Traffic Impact Study

2023-12-13 (DJK) numerous comments including providing internal trip capture data, site distribution not matching previous QuikTrip 4235 TIS, SB Tower left storage adjustment availability, 32nd &access signal warrant validity

1/10/2024
Thank you for the review and comments. Please see responses throughout this document.

Majestic Tower Crossings Retail

Aurora, Colorado

Prepared for:

Commerce Construction Co., L.P.

Kimley»Horn

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

Majestic Tower Crossings Retail

Aurora, Colorado

Prepared for
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20100 East 32nd Parkway
Suite 150
Aurora, Colorado 80011

Prepared by
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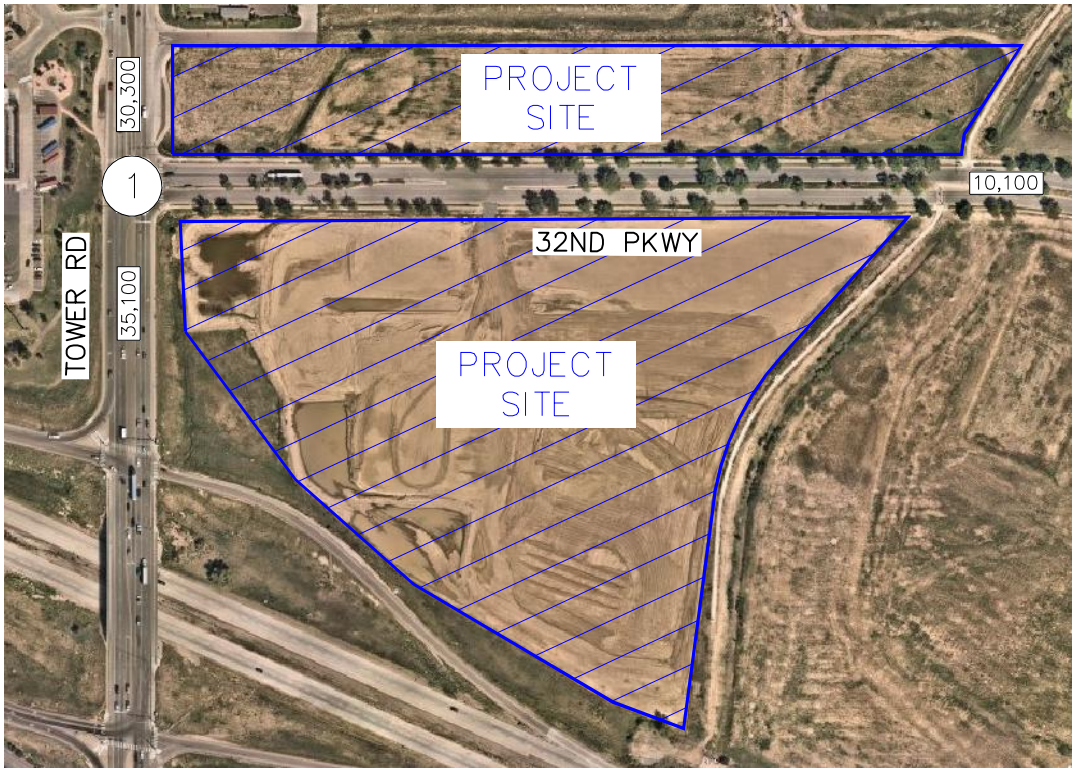
November 2022

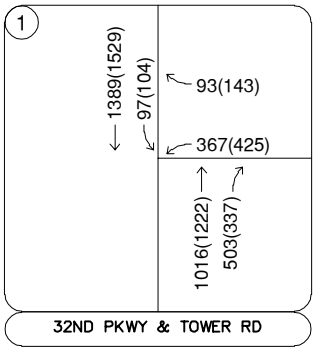
3.3 Existing Traffic Volumes

Existing turning movement counts were conducted at the study intersection on Tuesday, October 11, 2022, 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 be consistent with the City of Aurora Traffic Impact Study Guidelines, a two percent annual growth rate was used to estimate future traffic volume conditions. In addition, project traffic volumes estimated from Majestic Commercenter Phase 11 and Majestic Commercenter Building G, H, and J were included within the background traffic volumes. Traffic volumes from background studies are included in **Appendix B**. Background traffic volumes for 2025 and 2040 are shown in **Figures 4** and **5**, respectively.





Tuesday, October 11, 2022
7:15 to 8:15AM (4:00 to 5:00PM)

Comparible to "QuikTrip 4235" TIS dated & approved 01/2023

Noted.

LEGEND

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

FIGURE 3
MAJESTIC TOWER CROSSINGS RETAIL
AURORA, COLORADO
2022 EXISTING TRAFFIC VOLUMES

Provide documentation on Internal Capture Numbers

Documentation from the NCHRP 684 Internal Trip Capture Estimation Tool was added in the appendices of the revised study.

