Attachment A

Comprehensive Operational Analysis of Transit Services

Final Report, January 2014

VEOLIA TRANSPORTATION

Prepared by: Veolia Transportation for the City of Tucson and the Regional Transportation Authority

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Regional Partners

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Sun Tran Comprehensive Operational Analysis – Executive Summary

Overview

This report describes the Comprehensive Operational Analysis (COA) conducted of the transit services provided by the City of Tucson (COT) and other services provided within the region. The COA includes conclusions and specific recommendations toward the continual improvement of the transit services. The COT provides fixed route public transit bus service, express service, and complementary paratransit service under the service names of Sun Tran and Sun Van. The COT also provides transit bus service to neighboring jurisdictions, the Towns of Oro Valley and Marana, unincorporated areas of Pima County, Pascua Yaqui tribe, and the Tohono O'odham Nation through intergovernmental agreements through the Regional Transportation Authority (RTA). The RTA and University of Arizona (U of A) provide additional services within the region to include Sun Shuttle, Sun Shuttle Dial-a-Ride, and CAT Tran. Sun Van operates the Downtown Loop. All services are addressed in detail in separate sections of this analysis.

Sun Tran operates 40 fixed routes, including 27 local routes and 13 express routes, carrying over 20 million customers each year in the City of Tucson and nearby jurisdictions. Sun Van provides more than 540,000 trips annually to persons who are eligible for the paratransit service under the Americans with Disabilities (ADA) regulations.

The COA is an in-depth study of a transit system designed to identify strengths and weaknesses, and develop recommendations for improvement. The COA process provides a thorough look at the Sun Tran, Sun Shuttle, and CAT Tran systems to determine which aspects perform well, which need improvement, and makes recommendations on how Sun Tran and Sun Shuttle can chart a course for the future. Based on federal regulations, the Sun Van service must be complementary to Sun Tran's fixed route service. Any changes made to Sun Tran service as a result of the COA will be applied to Sun Van accordingly. Reasons for conducting the COA include:

- Need for innovation/ investment

  With the constraints of expanding service while continuing to service existing customers, the regional partners are tasked with developing strategies to serve all markets and make the services attractive to existing and potential customers. One of the largest obstacles facing the transit service is making the product competitive with driving. Investing in expanded service levels and/or area, technology, and passenger amenities are strategies that will help the services provide a product to attract new customers and improve mobility within the region. Identifying savings and potential reallocation or new areas of investment are key parts of the recommended service plan.

- Limited Funding Resources

  Funding for transit is limited due to the effects of the most recent economic downturn and ever-growing demands upon the COT's general fund. It is important to prioritize services with the available funding to ensure that the customers are being served in the

most efficient and effective ways possible. Strategies investigated include service productivity analysis, headway adjustments, route combinations, splitting routes and changes in the interlining of routes. Under the Recommended Service Plan within this report, no routes will be wholly eliminated.

The COA conclusions and recommendations are market based. For the purpose of this review, market based refers to recommendations developed using aggregate data and statistics collected and from responses of current transit passengers over a specified period. The analysis process included extensive data collection and analysis. Ridership data was gathered for a month long period along all Sun Tran routes using Automatic Passenger Counting equipment augmented and verified through in-person data collection over a six-month period. Ridership data gathered for Sun Shuttle services, the Downtown Loop, and CAT Tran for the same month as that period collected by Sun Tran were provided and reviewed as part of the analysis. The COA also included a market assessment conducted through a combination of onboard and mailed customer surveys, which resulted in the following total number of completed surveys by system:

Transit System	Completed Surveys
Sun Tran Regular Routes	7,688
Sun Tran Express Routes	297
Sun Van	128
Sun Shuttle	339
Downtown Loop	137
Oro Valley Dial-a-Ride	73
Total Surveys Completed	**8,662**

The ridership numbers and survey responses provided essential data depicting ridership patterns including origins, destinations, and transfers; productivity of routes and route segments; demographic data of the customer base; customer attitudes regarding the services provided; and unserved areas where service is desired.

All COA conclusions and recommendations are based upon the actual data and statistics reviewed, without consideration of funding sources or jurisdictional boundaries.

The COA process and this report address the following:

- Market Assessment, including an onboard customer survey
- Ridership analysis resulting in Route Profiles
- Sun Tran Key Performance Indicator Peer Review
- Sun Tran Fare Review
- Sun Tran Runcutting Procedures Review
- Review of current service structure
- Service Standards
- Recommended Service Plans
- Long range planning and next steps
- Conclusions and cost savings estimates

The COA provides separate sections detailing these topics, along with supporting data and reports, which are included as Appendices.

While a COA is a primary function of strategic service planning, there remain other considerations equally important to structure transit service to meet a community's needs. Essentially, the recommendations resulting from this analysis are intended as a beginning point for Tucson's and the region's continued planning processes, which should include ample opportunity for review and comment by passengers and the public. Other factors often considered by communities in whether to implement COA recommendations include that community's individual transit service philosophy in determining the level of service desired and the ability to invest the funds necessary to provide the desired level of service. Additionally, a community's commitment to a base level of service, regardless of route productivity or cost that it considers to be essential "life line" service to its citizens should be balanced with the market driven analysis recommendations.

Background

The most recent COA was conducted in 1997 through a contract between the City of Tucson and RLS and Associates. Applying the recommendations made in that COA resulted in a reorganization of Sun Tran and enabled budgetary savings of approximately $ 600,000. Many transit systems conduct comprehensive reviews every five to seven years, and augment these specific studies with ongoing short-term planning efforts. With a typical COA cost between $350,000 and $675,000, sufficient funding was not available to conduct another COA during this period. However, as part of the community's efforts to establish a Regional Transportation Authority, long-term transit planning was conducted by various service providers and community groups and resulted in the RTA's 20 year Transit Plan. This plan resulted in numerous increases in service area and schedules, beginning in 2008.

Like many transit systems across the country, Tucson's and the region's ability to adequately fund existing transit services became even more challenging during the recent national recession. The infusion of funding for service enhancements provided by the RTA, coupled with the need to stabilize or decrease the COT's general fund investment placed Sun Tran in a unique position to implement service expansion while considering reductions in the base service levels. Over the course of the past five (5) years, a variety of cost cutting and fare/revenue generation scenarios have been developed and reviewed by Tucson Mayor and Council in its effort to fund the transit services along with other ever-increasing general fund needs. These scenarios were developed in partnership between Tucson's Department of Transportation (TDOT) and Sun Tran staff and were made based upon the data available within the system. Additionally, Tucson's Mayor and Council named a citizen advisory group, the Transit Task Force (TTF) and charged this group to establish fare policies and structure for sustainable public transit service. Through Mayor and Council's commitment to public transit and in response to citizen input, service levels were maintained through this period and efforts to sustain the transit budget were addressed through modest fare increases implemented in fiscal years 2010 and 2012.

As part of initial discussions among the TTF, TDOT, and Sun Tran, the need for a COA presented itself as all parties agreed that further ridership and market analysis was desirable toward establishing future service and/or fare recommendations. Unable to set aside sufficient operating funds to contract for a COA, these groups along with the RTA worked together to segment planning activities. The group recognized the benefit to be realized by the planned smartcard fare collection system, which would enable Sun Tran to gather ridership data at a level not previously realized. However, it was recognized that the smartcard system would not be implemented in time for short-term strategic planning. The

addition of Automatic Passenger Counters as part of the equipment on new bus procurements enabled the system to achieve passenger alighting location data for the first time on a system-wide basis.

The need for planning efforts was intensified with new Title VI regulations issued by the Federal Transit Administration in late 2012, which included the requirement for all transit systems who had not conducted an onboard survey within the past five years to conduct one during 2013. The Title VI requirements were to establish specific ridership demographics to be used in future Title VI Transit Program submissions.

In early 2013, Veolia Transportation, the contractor who manages the Sun Tran and Sun Van services, offered to provide corporate resources as part of its current management contract to conduct the COA as a value added service to the COT. The RTA provided funding to contract the onboard surveying with an outside consultant, with costs minimized by Veolia including the review of the data and responses collected and including them in recommendations to be made. In addition to conducting the COA for the Sun Tran services, Veolia agreed to include the regional partners and reviewed their operations as well as connectivity to Sun Tran to help foster a truly regional network. The COA was conducted to build upon the current systems' strengths, while identifying recommended improvements to attract new customers. Because the COT faces its most difficult budgetary process in its upcoming fiscal year 2015, the COA process was accelerated from a typical 18-month period to a 9-month period, so that the analysis could be concluded in time to implement desired recommendations at the start of the fiscal year. The COA recommendations are those with low potential for negative impact upon existing ridership and the most potential for improving route effectiveness.

Market Assessment

The Market Assessment includes an analysis of the region's demographics and employment data from the U.S. Census, American Community Survey (ACS) as well as a customer survey administered in fall 2013 by Moore and Associates. The customer survey assessed the customer's use of the system and determined origins and destinations utilizing the services in Pima County.

In addition to the Market Assessment, a service assessment was part of the analysis, with performance and productivity being reviewed and evaluated for each of Sun Tran's 27 fixed route and 13 express services, and Sun Shuttle's nine (9) fixed shuttle routes, one (1) deviated shuttle route, and three (3) dial-a-ride services. The findings from the Service Assessment identify current transit successes as well as highlight opportunities to improve existing services. The data for the Service Assessment was collected between spring and fall 2013.

The service assessment resulted in route profiles, which provide both an Operational Summary and a Financial Summary. The route profiles are provided in APPENDIX A.

Sun Tran

System Ridership Findings

- Passenger boardings are highest during the midday period, notably between 12:00pm and 4:00pm on nearly all routes.
- Sun Tran Routes 4, 6, 8, 11, and 16 combined make up nearly half of all passenger boardings.
- Along some route segments, the service levels do not match ridership patterns or demand.

- Customers primarily access transit services by walking to the bus stop or transferring from another route.

Service Quality Findings

- Overall, Sun Tran service reliability, determined by on time performance is good with system-wide on-time performance at 88%. When not on time, services were more late than early. This can be attributed to the ongoing construction for the planned modern streetcar service and general roadwork by the Tucson Department of Transportation and the Arizona Department of Transportation. On-time performance data was not available for Sun Shuttle service, or CAT Tran. The Downtown Loop operates as a continuous route, without specific time points along the route.
- Travel speeds vary across the system, depending on where in the region the route is operating. Routes that operate through Downtown Tucson operate at a slower average speed than routes that do not serve the downtown area. Sun Tran local routes that have the highest average operating speeds are those on the southern and eastern edges of the city. Sun Tran Express routes that operate via highways have the highest average operating speed.
- Capacity issues do not exist on most routes. However, some routes such as Routes 8 and 16 have overcrowding issues. Additional service along busy corridors at peak times should be considered to address any capacity issues.

Service Performance Findings

- **Service Productivity:** Overall, Sun Tran is productive with approximately 33 passenger boardings per revenue hour (29 passenger boardings per platform hour) in Fiscal Year 2013. Routes 8, 11, and 19 are the most productive and routes 20, 27 and 37 are the least productive in the system.
- **Financial Effectiveness:** The Sun Tran Fare Review conducted as part of the COA determines that Sun Tran has a lower average fare among its peers, resulting in a higher average per passenger subsidy at $2.24. The subsidy per passenger boarding on a route-by-route basis ranges from a low of $0.74 for the Route 19 to a high of $4.62 for the Route 37. Increasing route productivity is a key component for financial effectiveness.

Sun Tran Key Performance Indicator Peer Review

Sun Tran key performance indicators were compared with those of eleven (11) other transit systems. Comparisons of Sun Tran's key performance indicators, with these similarly sized peer systems from across the nation, show that Sun Tran is highly cost-effective. This review is provided as a separate section of this report. The eleven (11) other transit systems were selected due to having comparable service areas, service area populations, and density. The eleven (11) locations included in the Peer Review are Spokane, Washington; Rochester, New York; Nashville, Tennessee; Louisville, Kentucky; Madison, Wisconsin; Columbus, Ohio; El Paso, Texas; San Antonio, Texas; Omaha, Nebraska; Kansas City, Missouri; and Fresno, California.

Customer Surveying

Onboard surveys were conducted aboard Sun Tran local fixed routes, Sun Tran express routes, and Sun Shuttle routes. Mailed customer surveys were conducted for Sun Van and Oro Valley Dial-a-Ride services. The customer survey process determined the ridership demographics as required by the Title

VI regulations and established Origin and Destination maps distinguishing ridership travel patterns. The Customer Survey Final Report is provided as APPENDIX B.

Review of Runcutting Procedures

Veolia corporate runcutting personnel conducted a review of Sun Tran's scheduling activities including run block determinations and operator assignments. The review concluded that Sun Tran employs a thorough process to effectively block runs and maintains flexibility in its application of the operator assignment and extra board provisions within bargaining agreement toward achieving maximum financial efficiencies. The Runcutting Procedures Report is provided as APPENDIX C.

Sun Shuttle

System Ridership Findings

- Sun Shuttle Routes 413, 421, 430, and 440 are the busiest routes in the system and when combined make up nearly half of all passenger boardings.
- Customers access transit services by walking to the bus stop or transferring from another route. Sun Shuttle users transfer to other Sun Shuttle routes as well as Sun Tran routes.

Service Quality Findings

- At the time the COA was being conducted, Sun Shuttle did not keep a record of on time performance.
- Travel speeds vary across the system, depending on where in the region the route is operating. Routes that operate onto the properties of businesses they serve tend to operate at a slower speed than routes that serve stops from the street. Sun Shuttle routes that have the highest average operating speeds are those that have segments that operate via highways.
- Capacity issues have not affected service on Sun Shuttle.

Service Performance Findings

- **Service Productivity**: Sun Shuttle on average has approximately four (4) passenger boardings per revenue hour (PPRH). Sun Shuttle fixed routes all follow the current standard threshold of two (2) passengers per revenue hour. All Sun Shuttle Routes regularly meet this standard with newer routes like the 450 performing in the 2.4 to 2.9 PPRH range and mature routes in high demand like the 440 performing in the 9 to 11.5 PPRH range.

- **Financial Effectiveness**: Sun Shuttle fixed routes have an average subsidy of $8.86 per passenger. Route 440, a mature route with the highest ridership, has an average subsidy of $2.68 per passenger. The Oro Valley Dial-a-Ride, a service that costs more than fixed route, has a subsidy of $31.83 per passenger.

CAT Tran

System Ridership Findings

- Most customers who ride CAT Tran are only using one route per trip. Only a few customers transfer between CAT Tran services and even fewer customers transfer between CAT Tran and other regional transit systems.
- Customers in general access transit services by walking to the bus stop.

Downtown Loop

System Ridership Findings

- Most customers access the Downtown Loop service by walking to the stop. Approximately 25% of all customers access the service by transferring from Sun Tran or Cat Tran.

Service Performance Standards

Service performance standards are essential to the planning process and assuring agency investments are worthwhile. The standards are used to ensure that all services are fulfilling their roles in the transit network. Performance should be measured before each service change, in order to assess if the changes improve performance over time, and to allow sufficient time for additional changes to be enacted if necessary. Performances standards help ensure that Sun Tran and the regional partner services are useful to customers as well as cost-effective for the agencies.

Sun Tran has a performance monitoring system. Each route is ranked based on its combined score and compared to the average score within their respective classifications and the aforementioned metrics. The routes are then assigned to one of the categories as shown in Service Performance Tables, provided in APPENDIX D.

The RTA has a performance monitoring system for Sun Shuttle. Ongoing monitoring of the system will help to identify high- and low- performing routes that may be candidates for restructuring or changes in service investment. The performance monitoring system is based on three key performance indicators: passengers per revenue hour, subsidy per passenger boarding, and passenger miles per revenue mile.

Performance Monitoring Recommendations

Sun Tran and Sun Shuttle's service performance should be reviewed on a regular ongoing basis. The performance ranking should be updated and reviewed before and after each service change. This provides the ability to view change over time, see how newly implemented services are progressing and address unproductive services at regular intervals throughout the year.

Service Framework

Based on the COA service analysis, Sun Tran and Sun Shuttle have three main goals to address, (1) reducing travel time, (2) maximizing a customer-focused system, and (3) developing a financially sustainable system. In order to meet these goals, the existing system will be evaluated and areas of potential reallocation or expansion will be identified to meet the goals and address the needs of existing and potential customers. The regional network of the future will need to be a complete system of transit services that are intertwined and interconnected, providing cost-and time-effective options.

Based on the COA service analysis, Sun Tran's current classification of routes (radial, non-radial and express) is determined to be a simple identification of whether or not the route operates into the downtown Ronstadt Transit Center or not. The current classification does not identify a route's purpose in the network. It is recommended that this classification be updated. Developing a classification that prioritizes routes based on their role in the network will help guide Sun Tran in making decisions on service investment.

Study Recommendations

Recommended Service Plan

The Recommended Service Plan is a compilation of suggested changes to individual routes and segments that puts Sun Tran and Sun Shuttle on a path for continued financial effectiveness and lays the groundwork for growth. The recommendations are based on meeting the service framework goals of: reducing travel time, making the service attractive and making the service sustainable. The plan seeks to address any overcrowding issues, duplicative service, inefficient or unproductive service, and unmet service needs. The majority of the recommendations are for immediate implementation while the long-range plan covers recommendations beyond the first year.

Sun Tran Immediate Changes (Year 0-1)

Service Change	Affected Routes
Service Level Realignment	4, 7, 9, 15, 27, 34
Service Rerouting	1, 2, 26, 34, 37, 102X, 105X, 107X
Service Restructuring	3, 6, 8, 11, 16, 21, 22, 50, 103X, 108X, 109X, 202X, 203X, 312X

Sun Shuttle Immediate Changes (Year 0-1)

Service Change	Affected Routes
Service Level Realignment	450
Service Rerouting	411
Service Restructuring	421

Sun Tran Near-Term Changes (Years 1-3)

Service Change	Affected Routes
Service Level Realignment	29, 104X
New Services	Southwest Express, Green Valley Express

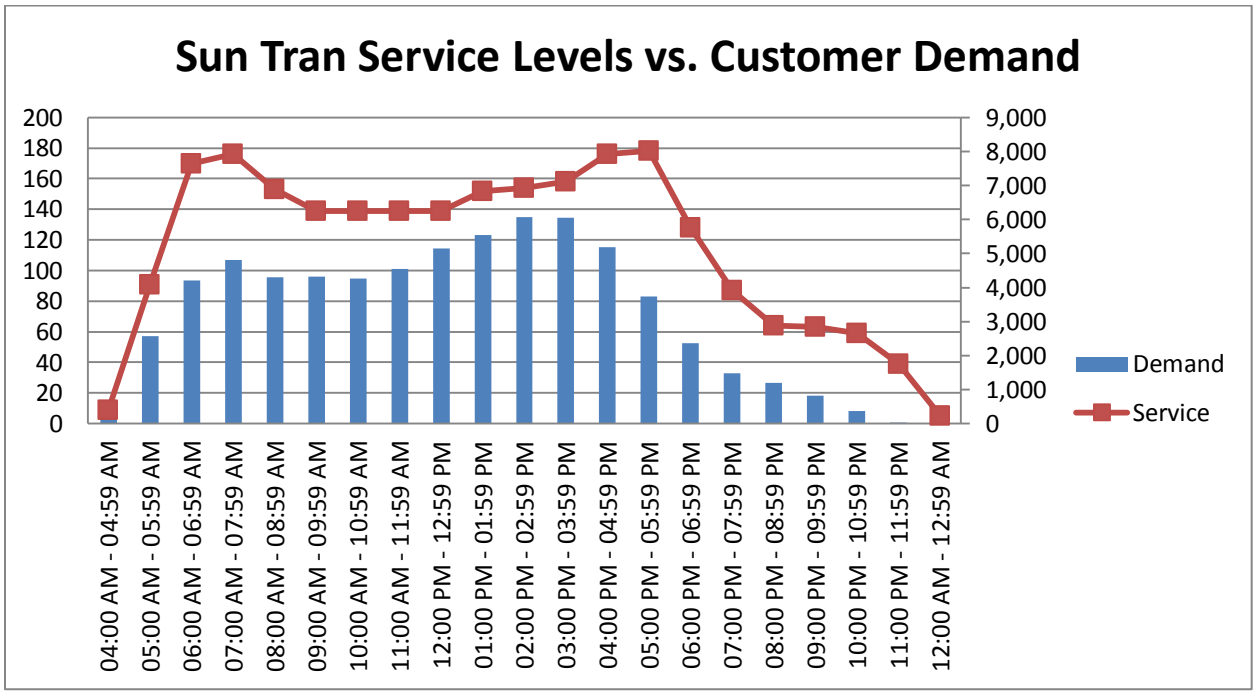
Sun Tran Long-Term Changes (Years 4+)

Service Change	Affected Routes
Service Level Realignment	18
Service Restructuring	Broadway Bus Lanes / Route 8

Service Level Realignment

Based on the data collected in the existing service analysis, Sun Tran service levels do not match demand. The current route frequencies resulted from ridership demands reported in the 1997 COA and service expansions implemented since 2008 as part of the RTA plan. Overall, ridership demand has

changed significantly since the 1997 COA in the areas of peak and non-peak service times. As a result, an excess of service currently exists during traditional peak periods while midday services are underserved. Addressing the misalignment in service levels will enable savings or the reallocation of funds to invest in new services in the future. The chart below details the service levels and customer demand by hour. The Recommended Service Plan uses this data in its recommendations for service levels by route.



Service Rerouting

Routes were reviewed in their entirety and stop-by-stop. This enabled the identification of route segments that could be evaluated for productivity independent of the remaining routes. The Recommended Service Plan addresses specific route segments and provides recommendations for segment rerouting and simplification.

Service Restructuring

All of the regional partners have service duplications with each other. The elimination of overlapping or duplicative service will enable the COT to realize savings in its transit investment or to reallocate resources to new investments. The Recommended Service Plan addresses duplication through route restructuring. Additional routes are recommended for restructuring by either splitting or merging the routes to enable different service levels matching demand.

Fare Policy

The COA included a Sun Tran Fare Review, which is a separate section to the report. While reviewing the existing fare structure special attention was paid to not only the actual fare prices but also the uses and "multipliers". Multipliers represent the factor that determines a multi-use fare price. The Sun Tran Fare Review, included in a subsequent section of this report, was provided to the TTF during its deliberations over the Fare Policy and Structures subsequently adopted by the group.

Transportation Policy Recommendations

Transportation policy is one of the keys to creating a sustainable future for Sun Tran and the region in general. Pima County and the City of Tucson are forecasted to add hundreds of thousands of new residents over the coming decades. Local jurisdictions together with the Metropolitan Planning Organization (MPO), Pima Association of Governments (PAG), will be implementing strategies such as land use planning and urban design to foster regional development and mobility. It is important for Sun Tran and Sun Shuttle to engage in policy development with regional planning and local government agencies. Recommendations to enhance transit's role in transportation policy include:

- Continue to foster a working relationship with RTA/PAG, the source of funding for new transit projects in Pima County. Coordinating plans for service investment, with data from Sun Tran on current ridership, will produce effective and efficient new services.
- Develop a working relationship with local government agencies to secure a role in developing transit supportive land-use and transportation planning. Increasing densities in already established neighborhoods will foster more efficient transit use.

Conclusions

In recognition that there are separate governing boards for the Sun Tran and Sun Shuttle systems, the Recommended Service Plan contained in this report separate the two systems. Final budgetary impacts of the Recommended Service Plan will be determined upon the actions taken by the governing boards for each, and it is recognized that there may be differing processes to be followed by each group toward implementing desired recommendations. Additionally, Sun Tran utilizes specific transit scheduling software, referred to as the Trapeze system, and must establish run assignments based upon existing bargaining agreement provisions. Sun Tran staff will need to reschedule service, based upon the direction of the Mayor and Council, to fully develop the cost of the Recommended Service Plan. It is anticipated that Sun Tran scheduling staff will be conducting this necessary work activity during the review and public outreach period, enabling desired implementation by August 2014.

Initial cost estimates indicate that the Recommended Service Plan contained in this report represents potential annual savings for the Sun Tran local fixed routes and Sun Express routes of approximately $2.4 and $ 2.6 million between the COT and RTA, inclusive of revenue and non-revenue service. Further details of the initial cost estimates are provided as Appendix E. Additional costs and or savings for the Sun Shuttle services will need to be evaluated during the public outreach and review period.

As the COA was being conducted, additional services were requested of Veolia. These requests will result in two additional reports, which will be issued as Addenda to the COA. They are:

- Bus/Rail Interface Report – a review of specific routes, which operate within the same general area of the planned streetcar service area, and to make recommendations regarding those specific routes. The Bus/Rail interface review began in conjunction with the COA, but relies upon data, which was not available until December 2013. For this reason, the bus/rail interface review is provided as a separate addendum report.

- Target Budget Service Review – a review to make further service change recommendations, strictly from a budgetary perspective, based upon the City's fiscal year 2015 targeted General Fund investment level. This review will identify potential service changes beyond those made within the COA's Recommended Service Plan and the Bus/Rail Interface Report. The

implications of the identified routing or service level changes will be contained within the Target Budget Service Review. The Target Budget Service Review will be provided as a separate addendum report in January 2014.

As another value-added service of Veolia's management contract, Veolia will also conduct a Sun Van scheduling review, similar to the Sun Tran Runcutting Review conducted as part of the COA. This review will be conducted separately from the COA and will be provided prior to the end of Sun Van's fiscal year 2014. The purpose of this review is to identify any scheduling improvements that may provide cost efficiencies to the COT without sacrificing the integrity of the paratransit service.

The COA, and the two aforementioned Addenda reports, will be provided to Mayor and Council for review and consideration in February 2014. The potential implementation of the COA Recommended Service Plan or any partial implementation will include activities specified in the COT's Title VI Program. Based upon the City of Tucson's Policy and Procedure for Solicitation and Consideration of Public Comment on Fare Changes and Major Service Changes on Public Transportation adopted in August 2013, it will be determined if any service changes meet the thresholds established to require a Service Equity Analysis. Staff will conduct any Fare and/or Service Equity Analysis to determine if the recommendations result in discriminatory impact on minority or low income populations. The results of the Equity Analysis(s) will be provided to the public in accordance with the Public Outreach Plan contained in the Title VI Program. In recognition of the potential interest and impact of the COA's system-wide review and recommendations, expanded public outreach activities will be provided to include media announcements, open houses, forums, website notices and response solicitation, social media, and notices upon transit vehicles.

Due to the review and public outreach activities, the anticipated timeline for implementation is for distribution of the COA and Addenda reports in February 2014. Staff will then conduct any required equity analysis and conduct public outreach activities through May 2014 and to seek Mayor and Council action in June 2014. The anticipated implementation date is August 2014.

Based on the potential service changes for FY 2015, a fleet analysis will be conducted and recommendations for fleet reduction, fleet replacement, and vehicle size, based on COA data, will be made. In addition, fleet cost savings for both capital and operating budgets will be estimated. This report will be provided as a separate document during the FY 2015 City budget process.

Market Assessment

The market assessment analyzes the current and future mobility needs of Pima County residents and visitors. This chapter will consist of the following sections:

- Analysis of the existing demographics in Pima County as well as overall trends
- Assessment of the travel needs of the various market segments within the current population including seniors, students, and commuters
- Assessment of major destinations, with a comparison of transit and non-transit origin-destination patterns to major destinations, based on travel data
- Analysis of the projected 5 year growth within the region, including a comparison of then to now and how these patterns will impact transit use

Population Overview

According to the 2012 American Community Survey, Pima County has 981,048 residents. Of those, 521,695 live in the City of Tucson. This is an increase of approximately 17% and 7% from 2000 respectively. Communities outside of Tucson in the county are growing faster than the City itself. The largest communities in Pima County are the City of Tucson (521, 695), Towns of Oro Valley (41,388), Marana (36,756), and Sahuarita (26,259).

Employment Overview

According to the most recent American Community Survey (2011), Pima County has 419,155 employed residents with 226,353 living within the city of Tucson. This is an increase of roughly 13% and 5% from 2000 respectively. It should be noted that the number of employed in the City of Tucson is growing slower than the number of residents in the county.

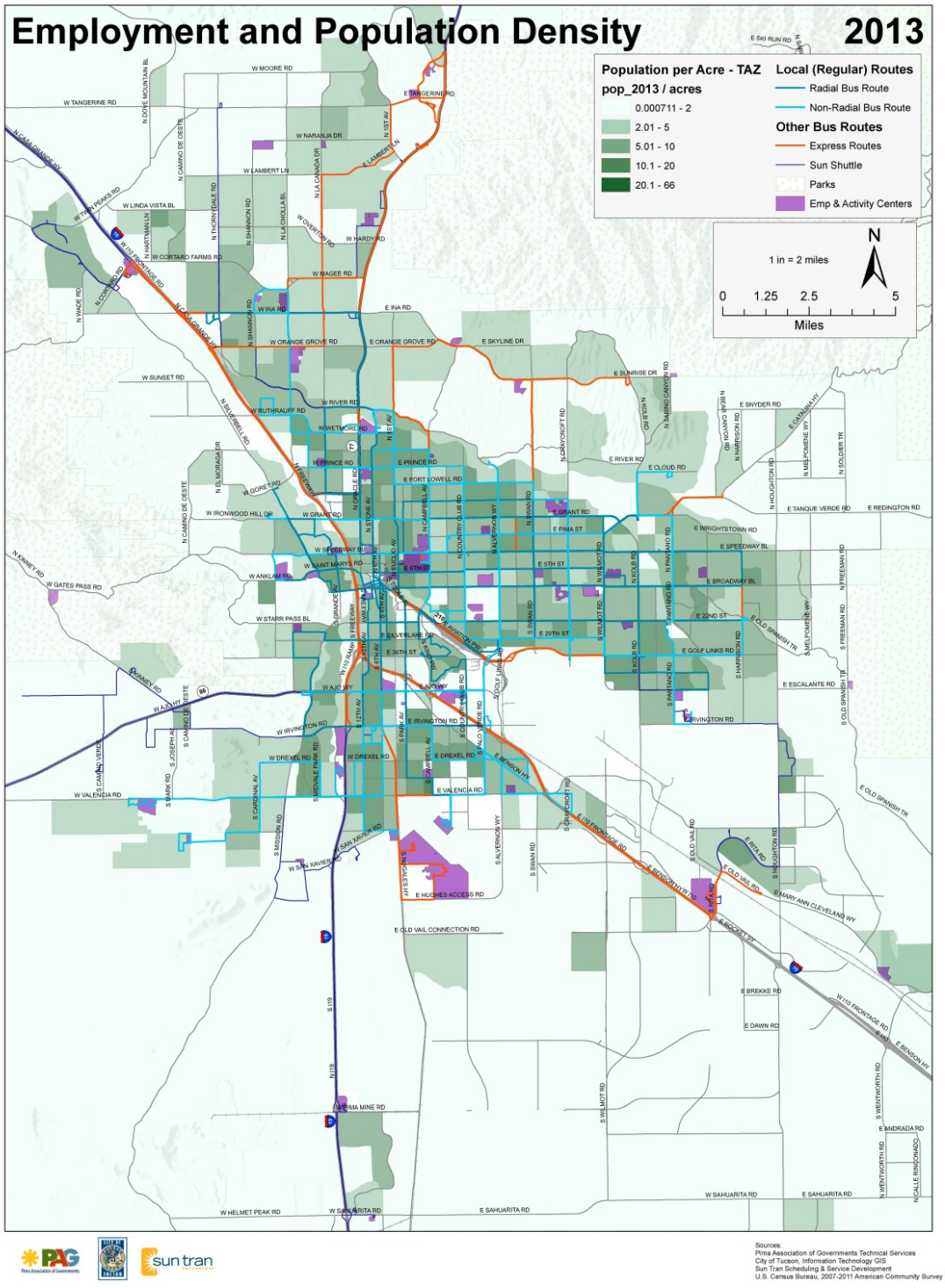
Population Density

Pima County covers 9,189 miles. The table outlines the various densities across the metropolitan area:

Residential densities in the region are low to moderate with the City of South Tucson, covering only one square mile, is the densest community in the area. Appropriately, Sun Tran currently provides high levels of service to the areas of Tucson, Flowing Wells, Casas Adobes, and South Tucson, as high densities present a good environment for transit services.

Community	Density (Pop. per sq. mi.)
Tucson	2,298
Casas Adobes	2,956
Oro Valley	1,163
Marana	306
Sahuarita	875
Green Valley	657
Flowing Wells	4,426
Tucson Estates	278
South Tucson	5,684

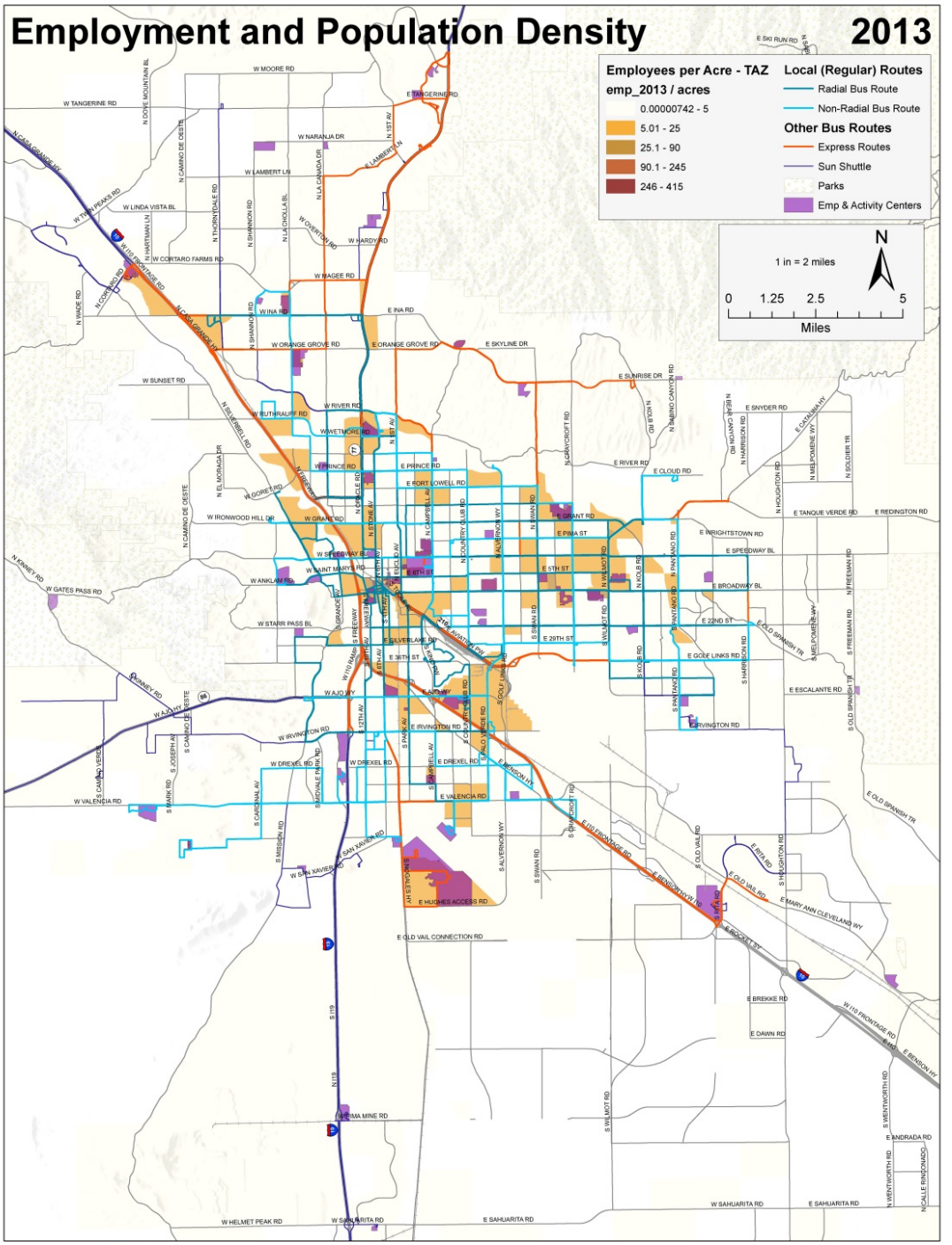
The map below shows the varying densities throughout the region. Residential density is highest near Interstate 10 (I-10), which runs through some of the oldest parts of Tucson, and near Broadway Boulevard. Other pockets of moderate density can be found scattered across the region such as Rita Ranch. The rest of the region is of low density.



Employment Density

Employment densities in the region are more concentrated than residential density. The highest densities are in Downtown Tucson; however, there are two other significant employment areas. These

are the Williams Center and Park Place area on Broadway between Rosemont Boulevard and Wilmot Road, and the Aero Park/ Tucson International Airport area on the south side of the city. Sun Tran currently provides high levels of service to all three employment areas but with the Aero Park exclusive served by the 200 series express routes.



Sources:
Pima Association of Governments Technical Services
City of Tucson, Information Technology GIS
Sun Tran Scheduling & Service Development
U.S. Census Bureau, 2007-2011 American Community Survey

Population Characteristics

Pima County has diverse demographics, including income levels, ethnicity, and age. Pima County's residents have a median age of 37.7 and a median income of $46,433. Large sections of the county are lightly populated with the majority of residents living in and around the city of Tucson. The Tucson area has large areas of low density with the higher densities in the neighborhoods surrounding the downtown core.

Population Characteristic: Ethnicity of Residents

White residents comprise the largest group at 55.2% of the County's population and 47.4% of Tucson's population. The second largest ethnic group identified is Hispanic/Latino making up 34.6% of the County's and 41.8% of Tucson's population. The on-board survey allowed residents to self-identify race and ethnicity in the same question. Most who identified as Hispanic/Latino did not also include a racial designation. For transit riders, minorities make up a larger share of ridership than the population would suggest, as indicated by the results of the onboard survey conducted as part of the COA's Market Assessment.

Race	Pima County	City of Tucson	Transit Customer
White	55.2%	47.4%	34.5%
Hispanic	34.6%	41.8%	35.6%
Black	3.3%	4.5%	10.7%
American Indian	2.4%	1.7%	9.8%
Asian/ Pacific Islander	2.6%	2.5%	5.5%
Other	0.2%	0.2%	3.9%
Two or More	1.7%	1.9%	N/A

Population Characteristic: Age of Residents

Pima County has a median age of 37.7 years; slightly higher than the national average of 36.8. The city of Tucson; however, has a median age of 33.8 years. 26.3% County residents are 18 years old or younger while 15.4% are 65 years old or older.

Age Group	Pima County	City of Tucson	Transit Customer
0-16	19.0%	19.5%	N/A
16-18	7.3%	8.1%	8.9%
19-24	7.7%	10.1%	27.3%
25-44	24.7%	27.1%	34.2%
45-64	25.9%	23.3%	23.6%
65 or Older	15.4%	11.9%	6.0%

Population Characteristic: Income of Residents

The median income of Pima County residents is $46,443, below the national average of $53,046. The City of Tucson's median income is $36,939, below both the county and the national median. A significant portion of residents earns less than $20,000 a year (26% of all county residents and 33.2% of Tucson residents).

Annual Income	Pima County	City of Tucson	Transit Customer
Less than $20,000	26.0%	33.2%	36.5%
$20,001-$35,000	12.0%	13.8%	10.2%
$35,001-$50,000	14.5%	15.6%	11.6%
$50,001-$75,000	18.0%	17.2%	9.4%
$75,001-$100,000	11.3%	9.6%	4.7%
More than $100,000	18.2%	10.6%	5.7%

Population Characteristics: Youth

A significant portion of the general population is 18 years old or younger. In the City of Tucson, many ride public transit to and from school. Sun Tran currently operates "plugs" during the school year, trips that are designed to address overcrowding along certain routes that operates to an area school. It is crucial to make Sun Tran attractive to the youth, increasing the likelihood they will continue riding transit as adults.

Population Characteristics: College Age

Over 39% of Sun Tran riders identified as students. This number is significant because only 12.5% of the surveyed passengers rode CAT Tran, the bus service provided by the University of Arizona; indicating that Sun Tran also carries a substantial portion of students. The University of Arizona and Pima Community College are two of the largest schools in the region with many Sun Tran routes servicing the institutions.

Population Characteristics: Senior Citizens

Statistically, across the nation, senior citizens are usually riders of public transit; however, this is not evidenced in Pima County. Only 6% of all riders identified themselves as senior citizens even though over 11% of Tucson and over 15% of all Pima County residents identify as being a senior citizen. There may be several factors in understanding the low usage by this age group - distance to reach a transit service, frequency, and availability of other modes of travel. Sun Shuttle's three Dial-a-Ride services serve senior citizen populations in the neighboring jurisdictions of Oro Valley, Green Valley/ Sahuarita and Ajo. However, the results of the onboard survey also demonstrate lower usage by the group.

