

Traffic Impact Study

2025-04-01 (DJK) reviewed, numerous comments:

- Pg 6, 38th & Tower aerial outdated, additional EB LTL added between Aug '24 and Mar '25
- Fig 2, update turn lane lengths
- Pg 13, noted on Fig 5 that 2040 needs to be updated to 2050
- Fig 5 2050 horizon year
- Pg 18, text about dual EB LTL at 38th & Tower & 2050 analyses required in Table 2
- Table 3 2050 analyses required
- Table 4 2050 analyses required for unsignalized and signalized, highlight LOS E and delay and tabulate turning movement LOS & Delay for 2050
- Table 5 & 6 update for 2050
- Table 7, update existing storage lengths and update for 2050 values
- Fig 6, update title for 2050 chk storage lengths
- Appendix, traffic counts, heavy vehicles need to be called out in traffic data per Section 4.2 of our TIS Guidelines
- Appendix, Synchro analyses, provided updated timing sheets for existing 38th & Tower
- Appendix, signal warrant analysis figure needed for 38th & Himalaya (to replace a duplicate Picadilly & 38th)

Majestic Center Himalaya

Aurora, Colo

Kimley-Horn's responses to the City comments are provided in blue text boxes throughout the report.

- The geometry at 38th Avenue and Tower has been revised to match the most recent conditions in the figures, analysis, and report text.
- The long-term analysis has been revised to 2050.
- The LOS E or worse movements have been highlighted in the LOS output tables.
- The heavy vehicle percent for the intersection counts have been included in the analysis and in the appendix.
- The 38th & Tower signal timing is included in the synchro analysis.
- The signal warrant analysis sheets have been updated in the appendix.

Prepared for:

Tower Metropolitan District

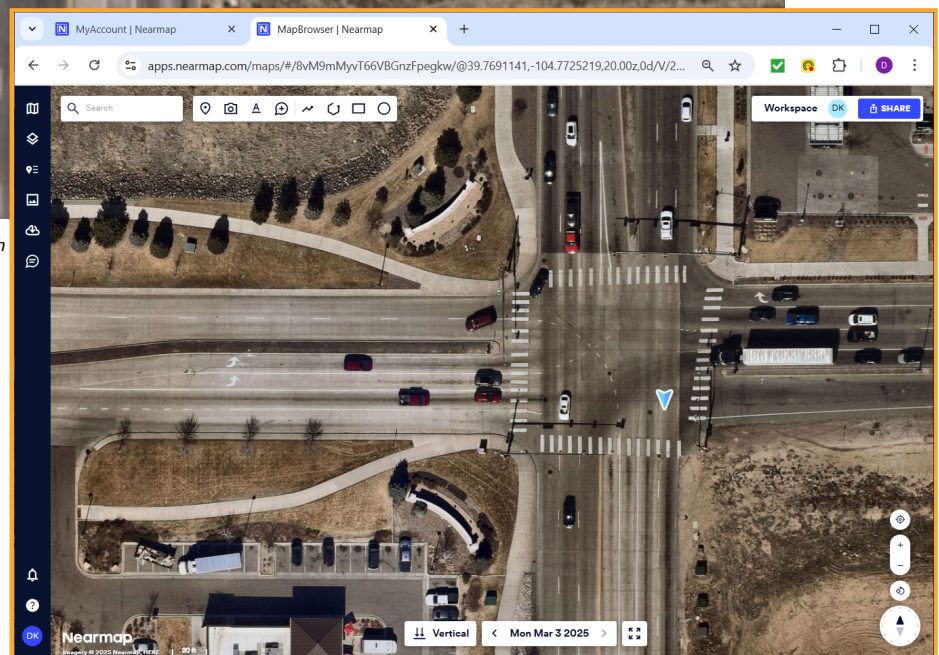
Kimley»Horn

The signalized intersection of 38th Avenue and Tower Road (#1) operates with protected-permissive left turn phasing on all four approaches. The northbound approach provides dual left turn lanes and two through lanes, with the outside through being a shared right turn lane. The southbound approach provides a left turn lane and three through lanes with the outside through lane being a shared right. The eastbound approach provides a left turn lanes, a through lane, and a right turn lane while the westbound approach provides a left turn lane, two through lanes, and a right turn lane. An aerial photo of the existing intersection configuration is below (north is up - typical).



Just updated between
Aug '24 & March '25

Kimley»Horn



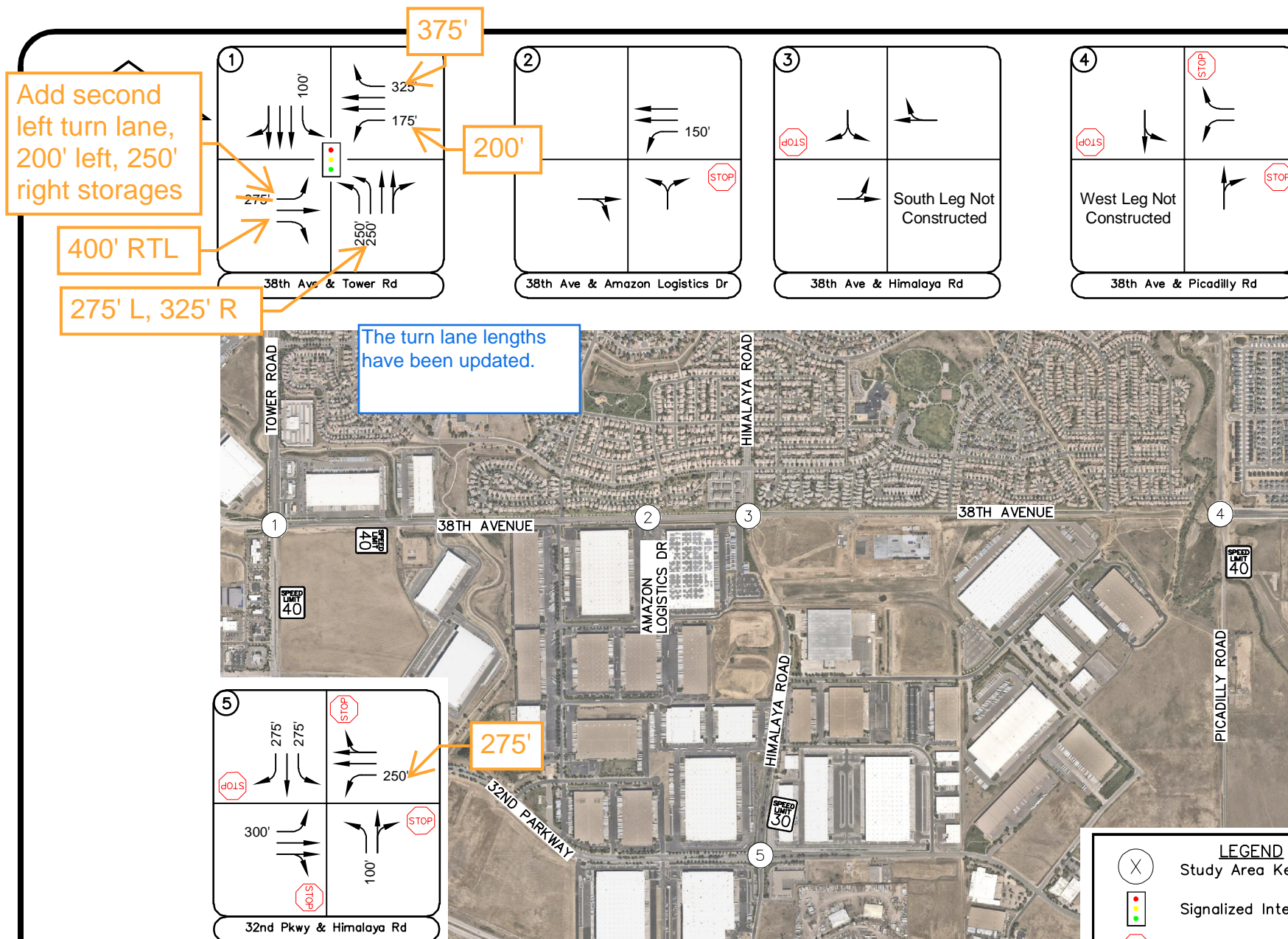
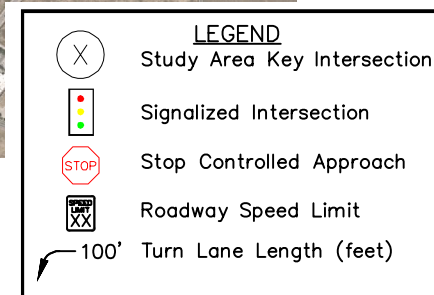


