately 40 trucks would use the Churn Creek Road-Pacheco Road access during the weekday p.m. peak hour.

The proposed circulation plan improves safety by reducing unsignalized left-turn movements onto Knighton Road and providing signalized left-turn access from the TA site for both automobiles and trucks at the main access and at the Knighton Road/Churn Creek Road-Pacheco Road intersection, respectively. This configuration significantly improves the long-term capability and capacity of the TA site accesses and will improve long-term safety on Knighton Road.



Traffic Operations

This section addresses the traffic volume data and traffic operations for the existing and cumulative scenarios associated with the TA site and proposed circulation plan.

TRAFFIC VOLUMES

Traffic volumes were developed for three scenarios along Knighton Road: existing no project, existing with project, and cumulative (year 2030) with project. The “with project” component of the scenario names refers to the proposed Knighton & Churn Creek Commons Retail Center. In addition to the proposed project, these scenarios include the improvements on Knighton Road and a new interchange configuration for the I-5/Knighton Road interchange in the operational analysis.

The existing traffic volumes were developed using turning movement counts collected by Quality Counts in July 2010 at the TA driveways and traffic volumes provided to us by Quad Knopf in August 2010. The traffic volumes along Knighton Road were balanced with the turning movement counts at the TA driveways to develop the existing traffic volumes for the study intersections. The existing no project traffic volumes were analyzed based on the current configuration of access points on Knighton Road. Figure 4 illustrates the existing traffic volumes during the weekday p.m. peak hour. As shown in Figure 4, the existing TA driveways serve approximately 100 trucks (in and out) and 185 autos (in and out) during the weekday p.m. peak hour. Appendix A includes the traffic count data.

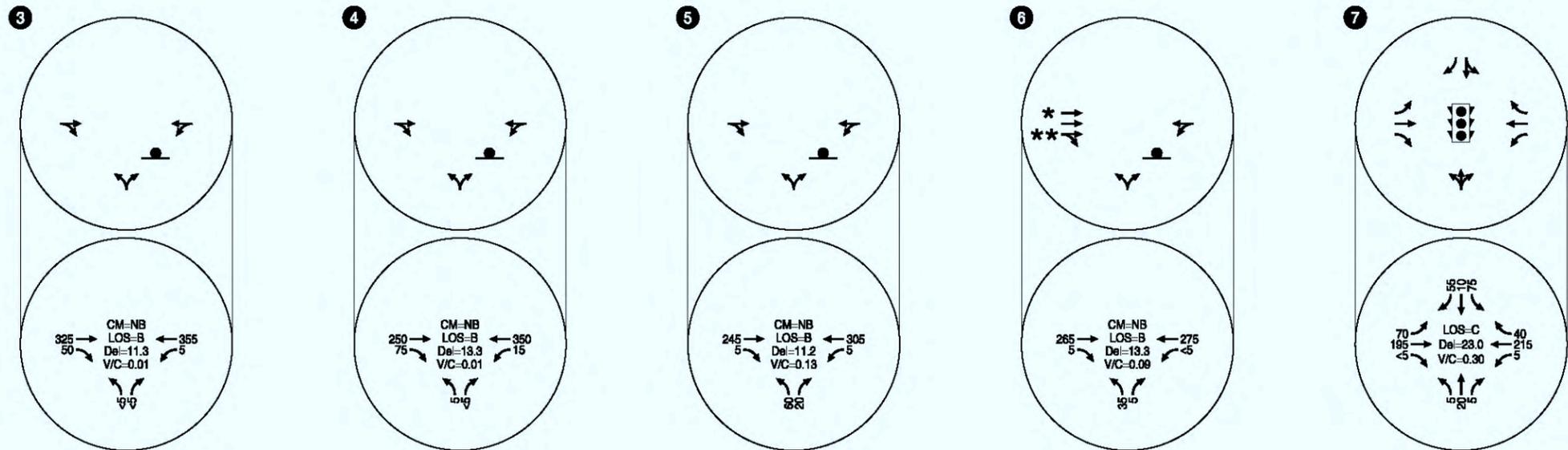
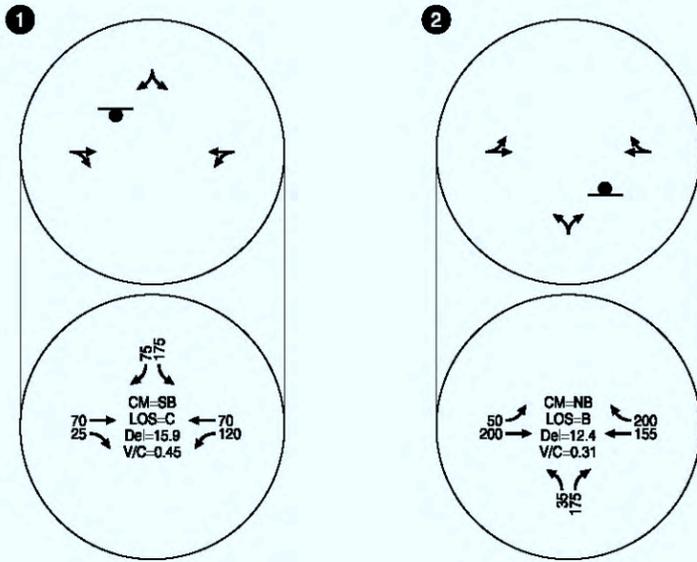
To develop the existing with project volumes, the existing no project volumes were rerouted based on the proposed circulation plan. The site generated traffic from the DEIR was added to the existing volumes. These volumes were analyzed on the proposed Knighton Road configuration. Figure 5 illustrates the existing plus project traffic volumes during the weekday p.m. peak hour.

The cumulative with project traffic volumes were developed using the cumulative no project volumes in the DEIR and driveway turning movement counts from July 2010. The volumes were then rerouted based on the proposed configuration. Site generated traffic from the DEIR was added to the rerouted cumulative no project volumes to develop the cumulative with project volumes. These volumes were analyzed on the proposed Knighton Road configuration. Figure 6 illustrates the cumulative plus project traffic volumes during the weekday p.m. peak hour.

LEVEL OF SERVICE ANALYSIS

The traffic operations along Knighton Road were evaluated for the existing no project, existing with project, and cumulative with project scenarios. Figure 4 shows the weekday p.m. peak hour traffic volumes and operations for the existing no project scenario. As shown in Figure 4, the study intersections are currently operating at a level of service “C” or better.

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LEGEND

- STOP SIGN
- TRAFFIC SIGNAL

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
 LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
 Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

* Inside through lane is the left-turn lane at the downstream signalized intersection.
 ** Outside through lane is the right-turn lane at the downstream signalized intersection.

EXISTING TRAFFIC CONDITIONS
 WEEKDAY PM PEAK HOUR
 SHASTA COUNTY, CALIFORNIA

Appendix B includes the level of service worksheets for the existing traffic conditions.

Figure 5 shows the traffic volumes and operations for the existing with project scenario. It is anticipated that the traffic signals on the Knighton Road corridor would be coordinated as part of a signal system to improve operations. As shown in Figure 5, all of the study intersections are forecast to operate at level of service "C" or better during the weekday p.m. peak hour. Appendix C includes the level of service worksheets for the existing with project scenario traffic conditions.

Figure 6 shows the traffic volumes and operations for the cumulative with project scenario. As shown in Figure 6, all of the study intersections are expected to operate at level of service "C" or better during the weekday p.m. peak hour. Appendix D includes the level of service worksheets for the cumulative with project scenario traffic conditions.

The proposed signalized access on Knighton Road is expected to operate at level of service "C" with a volume-to-capacity ratio of 0.74. The intersection of Knighton Road and Churn Creek is forecast to operate at level of service "C" and a volume-to-capacity ratio of 0.41.

The following are key findings of the level of service analysis:

