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A Decade of Light Rail

The intent of Building Communities and Enhancing Lives: A Quality of Life Report is to share the changes Valley Metro light rail has supported in local communities across the Phoenix region since beginning service on December 27, 2008.

In November 2004, Maricopa County voters approved the funding of the Regional Transportation Plan with the passage of Proposition 400. The 20-year plan dedicated a portion of the half-cent sales tax to expanding the regional transit system, which included the funding of Valley Metro light rail projects. These funds were necessary to leverage federal dollars to provide transportation improvements. In addition to funding light rail infrastructure projects, Proposition 400 committed dollars to bus capital and operating costs resulting in a major shift in the landscape and connectivity of the Phoenix metropolitan area.

Since the arrival of 20 miles of light rail service in December 2008, acceptance of and excitement about the advancement of transit has flourished. The myriad benefits that light rail catalyzes in communities is realized with more than $11 billion in economic investment along light rail since 2008, providing a greater access to jobs, schools and entertainment. Additional acceptance of transit was confirmed when city of Phoenix voters passed Proposition 104, a sales tax extension and increase known as Transportation 2050 (T2050), resulting in a $31.5 billion funding mechanism to significantly enhance bus service, improve streets and advance rail projects.

According to the Arizona Smart Growth Scorecard, “Communities have essential services and supports that all need to be linked by transportation and other infrastructure for access by all residents. For a

“The Maricopa Association of Governments applauds the success of the first decade of light rail service in our region. The system benefits all communities, whether they have light rail or not. It reduces overall traffic and improves our quality of life by providing important regional connections.”
—Gail Barney, Queen Creek Mayor, Chair of the Maricopa Association of Governments

“Light rail has been a blessing to the pastor and people of the First Institutional Baptist Church, located on Jefferson Street in Phoenix. New members have united with our congregation after seeing our church campus as the train passed by. Other members and those in need, who we serve, utilize light rail to make their way here throughout the week.”
—Dr. Warren H. Stewart, Sr., Senior Pastor, First Institutional Baptist Church
community to be livable and sustainable, it must have access to infrastructure beyond water, roads and other traditional types of infrastructure”.

**Evaluation of Services**

This Quality of Life report will evaluate the changes in the light rail corridor over the past decade that make the corridor a better place to live, work and play data, by evaluating data sourced from Valley Metro, state, regional and jurisdictional agencies and community stakeholders. The intent is to understand how the community’s overall quality of life has changed before and after the investment in light rail and to validate Valley Metro’s core purpose to connect communities and enhance lives. This understanding will aid in planning efforts and funding priorities as the Valley moves forward with future investments in transit. It also sets the stage to substantiate the value of transit in economic growth, mobility and health of communities as we approach the next referendum on regional transportation. The timing presents a unique opportunity with a targeted release during Railversary, the anniversary of Valley Metro light rail’s tenth year of service.

This report is structured around four key goals: Enhancing Customer Experience, Driving the Economy, Connecting Communities and Fostering Healthy Communities.

“Light rail has been a major economic driver that has spurred more than $11 billion in capital investments along the tracks since it opened 10 years ago,” said Phoenix Mayor and Valley Metro Rail Chair Thelda Williams. “It’s been a catalyst for positive change, connecting people to education and career opportunities and connecting neighborhoods. The regional transportation system has become integrated into the daily lives of thousands of residents across the Valley.”

- Thelda Williams, Phoenix Mayor and FY19 Valley Metro Rail Board Chair
CityScape in Downtown Phoenix Before and After Light Rail

3rd Street and Mill Avenue in Tempe, Before and After Light Rail

Source for Photos: Valley Metro.
Center Street and Main Street in Mesa, Before and After Light Rail

Source for Photos: Valley Metro.

About Valley Metro

Valley Metro connects communities and enhances lives through planning, designing, building and operating a multi-modal transportation system, serving 70+ million annual passenger boardings on fixed route bus, light rail, paratransit and vanpool across 42+ million revenue miles.

Valley Metro is led by two Board of Directors who set the policy direction for the organization, consisting of elected officials from 17 cities and towns as well as Maricopa County. The agency is supported by 350 employees, thousands of contractors and is financed by local, regional and federal funds, fares and advertising.

Founded in 1983 with the passage of the county-wide transportation sales tax, Valley Metro builds and operates a regional public transportation network, building toward a 66-mile high-capacity transit system. In December 2008, Valley Metro opened 20 miles of light rail, the largest light rail starter in Federal Transit Administration history. In August 2015, the Central Mesa Extension added 3.1 miles and in March 2016, the Northwest Extension Phase I added 3.2 miles to lengthen the light rail system to just over 26 miles. In addition, in 2019 the Gilbert Road Extension will add 1.9 miles, and the Tempe Streetcar is scheduled to open in 2021. Subsequent planned expansions of light rail include 5.4 miles to south Phoenix (the South Central Extension), 1.5 miles to connect to the Metrocenter Transit Center (Northwest Extension Phase II) and 1.3 miles of Capitol/I-10 West Extension Phase I. By 2023, the Valley Metro light rail system will operate separate and interconnected light rail lines with a central transfer point at CityScape in downtown Phoenix, and will double the frequency of trips between downtown Phoenix and west Mesa.

Phoenix Transportation 2050

On August 25, 2015, Phoenix voters passed Proposition 104, approving a sales tax extension and increase from 0.4 percent to 0.7 percent to fund transportation improvements for 35 years. The proposition, known as T2050, became effective January 1, 2016. Over the 35-year life of the program, revenues from the T2050 city sales tax are estimated to total approximately $16.7 billion – half of the program’s overall costs. An additional $14.8 billion is projected to be generated from

“Ten years of light rail has invigorated our economy and revitalized entire corridors – our system is truly an Arizona success story that should be celebrated nationally.”

- Mark Mitchell, Tempe Mayor
federal and county funds, passenger fares and other sources. Of this total, approximately 86 percent is dedicated to the city’s public transit program, with the remaining used to supplement existing streets funding.

The T2050 program includes approximately $428 million over five years for high capacity transit services, encompassing light rail and bus rapid transit (BRT). Construction of the first new station along the existing light rail system is currently underway thanks to T2050. The station near 50th and Washington streets will provide access to local businesses and Ability360, a resource center offering numerous programs and facilities for persons with disabilities.

One of Phoenix’s most transit-dependent communities, south Phoenix, will soon be served by light rail. The South Central Light Rail Extension project will extend five miles south from downtown Phoenix and connect the current light rail line to Baseline Road. Work is underway between the city of Phoenix, Valley Metro and community partners to prepare the community for the construction of the extension. In late 2016, the Federal Transit Administration awarded the project a $2 million grant to aid in business assistance and land use planning for transit oriented development. Originally this extension was planned to open by 2034, but T2050 allowed the project to be accelerated over a decade. Now, construction is anticipated to start in 2019 and the much-needed line is planned to open in 2023.

In January 2016, the Phoenix City Council approved accelerating the Northwest Extension Phase II to open in 2023, three years earlier than previously planned. This extension will advance the vision of city leaders as it takes light rail west on Dunlap Avenue, north on 25th Avenue and across I-17 near Mountain View Road, with a terminus on the west side of the freeway near Metrocenter Mall.

In January 2016, the Phoenix City Council approved taking a phased approach to the Capitol/I-10 West extension, designating the portion of the project from downtown Phoenix to the State Capitol area as Phase I, and the remaining segment along I-10 to 79th Avenue as Phase II. Valley Metro is conducting a federally required Environmental Assessment with design still to take place.

BRT is a high-capacity, bus-based transit system that delivers fast, comfortable and cost-effective trips in high demand travel areas. BRT relies on limited stops, interconnected signal priority systems, off-board fare collection, level boarding stations and other enhancements to reduce travel times. BRT is a common transit service in other cities, but a new approach to transit for Phoenix. Network planning of the system will focus on the highest transit ridership corridors, capacity needs and a phasing program that complements the T2050 finance program.
1. CONNECTING COMMUNITIES

Part of Valley Metro’s core purpose is to connect communities by providing an efficient, world-class public transit system. Transit provides freedom for residents and visitors of all ages to travel the Metropolitan Phoenix region, which spans more than 9,200 square miles. It links people and places through frequent, reliable transit service, improved walkability, bicycle connections, easy transfers and direct access to jobs, schools and other destinations across the region.

1.0 RIDERSHIP

1.0.1 The Role of Light Rail in the Transportation Network

In 2017, Valley Metro provided almost 66 million rides on 102 bus routes and the light rail system. While Valley Metro buses are the workhorse of the transit system, providing almost 50 million
rides in 2017, the light rail carries more riders than any other Valley Metro transit line. Since its introduction in 2008, light rail has made riding transit easier and faster, attracting new riders and encouraging more people to take transit. The light rail currently travels 26 miles across densely populated areas, including the downtown areas of Phoenix, Tempe and Mesa, providing more than 48,000 passengers to destinations each weekday.

During its opening year, the light rail exceeded forecasted ridership by 35 percent. By 2017, light rail carried 25 percent of the total regional fixed route transit ridership; overall, light rail ridership grew 34 percent from 2010 to 2017.

Until 2009, the Red Line bus operated a similar route to light rail, providing service to Metrocenter Mall in north Phoenix, the Central Avenue corridor to downtown Phoenix, Sky Harbor International Airport, downtown Tempe and downtown Mesa (Figure 1). The Red Line bus was Valley Metro's highest ridership until light rail was introduced. With the similarities between the Red Line and light rail, partnered with the attractiveness of a new mode of transit, the Red Line ceased service. Comparing the Red Line bus ridership in 2007 (2.8 million) to light rail ridership in 2017 (16.5 million) in the same corridor, indicates a 487 percent increase in ridership with the introduction of light rail over the past decade (Figure 2).

Figure 1. Light Rail Alignment (2018) Compared to Red Line Bus Route (2008)

Source: Valley Metro.

Building Communities + Enhancing Lives: A Quality of Life Report
1.0.2 New Riders of Light Rail

By adding light rail to a network of public transit services, Valley Metro broadened the appeal of transit. Bus and rail work together to connect passengers between services. Light rail has attracted riders who would not have otherwise chosen public transit. Analysis indicates that region-wide transit ridership rose nine percent with the addition of light rail service. A Valley Metro light rail intercept survey was conducted in 2009 to better understand characteristics of light rail riders and their travel demand (Valley Metro 2009). Thirty-five percent of survey respondents indicated that prior to the start of light rail, they had never used public transit in metro-Phoenix.

The 2015 Maricopa Association of Governments (MAG) Regional Travel Forecast Model was used to estimate change in transit trips with and without light rail operations. The results of this analysis show that with the implementation of light rail in the region transit trips increased by:

- 23 percent in the Central Avenue corridor
- 18 percent in central Tempe
- 17 percent in the Phoenix Central Business District
- 15 percent in the areas around Sky Harbor International Airport
- 16 percent in the neighborhood just east of the Phoenix Central Business District

Light rail has served as a vital lifeline for residents and visitors over the last 10 years, and accommodated many new riders during one of the most economically challenging times for the region. From 2007 to 2015, the region saw a seven percent increase in population and an eight percent drop in employment. At the height of the Great Recession (2008–2009), unemployment and gasoline prices spiked; see Figure 3 and Figure 4. Residents were losing jobs and gas prices
became prohibitively expensive. During these tough times, residents turned to public transit, especially light rail, to help their household budget. Since 2006, transit boardings in the region increased 25 percent (Figure 5). From 2007 to 2014, transit ridership to the Phoenix Central Business District (CBD) (Figure 6) grew 34 percent and trips beginning in the Phoenix CBD to other locations increased by almost 50 percent (MAG Regional Travel Forecast Model and 2007/2014 Valley Metro). A sizable portion of the increase in these transit trips are concentrated along the light rail line.

Figure 3. Historical Gas Prices 2005-2014

![Image of gas prices chart]

Source: GasBuddy 2014.

Figure 4. US Unemployment Rate 2000-2013

![Image of unemployment rate chart]

Source: FloatingPath 2018.
Figure 5. Valley Metro Transit Boardings FY2006-FY2018

Source: Valley Metro 2018.

Figure 6. Phoenix Central Business District
In comparing the onset of the Great Recession to the recovery years, Arizona’s average gas prices decreased, dropping 11 percent from 2007 to 2015, while total Vehicle Miles Traveled (VMT) throughout Maricopa County increased 8 percent. While Valley residents drove personal vehicles more as gas prices dropped, considerable growth in transit ridership continued in parts of the Valley served by light rail.

Students, including college students and K-12 students alike, make up 16 percent of all Valley Metro transit riders. On Valley Metro light rail, 30 percent of trips are students going to or from school (Valley Metro Origin and Destination Survey 2015). Between 2007 and 2014, college and university-based transit trips on weekdays increased region-wide by 22 percent. During that period, university trips to the Phoenix CBD increased by more than 400 percent. Much of this increase was due to the expansion of the ASU downtown Phoenix campus; enrollment in this campus increased by more than 200 percent between 2007 and 2014 (Figure 7). Between 2007 and 2014, transit trips to colleges and universities increased to the Phoenix CBD and along the Valley Metro light rail corridor.

Figure 7. Growth in ASU Enrollment

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2014</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>All ASU Enrollment</td>
<td>64,394</td>
<td>69,322</td>
<td>4,928</td>
</tr>
<tr>
<td>ASU Tempe Campus Enrollment</td>
<td>49,300</td>
<td>50,320</td>
<td>1,020</td>
</tr>
<tr>
<td>Downtown Phoenix ASU Enrollment</td>
<td>3,460</td>
<td>11,216</td>
<td>7,756</td>
</tr>
</tbody>
</table>


1.1 CORRIDOR WALKABILITY

Valley Metro light rail stations are in active, walkable places like neighborhoods, civic centers and downtowns and are in walking distance to retail, schools, jobs and a variety of housing options. According to Valley Metro’s 2015 Origin and Destination transit survey, 81 percent of light rail riders walk a quarter mile or less to access transit, an increase from 76 percent ridership in a 2011 survey.

Walk Score is a website that assesses the walkability of any address by surveying walking routes within proximity to nearby amenities. Walk Score measures pedestrian friendliness stating that “walkable neighborhoods with access to public transit, better commutes, and proximity to the people and places you love are the key to a happier, healthier and more sustainable lifestyle.” Phoenix and Mesa rank as the 31st and 37th most walkable large cities in the United States, respectively, and as generally car-dependent where most errands require a car. Tempe’s ranking, while slightly better, is classified as “Somewhat Walkable” where some errands can be accomplished on foot. Figure 8 shows the walkability scores for the cities of Phoenix, Tempe and Mesa.
Figure 8. Phoenix, Tempe and Mesa Overall Walk Scores

<table>
<thead>
<tr>
<th>City</th>
<th>Walk Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phoenix</td>
<td>41</td>
</tr>
<tr>
<td>Tempe</td>
<td>54</td>
</tr>
<tr>
<td>Mesa</td>
<td>37</td>
</tr>
</tbody>
</table>


Compared to the cities’ overall Walk Scores, light rail station area Walk Scores show that the communities along the light rail corridor are generally more walkable and attractive to pedestrians and transit riders. A majority of light rail station areas are ranked as “very walkable” or better (Figures 9 and 10).

