metroplan orlando
A REGIONAL TRANSPORTATION PARTNERSHIP

2045

Metropolitan Transportation Plan

Technical Series #3

Origin-Destination Analyses

January 2020

What is in this document?

Transportation planning has long relied on traffic volumes, travel times, and roadway capacity. These metrics are still important, but they do not always capture the full story of a transportation system. In this technical series, the flow of people from their origins to their destinations takes center stage. Findings include:

- The past 25 years of commuting show high growth and growing interaction with neighboring counties, especially Lake, Volusia, and Polk Counties. Despite growing inter-county commutes, a majority of jobs continue to be filled by workers who live and work in the same county (71 percent in 1990 and 68 percent in 2016).
- Cell phone data from StreetLight Data was visualized to help understand current travel patterns in the MetroPlan Orlando area. Major trip generators and attractors were identified, including theme parks, Orlando International Airport, and several key Central Florida neighborhoods and destinations.
- SunRail's origin-destination data shows that its strongest connections are between a central core of stations and two or three stations at each end. There is relatively little end-to-end travel, travel within the core stations, or travel between the core stations and stations immediately adjacent to them.
- Commercial vehicle data from StreetLight Data was summarized and mapped to help prioritize projects on freight corridors.
- Over two million trips under a mile are made every day in MetroPlan Orlando via cars. An additional 12 million car trips are between one and five miles in length. Maps showing where they are concentrated were developed to identify opportunities for mode shift to bicycling and walking.

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Why Look at Origins and Destinations?

Areawide transportation planning has long relied on traffic volumes, travel times, and roadway capacity. These metrics are still important, but because they are usually calculated for individual roadways, they do not always capture the full story of a transportation system. In this technical series, the flow of people from their origins to their destinations takes center stage. The sections in this document summarize different origin-destination datasets to illustrate the travel patterns of those who live, work, or play in Central Florida.

Historical Commute Flows

Before diving into the current state of origin-destination patterns, it is helpful to review how our region's travel patterns have varied over the years and how we got here. This section highlights trends of the past 25 years of commuting in Central Florida.

Data Sources

Commute flow data was obtained from the US Census Bureau, more specifically from the "journey to work" topic. This topic was included in the decennial Census from 1960 through 2000. After the 2000 Census, the topic was migrated to the American Community Survey (ACS). The following data sources were used for the analysis in this section:

- 1990 US Census
- 2000 US Census
- 2006-2010 ACS
- 2012-2016 ACS

The ACS data files used in this effort are compilations of five years' worth of surveys to Florida residents. For clarity, the rest of this section refers to the ACS surveys by their end year. Only commutes between Florida counties are summarized in this section.

The Census datasets report commute data for both residence and workplace geographies. To simplify discussion on this topic, this section will use the terms "workers" and "jobs" instead. Workers will be used to refer to employed adults over the age of 16. For example, "workers in Seminole County" refers to Seminole County residents who are employed—regardless of where their place of employment is. On the other hand, jobs will be used to refer to employment itself. As such, "jobs in Orange County" refers to people whose workplace is in Orange County—regardless of where they reside.

Findings

Workers and Jobs

Figure 3.1 presents a high-level summary of the historical US Census data on workers and jobs in the MetroPlan Orlando region, by county.

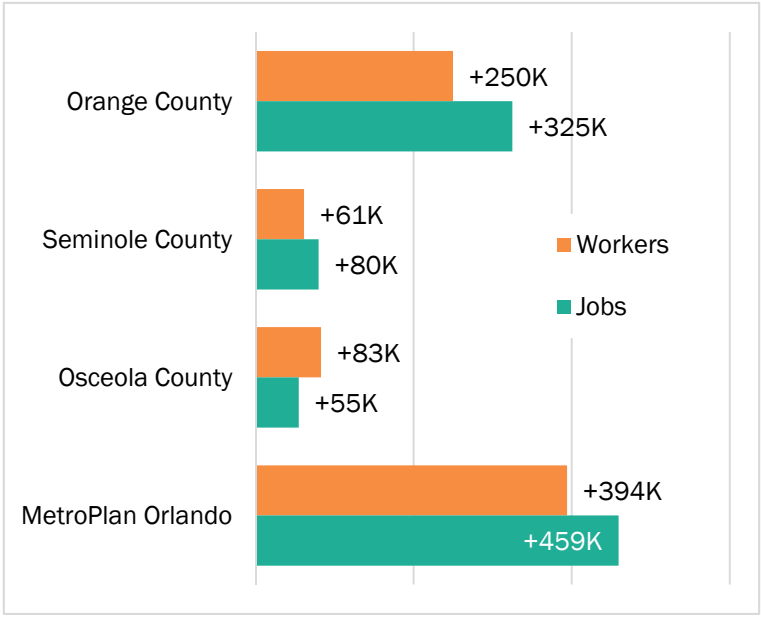
Figure 3.1 | Workers and Jobs in MetroPlan Orlando by County

Source: US Census

All three counties in MetroPlan Orlando region have experienced rapid growth in both workers and jobs since 1990 (see Figure 3.2). The tri-county region added 394,000 workers and 459,000 jobs between 1990 and 2016. Most of this increase took place in Orange County, which added 250,000 workers and 325,000 jobs in the same period. In percentage terms, Osceola County had the fastest growth: 162 percent increase in workers and 128 percent increase in jobs.

In 1990, the MetroPlan Orlando region had 105 jobs per 100 workers. In 2016, it had 110 jobs per 100 workers. This growing imbalance—combined with the rapid growth in employment over the 25-year period—has meant that the tri-county area is now importing an additional 65,000 workers—enough single-occupant vehicles to fill a six-lane freeway[1].

Figure 3.2 | Change in Workers and Jobs since 1990



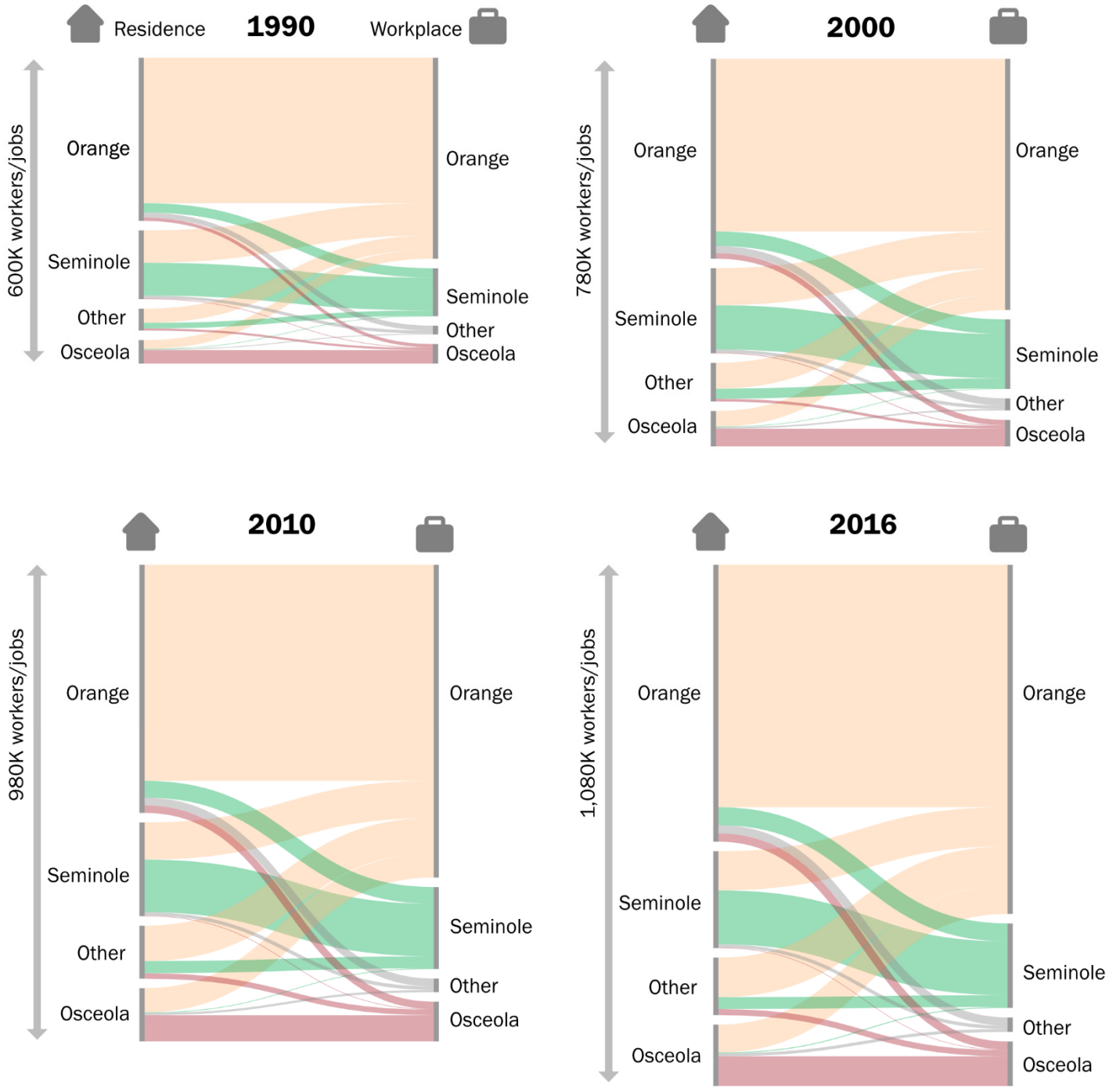
Note: Difference between 1990 US Census and 2012-16 ACS.

[1] Based on single-occupancy round-trip vehicular travel and daily LOS E volume threshold from FDOT Quality/Level of Service 2012.

County-to-County Flows

The rapid increases in workers and jobs experienced by the tri-county area has translated to more commute travel in the region. But commuting has not changed evenly across the three MetroPlan Orlando counties and neighboring counties. Figure 3.3 summarizes the flow of commuters from their residences to their workplaces.