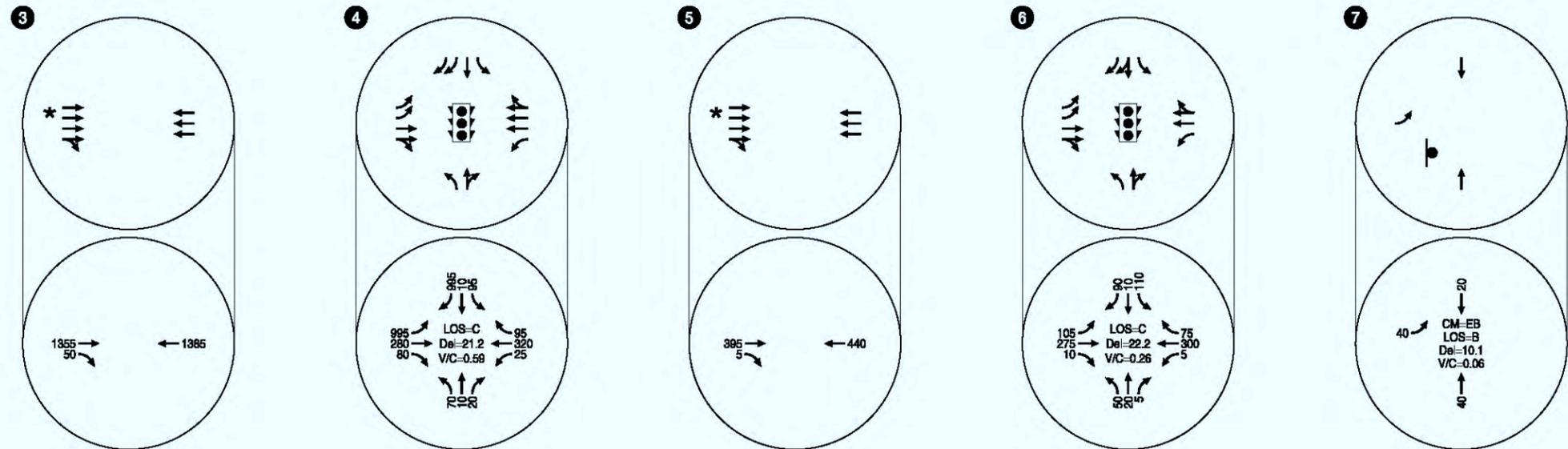
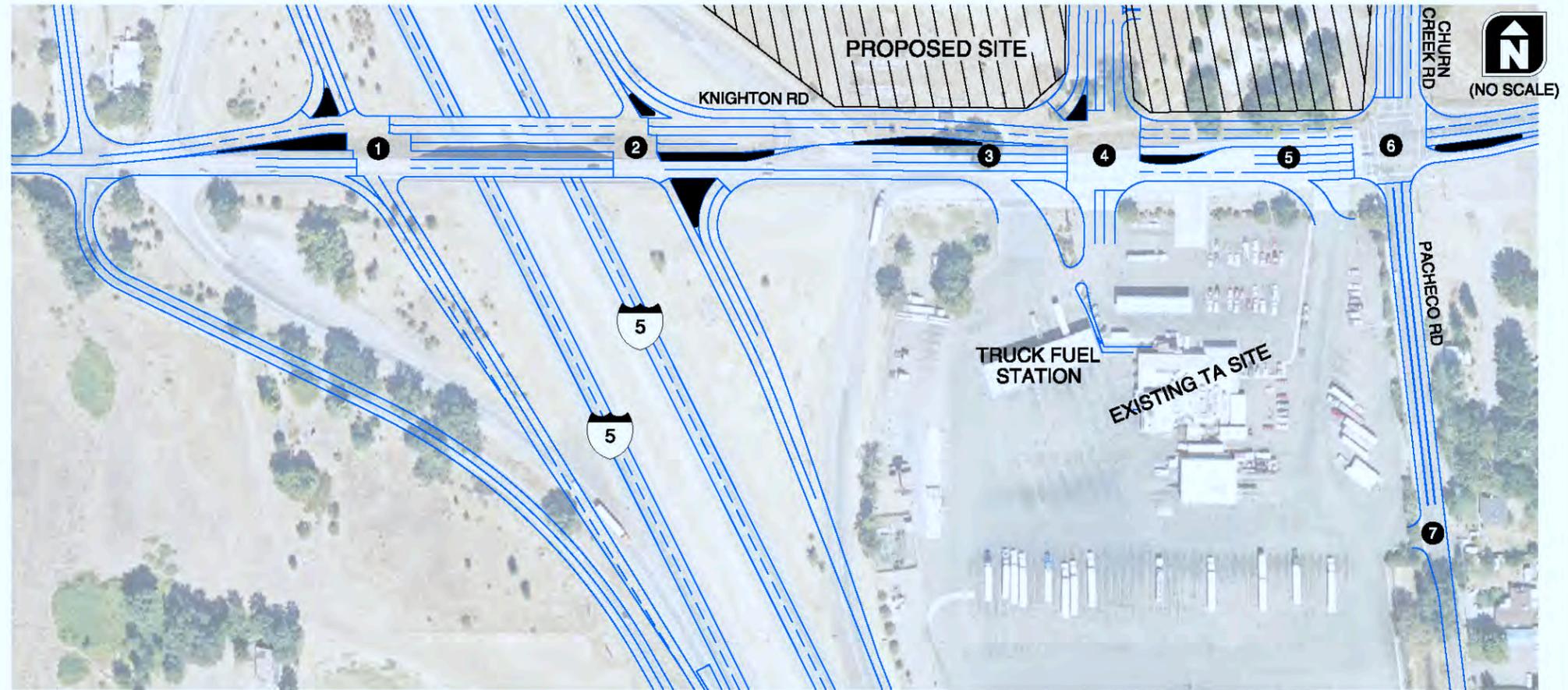
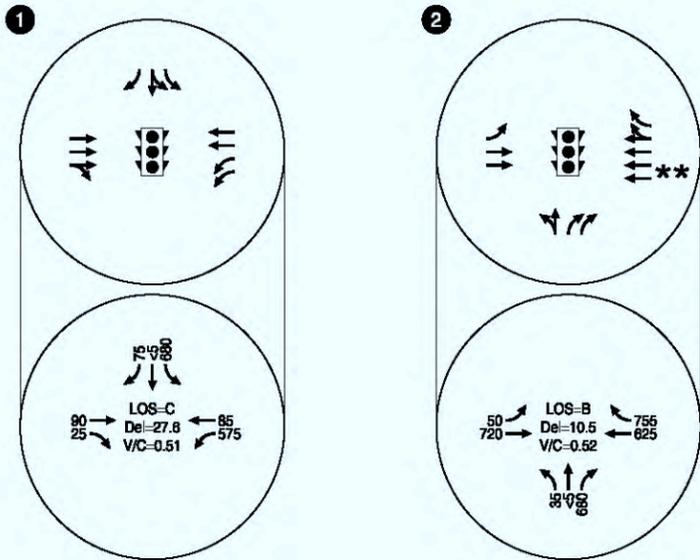
- The existing driveways operate acceptably today at level of service "B."
- With the Knighton & Churn Creek Commons Retail Center and proposed access configuration, the driveways on Knighton Road and Churn Creek Road-Pacheco Road will operate at levels of service "C" and "B," respectively.
- The proposed access configuration in 2030 with the proposed retail center results in levels of service "B" and "C" for the TA site accesses.

95TH PERCENTILE QUEUE ANALYSIS

Figure 7 shows the 95th percentile queues expected during the weekday p.m. peak hour under the project scenarios. The queuing analysis was evaluated with the proposed circulation plan. As shown in Figure 7, the northbound vehicle queues at the signalized access on Knighton Road are not expected to affect on-site circulation during either scenario. The 95th percentile queues can be accommodated on the northbound approach of the Knighton Road and Churn Creek Road-Pacheco Road intersection under both scenarios.

Based on the above traffic operations analysis, the proposed circulation plan is anticipated to provide acceptable traffic operations on Knighton Road and Churn Creek Road-Pacheco Road.

