

THE SAN DIEGO METROPOLITAN TRANSIT SYSTEM A STUDY OF ITS ECONOMIC IMPACT



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THE SAN DIEGO METROPOLITAN TRANSIT SYSTEM

A STUDY OF ITS ECONOMIC IMPACT

EXECUTIVE SUMMARY

- Including all of the ripple or multiplier effects, San Diego Metropolitan Transit System-related activities generated an estimated \$1.0 billion of gross regional product (GRP) in FY 2018. MTS was directly or indirectly responsible for nearly 13,000 of the total number of jobs and approximately \$625 million in total personal income.
- With operating expenses and capital outlays totaling \$364 million in FY 2018, every dollar of direct MTS spending yielded a total of about \$2.82 in GRP.
- San Diego's MTS contributes significantly to decreasing the region's carbon footprint and achieving its Climate Action Plan goals. In FY 2018, MTS reduced the region's carbon dioxide (CO₂) emissions by 97,000 metric tons. In dollar terms, this environmental savings amounted to \$13.6 million.
- In FY 2018, total savings accruing to San Diego MTS users totaled an estimated \$861 million. These savings went primarily to lower income households who represent the majority of MTS riders.
- MTS is 133 years old, originating as an open air street car led by two mules or horses. Today MTS trolleys and buses travel 29 million miles per year and deliver 85 million passenger trips.
- Financially, the San Diego MTS outperforms all of the other 15 largest metropolitan areas. It has the highest cost recovery rate and the lowest expense ratios relative to either miles traveled or the total number of passenger trips.
- San Diego's MTS serves all ethnic groups. Hispanics account for about 40% of riders. Men represent a slightly greater share of MTS ridership than women at 56% versus 44%.
- MTS provides discounted fares or special services on 22 million passenger trips for senior citizens, disabled persons, or individuals on Medicare.
- San Diego's MTS provides transportation particularly for lower-income groups. About one-fifth of riders earn less than \$15,000 per year.
- San Diego MTS ridership peaked in Fiscal Year 2015 (FY 2015) and has drifted lower in recent years along with the rest of the nation. A slight pickup has taken place in FY 2019.

- San Diego's MTS affects the economy through a number of channels. These include its direct effect on jobs, local companies providing goods and services to MTS, capital spending, savings to consumers, productivity gains for business, safety, tourism, cross-border transportation, and real estate development.
- San Diego's public transit provides major support to the region's tourist industry. In FY 2018, it provided 381,000 trips for Comic-Con attendees and 280,000 trips for baseball fans attending Padres games.
- MTS provides a vital link between employers and workers living in Mexico. In FY 2018, about 19,000 bus or trolley trips per day were made from San Ysidro or Otay Mesa.
- With the reduction of losses from car accidents including death, injury, or property damage, MTS enabled an estimated savings of \$6.1 million from greater safety in FY 2018.

Exhibit A

MTS Represents Sizable Economic Force

Fiscal Year 2018 estimate

MTS Budget	\$ 317 million
Jobs	12,900
Income	\$ 626 million
Gross Regional Product	\$ 1.0 billion
CO ₂ Reduction	\$ 13.6 million

Source: FBEI

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THE SAN DIEGO METROPOLITAN TRANSIT SYSTEM

A STUDY OF ITS ECONOMIC IMPACT

STUDY PURPOSE AND SCOPE

This report seeks to assess the total economic impact of the San Diego Metropolitan Transit System on San Diego's economy by analyzing the results of FY 2018. As the region considers the future of transportation, it is important for policymakers, business leaders, and residents to know the economic linkages and effects of its transit system.

The report traces all of the channels through which MTS affects the economy. These include its direct effect on jobs, local companies providing goods and services to MTS, capital spending, savings to consumers, productivity gains for business, safety, tourism, cross-border transportation, and real estate development. It also analyzes the impact on the region's greenhouse (GHG) emissions and Climate Action Plans.

The combination of these various channel effects yields estimates of the total impact of MTS on San Diego County's gross regional product (GRP), total employment, and personal income.

The report examines the demographics of MTS ridership in terms of its geographic usage, income levels, and ethnic composition. It analyzes historical trends of MTS ridership compared with national averages. The study also examines the financial performance of San Diego's MTS compared with that of transit systems in other major metropolitan areas.

Finally, the study examines the findings of other research conducted on public transit systems throughout the country.

BACKGROUND

The San Diego Metropolitan Transit System (MTS) dates back to July 3, 1886, beginning life as the San Diego Street Car Company. It debuted as an open air street car led by two mules or horses with a maximum speed of five miles an hour. It expanded to five lines running between what are today Market Street, F Street, Broadway, First Street, and Fifth Street. These operations involved six cars and 20 horses and cost five cents per ride. In today's dollars, that would amount to \$3.90 versus a typical current one-way fare of \$2.25 to \$2.50.¹

Today MTS, through its light rail and bus network, serves San Diego County's urbanized areas and the rural areas in the eastern part of the County. In total, its coverage spans 3,240 square miles.

Exhibit 1

The MTS in 1886



Source: SDMTS; FBEL

¹ Metropolitan Transit System, U.S. Bureau of Labor Statistics, FBEL.

San Diego's transit system operates through two major channels:

Light rail service, operated by San Diego Trolley, Inc. (SDTI), comprises 53 stations on 54.3 miles of track. It operates four lines (Orange, Green, Silver, and UC San Diego Blue Lines).

Bus service, provided by the San Diego Transit Corporation (SDTC) and private contractors, operates with 100 fixed routes as well as special paratransit service for disabled individuals (MTS Access). Fixed-route services encompass urban, rural, and express corridors.

Exhibit 2

2018 MTS Trolley Lines

Blue Line - Operates from the San Ysidro Transit Center through South County communities to America Plaza via The Center City corridor. **15.4 miles. 18 stations.**

Orange Line - Operates from the El Cajon Transit Center through East County communities to the Santa Fe Depot via the Center City corridor. **18.0 miles. 19 stations.**

Green Line - Operates from the Santee Transit Center through Mission Valley to 12th and Imperial Transit Center via the bayside corridor. **23.6 miles. 27 stations.**

Silver Line - Operates on a limited basis on the downtown loop from 12th & Imperial Transit Center along the bayside to C Street and Park Boulevard. **2.7 miles. 9 stations.**



Source: SDMTS; FBFI

In Fiscal Year 2018 (July 1, 2017-June 30, 2018), MTS saw 85 million passenger trips. MTS vehicles covered 29 million miles and operated a total of 1.7 million hours. MTS in Fiscal Year 2018 (FY 2018) provided discounted fares or special services on 22 million passenger trips for senior citizens (60 years and older), disabled persons as designated under the Americans for Disabilities Act (ADA), or individuals on Medicare.

In FY 2018, the MTS operating budget was \$279 million. This provided 2,750 full-time and another 195 part-time jobs, including positions created by firms under contract with MTS.²

DEMOGRAPHICS

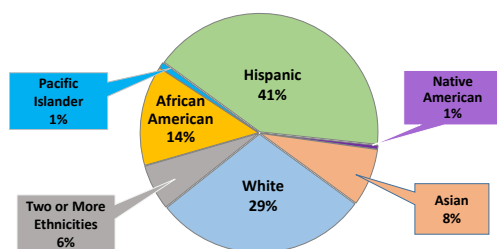
MTS serves all ethnic groups. Hispanics account for about 40% of riders. They are followed by Whites at about 30%, African-Americans at around 15%, and Asians at 8%.

Men represent a slightly greater share of MTS ridership than women. About 56% of all riders are male versus the 44% who are female.

