Kimley»Horn

July 29, 2020

Commerce Construction Co., L.P.
20100 East 32nd Parkway
Suite 150
Aurora, CO 80011

Attn: Mr. Spencer Cleveland
Project Manager

Re: Traffic Study Letter
MCC Retail Phase 1
32nd Parkway Project Access Evaluation
Aurora, CO

Dear Mr. Cleveland:

The purpose of this letter is to provide a traffic compliance trip generation comparison for the first phase of the MCC Retail project to the overall Majestic Tower Retail project previously studied. In addition, this evaluation determines if a traffic signal will be needed for the proposed access intersection along 32nd Parkway.

The Majestic Tower Retail project is proposed to be located on the southeast corner of the 32nd Parkway and Tower Road intersection in Aurora, Colorado. A vicinity map illustrating the location is attached in **Figure 1**. Specifically, MCC Phase 1 is located directly along the east side of Tower Road within the western portion of the overall development area (site map attached).

The "Majestic Tower Retail Traffic Impact Study" that included this development area was completed in July 2018 by Kimley-Horn. The trip generation of the proposed MCC Retail Phase 1 project will be compared with the trip generation from the original traffic study. The original Majestic Tower Retail traffic impact study included development of two 125-room hotels (250 rooms total), 136,000 square feet of retail space (90,000 square feet on the north side of 32nd Parkway), 23,000 square feet of restaurants (in three separate restaurants with one being an approximate 9,500 square foot Cracker Barrel), and a 12-fueling position gas station. For the purposes of this study now as MCC Retail Phase 1, it is assumed that this project will include a 10,000 square foot retail building to include 7,500 square feet of retail space (Verizon, an Insurance Office, and a Boutique) and 2,500 square feet of fast casual dining (Chipotle), a 3,000 square foot additional fast casual dining (Wahoo's Fish Tacos), a 3,100 square foot fast food restaurant with drive through (Freddy's), a 2,500 square foot high turnover sit down restaurant (IHOP), and a 110-room extended stay hotel to be developed in the first phase of the project.

This traffic compliance letter identifies the amount of traffic associated with the proposed development of MCC Retail Phase 1 and the expected trip distribution and traffic assignment along with an operational analysis for the project access intersection along 32nd Parkway. It is expected that project construction will be completed within the next couple of years; therefore, analysis was performed for the 2021 short term build out for Phase 1.

Existing Roadway Network and Traffic Counts
Regional access to the MCC Retail Phase 1 project will be provided by Interstate 70 (I-70) and Tower Road while direct access will be provided by one full movement access along the south side of 32nd Parkway. The project access along 32nd Parkway is proposed to be located approximately 500 feet east of Tower Road at the existing median opening.

32nd Parkway primarily extends east-west with two through lane in each direction with a raised median and a posted speed limit of 40 miles per hour. The access along the south side of 32nd Parkway is not currently constructed.

Peak hour counts were performed to the west of the proposed project access at the intersection of 32nd Parkway and Tower Road on Thursday, April 5, 2018. The weekday counts were conducted in 15-minute intervals during the morning and afternoon peak hours of adjacent street traffic from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM. These counts were used to calculate the eastbound and westbound through movements along 32nd Parkway at the proposed project access. The traffic volume along 32nd Parkway was found to be 416 vehicles per hour (vph) eastbound and 280 vph westbound during the morning peak hour. During the afternoon peak hour, the traffic volume along 32nd Parkway was observed to be 250 vph eastbound and 420 vph westbound. Count sheets are attached.

Unspecified Development Traffic Growth
The 2020 background traffic volumes from the original Majestic Tower Retail project traffic study were used as a basis for this study. As presented in the original traffic study, project traffic volumes from Majestic Commercenter Phase 9, Majestic Commercenter Phase 10, Gateway Buildings 22/23, Salida Flex, and Gateway V were all included in background traffic volumes. Based on the standard growth rate used by the City of Aurora, an annual growth rate of two (2) percent per year was used to calculate 2021 background traffic volumes from the previously identified 2020 background traffic volumes for the eastbound and westbound through movements along 32nd Parkway at the project access.

Trip Generation
Site-generated traffic estimates are determined through a process known as trip generation. Rates and equations are applied to the proposed land use to estimate traffic generated by the development during a specific time interval. The acknowledged source for trip generation rates is the Trip Generation Report[1] published by the Institute of Transportation Engineers (ITE). ITE has established trip rates in nationwide studies of similar land uses.

The original traffic impact study included two 125-room hotels (250 rooms total), 136,000 square feet of retail space (90,000 square feet on the north side of 32nd Parkway), 23,000 square feet of restaurants (in three separate restaurants with one being an approximate 9,500 square foot Cracker Barrel), and a 12-fueling position gas station. For the original traffic study, trip generation average rates were based on the ITE Trip Generation, 10th Edition, for Hotel (ITE Code 310), Shopping Center (ITE Code 820), High Turnover Sit-Down Restaurant (ITE Code 932), and Gasoline Station with Convenience Market (ITE Code 945).

1 Institute of Transportation Engineers, *Trip Generation: An Information Report*, Tenth Edition, Washington DC, 2017.

For this proposed project, Kimley-Horn used the average rate equations of the ITE Trip Generation, 10th Edition (most current edition), for Hotel (ITE Code 310), Shopping Center (ITE Code 820), Fast Casual Restaurant (ITE Code 930), High Turnover Sit-Down Restaurant (ITE Code 932), and Fast-Food Restaurant with Drive Through (ITE Code 934). The following **Table 1** summarizes the estimated trip generation for the project. Applicable trip generation calculations and report documentation from the original study are attached.

Table 1 - Trip Generation Comparison
Majestic Tower Retail vs. MCC Phase 1 Retail

Land Use and Size	Daily Vehicle Trips	Weekday Vehicle Trips					
		AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Previous Study							
Total External Trips After Internal Capture	10,226	311	232	543	443	400	843
Current Proposal							
Hotel (ITE Code 310) – 110 Rooms	804	30	19	49	27	26	53
Shopping Center (ITE Code 820) – 7,500 SF	226	4	3	7	7	10	17
Fast Casual Restaurant (ITE Code 930) – 5,500 SF	1,620	7	4	11	39	30	69
High Turnover Sit-Down Restaurant (ITE Code 932) – 2,500 SF	264	14	11	25	14	8	21
Fast-Food Restaurant w/ D.T (ITE Code 934) – 3,100 SF	1,364	62	60	123	48	41	90
Total External Trips After Internal Capture	**4,278**	**117**	**97**	**215**	**135**	**115**	**250**
Net Difference in Trips	***-5,948***	***-194***	***-135***	***-328***	***-308***	***-285***	***-593***

As summarized in the table, the currently proposed MCC Retail Phase 1 project is anticipated to generate 4,278 daily weekday external trips after internal capture. Of these, 215 trips are expected to occur during the weekday morning peak hour while 250 trips are expected to occur during the weekday afternoon peak hour. Based on a comparison to the traffic generated from the original traffic study, MCC Retail Phase 1 is anticipated to generate traffic within the volume limits previously studied, with 5,948 less daily trips, 328 less morning peak hour trips, and 593 less afternoon peak hour trips. Phase 1 is anticipated to generate approximately 42 percent of the overall Majestic Tower Retail project trips generated.

Distribution, Assignment, and Total Traffic

Distribution of site traffic was based on the original traffic study which considered the area street system characteristics, existing traffic patterns and volumes, and the proposed access system for the project. The 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. Project traffic originating from either direction can access the site. **Figure 2** illustrates the expected trip distribution for the proposed residential project.

Traffic assignment was obtained by applying the project trip distribution to the estimated project traffic generation of the MCC Retail Phase 1 development shown in the trip generation table. The traffic assignment is shown in **Figure 3**. Site traffic volumes were added to the 2021 background volumes to represent estimated buildout year conditions. The total traffic volumes for 2021 is illustrated in **Figure 4**, along with the volumes from 2021 the 2040 total buildout volumes are included for reference in **Figure 5**.

Traffic Operations Analysis

Kimley-Horn's analysis of traffic operations in the site vicinity was conducted to determine potential capacity deficiencies at the project access intersection for the 2021 buildout. The acknowledged source for determining overall capacity is the *Highway Capacity Manual*[2]*.* Capacity analysis results are listed in terms of Level of Service (LOS). LOS is a qualitative term describing operating conditions a driver will experience while traveling on a particular street or highway during a specific time interval. It ranges from A (very little delay) to F (long delays and congestion). For intersections and roadways in this study area, typical traffic study practice identifies LOS D as the minimum threshold for acceptable operations. The following **Table 2** shows the definition of level of service for signalized and unsignalized intersections.

Table 2 – Level of Service Definitions

Level of Service	Signalized Intersection Average Total Delay (sec/veh)	Unsignalized Intersection Average Total Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

Definitions provided from the Highway Capacity Manual, Sixth Edition, Transportation Research Board, 2016.

32nd Parkway Access Intersection

With completion of the MCC Retail Phase 1 project, the site proposes one full movement access along the south side of 32nd Parkway. The access along 32nd Parkway is proposed to be located approximately 500 feet east of Tower Road at the existing median opening. This new access should operate with stop control along the northbound exiting approach with installation of a R1-1 "STOP" sign along this approach. Two exiting lanes, one left turn lane and one right turn lane along with a westbound left turn lane and a shared eastbound through/right turn lane entering the project driveway will allow for acceptable operations. With these lane configurations and control, the capacity analysis indicates that acceptable delay and LOS D or better is forecasted for all movements during the morning and afternoon peak hours for the 2021 buildout with Phase 1 of the project as an unsignalized intersection.

2 Transportation Research Board, *Highway Capacity Manual*, Sixth Edition, Washington DC, 2016.

Table 3 provides the results of the level of service analysis for this intersection with LOS worksheets attached.

Table 3 – 32nd Parkway Access Intersection LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2021 Background Plus Project				
Westbound Left	10.8	B	8.7	A
Northbound Approach	28.3	D	18.9	C
Northbound Left	30.1	D	19.9	C
Northbound Right	12.6	B	10.2	B
2040 Background Plus Project *	10.9	B	12.4	B

* Results from overall Majestic Tower Retail master study, a signal is expected to be needed by 2040 as full development occurs

To further identify if signalization of the access intersection is needed for Phase 1 of this development, four-hour and peak hour vehicle volume signal warrant analysis was performed for the intersection of 32nd Parkway Project Access in 2021. Plotting the morning and afternoon peak hour points and the overall peak hour on the graphs illustrate that this intersection is not anticipated to meet the four-hour vehicular volume warrant or the peak hour vehicular volume warrant with two lane roadway approaches while considering only half of the right turn movements along the minor approach. It is important to note that this intersection is very close to warranting signalization with Phase 1 and the currently planned development of the projects within Majestic Commercenter to the east. Therefore, signalization will likely be needed based on development of the next project beyond Phase 1. The signal warrant analyses figures for this intersection is attached as **Figures 6 and 7**.