Figure 9. Walkability of Valley Metro Station Areas, Based on Walk Scores

<table>
<thead>
<tr>
<th>Percent of Total Light Rail Stations</th>
<th>Walkability Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5%</td>
<td>Walker’s Paradise</td>
</tr>
<tr>
<td>45%</td>
<td>Very Walkable</td>
</tr>
<tr>
<td>32.5%</td>
<td>Somewhat Walkable</td>
</tr>
<tr>
<td>10%</td>
<td>Car-Dependent</td>
</tr>
</tbody>
</table>


Figure 10. Walk Scores of Each Light Rail

<table>
<thead>
<tr>
<th>Station Name</th>
<th>Jurisdiction</th>
<th>Walk Score</th>
<th>Bike Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>19th Ave/Dunlap</td>
<td>Phoenix</td>
<td>71</td>
<td>66</td>
</tr>
<tr>
<td>Center/Main St</td>
<td>Mesa</td>
<td>70</td>
<td>84</td>
</tr>
<tr>
<td>Northern/19th Ave</td>
<td>Phoenix</td>
<td>80</td>
<td>53</td>
</tr>
<tr>
<td>Glendale Avenue/19th Ave</td>
<td>Phoenix</td>
<td>68</td>
<td>59</td>
</tr>
<tr>
<td>44th St/Washington</td>
<td>Phoenix</td>
<td>43</td>
<td>68</td>
</tr>
<tr>
<td>Center Pkwy/Washington</td>
<td>Tempe</td>
<td>23</td>
<td>75</td>
</tr>
<tr>
<td>38th St/Washington</td>
<td>Phoenix</td>
<td>37</td>
<td>60</td>
</tr>
<tr>
<td>Country Club/Main St</td>
<td>Mesa</td>
<td>72</td>
<td>84</td>
</tr>
<tr>
<td>Alma School/Main St</td>
<td>Mesa</td>
<td>60</td>
<td>85</td>
</tr>
<tr>
<td>Priest Dr/Washington</td>
<td>Tempe</td>
<td>33</td>
<td>77</td>
</tr>
<tr>
<td>Roosevelt/Central Ave</td>
<td>Phoenix</td>
<td>90</td>
<td>84</td>
</tr>
<tr>
<td>Central Ave/Camelback</td>
<td>Phoenix</td>
<td>66</td>
<td>70</td>
</tr>
<tr>
<td>19th Ave/Camelback</td>
<td>Phoenix</td>
<td>71</td>
<td>62</td>
</tr>
<tr>
<td>19th Ave/Montebello</td>
<td>Phoenix</td>
<td>70</td>
<td>66</td>
</tr>
<tr>
<td>7th Ave/Camelback</td>
<td>Phoenix</td>
<td>72</td>
<td>64</td>
</tr>
<tr>
<td>Location</td>
<td>City</td>
<td>Walk Score</td>
<td>Bike Score</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td>Indian School/Central Ave</td>
<td>Phoenix</td>
<td>77</td>
<td>72</td>
</tr>
<tr>
<td>Campbell/Central Ave</td>
<td>Phoenix</td>
<td>59</td>
<td>75</td>
</tr>
<tr>
<td>Osborne/Central Ave</td>
<td>Phoenix</td>
<td>68</td>
<td>74</td>
</tr>
<tr>
<td>Dorsey/Apache Blvd</td>
<td>Tempe</td>
<td>74</td>
<td>98</td>
</tr>
<tr>
<td>McClintock/Apache Blvd</td>
<td>Tempe</td>
<td>73</td>
<td>88</td>
</tr>
<tr>
<td>University Dr/Rural</td>
<td>Tempe</td>
<td>78</td>
<td>100</td>
</tr>
<tr>
<td>Mill Ave/3rd Street</td>
<td>Tempe</td>
<td>79</td>
<td>97</td>
</tr>
<tr>
<td>Thomas/Central Ave</td>
<td>Phoenix</td>
<td>61</td>
<td>89</td>
</tr>
<tr>
<td>Encanto/Central Ave</td>
<td>Phoenix</td>
<td>75</td>
<td>82</td>
</tr>
<tr>
<td>McDowell/Central Ave</td>
<td>Phoenix</td>
<td>86</td>
<td>86</td>
</tr>
<tr>
<td>Veterans Way/College Ave</td>
<td>Tempe</td>
<td>77</td>
<td>74</td>
</tr>
<tr>
<td>Washington/Central Ave</td>
<td>Phoenix</td>
<td>95</td>
<td>77</td>
</tr>
<tr>
<td>Van Buren/Central Ave</td>
<td>Phoenix</td>
<td>95</td>
<td>87</td>
</tr>
<tr>
<td>Van Buren/1st Ave</td>
<td>Phoenix</td>
<td>94</td>
<td>79</td>
</tr>
<tr>
<td>Sycamore/Main St</td>
<td>Mesa</td>
<td>57</td>
<td>84</td>
</tr>
<tr>
<td>Price-101Apache Blvd</td>
<td>Tempe</td>
<td>55</td>
<td>93</td>
</tr>
<tr>
<td>Smith-Martin/Apache Blvd</td>
<td>Tempe</td>
<td>65</td>
<td>87</td>
</tr>
<tr>
<td>24th St/Washington</td>
<td>Phoenix</td>
<td>53</td>
<td>66</td>
</tr>
<tr>
<td>24th St/Jefferson</td>
<td>Phoenix</td>
<td>58</td>
<td>67</td>
</tr>
<tr>
<td>12th St/Jefferson</td>
<td>Phoenix</td>
<td>68</td>
<td>92</td>
</tr>
<tr>
<td>3rd St/Washington</td>
<td>Phoenix</td>
<td>76</td>
<td>71</td>
</tr>
<tr>
<td>12th St/Washington</td>
<td>Phoenix</td>
<td>67</td>
<td>96</td>
</tr>
<tr>
<td>3rd St/Jefferson</td>
<td>Phoenix</td>
<td>84</td>
<td>73</td>
</tr>
<tr>
<td>Jefferson/ 1st Ave</td>
<td>Phoenix</td>
<td>95</td>
<td>77</td>
</tr>
<tr>
<td>Mesa Dr/Main St</td>
<td>Mesa</td>
<td>81</td>
<td>84</td>
</tr>
</tbody>
</table>

1.2 BIKE CONNECTIONS

The introduction of light rail into the Phoenix metropolitan area, as well as several pro-biking efforts at the municipal and regional levels, led to an increase in both bicycle infrastructure in the light rail corridor as well as the number of bicyclers accessing the Valley Metro system. Cycling and light rail go together as a bicycle greatly increases the comfortable distance that a transit rider might travel to access a station. Bicycling is a positive option to reach transit stops because it supports the health of riders and reduces car emissions (Figure 11).

“GRID is proud to be an integral part of the many mobility options offered by Valley Metro to the residents of the Phoenix metropolitan area. The symbiotic relationship between bike share and rail allows residents to solve the first mile/last mile problem, while at the same time enhancing connectivity from Mesa to Phoenix.”

-Jeff Titone, Regional Manager, GRID Bike Share

From 2008 to 2017, bicycle infrastructure increased 28 percent with the addition of 24 miles of bike lanes and trails within 0.5 mile of the light rail corridor (Figure 12). Each light rail vehicle is equipped to store four bicycles and there are 518 bike racks and 28 bike locker spaces at transit centers, park-and-rides and near light rail stations (Figures 13 and 14). Even though the number of bike lanes and trails increased within the corridor over the past decade, there is room for growth. The cities of Phoenix, Tempe and Mesa identified 16 miles of proposed new bike lanes for future implementation.
Figure 12. Comparison of Bike Lanes in the Light Rail Corridor, 2008 and 2017

Figure 13. Bike Racks at Light Rail Stations and Park-and-Rides

Source: Valley Metro 2018.
Bike Score, a sister website to Walk Score, evaluates how good a location is for biking based on bike lane infrastructure, hills, destinations, road connectivity and bike commuting mode share. The densest communities along the corridor (downtown Phoenix and Tempe) exhibit high Bike Scores, some even ranking as a ‘Biker’s Paradise’ (Figure 15). Outside of these areas, however, the Bike Score figures indicate room to improve in terms of providing seamless connections between light rail and the Valley’s growing bicycle network. Overall, 75 percent of light rail stations are very bikeable or better (Figure 16).

The Valley’s docked bike share network, GRID Bike Share (Figure 17), is heavily concentrated along the light rail corridor. This is no coincidence; robust transit, backed by bicycle and pedestrian infrastructure, including bike share options, creates a corridor that can be easily traversed without a vehicle. GRID Bike docks are clustered near light rail stations. As shown in Figure 18, 64 percent of the entire GRID Bike dock network is located within a half mile of light rail stations, leading to 84 percent of GRID Bike trips beginning and ending in the light rail corridor (Figure 19).

Origin and destinations of GRID Bike trips predominantly occur within the light rail corridor and within in the core of the three major cities served by Valley Metro light rail. Figure 19 highlights the highest concentration of destinations for GRID Bike customers in 2017 within the region.

With the improvements in bicycle infrastructure, availability of storage spaces and bike share in the corridor; and the widespread knowledge of the benefits of using a bike as a transit connection, Valley Metro has seen a major increase in the number of riders accessing its system via bicycle. This was especially apparent after the introduction of light rail, when the number of riders accessing transit system by bike increased by 36 percent (Valley Metro 2015).
Figure 15. Light Rail Station Area Bike Scores


Figure 16. Bikeability of Valley Metro Station Areas, Based on Bike Scores

<table>
<thead>
<tr>
<th>Percent of Total Light Rail Stations</th>
<th>Bikeability Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>15%</td>
<td>Bikers Paradise</td>
</tr>
<tr>
<td>60%</td>
<td>Very Bikeable</td>
</tr>
<tr>
<td>25%</td>
<td>Bikeable</td>
</tr>
</tbody>
</table>

Figure 17. GRID Bike Share Station located at the Roosevelt/Central Ave Light Rail Station

Source: Valley Metro.

Figure 18. GRID Bike Share Dock Locations

1.3 CONVENIENT TRANSFERS

The two most important determinants of rider satisfaction with transit are service frequency and travel time (TransitCenter 2016). To create an effective transit network, transfers between modes and routes must be convenient with a system of frequent service connections. For transfers to and from light rail to be convenient, the transfer window must be short, and connecting bus and rail service must both have frequent trips. Frequent service is generally considered to occur at 15 minutes or less throughout most of the day. In 2008, there were six frequent service bus routes that connected to the Red Line bus route. Today, there are 14 frequent service bus routes connecting to light rail, a 57 percent increase.

Over the past decade, Valley Metro implemented several other types of service improvements to bus routes that connect to light rail, including 36 service enhancements that added more trips to connecting bus routes and 29 route extension improvements to connecting bus routes. Service improvements like these increase convenience of intermodal use that riders desire, while opening
new destinations. The bus route extension improvements increases the distance a person could take transit with a single transfer from light rail. Frequency improvements to connecting bus routes make a significant impact of the ease of transferring between bus and rail. Over half of all transit trips taken on Valley Metro system-wide are single seat rides (Figure 20). Comparing the percentage of transfers taken for riders traveling on the Red Line (prior to light rail) and after light rail implementation, the percentage of single seat ride trips with no transfers dramatically increased (Figure 21) (Valley Metro 2015, 2011, 2007). However, while light rail offers regional streamlined trips, there is still a significant portion of transit trips taken in conjunction with light rail that require one or more transfers.

**Figure 20. Valley Metro Transfers System-Wide**

<table>
<thead>
<tr>
<th>Number of Transfers (System-Wide)</th>
<th>2007</th>
<th>2011</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>62.1%</td>
<td>48.4%</td>
<td>65.9%</td>
</tr>
<tr>
<td>1</td>
<td>30.3%</td>
<td>39.2%</td>
<td>28.3%</td>
</tr>
<tr>
<td>2</td>
<td>6.3%</td>
<td>10.6%</td>
<td>5.2%</td>
</tr>
<tr>
<td>3+</td>
<td>1.4%</td>
<td>1.5%</td>
<td>0.6%</td>
</tr>
</tbody>
</table>


**Figure 21. Corridor Transfers, Before and After Light Rail**

<table>
<thead>
<tr>
<th>Number of Transfers</th>
<th>2007 (Red Line)</th>
<th>2011 (Light Rail)</th>
<th>2015 (Light Rail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>16.3%</td>
<td>79.5%</td>
<td>65.6%</td>
</tr>
<tr>
<td>1</td>
<td>48.4%</td>
<td>4.3%</td>
<td>20.7%</td>
</tr>
<tr>
<td>2</td>
<td>24.9%</td>
<td>7.4%</td>
<td>10.7%</td>
</tr>
<tr>
<td>3+</td>
<td>10.4%</td>
<td>4.5%</td>
<td>2.7%</td>
</tr>
</tbody>
</table>


When comparing the convenience of the transfers between bus and light rail at the Central Station in Phoenix, Tempe Transportation Center and Sycamore/Main Street in Mesa, average wait times are generally between 5 to 8 minutes (Figure 22). This transfer window range is convenient, giving riders enough time to travel the distance between the bus and light rail and make it to the connection on-time.
Figure 22. Average Transit Wait Time between Bus and Light Rail at Transit Centers

<table>
<thead>
<tr>
<th>Bus Route Connecting to Valley Metro Light Rail</th>
<th>Central Station</th>
<th>Tempe Transportation Center</th>
<th>Sycamore Street/Main Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - Central Avenue</td>
<td>5 min (peak) / 8 min (off-peak)</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>1 - Washington</td>
<td>6 min (peak) / 8 min (off-peak)</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>3 - Van Buren</td>
<td>5 min (peak) / 7 min (off-peak)</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>7 - 7th Street</td>
<td>6 min (peak) / 8 min (off-peak)</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>8 - 7th Street</td>
<td>6 min (peak) / 8 min (off-peak)</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>10 - Roosevelt</td>
<td>7 min (peak) / 9 min (off-peak)</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>72 - Scottsdale/Rural</td>
<td>□</td>
<td>6 min (peak) / 8 min (off-peak)</td>
<td>□</td>
</tr>
<tr>
<td>65 - Mill/Kyrene</td>
<td>□</td>
<td>8 min (peak) / 6 min (off-peak)</td>
<td>□</td>
</tr>
<tr>
<td>66 - Mill/68th Street</td>
<td>□</td>
<td>7 min (peak) / 10 min (off-peak)</td>
<td>□</td>
</tr>
<tr>
<td>48 - 48th Street</td>
<td>□</td>
<td>7 min (peak) / 8 min (off-peak)</td>
<td>□</td>
</tr>
<tr>
<td>62 - Hardy</td>
<td>□</td>
<td>6 min (peak) / 8 min (off-peak)</td>
<td>□</td>
</tr>
<tr>
<td>45 - Broadway</td>
<td>□</td>
<td>□</td>
<td>7 min (peak) / 8 min (off-peak)</td>
</tr>
<tr>
<td>30 - University</td>
<td>□</td>
<td>□</td>
<td>5 min (peak) / 8 min (off-peak)</td>
</tr>
<tr>
<td>96 - Dobson</td>
<td>□</td>
<td>□</td>
<td>7 min (peak) / 7 min (off-peak)</td>
</tr>
<tr>
<td>40 - 40th Street North Phoenix</td>
<td>□</td>
<td>□</td>
<td>7 min (peak) / 8 min (off-peak)</td>
</tr>
</tbody>
</table>

Source: Valley Metro 2018.

Since the light rail opened, Valley Metro also made 50 service enhancements to bus routes that connect to rail to extend the hours that bus service operates per day. These span of service improvements reduce or eliminate the limiting factor created when a rider, for example, lives along a corridor with bus service they use to connect to rail, but the bus service does not match the same span of service hours as light rail. Longer span of service hours on the connecting bus routes helps workers who work late or irregular hours. Expanding service past midnight during the weekday on bus routes along Central Avenue, Van Buren Street, 7th Street and 7th Avenue,
among other span improvements, helped eliminate these types of issues, and allow multimodal users to make better use of the more extensive span of service on light rail.

Additionally, during the past ten years, Valley Metro added eight new bus routes that connect to light rail, including Route 40 on Apache/Main in Mesa and Route 48 on 48th Street in Tempe. The new connecting routes allow additional neighborhoods to easily connect to rail.

Transportation 2050 (T2050), a voter-approved Phoenix sales tax that passed in 2015 to increase funding for transportation improvements, includes $1.2 billion over five years for new and expanded bus and Dial-a-Ride services. T2050 has already extended the service day on several bus routes to match light rail hours of service, improving frequency to 30 minutes or less city-wide. Future improvements include adding new and extended routes, and increased frequency on high ridership routes.

1.4 CONNECTING CAMPUSES

Valley Metro light rail offers the region’s students enhanced mobility options, connecting schools and colleges, and functioning as an education corridor. Light rail has conceivably influenced the decision for schools and colleges to locate or expand their school campuses near the corridor. This is especially apparent with ASU’s choice to invest in a major expansion in downtown Phoenix as enrollment in the downtown Phoenix campus increased by more than 200 percent between 2007 and 2014. All students, including K-12, high school and college/university, are a major piece of Valley Metro’s overall ridership, making up 26 percent of Valley Metro bus and light rail riders. On light rail, students make up 21 percent of riders (Valley Metro 2015). As a demographic, students are less likely to own a vehicle, more likely to be lower-income and often have transit pass options available that lower the costs. The following photo shows the ribbon cutting ceremony for light rail in Tempe at the Veterans Way/College Ave station, serving the ASU Tempe campus and located across from the Tempe Transportation Center (Figure 23).
Below are isochrones, a visual display that shows how far someone can travel within certain amounts of time by utilizing transit. These isochrones show how light rail functions in the overall network of transit services to serve the needs of student connections. Travel distances are calculated using transit route travel times, how frequently the network of routes operate and how well routes connect.

The introduction of light rail improved ASU student, staff and faculty mobility. Between 2007 and 2014, transit trips to central Tempe increased by more than 30 percent (MAG Regional Travel Forecast Model). The following two comparisons illustrate this point as a “before and after” comparison, using a comparison of light rail to Red Line bus line mobility from both the ASU Tempe campus (Figure 24) and the ASU downtown Phoenix campus (Figure 25). These comparisons evaluate ‘one seat travel’, trips that do not involve transfers, for a couple of reasons. First, the alignments that both the light rail and Red Line bus follow connect many points of interest and represent a very common travel pattern. Second, for many users, ‘one seat travel’ is preferable to having to transfer to complete a trip. Using these isochrones could help ASU-affiliated residents determine where they would look for housing based on relative distances and ease of access to and from ASU.
NOTE: Orange color denotes an overlap between LRT (yellow) and Red Line bus (red) travel visualization of travel times.
As is shown in both figures, light rail and the Red Line bus follow very similar alignments. However, the possible distance a rider can travel on light rail in an hour on transit from either ASU campus is significantly farther than on the Red Line. This increase is because light rail travels in its own lane and has priority at traffic signals, increasing its overall speed while traversing its corridor.

“ASU’s philosophy of ‘one university in many places’ is supported by a multi-modal, public transportation network. Valley Metro Rail, in particular, has helped to streamline connectivity between the downtown Phoenix and Tempe campuses and has opened up a region full of destinations – from sporting events to arts and culture – for our student learners, faculty and staff.”

