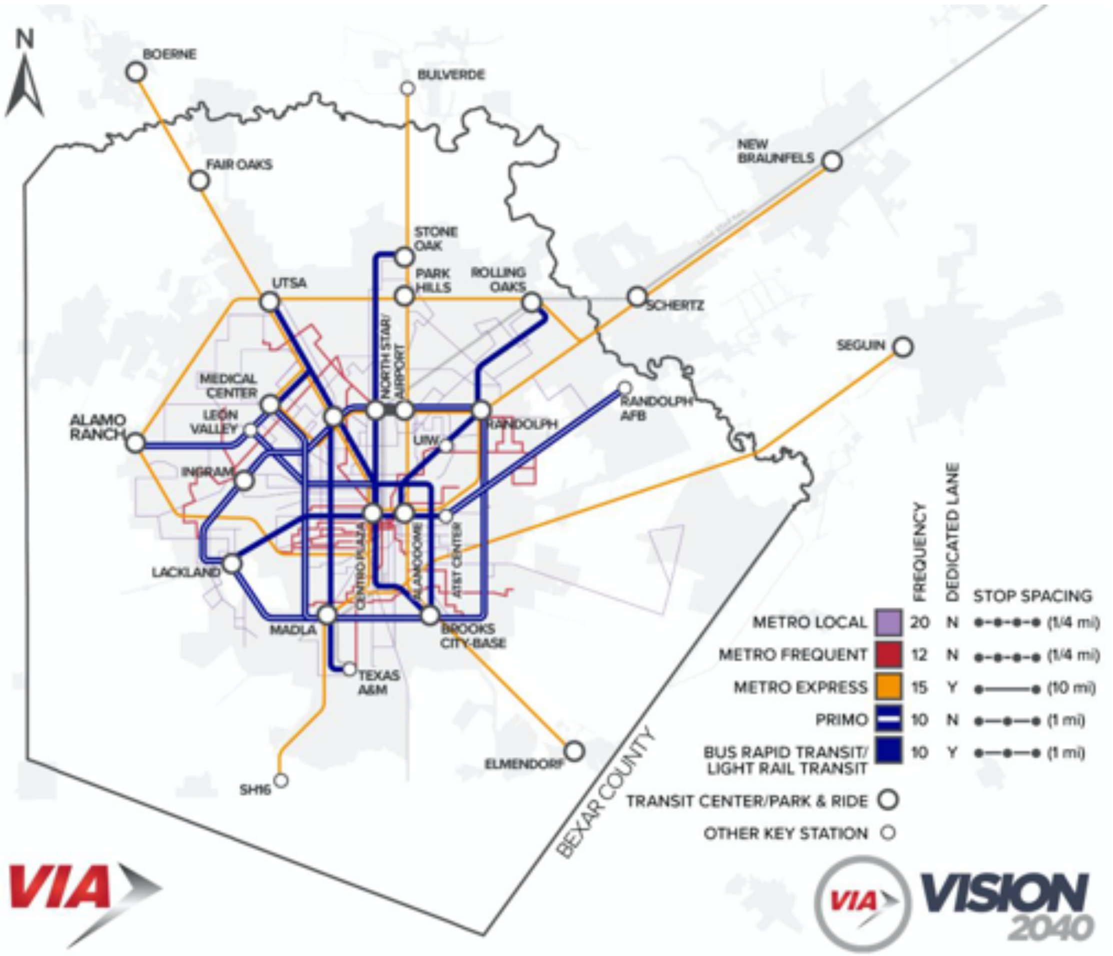
The Potential Economic Implications of Enhanced Transit in San Antonio



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Overview

There are numerous potential benefits to a community and its economy with the addition of enhanced transit service. As envisioned by VIA, enhanced local transit could include a range of improvements, including eventually bus rapid transit, that will operate in dedicated right-of-way that provides greater time-certainty. The most immediate beneficiaries are users who convert their automobile trips to transit trips, thereby reducing the personal frustration they experience each workday as they negotiate clogged roadways and attempt to predict unreliable driving times. Employers also benefit when workers commute using enhanced transit, because they do so in less time and are more likely to arrive punctual and rested. This, in turn, gives employees the opportunity to perform their work more productively. Improving transit service also creates opportunities for the entire region to capitalize on its users. By removing their cars from the roadways, transit commuters unintentionally improve the trips of workers who cannot or choose not to use some form of transit. Similarly, their actions also create benefits for industry since many firms are sensitive to the effects of roadway congestion.

Beyond the transportation impacts, enhanced transit can have a discernible impact on land use patterns, real estate values, corporate recruitment and relocation, the equitable capacity to connect workers to jobs, tourism, and the overall appeal of a region to potential firms and residents. These additional impacts cumulatively influence the level and pace of economic growth, as well as the competitive position of the region versus its peers domestically and abroad.

The following analysis is designed to provide insight into the potential impacts of enhanced transit on the San Antonio area community and economy, starting with a brief review of the community benefits that accrue when transit is improved, followed by a brief overview of the history and current presence of fixed-guideway systems in transit systems around the nation. A quantitative evaluation of the benefits of enhanced transit is then provided, using correlation analysis to examine the relationship between prosperity, economic growth, safety, and environmental quality. The potential impacts of new system construction are then quantified using the RIMS II Model of the San Antonio MSA to estimate the secondary effects associated with over half a billion dollars of investment that had been envisioned for Advanced Rapid Transit (ART) prior to the COVID-19 pandemic. The report’s conclusions form the final section.

Community Benefits

Public transit can provide a variety of economic, social and environmental benefits. Many of these benefits depend on the degree to which public transit reduces automobile travel, and so requires a combination of high-quality services (typically grade-separated rail or bus, in dedicated right-of-way, comfortable vehicles and attractive stations), ridership incentives (such as efficient road and parking pricing), and transit-oriented land use development policies.

