Mobility Market Research

January 27, 2023

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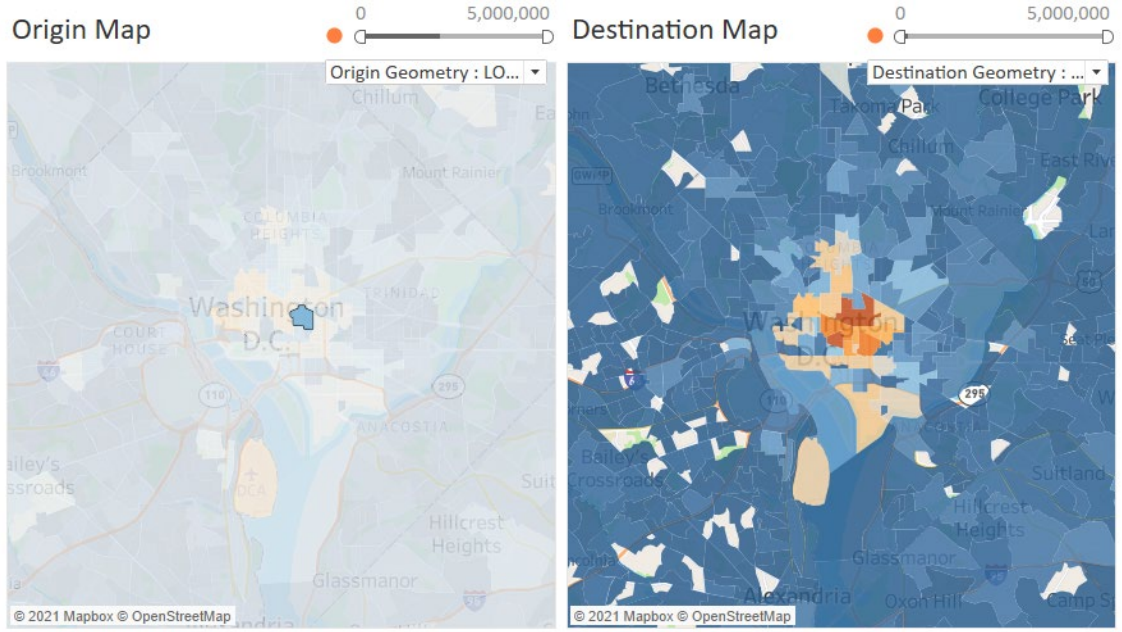
Washington Metropolitan Area Transit Authority

Project Goals:
Describe the regional mobility market in 2019 and Metro's place in the market.

What are LBS data and what can it tell us?

- **WMATA has acquired processed location-based services (LBS) data detailing estimates of person travel flows throughout our service region**
  - LBS data are timestamped geolocation data generated by smartphones where users have explicitly granted permission to track geolocations.
- **LBS data gives us information about ALL trips taken in our region across ALL modes with higher spatial and temporal resolution**
  - Metro's internal data gives us information about how our customers travel throughout the system



With LBS data we can understand how people are traveling throughout the region and the market in which we are competing for riders. An initial application is identifying travel demand and transit's market share to inform the Better Bus Network Redesign.

Key Findings: Opportunities for Growth

LBS data provide information about how people travel throughout the region across all modes. This project demonstrates some of the potential applications of the data for decision-making.

From 2019 LBS data, we find that:

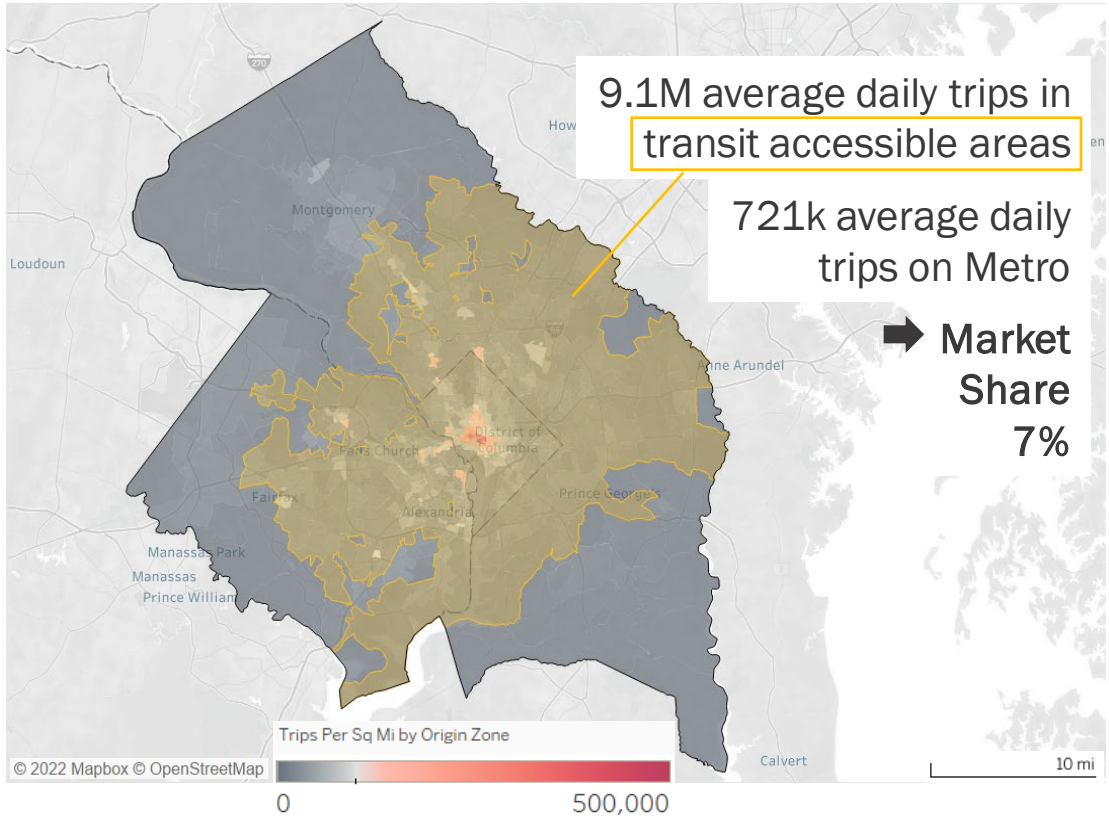
- The majority of trips were short, less than 5 miles
- Most trips were not work-related
- Metro's market share was highest at the weekday AM/PM peak and disproportionately low at off-peak times
- Weekend travel drops significantly more on Metro than the market overall

The results can inform strategies that target areas where market share is disproportionately low:

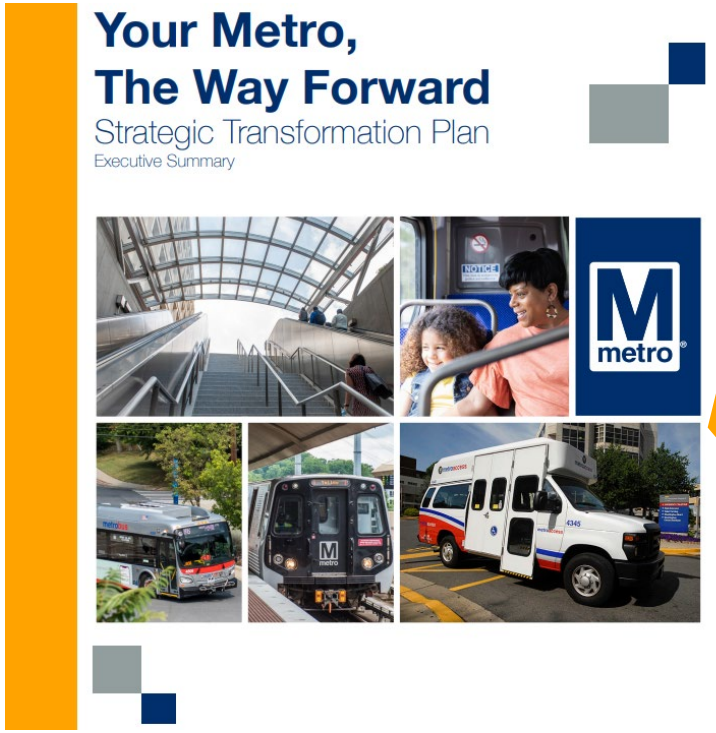
- Evaluate opportunities to expand the share of short-trips on Metro
- Identify factors that encourage non-work trips on Metro
- Assess service and fare strategies that incentivize weekend and off-peak ridership

Key Findings: Market Strategy

In 2019, Metro's market share was 7%, with 93% of trips occurring on other modes.



LBS data can be an input into developing a **competitive strategy** informed by a deeper understanding of the market in which we operate



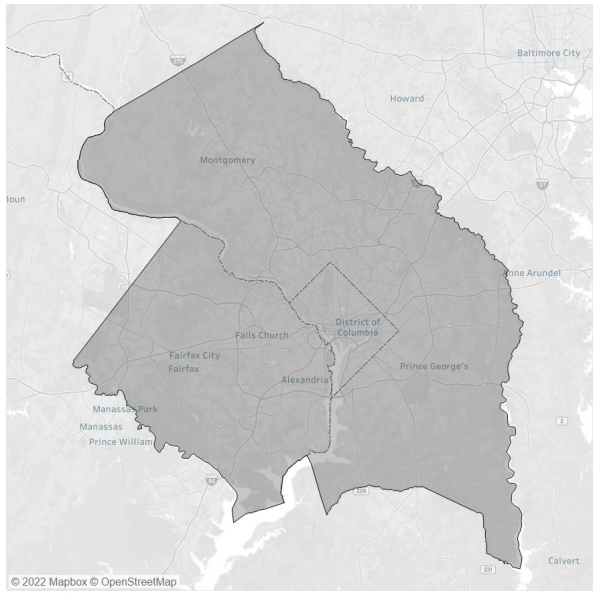
Strategic Transformation Plan Target: Increase transit mode share to ≥7%

Detailed Findings

How big was the market and what was Metro's market share?

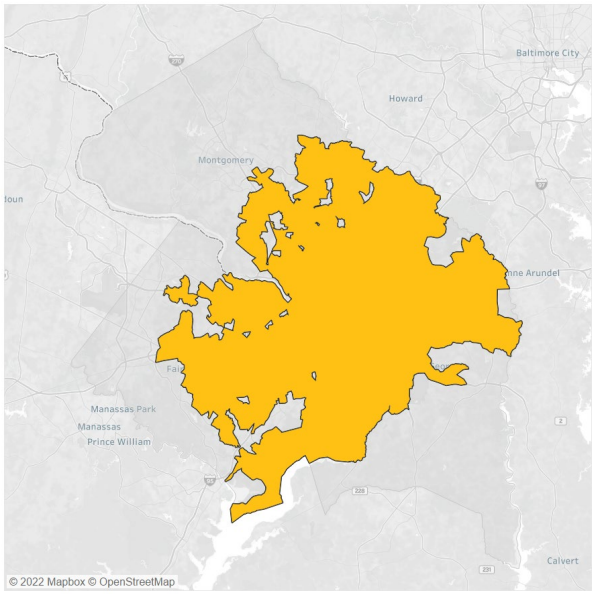
In 2019 there were 721k average daily linked trips on Metrorail and Metrobus. From 2019 LBS data, including all modes, we find that there were:

- **13.0 M average daily trips in the overall market**



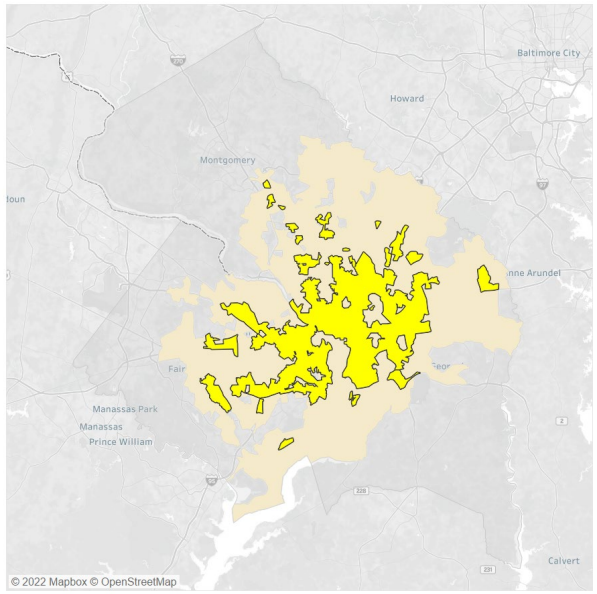
Metro's market share 6%

- **9.1 M average daily trips in transit accessible areas**



Metro's market share 7%

- **4.6 M average daily trips in transit rich areas**

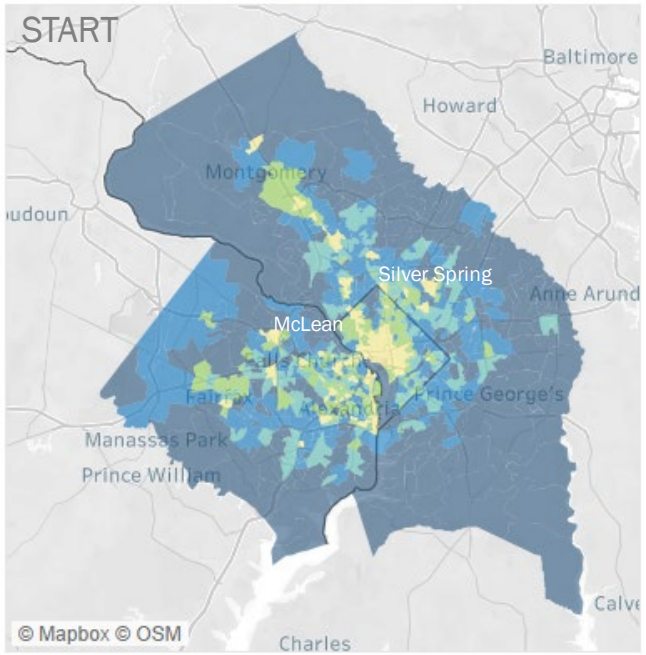


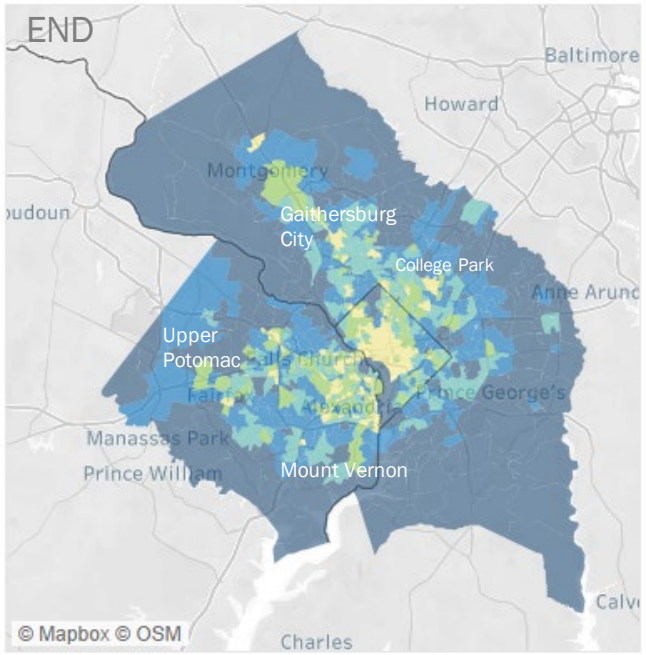
Metro's market share 11%

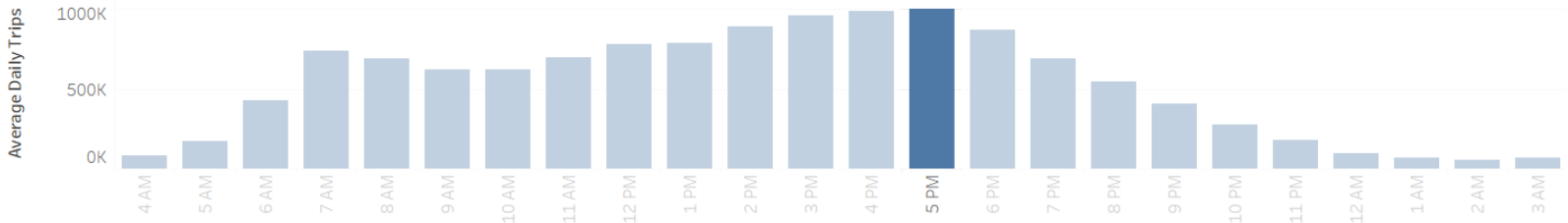
Throughout this project, Metro refers to Metrobus and Metrorail, and when trip comparisons are made it is using linked trips.
Loudoun County is not included in the market comparison because Metro's service in 2019 was limited, but data are available.

Geographic area is one way to define the "market". Other definitions are by day of week, time, distance, trip purpose, etc.

What does travel look like throughout the day?







