# Miami-Dade County COVID-19 Freight Impact Analysis



Miami-Dade Transportation Planning Organization

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### List of Acronyms and Abbreviations

AADT	Annual Average Daily Traffic
AADTT	Annual Average Daily Truck Traffic
AAM	Advanced Air Mobility
ATRI	American Transportation Research Institute
BTS	Bureau of Transportation Statistics
CATT	Center for Advanced Transportation Technology
CIP	Capital Improvement Program
COVID-19	Coronavirus Disease 2019
CSX	CSX Transportation
DHL	Dalsey, Hillblom and Lynn
EVMP	Electric Vehicle Infrastructure Master Plan
FAF	Freight Analysis Framework
FAL	Facilitation of Trade and Transport in Latin America and the Caribbean
FDI	Foreign Direct Investment
FDOT	Florida Department of Transportation
FEC	Florida East Coast Railway
FHWA	Federal Highway Administration
FLZ	Freight Logistics Zone
FRA	Federal Railroad Administration
FRATIS	Freight Advanced Traveler Information System
FTAC	Freight Transportation Advisory Committee
FTP	Florida Transportation Plan
ICTF	Intermodal Container Transfer Facility
INFRA	Infrastructure for Rebuilding America
ITS	Intelligent Transportation Systems
LHTD	Long-Haul Truck Drivers
LLDC	Land-Locked Developing Countries
LRTP	Long Range Transportation Plan
MAU	Monthly Active User
MDX	MDX Miami-Dade Expressway Authority
MIA	Miami International Airport
MIC	Monthly Intermodal Center
MPA	Miami Parking Authority
NEVI	National Electric Vehicle Infrastructure
NHS	National Highway System
NPMRDS	National Performance Management Research Data Set
O/D	Origin-Destination

### List of Acronyms and Abbreviations (continued)

OOIDA	Owner-Operator Independent Driver Association
PHFS	Primary Highway Freight System
PTI	Planning Time Index
SIS	Strategic Intermodal System
TDA	Transportation Data and Analytics Office
TEU	Twenty-Foot Equivalent Unit
ТМС	Transportation Management Center
TNC	Transportation Network Company
TPAS	Truck Parking Availability System
ТРО	Transportation Planning Organization
TRI	Truck Reliability Index
тѕмо	Transportation Systems Management and Operations
тті	Travel Time Index
TTTR	Truck Travel Time Reliability
UAM	Urban Air Mobility
US	United States
USDOT	United States Department of Transportation
VMT	Vehicle Miles Traveled
WIM	Weigh-In-Motion



# **Executive Summary**

This study compares pre- and post-COVID-19 freight travel patterns and freight industry data throughout Miami-Dade County. This data is used to develop insights and recommendations for the Miami-Dade Transportation Planning Organization (TPO) to assist in the development of the 2050 Long Range Transportation Plan (LRTP).



Miami-Dade County has a robust and vibrant freight system including all major modes of transportation. Local, regional, national, and international freight patterns are discussed in terms of pre- and post-COVID-19 to provide understanding as to how a future global pandemic, or similar disruption, may impact Miami-Dade County. This report relies on a wide-range of data sources including:

- American Transportation Research Institute
- Federal Highway Administration
- · Federal Railroad Administration
- Florida Department of Transportation
- Miami-Dade TPO
- · National Performance Management Research Data Set
- Owner-Operator Independent Driver Association Foundation
- · REPLICA
- United States Bureau of Labor Statistics
- United States Department of Transportation

A comprehensive analysis of these data provided an understanding of how COVID-19 impacted global freight movement and specifically Miami-Dade County. To mitigate the impacts of a future global distribution and assist future planning initiatives, the following recommendations are provided here and detailed in Section 4 of this report.

Recommendation Number	Category	Description
1	Truck	Conduct annual volume and travel time assessments of priority freight corridors in the region.
2	Truck	Conduct an alternative freight corridor assessment as part of the Long Range Transportation Plan update.
3	Land-Use	Lead local stakeholder collaboration workshops to advance development efforts in targeted freight logistics zones.
4	Rail	Partner with railroads in the region by routinely inviting them to present to Freight Transportation Advisory Committee (FTAC).
5	Aviation	Advance efforts of the Miami International Airport, such as their Capital Improvement Program (CIP), and continue to request FTAC presentations.
6	Truck	Conduct a countywide curb management study to inventory prior and current curb management efforts and identify future actions to steer the curb management activities at a regional level.
7	Multi	Develop an emerging technology plan to assist in the effective movement of freight, including technologies such as unmanned air-based or urban air mobility delivery services.
8	Truck	Continue to focus on trucking safety by identifying top truck crash locations and conducting a countywide turning movement analysis.
9	Maritime	Advance PortMiami efforts such as Net Zero, Inland Port, and Infrastructure Grant Opportunities.
10	Multi	Advance any and all Workforce Development efforts.

# **1. Study Purpose**

This study compares pre- and post-pandemic freight/truck movement and freight industry data to aid in the TPO's development of the 2050 Long Range Transportation Plan (LRTP) by providing an understanding as to how a future global pandemic, or similar disruption, may impact freight and trucking in Miami-Dade County.

The COVID-19 pandemic significantly impacted the transportation sector, including employment, logistics and supply chains. In the initial stages of the pandemic, passenger traffic dramatically decreased, yet the demand for consumer goods continued and even escalated. With more residents and workers minimizing travel, the demand for home deliveries increased significantly. This demand exacerbated the pre-pandemic truck driver shortage. Additional freight transportation impacts included disruptions to global international air cargo, congested seaports, travel restrictions, and limited transportation and manufacturing employee availability. In addition, demand and supply chain shifts included consumers panic buying certain goods combined with labor shortages leading to temporary shortages of items and severely depleted inventories. As cargo arrived at local ports, staffing shortages impacted truck and rail distribution, which further increased the

### What is the Study Purpose?

To assess the impacts of the coronavirus disease 2019 (COVID-19) pandemic on freight / truck travel patterns throughout Miami-Dade County.



### What is the Study

The benefit of this study are the recommendations derived from the analysis. These recommendations will support and provide guidance for the TPO's upcoming 2050 LRTP by detailing the impacts the global pandemic had on Miami-Dade County.

port congestion. Long-term implications of these shifts will remain uncertain as the nation and the world emerges from the COVID-19 pandemic and supply and demand normalize. The results of this study will support the TPO's upcoming 2050 LRTP by detailing the impacts the global pandemic had on Miami-Dade County. This study provides recommendations for proactively addressing any future pandemics or disruptions while prioritizing and structuring the 2050 LRTP.

# 2.Freight Profiles: Local, Regional, National, and International

### 2.1 Local Freight

Miami-Dade County has a robust and vibrant freight system including all major modes of transportation. These modes work in harmony with each other to provide a smooth flow of goods throughout the county, connecting to regional and international destinations. The overall local freight network includes a collection of roadways, railways, waterways, connectors, and freight hubs, many of which are designated as a Florida Strategic Intermodal System (SIS) facility. Florida recognizes the SIS designation is critical

### What is the Strategic Intermodal System (SIS)?

The SIS is Florida's highest priority network of transportation facilities important to the State's economy and mobility. It focuses the State's limited transportation resources on the facilities most significant for interregional, interstate, and international transport of people and goods.

as these SIS designated facilities are the State's highest priority for transportation capacity investments and are the primary focus for implementing the Florida Transportation Plan (FTP), the State's long-range transportation plan.

### Miami-Dade County Designated SIS Facilities

Commercial Airport: Miami International Airport (MIA) General Aviation Reliever Airport: Miami Opa-Locka Executive Airport and the Miami Executive Airport Rail: 50 miles of SIS designated rail and 7 miles of SIS designated connector Rail Yard: Hialeah Rail Yard Seaport: PortMiami Roadways: Designated highways consist of interstates, Florida's Turnpike, toll roads/ expressways, and other key State highways.

### **Miami-Dade County Demographics**

Miami-Dade County has a population of 2,701,767 as of the 2020 census, making it the most populous county in Florida and the seventh-most populous county in the United States. The Beacon Council projects that Miami-Dade County will reach 3 million residents by 2025. This represents the continued population growth that the County will experience, creating even greater demand for freight network efficiency and the ability to plan the transportation network to mitigate any adverse effects caused by a future disruption or pandemic.

**Figure 2-1** displays airports, railroads, seaports, waterways, truck parking locations, and roadways throughout Miami-Dade County. Miami-Dade County is home to four publicly owned, public use airports, including one of the busiest international airports in the world: MIA. There are two freight railroads operating in the County: CSX Transportation (CSX) and Florida East Coast (FEC) Railway. These railroads, along with nearly 60 miles of roadway designated as part of the National Highway Freight Network, and more than 500 miles of waterways, connect the County's ports and freight industries. The U.S. economy relies on these localized public and private infrastructure investments to support the efficient movement of freight.





The Primary Highway Freight System (PHFS) is a network of highways that are identified as critical highways within the United States freight transportation system, shown in **Figure 2-2**. These highways are determined by qualitative and quantitative measures of national data. The national network consists of 41,518 miles and Miami-Dade County has 60.36 of those miles. Florida's Turnpike, I-95, SR 826, and SR 836 are all identified as part of the PHFS. I-195 and I-75 are critical to the road connectivity within Miami-Dade but are not considered part of the PHFS.





**Figure 2-3** shows context for Miami-Dade's freight network, which services and connects the South Florida region. PortMiami is one of several ports in the region including: Port Everglades, Port of Palm Beach, and Port of Fort Pierce. I-75, I-95, Florida's Turnpike, and US I all serve as high-volume roadways providing access throughout the region. US 27 connects South Florida to Central Florida counties and is a critical facility for future developments in freight infrastructure. Additionally, CSX, the FEC, and various class 3 railroads provide rail connections throughout the Southeast.



Figure 2-3: Regional Context of the Transportation Network

Miami-Dade's freight rail network (**Figure 2-4**) is operated by the FEC and CSX. The FEC is based out of Jacksonville, Florida and follows Florida's coast along 351 miles of tracks. The FEC has connections and various track rights with other railroads therefore allowing for more freight options to be dispersed. CSX is also based in Jacksonville and operates throughout 23 other states and Canada with about 21,000 miles of track and the southernmost terminus being in Miami-Dade. Having connections to this extensive freight network provides South Florida with a range of opportunities for transporting freight.





# Miami International Airport is a Cargo Powerhouse

In 2021, during the COVID-19 pandemic, Miami International Airport ranked number one in the United State for international cargo. Miami International Airport (MIA) holds dominance within the region regarding air cargo. In 2021, during the COVID-19 pandemic, Miami International Airport ranked number one in the United States for international cargo. MIA imports of total perishables increased by more than 19

percent by volume from 2021 compared to 2020. Notably, the imports of flowers by volume increased by more than 39 percent. MIA leads the nation in perishables air cargo by a wide margin, including 89 percent of flowers and 69 percent of fruits and vegetables. Pharmaceuticals are also a valuable commodity at MIA.



PortMiami is the only seaport in the County. Seaports report throughput in the amount of Twenty-foot Equivalent Units (TEUs). This measurement is based on the dimension on a twenty-foot standard shipping container. In 2021, PortMiami processed 1.25 million TEUs. Aside from freight, PortMiami also has various cruise lines that consistently dock at the seaport. Miami-Dade also has an extensive rail network which allows freight to travel via rail. Each of these facilities are conveniently located close to major interstates such as Interstate 95, Interstate 75, and Florida's Turnpike. Having this abundance of road connectors allows for freight to be almost seamlessly transported from one mode to another and travel throughout the state via truck. Miami-Dade is effective in being a pillar for freight distribution throughout the Southeast due to the various modes of available freight infrastructure.

### 2.1.1 REPLICA Data Summary

Note: REPLICA data is an industry standard data source for transportation related data analysis due to its accuracy, validity, and availability. This study utilized REPLICA data throughout to summarize conditions and present recommendations.