Population Characteristics: Low Income Residents

Nationally, over 33% of all transit riders earn below $20,000 a year. This is consistent with the onboard survey, which demonstrates that both the City of Tucson demographics, with 33% of all residents earning below $20,000 and Pima County residents at 26% earning below $20,000.

Statistically, persons with low incomes are the most likely to ride transit. Persons with low incomes tend to not own vehicles and must rely on others, walk, or use public transit to travel. Areas of a high concentration of residents with low incomes include the south and west sides of Tucson and South Tucson. Sun Tran offers an economy fare for qualified persons with low-income at a deep discount.

Population Characteristics: Transit Dependency and Vehicle Availability

Transit dependency describes the necessity of a transit customer to rely on transit for basic mobility. Many transit customers do not have their own vehicle and ride transit services out of necessity. Nearly 61% of all customers indicated that they do not have access to a vehicle as the reason they ride transit. Over 27.6% of customers surveyed would walk to their destination if transit services were not available while only 11.2% of customers would drive their own vehicle. A significant 17% of all customers would not make the trip at all if transit services were not available to them. These numbers tell the story of the necessity of transit services in Pima County.

Reason for Riding	% of Customers
Lack of Car	60.8%
Cost	20.8%
Proximity to my destination	8.3%
Other	5.8%
Avoid traffic/ parking	4.2%

Mode of Transportation	% of Customers
Drive own vehicle	11.2%
Ride bicycle	12.4%
Friend/ family	24.0%
walk	27.6%
Wouldn't make trip	17.0%
Taxi	5.9%
Other	1.9%

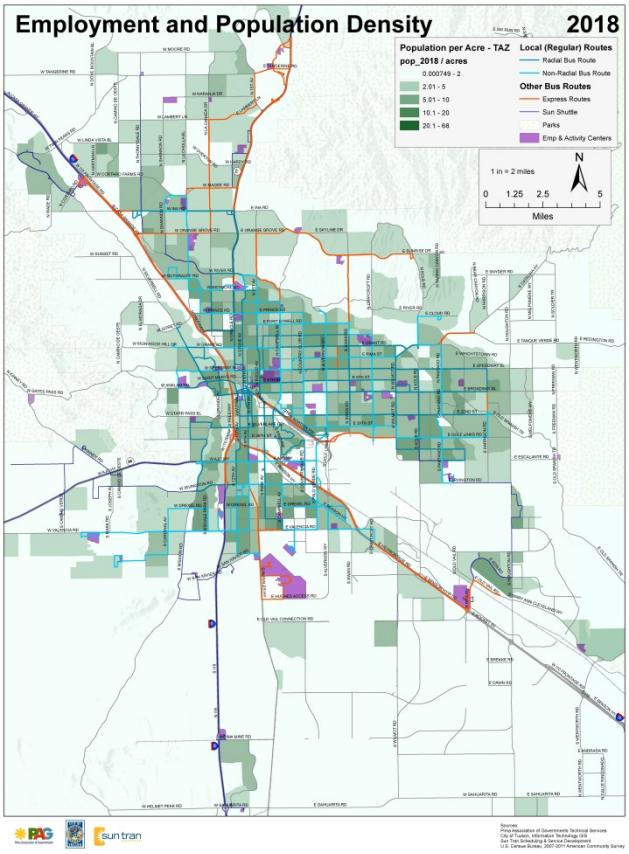
Vehicle availability is access to a vehicle (s) in a household. In general, 11.9% of all Pima County residents do not have a vehicle available to them, while 42.7% have one car available in the household. The remaining 55.4% have multiple vehicles available.

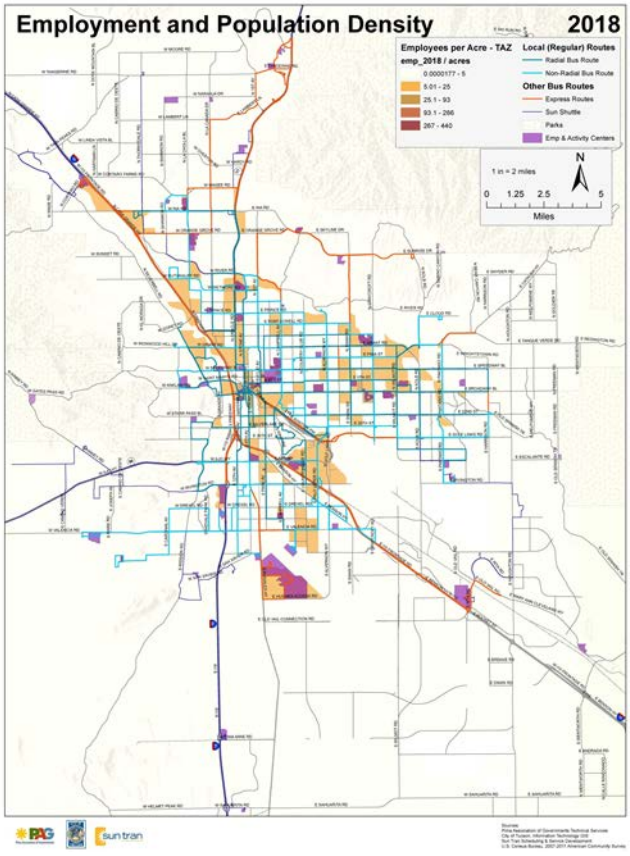
Vehicle Availability	% Available
No vehicles available	11.9%
1 vehicle available	42.7%
2 vehicles available	32.2%
3 or more vehicles available	13.2%

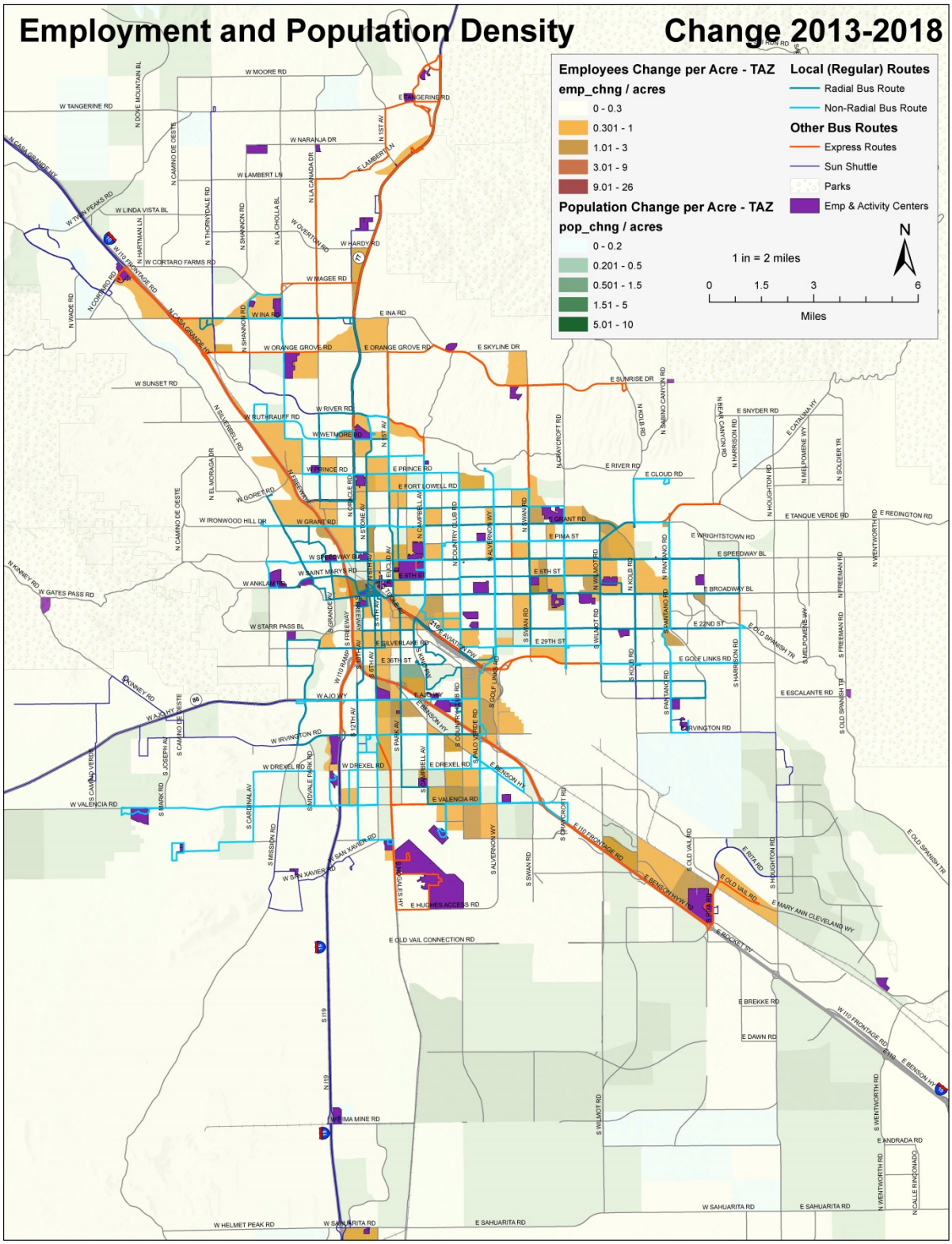
Future Development

Pima Association of Governments (PAG), the region's Metropolitan Planning Organization (MPO) has provided the COA with 5-year projections of growth within the region. This data will support the region's transit providers develop plans for future services.

In the maps below, the shaded areas show projected residential and employment growth. The majority of residential growth is expected in the Downtown area, far southern areas of the region near Sahuarita, and far eastern areas near Houghton Road. Most employment growth is projected to occur in the current employment hubs of Downtown Tucson, the Williams Center, and Aero Park/ Tucson International Airport. New areas of concentrated development may also occur along I-10 and Oracle Road.







Sources:
Pima Association of Governments Technical Services
City of Tucson, Information Technology GIS
Sun Tran Scheduling & Service Development
U.S. Census Bureau, 2007-2011 American Community Survey

Sun Tran/Sun Van Key Performance Indicator Peer (KPI) Review

A key measure of a transit systems' success is how it compares to its peers. For the purposes of the COA, National Transit Database (NTD) information was garnered from 2011 to determine how the performance of similar systems compares to that of Sun Tran's.

The systems selected were:

Spokane Transit Authority – Spokane, WA
Regional Transit Service, Inc. and Lift Line, Inc. – Rochester, NY
Metropolitan Transit Authority – Nashville, TN
Transit Authority of River City – Louisville, KY
Metro Transit System – Madison, WI
Central Ohio Transit Authority – Columbus, OH
Mass Transit Department – El Paso, TX
VIA Metropolitan Transit – San Antonio, TX
Transit Authority of Omaha – Omaha, NE
Kansas City Area Transportation Authority – Kansas City, MO
Fresno Area Express – Fresno, CA

The peer agencies were selected based on a range of criteria including population, number of peak buses operated, annual service miles, and hours. The selection was not limiting in geography or service area characteristics such as population density. Additionally, these agencies represent a mix of privately contracted management, operation, and direct operation. Finally, paratransit and any additional services were included in the analysis.

Service Characteristics

The following section compares the various service characteristics of the peer group to provide guidance for the performance indicator comparison.

Service Area and Population

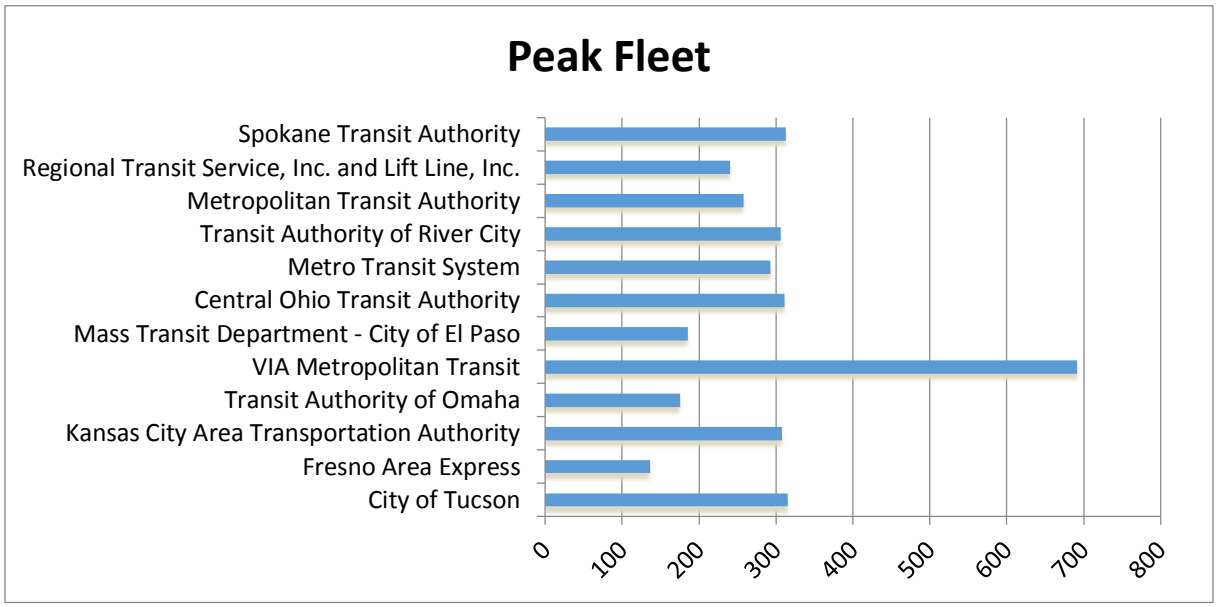
Agency	Service Area	Service Area Population	Density
Spokane Transit Authority	248	394,120	1,589
Regional Transit Service, Inc. and Lift Line, Inc.	293	694,394	2,370
Metropolitan Transit Authority	484	626,681	1,295
Transit Authority of River City	477	972,546	2,039
Metro Transit System	72	253,075	3,515
Central Ohio Transit Authority	337	1,081,405	3,209
Mass Transit Department	251	803,086	3,200
VIA Metropolitan Transit	1,213	1,555,963	1,283

Agency	Service Area	Service Area Population	Density
Transit Authority of Omaha	178	579,212	3,254
Kansas City Area Transportation Authority	332	748,415	2,254
Fresno Area Express	133	500,121	3,760
City of Tucson	230	544,000	2,365

Sun Tran/Sun Van's service area is smaller than the peer agency average (354) and population density is also slightly lower than the peer average (2,511). Population-wise Sun Tran/Sun Van ranks far behind the peer leader VIA, but does have significantly more population density than San Antonio's transit system.

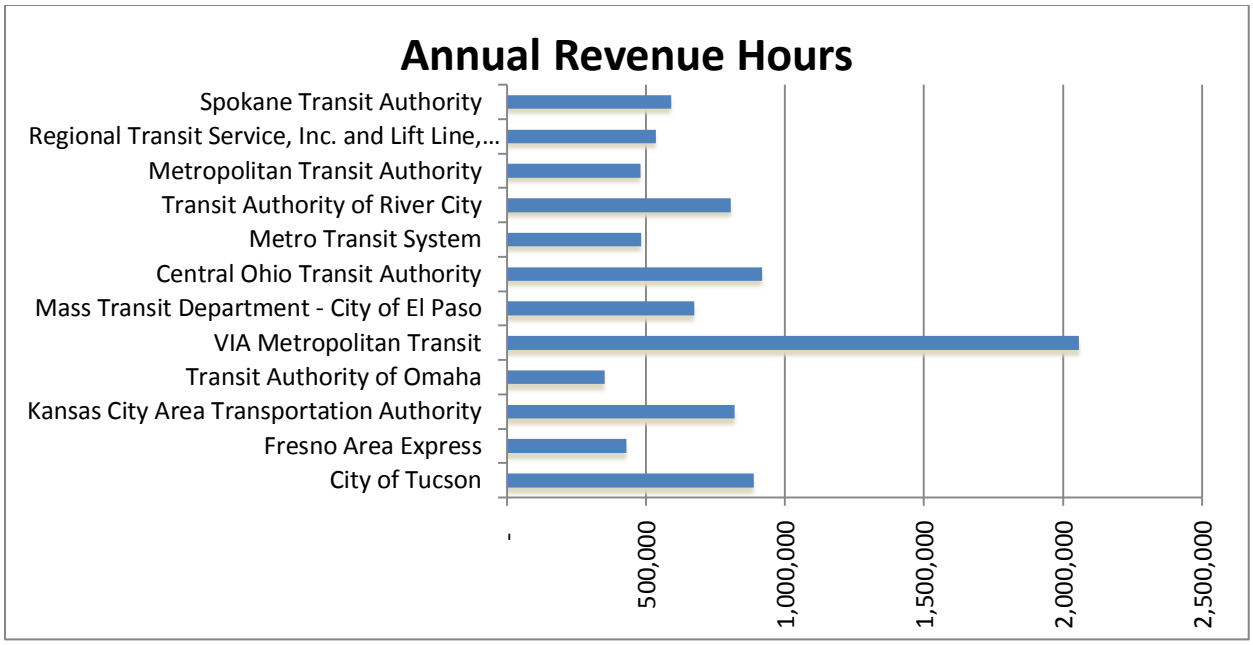
Peak Fleet

Sun Tran/Sun Van operates a fleet slightly above average in size (315) than the peer agencies. Sun Tran/Sun Van's fleet is newer than the peer agency average.

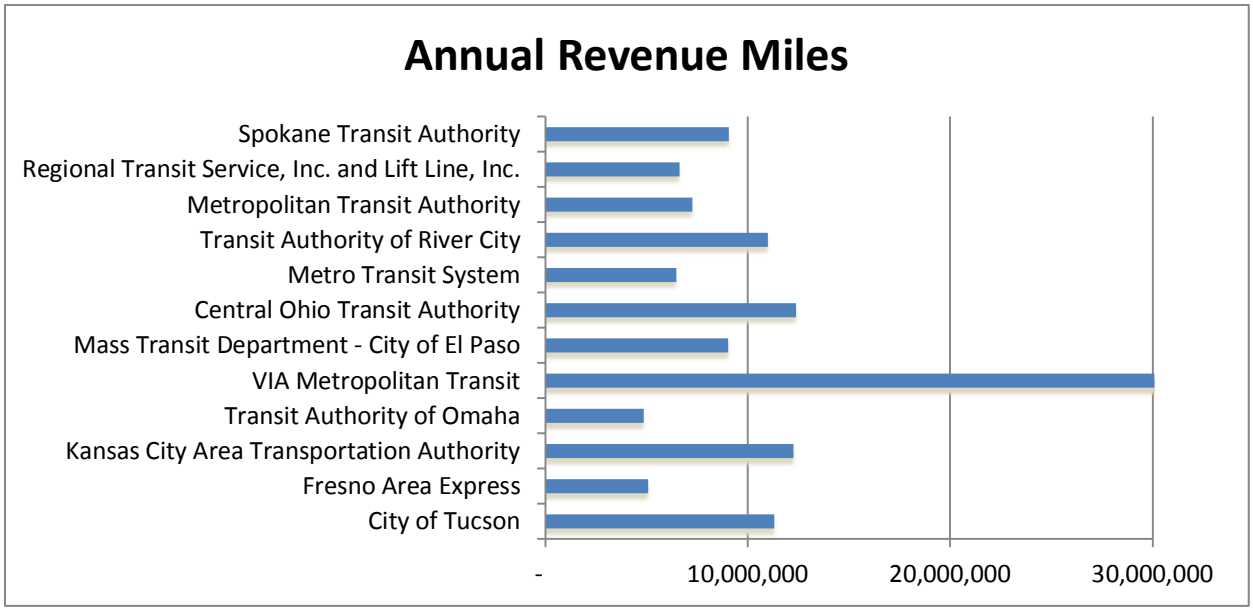


Annual Revenue Miles and Hours

Sun Tran/Sun Van operated approximately 888,000 hours in 2011, which was above the peer average (753k), and higher than nine of the peer agencies.



Sun Tran/Sun Van operated just over 11m miles in 2011, which was just higher than the peer average (10.5m) and higher than seven of the peer systems.



Key Performance Indicators

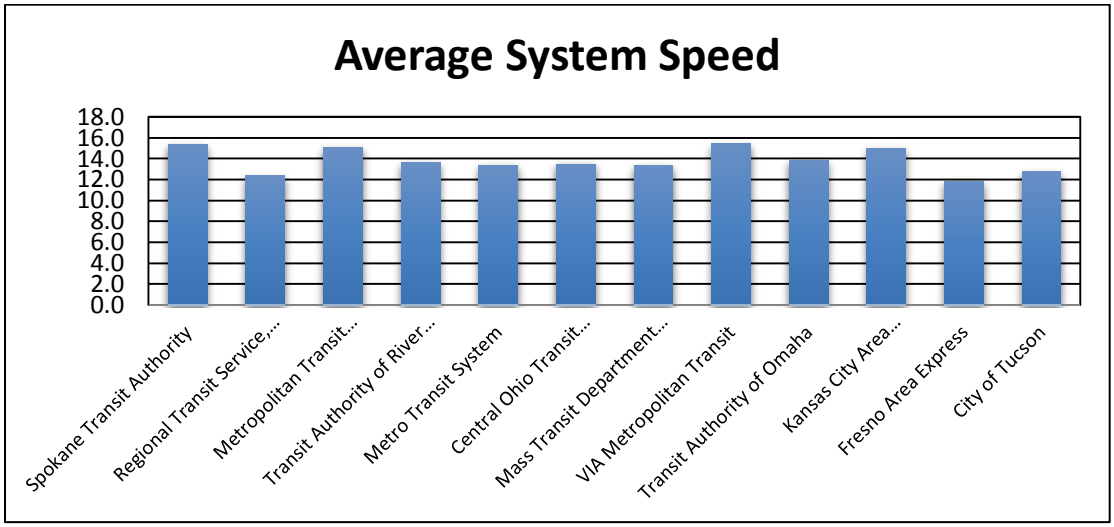
In order to properly measure and compare system performance the following key performance indicators were reviewed:

- System Speed
- Boardings per Hour
- Cost per Hour
- Cost per Boarding

- Revenue per Passenger
- Subsidy per Passenger

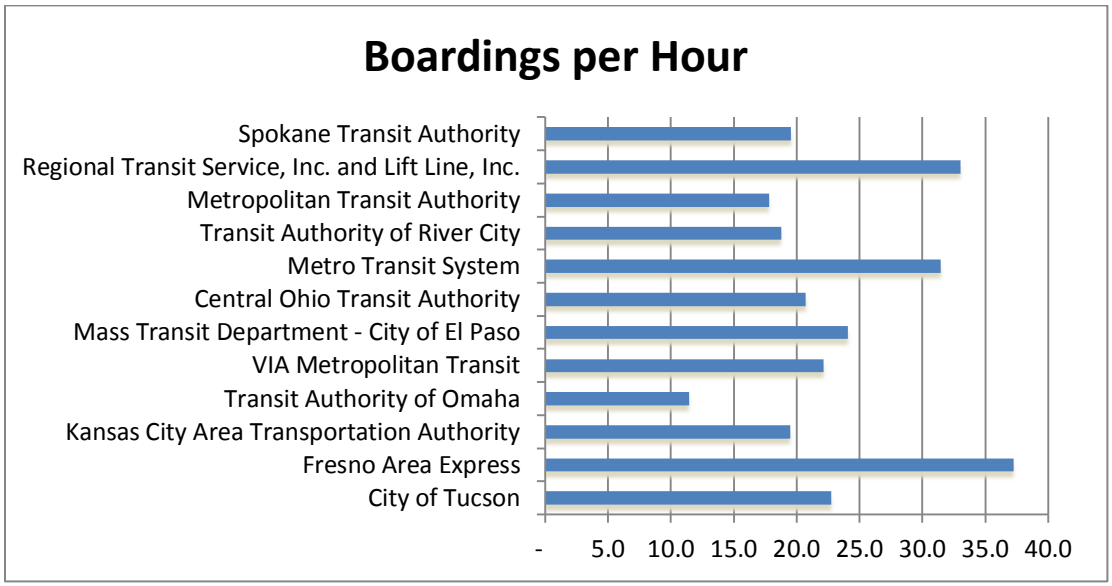
System Speed

Average miles per hour are a good indicator of service reliability and on-time performance. Sun Tran/Sun Van's system speed is below the peer average of 14 mph. This is due to a number of issues, most notably the streetcar construction taking place throughout Downtown.



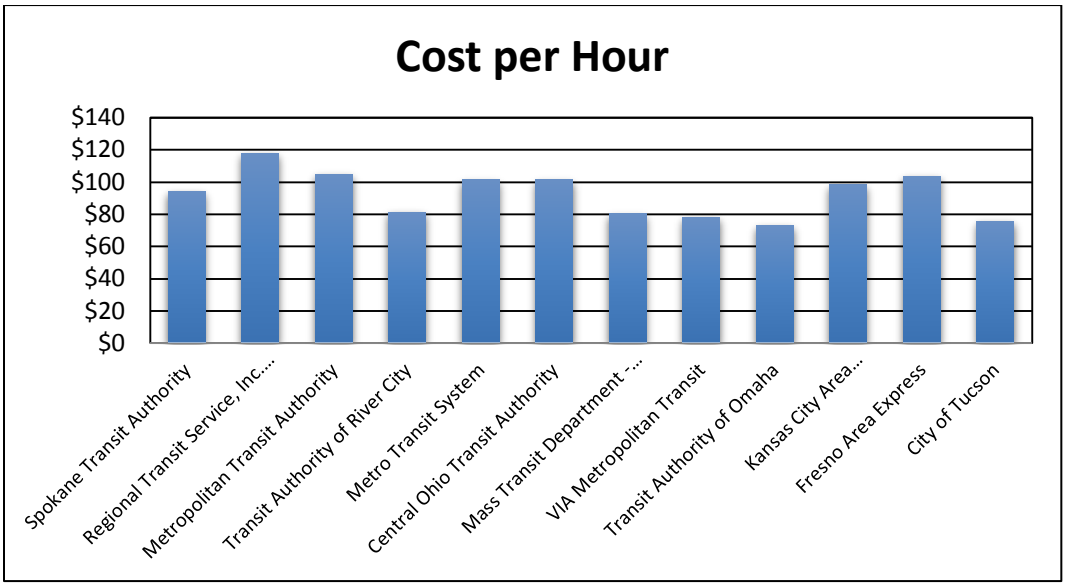
Boardings per Hour

The number of passengers a transit system carries per hour is considered the true measure of system productivity. The more passengers carried per hour, the higher the farebox revenue and lower the system cost. Sun Tran/Sun Van averages 22.7 boardings per hour, which is right at the peer system average.

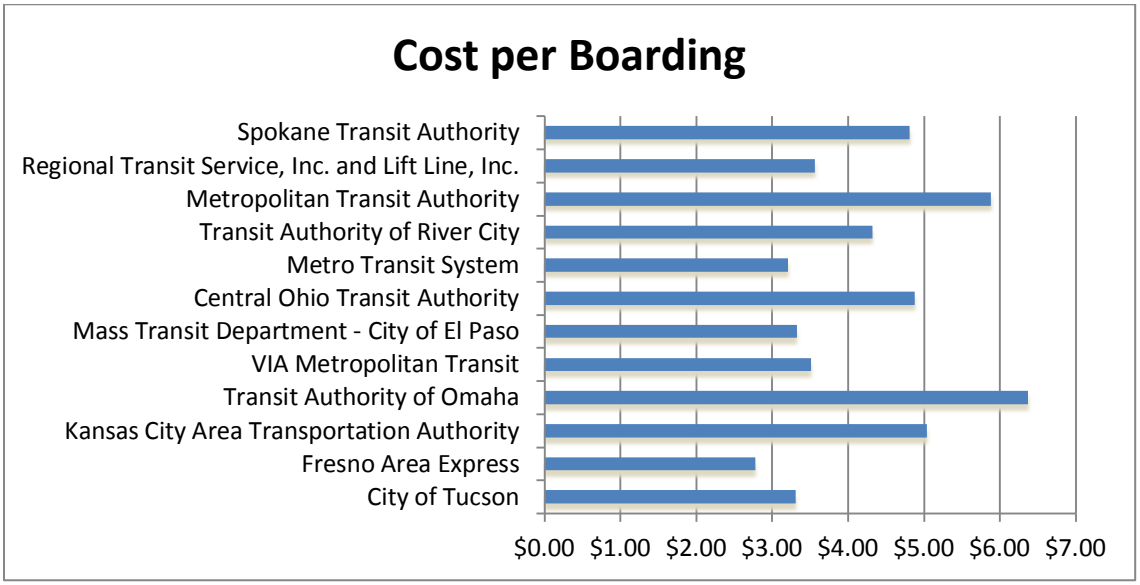


Cost and Revenue per Passenger

While passengers carried is the measure of productivity and effectiveness, costs and revenue determine system efficiency. Sun Tran/Sun Van's costs are well below the system average. On a cost per hour basis, Sun Tran/Sun Van's average of $75 per hour is over 18% lower than the peer system average.

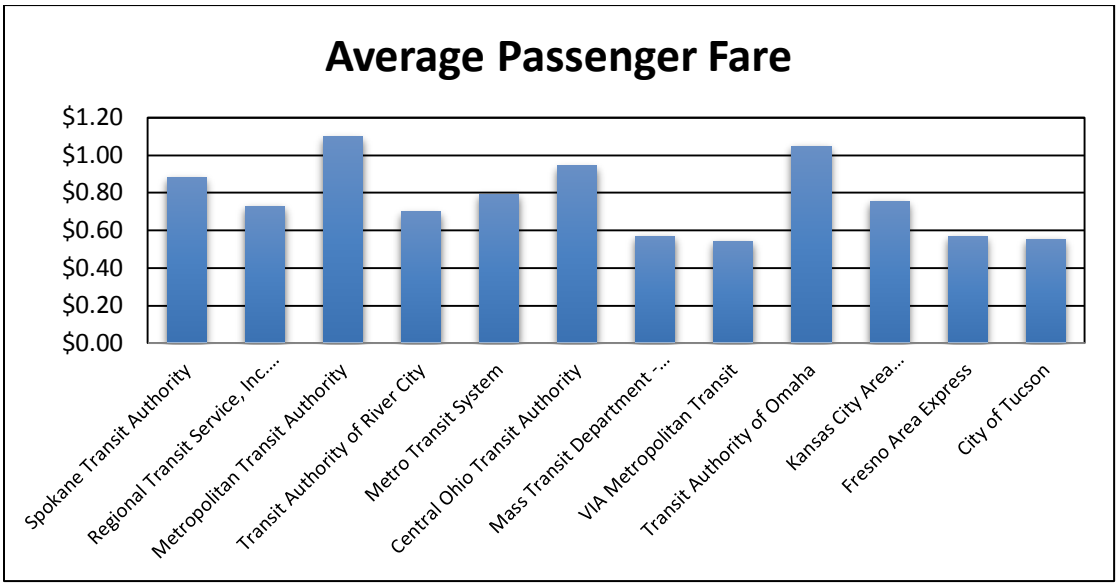


Cost per Boarding is a good metric looking at efficiency and productivity combined. This is a good measure of how well a system is managed and how effective the service this. Larger systems with high productivity may have exorbitant costs, but when combined with their total ridership, the costs are very much in line or even often times lower than smaller systems. For Sun Tran/Sun Van, not only are the total costs well below system average, when combined with productivity, the total cost per passenger of $3.31 is almost 25% below the peer system average.

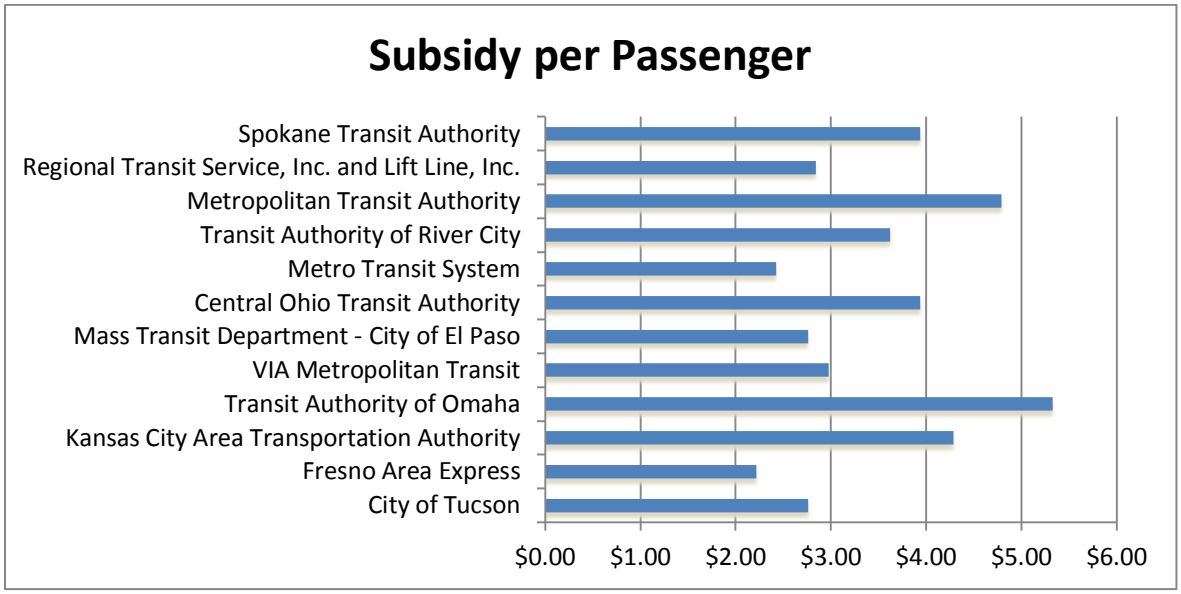


Where Sun Tran/Sun Van succeeds in being well managed and effective, it is well below average in garnering an appropriate level of fare revenue. Recommendations to the fare system are presented later on in this document, but from the 2011 NTD data it is obvious that riders are not paying their fair

share or that fares are deeply discounted. More than likely, it is a combination of these two. Sun Tran/Sun Van's average passenger fare is 50% lower than the system average and the lowest of the peer group.



To look at the impact of the transit system upon the taxpayer, the costs and revenues were reviewed. This is determined through the calculation of subsidy per passenger. This indicator determines the net cost of transit to the jurisdiction responsible for funding transit.



Sun Tran/Sun Van's Subsidy per Passenger is one of the lowest amongst the peer group and well below the system average of $3.49.

Comparison of Fixed Route Systems

Comparing KPI of the City of Tucson's fixed route system, Sun Tran, to the same peer groups' fixed route systems provides an additional snapshot of the fixed route's system's effectiveness.

Agency	Passenger Boardings	Revenue Hours	Revenue Miles	Pass Boardings per Revenue Hour	Pass Boardings per Revenue Miles
Spokane Transit Authority	11,031,338	381,167	5,313,529	28.9	2.1
Regional Transit Service, Inc. and Lift Line, Inc. (Rochester)	22,547,758	438,420	5,012,113	51.4	4.5
Metropolitan Transit Authority	9,273,784	361,120	4,669,467	25.7	2.0
Transit Authority of River City	16,718,127	566,036	6,869,657	29.5	2.4
Metro Transit System	14,592,214	382,454	4,822,865	38.2	3.0
Central Ohio Transit Authority	18,423,352	789,004	9,689,684	23.4	1.9
Mass Transit Department	16,390,603	569,198	7,160,901	28.8	2.3
VIA Metropolitan Transit	49,322,843	1,526,542	20,275,073	32.3	2.4
Transit Authority of Omaha	4,225,034	285,639	3,918,534	14.8	1.1
Kansas City Area Transportation Authority	15,988,034	579,042	7,794,854	27.6	2.1
Fresno Area Express	14,304,222	329,955	3,881,078	43.4	3.7
City of Tucson	19,943,953	633,265	7,995,596	31.5	2.5
TOTALS	212,761,262	6,841,842	87,403,351	31.1	2.4
AVERAGES	16,366,251	526,296	6,723,335	31.1	2.4

Conclusion

Sun Tran/Sun Van's operating performance is right about average in terms of boardings and productivity. This indicates that the peer group selected is appropriate. Additionally, the Key Performance Indicator Peer Review shows that Sun Tran/Sun Van is a highly effective and productive system that does a very good job keeping costs down. The target of the fare analysis will be to increase revenue and attempt to find any efficiency that has not been targeted by the management team.

Sun Tran Fare Review

A fairer fare: Steps to a more equitable fare structure

The goal for the City of Tucson is to develop a long-term fare policy. Using private sector strategies and industry best practices to price fares will provide the City a long-term revenue projection. Further, properly pricing fares will allow Sun Tran, the City's transit provider, to better address demand of the existing customer base and associated future growth. This document will provide an analysis of the current fare system and a conceptual methodology to price fares going forward.

Current fare structure:

Fares	Full Fare/Price	Economy Fare/Price	Express Fare/Price
– Cash fare	$1.50	$0.50	$2.00
– Transfers	$0.00	$0.00	$0.00
– Day Pass	$3.50	N/A	N/A
– Monthly passes	$42.00	$15.00	$56.00

While reviewing the existing fare structure, special attention was paid to not only the actual fare prices, but also the uses and "multipliers". Multipliers represent the factor that determines a multi-use fare price. For example, Sun Tran's current monthly pass is priced at $42, which represents a multiplier of 28 of the full cash fare ($42/$1.50). Likewise, the Economy monthly pass represents a multiplier of 30 ($15.00/$0.50). Multipliers are good to determine how many rides on average a customer would take utilizing the specific fare type. In the example earlier, the monthly pass is priced to estimate 28 uses on the fixed route system.

The table below represents the comparison between the priced multiplier and the actual use. With the exception of three fares, the existing fare structure is accurately priced. The issue facing most transit agencies is the "double-dipping" related to discounts. Unlimited ride passes provide customers with the conveniences of not having to have exact change and receiving a discount for riding frequently. The issue arises when this frequency discount is combined with other discounts such as free transfers or age-based discounts. It is further compounded when transit agencies do not receive the full dollar value of their base fare as is the case for Sun Tran. The table below shows the true level of discounts offered to customers by way of an unlimited ride pass. The highlighted difference represents the difference between the priced multiplier and the actual uses.

	Price	Multiplier	Actual	Difference
Full Fares				
– Day Pass	$3.50	2.3	4.0	-1.7
– Monthly passes	$42.00	28.0	38.3	-10.3
Economy Fares				
Monthly passes	$15.00	30.0	62.6	-32.6
Express Fares				
– Monthly passes	$56.00	28.0	26.7	1.3

The long-term viability of the system will be based on increasing revenue while managing costs.

Future Pricing Concepts

Base fare

Focusing on the base fare is an easy way to raise or lower all fares. However, it may not necessarily reflect current usage nor will it solve inherent problems discussed above with the current structure. The solution is not to simply increase fares. By raising the base fare $0.25, the City can bring in additional revenue. Because of the way discounts are provided, the net result would be marginally higher revenue, but also lost passengers. Sun Tran currently takes in approximately $0.63 per passenger or approximately 43% of the full fare of $1.50. Without addressing discounts and usage, a $0.25 or any other increase would only yield an additional $0.11 or less than $1.5m in additional fare revenue per year when factoring in elasticity as shown in the following table. In essence, a 50% fare increase would only result in a 27% revenue increase.

Base Fare	$1.50	$1.75	$2.00	$2.25
Increase	$0.00	$0.25	$0.50	$0.75
Elasticity (lost passengers)	0.00	(1.0m)	(1.9m)	(2.8m)
Net Revenue	$11.9m	$13.1	$14.3	$15.2
Average Fare	$0.63	$0.74	$0.84	$0.94

This is the primary reason why simply increasing the base fare will not result long-term sustainable fare revenue growth.

Fare Multipliers

Passes by design provide a discount to customers. In addition, passes provide other, less quantifiable benefits such as a more seamless payment experience (no need to carry exact change) and quicker boarding. When developing pass pricing in the future, it is critical to tie pricing to actual usage. The projections below are provided as an example only and final fare policy will be set by the City Council after discussions with staff. However, adjusting the multiplier slightly up and thereby getting closer to the actual use while still providing a discount, would generate an additional $800k in revenue per year, or the equivalent of a $0.15 increase in the base fare. The benefit here is that elasticity is much lower on multi-use fares than it is on the base fare.

Full Fares	Price	Multiplier	Actual	Adjusted Discount Price	Updated Multiplier
– Day Pass	$3.50	2.3	4.0	$4.50	3.0
– Monthly passes	$42.00	28.0	38.3	$50.00	33.3

In this example, customers purchasing the day pass would get four (4) rides for the price of three, and those buying the monthly pass would get one free ride per week in addition to having the other benefits mentioned above.