Table 1 – Majestic Tow affic Generation

Land Use and Size	ay Vehicle Trips						
	Hour			PM Peak Hour			
			Total	In	Out	Total	
North Side of 32nd Parkway							
Mini-Warehouse (151) – 30,000 Square Feet	44	2	1	3	2	3	5
Hotel (310) – 240 Rooms	1,994	63	43	106	63	70	133
Drive-In Bank (912) – 5,000 Square Feet	490	29	21	50	51	50	101
Convenience Store/Gas Station (945) – 16 Fueling Positions	4,012	210	217	427	178	173	351
North Trips with Internal Capture	**6,540**	**304**	**282**	**586**	**294**	**296**	**590**
South Side of 32nd Parkway							
Hotel (310) – 120 Rooms	560	29	19	48	9	13	22
Health/Fitness Club (492) – 40,000 Square Feet	1,190	27	25	52	54	46	100
Strip Retail Plaza (822) – 27,000 Square Feet	1,028	33	23	56	38	55	93
High-Turnover Sit-Down Restaurant (932) – 16,000 Square Feet	1,506	83	68	151	74	39	111
Fast Food Restaurant w/ DT (934) – 10,000 Square Feet	4,104	224	217	441	144	108	253
Coffee/Donut Shop w/ DT (937) – 2,500 Square Feet	1,172	109	104	213	41	33	75
South Trips with Internal Capture	**9,560**	**505**	**456**	**961**	**360**	**294**	**654**
Total Trips with Internal Capture	**16,100**	**809**	**738**	**1,547**	**654**	**590**	**1,244**

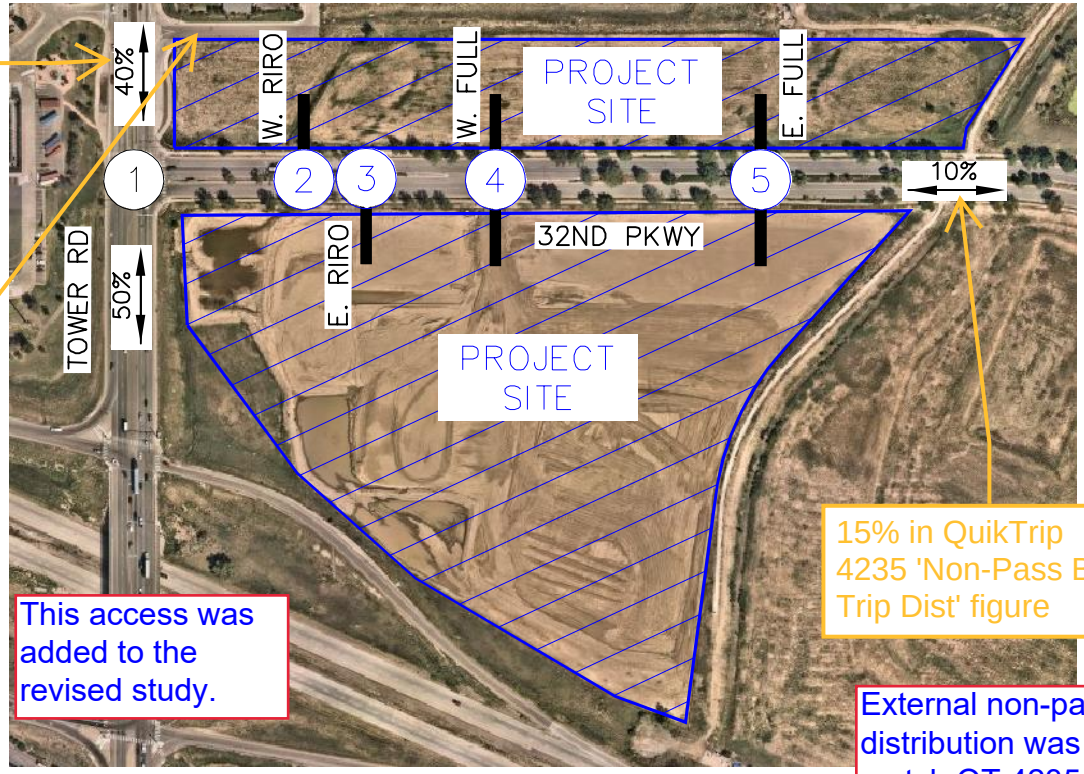
4.2 Trip Distribution

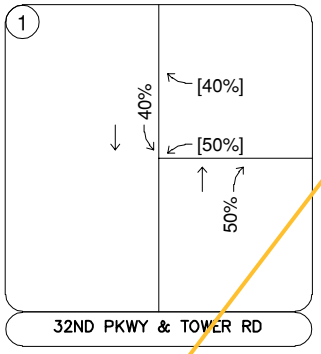
Distribution of site traffic on the street system was based on the area street system characteristics, existing traffic patterns, existing and anticipated surrounding demographic information, and the proposed access system for the project. The directional distribution of traffic is a means to quantify 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** for the north portion of the development and **Figure 7** for the southern portion of the development area.

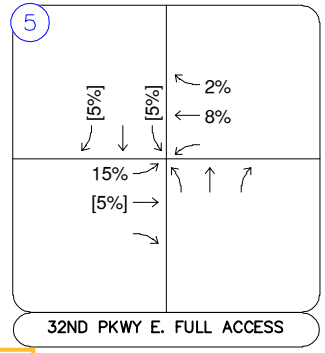
4.3 Traffic Assignment

Majestic Tower Crossings Retail traffic assignment was obtained by applying the project trip distribution to the estimated traffic generation of the development shown in **Table 1**. Traffic assignment is shown in **Figure 8.**