Trip volume data was gathered pre- to post-COVID-19 to assess changes in long haul and delivery freight travel. Pre-COVID-19 trip volume (2019) was relatively consistent at 170,000 to 200,000 typical roadway weekday trips (**Figure 2-5**). As expected, there was a sharp decline and slow recovery in 2020. In 2021, there were sharp increases in June / July and in November / December. This may be due to the rise in variants, Delta and Omicron, respectively, and fear of another outbreak. This likely caused consumers to resort to e-commerce and therefore increased trip volume. In 2022, trip volume has generally exceeded pre-pandemic levels.





Source: REPLICA

Total freight and passenger roadway trips in Miami-Dade County followed similar trends each year from 2019 to 2022 (**Figure 2-6**). The only exception would be a rapid decline of approximately 7 million trips from March to April 2020 – the onset of the COVID-19 pandemic. Total trips were consistently lower in 2019 but have exceeded pre-COVID-19 levels in 2021 and 2022.





#### Source: REPLICA

**Figure 2-7** and **2-8** display weekly totals for in-person and online retail spending in Miami-Dade County, respectively. In-person and online retail spending have each followed similar spending trends from 2019 to 2022, except from March to June 2020. During this period there was a decline of in-person spending and an uptick in online purchases due to the onset of COVID-19. When compared to pre-pandemic spending, both spending modes showed higher totals in 2021 and 2022. In-person spending post-COVID-19 has seen significant increases when compared to pre-COVID-19 spending. This indicates online retail spending is becoming more routine for Miami-Dade County consumers, but with a preference for in-person shopping.



Figure 2-7: Weekly Total In-Person Retail Spending, Miami-Dade County (2019 to 2022)

Source: REPLICA



### Figure 2-8: Weekly Total Online Retail Spending, Miami-Dade County (2019 to 2022)

Source: REPLICA

Throughout the pandemic, in-person grocery shopping in Miami-Dade County has far exceeded online spending (**Figures 2-9** and **2-10**). Pre-pandemic in-person spending was around \$115 million, whereas online spending was around \$3.5 million. As expected, there was a sharp increase in online purchases in 2020. In-person grocery spending spiked in March 2020 likely due to panic buying during the onset of COVID-19 in the U.S. Interestingly, consumer spending post-COVID-19 has surpassed pre-COVID-19 spending in both categories. Although, there has been a decrease in online grocery spending between 2021 and 2022. This suggests consumers in Miami-Dade County are likely returning to shop in-person.





Source: REPLICA



### Figure 2-10: Weekly Total Online Grocery Spending, Miami-Dade County (2019 to 2022)

Source: REPLICA

### 2.1.2 Local Freight Profile and the Freight Analysis Framework (FAF)

To assess the impacts of COVID-19 on freight inflow and outflow in Miami-Dade County, this study utilized the Freight Analysis Framework (FAF), which is produced through a partnership between the Bureau of Transportation Statistics (BTS) and the Federal Highway Administration (FHWA). The FAF integrates data from various sources to create a comprehensive picture of freight movement by all modes of transportation. At the time of this study, the current version of FAF (FAF 5.3) provides for tonnage and value by origin-destination (O/D) for commodity type and mode for the base year (2017), recent years (2018-2019), and forecast year estimates (2020 and 2022). The following analysis uses 2017-2019 pre-COVID-19 data as well as forecasts for 2020 and 2022 data. The FAF database did not have a forecast for 2021 at the time of this study development. The Miami FAF Zone includes multiple counties, from Miami-Dade in the south to Indian River and Okeechobee in the north, as shown in **Figure 2-11**.

Figure 2-11: Miami FAF Zone



Source: Freight Analysis Framework 5

Due to the COVID-19 pandemic, freight inflow and outflow in Miami-Dade County has been inconsistent. Between 2017 and 2019, total freight tonnage (domestic and international) increased an average of 1.7 percent annually while the freight valuation decreased by 1.6 percent.<sup>1</sup> **Figure 2-12** shows the total tons (in thousands) and dollars (in millions) between 2017 and 2022. The COVID-19 pandemic resulted in a 4.3 percent drop in freight tonnage from 2019 to 2020. However, due to the type of commodities still able to flow, freight valuation is projected to increase from 2019 to 2020. Based on FAF forecasts, the freight tonnage and value are expected to exceed pre-pandemic levels by 2022.

<sup>1</sup> Federal Highway Administration, "Freight Analysis Framework Version 5," 2022, https://faf.ornl.gov/faf5/Default.aspx (accessed September 02, 2022).

![](_page_20_Figure_1.jpeg)

Figure 2-12: Miami FAF Zone, Total Freight (2017 to 2022)

\*Forecast Data

In 2019, the trucking industry hauled 10.23 billion tons of freight representing 72.5 percent of the total domestic tonnage in the U.S.<sup>2</sup> The trucking industry hauled 10 percent fewer tons of freight in 2020 than in 2019 and 2018, yet it retained the same share of the total domestic tonnage across modes. According to the FAF database, this trend remained true in the Miami FAF Zone as well. Despite a two percent drop in freight tonnage in 2020 compared to 2019 and 2018, the trucking industry retained a mode share of 88 percent from 2017 to 2022 and the percentage of total freight value transported by truck was consistently 73 percent.

### 2.2 Regional Freight

Florida, and specifically Miami-Dade County, is uniquely positioned as a trade hub in the national and global market. With COVID-19 affecting global and national freight patterns, regional freight patterns were impacted as well. Florida's international trade, which includes imports and exports, supports over 2.5 million Florida jobs. More than one in five Florida jobs were supported by international trade in 2018 and trade-related jobs grew three times faster than total employment in the state between 1992 and 2018. On an annual basis, U.S. exporting plants increase employment two to four percent faster than plants that do not export.<sup>3</sup>

In 2020, two-way merchandise trade of \$135.1 billion combined with services exports of \$43.3 billion and the value of foreign direct investment (FDI) of \$91 billion generating international business and trade continued to be one of the state's strongest

Source: Freight Analysis Framework Version 5, TranSystems, 2022

<sup>2</sup> The American Transportation Research Institute (ATRI) and the Owner-Operator Independent Driver Association (OOIDA) Foundation, "COVID-19 Impacts on the Trucking Industry," 2020, https://www.commerce.senate.gov/services/files/1BB292D4-6FAE-4078-A1B5-48BF40FF660B (accessed September 02, 2022).

<sup>3</sup> Enterprise Florida, "2020 Florida International Business Highlights," 2021, https://www.enterpriseflorida.com/wp-content/up-loads/florida-international-business-highlights-only.pdf (accessed September 28, 2022).

sectors. Each of the top ten export states saw their origin exports decline in 2020, with overall U.S. exports falling by -13.3 percent. Despite Florida-origin exports to the world also declining by -18.3 percent to \$45.7 billion in 2020, Florida secured its spot as the sixth top exporter in the U.S.

**Table 2-1** highlights major changes in Florida's international trade from 2019 to 2020. These major decreases were expected regionally as national and global freight travel was impacted during the COVID-19 pandemic.

	Value in \$U.S. Billions	% Change vs. Previous Year	U.S. Rank
Total Trade in the World (2020)	\$135.1	-12.0%	N/A
Merchandise Exports (2020)	\$59.4	-17.6%	N/A
Merchandise Imports (2020)	\$75.7	-6.9%	N/A
Florida-Origin Exports (2020)	\$45.7	-18.3%	6th
Service Exports (2019)	\$42.9	0.9%	4th

### Table 2-1: International Trade and Services Overview (2019 to 2020)

Companies such as Amazon, Walmart, and Publix are aggressively expanding their footprint in Florida. Amazon is expanding in-person and online purchasing options in food retail with the acquisition of Whole Foods and future Amazon Fresh stores. Amazon and Walmart are the top e-commerce grocers in the nation, while Publix is expanding online shopping by partnering with Instacart, a leading food delivery app.<sup>4</sup>

In August 2021, Amazon announced a new robotics fulfillment center and five new delivery stations in Florida, which brought its total investment in the state to an estimated price tag of \$18 billion. Similarly, FedEx had

A Sign of Regional Freight Growth

FedEx employment in Miami-Dade County increased 7.7 percent between 2019 and 2020.

a \$72.2 million expansion, adding more than 138,000 square feet to the main FedEx sorting facility, for a total of more than 282,000 square feet. FedEx employment in Miami-Dade County increased 7.7 percent between 2019 and 2020. Shipping volume moving through the market increased 30.9 percent between 2019 and 2020. More than \$10 million in capital facility investment is underway at the FedEx Express facility at Miami International Airport.

Despite decreases in trade for Florida in 2020, Florida maintained top rankings in many U.S. import and export industry categories. Likewise, continued investment in South Florida further solidifies the state's prominence in regional trade and commerce.

<sup>4</sup> Paul Nutcher, "Florida-based Public Leads the State's Grocery Market, Can Amazon's Expansion Change That?" 2022, https:// www.palmbeachpost.com/story/business/economy/2022/03/16/publix-amazon-grocery-sales-market- florida-impact-publix/6797752001/ (accessed September 02, 2022).

### 2.3 National Freight

The COVID-19 pandemic caused national entities to implement measures that would protect the public and slow the spread of the virus. The first national effects on freight patterns occurred when China shuttered their boarders to contain the spread of COVID-19. The West Coast was significantly affected because almost half of the container volumes coming through the Ports of Los Angeles and Long Beach come from China.<sup>5</sup> On March 13, 2020, President Donald Trump declared a national emergency. Americans began to panic buy grocery essentials such as toilet paper, paper towels, hand sanitizer, masks, and cleaning supplies leaving shelves bare. At the federal level, truck drivers and industry support personnel were designated as essential workers to ensure businesses continued to run fluidly within the supply chain while protecting public health and safety. Although this designation was enacted, the trucking industry encountered obstacles due to shelter-in-place orders such as a lack of open public rest areas, dine-in restaurants, and closed state licensing agencies. The American Transportation Research Institute (ATRI) and the Owner-Operator Independent Driver Association (OOIDA) Foundation collaboratively designed a survey to identify trucking industry specific impacts of COVID-19. Over 5,000 usable responses were gathered from various trucking industry employees such as truck drivers, dispatchers, and senior executives. Detailed below are key findings from the survey that examine the impact of COVID-19 on national freight travel patterns.

**Table 2-2** outlines haul length changes from 2019 to 2020. The most notable changes were in longhaul and local trips. Prior to the pandemic, local trips accounted for only eight percent; this number increased to 18.2 percent during the pandemic. Local trips increased by more than 10 percent while long-haul trips decreased by 10 percent. This is indicative of a decline in long haul movements of international containers coupled with increased need for localized deliveries.

### A Change in Freight Trips

Prior to the pandemic, long-haul trips accounted for nearly one third of all trips; this number decreased to less than one quarter during the pandemic. Local trips increased by more than 10 percent while long-haul trips decreased by 10 percent.

	% Before Pandemic	% During Pandemic	Change
Local (less than 100 miles per trip)	7.8%	18.2%	10.4%
Regional (100-499 miles per trip)	31.0%	33.8%	2.8%
Inter-Regional (500-999 miles per trip)	28.6%	25.2%	-3.4%
Long-Haul (1,000+ miles per trip)	32.7%	22.7%	-10.0%

### Table 2-2: Average Length of Haul Before and During the COVID-19 Pandemic (2109 to 2020)

Source: American Transportation Research Institute (ATRI) and the Owner-Operator Independent Driver Association (OOIDA) Foundation

<sup>5</sup> ATRI and OOIDA, "COVID-19 Impacts"

Respondents to the survey reported that travel times were improved due to less traffic on the roadways, likely a result of the stay-at-home ordinances. About 87 percent of respondents declared that trips were either "much shorter" or "somewhat shorter." With fewer cars on the road, truck drivers experienced less congestion and were able to arrive to their destinations with fewer delays.