- **Highest trip densities by origin and destination occurred in similar areas across time periods**
- **During AM Peak, more people were traveling to Downtown DC than starting their trips there**
- **As the day progresses, top destinations outside of DC begin to emerged**
  - Top Midday destinations: Upper Potomac, College Park, and McLean
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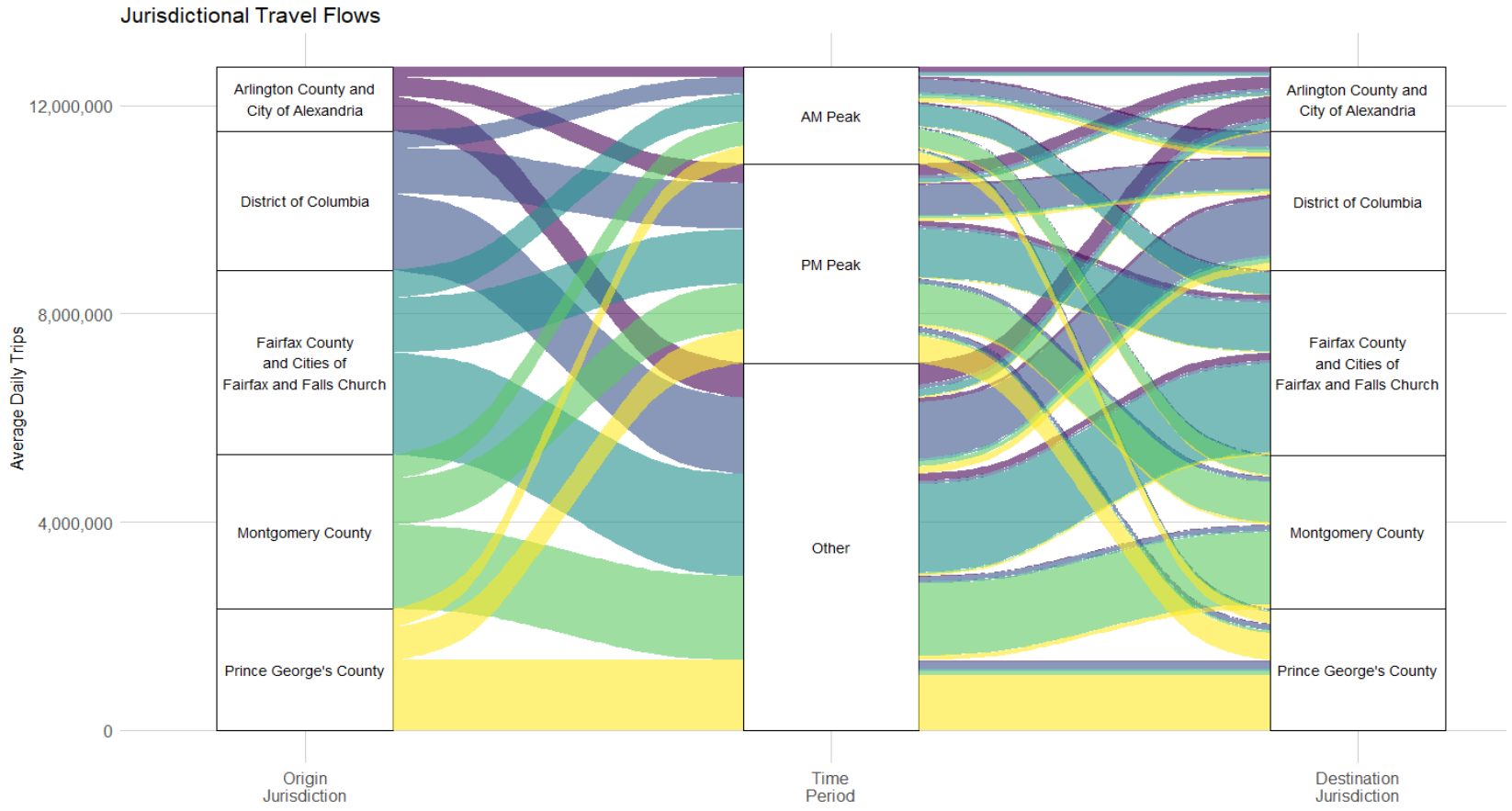
See Appendix for results by hour

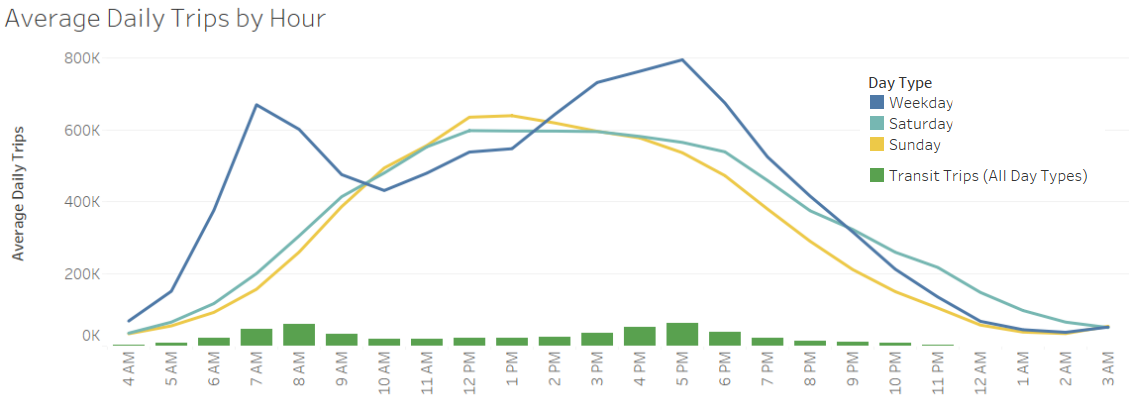
What does travel look like across jurisdictions?



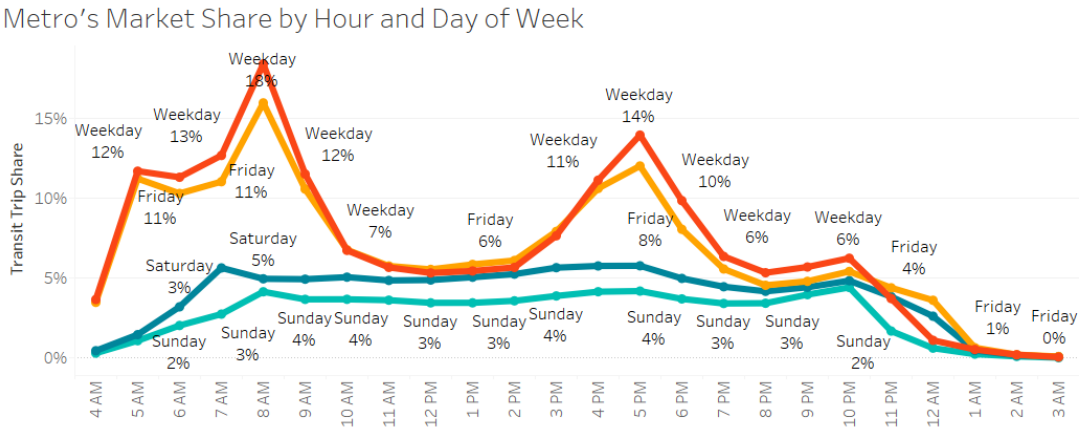
- **The majority of trips remained within the same jurisdiction (9.8M)**
  - 3.1M (24%) trips crossed jurisdictional boundaries
  - But most trips (93.4%) ended in a different block group than they started
- **For travel that left a jurisdiction, the top pairs were:**
  1. DC <> Prince George's County (540K)
  2. DC <> Montgomery County (400K)
  3. Montgomery County <> Prince George's County (320K)

How does travel and market share differ by day and time?

- **More trips on weekdays than weekends, different peak patterns**
  - 85% as many trips on weekends as weekdays overall, compared to 39% as many Metro trips on weekends as weekdays
  - Greatest number of trips per hour taken during the PM Peak (720K trips/hr) on weekdays
  - Over half of trips each day occurred during Midday and PM Peak (up to 71% of trips on Sundays)

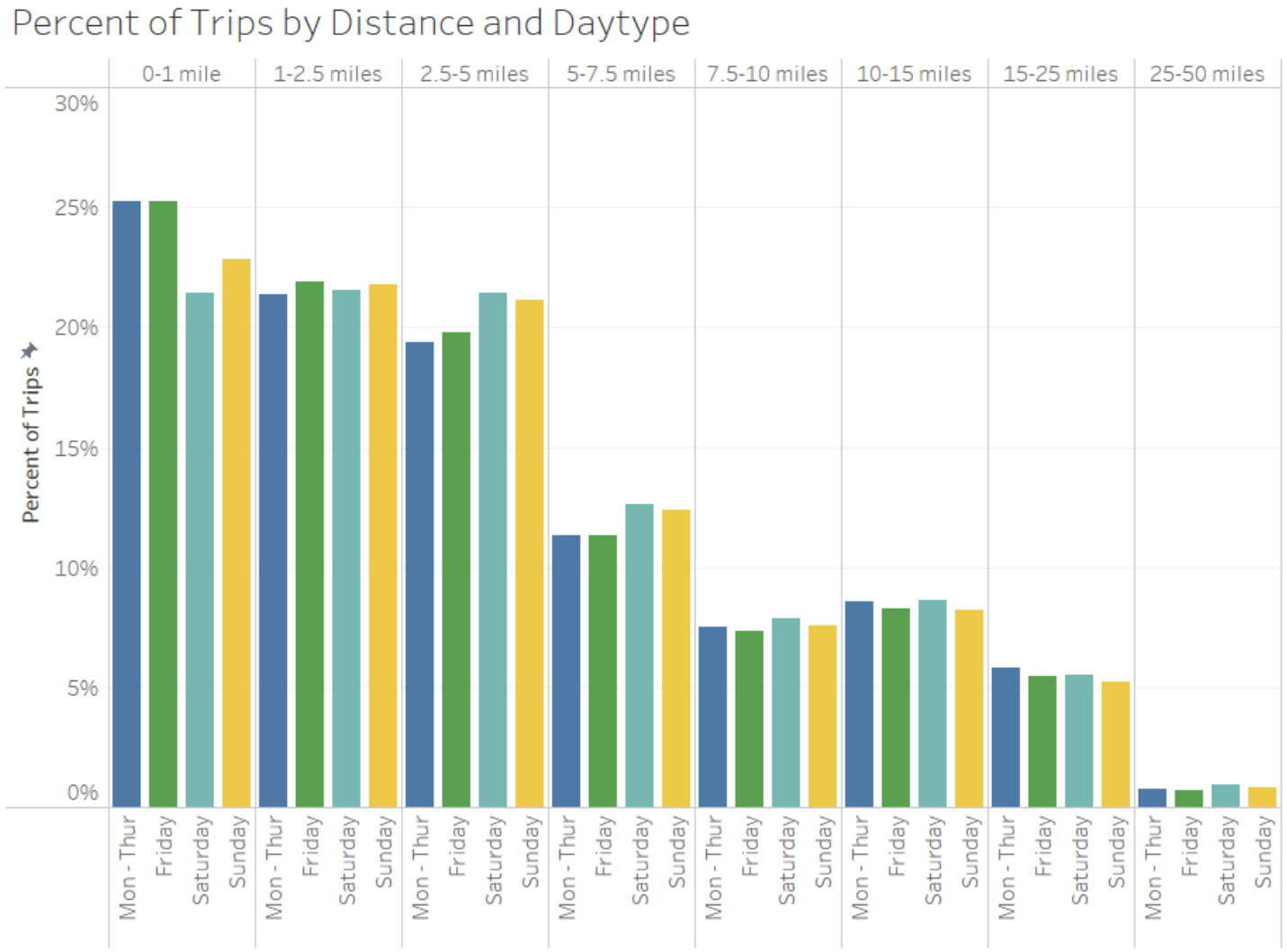


- **Metro captured less of the market on weekends and off-peak**
  - Highest market share was during the weekday AM and PM peak (up to 19% of trips per hour were on Metro)
  - Low market share during midday (~6%) and weekends (no more than 5%, and typically between 3 and 4%).



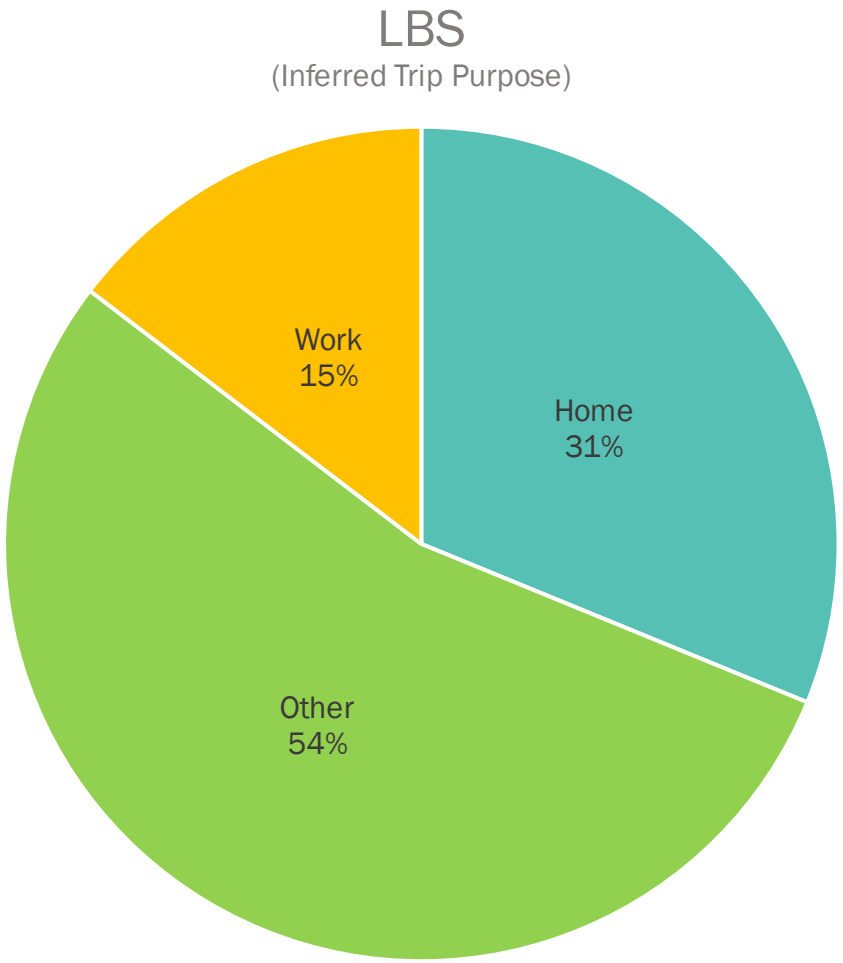
For this slide and analysis going forward, this image indicates that the results shown are for the transit accessible area →

How far do people typically travel?

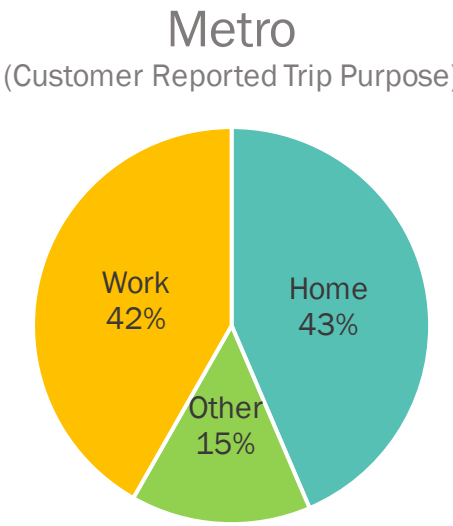


- **Two-thirds of trips were less than 5 miles**
- **About a quarter of trips were less than 1 mile**
- **Weekend trips, work-related trips, and trips further from the core were longer on average.**
  - Average distance for work-related trips was ~5.9 miles compared to 4.4 miles for other trip purposes
  - Average trip distance was 5.8 miles overall, but shorter in transit accessible (4.8 mi), and transit rich (3.9 mi) areas

Why are people traveling?

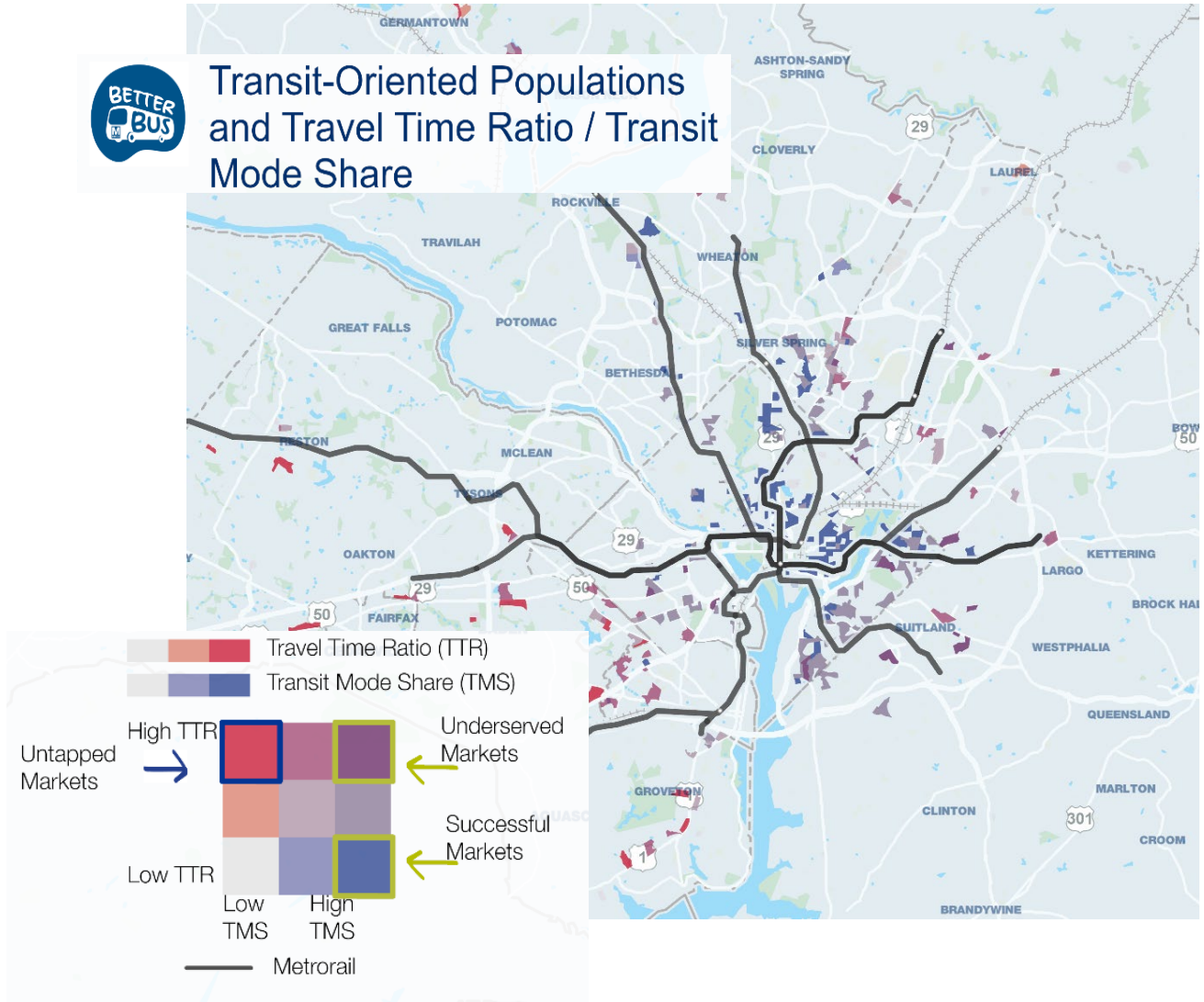


- **Metro served more home and work trip ends (86%) compared to what's inferred from the LBS data (46%) and less variety of other trip purposes than occur regionally across all modes (14% Metro vs 54% LBS data)**
- **From the LBS data, the majority of trips (85%) were not work-related**



Applications and Next Steps

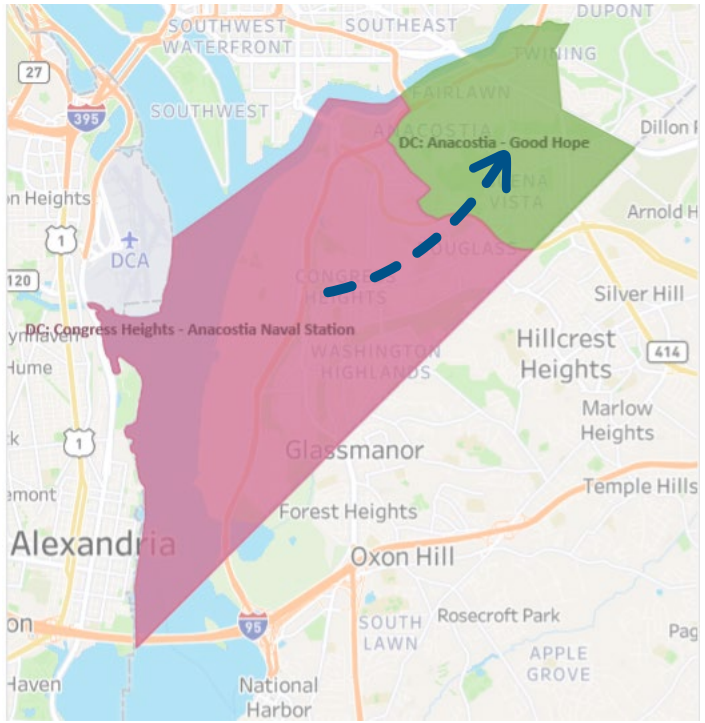
- **2022 LBS Data**
  - To be delivered May 2023
  - Data sharing license
  - How mobility has changed since 2019, what are new patterns or ongoing trends
- **Better Bus Network Redesign**
  - Market Assessment Report
  - COVID Market Assessment Report
- **Ongoing Analysis**
  - Continued in-depth evaluation of transit's mode share and competitiveness by time, cost, travel time component, etc.



