SOUTHEAST FLORIDA ORIGIN-DESTINATION TRAVEL SURVEY

FINAL REPORT

SEPTEMBER 2017

MIAMI-DADE
TRANSPORTATION PLANNING ORGANIZATION
111 NW 1st Street
Miami, Florida

WSP | PARSONS BRINCKERHOFF

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September 2017

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The preparation of this report has been financed in part from the U.S. Department of Transportation (USDOT) through the Federal Highway Administration (FHWA) and/or the Federal Transit Administration (FTA), the State Planning and Research Program (Section 505 of Title 23, U.S. Code) and Miami-Dade County, Florida. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

QUALITY MANAGEMENT

REVISION HISTORY

VER. NO	REV. NO	ISSUE DATE	PREPARED BY AND DATE	REVIEWED BY AND DATE	APPROVED BY AND DATE	FILE REFERENCE REMARKS
1	**1**	**4.27.2017**	**D.WU**	**R.PICADO 5.8.2017**		First draft
1	**2**	**9.1.2017**	**R.PICADO**	**J.LAFFERTY 9.1.2017**		Incorporates truck data analysis performed by Cambridge Systematics

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EXECUTIVE SUMMARY

Between 2014 and 2017, the Southeast Florida region undertook an effort to gather detailed information on the travel behavior of persons and commercial vehicles. This effort was led by the Miami-Dade Transportation Planning Organization, acting on behalf of the Broward Metropolitan Planning Organization, Palm Beach Metropolitan Planning Organization, and Florida Department of Transportation Districts Four and Six. This data collection effort consisted of three components: a household travel survey, an attitudinal survey, and a general origin-destination survey. This report documents the datasets that comprise the origin-destination survey.

Until recently, origin-destination surveys were conducted using travel intercept methods. These methods are well-suited to gather data on travel patterns at a few locations, but cannot be deployed in a cost-effective manner to survey travel patterns over a region as large as the Miami-Broward-Palm Beach Tri-County area. The growing availability of commercial datasets in which travel is synthesized from mobile phone and/or vehicle GPS signals offers an alternative to intercept surveys. For the 2015 Tri-County data collection effort, the regional partners chose to obtain origin-destination travel data from Streetlight Data, Inc.

The Southeast Florida origin-destination datasets obtained from Streetlight Data, Inc. comprise trip frequencies and other travel metrics derived from vehicle and mobile phone GPS traces. The sample includes travel observed over the entire Tri-County region in 2015 and 2016. The origin and destination trip ends were identified at a spatial resolution of 103 districts for personal travel, and 173 districts for commercial travel. Trip frequency, trip duration, and trip length for all origin-destination pairs are available for any combination of the following travel segments:

→ Vehicle types

- Personal travel
- Medium-duty commercial trucks
- Heavy-duty commercial trucks

→ Day types include

- Average Day (Monday - Sunday)
- Average Weekday (Monday-Thursday)
- Average Weekend Day (Saturday – Sunday)

→ Time periods

- All Day (12am-12am)
- Early AM (12am-6am)
- AM Peak (6am-10am)
- Midday (10am-3pm)
- PM Peak (3pm-7pm)
- Late PM (7pm-12am)

The report contains a description of the data and data delivery formats, data reasonableness checks, and sample visualizations that portray key characteristics of Southeast Florida travel and the breath of information contained in these datasets.

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1 INTRODUCTION

Between 2014 and 2017, the Southeast Florida region undertook an effort to gather detailed information on the travel behavior of persons and commercial vehicles. This effort was led by the Miami-Dade Transportation Planning Organization, acting on behalf of the Broward Metropolitan Planning Organization, Palm Beach Metropolitan Planning Organization, and Florida Department of Transportation Districts Four and Six. This data collection effort consisted of three components: a household travel survey, an attitudinal survey, and a general origin-destination survey. This report documents the datasets that comprise the origin-destination survey.

Until recently, origin-destination surveys were conducted using travel intercept methods. These methods are well-suited to gather data on travel patterns at a few locations, but cannot be deployed in a cost-effective manner to survey travel patterns over a region as large as the Miami-Broward-Palm Beach Tri-County area. The growing availability of commercial datasets in which travel is synthesized from mobile phone and/or vehicle GPS signals offers an alternative to intercept surveys. For the 2015 Tri-County data collection effort, the regional partners chose to obtain origin-destination travel data from Streetlight Data, Inc.

The Southeast Florida origin-destination datasets obtained from Streetlight Data, Inc. comprise trip frequencies and other travel metrics derived from vehicle GPS traces. The sample includes travel observed over the entire Tri-County region in 2015 and 2016. The origin and destination trip ends were identified at the spatial resolution of the districts shown in in Figure 1 and Figure 2, respectively for personal travel and commercial travel. The district systems were extended to include Okeechobee, St. Lucie and Martin counties, to better identify the origin and destination of trips that start or end outside of the Tri-County region. Overall, the personal travel district system consists of 103 districts, while the commercial travel district system consists of 173 districts, which nest within the 103 personal travel districts.

This report describes the travel metrics and travel segments that make up the Southeast Florida origin-destination (OD) trip data datasets, documents the data distribution file formats, and presents a few sample visualizations and tabulations prepared with the 2015 OD data. The report also includes various reasonableness checks on the reported level of trip making at selected special generators of commercial travel.

Figure 1. Personal Travel Districts

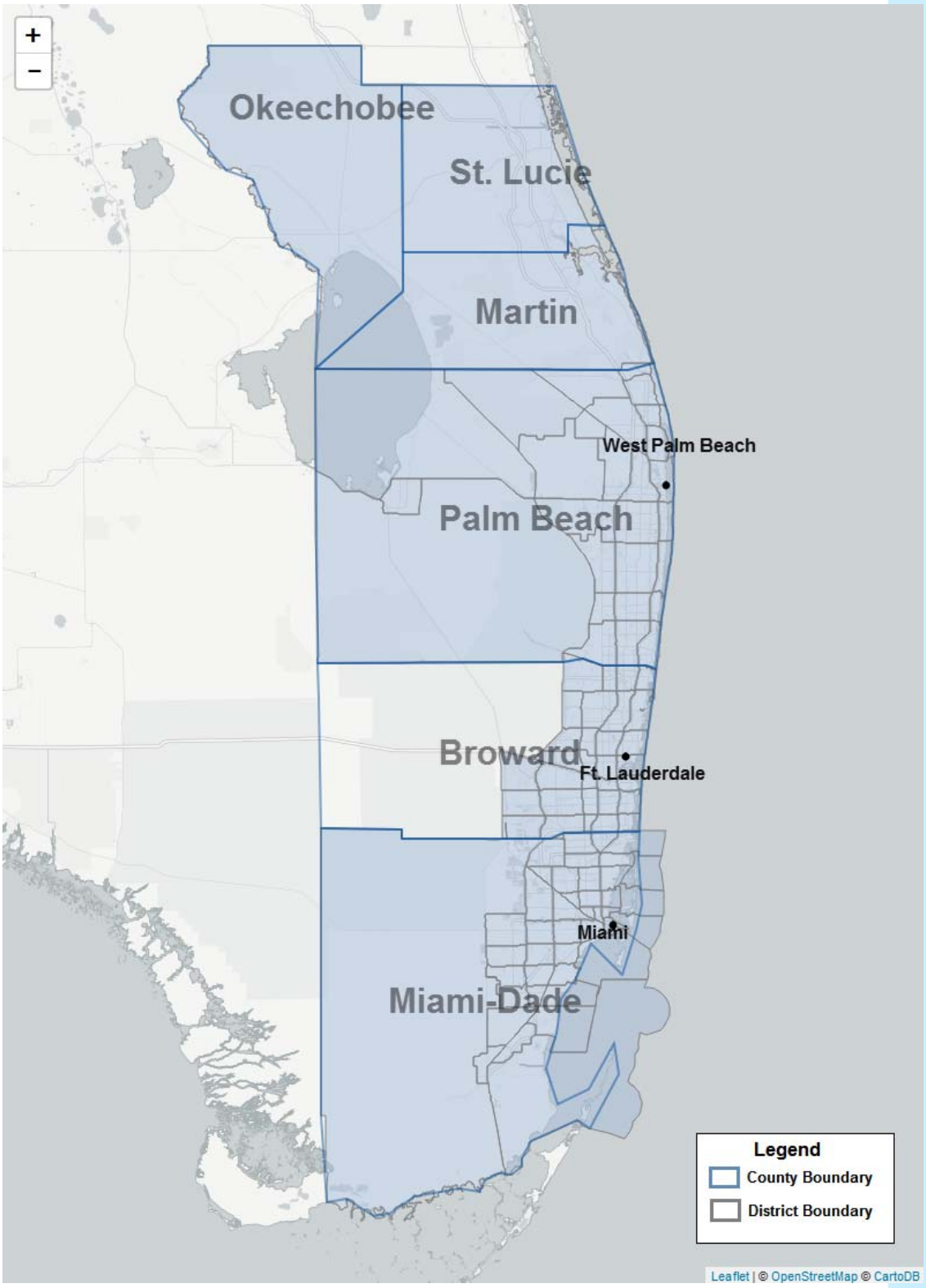
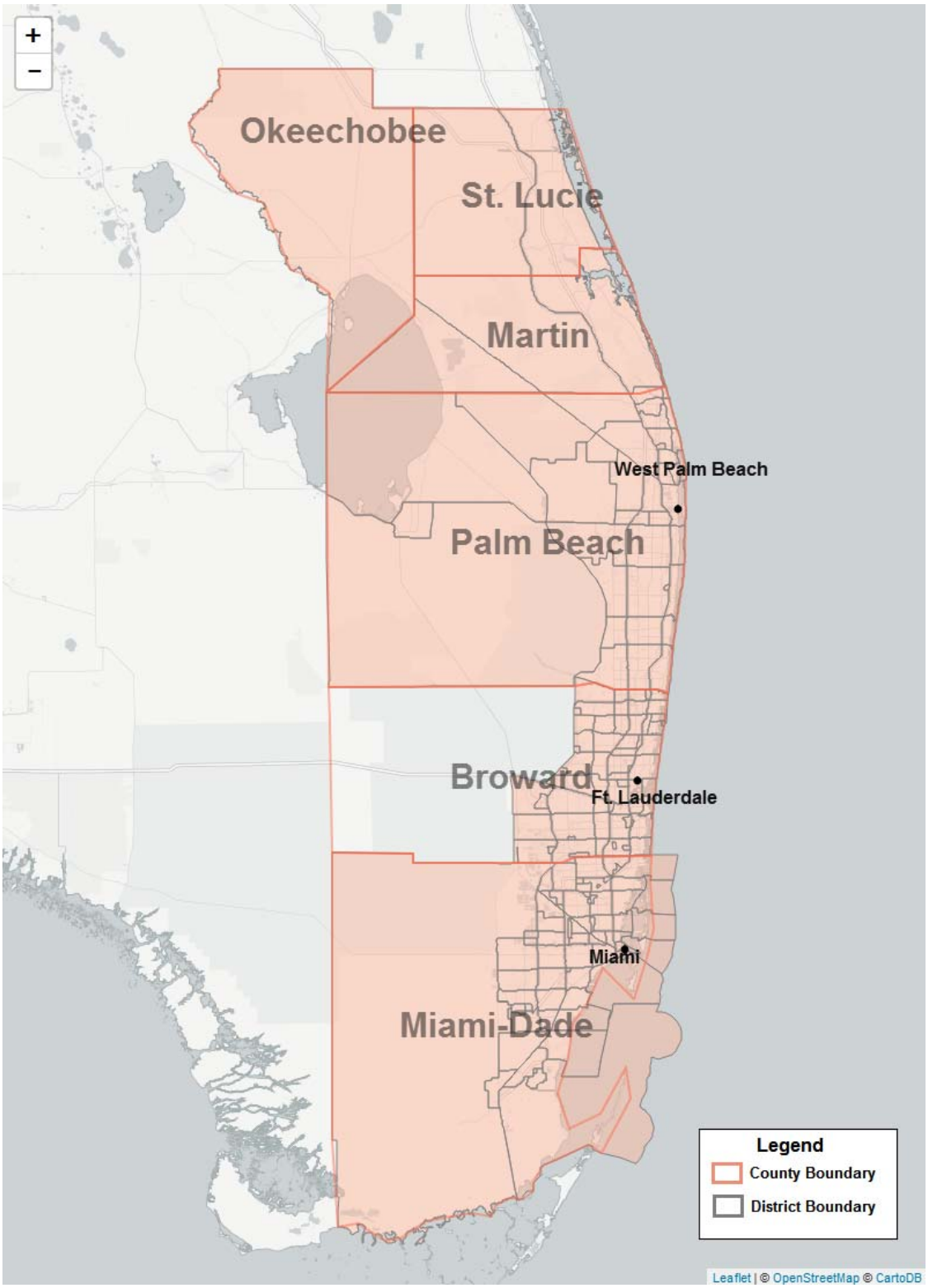


Figure 2. Commercial Travel Districts



2 DATASETS DESCRIPTION

2.1 OD DATA METRICS AND TRAVEL SEGMENTS

The Southeast Florida OD data covers travel observed over two entire years, 2015 and 2016, and is distributed separately for each year. The following travel segments are available for each year:

1. Origin/Destination Trip Frequencies. Trip frequencies between all origin and destination zone pairs for specified vehicle type, day types and time periods.
2. Select Link Trip Frequencies. Origin/destination trip frequencies for trips that use any of the thirty-five (35) selected road segments across the region. Similar to the origin/destination trip frequencies, this dataset is also segmented by vehicle class, day type and time period.

The vehicle types include:

- Personal travel
- Medium-duty commercial trucks
- Heavy-duty commercial trucks

The day types include:

- Average Day (Monday - Sunday)
- Average Weekday (Monday-Thursday)
- Average Weekend Day (Saturday – Sunday)

The time periods are defined as:

- All Day (12am-12am)
- Early AM (12am-6am)
- AM Peak (6am-10am)
- Midday (10am-3pm)
- PM Peak (3pm-7pm)
- Late PM (7pm-12am)

The following metrics are available for each dataset:

- Trip frequency
- Average trip duration
- Trip duration distribution percentages
- Trip length distribution percentages
- Travel speed distribution percentages
- Circuity distribution

For each year, the datasets are available in three packages, each containing data tables and district boundary files. A detailed description of the data packages is available in Appendix A.

2.2 DATA SOURCES

Streetlight Data, Inc. obtains its commercial data from devices that are part of a Fleet Management System, which can be found on medium duty and heavy duty trucks that are part of a company fleet. The personal data either comes from in-dashboard navigation systems in passenger vehicles, or from smartphones with location services enabled. The geospatial data obtained from these sources is uploaded and processed monthly, adding to an archive that extends back to 2014. Streetlight estimates that the Southeast Florida personal travel sample is approximately 1-4% of the total personal trips, and the commercial sample is approximately 10-12% of all commercial trips. These percentages can vary by sub-region and data collection period. An interactive depiction of the device sample rate at tract level for the Tri-County region for September 2016 is available at *http://blog.streetlightdata.com/evaluating-location-based-services-data-for-transportation-representative*.

2.3 SCALE FACTOR CALIBRATION

The trip frequencies are expressed in terms of a trip index, and also, trips. The trip index is the standard reporting unit. The trip index has not been adjusted for the device sample rates nor for the reporting period. Therefore, values expressed in terms of the trip index should be used only as *relative* measures of travel.

The trips metric is a scaled trip index, and may be used as both relative and absolute measure of travel. The scale factors expand the trip sample available for the chosen reporting period and geography to represent total vehicle trip making, separately for each vehicle class. For the Southeast Florida datasets, the scale factors were computed by comparing Annual Average Daily Traffic (AADT) at select locations to the number of trips captured in the trip sample, separately for 2015 and 2016. A region-wide mean scale factor is computed by averaging the scale factors across all locations, after removing outliers (observations that are more than two standard deviations away from the regional mean).

Table 1 shows the calculation of the scale factor for each AADT location, as well as the region-wide scale factor obtained after removing outliers.

Table 1. Trip Scale Factor Calculations

Calibration Factor:	MD	HD	Personal
	0.043	0.089	0.573

Day Type: 0: Average Day (Su-Su)

	MD	HD	Personal
Average	0.045	0.112	0.696
Standard Deviation	0.014	0.091	0.586

Zone Name	Zone ID	StreetLight Zone Trip Index			FDOT AADT Counts			WSP SE Florida Calibration Factor			Outliers		
		MD	HD	Personal	MD	HD	Personal	MD	HD	Personal	MD	HD	Personal
SR-9/I-95 NE OF 48TH ST	860163	163,019	142,978	495,497	5,512	6,737	191,901	0.034	0.047	0.387	0	0	0
SR 5 / US 1 - 0.1 MI N OF PEMBROKE RD	860176	10,645	655	66,289	572	86	27,927	0.054	0.131	0.421	0	0	0
SR 814/ATLANTIC BLV - 0.1 MI E OF 30 AV	860214	40,537	8,747	75,024	1,459	573	50,063	0.036	0.066	0.667	0	0	0
SR-A1A 0.1 MI N OF SR-814/ATLANTIC BLVD	860215	4,964	469	30,506	274	37	12,147	0.055	0.080	0.398	0	0	0
SR834/SAMPLE RD .35 M E OF POWERLINE RD	860255	36,697	8,143	76,904	1,508	503	43,683	0.041	0.062	0.568	0	0	0
SR-818/GRIFFIN RD 135' W OF SW 72 AVE	860256	22,604	2,191	50,883	900	253	26,977	0.040	0.116	0.530	0	0	0
SR7/US441 .1 MI S OF COCONUT CREEK PKWY	860298	22,828	1,678	43,069	1,068	254	49,554	0.047	0.152	1.151	0	0	0
SR93/I75 2 MI W OF US27 .6 MI W OF TOLL	860357	23,457	66,450	53,452	1,073	1,839	22,626	0.046	0.028	0.423	0	0	0
SR-93/I-75 0.78 MI N OF DADE CO/L	860362	119,981	72,569	448,887	4,240	4,579	160,779	0.035	0.063	0.358	0	0	0
SR 858/HALLANDALE BCH BLVD 0.1 MI. E. I-95	860384	30,278	4,340	142,617	1,022	255	49,807	0.034	0.059	0.349	0	0	0
SRA1A MCARTHR CSWY 0.2MI W OF PALM ISL ENT	870031	37,821	1,457	382,097	2,104	287	93,244	0.056	0.197	0.244	0	0	0
SR-9 0.4 MI SW OF BISCAYNE CANAL BRG	870096	28,487	8,556	21,317	985	1,115	23,824	0.035	0.130	1.118	0	0	0
SR 826/PALMETTO XPWY 2600' E OF NW 67TH AV	870137	114,290	61,647	211,933	4,514	3,667	132,866	0.039	0.059	0.627	0	0	0
SR-5/US-1 S OF GRANADA BLVD	870178	22,096	2,093	367,712	1,024	236	77,521	0.046	0.113	0.211	0	0	0
SR-836 1.4 MI E OF NW 107TH AVE	870187	80,508	10,297	350,161	4,058	1,259	134,597	0.050	0.122	0.384	0	0	0
SR-94/KENDALL DR 150' W OF SW 91ST AVE	870188	12,024	1,569	92,499	564	188	46,219	0.047	0.120	0.500	0	0	0
SR-915/NE 6TH AV 220' S OF NE 157TH ST	870258	9,528	234	12,598	306	76	25,094	0.032	0.327	1.992	0	1	1
US-27 2.1 MILES N OF PALMETTO EXPWY	879947	55,031	30,945	36,639	3,231	2,388	29,497	0.059	0.077	0.805	0	0	0
SR 5 / US 1 - N OF NEWCASTLE ST	930010	13,039	859	106,767	348	161	26,273	0.027	0.187	0.246	0	0	0
SR-7/US-441 0.7 MI NORTH OF SR-806	930099	15,102	1,133	39,181	925	422	18,757	0.061	0.373	0.479	0	1	0
SR80/SOUTHERN BLV 1 MI W OF SR7/US441	930101	42,427	15,808	89,908	2,349	1,106	65,643	0.055	0.070	0.730	0	0	0
SR-710/BEELINE HWY 3.6 MI SE OF SR-706	930140	9,016	9,900	4,617	485	741	4,225	0.054	0.075	0.915	0	0	0
SR 804/BOYNTON BCH BLVD - W OF SR 809/MILITARY TRL	930153	26,457	3,189	65,188	1,196	506	44,298	0.045	0.159	0.680	0	0	0
SR 9 / I-95 at CONGRESS AVE O/P	930174	171,021	147,053	386,985	6,127	6,720	184,792	0.036	0.046	0.478	0	0	0
SR9/I95 at SW 23RD AVE O/P 1.5 M S OF SR804	930198	167,235	152,559	380,419	4,892	6,848	183,921	0.029	0.045	0.483	0	0	0
SR-9/I-95 0.8 MI N OF DONALD ROSS RD	930217	102,689	147,891	181,678	3,150	5,565	96,277	0.031	0.038	0.530	0	0	0
SR-715 0.7 MI. S. OF HOOKER HWY	930257	4,826	10,802	1,435	350	313	4,637	0.072	0.029	3.231	1	0	1
SR-25/US-27 0.46 MI. N. OF CR-827	930268	19,537	54,266	4,512	502	2,262	4,956	0.026	0.042	1.098	0	0	0
SR 802/LAKE WORTH RD - W OF MILITARY TRL/SR 809	930404	23,238	1,868	30,990	1,530	595	40,375	0.066	0.319	1.303	0	1	0
NORTHLAKE BLVD 2 MI W OF SR-710/BEELINE HWY	938548	23,531	1,504	57,874	1,998	370	34,632	0.085	0.246	0.598	1	0	0
SR-91 N OF PEMBROKE RD/SR-824	970403	152,788	95,271	311,188	5,582	4,948	116,331	0.037	0.052	0.374	0	0	0
SR-91 N OF ATLANTIC AVE/SR-806	970413	119,019	140,866	232,527	4,006	4,807	80,209	0.034	0.034	0.345	0	0	0
SR-91 S OF PGA BLVD/SR-786	970416	78,940	130,229	148,293	2,594	4,009	52,351	0.033	0.031	0.353	0	0	0

3 TRIP ORIGIN VISUALIZATIONS

This and the next three chapters show visualizations produced with a sample of the data, for the year 2015. These visualizations are provided partly as a check on the reasonableness of the OD data, and as examples of ways in which the data can be used to portray travel patterns in the region.

The maps in this chapter convey information about trip origins -- the number of trip beginning in a zone. The color intensity is based on a trip density metric, to control for zone size. In general, the data exhibit expected patterns, with the most trips (per unit area) focused around the urban centers. The most intense trip activity takes place in the district that includes the Miami Central Business District (CBD).

3.1 AVERAGE DAY TRIP ORIGINS

Figure 3 and Figure 4 compare daily trip origins made by personal and commercial vehicles on an average day in 2015. While the personal trips center on major metro areas, such as Miami CBD, Miami Beach and Fort Lauderdale, the commercial trips do not. Instead, the highest density of commercial trips occur near Port Everglades and Florida East Coast Railway. In addition, a large amount of commercial trips can be seen near major shopping centers, including Walmart Supercenter and Miami International Mall. These pattern differences are reasonable and match a priori expectations.

