Trip Generation Study

Miami Beach Fire Station

833 6th Street
Miami Beach, Florida

February 16th, 2021

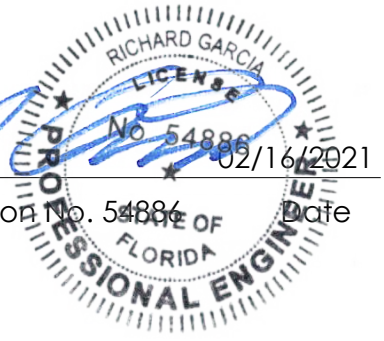
Richard Garcia & Associates, Inc.

Engineer's Certification

I, Richard Garcia, P.E. # 54886, certify that I currently hold an active Professional Engineers License in the State of Florida and am competent through education and experience to provide engineering services in the civil and traffic engineering disciplines contained in this report. In addition, the firm Richard Garcia & Associates, Inc. holds a Certificate of Authorization # 9592 in the State of Florida. I further certify that this report was prepared by me or under my responsible charge as defined in Chapter 61G15-18.001 F.A.C. and that all statements, conclusions and recommendations made herein are true and correct to the best of my knowledge and ability.

Project Description: **Miami Beach Fire Station** – Trip Generation Study

Project Location: 833 6th Street
Miami Beach, Florida



02/16/2021

Florida Registration No. 54886 Date

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Introduction

The purpose of this study is to evaluate the trip generation associated with the proposed Fire Station development. The analysis documented herewith evaluated the existing and proposed project traffic during the site's AM and PM peak hour of the adjacent street (i.e. Peak Hour). That is, when the roadway traffic will have the highest traffic volume.

Project Location / Description

The subject site is located between Meridian Avenue and Jefferson Avenue on the north side of 6th Street in the City of Miami Beach, Florida. This site was previously a Day Care with Community Rooms and Religious Services. The proposed use is for a Fire Station. Figure 1 depicts the site's location map while Figure 2 is the site plan provided for illustrative purposes only. It is important to note that the Fire Station (i.e. fire truck) will enter on Meridian Avenue and exit on Jefferson Avenue.