Where could the bus system offer a better experience for customers?

Some trips have high transit use despite inconvenient travel times. We can do better by for our customers and our region.

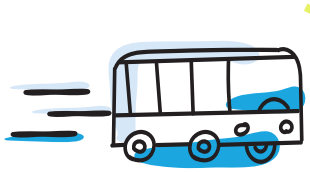
EXAMPLE: Congress Heights/Anacostia Naval Station to Anacostia/Good Hope



TRANSIT TRIPS ARE

5x LONGER THAN DRIVING

19%



OF TRIPS BETWEEN THESE LOCATIONS USE TRANSIT

Transit travel times can be made more reasonable by:

- Improving frequency,
- Putting bus stops closer to people's origins/ destinations,
- Making bus routes more direct,
- Decreasing transfers,
- Speeding up buses stuck in traffic

www.wmata.com/betterbus

Questions and Discussion

What is your response to these main findings? What opportunities do you see?

Dashboard Demo

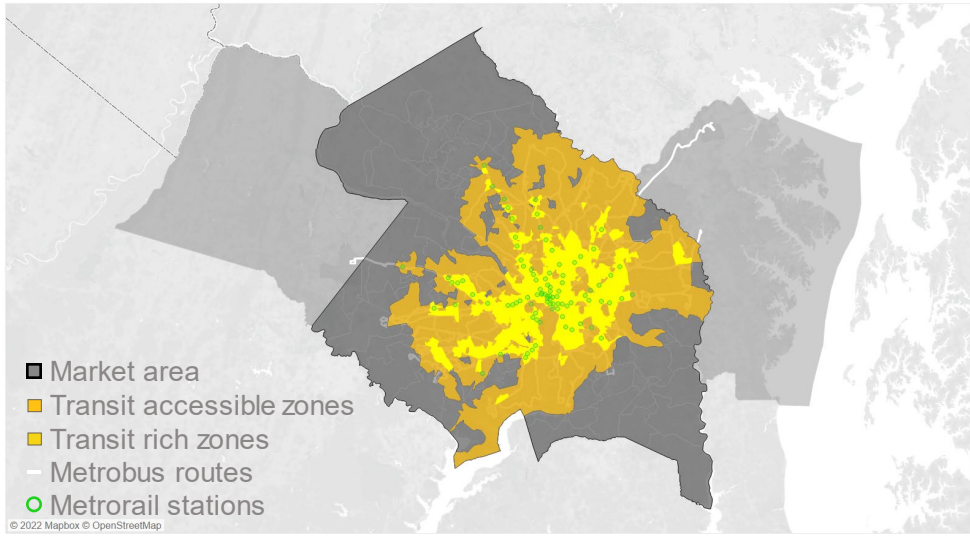
Appendix

Definitions

The Market: the WMATA Compact Area excluding Loudoun County (shown in dark grey)

Transit accessible area: zones where more than 10% of its area is within ¼ mi of a Metrobus route or ½ mi of a Metrorail station (shown in orange)

Transit rich area: zones where more than 80% of its area is within ¼ mi of a Metrobus route or ½ mi of a Metrorail station (shown in yellow)

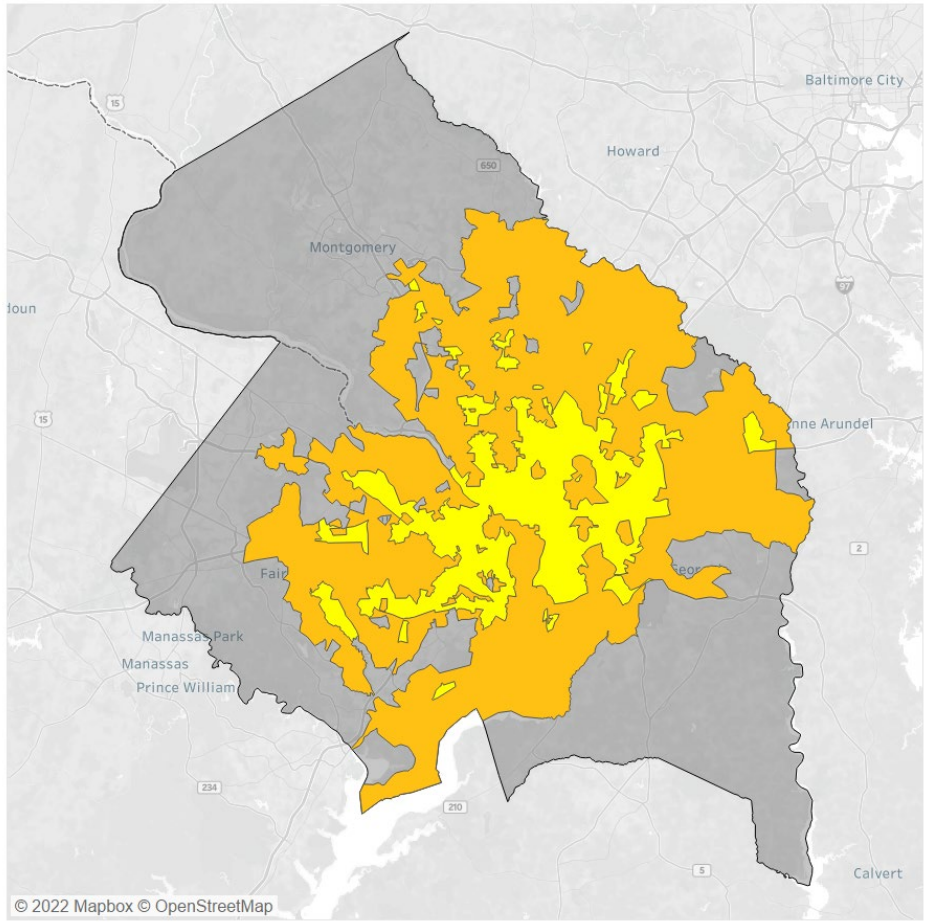


Transit refers to Metrobus and Metrorail, excluding regional operators

Metro is used to refer to the organization operating Metrobus and Metrorail

For trip purpose: "**Home**" refers to the location the phone is at most often during nighttime hours, "Regular" is the most common location of the phone during traditional business hours and referred to as "**Work**" in this report although could be some other purpose, and "**Other**" is any other location.

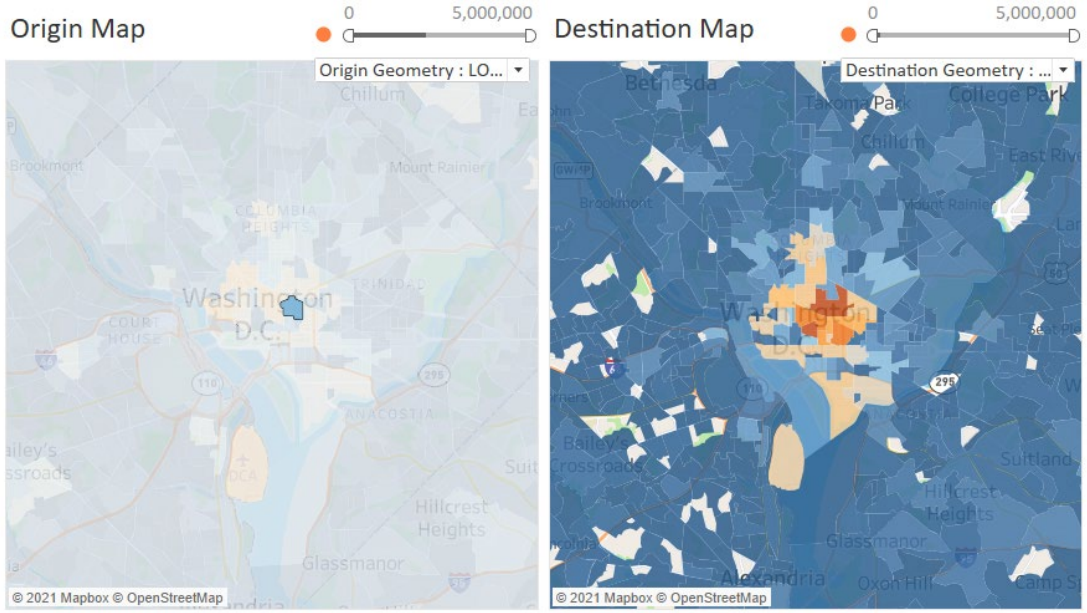
Details about the submarket areas



- **"Transit accessible" zones contain the bulk of the population (76%) and jobs (83%), and 70% of trips start and end here**
  - 69% of the zones meet the bus service standard for base coverage and 30% meet the standard for frequent service
- **"Transit rich" zones contain a third of the population (36%) and half the jobs (53%) in the region, and 35% of trips start and end here**
  - 88% of the zones meet the bus service standard for base coverage and 47% meet the standard for frequent service

Description of LBS data

- **Total O-D flows between zones based on adjusted census block group geographies (CBGs)**
  - For calendar year 2019
  - By Weekday/Friday/Saturday/Sunday, Month, Hour
  - Resident or Visitor
  - By Equity zone
  - Average distance and trip length
  - Trip purpose (Home-Regular, Home-Other, Regular-Other, Other-Other)*



	WDAY_TYPE	WDAY_TYPE_DESC	MONTH_ID	ST_HH24	PURPOSE	PURPOSE_DESC	TRIPLENGTHMI	TRIPLENGTH_DESC	VISITOR	EZ	EQUITYZONE_DESC	START_GEOID	END_GEOID	AVGDAILYTRIPS	DISTANCE_MI	YEAR
636	4	Sunday	4	9	2	Home-Other	6	10-15 miles	Resident	4	Non-Equity	506	46	19.217796	209.70116	2019
637	4	Sunday	4	13	2	Home-Other	5	7.5-10 miles	Resident	4	Non-Equity	506	46	18.272348	180.39534	2019
638	1	Weekday	4	6	4	Other-Other	6	10-15 miles	Resident	3	Low-Income an...	506	46	4.818528	48.650425	2019
639	1	Weekday	4	16	3	Regular-Other	5	7.5-10 miles	Resident	2	Minority Only	506	46	2.4385474	24.169632	2019
640	1	Weekday	4	17	2	Home-Other	6	10-15 miles	Resident	1	Low-Income Only	506	46	4.7807794	51.936966	2019
641	1	Weekday	4	16	2	Home-Other	6	10-15 miles	Resident	1	Low-Income Only	506	46	3.2698379	35.610405	2019
642	1	Weekday	4	20	2	Home-Other	6	10-15 miles	Resident	1	Low-Income Only	506	46	1.5278488	15.669734	2019
643	4	Sunday	4	17	2	Home-Other	6	10-15 miles	Resident	1	Low-Income Only	506	46	18.802643	204.68265	2019

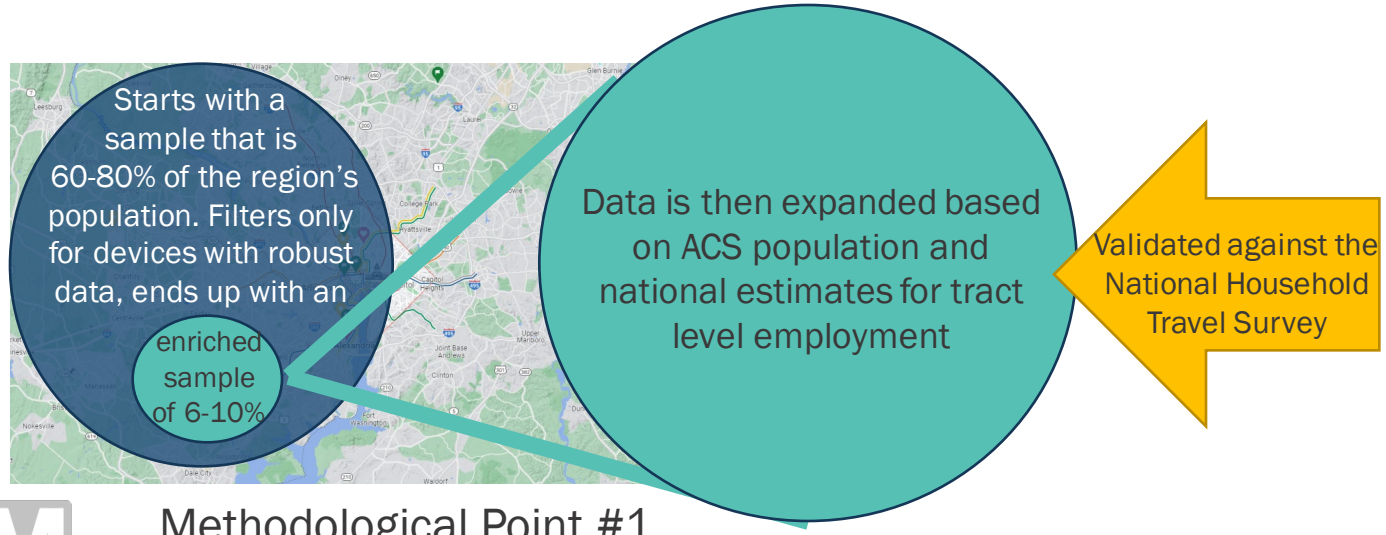
** Instead of asking directly, trip purpose is inferred. "Home" refers to the location the phone is at most often during nighttime hours, "Regular" is the most common location of the phone during traditional business hours and referred to as Work in this report, and "Other" is any other location.*

How representative is the data?

In terms of demographic representation

The LBS data do not have demographics associated with individual devices. Instead, we know that:

- **LBS data are representative across a wide variety of location types typically visited by high-, medium-, and low-income groups**
- **Smartphone penetration rates are high across all income levels, but less so across age groups, so the elderly (65+) and very young will be underrepresented**



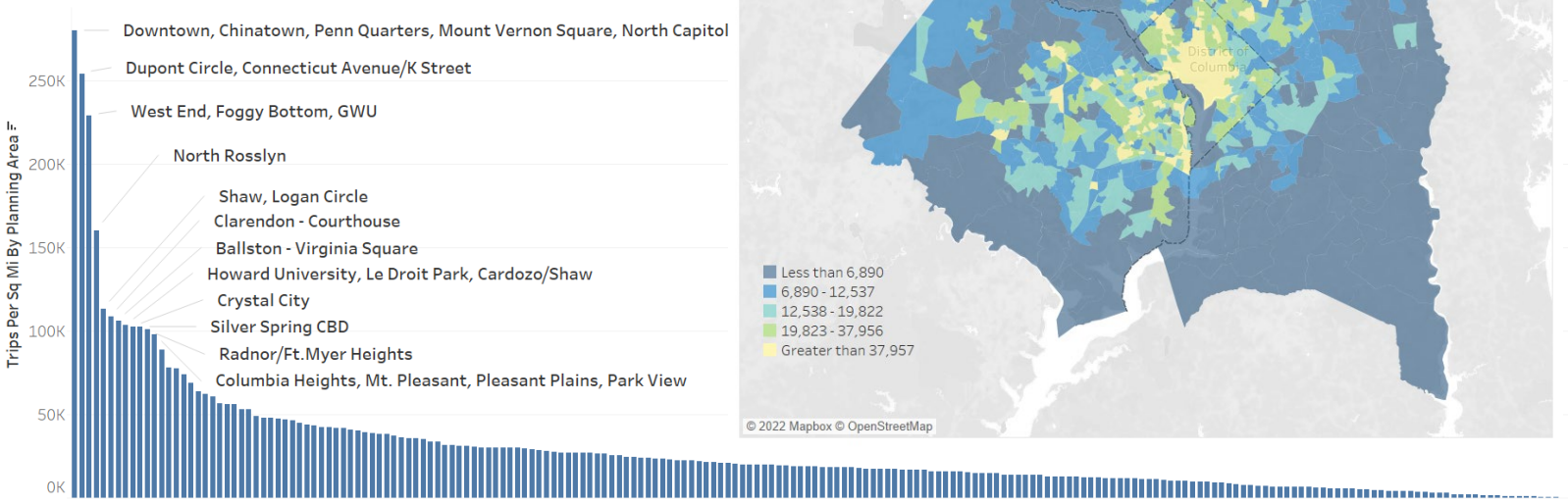
Methodological Point #1

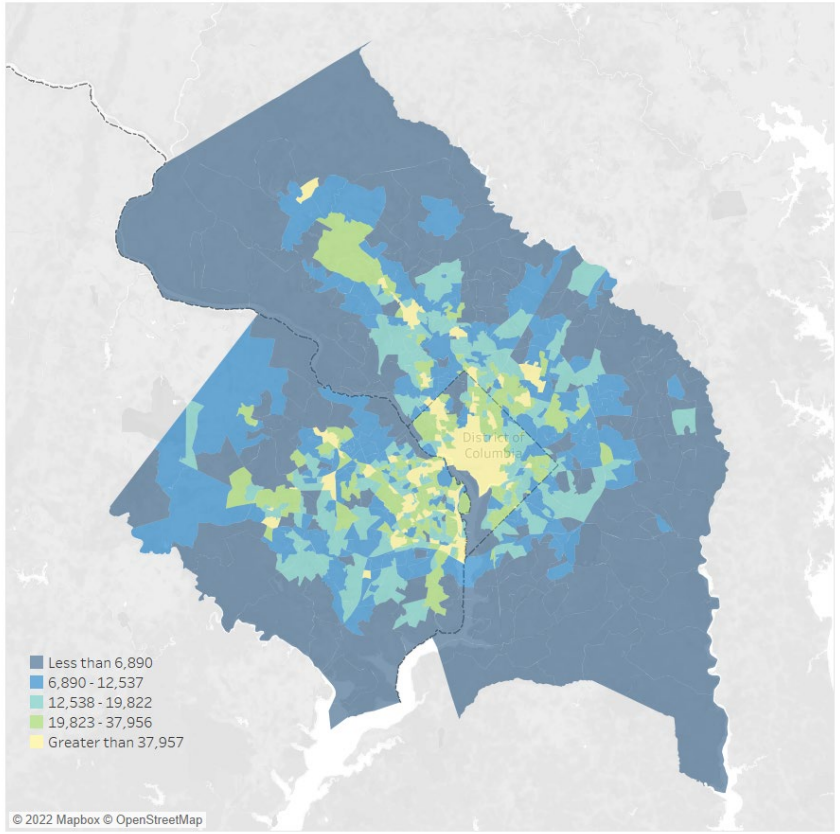
In terms of travel representation

The data is validated against the National Household Travel Survey so will match overall values we typically use but have similar weaknesses (e.g. potential to misstate short trips and trip chaining, misrepresentation of travel by undercounted populations such as undocumented).

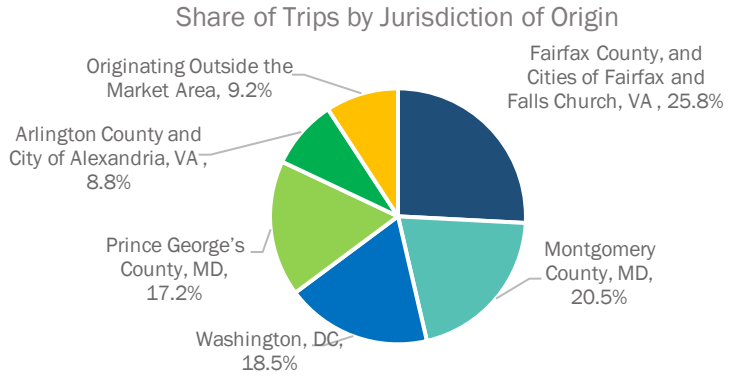
Where were trip densities highest? Did they vary by jurisdiction?