Conventional transport economic evaluation tends to overlook or undervalue many of these benefits, as summarized in the table below. Traditional evaluation (i.e., benefit/cost analysis) only quantifies user travel time savings (for example, if grade-separated transit increases transit travel speeds), but ignores most other impacts and benefits, including leverage effects if high quality transit is a catalyst for more compact, multi-modal land use development.

Table 1: Transit Benefits by Category

Benefits	Description	Benefits Typically Recognized?
User benefits	Increased convenience, speed and comfort to users from transit service improvements	Generally only increased speed
Congestion Reduction	Reduced traffic congestion	Direct but not indirect
Facility cost savings	Reduced road and parking facility costs	Generally not
Consumer savings	Reduced consumer transportation costs, including reduced vehicle operating and ownership costs	Operating costs, but not ownership costs
Transport diversity	Improved transportation options, particularly for non-drivers	Sometimes
Road safety	Reduced per capita traffic crash rate	Direct but not indirect
Environmental quality	Reduced pollution emissions and habitat degradation	Direct but not indirect
Efficient land use	More compact development, reduced sprawl	Sometimes
Economic development	Increased productivity and agglomeration efficiencies	Direct but not indirect
Community cohesion	Positive interactions among people in a community	Generally not
Public health	Increased physical activity (particularly walking)	Generally not

Source: Litman (2017), TXP

According to Todd Litman, in most North American communities, most transit passengers are transit dependent, i.e., they cannot use an automobile for that trip. However, there is evidence that high quality (convenient, fast, comfortable) transit, such as ART and express buses, often attract a large number of discretionary travelers, as indicated in the table below.

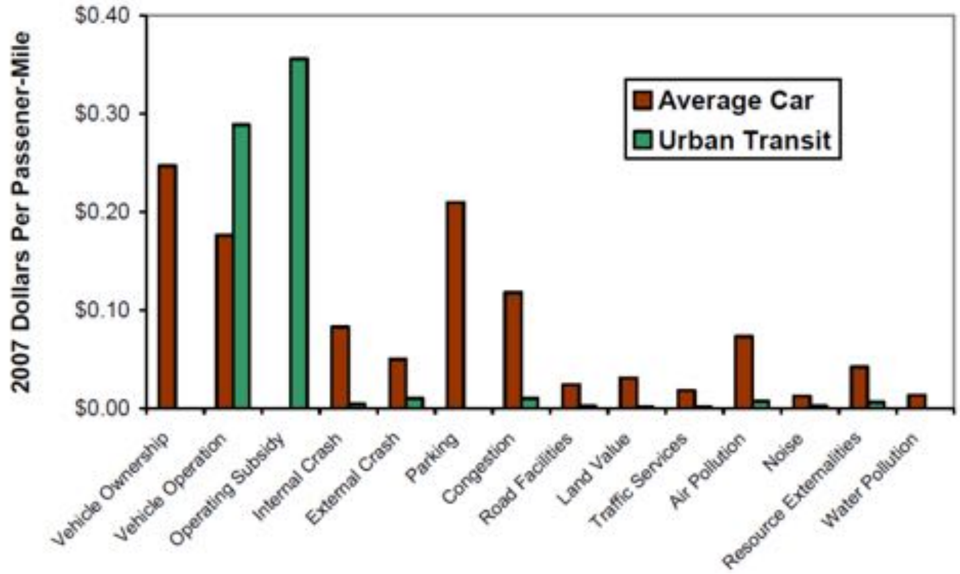
Table 1: Demand Characteristics by Transit Mode

Transit Mode	Description	Type of User	How Transit is Accessed	Trip Characteristics
Light-Rail Transit	Light rail between downtown and suburbs, with several stops	Mostly (62%) discretionary	Balanced between bus, walking, and park and ride	Home locations spread throughout the region; the average rider lives more than three miles from the line.
Express Bus	Express routes between downtown and suburbs	Primarily discretionary (84%)	About half park and ride (48%)	Home locations clustered at the line origin
Premium Express Bus	Express routes with coach buses	Almost exclusively discretionary (96%)	Mostly park and ride (62%)	Home locations clustered at the line origin
Local Bus	Serves urban and suburban areas with frequent stops	Mostly non-discretionary (52%)	Nearly all bus or walk (90%)	Home locations scattered along route; most riders live within a mile of the bus line

Source: Litman (2017), TXP

While the pandemic has temporarily shifted the equation to some degree (as fuel prices have fallen and riders have become concerned about social distancing) longer-term demographic and economic trends (such as an aging population, increasing urbanization, changing consumer preferences, and increased health and environmental concerns, etc.) are increasing demand for high-quality, enhanced transit and transit-oriented development. Although it is difficult to forecast exactly the trajectory of transit utilization (in part due to rapid technological innovation, especially related to autonomous vehicles), demand is likely to increase and be more sensitive to service quality and land use factors. This is in part due to the relative lower cost of transit, especially when all factors are taken into consideration. Figure 1 illustrates estimated automobile and public transit costs per passenger-mile under urban-peak conditions. As the chart indicates, while direct costs of operation are higher and overall transit typically must be subsidized, every other measured cost is substantially higher for automobiles. This emphasizes the importance of using comprehensive analysis that considers all significant impacts, including changes in indirect costs and benefits.

Figure 1: Estimated Urban-Peak Auto and Transit Costs



Source: Litman (2009), TXP

This analysis does not explicitly account for *equity value* (benefits to physically, economically and socially disadvantaged people) and *option value* (the value of maintaining an option for possible future use), although this is possible by assigning a value to improved mobility options that are affordable and serve non-drivers. Most transit service improvements and transit-oriented developments can help achieve these objectives. Equity and option value benefits can therefore be considered additional co-benefits of using transit improvements beyond those delineated above.

