# APPENDIX C TRAVEL PATTERN ANALYSIS

In addition to the annual average daily traffic evaluation discussed in Chapter 4 of this report, a larger travel pattern analysis was also conducted to better understand how COVID-19 has changed travel patterns in the Spokane region. Understanding how travel behavior in the region has changed is critical to informing future service updates and long-range planning for STA. This travel pattern analysis uses StreetLight data to provide contextual information about regional travel patterns and shed light on how travel trends may be changing long-term due to the COVID-19 pandemic.

The data included vehicle trip data for September through November of 2019 and 2021. To develop geographic analysis zones, the project team and STA staff drafted 75 zones (roughly based on census tract boundaries) to group neighborhoods and relevant land uses together. The map of all 75 zones is shown in Figure 1. Specific questions that the StreetLight analysis aimed to answer included:

- What is the distribution of overall travel demand by time of day?
- What are the key origin-destination (OD) pairs in the region?
- How has midday versus peak period travel demand changed?
- How have trips across the Washington/Idaho border changed?
- For trips that end in Spokane, where in Idaho did they start?

Figure 1   StreetLight Analysis Zones
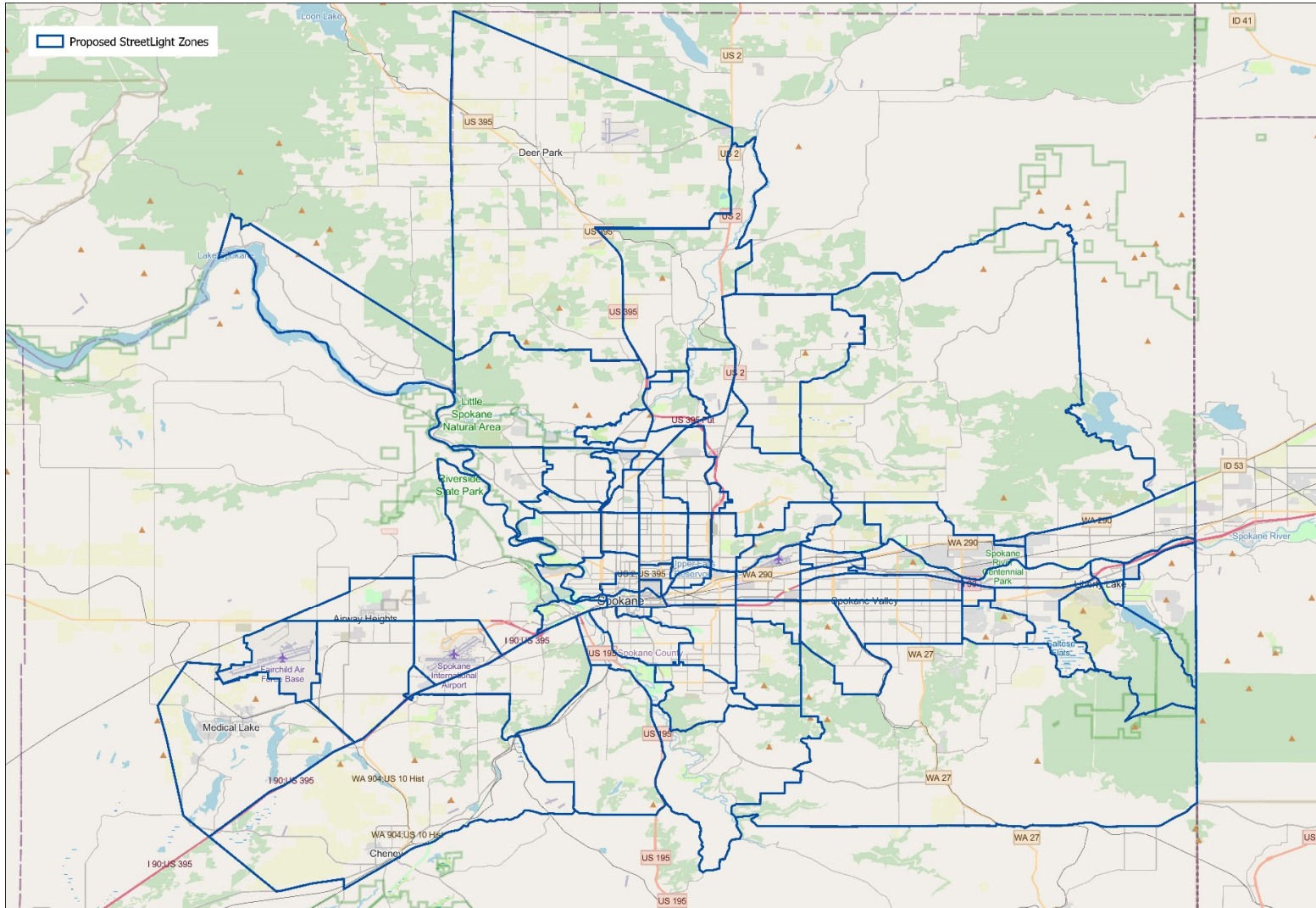
TRAVEL TRENDS

The purpose of this StreetLight analysis is to understand how COVID-19 has changed travel patterns in the Spokane region. As STA prepares for their Strategic Plan update, understanding how travel behavior in the region has changed is critical to their service updates and long-range planning. Beyond COVID-19 travel trends, the origin-destination data provides key insights to travel markets that may not currently be served by STA. However, the data should not be relied on solely for future trends, as travel patterns may not have stabilized entirely following the COVID-19 disruption.

