

ATTACHMENT B
TRIP GENERATION AND ITE EXCERPTS

DELANO HOTEL

DAILY

Land Use	ITE Code	Size	Trip Generation Rate	In	Out	Total Site Trips		Internal Trips		External Trips		Multi-Modal Trips		Total Vehicle Trips		Pass-by Trips		Primary Trips			
						In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Existing Uses	330	208 Rooms	T = 2.67 (X)	50%	50%	278	277	555	0	0	0.0%	278	277	555	44	44	88	15.9%	234	233	467
Proposed Uses	330	171 Rooms	T = 2.67 (X)	50%	50%	229	228	457	25	27	11.4%	204	201	405	32	32	64	15.9%	172	169	341
Fine Dining Restaurant	931	383 Seats	T = 2.60 (X)	50%	50%	498	498	996	27	25	5.2%	471	473	944	75	75	150	15.9%	396	398	794
						Total	727	726	1,453	52	52	104	675	674	1,349	107	107	214	568	567	1,135
						Net-New	449	449	898	52	52	104	397	397	794	63	63	126	334	334	668

MORNING PEAK HOUR

Land Use	ITE Code	Size	Trip Generation Rate	In	Out	Total Site Trips		Internal Trips		External Trips		Multi-Modal Trips		Total Vehicle Trips		Pass-by Trips		Primary Trips			
						In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out		
Existing Uses	330	208 Rooms	T = 0.33 (X)	70%	30%	48	21	69	0	0	0.0%	48	21	69	8	3	11	15.9%	40	18	58
Proposed Uses	330	171 Rooms	T = 0.33 (X)	70%	30%	39	17	56	0	0	0.0%	39	17	56	6	3	9	15.9%	33	14	47
Fine Dining Restaurant	931	383 Seats	T = 0.02 (X)	50%	50%	4	4	8	0	0	0.0%	4	4	8	1	0	1	15.9%	3	4	7
						Total	43	21	64	0	0	0	43	21	64	7	3	10	36	18	54
						Net-New	-5	0	-5	0	0	0	-5	0	-5	-1	0	-1	-4	0	-4

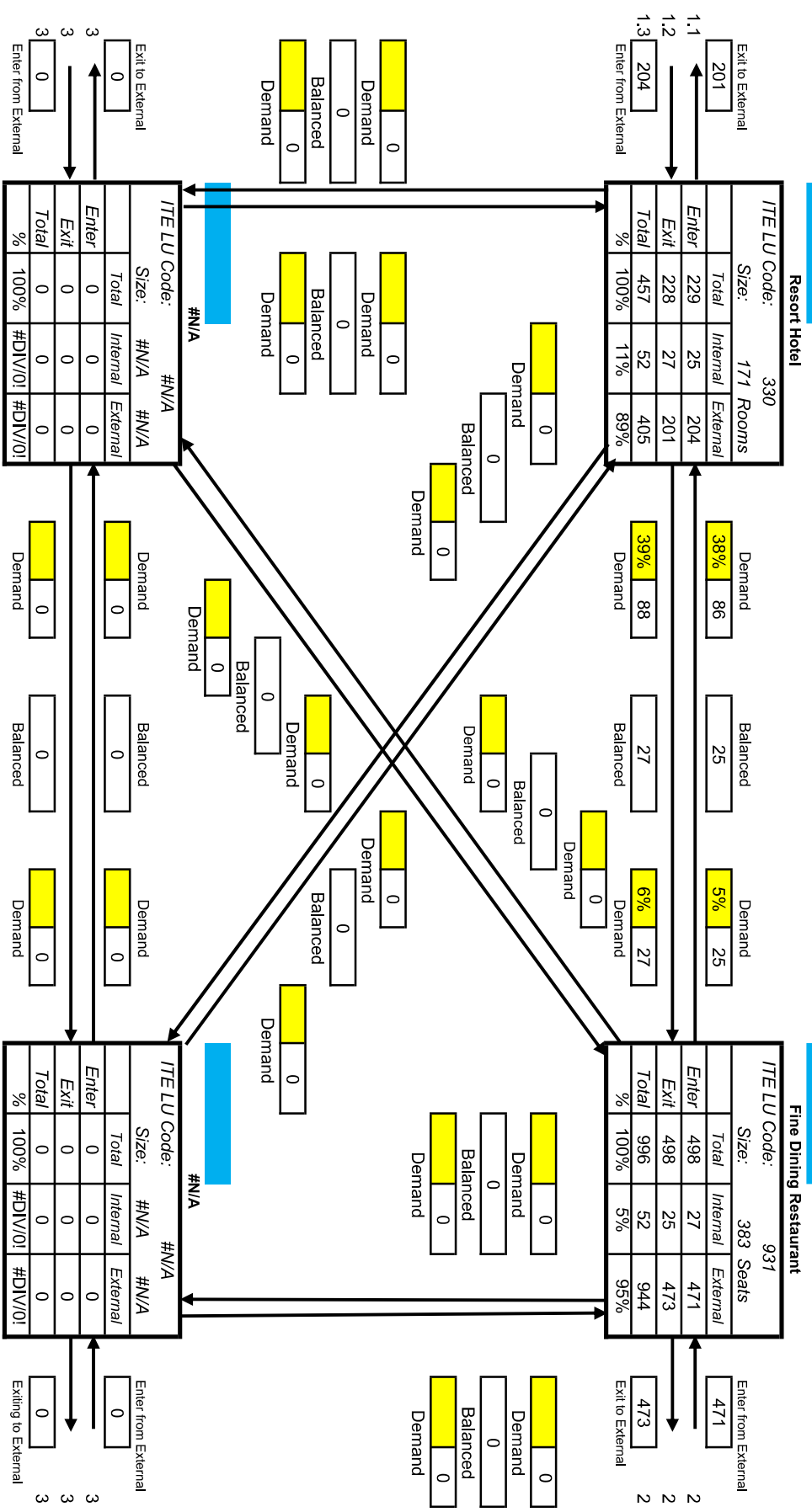
AFTERNOON PEAK HOUR

Land Use	ITE Code	Size	Trip Generation Rate	In	Out	Total Site Trips		Internal Trips		External Trips		Multi-Modal Trips		Total Vehicle Trips		Pass-by Trips		Primary Trips				
						In	Out	In	Out	In	Out	In	Out	In	Out	In	Out					
Existing Uses	330	208 Rooms	T = 0.39 (X)	43%	57%	35	46	81	0	0	0.0%	35	46	81	6	7	13	15.9%	29	39	68	
Proposed Uses	330	171 Rooms	T = 0.39 (X)	43%	57%	29	38	67	3	4	10.4%	26	34	60	4	6	10	15.9%	22	28	50	
Fine Dining Restaurant	931	383 Seats	T = 0.33 (X)	67%	33%	84	42	126	4	3	5.6%	80	39	119	13	6	19	15.9%	67	33	100	
						Total	113	80	193	7	7	14	7.3%	106	73	179	17	12	29	89	61	150
						Net-New	78	34	112	7	7	14	7.1%	27	98	11	5	16	60	22	82	

Analyst JG
Data 1/15/2026

MULTI-USE DEVELOPMENT TRIP GENERATION AND INTERNAL CAPTURE SUMMARY

Name of Dw/pt DELANO HOTEL
Time Period Daily



Net External Trips for Multi-Use Development

	Resort Hotel	Fine Dining Restaurant	#N/A	#N/A	TOTAL
Enter	204	471	0	0	675
Exit	201	473	0	0	674
Total	405	944	0	0	1349
Single-Use Trip Gen Est	457	996	0	0	1453

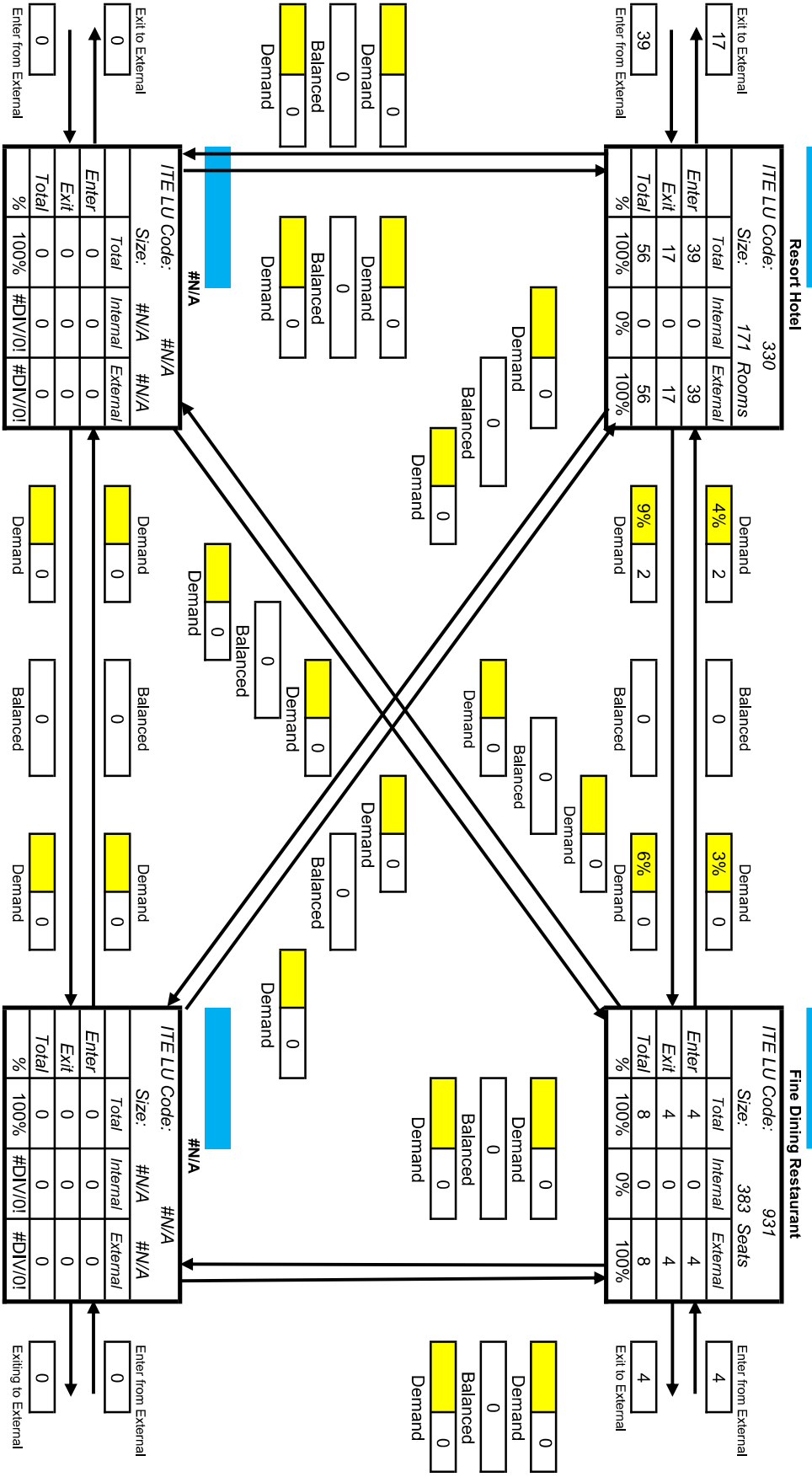
INTERNAL CAPTURE 7%

Source: Kaku Associates, Inc.

Net Internal Trips for Multi-Use Development

	In	Out	TOTAL
1 Resort Hotel	25	27	52
2 Fine Dining Restaurant	27	25	52
3 #N/A	0	0	0
4 #N/A	0	0	0
Total	52	52	104

MULTI-USE DEVELOPMENT TRIP GENERATION AND INTERNAL CAPTURE SUMMARY



Net External Trips for Multi-Use Development

	Resort Hotel	Fine Dining Restaurant	#N/A	#N/A	TOTAL
Enter	39	4	0	0	43
Exit	17	4	0	0	21
Total	56	8	0	0	64
Single-Use Trip Gen Est	56	8	0	0	64

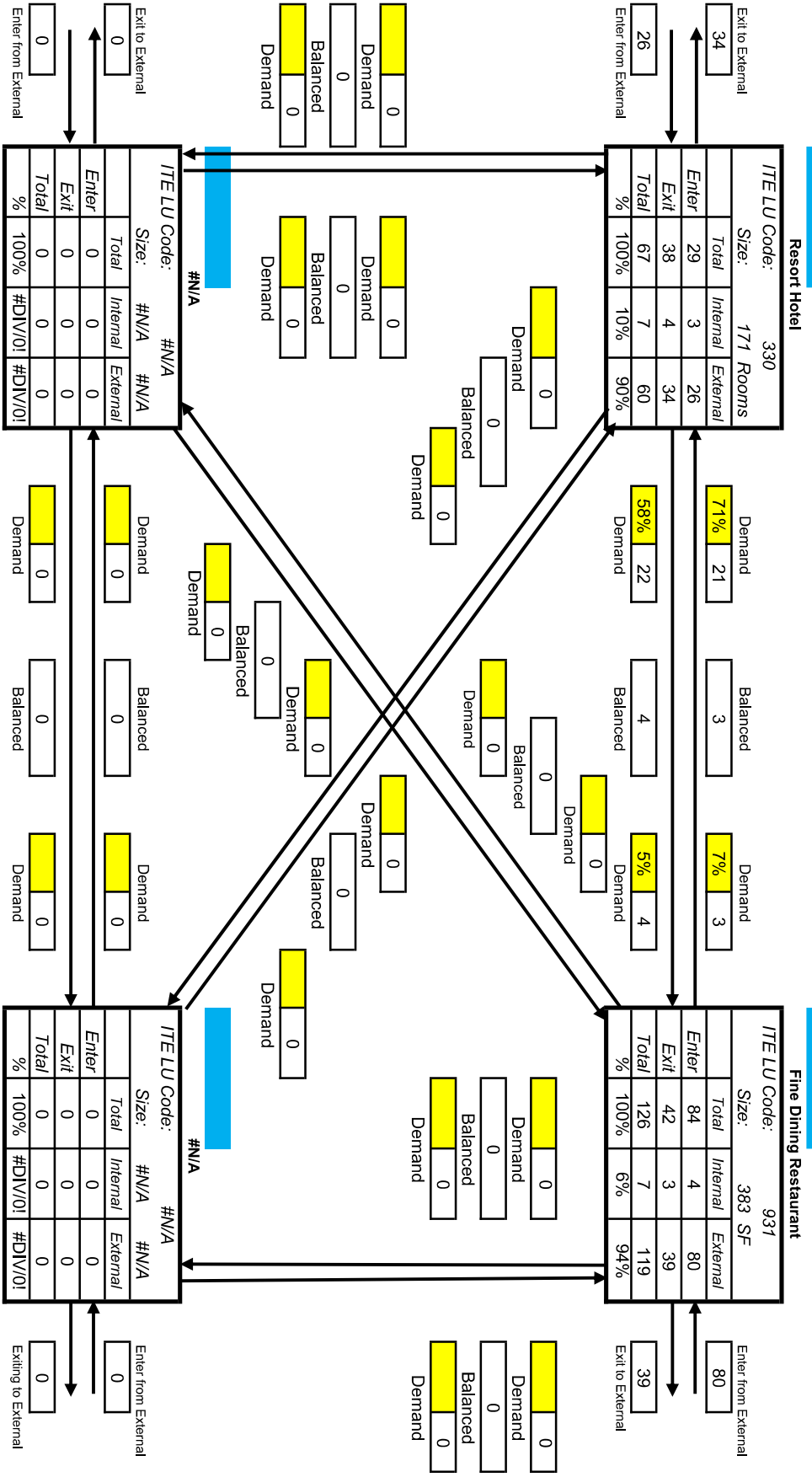
INTERNAL CAPTURE 0%

Source: Kaku Associates, Inc.

Net Internal Trips for Multi-Use Development

	In	Out	TOTAL
1 Resort Hotel	0	0	0
2 Fine Dining Restaurant	0	0	0
3 #N/A	0	0	0
4 #N/A	0	0	0
Total	0	0	0

MULTI-USE DEVELOPMENT TRIP GENERATION AND INTERNAL CAPTURE SUMMARY



Net External Trips for Multi-Use Development

	Resort Hotel	Fine Dining Restaurant	#N/A	#N/A	TOTAL
Enter	26	80	0	0	106
Exit	34	39	0	0	73
Total	60	119	0	0	179
Single-Use Trip Gen Est	67	126	0	0	193

INTERNAL CAPTURE: 7%

Source: Kaku Associates, Inc.

Net Internal Trips for Multi-Use Development

	In	Out	TOTAL
1 Resort Hotel	3	4	7
2 Fine Dining Restaurant	4	3	7
3 #N/A	0	0	0
4 #N/A	0	0	0
Total	7	7	14

Resort Hotel (330)

Vehicle Trip Ends vs: Rooms
On a: Weekday

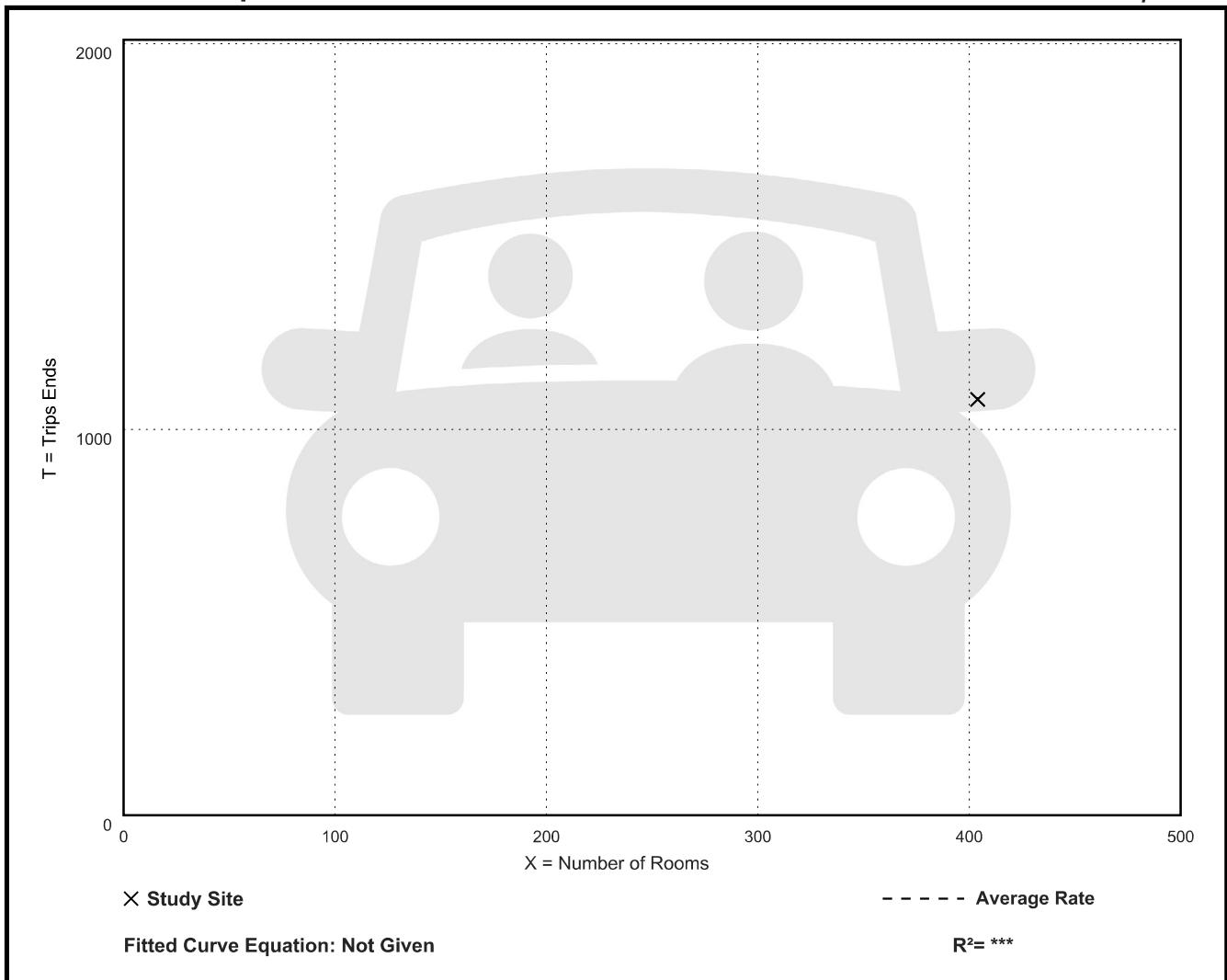
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. Num. of Rooms: 404
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
2.67	2.67 - 2.67	***

Data Plot and Equation

Caution – Small Sample Size



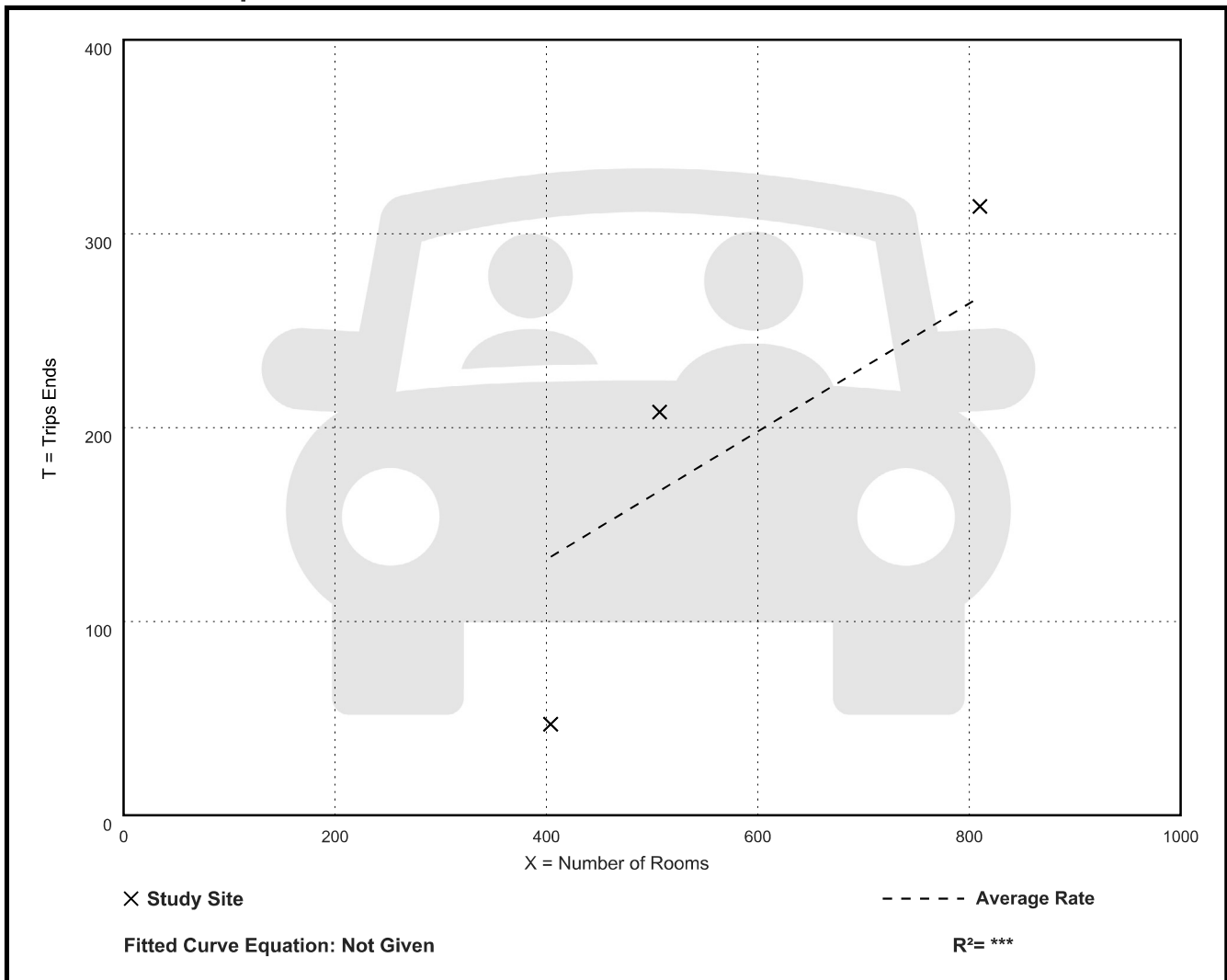
Resort Hotel (330)

Vehicle Trip Ends vs: Rooms
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 3
 Avg. Num. of Rooms: 574
 Directional Distribution: 70% entering, 30% exiting

Vehicle Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
0.33	0.12 - 0.41	0.15

Data Plot and Equation



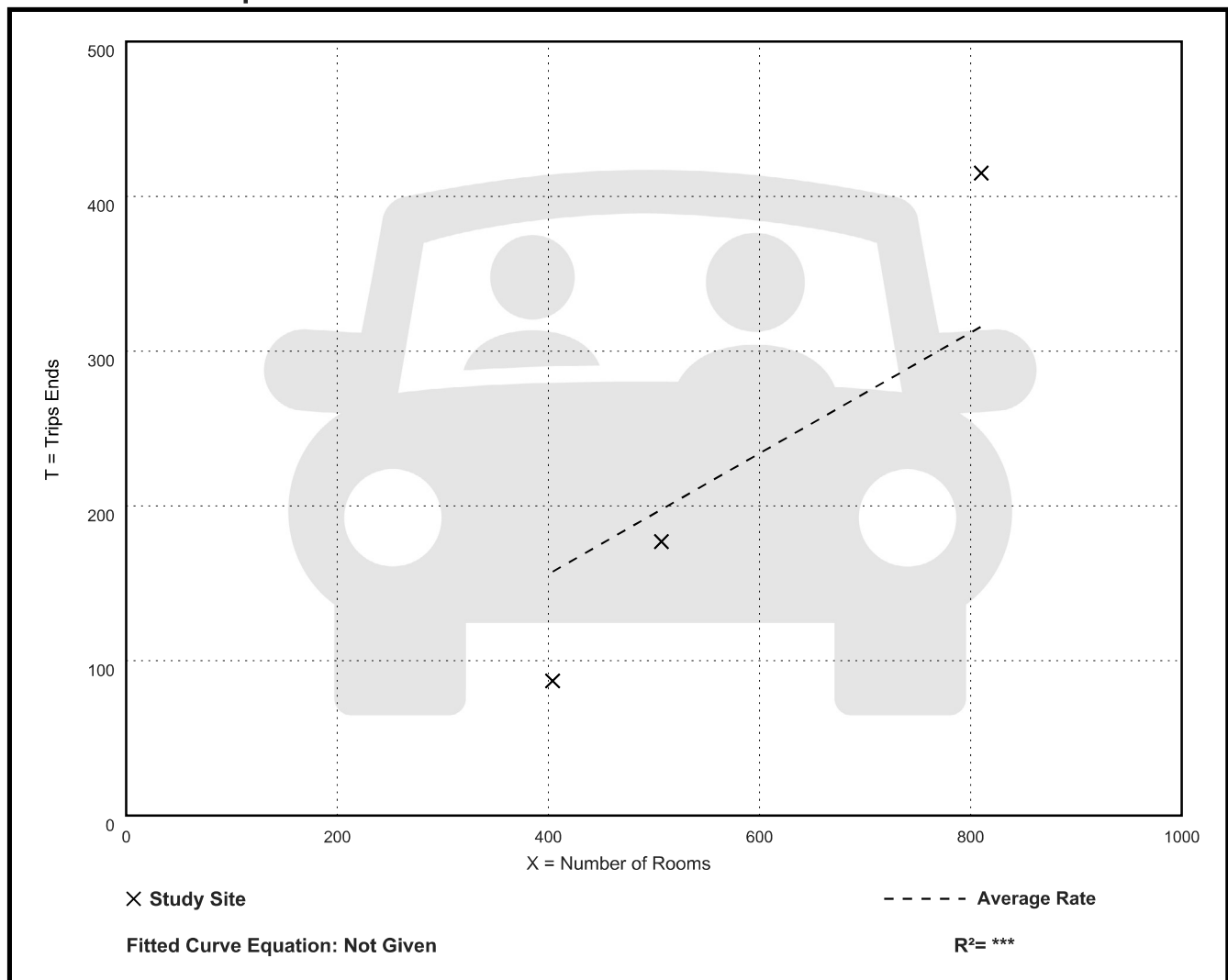
Resort Hotel (330)

Vehicle Trip Ends vs: Rooms
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 3
 Avg. Num. of Rooms: 574
 Directional Distribution: 43% entering, 57% exiting

Vehicle Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
0.39	0.22 - 0.51	0.15

Data Plot and Equation



Fine Dining Restaurant (931)

Vehicle Trip Ends vs: Seats
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 6

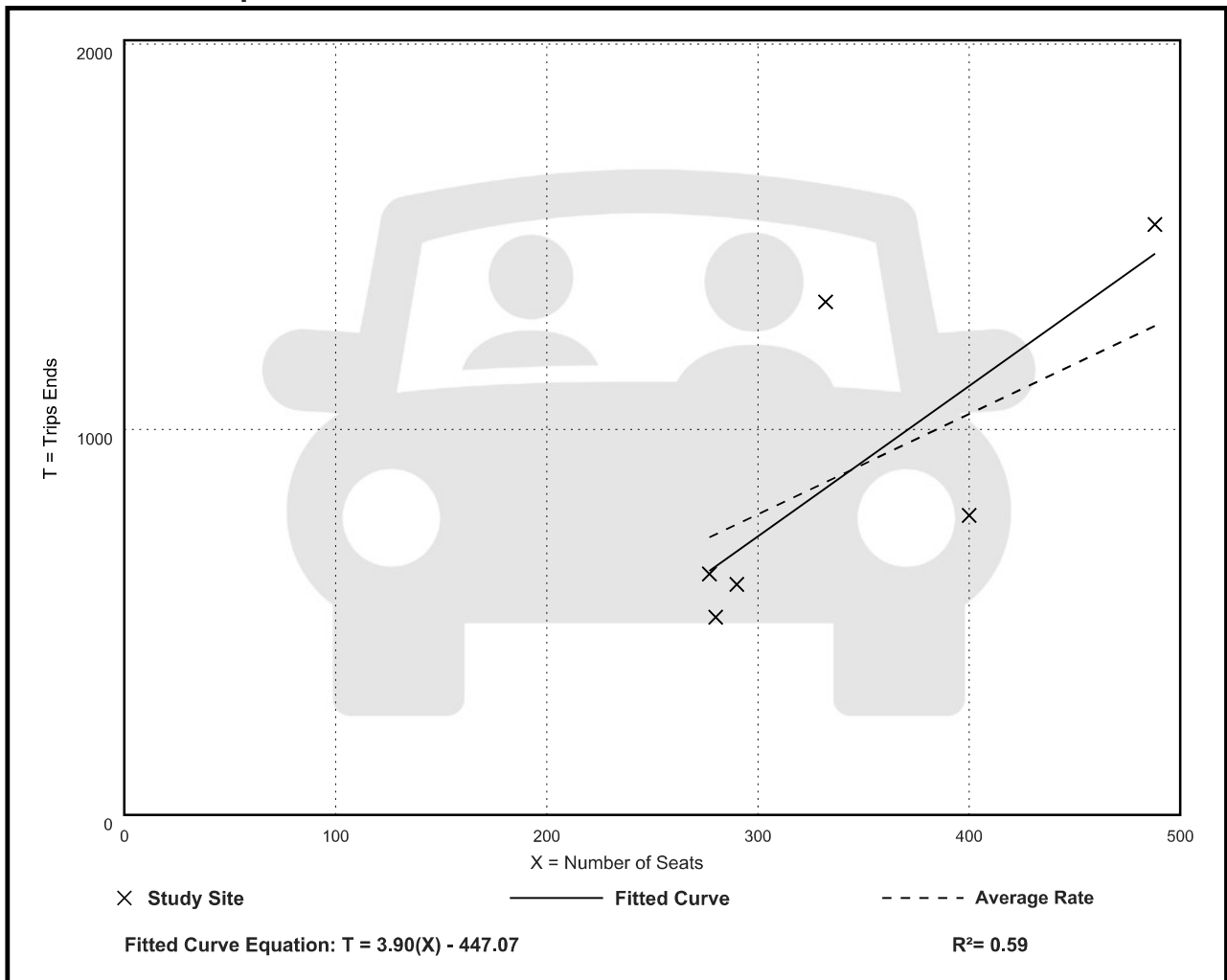
Avg. Num. of Seats: 345

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Seat

Average Rate	Range of Rates	Standard Deviation
2.60	1.83 - 4.01	0.85

Data Plot and Equation



Fine Dining Restaurant (931)

Vehicle Trip Ends vs: Seats

On a: **Weekday,**

Peak Hour of Adjacent Street Traffic,

One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 5

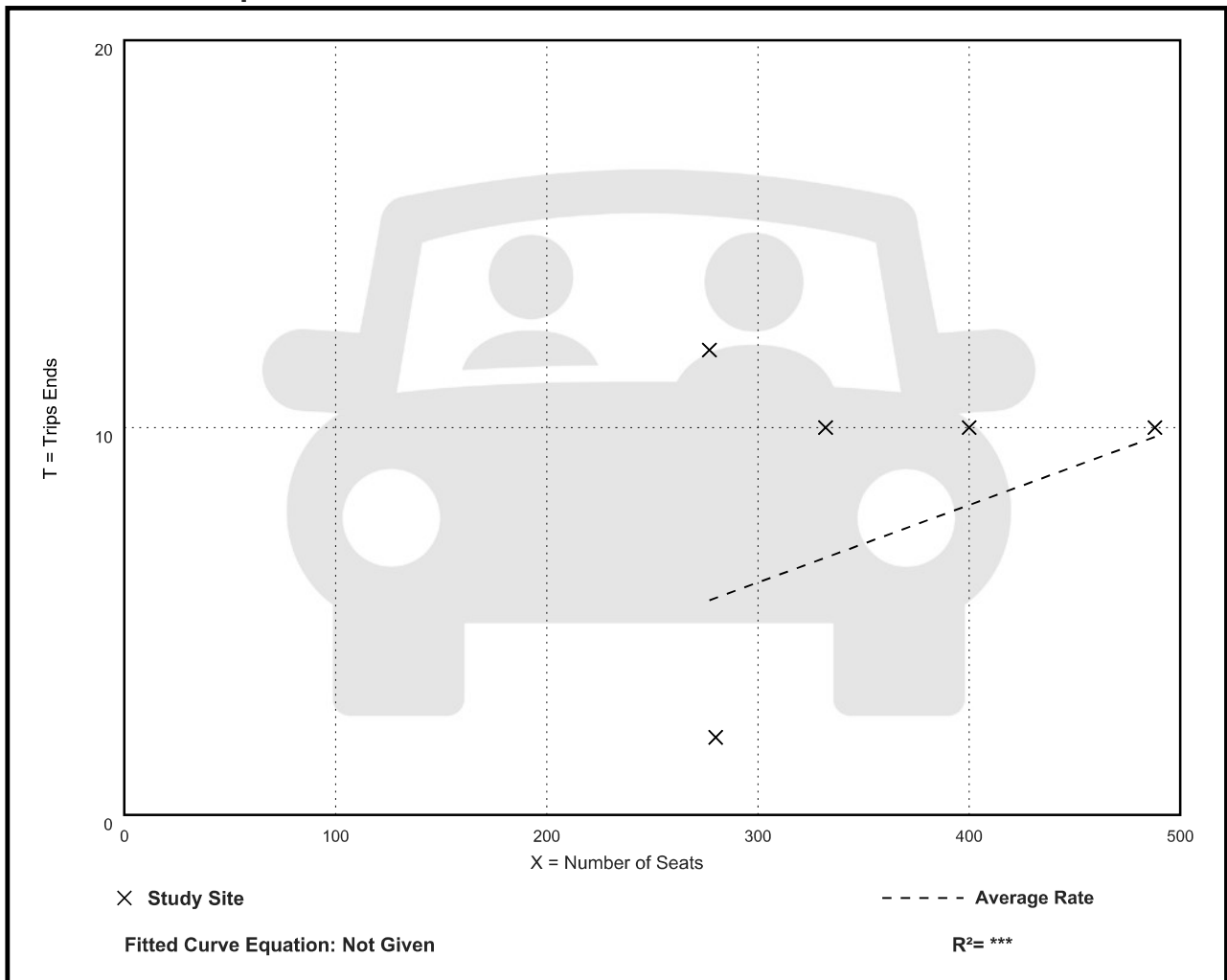
Avg. Num. of Seats: 355

Directional Distribution: Not Available

Vehicle Trip Generation per Seat

Average Rate	Range of Rates	Standard Deviation
0.02	0.01 - 0.04	0.01

Data Plot and Equation



Fine Dining Restaurant (931)

