



# Appendix F

## Miami-Dade County Request for Design Variation and Exception



## Miami-Dade County – Department of Transportation and Public Works (DTPW) Request for Design Exception/Variation

TO: Frank Guyamier, P.E.

DATE: 06/03/2020

County Design Engineer

SUBJECT: ☐ DESIGN EXCEPTION or ☒ DESIGN VARIATION

**Local road number or street name or intersection:** N Miami Avenue @ NE 6<sup>th</sup> Street

**Project description (limits):** Downtown Mobility Network (N Miami/S Miami Avenue from SE 1<sup>st</sup> Street to NE 11<sup>th</sup> Ter)

**Type construction (new, rehabilitation, adding lanes, resurfacing, etc.):** RRR

**Design Speed:** 30 mph

**Design Exception or Variation for the following Element:**

- |   |  |
|---|--|
| ( ) Design Speed  | ( ) Stopping Sight Distance            |
| ( ) Lane Width  | ( ) Maximum Grade                      |
| ( ) Shoulder Width                                      | ( ) Cross Slope                        |
| (x) Horizontal Curve Radius                             | ( ) Vertical Clearance                 |
| ( ) Superelevation Rate                                 | ( ) Design Loading Structural Capacity |
| (x) Other (explain): Intersection Minimum Inside Radius |  |

**Include a brief statement concerning the project and items of concern. (Attach all supporting documentation to this exhibit in accordance with Miami-Dade County Public Works Manual, and Florida Greenbook, FDOT Design Manual)**

The main purpose of this project is to improve mobility and safety for all modes within Downtown Miami. This project proposes exclusive bicycle lanes on N Miami/S Miami Avenue extending from SE 1<sup>st</sup> Street to NE 11<sup>th</sup> Ter and SE 1<sup>st</sup>/NE 1<sup>st</sup> Avenue from SE 1<sup>st</sup> Street to NE 11<sup>th</sup> Street. The number of travel lanes on N Miami/S Miami Avenue varies from two (2) lanes to three (3) lanes. Depending on the segment along N Miami/S Miami Avenue, this project proposes to repurpose either one of the travel lane or the on-street parking to a bicycle only lane. The proposed design provides multimodal and safety improvements for all modes. This document requests a horizontal curve radius and minimum inside radius design variation for the left-turning vehicles from NE 6<sup>th</sup> Street to N Miami Avenue.



