

**Board Report**

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**FINANCE, BUDGET & AUDIT COMMITTEE  
FEBRUARY 15, 2017****SUBJECT: IMPLEMENTATION OF ALL DOOR BOARDING ON THE SILVER LINE****ACTION: APPROVE CONTINUATION OF ALL DOOR BOARDING ON THE SILVER LINE****RECOMMENDATION**

CONSIDER:

- A. RECEIVING AND FILING an evaluation report on **All Door Boarding (ADB) on the Silver Line**; and
- B. APPROVING continuing All Door Boarding indefinitely on the Silver Line beyond the 6 month pilot period.

**ISSUE**

In March 2016, Metro's Board of Directors (Board) approved the implementation of All Door Boarding (ADB) as a 6 month pilot project on the Silver Line (Line 910/950). The purpose of the pilot, which began in June 2016, is to test a methodology for implementing ADB that increases speed and reliability of bus service, while controlling fare evasion. The pilot was implemented as directed, and pre/post implementation data was collected and analyzed. This report provides an evaluation of the benefits and constraints of ADB, and recommends a path forward for the Silver Line as well as criteria to consider for future ADB implementation.

**DISCUSSION****Background**

In keeping with elements critical to the success of BRT, reducing customers' transit travel time requires improvements to three parts of their trip: wait time, in service running time and stop dwell time. The Silver Line address wait times through high frequencies, and in service running time through signal priorities and partially dedicated right of way, but has not employed elements to address stop dwell times. ADB is a strategy for improving speed and reliability of transit service through faster boarding and more efficient fare collection. The objective of this pilot is to reduce bus stop dwell times and variability, by allowing customers with valid TAP cards to board at any door.

One drawback to this boarding approach is the potential for increased fare evasion. To minimize this concern, the ADB pilot was implemented with the requirement that passengers need to have a validated TAP card when riding the Silver Line. This allows for more thorough fare checks by enforcement officers, similar to the Metro rail system and the Orange Line.

Limiting fare payment to TAP only constitutes a fare change pursuant to Metro Administrative Code (Section 2-50-015). A Title VI analysis and a public hearing are required for any fare change that extends beyond the six month pilot period. A Title VI analysis was thus conducted to assess the impact of this fare change on minority and low-income populations within Metro's ridership, and a public hearing was conducted on October 19, 2016 to consider TAP only boardings as a condition of the Silver Line ADB project. Around 20 comments were received with the majority favoring the ADB pilot with TAP only boarding. As a result, the Board approved this fare change as a component of ADB on the Silver Line.

#### Pilot Logistics

The Silver Line ADB pilot commenced on June 26, 2016. To expedite fare payment and allow for boarding at any door, Bus Mobile TAP Validators (BMV) were installed inside the rear door of all Silver Line buses. In addition, BMVs were installed on the left stanchion immediately inside the front door to allow customers with valid TAP cards to bypass any ongoing activity at the farebox. Customers without valid TAP fare payment or needing assistance continue to enter through the front door to interact with the operator.

To mitigate fare evasion, two dedicated teams of LASD fare enforcement officers were assigned to address fare enforcement and quality of life issues on the Silver Line through the pilot period. Their mission is to provide safety and security under a high visibility deployment plan in which they enforce Metro's Customer Code of Conduct at stations and on board buses.

Prior to commencing the pilot, an extensive public outreach campaign was conducted to educate passengers on the ADB pilot and the TAP only requirement. Staff also visited Operating Divisions that manage the Silver Line to solicit input from the Bus Operators.

#### Findings

Attachment A provides a detailed evaluation report. In general, based on data collect before and after implementation, the Silver Line ADB pilot demonstrated that there can be resource savings from a reduction in dwell time. In addition, reducing the range (or fluctuation) in dwell time from trip to trip helps to improve the line's overall reliability and headway regularity. However, not all bus stops benefit significantly from ADB. As shown in Table 1, bus stops with heavier customer activities (boardings/alightings) experienced greater dwell time reductions compared to stops with fewer activities.

Table 1  
Average Change in Dwell per Customer Boarding/Alighting

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Avg. Boardings/Alighting per Customer	Seconds			
	Feb-16	Oct-16	Change (#)	Change (%)
Stops with 10 or less	12.0	11.0	(0.98)	-8%
Stops with 11-15	4.6	4.2	(0.44)	-9%
Stops with 16-20	6.6	3.6	(3.07)	-46%
Stops with greater than 20	5.1	2.8	(2.28)	-45%