Discounts

The Sun Tran average fare of $0.631 per rider represents only 43% of the full $1.50 fare. As mentioned earlier, this is due to discounts and multipliers. Multipliers have been addressed thus far; however, discounts are the principle reason for the lower than average fare. The economy base fare for low-income customers is a public service offered by the City to provide mobility for transit dependent riders. Specifically, while the City subsidizes the transit system to the tune of $2.76 per passenger overall, the subsidy for economy fare paying passengers is closer to $3, an almost 10% increase. Similarly, the Economy monthly pass is subsidized an additional 11% over the base Economy fare as shown in the table below:

Fare	Price	Full Fare	Discount	Subsidy
– Cash fare	$0.50	$1.50	67%	$3.01
– Monthly Passes	$15.00	$42.00	78%	$3.07

The Economy Monthly Pass is used almost twice as frequently as the Full Fare Monthly Pass; it is priced at a multiplier of 30 although it is used over 62 times a month. When considering actual usage, the discount increases from 78% to 84%. In other words, this pass is priced at only 16% of its true value.

Conclusion

Agencies can use any number of techniques to adjust fares and increase revenue. However, before considering any new fare strategy, the City should review the basic structure of the fare system; in addition, to how those fares are utilized. After correcting the structure and pricing fares properly, the City can raise and lower other fares as needed even basing increases on indices if need be.

Current Services

Existing Service Sun Tran

Sun Tran operates 40 fixed route bus services, consisting of 27 local routes and 13 express routes. The local routes mostly operate within the City of Tucson, while the express routes run from Tucson to nearby suburbs. Sun Tran classifies the local routes as either Radial Routes, which serve the downtown Ronstadt Transit Center, or Non-Radial Routes, which do not serve the downtown Ronstadt Transit Center. The Express routes are divided between the 100X-series routes, which serve Downtown Tucson, the 200X- series routes, which serve the AeroPark, and the 300-series route (the 312X) which connects Oro Valley with the Tohono Transit Center, on the northern edge of Tucson. In total, Sun Tran operates just under 700,000 platform hours (revenue hours, recovery time and non-revenue hours) and just over 9.3 million platform miles (revenue miles and non-revenue miles) carrying about 20.3 million passengers in fiscal Year 2013.

Sun Tran operates three transit Centers: the downtown Ronstadt Transit Center, the Tohono Tadai Transit Center on the north side and the Roy Laos Transit Center on the south side. Only four local fixed routes do not serve at least one of the transit centers.

Fixed Route Local Services

Fixed route local service forms the bulk of Sun Tran's operation, comprising 14 Radial routes and 13 Non-Radial routes. Radial routes system wide make up 68% of total passenger boardings, 64% of total revenue hours, and only 60% of total revenue miles. Non-radial routes total 31% of total passenger boardings, 33% of revenue hours, and 36% of revenue miles. Radial and Non-Radial routes operate seven days a week.

Radial Routes
1- Glenn/ Swan
2- Pueblo Gardens
3- 6th St/ Wilmot
4- Speedway
6- S Park Ave/ N 1st Ave
7- 22nd St
8- Broadway/ S 6th Ave
9- Grant Road
10- Flowing Wells
16- 12th Ave/ Oracle Road
19- Stone Ave
21- W Congress/ Silverbell
22- Grande
23- Mission

Non Radial Routes
5- Pima/ W Speedway
11- Alvernon way
15- Campbell
17- Country Club/ 29th
20- West Grant
24- 12th Ave
26- Benson Highway
27- Midvale Park
29- Valencia
34- Craycroft/ Fort Lowell
37- Pantano
50- Ajo Way
61- La Cholla

Fixed Route Express Service

Fixed route express Service is the smaller subset of Sun Tran's operation, comprising 13 routes. Nine (9) routes serve downtown Tucson, three (3) routes serve the AeroPark, and one (1) route serves the north suburb of Oro Valley. Express routes make up 1% of total ridership, 2% of total platform hours, and 4% of total platform miles. With the exception of the 110X and 312X, these routes only operate in one direction during the peak period – towards downtown or the AeroPark during the morning peak period, and the reverse in the afternoon peak period. Routes 110X and 312X operate in both directions during each peak period.

Express Services
101X- Golf Links- Downtown Express
102X- Northwest- UA Express
103X- Northwest- Downtown Express
104X- Marana- Downtown Express
105X- Foothills- Downtown Express
107X- Oro valley- Downtown Express
108X- Broadway- Downtown Express
109X- Catalina Hwy- Downtown Express
110X- Rita Ranch- Downtown Express
201X- Eastside- Aero Park Express
202X- Northwest- Aero Park Express
203X- Oro Valley- Aero Park Express
312X- Oro Valley- Tohono Express

Service Span

Sun Tran operates all fixed route local services seven days a week. All routes begin service by 7:00 am and operate until at least 6:00 pm, although many routes operate longer service spans. Fixed route express services usually operate from 6:00 am-8:00 am and 3:30 pm-6 pm, weekdays only.

Service Structure

The current Sun Tran structure is based upon a modified hub system. A hub system describes a transit system where routes radiate from a primary hub. Sun Tran's routes primarily radiate from one of three transit centers. As the transit system and City expanded to the east, routing was established in what is referred to as a grid system. Through the COA, this structure was reviewed. The current origin – destination mapping resulting from the onboard survey demonstrates that this overall model continues to meet the service demand of the community.

Service Frequency

Sun Tran operates all fixed route local services at least every 30 minutes on weekdays. Many routes operate more frequent service, particularly during peak periods. Routes 8-Broadway/S 6th Ave and 16- S 12th Ave/Oracle operate every 10 minutes during peak and midday periods. Eight other routes operate

every 10 to 15 minutes during peak periods with four of the eight operating every 10 to 15 minutes during midday periods. The other seventeen fixed route services operate every 30 minutes all day. Evening service operates every 30 to 60 minutes on all routes.

Route	Peak	Base	Evening/Night	Saturday	Sunday
1	30	30	60	60	60
2	30	30	50	60	60
3	15	30	60	60	60
4	10	15	30	30	30
5	30	30	N/A	60	60
6	15	30	60	30	60
7	15	15	60	60	60
8	10	10	30	15	20
9	15	30	60	60	60
10	30	30	40	60	60
11	15	15	60	30	30
15	15	15	30-60	60	60
16	10	10	15-30	30	30
17	30	30	60	60	60
19	30	30	60	30	60
20	30	30	N/A	60	60
21	30	30	60	30	30
22	30	30	60	60	60
23	30	30	60	60	60
24	30	30	60	60	60
26	30	30	60	60	60
27	15	30	30-40	60	60
29	30	30	40	60	60
34	30	30	40-60	60	60
37	30	30	N/A	60	60
50	30	30	60	60	60
61	30	30	N/A	60	60

Finally, most express services do not operate on a specified frequency but have specified trip departure times.

Service Investment

The tables below detail the service investment by the COT for Sun Tran on hours and miles for an average weekday, Saturday and Sunday. Revenue service is a trip that collects fares; platform includes revenue service and non-revenue service.

Weekday Investment	Hours	Miles
Revenue	2,203	27,715
Platform	2,385	31,849

Saturday Investment	Hours	Miles
Revenue	957	12,029
Platform	1,016	13,445

Sunday Investment	Hours	Miles
Revenue	705	8,857
Platform	755	10,172

Ridership

In fiscal year 2013, Sun Tran carried 20.3 million customers. The annual ridership translates into an average of 67,000 weekday boardings, 30,500 Saturday boardings and just over 18,000 Sunday boardings. Routes 4, 6, 8, 11 and 16 are the busiest in the system. With the exception of Route 11, all of the busiest routes are Radial. Routes 2, 10, 19, 21 and 23 had the lowest ridership on Radial routes.

Radial Routes	Total Passengers	Platform Hours	Platform Miles
1	620,084	22,434	282,556
2	404,282	17,954	247,857
3	944,204	41,913	560,595
4	1,637,000	51,429	649,943
6	1,312,370	40,499	503,621
7	795,006	26,138	361,159
8	3,217,992	83,063	999,127
9	789,801	24,388	286,904
10	476,725	15,116	182,666
16	2,029,245	62,287	737,019
19	499,814	11,459	110,761
21	232,969	10,783	124,033
22	227,426	9,871	100,813
23	519,744	19,415	236,085

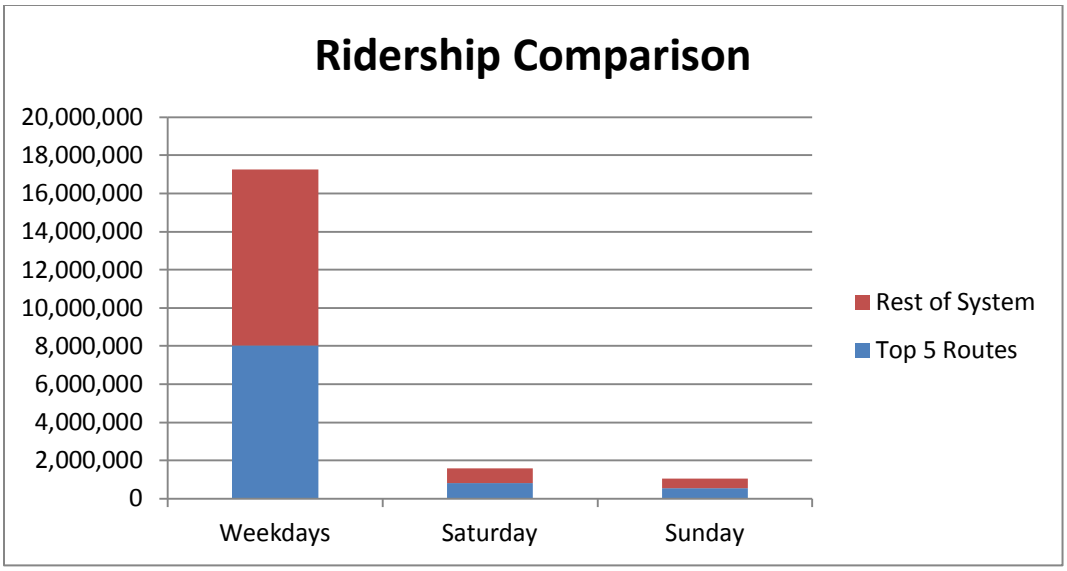
For fixed route non-radial services, Routes 11, 15, 17, 29, and 34 had the highest ridership. Routes 20, 24, 37, 50 and 61 had the lowest ridership

Non Radial Routes	Total Passengers	Platform Hours	Platform Miles
5	371,598	18,057	244,798
11	1,382,296	35,868	464,237
15	588,023	22,046	278,296
17	997,746	32,938	464,560
20	127,641	7,473	100,060
24	247,112	7,402	98,120
26	373,896	13,962	205,545
27	462,574	24,445	399,756
29	486,572	14,927	215,054
34	725,116	22,869	279,920
37	237,444	13,539	209,606
50	145,695	6,663	73,811
61	188,379	9,618	140,704

For the fixed route express services, Routes 101X, 104X, 107X, 110X and 202X had the highest ridership. The 100-series routes operate into downtown Tucson, while the 202X serves the Aero Park. Routes 103X, 105X, 109X, 201X and 312X had the lowest ridership.

Express Route	Total Passengers	Platform Hours	Platform Miles
101X	25,799	2,223	45,517
102X	24,106	2,421	51,782
103X	17,599	3,114	62,377
104X	28,156	1,694	41,282
105X	15,975	2,286	51,235
107X	24,154	2,464	61,993
108X	20,056	2,375	48,915
109X	17,396	2,787	51,066
110X	28,071	2,050	68,486
201X	17,277	2,052	46,485
202X	33,368	2,627	73,805
203X	20,750	3,785	103,022
312X	14,800	2,388	47,700

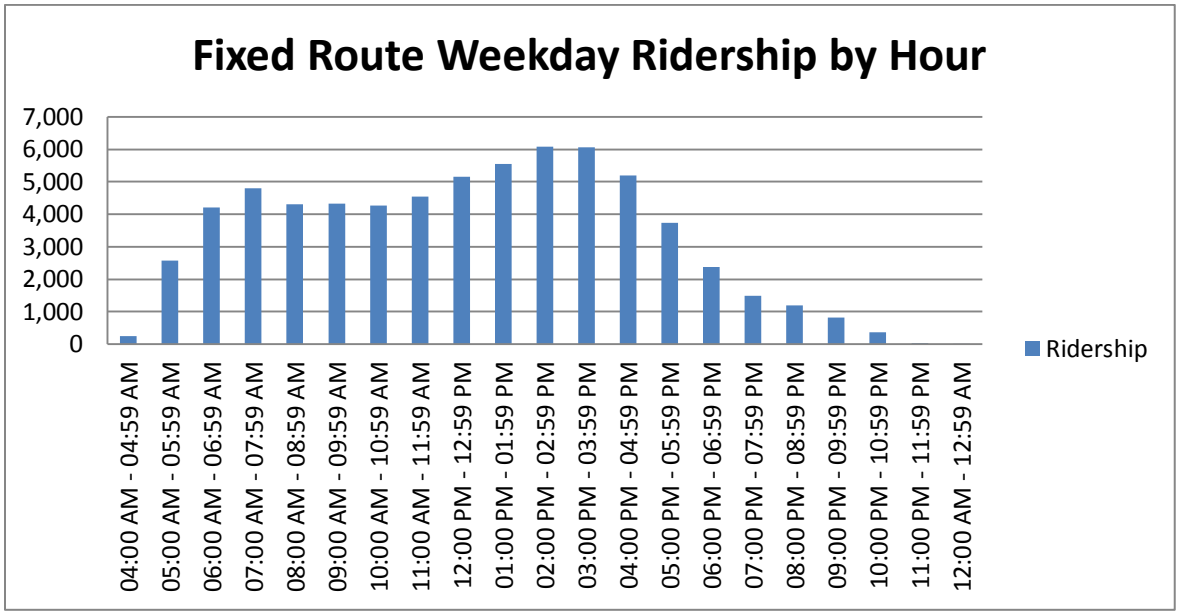
The chart below shows that 45% Sun Tran's ridership is concentrated on five routes: Routes 4 - Speedway, 6 - S Park Ave/N 1st Ave, 8 - Broadway/S 6th Ave, 11 - Alvernon Way and 16 - 12th Ave/Oracle. Consequently, Sun Tran devotes a significant amount of resources to those routes.



Ridership by Time of Day

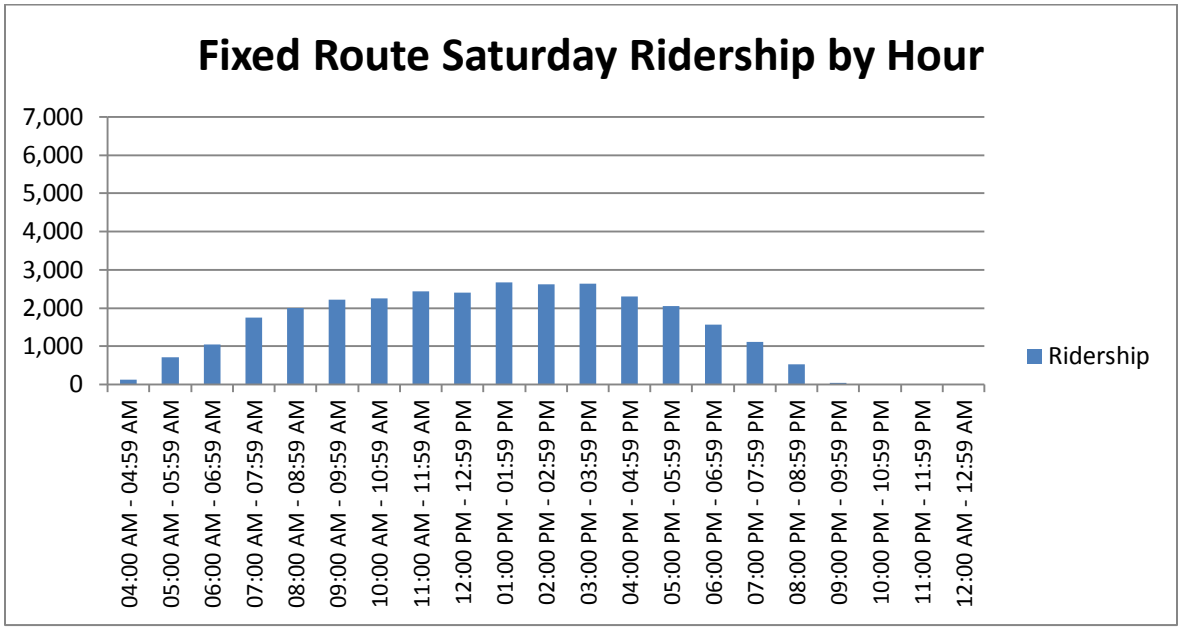
Weekdays

The busiest period of the day for most US transit systems, is in either the traditional morning or afternoon peak periods. In Tucson, the busiest period precedes the traditional afternoon peak period; ridership peaks between 2:00 pm-4:00 pm with over 6,000 boardings per hour. The traditional morning peak period averages just over 4,000 boardings per hour. Early afternoon averages over 5,000 boardings per hour are between 12:00 pm-4:00 pm. Ridership significantly drops off after 5:00 pm until the end of service. Service ends at about 12:30 am on weekdays.



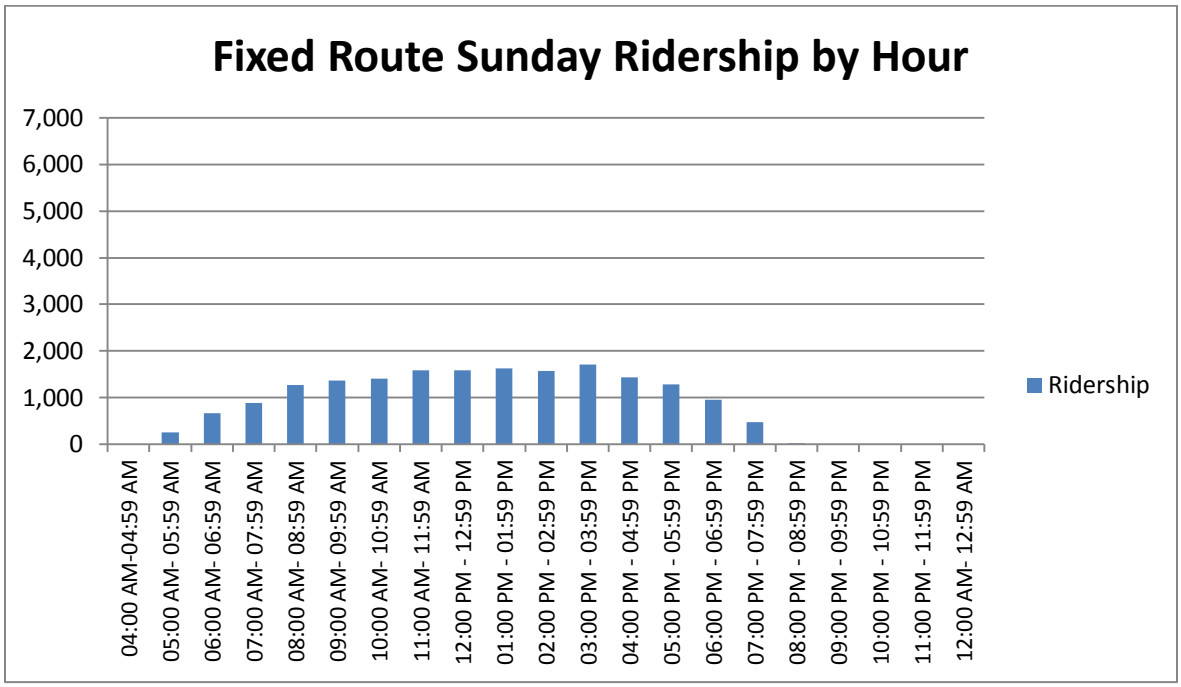
Saturday

Ridership on Saturday is roughly half that of weekdays. Ridership is relatively consistent from about 9:00 am - 5:00 pm, peaking between 1:00 pm and 4:00 pm. Ridership begins to drop off considerably after 4:00 pm. Service ends by 9:30 pm on Saturday.



Sunday

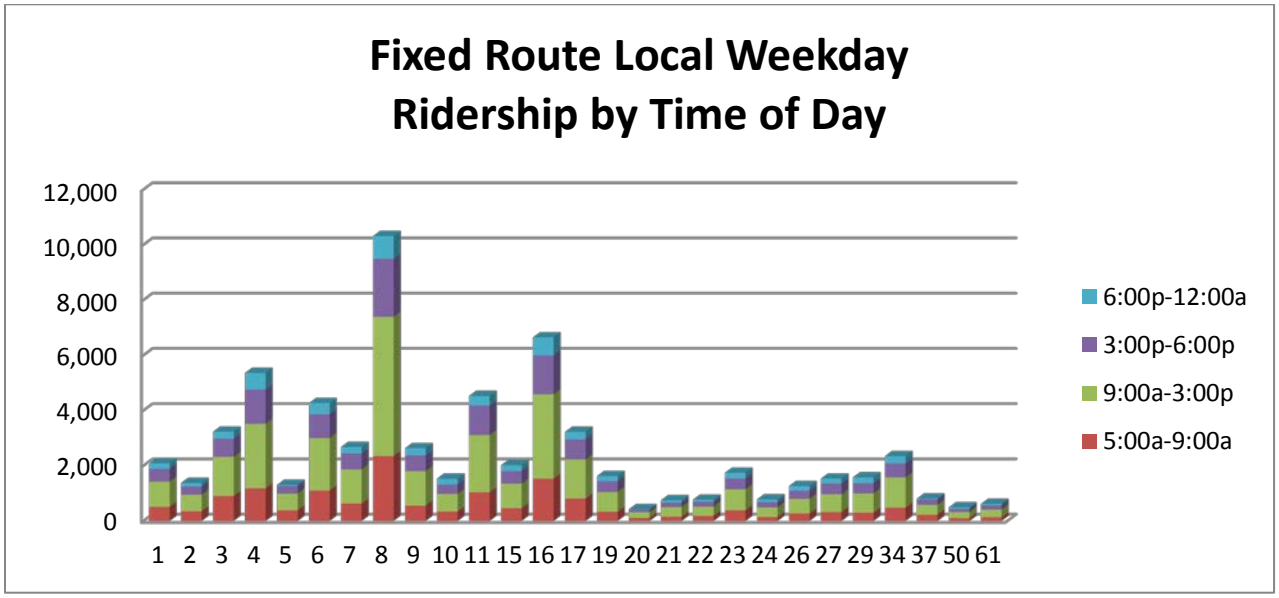
As seen with most US transit agencies, ridership on Sunday is far lower than on weekdays and Saturdays. Similar to Saturday, ridership per hour is consistent between 11:00 am and 4:00 pm, peaking between 3:00 pm and 4:00 pm. Service ends by 9:00 pm on Sunday.

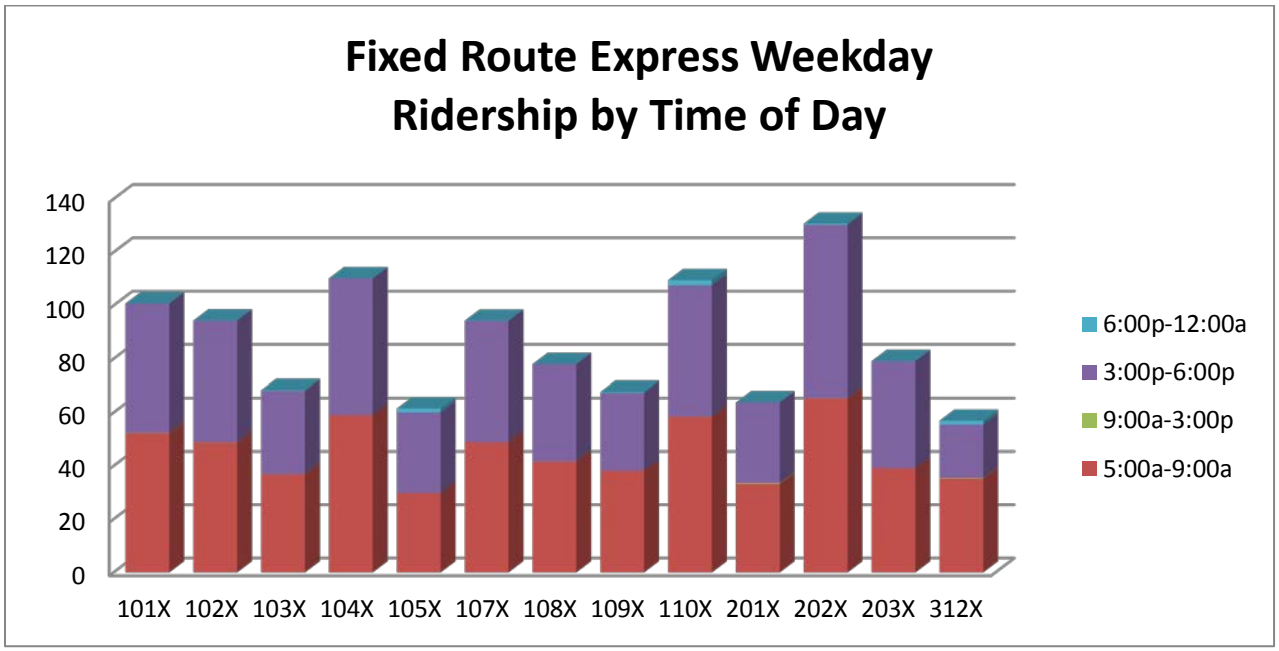


Route-Level Ridership by Time of Day

Weekday

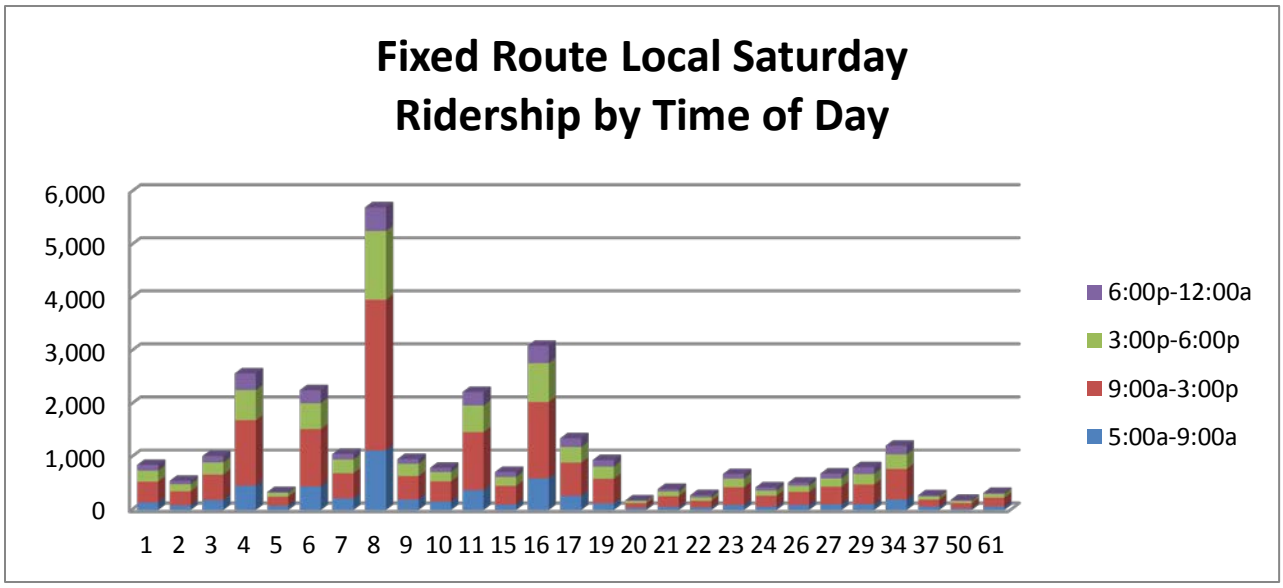
The busiest hours on many routes weekdays are between 2:00 pm and 4:00 pm, although some routes, such as Route 8- Broadway/ S 6th Ave have a peak outside of that period. Route 8's busiest hour is between 12:00 pm and 1:00 pm. Fixed route express services only operate during traditional peak periods.

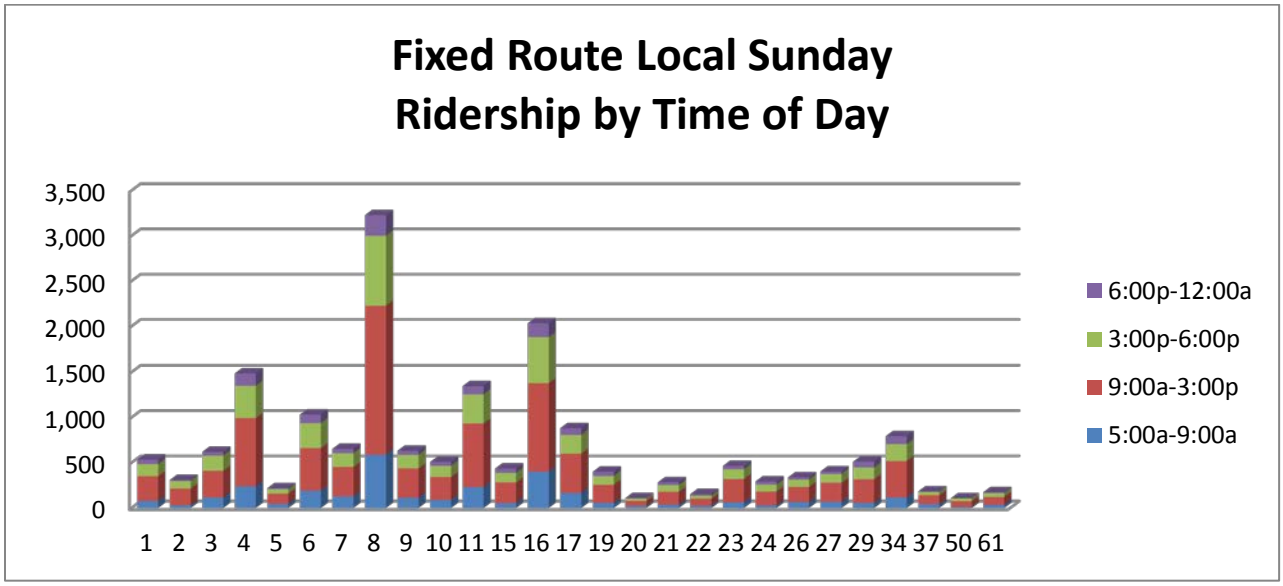




Weekend Route-Level Ridership

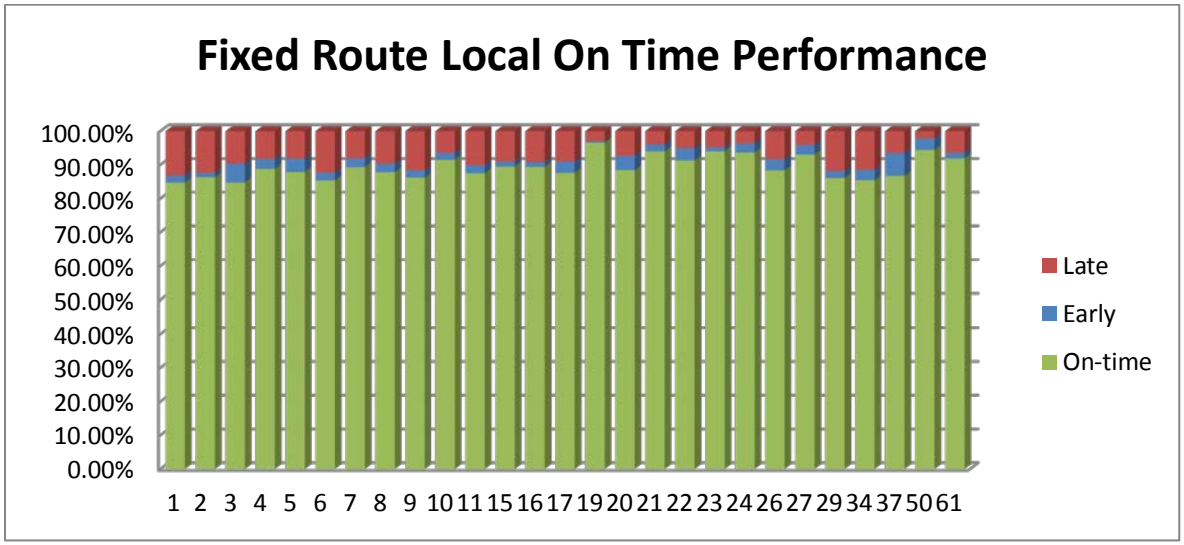
As seen in the ridership by hour for the system, service peaks occur during midday periods on both Saturday and Sunday. Many routes have the same frequency all day on both Saturday and Sunday, leading to periods that are less productive.



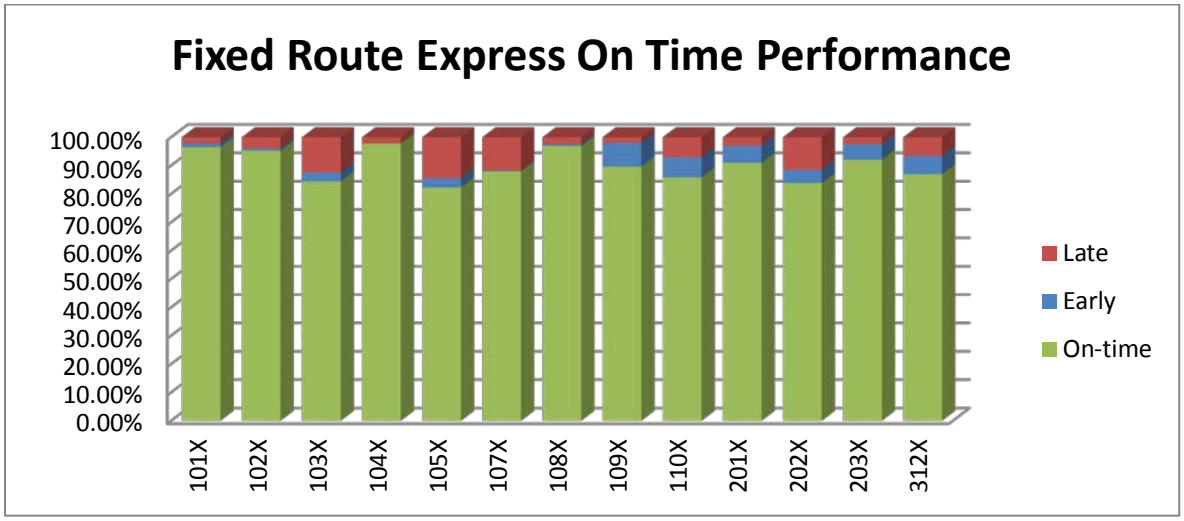


Service Reliability

Service reliability is an essential part of the customer experience. Customers in surveys say that on-time performance is the number one reason they ride or do not ride. The following charts provide trip adherence to the published schedule. It is measured using the on-time performance of a route. Sun Tran considers a trip on-time if it departs no more than one minute early, or no more than five minutes late. Any trip operating outside of these parameters will be classified as early or late. Sun Tran's systemwide on-time performance is relatively high,with 88% of trips considered on-time, 3% early and 9% late. However, the performance of the busier local routes was slightly worse than express routes. More than half the local routes are on time less than 88% of the time. One-quarter of the local routes are late more than 10% of the time. Route 19-Stone is the only local route to operate on- time more than 95% of the time.



Among the express routes, 89% were on-time, 4% were early, and 7% were late. Still, one-quarter of express the routes are late more than 10% of the time. Route 105X is the worst performing route with only 82% of trips on time, and 14% of trips arriving late.

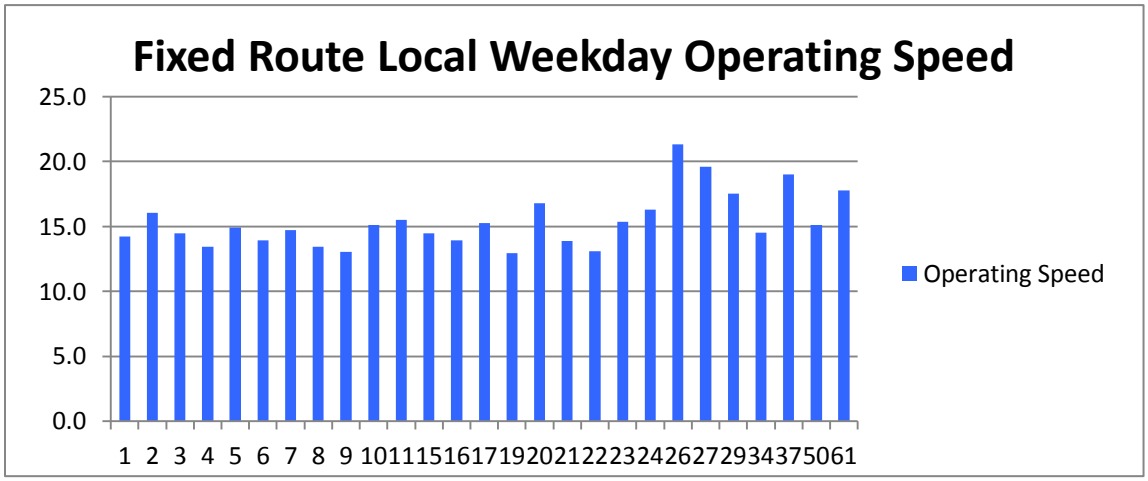


Operating Speed

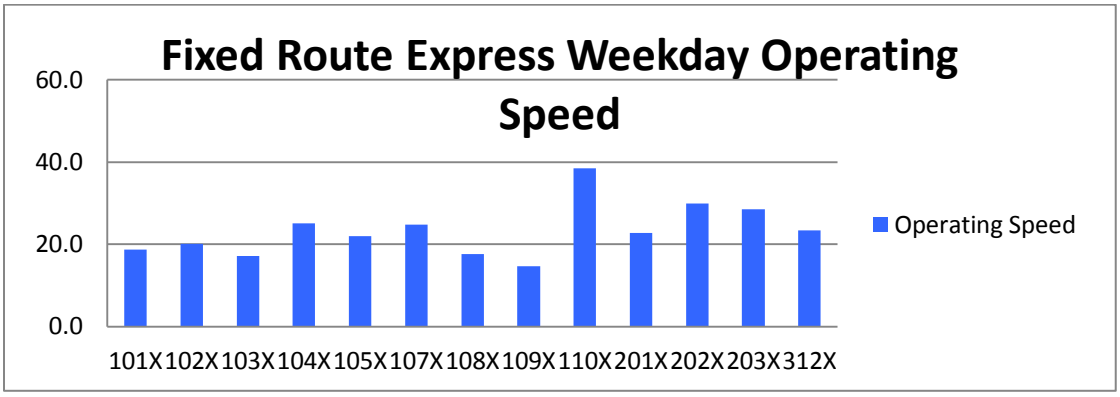
Increasing operating speeds in the system can decrease travel times for customers. Shortening trip times improves service for current customers, and can help attract new customers. Furthermore, decreasing running times may lead to a reduction in vehicles required to provide service; thereby increasing route efficiency. Many factors influence operating speed, including stop spacing, dwell times, traffic conditions, and any out of direction travel.

Weekday Operating Speed

Fixed route local routes average 14.8 mph travel speed on weekdays. Radial routes, which serve the downtown Ronstadt Transit Center and other routes that operate into the core of Tucson have an average lower speed due to traffic conditions and lower speed limits. Other non-radial routes that do not operate into Tucson's core have a higher average speed due to less congested traffic conditions and higher speed limits. Route 26 is the fastest local route with an average speed of 21.3 mph while Routes 9 and 19 are the slowest with an average speed of 13 mph.