-Melinda Alonzo, Director, ASU Parking & Transit
as compared to the Red Line. Additionally, light rail has more trips per hour compared to the Red Line bus, lowering riders’ wait times.

In Figures 26 and 27 below, isochrones show the travel improvements for students from K-12 schools traveling to Pueblo Grande Museum & Archaeological Park, a museum offering programs for all ages to learn about archeology, local history and cultural studies and located at 44th Street and Washington Street. In 2007, students from 289 K-12 schools could access Pueblo Grande Museum in 60 minutes or less on public transit. Although the Red Line did not directly service the museum, light rail passengers today can easily access the cultural amenity. Students from 309 K-12 schools can now access the museum in 60 minutes or less on transit, an increase of 20 schools since light rail opened.

Figure 26. K-12 Schools within an Hour of Transit Travel time to Pueblo Grande Museum in 2007

Source: Maricopa County Flood Control District (MCFCD) 2007.
Figures 27 and 29 show how well transit connects Gateway Community College (GCC) to high schools in the region, before and after light rail. Valley Metro has a light rail station directly in front of GCC, providing frequent connections to the college. As shown in Figures 28 and 29, in 2007, students from 81 high schools could get to GCC by bus from their high school within an hour on transit. With the introduction of light rail, the number of high schools within an hour transit ride of Gateway increased by 25 percent. Now, students from 101 high schools can access Gateway within an hour. This improvement allows more high school students from more neighborhoods to attend college-level classes.
Figure 28. High Schools within an Hour of Transit Travel time to Gateway Community College in 2007

Source: Maricopa County Flood Control District (MCFCD) 2007.
Figure 29. High Schools within an Hour of Transit Travel Time to Gateway Community College in 2017

![Map showing high schools within an hour of transit travel time to Gateway Community College in 2017.]

Source: Maricopa County Flood Control District (MCFCD) 2017.

**Figure 30** demonstrates the convenience to travel on transit between colleges and technical schools, such as the East Valley Institute of Technology (EVIT) and ASU, to popular destinations such as libraries and high schools. High schools are important connections to colleges and vocational schools, as many high school students take classes at a community college or vocational school prior to graduation. Studying the proximity of high schools to institutions of higher education is a useful metric to evaluate how Valley Metro’s multi-modal transit services perform as an overall network. Libraries also are important, as a supplemental study space and environments for students. For ASU students, accessibility to community college education is important for those who are dual-enrolled in community colleges for affordability options.
Comparing the number of these connections between 2007 and 2017 using isochrones analysis, the number of libraries, community colleges and high schools increased that ASU students can travel on transit within an hour. The analysis also shows mixed results for EVIT; generally, the number of libraries stayed the same and the number of high schools declined within an hour of traveling on transit.

### Figure 30. Number of School Connections by Travel Time Segment, Comparing 2007 to 2018

<table>
<thead>
<tr>
<th>Places</th>
<th>ASU 2007</th>
<th>ASU 2018</th>
<th>EVIT 2007</th>
<th>EVIT 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Libraries 0-15 min</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Libraries 16-30 min</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Libraries 31-45 min</td>
<td>2</td>
<td>7</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Libraries 46-60 min</td>
<td>7</td>
<td>5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total libraries in under an hour</td>
<td>10</td>
<td>13</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Community Colleges 0-15 min</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Community Colleges 16-30 min</td>
<td>2</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community Colleges 31-45 min</td>
<td>12</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community Colleges 46-60 min</td>
<td>12</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Community Colleges in under an hour</td>
<td>26</td>
<td>27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Schools 0-15 min</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>High Schools 16-30 min</td>
<td>7</td>
<td>18</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>High Schools 31-45 min</td>
<td>31</td>
<td>47</td>
<td>33</td>
<td>22</td>
</tr>
<tr>
<td>High Schools 46-60 min</td>
<td>33</td>
<td>26</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>Total High Schools in under an hour</td>
<td>71</td>
<td>92</td>
<td>63</td>
<td>54</td>
</tr>
</tbody>
</table>


There are a few factors to explain these shifts. Light rail was implemented in 2008 at the beginning of the Great Recession, when metro Phoenix and the rest of Arizona were hit exceptionally hard by the subprime mortgage crisis. Because Valley Metro is funded with sales tax, agency revenues were low during the recession, including regional funding for operating buses. This led to a reduction in service overall.

In 2015, Valley Metro altered the route of the Main Street and Arizona Avenue LINK services in coordination with light rail extending through downtown Mesa. This caused a decline in accessibility to these routes and meant that some transit riders could not ride as far in the same amount of time. In 2016, the Arizona Avenue and Main Street LINK routes were terminated because of dwindling ridership. Both routes lost substantial ridership after the light rail expansion as travel patterns changed with the introduction of the extension. In 2007, Route 81 (Hayden/McClintock) served ASU with a branch of the route diverting to University Drive/College...
Avenue. The route was streamlined to eliminate the time-consuming deviation and in 2018; Route 81 now serves McClintock Drive with no service to ASU.

1.5 COMMUNITY PARTNERSHIPS

Partnerships with local organizations and neighborhoods are vital to remaining relevant to the communities that Valley Metro serves. Valley Metro is more than a public transit system; it actively participates in corporate, education, community, culture and safety and security partnerships to connect communities and enhance lives. The following are a few examples of these partnerships.

In 2012, Valley Metro began its partnership with Coors Light to offer free rides on New Year’s Eve. Customers can enjoy free rides beginning at 7 p.m. on all buses, trains and Dial-a-Ride service. In 2016, Coors began partnering with Uber to provide transit riders a discount code during the New Year’s Eve free rides timeframe. This successful partnership offered travelers a safe ride to and from New Year’s celebrations and conveyed that the public should leave their car keys and opt for a safe ride.

Thinking outside the box, Valley Metro partners with the Talking Stick Resort Arena (TSRA) for the Rail Ride partnership – an innovative, mutually beneficial relationship that enhances the customers’ experiences and is the admiration of transit peers nationwide. The ticket partnership allows guests who purchase a ticket to an event at the arena to ride the light rail at no cost on the day of the event. Initiated in 2009, the partnership demonstrates the shared commitment to the metro Phoenix community and the agency’s interest in seeing both attendance and ridership expand to new markets. Valley Metro partners with the arena to encourage event attendees to ride light rail to the venue. TSRA hosts concerts, basketball games and family shows with light rail stops just steps away from the venue. Riding light rail to the venue is convenient, and avoids parking costs and traffic hassles. A minimal portion of the ticket price includes the light rail fare. In 2017, more than 93,000 light rail rides were taken to and from the arena with the Rail Ride partnership. The partnership is promoted through a sponsorship package at TSRA and regularly posted on social media. Valley Metro adds special event trains, extends the schedule to serve late night events and increases security officers to support the partnership.

Valley Metro supports local schools in its Design a Transit Wrap partnership with local high schools to encourage high school students to think about public transit; 1,800 students have entered the contest to compete to have their artwork displayed on a bus and train for one year.

"We’ve been the entertainment center of downtown Phoenix for more than 25 years and our partnership with Valley Metro Rail has really enhanced the fan experience by providing a safe, accessible and reliable public transportation option for our community to access the hundreds of events we host annually at Talking Stick Resort Arena, including Suns and Mercury games, plus performances by some of the biggest musical acts in the world.”

-Ralph Marchetta, Talking Stick Resort Arena, General Manager of Sports & Entertainment Services and Senior Vice President of Ticket Operations
Valley Metro pursues partnerships with neighborhood groups to promote quality of life in areas served by the transit system. For example, 19NORTH is a non-profit that grew out of community engagement during construction of the Northwest Phoenix light rail extension along 19th Avenue. This is a community-based group to provide collaboration and support for neighborhoods, schools, churches, businesses, non-profits, local government and law enforcement in the area. 19NORTH plans, hosts and manages a variety of activities to engage local neighborhoods including a community garden, an arts center, a business alliance and public fairs. Valley Metro staff attend regular 19NORTH meetings and participate in events including economic development tours, community cleanups and an employment fair.

To spread the holiday cheer among transit riders, Valley Metro and the City of Mesa host a Polar Express train on two weekends in December. The event is coupled with Merry Main Street and holiday-themed events occurring on weekends during the holiday season. The holiday-wrapped and decorated two-car train operates as a special shuttle between Alma School Road/Main Street and Mesa Drive/Main Street in Mesa. This event has become very popular with families who like to dress in pajamas to recreate an authentic Polar Express moment. Santa Claus, accompanied by his elves, joins the families on board to read the popular storybook. Carolers roam the station platform among lines of waiting passengers. A selfie-frame was provided so that families could take pictures and post to Facebook or on Twitter. In 2017, there were more than 6,200 riders over the four days of the Polar Express event.

Two weekends a year, Valley Metro offers space within park-and-rides to be turned into an international marketplace. The World Bazaar Phoenix Community Market is sponsored by the City of Phoenix and offers an economic boost for residents who have relocated here and have local goods for sale.

“Valley Metro Rail brought our community together. We began to collaborate when construction started and we forged partnerships that continue to unite us with a vision for the future of our community. It is this collaboration of neighborhoods, transportation, police, planning, churches, schools and businesses that continues to assure that 19NORTH thrives as a community. Valley Metro was a catalyst for our community coming together and becoming stronger!”
- Shannon McBride, Executive Director, 19NORTH
2. ENHANCING CUSTOMER EXPERIENCE

Valley Metro exists to enhance the lives of our customers, as well as the Valley as a whole, by providing customers with a satisfactory, safe, comfortable and reliable transit experience.

2.0 COMFORT AND SATISFACTION

2.0.1 Customers and Non-Riders are Satisfied

Valley Metro service remains popular among riders who use bus and light rail services every day. Satisfaction has grown with these riders; in 2006, 74 percent responded that they are satisfied with service, which grew to 81 percent in 2018. Part of the rise in satisfaction could be attributed to the amenities light rail offers to provide a more comfortable experience in comparison to the Red Line bus. Amenities include stations with seating, shade, trash receptacles, fare vending machines, water fountains and electronic customer information announcements and signage (Figures 31 and 32).
Figure 31. Shade, Seating and Other Amenities at Light Rail Station

Source: Valley Metro.

Figure 32. Valley Metro Fare Vending Machines

Source: Valley Metro.
The overall satisfaction rating has maintained an upward trend in the past 12 years. The biggest complaints in survey years were on-time performance and a lack of service or bus stops in proximity to those surveyed. Satisfaction with cleanliness and on-time performance also has improved since the introduction of light rail. Train arrival times, ease of purchasing fares and value of service all scored the highest according to the most recent survey. Shown in Figures 33 through 36, light rail rider satisfaction with service elements continues to be on an upward trend in most areas.

Figure 33. Overall Satisfaction with Valley Metro Service, 2003 - 2006 (Before Light Rail)

## Figure 34. Overall Satisfaction with Valley Metro Service, 2010 - 2018

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Top two (4+5 ratings)</td>
<td>81%</td>
<td>79%</td>
<td>70%</td>
<td>76%</td>
<td>81%</td>
<td>78%</td>
<td>75%</td>
</tr>
<tr>
<td>5 – Very Satisfied</td>
<td>44%</td>
<td>38%</td>
<td>36%</td>
<td>34%</td>
<td>42%</td>
<td>36%</td>
<td>38%</td>
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<tr>
<td>4</td>
<td>37%</td>
<td>41%</td>
<td>34%</td>
<td>42%</td>
<td>39%</td>
<td>42%</td>
<td>37%</td>
</tr>
<tr>
<td>3</td>
<td>15%</td>
<td>16%</td>
<td>21%</td>
<td>18%</td>
<td>13%</td>
<td>17%</td>
<td>19%</td>
</tr>
<tr>
<td>2</td>
<td>2%</td>
<td>3%</td>
<td>7%</td>
<td>45%</td>
<td>4%</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>1 – Very Dissatisfied</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Average</td>
<td>4.2</td>
<td>4.1</td>
<td>4.0</td>
<td>4.0</td>
<td>4.2</td>
<td>4.1</td>
<td>4.0</td>
</tr>
</tbody>
</table>


## Figure 35. History of Satisfaction with Light Rail Elements: Top Two Box Percentages, 2010 - 2018

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Train arrival times</td>
<td>88%</td>
<td>90%</td>
<td>93%</td>
<td>88%</td>
<td>97%</td>
<td>90%</td>
<td>92%</td>
</tr>
<tr>
<td>Ease to purchase passes at fare vending machines</td>
<td>87%</td>
<td>90%</td>
<td>89%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value of service for fare paid</td>
<td>86%</td>
<td>87%</td>
<td>86%</td>
<td>81%</td>
<td>91%</td>
<td>84%</td>
<td>86%</td>
</tr>
<tr>
<td>Train station kiosk signage</td>
<td>8%</td>
<td>86%</td>
<td>87%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NextRide text or call for next train arrival</td>
<td>84%</td>
<td>85%</td>
<td>82%</td>
<td>77%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantity and quality of onboard announcements</td>
<td>83%</td>
<td>88%</td>
<td>86%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usefulness of Transit Book</td>
<td>82%</td>
<td>80%</td>
<td>85%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to transfer between bus &amp; light rail</td>
<td>81%</td>
<td>81%</td>
<td>82%</td>
<td>77%</td>
<td>90%</td>
<td>84%</td>
<td>85%</td>
</tr>
<tr>
<td>Customer service when calling 602-253-5000</td>
<td>79%</td>
<td>86%</td>
<td>83%</td>
<td>76%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online trip planner</td>
<td>78%</td>
<td>81%</td>
<td>83%</td>
<td>79%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleanliness inside the train</td>
<td>77%</td>
<td>85%</td>
<td>87%</td>
<td>81%</td>
<td>90%</td>
<td>87%</td>
<td>91%</td>
</tr>
<tr>
<td>Cleanliness at the light rail stations</td>
<td>73%</td>
<td>84%</td>
<td>85%</td>
<td>81%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal safety</td>
<td>71%</td>
<td>80%</td>
<td>82%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of fare inspectors</td>
<td>71%</td>
<td>76%</td>
<td>75%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using the new Ridekick mobile app to plan your trip</td>
<td>70%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Valley Metro conducts research to understand how service enhancements may help attract target markets, including non-riders to understand their perceptions of transit services and how to engage with that market. The respondents of the 2018 Rider Satisfaction Survey indicated that a majority of Valley Metro services have improved since the previous year, which is crucial to bringing non-users of Valley Metro onto transit. According to the 2017 Non-Riders survey, approximately 40 percent of non-riders held a favorable view of Valley Metro and its services with 22 percent reporting their perception as “Very Good/Good”. This represents an increase over the 39 percent favorable rating in 2015. The 2017 gain was in the “Very Good/Good” category with corresponding decreases in the “Poor” and “Very Poor” categories. From 2015 to 2017, Non-Riders indicated a 6 percent decrease for those who say there is no chance they would take public transportation in the future.

2.1 MOVING PEOPLE RELIABLY

Since the introduction of light rail to the Valley, the goal has been to move more people through the heart of Phoenix Metro while improving travel time efficiently and dependability. Light rail offers less variability in travel times compared to other travel options as it is less affected by traffic congestion due to its dedicated lane with traffic signal priority (Figure 37). For 20 of its 26 miles, light rail operates in the street median. Automobile left turns are typically restricted to every quarter mile. Auto traffic continues to move well while the combined volume of people traveling on the roadway has increased with streets that have light rail. Comparing the light rail in 2017 to the Red Line bus that operated the corridor prior to 2009, there is a 15-minute decrease in end-to-end travel time during rush hour, a 14 percent increase in reliability (on-time performance) and trips come three minutes more often during peak rush hours.

Over the long term, the light rail investment will maintain reliable service as traffic congestion continues to grow and erode the reliability of other travel options. According to a report released
by the Federal Highway Administration called *Traffic Congestion and Reliability: Trends and Advanced Strategies for Congestion Mitigation*, auto travel times are generally more variable than rail travel times. The national congestion trend is moving upward, meaning reliability is continually decreasing overall. For big cities like Phoenix, this trend is more pronounced than it would be in smaller cities. Light rail retains reliability better, and in the long run, will require comparable or less travel time traffic congestion trends to continue (Cambridge Systematics, Inc. 2005).

**Figure 37. Valley Metro Light Rail Dedicated Lane with Traffic Signal Priority**

Source: Valley Metro.

**Figure 38** compares the time one needs to plan their trip using Valley Metro light rail and driving an automobile. The auto travel times and variability demonstrate the time required to make the trip on time to one’s destination, 95 percent of the time (U.S. Department of Transportation, Federal Highway Administration. 2017). **Figure 38** also shows that for shorter trips, light rail travel times are very similar to auto travel times, and in some cases are faster. For longer trips, autos are almost always faster. These are “in-vehicle” travel times and do not account for the time it takes to look for parking or wait for the train to arrive.
Since the development of Valley Metro light rail, the region is creating more efficient, high-capacity use of its roadways, offering more travel options to people in the communities that light rail serves. Each two-car light rail train can carry up to 372 people alongside the automobiles, bicycles and pedestrians also traveling in the corridor. Along Central Avenue, automobiles carry approximately 1,000 people per hour at an average of 1.2 people/vehicle (MAG 2018) while light rail can carry more than 1,800 people per hour on two-car trains every 12 minutes. Across the region, one percent of trips are taken by transit (regional transit mode split), covering Maricopa County and northern Pinal County. Using the MAG Regional Travel Forecast Model, Valley Metro staff estimates the split between travel in personal vehicles and on transit, using both bus and light rail, to demonstrate how light rail has a major impact on adding more capacity to the roadway and more travel options where it operates frequent trips and high capacity vehicles.