Figure 1: Location Map

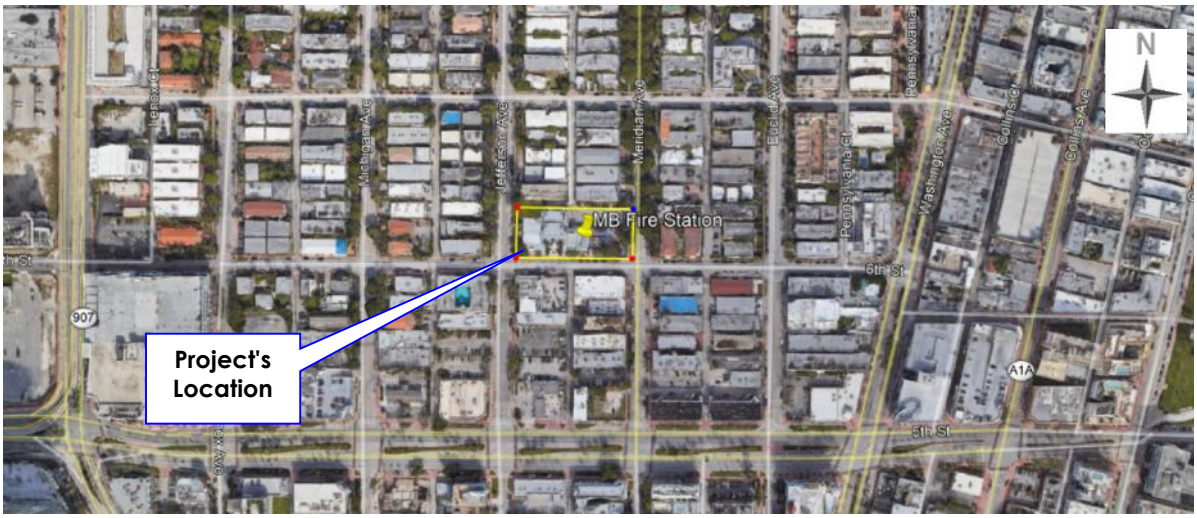
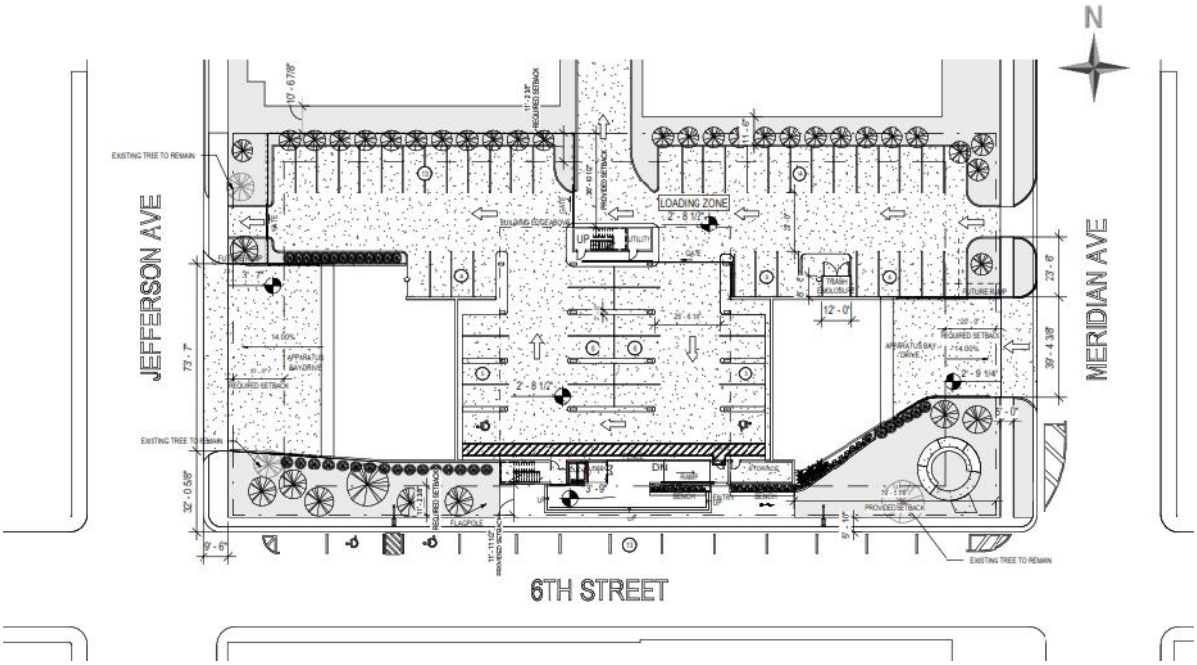


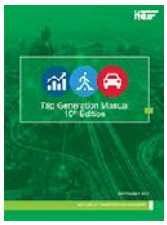
Figure 2: Site Plan



Project Traffic

This section of the report describes the analysis for estimating the traffic associated with the subject project. The trip generation analysis summarized below was performed consistent with the methodology described in the Institute of Transportation Engineers (ITE) Trip Generation Handbook, 3rd Edition.

Trip Generation



The trip generation characteristics for the subject project was obtained from **ITE's Trip Generation Manual, 10th Edition**. ITE's Land Use 575 (Fire Station), as identified by the Institute of Transportation Engineers (ITE), was used to determine the proposed trips. This use most closely resemble the proposed project's development. The trip generation analysis was performed for a typical weekday's AM and PM peak hour for the peak hour. This Fire Station trips were then compared to the existing uses. Additionally, no transit, pedestrian or bicycle trip reduction was utilized as a conservative approach.

As a result, the trip generation calculations yielded a reduction of **-15 net vehicle trips** (-7 trips-in & -8 trips-out) during the **AM peak hour.** Likewise, for the **PM peak hour** there was a similar reduction in trips of **-15 net vehicle trips** (-8 trips-in & -7 trips-out).

Tables 1 and 2 summarize the trip generation results for the AM and PM peak hour, respectively.