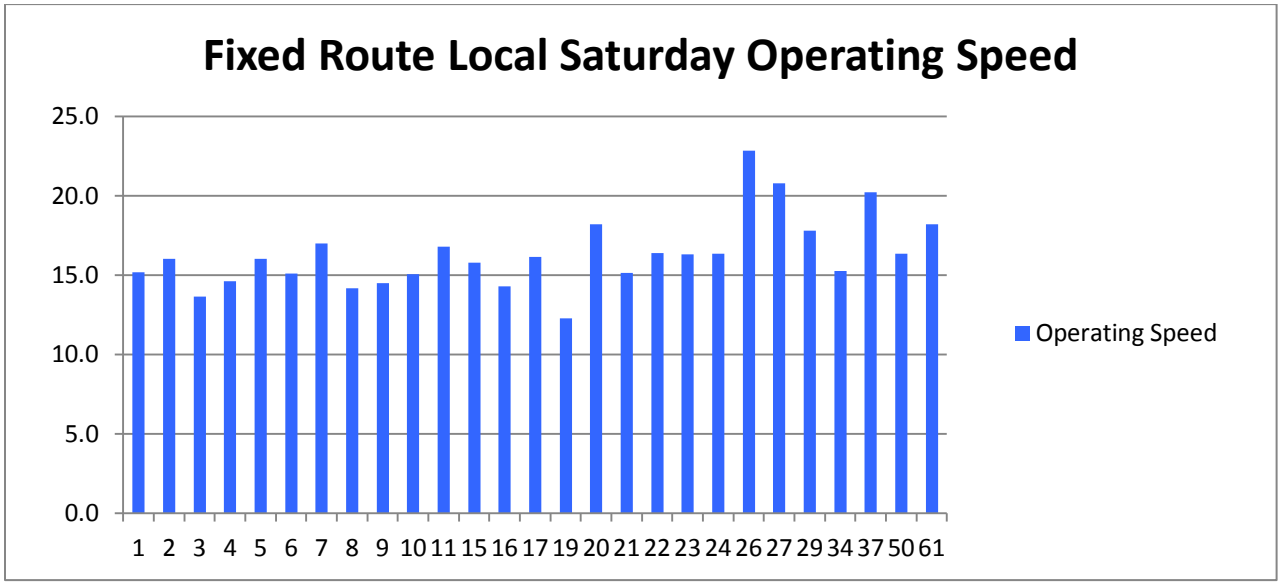
Express routes average 23.4 mph. About half of the express routes operate via area highways while the others operate on arterial streets. All express routes make limited stops. Route 110X is the fastest fixed route express route with an average speed of 38.5 mph while Route 109X is the slowest route with an average speed of 14.6 mph.



Weekend Operating Speed

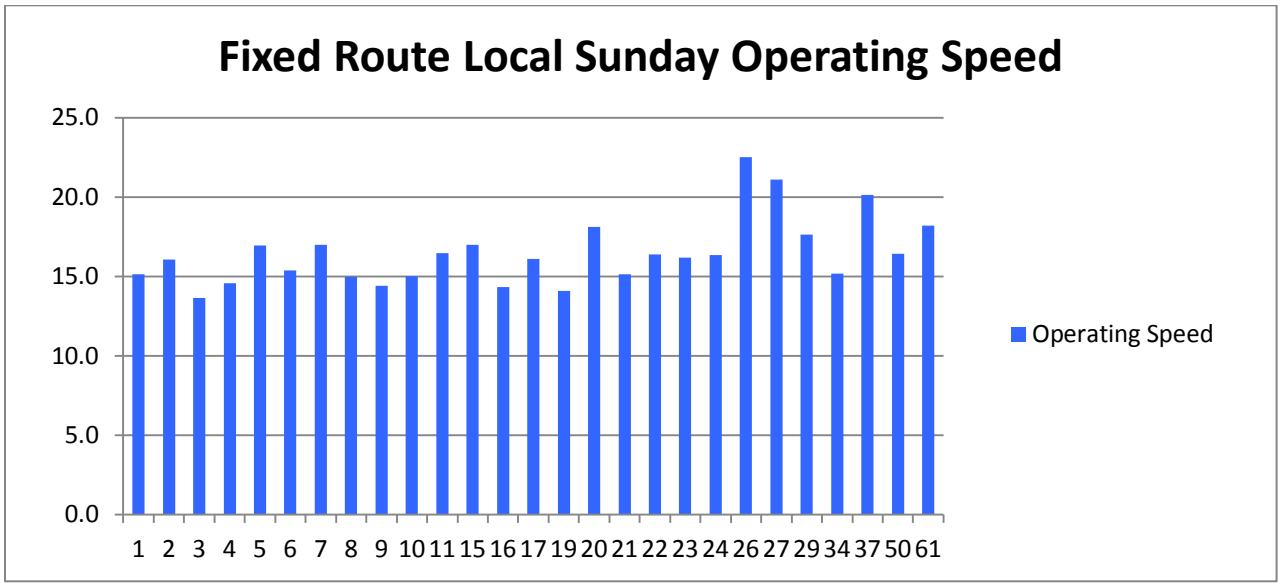
Saturday

Fixed route local routes operate at an average speed of 15.5 mph on Saturday, faster than on weekdays. Similar to weekdays, any routes that operate into the core of Tucson – both radial and non-radial – have lower average speeds. Routes that do not operate into Tucson's core have a higher average speed due to better traffic conditions and higher speed limits. Route 26 is the fastest local route with an average speed of 22.8 mph, while Route 19 is the slowest with an average speed of 12.8 mph.



Sunday

Fixed route local routes operate at an average speed of 15.8 mph on Sunday, slightly faster than on Saturday. Route 26 is the fastest local route with an average speed of 22.5 mph while Route 3 is the slowest with an average speed of 13.6 mph.



Service Assessment Sun Tran

In order to effectively analyze Sun Tran's service, standardized metrics were applied to route level data collected system wide. These metrics gauge service productivity and financial effectiveness. Service productivity is based on customer boardings and service levels, and is calculated using passenger boardings per revenue hour and passenger boardings per revenue mile. Financial Effectiveness is based on the total costs of operating a specific route, after incorporating ridership revenue. It is calculated using two metrics:

- **Farebox Recovery Ratio** measures the percentage of operating costs recouped through the farebox. Service is subsidized when the ratio is below 100 percent, and service is profitable when the ratio is above 100 percent.
- **Subsidy per Boarding** measures the operating cost per passenger boarding, after accounting for operating revenue.

It should be noted that fixed route express services are held to a different standard than fixed route local services due to the nature of the routes themselves; express routes usually only operate 3 trips in one direction during weekday peak hours, while local services have a much larger span of service.

Passenger Boarding per Revenue Hour

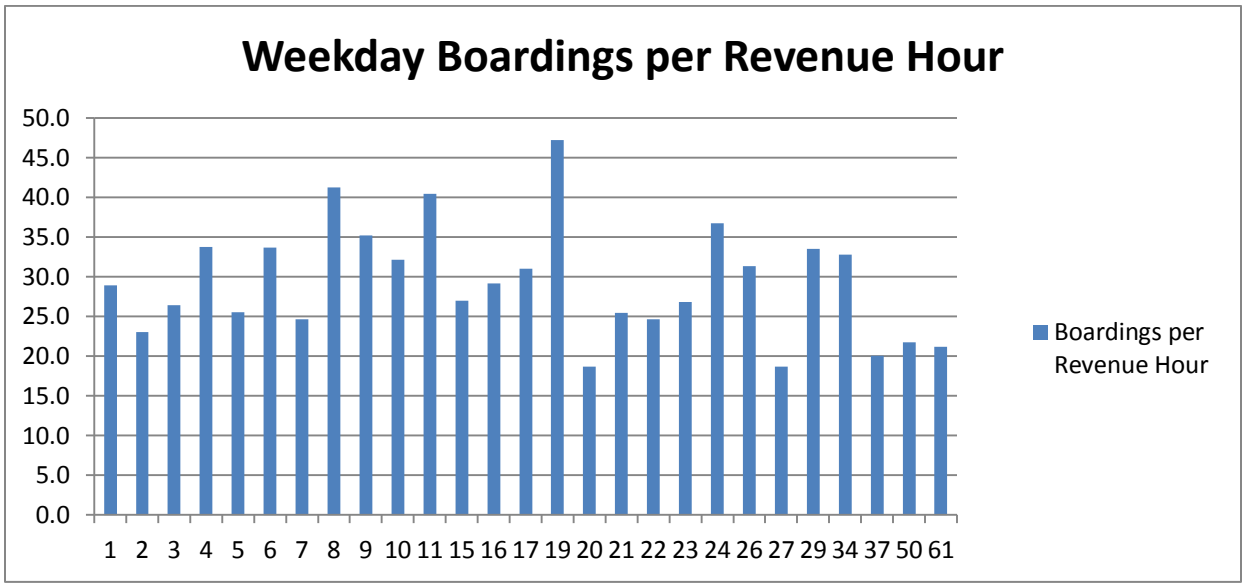
Passenger boarding per revenue hour is a key indicator of service productivity. Higher passenger boardings per revenue hour will usually have a positive correlation to other key performance metrics such as subsidy per passenger boarding. Routes with high passenger boardings per revenue hour are productive routes; they tend to carry more customers while requiring less investment per customer than less productive routes. Many of Sun Tran's most productive routes are radial routes, although some non-radial routes are productive as well such as Route 11 and Route 24. As a system, Sun Tran is on par with the peer reviewed systems at approximately 31 passenger boardings per revenue hour.

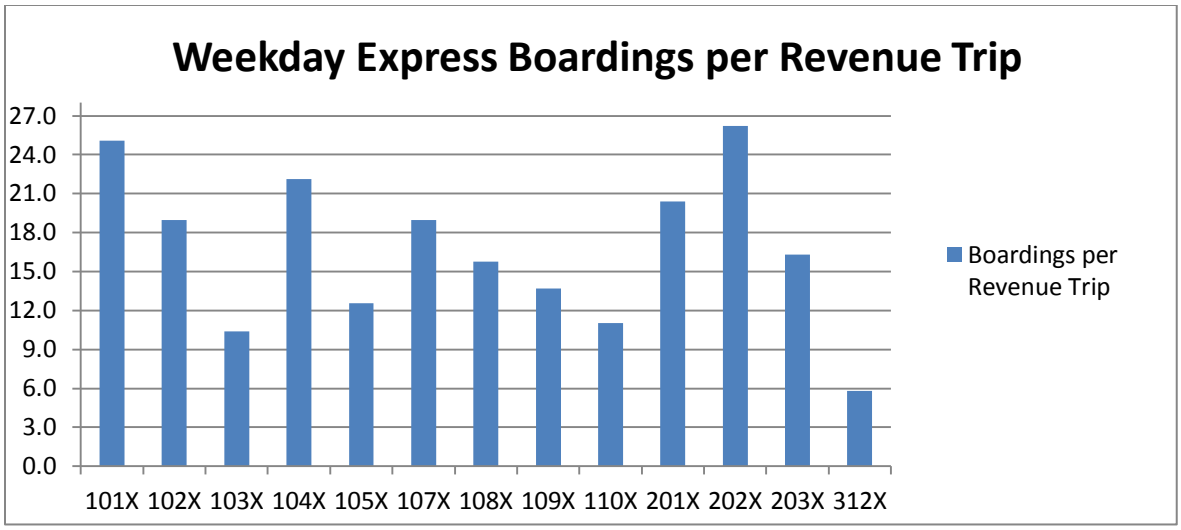
Weekday Passenger Boardings per Revenue Hour

Sun Tran uses passenger boardings per revenue hour to assess the productivity of fixed route local services. Sun Tran's fixed route local services average 31 passenger boardings per revenue hour. Thirteen (13) of the twenty-seven (27) local routes have a higher average passenger boarding per revenue hour. In most cases, Sun Tran's busiest routes are also the most productive. Only Route 3, Sun Tran's 7th busiest route, fails to make the top ten (10) most productive routes. Route 19 is Sun Tran's most productive route and averages over 47.2 passenger boardings per revenue hour. Route 19 has below average overall ridership but requires far fewer revenue hours to serve a relatively large number of customers. Routes 20 and 27 each average 18.7 passenger boardings per revenue hour on weekdays, the lowest in the system. While average boardings per revenue hour are provided for fixed route express services, it is not the most appropriate metric to be used in an evaluation. Instead, average passenger per trip metric is more appropriate because these routes have long segments where passengers are not boarding, which reduce the route's productivity.

ROUTE	Boardings per Revenue Hour	ROUTE	Boardings per Revenue Hour
1	28.9	19	47.2
2	23.0	20	18.7
3	26.4	21	25.4
4	33.7	22	24.6
5	25.6	23	26.8
6	33.7	24	36.7
7	24.6	26	31.3
8	41.2	27	18.7
9	35.2	29	33.5
10	32.1	34	32.8
11	40.4	37	20.0
15	26.9	50	21.7
16	29.2	61	21.2
17	31.0		

ROUTE	Boardings per Revenue Trip
101X	25.1
102X	19.0
103X	10.4
104X	22.1
105X	12.6
107X	19.0
108X	15.8
109X	13.7
110X	11.0
201X	20.4
202X	26.2
203X	16.3
312X	5.8

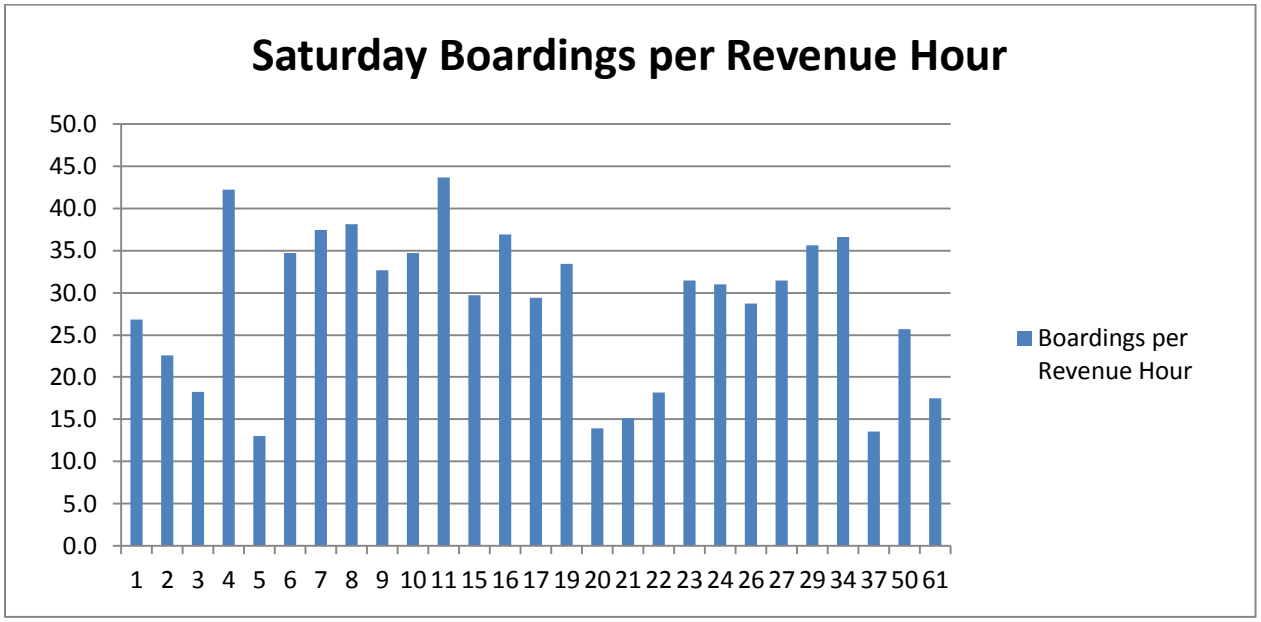




Weekend Passenger Boardings per Revenue Hour

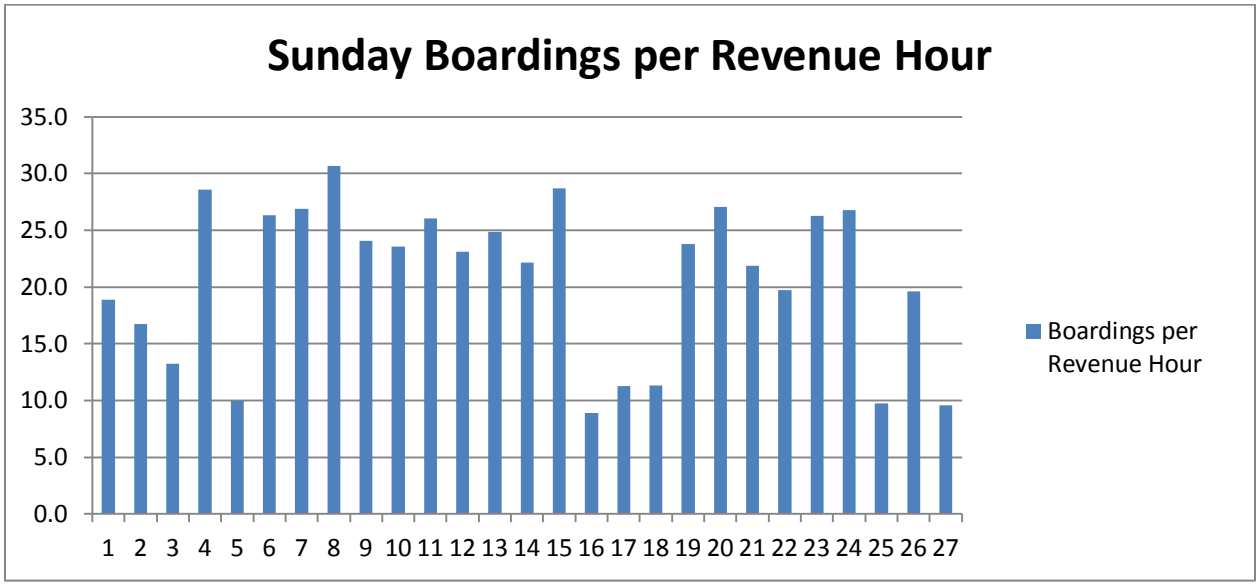
Average passenger boardings per revenue hour on Saturdays are 31.7, slightly higher than weekdays. However, only 11 out of the 27 fixed route local services have an equal or higher number of passenger boardings per revenue hour; more routes are less productive on Saturdays than on weekdays. Route 11 is the most productive route on Saturdays, at 43.7 passenger boardings per hour. Route 5 is least productive route on Saturday, at 13 passenger boardings per revenue hour. It should be noted that Route 27, one of the least productive routes on weekdays, roughly matches the system average with 31.4 passenger boardings per revenue hour on Saturdays.

ROUTE	Saturday Boardings per Revenue Hour	ROUTE	Saturday Boardings per Revenue Hour
1	26.8	19	33.4
2	22.6	20	13.9
3	18.2	21	15.2
4	42.2	22	18.2
5	13.0	23	31.4
6	34.7	24	31.0
7	37.5	26	28.7
8	38.1	27	31.4
9	32.6	29	35.6
10	34.7	34	36.6
11	43.7	37	13.6
15	29.7	50	25.7
16	36.9	61	17.5
17	29.4		



Average passenger boarding per revenue hour on Sundays is 22.7, substantially less than weekdays and Saturday. Fourteen routes are above the system average on Sunday. Route 8, Sun Tran's busiest route, is also the most productive on Sunday with an average passenger boarding per revenue hour of 30.7. Route 20 is the least productive at 8.9 passenger boardings per revenue hour.

ROUTE	Sunday Boardings per Revenue Hour	ROUTE	Sunday Boardings per Revenue Hour
1	18.9	19	28.7
2	16.7	20	8.9
3	13.2	21	11.3
4	28.6	22	11.3
5	9.9	23	23.8
6	26.4	24	27.1
7	26.9	26	21.9
8	30.7	27	19.8
9	24.1	29	26.2
10	23.6	34	26.8
11	26.0	37	9.7
15	23.1	50	19.6
16	24.9	61	9.6
17	22.2		



Passenger Boardings per Revenue Mile

The other metric for measuring routes operationally is passenger boardings per revenue mile. Passenger boarding per revenue mile is the number of passengers that board a vehicle for every mile a vehicle is in service.

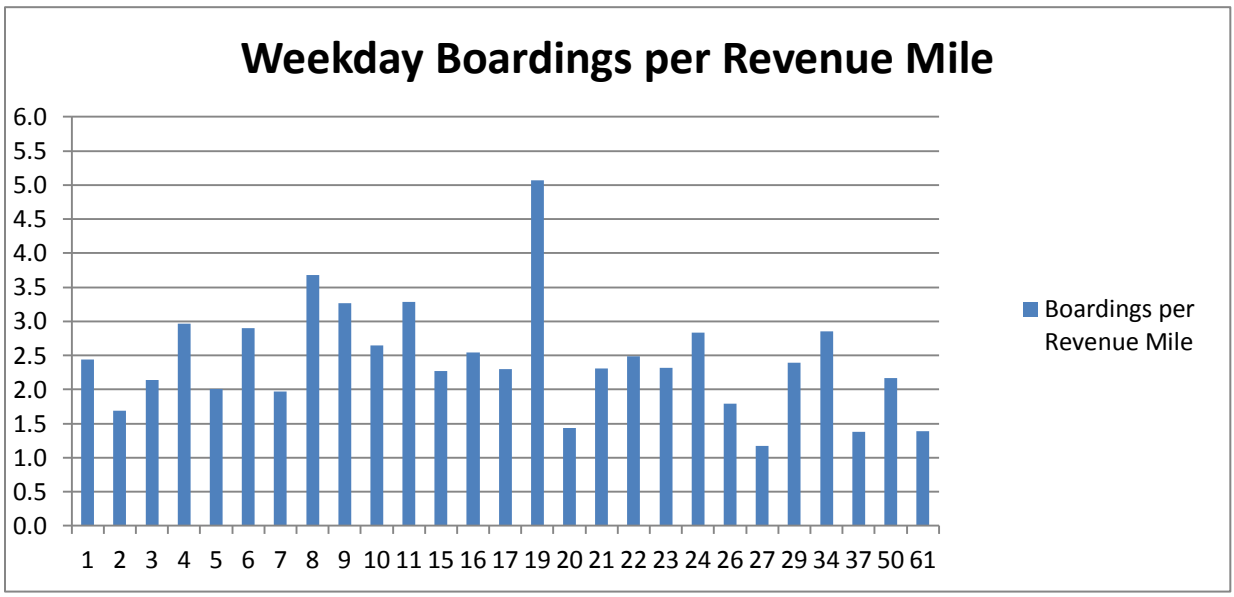
Weekday Passenger Boardings per Revenue Hour

Sun Tran's average weekday passenger boardings are 2.5 per revenue mile. In comparison, the peer systems average 2.4 passenger boardings per revenue mile. Nine routes average more than 2.6 passenger boardings per revenue mile. Route 19 has the highest weekday passenger boardings per revenue mile at 5.1. Route 27 has the lowest at 1.2 passenger boardings per revenue mile.

ROUTE	Boardings per Revenue Mile	ROUTE	Boardings per Revenue Mile
1	2.4	19	5.1
2	1.7	20	1.4
3	2.1	21	2.3
4	3.0	22	2.5
5	2.0	23	2.3
6	2.9	24	2.8
7	2.0	26	1.8
8	3.7	27	1.2
9	3.3	29	2.4
10	2.6	34	2.9

ROUTE	Boardings per Revenue Mile	ROUTE	Boardings per Revenue Mile
11	3.3	37	1.4
15	2.3	50	2.2
16	2.5	61	1.4
17	2.3		

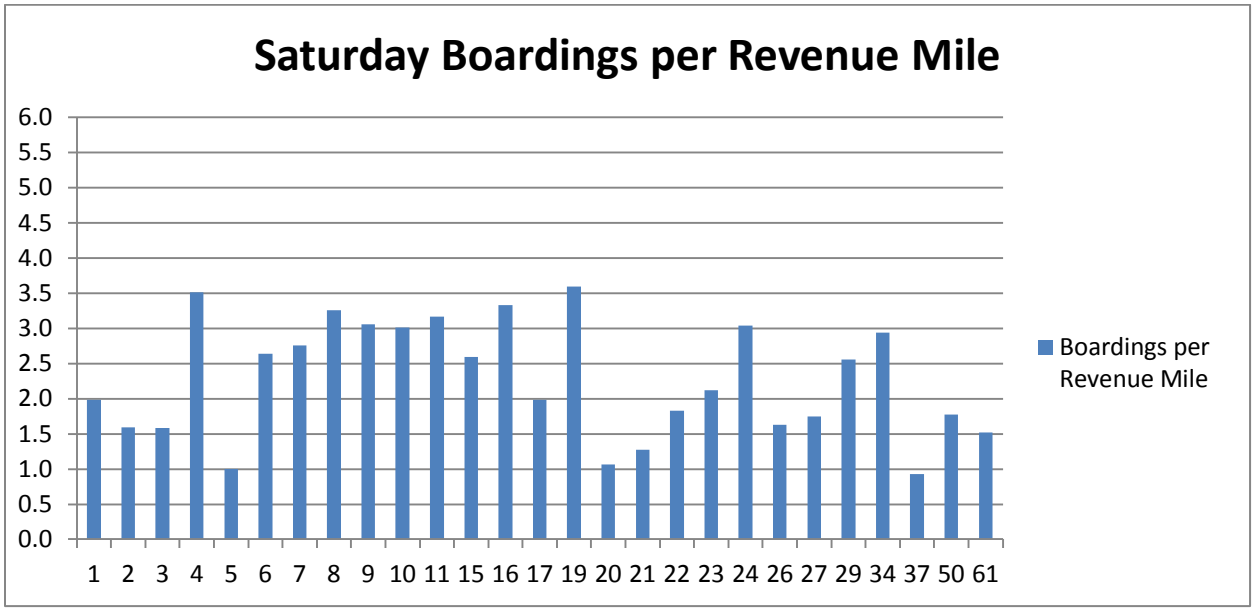
ROUTE	Boardings per Revenue Mile
101X	1.3
102X	0.8
103X	0.5
104X	1.4
105X	0.4
107X	0.8
108X	1.0
109X	0.8
110X	0.5
201X	0.6
202X	0.7
203X	0.4
312X	0.4



Weekend Passenger Boardings per Revenue Mile

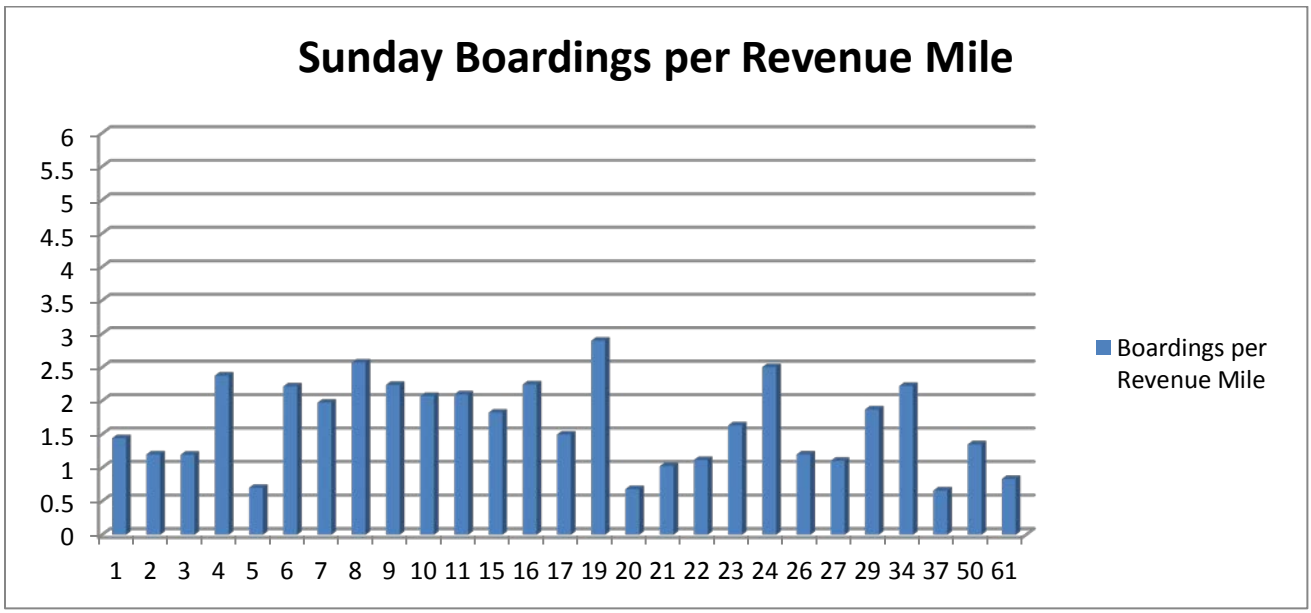
Passenger boardings per revenue mile on Saturday are slightly lower than on weekdays at 2.5, which indicate that Saturdays are nearly as productive as weekdays. Route 19 has the highest Saturday passenger boardings per revenue mile at 3.6. Route 50 has the lowest at 0.9 passenger boardings per revenue mile.

ROUTE	Saturday Boardings per Revenue Mile	ROUTE	Saturday Boardings per Revenue Mile
1	2.0	19	3.6
2	1.6	20	1.1
3	1.6	21	1.3
4	3.5	22	1.8
5	1.0	23	2.1
6	2.6	24	3.0
7	2.8	26	1.6
8	3.3	27	1.7
9	3.1	29	2.6
10	3.0	34	2.9
11	3.2	37	0.9
15	2.6	50	1.8
16	3.3	61	1.5
17	2.0		



Passenger boardings per revenue mile on Sunday are 33% lower than on Saturdays at 1.8. Route 19 has the highest Sunday passenger boardings per revenue mile at 2.9. Routes 5, 20 and 37 have the lowest at 0.7 passenger boardings per revenue mile.

ROUTE	Sunday Boardings per Revenue Mile	ROUTE	Sunday Boardings per Revenue Mile
1	1.4	19	2.9
2	1.2	20	0.7
3	1.2	21	1.0
4	2.4	22	1.1
5	0.7	23	1.6
6	2.2	24	2.5
7	2.0	26	1.2
8	2.6	27	1.1
9	2.2	29	1.9
10	2.1	34	2.2
11	2.1	37	0.7
15	1.8	50	1.3
16	2.2	61	0.8
17	1.5		



Farebox Recovery Ratio

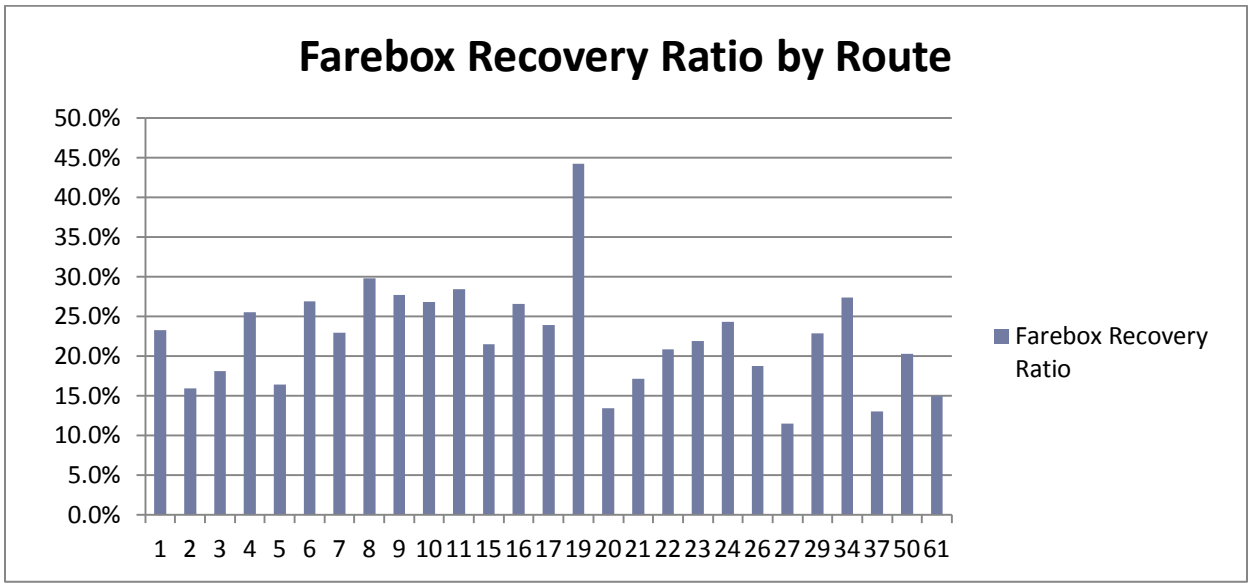
Farebox recovery Ratio measures the financial effectiveness for Sun Tran's various route services. Farebox recovery accounts for total costs of operating the route and revenue generated by paid

boardings. With an average fare of $0.63, Sun Tran's average farebox recovery ratio for weekdays is 22.7 percent. Fixed route local services have a slightly higher average ratio at 23.4 percent. Fourteen routes have an average farebox recovery ratio higher than the system average. Route 19 has the highest at 44 percent. Route 27 has the lowest average farebox recovery ratio at 11.5 percent. Routes with high passenger boardings per revenue hour also have high farebox recovery ratios.

Sun Tran's fixed route express service has an average farebox recovery ratio of 13.8 percent. Route 104X has the highest average farebox recovery ratio at 24.5 percent. Route 103X has the lowest average farebox recovery ratio at 7.8%.

Route	Farebox Recovery Ratio	Route	Farebox Recovery Ratio
1	23.3%	19	44.2%
2	15.9%	20	13.4%
3	18.1%	21	17.1%
4	25.5%	22	20.8%
5	16.4%	23	21.9%
6	26.9%	24	24.3%
7	23.0%	26	18.8%
8	29.8%	27	11.5%
9	27.7%	29	22.9%
10	26.8%	34	27.4%
11	28.4%	37	13.0%
15	21.5%	50	20.3%
16	26.6%	61	15.0%
17	23.9%		

Route	Farebox Recovery Ratio
101X	20.7%
102X	16.1%
103X	7.8%
104X	24.5%
105X	9.7%
107X	13.8%
108X	15.4%
109X	11.1%
110X	14.6%
201X	15.6%
202X	19.7%
203X	8.6%
312X	9.6%

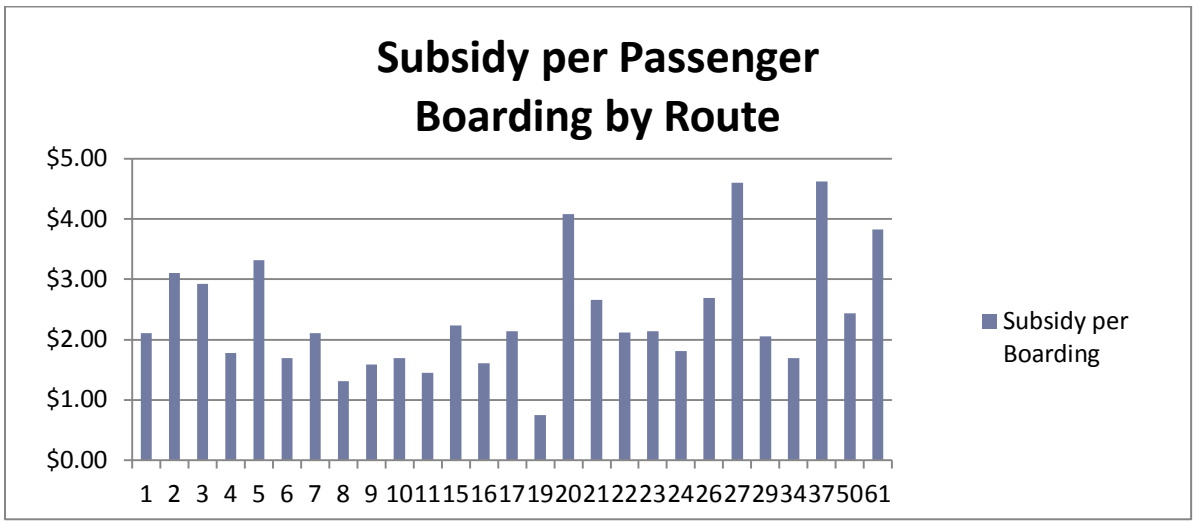


Subsidy per Passenger Boarding

Subsidy per passenger boarding is the cost to Sun Tran for each boarding minus the collected fare revenue (average fare is $.63 per boarding). Sun Tran's average subsidy per passenger boarding is $2.32. For fixed route local services, Route 19 has the lowest average subsidy per passenger boarding at $0.74. Route 37 has the highest average subsidy per passenger boarding at $4.62. For fixed route express services, Route 104X has the lowest average subsidy per passenger boarding at $6.67. Route 203X has the highest average subsidy per passenger boarding at $27.32. Routes with high passenger boardings per revenue hour and high farebox recovery ratios also have high low subsidy per passenger boardings.

Route	Subsidy per Boarding	Route	Subsidy per Boarding
1	$2.10	19	$0.74
2	$3.10	20	$4.08
3	$2.93	21	$2.66
4	$1.78	22	$2.11
5	$3.32	23	$2.14
6	$1.69	24	$1.81
7	$2.11	26	$2.69
8	$1.31	27	$4.60
9	$1.58	29	$2.05
10	$1.69	34	$1.69
11	$1.45	37	$4.62
15	$2.24	50	$2.43
16	$1.61	61	$3.82
17	$2.13		

Route	Subsidy per Boarding
101X	$8.42
102X	$10.86
103X	$19.66
104X	$6.67
105X	$17.44
107X	$13.32
108X	$12.42
109X	$15.71
110X	$12.54
201X	$13.67
202X	$10.70
203X	$27.32
312X	$17.53



Major Findings

- Service Productivity

  - Overall, Sun Tran is a productive system with approximately 31 to 32 passenger boardings per revenue hour weekdays and Saturdays. Sunday service is less productive with approximately 22.7 passenger boardings per revenue hour. This is in line with the average of Sun Tran's peers.
  - Route 19- Stone Ave consistently rates near the top on all operating and financial measures.
  - Routes with high productivity are candidates for additional service to ease overcrowding conditions and to attract new customers.

- Financial Effectiveness

  - Overall, Sun Tran has a moderate subsidy per passenger boarding at $2.32. The overall cost efficiency of operating the service helps to minimize the impact of having a low average fare.
  - Routes that have high productivity and high farebox recovery are the most financially effective with low subsidies per passenger boarding.
  - Routes segments that serve the transit centers are more financially effective than elsewhere in the system.

Existing Service Sun Shuttle

Sun Shuttle operates a total of thirteen (13) routes. Ten (10) of the routes provide fixed route shuttle service and three (3) provide Dial-A- Ride services. Most routes operate within and outside of the Tucson city limits into areas of Pima County. Combined, Sun Shuttle operates over 62,000 revenue hours and just under 1.2 million revenue miles carrying just over 262,000 passengers in Fiscal Year 2013.

Sun Shuttle travels to all three Sun Tran Transit Centers: the Downtown Ronstadt Transit Center, the Tohono Transit Center on the north side and the Roy Laos Transit Center on the south side.

Fixed Shuttle Routes

Fixed Route Shuttle Service is the bulk of Sun Shuttle's operation. Sun Shuttle routes operate either five (5) or six (6) days a week. The following table provides the listing of the Sun Shuttle routes.

Shuttle Routes	
401- Oro Valley-Catalina*	421- Green Valley/ Sahuarita
410- Marana*	430- Tucson Estates
411- Marana*	440- San Xavier
412- Marana*	450- Southeast Tucson/ Rita Ranch
413- Marana	486- Ajo/ Tucson

*Route has Flex-Service

Flex-Service

Route deviations are available on the Routes 401, 410, 411 and 412. For these routes, customers have the ability to board or alight up to ¾ of a mile from the scheduled routing provided they call and request this ahead of time.

Dial-a-Ride

Dial-a-Ride Service is the smallest subset of Sun Shuttle's operation, with three (3) routes comprising this service. They account for 17% of total ridership, 33% of total revenue hours, and 24% of total revenue miles. The Ajo-Why route only operates three round-trips, weekdays only. The Oro Valley service operates Monday through Friday for the general public and Monday through Saturday for ADA paratransit eligible customers. The Green Valley service operates Monday through Saturday.

Dial-a-Ride Routes
Green Valley (GV) Dial-a-Ride
Oro Valley (OV) Dial-a-Ride
Ajo-Why Dial-a-Ride

Service Span

Sun Shuttle operates six days a week. Some routes operate weekdays only. All routes begin service by 7:00 am and operate until at least 6:00 pm on weekdays and 9:00 am-3:00 pm on Saturday. Many routes operate longer service spans. Dial-a-Ride services operate similar service spans on weekdays. They do not operate on weekends.

Service Frequency

Sun Shuttle does not operate frequent service on a regular headway. Routes operate as frequent as every 30 minutes and as infrequent as every 2 hours.

