

## Traffic Impact Study

2024-12-15 (DJK) reviewed, comments include:

- chk intersection spacing, pg 8
- add noted gated acces, pg 9
- minor note on trip gen rounding, Table 1
- Fig 6 trip distribution between unsignalized vs signalized intersection usage questioned
- Bust in signalized intersections analyses, timing for both 35th and 38th revised earlier this year, see Exist Analyses in Appendix
- pg 37, request for Safety analyses along Chambers adjacent to the site frontage and at Chambers & 38th specifically. not requested in pre-app mtg but instituted for update TIS Guidelines for 2025
- PDF sht 70, comments regarding signalized timing used
- PDF sht 71, updated timing provide for both 35th and 38th Avenues

Thank for your review of the traffic study. Please see our responses to these comments throughout this review document.

# QuikTrip 4217

Aurora, Colorado

Prepared for:

**QuikTrip Corporation**

**Kimley»Horn**

# T R A F F I C   I M P A C T   S T U D Y

## QuikTrip 4217

Aurora, Colorado

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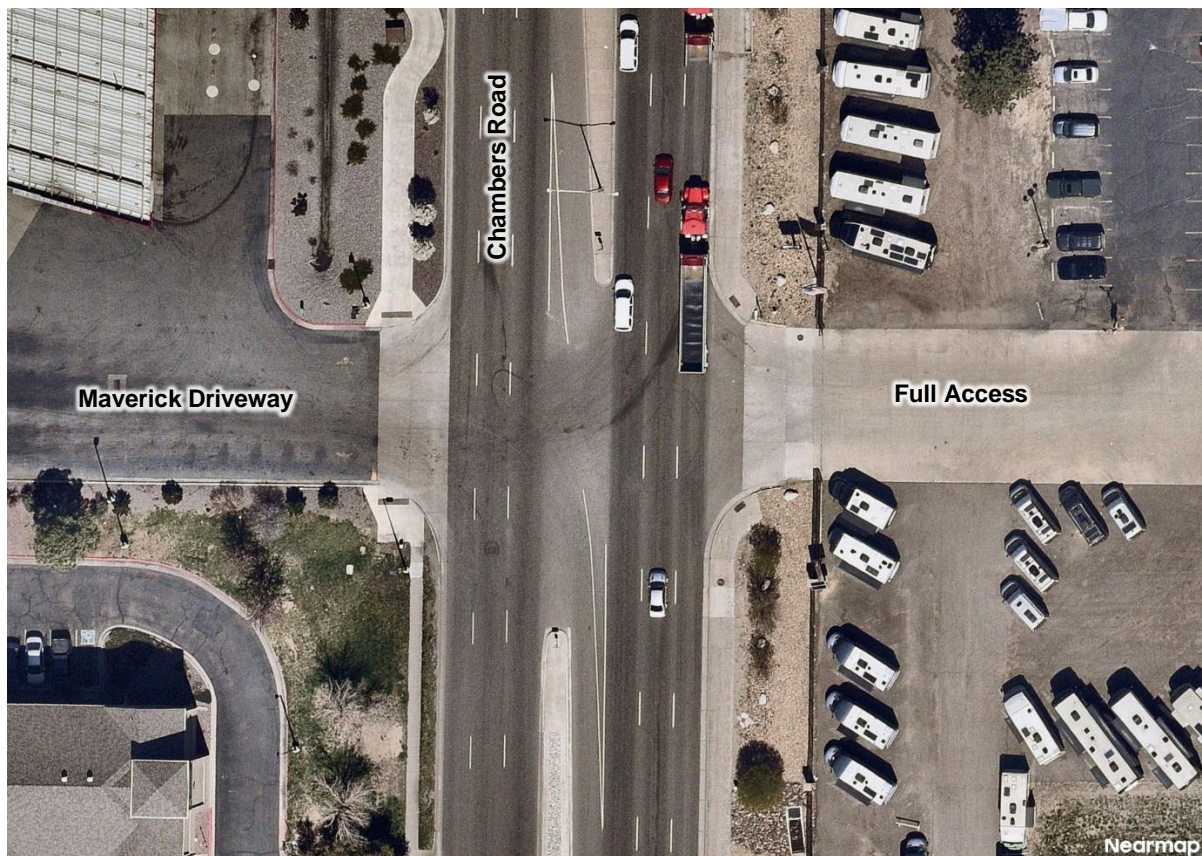
October 2024

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Flowline to flowline I get  
~290', CL to CL I get ~340'

This has been updated  
to better clarify the  
intersection spacing.