**Recommended by:** [Name]  
(Position, Department)

**Concurrence:** [Name]  
(Professional Engineer, Department, Municipality)

**Concurrence:** [Name]  
FDOT Design Engineer (if applicable)

**Concurrence:** Carlos Cruz-Casas, P.E.  
(Assistant Director, Strategic Planning Division DTPW)

**Concurrence:** Elia Nunez, P.E.  
(Assistant Director, Transit Planning, Design and Engineering Division DTPW)

**Concurrence:** Miguel Soria, P.E.  
(Assistant Director, Highways Division DTPW)

**Concurrence:** Darlene Fernandez, P.E.  
(Assistant Director, Traffic Engineering Division DTPW)

**Concurrence:** Alex Barrios  
(Assistant Director, Construction and Maintenance Division DTPW)

**Approval:** Frank Guyamier, P.E.  
(County Design Engineer DTPW)

**cc:** Eulois Cleckley, Director, DPTW  
Julian Guevara, Municipal Manager DTPW



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## I. PROJECT DESCRIPTION

The main purpose of this project is to improve mobility and safety for all modes within Downtown Miami. This project proposes exclusive bicycle lanes on N Miami/S Miami Avenue extending from SE 1<sup>st</sup> Street to NE 11<sup>th</sup> Ter and SE 1<sup>st</sup> Avenue/NE 1<sup>st</sup> Avenue from SE 1<sup>st</sup> Street to NE 11<sup>th</sup> Street. The project also proposes exclusive bicycle lanes on NW/NE 5<sup>th</sup> Street and NW/NE 6<sup>th</sup> Street from NW 3<sup>rd</sup> Avenue to NE 2<sup>nd</sup> Avenue. N Miami/S Miami Avenue is a minor arterial and SE 1<sup>st</sup>/NE 1<sup>st</sup> Avenue is a major collector, one-way pair with a posted speed limit of 30 mph and both the roadways are owned by Miami-Dade County. NW/NE 6<sup>th</sup> Street is a major collector one-way street with a posted speed limit 30 mph. In existing conditions, the number of travel lanes along N Miami/S Miami Avenue varies from two (2) to three (3) lanes with on-street parking along certain sections. Depending on the segment along N Miami/S Miami Avenue, this project proposes to repurpose either one of the travel lane or the on-street parking to a bicycle only lane. The proposed design provides multimodal and safety improvements for all modes.

## II. EXISTING CONDITION

In existing conditions, the corner radii at the intersection of N Miami Avenue @ NE 6<sup>th</sup> Street for the left-turning vehicles from NE 6<sup>th</sup> Street to N Miami Avenue is 10 ft, which is less than the recommended curbed intersection radii of 15 to 25 feet as per the FDOT Design Manual (FDM), Table 212.12.3 and as well as the minimum turning radius of 14.4 ft for a passenger car as per the *Manual of Uniform Minimum Standards for Design, Construction and Maintenance (Florida Greenbook)*, Table 3-3. Figure 1 illustrates the existing intersection configuration. Table 3-3 and the other relevant design standards discussed in Section III are included in Appendix A. Furthermore, as per the guidelines, the recommended minimum inside radius for a single-unit truck (SU-30) is 28.4 ft and for a single-unit truck with 3 axles (SU-40) is 36.4 ft.

Traffic counts data for N Miami/S Miami Avenue and NW/NE 6<sup>th</sup> Street was obtained and evaluated from Florida Traffic Online website (<https://tdaappsprod.dot.state.fl.us/fto/>). N Miami/S Miami Avenue is a minor arterial with an annual average daily traffic (AADT) volume of 5700 vehicles and a truck traffic percentage of 4.6%. The traffic monitoring site on N Miami Avenue was located between NE 6<sup>th</sup> Street and NE 5<sup>th</sup> Street. Similarly, NW/NE 6<sup>th</sup> Street is a major collector street with an annual average daily traffic (AADT) volume of 12,500 vehicles and a truck traffic percentage of 5.8%. The traffic monitoring site on NE 6<sup>th</sup> Street was located east of NE 1<sup>st</sup> Avenue and represents AADT for the segment of NE 6<sup>th</sup> Street between US 1 and N Miami Avenue. It should also be noted a significant portion of the traffic volume on NE 6<sup>th</sup> Street turn right onto NE 1<sup>st</sup> Avenue to access I-395 WB.

There is one bus Route (Route 7) and no trolley routes operating in this section of the study area. Route 7 connects Dolphin Mall and Downtown Miami. Route 7 runs along NW/NE 6<sup>th</sup> Street in the outbound direction from Downtown Miami to Dolphin Mall. A map of Route 7 is included in Appendix B.

As per 2020 FDM, Table 212.12.3, the existing corner radii of the intersection does not meet the recommended corner radii criteria for urban intersections.

As per Florida Greenbook, Table 3-3, the existing intersection minimum inside radius does not meet the required minimum inside radius criteria for passenger cars or single-unit trucks.