As the methods for estimating benefit-cost ratios for transit have improved—with more categories of benefits added to accepted and expected practice—the understanding of the range of benefits transit provides to society has expanded as well. Early evaluations of transit benefits tended to focus on savings that transit brought to riders and the congestion benefits that flowed to others in the transportation network. Over time, methods for quantifying the benefits to the larger society and the environment have been developed as well. Based on a review of the literature, the following key benefits of transit were the most-often cited and measured:

- Basic Mobility
- Traffic Congestion
- Employment & Housing
- Health & Environment
- Public Safety

Basic Mobility

The core role of transit is to provide mobility options, especially for those whose alternatives are limited. In San Antonio, 21% of the labor force gets to work by some means other than driving their vehicle alone – carpool, public transit, walking, or some other means (presumably biking or ride-sharing). It is likely that a significant number of this group is not choosing alternatives to single-occupancy vehicles, but rather have limitations (financial or otherwise) that require them to get to work by some other means. This is especially important at this juncture, as many workers must still physically go to work, in spite of COVID-19. According to a recent analysis by Dingel & Neiman, only 37% of the jobs in the United States can be performed entirely at home, "with significant variation across cities and industries." Applying their estimates by local occupation reveals that San Antonio just about matches the national average, at 36.2%. The translation is that the remainder, almost 645,000 workers, will have to physically go to work, at least part of the time, and many will need transit to return.

Traffic Congestion

In spite of the reprieve offered by the pandemic, the level of traffic congestion has been steadily increasing, as the Texas Transportation Institute reports that the average San Antonio driver spent 51 hours delayed in traffic in 2017 (the most recent year available), with total congestion costs in the San Antonio area for that year at $1.4 billion. Transit is often seen as a means of relieving this congestion, but skepticism is often expressed, as greater temporary capacity is seen as inducing demand that makes relief short-lived. However, public transit accounts for only 1% of U.S. passenger miles traveled but nevertheless attracts continued public financial support. An explanation for this apparent dichotomy may come from the work of Michael Anderson at UCLA. In October of 2003, Los Angeles transit workers went on strike for 35 days, shutting down major bus and rail lines. Anderson looked at hourly traffic speed data on major L.A. freeways during this time. The data showed that, during peak periods, the average delay increased 47% on these roads. The effects were largest on freeways that paralleled transit — and statistically insignificant on roads in neighboring counties.

> The intuition is straightforward: Transit is most attractive to commuters who face the worst congestion, so a disproportionate number of transit riders are commuters who would otherwise have to drive on the most congested roads at the most congested times. Since drivers on heavily congested roads have a much higher marginal impact on congestion than drivers on the average road, transit has a large impact on reducing traffic congestion.

Anderson then extrapolates his findings to show the economic benefit of public transit to the city. Using some back-of-the-envelope calculations, he says the congestion relief provided by the Los Angeles system ranges between $1.2 billion and $4.1 billion per year. In other words, the high cost of constructing transit systems come with considerable economic gains. Anderson concludes:

> Contrary to the conclusions in the existing transportation and urban economics literature, the congestion relief benefits alone may justify transit infrastructure investments.

Employment and Housing
Brookings has done an extensive analysis of transit's role in enhancing employment opportunities. Their analysis indicates that:

- Over three-quarters of all jobs in the 100 largest metropolitan areas are in neighborhoods with transit service. Western metro areas like Los Angeles and Seattle exhibit the highest coverage rates, while rates are lowest in Southern metro areas like Atlanta and Greenville.
- Regardless of region, city jobs across metro areas and industries have better access to transit than their suburban counterparts. The typical job is accessible to only about 27% of its metropolitan workforce by transit in 90 minutes or less. Labor access varies considerably from a high of 64% in metropolitan Salt Lake City to a low of 6% in metropolitan Palm Bay, reflecting differences in both transit provision, job concentration, and land use patterns.
- City jobs are consistently accessible to larger shares of metropolitan labor pools than suburban jobs

The suburbanization of jobs obstructs transit's ability to connect workers to opportunity and jobs to local labor markets, creating lost opportunity and undermining equity. Meanwhile, America has a shortage of 7.2 million affordable homes, and 8.1 million Americans spend more than half of their income on housing, according to the National Low-Income Housing Coalition. Within Texas, the affordable housing shortage is more severe, with 29 affordable homes available for every 100 renters, while the national rate is 37 homes. Having housing next to transit is especially important for America's lower-income population, who typically rely on transit more than wealthier Americans. To the extent that enhanced transit is implemented in San Antonio, better access to jobs should improve incomes for those at the lower end of the spectrum, which in turn increases the capacity to afford the costs of a home, as well as potentially geographically broadening access to a range housing across the community.

Health & Environment

County Health Rankings & Roadmaps is an annual collaboration between the University of Wisconsin Population Health Institute and the Robert Wood Johnson Foundation that assembles a range of data to inform policy development around improving health outcomes for all and to close the health gaps between those with the most and least opportunities for good health. In their view:

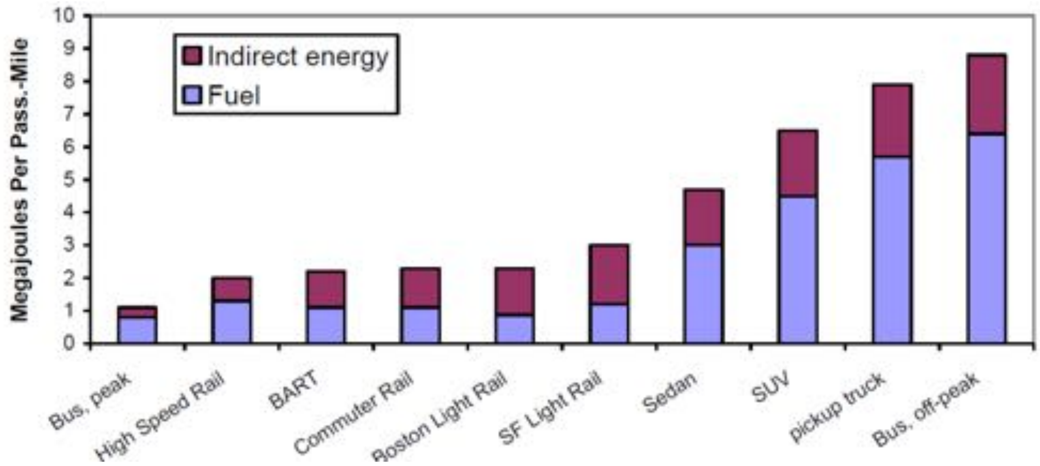
> Health is more than what happens at the doctor's office…A wide range of factors influence how long and how well we live from education and income to what we eat and how we move to the quality of our housing and the safety of our neighborhoods. For some people, the essential elements for a healthy life are readily available; for others, the opportunities for healthy choices are significantly limited.

Included in the list of indicators compiled are several related to commuting, including overall traffic volume, driving alone, and length of commute. Transit is seen as an important element of a healthy environment, to wit:

> Transit includes public systems such as city or regional buses, subway systems, and trams as well as bikes. Together, this varied and complex system connects people to each other, and to the places where they live, learn, work, and play. Local transit options can support active, energy-efficient travel. Too often, however, neighborhoods lack sidewalks, safe crossings, or shared transit services that support these choices. Across the US, we depend heavily on motorized travel, especially cars, to get from place to place - in 2017, the average American drove more than 10,000 miles. Most of our nation's workers (nearly 88%) get to work in a car. And, we often drive very short distances; almost half of all trips in America are two miles or less, and 74% of these are traveled by car. Dependence on driving leads to 40,000 traffic-related deaths annually and exposes us to air pollution, which has been linked to asthma and other respiratory illnesses, cardiovascular disease, pre-term births, and premature death. It also contributes to physical inactivity and obesity—each additional hour spent in a car/day is associated with a 6% increase in the likelihood of obesity, whereas each added kilometer walked/day is associated with a nearly 5% reduction in obesity risk.

Creating and adopting policies that support active travel and encourage shared transportation can not only help to increase physical activity and reduce obesity, but also reduce traffic-related injuries and deaths and improve the quality of our environment. Beyond the health implications, enhanced transit systems can yield a reduction in fuel consumption that in turn reduces greenhouse gases, mitigating pollution that causes asthma and other illnesses.

Figure 2: Lifecycle Energy Consumption

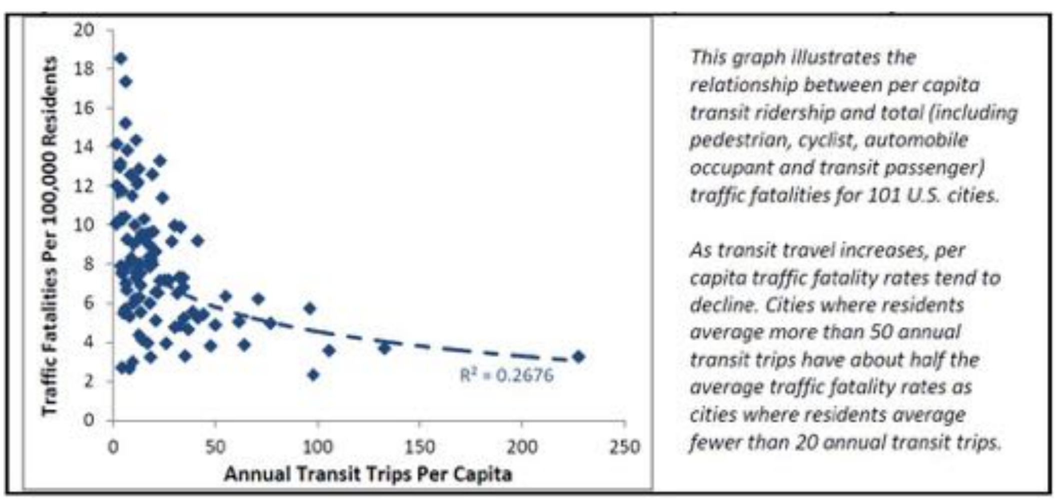


Sources: Litman (2017), TXP

Public Safety

Transit has been shown to have a positive impact on both traffic safety (crash risk) and community security (crime risk). Public transportation is overall a very safe form of travel. Its passengers have less than a tenth the per-mile crash rates as automobile occupants, and transit-oriented communities have less than a fifth the total (pedestrian, cyclist, automobile and transit passenger) per capita traffic fatality rates as in automobile-dependent communities. Traffic casualty rates tend to decline in a community as transit ridership increases. In fact, cities where residents average more than 50 annual transit trips have about half the average traffic fatality rates as cities where residents average fewer than 20 annual transit trips.

Figure 3: Traffic Fatalities vs. Transit Ridership for U.S. Urban Areas



Source: Litman (2020), TXP.

Two factors help explain these impacts. First, many community features that increase transit use, such as good walking and cycling conditions, and compact development, also tend to increase safety. Second, higher-risk groups, including young adults, seniors, alcohol drinkers and compulsive texters, are more likely to reduce their driving if their community has convenient and attractive public transit service. As a result, higher-risk driving reduction strategies, such as graduated licenses, senior driver testing, and anti-impaired and -distracted driving campaigns, become more effective if implemented with public transit improvements.