Table 1: Trip Generation - AM Peak Hour of the Generator

LAND USE (LU)	UNITS	ITE LU CODE	ITE TRIP GENERATION RATE	AM PEAK HOUR TRIPS				
				%	IN	%	OUT	TOTAL
Existing								
Community Rooms	2.903 Th.Sq.Ft.	560	0.33	60%	1	40%	0	1
Religious Service	2.790 Th.Sq.Ft.	560	0.33	60%	1	40%	0	1
Day Care Center	33 Students	565	0.78	53%	14	47%	12	26
Proposed								
Fire Station*	27.0 Th.Sq.Ft.	575	0.48	71%	9	29%	4	13
Net External Trips *(Proposed Trips - Existing Trips)*				**47%**	**-7**	**53%**	**-8**	**-15**

Notes: Sources: ITE Trip Generation, 10th Edition & ITE Trip Generation Handbook, 3rd Edition.
* Since ITE does not provide AM data for Fire Station (LU 575), Therefore, PM rate was used but the directional split was reversed (i.e. 71% Entering).

Table 2: Trip Generation - PM Peak Hour of the Generator

LAND USE (LU)	UNITS	ITE LU CODE	ITE TRIP GENERATION RATE	PM PEAK HOUR TRIPS				
				%	IN	%	OUT	TOTAL
Existing								
Community Rooms	2.903 Th.Sq.Ft.	560	0.49	45%	0	55%	1	1
Religious Service	2.790 Th.Sq.Ft.	560	0.49	45%	0	55%	1	1
Day Care Center	33 Students	565	0.79	47%	12	53%	14	26
Proposed								
Fire Station*	27.0 Th.Sq.Ft.	575	0.48	29%	4	71%	9	13
Net External Trips *(Proposed Trips - Existing Trips)*				**53%**	**-8**	**47%**	**-7**	**-15**

Notes: Sources: ITE Trip Generation, 10th Edition & ITE Trip Generation Handbook, 3rd Edition.

Trip Distribution

The subject project was found to be located within the Traffic Analysis Zone (TAZ) 653 as assigned by the Transportation Planning Organization's (TPO) on the Miami-Dade Transportation Plan (to the Year 2045) Directional Trips Distribution Report, September 2019. As such, a trip distribution was performed consistent with the trip distribution percentages of TAZ 653 by interpolating between the 2015 and 2045 TAZ data for the design year of 2022. ***Please note, since this project generated negative trips (a reduction from the existing use to the proposed use), the trip distribution was based on the Fire Station gross trips.***

Figure 3 depicts the TAZ map while the directional trip distribution percentages are outlined in Table 3. Appendix 2 contains the supporting documentation.