INRIX conducted a study on vehicle miles traveled (VMT) using data from June 2021 and June 2022 (**Figure 2-13**). The states with the biggest declines of truck VMT were Nebraska (-12 percent), Florida (-11.4 percent), and New Mexico (-10.6 percent) and states that saw increases in truck VMT were Delaware (10.2 percent), Rhode Island (4 percent), and Nevada (1.6 percent).

Freight movement is explicably volatile and typical freight flows feel impacts from current events. While some sectors experienced a dramatic reduction in trips and loads, other sectors delivering essential goods and medical supplies were at capacity due to consumer panic buying and other pandemic related deliveries. Truck travel times and average travel speeds were up, especially in areas where congestion would typically not allow trucks to travel through efficiently. This is likely due to the national stay-at-home ordinances and other traffic affecting factors during the COVID-19 pandemic.

![](_page_23_Figure_4.jpeg)

Figure 2-13: Change in VMT for Long Haul Trucks, June 2021 Compared to June 2022

Source: INRIX, National Truck Travel is Down -3 percent Over Last June, 2022

### 2.3.1 National Freight Profile and the Freight Analysis Framework (FAF)

Domestic freight in the Miami FAF Zone was impacted by the COVID-19 pandemic,

as shown in Figure 2-14. Between 2017-2019, domestic freight tonnage increased an average of 2.3 percent annually while the COVID-19 pandemic resulted in a 5.7 percent decrease in domestic freight tonnage from 2019 to 2020; domestic freight valuation increased an average of 0.1 percent between 2017 and 2019 and increased by 0.7 percent from 2019 to 2020 and is projected to increase 5.84 percent by 2022.6 This increase in value is led by commodities such as mixed freight, electronics, and pharmaceuticals.

![](_page_24_Figure_2.jpeg)

Figure 2-14: Domestic Freight Volume and Value (2017 to 2022)

\* Forecast Data

Source: Freight Analysis Framework Version 5.3

Most domestic freight in the Miami FAF Zone is transported by truck: 91 percent of all freight tonnage and nearly 76 percent of freight value.<sup>7</sup> Table 2-3 displays the amount of freight transported for each mode including mode share percentages. The least utilized transportation mode from 2017 to 2022 is pipeline. As shown in Table 2-4 pipelines were primarily used for transporting other coal and petroleum products. The top commodity for trucking is gravel by weight and mixed freight by value. Gravel was the commodity with the highest tonnage throughout the study period while mixed freight and electronics were the highest value freight during the study period (Table 2-5).

<sup>6</sup> Federal Highway Administration, "Freight Analysis Framework Version 5"

<sup>7</sup> Federal Highway Administration, "Freight Analysis Framework Version 5"

Mode	Total Tonnage (Thousands)	Total Dollars (Millions)	% of Total Freight Weight	% of Total Freight Value
1-Truck	1,750,843	\$1,428,173	91.0%	75.3%
2-Rail	55,895	\$12,313	1.3%	0.7%
3-Water	51,121	\$393,255	2.2%	1.1%
4-Air (include truck-air)	41,853	\$20,836	0.0%	1.3%
5-Multiple modes & mail	24,040	\$12,326	2.7%	20.8%
6-Pipeline	197	\$24,107	2.9%	0.7%

### Table 2-3: Miami FAF Domestic Freight by Mode (2017 to 2022)

Source: Freight Analysis Framework Version 5.3

### Table 2-4: Miami FAF Top Domestic Commodity by Mode (2017 to 2022)

Mode	Top Commodity (Tons)	Top Commodity (Dollars)
1-Truck	Gravel	Mixed Freight
2-Rail	Gravel	Motorized Vehicles
3-Water	Gasoline	Gasoline
4-Air (include truck-air)	Electronics	Miscellaneous Manufactured Products
5-Multiple modes & mail	Gravel	Pharmaceuticals
6-Pipeline	Other Coal and Petroleum Products	Other Coal and Petroleum Products

Source: Freight Analysis Framework Version 5.3

### Table 2-5: Miami FAF Top Commodities by Weight and Value (2017 to 2022)

Commodity	Total Tonnage (Thousands)	Total Dollars (Millions)
Gravel	620,437	\$8,341
Nonmetallic Mineral Products	212,858	\$36,949
Gasoline	201,007	\$109,900
Mixed freight	53,170	\$263,791
Electronics	7,629	\$204,021
Pharmaceuticals	1,940	\$135,406

Source: Freight Analysis Framework Version 5.3

### 2.4 International Freight

Global trade is an important aspect of assessing international freight travel patterns. Included figures and tables provide insight on global trade before, during and after the COVID-19 pandemic. Additionally, Latin America is highlighted as a location of key interest as they are one of Florida's largest trading partners.<sup>8</sup> Changes in global trade, and particularly in Latin America, directly impact freight travel in and out of Miami-Dade County.

**Figure 2-15** shows the distribution of PortMiami's market share by region. This international reach into worldwide markets is valuable to PortMiami's business model; however, it can also be a difficult influencer during worldwide disruptions such as the COVID-19 pandemic.

![](_page_26_Figure_4.jpeg)

![](_page_26_Figure_5.jpeg)

Source: PortMiami, 2021

Nearly 90 percent of global trade routes that were analyzed in **Table 2-6** showed trade volume declines from 2019 to 2020. **Table 2-6** breaks down changes in trade between regions and highlights intraregional trade in Latin America. Imports to Latin America decreased from every region - except the Far East - with the greatest decline in imports from Sub-Saharan Africa. Latin American exports increased to every region, except internally, with greatest growth in exports to Australasia followed by Sub-Saharan Africa.

		Exporting Region									
January to December		Far East	Europe	North America	Australasia	Middle East & India	Sub- Saharan Africa	Latin America	Total Imports		
	Far East	-0.8	0.3	-1.3	-4.5	10.8	1.7	2.5	-0.2		
	Europe	-5.4	0.8	-12.1	-6.7	-5.2	-0.8	3.6	-3.9		
ç	North America	7.3	-2.3	-10	-6.6	1.3	1.9	1.6	4.5		
Regio	Australasia	6.4	-3.4	-7.1	1.3	4.3	-7.7	12.1	3.1		
rting F	Middle East & India	-8.4	-6.5	-14.8	-10.2	0.8	-5.2	4.3	-6.2		
odul	Sub-Saharan Africa	-2.7	-5.6	-7.4	-8.1	0.8	2.1	10.5	-2.5		
	Latin America	0.3	-6.0	-11	-9.7	-0.2	-17	-14.2	-6.3		
	Total Exports	-0.4	-1.8	-1.8	-4.6	1.7	-0.5	-0.5	-1.2		

### Table 2-6: Intraregional Exports and Imports, Year-on-Year Variation (2019 to 2020)

\*In percentages of TEUs

Source: Economic Commission for Latin America

<sup>8</sup> Miami-Dade Beacon Council, "Trade: Location and Infrastructure Support Vibrate Foreign Trade," 2017, https://www.beaconcouncil.com/data/economic-overview/trade/ (accessed September 02, 2022).

In South America, COVID-19 had a greater, yet shorter in duration, impact on containerized import volumes when compared to containerized export volumes. Historically, containerized exports are typically received at lesser volumes than containerized imports. During the onset of the COVID-19 pandemic, this relationship changed, as shown in **Figure 2-16**. For a brief period from April to June 2020, exports exceeded imports. From April to May, COVID-19 confirmed deaths rose dramatically for every other region of the world, aside from South America.<sup>9</sup> Exports fell globally, which could explain the rapid decline in Latin American imports from March to May. Brazil, the economic superpower of Latin America, delayed enacting COVID-19 precautions. Brazil, and many other Latin American countries, are a major exporter of agricultural goods and petroleum.<sup>10</sup> These goods are particularly essential to trade partners.

![](_page_27_Figure_1.jpeg)

Figure 2-16: Container Imports, Exports, and Global Container Volume (2019 to 2020)

Source: Economic Commission for Latin America

10 Mar Z. Luna, "Essential economies driving Latin America's exports," 2021, https://www.spanish.academy/blog/10-essential-economies-driving-latin-americas-exports/ (accessed September 19, 2022).

<sup>9</sup> The Organisation for Economic Co-operation and Development, "COVID-19 in Latin America and the Caribbean: An Overview of Government Responses to the Crisis," 2020, https://www.oecd.org/coronavirus/policy-responses/covid-19-in-latin-america-and-the-caribbean-an-overview-of-government-responses-to-the-crisis-0a2dee41/ (accessed September 19, 2022).

<sup>11</sup> Reuters, "Timeline: Key moments in Bolsonaro's handling of the COVID-19 crisis," 2020, https://www.reuters.com/article/ us-health-coronavirus-brazil-timeline/timeline-key-moments-in-bolsonaros-handling-of-covid-19-crisis-idINKBN2482UL (accessed September 19, 2020).

Of the top 10 Miami International Airport trade partners, the first four are from South America including Brazil (\$10.825 Billion), Colombia (\$5.288 Billion), Chile (\$3.326 Billion), and Peru (\$2.728 Billion).<sup>12</sup> This level of trade between various countries indicates the importance of freight travel for each subregion within South America. While the largest trade partner, Brazil, is located in the east coast subregion, Chile and Peru are in the west coast subregion and Colombia is in the north coast subregion. Each South American subregion has a unique connection to the global economy due to their topography and current transportation infrastructure. When compared to other subregions, the East Coast of South America is the top importer and exporter. Cumulative year-on-year changes in trade from 2019 to 2020 were analyzed from all container ports in this subregion, as shown in **Figure 2-17**. Exports continued to rise from 2019 while imports declined halfway through 2020. The steepest decline in imports was not until September 2020, nearly six months after the onset of COVID-19.

![](_page_28_Figure_2.jpeg)

Figure 2-17: East Coast of South America - Shipping Container Exports and Imports, Cumulative Year-on-Year Variation (2019 to 2020)

Source: Economic Commission for Latin America

As shown in **Figure 2-18**, imports to the West Coast of South America were already down from 2019 but were further exacerbated by the COVID-19 pandemic. From June to October 2020, imports declined by over 10 percent each month from the previous year. Improvement was made toward the end of 2020 but was still below prepandemic levels. Exports also declined but recovered by September 2020, although not restored to pre-pandemic levels.

<sup>12</sup> Miami-Dade Beacon Council, "Trade."

![](_page_29_Figure_0.jpeg)

Figure 2-18: West Coast of South America - Shipping Container Exports and Imports, Cumulative Year-on-Year Variation (2019 to 2020)

Source: Economic Commission for Latin America

### 2.4.1 International Freight Profile and the Freight Analysis Framework (FAF)

There are multiple large-scale international import and export facilities with international impacts in the Miami FAF Zone including MIA, PortMiami, Port of Palm Beach, and Port Everglades. Throughout the study period, water was the mode with the highest freight tonnage while air had the highest freight value. **Figure 2-19** shows the total tons (in thousands) and dollars (in millions) imported and exported by year. Before the COVID-19 pandemic, the value of international freight decreased year-over-year. However, there was a slight increase in freight volume from 2018 to 2019 prior to the pandemic. The COVID-19 pandemic contributed to low tonnage and valuation of international freight in 2020. While there is no data available for 2021, export tonnage and valuation are projected to be higher than pre-pandemic levels in 2022.

![](_page_29_Figure_6.jpeg)

![](_page_29_Figure_7.jpeg)

Source: Freight Analysis Framework Version 5.3

## 3.Pre & Post COVID-19 Impacts on the Freight and Trucking Network

The following section seeks to answer the following question: What impact did the COVID-19 pandemic have on the freight and trucking network in Miami-Dade County?