The unsignalized intersection of Chambers Road with the Maverick driveway to the west and the existing full access to the east located approximately 275 feet south of 38<sup>th</sup> Avenue (#3), operates with stop control on both east and left approaches. The southbound and northbound approaches provide one left turn lane and three through lanes with the outside lane being a shared through/right turn lane. The eastbound Maverick driveway approach provides an exclusive right turn lane. The westbound approach provides enough lane width to accommodate a left turn and a right turn lane, but no lane markings are provided. It should be noted that vehicles were observed performing prohibited eastbound left turn movements from the Maverik access.



*Maverick Driveway / Full Access & Chambers Road (#3)*

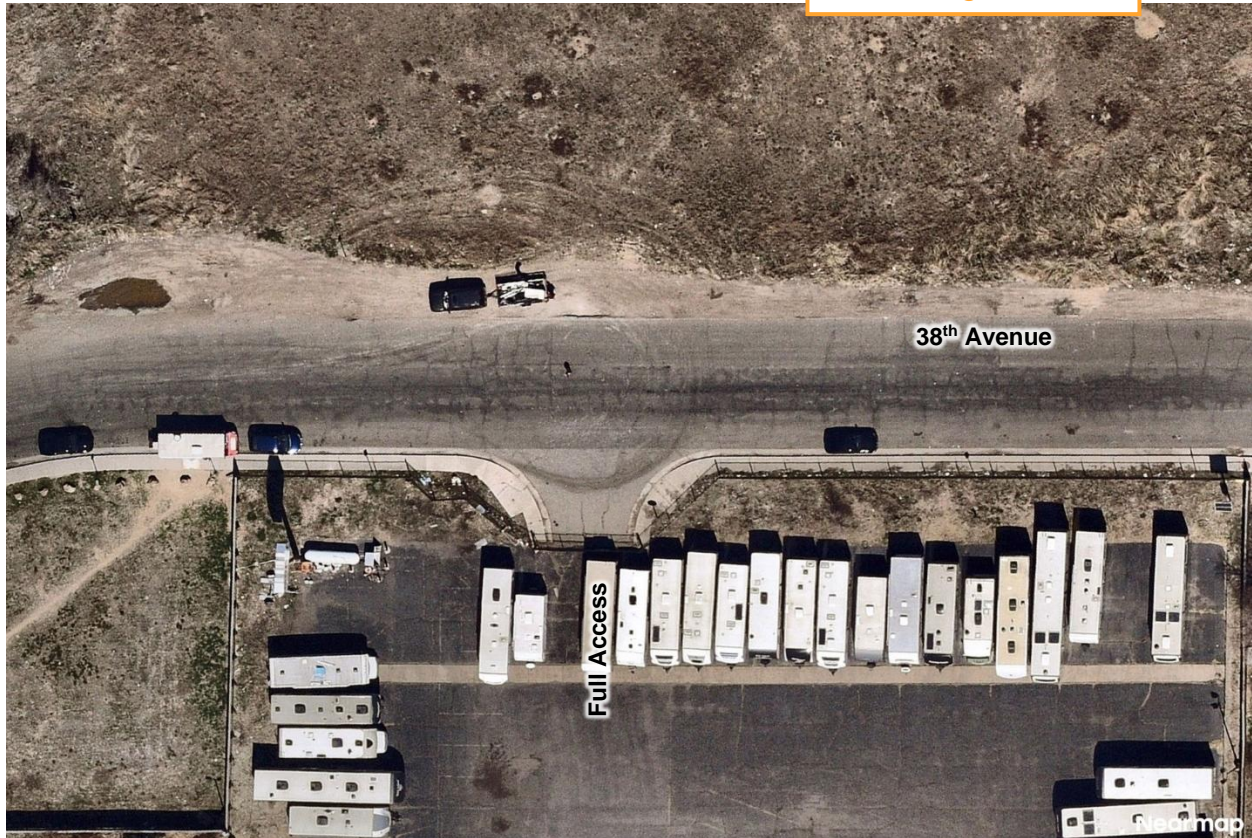


FL to CL

This has been updated to better clarify the intersection spacing, and additional description regarding its current gated condition has also been incorporated.