Bicycle and Pedestrian Access

Bicycle and pedestrian access evaluations were conducted for the MCC Retail Phase 1 development project. This focused on the areas of 32nd Parkway and Tower Road adjacent to the site. The following provides a description of the assessment.

Adjacent to the site, 32nd Parkway provides sidewalks along both sides of the street. All along 32nd Parkway, pedestrian access is acceptable with wide separated sidewalks and signalized pedestrian crossings with crosswalks at the signalized intersection of Tower Road. Along Tower Road, sidewalks exist along both sides of the street. All intersections along Tower Road within a quarter mile of the 32nd Parkway intersection provide signalized pedestrian crossings as well. Currently there are no bicycle lanes along 32nd Parkway or Tower Road adjacent to the project.

Transit within the area is provided by RTD. Route 169 along Tower Road is the nearest route to the site. This route runs daily every 60 minutes during all times, year-round. It runs north and south along Airport Boulevard between Arapahoe Road and Colfax Avenue before running north and south along Tower Road between Colfax Avenue and the Airport Boulevard Station. A bus stop exists along northbound and southbound Tower Road, just south of the intersection with 32nd Parkway. Benches exist at these bus stop locations.

Conclusions and Recommendations

In summary, this traffic study letter provides project traffic generation estimates to identify conformance with the original traffic study. MCC Retail Phase 1 is anticipated to generate traffic volumes within the original traffic study limits. The proposed access intersection along 32nd Parkway should operate with stop control along the northbound exiting approach with installation of a R1-1 "STOP" sign. Two exiting lane should be provided at the access intersection, one left turn lane and one right turn lane. The existing constructed westbound left turn lane should be designated. Likewise, it was found that a separate eastbound right turn lane wouldn't be needed for acceptable operations. It is understood that applying State of Colorado Department of Transportation (CDOT) warrants for right turn lanes from the State Highway Access Code (SHAC) results in a warrant being met for an eastbound right turn lane at this intersection. However, we don't feel it is appropriate to use the CDOT SHAC to determine warrants for right turn lanes along City of Aurora streets such as this location. The CDOT thresholds are set so low, at 50 vph for NR-B less than 40 mph, which is one right turn vehicle every 1 minute and 12 seconds on average. Using CDOT SHAC as guide for right turn lane thresholds will result in right turn lanes everywhere, which translates to higher through vehicle speeds. This is because CDOT's mission is to maintain speed and flow on their highways. Installation of right turn lanes when not needed ends up increasing through vehicle speeds making it less safe for other roadway users such as bicycles and pedestrians. With 32nd Parkway being four lanes and including numerous street trees along its edge, it is respectfully requested that the City reconsider requiring this right turn lane. The recommended intersection lane configurations and control for the project buildout are illustrated in **Figure 8**.

If you have any questions or require anything further, please feel free to call me at (303) 228-2304.

Sincerely,

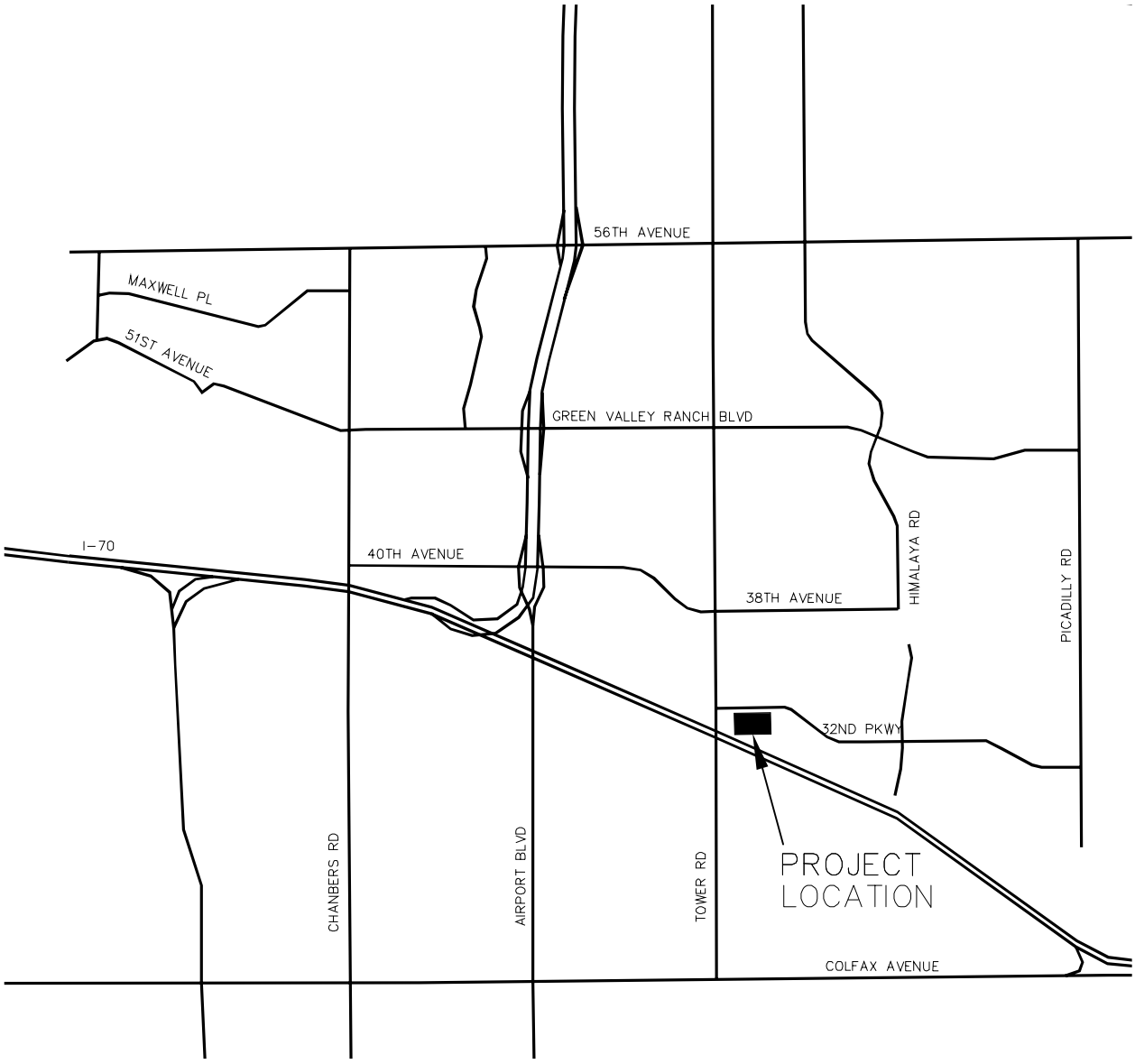
KIMLEY-HORN AND ASSOCIATES, INC.

Curtis D Rowe

Curtis D. Rowe, P.E., PTOE
Vice President



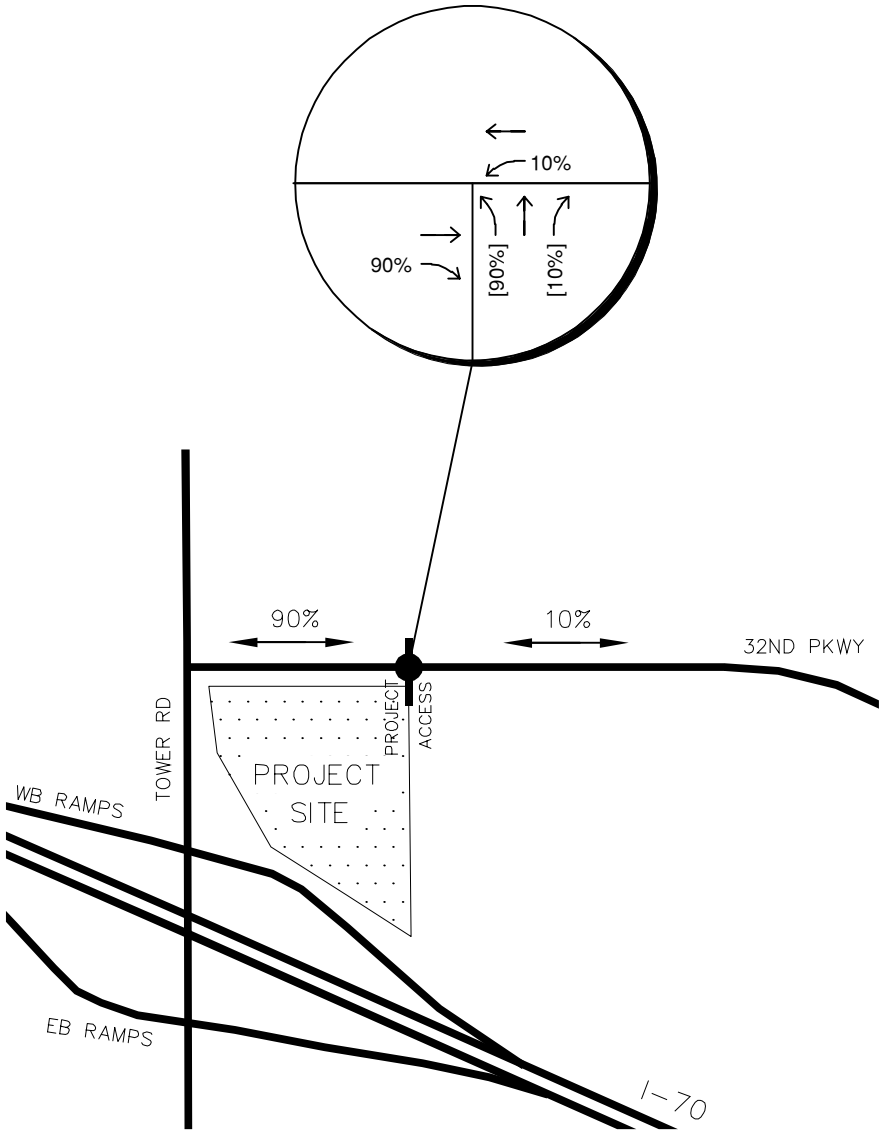
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NORTH
NTS 096388006



