DATE: March 12, 2013

TO: Metropolitan King County Councilmembers

FROM: Cheryle A. Broom, County Auditor

SUBJECT: Follow-up on Transit Audit – Bus Replacement Economic Analysis

Bus Replacement Economic Analysis at King County Transit

This memorandum is an update on the use of economic replacement analysis for bus purchases at Transit. In 2009 we found that Transit did not conduct economic analysis to determine the optimal time to replace its bus fleets. We recommended (A6):

> *Transit should create economic replacement analysis model to inform its vehicle replacement decisions, starting with a model for the Revenue Fleet.*

In response to this recommendation, Transit contracted with Portland State University (PSU) to develop an economic replacement model. However, Transit has not begun to use the PSU model. The next fleet replacement cycle will start in 2014 when decisions will need to be made concerning the replacement of the initial fleet of hybrid coaches. At that time, the timing of the replacement will be determined. A model will need to be in place to support this decision-making process.

Given the magnitude of Transit's cost of owning and operating buses, approximately $200 million per year, using economic replacement analysis to minimize these costs is particularly important. Economic vehicle replacement analysis considers purchase costs, operating and maintenance costs, and the time value of money to identify the optimal time to replace vehicles. Other county agencies responsible for large fleets (e.g., Fleet Administration) use economic replacement analysis.

Findings and Recommendations of PSU Economic Replacement Modeling

PSU used Transit data on vehicle purchasing and operating costs to conduct economic vehicle replacement analysis for Transit and provided a model to Transit to be used for future economic replacement analysis. Several of the results of the modeling indicate that further consideration of current Transit vehicle replacement practices may be warranted. For example, the PSU study found that:

Vehicle Replacement Age

The optimal replacement age of a diesel bus is 20 years and the optimal replacement age of a hybrid bus is 16-20 years. Transit currently replaces buses, whether diesel or hybrid, after 12-14 years of use.

Vehicle Type

Assuming no Subsidy

In the absence of federal purchase subsidies, diesel buses are more economic than hybrid buses. Transit currently purchases exclusively hybrid buses, and notes that county environmental policy drives this decision.

Assuming 80 Percent Subsidy

Assuming a federal purchase subsidy of 80 percent, hybrid buses are most economic. In other words, if the federal government subsidizes 80 percent of the purchase price, the lower operating costs of a hybrid bus offsets the higher purchase price.

Route Types

The nature of the route (e.g., local with frequent stops vs. express with less frequent stops) may determine whether a diesel or hybrid bus is more economical. However, because Transit did not provide data sufficient to determine the nature of the buses' routes, PSU's modeling could not take the nature of the route into account.

Portland State University Recommended that Transit:

1. Annually update model inputs and rerun the model.
2. Ensure that cost data is associated with the bus route types.

Discussion of the Role of Subsidies in the PSU Analysis

As described above, PSU's analysis found that the amount of federal purchase subsidies is the most important factor in determining whether diesel or hybrid buses are most economical. Assuming no federal purchase subsidies, diesel buses are more economical under most scenarios while assuming 80-percent federal purchase subsidies, hybrid buses are more economical under most scenarios.

The actual amount of federal purchase subsidies at Transit is not clear. While theoretically, the Federal Transit Administration (FTA) subsidizes bus purchases at a maximum of 80 percent, federal grant revenue available to Transit is subject to an annual maximum, and it appears that actual purchase subsidies are significantly less than 80 percent. Further, a large portion of the federal grants, which Transit has historically used for bus purchases and therefore might consider a purchase subsidy for replacement modeling purposes, would accrue to Transit regardless of whether Transit actually uses this revenue for bus purchases. For example, Transit receives $50 million per year from an FTA "preventive maintenance grant." Transit historically used this revenue for bus purchases, but more recently has used this revenue for operations. Because this

grant revenue is received regardless of whether it is used for bus purchases, and recently has been used for purposes other than purchasing buses, it should not be considered a purchase subsidy for the purpose of determining whether diesel or hybrid buses are more economical.

Current Status of Economic Replacement Modeling at Transit

Transit received the PSU economic replacement model in December 2011, but has yet to begin using the model to inform its vehicle replacement decisions. Transit has not updated the model with more current information, as recommended by PSU. Transit notes that they have had difficulty getting the model to work on the County's computer systems. Transit has indicated that they will begin using the model as future replacement decisions are being made. According to Transit, the next fleet replacement will involve the first hybrid fleet which was put into service in 2004. Transit indicates it will conduct replacement analysis of this fleet in 2014, and the analysis will include both economic and non-economic factors, such as overall condition of the fleet and user satisfaction.

Follow-Up Recommendations

1. Transit should annually update and run a vehicle replacement model as Portland State University recommended.
2. Transit should generate data on operating costs by route type in order to determine whether diesel or hybrid buses are most economical by route type, as Portland State University recommended.
3. In conducting economic vehicle replacement analysis, federal subsidies that are received regardless of whether they are used for bus purchases should not be considered a purchase subsidy.

Larry Brubaker, Senior Principal Management Auditor, conducted this follow-up review. Please contact Larry at 296-0369 or me at 296-1655 if you have any questions about the issues discussed in this letter.

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