Metro

Los Angeles County
Metropolitan Transportation
Authority
One Gateway Plaza
3rd Floor Board Room
Los Angeles, CA

Metro®

Board Report

File #: 2015-1714, **File Type:** Program   **Agenda Number:** 31.

SYSTEM SAFETY, SECURITY AND OPERATIONS COMMITTEE
MARCH 17, 2016

SUBJECT: ALL DOOR BOARDING PILOT EVALUATION

ACTION: REPORT ON THE RESULTS OF THE ALL DOOR BOARDING PILOT TEST ON LINE 720, AND APPROVE EXPANSION OF THE PILOT TO THE SILVER LINE.

RECOMMENDATION

CONSIDER:

A.   RECEIVING AND FILING report on the **evaluation results of the All Door Boarding pilot test on the Wilshire BRT** (Line 720); and

B.   APPROVING expanding the pilot program to the Silver Line (Line 910) starting Summer 2016.

ISSUE

On April 15, 2015, the Board of Directors adopted a Motion amending Item #24 of the Planning and Programming Committee. The motion directed staff to study the feasibility of All-Door Boarding (ADB) and Off Board Fare Payment on the Wilshire Boulevard BRT, as well as other applicable corridors, as part of Metro's continuing efforts to improve and enhance the transit experience and support Metro's Countywide BRT expansion.   It further directed staff to assess the practical challenges and opportunities of All-Door Boarding and/or Off-Board Fare Payment. This report provides the evaluation results from a pilot test of ADB conducted on the Wilshire BRT (Line 720) between May 18, 2015 and July 10, 2015.

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 Wilshire BRT addresses wait times through high frequencies, in service running time through signal priorities and bus only lanes, but has not employed elements to address stop dwell time. The ADB pilot program tests the effectiveness of faster boarding through more efficient fare collection. The pilot intends to reduce bus stop dwell times and variability, by allowing customers with

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valid TAP cards to enter at all doors.

Pilot Logistics

The ADB pilot test was conducted along Line 720 (Wilshire BRT), at the Wilshire/Vermont stop westbound during the AM peak (6:00 am-11:00 am) and the Wilshire/Westwood stop eastbound during the PM peak (2:00 pm - 7:00 pm), from May 18, 2015 to July 10, 2015, on weekdays only. Metro customer service representatives were on site to provide information on the pilot project and reminded passengers with valid TAP cards that they could board through any door. Vehicle Operations Supervisors were also present to monitor on-street operations. Prior to commencing the pilot, a comprehensive marketing and outreach effort was conducted. Staff was also available at each stop one week prior to implementation to distribute information on the pilot project and answer questions.

Scope of Evaluation

While ADB can result in true dollar cost savings and revenue impacts, the perceived benefits and drawbacks of the program should be considered equally important in the evaluation, given its influence on service quality and ridership. Therefore, the scope of evaluation of the ADB pilot consists of:

- Calculated dwell time savings and its impact on resource requirement and service reliability;

- Estimated impact to fare evasion;

- Customer perceptions of the benefits and drawbacks of implementing ADB;

- Other challenges and opportunities identified through peer agency review and observations from the ADB pilot program.

Peer agency reviews were also conducted for comparison and guidance on lessons learned. The agencies contacted were MTA in New York, MUNI in San Francisco, King County Metro in Seattle, Washington, and Translink in Vancouver, Canada. Each of these systems implemented ADB in different ways based on the needs of their system and other considerations.

Findings

Attachment B provides a detailed evaluation report. Overall, the ADB pilot demonstrated that there can be resource savings from a reduction in dwell time. In addition, reducing the range (or variability) in dwell time helps to improve the line's overall reliability and headway regularity.

Based on data collected, overall dwell time decreased because boarding is distributed among three doors instead of being limited to the front door only, reducing the overall per person time for boarding. Dwell time per passenger dropped from 4.35 seconds to 2.96 seconds, a decrease of 1.39 seconds

per passenger, or 32.0%. Dwell times can be further reduced by an additional 1.41 seconds, to 1.55 seconds, by restricting boardings to "TAP only". In this scenario, cash payments would not be allowed on board the bus.

In addition, access to all doors means there may be a more even distribution of the passenger load, and less time would be spent boarding and sitting down on buses. As such, there can be less boarding-related safety hazards, fewer opportunities for customer injuries, and less delay before the operator departs from the stop.

The more significant benefit of ADB is the perception of better service, which heavily influences a passenger's decision to use transit. Based on the customer survey conducted as part of the pilot, only 7% of the passengers were not in favor of the program; the overwhelming majority (82%) look forward to its implementation.

Operator and Supervisor feedback also indicates that they believe the ADB project is good for the system and they would support its implementation. Comments from the pilot test debrief sessions included:

-      A noticeably shorter dwell time when there are more than ten people boarding;

-      The customers being better able to see the available seating on the bus; and

-      A reduction in confrontations with passengers regarding fares, which would help avoid disputes and operator assaults.

While ADB can result in real and perceived benefits, the greatest challenge to implementing ADB is the impact to fare evasion. With ADB, passengers are able to bypass the operator by boarding at the un-manned middle and rear doors. Concerns that this policy would induce more fare evasion were voiced by all peer agencies interviewed as well as Metro employees and customers prior to and during the pilot test. Unfortunately, the data collected from the fareboxes and SAVs during the pilot test were inconclusive regarding the impact of ADB on fare evasion. Regardless, public perception is that ADB will induce more customers to evade paying their fare. Metro employees stationed at the pilot locations along with operators of Line 720 also perceived fare evasion as a result of ADB, and all peer agencies interviewed agree, and have implemented a fare enforcement program as part of their ADB project.

Silver Line Pilot

Given the success of the Line 720 ADB pilot conducted from May - June 2015, staff recommends extending the pilot to the Silver Line for a period of 6 months starting in Summer 2016. The Silver Line is an ideal candidate given that dwell time benefits of ADB are much greater for lines that have high levels of boardings per stop compared to those with fewer boardings. In addition, cost efficiencies from reduced running times are much greater for lines with higher frequencies than those

with fewer trips per hour. Finally, lines with more transit priorities to help increase running time speed and reliability would benefit more from ADB as the dwell times are a greater percentage of running time compared to lines that have slower in service speeds. The Silver Line exemplifies all of these characteristics.

The pilot test conducted on Line 720 from May to July 2015 was limited to two stops, during certain time periods only. The Silver Line pilot would be expanded to include all stops all of the time by installing mobile validators (MV) at all doors of the bus allowing passengers to TAP as they enter any door on the bus. As with the Line 720 pilot, the greatest concern is fare evasion. Currently it is difficult to check the fares of all passengers on the bus because not all passengers are provided a proof of payment (e.g. cash and token passengers). Therefore, the Silver Line pilot would require that all passengers pay their fare with a valid TAP card so fare enforcement officers can "sweep" the buses and check for valid TAP cards. A Title VI/Environmental Justice fare equity analysis of this fare change is included in Attachment B.