MCC RETAIL PHASE 1
32ND PARKWAY & PROJECT ACCESS
VICINITY MAP

FIGURE 1

Kimley»Horn



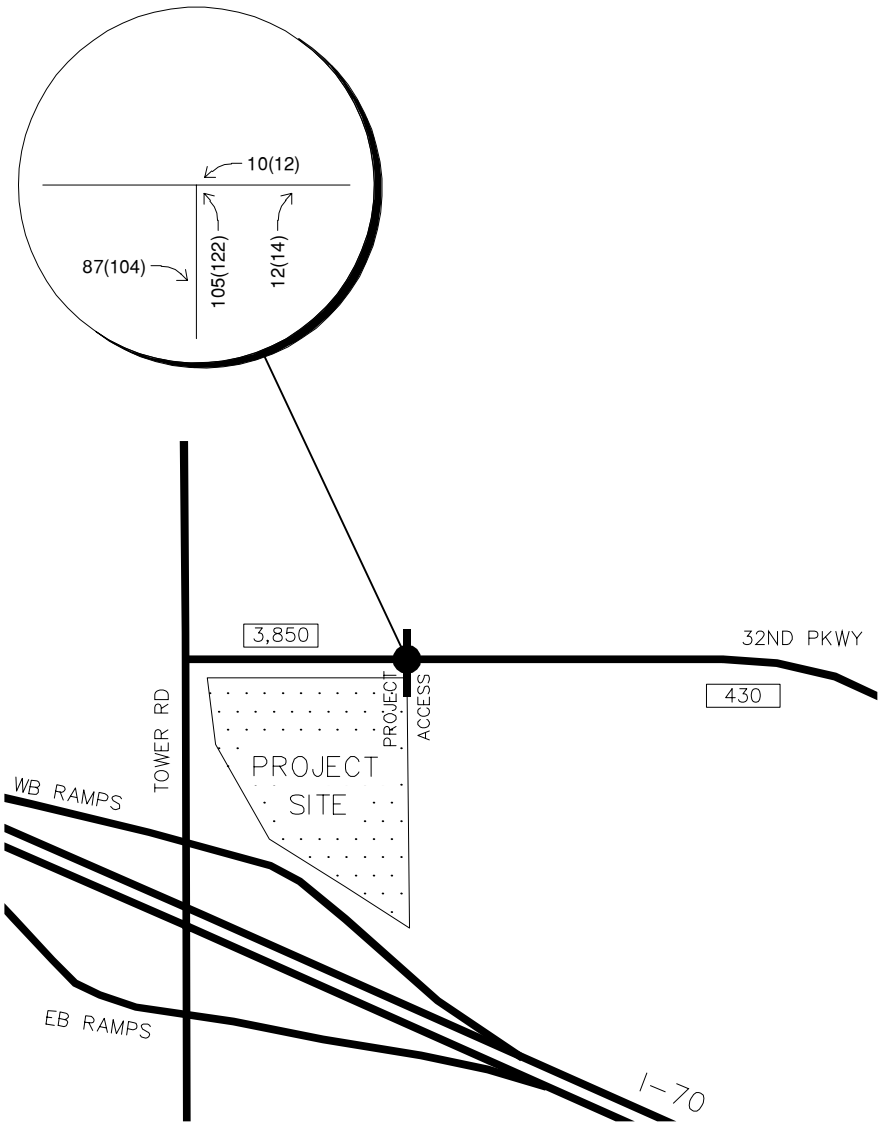
LEGEND

● Study Area Key Intersection

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

MCC RETAIL PHASE 1
32ND PARKWAY & PROJECT ACCESS
PROJECT TRIP DISTRIBUTION

FIGURE 2

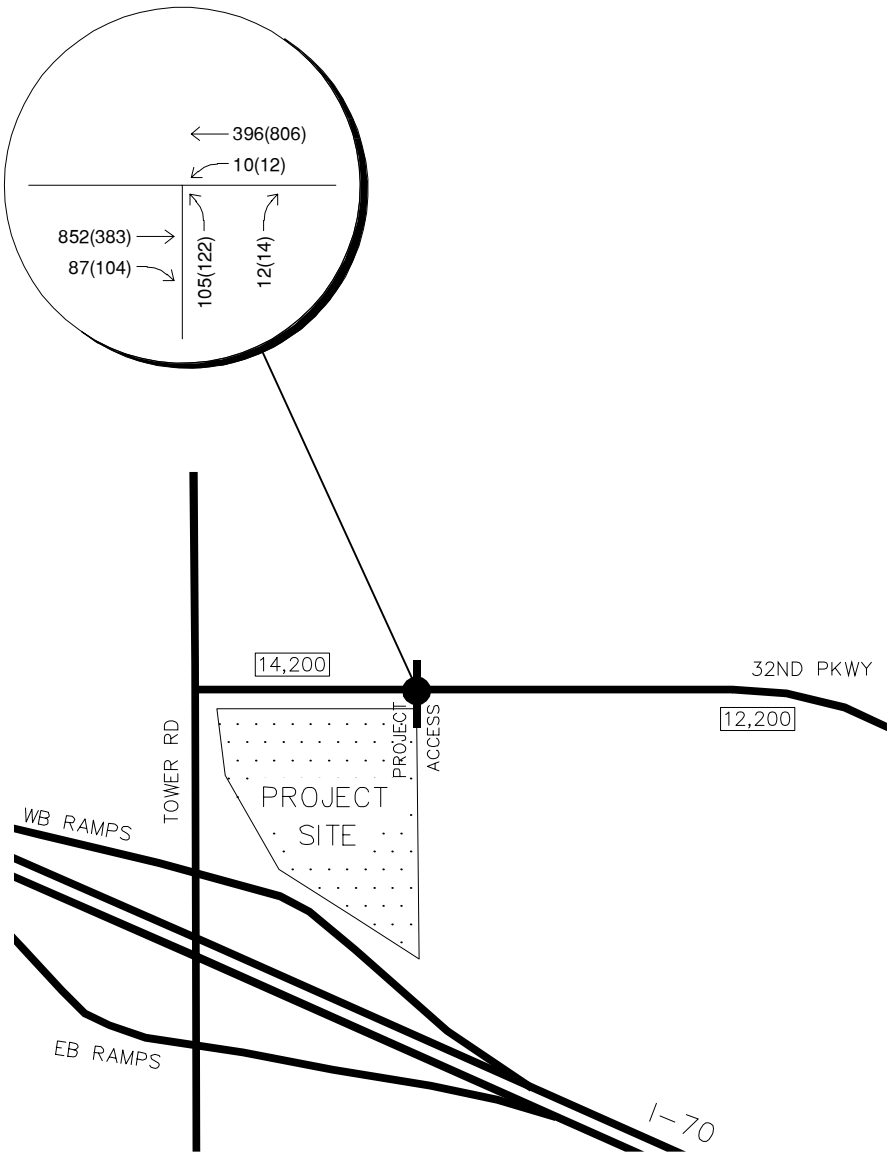


LEGEND

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

MCC RETAIL PHASE 1
32ND PARKWAY & PROJECT ACCESS
PROJECT TRAFFIC ASSIGNMENT

FIGURE 3

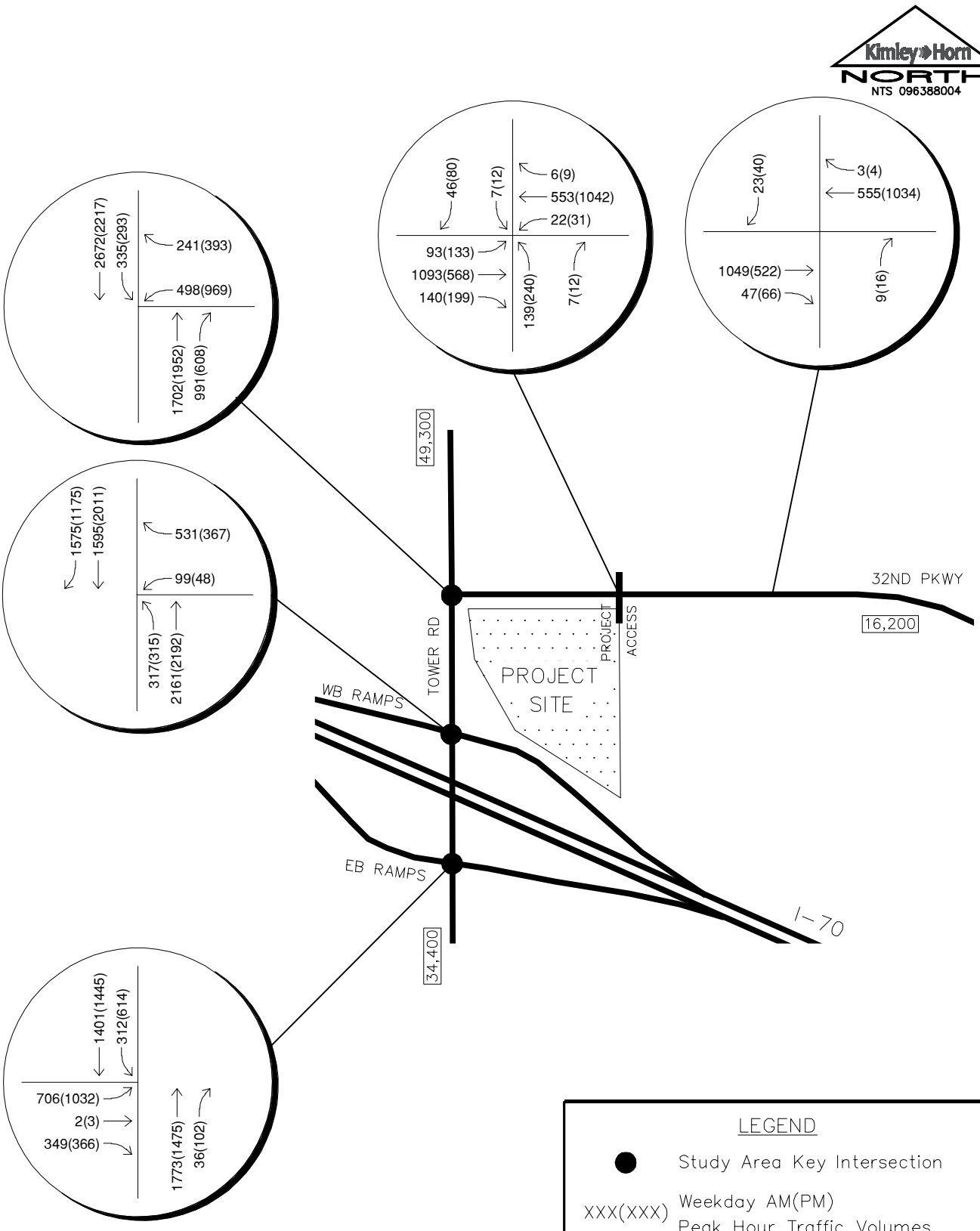


LEGEND

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

MCC RETAIL PHASE 1
32ND PARKWAY & PROJECT ACCESS
2021 BACKGROUND
PLUS PROJECT TRAFFIC VOLUMES

FIGURE 4

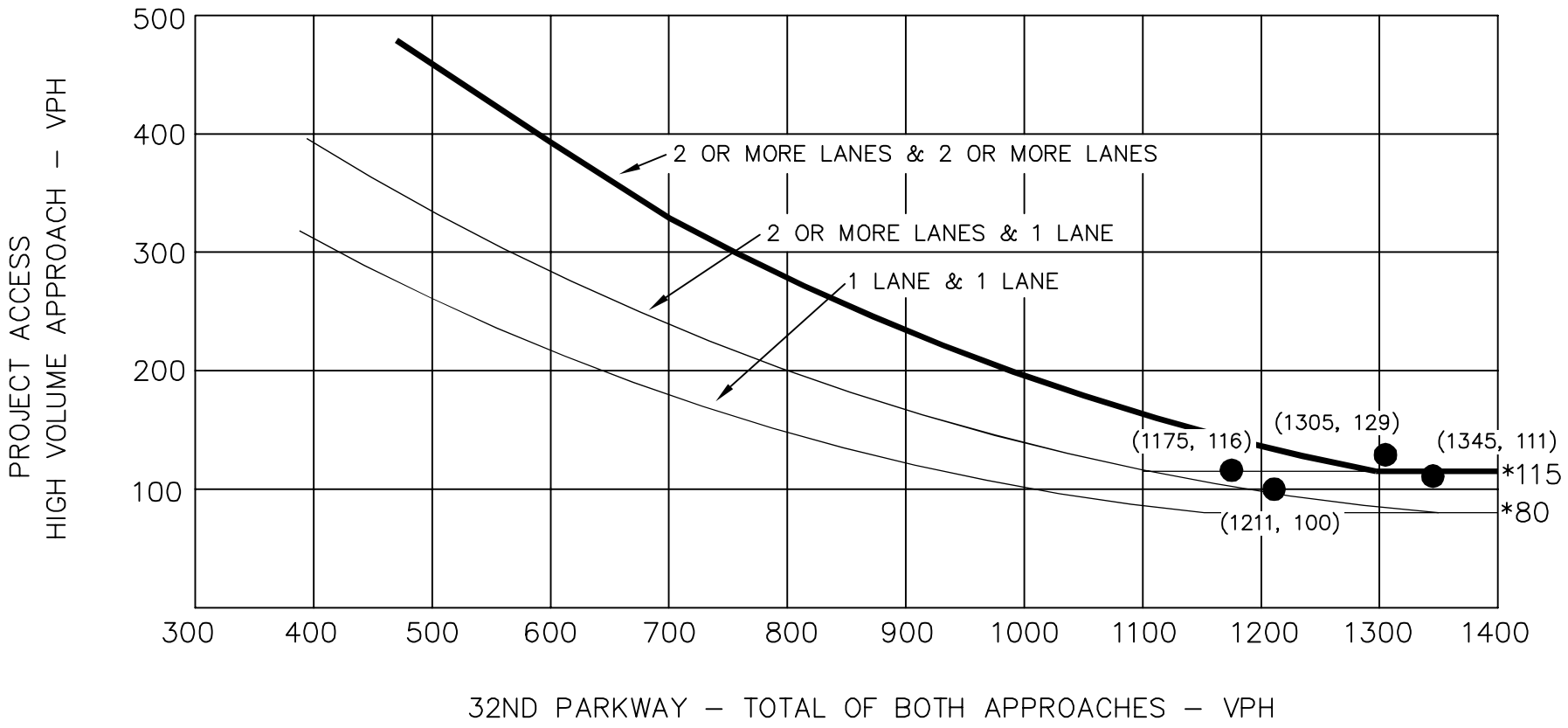


MAJESTIC TOWER RETAIL
32ND PARKWAY & TOWER ROAD
2040 BACKGROUND
PLUS PROJECT TRAFFIC VOLUMES

FIGURE 5

