APPENDIX B TRENDS RESEARCH AND VALIDATION

Following Phase I Outreach and Engagement, several common themes emerged as consistent discussion points. These themes are generally characterized as key trends that will impact the future of the Spokane region over the next decade.

These trends are divided into two groups:

- **Context Trends** – Factors that will influence STA that may require the agency to adapt or respond
- **Policy Trends** – Transit trends in which STA may influence direction in the future

Once these key trends were identified, additional research was conducted to inform and validate the potential impacts and resonance of these trends for the future of the Spokane region. This appendix details the findings from the research and validation related to each key trend identified in Phase I Outreach and Engagement.

CONTEXT TRENDS

Context trends may be generally thought of as factors happening outside of the direct control of STA. Context trends identified in Phase I Outreach and Engagement include:

- Population and Employment Growth
- Housing Affordability and Supply
- Regional Travel Patterns
- Demographic Shifts
- Homelessness

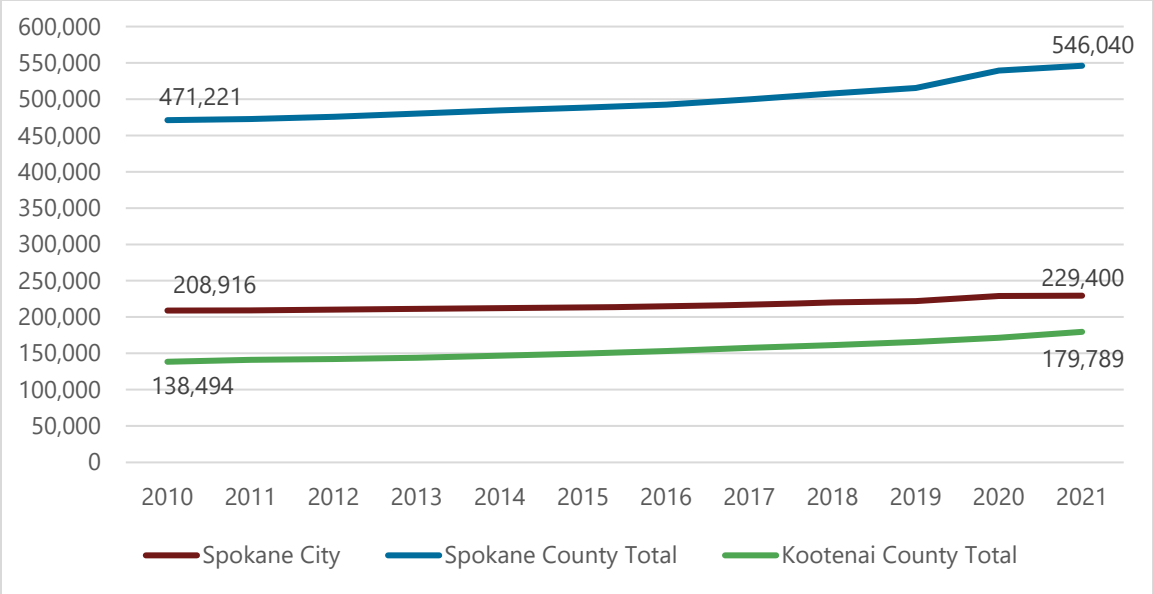
Population and Employment Growth

Nearly every interview with STA Board Members and community leaders identified population growth as a key trend impacting the region's future. These discussions also identified that population growth is not constrained to only the City of Spokane or Spokane County but also includes growth occurring in Kootenai County, Idaho. An analysis of

population data from the US Census Bureau (Figure 1) showed significant regional growth between 2010 and 2021, including a 15.8% increase in Spokane County and a 29.8% increase in Kootenai County.

Population growth in the region has also been occurring more rapidly in recent years, with Spokane County growing by 6.0% from 2019 to 2021 and Kootenai County growing by 8.5% over the same two-year period. While population has been growing quickly in both counties, the total population of Spokane County remains over three times as large as the population of Kootenai County and continues to be the focal point for the region.

Figure 1 Population Growth in Spokane, Spokane County, and Kootenai County (2010-2021)

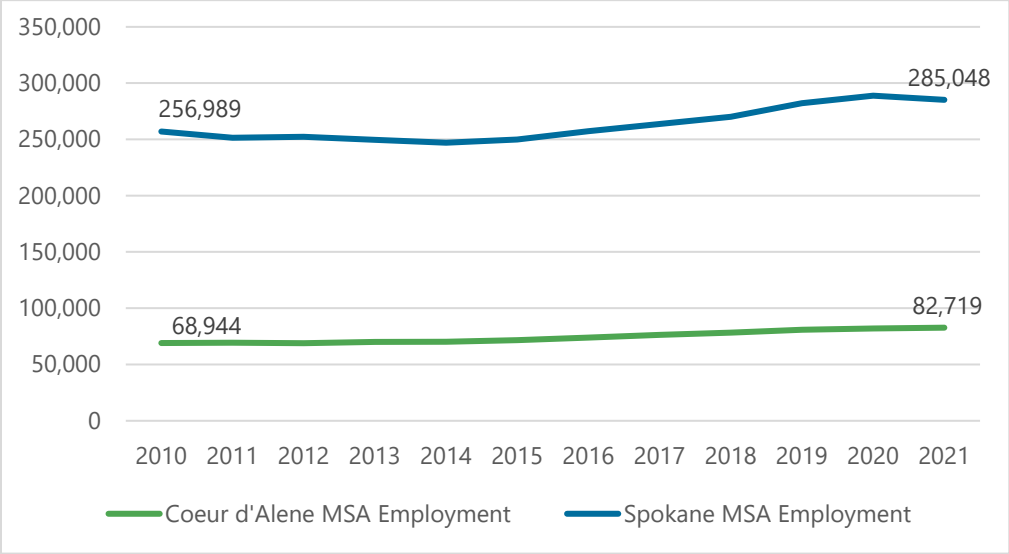


Source: US Census Bureau (2010-2021)

In addition to population growth, there has also been substantial employment growth in the region over the past decade. An evaluation of data reported by the US Bureau of Labor Statistics (Figure 2) showed a 10.9% increase in jobs located in the Spokane metropolitan statistical area (MSA) between 2010 and 2021 and a 19.9% increase in jobs located in the Coeur d'Alene MSA over the same period.

Similar to population, while there has been substantial employment growth in both areas, the total number of jobs located in the Spokane MSA is over three times the number in the Coeur d'Alene MSA.

Figure 2 Employment Growth in Spokane MSA and Coeur d'Alene MSA (2010-2021)



Source: US Bureau of Labor Statistics (2010-2021)