Figure 3: Traffic Analysis Zone (TAZ) Map

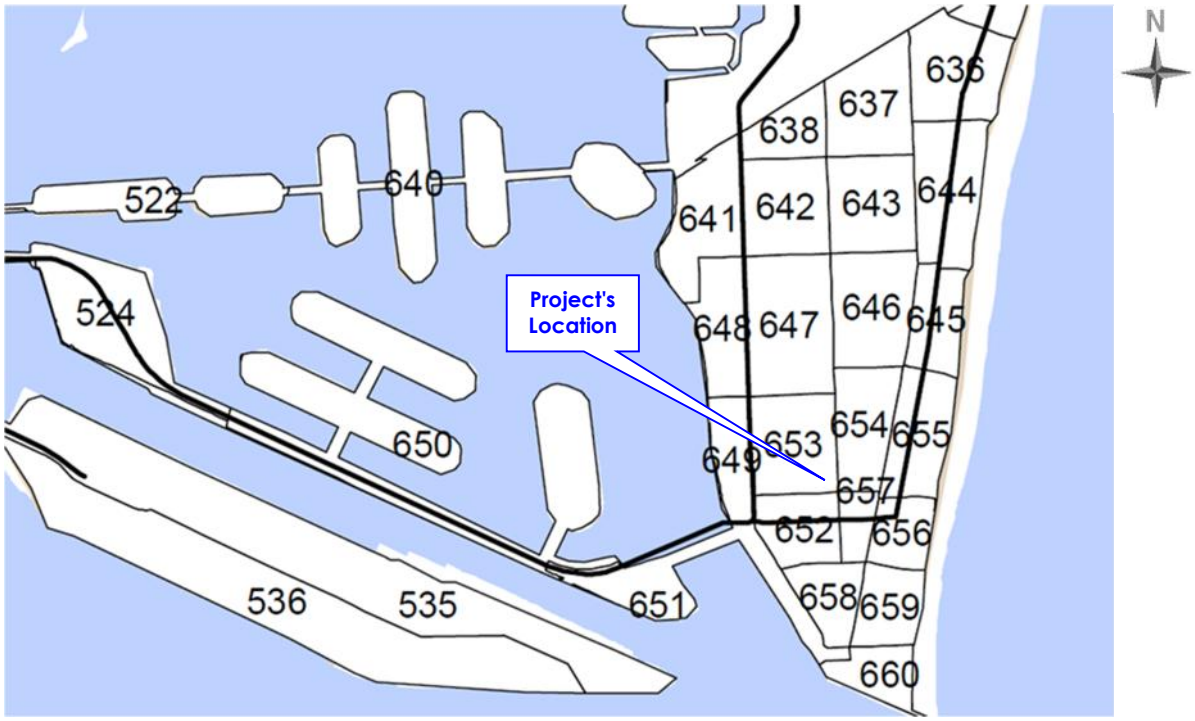


Table 3: Trip Distribution Percentages

DIRECTION	DISTRIBUTION PERCENTAGES (%)		
	MIAMI-DADE LRTP MODEL YEAR		DESIGN YEAR
	2015	2045	2022
NNE	20.30	15.80	19.25
ENE	4.10	2.10	3.63
ESE	6.40	5.10	6.10
SSE	8.10	5.20	7.42
SSW	1.60	1.10	1.48
WSW	20.50	24.60	21.46
WNW	16.60	31.40	20.05
NNW	22.50	14.70	20.68
TOTAL	**100.00**	**100.00**	**100.00**

Trip Assignment

The gross peak hour trips generated by the subject project have been distributed into the four quadrants: North, South, East and West. Table 4 includes the trip distribution percentages and the corresponding trip assignments for the AM and PM peak hour for the proposed Fire Station.

Table 4: Directional Trip Assignment

DIRECTION	DISTRIBUTION	AM PEAK HOUR			PM PEAK HOUR		
		IN	OUT	TOTAL	IN	OUT	TOTAL
NORTH	39.93%	4	2	6	2	4	6
EAST	9.73%	0	0	0	0	0	0
SOUTH	8.91%	1	0	1	0	1	1
WEST	41.51%	4	2	6	2	4	6
	100.00%	**9**	**4**	**13**	**4**	**9**	**13**

Conclusion

In conclusion, the proposed Fire Station project will generate less trips than the existing uses. Both the AM and PM peak hours were each found to generate 15 fewer trips. As a result, this project is found to improve traffic operations by generating less traffic and consequently have a "De Minimus" impact on traffic. Therefore, no further traffic analysis is hereby recommended.

Appendix 1: Trip Generation

TABLE: A1

TRIP GENERATION ANALYSIS
AM PEAK HOUR

Project Name: Miami Beach Fire Station

LAND USE (LU)	UNITS	ITE LU CODE	ITE TRIP GENERATION RATE	AM PEAK HOUR TRIPS				
				%	IN	%	OUT	TOTAL
Existing								
Community Rooms	2.903 Th.Sq.Ft.	560	0.33	60%	1	40%	0	1
Religious Service	2.790 Th.Sq.Ft.	560	0.33	60%	1	40%	0	1
Day Care Center	33 Students	565	0.78	53%	14	47%	12	26
Proposed								
Fire Station*	27.0 Th.Sq.Ft.	575	0.48	71%	9	29%	4	13
Net External Trips *(Proposed Trips - Existing Trips)*				**47%**	**-7**	**53%**	**-8**	**-15**

Notes: Sources: ITE Trip Generation, 10th Edition & ITE Trip Generation Handbook, 3rd Edition.

* Since ITE does not provide AM data for Fire Station (LU 575), Therefore, PM rate was used but the directional split was reversed (i.e. 71% Entering).

TABLE: A2

TRIP GENERATION ANALYSIS
PM PEAK HOUR

Project Name: Miami Beach Fire Station

LAND USE (LU)	UNITS	ITE LU CODE	ITE TRIP GENERATION RATE	PM PEAK HOUR TRIPS				
				%	IN	%	OUT	TOTAL
Existing								
Community Rooms	2.903 Th.Sq.Ft.	560	0.49	45%	0	55%	1	1
Religious Service	2.790 Th.Sq.Ft.	560	0.49	45%	0	55%	1	1
Day Care Center	33 Students	565	0.79	47%	12	53%	14	26
Proposed								
Fire Station*	27.0 Th.Sq.Ft.	575	0.48	29%	4	71%	9	13
Net External Trips *(Proposed Trips - Existing Trips)*				**53%**	**-8**	**47%**	**-7**	**-15**

Notes: Sources: ITE Trip Generation, 10th Edition & ITE Trip Generation Handbook, 3rd Edition.