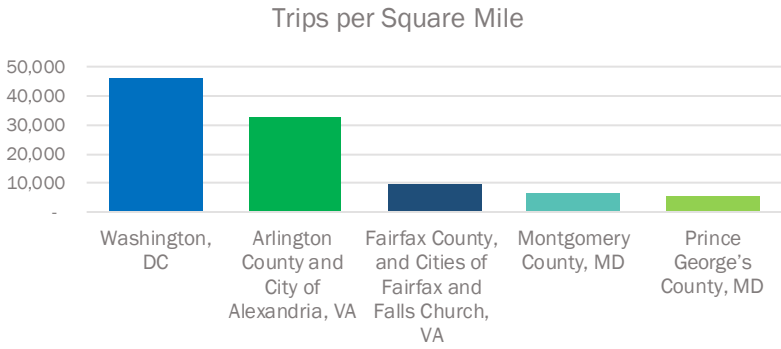
- **High trip densities (trips per square mile) along transport corridors and in the core**





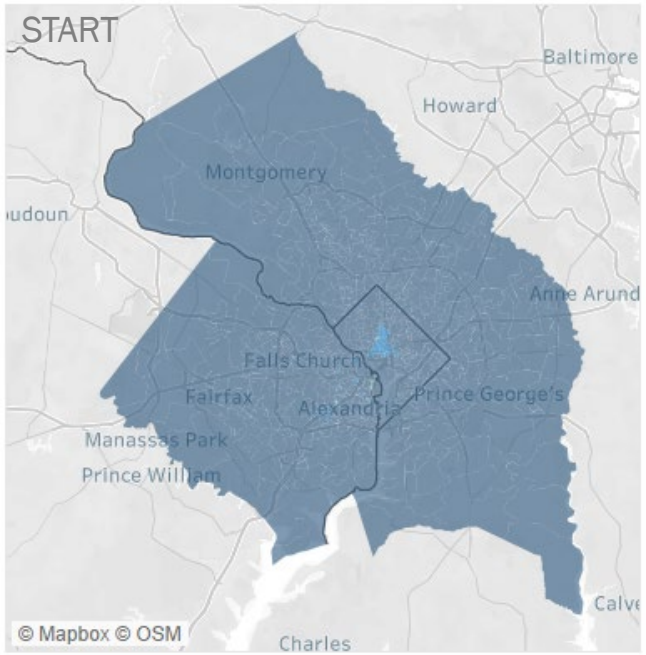
- **Relatively even distribution of total trips, but varying trip densities across jurisdictions**

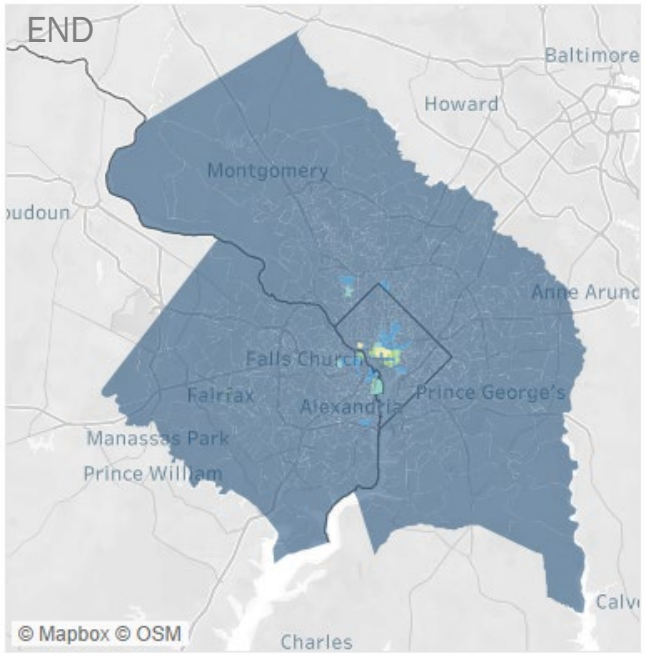


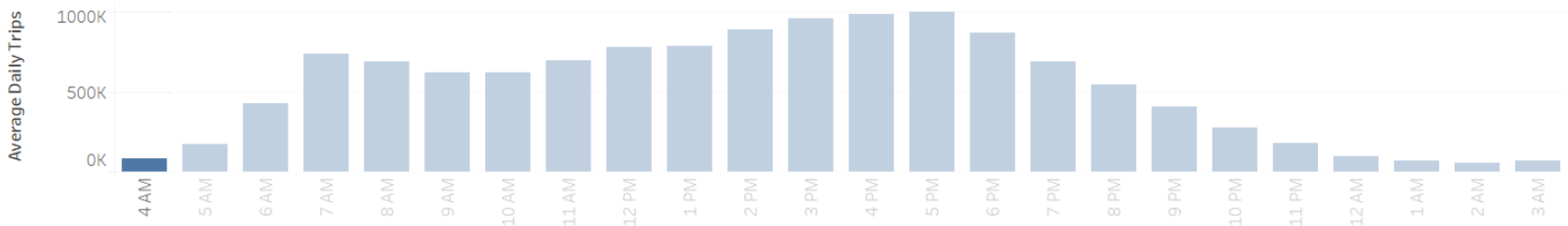


Trip density is based on the number of trips originating from that zone divided by the origin zone's area in square miles.

What does travel look like throughout the day?







- **Highest trip densities by origin and destination occurred in similar areas across time periods**
- **During AM Peak, more people were traveling to Downtown DC than starting their trips there**
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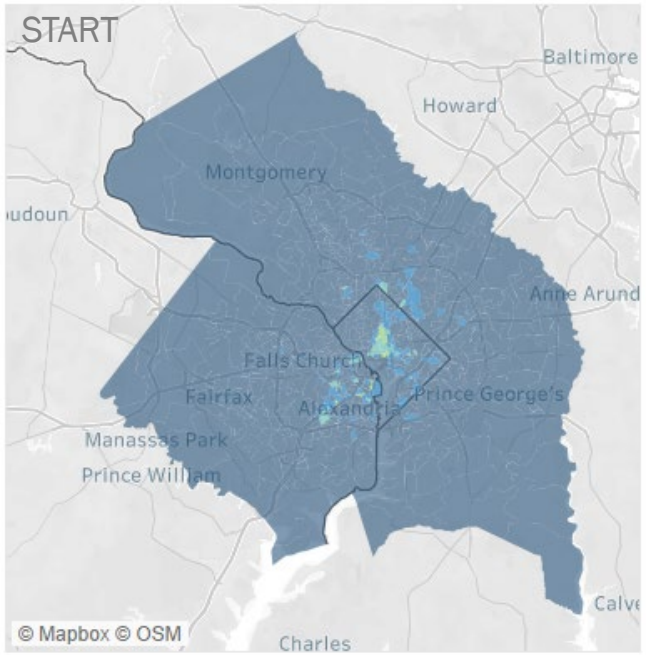

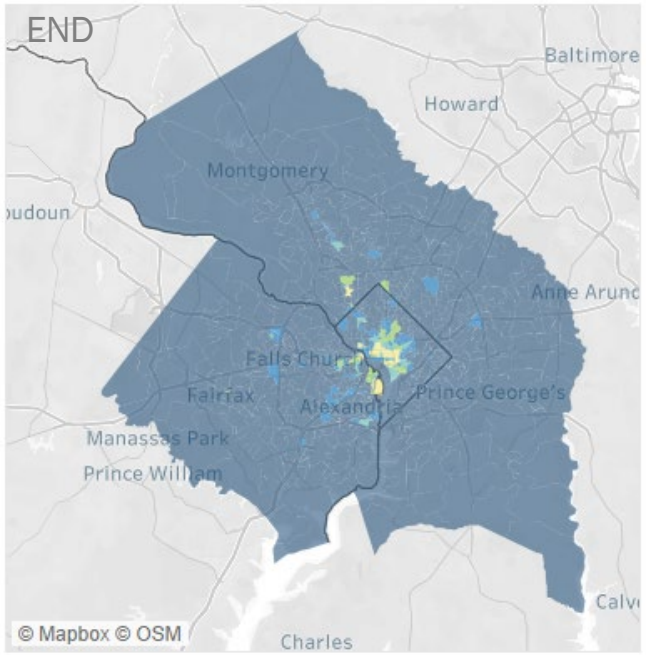

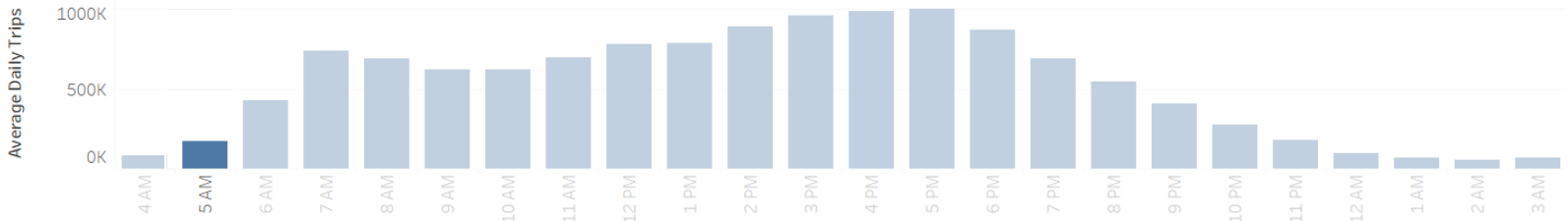

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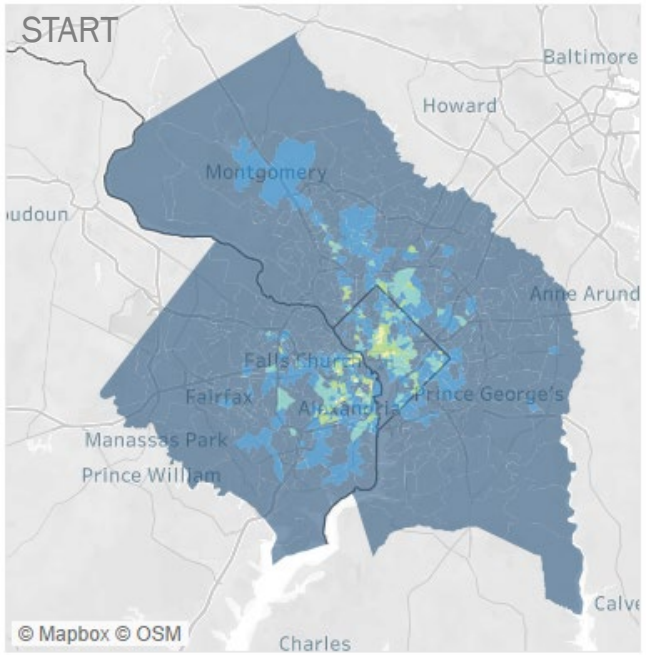

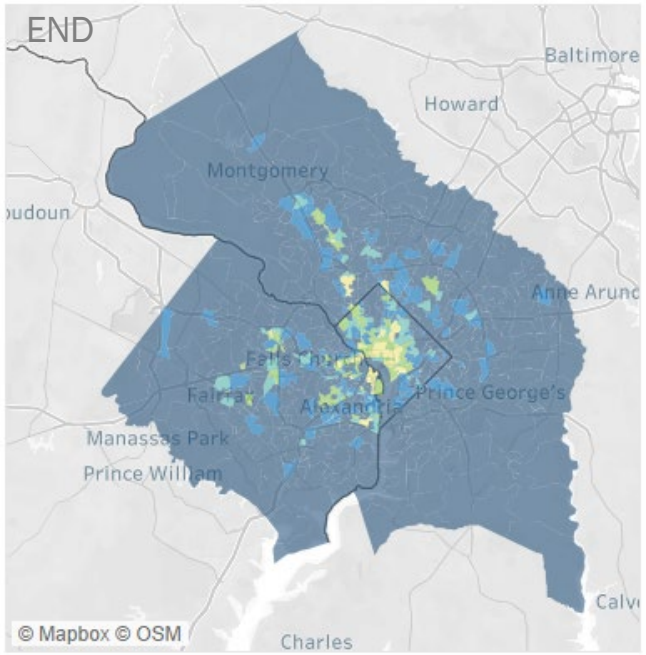

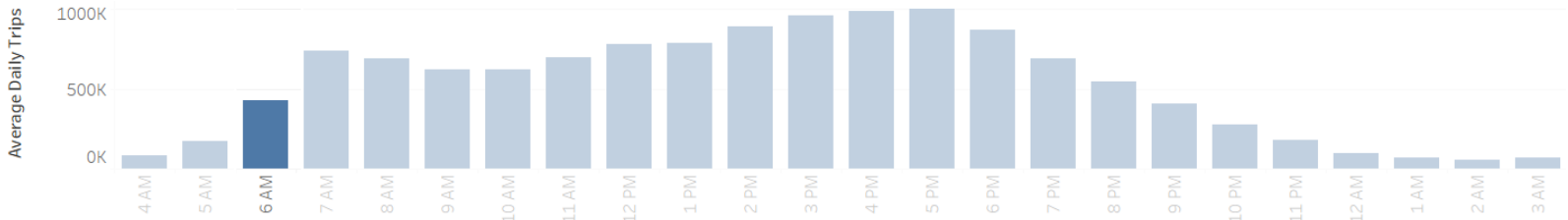

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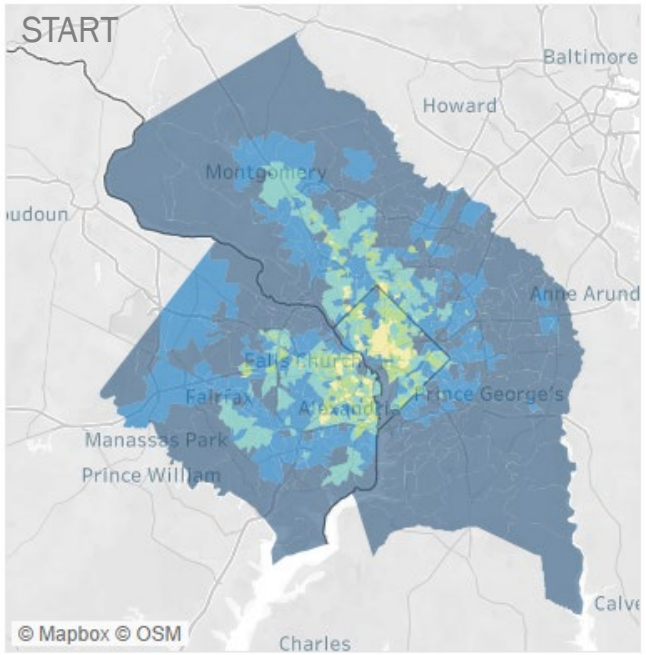

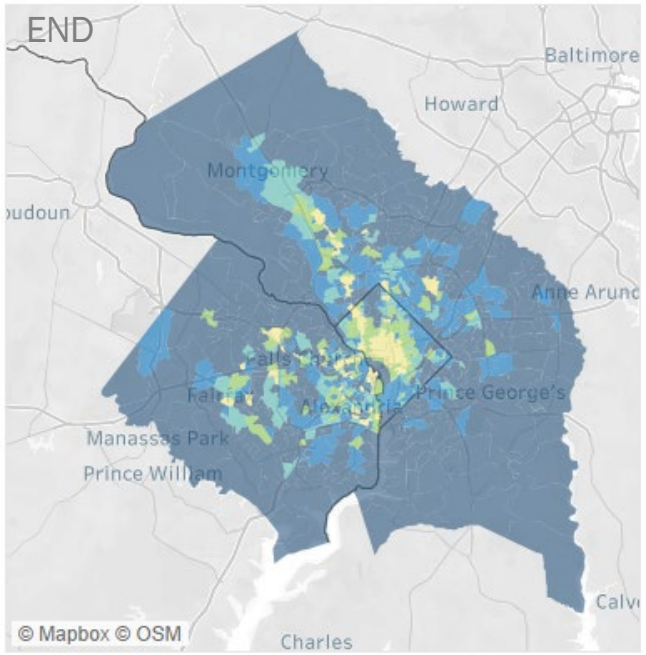

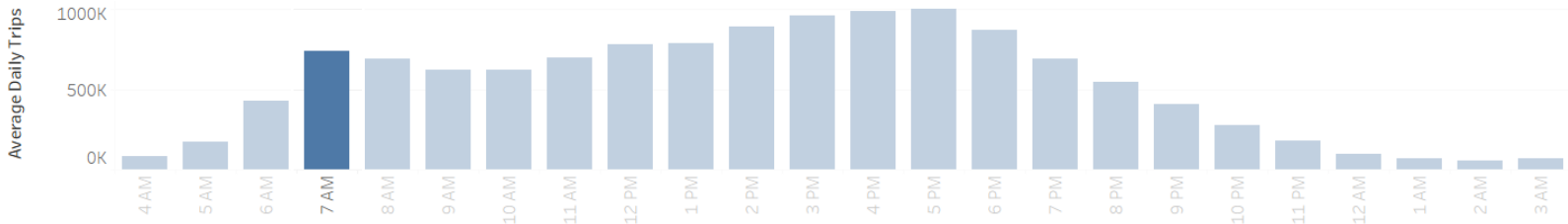

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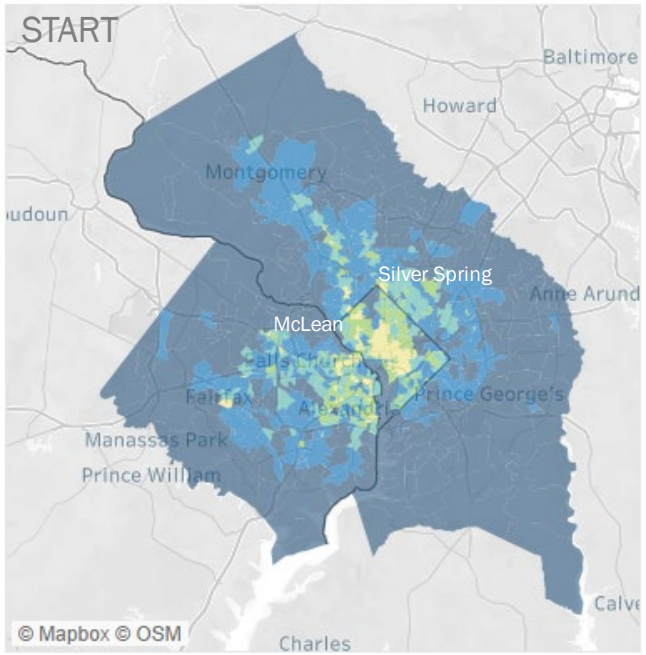