The unsignalized intersection of 38<sup>th</sup> Avenue and the existing full access located approximately 420 feet east of Chambers Road (measured edge to edge), operates with a stop control on the northbound approach. The northbound approach provides one shared left/right turn lane. The eastbound approach provides one shared through/right turn lane. The westbound approach provides one shared left turn/through lane.

Should mention the access is gated



38<sup>th</sup> Avenue & Full Access (#4)

The intersection lane configuration and control for the study area intersections are shown in **Figure 2**.

Striped, but median available for 225' total

Agreed, and this has been updated accordingly in the figures and throughout the report where needed.

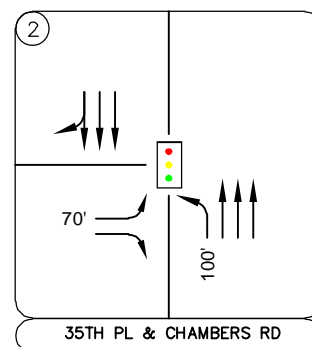
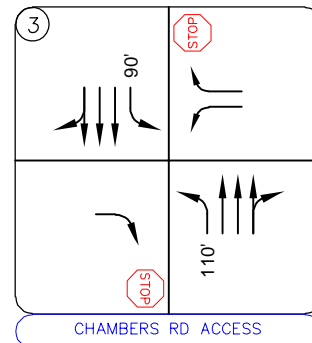
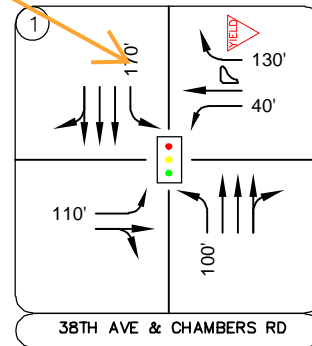
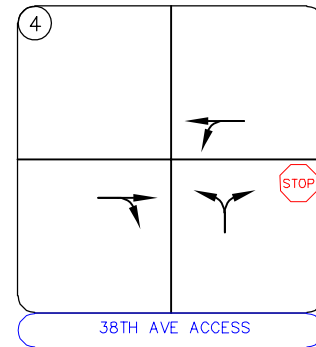
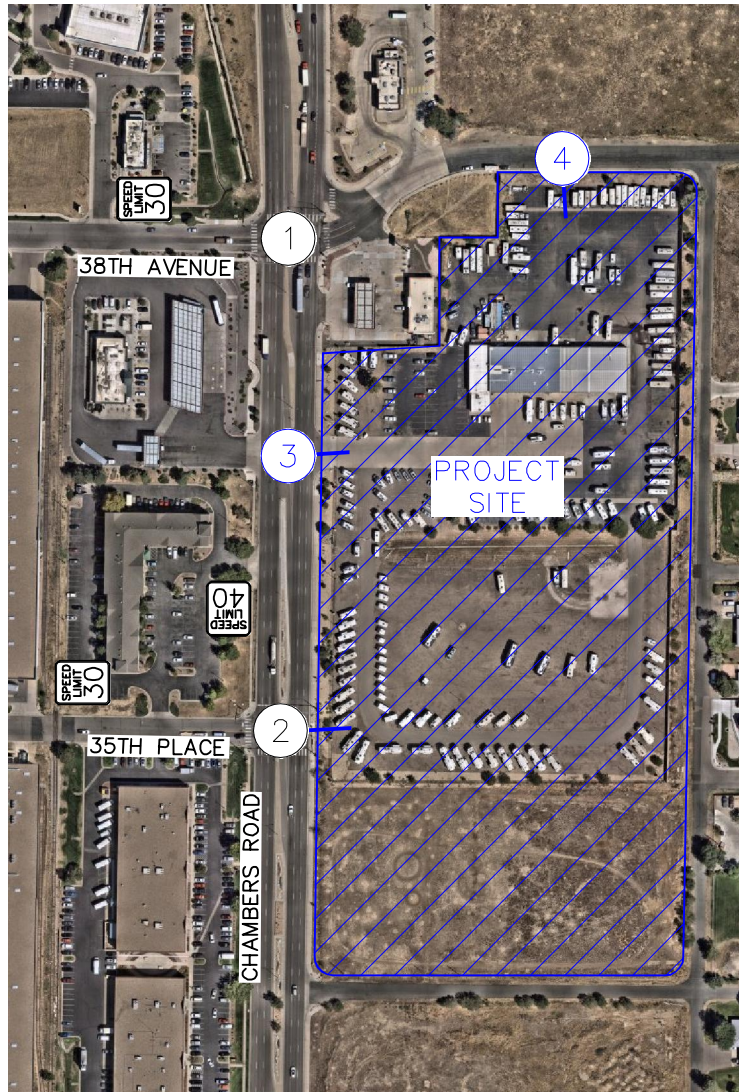
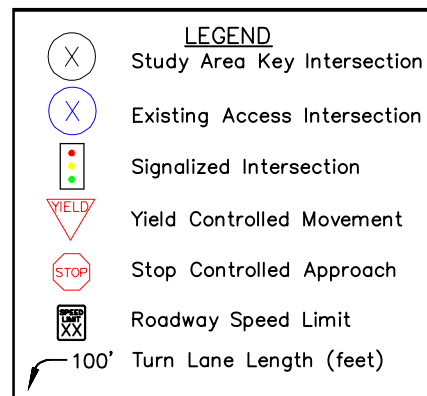