Figure 3.3 | County-to-County Flows

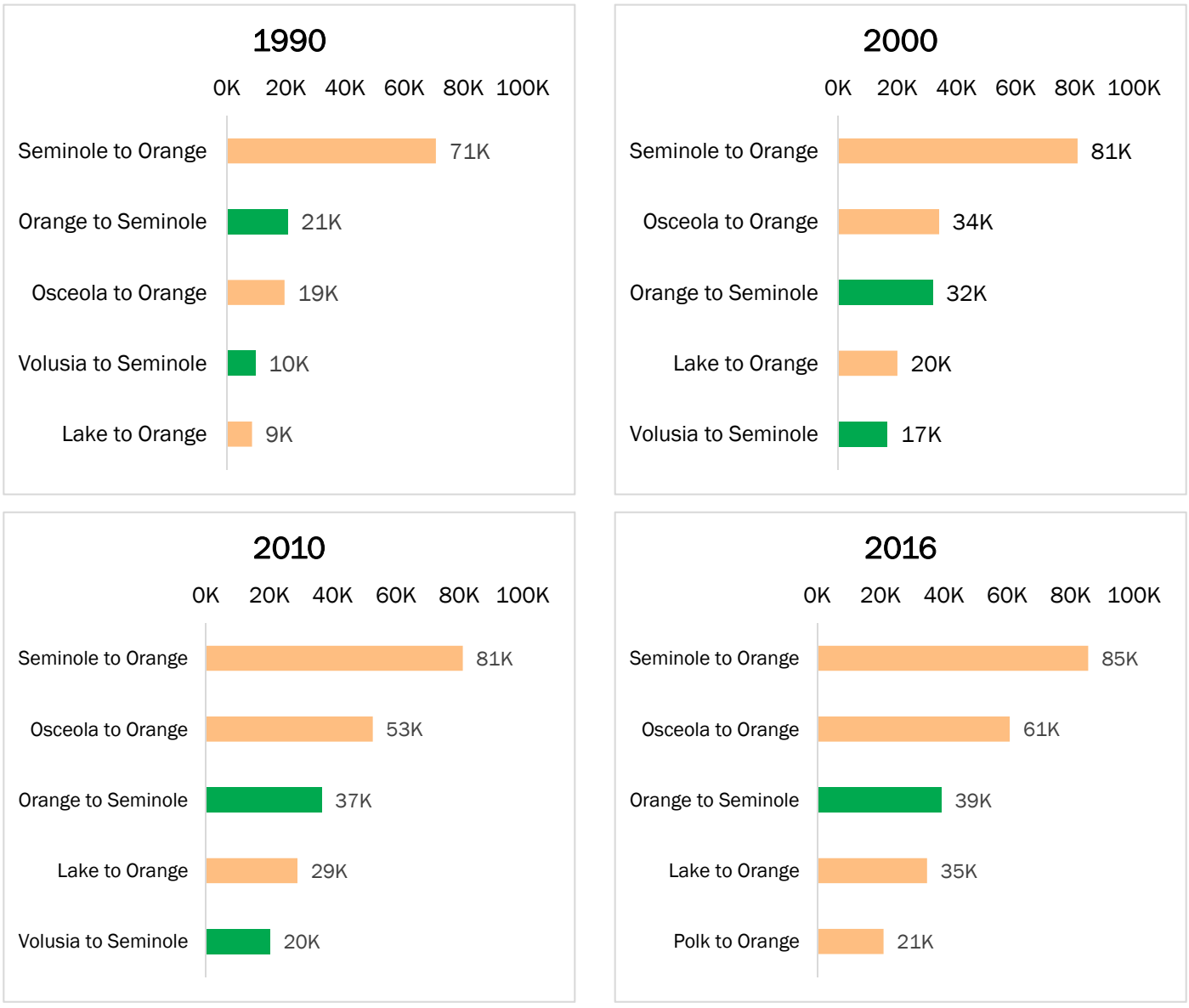


Source: US Census Bureau

It is evident from Figure 3.3 that the predominant commute flow is internal to Orange County: people who both live and work in Orange County. This flow represented roughly half of all commutes involving MetroPlan Orlando counties. Trips internal to Seminole County and Osceola County represented 11-12 percent and 5-6 percent, respectively.

Intercounty commutes—where an individual works in a county different from where they reside—represent about a third of all commutes involving MetroPlan Orlando counties. Intercounty commutes grew by 95 percent from 1990 to 2016, compared to 78 percent growth for all MetroPlan Orlando-related commutes over the same period. However, the increase was not evenly distributed across the origin-destination pairs, as shown in Figure 3.4.

Figure 3.4 | Top Five Inter-County Flows (Residence to Workplace)



Legend: Workplace in Orange County (■) and Seminole County (■)
Source: US Census Bureau | Note: The word "County" is omitted for brevity.

In 1990, the largest intercounty commute—by a large margin—was from Seminole County to Orange County. Since then, other commute flows into Orange County and Seminole County have grown more rapidly, narrowing the gap between the Seminole County to Orange County commute and the others. Intercounty commutes to Osceola County have been primarily from Orange County and from Polk County, but neither ranked in the top five across the four datasets.

Across all datasets, two of the top five intercounty commute flows involved counties outside of the tri-county area: Lake County, Volusia County, and Polk County. To put this into perspective, in 1990 only eight percent of all tri-county jobs were filled by workers who resided outside of the MetroPlan Orlando region. In 2016, that percentage had increased to about 12 percent.

Summary: Historical Commute Flows

The story of the past 25 years of commuting in the MetroPlan Orlando region is one of high growth, but also of growing interaction with neighboring counties. Orange County continues to be the employment hub of the region, growing from 440,000 jobs in 1990 to 760,000 jobs in 2016, a 70 percent increase. However, the share of MetroPlan Orlando jobs that are located in Orange County declined slightly, from 75 percent in 1990 to 73 percent in 2016.

The three-county area has added more jobs than workers over the past 25 years. This imbalance means that more workers are commuting into the MetroPlan Orlando area from neighboring counties, especially Lake County, Volusia County, and Polk County. Despite the growing inter-county commutes, a majority of jobs in the three-county region continue to be filled by workers who live and work in the same county (71 percent in 1990 and 68 percent in 2016).

Origins and Destinations in 2018

Origin-destination (OD) flows provide a variety of information for urban planners and policy makers in understanding regional mobility. This section used StreetLight Data products, sourced from cell phone location data, to visualize the OD travel patterns in the tri-county region.

Data Sources

StreetLight Data has two primary data sources: Location-Based Services (LBS) and Global Positioning System (GPS). LBS data is sourced from approximate cell phone location data collected by mobile applications. On the other hand, GPS data comes from vehicles and turn-by-turn navigation devices or applications. StreetLight Data separates its datasets into personal and commercial trips. In this analysis, the LBS personal trip data for 2018 was used. The data contains information for different types of day and time of day. The average weekday (i.e., Monday-Thursday) and all day (i.e., 12 am-12 am) options were selected for the visualization.

The location and boundaries of activity centers in the MetroPlan Orlando region were obtained from previous work completed by the MPO using AirSage data from 2014-2015. AirSage obtains device location data from cell phone carriers, which use triangulation between cell phone towers to estimate the device location.

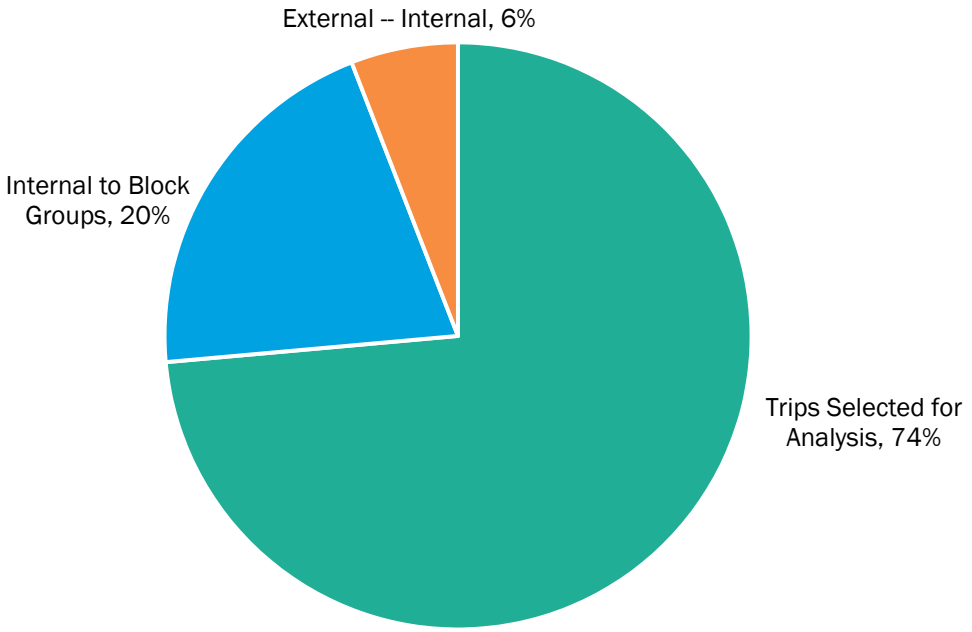
Methods

This subsection describes the specific steps to visualize the OD data. Kepler.gl, an open-source visualization library, was used to develop the visualization.

Census block groups were used as the basic geographic unit. In this analysis, only OD pairs that have both origins and destinations within MetroPlan Orlando were visualized. Through trips and trips with an endpoint outside MetroPlan Orlando were filtered out. In addition, trips that have the same origins and destinations were removed since these trips are primarily short-distance trips which are analyzed separately.

Figure 3.5 shows the percentage breakdown of trips selected for this analysis.

Figure 3.5 | Trips Visualized in OD Map



Source: StreetLight Data (2018 Monday-Thursday all-day average).

The visualization uses variable line thickness to represent trip volume for different OD pairs. An iterative approach resulted in a few adjustments to the original StreetLight Data dataset and the visualization's parameters. For example, it is noted that census block groups containing theme parks and attractions are large as they have little residential density. However, they have extremely high number of trips compared with other census block groups. Without adjustment to the line thickness scale, these census block groups would be overly represented in the visualization. On the other hand, many census block groups in urban cores are relatively small, leading to more dispersed visualization of the OD patterns. To better show the OD patterns, activity centers were used to group census block groups in the urban cores. These aggregated activity centers visually counterbalanced the large census block groups on the urban periphery.