FIGURE 2
MCC Himalaya Extension
Aurora, Colorado
Existing Geometry and Control



3.2 Future Roadway Network

Himalaya Road between 36th Drive and 38th Avenue will be constructed to provide connectivity to the Majestic Commercenter development with access to 38th Avenue in the near future. The roadway extension will continue to be a two-lane roadway with on-street parking to match existing conditions.

Likewise, it is anticipated that 38th Avenue will be constructed from Odessa Street to Picadilly Road sometime after the Himalaya Road extension. The roadway currently doesn't exist for approximately 1,200 feet. The eastbound direction along 38th Avenue between Tower Road to Himalaya Road will widen to provide two through lanes. Additionally, segments of 38th Avenue that are currently two-lanes will also be widened to four-lanes in the long-term.

Tower Road is planned to provide three northbound through lanes in the future. Therefore, the long-term analysis includes the third northbound through lane, separate northbound and southbound right turn lanes, and dual eastbound and westbound left turn lanes.

3.3 Existing Traffic Volumes

Existing turning movement counts were conducted at the study intersections on Tuesday, December 10, 2024 during the weekday morning and afternoon peak hours. 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

To conform to City of Aurora Traffic Impact Study Guidelines, a **two (2) percent annual growth** rate was used to estimate future traffic volume. This annual growth rate was used to estimate near term 2025 and long-term 2040 traffic volume projections at the key intersections. In addition, traffic volumes were assigned and rerouted from the existing network to account for the Himalaya Road extension to 38th Avenue. With construction of Himalaya Road, direct access to the Amazon site and the future development on the southeast corner of 38th Avenue and Himalaya Road intersection will be provided. Therefore, some Amazon traffic that currently uses the access along 38th Avenue is anticipated to reroute to the Himalaya Road accesses.

The traffic studies for the Food Bank of the Rockies and Gateway Park – Parcel TIC 2 were also used to estimate long-term 2040 traffic volumes. The volumes reported in the Food Bank of the Rockies included the Gateway Park – Parcel TIC 2 development in the 2040 long-term traffic volumes. These volumes aligned to the Northeast Area Transportation Study (NEATS) and DRCOG future traffic models. Future traffic volume excerpts taken from previous traffic studies are provided in **Appendix B**. The calculated background traffic volumes for 2025 and 2040 are shown in **Figure 4** and **Figure 5**, respectively.

2050 required, pre-app was over 2 years ago, COA using DRCOG 2050 horizon year for nearly the last 18 months. Noted in Fig 5 as well.
Want to ensure 38th & Himalaya designed for future conditions

Understood. A mixture of the 2% annual growth rate and projecting volumes to match DRCOG/NEATS was taken into account when generating 2050 volumes. Of note, future growth may be over conservative and traffic volumes should be reevaluated in the future.