Exhibit 3

MTS Serves a Diverse Range of People

Percent

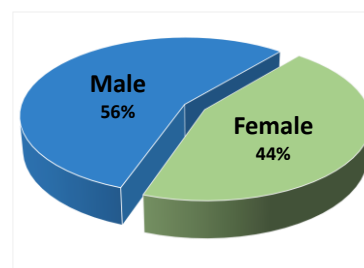


Source: SANDAG 2015 On-Board Transit Passenger Survey; FBFI

Exhibit 4

Men are more likely to use MTS

Percent

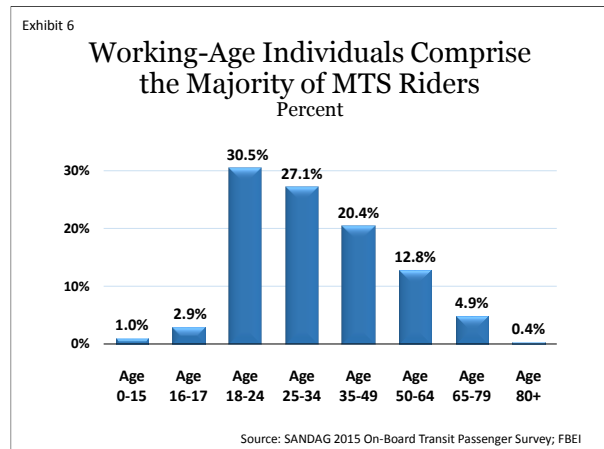
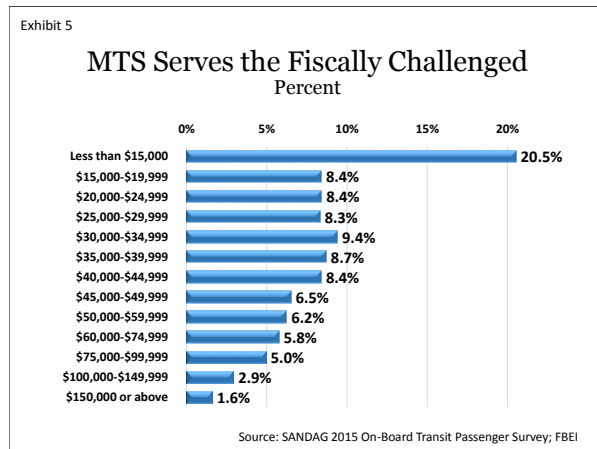


Source: SANDAG 2015 On-Board Transit Passenger Survey; FBFI

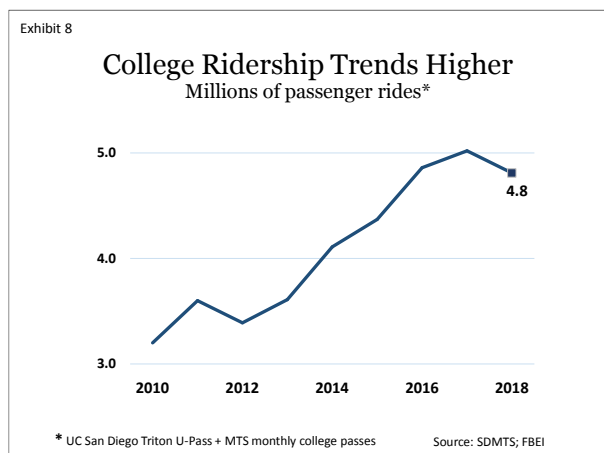
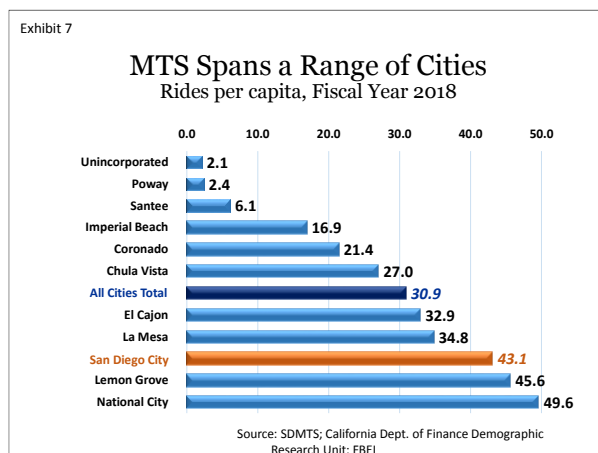
² MTS Adopted Fiscal Year 2019 Budget.

San Diego's MTS provides transportation particularly for lower-income groups. About one-fifth of riders earn less than \$15,000 per year. Nearly three-fifths make less than \$50,000 per year.

While MTS can serve a variety of transportation uses, such as shopping or traveling to sports or other entertainment, commuting to work represents the dominant function. Working-age individuals, with ages ranging from 18 to 64 years, represent over 90% of total ridership. The youngest of this group, aged 18-24, are 30% of the total, followed closely by the 25-34 age group at 27%.



San Diego's MTS offers transportation to a number of cities where it operates. In FY 2018, National City, Lemon Grove, and the City of San Diego experienced the highest transit usage per person. National City led with an average annual count of 50 rides per person, followed by Lemon Grove at 46 rides, and the City of San Diego at 43 rides. La Mesa, El Cajon, and Chula Vista all showed per capita ridership rates of over 25.

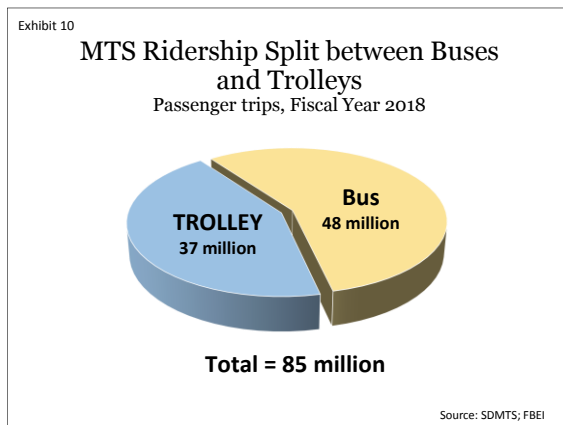
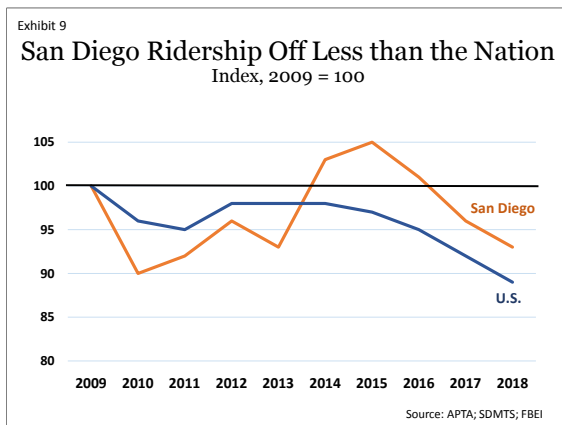


MTS has expanded its base among college students. Traffic congestion near campuses, scarce parking, education and other educational expenses, and environmental concerns have increased ridership. In 2014, a student-led referendum at UC San Diego, which provided transit passes for all students as part of tuition packages, was approved. In April 2018, UC San Diego students approved a six-year extension for the Triton U-Pass, with 72% of the vote. In FY 2018, regular college ridership totaled 4.8 million in terms of the number of passenger trips taken during the year. UC San Diego students represented about three-fourths of the total.

RIDERSHIP TRENDS

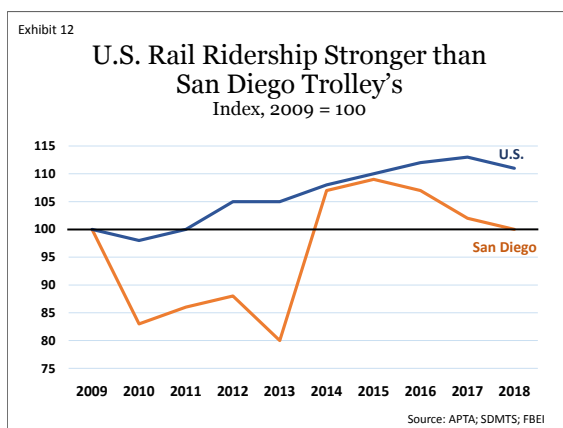
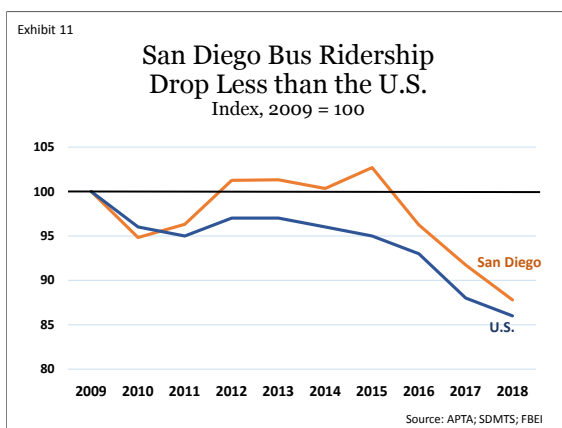
San Diego MTS ridership peaked in FY 2015 and has drifted lower in recent years. This is consistent with national trends, which have also softened. The decline in oil prices from over \$100 a barrel in 2014 and improving economic conditions have led people back to their cars. Relative to the end of the 2007-09 recession, San Diego MTS ridership has declined 7.2% versus a 10.9% drop nationally. San Diego MTS ridership improved slightly in the first half of FY 2019.