Figure 3. Average Daily Personal Travel Trips by Trip Origin

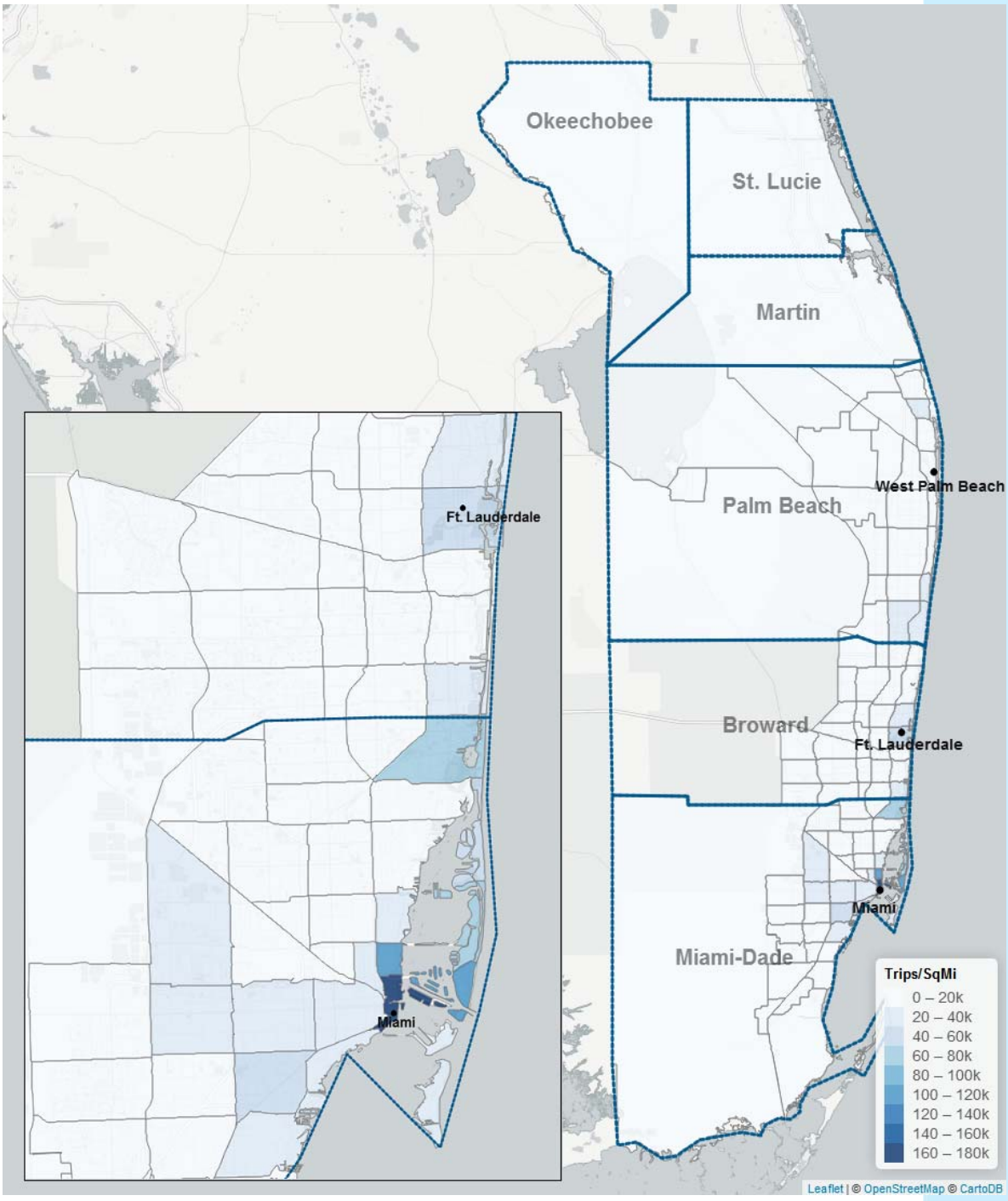
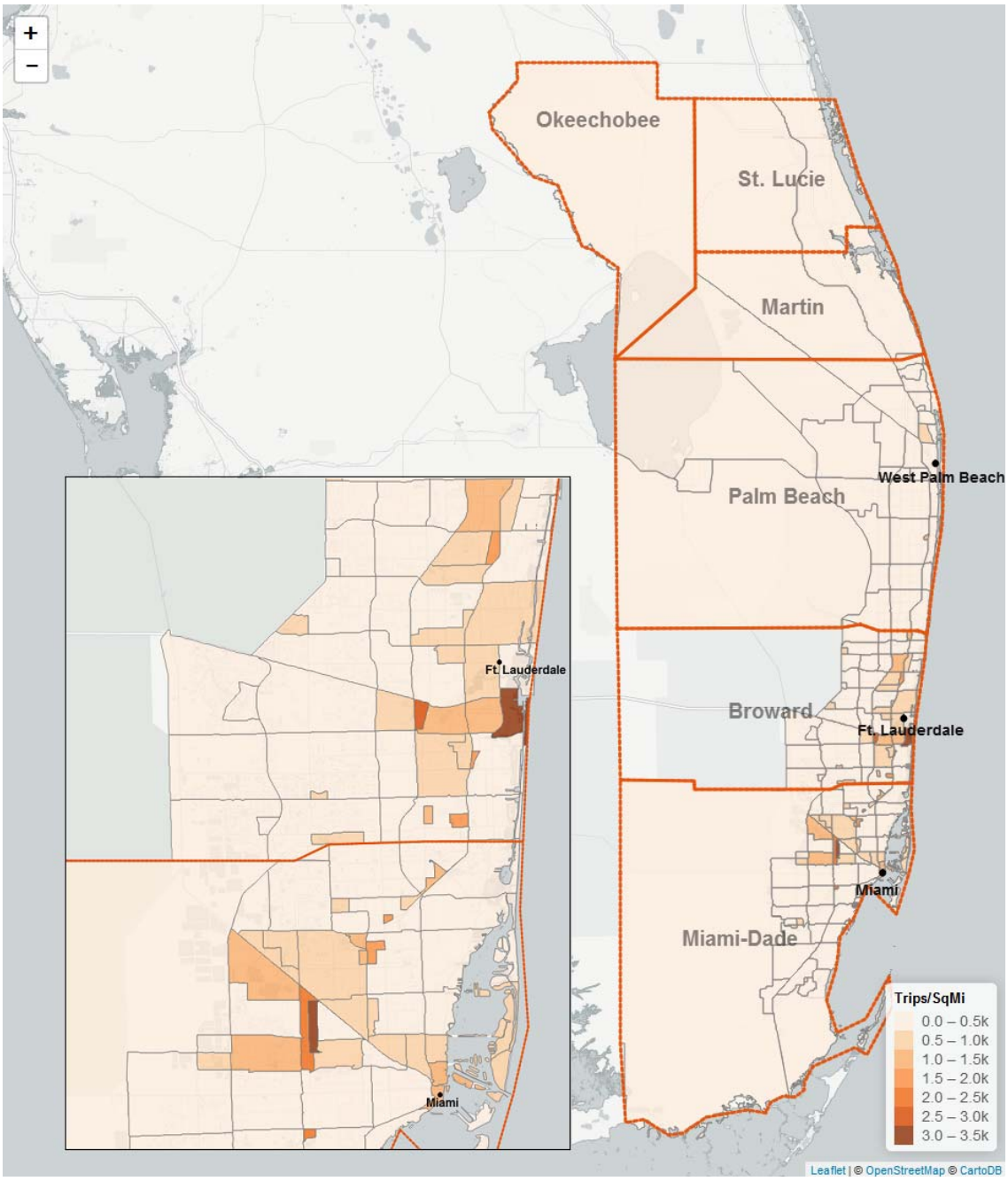


Figure 4. Average Daily Commercial Travel Trips by Trip Origin



3.2 TRIP ORIGINS DURING PEAK TRAVEL PERIODS

3.2.1 PERSONAL TRAVEL

Figure 5 and Figure 6 show trip origins by time of day for personal vehicles. More trips occur in the PM period than the AM. The pattern of trip intensity is also different, with the PM period showing more intensity in suburban zones. This matches expected behavior with more trip chaining, shopping, and other trip purposes occurring in the PM.

Figure 5. Personal Travel Trips by Origin during AM Peak

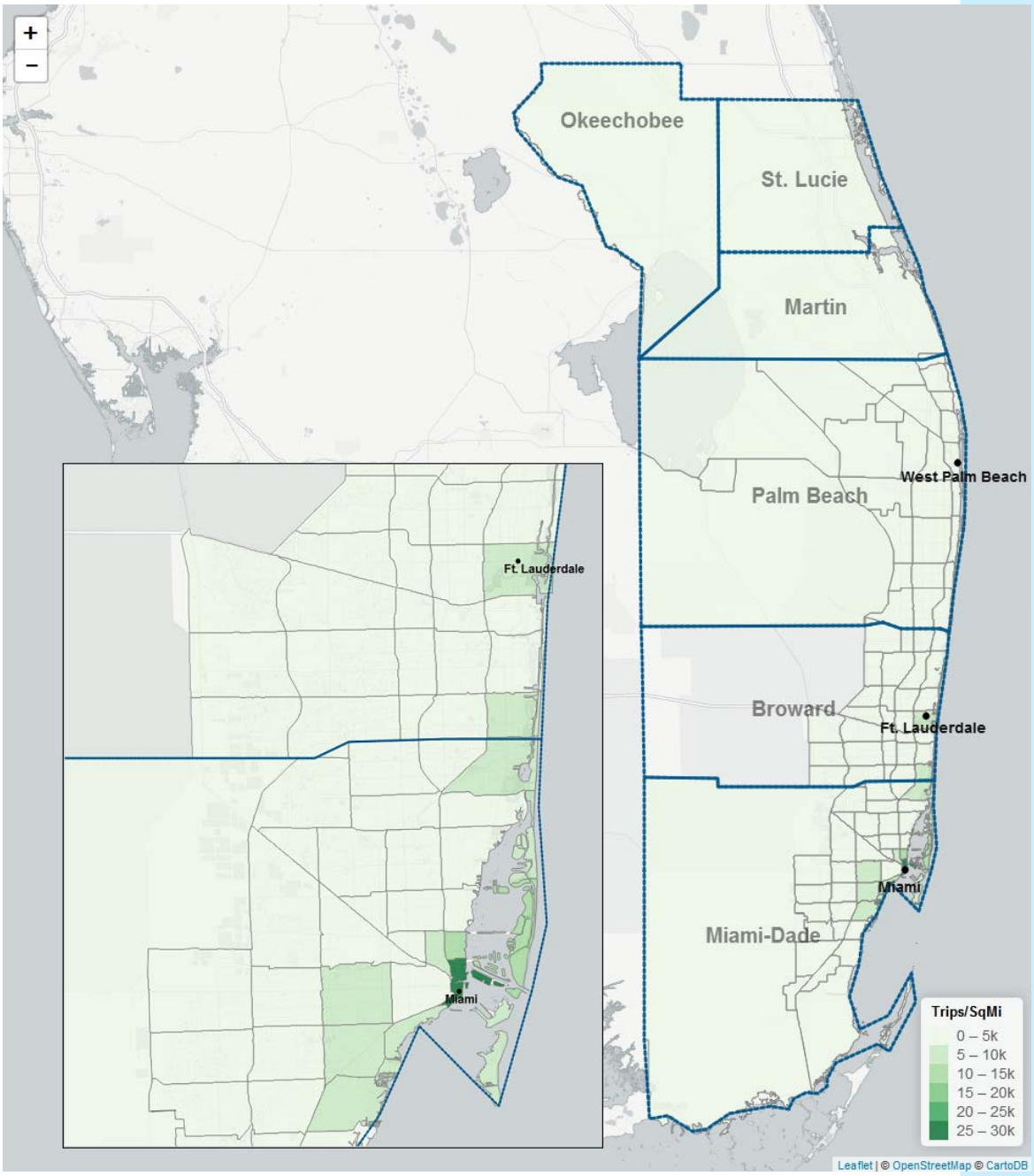
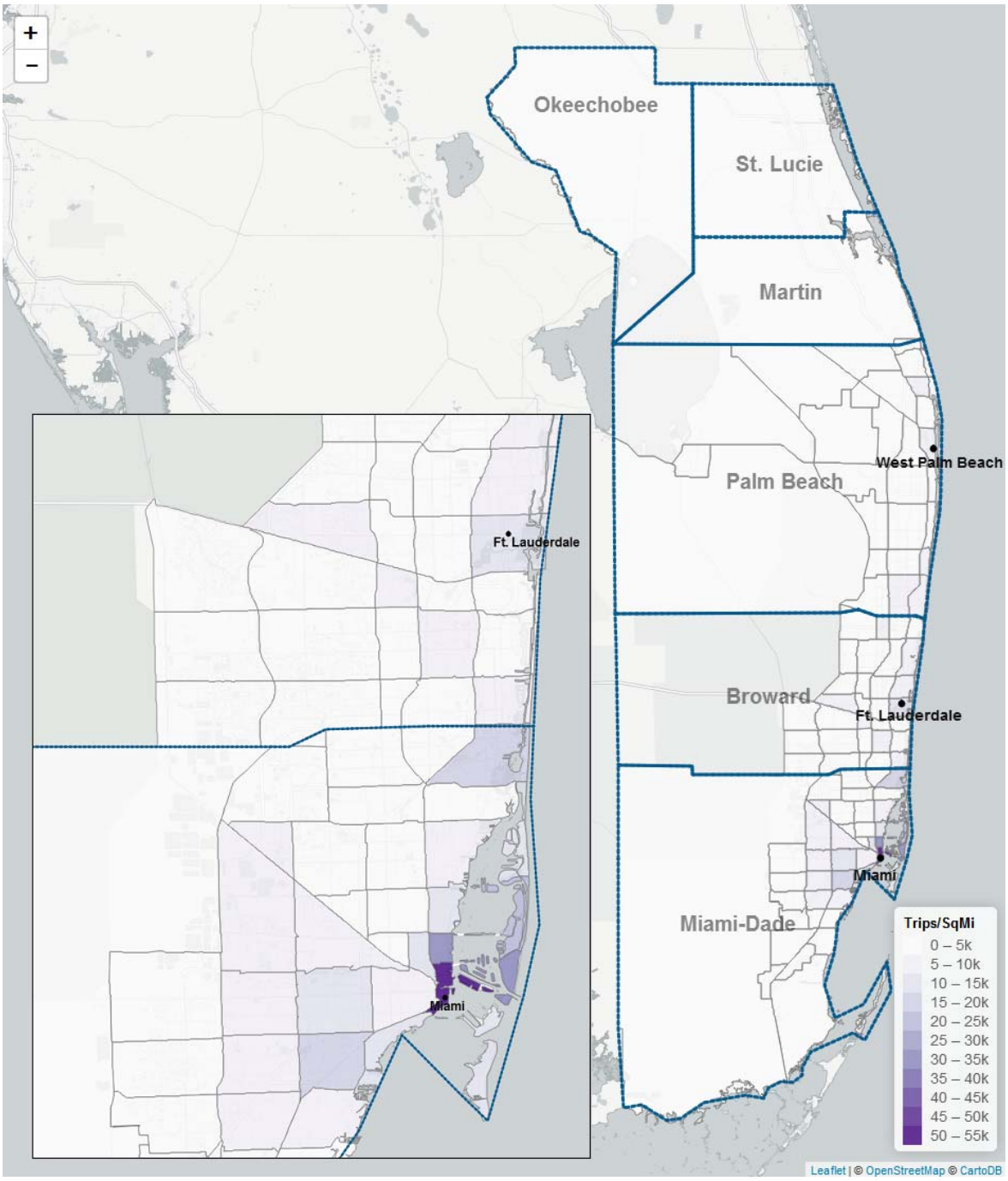


Figure 6. Personal Travel Trips by Origin during PM Peak



3.2.2 COMMERCIAL TRAVEL

Unlike personal travel, more commercial trips occur in the AM period than the PM period. The distribution of trips remains similar in both periods. Figure 7 and Figure 8 show comparison of commercial trip density by origin during AM and PM peak periods.

Figure 7. Commercial Travel Trips by Origin during AM Peak

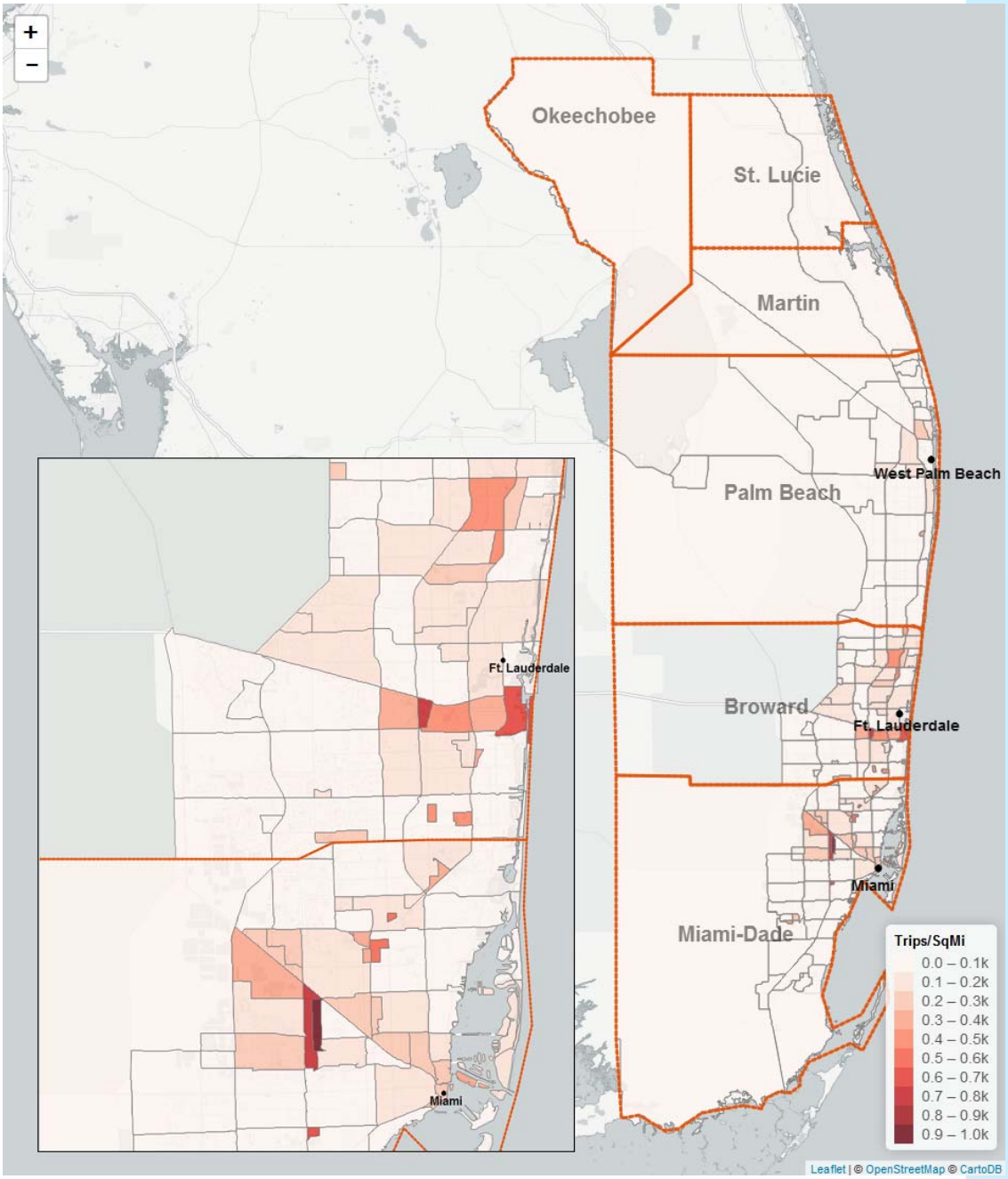
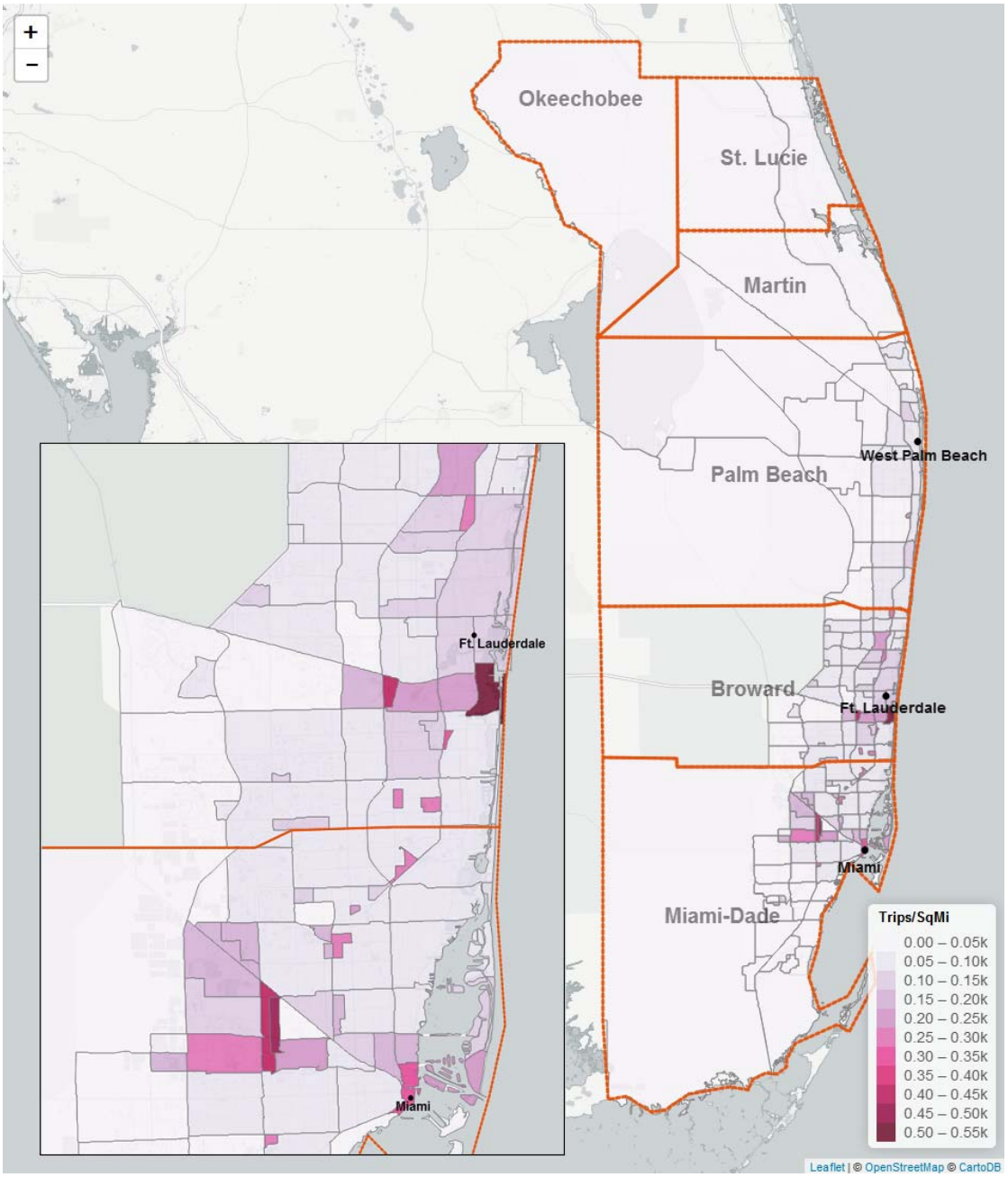


Figure 8. Commercial Travel Trips by Origin during PM Peak



3.3 WEEKDAY AND WEEKEND TRAVEL PATTERN

3.3.1 PERSONAL TRAVEL

Figure 9 and Figure 10 show a comparison of personal travel trip origins on a weekday and a weekend day. As expected, the data confirm that more trips occur, on average, on a weekday than on a weekend day. Interestingly, on weekend days the trip origins are more confined to urban centers than on weekdays. This may be because places that generate weekend activities, such as shopping, dining, and entertainment, are more likely to be located on or near city centers.