### 3.1 Trucking and Roadway Infrastructure

Trucks and other vehicles are utilized to deliver goods, people and products from their origin to their destination. Roads, and other vehicle related facilities, are planned and built to provide safe and What impact did the COVID-19 pandemic have on the freight and trucking network in Miami-Dade County?

effective infrastructure for these vehicles to use during transport. The freight industry relies on all of these elements in order to achieve efficiency and the effective delivery of freight. While one may not feel that providing for more efficient passenger vehicle infrastructure would influence freight transport, the fact is that passenger vehicles impact the ability of freight vehicles to provide efficient service. Therefore, this analysis assesses the impact of all modes that directly impact the freight industry. This section will review the impacts that the road network has on the effectiveness of the freight industry.

### 3.1.1 Annual Average Daily Truck Traffic (AADTT)

The most common metric to depict the volume of truck traffic on a roadway is Annual Average Daily Truck Traffic (AADTT). To assess changes in truck volume throughout Miami-Dade County, AADTT data from 2018 through 2021 was retrieved from the Florida Department of Transportation (FDOT) traffic database. **Figures 3-1 through 3-5** show the total volume of truck traffic throughout the study period. While highways facilitate the distribution of freight to other regions of Florida and beyond, local roads serve as connectors to various freight terminals such as warehousing, seaports, and airports. Florida's Turnpike, SR 826, US 27, US 41/SR 90/8th Street, I-75, and I-95 consistently experienced high truck volumes throughout the study period. The highest truck volume in 2017 was 28,800, while the highest truck volume in 2021 was 43,580. **Figure 3-6** shows the percentage of truck traffic on each roadway.

![](_page_31_Figure_0.jpeg)

![](_page_31_Figure_1.jpeg)

![](_page_32_Figure_1.jpeg)

Figure 3-2: Miami-Dade County Truck Volumes / AADTT (2018)

![](_page_33_Figure_0.jpeg)

Figure 3-3: Miami-Dade County Truck Volumes / AADTT (2019)

![](_page_34_Figure_1.jpeg)

Figure 3-4: Miami-Dade County Truck Volumes / AADTT (2020)

![](_page_35_Figure_0.jpeg)

Figure 3-5: Miami-Dade County Truck Volumes / AADTT (2021)

![](_page_36_Figure_1.jpeg)

Figure 3-6: Truck Percentage on the Miami-Dade Highway System (2021)

To assess changes to truck volumes, 2017 AADTT was used as a base year. Changes in AADTT over the study period is displayed in **Figure 3-7** and **Table 3-1**. In 2018, truck volume increased 0.4 percent from 2017. The initial effects of the pandemic began in 2020, and as a result, truck volume in the County decreased by 9 percent In 2021. Truck volume within the County returned to pre-pandemic conditions with a 0.9 percent increase in truck volume over the base year. In contrast, total AADT was still below pre-pandemic levels in 2021. The changes in truck volume and total vehicle volume, with a base year of 2017, are displayed in **Figure 3-8**.

![](_page_37_Figure_1.jpeg)

![](_page_37_Figure_2.jpeg)

Source: FDOT, 2022

#### Table 3-1: Miami-Dade County Truck Volume Changes (2017 to 2021)

Year	Annual Percent Change	Percent Change From 2017
2017	0.0%	N/A
2018	0.4%	100.4%
2019	-1.7%	98.7%
2020	-9.3%	89.5%
2021	12.7%	100.9%

Source: FDOT, 2022

![](_page_37_Figure_7.jpeg)

![](_page_37_Figure_8.jpeg)

**Table 3-2** and **Figure 3-9** show changes to truck volume on some of the County's most heavily traveled truck routes including SR 826 (between US 27 and SR 934/NW 74th Street), I-75 (between Florida's Turnpike and NW 87th Avenue), Florida's Turnpike (between the Broward County border and I-95), I-95 (between 119th Street and 103rd Street), and US 27 (between 74th Street and 9th Street). To focus on impacts related to COVID-19, **Table 3-2** shows changes in truck volume from 2019 to 2021. The roadway most impacted by COVID-19 was SR 826 which experienced a decline of nearly 10,000 truck per day, a decrease of more than 21 percent. Notably, I-95 and I-75 experienced an increase in truck volume between 2019 and 2021.

Roadway	2017	2018	2019	2020	2021	Change (2019 to 2021)
SR 826	27,588	35,217	25,630	16,929	20,090	-21.6%
I-75	6,993	6,692	7,755	10,080	9,002	16.1%
Florida's Turnpike	8,864	9,209	9,391	10,336	9,293	-1.0%
US 27	9,213	8,639	8,208	8,554	8,109	-1.2%
I-95	7,786	9,108	9,879	9,416	10,116	2.4%

### Table 3-2: Truck Volume / AADTT Change (2017 to 2021)

Source: FDOT, 2022

![](_page_38_Figure_5.jpeg)

### Figure 3-9: Truck Volume Change (2017 to 2021)

Source: FDOT, 2022

### 3.1.2 Truck Travel Time Reliability (TTTR)

One of the most common metrics for measuring freight movement on roadways is Truck Travel Time Reliability (TTTR) also known as a Truck Reliability Index (TRI). TRI is the ratio of the 95th percentile travel time to the 50th percentile travel time for trucks. The lower the TRI ratio, the less difference in travel time between the most congested period and travel time during average traffic flow. According to the FHWA FMM National 5.1 Urban Area Dashboard (Freight Mobility Trends Analysis Tool), TRI went from over 1.6 pre-pandemic to 1.42 in 2021, an increase in travel time reliability.<sup>13</sup> TRI from 2017 to 2021 is shown in **Figure 3-10**.

Another common metric for measuring freight flow and efficiency is truck hours delay per mile, which decreased significantly during the COVID-19 pandemic. Delay/mile is the extra travel time over normal conditions multiplied by the number of trucks, divided by the roadway segment length. Before the pandemic, truck delay times were decreasing moderately, as shown in **Figure 3-11**. After lockdowns reduced travel for most of the county, truck delay times dramatically decreased due to fewer passenger vehicles on the roadways. Truck delay times have returned to pre-pandemic levels with a 2021 delay/mile of 7,536 truck hours.<sup>14</sup>

### Figure 3-10: Miami TPO Truck Reliability Index (2017 to 2021)

![](_page_39_Figure_4.jpeg)

![](_page_39_Figure_5.jpeg)

![](_page_39_Figure_6.jpeg)

![](_page_39_Figure_7.jpeg)

Source: FHWA FMM National 5.1 Dashboard

<sup>13</sup> Federal Highway Administration, "Freight Mobility Trends Analysis Tool," 2021, https://explore.dot.gov/t/FHWA/views/ FHWAFMMNational5\_1/UrbanAreaDash?%3Aembed=y&%3Aiid=3&%3AisGuestRedirectFromVizportal=y (accessed on September 02, 2022).

<sup>14</sup> Federal Highway Administration, "Freight Mobility Trends Analysis Tool"

While TRI considers traffic flow over a certain period, two other metrics for measuring the flow of freight are Planning Time Index (PTI) and Travel Time Index (TTI). PTI is the ratio of travel time on the worst day of the month to the free-flow travel time. Prior to the pandemic, the PTI for Miami-Dade County was decreasing at a slow rate. The pandemic caused a sharp decrease in PTI, as shown in **Figure 3-12**. In 2021, PTI was still well below pre-pandemic levels with a PTI of 2.49.<sup>14</sup> This means, a 30-minute trip in light traffic should be planned to take nearly 75 minutes (74.7 minutes to be exact). TTI is similar PTI because while PTI compares the worst day of the month and free-flow traffic, TTI compares peak-period average travel time and free-flow travel time. TTI is the ratio of a peak-period travel time to free-flow travel time. The TTI for Miami-Dade County followed a similar trend as the PTI, there were low reductions in TTI from 2017-2019 and then a large decrease in TTI because of the pandemic (**Figure 3-13**). In 2021, the TTI was 1.41.<sup>15</sup> This means in 2021, a 30-minute trip would take 42.3 minutes during peak periods. That same trip would have taken more than 48 minutes in 2017.

![](_page_40_Figure_2.jpeg)

Source: FHWA FMM National 5.1 Dashboard

![](_page_40_Figure_4.jpeg)

![](_page_40_Figure_5.jpeg)

Source: FHWA FMM National 5.1 Dashboard

15 Federal Highway Administration, "Freight Mobility Trends Analysis Tool"

Another resource used to measure the impact of COVID-19 on the effectiveness of the freight transportation network is the National Performance Management Research Data Set (NPMRDS). NPMRDS is a vehicle probe-based travel time data set acquired by the Federal Highway Administration (FHWA) for its use in various performance measurement programs, such as its Freight Performance Measures, Urban Congestion Report, and other programs. The NPMRDS data are provided by a team consisting of the CATT Lab at the University of Maryland, INRIX, the Texas A&M Transportation Institute, and KMJ Consulting. **Figure 3-14** shows the Truck Travel Time Reliability Index (TTTR) for interstate roads in Miami-Dade County. As a result of pandemic lockdowns, TTTR dropped from 3.2 in March 2020, to 1.84 in May 2020.<sup>16</sup> In 2022, the TTTR has yet to return to pre-pandemic levels with a July index of 2.5. According to NPMRDS, travel time is still more reliable than before the COVID-19 pandemic.

![](_page_41_Figure_1.jpeg)

#### Figure 3-14: TTTR in Miami-Dade County (2017 to 2022)

#### Source: NPMRDS, 2022

While the FMM National 5.1 dashboard and NPMRDS have varying values for calculated delay, similar trends are present in both datasets. When comparing both datasets it is apparent that the COVID-19 pandemic created a significant reduction in truck delay. Less congestion on roadways resulted in improved travel time reliability. In Miami-Dade County, roadway congestion has yet to return to pre-pandemic levels signifying that freight is moving more reliably than in early 2020.

<sup>16</sup> Federal Highway Administration, "National Performance Management Research Data Set," 2022, https://npmrds.ritis.org/analytics/ (accessed September 02, 2022).

### 3.1.3 Freight Analysis Framework

At the time of this study, the current version of FAF (FAF 5.3) provides for tonnage and value by origin-destination (O/D) for commodity type and mode for the base year (2017), recent years (2018-2019), and forecast year estimates (2020 and 2022). The following analysis uses 2017-2019 pre-COVID-19 data as well as forecasts for 2020 and 2022 data. The FAF database did not have a forecast for 2021 at the time of this study development. According to the FAF database, despite a four percent drop in total freight tonnage in 2020 compared to 2019, the trucking industry retained a mode share of 88 percent throughout the study period and the percentage of total freight value transported by truck was consistently 73 percent<sup>17</sup> as shown in **Table 3-3**. This means while the industry experienced setback due to the COVID-19 pandemic, they were consistent with other modes suggesting factors outside of the industry contributed to the reduced tonnage and value. Figure 3-15 shows the total weight (by thousand tons) and value (by million dollars) transported in Miami-Dade County from 2017-2019 and includes projections for 2020 and 2022.

	2017	2018	2019	2020*	2022*
Tonnage	88.63%	88.04%	88.23%	89.17%	88.64%
Value	72.87%	72.84%	72.54%	73.20%	72.86%

### Table 3-3: Miami FAF Percentage of Total Freight Moved by Truck (2017 to 2022)

\*Forecast Data

Source: Freight Analysis Framework Version 5.3

![](_page_42_Figure_7.jpeg)

### Figure 3-15: Miami FAF Truck Freight, Tonnage and Value (2017 to 2022)

Source: Freight Analysis Framework Version 5.3

17 Federal Highway Administration, "Freight Analysis Framework Version 5"

<sup>\*</sup>Forecast Data

### 3.1.4 Freight Employment Analysis

Data retrieved from the U.S. Bureau of Labor Statistics was used to assess significant increases or decreases in employment within the freight industry over a 5-year period. Miami-Dade County, state, and national level employment data were compared from 2017 to 2021. Freight data included the truck transportation industry with corresponding general and specialized subsector freight data. General and specialized subsectors were further categorized by local and long-distance freight transportation.