There are also indications that public transit investments coupled with transit-supportive policies also tend to increase overall community security by increasing community cohesion (positive interactions among neighbors) and passive surveillance (more passersby who can report threats), reducing concentrated poverty and increasing economic opportunities for at-risk residents, and by reducing vehicle crimes (road rage, vehicular assault, vehicle thefts and vandalism). As a result, all else being equal, transit-oriented communities tend to have lower overall crime rates than automobile-oriented communities.

In sum, the literature supports a range of community benefits associated with enhanced utilization of transit, especially in urban areas. In order to extend and localize the analysis TXP has examined the statistical relationship between increasing investment in transit, especially associated with enhancing the level of fixed-guideway service provided, and broader measures of economic growth, prosperity, and specific measures of public safety and environmental quality. The following section details the results of this analysis.

Analysis of Transit Benefits

Context

The idea of using transportation as a catalyst for development and economic growth was the basic motivation behind most of the privately developed streetcar systems in the early 20th century, which were built for the express purpose of attracting economic activity and maximizing the value of surrounding real estate. The post-World War II mass adoption of the automobile shifted the paradigm, as land use patterns became increasingly segregated in new development. As a result, annual unlinked passenger rail trips in the U.S. fell from 13.4 billion in 1944 to just over 2 billion in 1973.

Beginning in the late 1970s, construction began on rail transit in growing metropolitan areas that previously did not have passenger rail systems, such as Washington DC, San Francisco and Atlanta. These systems were built with the purpose of relieving congestion and were funded entirely by the public sector. In contrast with the systems built before World War II, the new facilities were built with the expectation that most transit riders would reach the station by car, and as a result there were few attempts to integrate new stations with surrounding land uses.

Another major wave of new transit was built beginning in the 1980s, consisting mainly of new light rail systems, most in existing freight rail corridors and on abandoned freight rights-of-way. Examples include San Diego (1981), Portland (1986), Los Angeles (1990), St. Louis (1993), Denver (1994), and Dallas (1996). This period also saw growing interest in transit-oriented development (TOD) to promote sustainable, transit-supportive land use patterns near transit. More recently, Houston, Charlotte, Phoenix and Austin have all initiated service in the past twenty years.

From 2000 to the end of 2017, 52 new systems and 124 extensions (both rail and busway) opened, resulting in a total of 1,393 additional segment miles. Fixed-guideway systems have assumed a growing role in transit, as the number of unlinked passenger trips was almost evenly divided between fixed-guideway and other transit forms in 2018, while the volume of fixed guideway miles-traveled hit 60% of the total.

Figure 4: Unlinked Passenger Trips as a Share of Total

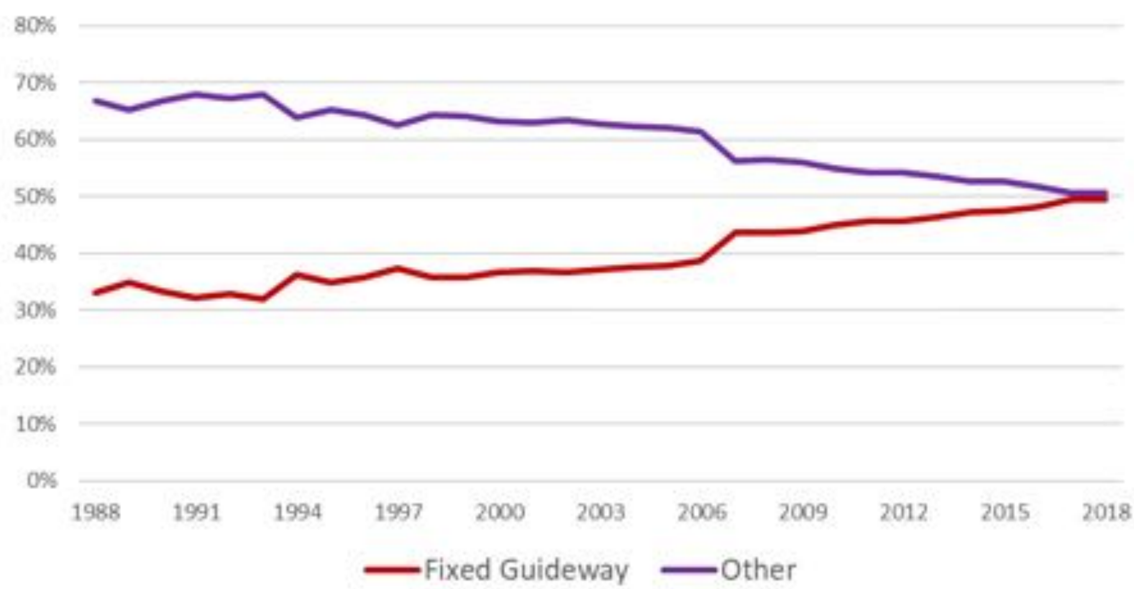
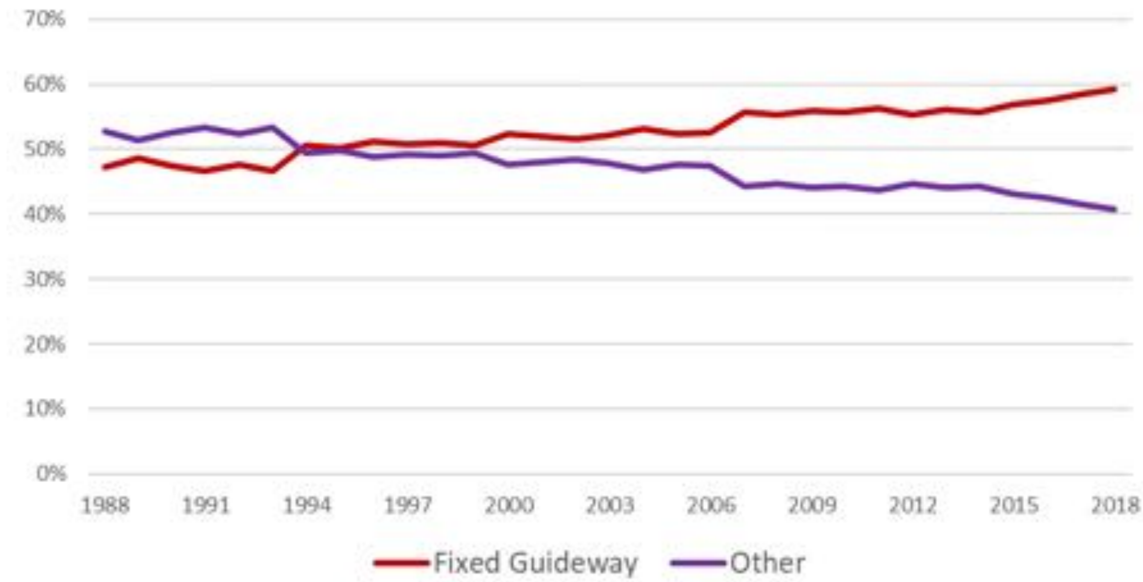