Figure 2 shows the summary of vehicle trips that start or end within the 75 zones in the Spokane region between Fall 2019 and Fall 2021.

Figure 2   Travel Trends Summary

Time of Day	Average Daily Vehicle Volumes			Average Trip Length		
	2019	2021	Percent Change	2019	2021	Percent Change
All Day (12 am – 12 am)	3,078,300	2,602,900	-15%	9.2	10.2	11%
Mid-Day (10am – 3pm)	1,013,300	849,700	-16%	8.3	9.4	14%
Peak PM (3pm – 7pm)	1,093,100	901,900	-17%	8.5	9.5	12%

Source: StreetLight Data for September – November 2019 and 2021

Across the entire study region as of Fall 2021, vehicle trips had not yet returned to pre-pandemic levels across any time of day. Overall, trips were still down 15%, with even greater decreases in peak PM travel. While travel is down, average trip lengths have increased. This could be due to several factors, including:

- Traveler's ability to take longer trips and reach destinations that are further away because freeways and other major roadways are less congested than 2019 conditions,
- A shift in trip-making behavior; people are not completing as many of their shorter trips for a variety of reasons, but maintained the longer trips, or
- An increase in trip-chaining.

Figure 3 **-** Figure 5 map the percent change in vehicle trips by time of day for all zones in the study area. Downtown Spokane saw the largest decrease in trips, while the less urban areas saw relatively flat trip change between 2019 and 2021. The zones with the largest trip growth are the two new Amazon Fulfillment Centers in Spokane (the zones shown in yellow). Both

areas saw an increase of greater than 200% growth in all day vehicle trips between 2019 and 2021, as well as increases in average trip lengths.
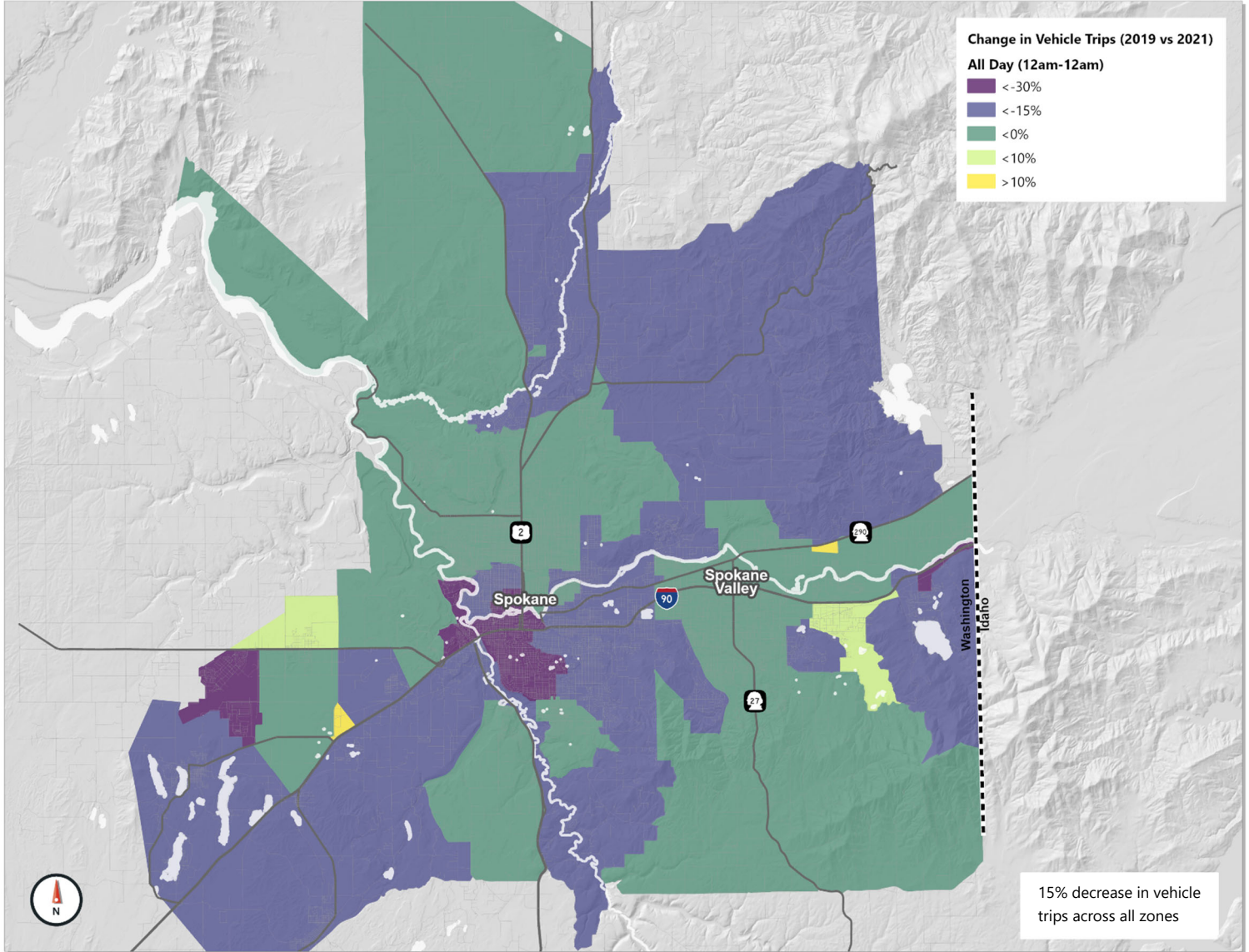
Figure 3   Vehicle Trip Change (All Day)