To address the issue of Cash and Token passengers not being able to board, Ticket Vending Machines (TVM) are being installed at key stations such as Harbor/Gateway. Fareboxes will also be programmed with "Top Off" capabilities, to allow passengers to add stored value to cards on board at stops that are not near TMVs or TAP vendor outlets. In addition, passengers loading their cards remotely through the taptogo.net website or by phone will benefit by being able to use their fare within an hour of load by tapping on a mobile validator, compared to 24-48 hours at the farebox. Finally, as TAP cards replace tokens as a means of providing transportation benefits to social service program clients (who are the primary recipient of tokens) which is currently being pursued, these passengers will benefit from ADB.

DETERMINATION OF SAFETY IMPACT

Approval to expand the ADB pilot to the Silver Line will not have a safety impact to customers or employees. Indirectly, based on Operator feedback on the Line 720 ADB pilot, 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

The ADB pilot on the Silver Line will utilize TAP equipment currently being installed for the Silver Line. Therefore, no additional funding in the FY16 budget will be required to procure equipment for this program. In fact, the ADB pilot on the Silver Line is anticipated to save 1,500 in annual revenue service hours (RSH), or 750 RSH during the 6 month pilot period. Based on a marginal operating rate of $100 per RSH, the pilot savings results in a reduction of $75,000 in operating cost for FY17.

ALTERNATIVES CONSIDERED

The alternative to staff recommendation is to not extend the ADB pilot to the Silver Line. However, this is not recommended as passengers will not benefit from shorter dwell times, and Metro will not be able to reduce the FY17 operating budget by $75,000 while maintaining the same level of service.

NEXT STEPS

Should the Board approve the ADB pilot on the Silver Line, staff will initiate an implementation plan that will include installation of equipment, a revised Silver Line schedule reflecting the shorter dwell times, fare enforcement deployment plan, Operator and passenger outreach.

Prior to the conclusion of the pilot period, staff will provide the Board with a recommendation to terminate the program, continue it on the Silver Line only, or implement ADB on other Metro Lines. This recommendation will be based on an evaluation of actual dwell time savings, ridership impacts, fare evasion rates, and passenger and Operator feedback.
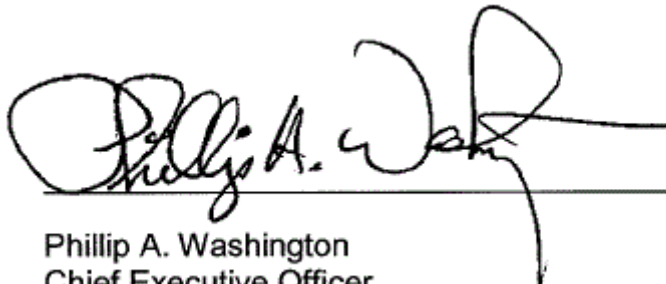
ATTACHMENTS

Attachment A - Line 720 All Door Boarding Pilot Project Evaluation
Attachment B - All Door Boarding Fare Equity Analysis - Feb 2016

Prepared by: Conan Cheung, Executive Officer, Finance, (213) 922-6949
          Anika-Aduesa Smart, Budget Management Analyst IV, (213) 922-6964

Reviewed by: Nalini Ahuja, Executive Director, Finance and Budget, (213) 922-3088

Phillip A. Washington
Chief Executive Officer

Line 720 All Door Boarding Pilot Project Evaluation

Project Summary Report

Objective

On April 15, 2015, the Board of Directors adopted a Motion amending Item #24 of the Planning and Programming Committee (see Attachment 1). The motion directed staff to study the feasibility of All-Door Boarding (ADB) and Off Board Fare Payment (OBFP) on the Wilshire Boulevard BRT, as well as other applicable corridors, as part of Metro's continuing efforts to improve and enhance the transit experience and support Metro's Countywide BRT expansion.   It further directed staff to assess the practical challenges and opportunities of All-Door Boarding and/or Off-Board Fare Payment.

Optimization of the Customer Transit Experience

The Federal Transit Administration (FTA) identifies a number of major elements critical to the success of BRT, such as type of running way, branding, stations, and Intelligent Transportation Systems (ITS). The incorporation of these elements achieves several key BRT objectives, including travel time savings, improved reliability, branding to attract new markets, enhanced safety and security, enhanced capacity, and accessibility.

The Rapid Line 720, Metro's busiest bus line, has an average of 39,000 boardings per weekday. The line is challenged with poor on time performance and bus bunching, as a result of heavy corridor traffic which negatively impacts bus running times. High passenger boarding activity also results in lengthy dwell times, further impacting travel time and reliability.

Initial efforts to implement BRT elements did not include dedicated bus lanes and/or right-of-way or expedited fare payment strategies. However the subsequent addition of a total of 7.7 miles of dedicated peak period bus lanes for the route, completed in August 2015, rounded out six (6) attributes of BRT elements applied to the line, as shown in Table 1.
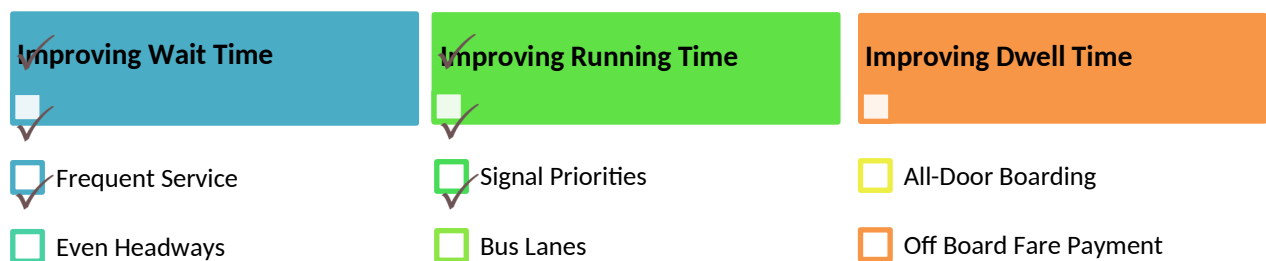
Table 1
Attributes of BRT

Element	Line 720
Running Ways	• Peak hour bus lanes along 7.7 miles of Wilshire Blvd.
Stations	• Rapid designed shelters with customer amenities
Vehicles	• Low floor articulated buses
ITS	• Bus signal priority and NextBus technology
Service and Operations Plan	• Frequent service with longer stop spacing
Branding Elements	• Branded bus color and station design
Fare Collection	N/A

While the new lanes allow buses to operate at higher speeds through the congested corridor, dwell times still continue to increase because of high levels of boarding activity at key stops; as such additional measures need to be taken to reduce transit travel times on this route.