35% in QuikTrip 4235 'Non-Pass By Trip Dist' figure





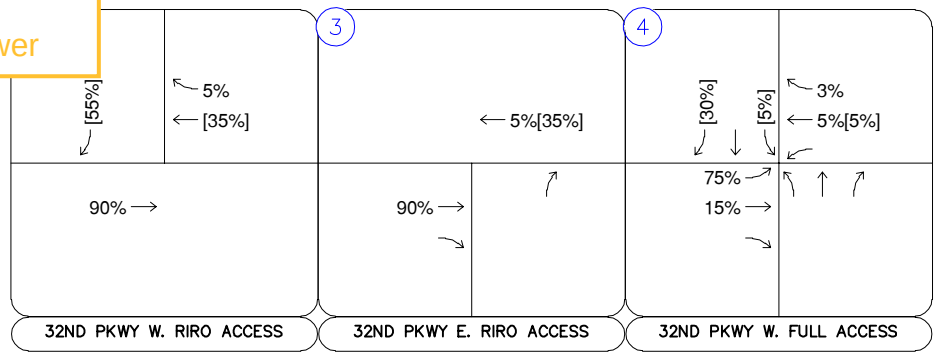


15% in QuikTrip 4235 'Non-Pass By Trip Dist' figure

Also note, this north side development has access to the northern E-W Road, QuikTrip study has 35% exiting to northbound Tower

This access was added to the revised study.

External non-pass by trip distribution was updated to match QT 4235. However, it should be noted different land uses attract users from different areas based on the land uses proposed.



LEGEND

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

FIGURE 6
MAJESTIC TOWER CROSSINGS RETAIL
AURORA, COLORADO
PROJECT TRIP DISTRIBUTION – NORTH SITE

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 D**. 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 existing, 2025 horizon analysis, and the long-term 2040 horizon analysis years. 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.

32nd Parkway & Tower Road (#1)

The existing intersection of 32nd Parkway and Tower Road (#1) is signalized and operates with protected/permitted left turn phasing for the southbound left turn movement. The intersection operates acceptably at LOS B during both peak hours under existing conditions. With project traffic, this intersection is anticipated to continue operating at an acceptable level of service D in the 2025 horizon.

By 2040, a third northbound through lane along Tower Road may need to be constructed at this intersection. When this occurs, a separate northbound right turn lane will still be needed. With this improvement, this intersection is anticipated to operate acceptably with LOS D during both peak hours in 2040 with project traffic. **Table 3** provides the results of the LOS analysis conducted at this intersection.

Table 3 – 32nd Parkway & Tower Road (#1) LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2022 Existing	12.9	B	14.9	B
2025 Background	14.5	B	18.9	B
2025 Background Plus Project	46.6	D	43.5	D
2040 Background	20.0	B	28.8	C
2040 Background Plus Project #	52.9	D	48.7	D

= Three Northbound Through Lanes

Distribution revisions will alter these analyses. Provide all movement groups delay & LOS

LOS and delays were updated in the revised study.

QuikTrip said 225', Nearmap shows approx 210'

The existing turn lane length was updated to 210 feet.

Table 5 – Turn Lane Queuing Analysis Re

Intersection Turn Lane	Existing Turn Lane Length (feet)	2025 Calculated Queue (feet)	2025 Recommended Length (feet)	2040 Calculated Queue (feet)	2040 Recommended Length (feet)
32nd Pkwy & Tower Rd (#1)					
Westbound Left	250'/C DL	524'	250'/C DL	623'	250'/C DL
Southbound Left	150	**577'**	**575'**	**688'**	575'
32nd Pkwy E. RIRO Access (#3)					
Eastbound Right	DNE	25'	**150'+145'T**	25'	150'+145'T
32nd Pkwy W. Full Access (#4)					
Eastbound Left	100'	**116'**	**125'**	113'	125'
Eastbound Right	DNE	11'	**150'+145'T**	16'	150'+145'T
Westbound Left	100'	19'	100'	18'	100'
Northbound Left	DNE	130' DL	**150' DL**	133' DL	150' DL
Southbound Left	DNE	29'	**50'**	29'	50'
32nd Pkwy E. Full Access (#5)					
Eastbound Left	DNE	25'	**100'+145'T**	25'	100'+145'T
Eastbound Right	DNE	25'	**150'+145'T**	25'	150'+145'T
Westbound Left	DNE	25'	**100'+145'T**	25'	100'+145'T
Northbound Left	DNE	50'	**50'**	50'	50'
Southbound Left	DNE	25'	**25'**	25'	25'

DNE = Does Not Exist; C = Continuous; **Red** Text = Storage Deficiency; **Blue** Text = Recommendation; DL = Dual Left Turn Lanes

As shown in the table above, the southbound left turn queue at the 32nd Parkway and Tower Road (#1) intersection is anticipated to extend beyond the available storage by 2025. Therefore, it is recommended that this lane be extended from 150 feet to the maximum length of 575 feet by 2025. This lane can't be extended further due to the back-to-back northbound left turn lane that exists for Salida Street to the north.

Double check this statement, not seeing that a full 575' lane can't fit in current median

By 2025, the eastbound left turn lane at the 32nd Parkway West Full Access (#4) is recommended to be extended form 100 feet to 125 feet. Sin ern edge of the existing wide median opening for th nal 25 feet of eastbound left turn lane length will be t is recommended that dual northbound left turn la gth of 150 feet and the southbound left turn lane be

A 575 foot turn lane is the maximum length that can fit in this median as stated in the traffic study. Of note, the maximum length of 575 feet would be a continuous lane; however, an approximate 525-foot southbound left turn lane could be implemented if a taper is desired. This taper would be recommended to be reduced to approximately 50 feet to allow for a longer turn lane.

