

Traffic Impact Study

2024-03-27 (DJK)

Minor comments, including Chambers/Smoky Hill left turn storage lengths, access background volume depictions, non pass-by direction percentages, LOS E highlights

Thank you Dean for your comments. Kimey-Horn has addressed all the comments throughout the document in blue text boxes.

QuikTrip 4274

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 4274

Aurora, Colorado

**Prepared for
QuikTrip Corporation**

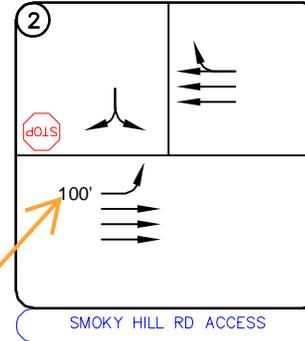
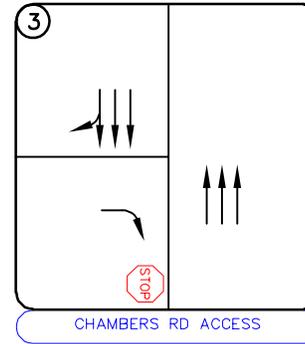
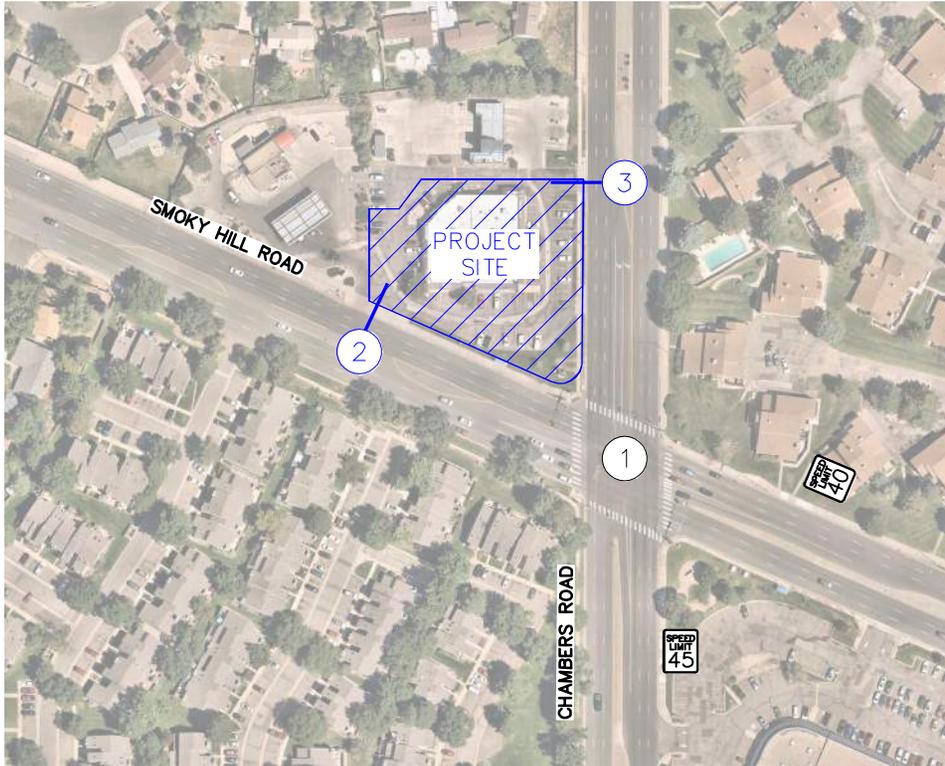
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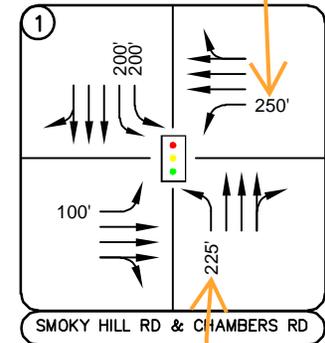
November 2023

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The turn lane lengths has been updated.