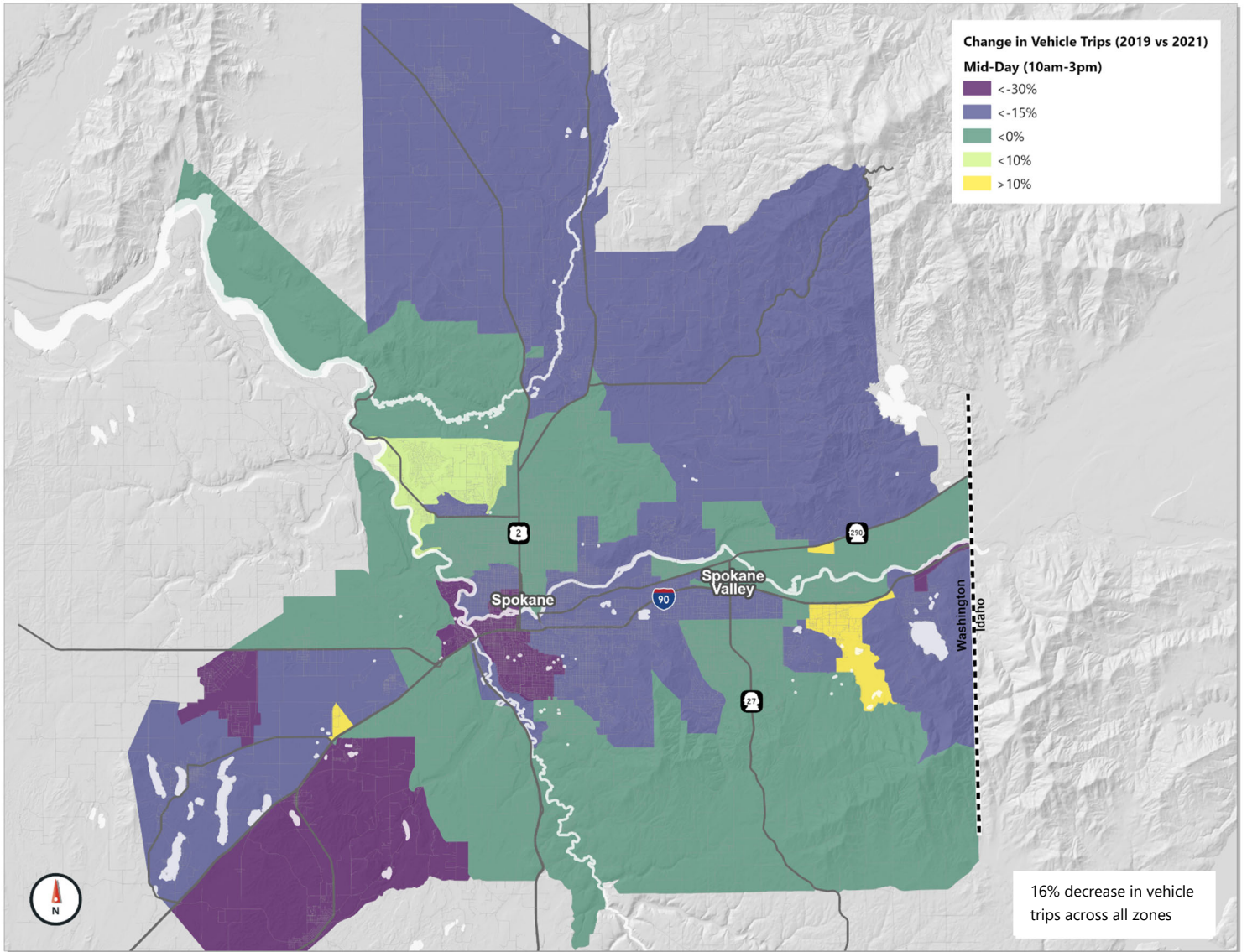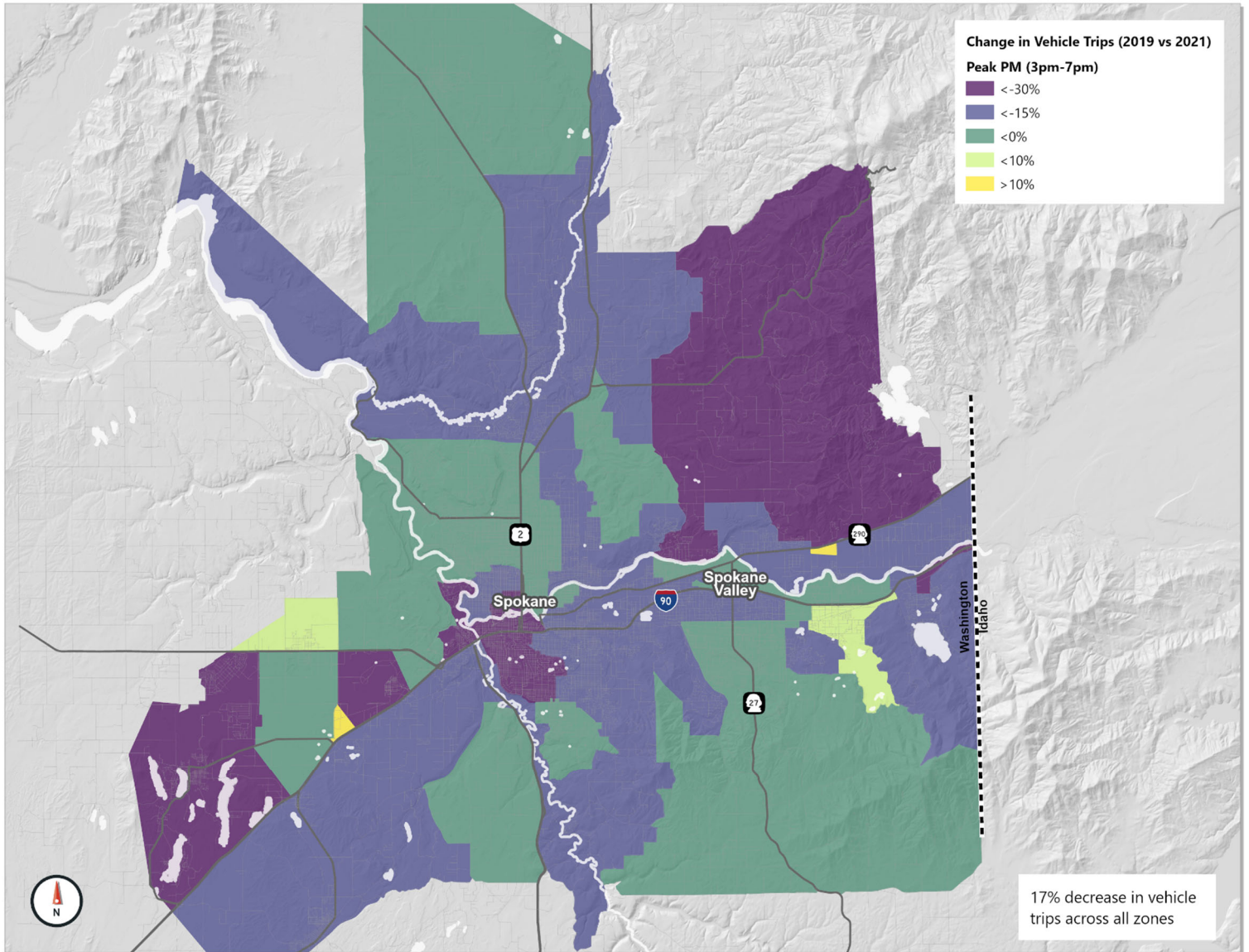**Figure 4   Vehicle Trip Change (Mid-Day)**