FIGURE 2  
 QUIKTRIP 4217  
 AURORA, COLORADO  
 EXISTING GEOMETRY AND CONTROL





**Table 1 – QuikTrip 4217 Traffic Generation**

Land Use and Size	Weekday Vehicle Trips						
	Daily	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Convenience Store/Gas Station (ITE 945) 20 VFP / 7,318 Square Feet	6,916	316	316	632	269	269	538
Truck Stop (ITE 950) – 4 Truck Fueling Positions	896	27	29	56	33	29	62
Total Site Generated Trips	7,812	343	345	688	302	298	600
<b>Non Pass-By Trips</b>	<b>1,954</b>	<b>82</b>	<b>83</b>	<b>165</b>	<b>76</b>	<b>75</b>	<b>150</b>
<b>Pass-By Trips</b>	<b>5,858</b>	<b>261</b>	<b>262</b>	<b>523</b>	<b>226</b>	<b>223</b>	<b>450</b>

rounding, off by 2

#### 4.2 Trip Distribution

Distribution of site traffic on the street system was based on the area street system characteristics, existing traffic patterns, existing and anticipated surrounding demographic information, and the proposed access system for the project. The directional distribution of traffic is the percentage of site-generated traffic that approaches the site from a given direction and departs the site back to the original source. The non pass-by project trip distribution for the proposed development is illustrated in **Figure 6**.

This has been corrected and updated in the table and the analysis.

Since the project is a commercial development, a certain amount of traffic attracted to the gas station and truck stop development will already be passing by the site. This pass-by distribution is a means to quantify the amount of traffic arriving to the site from a given direction and then leaving the site in the same original direction of travel, continuing the driver's trip. The expected weekday morning and afternoon peak hour pass-by trip distributions were calculated based on actual traffic volumes at the study intersections. Directional differences in the morning and afternoon peak hours were accounted for in the pass-by distributions as shown in **Figures 7** and **8**, respectively.

#### 4.3 Traffic Assignment

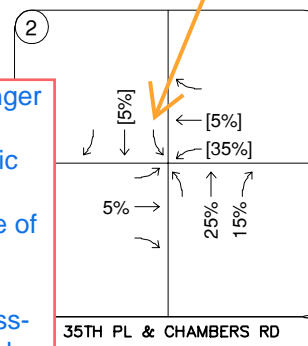
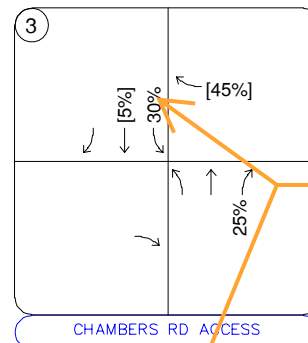
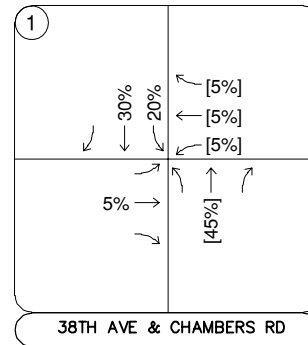
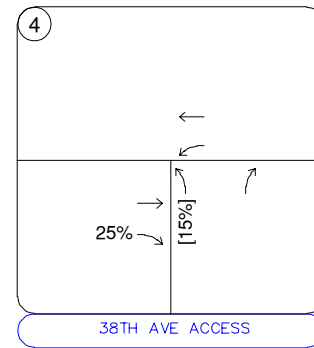
The project traffic assignment was obtained by applying the project trip distribution to the estimated traffic generation of the development shown in **Table 1**. Project non pass-by traffic assignment is shown in **Figure 9**, while **Figure 10** illustrates the expected pass-by traffic assignment.