### III. DESIGN CRITERIA

#### FDOT Design Manual (2020)

FDOT Design Manual, Chapter 212.12 Intersections – Turning Roadways, provides corner radii guidance for curbed intersections. Table 212.12.3 recommends a corner radius of 25 – 30 ft for typical intersections and in an urban context classification the following are recommended:

1. Radii of 15 to 25 feet are adequate for passenger vehicles. These radii are suitable for minor cross streets where there is little occasion for trucks to turn and at major intersections where there are parking lanes;
2. Radii of 25 feet or more should be provided at minor cross streets on new construction or reconstruction projects;
3. Radii of 30 feet or more should be provided at minor cross streets where practical so that an occasional truck can turn without too much encroachment;

#### FDOT Greenbook (2018 Draft)

FDOT Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways, Chapter 3 – Geometric Design, Section C.2 Design Vehicles, states a “design vehicle” is a vehicle with representative weight, dimensions, and operating characteristics, used to establish street and highway design controls for accommodating vehicles of designated classes. In addition, the guideline states that for the purposes of geometric design, the design vehicle should be one with dimensions and minimum turning radii larger than those of almost all vehicles in its classes.

Table 3-3 in Florida Greenbook provides the minimum turning radii criteria for the various design vehicles. The principle dimensions affecting design of an intersection is the minimum inside radius/centerline turning radius. The speed of the turning vehicles is assumed to be less than 10 mph.

For passenger cars (P), the minimum inside radius should be at least 14.4 ft. Similarly, for Single Unit Truck (SU-30) and Single Unit Truck– 3 Axle (SU-40), the minimum inside radius should be at least 28.4 ft and 36.4 ft, respectively.

#### Miami-Dade County Public Works Manual

As per Miami-Dade County Public Works Manual, Street Intersection Curb and Gutter - Exhibit R 15.2 recommends a 25 ft minimum turning radius. The guidelines do not specify turning radius requirements based on design vehicles types.



#### **IV. PROPOSED CRITERIA**

The project proposes 5 ft wide exclusive bicycle lanes, on both N Miami Avenue and NE 6<sup>th</sup> Street, with a 4 ft buffer when adjacent to a travel lane and 3 ft buffer when adjacent to a parking lane. With the proposed configuration, the corner radius of the intersection increases from the existing corner radius of 10 ft to 20 ft. Figure 2 shows the proposed intersection configuration. The proposed configuration improves existing conditions and satisfies the recommended corner radii guidelines of 15 to 25 feet for urban intersections and the minimum inside radius guidelines for a passenger car but does not meet the recommended 36.4 ft turning radius for a Single Unit Truck– 3 Axle (SU-40). The proposed design criterion is to maintain the 20 ft corner turning radius for the intersection. This allows project implementation without widening the intersection and roadways.



[illegible]



## **V. JUSTIFICATION**

The project goal is to improve mobility for all modes within Downtown Miami. This is accomplished by repurposing one of the travel lanes or the parking lane to a bicycle lane and upgrading signing/pavement markings along the corridor. The proposed design provides multimodal and safety improvements for all modes.

### **1. Reconstruction and Right-of Way Potential Impacts**

N Miami/S Miami Avenue is within the downtown urban area consisting of commercial, residential and office buildings. There are storefronts and residential property located adjacent to the right-of-way (R/W) within the project limits. Any R/W acquisition would impact these structures. To conform with the Florida Greenbook for minimum inside radius, intersection widening would be necessary. Intersection widening would require reconstructing the outside curb and gutter, modifications of the drainage systems (due to widening), sidewalk reconstruction as well as driveway reconstruction. This would result in significant reconstruction and R/W acquisition cost. Widening the intersection would also require acquiring R/W, which will result in impacts to the adjacent properties. Most of the adjacent properties are developed and right-of-way acquisition would have a large impact on businesses and residences.

### **2. Crash Analysis**

The most recent five (5) year Crash Reports were downloaded from Florida Signal Four Analytics Database for the intersection of N Miami Avenue @ NE 6<sup>th</sup> Street. The reports cover the years between 2015-2019. Data provided includes the location of the crash, the type of crash, the date and the existing conditions. A total of 27 (twenty-seven) crashes occurred in the 5-year period and all crash reports were reviewed. The analysis revealed that four (4) of the twenty-seven (27) crashes involved a left-turning vehicle. No pedestrian or bicycle crashes were reported. A detailed review of the crash reports revealed that the four (4) crashes that involved left-turning vehicle was due to careless driving/improper lane changing. A summary table of all the crashes and the four crash reports that involved a left-turning vehicle is included in Appendix C. Additional information for all other crashes could be made available upon request.