- **Mesa:** Transit carries 10 percent of trips on Main Street between Country Club Drive and Extension Road.
- **Tempe:** Transit carries 20 percent of the trips on Apache Boulevard between the 101 Freeway and McClintock Drive.
- **Phoenix:** Transit carries 38 percent of the trips traveled on Central Avenue between McDowell Road and Interstate 10.
After the completion of the Gilbert Road Light Rail Extension in 2019 and the future South Central Light Rail Extension, Northwest Light Rail Extension Phase II and Capitol/I-10 West Extension Phase I in 2023, the Valley Metro light rail system will operate separate and interconnected light rail lines and will double the frequency of trips between downtown Phoenix and west Mesa to destinations like ASU Main and downtown Phoenix campuses. With this service expansion, light rail service between downtown Phoenix and west Mesa will have the capacity to carry more than 2,700 people/hour.

2.2 SAFE TRAVEL

2.2.1 Transit Rider Safety and Security

Personal safety is a large factor in deciding to use transit service. According to the 2006 Valley Metro Rider Satisfaction Survey, prior to the introduction of light rail, 69 percent of riders felt safe at bus stops and 80 percent felt safe on the bus (Valley Metro 2006). In 2018, 71 percent of light rail riders reported feeling safe riding the system (Valley Metro 2018). Overall, the transit system is consistently safe and reliable, operating daily for up to 20 hours in an urban environment with more than 228 trips carrying 48,000 average weekday riders. Although crimes in major categories are negligible, Valley Metro seeks to reduce disruptive, intrusive, unsafe and inappropriate behavior. In 2016, the City Phoenix added three K-9 teams who randomly board trains and visit transit centers and stations to deter and detect suspicious behavior and identify suspicious packages. Off-duty officers were added by the cities of Phoenix, Tempe and Mesa beginning in 2017 to assist in targeted transit enforcement and crime suppression along the light rail system. Valley Metro also provides security-related staff dedicated to passenger safety on the system and will increase these resources in FY19 by hiring an additional 24 security team members.

To maximize safety and security for the passenger, the following features are incorporated into the system:

- Security staff assigned to rove and monitor the light rail system, both onboard trains and at stations.
- Cameras at every rail station, park-and-ride and inside all light rail vehicles, which are largely monitored by the central operations center.
- Emergency call boxes and safety lighting at each light rail station and park-and-ride.
- Six emergency call buttons are inside each light rail car, connecting the rider to the train operator.
- Vehicle operators have communication with dispatch who can connect to local police.
Valley Metro values the collaboration of community partners, and will continue to provide support to the communities served by light rail. Those community partners include social service agencies and community organizations near the light rail system. As a visible and essential part of public travel across the region, Valley Metro’s top priority is to provide transit services that are safe and reliable.

One ongoing safety program is Valley Metro’s Incident-centered Care and Enforcement Program (or ICEP), which provides a regular forum for Valley Metro to connect with social service agencies of all varieties. Valley Metro collaborates with these experts to conduct outreach, exchange information, understand trends and, ultimately, to use transit as a “platform” to connect with those in need of services.

In October 2017, the Valley Metro Board of Directors unanimously approved a new “Respect the Ride” (Figure 39) Code of Conduct to bolster safety and security while creating a positive rider experience. The new Code of Conduct discourages disruptive behavior on the light rail and empowers the transit agency to remove riders who engage in inappropriate or unsafe behavior. This Code of Conduct focuses on creating a safe and positive rider experience. It allows the agency to crack down on bad behavior and enhance the rider experience. By being proactive, Valley Metro sets the tone for rider behavior going forward, especially as the system expands and new lines are added. All fare-paying passengers have the right to enjoy a safe and comfortable ride.

Paid Fare Zones, a best practice nationally, were installed in spring 2018. A zone includes orange striping and enhanced signage at entryways and around each light rail station, as appropriate, to clearly delineate to passengers that they are stepping into a transit area, requiring a certain behavior.

“Our collaboration with Valley Metro allows us to have a mobile safety net for the youth in the Valley. We value Valley Metro’s partnership and their commitment to helping youth that find themselves in crisis.”

-Stacy Campbell, Wellness Coordinator, UMOM New Day Centers
2.2.2 Safety of the Corridor and a Safe Way to Travel

Every year in the United States, 37,000 people die in car crashes and an additional 2.35 million people are injured or disabled. Road traffic crashes are the ninth leading cause of death, and unless action is taken, it is predicted to be the fifth leading cause of death by 2030. Car crashes cost the United States $230.6 billion each year, which is an average of $820 per person (Association for Safe International Road Travel 2018).

In Arizona, there were more than 127,000 car crashes in 2017. Of those, 37,823 resulted in injury and 1,000 resulted in fatalities. This is the equivalent of roughly three people killed every day. Motor vehicle crashes resulted in about $10 billion in economic losses in 2017. Comparing the average crash rate in Maricopa County from 2009 to 2011, to the average from 2015 to 2017, data shows that car crashes increased 29 percent within the past decade. From 2005 to 2015, vehicle miles traveled in Maricopa County increased 14 percent (Figures 40 and 41), with an equal increase in population of 14 percent over the same time period (American Community Survey) (ADOT 2009, 2010, 2011, 2015, 2016, 2017). This comparison shows that the growth of the automobile crash rate is outpacing the rate of growth of driving in Maricopa County.
By taking light rail, a person can reduce his or her chance of being in a crash by more than 90 percent, as opposed to commuting by car (American Public Transportation Association [APTA] 2018). Traveling by light rail is 30 times safer than riding in a car (Journal of Public Transportation 2014). According to the Journal of Public Transportation, in the United States between 2007 and 2013, there were 37,000 fatalities from car crashes annually, compared to 32 fatalities from rail collisions in the same period based on rail transit safety data from the U.S. Department of Transportation (U.S. Department of Transportation, Federal Transit Administration 2016). In the unlikely event of a collision, fewer than 5 percent of light rail accidents result in passenger fatality, and 42 percent of light rail accidents were the result of a collision with automobiles at the fault of the driver (U.S. Department of Transportation, Federal Transit Administration 2016). Transit travel
has lower collision rates than automobile travel, even when accounting for risks to other road users (Victoria Transport Policy Institute 2018). Cities with higher transit ridership rates tend to have lower per-capita traffic fatality rates (Journal of Public Transportation 2014).

From 2009 to 2017, spanning almost a decade of operations, there were a total of 304 collisions involving light rail in the Phoenix metro region. During this time, there were three light rail projects built that introduced new turning movements and traffic rules for automobiles. These new projects led to small, short-lived increases in collisions; this is evident from the five collisions that occurred in the first year after the Central Mesa Extension opened and the two collisions that occurred in the first year after the Northwest Extension Phase 1 opened. In all 304 collisions, 65 percent resulted in no injury; only one incident was caused by operator error.

In comparison, there were more than 46,000 automobile vehicle crashes on average per year from 2009 to 2016 within the cities of Phoenix, Tempe and Mesa. The number of collisions involving a light rail train pales in comparison to the rate of automobile crashes. On average, there are about 34 light rail collisions per year and about 19 persons per year that are injured in such collision. In total, 173 persons were injured in nine years (Figure 42) (including light rail passengers and other road users). Of the 265 total collisions involving an automobile and light rail, 63 percent were caused by an improper automobile left/U-turn, 14 percent were caused by an improper automobile right turn and 13 percent were caused by an automobile running a red light. There have been two fatalities between an automobile and light rail trains or facilities (2012 and in 2017).

Pedestrian collisions include persons walking across the crosswalk in front of a light rail train, getting caught in-between the platform edge and train when the light rail vehicle is leaving/approaching station, walking/laying on tracks when train is approaching, trespassing on light rail tracks, or falling or stumbling into the tracks as a train approaches. In total, there have been 31 collisions between a pedestrian and light rail. None of the pedestrian collisions were caused by operator error.

Valley Metro and the cities of Tempe, Mesa and Phoenix implemented safety improvements to counteract collisions with the light rail, including:

- Train activated No Left/Right Turn signs that provides motorists with reason for prohibition (Figure 43).
- Light rail-only phase at several intersections downtown (Figure 44).
- Plastic pylons at pedestrian crossings to deter vehicle crossing, in use on Terrace Road in Tempe (Figure 45).
- Enhanced pedestrian crosswalk visibility at 19th Ave/Dunlap Station.

Figure 43. Train Activated No Left/Right Turn Signs

Source: Valley Metro.

Figure 44. Light Rail-only Phase

Source: Valley Metro.
There are additional opportunities for Valley Metro and cities to further improve more intersections, such as installing more No Left Turn signs. There also are opportunities to continue and expand safety campaigns, especially localized campaigns for new light rail extensions, new modes like streetcar and new road features like roundabouts.

2.3 STUDENT TRAVEL

Students, including those in K-12, high school and college/university, make up 26 percent of all Valley Metro public transit riders. On Valley Metro light rail, students make up 21 percent of riders (Valley Metro 2015). Each fall, Valley Metro attends ASU’s student orientation and welcome back events to provide information on safe transit use. Riding transit helps save money on fuel and parking and time spent on transit can be used to study, relax between classes or catch up on social media. Light rail provides a safe and reliable travel option between schools and college campuses, especially students connecting between ASU’s downtown Phoenix campus (11,737 students in fall 2016) and Tempe campus (51,869 students in fall 2016). To illustrate this, a comparison of travel options for students traveling between these campuses and student perceptions follows.

ASU students traveling between the downtown Phoenix and Tempe campuses have several travel options. Light rail provides students with a direct connection between the downtown Phoenix and Tempe campuses via the Van Buren/1st Avenue to Veterans Way/College Avenue light rail stations. The ASU Maroon shuttle stops at the west campus in Glendale, Central Avenue/Polk Street in downtown Phoenix, and Forest Avenue/Lemon Street in Tempe as well.
Along with the option to use light rail, students also can take an ASU private shuttle or other modes, such as taxis, Uber, Lyft or personal vehicles. These travel options have trade-offs, including costs and convenience, that factor into student’s decisions for how they travel. In 2017 and 2018, Valley Metro conducted two surveys of ASU students to better understand their travel decisions and perceptions of the variety of travel modes available. Figure 46 shows the distribution of the surveyed students’ primary travel modes used in a week. While 33 percent of students drove alone, 19 percent of these students used Valley Metro and another 19 percent using ASU’s private campus shuttle. When asked for the most important reason they chose light rail as their primary mode of transportation, students most often cited convenience (41 percent) and cost (38 percent). One in ten students attributed their reliance on rail to travel time and reliability.

Figure 46. ASU Student Primary Mode of Travel Used in the Past Week

*Note: “Valley Metro” is all transit services, including bus, light rail, and neighborhood circulators. Source: Valley Metro 2018.

The travel time it takes to drive between the campuses during peak rush hours were modeled and compared to the scheduled light rail travel time. This analysis showed that the estimated time needed for a trip during rush hour in a private vehicle is 28.2 minutes, and the scheduled time to take light rail between campuses also is 28 minutes. The travel times are almost the same, however when riding light rail you do not have to spend time looking for or paying for parking, which is limited and expensive near both campuses. Light rail provides students with a direct connection between the downtown Phoenix and Tempe campuses via the Van Buren/1st Avenue to Veterans Way/College Avenue light rail stations. In comparison, the ASU Maroon shuttle stops...
at the west campus in Glendale, Central Avenue/Polk Street in downtown Phoenix and Forest Avenue/Lemon Street in Tempe.

**Figure 47** compares the quality and convenience of both the light rail service and ASU Maroon shuttle and compares the tradeoffs of these services. In general, light rail service is a faster, more reliable ride, operating in a dedicated right-of-way. The ASU Maroon shuttle travels on the 1-10 freeway and is subject to freeway congestion and traffic delays. Valley Metro operates service more hours of the day and offers significantly more frequent trips, especially on the weekends. The ASU Maroon service is free for students and offers Wi-Fi onboard vehicles. Additionally, the ASU Shuttle Tracker allows students to go online and track their shuttle for anticipated arrival times. Students also can download the Ride Systems app to track shuttles and see approximately how full each shuttle is. While there is less of a need for light rail riders to rely on schedules due to the high frequency and reliability of the trains, there are various agency and third-party phone applications and resources available to provide light rail schedules and service alerts.

**Figure 47. Comparison of Light Rail to ASU Shuttle**

<table>
<thead>
<tr>
<th></th>
<th>Light Rail</th>
<th>ASU Shuttle</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Travel Time</strong></td>
<td>29 minutes</td>
<td>30 minutes</td>
</tr>
<tr>
<td><strong>Service Hours</strong></td>
<td>20 hours (5 a.m. – 1 a.m.; M-F)</td>
<td>17 hours (6 a.m. – 11 p.m.; M-F)</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>12 minutes (6 a.m. – 6 p.m.; M-F)</td>
<td>30 minutes (8 a.m. – 11 p.m.; M-F)</td>
</tr>
<tr>
<td><strong>Weekend Service</strong></td>
<td>15 to 20-min frequency (5 a.m. – 2 a.m.)</td>
<td>2-hour frequency (8 a.m. - 6 p.m.)</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>$2 per trip; $200 U-Pass per year</td>
<td>Included in tuition</td>
</tr>
<tr>
<td><strong>Wi-Fi</strong></td>
<td>x</td>
<td>✓</td>
</tr>
</tbody>
</table>

Source: ASU 2018; Valley Metro 2018.

As shown in **Figure 48**, 60 percent of surveyed ASU students cited their reason for riding light rail is low cost and 56 percent also cited the location of stops and stations. This mirrors the “most important” reasons given for using light rail as their primary mode of transportation in a week – cost and convenience.
When students who identified as light rail users were asked what would encourage them to use light rail more often, the top five suggestions offered by students were shorter waiting times (43 percent), faster trips (42 percent), less expensive passes (40 percent), Wi-Fi (37 percent) and expanded service areas (35 percent). One potential explanation for the perceived difference in timeliness is that the ASU Shuttles’ schedules are tailored toward students’ scheduled class times. Additionally, regarding safety, more than 25 percent of respondents recommended having more security personnel on-board light rail trains.

Discounted U-Pass transit passes are available to all ASU students and are good for unlimited rides on light rail and all Valley Metro Local, Express and RAPID bus routes. 87 percent of the students were aware of ASU’s U-Pass. Almost two-thirds (63 percent) of those aware of the U-Pass say they have one, which equates to 55 percent of all light rail users having a U-Pass. The primary reasons students cited for not having a U-Pass were that it is too expensive or not necessary.

Students who identified as light rail riders reported riding light rail an average of 4.5 times in the past week with more than one-half (53 percent) saying they rode five or more times. Most of these students reported riding at the same frequency they did a year ago (52 percent) or more often (33 percent). Only 5 percent said they now ride less frequently.

More than three-quarters of these students find it “very easy” to plan trips. While fewer than half spent time planning their rail trips (56 percent of users said they don’t plan trip/familiar with route), the most popular planning tools were Google transit (18 percent) or one of Valley Metro’s digital planning tools – online trip planner (8 percent) or RideKick app (8 percent). One-half of these students (49 percent) feel that light rail is largely safe and secure; only 15 percent of student light
rail riders view it as unsafe. Nearly two-thirds of light rail users reported personally witnessing something that made them feel unsafe on light rail. They were most likely to mention feeling unsafe when they witnessed people who were fighting or being violent (38 percent), intoxicated or on drugs (29 percent), or acting rudely (25 percent).

2.4 ARTS AND CULTURE

Light rail features public art concepts at each station and at select facilities. Within the original 26-mile alignment, Valley Metro added 40 public art pieces to rail station areas (Figures 49 and 50). The inclusion of public art in a community’s transit system demonstrates a public transit agency’s attention to the personal experience of its riders and a concern for the wellbeing of its patrons. Public art can be a galvanizing or unifying element for a neighborhood and help set the tone for adjacent development and improvements. Art helps cement the impression of permanence and can be the catalyst that helps others commit to investing resources into development and infrastructure.

Adding public art to the light rail system is a cost-effective way of heightening the customer experience and associating public transit with positive cultural images and aspirations. The presence of high quality art engenders a positive perception of transit. Well-lit, well-designed transit stations that include high quality art can create an environment that provides riders with a sense of safety and security. When the public’s respect for place is heightened, positive behavior is often the result. The integration of art in public spaces sends a message that this is a valued space and, in effect, the people who use the space are valued.

Valley Metro light rail supports arts and culture by connecting to over 55 arts and culture destinations by rail, including cultural resources, theaters, museums and entertainment districts, and has created the ArtsLine (Figure 51), a rotating transit art series, created to increase visibility of arts and cultural destinations along the light rail and associate the Valley Metro brand with this community. This includes First Friday (Figure 52), a major arts event that occurs along the light rail each month where thousands of residents and tourists converge for the Art Walk and events at museums and galleries.
Figure 49. Light Rail Station Art at Alma School/Main St. Station

Source: Valley Metro.