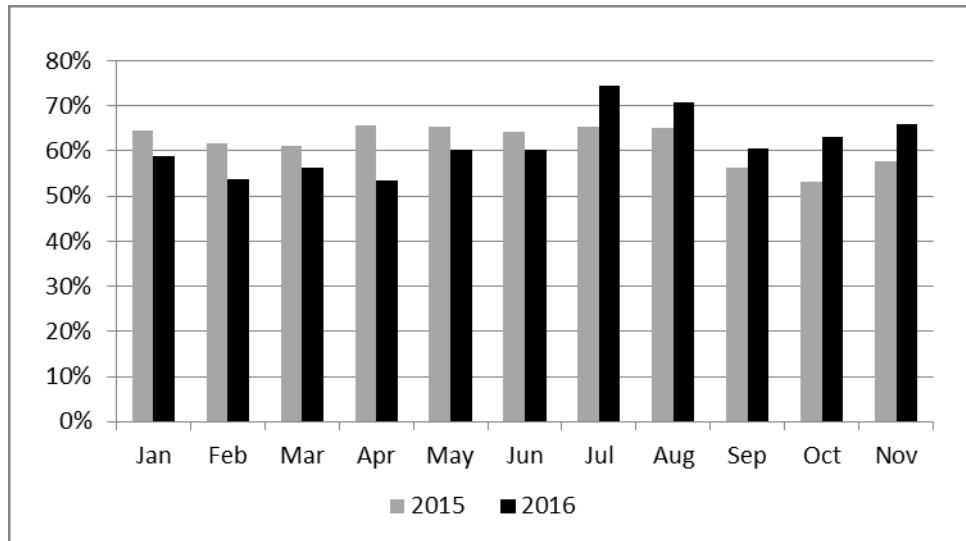
Based on the average customer activity at each stop throughout the day, and the dwell time reductions from Table 1, Table 2 shows the average minutes of dwell time reduction per trip on the Silver Line for different time periods. Prior to ADB, each Silver Line trip incurred about 14 min of dwell time on average. Overall, ADB reduced dwell times by 2.1 minutes per trip, or about 15%. The greatest benefits were achieved during the PM Peak in the southbound direction, with a savings of 3.4 min, while the least amount of savings was during the Early AM in the southbound direction. Since resource (bus) savings can only be achieved if the dwell time savings is equal to greater than the headway (4.5 min in the AM Peak and 5.0 min in the PM Peak), ADB alone does not reduce the number of peak buses required to operate the Silver Line. However, due to increased travel time along the corridor, ADB can be attributed to eliminating the need to add an additional bus during the peak periods, which would cost \$150,000 annually.

Table 2  
Average Change in Dwell Time Per Trip

	Dwell Time Change (min)		
	Northbound	Southbound	Average
Early AM	(2.2)	(0.7)	<b>(1.5)</b>
AM Peak	(2.2)	(2.8)	<b>(2.5)</b>
Base	(2.1)	(2.3)	<b>(2.2)</b>
PM Peak	(2.0)	(3.4)	<b>(2.7)</b>
Evening	(1.1)	(2.2)	<b>(1.7)</b>
Average	(1.9)	(2.3)	<b>(2.1)</b>

Although ADB did not save enough dwell time to achieve operational efficiencies, it did result in less fluctuation in dwell times at stops with heavy customer activity. Since bus schedules are set once for every six month period, reducing fluctuations in both running time and dwell time should result in an improvement in On Time Performance (OTP). Figure 1 shows that OTP improved since the implementation of ADB as a result of 1) dwell time savings being reinvested into running time where needed, and 2) reduction in the fluctuation in dwell times, increasing the probability that schedules will be met. To achieve this improvement without ADB would require additional scheduled time to be added, likely resulting in increased resource requirement (and operating cost), as well as an overall increase in trip travel time. ADB combined with planned ExpressLanes enforcement technology improvements should yield further travel time savings in the future. Additionally, current installation of TVM's at all in-line stations between El Monte Station and the Harbor Gateway Transit Center will reduce the amount of cash paying customer interactions at the farebox, thereby resulting in further ADB savings.

Figure 1  
Silver Line In Service On Time Performance



In addition to the dwell time reductions and improvements to on time performance overall customer response was positive. Eighty six percent of customers surveyed indicated that the ADB project is a good idea and should be continued. Eighty one percent of customers surveyed responded that they have boarded through the back door, and of those, approximately 86% of them prefer to do so.

### Fare Enforcement Efforts

The perception of fare evasion is a concern for passengers who ride the Silver Line. Many passengers surveyed responded that they have seen fare evasion on numerous occasions. Fare evasion, whether real or perceived, continues to be the primary concern for agencies that have implemented ADB, and must be continuously checked and enforced to ensure that it does not escalate.

The Silver Line ADB pilot project was supported by one dedicated team of fare enforcement officers per AM and PM shift. Reports from the fare enforcement officers indicate that fare evasion has decreased from 8% in August to 5% in December 2016 as a result of the dedicated fare enforcement team.