## **VI. CONCLUSION AND RECOMMENDATION**

The proposed project is Resurfacing, Restoration and Rehabilitation (RRR) project along N Miami/S Miami Avenue and SE 1<sup>st</sup> /NE 1<sup>st</sup> Avenue. N Miami/S Miami Avenue is an urban minor arterial located within Miami-Dade County and the posted speed limit for this corridor is 30 mph. The project's main objective is to improve mobility for all modes within Downtown Miami.



Based on the crash report analysis for the last 5-year (2015-2019), it was determined that there were no crashes found to be associated with the existing substandard corner radii or the minimum turning radius. Thus, a benefit/cost ratio of zero would result from upgrading to meet the following FDOT criteria:

- Radii of 30 feet or more should be provided at minor cross streets where practical so that an occasional truck can turn without too much encroachment;
- Minimum Inside Radius for a Single Unit Truck– 3 Axle (SU-40) design vehicle.

Addressing the existing turning radius to meet current FDOT design criteria would increase the cost of the project substantially. Therefore, a Corner Radii and Minimum Turning Radius Design Variation for Trucks is being requested to maintain the proposed corner radii and turning radius of 20 ft at the intersection of N Miami Avenue @ NE 6<sup>th</sup> Street.

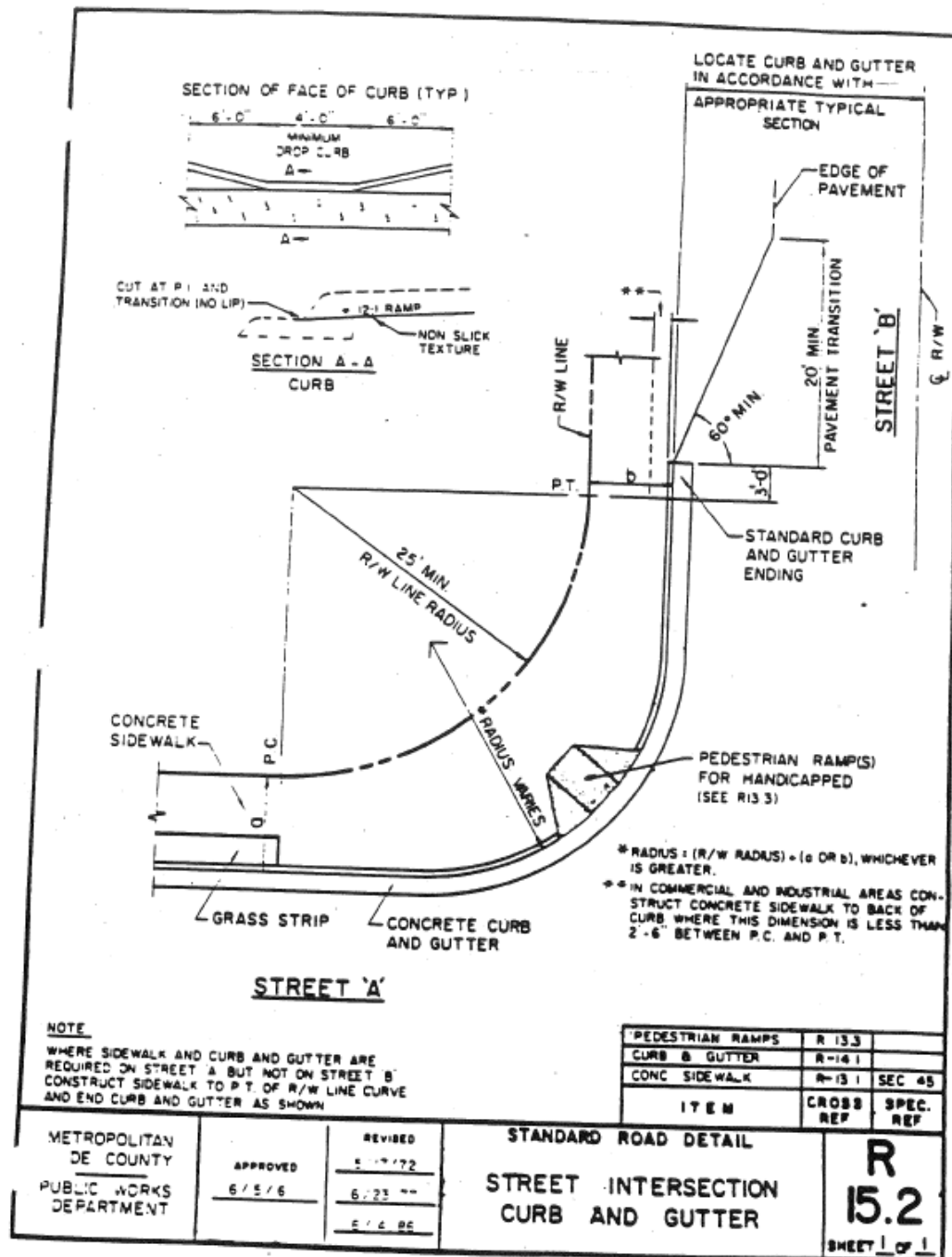


## Appendix A

### Design Criteria



## Miami-Dade County Public Works Standard





## FDOT Design Manual (2020)

Topic #625-000-002  
FDOT Design Manual

January 1, 2020

For curbed intersections, corner radii should follow the guidance in **Table 212.12.3**, and accommodate the following:

- The design vehicle and design speed for each street
- Available RW