closer to 270'



closer to 250'

more like 80'

LEGEND

- (X) Study Area Key Intersection
- (X) Existing Access Intersection
- Signalized Intersection
- STOP Stop Controlled Approach
- ROAD SPEED LIMIT XX Roadway Speed Limit
- 100' Turn Lane Length (feet)

FIGURE 2
 QUIKTRIP 4274
 AURORA, COLORADO
 EXISTING GEOMETRY AND CONTROL

3.3 Existing Traffic Volumes

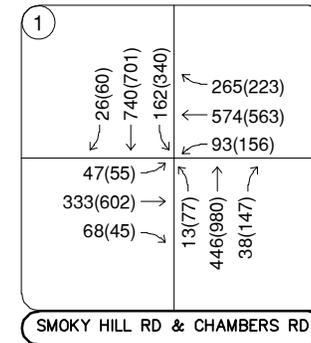
Existing turning movement counts were conducted at the intersection of Smoky Hill Road & Chambers Road on Thursday, October 19, 2023 during the weekday morning and afternoon peak hours. Since the two project accesses currently exist and are shared with the adjacent car washes, the driveway counts were also collected on October 19, 2023 to determine the existing driveway counts. To provide a conservative analysis, the existing driveway counts were used, and project traffic was added directly on top without removing any trips from the existing strip plaza. The counts were conducted during the morning and afternoon peak hours of adjacent street traffic in 15-minute intervals from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM on this count date. The existing intersection traffic volumes are shown in **Figure 3** with count sheets provided in **Appendix A**.

3.4 Unspecified Development Traffic Growth

According to traffic projections from the Denver Regional Council of Governments (DRCOG) traffic model, the area surrounding the site is expected to have an average 30-year growth factor of 1.26 which equates to an annual growth rate of 0.77 percent. Future traffic volume projections and growth rate calculations are provided in **Appendix B**. This annual growth rate was used to estimate short-term 2026 and long-term 2050 traffic volume projections at the key intersections. The calculated background traffic volumes for 2026 and 2050 are shown in **Figure 4** and **Figure 5**, respectively.



Why not show intersections 2 & 3 growth (through movements) as well?



The intersection accesses (#2 and 3) have been included in the background traffic volume figures. However, these access intersections were only analyzed in the total conditions.

FIGURE 4
 QUIKTRIP 4274
 AURORA, COLORADO
 2026 BACKGROUND TRAFFIC VOLUMES

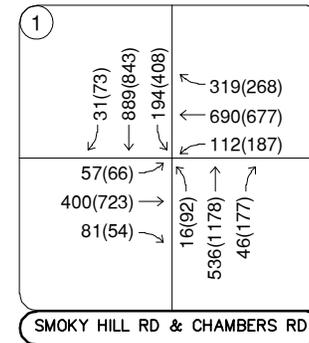
LEGEND

- (X) Study Area Key Intersection
- XXX(XXX) Weekday AM(PM)
Peak Hour Traffic Volumes
- [XX,X00] Estimated Daily Traffic Volume



FIGURE 5
 QUIKTRIP 4274
 AURORA, COLORADO
 2050 BACKGROUND TRAFFIC VOLUMES

Why not show intersections 2 & 3 growth (through movements) as well?



The intersection accesses (#2 and 3) have been included in the background traffic volume figures. However, these access intersections were only analyzed in the total conditions.

LEGEND

(X) Study Area Key Intersection

XXX(XXX) Weekday AM(PM)
 Peak Hour Traffic Volumes

[XX,X00] Estimated Daily Traffic Volume

Table 1 – QuikTrip 4274 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) 14 FP/5,312 SF	3,600	189	190	379	159	160	319
Non Pass-By Trips	900	45	46	91	40	40	80
Pass-By Trips	2,700	✓ 144	✓ 144	✓ 288	✓ 119	✓ 120	✓ 239