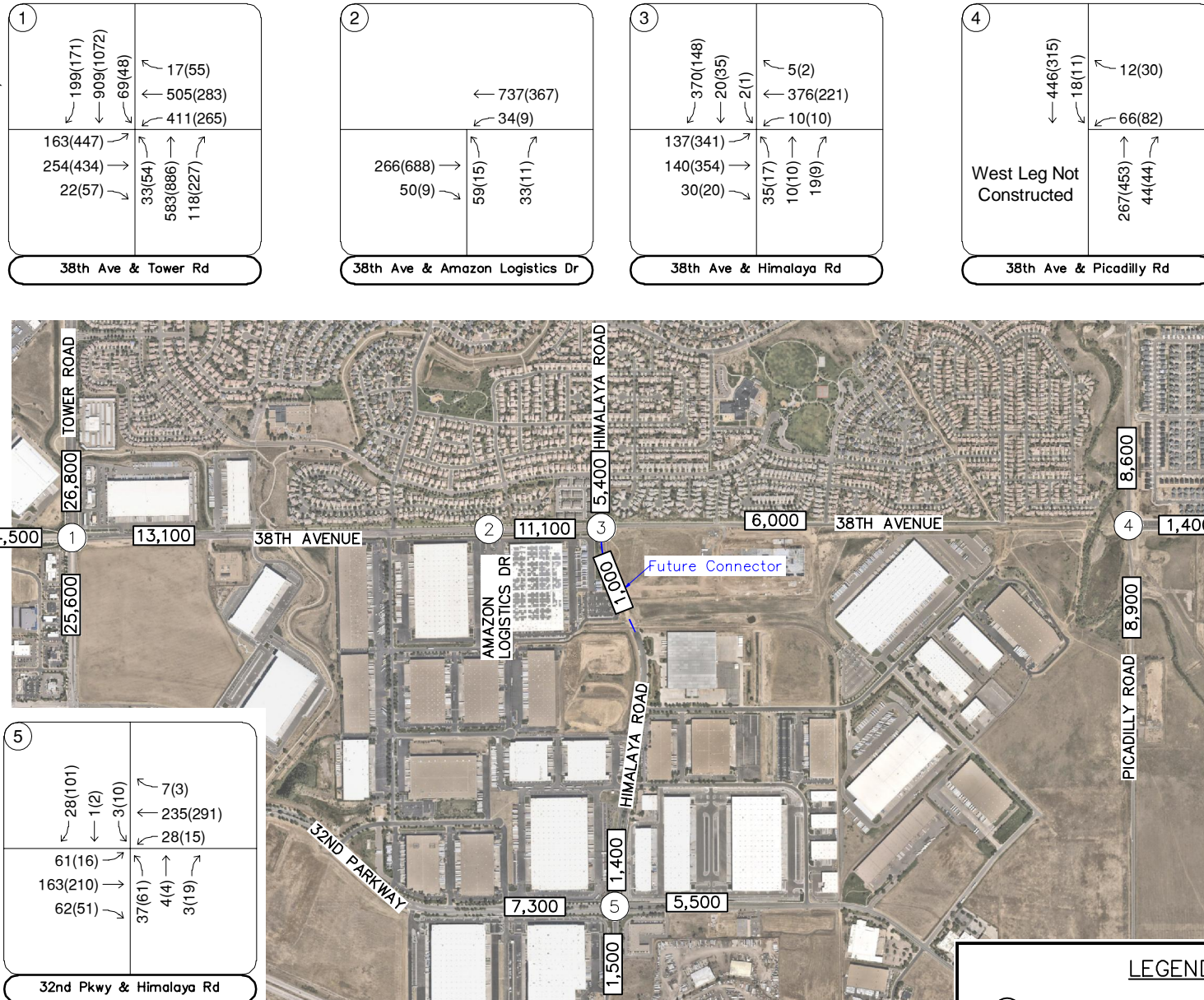


FIGURE 4
MCC Himalaya Extension
Aurora, Colorado
2025 Future Traffic Volumes

LEGEND

(X) Study Area Key Intersection

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

[XX,X00] Estimated Daily Traffic Volume

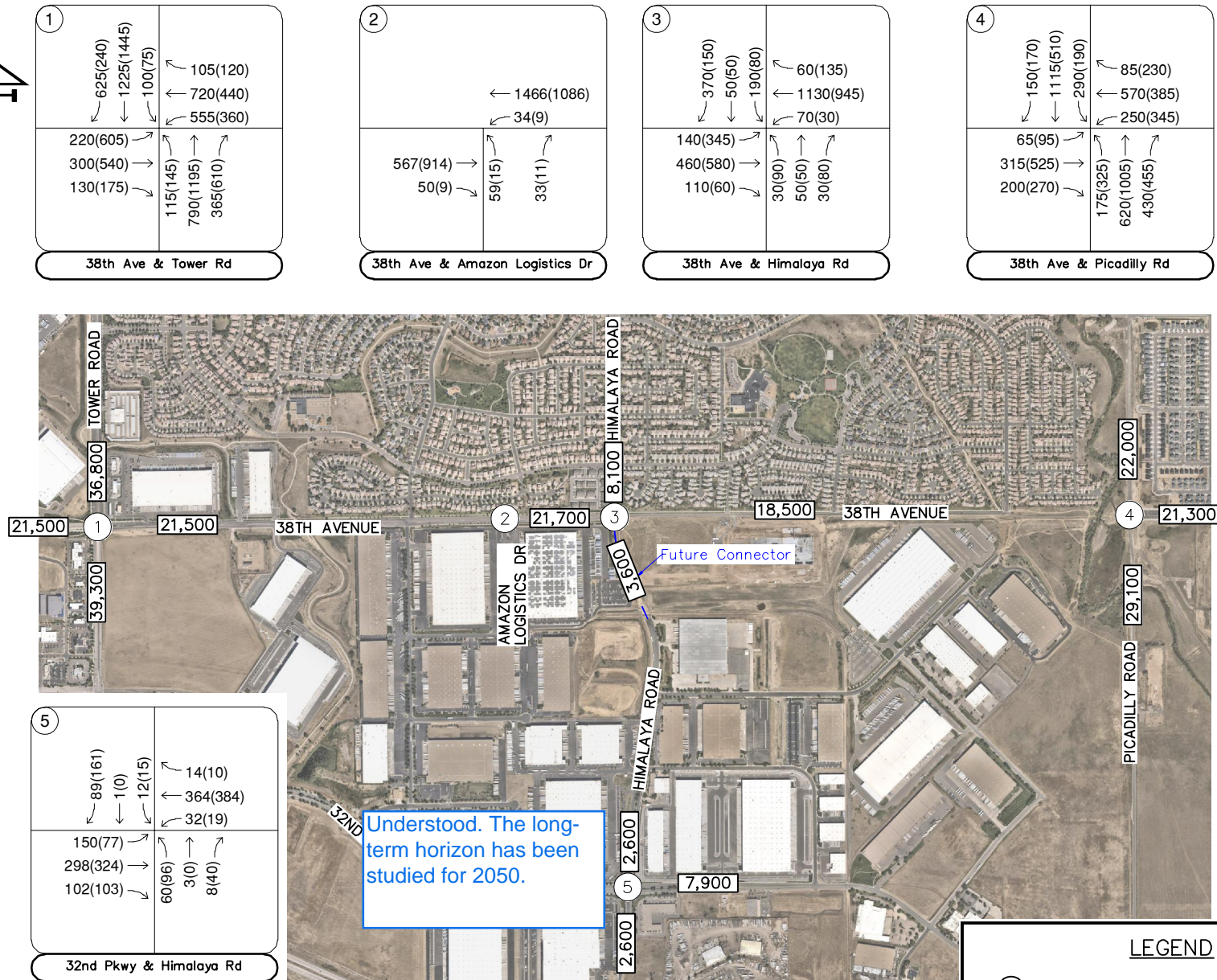


FIGURE 5
MCC Himalaya Extension
Aurora, Colorado
2040 Future Traffic Volumes

I understand the pre-app notes stated 2040, but that was a pre-app from over two years ago. 20 yrs from baseline is 2044, DRCOG has been using 2050 since last year

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 whole intersection. LOS for signalized, roundabout, and all-way stop controlled intersections are defined for each approach and for the overall intersection.

4.2 Key Intersection Operational Analysis

Calculations for the operational level of service at the key intersections for the study area are provided in **Appendix C**. 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. 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.

38th Avenue and Tower Road (#1)

The signalized intersection of 38th Avenue and Tower Road (#1) is currently operating with permissive left turn phasing on all four approaches. The intersection is currently operating during the morning and afternoon peak hours based on existing conditions. During the morning and afternoon peak hours, the intersection is anticipated to continue operating at LOS D during both peak hours. By the long-term 2040 horizon, dual eastbound left turn lanes, dual westbound turn lanes, three northbound through lanes, and an exclusive northbound right turn lane are identified to be needed. These recommendations are consistent with traffic studies in the surrounding area. **Table 2** provides the results of the LOS analysis conducted at this intersection.