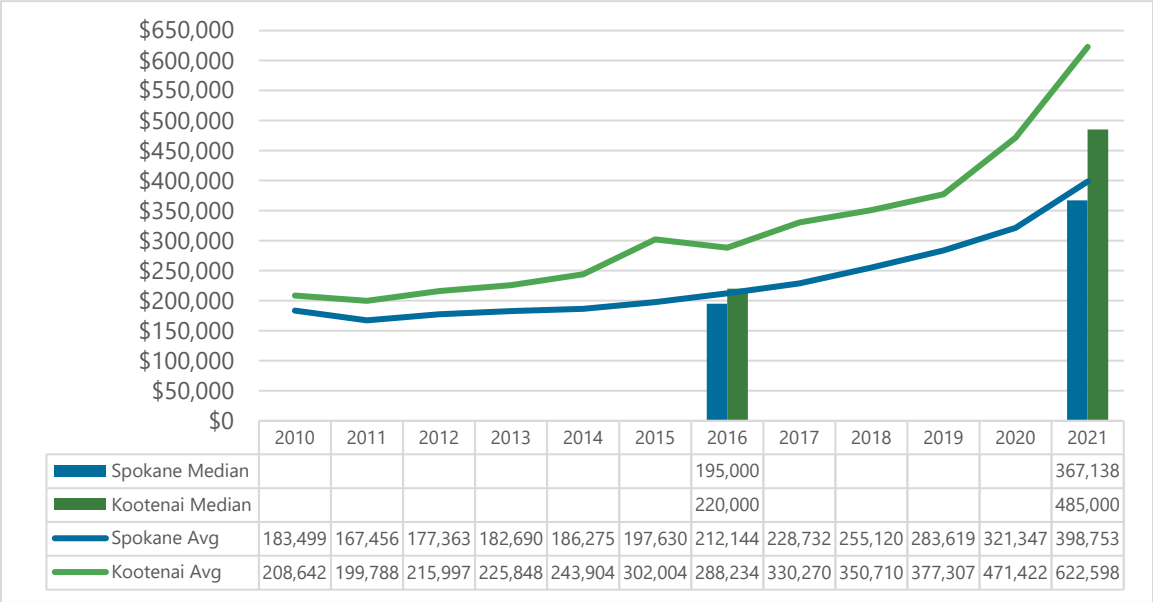
The strong population and employment growth observed over the past decade has several implications for the future of transit in the Spokane region. As population and employment increase, regional demand for transportation also increases with more people taking more trips to access goods, services, and employment opportunities. This represents an opportunity for STA to adapt transit service to best meet the needs of this growing population.

A key component of this opportunity is in identifying the geographic distribution of where population and employment growth is occurring within the region. Growth occurring outside of the urbanized core or outside of the existing Public Transportation Benefit Area (PTBA) are more difficult to serve with public transportation. Housing affordability and supply plays a role in predicting where this growth is likely to occur, but there will continue to be some level of uncertainty in the geographic distribution of growth that represents a key factor for evaluating the effectiveness of future strategies in the strategic plan.

Housing Affordability and Supply

Housing affordability and the supply of housing was frequently mentioned in conversations surrounding population growth. As the Spokane region has grown over the past decade, the cost of housing has also increased. Between 2016 and 2021, the average residential sale price increased 88% in Spokane County and 116% in Kootenai County. Similarly, the median residential sale price also increased 88% in Spokane County and 120% in Kootenai County over the same period (Figure 3).

Figure 3 Average and Median Residential Sales Price in Spokane and Kootenai Counties (2010-2021)



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Spokane Median							195,000					367,138
Kootenai Median							220,000					485,000
Spokane Avg	183,499	167,456	177,363	182,690	186,275	197,630	212,144	228,732	255,120	283,619	321,347	398,753
Kootenai Avg	208,642	199,788	215,997	225,848	243,904	302,004	288,234	330,270	350,710	377,307	471,422	622,598

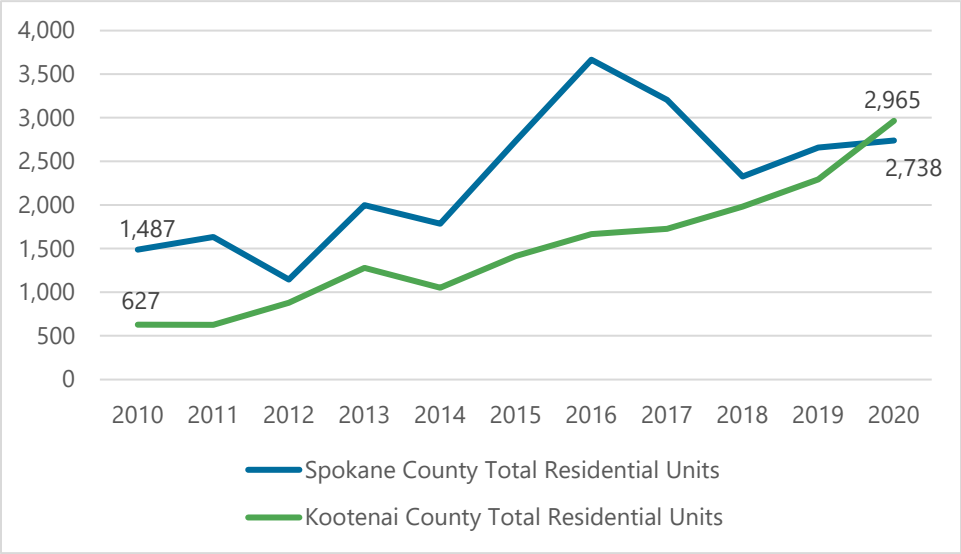
Source: Spokane-Kootenai Real Estate Research Committee, 2021. The Housing Availability and Affordability Study for Kootenai County, 2021.

Note: 2021 data through September only. Median residential sales prices only available for 2016 and 2021.

The substantial increase in residential real estate sale prices over the past decade is indicative of a housing market in which population growth is outpacing the development of new housing. As demand for housing grows faster than the supply of available housing, prices generally increase. To better understand historical housing development patterns, the number of residential units included in issued building permits was evaluated for Spokane County and Kootenai County (Figure 4). Total residential units permitted have generally been increasing but reached a high in Spokane County in 2016 before declining into 2018 and remaining relatively consistent through 2020. Permitted units in Kootenai County have continued to increase year over year, reaching a new high in 2020 and surpassing the number of units in Spokane County permitted that year. As a county with roughly 1/3 the population of Spokane County, Kootenai County appears poised for continued growth in the future by continuing to increase permitted residential units year over year.

The future allocation of new housing starts within the region will play a crucial role in both housing affordability by increasing supply to better align with demand and in the geographic distribution of population growth as people will choose to locate in areas with more housing availability and more affordable housing.

Figure 4 Residential Units in Issued Building Permits per Year (2010-2020)



Source: Spokane-Kootenai Real Estate Research Committee, 2021.

Regional Travel Patterns

Shifting regional travel patterns is another factor that is interrelated with population growth and housing affordability. As the population continues to grow, where people choose to live (or can afford to live) and work directly impacts travel patterns within the region. The geographic distribution of population and employment plays a direct role in how and where people travel within the region.

StreetLight Data Analysis

An evaluation of travel patterns using StreetLight mobile device location data was conducted 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 inform 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 5 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 5 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 farther 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
- An increase in trip-chaining

Additional information on this evaluation is included in Appendix B of this report

Traffic Counts Data

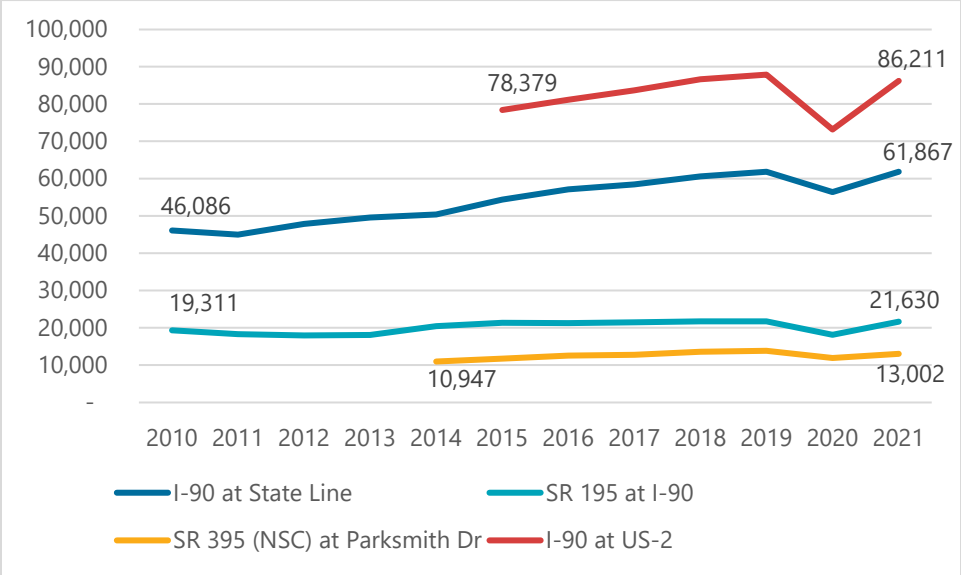
To better understand the historical trends of travel around Spokane, Washington State Department of Transportation traffic counts data was used to evaluate the annual average daily traffic at four points on highways surrounding Spokane. These locations were selected based on data availability and to identify bi-directional travel volumes in all four cardinal directions. Specific locations include:

- I-90 at the Washington-Idaho border (east of Spokane)
- I-90 at the US-2 interchange (west of Spokane)
- SR 395 (North Spokane Corridor) at Parksmith Drive (north of Spokane)
- SR 195 at I-90 (south of Spokane)

Data for both locations on the I-90 corridor was available between 2010 and 2021; however, data for SR 395 was only available beginning in 2014 and data for SR 195 was only available beginning in 2015. All four locations show increases in traffic volumes over the periods for which data is available (Figure 6), including a decrease in travel during 2020 related to the

Covid-19 pandemic with traffic volumes rebounding back to approximately pre-pandemic levels in 2021.

Figure 6 Annual Average Daily Traffic Volumes (2010-2021)



Source: WSDOT Traffic Data Reporting System (2021)

Between 2015 and 2021, traffic volumes to the east, west, and north of Spokane all increased by at least 10%. Specific increases by location include:

- I-90 at the Washington-Idaho border increased approximately 14%
- I-90 at the US-2 interchange increased approximately 10%
- SR 395 (North Spokane Corridor) increased approximately 11%
- SR 195 at I-90 increased approximately 1%

Additionally, the two locations along I-90 carried significantly higher volumes of traffic than either location on SR 195 or SR 395. This data suggests that growth in travel to and from Spokane is highest to the west (into the West Plains), to the north along the North Spokane Corridor, and to the east (into northern Idaho). Additionally, east-west travel along I-90 is notably higher than either of the north-south corridors evaluated.

Another aspect of this trend that is explored in more detail in Appendix C of this document is the impact of the Covid-19 Pandemic on travel patterns, including the volume of trips made, the average distance of trips made, and the origins and destinations of trips.

Regional Work Travel Patterns

As population and employment have grown significantly in both Spokane and Kootenai Counties and traffic volumes along I-90 have consistently increased over the past decade, an additional evaluation of work-related travel patterns was conducted to identify changes in commute patterns across county lines. This evaluation is based on Longitudinal Employer-Household Dynamics (LEHD) data provided by the US Census Bureau that shows home and work locations for individual travelers and can be used to determine the volume of work-related travel between two locations.

Growth in commute travel into Spokane County was significantly higher between Kootenai County and Spokane County than any other location (Figure 8 and Figure 7). The number of individual people traveling from Kootenai County into Spokane County for work increased by 45% over this ten-year period, compared to a 5% increase for Whitman County and a 1% increase for both Lincoln and Stevens County. This 45% increase from Kootenai County to Spokane County includes an increase of over 3,500 individual travelers. For context, commuters who both live and work in Spokane County increased by over 18,400 individual commuters, an 11% increase.

An analysis of commute related travel for workers living in Spokane County showed similar results, with substantially higher increases in travel from Spokane County to Kootenai County than to other counties (Figure 10 and Figure 9). Work related travel from Spokane County to Kootenai County increased by over 2,000 individual travelers (54% increase) between 2009 and 2019. Travel to Stevens County increased by a large percentage (50%) but accounted for fewer than 600 additional travelers. Commuters from Spokane to Whitman and Lincoln Counites increased 3% and 10%, respectively.

Figure 7 Change in Commuters traveling to Spokane County by County (2009-2019)

Spokane County workers who live in...	Spokane County	Kootenai County	Stevens County	Lincoln County	Whitman County
2009	162,530	7,862	5,415	905	896
2019	180,933	11,440	5,463	913	941
Percent Change	11%	45%	1%	1%	5%

Source: US Census Bureau Longitudinal Employer Household Dynamics (2009, 2019)

Figure 8 Percent Change in Work Travel to Spokane County (2009-2019)

Source: US Census Bureau Longitudinal Employer Household Dynamics (2009, 2019)

Figure 9 Change in Commuters traveling from Spokane County by County (2009-2019)

Spokane County residents who work in...	Spokane County	Kootenai County	Stevens County	Lincoln County	Whitman County
2009	162,530	3,786	1,114	447	1,158
2019	180,933	5,825	1,668	490	1,190
Percent Change	11%	54%	50%	10%	3%

Source: US Census Bureau Longitudinal Employer Household Dynamics (2009, 2019)

Figure 10 Percent Change in Work Travel from Spokane County (2009-2019)

Source: US Census Bureau Longitudinal Employer Household Dynamics (2009, 2019)

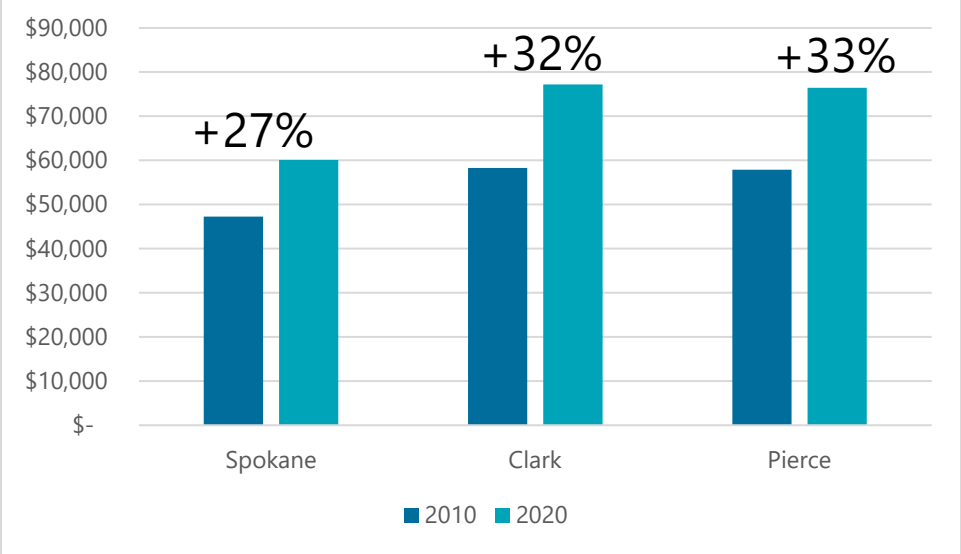
Demographic Shifts

While population growth in the region has been well-documented, shifting demographics also play a key role in Spokane's future. Several demographic factors were identified for evaluation, including median income, population below the federal poverty level, non-white population, and 4-year degree attainment. These demographic factors were evaluated for the two most recent Census years, 2010 and 2020. In addition to evaluating demographic shifts in Spokane County, these factors were also evaluated for Pierce County and Clark County in western Washington to provide a peer county comparison.

Median Income

Between 2010 and 2020, median income in Spokane County increased from $47,000 to $60,000, a 27% increase over the ten-year period. This increase outpaces the 19% inflation reported by the US Bureau of Labor Statistics over this same time frame. Compared to Clark and Pierce Counties, median income increased in all three counties. The increase in Spokane County was slightly smaller, a 27% increase compared to a 32% and 33% increase in Clark and Pierce Counties (Figure 11).

