DRAFT TUCSON TRANSIT PRE- AND POST-PANDEMIC RIDERSHIP DEMOGRAPHIC, ECONOMIC, AND FISCAL OUTCOMES

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EXECUTIVE SUMMARY

Since the COVID-19 pandemic, transit ridership among metropolitan areas of more than one million population in the west outside California cratered, except Tucson. Where those transit systems remain about 30 percent below pre-pandemic levels, Tucson's total transit ridership increased more than 20 percent. In other words, Tucson's transit ridership is proportionately 70 percent higher now than the average of those other systems compared to pre-pandemic levels.

But there's more.

Where the downtowns of Denver, Portland and Seattle are now worth billions of dollars less than before the pandemic, Tucson's downtown is now worth hundreds of millions of dollars more.

Why is this?

Tucson is America's only major metropolitan that waived transit fares through and after the pandemic, because of its Fare-Free policy. While one cannot assert purely cause-and-effect Fare-Free outcomes, the weight of associations shows that Fare-Free, combined with other policies that promote development along transit corridors, generate important social, economic and fiscal benefits.

This report shows that transit corridors accounted for nearly all residential units and population growth since 2019. This is a product of good planning because it makes sense to increase mobility options by encouraging residential development along transit lines. Where such planning efforts include access to Fare-Free transit, the market is rewarded with improved mobility options. The key beneficiaries are lower income workers and transportation dependent people who account for most of the new ridership.

Moreover, most new jobs are located along transit corridors, which is also a product of good planning. Indeed, by locating along transit corridors, firms are rewarded with Fare-Free transit benefits.

There are strong arguments for a Fare-Free policy regardless of cost. Yet the Fare-Free policy generates fiscal revenue to the city that helps offset costs. These revenues are generated by new development occurring along transit corridors. These revenues are:

New Transit Corridor Property Taxes	$17,053,280
Direct Transit Premium Property Taxes	*$4,754,411*
New Transit Corridor Revenue Sharing	$3,053,889
Total New Revenue Transit Corridor Revenue	$20,107,169

The figure of $17,053,280 is the new property tax revenue gained along transit corridors estimated for 2025. In review, transit corridors are defined narrowly as only the city blocks fronting bus routes and streetcar tracks, and the city blocks adjacent to them. In contrast, many studies include fiscal benefits up to one-half mile away. The analysis is thus conservative.

Research shows that without Fare-Free, transit ridership would drop by about one third. In other cities without Fare-Free, property values downtown and elsewhere fell by billions of dollars and property tax revenues would have fallen accordingly. Fare-Free is associated with increased ridership that enhances nearby property value that not only preserves the pre-pandemic property tax bases but expands it. Put differently, without Fare-Free, there is some evidence to suggest that none of the new property taxes occurring along transit corridors would have materialized.

The line showing "direct transit premium property taxes" reflect only the narrow, direct value that transit proximity confers on the city fiscal structure. In the absence of the Fare-Free policy and considering the effect of reduced transit ridership on property values elsewhere, this fiscal benefit exists substantially because of Fare-Free.

New residents locating within transit corridors enable the City to increase its share of federal and state revenue sharing programs, estimated in 2025 to be $3,053,889.

Total new revenue to the City associated with Fare-Free policies that may have attracted new development to transit corridors (along with other policies) exceeds $20 million.

Not included are transaction tax revenues generated from businesses directly along the corridors. The reason is that COVID-19 has changed the dynamics of taxable sales, shifting much of it to online platforms. Although the City does receive taxes from online sales, it is accounted for differently and not necessarily credited to transit corridors. Nonetheless, without the thousands of new homes that have been built along transit corridors since the pandemic, and the transactions they make along those corridors, the corridor-specific transaction taxes would be even lower. In effect, new development along transit corridors benefiting from the Fare-Free policy helps preserve much of the transaction tax revenue that is lost due to economic restructuring.

Fare-Free advances the City's policies to:

- Facilitate development along transit corridors to advance social equity, environmental quality, and other objectives
- Steer development to where excess capacity exists
- Maximize economic and fiscal benefits through higher density, mixed use development
- Create social and economic synergies along transit corridors that would not occur otherwise
- Correct for the highly regressive nature of transit fares on those who can least afford them but for whom they have few or no transportation alternatives
- Advance social equity by improving mobility options for everyone

What follows are summaries of each chapter.

Chapter 1: Comparing Fare-Free and Transit Ridership Among Selected Metropolitan Areas

The COVID-19 pandemic of 2020-2022 reduced transit ridership across the nation if not the world. Among western metropolitan areas of more than one million people outside California, Tucson was the only one to eliminate fares then. Special federal funds were used to offset fares. The City has sustained its "Fare-Free" policy since then, though with budget challenges.

Chapter 1 summarizes the Fare-Free policy and compares transit ridership trends before, during and after the pandemic. Key findings include:

- Among bus systems, Tucson gained the most riders since before COVID-19. Between 2019 and 2024, Tucson added nearly 2.6 million riders, an increase of nearly 20%. All other bus systems lost riders.

- Among streetcar systems for which data are available, Tucson's ridership nearly doubled while all other systems lost riders.

Research presented in this report provides only descriptive before-and-after analysis and is limited to overall trends without focusing on individual routes, though overall bus and streetcar trends will be included.

Chapter 2: Analysis of 2019 and 2025 On-Board Surveys

The association between Fare-Free and key demographic as well as ridership outcomes is addressed in Chapter 3. As a precursor, the 2019 transit on-board survey is the benchmark for the pre-pandemic, pre-Fare-Free period. Differences between the 2019 and 2025 surveys offer coincidental though not causal associations between the Fare-Free policy and post-pandemic outcomes. Key findings are:

- Of the 3.4 million new riders between 2019 and 2025, 2.7 million are attributable to riders between the ages of 25 and 54.

- About 80 percent of the increase in bus riders and 40 percent of the streetcar riders are minority.

- A surprise is that all the change in bus ridership is attributable to males while the number of female riders stayed about the same. On the other hand, female riders accounted for more than half of the total streetcar change.

- The number of transit riders without a driver's license or physically disabled increased by about 12 percent. A larger share, 17 percent, among streetcar riders compared to 8 percent among physically disabled while the change among bus riders was 11 percent for those without a license and 13 percent among physically disabled.

- About 97 percent of the change in riders is attributable to those who do not have a car, compared to 87 percent overall and 54 percent among streetcar riders.

- Even more impressive is that all new bus riders and transit riders overall, and 80 percent of the streetcar riders did not have a vehicle available to make their trip.

- Another surprise is that adjusting for inflation, the average household income of transit riders across both modes fell between 2019 and 2025.

- Lastly, the transit on-board surveys show significant increases in the share of riders who used transit for shopping, personal business, medical visits, dining out, and recreation.

The on-board surveys do not capture the extent to which economic activity has changed along transit routes. These are the subjects of future chapters.

Chapter 3: Analysis of American Community Survey Commuting Data, 2019-2024

Chapter 3 uses the 1-year sample of the American Community Survey (ACS) to compare change in commuting to work characteristics before pandemic and Fare-Free in 2019 and after, in 2024. Notable trends include:

- The average age of commuters via transit fell significantly from about 37 years of age to 31.

- However, mathematically, all the changes in workers between 2019 and 2024 worked at home instead of the traditional workplace. These workers are allowed by their employers to work from home full-time, or they are contract workers as well as consultants who work from home. They are also older, being 43 years of age compared to 37.

- The change in commuting via transit is bifurcated with those under 45 years of age increasing their use of transit but those over 45 years decreasing their use. The implication is that older workers are shifting to working from home, which reduces the need to commute for workers using either the auto or transit.

- Minority workers dominated the change in total workers as well as those who use transit in their commute. They are also a large share of the change in workers working from home, though White workers accounted for more than half the change.

- While the inflation adjusted incomes of workers increased between 2019 and 2024, from about $36,500 to about $40,500, for transit workers it fell slightly, from about $26,700 to about $26,200. This income trend is like the on-board survey findings. In contrast, those working from home averaged incomes of nearly $45,000 in 2024.

- Working from home accounted for more than 80 percent of the increase in jobs between 2019 and 2025. Of the rest, the change in jobs accessed by transit was more than those accessed by the auto.

Chapter 4: Residential Development and Population Growth Along Transit Corridors Since Fare-Free

Transit outcomes are often based on the half mile distance from transit stations or stops. However, to be conservative, this study is based on "transit corridors" which are comprised of the blocks fronting transit stops and routes or tracks, and adjacent blocks. In Tucson, three transit systems overlap the same space: bus, streetcar, and express bus. The bus system overlaps streetcar and express bus systems meaning that outcome analysis can focus on just its space. Analysis shows that the areas within the bus transit corridor added:

2,980 housing units or about 88 percent of the city's total change.
7,035 people or about 87 percent of the city's total change.
$697 million or about 91 percent of the city's total change.

The population change estimate is used to calculate state and federal revenue sharing implications in a later chapter.

Chapter 5: Job Data Comparing 2019 to 2023

Chapter 5 analyzes the Longitudinal Employment-Household Dynamics (LEHD) database for 2019 and 2023 to determine the extent to which jobs were attracted to transit corridors. Key findings include:

- Nearly all (96 percent) new jobs between 2019 and 2023 located within bus/streetcar stops (56 percent) and blocks fronting the routes/tracks (40 percent).
- About 18 percent of these new jobs are directly related to the streetcar with the balance of 78 percent attributable to bus service.
- Job changes focused mostly at transit stops and corridors.
- There were fewer higher wage jobs in 2023 than in 2019, and more middle- and lower-wage jobs.
- However, transit stop and route/track corridors lost fewer higher-wage jobs than the rest of the city.
- These findings align with chapters 2 and 3 that show new transit riders' average incomes were lower after Fare-Free than before.

Chapter 6: Property Tax Revenue Change Since Fare-Free, 2019-2025

Property tax analysis focused on changes in value between 2019 and 2025 of census blocks and blocks directly fronting routes and tracks, and the next blocks adjacent to those. The analysis is conservative because it does not extend out to one-half mile as many other studies do. Key trends are:

- Non-exempt property value along the transit corridors increased by more than $16 billion and accounted for more than 90 percent of the city's entire increase in non-exempt property value.

- In 2025, the bus and streetcar corridors were responsible for more than $16 million in property tax revenue of which nearly $5 million is based on the transit proximity premium.

The caveat is that this is a revenue analysis that does not consider costs of serving new development. On the other hand, if existing facilities have excess capacity or service efficiencies gained where new development is mostly along transit corridors, these costs should be lower than revenues.

Chapter 7: Transaction Tax Revenue Change Since Fare-Free

Unfortunately, COVID-19 changed the dynamics of taxable sales, shifting much of it to online platforms. Although the City does receive taxes from online sales, it is accounted for differently and not necessarily credited to transit corridors. As a result, inflation-adjusted transaction taxes along transit corridors fell between 2019 and 2025 even as they increased for the City. Nonetheless, without the thousands of new homes that have been built along transit corridors since the pandemic, and the transactions they make along those corridors, the corridor-specific transaction taxes would be even lower. In effect, new development along transit corridors benefiting from the Fare-Free policy helps preserve much of the transaction tax revenue that is lost due to economic restructuring.

Chapter 8: Revenue Sharing Associated with Transit Corridor Growth Since Fare-Free, 2019-2025

The City receives income and sales tax revenue sharing proceeds from the state, as well as state Smart & Safe Arizona funds and federal Community Development Block Grant funds. Since Fare-Free, more than 7,000 people or about 87 percent of the city's new population settled in transit corridors. This equates to new annual revenue sharing proceeds of more than $3 million.

Chapter 9: Summary of Demographic, Economic, and Fiscal Changes Along Transit Corridors Since Fare-Free

The report ends in Chapter 9, which summarizes the key findings and implications noted at the beginning of the Executive Summary. It concludes that a sinister way to measure fully the benefits of Fare-Free would be to restore fares to their pre-pandemic, inflation-adjusted level and measure social, environmental, economic, and other outcomes after a few years. Policy makers will then have better knowledge on which to base future Fare-Free decisions.

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INTRODUCTION

On the heels of the COVID-19 pandemic, Tucson's transit ridership plummeted in 2020, as shown in Exhibits I-1, I-2 and I-3 for bus, streetcar, and shuttle services, respectively.

Partly as a response to falling ridership, the City adopted its Fare-Free policy in March 2020. After considerable debate, the City Council voted 5-2 in August 2025 to maintain free fares by prioritizing access for residents despite budgetary constraints and safety concerns. The service is funded by the city's General Fund.

Tucson's Fare-Free Policy:

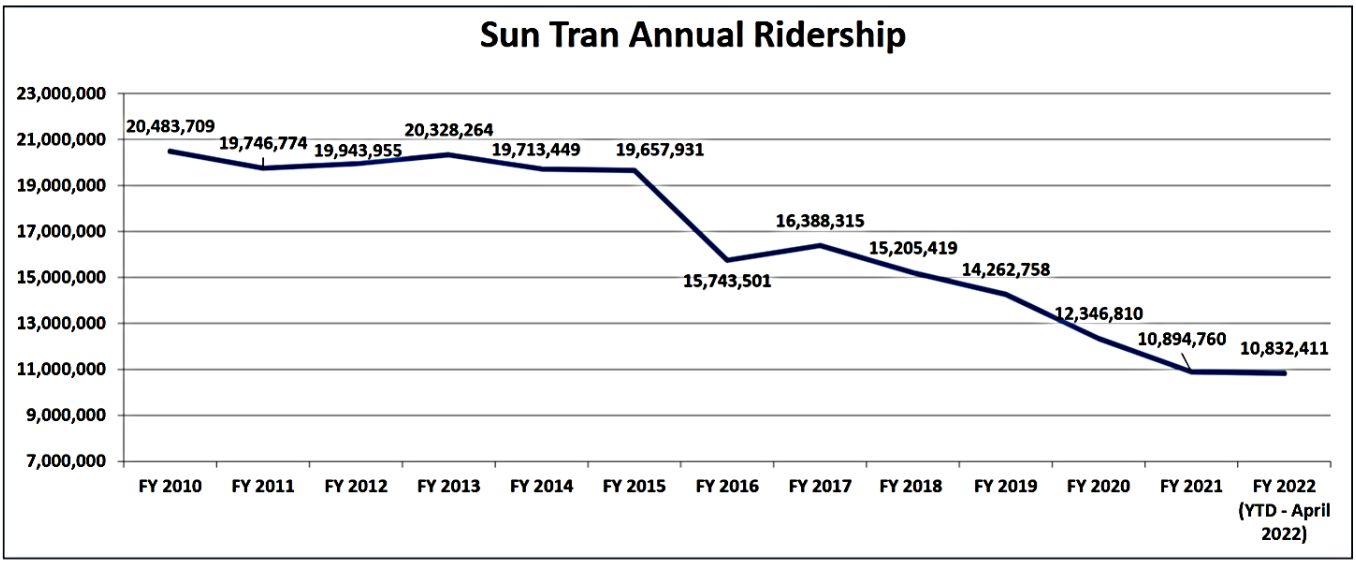
- Includes all Sun Tran buses, Sun Link streetcars, and Sun Van shuttle services.
- Extends to the foreseeable future, following votes to reject reinstating fares.
- While funded initially by federal COVID-19 relief funds, it is now supported by the city's General Fund, with debates focusing on a $9–$10 million annual funding gap.

Given the cost of Fare-Free, the City wants to know transit-related outcomes. The purpose of this study is to address four questions:

1. Adjusting for inflation and tax rates, have city tax and fee revenues changed significantly along transit corridors after free fares were implemented, controlling for inflation?
2. Have the number and demographics of transit riders changed since free fares?
3. Have the number of jobs along transit corridors changed since free fares?
4. Has the amount of real estate development changed since free fares?

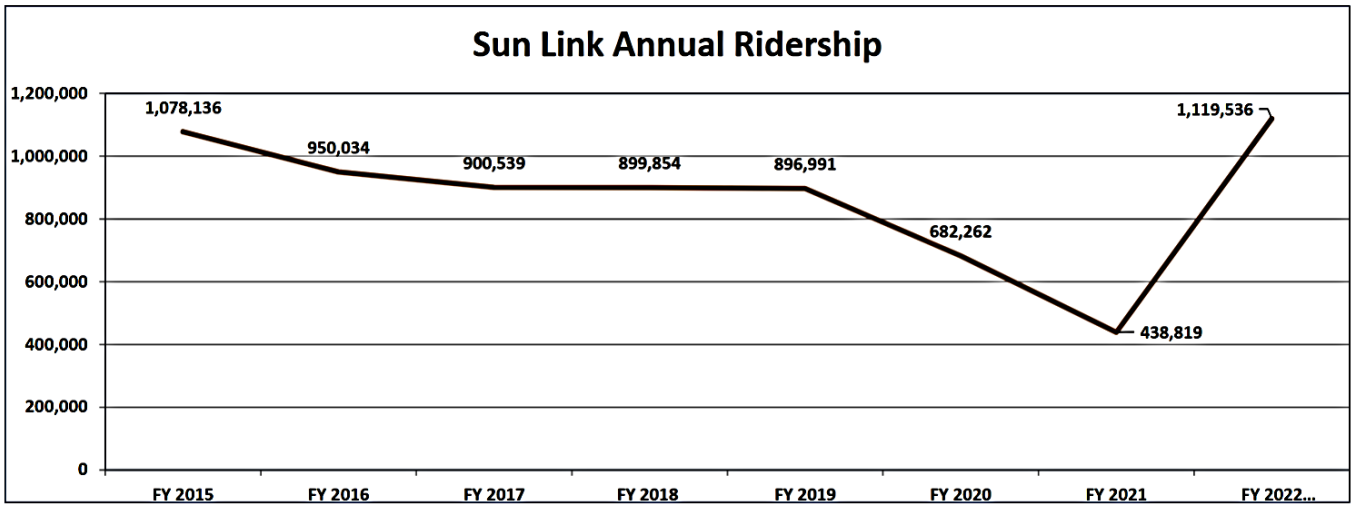
The analysis will be aggregated to transit modes. Subsequent analysis may be disaggregated into transit segments.