Findings

Figure 3.6 on the following page shows the OD patterns visualized within the study area. Red represents the destination zone, and yellow represents the origin zone for the trips. The following observations are made:

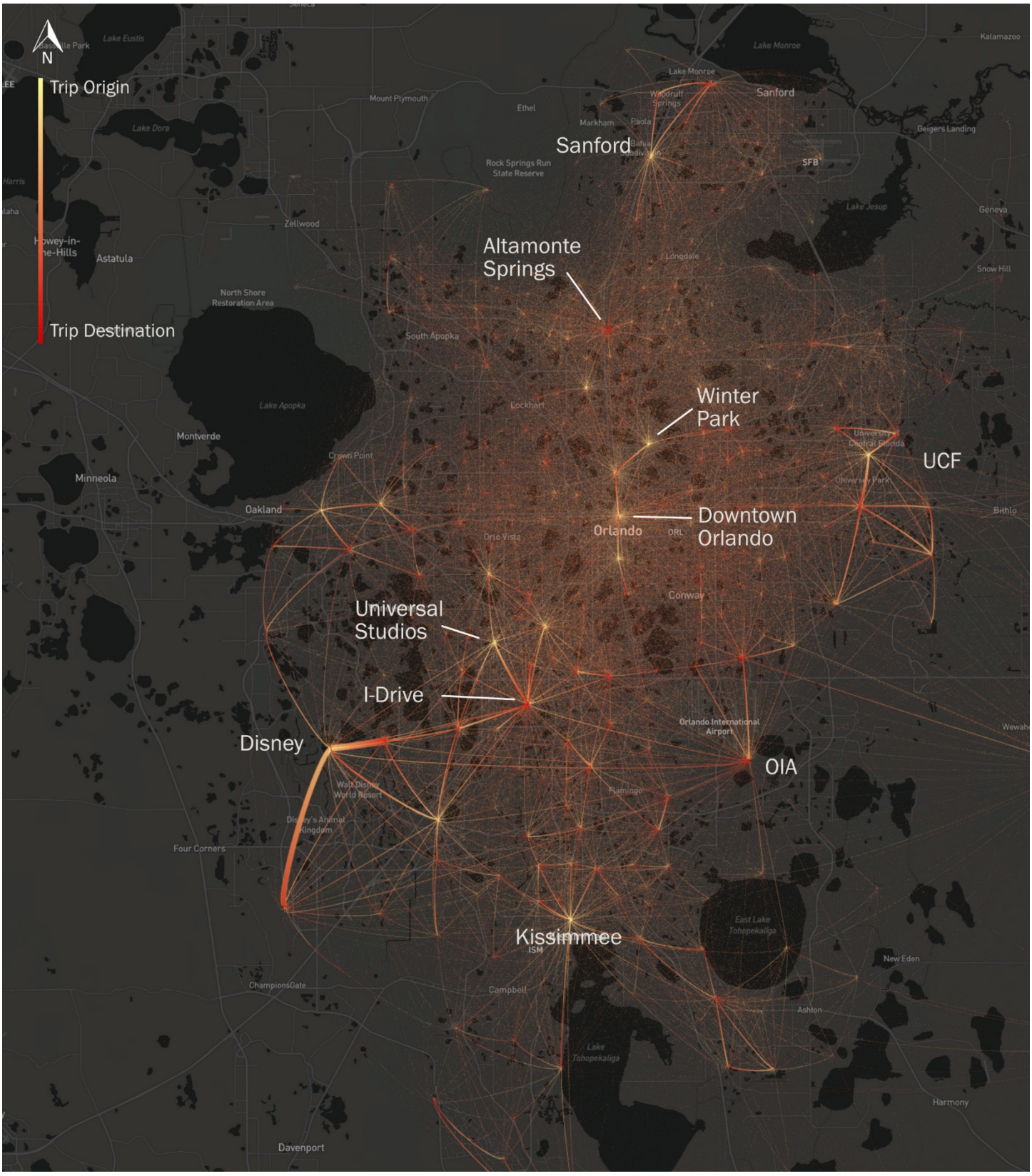
1. The largest trip generators and attractors are Disney World and Universal Studios/International Drive.
2. It is also clear in the map that Downtown Orlando, Orlando International Airport (MCO), and suburban areas with employment centers like Heathrow/Lake Mary, Waterford Lakes/University of Central Florida (UCF), Winter Garden/Ocoee, and Kissimmee are among the largest trip generators and attractors.
3. Downtown Orlando and the areas immediately south and north of it stand out as major origins and destinations for trips in MetroPlan Orlando. Further north, the Altamonte Springs area shows high activity. This is likely due to major retail and healthcare destinations located in its census block group.
4. The map shows MCO trips are longer than trips associated with other popular destinations, indicating that the airport has strong connections with the entire metropolitan area. In addition, MCO trips are primarily linked with the attractions area.
5. Census block groups near UCF and Waterford Lakes area produce a relatively high number of trips. Most of these trips go to nearby neighborhoods.

Summary: Origins-Destinations

This section visualized the existing OD patterns in MetroPlan Orlando as obtained from StreetLight Data. Major trip generators and attractors can be identified, including theme parks, Orlando International Airport, and several key Central Florida neighborhoods and destinations. The visualization can help communicate the importance of connecting different activity centers and neighborhoods within the region.

Furthermore, the lessons learned through the iterative visualization process can inform future updates of this map. For example, a better zone structure for this kind of visualization may be a grid (e.g., 1-km squares) rather than census block groups. As noted earlier, the size of census block groups is loosely based on population—not number of trips. With Central Florida's robust visitor industry, residential population does not always correlate to trip intensity. A grid zone set would remove the variability in the census block group sizing.

Figure 3.6 | Origin-Destination Patterns within MetroPlan Orlando



Source: StreetLight Data (2018 Monday-Thursday all-day average)

SunRail Origin-Destination Patterns in 2019

SunRail is the commuter rail service serving the MetroPlan Orlando area and Volusia County. As shown in Figure 3.7, SunRail currently serves 16 stations spanning about 49 miles. Weekday service is provided by 40 daily trains (20 northbound, 20 southbound), offering service every 30 minutes during morning and evening peak hours.

SunRail uses a zone-based fare system, where a passenger's fare is determined by the number of counties between which they travel. As of this writing, a full-priced one-way fare ranges from $2 for trips within the same county to $5 for trips that travel across all four counties served by SunRail. Monthly passes start at $56 for a one-county pass and increase by $28 for each additional county.

To date, SunRail activity has been reported through average daily ridership counts or average boardings and alightings by station. This subsection expands on these figures by looking into the origin-destination patterns of SunRail riders.

Figure 3.7 | SunRail Map

Data Sources

Origin-destination data from SunRail's ticketing and validation systems was obtained for April 2019. Based on year-to-date ridership statistics, April 2019 was roughly equal to the annual average. The data is aggregated at the hourly level. The figures in this subsection use an average of all weekdays in April 2019.

The data are separated by fare media (i.e., SunCard or paper tickets) and by whether the trip was matched or unmatched. Matched trips are those for which the rider tapped on at the station where they boarded the train and tapped off at the station where they alighted from the train. Unmatched trips are those for which the rider did not tap off or the system did not record it. About three quarters of the trips reported in the data set were matched.

To scale up the origin-destination patterns observed through the matched trips, high-level data reported to the Central Florida Commuter Rail Commission (CFCRC) was obtained. Specifically, the data included boardings per station and per time period between July 2018 and April 2019 and the average daily ridership in April 2019 (i.e., 6,371 trips).

Finally, station mileposts were obtained from the CFCRC's timetable to calculate SunRail trip lengths.

Methods

Because matched trips are only a subset of all SunRail trips, steps were taken to adjust the results from the matched trips to align with the CFCRC data on station boardings and daily ridership.

The proportion of matched trip boardings from each station to all matched trip boardings (from the ticketing and validation dataset) was compared to the equivalent percentage of boardings at each station to all boardings (from the high-level CFCRC data). The sum of absolute differences between these two proportions was minimized across all stations by use of weights calculated using Excel's GRG nonlinear optimization tool.

A scaling factor was then applied to ensure that the origin-destination flows from this exercise added exactly to the 6,371 average daily trips reported by the CFCRC for April 2019.

A similar process was repeated for the AM and PM peak periods to more accurately reflect travel patterns in those periods.

Findings

Table 3.1 on the following page presents the weighted origin-destination flows between SunRail stations for an average weekday in April 2019. Color coding is used to draw attention to the largest flows.

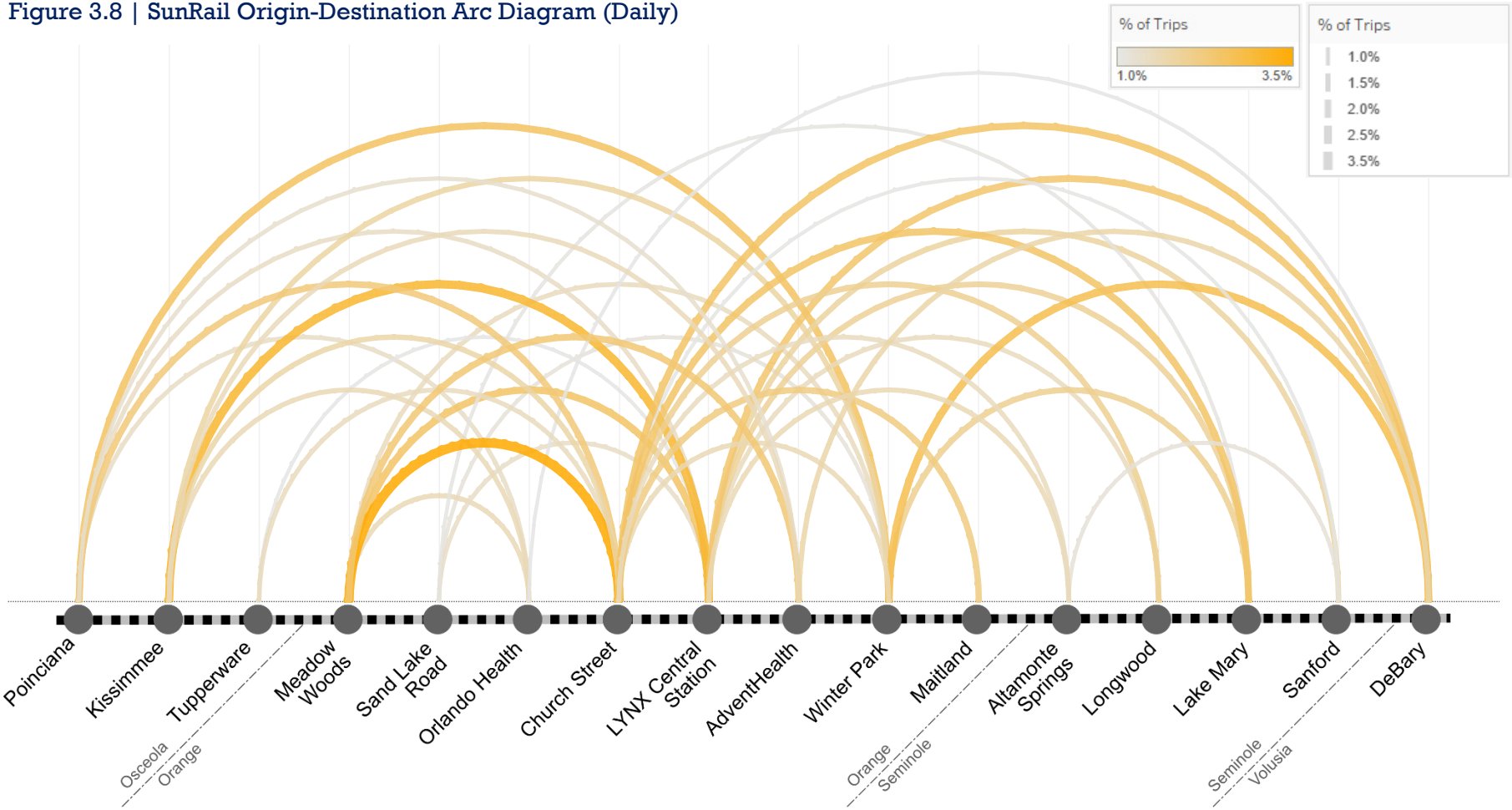
Figure 3.8 illustrates the major daily origin-destination pairs from Table 3.1. The thickness of the arcs is indicative of the number of trips traveling between the two stations at each end. Because Figure 3.8 presents daily flows, the flows are bidirectional. In other words, it shows that 156 trips traveled between Church Street and DeBary—without distinction between northbound and southbound trips.