Table 2 – 38th Avenue & Tower Road LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2024 Existing	46.5	D	50.0	D
2025	47.1	D	52.2	D
2040 #	47.4	D	53.7	D

= Dual EB and WB Left Turn Lanes, Three NB Through Lanes, Separate NB Right Turn Lane

38th Avenue and Amazon Logistics Drive (#2)

The unsignalized 'T'-intersection of 38th Avenue and Amazon Logistics Drive (#2) operates with stop control on the northbound Amazon Logistics Drive approach. The intersection movements operate acceptably at LOS B or better during both peak hours under existing conditions. The second eastbound through lane can be introduced assuming 38th Avenue to the east will be widened to the ultimate configuration. The existing roadway width can accommodate the second eastbound through lane. By 2040, the intersection movements are anticipated to continue operating acceptably. **Table 3** provides the results of the LOS analysis conducted at this intersection.

Table 3 – 38th Avenue & Amazon Logistics Drive LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2024 Existing Northbound Approach Westbound Left	14.5 8.0	B A	14.6 9.1	B A
2025 # Northbound Approach Westbound Left	13.6 8.1	B A	14.6 9.2	B A
2040 # Northbound Approach Westbound Left	22.1 9.1	C A	18.1 10.1	C B

= Two EB Through Lanes

Update for 2050

Understood. The long-term horizon has been studied for 2050.

38th Avenue and Himalaya Road (#3)

The unsignalized 'T'-intersection of 38th Avenue and Himalaya Road (#3) operates with stop control on the southbound Himalaya Road approach. The intersection movements operate acceptably at LOS C or better during both peak hours under existing conditions. The south leg is planned to be constructed in the near-term horizon. Therefore, once constructed, separate left turn lanes can be implemented on all four approaches with the second eastbound and westbound through lane. Additionally, the separate southbound right turn lane can be implemented within the existing pavement width. The intersection movements are still anticipated to operate acceptably. By 2040, the volumes meet warrants for signalization. The MUTCD Four Hour Signal Warrant worksheet is included in **Appendix E. Table 4** provides the results of the LOS analysis conducted at this intersection.

Table 4 – 38th Avenue & Himalaya Road LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2024 Existing				
Eastbound Left	8.5	A	8.6	A
Southbound Approach	19.0	C	10.8	B
2025 #				
Northbound Left	28.0	D	35.9	E
Northbound Through/Right	11.7	B	19.1	C
Eastbound Left	8.6	A	8.6	A
Westbound Left	7.6	A	8.1	A
Southbound Left	15.6	C	25.7	D
Southbound Through	16.0	C	30.5	D
Southbound Right	13.6	B	9.7	A
2040 ##	26.3	C	30.6	C

= Addition of the South Leg, Two EB and WB Through Lanes, Separate SB Right Turn Lane
= Addition of the South Leg, Two EB and WB Through Lanes, Separate SB Right Turn Lane, Signalization on All Four Approaches, Separate SB Right Turn Lane

The unsignalized condition has been included in the analysis.

Need to see unsignalized delay (for 2050)

Show turning movement LOS and delays as well.

The LOS for the turning movements have been included.

Highlight LOS E and associated delay

The LOS E or worse has been highlighted in the report tables.

38th Avenue and Picadilly Road (#4)

The unsignalized 'T'-intersection of 38th Avenue and Picadilly Road (#4) operates with all-way stop control on all three approaches. The intersection operates at LOS B during the morning and afternoon peak hours under existing conditions. The Himalaya Road extension will not yet affect this intersection since 38th Avenue does not extend to the west. Therefore, the intersection operations will remain at LOS B during both peak hours. However, by 2040, the west leg of the intersection will be constructed and 38th Avenue will extend to Odessa Street as a four-lane roadway. Additionally, Picadilly Road is planned to be completely built out with two northbound and southbound through lanes in each direction. Separate left and right turn lanes are planned to be implemented with full buildout of the intersection. The volumes at the intersection meeting warrants for signalization. The MUTCD Four Hour Signal Warrant worksheet is included in **Appendix E. Table 5** provides the results of the LOS analysis conducted at this intersection.

Table 5 – 38th Avenue & Picadilly Road LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2024 Existing	12.6	B	14.4	B
Westbound Approach	10.2	B	10.6	B
Northbound Approach	10.8	B	16.7	C
Southbound Approach	14.2	B	12.2	B
2025	12.9	B	14.9	B
Westbound Approach	10.3	B	10.7	B
Northbound Approach	11.0	B	17.4	C
Southbound Approach	14.6	B	12.4	B
2040 #	31.7	C	39.5	D

= Signalized, Addition of the West Leg, Two NB, SB, EB, and WB Through Lanes. Separate Left and Right Turn Lanes

Update for 2050

Understood. The long-term horizon has been studied for 2050.

32nd Parkway and Himalaya Road (#5)

The unsignalized intersection of 32nd Parkway and Himalaya Road (#5) operates with all-way stop control on all four approaches. Under existing conditions, the overall intersection and approaches operate at LOS B or better during both peak hours. With project traffic, all movements are anticipated to continue operating at an acceptable level of service throughout the 2040 horizon. Therefore, no improvements or modifications are anticipated to be needed at this intersection based on the addition of project traffic and this operational level of service analysis. **Table 6** provides the results of the LOS analysis conducted at this intersection.

Table 6 – 32nd Parkway & Himalaya Road LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2024 Existing	9.4	A	10.7	B
Eastbound Approach	9.3	A	10.4	B
Westbound Approach	9.7	A	11.3	B
Northbound Approach	9.8	A	10.5	B
Southbound Approach	8.8	A	10.2	B
2025 Scenario	9.3	A	10.7	B
Eastbound Approach	9.1	A	10.5	B
Westbound Approach	9.5	A	11.3	B
Northbound Approach	9.7	A	10.5	B
Southbound Approach	8.6	A	10.0	A
2040 Scenario	12.7	B	16.1	C
Eastbound Approach	12.5	B	15.7	C
Westbound Approach	13.6	B	17.9	C
Northbound Approach	11.9	B	13.7	B
Southbound Approach	11.2	B	14.6	B

update for 2050

Understood. The long-term horizon has been studied for 2050.

4.3 Vehicle Queuing Analysis

A vehicle queuing analysis was conducted for the study area intersection. The analysis was performed using Synchro presenting the results of the 95th percentile queue lengths. Results

Understood. The long-term horizon has been studied for 2050.