Exhibit I-1
Sun Tran (Bus) Ridership 2010 to 2022



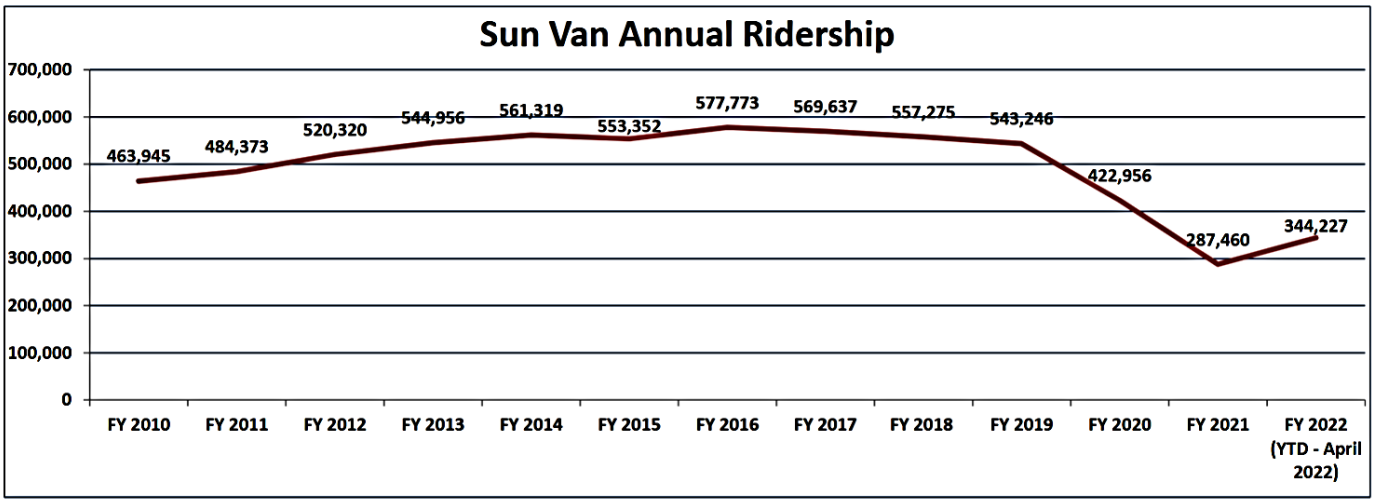
Source: Regional Transportation Authority (2022)

Exhibit I-2
Sun Link (Streetcar) Ridership 2015 to 2022



Source: Regional Transportation Authority (2022)

Exhibit I-3
Sun Van (Shuttle) Ridership 2010 to 2022



Source: Regional Transportation Authority (2022)

CHAPTER 1
EXPECTATIONS OF FARE-FREE OUTCOMES FROM LITERATURE AND RESEARCH DESIGN

Overview

Transportation does not pay its own way. That is, transportation systems in the US cost hundreds of billions of dollars more each year than is raised from motor fuel taxes, vehicle-based taxes and fees, farebox revenues and so forth (Shirley 2023). Yet the economy and society depend on transportation for work, leisure, shopping, and personal services among others. While some may argue that unless transportation pays its own way, inefficiencies will arise, others can argue that some elements of transportation are public goods that ought to be paid for by society. While this is true for the billions in annual subsidies spent on the federal highway system above gas tax revenue, this is especially the case with public transit. In this respect, studies chronicle the benefits of public transit in terms of (Litman 2025):

- Reduced congestion benefits;
- Increased economic development;
- Increased savings, especially among lower income workers for whom automobile ownership can be prohibitive;
- Reduced transportation dependency;
- Reduced automobile injury or loss of life from automobile accidents;
- Reduced greenhouse gas emissions along with improved air quality;
- Improved public health as transit induces more walking;
- Improved health care access and outcomes;
- Reduced demand for more or wider highways often at considerable expense; and
- Enhanced community well-being among many others.

The economic benefits are especially important since improved productivity generates the very taxes and fees needed to help pay for transportation systems. For instance, in their location decision-making process, many companies prefer locating in places with robust transit systems (APTA 2018). But there is also an overlooked public service benefit as well: When lower income groups have improved mobility and access, it generates savings on government services and support programs (Weisbrod et al. 2017).

Studies also show that these benefits exceed costs. For instance, a national benefit/cost study of bus transit showed a B/C ratio of 2.60 meaning that for every dollar invested in bus transit, society gained $2.60 in benefits (Ferrell 2015). The bus transit B/C ratio for Arizona is 2.21. For streetcars, a study of the Kansas City system found a B/C ratio of 4.96 (WSP 2018) while the B/C ratio for the Cincinnati streetcar is estimated at up to 3.90.

Another way to view benefit-cost is to compare transit outcomes with automobiles. Using this approach, one such study found that despite subsidies, rail transit benefits exceeded those of the personal occupancy vehicle (POV) (Nelson 1997).

Given these studies, social and economic efficiency arguments support such things as extensive transit systems and free fares. How this is paid depends on public policies. Where aggregate

improvement in society is the objective, public transit would be a public good financed from general taxes. After all, if aggregate benefits exceed costs, society is better off supporting public transit. In the context of Tucson's transit system, the value-added approach treats transit investment as a public good. New revenues associated with the streetcar need not be viewed as something to be captured and spent solely on the system itself, though that is clearly a policy option. An alternative perspective would treat streetcar costs as necessary to generate social, environmental, and economic benefits that exceed costs meaning that value-added revenue estimated in this report can be used to advance other initiatives, thereby making the city and its citizens even better off (Hartman et al. 2024).

This chapter expands on these overall perspectives by:

- Reviewing relevant research into the effect of fares on transit ridership;
- Comparison Tucson's Fare-Free transit ridership outcomes with other major Western transit systems outside California;
- Posing research questions; and
- Outlining the research design, data, and analytic approach

Relevant Research

A key element of transit policy is balancing the need for transportation equity with revenues to pay the bills. Helia et al. (2025) synthesize relevant research. Their context was the effect of the pandemic on ridership and how ridership was influenced by changes in fares both during the pandemic and generally. They offer three relevant findings.

First, the demographic profile of transit riders who stopped using public transportation during and after the COVID-19 pandemic consists largely of **higher-income individuals, white-collar workers, and those with higher education levels**. While overall **ridership plummeted** among this group **because they are "choice riders"** (those who have alternatives like driving), they stopped using transit due to the ability to work from home, fear of infection, and more flexible travel options.

Second, research shows that **choice riders are the most sensitive of all groups to fare changes**. A proportionate change in fares can have a disproportionate change in ridership among them.

Third, their study suggests that fare concessions among other efforts are needed to bring riders back (Helia et al. 2025: 11 with emphasis added):

> Our findings indicate that focusing solely on safety and protective measures will not help restore transit ridership to its pre-pandemic levels. Instead, transit agencies and decision makers may direct in- vestments toward improving rider security and comfort (e.g., reduce crowdedness, deploy larger seats, armrests, or other similar measures that increase personal physical space onboard) and **offering monetary incentives (in terms of reduced fares or discounts)** to further encourage the return to transit. Moreover, with the extended WFH [Work From Home] policies and the growing desire for doing activities online, transit agencies might be better off shifting their focus in route planning and service marketing from work trips to other trip purposes.

Comparative Post-Pandemic Ridership

Using FTA longitudinal ridership data, an interesting picture arises about ridership and fares for bus and streetcar systems among western US metropolitan areas of more than one million people outside of California. Unfortunately, because APTA does not report streetcar ridership for SLC, it is not included. Tempe's streetcar is not included because it was launched during/after the pandemic. There is also no differentiation between regular and express bus.

Exhibit 1-1 is of bus ridership. Ridership on all systems nosedived during the pandemic. After waiving its fares, however, Tucson's bus ridership recovered to and then exceeded pre-pandemic levels. SLC also slightly exceeded pre-pandemic levels. SLC is anomalous because 300,000+ students, faculty and staff in all the colleges and universities served by the system have free access. In effect, it is a hybrid free and fare system.

Exhibit 1-2 addresses streetcar ridership which includes Tucson, Portland and Seattle. Tucson's post-ridership is nearly twice that of pre-pandemic levels. Although Tucson's streetcar corridor grew by about 10%, this does not account for nearly doubling its ridership and economic transactions.

This is not causal though strongly circumstantial evidence for the demographic, economic development, and fiscal outcomes of free fares.

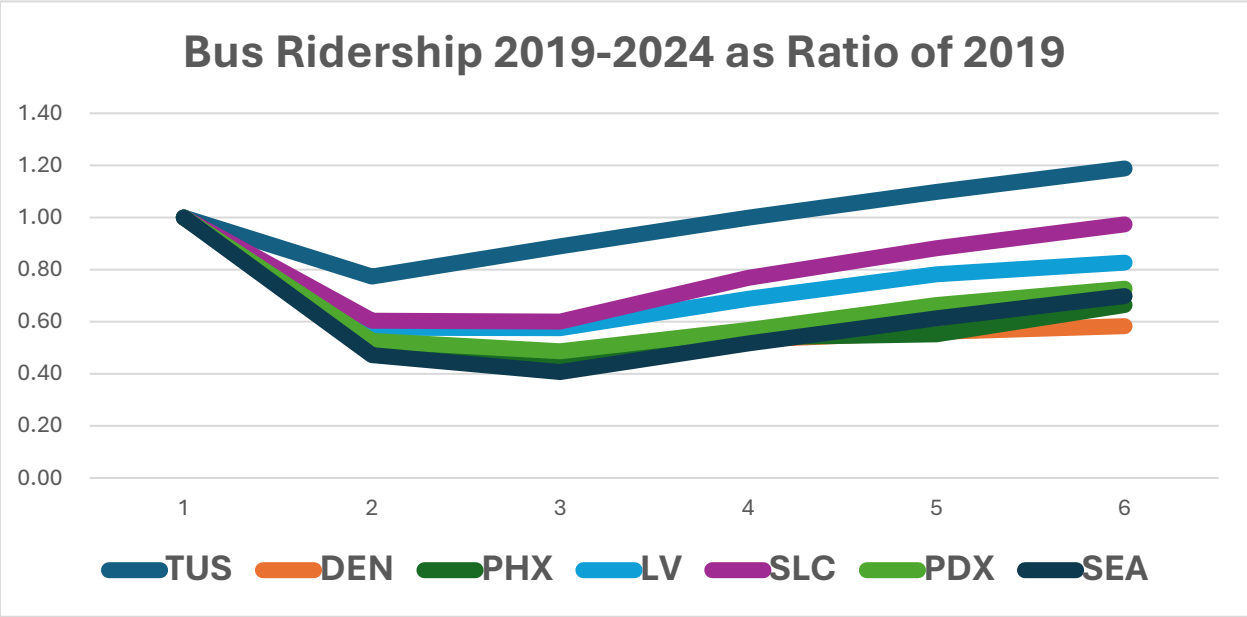
Exhibit 1-3 shows the relative difference in bus ridership trends between 2019 and 2024 between Tucson and all other systems excluding Sal Lake City's hybrid system. Exhibit 1-4 does the same for selected streetcar systems. The metric labeled "Tucson Preservation and Value Added Ratio" is the ratio of Tucson's bus ridership change 2019-2024 to the weighted average bus ridership trends of selected transit systems in the West outside California. The term "Preservation" is used because declining ridership can erode the value of transit proximity and thus real estate values. The term "Value Added" is used because increasing ridership can improve the value of transit proximity and thus real estate values. These concepts will be used in Chapter 6, relating to property taxes.

In Exhibit 1-3, the figure 1.70 means that Tucson's bus ridership in 2024 averaged 70 percent more than the other bus systems. For the streetcar system in Exhibit 1-4, the ratio of 2.52 means that Tucson's streetcar ridership in 2024 averaged 152 percent more than the weighted average of Portland's and Seattle's streetcar system. The combined, weighted effect is shown in Exhibit 1-5. It shows Tucson's combined bus and streetcar ratio of 1.78. The first element of that ratio, 1.0, is for "preservation" while 0.78 is for "value added" on top of preservation.

Finally, recent research by Tyndall (2026) shows that without Fare-Free, Tucson's bus ridership would not have been the more than 17 million annual passengers that were observed in 2024, but about 12 million (see Exhibit 1-6) or roughly a third less. This is in line with experience among other major west coast transit systems outside California without Fare-Free policies.

Research questions are posed next, which is followed by the research design that guides research used in this report.

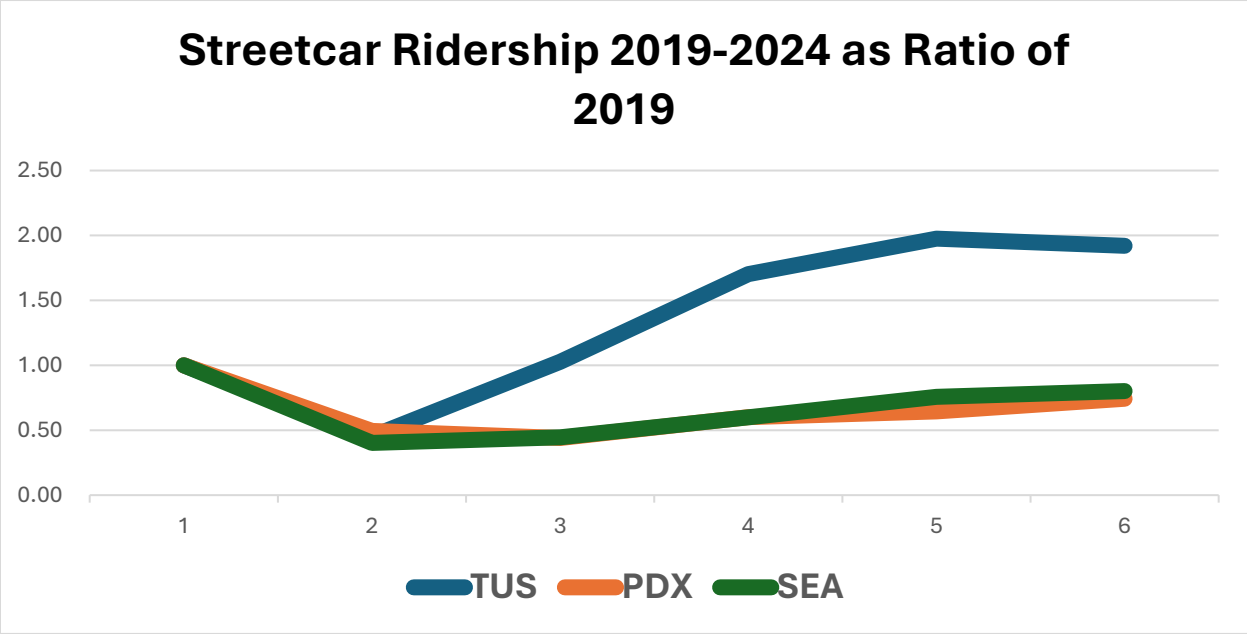
Exhibit 1-1
Pre-Post Pandemic Bus Ridership Among Selected Western US Metropolitan Areas, 2019-2024



Source: FTA data compiled by authors.

Note: Only Tucson has a universal free fare system. Salt Lake City has a hybrid free fare system that serves more riders proportionately than the other systems.

Exhibit 1-2
Pre-Post Pandemic Streetcar Ridership Among Western US Metropolitan Areas Over 1 Million Population Outside California, 2019-2024



Source: FTA data compiled by authors.

Exhibit 1-3
Tucson Bus Ridership Performance Compared to Western Metropolitan Areas over One Million Population Outside California, 2019-2024

Transit System	2019	2024	Ratio
Tucson	13,796,376	16,393,378	1.19
Denver	47,678,178	27,790,030	0.58
Las Vegas	65,528,910	54,188,827	0.83
Phoenix	37,694,025	25,040,711	0.66
Portland	57,374,350	39,702,464	0.69
Seattle	103,527,532	71,808,522	0.69
Composite*	311,802,995	218,530,554	0.70
Tucson Performance Ratio**			**1.70**

*Excludes Tucson.
** (Tucson 1.19 / Composite 0.70).
Source: FTA data compiled by authors.

Exhibit 1-4
Tucson Streetcar Ridership Performance Compared to Western Metropolitan Areas over One Million Population Outside California, 2019-2024

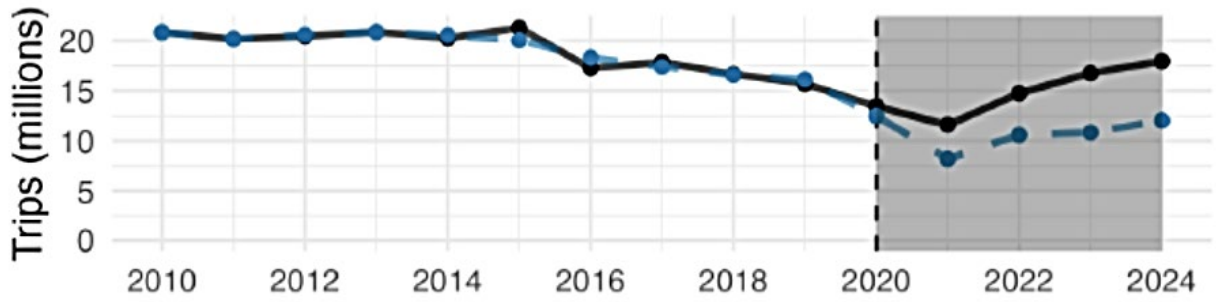
Streetcar System	2019	2024	Ratio
Tucson	873,142	1,676,443	1.92
Portland	4,097,594	3,041,937	0.74
Seattle	1,863,409	1,492,360	0.80
Composite	5,961,003	4,534,297	0.76
Tucson Performance Ratio			**2.52**

Source: FTA data compiled by authors.

Exhibit 1-5
Tucson Bus and Streetcar Ridership Combined Performance Compared to Western Metropolitan Areas over One Million Population Outside California, 2019-2024

Combined	2019	2024	Ratio
Tucson	14,669,518	18,069,821	1.23
Portland	57,374,350	39,702,464	0.69
Seattle	103,527,532	71,808,522	0.69
Composite	160,901,882	111,510,986	0.69
Tucson Performance Ratio			**1.78**

Exhibit 1-6
Actual Annual Unlinked Passenger Trips Pre- and Post-Fare Free Compared to Estimate of Post-Pandemic Ridership without Fare-Free



Note: Upper black line is actual Sun Tran bus ridership while the lower blue line is the estimated ridership without Fare-Free.
Source: Tyndall (2026).

Research Questions

Research into the outcomes of Tucson's Fare-Free policy will be addressed through these four questions:

1. Have the number and demographics of transit riders changed since free fares?

2. Have the number of jobs along transit corridors changed since free fares?

3. Has the amount of real estate development changed since free fares?

4. Have city tax and fee revenues changed significantly along transit corridors after free fares were implemented?

Research Design, Data, and Analytic Approach

Using descriptive statistics, this is a quasi-experimental longitudinal case study testing for ridership, fiscal, demographic, job, and development outcomes before and after free fares were implemented in 2020. Depending on data availability, the study period is 2019 through 2025. The study area is the city and its transit corridors.

Ridership data are provided by the city. Citywide fiscal data are provided by the City.

Property tax data are provided by the Pima County Assessor. These data are disaggregated into census blocks adjacent to transit routes and extending one-quarter of a mile outward from the centerline of transit routes. These data may be disaggregated into transit corridor segments as determined by the City. However, analysis of these segments will be scoped and analyzed later if needed.

Sales, use, hotel/motel, utility, and related data are provided by the City with cooperation from the state as needed. These data are provided for the blocks along transit corridors and the blocks out one-quarter of a mile from those corridors. These data may be disaggregated into transit corridor segments as determined mutually between City and State officials. However, analysis of these segments will be scoped and analyzed later if needed.

Demographic data are based on the census American Community Survey (ACS) of 2019 and 2024 for the City as a whole. An attempt to use 5-year ACS data comparing 2015-19 to 2020-24 confronted skewed data because of pandemic effects during most of the 2020-24 data collection period. However, City residential permitting data for 2019 to early 2026 were used to evaluate location trends along transit corridors and estimate population trends.

Job data was provided by the Longitudinal Employment-Household Dynamics (LEHD) database through the most recent year available. Data were collected for the City as a whole and disaggregated into census blocks along transit routes and adjacent to those blocks.

Using PAG's onboard surveys for 2019 and the City's on-board survey for 2025, overall changes in the demographic profile of riders before and after free fares will also be evaluated. This will be supplemented by American Community Survey citywide commuter demographics based on its 2015-2019 and 2020-2024 5-year surveys.

In review

- Among bus systems, Tucson gained the most riders since before COVID-19. Among bus systems in Denver, Las Vegas, Phoenix, Portland, Salt Lake City and Seattle, only Salt Lake City and Tucson recovered fully after COVID-19. Salt Lake City has a hybrid free-fare system in which hundreds of thousands of students, university workers, and others have free access to transit. Tucson is the only system with a fully fare-free system. It also outgained all bus systems in ridership increases.

- Only three streetcar systems have data available extending before, during and after the pandemic: Portland, Seattle and Tucson. Only Tucson implemented a free-fare streetcar policy, and it is the only system that recovered fully post-COVID 19.

Based on literature, the following ridership expectations should be associated with the Fare-Free policy:

- Overall ridership gains are expected.

- There should be an increase in "choice" riders who can choose between transit or the auto for mobility and would choose transit especially if fares were free. As they are added to the system, average household income of riders should increase.

- Increasing choice riders would also increase the number and share of White riders.

Research presented in this report provides only descriptive before-and-after analysis and is limited to overall trends without focusing on individual routes, though overall bus and streetcar trends will be included.