Figure 5: Passenger Miles as a Share of Total



Sources: National Transit database, APTA, TXP

Statistical Analysis

Dependence refers to any statistical relationship between two random variables or two sets of data. Correlation refers to any of a broad class of statistical relationships involving dependence. Familiar examples include the correlation between the physical statures of parents and their offspring, and the correlation between the demand for a product and its price. Correlations are useful because they can indicate a predictive relationship that can inform decision-making. For example, an electrical utility may produce less power on a mild day based on the observed correlation between electricity demand and weather.

Formally, dependence refers to any situation in which random variables do not satisfy a mathematical condition of probabilistic independence. There are several correlation coefficients, often denoted ρ or r, measuring the degree of correlation. The most common of these is the Pearson correlation coefficient, which is used here.

Datasets

The National Transit database provides a variety of transit-related measures by agency and by mode, with information online currently available by month through the end of 2019. Based on the convention used to categorize transit by mode, a combination of bus rapid transit, light rail, commuter rail, heavy rail, and hybrid rail were aggregated as fixed-guideway transit. These modes tend to operate in dedicated right-of-way and employ advanced technology, consistent with the underpinnings of the system proposed by VIA. Share of miles traveled by fixed-guideway mode as a share of total miles traveled was determined to be the appropriate proxy for level of fixed guideway transit.

In order to align with other datasets annual figures from 2018 were used in the analysis. Population figures in this database reflect the population served by local transit agencies in each region and were used in per capita calculations. At the same time, to facilitate comparisons among analogous urban areas, the decision was made to limit the analysis to 21 communities with populations between one and two million people, including San Antonio, as defined by the UZA population figures in this dataset.

The Bureau of Economic Analysis of the Commerce Department provides data on gross area product (the local equivalent of gross domestic product), the most comprehensive measure of regional economic activity. The American Community Survey provides data on commuting patterns (including modes of transportation), while the Center for Neighborhood Technology was the source for data on pollution, auto fatalities, and share of jobs in proximity to transit. For purposes of this analysis, enhanced public transit is assumed to qualify as a fixed-guideway oriented system of transit, as a substantial component of what is proposed includes modes that rely on dedicated right-of-way.

Table 1: Demographic, Transit, and Economic Data

UZA	Population	Share of Vehicle Miles: Fixed Guideway	Share of Jobs Proximate to Transit Within Mean Commute	Per Capita GDP	5-Year Per Capita GDP Growth	15-Year Per Capita GDP Growth
Austin	1,362,416	7.5%	1.01%	$67,783	3.95%	3.07%
Charlotte	1,249,442	25.6%	0.54%	$65,510	3.53%	2.56%
Cincinnati	1,624,827	0.8%	0.52%	$63,769	3.60%	2.87%
Cleveland	1,780,673	35.7%	0.65%	$65,425	3.73%	2.94%
Columbus	1,368,035	0.0%	0.94%	$61,462	2.88%	2.50%
Indianapolis	1,487,483	0.0%	0.60%	$68,585	2.75%	2.72%
Jacksonville	1,065,219	1.4%	0.49%	$54,276	3.71%	2.20%
Kansas City	1,519,417	7.9%	0.50%	$61,883	2.72%	2.59%
Las Vegas	1,886,011	6.9%	0.72%	$54,994	3.64%	2.06%
Memphis	1,060,061	0.3%	0.79%	$57,169	2.98%	2.21%
Milwaukee	1,376,476	0.3%	1.71%	$65,904	3.12%	2.65%
Orlando	1,510,516	10.3%	0.43%	$53,964	3.46%	1.99%
Pittsburgh,	1,733,853	25.9%	0.93%	$65,804	3.72%	3.99%
Portland OR	1,849,898	49.0%	1.57%	$66,476	4.60%	3.13%
Providence RI	1,190,956	3.4%	1.48%	$53,881	2.86%	2.88%
Riverside CA	1,932,666	32.7%	0.27%	$40,565	4.75%	3.15%
Sacramento,	1,723,634	50.2%	0.85%	$62,119	4.49%	2.94%
Salt Lake City	1,021,243	64.0%	1.53%	$77,384	2.45%	2.74%
San Antonio	**1,758,210**	**0.0%**	**0.79%**	**$53,190**	**4.27%**	**3.78%**
San Jose	1,664,496	56.4%	1.73%	$166,024	6.47%	4.45%
Virginia Beach	1,439,666	6.8%	0.50%	$57,252	2.45%	2.45%