Appendix 2: Trip Distribution

MIAMI-DADE TRANSPORTATION PLANNING ORGANIZATION

2045 LRTP SUPPORTING DOCUMENTS

DIRECTIONAL TRIP DISTRIBUTION REPORT

SEPTEMBER 2019

TRAFFIC ANALYSIS ZONE (TAZ)

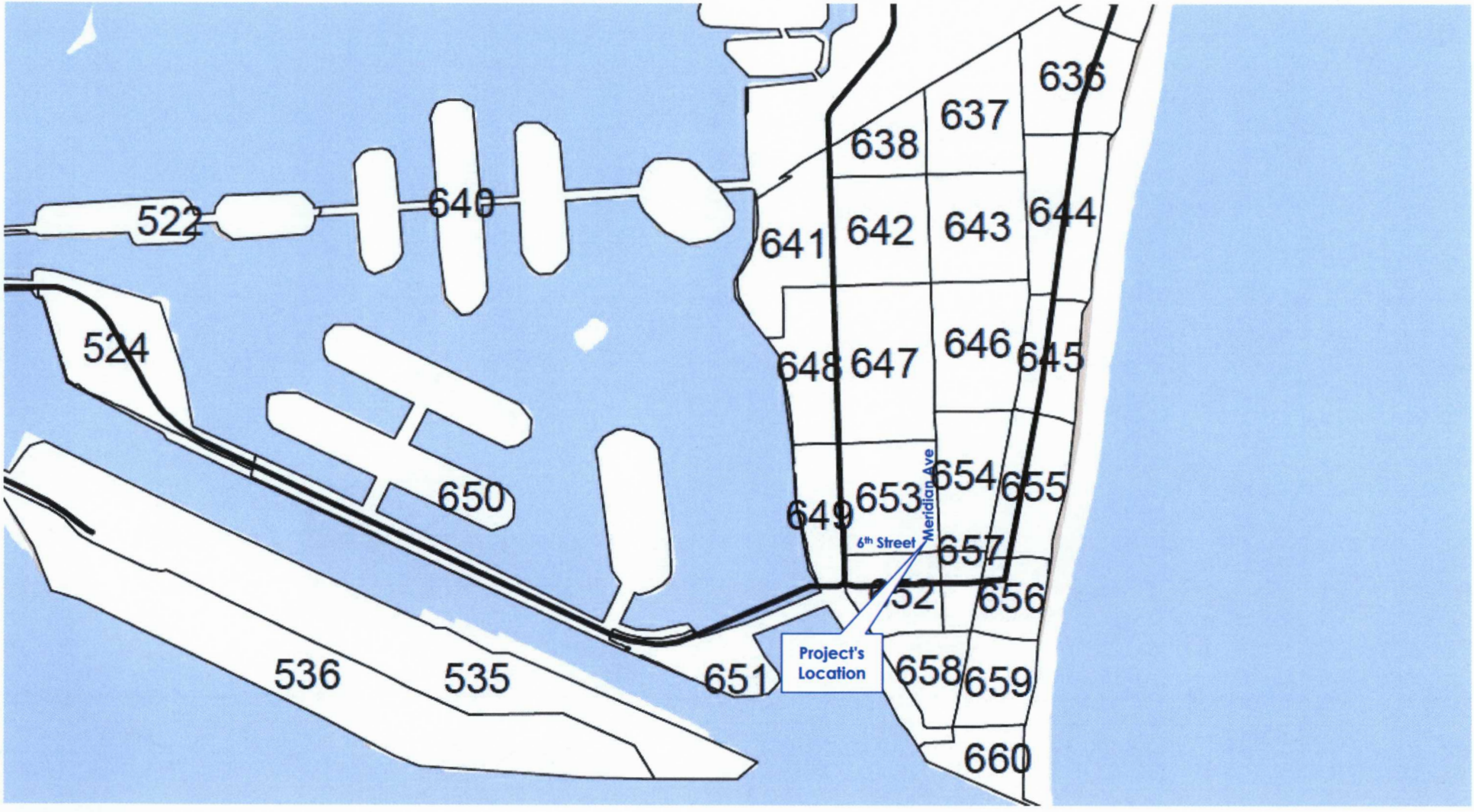


TABLE: A3-1

Cardinal Distribution
AM Peak Hour
Traffic Analysis Zone (TAZ) 653

Project Name: Miami Beach Fire Station

DIRECTION	DISTRIBUTION PERCENTAGES (%)			AM PEAK HOUR		
	MIAMI-DADE LRTP MODEL YEAR		DESIGN YEAR	IN	OUT	TOTAL
	2015	2045	2022			
NNE	20.30	15.80	19.25	2	1	3
ENE	4.10	2.10	3.63	0	0	0
ESE	6.40	5.10	6.10	0	0	0
SSE	8.10	5.20	7.42	1	0	1
SSW	1.60	1.10	1.48	0	0	0
WSW	20.50	24.60	21.46	2	1	3
WNW	16.60	31.40	20.05	2	1	3
NNW	22.50	14.70	20.68	2	1	3
TOTAL	100.00	100.00	100.00	9	4	13