Reducing customers' transit travel time requires improvements to three parts of their trip: wait time, in service running time and stop dwell time. Figure 1 below summarizes the aspects of travel time and the optimizing strategies used to address them.

Figure 1
Travel Time Strategies

Improving Wait Time	Improving Running Time	Improving Dwell Time
☑ Frequent Service	☑ Signal Priorities	☐ All-Door Boarding
☐ Even Headways	☐ Bus Lanes	☐ Off Board Fare Payment

As other efforts are underway to reduce wait time and increase operations speeds as indicated above, the ADB pilot program tests the effectiveness of the remaining element of BRT, faster boarding through more efficient fare collection. It is aimed at reducing bus stop dwell times and variability, by allowing customers with valid TAP cards to enter from the middle and rear doors. Cash and transfer customers were still required to enter from the front door.

The ADB pilot test was conducted along Line 720 (Wilshire BRT), at the Wilshire/Vermont stop westbound during the AM (6:00 am-11:00 am) and the Wilshire/Westwood stop eastbound during the PM (2:00 pm – 7:00 pm) (see Figure 2). The test was conducted from May 18, 2015 to July 10, 2015, on weekdays only.

Stand Alone TAP Validators (SAV) were placed on the sidewalk at the locations of the rear, middle, and front left doors to allow customers to "TAP and Board Any Door". Customers paying with cash, transfer, token, or needing assistance continued to enter through the front door. Metro customer service representatives were on site to provide information on the pilot project and reminded passengers with valid TAP cards that they could board through any door. Vehicle Operations Supervisors were also present to monitor on-street operations.

Figure 2: Wilshire BRT All Door Boarding Pilot Locations
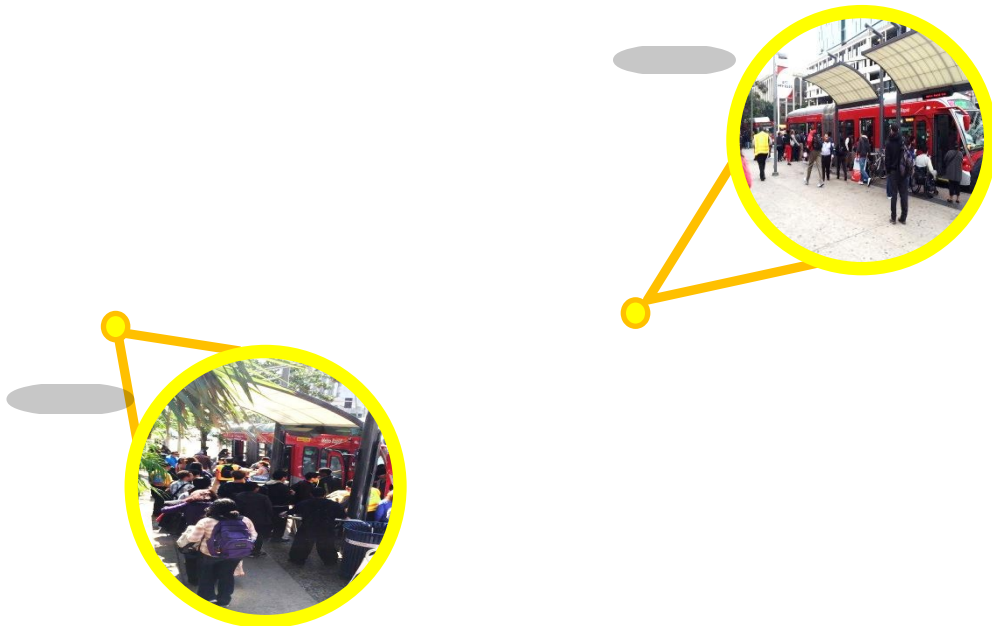
Communications and Customer Engagement

An important part of the process was engaging customers, to share project objectives and solicit their opinions on the value and viability of the project. Prior to commencing the pilot, a comprehensive marketing and outreach effort was conducted, including the distribution of a number of marketing materials in various languages, and social and electronic media. Staff was also available at each stop one week prior to implementation to distribute information on the pilot project and answer questions. The pre-pilot comprehensive marketing and outreach effort included the following:

- Pull-up banners at Wilshire/Vermont
- A-frames at Wilshire/Westwood
- Take-ones
- Flyers
- Poster Boards for divisions
- Post information on metro.net
- Eblasts
- The Source/El Pasajero
- Metro Facebook
- Metro Twitter
- Metro Daily Brief

Staff also visited affected Operating Divisions to solicit input from the Bus Operators.

While ADB can result in true dollar cost savings and revenue impacts, the perceived benefits and drawbacks of the program should be considered equally important in the evaluation, given its influence on service quality and ridership. Therefore, the scope of evaluation of the ADB pilot consists of:

- Calculated dwell time savings and its impact on resource requirement and service reliability;
- Estimated impact to fare evasion;
- Customer perceptions of the benefits and drawbacks of implementing ADB;
- Other challenges and opportunities identified through peer agency review and observations from the ADB pilot program.

To support the evaluation plan, quantitative data was collected during the test period, as well as qualitative assessments through surveys, focus groups and peer agency reviews, as follows:

- Automatic Passenger Counter (APC) boarding data;
- Farebox and Stand Alone Validator (SAV) fare unit counts;
- Manual passenger counts and dwell time checks conducted by OMB staff;
- Data from the Transit Court department regarding fare evasion;
- Customer surveys conducted by OMB and TAP staff; and
- Vehicle Operations Supervisors (VOS), TAP "Blue Shirt" ambassadors and Operator debriefs.

Peer agency reviews were also conducted for comparison and guidance on lessons learned (Attachment 2). The agencies contacted were MTA in New York, MUNI in San Francisco, King County Metro in Seattle, Washington, and Translink in Vancouver, Canada. Each of these systems implemented ADB in different ways based on the needs of their system and other considerations.

The ADB pilot demonstrated that there can be resource savings from a reduction in dwell time. In addition, reducing the range (or variability) in dwell time helps to improve the line's overall reliability and headway regularity. Attachment 3 presents detailed dwell time and resource savings by line for Rapids and Silver Line.

Based on data collected, overall dwell time decreased because boarding is distributed among three doors instead of being limited to the front door only, reducing the overall per person time for boarding. Dwell time per passenger dropped from 4.35 seconds to 2.96 seconds, a decrease of 1.39 seconds per passenger, or 32%. The results also showed buses spent 6.2% less time picking up and dropping off passengers at stops (i.e. dwell time), as a percentage of their overall time in service. Prior to the pilot, dwell time represented 29% of the trip time of the segment, compared to 27% during the pilot. In addition, dwell times can be further reduced by an additional 1.41 seconds, to 1.55 seconds, by restricting boardings to "TAP only". In this scenario, cash payments would not be allowed on board the bus.