**Table 3-4** outlines the total number of establishments and employees across the three locations and calculates the yearly percent change. Generally, across all locations, truck transportation establishments saw growth each year. Miami-Dade County outpaced state and national level growth, especially during COVID-19. While the number of establishments increased, there was a general trend of declining employment during 2020. Despite this, Miami-Dade County saw over 13 percent growth in 2021 when compared to the previous year. This outpaces previous trends in the area and when compared to state and national employment data. This is indicative that Florida, and specifically Miami-Dade County, is a prime location for freight sector growth.

Number of Establishments									
Veer	County		Sta	State		National			
rear	#	% Change	#	% Change	#	% Change			
2017	887	N/A	6,515	N/A	127,366	N/A			
2018	944	6.4%	6,953	6.7%	133,897	5.1%			
2019	1,000	5.9%	7,446	7.1%	141,139	5.4%			
2020	1,125	12.5%	8,063	8.3%	146,861	4.1%			
2021 <sup>⊳</sup>	1,392	23.7%	9,595	19.0%	159,743	8.8%			

## Table 3-4: Miami-Dade County, Florida, and National Establishments & Employees inPrivate Truck Transportation (2017 to 2021)

Number of Employees								
Year	County		Sta	ate	National			
2017	5,392	N/A	52,966	N/A	145,2674	N/A		
2018	5,761	6.8%	55,581	4.9%	1,494,498	2.9%		
2019	5,716	-0.8%	59,004	6.2%	1,528,166	2.3%		
2020	5,634	-1.4%	59,488	0.8%	1,471,061	-3.7%		
<b>2021</b> <sup>⊳</sup>	6,312	12.0%	64,457	8.4%	1,505,596	2.3%		

P: Preliminary Source: U.S. Bureau of Labor Statistics **Table 3-5** displays the number of Local General Freight Trucking establishments and employees over a 5-year period. Local General Freight Trucking establishments handle a wide variety of commodities, generally palletized and transported in a container or van trailer. Local general freight trucking establishments usually provide trucking within a metropolitan area which may cross state lines. Generally, the trips are same-day return.<sup>18</sup> Miami-Dade County establishments saw a nearly 10 percent increase during 2020, while growth for state and national establishments plateaued or had minimal growth. This growth continued for each location in 2021, significantly outpacing previous years. Miami-Dade County was the only county to have significant employee growth in 2020, with national employment declining. By 2021, all locations saw employment growth, typically at higher rates than pre-COVID-19 years. The State of Florida saw the most growth in employment in 2021 when compared to other locations.

Number of Establishments								
Maari	Cou	inty	Sta	ate	National			
Year	#	% Change	#	% Change	#	% Change		
2017	399	N/A	2,167	N/A	33,805	N/A		
2018	410	2.8%	2,255	4.1%	35,355	4.6%		
2019	422	2.9%	2,359	4.6%	36,978	4.6%		
2020	476	12.8%	2,497	5.8%	38,526	4.2%		
2021 <sup>p</sup>	558	17.2%	2,967	18.8%	42,206	9.6%		
Number of	Employees							
Year	Cou	inty	Sta	ate	National			
2017	1,711	N/A	9,913	N/A	251,378	N/A		
2018	2,052	19.9%	10,439	5.3%	259,020	3.0%		
2019	1,970	-4.0%	11,182	7.1%	269,156	3.9%		
2020	2,024	2.7%	11,982	7.2%	267,432	-0.6%		
2021 <sup>p</sup>	2,262	11.8%	14,056	17.3%	281,046	5.1%		

### Table 3-5: Miami-Dade County, Florida, and National Establishments & Employees inLocal General Freight Trucking (2017 to 2021)

P: Preliminary

<sup>18</sup> North American Industry Classification System Association, "NAICS Code Description: 484110 General Freight Trucking, Local," n.d., https://www.naics.com/naics-code-description/?code=484110#:~:text=484110%20%2D%20General%20Freight%20Truck-ing%2C%20Local (accessed September 02, 2022).

**Table 3-6** displays the number of Local Specialized Freight Trucking establishments and employees over a 5-year period. The establishments of this industry are primarily engaged in the transportation of freight which, because of size, weight, shape, or other inherent characteristics, requires specialized equipment, such as flatbeds, tankers, or refrigerated trailers.<sup>19</sup> State and national data had minimal changes to establishments in this industry subsector. Miami-Dade County witnessed major growth, with over 20 percent growth from 2019 to 2020. Increased establishment growth continued into 2021. Employment data tells a different story. Growth in employment for the County and state slowed during 2020 and significantly declined nationally. In 2021, Miami-Dade has seen growth, but at a slower rate than previous years while state employment is minimal. Nationally, there is still a decline in this industry.

Number of Establishments									
Maran	Cou	inty	Sta	ate	National				
Year	#	% Change	#	% Change	#	% Change			
2017	85	N/A	908	N/A	28,852	N/A			
2018	88	3.5%	904	-0.4%	29,372	1.8%			
2019	81	-8.0%	934	3.3%	29,769	1.4%			
2020	91	12.3%	968	3.6%	30,085	1.1%			
2021 <sup>p</sup>	107	17.6%	1,009	4.2%	30,602	1.7%			

### Table 3-6: Miami-Dade County, Florida, and National Establishments & Employees inLocal Specialized Freight Trucking (2017 to 2021)

Num	ber d	of Em	plov	ees

Year	County		Sta	ate	National		
2017	642	N/A	7,189	N/A	220,057	N/A	
2018	685	6.7%	7,476	4.0%	227,682	3.5%	
2019	711	3.8%	7,818	4.6%	232,304	2.0%	
2020	733	3.1%	7,861	0.6%	219,780	-5.4%	
2021 <sup>⊳</sup>	743	1.4%	7,918	0.7%	218,471	-0.6%	

P: Preliminary

<sup>19</sup> United States Census Bureau, "North American Industry Classification System," n.d., https://www.census.gov/naics/?input=4842&year=2022&details=484210 (accessed September 02, 2022).

**Table 3-7** displays the number of Long Distance General Freight Trucking establishments and employees over a 5-year period. In 2020, national establishment growth slowed while county and state growth increased from the previous year. In 2021, overwhelming growth was seen at all locations, with Miami-Dade County witnessing the largest change from 2020 with nearly 22 percent growth. Slowed or declining employment was witnessed in 2020 for each location. Despite this, all locations recuperated to pre-COVID-19 growth rates in 2021. In 2021, Miami-Dade County experienced enormous improvement in employment in this sector.

## Table 3-7: Miami-Dade County, Florida, and National Establishments & Employees inLong Distance General Freight Trucking (2017 to 2021)

Number of Establishments									
Veer	Οοι	inty	Sta	ate	National				
rear	#	% Change	#	% Change	#	% Change			
2017	271	N/A	2,223	N/A	45,767	N/A			
2018	313	15.5%	2,492	12.1%	49,483	8.1%			
2019	348	11.2%	2,754	10.5%	53,970	9.1%			
2020	403	15.8%	3,127	13.5%	57,255	6.1%			
2021₽	555	37.7%	4,031	28.9%	65,062	13.6%			
Number of I	Employees								
Year	Οοι	inty	State		National				
2017	2,033	N/A	23,128	N/A	747,666	N/A			
2018	2,066	1.6%	24,424	5.6%	770,496	3.1%			
2019	2,086	1.0%	25,967	6.3%	787,596	2.2%			
2020	2,077	-0.4%	25,991	0.1%	756,726	-3.9%			
2021 <sup>⊳</sup>	2.322	11.8%	28.001	7.7%	775.980	2.5%			

P: Preliminary

**Table 3-8** displays the number of Long Distance Specialized Freight Trucking establishments and employees over a 5-year period. Generally, establishment growth slowed over the five-year period for each location. Growth has not yet returned to pre-COVID-19 levels. Employment in this industry subsector was hit hardest during COVID-19, with all locations experiencing major declines. Specifically, Miami-Dade County had a nearly 45 percent decline from the previous year. In 2021, county and state data showed growth while national employment rates are still declining.

Number of Establishments								
Maar	Cou	inty	Sta	ate	National			
rear	#	% Change	#	% Change	#	% Change		
2017	47	N/A	471	N/A	10,798	N/A		
2018	55	17.0%	520	10.4%	11,254	4.2%		
2019	64	16.4%	575	10.6%	11,795	4.8%		
2020	69	7.8%	613	6.6%	12,086	2.5%		
2021 <sup>p</sup>	69	0.0%	652	6.4%	12,386	2.5%		
Number of	Number of Employees							

Table 3-8: Miami-Dade County, Florida, and National Establishments & Employees inLong Distance Specialized Freight Trucking (2017 to 2021)

Number of Employees												
Year	County		Sta	ate	National							
2017	338	N/A	6,615	N/A	134,188	N/A						
2018	330	-2.4%	6,912	4.5%	137,429	2.4%						
2019	369	11.8%	7,480	8.2%	139,076	1.2%						
2020	250	-32.2%	7,110	-4.9%	132,417	-4.8%						
2021 <sup>⊳</sup>	264	5.6%	7,383	3.8%	129,342	-2.3%						

P: Preliminary

### 3.2 Maritime

Prior to COVID-19, maritime freight traffic was increasing at most seaports in the U.S., and especially at PortMiami where record numbers were being experienced regularly. PortMiami's reported cargo numbers remained strong through the pandemic and are surpassing pandemic levels today, as show in **Table 3-9** and **Figure 3-16**.

In FY 2020, PortMiami recorded 1.07 million TEUs, a slight decrease from previous years due to the COVID-19 pandemic. However, in FY 2021, PortMiami reported a record 1.25 million TEUs. In FY 2022, or a 17.5% increase year-over-year. Aside from the world coming out of the COIVD-19 pandemic, this increase is due to

Nearshoring is a new trend, in which ports are taking manufacturing from countries such as Asia, China, Vietnam, and bringing it closer to the Western Hemisphere, to Mexico, Latin America, and the U.S.

nearshoring. Nearshoring is a new trend, in which ports are taking manufacturing from countries such as Asia, China, Vietnam, and bringing it closer to the Western Hemisphere, to Mexico, Latin America, and the U.S. This shift in global manufacturing and trade is resulting in higher cargo handling and demand for U.S. ports such as PortMiami. The trend of nearshoring is likely to continue, and coupled with forecasted growth at PortMiami, it is vital that the transportation and trucking network provide

**20%** The amount of inbound tonnage growth that PortMiami has experienced during post-COVID-19. the support and carrying capacity that PortMiami requires. PortMiami expects this growth trend to continue with anticipated 1.36 million TEUs projected for FY 2023 and an annual growth rate of 3% into the future.

Total tonnage at PortMiami is also at record levels – most notable for inbound tonnage. While outbound tonnage has recovered to pre-pandemic levels, *inbound tonnage has increased by nearly 20 percent*.

### 3.2.1 PortMiami Rail

Currently, PortMiami has two FEC Railway trains coming in and out of the port daily. Each train bring 60 to 80 containers into PortMiami from inland U.S. Outgoing trains haul 50 to 60 containers daily into Central and North Florida and the Southeastern U.S.

PortMiami is a partner with FEC Railways to provide on-port rail service. This service links the Port and the Hialeah Rail Yard providing direct cargo access to the national rail system. The on-dock intermodal rail service provides shippers the convenience of port-to-door service with absolute lead times that match or exceed those of trucking, but with greater reliability and reduced carbon emissions. This FEC rail service to PortMiami, with expanded connections throughout North America, augments the Port's efforts to become a major global logistics hub allowing containerized cargo to reach 70 percent of the American population in 1-4 days. Rail cargo volumes have been increasing in the last years, according to data from PortMiami. During the 2021 fiscal year, FEC trains moved 37,938 containers by rail in and out of PortMiami, 52 percent more than FY 2020 when FEC trains moved 24,908 TEUs. Volume was up 44 percent from the 2019 pre-pandemic level, showing that PortMiami's rail volumes have been growing despite the industry-wide trade disruptions. About 5 percent of all PortMiami cargo is shipped in and out of the port by rail, and with new development projects, PortMiami expects its rail cargo to increase 20 percent in volume at the Port. Seaboard Marine is the main user of FEC rail at PortMiami, with 75 to 80 percent of all FEC volumes at the Port and focused on Latin America and the Caribbean.