Figure 5   Vehicle Trip Change (PM)

The COVID-19 pandemic broadly affected travel patterns, but a notable trend across the country and Washington state has been the decrease in peak period vehicle trips, and relative shift towards more midday travel. This shift in travel behavior has larger implications for transit, as many agencies provide the bulk of their service during peak periods. As STA looks forward to 2035, insights into travel demand by time of day are important for service planning. Figure 6 shows the change in the PM/MD ratio between Fall 2019 and Fall 2021 for each analysis zone. A decrease in the ratio indicates that the amount of PM travel decreased compared to midday, which occurred in about 65% of the study area. Many areas saw decreases in this ratio, but notable outliers include the area west of US 195/Airway Heights, the campus area near Gonzaga, and the Amazon Fulfillment Centers (areas shown in yellow where the ratio of PM to MD trips was 10% higher in 2021 than in 2019).

Figure 6   Change in PM/MD Ratio
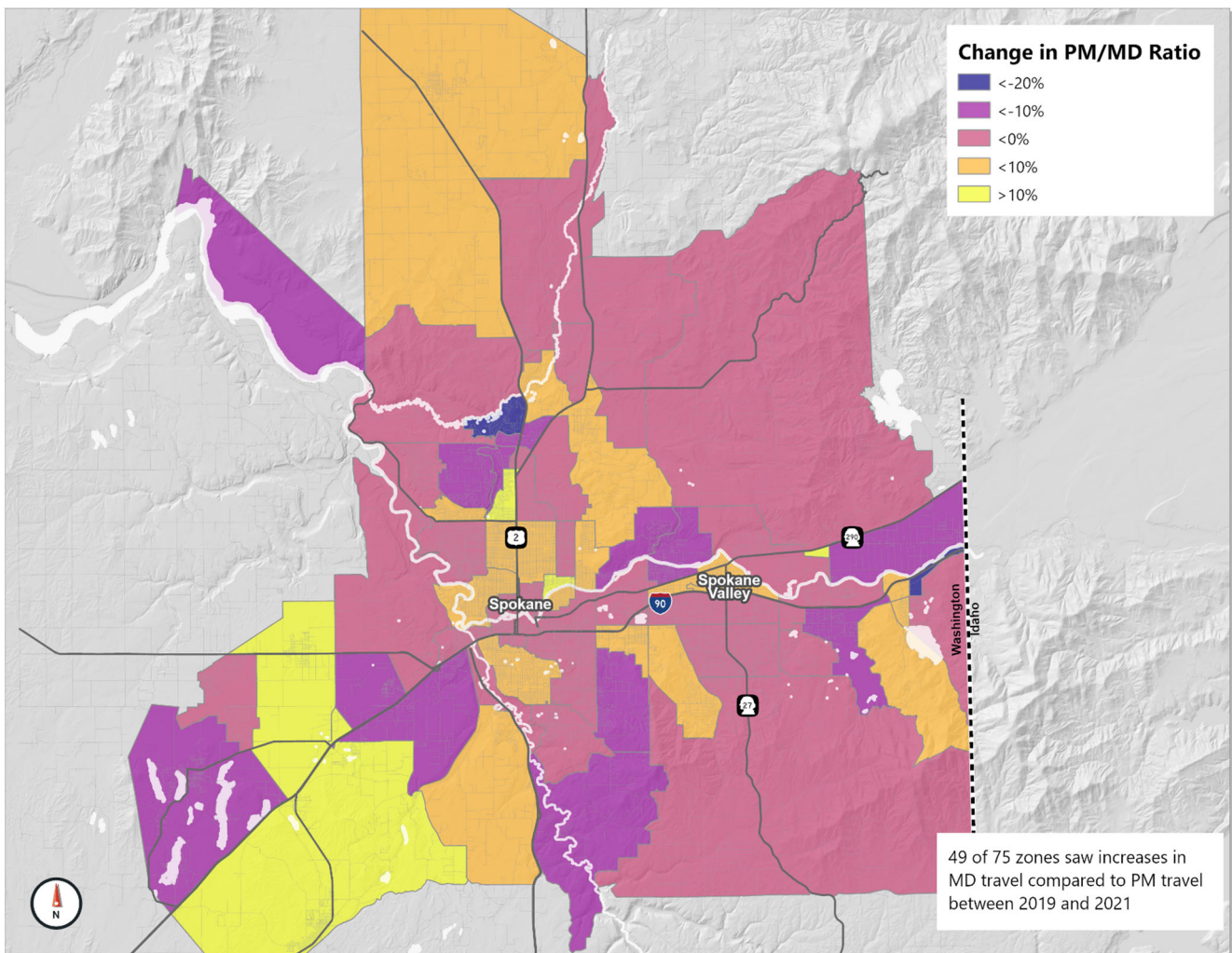
Given Spokane's unique position a few miles from the Washington/Idaho border, STA is interested in understanding travel patterns across the state lines. Figure 7 summarizes the change in vehicle trips across the border by time of day and direction.

Figure 7   Washington/Idaho Border Travel

Time of Day	Percent Change in Vehicle Volumes	
	Inbound (Idaho to Spokane)	Outbound (Spokane to Idaho)
All Day (12am – 12am)	-1%	1%
Peak AM (6am – 10am)	-20%	3%
Mid-Day (10am – 3pm)	7%	6%
Peak PM (3pm – 7pm)	2%	-5%

Source: StreetLight Data for September – November 2019 and 2021

Travel demand in both directions has generally recovered to pre-pandemic conditions across the entire day except for the peak direction of travel in the AM and PM peak periods. Conversely, midday travel increased in both directions across the border. This is likely explained by the decrease in commute trips during the peak periods while demand for other non-work travel has returned to previous levels.

Origin Destination Data

A dashboard[1] was created to visualize the top origin-destination pairs in both 2019 and 2021 and compare the percent change between the study years.

Origin-destination (OD) data can provide detailed insights about current and changing travel patterns in the Spokane region, such as where peak travel demand is coming from/going to, and how demand changes by time of day. When combined with other demographic and geographic data, origin-destination data can support near-term and long-term strategic planning. One limitation of the data is that it provides only a relative comparison between zones because the zonal structure is not normalized to population or employment totals. Therefore, the data should not be used to compare origin-destination volumes across different zones (such as identifying the origin-destination pairs throughout the region with the greatest volume), but instead is most applicable to review specific destinations to understand the origin demand patterns and the potential longer-term change to the origin patterns due to the COVID-19 pandemic.

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[1] https://public.tableau.com/app/profile/sean.reseigh/viz/STAO-DPairs/Story

The dashboard is interactive and allows the user to select any zone to visualize the traffic flows for trips by time of day (all-day, AM peak, midday, or PM peak) [2] to/from the zone. The user can select to visualize either year or the percent change. The dashboard also includes a filter for the 90th, 80th, 70th, etc., percentile of trips to provide an easy visualization of the top OD flows. For example, Figure 8 shows the top 50th percentile of trip destinations from downtown Spokane in Fall 2021. The other tabs of the dashboard allow users to see 'Destination Volume', which shows flows from origins to a specific destination, or the percent change in flows at a given zone.