4.2 Trip Distribution

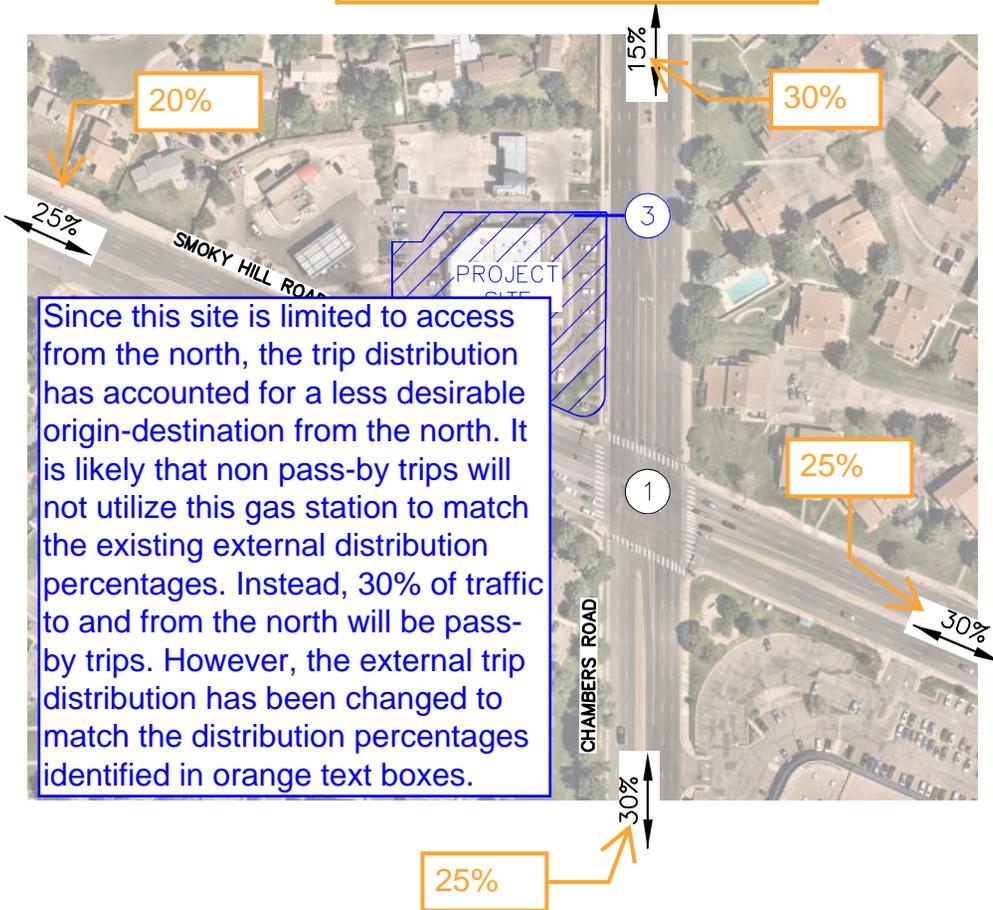
Distribution of site traffic on the street system was based on the area street system characteristics, existing traffic patterns, existing and anticipated surrounding demographic information, and the proposed access system for the project. The directional distribution of traffic is a means to quantify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

Since the project is a commercial development, a certain amount of traffic attracted to the gas station 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 intersection of Smoky Hill Road and Chambers Road. 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 and Total Traffic Volumes

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. Site traffic volumes were added to the background volumes to represent estimated traffic conditions for the short-term 2026 buildout horizon and long-term 2050 planning horizon. These total traffic volumes for the study area are illustrated for the 2026 and 2050 horizon years in **Figures 11** and **12**, respectively.

Check count sheets, seeing differing %'s per peak volumes entering/exiting intersection 1



Since this site is limited to access from the north, the trip distribution has accounted for a less desirable origin-destination from the north. It is likely that non pass-by trips will not utilize this gas station to match the existing external distribution percentages. Instead, 30% of traffic to and from the north will be pass-by trips. However, the external trip distribution has been changed to match the distribution percentages identified in orange text boxes.