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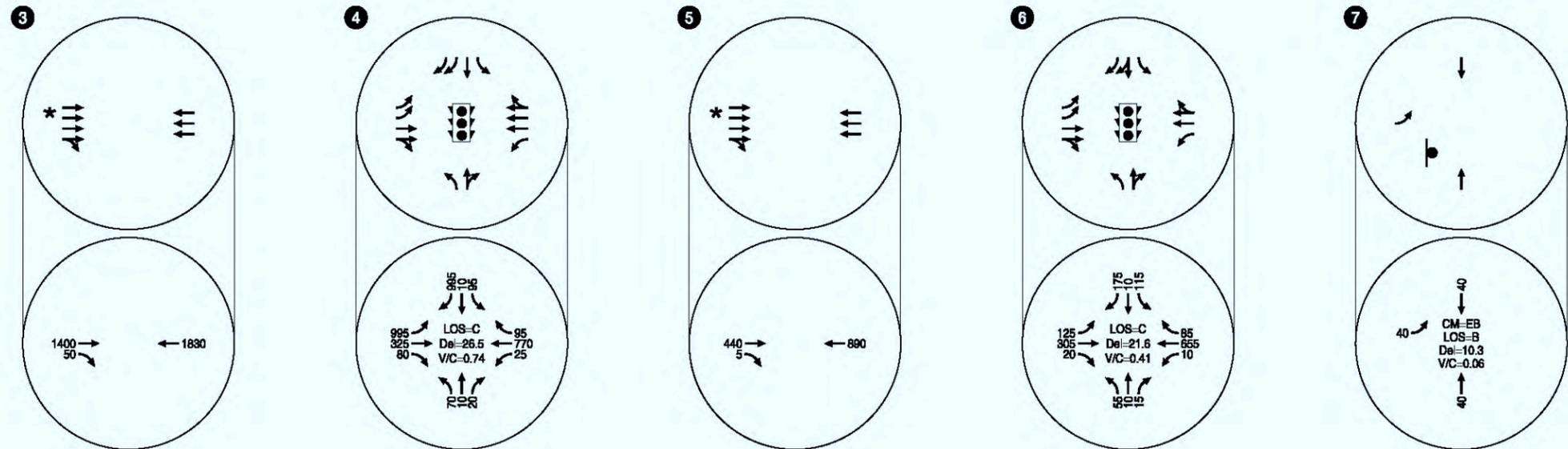
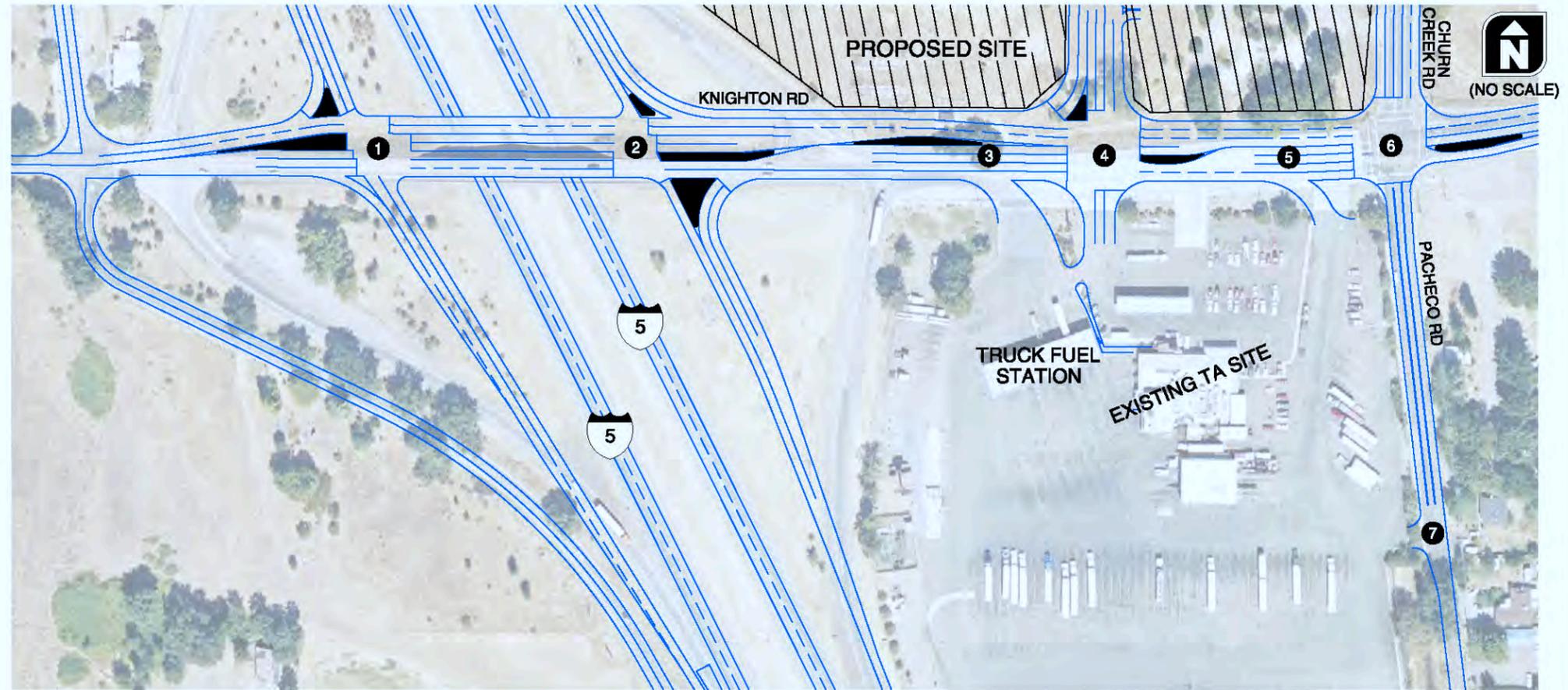
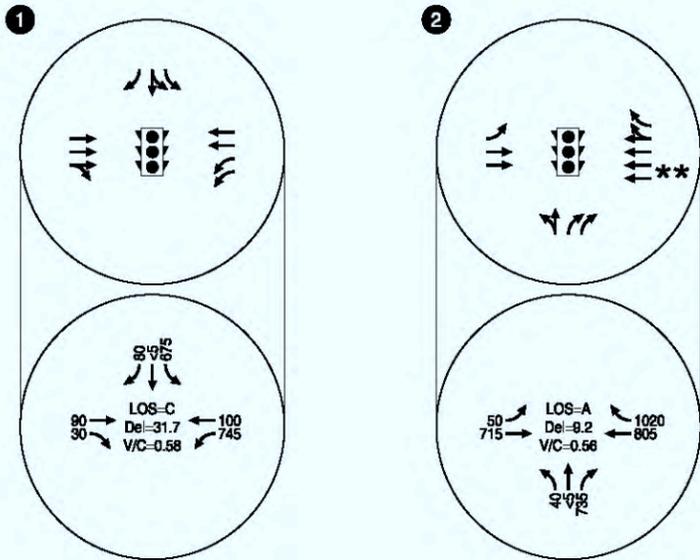
- STOP SIGN
- TRAFFIC SIGNAL

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
 LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
 Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

* The two inside through lanes are the left-turn lanes at the downstream signalized intersection.
 ** The two inside through lanes are auxiliary lanes for the left turns at the downstream signalized intersection.

EXISTING WITH PROJECT TRAFFIC CONDITIONS
 WEEKDAY PM PEAK HOUR
 SHASTA COUNTY, CALIFORNIA

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LEGEND

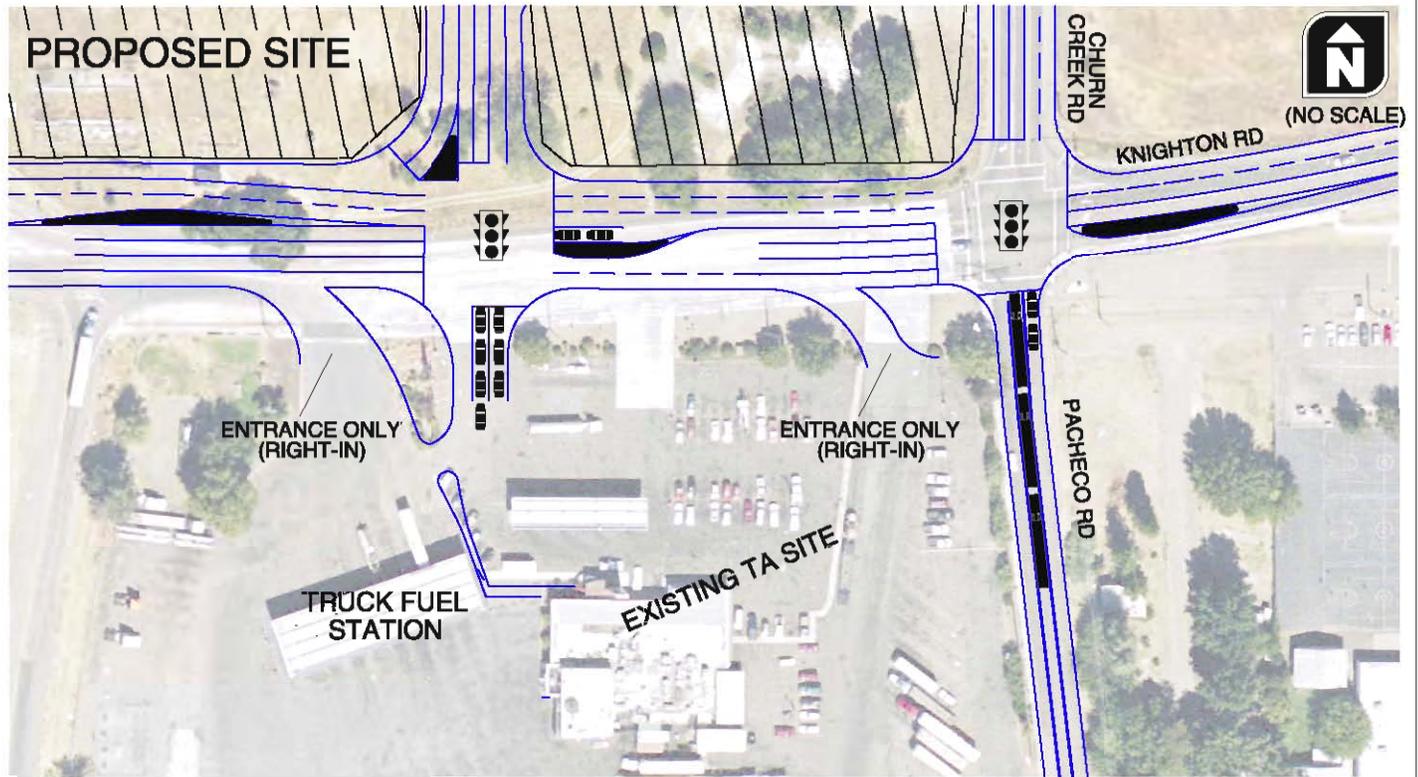
- STOP SIGN
- TRAFFIC SIGNAL

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
 LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
 Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