Figure 9. Daily Personal Travel Trips by Origin on Average Weekday (Mon – Thu)

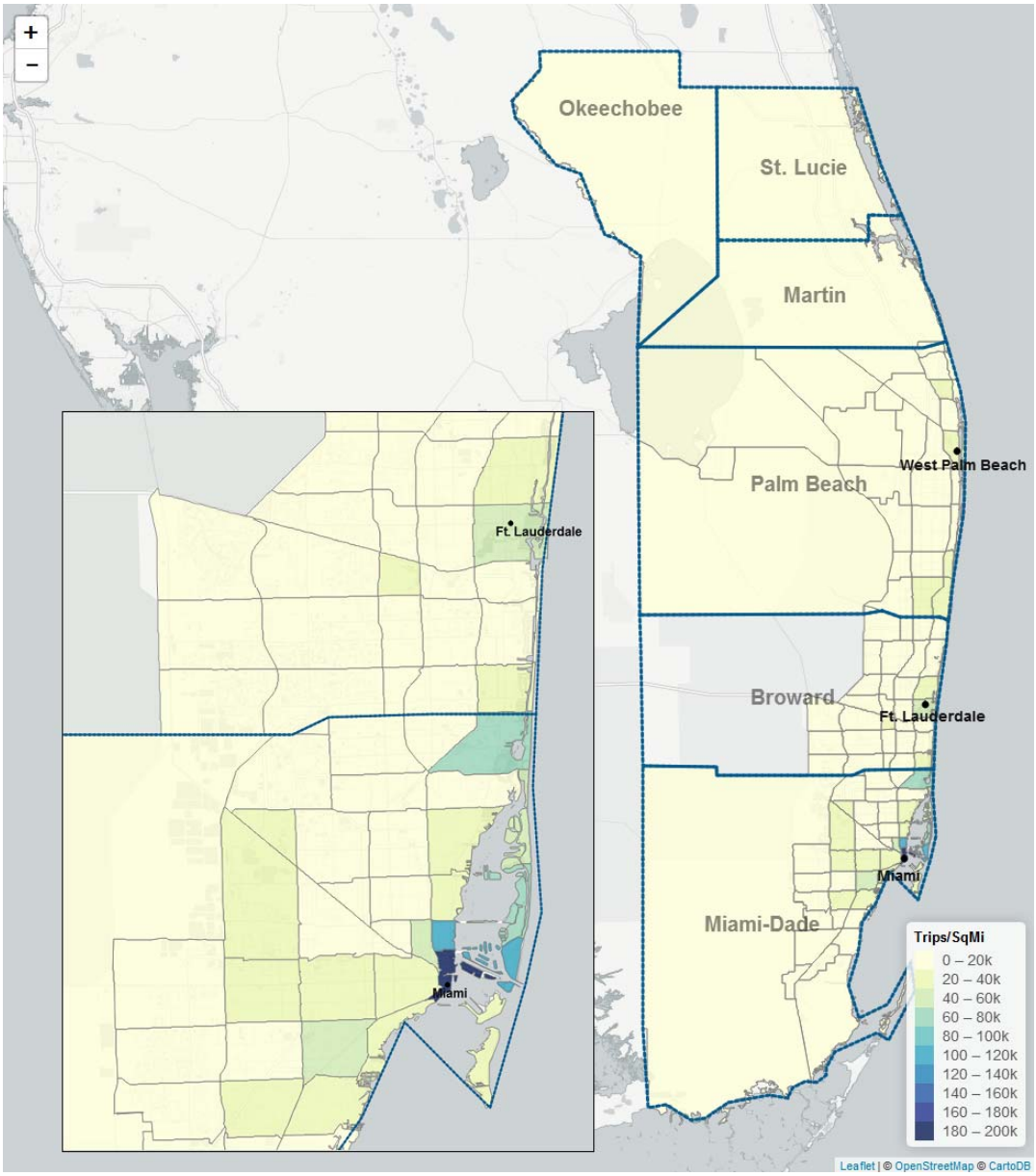
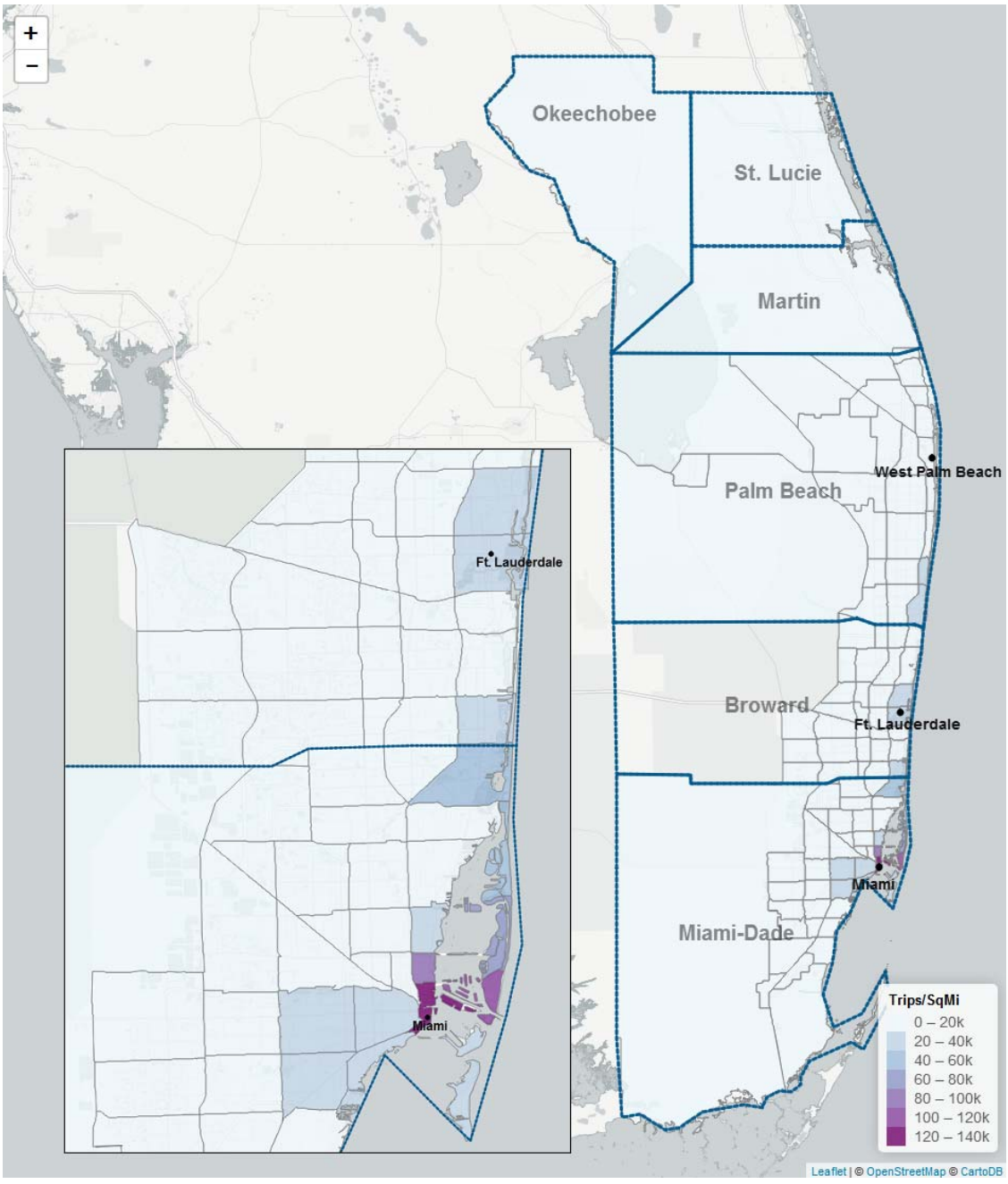


Figure 10. Daily Personal Travel Trips by Origin on Average Weekend Day (Sat - Sun)



3.3.2 COMMERCIAL TRAVEL

Figure 11 and Figure 12 show the commercial travel trip intensity on an average weekday and on an average weekend day. Similar to personal travel, more commercial trips occur on a weekday than on a weekend day. The pattern of trip intensity does shift for commercial vehicles between the week and weekend. Miami International Airport and Port Everglades remain the centers of activity.

Figure 11. Commercial Travel Trips by Origin on Average Weekday (Mon-Thu)

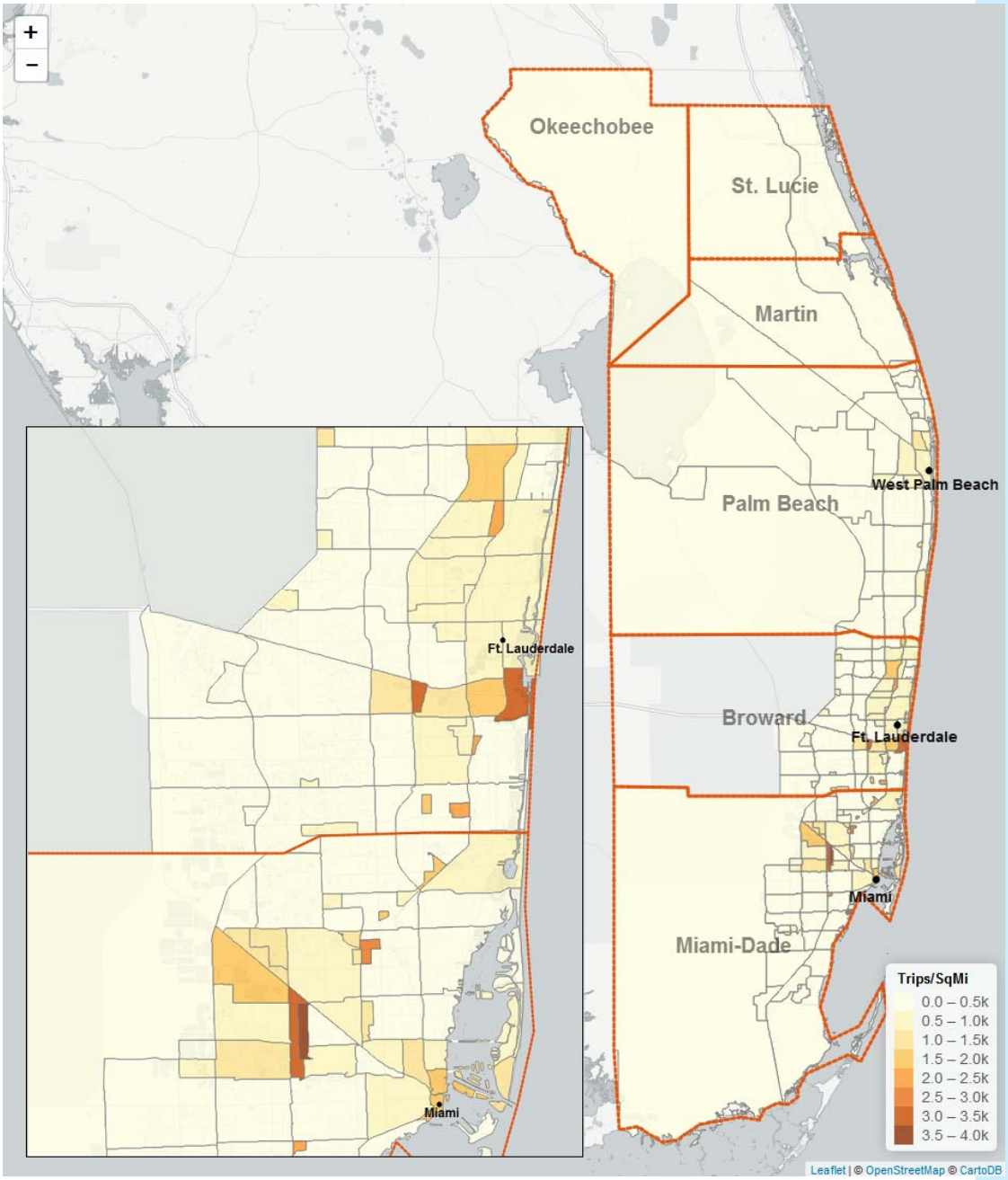
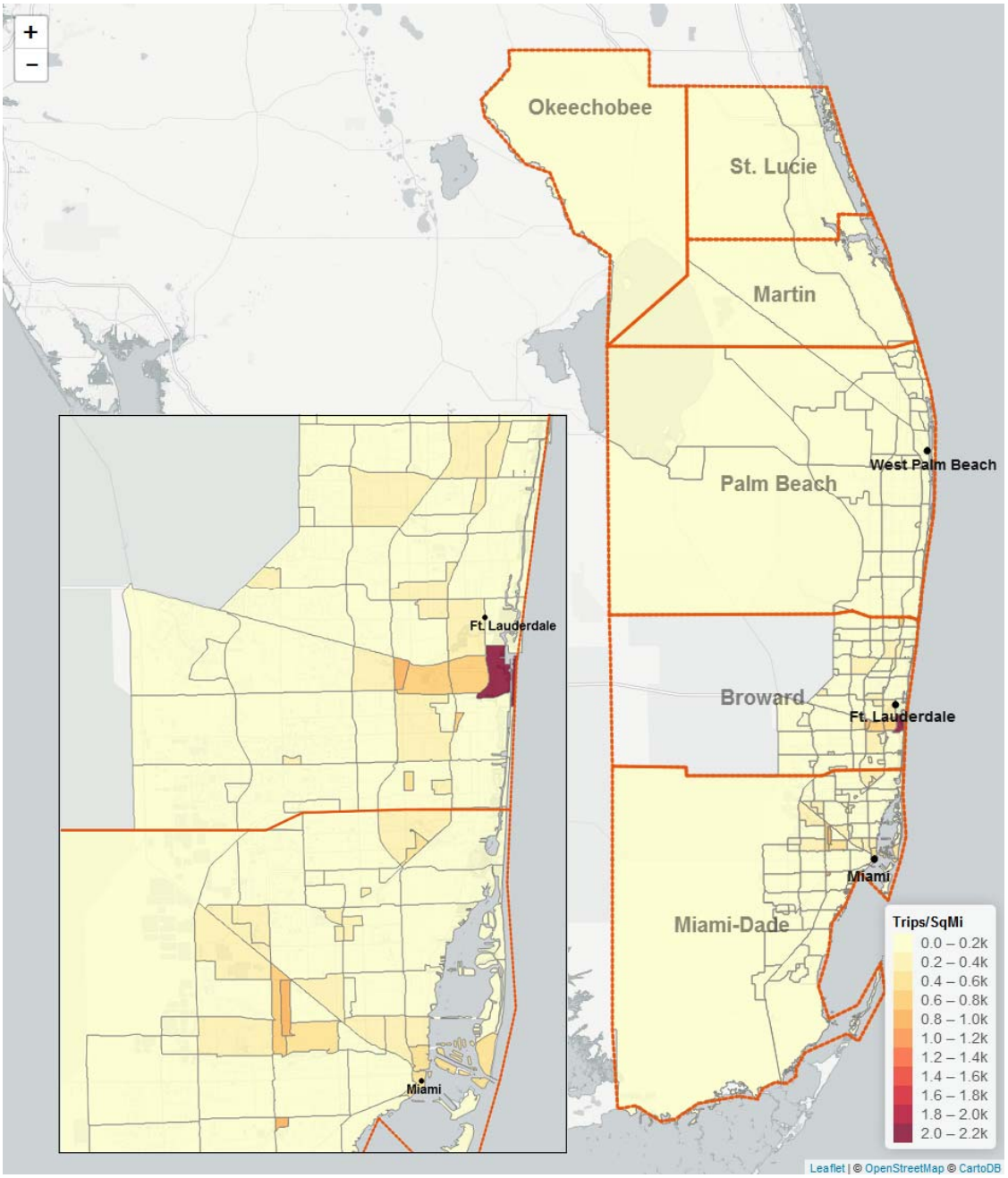


Figure 12. Commercial Travel Trips by Origin on Average Weekend Day



4 TRIP DURATION

Table 2 and Table 3 summarize average trip duration during peak and off-peak periods, for personal travel between counties. Average trip duration is slightly shorter during off-peak hours, as expected. The peak-to-off peak travel time difference becomes more significant as the travel distance increases. Trips between Miami and Palm Beach exhibit the largest travel time difference, on average six minutes.

Table 2. Average Peak Personal Travel Trip Duration (in minutes)

		TO COUNTY		
		Miami	Broward	Palm Beach
From County	Miami	17	35	74
	Broward	37	14	32
	Palm Beach	76	33	14

Table 3. Average Off-Peak Personal Travel Trip Duration (in minutes)

		TO COUNTY		
		Miami	Broward	Palm Beach
From County	Miami	16	32	68
	Broward	33	14	30
	Palm Beach	70	30	14

Table 4. Average Trip Duration for Trips within Major Cities summarizes average trip duration, average distance, and average productivity (ratio of average distance to average duration) of trips that start in the three major urban centers. Over an entire weekday, trips that start in the Miami CBD district are longer and slower, on average, than trips that start in the Ft. Lauderdale or West Palm Beach urban centers. These statistics are consistent with the significance of the Miami as a regional attractor, as well as the higher congestion experienced on and around the Miami CBD, relative to the other areas.

Table 4. Average Trip Duration for Trips within Major Cities

DISTRICT	AVERAGE DISTANCE (mi)	AVERAGE DURATION (min)	AVERAGE PRODUCTIVITY (mph)
19 Miami CBD	7.7	22.2	20.9
61 Fort Lauderdale	7.3	18.4	24.0
92 West Palm Beach	7.3	17.3	26.0

Figure 13 shows the effect of traffic congestion on trip durations, in this case for trips between the Miami CBD and Ft Lauderdale. The figure shows the distribution of trip durations observed during an entire year, classified by trip start period (Early AM, AM Peak, PM Peak). All time periods show a range of trip durations, which reflect day-to-day variability as well as differences in trip length and average travel conditions. The figure shows that the average trip duration in the early AM is approximately 10 minutes shorter than during the peak periods. The figure also shows a wider spread of travel times in the PM Peak than in the AM Peak, indicating that while the most common duration during the peak periods is 50 minutes, one is much more likely to experience longer durations in the evening peak than in the morning peak.

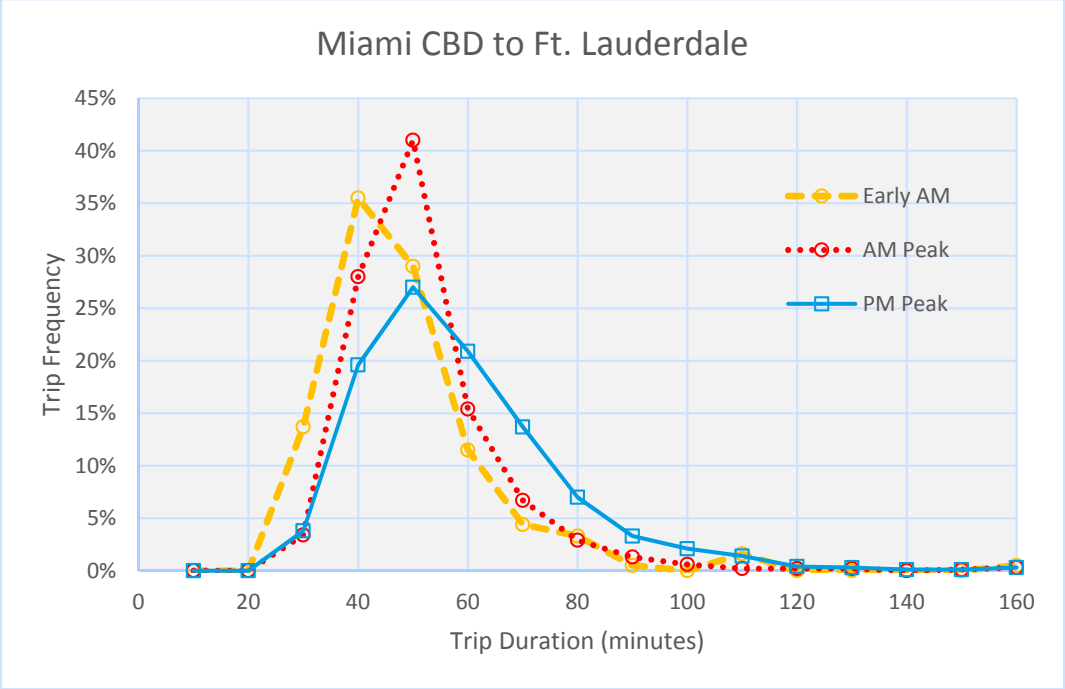


Figure 13. Distribution of Trip Durations (min)

5 ORIGIN-DESTINATION TRAVEL PATTERNS

Figure 14 to Figure 16 show personal travel trips originating in the three urban center districts – Miami CBD, Fort Lauderdale and West Palm Beach, by their destination. As can be seen, the majority of trips are short-distance trips that end in the vicinity of the urban centers. Approximately 30% of all the trips that start in these districts are less than two miles long, and 20% to 30% are between two miles and five miles long. Less than 5% of all trips are more than 30 miles long.