Chapter 2 begins analysis with a review of on-board surveys for 2019 and 2025. There are some surprises.

CHAPTER 2
ANALYSIS OF 2019 AND 2025 ON-BOARD SURVEYS

This chapter compares 2019 to 2025 transit on-board surveys. In 2019 before the pandemic and again in 2025 when the pandemic was officially declared to have ended, the Pima Association of Governments (PAG 2019) and the City of Tucson (Tucson 2025) conducted on-board surveys of streetcar (Sun Link) and bus (Sun Tran) systems. The 2019 survey was conducted during January and February of that year while the 2025 survey was undertaken in late January through late March. Survey details are presented in both reports. For 2019, there were 5,857 respondents while the 2025 survey included 10,424 respondents.[1]

This analysis addresses the association between fares that were waived during the pandemic and ridership outcomes with respect to age, race, gender, transportation disadvantage (without a driver's license or physically disabled), household vehicles present, income, and origins/destinations.[2] Only weekday analysis is done. For brevity of statistical exposition, all differences between 2019 and 2025 survey outcomes are significant at the 0.05 level of the two-tailed t-test.

Both surveys report distributions in percentages. This report converts many of them into ridership figures based on those percentages. This enables interpretation of the magnitude of change as well as analysis of the share of change associated with categorical changes. Annual ridership figures come from the Federal Transit Administration (FTA 2026).

Age

Exhibit 2-1 shows the distribution of riders by age group for 2019 and 2025 as well as the change in distribution. Key figures in the bottom part of the Exhibit are highlighted with the following implications for the Fare Free policy.

- Streetcar transit ridership increased substantially among the younger age groups dominated by 18-24 years of age, who are substantially college students.

- The reduction in bus riders in the same age group is anomalous. One reason may be students relocating from elsewhere around the city to the thousands of new student beds built along the streetcar line in recent years. Students who used to ride the bus now use the streetcar which helps account for the very large increase in streetcar riders in the same age group.

- Among other age groups, bus ridership rose substantially among riders between 25 and 54, accounting for 80 percent of the change and more than 2.7 million new passengers.

- The largest increase was among bus riders between 35 and 44 years of age, followed by riders aged 45 to 54.

In review, even excluding college-aged streetcar riders, ridership among most of the other age groups increased significantly since Fare-Free was introduced in 2020. Change in ridership based on gender are reviews next.

Exhibit 2-1
Change in Riders and Riders by Age, 2019 and 2025

2019 On-Board Survey

Rider Age	Streetcar	Bus	Combined
15 & Under	0.7%	2.3%	2.2%
16-17	1.0%	5.3%	5.0%
18-24	59.6%	18.1%	20.6%
25-34	13.6%	22.0%	21.5%
35-44	8.2%	15.7%	15.2%
45-54	4.1%	14.2%	13.6%
55-64	5.6%	13.7%	13.2%
65 and older	7.2%	8.7%	8.6%
Average	30.6	39.3	38.8

2025 On-Board Survey

Rider Age	Streetcar	Bus	Combined
15 & Under	0.6%	1.7%	1.6%
16-17	1.7%	4.7%	4.4%
18-24	56.3%	13.3%	17.3%
25-34	19.4%	21.2%	21.0%
35-44	7.7%	21.9%	20.6%
45-54	4.6%	15.3%	14.3%
55-64	4.2%	13.0%	12.2%
65 and older	5.6%	8.9%	8.6%
Average	29.8	40.6	39.6

Change 2019-2025 Onboard Survey

Rider Age	Streetcar	Bus	Combined	Change Share
15 & Under	3,947	(38,629)	(34,683)	-1%
16-17	19,768	39,281	59,049	2%
18-24	**423,445**	(316,825)	106,620	3%
25-34	**206,483**	**440,193**	**646,676**	**19%**
35-44	**57,488**	**1,424,119**	**1,481,607**	**44%**
45-54	**41,318**	**549,101**	**590,419**	**17%**
55-64	21,515	241,036	262,550	8%
65 and older	31,015	258,726	289,741	9%
Total Change	804,977	2,597,002	3,401,979	

Figures may not sum due to rounding.

Source: PAG 2019 and Tucson 2025 on-board surveys.

Race

Exhibit 2-2 reviews trends in ridership by race (White and Minority) with key findings highlighted. In review:

- Minorities accounted for 39 percent of the growth in streetcar riders and more than twice that, 79 percent, among bus riders, and 70 percent combined.

Next is a review of change in ridership by gender between 2019 and 2025.

Gender

Changes in ridership among females and males is reported in Exhibit 2-3. Although the 2025 survey allowed for multiple genders where the 2019 survey did not, alternative genders in 2025 were a very small share overall and were thus distributed proportionately to female and male genders to ensure comparability in analysis. Trends are:

- Female bus ridership held steady at about 5.7 million annual riders between 2019 and 2025, but male ridership grew significantly from about 8.1 million to 10.7 million, or about 2.6 million. Subject to further exploration, one reason may be that a higher share of female riders do not have access to cars than males and thus rely on transit for mobility, but with Fare-Free males, who may have more access to autos than females, decide to take transit instead of drive. Whether they would revert to driving if fares are reinstated is not known.

- The situation is different with streetcars as the share of female and male riders remained nearly the same, with females gaining a small share.

- Overall, considering both the streetcar and bus, females accounted for 12 percent of the 3.4 million ridership increase with males accounting for 88 percent.

Next, the change in riders with disabilities is reported.

Exhibit 2-2
Change in Riders by Race, White and Minority, 2019 and 2025

	2019 On-Board Survey		
Rider Race	**Streetcar**	**Bus**	**Combined**
Total Riders	873,142	13,796,376	14,669,518
Percent			
White	80%	71%	72%
Minority	20%	29%	28%
Number			
White	695,720	9,840,955	10,554,718
Minority	177,422	3,955,421	4,114,800
	2025 On-Board Survey		
Rider Race	**Streetcar**	**Bus**	**Combined**
Total Riders	1,676,443	16,393,378	18,069,821
Percent			
White	71%	63%	64%
Minority	29%	37%	36%
Number			
White	1,188,598	10,377,008	11,565,606
Minority	487,845	6,016,370	6,504,215
	Change 2019-2025 Onboard Survey		
Rider Race	**Streetcar**	**Bus**	**Combined**
Total Riders	803,301	2,597,002	3,400,303
Percent			
White	61%	21%	30%
Minority	**39%**	**79%**	**70%**
Number			
White	492,878	536,053	1,010,888
Minority	310,423	2,060,949	2,389,415

Number may not sum due to rounding.

Source: PAG 2019 and Tucson 2025 on-board surveys.

Exhibit 2-3
Change in Riders by Gender, 2019 and 2025

2019 On-Board Survey			
Rider Gender	**Streetcar**	**Bus**	**Combined**
Total	873,142	13,796,376	14,669,518
Percent			
Female	52%	41%	42%
Male	48%	59%	58%
Number			
Female	455,082	5,688,246	6,143,327
Male	418,060	8,108,130	8,526,191
2025 On-Board Survey			
Rider Gender	**Streetcar**	**Bus**	**Combined**
Total	1,676,443	16,393,378	18,069,821
Percent			
Female	52%	35%	36%
Male	48%	65%	64%
Number			
Female	878,456	5,661,377	6,539,833
Male	797,987	10,732,001	11,529,988
2019-2025 On-Board Survey Change			
Rider Gender	**Streetcar**	**Bus**	**Combined**
Total	803,301	2,597,002	3,400,303
Percent			
Female	53%	-1%	12%
Male	47%	101%	88%
Number			
Female	423,375	(26,869)	396,505
Male	379,926	2,623,871	3,003,798

Figures may not sum due to rounding.

Source: PAG 2019 and Tucson 2025 on-board surveys.

Ridership Disability

Ridership disability includes those without a driver's license and those with physical disabilities. However, there is some overlap that is not reported in the surveys as many physically disabled riders do not have a license. Comparisons between 2019 and 2025 are offered in Exhibit 2-4 with the following observations:

- The share of streetcar riders without a driver's license increased by 17 percent between 2019 and 2025, and by 11 percent for buses and overall, increase about 12 percent overall. The number of those riders increased significantly to about 135,000 for the streetcar and nearly 400,000 for bus. Even before Fare-Free, riders without driver's licenses may not have qualified for reduced fares.

- The share of disabled riders using the streetcar increased by 8 percent during the study period and for buses the increase was 13 percent. Their ridership increased by about 61,000 and 336,000 respectively, or nearly 400,000 overall.

Considering that the city's population grew by about 1.5 percent, the increase in transit riders who have no driver's license or who are disabled is impressive.

The number of vehicles present among rider households is reviewed next.

Number of Vehicles Present

One motivation for riding in transit is the lack of vehicles available to access locations. Another is that the availability of transit reduces the need for vehicles. While analysis is needed to tease out the association between vehicle present and transit ridership, overall trends between 2019 and 2025 are shown in Exhibit 2-5. The following observations are made with respect to the change in the number of transit riders in households with no or one vehicle:

- Among bus riders, those in households with no auto increased by 97 percent, nearly double, or more than 2.5 million riders between 2019 and 2025. The figure is far lower, about 2 percent, for riders in households with one auto. Combined, riders in households with no or one vehicle increased by about 2.6 million during the study period.

- Among streetcar riders, those in households with no or one vehicle increased by 88 percent (54 percent among those with no auto and 34 percent among those with one), or more than 700,000 riders.

These findings are remarkable in that it appears that transit riders are either eschewing autos in favor of using transit, or Fare-Free has made transit an economically viable alternative to auto, or both. Recall above where male ridership increased significantly, by more than 2.6 million. There is a coincidental though statistically unproven relationship between the increase in male bus riders and riders in households of no vehicle.

The association between Fare-Free and the income of riders is presented next.

Exhibit 2-4
Change in Riders by Disability, 2019 and 2025

	2019 On-Board Survey		
Rider Disability	**Streetcar**	**Bus**	**Combined**
Total	873,142	13,796,376	14,669,518
Percent			
Without License	19%	56%	54%
Physical Disability	3%	12%	12%
Number			
Without License	166,945	7,710,795	7,877,739
Physical Disability	28,028	1,663,843	1,691,871
	2025 On-Board Survey		
Rider Disability	**Streetcar**	**Bus**	**Combined**
Total	1,678,119	16,393,378	18,071,497
Percent			
Without License	18%	49%	46%
Physical Disability	5%	12%	12%
Number			
Without License	302,061	7,983,575	8,285,637
Physical Disability	89,108	1,999,992	2,089,100
	2019-2025 On-Board Survey Change		
Rider Disability	**Streetcar**	**Bus**	**Combined**
Total	804,977	2,597,002	3,401,979
Percent			
Without License	17%	11%	12%
Physical Disability	8%	13%	12%
Number			
Without License	135,117	272,781	407,897
Physical Disability	61,080	336,149	397,229

Figures may not sum due to rounding.

Source: PAG 2019 and Tucson 2025 on-board surveys.

Exhibit 2-5
Change in Riders in Households with No or One Vehicle, 2019 and 2025

	2019 On-Board Survey		
Vehicles Present	**Streetcar**	**Bus**	**Combined**
Total	873,142	13,796,376	14,669,518
Percent			
None	33%	55%	54%
One Vehicle	41%	28%	29%
Number			
None	290,669	7,571,451	7,862,120
One Vehicle	357,464	3,840,911	4,198,375
	2025 On-Board Survey		
Vehicles Present	**Streetcar**	**Bus**	**Combined**
Total	1,676,443	16,393,378	18,069,821
Percent			
None	43%	62%	60%
One Vehicle	38%	24%	25%
Number			
None	724,223	10,098,321	10,822,544
One Vehicle	633,695	3,885,231	4,518,926
	2019-2025 On-Board Survey Change		
Vehicles Present	**Streetcar**	**Bus**	**Combined**
Total	803,301	2,597,002	3,400,303
Percent			
None	54%	97%	87%
One Vehicle	34%	2%	9%
Number			
None	433,554	2,526,870	2,960,424
One Vehicle	276,231	44,320	320,551

Figures may not sum due to rounding.

Source: PAG 2019 and Tucson 2025 on-board surveys.

Vehicles Available for this Trip?

There is another way in which to address the availability of vehicles in a household using transit, and that is the availability of a vehicle that could have been used for a transit trip. This is shown in Exhibit 2-6 with the following outcomes:

- While in 2019 about 71 percent of streetcar riders had a vehicle they could have used for the trip, in 2025 that figure had fallen to about 38 percent. In effect, 97 percent of the change in streetcar trips between 2019 and 2025 were among riders who had no vehicle alternatives to make the trip. Of the more than 800,000 new streetcar trips during the study period, nearly 780,000 were among riders who had no vehicle alternatives.

- The situation is even more impressive among bus riders. In 2019, about 35 percent had a vehicle that could have been used for the trip, but this fell to about 11 percent in 2025. Mathematically, between 2019 and 2025, more than 3 million bus trips were taken by riders who did not have a vehicle available to make the trip.

Clearly, Fare-Free is associated with less dependence on autos for trips and indeed there is a significant increase in riders' dependence on transit for their mobility.

What follows is the change in incomes of riders by mode during the study period.

Exhibit 2-6
Is a Vehicle Available for This Trip?

2019 On-Board Survey			
Vehicles for Trip?	**Streetcar**	**Bus**	**Combined**
Total	873,142	13,796,376	14,669,518
Percent			
No	29%	65%	63%
Yes	71%	35%	37%
Number			
No	256,180	9,028,348	9,284,528
Yes	616,962	4,768,028	5,384,990
2025 On-Board Survey			
Vehicles for Trip?	**Streetcar**	**Bus**	**Combined**
Total	1,676,443	16,393,378	18,069,821
Percent			
No	62%	89%	87%
Yes	38%	11%	13%
Number			
No	1,033,192	14,639,287	15,672,478
Yes	643,251	1,754,091	2,397,343
2019-2025 On-Board Survey Change			
Vehicles for Trip?	**Streetcar**	**Bus**	**Combined**
Total	803,301	2,597,002	3,400,303
Percent			
No	97%	216%	188%
Yes	3%	-116%	-88%
Number			
No	777,012	5,610,938	6,387,950
Yes	26,289	(3,013,936)	(2,987,647)

Figures may not sum due to rounding.

Source: PAG 2019 and Tucson 2025 on-board surveys.

Income

Chapter 1 suggests that free transit fares will attract higher income riders. These are called "choice" riders because they have the choice of using transit or their automobile (or ride-hailing services). The expectation is that Tucson's Fare-Free policy will shift the profile of riders to higher incomes along with increases in ridership. But this is not the case, as seen in Exhibit 2-7. Key outcomes include:

- Adjusting for inflation between 2019 and 2025, the average household income of streetcar, bus, and combined riders ***fell***.

- Streetcars saw the largest proportionate decrease in income. This may be attributable to the large increase in college-age riders noted earlier.

- The reduction in the household income of bus riders is not expected. This is also seen in Chapter 3 which uses census data to compare 2019 to 2024.

There is another way to view this trend which is presented in Exhibit 2-8. Consider that in 2019, Tucson's median household income was $55,900 in 2025 dollars. [3] In 2025, the median household income was $61,693.[4] The average income for bus rider households was just 58 percent of Tucson's median household income in 2019, but this ratio ***fell*** to 46 percent in 2025. For streetcar and bus riders combined, the ratio fell from 60 percent in 2019 to 48 percent in 2025.

The overall conclusion is that contrary to expectations based on research, in Tucson the effect of the Fare-Free is to attract ***more lower income riders*** than higher income ones.
The final analysis presented in this chapter focuses on changes in origins and destinations between 2019 and 2025. This is followed by a summary of implications based on this chapter.

Exhibit 2-7
Riders by Income for 2019 and 2022, and Change in Riders

	2019 Onboard Survey		
Rider HH Income	**Streetcar**	**Bus**	**Combined**
Under $10,000	287,226	3,677,100	3,964,326
$10,000- $14,999	125,503	2,492,758	2,618,261
$15,000- $24,999	108,356	3,171,136	3,279,493
$25,000- $34,999	71,426	1,864,332	1,935,758
$35,000- $49,999	62,498	1,203,678	1,266,176
$50,000- $74,999	98,211	786,339	884,549
$75,000- $99,999	59,454	333,549	393,003
$100,000 or more	60,469	267,484	327,953
Total	873,142	13,796,376	14,669,518
CPI Adjusted 2025	**$42,271**	**$32,478**	**$33,363**
	2025 Onboard Survey		
Rider HH Income	**Streetcar**	**Bus**	**Combined**
Under $10,000	400,670	4,737,686	5,138,356
$10,000- $14,999	159,262	2,295,073	2,454,335
$15,000- $24,999	256,496	2,885,235	3,141,730
$25,000- $34,999	206,202	2,540,974	2,747,176
$35,000- $49,999	187,762	1,704,911	1,892,673
$50,000- $74,999	179,379	1,245,897	1,425,276
$75,000- $99,999	140,821	540,981	681,803
$100,000 or more	147,527	442,621	590,148
Total	1,676,443	16,393,378	18,071,497
Average 2025	**$39,153**	**$28,503**	**$29,489**

Figures may not sum due to rounding.

Source: PAG 2019 and Tucson 2025 on-board surveys.

Exhibit 2-8
Transit Rider Household Income Trends, 2019 to 2025 in 2025 Dollars

Mode	2019	2019 Ratio	2025	2025 Ratio
Median Income*	$55,900		$61,693	
Streetcar**	$42,271	76%	$39,153	65%
Bus**	$32,478	58%	$28,503	46%
Combined**	$33,363	60%	$29,489	48%

* ACS 1-year data for Tucson median household income 2019 and 2024 in 2025 dollars.
** PAG 2019 and Tucson 2025 on-board surveys average household income for streetcar, bus, and combined modes in 2025 dollars.
Source: PAG 2019 and Tucson 2025 on-board surveys.

Origin and Destination Trips

The Pima Association of Governments in 2019 and the City of Tucson in 2025 conducted on-board surveys of transit riders for the streetcar and bus systems.[5] On-board surveys capture respondents at one point in their trip who then reveal their trip origin (from where they came) and destination (where they are going). Survey results are reported in Exhibit 2-9 for origins and Exhibit 2-10 for destinations. These percentages cannot be converted into trip numbers because FTA data do not differentiate by trip location or purpose.

Analysis of on-board trends considers expansion of trips for other than home and work origins and destinations. As the number of total trips expands, the share of home- and work-related trips falls. It is thus not surprising that trips from/to work lost share for each mode and overall. Trips from home also lost share for both modes and overall but gained share for destinations on the bus as well as overall. One reason may be that with expanded use of transit serving more trip purposes, the destination home increases as a share of all destination trips.

The most interesting outcomes are with respect to other than home and work origins and destinations. Key changes are highlighted in Exhibits 2-9 and 2-10. Highlights are:

- Shopping-based trips increased significantly between 2019 and 2025. Despite the pandemic accelerating e-commerce trends, the use of transit for shopping grew. One reason may be the desire of people to engage in comparison shopping that is not easily substituted by online services. After all, more than 80 percent of all retail activity is not transacted online. [6]

- Using transit to dine out also increased significantly during the study period as both a destination and origin of transit trips. This was especially the case with the streetcar, but because it has many times more riders than the streetcar, the increase in the number of people using the bus to dine out is likely more than the increase for the streetcar.

- Using both modes for social visits also increased for both origins and destinations.

- Personal business trips, medically related, and recreation related trips increased as a share of origin trips but decreased as a share of destination trips. One reason may be that transit riders start out with one of those trips as the principal destination and then add other trips when those visits are finished.

Overall, Fare-Free is associated with expanded trip origins and destinations away from just home and work. This is an indicator of expanded mobility options for transit riders.

This chapter concludes with summary observations.