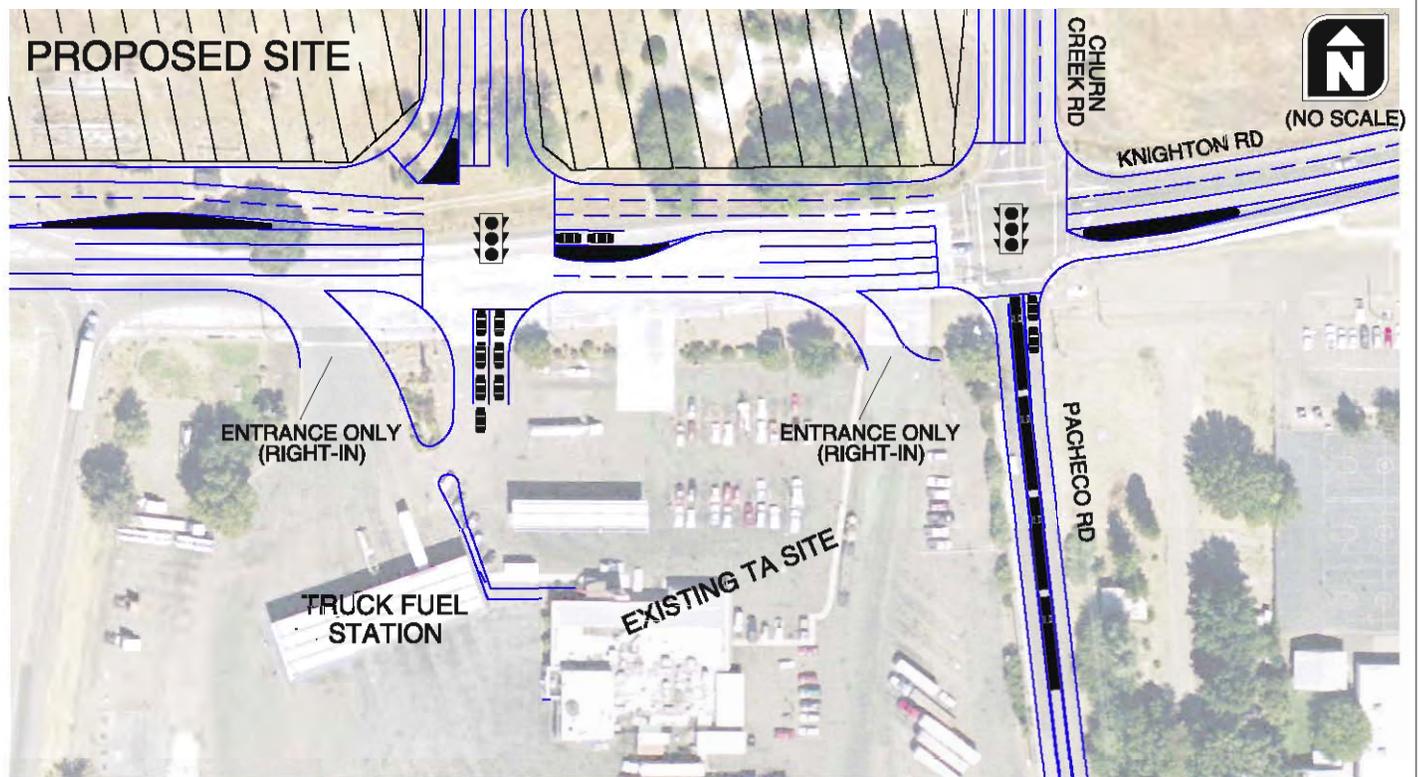
* The two inside through lanes are the left-turn lanes at the downstream signalized intersection.
 ** The two inside through lanes are auxiliary lanes for the left turns at the downstream signalized intersection.

CUMULATIVE WITH PROJECT TRAFFIC CONDITIONS
 WEEKDAY PM PEAK HOUR
 SHASTA COUNTY, CALIFORNIA

EXISTING WITH PROJECT SCENARIO



CUMULATIVE WITH PROJECT SCENARIO



95TH PERCENTILE VEHICLE QUEUES, WEEKDAY PM PEAK HOUR
EXISTING AND CUMULATIVE WITH PROJECT SCENARIOS
SHASTA COUNTY, CALIFORNIA

FIGURE
7

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Conclusions

The results of the analysis indicate that the proposed circulation plan for the TA site and on Knighton Road and Churn Creek Road-Pacheco Road provide acceptable traffic operations and improved safety on Knighton Road. The findings of this analysis are highlighted below.

- The existing circulation pattern on Knighton Road includes four full-access driveways serving the TA site. The proposed circulation pattern consolidates the access points on Knighton Road into one signalized access and two right-in only driveways on Knighton Road and provides truck egress onto Knighton Road via the existing signal at the Knighton Road/Churn Creek Road-Pacheco Road intersection.
- The proposed circulation plan results in the same number of access points for the TA site that currently exist; however, access to a signal is provided for all left turns from the site onto Knighton Road. The proposed circulation plan reduces activity on Knighton Road and decreases the number of potential conflicts by directing traffic to key locations, resulting in improved safety along the corridor.
- All of the study intersections are expected to operate undercapacity and at level of service "C" or better during the existing no project, existing with project, and cumulative with project scenarios (assuming the proposed circulation plan for the with project scenarios).
- Currently, approximately 100 trucks access (enter or exit) the TA site from Knighton Road during the weekday p.m. peak hour. The proposed circulation plan reroutes trucks exiting the site onto Churn Creek Road-Pacheco Road, resulting in approximately 40 trucks using Churn Creek Road-Pacheco Road during the weekday p.m. peak hour.
- No queuing issues are anticipated under the with project scenarios.

We trust this memorandum addresses the traffic operations and circulation patterns associated with the proposed circulation plan for the TA site. If you have any questions, please contact us at 208.338.2683.

Attachments

Appendix A – Traffic Count Data

Appendix B – Existing Traffic Conditions, Weekday PM Peak Hour

Appendix C – Existing Plus Project Traffic Conditions, Weekday PM Peak Hour

Appendix C – Cumulative Plus Project Traffic Conditions, Weekday PM Peak Hour

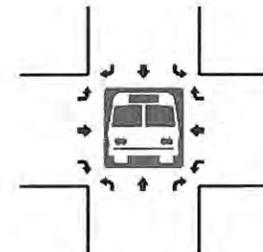
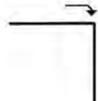
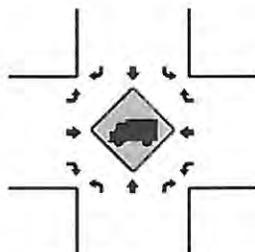
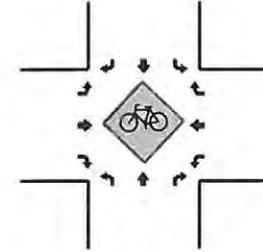
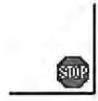
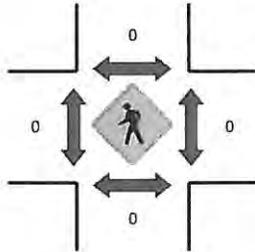
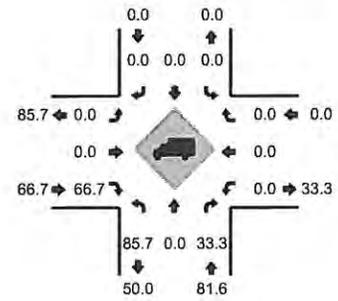
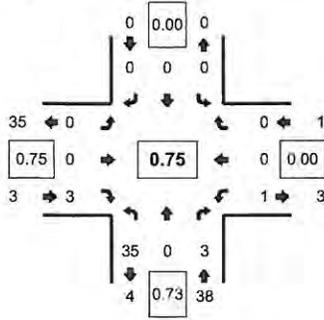
Appendix A

Traffic Count Data

LOCATION: ~~Truck Exit (East)~~ -- Knighton Rd
 CITY/STATE: Redding, CA

QC JOB #: 10532504
 DATE: 7/29/2010

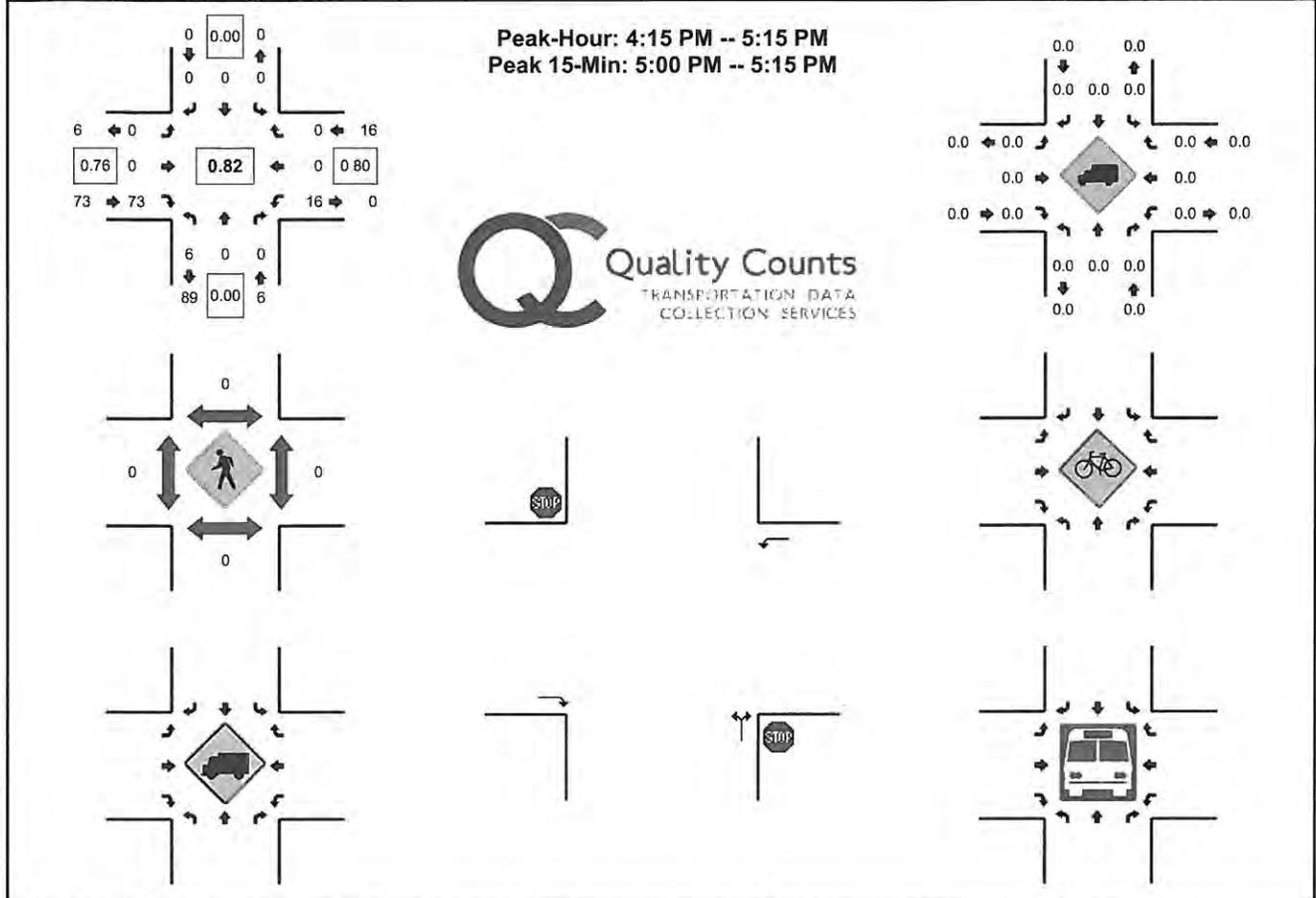
Peak-Hour: 4:15 PM -- 5:15 PM
 Peak 15-Min: 5:00 PM -- 5:15 PM