Access to all doors means there may be a more even distribution of the passenger load, and less time would be spent boarding and sitting down on buses. As such, there can be less boarding-related safety hazards, fewer opportunities for customer injuries, and less delay before the operator departs from the stop.

The more significant benefit of ADB is the perception of better service, which heavily influences a passenger's decision to use transit. Based on the customer survey conducted as part of the pilot, 89% of passengers thought that it took less time for them to board, with 66% responding with "much faster" and 23% with "somewhat faster". In addition, 75% of survey respondents thought it was easier to board the bus with only 5% thinking it was harder. Only 7% of the passengers were not in favor of the program; the overwhelming majority (82%) look forward to its implementation. Full comments and customer feedback is provided in Attachment 4.

These results support the fact that ADB can produce significant perceived time savings, especially at stops with high boarding volumes, high numbers of cash-paying passengers and on lines with significant wheelchair boardings. For example, at a stop with five boardings, the difference in dwell time between a bus using ADB and one without ADB is roughly seven seconds. However, at a stop with thirty boardings, the dwell time difference increases to 42 seconds; hence the greater time savings at the busier stop results in a greater real and perceived benefit of ADB. Focusing on the Rapids and Silver Line, the project will likely have greatest impact on six lines—704 (Santa Monica Blvd), 720 (Wilshire Blvd), 733 (Venice Blvd), 744 (Van Nuys and Reseda Blvds), 754 (Vermont Ave) and 910 (Silver Line). These lines had a combined weekday average ridership of 107,063, and record nearly 700,000 passengers weekly. There may also be improvements seen on the 757 (Western Ave), whose average weekday ridership is over 13,000.

The real and perceived benefits of ADB are expected to result in ridership increases. Attachment 5 provides detailed estimations of ridership increases for all Rapids and Silver Line. The analysis shows a modest weekday increase of 0.17% as a result of ADB. If boardings were restricted to "TAP Only", weekday ridership increase is projected to be 0.34%.

Operator and Supervisor feedback (summarized in Attachment 6) also indicates that they believe the ADB project is good for the system and they would support its implementation. Comments included:

- A noticeably shorter dwell time when there are more than ten people boarding;
- The customers being better able to see the available seating on the bus; and
- A reduction in confrontations with passengers regarding fares, which would help avoid disputes and operator assaults.

While ADB can result in resource savings and more significant perceived service quality benefits, the greatest challenge to implementing ADB is the impact to fare evasion. Traditionally, front door only boarding allows the operator to serve as a "gate-keeper", quoting the fare to each customer that boards and reminding them to pay. With ADB, passengers are able to bypass the operator by boarding at the un-manned middle and rear doors. Concerns that this policy would induce more fare evasion were voiced by all peer agencies interviewed as well as Metro employees and customers prior to and during the pilot test.

Unfortunately, the data collected from the fareboxes and SAVs during the pilot test were inconclusive regarding the impact of ADB on fare evasion. When comparing fare evasion on the Orange Line, which employs ADB and Off Board Fare Payment, and the overall bus system, the results are equally unclear.

Regardless, public perception is that ADB will induce more customers to evade paying their fare. In the customer survey conducted as part of the ADB pilot test, 52% of respondents stated that they have witnessed fare evasion at the middle and rear doors. However, 82% of these respondents still support ADB. Comments submitted indicated that some customers were frustrated at the amount of fare evasion they perceive. Others were irritated that people who may not be paying are able to board in the rear of the bus and find a vacant seat, while those paying cash at the front were not. "How do they know if I tapped?" and "What about those people who didn't TAP?" were constant questions asked by customers, primarily at Westwood where there is a greater percentage of cash paying customers.

Metro employees stationed at the pilot locations along with operators of Line 720 also perceived fare evasion as a result of ADB. Employees indicated that people are more likely to evade if they are not watched by the operator at the front door or TAP "Blue Shirt" Ambassadors at the middle and rear doors. Employees and customers both reiterated the need for a fare enforcement campaign to complement ADB, to at a minimum, dissuade current and any additional induced fare evasion. All peer agencies interviewed had similar concerns, and have implemented a fare enforcement program as part of their ADB project.

The experience of the rate and pervasiveness of fare evasion varies widely from agency to agency, however all agencies agree that there is a strong correlation between fare enforcement and the amount of fares lost. Based on the experience of King County Metro, New York MTA, and San Francisco MUNI, fare evasion was reduced by as little as 6% to as high as 50% after implementation.

ADB and Off Board Fare Payment are typically service characteristics found on many rail and BRT systems. At Metro, ADB and Off Board Fare Payment have been employed on the rail and Orange Line BRT only. Expanding ADB to the Silver or Rapid Lines requires consideration of the following:

- <u>TAP Only Boardings</u> - To achieve the maximum benefits of ADB and minimize fare evasion, boardings on ADB lines should be limited to TAP only. Not only with this policy improve dwell time savings, it would allow fare enforcement officers to check all passengers for valid TAP payment. Currently it is difficult to check all passengers on the bus because not all passengers are provided a proof of payment (e.g. cash and token passengers). However, implementing a TAP only policy would require a Title VI and Environmental Justice analysis on minority and low income riders.

- <u>Priority Lines</u> – The analysis indicates that the dwell time benefits of ADB are much greater for lines that have high levels of boardings per stop compared to those with fewer boardings. In addition, cost efficiencies from reduced running times are much greater for lines with higher frequencies than those with fewer trips per hour. Finally, lines with more transit priorities to help increase running time speed and reliability would benefit more from ADB as the dwell times are a greater percentage of running time compared to lines that have slower in service speeds.

Attachment 1
Motion Amending Item #24

24

Motion by Directors Bonin, Garcetti and Kuehl
Amending Item # 24 Countywide Bus Rapid Transit
Planning & Programming Committee
April 15, 2015 - REVISED

Metro recently completed a Countywide BRT and Street Design Improvement study and is now embarking on the expansion of its BRT system to address regional mobility goals. BRT systems have proven highly advantageous to passengers, providing frequent, fast, reliable, high capacity service.

Metro has already implemented a range of BRT type improvements in the County from the Rapid system to Dedicated Bus Lane projects to the Orange Line. Travel time and service reliability could be improved through the proper application of off board fare payment and/or all door boarding.

The time needed to load all passengers through the front door and require on board fare payment can significantly slow bus operations, increasing dwell time at stops and potentially impacting schedule reliability.

Moving fare payment off the bus and/or using all doors for boarding offers the potential to reduce dwell time.