Table 3.1 | Origin-Destination Matrix by Time of Day

Time Period	Origin	Destination: Poinciana	Kissimmee	Tupperware	Meadow Woods	Sand Lake	Orlando Health	Church Street	LYNX Central Station	AdventHealth	Winter Park	Maitland	Altamonte Springs	Longwood	Lake Mary	Sanford	DeBary	Grand Total
Daily	Poinciana		16	4	11	12	46	71	41	41	72	12	6	5	5	14	3	359
	Kissimmee	18		12	8	16	54	63	94	53	55	11	11	9	7	10	3	425
	Tupperware	6	11		1	3	23	48	34	19	27	4	2	3	3	2	1	187
	Meadow Woods	8	6	1		4	50	109	73	72	44	14	9	10	8	11	6	427
	Sand Lake	16	25	2	5		7	24	51	17	41	23	21	20	36	24	23	335
	Orlando Health	43	46	22	49	6		4	5	9	10	16	17	27	24	23	28	328
	Church Street	71	47	46	111	17	3		4	12	48	69	47	61	74	31	75	717
	LYNX Central Station	49	96	32	83	37	9	6		10	33	33	47	42	61	56	69	662
	AdventHealth	41	44	17	73	15	6	12	7		7	13	19	23	27	24	47	375
	Winter Park	87	59	26	50	33	12	52	30	5		10	17	18	61	31	83	573
	Maitland	12	10	3	16	18	15	68	26	10	10		1	3	8	10	11	221
	Altamonte Springs	9	15	3	12	20	25	47	54	24	18	1		4	19	36	16	303
	Longwood	6	8	3	12	18	32	64	52	24	18	4	8		8	12	12	282
	Lake Mary	6	7	2	10	33	29	81	61	34	66	8	18	7		6	7	375
	Sanford	18	11	1	14	23	24	36	60	28	32	10	40	16	6		10	329
	DeBary	2	4	1	7	29	37	81	82	62	87	18	24	15	12	13		473
	Total	392	407	176	463	284	370	765	675	420	567	245	289	262	358	304	394	6,371
5-11 AM	Poinciana		6	1	5	5	26	36	25	21	36	7	3	2	3	6	1	184
	Kissimmee	2		2	2	7	33	33	44	33	21	5	2	2	2	3	1	192
	Tupperware	1	5		0	2	15	28	20	10	12	3	1	0	1	0	0	99
	Meadow Woods	1	2	0		1	38	72	47	50	23	8	4	6	5	5	1	262
	Sand Lake	1	8	0	1		3	9	7	6	12	4	6	6	6	5	3	77
	Orlando Health	5	7	2	2	2		1	1	1	1	1	2	2	3	3	2	35
	Church Street	2	2	3	1	1	0		0	4	6	4	1	2	1	1	1	30
	LYNX Central Station	2	25	5	12	19	4	2		3	13	5	11	8	15	12	5	140
	AdventHealth	5	5	2	7	4	3	5	1		1	2	1	4	2	2	2	46
	Winter Park	2	7	2	2	6	3	18	5	1		1	2	2	4	2	4	61
	Maitland	1	2	0	2	7	7	30	10	4	2		0	1	1	1	0	67
	Altamonte Springs	1	4	0	2	7	11	25	21	14	6	0		1	6	10	2	112
	Longwood	1	3	2	2	7	21	38	28	13	7	1	2		2	3	2	129
	Lake Mary	0	3	1	1	20	17	46	30	19	27	3	6	2		1	1	178
	Sanford	0	2	0	2	8	13	22	31	16	12	5	17	4	3		2	138
	DeBary	1	2	0	2	16	21	48	51	39	35	12	10	9	6	3		256
	Total	25	84	22	42	110	216	411	321	234	213	62	68	53	59	58	28	2,006
3-8 PM	Poinciana		3	1	2	2	4	10	1	5	5	1	0	1	1	1	0	38
	Kissimmee	6		6	3	4	5	11	19	4	12	3	5	3	3	3	1	87
	Tupperware	4	3		1	0	2	7	5	3	6	1	1	2	1	1	0	36
	Meadow Woods	4	2	0		1	2	14	9	7	7	3	2	2	1	3	3	60
	Sand Lake	11	11	1	2		2	9	31	6	14	12	10	9	21	8	12	159
	Orlando Health	29	28	16	37	2		2	2	3	4	11	11	18	15	14	18	210
	Church Street	46	32	32	79	8	1		1	5	24	49	33	43	51	20	48	473
	LYNX Central Station	34	42	19	53	10	2	1		3	12	19	21	24	30	26	46	342
	AdventHealth	24	24	10	45	7	2	4	4		3	7	12	12	17	13	28	212
	Winter Park	47	29	13	32	15	4	17	17	2		5	9	9	33	15	39	285
	Maitland	8	4	3	10	4	1	11	5	3	4		1	1	4	5	8	71
	Altamonte Springs	5	4	1	7	8	6	7	14	2	5	1		1	7	14	8	89
	Longwood	3	3	0	8	7	2	11	10	6	5	2	4		4	4	7	74
	Lake Mary	4	2	0	6	4	4	14	13	6	15	3	6	2		3	5	87
	Sanford	10	4	1	8	6	4	5	11	4	7	2	12	6	1		4	85
	DeBary	1	1	0	2	4	4	11	7	4	13	2	5	2	3	6		64
	Total	235	191	104	295	82	45	134	149	61	134	119	131	136	191	137	228	2,372

Source: SunRail (April 2019) | Note: Lines between stations represent county boundaries

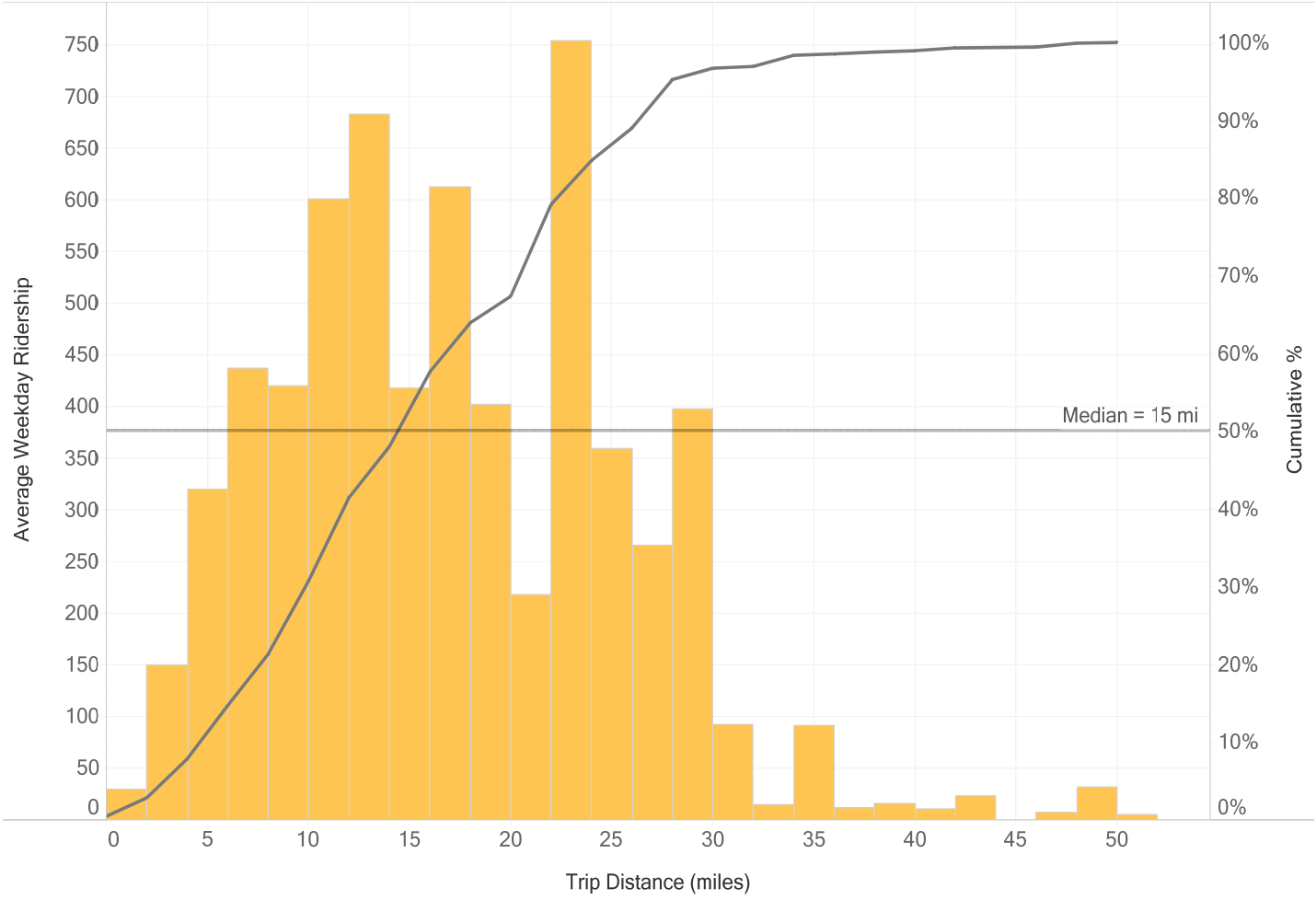
Figure 3.8 | SunRail Origin-Destination Arc Diagram (Daily)



Source: SunRail (April 2019)
Note: Movements representing less than one percent of ridership omitted for clarity.