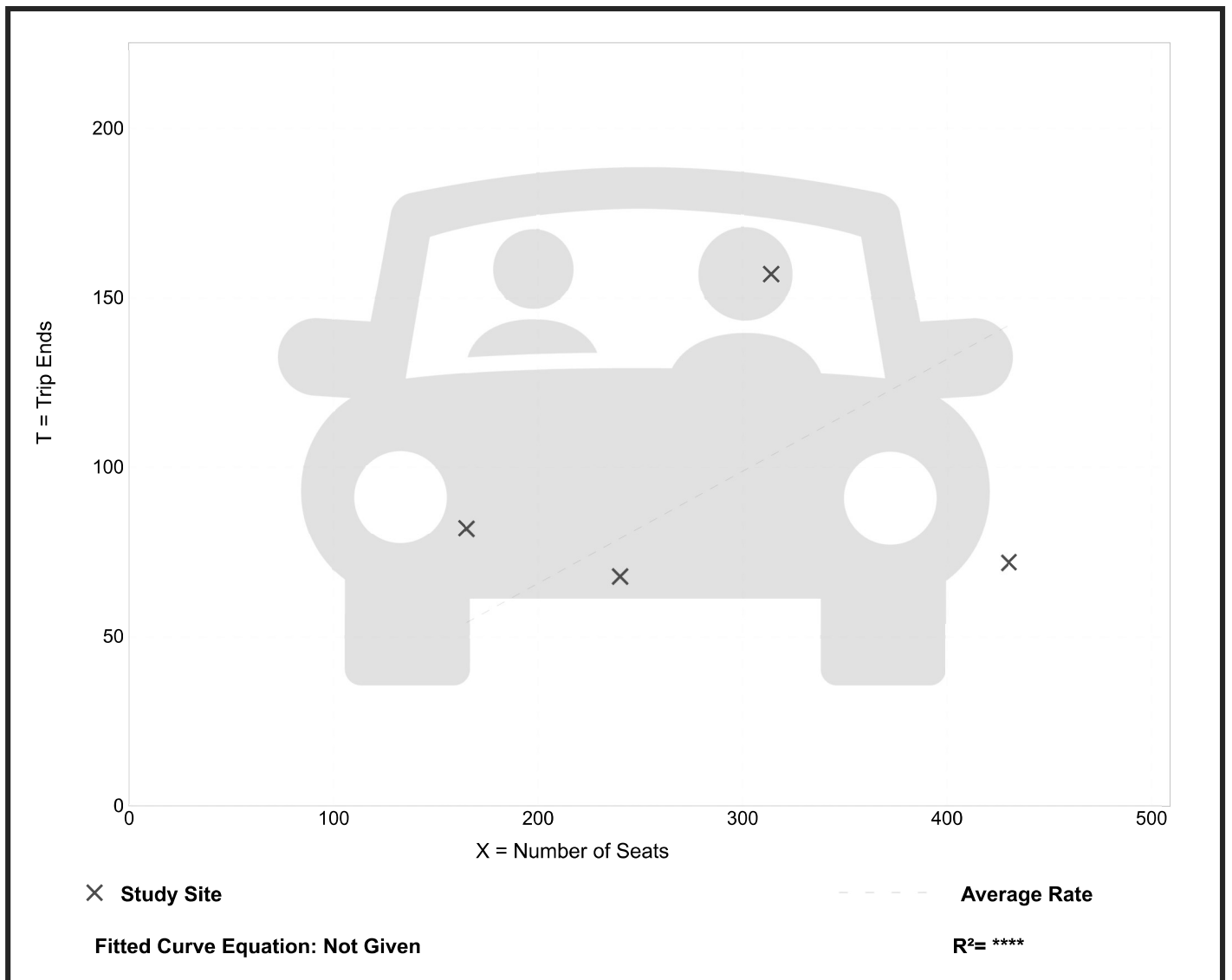
Vehicle Trip Ends vs: Seats
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 4
 Avg. Num. of Seats: 287
 Directional Distribution: 67% entering, 33% exiting

Vehicle Trip Generation per Seat

Average Rate	Range of Rates	Standard Deviation
0.33	0.17 - 0.50	0.17

Data Plot and Equation

Caution – Small Sample Size



**Table 6.1 Unconstrained Internal Person Trip Capture Rates
for Trip Origins within a Mixed-Use Development**

		WEEKDAY	
		AM Peak Hour	PM Peak Hour
From OFFICE	To Retail	28%	20%
	To Restaurant	63%	4%
	To Cinema/Entertainment	0%	0%
	To Residential	1%	2%
	To Hotel	0%	0%
From RETAIL	To Office	29%	2%
	To Restaurant	13%	29%
	To Cinema/Entertainment	0%	4%
	To Residential	14%	26%
	To Hotel	0%	5%
From RESTAURANT	To Office	31%	3%
	To Retail	14%	41%
	To Cinema/Entertainment	0%	8%
	To Residential	4%	18%
	To Hotel	3%	7%
From CINEMA/ENTERTAINMENT	To Office	0%	2%
	To Retail	0%	21%
	To Restaurant	0%	31%
	To Residential	0%	8%
	To Hotel	0%	2%
From RESIDENTIAL	To Office	2%	4%
	To Retail	1%	42%
	To Restaurant	20%	21%
	To Cinema/Entertainment	0%	0%
	To Hotel	0%	3%
From HOTEL	To Office	75%	0%
	To Retail	14%	16%
	To Restaurant	9%	68%
	To Cinema/Entertainment	0%	0%
	To Residential	0%	2%

Source: Bochner, B., K. Hooper, B. Sperry, and R. Dunphy. NCHRP Report 684: *Enhancing Internal Trip Capture Estimation for Mixed-Use Developments*. Washington, DC: Transportation Research Board, Tables 99 and 100, 2011.

**Table 6.2 Unconstrained Internal Person Trip Capture Rates
for Trip Destinations within a Mixed-Use Development**

		Weekday	
		AM Peak Hour	PM Peak Hour
To OFFICE	From Retail	4%	31%
	From Restaurant	14%	30%
	From Cinema/Entertainment	0%	6%
	From Residential	3%	57%
	From Hotel	3%	0%
To RETAIL	From Office	32%	8%
	From Restaurant	8%	50%
	From Cinema/Entertainment	0%	4%
	From Residential	17%	10%
	From Hotel	4%	2%
To RESTAURANT	From Office	23%	2%
	From Retail	50%	29%
	From Cinema/Entertainment	0%	3%
	From Residential	20%	14%
	From Hotel	6%	5%
To CINEMA/ENTERTAINMENT	From Office	0%	1%
	From Retail	0%	26%
	From Restaurant	0%	32%
	From Residential	0%	0%
	From Hotel	0%	0%
To RESIDENTIAL	From Office	0%	4%
	From Retail	2%	46%
	From Restaurant	5%	16%
	From Cinema/Entertainment	0%	4%
	From Hotel	0%	0%
To HOTEL	From Office	0%	0%
	From Retail	0%	17%
	From Restaurant	4%	71%
	From Cinema/Entertainment	0%	1%
	From Residential	0%	12%

Source: Bochner, B., K. Hooper, B. Sperry, and R. Dunphy. NCHRP Report 684: *Enhancing Internal Trip Capture Estimation for Mixed-Use Developments*. Washington, DC: Transportation Research Board, Tables 101 and 102, 2011.

Sex of Workers by Means of Transportation to Work



Note: This is a modified view of the original table produced by the U.S. Census Bureau. This download or printed version may have missing information from the original table.

Census Tract 42.06; Miami-Dade County; Florida		
Label	Estimate	Margin of Error
▼ Total:	1,139	±634
➤ Car, truck, or van:	820	±635
➤ Public transportation (excluding taxicab):	9	±11
Bicycle	29	±37
Walked	123	±144
Taxicab, motorcycle, or other means	30	±27
Worked from home	128	±65
➤ Male:	781	±381
➤ Female:	358	±286

$$\text{Multimodal trip percentage: } (9+29+123)/(1,139-128) = 161/1,011 = 15.9\%$$

ATTACHMENT C
TRAFFIC DATA, FDOT TABLES, AND CENSUS DATA

Nationwide Traffic Data, LLC

Intersection Turning Movement Count

Location: Collins Ave/Jimmy Buffett Mem Hwy & 17th St
City: Miami Beach
Control: Signalized

Project ID: 26-570001-001
Date: 1/6/2026

Data - Total

NS/EW Streets:	Collins Ave/Jimmy Buffett Mem Hwy				Collins Ave/Jimmy Buffett Mem Hwy				17th St				17th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TOTAL
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	
	10	42	1	0	5	70	14	0	24	5	16	0	1	1	3	0	192
	7:00 AM																
	10	57	2	0	0	77	19	1	18	5	8	0	0	2	3	0	202
	7:15 AM																
	10	57	2	1	0	86	14	0	8	4	15	0	1	2	0	0	200
	7:30 AM																
	17	64	1	0	0	94	22	2	14	2	16	0	1	2	2	0	237
7:45 AM																	
8	76	2	0	0	104	14	0	9	3	15	0	0	6	0	0	237	
8:00 AM																	
15	81	2	0	0	121	21	1	15	4	9	0	3	0	3	0	275	
8:15 AM																	
19	78	2	0	1	100	17	0	11	1	12	0	0	0	1	0	242	
8:30 AM																	
12	98	1	0	2	94	24	0	16	2	13	0	1	3	1	0	267	
8:45 AM																	
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	15.12%	82.78%	1.95%	0.15%	0.89%	82.61%	16.06%	0.44%	46.94%	10.61%	42.45%	0.00%	19.44%	44.44%	36.11%	0.00%	1852
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	54	333	7	0	3	419	76	1	51	10	49	0	4	9	5	0	1021
PEAK HR FACTOR :	0.711	0.849	0.875	0.000	0.375	0.866	0.792	0.250	0.797	0.625	0.817	0.000	0.333	0.375	0.417	0.000	0.928
			0.887			0.872				0.887				0.750			
PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TOTAL
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	
	15	127	2	0	1	103	24	0	25	3	31	0	2	4	2	0	339
	4:00 PM																
	19	172	1	0	1	91	19	0	28	2	22	0	2	3	1	0	361
	4:15 PM																
	16	131	3	0	1	111	26	0	24	4	17	0	0	3	2	0	338
	4:30 PM																
	25	122	1	0	0	107	23	0	23	1	16	0	1	4	0	0	323
4:45 PM																	
24	91	0	0	2	105	18	0	21	1	18	0	0	2	4	0	286	
5:00 PM																	
13	101	1	1	2	107	16	0	20	1	13	1	0	2	2	0	280	
5:15 PM																	
17	101	1	0	1	122	38	0	28	1	19	0	0	2	0	0	330	
5:30 PM																	
15	104	0	0	1	107	29	0	19	2	24	0	4	2	3	0	310	
5:45 PM																	
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	13.06%	86.04%	0.82%	0.09%	0.85%	80.85%	18.29%	0.00%	51.65%	4.12%	43.96%	0.27%	20.00%	48.89%	31.11%	0.00%	2567
PEAK HR :	04:00 PM - 05:00 PM																TOTAL
PEAK HR VOL :	75	552	7	0	3	412	92	0	100	10	86	0	5	14	5	0	1361
PEAK HR FACTOR :	0.750	0.802	0.583	0.000	0.750	0.928	0.885	0.000	0.893	0.625	0.694	0.000	0.625	0.875	0.625	0.000	0.943
			0.826			0.918				0.831				0.750			

Nationwide Traffic Data, LLC

Intersection Turning Movement Count

Location: Collins Ave/Jimmy Buffett Mem Hwy & 17th St
City: Miami Beach
Control: Signalized

Project ID: 26-570001-001
Date: 1/6/2026

Data - Cars

NS/EW Streets:	Collins Ave/Jimmy Buffett Mem Hwy				Collins Ave/Jimmy Buffett Mem Hwy				17th St				17th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	10	38	1	0	4	67	11	0	19	3	14	0	0	1	3	0	171
7:15 AM	7	52	2	0	0	73	14	0	15	5	7	0	0	2	3	0	180
7:30 AM	9	49	2	1	0	84	12	0	7	4	14	0	1	1	0	0	184
7:45 AM	14	60	0	0	0	88	17	2	13	2	15	0	1	2	2	0	216
8:00 AM	8	66	0	0	0	103	8	0	7	3	14	0	0	5	0	0	214
8:15 AM	13	70	0	0	0	113	16	1	11	3	9	0	1	0	1	0	238
8:30 AM	17	73	1	0	1	95	14	0	8	0	10	0	0	0	1	0	220
8:45 AM	8	89	1	0	2	90	18	0	13	2	11	0	1	2	1	0	238
TOTAL VOLUMES:	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s:	14.55%	84.09%	1.18%	0.17%	0.84%	85.59%	13.21%	0.36%	44.50%	10.53%	44.98%	0.00%	14.29%	46.43%	39.29%	0.00%	1661
PEAK HR:	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL:	46	298	2	0	3	401	56	1	39	8	44	0	2	7	3	0	910
PEAK HR FACTOR:	0.676	0.837	0.500	0.000	0.375	0.887	0.778	0.250	0.750	0.667	0.786	0.000	0.500	0.350	0.750	0.000	0.956
	0.883				0.887				0.875				0.600				
PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	13	120	2	0	1	98	21	0	23	3	28	0	2	4	2	0	317
4:15 PM	18	168	1	0	1	91	17	0	26	2	22	0	2	3	1	0	352
4:30 PM	15	125	3	0	1	108	22	0	24	4	17	0	0	3	2	0	324
4:45 PM	24	115	1	0	0	105	20	0	21	0	16	0	1	3	0	0	306
5:00 PM	23	85	0	0	2	105	15	0	19	1	17	0	0	2	3	0	272
5:15 PM	11	95	1	1	1	104	15	0	18	1	13	1	0	2	2	0	265
5:30 PM	17	97	0	0	1	118	28	0	27	1	19	0	0	1	0	0	309
5:45 PM	14	100	0	0	1	105	23	0	19	2	23	0	2	1	3	0	293
TOTAL VOLUMES:	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s:	12.87%	86.27%	0.76%	0.10%	0.80%	83.15%	16.05%	0.00%	51.01%	4.03%	44.67%	0.29%	17.95%	48.72%	33.33%	0.00%	2438
PEAK HR:	04:00 PM - 05:00 PM																TOTAL
PEAK HR VOL:	70	528	7	0	3	402	80	0	94	9	83	0	5	13	5	0	1299
PEAK HR FACTOR:	0.729	0.786	0.583	0.000	0.750	0.931	0.909	0.000	0.904	0.563	0.741	0.000	0.625	0.813	0.625	0.000	0.923
	0.809				0.926				0.861				0.719				

Nationwide Traffic Data, LLC

Intersection Turning Movement Count

Location: Collins Ave/Jimmy Buffett Mem Hwy & 17th St
City: Miami Beach
Control: Signalized

Project ID: 26-570001-001
Date: 1/6/2026

Data - HT

NS/EW Streets:	Collins Ave/Jimmy Buffett Mem Hwy				Collins Ave/Jimmy Buffett Mem Hwy				17th St				17th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	4	0	0	1	3	3	0	5	2	2	0	1	0	0	0	21
7:15 AM	3	5	0	0	0	4	5	1	3	0	1	0	0	0	0	0	22
7:30 AM	1	8	0	0	0	2	2	0	1	0	1	0	0	1	0	0	16
7:45 AM	3	4	1	0	0	6	5	0	1	0	1	0	0	0	0	0	21
8:00 AM	0	10	2	0	0	1	6	0	2	0	1	0	0	1	0	0	23
8:15 AM	2	11	2	0	0	8	5	0	4	1	0	0	2	0	2	0	37
8:30 AM	2	5	1	0	0	5	3	0	3	1	2	0	0	0	0	0	22
8:45 AM	4	9	0	0	0	4	6	0	3	0	2	0	0	1	0	0	29
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	19.48%	72.73%	7.79%	0.00%	1.43%	47.14%	50.00%	1.43%	61.11%	11.11%	27.78%	0.00%	37.50%	37.50%	25.00%	0.00%	191
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	8	35	5	0	0	18	20	0	12	2	5	0	2	2	2	0	111
PEAK HR FACTOR :	0.500	0.795	0.625	0.000	0.000	0.563	0.833	0.000	0.750	0.500	0.625	0.000	0.250	0.500	0.250	0.000	0.750
	0.800				0.731				0.792				0.375				
PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	2	7	0	0	0	5	3	0	2	0	3	0	0	0	0	0	22
4:15 PM	1	4	0	0	0	0	2	0	2	0	0	0	0	0	0	0	9
4:30 PM	1	6	0	0	0	3	4	0	0	0	0	0	0	0	0	0	14
4:45 PM	1	7	0	0	0	2	3	0	2	1	0	0	0	1	0	0	17
5:00 PM	1	6	0	0	0	0	3	0	2	0	1	0	0	0	1	0	14
5:15 PM	2	6	0	0	1	3	1	0	2	0	0	0	0	0	0	0	15
5:30 PM	0	4	1	0	0	4	10	0	1	0	0	0	0	1	0	0	21
5:45 PM	1	4	0	0	0	2	6	0	0	0	1	0	2	1	0	0	17
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	16.67%	81.48%	1.85%	0.00%	1.92%	36.54%	61.54%	0.00%	64.71%	5.88%	29.41%	0.00%	33.33%	50.00%	16.67%	0.00%	129
PEAK HR :	04:00 PM - 05:00 PM																TOTAL
PEAK HR VOL :	5	24	0	0	0	10	12	0	6	1	3	0	0	1	0	0	62
PEAK HR FACTOR :	0.625	0.857	0.000	0.000	0.000	0.500	0.750	0.000	0.750	0.250	0.250	0.000	0.000	0.250	0.000	0.000	0.705
	0.806				0.688				0.500				0.250				

Nationwide Traffic Data, LLC

Intersection Turning Movement Count

Location: Collins Ave/Jimmy Buffett Mem Hwy & 17th St
City: Miami Beach
Control: Signalized

Project ID: 26-570001-001
Date: 1/6/2026

Data - Bikes

NS/EW Streets:	Collins Ave/Jimmy Buffett Mem Hwy				Collins Ave/Jimmy Buffett Mem Hwy				17th St				17th St					
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND					
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TOTAL	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU		
	0	2	1	0	0	2	0	0	1	0	2	0	1	0	0	0	9	
	7:00 AM																2	
	7:15 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
	7:30 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	8
	7:45 AM	0	2	1	0	0	2	0	0	2	1	0	0	0	0	0	0	8
	8:00 AM	0	3	0	0	0	2	0	0	2	0	1	0	0	0	0	0	11
	8:15 AM	0	4	0	0	1	2	0	0	1	1	0	0	0	0	2	0	3
8:30 AM	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	7	
8:45 AM	0	2	0	0	0	2	1	0	1	0	0	0	0	1	0	0		
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL	
APPROACH %'s :	0.00%	89.47%	10.53%	0.00%	6.67%	86.67%	6.67%	0.00%	58.33%	16.67%	25.00%	0.00%	25.00%	25.00%	50.00%	0.00%	50	
PEAK HR :	08:00 AM - 09:00 AM																29	
PEAK HR VOL :	0	11	0	0	1	7	1	0	4	1	1	0	0	1	2	0	0.659	
PEAK HR FACTOR :	0.000	0.688	0.000	0.000	0.250	0.875	0.250	0.000	0.500	0.250	0.250	0.000	0.000	0.250	0.250	0.000		
	0.688				0.750				0.500				0.375					
PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND					
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TOTAL	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU		
	0	2	0	0	0	6	0	0	0	2	1	0	0	6	0	0	17	
	4:00 PM																14	
	4:15 PM	0	2	1	0	0	5	2	0	3	0	0	0	0	1	0	0	23
	4:30 PM	2	1	0	0	0	8	3	0	1	3	0	0	1	4	0	0	26
	4:45 PM	1	7	0	0	0	9	2	0	2	2	0	0	0	3	0	0	25
	5:00 PM	0	6	1	0	0	4	2	0	0	6	0	0	1	4	1	0	19
	5:15 PM	0	4	3	0	0	4	0	0	0	4	1	0	0	3	0	0	16
5:30 PM	1	2	1	0	1	2	2	0	0	1	0	0	0	4	0	2	11	
5:45 PM	0	6	1	0	0	2	1	0	0	1	0	0	0	0	0	0		
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL	
APPROACH %'s :	9.76%	73.17%	17.07%	0.00%	1.89%	75.47%	22.64%	0.00%	22.22%	70.37%	7.41%	0.00%	6.67%	83.33%	3.33%	6.67%	151	
PEAK HR :	04:00 PM - 05:00 PM																80	
PEAK HR VOL :	3	12	1	0	0	28	7	0	6	7	1	0	1	14	0	0	0.769	
PEAK HR FACTOR :	0.375	0.429	0.250	0.000	0.000	0.778	0.583	0.000	0.500	0.583	0.250	0.000	0.250	0.583	0.000	0.000		
	0.500				0.795				0.875				0.625					

Nationwide Traffic Data, LLC

Intersection Turning Movement Count

Location: Collins Ave/Jimmy Buffett Mem Hwy & 17th St
City: Miami Beach

Project ID: 26-570001-001
Date: 1/6/2026

Data - Pedestrians (Crosswalks)

NS/EW Streets:	Collins Ave/Jimmy Buffett Mem Hwy		Collins Ave/Jimmy Buffett Mem Hwy		17th St		17th St		TOTAL
	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
AM	EB	WB	EB	WB	NB	SB	NB	SB	
7:00 AM	17	4	13	1	3	11	6	19	74
7:15 AM	7	8	11	3	5	9	2	6	51
7:30 AM	8	6	8	1	8	8	6	15	60
7:45 AM	8	2	6	1	8	11	13	15	64
8:00 AM	14	5	3	4	15	13	15	23	92
8:15 AM	2	2	8	13	13	14	14	31	97
8:30 AM	7	10	6	8	16	27	24	26	124
8:45 AM	11	6	7	4	18	20	17	48	131
TOTAL VOLUMES :	EB 74	WB 43	EB 62	WB 35	NB 86	SB 113	NB 97	SB 183	TOTAL 693
APPROACH %'s :	63.25%	36.75%	63.92%	36.08%	43.22%	56.78%	34.64%	65.36%	
PEAK HR :	08:00 AM - 09:00 AM								TOTAL
PEAK HR VOL :	34	23	24	29	62	74	70	128	444
PEAK HR FACTOR :	0.607	0.575	0.750	0.558	0.861	0.685	0.729	0.667	0.847
	0.750		0.631		0.791		0.762		

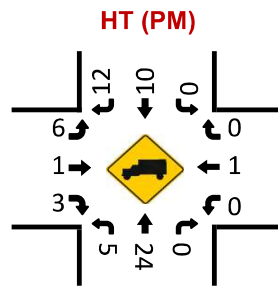
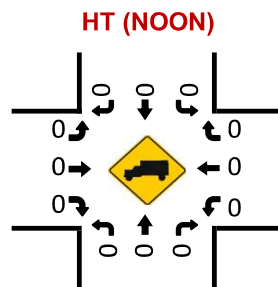
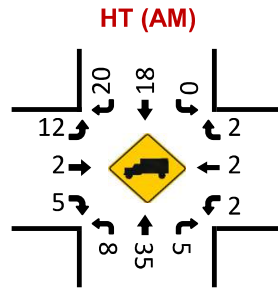
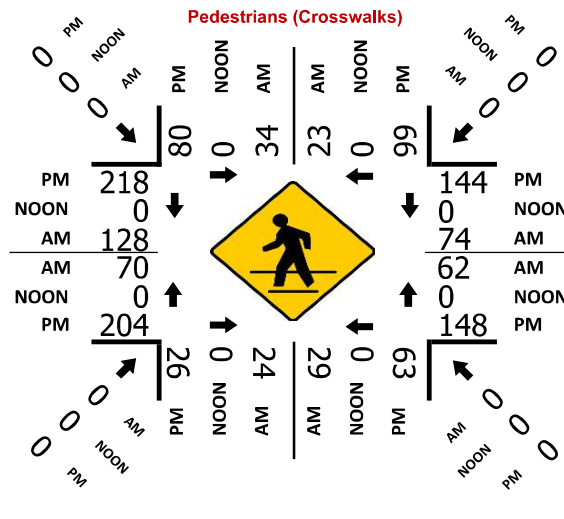
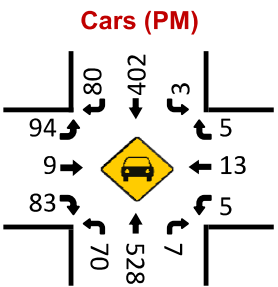
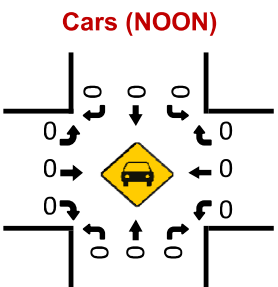
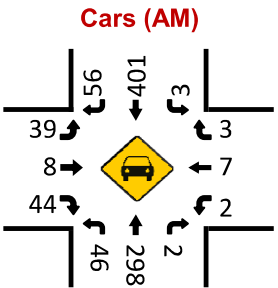
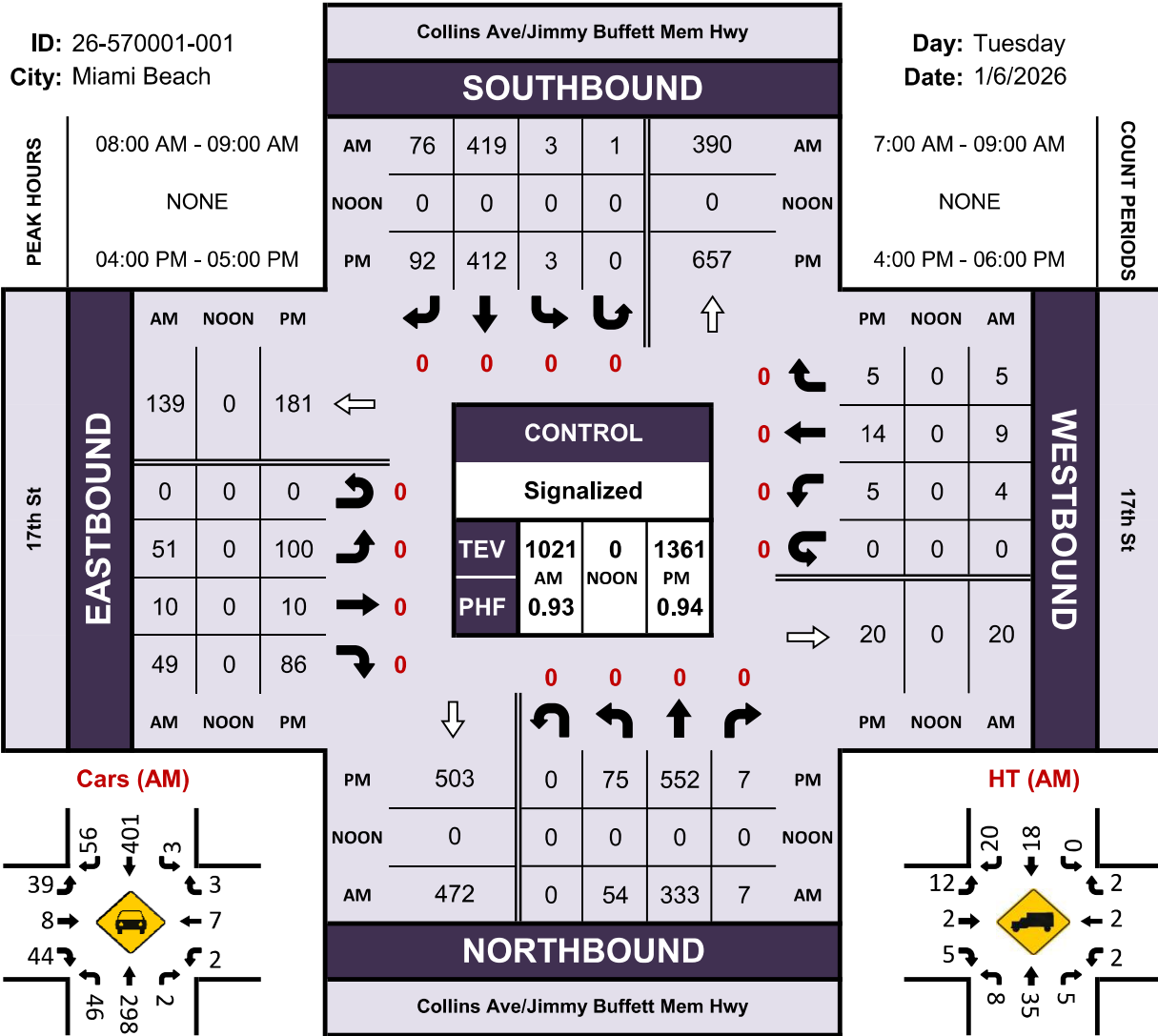
NS/EW Streets:	Collins Ave/Jimmy Buffett Mem Hwy		Collins Ave/Jimmy Buffett Mem Hwy		17th St		17th St		TOTAL
	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
PM	EB	WB	EB	WB	NB	SB	NB	SB	
4:00 PM	23	30	9	10	20	30	63	43	228
4:15 PM	14	25	13	7	54	33	47	62	255
4:30 PM	21	13	2	14	27	27	64	57	225
4:45 PM	22	31	2	32	47	54	30	56	274
5:00 PM	7	35	13	29	51	40	40	48	263
5:15 PM	17	36	20	37	45	60	52	52	319
5:30 PM	35	31	8	26	38	92	49	85	364
5:45 PM	8	21	7	14	50	67	55	83	305
TOTAL VOLUMES :	EB 147	WB 222	EB 74	WB 169	NB 332	SB 403	NB 400	SB 486	TOTAL 2233
APPROACH %'s :	39.84%	60.16%	30.45%	69.55%	45.17%	54.83%	45.15%	54.85%	
PEAK HR :	04:00 PM - 05:00 PM								TOTAL
PEAK HR VOL :	80	99	26	63	148	144	204	218	982
PEAK HR FACTOR :	0.870	0.798	0.500	0.492	0.685	0.667	0.797	0.879	0.896
	0.844		0.654		0.723		0.872		

Collins Ave/Jimmy Buffett Mem Hwy & 17th St

Peak Hour Turning Movement Count

ID: 26-570001-001
City: Miami Beach

Day: Tuesday
Date: 1/6/2026



TOD Schedule Report
for 2665: Collins Av&17 St

Asset	Intersection	TOD Schedule	Op Mode	Plan #	Cycle	Offset	TOD Setting	Active PhaseBank	Active Maximum
2665	Collins Av&17 St	DOW-2	TOD	[03] AM PEAK	100	81	N/A	1	Max 2

Splits

PH 1	PH 2	PH 3	PH 4	PH 5	PH 6	PH 7	PH 8
-	NBT	-	EBT	-	SBT	-	WBT
0	54	0	33	0	54	0	33

Active Phase Bank: Phase Bank 1

Phase	Walk			Don't Walk			Min Initial			Veh Ext			Max Limit			Max 2			Yellow	Red	
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3			
1 -	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	0	0
2 NBT	5	-	5	-	5	-	20	-	20	-	20	-	50	-	50	-	50	-	50	4	3
3 -	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	0	0
4 EBT	10	-	10	-	10	-	14	-	14	-	14	-	12	-	12	-	12	-	12	4	2.2
5 -	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	0	0
6 SBT	5	-	5	-	5	-	20	-	20	-	20	-	50	-	50	-	50	-	50	4	3
7 -	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	0	0
8 WBT	10	-	10	-	10	-	14	-	14	-	14	-	12	-	12	-	12	-	12	4	2.2

Last In Service Date: unknown

Permitted Phases	12345678
Default	-2-4-6-8
External Permit 0	-2-4-6-8
External Permit 1	-2-4-6-8
External Permit 2	-2-4-6-8

TOD Schedule Report
for 2665: Collins Av&17 St

Current TOD Schedule	Plan	Cycle	Green Time								Ring Offset	Offset
			1	2	3	4	5	6	7	8		
			NBT	EBT	SBT	WBT						
	1	100	0	54	0	33	0	54	0	33	0	12
	2	100	0	63	0	24	0	63	0	24	0	75
	3	100	0	54	0	33	0	54	0	33	0	81
	4	100	0	63	0	24	0	63	0	24	0	68
	5	110	0	73	0	24	0	73	0	24	0	101
	6	130	0	90	0	27	0	90	0	27	0	30
	7	120	0	74	0	33	0	74	0	33	0	90
	8	110	0	73	0	24	0	73	0	24	0	33
	11	90	0	53	0	24	0	53	0	24	0	17
	12	90	0	53	0	24	0	53	0	24	0	59
	13	90	0	53	0	24	0	53	0	24	0	23
	14	120	0	80	0	27	0	80	0	27	0	88
	15	120	0	83	0	24	0	83	0	24	0	111
	16	90	0	53	0	24	0	53	0	24	0	70
	17	90	0	53	0	24	0	53	0	24	0	70
	18	100	0	54	0	33	0	54	0	33	0	58
	21	90	0	53	0	24	0	53	0	24	0	17
	22	100	0	54	0	33	0	54	0	33	0	37
	23	100	0	54	0	33	0	54	0	33	0	17
	25	140	0	94	0	33	0	94	0	33	0	85

Current Time of Day Function

Time	Function	Settings *	Day of Week
0000	TOD OUTPUTS	-----	SUM T W ThF S
0000	PED RECALL	-----	SUM T W
0530	PED RECALL	8---4---	M T W ThF

Local Time of Day Function

Time	Function	Settings *	Day of Week
0000	TOD OUTPUTS	-----	SUM T W ThF S
0000	PED RECALL	8---4---	ThF S
0000	PED RECALL	-----	SUM T W
0200	PED RECALL	-----	ThF S
0500	PED RECALL	8---4---	Su
0530	PED RECALL	8---4---	M T W ThF

Local TOD Schedule

Time	Plan	DOW
0000	1	Su M T W Th
0000	7	F S
0300	1	F S
0300	22	M T W Th
0300	4	Su
0700	5	Su
0700	1	M T W Th F S
0930	2	M T W Th
1000	8	Su
1500	14	Su
1500	3	M T W Th
1800	18	M T W Th F
1800	6	Su
2200	1	M T W Th
2200	6	F

- * Settings**
- Blank - FREE - Phase Bank 1, Max 1
 - Blank - Plan - Phase Bank 1, Max 2
 - 1 - Phase Bank 2, Max 1
 - 2 - Phase Bank 2, Max 2
 - 3 - Phase Bank 3, Max 1
 - 4 - Phase Bank 3, Max 2
 - 5 - EXTERNAL PERMIT 1
 - 6 - EXTERNAL PERMIT 2
 - 7 - X-PED OMIT
 - 8 - TBA

SIGNAL OPERATING PLAN



Timing Phases	Direction	NB	SB	EB	WB	Ped Heads				Movements/Display/Actuation
	Head No.	6	2	8	4	P6	P2	P8	P4	
	Dwell									
	C									
	l									
	e									
	a									
	Dwell									
	C									
	l									
	e									
	a									
(2+6) N/SB Collins Av (RECALL)	Dwell	G	G	R	R	W/F	W/F	DW	DW	
	4+8	Y	Y	R	R	DW	DW	DW	DW	
	C									
	l									
	e									
(4+8) E/WB 17 Street (ACTUATED)	Dwell	R	R	G	G	DW	DW	W/F	W/F	
	2+6	R	R	Y	Y	DW	DW	DW	DW	
	C									
	l									
	e									
	Dwell									
	C									
	l									
	e									
	a									
Flashing Operation		FY	FY	FR	FR					Page 1 of 1