Kimley»Horn

WARRANT 2 - FOUR HOUR VEHICULAR VOLUME



* 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 APPROACHING WITH ONE LANE.

MCC RETAIL PHASE 1
32ND PARKWAY ACCESS
FOUR HOUR VOLUME WARRANT

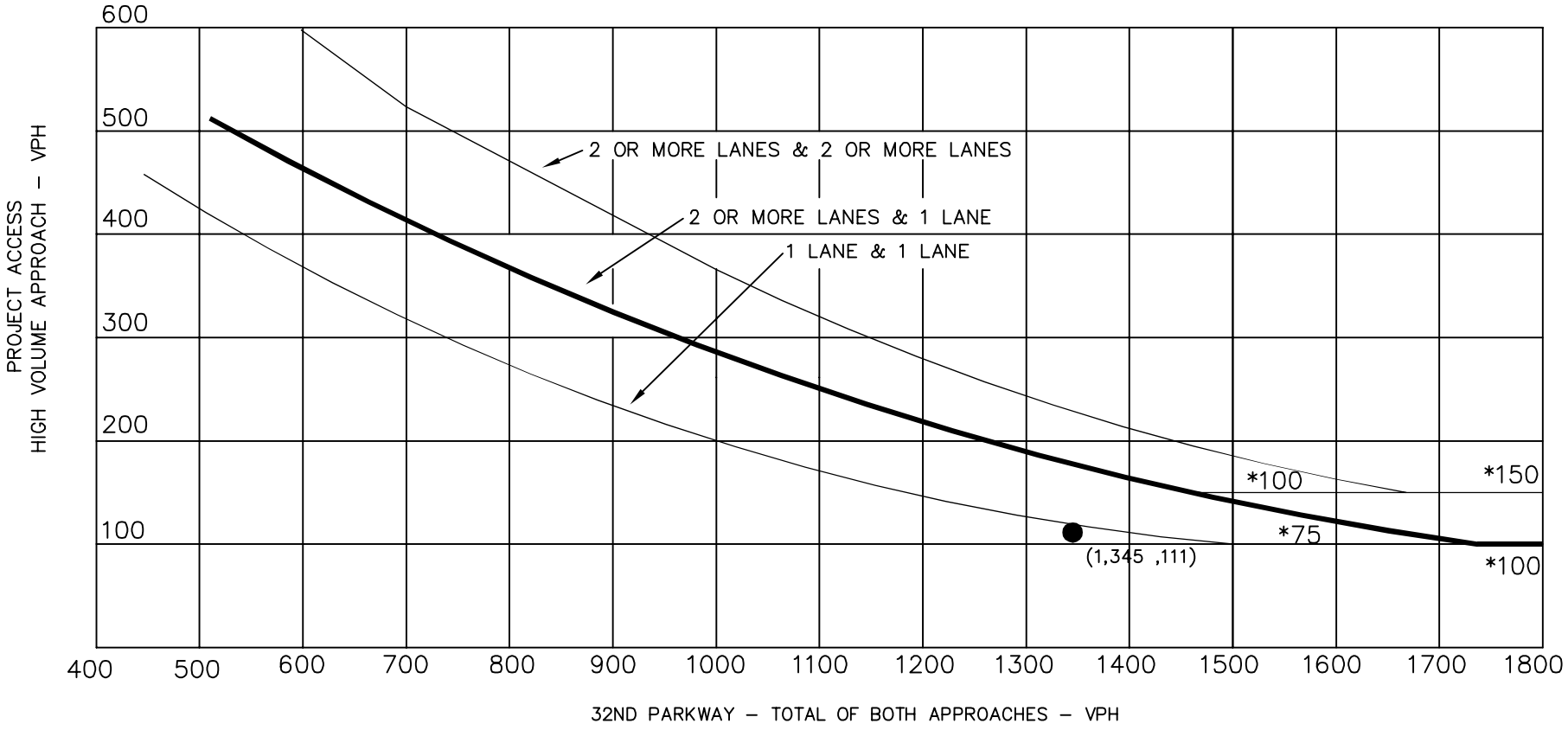
● 2021 TRAFFIC DATA POINT

Source: Manual of Uniform Traffic Control Devices 2009

FIGURE 6

Kimley»Horn

WARRANT 3 - PEAK HOUR



* NOTE: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

MCC RETAIL PHASE 1
32ND PARKWAY ACCESS
PEAK HOUR VOLUME TRAFFIC SIGNAL WARRANT

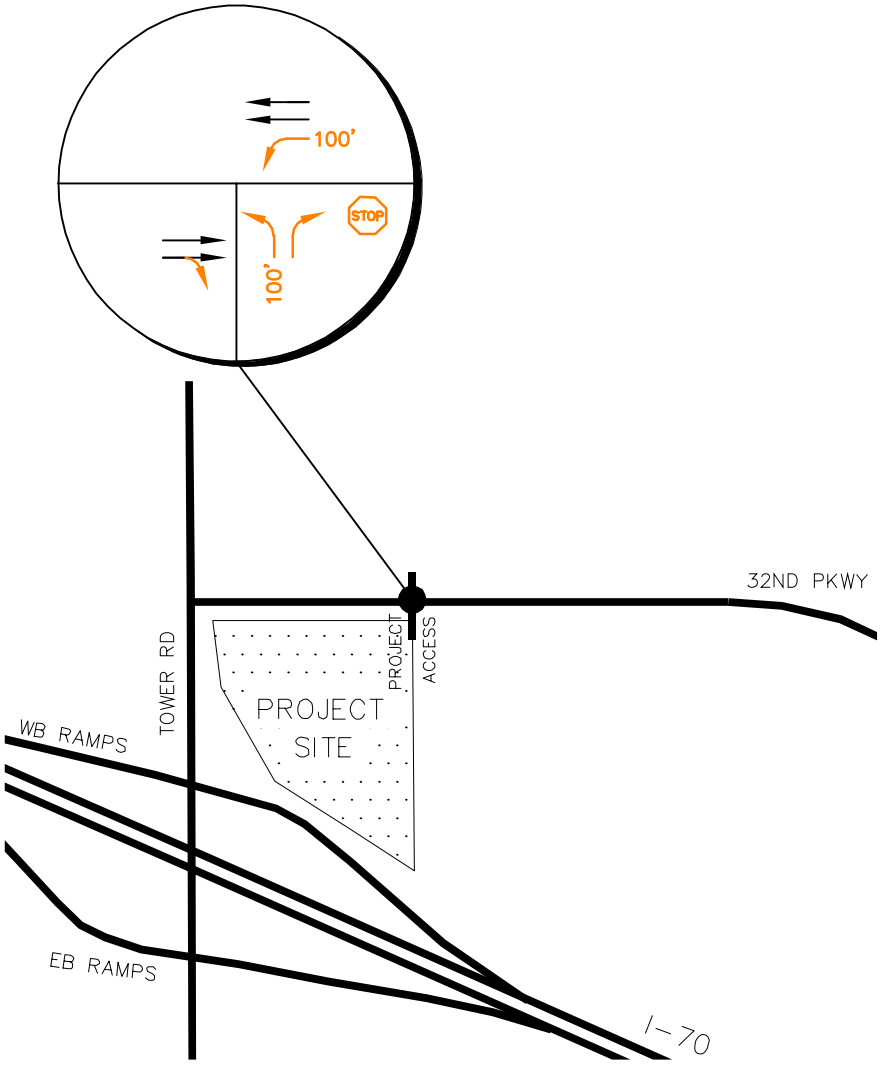
● 2021 TOTAL TRAFFIC DATA POINT

Source: Manual of Uniform Traffic Control Devices 2009

FIGURE 7

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NTS 096388006



LEGEND
- Study Area Key Intersection
- Signalized Intersection
- STOP Stop Controlled Approach
- Improvements
- 100' Turn Lane Length (feet)