The origin-destination data described above was fused with the milepost data from the CFCRC timetable to estimate trip lengths for SunRail users. Figure 3.9 shows a histogram of trip lengths across the SunRail system.

Figure 3.9 | Histogram of Trip Lengths (Daily)



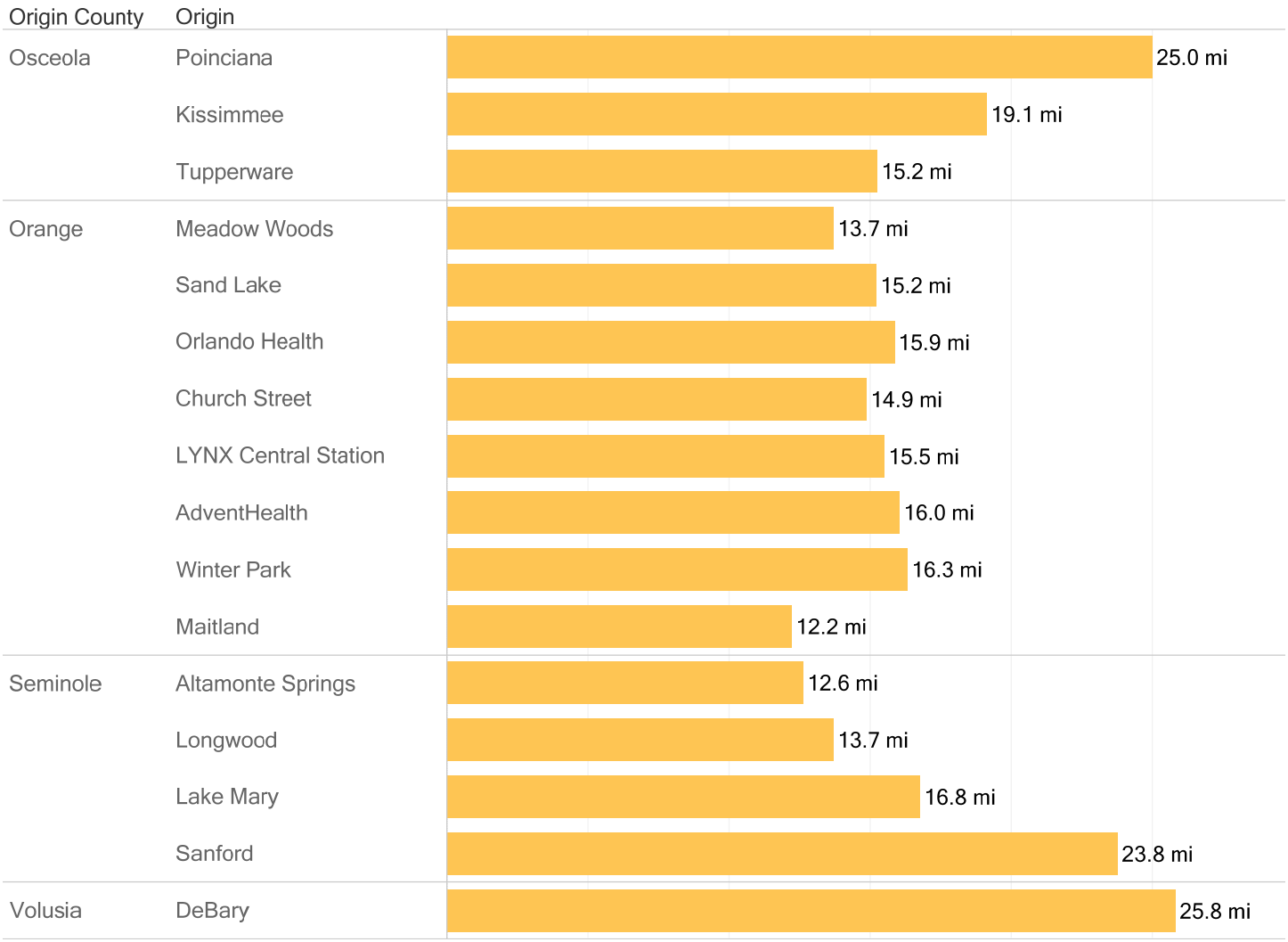
Legend
Average Weekday Ridership
Cumulative %
Source: SunRail (April 2019)

To understand trip lengths in more detail, the average trip length of trips starting at each station was computed. This was done using the simple equation below:

$$\frac{\sum(Trips\ Starting\ in\ Station \times Distance\ of\ Those\ Trips)}{\sum Trips\ Starting\ in\ Station}$$

Figure 3.10 shows the resulting average trip lengths for each origin station. An analysis using destination stations instead of origin stations yielded nearly identical results.

Figure 3.10 | Average Trip Length by Origin Station (Daily)



Source: SunRail (April 2019)

Summary: SunRail Origin-Destination Patterns

At the most general level, SunRail's origin-destination data shows that the strongest connections are between a central core of stations and two or three stations at each end. There is relatively little end-to-end travel, travel within the core stations, or travel between the core stations and stations immediately adjacent to them. This is typical of commuter rail services—as trains only run at most once every 30 minutes, the travel time savings of taking the train must offset the time passengers are willing to wait at the platform (as well as the time to get between their stations and their final destination).

Based on the data presented here, the core stations could be defined as Church Street, LYNX Central Station, AdventHealth, and Winter Park. The interaction between Church Street and Winter Park is an exception to the relatively low origin-destination activity between the core stations; these two stations are in two of the denser mixed-use neighborhoods in the region.

At the southern end, Meadow Woods, Kissimmee, and Poinciana show strong interaction with the core stations. At the northern end, DeBary and Lake Mary stand out in this regard. The drop-off in trip origins and destinations between Meadow Woods and Tupperware suggests that zone-based pricing may play a role in the origin-destination patterns of SunRail users in this area.

It should be noted that the origin-destination patterns are not perfectly symmetrical—for example, while a total of 473 trips were estimated as originating in DeBary, only 394 were estimated as using DeBary as a destination. This suggests that passengers may be using SunRail for one leg of their trip, but then using a different mode for their return trip.

With respect to trip lengths, the median one-way journey on SunRail is roughly 15 miles. The most common distance traveled is about 23 miles. Trips between DeBary and Winter Park and between Poinciana and Church Street are about 23 miles long. One third of trips on SunRail are 20 miles or longer.

When trip lengths are evaluated at the station level, it is apparent that average trip distance increases as stations approach the end of the line. For trips starting from the core stations, average trip distances are between 15 and 16 miles. For the stations at the end of the line, average trip distances are between 25 and 26 miles. Table 3.1 helps visualize the reason for this difference: the destinations of trips starting at stations near the end of the line are particularly concentrated on the core area roughly 25-30 miles away. On the other hand, trips starting from the core area have a more even distribution.

Commercial Vehicle Travel in 2018

The movement of goods is an important component of regional mobility. Freight movement connects markets and business and plays a vital role in supporting urban and regional development. Understanding urban freight movement helps planners and policy makers identify important freight hubs and corridors. This section discusses the movement of commercial vehicles in the MetroPlan Orlando area.

Data Sources

StreetLight Data was also used for this analysis. Unlike the OD visualization section, this section focuses on the "commercial" dataset sourced from GPS units on board freight and delivery vehicles. The 2018 annual average weekday (Monday-Thursday) and all-day time periods were selected for visualization, although other time periods are available in the processed dataset for future review.

Two commercial vehicle indicators were calculated for each roadway segment in the MetroPlan Orlando freight network: commercial vehicle volume and commercial vehicle percentage. Commercial vehicle percentage was derived by dividing commercial trips by the sum of personal trips and commercial trips.

Findings

Figure 3.11 and Figure 3.12 are maps of commercial vehicle movement in the MetroPlan Orlando area.

As shown in Figure 3.11, commercial vehicle activities generally concentrate on limited access facilities. It is noted that the major freight corridors are I-4, Florida's Turnpike, SR 408, SR 417, and SR 528. Among these roadways, I-4 and Florida's Turnpike have the highest commercial vehicle volumes, not only because they serve as the most important north-south freeways in the metropolitan area, but also because they connect to statewide freight hubs.