Miami-Dade County Public Works Department

Drawn WILLIAM RIVERA PAZ	Date 3/7/2013	COLLINS AV & 17 STREET			
Checked <i>H. Hernandez</i>	Date 4/1/13	Placed in Service		Phasing No.	Asset Number
		Date	By	4	2665

2024 PEAK SEASON FACTOR CATEGORY REPORT - REPORT TYPE: ALL
 CATEGORY: 8700 MIAMI-DADE NORTH

MOCF: 0.95

WEEK	DATES	SF	PSCF
1	01/01/2024 - 01/06/2024	1.07	1.13
2	01/07/2024 - 01/13/2024	1.03	1.08
3	01/14/2024 - 01/20/2024	1.00	1.05
4	01/21/2024 - 01/27/2024	0.98	1.03
* 5	01/28/2024 - 02/03/2024	0.97	1.02
* 6	02/04/2024 - 02/10/2024	0.96	1.01
* 7	02/11/2024 - 02/17/2024	0.95	1.00
* 8	02/18/2024 - 02/24/2024	0.95	1.00
* 9	02/25/2024 - 03/02/2024	0.94	0.99
*10	03/03/2024 - 03/09/2024	0.94	0.99
*11	03/10/2024 - 03/16/2024	0.94	0.99
*12	03/17/2024 - 03/23/2024	0.94	0.99
*13	03/24/2024 - 03/30/2024	0.95	1.00
*14	03/31/2024 - 04/06/2024	0.95	1.00
*15	04/07/2024 - 04/13/2024	0.96	1.01
*16	04/14/2024 - 04/20/2024	0.97	1.02
*17	04/21/2024 - 04/27/2024	0.98	1.03
18	04/28/2024 - 05/04/2024	0.99	1.04
19	05/05/2024 - 05/11/2024	1.00	1.05
20	05/12/2024 - 05/18/2024	1.02	1.07
21	05/19/2024 - 05/25/2024	1.03	1.08
22	05/26/2024 - 06/01/2024	1.04	1.09
23	06/02/2024 - 06/08/2024	1.05	1.11
24	06/09/2024 - 06/15/2024	1.06	1.12
25	06/16/2024 - 06/22/2024	1.05	1.11
26	06/23/2024 - 06/29/2024	1.04	1.09
27	06/30/2024 - 07/06/2024	1.03	1.08
28	07/07/2024 - 07/13/2024	1.02	1.07
29	07/14/2024 - 07/20/2024	1.02	1.07
30	07/21/2024 - 07/27/2024	1.01	1.06
31	07/28/2024 - 08/03/2024	1.01	1.06
32	08/04/2024 - 08/10/2024	1.01	1.06
33	08/11/2024 - 08/17/2024	1.01	1.06
34	08/18/2024 - 08/24/2024	1.01	1.06
35	08/25/2024 - 08/31/2024	1.01	1.06
36	09/01/2024 - 09/07/2024	1.01	1.06
37	09/08/2024 - 09/14/2024	1.01	1.06
38	09/15/2024 - 09/21/2024	1.01	1.06
39	09/22/2024 - 09/28/2024	1.01	1.06
40	09/29/2024 - 10/05/2024	1.01	1.06
41	10/06/2024 - 10/12/2024	1.01	1.06
42	10/13/2024 - 10/19/2024	1.02	1.07
43	10/20/2024 - 10/26/2024	1.02	1.07
44	10/27/2024 - 11/02/2024	1.02	1.07
45	11/03/2024 - 11/09/2024	1.02	1.07
46	11/10/2024 - 11/16/2024	1.03	1.08
47	11/17/2024 - 11/23/2024	1.03	1.08
48	11/24/2024 - 11/30/2024	1.04	1.09
49	12/01/2024 - 12/07/2024	1.05	1.11
50	12/08/2024 - 12/14/2024	1.06	1.12
51	12/15/2024 - 12/21/2024	1.07	1.13
52	12/22/2024 - 12/28/2024	1.03	1.08
53	12/29/2024 - 12/31/2024	1.00	1.05

* PEAK SEASON

04-MAR-2025 16:32:53

830UPD

6_8700_PKSEASON.TXT

**GROWTH RATE CALCULATION
DELANO HOTEL**

Roadway	FDOT Site	10 Year Linear Trend	10 Year Exponential Trend	10 Year Decaying Trend
SR A1A/COLLINS AV, N OF 21 ST	5170	-3.57%	-4.05%	-4.38%
17TH ST, 200' E OFMERIDIAN AVE	8531	-2.00%	-2.20%	-2.04%
WASHINGTON AVE, 200' N OF 12 ST	8414	-3.89%	-4.68%	-4.14%
16 ST, 200' E OFMERIDIAN AVE	8567	-5.21%	-6.30%	-7.05%
Average Annual Growth Rate		-3.67%	-4.31%	-4.40%

Used 0.5% Growth Rate

FLORIDA DEPARTMENT OF TRANSPORTATION
 TRANSPORTATION STATISTICS OFFICE
 2024 HISTORICAL AADT REPORT

COUNTY : 87 - MIAMI-DADE

SITE : 5170 - SR A1A/COLLINS AV, N OF 21 ST (MIAMI BEACH)

YEAR	AADT	DIRECTION 1	DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR
2024	21300 C	N 9800	S 11500	9.00	54.90	22.60
2023	21000 C	N 10000	S 11000	9.00	55.10	25.20
2022	19500 C	N 9000	S 10500	9.00	54.70	6.20
2021	18400 C	N 9300	S 9100	9.00	54.30	8.40
2020	10400 C	N 5200	S 5200	9.00	54.20	31.10
2019	23500 C	N 12000	S 11500	9.00	54.60	10.00
2018	27500 C	N 13000	S 14500	9.00	54.30	7.90
2017	26500 C	N 13000	S 13500	9.00	55.00	6.60
2016	26000 C	N 13500	S 12500	9.00	54.50	20.20
2015	26500 C	N 12500	S 14000	9.00	54.70	4.20
2014	27000 C	N 12500	S 14500	9.00	54.50	4.10
2013	22500 C	N 10500	S 12000	9.00	52.40	9.00
2012	25000 C	N 12000	S 13000	9.00	55.70	4.30
2011	26500 C	N 13500	S 13000	9.00	55.10	2.80
2010	25000 C	N 12500	S 12500	8.98	54.08	2.80
2009	26500 C	N 13000	S 13500	8.99	53.24	2.70

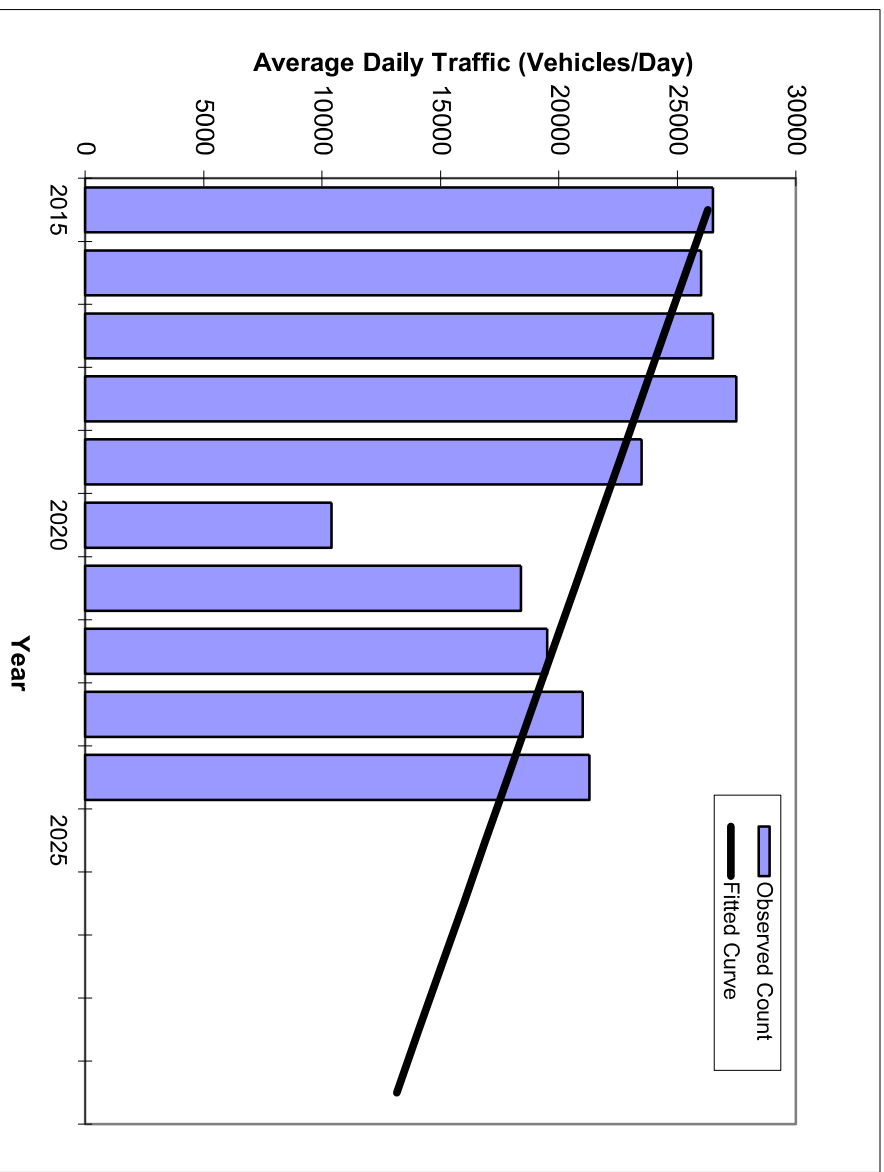
AADT FLAGS : C = COMPUTED; E = MANUAL ESTIMATE; F = FIRST YEAR ESTIMATE
 S = SECOND YEAR ESTIMATE; T = THIRD YEAR ESTIMATE; R = FOURTH YEAR ESTIMATE
 V = FIFTH YEAR ESTIMATE; 6 = SIXTH YEAR ESTIMATE; X = UNKNOWN
 *K FACTOR : STARTING WITH YEAR 2011 IS STANDARD, PRIOR YEARS ARE K30 VALUES

Traffic Trends - V2023

COLLINS AVE – SR A1A/COLLINS AV, N OF 21 ST (MIAMI BEACH)

FM #	1234
Location	1

County:	Miami-Dade (87)
Station #:	875170
Roadway:	COLLINS AVE



Annual Trend Decrease:	939
Trend R-squared:	51.15%
Trend Annual Historic Growth Rate:	-3.57%
Trend Growth Rate (2024 to Design Year)	-5.27%
Printed:	1/6/2026

Linear Growth Option

Year	Traffic (ADT/AADT)	
	Count*	Trend
2015	26,500	26,290
2016	26,000	25,360
2017	26,500	24,420
2018	27,500	23,480
2019	23,500	22,540
2020	10,400	21,600
2021	18,400	20,660
2022	19,500	19,720
2023	21,000	18,780
2024	21,300	17,850
2026 Opening Year Trend		
2026	N/A	15,970
2027 Interim Year Trend		
2027	N/A	15,030
2029 Design Year Trend		
2029	N/A	13,150
FSUTMS Forecasts/Trends		

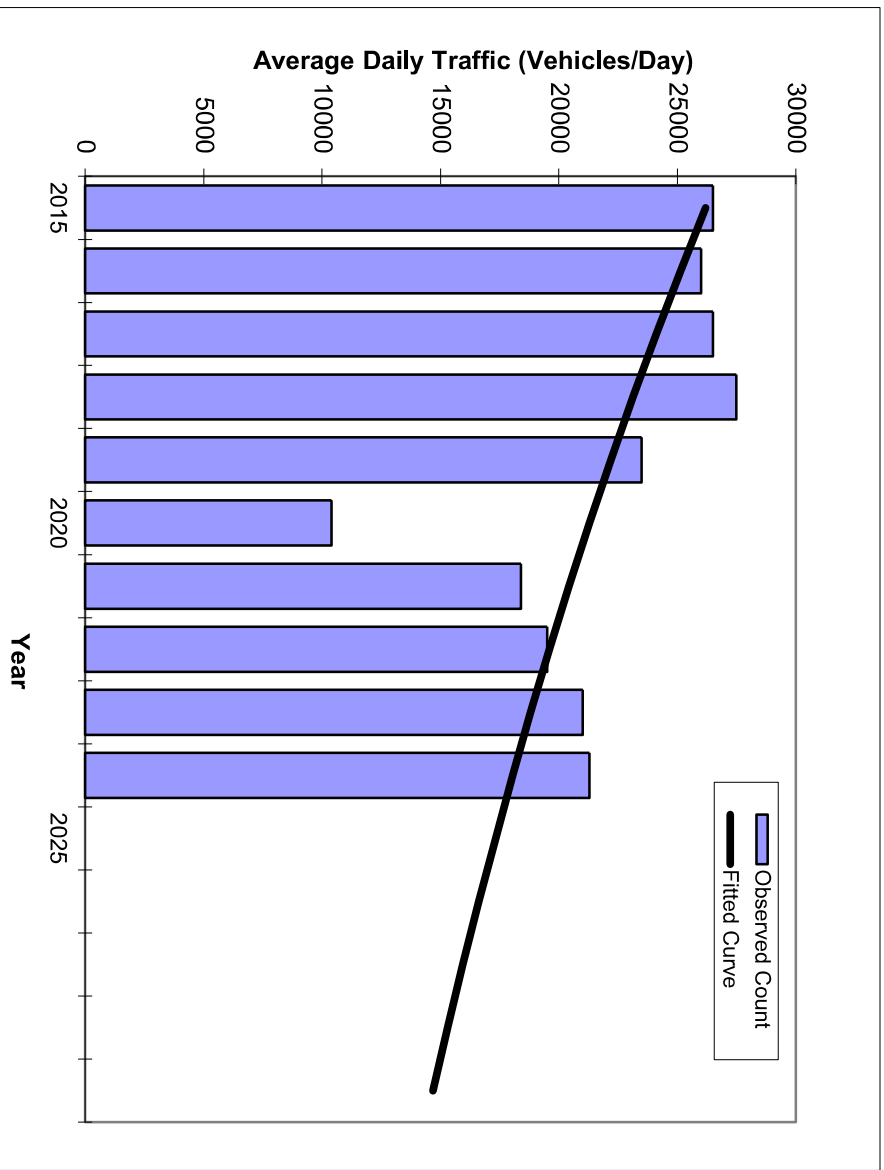
*Axle-Adjusted

Traffic Trends - V2023

COLLINS AVE – SR A1A/COLLINS AV, N OF 21 ST (MIAMI BEACH)

FM #	1234
Location	1

County:	Miami-Dade (87)
Station #:	875170
Roadway:	COLLINS AVE



Trend R-squared:	46.23%
Compounded Annual Historic Growth Rate:	-4.05%
Compounded Growth Rate (2024 to Design Year)	-4.05%
Printed:	1/6/2026

Exponential Growth Option

Year	Traffic (ADT/AADT)	
	Count*	Trend
2015	26,500	26,190
2016	26,000	25,130
2017	26,500	24,110
2018	27,500	23,130
2019	23,500	22,200
2020	10,400	21,300
2021	18,400	20,430
2022	19,500	19,600
2023	21,000	18,810
2024	21,300	18,050
2026 Opening Year Trend		
2026	N/A	16,610
2027 Interim Year Trend		
2027	N/A	15,940
2029 Design Year Trend		
2029	N/A	14,680
FSUTMS Forecasts/Trends		

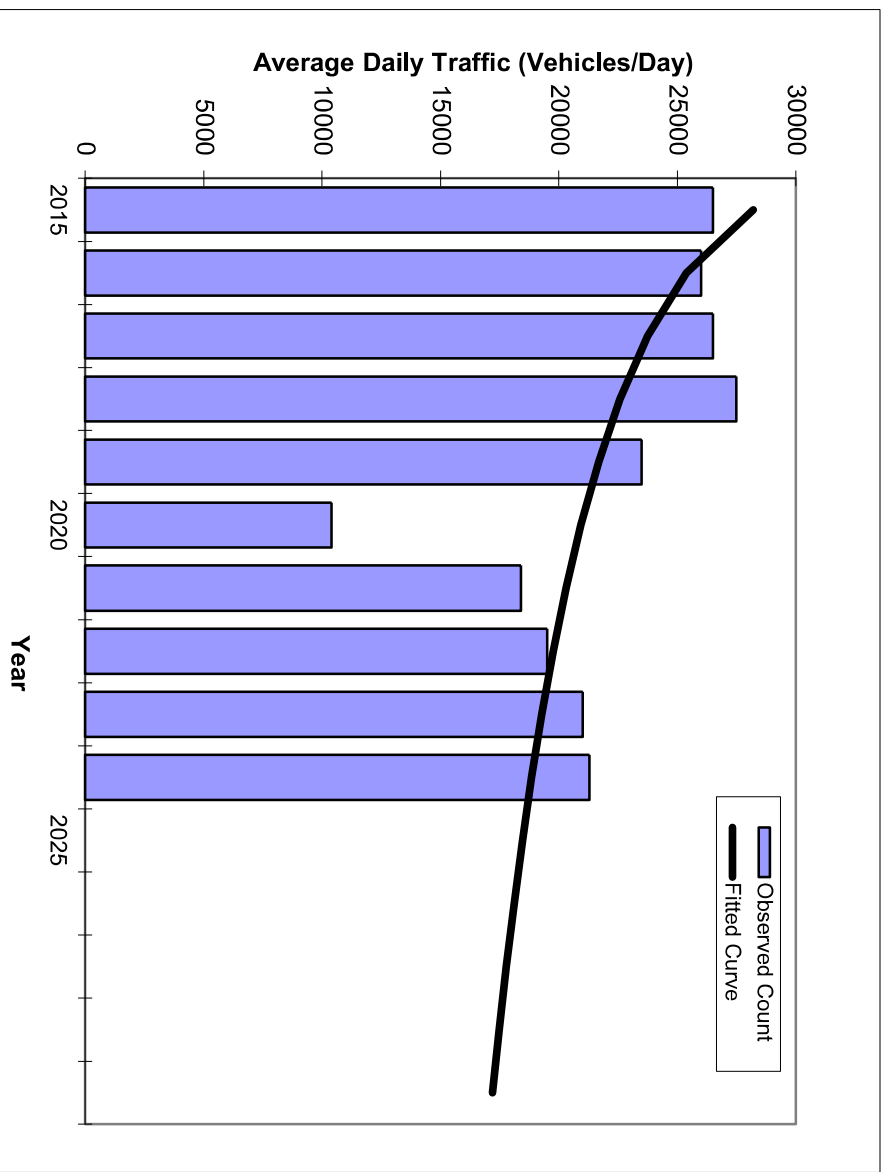
*Axle-Adjusted

Traffic Trends - V2023

COLLINS AVE – SR A1A/COLLINS AV, N OF 21 ST (MIAMI BEACH)

FM #	1234
Location	1

County:	Miami-Dade (87)
Station #:	875170
Roadway:	COLLINS AVE



Trend R-squared:	56.28%
Compounded Annual Historic Growth Rate:	-4.38%
Compounded Growth Rate (2024 to Design Year)	-1.82%
Printed:	1/6/2026

Decaying Exponential Growth Option

Year	Traffic (ADT/AADT)	
	Count*	Trend
2015	26,500	28,210
2016	26,000	25,390
2017	26,500	23,750
2018	27,500	22,570
2019	23,500	21,670
2020	10,400	20,930
2021	18,400	20,300
2022	19,500	19,760
2023	21,000	19,280
2024	21,300	18,850
2026 Opening Year Trend		
2026	N/A	18,110
2027 Interim Year Trend		
2027	N/A	17,780
2029 Design Year Trend		
2029	N/A	17,200
FSUTMS Forecasts/Trends		

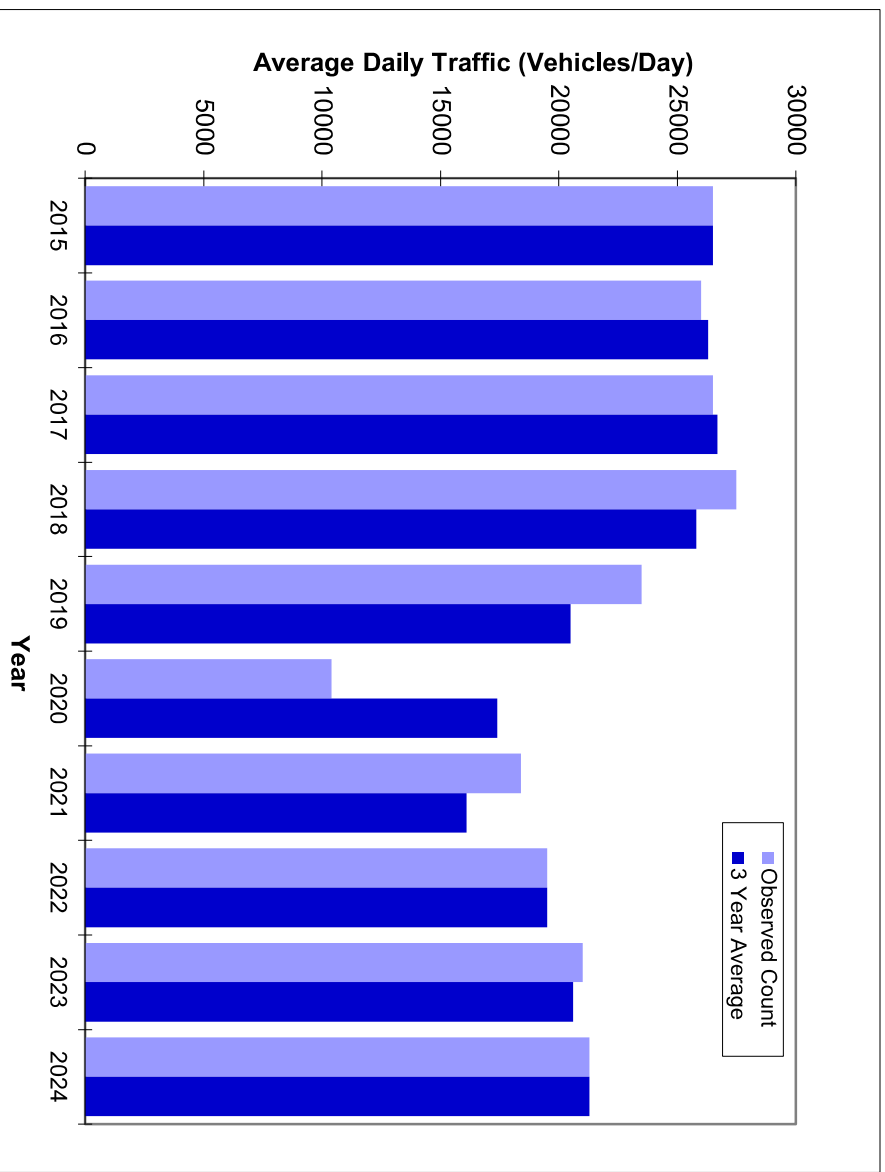
*Axle-Adjusted

Traffic Trends - V2023

COLLINS AVE – SR A1A/COLLINS AV, N OF 21 ST (MIAMI BEACH)

FM #	1234
Location	1

County:	Miami-Dade (87)
Station #:	875170
Roadway:	COLLINS AVE



Actual AADT vs 3 Year Average	

Year	Traffic (ADT/AADT)	
	Count*	3 Yr Avg
2015	26,500	26,500
2016	26,000	26,300
2017	26,500	26,700
2018	27,500	25,800
2019	23,500	20,500
2020	10,400	17,400
2021	18,400	16,100
2022	19,500	19,500
2023	21,000	20,600
2024	21,300	21,300

* Axle-Adjusted

FLORIDA DEPARTMENT OF TRANSPORTATION
 TRANSPORTATION STATISTICS OFFICE
 2024 HISTORICAL AADT REPORT

COUNTY : 87 - MIAMI-DADE

SITE : 8531 - 17TH ST, 200' EAST OCEMERIDIAN AVE (2011 OFF SYSTEM CYCLE)

YEAR	AADT	DIRECTION 1	DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR
2024	15400	F	W	9.00	52.70	3.80
2023	15600	C	W	9.00	63.10	3.70
2022	16900	T	W	9.00	56.50	3.50
2021	16500	S	W	9.00	55.00	2.90
2020	17300	F	W	9.00	56.00	4.40
2019	19400	C	W	9.00	56.00	4.00
2018	16800	T	W	9.00	54.30	3.00
2017	18800	S	W	9.00	59.30	2.50
2016	18900	F	W	9.00	56.10	5.10
2015	19000	C	W	9.00	57.40	7.10
2014	18700	S	W	9.00	59.30	10.70
2013	18900	F	W	9.00	58.90	16.20
2012	19000	C	W	9.00	59.70	16.00

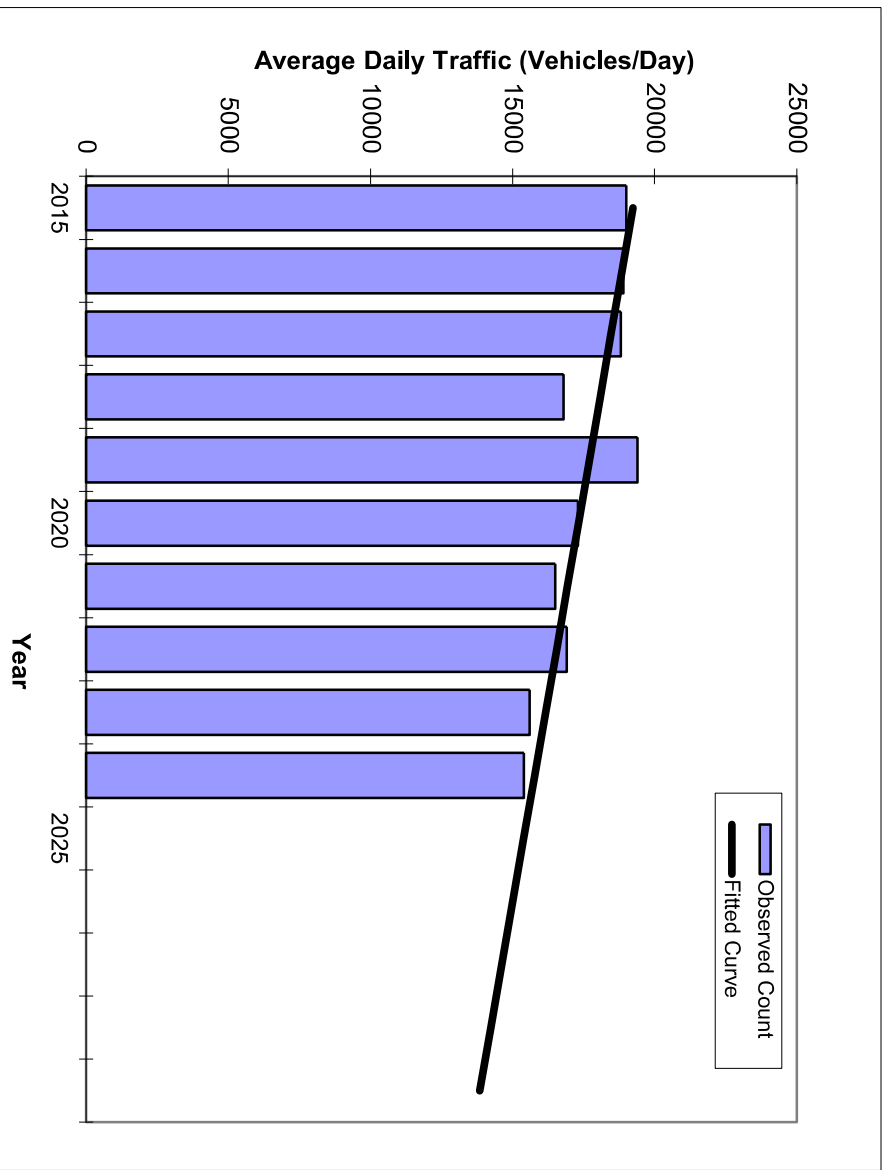
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 V = FIFTH YEAR ESTIMATE; 6 = SIXTH YEAR ESTIMATE; X = UNKNOWN
 *K FACTOR : STARTING WITH YEAR 2011 IS STANDARDK, PRIOR YEARS ARE K30 VALUES

Traffic Trends - V2023

7 ST -- 17TH ST, 200' EAST OF MERIDIAN AVE (2011 OFF SYSTEM CYCLE)

FM #	1234
Location	1

County:	Miami-Dade (87)
Station #:	878531
Roadway:	17 ST



Annual Trend Decrease:	385
Trend R-squared:	95.10%
Trend Annual Historic Growth Rate:	-2.00%
Trend Growth Rate (2024 to Design Year)	-2.45%
Printed:	1/6/2026

Linear Growth Option

Year	Traffic (ADT/AADT)	
	Count*	Trend
2015	19,000	19,240
2016	18,900	18,860
2017	18,800	18,470
2018	16,800	18,090
2019	19,400	17,700
2020	17,300	17,320
2021	16,500	16,930
2022	16,900	16,550
2023	15,600	16,160
2024	15,400	15,780
2026 Opening Year Trend		
2026	N/A	15,010
2027 Interim Year Trend		
2027	N/A	14,620
2029 Design Year Trend		
2029	N/A	13,850
FSUTMS Forecasts/Trends		

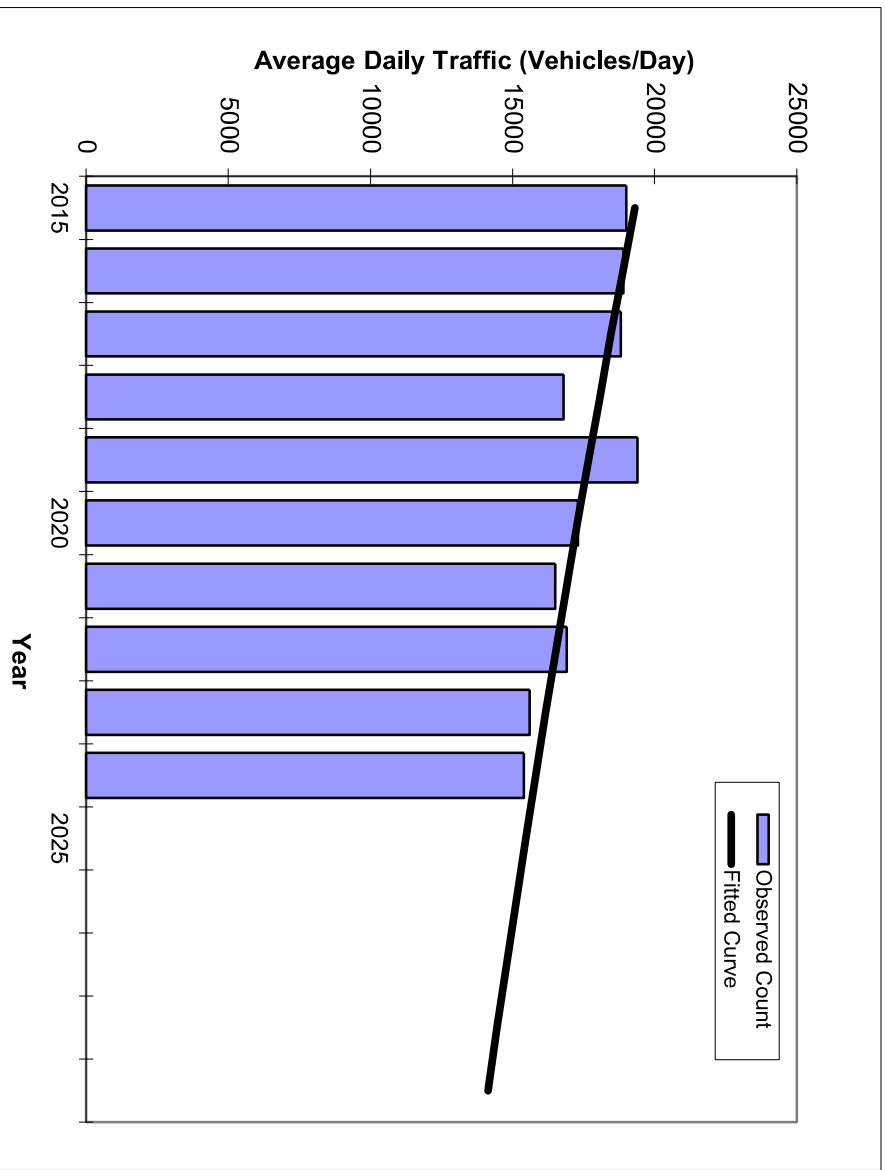
*Axle-Adjusted

Traffic Trends - V/2023

7 ST -- 17TH ST, 200' EAST OF MERIDIAN AVE (2011 OFF SYSTEM CYCLE)

FM #	1234
Location	1

County:	Miami-Dade (87)
Station #:	878531
Roadway:	17 ST



Trend R-squared:	94.08%
Compounded Annual Historic Growth Rate:	-2.20%
Compounded Growth Rate (2024 to Design Year)	-2.21%
Printed:	1/6/2026

Year	Traffic (ADT/AADT)	
	Count*	Trend
2015	19,000	19,310
2016	18,900	18,890
2017	18,800	18,470
2018	16,800	18,070
2019	19,400	17,670
2020	17,300	17,280
2021	16,500	16,900
2022	16,900	16,530
2023	15,600	16,160
2024	15,400	15,810
2025	-	-
2026	-	-
2027	-	-
2028	-	-
2029	-	-
2030	-	-

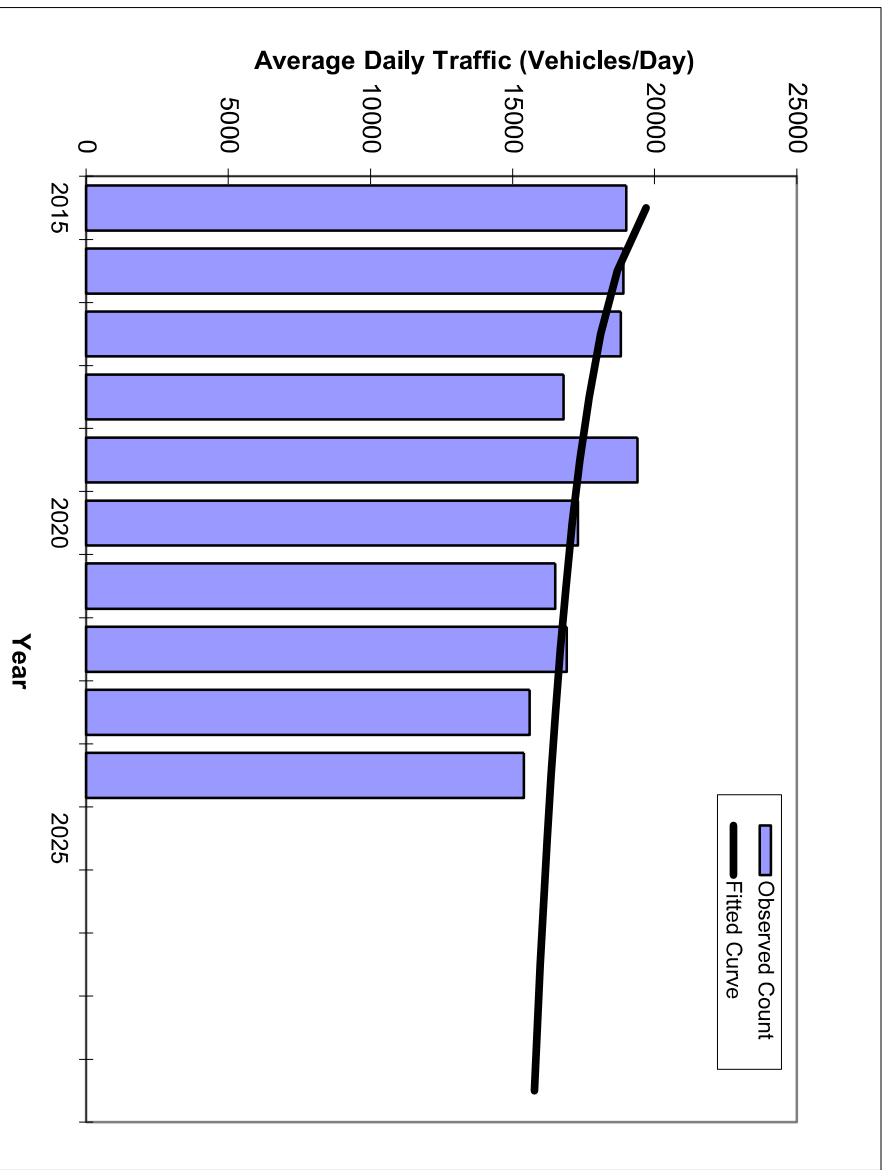
*Axle-Adjusted

Traffic Trends - V/2023

7 ST -- 17TH ST, 200' EAST OF MERIDIAN AVE (2011 OFF SYSTEM CYCLE)

FM #	1234
Location	1

County:	Miami-Dade (87)
Station #:	878531
Roadway:	17 ST



Trend R-squared:	79.04%
Compounded Annual Historic Growth Rate:	-2.04%
Compounded Growth Rate (2024 to Design Year)	-0.73%
Printed:	1/6/2026