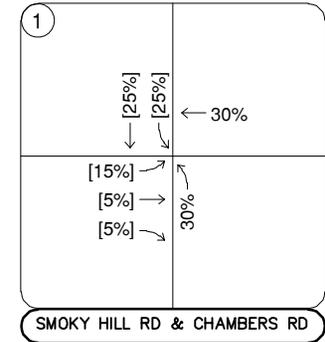
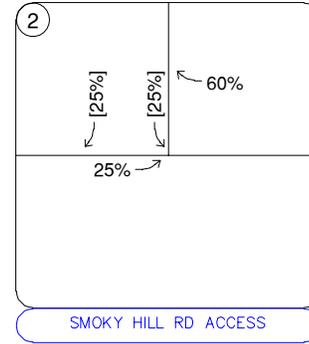
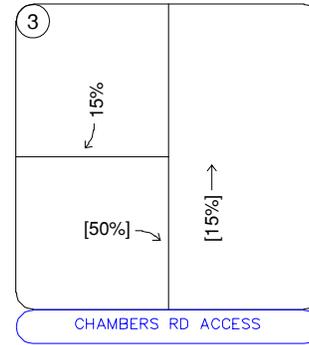


FIGURE 6
 QUIKTRIP 4274
 AURORA, COLORADO
 NON PASS-BY PROJECT TRIP DISTRIBUTION

LEGEND

- (X) Study Area Key Intersection
- (X) Project Access Intersection
- XX% External Trip Distribution Percentage
- XX%[XX%] Entering[Exiting] Trip Distribution Percentage

Table 3 – Smoky Hill Road & Chambers Road LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay	LOS	Delay	LOS
	(sec/veh)		(sec/veh)	
2023 Existing	32.6	C	34.9	C
Eastbound Approach	49.3	D	62.4	E
Eastbound Left	45.8	D	48.5	D
Eastbound Through	49.4	D	61.8	E
Eastbound Right	50.1	D	66.9	E
Westbound Approach	52.3	D	53.7	D
Westbound Left	41.9	D	46.8	D
Westbound Through	52.6	D	53.8	D
Westbound Right	55.1	E	57.5	E
Northbound Approach	15.0	B	21.2	C
Northbound Left	12.8	B	14.6	B
Northbound Through	15.0	B	21.3	C
Northbound Right	15.2	B	22.1	C
Southbound Approach	14.1	B	16.3	B
Southbound Left	11.8	B	15.7	B
Southbound Through	14.5	B	16.5	B
Southbound Right	14.8	B	16.8	B
2026 Background	32.6	C	35.5	D
Eastbound Approach	48.9	D	63.7	E
Eastbound Left	45.4	D	48.4	D
Eastbound Through	49.0	D	62.9	E
Eastbound Right	49.7	D	68.9	E
Westbound Approach	51.9	D	53.8	D
Westbound Left	41.4	D	46.7	D
Westbound Through	52.3	D	53.9	D
Westbound Right	54.7	D	57.9	E
Northbound Approach	15.4	B	21.8	C
Northbound Left	13.2	B	14.9	B
Northbound Through	15.4	B	22.0	C
Northbound Right	15.6	B	22.9	C
Southbound Approach	14.5	B	16.8	B
Southbound Left	12.1	B	16.4	B
Southbound Through	14.9	B	16.9	B
Southbound Right	15.2	B	17.3	B

Highlight all E/Fs

All E LOS and corresponding delays have been highlighted in yellow. There are no LOS Fs reported.