15-Min Count Period	Truck Exit (East) (Northbound)			Truck Exit (East) (Southbound)			Knighton Rd (Eastbound)			Knighton Rd (Westbound)			Total	Hourly Totals
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Beginning At														
4:00 PM	9	0	1	0	0	0	0	0	3	0	0	0	13	
4:15 PM	9	0	1	0	0	0	0	0	1	1	0	0	12	
4:30 PM	4	0	2	0	0	0	0	0	0	0	0	0	6	
4:45 PM	9	0	0	0	0	0	0	0	1	0	0	0	10	41
5:00 PM	13	0	0	0	0	0	0	0	1	0	0	0	14	42
5:15 PM	10	0	0	0	0	0	0	0	1	0	0	0	11	41
5:30 PM	11	0	0	0	0	0	0	0	0	0	0	0	11	46
5:45 PM	11	0	0	0	0	0	0	0	0	0	0	0	11	47
Peak 15-Min Flowrates	Northbound			Southbound			Eastbound			Westbound			Total	
All Vehicles	52	0	0	0	0	0	0	0	4	0	0	0	56	
Heavy Trucks	44	0	0	0	0	0	0	0	4	0	0	0	48	
Pedestrians		0			0			0			0		0	
Bicycles														
Railroad														
Stopped Buses														

Comments:

LOCATION: Car Entrance (West) - Knighton Rd
 CITY/STATE: Redding, CA
 QC JOB #: 10532502
 DATE: 7/29/2010



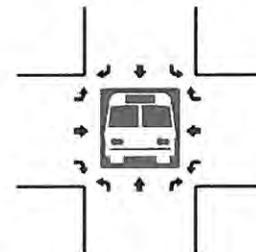
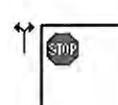
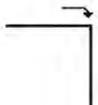
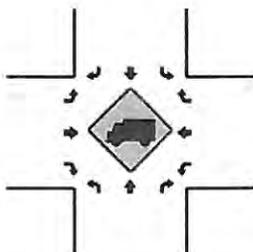
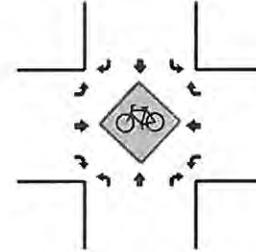
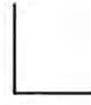
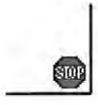
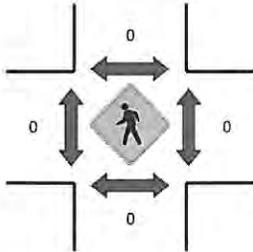
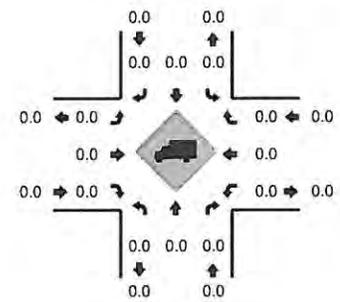
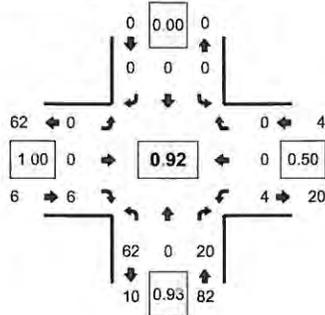
15-Min Count Period	Car Entrance (West) (Northbound)			Car Entrance (West) (Southbound)			Knighton Rd (Eastbound)			Knighton Rd (Westbound)			Total	Hourly Totals
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Beginning At														
4:00 PM	1	0	1	0	0	0	0	0	18	1	0	0	21	
4:15 PM	3	0	0	0	0	0	0	0	17	4	0	0	24	
4:30 PM	2	0	0	0	0	0	0	0	17	3	0	0	22	
4:45 PM	1	0	0	0	0	0	0	0	15	4	0	0	20	87
5:00 PM	0	0	0	0	0	0	0	0	24	5	0	0	29	95
5:15 PM	2	0	0	0	0	0	0	0	13	4	0	0	19	90
5:30 PM	1	0	0	0	0	0	0	0	19	4	0	0	24	92
5:45 PM	2	0	0	0	0	0	0	0	17	3	0	0	22	94
Peak 15-Min Flowrates	Northbound			Southbound			Eastbound			Westbound			Total	
All Vehicles	0	0	0	0	0	0	0	0	96	20	0	0	116	
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	
Pedestrians		0			0			0			0		0	
Bicycles														
Railroad														
Stopped Buses														

Comments:

LOCATION: Car Exit (East) -- Knighton Rd
 CITY/STATE: Redding, CA

QC JOB #: 10532503
 DATE: 7/29/2010

Peak-Hour: 4:15 PM -- 5:15 PM
 Peak 15-Min: 5:00 PM -- 5:15 PM



15-Min Count Period Beginning At	Car Exit (East) (Northbound)			Car Exit (East) (Southbound)			Knighton Rd (Eastbound)			Knighton Rd (Westbound)			Total	Hourly Totals
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
4:00 PM	22	0	3	0	0	0	0	0	1	1	0	0	27	
4:15 PM	13	0	6	0	0	0	0	0	2	1	0	0	22	
4:30 PM	22	0	2	0	0	0	0	0	2	0	0	0	26	
4:45 PM	12	0	5	0	0	0	0	0	1	1	0	0	19	94
5:00 PM	15	0	7	0	0	0	0	0	1	2	0	0	25	92
5:15 PM	18	0	3	0	0	0	0	0	1	1	0	0	23	93
5:30 PM	11	0	8	0	0	0	0	0	1	2	0	0	22	89
5:45 PM	20	0	5	0	0	0	0	0	0	1	0	0	26	96

Peak 15-Min Flowrates	Northbound			Southbound			Eastbound			Westbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
All Vehicles	60	0	28	0	0	0	0	0	4	8	0	0	100
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians		0			0				0		0		0
Bicycles													
Railroad													
Stopped Buses													

Comments:

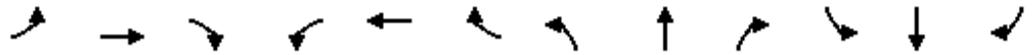
Appendix B

Existing Traffic Conditions, Weekday PM Peak Hour

HCM Unsignalized Intersection Capacity Analysis

3: Knighton Road & I-5 SB Off-Ramp

9/30/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↻			↻						↻	
Volume (veh/h)	0	72	25	120	70	0	0	0	0	176	1	76
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	76	26	126	74	0	0	0	0	185	1	80
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	74			102			496	415	89	415	428	74
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	74			102			496	415	89	415	428	74
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			91			100	100	100	63	100	92
cM capacity (veh/h)	1507			1471			411	478	961	507	470	980

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	102	200	266
Volume Left	0	126	185
Volume Right	26	0	80
cSH	1700	1471	592
Volume to Capacity	0.06	0.09	0.45
Queue Length 95th (ft)	0	7	58
Control Delay (s)	0.0	5.1	15.9
Lane LOS		A	C
Approach Delay (s)	0.0	5.1	15.9
Approach LOS			C

Intersection Summary		
Average Delay		9.3
Intersection Capacity Utilization	38.1%	ICU Level of Service
Analysis Period (min)		15
		A

HCM Unsignalized Intersection Capacity Analysis

6: Knighton Road & I-5 NB On-Ramp

9/30/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBR	SEL	SER
Lane Configurations		4			1			2			
Volume (veh/h)	49	199	0	0	157	198	33	1	176	0	0
Sign Control		Free			Free			Stop		Stop	
Grade		0%			0%			0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	52	209	0	0	165	208	35	1	185	0	0
Pedestrians											
Lane Width (ft)											
Walking Speed (ft/s)											
Percent Blockage											
Right turn flare (veh)											
Median type		None			None						
Median storage (veh)											
Upstream signal (ft)					732						
pX, platoon unblocked	0.95						0.95	0.95		0.95	0.95
vC, conflicting volume	374			209			582	686	209	768	582
vC1, stage 1 conf vol											
vC2, stage 2 conf vol											
vCu, unblocked vol	320			209			539	648	209	733	539
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5
tC, 2 stage (s)											
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0
p0 queue free %	96			100			92	100	77	100	100
cM capacity (veh/h)	1168			1344			414	352	823	237	406
Direction, Lane #	EB 1	WB 1	NB 1								
Volume Total	261	374	221								
Volume Left	52	0	35								
Volume Right	0	208	185								
cSH	1168	1700	709								
Volume to Capacity	0.04	0.22	0.31								
Queue Length 95th (ft)	3	0	33								
Control Delay (s)	2.0	0.0	12.4								
Lane LOS	A		B								
Approach Delay (s)	2.0	0.0	12.4								
Approach LOS			B								
Intersection Summary											
Average Delay			3.8								
Intersection Capacity Utilization			56.3%		ICU Level of Service				B		
Analysis Period (min)			15								