MCC RETAIL PHASE 1
32ND PARKWAY & PROJECT ACCESS
2021 RECOMMENDED
LANE CONFIGURATIONS AND CONTROL

FIGURE 8

Kimley»Horn

RDC
Ridgeview Data Collection

Morrison, CO 80465

Aurora, CO
Majestic Commercenter Phase 11
AM Peak
32nd Parkway and Tower Rd

File Name : 32nd Pkwy and Tower Rd AM
Site Code : IPO 329
Start Date : 4/5/2018
Page No : 1

Groups Printed- Automobiles

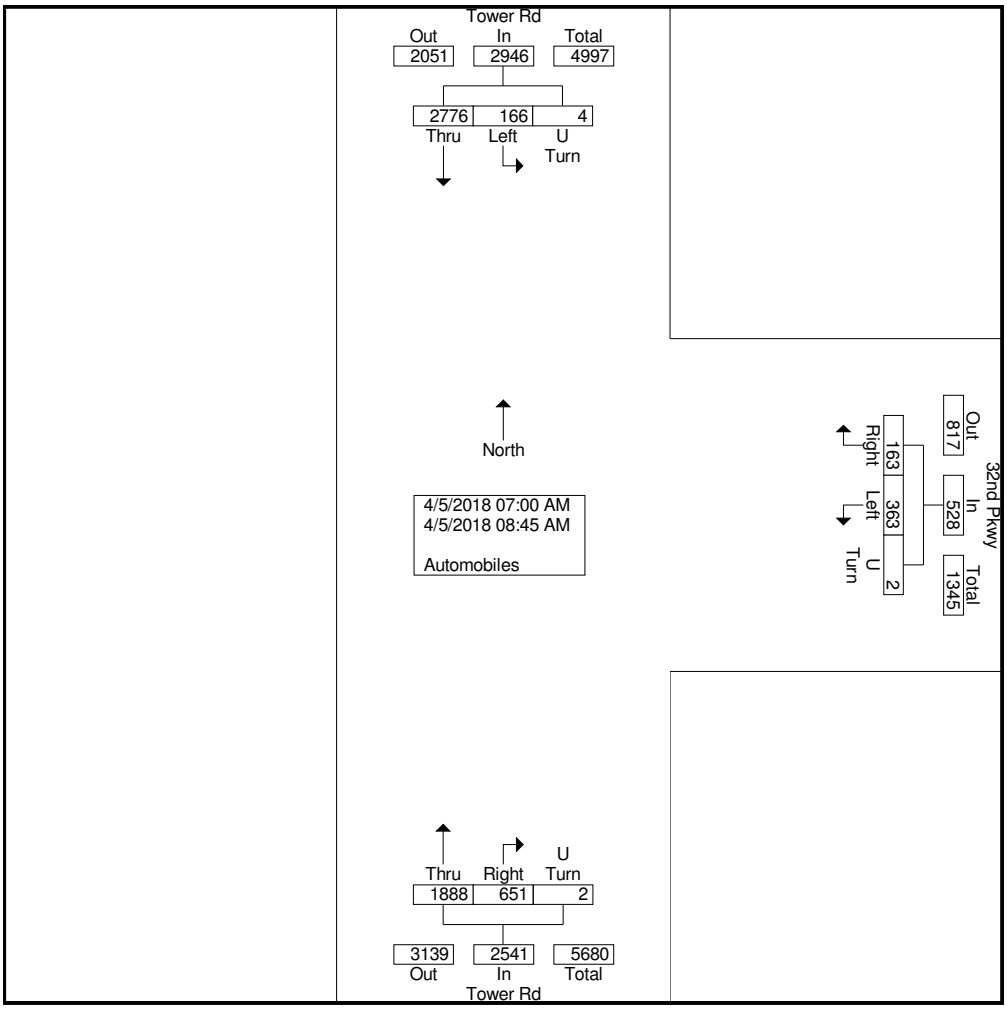
	32nd Pkwy Westbound				Tower Rd Northbound				Tower Rd Southbound				
Start Time	Left	Right	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Thru	U Turn	App. Total	Int. Total
07:00 AM	45	20	0	65	215	77	0	292	15	378	1	394	751
07:15 AM	57	21	1	79	248	72	0	320	11	385	0	396	795
07:30 AM	58	24	0	82	304	72	1	377	24	375	0	399	858
07:45 AM	37	25	0	62	307	111	0	418	22	428	0	450	930
Total	197	90	1	288	1074	332	1	1407	72	1566	1	1639	3334
08:00 AM	45	12	0	57	236	82	0	318	22	367	1	390	765
08:15 AM	38	21	0	59	187	91	1	279	18	291	0	309	647
08:30 AM	31	28	0	59	209	75	0	284	23	287	2	312	655
08:45 AM	52	12	1	65	182	71	0	253	31	265	0	296	614
Total	166	73	1	240	814	319	1	1134	94	1210	3	1307	2681
Grand Total	363	163	2	528	1888	651	2	2541	166	2776	4	2946	6015
Apprch %	68.8	30.9	0.4		74.3	25.6	0.1		5.6	94.2	0.1		
Total %	6	2.7	0	8.8	31.4	10.8	0	42.2	2.8	46.2	0.1	49	

RDC
Ridgeview Data Collection

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Majestic Commercenter Phase 11
AM Peak
32nd Parkway and Tower Rd

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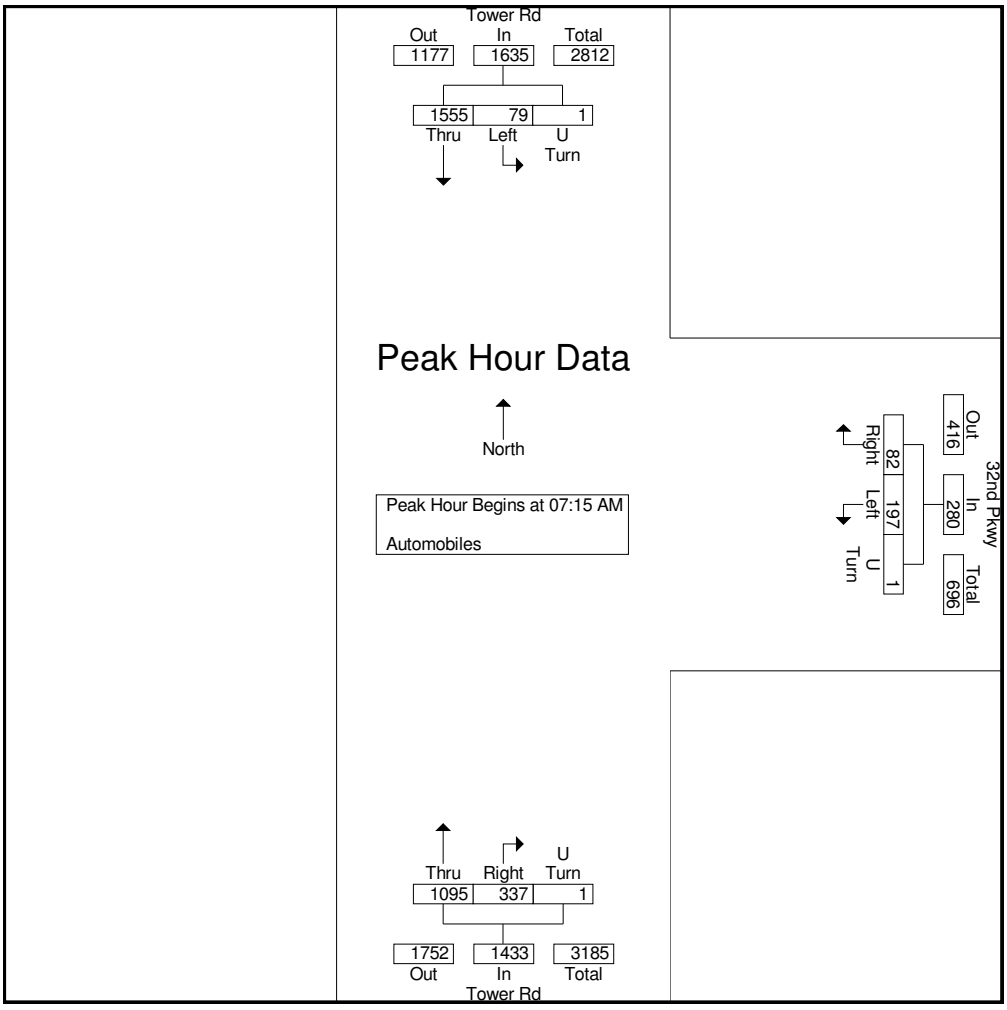
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Aurora, CO
Majestic Commercenter Phase 11
AM Peak
32nd Parkway and Tower Rd

File Name : 32nd Pkwy and Tower Rd AM
Site Code : IPO 329
Start Date : 4/5/2018
Page No : 3

	32nd Pkwy Westbound				Tower Rd Northbound				Tower Rd Southbound				
Start Time	Left	Right	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Thru	U Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:15 AM													
07:15 AM	57	21	1	79	248	72	0	320	11	385	0	396	795
07:30 AM	58	24	0	82	304	72	1	377	24	375	0	399	858
07:45 AM	37	25	0	62	307	111	0	418	22	428	0	450	930
08:00 AM	45	12	0	57	236	82	0	318	22	367	1	390	765
Total Volume	197	82	1	280	1095	337	1	1433	79	1555	1	1635	3348
% App. Total	70.4	29.3	0.4		76.4	23.5	0.1		4.8	95.1	0.1		
PHF	.849	.820	.250	.854	.892	.759	.250	.857	.823	.908	.250	.908	.900