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2026 Background Plus Project	33.3	C	36.5	D
Eastbound Approach	45.0	D	56.9	E
Eastbound Left	42.8	D	46.8	D
Eastbound Through	45.4	D	57.3	E
Eastbound Right	45.9	D	60.7	E
Westbound Approach	52.5	D	58.8	E
Westbound Left	39.2	D	44.3	D
Westbound Through	52.8	D	59.0	E
Westbound Right	56.0	E	66.7	E
Northbound Approach	17.3	B	23.4	C
Northbound Left	14.7	B	16.2	B
Northbound Through	17.5	B	23.9	C
Northbound Right	17.8	B	24.8	C
Southbound Approach	17.4	B	19.0	B
Southbound Left	14.1	B	17.8	B
Southbound Through	18.1	B	19.4	B
Southbound Right	18.4	B	19.8	B
2050 Background	33.5	C	41.0	D
Eastbound Approach	45.3	D	68.1	E
Eastbound Left	42.2	D	46.6	D
Eastbound Through	45.5	D	66.8	E
Eastbound Right	46.0	D	75.6	E
Westbound Approach	50.1	D	56.3	E
Westbound Left	37.4	D	50.4	D
Westbound Through	50.4	D	55.4	E
Westbound Right	53.8	D	61.9	E
Northbound Approach	19.6	B	29.3	C
Northbound Left	16.5	B	18.5	B
Northbound Through	19.6	B	29.5	C
Northbound Right	19.9	B	31.1	C
Southbound Approach	18.5	B	23.3	C
Southbound Left	14.9	B	27.8	C
Southbound Through	19.1	B	21.2	C
Southbound Right	19.5	B	21.8	C

All E LOS and corresponding delays have been highlighted in yellow. There are no LOS Fs reported.

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2050 Background Plus Project	34.5	C	41.6	D
Eastbound Approach	42.2	D	58.5	E
Eastbound Left	40.7	D	47.0	D
Eastbound Through	42.4	D	58.4	E
Eastbound Right	42.9	D	63.4	E
Westbound Approach	51.1	D	60.4	E
Westbound Left	35.7	D	46.1	D
Westbound Through	51.4	D	60.2	E
Westbound Right	55.4	E	69.4	E
Northbound Approach	21.5	C	31.3	C
Northbound Left	18.2	B	20.2	C
Northbound Through	21.7	C	31.8	C
Northbound Right	22.0	C	33.7	C
Southbound Approach	21.4	C	26.2	C
Southbound Left	17.0	B	29.8	C
Southbound Through	22.3	C	24.2	C
Southbound Right	22.8	C	24.9	C

Project Accesses

With redevelopment of the existing site to a gas station, the Chambers Road will be removed. Additionally, the existing full Hill Road will be narrowed from the existing 75-foot driveway width to 40 feet. This reduction in width will result in less confusion for inbound and outbound drivers. The existing right-in/right-out access along Chambers Road will remain. An R1-1 "STOP" sign is recommended to be placed at both approaches exiting the site. **Table 4** provides the results of the level of service for this project street access. As shown in the table, the project street access intersections are anticipated to have all movements operating with acceptable LOS during the peak hours in both the buildout year 2026 and the 2050 long-term horizons.

All E LOS and corresponding delays have been highlighted in yellow. There are no LOS Fs reported.

Smoky Hill Road Access

- An east left turn lane **is** warranted at the project access along Smoky Hill Road based on projected 2050 background plus project traffic volumes being 38 westbound left turns during the peak hour and the threshold being 25 vph. However, an existing eastbound left turn lane is provided with a length of approximately 100 feet. Based on the 40 mile per hour speed limit, the storage length is 40 feet with a 145-foot taper (12:1). However, the turn lane cannot be further extended to the west since extending the turn lane will block the full movement access at Fraser Circle. This existing eastbound left turn lane at the Smoky Hill Road access has a unique entry design that could be leading to driver confusion; therefore, the City of Aurora could consider introducing a small 10-foot striped bulb out with a reduced 25-foot taper to define a clear left turn entry for this turn lane.

5.4 Vehicle Queuing Analysis

A vehicle queuing analysis was conducted for the study area intersections. The queuing analysis was performed using Synchro presenting the results of the 95th percentile queue lengths. Results are shown in the following **Table 5** with calculations provided within the level of service operational sheets of **Appendix D** for unsignalized intersections and **Appendix E** for signalized intersections.