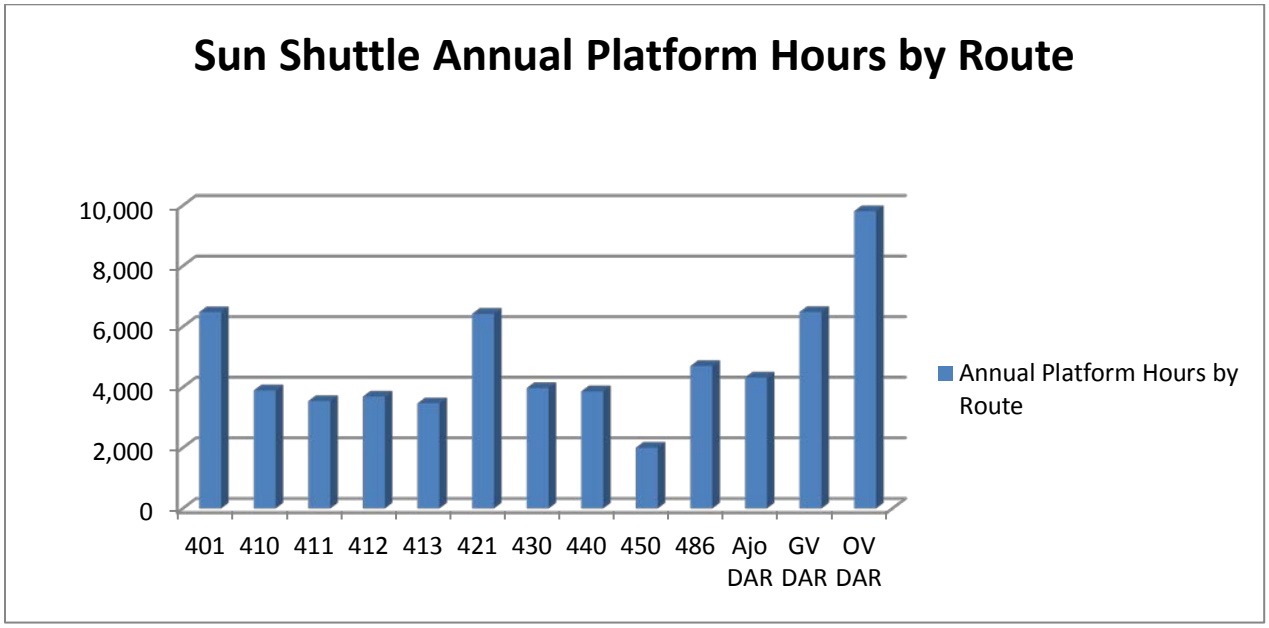
Route	Weekdays	Saturday
401	60	60
410	120	120
411	30-60	45
412	80	80
413	30-60	60
421	36-185	79
430	90	90
440	70	59
450	95	N/A
486	1 Round Trip	N/A

Dial-a-Ride services do not operate on a frequency; however, these services require a reservation to be made in advance.

Service Investment

As mentioned at the start of this section, Sun Shuttle operates 62,000 revenue hours and just under 1.2 million revenue miles carrying just over 262,000 passengers in Fiscal Year 2013. With increasing ridership, the Oro Valley Dial-a-Ride requires the most investment annually. Route 450, the newest Sun Shuttle fixed route, has required the least amount of investment in its first year.

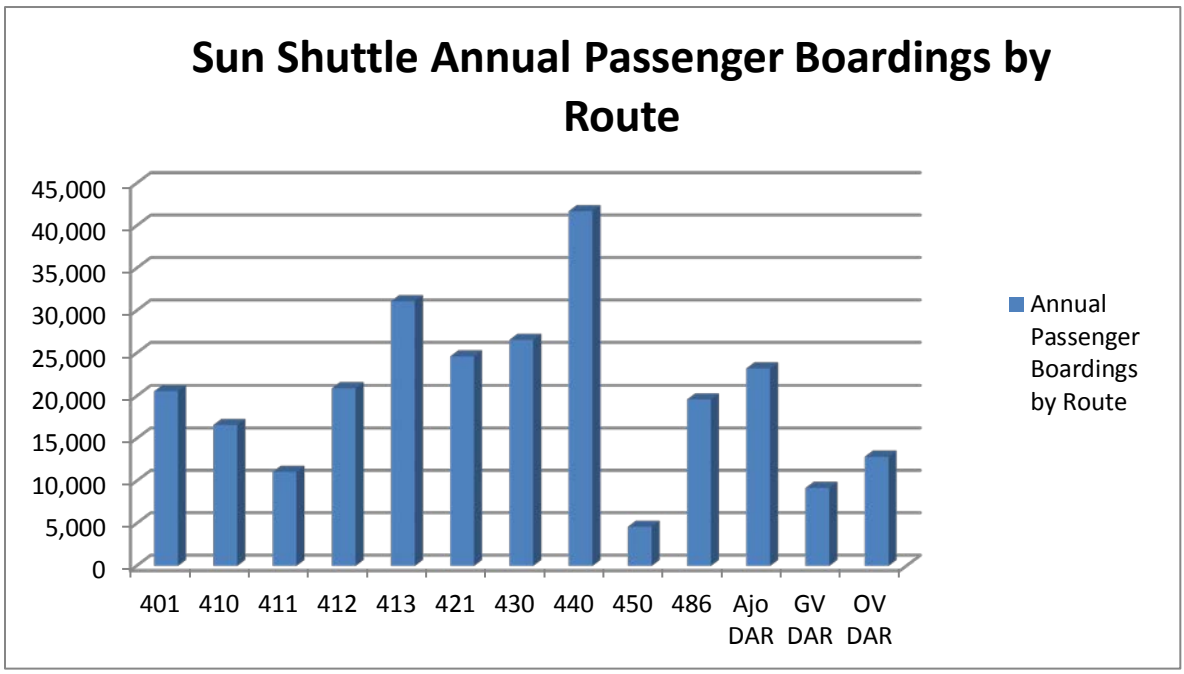
Routes	Platform Hours	Platform Miles
401	6,473	95,834
410	3,892	95,384
411	3,540	54,230
412	3,687	74,044
413	3,465	99,220
421	6,419	180,614
430	3,969	74,671
440	3,859	66,829
450	2,000	39,209
486	4,697	121,293
Ajo DAR	4,316	47,685
GV DAR	6,479	88,587
OV DAR	9,808	146,236



Ridership

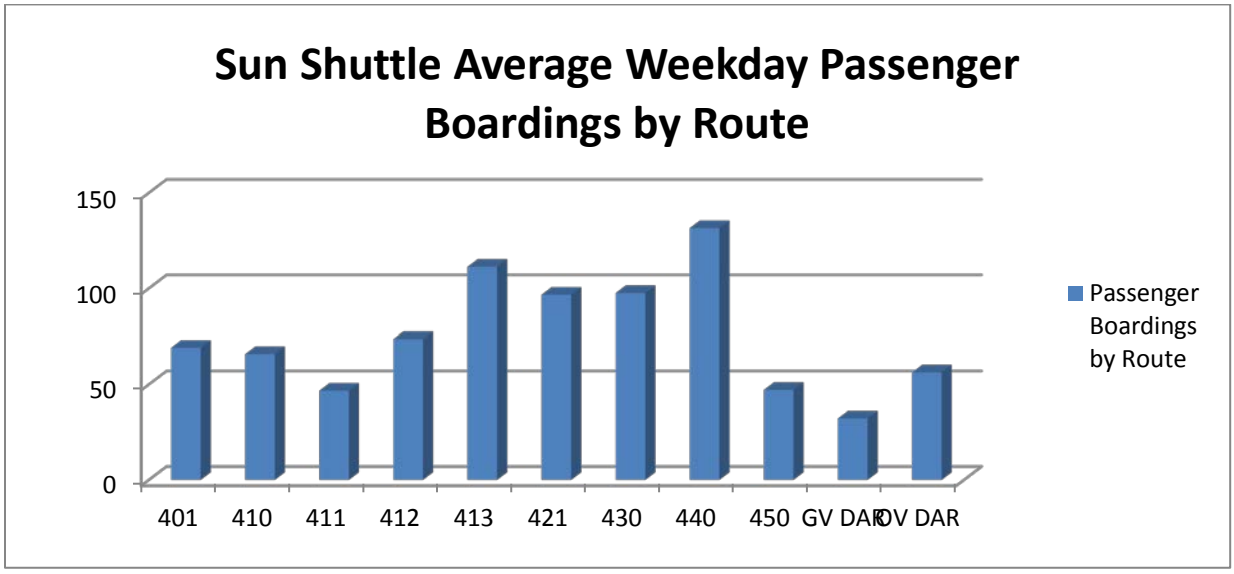
In Fiscal year 2013, Sun Shuttle carried 262,000 customers. On average, Sun Shuttle routes carry nearly 20,000 customers annually. Route 411 is among the routes with the lowest ridership; Route 450 is the least busy; however, it is a new route with growing ridership. Compared to the Ajo and Oro Valley Dial-a-Ride services, the Green Valley Dial-a-Ride is the least busy.

Routes	Passenger Boardings
401	20,572
410	16,599
411	11,067
412	20,929
413	31,101
421	24,603
430	26,552
440	41,711
450	4,610
486	19,605
Ajo DAR	23,185
GV DAR	9,181
OV DAR	12,855



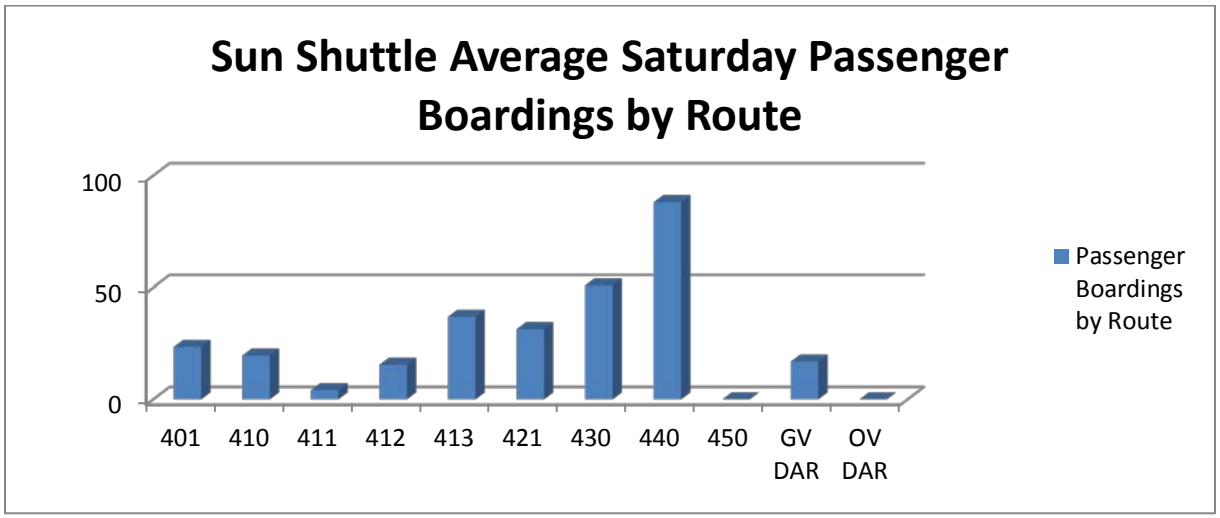
Weekday Passenger Boardings

Weekday passenger boardings on Sun Shuttle routes are considerably lower than on the more urban Sun Tran routes, which as an urban fixed route system have service that is more frequent. Most Sun Shuttle routes have fewer than 100 passenger boardings on a typical weekday. Routes 413 and 440 on average have more than 100 passenger boardings on a typical weekday.



Weekend Passenger Boardings

Saturday passenger boardings on Sun Shuttle routes are lower than on weekdays. Most Sun Shuttle routes have fewer than 50 passenger boardings on a typical Saturday. Route 440 averages a little more than 80 passenger boardings on a typical Saturday. Sun Shuttle does not operate on Sunday. The Green Valley Dial-a-Ride operates on Saturdays while the Oro Valley Dial-a-Ride operates on Saturdays for ADA paratransit eligible customers only. Oro Valley ADA paratransit eligible trips are not depicted in the following chart; only those services for the general public are included.



Customer Experience

The customer experience is an essential part of the success of the transit agency and its services. This experience begins at the bus stop, waiting for the bus until the customer arrives at their destination. This section provides an overview of the quality of service Sun Shuttle currently offers to customers. This includes reliability, operating speeds, trip loads. These factors affect the customer experience on the route and potential customers' decision to use the system.

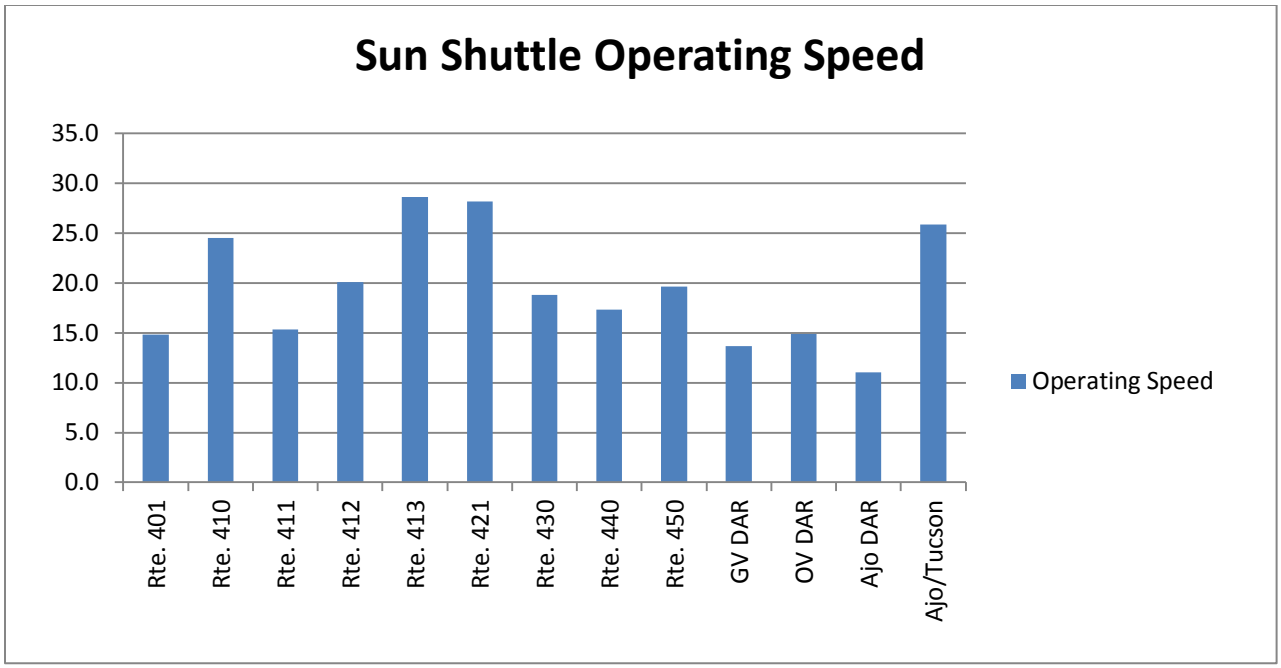
Service Reliability

Service reliability is the effectiveness of trips adhering to the published schedule. This is measured by the on time performance of a route. Sun Shuttle at the time does not collect on time performance data.

Operating Speed

Improving operating speeds in the system can decrease travel times for customers. Shortening trip times can make service more attractive to current customers and potential customers. Decreasing running times may lead to a reduction in vehicles required to provide service, thereby increasing route efficiency. Several factors influencing operating speed include stop spacing, dwell time, traffic conditions, and any out of direction travel. Fixed route Sun Shuttle routes average 21.5 mph. Dial-a-Ride services average 13.8 mph. Route 413 has the highest average operating speed at 28.8 mph. The Ajo-Why Dial-a-Ride averages 11.1 mph.

Route	Operating Speed
401	14.9
410	24.5
411	15.3
412	20.3
413	28.8
421	28.1
430	18.9
440	17.4
450	19.3
GV DAR	13.9
OV DAR	14.9
Ajo DAR	11.1
Ajo/Tucson	26



CAT Tran

CAT Tran operates seven (7) fixed -route bus services. Most routes operate on and around the University of Arizona Campus. One route, the USA route travels to the Ronstadt Transit Center in downtown Tucson, connecting with Sun Tran, Sun Shuttle, and the Downtown Loop. CAT Tran completed a ride check of ridership during April 2013 for all routes except for the Southwest Off-Campus UA Mall Shuttle. Based on the ride checks, CAT Tran carries over 11,600 passengers a day.

CAT Tran Routes
USA Downtown Route
North South (Purple) Route
Mountain Ave (Orange) Route
Outer Campus (Green) Loop
Inner Campus (Teal) Route
Night Cat
Southwest Off Campus UA Mall Route

Service Span

CAT Tran operates five days a week. Most routes operate between 6:30 am and 6:30 pm. The Night Cat, which is the evening route, operates between 6:00 pm and 1:00 pm.

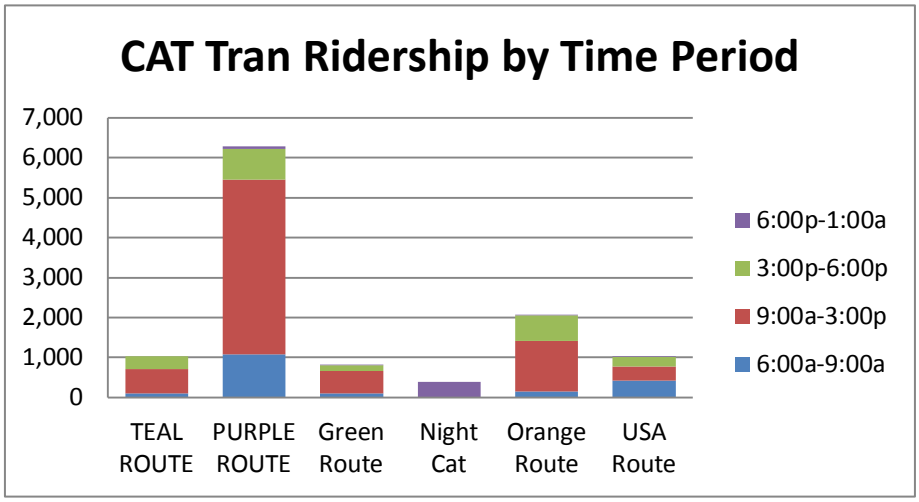
Service Frequency

CAT Tran operates a fairly frequent service. Most routes operate every 15-20 minutes. Only the Green Route operates less frequently.

Route	Frequency (mins)
USA Downtown Route	Every 17-20
North South (Purple) Route	Every 15
Mountain Ave (Orange) Route	Every 15
Outer Campus (Green) Loop	Every 23
Inner Campus (Teal) Route	Every 20
Night Cat	Every 20

Ridership by Time of Day

Similarly, to Sun Tran, CAT Tran's busiest period of the day is the midday. The Teal, Purple, and Green Routes peak in the midday. The USA route is at its busiest during the morning period while the Orange Route is at its busiest during the midday and afternoon. The Night Cat does not begin service until 6:00 pm while other route services are ending for the night.



Downtown Loop

The Downtown Loop is a City of Tucson operated service that provides circulator service to downtown customers. The service operates weekdays from about 7:00 am until 5:00 pm. The Downtown Loop connects with Sun Tran, Sun Shuttle, and CAT Tran at the Downtown Ronstadt Center.

Service Span & Frequency

The Downtown Loop operates five days a week between 7:00 am and 5:00 pm, running every 30 minutes.

Service Investment & Passenger Boardings

The Downtown Loop provides 3,000 revenue hours and 23,000 revenue miles, carrying 52,000 passengers in Fiscal Year 2013.

Operating Speed

Improving operating speeds in the system can decrease travel times for customers. Shortening trip times can make service more attractive to current customers and potential customers. Decreasing running times may lead to a reduction in vehicles required to provide service, thereby increasing route efficiency. Several factors influencing operating speed include stop spacing, dwell time and traffic conditions in downtown Tucson. In fiscal year 2013, the Downtown Loop's average operating speed was 8.18 mph.

Because the Downtown Loop is situated within the planned streetcar service alignment area, further review is being conducted in the Bus/Rail Interface Report, which is a separate document.

Service Assessment Sun Shuttle

Sun Shuttle provides a network of fixed-route and flex-route transit services throughout Pima County, the Tohono O'odham Nation, and San Xavier Reservation.
This report reviews the Sun Shuttle fixed route services in detail, offering key service performance findings in the following areas:

- Service Ridership- where and how many customers use Sun Shuttle at the network and route level.
- Service Quality- vehicle passenger loads and operating speed
- Service Performance- service effectiveness (productivity) and financial effectiveness (cost efficiency/subsidies).

These service performance findings will serve as the base for the development of a new service plan. The findings in this report will highlight high performing Sun Shuttle routes, identify opportunities to improve those routes, and apply appropriate strategies to improve lower performing routes

Service Evaluation Goals

- Understand the system
  - Where are people riding?
  - Where does service quality need improvement?
  - Where service is under or over utilized?
  - Where is service financially effective?
- Use the findings to update and refine the service development framework
- Identify service successes and challenges for consideration in the Preferred Service Plan

Ultimately, the goal of this section of the COA is to find out which routes are attracting the most customers and to understand what is working and what is not.

Methodology

Unlike Sun Tran, Sun Shuttle does not have Automated Passenger Counters (APCs) onboard buses. In order to obtain passenger data at the stop level, Sun Shuttle operators manually collected passenger counts on all routes during spring 2013. All trips on the route were checked weekdays and Saturday. Sun Shuttle does not operate on Sunday.

Network Overview

Sun Shuttle is a neighborhood connector that provides service to the lower density areas of the Tucson metropolitan region where Sun Tran service is not financially feasible. Sun Shuttle vehicles are cutaways, much smaller than Sun Tran's 40' vehicles. Sun Shuttle's network primarily serves communities outside of the city of Tucson, although all three Sun Tran transit centers are served. Route 412 provides service to the Tohono Transit Center and Route 421 provides service to the downtown Ronstadt Transit Center and as well as the Roy Laos Transit Center.

Service Frequencies

Sun Shuttle does not operate on a base frequency. Sun Shuttle services operate with one vehicle per route (with the exception of Routes 401 and 421) and the trip departure times are based on the round trip time of the route. Some routes have short turn trips (trips that do not operate the full length of the

route) to provide the operator a break. This type of schedule leads to varying service levels because there is only one vehicle on each route with the exceptions of Routes 401 and 421.

Route	Peak Period	Base	Saturday
401- Oro Valley/ Catalina	60	60	60
410- Marana	120	120	120
411- Marana	30-60	30-60	45
412- Marana	80	80	80
413- Marana	30-90	30-90	30-90
421- Green Valley/ Sahuarita	36-120	185	36-120
430- Tucson Estates	90	90	90
440- San Xavier	70	70	60
450- Rita Ranch	95	95	Does Not Operate
486- Ajo-Tucson	1 Round Trip	Does Not Operate	Does Not Operate
486- Ajo- Why Shuttle	2 Round Trips	1 Round Trip	Does Not Operate

Service Investment

In fiscal year 2013, Sun Shuttle ran just under 62,000 service hours and just under 1,200,000 miles. The Ajo, Oro Valley and Green Valley/ Sahuarita Dial-a-Rides require the largest investment in service hours to meet customer demands, sine the service serves fewer customers and often for longer trip distances.

Peak Fleet

To meet customer demand and provide service on the street, Sun Shuttle must deploy 12 vehicles to meet the service requirement.

Route	Peak Period	Base	Saturday
401- Oro Valley/ Catalina	2	2	2
410- Marana	1	1	1
411- Marana	1	1	1
412- Marana	1	1	1
413- Marana	1	1	1
421- Green Valley/ Sahuarita	2	1	2
430- Tucson Estates	1	1	1
440- San Xavier	1	1	1
450- Rita Ranch	1	1	Does Not Operate
486- Ajo-Tucson	1	Does Not Operate	Does Not Operate
486- Ajo- Why Shuttle	1	1	Does Not Operate
Green Valley Dial-a-Ride	1	1	1
Oro Valley Dial A Ride	1	1	ADA Operation Only

Service Ridership

As a neighborhood connector, Sun Shuttle has far less demand than its more urban counterpart Sun Tran. Sun Shuttle service is designed as a lifeline service for residents that connects area residents to neighborhood medical, shopping centers, and to the larger transit system. Sun Shuttle operates every 30 minutes to two hours, which makes it difficult to attract additional choice riders.

Geographic Distribution

System ridership is dispersed throughout the region. The network contains five (5) fixed routes and one (1) dial-a-ride north and northwest of Tucson, one (1) fixed route in the southeast, three (3) fixed routes and one (1) Dial-a-Ride south and southwest of Tucson, and one (1) fixed route and one (1) Dial-a-Ride service in Ajo. The table below shows the breakdown of boardings and service investment by region.

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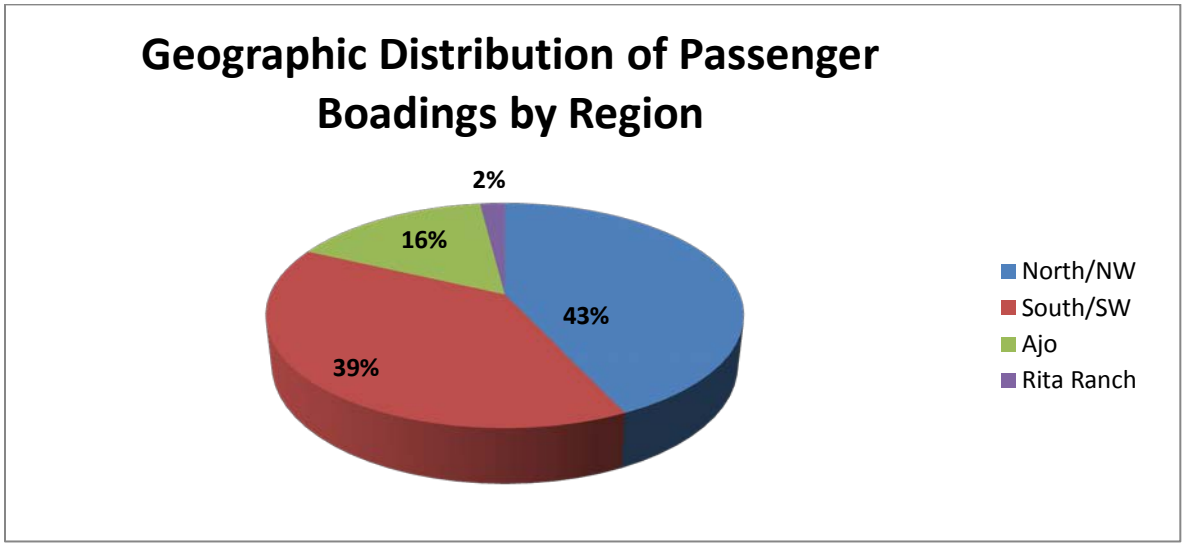
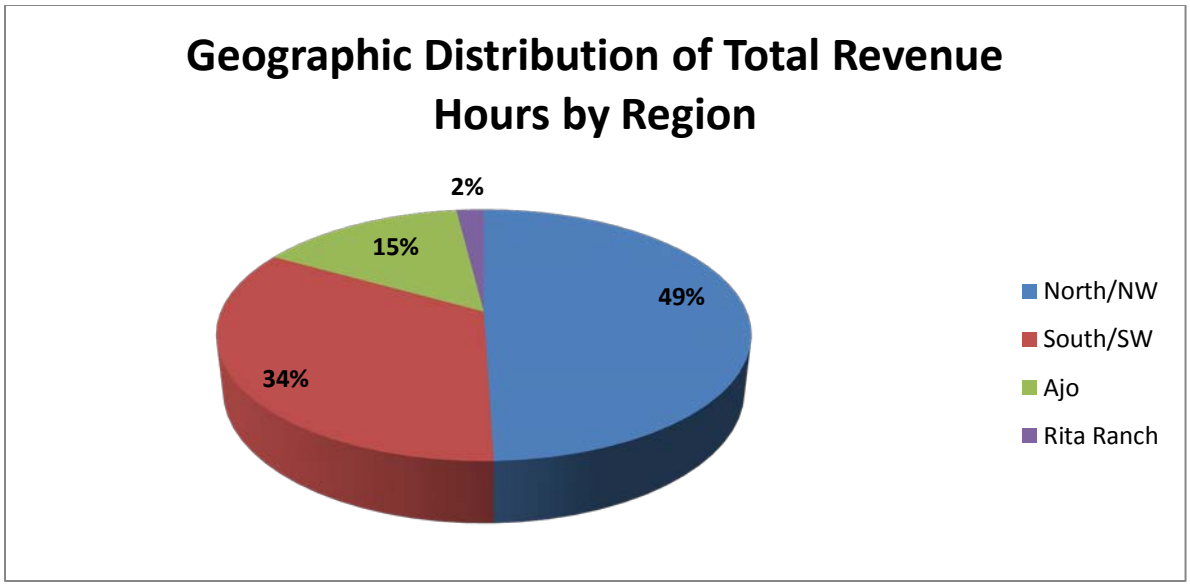
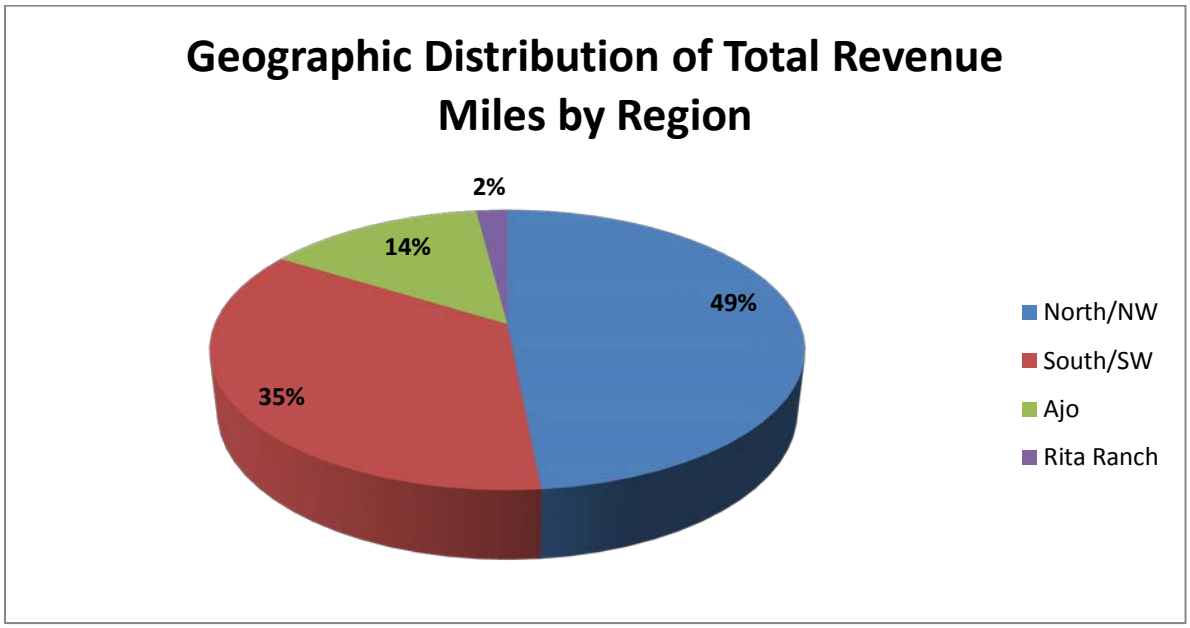
Region	Route (s)
North/ Northwest	401, 410, 411, 412, 413, Oro Valley Dial-a-Ride
South/ Southwest	421, 430, 440, Green Valley Dial-a-Ride
Ajo	486 (Ajo-Tucson), Ajo-Why Dial-a-Ride
Southeast - Rita Ranch	450

Region	Total Passenger Boardings	Total Revenue Hours	Total Revenue Miles	Passenger Boardings per Revenue Hour	Passenger Boardings per Revenue Mile
North/Northwest	43%	50%	48%	3.68	0.20
South/Southwest	39%	34%	35%	4.90	0.25
Ajo	16%	15%	14%	4.73	0.25
Southeast - Rita Ranch	2%	2%	2%	3.20	0.17

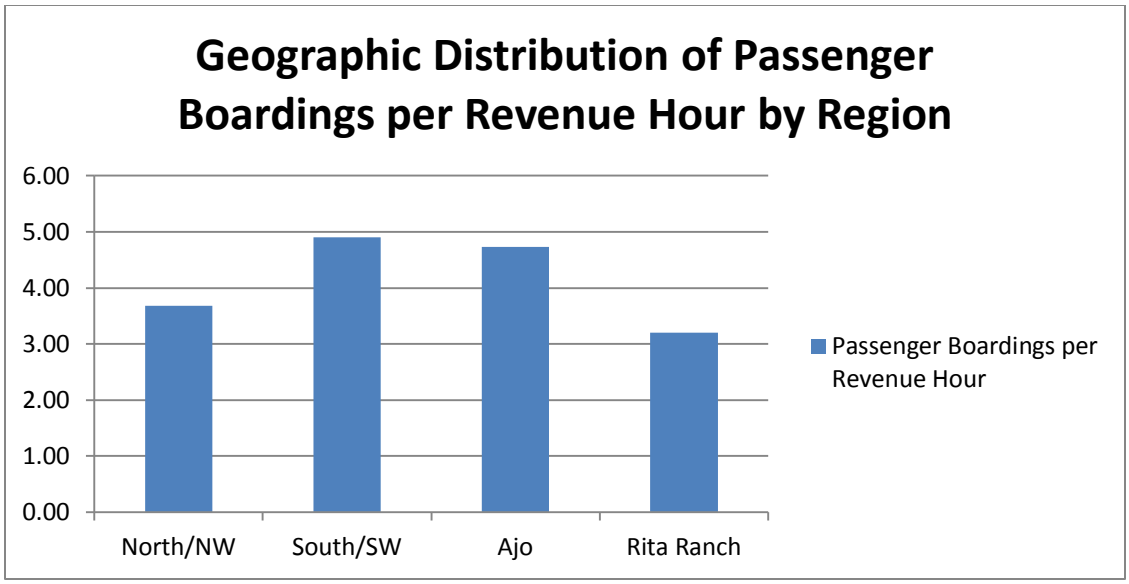
The pie charts below detail each region's share of total service investment. The North/ Northwest has largest the share of passenger boardings. However, it requires more resources and investment to operate, due to the Oro Valley Dial-a-Ride service and number of fixed routes available.



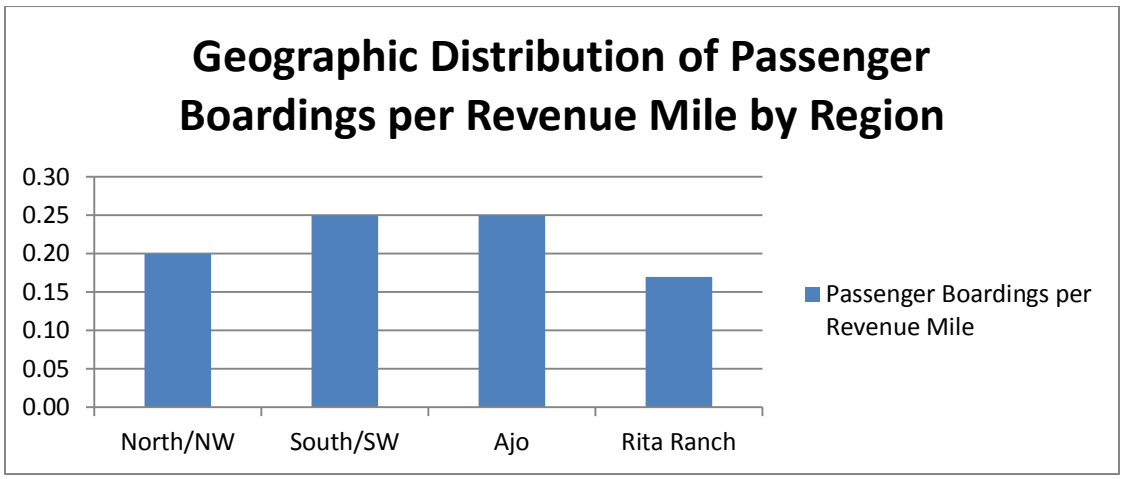




The graph below illustrates that the South/Southwest region averages the most passenger boardings per revenue hour with nearly five (5) passenger boardings per revenue hour, closely followed by the Ajo region. The North/ Northwest region averages just under four (4) passenger boardings per revenue hour while Route 450 in the Southeast - Rita Ranch area averages just over three (3) passenger boardings per revenue hour.



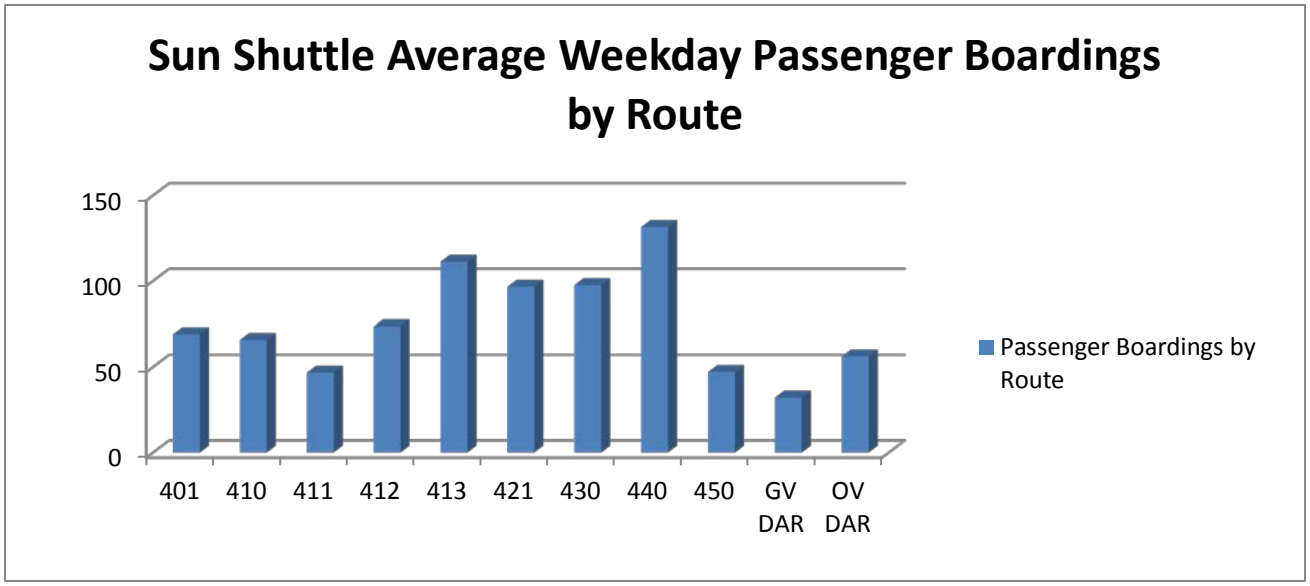
The graph below shows the South/Southwest and Ajo regions are the most productive with .25 passenger boardings per revenue mile. The North/ NW region averages .2 passenger boardings per revenue mile while Route 450 in Rita Ranch averages .15 passenger boardings per revenue mile.



Route Level Ridership

Routes 413, 421, 430 and 440 have the largest amount of daily boardings on weekdays. Routes 401, 410, 411, 412, 450 have the fewest daily boardings on weekdays. The Oro Valley Dial-a-Ride has the most daily boardings on weekdays for this service.

Route	Passenger Boardings by Route
401	69
410	66
411	47
412	74
413	111
421	97
430	98
440	132
450	47
GV DAR	32
OV DAR	56



Service Access

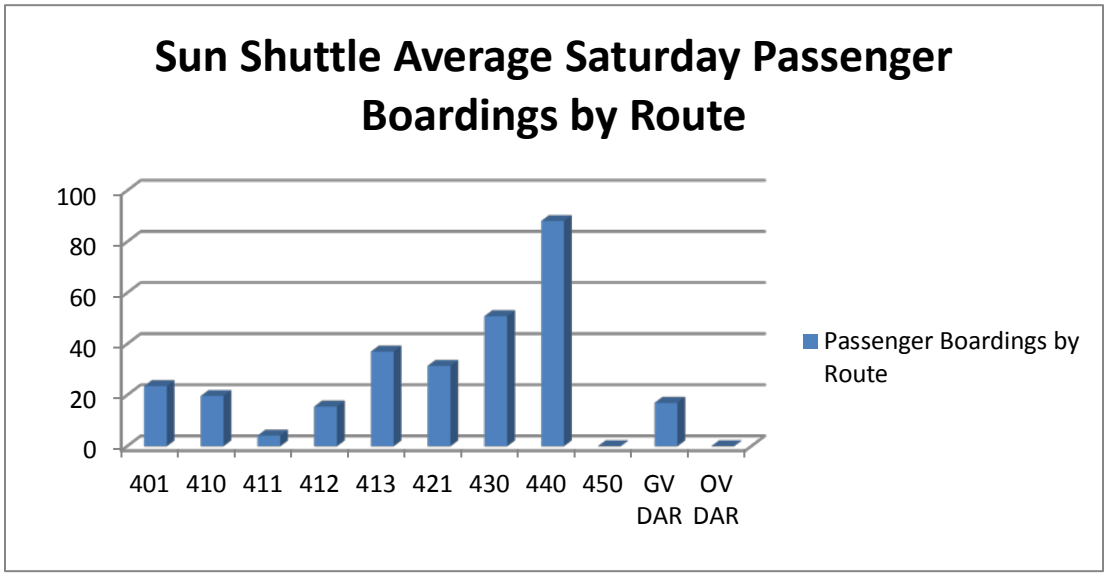
Customers access the service by walking or connecting from another bus. Nearly half of all riders indicate that their trip involves a connection to Sun Tran.