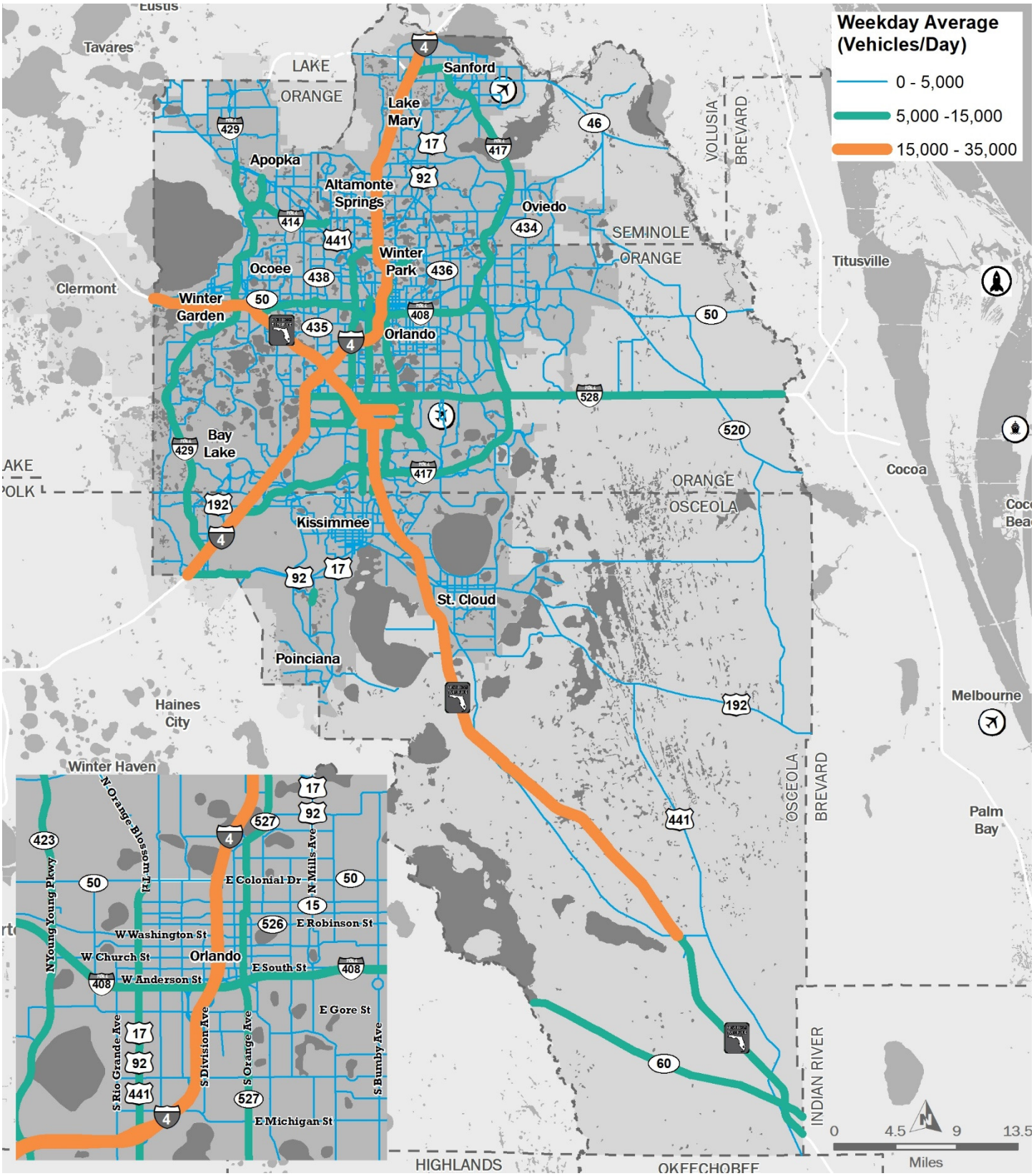
Figure 3.12 shows commercial vehicle volume on non-limited access facilities. This figure helps better visualize commercial vehicle movements on regional arterials and collectors. Major arterials, including South Orange Avenue, Sand Lake Road, Taft Vineland Road, Landstreet Road, and Orange Blossom Trail have among the highest commercial vehicle movement activity among arterials. SR 60—a two-lane highway in southern Osceola County—also carries considerable commercial vehicle traffic.

Summary: Commercial Vehicle Travel

The commercial vehicle movement analysis used two indicators: commercial vehicle volume and percentages. The patterns generally show a strong correlation between roadway functional classification and commercial vehicle activity—highways and major urban roads have higher volumes and percentages compared with other roads. In MetroPlan Orlando, major freight corridors are I-4, Florida's Turnpike, and major expressways including SR 417 and SR 408.

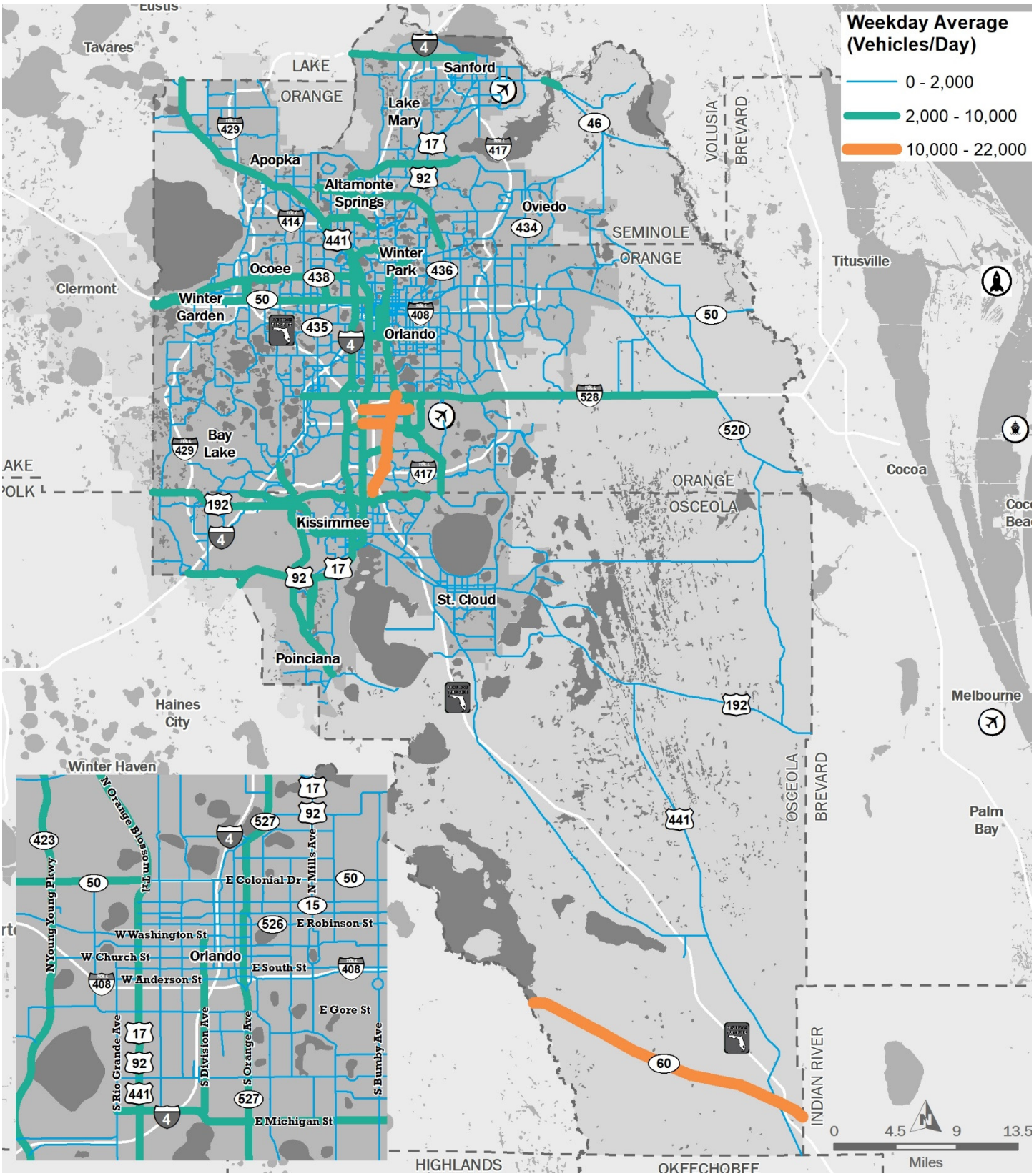
This analysis can help further understand and prioritize projects on freight corridors in the MetroPlan Orlando area.

Figure 3.11 | Commercial Vehicle Movement Volumes (All Roads)



Source: StreetLight Data (2018 Monday-Thursday all-day average, commercial vehicles)

Figure 3.12 | Commercial Vehicle Movement (Non-Limited Access Roads)



Source: StreetLight Data (2018 Monday-Thursday all-day average, commercial vehicles)

Short-Distance Car Trips in 2018

Short-distance trips account for a large portion of trips across the United States. A Rails to Trails Conservancy study[2] found that more than half of US trips are within a 20-minute bike ride and more than a quarter of trips are within a 20-minute walk. This section seeks to understand the occurrence of short-distance auto trips in the MetroPlan Orlando planning area.

Identifying locations where these short trips are occurring may serve to prioritize areas for pedestrian and bicyclist infrastructure. And on the other hand, identifying locations where short trips are *not* occurring may help point out areas where a more diverse land use mix and improved pedestrian and bicycling/roadway network connectivity could reduce trip distances.

Data Sources

The attributes of personal trips originating or terminating in the tri-county region were obtained from StreetLight Data. Trips originating and ending in each Census block group were grouped by trip length. For this analysis, trips were summarized as being less than one mile in length (roughly equivalent to a 20-minute walk) and less than five miles in length (roughly equivalent to a 30-minute bike ride).

The StreetLight Data products used for this section are sourced from GPS, which are predominantly from connected vehicles or navigation mobile applications. This data set was used to focus on short-distance vehicle trips that may have the propensity to shift to other travel modes such as walking or bicycling.

Findings

Over two million trips under a mile are made every day in MetroPlan Orlando. An additional 12 million trips are between one and five miles in length. These trips present opportunities to shift travel mode to bicycling and walking. Similar to the national metric from the Rails to Trails Conservancy study[2], over half of all trips in MetroPlan Orlando are shorter than five miles. The breakdown of trips by distance are shown in Figure 3.13 and Figure 3.14 for each county in MetroPlan Orlando.

[2] Torsha Bhattacharya, Ph.D.; Kevin Mills, J.D.; and Tiffany Mulally, Ph.D., *Active Transportation Transforms America: The Case for Increased Public Investment in Walking and Biking Connectivity* (Washington, D.C.: Rails-to-Trails Conservancy, 2019).