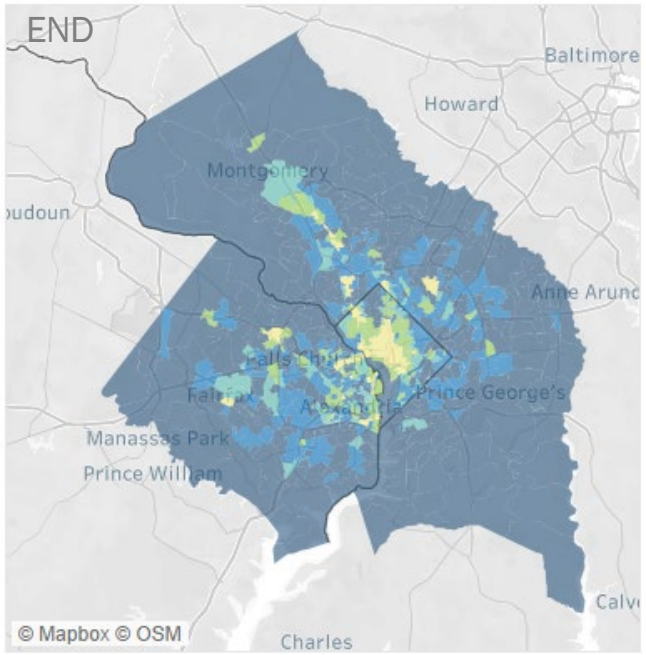

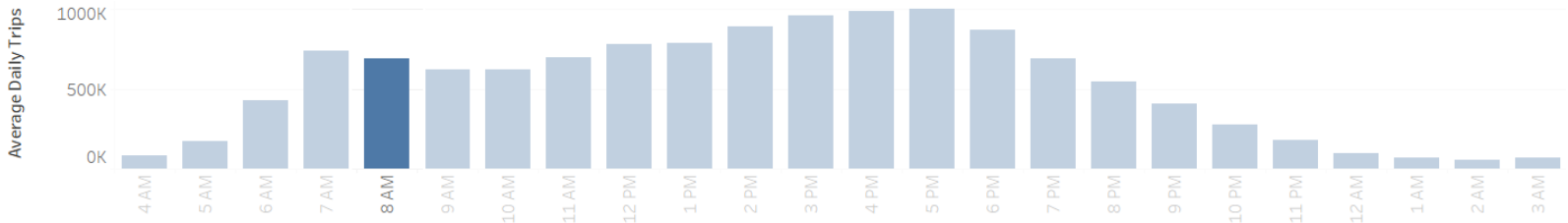

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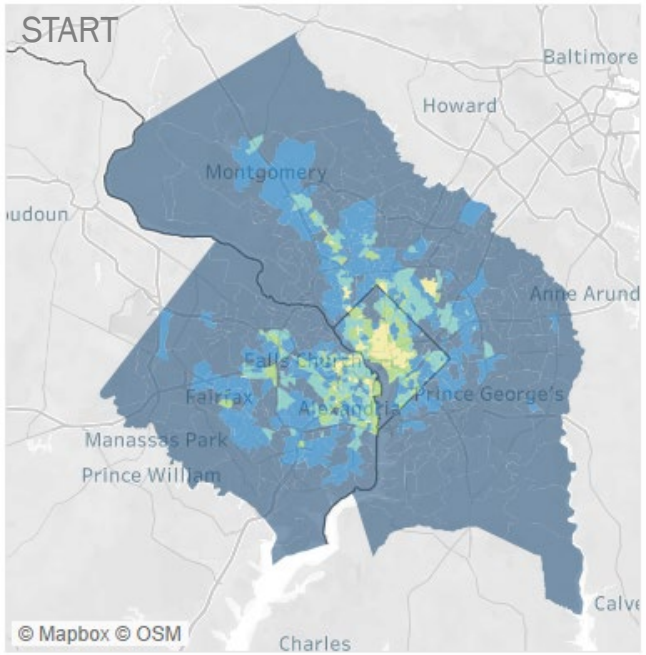

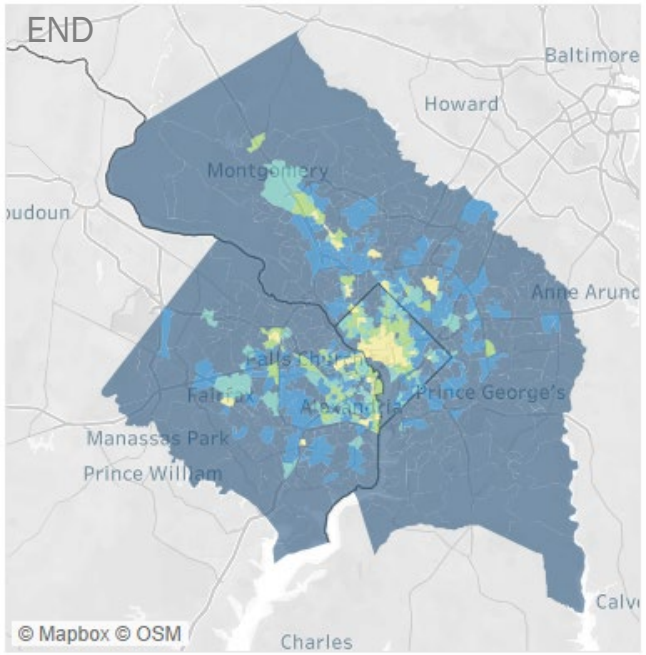

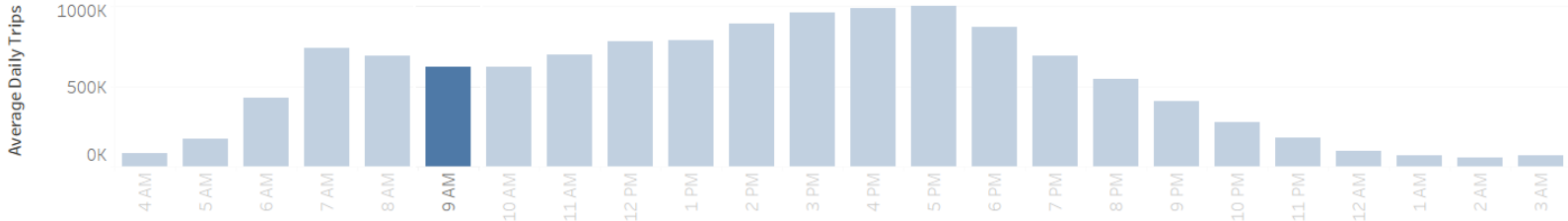

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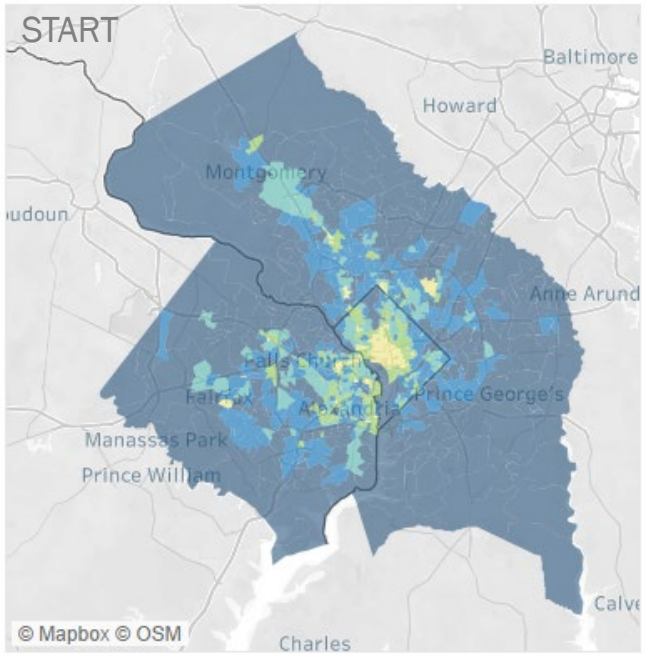

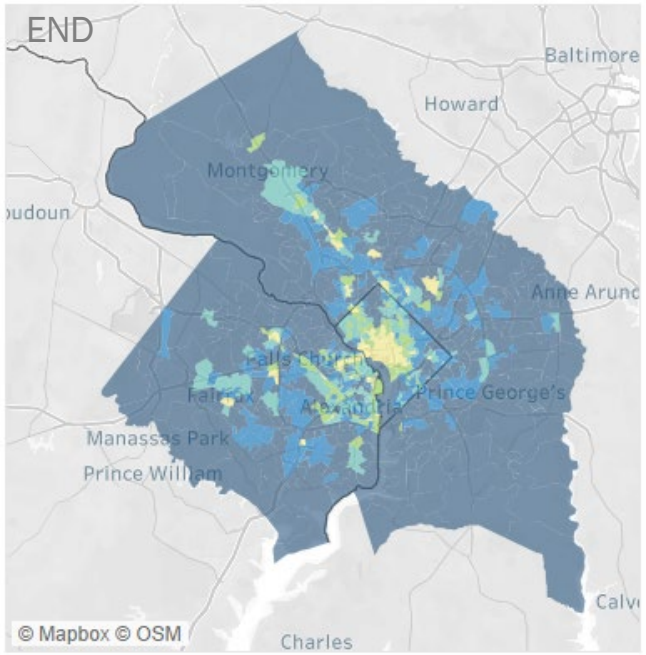

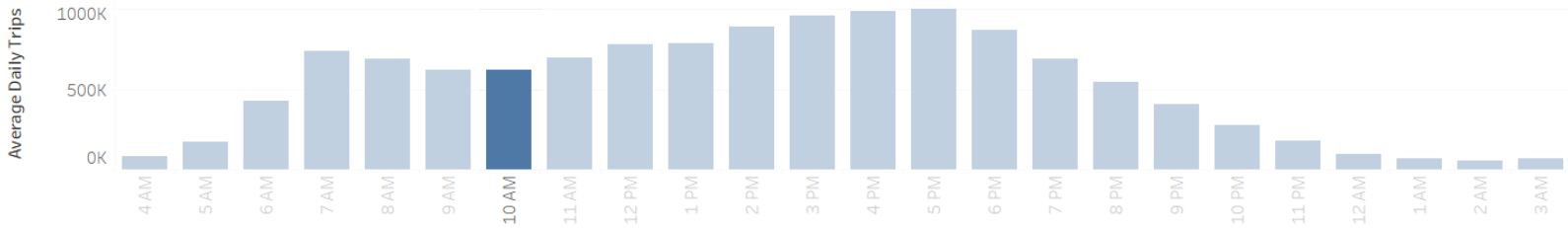

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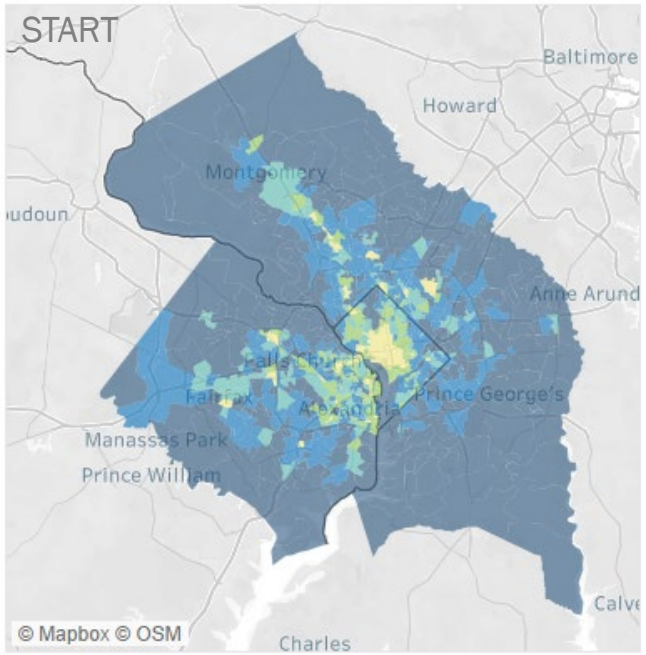

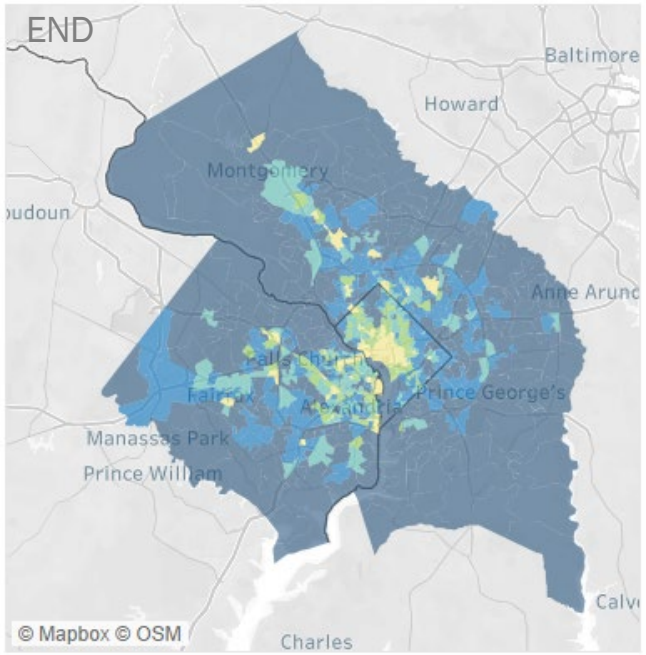

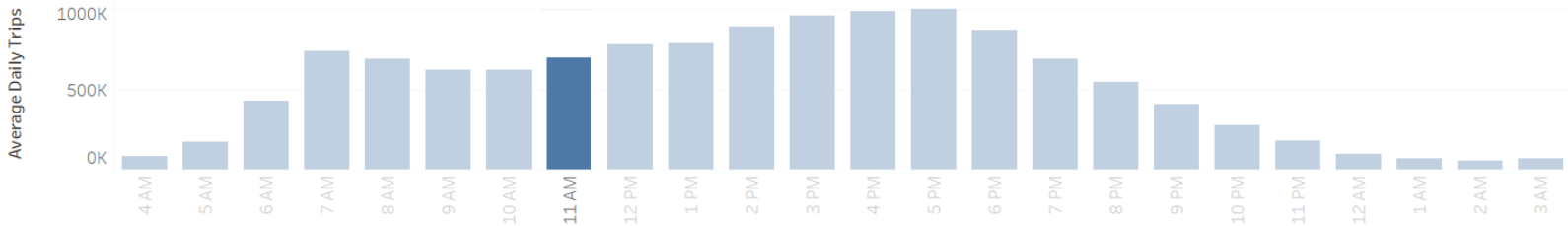

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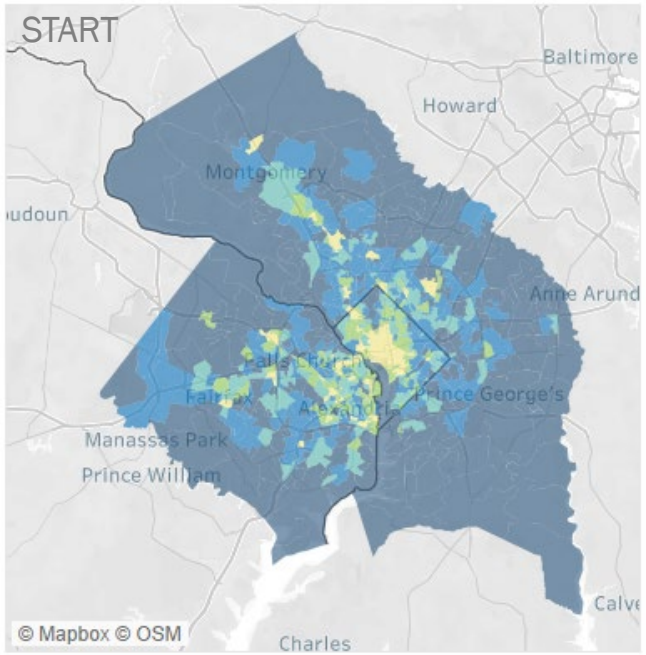

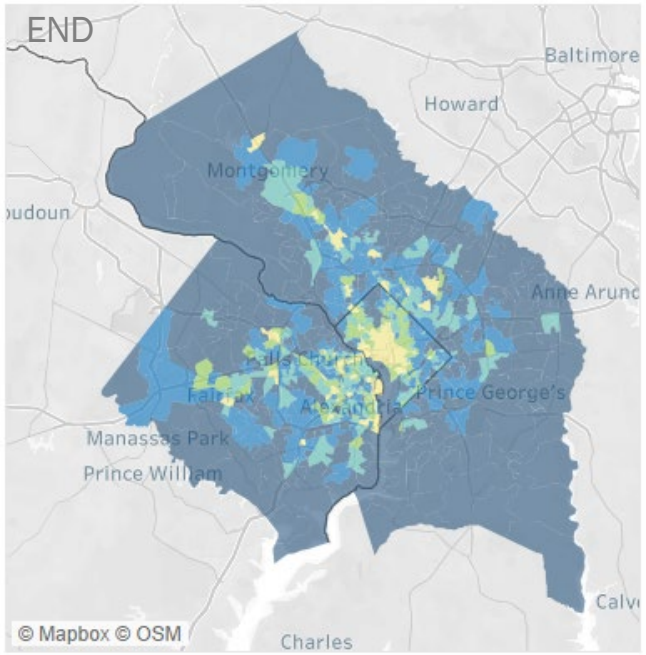

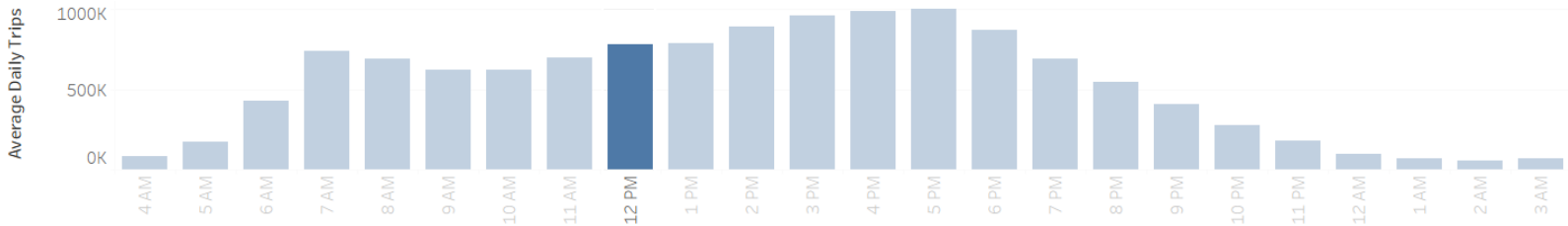

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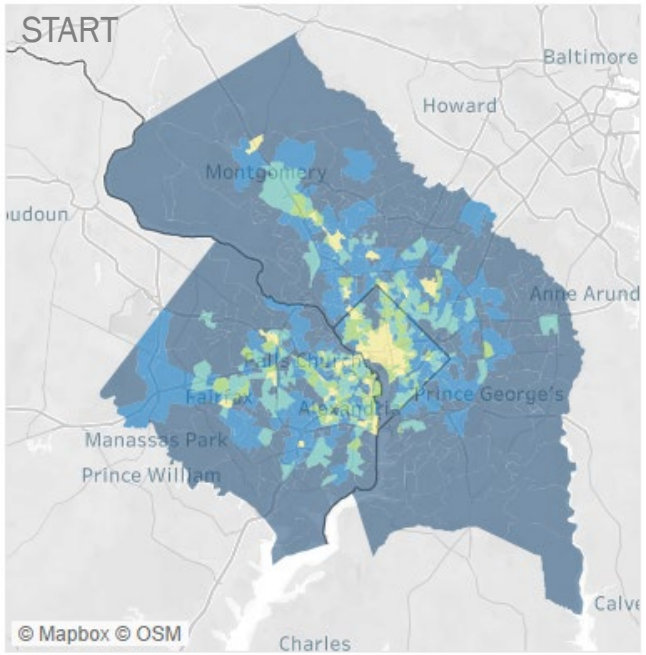