Figure 8   Top Flows from Downtown Spokane

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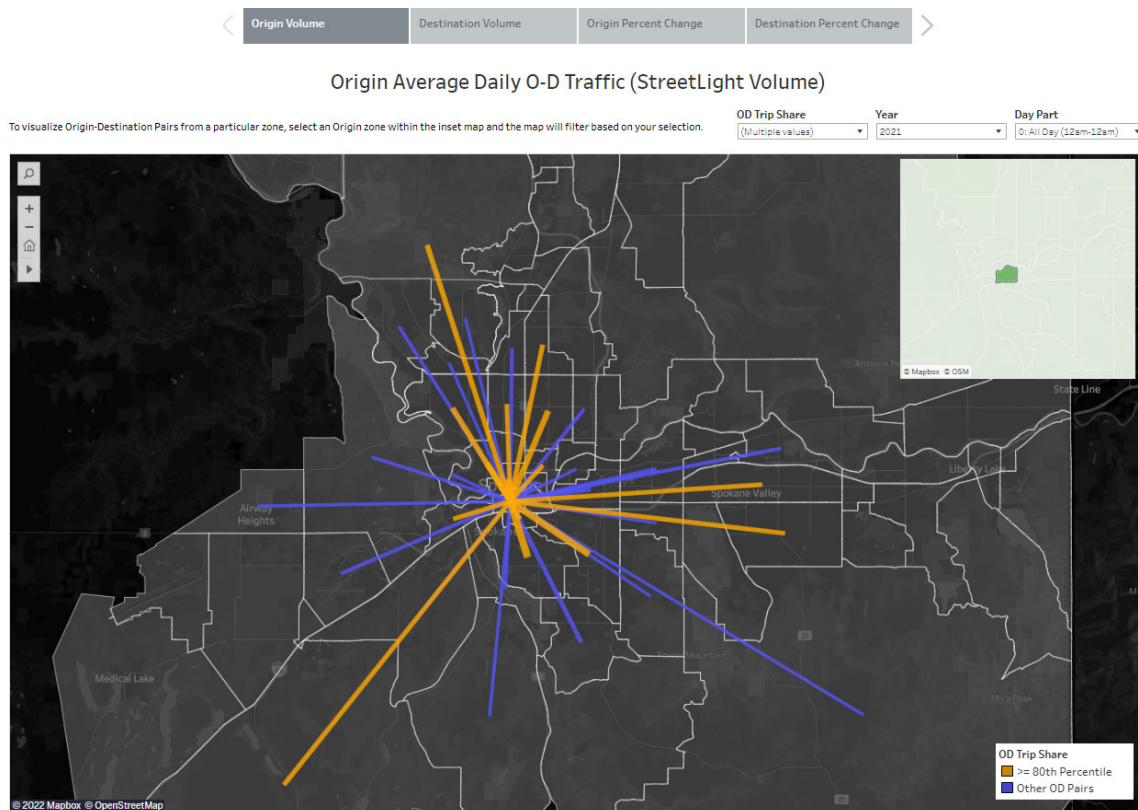
[2] All-day captures every trip over the course of the day while the AM, midday, and PM peak periods reflect trips that only travel during those time periods

Travel flows for key destinations in the study area are shown for Downtown Spokane (Figure 9), Hospital District (Figure 10), Amazon Fulfillment Center-west (Figure 11), and Amazon Fulfillment Center-east (Figure 12) are shown in the following figures. The Downtown Spokane and Hospital District reflect 2019 average all-day trips, while the two new distribution centers show 2021 all-day trip data.

Generally, zones closer to the destination generate more trips; however, these example employment centers also show a high number of trips originating from across a wide variety of areas in the region such as Spokane Valley and Liberty Lake to the east. For Downtown Spokane and the Hospital District, existing STA transit service generally serves these top origin zones.

There are no transit routes serving the new Amazon Fulfillment Center-east. There are transit routes serving the new Amazon Fulfillment Center-west as it is located near the Spokane International Airport.

Additional review of the origin-destination data and the relative changes from 2019 to 2021 for specific zones will be used to inform longer-term strategic planning for STA as potential network changes are identified.