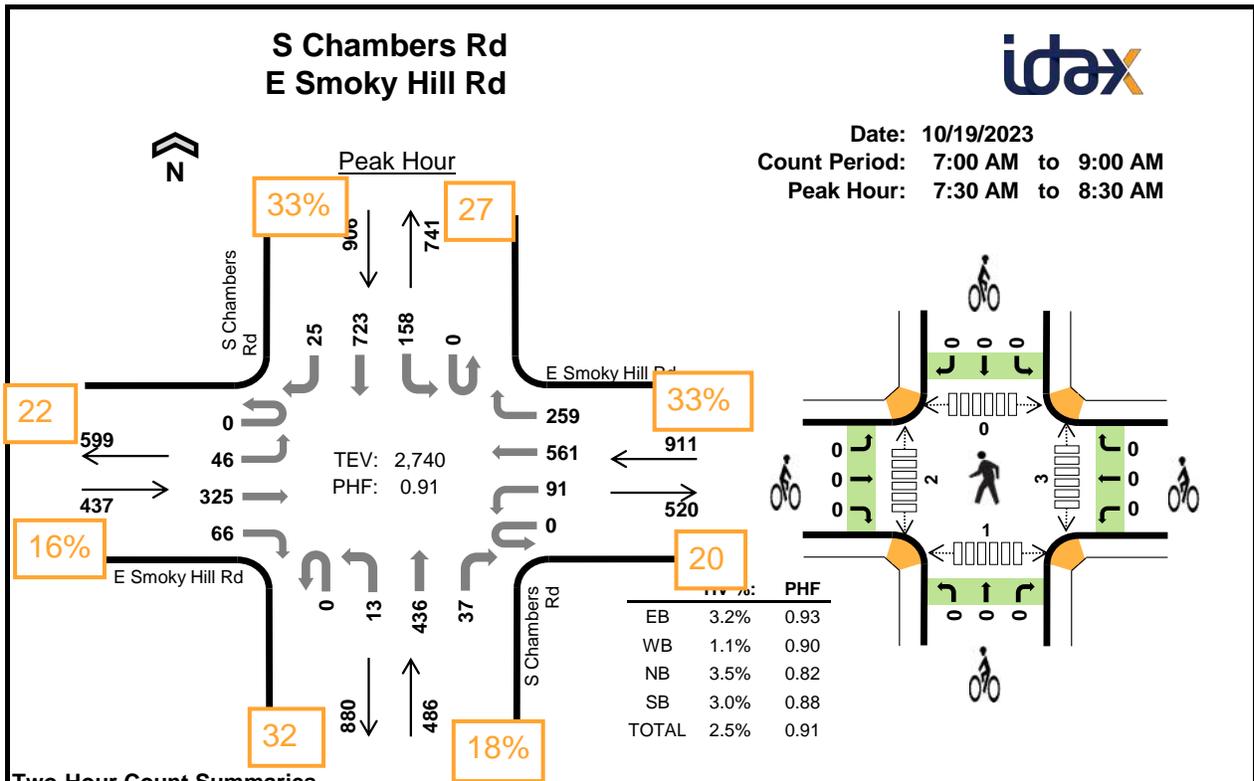
Table 5 – Turn Lane Queuing Analysis Results

Intersection Turn Lane	Existing Turn Lane Length (feet)	2026 Calculated Queue (feet)	2026 Recommended Length (feet)	2050 Calculated Queue (feet)	2050 Recommended Length (feet)
Smoky Hill & Chambers					
Eastbound Left	100'	109'	100'	122'	125'
Westbound Left	250'	160'	250'	208'	250'
Northbound Left	225'	94'	225'	104'	225'
Southbound Left	200' DL	125' DL	200' DL	229' DL	225' DL
Smoky Hill Access					
Eastbound Left	100'	25'	100'	25'	100'

DL = Dual Left Turn Lanes; **Blue** Text = Recommendation

Understood, additional median work has been included in the recommendations if the southbound left turn lanes are extended. Within the existing turn lane lengths through the short-term volumes are realized, then the eastbound left turn lane at the intersection may need to be extended from 100 feet to 125 feet. Turn lanes may need to extend from 200 feet to 225 feet.