Because of the nature of the site with both the convenience store and passenger vehicle fueling positions located adjacent to this access and the backtracking required if vehicles enter at 35th PI from the north, it is believed most SB traffic on Chambers will desire to enter via the SBL at 38th or at the 3/4 movement access. Despite the high NB volume, because there are signals on either side of this access, this will provide gaps in traffic on Chambers.

We have updated the analysis to provide 5% of both the non pass-by and pass-by traffic entering via the signal at 35th PI, however for the reasons mentioned above, it is believed this distribution will be representative of how traffic will arrive to the site from the north.

Additionally, based on the results of the updated analysis, even with this trip distribution assigned to the SBL at the 3/4 access, this amounts to no more than an average of about 1.8 veh/min turning SBL at this access. During peak periods, based on the analysis performed this would not be expected to exceed an average of 50' (about two vehicles) queued for this movement through 2050.



Really think this % will fight the high NB traffic volume vs using the signal at 35th?

### LEGEND

Study Area Key Intersection

Project Access Intersection

XX% External Trip Distribution Percentage  
 XX%[XX%] Entering[Exiting] Trip Distribution Percentage

**FIGURE 6**  
 QUIKTRIP 4217  
 AURORA, COLORADO  
 NON PASS-BY TRIP DISTRIBUTION

Study area intersections were analyzed based on average total delay analysis for signalized and unsignalized intersections. Under the unsignalized analysis, the LOS for a two-way stop-controlled intersection is determined by the computed or measured control delay and is defined for each minor movement. LOS for a two-way stop-controlled intersection is not defined for the intersection as a whole. LOS for signalized, roundabout, and all-way stop controlled intersections are defined for each approach and for the overall intersection.

## 5.2 Key Intersection Operational Analysis

Calculations for the operational level of service at the key intersections for the study area are provided in **Appendix E**. The existing year analysis is based on the lane geometry and intersection control shown in **Figure 2**. Existing peak hour factors were utilized in the analysis. The existing heavy vehicle percentages obtained from the turning movement counts were also used in each horizon year. The signalized intersection analysis utilizes the observed cycle lengths with optimized phasing and timing. Based on increased national attention given to establishing appropriate yellow and all-red clearance intervals to improve intersection safety, these have been calculated and are applied for approaches at the signalized intersections. The increase in yellow and all red time sacrifices intersection capacity for improved safety. Synchro traffic analysis software was used to analyze the signalized and unsignalized key intersections for HCM level of service.

### 38<sup>th</sup> Avenue and Chambers

The signalized intersection of 38<sup>th</sup> Avenue and Chambers has left turn phasing on the southbound approach and permit left turn on the northbound approaches. The intersection movements operate according to existing conditions.

With project traffic, all movements are anticipated to continue operating at an acceptable level of service throughout the 2050 horizon. Therefore, no improvements are anticipated to be needed at this intersection based on the additional traffic and this operational level of service analysis. Of note, the future traffic counts sometimes report less delays than the existing condition when traffic assignment is added to movement that have less movement delay than the average intersection delay. This provides the results of the LOS analysis conducted at this intersection.

Your analyses of Chambers at 35th and 38th are all incorrect. See Appendix, updated traffic signal timings provided per newly install controllers earlier this year. All signalized analyses will need to be rerun with the updated timings.

Thank you for providing updated signal timings at 35th and 38th. We have incorporated these signal timings into our analysis and have maintained the existing timings through all horizons and scenarios in the updated analysis.