Figure 9   2019 All Day Trips Destined to Downtown Spokane (80th percentile or higher zones)
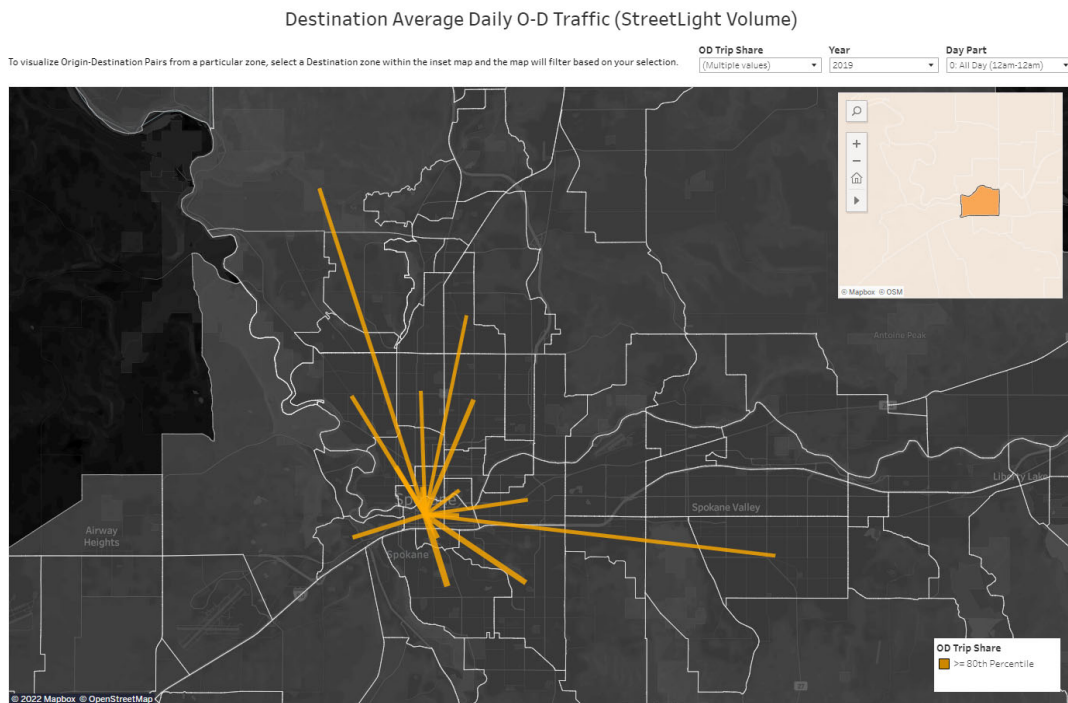
Figure 10   2019 All Day Trips Destined to Hospital District (80th percentile or higher zones)
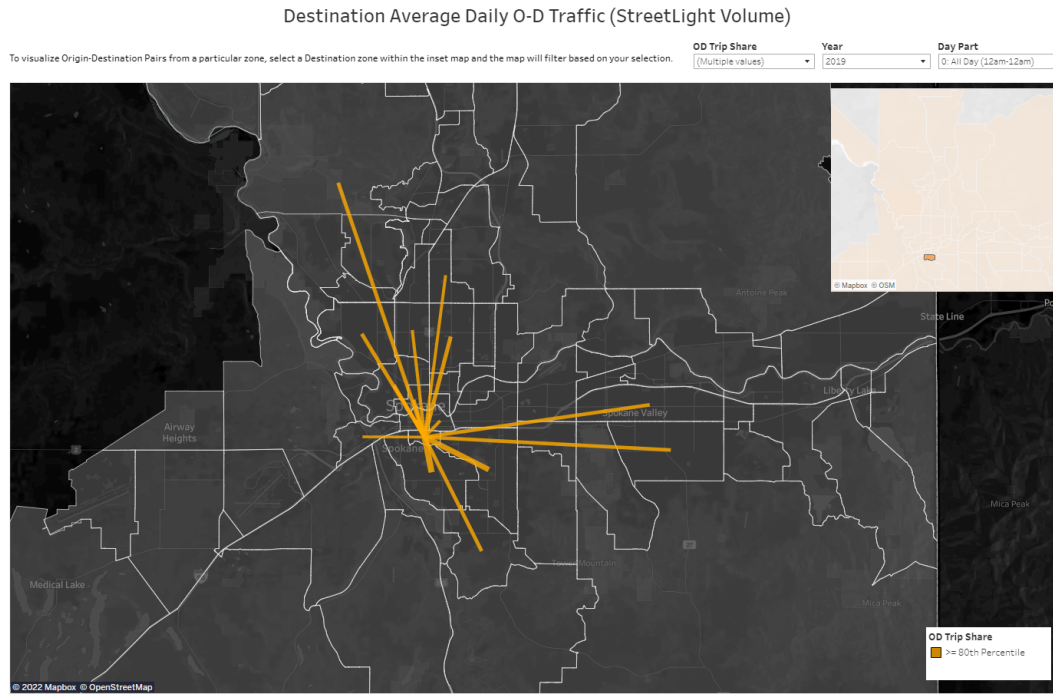