Exhibit 2-9
Trip Origins 2019 and 2025

	2019 On-Board Survey			2025 On-Board Survey			Percentage Change 2019-2025		
Origin	**Sun Link**	**Sun Tran**	**Combined**	**Sun Link**	**Sun Tran**	**Combined**	**Sun Link**	**Sun Tran**	**Combined**
Your HOME	41.19%	48.82%	48.37%	32.7%	46.2%	44.9%	-20.6%	-5.4%	-7.1%
Your usual WORKPLACE	10.70%	14.06%	13.86%	8.9%	10.7%	10.5%	-16.8%	-23.9%	-24.0%
Personal business (bank, mail)	**4.01%**	**8.09%**	**7.85%**	**4.0%**	**9.3%**	**8.8%**	**-0.2%**	**15.0%**	**12.2%**
Shopping	**2.56%**	**6.86%**	**6.60%**	**7.2%**	**11.0%**	**10.6%**	**181.3%**	**60.3%**	**61.2%**
College / University (students)	28.44%	4.13%	5.58%	21.6%	1.9%	3.7%	-24.1%	-54.0%	-33.1%
Social visit (friends, relatives)	**1.10%**	**5.39%**	**5.13%**	**3.1%**	**6.2%**	**5.9%**	**181.8%**	**15.0%**	**15.1%**
Medical appointment / doctor	**0.67%**	**3.77%**	**3.59%**	**1.3%**	**4.3%**	**4.0%**	**94.0%**	**14.1%**	**12.2%**
School K12 (students only)	0.81%	3.27%	3.12%	1.7%	2.5%	2.4%	109.9%	-23.5%	-22.3%
Dining out	**6.54%**	**1.48%**	**1.78%**	**15.8%**	**3.0%**	**4.2%**	**141.6%**	**102.7%**	**135.2%**
Recreation / Sightseeing	**1.52%**	**1.67%**	**1.66%**	**2.1%**	**2.8%**	**2.7%**	**38.2%**	**67.7%**	**64.7%**
Other business (meeting, delivery)	0.26%	1.57%	1.49%	0.3%	0.8%	0.8%	15.4%	-49.0%	-49.5%
Your Hotel	2.16%	0.16%	0.28%	0.9%	0.2%	0.3%	-58.3%	25.0%	-5.0%

Note: Only destinations accounting for with more than one percent of the respondents are included.

Source: PAG 2019 and Tucson 2025 on-board surveys.

Exhibit 2-10
Trip Destinations 2019 and 2025

	2019 On-Board Survey			2025 On-Board Survey			Percentage Change 2019-2025		
Destination	**Sun Link**	**Sun Tran**	**Combined**	**Sun Link**	**Sun Tran**	**Combined**	**Sun Link**	**Sun Tran**	**Combined**
Your HOME	36.91%	35.27%	35.37%	36.0%	39.4%	39.0%	-2.5%	11.7%	10.3%
Your usual WORKPLACE	9.89%	20.31%	19.69%	5.2%	12.7%	11.8%	-47.4%	-37.5%	-40.1%
Personal business (bank, mail)	5.20%	10.70%	10.37%	5.4%	9.5%	9.0%	3.8%	-11.2%	-13.2%
Shopping	**1.93%**	**7.22%**	**6.91%**	**6.7%**	**11.9%**	**11.3%**	**247.2%**	**64.8%**	**63.6%**
College / University (students)	30.29%	4.42%	5.96%	21.8%	3.2%	5.4%	-28.0%	-27.6%	-9.4%
Social visit (friends, relatives)	**2.48%**	**6.80%**	**6.54%**	**5.1%**	**7.9%**	**7.5%**	**105.6%**	**16.2%**	**14.6%**
Medical appointment / doctor	1.17%	4.56%	4.36%	1.3%	4.0%	3.7%	11.1%	-12.3%	-15.1%
School K12 (students only)	0.46%	4.13%	3.91%	0.7%	3.1%	2.8%	52.2%	-24.9%	-28.4%
Dining out	**4.67%**	**1.77%**	**1.94%**	**13.7%**	**2.8%**	**4.1%**	**193.4%**	**58.2%**	**111.1%**
Recreation / Sightseeing	3.18%	1.93%	2.00%	3.0%	2.7%	2.8%	-5.7%	39.9%	39.7%
Other business (meeting, delivery)	1.60%	1.74%	1.73%	0.3%	1.5%	1.4%	-81.3%	-13.8%	-19.2%
Your Hotel	1.28%	0.28%	0.34%	0.1%	0.1%	0.1%	-92.2%	-64.3%	-70.5%

Note: Only destinations accounting for with more than one percent of the respondents are included.
Source: PAG 2019 and Tucson 2025 on-board surveys.

Summary Observations

The 2019 and 2025 on-board surveys provide a snapshot of ridership change before and just after the Fare-Free policy. Highlights are:

- Of the 3.4 million new riders between 2019 and 2025, 2.7 million are attributable to riders between the ages of 25 and 54.

- About 80 percent of the increase in bus riders and 40 percent of the streetcar riders are minority.

- A surprise is that all the change in bus ridership is attributable to males while the number of female riders stayed about the same. On the other hand, female riders accounted for more than half of the total streetcar change.

- The number of transit riders without a driver's license or physically disabled increased by about 12 percent. A larger share, 17 percent, among streetcar riders compared to 8 percent among physically disabled while the change among bus riders was 11 percent for those without a license and 13 percent among physically disabled.

- About 97 percent of the change in riders is attributable to those who do not have a car, compared to 87 percent overall and 54 percent among streetcar riders.

- Even more impressive is that all new bus riders and transit riders overall, and 80 percent of the streetcar riders did not have a vehicle available to make their trip.

- Another surprise is that adjusting for inflation, the average household income of transit riders across both modes fell between 2019 and 2025.

- Lastly, the transit on-board surveys show significant increases in the share of riders who used transit for shopping, personal business, medical visits, dining out, and recreation.

The on-board surveys do not capture the extent to which economic activity has changed along transit routes. These are the subjects of future chapters.

Next, Chapter 3 will use the 1-year American Community Survey for the city as a whole to assess the nature of transit ridership change generally and with respect to demographic and economic features between 2019, before the pandemic, and 2024. It will also assess the extent to which the number of jobs accessed by transit has changed, which has important economic development implications.

CHAPTER 3
ANALYSIS OF AMERICAN COMMUNITY SURVEY COMMUTING DATA, 2019-2024

The American Community Survey (ACS) adds much more detail than the decennial census relating to demographics, economics, transportation, and other subjects. The ACS includes annual surveys ("1-year" surveys) for geographic units of more than 65,000 residents, such as Tucson, and 5-year surveys for geographies as small as "census block groups" (CBGs) which are comprised of about half a dozen to more than a dozen city blocks. This chapter uses the ACS 1-year surveys for 2019 (before the pandemic) and 2024 (afterward). The 5-year samples for 2015-2019 and 2020-2024 will be used later in this report for CBD analysis along transit routes.

Using the ACS for 2019 and 2024, this chapter identifies ridership trends overall and with respect to age, race and Hispanic ethnicity, income, vehicles present, commuting time, and jobs accessed by economic sector as well as land use type.

An attempt was made to compare the census block group-based ACS 5-year estimates of 2015-2019 and 2020-2024. However, because the pandemic affected three of the five survey sample years, 2020 through 2022, comparisons would not be reliable. On the other hand, inasmuch as more than three quarters of the city's population lives within one-half mile of a transit stop, the 2019 and 2024 ACS comparisons are reasonably representative of commuter riders.

Overall Commuting Trends

The pandemic changed much about where people work. This trend is inferred in Exhibit 3-1 which shows workers' mode to work for 2019 and 2024. It is important to note that despite the much-publicized rise of workers working from home, the vast majority of workers still work in a place outside the home (Peiser and Hugel 2022). Moreover, working from home as an option of the employer is limited to a few days per week, not usually full time. Using ACS data, workers working from home means those who work from home and no other place.

The following trends are noted:

- Although the number of workers increased by more than 15,000 or about 5.9 percent, the number of workers commuting via automobile fell by 0.1 percent while walking or biking to work fell by 22.4 percent.

- The number of workers using the bus in their commute to work increased by 2.8 percent, accounting for 1.1 percent of the total change in workers.

- By far the largest percentage change in modes is using the streetcar for the work commute, which increased more than five-fold (559 percent), accounting for 4.1 percent of the change in workers.

- A surprising change is the reduction in workers walking or biking to work, which fell by more than 22 percent.

- The most important workplace change is working from home, which more than doubled between 2019 and 2024. However, the share of workers working from home is a small fraction of all workers, being about 6 percent in 2019 and 12 percent in 2024.

Most of the analysis in this chapter focuses on those who commute to work. Trends in the age of workers who commute by mode are reviewed next.

Age

Exhibit 3-2 shows trends in the age of commuters by mode between 2019 and 2024. It also shows the average age of those who work from home for only 2024; 2023 is also included for them to see near-term trends. Details of changes in age by age category are reported in Exhibit 3-3. Key trends are:

- The average age of all commuters by auto and transit mode, and overall, fell between 2019 and 2024, meaning that transit riders are becoming younger.

- Although the average age of workers working from home is not reported by the census before 2023, age for 2023 is reported along with 20-24. It appears that as the age of commuters is falling, the age of those working from home is rising. The implication is that a larger share of the older workforce is working at home compared to younger workers.

- There is a bifurcation trend among younger workers who commute and those who work from home. Especially among transit riders, the younger age groups saw increases in ridership while older age groups saw substantially decreases. The trend is also evident among those who commute by auto, though it is less pronounced.

As a reminder, these are trends for only commuting to work by mode. Generally, less than 20 percent of all vehicle trips are for the commute to work.

Commuting Mode

Commuting via transit clearly gained riders among those younger than 45 years of age. A growing share of older workers are shifting to working from home. Is this a trend where younger professionals learn their trade and then shift to working from home? Or, are older professionals being forced by employment dynamics favoring younger and less expensive workers to reinvent themselves by working at home?

There is another dynamic. If more people work from home, when they move, many people may seek locations accessible to and thus use transit. This dynamic is addressed partly in a later section which reviews changes in the number of vehicles present.

The next section reviews change in White and Non-White transportation modes.

Exhibit 3-1
Commuting Mode Trends, 2019-2024

Mode	2019	2024	Change	Percent	Share
Total Workers	256,628	271,727	15,099	5.9%	
Auto	215,849	215,605	(244)	-0.1%	-1.6%
Bus	6,005	6,173	168	2.8%	1.1%
Streetcar	111	731	620	558.6%	4.1%
Walk/Bike	15,122	11,742	(3,380)	-22.4%	-22.4%
Other	3,678	3,857	179	4.9%	1.2%
Work Home	15,863	33,619	17,756	111.9%	117.6%

Source: American Community Survey, 1-year samples, 2019 and 2024, Table S08031.

Exhibit 3.2
Average Age of Workers by Commute Mode, 2019-2024

Mode	2019	2024	Change	Percent
Total	36.9	36.8	-0.1	-0%
Auto	37.2	36.4	-0.8	-2%
Transit	35.8	30.7	-5.1	-14%
Other	35.1	39.5	4.4	13%
Work Home 2024		43.0		
Work Home 2023		41.4		

Source: American Community Survey, 1-year samples, 2019 and 2024, Table S0802, for total workers. “Other” includes Taxi/ride-hailing, motorcycle, bicycle, or other means, and working from home.

Exhibit 3-3
Commuting Mode by Age Category Trends, 2019-2024

Numerical Change

Age Group	Total Change	Auto Change	Transit Change	Other Change (Mostly Work at Home Change)
Total	15,099	(244)	788	14,555
16 to 24 years	1	(181)	493	(310)
25 to 44 years	11,595	3,605	963	7,026
45 to 59 years	3,337	(1,625)	(561)	5,523
60+ years	182	(1,887)	(101)	2,169

Percentage Change

Age Group	Total Percent	Auto Percent	Transit Percent	Other Percent (Mostly Work at Home Change)
Total	5.9%	-0.1%	12.9%	42.0%
16 to 24 years	0.0%	0.0%	36.0%	-4.0%
25 to 44 years	11.0%	4.0%	39.0%	49.0%
45 to 59 years	5.0%	-3.0%	-31.0%	75.0%
60+ years	1.0%	-7.0%	-20.0%	51.0%

Source: American Community Survey, 1-year samples, 2019 and 2024, Table S0802, for total workers. “Other” includes Taxi/ride-hailing, motorcycle, bicycle, or other means, and working from home.

White/Non-White

Exhibit 3-4 explores changes in White, non-Hispanic and Non-White commuters by mode during the study period. Key trends include:

- Non-Whites accounted for 83 percent of the change in commuters between 2019 and 2024.
- They also accounted for 82 percent of the change in transit riders during this period.
- Intriguingly, the number of Non-Whites commuting via auto grew while Whites commuting via auto fell.
- In contrast, Non-Whites accounted for only 38 percent of the change in Other modes to work, which, based on the information above, is comprised completely of workers working from home.

Non-Whites are clearly dominating the local jobs market change, which is reflected in commuting trends. The last section of this chapter reports the change on occupations and economic sectors among workers commuting to work, showing a decided shift toward Non-Whites in most categories.

The next section assesses income trends among commuters.

Income

Income trends by mode are shown in Exhibit 3-5 with the following observations:

- Overall and for the auto commute mode, average household incomes rose in constant 2024 dollars from 2019 to 2024.
- This was not the case with transit where average household income fell.
- The average household income of workers working at home increased by 31 percent, with that group rising by far to the highest level among workers.

Like in Chapter 2, Exhibit 3-6 compares the change in average incomes relative to the city as a whole. The key interpretation is that the average household incomes of transit riders fell from about 70 percent of the average overall in 2019 to about 60 percent overall in 2024.

The next section addresses transit dependency indirectly based on the number of vehicles in the household by commute mode.

Exhibit 3-4
White/Non-White Transportation Mode Trends, 2019-2024

Mode	2019 White	2019 Non-White	2024 White	2024 Non-White	Change 2019-2024	Non-White Change	Non-White Share
Total	108,810	147,818	111,408	160,319	15,099	12,501	83%
Auto	89,406	126,443	82,814	132,791	(244)	6,348	100%
Transit	2,238	3,878	2,382	4,522	788	645	82%
Other	17,166	17,497	26,212	23,006	14,555	5,509	38%
Work Home			17,852	15,714			

Source: American Community Survey, 1-year samples, 2019 and 2024, Table S0802, for total workers. "Other" includes Taxi/ride-hailing, motorcycle, bicycle, or other means, and working from home.

Exhibit 3-5
Income Trends by Mode, 2019-2024

Mode	Income 2019*	Income 2024	Percent
Total	$36,535	$40,488	11.0%
Auto	$37,180	$39,945	7.0%
Transit	$26,668	$26,232	-2.0%
Other	$34,256	$44,865	31.0%
Work Home		$52,258	

*In 2024 dollars

Source: American Community Survey, 1-year samples, 2019 and 2024, Table S0802, for total workers. "Other" includes Taxi/ride-hailing, motorcycle, bicycle, or other means, and working from home.

Exhibit 3-6
Income Trends by Mode Relative to City Average Income, 2019-2024

Mode	Income Ratio 2019	Income Ratio 2024
Auto	1.0	1.0
Transit	0.7	0.6
Other	0.9	1.1
Work Home		1.3

Source: Adapted from American Community Survey, 1-year samples, 2019 and 2024, Table S0802, for total workers. "Other" includes Taxi/ride-hailing, motorcycle, bicycle, or other means, and working from home.

Number of Vehicles Present

This section addresses the number of vehicles present among households based on commute mode and working at home. Results are reported in Exhibit 3-7 with the following highlights:

- Among transit riders, although the share of households with no vehicles did not change much during the study period, the number of transit households with one vehicle increased appreciably. The interpretation is that Fare-Free shifted many households with one vehicle away from using the auto to commute to riding transit instead.

- Among households working from home, which comprise the entire change of "Other" workers based on analysis presented earlier, the share of such households with no or one vehicle fell between 2019 and 2024. There are two related interpretations:

    - First, as the number of households who work from home increases, the need for vehicles decreases. Hence, during the study period, work-at-home households with no or one vehicle increased from 38 percent to 45 percent.

    - Second, the availability of transit allows work-at-home households to substitute the use of transit for other purposes besides the journey-to-work . This was suggested in Chapter 2 where the number and share of trips for shopping, dining out, and social visits increased. This provides indirect evidence that work-at-home households may be attracted to locations with transit accessibility to expand their mobility options even if they have an automobile.

The change in time spent commuting is presented next.

Exhibit 3-7
Change in Vehicles Present, 2019-2024

Vehicles	Total 2019	Auto 2019	Transit 2019	Other 2019	
None	4.0%	1.5%	43.9%	12.8%	
One	29.6%	29.2%	27.2%	32.4%	
Total	33.6%	30.7%	71.1%	45.2%	
Vehicles	**Total 2024**	**Auto 2024**	**Transit 2024**	**Other 2024**	**Work at Home**
None	4.3%	2.1%	42.9%	8.7%	5.2%
One	28.4%	27.9%	40.7%	28.9%	30.6%
Total	32.7%	30.0%	83.6%	37.6%	35.8%

Source: Adapted from American Community Survey, 1-year samples, 2019 and 2024, Table S0802, for total workers. "Other" includes Taxi/ride-hailing, motorcycle, bicycle, or other means, and working from home.

Commute Time

Exhibit 3-8 summarizes interesting changes in commuting time by mode with the following implications:

- The commute time via auto stayed about the same while commute time among "Options" fell by about 16 percent because of the large shift of workers in this category working from home.

- Commute time for transit use fell dramatically, from an average of about 51 minutes to about 37 minutes or about 27 percent. There are two interpretations:

    - First, one reason may be the increase in jobs accessed by transit during the study period. This will be explored in the last section.

    - Second, Fare-Free may have encouraged more commuters to shift from the auto to transit for shorter commutes which would lower the overall average transit commute time. For instance, instead of driving a few minutes to one's workplace and incurring vehicle maintenance and perhaps parking costs doing so, using Free-Fare transit saves some vehicle costs and may add conveniences even if a few minutes are added to commuting time. The implication is that reinstating fares could move these choice riders back to the auto.

The last analytic section explores changes in occupations and jobs by economic sector among all commuters but with special reference to transit riders.

Exhibit 3-8
Change in Commuting Time by Mode, 2019-2024

Mode	Commute Time 2019	Commute Time 2014	Percent Change
Total	22.7	21.7	-4%
Auto	22.4	22.4	0%
Transit	51.2	37.2	-27%
Other	19.3	16.3	-16%

Source: Adapted from American Community Survey, 1-year samples, 2019 and 2024, Table S0802, for total workers. "Other" includes Taxi/ride-hailing, motorcycle, bicycle, or other means, and working from home.

Jobs

The last analytic section of this chapter explores the change in jobs accessed by commuters between 2019 and 2024. While Exhibit 3-9 shows jobs by two-digit economic sector,[7] the focus is on Exhibit 3-10 which assembles economic sectors into major land use categories for planning purposes. The following trends are observed:

Consider commuting to work via the auto. Since the pandemic, jobs in the retail sector have been challenged by online shopping and services while many office and service jobs have been displaced from physical locations to workers' homes. This is one explanation for the increase in working from home. This explains the reduction in jobs access by autos in these land use categories. On the other hand, leisure and institutional jobs often require the physical presence of workers such as restaurants, museums, and medical care. These land uses saw an increase in auto commutes during the study period.

Now consider working from home. From earlier analysis, it was shown that all the change in the "Other" commute mode is associated with those working from home. But it is not that they do such things as manufacture goods from their homes, for instance. Rather, these are employees or self-employed contract workers whose firms or clients are active in several economic sectors. They may provide research, design, accounting, marketing, and other analytic services for firms that operate out of facilities. Notably, work-from-home workers dominate the industrial land uses which are comprised of the economic sectors noted in Exhibit 3-9. They also dominate change in jobs in the office and service land use category and are prominent in the industrial land use category. For the most part, these workers can live anywhere. Many of them live along transit routes as they seek access to amenities that may not be as readily available elsewhere.