Figure 14. Trips by Destination for Trips Originating from Miami CBD District

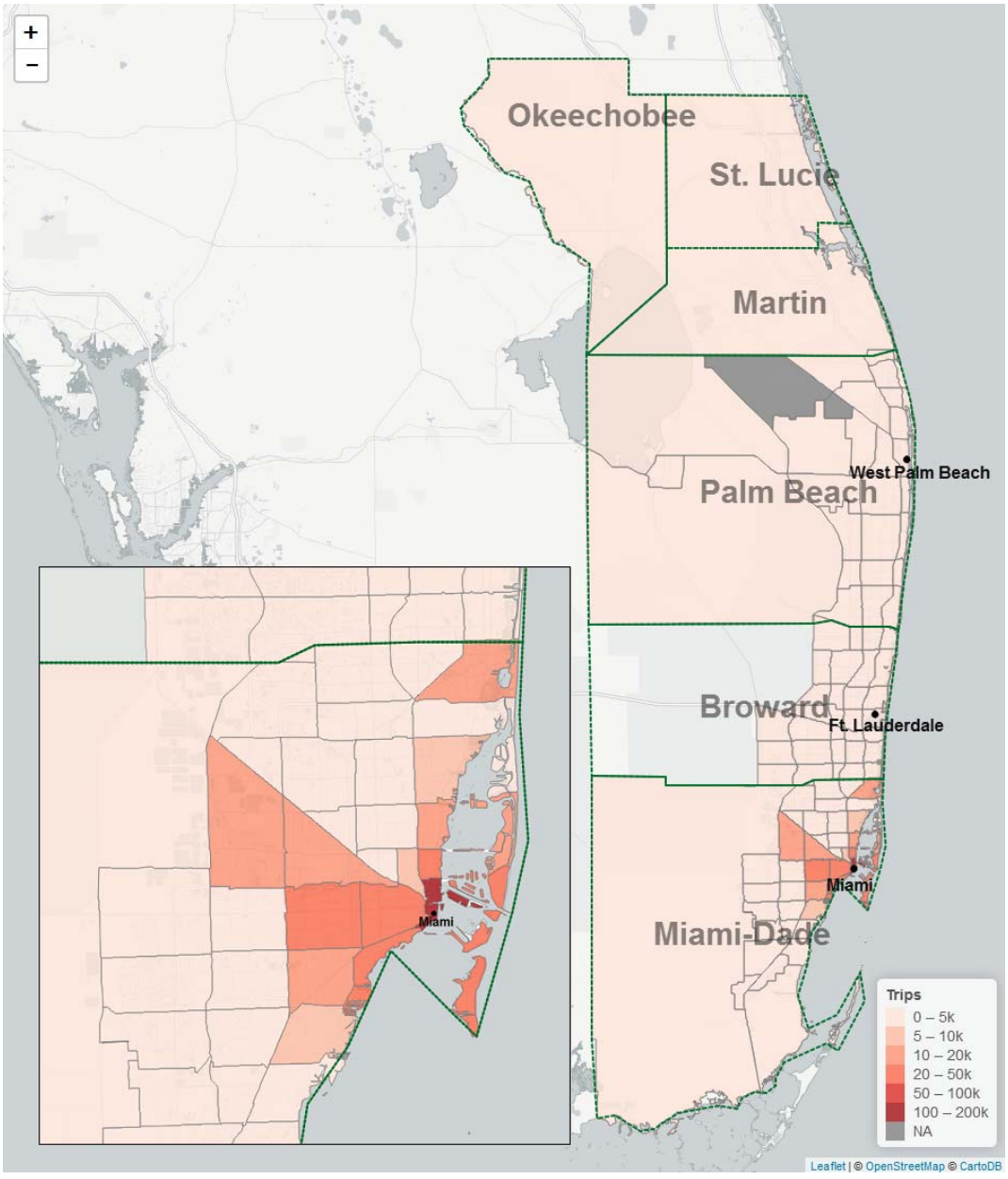


Figure 15. Trips by Destination for Trips Originating from Fort Lauderdale

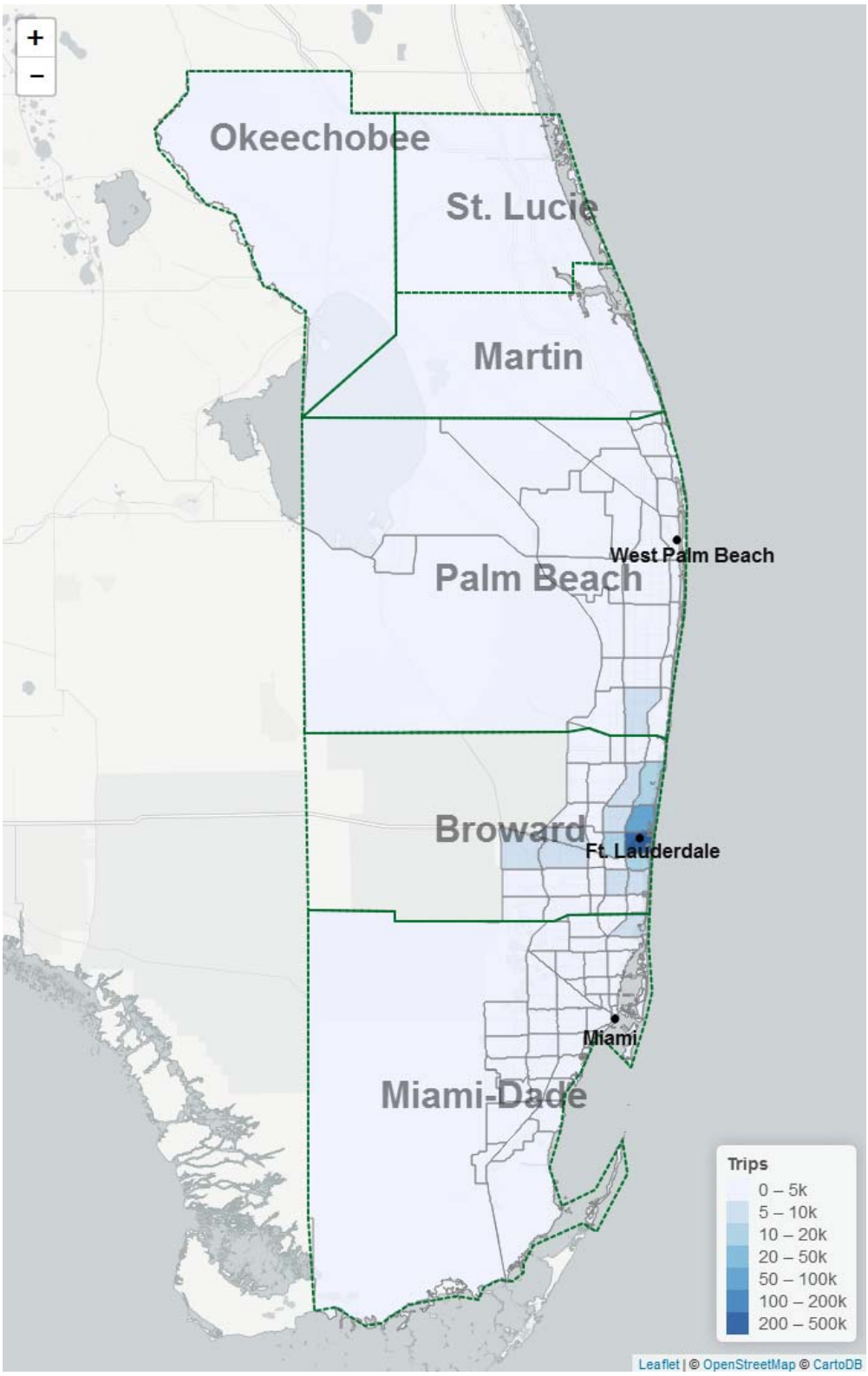
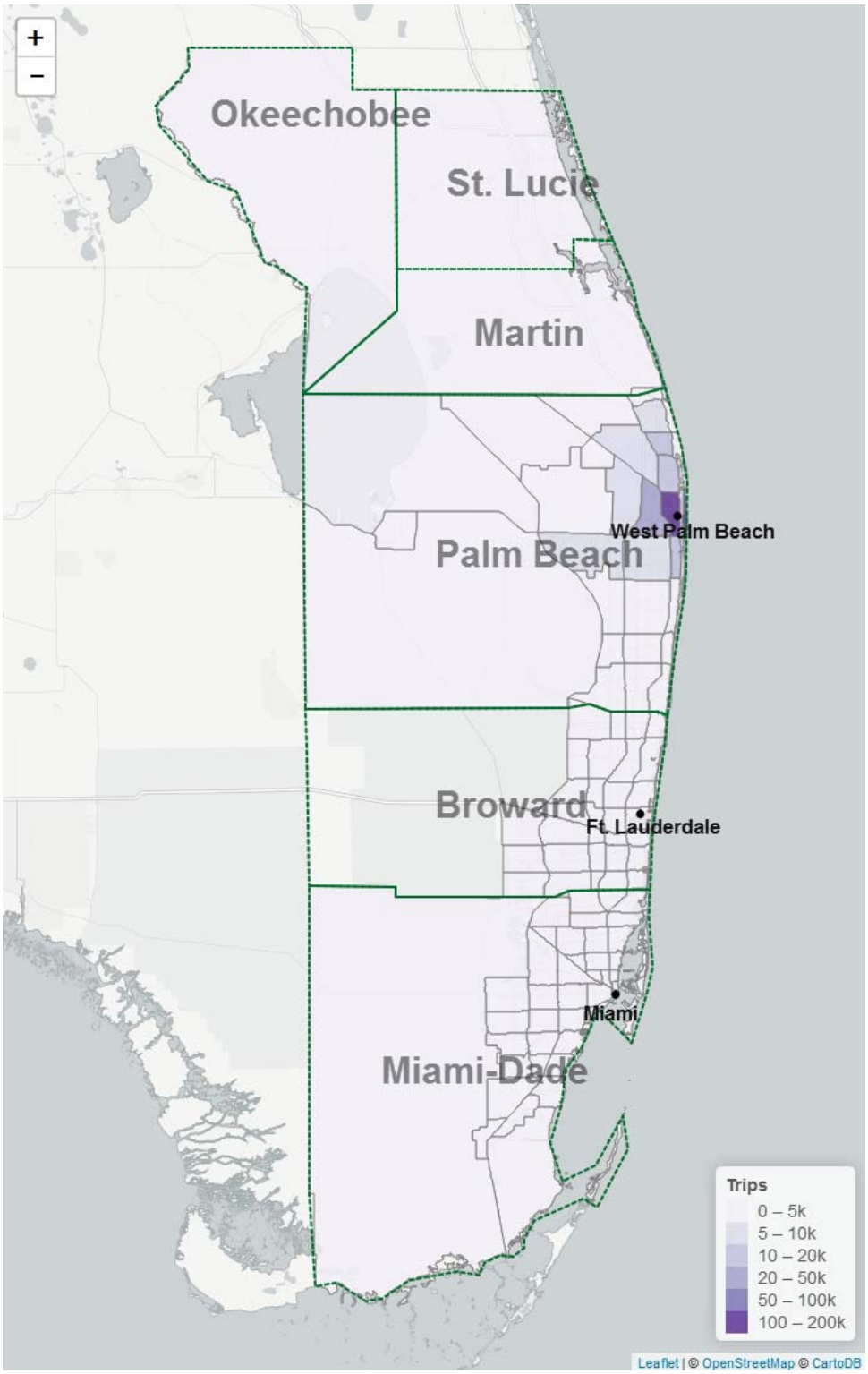


Figure 16. Trips by Destination for Trips Originating from West Palm Beach District



An alternative way of portraying origin-destination travel patterns is with a chord diagram, an example of which is shown in Figure 17. Chord diagrams are useful to illustrate major OD patterns amongst a few areas in a single chart. Due to the large number of districts available for the Southeast Florida datasets, effective use of these diagrams requires aggregating the districts into super-districts (as was done for this illustration), or alternative extracting only the districts of interest from the regional database.

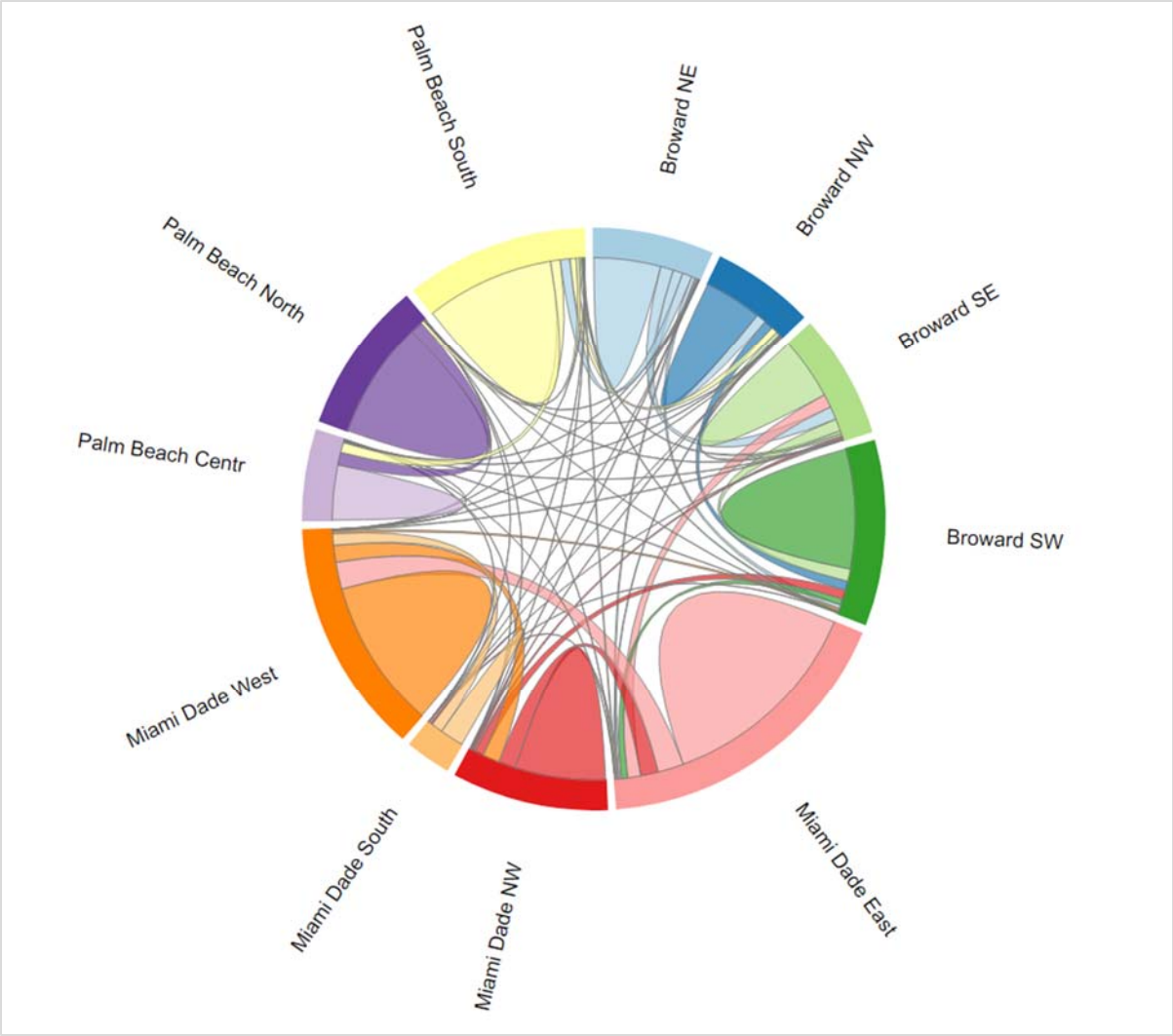


Figure 17. Origin -- Destination Pattern based on Super Districts

6 ORIGIN-DESTINATIONS WITH MIDDLE FILTERS

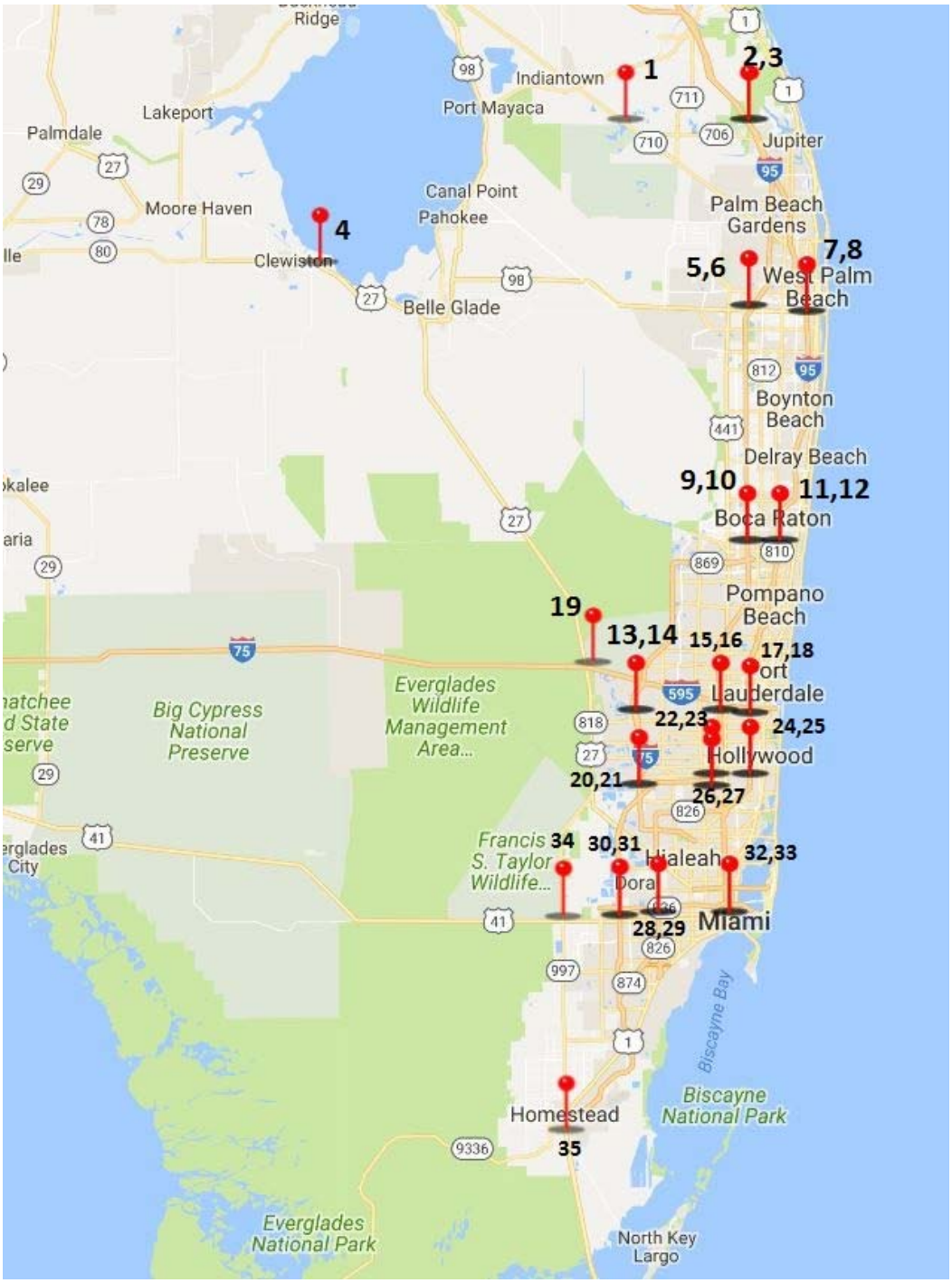
Middle filters provide an ability similar to a traditional select link analysis. When middle filters are used, the total OD table is filtered down to contain only the trips that pass through a road segment of interest. In total, 35 middle filters were identified, and OD trip tables are provided for each of them. The location of the middle filters available in the Southeast Florida datasets is shown in Table 5 and Figure 18.

Table 5. Middle Filter Locations

ID	COUNTY	FACILITY	COLLECTION LOCATION	DIRECTION
1	Palm Beach (PB)	Beeline Hwy (SR 710)	Martin/PB Countyline	Southbound
2	Palm Beach (PB)	Florida Turnpike (SR 91)	Martin/PB Countyline	Southbound
3	Palm Beach (PB)	I-95	Martin/PB Countyline	Southbound
4	Palm Beach (PB)	US 27	Hendry/PB Countyline	Southbound
5	Palm Beach (PB)	Florida Turnpike (SR 91)	South of Southern Blvd.	Southbound
6	Palm Beach (PB)	Florida Turnpike (SR 91)	South of Southern Blvd.	Northbound
7	Palm Beach (PB)	I-95	South of Southern Blvd.	Southbound
8	Palm Beach (PB)	I-95	South of Southern Blvd.	Northbound
9	PB/Broward	Florida Turnpike (SR 91)	PB/Broward Countyline	Southbound
10	PB/Broward	Florida Turnpike (SR 91)	PB/Broward Countyline	Northbound
11	PB/Broward	I-95	PB/Broward Countyline	Southbound
12	PB/Broward	I-95	PB/Broward Countyline	Northbound
13	Broward	I-75	North of Griffin Rd.	Southbound
14	Broward	I-75	North of Griffin Rd.	Northbound
15	Broward	Florida Turnpike (SR 91)	North of Griffin Rd.	Southbound
16	Broward	Florida Turnpike (SR 91)	North of Griffin Rd.	Northbound
17	Broward	I-95	North of Griffin Rd.	Southbound
18	Broward	I-95	North of Griffin Rd.	Northbound
19	Broward	I-75	West of US 27	Southbound
20	Broward/MD	I-75	Broward/MD Countyline	Southbound
21	Broward/MD	I-75	Broward/MD Countyline	Northbound
22	Broward/MD	Florida Turnpike (SR 821)	Broward/MD Countyline	Southbound

ID	COUNTY	FACILITY	COLLECTION LOCATION	DIRECTION
23	Broward/MD	Florida Turnpike (SR 821)	Broward/MD Countyline	Northbound
24	Broward/MD	I-95	Broward/MD Countyline	Southbound
25	Broward/MD	I-95	Broward/MD Countyline	Northbound
26	Miami-Dade (MD)	Florida Turnpike Extension (SR 91)	North of NW 199 Street	Southbound
27	Miami-Dade (MD)	Florida Turnpike Extension (SR 91)	North of NW 199 Street	Northbound
28	Miami-Dade (MD)	Palmetto Expressway (SR 826)	North of SW 8 Street	Southbound
29	Miami-Dade (MD)	Palmetto Expressway (SR 826)	North of SW 8 Street	Northbound
30	Miami-Dade (MD)	Florida Turnpike (SR 821)	North of SW 8 Street	Southbound
31	Miami-Dade (MD)	Florida Turnpike (SR 821)	North of SW 8 Street	Northbound
32	Miami-Dade (MD)	I-95	North of SW 8 Street	Southbound
33	Miami-Dade (MD)	I-95	North of SW 8 Street	Northbound
34	Miami-Dade (MD)	Tamiami Trail (SR 90)	West of Krome Avenue (SR 997)	Eastbound
35	Miami-Dade (MD)	US 1	North of Card Sound Rd.	Northbound

Figure 18. Middle Filter Locations



The maps below show trips by origin district and destination district, for trips passing through each of the five middle filters. The blue markers identify the location of the middle filter.

6.1 SB I-95 AT BROWARD / MIAMI-DADE COUNTY LINE

Figure 19 and Figure 20 show the origins and destinations for trips utilizing southbound (SB) I-95 at the Broward / Miami-Dade County line. As can be seen, the majority of the trips originate from the coastal area of Broward County, especially Fort Lauderdale and Dania Beach. The top destinations for these trips include North Miami Beach, and Miami CBD.