Figure 50. Valley Metro Light Rail Bridge Art in Tempe

Source: Valley Metro.
Figure 51. Valley Metro Showcasing an Arts-Line Artist’s Mural Art at the Roosevelt/Central Ave Light Rail Station

Source: Valley Metro.

Figure 52. First Friday in Phoenix

Source: Valley Metro.
3. DRIVING THE ECONOMY

The investment in Valley Metro light rail introduced profound and permanent changes to the communities it serves. The streetscape is dramatically altered as the focus of the corridor shifts from fast-moving cars to pedestrian-scale interactions. With a decreased demand for parking, developers can focus on changing the uses of their developments to better support a more pedestrian-friendly street level environment. These changes have happened in the current corridor with a marked increase in the number of pedestrians accessing work, entertainment, retail and schools. Developers also shifted their designs to fit with light rail, filling up vacant land and building mixed-use developments that create economic opportunity. These changes attract people and jobs to the corridor in one of country’s fastest growing metro areas, helping it weather the Great Recession and grow at a fast pace, post-Recession. These changes were implemented in a way that benefits all residents, not just one group.
3.0 INVESTMENT AND DEVELOPMENT

3.0.1 Economic Development

Since the beginning of light rail construction, development in the corridor produced more than 50 million square feet of new construction through 344 different projects. As is shown in Figure 53, the largest category of development by far is residential, followed by commercial. The corridor is now home to 25,457 new residential units and 4,017 hotel rooms. Investment has come both from the public sector and the private sector, but the vast majority (74 percent) of new capital in the corridor has come from private sector developments.

Figure 53. Investment and Development in the Light Rail Corridor Since Beginning of Construction

Valley Metro light rail’s opening and the start of the Great Recession were concurrent, making the $11 billion figure of capital investment in the corridor even more impressive. However, the corridor was not immune to the recession’s effects. Between 2007 and 2012, even with light rail operating, property values in the corridor fell overall by 6 percent. Although this trend was not ideal, the corridor did fare significantly better in that period than the Phoenix Metro area as a whole. Post-recession, the corridor boomed. Between the years of 2012 and 2017, property values increased by 38 percent. Overall, in the first ten years of Valley Metro light rail operations, property values along the corridor increased by 30 percent.
The benefits of locating along light rail has proven to be beneficial for businesses, especially around station areas. One study from Arizona State University revealed that light rail stations in Phoenix increased the surrounding property values of all three classes of commercial real estate (industrial, office, and retail and service) (Seo, Salon, Kuby & Golub 2018). This study also showed that this correlation is stronger than the effect of highway exits on property values, which is consistent with the observed difference in property values comparing the light rail corridor with the rest of the Valley.

Despite these impressive increases in property values, the observed trends began prior to light rail operations. Looking specifically at the time during light rail construction (2006-2011), residential sales prices rose 37 percent. This is significant in and of itself, and especially significant considering that the Phoenix metropolitan region saw a 1 percent decrease in residential sales prices during the same period. This trend shows that the region’s push for high-capacity transit was a factor in the corridor’s resilience and growth over the past decade.

The increase during that period was not just in property values. As stations were announced, developers seized the opportunity to purchase vacant land in station areas. For example, from 2006 to 2009, 20 investment grade office buildings were under construction within half-mile of the light rail stations, totaling approximately 4.5 million square feet. The excitement seen in increased construction activity also was reflected in base office rents, increasing from $17.56 in 2004 to $26.85 in 2008. This had the effect of more than doubling the sales volume of vacant land in station areas for the first three years after station location announcements (LRT Property Values, Kittrell 2012; National Association of Realtors 2013).

Subsequently, 10 years into light rail operations, development has occurred on most of the vacant land near light rail stations. In 2004, before light rail construction began, the corridor contained 3.11 square miles of vacant land (almost 2,000 acres). By 2017, 62 percent of that acreage had been developed, leaving only 1.17 square miles of land (750 acres) left for development. And with the pace in which projects are being announced and development is occurring, it is inevitable that the amount of vacant land left for developers in the corridor will continue to quickly deplete (LRT Property Values, Kittrell 2012; National Association of Realtors 2013).

Since the beginning of light rail construction, the revitalization of underutilized properties in the corridor occurred through 101 adaptive reuse, redevelopment and renovation projects. These rehab projects have brought more than $1.8 billion in capital investment into the corridor and breathed new life into more than 7 million square feet of property across the different use types (Valley Metro Economic Development Database 2018). Infill developments and adaptive reuse projects along the light rail corridor are helping to revitalize and strengthen the region’s urban core.

When pursuing projects in the corridor, developers are looking at light rail as an amenity that can benefit their investment. As such, many developers are building mixed-use projects, where a development has a variety of functions. These mixed-use developments help to keep the corridor active and exciting throughout the day, as mixed-use developments typically blend residential with retail and office uses on the ground floor. Since the beginning of light rail construction, 119 mixed-use projects have been built in the corridor, bringing an estimated $7 billion of investment. Beyond just the magnitude of investment, these developments brought more than 16,000 residential units to the market, as well as over 13 million square feet of new commercial space (Valley Metro Economic Development Database 2018). The investments in mixed-use
development are paying off, as can be seen in Figure 54. Station areas with higher levels of investment are designated by larger purple halos, and the top stations for ‘Walk Share’, or the percentage of riders accessing light rail by walking, are green. As can be seen, there is a connection between riders accessing transit by walking and the level of investment at a station. This is a sure sign of effective mixed-use developments, which encourage pedestrian activity and transit use.

Figure 54. Walk Share and Capital Investment

Source: Valley Metro Economic Development Database 2018; Valley Metro Origin and Destination Survey 2015.
During the initial construction of light rail and its more recent extensions, Valley Metro has worked with local business owners to ensure that business continues to function without delay or inconvenience. Valley Metro’s Business Assistance Programs provide business owners with resources aimed to attract and retain customers during light rail construction. Valley Metro partners with municipalities and local business organizations to offer business owners access to workshops and training, marketing assistance and discount campaigns.

Most recently, Valley Metro provided assistance to businesses along the Central Mesa Extension (CME) (Figure 55) and the Northwest Phase I Extension (Figure 56). During the construction of the CME, some notable highlights included:

- 163 businesses participated in METRO Max Rewards program
- 199 businesses utilized signage/banner program
- 248 community meetings and events during construction
- 877 social media followers of construction page

During the Northwest Phase I Extension, some of the notable highlights included:

- 153 businesses participated in customer rewards program
- 169 community meetings and events held
- 357 business development workshops held by partners
- 4,700 attendees present at business centric community events
- 9,478 contest entries received
- 13.6 million measurable impressions captured by Shop On 19th Ave campaign

“Our goal for business assistance is to drive customer traffic to construction impacted businesses and mitigate challenges of construction. We do this through community events, marketing programs, discount programs, and various campaigns to help business survive and thrive through construction.” – Debra Boehlke, Business Assistance Program Lead

“As far as affecting my business here, revenue-wise maybe it’s helped. But it’s, ultimately, made my neck of the woods better. I think it makes the area safer and new business are attracted because of light rail and the old businesses will thrive.” He said he took part in several of the business assistance classes Valley Metro offered. Some of his neighbors also secured low-interest loans through Valley Metro to help them during construction, he said.

“Whatever they offer you – accept it.”
-Phil Briggs, Owner, Automatic Transmission Exchange (41st/Washington)
Figure 55. Central Mesa Extension Opening Celebration, August 22, 2015

Source: Valley Metro.

Figure 56. Northwest Extension Phase I Opening Celebration, March 19, 2016

Source: Valley Metro.
3.0.3 Attracting Transit-Oriented Development (TOD)

As the Valley Metro light rail corridor transformed from auto-centric to multimodal streetscape improvements, investment and development followed. This is very much the case in the Phoenix region: investment and development along the light rail corridor is significant, to the point where the corridor’s growth outpaces that of the region. However, when measuring investment and development in the corridor, it is important to focus not just on the magnitude of growth, but also on the quality of investments. They are meaningful and long-lasting; the investments support long-range plans.

For example, LISC Phoenix, a national organization with a community focus, has committed to equitable transit-oriented development and increasing the availability of affordable and mixed income housing in the light rail corridor over the past decade. The non-profit released Impact 2008-2018, An Assessment of LISC Phoenix Investments in Commercial Corridors in Phoenix, Mesa and Tempe, and in it stated that, “Phoenix is poised for significant population increases over the next decade, that residential and commercial development will have to occur somewhere, and that the best place for it will be along Valley Metro’s 26-mile light rail line.”

According to Impact 2008-2018, “LISC Phoenix began investing in the Main Street Mesa commercial corridor with support of State Farm in 2008. LISC leaders saw transit-oriented development as an important key to future development and support for low-income communities.” Since light rail construction, more than 20 new businesses have opened on Main Street in Mesa (LISC Phoenix 2018). LISC Phoenix was one of the partners to help bring El Rancho del Arte (Figure 57), an affordable housing development designed with art installations, supportive services and communal spaces, to downtown Mesa.

“We are proud to partner with Valley Metro to bring transit oriented development to Mesa, Tempe and Phoenix. Our investments produced more than 1,200 units of housing and over 250,000 sq. ft. of commercial real estate to forge resilient and inclusive communities of opportunity.”

-Terry Benelli, Executive Director, LISC Phoenix

“This area is growing fast. It’s vibrant. And you have amenities that actually facilitate our desire to create that live-work-play. Access to public transportation and multiple transportation options is critical to our operations going forward.”

-Michael Tipsord, Chairman, President and CEO of State Farm Insurance on locating the company’ $600 million campus to Tempe along light rail
Lennar Multifamily Communities LLC, a national real estate company developing mid-rise communities with a variety of multiple and differently sized units, recognized the growth and opportunity the light rail brings to the Valley (Figure 58). Lennar built Nexa, a nearly 400-unit community in the heart of Tempe and also built Muse, a 367-unit community in midtown Phoenix. “I don’t believe we would be developing at this location without the light rail,” said Nathan Stum, Development Manager for Lennar Multifamily Communities.
Jeff Moloznik, the Vice President of Development for RED Development, the national development company that invested nearly one billion dollars into downtown Phoenix in the form of CityScape (Figure 59), said: "The light rail is a good example of how the public sector can make an investment and the private sector will follow behind."

Figure 59. CityScape Development: Phoenix

“People want to live in a walkable, urban environment, even in Arizona. They can get that in Downtown Tempe and Downtown Phoenix, and with light rail, they don’t need a car to live there.” – Pat Devine, Senior Director, Cushman Wakefield
3.0.4 Corridor Population Changes

It is important to understand why the corridor is developing as it is. A lot can be explained by looking into the population residing in the corridor, specifically looking at age distribution. Figure 60 shows that overall trends in the Valley Metro corridor are similar to the region as a whole, but there are a few notable exceptions.

Figure 60. Percent Change, Age Distribution

![Age Distribution Chart]


As with the region, the population in the light rail corridor increased over the past 10 years. This increase did not occur with all population groups, however. In the region overall, older residents increased at the fastest pace: 33 percent increase in 65+ residents; 23 percent increase in 50 to 64 residents; and an increase in the 20 to 24-year-old population took a distant third at 9 percent. The growth of the 20-24 population in the light rail corridor far surpassed that of the region as a whole, likely due to the growth of ASU and other educational institutions along the corridor, especially with the opening of ASU’s downtown Phoenix campus (Figure 61). When comparing that population from before light rail to after, an increase of over 40 percent is observed. The population of older residents also grew in the corridor, though not at the same pace as the overall region, showing that the corridor is attractive to retirees.
Examining the corridor more deeply, it becomes clear that the population is growing at both the top and bottom of the age pyramids, while decreasing in the middle. As is seen in Figure 62, the median age in the corridor decreased by almost a year to 27.6 years old.

Comparing the corridor’s population shifts to the region as a whole, reveals interesting statistics. The region’s median age increased by 2.5 years, whereas the median age in the corridor decreased (Figure 62). The total population in both the corridor and region went up, but the region slightly outpaced the corridor (6 percent as compared to 5.9 percent) (U.S. Census Bureau 2016).

3.0.5 Value of Art Connections

Over the past decade the corridor has become denser, attracting new developments that increase the retail and residential options and encouraging pedestrian activity that attract local business patrons. These investments are enhanced by a strong investment in public art. To date, Valley Metro has invested more than $9 million in public art installments, namely at light rail stations. For these projects, Valley Metro has commissioned 40 different artists or art teams. Of those artists, 17 have been local artists and 23 have brought their outside influence and talents to the Valley. These art projects add interest and excitement to the streetscape, providing an important benefit to all Valley residents and visitors, regardless if they use light rail or not.

Alongside public art installments by Valley Metro are the region’s arts organizations. The number of people employed in arts, entertainment and recreation along the corridor has increased from...
6,171 in 2005 to 6,965 in 2015, representing an almost 13 percent increase. These employees help run more than 80 arts and cultural organizations in Phoenix, 16 in Tempe and 13 in Mesa that are located within the light rail corridor. The Mesa Arts Center alone generates an estimated $25.2 million annually. Arts-related professions also are more concentrated in the corridor than in the region as a whole. In 2015, 2.6 percent of total jobs in the corridor were arts-related, compared to 2.1 percent region-wide.

3.1 EMPLOYMENT
From 2008 to 2013, the Great Recession occurred, impacting both national and local economies. The metropolitan Phoenix region experienced a longer recovery period with the economy moving towards greater stability in 2015. Similarly, for the state of Arizona, there was a longer recovery period in 2007 as compared to the recessionary period in 2001 (Figure 63).

Figure 63. Recession Recovery in Arizona

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The personal-finance website WalletHub conducted an in-depth analysis of 2017’s most and least recession-impacted cities. Among large cities, Phoenix and Mesa ranked 59th and 60th with Tucson coming in last of the 62 large cities ranked, which emphasizes how heavily Arizona was effected. Three of the top-five most impacted cities are in Arizona.

In 2016, The Arizona Republic conducted research to track the employment progress the state had made from the beginning of the recession in 2007 to 2016, using data from the Bureau of Labor Statistics. This data revealed that at the start of the Great Recession, there were more than 210,000 workers employed in the construction industry across the state. That number dropped to 132,000 workers in 2016, revealing that 8 years after the recession, 80,000 construction jobs were lost in the Phoenix Metro area. During the same period, the health care industry added 74,000 jobs across the state. Government jobs, the majority in the education field, had 25,000 fewer jobs from 2008 to 2016, and the hospitality industry countered that loss by adding 27,000 jobs during that time.

In those same 8 years, the Phoenix CBD, which includes the downtown area of Phoenix and has the highest concentration of jobs and services in the region, saw a modest increase in population (3 percent) and a robust increase in employment (18 percent). Valley Metro light rail directly serves the Phoenix CBD and provides a direct connection to this employment center to residents living across the Valley. According to LISC Phoenix, more than 35,000 jobs have been created within 0.5 mile of light rail since 2008 (28. LISC Phoenix 2018).

3.1.1 Transforming the Employment Profile

Metro Phoenix is becoming a destination for companies looking for help from labor competition and excessive costs found in other cities, as well as servicing the expansion of large corporations already present in the Valley. For example, the number of tech companies in the Phoenix Metro area has increased more than 300 percent in the last 5 years. The number of tech companies in the Phoenix CBD grew from 67 to 260 since 2012 and technology jobs increased from roughly 1,800 to more than 7,000. The department used a combination of employment data from the MAG and the City of Phoenix to calculate the increase based on tech companies with five or more employees located in the central business district (AZCentral 2017).

The lower cost of doing business and lower cost of living are reasons companies move to Phoenix, but a well-educated labor base with thousands of students graduating from the universities in the Phoenix area also is a great selling point. Having a light rail system in the urban core of Phoenix metro acts as a catalyst for industry by providing transportation options and lifestyle choices for employees and demonstrating the value Phoenix is willing to invest in itself. Light rail provides a needed transportation option for the employees of the industries drawn to Phoenix’s urban core, and that need is justified by amount of work-based trips taken by riders. As shown in Figure 64, a significant portion (39 percent) of transit trips are work-based trips, with 30 percent of trips on light rail as work-based. Over time, work-based trips have grown on the entire transit system, but especially on light rail. Comparing 2011 to 2015, the proportion of work-based transit trips for the entire system (bus and rail) grew 38 percent, and for light rail the proportion of these trips grew more than 50 percent.
The employment landscape has changed in the Valley over the last 10 years, hit hard by the Great Recession and finally beginning to reach pre-recession employment status around 2015. The workforce experienced changes within the light rail corridor in relation to earnings, age and skill worker level. These trends are explored in the following analysis using 2005 and 2015 U.S Census Longitudinal Employer-Household Dynamics data to compare employment statistics before and after light rail in the corridor.

The ages of workers changed; the proportion of 30–54 year olds went up slightly, 29 year olds and younger decreased 31 percent, and 55 year olds and older increased 48 percent (Figure 65). This could be reflective of the job market that emerged after the recession as less skilled, lower paying jobs began to leave the corridor ($1,250 per month or less) and higher paying more skilled jobs (more than $3,333 per month) took their place, attracting more established professionals (Figure 66).