At the 32nd Parkway East Access (#5), it is rec be designated to a length of 50 feet while the southbound left turn be designated to a length of 25 feet.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis presented in this report, Kimley-Horn believes Majestic Tower Crossings Retail will be successfully incorporated into the existing and future roadway network. The eastern full movement access is anticipated to operate acceptably. Analysis of the existing street network, the proposed project development, and expected traffic volumes resulted in the following recommendations:

2025 Recommendations

- With completion of the Majestic Tower Crossings Retail project, four accesses are proposed along 32nd Parkway. One right-in/right-out access is proposed on the north side of 32nd Parkway, one right-in/right-out access is proposed along the south side of 32nd Parkway, and two full movement accesses are proposed to provide access to both the northern and southern development areas. The right-in/right-out accesses are proposed to exist along 32nd Parkway between Tower Road and the western full movement access intersection.

- It is recommended that the southbound left turn lane at the intersection of 32nd Parkway and Tower Road (#1) be extended from 150 feet to 575 feet by 2025. This left turn lane length is feasible without impacting the back-to-back northbound left turn lane for Salida Street to the north.

- It is recommended that R1-1 "STOP" signs be installed on the approaches exiting the development at both 32nd Parkway Right-In/Right-Out Accesses (#2 & #3). Since the northbound and southbound approache…urn movements only, R3-2 No Left Turn s…OP" signs. To meet City of Aurora standards…ber eastbound right turn lane be designate…ess (#2) for the southern development area.

The signal warrant analysis was updated based on the ITE hourly rates and the distributions for the project. We have provided the hourly rates provided by ITE within the appendices of the report. If you require further documentation we can email you the complete spreadsheet used to derive these volumes.

- With project construction the 32nd Parkway West Full Access (#4) is anticipated to warrant a traffic signal. Therefore, it is recommended that this intersection be signalized with project construction. The northbound approach should be constructed with 150-foot dual left turn lanes and a shared through/right turn lane. Additionally, it is recommended that the

Provide volume documentation that tabulate the 4 separate hours depicted in the graph in Appendix F

Trip Generation Planner (ITE 11th Edition) - Summary Report

Kimley»Horn

Weekday Trip Generation
Trips Based on Average Rates/Equations

Project Name **Majestic Tower Crossing Retail**
Project Number **0963888012**

							Rates			Total Trips							Net Trips after Internal Capture						
ITE Code	Internal Capture Land Use	Land Use Description	Independent Variable	Setting/Location	No. of Units	Avg Rate or Eq	Daily Rate	AM Rate	PM Rate	Daily Trips	AM Trips	PM Trips	AM Trips In	AM Trips Out	PM Trips In	PM Trips Out	Daily Trips	AM Trips	PM Trips	AM Trips In	AM Trips Out	PM Trips In	PM Trips Out
151	Retail	Mini-Warehouse	1,000 Sq Ft	General Urban/Suburban	30	Avg	1.45	0.09	0.15	44	3	5	2	1	2	3	44	3	5	2	1	2	3
310	Hotel	Hotel	Room(s)	General Urban/Suburban	240	Eq	N/A	N/A	N/A	2,178	113	150	63	50	75	75	1,994	106	133	63	43	63	70
912	Retail	Drive-In Bank	1,000 Sq Ft	General Urban/Suburban	5	Avg	100.35	9.95	21.01	502	51	105	30	21	52	53	490	50	101	29	21	51	50
945	Retail	Convenience Store/Gas Station	Employee(s)	General Urban/Suburban	16	Avg	257.13	27.04	22.76	4,114	433	364	216	217	182	182	4,012	427	351	210	217	178	173
									Grand Total	9,684	953	624	484	469	311	313	6,540	586	590	304	282	294	296

51%/49%

There spreadsheet rounding errors have been updated in the revised study.

Kimley»Horn

Project	Majestic Tower Crossing Retail				
Subject	Trip Generation for Mini Warehouse				
Designed by	TES	*Date*	October 27, 2022	*Job No.*	096388012
Checked by		*Date*		*Sheet No.*	of

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 11th Edition, Average Rate Equations

Land Use Code - Mini-Warehouse (151)

Independant Variable - 1000 Square Feet Gross Floor Feet (X)
Gross Floor Area = 30,000
X = 30.0
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Page 111)

Weekday Average
T = 0.09 (X)
T = 0.09 * 30

Directional Distribution: 59% ent. 41% exit.
T = 3 Average Vehicle Trip Ends
2 entering 1 exiting

2 + 1 = 3 ✓

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (Page 112)

Weekday Average
T = 0.15 (X)
T = 0.15 * 30

Directional Distribution: 47% ent. 53% exit.
T = 5 Average Vehicle Trip Ends
2 entering 3 exiting

2 + 3 = 5 ✓

Weekday Daily (Page 110)

Weekday Average
T = 1.45 (X)
T = 1.45 * 30

Directional Distribution: 50% entering, 50% exiting
T = 44 Average Vehicle Trip Ends
22 entering 22 exiting

22 + 22 = 44 ✓

Kimley»Horn

Project	Majestic Tower Crossing Retail				
Subject	Trip Generation for Hotel				
Designed by	TES	*Date*	October 27, 2022	*Job No.*	096388012
Checked by				*Sheet No.*	*of*

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 11th Edition, Fitted Curve

Land Use Code -Hotel (310)

Independent Variable - Rooms (X)

X = 240
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Page 501)

(T) = 0.50 (X) - 7.45
(T) = 0.50 * (240.0) - 7.45

Directional Distribution: 56% ent. 44% exit.
T = 113 Average Vehicle Trip Ends
63 entering 50 exiting

63 + 50 = 113 ✓

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (Page 502)

T = 0.74 (X) - 27.89
T = 0.74 * 240 - 27.89

Directional Distribution: 51% ent. 49% exit.
T = 150 Average Vehicle Trip Ends
75 entering 75 exiting

75 + 75 = 150 ✓

76 74

There spreadsheet rounding errors have been updated in the revised study.