Of the 85 million passenger trips taken on MTS during FY 2018, 48 million, or 56%, were by bus. The bus share of trips has decreased from the 65% reached in FY 2013. Trolley's 44% share of FY 2018 was up from its 35% of FY 2013.



Bus ridership on San Diego MTS has followed national trends, although its drop over the past several years has been less than the rest of the country. Between FY 2009 and FY 2018 bus ridership in San Diego declined 12.2% versus a U.S. drop of 14.4%. San Diego bus ridership reached its high point in FY 2015 and has fallen lower since that time, although it picked up about 1% through May of FY 2019. Nationally, ridership achieved its highest point in FY 2012.

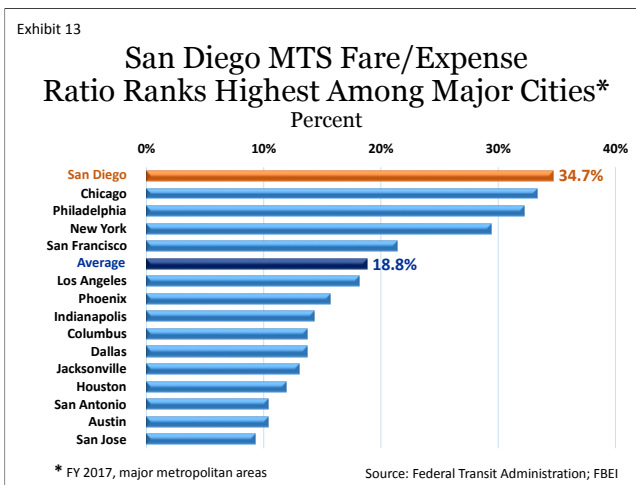
Trolley ridership on the San Diego MTS has decreased from its high point in FY 2015, although ridership edged up about 1% through May of FY 2019. Nationally, passenger trips by commuter or light rail increased steadily from FY 2009 to their peak in FY 2017.



FINANCIAL PERFORMANCE

Reflecting their objectives to offer residents a more efficient form of transportation, along with environmental and other benefits discussed earlier in this report, almost no public transit system operates in the black. Rider fares pay for only part of the expense, although advertising, interest earnings, and rental income provide some additional revenue. Federal, state, and local funds fill the gap between total operating expense and revenue.

In FY 2017, San Diego MTS covered 34.7% of its total operating expense with fare collections. This was the highest ratio of the 15 largest metropolitan areas when the costs of operating bus, light, and commuter rail systems are compared. Aside from San Diego, only Chicago and Philadelphia covered more than 30% of their expenses with fares. San Diego's ratio was significantly higher than the 15-city average of 18.8%.

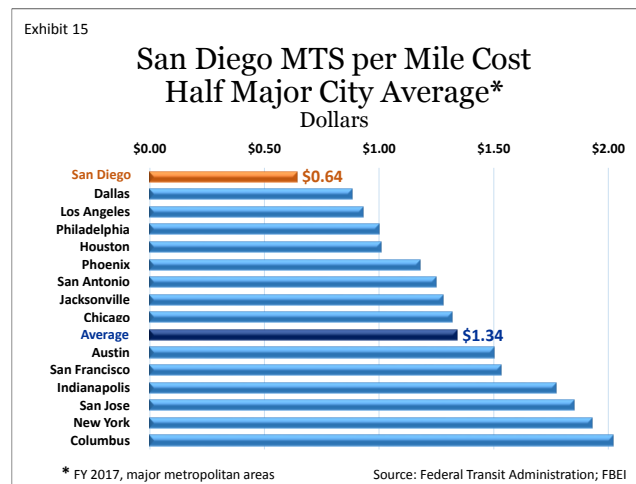


Operating expense per passenger trip equaled \$3.05 in FY 2017 for the San Diego MTS. Chicago, with a cost of \$3.25 per trip, and San Francisco at \$3.63 were the only other two cities among the 15 largest metropolitan areas with expenses less than \$4.00 per trip. San Diego's cost per passenger trip was \$2.75 under the 15-city average of \$5.80.



San Diego's operating expense relative to total miles traveled was the lowest among all of the 15 largest metropolitan areas at \$ 0.64 per mile. Only Dallas and Los Angeles had expenses per mile that were also below \$1.00 per mile. San Diego's average cost per mile was less than one-half the 15-city average.

Compared with all of the nearly 500 transit districts throughout the country, San Diego's MTS ranked close to or over the 90th percentile in terms of all three of the financial performance metrics discussed above.

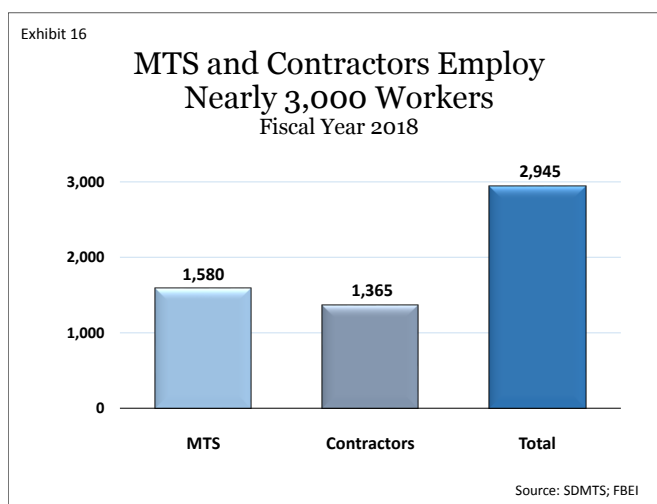


CHANNELS OF INFLUENCE

The San Diego MTS affects the economy through a number of channels that combine to impact the region's total output, income, jobs, and environment. These channels are the following:

MTS employees and compensation

In FY 2018, MTS employed 1,580 workers with a total payroll of \$131 million. Another 1,365 people worked to provide bus service under contract with MTS. The agency is thus one of the region's major employers with a total workforce of 2,945 individuals. These represent a significant source of both household income and spending.



Services and Supplies

MTS feeds into the local economy directly through its purchase of various goods and services. Some of this spending, such as for fuel and tires that are not produced in San Diego, has little impact on the regional economy. The majority of outlays supports local businesses. This spending encompasses such areas as security, equipment repair and maintenance, contracted transportation services, and utilities. In FY 2018, MTS spending on services and supplies directly supporting San Diego's economy equaled an estimated \$109 million.

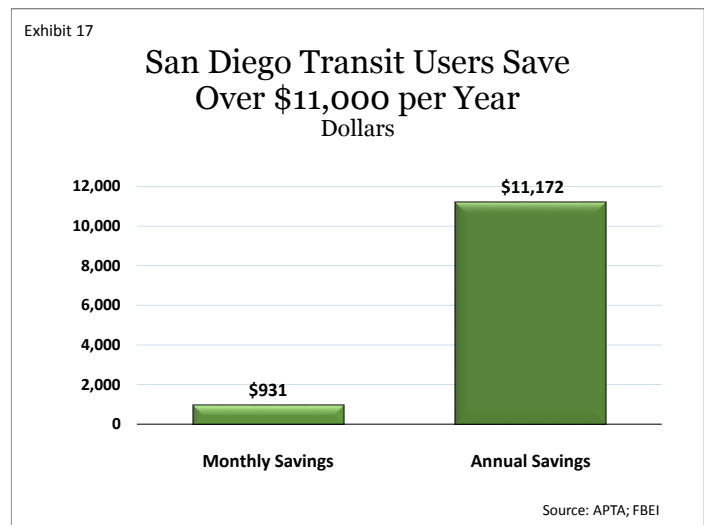
Capital Spending

Each year MTS invests in system upgrades and/or expansion. This includes its bus and trolley systems, as well as its information technology networks. In FY 2018, the Courthouse Station in downtown San Diego was completed. This marked the first opening of a new San Diego trolley station since 2005.

In FY 2018, MTS capital outlays totaled \$84 million. Because railcars and other items are not manufactured locally, they are purchased from outside the San Diego region. For this reason, total MTS spending on infrastructure and other capital spending directly impacting the region accounts for about one-third of the total. In FY 2018, MTS capital spending directly affecting the region totaled an estimated \$27 million.