See Fig 2

See following **Table 7** with calculations provided within the level of service sheets or **Appendix C** for unsignalized intersections and **Appendix D** for signalized

2050 needs to be investigated

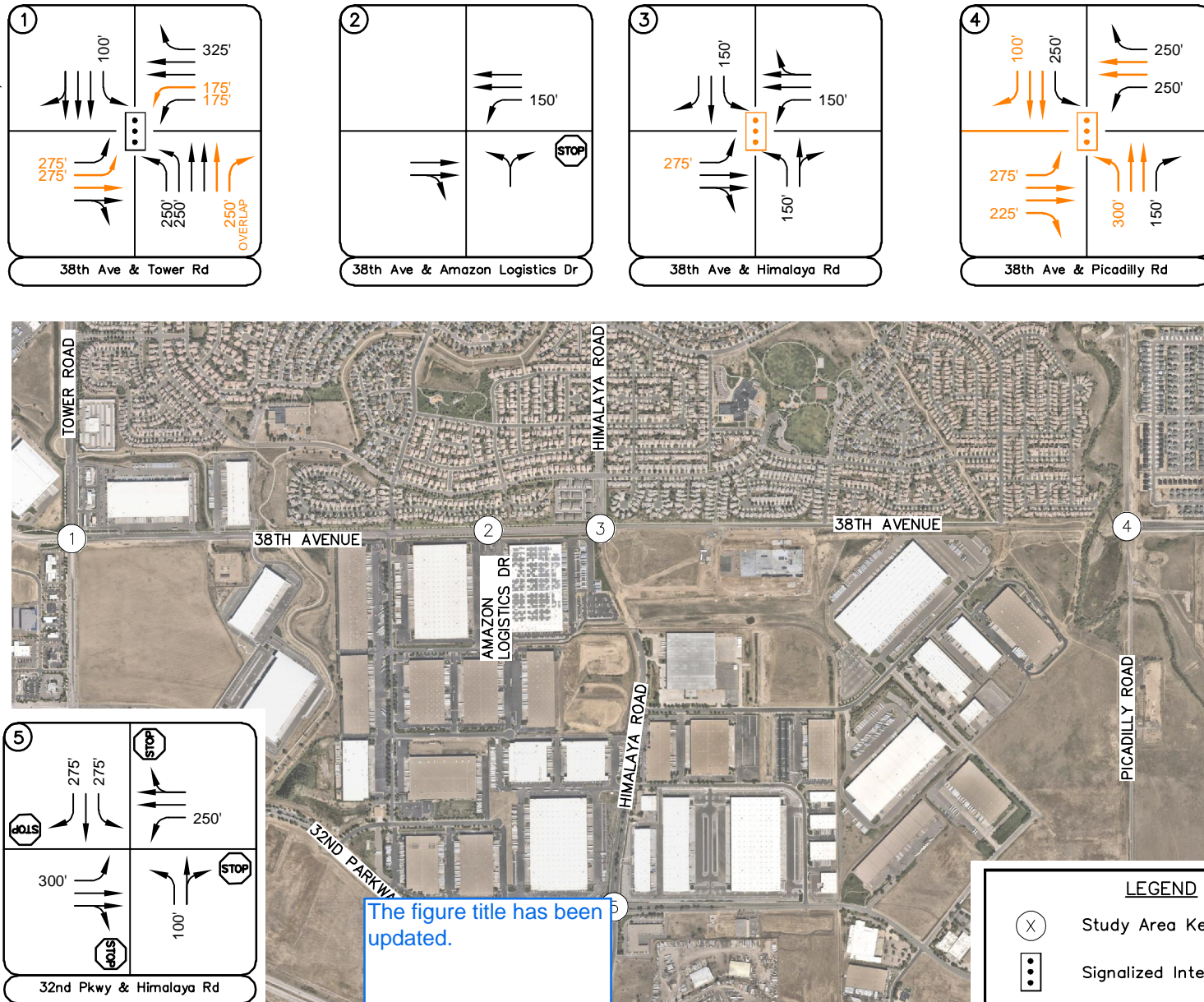
The existing turn lane lengths have been updated in Table 7.

Table 7 – Turn Lane Queuing Analysis Results

Intersection Turn Lane	Existing Turn Lane Length (feet)	2025 Calculated Queue (feet)	2025 Recommended Length (feet)	2040 Calculated Queue (feet)	2040 Recommended Length (feet)
38th Ave & Tower Rd					
Eastbound Left	275'	455'	275'	379' DL	300' DL
Eastbound Right	C	0'	C	-	-
Westbound Left	175'	387'	175'	309' DL	325' DL
Westbound Right	325'	0'	325'	64'	325'
Northbound Left	250' DL	24' DL	250' DL	131' DL	250' DL
Northbound Right	DNE	-	DNE	453'	475'
Southbound Left	100'	60'	100'	117'	125'
38th Ave & Amazon Log					
Westbound Left	150'	25'	150'	25'	150'
38th Ave & Himalaya Rd					
Eastbound Left	200'	25'	200'	271'	275'
Westbound Left	DNE	25'	150'	58'	150'
Northbound Left	DNE	25'	150'	95'	150'
Southbound Left	150'	25'	150'	189'	150'
38th Ave & Picadilly Rd					
Eastbound Left	DNE	-	DNE	110'	150'
Eastbound Right	DNE	-	DNE	173'	175'
Westbound Left	C	25'	450'	403'	450'
Westbound Right	C	25'	275'	57'	275'
Northbound Left	DNE	-	DNE	238'	250'
Northbound Right	DNE	-	DNE	117'	150'
Southbound Left	DNE	-	DNE	240'	250'
Southbound Right	DNE	-	DNE	53'	150'
32nd Pkwy & Himalaya Rd					
Eastbound Left	300'	25'	300'	50'	300'
Westbound Left	250'	25'	250'	25'	250'
Northbound Left	100'	25'	100'	25'	100'
Southbound Left	275'	25'	275'	25'	275'
Southbound Right	275'	25'	275'	50'	275'

DNE = Does Not Exist; C = Continuous; **Red** Text = Turn Lane Constraint; **Blue** Text = Recommendation

All queues are anticipated to remain within the existing or recommended turn lane lengths through 2040 except the southbound left turn lane at the 38th Avenue and Himalaya Road intersection. This turn lanes cannot be extended due to the back-to-back left with the northbound left turn lane at the 40th Avenue and Himalaya Road. Of note, the queues for the eastbound left turn and



LEGEND

- (X) Study Area Key Intersection
- [Signalized Intersection Symbol] Signalized Intersection
- [Stop Sign Symbol] Stop Controlled Approach
- [Orange Arrow] Improvement
- [100' Turn Lane Length Symbol] 100' Turn Lane Length (feet)

FIGURE 6
MCC Himalaya Extension
Aurora, Colorado
2025 Recommended Geometry and Control

Revise to 2050



Ridgeview Data
Collection

Aurora, CO
Aurora Majestic Center
AM Peak
38th Ave Amazon Access

File Name : 2 38th Ave Amazon Access AM
Site Code : KHA 666
Start Date : 12/10/2024
Page No : 1