- Angle of turn between intersection legs
- The number of pedestrians using the crosswalk
- The width and number of lanes on the intersecting street

**Table 212.12.3 Recommended Corner Radii**

Corner Radius (ft)	Operational Characteristics
25 - 30	P vehicles and SU vehicles with minor lane encroachment
40	P vehicles, SU vehicles, and WB-40 vehicles with minor encroachment
50	All vehicles up to WB-40

Often it is not practical to provide designs that do not require larger design vehicles to encroach on adjacent or opposing lanes. Guidelines for corner radii in urbanized context classifications are as follows:

- (1) Radii of 15 to 25 feet are adequate for passenger vehicles. These radii are suitable for minor cross streets where there is little occasion for trucks to turn and at major intersections where there are parking lanes;
- (2) Radii of 25 feet or more should be provided at minor cross streets on new construction or reconstruction projects;
- (3) Radii of 30 feet or more should be provided at minor cross streets where practical so that an occasional truck can turn without too much encroachment;
- (4) Radii of 40 feet or more or preferably three-centered curves or simple curves with tapers to fit the paths of large truck combinations, should be provided where such combinations or buses turn frequently. Where speed reductions would cause problems, larger radii should be considered; and,
- (5) Curb radii should be coordinated with crosswalk distances or special designs should be used to make crosswalks efficient for all pedestrians. Where larger radii are used, an intermediate refuge or median island is desirable or crosswalks may need to be offset so that crosswalk distances are not excessive.