additional median work will be necessary to discourage left turns from the RIRO access if SB left turn lanes extended



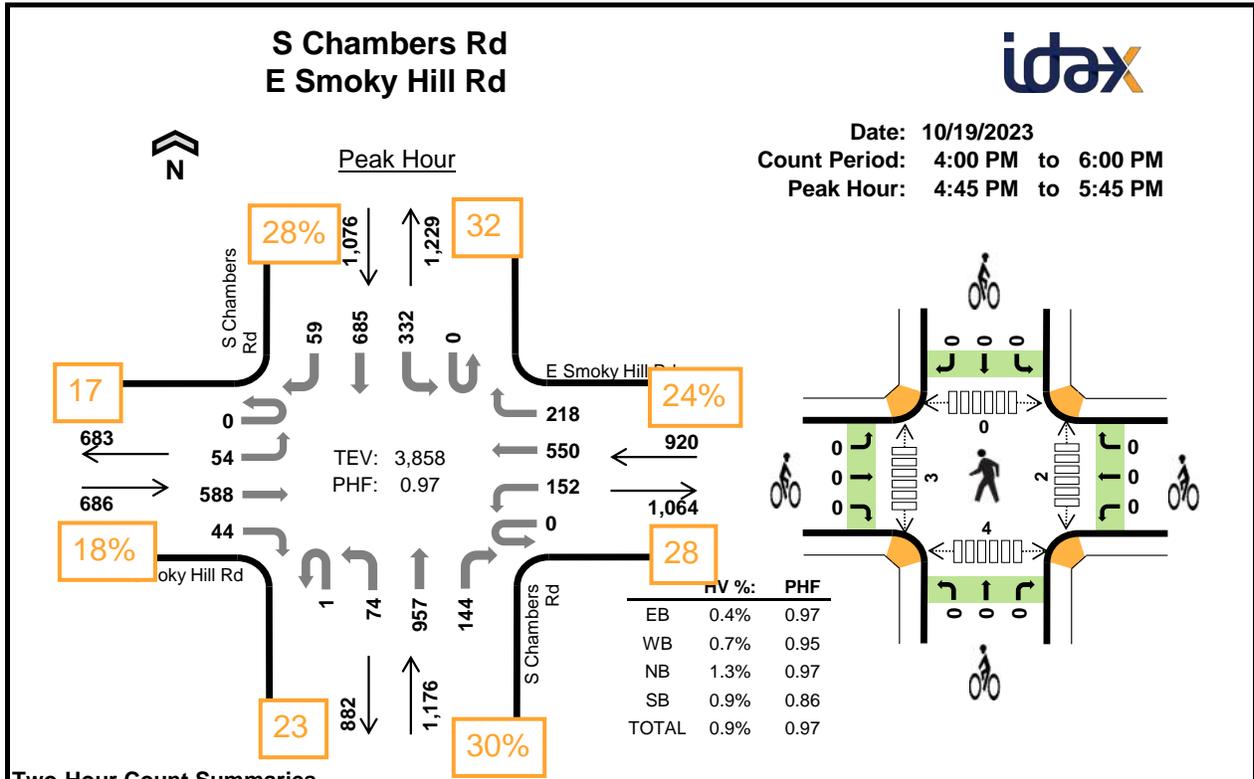
Two-Hour Count Summaries

Interval Start	E Smoky Hill Rd Eastbound				E Smoky Hill Rd Westbound				S Chambers Rd Northbound				S Chambers Rd Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
7:00	32	51	0	2	83	4	0	23	146	4	0	23	138	2	541	0			
7:15	58	69	0	4	87	11	0	23	138	2	0	23	138	2	607	0			
7:30	25	76	0	4	106	9	0	33	218	6	0	33	218	6	695	0			
7:45	52	76	0	0	138	10	0	36	195	6	0	36	195	6	755	2,598			
8:00	30	54	0	5	96	12	0	44	139	6	0	44	139	6	617	2,674			
8:15	54	53	0	4	96	6	0	45	171	7	0	45	171	7	673	2,740			
8:30	55	45	0	7	85	9	0	39	138	5	0	39	138	5	645	2,690			
8:45	19	49	0	6	101	17	0	54	179	4	0	54	179	4	661	2,596			
Count Total	0	93	623	118	0	199	1,125	473	0	32	792	78	0	297	1,324	40	5,194	0	
Peak Hour	All	0	46	325	66	0	91	561	259	0	13	436	37	0	158	723	25	2,740	0
	HV	0	0	13	1	0	0	8	2	0	0	15	2	0	11	15	1	68	0
	HV%	-	0%	4%	2%	-	0%	1%	1%	-	0%	3%	5%	-	7%	2%	4%	2%	0