Decaying Exponential Growth Option

Year	Traffic (ADT/AADT)	
	Count*	Trend
2015	19,000	19,700
2016	18,900	18,690
2017	18,800	18,110
2018	16,800	17,690
2019	19,400	17,370
2020	17,300	17,100
2021	16,500	16,880
2022	16,900	16,690
2023	15,600	16,510
2024	15,400	16,360
2026 Opening Year Trend		
2026	N/A	16,100
2027 Interim Year Trend		
2027	N/A	15,980
2029 Design Year Trend		
2029	N/A	15,770
FSUTMS Forecasts/Trends		

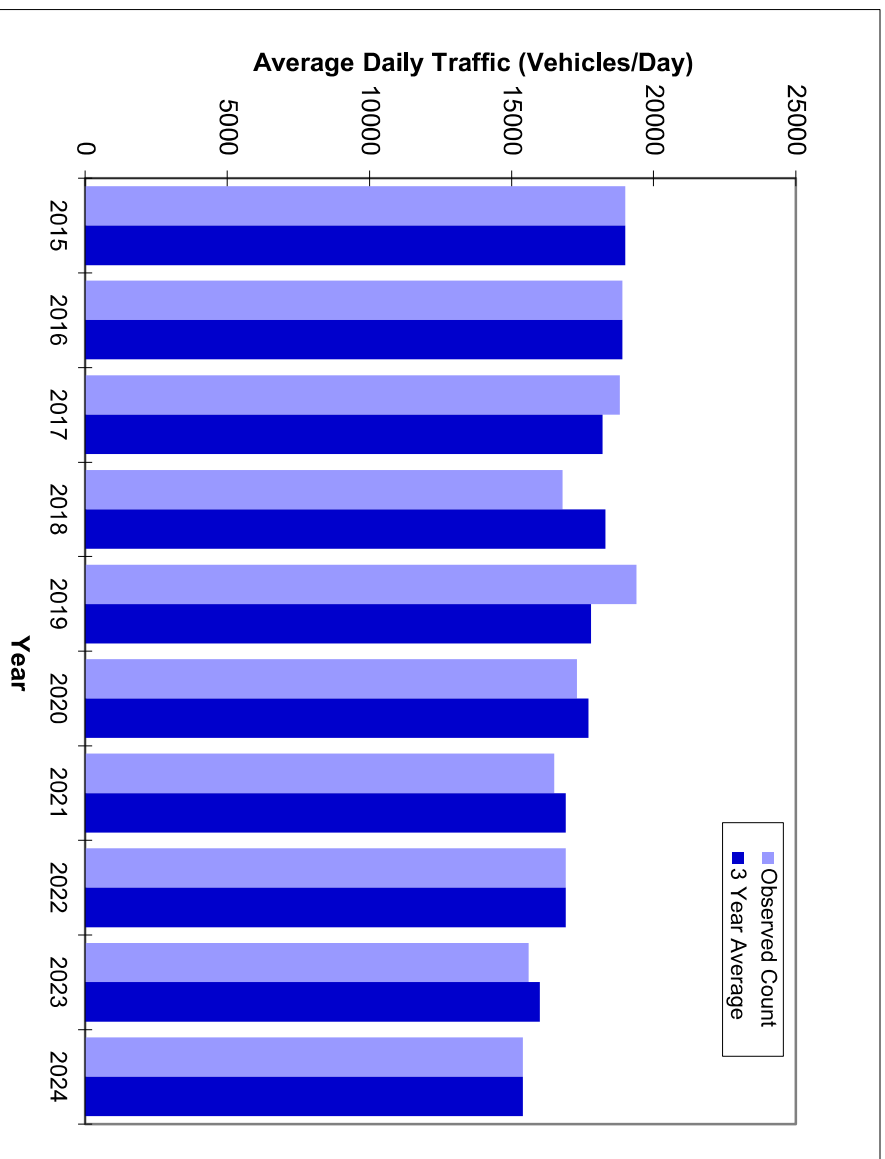
*Axle-Adjusted

Traffic Trends - V2023

7 ST -- 17TH ST, 200' EAST OF MERIDIAN AVE (2011 OFF SYSTEM CYCLE)

FM #	1234
Location	1

County:	Miami-Dade (87)
Station #:	878531
Roadway:	17 ST



Actual AADT vs 3 Year Average	

Year	Traffic (ADT/AADT)	
	Count*	3 Yr Avg
2015	19,000	19,000
2016	18,900	18,900
2017	18,800	18,200
2018	16,800	18,300
2019	19,400	17,800
2020	17,300	17,700
2021	16,500	16,900
2022	16,900	16,900
2023	15,600	16,000
2024	15,400	15,400

* Axle-Adjusted

FLORIDA DEPARTMENT OF TRANSPORTATION
 TRANSPORTATION STATISTICS OFFICE
 2024 HISTORICAL AADT REPORT

COUNTY : 87 - MIAMI-DADE

SITE : 8414 - WASHINGTON AVE, 200 FT N OF 12 ST (2011 OFF SYSTEM CYCLE)

YEAR	AADT	DIRECTION 1	DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR			
2024	14600	C	N	7000	S	7600	9.00	52.70	3.60
2023	15400	C	N	7000	S	8400	9.00	63.10	4.30
2022	15100	C	N	7000	S	8100	9.00	56.50	4.20
2021	14200	C	N	6500	S	7700	9.00	55.00	3.30
2020	14100	C	N	7100	S	7000	9.00	56.00	10.70
2019	23000	C	N	11000	S	12000	9.00	56.00	2.40
2018	20400	C	N	11500	S	8900	9.00	54.30	2.50
2017	20200	C	N	9200	S	11000	9.00	59.30	2.40
2016	20800	C	N	9800	S	11000	9.00	56.10	1.90
2015	20300	C	N	9800	S	10500	9.00	57.40	17.50
2014	21000	C	N	10000	S	11000	9.00	59.30	13.90
2013	18700	F	N	9200	S	9500	9.00	58.90	16.20
2012	18700	C	N	9200	S	9500	9.00	59.70	16.00

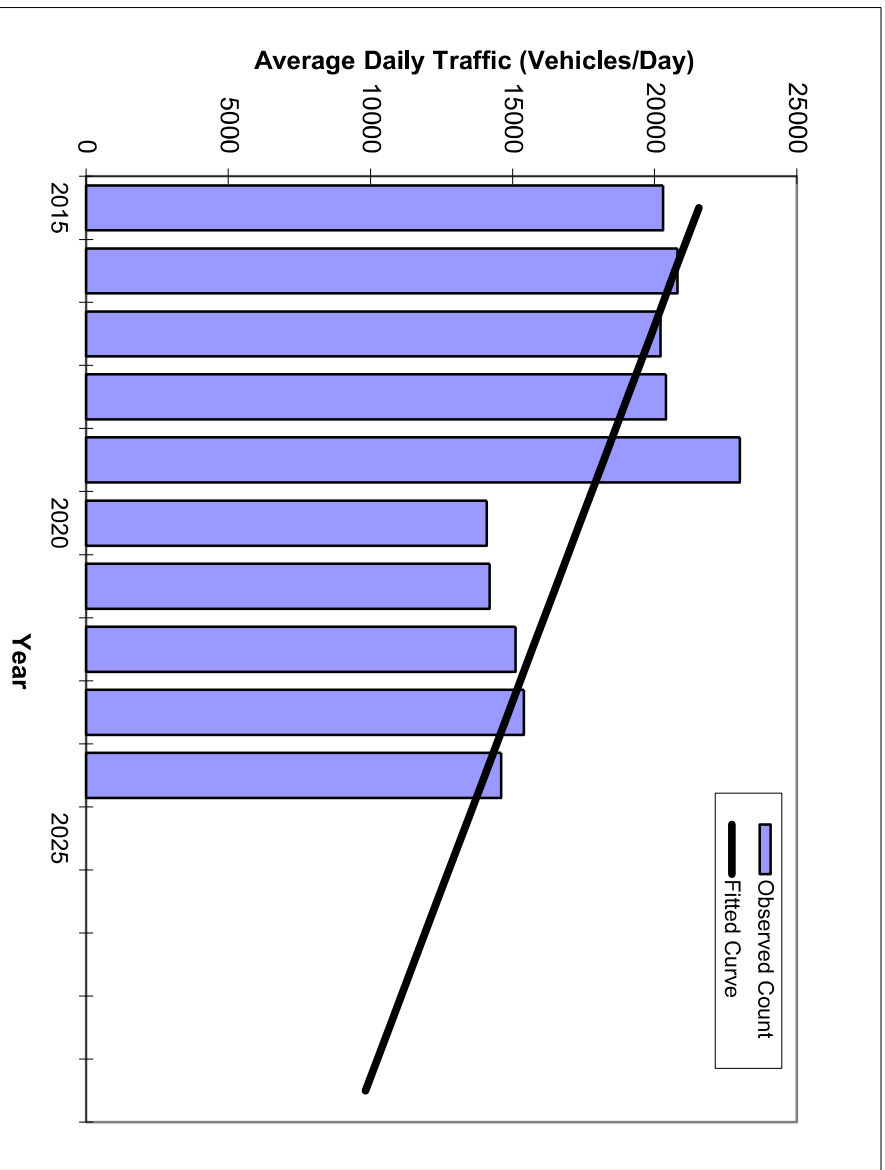
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 *K FACTOR : STARTING WITH YEAR 2011 IS STANDARD, PRIOR YEARS ARE K30 VALUES

Traffic Trends - V2023

ASHINGTON AVE -- WASHINGTON AVE, 200 FT N OF 12 ST (2011 OFF SYSTEM CYCL

FM #	1234
Location	1

County:	Miami-Dade (87)
Station #:	878414
Roadway:	WASHINGTON AVE



Annual Trend Decrease:	838
Trend R-squared:	82.13%
Trend Annual Historic Growth Rate:	-3.89%
Trend Growth Rate (2024 to Design Year)	-5.98%
Printed:	1/6/2026

Linear Growth Option

Year	Traffic (ADT/AADT)	
	Count*	Trend
2015	20,300	21,560
2016	20,800	20,720
2017	20,200	19,890
2018	20,400	19,050
2019	23,000	18,210
2020	14,100	17,370
2021	14,200	16,530
2022	15,100	15,690
2023	15,400	14,860
2024	14,600	14,020
2026 Opening Year Trend		
2026	N/A	12,340
2027 Interim Year Trend		
2027	N/A	11,500
2029 Design Year Trend		
2029	N/A	9,830
FSUTMS Forecasts/Trends		

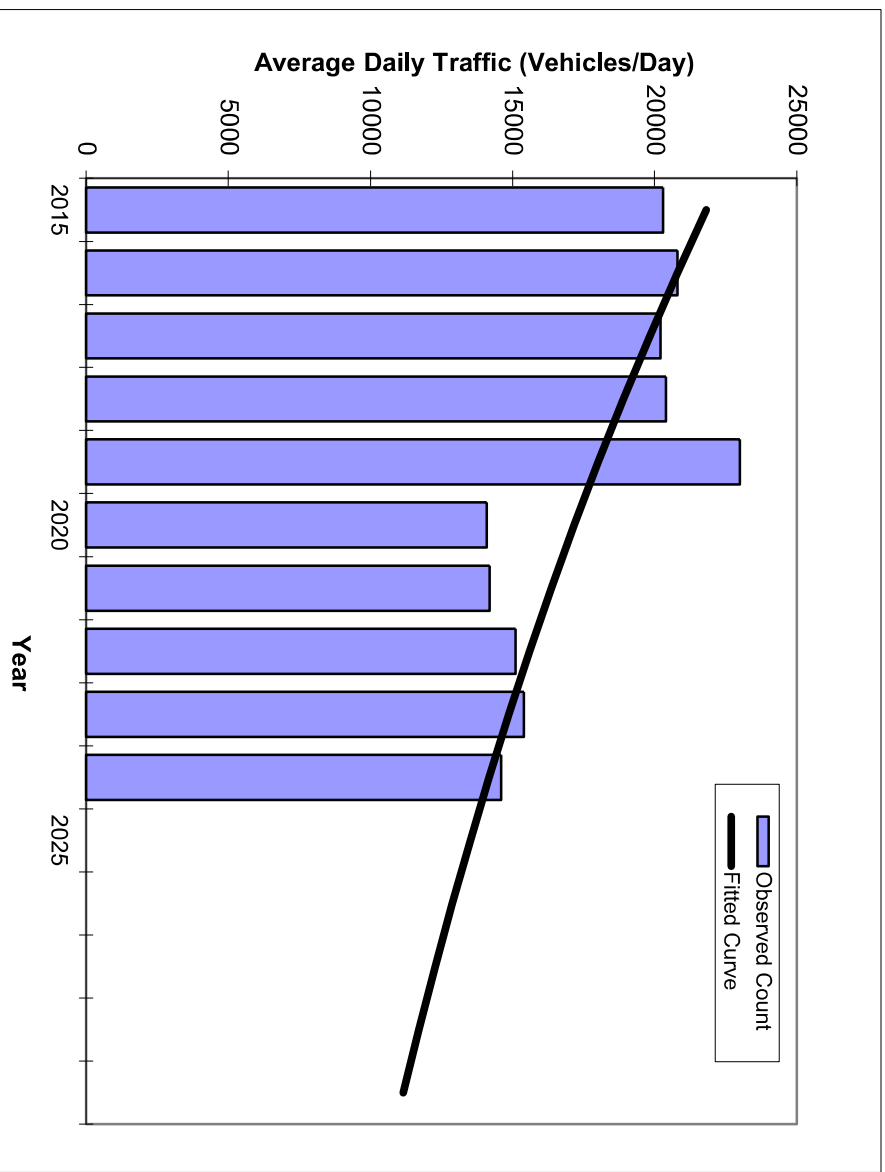
*Axle-Adjusted

Traffic Trends - V2023

ASHINGTON AVE -- WASHINGTON AVE, 200 FT N OF 12 ST (2011 OFF SYSTEM CYCL

FM #	1234
Location	1

County:	Miami-Dade (87)
Station #:	878414
Roadway:	WASHINGTON AVE



Trend R-squared:	82.30%
Compounded Annual Historic Growth Rate:	-4.68%
Compounded Growth Rate (2024 to Design Year)	-4.68%
Printed:	1/6/2026

Exponential Growth Option

Year	Traffic (ADT/AADT)	
	Count*	Trend
2015	20,300	21,820
2016	20,800	20,800
2017	20,200	19,830
2018	20,400	18,900
2019	23,000	18,010
2020	14,100	17,170
2021	14,200	16,370
2022	15,100	15,600
2023	15,400	14,870
2024	14,600	14,180
2025	-	-
2026	-	-
2027	-	-
2028	-	-
2029	-	-
2030	-	-

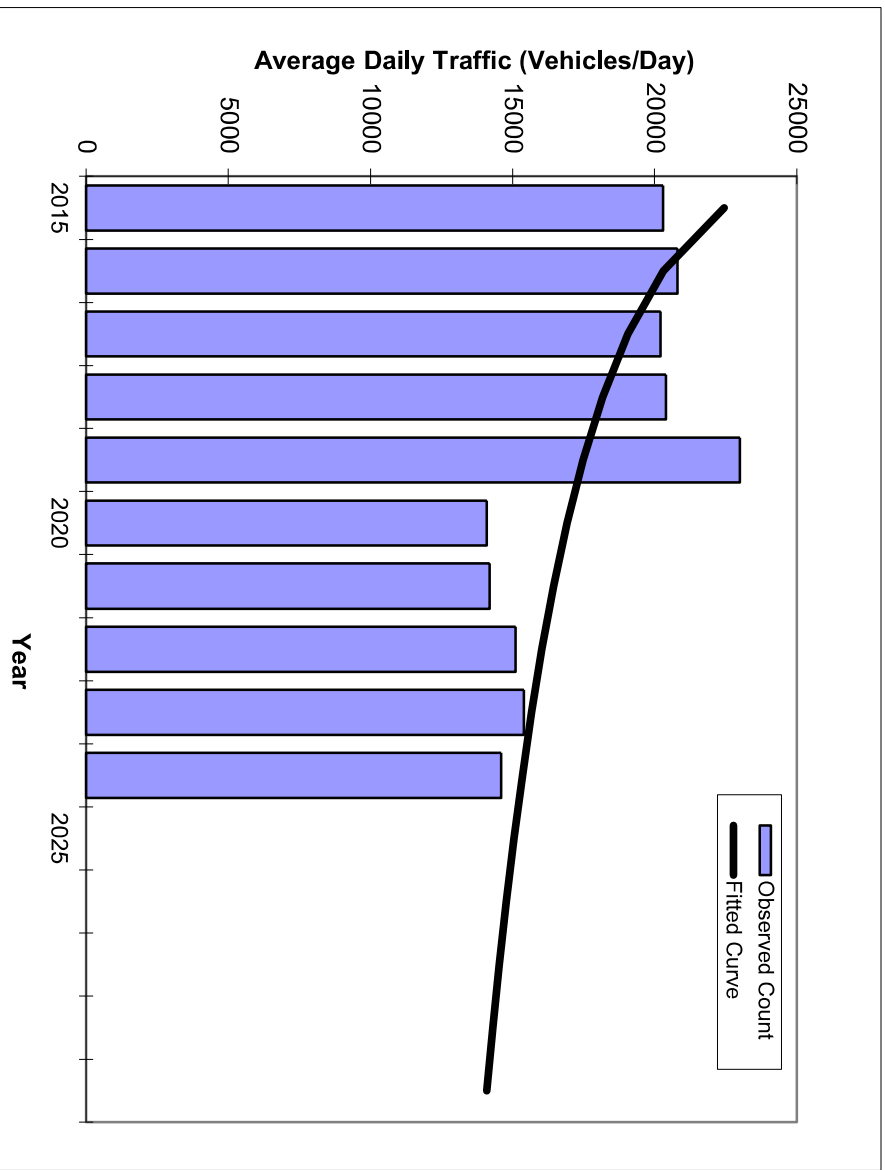
*Axle-Adjusted

Traffic Trends - V2023

ASHINGTON AVE -- WASHINGTON AVE, 200 FT N OF 12 ST (2011 OFF SYSTEM CYCL

FM #	1234
Location	1

County:	Miami-Dade (87)
Station #:	878414
Roadway:	WASHINGTON AVE



Trend R-squared:	65.27%
Compounded Annual Historic Growth Rate:	-4.14%
Compounded Growth Rate (2024 to Design Year)	-1.70%
Printed:	1/6/2026

Decaying Exponential Growth Option

Year	Traffic (ADT/AADT)	
	Count*	Trend
2015	20,300	22,450
2016	20,800	20,310
2017	20,200	19,060
2018	20,400	18,170
2019	23,000	17,480
2020	14,100	16,920
2021	14,200	16,450
2022	15,100	16,030
2023	15,400	15,670
2024	14,600	15,350
2026 Opening Year Trend		
2026	N/A	14,780
2027 Interim Year Trend		
2027	N/A	14,540
2029 Design Year Trend		
2029	N/A	14,090
FSUTMS Forecasts/Trends		

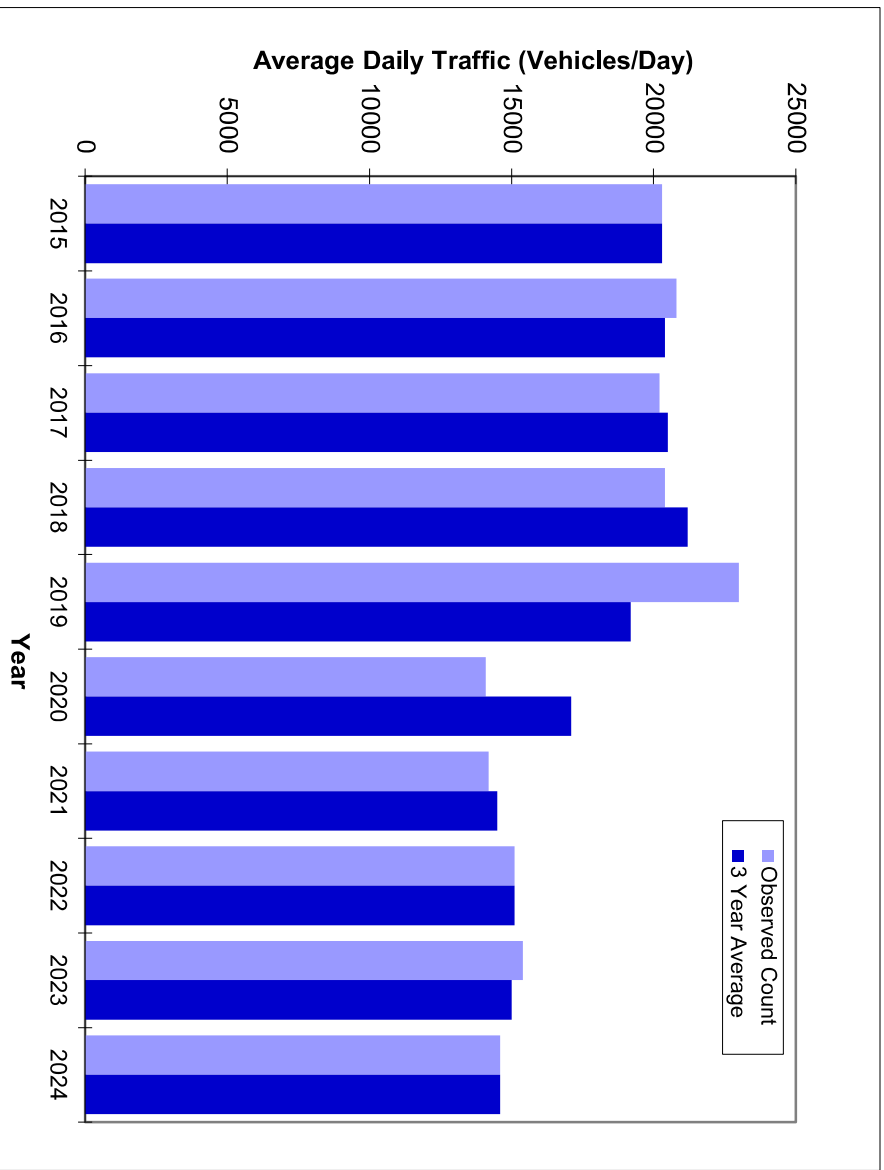
*Axle-Adjusted

Traffic Trends - V2023

ASHINGTON AVE -- WASHINGTON AVE, 200 FT N OF 12 ST (2011 OFF SYSTEM CYCL

FM #	1234
Location	1

County:	Miami-Dade (87)
Station #:	878414
Roadway:	WASHINGTON AVE



Actual AADT vs 3 Year Average	
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Year	Traffic (ADT/AADT)	
	Count*	3 Yr Avg
2015	20,300	20,300
2016	20,800	20,400
2017	20,200	20,500
2018	20,400	21,200
2019	23,000	19,200
2020	14,100	17,100
2021	14,200	14,500
2022	15,100	15,100
2023	15,400	15,000
2024	14,600	14,600

*Axle-Adjusted

FLORIDA DEPARTMENT OF TRANSPORTATION
 TRANSPORTATION STATISTICS OFFICE
 2024 HISTORICAL AADT REPORT

COUNTY : 87 - MIAMI-DADE

SITE : 8567 - 16 ST, 200' EAST OMERIDIAN AVE (2011 OFF SYSTEM CYCLE)

YEAR	AADT	DIRECTION 1	DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR
2024	6400	F	E	9.00	52.70	3.80
2023	6400	C	W	9.00	63.10	3.70
2022	4700	T	W	9.00	56.50	3.50
2021	4500	S	W	9.00	55.00	2.90
2020	4700	F	W	9.00	56.00	4.40
2019	5300	C	W	9.00	56.00	4.00
2018	7800	T	W	9.00	54.30	3.00
2017	8700	S	W	9.00	59.30	2.50
2016	8900	F	W	9.00	56.10	5.10
2015	9100	C	W	9.00	57.40	7.10
2014	9700	S	W	9.00	59.30	10.70
2013	9800	F	W	9.00	58.90	16.20
2012	9900	C	W	9.00	59.70	16.00

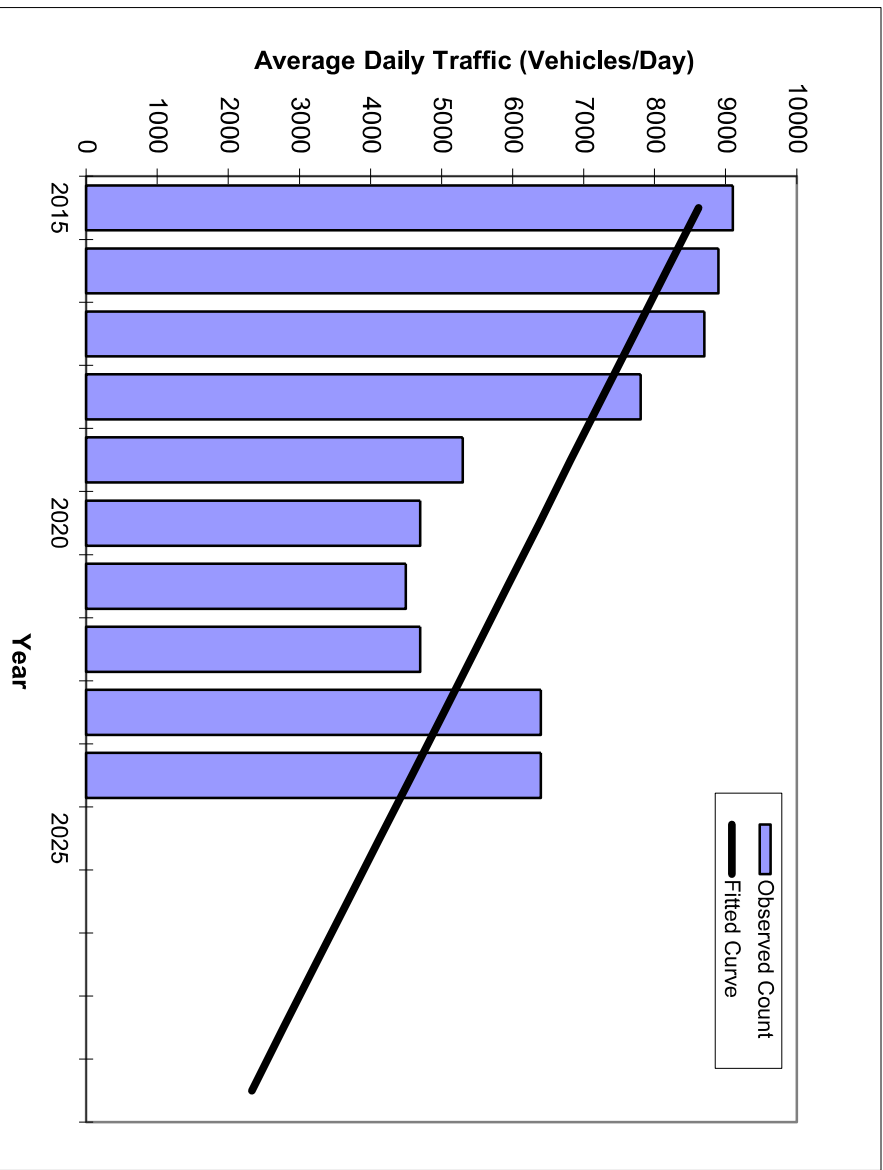
AADT FLAGS : C = COMPUTED; E = MANUAL ESTIMATE; F = FIRST YEAR ESTIMATE
 S = SECOND YEAR ESTIMATE; T = THIRD YEAR ESTIMATE; R = FOURTH YEAR ESTIMATE
 V = FIFTH YEAR ESTIMATE; 6 = SIXTH YEAR ESTIMATE; X = UNKNOWN
 *K FACTOR : STARTING WITH YEAR 2011 IS STANDARD, PRIOR YEARS ARE K30 VALUES

Traffic Trends - V2023

16 ST -- 16 ST, 200' EAST OF MERIDIAN AVE (2011 OFF SYSTEM CYCLE)

FM #	1234
Location	1

County:	Miami-Dade (87)
Station #:	878567
Roadway:	16 ST



Annual Trend Decrease:	450
Trend R-squared:	60.32%
Trend Annual Historic Growth Rate:	-5.21%
Trend Growth Rate (2024 to Design Year)	-9.83%
Printed:	1/6/2026

Linear Growth Option

Year	Traffic (ADT/AADT)	
	Count*	Trend
2015	9,100	8,620
2016	8,900	8,170
2017	8,700	7,720
2018	7,800	7,270
2019	5,300	6,820
2020	4,700	6,380
2021	4,500	5,930
2022	4,700	5,480
2023	6,400	5,030
2024	6,400	4,580
2026 Opening Year Trend		
2026	N/A	3,680
2027 Interim Year Trend		
2027	N/A	3,230
2029 Design Year Trend		
2029	N/A	2,330
FSUTMS Forecasts/Trends		

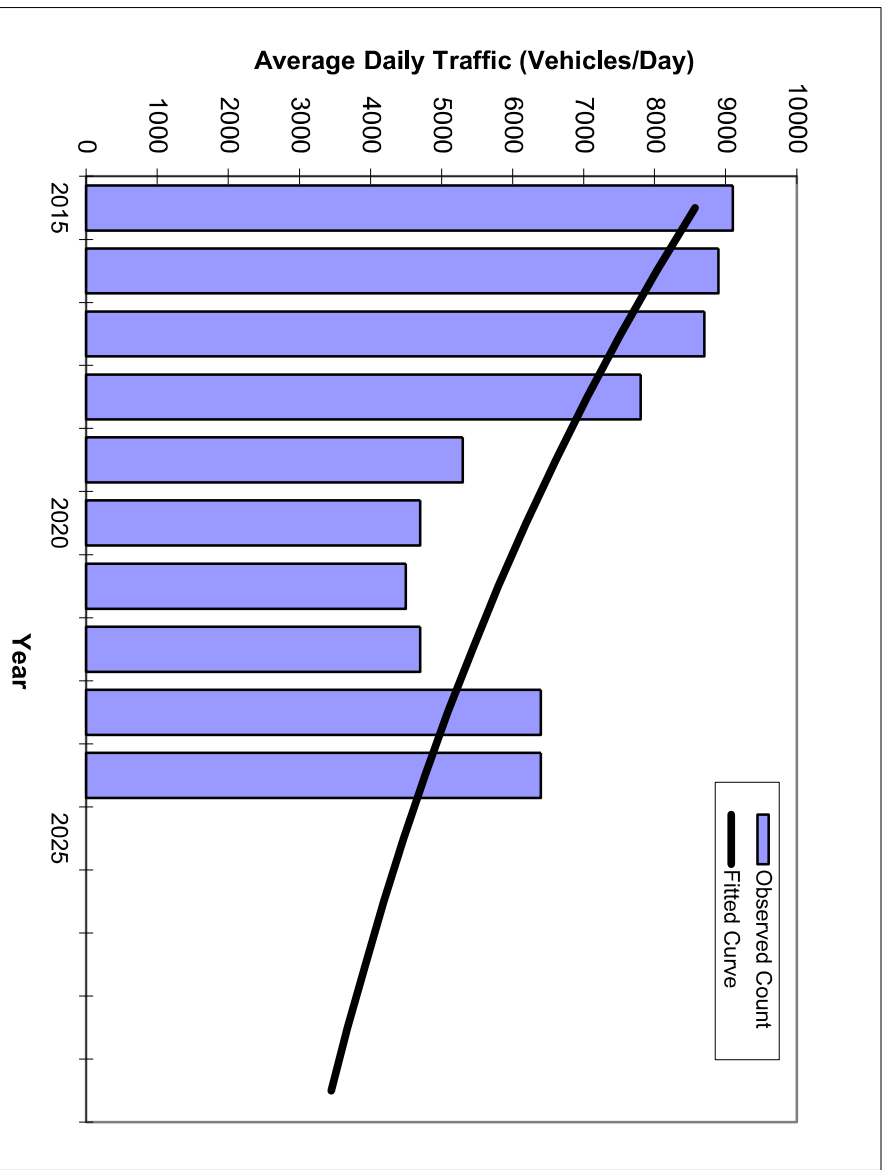
*Axle-Adjusted

Traffic Trends - V2023

16 ST -- 16 ST, 200' EAST OF MERIDIAN AVE (2011 OFF SYSTEM CYCLE)

FM #	1234
Location	1

County:	Miami-Dade (87)
Station #:	878567
Roadway:	16 ST



Trend R-squared:	54.93%
Compounded Annual Historic Growth Rate:	-6.30%
Compounded Growth Rate (2024 to Design Year)	-6.27%
Printed:	1/6/2026

Exponential Growth Option

Year	Traffic (ADT/AADT)	
	Count*	Trend
2015	9,100	8,570
2016	8,900	8,030
2017	8,700	7,520
2018	7,800	7,050
2019	5,300	6,610
2020	4,700	6,190
2021	4,500	5,800
2022	4,700	5,440
2023	6,400	5,090
2024	6,400	4,770

2026 Opening Year Trend		
2026	N/A	4,190
2027 Interim Year Trend		
2027	N/A	3,930
2029 Design Year Trend		
2029	N/A	3,450
FSUTMS Forecasts/Trends		

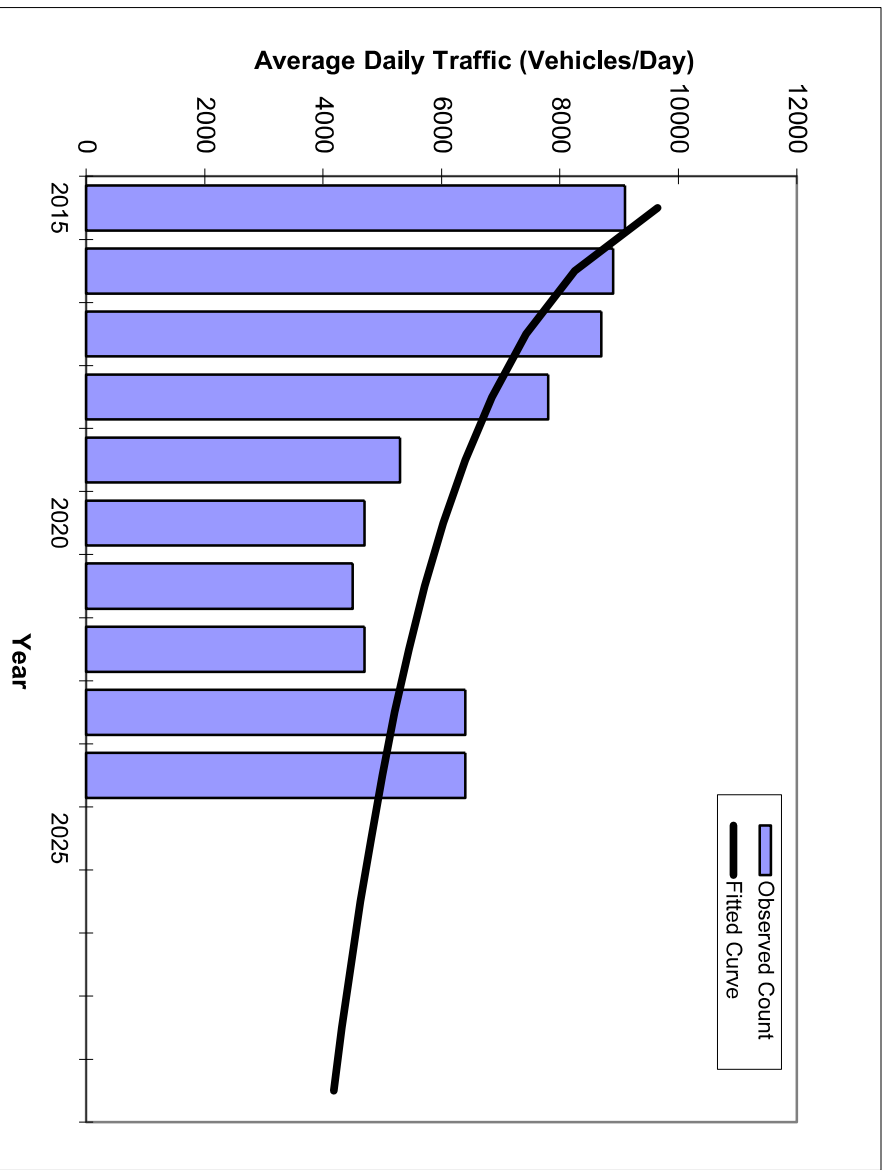
*Axle-Adjusted

Traffic Trends - V2023

16 ST -- 16 ST, 200' EAST OF MERIDIAN AVE (2011 OFF SYSTEM CYCLE)

FM #	1234
Location	1

County:	Miami-Dade (87)
Station #:	878567
Roadway:	16 ST



Trend R-squared:	71.23%
Compounded Annual Historic Growth Rate:	-7.05%
Compounded Growth Rate (2024 to Design Year)	-3.52%
Printed:	1/6/2026