The change in workers accessing jobs via transit outnumbers jobs accessed by the auto during the study period. They concentrate in the leisure and institutional land use categories. Retail jobs accessed by transit also showed the only gain among the other modes. To some extent, the kinds of jobs accessed by transit are also the most suitable for transit service because they tend to locate at nodes along high-capacity transportation corridors.

The chapter concludes with guidance for research into economic and fiscal outcomes associated with transit service in Tucson.

Exhibit 3-9
Change in Jobs by Economic Sector by Mode, 2019-2024

Industry	Total Change	Auto Change	Transit Change	Other Change	LU
Total	15,627	187	789	14,651	
Agriculture, forestry, fishing, hunting, mining	(392)	(610)	(171)	526	
Construction	4,182	520	(31)	4,110	Ind
Manufacturing	6,869	3,443	153	3,383	Ind
Wholesale trade	(45)	(661)	35	690	Ind
Retail trade	(1,464)	(2,014)	92	(16)	Ret
Transportation and warehousing, and utilities	3,668	654	(128)	3,645	Ind
Information and finance and insurance, and real estate and rental and leasing	(5,706)	(4,374)	(409)	(624)	Off
Professional, scientific, management, and administrative and waste management	(5,540)	(4,190)	148	(1,982)	Off
Education, health care, social assistance	7,126	4,750	491	1,310	Ins
Arts, entertainment, recreation, accommodation, food services	272	1,598	512	(2,707)	Lei
Other services (except public administration)	(543)	(1,350)	64	810	Off
Public administration	6,582	2,943	34	4,140	Off
Armed forces	619	(521)	0	1,367	Ins

Nore: “LU” means land use assignment for Exhibit 3-10.
Source: Adapted from American Community Survey, 1-year samples, 2019 and 2024, Table S0802, for total workers. “Other” includes Taxi/ride-hailing, motorcycle, bicycle, or other means, and working from home.

Exhibit 3-10
Change in Jobs by Land Use Classification by Mode, 2019-2024

Land Use	Total Change	Auto Change	Transit Change	Other Change
Total	16,020	797	960	14,125
Industrial	14,674	3,955	28	11,827
Retail	(1,464)	(2,014)	92	(16)
Office, Services	(5,207)	(6,970)	(163)	2,344
Leisure	272	1,598	512	(2,707)
Institutional	7,745	4,229	491	2,677

Source: Adapted from Exhibit 3-9. Agriculture, forestry, fishing and hunting, and mining is excluded.

Chapter Summary and Guidance for Economic and Fiscal Research

ACS 1-year survey data for Tucson as a whole focuses on only the commute to work, which comprises less than 20 percent of all trips. In contrast, Chapter 2 is based on all transit trip purposes. It showed important changes in transit trips related to nonwork purposes such as shopping, education, dining out, and socializing. The sample size of about 600 is also smaller than the on-board surveys which ranged from over 6,000 in 2019 to more than 10,000 in 2025.

The literature review in Chapter 1 expected that Tucson's Fare-Free policy would increase ridership among higher income people and implicitly more Whites. With respect to commuting to work, census ACS analysis for 2019 and 2024 shows otherwise. Not only have non-White riders increased their share of ridership, but the average income of riders has fallen. These trends are like the on-board surveys.

Moreover, there is a bifurcation of uses as data show significant increase among commuters under 45 years of age and decreases among those who are older. However, the change is attributable mostly to large shifts in people over 45 years of age toward working from home and thus eliminating both auto and transit commutes.

The next chapter reviews the nature of residential development since the pandemic and fare-free and estimates the number of new residents occupying those units. This will be used in later chapters to estimate population-based revenue sharing value added associated with population growth along transit corridors.

Chapter 4
Residential Development and Population Growth Along Transit Corridors Since Fare-Free

This chapter summarizes residential development along bus, streetcar, and express bus corridors since 2019, just about the time fare-free was instituted in response to the COVID-19 pandemic. The analysis includes identifying the number of new single and multifamily residential units built during the study period. It also estimates the number of new residents. This information will be used later to estimate fiscal revenues associated with state and federal revenue sharing.

Data come from the Department of Planning and Development Services. They include the type of residential unit approved since 2019, geocoded to parcels. Only units for which a certificate of occupancy (CO) was issued are included in the analysis. New residential units are arranged as follows:

> **Transit Corridor** is defined as the city blocks fronting bus, streetcar or express bus routes or tracks plus the adjacent city blocks.
>
> **Rest of City** are all other city blocks.

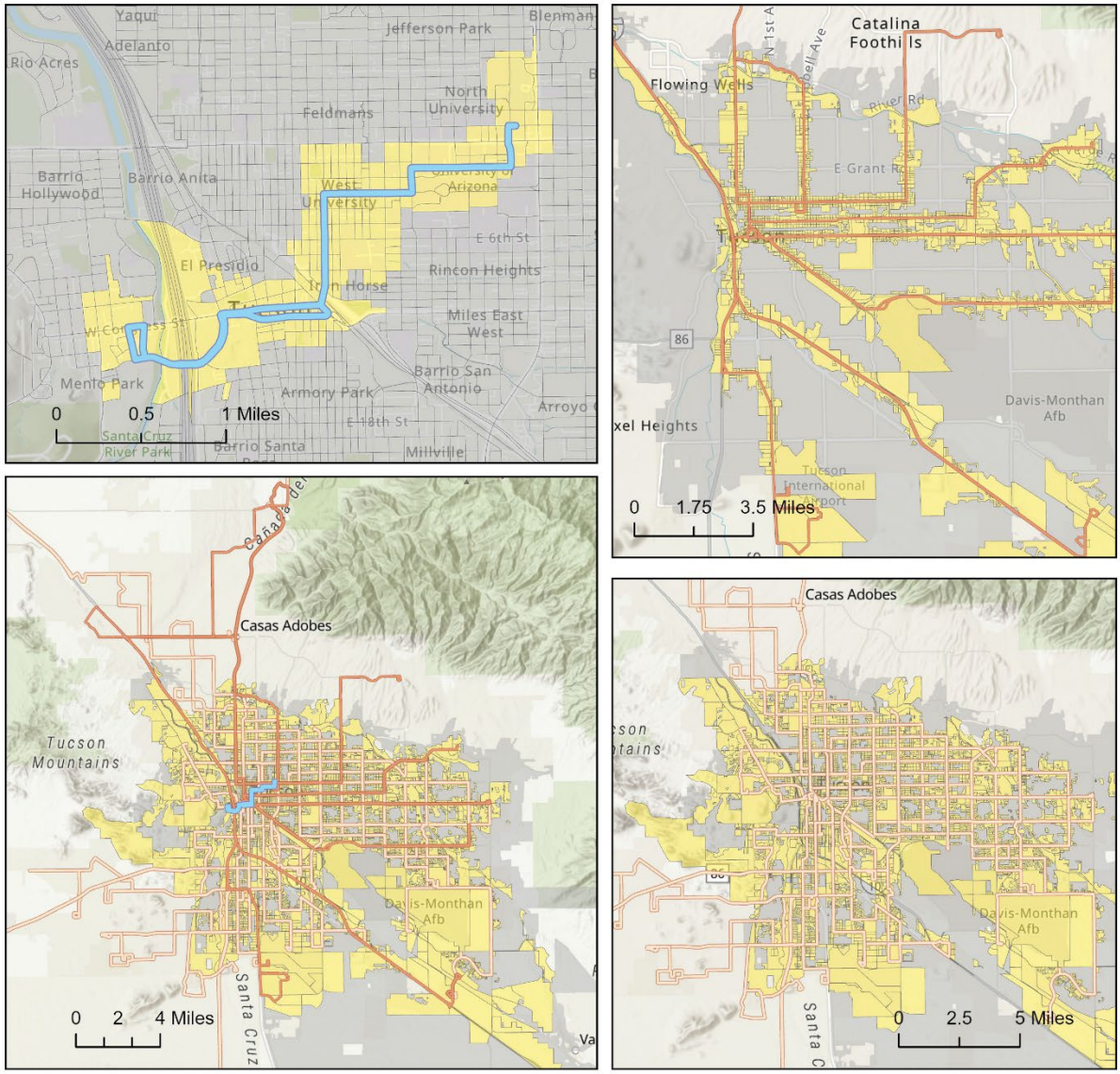
Exhibit 4-1 illustrates these tiers.

Data are divided into single family (SF) and multifamily (MF) units, but with qualifications. SF units include townhouses and "built to rent" detached units that are like single family detached homes but intended to be rented. Exhibit 4-2 illustrates the location of COs issued for SF and MF units with respect to combined transit tiers, though not the number of units associated with each CO.

Market values for new units are also included in the analysis. This was done as follows. Assessor data were joined to the permit address. In effect, each parcel gets one record from the assessor data. However, occasionally assessor records repeated permitted units on a parcel, so they were identified and removed to prevent double counting. Also, there were two variables for value: "Current FCV" and "Value." Often, one or the other of those figures did not make sense intuitively, such as a few thousand dollars for a completed single family unit. The higher figure of those two variables were used to estimate value.

Exhibits 4-3, 4-4 and 4-5 report results respectively for SF, MF, and combined residential units and values for each tier as well as the share of development occurring in each tier compared to the city. Key trends are noted below.

Exhibit 4-1
Transit Corridor and Half Mile Increment Tiers for Individual and Combined Modes



Tucson Transit Routes & Tiers

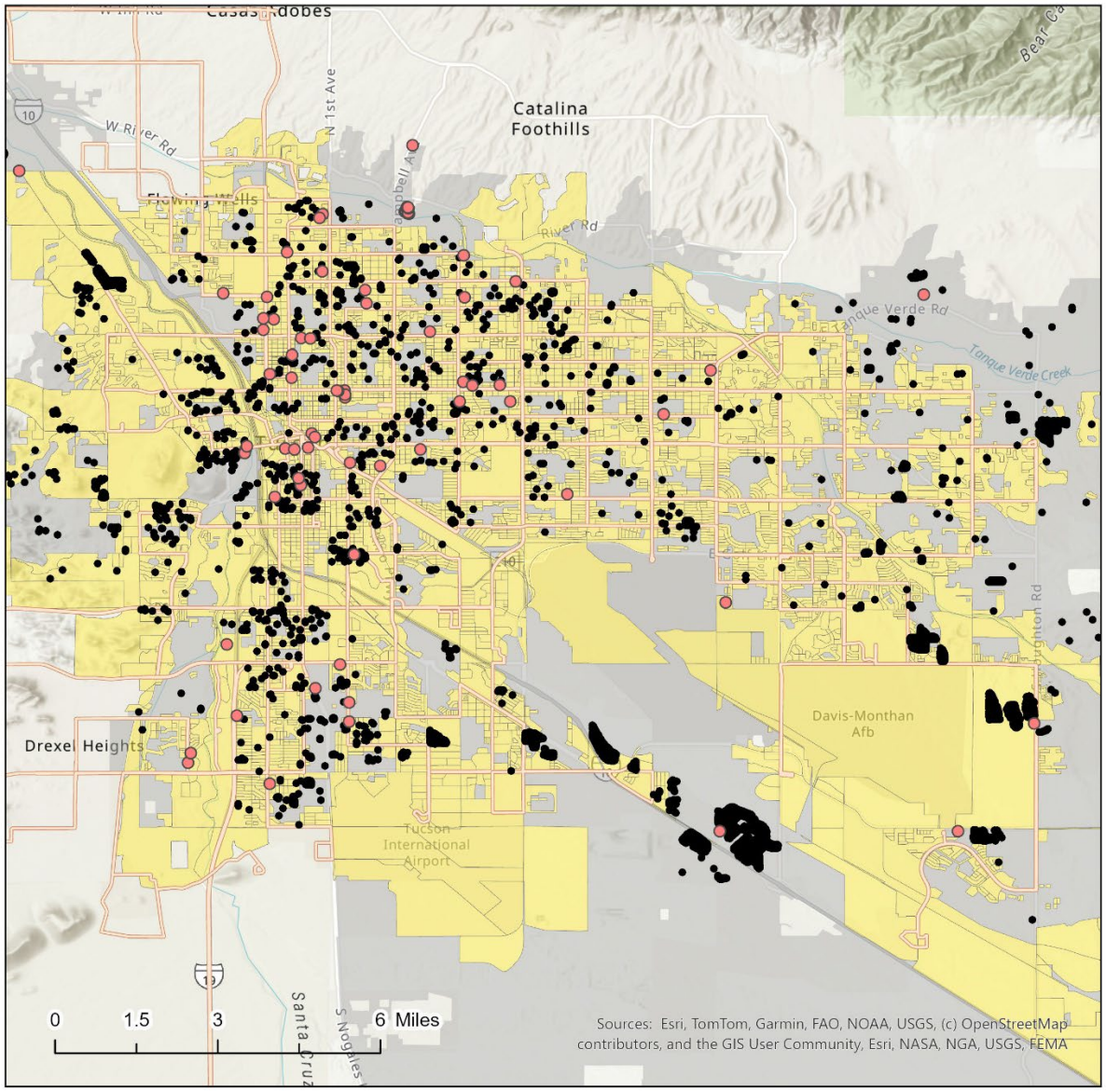
- Streetcar
- Express Routes
- Bus & Shuttle Routes
- Transit Corridors
- Balance

N
W E
S

Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community, Esri, NASA, NGA, USGS, Esri, CGIAR, USGS

Cartographer: Robert Hibberd

Exhibit 4-2
Location of Residential Developments Permitted by Combined Tier



New Housing Permits by Bus Tier

Cartographer: Robert Hibberd

- Multifamily Permits
- Single Family Permits
- Bus Corridor
- Balance
- Bus & Shuttle Routes

Exhibit 4-3
Post-2019 Single Family Units and Value for the Transit Corridor and Share of City

Units	**Bus**	**Streetcar**	**Express Bus**
Transit Corridor	1,435	26	1,192
City Total	1,836	1,836	1,836
Transit Corridor Share	78%	1%	65%
Residential Value Added	**Bus**	**Streetcar**	**Express Bus**
Transit Corridor	$376,422,444	$9,317,485	$278,584,850
City Total	$446,873,213	$446,873,213	$446,873,213
Transit Corridor	84%	2%	62%

Source: Authors' adaptation of DPDS residential permitting data since 2019 linked to assessor data.

Exhibit 4-4
Post 2019 Multifamily Units and Value for the Transit Corridor and Share of City

Units	**Bus**	**Streetcar**	**Express Bus**
Transit Corridor	1,545	484	1,415
City Total	1,545	1,545	1,545
Transit Corridor	100%	31%	92%
Residential Value Added	**Bus**	**Streetcar**	**Express Bus**
Transit Corridor	$320,807,328	88,776,000	$239,217,180
City Total	$320,807,328	$320,807,328	$320,807,328
Transit Corridor	100%	28%	75%

Source: Authors' adaptation of DPDS residential permitting data since 2019 linked to assessor data.

Exhibit 4-5
Post 2019 Residential Units and Value for Transit Corridors and Share of City

Units	**Bus**	**Streetcar**	**Express Bus**
Transit Corridor	2,980	510	2,607
City Total	3,381	3,381	3,381
Transit Corridor	88%	15%	77%
Residential Value Added	**Bus**	**Streetcar**	**Express Bus**
Transit Corridor	$697,229,772	$98,093,485	$517,802,030
City Total	$767,680,541	$767,680,541	$767,680,541
Transit Corridor	91%	13%	67%

Source: Authors' adaptation of DPDS residential permitting data since 2019 linked to assessor data.

- Because it serves the university, downtown, and other high intensity nodes, very few SF units were built along the streetcar corridor during the study period. On the other hand, despite comprising less than 1 percent of the city's land area, the streetcar corridor accounted for 31 percent of all new MF units. Overall, the streetcar corridor accounted for 22 percent of all new residential units and 15 percent of all new residential value.

- The express bus network connects much of the northern part of the city and certain other areas to downtown. Its transit corridor accounted for 92 percent of all new MF, 65 percent of all new MF units, and 77 percent of all new residential units. It also accounted for 75 percent, 62 percent, and 67 percent of the new MF, SF, and total residential value added, respectively.

- Not surprising though perhaps not known commonly, the bus corridor accounted for all (100 percent) of new MF units, 78 percent of new SF units, and 88 percent of all new residential units since 2019. It also accounted for 100 percent, 84 percent and 91 percent of the residential value added, respectively.

Exhibit 4-6 estimates the number of new residents associated with new units added since 2019. The multipliers used to do this are as follows:

- Market analysis indicates that SF units average 2.58 people per household[8] while the vacancy rate for SF units average 2 percent.[9] The effective number of people per SF household is 2.5284.

- For MF units, market analysis indicates that the average household size is 2.24 people[10] and the rental unit vacancy rate is about 9.0 percent.[11] The effective number of people per MF household is 2.0384.

- There is a special case of private sector student housing built near the University of Arizona along the streetcar corridor. During the study period, 161 units were built. At full occupancy, they have a maximum of four people per unit. The census enumerates them as city residents. Otherwise, to be conservative, the vacancy rate for rental units is assumed to be the same as for other rental units. The effective number of people per MF household is 3.64.

Overall, it is estimated that about 8,000 new residents have been added to the city since 2019. This method is consistent with the city's growth during the study period based on third party estimates showing that between 2019 and 2025, the city grew from 548,961[12] to 556,854[13] or nearly 8,000 people.

Exhibit 4-7
Estimated New Population by Transit System and Housing Type

SF @ 2.5284/HH	**Bus**	**Streetcar**	**Express Bus**
Transit Corridor	3,628	66	3,014
City Total	4,642	4,642	4,642
MF @ 2.0284/HH	**Bus**	**Streetcar**	**Express Bus**
Transit Corridor	2,821	658	2,556
City Total	2,821	658	2,821
UA @ 3.64/HH	**Bus**	**Streetcar**	**Express Bus**
Transit Corridor	586	586	586
City Total	586	586	586
Total Population	**Bus**	**Streetcar**	**Express Bus**
Transit Corridor	7,035	1,310	6,156
City Total	8,049	8,049	8,049
Population Share	**Bus**	**Streetcar**	**Express Bus**
Transit Corridor	87%	16%	76%

Source: Authors.

Summary Residential Growth and Residential Value Added Outcomes

Transit outcomes are often based on the half mile distance from transit stations or stops. However, to be conservative, this study is based on "transit corridors" which are comprised of the blocks fronting transit stops and routes or tracks, and adjacent blocks. In Tucson, three transit systems overlap the same space: bus, streetcar, and express bus. The bus system overlaps streetcar and express bus systems meaning that outcome analysis can focus on just its space. Analysis shows that the areas within the bus transit corridor added:

2,980 housing units or about 88 percent of the city's total change.
7,035 people or about 87 percent of the city's total change.
$697 million or about 91 percent of the city's total change.

The population change estimate will be used to calculate state and federal revenue sharing implications.

While this chapter assessed the association between transit proximity and change in housing units, people, and value added residential real estate, the next chapter will assess the change in jobs with respect to transit accessibility.

Chapter 5
Change in Jobs by Economic and Land Use Sector, 2019-2023

Overview

This chapter reports the change in jobs by major land use category between 2019 and 2023. Data come from the Longitudinal Employer-Household Dynamics (LEHD) program, which is part of the Census Bureau. The LEHD produces public-use data linking worker and employer information to create detailed, localized employment statistics. By combining state-provided Unemployment Insurance records with federal data, it offers insights into job flows, earnings, and worker demographics. The LEHD is a collaboration between the Census Bureau and state partners, including Arizona, covering over 97% of private sector employment. For Arizona, data are available at detailed geographic and industry levels, spanning 2004 to 2023, which is the most recent year available. Data are provided at the census block level, making it the most fine-grained geography for analysis.