Figure 19. Origin of Trips Using SB I-95 at Broward/Miami-Dade County Line

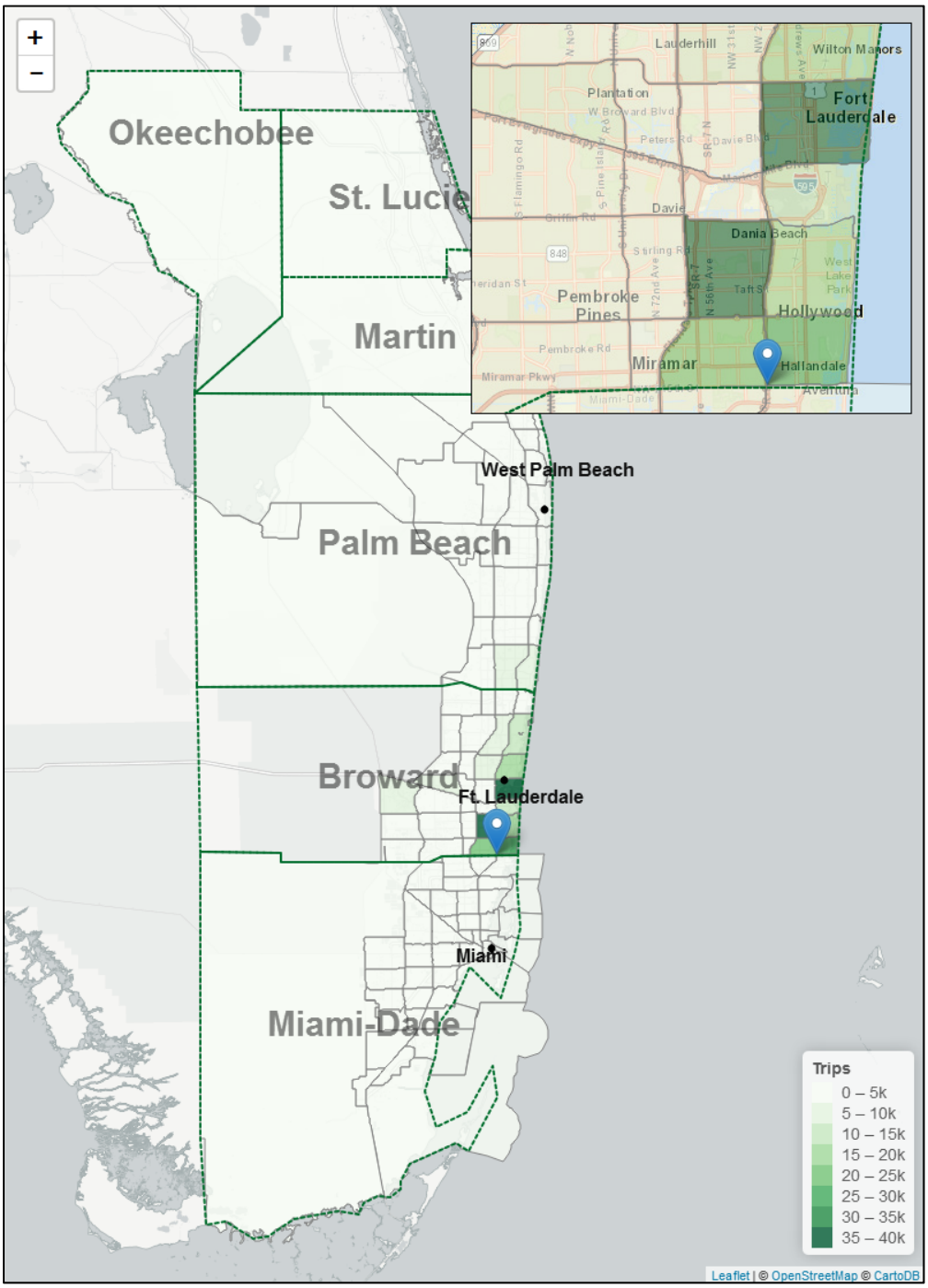
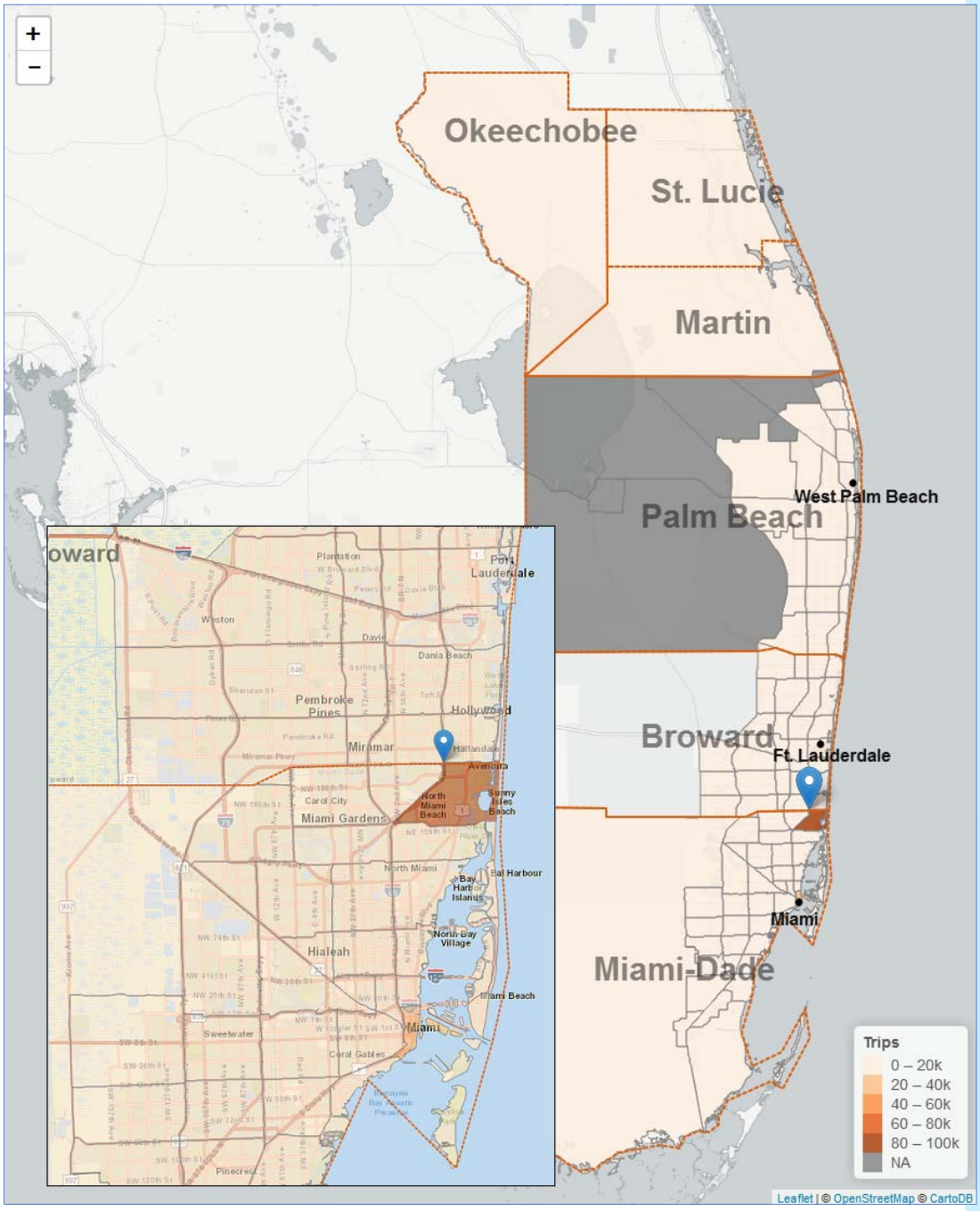
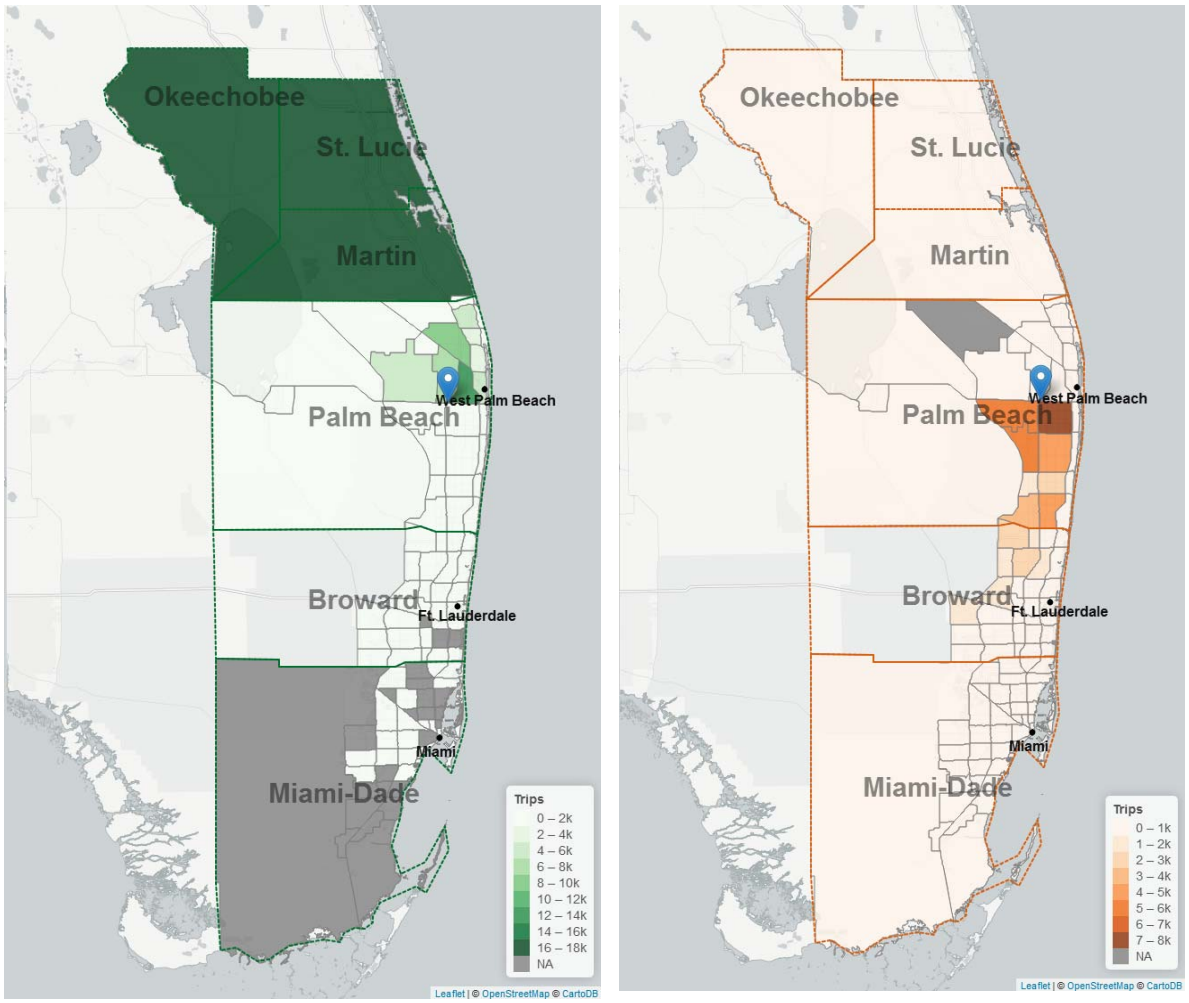


Figure 20. Destination of Trips Using SB I-95 at Broward/Miami-Dade County Line



6.2 SB FLORIDA TURNPIKE SOUTH OF SOUTHERN BLVD

Figure 21 shows the origins and destinations for trips passing through SB Florida Turnpike south of Southern Blvd. Other than West Palm Beach and Palm Beach Gardens, a large percentage of the trips using this segment of freeway come from the three northern counties. A high percentage of the trips using this section of the Florida Turnpike are destined to districts directly south of West Palm Beach, such as Palm Springs, Wellington, and Boca Raton.



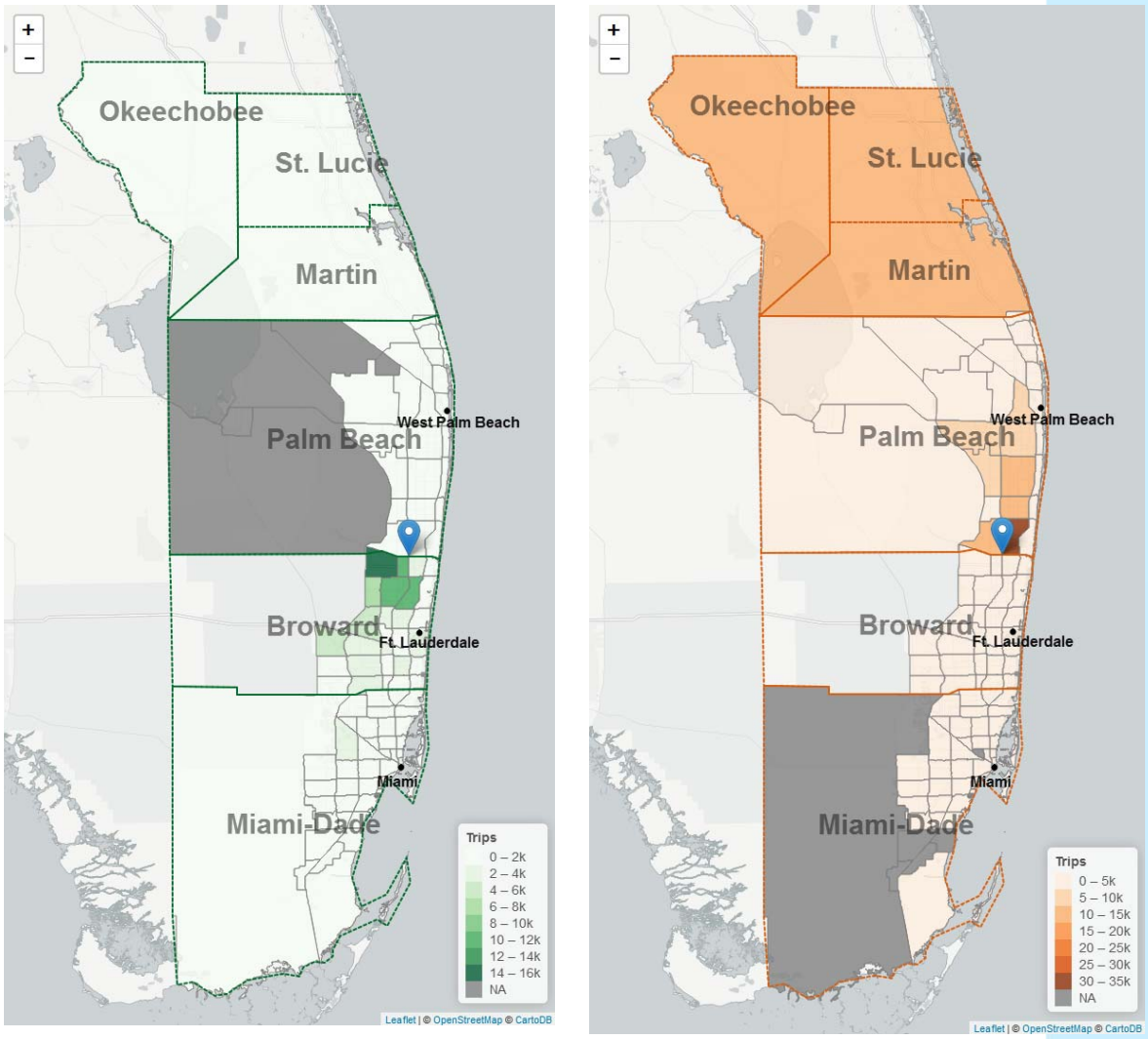
(a) Trip origins

(b) Trip destinations

Figure 21. Origins and Destinations of Trips Using SB Florida Turnpike south of Southern Blvd

6.3 NB FLORIDA TURNPIKE AT PALM BEACH / BROWARD COUNTY LINE

Figure 22 shows origins and destinations of trips passing through northbound (NB) Florida Turnpike at the Palm Beach / Broward County line. The majority of these trips originate from northern Broward. The districts that generate the highest number of trips include Coral Springs, Coconut Creek and East Pompano Beach. On the other hand, a high percentage of the trips observed in this section of the Florida Turnpike are headed to Boca Raton, south Palm Beach County and the three northern counties.



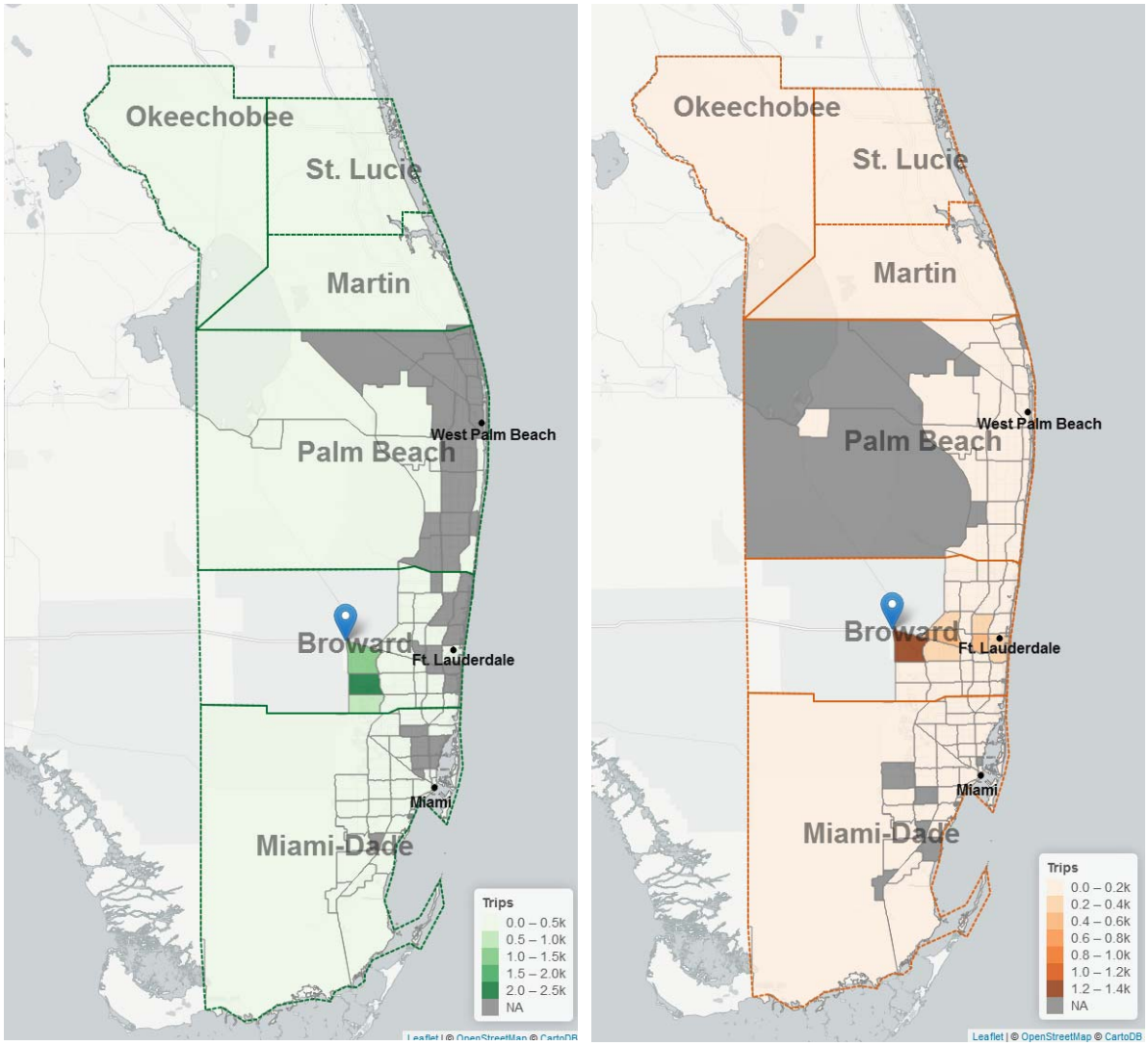
(a) Trip Origins

(b) Trip Destinations

Figure 22. Origins and Destinations for Trips Using NB Florida Turnpike at Palm Beach / Broward County Line

6.4 SB I-75 EAST OF US-27

Figure 23 shows the origins and destinations of trips passing through SB I-75 east of US-27. The top origins include Southwest Ranches, Pembroke Pines and Weston. The majority of the trips have destinations in districts along I-75, including Weston, Davie and Fort Lauderdale.



(a) Trip Origins (b) Trip Destinations

Figure 23. Origins and Destinations of Trips Using SB I-75 east of US-27

6.5 NB I-95 NORTH OF NW 8TH ST

Figure 24 and Figure 25 show the origins and destinations of trips passing through NB I-95 north of NW 8th St. Most of the trips are from areas near the Miami CBD. The top destinations of these trips include Miami CBD, Miami Beach, Miami International Airport and North Miami Beach.

Figure 24. Origins for Trips Using NB I-95 North of NW 8th St

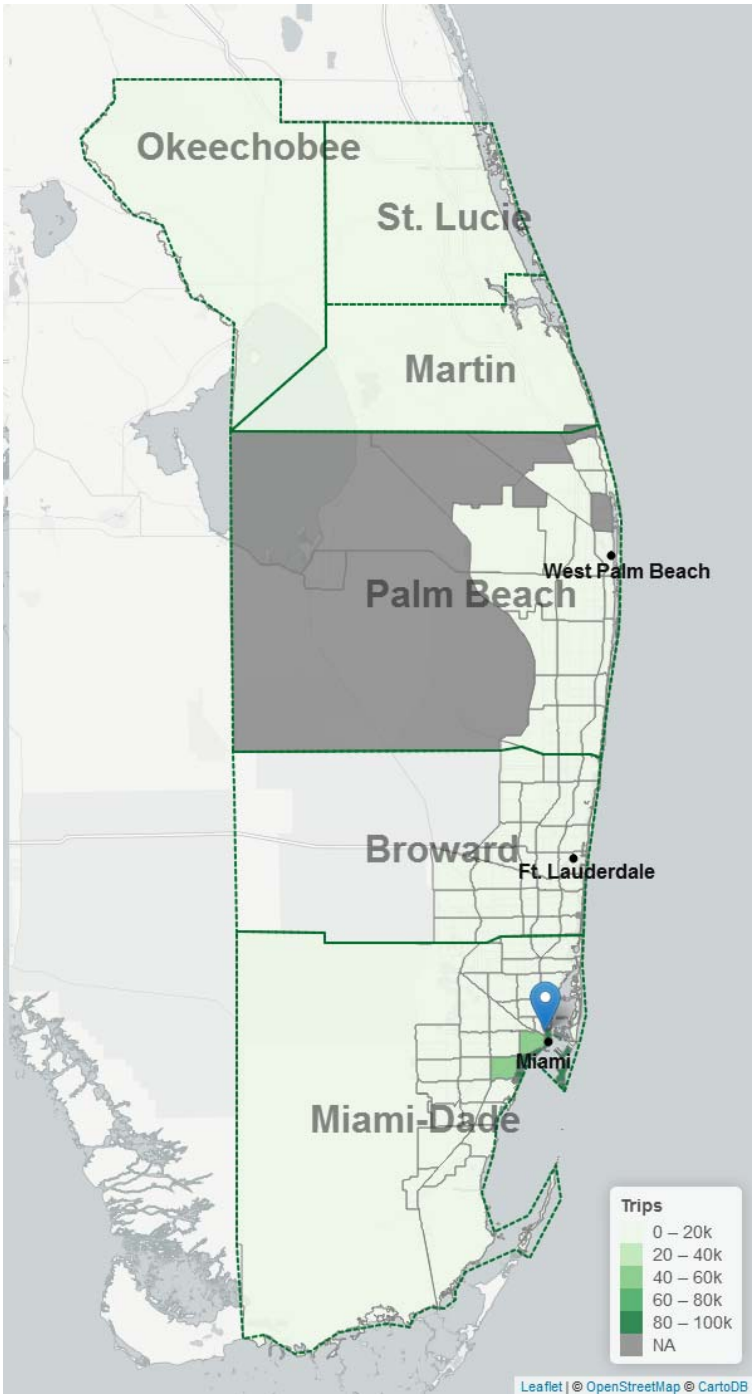
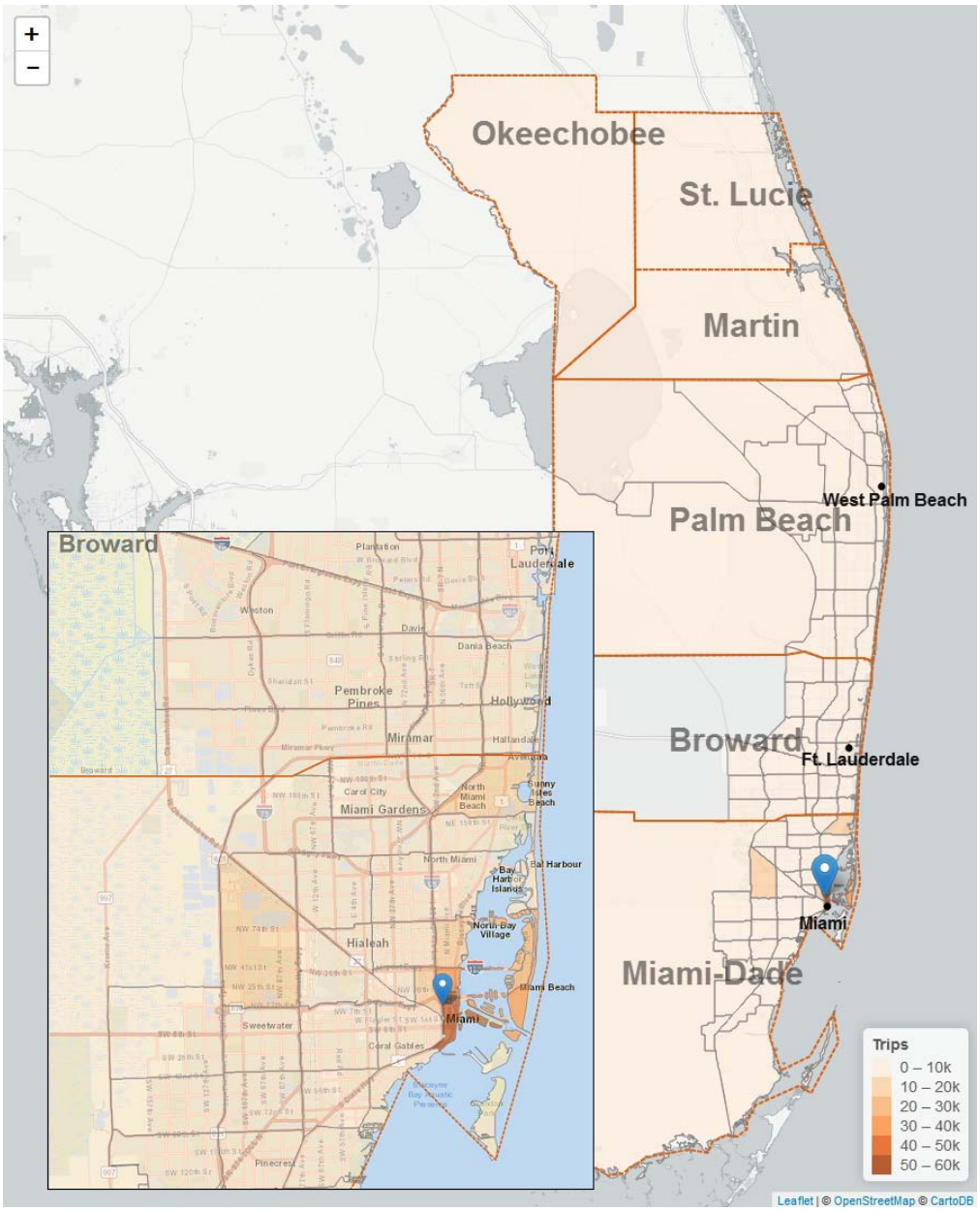