Sources: National Transit database, BEA, Center for Neighborhood Technology, TXP

Table 2: Correlation Results - Economy

	Non-Auto Commuting	Share of Jobs Proximate to Transit	Fixed Guideway Share of Transit
2018 Per Capita GDP	0.352632	0.544790	0.486565
5-year Per Capita GDP Growth	0.534850	0.214137	0.495725
15-year Per Capita GDP Growth	0.472807	0.411615	0.444838

Source: TXP

Table 3: Commuting, CO_2, and Auto Fatalities Data

UZA	Share of Commute: Auto	Share of Commute: Transit	Share of Commute: Other	Share of Commute: Non-Auto	Mean Commute Time (Minutes)	CO_2 per Household	Auto-Related Fatalities per 100,000
Austin	77%	2%	21%	23%	27.4	9.03	9.8
Charlotte	79%	2%	19%	21%	24.9	9.43	7.8
Cincinnati	82%	2%	17%	18%	24.5	9.01	8.1
Cleveland	82%	3%	16%	19%	23.8	8.24	6.2
Columbus	81%	2%	17%	19%	28.5	8.68	8.5
Indianapolis	83%	1%	16%	17%	25.4	9.11	8.3
Jacksonville	80%	1%	19%	20%	26.9	9.03	13.4
Kansas City	84%	1%	15%	16%	23.5	9.09	10.1
Las Vegas	79%	3%	18%	21%	25.4	8.03	7.9
Memphis	86%	1%	13%	14%	24.2	9.07	13.3
Milwaukee	82%	3%	16%	19%	23.0	8.02	6.2
Orlando	80%	1%	18%	20%	29.0	8.88	12.4
Pittsburgh	77%	6%	18%	23%	26.7	8.43	9.3
Portland OR	70%	6%	24%	30%	26.8	9.33	5.1
Providence RI	81%	2%	16%	19%	26.9	8.13	7.1
Riverside CA	80%	1%	19%	20%	25.0	9.32	10.8
Sacramento,	77%	2%	21%	24%	26.2	8.45	8.0
Salt Lake City	75%	3%	22%	26%	22.9	9.14	7.3
San Antonio	79%	2%	19%	21%	26.6	9.07	10.6
San Jose	75%	4%	21%	25%	29.8	8.49	5.1
Virginia Beach	81%	1%	17%	19%	25.0	8.69	7.5

Sources: American Community Survey, Center for Neighborhood Technology, TXP

Table 4: Correlation Results – Environment & Safety

	Non-Auto Commuting	Share of Jobs Proximate to Transit	Fixed Guideway Share of Transit
Auto Fatalities/100,000	-0.593013	-0.611092	-0.480389
Co_2 Emissions/household	-0.609163	-0.540575	-0.101809

Source: TXP

Findings from Statistical Analysis

There is a significant relationship between non-auto commuting, share of jobs in proximity to transit, share of transit activity that occurs on fixed-guideways, and both absolute prosperity and economic growth.

Overall transit/non-auto commuting is shown to have a positive relationship with the recent level of per capita GDP and per capita GDP growth, and that relationship remains consistent when examined using fixed-guideway utilization as the transit measure. Over time, there is also a significant relationship between economic performance and the location of employment in proximity to transit. The findings are largely significant at the 95% confidence interval.

There is also a strong relationship between non-auto commuting, share of jobs in proximity to transit, share of transit activity that occurs on fixed-guideways, and measures of public safety and environmental quality.

The confidence level is quite high for non-auto commuting and share of jobs proximate to transit, as both are significant at the 99% level. For fixed-guideways, the confidence level drops to 95% when examined related to auto fatalities; for CO_2 emissions there is a modestly inverse relationship, i.e., when share of fixed-guideway goes up level of emissions go down, but the relationship is not statistically significant.

These findings are consistent with those offered by Arthur Nelson and Joanna Ganning in their study for the National Institute for Transportation and Communities. Entitled *National Study of BRT Development Outcomes*, the conclusion to their 2015 work included the following:

> Though we offer only circumstantial evidence that BRT systems can influence physical and economic development patterns, it is nonetheless substantial and consistent with theoretical expectations…We found a statistically significant change in the share of new development occurring in the latter period compared to the baseline period, indicating an association between BRT corridors and new office and apartment development….Although we cannot claim causality, results are consistent with theoretical expectations.
>
> We evaluated the change in share of jobs by major job sector.… we found that BRT station areas attracted a larger share of the jobs than the counter-factual station areas during the treatment period…We conclude that the weight of the evidence suggests a causal relationship in that bus rapid transit systems can influence new development and job location patterns over time.

> We now address the relationship between BRT and how it may influence the location of people and housing…We found that household transportation costs as a share of budgets increase with respect to CBD distance to about 19 miles, and about eight miles with respect to BRT stations. In other words, BRT stations confer transportation cost savings that may be capitalized into residential property values, making them more valuable.[1]

Other Benefits: Potential Economic Impact of Construction

Direct Spending

Preliminary estimates of the total project costs associated with implementing ART in San Antonio put the total project cost at $566.7 million. Allocating contingency reserves proportionately across categories yields spending by broad category of $206.1 million for construction, $134.4 million for right-of-way real estate acquisition, $161.1 million for a range of professional services, and $65.1 million for vehicles/equipment. The assumption is that the vehicles/equipment are purchased from vendors outside the San Antonio area, with the balance of the spending ($501.6 million) occurring locally.

Input-Output Modeling

The second step in the process is to translate the direct impact above into the total economic impact through an input-output model of the Texas economy that allows measurement of the secondary, or "ripple" effects.

Economists use a number of statistics to describe regional economic activity. Four common measures are:

- Output (also known as Economic Activity and equivalent to top-line revenue), which describes total economic activity and is equivalent to a firm's gross sales or top-line;
- Value Added which equals gross output of an industry or a sector less its intermediate inputs or purchases from other firms used in the production process;
- Labor Income, which corresponds to wages and benefits; and
- Employment, which refers to jobs that have been created in the local economy.