**Figure 65. Comparison of Number of Jobs by Worker Age (2005-2015) (All Jobs in Corridor)**

Figure 66. Number of Jobs by Earnings (2005-2015) (All Jobs in Corridor)

<table>
<thead>
<tr>
<th>Earnings Range</th>
<th>2005</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,250 per month or less</td>
<td>50,000</td>
<td>100,000</td>
</tr>
<tr>
<td>$1,251 to $3,333 per month</td>
<td>100,000</td>
<td>150,000</td>
</tr>
<tr>
<td>More than $3,333 per month</td>
<td>150,000</td>
<td>200,000</td>
</tr>
</tbody>
</table>


Figure 67 shows that the industries with large numbers of jobs in 2005 such as the construction, manufacturing and information industry had large decreases after 2005. By 2015, industries such as health care, finance and public administration had taken their place.

Figure 68 shows a comparison of the change in jobs from 2005 to 2015 in geographic areas in the Phoenix region. Corridor-wide, there is a one percent increase in the number of jobs, showing that the number of jobs has leveled out to pre-recession numbers. While this may not seem significant, a closer look at segments of the light rail corridor show that job growth has well exceeded pre-recession levels and the growth of jobs in the county overall. For example, Maricopa County overall has had a 10 percent increase in jobs since 2005, but the amount of jobs along the Central Avenue segment of the corridor increased 20 percent during the same period. Between 2005 and 2015 areas like Transit District 12 in west Mesa (west Mesa from Country Club to the 101 North, South to the US 60) and Phoenix Central Business District showed negative job growth and are still recovering from the Great Recession. However, looking at the “recovery years” in these communities from 2010 to 2015, those same areas show growth toward recovery: West Mesa (Transit District 12) grew at 2 percent and Phoenix CBD grew at 6 percent. This is more reflective of how the economy has reacted in Metro Phoenix overall post-recession. Employment spiked in downtown Tempe, Central Avenue in Phoenix and Mesa as a whole. Due to the development of downtown Tempe and the Riverview District, the number of jobs soared where the light rail is prominent. Mesa is redeveloping much of their downtown with many mixed-use buildings along the corridor and will soon be home to office parks in the Riverview District. Mesa continues to establish itself as an integral destination thanks to these efforts as well as a new ASU campus.
Figure 67. Comparison of Number of Jobs by Industry (All Jobs in Corridor)

### Figure 68. Job Growth Chart 2005 – 2015

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maricopa County</td>
<td>1,855,013</td>
<td>1,614,172</td>
<td>1,687,927</td>
<td>9.90%</td>
<td>167,086</td>
<td>14.92%</td>
<td>240,841</td>
</tr>
<tr>
<td>Tempe</td>
<td>194,678</td>
<td>175,801</td>
<td>181,448</td>
<td>7.29%</td>
<td>13,230</td>
<td>10.74%</td>
<td>18,877</td>
</tr>
<tr>
<td>Mesa</td>
<td>144,811</td>
<td>126,059</td>
<td>139,075</td>
<td>4.12%</td>
<td>5,736</td>
<td>14.88%</td>
<td>18,752</td>
</tr>
<tr>
<td>Phoenix</td>
<td>892,678</td>
<td>815,492</td>
<td>867,499</td>
<td>2.90%</td>
<td>25,179</td>
<td>9.46%</td>
<td>77,186</td>
</tr>
<tr>
<td>Transit District 11 (Tempe)</td>
<td>108,042</td>
<td>97,965</td>
<td>104,237</td>
<td>3.65%</td>
<td>3,805</td>
<td>10.29%</td>
<td>10,077</td>
</tr>
<tr>
<td>Transit District 12 (Mesa)</td>
<td>17,453</td>
<td>17,153</td>
<td>19,977</td>
<td>-</td>
<td>-2,524</td>
<td>1.75%</td>
<td>300</td>
</tr>
<tr>
<td>Phoenix / Central Ave</td>
<td>71,894</td>
<td>64,738</td>
<td>59,753</td>
<td>20.35%</td>
<td>12,159</td>
<td>11.05%</td>
<td>7,156</td>
</tr>
<tr>
<td>Phoenix CBD</td>
<td>67,611</td>
<td>63,875</td>
<td>72,468</td>
<td>-6.70%</td>
<td>-4,857</td>
<td>5.85%</td>
<td>3,736</td>
</tr>
</tbody>
</table>


The cities served by Valley Metro light rail have experienced sizable impacts in employment density near the corridor (Figure 69). In fact, more than 10 percent of the region’s employers are located in the corridor. Figure 70 compares employment density in 2007 and 2017 for both the corridor and overall region. There are nearly 9,800 employees per square mile within the light rail corridor. The regional average of employees per square mile is 1,700. This means that the corridor’s employment density is nearly 600 percent more dense compared to the overall region. From 2007 to 2017, the light rail corridor increased its employment density by 17 percent, while the region had a 2 percent decrease overall.
Driving the Economy

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Figure 69. 2015 Regional Employment Density

![Map showing regional employment density](image)

Source: MAG 2016.

Figure 70. Estimated Employment Density

<table>
<thead>
<tr>
<th>Year</th>
<th>Valley Metro Light Rail Corridor</th>
<th>MAG Regional Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>8,347/sq mi</td>
<td>1,738/sq mi</td>
</tr>
<tr>
<td>2017</td>
<td>9,798/sq mi</td>
<td>1,700/sq mi</td>
</tr>
</tbody>
</table>

Source: MAG 2018.

Figures 71 through 73 call out specific portions of the light rail corridor that have experienced substantial increases in employment density. The Central Avenue corridor in Phoenix, already the region’s densest clustering of jobs, attracted enough new employment to densify by 13 percent. The area around the end-of-line of the Northwest Extension Phase I (19th Avenue/Dunlap), which
Driving the Economy

is a mature office corridor, densified by 5 percent. And downtown Tempe exhibited the greatest densification along the corridor with a 45 percent increase in over the 10-year period.

Incomes of residents living in the light rail corridor follow a similar trend to that of workers employed in the corridor. The median household income for corridor residents is up almost 31 percent from 1999 to 2016, from just above $27,000 to over $35,500. This increase is in tandem with a growing population in the corridor, as can be seen in Figure 74 below.

The breakdown of residents by income level paints a similar picture to that of the types of jobs present in the corridor. Namely, there is a noticeable increase in both higher-income jobs and higher-income households in the corridor. As the breakdown of job types has changed along the light rail corridor, the breakdown of those residing in the corridor has changed as well. Looking at the number of residents split into different levels, a noticeable uptick is observed in households earning $50,000 and higher. The number of households earning in the $35,000 to $49,999 range remains constant and the number of households earning between $10,000 to $34,999 is decreasing. Interestingly, the number of households earning under $10,000 is up significantly: this is likely tied to the presence of students due to growth of higher education institutions choosing to locate and expand near light rail. See Figure 74 for a detailed breakdown. By analyzing the annual operating and capital budgets, as well as the federal and local investment for construction and design, it can be estimated that through the planning, engineering, building, operating and maintenance of the light rail system, more than 10,000 jobs have been created and/or supported by Valley Metro light rail (Bureau of Labor Statistics 2018; U.S. Department of Transportation 2018).

Figure 71. Mean Employment Density in Segments of the Light Rail Corridor

<table>
<thead>
<tr>
<th>Year</th>
<th>Central Ave</th>
<th>19th Ave/Dunlap Ave</th>
<th>Downtown Tempe/ASU</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>20,048/sq mi</td>
<td>5,309/sq mi</td>
<td>7,190/sq mi</td>
</tr>
<tr>
<td>2017</td>
<td>22,654/sq mi</td>
<td>5,610/sq mi</td>
<td>10,494/sq mi</td>
</tr>
<tr>
<td>Density Change</td>
<td>13.0%</td>
<td>5%</td>
<td>45%</td>
</tr>
</tbody>
</table>

Source: MAG 2018.
Figure 72. 2017 Regional Employment Density Per Square Mile

Source: MAG 2018.
Figure 73. Employment Density in Central Corridor, 19th Ave and Downtown Tempe

Source: MAG 2018.
3.2 INNOVATION AND EDUCATION

3.2.1 Education Corridor

Educational institutions have a large presence along the light rail corridor in Tempe, Mesa and Phoenix. Supporting the needs of education and innovation are crucial for the Phoenix metropolitan region’s future. Light rail connects campuses, offers convenient alternatives to driving for those without cars, and spurs development that appeals to both students and innovators.

The region is benefitting from higher educational capital investments and infill along the corridor, as seen in Figure 75. The value of capital investment in educational facilities since the construction of light rail has totaled $2.6 billion and contributed to a major increase in the educational footprint in the corridor, including 60 projects and 5.5 million square feet of education facilities (Valley Metro Economic Development Database 2018). In 2012, Benedictine University opened a campus in downtown Mesa and an ASU satellite campus will

“The introduction and continued expansion of Valley Metro Rail has been a game changer for ASU, our students and the broader community. Valley Metro Rail has become an integral part of our efforts to provide greater access to the university and connect students between campuses in sustainable ways. It also helps students to quickly, easily and affordably access all that the Valley has to offer such as events, amenities and employment opportunities.”

-Dr. Michael Crow, ASU President
soon join Benedictine. Wilkes University and NAU-East Valley also have transit-accessible outposts in downtown Mesa.

Figure 75. Examples of Educational Capital Investment Corridor

![Examples of Educational Capital Investment Corridor](image)


The light rail connects the ASU Tempe campus to the downtown Phoenix ASU campus in less than 30 minutes. The ASU downtown Phoenix campus, brought about in part because of the light rail investment, now enrolls 12,000 students and has contributed to a revitalization of downtown Phoenix’s identity. Many new businesses and residential developments have catered to the growing student presence. The Phoenix Biomedical Campus, a part of Northern Arizona University built in collaboration with the University of Arizona (U of A), has so far contributed $1.3 billion to Phoenix’s economy (University of Arizona College of Medicine – Phoenix. 2015). This project began after light rail was built as well.

No municipality in the region has been more heavily affected by light rail in terms of the impacts on education than Tempe, home of the fast-growing flagship campus of Arizona State University where more than 50,000 students are enrolled. Light rail runs through the Arizona State University campus and provides a connection for students, faculty and staff. The past decade has been one of immense change and urban development for the city of Tempe and particularly its downtown area. In the past 10 years, some of the largest additions have been the Hayden Ferry Lakeside and Marina Heights commercial developments along Tempe Town Lake, numerous dorms and apartments along Apache Boulevard and Rural Road, additions to Mill Avenue including the Brickyard and West Sixth (which includes the tallest building in Tempe), and Valley Metro light rail.

Since the inception of light rail 10 years ago, downtown Tempe and the surrounding ASU campus has rapidly developed, increasing in density by almost 50 percent in the period from 2008–2018; this is the largest density change and most densely populated area in all the Phoenix Metro area. The Downtown Tempe Foundation credits a portion of their downtown revitalization and fast-growing community to accepting light rail. Having the infrastructure to support movement of people through Tempe has helped bring people for work, education and tourist activities. Tempe has about 185,000 residents, yet on the average day there are more than 300,000 people in the city (U.S. Census Bureau 2017).

The following 10 years will bring even more change. With the Nexus Innovation Corridor, ASU Greek Village and numerous other multi-use developments, the area will continue to become
more densely populated. The City of Tempe General Plan 2040 calls for Tempe to create a 20-Minute City, meaning that people should be able to travel anywhere in the city in 20 minutes by bicycle, transit or walking.

The benefits of light rail extend beyond post-secondary education as well. As seen in Figure 76, K-12 schools are distributed throughout the corridor. Students at these schools are likely familiar with transit and can use light rail to access businesses and higher educational opportunities. Students are important to Valley Metro light rail; they make up 30 percent of the system’s ridership. And as they use the system and become more familiar with it, they likely will keep using it after graduation.

Figure 76. K-12 Schools in Valley Metro Light Rail Corridor

Source: Maricopa County Flood Control District (MCFCD) 2017.
3.2.2 Attracting Innovation

The light rail corridor provides access to, and also attracts, the medical technology industry with companies like WebPT. This company has been featured on the Inc.5000 (Marketwired 2017) list of the nation’s fastest growing private companies 5 years in a row since 2012. The U of A Center for Simulation and Innovation medical technology campuses is also located in the Valley Metro light rail corridor allowing access for students and professionals to co-locate in researching medical technology. This medical technology presence is part of the larger technology industry growing in the Phoenix Metro area that supplies jobs and assists in the economic growth in the Valley.

“Innovation spaces are buildings or interiors used to modernize the economy through workspaces that facilitate collaboration and organized interaction among professions. Incubators, accelerators, co-working spaces and tech startups fall under the umbrella of an innovation space. The drive for spaces like these are the result of rapidly changing culture, economies and demographics that demand creative and experimental design. Innovation spaces offer a range of support for activities that were previously found in separate spaces. These spaces allow separate professions and disciplines to more easily converge and interact in a more open and flexible format. The collaborative nature of innovation spaces cultivates the opportunity to enhance the most vital components of the economy through the lenses of different professions and make cities more competitive.

Innovation spaces like incubators and startups support emerging technologies, allowing new types of industries to thrive in the Valley and make breakthroughs in areas like translational research and healthcare modernization. The Greater Phoenix Economic Council (GPEC) is an economic development organization that represents Maricopa County in tracking and attracting diverse industries in the Valley. GPEC chronicles innovation spaces in the region as seen in Figure 77. There are 24 innovation spaces in the light rail corridor, including nine incubators/accelerators, nine co-working spaces and six tech start-ups. The corridor itself contains nearly 40 percent of all 64 innovation spaces in the Phoenix Metro area, which also is the highest concentration in the Valley.

“While startup costs are arguably cheaper in Phoenix versus Silicon Valley... the city’s air conditioning and convenient light rail line as two reasons why it may seem more appealing to businesses. This may explain why the number of tech companies in Phoenix has grown fourfold since 2012, many of them setting up shop in this former sector of dilapidated warehouses near downtown.” KTAR, referencing why Phoenix is named among most up-and-coming areas.

“As we pitch Greater Phoenix’s value proposition to businesses looking to relocate or expand, transportation is always discussed. Whether that business is a high-tech startup or a global enterprise, they want to assure their employees have access to public transportation options. Valley Metro is a great partner to our economic development strategy and has been instrumental in strengthening our region and connecting people.”

-Chris Camacho, President & CEO, Greater Phoenix Economic Council
3.3 SPECIAL EVENTS AND TOURISM

3.3.1 Occasional Riders and Tourists

More than 22 million people visit metropolitan Phoenix each year. Phoenix is one of the few U.S. cities with franchises in all four major professional sports leagues: Phoenix Suns (NBA), Arizona Diamondbacks (MLB), Arizona Cardinals (NFL) and Arizona Coyotes (NHL). Valley Metro light rail was built purposefully to connect activity centers together to give tourists and patrons of special events more travel options. Current boarding data shows that weekend and holiday ridership of light rail is less than weekday utilization, but that the decline from weekday to weekend/holiday is significantly less pronounced than the decline on overall transit system. This reflects in part that riders use light rail for special events. Thanks to the several sports venues and museums located along the corridor, holidays and special events see spikes in ridership that normally would not be so high.

Source: Greater Phoenix Economic Council (GPEC) 2018.
According to Figure 78, Saturday ridership for Valley Metro bus and light rail service combined is 35 percent lower than weekday ridership, where light rail ridership alone only drops 18 percent on Saturdays. Sunday/holiday ridership for bus and light rail drops 42 percent from weekday ridership, but light rail ridership alone only drops 24 percent.

Figure 78. Comparison of Weekday and Weekend Service Level, Valley Metro Bus and Light Rail

These numbers show the dramatic difference in ridership, especially because there are so many special events of all sizes in Phoenix, Tempe and Mesa along the light rail corridor. As an example of how special events affect ridership, Figure 79 shows that on Arizona Diamondbacks’ game days, rail ridership is twice the normal average.
The PHX Sky Train® is an automated train at Phoenix Sky Harbor International Airport that transports travelers between the airport and the 44th St/Washington light rail station. It caters to airport users not only by connecting them to light rail, but also by providing bag checking services, check-in counter and a pet park. According to an APTA study (APTA 2007), cities with rail access directly from the airport show stronger hotel performance across key indicators, particularly in attracting business travelers through conventions and meetings, than those that do not offer such transportation infrastructure options.

According to another APTA study (APTA 2013), from 2006 to 2013, cities with direct rail access to terminals reported higher hotel performance in both average daily room rates and revenue per available room (both 10.9 percent higher). This is apparent in the ridership recorded from Valley Metro and PHX Sky Train® (Figure 80) vehicles. When the PHX Sky Train® was expanded to reach Terminal 3 in 2014, ridership at the 44th St/Washington station increased 20 percent and PHX Sky Train® ridership increased 64 percent from 2014 to 2015 (Figure 81). This demonstrates that there are airport users, including tourists, local business travelers and employees, who take transit to get to their final destinations along the light rail alignment and value the expansion of light rail to more direct connections and destinations.
### Special Events and Hotels

Since the beginning of light rail construction, there has been $1.2 billion in public and private capital investment in new hotel construction in the light rail corridor, including 17 new hotel development projects with a total of 4,017 hotel rooms (Valley Metro Economic Development Database 2018). In the past, the Red Line Bus ran directly through the airport, and now light rail runs along Washington Street and deeper into downtown Tempe, both of which have a greater...
concentration of hotels. This difference in routing and higher frequency of trips on light rail provides more direct and reliable connections to hotels for tourists who choose to use transit to access lodging. Light rail has been advantageous in connecting the Phoenix Convention Center to hotels located along the corridor. Comparing pre-light rail construction to today, there is a 69 percent increase in the number of hotels reachable in under an hour from the Convention Center. Riding on the Red Line bus before light rail, tourists could connect to a total of 48 hotels from the Phoenix Convention Center; riding Valley Metro light rail in 2018, tourists can now reach 81 hotels (Figure 82). This increase in hotels benefits visitors to Phoenix and the many hotel employees.