Off-board fare payment can present challenges in terms of technology, enforcement and the constrained right of way common in an urban environment. Nevertheless, if Metro is to pursue a world-class system of BRT, the advantages of off-board fare payment and/or all door boarding should not be ignored and should be studied concurrently with Metro BRT studies currently underway.

I THEREFORE MOVE that the Board direct the CEO to report back at the Planning and Programming meeting with a preliminary analysis of the opportunities and challenges of implementing an off-board fare payment program and/or all door boarding to support our Countywide BRT expansion, using industry best practices in technology, station design and enforcement as a guide.

I FURTHER MOVE that the Board direct the CEO to undertake an applied study using the Wilshire Boulevard BRT corridor or other appropriate corridors as an opportunity to fully assess the practical challenges and opportunities. The study should include, but not be limited to:

  A. The impact of off board fare payment and all door boarding policy on bus dwell time, passenger convenience, and fare evasion
  B. Guidelines and criteria for off board fare payment and all door boarding, including options for payment systems, requirements for right of way and utilities for each option, capital cost and ongoing support for each (i.e. maintenance, revenue collection, fare enforcement, etc.)

Off-Board Fare Payment and All-Door Boarding for Bus Service: Peer Survey Results

Peer research was conducted during June and July of 2015 via phone and email correspondence and site visits.   Overall, and was assembled from interviews with the peer agencies and in the case of San Francisco, review of a published report on ADB.

Summary of Peer Survey Research

Basic Characteristics

Extent of All-Door Boarding	All-door boarding is typically allowed throughout the same class of service. In the case of San Francisco, all-door boarding is permitted throughout the entire Muni system.
Extent of Off-Board Fare Payment	While NYC MTA provides fare collection machines at all Select Bus Service stops[1] (in part because of the MetroCard fare media) and KC Metro provides off-board smart card validators at select stops, Translink and SF Muni provide no off-board fare payment options.
Off-Board Fare Payment and All-Door Boarding Program	In San Francisco and Vancouver, mobile validators installed on board the vehicle allow passengers with smart cards to board and pay at any door. In Seattle, smart card holding passengers may board through the rear doors only at stops where off-board validators are present.
On-Board Fare Payment	In these three cities, cash paying customers continue to pay on board at the front door, whereas in New York City, all fare payment takes place off board.[2] Only San Francisco and Vancouver's systems allow customers with electronic smart cards to board through the rear doors and pay on-board.

Proof-of-Payment System and Fare Enforcement

Proof-of-Payment System and Receipts/Transfers	All peer agencies require proof-of-payment while on-board a vehicle with all-door boarding, and provide some form of proof-of-payment to all customers.
Fare Enforcement Regime	At all peer agencies, fare inspectors enforce the proof-of-payment system.
Estimated Fare Evasion	Estimates of fare evasion on these lines ranged from 1% to 8%. Several systems reported declines in fare evasion following all-door boarding and the introduction of fare enforcement. In the case of New York City and Seattle, the decline was almost 50%, while in San Francisco the decline was a fraction of a percent.

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[1] Excluding the Staten Island S79 SBS
[2] With the exception of some transfers purchased with cash.

Technology and Costs

Fleet	Because all-door boarding is deployed on a particular class of service (with the exception of San Francisco), vehicles with all-door boarding have a distinctive bus wrap.
Technology Used	San Francisco, Seattle and Vancouver use small electronic fare card validators for off-board and on-board fare payment, whereas New York City uses ticket vending machines (TVMs) (originally retrofitted subway TVMs and parking meter coin machines).
Capital costs	Costs of the fare collection machines were not readily available from all agencies, but costs range from $7,000 to $27,000 per device.
Maintenance Costs	Agencies reported minimal maintenance costs. TCRP Synthesis 96 *Off-Board Fare Payment Using Proof-of-Payment Verification* states that these costs are not yet recorded in detail throughout the American transit industry.
Enforcement Costs	Estimates varied, with agencies reporting costs either by line, system-wide or per fare inspector.

Outreach, Operations and Outcomes

Outreach & Implementation Process	Agencies typically used a combination of marketing to customers, decals on buses, press events, and customer service employees at stations.
All-Door Boarding Hours	In most cases, all-door boarding is allowed throughout scheduled service, but Seattle limits all-door boarding to daytime hours.
Operator Training	In New York City and King County operators receive special training, while in San Francisco, operators were provided a bulletin explaining the agency's all-door boarding policy.
Outcomes	Because all-door boarding and off-board fare payment were often deployed alongside other improvements, such as transit-only lanes, agencies were unable to ascribe specific gains in ridership or speed to these policies. However, NYC MTA estimates that these two features were responsible for a 10 to 15 percent improvement in travel time. San Francisco observed shorter dwell times per passenger (3.9s to 2.5s on average) and a higher bus system speed (8.48mph to 8.56 mph).

Data Sources

Except where otherwise specified, information comes from the following sources:

- King County Metro: Interview with Karen Rosenzweig, 6/12/2015
- Translink: Interview with Marisa Espinosa, 6/30/2015
- NYCMTA: Interview with Robert Thompson, 7/2/2015
- SFMTA: All-Door Boarding Evaluation Final Report, December 2014

Off-Board Fare Payment and All-Door Boarding for Bus Service: Peer Survey Results

Table 1. Basic Characteristics

	Extent of All-Door Boarding	Extent of Off-Board Fare Payment	Off-Board Fare Payment and All-Door Boarding Program	On-Board Fare Payment
King County Metro (Seattle, WA Area)	RapidRide lines, which include a variety of BRT-like treatments.	Stops on RapidRide lines with more than 150 boardings per day.	Stand-alone fare transaction processors (smart card validators) are present at high ridership bus 'stations', and allow smart card holders to validate and board through rear doors. At RapidRide stops without validators, only customers with paper transfers may board through rear doors.	Customers paying cash and smart card users at non-station stops continue to pay on-board at the front door.
Translink – Coast Mountain Bus Company (Vancouver, BC Area)	99 B-Line and 145 Line. Translink has previously deployed ADB on other routes, and is evaluating ADB for all routes with articulated buses. Note that Translink officially uses the term "Three Door Boarding" (3DB).	Not present. Translink is considering off-board validation at select stops and a ticket vending machine for the 620 line, which is heavily used by tourists.	All-door boarding is permitted at all stops of the 99-B Line and select 145 Line stops, due to the large proportion of university students on these lines who possess electronic fare cards. Customers tap at mobile validators as they board **and** as they exit.	Customers with electronic fare cards may pay at mobile validators at each door. Customers paying cash continue to pay on-board at the front door.
New York City MTA (New York City, NY area)	Select Bus Service lines (with the exception of the S79 SBS Line)	Select Bus Service lines (with the exception of the S79 SBS Line)	Customers pay their fare at off-board ticket vending machines at SBS stops, which provide a receipt that constitutes proof-of-payment. Off-board fare payment is required. All-door boarding is permitted at SBS stops.	No on-board fare payment, with the exception of cash-paying customers buying a transfer pass.