Figure 11 Change in Median Income for Spokane, Clark, and Pierce Counties (2010-2020)

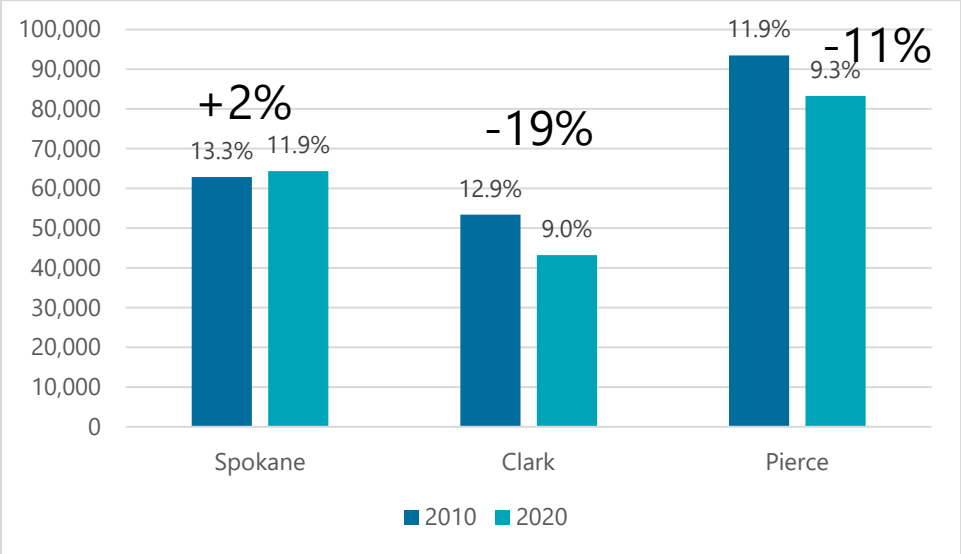


Source: US Census Bureau (2010, 2020)

Poverty

Between 2010 and 2020, the total number of people in Spokane County living under the federal poverty level increased by about 2% (1,000 individuals). However, the percent of the total population under the federal poverty level decreased from 13% to 12%. Unlike Spokane County, Clark and Pierce Counties both saw an overall decrease in population living under the federal poverty level between 2010 and 2020, including a 19% decrease in Clark County and an 11% decrease in Pierce County (Figure 12). The percentage of the total population living below the federal poverty level decreased from approximately 13% to 9% in Clark County and from approximately 12% to 9% in Pierce County.

Figure 12 Change in Population Living under the Federal Poverty Level for Spokane, Clark, and Pierce Counties (2010-2020)

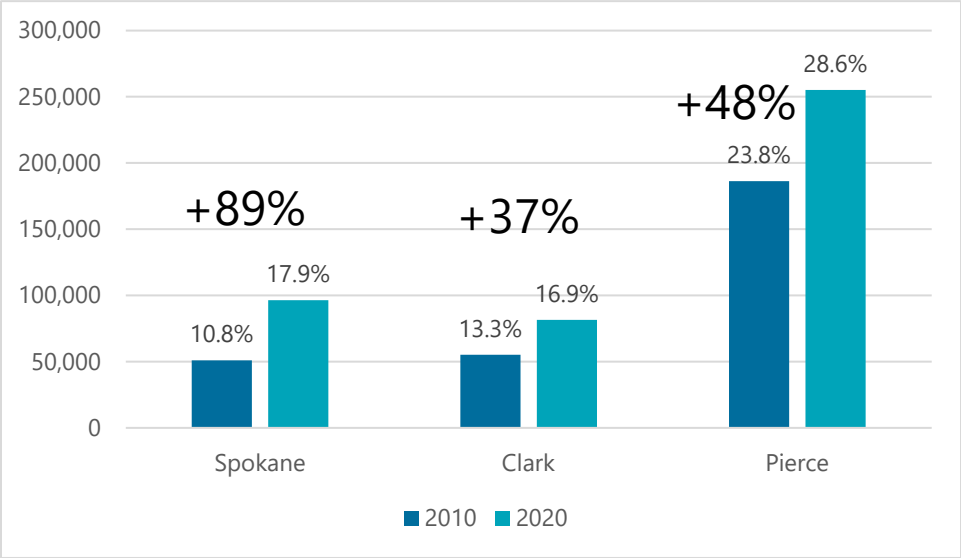


Source: US Census Bureau (2010, 2020)

Non-White Population

The non-white population in Spokane County increased significantly between 2010 and 2020, growing 89%, from 51,000 individuals to 96,000 individuals. This amounts to an increase from 11% of the overall population identifying as non-white to 18% of the population identifying as non-white. Compared to Clark and Pierce Counties (Figure 13), Spokane County had a larger percent increase in non-white population and now has a larger percent of the population identifying as non-white than Clark County but is notably lower than Pierce County.

Figure 13 Change in Non-White Population in Spokane, Clark, and Pierce Counties (2010-2020)

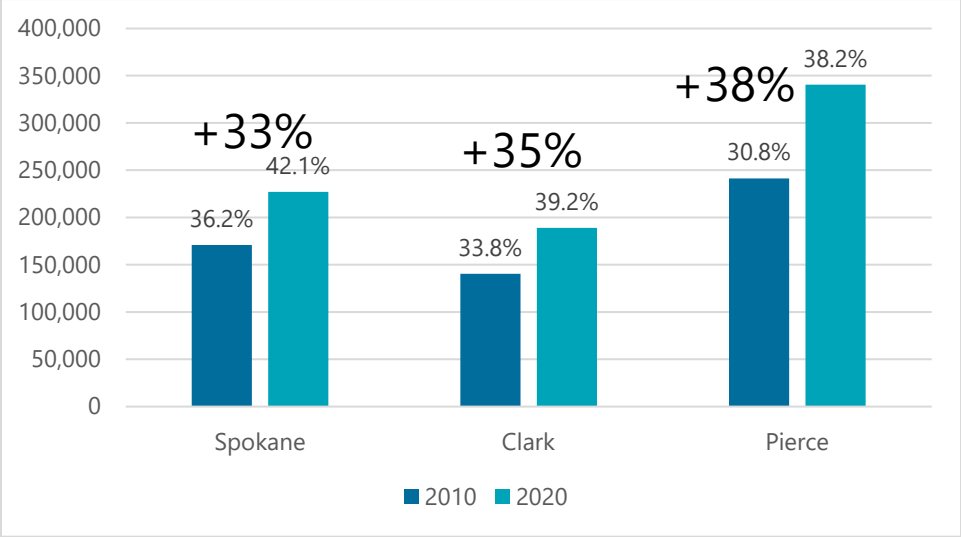


Source: US Census Bureau (2010, 2020)

Education

In Spokane County, four-year degree attainment increased from 171,000 people in 2010 to 227,000 in 2020, an increase of 33% (Figure 14). This is a similar increase to both Clark and Pierce Counties, 35% and 38% respectively. The percent of the population attaining a four-year degree in Spokane County reached 42% in 2020, higher than the 39% and 38% in Clark and Pierce Counties, respectively.