A lot of the growth experienced at PortMiami is possible due to the regional investments in recent years, including the deep dredging of PortMiami to allow larger ships to access the Port, including 600 post-Panamax vessels. It will be important for the region to continue supporting the growth and development of PortMiami as the benefits are farreaching and affect multiple sectors of the economy.

ltem	2016	2017	2018	2019	2020	2021	2022*	2023*
TEUs	1,028,156	1,020,192	1,083,586	1,120,913	1,066,738	1,254,062	1,304,224	1,356,393
Cargo Ships Docked	1,231	1,422	1,081	958	868	939		
Inbound Tonnage	3,871,906	4,567,926	4,749,255	5,745,632	5,792,134	6,834,613		
Outbound Tonnage	3,827,980	4,045,813	4,028,719	4,375,938	3,933,140	4,314,614		
Total Tonnage	7,699,886	8,613,739	877,974	10,121,570	9,725,274	11,149,227		

Table 3-9: Port Miami Cargo Statistics (2016-2023)

\*Forecast Data

![](_page_49_Figure_5.jpeg)

### Figure 3-16: PortMiami TEUs (2017-2022)

\*Forecast Data

The Miami FAF zone includes multiple ports beyond PortMiami such as Port Everglades and Port of Palm Beach. According to the FAF database, freight tonnage and valuation were increasing prior to the pandemic, as shown in **Figure 3-17**. From 2019 to 2020, there was a projected 91 percent decrease in tonnage moved over water, accounting for a decrease in valuation of 27 percent. Compared to other modes, maritime freight was impacted the most by the COVID-19 pandemic. As previously detailed, PortMiami data is surpassing pre-pandemic numbers, so this FAF trend analysis below will be important to compare with actual data as it becomes available for the 2050 Long Range Transportation Plan.

![](_page_50_Figure_2.jpeg)

![](_page_50_Figure_3.jpeg)

\*Forecast Data Source: Freight Analysis Framework Version 5.3

Since conducting this analysis, the FAF 5.4 update was released which includes estimates for 2020 freight movement. The FAF 5.4 estimate is more consistent with data provided by Port Miami than FAF 5.3. While FAF 5.4 estimates a decrease in tonnage and value from 2019 to 2020, the actual decrease is far less than the FAF 5.3 forecast suggested. For 2020, FAF 5.4 estimates 10,117 thousand tons and \$8,231 million dollars worth of freight was transported in the Miami FAF zone by water.

### 3.3 Aviation

MIA, which serves 42 cargo airlines, led the nation in international cargo in 2021. This record year for the airport handled 2.75 million tons of freight – an 18 percent increase over 2020. The value of all international freight in 2021 was \$67.5 billion – a 28 percent increase over 2020. Importantly, MIA is 95 percent of Florida's total air trade value. MIA's top trade partners by total weight are Colombia and Chile and the top trade partner by value is Brazil at more than double the value of the next highest value trade partner of Colombia.

![](_page_51_Picture_2.jpeg)

MIA imports of total perishables increased by more than 19 percent by volume from 2021 compared to 2020. Notably, the imports of flowers by volume increased by more than 39 percent. MIA leads the nation in perishables air cargo by a wide margin, including 89 percent of flowers and 69 percent of fruits and vegetables. The quantity and value of perishables supports the importance of cold storage facilities and distribution services.

According to the FAF database, the total weight of freight transported by air at MIA was increasing prior to the pandemic. In contrast, freight value decreased slightly from 2017 to 2018 but saw an increase from 2019 through 2022 and exceed pre-pandemic levels, while tonnage is still lower than before the pandemic. **Figure 3-18** shows the total weight and value of air freight moved in the Miami FAF from 2017 to 2022.

![](_page_51_Figure_5.jpeg)

### Figure 3-18: Miami FAF Air Freight, Tonnage and Value (2017 to 2022)

Source: Freight Analysis Framework Version 5.3

As the data depicts, MIA cargo and air freight tonnage and value is tracking to record levels as the post-COVID-19 economy continues to accelerate. It is imperative that the transportation network and the trucking industry are provided adequate infrastructure and resources to provide efficient and effective transport of cargo from MIA to the rest of the world. The roadway network surrounding MIA has consistently seen high levels of congestion and inefficiency. The lack of available right-of-way needed for possible road improvements has created a situation where alternative modes of transport or other alternative arrangements are being sought by distributors, importers and exporters. Much discussion has been had about reallocating some of the air cargo, particularly the floral commodities, to alternatives sites for receipt and distribution. As the Miami-Dade TPO plans and prepares for the 2050 LRTP it will be critical that the LRTP process addresses the trucking and freight network that serves MIA now and in the future.

### 3.4 Rail

The Miami-Dade TPO region is served by two freight railroads: the FEC and CSX Railways. Both carriers provide freight and passenger service on their lines, which requires a high level of coordination, rail traffic forecasting, maintenance, and other variables and needs that are demanding and costly. The rail carriers are key players in the Miami-Dade regional economy and transportation network, and as a result, it is important that analysis and assessments of the transportation, freight and trucking industry in the region takes into account their operations and plans.

According to the FAF database, prior to the COVID-19 pandemic, rail freight tonnage and value were both decreasing. **Figure 3-19** shows the total freight weight in thousand tons and value in million dollars. In 2017, 1.6 percent of freight in Miami-Dade County moved on rail but

![](_page_52_Picture_5.jpeg)

![](_page_52_Picture_6.jpeg)

by 2019 railed moved only 0.8 percent of total freight. FAF forecasts rail rebounding to 2017 levels in 2020 and growth by 2022. By 2022, rail freight is projected to reach historic highs in the Miami-Dade region. As cargo carriers and logistical providers began looking for alternatives to trucks due to factors such as delay, availability, costs and other pressing issues, rail became a viable alternative.

![](_page_53_Figure_0.jpeg)

Figure 3-19: Miami FAF Rail Freight, Tonnage and Value (2017 to 2022)

\*Forecast Data

Source: Freight Analysis Framework Version 5.3

A key asset to the rail infrastructure in the region is the Hialeah Rail Yard and the South Florida Intermodal Logistics Center, located at the southern end of the Hialeah Yard. The Hialeah Yard is owned and operated by FEC Railways and is located 12 miles northwest of Downtown Miami. Located in one of the densest industrial and warehouse areas in the region, the Hialeah Yard is the backbone of the region's rail industry. It will be critical for the region to continue coordinating with FEC to ensure adequate growth and operations facilitation for the current and planned Hialeah Yard services.

# 4. Recommendations

Focusing on the intent of this study, which is to assess the pre- and post-COVID-19 pandemic impacts on the Miami-Dade County freight/truck transportation network, this section will lay out clear goals and direction for the Miami-Dade TPO to consider when planning for the future of freight/truck transportation in the region. The trucking industry and related infrastructure is directly impacted by all modes of transportation, including seaports, aviation, rail and highways. This study specifically emphasizes how the trucking industry was impacted by the COVID-19 pandemic, so the Miami-Dade TPO can make educated and effective decisions as to the future of transportation directives in the region.

The following 10 recommendations are intended to highlight the main areas of attention for the Miami-Dade TPO to consider when evaluating future freight and trucking transportation decisions.

### **Recommendation #1**

Conduct annual volume and travel time assessments of priority freight corridors in the region. The top five based on 2021 AADTT include:

- 1. SR 826
- 2. I-75
- 3. Florida's Turnpike
- 4. US 27
- 5. 1-95

### **Recommendation #2**

Conduct an alternative freight corridor assessment as part of the Long Range Transportation Plan update.

Some possible options for alternative corridors may include:

- 1. SR 997/ Krome Avenue/ 177th Avenue
- 2. SR 9/27th Avenue/Unity Boulevard

### **Recommendation #3**

Lead local stakeholder collaboration workshops to advance development efforts in targeted freight logistics zones.

Freight zones provide many benefits, including improved supply chain integration, better use of shared transportation infrastructure, and other cost reductions due to the

economies of scale of clusters of freight industries. Managing the freight zone also provides the opportunity for accelerated construction and operation due to a collaborative planning process involving public and private partners. A collaborative approach to identifying and supporting freight development is essential for successful management of freight growth. Many factors must be considered, including available real estate, zoning, land use, accessibility, and environmental impacts. Public and private partners must work together on these growth opportunities to coordinate and prioritize policy and infrastructure needs. These identified needs will help drive investment decisions for maximizing development opportunities

### **Recommendation #4**

Partner with railroads in the region by routinely inviting them to present to FTAC.

Freight rail is environmentally friendly and cost effective for moving large volumes of freight. Rail is an important intermodal connector for international freight through PortMiami as well. Furthermore, investment in the rail network helps reduce truck traffic. Support for all modes of transportation – including rail – provides a robust network to help provide a resilient transportation response to disruptions such as the COVID-19 pandemic.

### **Recommendation #5**

Advance efforts of the Miami International Airport, such as their Capital Improvement Program (CIP), and continue to request FTAC presentations.

The Miami International Airport CIP includes airport projects that will support future growth in cargo freight. MIA is a critical component in Miami-Dade County's successful freight system. FedEx recently completed a major expansion – increasing capacity and opportunities at the airport. MIA is one of the busiest intermodal centers in the nation, and support of the prioritized CIP will help ensure resources are allocated effectively to improve the safety and efficiency of freight movement.

### **Recommendation #6**

Conduct a countywide curb management study to inventory prior and current curb management efforts and identify future actions to steer the curb management activities at a regional level.

The curb is now a shared space for cars; trucks; deliveries; pick-ups and drop-offs; Transportation Network Company (TNC) services such as Uber and Lyft; car sharing, scootersharing, and bike-share services; emergency response vehicles; public transit vehicles; and more. The concept of the curb as the storage place for a passenger vehicle is gone. Urban areas are struggling with the demand for curb space as all these uses are increasing in popularity and their need for access to the curb.

In mid-2021 the Miami Parking Authority (MPA) launched a pilot program utilizing technology to monitor the types of uses and the length of use for curb space in key areas of Miami, such as Brickell, the Central Business District, and Wynwood. The intent of this pilot

project is to develop policies and curb management techniques that can aid in the effective use of curb space. Other cities in the United States have implemented curb management programs that utilize scheduling software and apps, schedule and pay stations, time-based policies, and other regulatory methods that attempt to balance the supply and demand of curb space.

As the Miami-Dade County region evolves and grows, so will the demand for curb space. As densities increase, as the Miami metro region is promoted for quality-of-life initiatives, so will the demand for curb space. As on-demand delivery services become commonplace, so will the demand for curb space. As a result, the planning and policy partners in the region must focus on the allocation of curb space to a variety of users. When urban corridors and transportation plans are reviewed and designed, it is imperative that curb space is part of the equation. Some suggested curb management practices may include:

- Scheduling services, software, and apps
- Zonal allotment programs for curb space based on time of day, vehicle type, or some other prioritization system
- Curb auctioning system for real-time access (highest bidder gets the space reserved)
- Period-based (peak and no-peak) regulations that allow such things as doubleparking, angled parking, curb encroachment or mounting, and similar allowances
- Enforcement techniques
- Variable pricing
- Providing non-curb zones (i.e., parking garage, parking area) that support curbbased services).

### **Recommendation #7**

Develop an emerging technology plan to assist in the effective movement of freight, including technologies such as unmanned air-based or urban air mobility delivery services.

Statewide emerging technology and Intelligent Transportation Systems (ITS) deployment will be an essential element in supporting the safe and efficient movement of goods. In addition to existing deployments, significant opportunities for advancing technology and innovation are progressing throughout Miami-Dade County. Several of these additional opportunities should be explored in the upcoming 2050 LRTP.