Weekday (Page 500)

Average Weekday
(T) = 10.84 (X) - 423.51
(T) = 10.84 * (240.0) - 423.51

Directional Distribution: 50
T = 2178 Average
1089 entering 1[illegible] exiting

1089 + 1089 = 2178 ✓

Kimley»Horn

Project	Majestic Tower Crossing Retail				
Subject	Trip Generation for Drive-In Bank				
Designed by	TES	*Date*	October 27, 2022	*Job No.*	096388012
Checked by		*Date*		*Sheet No.*	1 of 1

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 11th Edition, Average Rate Equations

Land Use Code - Drive-In Bank (912)

Independent Variable - 1000 Square Feet Gross Floor Area (X)

SF = 5,000
X = 5.000
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Page 599)

Average Weekday
T = 9.95 (X)
T = 9.95 * 5.000

Directional Distribution: 58% ent. 42% exit.
T = 51 Average Vehicle Trip Ends
30 entering 21 exiting

30 + 21 = 51

29 21 50

There spreadsheet rounding errors have been updated in the revised study.

Peak Hour of Adjacent Street Traffic, One Hour B

Average Weekday
T = 21.01 (X)
T = 21.01 * 5.000

Directional Distribution: 50% ent.
T = 105 Average Vehicle Trip Ends
52 entering 53 exiting

52 + 53 = 105

Weekday (Page 598)

Average Weekday
T = 100.35 (X)
T = 100.35 * 5.000

Directional Distribution: 50% entering, 50% exiting
T = 502 Average Vehicle Trip Ends
251 entering 251 exiting

251 + 251 = 502 ✓

Non Pass-By Trip Volumes (Per ITE Trip Generation Manual, 11th Edition)

PM Peak Hour = 65% Non-Pass By AM Peak Hour = 71% Non-Pass By

	IN	Out	Total
AM Peak	21	15	36 ✓
PM Peak	34	34	68 ✓
Daily	163	163	326

PM Peak Hour Rate Applied to Daily

Pass-By Trip Volumes (Per ITE Trip Generation Manual, 11th Edition)

PM Peak Hour = 35% ✓ Pass By AM Peak Hour = 29% ✓ Pass By

	IN	Out	Total
AM Peak	9	6	15 ✓
PM Peak	18	19	~~26~~ 37
Daily	88	88	176

PM Peak Hour

Of note, pass-by was conservatively not utilized in this study so this data is provided in all our spreadsheets for informational purposes only.

Kimley»Horn

Project QuikTrip 4235
Subject Trip Generation for Gasoline/Service Station with Convenience Market
Designed by TES *Date* March 17, 2022 *Job No.* 096888026
Checked by _____ *Date* _____ *Sheet No.* _____ *of* _____

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 11th Edition, Average Rate Equations

Land Use Code - Convenience Store/Gas Station - GFA (4-5.5K) (945)

Independant Variable - Vehicle Fueling Positions (X)

Vehicle Fueling Positions= 16 Positions
X = 16
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Page 873)

Average Weekday
T = 27.04 (X)
T = 27.04 * 16

Directional Distribution: 50% ent. 50% exit.
T = 433 Average Vehicle Trip Ends
216 entering 217 exiting

216 + 217 = 433 ✓

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (Page 874)

Average Weekday
T = 22.76 (X)
T = 22.76 * 16.000

Directional Distribution: 50% ent. 50% exit.
T = 364 Average Vehicle Trip Ends
182 entering 182 exiting

182 + 182 = 364 ✓

Weekday (Page 872)

Average Weekday
T = 257.13 (X)
T = 257.13 * 16.000

Directional Distribution: 50% entering, 50% exiting
T = 4114 Average Vehicle Trip Ends
2057 entering 2057 exiting

2057 + 2057 = 4114 ✓

Non Pass-By Trip Volumes (Per ITE Trip Generation Manual, 11th Edition)

PM Peak Hour = 25% Non-Pass By AM Peak Hour = 24% Non-Pass By

	IN	Out	Total	
AM Peak	52	52	104	
PM Peak	46	46	91	
Daily	514	514	1028	PM Peak Hour Rate Applied to Daily

Pass-By Trip Volumes (Per ITE Trip Generation Manual, 11th Edition) ✓

PM Peak Hour = 75% ✓ Pass By AM Peak Hour = 76% ✓ Pass By

	IN	Out	Total	
AM Peak	164	165	329 ✓	
PM Peak	137	137	273 ✓	
Daily	1543	1543	3086	PM Peak Hour Rate Applied to Daily

Kimley»Horn

Project	Majestic Tower Crossing Retail				
Subject	Trip Generation for Hotel				
Designed by	TES	*Date*	October 27, 2022	*Job No.*	096388012
Checked by				*Sheet No.*	of