Figure 14 Change in Four-Year Degree Attainment in Spokane, Clark, and Pierce Counties (2010-2020)



Source: US Census Bureau (2010, 2020)

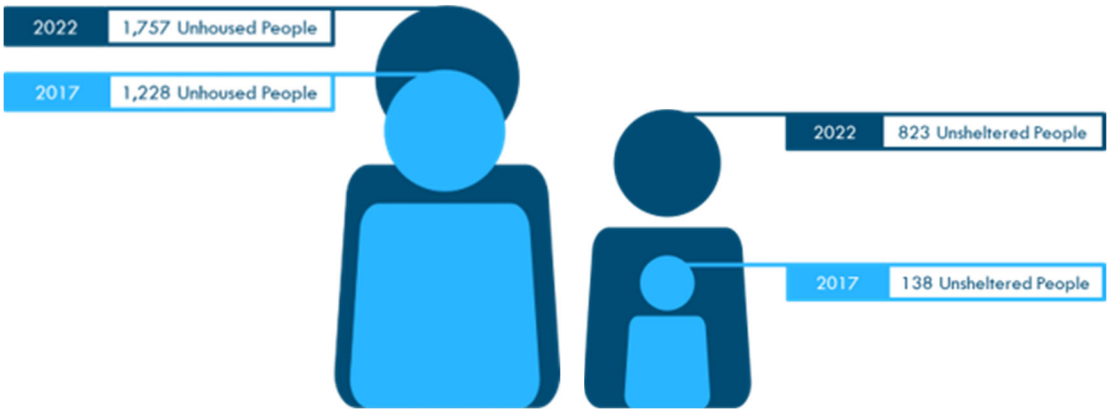
Homelessness

Increasing rates of homelessness and the perceptions of homelessness in the region emerged as a key trend numerous times during Phase I outreach. To better understand this trend, both the changes in public perceptions and observed rates of homelessness were evaluated.

STA conducts periodic community perceptions surveys to identify characteristics and priorities for the community. Typically, these surveys ask respondents to identify what they perceive to be the most important issue facing the Spokane area. This question has not been asked since 2019 due to the emergence of the Covid-19 Pandemic, but was asked in 2013, 2016, and 2019 (Figure 16). These results indicate that the issue of poverty and homelessness went from a minor community concern, with 2% of respondents identifying this as their top issue, to the number one issue in 2019, with over 40% of respondents choosing poverty and homelessness.

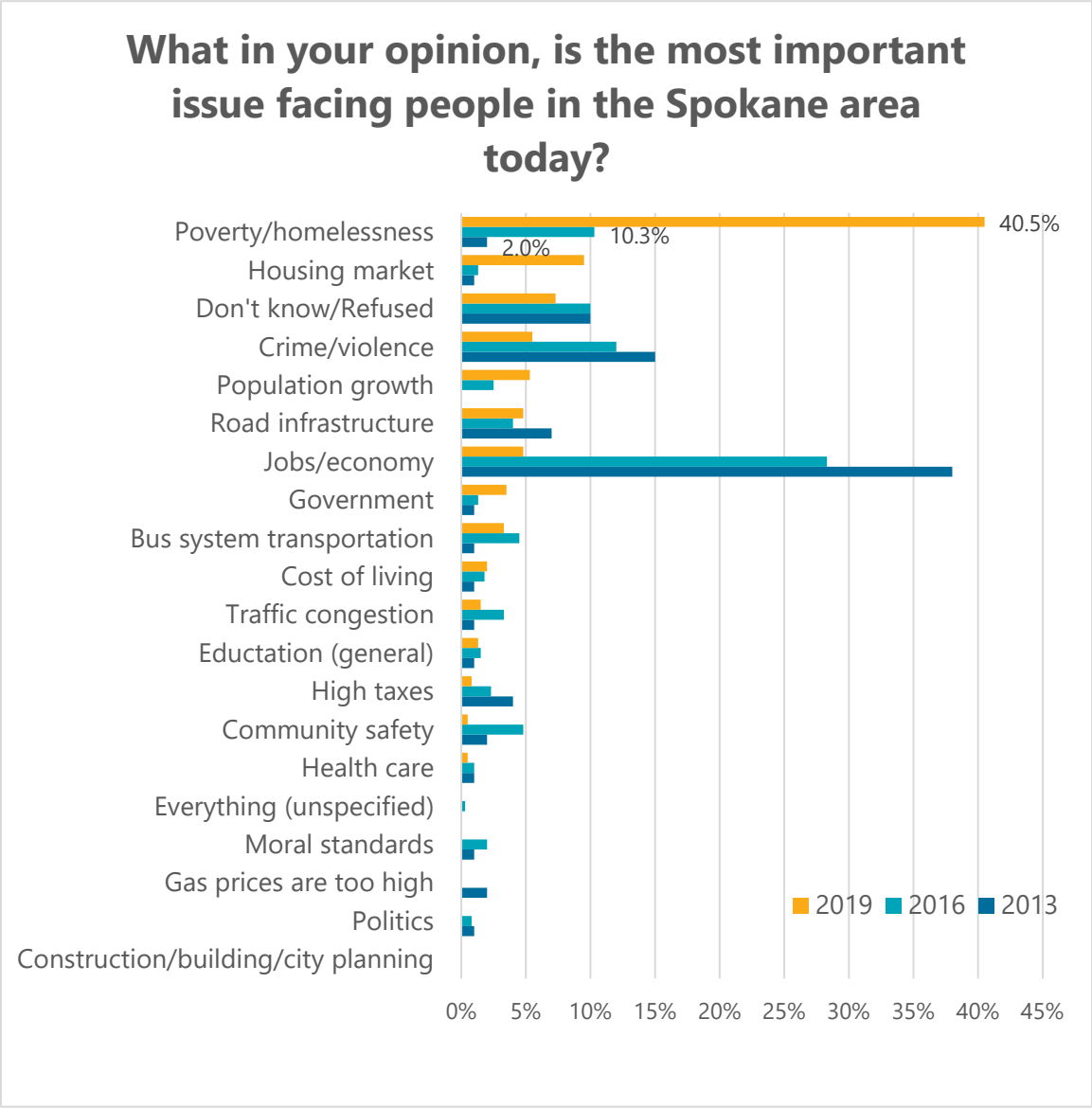
As public perceptions have shifted since 2013 to indicate significantly more concern surrounding homelessness, point-in-time counts conducted by the City of Spokane in 2017 and 2022 were used to identify observed trends in the rates of homelessness. Over this five-year period, the total number of unhoused individuals, including both those living in formal homeless shelters and those living outside of shelters, grew from 1,228 to 1,757 (a 43% increase). The growth in unsheltered individuals was even more stark, increasing from 138 in 2017 to 823 in 2022, a 496% increase.

Figure 15 Change in Unhoused and Unsheltered Population in Spokane (2017-2022)



Source: City of Spokane Point in Time Counts (2017 and 2022)

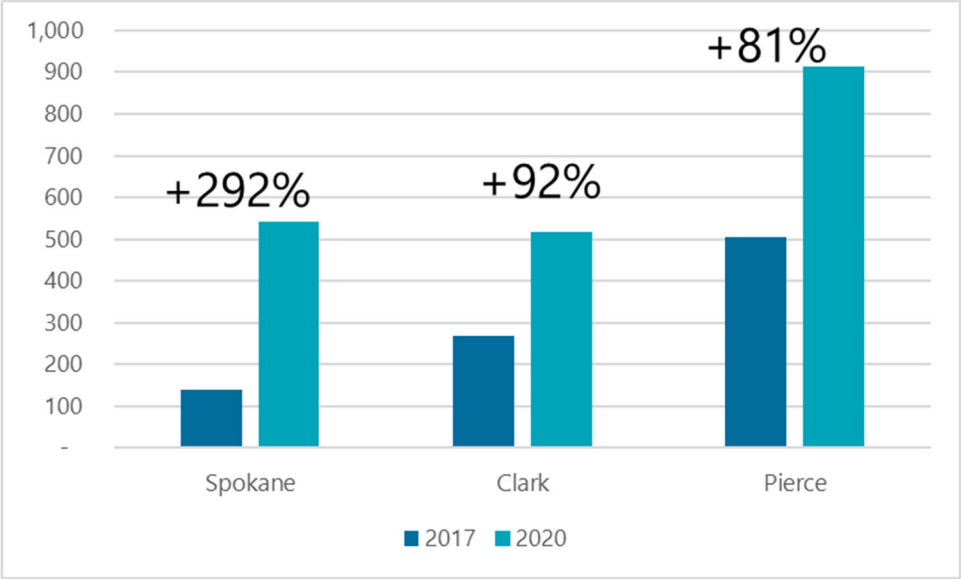
Figure 16 Spokane Community Perceptions Survey Results (2019)



Source: STA Community Perceptions Survey (2019)

A review of changes in homelessness rates for other peer counties in Washington, including Clark County and Pierce County, found that the percent increase for total unhoused population was similar. However, the percent change in unsheltered homeless populations was notably larger for Spokane County. Between 2017 and 2020 (the latest year in which a full dataset was available for all three counties) unsheltered homelessness increased by 81% in Pierce County, 92% in Clark County, and 292% in Spokane County (Figure 17). This suggests that the recent trend in unsheltered homelessness may be an increasingly visible phenomenon in the Spokane region compared to other areas of the state.