Transitioning more customers from cash to TAP boardings was an objective of the pilot as it reduces dwell times and improves fare enforcement. Overall, there was a decline in the number of customers paying cash, from 46,620 to 30,385, confirming that there has been a significant conversion from cash to TAP. However, there was a slight increase in the difference between actual and expected cash fare revenue. As a result, the average fare revenue per cash customer decreased from \$2.22 to \$2.19.

The Silver Line charges a premium fare of \$2.50 to ride, compared to the base adult cash fare of

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\$1.75. Therefore, customers are required to pay a \$0.75 upcharge if boarding using a free two hour transfer after paying \$1.75 in TAP stored value on a previous line, or with a regular 7-Day, 30-Day, or EZ TAP pass without zone upcharges. Given the uniqueness of the Silver Line fare structure, some customers were either not aware of the upcharge or unsure of when/how to pay it at the farebox. However, through extensive operator and customer outreach and education, increased compliance has become another benefit of the pilot. Within a fifteen-week period, the upcharge compliance showed a steady increase, almost doubling. This improvement increased the average upcharge from \$0.21 to \$0.34.

### Recommendations

Based on the evaluation results, along with upcoming improvements to be implemented along the line, it is recommended that ADB continue on the Silver Line. While resource savings were not achieved during the six month pilot period, it is evident that the program has helped to improve on time performance by reducing fluctuations in dwell time and saving revenue hours to reinvest in running time. In addition, the TAP only boarding improved fare enforcement, upcharge compliance, and reduced dwell time.

Public and employee reaction to ADB has been favorable aside from the concerns about induced fare evasion. Therefore, the dedicated teams on fare enforcement officers must continue to support the Silver Line in order to ensure that fare evasion is monitored and punished, and public perception is addressed.

Future consideration to implement ADB on any other line should adhere to the following minimum requirements:

- High Frequency - In order to maximize resource savings the amount of dwell time saved must equal or exceed the scheduled headway. Therefore, any future candidate for ADB should maintain a peak hour average headway of less than 10 minutes.
- Stop Activity - The Silver Line pilot has shown that the maximum benefits of ADB are derived at stops with heavy customer activity. Therefore, new ADB lines should have more than 10 boardings and alightings per trip at stops that account for at least 50% of the trip's total boardings and alightings.
- Transit Priorities - To minimize the external factors influencing dwell time, any near side stop at a signalized intersection on a candidate line should have transit priorities. In addition, exclusive or partially exclusive Right of Way for the majority of the line is preferable.
- Other Considerations - Other factors that would improve the candidacy of a line for ADB include high wheelchair boardings, articulated buses, and a high percentage of cash paying customers.

### **DETERMINATION OF SAFETY IMPACT**

Approval to continue ADB on the Silver Line will not have a safety impact to customers or employees. Indirectly, based on Operator feedback, ADB may reduce assaults on operators as fare enforcement, one of the major causes of conflict between passengers and Operators, would be largely transferred to law enforcement.

### **FINANCIAL IMPACT**

ADB on the Silver Line will utilize TAP equipment currently installed for the Silver Line. Therefore, no additional funding in the FY17 budget will be required to procure equipment for this program.

The result in dwell time improvements allowed for a reallocation of resources, providing the additional running time needed to improve on time performance, which may have required up to 1,500 annual revenue service hours (RSH). Based on a marginal operating rate of \$100 per RSH, these RSH would have increased the FY17 operating cost by \$150,000.

In addition, the dedicated fare enforcement resulted in a 3% decrease in fare evasion, from 8% to 5%. This improvement represents an annual increase of about \$125,000 in fare revenue.

### **ALTERNATIVES CONSIDERED**

The alternative to staff recommendation is to not continue ADB on the Silver Line. However, this is not recommended as customers will not benefit from shorter dwell times, and Metro will not be able to sustain the improved on time performance without additional resources.

### **NEXT STEPS**

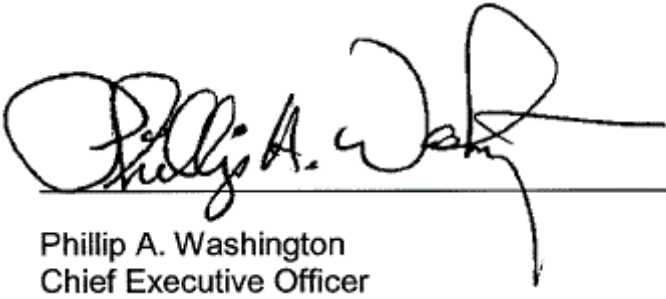
Should the Board approve continuation of ADB on the Silver Line, TAP will continue to support the effort to maintain equipment for the Silver Line, System Safety and Law Enforcement will continue fare checks with the existing deployment plan, and Operations will continue to refine schedules as the ADB program stabilizes.

### **ATTACHMENTS**

Attachment A - Silver Line All Door Boarding Pilot Project Evaluation

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