Figure 3.13 | Percentage of Trips by Trip Distance by County (Daily)

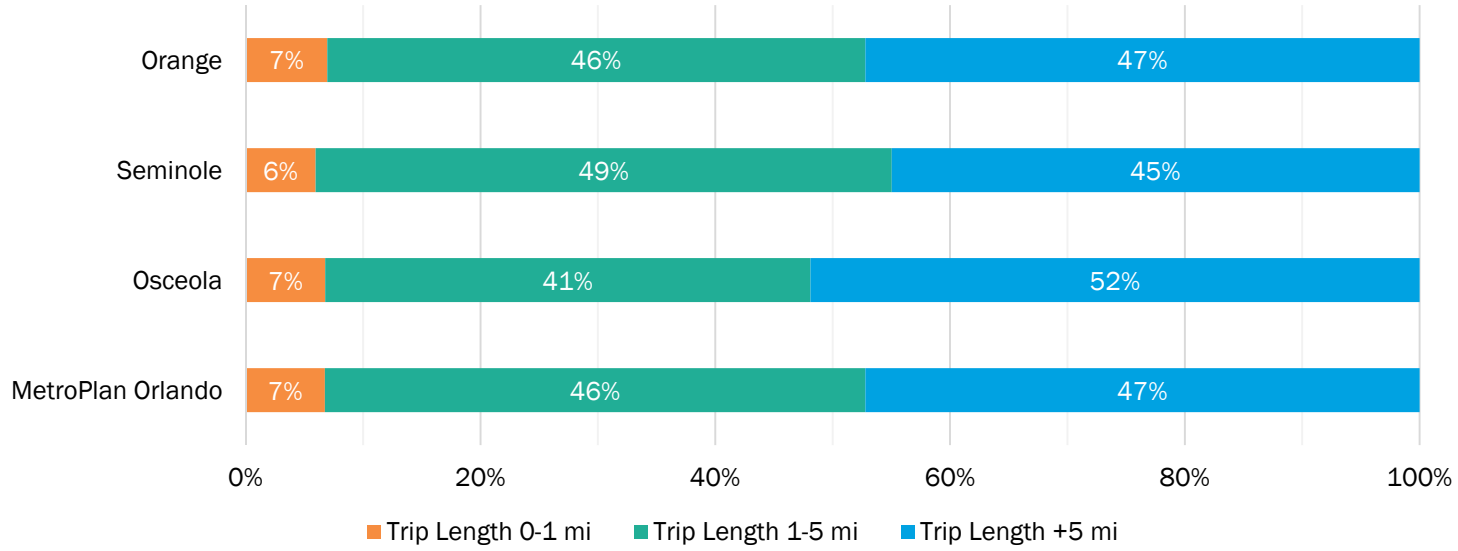
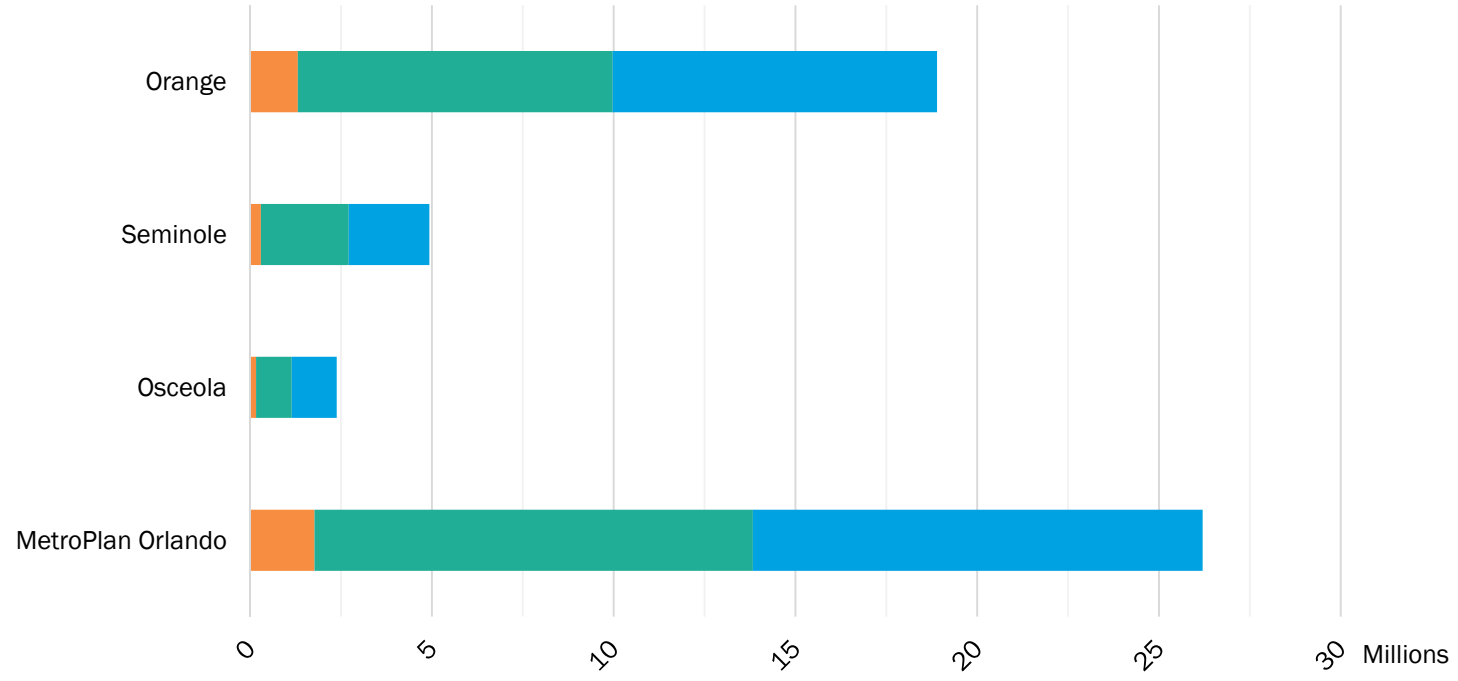


Figure 3.14 | Number of Trips by Trip Distance by County (Daily)



	MetroPlan Orlando	Osceola	Seminole	Orange
Trip Length 0-1 mi	1,767,561	161,211	293,535	1,312,816
Trip Length 1-5 mi	12,062,604	983,536	2,418,190	8,660,878
Trip Length +5 mi	12,373,058	1,234,978	2,215,975	8,922,106

Trip Length 0-1 mi Trip Length 1-5 mi Trip Length +5 mi

The data is visualized according to the number of short trips made from or to each Census block group and the proportion of all trips made to or from each Census block group that were under one and five miles, respectively. The color scale is shown in Figure 3.15. The bounds of the color scale are based on the distribution of trips in the dataset.

Maps summarizing the number and proportion of short trips for each census block group are shown in Figure 3.16 and Figure 3.17.

The ten zones with the highest number of short trips are shown with red hashing in these maps. Care should be taken when interpreting this data, as some zones are very large and may have a high number of short trips, even though these short trips make up a small number of the trips that are originating or terminating in the zone.