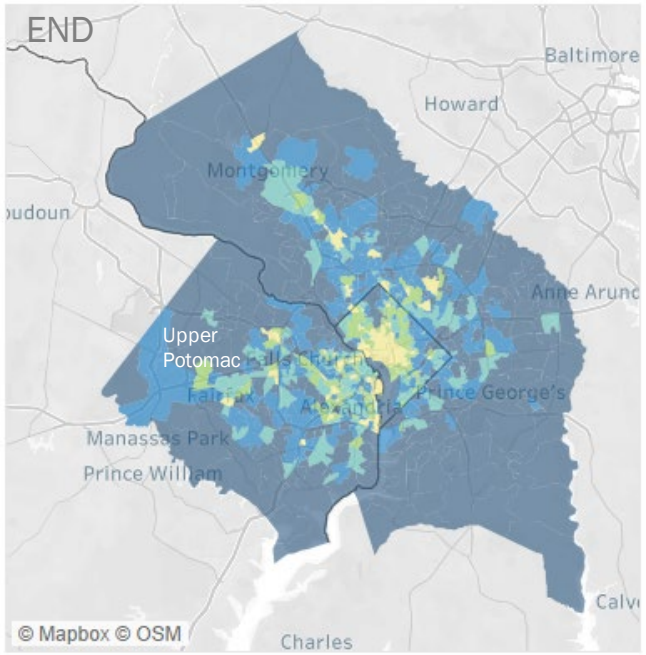

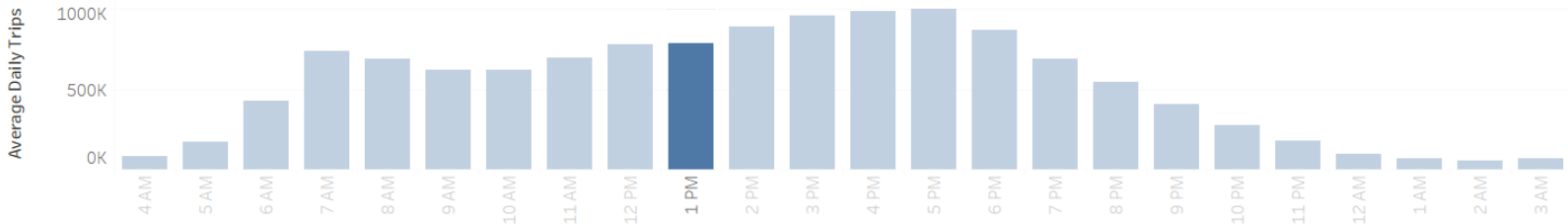

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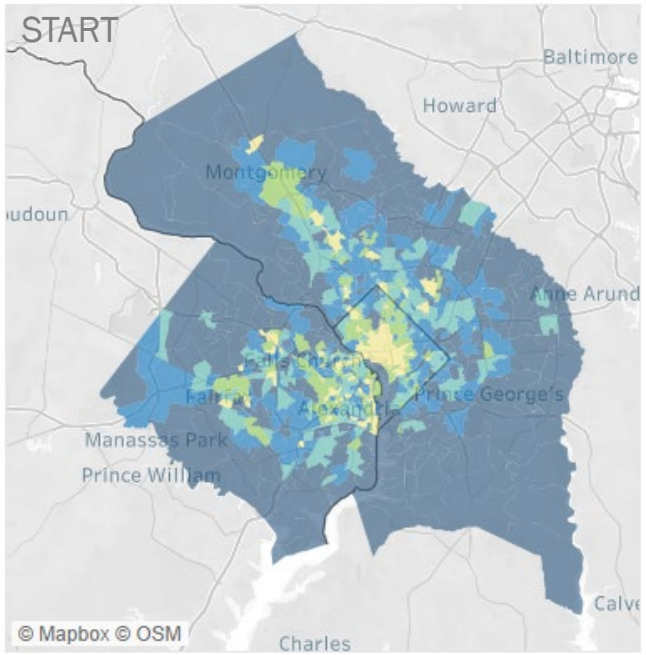

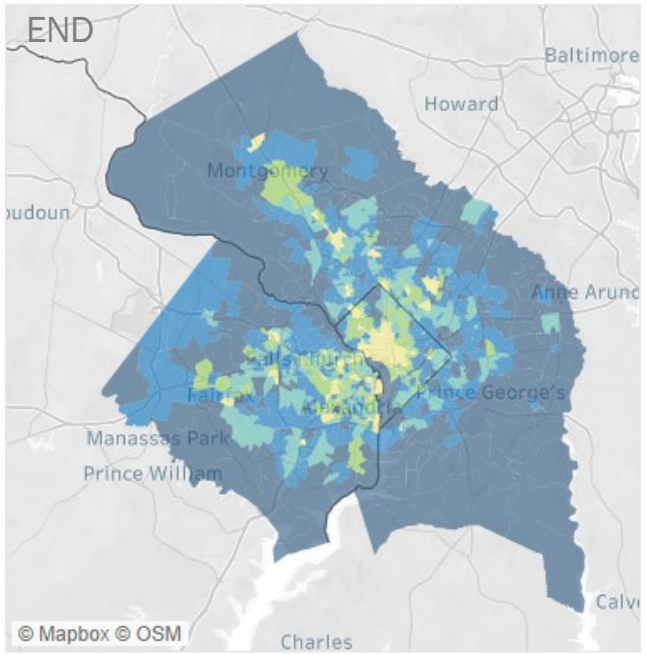

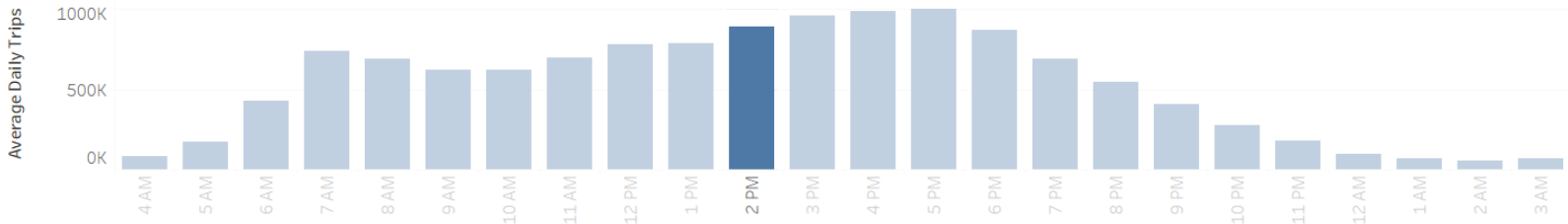

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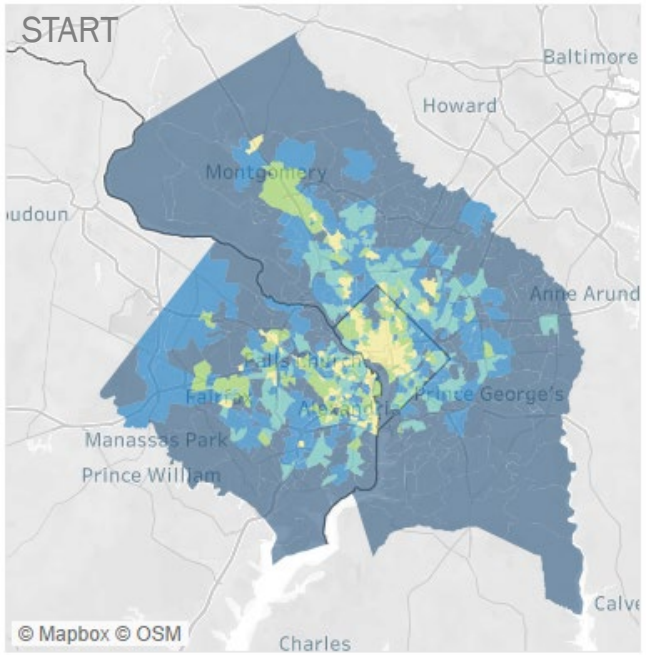

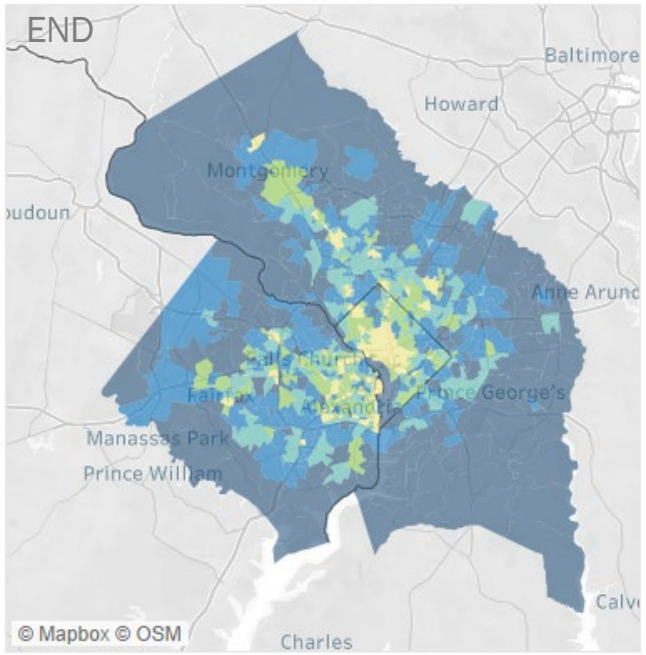

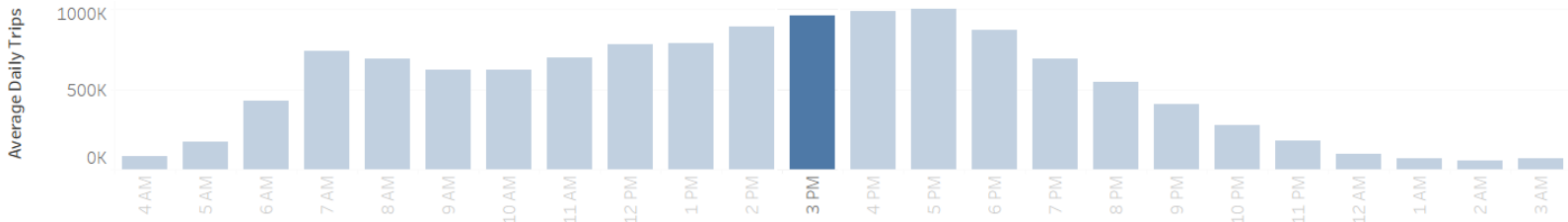

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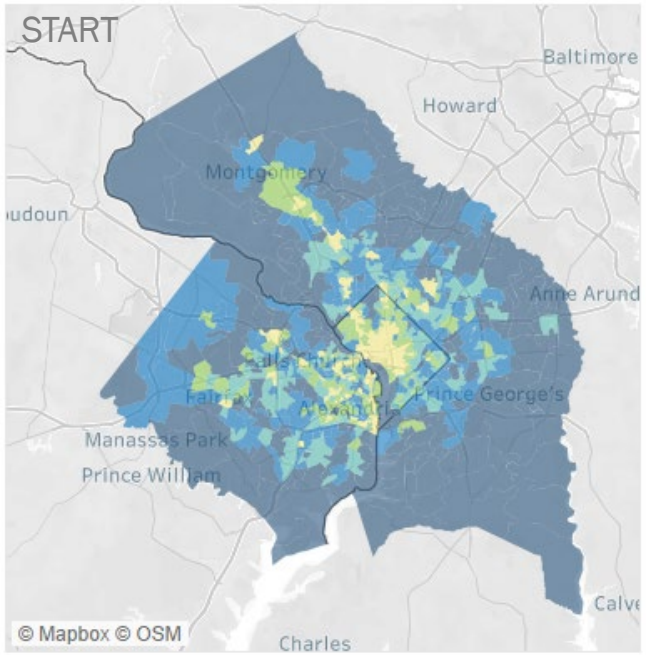

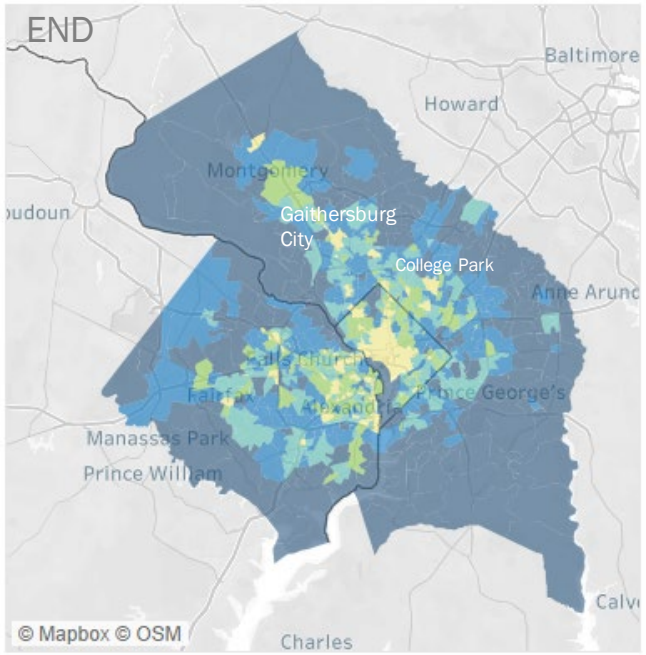

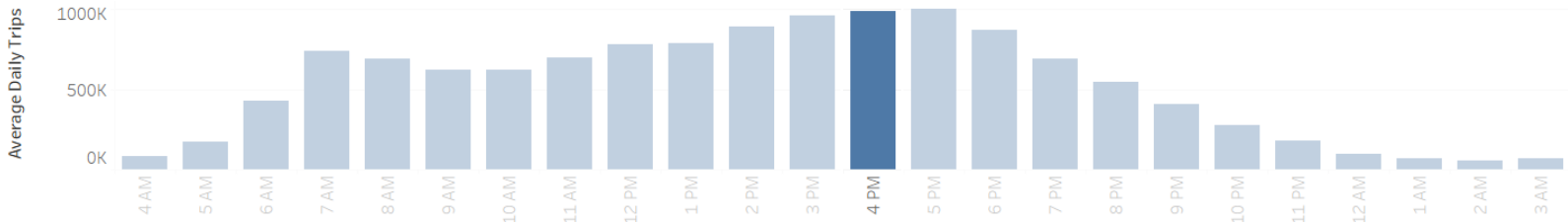

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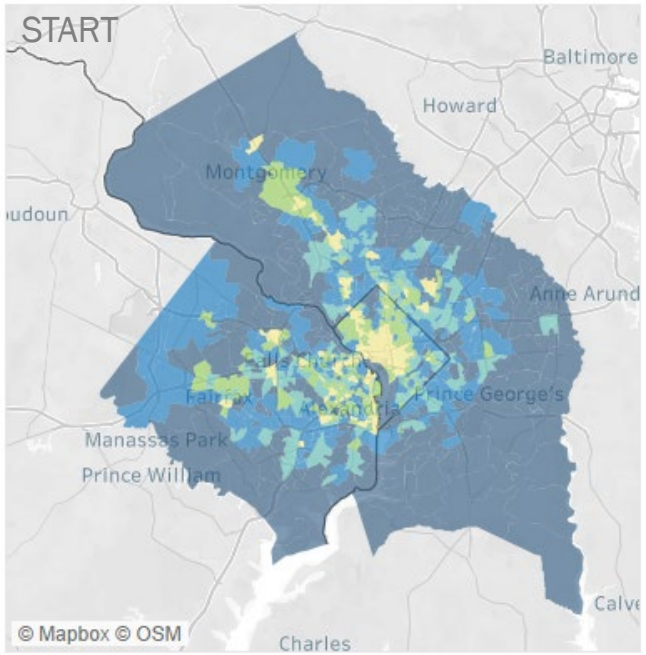

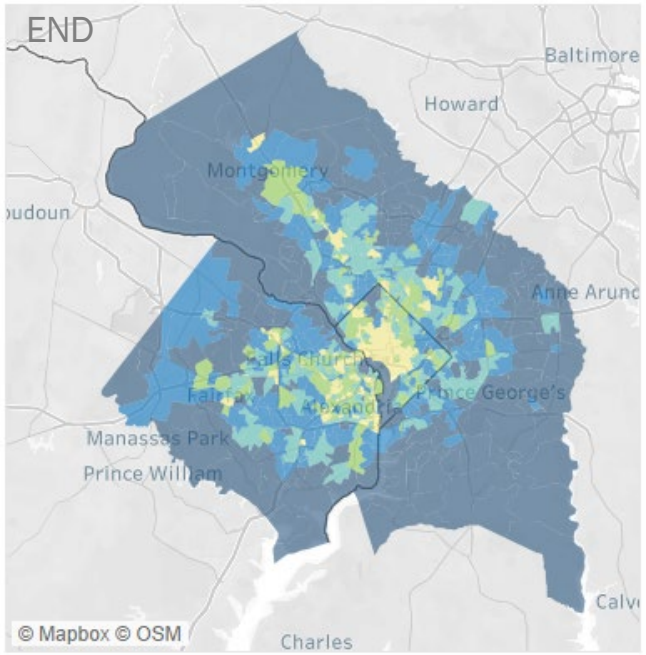

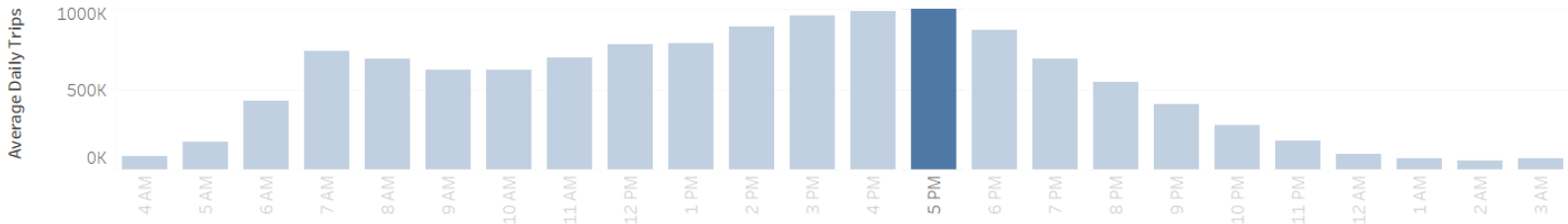

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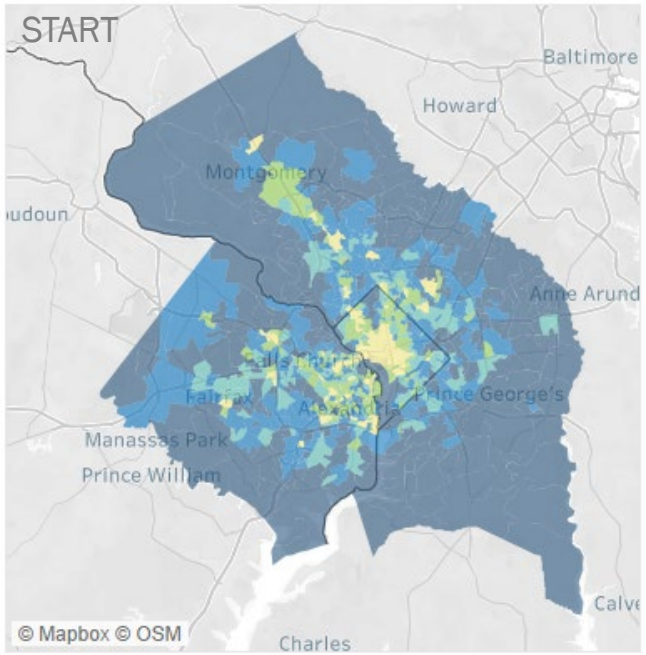