Saturday Ridership

Sun Shuttle on Saturday averages 287 boardings. It is 34% of total weekday boardings. Route 440 has the largest number of boardings on Saturday, nearly one-third of the total Saturday boardings for the Sun Shuttle System. Routes 401, 410, 411, 412 have the smallest amount of customers on Saturday,

totaling less than Route 440 when combined. Routes 450, 486 and the Oro Valley Dial-A-Ride do not operate on Saturday for the general public. Oro Valley Dial-a-Ride provides service on Saturdays for ADA eligible customers.

Route	Passenger Boardings by Route
401	24
410	20
411	4
412	16
413	37
421	31
430	51
440	88
450	Does Not Operate
GV DAR	17
OV DAR	Does Not Operate



Farebox Recovery Ratio

Farebox Recovery Ratio measures the financial effectiveness of Sun Shuttle's various route services. Farebox recovery accounts for total costs of operating the route and revenue generated by paid boardings. Sun Shuttle's average farebox recovery ratio for fixed route shuttle service is 9.9%. Dial-a-Ride route services have a slightly lower ratio at 6%. Route 486 has the highest at 24.7%. Route 411 has the lowest average farebox recovery ratio at 3.5%. Routes with high passenger boardings per revenue hour also have high farebox recovery ratios.

Route	Farebox Recovery Ratio
Rte. 401	5.8%
Rte. 410	6.1%
Rte. 411	3.5%
Rte. 412	7.8%
Rte. 413	6.6%
Rte. 421	4.6%
Rte. 430	8.4%
Rte. 440	11.3%
Rte. 450	4.2%
Rte. 486	24.7%
GV DAR	4.2%
OV DAR	5.4%
Ajo DAR	9.1%

Subsidy per Passenger Boarding

Subsidy per passenger boarding is the cost to Sun Shuttle for each boarding minus the collected fare revenue. Sun Shuttle's average subsidy per passenger boarding is $6.66 for fixed route shuttle services while the average subsidy per passenger boarding for the Dial-a-Ride services is $19.47. For fixed route shuttle services, Route 440 has the lowest average subsidy per passenger boarding at $2.68. For Dial-a-Ride services, the Ajo-Why Dial-a-Ride has the lowest average subsidy per passenger boarding at $9.28. The Oro Valley Dial-a-Ride has the highest average subsidy per passenger boarding at $31.83.

Route	Subsidy per Passenger Boardings
Rte. 401	$9.89
Rte. 410	$7.56
Rte. 411	$10.90
Rte. 412	$5.74
Rte. 413	$3.70
Rte. 421	$10.26
Rte. 430	$4.49
Rte. 440	$2.68
Rte. 450	$9.48
Rte. 486	$11.99
GV DAR	$27.88
OV DAR	$31.83
Ajo DAR	$9.28

Service Assessment Findings

Sun Shuttle should not be compared to the more urban Sun Tran, since the two systems serve different markets with very different customer needs. However, within the Sun Shuttle network, the passenger boarding statistics highlight the more successful routes. Five (5) of the Sun Shuttle routes with the highest farebox recovery ratios all travel to a Sun Tran Transit Center. Limited transfer opportunities exist for the northern routes, which impacts the potential for growth.

Sun Shuttle fixed route service productivity appears to be relatively low on newer routes such as 450. Additionally, Sun Shuttle Dial-a-Ride service costs continue to grow as ridership increases. The challenge continues to be attracting enough customers on a few of the routes in the North/ Northwest region. Strategies to attract customers include improving connections with Sun Tran and offering service that is more frequent where possible.

The Sun Shuttle subsidy per passenger boarding is high, which is typical of neighborhood circulator services when compared to larger fixed route systems such as Sun Tran. Increasing ridership on fixed route service will improve the effectiveness of the services.

Service Standards

Service standards are an effective tool in determining the value of a route. Service standards are system-wide policy objectives for bus service that govern minimum service levels, hours of operation, and other goals. These objectives exist to ensure that the agency can provide widespread access to buses while maintaining a cost-effective service. Routes should be measured regularly to guarantee acceptable performance. Should a route's performance change significantly, the agency should consider adjusting service. Service standards are designed to help agencies design effective routes that are both attractive to customers and cost-effective.

Monitoring System

- Passenger Boardings per Revenue Hour- This measures the number of passenger boardings per every hour of service on the street for fixed- route local services.
- Passenger Boardings per Trip- This measures the number of passenger boardings for every trip for fixed- route express services.
- Passenger Boardings per Revenue Mile- This measures the number of passenger boardings per every mile of service on the street.
- Subsidy per Passenger Boarding- This measures the difference between fare revenue collected and the cost of providing the service.

Monitoring the system involves:

- Identifying the average of each metric for each service type (radial, non-radial, express)
- Determining how far each route falls from the system average in terms of standard deviation
- Combining the results from the three metrics into a single score. The scores are given equal weight and are shown in tables.

Service performance should be monitored and reviewed regularly. Sun Tran and Sun Shuttle publish new schedules in its Ride Guide twice a year, and any service changes should be timed accordingly. Actively monitoring performance allows agencies to assess how new or modified routes are performing, and plan for future changes.

Performance Standards

Each route is ranked based on its adjusted combined score and compared to the score average. The routes are then assigned to one of five categories, as shown in the tables below.

Sun Tran's network is currently divided into three categories: radial, non-radial and express. This analysis would redistribute Sun Tran routes into the following categories: Trunk, Crosstown, Neighborhood, Arterial Express, and Highway Express. Scoring is based on the averages within each category as the routes in each category serve specific purposes, which are explained below.

- Trunk Routes operates 20 minutes or better between 6:00am and 6:00pm weekdays. Trunk routes operate on major arterial roads. Trunk routes serve to move people on major transit corridors quickly and efficiently providing single seat service or most convenient transfer points.

- Crosstown routes operate less frequently than trunk routes. These routes generally operate every 30 minutes between 6:00am and 6:00pm weekdays. Some routes may operate more frequently at certain times to meet a specific demand. Crosstown routes operate on major and minor arterial roads and connect different parts of the city. These routes tend to have greater travel distances.
- Neighborhood Routes operate similarly to trunk routes. These routes generally operate every 30 minutes between 6:00am and 6:00pm weekdays. Some routes may occasionally operate more frequently during peak periods and less frequently between the peak periods to meet demand.
- Arterial Express Routes operate during peak periods (5:30am-8:30am & 3:30pm-6:00pm). These routes make limited stops on major arterial roads, at major destinations and transfer points.
- Highway Express Routes operate during peak periods (5:30am-8:30am & 3:30pm-6:00pm). These routes stop along local streets then operate nonstop via an area freeway.

It should be noted that the tables are fluid and route performance standards or route category levels may change based on monitoring adjustments made in service frequency, span, and ridership. For example, if several low-performing routes were discontinued, the average within that category would improve, pushing average routes into the low-performing route category. As a result, it is recommended that the tables below form only a part of a more thorough analysis. Recommended service changes from this COA will be discussed in the Preferred Service Plan.

Trunk Routes	Values			Distance From Mean				
	Pass. Per Revenue Hour	Pass. Per Revenue Mile	Subsidy per Passenger	Pass. per Revenue Hour	Pass. per Revenue Mile	Subsidy per Passenger	Combined Score	Adjusted Combined Score
4	37.10	3.07	$1.78	(1.76)	0.21	(0.25)	(1.80)	9.37
6	37.18	2.95	$1.69	(1.68)	0.09	(0.16)	(1.75)	9.42
8	45.08	3.67	$1.31	6.22	0.81	0.21	7.24	18.41
11	43.00	3.26	$1.45	4.14	0.40	0.08	4.62	15.79
16	31.94	2.65	$1.61	(6.92)	(0.21)	(0.08)	(7.21)	3.96

Crosstown Routes	Values			Distance From Mean				
	Pass. per Revenue Hour	Pass. per Revenue Mile	Subsidy per Passenger	Pass. per Revenue Hour	Pass. Per Revenue Mile	Subsidy per Passenger	Combined Score	Adjusted Combined Score
1	30.33	2.37	$2.10	(1.00)	0.21	0.05	(0.74)	13.53
3	27.42	2.11	$2.93	(3.91)	(0.05)	(0.77)	(4.73)	9.54
5	25.45	1.85	$3.32	(5.88)	(0.31)	(1.16)	(7.35)	6.92
7	27.01	2.06	$2.11	(4.32)	(0.10)	0.05	(4.37)	9.90
9	37.94	3.33	$1.58	6.61	1.17	0.57	8.35	22.62
10	35.00	2.73	$1.69	3.67	0.57	0.46	4.70	18.97
15	28.84	2.32	$2.24	(2.49)	0.16	(0.08)	(2.41)	11.86
17	33.94	2.34	$2.13	2.61	0.18	0.02	2.82	17.09
19	50.93	4.85	$0.74	19.61	2.69	1.41	23.70	37.97
34	35.73	2.89	$1.69	4.40	0.73	0.47	5.59	19.86
37	20.37	1.31	$4.62	(10.95)	(0.85)	(2.47)	(14.27)	(0.00)

Neighborhood Routes	Values			Distance From Mean				
	Pass. per Revenue Hour	Pass. per Revenue Mile	Subsidy per Passenger	Pass. per Revenue Hour	Pass. per Revenue Mile	Subsidy per Passenger	Combined Score	Adjusted Combined Score
2	24.34	1.69	$3.10	(2.42)	(0.17)	(0.28)	(2.87)	6.49
20	19.15	1.37	$4.08	(7.61)	(0.49)	(1.26)	(9.36)	0.00
21	25.17	2.03	$2.66	(1.59)	0.17	0.17	(1.25)	8.11
22	25.59	2.40	$2.11	(1.17)	0.55	0.71	0.08	9.44
23	28.93	2.31	$2.14	2.18	0.46	0.69	3.32	12.68
24	40.19	2.95	$1.81	13.43	1.10	1.01	15.54	24.90
26	32.67	1.76	$2.69	5.91	(0.09)	0.13	5.95	15.31
27	20.60	1.24	$4.60	(6.16)	(0.62)	(1.78)	(8.56)	0.80
29	36.32	2.44	$2.05	9.57	0.58	0.77	10.92	20.28
50	23.52	2.14	$2.43	(3.24)	0.28	0.39	(2.56)	6.80
61	21.78	1.39	$3.82	(4.98)	(0.47)	(1.00)	(6.45)	2.91

Minimum Threshold

Sun Tran and the other service providers within the region have an obligation to operate an efficient, cost-effective, and attractive system to the customers and the residents of Pima County. Accordingly, the transit agencies should implement a minimum threshold to support operating service on a route. Establishing minimum thresholds creates a baseline for all transit routes, preventing unproductive

services from consuming limited resources that could be better used elsewhere. Below are the recommended minimum thresholds for Sun Tran and Sun Shuttle

Measure	Sun Tran		Sun Shuttle	
	Local	Express	Fixed	Dial a Ride
Passenger Boardings per Hour	25	N/A	2	1
Passengers Per Trip	N/A	15	N/A	N/A
Subsidy per Passenger Boarding	$3.00	$15.00	$7.00	$25.00

Action Plan

Action should be taken for any route that does not adhere to the established threshold for its category. Routes that score significantly above or below the standard require the most attention from the transit agency. Routes that score well below the standard should receive immediate attention and corrective action. Routes that score well above the standard also require immediate attention because they may require additional resources. Routes within the standard should be monitored for minor tweaks to improve productivity. The section below details the transit provider action recommended to individual route performance.

Segment Analysis

A segment analysis evaluates a route on the segment level:

- Low Performing Routes
  Individual segments of routes in this category may need to be reviewed. The review may highlight segments that are very unproductive, which reduce the entire route's productivity. Identifying these unproductive segments may identify ways to improve overall route performance. If no one segment is identified, structural changes may be required for the entire length of the route.
- Below Average Performing Routes
  Routes in this category may require a similar review to the lowest performing routes, although the need is less urgent.
- Average Performing Routes
  Routes in this category are performing adequately and do not need to be actively monitored.
- Above Average Performing Routes
  Routes in this category may need to be reviewed, particularly routes on the higher end. The review may highlight segments along the route that are very productive, and may have overcrowding issues.
- High Performing Routes
  Like with the above average performing routes, a review may be necessary to identify additional investment needs. These routes may have overcrowding issues due to

customer demand. A segment analysis may identify portions of the route that may need additional resources.

Marketing

- Low Performing Routes
  Routes in this category might benefit from targeted marketing that entices existing and potential customers to use the service. Lack of knowledge of service hours, destinations, and connections may contribute to a route's poor performance. Rider awareness may lead to an improvement.
- Below Average Performing Routes
  Like the low performing routes, routes in this category may require additional marketing.
- Average Performing Routes
  No action is required for routes in this category.
- Above Average Performing Routes
  No action is required for routes in this category.
- High Performing Routes
  No action is required for routes in this category.

Rider outreach

Surveys and customer interviews are a useful tool for service planning. These surveys will identify popular destinations and trip patterns that attract customers. The surveys and interviews may also identify underserved areas or route design issues, such as frequency and span, which limit a route's potential.

Service Levels

Customer demand determines a route's frequency and span. Routes with higher frequencies and longer service spans tend to be the busiest routes, while routes with low frequency and shorter service spans are often the least busy. Adjusting service levels to match customer demand will satisfy customer needs and maximize an agency's limited resources.

- Low Performing Routes
  Routes in this category may need an adjustment in service levels to meet existing demand. This may mean less frequent service or a reduction in service span.

- Below Average Performing Routes
  Routes in this category may require adjustments in service levels, particularly routes on the lower end in a similar fashion to low performing routes.

- Average Performing Routes
  No action is required for routes in this category, although minor adjustments may improve productivity, decrease the subsidy per passenger boarding, and increase on time performance.

- Above Average Performing Routes

  Routes in this category may require adjustments in service levels to meet existing demand. Certain trips or segments may experience overcrowding that additional investment could reduce, positioning the route for future growth.
- High Performing Routes

  Routes in this category may require adjustments in service levels to meet existing demand. Like the previous category, these routes might experience overcrowding that additional investment could reduce.

  For certain high performing routes, additional service types may be appropriate to reduce travel time and increase ridership; the arterial express services (108X and 109X) are a good example. These routes would supplement existing local services. With significant ridership growth and adequate capital resources, bus rapid transit could be considered.

Discontinuation

In certain circumstances, transit providers should consider eliminating routes. Discontinuing a route or segment implies that all other options have been exhausted and the route or segment was unable to raise productivity to an acceptable level. If possible, discontinuing unproductive segments is preferred to discontinuing an entire route, particularly if no other alternative is available for impacted customers. When considering segment or route discontinuation, attention should include the determination of "lifeline" or core service levels. "Lifeline" service level describes the minimum service level found acceptable by the community to provide access to a specific area or during specific hours.

Service Framework

Growing traffic congestion and costs along with increasing awareness in environmental concerns result in employers and residents considering alternatives to operating a private automobile. While Sun Tran's system adequately meets current needs, it will be challenged to attract new customers and provide a sustainable mobility option to the Tucson metropolitan area. The system must consider how to best evolve to build on its success.

Service Framework Goals

- Develop a customer focused system that satisfies the needs of current customers and attracts new customers to the network.
- Develop a sustainable system that best serves the network based on current demands and positions the network for growth under current financial conditions.
- Reduce travel time where possible to increase the attractiveness of the system to existing and potential customers.

To achieve the service framework goals, Sun Tran must direct resources to the proper services that will attract customers and foster growth. The current classification of routes generally assigns a route to a type based on a terminal or stop frequency rather than the characteristics of the route. The current classifications distort some routes relative performance compared to other routes within the category. The larger routes over-perform while the smaller ones underperform because they are being compared to a higher class of routes. The COA has identified the new classifications based on frequency and operating environment. The realignment of classifications will lead to better comparisons and evaluations.

Current Service Classification

Radial Route	Local service that serves the downtown Ronstadt Transit Center
Non-Radial Route	Local service that does not serve the Downtown Ronstadt Transit Center
Express Route	High speed service for peak period commuters; operates via area highways and makes limited stops.

Proposed Service Classification

Trunk Service	Frequent local service across the service area along arterial roads
Crosstown Service	Local service along major and secondary arterials
Neighborhood Service	Local service connecting neighborhoods to a Transit Center
Arterial Express Service	Higher speed, high performance service for peak period commuters; operates via arterial roads and makes limited stops.
Highway Express Service	High speed, high performance service for peak period commuters; operates via area highways and makes limited stops.

Service Tier Criteria	Corridor Type	Passenger Volume	Role
Trunk Service	Major arterials	High Ridership per revenue mile	Core of the network
Crosstown Service	Major and secondary arterials	Medium to high ridership per revenue mile	Core of the network
Neighborhood Service	Local and neighborhood streets	Medium to low ridership per route mile	Neighborhood connector
Arterial Express Service	Major arterials	Medium ridership per revenue mile	Fast, efficient peak-hour service
Highway Express Service	Freeways	High point to point demand	Fast, efficient peak-hour service

Trunk Service

Routes that are classified as "Trunk" make up the spine of the network that operates on major arterial roads. These routes attract the most customers, have the highest levels of service, and receive a substantial investment from Sun Tran. These routes connect customers with major destinations throughout the city, which explains their success. Trunk routes generally operate every 20 minutes or better between 6:00am and 6:00pm weekdays and every 20 to 60 minutes nights and weekends. Maintaining this success will require investing additional resources to improve the travel experience; these improvements could include reduced wait time and travel time, and increased reliability.

Crosstown Service

Routes that are classified as "Crosstown" serve an important role of linking areas of Tucson via a one-seat ride. Many of these routes traverse the city from one side to the other connecting with other route services along the way. Busier crosstown routes have frequent service to address the demand of customers but generally operate every 30 minutes between 6:00am and 6:00pm weekdays and every 30 to 60 minutes nights and weekends.

Neighborhood Service

Routes that are classified as "Neighborhood" serves as important connectors linking neighborhoods to the arterial roads where the crosstown and trunk services operate. These routes generally operate every 30 minutes between 6:00am and 6:00pm weekdays and every 30 to 60 minutes nights and weekends. Busier neighborhood routes may have frequent peak service to address the demand of customers.

Arterial Express Service

Routes that are classified as "Arterial Express" serves as peak commuter expresses. These operate during peak periods (5:30am-8:30am & 3:30pm-6:00pm) via arterial roads in Tucson and Oro Valley making limited stops, reducing travel time for customers. In the future network, these routes will make stops at intersections with other routes.

Highway Express Service

Routes that are classified as "Highway Express" serves as peak commuter expresses. These operate during peak periods (5:30am-8:30am & 3:30pm-6:00pm) via I-10, I-19, or Aviation Highway making limited stops along local roads but non-stop via the highway. 100-series routes will continue to serve the central business district or the University of Arizona while the 200-series routes will continue to serve the AeroPark, a subset of Highway Expresses.

The table below shows the current and proposed reclassification of radial and non-radial routes.

Route	Current Classification	Proposed Classification	Route	Current Classification	Proposed Classification
Route 1	Radial	Crosstown	Route 19	Radial	Crosstown
Route 2	Radial	Neighborhood	Route 20	Non- Radial	Neighborhood
Route 3	Radial	Crosstown	Route 21	Radial	Neighborhood
Route 4	Radial	Trunk	Route 22	Radial	Neighborhood
Route 5	Non- Radial	Crosstown	Route 23	Radial	Neighborhood
Route 6	Radial	Trunk	Route 24	Non- Radial	Neighborhood
Route 7	Radial	Crosstown	Route 26	Non- Radial	Neighborhood
Route 8	Radial	Trunk	Route 27	Non- Radial	Neighborhood
Route 9	Radial	Crosstown	Route 29	Non- Radial	Neighborhood
Route 10	Radial	Crosstown	Route 34	Non- Radial	Crosstown
Route 11	Non- Radial	Trunk	Route 37	Non- Radial	Crosstown
Route 15	Non- Radial	Crosstown	Route 50	Non- Radial	Neighborhood
Route 16	Radial	Trunk	Route 61	Non- Radial	Neighborhood
Route 17	Non- Radial	Crosstown			

The table below shows the current and proposed reclassification of express routes.

Route	Current Classification	Proposed Classification
Route 101X	Express	Highway Express
Route 102X	Express	Highway Express
Route 103X	Express	Highway Express
Route 104X	Express	Highway Express
Route 105X	Express	Arterial Express
Route 107X	Express	Arterial Express
Route 108X	Express	Arterial Express
Route 109X	Express	Arterial Express
Route 110X	Express	Highway Express
Route 201X	Express	AeroPark Express
Route 202X	Express	AeroPark Express
Route 203X	Express	AeroPark Express
Route 312X	Express	Arterial Express

Recommendations

The Recommended Service Plan is a detailed list of recommendations for individual routes based on data collected and analyzed for the COA. The recommendations in this plan are for immediate (within the next year) action. Recommendations are market driven and do not address funding sources, or jurisdictional acceptance of existing productivity. There are no recommendations made to wholly eliminate any routes. However, recommendations include the discontinuance of route segments that either are duplicated by other routes or have low productivity and high subsidy per passenger boarding. The recommendations are made to improve the overall productivity of the regional network of transit services.

Recommended Service Plan - Sun Tran

Route 1 Glenn Street/ Swan Road

Route 1 operates north-south via Swan Road and east-west via Glenn Street between 22nd Street/Country Club Road and the downtown Ronstadt Transit Center.

Recommendation:

Based on Route 1's ridership numbers collected from the Automated Passenger Counters and data collectors and it's duplicative service with Route 17 along 29th Street, it is recommended that Route 1 is restructured to no longer operate between Country Club Road/ 22nd Street and 29th Street/Swan Road. All trips will operate between the downtown Ronstadt Transit Center and 29th Street/ Swan Road. This route segment elimination will result in financial savings. Current service along 29th St is duplicated by Rt. 17. Southbound buses will terminate at the U.S. Border Patrol entrance and utilize the designated U-turn at the Davis-Monthan Air Force Base, Swan Road Gate.

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	60	60	60
Proposed	30	30	30	60	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	61.10	28.22	24.52
Proposed	50.75	22.30	19.38

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	868.32	428.05	370.98
Proposed	724.05	353.45	306.32

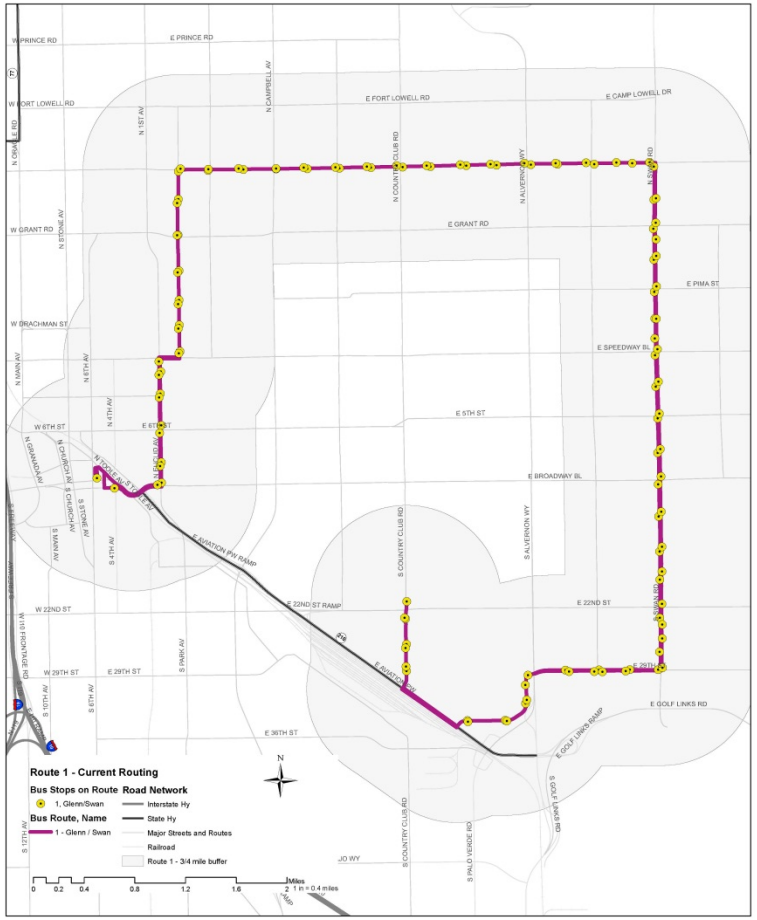
VEOLIA TRANSPORTATION

Route 1 - Glenn / Swan

Current and Proposed Changes

sun tran

Current Routing



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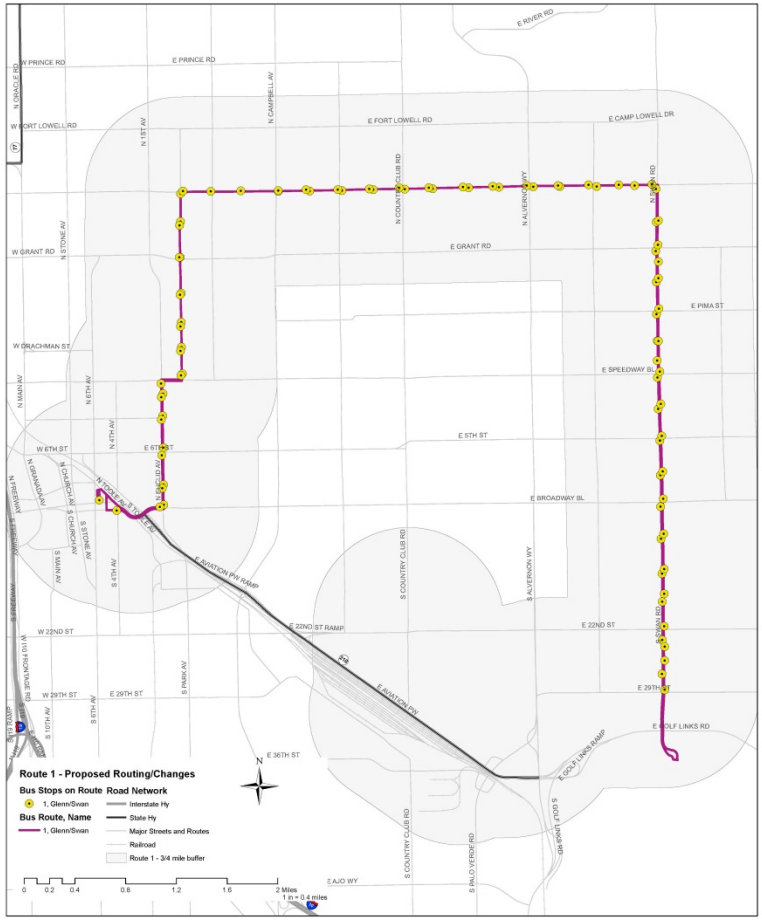


Date: 12/12/2013

Sources: City of Tucson GIS, Information Technology
Sun Tran Routes & Bus Stops, Scheduling & Service Development

Map is for illustrative purposes only

Folder & Name: \\ArcMap10_TitleVI\Route Maps\Route 1 Current vs Proposed - Bus Stop & Route

Route 2 Pueblo Gardens

Route 2 serves the Pueblo Gardens neighborhood. The route operates east-west via Irvington Road and north-south via Country Club Road before it enters the Pueblo Gardens neighborhood. Route 2 exits the neighborhood and operates east-west via Silverlake Road and north-south via Park Avenue to the Ronstadt Transit Center

Recommendation:

Based on Route 2's ridership numbers collected from the Automated Passenger Counters, data collector's passenger counts and running times, it is recommended that Route 2 be restructured through realignment, simplifying its routing through Pueblo Gardens. This re-alignment will decrease the travel time for customers riding through the neighborhood, increase the overall route productivity, and decrease its subsidy per passenger boardings. Another restructuring recommendation for Route 2 represents the new provision of service to a retail area, and future employment opportunities at the University of Arizona Biosciences Tech Park, currently unserved. This additional service is in response to previous customer requests for the service. The restructured addition is a realignment to include 36th Street from Kino Boulevard to S. 6th Avenue to Ronstadt Transit Center.

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	60	60	60
Proposed	30	30	30	60	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	50.72	21.47	16.00
Proposed	50.37	22.17	15.03

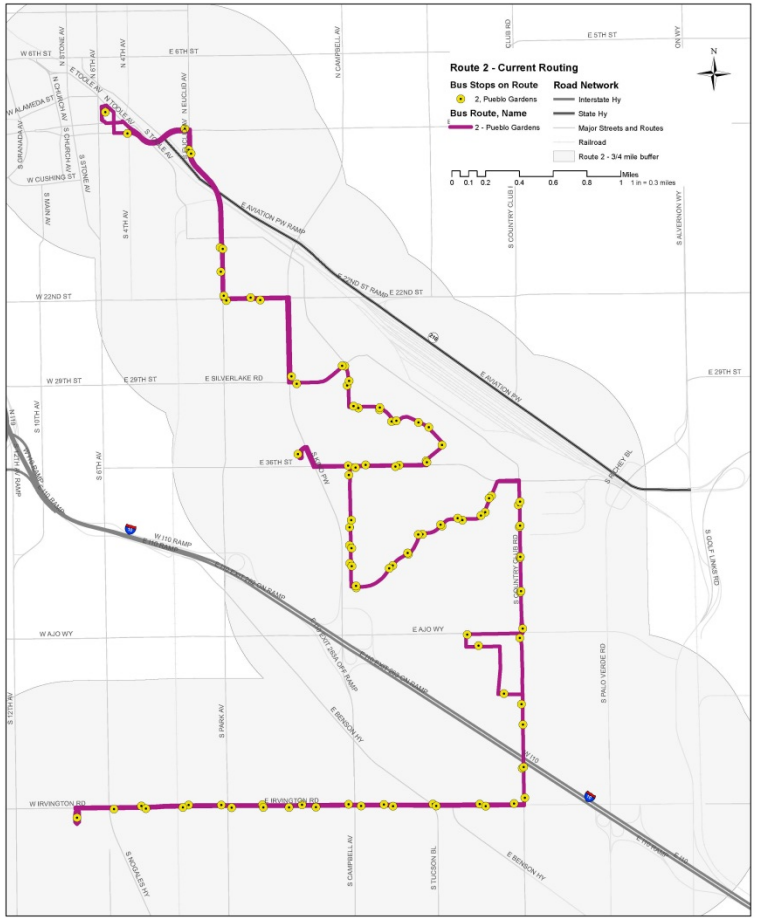
Revenue Miles	Weekdays	Saturdays	Sundays
Existing	812.88	343.39	257.10
Proposed	811.31	372.55	279.09

VEOLIA TRANSPORTATION

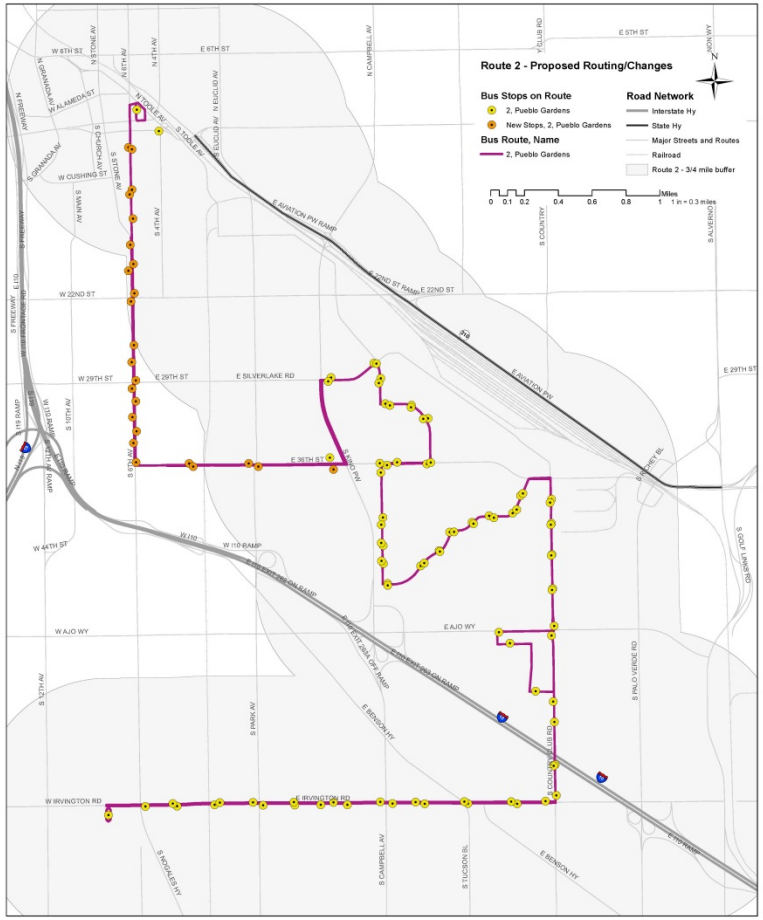
Route 2 - Pueblo Gardens
Current and Proposed Changes

sun tran

Current Routing



Proposed Changes



Date: 12/20/2013

Sources: City of Tucson GIS, Information Technology
Sun Tran Routes & Bus Stops, Scheduling & Service Development

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Map is for illustrative purposes only

Route 3 6th Street/ Wilmot Road (Existing)

Route 3 6th Street/ Wilmot Road (Proposed)

Route 28 Street Mary's Road (Proposed as New)

Route 3 operates from Pima Community College West Campus via Anklam Road through the downtown Ronstadt Transit Center and operates east-west via 6th and 5th Streets, north-south via Wilmot Road and east-west via Stella Road to Pima Community College East Campus. Some peak period trips only operate as far east as Wilmot Road/Broadway Boulevard.

Recommendation:

Restructure the Route 3 by splitting the existing Route 3 at the Downtown Ronstadt Transit Center:

- Route 3 (NEW) will operate between the downtown Ronstadt Transit Center and Pima Community College East Campus.
    - All trips operate through to Pima Community College East Campus instead of trips alternating between Wilmot Road/ Broadway and Pima Community College East Campus during peak periods.
    - Restructure service level to reflect market demand by changing the Peak period service to operate every 20 minutes instead of every 15 minutes.
- Route 28 (NEW) will operate between the downtown Ronstadt Transit Center and Pima Community College West Campus.
    - Restructure service level to reflect market demand by changing the Peak period frequency to operate every 30 minutes instead of every 15 minutes.

The recommendations are based upon market demand. The existing route has differing productivity levels along its segments. Separating this route enables different service levels along each segment, meeting the service needs in a more productive manner.

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	15	30	15	60	60	60
Proposed	20	30	20	60	60	60

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	15	30	15	60	60	60
Proposed	30	30	30	60	60	60

Route 3

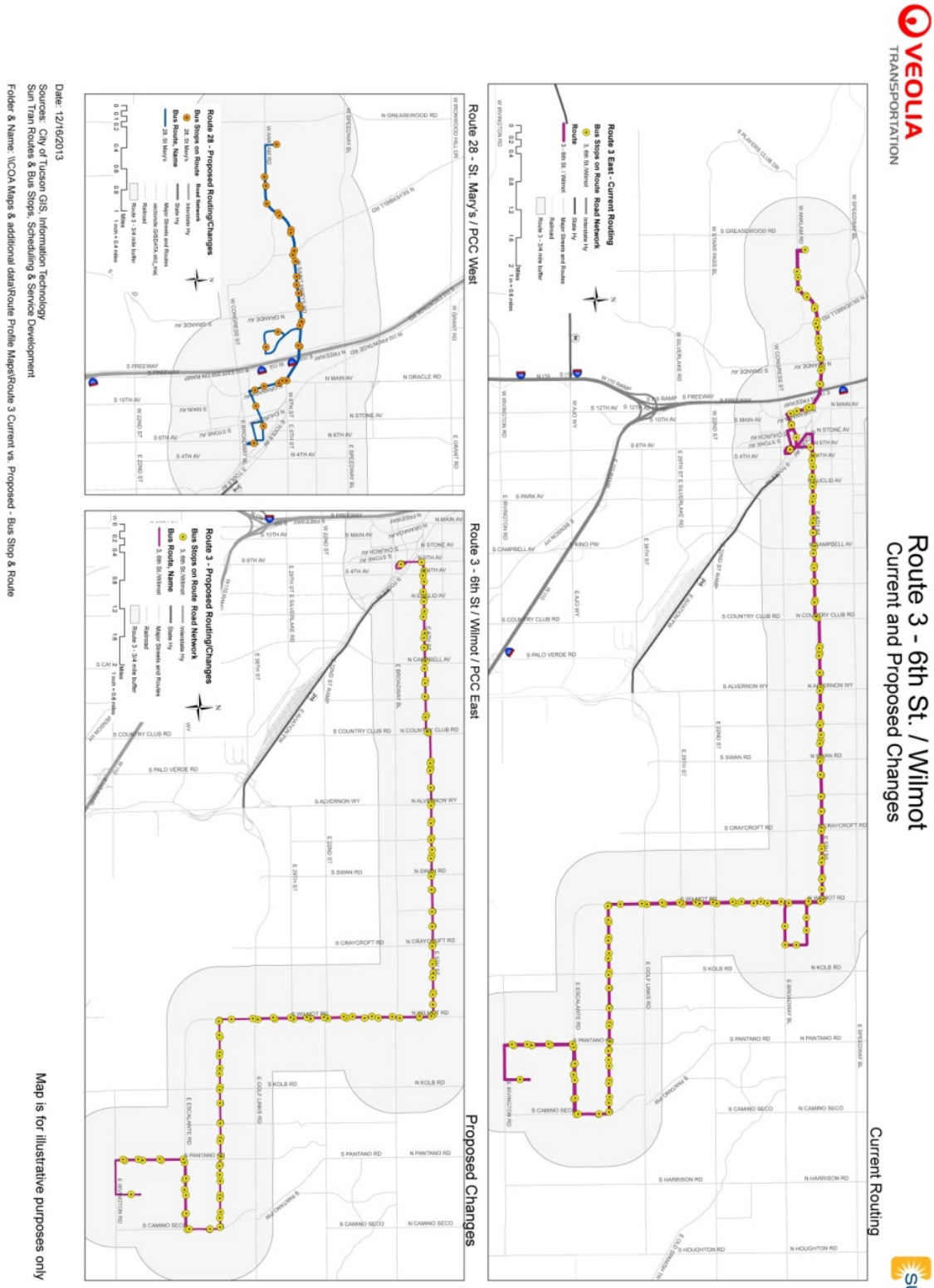
Revenue Hours	Weekdays	Saturdays	Sundays
Existing	108.22	46.78	38.07
Proposed	82.60	32.73	26.65

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	1,554.56	634.43	515.47
Proposed	1,273.91	522.63	424.64

Route 28

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	See Route 3	See Route 3	See Route 3
Proposed	19.83	8.53	7.47

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	See Route 3	See Route 3	See Route 3
Proposed	227.90	113.95	99.71


VEOLIA TRANSPORTATION
Route 3 - 6th St. / Wilmot
Current and Proposed Changes
sun tran
Current Routing
Route 3 East - Current Routing
Bus Stops on Route
Road Network
Route
Route 28 - St. Mary's / PCC West
Route 28 - Proposed Routing/Changes
Bus Stops on Route
Bus Route, Name
Route 3 - 6th St / Wilmot / PCC East
Route 3 - Proposed Routing/Changes
Proposed Changes
Date: 12/16/2013
Sources: City of Tucson GIS, Information Technology
Sun Tran Routes & Bus Stops, Scheduling & Service Development
Folder & Name: \\COA Maps & additional data\Route Profile Maps\Route 3 Current vs. Proposed - Bus Stop & Route
Map is for illustrative purposes only

Route 4 Speedway Boulevard

Route 4 operates from the downtown Ronstadt Transit Center and operates east-west via Speedway Boulevard to Kolb Road where the route branches. One branch continues to operate east-west via Speedway Boulevard to Harrison Road. The other branch operates north-south via Kolb Road to Golf Links Road.

Recommendations:

Adjust service levels to reflect market demand. This will result in increasing productivity and decreasing the subsidy per passenger.

Weekdays:

- Operate trunk service every 15 minutes during peak periods instead of every 10 minutes.
    - Operate service on the branches every 30 minutes during peak periods instead of every 20 minutes.
- Operate trunk service every 10 minutes during the midday instead of every 15 minutes.
    - Operate service on the branches every 20 minutes during the midday instead of every 30 minutes.

Saturdays:

- No recommended changes

Sundays:

- No recommended changes

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	10	15	10	30	60	60
Proposed	15	10-15	15	60	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	134.30	50.03	42.93
Proposed	129.75	50.03	42.93

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	1,804.50	731.23	625.13
Proposed	1,733.70	731.23	625.13

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	1,804.50	731.23	625.13
Proposed	1,733.70	731.23	625.13

Route 5 Pima Street/ West Speedway Boulevard

Route 5 operates east-west via Speedway Boulevard, north-south via Tucson Boulevard and again east-west via Pima Street between Pima Community College West and Udall Station.