	Extent of All-Door Boarding	Extent of Off-Board Fare Payment	Off-Board Fare Payment and All-Door Boarding Program	On-Board Fare Payment
San Francisco Municipal Transportation Agency (San Francisco, CA)	All buses and trains in network (excluding cable car lines)	Not present.	There is no off-board fare payment at Muni bus stops. All passengers with tickets and smart cards may board through the rear door after validating on-board, and customers with transfers may board through the rear doors as well.	Mobile Validators on board vehicles allow smart card holders to board and pay through any door. Customers paying cash continue to board and pay at the front door.

Table 2. Proof-of-Payment System and Fare Enforcement

	Proof-of-Payment System and Receipts/Transfers	Fare Enforcement Regime	Estimated Fare Evasion
King County Metro (Seattle, WA Area)	Customers must have proof-of-payment. Customers paying cash receive a transfer at the front door, and other passengers must have valid fare.	Twelve contracted inspectors patrol the six RapidRide lines in teams of two.	1% to 4%, depending on the RapidRide line. According to a pre-RapidRide survey, fare evasion was at 7% before dropping to 4% on one line.
Translink – Coast Mountain Bus Company (Vancouver, BC Area)	Translink created a "Fare Paid Zone" (FPZ) onboard buses with all-door boarding.	Transit police and unarmed security officers conduct random checks on board using mobile validators, though these inspections primarily happen on the rail network.[3]	Approximately 5% on lines with All-Door Boarding.
New York City MTA (New York City, NY area)	Customers must have proof-of-payment. Receipts provided by off-board ticket vending machines constitute proof-of-payment.	Team of fare enforcement officers (known as the "Eagle Team") patrol SBS lines.	6.1% on the Bx12, a 50% decrease from pre-SBS levels.[4] SBS has lower fare evasion rates than local service because of the inspections.
San Francisco Municipal Transportation Agency (San Francisco, CA)	Customers must have proof-of-payment throughout the Muni system. Customers boarding with cash receive a paper transfer at the front door, and other passengers must have valid fare.	Approximately 50 Transit Fare Inspectors (SFMTA staff) inspect both buses and the rail system.[5] Thirteen new inspectors were hired for the implementation of all-door boarding system wide.	7.9% ±.2% system wide with ADB, compared to 8.4%±.6% two years before implementation and 9.5%±.3% five years before implementation.

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[3] Lindblom, Mike. "Shooting brings attention to light rail's fare inspection force." The Seattle Times. July 8, 2014
[4] TCRP 96
[5] SFOpenBook Employee Compensation

Table 3. Technology and Costs

	Fleet	Technology Used	Capital costs	Maintenance Costs	Enforcement Costs
King County Metro (Seattle, WA Area)	Three-door, articulated, low-floor buses with distinctive RapidRide bus wrap.	1 smart-card validator placed at selected bus stops.	The 131 electronic fare card readers in the RapidRide system cost KC Metro $1.05 million, or roughly $8000 per reader.[6]	Minimal. The units are cleaned during regular station maintenance, and have so far required only sporadic maintenance.	$1 million per year for all lines.
Translink – Coast Mountain Bus Company (Vancouver, BC Area)	The 99-B Line uses articulated buses. Chimes at rear doors close have improved safety, but not all buses feature these.	1 mobile validator at the front door, and 2 validators each at middle and rear doors. (Passengers are required to tap off as well as on, so two validators help expedite these processes). Validators have slight delay as a card is read.	Not available.	Not available.	Not available.

[6] RapidRide Performance Evaluation Report

	Fleet	Technology Used	Capital costs	Maintenance Costs	Enforcement Costs
New York City MTA (New York City, NY area)	Buses with distinctive SBS bus wrap. These buses continue to have fareboxes due to the need for some passengers to pay for additional transfers.	Retrofitted subway TVMs and parking meters were installed at all early SBS stops. Since that time, the agency has developed SBS-specific machines to be used for Off-Board Fare Payment.	Each MetroCard Fare Collection machine costs approx. $27,000 each (usually two are installed at each stop), and each Coin fare collection machine costs approx. $7000 each.[7] The cost of installing and powering these machines can also be considerable.	Not available.	$700,000 to $1.5 million per line, per year.
San Francisco Municipal Transportation Agency (San Francisco, CA)	Because All-Door Boarding is present throughout the Muni system, no sub-fleets are used for All-Door Boarding.	1 mobile validator is present at each door of a Muni vehicle.	Not available.	Not available.	The cost of a fare inspector, net of additional fines received, is estimated to be $47,000. The median compensation of a fare inspector in CY14 was approximately $97,000.[8]

[7] TCRP 96
[8] SFOpenBook Employee Compensation

Table 4. Outreach, Operations and Outcomes

	Outreach & Implementation Process	All-Door Boarding Hours	Operator Training	Outcomes
King County Metro (Seattle Area)	Outreach began one month in advance. Marketing to customers has focused not on making off-board fare payment "another way to pay," but rather as an opportunity to "speed up the trip." Decals indicate that customers pay at front after 7PM	6AM to 7PM. Plans to extend times limited by need for Transit Police support for Fare Inspection.	Operators who pick these lines receive a special training on the characteristics of the RapidRide program.	Generally, RapidRide ridership is higher by 40% compared to previous routes, but attributing the improvement to ADB or OBFP is not possible.
Translink – Coast Mountain Bus Company (Vancouver, BC Area)	Customer service campaign, as well as outreach through signage, decals, signs at stops, and branding. Added signage to route: "3 door boarding location". Most bus stops have a marked queue location, so it's clear where ADB is allowed.	Throughout operating hours for lines with all-door boarding.	No special operator training	Most customers see greater advantages than disadvantages with all-door boarding and proof-of-payment, according to a customer survey.

	Outreach & Implementation Process	All-Door Boarding Hours	Operator Training	Outcomes
New York City MTA (New York City, NY area)	Outreach before SBS service began included: • Community Meetings • Elected Officials Meetings Outreach following SBS implementation included: • Deployment of Customer Ambassadors for 2 week time frame for 13-15 hours per day • Branding of SBS buses, fare machines (branding of SBS helped cut down on the confusion factor) • Information decals on all doors	Throughout Select Bus Service operating hours.	All SBS operators go through special training (e.g., don't need to make people pay). Operators prefer the SBS routes as they can drive faster with little or no time points	By itself, OBFP and ADB resulted in an estimated 10-15 percent improvement in travel time. MTA observed a 10% increase in passengers within the first year of implementing SBS.