Note:

Based on Miami-Dade Transportation Plan (to the Year 2045) Directional Trip Distribution Report, September 2019. Since the current data is only available for the model years 2015 and 2045, the eight (8) cardinal directions were interpolated to the design year shown.

TABLE: A3-2

AM PEAK HOUR	IN	OUT	TOTAL
TRIPS:	9	4	13
PERCENT:	69.23%	30.77%	(Calculated)

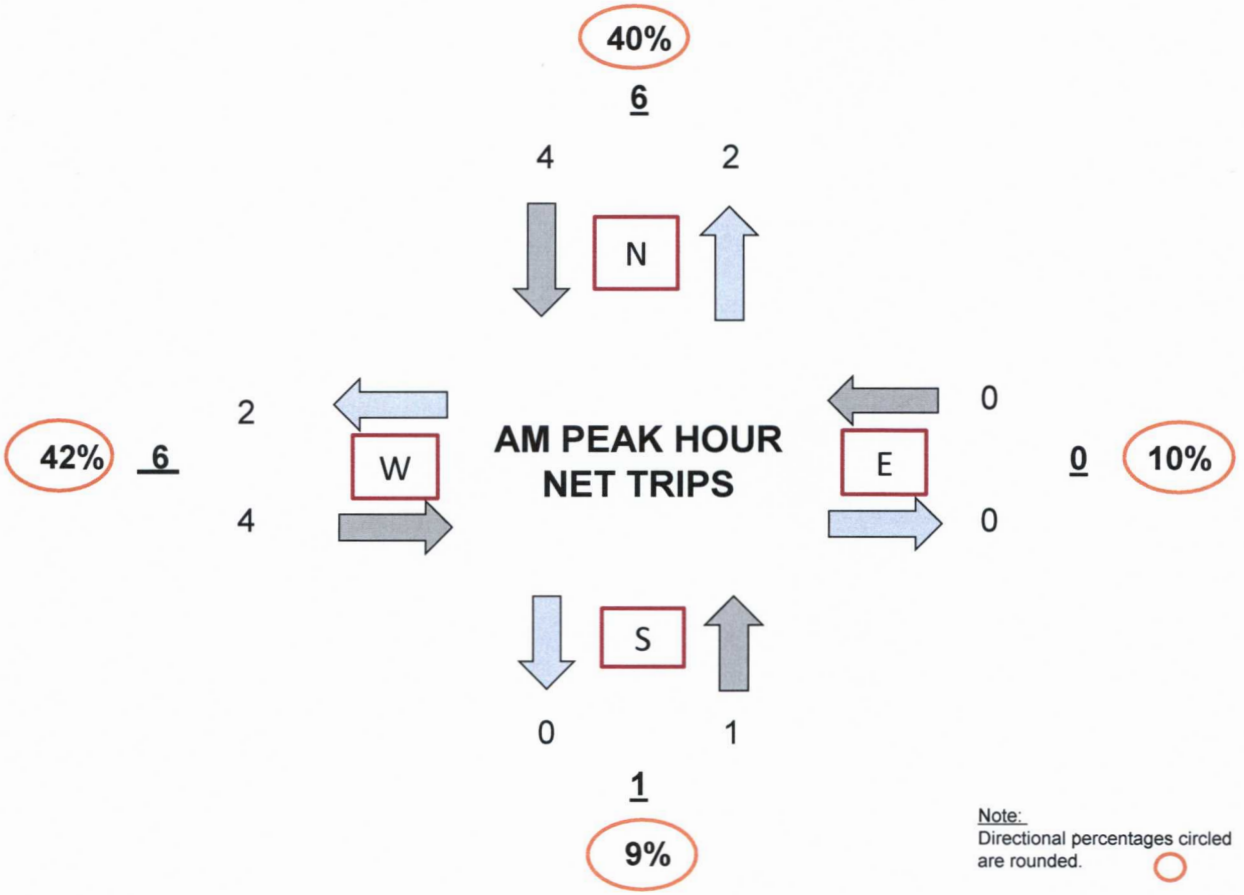
DIRECTION	DISTRIBUTION %	INGRESS		EGRESS		TOTAL
		CALCULATED	USED	CALCULATED	USED	
NNE	19.25	1.733	2	0.770	1	3
ENE	3.63	0.327	0	0.145	0	0
ESE	6.10	0.549	0	0.244	0	0
SSE	7.42	0.668	1	0.297	0	1
SSW	1.48	0.134	0	0.059	0	0
WSW	21.46	1.931	2	0.858	1	3
WNW	20.05	1.805	2	0.802	1	3
NNW	20.68	1.861	2	0.827	1	3
TOTAL	100.00	9.007	9	4.003	4	13