The job analysis is based on the North American Industrial Classification System (NAICS) where the non-resource based economic sectors are grouped into 5 major land use categories, as shown in Exhibit 5-1. The analysis calculates the change in jobs between 2019 and 2023 for each of the land use categories for Tucson's bus and streetcar networks separately and then combined. The analysis arrays data by the following geographies:

- The **Stop** tier is comprised of census block where bus and streetcar **Stops** are located.
- The **Route** and **Track** tier is comprised of census blocks along a bus Route and streetcar Track excluding blocks with Stops.
- The **Stop + Route/Track** tier is comprised of Stop and Route/Track data.
- The **Adjacent** tier is comprised of census blocks adjacent to Stops, Routes, and Tracks.
- The **Quarter Mile** tier is comprised of census blocks extending a quarter mile from the centerline of Routes and Tracks excluding those as well as Stop and Adjacent blocks.
- The **Half Mile** tier is comprised of census blocks extending to a half mile outward from the centerline of Routes and Tracks excluding the prior tiers.
- The **Balance** tier is all the rest of the census blocks in the city limits.

Exhibit 5-2 reports results for the bus network while Exhibit 5-3 reports results for the streetcar network. There are some unavoidable overlaps between these exhibits. Notably, Exhibit 5-2 for buses includes bus stops and routes that operate within the streetcar right-of-way which also means that Exhibit 5-3 for streetcars includes streetcar stops and tracks that operate within bus routes. For this reason, Exhibit 5-2 can be considered outcomes for Tucson's transit system as a whole. Exhibit 5-3 is a subset of the city where streetcars and buses mutually operate. To control for this, Exhibit 5-4 subtracts Exhibit 5-3 from Exhibit 5-2 to limit the analysis to just buses, but this may undercount bus-only results somewhat.

Findings and implications complete this chapter.

Exhibit 5-1
Assignment of NAICS Economic Sectors into Major Land Use Codes

Sector	Definition	Land Use Category
11	Agriculture, Forestry, Fishing and Hunting	NA
21	Mining, Quarrying, and Oil and Gas Extraction	Industrial
22	Utilities	Industrial
23	Construction	Industrial
31-33	Manufacturing	Industrial
42	Wholesale Trade	Industrial
44-45	Retail Trade	Leisure
48-49	Transportation and Warehousing	Industrial
51	Information	Office
52	Finance and Insurance	Office
53	Real Estate and Rental and Leasing	Office
54	Professional, Scientific, and Technical Services	Office
55	Management of Companies and Enterprises	Office
56	Administrative and Support and Waste Management and Remediation Services	Office
61	Educational Services	Education
62	Health Care and Social Assistance	Health
71	Arts, Entertainment, and Recreation	Leisure
72	Accommodation and Food Services	Leisure
81	Other Services (except Public Administration)	Office
92	Public Administration	Office

Exhibit 5-2
Change in Jobs by Land Use Category for the Bus System, 2019-2023

2019 Jobs	Industrial	Office	Education	Health	Leisure	Total	
Bus Stop	12,031	40,910	18,172	35,532	39,211	145,856	
Bus Route	7,079	26,637	13,387	9,492	11,043	67,638	
Stop + Route	***19,110***	***67,547***	***31,559***	***45,024***	***50,254***	***213,494***	
Adjacent	1,400	4,812	182	1,192	2,223	9,809	
Quarter Mile	2,370	3,135	144	1,313	1,310	8,272	
Half Mile	1,483	2,194	347	553	595	5,172	
Balance	564	1,721	95	222	1,953	4,555	
Total City	24,927	79,409	32,327	48,304	56,335	241,302	
2023 Jobs	**Industrial**	**Office**	**Education**	**Health**	**Leisure**	**Total**	
Bus Stop	15,692	44,469	19,851	32,007	39,741	151,760	
Bus Route	6,753	24,348	12,772	14,873	13,069	71,815	
Stop + Route	***22,445***	***68,817***	***32,623***	***46,880***	***52,810***	***223,575***	
Adjacent	1,610	3,639	177	1,028	1,729	8,183	
Quarter Mile	1,938	2,360	417	1,723	1,148	7,586	
Half Mile	1,598	2,465	234	1,498	1,065	6,860	
Balance	800	3,431	264	200	948	5,643	
Total City	28,391	80,712	33,715	51,329	57,700	251,847	
2019-23 Jobs	**Industrial**	**Office**	**Education**	**Health**	**Leisure**	**Total**	**Share**
Bus Stop	3,661	3,559	1,679	(3,525)	530	5,904	56%
Bus Route	(326)	(2,289)	(615)	5,381	2,026	4,177	40%
Stop + Route	***3,335***	***1,270***	***1,064***	***1,856***	***2,556***	***10,081***	***96%***
Adjacent	210	(1,173)	(5)	(164)	(494)	(1,626)	-15%
Quarter Mile	(432)	(775)	273	410	(162)	(686)	-7%
Half Mile	115	271	(113)	945	470	1,688	16%
Balance	236	1,710	169	(22)	(1,005)	1,088	10%
Total City	3,464	1,303	1,388	3,025	1,365	10,545	

Note: This table includes streetcar track data.
Source: Authors' compilation of LEHD data.

Exhibit 5-3
Change in Jobs by Land Use Category for the Streetcar System, 2019-2023

2019 Jobs	**Industrial**	**Office**	**Education**	**Health**	**Leisure**	**Total**	
Streetcar Stop	462	7,103	20,530	1,250	1,606	30,951	
Track	1,312	1,917	27	341	1,476	5,073	
Stop + Track	***1,774***	***9,020***	***20,557***	***1,591***	***3,082***	***36,024***	
Adjacent	208	2,152	7	5,104	461	7,932	
Quarter Mile	161	3,764	157	307	911	5,300	
Half Mile	121	1,196	72	1,198	593	3,180	
Balance	22,663	63,277	11,534	40,104	51,288	188,866	
Total City	24,927	79,409	32,327	48,304	56,335	241,302	
2023 Jobs	**Industrial**	**Office**	**Education**	**Health**	**Leisure**	**Total**	
Streetcar Stop	549	7,223	20,348	2,063	1,761	31,944	
Track	1,456	2,397	465	146	1,480	5,944	
Stop + Track	***2,005***	***9,620***	***20,813***	***2,209***	***3,241***	***37,888***	
Adjacent	94	1,774	88	6,833	387	9,176	
Quarter Mile	153	3,779	137	187	935	5,191	
Half Mile	105	1,123	88	403	712	2,431	
Balance	26,034	64,416	12,589	41,697	52,425	197,161	
Total City	28,391	80,712	33,715	51,329	57,700	251,847	
2019-23 Jobs	**Industrial**	**Office**	**Education**	**Health**	**Leisure**	**Total**	**Share**
Streetcar Stop	87	120	(182)	813	155	993	9%
Track	144	480	438	(195)	4	871	8%
Stop + Track	***231***	***600***	***256***	***618***	***159***	***1,864***	***18%***
Adjacent	(114)	(378)	81	1,729	(74)	1,244	12%
Quarter Mile	(8)	15	(20)	(120)	24	(109)	-1%
Half Mile	(16)	(73)	16	(795)	119	(749)	-7%
Balance	3,371	1,139	1,055	1,593	1,137	8,295	79%
Total City	3,464	1,303	1,388	3,025	1,365	10,545	

Note: This table includes bus route data.
Source: Authors' compilation of LEHD data.

Exhibit 5-4
Change in Jobs by Land Use Category for the Bus System Subtracting the Streetcar System, 2019-2023

2019 Jobs	**Industrial**	**Office**	**Education**	**Health**	**Leisure**	**Total**	
Bus Stop	11,569	33,807	(2,358)	34,282	37,605	114,905	
Bus Route	5,767	24,720	13,360	9,151	9,567	62,565	
Stop + Route	***17,336***	***58,527***	***11,002***	***43,433***	***47,172***	***177,470***	
Adjacent	1,192	2,660	175	(3,912)	1,762	1,877	
Quarter Mile	2,209	(629)	(13)	1,006	399	2,972	
Half Mile	1,362	998	275	(645)	2	1,992	
Balance	564	1,721	95	222	1,953	4,555	
Total City	24,927	79,409	32,327	48,304	56,335	241,302	
2023 Jobs	**Industrial**	**Office**	**Education**	**Health**	**Leisure**	**Total**	
Bus Stop	15,143	37,246	(497)	29,944	37,980	119,816	
Bus Route	5,297	21,951	12,307	14,727	11,589	65,871	
Stop + Route	***20,440***	***59,197***	***11,810***	***44,671***	***49,569***	***185,687***	
Adjacent	1,516	1,865	89	(5,805)	1,342	(993)	
Quarter Mile	1,785	(1,419)	280	1,536	213	2,395	
Half Mile	1,493	1,342	146	1,095	353	4,429	
Balance	800	3,431	264	200	948	5,643	
Total City	28,391	80,712	33,715	51,329	57,700	251,847	
2019-23 Jobs	**Industrial**	**Office**	**Education**	**Health**	**Leisure**	**Total**	**Share**
Bus Stop	3,574	3,439	1,861	(4,338)	375	4,911	47%
Bus Route	(470)	(2,769)	(1,053)	5,576	2,022	3,306	31%
Stop + Route	***3,104***	***670***	***808***	***1,238***	***2,397***	***8,217***	***78%***
Adjacent	324	(795)	(86)	(1,893)	(420)	(2,870)	-27%
Quarter Mile	(424)	(790)	293	530	(186)	(577)	-5%
Half Mile	131	344	(129)	1,740	351	2,437	23%
Balance	236	1,710	169	(22)	(1,005)	1,088	10%
Total City	3,464	1,303	1,388	3,025	1,365	10,545	

Source: Authors' compilation of LEHD data.

Findings and Policy Implications

Overall, mathematically, nearly all (96 percent) new jobs between 2019 and 2023 located within bus/streetcar stops (56 percent) and blocks fronting the routes/tracks (40 percent). However, only 18 percent appears directly related to the streetcar with the balance of 78 percent attributable to bus service. Moreover, overall, job change was not associated with the adjacent tier, although for some major land uses there appears to be some effect.

Much of the reason for this is a self-fulfilling outcome where jobs are attracted to the very corridors transit operates because they are also where the traffic exists. Land use controls also steer job-related land uses to these corridors. Whether some of these new jobs arose because of Fare-Free cannot be determined causally, though the association does exist.

These outcomes apply to all major land use categories front bus routes and streetcar tracks. Beyond this direct connection to transit, job change is often negative for the bus the streetcar tiers outward. That is, the Stop and Route/Track tiers are the most robust in attracting new jobs than the other tiers.

The question arises about the wage level of new jobs. The NAICS job categories can be divided into higher-, middle- and lower-wage jobs, illustrated in Exhibit 5-5. Exhibit 5-6 shows the distribution of job changes by these wage categories for the bus and streetcar systems combined. A clear trend emerges across all tiers, which is that there were fewer higher wage jobs in 2023 than in 2019, and more middle- and lower-wage jobs. This aligns somewhat with chapters 2 and 3 that show new transit riders' average incomes were lower after Fare-Free than before. An addition, subtle observation is that transit stop and route/track corridors proportionately lost fewer higher-wage jobs than the rest of the city.

The next chapters address fiscal outcomes associated with the Fare-Free policy.

Exhibit 5-5
Assignment of NAICS Employment Sectors to Wage Categories

Table ES.6: Allocation of Workers by Lower-, Middle- and Upper-Wage Category

NAICS	Description	Mean Annual Wages, 2013	Wage Category	Share of Workers
44	Retail Trade	$25,779	Lower	
56	Administrative, Support, Waste Mgmt., Remediation	$35,931	Lower	
61	Educational Services	$35,427	Lower	
71	Arts, Entertainment and Recreation	$32,188	Lower	
72	Accommodation and Food Services	$17,453	Lower	
81	Other Services (except Public Administration)	$29,021	Lower	
	Weighted Mean Wages and National Share of Workers		***~$30,000***	***~33%***
48	Transportation and Warehousing	$45,171	Middle	
53	Real Estate and Rental and Leasing	$46,813	Middle	
62	Health Care and Social Assistance	$44,751	Middle	
92	Public Administration	$51,340	Middle	
	Weighted Mean Wages and National Share of Workers		***~$50,000***	***~33%***
22	Utilities	$94,239	Upper	
31	Manufacturing	$54,258	Upper	
42	Wholesale Trade	$65,385	Upper	
51	Information	$83,677	Upper	
52	Finance and Insurance	$88,677	Upper	
54	Professional, Scientific and Technical Services	$75,890	Upper	
55	Management of Companies and Enterprises	$105,138	Upper	
	Weighted Mean Wages and National Share of Workers		***~$70,000***	***34%***

Source: Adapted from County Business Patterns, 2013 by Arthur C. Nelson and Robert Hibberd, University of Arizona.

Exhibit 5-6
Change in Jobs Along Transit Corridors by Wage Category, 2019-2023

2019 Wage	**Upper Wage**	**Middle Wage**	**Lower Wage**	**Total**
Transit Stop	23,055	45,896	76,905	145,856
Transit Route	12,493	23,049	32,096	67,638
Stop + Route	35,548	68,945	109,001	213,494
Adjacent	4,073	2,373	3,363	9,809
Quarter Mile	3,130	2,140	3,002	8,272
Half Mile	2,335	1,163	1,674	5,172
Balance	676	732	3,147	4,555
Total City	45,762	75,353	120,187	241,302
2023 Wage	**Upper Wage**	**Middle Wage**	**Lower Wage**	**Total**
Transit Stop	23,196	47,513	81,051	149,892
Transit Route	11,247	28,745	31,823	71,170
Stop + Route	34,443	76,258	112,874	221,062
Adjacent	3,957	1,518	2,708	7,985
Quarter Mile	2770	2355	2461	7324
Half Mile	1970	2515	2375	6702
Balance	1040	767	3836	5590
Total City	44,180	83,413	124,254	248,663
2019-23 Wage	**Upper Wage**	**Middle Wage**	**Lower Wage**	**Total**
Transit Stop	141	1,617	4,146	4,036
Transit Route	(1,246)	5,696	(273)	3,532
Stop + Route	(1,105)	7,313	3,873	7,568
Share	***-15%***	***97%***	***51%***	
Adjacent	(116)	(855)	(655)	(1,824)
Quarter Mile	(360)	215	(541)	(948)
Half Mile	(365)	1,352	701	1,530
Balance	364	35	689	1,035
Total City	(1,582)	8,060	4,067	7,361
Share	***-21%***	***109%***	***55%***	

Source: Authors' compilation of LEHD data.

Chapter 6
Property Tax Revenue Change Since Fare-Free, 2019-2025

This chapter estimates the change in assessed value and non-exempt property value since Fare-Free was institute in 2020. It includes a review of the analytic approach, the research design and data, value added trends, and an estimate of the share of property taxes associated with the Fare-Free policy. Note is made that this is not a causal analysis as one cannot know whether and the extent to which the Fare-Free policy results directly in a change to property tax revenues.

Analytic Approach

This study estimates the change in assessed value overall and non-exempt property value between 2019, before the pandemic, through 2025, after Fare-Free was implemented in March 2020. This year was selected because it serves as the baseline before the pandemic. If analysis were to start in the depths of the pandemic, results may over-estimate the association between Fare-Free and development trends. By using 2019, before the policy was implemented, a conservative association can be drawn.

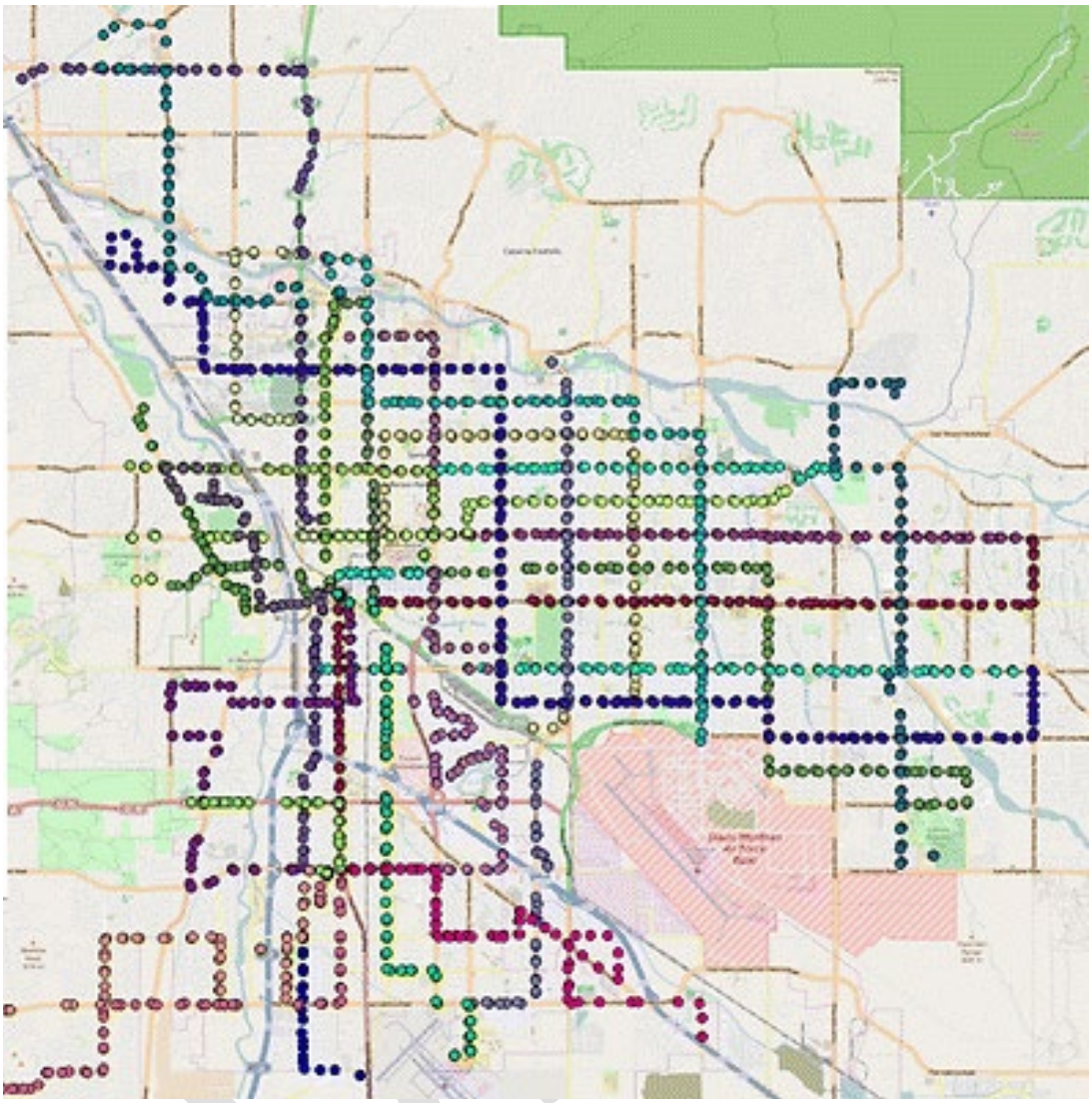
Separate analyses are done for the bus (see Exhibit 6-1), streetcar (Exhibit 6-2) and express bus (Exhibit 6-3) systems, and combined systems. Because bus and streetcar routes/tracks overlap in the streetcar service area, the combined analysis subtracts streetcar figures from the bus analysis. This will result in a slight underestimate of outcomes, further making the analysis conservative.

The analysis is limited to bus and streetcar corridors operating during the study period. These corridors are defined as:

> **Stop+Frontage** which includes all census blocks with a stop on or adjacent to it as well as all census blocks along the busway and streetcar track.
>
> **Adjacent** includes all census blocks adjacent to the Stop+Frontage blocks.
>
> **Cumulative** includes both geographies.