Groups Printed- Automobiles - Bicycle and Pedestrian





















Start Time	38th Avenue Eastbound				38th Avenue Westbound				Amazon Logistics Dr Northbound				Int. Total
	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	
07:00 AM	36	1	0	37	0	127	0	127	1	3	0	4	168
07:15 AM	62	3	0	65	5	167	0	172	9	1	0	10	247
07:30 AM	59	10	0	69	6	174	0	180	39	30	0	69	318
07:45 AM	50	10	0	60	5	203	0	208	19	8	0	27	295
Total	207	24	0	231	16	671	0	687	68	42	0	110	1028
08:00 AM	48	17	0	65	15	175	0	190	10	4	0	14	269
08:15 AM	69	35	0	104	23	149	0	172	16	5	0	21	297
08:30 AM	60	16	0	76	8	119	0	127	12	1	0	13	216
08:45 AM	45	4	0	49	1	92	0	93	8	6	0	14	156
Total	222	72	0	294	47	535	0	582	46	16	0	62	938
Grand Total	429	96	0	525	63	1206	0	1269	114	58	0	172	1966
Apprch %	81.7	18.3	0		5	95	0		66.3	33.7	0		
Total %	21.8	4.9	0	26.7	3.2	61.3	0	64.5	5.8	3	0	8.7	
Automobiles	429	96	0	525	63	1206	0	1269	114	58	0	172	1966
% Automobiles	100	100	0	100	100	100	0	100	100	100	0	100	100
Bicycle and Pedestrian	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycle and Pedestrian	0	0	0	0	0	0	0	0	0	0	0	0	0

The count sheets have been updated to include heavy vehicle percentages. These percentages have been included in the Synchro analysis.

Why wasn't heavy vehicles counted separately?
Section 4.2 of TIS Guidelines

Timings
1: Tower Rd & 38th Ave

2024 Existing AM
12/17/2024

										
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	160	249	22	403	495	17	32	572	68	891
Future Volume (vph)	160	249	22	403	495	17	32	572	68	891
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases	4		4	8		8	2		6	
Detector Phase	7	4	4	3	8	8	5	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	5.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	11.0	24.0
Total Split (s)	18.0	26.0	26.0	35.0	43.0	43.0	11.0	48.0	11.0	48.0
Total Split (%)	15.0%	21.7%	21.7%	29.2%	35.8%	35.8%	9.2%	40.0%	9.2%	40.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	None	C-Max

Intersection Summary

Cycle Length: 120

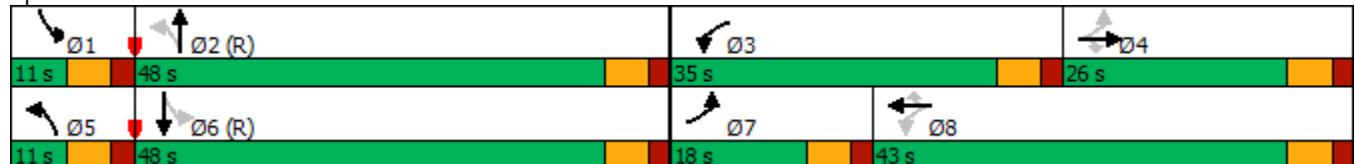
Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Splits and Phases: 1: Tower Rd & 38th Ave























See attached sheet for updated timings

CURRENT TRAFFIC SIGNAL TIMING DURING THE AM PERIOD

Timings

399: Tower Rd & 40th Ave/38th Ave

04/02/2025

										
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	127	148	34	466	538	38	73	579	37	1124
Future Volume (vph)	127	148	34	466	538	38	73	579	37	1124
Turn Type	D.P+P	NA	NA	D.P+P	NA	NA	D.P+P	NA	Perm	NA
Protected Phases	7	4		3	8		5	2		6
Permitted Phases	8			4			6		6	
Detector Phase	7	4		3	8		5	2	6	6
Switch Phase										
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	11.0	11.0	11.0
Minimum Split (s)	10.0	12.0		10.0	12.0		11.0	17.0	17.0	17.0
Total Split (s)	16.0	20.0		45.0	49.0		11.0	70.0	59.0	59.0
Total Split (%)	11.9%	14.8%		33.3%	36.3%		8.1%	51.9%	43.7%	43.7%
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-1.0		0.0	-1.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	5.0		4.0	5.0		3.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes		Yes	Yes
Recall Mode	None	None		None	None		None	C-Max	C-Max	C-Max
Act Effect Green (s)	53.1	17.2	0.0	53.1	44.5	0.0	67.9	69.9	58.9	58.9
Actuated g/C Ratio	0.39	0.13	0.00	0.39	0.33	0.00	0.50	0.52	0.44	0.44
v/c Ratio	0.30	0.80	0.27	0.92	0.51	0.27	0.43	0.50	0.23	0.77
Control Delay	24.2	81.6	3.7	55.2	37.7	3.7	28.4	22.6	29.7	34.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.2	81.6	3.7	55.2	37.7	3.7	28.4	22.6	29.7	34.4
LOS	C	F	A	E	D	A	C	C	C	C
Approach Delay		48.6			43.9			23.3		34.3
Approach LOS		D			D			C		C

Intersection Summary

Cycle Length: 135

Actuated Cycle Length: 135

Offset: 78 (58%), Referenced to phase 2:NBT and 6:NBSB, Start of Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 35.7

Intersection LOS: D

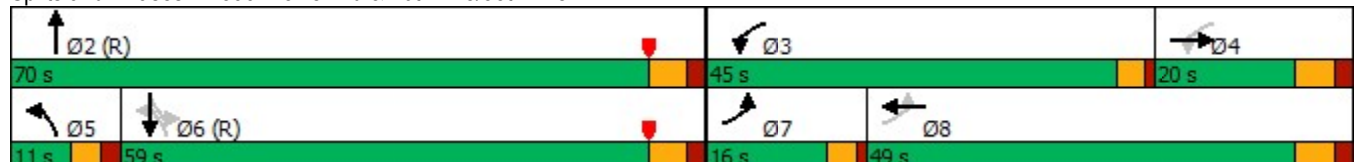
Intersection Capacity Utilization 72.8%

ICU Level of Service

Analysis Period (min) 15

This signal timing sheet
has been included in the
analysis.