Figure 17 Percent Change in Unsheltered Homelessness by County (2017 to 2020)



Source: Point in Time Counts (2017 and 2020)

POLICY TRENDS

Unlike context trends, policy trends represent factors that STA has some direct influence over. Commonly identified policy trends include:

- Equity and accessibility
- Frequency and reliability
- Transit priority and infrastructure
- Demand-based services
- Workforce and organizational development

Equity and Accessibility

Service adjustments for essential workers

The COVID-19 pandemic produced dramatic changes in transit usage. While many office workers were able to work from home, "essential workers" have continued to ride transit consistently because their jobs require in-person presence with off-peak start or end times. Essential workers tend to be disproportionately immigrants, persons of color, lower-income, and female.[1] Based on their travel needs, pandemic-era transit usage has seen a greater share of trips during off-peak hours rather than traditional commuting peaks. Shorter transit trips between neighborhoods have tended to continue during the pandemic, while ridership on downtown-focused regional commuter services dropped sharply. There is a clear equity dimension to these trends; Denver found that the areas where transit ridership increased during the pandemic had median household incomes about $25,000 lower than the areas where ridership decreased.[2]

As a result, many transit agencies have considered adjusting service to prioritize the needs of their new ridership base. APTA recommends that agencies "reallocate resources toward vulnerable people, underserved neighborhoods, and essential workplaces" where transit service has the most meaningful impact. In response to less peak-period commuting, transit providers may shift service towards night and weekend periods that tend to be used by marginalized groups. In response to less downtown-focused commute patterns, transit networks may deemphasize radial networks focused on downtown while prioritizing neighborhood-to-neighborhood access that tends to be used by marginalized groups. One

[1] A Basic Demographic Profile of Workers in Frontline Industries. Center for Economic and Policy Research, 2020.

[2] On the Horizon: Planning for Post-Pandemic Travel. American Public Transportation Association, 2021. Highlights the experience of Denver RTD and LA Metro.

agency that largely maintained ridership levels during the pandemic is the Greater Richmond Transit Company; this appears to be a result of a 2018 route network redesign that prioritized vulnerable neighborhoods and essential workers. The Port Authority in Pittsburgh similarly expanded service to communities where many people of color and families with low incomes live.[3]

Performance metrics to prioritize equity

Pandemic-era changes to transit ridership and the racial justice protests of 2020 have given transit agencies renewed focus on equity considerations. Defining a starting point and measuring an issue is required before improvement can occur, so many agencies have developed equity-focused performance metrics. These metrics primarily focus on distributional equity, or the distribution of service across all segments of a community, prioritizing those with highest need. Note that other forms of equity may include procedural equity (representation in decision-making processes), restorative equity (reversing historical inequities), and structural equity (accountability for decision-makers).

Equity-focused performance metrics can be place-based (describing transit in defined areas of need) or person-based (describing transit for an average user from a marginalized group). The San Francisco Municipal Transportation Agency defined eight place-based "equity neighborhoods" that are used for performance monitoring, with the policy that service levels in these neighborhoods should at least keep pace with the system as a whole. These neighborhoods, shown in the map to the right, were identified based on income, private vehicle ownership, race, and ethnicity.[4]

Person-based equity metrics can give a more accurate representation of the experience of user groups in demographically mixed areas, though the metrics are somewhat more complex to calculate. For example, Miami-Dade County studied the number of jobs that could be reached by transit in 30, 45, and 60 minutes for the average person, average person in poverty, average person of color, and average person without a vehicle.[5] As another example, Metro Transit in Minneapolis-St. Paul conducts equity analyses that compare the

[3] On the Horizon: Planning for Post-Pandemic Travel. American Public Transportation Association, 2021.

[4] Equity in Practice: A Guidebook for Transit Agencies. TransitCenter, 2021.

[5] Equity in Practice: A Guidebook for Transit Agencies. TransitCenter, 2021.

experience of Black, Indigenous, and people of color (BIPOC) populations with white populations in terms of access to high-frequency service, access to all-day service, levels of crowding, and service change impacts.[6]

Best practices for service requests outside of Public Transportation Benefit Area

Transit agencies often face tradeoffs between maximizing ridership and ensuring access throughout its region. The Spokane Transit Authority is fortunate to have a Public Transportation Benefit Area (PTBA), whose boundary is based on the Spokane County Urban Growth Area (UGA). The PTBA supports a strategy of keeping transit service focused on the urban areas that have appropriate levels of demand, and it provides a clear basis for deprioritizing service requests in low-demand areas outside the PTBA. However, in recent years the demand for housing in the Spokane region has outpaced supply, and housing prices have risen to record levels.[7] This has resulted in increased low-density development outside of the PTBA. The resulting development pattern will increase pressure for expanded transit service outside the PTBA and renew equity concerns if transit resources are reallocated from the core.

When transit agencies receive requests for service beyond their official boundaries, there are a range of potential approaches if the request is considered to have merit. In some cases, if a destination is just outside of the boundary, an agency may decide to serve it without special compensation, on the grounds that it will primarily benefit riders from the core service area. More commonly, agencies may require special contracts with external partners to pay for the full cost of extraterritorial transit operations. In the long term, modifying the PTBA could also be an option if development patterns merit.

However, these approaches also may involve barriers to overcome. Financial considerations might include avoiding any use of federal funds beyond the official service area, accounting for the cost of new ADA paratransit requirements, and segregating any funding for contracted service. Operational considerations could include vehicle availability and scheduling efficiency. Planning considerations could include considering whether the new service fits with broader regional transit planning, does not create new service gaps, and will have reliable long-term funding.[8, 9, 10]

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[6] Annual Service Equity Evaluation. Metro Transit, August 2021.

[7] Edelen, Amy. Spokane County's median home price soars to record $325,000 in February. The Spokesman-Review, March 16, 2021.

[8] Service Area Guidelines – Options for Service Gaps in Urban Public Transit. VIA, 2016.

[9] Sub-allocating FTA Section 5307 Funding Among Multiple Recipients in Metropolitan Areas. TCRP, 2014.

[10] Sizing and Serving Texas Urban Gaps. TTI, 2011.

Frequency and Reliability

While COVID-19 was initially devastating for transit ridership, the decade leading up to the pandemic already saw steady ridership losses in many American cities, particularly bus ridership. Although a multitude of factors can influence transit ridership, including gas prices, car ownership rates, and the emergence of Uber, studies have shown that reduction in bus service, especially bus frequency, bears much responsibility for falling ridership.[11] While many factors play into the success of a transit system, frequency and reliability consistently rank among the most important to riders.[12] Frequency and reliability provide a sense of trip security for transit riders. With high frequency service, passengers don't need to plan their trip around the bus schedule; they know that if they miss their bus, another one is only a few minutes away. Additionally, when service is reliable, passengers know that they'll be able to make it to their destination on time and avoid being late. Considering the importance of these two factors, many cities are now exploring or implementing serious investments in bus service to reverse this trend.[13]

Bus service improvements can come in a variety of ways, but they all share the same goals of making bus service more frequent and reliable. On a route level, many cities are adding transit priority measures such as bus only lanes[14] and transit signal prioritization[15] to boost both frequency and reliability on targeted routes. Examples of these are explored at length in the *Transit Priority and Infrastructure* trends section. In addition to transit priority measures, some agencies have taken a network-level approach to develop a frequent transit network. Generally, frequent transit networks are a network of connecting routes where riders can expect frequent, reliable service most of the time. Similar to STA's High Performance Transit Network (HNTP) Portland's Tri-Met defines their designated Frequent Service Network as rail and bus routes that run every 15 minutes or better, most of the day, most days.[16] Most recently, bus network redesigns have been a common way for agencies to reconfigure existing resources to help develop a frequent transit network.