In an input-output analysis of new economic activity, it is useful to distinguish three types of expenditure effects: direct, indirect, and induced.

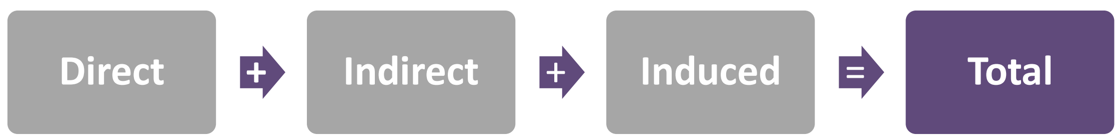
1 Nelson, Arthur C. and Ganning, Joanna. (2015). *National Study of BRT Development Outcomes.* National Institute for Transportation and Communities (NITC)

Direct effects are changes associated with the immediate effects or final demand changes. Spending by the project to buy goods and services, and pay their employees, are examples of direct effects.

Indirect effects are changes in backward-linked industries caused by the changing input needs of directly affected industries – typically, additional purchases to produce additional output. Satisfying the demand from the construction of a new project means that suppliers themselves must purchase goods and other services. These downstream purchases affect the economic output of other merchants.

Induced effects are the changes in regional household spending patterns caused by changes in household income generated from the direct and indirect effects. The restaurant owner in the community experiences increased income from spending by those who work for those building the project, as do those supplying it. Induced effects capture the way in which increased income is spent in the economy.

Figure 3: The Flow of Economic Impacts



A multiplier reflects the interaction between different sectors of the economy. An output multiplier of 2.5 for example, means that for every $1,000 injected into the economy, all other sectors produce an additional $1,500 in output. The larger the multiplier, the greater the economic impact. In this analysis, TXP used the RIMS II input-output multipliers produced by the U.S. Bureau of Economic Analysis for the San Antonio MSA. The results that follow provide the total impacts associated with potential ART construction in San Antonio.

Economic Impact Findings

The potential local economic impact of construction of the project is significant. Estimated direct local spending of $501.6 million yields $642.9 million in total output, $379.5 million in value-added, $182.9 million in labor income, and supports a total of 4,186 permanent jobs for the life of the project. While most of the impact is felt in Construction and Real Estate, every sector of the local economy would benefit. Table 5 provides detailed results.

Table 5: Detailed Economic Impact of Potential ART System Construction

	Output	Value-Added	Earnings	Jobs
Agriculture, etc.	$629,113	$259,890	$163,999	7
Mining	$4,721,945	$2,880,303	$807,453	10
Utilities	$9,439,123	$5,028,284	$1,445,486	14
Construction	$215,209,005	$115,757,546	$78,029,944	1,281
Durable Manufacturing	$33,159,617	$12,050,958	$6,460,574	121
Non-Durable Manufacturing	$10,711,060	$3,371,401	$1,873,897	36
Wholesale Trade	$16,736,077	$11,349,167	$5,236,353	68
Retail Trade	$31,535,471	$20,682,799	$11,042,656	381
Transportation & Warehousing	$11,607,233	$5,792,861	$3,877,739	90
Information	$10,803,255	$6,254,328	$2,400,823	36
Finance & Insurance	$27,704,738	$15,059,939	$6,740,905	119
Real Estate	$181,814,522	$127,600,548	$28,002,225	1,110
Professional Services	$15,498,292	$9,718,022	$6,878,969	96
Management of Firms	$4,971,941	$2,991,410	$2,055,810	24
Administrative & Waste Services	$16,334,036	$10,630,966	$7,050,866	198
Educational Services	$2,985,139	$1,810,261	$1,393,543	48
Health Services	$24,401,789	$14,598,594	$11,121,458	246
Arts/Entertainment/Recreation	$2,416,963	$1,379,202	$894,375	41
Accommodation	$3,180,494	$2,006,516	$887,204	26
Food Services	$8,548,517	$4,496,060	$2,770,046	130
Other Services	$10,500,391	$5,830,463	$3,809,607	105
Households	N.A.	N.A.	$252,720	23
Total Annual	**$642,908,720**	**$379,549,518**	**$182,943,933**	**4,186**

Source: TXP

Conclusion

While traditional transportation analysis has focused largely on user benefits, there is a growing sense that the broader impacts on the performance of a region and the nature and scope of its economic development should also be factored into the equation. There is no question that San Antonio has enjoyed relative recent economic success, averaging 2.5% annual job growth for the past five years, compared to 1.7% nationwide. However, past success does not necessarily guarantee a bright future, as the future economic development faces the twin challenges of the pandemic and ever-increasing competition, both foreign and domestic. This environment puts a heightened focus on decisions related to substantial public sector investments, especially since the range of transit improvements envisioned under enhanced transit do not exist locally.

Beyond the potential stimulus impact of construction of the project and the well-understood community benefits, the results here indicate that transit in general, and fixed guideway transit in particular, can have a positive influence on the performance of a regional economy and the community. These findings are tempered by the old expression that "correlation does not imply causation," as it is inappropriate to suggest that transit, by itself, is the direct cause of economic growth. Rather, the analysis indicates that the relationship between transit/fixed guideway systems and economic development is not random, and that investments such as those envisioned with enhanced transit can contribute to a region's economic development. Sustained economic growth is the product of a variety of factors, such as an educated and skilled workforce, high levels of worker productivity, local policies that are conducive to business and overall quality of life, local transportation accessibility, mobility, and options, and a capacity to compete globally, to name a few. A region might grow without one of these factors, but rarely can it sustain growth without a fairly diversified "portfolio." By the same token, the impact of these factors is cumulative, and is typically fully felt over an extended period of time. Based on all of the above, enhancing the local transit system has the potential to be an important asset in the overall mix.

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