TABLE: A3

Cardinal Distribution
AM Peak Hour
Traffic Analysis Zone (TAZ) 653

Project Name: Miami Beach Fire Station

DIRECTION	DISTRIBUTION (%) DESIGN YEAR	DIRECTION	DISTRIBUTION	AM PEAK HOUR		
				IN	OUT	TOTAL
NNE	19.25	NORTH	39.93%	4	2	6
ENE	3.63					
ESE	6.10	EAST	9.73%	0	0	0
SSE	7.42					
SSW	1.48	SOUTH	8.91%	1	0	1
WSW	21.46					
WNW	20.05	WEST	41.51%	4	2	6
NNW	20.68					
TOTAL	100.00		100.00%	9	4	13



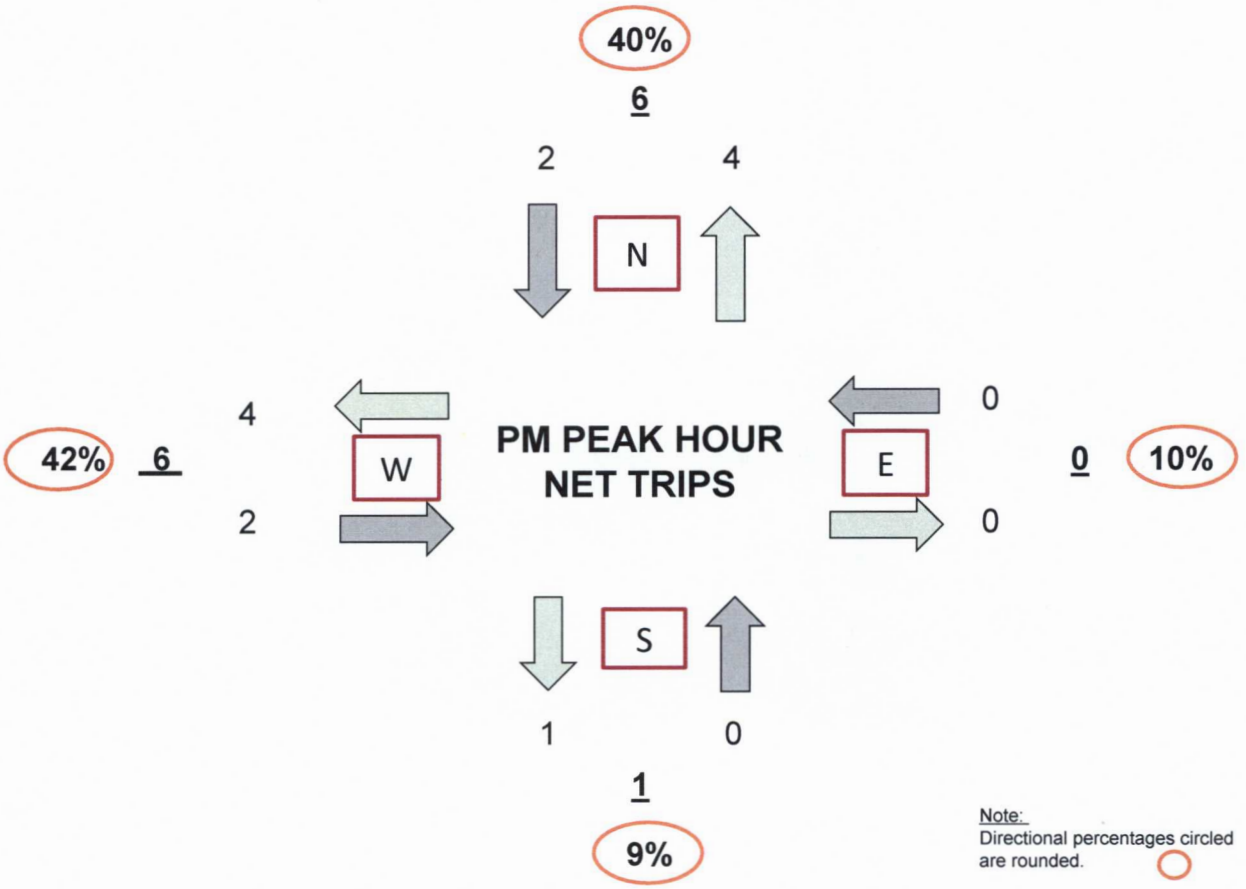
Note:
Directional percentages circled are rounded.