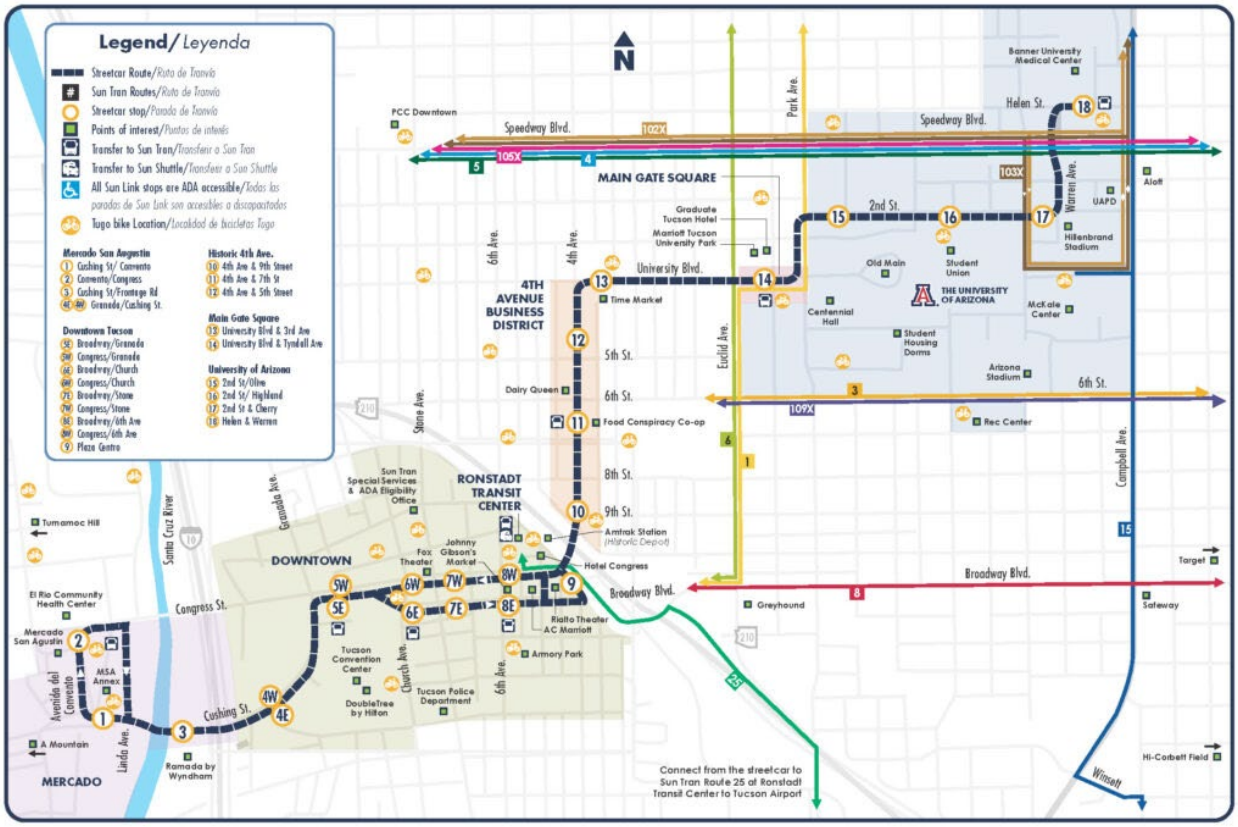
The research design and data are reviewed next.

Exhibit 6-1
Tucson Bus Route Map



Source. Tucson.

Exhibit 6-2
Tucson Streetcar Map with Stops



Source: https://www.suntran.com/routes-services/sunlink/

Exhibit 6-3
Tucson Express Bus Map

Source: https://gisdata.tucsonaz.gov/datasets/cotgis::sun-tran-express-bus-routes-open-data/explore?location=32.263021%2C-110.685791%2C9

Research Design and Data

This study is quasi-experimental, meaning that full scientific controls are not used to tease out the statistically meaningful effects of the Fare-Free policy considering all other factors. It is also a pre-post design since it evaluates conditions before and after an intervention occurs. Finally, the study is based on descriptive analysis. Future analysis can use parametric techniques to refine outcomes. Moreover, the analysis aggregates parcel-based assessor data into census blocks, which helps with analytic efficiency. Future analysis can include specialized studies relating to residential and nonresidential land use types, for which data have already been collected.[14] What follows is the analysis and a summary with implications.

Analysis of Value Added Trends

Exhibit 6-4 present results for all property including exempt property while Exhibit 6-5 report results for non-exempt property. Exhibit 6-6 shows the value added property taxes generated in 2025 along the bus and streetcar routes to the Quarter-Mile tier.

Total Assessed Value Findings

Key findings for total assessed value (Exhibit 6-4) include:

- Between 2019 and 2025, property value along the bus Stops and Frontage corridors increased Tucson's entire assessed value by 50 percent, or more than $13 billion, in 2025 dollars. The Adjacent and Quarter-Mile corridors added another 11 percent and 10 percent, respectively, to 71 percent or nearly $19 billion. This is not unexpected given the City's extensive bus network combined with policies that steer multi-family and nonresidential development to transit corridors.

- During the study period, the streetcar Stop + Frontage corridor added more than $1 billion in property value while the Adjacent and Quarter-Mile corridors added about $160 million each, respectively, for a total of more than $1.3 billion. These corridors account for about 1 percent of the total land area of the city.

- The express bus system, which overlaps both, is associated with a nearly $6 billion increase in assessed value with the adjacent and quarter mile tiers adding $2.3 billion and $3.6 billion. These tiers accounted for nearly $14 billion or 53 percent of the entire change in the City's assessed value.

- The bus system, minus the streetcar system, estimates transit system outcomes to control overlaps between all three systems. The transit systems added more than $12 billion to the City's property value between 2019 and 2025, or about 46 percent. The Adjacent and Quarter-Mile corridors added $2.8 billion and $2.5 billion, respectively, for a total of more than $17 billion, thus accounting for about two-thirds (66 percent) of the City's property value growth.

Non-Exempt Assessed Value Findings

Key findings for non-exempt assessed value (Exhibit 6-5) are:

- During the study period, 2019 and 2025, non-exempt property value along the bus Stops and Frontage corridors increased Tucson's non-exempt assessed value by 73 percent, or more than $13.6 billion, in 2025 dollars. The Adjacent and Quarter-Mile corridors added another 15 percent ($2.8 billion) and 14 percent ($2.6 billion), respectively. In effect, the increase in non-exempt property value within the Quarter-Mile bus corridors accounted for all of the City's $19 billion increase in non-exempt value.

- Between 2019 and 2025, the streetcar Stop + Frontage corridor added nearly $740 million to the City's non-exempt property value. It is less than the total increase in assessed value along this corridor because of large public, tax-exempt investments since 2019. Nonetheless, including the $165 million added to the Adjacent corridor and nearly $260 million added to the Quarter-Mile corridor, more than $1.2 billion in non-exempt property value was added to the City from the streetcar system. For perspective, the streetcar system added about 6 percent to the City's non-exempt property value despite being on about 1 percent of the total land area of the city.

- Over the study period, the express stop and frontage, adjacent, and quarter mile tiers added non-exempt values of about $10.7 billion, $2.2 billion and $3.5 billion, respectively. They accounted for about 88 percent of the City's increase in non-exempt property value, or about $16.4 billion.

- Combining, the transit systems added nearly $13 billion to the City's property value between 2019 and 2025, or nearly 70 percent. The Adjacent and Quarter-Mile corridors added $2.7 billion and $2.3 billion, respectively, for a total of nearly $18 billion, thus accounting for nearly all (96 percent) of the City's property value added.

Because it is not possible to determine the counter-factual that addresses Free-Fare effects or even transit effects, these results are only associative. One way in which to test the robustness of the analysis is to reduce or eliminate transit or reinstate fares. That would create conditions for a true scientific study into the social and economic benefits of transit and Fare-Free.

An estimate of the value added property tax revenues is explored next, noting the earlier caveats.

Exhibit 6-4
Change in Total Assessed Value of Property Along Transit Corridors, 2019-2025

Bus Corridor	**Assessed Value Added 2019-2025**	**Change Share**
Stop & Frontage	$13,137,238,972	50%
Adjacent	$2,913,023,775	11%
Cumulative	$16,050,262,747	61%
City Total	$26,500,928,388	
Streetcar Corridor	**Assessed Value Added 2019-2025**	**Change Share**
Stop & Frontage	$1,006,913,146	4%
Adjacent	$156,989,132	1%
Cumulative	$1,163,902,278	4%
City Total	$26,500,928,388	
Express Corridor	**Assessed Value Added 2019-2025**	**Change Share**
Stop & Frontage	$7,915,353,089	30%
Adjacent	$2,384,669,070	9%
Cumulative	$10,300,022,159	39%
City Total	$26,500,928,388	
Transit Corridor	**Assessed Value Added 2019-2025**	**Change Share**
Stop & Frontage	$12,130,325,827	46%
Adjacent	$2,756,034,643	10%
Cumulative	$14,886,360,470	56%
City Total	$26,500,928,388	

Source: Adapted from Pima County Assessor using data acquired February 2026.

Exhibit 6-5
Change in Non-Exempt Assessed Value of Property Along Transit Corridors, 2019-2025*

Bus Corridor	**Non-Exempt Value Added 2019-2025**	**Change Share**
Stop & Frontage	$13,627,991,992	73%
Adjacent	$2,856,570,675	15%
Cumulative	$16,484,562,667	89%
City Total	$18,619,105,447	
Streetcar Corridor	**Non-Exempt Value Added 2019-2025**	**Change Share**
Stop & Frontage	$736,505,600	4%
Adjacent	$165,771,735	1%
Cumulative	$902,277,335	5%
City Total	$18,619,105,447	
Express Corridor	**Non-Exempt Value Added 2019-2025**	**Change Share**
Stop & Frontage	$10,748,307,337	58%
Adjacent	$2,184,129,111	12%
Cumulative	$12,932,436,448	69%
City Total	$18,619,105,447	
Transit Corridor	**Non-Exempt Value Added 2019-2025**	**Change Share**
Stop & Frontage	$12,891,486,391	69%
Adjacent	$2,690,798,939	14%
Cumulative	$15,582,285,330	84%
City Total	$18,619,105,447	

*Total non-exempt assessed value in early 2026 was $65,967,285,344.
Source: Adapted from Pima County Assessor using data acquired February 2026.

Property Tax Value Added Estimates

The discussion in Chapter 1 found that Tucson's Fare-Free policy has two beneficial outcomes. First, by preserving ridership, it can preserve transit-related value-added property tax revenues. That is, given that riders using transit are the reason why real estate is more valuable near transit than farther away, if ridership falls then transit's influence on value will likely fall. Tucson's Fare-Free policy thus has a value-added real estate value preservation effect that translates into preserving property taxes. Second, when ridership continues to increase even as it falls in other metropolitan areas, there is a value added effect that is on top of the preservation effect.

Unfortunately, there is no research into these two effects on real estate value. Circumstantial information bolsters these expectations, nonetheless. Consider downtown vacancy rates. An AI query generated downtown office vacancy rates for Denver, Phoenix, Portland, Seattle and Tucson in 2019 and 2025 (second through fourth quarters—Q2, Q3 and Q4).[15] The first three downtowns saw dramatic increases in vacancy rates since 2019, driven by the COVID-19 pandemic. This led to remote work and other factors resulting in high vacancy rates in 2025. Tucson, conversely, maintained a much tighter, more stable, though gradually increasing, office vacancy rate driven by healthcare demand.[16] Exhibit 6-6 shows results. More details are offered below.

Downtown Denver
- **2019:** Vacancy was relatively stable, with total downtown vacancy at 16.5% at the end of 2019.
- **2025:** Downtown Denver's office vacancy rate grew to a record 38.2% by Q4 2025. Much of the downtown submarket in 2025 was more than 40% empty.

Downtown Phoenix
- **2019:** The vacancy rate for office properties was approximately 16.4%, showing relative stability just before the shift to remote work.
- **2025:** The Phoenix office vacancy rate was approximately 27.5% in Q2 2025.

Downtown Portland
- **2019:** Portland's office market was stable, with vacancy around 10–12%.
- **2025:** The downtown direct vacancy rate reached 34.7% in Q4 of 2025, a record high. The market has experienced 12 consecutive quarters of rising vacancies.

Downtown Seattle
- **2019:** Vacancy was considered healthy by market standards, below 15%.
- **2025:** The downtown office vacancy rate hit a record high of 35.6% in Q4 of 2025, up from 32.3% at the end of 2024.

Downtown Tucson
- **2019:** Vacancy was lower than major metros, with steady demand.
- **2025:** Tucson's office market experienced a slight uptick in vacancy as it reached 10.2% in Q3 2025. While rising only modestly, this is significantly lower than the other west coast/mountain metros.

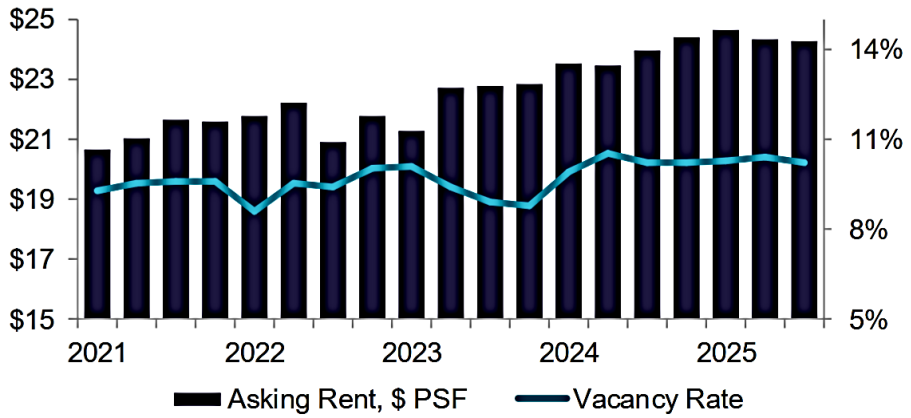
Exhibit 6-7 illustrates Tucson's citywide office vacancy trends from the depth of the pandemic in 2021 to the end of 2025.

Exhibit 6-6
Downtown Office Vacancy Rates for Selected Cities, 2019 and 2025

City	2019 Vacancy	2025 Vacancy	Percent Change*	Trend
Denver	10.7%–16.5%	38.2% (Q4)	181%	Severe increase
Phoenix	16.4%	27.5% (Q2)	68%	Substantial Increase
Portland	10%–12%	34.7% (Q4)	215%	Record high
Seattle	11%–15%	35.6% (Q4)	174%	Record high
Tucson	8%–9%	10.2% (Q3)	19%	Modest increase

*Percent change based on midpoint in 2019.
Source: AI query substantiated by authors (see text).

Exhibit 6-7
Tucson Citywide Rent and Vacancy Rate, 2021 through 2025



Source: Cushman & Wakefield as reported in https://www.picor.com/wp-content/uploads/2025/11/Tucson_Americas_Alliance_Marketbeat_Office_Q32025_FINAL.pdf.

Tucson may be nearly alone in having consistently low office vacancies since the pandemic. Why? There are many reasons but one may be that Fare-Free induced some workers to choose to work in the office rather than home, including choosing transit over commuting to work via car, a small but not trivial trend noted in the on-board surveys (see Chapter 2). This reason cannot be over-stated, but Tucson is alone among the selected metropolitan areas for having a Fare-Free policy and having more transit riders in 2025 than in 2019. Indeed, as of 2025, the other metropolitan areas averaged about 30 percent fewer transit riders than before the pandemic.

Informal surveys of commercial real estate links indicate that downtowns have lost billions of dollars in market value since 2020, with Tucson being an exception. It is important to note, however, that other sectors have fared much better since the pandemic, especially retail and warehousing.

The foregoing serves as the context for assessing the change in real estate values along transit corridors. Exhibit 6-8 distills information from prior exhibits to show the incremental change on non-exempt property value for each mode from 2019 through 2025. It shows the incremental non-exempt value and estimated property taxes for each mode.

In addition to the increase in value, an adjustment is made that is called the "Transit Proximity Premium Percent." It reflects the share of property value attributable to transit proximity by mode. For instance, research for Tucson shows that commercial property located on streetcar routes are worth about 40 percent more because of streetcar accessibility, holding all other factors constant (Nelson and Hibberd 2025). This is called the proximity premium. For express buses, the proximity premium is assumed to be 20 percent, which is about same as found for bus rapid transit (BRT) systems that appear similar in route design as Tucson's express bus system (Nelson and Hibberd 2024). The problem is that because there is no direct research on what the premium is for express buses, BRT research is used as a proxy. Lastly, a 10 percent premium is assigned to regular bus stop proximity where stops are not otherwise assigned to express buses. There is no research into what the bus stop proximity premium is, however. Future research can use Tucson as a case study to estimate it. In the meantime, 10 percent is assumed to be a reasonable benefit.

Increments are defined as follows with associated results:

- The streetcar increment is the baseline from prior exhibits. The streetcar system nearly perfectly overlaps with express bus and bus systems. Because taxes are assessed on only non-exempt property, Exhibit 6-8 does not show the full extent of change in property value along the streetcar corridor. Combined with more than $1.1 billion in exempt property value, the streetcar corridor's real estate value increased by more than $2 billion since 2019. With a streetcar proximity premium of 40 percent, about $373,000 in incremental property taxes are assigned to the streetcar system.

- The express bus increment includes stops that are not solely streetcar or regular buses. It gained about $12 billion in real estate value since 2019. With a 20 percent proximity premium, the express bus mode is estimated to generate an increment of about $2.7 million in property taxes.

- Regular buses are the residual after accounting for streetcar and express bus stops. It accounts for about $3.5 billion in incremental transit corridor property value. Assuming a 10 percent proximity increment, it generates about $1.7 million in property taxes.

Exhibit 6-8
Estimated Value-Added Property Taxes Associated with Fare-Free

Corridor Mode	Transit Incremental Change 2019-2025	Transit Cumulative Change 2010-2025	Transit Proximity Premium Percent	Transit Proximity Premium Amount	Property Tax Premium 2025** @ 1.0345 Mils
Streetcar	$902,277,335	$902,277,335	40%	$360,910,934	$373,362
Express Bus	$12,030,159,113	$12,932,436,448	20%	$2,586,487,290	$2,675,721
Bus	$3,552,126,219	$16,484,562,667	10%	$1,648,456,267	$1,705,328
Transit Corridor	$16,484,562,667			$4,595,854,490	**$4,754,411**
City Total	$18,619,105,447			Corridor Taxes =	**$17,053,280**

*Millage rate of 1.0345, or $1.0345 per $1,000 valuation from https://www.tucsonaz.gov/files/sharedassets/public/v/1/bsd/documents/finance-documents/r23934.pdf

**Although the analysis is based on data into February 2026, the year 2025 is used for discussion.

Source: Created by authors from Assessor data.

- Combined, after eliminating double-counting, the transit proximity premium approaches $5 million per year ($4.8 million).

There are broader perspectives, however:

- Property taxes along transit corridors increased by $17,053,280, for 2025. In review, transit corridors are defined narrowly as only the city blocks fronting bus routes and streetcar tracks, and the city blocks adjacent to them. In contrast, many studies include fiscal benefits up to one-half mile away.

- Research shows that without Fare-Free, transit ridership would drop by about one third. In other cities without Fare-Free, property values downtown and elsewhere fell by billions of dollars and property tax revenues would have fallen accordingly. Fare-Free is associated with increased ridership that enhances nearby property value that not only preserves the pre-pandemic property tax bases but expands it. Put differently, without Fare-Free, there is some evidence to suggest that none of the new property taxes occurring along transit corridors would have materialized.