Decaying Exponential Growth Option

Year	Traffic (ADT/AADT)	
	Count*	Trend
2015	9,100	9,650
2016	8,900	8,250
2017	8,700	7,430
2018	7,800	6,850
2019	5,300	6,400
2020	4,700	6,030
2021	4,500	5,720
2022	4,700	5,450
2023	6,400	5,210
2024	6,400	5,000
2026 Opening Year Trend		
2026	N/A	4,630
2027 Interim Year Trend		
2027	N/A	4,470
2029 Design Year Trend		
2029	N/A	4,180
FSUTMS Forecasts/Trends		

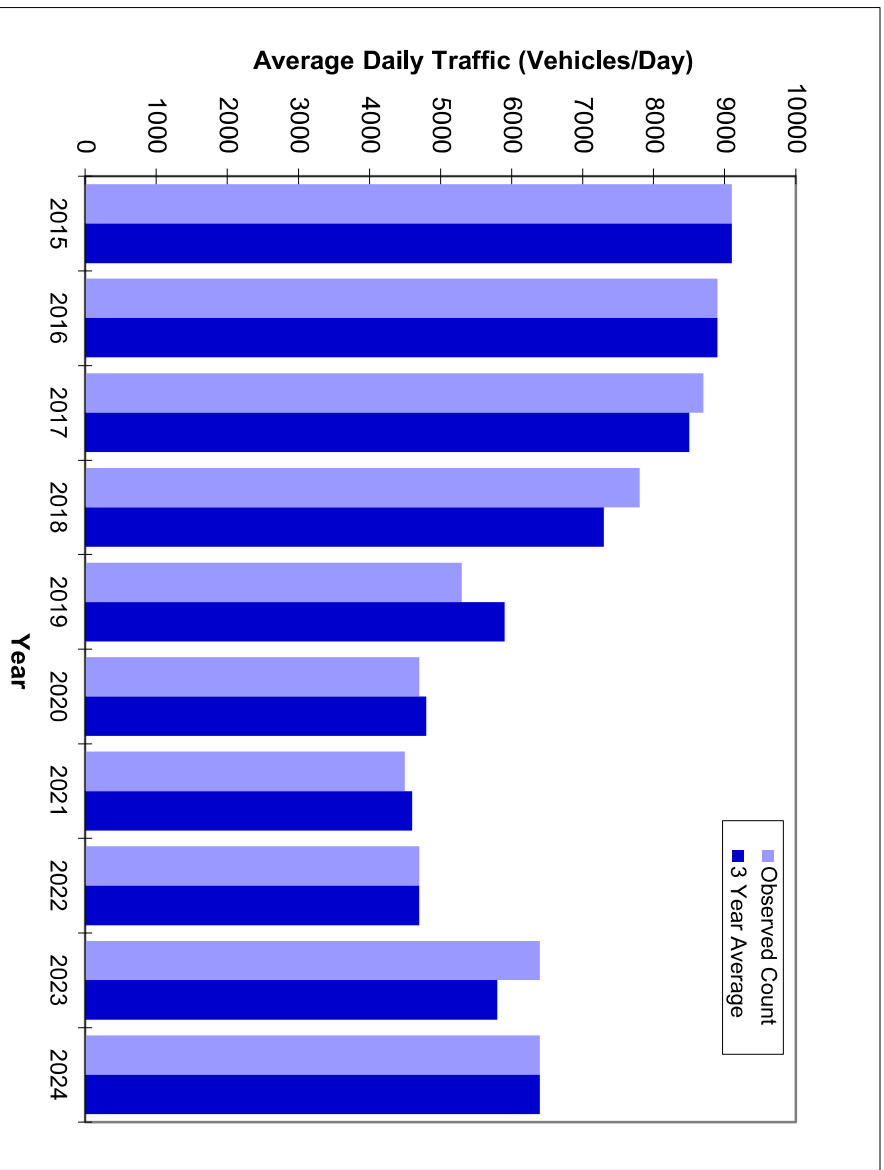
*Axle-Adjusted

Traffic Trends - V2023

16 ST -- 16 ST, 200' EAST OF MERIDIAN AVE (2011 OFF SYSTEM CYCLE)

FM #	1234
Location	1

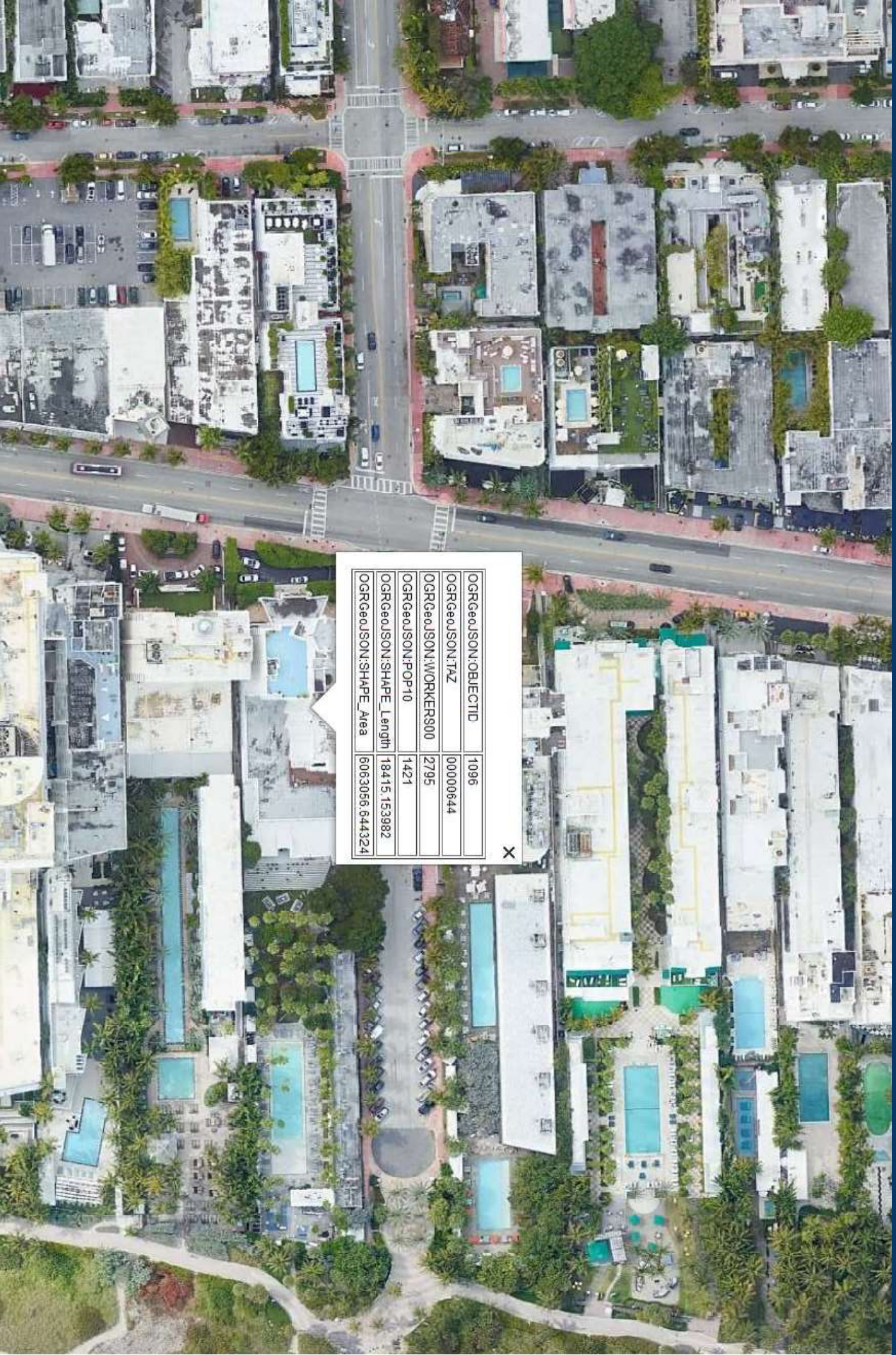
County:	Miami-Dade (87)
Station #:	878567
Roadway:	16 ST



Actual AADT vs 3 Year Average	

Year	Traffic (ADT/AADT)	
	Count*	3 Yr Avg
2015	9,100	9,100
2016	8,900	8,900
2017	8,700	8,500
2018	7,800	7,300
2019	5,300	5,900
2020	4,700	4,800
2021	4,500	4,600
2022	4,700	4,700
2023	6,400	5,800
2024	6,400	6,400

*Axle-Adjusted



OGRGeOJSON:OBJECTID	1096
OGRGeOJSON:TAZ	000000644
OGRGeOJSON:WORKERS00	2795
OGRGeOJSON:POP10	1421
OGRGeOJSON:SHAPE_Length	18415.153982
OGRGeOJSON:SHAPE_Area	6063056.644324

Miami-Dade 2015 Base Year Direction Trip Distribution Summary											
TAZ of Origin		Trips / Percent	Cardinal Directions								Total Trips
County TAZ	Regional TAZ		NNE	ENE	ESE	SSE	SSW	WSW	WNW	NNW	
625	3525	Trips	610	160	-	557	431	1,317	679	1,035	4,961
625	3525	Percent	12.7	3.3	-	11.6	9.0	27.5	14.2	21.6	
626	3526	Trips	122	-	-	-	2,090	2,277	1,198	2,942	9,399
626	3526	Percent	1.4	-	-	-	24.2	26.4	13.9	34.1	
627	3527	Trips	279	-	-	-	2,051	2,578	845	1,965	8,061
627	3527	Percent	3.6	-	-	-	26.6	33.4	11.0	25.5	
628	3528	Trips	298	-	49	79	984	902	332	679	3,579
628	3528	Percent	9.0	-	1.5	2.4	29.6	27.2	10.0	20.5	
629	3529	Trips	1,374	549	344	1,656	1,708	3,707	1,668	2,101	14,261
629	3529	Percent	10.5	4.2	2.6	12.6	13.0	28.3	12.7	16.0	
630	3530	Trips	952	-	210	347	1,696	2,375	794	1,114	8,135
630	3530	Percent	12.7	-	2.8	4.6	22.7	31.7	10.6	14.9	
631	3531	Trips	255	-	-	-	1,215	1,471	440	1,030	4,651
631	3531	Percent	5.8	-	-	-	27.6	33.4	10.0	23.4	
632	3532	Trips	309	-	-	-	1,242	1,751	750	635	4,880
632	3532	Percent	6.6	-	-	-	26.5	37.4	16.0	13.5	
633	3533	Trips	310	-	-	-	1,181	1,428	750	730	4,590
633	3533	Percent	7.0	-	-	-	26.9	32.5	17.1	16.6	
634	3534	Trips	1,502	112	240	837	1,718	1,928	976	1,727	9,998
634	3534	Percent	16.6	1.2	2.7	9.3	19.0	21.3	10.8	19.1	
635	3535	Trips	779	-	-	-	2,021	1,994	952	1,411	8,010
635	3535	Percent	10.9	-	-	-	28.2	27.9	13.3	19.7	
636	3536	Trips	1,041	-	-	686	1,152	2,072	911	1,071	7,384
636	3536	Percent	15.0	-	-	9.9	16.6	29.9	13.1	15.4	
637	3537	Trips	323	31	87	217	126	601	303	290	1,987
637	3537	Percent	16.4	1.6	4.4	11.0	6.4	30.4	15.3	14.7	
638	3538	Trips	152	35	87	86	114	218	162	126	999
638	3538	Percent	15.5	3.6	8.9	8.7	11.6	22.3	16.5	12.9	
639	3539	Trips	825	281	277	1,089	131	1,364	796	599	5,721
639	3539	Percent	15.4	5.2	5.2	20.3	2.4	25.4	14.9	11.2	
640	3540	Trips	344	247	868	104	43	685	405	274	3,053
640	3540	Percent	11.6	8.3	29.2	3.5	1.5	23.1	13.6	9.2	
641	3541	Trips	1,051	1,714	291	723	309	1,572	1,188	916	8,356
641	3541	Percent	13.5	22.1	3.7	9.3	4.0	20.3	15.3	11.8	
642	3542	Trips	1,849	1,404	115	1,263	457	2,697	1,962	1,518	12,299
642	3542	Percent	16.4	12.5	1.0	11.2	4.1	23.9	17.4	13.5	
643	3543	Trips	1,747	551	-	965	479	2,595	1,554	1,715	10,383
643	3543	Percent	18.2	5.7	-	10.1	5.0	27.0	16.2	17.9	
644	3544	Trips	2,022	-	-	-	2,250	4,141	2,585	2,646	15,224
644	3544	Percent	14.8	-	-	-	16.5	30.4	19.0	19.4	
645	3545	Trips	1,268	-	-	-	907	1,498	1,720	1,351	7,018
645	3545	Percent	18.8	-	-	-	13.5	22.2	25.5	20.0	
646	3546	Trips	986	-	156	520	250	1,081	1,094	1,181	5,470
646	3546	Percent	18.7	-	3.0	9.9	4.7	20.5	20.8	22.4	
647	3547	Trips	350	103	114	165	66	354	359	408	1,979
647	3547	Percent	18.2	5.4	5.9	8.6	3.5	18.5	18.7	21.2	
648	3548	Trips	1,027	434	254	401	48	903	1,001	514	4,747
648	3548	Percent	22.4	9.5	5.5	8.8	1.0	19.7	21.9	11.2	
649	3549	Trips	754	192	184	230	41	612	743	427	3,320
649	3549	Percent	23.7	6.0	5.8	7.2	1.3	19.2	23.3	13.4	
650	3550	Trips	45	80	104	0	14	155	304	133	850
650	3550	Percent	5.4	9.6	12.4	0.0	1.6	18.5	36.5	16.0	

Miami-Dade 2045 Cost Feasible Plan Direction Trip Distribution Summary												
TAZ of Origin		Trips / Percent	Cardinal Directions								Total Trips	
County TAZ	Regional TAZ		NNE	ENE	ESE	SSE	SSW	WSW	WNW	NNW		
625	3525	Trips	515	114	-	541	802	1,791	829	1,096	5,972	
625	3525	Percent	9.1	2.0	-	9.5	14.1	31.5	14.6	19.3		
626	3526	Trips	66	-	-	-	2,417	3,260	1,417	2,993	11,237	
626	3526	Percent	0.7	-	-	-	23.8	32.1	14.0	29.5		
627	3527	Trips	174	-	-	-	2,276	3,212	1,138	1,885	9,055	
627	3527	Percent	2.0	-	-	-	26.2	37.0	13.1	21.7		
628	3528	Trips	238	-	23	101	1,053	1,266	390	660	4,028	
628	3528	Percent	6.4	-	0.6	2.7	28.2	33.9	10.5	17.7		
629	3529	Trips	1,686	621	373	1,692	1,801	6,032	2,362	2,490	18,425	
629	3529	Percent	9.9	3.6	2.2	9.9	10.6	35.4	13.9	14.6		
630	3530	Trips	888	-	326	303	1,717	3,876	1,515	1,553	11,277	
630	3530	Percent	8.7	-	3.2	3.0	16.9	38.1	14.9	15.3		
631	3531	Trips	296	-	-	-	1,351	2,360	838	1,324	6,591	
631	3531	Percent	4.8	-	-	-	21.9	38.3	13.6	21.5		
632	3532	Trips	343	-	-	-	1,500	2,647	1,390	1,098	7,499	
632	3532	Percent	4.9	-	-	-	21.5	37.9	19.9	15.7		
633	3533	Trips	368	-	-	-	1,052	1,986	859	841	5,391	
633	3533	Percent	7.2	-	-	-	20.6	38.9	16.8	16.5		
634	3534	Trips	1,404	80	149	773	1,637	2,733	1,332	1,712	10,593	
634	3534	Percent	14.3	0.8	1.5	7.9	16.7	27.8	13.6	17.4		
635	3535	Trips	566	-	-	-	1,311	2,266	1,228	1,254	7,246	
635	3535	Percent	8.5	-	-	-	19.8	34.2	18.5	18.9		
636	3536	Trips	1,066	-	-	607	978	3,045	1,398	1,193	8,805	
636	3536	Percent	12.9	-	-	7.3	11.8	36.8	16.9	14.4		
637	3537	Trips	468	44	144	315	198	868	501	309	2,865	
637	3537	Percent	16.5	1.6	5.1	11.1	6.9	30.5	17.6	10.9		
638	3538	Trips	127	33	78	94	79	401	285	185	1,342	
638	3538	Percent	9.9	2.6	6.1	7.3	6.2	31.3	22.2	14.5		
639	3539	Trips	944	303	253	1,068	176	2,395	1,085	905	7,569	
639	3539	Percent	13.2	4.3	3.6	15.0	2.5	33.6	15.2	12.7		
640	3540	Trips	119	74	216	10	30	177	136	147	1,166	
640	3540	Percent	13.1	8.2	23.7	1.1	3.4	19.4	14.9	16.2		
641	3541	Trips	1,145	1,056	206	569	242	2,378	1,724	1,142	9,066	
641	3541	Percent	13.5	12.5	2.4	6.7	2.9	28.1	20.4	13.5		
642	3542	Trips	1,701	1,196	113	964	433	3,470	2,140	1,631	12,324	
642	3542	Percent	14.6	10.3	1.0	8.3	3.7	29.8	18.4	14.0		
643	3543	Trips	1,884	580	-	1,133	631	3,768	2,190	2,157	13,183	
643	3543	Percent	15.3	4.7	-	9.2	5.1	30.5	17.7	17.5		
644	3544	Trips	1,948	-	-	-	2,227	5,534	3,264	3,082	17,780	
644	3544	Percent	12.1	-	-	-	13.9	34.5	20.3	19.2		
645	3545	Trips	1,314	-	-	-	844	1,661	2,170	1,703	8,075	
645	3545	Percent	17.1	-	-	-	11.0	21.6	28.2	22.1		
646	3546	Trips	1,025	-	125	496	263	1,741	1,656	1,299	6,976	
646	3546	Percent	15.5	-	1.9	7.5	4.0	26.4	25.1	19.7		
647	3547	Trips	296	122	96	109	79	582	661	405	2,490	
647	3547	Percent	12.6	5.2	4.1	4.6	3.4	24.8	28.1	17.3		
648	3548	Trips	943	278	128	313	73	1,525	1,351	576	5,397	
648	3548	Percent	18.2	5.4	2.5	6.0	1.4	29.4	26.0	11.1		
649	3549	Trips	643	120	121	216	43	873	952	508	3,661	
649	3549	Percent	18.5	3.4	3.5	6.2	1.3	25.1	27.4	14.6		
650	3550	Trips	60	71	65	8	14	279	312	136	969	
650	3550	Percent	6.4	7.5	6.9	0.9	1.5	29.5	33.0	14.4		

Transportation Users' Attitudes and Choices of Ride-Hailing Services in Two Cities with Different Attributes

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Abstract

The rapid technological developments in the 21st century created new opportunities for shared-use economy applications around the globe. Among other services, Transportation Network Companies (TNCs) like Uber and Lyft emerged in the US as a transportation alternative that offered a higher level of availability, reliability, and convenience than traditional modes. However, TNCs deployment was also blamed for increases in vehicle miles traveled (VMT) in large cities that embraced TNC services early on. Concerns about TNC adoption are also magnified by the current controversy in policy and legislation as to the regulation of TNCs. These new realizations create a need to examine the transportation users' attitudes and perceptions regarding ride-hailing service, after nearly a decade of service in the United States market. In doing so, this paper compares and contrasts results from two recently completed studies aiming at creating links between socio-demographic factors and TNC use. The paper describes the methods employed to collect the data and presents findings from the analysis of 790 users' responses in the Birmingham, AL and Miami Beach, FL markets. The study documents preferences and attitudes toward TNCs and highlights similarities and differences in travel behaviors related to local considerations. Moreover, the study uses the Least Absolute Shrinkage and Selection Operator (Lasso) method to identify predictors for TNC use based on the users' responses in Birmingham and Miami Beach case studies. Vehicle availability and waiting time emerged as the only significant predictors for the Birmingham region whereas vehicle ownership, vehicle use, residency, and prior use of transit and TNC were some of the predictors identified for the Miami Beach area. Understanding the characteristics of TNC users and the leading reasons that drive people towards the use of TNCs services is expected to help transportation agencies

and TNC providers in their efforts to plan for transportation services that meet customer needs in the future.

Keywords

Transportation Network Companies (TNC), Ride-Hailing, Travel Behavior, Mode Choice, Survey, Birmingham, Miami Beach

1. Introduction

Transportation Network Companies (TNCs) such as Uber and Lyft are smart-phone app-based ride-hailing services that have grown rapidly over the past decade. Such services match passengers with drivers using online enabled platforms. The launch of TNC services took place in 2009, when Uber (formerly known as UberCab) introduced the service in the San Francisco area [1]. Soon after, TNCs made their appearance in various other markets across the US, thus adding transportation options that competed or complemented available transportation services. The promise to save time, increase affordability and convenience, reduce stress, and the lack of need to own and use a personal automobile has been appealing to many customers who embraced TNC services, especially in large metropolitan areas. Among available TNCs in the US market, Uber is the market leader with 65% market share.

In addition to providing user benefits, TNCs were initially perceived as a solution for urban congestion. However, in several cities in the United States (US) where these companies operate, TNCs failed to deliver on this promise. In fact, recent studies from heavily congested cities in the US have reported that TNCs took over part of the transit ridership rather than promoting ridesharing among solo drivers. To make things worse, Uber- or Lyft vehicles waiting for rides contributed to increased Vehicle Miles Traveled (VMT) and urban pollution. In addition, TNCs have been involved in regulatory and policy challenges, mainly because of the controversial aggressive models of market entry and the pushback from regulated for-hire transport industry [2].

A number of recent studies explored the emerging trend of TNC services as a mode of transportation. A concise summary is available by Sisiopiku *et al.* in [3]. Shaheen (2018) discussed the recent cultural shift from the auto-dependency to shared mobility and the impact of such shift on the growth of ride-hailing services such as Uber and Lyft [4]. Several studies attempted to define TNC market characteristics using surveys. These studies showed great variations in their findings depending on the geographical locations and the surveyed user demographics. For instance, studies conducted in large metropolitan areas like Boston, Chicago, Los Angeles, New York, San Francisco, Seattle and Washington D.C. showed that the typical TNC user is 18 - 29 years of age and possesses an advanced degree [5]. However, TNC users in cities like Pittsburgh and Puget where predominantly 34 - 44 years old and holding Bachelors' degrees [6] [7].

Cirella *et al.* (2017) examined the differences in travel mode choice between Millennials and Generation Xers in California using inputs from 2155 individuals. When compared to Gen Xers, Millennials were three times more likely to use Uber or Lyft [8]. With respect to older transportation users, Freund *et al.* (2020) suggested that door-to-door assistance service could increase the use of TNC service among 65+ years old population [9]. A survey of 380 TNC users in San Francisco conducted by Rayle *et al.* (2014) reported that 67% of responders used ridesourcing for social/leisure trips (bars, restaurants, concerts, friends/family visits) while only 16% used it for commuting purposes. Responders reported that their leaning towards TNCs was driven by the availability of a secure payment system with short wait time and 40% of TNC users in the San Francisco region reported using their private vehicle less due to the availability of on-demand mobility sharing services [10]. A national Pew Research Center survey of 4787 American adults in 2015 found only 15% of Americans had used ride-hailing apps, whereas one third had yet to even hear of them [11]. While the author did not find race or gender as influential factors in the use of these apps; age, education, income level and type of locale (*i.e.* urban, suburban, or rural) were all found to be strongly explanatory.

Overall, the literature review confirms that knowledge and utility of TNC services among travelers vary greatly in accordance to a vast array of socio-demographic variables, as with most new technology [11]. Moreover, systematic documentation of actual impacts of TNCs presence on the preferences and daily travel patterns of the transportation system users is still limited. This is due to the lack of availability of detailed data resulting from privacy concerns and resistance of TNC companies to share company data [12]. Thus, localized studies are of great value in order to document transportation users' attitudes and preferences and identify socio-demographic variables that influence the use of TNC services.

In light of this need, the objective of this study was to examine the impact of transportation users' choice preferences on the selection of ride-hailing services as a mobility option in the Southeast US. Using questionnaire responses from two different geo-locations in the Southeast (*i.e.*, Birmingham, Alabama and Miami Beach, Florida) the study documented and compared preferences and attitudes toward TNC use as a travel mode of choice. The study considered demographic data in the analysis and interpretation of the survey findings and the identification of indicators that affect the use of TNCs at the study locations.

2. Methodology and Data Collection

This study compared results from two surveys that collected and documented public perceptions related to ride-hailing services in two TNC markets; namely Birmingham, AL and Miami Beach, FL. The study builds on the authors' earlier work [12] that used a questionnaire survey to understand the leading reasons and conditions that drive people towards the use of TNCs services in the Birmingham Metro Area.

Both surveys were developed using the Qualtrics Research Core tool in accor-

dance with the Institute of Transportation Engineers Manual on Transportation Engineering (ITE) Studies guidelines [13]. Qualtrics LLC facilitated the identification and recruitment of survey participants and automated the data entry and management process. The research team obtained the survey responses from Qualtrics LLC and performed validation checks, data processing, and data analysis. All necessary approvals were obtained from the Institutional Review Board (IRB) for Human Use prior to conducting the surveys. For quality assurance, both questionnaires were pretested and refined prior to distribution.

The surveys sought to get information about users' attitudes towards using TNCs along with detailed socio-demographic such as age, gender, education level, and employment type. The demographic data were categorized based on the US Census criteria. The survey also requested participants to report detailed trip information for a typical day (*i.e.*, 24-hr travel diary) during a typical weekday including origin and destination of each trip, travel time, trip purpose and the travel mode used. Additionally, information related to vehicle ownership, alternate mode choices, and recommendations for future transportation improvements (including expansion of the TNC services) was solicited.

Participants were presented with simple multiple-choice questions with specified context and were asked to answer each question categorically based on the context. While some survey questions were identical or similar between the two study sites, others solicited inputs on issues of unique importance to each study site. For example, since Miami Beach Area is a popular tourist spot that is busy during the weekends, Miami Beach survey participants were asked to provide trip information for a typical weekend, in addition to a typical weekday. In addition, being an adult who is residing within the geographical area of interest was a requirement for participation in the Birmingham study, but not in the Miami Beach survey in order to allow for documentation of responses from tourists that visited the Miami Beach area for recreational purposes.

The collected responses were carefully checked and validated. After eliminating any surveys that included incomplete, duplicate, or irregular answers, 451 responses from the Birmingham area and 339 from the Miami Beach area were analyzed for a total of 790 surveys. It is important to note that out of the 339 respondents in Miami Beach Area, 71 (21%) were Miami Beach residents and the rest (79%) were visitors from the greater Miami area or out-of-city tourists. This allowed for examination of potential differences in the preferences and attitudes toward TNCs between residents and tourists in the Miami Beach case study. For a quick reference, **Table 1** summarizes characteristics of both study locations along with information relevant to the two surveys.

3. Data Analysis and Results

3.1. Descriptive Analysis

Population segmentation through demographic characteristics illustrates the size of potential TNC market in the selected study regions. Among the 451 responders from Birmingham and 339 from Miami Beach considered in the analysis, 342

and 204 respectively were women. Based on the responses provided in the Birmingham and Miami Beach surveys, more female than male travelers are TNC users where the female to male ratio is 74:26 and 55:44 respectively.

When considering the age of the survey participants, the largest percentage of participants in both the Miami Beach and Birmingham surveys represented the young adult age group. Inspection of the survey results confirmed that the peak age group for the overall survey correlated with the TNC users. **Figure 1** displays the distribution of the TNC users by age group.

Figure 2 shows the usage of modes other than private automobile in the past year for the survey participants. It can be observed that ride-hailing services were more popular (73% FL and 45% AL) than public transit service and organized ride sharing programs among the users in both the regions.

Table 1. Summary characteristics of study sites and survey responses.

	Birmingham, AL	Miami, FL
Population	1,141,309 capita (2016 Census)	88,885 capita (2019 Census)
Available Travel Modes	Private vehicle, bus, taxi, TNCs, bikes, carpool, vanpool	Private vehicle, bus, taxi, TNCs, bikes, carpool, vanpool, subway
Total Responses	451	339
Number of Self-reported trips	1130	878
Type of Respondents	100% residents	21% residents, 79% tourists

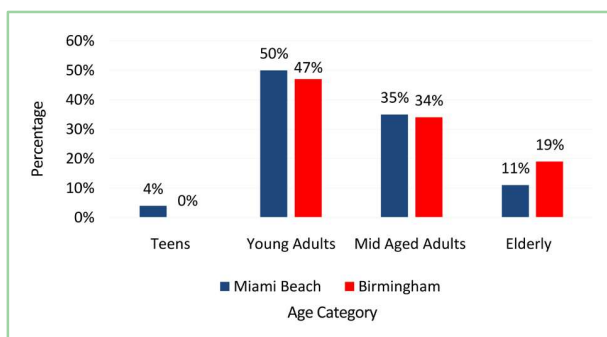


Figure 1. Age group of survey participants (TNC users).

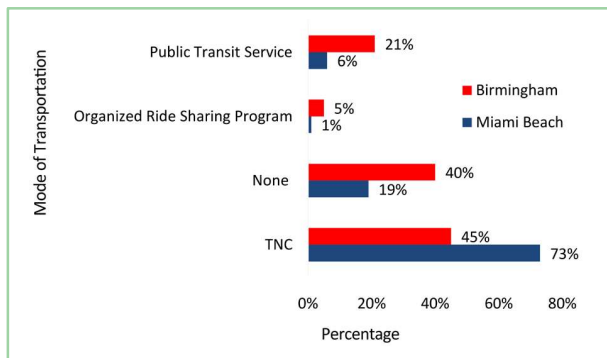


Figure 2. Modes other than private car used in the past year by the survey participants.

As shown in **Figure 3**, the analysis of self-reported trip data over a 24-hr period showed that approximately 6.4% of the reported trips in the Birmingham region were conducted by TNCs whereas in Miami Beach the reported TNC market share was higher (20% of the weekday trips and 17% of the weekend trips). There are many possible explanations for the difference. First, Uber was introduced in the Miami market in June 2014; more than a year and a half before coming into the Birmingham market thus users are more familiar with TNC presence. More importantly, there is the severe shortage of parking availability in the Miami Beach area, which makes ride-hailing services an attractive alternative to automobile use, especially for tourists and visitors within the Miami area. The Miami Beach area has a large number of restaurants, bars, and late night entertainment venues, which can also contribute the use, as users try to avoid driving after alcohol consumption. It is also worth noting that personal automobile usage in Birmingham is significantly higher (85%) than that at the Miami Beach (56%). This is consistent with earlier studies in the Birmingham area [14] [15] which reported automobile use in the Birmingham metro between 83% and 86%. It is also evident that use of transit services for both regions is very low (2%).

Additional analysis was performed to compare mode choices between weekday and weekend trips in the Miami Beach region (**Figure 4**). As previously mentioned, weekends are typically busy in this region due to high attraction of tourists and visitors. It can be observed that there are **no major differences in the preference of mode selection in Miami Beach region based on the day of the week consideration** (weekday versus weekend).

Figure 5 illustrates trip purposes of trips performed by survey respondents using TNC as their mode of transportation during typical weekdays in the Birmingham and Miami Beach regions. Additionally, the weekend trip purpose versus TNC trip data was added to assess any difference in behaviors during the weekend scenario in the Miami Beach region.

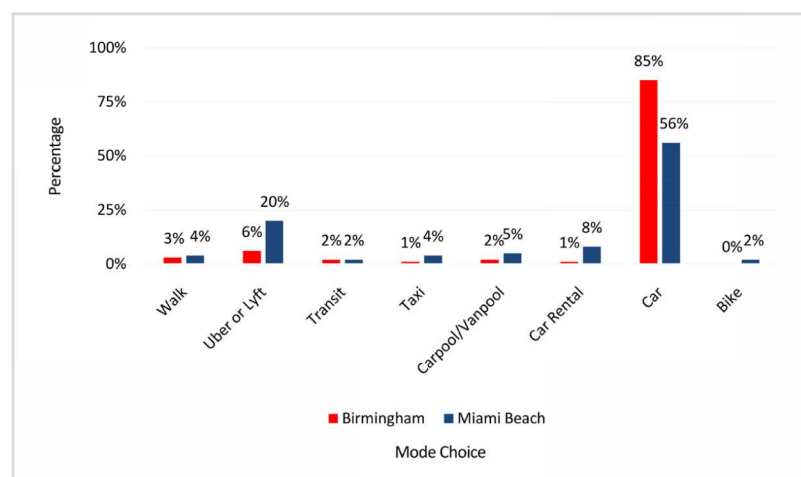


Figure 3. Mode Choices of Birmingham and Miami survey respondents.

Total vehicular modes: $20+4+5+8+56 = 93\%$
 Total personal vehicular modes: $(56+8+5)/93\% = 74\%$
 Total rideshare modes: $(20+4)/93\% = 26\%$

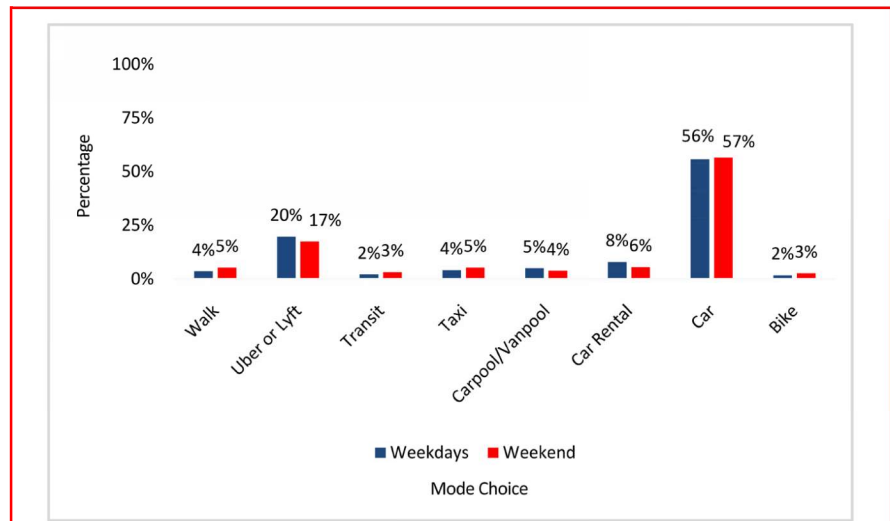


Figure 4. Mode choices of Miami Beach survey respondents during a typical weekday and a weekend.