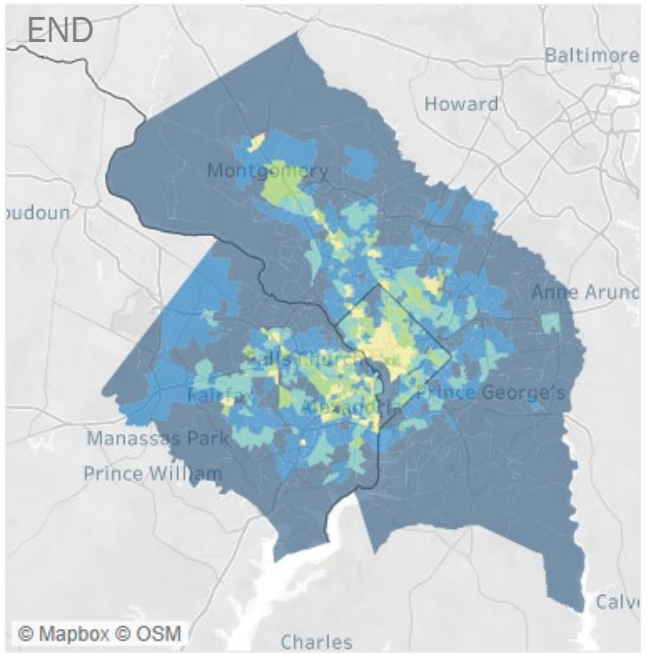

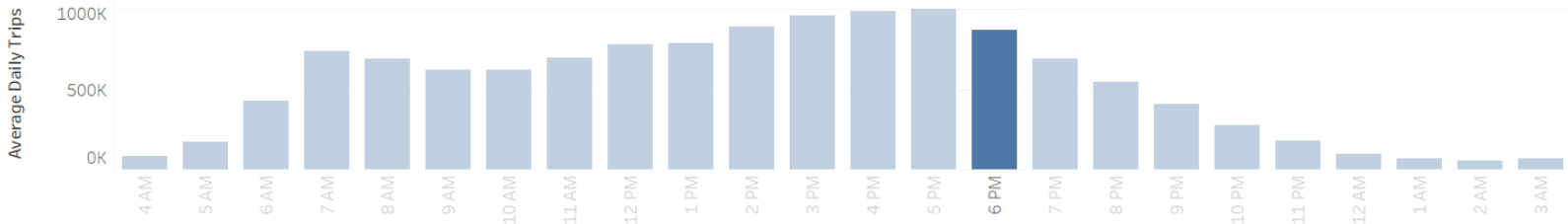

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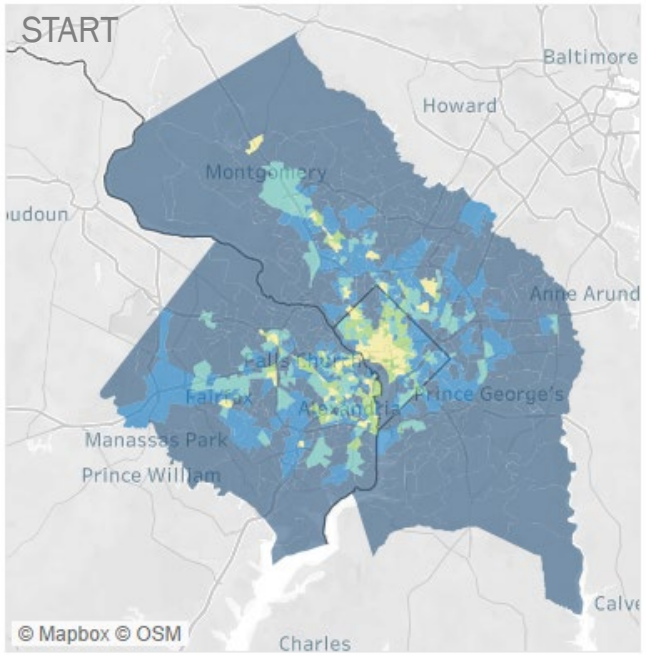

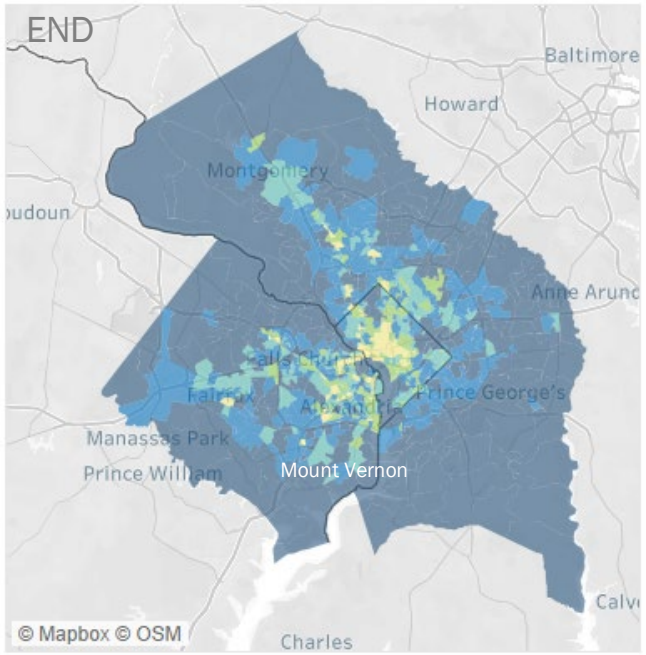

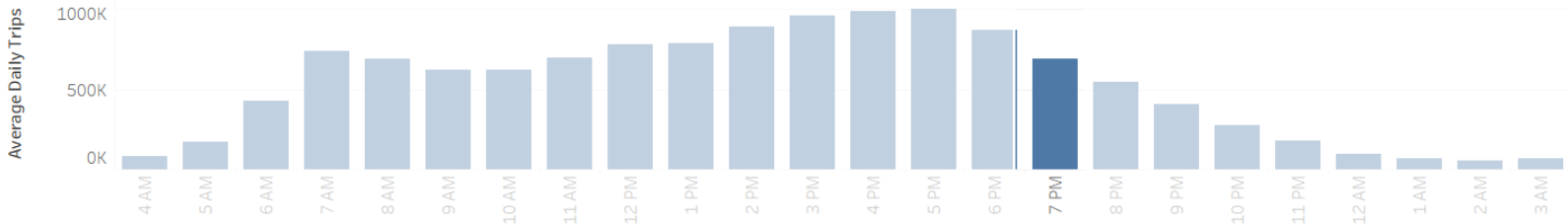

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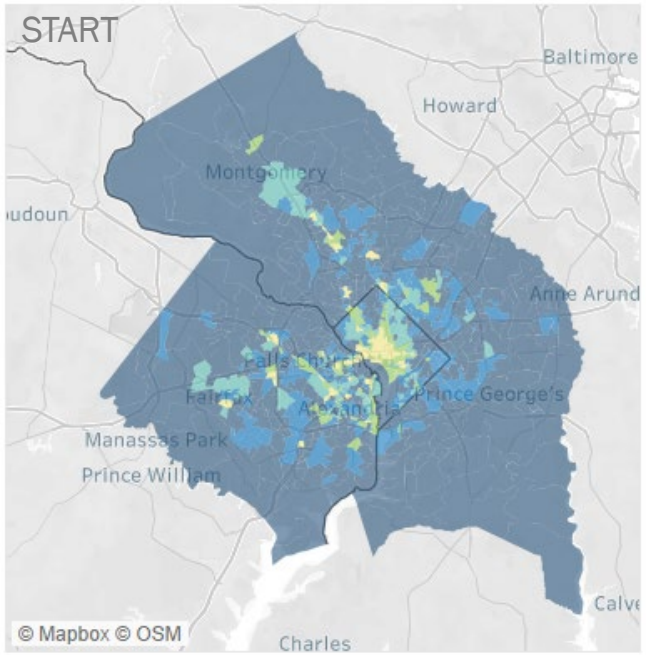

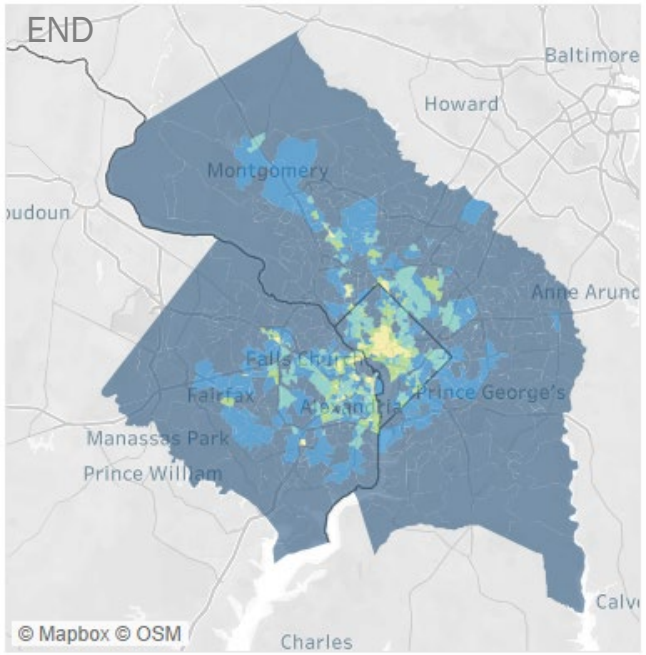

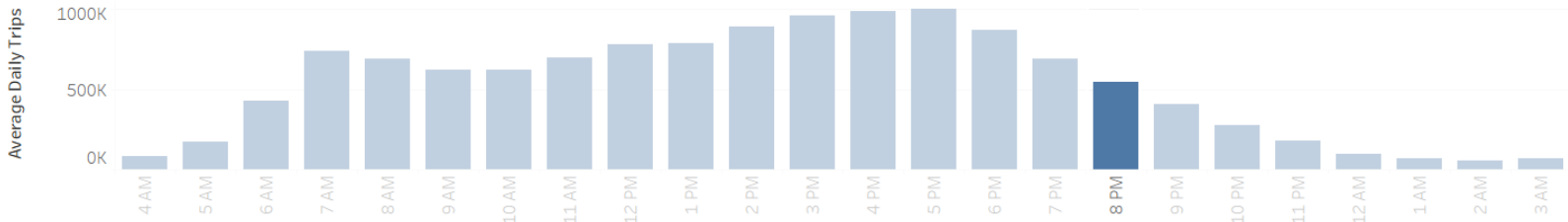

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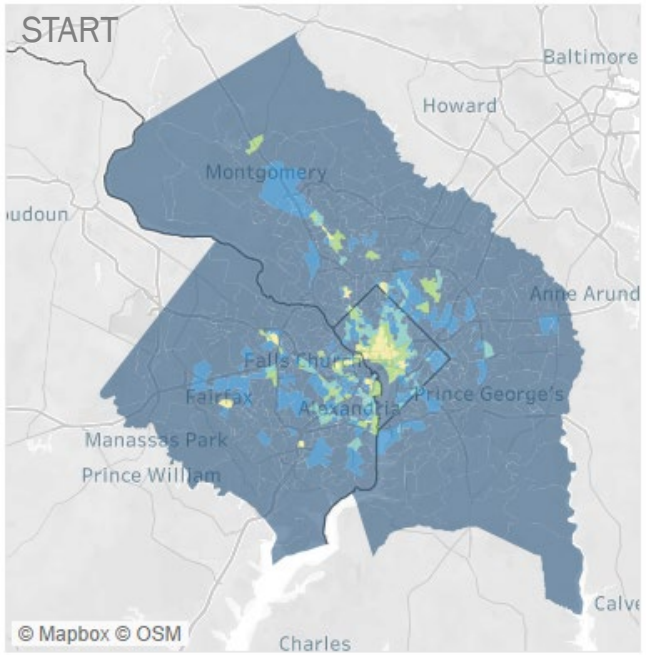

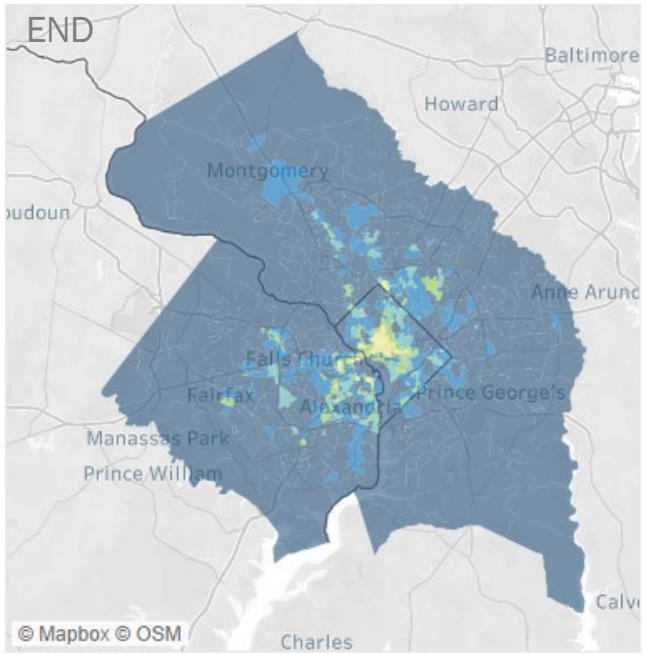

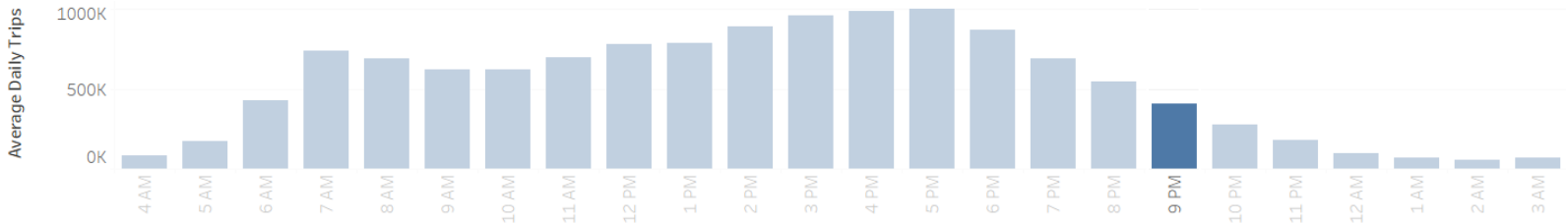

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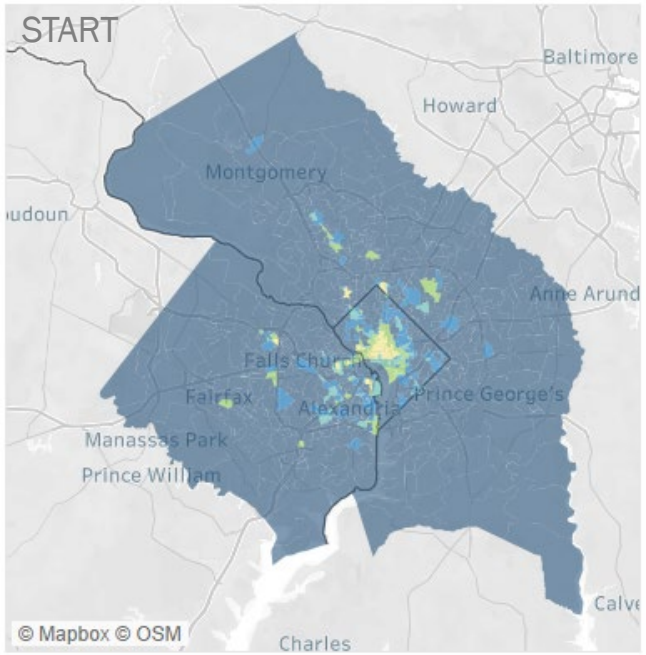

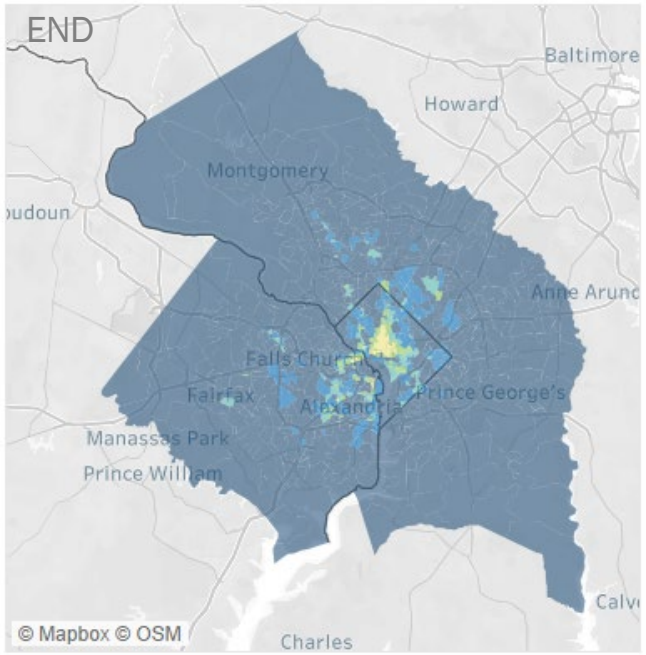

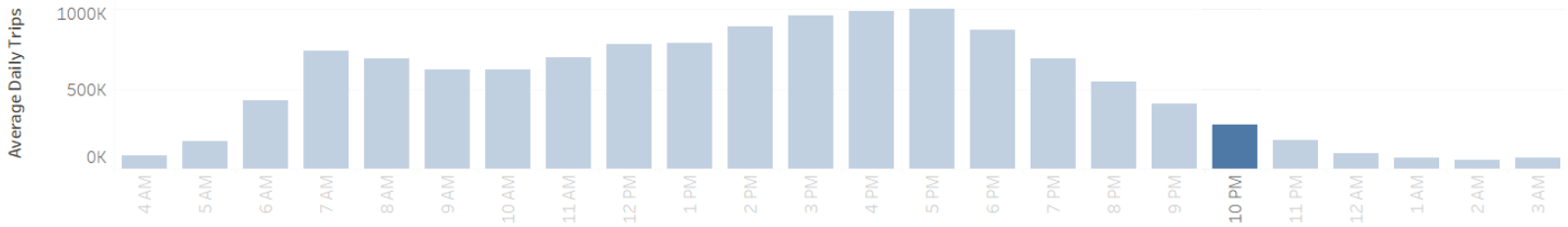

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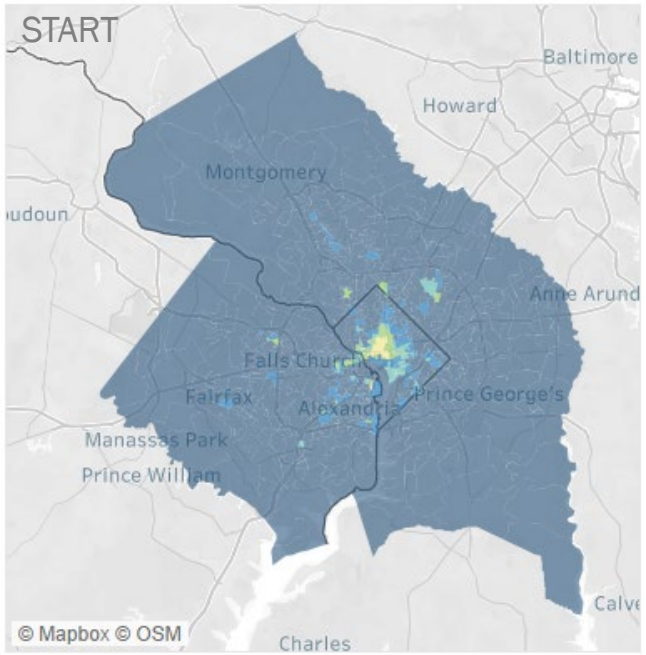