Recommendation:

No recommended changes to routing or service levels. Efficiencies reflected in the tables below are a result of recommended changes in route interlining.

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	60	60	60
Proposed	30	30	30	60	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	45.82	21.02	18.43
Proposed	45.82	21.02	19.52

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	683.54	337.24	312.26
Proposed	683.55	337.24	312.26

Route 6 S Park Avenue/ N 1st Avenue (Existing)

Route 6 Euclid Avenue/ N 1st Avenue (Proposed)

Route 25 S Park Avenue (Proposed as NEW)

Route 6 operates north-south along S Park Avenue, N Euclid Avenue and N 1st Avenue between the Tohono Tadai Transit Center and Tucson International Airport. Some trips end at the Roy Laos Transit Center.

Recommendation:

Restructure route by splitting existing Route 6 at the downtown Ronstadt Transit Center and restructure the service levels of the two:

- Route 6 (NEW) will operate between downtown Ronstadt Transit Center and Tohono Tadai Center.
- Route 25 (NEW) will operate between downtown Ronstadt Transit Center and Tucson International Airport.
    - Some trips will only operate between downtown Ronstadt Transit Center and the Roy Laos Transit Center.

Using Automated Passenger Counter and data collector ridership data, market demand was determined to be greater on the portion north of downtown (Rt. 6). The dividing of the route will allow for weekday

15 minute peak hour frequency north of downtown and 30 minute all day frequency south (Rt. 25) to reflect market demand. Weekend frequencies will remain the same. The recommendation will improve route productivity resulting in lowering the subsidy per passenger boarding.

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	15	30	15	30	30	60
Proposed	15	30	15	30	30	60

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	15	30	15	60	30	60
Proposed	30	30	30	60	30	60

Route 6

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	105.47	56.63	30.28
Proposed	49.72	29.03	13.30

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	1,467.72	854.42	465.53
Proposed	566.38	355.50	162.67

Route 25

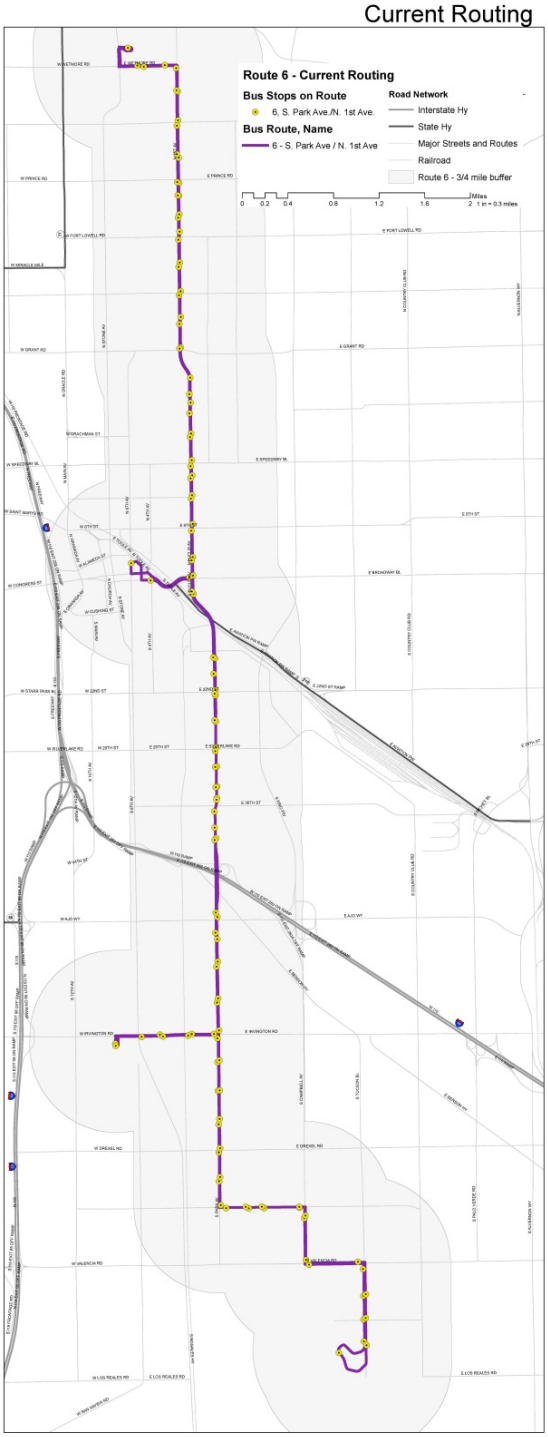
Revenue Hours	Weekdays	Saturdays	Sundays
Existing	See Route 6	See Route 6	See Route 6
Proposed	52.13	31.60	21.07

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	See Route 6	See Route 6	See Route 6
Proposed	773.20	503.66	336.13

Route 6 - S. Park Ave. / N. 1st Ave

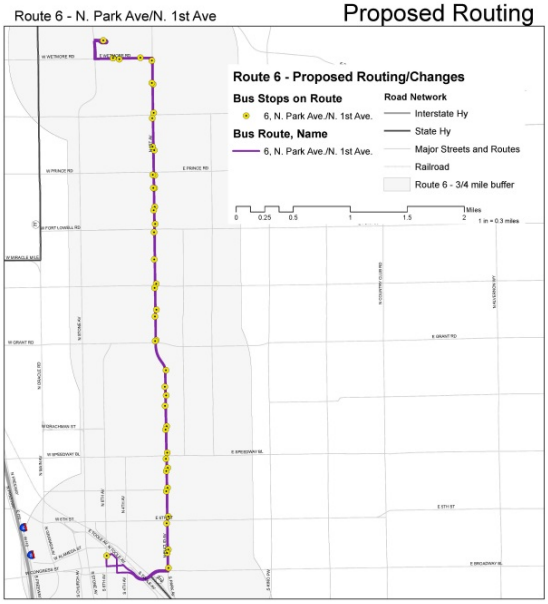
Current and Proposed Changes

Current Routing



Proposed Routing

Route 6 - N. Park Ave/N. 1st Ave



Route 25 - S. Park Ave

Date: 12/20/2013

Source: City of Tucson GIS, Infromation Technology
Sun Tran Bus Routes & Stops, Scheduling & Service Development

Folder & Name: \\COA Maps & additional data\Route Profile Maps\Route 6 Current vs Proposed - Bus Stops & Route

Map is for illustrative purposes only

Route 7 22nd Street

Route 7 operates north-south via 10th Avenue and east-west via 22nd Street between downtown Ronstadt Transit Center and Harrison Road.

Recommendations:

Weekdays:

- Restructure service levels to reflect market demand. Operate service every 20 minutes instead of every 15 minutes from the start of service until 1:00pm and again from 3:00pm until 6:00pm.

Saturdays:

- No recommended changes

Sundays:

- No recommended changes

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	15	15	15	60	60	60
Proposed	20	15-20	20	60	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	92.68	22.50	19.50
Proposed	78.65	22.50	19.50

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	1,376.71	386.42	334.89
Proposed	1,147.44	382.41	331.43

Route 8 Broadway/ S 6th Avenue (Existing)

Route 8 Broadway (Proposed)

Route 18 S 6th Avenue (NEW)

Route 8 serves two major corridors in Tucson and South Tucson. The route operates north-south along S 6th Avenue between Roy Laos Transit Center and downtown Ronstadt Transit Center. From Ronstadt, the route operates east-west along via Broadway Boulevard where it splits into two branches at Wilmot Road. One branch continues to operate east-west on Broadway Boulevard to Speedway Boulevard/ Harrison Rd while the other operates north-south on Wilmot Road to Lee Street.

Recommendation:

Restructure route by splitting existing Route 8 at downtown Ronstadt Transit Center:

Demand for service on Broadway Boulevard and S. 6th Avenue are markedly different with S. 6th Avenue being the higher of the two. Separating the route will allow service levels along each segment to differ and to reflect market demand.

- Route 8 (NEW) operates between downtown Ronstadt Transit Center and either Wilmot Road/Lee St or Speedway Boulevard/Harrison Road.
    - Service on the trunk will operate every 15 minutes between downtown Ronstadt Transit Center and Wilmot Road/ Broadway from the start of service until 11:30am and from 4:30pm until 7:00pm.
        - Service on the branches north of Wilmot Road to Wilmot/Lee, and east to Speedway Boulevard/Harrison Road will operate every 30 minutes during those periods.
            - Additional service will be provided on Route 108X to Speedway Boulevard/Harrison Road.
    - Service on the trunk will operate every 10 minutes between Ronstadt Transit Center and Wilmot Road/ Broadway from 11:30am until 4:30pm.
            - Service on the branches north of Wilmot Road to Wilmot Road/Lee Street and east to Speedway Boulevard/Harrison Road will operate every 20 minutes from 11:30am until 4:30pm.
- Route 18 (NEW) operates between downtown Ronstadt Transit Center and Roy Laos Transit Center.
    - Service will operate every 15 minutes from the start of service until 8:00am and from 6:00pm until 7:00pm weekdays.
    - Service will operate every 7-10 minutes from 8:00am until 6:00pm.

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	10	10	10	15-30	15	20
Proposed	15	10	10-15	15-30	15	20

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	60	60	60
Proposed	30	30	30	60	60	60

Route 8

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	207.95	123.23	83.82
Proposed	110.93	78.00	56.20

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	2,701.28	1,687.18	1,211.53
Proposed	1,897.16	1,423.10	1,022.22

Route 18

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	See Route 8	See Route 8	See Route 8
Proposed	87.55	43.40	32.57

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	See Route 8	See Route 8	See Route 8
Proposed	863.70	506.49	379.87

VEOLIA TRANSPORTATION

Route 8 - Broadway / S. 6th Ave

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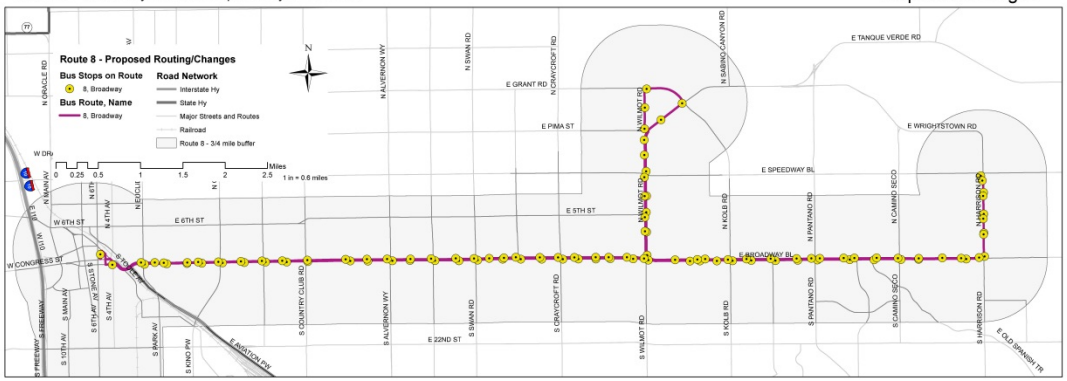
Current and Proposed Changes

Current Routing

Route 8 - Broadway / Wilmot / Speedway & Harrison

Proposed Changes



Route 18 - S. 6th Avenue

Proposed Changes

Map is for illustrative purposes only

Date: 12/19/2013
Sources: City of Tucson GIS, Information Technology
Sun Tran Routes & Bus Stops, Scheduling & Service Development
Folder & Name: \\COA Maps & additional data\Route Profile Maps\Route 8 Current vs Proposed - Bus Stop & Route

Route 9 Grant Road

Route 9 operates east-west via 6th St, north-south via Campbell Road and again east-west via Grant between downtown Ronstadt Transit Center and Tanque Verde Road/Sabino Canyon Road.

Recommendation:

Restructure service level to reflect market demand. Operate 15 minute service starting at 1:00pm instead of 2:00pm. Data collected shows demand increases at 1:00pm, not 2:00pm.

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	15-30	15-30	60	60	60
Proposed	30	15-30	15-30	60	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	62.57	21.65	19.58
Proposed	64.13	21.65	19.58

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	794.89	305.81	275.33
Proposed	815.46	305.80	275.50

Route 10 Flowing Wells Road

Route 10 operates north-south via Stone Avenue, Oracle Road and Flowing Wells Road then east-west via River Road between downtown Ronstadt Transit Center and Tohono Tadai Transit Center.

Recommendation:

No recommended changes

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	60	60	60
Proposed	30	30	30	60	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	38.25	17.47	16.33
Proposed	38.25	17.47	16.33

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	577.94	262.64	245.19
Proposed	577.94	262.64	245.19

Route 11 Alvernon Way (Existing)

Route 50 Ajo Way (Existing)

Route 11 Alvernon Way (Proposed)

Route 11 operates north-south via Alvernon Way from Dodge Road/ River Road to Ajo Way. At Ajo Way, the route branches and operates east-west via Ajo Way to the Roy Laos Transit Center or via Alvernon Way to Tucson International Airport.

Route 50 operates north-south via 6th Avenue and east-west via Ajo Way.

Recommendation:

- Based on Route 50's ridership numbers collected from the Automated Passenger Counters and data collectors, it is recommended that Route 50 be merged with the Ajo Way branch of Route 11 to create an Ajo Way crosstown route that does not operate into Roy Laos Transit Center. Routes 2, 8, 16, and 23 all transfer to and from Routes 8 and 50 on Ajo Way. Each of those routes goes to Roy Laos Transit Center. Elimination of service to Roy Laos Transit Center will result in financial efficiencies while still giving passengers wishing to travel to the center options to get there.

- Service on the trunk will operate every 15 minutes between Dodge Road/River Road and Ajo Way/Palo Verde Way from the start of service until 12:00pm and from 4:00pm until 7:00pm.
    - Service on the branches south and west of Ajo Way/Palo Verde Way will operate every 30 minutes during those periods.
- Service on the trunk will operate every 10 minutes between Dodge Road/River Road and Ajo Way/Palo Verde Way between 12:00pm and 4:00pm.
    - Service on the branches south and west of Ajo Way/Palo Verde Way will operate every 20 minutes during those periods.

Route 11

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	15	15	15	30	30	30
Proposed	15	10-15	10-15	30	30	30

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	89.00	41.82	39.03
Proposed	105.75	46.23	42.13

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	1,378.44	702.24	642.26
Proposed	1,595.21	734.06	670.41

Route 50

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	60	60	60
Proposed	N/A	N/A	N/A	N/A	N/A	N/A

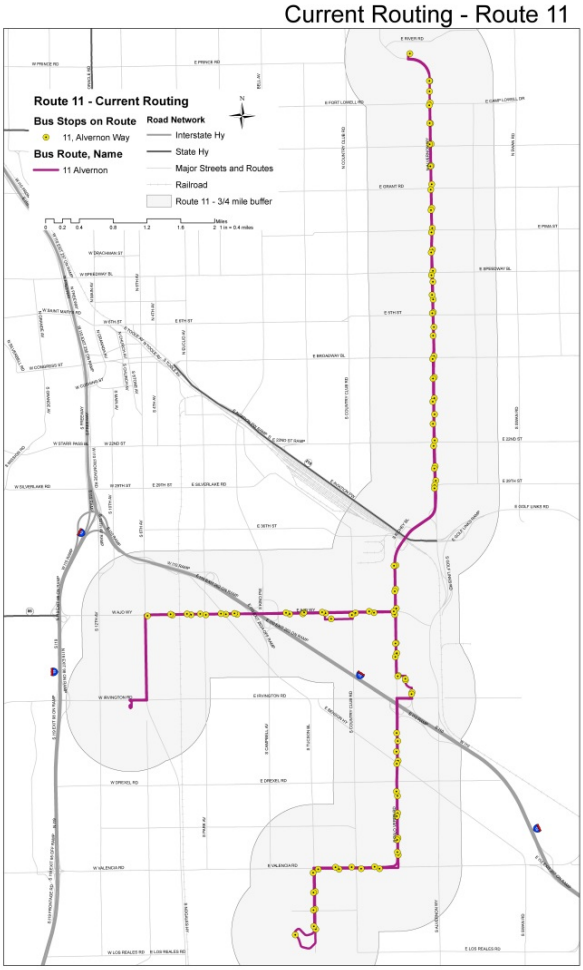
Revenue Hours	Weekdays	Saturdays	Sundays
Existing	15.07	6.53	4.85
Proposed	N/A	N/A	N/A

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	227.17	106.53	79.34
Proposed	N/A	N/A	N/A

Route 11 - Alvernon
Route 50 - Ajo Way

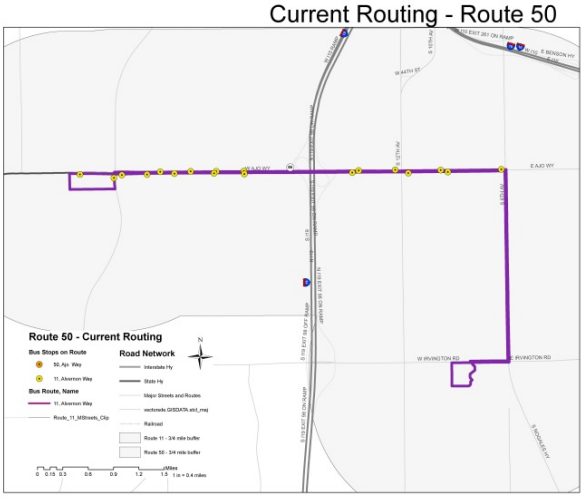
Current and Proposed Changes

Current Routing - Route 11



Proposed Changes

Current Routing - Route 50



Date: 12/13/2013

Source: City of Tucson GIS, Infromation Technology
Sun Tran Bus Routes & Stops, Scheduling & Service Development

Folder & Name: \\COA Maps & additional data\Route Profile Maps\Routes 11 and 50 - Current vs Proposed - Bus Stops & Route

Map is for illustrative purposes only

Route 15 Campbell Avenue

Route 15 operates north-south via Campbell Avenue and Stone Avenue between 22nd Street/Country Club Road and the Tohono Tadai Transit Center. Every other trip during peak periods and midday on weekdays operates between the University of Arizona Mall and the Tohono Tadai Transit Center.

Recommendations:

Based on Route 15's ridership numbers collected from the Automated Passenger Counters and data collectors, it is recommended that service levels be restructured with the frequency being reduced to 20 minutes, which reflects demand.

Weekdays:

- Operate all trips to Country Club Road/22nd Street.
- Operate peak period service every 20 minutes instead of every 15 minutes.
- Operate midday service every 30 minutes instead of every 15 minutes.

Saturdays:

- No recommended changes

Sundays:

- No recommended changes

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	15/30	15/30	15/30	60	60	60
Proposed	20	20	20	60	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	61.38	17.50	14.08
Proposed	56.77	17.50	14.08

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	882.67	275.89	239.11
Proposed	809.28	275.89	239.11

Route 16 Oracle Road/ 12th Avenue (Existing)

Route 16 Oracle Road (Proposed)

Route 12 12th Avenue (NEW)

Route 16 operates between Roy Laos Transit Center and Ina Road/Thornydale Road. Route 16 operates north-south along S 12th Avenue and Oracle Road and east-west via Ina Road. Every other trip operates between Roy Laos Transit Center and Tohono Tadai Transit Center.

Recommendation:

Restructure routing by splitting existing Route 16 at the Tohono Transit Center:

Restructure service to reflect market demand. Demand for service on S. 10th/12th Avenue and Oracle Road are markedly different with Oracle being the higher of the two. Separating the route will allow establishing service levels along each segment separately to reflect market demand upon each.

- Route 16 (NEW) operates between downtown Ronstadt Transit Center and Tohono Tadai Transit Center or Ina Road/Thornydale Road.
    - Operate Route 16 during peak periods every 15 minutes.
    - Operate Route 16 during the midday every 7.5-10 minutes.
    - Operate Route 16 between 10:00am and 4:00pm on Saturdays every 20 minutes.

- Route 12 (NEW) operates between Roy Laos Transit Center and downtown Ronstadt Transit Center.
    - Operate Route 16S during peak periods every 15 minutes.
    - Operate Route 16S during the midday every 10 minutes.
    - Operate Route 16Severy 30 minutes on weekends.

Route 16

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	10	10	10	15-30	30	30
Proposed	15	7.5-10	7.5-10	15-30	15-30	20-30

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	188.23	65.08	63.32
Proposed	127.45	74.01	58.58

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	2,566.64	911.99	889.27
Proposed	1,557.81	828.01	669.05

Route 12

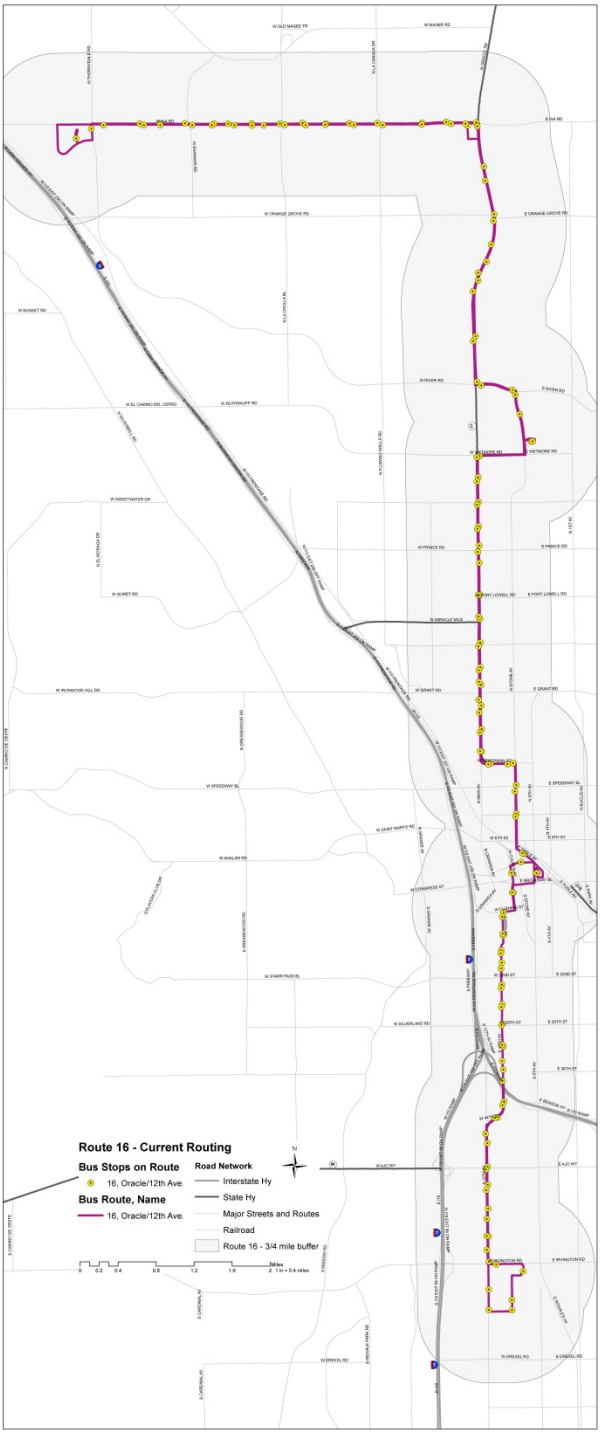
Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	10	10	10	30	30	30
Proposed	15	15	15	30	30	30

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	See Route 16	See Route 16	See Route 16
Proposed	726.83	360.38	337.13

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	See Route 16	See Route 16	See Route 16
Proposed	79.09	31.64	30.20

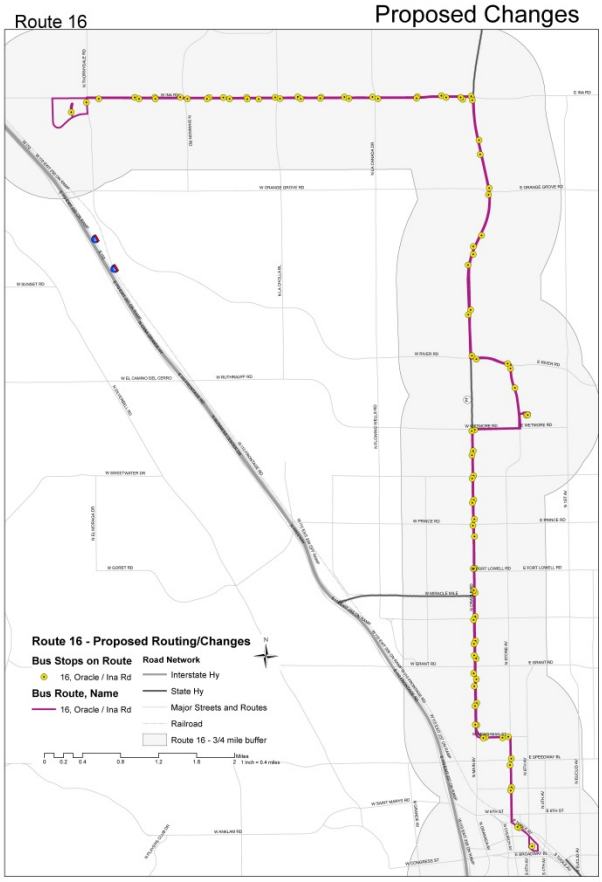
Route 16 - Oracle / Ina Rd
Route 12 - 12th Ave
Current and Proposed Changes

Current Routing

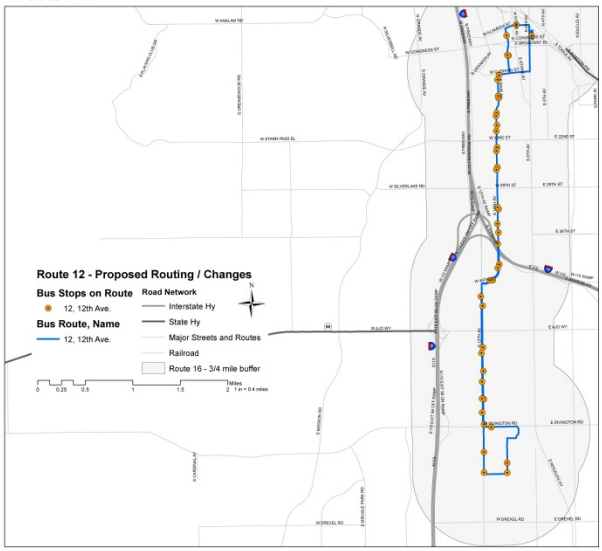


Proposed Changes

Route 16



Route 12



Date: 1/10/2014

Source: City of Tucson GIS, Infromation Technology
Sun Tran Bus Routes & Stops, Scheduling & Service Development

Folder & Name: \\COA Maps & additional data\Route Profile Maps\Route 16 Current vs Proposed - Bus Stops & Route

Map is for illustrative purposes only

Route 17 Country Club Road/ 29th Street

Route 17 operates east-west via Golf Links Road and 29th Street, north-south via Country Club Road and east-west via Prince Road between 22nd Street/ Harrison Road and Davis Road/ Ruthrauff Road.

Recommendations:

No recommended changes

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	60	60	60
Proposed	30	30	30	60	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	93.18	42.07	36.60
Proposed	93.18	42.07	36.60

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	1,404.39	672.05	582.44
Proposed	1,404.39	672.05	582.44

Route 19 Stone Avenue

Route 19 operates north-south via Stone Avenue between downtown Ronstadt Transit Center and the Tohono Transit Center.

Recommendations:

No recommended changes

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	60	30	60
Proposed	30	30	30	60	30	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	24.75	21.33	9.80
Proposed	24.75	21.33	9.80

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	319.97	260.91	137.83
Proposed	319.97	260.91	137.83

Route 20 West Grant Road

Route 20 operates north-south via Campbell Road and east-west Grant Road between the University of Arizona Mall and Sterling University Villas.

Recommendations:

No recommended changes

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	60	60	60
Proposed	30	30	30	60	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	17.62	9.20	8.87
Proposed	17.62	9.20	8.87

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	282.22	159.52	153.31
Proposed	282.22	159.52	153.31

Route 21 Silverbell Road (Existing)

Route 22 Grande Avenue (Existing)
Route 21Silverbell Road (Proposed)

Route 21 operates east-west via Congress Boulevard and north-south via Silverbell Road between downtown Ronstadt Transit Center and Dales Crossing Drive at Goret Road/ Silverbell Road.

Route 22 operates east-west via Congress Boulevard and north-south on Grande Avenue and El Rio Road between downtown Ronstadt Transit Center and Grant Road/ Silverbell Road.

Recommendations:

Based on Route 21 and Route 22's ridership numbers collected from the Automated Passenger Counters, data collectors, and its duplicative service with each other, restructured routing is recommended to merge Route 21 with the Route 22. The combined route will operate over the segments of both previous routes with higher ridership. The combination of the two routes will improve productivity resulting in a lower subsidy per passenger boarding. The new combined route will also serve Pima Community College, Community Campus and the City of Tucson, Community Resource Center on Bonita Avenue.

Weekdays:

- Operate the merged route every 30 minutes during peak periods and middays, hourly during the evenings.

Weekends:

- Operate the merged route hourly throughout its service.

Route 21

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	30	30	30
Proposed	30	30	30	60	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	23.47	20.45	18.30
Proposed	32.93	13.75	12.83

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	327.08	310.80	278.10
Proposed	503.46	251.73	234.95

Route 22

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	60	60	60
Proposed	N/A	N/A	N/A	N/A	N/A	N/A

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	23.67	9.30	8.40
Proposed	See Route 21	See Route 21	See Route 21

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	312.22	153.56	138.74
Proposed	See Route 21	See Route 21	See Route 21

VEOLIA TRANSPORTATION

Route 21 - W. Congress / Silverbell

Current and Proposed Changes

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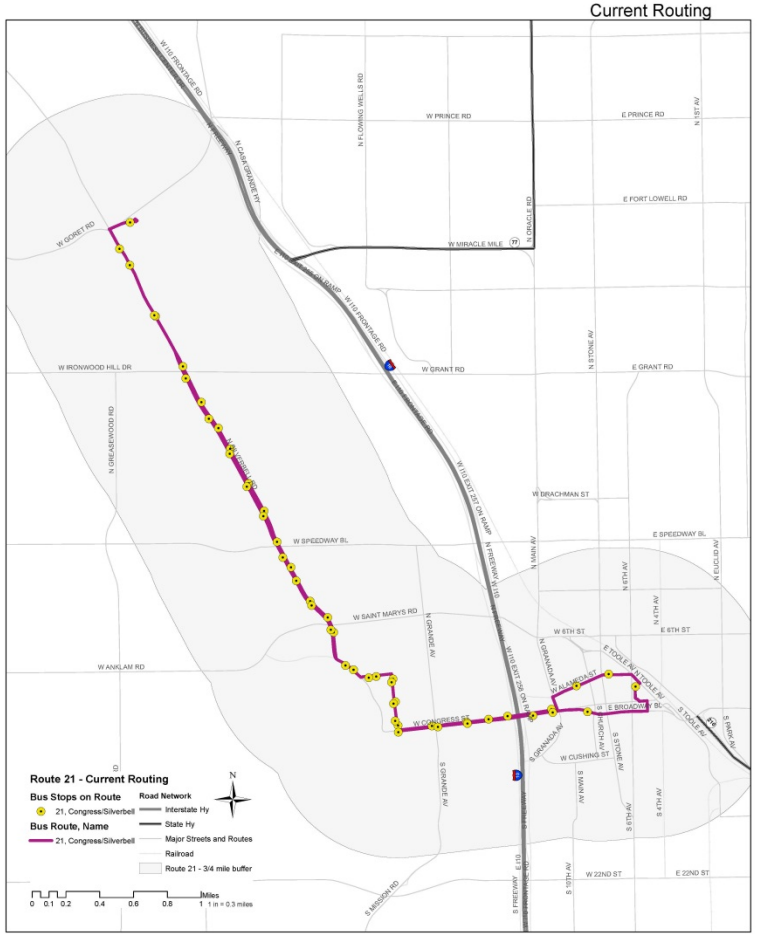
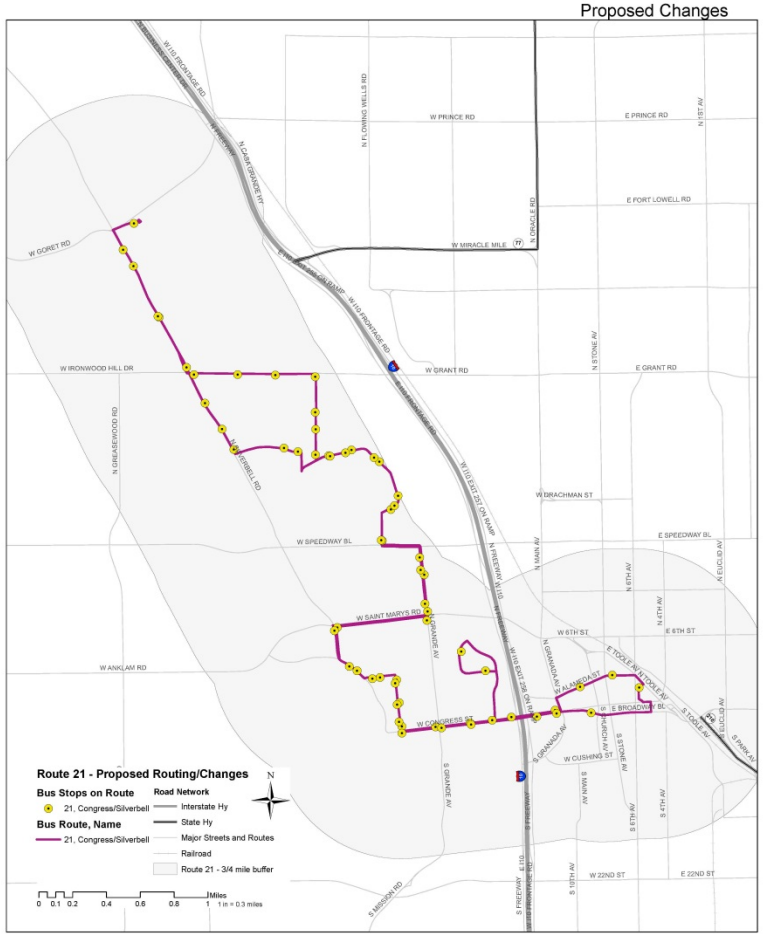
Current Routing



Proposed Changes



Date: 12/13/2013

Sources: City of Tucson GIS, Information Technology
Sun Tran Routes & Bus Stops, Scheduling & Service Development

Folder & Name: \\COA Maps & additional data\Route Profile Maps\Route 21 Current vs Proposed - Bus Stop & Route

Map is for illustrative purposes only

Route 23 Mission Road

Route 23 operates east-west via Silverlake Road and San Marcos Road, north-south via La Cholla Boulevard and Mission Road and east-west via Irvington Road between downtown Ronstadt Transit Center and Roy Laos Transit Center.

Recommendation:

No recommended changes

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	60	60	60
Proposed	30	30	30	60	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	49.72	19.60	17.63
Proposed	49.70	19.60	17.63

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	762.69	319.53	284.96
Proposed	773.10	319.53	284.96

Note: Changes to hours and miles shown above are due to changes in interlining.

Route 24 S 12th Avenue

Route 24 operates north-south on 12th Avenue and east-west on Los Reales Road between Roy Laos Transit Center and Desert Diamond Casino.

Recommendation:

No recommended changes

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	60	60	60
Proposed	30	30	30	60	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	16.82	8.53	7.15
Proposed	18.38	8.53	7.43

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	274.25	139.30	116.96
Proposed	301.24	139.30	121.30

Note: Changes to hours and miles shown above are due to changes in interlining.

Route 26 Benson Highway

Route 26 operates via Benson Highway between Roy Laos Transit Center and Craycroft Road/Benson Highway.

Recommendation:

Operate route via Country Club Road between Drexel Road and Benson Hwy instead of Masterson Avenue. This restructure in routing addresses a safety and operational issue. Traveling on Country Club will alleviate the concern.

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	60	60	60
Proposed	30	30	30	60	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	33.07	13.78	12.55
Proposed	33.12	13.78	12.55

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	641.83	285.57	257.30
Proposed	641.83	285.57	257.30

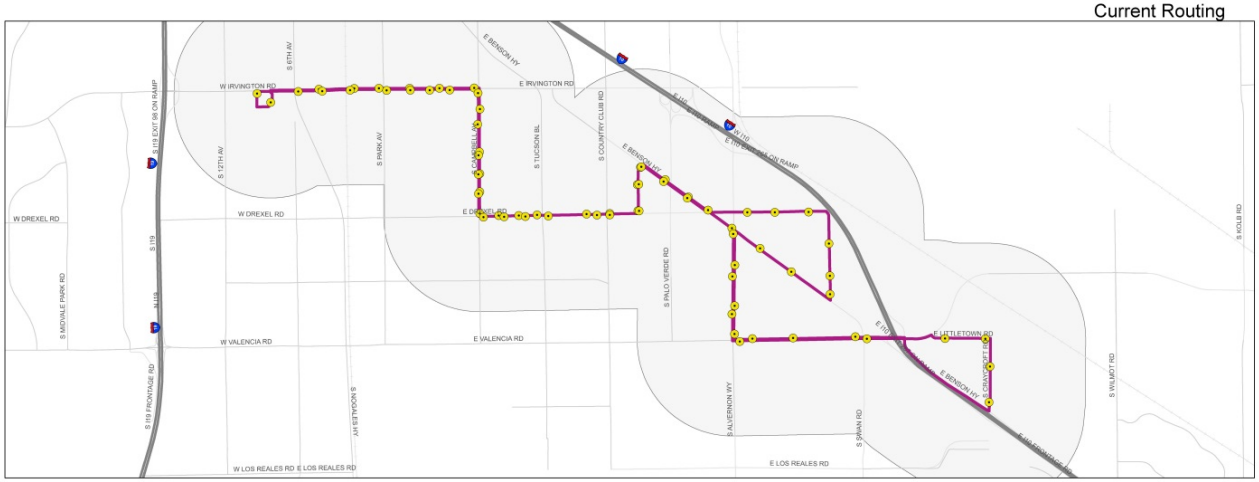
Note: Changes to hours and miles shown above are due to changes in interlining.

VEOLIA TRANSPORTATION

Route 26 - Benson Highway
Current and Proposed Changes

sun tran

Current Routing



Route 26 - Current Routing

Bus Stops on Route
- 26, Benson Highway

Bus Route, Name
- 26, Benson Highway

Road Network
- Interstate Hy
- State Hy
- Major Streets and Routes
- Railroad
- Route 26 - 3/4 mile buffer

N

0 0.25 0.5 1 1.5 2 2.5 Miles 1 in = 0.4 miles

Proposed Changes

Route 26 - Proposed Routing/Changes

Bus Stops on Route
- 26, Benson Highway
- New Stops, 26, Benson Highway

LineAbbr, LineName
- 26, Benson Highway

Road Network
- Interstate Hy
- State Hy
- Major Streets and Routes
- Railroad
- Route 26 - 3/4 mile buffer

N

0 0.25 0.5 1 1.5 2 2.5 Miles 1 in = 0.4 miles

Date: 12/20/2013

Sources: City of Tucson GIS, Information Technology
Sun Tran Routes & Bus Stops, Scheduling & Service Development
Folder & Name: \\COA Maps & additional data\Route Profile Maps\Route 26 Current vs Proposed - Bus Stop & Route

Route 27 Midvale Park

Route 27 operates north-south via Santa Clara Avenue, Midvale Park Road and Cardinal Avenue and east-west via Valencia Road and Drexel Road. Route 27 operates between Roy Laos Transit Center and Casino Del Sol.

Recommendations:

Weekdays:

- Restructure service level to reflect market demand. Due to low ridership, it is recommended that peak service operate every 30 minutes instead of every 15 minutes.

Saturdays:

- No recommended changes

Sundays:

- No recommended changes

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	15	30	15	40	60	60
Proposed	30	30	30	40	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	66.93	18.93	17.35
Proposed	42.73	18.93	17.35

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	1,310.33	393.34	366.26
Proposed	866.65	393.34	366.26

Route 29 Valencia Road

Route 29 operates north-south via Nogales Highway and east-west via Valencia Road between Roy Laos Transit Center and Casino of the Sun.

Recommendation:

No recommended changes

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	60	60	60
Proposed	30	30	30	60	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	37.65	17.65	15.52
Proposed	37.65	17.65	15.52

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	655.20	312.21	271.86
Proposed	655.20	312.21	271.86

Route 34 Craycroft Road/ Fort Lowell Road

Route 34 operates north-south via 1st Avenue and Craycroft Road and east-west via Fort Lowell Road.

Recommendations:

Restructure routing by removing route from local streets at Craycroft Road/30th Street, maintain northbound trip on a major street, Craycroft Road; and complete route recovery time at designated bus pullout on Craycroft Road at 29th Street. The segment to be removed is a turnaround that is no longer needed. Based on Route 34's ridership numbers collected from the Automated Passenger Counters, restructuring the service level to reflect market demand is recommended. Operate Route 34 every 20 minutes from 1:00pm until 4:00pm.