Consumer Savings

Public transit can produce significant savings for households. The American Public Transportation Association (APTA) publishes monthly estimates on the annual average savings across U.S. cities. These savings reflect the difference between transit fares and driving costs, including the expense of gasoline together with outlays for car financing, insurance, maintenance and repair. In April 2019, monthly savings for San Diego MTS users averaged about \$930 a month or approximately \$11,200 per year.



In addition to the savings that commuters and other regular users of rapid transit realize, older and disabled individuals who cannot drive have a transportation resource that typically is less expensive than alternatives. The Special Access program of MTS, in particular, serves the disabled through its paratransit network. Without this service, many individuals would have to pay for taxi or shared-ride transportation.

In FY 2018, total savings accruing to San Diego MTS users totaled an estimated \$861 million. These savings went primarily to lower income households who represent the majority of MTS riders.

Business Benefits

Rapid transit can benefit companies through improving their access to workers, expanding their markets, or boosting productivity. Employees finding housing in less expensive outlying areas can avoid the time and strain of congested commutes by car. Retailers may have more ready access to customers. Companies can realize productivity gains with less tardiness and employees who arrive at work under less stress.

MTS offers ECO Pass, which gives San Diego businesses an annual discount for purchasing monthly bus and trolley passes for their employees. In FY 2018, nearly 47,000 passes were purchased. Various companies in downtown San Diego through the Downtown Partnership participated in the program. Other major employers participating included the City of San Diego, Evans Hotels, Hotel Del Coronado, the San Diego Marriott Hotel, the San Diego Unified School District, Scripps Health Care, Sharp Health Care, and the University of California San Diego.

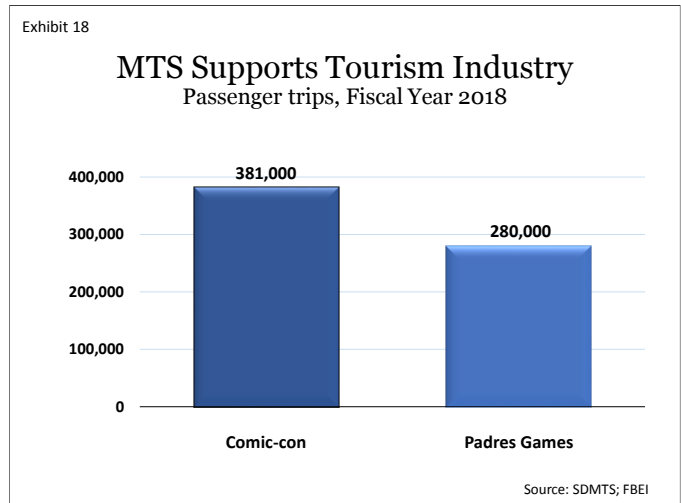
The total value of productivity gains for San Diego employers significantly utilizing MTS is estimated at \$688,000 for FY 2018.

Tourism

MTS supports San Diego's tourist industry by providing transportation for major conventions, sporting events, and various holiday and other special stagings. In FY 2018, MTS provided 381,000 trips for Comic-Con attendees. Baseball fans took 280,000 trips to see Padres games during the season.

The MTS trolley system was a transit preference for many attendees to various events held at the SDCCU Stadium in FY 2018. Buses and trolleys also accommodated a wide range of special events, such as the Big Bay Boom on July 4th.

The total net value of transportation services supplied to the tourist industry by San Diego's MTS is estimated at \$10.0 million in FY 2018.

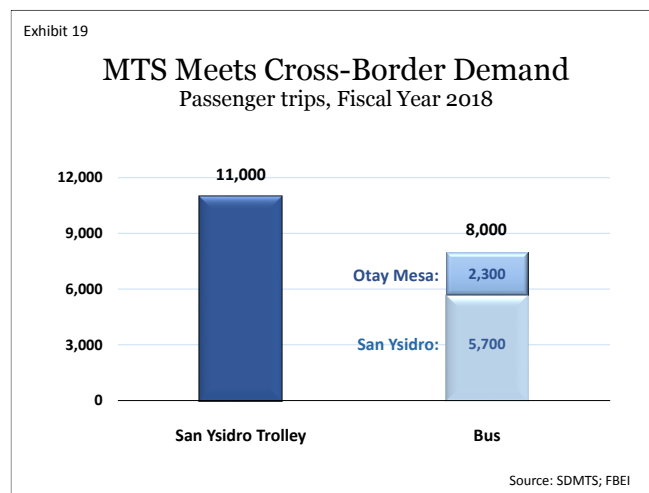


Cross-Border Transit

MTS provides a critical link between San Diego and Mexico. San Diego's economy relies heavily on workers from Mexico, particularly in such areas as construction, restaurants, hotels, and landscaping.

MTS trolley trips from San Ysidro averaged approximately 11,000 per day in FY 2018. MTS buses ran about 5,700 trips out of San Ysidro per day and another 2,300 daily trips out of Otay Mesa. More than one-half of all individuals crossing the border use MTS services.³

Businesses in National City, downtown San Diego, and other parts of the region benefit from the lower transportation costs and greater accessibility to employees. This cross-border direct dollar savings equaled an estimated \$53 million in FY 2018.

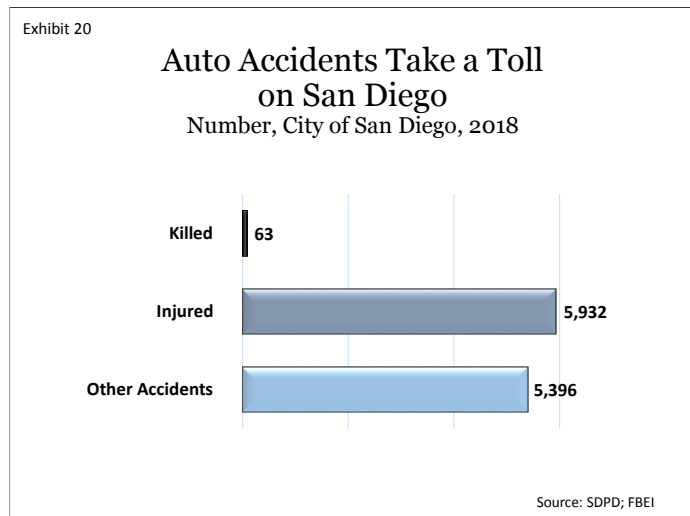


³ San Diego MTS, *Community Impact and Performance Report*, 2018.

Safety

Traffic accidents cause death, injury, and property damage or loss. In calendar year 2018, more than 11,000 auto accidents occurred in the City of San Diego. Sixty-three people were killed, while nearly 6,000 more were injured. Another 5,400 car crashes occurred.

In addition to what can be severe personal loss, car crashes inflict significant economic damage. These economic costs encompass income losses as well as the expense of health care, rehabilitation, and car repair or replacement. In FY 2018, MTS achieved safety savings for its users of \$6.1 million.



Real Estate Development

It would seem that properties with a close proximity to a transit station or transit hub might offer a greater economic potential for a developer versus another project further away or one without access to public transportation. However, in the absence of special incentives, does the presence of available transit significantly impact a developer's decision to build houses, condos, an apartment complex, an office complex, or a retail center?

Most of the research on the economic relationship between development and transit has focused on the increase or decrease in residential and commercial land values, property values, and/or rents based on proximity to a transit station. This literature points out that transit systems can affect property values both positively (increased accessibility) and negatively (noise, pollution, and crime)⁴. One study that focused on San Diego's light and commuter rail concluded that rail transit services do provide land-value benefits to residential and commercial properties, but the impacts on values are corridor- and land-use specific.⁵

There have been some general documented impacts to indicate that this finding holds true for other cities as well:

- Philadelphia – Home values increase 6.4% for homes near train stations.
- Washington D.C. – Housing prices rise 2.4% to 2.6% for every tenth of a mile closer to a D.C. Metro station.
- San Francisco – Home prices increase from \$1,578 to \$2,300 for every 100 feet closer to a BART station based on different neighborhoods.

⁴ Kilpatrick, Throup, Carruthers, and Krause, *The impact of Transit Corridors on Residential Property Values*, 2007.

⁵ Cevero, *Effects of Light and Commuter Rail Transit on Land Prices: Experiences in San Diego County*, 2004.

