Comprehensive Operational Analysis of Transit Services

Final Report, January 2014

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

<table>
<thead>
<tr>
<th>Transit System</th>
<th>Completed Surveys</th>
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<tbody>
<tr>
<td>Sun Tran Regular Routes</td>
<td>7,688</td>
</tr>
<tr>
<td>Sun Tran Express Routes</td>
<td>297</td>
</tr>
<tr>
<td>Sun Van</td>
<td>128</td>
</tr>
<tr>
<td>Sun Shuttle</td>
<td>339</td>
</tr>
<tr>
<td>Downtown Loop</td>
<td>137</td>
</tr>
<tr>
<td>Oro Valley Dial-a-Ride</td>
<td>73</td>
</tr>
<tr>
<td><strong>Total Surveys Completed</strong></td>
<td><strong>8,662</strong></td>
</tr>
</tbody>
</table>

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.

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<th>Sun Tran Immediate Changes (Year 0-1)</th>
<th>Service Change</th>
<th>Affected Routes</th>
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<tr>
<td>Service Level Realignment</td>
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<td>Service Rerouting</td>
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<tr>
<td>Service Restructuring</td>
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<td>Service Rerouting</td>
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<tr>
<td>New Services</td>
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<tr>
<td>Service Restructuring</td>
<td>Broadway Bus Lanes / Route 8</td>
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**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.