**Connected and Automated Vehicle Infrastructure** includes both technology components and traditional maintenance activities. Automated vehicle technology is primarily led by the private sector with support from public partners. Local infrastructure investments help prepare for connected and automated vehicles. The

infrastructure and technology are wide ranging and rapidly evolving. From vehiclebased safety systems to cooperative cruise control and pilots of autonomous trucks, many systems rely on basic infrastructure such as pavement markings and road signs for safe operations. Freight automation is a fast-moving industry, with new initiatives announced frequently, including truck platooning and driverless vehicles on roads and within intermodal facilities.

**Electric Vehicle Infrastructure** will be guided by FDOT's Electric Vehicle Infrastructure Deployment Plan. Florida's Plan was informed by significant community and stakeholder engagement and serves as a roadmap for implementing the National Electric Vehicle Infrastructure (NEVI) Program while supporting the State's Electric Vehicle Infrastructure Master Plan (EVMP). The EVMP objectives:

- Support both short-range and long-range EV travel
- Encourage the expansion of EV use in the State
- Serve evacuation routes in the State

**Truck Parking Availability System (TPAS**) is an ITS application to assist truck drivers in locating available parking spaces in real-time, allowing drivers to safely plan for federally required off-duty periods. This strategy includes real-time parking availability monitoring and providing through dynamic signing or mobile applications.

**Smart Freight Deployment** using ITS on critical freight corridors also includes truck priority or green-time extension signals to ensure that vehicles clear the intersection safely. Dynamic message signs and other traveler information systems provide traffic and safety information. Intelligent freight technology can help trucks and regulatory agencies reduce stops at weigh stations to improve safety and mobility.

**Dynamic Routing and Signing** would help address freight transportation challenges. Dynamic routing and signing provides highway conditions and traffic information to trucking companies and other motorists. Safe technology communication methods for inside the truck and on dynamic message signs help alert drivers to traffic congestion and truck parking.

**Transportation Systems Management and Operations (TSMO)** plans identify opportunities for collaboration and deployment of technology systems to improve transportation operational performance. Specific strategies include traffic incident management, traffic signal management, work zones, planned events, and weather response and Transportation Management Centers (TMC). Freight considerations must be integrated into TSMO Plans and freight stakeholder engagement is critical for success.

**Urban Air Mobility (UAM)** is a new technology where everything from small package delivery drones to passenger-carrying air taxis is operating above populated areas. UAM will use highly automated aircraft to operate and transport passengers or cargo at lower altitudes within urban and suburban areas. Advanced Air Mobility (AAM) builds upon the UAM concept by incorporating use cases not specific to operations in urban environments, such as cargo delivery.

### **Recommendation #8**

Continue to focus on trucking safety by identifying top truck crash locations and conducting a countywide turning movement analysis.

Safety affects all roadway users. Traffic delays due to accidents cause significant costs to all roadway users and consumers. Some safety aspects to consider respective to freight and trucking include:

**Safety Warning Detection Systems** using in-vehicle monitoring systems and probe data that provides hard braking and location data to allow for driver notification of incidents, work zones, and trains at railroad crossings is critical for safer driving systems now and for future automated platforms.

**Intersection Radii Analysis** provides an analysis of intersections to evaluate the ability of trucks to make effective and safe turns.

**Weigh-in-Motion (WIM)** stations are a key element of truck safety in Florida. The Miami-Dade TPO should continue to coordinate with FDOT for the advancement of the Weigh-in-Motion program and introduce additional WIM facilities with the region as needed.

**Truck Parking** shortages in Miami-Dade County remains a safety concern. The issue has become even more critical since the 2019 Miami-Dade County Preliminary Truck Parking Assessment due to the increase in truck traffic. The inadequate availability of truck parking poses a safety concern for drivers unable to find safe parking locations to comply with federally mandated rest breaks. Potential locations should continue to be identified and assessed for viability of truck parking development.

### **Recommendation #9**

Advance PortMiami efforts such as Net Zero, Inland Port, and Infrastructure Grant Opportunities.

PortMiami is accelerating the development of the nation's first end-to-end net zero carbon emission supply chain. Increased cargo demand, nearshoring, and labor shortages all support the investment in sustainable port infrastructure. Unprecedented levels of federal competitive grant opportunities are available for addressing supply chain needs. One component of the net zero vision is development of an inland port. PortMiami is evaluating locations inside the County as well as a regional location with good highway and rail connections. This infrastructure development would significantly boost cargo capacity and economic activity within Miami-Dade County.

### **Recommendation #10**

Advance any and all Workforce Development efforts.

The COVID-19 pandemic impacted the labor markets tremendously, and Miami-Dade County freight employment outpaced state and national level growth – especially during the pandemic. Miami-Dade County is perfectly positioned for continued freight sector growth and workforce development opportunities will continue to be critically important to support this growth. Workforce Florida, FDOT, and the Florida Chamber of Commerce have all expressed the need for more workforce training programs. FDOT recently conducted a study to explore the development of an Intermodal and Logistics Academy. Miami-Dade County stands to benefit from workforce development opportunities.

# Appendices

### Appendix A: Literature Review and Summary

As part of this study, documents detailing existing conditions and known impacts to freight caused by COVID-19 were reviewed and included in this section. Sources are categorized by geography (then alphabetically), beginning with local freight patterns followed by national and international freight patterns.

### **Local Freight Patterns**

# Analysis and modeling of changes in online shopping behavior due to COVID-19 pandemic: A Florida case study (2022)

There is a significant need for an update on new shopping trends, especially changes in people's behavior due to the ongoing COVID-19 pandemic, and to assess if the pandemic permanently changed the trends of in-store and online shopping. Based on the findings of this study, it is hard to state that online shopping can vanish in-store shopping due to COVID-19. People still need to go to brick and mortar stores to fulfill their needs for the joy of shopping, interactions with other people, and touching the products they would like to buy. Therefore, transportation stakeholders need to pay special attention to both in-store and online shopping trends for their planning and operation management of ground transportation infrastructure.

**Relevance:** This study tracked consumer shopping behaviors over the COVID-19 pandemic to identify if any permanent changes in online or in-store preferences occurred. The analysis of results showed that while COVID-19 caused some increases in online shopping trends, it did not drastically change its normal trend. 59 percent of respondents stated that they will do more online shopping after the pandemic, 38 percent stated that their online shopping behavior would not be changed due to the pandemic, and only 3 percent stated that they would do less online shopping after the pandemic. Based on the findings of this study, using online shopping services for the procurement of grocery items and household essentials would continue to have an ascending trend. This finding highlights the fact that people who used online services for their household and grocery shopping during the pandemic found it to be a simple, fast, and attractive experience and stated that they will continue using it.

### District 6 Freight Resource (Online Resource)

District 6 represents Miami-Dade and Monroe counties in South Florida. It is home to 2,550,220 residents and its roads are traveled more than 30.8 million miles daily. This online database houses documents and publications relevant to freight throughout the district.

**Relevance:** There are many reports on this site which provide context for freight movement throughout the Miami-Dade County. City of Doral Subarea Freight Mobility Improvement Plan (2018), Miami River Freight Study (2018), City of Opa-locka Freight Implementation Plan (2017) and other reports included in this literature review are hosted on this page (https://www.fdot.gov/rail/publications.shtm/D6freight).

### FDOT Freight Moves Florida (Online Resource)

The Florida Department of Transportation (FDOT) is an executive agency and directly reports to the Governor. FDOT's mission is to provide a safe transportation system that ensures the mobility of people and goods, enhances economic prosperity, and preserves the quality of our environment and communities.

**Relevance:** Numerous documents hosted on this website (http://freightmovesflorida. com/) provide data and language to support freight goals in Miami-Dade County.

### FDOT Statewide Truck Parking Study (2020)

The Florida Department of Transportation (FDOT) commissioned the Statewide Truck Parking Study to build upon existing truck parking studies by using new data and approaches to identify, prioritize, and recommend solutions to address the areas in Florida with the greatest truck parking needs. The Statewide Truck Parking Study provides the recommendations, implementation plan, and supporting resources that consolidate potential solutions into a portfolio of actionable projects, policies, and partnerships to address truck parking problems throughout Florida.

**Relevance**: This plan identifies capacity needs along FL 836 in the northeast part of Miami-Dade County and on US 27 along the western edge of the County. The plan also identified two hotspots for unauthorized truck parking in the County. Hotspot T-1 had 1,485 unauthorized trucks parking on four different roadway segments located near a Miami-Dade County-owned parcel adjacent to MIA. Another hotspot, with a total of 5,386 unauthorized trucks, is located in Miami-Dade County near the Miami Dade College – North Campus.

#### FedEx Newsroom and Economic Impact Report (2021)

FedEx Express, a subsidiary of FedEx Corporation and the world's largest express transportation company, recently completed a major expansion of its air cargo hub located at Miami International Airport. The expansion will increase capacity and capabilities at the company's Americas gateway, which connects the U.S. and Canada to Latin America and the Caribbean.

#### **Relevance:**

The \$72.2 million expansion adds more than 138,000 square feet to the main sort facility, bringing it to a total of more than 282,000 square feet. The enhancements include a new customs clearance area and a new 70,000-square-foot cold chain facility, the largest in the FedEx global network. The expansion will create hundreds of new jobs at the hub during the holiday shipping season. This facility will bolster economic opportunities and advance freight trade across the Americas.

# Florida-based Publix leads the state's grocery market. Can Amazon's expansion change that? (2022 News Article)

This is part of an ongoing series of articles on the impacts of Amazon's rapid growth in Florida, covering effects on real estate, small businesses, the job market, politics and more. Amazon and Publix, with other smaller retailers, are in competition to expand e-commerce produce services in Florida. Amazon also operates more than 50 sites in Florida that support customer fulfillment and delivery operations, including more than 10 facilities that launched in 2020 and one fulfillment center for its Amazon Fresh orders. Amazon is intending to open a 35,000-square-foot Amazon Fresh grocery store in Boca Raton, Florida, the company's first such store in that state and its first store in the Southeast. This article offers a look into consumer behavior regarding grocery shopping, specifically via e-commerce.

### **Relevance:**

In terms of market share for January 2022 versus a year ago, Publix share of online grocery sales grew nearly five percentage points to 47 percent because of gains in its monthly active user (MAU) base and order frequency, and delivery's share grew just under one point to 35 percent, from increases in order frequency and spending per transaction. In contrast, ship-to-home's share of online sales fell more than five points from January 2021 to 18 percent, setting a record low that is more than 20 points lower than pre-COVID levels.

### Miami-Dade County Freight Plan Update (2018)

The purpose of the report is to highlight the importance of freight mobility in Miami-Dade County, to update the County Freight Plan from 2014 to 2018, to develop an application for a Miami-Dade County designated Freight Logistics Zone (FLZ) and to coordinate with freight stakeholders to prepare an updated list of transportation projects to be considered for funding in the development of the TPO 2045 Long Range Transportation Plan (TPO 2045 LRTP). Miami-Dade's freight infrastructure has undergone significant improvement and expansion to position the region for future growth opportunities. Much of that growth will be attributed to the recent deep dredging of the port channel to a 50-foot depth and the widening of the Panama Canal. Miami-Dade County and stakeholders have prepared themselves to handle mobility to/from the Port and MIA and to compete for increases in trade by: constructing the PortMiami Tunnel to connect PortMiami directly to the Interstate System; connecting the MIA cargo operations area to the Doral warehousing areas on the NW 25th Street Viaduct; rehabilitating rail service to PortMiami and connecting to the on-port Intermodal Container Transfer Facility (ICTF); developing an intermodal logistics center in Hialeah; replacing the SR 826/SR 836 interchange; and participating in a USDOT sponsored Freight Advanced Traveler Information System (FRATIS). With these improvements complete, the underlying premise of this report is to identify existing and future freight transportation needs in order to develop a list of freightrelated projects for consideration in the development of the TPO 2045 LRTP.