	Outreach & Implementation Process	All-Door Boarding Hours	Operator Training	Outcomes
San Francisco Municipal Transportation Agency (San Francisco, CA)	Outreach before all-door boarding implementation included: • Informational panels on the inside of vehicles • A press event • Outreach to community groups • Web videos Outreach during ADB implementation included: • New decals on vehicles Other implementation steps included: • Fare Inspector Staffing Increase • Transportation Code Amendments • A Fare Survey	Throughout service hours, but an operator may choose to limit boarding to the front door only if safety concerns arise.	The agency provided a bulletin to operators explaining the new procedures.	SFMTA observed: - shorter dwell times per boarding and alighting (from an avg. of 3.9sto 2.5s) - higher bus system speed (from an avg of 8.48mph in FY12 to 8.56mph in FY14)

Attachment 3
Dwell Time Savings Analyses

The following tables demonstrate where savings can be achieved throughout Metro's system, based on headway by route, time of day and day of week. Data was collected from the APC (Automatic Passenger Counter) program for the timed door opening and closing of each of the buses on route 720 during the Pre-Test and Test Periods (May 4-15, 2015 and May 18-29/June 8-19, 2015 respectively).

The tables first calculate the dwell time savings (in minutes, per trip, based on the ridership during that time of day:

Savings = (Ridership x Seconds Saved per Boarding/60) / No. of Trips (in minutes)

The number of buses saved is then calculated as

No. Buses = Savings / Headway Time

The green highlights on both sets of tables indicate the areas where at least 0.5 buses could be saved with ADB. To calculate overall number of buses that could be saved, results of 0.7 buses and above were considered a "full bus" and results of 0.5 and 0.6 buses were considered "half buses". The values were then tabulated to determine by time of day, and by day of week, how many buses could be saved using ADB.

Dwell Time Savings Analyses – Cash and TAP Boardings

CHANGE IN BUS REQUIREMENT - WEEKDAY

LINE	DIR	EAM	AM	MID	PM	EVE	DIR	EAM	AM	MID	PM	EVE
704	W	0.0	0.2	0.1	0.2	0.0	E	0.0	0.1	0.1	0.2	0.1
705	N	0.0	0.1	0.1	0.1	0.0	S	0.0	0.1	0.1	0.1	0.0
710	N	0.0	0.1	0.1	0.1	0.0	S	0.0	0.1	0.1	0.1	0.0
720	W	0.1	0.9	0.5	0.3	0.1	E	0.0	0.2	0.4	0.7	0.3
728	W	0.0	0.1	0.1	0.1	0.0	E	0.0	0.1	0.1	0.1	0.0
733	W	0.0	0.2	0.2	0.1	0.0	E	0.0	0.1	0.1	0.2	0.1
734	N	0.0	0.1	0.1	0.1	0.0	S	0.0	0.1	0.1	0.0	0.0
740	N	0.0	0.0	0.0	0.0	0.0	S	0.0	0.1	0.0	0.0	0.0
744	W	0.0	0.1	0.1	0.1	0.0	E	0.0	0.1	0.1	0.1	0.1
745	N	0.0	0.1	0.1	0.1	0.0	S	0.0	0.1	0.0	0.1	0.0
750	W	0.0	0.1	0.0	0.0	0.0	E	0.0	0.0	0.0	0.1	0.0
751	N	0.0	0.1	0.1	0.1	0.0	S	0.0	0.1	0.1	0.1	0.0
754	N	0.0	0.3	0.2	0.3	0.0	S	0.0	0.2	0.2	0.4	0.1
757	N	0.0	0.2	0.2	0.2	0.0	S	0.0	0.1	0.2	0.2	0.0
760	N	0.0	0.1	0.1	0.1	0.0	S	0.0	0.1	0.0	0.1	0.0
762	N	0.0	0.1	0.1	0.1	0.0	S	0.0	0.0	0.1	0.1	0.0
770	W	0.0	0.1	0.1	0.1	0.0	E	0.0	0.1	0.1	0.1	0.0
780	W	0.0	0.1	0.1	0.2	0.0	E	0.0	0.2	0.1	0.2	0.0
788	N	0.0	0.0	0.0	0.0	0.0	S	0.0	0.1	0.0	0.0	0.0
794	N	0.0	0.1	0.1	0.1	0.0	S	0.0	0.1	0.1	0.1	0.0
910	N	0.0	0.2	0.1	0.2	0.1	S	0.0	0.3	0.1	0.2	0.0

CHANGE IN BUS REQUIREMENT - SATURDAY

LINE	DIR	EAM	AM	MID	PM	EVE	DIR	EAM	AM	MID	PM	EVE
704	W		0	0	0	0	E	0	0	0	0	0
705	N						S					
710	N		0	0	0	0	S		0	0	0	0
720	W	0	0	0	0	0	E	0	0	0	0	0
728	W						E					
733	W	0	0	0	0	0	E	0	0	0	0	0
734	N						S					
740	N	0	0	0	0	0	S		0	0	0	0
744	W	0	0	0	0	0	E		0	0	0	0
745	N	0	0	0	0	0	S	0	0	0	0	0
750	W						E					
751	N						S					
754	N		0	0	0	0	S		0	0	0	0
757	N						S					
760	N	0	0	0	0	0	S	0	0	0	0	0
762	N						S					
770	W		0	0	0	0	E		0	0	0	
780	W						E					
788	N						S					
794	N						S					
910	N	0	0	0	0	0	S	0	0	0	0	0

CHANGE IN BUS REQUIREMENT - SUNDAY

LINE	DIR	EAM	AM	MID	PM	EVE	DIR	EAM	AM	MID	PM	EVE
704	W		0	0	0	0	E	0	0	0	0	0
705	N						S					
710	N						S					
720	W	0	0	0	0	0	E	0	0	0	0	0
728	W						E					
733	W	0	0	0	0	0	E	0	0	0	0	0
734	N						S					
740	N						S					
744	W	0	0	0	0	0	E		0	0	0	0
745	N		0	0	0	0	S		0	0	0	0
750	W						E					
751	N						S					
754	N		0	0	0	0	S		0	0	0	0
757	N						S					
760	N						S					
762	N						S					
770	W						E					
780	W						E					
788	N						S					
794	N						S					
910	N	0	0	0	0	0	S	0	0	0	0	0

To ensure an "apples to apples" comparison of the dwell time savings before and after the ADB pilot, the data from the Service Planning and Analysis (SPA) Department was used for the first analysis, and the savings per passenger was 1.39 seconds with the standard mix of cash and TAP passengers.