- Multi-city – Across a five-city average, rents rise \$19 a month and houses show a premium of \$4,972 as one moves from three miles to one mile closer to a transit station.
- St. Louis – Home prices rise \$140 for every 10 feet closer to a transit station.⁶

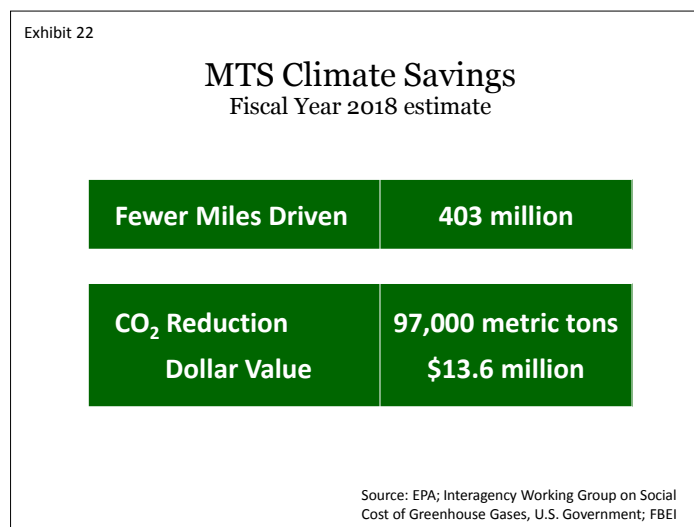
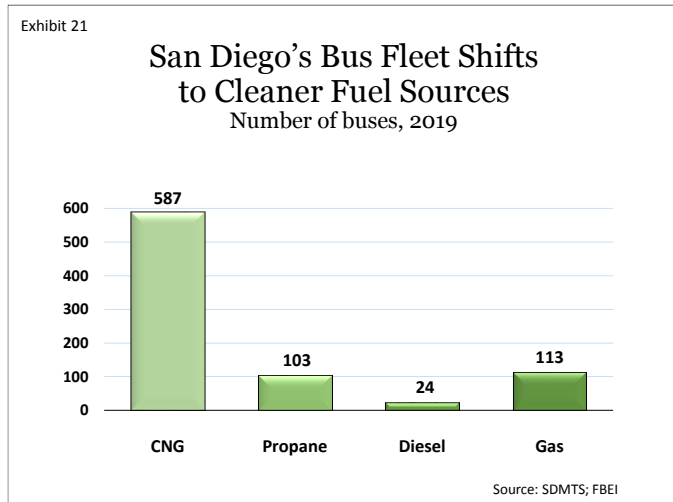
Many projects, such as those in downtown San Diego, might well have been developed even in the absence of a transit hub. However, FBEl did model the Villa Encantada development on the underutilized parking lot at the MTS Encanto station (505 62nd Street and Imperial) because this project is taking place on MTS property. The construction value of this development attributed to its proximity to the MTS station was estimated at \$2.25 million for FY 2018.

Environment

Public transit can have significant effects in reducing the region's carbon footprint. Because public transportation produces lower greenhouse (GHG) emissions than autos it can provide a major way for the region to achieve its Climate Action Plan goals.

Over two-thirds of the fleet of over 800 MTS buses are currently powered by compressed natural gas (CNG). This fuel emits 30% less GHG into the atmosphere compared with diesel. Approximately another 100 buses rely on propane, which also has a low GHG emission factor.

In FY 2018, public usage of San Diego's MTS meant that over 400 million fewer miles were driven than would otherwise have taken place. As a result, carbon dioxide (CO₂) emissions, which are the primary source of GHG, were reduced by 97,000 metric tons. In dollar terms, this environmental savings amounted to \$13.6 million.



⁶ Kilpatrick et al.

THE TOTAL ECONOMIC IMPACT

The impact of dollars most closely linked to the MTS budget is only the starting point for measuring the impact on San Diego. Two additional dimensions are important.

First, supply chain, or business-to-business, effects are significant. For example, once a firm receives a contract to build a new trolley line or transit station or to repair equipment, it will need to purchase materials, engage subcontractors, and hire employees to carry out the work.

Second, consumer spending will receive a boost. Workers employed by the primary contractors plus those benefiting along the supply chain will spend a part of their related earnings on various goods and services produced in San Diego.

Accounting for the supply chain and consumption effects means that each dollar of MTS-related expenditures goes further than its face value in creating jobs, income, regional gross regional product (GRP), and total business sales.

Exhibit 23

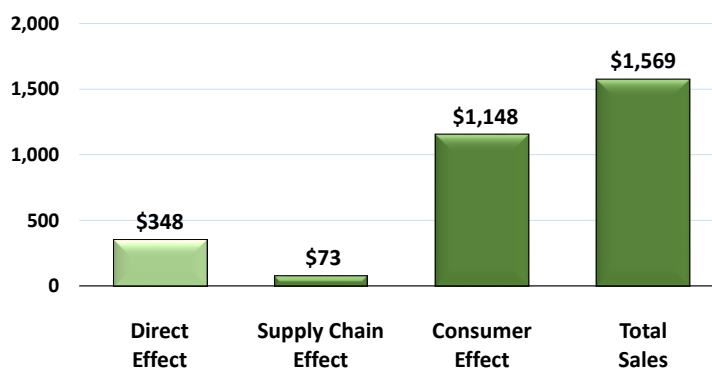
MTS Channels are Widespread Millions of dollars, Fiscal Year 2018

Compensation	\$ 131.2
Services and Supplies	\$ 109.5
Capital Spending	\$ 27.3
Consumer Savings	\$ 861.3
Business Benefits	\$ 0.7
Tourism	\$ 10.0
Cross Border Transit	\$ 53.1
Safety	\$ 6.1
Real Estate Development	\$ 2.3
CO ₂ Reduction	\$ 13.6

Source: SDMTS; FBEI

Exhibit 24

MTS Direct Effects Expand Beyond Starting Point Millions of dollars, Fiscal Year 2018 estimate



Source: FBEI

The total dollars related to MTS represent an important economic driver in the economy. It should be noted that some of this spending would have taken place in the absence of MTS, primarily by other transportation modes. Important effects, such as safety and the environment, would have been absent. This analysis focuses on the total size and scope of San Diego's MTS as it currently influences the region's economy.

In FY 2018, incorporating all of the ripple or multiplier effects, San Diego's MTS was responsible for nearly 13,000 of the total number of jobs existing in the County. These jobs yielded about \$625 million in income or earnings for wage and salary workers and for various small business owners. The total impact of MTS-related spending generated an estimated \$1.0 billion of output or GRP in the San Diego region in FY 2018.

Exhibit 25

MTS Represents Sizable Economic Force Fiscal Year 2018 estimate

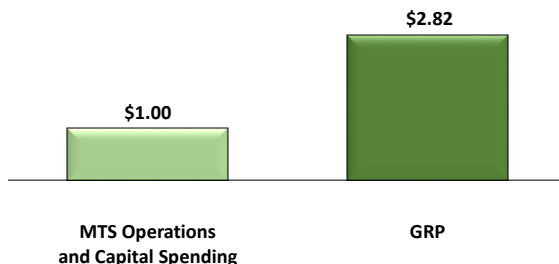
MTS Budget	\$ 317 million
Jobs	12,900
Income	\$ 626 million
Gross Regional Product	\$ 1.0 billion
CO ₂ Reduction	\$ 13.6 million

Source: FBEI

MTS budget outlays show an impressive return in terms of their economic impact. The agency's operating expenses and capital spending during FY 2018 totaled \$364 million, while it contributed directly or indirectly to a total GRP impact of \$1.0 billion. This means that every dollar of direct MTS spending yielded a total of approximately \$2.82 in GRP.

Exhibit 26

MTS Returns \$2.82 per Dollar Fiscal Year 2018 estimate



Source: SDMTS; FBEI

CONCLUSIONS

San Diego MTS is an important economic force in the region. It has a sizable impact through a number of channels, ranging from infrastructure spending, consumer savings, and tourism to business productivity and cross-border transit. It contributes significantly to greater safety in transportation and to the region's Climate Action Plan objectives. MTS also contributes meaningfully to the region's total employment, personal income, and GRP.

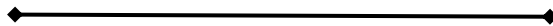
Along with the rest of the nation, ridership has slipped in recent years. Some of this is due to an improving economy and oil prices that are off their earlier peaks. The trolley's expansion in San Diego could help revive ridership.

The availability of convenient public transit has become a major factor in determining the competitiveness of cities as companies look for areas to start new ventures or expand existing operations. It is also an important factor for many potential employees.

San Diego MTS represents a major source of support for the region's lower income households as well as a diverse range of ethnic groups. It serves college students who are financially burdened with the cost of housing and student debt. It provides a vital link between businesses and individuals crossing the border for work. It also enables large conventions like Comic-Con that might otherwise not be feasible.