**Relevance:** This report outlines changes in freight infrastructure between 2014 and 2018, detailing the resulting impacts on freight movement. In addition to providing historical context for current freight activity, this report highlights future goals and projects to support freight movement in Miami-Dade County.

### Miami-Dade County Preliminary Truck Parking Assessment (2019)

Approximately 75 percent of the annual freight tonnage in Miami-Dade County is moved by truck. As a result of economic growth, safety concerns, and the real estate market, the County faces a severe shortage of truck parking spaces. According to the Comprehensive Parking Study for Freight Transport in Miami-Dade County (2010) the County has a short-haul truck parking space deficit of 10,195 spaces and a long-haul truck parking space deficit of 1,825 spaces. This memorandum aims to preliminarily assess the viability of truck parking development at these five locations. Of the five identified Miami-Dade County-owned parcels for potential truck parking development, two were determined to be suitable for use.

**Relevance:** This report highlights the need for additional truck parking in Miami-Dade County. Given the location of MIA, PortMiami, and the inventory of warehouse/industrial land use throughout the County, the northern half of the County faces the largest deficit of truck parking spaces.

### Miami-Dade TPO COVID-19 Travel Behavior Trend Analysis (2022)

The Miami-Dade Transportation Planning Organization (TPO) undertook a COVID-19 Travel Behavior Trend Analysis to investigate the effects of the COVID-19 pandemic on travel behavior in Miami-Dade County. This was done by comparing pre-pandemic transportation related data sets to data collected during various phases of the pandemic and post lock down. Trend analysis for highway volumes, transit usage, airport/cruise port passengers and other transportation data were completed using 2019 (pre-pandemic), 2020 and available 2021 data. The objective of the study was to identify any changes in travel behavior trends from the onset of the pandemic, through to 2021, that may inform the long-range transportation planning process. In Miami-Dade County a sequence of restrictions on non-essential activities were mandated in March and early April, with direct impacts on economic activity. As a result, mobility, as a whole (e.g., air traffic, cruise traffic, transit usage and the use of most other modes of transportation) fell dramatically. Total monthly traffic for 2020 was down 21.2 percent from 2019.

**Relevance:** Travel was most significantly impacted during the initial period of the pandemic when lockdowns were the strictest (March – May 2020). Overall, highway traffic was the least impacted by COVID-19 travel behavior changes (21 percent decrease in annual traffic from 2019 to 2020).

### **National Freight Patterns**

### An Analysis of the Operational Costs of Trucking (2020, 2021)

ATRI published the first iteration of An Analysis of the Operational Costs of Trucking in 2008 with the goal of providing accurate marginal cost data for the trucking industry. The 2020 report which came out last year highlights many ways the trucking industry was impacted by the COVID-19 pandemic. This year's report, based on motor carrier financial and operational data from 2021, had a record number of industry participants. Amid a variety of supply chain challenges, parts shortages and rising inflation, 2021 had the highest trucking industry costs on record.

**Relevance:** Fuel costs dropped 7.6 cents from 38.4 cents in 2019 to 30.8 cents per mile in 2020. In 2021, fuel was the single largest factor for industry cost changes, increasing by 35.4 percent to 41.7 cents per mile. In 2020, wages increased while the benefits costs per mile decreased; average compensation was slightly lower than 2019 but represented a greater share of overall marginal costs. In 2021, driver wages had a significant increase of 10.8 percent to 62.7 cents per mile, as did repair and maintenance costs, which rose 18.2 percent to 17.5 cents per mile. In 2020, Truck and trailer lease or purchase payments increased to an all-time high of 27.1 cents per mile. Fleets with more than 100 trucks spent \$1.831 per mile in marginal costs versus \$1.880 for small fleets. Rising costs are beginning to have an adverse effect on the industry. Truck tonnage rose over most of the first half of 2022, with a June year-over-year increase of 7.9 percent, as did the number of shipments and freight spending.

### COVID-19 Impacts on the Trucking Industry (2020)

The American Transportation Research Institution (ATRI) and Owner-Operator Independent Driver Association (OOIDA) Foundation jointly developed a trucking industry-targeted survey that identified a range of operational and financial issues that might be impacted by the COVID-19 pandemic. The survey was designed to obtain the assessments and perspectives of multiple labor categories in trucking, from truck drivers to dispatchers to senior executives. The research initiative generated nearly 5,100 survey responses representing a broad cross-section of the industry in terms of geography, sector and fleet size.

**Relevance:** Trucking activity during the COVID-19 pandemic was generally suffering with several exceptions. Trucks moving essential consumer goods and medical supplies were generally at capacity in March. Trip velocities are up considerably at hotspots, chokepoints and during rush-hour operations, and only up slightly on the rest of the roadway network. Forty-five (45) percent of owner-operators and trucking firms do not have any formal disaster plan, and of those who do, only 31.8 percent address pandemics. Prior to the pandemic, approximately eight percent of respondents' truck trips were considered "local" at less than 100 miles. During the pandemic, this figure more than doubled, while the longest two trip categories decreased by 13.4 percentage points.

The Impact of COVID-19 on the Work Environment in Long-Haul Truck Drivers (2021)

To describe and compare the working conditions of LHTDs before and during the Coronavirus (COVID-19) pandemic and to assess the perceptions of LHTDs on accessing food, rest-rooms, and parking in Canada. An online survey was disseminated between August 2020 and March 2021 to various trucking organizations across Canada to collect data on health and wellness during the COVID-19 pandemic. Data were analyzed using descriptive and inferential statistics and thematic analysis for open ended responses. Participants reported issues with finding parking, washrooms, and food. Compared with before COVID-19, LHTD worked significantly more hours and consumed more caffeine.

**Relevance:** LHTD worked more hours during the pandemic with approximately 33 percent reporting more pressure to work. More than 50 percent reported being fatigued. Approximately 30 percent reported that parking at truck stops was more challenging during the pandemic and many rest areas were closed. Despite 29 percent having poorer quality sleep and 18.5 percent being more fatigued since the pandemic, we found that LHTD experiencing fatigue were significantly more likely to have trouble finding parking. A prior study showed that a lack of truck stops along regular routes was associated with increased crash risk in LHTD.

### INRIX COVID-19's Impact on Freight (2020)

Launched in 2016, INRIX Research uses big data, analysis and economics to add insight to the movement of people and goods. Using INRIX Trip Analytics, INRIX Research analyzed freight movement trends before and during the COVID-19 pandemic. This study reports that freight movement has fallen a modest 13 percent during the pandemic, compared to a 46 percent drop in personal vehicle-miles traveled.

**Relevance:** Florida freight VMT decreased by 12 percent during the onset of the COVID-19 pandemic. Miami experienced a highway travel speed increase of 26 percent in the AM rush hour (8:00 AM) and a 38 percent increase in highway travel speeds during the PM rush hour (5:00 PM).

# A Novel COVID-19 Based Truck Driver Syndemic? Implications for public health, safety, and vital supply chains (2020)

U.S. long-haul truck drivers (LHTD) traverse great distances and interact with numerous individuals, rendering them vulnerable to acquiring and transmitting coronavirus disease 2019 (COVID-19). Together, the unique co-occurrence of pronounced health disparities and known COVID-19 infection, morbidity, and mortality risks suggest the possibility of a novel COVID-19 based truck driver syndemic due to advanced driver age and endemic health issues. In turn, long-term symptoms of COVID-19 may perpetuate existing health disparities. The cooccurrence of afflictions may also result in compromised safety performance. To curb the likelihood of a COVID-19 based truck driver syndemic, several action steps are needed. First, key COVID-19 metrics need to be established for this population. Second, relationships between long-haul trucker network attributes and COVID-19 spread need to be delineated. Third, mutually reinforcing interactions between endemic health disparities and COVID-19 vulnerability need to be elucidated.

**Relevance:** Highlights that as a man-powered transportation system, there are increased risks for LHTD during pandemics. It is important to center long-haul truck drivers' health and vulnerability to operating during severe health crises.

### **International Freight Patterns**

### 2020 Port Report: the impact of the coronavirus disease (COVID-19) pandemic on the shipping trade, trans-shipment and throughput of container ports in Latin America and the Caribbean, (2021)

This Bulletin on the Facilitation of Trade and Transport in Latin America and the Caribbean (FAL Bulletin) outlines how activity in container terminals and ports in Latin America and the Caribbean has changed in 2020 compared to 2019, analyzing the effects of the COVID-19 pandemic on international shipping trade in the region. This FAL Bulletin provides shipping trade (exports and imports), trans-shipment and throughput data. The data are presented as cumulative monthly, quarterly, or annual figures for 2020 compared to 2019, depending on the availability of data for each terminal or port, to analyze the effects of the COVID-19 pandemic on regional port activity over the year. The analysis is based on data from 28 Latin American and Caribbean countries and territories, and a total of 102 terminals and ports in the region.

**Relevance:** In Latin America, figures for March 2020 were 0.7 percent lower than the same month of 2019, followed by sharp drops of 15.8 percent in April 2020, 16.8 percent in May and 16.1 percent in June. In October, there was a return to year-on-year growth, but not enough to revisit the levels of 2019. For the full year there was a year-on-year decrease of 2.9 percent compared to 2019.

### The Impact of COVID-19 on Transport and Logistics Connectivity in the Landlocked Countries of South America (2020)

The report develops following a three-stage analytical framework focusing on Bolivia and Paraguay. First, Chapter one reviews the existent infrastructure and logistics country profiles covering road, railway, fluvial, and air transport means. Then, Chapter two summarizes the reactions to COVID-19 by compiling the measures taken regarding border-closures, customs, airports and relevant transit countries. Then, Chapter three analyzes the impact of the COVID-19 pandemic and these measures on international connectivity. This is accomplished by examining the effects on air transport, inland transport to neighboring maritime gateways and their connectivity, and Information and Communication Technology connectivity as well. Lastly, Chapter four states the conclusions and contributions of this report.

**Relevance:** Air connectivity in the Latin America and the Caribbean region has been affected more than global averages, especially in freight. Freight volumes were affected significantly, down 76 percent in Bolivia and 55 percent in Paraguay, for April year-on-year. Nearly all commercial airports stopped service. Port-specific connectivity was also compared to country-level connectivity of transit countries. Results showed that Land-locked Developing Countries (LLDCs) face an additional disadvantage, especially in the Pacific, where they reach Chilean and Peruvian peripheral, non-capital ports with considerably lower global connectivity than the rest of Chile and Peru, and lower than Atlantic capital ports.

### DHL Ocean Freight Market Update (2021, 2022)

Dalsey, Hillblom and Lynn (DHL) released an Ocean Freight Market Update to track month by month changes in global freight during the COVID-19 pandemic. This presentation tracks major trade rates across multiple regions: Europe, North America, South America, and Asia Pacific, Middle East and North Africa, and Sub-Saharan Africa.

**Relevance:** South America and Europe, Middle East and North Africa, and Sub-Saharan Africa have no change in their capacity and rates of imports. There is decreased capacity but strongly increased rates with North America. Capacity has no change but there is a strong increase in rates with Asia Pacific. Equipment shortages and Columbian protests added to market strain in South America. Carriers reduced opportunities to Mexico because of shortages.

**Trade: Location and Infrastructure Support Vibrant Foreign Trade (Online Resource)** South Florida is a major trade hub for U.S. trade with the world, especially with Latin America and the Caribbean. The Miami Customs District is the 12th largest customs district in the United States, and one of a handful with a trade surplus. Most information in this resource was gathered in 2016 and 2017. An economic overview of trade is provided by the Miami-Dade Beacon Council. Exhibits with dollar value, export versus import versus percent total, cargo TEU's, and tonnage in Miami-Dade are provided.

*Relevance:* Global trade is quantified and categorized in Miami-Dade County. DHL's American Headquarters are in Broward County, just north of Miami-Dade County.

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