# FDOT Greenbook (2018 Draft)

**Table 3 – 3 Minimum Turning Radii of Design Vehicles**

<u>DESIGN VEHICLE</u>	<u>Symbol</u>	<u>DIMENSIONS IN FEET</u>		
		<u>Minimum Design Turning Radius</u>	<u>Centerline Turning Radius</u>	<u>Minimum Inside Radius</u>
<u>Passenger Car</u>	<u>P</u>	<u>23.8</u>	<u>21.0</u>	<u>14.4</u>
<u>Single Unit Truck</u>	<u>SU-30</u>	<u>41.8</u>	<u>38.0</u>	<u>28.4</u>
<u>Single Unit Truck – 3 Axle</u>	<u>SU-40</u>	<u>51.2</u>	<u>47.4</u>	<u>36.4</u>
<u>City Transit Bus</u>	<u>CITY-BUS</u>	<u>41.6</u>	<u>37.8</u>	<u>24.5</u>
<u>Conventional School Bus (65 passenger)</u>	<u>S-BUS 36</u>	<u>38.6</u>	<u>34.9</u>	<u>23.8</u>
<u>Articulated Bus</u>	<u>A-BUS</u>	<u>39.4</u>	<u>35.5</u>	<u>21.3</u>
<u>Motor Home</u>	<u>MH</u>	<u>39.7</u>	<u>36.0</u>	<u>26.0</u>
<u>Car &amp; Camper Trailer</u>	<u>P/T</u>	<u>32.9</u>	<u>30.0</u>	<u>18.3</u>
<u>Car &amp; Boat Trailer</u>	<u>P/B</u>	<u>23.8</u>	<u>21.0</u>	<u>8.0</u>
<u>Intermediate Semitrailer</u>	<u>WB-40</u>	<u>39.9</u>	<u>36.0</u>	<u>19.3</u>
<u>Interstate Semitrailer</u>	<u>WB-62</u>	<u>44.8</u>	<u>41.0</u>	<u>7.4</u>
<u>Florida Interstate Semitrailer***</u>	<u>WB-62FL</u>	<u>44.8</u>	<u>41.0</u>	<u>7.4</u>
<u>"Double-Bottom"-Semitrailer/Trailer Combination</u>	<u>WB-67D</u>	<u>44.8</u>	<u>40.9</u>	<u>19.1</u>

Source: 2011 AASHTO Greenbook, Design Controls and Criteria, Table 2-2b.

\* The turning radius assumed by a designer when investigating possible turning paths and is set at the centerline of the front axle of a vehicle. If the minimum turning path is assumed, the CTR approximately equals the minimum design turning radius minus one-half the front width of the vehicle.





## AASHTO (2018)

Table 2-5a. Minimum Turning Radii of Design Vehicles (U.S. Customary Units)

Design Vehicle Type	Passenger Car	Single-Unit Truck	Single-Unit Truck (Three Axle)	Intercity Bus (Motor Coach)		City Transit Bus	Conventional School Bus (65 pass.)	Large <sup>a</sup> School Bus (84 pass.)	Articulated Bus	Intermediate Semi-trailer
Symbol	P	SU-30	SU-40	BUS-40	BUS-45	CITY-BUS	S-BUS36	S-BUS40	A-BUS	WB-40
Minimum Design Turning Radius (ft)	23.8	41.8	51.2	41.7	44.0	41.6	38.6	39.1	39.4	39.9
Center-lineb Turning Radius (CTR) (ft)	21.0	38.0	47.4	37.8	40.2	37.8	34.9	35.4	35.5	36.0
Minimum Inside Radius (ft)	14.4	28.4	36.4	24.3	24.7	24.5	23.8	25.3	21.3	19.3