Figure 3.15 | Legend for Short Trip Length Maps

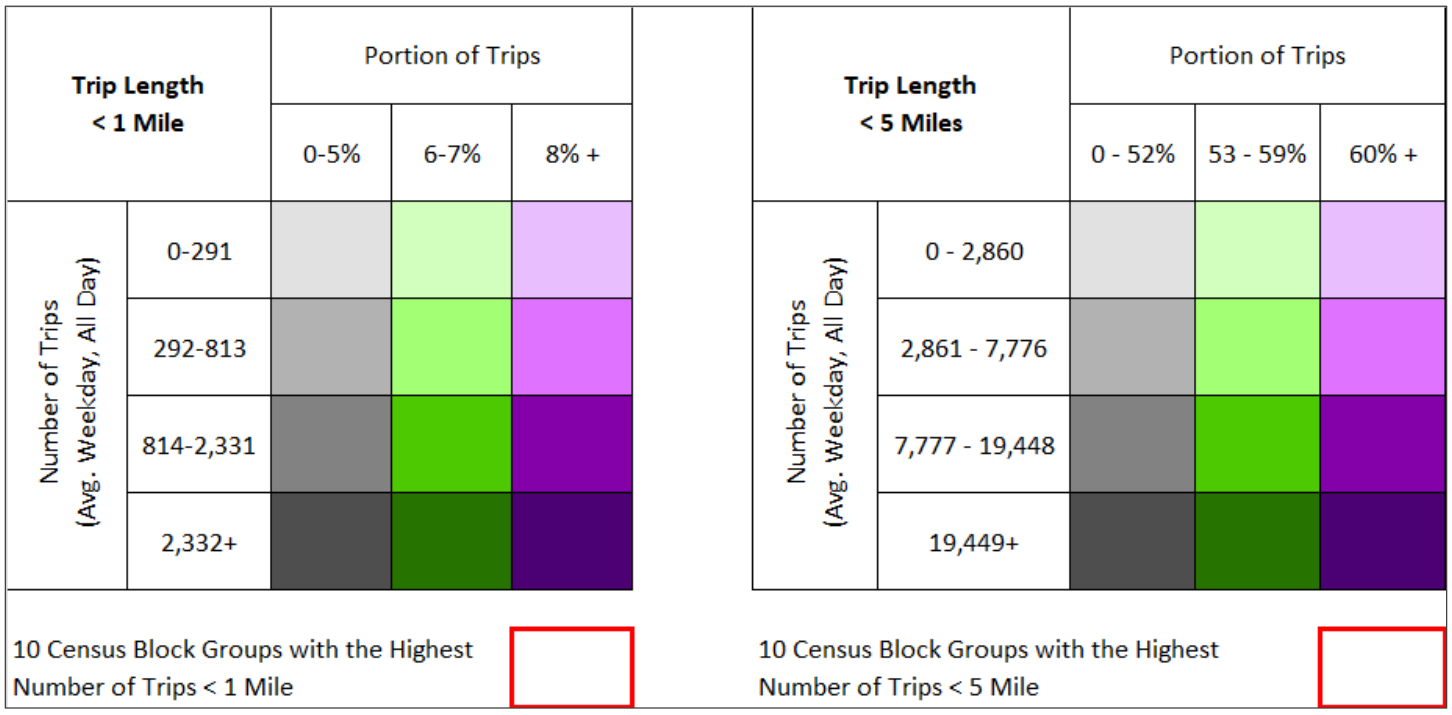
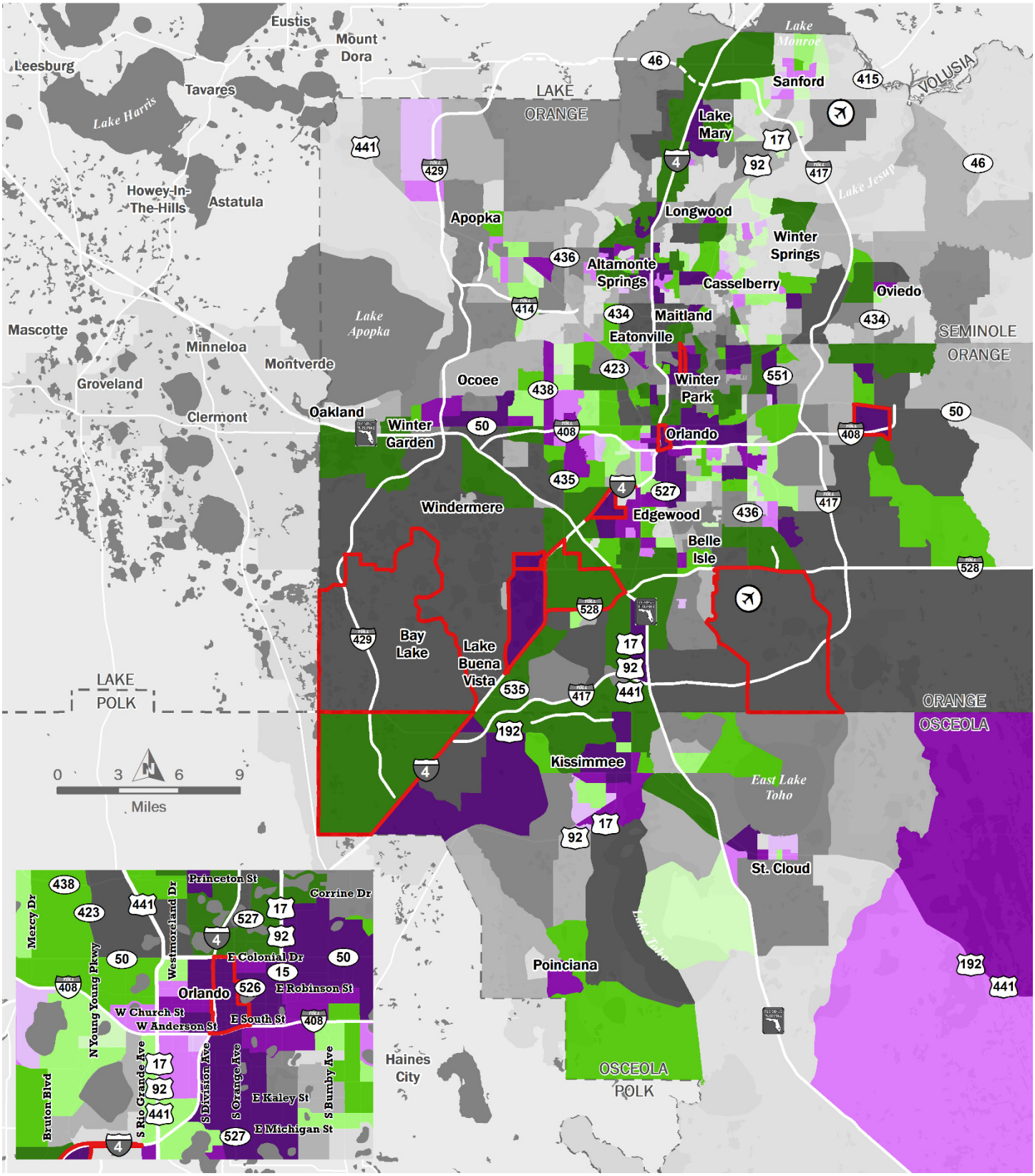
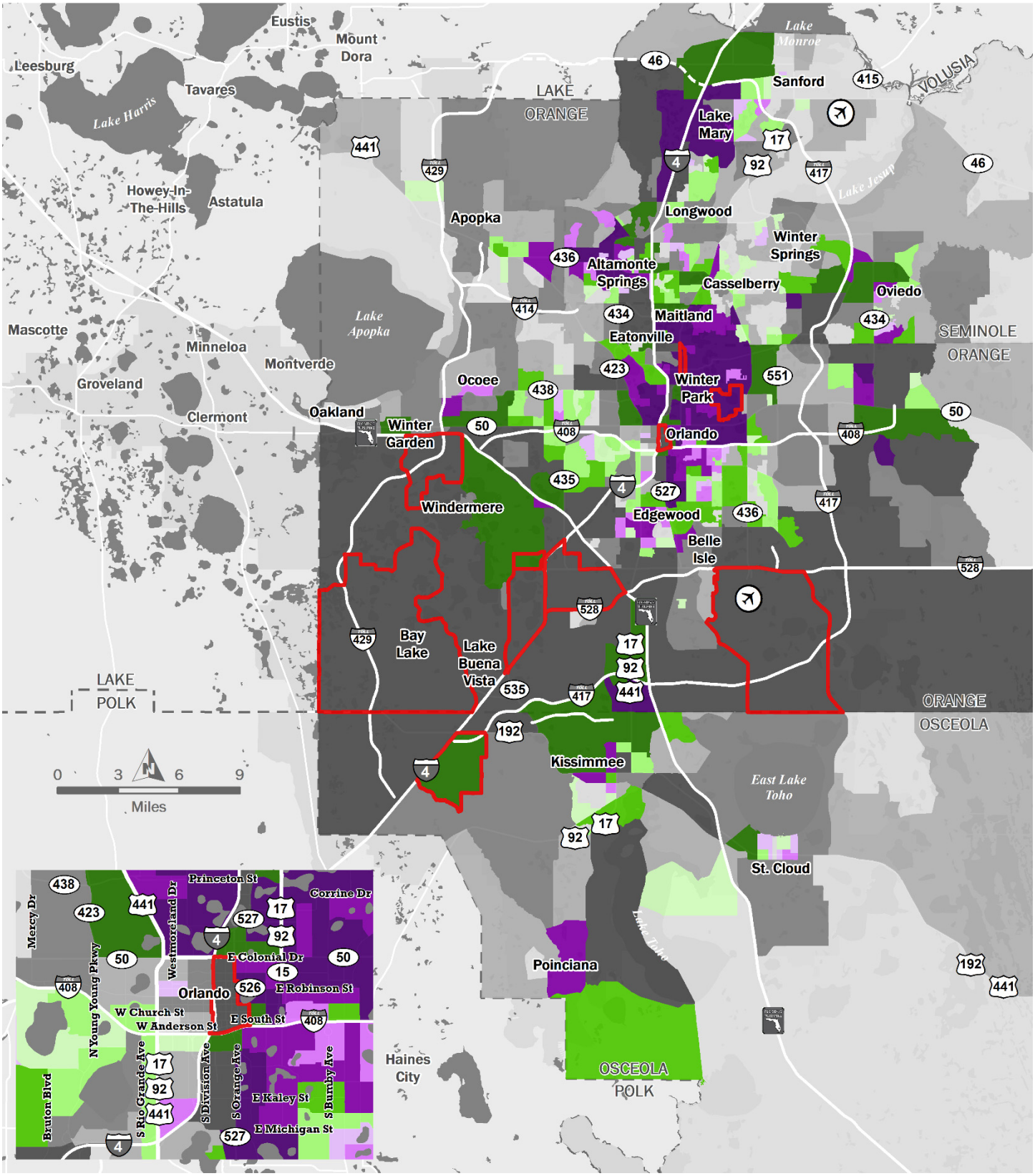


Figure 3.16 | Zone Traffic (Origin + Destination): Trips Less than 1 Mile



Source: StreetLight Data (2018 Monday-Thursday all-day average)

Figure 3.17 | Zone Traffic (Origin + Destination): Trips Less than 5 Miles



Source: StreetLight Data (2018 Monday-Thursday all-day average)

Several observations from the data include:

- As was noted in the OD visualization section, some census block groups have an extremely high volume of trips. Census block groups are defined to cover a similar number of residents (generally between 600 and 3,000 residents, but much more populated census block groups are noted on the edges of MetroPlan Orlando's urbanized areas). If census block groups have a low population density but contain regional transportation hubs or visitor destinations, their volume of trips will be higher than similarly sized residential census block groups. For example, the census block group containing the Orlando International Airport recorded almost 700,000 trips per day. Some of these census block groups are identified as being in the Top 10 of census block groups for the number of short trips being made, even though short trips make up a small proportion of their trips. While considering the data presented here, it is important to simultaneously consider the proportion of short trips and the absolute number of short trips. By focusing on the absolute number of short trips, MetroPlan Orlando may be more effective at targeting improvements to serve the greatest number of potential users, even though their trips may not make up a large proportion of total vehicle trips.
- A similar proportion of vehicle trips in each county are less than five miles in length and less than one mile in length. However, most trips in the MetroPlan Orlando area are made from or to Orange County.
- Several of the areas with a high proportion of trips shorter than one mile experience recurring vehicular congestion. Mode shift in these areas may yield substantial benefits to traffic operations and users may be relatively more interested to try other non-auto modes. Major corridors through these areas include Orange Avenue south of downtown, SR 50 through Orlando, US 17/92 through Winter Park, SR 436 through Altamonte Springs, and Conroy Road/Millenia Boulevard near the Mall of Millenia.
- The broad area covering Mall of Millenia, Universal Studios, Sand Lake Road, International Drive, and the Convention Center has a high proportion of vehicle trips less than one mile, although this area does not have a high proportion of trips less than five miles. (This area still has a high *absolute* number of trips less than five miles being made.) Targeting this area with easy to use multimodal infrastructure and services may be effective at supporting a "park-once" environment or encouraging users to use transit, walking, or bicycling for short trips.
- The area around Disney World does not have a high proportion of vehicle trips less than one mile or less than five miles. This may be because Disney World already supports a park-once environment, where visitors park and then use Disney Transit to move between their destinations. Due to the sheer number of trips in the Disney World census block group, it still ranks in the top 10 for short-distance trips.
- Winter Park, Maitland, and Baldwin Park have a high proportion of trips that are less than five miles, but not a high proportion of trips that are less than one mile. This may indicate that very short trips are not being made, or that these very short trips are already being made without a car. Increased investment in transit or bicycling in these areas may be effective at shifting the mode of these short trips that are less than 5 miles.

Summary: Short-Distance Car Trips

This analysis identified areas with a high number of short-distance car trips, which may be prime candidates for investment in walking and bicycling infrastructure with the aim of increasing the number of bicycle and pedestrian trips in MetroPlan Orlando. As always, decisions on the type and alignment of bicycle and pedestrian infrastructure should consider additional factors.

In addition to considering the distance of the trip, considering the level of congestion in areas may further prioritize areas for transit, bicycle, and pedestrian infrastructure. Although highly congested roadways are also likely to have right-of-way constraints, people may be more likely to walk or bike along congested roads due to automobiles not moving much faster than a person biking or walking. Consideration of land use and investment in more premium transit routes (with transit priority treatments and exclusive lanes) may also further inform this decision.

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