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 11th Edition, Fitted Curve

Land Use Code -Hotel (310)

Independent Variable - Rooms (X)

X = 120
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Page 501)

(T) = 0.50 (X) - 7.45
(T) = 0.50 * (120.0) - 7.45

Directional Distribution: 56% ent. 44% exit.
T = 53 Average Vehicle Trip Ends
30 entering 23 exiting

30 + 23 = 53

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (Page 502)

T = 0.74 (X) - 27.89
T = 0.74 * 120 - 27.89

Directional Distribution: 51% ent. 49% exit.
T = 61 Average Vehicle Trip Ends
31 entering 30 exiting

31 + 30 = 61

Weekday (Page 500)

Average Weekday
(T) = 10.84 (X) - 423.51
(T) = 10.84 * (120.0) - 423.51

Directional Distribution: 50% entering, 50% exiting
T = 878 Average Vehicle Trip Ends
439 entering 439 exiting

439 + 439 = 878

Kimley»Horn

Project	Majestic Tower Crossing Retail				
Subject	Trip Generation for General Health/Fitness Club				
Designed by	TES	*Date*	October 27, 2022	*Job No.*	096388012
Checked by		*Date*		*Sheet No.*	of

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 11th Edition, Average Rates

Land Use Code - Health/Fitness Club (492)

Independant Variable - 1000 Square Feet (X)
SF = 40,000
X = 40.000
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (400 Series Page 268)

Directional Distribution: 51% ent. 49% exit.

(T) = 1.31 (X) T = 52 Average Vehicle Trip Ends
(T) = 1.31 * (40.0) 27 entering 25 exiting

27 + 25 = 52 ✓

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (400 Series Page 269)

Directional Distribution: 57% ent. 43% exit.

(T) = 3.45 (X) T = 138 Average Vehicle Trip Ends
(T) = 3.45 * (40.0) 79 entering 59 exiting

79 + 59 = 138 ✓

Weekday (10% K-Factor of PM Trips)

Directional Distribution: 50% ent. 50% exit.

(T) = 10 (PM trips) T = 1380 Average Vehicle Trip Ends
(T) = 10 * (138.0) 690 entering 690 exiting

690 + 690 = 1380 ✓

Kimley»Horn

Project	Majestic Tower Crossing Retail				
Subject	Trip Generation for Strip Retail Plaza (<40k)				
Designed by	TES	*Date*	October 27, 2022	*Job No.*	096388012
Checked by		*Date*		*Sheet No.*	of

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 11th Edition, Average Rate Equations

Land Use Code - Strip Retail Plaza (<40k) (822)

Independent Variable - 1000 Square Feet Gross Leasable Area (X)

Gross Leasable Area = 27,000 Square Feet
X = 27.000
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (800 Series Page 230)

Average Weekday — Directional Distribution: 60% ent. 40% exit.
T = 2.36 * (X) — T = 64 Average Vehicle Trip Ends
T = 2.36 * 27 — 38 entering 26 exiting

38 + 26 = 64 ✓

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (800 Series page 231)

Average Weekday — Directional Distribution: 50% ent. 50% exit.
T = 6.59 * (X) — T = 178 Average Vehicle Trip Ends
T = 6.59 * 27 — 89 entering 89 exiting

89 + 89 = 178 ✓

Weekday (800 Series page 229)

Average Weekday — Directional Distribution: 50% entering, 50% exiting
T = 54.45 * (X) — T = 1470 Average Vehicle Trip Ends
T = 54.45 * 27 — 735 entering 735 exiting

735 + 735 = 1470 ✓

Non Pass-By Trip Volumes (Per ITE Trip Generation Manual, 11th Edition)

AM Peak Hour = 60% Non-Pass By — PM Peak Hour = 60% Non-Pass By

	IN	Out	Total	
AM Peak	23	16	38	Pass-By Rates from ITE 821
PM Peak	53	53	107	PM Peak Hour Rate Applied to AM Peak Hour
Daily	441	441	882	PM Peak Hour Rate Applied to Daily

Pass-By Trip Volumes (Per ITE Trip Generation Manual, 11th Edition)

AM Peak Hour = 40% Pass By — PM Peak Hour = 40% Pass By

	IN	Out	Total	
AM Peak	15	10	26 ✓	PM Peak Hour Rate Applied to AM Peak Hour
PM Peak	36	36	71 ✓	
Daily	294	294	588	PM Peak Hour Rate Applied to Daily

Kimley»Horn

Project Majestic Tower Crossing Retail
Subject Trip Generation for High Turnover Sit-Down Restaurant
Designed by TES *Date* October 27, 2022 *Job No.* 96388012
Checked by *Date* *Sheet No.* *of*

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 11th Edition, Average Rates

Land Use Code - High Turnover Sit-Down Restaurant (932)

Independent Variable - 1000 Square Feet (X)
SF = 16,000
X = 16.000
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (900 Series Page 674)

Directional Distribution: 55% ent. 45% exit.
(T) = 9.57 (X) T = 153 Average Vehicle Trip Ends
(T) = 9.57 * (16.0) 84 entering 69 exiting

84 + 69 = 153 ✓

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (900 Series Page 674)

Directional Distribution: 61% ent. 39% exit.
(T) = 9.05 (X) T = 145 Average Vehicle Trip Ends
(T) = 9.05 * (16.0) 88 entering 57 exiting