[11] http://tram.mcgill.ca/Research/Publications/Transit_Ridership_overtime.pdf

[12] https://transitcenter.org/publication/whos-on-board-2019/

[13] https://transitcenter.org/theres-a-reason-transit-ridership-is-rising-in-these-7-cities/#:~:text=Looking%20at%20the%202018%20NTD,%2C%20Detroit%2C%20and%20Las%20Vegas.

[14] https://archive.curbed.com/2019/10/14/20902256/bus-lane-emissions-climate-change

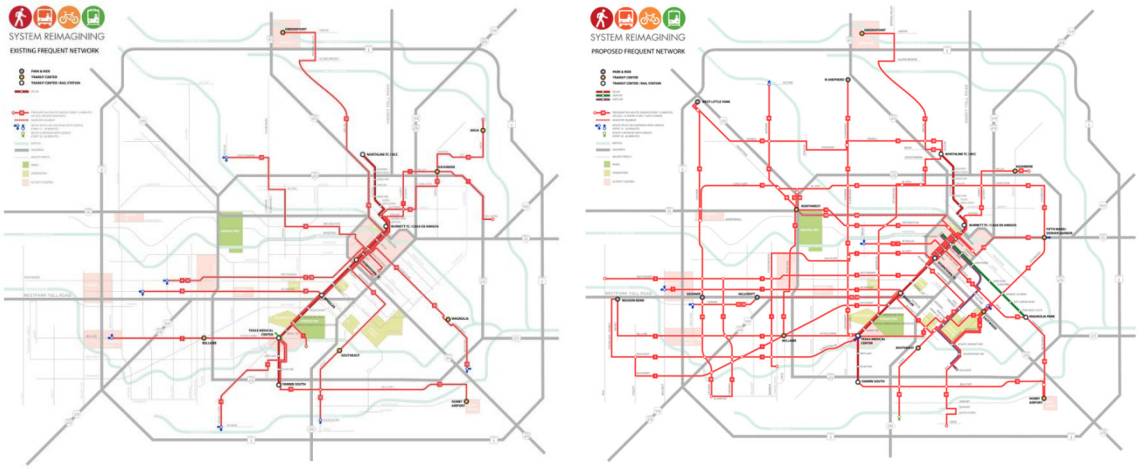
[15] https://nacto.org/publication/transit-street-design-guide/intersections/signals-operations/active-transit-signal-priority/

[16] https://www.transitforwardri.com/pdf/Strategy%20Paper%206%20Frequent%20Transit%20Networks.pdf

Houston Bus Network Redesign

An oft cited example of bus network redesign is the 2015 *Reimagined Network Plan* from Houston, TX, where regional transit provider Metro implemented one of the largest bus network changes in US history. Fundamentally, the network overhaul changed Houston's bus network from a peak-oriented low-frequency radial network, which focused on bringing people in and out of the city's downtown at weekday AM and PM peaks, into a high-frequency all-day grid. In addition to broad network design changes, a primary focus was to bolster frequency and reliability on its busiest corridors. This meant doubling the number of routes with 15-minute frequency and maintaining this frequency across both peak and off-peak times. Counting on a bus to show up at the same time on both Sunday morning and Monday morning is the cornerstone of bolstering system reliability and opens the system to a whole new type of rider.

This strategy paid off. After years of declining ridership (20% reduction from 2007-2011),[17] Houston saw local bus ridership increase by 4.3% and total local network ridership increase 11% between November 2014 and November 2015. Additionally, increased frequency of weekend service helped lead to a 30% boost in Sunday ridership.[18]



Previous High Frequency Network *Implemented High Frequency Network*

Bus Network Redesign with a Focus on Frequency

[17] https://kinder.rice.edu/urbanedge/2020/01/16/houston-metro-public-transit-bus-service-improved-ridership

[18] https://nacto.org/case-study/metro-bus-network-redesign-houston/

Other cities are taking note from Houston, with Los Angeles[19], Boston, Washington DC[20], Philadelphia, and New York[21] all considering or implementing some version of a bus network redesign. Boston's Massachusetts Bay Transportation Authority (MBTA) has an ongoing bus network redesign which used ridership data and feedback to land on the following key network changes:

- More high-frequency corridors
- More midday, evening, and weekend service
- Better access to key destinations
- New bus routes (rolling out in 2022)[22]

Additionally, MBTA is specifically prioritizing communities with high bus dependence to further support those who already rely on quality bus service. Similar to Houston, the MBTA is aiming to reconfigure its network to better serve all riders, not just 9-5 commuters.

Transit Priority and Infrastructure

As the Spokane area grows, reserving space for transit on the region's roadways will become important to support a healthy transportation network in the region. Building infrastructure that is oriented towards transit can be costly but taking steps now can greatly reduce future costs as congestion and other stresses on the transportation network increase. Transit-specific infrastructure also can help build a culture of transit use in the region by making the service fast and reliable. The more that residents and visitors can see that transit is a viable option for travel, the more likely they will be to use the system.

Regions around the country have been recognizing the importance of prioritizing transit infrastructure as they grow. Before the COVID-19 pandemic, TransitCenter concluded that cities seeing growth in ridership where most often ones that had turned attention to bus prioritization. The following examples are just some of the agencies that have done so. Most have selected corridors to prioritize and identify tools that can be applied to the local contexts.

[19] https://www.metro.net/about/plans/nextgen-bus-plan/

[20] https://www.washingtonpost.com/local/trafficandcommuting/metro-is-mulling-a-major-redesign-of-the-bus-system-but-first-officials-need-to-figure-out-why-people-arent-riding/2017/12/30/8c37ee08-d52c-11e7-95bf-df7c19270879_story.html

[21] https://new.mta.info/project/bus-network-redesign

[22] https://www.mbta.com/projects/bus-network-redesign

San Francisco

Launched in 2015, Muni Forward is a project that aims to prioritize transit on congested corridors. Since that time, the city has built more than 55 miles of improvements to keep buses moving reliably with upgrades like red transit lanes, bus bulbs for faster boarding, and traffic signal priority. From 2015 to 2019, ridership in these corridors saw growth.

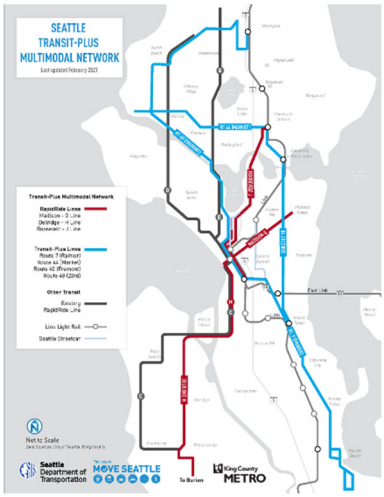
Baltimore

With collaboration with city and state transportation agencies, BaltimoreLink has established priority corridors for transit and a toolkit to improve the rider experience. Design engineering is currently taking place for improvements to the first corridor.