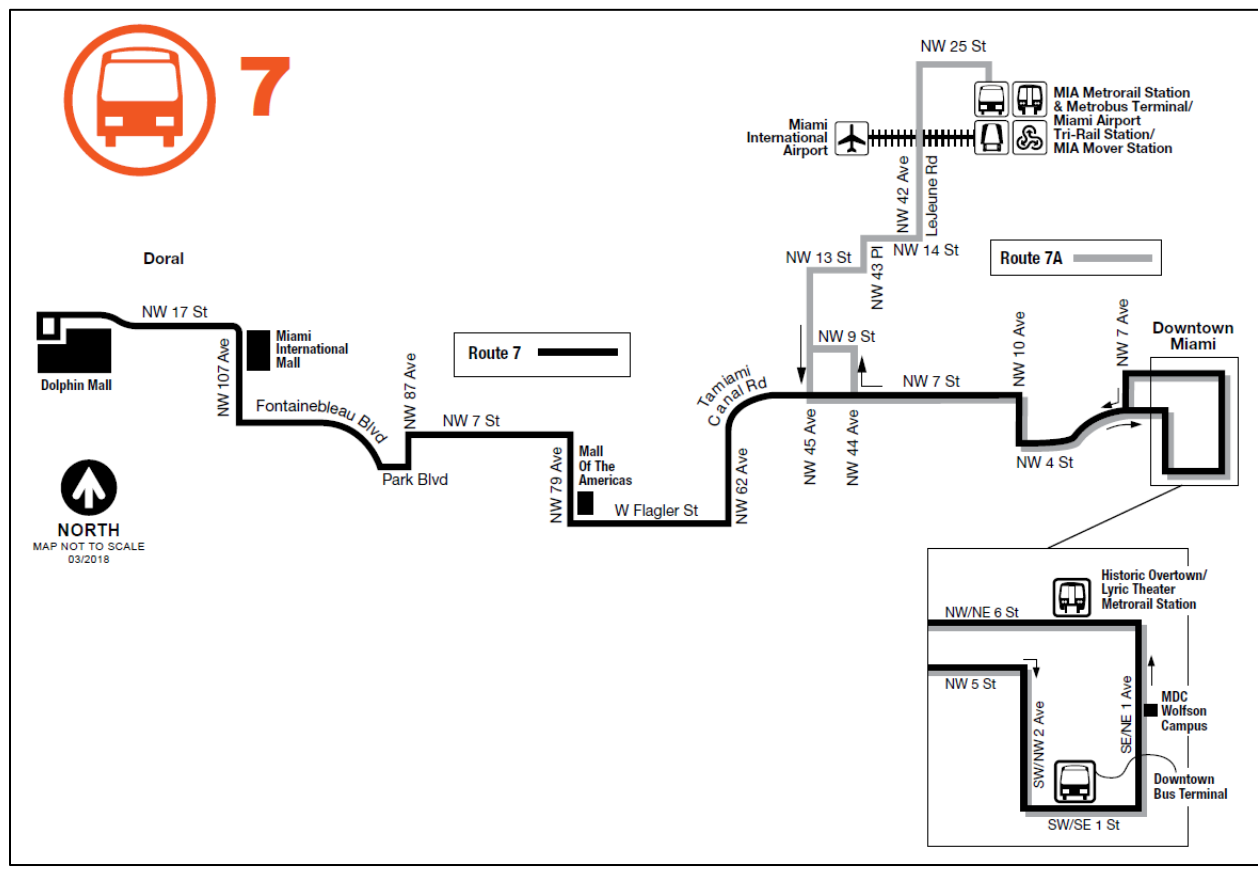


## **Appendix B**

### **Transit Routes**



## Route 7 Transit Map





## Appendix C

### Crash Analysis Summary and Crash Reports



## Crash Analysis Summary

HSMV Report Number	Crash Date	Crash Time	Crash Street	Crash Type	Crash Severity	Manner of Collision	Road Surface Condition	Cause of Crash
85681867	1/8/2015	3:37 AM	N. MIAMI AVE	Angle	Injury	Angle	Dry	Careless Driving
85867346	4/23/2015	10:30 AM	N MIAMI AVE	Angle	Property Damage Only	Front to Rear	Wet	Careless Driving (Failure to adhere to traffic signal)
<b>86061959</b>	7/18/2015	5:54 PM	NE 6 ST	Other	Property Damage Only	Angle	Dry	Careless Driving (Improper lane change left-turning vehicles)
86223989	10/30/2015	10:45 AM	N MIAMI AVE	Angle	Property Damage Only	Front to Rear	Dry	Careless Driving (Failure to adhere to traffic signal)
86227601	12/24/2015	3:44 PM	N MIAMI AVE	Rear End	Property Damage Only	Front to Rear	Dry	Careless Driving (Through traffic sideswipe)
86228266	1/6/2016	4:35 PM	N. MIAMI AVENUE	Head On	Property Damage Only	Front to Front	Dry	Careless Driving (Failure to adhere to traffic signal)
86416670	2/4/2016	10:37 PM	NORTH MIAMI AVE	Angle	Injury	Angle	Dry	Careless Driving (Failure to adhere to traffic signal)
86417357	2/14/2016	2:30 AM	NW 6TH ST	Angle	Injury	Angle	Dry	Careless Driving (Failure to adhere to traffic signal)
86420856	4/22/2016	12:30 PM	NE 6 STREET	Other	Property Damage Only	Sideswipe, Same Direction	Dry	Vehicle travelling on NE 6th St crashed into parked vehicle
86421429	4/30/2016	10:20 AM	N MIAMI AVE	Other	Property Damage Only	Other	Dry	Traffic Signal Damage. Truck carrying load hit traffic signal head above
86427951	8/25/2016	7:00 PM	NORTH MIAMI AVE.	Angle	Property Damage Only	Angle	Dry	Careless Driving (Failure to adhere to traffic signal)
86433875	11/20/2016	9:12 AM	N MIAMI AVE	Angle	Property Damage Only	Angle	Dry	Careless Driving (Failure to adhere to traffic signal)
86863220	1/14/2017	11:05 AM	N MIAMI AVE	Other	Property Damage Only	Other	Dry	Sewer pot hole cover hit vehicle