88 + 57 = 145

Weekday (900 Series Page 673)

Directional Distribution: 50% ent. 50% exit.
(T) = 107.20 (X) T = 1716 Average Vehicle Trip Ends
(T) = 107.20 * (16.0) 858 entering 858 exiting

858 + 858 = 1716 ✓

Non Pass-By Trip Volumes (Per ITE Trip Generation Manual, 11th Edition)

AM Peak Hour = 57% Non-Pass By PM Peak Hour = 57% Non-Pass By

	IN	Out	Total	
AM Peak	48	39	87	PM Peak Hour Rate Applied to AM Peak Hour
PM Peak	50	32	82	
Daily	489	489	978	PM Peak Hour Rate Applied to Daily

Pass-By Trip Volumes (Per ITE Trip Generation Manual, 11th Edition)

AM Peak Hour = 43% Pass By PM Peak Hour = 43% ✓ Pass By

	IN	Out	Total	
AM Peak	36	30	67 ✓	PM Peak Hour Rate Applied to AM Peak Hour
PM Peak	38	25	63 ✓	
Daily	369	369	738	PM Peak Hour Rate Applied to Daily

Kimley»Horn

Project	Majestic Tower Crossing Retail				
Subject	Trip Generation for Fast-Food Restaurant with Drive-Through Window				
Designed by	TES	*Date*	October 27, 2022	*Job No.*	096388012
Checked by		*Date*		*Sheet No.*	of

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 11th Edition, Average Rates

Land Use Code - Fast-Food Restaurant with Drive-Through Window (934)

Independant Variable - 1000 Square Feet (X)
SF = 10,000
X = 10.000
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (900 Series Page 726)

(T) = 44.61 (X)
(T) = 44.61 * (10.0)

Directional Distribution: 51% ent. 49% exit.
T = 446 Average Vehicle Trip En
227 entering 219 exiting

227 + 219 = 446 ✓
228 218

The trip generation throughout the study is rounded. 51% is 227.46 and 49% is 218.54 so with rounding up and down, we believe the current values are appropriate. Of note, this rounding will not change the results of the traffic analysis.

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (900 Series Page 7

(T) = 33.03 (X)
(T) = 33.03 * (10.0)

Directional Distribution: 52% ent.
T = 330 Average Vehicle Trip En
172 entering 158 exiting

172 + 158 = 330 ✓

Weekday (900 Series Page 725)

(T) = 467.48 (X)
(T) = 467.48 * (10.0)

Directional Distribution: 50% ent. 50% exit.
T = 4676 Average Vehicle Trip Ends
2338 entering 2338 exiting

2338 + 2338 = 4676 ✓

Non Pass-By Trip Volumes (Per ITE Trip Generation Manual, 11th Edition)

AM Peak Hour = 50% Non-Pass By PM Peak Hour = 45% Non-Pass

	IN	Out	Total
AM Peak	114	110	223
PM Peak	77	71	149
Daily	1052	1052	2104

PM Peak Hour Rate Applied to Daily

Pass-By Trip Volumes (Per Trip Generation Manual, 11th Edition)

AM Peak Hour = 50% ✓ Pass By PM Peak Hour = 55% ✓ Pass By

	IN	Out	Total
AM Peak	~~114~~ 112 ✓	~~110~~ 111	223 ✓
PM Peak	95	87	182 ✓
Daily	1286	1286	2572

PM Peak Hour Rate Applied to Daily

Of note, pass-by was conservatively not utilized in this study so this data is provided in all our spreadsheets for informational purposes only.

Trip generation throughout the study is rounded. This has been updated but based on 227 entering and 219 exiting, we believe the "in" values should be 113 and the "out" values should be 110.

Kimley»Horn

Project	Majestic Tower Crossing Retail				
Subject	Trip Generation for Coffee/Donut Shop with Drive Through				
Designed by	TES	*Date*	October 27, 2022	*Job No.*	096388012
Checked by		*Date*		*Sheet No.*	of

TRIP GENERATION MANUAL TECHNIQUES

This coffee shop will have indoor seating. Of note, coffee shops of approximately 1,000 SF or less are the sites that typically don't have indoor seating.

ITE Trip Generation Manual 11th Edition, Average Rate Ec

Land Use Code - Coffee/Donut Shop with Drive-Through Window (937)

Independent Variable - 1000 Square Feet Gross Floor Feet (X)

Building size is approx 50'x50', is any seating expected inside? LU 938 seems better represented

Gross Floor Area = 2,500
X = 2.5
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Series 900 Page 777)

T = 85.88 (X)
T = 85.88 * 2.5

Directional Distribution: 51%
T = 215 ✓ Average Vehicle T
110 entering 105 exiti

109 106

The trip generation throughout the study is rounded. 51% is 109.65 and 49% is 105.35 so with rounding up and down, we believe the current values are appropriate. Of note, this rounding will not change the results of the traffic analysis.