Figure 82. Comparison of Hotels Pre-Light Rail to Current Day


The Phoenix metro area is a booming center for tourism contributing $21.2 billion to the Arizona economy (Arizona Office of Tourism 2018). Phoenix is home to a multitude of large venues, many of which are located along the light rail corridor, such as Chase Field, Sun Devil Stadium and Talking Stick Resort Arena. With major league sports teams, warm weather year-round and events attracting people from all over, Phoenix keeps itself on the map as a destination for all
Driving the Economy

Building Communities + Enhancing Lives: *A Quality of Life Report*

types of travelers. In 2017, along the light rail corridor, there were 126 smaller events with 10,000 attendees or less; 153 larger events with between 10,000 and 50,000 attendees; and 25 mega events with 50,000 attendees or more (Figure 83).

Figure 83. All Special Events Held Along the Valley Metro Corridor in 2017

<table>
<thead>
<tr>
<th>Activities (2017)</th>
<th>Attendance</th>
<th>Weekdays/Year</th>
<th>Weekends/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phoenix Suns</td>
<td>12,000</td>
<td>29</td>
<td>12</td>
</tr>
<tr>
<td>Phoenix Mercury</td>
<td>6,000</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Arizona Rattlers</td>
<td>7,000</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Diamondbacks</td>
<td>20,500</td>
<td>58</td>
<td>27</td>
</tr>
<tr>
<td>Other Sporting Events (Smaller)</td>
<td>10,000</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Other Sporting Events (Larger)</td>
<td>23,500</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Other Sporting Events (Mega)</td>
<td>72,000</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Concerts (Smaller)</td>
<td>9,000</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>Parades (Larger)</td>
<td>40,000</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Parades (Mega)</td>
<td>100,000</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Festivals (Smaller)</td>
<td>3,500</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Festivals (Larger)</td>
<td>30,000</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td><strong>Phoenix Convention Center</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rock 'n' Roll AZ Health Expo</td>
<td>34,000</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>NABC Convention</td>
<td>5,000</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Final Four Fan Fest</td>
<td>28,000</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Phoenix Comic Fest</td>
<td>100,000</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Real Wild &amp; Woody Beer Festival</td>
<td>4,000</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Miscellaneous</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disney on Ice</td>
<td>2,000</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>First Friday</td>
<td>5,000</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Comedy Get Down</td>
<td>20,000</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Tempe Activities (2017)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASU Commencement</td>
<td>36,000</td>
<td>36,000</td>
<td>1</td>
</tr>
<tr>
<td>ASU Football</td>
<td>50,000</td>
<td>50,000</td>
<td>6</td>
</tr>
<tr>
<td>Parades (Smaller)</td>
<td>12,000</td>
<td>12,000</td>
<td>0</td>
</tr>
<tr>
<td>Parades (Larger)</td>
<td>35,000</td>
<td>35,000</td>
<td>1</td>
</tr>
<tr>
<td>Rock 'n' Roll Marathon</td>
<td>20,600</td>
<td>20,600</td>
<td>0</td>
</tr>
<tr>
<td>Festivals (Smaller)</td>
<td>5,000</td>
<td>5,000</td>
<td>1</td>
</tr>
<tr>
<td>Festivals (Larger)</td>
<td>50,000</td>
<td>50,000</td>
<td>1</td>
</tr>
<tr>
<td>Festivals (Mega)</td>
<td>75,000</td>
<td>75,000</td>
<td>2</td>
</tr>
<tr>
<td>Pat's Run</td>
<td>31,000</td>
<td>31,000</td>
<td>0</td>
</tr>
<tr>
<td><strong>Mesa Activities (2017)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mesa Arts Festival</td>
<td>10,000</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Mesa Music Festival</td>
<td>2,000</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Activities (2017)</td>
<td>Attendance</td>
<td>Weekdays/Year</td>
<td>Weekends/Year</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------------</td>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Motorcycles on Main</td>
<td>2,500</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>2nd Friday Night Out</td>
<td>3,200</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Manheim Steemroller Christmas</td>
<td>5,000</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Celebrate Mesa</td>
<td>4,000</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Downtown Mesa Brew Fest</td>
<td>5,000</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Mesa MLK Parade/Festival</td>
<td>10,000</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Spark! Festival</td>
<td>10,000</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>CycloMesa</td>
<td>10,000</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Taste of Arizona</td>
<td>40,000</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>AZ Celebration of Freedom</td>
<td>4,000</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>


Figure 84. National Football League Super Bowl XLIX event in Downtown Phoenix, 2015

Even though the Super Bowl XLIX game was held at the University of Phoenix Stadium in Glendale, AZ, the impact of the events supporting the game across the Valley spread across all sectors and industries, especially on Valley Metro services. The Saturday before Super Bowl XLIX saw more than 126,000 riders, the highest light rail ridership levels ever recorded, breaking the previous high of 66,000 (Figures 84 and 85). In total, almost 390,000 rides were recorded from Thursday through Super Bowl Sunday. The Super Bowl attracted not only sport-related events such as the NFL Experience and Super Bowl Central, but also music and recreational events into downtown Phoenix. More than a million people were estimated to be in attendance at the events in downtown Phoenix. Light rail connected tourists and visitors to these huge events, helping alleviate roadways of further congestion. Overall, 10 to 15 percent of Super Bowl attendees rode light rail during their visit. In addition to revenue from ticket sales, Valley Metro also generated more than $450,000 from advertising during Super Bowl events.
The Super Bowl Committee awarded Phoenix the rights to host Super Bowl XLIX in part because of Phoenix’s extensive light rail system, allowing visitors to easily connect between venues, events and hotels. In May 2018, the Super Bowl Committee again awarded Phoenix the right to host Super Bowl LVII in 2023, noting the growth of the hotel industry in Phoenix and continued improvements to the stadium.

In addition, Valley Metro light rail has been noted by other host and selection committees as a major reason that the region is able to host mega-events, such as the NBA All-Star Game in 2009, MLB All-Star game in 2011, NCAA Championship Game in 2016, and NCAA Final Four in 2017 (Figures 86 through 88). It was recently announced that the region will host another NCAA Final Four in 2024.
Figure 86. Downtown Phoenix during the Major League Baseball All-Star Game, 2011

Source: Valley Metro.

Figure 87. NCAA College Football Championship Game in Downtown Phoenix, 2016

Source: Valley Metro.
Figure 88. Light Rail Train Wrapped for the NCAA Final Four events in 2017

Source: Valley Metro.
4. FOSTERING COMMUNITY HEALTH

Investments in high-capacity transit, such as light rail, should lead to ridership increases, economic growth and improvements to streetscapes, but most importantly it should help to elevate the vitality and health of individuals and communities as a whole.

In the light rail corridor, observable changes in access to jobs, diversity of housing and healthy food options over the past decade have been made, and the trajectory of the corridor is continued growth and improvement in these areas. The corridor offers residents an affordable and sustainable place to live, work and play. Light rail was designed and built to benefit all members of the community.

4.0 EDUCATION AND WORKFORCE TRAINING

Education and workforce training opportunities are an important measure of transit project success. Growth in these areas demonstrate how transit investments encourage investment of capital, which in turn helps workers and learners. When companies and schools locate near transit, they allow for a diverse group of workers and learners to access their offerings.
4.0.1 Serving People of All Backgrounds

The demographic trends amongst those living in the corridor differs from those riding light rail. Ridership from all demographic race groups grew between the two times of data recording (2011 and 2015), except for among Asian riders. All populations residing in the corridor except two (Hispanic and Native American) have increased; the Asian, non-Hispanic population increased more than 50 percent since development of light rail. The overall resident population in the corridor has increased 5.9 percent (U.S. Census Bureau 2012-2016, 2005-2009).

In 2011, the first year of data gathering on rider demographics, 67 percent of riders were between the ages of 16 to 34. By 2015, the percentage of riders in this age group dropped to 57 percent. Part of the decreased percentage of younger riders is attributed to an overall lower percentage of Valley Metro rides (rail and bus) taken by students. University student ridership between 2011 and 2015 decreased 36 percent (compared to 39 percent for the overall Valley Metro system). This is likely due to the increased non-public transit mobility options available in the Valley (e.g., Uber, Lyft, Grid Bike Share and Bird scooters) and the introduction of campus-to-campus shuttles. The ASU shuttle serves the Tempe and downtown Phoenix campuses and is exclusively offered to ASU faculty and staff. However, student riders on light rail still make up a significant portion of ridership, and the service is well suited as a part of the transit network for the 61,000 average weekday student riders (Valley Metro 2011, 2015).

4.0.2 Growing Educational Options

Although actual student ridership has decreased on light rail, this has not deterred educational institutions from investing in the corridor. With a larger proportion of students now in the corridor, it is likely that student ridership will once again increase. This trend is especially pronounced when looking at the change in K-12 school enrollment. As shown in Figure 89, 17 percent more students were enrolled in public and charter schools located in the corridor in 2016 than in 2008. This increase does not come only from schools expanding, but new schools choosing to locate

“Access to the Metro Light Rail system was a high priority for selecting a site for Creighton University’s Arizona Health Sciences Campus. We needed good access to our clinical training sites that include Dignity Health Saint Joseph’s, District Medical Group, and Maricopa Integrated Health System facilities that are located near the Light Rail system. Creighton students will be able to attend classes at the new midtown Creighton campus and then travel to their clinical training sites via the Light Rail system. We also wanted our students to have the ability to live throughout the Valley to provide lower-cost housing options and then easily commute to our centrally-located campus on the Light Rail. Phase One of our new campus will include a 200,000 square feet building at an estimated cost of $100 million. We will also be creating about 125 new high-wage jobs in Phoenix. We will train over 4,000 new physicians, nurse and other health professionals in the next ten years to help address the healthcare workforce shortages in Arizona. The Light Rail was instrumental in our decision to build a new medical school and health sciences campus in Phoenix.”

-Dale Davenport, Senior Associate Dean, School of Medicine, Creighton University
along the corridor. Since light rail began operations, 20 new K-12 schools have located in the corridor (MAG 2016). Enrollment in the corridor’s private schools (Brophy, Xavier, Queen of Peace, Tempe Montessori and Valley Lutheran) are not included in Figure 89, but adding those five schools would boost overall enrollment in the corridor by at least one thousand students.

Figure 89. Public and Charter School Enrollment in the Light Rail Corridor

![Bar chart showing public and charter school enrollment in the Light Rail Corridor from 2008-2009 to 2016-2017.](chart.png)

Source: Arizona Department of Education 2017

Enrollment at vocational schools and community colleges in the corridor is also up. Twenty-one new vocational schools opened in the corridor since 2012, giving students a broad new range of potential schools to attend using transit (MAG 2016). The total number of students attending these schools in 2017 was almost 128,000 – 10 percent at vocational institutions and the other 90 percent at public, 2-year colleges. Across the entire corridor, enrollment in 4-year colleges and universities increased 22 percent from 2008 to 2018 and enrollment at the ASU downtown campus rose 231 percent during the past decade (Arizona Department of Education 2017).
4.1 HOUSING AND AFFORDABILITY

4.1.1 New Housing Options

The light rail has a large economic impact on the Phoenix Metro area, especially in the development and investment of new housing options (Figure 90). The inclusive nature of transit has spawned a diverse range of housing types within the corridor. Since construction of light rail, the corridor has added approximately:

- 6,868 student housing units;
- 14,352 market-rate apartment units;
- 1,373 senior housing units; and
- 2,229 dedicated affordable housing units.

Figure 90. Examples of New Housing Options Built in the Light Rail Corridor


“The vision of Native American Connections (NAC) is to improve the lives of individuals and families through Native American culturally appropriate behavioral health, affordable housing, and community development services. Light rail has exponentially improved our capacities to serve the community. With the opening of Devine Legacy near the Central and Campbell light rail stop, NAC introduced one of the Valley’s first affordable Transit Oriented Developments. Since that time, we have continued to build our high quality, LEED Platinum certified affordable housing communities near light rail to give our residents the best access to affordable, quality transit opportunities and access to social and cultural amenities. Many NAC residents choose to not own a vehicle and ensure their housing stability without the extra cost of maintaining a car. Our corporate and behavioral health offices are also located on light rail, ensuring convenient and affordable access for our clients seeking services.”

-Diana Yazzie Devine, CEO & President, Native American Connections
These investments include a wide range of housing options, including places like Camelback Pointe, a 54 unit shelter and rehabilitation center in Phoenix that caters to those who suffer from chronic homelessness; Gracie’s Village in Tempe, a 50 unit affordable housing complex intended for working families; and Encore on First in Mesa, a 125 unit low-rent housing complex dedicated to independent seniors (Valley Metro Economic Development Database 2018).

4.1.2 Safe and Affordable Way for Individuals to Cut Costs

According to the Housing and Transportation Affordability Index (Center for Neighborhood Technology [CNT] 2018), housing is traditionally deemed affordable when it consumes no more than 30 percent of income. Transportation is usually a household’s second largest expense. The benchmark for affordability for combined housing and transportation costs is no more than 45 percent of household income. The cost of transportation can be lowered by taking advantage of Valley Metro transit options. Light rail offers an alternative to the many costs associated with owning and operating a personal vehicle. According to the APTA (APTA 2017), households can save nearly $10,000 a year by utilizing public transportation and living with one less car. Maricopa County household income data shows that on average, 53 percent of household income is dedicated to housing and transportation costs (Figure 91). Compared to light rail corridor residents, on average only 39 percent of household income is dedicated to housing and transportation costs, meaning that the corridor meets the affordability benchmark and is more affordable on average compared to Maricopa County as a whole (Center for Neighborhood Technology [CNT] 2018).

**Figure 91. Average Cost of Having a Car in Phoenix for 3 Years**

<table>
<thead>
<tr>
<th>Initial Cost of a Car</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total:</strong></td>
<td>$33,845</td>
</tr>
<tr>
<td><strong>Fuel</strong></td>
<td>$25,407</td>
</tr>
<tr>
<td><strong>Insurance</strong></td>
<td>$4,815</td>
</tr>
<tr>
<td><strong>Fees</strong></td>
<td>$1,332</td>
</tr>
<tr>
<td><strong>Repairs/Maintenance</strong></td>
<td>$3,558</td>
</tr>
</tbody>
</table>


There are other costs associated with personal vehicle use that directly affect commuters. For example, those enjoying the amenities and activities in downtown Phoenix pay between $4–12 for 2 hours of parking. For those who seek a higher education at

“The deal took more than a year to close,” but French says, the property had a lot of pluses. “This site is extremely well located, close to the light rail,” he explains of Bridgewater at Midtown, the affordable senior living community.

-David McGlothlin, reporting for AZ Big Media
one of ASU’s three campuses, paying to park on campus can cost $780 per academic year. Valley Metro offers reduced fare for students with special priced passes like the U-Pass. In 2017 and 2018, Valley Metro surveyed ASU students to better understand the use of light rail service between the Tempe and downtown Phoenix campuses. When asked the main reason for riding light rail, students most often cited low cost (64 percent) as the most important factor (Valley Metro 2018).

Driving also has non-financial costs that may be more valuable than money, like time. According to The Centre for Economics and Business Research (2014), expenses from traffic congestion in the United States totaled $124 billion in 2013. This accounts for direct costs (value of fuel and time wasted) and indirect costs (increased cost of transporting goods and reduced workplace productivity). Without efforts to expand public transit, this number could climb to $186 billion by 2030. The amount of time spent in traffic also is harmful to riders’ wallets. Phoenix experiences 51 hours in traffic delay per auto commuter per year; this results in 25 gallons of excess fuel used per car each year and costs drivers $1,201. According to APTA (2018), U.S. public transportation saves 4.2 billion gallons of gasoline per year.

4.1.3 Transit-Dependent Travelers and Disadvantaged Populations

Valley Metro believes that connecting the community to the right amenities is important to improving the quality of life. What is equally as important is connecting the right communities to those amenities, those being the communities that are most vulnerable and in need of public transit. When analyzing an 8-year span between 2009 and 2017, it was evident that car ownership rose in the Phoenix Metro area; the percentage of people without a vehicle diminished throughout the region. There are more cars on the road contributing to congestion, eroding public infrastructure and contributing to poor air quality conditions in the Valley, leading to the diminishment of the quality of life for everyone.

Even though more people own cars in 2017 than in 2009, the percentage of people who do not own cars, due to cost or choice, has grown around the light rail corridor and around the corridors slated for future light rail extensions, such as south central Phoenix. In 2009, 29 percent of the census tracts (with more than 10 percent of the tract having zero-vehicle households) were within a half-mile of the corridor. In 2017, that percentage went up to 46 percent (Figure 92). From this analysis, Valley Metro can draw two conclusions: (1) the light rail was well-designed to serve

"Valley Metro Rail is a vital community resource for both our affordable housing residents and our behavioral health clients. They have come to rely on the connectivity that light rail provides – from traveling to work, job interviews and medical appointments to accessing much needed community resources. Transit can be a sizable portion of a lower income person’s household budget – light rail reduces that impact greatly and positions our residents and clients to achieve and maintain stability, health and overall wellness."