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Ridgeview Data Collection

Morrison, CO 80465

Aurora, CO
Majestic Commercenter Phase 11
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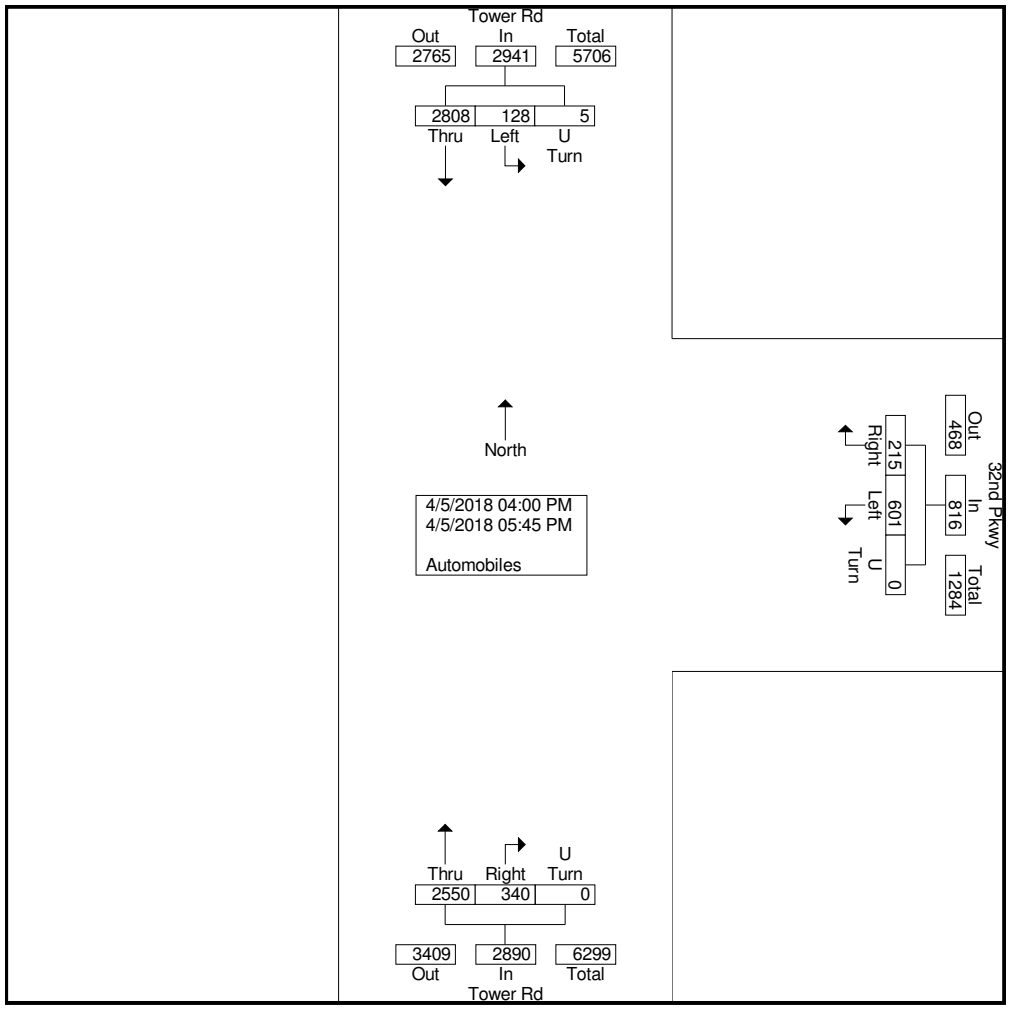
	32nd Pkwy Westbound				Tower Rd Northbound				Tower Rd Southbound				
Start Time	Left	Right	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Thru	U Turn	App. Total	Int. Total
04:00 PM	82	26	0	108	308	58	0	366	15	345	0	360	834
04:15 PM	62	16	0	78	329	53	0	382	16	375	0	391	851
04:30 PM	102	28	0	130	294	38	0	332	15	369	0	384	846
04:45 PM	73	31	0	104	330	43	0	373	12	338	1	351	828
Total	319	101	0	420	1261	192	0	1453	58	1427	1	1486	3359
05:00 PM	96	38	0	134	301	35	0	336	18	345	0	363	833
05:15 PM	57	21	0	78	336	39	0	375	14	355	1	370	823
05:30 PM	67	34	0	101	306	47	0	353	21	333	2	356	810
05:45 PM	62	21	0	83	346	27	0	373	17	348	1	366	822
Total	282	114	0	396	1289	148	0	1437	70	1381	4	1455	3288
Grand Total	601	215	0	816	2550	340	0	2890	128	2808	5	2941	6647
Apprch %	73.7	26.3	0		88.2	11.8	0		4.4	95.5	0.2		
Total %	9	3.2	0	12.3	38.4	5.1	0	43.5	1.9	42.2	0.1	44.2	

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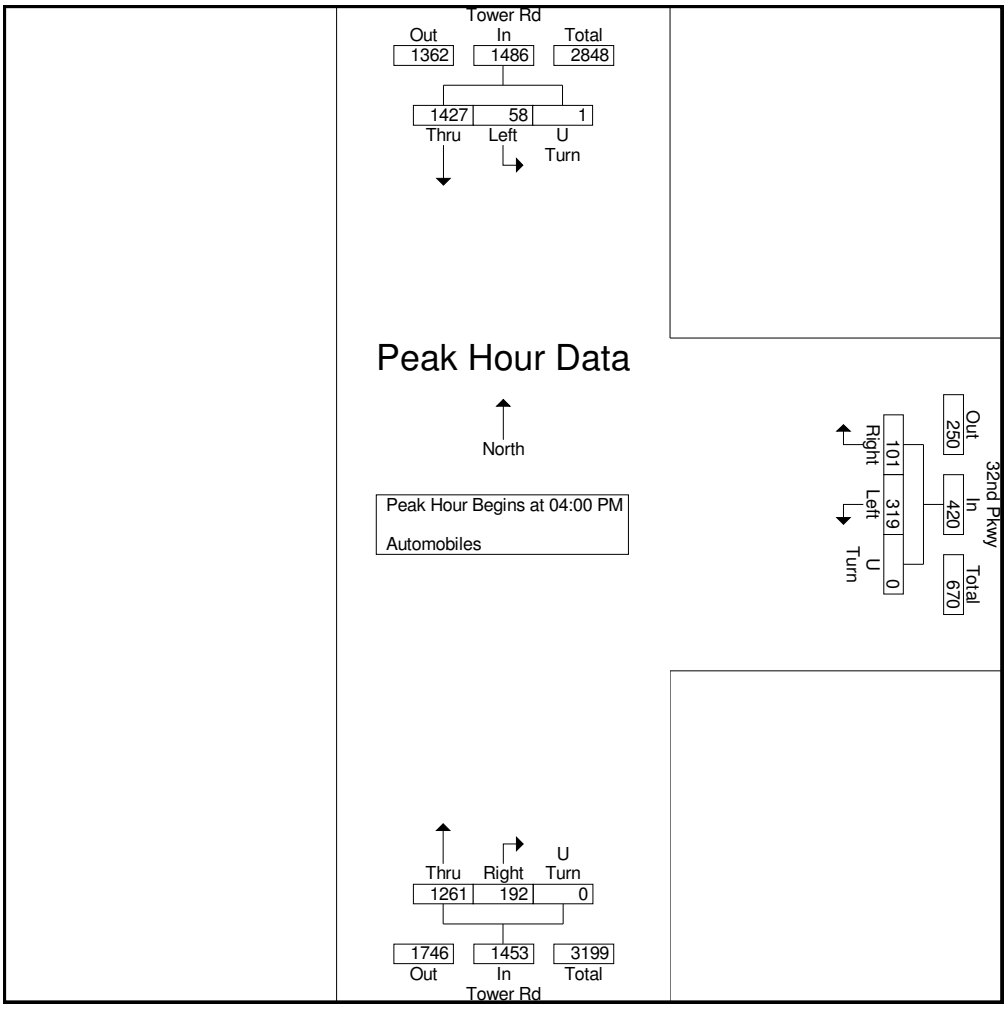
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	32nd Pkwy Westbound				Tower Rd Northbound				Tower Rd Southbound				
Start Time	Left	Right	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Thru	U Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	82	26	0	108	308	58	0	366	15	345	0	360	834
04:15 PM	62	16	0	78	329	53	0	382	16	375	0	391	851
04:30 PM	102	28	0	130	294	38	0	332	15	369	0	384	846
04:45 PM	73	31	0	104	330	43	0	373	12	338	1	351	828
Total Volume	319	101	0	420	1261	192	0	1453	58	1427	1	1486	3359
% App. Total	76	24	0		86.8	13.2	0		3.9	96	0.1		
PHF	.782	.815	.000	.808	.955	.828	.000	.951	.906	.951	.250	.950	.987



Trip Generation Planner (ITE 10th Edition) - Summary Report

Kimley»Horn

Weekday Trip Generation
Trips Based on Average Rates/Equations

Project Name **MCC Retail Phase 1**
Project Number **096388006**

ITE Code	Internal Capture Land Use	Land Use Description	Independent Variable	Setting/Location	No. of Units	Avg Rate or Eq	Rates: Daily Rate	Rates: AM Rate	Rates: PM Rate	Total Trips: Daily Trips	Total Trips: AM Trips	Total Trips: PM Trips	Total Trips: AM Trips In	Total Trips: AM Trips Out	Total Trips: PM Trips In	Total Trips: PM Trips Out	Net Trips after Internal Capture: Daily Trips	Net Trips after Internal Capture: AM Trips	Net Trips after Internal Capture: PM Trips	Net Trips after Internal Capture: AM Trips In	Net Trips after Internal Capture: AM Trips Out	Net Trips after Internal Capture: PM Trips In	Net Trips after Internal Capture: PM Trips Out	Net Trips after Internal Capture & Pass-: Daily Trips	Net Trips after Internal Capture & Pass-: AM Trips	Net Trips after Internal Capture & Pass-: PM Trips	Net Trips after Internal Capture & Pass-: AM Trips In	Net Trips after Internal Capture & Pass-: AM Trips Out	Net Trips after Internal Capture & Pass-: PM Trips In
310	Hotel	Hotel	Room(s)	General Urban/Suburban	110	Avg	8.36	0.47	0.60	920	52	66	31	21	34	32	804	49	53	30	19	27	26	804	49	53	30	19	27
820	Retail	Shopping Center	1,000 Sq Ft GLA	General Urban/Suburban	7.5	Avg	37.75	0.94	3.81	284	7	29	4	3	14	15	226	7	17	4	3	7	10	226	7	11	4	3	5
930	Restaurant	Fast Casual Restaurant	1,000 Sq Ft	General Urban/Suburban	5.5	Avg	315.17	2.07	14.13	1,734	11	78	7	4	43	35	1,620	11	69	7	4	39	30	1,620	11	69	7	4	39
932	Restaurant	High-Turnover (Sit-Down) Restaurant	1,000 Sq Ft	General Urban/Suburban	2.5	Avg	112.18	9.94	9.77	282	25	24	14	11	15	9	264	25	21	14	11	14	8	264	25	12	14	11	8
934	Restaurant	Fast-Food Restaurant w/ D.T.	1,000 Sq Ft	General Urban/Suburban	3.1	Avg	470.95	40.19	32.67	1,460	125	101	64	61	53	48	1,364	123	90	62	60	48	41	1,364	63	45	32	31	24
	Subtotal before Internal Capture	**Total Office**	1,000 Sq Ft																										
		Total Retail	1,000 Sq Ft		**7.5**					284	7	29	4	3	14	15	225	7	17	4	3	7	10						
		Total Restaurant	1,000 Sq Ft		**11.1**					3,476	161	203	85	76	111	92	3,247	158	180	83	75	101	79						
		Total Ciema/Entertainment	Screen(s)																										
		Total Residential	Dwelling Unit(s)																										
		Total Hotel	Room(s)		**110**					920	52	66	31	21	34	32	803	49	53	30	19	27	26						
		Total Other																											
									Grand Total	4,680	220	298	120	100	159	139	4,278	214	250	117	97	135	115	4,278	154	190	86	68	103