- The "direct transit premium property taxes" reflect only the narrow, direct value that transit proximity confers on the city fiscal structure. In the absence of the Fare-Free policy and considering the effect of reduced transit ridership on property values elsewhere, this fiscal benefit exists substantially because of Fare-Free.

More sophisticated analysis is needed to tease this out more precisely. On the other hand, it is a reasonable estimate of Fare-Free benefits if one assumes that without Fare-Free, ridership would be reduced and along with it much if not all the increase in property values along transit corridors.

Summary and Implications

From Chapter 2, it appears that Fare-Free is associated with about 23 percent more riders in 2025 than in 2019, despite essentially flat overall population growth. Fron Chapter 1, it is noted that transit systems that did not waive their fares still lag in the range of one-third below their pre-pandemic ridership. It appears that Tucson's Fare-Free not only prevented a similar outcome but increased ridership. In effect, the Fare-Free policy preserved ridership and implicitly preserved real estate property values along transit corridors *and* added hundreds of thousands of new riders.

Analysis focused on changes at census blocks and blocks directly fronting routes and tracks, and the next blocks adjacent to those. The analysis is conservative because it does not extend out to one-half mile as many other studies do. Key trends are:

- Non-exempt property value along the transit corridors increased by more than $16 billion and accounted for more than 90 percent of the city's entire increase in non-exempt property value.

- In 2025, the bus and streetcar corridors were responsible for more than $16 million in property tax revenue of which nearly $5 million is based on the transit proximity premium.

The caveat is that this is a revenue analysis that does not consider costs of serving new development. On the other hand, if existing facilities have excess capacity, these costs could be quite low.

The next chapter estimates value added transaction taxes.

Chapter 7
Analysis of Transaction Taxes Along Transit Corridors

The City of Tucson receives revenue from taxes on various types of economic transactions. Most of these transaction taxes come directly from the transit corridor, but others come indirectly through revenue sharing. A common type of direct transit corridor tax would be business privilege taxes ("sales" taxes) that are generated through direct transactions between buyers and sellers in establishments located along transit corridors. Other revenues directly related to the corridor include the public utility tax, use tax, transient occupancy tax, and room excise tax. Chapter 8 will estimate indirect revenues associated with federal and state revenue sharing. This chapter begins with an overview of transactions taxes and proceeds with estimates related to transit corridors.

Tucson's major sources of transaction taxes include:

- The business privilege tax (often called "sales tax" or the "Transaction Privilege Tax – TPT") is 2.6 percent for most retail and business activities. It has been in effect since 2018. The tax is combined with state (5.6 percent) and county (0.5 percent that was recently renewed) taxes for a total combined rate of 8.7 percent.

- The City also imposes a 2.25 percent Utility Franchise Fee on Tucson Electric Power (TEP) customers within city limits. This is added to monthly bills as a charge for using public rights-of-way. The fee has been in place since 2000. It is collected by the utility and passed directly to the city. The fee is often paired with a separate 2.25% public utility tax.

- Tucson's use tax rate is 2.6 percent to align with the city's transaction privilege (sales) tax rate, which has been in effect also since 2018. It applies to the storage, use, or consumption of goods purchased without payment of the city tax (such as online and out-of-state purchases) which are used to conduct business in Tucson.

- The City also has a transient occupancy tax (TOT) for lodging that is 6 percent of the room rent, plus a $4 per night per room/unit surcharge. When combined with state's 5.5 percent and Pima County's 0.55 percent taxes, the total transient occupancy tax in the city is slightly more than 12 percent.

Analysis compares transaction tax revenues collected along the transit corridors before (2019) and after (2025) the pandemic and fare-free. Because the pandemic accelerated the shift to online shopping, future research could use 2020 or 2021 as the base year for comparison. The results reported below can be considered conservative.

Transaction tax data were collected on properties fronting bus and streetcar corridors. Overall results are reported in Exhibit 7-1. Note that because bus and streetcar corridors overlap, streetcar data are a subset of bus data. Transaction tax revenue for 2019 has been adjusted to 2025 dollars for comparison.

Exhibit 7-1
Transit Corridor Transaction Tax Revenue 2019 and 2025, in 2025 Dollars

Transaction Taxes	Actual 2019, 2025$	Actual 2025	Change 2019-25
Business Privilege Tax	$277,214,629	$318,845,250	$41,630,621
Public Utility Tax	$33,532,670	$30,426,860	($3,105,810)
Use Tax	$15,133,091	$11,270,240	($3,862,851)
Transient Occupancy Tax	$16,422,298	$18,521,040	$2,098,742
Room Tax	$9,795,341	$8,085,340	($1,710,001)
Utility Franchise Fees	$19,305,254	$17,248,480	($2,056,774)
Total Revenue	$371,403,283	$404,397,210	$32,993,927
Transit Corridor Comparisons			
Bus Corridor Revenue	$340,496,925	$271,080,401	($69,416,524)
Bus Corridor City Share	92%	67%	-20%
Streetcar Corridor Revenue	$29,380,033	$25,191,154	($4,188,878)
Streetcar Corridor City Share	8%	6%	-14%
High Incident Corridor Revenue	$165,754,147	$131,640,285	($34,113,862)
High Incident Corridor City Share	45%	33%	-21%
High Incident Ratio to Bus Revenue	49%	49%	100%

Source: City of Tucson, adapted by authors.

The following observations are made:

- While city transaction tax revenue increased overall, inflation adjusted revenue actually fell for all categories except the business privilege and TOT taxes.

- In inflation adjusted terms, total transaction tax revenues received along transit corridors fell by 20 percent overall (for bus) and 14 percent for streetcar.

- The reason for the substantial decline is that COVID-19 accelerated online shopping thus reducing in-store sales. Although overall sales taxes increased for the city, the difference is attributable to an increase in taxable online sales assigned to Tucson addresses and not from on-site sales.

Summary

Using on-board surveys for 2019 and 2025, Chapter 2 shows that transit destinations for shopping increased substantially, especially among bus riders. But many of these trips could have been for groceries, medicine, or other purposes where many goods are exempt from transaction taxes. The increase in the number of these trips is also attributable to population growth along the corridors, as shown in Chapter 4. But for several thousand new homes, households, and people, taxable transactions along transit corridors would likely have been lower.

A final consideration relates to an increase in undesirable incidents in transit ridership associated with Fare-Free. Although this study does not include addressing the effect of incidents on transit outcomes, the concern is legitimate. Yet, in perspective, the overall effect on transactions appears negligible as the share of transaction tax revenue along high-incident bus corridors and bus corridors in general was virtually the same in 2025 as 2019. This is not to say that certain establishments have seen an increase in incidents because of fare-free, only that overall, the effects appear limited.

The last analytic chapter assesses the federal and state revenue sharing implications of transit corridor growth.

Chapter 8
Federal and State Revenue Sharing

The last analytic chapter focuses on the potential for new residents along transit corridors to generate new revenue to the city based on federal and state revenue sharing systems. Although each revenue sharing system has its own formulas and many are tied to the decennial census, the effect of population growth along transit corridors should be new revenue for the city at some point in time. Subject to further analysis about revenue sharing details, these following programs are considered.

In Exhibit 8-1, each major revenue sharing source is listed along with a calculation of revenues per capita using the ACS 1-year estimate for 2024. This is applied to the estimated increase in transit corridor population through 2025. Population for the year 2024 is used to be conservative. If earlier years are used and applied to later year revenues, revenues per new resident will be higher. Note is made that some revenue sharing programs have restrictions, such as Smart & Safe Arizona and Community Development Block Grant. However, these funds can be used to benefit new corridor residents, subject to local allocation decisions.

Like noted elsewhere, this estimate is not of the change in population and associated revenue sharing caused by the city's Fare-Free policy. It only shows that since the city's policy was instituted, more than 7,000 people or about 87 percent of the city's new population settled in transit corridors. Recall that this is defined narrowly as the city blocks fronting bus routes or streetcar tracks and the city blocks adjacent to them.

Exhibit 8-1
Revenue Sharing Estimates Attributable to Transits Corridor Population Growth

Revenue Sharing Source	Figure
State Shared Income Tax	$116,413,020
State Shared Sales Tax	$84,124,370
State Shared Auto Lieu Tax	$28,554,198
Smart & Safe Arizona	$3,895,000
Community Development Block Grant	$7,549,162
Total Revenue Sharing	$240,535,750
Population 2024	554,103
Revenue Sharing per Resident	$434.10
New Transit Corridor Residents	7,035
Revenue Sharing Revenue	$3,053,889

Source: Budget figures from FY 2026 Tucson budget at https://www.tucsonaz.gov/files/sharedassets/public/v/1/bsd/documents/finance-documents/r23934.pdf

CHAPTER 9
SUMMARY OUTCOMES OF TUCSON'S FARE-FREE POLICY

This summary chapter focuses on fiscal outcomes along transit corridors since Free-Fare was implemented in March of 2020. The chapter starts with a summary of ridership trends followed by demographics, housing, and job trends. It continues with a review of fiscal outcomes with Free-Fare implications.

Fare-Free Ridership Trends

The evidence seems clear that the city's Fare-Free policy reversed what would have been a trend toward lost transit ridership. Every peer system studied in this report lost ridership during the pandemic and they still average about 30 percent fewer riders than before COVID-19. As before the pandemic, transit riders have lower income than the population as a whole and a larger share than before the pandemic use transit as their sole means of transportation.

Demographic and Housing Trends

Transit corridors accounted for nearly all residential units and population growth since 2019. This is a product of good planning because it makes sense to increase mobility options by encouraging residential development along transit lines. Where such planning efforts include access to Fare-Free transit, the market is rewarded with increasing mobility options.

Job Trends

Like people and housing, most new jobs are located along transit corridors, which is also a product of good planning. Likewise, by locating along transit corridors, firms are rewarded with Fare-Free transit benefits.

Fiscal Trends

Before reviewing fiscal outcomes, a small lesson in density and marginal costs is useful. With few exceptions, as density increases the costs of serving development decreases. Moreover, as mobility options increase, economic exchange also increases. The combination of density and transit mobility generally increases economic exchange resulting in more jobs and productivity gains. The upshot of these dynamics is that urban areas become more efficient the more densely settled they are and the more mobility options they have. Efficiency gains leading to these positive outcomes occur at any level of density and mobility improvement.

Tucson has long had policies that encourage thoughtful increases in density, mostly through encouraging "middle housing" options even before the term became popular, as well as well-designed higher density housing. The city also advances mixed use development. Both lead to efficient land use outcomes.

Whether by design or merely in response to COVID-19, Tucson's Fare-Free policy advances the city's middle housing, higher density housing, and mixed use development policies. It does so by rewarding these development efforts with expanded access to transit by owners, renders, tenants,

and visitors. Other Fare-Free benefits include advancing social equity for lower income and transportation disadvantaged people, and environmental benefits.

Given the social and environmental benefits, among others, there are strong arguments for a Fare-Free policy regardless of cost. Yet the Fare-Free policy generates fiscal revenue to the city that helps offset costs, even if all direct monetary costs are not recovered. However, these revenues are indirect because they are generated by new development occurring along transit corridors. These indirect revenues cannot be calculated precisely. Accordingly, the indirect revenues estimated in this study are associated with new revenue generated by development that occurs where the City wants it: along transit corridors.

In review, these indirect revenues generated from development occurring along transit corridors include:

Property Taxes	$4,754,411
Revenue Sharing	$3,053,889
Total Revenue	$7,808,300

Note is made that the costs to serve new development along transit corridors are not addressed.

Not included are transaction tax revenues generated from businesses directly along the corridors. The reason is that COVID-19 has changed the dynamics of taxable sales, shifting much of it to online platforms. Although the City does receive taxes from online sales, it is accounted for differently and not necessarily credited to transit corridors. Nonetheless, without the thousands of new homes that have been built along transit corridors since the pandemic, and the transactions they make along those corridors, the corridor-specific transaction taxes would be even lower. In effect, new development along transit corridors benefiting from the Fare-Free policy helps preserve much of the transaction tax revenue that is lost due to economic restructuring.

Fare-Free Perspectives

Assuming Fare-Free policy objectives are met, it may not matter whether all costs are offset because:

- It is City policy to facilitate development along transit corridors to advance social equity, environmental quality, and other objectives
- The City may have excess facility capacity along many transit corridors meaning there may be small marginal costs incurred to serve new development
- Higher density and mixed use development along corridors is less costly to serve per unit of development
- Development along transit corridors creates economic synergies that do not occur elsewhere though they may be difficult to quantify

Finally, there is a sinister way to measure fully the benefits of Fare-Free. That would be to restore fares to their pre-pandemic, inflation-adjusted level and measure social, environmental, economic, and other outcomes after a few years. Policy makers will then have better knowledge on which to base future Fare-Free decisions.

References

American Public Transportation Association. 2018. *The Economic Cost of Failing to Modernize*. Available a.

American Public Transit Association + National Association of Realtors. 2013. *The New Real Estate Mantra: Location Near Public Transportation*. Available at https://cnt.org/sites/default/files/publications/CNT_TheNewRealEstateMantra.pdf

Federal Transit Administration. 2026. *Complete Monthly Ridership*. Available at https://www.transit.dot.gov/ntd/data-product/monthly-module-adjusted-data-release

Ferrell, Christopher E. 2015. *The Benefits of Transit in the United States: A Review and Analysis of Benefit-Cost Studies*, San Jose CA: Mineta Transportation Institute, San Jose State University,

Hartman, L. M., K. M. Wooley, and R. C. Tucker. 2024. The case for buses: interdisciplinary ethical arguments in support of strong public transit. *Journal of Environmental Studies and Sciences* 14, 180–192. https://doi.org/10.1007/s13412-023-00874-1

Helia, Mohammadi-Mavi, Mustafa Fardin, Andisheh Ranjbari. 2025. Should we blame COVID-19 for the decline in transit ridership, or was it merely a stimulant? *Transportation Research Interdisciplinary Perspectives*, 31, https://doi.org/10.1016/j.trip.2025.101397.

Litman, Todd. 2025, *Evaluating Public Transit Benefits and Costs*, Victoria BC: Victoria Transport Policy Institute. Available at https://www.vtpi.org/tranben.pdf

Nelson, Arthur C. 1997. PART 3: Society: Social Benefits of Transit: Case Study of Metropolitan Atlanta Rapid Transit Authority. *Transportation Research Record, 1576*(1), 123-131. https://doi.org/10.3141/1576-16.

Nelson, Arthur C. and Hibberd, Robert. 2025. *Economic Development and Demographic Outcomes of Streetcar Station Proximity with Post-Pandemic Implications*. Available at SSRN: https://ssrn.com/abstract=5113417 or http://dx.doi.org/10.2139/ssrn.5113417

Nelson, Arthur C. and Hibberd, Robert. 2024. *Bus Rapid Transit Outcomes with Post-Pandemic Implications*. Available at SSRN: https://ssrn.com/abstract=5014844 or http://dx.doi.org/10.2139/ssrn.5014844

Peiser, Richard B. and Matt Hugel. 2022. Is the Pandemic Causing a Return to Urban Sprawl? *Journal of Comparative Urban Law and Policy*, 5(1): 26-41. Available at: https://readingroom.law.gsu.edu/jculp/vol5/iss1/7

Pima Association of Governments. 2019. *2019 Tucson Onboard Transit Survey FINAL Report*. Available at https://www.tucsonaz.gov/files/sharedassets/public/v/1/transportation-and-mobility/transit-services/documents/2019_on-board_survey_tucson_final.pdf

Pima Association of Governments. 2022. *2022 Tucson On-Board Survey*. Available at https://www.suntran.com/wp-content/uploads/2022/11/Tucson-Final-Report-20220815.dm_.pdf/

Regional Transportation Authority. 2022. Transit Update – Ridership RTA Citizen's Accountability for Regional Transportation Committee. Available at https://rtamobility.com/wp-content/docs/2022/06/RTACART-2022-05-26-Sun-Tran-Ridership-History-Presentation.pdf

Shirley, Chad. 2023. Testimony on The Status of the Highway Trust Fund. Available at https://www.cbo.gov/publication/59667

Stagaman, Mary. nd *An Assessment of the Cincinnati Streetcar Study*, Cincinnati OH: University of Cincinnati Center for the City.

Tucson, City of. 2025. *2025 Tucson Transit On-Board Survey*. Available at https://www.suntran.com/wp-content/uploads/2025/10/Tucson-OB-Survey-Report-Final-20250708-2.pdf.

Tyndall, Justin. 2026. *Fare-Free Transit in the United States: Effects on Ridership, Service, and Finances*. Available at https://www.justintyndall.com/Tyndall_farefree.pdf

Weisbrod, Glen, Naomi Stein, Chandler Duncan, and Adam Blair. 2017, *Practices for Evaluating the Economic Impacts and Benefits of Transit*, Washington DC: Transportation Research Board.

WSP. 2018, *Kansas City Riverfront Extension Benefit-Cost Analysis*, Kansas City MO: City of Kansas City.

ENDNOTES

[1] The 2019 and 2022 surveys included Sun Van (shuttle) riders, but the 2025 survey does not. Shuttle service is limited anyway, so bus and streetcar ridership is reported.

[2] Although gender is reported in both surveys, results for 2022 appear anomalous and unusable. Notably, where 42.2 percent of the riders in 2019 were female, 36.0 percent in 2022 were. In contrast, the 2022 1-year ACS reports 53.1 percent of transit riders were female compared to 52.4 percent in the 2019 1-year ACS. Gender using the ACS will be addressed elsewhere in this report.

[3] Median household income for 2019 from https://data.census.gov/table/ACSST1Y2019.S1901?q=median+household+income+2019&g=160XX00US0477000. The 2019 figure of $44,365 is adjusted to 2025 using the consumer price index factor of 1.26 resulting in an inflation-adjusted income of $55,900 (precise figure may not sum because of rounding). Adjusting for 2024 median household income of $60,483, the CPI factor of 1.02 is $61,693 (precise figure may not sum because of rounding).

[4] Median household income for 2025 from https://data.census.gov/table?q=median+household+income+2022&g=160XX00US0477000

[5] Shuttle service was included in the 2019 and 2022 surveys but they comprised a small share of all transit trips and are mostly limited service in terms of time of day and origins/destinations.

[6] See https://www.census.gov/retail/mrts/www/data/pdf/ec_current.pdf

[7] From the North American Industry Classification System (NAICS). See https://www.census.gov/naics/.

[8] See https://www.infoplease.com/us/census/arizona/tucson/demographic-statistics#:~:text=Table_title:%20Tucson%2C%20AZ%20Demographic%20Statistics%20Table_content:%20header:,%7C%20Number:%202.58%20%7C%20Percent:%20(X)%20%7C.

[9] Based on for-sale units from https://www.huduser.gov/portal/publications/pdf/TucsonAZ-CHMA-24.pdf

[10] See https://www.infoplease.com/us/census/arizona/tucson/demographic-statistics#:~:text=Table_title:%20Tucson%2C%20AZ%20Demographic%20Statistics%20Table_content:%20header:,%7C%20Number:%202.58%20%7C%20Percent:%20(X)%20%7C

[11] Based on for-rent units from https://www.huduser.gov/portal/publications/pdf/TucsonAZ-CHMA-24.pdf

[12] See https://www.neilsberg.com/insights/tucson-az-population-by-year/

[13] See https://worldpopulationreview.com/us-cities/arizona

[14] Values for 2019 are not inflated to 2025 because depreciation substantially offsets inflation. Future research can adjust for individual properties to correct fully for inflation and depreciation, though little will be gained in terms of understanding trends.

[15] Las Vegas is anomalous because its downtown is not a major center while data for Salt Lake City were not available.

[16] The specific Google query of March 29, 2025, was: “What were the vacancy rates of downtown Tucson, Denver, Portland and Seattle in 2019 and what were they in 2025?”. All relevant links are included in the

output to verify the results. A separate query needed to be asked for Phoenix: “What was the office vacancy rate for of downtown phoenix in 2019 and what was it in 2025?”