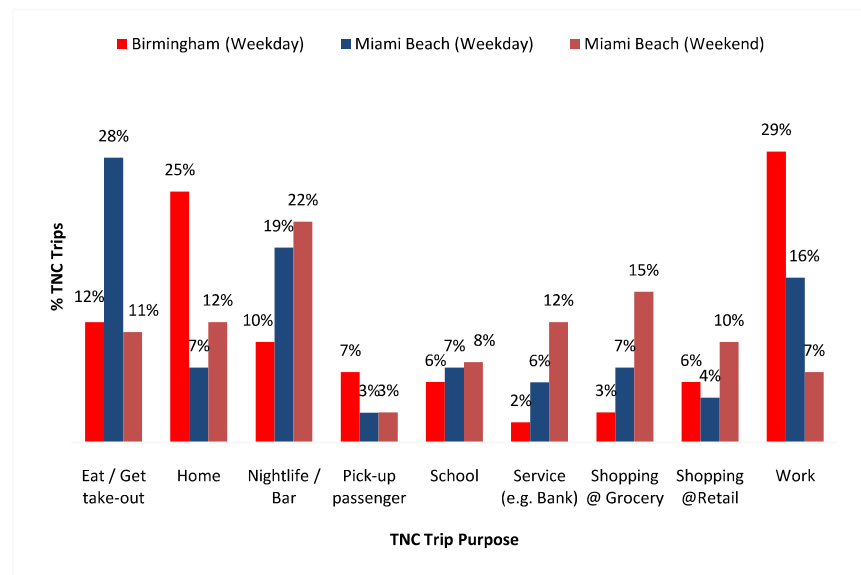


Figure 5. Trip purposes vs TNC trips.

The majority of Birmingham respondents use TNCs to travel to work (29%) or home (25%). During weekdays, the TNC trips to work in Miami Beach are just 16%, noticeably lower to those in the Birmingham Metro area. This is expected, as the majority of the survey respondents in the Miami Beach area are either tourists or commute to Miami downtown with personal automobile. It can also be seen that the peak destinations for weekday TNC trips in the Miami Beach are restaurants (28%) and nightlife/bar (19%). As expected, during weekends in Miami Beach, the majority of the TNC trips are geared toward entertainment and shopping with trips to nightlife/bar (22%) being the dominating trip purpose category.

The relationships between vehicle ownership, TNC usage, and TNC trip pur-

purpose are illustrated in **Figure 6** (Birmingham) and **Figure 7** (Miami Beach), respectively. In the Birmingham metro area, it is evident that individuals having vehicle ownership tend not to use TNC as a mode of transportation. Survey respondents having regular access to personal automobiles use TNC service occasionally to commute to work (17%) or home (10%) and for recreational purposes. In the Miami Beach area, the scenario is opposite to that of Birmingham. Despite personal vehicle ownership, survey respondents opted to use TNC service, primarily to access restaurants (21%) and bars (13%) during nighttime. When non-resident trips were excluded from the analysis, similar results were obtained with the majority of TNC trips by Miami Beach residents being destined to restaurants (40%) and bars (13%).

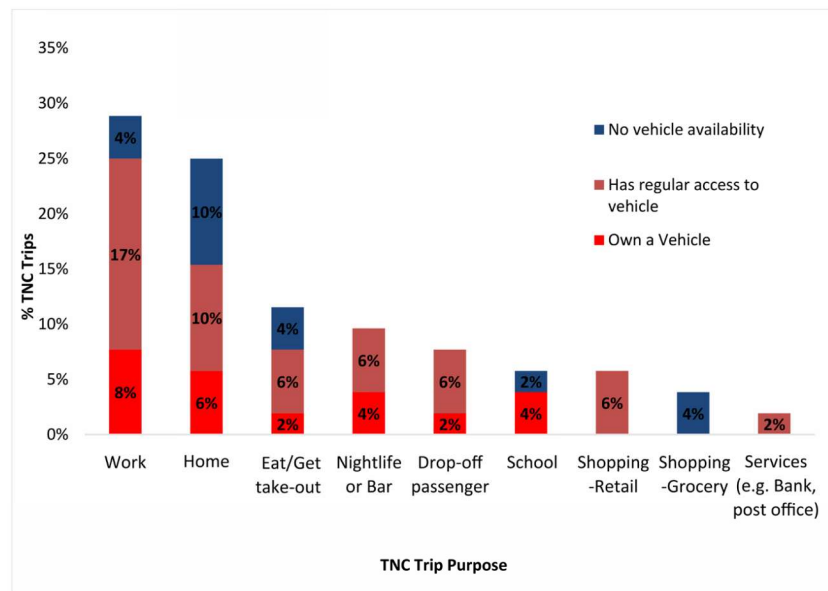


Figure 6. Car availability of TNC users (Birmingham). Source: [12].

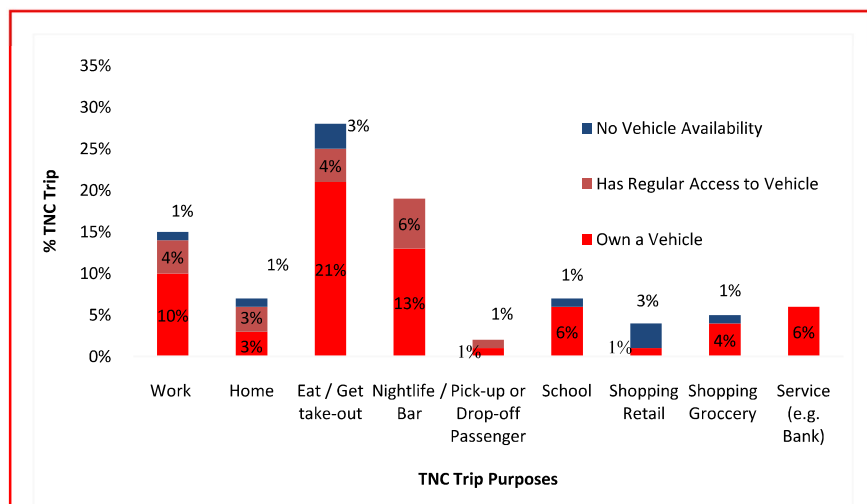


Figure 7. Car availability of TNC users (Miami Beach).

Table 2 and **Table 3** show the correlation between TNC trip time, waiting time and vehicle availability on mobile apps for the Birmingham and Miami Beach regions, respectively. TNC trip times are categorized based on the time of the day (*i.e.*, daytime and nighttime). It can be observed that the range of waiting times is different for the two regions under consideration reflecting local conditions. The maximum waiting time for the Miami Beach region is more than 30 minutes (especially during weekends), whereas in Birmingham it is much shorter, ranging between 11 and 15 minutes. Also, the range of available vehicles in the app is different in both regions. In contrast to the maximum range of vehicles in Birmingham (3 - 5), the range of maximum vehicles in Miami Beach is more than 5. The trips are equally allocated during day and night in both regions. The majority of the waiting times in Birmingham are between 0 - 5 minutes, both in daytime (25%) and nighttime (33%). However, in Miami Beach, the majority of survey responders report waiting times that range between 5 - 15 minutes both during daytime (27%) and nighttime (25%), possibly reflecting the nature of the transportation network in Miami Beach that provide accessibility challenges to the drivers.

Table 2. Correlation of TNC trip time with waiting time and vehicle availability on app (Birmingham).

Available vehicles on App	1 - 2	3 - 5	Total
Day-time trips	38%	12%	50%
0 - 5 minute	19%	6%	25%
11 - 15 minutes	4%	4%	8%
6 - 10 minutes	15%	2%	17%
Night-time trips	50%	0%	50%
0 - 5 minute	33%	0%	33%
6 - 10 minutes	17%	0%	17%
Total	88%	12%	100%

Table 3. Correlation of TNC trip time with waiting time and vehicle availability on app (Miami Beach).

Available vehicles on App	None	1-5	5+	Total
Day-time trips	4%	31%	16%	51%
<5 minute	0%	7%	2%	9%
5 - 15 minutes	0%	15%	13%	28%
15 - 30 minutes	4%	9%	2%	15%
More than 30 minutes	0%	0%	0%	0%
Night-time trips	7%	33%	9%	49%
<5 minute	2%	7%	4%	13%
5 - 15 minutes	4%	18%	4%	25%
15 - 30 minutes	2%	4%	0%	5%
More than 30 minute	0%	4%	2%	5%
Total	11%	64%	25%	100%

The survey participants in both study locations were asked about their preference with respect to future improvements related to transportations infrastructure and services. **Figure 8** illustrates such preferences based on survey responses in the Birmingham and Miami Beach regions. Based on their responses, 26% and 19% of survey participants recommended an expansion of TNC services in the Birmingham and Miami Beach regions respectively. Furthermore, survey participants from both regions equally prioritized improving public transit facilities (43%).

Survey respondents in Birmingham were also asked to note the reason(s) for using TNCs in the past. To identify the most influential reasons for selecting TNC services as a mode of transportation, the reasons stated by the respondents were factorized in terms of binary values where 1 is assigned to “selected values” and 0 is assigned to values that were “not selected”. **Table 4** documents the mean and standard deviation according to the survey responses.

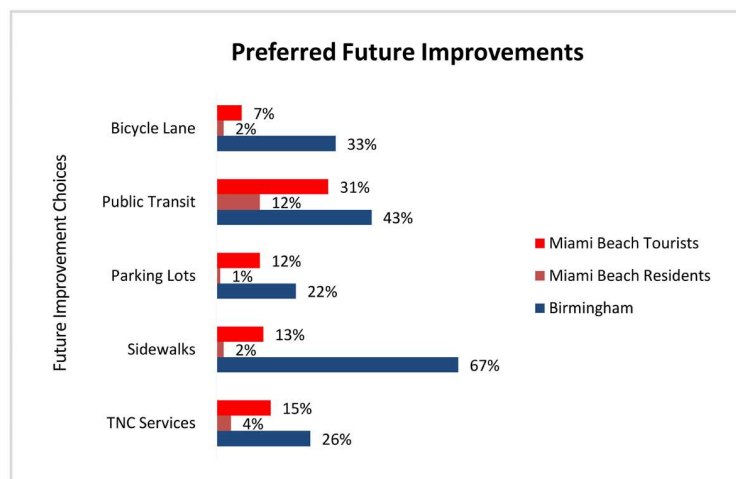


Figure 8. Preference for future improvements of transportation infrastructure and services.

Table 4. Summary characteristics of study sites and survey responses.

Reason	Mean	Standard Deviation
Convenience	0.56	0.50
Safety	0.30	0.46
No car availability	0.27	0.44
Destination has limited/no parking	0.24	0.43
Cheaper than alternatives	0.21	0.41
Parking at destination is expensive	0.19	0.39
Transit is not accessible	0.06	0.23
Transit is not reliable	0.03	0.17
Other reason	0.03	0.18
Other mode not available	0.02	0.15

The results clearly show that convenience was reported by transportation users in the Birmingham area as the main driving force for selection of TNCs as a travel mode. Safety/avoiding driving when intoxicated, and lack of automobile availability were cited as the second and third most important reasons for use of TNCs in the survey of Birmingham users.

The survey conducted in Birmingham also asked respondents with no previous TNC experience within the past year to mark the main reason for not considering TNCs as a mode of transportation. From **Figure 9**, it can be observed that nearly 30% of survey respondents reported that the use of TNCs was not convenient for them, while another 20% noted that they do not use TNCs due to associated cost. The “other reasons” that were cited by the survey respondents include personal preference to use other transportation modes, distance to destination making TNC unattractive, concerns about riding in another person’s car and the lack of accommodations for individuals with limited mobility.

The study also confirmed that trip distance plays a role as a potential determinant of TNC use. According to the characteristics of the TNC trips reported in the Birmingham case study, TNC users use TNC services for trips under 10 miles. A comparison between TNC and non-TNC trips revealed that the average trip length performed by TNC was 5.19 miles, far lower than the average trip length of automobile trips (9.28 miles) in the region. Further analysis indicated that the longest TNC trips involved drop-off of a passenger or trips to work or home. The average trip length per trip purpose for TNC trips is shown in **Figure 10**.

The survey conducted in Miami Beach also requested feedback from respondents about their willingness to use ride-hailing services to commute if incentives or special services were provided. The four questions that were designed to portray the hypothetical scenarios are as follows:

- Willingness to use ride-hailing services for the first or last mile if incentives (discounts) are provided
- Willingness to use the ride-hailing services for commuting if the public transit service is made free
- Willingness to use the ride-hailing services for the first or last mile to reach home or to the nearby public transit stop or station, and
- Willingness to use the ride-hailing services for commuting if a rewards point system is introduced by their work place.

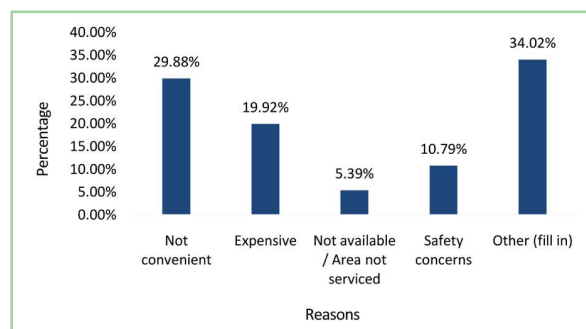


Figure 9. Reasons for not Using TNCs (Birmingham).

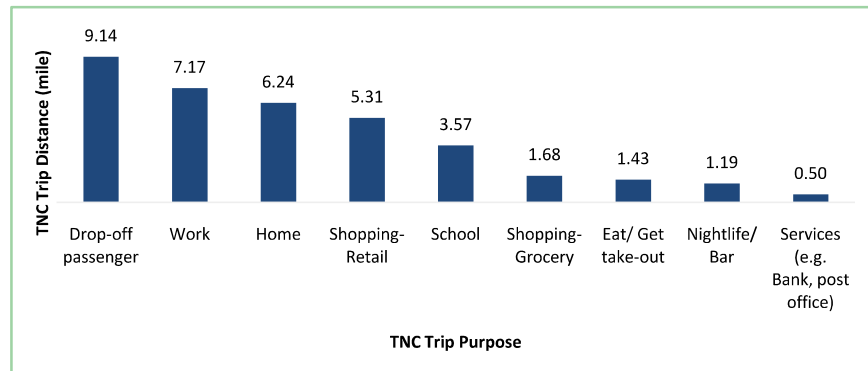


Figure 10. TNC trip distance (miles) for various trip purposes (Birmingham). Source: [12].

The majority of the respondents expressed their willingness to use the TNC services when incentives or special offers are provided as shown in **Figure 11**. The type of incentive offered appeared to make little difference in their response. Only 20% of the survey participants reported a complete lack of interest in considering TNC services for commuting purposes, even if incentives were offered. This is consistent with other studies that suggest that automobile-dependent users show resistance in embracing alternative modes [16].

3.2. Regression Analysis

In addition to the descriptive analysis, the study employed the Least Absolute Shrinkage and Selection Operator (Lasso), a very popular machine learning algorithm [17], to perform regression analysis. The purpose of this effort was to identify parameters that can be used to predict TNC use. Lasso regression provides two major advantages over linear regression, which made it an attractive alternative to linear regression, namely 1) clear variable or feature selection and 2) better prediction accuracy. Lasso regression, through shrinkage or regularization of the coefficients, increases the prediction accuracy and decreases the variance of the model interpretability. This regression technique selects strong variables in high dimension data for clearer interpretations of the results since models with too many variables are hard to interpret [18]. Additionally, Lasso regression eliminates over-fitting, *i.e.*, large variance and unbiased estimates, which increases prediction accuracy [19].

In Lasso regression, categorical variables are encoded into a set of indicators by transforming the variables into factors. Consequently, a dummy variable matrix of predictors is created, along with continuous predictors to serve as inputs to the model. Dummy coding includes binary attributes to indicate category membership. The reference category is indicated as “0” and corresponding category is coded as “1” in the dummy coding. As shown in Equation (1), Lasso adds a penalty term *i.e.*, product of a bias parameter λ with the absolute value of the slope to regulate the size of the coefficients (β_{lasso}) which can affect the number of predictors included in the model.

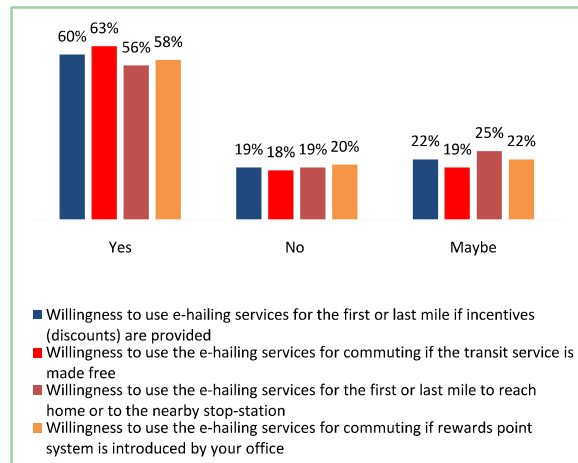


Figure 11. Willingness to use ride-hailing services in hypothetical scenarios (Miami Beach).

$$\beta_{\text{lasso}} = \text{Min}(\text{Sum of squared residuals}) + \lambda * |\text{slope}| \quad (1)$$

The tuning parameter (λ) is chosen by cross validation, *i.e.* when $\lambda = 0$ mean square error is 0. As λ increases, shrinkage occurs so that the variables that are insignificant (“0” value) are eliminated.

In this study, the Lasso method was applied separately on the Miami Beach Survey and Birmingham Survey Data. There were 155 baseline variables for the Miami Beach case study and 103 base line variables for the Birmingham case study. 80% of the data was used to train the model and the remaining 20% was used for model predictions. The dependent variable “y” represented the TNC usage among the respondents in both study regions. The estimated coefficients and the variables selected under the Lasso method considered only features that were significant for the model fitting.

Lasso fits the most significantly contributed variables by making the insignificant variables exactly to zero. **Figure 12** shows the shrinkage of the coefficients towards zero to eliminate the insignificant variables present in the two models developed in this study (*i.e.*, Miami Beach and Birmingham models).

Figure 13 represents selection of the optimum value of λ using cross validation. The optimum λ value for Miami Beach and Birmingham model were 0.009294 and 0.00088 respectively. The graphs indicate that the unregularized models are a good fit. The best mean squared error (MSE) were 13.75% and 0% for the Miami Beach and Birmingham models, respectively.

The application of the Lasso procedure resulted in the elimination of 123 variables and 101 variables from Miami Beach and Birmingham survey respectively. Finally, the method led to the selection of 32 variables for the Miami Beach model and 2 variables for the Birmingham model.

Figure 14 showcases the results from the regression analysis by fitting the model with significant independent variables identified by the Lasso method. For the Miami Beach model, notable features such as car availability, vehicle ownership, availability of Uber/Lyft, age range (18 - 29), high income (>\$75 K),

Miami residency etc., possess positive significance for using TNC services in the Miami Beach region. Additionally, features such as lack of prior use of public transit, lack of use of TNC services and interest in future expansion of sidewalks possess a negative significance with respect to using TNC services in the Miami Beach area. In the Birmingham region only two parameters, namely car availability and waiting time were found to be significant predictors to choosing TNC as a mode of transportation.

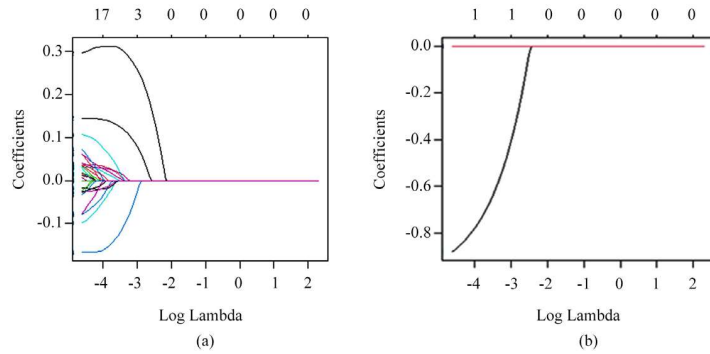


Figure 12. Coefficient Shrinkage for (a) Miami Beach Model; and (b) Birmingham Model.

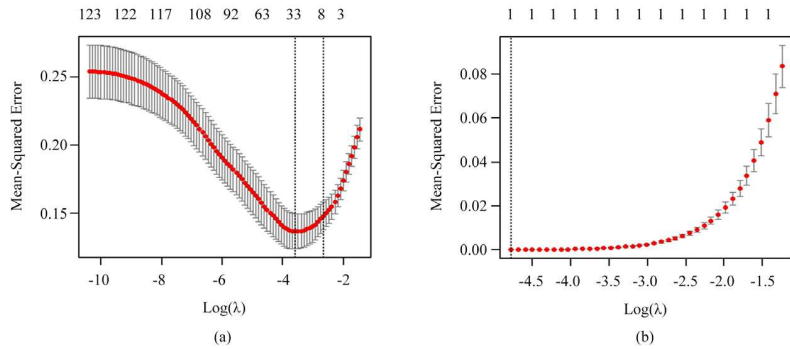


Figure 13. Optimum Tuning Parameter for (a) Miami Beach Model; and (b) Birmingham Model.

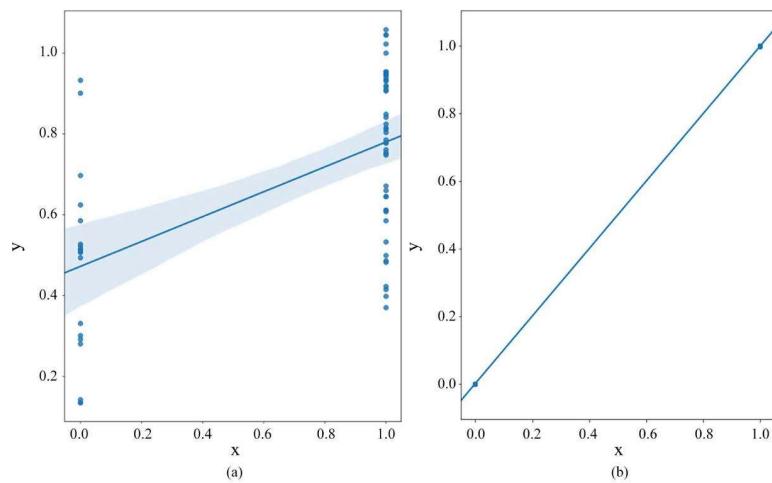


Figure 14. Regression Model-Fit for (a) Miami Beach Model; and (b) Birmingham Model.

4. Conclusions

The analysis of 790 questionnaire surveys of transportation system users in the Birmingham and Miami Beach region shed light on users' awareness and use of TNC services in the Southeastern US. Examination of the survey participants' responses confirmed that TNC service coverage and other geographic considerations and user characteristics impact user perceptions and adoption of such services. Thus, local transportation users' surveys are an important tool to document travelers' preferences and guide planning of TNC services accordingly.

The study also confirmed that, even in small- and medium-size urban areas, transportation users are aware of ride-hailing services and are taking advantage of them. It was also found that the trip purpose for using TNC services varied according to the composition of the survey participants (*i.e.*, local residents versus visitors/tourists). Residents used TNC trips more for trips to home or work while visitors chose ride-hailing trips mostly to access entertainment establishments including restaurants and bars.

An interesting difference between the findings from the two surveys was the relationship between vehicle ownership and TNC use. In the highly automobile-dependent Birmingham market, TNC use was more closely linked to need (*i.e.*, lack of vehicle availability) than choice, while the opposite was the case in the Miami Beach case study.

The findings of the surveys also helped us to define the profile of the typical TNC user in the study regions. In the Birmingham metro area the typical TNC users are 25 - 34 years of age that use the ride-hailing services for commuting or entertainment purposes for short to medium range distances (or average of 5 miles). The typical profile of a Miami Beach TNC user is that of younger traveler (18 - 29 years of age) that uses the ride-hailing service primarily for entertainment purposes, especially during weekends in order to get to the tourist-attraction locations.

Finally, the model fitting exercise identified predictors for TNC use. For the Birmingham region, TNC use was strongly correlated with vehicle availability and waiting time. Several independent variables were identified as significant predictors of TNC use in the Miami Beach model including vehicle availability, vehicle ownership, availability of Uber/Lyft, age range (18 - 29), high income (>\$75 K), and residency.

Overall, the study findings establish valuable links between travel behaviors and TNC use. These can inform transportation agencies about the needs and opportunities for ride-hailing services in the local market. The findings can also be used to create targeted marketing plans and incentives to encourage mode switching to shared modes, including TNCs. Overall, the study highlights the importance of understanding the user characteristics of the local market when planning for TNC and other ride-sharing services in the future.

Acknowledgements

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gating Network Congestion by Integrating Transportation Network Companies and Urban Transit”.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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ATTACHMENT D
INTERSECTION VOLUME TABLES

PM Peak Hour Volumes DELANO HOTEL

Intersection	Road	Direction	Movement	PM PEAK 2025 Existing Volumes	PM PEAK 2027 No Build Volumes	PM PEAK Site Trips	PM PEAK 2027 Build Volumes
(1) Collins Avenue (A1A) & 17 Street	17 Street	Eastbound	EBL	113	114	0	114
			EBT	11	11	34	45
			EBR	97	98	11	109
			Approach	221	223	45	268
		Westbound	WBL	6	6	86	92
			WBT	16	16	32	48
	WBR		6	6	32	38	
	Collins Avenue (A1A)	Northbound	Approach	28	28	150	178
			NBL	85	86	0	86
			NBT	624	630	0	630
			NBR	8	8	40	48
		Southbound	Approach	717	724	40	764
			SBL	3	3	26	29
			SBT	466	471	11	482
SBR			104	105	0	105	
Approach	573	579	37	616			
(2) Collins Avenue (A1A) & Driveway	Driveway	Eastbound	EBL	0	0	0	0
			EBT	0	0	0	0
			EBR	0	0	0	0
			Approach	0	0	0	0
		Westbound	WBL	0	0	0	0
			WBT	0	0	0	0
	WBR		0	0	0	0	
	Collins Avenue (A1A)	Northbound	Approach	0	0	0	0
			NBL	0	0	0	0
			NBT	716	723	40	763
			NBR	0	0	28	28
		Southbound	Approach	716	723	68	791
			SBL	0	0	22	22
			SBT	568	574	86	660
SBR			0	0	0	0	
Approach	568	574	108	682			
(3) 17 Street & Driveway	17 Street	Eastbound	EBL	0	0	0	0
			EBT	23	23	100	123
			EBR	0	0	0	0
			Approach	23	23	100	123
		Westbound	WBL	0	0	0	0
			WBT	27	27	100	127
	WBR		0	0	0	0	
	Driveway	Northbound	Approach	27	27	100	127
			NBL	0	0	50	50
			NBT	0	0	0	0
			NBR	0	0	0	0
		Southbound	Approach	0	0	50	50
			SBL	0	0	0	0
			SBT	0	0	0	0
SBR			0	0	0	0	
Approach	0	0	0	0			

ATTACHMENT E
INTERSECTION CAPACITY REPORTS

EXISTING CONDITIONS

Table 1.1 - 2026 Existing Intersection Capacity Analysis Summary

Location	Time	Level of Service ⁽¹⁾	
		(1) Collins Avenue (A1A) & 17 Street	
		Signalized	Delay
EBL	PM	C	26.5
EBT	PM	C	25.2
EBR	PM	C	25.2
EB Approach	PM	C	25.9
WBL	PM	C	22.9
WBT	PM	C	22.9
WBR	PM	C	22.9
WB Approach	PM	C	22.9
NBL	PM	B	19.9
NBT	PM	B	19.9
NBR	PM	B	17.0
NB Approach	PM	B	18.3
SBL	PM	B	14.4
SBT	PM	B	15.2
SBR	PM	B	15.2
SB Approach	PM	B	14.8
Overall	PM	B	18.2

⁽¹⁾ Delay is average delay per vehicle in seconds

⁽²⁾ Approach operates under Free-flow conditions



Table 1.2 - 2026 Existing Intersection Queue Lengths Summary

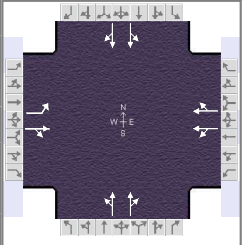
Location	Time	95th Percentile Queue Lengths (ft)															
		EBL	EBTR	WBTL	WBTR	NBTL	NBTR	SBTL	SBTR	Storage (ft)	95 th %tile						
(1) Collins Avenue (A1A) &	PM	NA	105	NA	99	NA	11	60	11	NA	253	NA	256	NA	204	NA	163

95th percentile volume exceeds capacity, queue may be longer.

m Volume for 95th percentile queue is metered by upstream signal.

HCS Signalized Intersection Input Data

General Information				Intersection Information			
Agency	Langan			Duration, h	0.250		
Analyst	JSP			Analysis Date	1/14/2026		
Jurisdiction		Time Period	PM Peak	Area Type	CBD		
Urban Street		Analysis Year	2026 Existing	PHF	0.94		
Intersection	Collins Ave and 17th St		File Name	2026 Existing PM.xus			
Project Description	2026 Existing PM						



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	113	11	97	6	16	6	85	624	8	3	466	104

Signal Information												
Cycle, s	100.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	54.0	32.8	0.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0		
				Red	3.0	2.2	0.0	0.0	0.0	0.0		

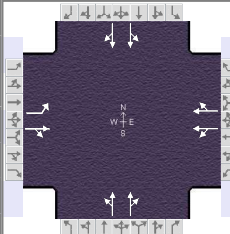
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	113	11	97	6	16	6	85	624	8	3	466	104
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_0), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h	None			None			None			None		
Heavy Vehicles (P_{HV}), %	6	10		7			4			2		
Ped / Bike / RTOR, /h	89	7	0	179	14	0	292	12	0	422	28	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (AT)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (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
Lane Width (W), ft	11.0	11.0		11.0			11.0			11.0		
Turn Bay Length, ft	0	0		0			0			0		
Grade (P_g), %		0		0			0			0		
Speed Limit, mi/h	30	30	30	30	30	30	30	30	30	30	30	30

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		39.0		39.0		61.0		61.0
Yellow Change Interval (Y), s		4.0		4.0		4.0		4.0
Red Clearance Interval (R_c), s		2.2		2.2		3.0		3.0
Minimum Green (G_{min}), s		7		7		7		7
Start-Up Lost Time (l_t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (e), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (PT), s		2.5		2.5		1.0		1.0
Recall Mode		Off		Off		Max		Max
Dual Entry		Yes		Yes		Yes		Yes
Walk ($Walk$), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (PC), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0	0	No	0.0	0	No	0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

HCS Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Langan			Duration, h	0.250		
Analyst	JSP		Analysis Date	1/14/2026		Area Type	CBD
Jurisdiction		Time Period	PM Peak		PHF	0.94	
Urban Street		Analysis Year	2026 Existing		Analysis Period	1> 7:00	
Intersection	Collins Ave and 17th St		File Name	2026 Existing PM.xus			
Project Description	2026 Existing PM						



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	113	11	97	6	16	6	85	624	8	3	466	104

Signal Information												
Cycle, s	100.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	54.0	32.8	0.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0		
				Red	3.0	2.2	0.0	0.0	0.0	0.0		

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		6		2
Case Number		6.0		8.0		8.0		8.0
Phase Duration, s		39.0		39.0		61.0		61.0
Change Period, (Y+R _c), s		6.2		6.2		7.0		7.0
Max Allow Headway (MAH), s		4.1		4.1		0.0		0.0
Queue Clearance Time (g _s), s		11.9		8.9				
Green Extension Time (g _e), s		0.8		0.9		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.00		0.00				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (v), veh/h	120	115		15		15	351		412	347		262
Adjusted Saturation Flow Rate (s), veh/h/ln	1020	1237		1164		1238	1093		1487	1679		1235
Queue Service Time (g _s), s	9.1	6.9		0.0		0.8	13.1		17.6	0.0		12.4
Cycle Queue Clearance Time (g _c), s	9.9	6.9		6.9		0.8	25.5		17.6	12.0		12.4
Green Ratio (g/C)	0.33	0.33		0.33		0.33	0.54		0.54	0.54		0.54
Capacity (c), veh/h	398	406		433		406	636		803	943		667
Volume-to-Capacity Ratio (X)	0.302	0.283		0.035		0.036	0.552		0.513	0.368		0.393
Back of Queue (Q), ft/ln (95 th percentile)	105	99		11		11	253		256	204		163
Back of Queue (Q), veh/ln (95 th percentile)	4.0	3.7		0.4		0.4	10.1		10.2	8.1		6.5
Queue Storage Ratio (RQ) (95 th percentile)	0.00	0.00		0.00		0.00	0.00		0.00	0.00		0.00
Uniform Delay (d ₁), s/veh	26.2	24.9		22.9		22.9	16.5		14.6	13.3		13.4
Incremental Delay (d ₂), s/veh	0.3	0.3		0.0		0.0	3.4		2.3	1.1		1.7
Initial Queue Delay (d ₃), s/veh	0.0	0.0		0.0		0.0	0.0		0.0	0.0		0.0
Control Delay (d), s/veh	26.5	25.2		22.9		22.9	19.9		17.0	14.4		15.2
Level of Service (LOS)	C	C		C		C	B		B	B		B
Approach Delay, s/veh / LOS	25.9		C	22.9		C	18.3		B	14.8		B
Intersection Delay, s/veh / LOS	18.2						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.11	B	2.11	B	1.89	B	2.08	B
Bicycle LOS Score / LOS	0.88	A	0.51	A	1.12	A	0.99	A

FUTURE NO BUILD CONDITIONS

Table 2.1 - 2027 No Build Intersection Capacity Analysis Summary

Location	Time	Level of Service ⁽¹⁾	
		(1) Collins Avenue (A1A) & 17 Street	
		Signalized	Delay
EBL	PM	C	26.6
EBT	PM	C	25.2
EBR	PM	C	25.2
EB Approach	PM	C	25.9
WBL	PM	C	22.9
WBT	PM	C	22.9
WBR	PM	C	22.9
WB Approach	PM	C	22.9
NBL	PM	C	20.3
NBT	PM	C	20.3
NBR	PM	B	17.1
NB Approach	PM	B	18.5
SBL	PM	B	14.5
SBT	PM	B	15.2
SBR	PM	B	15.2
SB Approach	PM	B	14.8
Overall	PM	B	18.3

⁽¹⁾ Delay is average delay per vehicle in seconds

⁽²⁾ Approach operates under Free-flow conditions



Table 2.2 - 2027 No Build Intersection Queue Lengths Summary

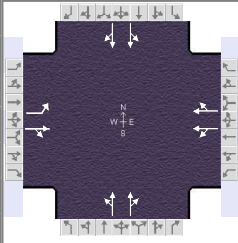
Location	Time	95th Percentile Queue Lengths (ft)																
		EBL		EBTR		WBTL		WBTR		NBTL		NBTR		SBTL		SBTR		
		Storage (ft)	95 th %tile	Storage (ft)	95 th %tile	Storage (ft)	95 th %tile	Storage (ft)	95 th %tile	Storage (ft)	95 th %tile	Storage (ft)	95 th %tile	Storage (ft)	95 th %tile	Storage (ft)	95 th %tile	
(1) Collins Avenue (A1A) &	PM	NA	106	NA	100	NA	11	60	11	NA	256	NA	259	NA	206	NA	NA	165

95th percentile volume exceeds capacity, queue may be longer.

m Volume for 95th percentile queue is metered by upstream signal.