## 6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis presented in this report, Kimley-Horn believes QuikTrip 4217 will be successfully incorporated into the existing and future roadway network. Analysis of the existing street network, the proposed project development, and expected traffic volumes resulted in the following conclusions and recommendations:

- With redevelopment of the existing site to a gas station, the existing full access along Chambers Road will be restricted to a three-quarter access (left-in/right-in/right-out). An R3-5R “RIGHT ONLY” sign is recommended to be installed at the exiting of this approach. Exiting westbound left turn movements will be prohibited and no longer allowed at the project access. The existing full access along 38<sup>th</sup> Avenue will remain. An R1-1 “STOP” sign is recommended to be kept at both 38<sup>th</sup> Avenue and Chambers Road approaches exiting the site.
- With redevelopment of the site, the east leg of the signalized 35<sup>th</sup> Place and Chambers Road intersection will be constructed to provide site access. It is recommended to install a 100-foot southbound left turn lane at the 35th Place and Chambers Road intersection and a shared taper with the adjacent northbound left turn lane.
- Any onsite or offsite improvements should be incorporated into the Civil Drawings and conform to standards of the City of Aurora and the Manual on Uniform Traffic Control Devices (MUTCD) – 11<sup>th</sup> Edition, 2023.

A request for a simple Corridor Safety Analysis is asked for along Chamber Road in the vicinity of the site frontage (as well as the intersection of Chambers & 38th in its entirety). The data can be pulled from Pre-App of February did not request as requirement transpired on or around April 2024 and has been written into our 2025 TIS Guideline update

We have incorporated a safety analysis of this area into the updated study.

# Timings

## 1: Chambers Road & 38th Avenue

2024 Existing AM

09/25/2024



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	152	9	13	7	39	16	842	41	1106
Future Volume (vph)	152	9	13	7	39	16	842	41	1106
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	pm+pt	NA
Protected Phases		4		8			2	1	6
Permitted Phases	4		8		8	2		6	
Detector Phase	4	4	8	8	8	2	2	1	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.5	24.5	24.5	24.5	24.5	23.7	23.7	11.5	23.7
Total Split (s)	49.0	49.0	49.0	49.0	49.0	55.0	55.0	16.0	71.0
Total Split (%)	40.8%	40.8%	40.8%	40.8%	40.8%	45.8%	45.8%	13.3%	59.2%
Yellow Time (s)	3.2	3.2	3.2	3.2	3.2	4.3	4.3	3.2	4.3
All-Red Time (s)	3.3	3.3	3.3	3.3	3.3	1.4	1.4	2.8	1.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	5.7	5.7	6.0	5.7
Lead/Lag						Lag	Lag	Lead	
Lead-Lag Optimize?						Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	23.9	23.9	23.9	23.9	23.9	73.5	73.5	83.6	83.9
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.20	0.61	0.61	0.70	0.70
v/c Ratio	0.77	0.11	0.06	0.02	0.12	0.09	0.35	0.12	0.42
Control Delay (s/veh)	67.0	19.1	35.1	33.7	1.8	13.1	11.4	8.2	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	67.0	19.1	35.1	33.7	1.8	13.1	11.4	8.2	8.7
LOS	E	B	D	C	A	B	B	A	A
Approach Delay (s/veh)		59.7		12.9			11.4		8.7
Approach LOS		E		B			B		A

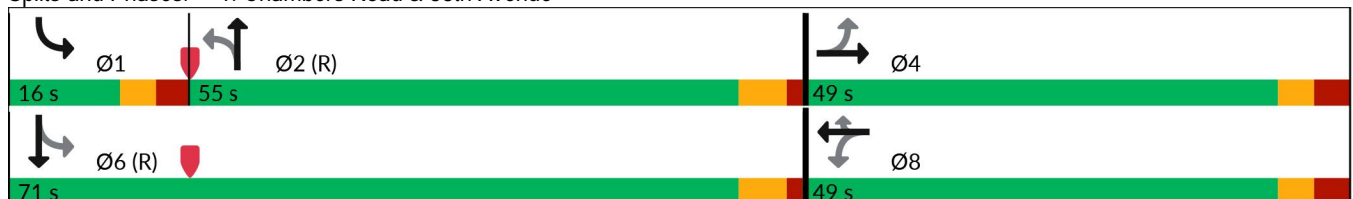
### Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 16 (13%), Referenced to phase 2:NBT and 6:SBT  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.77  
 Intersection Signal Delay (s/veh): 13.5  
 Intersection Capacity Utilization 59.3%  
 Analysis Period (min) 15

Did you confirm timings with COA Traffic Staff? See attached on next page (140 sec cycle) DRCOG timing seemingly used have not been updated since the controller swap-outs performed earlier this year

As noted previously, the updated signal timings have been incorporated into the study in each scenario and horizon year.