Splits and Phases: 399: Tower Rd & 40th Ave/38th Ave



























HCM 6th Signalized Intersection Summary

2024 Existing AM

1: Tower Rd & 38th Ave





















12/17/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	160	249	22	403	495	17	32	572	116	68	891	195
Future Volume (veh/h)	160	249	22	403	495	17	32	572	116	68	891	195
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	162	252	22	407	500	17	32	578	117	69	900	197
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	353	283	240	450	945	422	467	1191	240	320	1739	379
Arrive On Green	0.09	0.15	0.15	0.21	0.27	0.27	0.03	0.40	0.40	0.04	0.41	0.41
Sat Flow, veh/h	1781	1870	1585	1781	3554	1585	3456	2946	595	1781	4196	914
Grp Volume(v), veh/h	162	252	22	407	500	17	32	348	347	69	729	368
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1777	1585	1728	1777	1763	1781	1702	1706
Q Serve(g_s), s	9.1	15.9	1.4	22.2	14.4	1.0	0.6	17.4	17.5	2.7	19.2	19.3
Cycle Q Clear(g_c), s	9.1	15.9	1.4	22.2	14.4	1.0	0.6	17.4	17.5	2.7	19.2	19.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.34	1.00		0.54
Lane Grp Cap(c), veh/h	353	283	240	450	945	422	467	718	713	320	1411	707
V/C Ratio(X)	0.46	0.89	0.09	0.90	0.53	0.04	0.07	0.48	0.49	0.22	0.52	0.52
Avail Cap(c_a), veh/h	367	312	264	512	1096	489	517	718	713	328	1411	707
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.8	49.9	43.8	32.0	37.6	32.7	21.0	26.5	26.5	20.9	26.2	26.2
Incr Delay (d2), s/veh	0.9	24.2	0.2	18.2	0.5	0.0	0.1	2.3	2.4	0.3	1.4	2.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	9.3	0.6	11.7	6.3	0.4	0.3	7.8	7.8	1.2	8.0	8.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.7	74.2	44.0	50.2	38.1	32.7	21.0	28.8	28.9	21.2	27.5	28.9
LnGrp LOS	D	E	D	D	D	C	C	C	C	C	C	C
Approach Vol, veh/h		436			924			727			1166	
Approach Delay, s/veh		59.5			43.3			28.5			27.6	
Approach LOS		E			D			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.5	54.5	30.8	24.2	9.3	55.7	17.1	37.9				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	5.0	42.0	29.0	20.0	5.0	42.0	12.0	37.0				
Max Q Clear Time (g_c+I1), s	4.7	19.5	24.2	17.9	2.6	21.3	11.1	16.4				
Green Ext Time (p_c), s	0.0	4.5	0.6	0.3	0.0	7.8	0.0	3.4				
Intersection Summary												
HCM 6th Ctrl Delay				36.5								
HCM 6th LOS				D								

Timings
1: Tower Rd & 38th Ave

2024 Existing PM

12/17/2024

										
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	438	425	56	260	277	54	53	869	47	1051
Future Volume (vph)	438	425	56	260	277	54	53	869	47	1051
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases	4		4	8		8	2		6	
Detector Phase	7	4	4	3	8	8	5	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	5.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	11.0	24.0
Total Split (s)	33.0	34.0	34.0	24.0	25.0	25.0	11.0	51.0	11.0	51.0
Total Split (%)	27.5%	28.3%	28.3%	20.0%	20.8%	20.8%	9.2%	42.5%	9.2%	42.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	None	C-Max

Intersection Summary

Cycle Length: 120

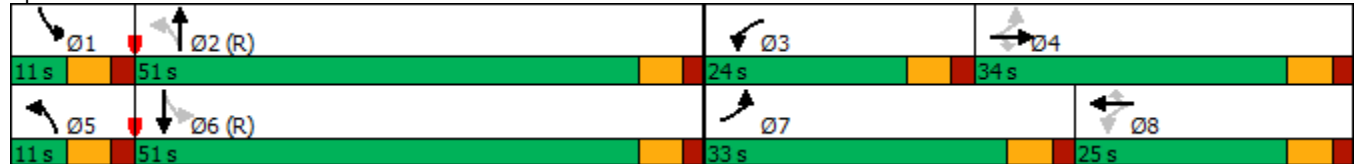
Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Splits and Phases: 1: Tower Rd & 38th Ave































See attached sheet for updated timings

THIS IS THE CURRENT TRAFFIC SIGNAL TIMING AT THE INTERSECTION DURING THE PM PERIOD

Timings

399: Tower Rd & 40th Ave/38th Ave

04/02/2025

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	Ø9	
Lane Configurations	 				 		 	 		  		
Traffic Volume (vph)	281	297	61	270	129	36	32	742	24	933		
Future Volume (vph)	281	297	61	270	129	36	32	742	24	933		
Turn Type	D.P+P	NA	NA	D.P+P	NA	NA	D.P+P	NA	Perm	NA		
Protected Phases	7	4		3	8		5	2		6	9	
Permitted Phases	8			4			6		6			
Detector Phase	7	4		3	8		5	2	6	6		
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	11.0	11.0	11.0	4.0	
Minimum Split (s)	10.0	12.0		10.0	12.0		11.0	17.0	17.0	17.0	10.0	
Total Split (s)	29.0	26.0		32.0	29.0		11.0	67.0	56.0	56.0	10.0	
Total Split (%)	21.5%	19.3%		23.7%	21.5%		8.1%	49.6%	41.5%	41.5%	7%	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	-1.0		0.0	-1.0		-2.0	-2.0	-2.0	-2.0		
Total Lost Time (s)	4.0	5.0		4.0	5.0		3.0	4.0	4.0	4.0		
Lead/Lag	Lead	Lag		Lead	Lag		Lead		Lag	Lag		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	None		None	None		None	C-Max	C-Max	C-Max	None	

Intersection Summary

Cycle Length: 135









Actuated Cycle Length: 135

Offset: 33 (24%), Referenced to phase 2:NBT and 6:NBSB, Start of Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Splits and Phases: 399: Tower Rd & 40th Ave/38th Ave

	Ø9	Ø2 (R)			Ø3			Ø4		
67 s				32 s			26 s			10 s
	Ø5		Ø6 (R)			Ø7			Ø8	
11 s		56 s		29 s			29 s			

This signal timing sheet has been included in the analysis.