Figure 11   2021 All Day Trips Destined to Amazon Fulfillment Center - west (80th percentile or higher zones)
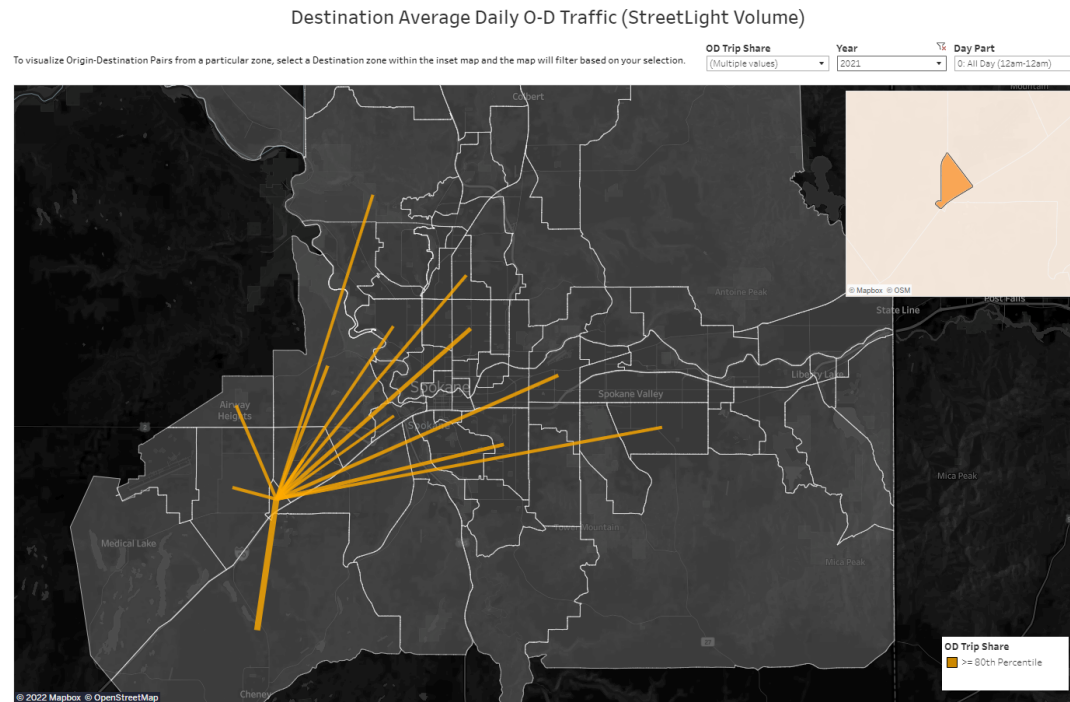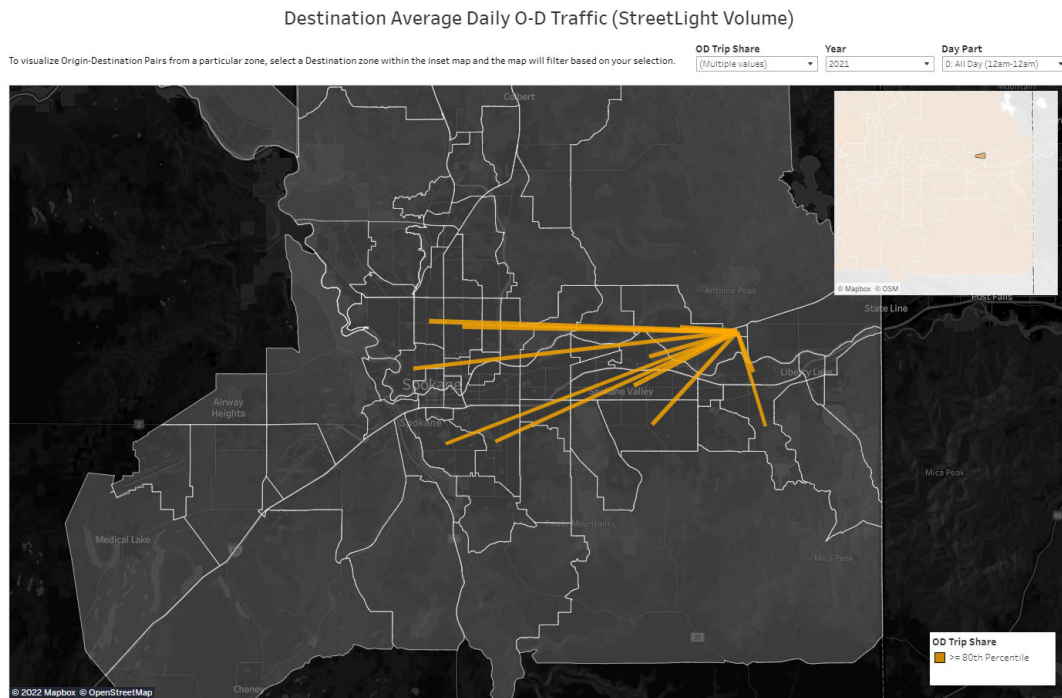
Figure 12   2021 All Day Trips Destined to Amazon Fulfillment Center - east (80th percentile or higher zones)

Destination Average Daily O-D Traffic (StreetLight Volume)

Conclusion

The data and findings identify recent trends and shifts in travel behavior in the Spokane region. However, the data should not be taken as an accurate portrayal of future travel demand patterns due to the ongoing and shifting nature of the COVID-19 pandemic. Figure 13 highlights several trends observed in this analysis and their potential role in informing the strategic plan.

Figure 13   Spectrum of Travel Behavior Changes

Potential Continuing Trends

Potential Reversing Trends

- Changes in travel demand between zones may continue as people have shifted their travel patterns longer-term due to adjustments in where they work and/or shop as a result of the pandemic

- Shifts in time-of-day travel demand may continue as workplace policies make more permanent changes

- Increase in midday travel across the Washington/Idaho border may continue as people adjust to new travel patterns

- Changes in demand may revert to pre-COVID levels as conditions stabilize and people continue to return to their previous travel patterns

- Shifts in time-of-day travel demand may not change in aggregate if increased population and employment induces demand initially lost due to the pandemic

- Peak period travel across the Washington/Idaho border could increase as people revert to previous travel patterns and induced demand from population/employment growth fails to occur