HCM Unsignalized Intersection Capacity Analysis

9: Knighton Road & Shopping Center

9/30/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↻			↻			↻			↻	
Volume (veh/h)	0	252	73	16	350	0	6	0	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	265	77	17	368	0	6	0	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh		2			2							
Upstream signal (ft)					416							
pX, platoon unblocked	0.92						0.92	0.92		0.92	0.92	0.92
vC, conflicting volume	368			342			706	706	304	706	744	368
vC1, stage 1 conf vol							304	304		402	402	
vC2, stage 2 conf vol							402	402		304	342	
vCu, unblocked vol	274			342			640	640	304	640	681	274
tC, single (s)	4.1			4.3			7.8	6.5	6.4	7.1	6.5	6.2
tC, 2 stage (s)							6.8	5.5		6.1	5.5	
tF (s)	2.2			2.4			4.2	4.0	3.5	3.5	4.0	3.3
p0 queue free %	100			99			99	100	100	100	100	100
cM capacity (veh/h)	1190			1123			442	519	696	545	502	706

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	342	385	6	0
Volume Left	0	17	6	0
Volume Right	77	0	0	0
cSH	1700	1123	442	1700
Volume to Capacity	0.20	0.01	0.01	0.00
Queue Length 95th (ft)	0	1	1	0
Control Delay (s)	0.0	0.5	13.3	0.0
Lane LOS		A	B	A
Approach Delay (s)	0.0	0.5	13.3	0.0
Approach LOS			B	A

Intersection Summary			
Average Delay		0.4	
Intersection Capacity Utilization		41.4%	ICU Level of Service A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis

12: Knighton Road & Churn Creek Road

9/30/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	72	193	1	4	214	38	6	22	4	73	8	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0			5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99			0.96	1.00
Satd. Flow (prot)	1719	1810	1538	1719	1810	1538		1764			1731	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.94			0.72	1.00
Satd. Flow (perm)	1719	1810	1538	1719	1810	1538		1681			1307	1538
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	76	203	1	4	225	40	6	23	4	77	8	60
RTOR Reduction (vph)	0	0	0	0	0	24	0	4	0	0	0	53
Lane Group Flow (vph)	76	203	1	4	225	16	0	29	0	0	85	7
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	34.8	76.4	76.4	1.4	43.0	43.0		12.2			12.2	12.2
Effective Green, g (s)	34.8	76.4	76.4	1.4	43.0	43.0		12.2			12.2	12.2
Actuated g/C Ratio	0.33	0.73	0.73	0.01	0.41	0.41		0.12			0.12	0.12
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	570	1317	1119	23	741	630		195			152	179
v/s Ratio Prot	c0.04	c0.11		0.00	c0.12							
v/s Ratio Perm			0.00			0.01		0.02			c0.07	0.00
v/c Ratio	0.13	0.15	0.00	0.17	0.30	0.03		0.15			0.56	0.04
Uniform Delay, d1	24.6	4.4	3.9	51.2	20.9	18.5		41.7			43.9	41.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	0.5	0.2	0.0	3.6	1.1	0.1		0.4			4.4	0.1
Delay (s)	25.1	4.6	3.9	54.8	22.0	18.6		42.1			48.3	41.3
Level of Service	C	A	A	D	C	B		D			D	D
Approach Delay (s)		10.2			21.9			42.1			45.4	
Approach LOS		B			C			D			D	

Intersection Summary

HCM Average Control Delay	23.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

21: Knighton Road & Truck Exit

9/30/2010



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑	↑↑	
Volume (veh/h)	263	3	1	273	35	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	286	3	1	297	38	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				101		
pX, platoon unblocked					0.92	
vC, conflicting volume			289		586	97
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			289		504	97
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		92	100
cM capacity (veh/h)			1270		456	940

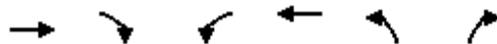
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	NB 1
Volume Total	114	114	60	298	41
Volume Left	0	0	0	1	38
Volume Right	0	0	3	0	3
cSH	1700	1700	1700	1270	475
Volume to Capacity	0.07	0.07	0.04	0.00	0.09
Queue Length 95th (ft)	0	0	0	0	7
Control Delay (s)	0.0	0.0	0.0	0.0	13.3
Lane LOS				A	B
Approach Delay (s)	0.0			0.0	13.3
Approach LOS					B

Intersection Summary					
Average Delay			0.9		
Intersection Capacity Utilization			25.2%	ICU Level of Service	A
Analysis Period (min)			15		

HCM Unsignalized Intersection Capacity Analysis

26: Knighton Road & Vehicle Exit

9/30/2010



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←	←	↘
Volume (veh/h)	246	6	4	304	62	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	267	7	4	330	67	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			None		
Median storage (veh)	2					
Upstream signal (ft)				286		
pX, platoon unblocked				0.92		
vC, conflicting volume			274	610	271	
vC1, stage 1 conf vol				271		
vC2, stage 2 conf vol				339		
vCu, unblocked vol			274	531	271	
tC, single (s)			4.1	6.4	6.2	
tC, 2 stage (s)				5.4		
tF (s)			2.2	3.5	3.3	
p0 queue free %			100	89	97	
cM capacity (veh/h)			1289	642	768	

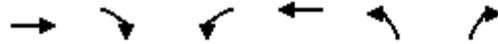
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	274	335	89
Volume Left	0	4	67
Volume Right	7	0	22
cSH	1700	1289	669
Volume to Capacity	0.16	0.00	0.13
Queue Length 95th (ft)	0	0	11
Control Delay (s)	0.0	0.1	11.2
Lane LOS		A	B
Approach Delay (s)	0.0	0.1	11.2
Approach LOS			B

Intersection Summary			
Average Delay		1.5	
Intersection Capacity Utilization		30.5%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

27: Knighton Road & Truck Entrance

9/30/2010



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	
Volume (veh/h)	325	50	3	353	2	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	353	54	3	384	2	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		TWLTL			
Median storage (veh)	2					
Upstream signal (ft)	534					
pX, platoon unblocked					0.93	
vC, conflicting volume	408			771	380	
vC1, stage 1 conf vol					380	
vC2, stage 2 conf vol					390	
vCu, unblocked vol	408			716	380	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)					5.4	
tF (s)	2.2			3.5	3.3	
p0 queue free %	100			100	100	
cM capacity (veh/h)	1151			570	667	

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	408	387	2
Volume Left	0	3	2
Volume Right	54	0	0
cSH	1700	1151	570
Volume to Capacity	0.24	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.1	11.3
Lane LOS		A	B
Approach Delay (s)	0.0	0.1	11.3
Approach LOS			B

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	31.0%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix C

Existing Plus Project Traffic Conditions, Weekday PM Peak Hour

HCM Signalized Intersection Capacity Analysis

3: KNIGHTON RD & I-5 SB ON RAMP

9/30/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑		↑↑	↑↑					↑	↑	↑
Volume (vph)	0	90	25	573	87	0	0	0	0	681	1	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0					5.0	5.0	5.0
Lane Util. Factor		0.91		0.97	0.95					0.95	0.95	1.00
Frt		0.97		1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		4921		3183	3539					1559	1563	1583
Flt Permitted		1.00		0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		4921		3183	3539					1559	1563	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	95	26	603	92	0	0	0	0	717	1	80
RTOR Reduction (vph)	0	24	0	0	0	0	0	0	0	0	0	38
Lane Group Flow (vph)	0	97	0	603	92	0	0	0	0	358	360	42
Heavy Vehicles (%)	2%	2%	2%	10%	2%	2%	2%	2%	2%	10%	2%	2%
Turn Type				Prot						Split		Perm
Protected Phases		2		1	6					4	4	
Permitted Phases												4
Actuated Green, G (s)		6.7		28.0	39.7					55.3	55.3	55.3
Effective Green, g (s)		6.7		28.0	39.7					55.3	55.3	55.3
Actuated g/C Ratio		0.06		0.27	0.38					0.53	0.53	0.53
Clearance Time (s)		5.0		5.0	5.0					5.0	5.0	5.0
Vehicle Extension (s)		3.0		3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		314		849	1338					821	823	834
v/s Ratio Prot		c0.02		c0.19	0.03					0.23	c0.23	
v/s Ratio Perm												0.03
v/c Ratio		0.31		0.71	0.07					0.44	0.44	0.05
Uniform Delay, d1		46.9		34.8	20.8					15.3	15.3	12.1
Progression Factor		1.00		1.01	0.70					1.00	1.00	1.00
Incremental Delay, d2		0.6		4.9	0.0					1.7	1.7	0.1
Delay (s)		47.5		40.1	14.5					17.0	17.0	12.2
Level of Service		D		D	B					B	B	B
Approach Delay (s)		47.5			36.7			0.0			16.5	
Approach LOS		D			D			A			B	

Intersection Summary

HCM Average Control Delay	27.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

4: KNIGHTON RD & TRUCK ENTRANCE #1

9/30/2010



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		
Volume (veh/h)	1353	50	0	1383	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1424	53	0	1456	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	475			132		
pX, platoon unblocked					0.94	
vC, conflicting volume	1477			1936	382	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1477			1769	382	
tC, single (s)	4.1			6.8	6.9	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	100			100	100	
cM capacity (veh/h)	452			70	616	