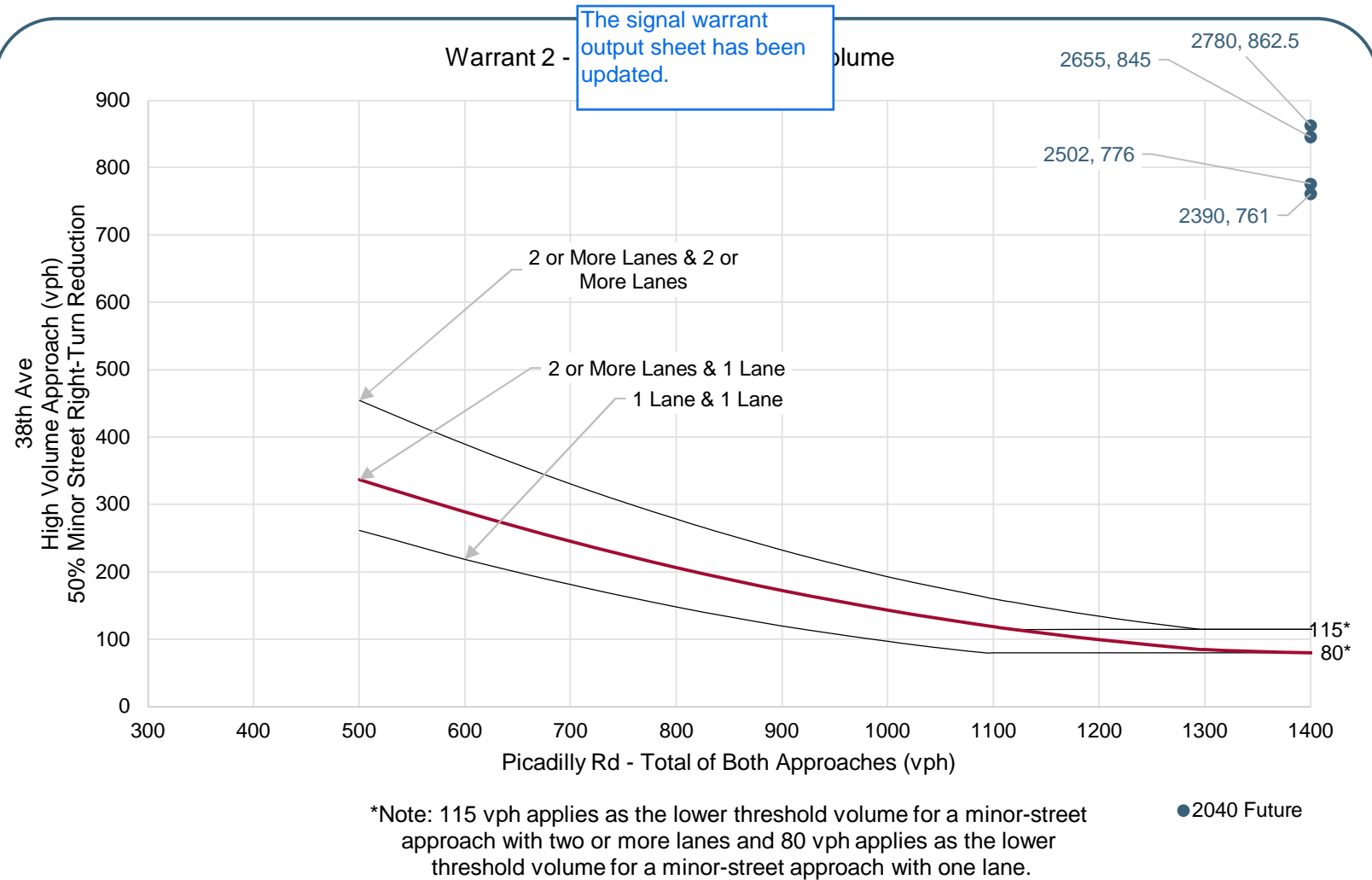
APPENDIX E

SHOULD THIS HAVE BEEN 38TH & HIMALAYA?
PROVIDE CORRECT SHEET

Signal Warrant Worksheets

The signal warrant
output sheet has been
updated.

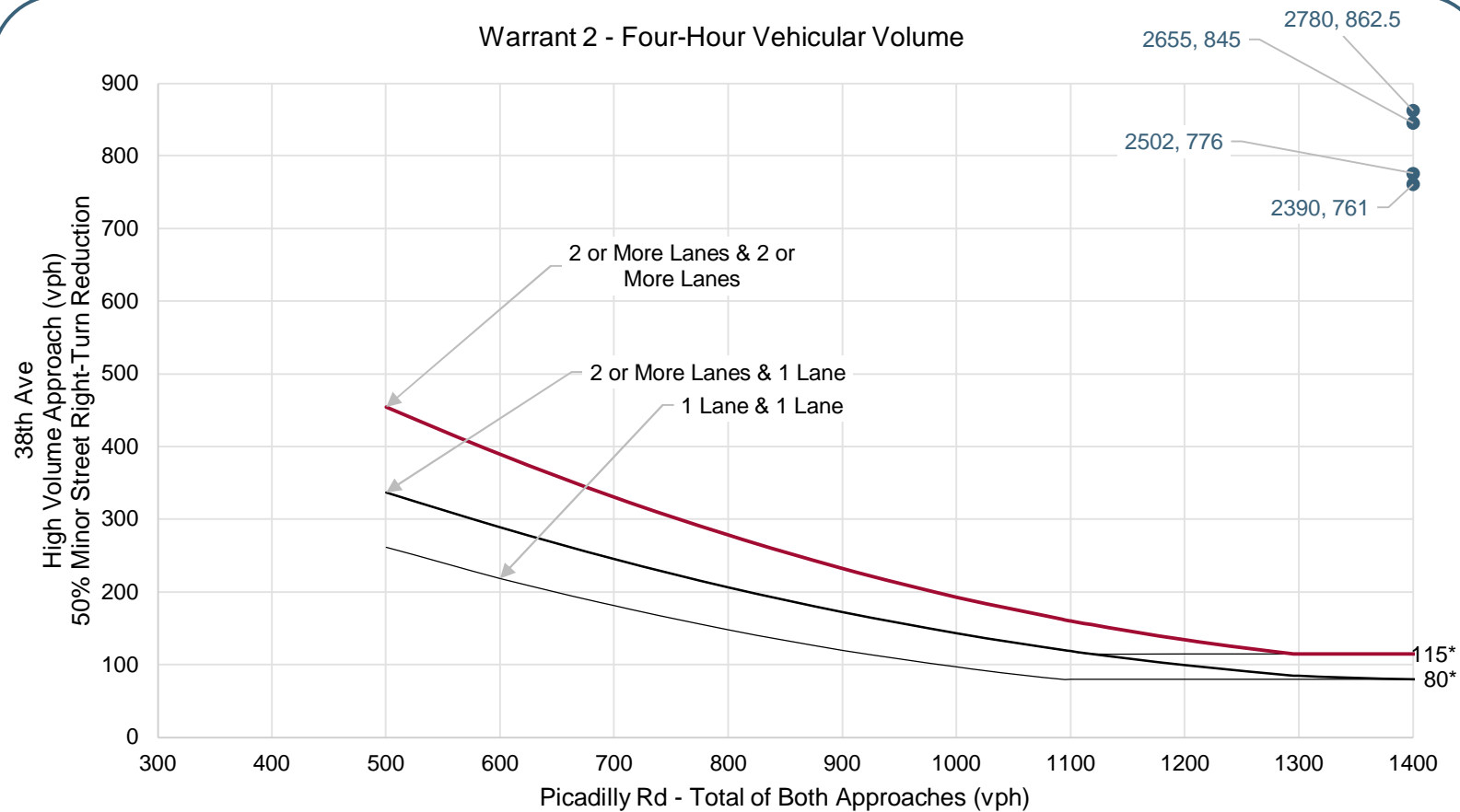
SHOULD THIS HAVE BEEN 38TH & HIMALAYA?
PROVIDE CORRECT SHEET



Picadilly Rd & 38th Ave
Signal Warrant Analysis
Four-Hour Volume Warrant

Source: Manual on Uniform Traffic Control Devices 2009

Figure 2



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

● 2040 Future

Picadilly Rd & 38th Ave
Signal Warrant Analysis
Four-Hour Volume Warrant

Source: Manual on Uniform Traffic Control Devices 2009

Figure 2