### Splits and Phases: 1: Chambers Road & 38th Avenue



Dial 1/Split 1 (top) = AM Plan  
Dial 2/Split 2 = Off Peak/Midday  
Dial 2/Split 2 = Weekend  
Dial 3/Split 1 = PM Plan

M-F TOD Schedule:

6:00AM – Action Plan 1 (AM Peak)  
9:00AM – Action Plan 2 (Off Peak)  
15:00/3:00PM – Action Plan 3 (PM Peak)  
19:00/7:00PM – Action Plan 2 (Off Peak)  
22:00/10:00PM – Action Plan 10 (Free)

TransSuite now which only has intersections where controller swap outs were completed.

Thank you for providing the updated signal timings. We have incorporated these into all scenarios and horizon years in the updated study.

225 Chambers Rd 35th Pl	Phase	1	2	3	4	5	6	7	8												
	Movement	SBT		EBL		NBT															
	Min Green + 1	11	0	6	0	11	0	0	0											Cycle Length	140
	Walk + 1	0	6	0	6	0	0	0	0											Offset	66
	FDW	0	12	0	22	0	0	0	0											Alt. Sequence	None
	Yellow	4	0	4	0	4	0	0	0											Ped Float	0
	All Red	2	0	2	0	2	0	0	0												
	Min Veh Split	N/A	17	N/A	12	N/A	17	N/A	N/A											Cycle Length	80
	Min Ped Split	N/A	24	N/A	34	N/A	N/A	N/A	N/A											Offset	42
																				Alt. Sequence	None
211 Chambers Rd 38th Ave	Phase	1	2	3	4	5	6	7	8												
	Movement	SBL	NBT		EBT		SBT		WBT												
	Min Green + 1	6	11	0	6	0	11	0	6											Ped Float	0
	Walk + 1	0	6	0	6	0	6	0	6												
	FDW	0	9	0	24	0	13	0	27											Cycle Length	80
	Yellow	3	4	0	4	0	4	0	4											Offset	27
	All Red	1	2	0	2	0	2	0	2											Alt. Sequence	None
	Min Veh Split	10	17	N/A	12	N/A	17	N/A	12											Ped Float	17
	Min Ped Split	N/A	21	N/A	36	N/A	25	N/A	39												
																				Cycle Length	80
Timing not implemented by direction of	Phase	1	2	3	4	5	6	7	8												
	Movement	SBL	NBT		EBT		SBT		WBT												
	Min Green + 1	6	11	0	6	0	11	0	6											Offset	77
	Walk + 1	0	6	0	6	0	6	0	6											Alt. Sequence	None
	FDW	0	9	0	24	0	13	0	27											Ped Float	19
	Yellow	3	4	0	4	0	4	0	4												
	All Red	1	2	0	2	0	2	0	2											Cycle Length	90
	Min Veh Split	10	17	N/A	12	N/A	17	N/A	12											Offset	37
	Min Ped Split	N/A	21	N/A	36	N/A	25	N/A	39											Alt. Sequence	None
																				Ped Float	4
Timing not implemented by direction of	Phase	1	2	3	4	5	6	7	8												
	Movement	SBL	NBT		EBT		SBT		WBT												
	Min Green + 1	6	11	0	6	0	11	0	6												
	Walk + 1	0	6	0	6	0	6	0	6											Cycle Length	80
	FDW	0	9	0	24	0	13	0	27											Offset	77
	Yellow	3	4	0	4	0	4	0	4											Alt. Sequence	None
	All Red	1	2	0	2	0	2	0	2											Ped Float	19
	Min Veh Split	10	17	N/A	12	N/A	17	N/A	12												
	Min Ped Split	N/A	21	N/A	36	N/A	25	N/A	39											Cycle Length	90
																				Offset	37

Note, timings are implemented per our updated TranSuite swapped out controllers implemented earlier this year.