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3
Volume Total	407	407	407	256	485	485	485
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	53	0	0	0
cSH	1700	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.24	0.24	0.24	0.15	0.29	0.29	0.29
Queue Length 95th (ft)	0	0	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS							
Approach Delay (s)	0.0				0.0		
Approach LOS							

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	30.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis

6: KNIGHTON RD & I-5 NB ON RAMP

9/30/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑			↑↑↑	↗		↑	↗↗			
Volume (vph)	49	722	0	0	627	756	33	1	681	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			5.0	4.0		5.0	5.0			
Lane Util. Factor	1.00	0.95			0.81	0.81		1.00	0.88			
Frt	1.00	1.00			0.94	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1770	3282			5281	1189		1776	2584			
Flt Permitted	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	1770	3282			5281	1189		1776	2584			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	52	760	0	0	660	796	35	1	717	0	0	0
RTOR Reduction (vph)	0	0	0	0	98	0	0	0	101	0	0	0
Lane Group Flow (vph)	52	760	0	0	960	398	0	36	616	0	0	0
Heavy Vehicles (%)	2%	10%	2%	2%	10%	10%	2%	2%	10%	2%	2%	2%
Turn Type	Prot						Free	Split	custom			
Protected Phases	5	2					4 6	3	3			
Permitted Phases							Free			3 4		
Actuated Green, G (s)	6.4	51.4					73.6	105.0	10.0	43.6		
Effective Green, g (s)	6.4	51.4					73.6	105.0	10.0	43.6		
Actuated g/C Ratio	0.06	0.49					0.70	1.00	0.10	0.42		
Clearance Time (s)	5.0								5.0			
Vehicle Extension (s)	3.0								3.0			
Lane Grp Cap (vph)	108	1607					3702	1189	169	1073		
v/s Ratio Prot	0.03	c0.23					0.18		0.02			
v/s Ratio Perm								0.33		c0.24		
v/c Ratio	0.48	0.47					0.26	0.33	0.21	0.57		
Uniform Delay, d1	47.7	17.8					5.7	0.0	43.9	23.6		
Progression Factor	0.92	0.41					0.63	1.00	1.00	1.00		
Incremental Delay, d2	3.2	0.9					0.0	0.6	0.6	0.7		
Delay (s)	47.2	8.2					3.6	0.6	44.5	24.3		
Level of Service	D	A					A	A	D	C		
Approach Delay (s)	10.7						2.8		25.3	0.0		
Approach LOS	B						A		C	A		

Intersection Summary

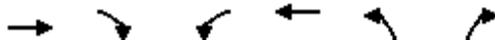
HCM Average Control Delay	10.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

7: KNIGHTON RD & TRUCK ENTRANCE #2

9/30/2010



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		
Volume (veh/h)	394	3	0	442	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	415	3	0	465	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	292			133		
pX, platoon unblocked						
vC, conflicting volume			418		571	105
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			418		571	105
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1138		451	929

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3
Volume Total	118	118	118	62	155	155	155
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	3	0	0	0
cSH	1700	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.07	0.07	0.07	0.04	0.09	0.09	0.09
Queue Length 95th (ft)	0	0	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS							
Approach Delay (s)	0.0			0.0			
Approach LOS							

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	11.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis

9: KNIGHTON RD & ACCESS #1 (FULL)

9/30/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	993	281	79	24	322	96	68	10	20	96	10	993
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	0.95		1.00	0.91		1.00	1.00		1.00	1.00	0.88
Frt	1.00	0.97		1.00	0.97		1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3423		1770	4471		1770	1679		1770	1863	2787
Flt Permitted	0.95	1.00		0.95	1.00		0.62	1.00		1.00	1.00	1.00
Satd. Flow (perm)	3433	3423		1770	4471		1164	1679		1863	1863	2787
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1045	296	83	25	339	101	72	11	21	101	11	1045
RTOR Reduction (vph)	0	18	0	0	47	0	0	20	0	0	0	267
Lane Group Flow (vph)	1045	361	0	25	393	0	72	12	0	101	11	778
Heavy Vehicles (%)	2%	2%	2%	2%	15%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			pm+pt			pm+pt		pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases							8			4		4
Actuated Green, G (s)	48.0	68.2		3.4	23.6		16.7	6.4		10.1	3.1	51.1
Effective Green, g (s)	48.0	68.2		3.4	23.6		16.7	6.4		10.1	3.1	51.1
Actuated g/C Ratio	0.46	0.65		0.03	0.22		0.16	0.06		0.10	0.03	0.49
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	1569	2223		57	1005		245	102		173	55	1356
v/s Ratio Prot	c0.30	0.11		0.01	c0.09		c0.03	0.01		c0.04	0.01	0.26
v/s Ratio Perm							0.02			c0.02		0.02
v/c Ratio	0.67	0.16		0.44	0.39		0.29	0.12		0.58	0.20	0.57
Uniform Delay, d1	22.2	7.2		49.9	34.6		38.7	46.6		45.5	49.7	19.2
Progression Factor	0.81	0.75		1.25	0.71		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.0	0.1		5.3	1.1		0.7	0.5		4.9	1.8	0.6
Delay (s)	20.1	5.6		67.4	25.6		39.4	47.2		50.4	51.5	19.8
Level of Service	C	A		E	C		D	D		D	D	B
Approach Delay (s)		16.2			27.9			41.8			22.8	
Approach LOS		B			C			D			C	

Intersection Summary

HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: KNIGHTON RD & CHURN CREEK RD

9/30/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↕↔		↔	↕↔		↔	↔		↔	↕↔	↔
Volume (vph)	107	277	10	4	301	73	52	22	7	108	8	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	0.95		1.00	0.95		1.00	1.00		1.00	0.95	0.95
Frt	1.00	0.99		1.00	0.97		1.00	0.96		1.00	0.87	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3520		1770	3435		1003	1798		1770	1543	1504
Flt Permitted	0.95	1.00		0.95	1.00		0.72	1.00		0.74	1.00	1.00
Satd. Flow (perm)	3433	3520		1770	3435		760	1798		1374	1543	1504
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	113	292	11	4	317	77	55	23	7	114	8	97
RTOR Reduction (vph)	0	1	0	0	14	0	0	6	0	0	40	44
Lane Group Flow (vph)	113	302	0	4	380	0	55	24	0	114	14	7
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	80%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	18.0	74.4		1.3	57.7		14.3	14.3		14.3	14.3	14.3
Effective Green, g (s)	18.0	74.4		1.3	57.7		14.3	14.3		14.3	14.3	14.3
Actuated g/C Ratio	0.17	0.71		0.01	0.55		0.14	0.14		0.14	0.14	0.14
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	589	2494		22	1888		104	245		187	210	205
v/s Ratio Prot	c0.03	0.09		0.00	c0.11			0.01			0.01	
v/s Ratio Perm							0.07			c0.08		0.00
v/c Ratio	0.19	0.12		0.18	0.20		0.53	0.10		0.61	0.07	0.03
Uniform Delay, d1	37.3	4.9		51.3	12.0		42.2	39.7		42.7	39.5	39.4
Progression Factor	1.06	1.19		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1		4.0	0.2		4.8	0.2		5.5	0.1	0.1
Delay (s)	40.3	5.9		55.3	12.2		47.0	39.9		48.3	39.7	39.4
Level of Service	D	A		E	B		D	D		D	D	D
Approach Delay (s)		15.2			12.7			44.5			44.1	
Approach LOS		B			B			D			D	

Intersection Summary

HCM Average Control Delay	22.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	39.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

17: TRUCK EXIT & CHURN CREEK RD

9/30/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	40	0	0	41	22	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	42	0	0	43	23	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					501	
pX, platoon unblocked						
vC, conflicting volume	66	23	23			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	66	23	23			
tC, single (s)	7.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	4.4	3.3	2.2			
p0 queue free %	94	100	100			
cM capacity (veh/h)	743	1054	1592			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	42	43	23			
Volume Left	42	0	0			
Volume Right	0	0	0			
cSH	743	1592	1700			
Volume to Capacity	0.06	0.00	0.01			
Queue Length 95th (ft)	4	0	0			
Control Delay (s)	10.1	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	10.1	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			3.9			
Intersection Capacity Utilization		13.3%		ICU Level of Service		A
Analysis Period (min)			15			

Appendix D

Cumulative Plus Project Traffic Conditions, Weekday PM Peak Hour

HCM Signalized Intersection Capacity Analysis

3: KNIGHTON RD & I-5 SB ON RAMP

9/30/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑		↑↑	↑↑					↑	↑	↑
Volume (vph)	0	88	30	746	101	0	0	0	0	675	1	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0					5.0	5.0	5.0
Lane Util. Factor		0.91		0.97	0.95					0.95	0.95	1.00
Frt		0.96		1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		4890		3183	3539					1559	1563	1583
Flt Permitted		1.00		0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		4890		3183	3539					1559	1563	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	93	32	785	106	0	0	0	0	711	1	84
RTOR Reduction (vph)	0	30	0	0	0	0	0	0	0	0	0	46
Lane Group Flow (vph)	0	95	0	785	106	0	0	0	0	355	357	38
Heavy Vehicles (%)	2%	2%	2%	10%	2%	2%	2%	2%	2%	10%	2%	2%
Turn Type				Prot						Split		Perm
Protected Phases		2		1	6					4	4	
Permitted Phases												4
Actuated Green, G (s)		7.4		35.0	47.4					47.6	47.6	47.6
Effective Green, g (s)		7.4		35.0	47.4					47.6	47.6	47.6
Actuated g/C Ratio		0.07		0.33	0.45					0.45	0.45	0.45
Clearance Time (s)		5.0		5.0	5.0					5.0	5.0	5.0
Vehicle Extension (s)		3.0		3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		345		1061	1598					707	709	718
v/s Ratio Prot		c0.02		c0.25	0.03					0.23	c0.23	
v/s Ratio Perm												0.02
v/c Ratio		0.28		0.74	0.07					0.50	0.50	0.05
Uniform Delay, d1		46.3		31.0	16.3					20.3	20.3	16.1
Progression Factor		1.00		1.14	0.66					1.00	1.00	1.00
Incremental Delay, d2		0.4		4.4	0.0					2.5	2.5	0.1
Delay (s)		46.7		39.8	10.8					22.9	22.9	16.2
Level of Service		D		D	B					C	C	B
Approach Delay (s)		46.7			36.3			0.0			22.2	
Approach LOS		D			D			A			C	