In order to reduce GHG emissions, the role of MTS could be expanded. For many San Diego households it could become a primary option for transportation rather than the last. Businesses could do more to encourage their employees to take public transit. Hotels, entertainment, and sports venues could boost the awareness and attractiveness of public transit. Private and public schools could encourage more MTS ridership among their student bodies.

San Diego's MTS already plays an important role in the economy. It could become an even more vital cog in the region.



APPENDICES

Appendix A: Methodology

To assess the total economic impact of MTS on the San Diego region (San Diego County), each of its primary channels of influence was quantified and or estimated for FY 2018.

Compensation: Total compensation figures and full-time equivalent employee (FTE) counts were based on revised figures from the MTS FY 2019 Adopted Budget and MTS payroll records.

Services and Supplies: FY 2018 spending on security, repair and maintenance, the rebuilding of engines or transmissions, tires, CNG, traction power, contracted bus service, utilities, and other goods and services, was obtained from the MTS FY 2019 Adopted Budget. FBEI estimated the shares of spending that would accrue to San Diego firms based on the capacity of local industries.

Capital Spending: The cash flow segment of capital investment for FY 2018 was obtained from MTS. Based on an analysis of companies receiving MTS contracts, shares of capital spending directed at San Diego firms were estimated at 80% for construction projects and 45% for equipment.

Consumer Savings: The number of regular MTS riders for FY 2018 was estimated based on the number of monthly passes used and the average number of working or transit days per year. APTA figures were used for the annual savings estimated for a San Diego household using public transit. The savings for Special Access riders were calculated by using an estimate of what a typical ride would cost using a shared ride service such as Uber. Total cost savings for both regular MTS and Special Access users were analyzed as equivalent to income gains and allocated across households based on the income distribution of MTS riders.

Business Benefits: The impact on business productivity and the value of MTS service to enterprises was based on those organizations who purchased the MTS ECO Pass in FY 2018. The total value of MTS business benefits was estimated as the cost of the ECO Pass plus the return enterprises would expect on a similar investment. The cost of capital for non-financial firms was estimated at 8.22% as published by the NYU Stern School of Business.

Tourism: Ridership trip counts for FY 2018 for such events as Comic-Con, Padres games, and the Big Bay Boom were obtained from MTS. FBEI calculated the difference between the cost of using MTS for such events and the cost of driving and parking or using taxis or shared ride services. These base numbers were adjusted to estimate the impact on all conventions, special events staging, or sporting events that are partly served by MTS and allocated to restaurants and other segments of tourism.

Cross-Border Transit: Daily trolley and bus passenger trip counts from San Ysidro and Otay Mesa were secured from MTS and converted to annual counts. The cost of using MTS per year with a combination of monthly and daily passes was estimated. That cost was then compared to the annual cost of driving based on the estimated number of miles per trip and cost per mile. Per mile costs were based on published IRS calculations. Savings were allocated to different business segments, such as construction, tourism and landscaping, to represent the savings in compensation or access to workers for firms dependent on cross-border employees.

Safety: Data from the San Diego Police Department (SDPD) was used to source the number of traffic fatalities, injuries, or other car accidents for calendar year 2018 for the City of San Diego. The economic cost of each type of accident was based on research from the National Safety Council and then adjusted for inflation. The cost savings from the increased safety afforded by public transit ridership was adjusted to reflect the entire area served by MTS and was allocated across households based on the income distribution of MTS users.

Real Estate Development: Villa Encantada is the redevelopment of an underutilized parking lot next to an Orange Line trolley station in the Encanto neighborhood. The project broke ground in February 2017 and was completed in the summer of 2018. The total project development costs were \$27 million with 50% of these costs considered as costs for actual construction materials and labor hard costs (\$13.5 million). Since two-thirds of the development occurred in FY 2018, these hard costs were then multiplied by two-thirds for a total of \$9.0 million. This amount was further reduced by 75% to reflect the impact of proximity to a transit station for a total economic impact of \$2.25 million.

CO₂ Reduction: To calculate the value of a reduction in CO₂ emissions, U.S. Department of Transportation (DOT) numbers were used to estimate the reduction in the number of pounds of carbon per passenger mile over various forms of public transit relative to cars. The reduction for San Diego's MTS was based on the ridership on trolleys versus buses, the composition of the MTS bus fleet by fuel source, and the emission factors for different fuel types as published by the U.S. Environmental Protection Agency (EPA). The total estimate of the reduction in car miles driven was then calculated from the total number of MTS passenger trips in FY 2018 and the average length of each of those trips. Carbon savings were converted from pounds to metric tons. The price of CO₂ savings per metric ton was taken from estimates provided by the U.S. Interagency Working Group on Social Cost of Greenhouse Gases and then adjusted for inflation.

The IMPLAN® model was used to analyze the total economic impact of MTS. This is a widely used model to evaluate the various ripple or multiplier effects of an increase in spending on a region's sales, output, and income. These ripple effects encompass two stages: supply chain and consumer effects. The supply chain effects reflect the impact on other businesses when a local firm has to purchase additional goods or services to support its own increase in sales or activity. The consumer effects refer to the increase in household outlays due to the gain in jobs and income created by the direct impact of the increase in spending as well the effects along the supply chain.

For the purpose of modeling all of the channels affecting various economic sectors, the incremental effects on business sales were divided into various industry categories. These included construction firms, transportation providers, equipment servicing and repair businesses, security firms, hotels, restaurants, various retailers, entertainment and sporting venues, transportation, and other relevant categories. The cost savings from the reduction in driving expenses and the increased safety afforded by public transit ridership were allocated across households based on the income distribution of MTS users.

Adjustments were made to account for inflation and to convert the results into 2018 dollars. Simulations were then run to obtain the direct, indirect, and total impact of MTS on the area's total sales, gross regional product (GRP), and income.

Appendix B: Literature Review

Summary: A significant number of reports and studies have been done that address the impacts of public transportation on various social and economic issues, encompassing a wide range of local, state, and federal perspectives. A sampling of these documents were reviewed for this report with corresponding summaries provided. A few of the key findings that are noteworthy for San Diego are as follows:

- The Moovit Public Transit Index collection of over five billion data points per day finds San Diego comparable to the San Francisco Bay Area, Los Angeles, and New York City regarding average time riding public transportation, average wait time, average distance for a single trip, number of riders with at least one transfer, and the average distance walked to work or home.
- A ratio analysis of an American Public Transportation Association study showing the impact on business sales, wages, jobs, and gross domestic product (GDP) resulting from a \$1 billion national investment in public transportation yields similar results to the calculations done in this study when the input is scaled to the \$317 million MTS budget.
- Equitable Transit-Oriented Development (TOD) is emerging as a top issue for localities. Equitable TOD seeks to ensure that residents of all incomes and backgrounds can afford to live near and use public transportation services, as opposed to driving lower income residents further out.

Other studies reviewed discuss the contribution of public transportation to agglomeration, rents, jobs, auto congestion, travel/commute times, residential and commercial property values, and environmental protection.

I. Moovit Insights Public Transit Index

https://moovitapp.com/insights/en/Moovit_Insights_Public_Transit_Index-582#

The Moovit Public Transit index measures how much people in San Diego use public transit compared to other cities. Their index utilizes approximately five billion anonymous data points a day that are added to the database. This database is the largest in the world and collects information from thousands of different cities.

According to the index, San Diego has four transit type(s), including Light Rail, Train, Bus, and Ferry, operated by several transit agencies, including MTS, North County Transit District, the San Diego International Airport, and the University of San Diego Tram Service.

Key Findings:

- In San Diego, the average amount of time people spend riding public transit is 70 minutes. Over 71% of those riders spend more than 2 hours on public transportation every day.
 - This is comparable to New York City where the average transit time is 87 minutes, SF Bay Area where the average travel time is 77 minutes, and Los Angeles where the average transit time is 86 minutes.
- People who wait or stop at a station in San Diego wait on average 16 minutes, but over 46% wait longer than 20 minutes.
 - This is comparable to New York City – 15 minutes, SF Bay Area – 13 minutes, and Los Angeles – 20 minutes.
- The average distance people ride in a single trip within San Diego is 6.96 miles. Yet 74% of riders travel over 7.45 miles in a single direction.
 - This is comparable to New York City (5.9 miles), SF Bay Area (5.65 miles), and Los Angeles (6.9 miles).
- The percentage of public transit riders who transfer lines at least once in San Diego is 55%. On average, 27% of riders transfer at least twice during a single trip
 - This is comparable with New York City (72%), SF Bay Area (58%), and Los Angeles (71%).
- In San Diego, the average distance people walk to work or home is 0.75 miles. Approximately, 48% walk more than 0.62 miles to reach their destination.
 - This is comparable with New York City (0.43 miles), SF Bay Area (0.47 miles), and Los Angeles (0.58 miles).