Figure 25. Destinations for Trips Using NB I-95 North of NW 8th St



7 TRIP GENERATION AT SELECTED COMMERCIAL ACTIVITY LOCATIONS

7.1 INTRODUCTION

This section documents the review conducted on the commercial travel portion of the Streetlight Origin-Destination (O-D) dataset. Truck GPS data are obtained using passive data collection techniques from a large sample of trucks. Owing to the passive nature of the data collection, the dataset contains no information about travel purpose, commodities being carried on the trucks, or the operators running the truck – all of which would require active intervention on the part of the vendor. Instead, this GPS dataset captures only locational information, and the vendor uses this data to **infer** information such as trip start and end points, time of day of travel, or average number of stops made during a day. Key aspects of the database are described below.

- First, Streetlight uses proprietary routines to **infer trip ends** from these GPS events. Based on conversations with Streetlight, it appears that if a truck's position has not changed more than five meters in five minutes, their algorithms assume this to be a trip end.
- Second, the trip ends in the database **are aggregated to zones** identified by the MPOs, both to help make the data more manageable and to protect the confidentiality of the GPS positions provided by individual devices/vehicles. Throughout this report these zones are referred to as travel analysis districts (TADs).
- Third, **segmentation variables** are used to split the passive datasets into multiple databases. The most relevant characteristic, from a planning/modeling standpoint, is the registered gross vehicle weight (GVW) of the truck in which the GPS device was installed. Resulting datasets are classified into two truck categories: medium (greater than 14,000 lbs. and less than 33,000 lbs. GVW) and heavy (greater than 33,000 lbs. GVW) trucks.

This review was undertaken on unadjusted data obtained from Streetlight and as such, it should be noted that the database does not represent the travel of all trucks. Rather, the data represent only those trucks whose GPS traces have been collected and processed by Streetlight. Any survey, including passively collected data, must be expanded before they can be used to develop models or to objectively quantify measures of demand. Therefore, the rates, variables, and relationships presented in this review should not immediately be included in truck models without further evaluation. Rather, this review must be viewed through the lens of an initial exploratory framework upon which future analyses and expansions may be constructed.

The commercial travel trip ends are reported at the spatial resolution of the 173 commercial TADs shown in Figure 2. The number of commercial TADs in each county is shown in Table 6.

Table 6: Commercial Travel Analysis Districts by County

COUNTY	NUMBER OF TADS	AVG. TAD SIZE (sq. miles)	TOTAL TAD SIZE (sq. miles)
Miami-Dade	67	36	2,431
Broward	61	7	427
Palm Beach	39	57	2,228
Martin	3	218	654
St. Lucie	2	289	577
Okeechobee	1	892	892

To better understand truck traffic flow, the team identified major truck activity centers, also known as special generators. This includes areas such as airports, central business districts (CBDs), and marine ports. For the purposes of this analysis, only the largest of the special generators were identified. For example, out of the 13 public airports inside the region, only the three largest ones, Fort Lauderdale–Hollywood International Airport, Miami International Airport, and Palm Beach International Airport, were identified as special generators. Similar, only the CBDs of Miami and Fort Lauderdale were included in the analysis. Finally, Port Miami, Port Everglades and Port of Palm Beach were considered as special generators as well. Figure 26 through Figure 29 below show the location of these special generators alongside all 173 TADs.

To support the evaluation process, estimates of 2015 population and employment were appended to the travel data. These estimates are available for the 4,236 traffic analysis zones (TAZ) used for modeling travel demand in the region. Since the TADs used in the Streetlight dataset are larger than the model TAZs, TAZ level socioeconomic data were aggregated to the Streetlight TADs. Table 7 shows the population and employment numbers in the special generator zones.

Table 7: Population and Employment in Special Commercial Travel Generator Zones

LOCATION TYPE	NAME	COUNTY	POPULATION	EMPLOYMENT
Airport	Miami International Airport	Miami-Dade	458	8,707
Airport	Fort Lauderdale–Hollywood International Airport	Broward	2,926	10,603
Airport	Palm Beach International Airport	Palm Beach	15,222	15,215
CBD	Miami CBD	Miami-Dade	31,398	25,639
CBD	Miami CBD	Miami-Dade	11,732	47,675
CBD	Fort Lauderdale CBD	Broward	35,311	63,721
Seaport	Port Miami	Miami-Dade	0	3,928
Seaport	Port Everglades	Broward	652	4,560
Seaport	Port Palm Beach	Palm Beach	16,099	7,841

Figure 26: Commercial Travel Generators Selected for Further Analysis

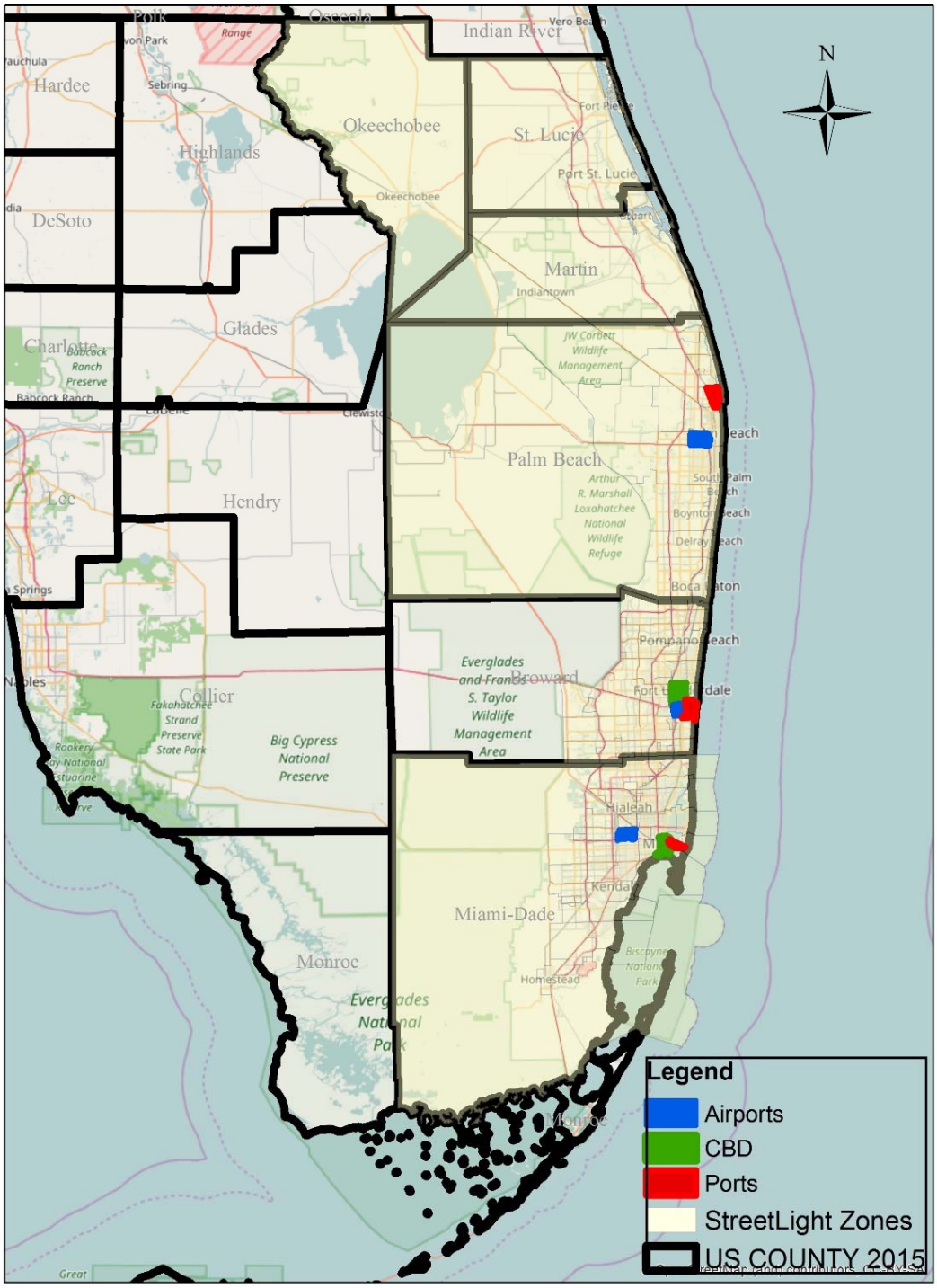


Figure 27: Miami-Dade County Selected Commercial Travel Generators

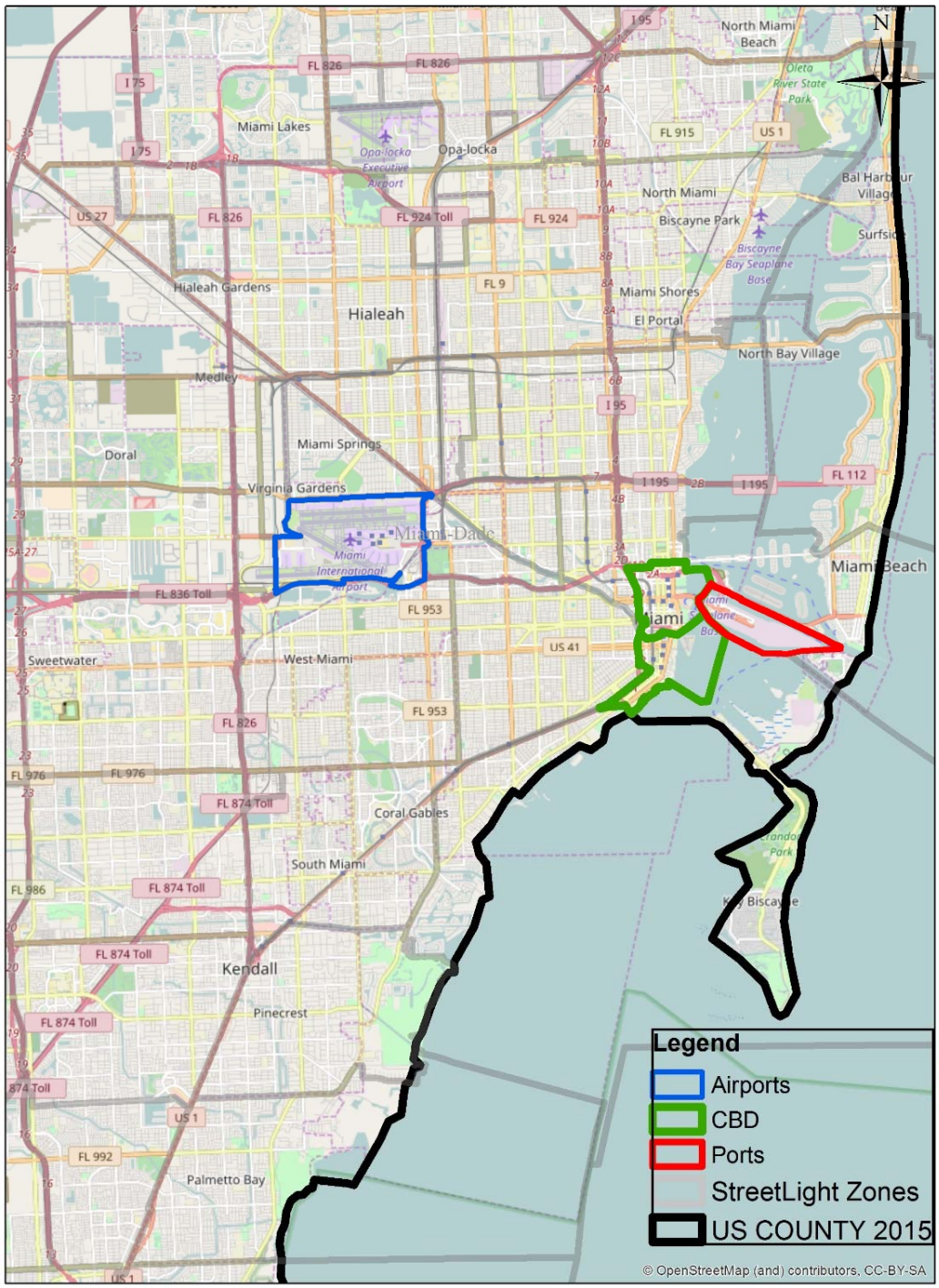


Figure 28: Broward County Selected Commercial Travel Generators

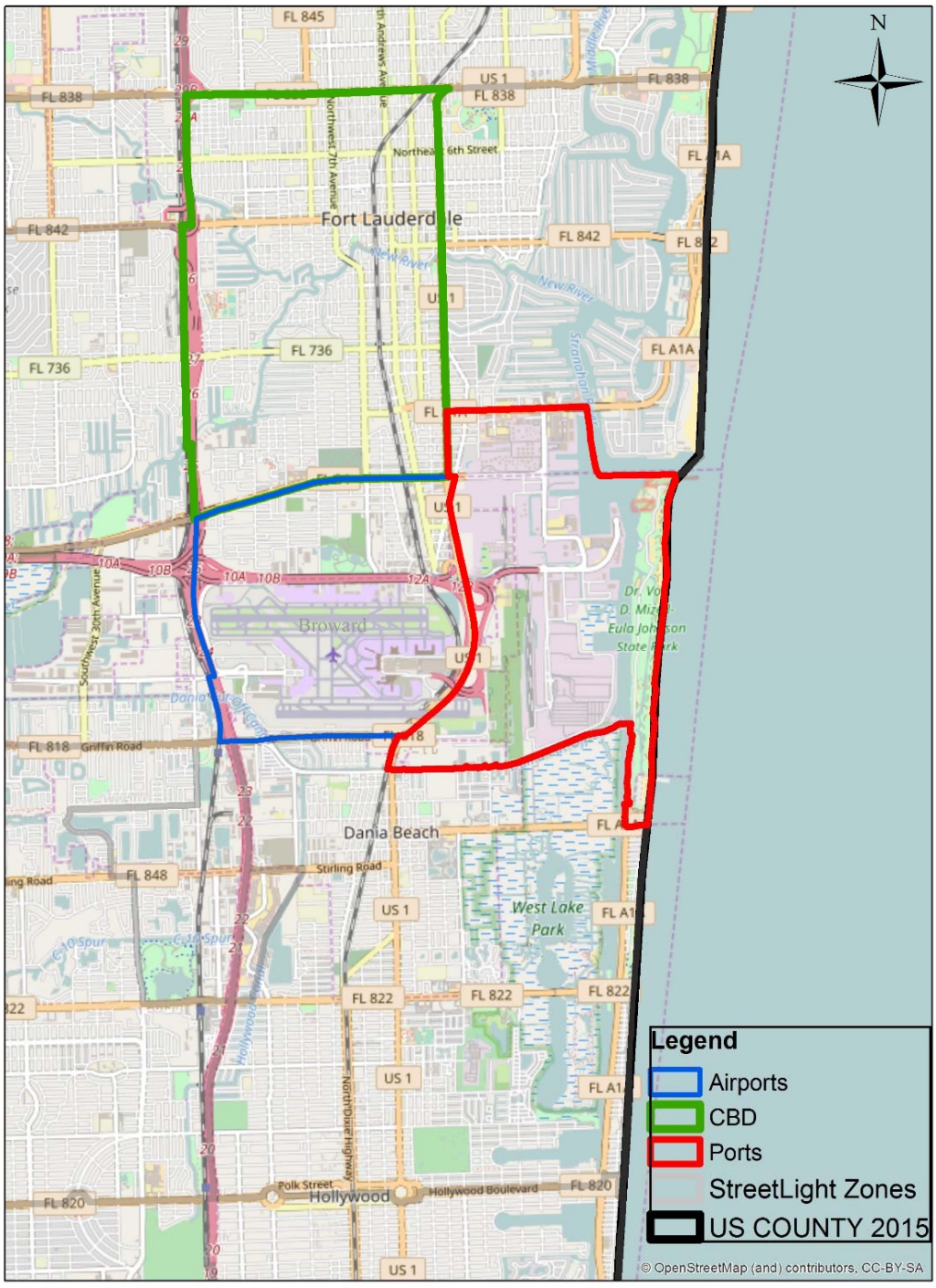
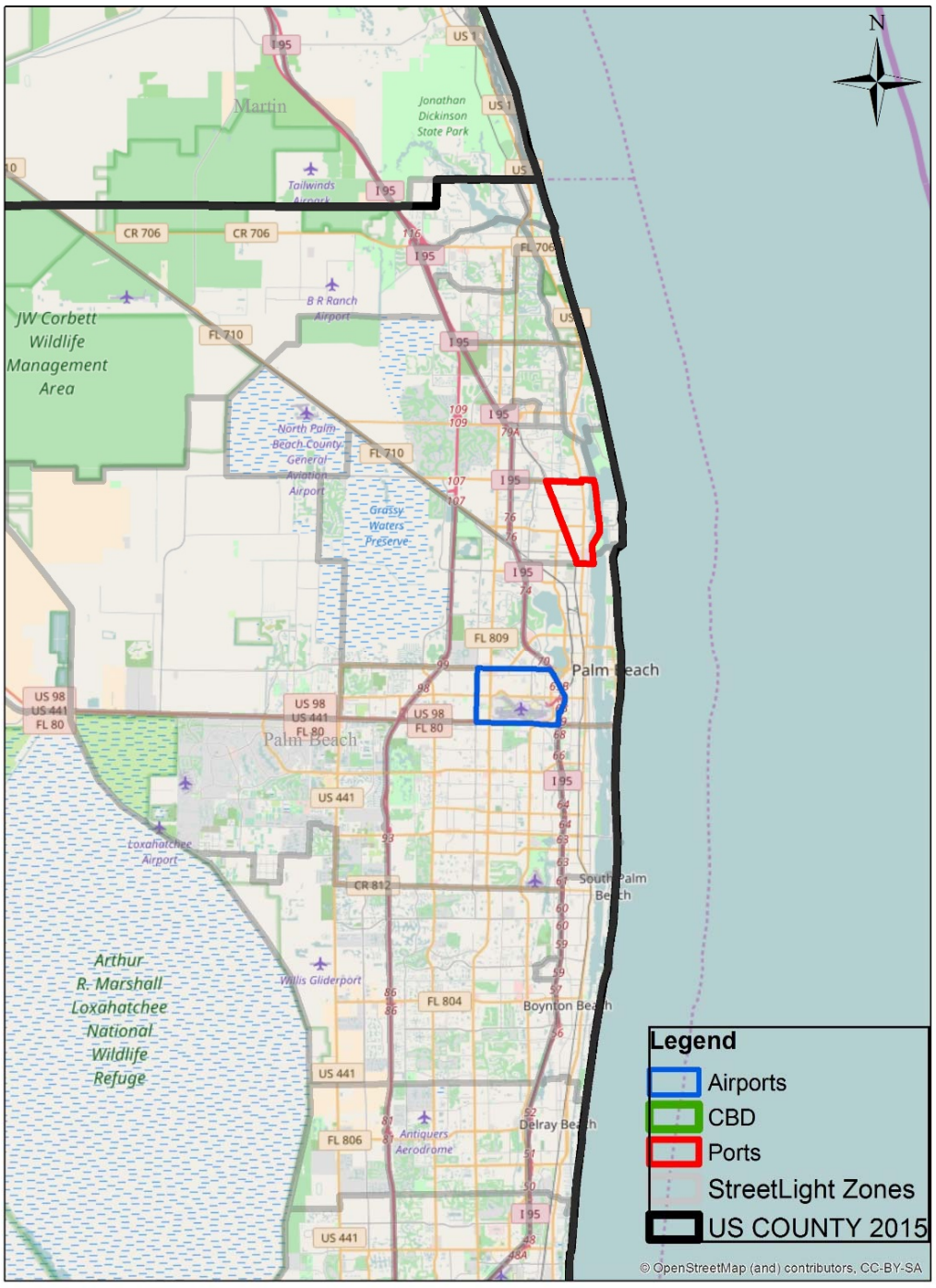


Figure 29: Palm Beach County Selected Commercial Travel Generators



The Streetlight truck trip data were reviewed across multiple dimensions from a planning and modeling perspective. Key checks include:

- Evaluating trip generation rates that might be estimated for explanatory variables;
- Studying the consistency of the data to support special generators;
- Assessing the distribution of trips by time of day; and
- Summarizing the geographic distribution pattern and average trip lengths implied by the dataset.