TABLE: A4

Cardinal Distribution
PM Peak Hour
Traffic Analysis Zone (TAZ) 653

Project Name: Miami Beach Fire Station

DIRECTION	DISTRIBUTION (%) DESIGN YEAR	DIRECTION	DISTRIBUTION	PM PEAK HOUR		
				IN	OUT	TOTAL
NNE	19.25	NORTH	39.93%	2	4	6
ENE	3.63					
ESE	6.10	EAST	9.73%	0	0	0
SSE	7.42					
SSW	1.48	SOUTH	8.91%	0	1	1
WSW	21.46					
WNW	20.05	WEST	41.51%	2	4	6
NNW	20.68					
TOTAL	100.00		100.00%	4	9	13



Note:
Directional percentages circled are rounded.

TABLE: A4-1

Cardinal Distribution
PM Peak Hour
Traffic Analysis Zone (TAZ) 653

Project Name: Miami Beach Fire Station

DIRECTION	DISTRIBUTION PERCENTAGES (%)			PM PEAK HOUR		
	MIAMI-DADE LRTP MODEL YEAR		DESIGN YEAR	IN	OUT	TOTAL
	2015	2045	2022			
NNE	20.30	15.80	19.25	1	2	3
ENE	4.10	2.10	3.63	0	0	0
ESE	6.40	5.10	6.10	0	0	0
SSE	8.10	5.20	7.42	0	1	1
SSW	1.60	1.10	1.48	0	0	0
WSW	20.50	24.60	21.46	1	2	3
WNW	16.60	31.40	20.05	1	2	3
NNW	22.50	14.70	20.68	1	2	3
TOTAL	100.00	100.00	100.00	4	9	13

Note:

Based on Miami-Dade Transportation Plan (to the Year 2045) Directional Trip Distribution Report, September 2019. Since the current data is only available for the model years 2015 and 2045, the eight (8) cardinal directions were interpolated to the design year shown.

TABLE: A4-2

PM PEAK HOUR	IN	OUT	TOTAL
TRIPS:	4	9	13
PERCENT:	30.77%	69.23%	(Calculated)

DIRECTION	DISTRIBUTION %	INGRESS		EGRESS		TOTAL
		CALCULATED	USED	CALCULATED	USED	
NNE	19.25	0.770	1	1.733	2	3
ENE	3.63	0.145	0	0.327	0	0
ESE	6.10	0.244	0	0.549	0	0
SSE	7.42	0.297	0	0.668	1	1
SSW	1.48	0.059	0	0.134	0	0
WSW	21.46	0.858	1	1.931	2	3
WNW	20.05	0.802	1	1.805	2	3
NNW	20.68	0.827	1	1.861	2	3
TOTAL	100.00	4.003	4	9.007	9	13