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (Series 900

T = 38.99 (X)
T = 38.99 * 2.5

Directional Distribution: 50%
T = 98 ✓ Average Vehicle T
49 entering 49 exiting

Weekday (Series 900 Page 776)

Average Weekday
(T) = 533.57 (X)
(T) = 533.57 * (2.5)

Directional Distribution: 50% entering, 50% exiting
T = 1334 Average Vehicle Trip Ends
667 entering 667 exiting

667 + 667 = 1334 ✓

check with PM on pass-by

Applying ITE LU 934 Fast Food with Drive-Through Pass-by Rates

Non Pass-By Trip Volumes (Per ITE Trip Generation Manual, 11th Edition)

AM Peak Hour = 50% Non-Pass By
PM Peak Hour = 45% Non-Pass By

	IN	Out	Total
AM Peak	55	53	108
PM Peak	22	22	44
Daily	300	300	600

Pass-By Rates from ITE 938

PM Peak Hour Rate Applied to Daily

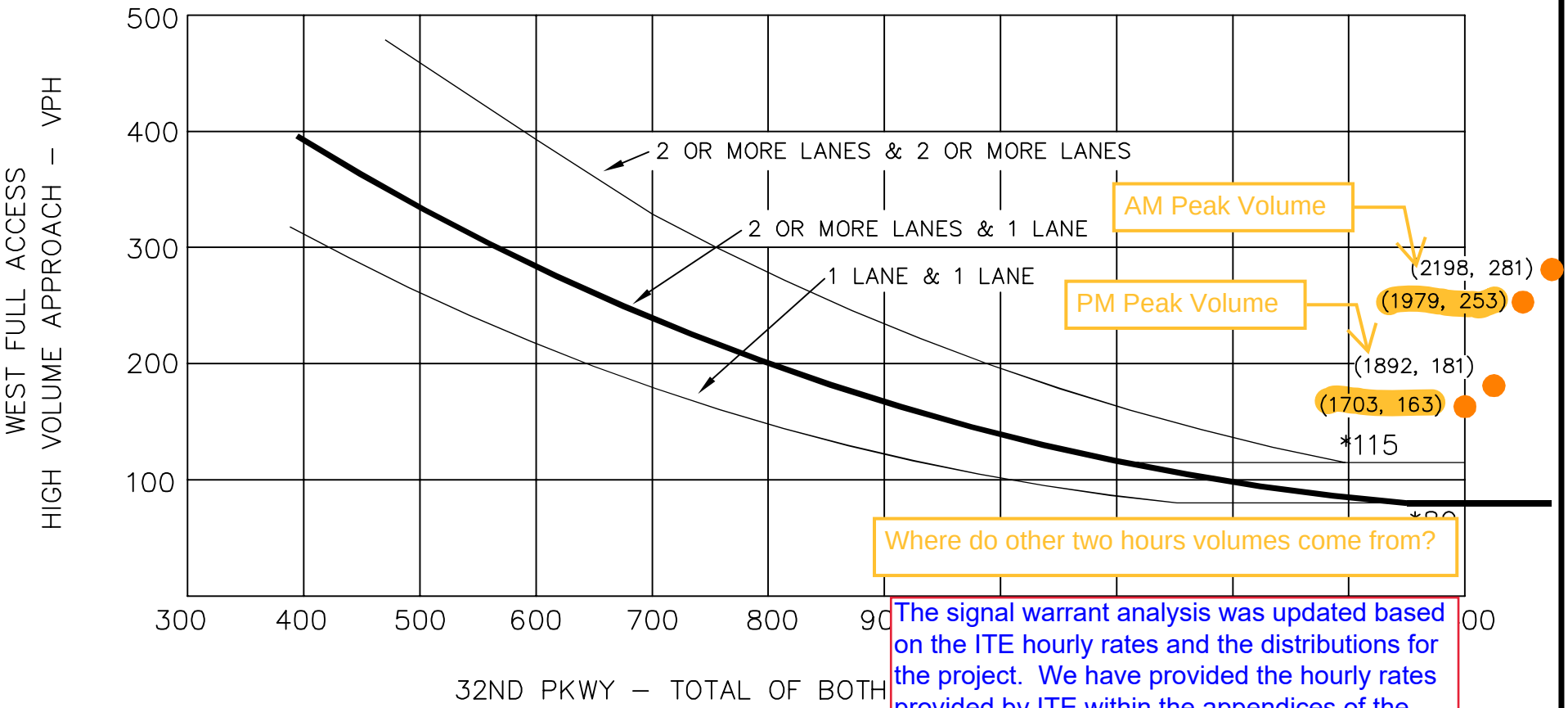
Pass bys for 938 are 90% AM and 98% PM

Provide documentation for 937 if still using

Of note, pass-by was conservatively not utilized in this study so this data is provided in all our spreadsheets for informational purposes only.

However, when pass-by is used for coffee-shop, we typically conservatively utilize the pass-by rates for fast-food restaurant because coffee shop only provides rates for buildings without indoor seating which raises the pass-by rates which we believe reduces the volumes too much for this use.

WARRANT 2 - FOUR HOUR VEHICULAR VOLUME



Where do other two hours volumes come from?

The signal warrant analysis was updated based on the ITE hourly rates and the distributions for the project. We have provided the hourly rates provided by ITE within the appendices of the report. If you require further documentation we can email you the complete spreadsheet used to derive these volumes.

* NOTE: 115 VPH APPLIE... STREET
APPROACH WITH... LOWER
THRESHOLD VOL... LANE.

32ND PKWY W. FULL ACCESS
SIGNAL WARRANT ANALYSIS
FOUR HOUR VOLUME WARRANT

● 2025 TOTAL TRAFFIC DATA POINT

Source: Manual of Uniform Traffic Control Devices 2009

Kimley»Horn