HCS Signalized Intersection Input Data

General Information				Intersection Information			
Agency	Langan			Duration, h	0.250		
Analyst	JSP		Analysis Date	Jan 14, 2026		Area Type	CBD
Jurisdiction		Time Period	PM Peak		PHF	0.94	
Urban Street		Analysis Year	2027 No Build		Analysis Period	1> 7:00	
Intersection	Collins Ave and 17th St		File Name	2027 No Build PM.xus			
Project Description	2027 No Build PM						



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	114	11	98	6	16	6	86	630	8	3	471	105

Signal Information														
Cycle, s	100.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	No	Simult. Gap E/W	On	Green	54.0	32.8	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
				Red	3.0	2.2	0.0	0.0	0.0	0.0				

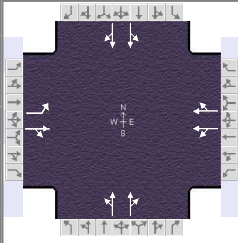
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	114	11	98	6	16	6	86	630	8	3	471	105
Initial Queue (Q _b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s ₀), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N _m), man/h	None			None			None			None		
Heavy Vehicles (P _{HV}), %	6	10		7			4			2		
Ped / Bike / RTOR, /h	89	7	0	179	14	0	292	12	0	422	28	0
Buses (N _b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (AT)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (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
Lane Width (W), ft	11.0	11.0		11.0			11.0			11.0		
Turn Bay Length, ft	0	0		0			0			0		
Grade (P _g), %		0		0			0			0		
Speed Limit, mi/h	30	30	30	30	30	30	30	30	30	30	30	30

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s		39.0		39.0		61.0		61.0
Yellow Change Interval (Y), s		4.0		4.0		4.0		4.0
Red Clearance Interval (R _c), s		2.2		2.2		3.0		3.0
Minimum Green (G _{min}), s		7		7		7		7
Start-Up Lost Time (l _t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (e), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (PT), s		2.5		2.5		1.0		1.0
Recall Mode		Off		Off		Max		Max
Dual Entry		Yes		Yes		Yes		Yes
Walk (Walk), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (PC), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0	0	No	0.0	0	No	0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

HCS Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Langan			Duration, h	0.250		
Analyst	JSP		Analysis Date	Jan 14, 2026		Area Type	CBD
Jurisdiction		Time Period	PM Peak		PHF	0.94	
Urban Street		Analysis Year	2027 No Build		Analysis Period	1> 7:00	
Intersection	Collins Ave and 17th St		File Name	2027 No Build PM.xus			
Project Description	2027 No Build PM						



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	114	11	98	6	16	6	86	630	8	3	471	105

Signal Information														
Cycle, s	100.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	No	Simult. Gap E/W	On	Green	54.0	32.8	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
				Red	3.0	2.2	0.0	0.0	0.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		6		2
Case Number		6.0		8.0		8.0		8.0
Phase Duration, s		39.0		39.0		61.0		61.0
Change Period, ($Y+R_c$), s		6.2		6.2		7.0		7.0
Max Allow Headway (MAH), s		4.1		4.1		0.0		0.0
Queue Clearance Time (g_s), s		12.0		9.0				
Green Extension Time (g_e), s		0.9		0.9		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.00		0.00				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (v), veh/h	121	116		15		15	354		416	351		265
Adjusted Saturation Flow Rate (s), veh/h/ln	1020	1237		1160		1238	1086		1487	1679		1235
Queue Service Time (g_s), s	9.2	6.9		0.0		0.8	13.5		17.9	0.0		12.6
Cycle Queue Clearance Time (g_c), s	10.0	6.9		7.0		0.8	26.1		17.9	12.1		12.6
Green Ratio (g/C)	0.33	0.33		0.33		0.33	0.54		0.54	0.54		0.54
Capacity (c), veh/h	398	406		432		406	632		803	943		667
Volume-to-Capacity Ratio (X)	0.304	0.286		0.035		0.037	0.560		0.519	0.372		0.397
Back of Queue (Q), ft/ln (95 th percentile)	106	100		11		11	256		259	206		165
Back of Queue (Q), veh/ln (95 th percentile)	4.0	3.7		0.4		0.4	10.3		10.4	8.2		6.6
Queue Storage Ratio (RQ) (95 th percentile)	0.00	0.00		0.00		0.00	0.00		0.00	0.00		0.00
Uniform Delay (d_1), s/veh	26.3	24.9		22.9		22.9	16.7		14.7	13.4		13.5
Incremental Delay (d_2), s/veh	0.3	0.3		0.0		0.0	3.6		2.4	1.1		1.8
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0		0.0	0.0		0.0	0.0		0.0
Control Delay (d), s/veh	26.6	25.2		22.9		22.9	20.3		17.1	14.5		15.2
Level of Service (LOS)	C	C		C		C	C		B	B		B
Approach Delay, s/veh / LOS	25.9	C		22.9	C		18.5	B		14.8	B	
Intersection Delay, s/veh / LOS	18.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.11	B	2.11	B	1.89	B	2.08	B
Bicycle LOS Score / LOS	0.88	A	0.51	A	1.12	A	1.00	A

FUTURE BUILD CONDITIONS

Table 5.1 - 2027 Build Intersection Capacity Analysis Summary

Location	Time	Level of Service ⁽¹⁾	
		(1) Collins Avenue (A1A) & 17 Street	
		Signalized	Delay
EBL	PM	C	30.5
EBT	PM	C	26.3
EBR	PM	C	26.3
EB Approach	PM	C	26.1
WBL	PM	C	33.3
WBT	PM	C	33.3
WBR	PM	C	24.6
WB Approach	PM	C	29.1
NBL	PM	C	21.9
NBT	PM	C	21.9
NBR	PM	B	18.2
NB Approach	PM	B	20.0
SBL	PM	B	14.9
SBT	PM	B	15.9
SBR	PM	B	15.9
SB Approach	PM	B	15.3
Overall	PM	C	20.5

⁽¹⁾ Delay is average delay per vehicle in seconds

⁽²⁾ Approach operates under Free-flow conditions



Table 5.2 - 2027 Build Intersection Queue Lengths Summary

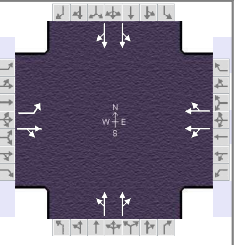
Location	Time	95th Percentile Queue Lengths (ft)																
		EBL		EBTR		WBTL		WBTR		NBTL		NBTR		SBTL		SBTR		
		Storage (ft)	95 th %tile	Storage (ft)	95 th %tile	Storage (ft)	95 th %tile	Storage (ft)	95 th %tile	Storage (ft)	95 th %tile	Storage (ft)	95 th %tile	Storage (ft)	95 th %tile	Storage (ft)	95 th %tile	
(1) Collins Avenue (A1A) &	PM	NA	115	NA	146	NA	90	60	71	NA	230	NA	272	NA	212	NA	NA	190

95th percentile volume exceeds capacity, queue may be longer.

m Volume for 95th percentile queue is metered by upstream signal.

HCS Signalized Intersection Input Data

General Information				Intersection Information			
Agency	Langan			Duration, h	0.250		
Analyst	JSP			Analysis Date	1/14/2026		
Jurisdiction		Time Period	PM Peak	Area Type	CBD		
Urban Street		Analysis Year	2027 Build	PHF	0.94		
Intersection	Collins Ave and 17th St		File Name	2027 Build PM.xus			
Project Description	2027 Build PM						



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	114	45	109	92	48	38	86	630	48	29	482	105

Signal Information												
Cycle, s	100.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	54.0	32.8	0.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0		
				Red	3.0	2.2	0.0	0.0	0.0	0.0		

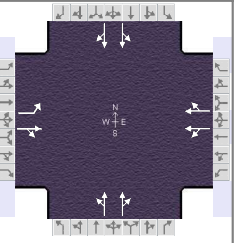
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	114	45	109	92	48	38	86	630	48	29	482	105
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_0), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %	6	10			7			4			2	
Ped / Bike / RTOR, /h	89	7	0	179	14	0	292	12	0	422	28	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (AT)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (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
Lane Width (W), ft	11.0	11.0			11.0			11.0			11.0	
Turn Bay Length, ft	0	0			0			0			0	
Grade (P_g), %		0			0			0			0	
Speed Limit, mi/h	30	30	30	30	30	30	30	30	30	30	30	30

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		39.0		39.0		61.0		61.0
Yellow Change Interval (Y), s		4.0		4.0		4.0		4.0
Red Clearance Interval (R_c), s		2.2		2.2		3.0		3.0
Minimum Green (G_{min}), s		7		7		7		7
Start-Up Lost Time (l_t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (e), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (PT), s		2.5		2.5		1.0		1.0
Recall Mode		Off		Off		Max		Max
Dual Entry		Yes		Yes		Yes		Yes
Walk ($Walk$), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (PC), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0	0	No	0.0	0	No	0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

HCS Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Langan			Duration, h	0.250		
Analyst	JSP		Analysis Date	1/14/2026		Area Type	CBD
Jurisdiction		Time Period	PM Peak		PHF	0.94	
Urban Street		Analysis Year	2027 Build		Analysis Period	1> 7:00	
Intersection	Collins Ave and 17th St		File Name	2027 Build PM.xus			
Project Description	2027 Build PM						



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	114	45	109	92	48	38	86	630	48	29	482	105

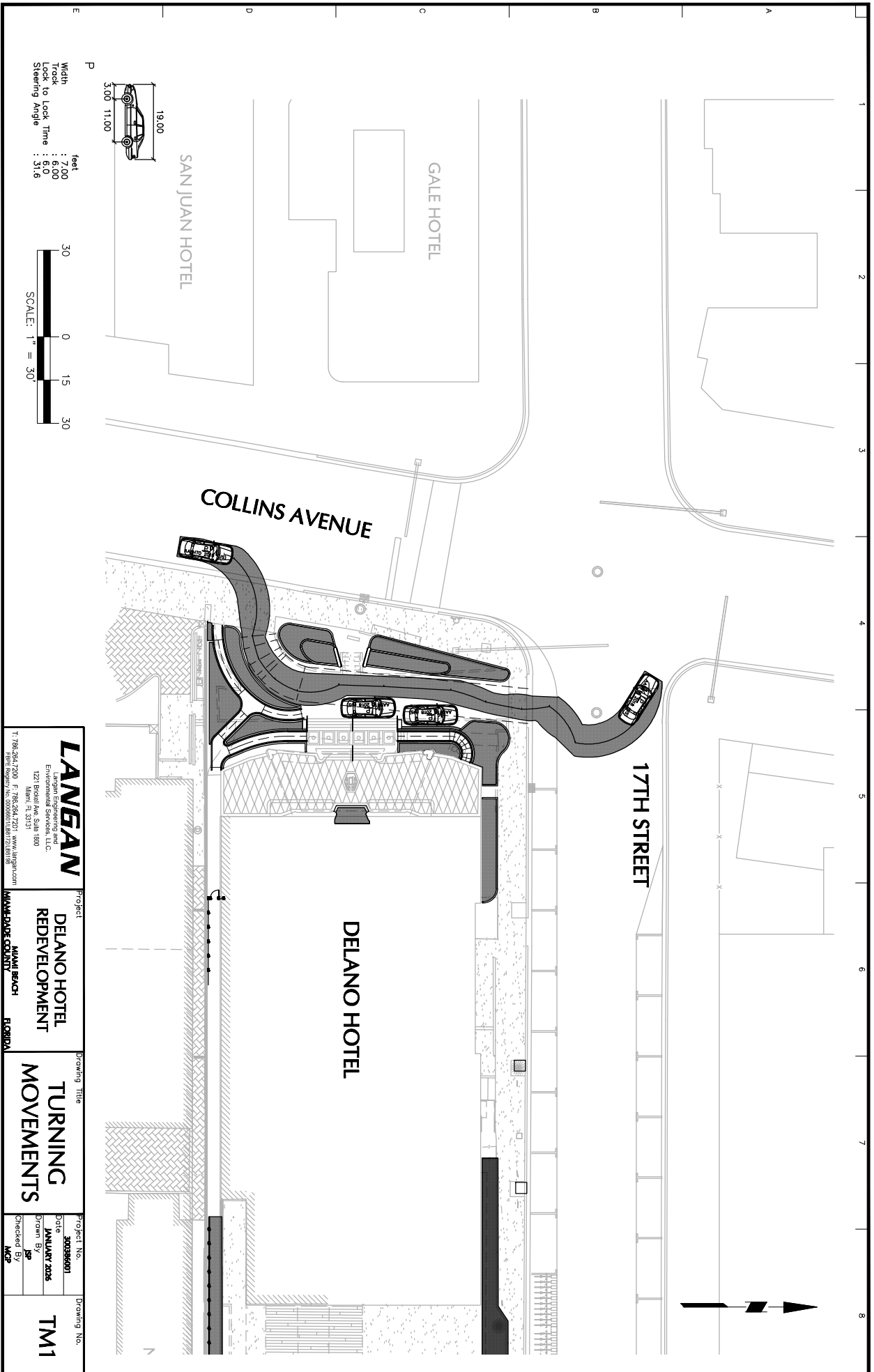
Signal Information												
Cycle, s	100.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	54.0	32.8	0.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0		
				Red	3.0	2.2	0.0	0.0	0.0	0.0		

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		6		2
Case Number		6.0		8.0		8.0		8.0
Phase Duration, s		39.0		39.0		61.0		61.0
Change Period, (Y+R _c), s		6.2		6.2		7.0		7.0
Max Allow Headway (MAH), s		4.0		4.0		0.0		0.0
Queue Clearance Time (g _s), s		17.6		20.1				
Green Extension Time (g _e), s		1.4		1.3		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.01		0.02				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (v), veh/h	121	164		98		91	390		423	359		296
Adjusted Saturation Flow Rate (s), veh/h/ln	987	1297		702		1233	1096		1396	1524		1260
Queue Service Time (g _s), s	10.2	9.7		8.4		5.4	15.4		20.0	0.2		14.1
Cycle Queue Clearance Time (g _c), s	15.6	9.7		18.1		5.4	29.5		20.0	20.2		14.1
Green Ratio (g/C)	0.33	0.33		0.33		0.33	0.54		0.54	0.54		0.54
Capacity (c), veh/h	342	425		302		404	636		754	862		681
Volume-to-Capacity Ratio (X)	0.354	0.385		0.324		0.226	0.613		0.561	0.417		0.435
Back of Queue (Q), ft/ln (95 th percentile)	115	146		90		71	290		272	212		190
Back of Queue (Q), veh/ln (95 th percentile)	4.4	5.4		3.6		2.9	11.6		10.9	8.5		7.6
Queue Storage Ratio (RQ) (95 th percentile)	0.00	0.00		0.00		0.00	0.00		0.00	0.00		0.00
Uniform Delay (d ₁), s/veh	30.0	25.8		32.8		24.4	17.6		15.2	13.5		13.8
Incremental Delay (d ₂), s/veh	0.5	0.4		0.5		0.2	4.4		3.0	1.5		2.0
Initial Queue Delay (d ₃), s/veh	0.0	0.0		0.0		0.0	0.0		0.0	0.0		0.0
Control Delay (d), s/veh	30.5	26.3		33.3		24.6	21.9		18.2	14.9		15.9
Level of Service (LOS)	C	C		C		C	C		B	B		B
Approach Delay, s/veh / LOS	28.1	C		29.1	C		20.0	B		15.3	B	
Intersection Delay, s/veh / LOS	20.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.11	B	2.11	B	1.89	B	2.08	B
Bicycle LOS Score / LOS	0.96	A	0.64	A	1.16	A	1.03	A

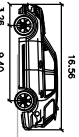
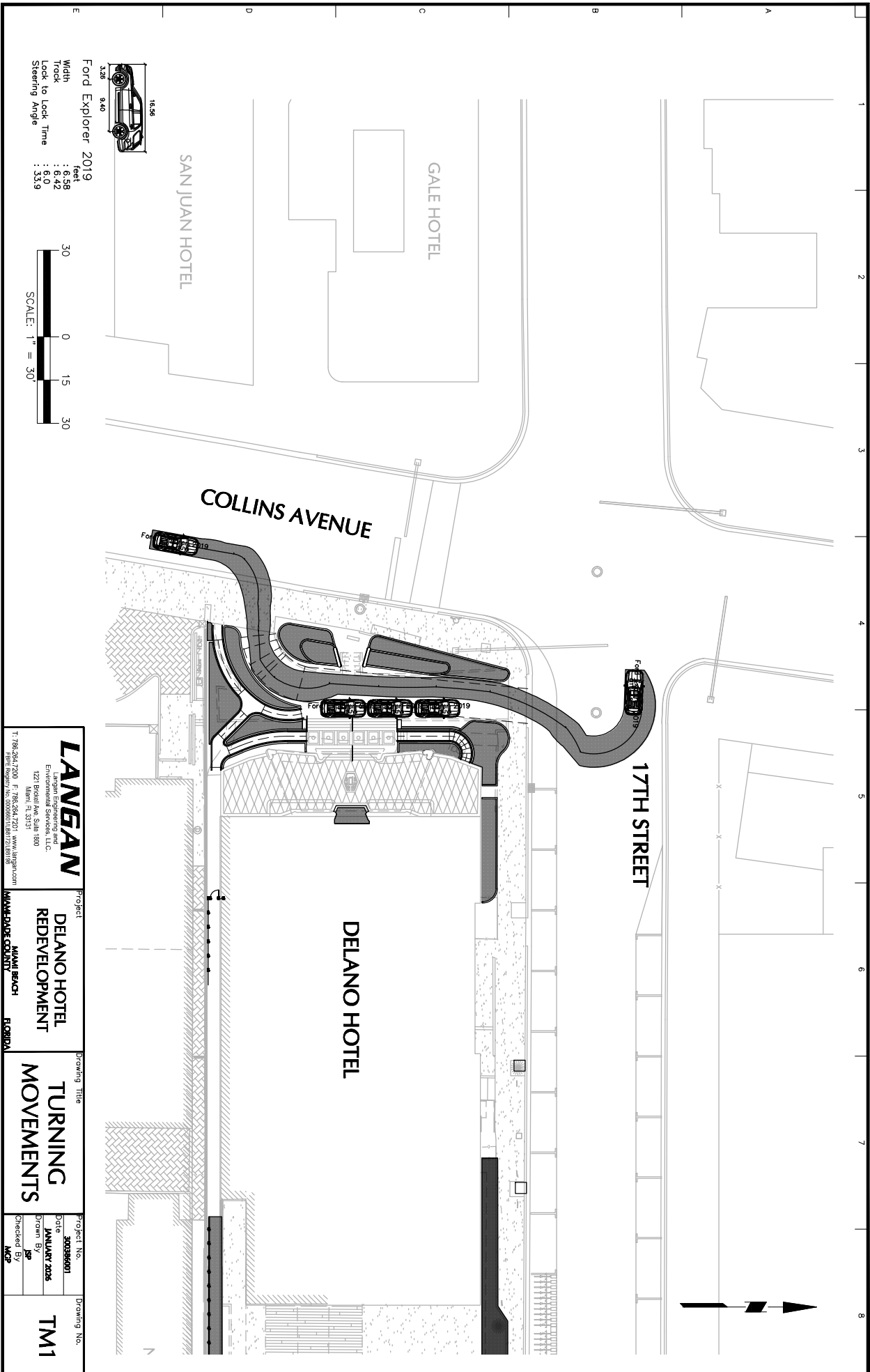
ATTACHMENT F
MANEUVERABILITY ANALYSIS



feet
 Width : 3.00
 Wheelbase : 11.00
 Length : 19.00
 Steering Angle : 31.6



LANGAN Environmental Services, LLC. 1221 Borelli Ave, Suite 1800 Miami, FL 33131 T: 786.254.7200 F: 786.254.4720 www.langan.com PERMITS DEPARTMENT 300386001	Project	DELANO HOTEL REDEVELOPMENT	Project No.	300386001
	Miami Beach	FLORIDA	Drawing Title	TURNING MOVEMENTS
Date: 1/30/2026 Time: 14:25 User: jpark Style: Table Langan.sld Layout: P Document Code: 300386001-0201-H-T08-0101		Drawing No.	TM1	



Ford Explorer 2019
 Width : 18.58 feet
 Height : 9.40 feet
 Wheelbase : 3.28 feet
 Lock to Lock Time : 6.0 seconds
 Steering Angle : 33.9 degrees



LANGAN Environmental Services, LLC 1221 Borelli Ave, Suite 1800 Miami, FL 33131 T: 786.254.7200 F: 786.254.4721 www.langan.com PEER REVIEW NO. 0000801018R17Z18R18S		Project DELANO HOTEL REDEVELOPMENT	Drawing Title TURNING MOVEMENTS	Project No. 300386001 Date JANUARY 2025 Drawn By JP Checked By MCP	Drawing No. TM1
T: 786.254.7200 F: 786.254.4721 www.langan.com PEER REVIEW NO. 0000801018R17Z18R18S		Miami Beach FLORIDA			

Date: 1/13/2025 Time: 12:27 User: jpark Style: Table Langan.sld Layout: P Document Code: 300386001-0201-H-T08-0101

ATTACHMENT G
MULTIMODAL EVALUATION



LEGEND

- EXISTING SIDEWALK
- EXISTING HIGH-EMPHASIS CROSSWALK
- PEDESTRIAN ROUTES
- BUS STOP
- CITI BIKE STATION



<p>LANGAN ENGINEERING & ENVIRONMENTAL SERVICES</p> <p>1221 Brickell Avenue, Suite 1800, Miami, FL 33131 P: 786.254.7221 F: 786.254.7201 www.langan.com FL CERTIFICATE OF AUTHORIZATION No. 00008601</p>		<p>Project</p> <p>DELANO HOTEL</p> <p>MIAMI BEACH</p> <p>MIAMI-DADE</p> <p>FLORIDA</p>		<p>Figure Title</p> <p>PEDESTRIAN ACCESS</p> <p>FIGURE</p>		<p>Project No.</p> <p>300386001</p>	
		<p>Date</p> <p>1/6/2026</p>		<p>Scale</p> <p>NTS</p>			

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	FROM / DESDE / DE	TO / HASTA / A	EVERY / CADA / CHAK
WEEKDAY DIAS LABORABLES LASEMÈN	5:30 a.m.	7:00 p.m.	30 min
SATURDAY SÁBADO SAMDI	6:00 a.m.	7:00 p.m.	30 min
SUNDAY DOMINGO DIMANCH	6:00 a.m.	7:00 p.m.	30 min
	7:00 p.m.	10:00 p.m.	60 min
	7:00 p.m.	10:00 p.m.	60 min
	7:00 p.m.	10:00 p.m.	60 min

Frequencies are approximate and may vary depending on traffic and road conditions.

Los frecuencias son aproximadas, pues dependen del tráfico y otras condiciones de las vías. Asesye yo apwoksimatif epi yo ka varje selon kondisyon siklasyon sou wout yo.



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14

METROBUS

MARCH 2025 | MARZO 2025 | MAS 2025

- Local service seven days a week.
- Travels from Mt. Sinai Medical Center to Omni Metrobus Terminal / Adrienne Arsh Center Metromover Station along Collins Ave, Washington Ave, and the MacArthur Causeway.



- Servicio local los siete días de la semana.
- Va desde Mt. Sinai Medical Center hasta la terminal Omni del Metrobús/ estación Adrienne Arsh Center del Metromover, pasando por Collins Ave, Washington Ave y MacArthur Causeway.
- Sèvis lokal set iou sou seti.
- Wwayaje sot nan Mt. Sinai Medical Center pou rive nan Omni Metrobus Terminal / Adrienne Arsh Center Metromover Station sou Collins Ave, Washington Ave, ak MacArthur Causeway.



MORE INFORMATION
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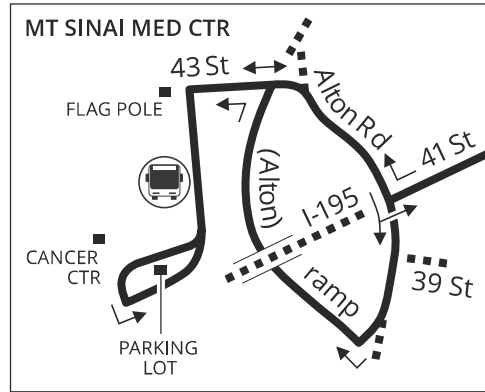
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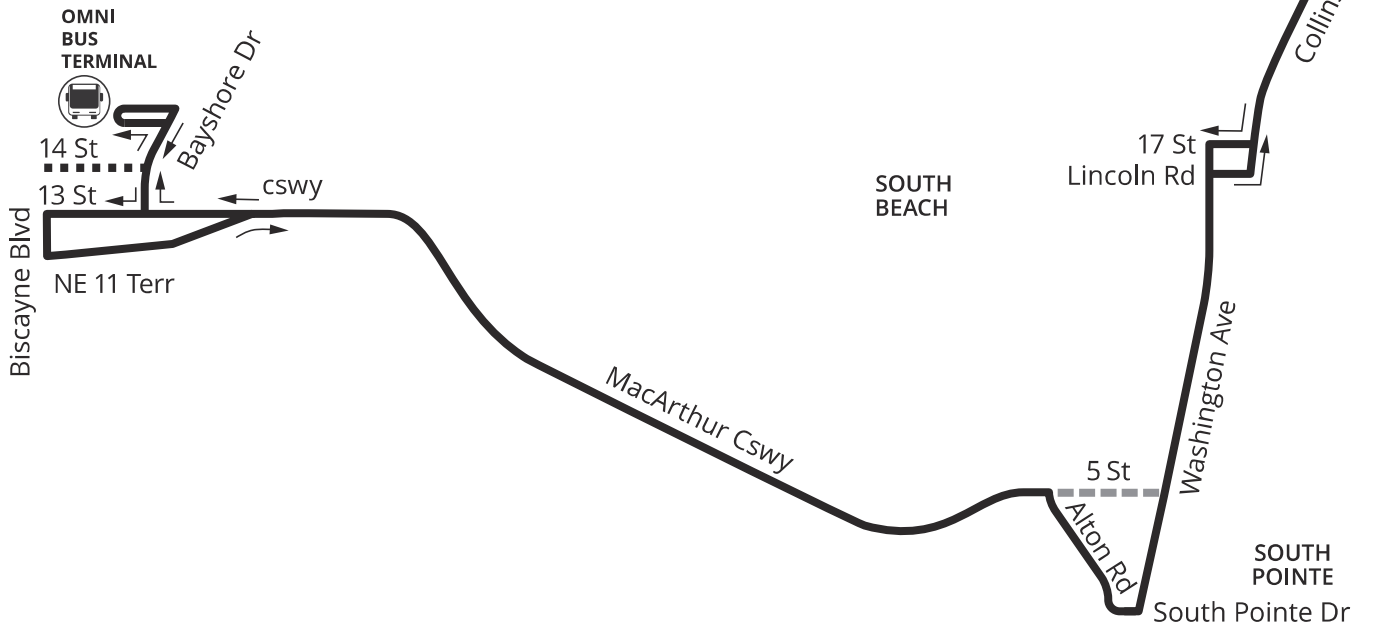
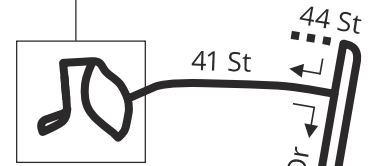
MIAMI-DADE COUNTY



14



MID BEACH



NORTH

11/2023

SERVICE FREQUENCIES

FRECUENCIAS DE SERVICIO / FREKANIS SÈVIS YO

	FROM DESDE / DE	TO HASTA / A	EVERY CADA / CHAK
WEEKDAY DIAS LABORABLES LASFÈMÈN	12:00 a.m.	4:00 a.m.	60 min (Northside-M Beach)
	4:00 a.m.	6:00 a.m.	30 min (Hialeah-M Beach)
	6:00 a.m.	10:00 p.m.	15 min (Hialeah-M Beach)
SATURDAY SÁBADO SAMDI	10:00 p.m.	12:00a.m.	30 min (Hialeah-M Beach)
	12:00 a.m.	5:00 a.m.	60 min (Northside-M Beach)
	5:00 a.m.	7:00 a.m.	30 min (Hialeah-M Beach)
SUNDAY DOMINGO DIMANCH	7:00 a.m.	10:00 p.m.	15 min (Hialeah-M Beach)
	10:00 p.m.	12:00 a.m.	30 min (Hialeah-M Beach)
	12:00 a.m.	5:00 a.m.	60 min (Northside-M Beach)
SUNDAY DOMINGO DIMANCH	5:00 a.m.	8:00 a.m.	30 min (Hialeah-M Beach)
	8:00 a.m.	8:00 p.m.	20 min (Hialeah-M Beach)
	8:00 p.m.	12:00 a.m.	60 min (Hialeah-M Beach)

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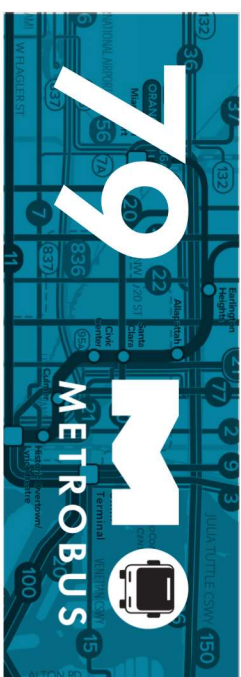
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APRIL 2024 ABRIL 2024 | AVRIL 2024

- Local service seven days a week.
- Travels from Hialeah Metrorail Station to South Beach along NW/NE 79 St, the 79th Street Causeway and Collins Ave
- Overnight trips travel from Northside Metrorail Station



- Servicio local los siete días de la semana.
 - Va desde la estación de Hialeah del Metrorail hasta South Beach, pasando por NW/NE 79 St, 79th Street Causeway y Collins Ave.
 - En el horario nocturno el recorrido comienza en la estación Northside del Metrorail.
-
- Sèvis lokal sèt jou sou sèt.
 - Woyajye soti nan estasyon Hialeah Metrorail pou rive nan South Beach sou NW/NE 79 St, 79th Street Causeway ak Collins Ave.
 - Woyajl lamwiti yo fèt soti nan estasyon Northside Metrorail.

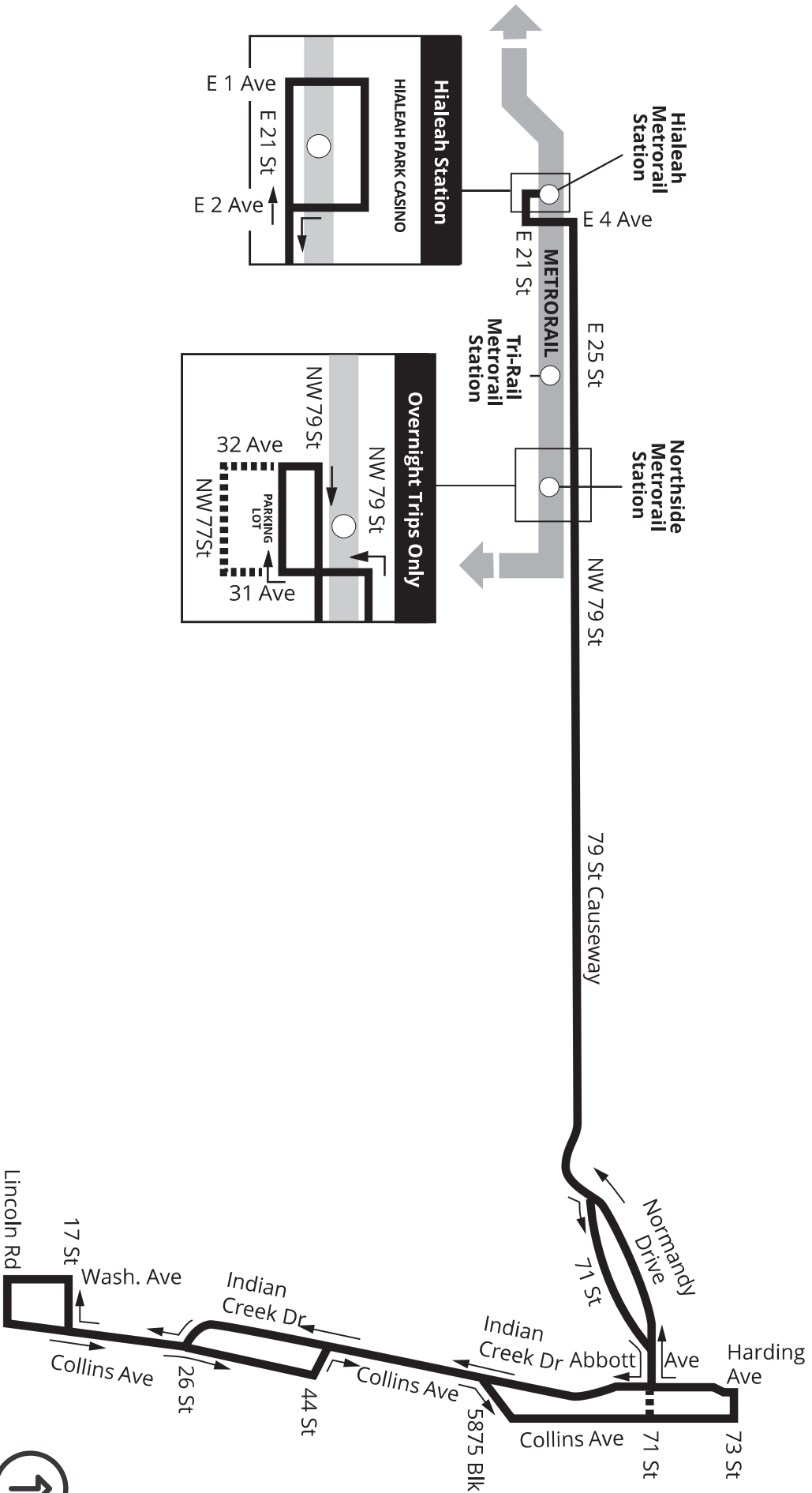


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MIAMI-DADE COUNTY
 DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS



79



NORTH
11/2023

SERVICE FREQUENCIES

FRECUENCIAS DE SERVICIO / FREKANS SÈVIS YO

	FROM DISE / DE	TO HASTA / A	EVERY CADA / CHAK
WEEKDAY	12:00 a.m.	4:00 a.m.	60 min
DAYS LABORABLES	4:00 a.m.	10:00 p.m.	9 min
LASEMÈN	10:00 p.m.	12:00 a.m.	20 min
	12:00 a.m.	5:00 a.m.	60 min
SATURDAY	5:00 a.m.	7:00 a.m.	15 min
SÁBADO	7:00 a.m.	10:00 p.m.	9 min
SAMDI	10:00 p.m.	12:00 a.m.	15 min
	12:00 a.m.	5:00 a.m.	60 min
SUNDAY	5:00 a.m.	7:00 a.m.	30 min
DOMINGO	7:00 a.m.	8:30 p.m.	15 min
DIMANSH	8:30 p.m.	12:00 a.m.	30 min

Frequencies are approximate and may vary depending on traffic and road conditions.
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- Local service seven days a week.
- Travels from the Bus Terminal at Aventura Mall to Downtown Miami through Miami Beach.
- Stops include the Government Center Metrorail / Metromover station.

- Servicio local los siete días de la semana.
- Va desde la terminal de autobuses en Aventura Mall hasta el downtown de Miami, pasando por Miami Beach.
- Con parada en la estación Government Center del Metrorail y el Metromover.

- Sèvis lokal seti jou psou sei.
- Wwayajè sot nan Terminal Olobis la nan Aventura Mall pou rive nan Downtown Miami atravè Miami Beach.
- Atrè yo gen ladan estasyon Metrorail / Metromover Government Center.