-Diana Yazzie Devine, CEO & President, Native American Connections
populations with less access to personal vehicles and (2) even though vehicle ownership is higher, more people without cars are choosing to live near the light rail.

Figure 92. Zero-Vehicle Households by Census Tract

Using public transit allows new residents to be productive by accessing jobs, school or shopping and the agency works with the community to solve the barriers to using transit. For example, Valley Metro educates several hundred refugees on how to ride the bus and rail each year. These workshops are regularly scheduled with Lutheran Social Services and Arizona Immigration and Refugee Services (AIRS). Valley Metro also has worked with International Rescue Commission, Catholic Charities, and the Somali American United Council with regularity in past years. Some school districts have special programs for refugee students and include Valley Metro in transit training.

Like the need to lower housing and transportation costs, other basic needs like having access to affordable food is a challenge as communities can lack access to affordable and fresh food.
options. The access to food is a basic and vital need to maintain a secure quality of life. Valley Metro light rail facilitates a transportation need for disadvantaged populations by connecting them to basic resources like grocers.

Those who qualify for low-income programs like the Supplemental Nutrition Assistance Program (SNAP) and Electronic Benefits Transfer (EBT), an electronic system that authorizes transfers of government benefits from a federal account to pay retailers, are especially susceptible to transportation obstacles and rely on light rail and other transit services to meet their transportation needs. Within the light rail corridor, there are nearly 100 stores that accept SNAP/EBT benefits (Figure 93).

Figure 93. Grocery Stores Accepting Electronic Benefits Transfer Cards in the Light Rail Corridor

4.2 HEALTHY LIVING

Access to necessities is an important factor in quality of life. Phoenix Metro residents deserve the ability to reach the most fundamental resources like fresh food and medical assistance. Light rail was designed to offer this capability, especially to those most out of reach of fundamental needs like the elderly, economically challenged and those without transportation. Light rail enhances the communities it serves by providing an opportunity to connect with resources that sustain life.

Commuting can be stressful, and Valley Metro can help commuters make wiser, less stressful choices when getting to work. Taking light rail to work fits physical activity into commuters’ lives by encouraging them to walk to and from transit. Traveling by light rail has a positive impact on air quality, which in turn has a positive effect on the physical health of communities. For residents living without a car in Metro Phoenix, light rail provides access to grocery stores and other healthy food options. All these benefits contribute to happier and healthier communities.

Live Well Arizona, a collaborative effort to celebrate the state-wide work taking place to develop healthier, more livable communities in Arizona, cited community safety as an element of quality of life. “Creating a safe community means creating a healthy community. For instance, unsafe roads, bikeways, and walkways may limit access to destinations of health and result in negative health outcomes. Ensuring communities are safe will help ensure that communities are healthy.” (Live Well Arizona 2018)

4.2.1 Safety for Bicyclists and Pedestrians

With the investment in light rail comes roadway design and infrastructure improvements that extend benefits beyond transit riders. Each light rail project has improved the pedestrian environment by adding new signals and safe crossings. Overall, the light rail has helped less urbanized areas of the Valley improve pedestrian safety and overall walkability.

More urbanized areas of the corridor like downtown Phoenix, Central Phoenix and downtown Tempe had many pedestrian crossings and signalized crossings prior to the Valley Metro light rail, while the less urbanized areas such as Mesa, East Tempe, and Phoenix north of 19th St/Camelback Road, did not have many pedestrian-friendly features before the light rail was constructed. Adding light rail in these areas significantly helped increase walkability and safety for pedestrians. Figure 94 shows the number of infrastructure improvements in the corridor that were added over the past decade to improve pedestrian safety, either with the construction of light rail projects or after the implementation of light rail.
4.2.2 Bicycle and Pedestrian Crashes Less Common and Less Severe after Light Rail

Arizona Department of Transportation crash report data was analyzed to show how bicyclist and pedestrian safety has changed in communities within the corridor since light rail was constructed. Using this data, crash data in the region and the light rail corridor before light rail was constructed (2002 to 2004) was compared with crash data after operations began (2009 to 2011) to show the impacts that introducing light rail and the effects of the Great Recession had on pedestrian and bicycle crashes. From 2002 to 2004, there was a total of nearly 180,000 bicycle and pedestrian crashes in the region and just over 3,800 within the future light rail corridor. After the light rail was introduced to the Valley, the total amount of bicycle and pedestrian crashes in the region studied reduced by 27 percent to roughly 130,000 crashes. Within the light rail corridor however, the
amount of crashes reduced much more dramatically by 50 percent, from approximately 3,800 down to 1,900.

Roughly 40 percent of bicycle and pedestrian crashes led to an injury or fatality in the corridor before light rail was constructed. This rate was even higher than the overall rate of crash related injuries and fatalities across the region (37 percent) in those pre-light rail years. After light rail began operating, the rate of bicycle and pedestrian crashes across the region that led to injury or fatality decreased slightly by 4 percent. Compared to the light rail corridor, the rate of injury and fatality went down 10 percent (Figure 95).

Figure 95. Comparison of Fatal Bicycle and Pedestrian Crashes in the Corridor, Before and After Light Rail

4.2.3 Access to Medical Care

Valley Metro strives to give access to important amenities that improve the quality of life for residents. Some people need access to basic drug store amenities to obtain medicine or for more serious medical care facilities. This is one area that the Valley Metro can work with partners to increase the number of medical options located in the corridor.

Since the construction of light rail, five new healthcare facilities were built in the corridor, including Adelante Healthcare Center in Mesa and in Phoenix at Virginia on 3rd Street in Phoenix, an innovative substance abuse treatment facility developed by Native American Connections. However, as shown in Figure 96, the number of medical facilities in the corridor that runs through
Phoenix and Tempe has decreased by roughly 20 percent since 2004, and Mesa only has one facility remaining. The percentage of acreage dedicated to medical facilities within the corridor in Phoenix only fell slightly (17 percent), while Tempe nearly doubled in acreage (83 percent growth) and Mesa saw diminishments that correlate with number of facilities leaving the corridor (MAG 2016).

Figure 96. 2004-2017, Percent Change in Medical Facilities and Acreage

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<tr>
<td></td>
<td>Year</td>
<td>2004</td>
<td>2017</td>
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<tr>
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<td></td>
<td>423</td>
<td>352</td>
</tr>
<tr>
<td>Tempe</td>
<td></td>
<td>6</td>
<td>11</td>
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<tr>
<td>Mesa</td>
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<thead>
<tr>
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<th>Number of Facilities</th>
<th>2004</th>
<th>2017</th>
<th>% Change</th>
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<td></td>
<td>91</td>
<td>70</td>
<td>-23</td>
</tr>
<tr>
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<td>6</td>
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<tr>
<td>Mesa</td>
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<td>5</td>
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4.2.4 Cleaner Air for Public Health

Operating the light rail helps to mitigate poor air quality in the region, which is important as Phoenix ranks #4 in the list of top 10 most populated metropolitan areas with more than 100 days of elevated air pollution in 2016 (Environment Arizona Research & Policy Center 2018). The region has been in non-attainment for federal air quality standards since 2008 and ranks lower than New York City. Additionally, the American Lung Association ranked the Phoenix area in 2011 as the 19th most ozone polluted cities in the U.S., with an unfavorable increase in 2016 to a ranking in the 4th spot (Figure 97) (American Lung Association 2016, 2011).

One of the components of good air quality that the Phoenix region does not meet is in regard to ozone pollution. Breathing ozone in the air, otherwise known as smog, increases the risk of health impacts like coughing, wheezing and throat irritation and also increases the risk of infection and exacerbates or even causes chronic diseases like asthma. In Arizona, the primary source of ozone pollution comes from nitrogen oxides (NOx). As reported by the MAG Eight-Hour Ozone Moderate Area Plan for the Maricopa Nonattainment Area, there are 127 metric tons of NOx emitted each day and cars account for 49 percent of emissions. Unlike automobiles, light rail is powered by electricity primarily, mostly created through natural gas and nuclear energy (Union of Concerned Scientists 2015) and increasingly powered by renewable sources; it is therefore a cleaner way to travel.
When high ozone pollution warnings are issued by the Arizona Department of Environmental Quality, the first suggestion to the public is to reduce driving by riding the bus, carpooling, teleworking or riding light rail. Valley Metro light rail prevented 19,133 tons Criteria Air Pollutants from 2009 to 2017 (APTA 2017).

Not only does non-attainment with ozone standards hurt public health, but it has a costly burden on the local economy due to its potential to increase emissions regulations for businesses. If fewer cars were on the road, NOx emissions would decrease; however, automotive traffic has increased over the past decade and ozone pollution remains in non-attainment of US EPA standards. If cars are not taken off the road and the region does not meet attainment of US EPA ozone standards, the region can enter serious non-attainment with ozone standards and businesses would be forced to take on more restrictive regulations and higher operating costs in order to reduce Ozone pollution; this would result in fewer job opportunities for Arizonans (The Center for Regulatory Solutions 2016). The Center for Regulatory Solutions reports that businesses were finally able to reach 1997 ozone standards in 2014 and that reaching 2008 standards would be extremely costly to local businesses, discourage expansion and hurt the local economy. By continuing to expand light rail and attracting more transit riders, Ozone pollution would be mitigated and the region has a better chance of meeting the US EPA ozone attainment standards, thereby avoiding an increased burden on Arizona businesses.
4.2.5 Healthy and Fresh Food Options

The U.S. Department of Agriculture defines a food desert as an area that is void of grocery stores or other healthy food providers. Food deserts and lack of access to affordable, healthy foods is a problem that many cities face, including Phoenix. Valley Metro light rail provides access to grocery stores and is mitigating food deserts in the region. Almost half (46 percent) of light rail station areas that did not have access to grocery stores before light rail operations (2006) now have access to a grocery store within walking distance (Figure 98). Light rail provides access to 47 different grocery stores within walking distance; 25 new grocery stores have opened along the corridor since the construction of light rail (2006) (ESRI Living Atlas 2016). In addition to grocery stores, light rail riders and residents of the communities along the corridor now have access to a plethora of new healthy food options, such as farmers’ markets.

Figure 98. Grocery Stores in the Light Rail Corridor

Source: U.S. Department of Agriculture 2015.
4.2.6 Reduce Stress by Taking Transit

Exercise is essential for a healthy lifestyle. The CDC recommends exercise for 20 minutes a day. Commuting by car involves very little physical activity when compared with public transportation commuting. Driving is bad for your health and contributes to the obesity epidemic. People who commute using their cars have a BMI that is 1.18 kg/m² more than people that use transit (U.S. National Library of Medicine 2011). In addition, drivers who work in sedentary environments who do not exercise before or after work, do not meet the Surgeon General’s recommendation of 30 minutes of exercise per day. There is a 6 percent increase in the odds of obesity for every hour that is spent in the car (U.S. National Library of Medicine 2017). Prolonged sitting and the stress of driving can compromise cardiovascular health.

Conversely, the use of light rail to commute showed an 81 percent decrease in the chance of becoming obese when compared with drivers (U.S. National Library of Medicine 2011). More than two thirds of public transit riders in the U.S. walk to their stop or destination, and light rail commuters burn around 124 more calories per day, which is equivalent to losing one pound of body fat per 6 weeks (APTA 2018). Light rail commuters take an average of 30 percent more steps per day than people who do not use light rail to get to work (Sage Journals 2007). In fact, 81 percent of riders accessing the Valley Metro’s light rail system access the stations by walking at least a quarter mile, which is about a 5 minute walk. Valley Metro light rail commuters have taken many steps, literally, to make their lifestyles more active. Combining all riders who walked to the light rail in 2015, it is estimated that more than 28 million steps were taken in the corridor to access light rail (Valley Metro 2015).

Stress is a factor that influences American lives on a daily basis, considering the stressful environment commuting creates. Left unchecked, stress contributes to cardiovascular disease, the leading cause of death globally. Choosing a commute mode can affect the amount of stress commuters incur when getting to work, and studies have shown that commuting by transit and walking are less stressful ways of getting to work than driving (Legrain et al. 2015; U.S. National Library of Medicine 2011). Walking to transit and removing yourself from the driver seat combined thereby improves the outlook of your physical health.

4.3 SUSTAINABILITY

4.3.1 Better for the Environment

Valley Metro offers an inherently sustainable service to riders, bringing many important environmental benefits to the Phoenix Metro area. Most of the environmental benefits of light rail stem from one action: taking cars off the road. According to the 2015 Valley Metro Origins/Destinations survey, 57 percent of riders had access to a car but chose to take light rail. This is the equivalent of 27,000 car trips removed from the road daily and 8.2 million car trips taken off the road annually. This helps to curb the negative effects of the rise in vehicle miles traveled, such as congestion and mobile source air pollution. From 2005 to 2015, Maricopa County’s VMT rose 14 percent (ADOT 2017). Taking cars off the road provides two significant environmental benefits, (1) reducing the gallons of gasoline consumed in an area and (2) lowering greenhouse gas emissions.
Valley Metro light rail is ultimately a cleaner way to travel compared to automobile travel because it reduces the regional demand for gasoline. In total, 60,806,751 gallons of fuel have been saved since the opening of light rail in 2009. In 2017 alone, light rail saved 8 million gallons of fuel that would have been used in an automobile, which is the equivalent of 7,860 homes’ energy use for one year (Federal Highway Administration 2017). This is a significant step in lowering the demand for a nonrenewable resource such as gasoline. Saving fuel goes hand-in-hand with reducing the harmful effects of carbon emissions and has an immediate positive impact in reducing people’s carbon footprint and exposure to air pollutants.

Light rail also is cleaner way to travel compared to automobile travel because the train is powered by electricity and does not emit harmful pollutants into the air that contribute to climate change. As discussed, light rail is powered by electricity. This is a much cleaner energy source than fossil fuels. According to the U.S. Department of Transportation, light rail produces a third of the greenhouse gases in comparison to driving alone. Figure 99 shows the pounds of CO2 emitted per passenger mile along with the potential savings of each mode of transit if they operated at full capacity. Light rail currently produces 0.36 pounds of carbon dioxide emissions and has the potential to emit only 0.14 pounds per passenger if fully utilized (USDOT 2010).

Aside from removing cars from the road, light rail also improves the built environment and air quality through landscaping. Landscaping is at or near every station, and since the light rail was constructed, the agency has planted 2,019 trees in the light rail corridor. Not only does this make waiting for the train more comfortable, but trees help purify the air and mitigate air pollution.
4.3.2 Valley Metro is Green by Design

Valley Metro has undertaken a variety of efforts to increase environmental accountability and promote sustainability practices throughout the light rail corridor and Valley Metro operations. LEED certification is a green building rating system and a globally recognized symbol of sustainability achievement. Since the construction of light rail the corridor, 49 of the new developments in the corridor have achieved LEED certification, including 8 platinum, 14 silver and 19 gold ratings. Valley Metro is a part of the APTA Sustainability Commitment and has achieved Silver Recognition as of July 9, 2018 (Figure 100).
As a part of this commitment, Valley Metro pledges to adhere to sustainable utility usage, achieve sustainability goals and commit to evolving action. Valley Metro achieved numerous sustainability goals in order to be awarded silver recognition. Valley Metro has sustainability initiatives related to waste and implements can, oil, battery and general recycling at all facilities. Every year three tons of waste is prevented from reaching the landfill and six thousand pounds of materials is recycled. Waste diversion efforts result in a decrease of 2 percent of all the materials Valley Metro sends to the general landfill.

The light rail vehicles are housed and maintained at the Operations & Maintenance Center, where Valley Metro installed solar panels to help power the facility (Figure 103). As of July 2018, approximately 3,676,861 total kWh have been generated from these solar panels, a value of $227,597 in energy cost savings. The carbon dioxide (CO₂) offset of this energy savings equates to 66,183 trees and the total energy generated equals 2,639 tons of CO₂ saved (Valley Metro Real Time Solar Data Dashboard 2018 (Valley Metro 2018)).
Additionally, Valley Metro implemented a vehicle wash recycling program that reuses water from washing buses and rail vehicles; this results in a 60 percent reduction of fresh water usage. Furthermore, at the Operations & Maintenance Center all transit vehicle windows are tinted to reduce air conditioning demands. Light rail windows have a spectrally selective coating that reflects heat causing infrared rays without impairing visible light transmission, resulting in increased thermal comfort and energy savings.

Valley Metro works with the community to advance the culture of sustainability. For example, the agency created a sustainability internship position. This position provides students pursuing sustainability degrees with opportunities to apply their knowledge to real world situations and participate in furthering Valley Metro’s sustainability efforts. Past interns assisted in the implementation of many sustainability actions previously mentioned as well as helping with APTA utility reporting and sustainability applications.

Valley Metro light rail is a sustainable addition to the Phoenix Metro area and offers residents a myriad of environmental benefits and services, from reducing gasoline needs to improving air quality. The impact that Valley Metro has on the environment positively affects the quality of life for people in the Phoenix Metro area.
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