7.2 TRIP GENERATION ANALYSIS

To test the ability of the data to support the development of models of truck trip generation, the Streetlight truck trip ends were regressed against various explanatory variables. Available explanatory variables include TAD population and employment, and indicator variables for the presence of special generators in a TAD. As the name implies, special generators are locations that generate trips at a higher rate than the average rate observed at other commercial establishments. In the context of a truck model, places such as ports, seaports, large distribution centers, or large manufacturing facilities can be considered special generators. In the regression models, special generators can be introduced with an indicator variable, i.e., a variable that takes a value of one if the TAD contains a special generator, and a value of zero otherwise. The value of the indicator variable coefficient is an indication of the number of trip ends that the TAD generates beyond the overall average trip rate, due to the presence of the special generator.

The regression models were run only for the internal zones.

While linear regressions were computed both with and without zero intercepts, any trip generation models will likely need to be developed as zero intercept regressions to properly represent no travel in zones where there is no residential or employment activity. Even before any expansion of the truck trip end data, the regression of the explanatory variables against the trips ends was quite good and produced reasonable results.

7.2.1 HEAVY TRUCK TRIP GENERATION ANALYSIS

The results of the heavy truck linear regression are shown in Table 8. All explanatory variables, with the exception of the indicator variable for the Port Miami, exhibit the right sign for the coefficient and are mostly statistically significant. The criterion for statistical significance is a t-statistic greater than 1.96.

The sign of the coefficient indicates whether that variable would be useful as an explanatory variable in actual model development. As an example, heavy trucks do not typically serve residential zones, but they do serve places of employment. Thus, it is reasonable that for heavy trucks the coefficient for population is negative and not very significant. This variable is indeed unlikely to be used in trip generation models for heavy trucks.

As shown in Table 8, the marine ports and the airports, with the exception of the Port Miami, have high positive coefficients and are somewhat statistically significant. Each of these zones will likely be special generators for any heavy truck trip generation model with employment (or employment sub-segments) as the primary explanatory variable.

It is not possible to say without examining the expanded data whether the reason that Port Miami has such a low value and t-statistic is because (a) there is sample bias and heavy trucks traveling to Port Miami do not provide GPS data to Streetlight, or (b) there is no sample bias and indeed heavy trucks do not serve the Port in orders of magnitude greater than other zones with similar employment activity. It is advisable that additional survey information, such as gate counts, traffic counts, and surveys be obtained for the Port Miami and that these be used in expanding the heavy truck trip end data.

The CBDs as special generators exhibit negative and somewhat significant coefficients. This could be because (a) the data has not yet been expanded properly, or (b) heavy trucks do not serve CBDs owing to the nature of employment in the CBDs, or (c) the employment in these CBDs is already doing a good job of explaining trips ends. In any case, this finding is not altogether unexpected.

Table 8: Heavy Truck Linear Regression Results

EXPLANATORY VARIABLE	COEFFICIENT	t STATISTIC
Intercept	0	n/a
Population	-0.07	-1.19
Employment	0.93	6.60
Miami CBD (TADs 48 and 49)	-28,851	-1.74
Fort Lauderdale CBD (TAD 100)	-36,700	-1.53
Airports (TADs 54, 89 and 151)	13,452	1.02
Port Miami (TAD 50)	512	0.02
Port Everglades (TAD 88)	183,579	8.07
Port Palm Beach (TAD 159)	25,166	1.11
Regression Statistics		
Multiple R	0.71	
R Square	0.51	
Observations	167	

7.2.2 MEDIUM TRUCK TRIP GENERATION ANALYSIS

The results of the medium truck trip generation regression are shown in Table 8. As in the case of the heavy truck regression, the results for the medium trucks again look reasonable. All explanatory variables, with the exception of Port Miami and the Port of Palm Beach indicator variables, are statistically significant and have reasonable signs. For instance, medium trucks tend to serve residential areas more often than heavy trucks; a positive sign for the population variable indicates that this behavior is reflected in the data.

Results similar to those of the heavy truck models are observed in the medium truck analysis shown in Table 9, where all of the marine ports and the airports have high positive coefficients and, with exception of Port Miami and the Port Palm Beach, exhibit t-statistics greater than 1.0. Each of these zones will likely be special generators for any medium truck trip generation model that uses both population and employment as explanatory variables.

As in the case of heavy trucks, it is not possible to say without separately examining the expanded data whether the reason that Port Miami and Port of Palm Beach have low t-statistics is because the data

have yet to be expanded, the medium trucks traveling to these ports do not provide GPS data to Streetlight, or medium trucks do not serve these ports. Port. It is advisable that additional data collection, such as gate counts and surveys be obtained for these ports and these data be used in expanding the medium truck trip end data.

Table 9: Medium Trucks Linear Regression Results

EXPLANATORY VARIABLE	COEFFICIENT	t STATISTIC
Intercept	0	n/a
Population	0.92	7.41
Employment	3.89	13.15
Miami CBD (TADs 48 and 49)	-94,533	-2.70
Fort Lauderdale CBD (TAD 100)	-120,295	-2.39
Airports (TADs 54, 89 and 151)	87,833	3.16
Port Miami (TAD 50)	30,246	0.63
Port Everglades (TAD 88)	152,436	3.18
Port Palm Beach (TAD 159)	10,057	0.21
Regression Statistics		
Multiple R	0.94	
R Square	0.87	
Observations	167	

7.3 TRIP DISTRIBUTION ANALYSIS

Trip distribution models for truck trips should not be developed based on non-expanded Streetlight data. However, preliminary analyses can provide ideas for thoughtful survey expansion and for understanding the existing data structure and hence, this analysis was conducted as part of this study.

The truck trips were sorted into average daily weekday trips (Monday to Thursday). As shown in Table 10 for heavy trucks and in Table 11 for medium trucks, the largest values of the flows are observed in intra-county movements – which is an expected outcome. The unexpanded trip tables are symmetrical with respect to the diagonal as would be expected with an expanded trip table.

The share of external trips to and from the region is roughly 10% for heavy trucks in the urban counties with larger percentages for the more northerly counties that are closer to the externals to the study area (very reasonable). Medium trucks, which are far less likely to leave the study area than heavy trucks owing to the nature of services they provide, only have 1% of the total truck trips to and from externals. All of these findings make intuitive sense.

Table 10: Weekday County-to-County Heavy Truck Trip Flows (in thousands)

COUNTY	Miami-Dade	Broward	Palm Beach	Martin	St. Lucie	Okee-chobee	External	Total	% External
Miami-Dade	470	73	33	9	23	1	53	661	8%
Broward	74	339	64	11	28	2	62	580	11%
Palm Beach	28	62	172	13	31	3	54	363	15%
Martin	7	10	13	16	16	3	16	81	20%
St. Lucie	20	27	28	13	86	4	99	276	36%
Okeechobee	2	2	3	3	4	5	12	32	39%
External	52	63	53	16	88	12	n/a	284	
Total	653	576	366	81	275	30	297	2,277	
% External	8%	11%	15%	20%	32%	40%			

Table 11 Weekday County-to-County Medium Truck Trip Flows

COUNTY	Miami-Dade	Broward	Palm Beach	Martin	St. Lucie	Okee-chobee	External	Total	% External
Miami-Dade	2,782	263	31	2	6	1	31	3,116	1%
Broward	262	2,648	168	4	9	1	23	3,115	1%
Palm Beach	31	167	2,270	36	30	4	31	2,570	1%
Martin	1	4	36	219	49	4	8	322	3%
St. Lucie	6	8	29	49	393	5	59	550	11%
Okeechobee	1	1	4	4	5	65	12	93	13%
External	31	22	31	8	56	13	n/a	161	
Total	3,114	3,114	2,570	322	550	93	164	9,927	
% External	1%	1%	1%	3%	10%	13%			

Average trip lengths were computed from travel durations reported by the Streetlight truck trips. As shown in Table 12, heavy truck average trip lengths are considerably longer than medium truck average trip lengths. While these values may change after expansion of the data, the pattern is unlikely to change drastically. The average trip lengths show the same pattern as those presented in the FHWA's Quick Response Freight Manual version 1 from 1996 for the Phoenix area. However, it must be noted that both the medium and heavy truck average trip lengths provided by Streetlight are longer than those presented in the QRFM I, but that might be because these values were computed from Streetlight trucks traveling over a multicounty highly urban area, while the average times in the QRFM I were derived from trucks traveling in the two-county Phoenix region.

Table 12: Average Truck Trip Length

TRUCK SIZE	SE FLORIDA (StreetLight)	PHOENIX (QRFM I)
Heavy Trucks	46.7 minutes	33.3 minutes
Medium Trucks	25.8 minutes	10.0 minutes

The trip length frequency distribution was also examined, as shown in Figure 30 for heavy trucks and Figure 31 for medium trucks. These distributions appear reasonable, with the medium trucks exhibiting a shorter tail of long trips as compared to heavy trucks.

Figure 30: Heavy Truck Trip Length Frequency, Average Weekdays

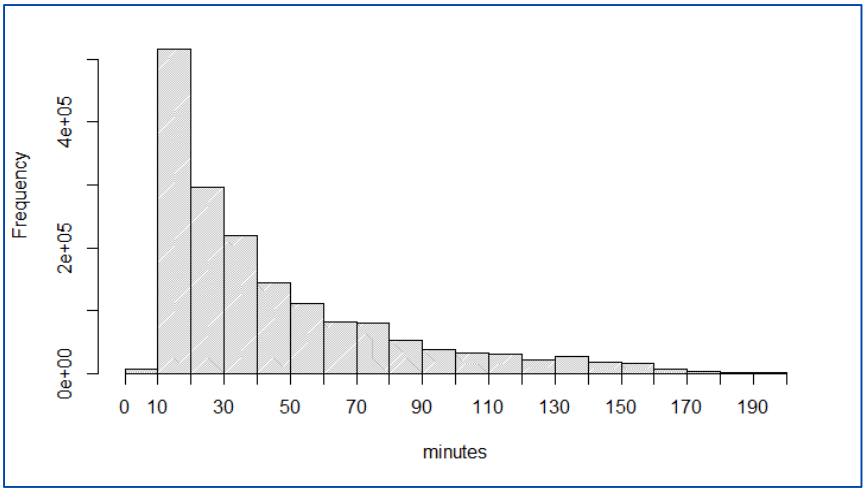
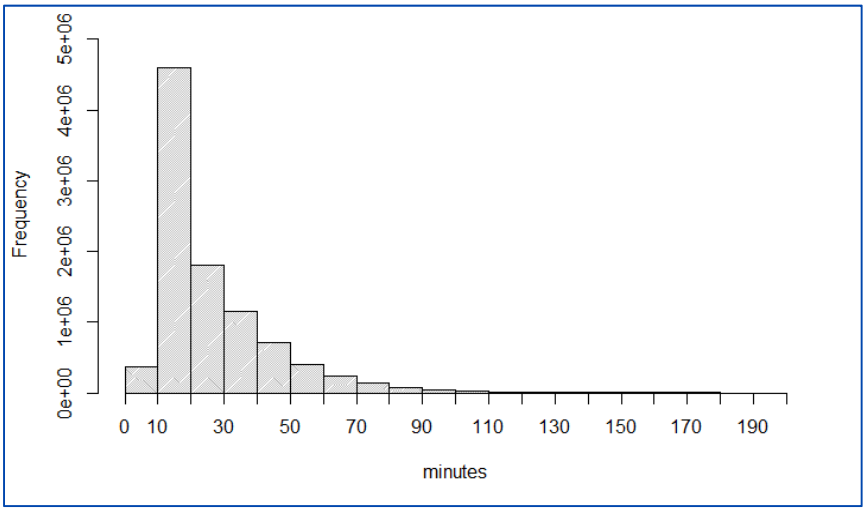


Figure 31: Medium Truck Trip Length Frequency, Average Weekdays



7.4 TIME-OF-DAY ANALYSIS

It is expected that the truck models developed using Streetlight data will be used to support weekday models of trip generation and trip distribution, as well as allocations to time of day periods. Therefore, the Streetlight data should not be biased by time period. As part of this preliminary analysis, Streetlight data were examined to ensure that they follow time of day patterns observed from other sources of truck data.

As shown in Figure 32, heavy truck trips occur primarily during the day (AM peak, Midday and PM Peak) with highest percentage during the Midday. While departure times from origins are presented in the figure, the arrival times at destinations were also examined and produced virtually the same results. This usage pattern for a typical weekday is consistent with patterns observed from other sources and other regions.

The medium truck trips also occur primarily during the day (AM peak, Midday and PM Peak) with highest percentage during the Midday (Figure 33). However, the travel share of the day-time travel for medium trucks is almost 90% as compared to about 75% for heavy trucks.

Nearly 15% of heavy truck travel happens during the early AM period as compared to only 5% of medium truck travel. The difference in travel patterns during the early AM period between the heavy and medium trucks is as expected since heavy trucks tend to travel through the night and over longer travel distances.

Figure 32: Heavy Truck Trip Origins by Departure Time, Weekdays

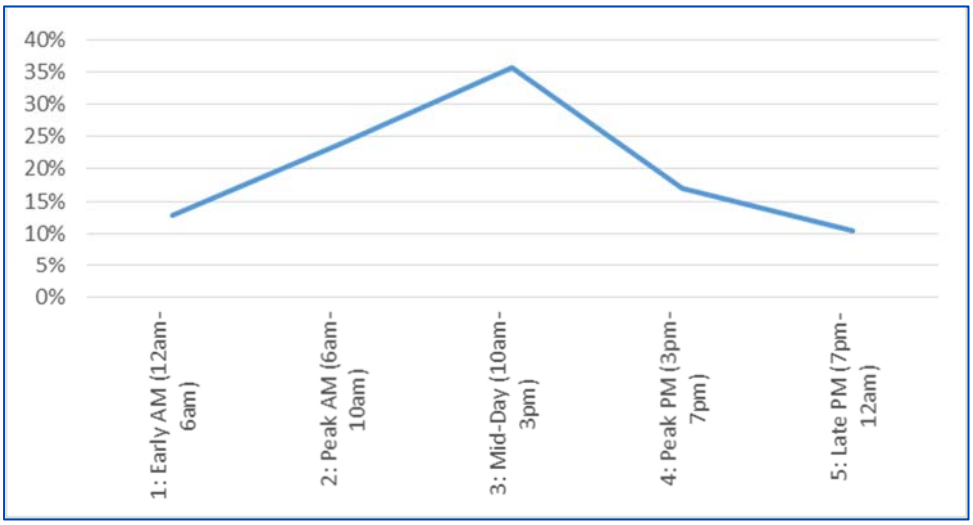
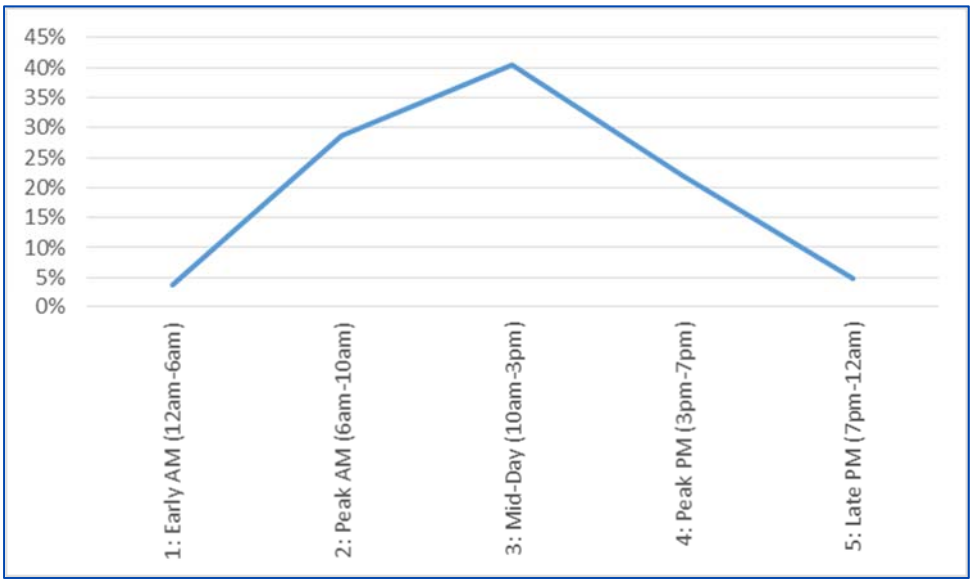


Figure 33: Medium Trucks Trip Origins by Departure Time, Weekdays



7.5 TRAVEL TIME ANALYSIS

Finally, reported times for a selected number of origin-destination pairs were compared to travel times obtained from Google Maps. To generate travel times within Google Maps, the center of the origin zone was chosen to be the trip starting point while the trip end point was chosen to be the center of the destination zone.

It must be noted that the Streetlight-reported times are averages over many origins and destinations within the zone pairs whereas the times reported by Google Maps are for a single trip between the zone centroids. The results are shown in Figure 34. While there are differences in times reported by the two sources, the general patterns are reassuring and leads us to conclude that the averaging and reporting of travel times by Streetlight is not biasing travel statistics.

7.6 SUMMARY CONCLUSIONS

Based on this review of the truck trip data provided by Streetlight, the data appear to be suitable for use as estimation data in the development of truck models.

- The data appear to regress well against likely explanatory variables. During actual model design, greater detail in the explanatory variables may be needed to support modeling.
- The truck trips to and from special generators appear reasonable, with the exception of the heavy truck trips to and from the Port of Miami and a few special generators for Medium Trucks – all of which deserve special attention in data expansion and model development.
- The travel patterns between origin-destination pairs also appears to be reasonable at a county-level. The average trip lengths derived from the truck trip data shows no significant geographic biases.

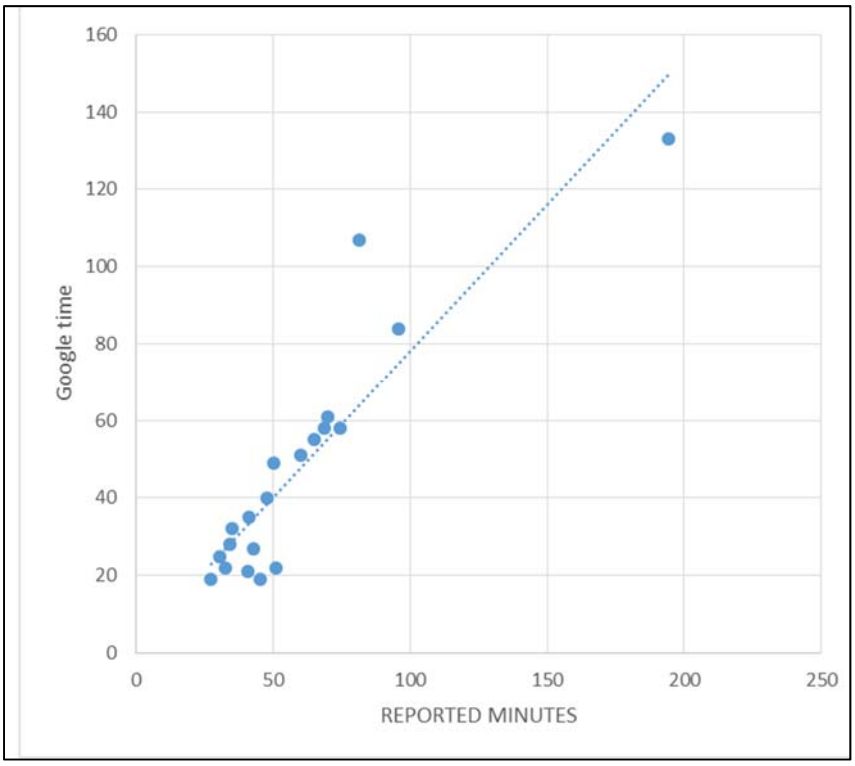
- The time of day distribution of the trips appears comparable to other sources and thus the temporal distribution of the observed trips is likely to be similar to the temporal distribution of all expanded truck trips. Even the comparisons of travel times with Google Maps data show consistencies.

While the Streetlight truck trip data appear reasonable, these truck trips do not represent all trucks traveling in the study area. The data should be expanded based on other locational data. For example, the Streetlight truck trip data may be used as a seed trip table in an Origin Destination Matrix Estimation (ODME) with observed trucks counts, by truck size, and preferable by time-of-day being used as matrix constraints.

As noted in the special generator discussion, additional counts or supplemental gate surveys of trucks near key locations may be warranted in the event that the trucks traveling to and from special generators are under-represented in Streetlight Data even after a first round of expansion.

While this review concentrated on the suitability of the GPS data to develop weekday truck models, it is noted that this data also includes truck trips for weekends. This suggests that weekend truck models, or factors to adjust weekday truck forecasts to weekend forecast might also be developed from this data, if necessary.

Figure 34: Comparison of Google and StreetLight Travel Times for Selected OD Pairs



8 SUMMARY

This report describes a comprehensive dataset of personal and commercial trip origin-destination travel patterns for the three counties of Southeast Florida. The data was obtained from Streetlight Data, Inc., on behalf of the Miami-Dade Transportation Planning Organization, the Broward Metropolitan Planning Organization, the Palm-Beach Metropolitan Planning Organization, and Florida Department of Transportation Districts Four and Six. The data portray average travel conditions for two broad data periods, which comprise all months in 2015 and all months in 2016. These data periods partially overlap with the deployment of the 2016 Southeast Florida Household Travel Survey, which took place in Fall 2016 and Spring 2017.

The OD data are available to these regional partners in packages of comma-separated value (CSV) files, which are accessible with MS Excel and practically any data processing software, such as R, SAS, STATA, SAS, ACCESS, and many others. Each package includes boundary files of the trip end district definitions, in ESRI shapefile format. Similarly, the location of all middle filters is provided in the form of zone boundaries, also in ESRI shapefile format. Appendix A describes in detail the contents of each data package.

The report illustrates various travel patterns which can be constructed with the OD data. An interactive report is also available with the data distribution packages, portraying additional visualizations. Users of these data are encouraged to build their own tabulations and visualizations.

Appendix A

APPENDIX A – DATA DICTIONARY

This section describes the contents of the data distribution packages.

PACKAGE 1 - ORIGIN/DESTINATION TRIP FREQUENCIES WITH PERSONAL TRAVEL DISTRICT SYSTEM

This package includes origin/destination trip frequencies and aggregate trip attributes associated with the zones or zone pairs, using personal travel district system. The files and their contents are listed below.

1. SOUTH_FLORIDA_DISTRICTS_PERSONAL_TRAVEL_DISTRICTS.SHP

This file is the district boundary file of the personal travel district system.

2. SOUTH_FLORIDA_DISTRICTS_CALIBRATION_ZONE_SET.SHP

This file is the zone boundary file of the AADT count locations, also called calibration zones, used in scale factor calculations.

3. CALIBRATION_ZONES.CSV

This file provides information on the calibration zones that are used to scale StreetLight Trip Indexes. The definition of the fields are listed below.

Field Name	Definition
Zone ID	Numeric ID for the Zone/count location. This is the 'id' from the calibration zone shapefile.
Zone Name	Name of the calibration zone/count location.
Zone Is Pass-Through	"Yes" value indicates that only trips passing through the Zone are represented in the StreetLight Trip Index. "No" value indicates that only trips that start in the Zone are represented in the StreetLight Trip Index values.
Zone Direction (degrees)	The direction in which trips pass-through the Zone, only relevant when "Is Pass-Through" is set to "Yes". Values are provided in degrees from 0 to 359, where 0 is due north, 90 is east, 180 is due south, etc. A value of "Null" refers to no direction filter and therefore all trips that pass-through the Zone will be used. Note: this attribute is only relevant for Zones where "Is Pass-Through" is set to "Yes".
Calibration Type	Type of input data used as calibration target.
Calibration Value	Calibration target value.
Personal Traffic Ratio	The ratio between personal traffic target and StreetLight personal traffic trip index for the Zone/count location.