Portland

The Rose Lane Project by the Portland Bureau of Transportation is giving greater priority to buses and streetcars on the road by planning for improvements and implementing the 20 tools identified valuable in Portland. With continued public engagement, PBOT is using a pilot approach to test improvements, monitor, modify, and, if successful, making them permanent. Portland has completed several corridor-level and spot infrastructure improvements and has many dozen in queue.

Seattle



Since 2010, King County Metro has been implementing multiple lines of RapidRide bus service, which includes a number of enhancements in bus frequency and rider amenities. A 2018 levy set into motion the City of Seattle's Transit-Plus Multimodal Corridor Program, which aims to improve bus speed and reliability along seven priority corridors using a variety of treatments. All the corridors align with RapidRide bus service lines or potential future lines. Using levy funds, four of the corridors are currently under construction and the remaining three are under design.

Local Application

STA Moving Forward identified several high-performance transit corridors which will be targeted for transit priority investments. As Spokane continues to grow, expanding upon the existing high-performance transit corridors will be critical ensure people, jobs, and services are connected and to make transit a competitive option with driving. One opportunity would

be to target areas identified by the City of Spokane as Target Investment Areas (the University District, East Sprague, and North Bank). These areas are well-positioned for new development and are already suited for transit because of their relatively higher density, connected street grid, and proximity to downtown.

Cities across the nation are working to make the infrastructure supporting transit work better for people as they grow. Spokane can stay ahead of growth by making transit priority improvements before greater transportation pressures and a more complex built environment add additional expense to improvements.

Demand-Based Services

In recent years, many transit agencies have deployed on-demand services (sometimes called microtransit), enabled by technologies such as smartphones and mobile payments. This is typically operated using a paratransit-style van that serves same-day trip requests within an established service boundary, while also making scheduled connections with the fixed-route transit network. While these services do not generate a significant amount of ridership, they can serve a variety of other purposes, such as providing coverage in low-demand areas where existing bus routes perform poorly, creating first-mile and last-mile connections with the core transit network, and offering basic transportation options during time periods when demand is low. This service model could be worth consideration if STA is under pressure to provide service in low-demand/low-density areas at the fringe of the region.

On-demand microtransit zones can typically serve areas of a few square miles with a single vehicle to accommodate customer requests with reasonable wait times, though larger zones can be served with more vehicles.[23] Service productivity is typically in the range of 3 to 4.5 passenger trips per vehicle service hour, and the operating cost per passenger is typically on the order of $22 per passenger.[24] The thinktank TransitCenter cautions that "microtransit is locked into a high-cost format that consumes more subsidies as usage increases" due to limited capacity, unlike fixed-route forms of transit that become more cost-effective with more ridership.[25] Alternative performance measures might better reflect unique purposes for this service; these may include the number of residents or jobs with access to the service or average customer response times.

Agencies that chose to implement on-demand microtransit service will face decisions such as selecting a software system, selecting a vehicle type, defining stop policies, providing options

[23] Baumgartner, David. Evaluation of a Demand-Responsive Transit Service and Analysis of its Applicability in Other Locations. 2009.

[24] Microtransit or General Public Demand–Response Transit Services: State of the Practice. TCRP Synthesis 141, 2019.

[25] Microtransit + Transit. TransitCenter, 2019.

for unbanked populations, and providing options for customers without smartphones. Several examples of agencies that operate on-demand microtransit zones are below:

- Capital Metro Pickup Zones in Austin, TX
- Pace Suburban Bus On-Demand in Chicago Suburbs, IL
- Denver RTD FlexRide
- West Sacramento On-Demand Rideshare
- Sacramento RT – SmaRT Ride

Workforce and Organizational Development

What Happened?

While finding and retaining skilled and committed operators has always been a challenge for transit agencies[26], the COVID-19 pandemic has exacerbated many of these challenges while presenting new ones. Risk of virus exposure, as well as reduced ridership, leading to widespread service cuts, initially pushed many operators out of work. But now that service is scaling back up, many agencies around the country (and world) are having trouble bringing staffing back to full capacity. Agencies are dealing with this in the short term by reducing service and reconfiguring routes but are also trying a variety of strategies to bring operators back.

Signing bonuses

Like many agencies, the Greater Richmond Transit Company used funding directly from the CARES Act to support their network, including hiring new drivers. Last year, GRTC began offering hiring bonuses of $8,500 and $5,000 for new bus mechanics and operators, respectively, to help bring staffing levels back to normal. Richmond isn't alone: Washington DC's Metro[27], Portland OR's Tri-Met and St. Louis Metro Transit[28] are all offering some form of hiring bonus for new mechanics, electricians, and bus operators.

Expediting Commercial Driver's Licenses (CDL)

Even with interested applicants and funding, the pandemic has slowed down acquisition of commercial driver's licenses as many DMVs have been intermittently closed or short staffed as well. To help expedite this process, the GRTC has negotiated with the Virginia Department of Motor Vehicles (DMV) to allow the company to administer online CDL courses for

[26] https://www.bloomberg.com/news/articles/2018-06-28/there-s-a-bus-driver-shortage-and-no-wonder

[27] https://www.washingtonpost.com/transportation/2022/02/01/metrobus-bus-operators-bonus/

[28] https://www.stltoday.com/news/local/metro/st-louis-public-transit-company-offers-2-000-signing-bonuses-for-new-drivers-electricians-and/article_ef5668e1-7e1a-5c7b-9e29-bed2120a93b0.html

candidates in-house. GRTC's CEO, Julie Timm, has reported initial success in this new partnership: "Now that we can administer the online courses for candidates, that's helped us have a new bumper crop of drivers coming in. During COVID we had been having just one to two new recruits in each incoming class, but now we're back to the pre-pandemic level of double digits."[29] In addition to expedited CDL training, taking a proactive approach to building a pipeline of future employees by working with local community colleges and national organizations like the FTA's Transit Workforce Center (TWC)[30] is an effective way to expand candidate pools long-term.

Increased Wages

Hampton Roads Transit (HRT) in Southeast Virginia, an agency serving 22 million annual passengers, reported being down 30% of the bus operators needed to meet service. On top of a $4,000 signing bonus and expedited CDLs, HRT recently renegotiated their collective bargaining agreement to increase starting driver wages by 20%.[31] Portland OR's Tri-Met, an agency facing 9% labor-induced service cuts this year, has not only increased wages by $4/hour, but also actively advertises their guaranteed bonus and raise structure for prospective drivers. Additionally, Tri-Met has added a $3,500 signing bonus for drivers, incorporates a 7-week in-house training program with CDL certification, and works with drivers to choose their schedules.[32]

Optimized scheduling

In addition to better pay and bonuses, some municipalities have turned to private scheduling platforms to help develop schedules that are more flexible and attractive to both new and existing drivers. Western Reserve Transit Authority, an operator in Greater Youngstown, OH, used Optibus to build schedules designed to improve working conditions for drivers and improve route efficiency. After a year and a half of the optimized schedule, runs were reduced by 12%, part-time runs were eliminated, and split durations were reduced by 17%, with almost identical service levels. This reduction in split shifts is especially effective at bringing in new drivers, as newer drivers often receive these less-desirable shifts.[33] Other

[29] https://www.virginiamercury.com/2021/11/19/whats-behind-the-bus-driver-shortage/

[30] https://www.transit.dot.gov/research-innovation/workforce-development-initiative

[31] https://t4america.org/2021/11/02/bus-operator-shortage/

[32] https://news.trimet.org/2022/03/video-trimet-boosts-bonus-for-newly-hired-bus-operators-to-3500/

[33] https://www.optibus.com/tackling-the-driver-shortage-creating-schedules-that-attract-and-maintain-workers/

scheduling software like Trapeze, HASTUS, and The Master Scheduler are all capable of this type of scheduling optimization as well.