Notes:
(1) AM and/or PM rates correspond to peak hour of generator
(2) Land use was removed in *Trip Generation, 10 Edition,* trip generation data from the ITE *Trip Generation, 9th Edition*

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	MCC Retail Phase 1	**Organization:**	Kimley-Horn and Associates, Inc.
Project Location:	Aurora, CO	**Performed By:**	TES
Scenario Description:		**Date:**	4/9/2020
Analysis Year:	2021	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office		-	1,000 Sq Ft	0	0	0
Retail		8	1,000 Sq Ft	7	4	3
Restaurant		11	1,000 Sq Ft	161	85	76
Cinema/Entertainment		-	Screen(s)	0	0	0
Residential		-	Dwelling Unit(s)	0	0	0
Hotel		110	Room(s)	52	31	21
All Other Land Uses[2]		-	0	0	0	0
				220	120	100

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.00	0%	0%	1.00	0%	0%
Retail	1.00	0%	0%	1.00	0%	0%
Restaurant	1.00	0%	0%	1.00	0%	0%
Cinema/Entertainment	1.00	0%	0%	1.00	0%	0%
Residential	1.00	0%	0%	1.00	0%	0%
Hotel	1.00	0%	0%	1.00	0%	0%
All Other Land Uses[2]	1.00	0%	0%	1.00	0%	0%

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	1
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	2	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	220	120	100
Internal Capture Percentage	3%	3%	3%
External Vehicle-Trips[5]	214	117	97
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	0%	0%
Restaurant	2%	1%
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	3%	10%

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	MCC Retail Phase 1
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	4	4	1.00	3	3
Restaurant	1.00	85	85	1.00	76	76
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	0	0	1.00	0	0
Hotel	1.00	31	31	1.00	21	21

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	1		0	0	0	0
Restaurant	24	11		0	3	2
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	16	3	2	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		1	20	0	0	0
Retail	0		43	0	0	0
Restaurant	0	0		0	0	1
Cinema/Entertainment	0	0	0		0	0
Residential	0	1	17	0		0
Hotel	0	0	5	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	0	4	4	4	0	0
Restaurant	2	83	85	83	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	1	30	31	30	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	0	3	3	3	0	0
Restaurant	1	75	76	75	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	2	19	21	19	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	MCC Retail Phase 1	**Organization:**	Kimley-Horn and Associates, Inc.
Project Location:	Aurora, CO	**Performed By:**	TES
Scenario Description:		**Date:**	4/9/2020
Analysis Year:	2021	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office		-	1,000 Sq Ft	0	0	0
Retail		8	1,000 Sq Ft	29	14	15
Restaurant		11	1,000 Sq Ft	203	111	92
Cinema/Entertainment		-	Screen(s)	0	0	0
Residential		-	Dwelling Unit(s)	0	0	0
Hotel		110	Room(s)	66	34	32
All Other Land Uses[2]		-	0	0	0	0
				298	159	139

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.00	0%	0%	1.00	0%	0%
Retail	1.00	0%	0%	1.00	0%	0%
Restaurant	1.00	0%	0%	1.00	0%	0%
Cinema/Entertainment	1.00	0%	0%	1.00	0%	0%
Residential	1.00	0%	0%	1.00	0%	0%
Hotel	1.00	0%	0%	1.00	0%	0%
All Other Land Uses[2]	1.00	0%	0%	1.00	0%	0%

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		4	0	0	1
Restaurant	0	7		0	0	6
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	6	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	298	159	139
Internal Capture Percentage	16%	15%	17%
External Vehicle-Trips[5]	250	135	115
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	50%	33%
Restaurant	9%	14%
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	21%	19%

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	MCC Retail Phase 1
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	14	14	1.00	15	15
Restaurant	1.00	111	111	1.00	92	92
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	0	0	1.00	0	0
Hotel	1.00	34	34	1.00	32	32

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		4	1	4	1
Restaurant	3	38		7	17	6
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	5	22	0	1	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		1	2	0	0	0
Retail	0		32	0	0	6
Restaurant	0	7		0	0	24
Cinema/Entertainment	0	1	3		0	0
Residential	0	1	16	0		4
Hotel	0	0	6	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	7	7	14	7	0	0
Restaurant	10	101	111	101	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	7	27	34	27	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	5	10	15	10	0	0
Restaurant	13	79	92	79	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	6	26	32	26	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

Kimley»Horn

Project	MCC Retail Phase 1				
Subject	Trip Generation for Hotel				
Designed by	TES	*Date*	April 09, 2020	*Job No.*	096388006
Checked by				*Sheet No.*	of

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 10th Edition, Average Rate Equations

Land Use Code -Hotel (310)

Independant Variable - Rooms (X)

X = 110
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Series 300 Page 3)

Directional Distribution: 59% ent. 41% exit.

(T) = 0.47 (X)
(T) = 0.47 * (110.0)

T = 52 Average Vehicle Trip Ends
31 entering 21 exiting

31 + 21 = 52

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (Series 300 Page 4)

Directional Distribution: 51% ent. 49% exit.

T = 0.60 X
T = 0.60 * 110

T = 66 Average Vehicle Trip Ends
34 entering 32 exiting

34 + 32 = 66

Weekday (Series 300 Page 2)

Average Weekday
Directional Distribution: 50% entering, 50% exiting

(T) = 8.36 (X)
(T) = 8.36 * (110.0)

T = 920 Average Vehicle Trip Ends
460 entering 460 exiting

460 + 460 = 920

Saturday (300 Series Page 7)

Directional Distribution: 50% ent. 50% exit.

T = 8.19 X
T = 8.19 * 110

T = 902 Average Vehicle Trip Ends
451 entering 451 exiting

451 + 451 = 902

Saturday Peak Hour of Generator (300 Series Page 8)

Average Weekday
Directional Distribution: 56% entering, 44% exiting

(T) = 0.72 (X)
(T) = 0.72 * (110.0)

T = 80 Average Vehicle Trip Ends
45 entering 35 exiting

45 + 35 = 80

Kimley»Horn

Project	MCC Retail Phase 1				
Subject	Trip Generation for Shopping Center (Verizon, Insurance Office, and Boutique)				
Designed by	TES	*Date*	April 09, 2020	*Job No.*	096388006
Checked by		*Date*		*Sheet No.*	of

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 10th Edition, Average Rate Equations

Land Use Code - Shopping Center (820)

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

Gross Leasable Area = 7,500 Square Feet
X = 7.500
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (800 Series Page 139)

Average Weekday — Directional Distribution: 62% ent. 38% exit.
T = 0.94 * (X) — T = 7 Average Vehicle Trip Ends
T = 0.94 * 7.5 — 4 entering 3 exiting

4 + 3 = 7

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (800 Series page 140)

Average Weekday — Directional Distribution: 48% ent. 52% exit.
T = 3.81 * (X) — T = 29 Average Vehicle Trip Ends
T = 3.81 * 7.5 — 14 entering 15 exiting

14 + 15 = 29

Weekday (800 Series page 138)

Average Weekday — Directional Distribution: 50% entering, 50% exiting
T = 37.75 * (X) — T = 284 Average Vehicle Trip Ends
T = 37.75 * 7.5 — 142 entering 142 exiting

142 + 142 = 284

Non Pass-By Trip Volumes (Per ITE Trip Generation Handbook, 3rd Edition September 2017-Page 190)

AM Peak Hour = 66% Non-Pass By — PM Peak Hour = 66% Non-Pass By

	IN	Out	Total
AM Peak	3	2	5
PM Peak	9	10	20
Daily	94	94	188

PM Peak Hour Rate Applied to Daily

Pass-By Trip Volumes (Per ITE Trip Generation Handbook, 3rd Edition September 2017 -Page 190)

AM Peak Hour = 34% Pass By — PM Peak Hour = 34% Pass By

	IN	Out	Total
AM Peak	1	1	3
PM Peak	5	5	10
Daily	48	48	96

PM Peak Hour Rate Applied to Daily

Kimley»Horn

Project	MCC Retail Phase 1				
Subject	Trip Generation for Fast Casual Restaurant Chipotle				
Designed by	TES	*Date*	April 09, 2020	*Job No.*	96388006
Checked by		*Date*		*Sheet No.*	of

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 10th Edition, Average Rate Equations

Land Use Code - Fast Casual Restaurant (930)

Independant Variable - 1000 Square Feet Gross Floor Area (X)
Gross Floor Area = 2,500 Square Feet
X = 2.500
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (900 Series Page 62)

Average Weekday
T = 2.07 (X)
T = 2.07 * 2.500

Directional Distribution: 67% ent. 33% exit.
T = 5 Average Vehicle Trip Ends
3 entering 2 exiting

3 + 2 = 5

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (900 Series Page 63)

Average Weekday
T = 14.13(X)
T = 14.13 * 2.500

Directional Distribution: 55% ent. 45% exit.
T = 35 Average Vehicle Trip Ends
19 entering 16 exiting

19 + 16 = 35

Weekday (900 Series Page 61)

Average Weekday
T = 315.17 (X)
T = 315.17 * 2.500

Directional Distribution: 50% entering, 50% exiting
T = 788 Average Vehicle Trip Ends
394 entering 394 exiting

394 + 394 = 788

Saturday Peak Hour of Generator (900 Series Page 67)

Directional Distribution: 55% ent. 45% exit.
T = 34.02 (X)
T = 34.02 * 2.500

T = 85 Average Vehicle Trip Ends
47 entering 38 exiting

47 + 38 = 85

Kimley»Horn

Project	MCC Retail Phase 1				
Subject	Trip Generation for Fast Casual Restaurant Wahoo's Fish Tacos				
Designed by	TES	*Date*	April 09, 2020	*Job No.*	96388006
Checked by		*Date*		*Sheet No.*	of

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 10th Edition, Average Rate Equations

Land Use Code - Fast Casual Restaurant (930)

Independant Variable - 1000 Square Feet Gross Floor Area (X)
Gross Floor Area = 3,000 Square Feet
X = 3.000
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (900 Series Page 62)

Average Weekday
T = 2.07 (X)
T = 2.07 * 3.000

Directional Distribution: 67% ent. 33% exit.
T = 6 Average Vehicle Trip Ends
4 entering 2 exiting

4 + 2 = 6

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (900 Series Page 63)

Average Weekday
T = 14.13(X)
T = 14.13 * 3.000

Directional Distribution: 55% ent. 45% exit.
T = 42 Average Vehicle Trip Ends
23 entering 19 exiting

23 + 19 = 42

Weekday (900 Series Page 61)

Average Weekday
T = 315.17 (X)
T = 315.17 * 3.000

Directional Distribution: 50% entering, 50% exiting
T = 946 Average Vehicle Trip Ends
473 entering 473 exiting