Intersection Summary

HCM Average Control Delay	30.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

4: KNIGHTON RD & TRUCK ENTRANCE #1

9/30/2010



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		
Volume (veh/h)	1398	50	0	1829	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1472	53	0	1925	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	475			132		
pX, platoon unblocked					0.82	
vC, conflicting volume	1524			2140		394
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1524			1624		394
tC, single (s)	4.1			6.8		6.9
tC, 2 stage (s)						
tF (s)	2.2			3.5		3.3
p0 queue free %	100			100		100
cM capacity (veh/h)	433			77		605

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3
Volume Total	420	420	420	263	642	642	642
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	53	0	0	0
cSH	1700	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.25	0.25	0.25	0.15	0.38	0.38	0.38
Queue Length 95th (ft)	0	0	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS							
Approach Delay (s)	0.0				0.0		
Approach LOS							

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis

6: KNIGHTON RD & I-5 NB ON RAMP

9/30/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	713	0	0	807	1022	40	1	735	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			5.0	4.0		5.0	5.0			
Lane Util. Factor	1.00	0.95			0.81	0.81		1.00	0.88			
Frt	1.00	1.00			0.94	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1770	3282			5271	1189		1776	2584			
Flt Permitted	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	1770	3282			5271	1189		1776	2584			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	53	751	0	0	849	1076	42	1	774	0	0	0
RTOR Reduction (vph)	0	0	0	0	103	0	0	0	72	0	0	0
Lane Group Flow (vph)	53	751	0	0	1284	538	0	43	702	0	0	0
Heavy Vehicles (%)	2%	10%	2%	2%	10%	10%	2%	2%	10%	2%	2%	2%
Turn Type	Prot						Free	Split	custom			
Protected Phases	5	2					4 6	3	3			
Permitted Phases							Free			3 4		
Actuated Green, G (s)	8.0	44.5					72.0	105.0	10.0	50.5		
Effective Green, g (s)	8.0	44.5					72.0	105.0	10.0	50.5		
Actuated g/C Ratio	0.08	0.42					0.69	1.00	0.10	0.48		
Clearance Time (s)	5.0	5.0							5.0			
Vehicle Extension (s)	3.0	3.0							3.0			
Lane Grp Cap (vph)	135	1391					3614	1189	169	1243		
v/s Ratio Prot	0.03	c0.23					0.24			0.02		
v/s Ratio Perm							c0.45		c0.27			
v/c Ratio	0.39	0.54					0.36	0.45	0.25	0.56		
Uniform Delay, d1	46.2	22.6					6.9	0.0	44.0	19.4		
Progression Factor	0.83	0.34					0.59	1.00	1.00	1.00		
Incremental Delay, d2	1.9	1.3					0.0	0.9	0.8	0.6		
Delay (s)	40.3	9.1					4.1	0.9	44.8	20.0		
Level of Service	D	A					A	A	D	C		
Approach Delay (s)	11.1						3.2	21.3		0.0		
Approach LOS	B						A	C		A		

Intersection Summary

HCM Average Control Delay	9.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

7: KNIGHTON RD & TRUCK ENTRANCE #2

9/30/2010



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		
Volume (veh/h)	439	3	0	888	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	462	3	0	935	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	292			133		
pX, platoon unblocked					0.92	
vC, conflicting volume	465			775		117
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	465			440		117
tC, single (s)	4.1			6.8		6.9
tC, 2 stage (s)						
tF (s)	2.2			3.5		3.3
p0 queue free %	100			100		100
cM capacity (veh/h)	1092			500		913

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3
Volume Total	132	132	132	69	312	312	312
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	3	0	0	0
cSH	1700	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.08	0.08	0.08	0.04	0.18	0.18	0.18
Queue Length 95th (ft)	0	0	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS							
Approach Delay (s)	0.0				0.0		
Approach LOS							

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	20.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis

9: KNIGHTON RD & ACCESS #1 (FULL)

9/30/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	993	326	79	24	768	96	68	10	20	96	10	993
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	0.95		1.00	0.91		1.00	1.00		1.00	1.00	0.88
Frt	1.00	0.97		1.00	0.98		1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3436		1770	4492		1770	1679		1770	1863	2787
Flt Permitted	0.95	1.00		0.95	1.00		0.62	1.00		1.00	1.00	1.00
Satd. Flow (perm)	3433	3436		1770	4492		1164	1679		1863	1863	2787
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1045	343	83	25	808	101	72	11	21	101	11	1045
RTOR Reduction (vph)	0	16	0	0	14	0	0	20	0	0	0	185
Lane Group Flow (vph)	1045	410	0	25	895	0	72	12	0	101	11	860
Heavy Vehicles (%)	2%	2%	2%	2%	15%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			pm+pt			pm+pt		pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases							8			4		4
Actuated Green, G (s)	46.0	68.2		3.4	25.6		16.7	6.4		10.1	3.1	49.1
Effective Green, g (s)	46.0	68.2		3.4	25.6		16.7	6.4		10.1	3.1	49.1
Actuated g/C Ratio	0.44	0.65		0.03	0.24		0.16	0.06		0.10	0.03	0.47
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	1504	2232		57	1095		245	102		173	55	1303
v/s Ratio Prot	c0.30	0.12		0.01	c0.20		c0.03	0.01		c0.04	0.01	c0.29
v/s Ratio Perm							0.02			0.02		0.02
v/c Ratio	0.69	0.18		0.44	0.82		0.29	0.12		0.58	0.20	0.66
Uniform Delay, d1	23.8	7.3		49.9	37.5		38.7	46.6		45.5	49.7	21.5
Progression Factor	0.90	1.03		0.75	0.76		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.3	0.2		5.1	6.6		0.7	0.5		4.9	1.8	1.3
Delay (s)	23.6	7.7		42.7	35.0		39.4	47.2		50.4	51.5	22.8
Level of Service	C	A		D	D		D	D		D	D	C
Approach Delay (s)		19.0			35.2			41.8			25.5	
Approach LOS		B			D			D			C	

Intersection Summary

HCM Average Control Delay	25.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: KNIGHTON RD & CHURN CREEK RD

9/30/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	304	19	10	657	85	56	10	13	115	10	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	0.95		1.00	0.95		1.00	1.00		1.00	0.95	0.95
Frt	1.00	0.99		1.00	0.98		1.00	0.92		1.00	0.87	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3508		1770	3479		1003	1706		1770	1534	1504
Flt Permitted	0.95	1.00		0.95	1.00		0.67	1.00		0.74	1.00	1.00
Satd. Flow (perm)	3433	3508		1770	3479		710	1706		1380	1534	1504
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	132	320	20	11	692	89	59	11	14	121	11	184
RTOR Reduction (vph)	0	2	0	0	7	0	0	12	0	0	74	84
Lane Group Flow (vph)	132	338	0	11	774	0	59	13	0	121	23	14
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	80%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	16.0	73.4		1.5	58.9		15.1	15.1		15.1	15.1	15.1
Effective Green, g (s)	16.0	73.4		1.5	58.9		15.1	15.1		15.1	15.1	15.1
Actuated g/C Ratio	0.15	0.70		0.01	0.56		0.14	0.14		0.14	0.14	0.14
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	523	2452		25	1952		102	245		198	221	216
v/s Ratio Prot	c0.04	0.10		0.01	c0.22			0.01			0.02	
v/s Ratio Perm							0.08			c0.09		0.01
v/c Ratio	0.25	0.14		0.44	0.40		0.58	0.05		0.61	0.11	0.07
Uniform Delay, d1	39.2	5.3		51.3	13.0		42.0	38.8		42.2	39.1	38.9
Progression Factor	1.07	0.84		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.1	0.1		11.9	0.6		7.7	0.1		5.5	0.2	0.1
Delay (s)	43.1	4.5		63.2	13.6		49.7	38.9		47.7	39.3	39.0
Level of Service	D	A		E	B		D	D		D	D	D
Approach Delay (s)		15.3			14.3			46.5			42.4	
Approach LOS		B			B			D			D	

Intersection Summary

HCM Average Control Delay	21.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

17: TRUCK EXIT & CHURN CREEK RD

9/30/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	40	0	0	39	39	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	42	0	0	41	41	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					501	
pX, platoon unblocked						
vC, conflicting volume	82	41	41			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	82	41	41			
tC, single (s)	7.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	4.4	3.3	2.2			
p0 queue free %	94	100	100			
cM capacity (veh/h)	726	1030	1568			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	42	41	41			
Volume Left	42	0	0			
Volume Right	0	0	0			
cSH	726	1568	1700			
Volume to Capacity	0.06	0.00	0.02			
Queue Length 95th (ft)	5	0	0			
Control Delay (s)	10.3	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	10.3	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization		13.3%		ICU Level of Service		A
Analysis Period (min)			15			