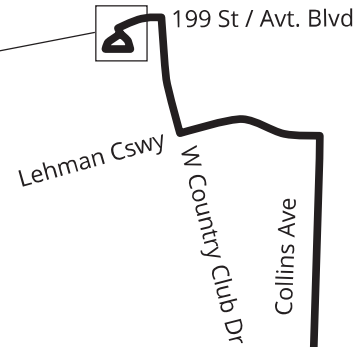
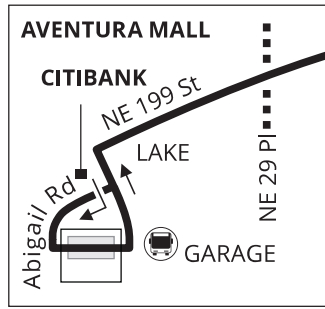

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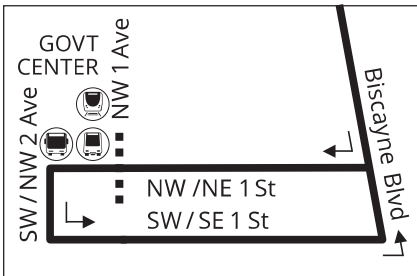
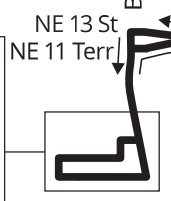
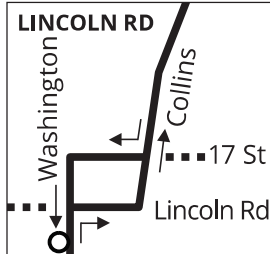
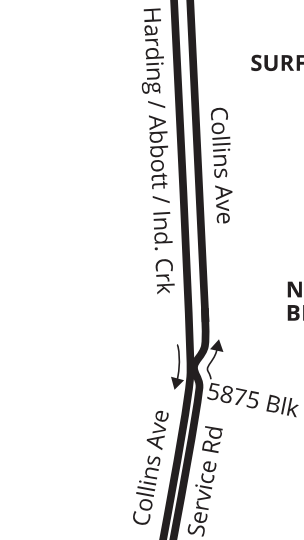
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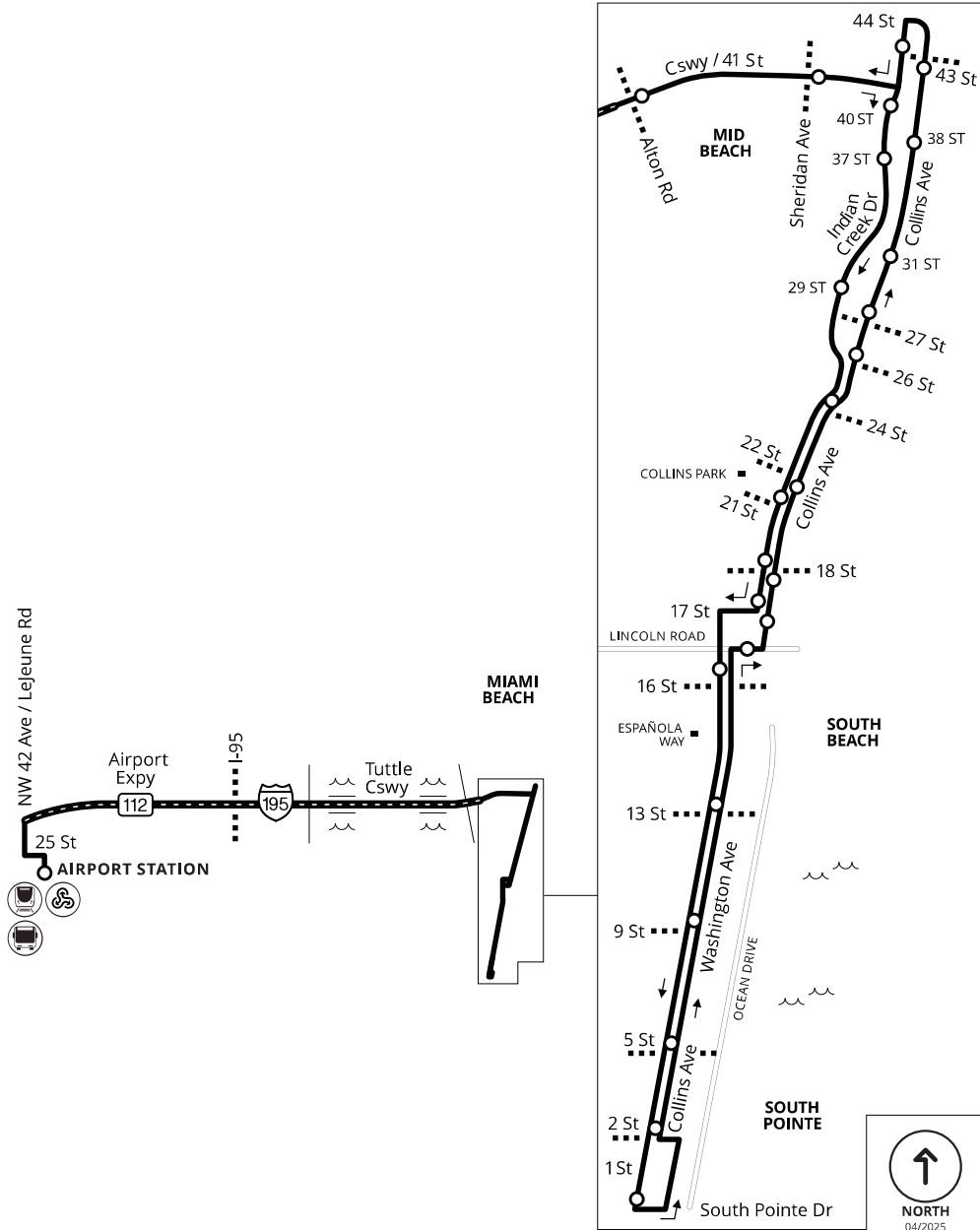
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ATTACHMENT H
SERVICE TIME DATA, ITE EXCERPTS, AND VALET QUEUEING
ANALYSIS CALCULATIONS

Delano Hotel Valet Figure

Hotel Valet Parking Operations

Legend

- Ingress Queue
- Egress Queue
- Valet Drop Off/Pick Up Area

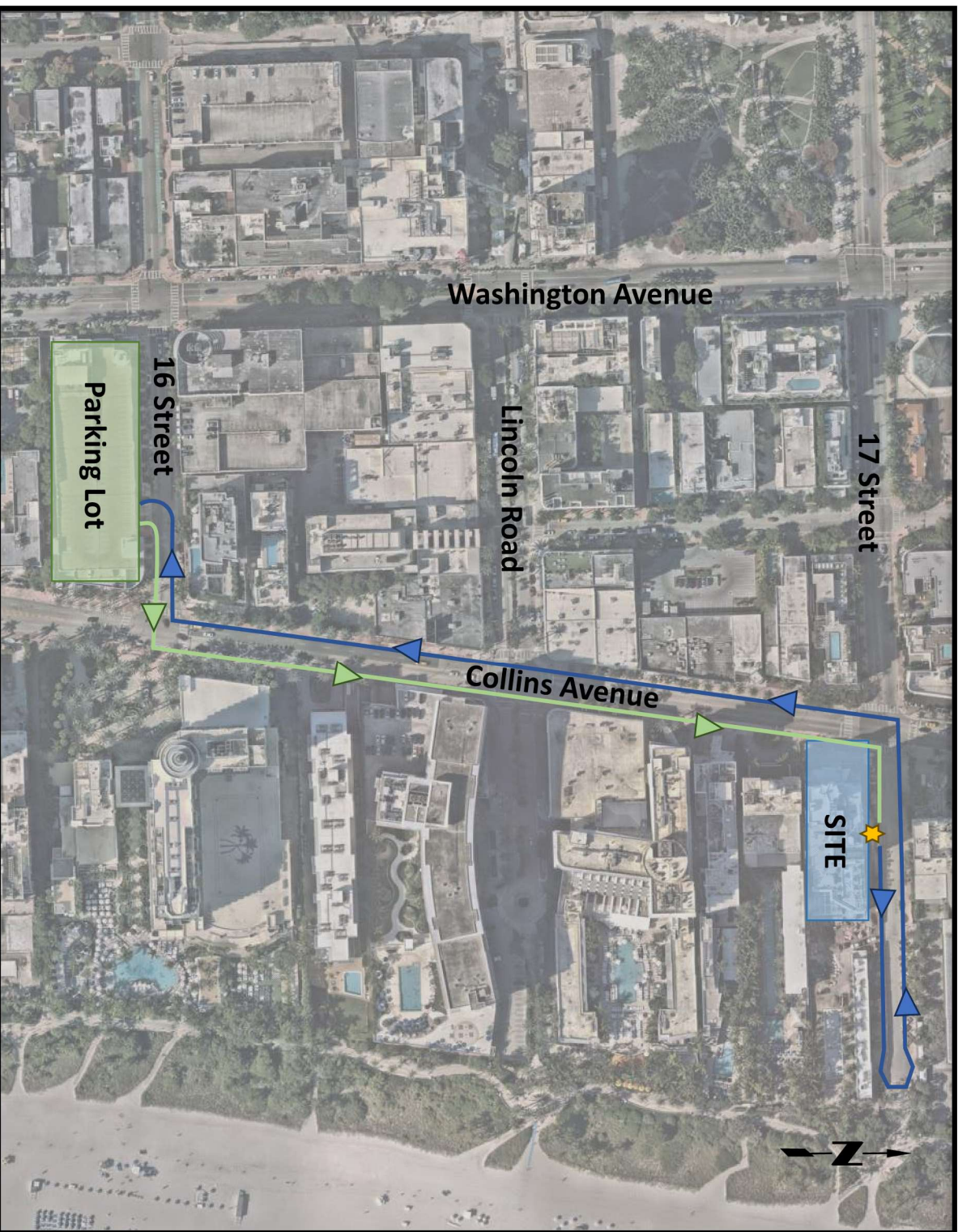


Delano Hotel Valet Figure

Restaurant/ Member's Club
Valet Parking Operations

Legend

- Ingress Queue
- Egress Queue
- Valet Drop Off/Pick Up Area



Valet Service Time Calculations - Hotel
DELANO HOTEL

Valet Service Time Drop-off	
Activity	Service Time (min)
Vehicle Pick-Up	0.40
Vehicle Travel Time (Including vehicular signal delay)	2.98
Return to Valet booth (Including pedestrian signal delay)	5.00
Total Service Time	8.38

Travel Time from Valet Booth to Valet Parking Spaces				
From Valet Stand	Speed (mph)	Speed (mps)	Distance to Vehicle Parking (m)	Travel Time (sec)
	10	4.44	527.00	118.58
Travel Time from Parking Garage to Valet Drop-Off				
From Valet Parking	Speed (mph)	Speed (mps)	Distance to Valet Drop-Off (m)	Travel Time (sec)
	10	4.44	488.00	109.80

Valet Service Time Pick-up	
Activity	Service Time (min)
Get Ticket/Keys	0.15
Pickup Car Time (Including pedestrian signal delay)	5.00
Vehicle Travel Time (Including vehicular signal delay)	2.83
Return car	0.25
Total Service Time	8.23

Valet Operator time to return to Booth	
Return to Valet booth from Valet Parking	5 min

QUEUING ANALYSIS - Hotel
DELANO HOTEL

Operation Type	Time (min)*
Valet Operation	8.38

Afternoon Peak Hour Valet Parking Queuing Analysis		
Variable	Equation	
Peak hour service rate per attendant (veh/hr/attendant)	$Q = \frac{60}{\text{Service Time}}$	7.1631
Number of valet attendants	N	8
Peak hour arrival rate of vehicles (veh/hr)	q	37
Coefficient of utilization	$p = \frac{q}{NQ}$	0.6457
Probability of no guests in system	$P(0) = \left[\sum_{n=0}^{N-1} \frac{\left(\frac{q}{Q}\right)^n}{n!} + \frac{\left(\frac{q}{Q}\right)^N}{N!(1-p)} \right]^{-1}$	0.0054
Proportion of guests who wait	$P[E(w) > 0] = \left[\frac{\left(\frac{q}{Q}\right)^N}{N!(1-p)} \right] P(0)$	0.1927
Probability of a queue exceeding a length M (95th Percentile)	$P(x > M) = (p^{M+1}) P[E(w) > 0]$	0.05
Queue length which is exceeded 5% of the time (veh)	$M = \left\lceil \frac{\ln P(x > M) - \ln P[E(w) > 0]}{\ln p} \right\rceil - 1$	2

Afternoon Peak Hour Trip Generation Summary				
Land Use	ITE Code	In	Out	Total Trips
Resort Hotel	330	16	21	37
Fine Dining Restaurant	931	50	24	74
Total		66	45	111

* Adopted from ITE Transportation and Development, 1988

Valet Service Time Calculations - Restaurant
DELANO HOTEL

Valet Service Time Drop-off	
Activity	Service Time (min)
Vehicle Pick-Up	0.40
Vehicle Travel Time (Including vehicular signal delay)	3.13
Return to Valet booth (Including pedestrian signal delay)	6.00
Total Service Time	9.53

Travel Time from Valet Booth to Valet Parking Spaces				
From Valet Stand	Speed (mph)	Speed (mps)	Distance to Vehicle Parking (m)	Travel Time (sec)
	10	4.44	567.00	127.58
Travel Time from Parking Garage to Valet Drop-Off				
From Valet Parking	Speed (mph)	Speed (mps)	Distance to Valet Drop-Off (m)	Travel Time (sec)
	10	4.44	567.00	127.58

Valet Service Time Pick-up	
Activity	Service Time (min)
Get Ticket/Keys	0.15
Pickup Car Time (Including pedestrian signal delay)	6.00
Vehicle Travel Time (Including vehicular signal delay)	3.13
Return car	0.25
Total Service Time	9.53

Valet Operator time to return to Booth	
Return to Valet booth from Valet Parking	6 min

QUEUING ANALYSIS - Restaurant
DELANO HOTEL

Operation Type	Time (min)*
Valet Operation	9.53

Afternoon Peak Hour Trip Generation Summary

Land Use	ITE Code	In	Out	Total Trips
Resort Hotel	330	16	21	37
Fine Dining Restaurant	931	50	24	74
Total		66	45	111

Afternoon Peak Hour Valet Parking Queuing Analysis		
Variable	Equation	
Peak hour service rate per attendant (veh/hr/attendant)	$Q = \frac{60}{\text{Service Time}}$	6.2984
Number of valet attendants	N	16
Peak hour arrival rate of vehicles (veh/hr)	q	74
Coefficient of utilization	$p = \frac{q}{NQ}$	0.7343
Probability of no guests in system	$P(0) = \left[\sum_{n=0}^{N-1} \frac{\left(\frac{q}{N}\right)^n}{n!} + \frac{\left(\frac{q}{N}\right)^N}{N!(1-p)} \right]^{-1}$	0.0000
Proportion of guests who wait	$P[E(w) > 0] = \left[\frac{\left(\frac{q}{N}\right)^N}{N!(1-p)} \right] P(0)$	0.1785
Probability of a queue exceeding a length M (95th Percentile)	$P(\alpha > M) = (p^{M+1}) P[E(w) > 0]$	0.05
Queue length which is exceeded 5% of the time (veh)	$M = \left\lceil \frac{\ln P(\alpha > M) - \ln P[E(w) > 0]}{\ln p} \right\rceil - 1$	3

* Adopted from ITE Transportation and Development, 1988

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APPLICATIONS OF QUEUEING ANALYSIS

Providing an adequate and well-defined storage area for drive-thru traffic is particularly critical, especially at fast-food restaurants and drive-thru bank facilities where queues can, and do, become quite long. Waiting vehicles should be stored on private property clear of driveways so that traffic back-up does not interfere with movement on the arterial street. At fast-food restaurants, the menu board should be installed upstream of the service window to permit drive-thru customers to place their orders prior to their arrival at the service window. Preparation of their order can then begin before they reach the service window, thus minimizing their time at the service window. A well-defined storage area for the waiting traffic should be located so that the waiting vehicles do not block or impede the movement of driveway traffic.

Where a single service position is involved, the situation is referred to as a *single-channel problem*. *Multiple-channel problems* arise when two or more service positions are available. Such problems commonly arise with bank tellers (indoor as well as drive-in windows), entrances and exits at large parking lots and garages, at passenger pick-up areas at transit stations and taxi stands, truck terminals or loading/unloading areas, supermarket checkout counters, telephone calls, building entrances, and transit-station turnstiles. The assumptions of Poisson arrivals and negative exponential service time are commonly acceptable and used for both single- and multiple-channel problems. Thurgood [11] found these assumptions to be representative of drive-in facilities.

Customers arriving randomly at a drive-in facility may enter into service immediately or may have to enter the queue until they can be served. Waiting lines occur whenever the immediate demand for service exceeds the current capacity of the facility providing that service.

Basic Notation and Terminology

The following notation is employed throughout this section:

- n = number of customers in the drive-in system
- M = number of customers in the queue waiting to be served (number of customers in the system minus the number being served)
- $P(n)$ = steady-state probability that exactly n customers are in the queueing system
- $P(0)$ = probability that zero vehicles are in the queueing system
- N = number of parallel service positions
- q = mean average arrival rate of vehicles into the system (vehicles/hour)
- Q = mean average service rate per service position (vehicles/hour/position)
- Avg (t) = $\frac{60}{Q}$ = mean service time expressed in minutes per vehicle
- ρ = $\frac{q}{Q}$ = coefficient of utilization
- $E(m)$ = expected (average) number of customers in the system
- $E(n)$ = expected (average) number of customers waiting in the queue
- $E(t)$ = expected (average) waiting time in system (includes service time)
- $E(w)$ = expected (average) waiting time in queue (excludes service time)

The equations employed in the analysis of queueing problems are given in Table 8-10.

Jones, Woods, and Thurgood [4] have developed a graph (Figure 8-6) for determining the probability that there will be no customers in the system—values for $P(0)$. They also developed graphs for determining the average number of waiting customers (Figure 8-7), the average waiting time (Figure 8-8), and average queue length (Figure 8-9). These figures avoid the necessity to perform the time-consuming, although simple, queueing-analysis calculations. See pp. 228–30.

TABLE 8-10
Queuing System Equations

Equation Number	Variable	Equation
(8-1)	Coefficient of utilization	$\rho = \frac{q}{NQ}$
(8-2)	Probability of no customers in the system	$P(0) = \left[\sum_{n=0}^{N-1} \frac{\left(\frac{q}{Q}\right)^n}{n!} + \frac{\left(\frac{q}{Q}\right)^N}{N!(1-\rho)} \right]^{-1}$
(8-3)	Mean number in the queue	$E(m) = \left[\frac{\rho \left(\frac{q}{Q}\right)^N}{N!(1-\rho)^2} \right] P(0)$
(8-4)	Mean number in the system	$E(n) = E(m) + \frac{q}{Q}$
(8-5)	Mean wait time in queue (hours)	$E(w) = \frac{E(m)}{q}$
(8-6)	Mean time in the system (hours)	$E(t) = E(w) + \frac{1}{Q}$ $= E(w) + \text{Avg}(t)$
(8-7)	Proportion of customers who wait	$P[E(w) > 0] = \left[\frac{\left(\frac{q}{Q}\right)^N}{N!(1-\rho)} \right] P(0)$
(8-8)	Probability of a queue exceeding a length M	$P(x > M) = (\rho^{N+1})P[E(w) > 0]$
(8-9a)	Queue storage required	$M = \left[\frac{\ln P(x > M) - \ln E(w) > 0}{\ln \rho} \right] - 1$
(8-9b)*	Queue storage required	$M = \left[\frac{\ln P(x > M) - \ln Q_M}{\ln \rho} \right] - 1$

* Q_M is a statistic which is a function of the utilization rate and the number of service channels (service positions); see Table 8-11. The table of Q_M values and use of Equation (8-9b) greatly simplifies the calculations compared to those using Equations (8-9a).

Use of the equations and the graphs may be illustrated by the following example of a drive-in bank.

Conditions:

Number of drive-in windows, $N = 3$

Demand on the system, $q = 70$

Service capacity per channel, $Q = 28.6$ for an average service time, $\text{Avg}(t) = 2.1$ minutes

Solution Using Graphs:

- Coefficient of utilization = $70/(3)(28.6) = 0.816$
- Probability that there are customers waiting in the system, Figure 8-6:
 $P(0) = 0.05$
- Expected average number of customers waiting in the queue, Figure 8-7:
 $E(m)/N = 1.0$; and the average number $E(m) = (3)(1.0) = 3$

location, a 5% probability of back-up onto the adjacent street is judged to be acceptable. Demand on the system for design is expected to be 110 vehicles in a 45-minute period. Average service time was expected to be 2.2 minutes. Is the queue storage adequate?

Such problems can be quickly solved using Equation (8-9b) given in Table 8-10 and repeated below for convenience.

$$M = \left[\frac{\ln P(x > M) - \ln Q_M}{\ln \rho} \right] - 1$$

where:

M = queue length which is exceeded p percent of the time

N = number of service channels (drive-in positions)

Q = service rate per channel (vehicles per hour)

$\rho = \frac{\text{demand rate}}{\text{service rate}} = \frac{q}{NQ} = \text{utilization factor}$

q = demand rate on the system (vehicles per hour)

Q_M = tabled values of the relationship between queue length, number of channels, and utilization factor (see Table 8.11)

TABLE 8-11
Table of Q_M Values

	$N = 1$	2	3	4	6	8	10
0.0	0.0000	0.0000	0.0000	0.0000			
0.1	.1000	.0102	.0037	.0008	.0000	0.0000	0.0000
.2	.2000	.0666	.0247	.0096	.0015	.0002	.0000
.3	.3000	.1385	.0700	.0370	.0111	.0036	.0011
.4	.4000	.2286	.1411	.0907	.0430	.0185	.0088
.5	.5000	.3333	.2368	.1739	.0991	.0591	.0360
.6	.6000	.4501	.3548	.2870	.1965	.1395	.1013
.7	.7000	.5766	.4923	.4286	.3359	.2706	.2218
.8	.8000	.7111	.6472	.5964	.5178	.4576	.4093
.9	.9000	.8526	.8172	.7878	.7401	.7014	.6687
1.0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$$\rho = \frac{q}{NQ} = \frac{\text{arrival rate, total}}{\text{(number of channels) (service rate per channel)}}$$

N = number of channels (service positions)

Solution

Step 1: $Q = \frac{60 \text{ min/hr}}{2.2 \text{ min/service}} = 27.3$ services per hour

Step 2: $q = (110 \text{ veh/45 min}) \times (60 \text{ min/hr}) = 146.7$ vehicles per hour

Step 3: $\rho = \frac{q}{NQ} = \frac{146.7}{(6)(27.3)} = 0.8956$

Step 4: $Q_M = 0.7303$ by interpolation between 0.8 and 0.9 for $N = 6$ from the table of Q_M values (see Table 8-11).

Step 5: The acceptable probability of the queue, M , being longer than the storage, 18 spaces in this example, was stated to be 5%. $P(x > M) = 0.05$, and:

$$M = \left[\frac{\ln 0.05 - \ln 0.7303}{\ln 0.8956} \right] - 1 = \left[\frac{-2.996 - (-0.314)}{-0.110} \right] - 1$$

$$= 24.38 - 1 = 23.38, \text{ say } 23 \text{ vehicles.}$$

The number of vehicles in the queue would be expected to exceed 23 more than 5% of the time. Since the site plan will accommodate a queue of 18 vehicles, the storage is not sufficient for the conditions stated.

It is important to realize that, for any $P(x > M)$ value, the queue length required increases very rapidly for values of $\rho > 0.85$ (see Figure 8-9). When $\rho > 1.0$, the solution is indeterminate and the queue length theoretically becomes infinite.

Analysis of Service Times. In many instances it is effective to demonstrate that a proposed design not only is inadequate to store vehicles waiting for service but will result in unacceptable wait times as well. The necessary equations are given in Table 8-10.

For purposes of checking computations it is convenient to know that the limit of $P(0)$, as the number of channels approaches infinity (in practical terms when $N > 10$), is:

$$\lim_{N \rightarrow \infty} P(0) = e^{-\lambda} \quad \text{where } \lambda = q/Q$$

Drive-In Bank Example: Under the site-development approval requirements, representatives of a bank presented a site plan for the construction of a new bank having three service positions. Information provided by bank officials and observations at other local banks provided the following data:

- Expected average arrival rate during the design hour (4:30–5:30 p.m. on Fridays) = 70 vehicles per hour (vph)
- Average service time per customer = 2.1 minutes

Does the site plan provide for sufficient storage to accommodate all vehicles arriving 95% of the time?

$$q = 70 \text{ vph arrival rate}$$

$$Q = \frac{60 \text{ minutes per hour}}{2.1 \text{ minutes per service}} = 28.6 \text{ vph service rate}$$

$$\rho = \frac{70}{(3)(28.6)} = 0.816$$

$$\frac{q}{Q} = \frac{70}{28.6} = 2.45$$

$$Q_M = 0.674 \text{ by interpolation from Table 8-11}$$

$$P(x > M) = 1.00 - 0.95 = 0.05$$

By Equation (8-9b)

$$M = \left[\frac{\ln 0.05 - \ln 0.674}{\ln 0.816} \right] - 1 = \left[\frac{-2.996 - (-0.396)}{-0.203} \right] - 1 = 11.8, \text{ say } 12$$

Thus, it would be necessary to store 12 vehicles, exclusive of the three service positions, in order to accommodate the arriving vehicles 95% of the time; or alternatively, to have waiting vehicles extending back into the adjacent street no more than 5% of the time between 4:30 and 5:30 p.m. on Fridays. Since the site plan provides for six spaces, the site plan as submitted is inadequate and should be disapproved.

A solution to the problem would be to increase the storage, or if this is not possible add a service position in order to reduce the average service time.

Addition of a service position would reduce the number of storage spaces needed to three (three storage plus four service positions)—assuming the same arrival rate and service time:

$$M = \left[\frac{\ln 0.05 - \ln 0.301}{\ln 0.612} \right] - 1 = 2.7, \text{ say } 3$$

A redesign to provide four service positions would have the additional benefit of substantially reducing the expected waiting time (from over 4 minutes to less than $\frac{1}{2}$ minute) for the bank customers using the drive-in windows:

With Three Service Positions:

$$q = 70 \text{ vph}$$

$$Q = 28.6 \text{ vph}$$

$$\frac{q}{Q} = 2.45$$

$$\rho = \frac{70}{(3)(28.6)} = 0.816$$

$$P(0) = \left[\frac{(2.45)^0}{0!} + \frac{(2.45)^1}{1!} + \frac{(2.45)^2}{2!} + \frac{(2.45)^3}{3! \left[1 - \left(\frac{2.45}{3} \right) \right]} \right]^{-1}$$

$$= [1 + 2.45 + 3.00 + 13.37]^{-1} = 0.0505$$

$$E(m) = \left[\frac{(0.816) \left(\frac{70}{28.6} \right)^3}{3!(1 - 0.816)^2} \right] 0.0505 = 2.97$$

$$E(n) = 2.97 + \frac{70 \cdot 2.45}{2.45 \cdot 28.6} = 5.42$$

$$E(t) = \frac{2.97}{70} = 0.0424 \text{ hours or } 2.55 \text{ minutes}$$

$$E(w) = 0.0424 + \frac{1}{28.6} = 0.0774 \text{ hours or } 4.64 \text{ minutes}$$

With Four Service Positions:

$$q = 70 \text{ vph}$$

$$Q = 28.6 \text{ vph}$$

$$\frac{q}{Q} = 2.45$$

$$\rho = \frac{70}{(4)(28.6)} = 0.612$$

$$P(0) = \left[\frac{(2.45)^0}{0!} + \frac{(2.45)^1}{1!} + \frac{(2.45)^2}{2!} + \frac{(2.45)^3}{3!} + \frac{(2.45)^4}{4! \left[1 - \left(\frac{2.45}{4} \right) \right]} \right]^{-1}$$

$$= 0.0783$$

$$E(m) = \left[\frac{(0.612)(2.45)^4}{4!(1 - 0.612)^2} \right] 0.0783 = 0.48$$

$$E(n) = 0.48 + 2.45 = 2.93$$

$$E(t) = 0.007 + \frac{1}{28.6} = 0.042 \text{ hours or } 2.51 \text{ minutes}$$

$$E(w) = \frac{0.48}{70} = 0.007 \text{ hours or } 0.41 \text{ minutes}$$

However, the service time would increase somewhat unless an additional teller were also added. Nevertheless, an increase to 2.5 minutes, or more, would still reduce the storage space required and result in better service (less time in the system). Besides, time spent being served is less irritating to the customer than an equal time spent waiting.

Conversion of a Residence. An existing single-family residence was situated on a 2.5-acre tract fronting on the major north-south arterial in the urbanizing fringe of a metropolitan area of 100,000 population. The 85th percentile speed exceeded 50 mph; however, it was anticipated that the speed limit would be reduced to 45 mph as further urbanization occurred.

Requests for rezoning from single-family residential to general commercial had received negative recommendations from the Planning and Zoning Commission and denied by the City Council. Nevertheless, the fact that changing conditions in the vicinity of the site were making the property less desirable as a single-family residence was generally recognized. Therefore, when an application was submitted for a Conditional Use Permit to establish a private school using the existing residence for classrooms, the Planning and Zoning Commission was very favorably disposed to the request. The applicant provided the following information prior to the public hearing.

1. The completed application for a conditional use
2. A statement that the intended use was for a Montessori school using the existing structure
3. A site plan as required for all proposed development, other than single-family and duplex residential development, before a building permit will be issued for a new structure and for remodeling of an existing one

The following information was presented at the public hearing by the applicant:

1. At least 40 students would be enrolled before any change would be made in the site circulation.
2. Eighty percent of the students were expected to be picked up within a 20-minute period—a substantial additional fee was to be charged for children picked up more than 30 minutes after school.
3. A strong parent-school relationship was intended, so that average pick-up time of at least 2 minutes and visits of 5 minutes or longer would not be unusual.

The following were agreed upon at the public hearing:

1. The probability of vehicles backing up onto the main lane of the major arterial should be negligible, less than 1%.
2. The site plan, with no change in the circulation pattern, would provide for four service positions and three storage positions.

Based upon these conditions, the following analysis was performed using Equation (8-9b):

$$M = 3$$

$$N = 4$$

$$Q = 60 \text{ minutes per hour} \div 2 \text{ minutes per service} = 30 \text{ vph}$$

$$q = (40 \text{ students}) (80\% \text{ in } 20 \text{ minutes}) \left(\frac{60}{20}\right) = 96 \text{ vph}$$

$$\rho = \frac{96}{(4)(30)} = 0.8000$$

$$P(x > 3) = 0.01 \text{ (a 1\% chance of vehicles backing up onto the arterial)}$$

$$Q_M = 0.8585, \text{ from Table 8-11}$$

$$3 = \left[\frac{\ln P(x > 3) - \ln 0.5964}{\ln 0.8000} \right] - 1$$

$$3 = \left[\frac{\ln P(x > 3) - (-0.5168)}{-0.2231} \right] - 1$$

Then,

$$\ln P(x > 3) = (4)(-0.2231) - 0.5168 = -1.4092$$

and

$$P(x > 3) = e^{-1.4092} = 0.244 \text{ or } 24\%$$

Thus, the calculated probability that the queue could back up onto the arterial is 24% (given the stated conditions), which is considerably greater than the acceptable probability of less than 1%, and the application was denied. The Planning and Zoning Commission suggested various compromises of redesign of the site and issuance of a conditional use permit for a school (under the ordinance, a school can be located in any zoning district by condition) with the condition that the maximum enrollment would not exceed 24 students, which is the number necessary to achieve a value of $P(x > 3) < 0.01$. All such proposals were rejected by the applicant. The site was subsequently rezoned to the Administrative and Professional District (a restricted office district) and is now being used as a dentist's office.

REFERENCES

1. Barton-Aschman Associates, Inc., *McDonald's Site Traffic Analysis Manual*, 1980.
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3. Institute of Transportation Engineers, *Trip Generation Rates*, 1976.
4. Jones, Robert L., Woods, Donald, L., and Thurgood, Glen S., "Drive-In Banking: Managing for Maximum Service," *ITE Journal*, publication pending.
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6. Lopata, Roy H. and Jaffe, Stuart J., "Fast Food Restaurant Trip Generation: Another Look," *ITE Journal*, 1980.
7. Petersen, David O., "Bank-Savings and Loan Traffic and Parking Analysis," unpublished internal memorandum, Barton-Aschman Associates Inc., February 1974.
8. Scifres, Peter N., "Traffic Planning for Drive-In Financial Institutions," *Traffic Engineering*, September 1975.
9. The Traffic Institute, Northwestern University, Selected Studies of Burger King Restaurants.
10. The Traffic Institute, Northwestern University, short course notes.
11. Thurgood, Glen S., "The Application of Stochastic Queueing Theory in the Development of Suggested Traffic Design Guidelines for Drive-In Service Facilities," doctoral dissertation, Texas A&M University, December 1975.

Joe Goldberg

From: Barrera, Jimena <JimenaBarrera@miamibeachfl.gov>
Sent: Tuesday, February 24, 2026 2:14 PM
To: Dante Burgos
Cc: Oscar Mejia; Jakub KOCANDRLE
Subject: Re: Delano Hotel Miami Beach - 17th Street Parking Spaces
Attachments: Valet Service - Checklist 2025.pdf

Good afternoon, Dante,

Thank you for taking my call. Please send me the photos of the area where you plan to ramp, along with the corresponding space numbers, and I will discuss the

request with my Assistant Director. Additionally, please confirm the name of the restaurant and ensure that they have an active BTR.

Here are the necessary steps you need to take to begin operations:

1. Visit the Customer Service Department
Go to 1755 Meridian Ave, Suite 100 to apply for adding the new location to your Business Tax Receipt (BTR).
Bring all required documents. I have attached the check list to the email for your reference.
2. Document Verification
The office will review your documents. Once approved, you'll receive a BLPL number (BLPL2026-xxxx).
3. **(Important)** Operational Plan Submission
Submit a Valet Operational Plan when you turn in your documents. This plan must be reviewed by a Traffic Engineer.
4. Department Review
Your application will be reviewed by departments such as Parking & Transportation, Code Enforcement, and Finance using your BLPL number. They will determine whether to approve or deny your request.

Once your application is approved, we can discuss operations.

Please provide me with the BLPL number once you have applied and below is the link to the city's ordinance.

[ARTICLE VIII. - PARKING LOT | Code of Ordinances | Miami Beach, FL | Municode Library](#)

Please feel free to reach out if anything is unclear. I understand this is a lot of information, and I'm here to help!

Regards,

MIAMIBEACH

Jimena Barrera - Parking Admin Specialist

PARKING DEPARTMENT

1755 Meridian Ave Suite 200, Miami Beach, Florida 33139

Tel: 305-673-7000 ext. 26220 / www.miamibeachfl.gov

- Space rental hours of operation are Monday-Friday 8:30 a.m. to 3:00 p.m.
- Space rental must be requested at least (3) business days in advance.
- Non-metered/residential areas require at least (15) business days' notice.
- Payment must be received 48 hours or two (2) business days in advance, whichever is greater, of the rental date.
- Modifications, refunds and/or credits cannot be issued once the invoice is paid.

We are committed to providing excellent public service and safety to all who live, work and play in our vibrant, tropical, historic community.

From: Jakub KOCANDRLE <jakub.kocandrle@delanohotels.com>

Sent: Friday, February 20, 2026 3:38 PM

To: Dante Burgos <dburgos@metropolis.io>; Barrera, Jimena <JimenaBarrera@miamibeachfl.gov>

Cc: Oscar Mejia <omejia@metropolis.io>; Alejandro SANCHEZ <Alejandro.Sanchez@delanohotels.com>

Subject: RE: Delano Hotel Miami Beach - 17th Street Parking Spaces

You don't often get email from jakub.kocandrle@delanohotels.com. [Learn why this is important](#)

[THIS MESSAGE COMES FROM AN EXTERNAL EMAIL - USE CAUTION WHEN REPLYING AND OPENING LINKS OR ATTACHMENTS]

Good afternoon, Ms. Barrera,

I hope this email finds you well, and pleasure to e-meet you.

This is to confirm that we are engaged with Metropolis, and in final stages of contract agreement for Valet Parking Services. As Dante mentioned, we are seeking permits to obtain an operational space for our Food & Beverage Operations Valet Station on the 17th Street.

Please do not hesitate to contact us if you have any questions.

Yours sincerely,

JAKUB KOCANDRLE - DIRECTOR OF ROOMS

Jakub.KOCANDRLE@delanohotels.com

DELANO MIAMI BEACH

17th Street Entrance, 1685 Collins Ave, Miami Beach, FL 33139, US



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From: Dante Burgos <dburgos@metropolis.io>

Sent: Friday, February 20, 2026 2:39 PM

To: Barrera, Jimena <JimenaBarrera@miamibeachfl.gov>; Jakub KOCANDRLE <jakub.kocandrle@delanohotels.com>

Cc: Oscar Mejia <omejia@metropolis.io>

Subject: Re: Delano Hotel Miami Beach - 17th Street Parking Spaces

Good afternoon Jimena,

I hope you are doing well.

As we approach the Delano Hotel's reopening in Miami Beach, currently scheduled for the end of March 2026, we would like to resume our discussion regarding the rental of municipal parking spaces along 17th Street adjacent to the property.

I have copied Jakub, The Hotel Manager at the Delano, should you require any additional information or have specific requirements.

We would appreciate the opportunity to meet and discuss this in more detail to ensure full compliance with City of Miami Beach requirements and proper coordination with the Parking Department.

Would you be available this Monday for a brief meeting? Please let me know a time that works best for you and I will gladly accommodate.

Thank you for your time and assistance. I look forward to your response.

Best regards,



Dante Burgos | Metropolis
Regional Manager

Mobile: 786 515 7900 | metropolis.io