II. Economic Impact of Public Transportation Investment. Glen Weisbrod. Arlee Reno. American Public Transportation Association. (2009, October).

The purpose of this study was to learn how investment in public transportation affects the economy in terms of employment, wages, and business income. The data used in the study is pulled directly from two sources: Federal Transit Administration of the US Department of Transportation and the American Public Transportation Association. Through a calculation of indirect and induced (multiplier) impacts, the direct, indirect, and induced impacts on jobs, income, and spending were found.

Key Findings:

- Travel and vehicle ownership cost savings for public transportation passengers and those switching from automobiles, leading to shifts in consumer spending;
- Reduced traffic congestion for those traveling by automobile and truck, leading to further direct travel cost savings for businesses and households;
- Business operating cost savings associated with worker wage and reliability effects of reduced congestion;
- Business productivity gains from access to broader labor markets with more diverse skills, enabled by reduced traffic congestion and expanded transit services areas. Additional regional business growth enabled by indirect impacts on supply chains and induced impacts on spending of worker wages. At a national level, cost savings and other productivity impacts can affect competitiveness in international markets.

Charts taken directly from the study:

Exhibit 3-3. Jobs Generated in the US per Billion Dollars of Spending on Public Transportation (National Spending Mix, with 2007 prices)

Job Generation per \$ Billion of Spending	Capital	Operations	Blended Average
Direct Effect	8,202	21,227	17,450
Indirect Effect	7,875	2,934	4,367
<u>Induced Effect</u>	<u>7,111</u>	<u>16,979</u>	<u>14,291</u>
Total Jobs	23,788	41,140	36,108

Exhibit 3-6 Economic Impact per Billion Dollars of National Investment in Public Transportation (includes indirect and induced impacts)*

Economic Impact	Per \$ Billion of Capital Investment	Per \$ Billion of Operations Investment	Per \$ Billion of Average Investment
Output (Business Sales)	\$ 3.0 billion	\$ 3.8 billion	\$ 3.6 billion
GDP (Value Added)	\$ 1.5 billion	\$ 2.0 billion	\$ 1.8 billion
Labor Income	\$ 1.1 billion	\$ 1.8 billion	\$ 1.6 billion
Tax Revenue (fed, state, local)	\$ 350 million	\$ 530 million	\$ 488 million
Jobs (Employment)	23,788	41,140	36,108

* Note: indirect and induced impacts reflect effects on additional industries; they do not provide additional multiplier effects on federal investment unless there is sufficient unemployment to absorb additional jobs without displacement of other existing jobs

III. Transit Service, Physical Agglomeration and Productivity in U.S. Metropolitan Areas. David Chatman. Robert Noland. Sage Journals. (2013, August).

Agglomeration can show the importance of how more jobs cluster in a city center as a result of when more people collect in a city' core, which boosts both wages and economic productivity over time. According to this study, the key is public transportation. The larger the labor force, which can be widened with public transportation, the better chance an employer will have to match the needs of a job with the skills of a worker.

The researchers ran a number of statistical models that took into account factors such as job density, population growth, and transit development, as well as economic productivity measures and average wages. This was done over 300 metropolitan areas across the United States. The results below are an average of all 300 metropolitan areas.

Key Findings:

- Every time a metro area added 4 seats to rails and buses per 1,000 residents, the central city ended up with 320 more employees per square mile – an increase of 19 percent in job availability.
- Adding 85 rail miles delivered a 7% increase in employees.
- A 10% expansion in transit service (by adding either rail or bus seats or rail miles) produced a wage increase between \$53 and \$194 per worker per year in the city center. The gross metropolitan product rose between 1 and 2 percent.
- On average, across all the metro areas in the study, expanding transit service produced an economic benefit via agglomeration of roughly \$45 million a year – with that figure ranging between \$1.5 million and \$1.8 billion based on the size of the city.

IV. Can Public Transportation Increase Economic Efficiency? Matthew Drennan and Charles Brecher. Access Magazine. (2012).

The purpose of this paper was to examine if public transportation can increase agglomeration economics. The authors' hypothesis was that office rents, as indicators of efficiency gains from the presence of urban agglomeration economics, would be higher in areas better served by mass transit. They claim that good mass transit enables large numbers of skilled workers to live in or travel to a small area. Such concentrations in workers increase the likelihood of agglomeration economies of two types:

1. Labor pooling: the high concentration of workers with specific skills in an area
2. Knowledge spillovers: the informal sharing of information among those engaged in the same occupation, whether it be stonework or computer software.

The study then asks the question: Do Central Business Districts (CBD) with high concentrations of office space command higher rents because of higher public transit use?

Key Findings:

- The answer to the question above is tentatively yes – but not by a large amount. For those CBD's with more than 30% of the total metropolitan office space, the effect of transit use on rents is small but positive. By contrast, the results show that transit use has no effect on office rents in places with a low concentration of office space in the CBD. This means that public transit appears to increase office rents, but only for places with a high concentration (above 30%) of office space in the CBD.
- A 10% rise in transit use raises office rents by only 0.5%. Using the mean office rent of \$23.86 per square foot per year in 2007 for all markets, these percent changes translate into rent gains of only 1 cent to 12 cents per square foot per year.
- The policy implication is that rent gains from increasing transit ridership would be a relatively small fraction of the cost of expanding public transit in metro areas with a high concentration of space in the CBD.

V. Where the Jobs Are: Employer Access to Labor by Transit. Adie Tomer. Metropolitan Policy Program at Brookings. (2012, July).

While automobiles do provide broad job accessibility, there is no guarantee the trip is easy. The data in this study indicates the nation's average distance to work jumped from 9.9 miles in 1983 to 13.3 miles in 2009. Meanwhile, as solo drivers topped 74 percent of all commuters, the average number of hours spent in traffic increased from 14 hours in 1982 to 34 hours in 2010. Additionally, the high cost of owning and operating a vehicle appears to be a primary reason that 10% of households in the U.S. do not have access to a vehicle. Compared to their car-owning counterparts, zero-vehicle households are more likely to earn low incomes, live in cities, and take public transportation to work.

For people who may own a car, but still be low income, there are significant problems with the daily commute that affect workers and employers. The research done for this study shows congestion geographically limits business markets, raises costs, and reduces employee productivity. The study argues the case for public transportation as the solution to these problems. It concludes that public transportation offers businesses and workers an alternative to automobile congestion, while it takes cars off the road to allow more space for commercial freight, transportation, and delivery.

The findings from this study indicate that the typical job is accessible to only 27% of the metropolitan workforce by transit in 90 minutes or less. Additionally, labor access varies considerably from a high of 64% in Salt Lake City, Utah, to a low of 6% in Palm Bay, Florida, reflecting differences in transit availability, job concentration, and land use patterns. This demonstrates that city jobs are consistently accessible to larger shares of metropolitan labor pools than suburban jobs, reinforcing cities' geographic advantage relative to transit routing.

- VI. America's commuting choices: 5 major takeaways from 2016 census data. Adie Tomer. Brookings Institute. (2017, October). <https://www.brookings.edu/blog/the-avenue/2017/10/03/americans-commuting-choices-5-major-takeaways-from-2016-census-data/>

This article focuses on the largest takeaways from 2016 American Community Survey Data (ACS):

- American commuters are still largely depend on cars
 - Over 76% of Americans drive alone to work every day, while another 9% carpool with someone else. That means that at least 115 million cars and trucks are on American streets every day. For comparison, 5.1% use public transportation, 2.7% walk, and 5.0% work from home.
 - Owning and maintain a private vehicle is the second highest average expense after housing.
- Nationally, commuting shares are stubbornly persistent
 - Looking at ACS data from 2007 and 2016, no transportation mode saw its share of total commuters change more than 1.5%. Even with new roads, widened roads, new transit lines, ride-hailing services, and bike share systems, the same fundamental distribution of commuter choice has prevailed.
 - In 2016, transportation became the economy's number one polluting sector.
- Cities are beginning to lead shifts away from driving
 - 21 of the country's 50 most populated cities experienced a significant drop in driving. Seattle's solo driving rate dropped below 50%.
- Working from home continues its upward climb
 - 32 out of the 50 largest cities in the nation realized a significant increase in work from home sites
- Better data is needed to capture the transportation patterns for different purposes
 - Current research shows that ride-hailing spikes during off-peak commuting hours, suggesting many users are not ride-hailing for work. ACS data does not reflect the behavior of these individuals.