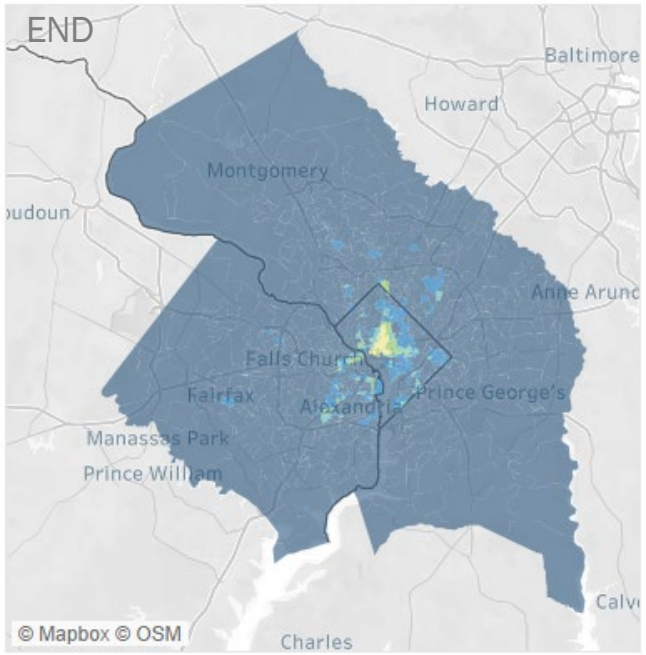

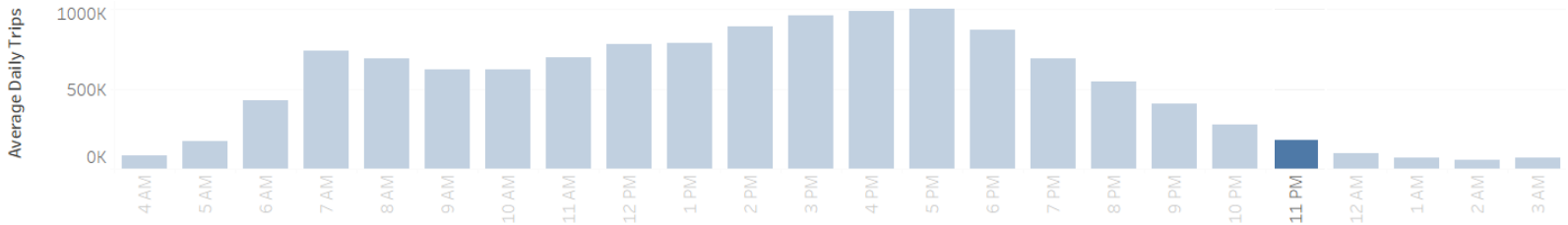

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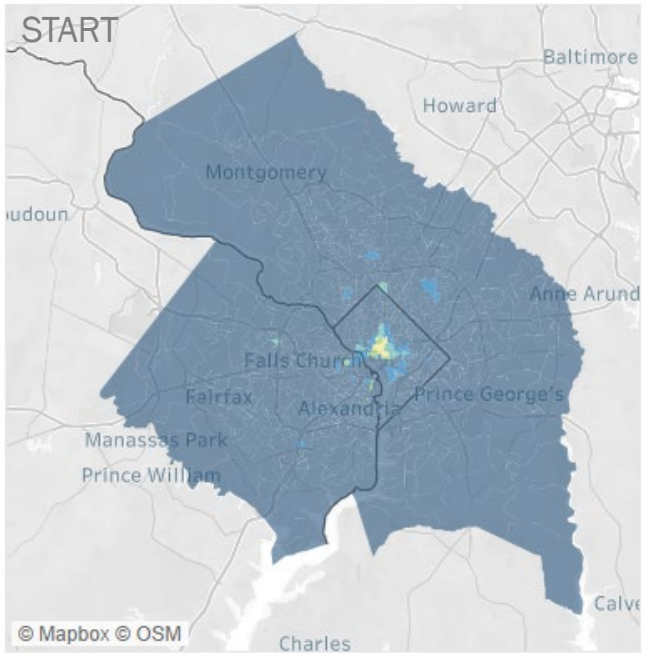

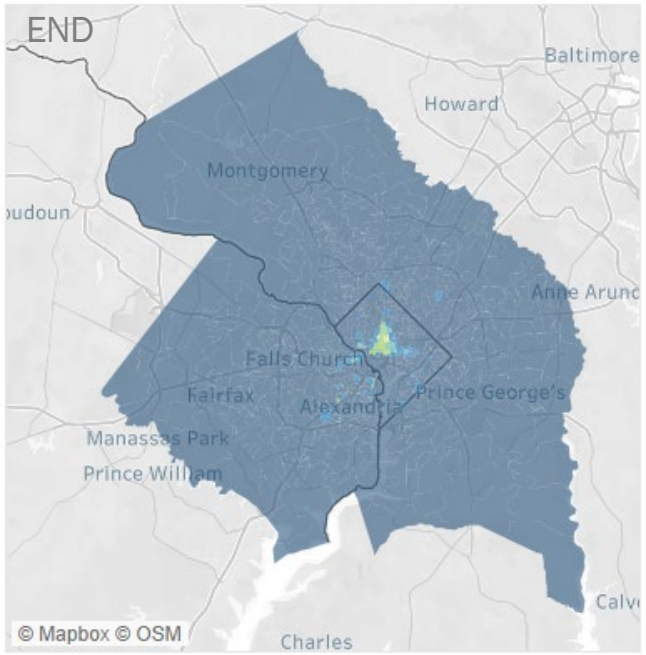

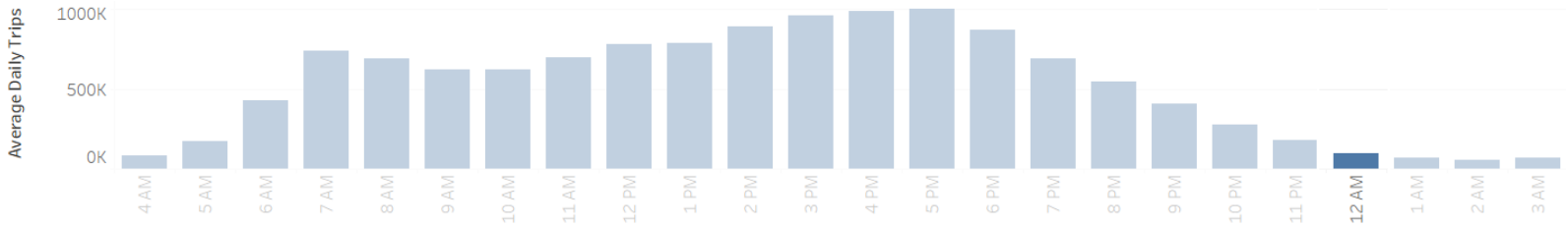

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- **During AM Peak, more people were traveling to Downtown DC than starting their trips there**
- **As the day progresses, top destinations outside of DC begin to emerged**
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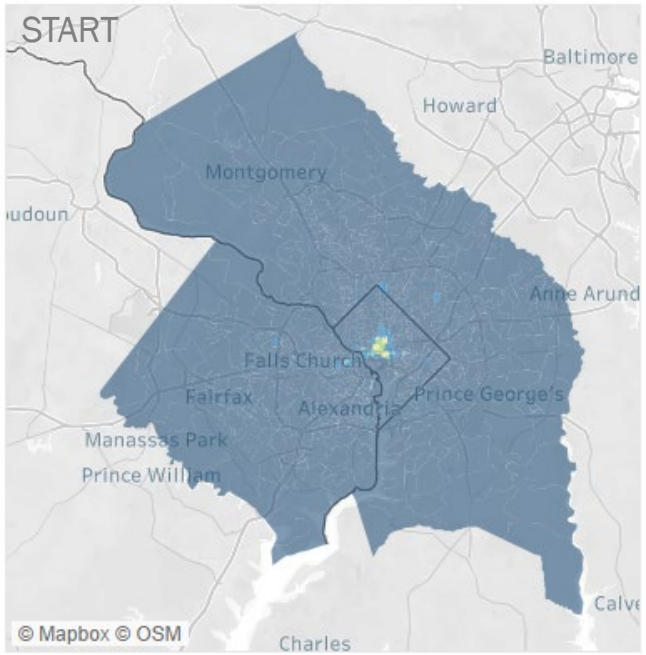
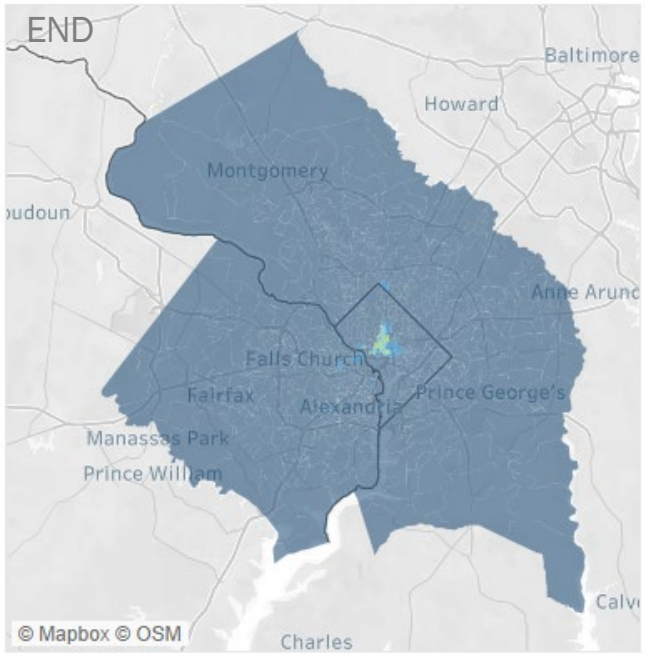
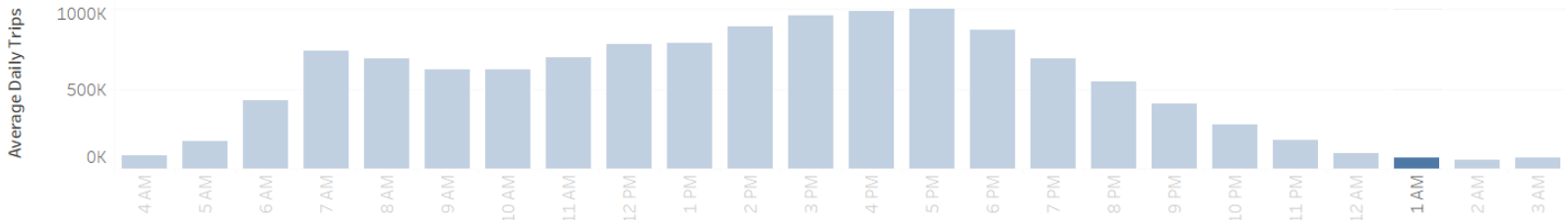
What does travel look like throughout the day?







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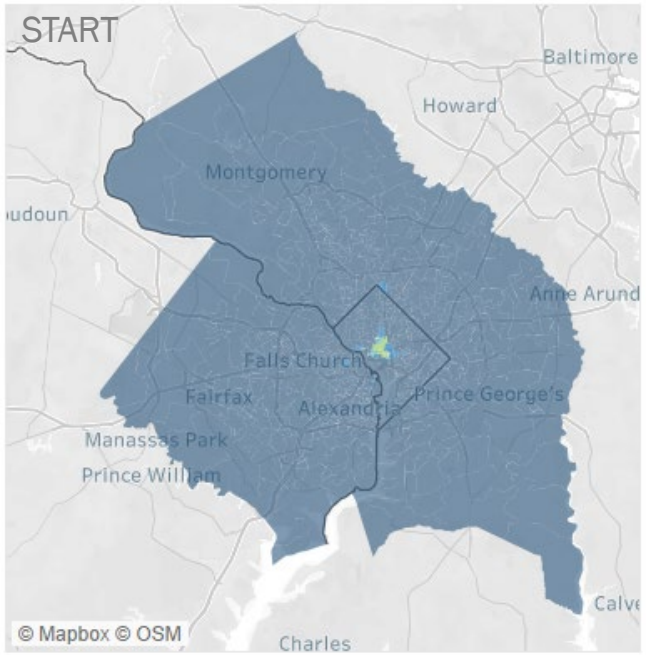

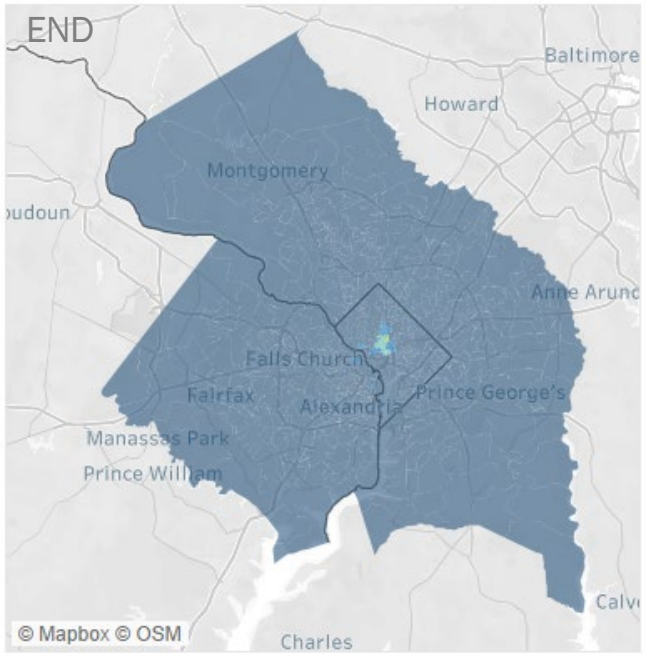

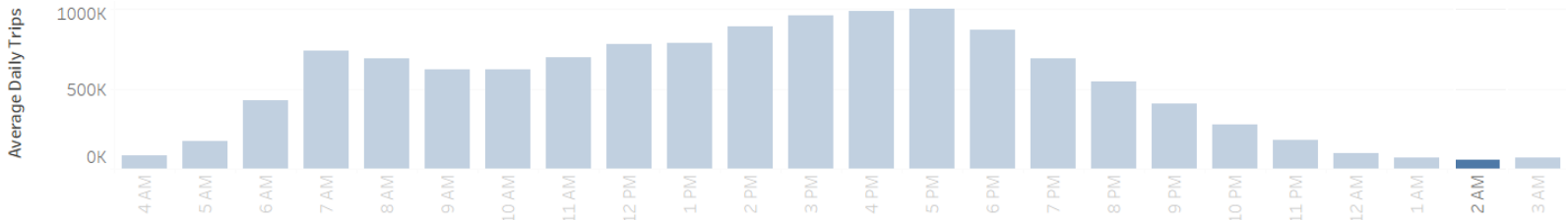

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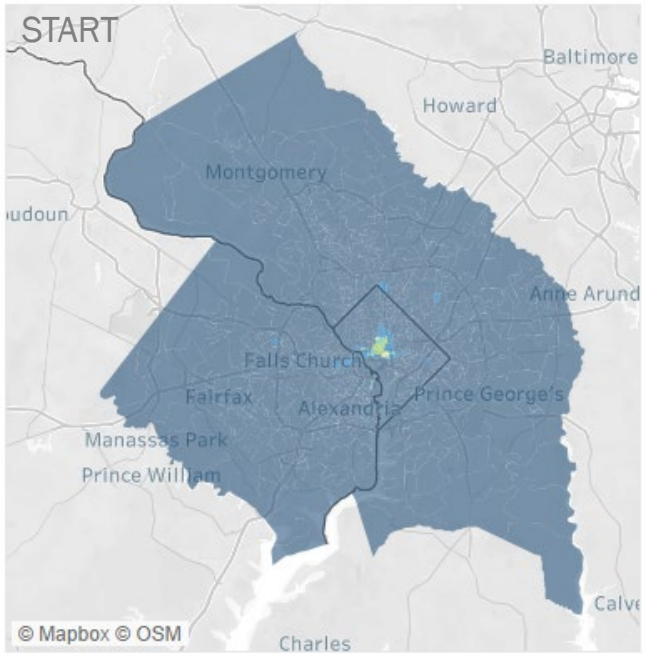

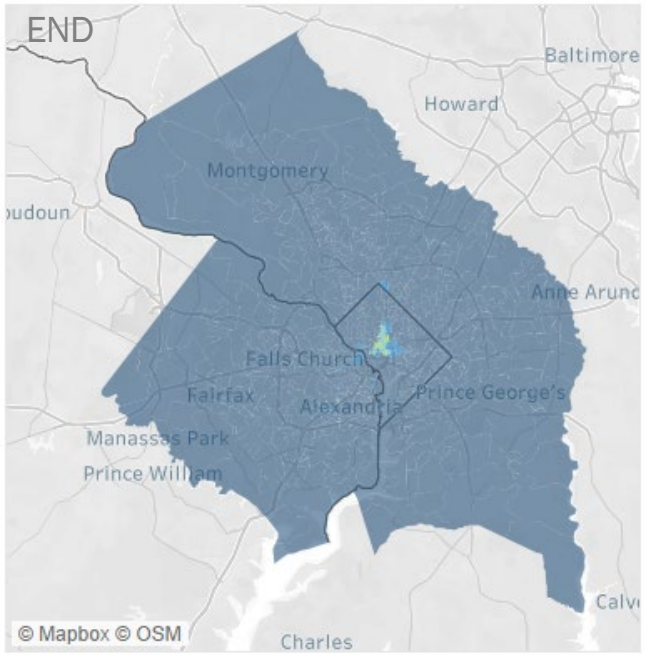

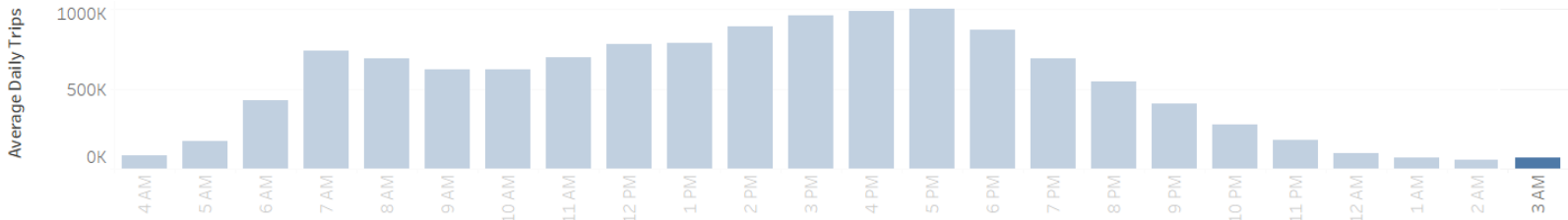

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