Field Name	Definition
Commercial Medium Duty Traffic Ratio	The ratio between target and StreetLight Trip Index for medium-duty commercial vehicle, for the Zone/count location.
Commercial Heavy Duty Traffic Ratio	The ratio between target and StreetLight Trip Index for heavy-duty commercial vehicle, for the Zone/count location.
Personal Calibration - Is Excluded Zone	A flag that indicates if this Zone is not used to calculate the project personal trip scaling factor, since it was found to be an outlier.
Commercial Medium Duty Calibration - Is Excluded Zone	A flag that indicates if this Zone is not used to calculate the scaling factor medium-duty commercial vehicle trips, since it was found to be an outlier.
Commercial Heavy Duty Calibration - Is Excluded Zone	A flag that indicates if this Zone is not used to calculate scaling factor for heavy-duty commercial vehicle trips, since it was found to be an outlier.

4. OD_PERSONAL.CSV AND OD_COMMERCIAL.CSV

These files contain the origin/destination trip frequencies and zone information for personal or commercial trips.

Field Name	Definition
Vehicle Type	Type of vehicle analyzed with values of 'Personal' or 'Commercial'
Vehicle Weight	The weight class of the vehicle analyzed with values of 'Medium' or 'Heavy'. This field is present only in the Commercial file.
Origin Zone ID	Numeric ID for the Origin Zone. This is the 'id' from the district shapefile.
Origin Zone Name	Name for the Origin Zone. This is the 'name' from the district shapefile.
Origin Zone Is Pass-Through	"Yes" value indicates that only trips passing through the Origin Zone are represented in the StreetLight Trip Index. "No" value indicates that only trips that start in the Origin Zone are represented in the StreetLight Trip Index values.
Origin Zone Direction (degrees)	The direction in which trips pass-through the Origin Zone, only relevant when "Is Pass-Through" is set to "Yes"
Destination Zone ID	Numeric ID for the Destination Zone. This is the 'id' from the district shapefile.
Destination Zone Name	Name for the Destination Zone. This is the 'name' from the district shapefile.
Destination Zone Is Pass-Through	Yes value indicates that only trips passing through the Destination Zone are represented in the StreetLight Trip Index. "No" value indicates that only trips that end in the Destination Zone are represented in the StreetLight Trip Index values.
Destination Zone Direction (degrees)	The direction in which trips pass-through the Destination Zone, only relevant when "Is Pass-Through" is set to "Yes"

Field Name	Definition
Day Type	Average Day (average of traffic Monday through Sunday), Average Weekday (average of weekday traffic Monday through Thursday), or Average Weekend Day (average of weekend traffic Saturday through Sunday).
Day Part	Time periods defined as: 0: All Day (12am-12am) 1: Early AM (12am-6am) 2: Peak AM (6am-10am) 3: Mid-Day (10am-3pm) 4: Peak PM (3pm-7pm) 5: Late PM (7pm-12am)
O-D Traffic (StL Index)	The volume of trips from the Origin Zone to the Destination Zone.
Origin Zone Traffic (StL Index)	All trips from the Origin Zone with no limitation on where they went.
Destination Zone Traffic (StL Index)	All trips to the Destination Zone with no limitation on where they came from.
O-D Traffic (Project Index [BETA])	Scaled volume of trips from the Origin Zone to the Destination Zone, using calculated scaling factors.
Origin Zone Traffic (Project Index [BETA])	Scaled trips from the Origin Zone with no limitation on where they went, using calculated scaling factors.
Destination Zone Traffic (Project Index [BETA])	Scaled trips to the Destination Zone with no limitation on where they came from, using calculated scaling factors.
Avg Trip Duration (sec)	Average travel time (in seconds) for the trips from the Origin Zone to the Destination Zone

5. OD_PREM_A_TRIP_ATTRIBUTES_PERSONAL.CSV AND OD_PREM_A_TRIP_ATTRIBUTES_COMMERCIAL.CSV

These files contain aggregate trip attributes of trips between zone pairs.

Field Name	Definition
Vehicle Type	Type of vehicle analyzed with values of 'Personal' or 'Commercial'.
Vehicle Weight	The weight class of the vehicle analyzed with values of 'Medium' or 'Heavy'. This field is present only in the Commercial file.
Origin Zone ID	Numeric ID for the Origin Zone. This is the 'id' from the district shapefile.
Origin Zone Name	Name for the Origin Zone. This is the 'name' from the district shapefile.
Origin Zone Is Pass-Through	"Yes" value indicates that only trips passing through the Origin Zone are represented in the StreetLight Trip Index. "No" value indicates that only trips that start in the Origin Zone are represented in the StreetLight Trip Index values.
Origin Zone Direction (degrees)	The direction in which trips pass-through the Origin Zone, only relevant when "Is Pass-Through" is set to "Yes".
Destination Zone ID	Numeric ID for the Destination Zone. This is the 'id' from the district shapefile.

Field Name	Definition
Destination Zone Name	Name for the Destination Zone. This is the 'name' from the district shapefile.
Destination Zone Is Pass-Through	“Yes” value indicates that only trips passing through the Destination Zone are represented in the StreetLight Trip Index. "No" value indicates that only trips that end in the Destination Zone are represented in the StreetLight Trip Index values.
Destination Zone Direction (degrees)	The direction in which trips pass-through the Destination Zone, only relevant when "Is Pass-Through" is set to "Yes".
Day Type	Average Day (average of traffic Monday through Sunday), Average Weekday (average of weekday traffic Monday through Thursday), or Average Weekend Day (average of weekend traffic Saturday through Sunday).
Day Part	Time periods defined as: 0: All Day (12am-12am) 1: Early AM (12am-6am) 2: Peak AM (6am-10am) 3: Mid-Day (10am-3pm) 4: Peak PM (3pm-7pm) 5: Late PM (7pm-12am)
Avg Trip Duration (sec)	The average trip time in seconds between the Origin and Destination Zones for low network factor* trips.
Avg All Trip Duration (sec)	The average trip time in seconds between the Origin and Destination Zones for all trips
Avg Trip Length (mi)	The average trip length in miles between the Origin and Destination Zones for low network factor* trips.
Avg All Trip Length (mi)	The average trip length in miles between the Origin and Destination Zones for all trips.
Avg Trip Speed (mph)	The average trip speed in mph between the Origin and Destination Zones for low network factor* trips.
Avg All Trip Speed (mph)	The average trip speed in mph between the Origin and Destination Zones for all trips.
Avg All Circuity	The average circuity between the Origin and Destination Zones for all trips. Trip circuity is the average ratio of the length of the trip to the crows' flight (or direct) distance between the end-points of the trips between an Origin or Destination zone (for O-D). It is dependent on the Trip Type (Unlocked or Locked to Route). Locked to Route trips will generally have a higher circuity than Unlocked trips because they are longer.
Trip Duration X-Y min (percent)	The percent of all trips between the Origin and Destination Zones for which the trip time is in the bin from X to Y minutes. The bin is inclusive of the start value X and exclusive of the end value Y.
Trip Length X-Y mi (percent)	The percent of all trips between the Origin and Destination Zones for which the trip length is in the bin from X to Y miles. The bin is inclusive of the start value X and exclusive of the end value Y.
Trip Speed X-Y mph (percent)	The percent of all trips between the Origin and Destination Zones for which the average speed is in the bin from X to Y mph. The bin is inclusive of the start value X and exclusive of the end value Y.

Field Name	Definition
Trip Circuity X-Y (percent)	The percent of all trips between the Origin and Destination Zones for which the trip circuity is in the bin from X to Y. The bin is inclusive of the start value X and exclusive of the end value Y.

*Network factor is defined as unlocked trip length / distance (trip point in origin zone, trip point in destination zone). Low network is less than 4. This is different from circuity in that it is always calculated using the unlocked (or connect the points) trip length.

6. ZONE_PREM_A_TRIP_ATTRIBUTES_PERSONAL.CSV AND ZONE_TRIP_ATTRIBUTES_OD_COMMERCIAL.CSV

These files contain aggregate trip attributes for trips either starting or ending at the Zones.

Field Name	Definition
Vehicle Type	Type of vehicle analyzed with values of 'Personal' or 'Commercial'.
Vehicle Weight	The weight class of the vehicle analyzed with values of 'Medium' or 'Heavy'. This field is present only in the Commercial file.
Zone Type	Indicates if the Zone is an Origin or Destination Zone.
Zone ID	Numeric ID for the Zone. This is the 'id' from the district shapefile.
Zone Name	Name for the Zone. This is the 'name' from the district shapefile.
Zone Is Pass-Through	"Yes" value indicates that only trips passing through the Zone are represented in the StreetLight Trip Index. "No" value indicates that only trips that start in the Zone are represented in the StreetLight Trip Index values.
Zone Direction (degrees)	The direction in which trips pass-through the Zone, only relevant when "Is Pass-Through" is set to "Yes".
Day Type	Average Day (average of traffic Monday through Sunday), Average Weekday (average of weekday traffic Monday through Thursday), or Average Weekend Day (average of weekend traffic Saturday through Sunday).
Day Part	Time periods defined as: 0: All Day (12am-12am) 1: Early AM (12am-6am) 2: Peak AM (6am-10am) 3: Mid-Day (10am-3pm) 4: Peak PM (3pm-7pm) 5: Late PM (7pm-12am)
Avg Trip Duration (sec)	The average trip time in seconds for low network factor* trips starting in, or ending in the Zone based on the Zone Type.
Avg All Trip Duration (sec)	The average trip time in seconds for all trips starting in, or ending in the Zone based on the Zone Type.
Avg Trip Length (mi)	The average trip length in miles for low network factor* trips starting in, or ending in the Zone based on the Zone Type.
Avg All Trip Length (mi)	The average trip length in miles for all trips starting in, or ending in the Zone based on the Zone Type.
Avg Trip Speed (mph)	The average trip speed in mph for low network factor* trips starting in, or ending in the Zone based on the Zone Type.

Field Name	Definition
Avg All Trip Speed (mph)	The average trip speed in mph for all trips starting in, or ending in the Zone based on the Zone Type.
Avg All Circuity	The average circuity for all trips starting in, or ending in the Zone based on the Zone Type.
Trip Duration X-Y min (percent)	The percent of all trips starting in, or ending in the Zone, based on the Zone Type, for which the trip time is in the bin from X to Y minutes. The bin is inclusive of the start value X and exclusive of the end value Y.
Trip Length X-Y mi (percent)	The percent of all trips starting in, or ending in the Zone, based on the Zone Type, for which the trip length is in the bin from X to Y miles. The bin is inclusive of the start value X and exclusive of the end value Y.
Trip Speed X-Y mph (percent)	The percent of all trips starting in, or ending in the Zone, based on the Zone Type, for which the average speed is in the bin from X to Y mph. The bin is inclusive of the start value X and exclusive of the end value Y.
Trip Circuity X-Y (percent)	The percent of all trips starting in, or ending in the Zone, based on the Zone Type, for which the trip circuity is in the bin from X to Y. The bin is inclusive of the start value X and exclusive of the end value Y.

*Network factor is defined as unlocked trip length / distance (trip point in origin zone, trip point in destination zone). Low network is less than 4. This is different from circuity in that it is always calculated using the unlocked (or connect the points) trip length.

PACKAGE 2 - ORIGIN/DESTINATION TRIP FREQUENCIES WITH COMMERCIAL TRAVEL DISTRICT SYSTEM

This package includes trip frequencies and attributes files same as those in Package 1, but using a different district system, the commercial travel district system. The definition of the commercial travel district boundaries can be found in the file “SE_Florida_Districts_Commercial_Travel_Districts.shp”.

PACKAGE 3 – SELECT LINK TRIP FREQUENCIES WITH PERSONAL TRAVEL DISTRICT SYSTEM

This package includes origin/destination trip frequencies and trip attributes for trips that use any of the thirty-five (35) selected road segments across the region. The zone system used is the personal travel district system. The files and their contents are listed below. The trips in this package are not scaled.

1. SE_FLORIDA_ODWMF_MIDDLE_FILTER_ZONE_SET.SHP

This file is the zone boundary file of the middle filters, or select links.

2. MF_PERSONAL.CSV AND MF_COMMERCIAL.CSV

These files contain the select link trip frequencies and zone information for personal or commercial trips.

Field Name	Definition
Device Type	Type of vehicle analyzed with values of 'Personal' or 'Commercial'.
Vehicle Weight	The weight class of the vehicle analyzed with values of 'Medium' or 'Heavy'. This field is present only in the Commercial file.
Origin Zone ID	Numeric ID for the Origin Zone. This is the 'id' from the district shapefile.
Origin Zone Name	Name for the Origin Zone. This is the 'name' from the district shapefile.
Origin Zone Is Pass-Through	"Yes" value indicates that only trips passing through the Origin Zone are represented in the StreetLight Trip Index. "No" value indicates that only trips that start in the Origin Zone are represented in the StreetLight Trip Index values.
Origin Zone Direction (degrees)	The direction in which trips pass-through the Origin Zone, only relevant when "Is Pass-Through" is set to "Yes"
Middle Filter Zone ID	Numeric ID for the Middle Filter Zone/select link.
Middle Filter Zone Name	Name for the Middle Filter Zone/select link.
Middle Filter Zone Direction (degrees)	The direction in which trips pass-through the Middle Filter Zone/select link.
Destination Zone ID	Numeric ID for the Destination Zone. This is the 'id' from the district shapefile.
Destination Zone Name	Name for the Destination Zone. This is the 'name' from the district shapefile.
Destination Zone Is Pass-Through	“Yes” value indicates that only trips passing through the Destination Zone are represented in the StreetLight Trip Index. "No" value indicates that only trips that end in the Destination Zone are represented in the StreetLight Trip Index values.
Destination Zone Direction (degrees)	The direction in which trips pass-through the Destination Zone, only relevant when "Is Pass-Through" is set to "Yes"
Day Type	Average Day (average of traffic Monday through Sunday),
	Average Weekday (average of weekday traffic Monday through Thursday), or
	Average Weekend Day (average of weekend traffic Saturday through Sunday).
Day Part	Time periods defined as:
	0: All Day (12am-12am)
	1: Early AM (12am-6am)
	2: Peak AM (6am-10am)
	3: Mid-Day (10am-3pm)
	4: Peak PM (3pm-7pm)
	5: Late PM (7pm-12am)
O-M-D Traffic (StL Index)	The volume of trips from the Origin Zone, through the select link, to the Destination Zone
Origin Zone Traffic (StL Index)	All trips from the Origin Zone with no limitation on where they went.
Middle Filter Zone Traffic (StL Index)	All trips through the Middle Filter Zone/select link with no limitation on where they came from or where they went.
Destination Zone Traffic (StL Index)	All trips to the Destination Zone with no limitation on where they came from.
Avg Trip Duration (sec)	Average time (in seconds) for the trips from the Origin Zone, through the select link, to the Destination Zone.

3. MF_PREM_A_TRIP_ATTRIBUTES_PERSONAL.CSV AND MF_PREM_A_TRIP_ATTRIBUTES_COMMERCIAL.CSV

These files contain aggregate trip attributes for trips between zone pairs and through select links.

Field Name	Definition
Device Type	Type of vehicle analyzed with values of 'Personal' or 'Commercial'.
Vehicle Weight	The weight class of the vehicle analyzed with values of 'Medium' or 'Heavy'. Column is present only in the Commercial file.
Origin Zone ID	Numeric ID for the Origin Zone. This is the 'id' from the district shapefile.
Origin Zone Name	Name for the Origin Zone. This is the 'name' from the district shapefile.
Origin Zone Is Pass-Through	"Yes" value indicates that only trips passing through the Origin Zone are represented in the StreetLight Trip Index. "No" value indicates that only trips that start in the Origin Zone are represented in the StreetLight Trip Index values.
Origin Zone Direction (degrees)	The direction in which trips pass-through the Origin Zone, only relevant when "Is Pass-Through" is set to "Yes".
Middle Filter Zone ID	Numeric ID for the Middle Filter Zone/select link.
Middle Filter Zone Name	Name for the Middle Filter Zone/select link.
Middle Filter Zone Direction (degrees)	The direction in which trips pass-through the Middle Filter Zone/select link. Values are provided in degrees from 0 to 359, where 0 is due north, 90 is east, 180 is due south, etc. A value of "Null" refers to no direction filter and therefore all trips that pass-through the Zone will be used.
Destination Zone ID	Numeric ID for the Destination Zone. This is the 'id' from the district shapefile.
Destination Zone Name	Name for the Destination Zone. This is the 'name' from the district shapefile.
Destination Zone Is Pass-Through	“Yes” value indicates that only trips passing through the Destination Zone are represented in the StreetLight Trip Index. "No" value indicates that only trips that end in the Destination Zone are represented in the StreetLight Trip Index values.
Destination Zone Direction (degrees)	The direction in which trips pass-through the Destination Zone, only relevant when "Is Pass-Through" is set to "Yes".
Day Type	Average Day (average of traffic Monday through Sunday),
	Average Weekday (average of weekday traffic Monday through Thursday), or
	Average Weekend Day (average of weekend traffic Saturday through Sunday).
Day Part	Time periods defined as:
	0: All Day (12am-12am)
	1: Early AM (12am-6am)
	2: Peak AM (6am-10am)
	3: Mid-Day (10am-3pm)
	4: Peak PM (3pm-7pm)
	5: Late PM (7pm-12am)
Avg Trip Duration (sec)	The average trip time in seconds for low network factor* trips starting at the Origin Zones, passing through the Middle Filter Zones/select links, and ending at the Destination Zones.

Field Name	Definition
Avg All Trip Duration (sec)	The average trip time in seconds for all trips starting at the Origin Zones, passing through the Middle Filter Zones/select links, and ending at the Destination Zones.
Avg Trip Length (mi)	The average trip length in miles for low network factor* trips starting at the Origin Zones, passing through the Middle Filter Zones/select links, and ending at the Destination Zones.
Avg All Trip Length (mi)	The average trip length in miles for all trips starting at the Origin Zones, passing through the Middle Filter Zones/select links, and ending at the Destination Zones.
Avg Trip Speed (mph)	The average trip speed in mph for low network factor* trips starting at the Origin Zones, passing through the Middle Filter Zones/select links, and ending at the Destination Zones.
Avg All Trip Speed (mph)	The average trip speed in mph for all trips starting at the Origin Zones, passing through the Middle Filter Zones/select links, and ending at the Destination Zones.
Avg All Circuity	The average circuity for all trips starting at the Origin Zones, passing through the Middle Filter Zones/select links, and ending at the Destination Zones.
Trip Duration X-Y min (percent)	The percent of all trips starting at the Origin Zones, passing through the Middle Filter Zones/select links, and ending at the Destination Zones for which the trip time is in the bin from X to Y minutes.
Trip Length X-Y mi (percent)	The percent of all trips starting at the Origin Zones, passing through the Middle Filter Zones/select links, and ending at the Destination Zones for which the trip length is in the bin from X to Y miles.
Trip Speed X-Y mph (percent)	The percent of all trips starting at the Origin Zones, passing through the Middle Filter Zones/select links, and ending at the Destination Zones for which the average speed is in the bin from X to Y mph.
Trip Circuity X-Y (percent)	The percent of all trips starting at the Origin Zones, passing through the Middle Filter Zones/select links, and ending at the Destination Zones for which the trip circuity is in the bin from X to Y.

*Network factor is defined as unlocked trip length / distance (trip point in origin zone, trip point in destination zone). Low network is less than 4. This is different from circuity in that it is always calculated using the unlocked (or connect the points) trip length.

4. ZONE_PREM_A_TRIP_ATTRIBUTES_PERSONAL.CSV AND ZONE_PREM_A_TRIP_ATTRIBUTES_COMMERCIAL.CSV

These files contain aggregate trip attributes for trips associated with the Zones.

Field Name	Definition
Device Type	Type of vehicle analyzed with values of 'Personal' or 'Commercial'.
Vehicle Weight	The weight class of the vehicle analyzed with values of 'Medium' or 'Heavy'. This field is present only in the Commercial file.
Zone Type	Indicates if the Zone is an Origin, Middle Filter, or Destination Zone.
Zone ID	Numeric ID for the Zone. This is the 'id' from the zone shapefile.
Zone Name	Name for the Zone. This is the 'name' from the zone shapefile.
Zone Is Pass-Through	"Yes" value indicates that only trips passing through the Zone are represented in the StreetLight Trip Index. "No" value indicates that only trips that start or end in the Zone are represented in the StreetLight Trip Index values.
Zone Direction (degrees)	The direction in which trips pass-through the Zones. Values are provided in degrees from 0 to 359, where 0 is due north, 90 is east, 180 is due south, etc. A value of "Null" refers to no direction filter and therefore all trips that pass-through the Zone will be used.
Day Type	Average Day (average of traffic Monday through Sunday), Average Weekday (average of weekday traffic Monday through Thursday), or Average Weekend Day (average of weekend traffic Saturday through Sunday).
Day Part	Time periods defined as: 0: All Day (12am-12am) 1: Early AM (12am-6am) 2: Peak AM (6am-10am) 3: Mid-Day (10am-3pm) 4: Peak PM (3pm-7pm) 5: Late PM (7pm-12am)
Avg Trip Duration (sec)	The average trip time in seconds for low network factor* trips starting in, passing through, or ending in the Zone, based on the Zone Type.
Avg All Trip Duration (sec)	The average trip time in seconds for all trips starting in, passing through, or ending in the Zone, based on the Zone Type.
Avg Trip Length (mi)	The average trip length in miles for low network factor* trips starting in, passing through, or ending in the Zone, based on the Zone Type.
Avg All Trip Length (mi)	The average trip length in miles for all trips starting in, passing through or ending in the Zone, based on the Zone Type.
Avg Trip Speed (mph)	The average trip speed in mph for low network factor* trips starting in, pass through, or ending in the Zone, based on the Zone Type.
Avg All Trip Speed (mph)	The average trip speed in mph for all trips starting in, passing through, or ending in the Zone, based on the Zone Type.
Avg All Circuity	The average circuity for all trips starting in, passing through, or ending in the Zone, based on the Zone Type.
Trip Duration X-Y min (percent)	The percent of all trips starting in, passing through, or ending in the Zone, based on the Zone Type, for which the trip time is in the bin from X to Y minutes. The bin is inclusive of the start value X and exclusive of the end value Y.

Field Name	Definition
Trip Length X-Y mi (percent)	The percent of all trips starting in, passing through, or ending in the Zone, based on the Zone Type, for which the trip length is in the bin from X to Y miles. The bin is inclusive of the start value X and exclusive of the end value Y.
Trip Speed X-Y mph (percent)	The percent of all trips starting in, passing through, or ending in the Zones, based on the Zone Type, for which the average speed is in the bin from X to Y mph. The bin is inclusive of the start value X and exclusive of the end value Y.
Trip Circuity X-Y (percent)	The percent of all trips starting in, passing through, or ending in the Zone, based on the Zone Type, for which the trip circuity is in the bin from X to Y. The bin is inclusive of the start value X and exclusive of the end value Y.

*Network factor is defined as unlocked trip length / distance (trip point in origin zone, trip point in destination zone). Low network is less than 4. This is different from circuity in that it is always calculated using the unlocked (or connect the points) trip length.

PACKAGE 4 - SELECT LINK TRIP FREQUENCIES WITH COMMERCIAL TRAVEL DISTRICT SYSTEM

This package includes trip frequencies and attributes files same as those in Package 3, but using a different district system, the commercial travel district system.