473 + 473 = 946

Saturday Peak Hour of Generator (900 Series Page 67)

Directional Distribution: 55% ent. 45% exit.
T = 34.02 (X)
T = 34.02 * 3.000

T = 102 Average Vehicle Trip Ends
56 entering 46 exiting

56 + 46 = 102

Kimley»Horn

Project MCC Retail Phase 1
Subject Trip Generation for High-Turnover (Sit-Down) Restaurant IHOP

Designed by TES *Date* April 09, 2020 *Job No.* 096388006
Checked by *Date* *Sheet No.* *of*

TRIP GENERATION MANUAL TECHNIQUES
ITE Trip Generation Manual 10th Edition, Average Rate Equations
Land Use Code - High Turnover Sit-Down Restaurant (932)
Independant Variable - 1000 Square Feet Gross Floor Area (X)
Gross Floor Area = 2,500 Square Feet
X = 2.500
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (900 Series Page 97)
Average Weekday — Directional Distribution: 55% ent. 45% exit.
T = 9.94 (X) — T = 25 Average Vehicle Trip Ends
T = 9.94 * 2.500 — 14 entering 11 exiting

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (900 Series Page 98)
Average Weekday — Directional Distribution: 62% ent. 38% exit.
T = 9.77 (X) — T = 24 Average Vehicle Trip Ends
T = 9.77 * 2.500 — 15 entering 9 exiting

Weekday (900 Series Page 96)
Average Weekday — Directional Distribution: 50% entering, 50% exiting
T = 112.18 (X) — T = 282 Average Vehicle Trip Ends
T = 112.18 * 2.500 — 141 entering 141 exiting

P.M. Peak Hour of Generator (900 Series Page 100)
Average Weekday — Directional Distribution: 52% ent. 48% exit.
T = 17.41 (X) — T = 44 Average Vehicle Trip Ends
T = 17.41 * 2.500 — 23 entering 21 exiting

Saturday Peak Hour of Generator (900 Series Page 105
Average Saturday — Directional Distribution: 51% ent. 49% exit.
T = 11.19 (X) — T = 28 Average Vehicle Trip Ends
T = 11.19 * 2.500 — 14 entering 14 exiting

Non Pass-By Trip Volumes (Per ITE Trip Generation Handbook, 3rd Edition September 2017-Page 207)
AM Peak Hour = 57% Non-Pass By — PM Peak Hour = 57% Non-Pass By

	IN	Out	Total
AM Peak	8	6	14
PM Peak	9	5	14
Daily	80	80	160

PM Peak Hour Rate Applied to Daily

Pass-By Trip Volumes (Per ITE Trip Generation Handbook, 3rd Edition September 2017 -Page 207)
AM Peak Hour = 43% Pass By — PM Peak Hour = 43% Pass By

	IN	Out	Total
AM Peak	6	5	11
PM Peak	7	4	11
Daily	61	61	122

PM Peak Hour Rate Applied to Daily

Kimley»Horn

Project	MCC Retail Phase 1				
Subject	Trip Generation for Fast-Food Restaurant with Drive-Through Window Freddys				
Designed by	TES	*Date*	April 09, 2020	*Job No.*	96388006
Checked by		*Date*		*Sheet No.*	of

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 10th Edition, Average Rate Equations

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

Independant Variable - 1000 Square Feet Gross Floor Area (X)
Gross Floor Area = 3,100 Square Feet
X = 3.100
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (900 Series page 158)

Average Weekday — Directional Distribution: 51% ent. 49% exit.
T = 40.19 (X) — T = 125 Average Vehicle Trip Ends
T = 40.19 * 3.100 — 64 entering 61 exiting

64 + 61 = 125

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (900 Series page 159)

Average Weekday — Directional Distribution: 52% ent. 48% exit.
T = 32.67 (X) — T = 101 Average Vehicle Trip Ends
T = 32.67 * 3.100 — 53 entering 48 exiting

53 (*)+ 48 = 101

Weekday (900 Series page 157)

Average Weekday — Directional Distribution: 50% entering, 50% exiting
T = 470.95 (X) — T = 1460 Average Vehicle Trip Ends
T = 470.95 * 3.100 — 730 entering 730 exiting

730 + 730 = 1460

Saturday Peak Hour of Generator (900 Series page 163)

Directional Distribution: 51% ent. 49% exit.
T = 54.86 (X) — T = 170 Average Vehicle Trip Ends
T = 54.86 * 3.100 — 87 entering 83 exiting

87 + 83 = 170

Non Pass-By Trip Volumes (Per ITE Trip Generation Handbook, 3rd Edition September 2017)

AM Peak Hour = 51% Non-Pass By — PM Peak Hour = 50% Non-Pass By

	IN	Out	Total
AM Peak	33	31	64
PM Peak	27	24	51
Daily	365	365	730

PM Peak Hour Rate Applied to Daily

Pass-By Trip Volumes (Per ITE Trip Generation Handbook, 3rd Edition September 2017)

AM Peak Hour = 49% Pass By — PM Peak Hour = 50% Pass By

	IN	Out	Total
AM Peak	31	30	61
PM Peak	27	24	51
Daily	365	365	730

PM Peak Hour Rate Applied to Daily

Intersection	
Int Delay, s/veh	2.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	852	87	10	396	105	12
Future Vol, veh/h	852	87	10	396	105	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	100	0
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	926	95	11	430	114	13

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1021	0	1211	511
Stage 1	-	-	-	-	974	-
Stage 2	-	-	-	-	237	-
Critical Hdwy	-	-	4.3	-	7	7.1
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	-	-	2.3	-	3.6	3.4
Pot Cap-1 Maneuver	-	-	629	-	164	487
Stage 1	-	-	-	-	309	-
Stage 2	-	-	-	-	757	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	629	-	161	487
Mov Cap-2 Maneuver	-	-	-	-	255	-
Stage 1	-	-	-	-	309	-
Stage 2	-	-	-	-	744	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	28.3
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	255	487	-	-	629	-
HCM Lane V/C Ratio	0.448	0.027	-	-	0.017	-
HCM Control Delay (s)	30.1	12.6	-	-	10.8	-
HCM Lane LOS	D	B	-	-	B	-
HCM 95th %tile Q(veh)	2.2	0.1	-	-	0.1	-

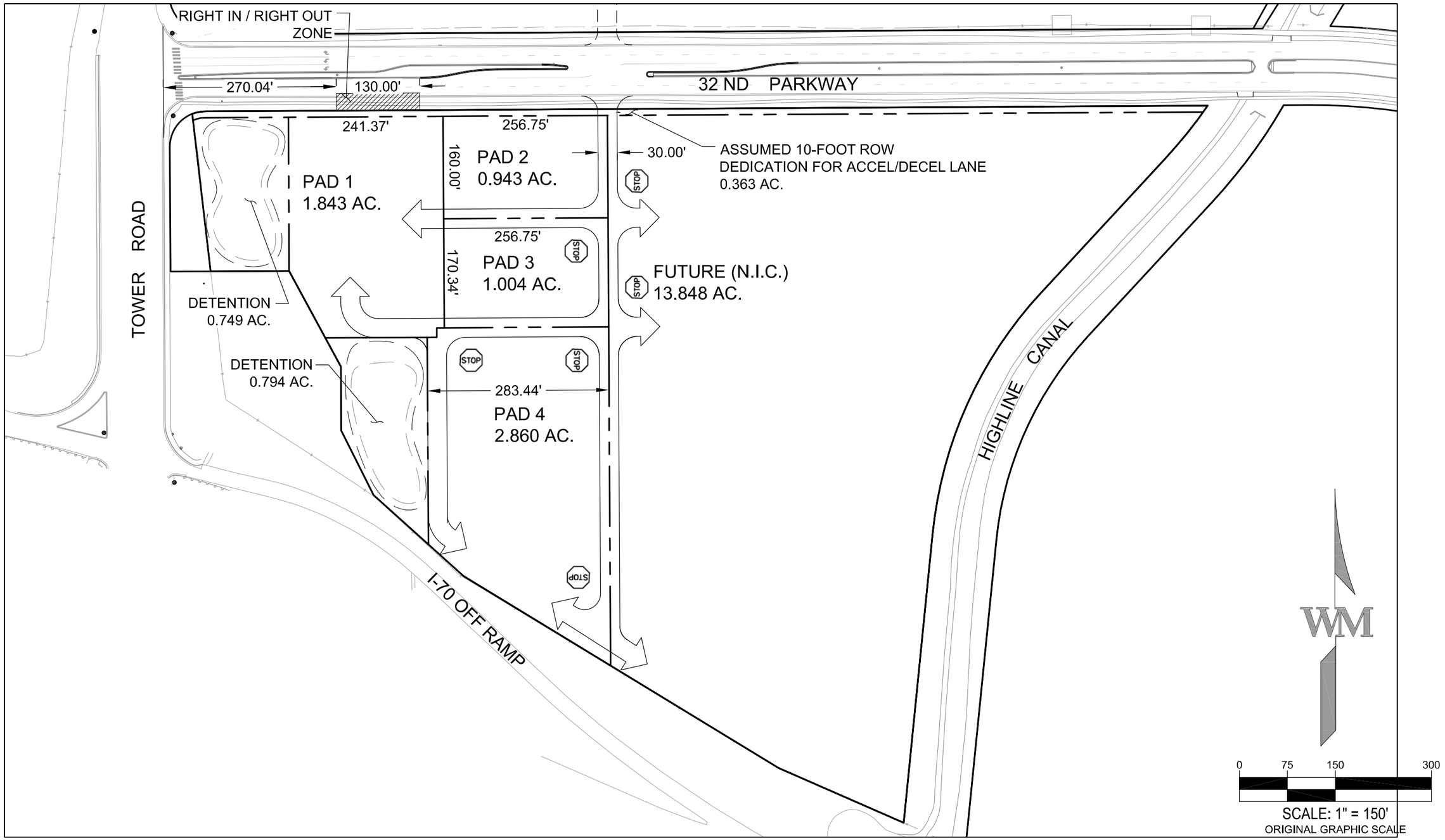
Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	383	104	12	806	122	14
Future Vol, veh/h	383	104	12	806	122	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	100	0
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	416	113	13	876	133	15

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	529	0	937	265
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	464	-
Critical Hdwy	-	-	4.3	-	7	7.1
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	-	-	2.3	-	3.6	3.4
Pot Cap-1 Maneuver	-	-	981	-	249	710
Stage 1	-	-	-	-	571	-
Stage 2	-	-	-	-	577	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	981	-	246	710
Mov Cap-2 Maneuver	-	-	-	-	372	-
Stage 1	-	-	-	-	571	-
Stage 2	-	-	-	-	569	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	18.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	372	710	-	-	981	-
HCM Lane V/C Ratio	0.356	0.021	-	-	0.013	-
HCM Control Delay (s)	19.9	10.2	-	-	8.7	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	1.6	0.1	-	-	0	-



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PA / PM:	CSS
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