As mentioned in the previous response, the external trip distribution was used by averaging the morning and afternoon peak hour percentages.

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	2	0	2	2	6	0	0	0	0	0	0	1	0	0	1
7:15 AM	2	3	2	6	13	0	0	0	0	0	0	0	0	0	0
7:30 AM	2	1	5	6	14	0	0	0	0	0	1	2	0	1	4
7:45 AM	4	1	5	6	16	0	0	0	0	0	0	0	0	0	0
8:00 AM	3	1	5	8	17	0	0	0	0	0	0	0	0	0	0
8:15 AM	5	7	2	7	21	0	0	0	0	0	2	0	0	0	2
8:30 AM	3	5	2	7	17	0	0	0	0	0	0	0	0	2	2
8:45 AM	4	6	3	4	17	0	0	0	0	0	0	0	0	0	0
Count Total	25	24	26	46	121	0	0	0	0	0	3	3	0	3	9
Peak Hour	14	10	17	27	68	0	0	0	0	0	3	2	0	1	6



Two-Hour Count Summaries

Interval Start	E Smoky Hill Rd Eastbound				E Smoky Hill Rd Westbound				S Chambers Rd Northbound				S Chambers Rd Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	0	4	0	4	0	4	0	4	0	20	235	43	0	82	183	14	923	0	
4:15 PM	0	3	0	3	0	3	0	3	0	21	219	38	0	76	164	18	943	0	
4:30 PM	0	5	0	5	0	5	0	5	1	23	205	31	0	92	160	13	936	0	
4:45 PM	0	17	0	63	0	1	13	249	40	0	102	193	17	999		3,801			
5:00 PM	0	4	0	4	0	4	0	4	0	16	237	28	0	74	155	8	932	3,810	
5:15 PM	0	5	0	5	0	5	0	5	0	20	235	34	0	78	193	16	988	3,855	
5:30 PM	0	3	0	3	0	3	0	3	0	25	236	42	0	78	144	18	939	3,858	
5:45 PM	0	4	0	4	0	4	0	4	0	25	227	32	0	92	155	11	945	3,804	
Count Total	0	103	1,180	106	0	272	1,080	432	2	163	1,843	288	0	674	1,347	115	7,605	0	
Peak Hour	All	0	54	588	44	0	152	550	218	1	74	957	144	0	332	685	59	3,858	0
	HV	0	0	3	0	0	0	5	1	0	0	13	2	0	3	6	1	34	0
	HV%	-	0%	1%	0%	-	0%	1%	0%	0%	0%	1%	1%	-	1%	1%	2%	1%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	1	1	6	3	11	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	5	4	3	12	0	0	0	1	1	0	2	0	1	3
4:30 PM	1	4	3	6	14	0	0	0	0	0	2	1	0	2	5
4:45 PM	1	2	3	3	9	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	1	4	1	6	0	0	0	0	0	0	0	0	0	0
5:15 PM	1	1	2	4	8	0	0	0	0	0	0	0	0	0	0
5:30 PM	1	2	6	2	11	0	0	0	0	0	2	3	0	4	9
5:45 PM	0	1	3	1	5	0	0	0	0	0	1	0	0	0	1
Count Total	5	17	31	23	76	0	0	0	1	1	5	6	0	7	18
Peak Hour	3	6	15	10	34	0	0	0	0	0	2	3	0	4	9