86868618	3/31/2017	9:49 AM	N MIAMI AVE	Sideswipe	Property Damage Only	Sideswipe, Same Direction	Dry	Careless Driving (Through traffic sideswipe)
<b>87571566</b>	12/14/2017	9:25 AM	NE 6TH ST	Sideswipe	Property Damage Only	Sideswipe, Same Direction	Dry	Improper left-turn. Both vehicles turning left (Car and a Bus) crashed
87576729	3/6/2018	10:30 AM	N MIAMI AVE	Unknown	Property Damage Only	Sideswipe, Same Direction	Dry	Careless Driving (Through traffic sideswipe). Improper lane change
<b>87847935</b>	4/13/2018	8:48 AM	N MIAMI AVE	Other	Property Damage Only	Sideswipe, Same Direction	Dry	Careless Driving (Improper lane change left-turning vehicles)
87849424	5/4/2018	3:30 PM	N MIAMI AVE	Rear End	Property Damage Only	Front to Rear	Dry	Careless Driving (Rear end)
87857006	8/29/2018	8:45 PM	N. MIAMI AVE	Unknown	Property Damage Only	Sideswipe, Same Direction	Dry	Careless Driving (Sideswipe - Improper lane change)
87857088	8/31/2018	8:48 AM	MIAMI AVE N	Rear End	Property Damage Only	Front to Rear	Dry	Careless Driving (Rear end)
89242357	6/28/2019	7:49 AM	N MIAMI AVE	Angle	Property Damage Only	Angle	Dry	Careless Driving (Failure to adhere to traffic signal)
89242314	7/13/2019	8:28 AM	N MIAMI AVE	Rear End	Injury	Front to Rear	Dry	DUI
89243042	7/25/2019	8:47 PM	N MIAMI AVENUE	Other	Property Damage Only	Other	Dry	Careless Driving (Failure to adhere to traffic signal)
89243726	8/5/2019	2:38 PM	N MIAMI AVE	Angle	Property Damage Only	Angle	Wet	Careless Driving (Failure to adhere to traffic signal)
89245192	8/27/2019	4:15 PM	N MIAMI AV	Angle	Property Damage Only	Angle	Dry	Careless Driving (Failure to adhere to traffic signal)
<b>89246854</b>	9/21/2019	2:34 PM	NW 6TH ST	Sideswipe	Property Damage Only	Sideswipe, Same Direction	Wet	Careless Driving (Improper lane change left-turning vehicles)
89247626	10/2/2019	5:14 PM	NE 6 ST	Sideswipe	Property Damage Only	Sideswipe, Same Direction	Dry	Careless Driving (Through traffic sideswipe)