Weekdays:

- Operate Route 34 every 20 minutes instead of every 30 minutes between 1:00pm and 4:00pm.

Saturdays:

- No recommended changes

Sundays:

- No recommended changes

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	60	60	60
Proposed	30	20-30	30	60	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	56.78	26.97	23.52
Proposed	62.80	26.97	23.52

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	820.94	410.47	355.74
Proposed	903.03	410.47	355.74

VEOLIA TRANSPORTATION
Route 34 - Craycroft / Ft. Lowell
Current and Proposed Changes
Current Routing
Proposed Changes
sun tran
Route 34 - Current Routing
Bus Stops on Route
34, Craycroft/Ft. Lowell
Bus Route, Name
34, Craycroft/Ft. Lowell
Road Network
Interstate Hy
State Hy
Major Streets and Routes
Railroad
Route 34 - 34 mile buffer
Miles
Route 34 - Proposed Routing/Changes
Bus Stops on Route
34, Craycroft/Ft. Lowell
Bus Route, Name
34, Craycroft/Ft. Lowell
Road Network
Interstate Hy
State Hy
Major Streets and Routes
Railroad
Route 34 - 34 mile buffer
Miles
Date: 12/20/2013
Sources: City of Tucson GIS, Information Technology
Sun Tran Routes & Bus Stops, Scheduling & Service Development
Folder & Name: \\COA Maps & additional data\Route Profile Maps\Route 34 Current vs Proposed - Bus Stop & Route
Map is for illustrative purposes only

Route 37 Pantano Road

Route 37 operates north-south via Pantano Road between Pima Community College East and Cloud Road/ Pantano Road.

Recommendations:

Based on passenger boarding data collected from the Automated Passenger Counters and data collectors, routing restructuring is recommended that service along an unproductive segment of the route be discontinued. The recommended discontinued segment is from north of Tanque Verde Road along Sabino Canyon Road to Cloud Road/Pantano Road. All trips will operate between Tanque Verde/Sabino Canyon and Pima Community College East Campus. The recommendation will improve the route productivity resulting in a lower subsidy per passenger boarding.

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	NA	60	60
Proposed	30	30	30	NA	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	30.95	14.75	13.75
Proposed	25.50	11.48	10.72

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	588.51	298.35	277.04
Proposed	459.61	233.92	217.22

Route 61 La Cholla Boulevard

Route 61 operates east-west via Wetmore Road and Ruthrauff Road and north-south via La Cholla Road between Tohono Tadai Transit Center and Foothills Mall.

Recommendation:

No recommended changes

Frequency	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
Existing	30	30	30	60	60	60
Proposed	30	30	30	60	60	60

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	24.97	11.48	11.48
Proposed	24.97	11.48	11.48

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	443.64	209.16	209.16
Proposed	443.64	209.16	209.16

Route 101X Golf Links- Downtown Express

Route 101X operates east-west via Golf Links Road and Aviation Parkway between Harrison Road and downtown Tucson.

Recommendation:

No recommended changes

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	3.40	NA	NA
Proposed	4.05	NA	NA

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	73.30	NA	NA
Proposed	73.30	NA	NA

Route 102X Northwest- University of Arizona Express

Route 102X operates east-west via Ina Road and Speedway Boulevard and north-south via I-10 to downtown Tucson and the University of Arizona.

Recommendation:

Based on Route 102X's ridership numbers collected from the Automated Passenger Counters and data collectors, restructured routing is recommended to discontinue service along an unproductive segment. It is recommended that Route 102X operate between Foothills Mall and University of Arizona Hospital. Service along the recommended discontinued segment is provided by the Route 103X. The recommendation reflects market demand and increases route productivity by removing segments of duplicated service.

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	6.03	NA	NA
Proposed	5.45	NA	NA

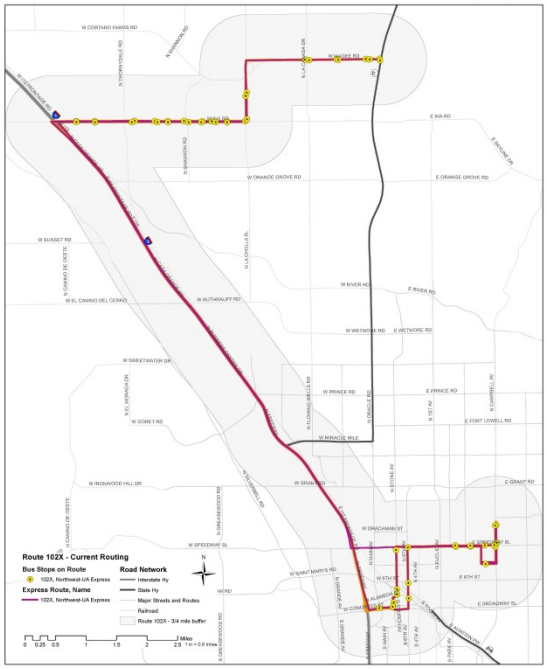
Revenue Miles	Weekdays	Saturdays	Sundays
Existing	121.56	NA	NA
Proposed	105.98	NA	NA

VEOLIA TRANSPORTATION

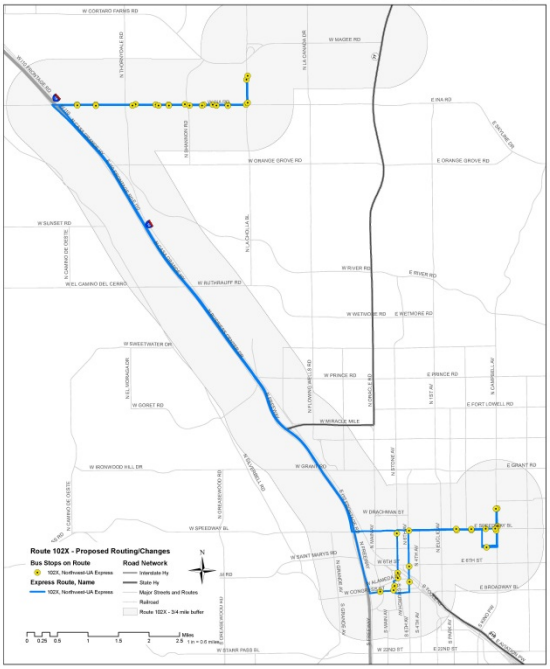
Route 102X - Northwest - UA Express
Current and Proposed Changes

sun tran

Current Routing



Proposed Changes



Date: 12/20/2013
Sources: City of Tucson GIS, Information Technology
Sun Tran Routes & Bus Stops, Scheduling & Service Development
Folder & Name: \\COA Maps & additional data\Route Profile Maps\Route 102X Current vs Proposed - Bus Stop & Route

Map is for illustrative purposes only

Route 103X Northwest- Downtown Express

Route 103X operates east-west via Ina Road and Speedway Boulevard and north-south via Oracle Road and Campbell Avenue to the University of Arizona and downtown Tucson.

Recommendation:

Based on Route 103X's ridership numbers collected from the Automated Passenger Counters and data collectors, it is recommended that service levels be restructured to reflect market demand. Route 103X be realigned to operate from Rancho Vistoso Park & Ride to Foothills Mall where it will continue via Ina Road and River Road to 1st Avenue (Euclid) to Speedway Boulevard where it will terminate at the University of Arizona Mall. Route 103X will no longer duplicate Routes 15 and 102X. It is also recommended that the service level be restricted to reflect market demand, with Route 103X only operating three trips in both directions instead of four. The recommendations increase route productivity by removing segments of duplicated service and adjusting service frequency.

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	8.33	NA	NA
Proposed	5.80	NA	NA

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	138.82	NA	NA
Proposed	136.52	NA	NA

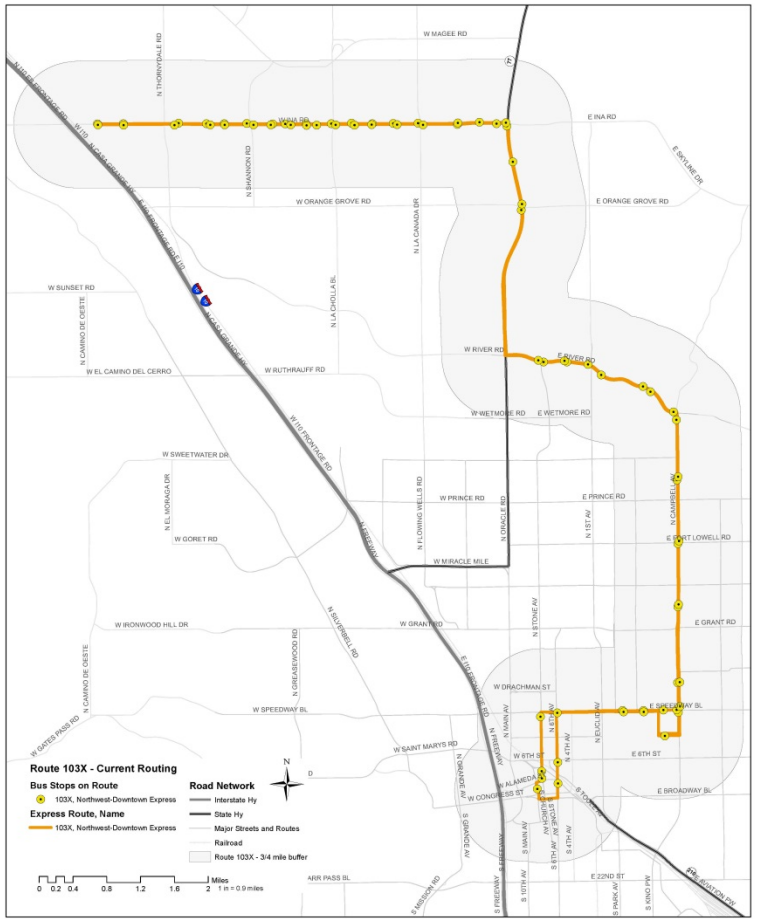
VEOLIA TRANSPORTATION

Route 103X - Northwest - Downtown Express

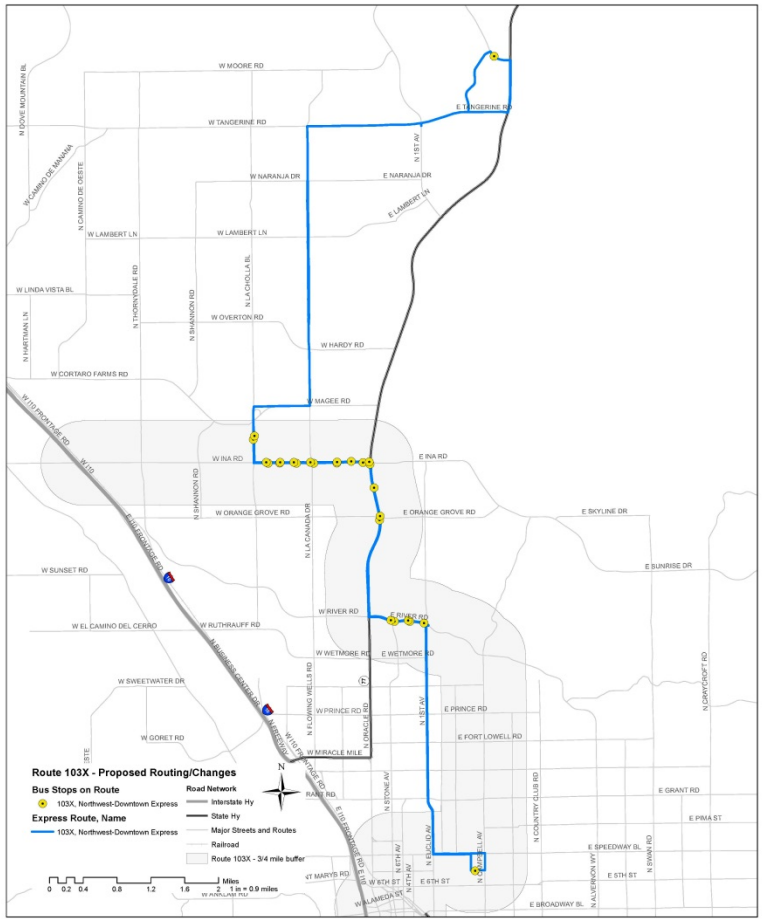
Current and Proposed Changes

sun tran

Current Routing



Proposed Changes



Date: 12/20/2013
Sources: City of Tucson GIS, Information Technology
Sun Tran Routes & Bus Stops, Scheduling & Service Development
Folder & Name: \\COA Maps & additional data\Route Profile Maps\Route 103X Current vs Proposed - Bus Stop & Route

Map is for illustrative purposes only

Route 104X Marana- Downtown Express

Route 104X operates from the Arizona Pavilions Park & Ride via I-10 to Downtown.

Recommendation:

No recommended changes

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	3.20	NA	NA
Proposed	3.20	NA	NA

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	78.44	NA	NA
Proposed	78.44	NA	NA

Route 105X Foothills- Downtown Express

Route 105X operates east-west via Sunrise Drive and Speedway Boulevard and north-south via Swan Road to the University of Arizona and downtown Tucson.

Recommendation:

Based on Route 105X's ridership numbers collected from the Automated Passenger Counters and data collectors, restructured routing is recommended to discontinue service along an unproductive segment. The recommendation is that Route 105X no longer serve the Kolb Road/ Sunrise Drive stops. The recommendation will improve the route productivity resulting in a lower subsidy per passenger boarding.

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	6.85	NA	NA
Proposed	5.38	NA	NA

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	151.76	NA	NA
Proposed	114.40	NA	NA

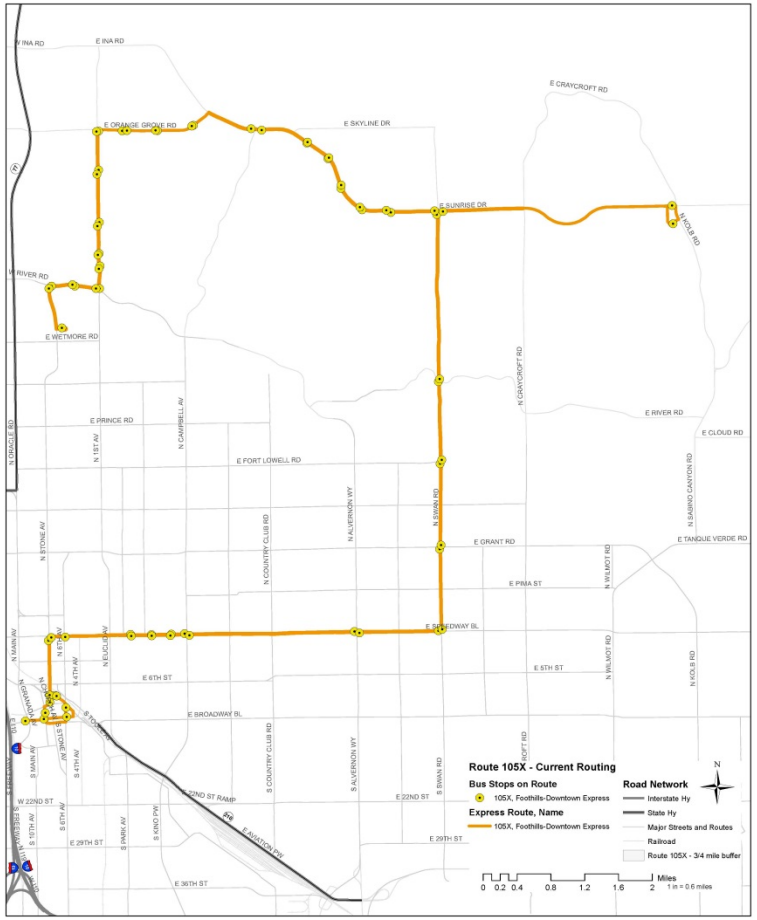
VEOLIA TRANSPORTATION

Route 105X - Foothills - Downtown Express

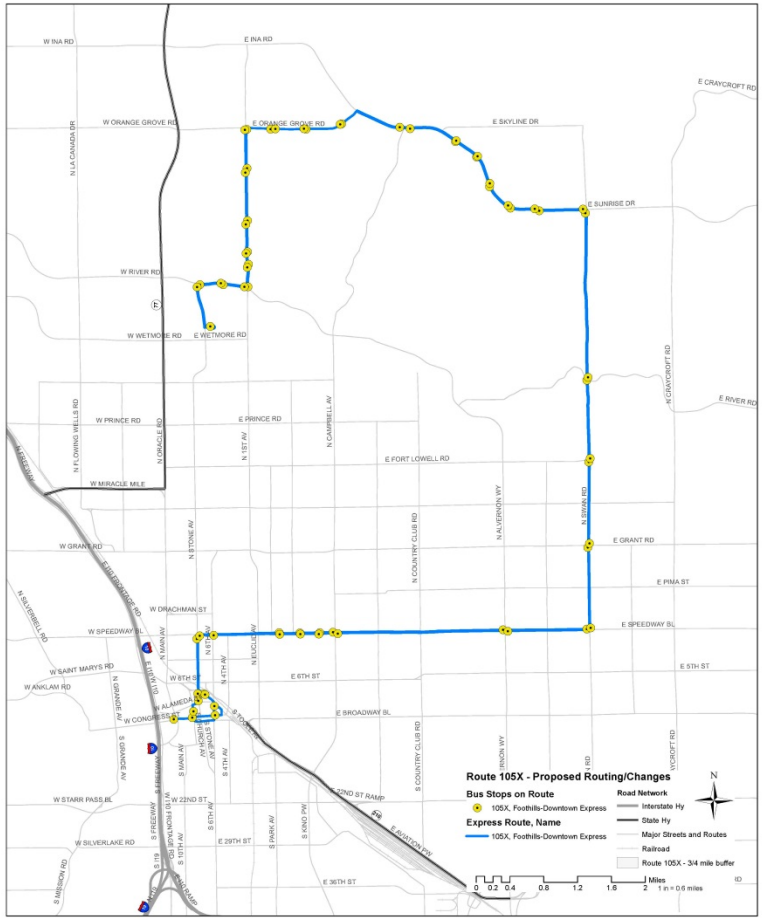
Current and Proposed Changes

sun tran

Current Routing



Proposed Changes



Date: 12/20/2013
Sources: City of Tucson GIS, Information Technology
Sun Tran Routes & Bus Stops, Scheduling & Service Development

Folder & Name: \\COA Maps & additional data\Route Profile Maps\Route 105X Current vs Proposed - Bus Stop & Route

Map is for illustrative purposes only

Route 107X Oro Valley- Downtown Express

Route 107 operates north-south via Oracle Road and Stone Avenue between Oro Valley and Downtown Tucson.

Recommendation:

Restructure the routing of the 107X between Rancho Vistoso Park & Ride and Orange Grove Road/ Oracle Road to serve current Route 312X stops between Lambert Road and Orange Grove Road. The restructured routing will also be discontinued along a segment to be operated by another route to avoid duplication. The segment of the existing route along Lambert and La Canada will be operated by Route 103X.

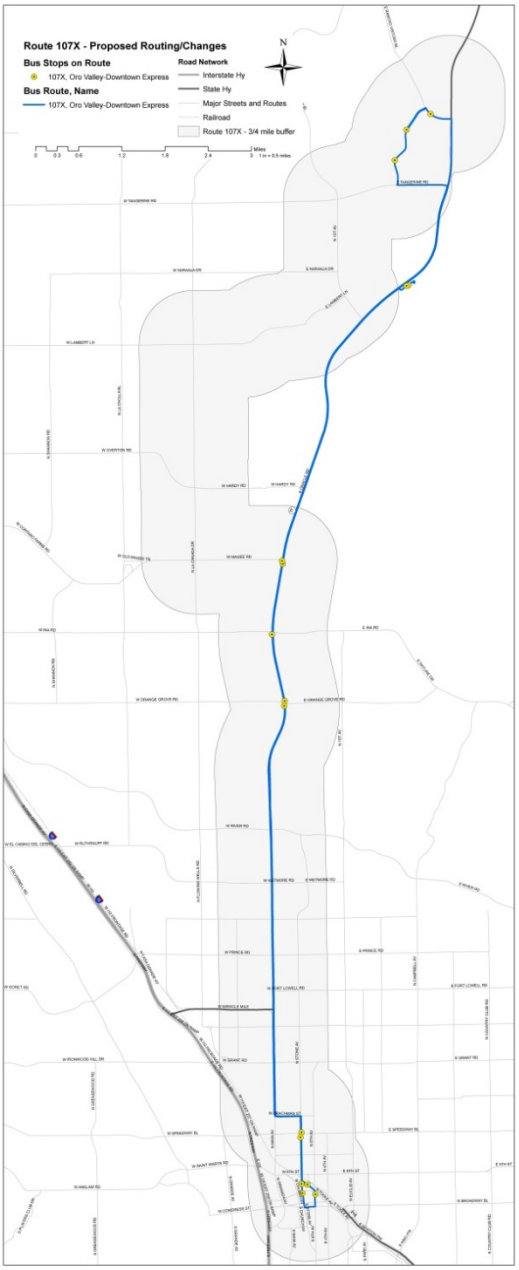
Revenue Hours	Weekdays	Saturdays	Sundays
Existing	5.00	NA	NA
Proposed	5.25	NA	NA

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	121.28	NA	NA
Proposed	108.48	NA	NA

Route 107X
Oro Valley - Downtown Express
Current and Proposed Changes

Current Routing

Proposed Changes



Date: 12/16/2013
Source: City of Tucson GIS, Infromation Technology
Sun Tran Routes & Bus Stops, Scheduling & Service Development

Map is for illustrative purposes only

Folder & Name: \\COA Maps & additional data\Route Profile Maps\Route 107X Current vs Proposed - Bus Stop & Route

Route 108X Broadway- Downtown Express

Route 108X operates via Broadway Boulevard between Speedway Boulevard and Harrison Road and downtown Tucson.

Recommendation:

Based on Route 108X's ridership numbers collected from the Automated Passenger Counters and data collectors, coupled with the fact that service is duplicated by the Route 8, consideration was given for the discontinuance of this route. However, as part of the short-term recommendations, efforts could be made to improve the overall productivity of the route. It is recommended that changes be made in the stop locations for the Route 108X to attract more riders. It is also recommended to restructure the service times so that they differ from the Broadway Boulevard local Route 8.

Additional Stops:

- Broadway /Country Club Road
- Broadway /Swan Road
- Broadway /Craycroft Road

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	4.25	NA	NA
Proposed	4.25	NA	NA

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	73.21	NA	NA
Proposed	73.21	NA	NA

Route 109X Catalina Highway- Downtown Express

Route 109X operates east-west via Catalina Highway and Speedway Boulevard between Bear Canyon Road/Tanque Verde Road and downtown Tucson.

Recommendation:

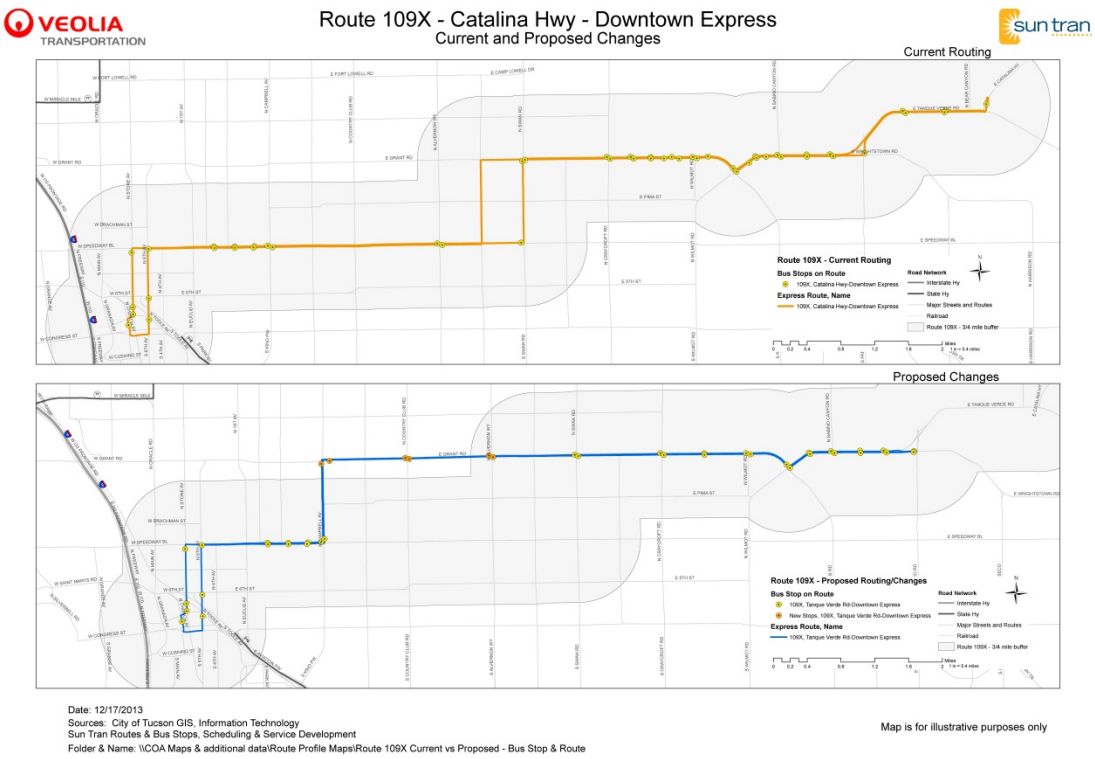
It is recommended that routing be restructured to discontinue service along a segment of the Route 109X, from Catalina Highway to Wrightstown Road/ Pantano Road. The recommendation is made to address operational concerns due to a lack of a Park & Ride (or other suitable bus turn-around point) at Catalina Highway. Route 109X will operate via Wrightstown Road to Tanque Verde Road to Grant Road to Campbell Avenue where it will resume its current routing from Speedway Boulevard/ Campbell Avenue into downtown Tucson.

Additional Stops:

- Wrightstown Road/Pantano Road
- Grant Road/Alvernon Way
- Grant Road/Country Club Road
- Grant Road/Campbell Avenue

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	5.48	NA	NA
Proposed	4.78	NA	NA

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	78.61	NA	NA
Proposed	67.16	NA	NA



Route 110X – Rita Ranch- Downtown Express

Route 110X operates via Rita Road and I-10 between Rita Ranch and downtown Tucson.

Recommendation:

No recommendations are made to restructure routing or service levels. It is recommended to adjust the time of the trips provided to improve connections with the northbound trips from other express routes in downtown Tucson.

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	5.80	NA	NA
Proposed	5.80	NA	NA

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	224.82	NA	NA
Proposed	224.98	NA	NA

Route 201X- Eastside- Aero Park Express

Route 201X operates north-south via Harrison Road and Alvernon Way and east-west via Speedway Boulevard between Golf Links Road/ Harrison Road and AeroPark Boulevard and Raytheon.

Recommendation:

No recommended changes

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	4.57	NA	NA
Proposed	4.57	NA	NA

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	104.45	NA	NA
Proposed	104.45	NA	NA

Route 202X- Northwest- Aero Park Express (Existing)

Route 203X Oro Valley- Aero Park Express (Existing)

Route 202X- Northwest- Aero Park Express (Proposed)

Route 202X operates north-south on La Cholla Boulevard then east-west on Ina Road and north-south via I-10, I-19, and Nogales Highway between Tucson and AeroPark Boulevard and Raytheon. Route 202X makes an additional stop outside Roy Laos Transit Center.

Route 203X operates via Rancho Vistoso, east-west via Orange Grove and north-south via I-10, I-19 and Nogales Highway between Oro Valley and AeroPark Boulevard and Raytheon. Route 203X makes an additional stop outside Roy Laos Transit Center.

Recommendation:

Based on Route 202X and 203X's passenger boarding data from the Automated Passenger Counters and data collectors, route restructuring is recommended to combine the two routes. It is recommended that Route 202X no longer operates via the lightest used segment along La Cholla Boulevard and instead is merged with Route 203X north of Ina Road. Route 203X would be discontinued. The segment of Route 203X which would be discontinued is an area where there are no current stops, Ina Road and Irvington Road. This recommendation will improve the route productivity resulting in a lower subsidy per passenger boarding.

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	6.85	NA	NA
Proposed	5.38	NA	NA

Route 202X

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	5.90	NA	NA
Proposed	7.10	NA	NA

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	175.41	NA	NA
Proposed	234.70	NA	NA

Route 203X

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	7.65	NA	NA
Proposed	See Route 202X	NA	NA

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	217.97	NA	NA
Proposed	See Route 202X	NA	NA

VEOLIA TRANSPORTATION

Route 202X
Northwest - Aero Park Express
Current and Proposed Changes

sun tran

Current Routing

Proposed Changes

Date: 12/18/2013
Source: City of Tucson GIS, Infromation Technology
Sun Tran Routes & Bus Stops, Scheduling & Service Development

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Map is for illustrative purposes only

Route 312X Oro Valley - Tohono Express

Route 312X operates north-south via Oracle Road between Oro Valley and the Tohono Transit Center.

Recommendation:

Based on Route 312X's ridership numbers collected from the Automated Passenger Counters and data collectors, restructured routing is recommended to extend the route sough from the Tohono Tadai Transit Center to the downtown Ronstadt Transit Center. Route 312X will begin service northbound in the morning from downtown on Stone Avenue to Tohono Tadai Transit Center and north along Oracle to Rancho Vistoso Park and Ride. Afternoon service would travel southbound utilizing the opposite of the morning route. This service will allow passengers currently riding Route 312X in the reverse commute to continue to ride Sun Tran. For southbound service in the morning and northbound service in the afternoon, passengers may use Sun Tran's Route 107X or Sun Shuttle's Route 401, which both operate over the current Route 312X's route. This recommendation extends service, which expands access for residents from the City of Tucson to jobs further north, addressing previous passenger requests. Operating this route as a reverse commute express service reflects market demand.

Additional Stops:

- Downtown Ronstadt Transit Center
- Euclid Avenue/Speedway Boulevard
- Euclid Avenue/Grant Road
- Euclid Avenue/Prince Road

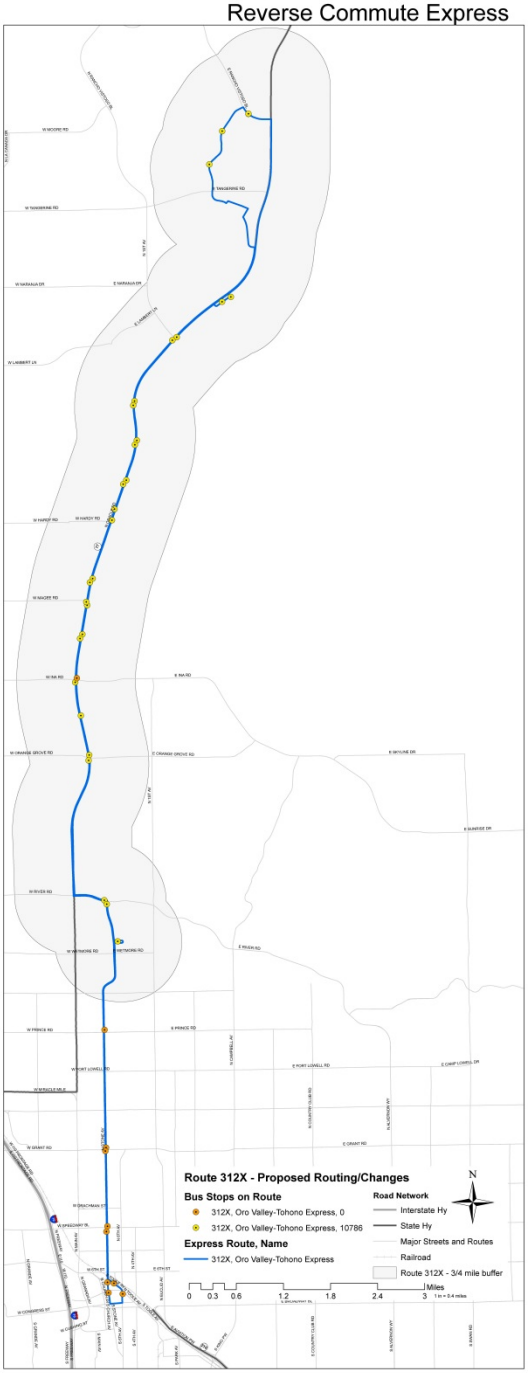
Revenue Hours	Weekdays	Saturdays	Sundays
Existing	6.67	NA	NA
Proposed	4.82	NA	NA

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	155.55	NA	NA
Proposed	107.47	NA	NA

Route 312X
Oro Valley - Tohono Express
Current and Proposed Changes

Current Routing
Bi-directional Express

Proposed Changes
Reverse Commute Express



Date: 12/18/2013

Source: City of Tucson GIS, Infromation Technology
Sun Tran Routes & Bus Stops, Scheduling & Service Development

Folder & Name: \\COA Maps & additional data\Route Profile Maps\Route 312X Current vs Proposed Bus Stop & Route

Map is for illustrative purposes only

Recommended Service Plan for Regional Partners

Sun Shuttle

Route 401 N. Oracle/ Catalina

Route 401 operates from Ina Road to Golder Ranch. The Dial-a-Ride is a Sun Shuttle route operating in Oro Valley with extended area service for qualified senior and disabled residents.

Recommendation:

- Provide better connections with Sun Tran Route 16.

Route 410 Anway/Trico

Route 410 operates between Avra Valley Road/Anway Road and Grier Road.

Recommendation:

- No recommended changes

Route 411 Cortaro/ Silverbell

Route 411 operates between Arizona Pavilions and Coachline State Park. Some operate east of Arizona Pavilions to Regency Plaza on Thornydale Road.

Recommendation:

- Extend Route 411 to Regency Plaza at all times to provide better connections with Sun Tran Route 16.
- Provide better connections with Sun Tran Routes 102X and 104X for commuters traveling to Downtown Tucson.
- Service will operate every 60 minutes consistently on weekdays and every 60 minutes on Saturdays instead of every 45 minutes.

Frequency	Weekdays	Saturday	Sunday
Existing	50-70	45	
Proposed	60	60	

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	12.60	6.10	
Proposed	12.88	5.88	

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	205.40	97.60	
Proposed	221.00	102.00	

Route 412 Thornydale/ River

Route 412 operates between the Tohono Tadai Transit Center and Thornydale Road/ Tangerine Road.

Recommendation:

- No recommended changes

Route 413 Marana/ I-10

Route 413 operates between the Arizona Pavilions and the Marana Health Center. Some trips are extended south of the Arizona Pavilions to Regency Plaza.

Recommendation:

- Extend Route 413 from the Arizona Pavilions and Regency Plaza to the Tohono Tadai Transit Center for all trips.
- Operate service hourly instead of every 30 minutes to 1 hour 30 minutes.

Route 421 Green Valley/ Sahuarita Connector

Route 421 operates between Green Valley and the downtown Ronstadt Transit Center in Tucson.

Recommendation:

- Do not operate Route 421 north of the Roy Laos Transit Center. Customers must use Sun Tran Routes 16 and 18 to continue to Downtown.
- Operate service every 60-70 minutes during peak periods and Saturdays.
- Operate service every 2 hours 10 minutes during midday.

Frequency	Weekdays	Saturday	Sunday
Existing	36-185	79	
Proposed	60-130	60-70	

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	24.62	13.84	
Proposed	24.50	13.74	

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	656.67	379.91	
Proposed	691.55	390.6	

Route 430 Tucson Estates

Route 430 operates between Tucson Estates and the Roy Laos Transit Center.

Recommendation:

- No recommended changes

Route 440 San Xavier

Route 440 operates between the San Xavier Reservation and the Roy Laos Transit Center.

Recommendation:

No recommended changes

Route 450 Southeast Tucson/ Rita Ranch

Route 450 operates between the Old Vail Park & Ride in Rita Ranch and the Golf Links Park & Ride in southeast Tucson.

Recommendation:

- Operate Route 450 every 90 minutes to provide better connections to Sun Tran Routes.

Route 486 Ajo- Tucson

Route 486 operates as two services. The Shuttle Service operates between Ajo and Tucson. The Dial-a-Ride service operates between Ajo and Why.

Recommendation:

- Coordinate better schedules between the Sun Shuttle Dial-a-Ride and Sun Shuttle services to provide connections.
- Raise base fare to $1.50 and all other fares to improve the subsidy per passenger boarding.

Downtown Loop

With the opening of the Sun Link streetcar in summer 2014, the Downtown Loop will become a duplicative service. Many of the Downtown Loop's major stops are within walking distance of Sun Link or existing Sun Tran service.

Recommendation:

No recommendations are being made for the Downtown Loop as part of this analysis. However, due to its location along the planned alignment for the streetcar service, further review will be conducted in the Bus/Rail Interface Report.

CAT Tran (University of Arizona Shuttle)

With the opening of the Sun Link streetcar in summer 2014, large sections of the USA route for CAT Tran will become a duplicative service to Sun Link in addition to Sun Tran's many U of A- Downtown services.

Recommendation:

CAT Tran will need to reevaluate the service to determine if it will continue to operate the shuttle along the Sun Link route.

Long Range Service Plan

1-3 Years

Southwest Tucson- Downtown Express

This new highway express route will operate from the Park & Ride near Casino del Sol via Valencia Road, Midvale Park Road, Irvington Road and I-19 into downtown Tucson. This route will operate with three round trips on weekdays: three northbound trips in the morning and three southbound trips in the afternoon.

- Two Park & Ride lots currently exist: one at the Casino del Sol and one on Irvington Road just west of I-19.
- Three roundtrips will operate during weekday peak periods.

Revenue Hours	Weekdays	Saturdays	Sundays
Proposed	3.00		

Revenue Miles	Weekdays	Saturdays	Sundays
Proposed	79.50		

Green Valley/ Sahuarita- Downtown Express

This new highway express route will operate from the Park & Ride in Green Valley Village and the Sahuarita Town Hall via I-19 into Downtown Tucson. This route will operate with three round trips on weekdays: three northbound trips in the morning and three southbound trips in the afternoon.

- Two Park & Ride lots currently exist: one in Green Valley Village and one at the Sahuarita Town Hall.
- Three roundtrips will operate during weekday peak periods.

Revenue Hours	Weekdays	Saturdays	Sundays
Proposed	4.00		

Revenue Miles	Weekdays	Saturdays	Sundays
Proposed	167.70		

Route 29 Valencia Road

- Additional peak service on the route will be added should the ridership continue to grow. Peak period service currently operates every 30 minutes but would increase to every 20 minutes if on board passenger loads average more than 40 passengers for multiple trips.

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	37.65	17.65	15.52
Proposed (0-1 Yr)	45.28	21.25	18.85
Proposed (1-3 Yrs)	51.21	21.25	18.85

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	655.20	312.21	271.86
Proposed (0-1 Yr)	799.77	399.15	347.56
Proposed (1-3 Yrs)	902.97	399.15	347.56

Route 104X Marana- Downtown Express

- A trial reverse commute service would be implemented on Route 104X operating northbound in the morning and southbound in the afternoon to provide Tucson residents with a faster travel option to reach Ina Road and points north. The trips should be timed to meet the Sun Shuttle routes that serve the Arizona Pavilions.

Revenue Hours	Weekdays	Saturdays	Sundays
Existing	37.65	17.65	15.52
Proposed (0-1 Yr)	45.28	21.25	18.85

Revenue Miles	Weekdays	Saturdays	Sundays
Existing	655.20	312.21	271.86
Proposed (0-1 Yr)	799.77	399.15	347.56

4-6 Years

Route 18 S 6th Avenue

Additional weekend service on the route will be added should the ridership continue to grow. Service on Saturday operate every 15 minutes but would increase to every 10 minutes between 10:00am and 4:00pm should passenger loads average more than 40 passengers for multiple trips. Service on Sunday operate every 20 minutes but would increase to every 15 minutes between 10:00am and 4:00pm should passenger loads average more than 40 passengers for multiple trips.

Revenue Hours	Weekdays	Saturdays	Sundays
Proposed (0-1 Yr)	87.55	43.40	32.57
Proposed (1-3 Yrs)	87.55	54.40	38.07

Revenue Hours	Weekdays	Saturdays	Sundays
Proposed (0-1 Yr)	863.70	506.49	379.87
Proposed (1-3 Yrs)	863.70	614.97	434.11

Broadway Bus Lanes

The City of Tucson is leading a project to widen Broadway Boulevard between Euclid Avenue and Country Club Road. Within the scope of the project, two bus only lanes will potentially be constructed to increase the average speed of buses on the corridor. The construction of the bus only lanes on this section of Broadway Boulevard will ultimately allow Sun Tran to use fewer resources to serve the demand along the corridor. As the running time decreases, the number of vehicles required to meet demand will decrease as well. Faster travel times will attract new customers to Routes 8 and 108X which may require additional trips to meet demand.