- VII. Communities Are Embracing Development near Transit: A Snapshot of Transit-Oriented Development Support across the United States. Jana Lynott. AARP Public Policy Institute. September 2017.

This study focuses on Transit-Oriented Development (TOD), which is one means of creating sought after, economically vibrant neighborhoods. TODs include a mixture of housing, office, retail, and/or other commercial development and amenities integrated into a walkable neighborhood and located within a half mile of quality public transportation. They are intended to boost ridership, reduce traffic and vehicle emissions, and encourage active lifestyles.

Key Findings:

- TOD benefits from strong support from multiple community segments. These include, in particular, regional transit agencies that use their real estate assets to catalyze development near transit as well as metropolitan planning organizations that are taking the lead in drawing up model TOD zoning district templates or design guidelines that localities can adopt within their own policy and regulatory frameworks.
- TOD requires complex funding and partnerships. Metro Transit in the Twin Cities, for example, has identified more than 70 federal, state, local, and private grants and financing opportunities for TOD development, many of which have been tapped to build TOD neighborhoods around the region's three new Metro light rail and Bus Rapid Transit (BRT) lines.
- Equitable TOD is emerging as a top issue for localities. Transit rich neighborhoods can often increase the price of housing in the surrounding neighborhoods, thus pushing lower income residents out. Equitable TOD seeks to ensure that residents of all incomes and backgrounds can afford to live near and take advantage of high frequency public transportation services and other neighborhood amenities.

- VII. APTA Economic Impact of Public Transportation Investment. (2009).

A statistical study of residential property values in Buffalo, NY, examined how values varied for properties within one-half mile of light rail transit stations. It found that every foot closer to a light rail station increased average property values by \$2.31 (using geographical straight-line distance) and \$0.99 (using network distance). Consequently, a home located within one-quarter of a mile radius of a light rail station can earn a premium of \$1,300-\$3,000 (Hess, 2007).

Studies over two decades show average housing value premiums associated with being near a station (usually expressed as being within 1/4 to 1/2 mile of a station) are 6.4% in Philadelphia, 6.7% in Boston, 10.6% in Portland, 17% in San Diego, 20% in Chicago, 24% in Dallas, and 45% in Santa Clara County. These numbers reflect specific locations in each metropolitan area. (Cervero et al, 2004).

A review of experiences in the San Francisco Bay Area study found that for every meter closer a single-family home was to a BART station, its sales price increased by \$2.29, all else being equal. Alameda County homes near BART stations sold, on average, for 39% more than otherwise comparable ones 20 miles from the nearest station (Cervero et al, 2004).

A detailed study conducted by researchers at the University of Toronto in 2000 indicated that proximity to a subway station in Toronto generated approximately \$4,000 in additional residential property value for a home with a value of \$225,000. (Canadian Transit Association, 2003)

A study of the DART system compared differences in land values of “comparable” retail and office properties near and away from light rail stations. The average change in land values from 1997 to 2001 for retail and residential properties near DART stops was 25% and 32%, respectively; for “control” parcels, the average changes were 12% and 20% (Weinstein and Clower, 2003).

Studies found that with routes that are more direct with more frequent service, time saved for the existing and new public transportation passengers helps businesses. This is even more beneficial in dense, urban areas as it can help reduce traffic congestion. Business productivity rises as employees become more time efficient and reliable, which theoretically increases their ability to do business. The authors found that with proper public transportation, \$11 billion per year of congestion cost savings could occur, with 55% of the money going to households and 45% going to businesses.

VIII. DART Transit Economic Impact study - The Economic and Fiscal Impacts of Development near DART Stations. (2017).

Researchers studied four DART LRT stations in the Dallas Central Business District. Since the opening of DART light rail service, gross retail sales increased 36.2% from the fiscal year beginning in the third quarter of 1996 compared with FY 1997. Gross retail sales for the rest of the city of Dallas rose only 3.6% during the same time frame.

Public development near DART stations:

- Had a direct property value impact of \$1.81 billion with an indirect impact of \$682.9 million
- Produced an economic impact of \$3.36 billion for the Dallas-Fort Worth region
- Created 20,741 construction jobs in the Dallas-Fort Worth region
- Created \$1.3 billion in employee compensation
- Generated \$105 million in state and local taxes and \$278 million in federal tax revenue

IX. The Economic Impact of the Metropolitan Atlanta Rapid Transit Authority (MARTA). (2007)

Key findings regarding economic development around Atlanta's transit hubs:

- Employment by industry - If MARTA would have ceased operations in 2001 the Atlanta area would have experienced approximately 19,600 fewer jobs in 2001, and by 2055, the city would have seen 45,500 fewer jobs.
- Gross regional output by industry - MARTA's presence in Atlanta accounted for approximately \$2.0 billion in the region in 2001, 0.6% of the regional economy. By 2055, MARTA is expected to account for more than \$10.3 billion worth of Atlanta's total sales.
- Real disposable personal income per capita by region - MARTA's presence in Atlanta generated approximately \$52 per Atlanta-area resident in 2001. By 2055, MARTA's presence could generate over \$224 per Atlanta-area resident

X. New Hampshire Economic Impact of Passenger Rail Expansion along the New Hampshire Capital Corridor. (2010).

Key findings regarding the impact on businesses productivity of reduced travel times:

Table 6 –Economic Impact of Time Savings in 2030

TOTAL ECONOMIC IMPACT 2030	Impact
<i>JOBS (number)</i>	173
<i>BUSINESS SALES (\$millions)</i>	\$20.3
<i>LABOR INCOME (\$millions)</i>	\$8.9

Changes in vehicle hours and vehicle-miles of travel were used to estimate changes in travel time, vehicle operating cost, and accident rates. Those effects were then used to estimate the dollar value of total user (time and operating) costs for the affected mix of rail and highway users.

Key findings regarding impact on business with increased access to workers:

Table 8 – Impact of Labor Market Expansion in 2030

LABOR MARKET EXPANSION 2030	Impact
Labor Market Growth (no. of employees, 2030)	5,000
Percent Growth (versus no-build)	0.2%
TOTAL ECONOMIC IMPACT	
<i>JOBS (number)</i>	562
<i>BUSINESS SALES (\$ millions)</i>	\$68.7
<i>LABOR INCOME (\$ millions)</i>	\$29.6

Expanded labor market access has the effect of increasing competitiveness and productivity, thereby expanding output and employment. The economic impact model assessed this effect by estimating the additional workers available in the study area within a 40-minute travel time. Considering both the highway congestion relief and the resulting improvement in travel speed compared to peak-period car use, the researchers estimated a labor market expansion effect of 5,000 workers.

XI. The Southeastern Pennsylvania Transportation Authority (SEPTA) Drives the Economy of Pennsylvania. (2019, May 01).

A regression model was estimated using data from over 315,115 transactions of single-family homes in the five counties.

Key findings:

- Access to transit helps increase home values. Access to SEPTA service contributes a premium of \$33 billion in housing value, representing 11% of total housing value in southeastern PA.
- In aggregate, SEPTA's rail service adds \$14.5 billion in residential property value across Bucks, Chester, Delaware and Montgomery counties.
- Transit helps reduce household expenses. In the City of Philadelphia, the average household saves \$830 per year, a net financial benefit associated with proximity to high-quality transit. These annual household savings add up to \$481 million citywide.
- SEPTA's capital investments generate \$3.05 billion in economic impact within Pennsylvania each year, supporting more than 23,070 jobs and more than \$1.715 billion in earnings.

XII. Public Transportation Helps Protect Our Environment. American Public Transportation Association. http://www.capecodtransit.org/downloads/environment_fact_sheet.pdf

This study discusses the importance of public transportation and how it plays a significant role in finding smart solutions to the environmental challenges facing the nation today. Below are some key findings from the study:

- Public transportation saves 37 million metric tons of carbon dioxide annually – equivalent to the emissions resulting from the electricity generated for the use of 4.9 million households.
- If an individual switches a 20-mile roundtrip commute to public transportation, the annual CO₂ emissions will fall by 4,800 pounds per year, equal to a 10% reduction in a two-car household's carbon footprint.
- Public transportation offers an immediate alternative for individuals seeking to reduce their energy use and carbon footprints. Taking public transportation far exceeds the combined benefits of using energy-efficient light bulbs, adjusting thermostats, weatherizing one's home, and replacing a refrigerator.

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