The calculation of the additional "TAP only" boardings savings (in the following tables) was calculated with data collected by OMB staff for the second and third doors only, where TAP only boarding times through the middle and rear doors were recorded and was the only such

data available to draw comparison. In this second analysis, assuming all of the same ridership would be using TAP to pay, the calculations are done with an additional 1.41 sec per passenger time savings (a total of 2.8 seconds per passenger).

Dwell Time Savings Analyses – TAP Only Boardings

CHANGE IN BUS REQUIREMENT - WEEKDAY - TAP ONLY

LINE	DIR	EAM	AM	MID	PM	EVE	DIR	EAM	AM	MID	PM	EVE
704	W	0.0	0.4	0.3	0.3	0.1	E	0.0	0.2	0.2	0.4	0.2
705	N	0.0	0.3	0.1	0.2	0.0	S	0.0	0.2	0.1	0.2	0.0
710	N	0.0	0.2	0.2	0.2	0.0	S	0.0	0.2	0.2	0.2	0.0
720	W	0.2	1.8	0.9	0.7	0.3	E	0.1	0.5	0.7	1.5	0.5
728	W	0.0	0.3	0.1	0.2	0.0	E	0.0	0.1	0.1	0.2	0.0
733	W	0.0	0.5	0.3	0.3	0.1	E	0.0	0.2	0.2	0.4	0.2
734	N	0.0	0.1	0.2	0.2	0.1	S	0.0	0.2	0.1	0.1	0.0
740	N	0.0	0.1	0.1	0.1	0.0	S	0.0	0.1	0.1	0.1	0.0
744	W	0.0	0.2	0.3	0.2	0.0	E	0.0	0.2	0.3	0.3	0.1
745	N	0.0	0.2	0.1	0.2	0.0	S	0.0	0.1	0.1	0.2	0.0
750	W	0.0	0.2	0.1	0.1	0.0	E	0.0	0.1	0.1	0.1	0.0
751	N	0.0	0.1	0.1	0.2	0.0	S	0.0	0.2	0.1	0.1	0.0
754	N	0.0	0.6	0.5	0.5	0.1	S	0.0	0.5	0.4	0.7	0.1
757	N	0.0	0.4	0.4	0.4	0.0	S	0.0	0.3	0.3	0.5	0.0
760	N	0.0	0.2	0.1	0.1	0.0	S	0.0	0.1	0.1	0.2	0.0
762	N	0.0	0.1	0.1	0.1	0.0	S	0.0	0.1	0.1	0.1	0.0
770	W	0.0	0.2	0.2	0.2	0.0	E	0.0	0.2	0.2	0.2	0.0
780	W	0.0	0.3	0.2	0.3	0.0	E	0.0	0.3	0.2	0.3	0.0
788	N	0.0	0.0	0.0	0.1	0.0	S	0.0	0.1	0.0	0.0	0.0
794	N	0.0	0.1	0.1	0.1	0.0	S	0.0	0.2	0.1	0.2	0.0
910	N	0.0	0.5	0.3	0.5	0.1	S	0.1	0.6	0.2	0.4	0.1

CHANGE IN BUS REQUIREMENT - SATURDAY - TAP ONLY

LINE	DIR	EAM	AM	MID	PM	EVE	DIR	EAM	AM	MID	PM	EVE
704	W		0	0	0	0	E	0	0	0	0	0
705	N						S					
710	N		0	0	0	0	S		0	0	0	0
720	W	0	0	0	0	0	E	0	0	0	0	0
728	W						E					
733	W	0	0	0	0	0	E	0	0	0	0	0
734	N						S					
740	N	0	0	0	0	0	S		0	0	0	0
744	W	0	0	0	0	0	E		0	0	0	0
745	N	0	0	0	0	0	S	0	0	0	0	0
750	W						E					
751	N						S					
754	N		0	0	0	0	S		0	0	0	0
757	N						S					
760	N	0	0	0	0	0	S	0	0	0	0	0
762	N						S					
770	W		0	0	0	0	E		0	0	0	
780	W						E					
788	N						S					
794	N						S					
910	N	0	0	0	0	0	S	0	0	0	0	0

CHANGE IN BUS REQUIREMENT - SUNDAY - TAP ONLY

LINE	DIR	EAM	AM	MID	PM	EVE	DIR	EAM	AM	MID	PM	EVE
704	W		0	0	0	0	E	0	0	0	0	0
705	N						S					
710	N						S					
720	W	0	0	0	0	0	E	0	0	0	0	0
728	W						E					
733	W	0	0	0	0	0	E	0	0	0	0	0
734	N						S					
740	N						S					
744	W	0	0	0	0	0	E		0	0	0	0
745	N		0	0	0	0	S		0	0	0	0
750	W						E					
751	N						S					
754	N		0	0	0	0	S		0	0	0	0
757	N						S					
760	N						S					
762	N						S					
770	W						E					
780	W						E					
788	N						S					
794	N						S					
910	N	0	0	0	0	0	S	0	0	0	0	0

It was determined that savings could only be achieved within the weekday headways.

Resource Savings

The following table shows the number of daily buses and revenue service hours (RSH) that can be saved by implementing All Door Boarding on Rapids and Silver Line for both scenarios.

TAP and Cash Boardings

	Time Periods				
	AM	MID	PM	EVE	Total
Buses/Day	1	-	1	-	
RSH/Bus	3	6	4	4	
RSH/Day	3	-	4	-	7
RSH/Year	765	-	1,020	-	1,785
Savings/Year	**$76,500**	**$0**	**$102,000**	**$0**	**$178,500**

TAP Only Boardings

	Time Periods				
	AM	MID	PM	EVE	Total
Buses/Day	5	3	5	1	
RSH/Bus	3	6	4	4	
RSH/Day	15	18	20	4	57
RSH/Year	3,825	4,590	5,100	1,020	14,535
Savings/Year	**$382,500**	**$459,000**	**$510,000**	**$102,000**	**$1,453,500**

The calculation for savings is as follows, calculated by time of day:

Annualized savings = No. of Buses x No. of Hours x Marginal Cost x No. of Weekdays,
Where the Marginal Cost = $100.00 and No. of Weekdays = 255.

Attachment 4
Customer Survey Report Summary

The customer service survey was conducted to assess the qualitative aspects of the project, to examine usage trends and customer reactions to the change, and to gain insight and measure customer perception of the service.

Key Findings:
- 82 percent of customers hope to see all-door boarding return, with fewer than 7 percent opposing the continuation of all-door boarding.
- A slight majority of customers stated that they had seen some fare evasion. Those who had seen some individuals boarding without paying were five percentage points less likely to support continuing all-door boarding.
- Customers overwhelmingly thought boarding was easier and faster during the pilot test. However, there was no agreement on whether all-door boarding reduced or worsened crowding.
- Customers who paid with cash at the front door also stated that boarding the bus was easier and faster with all-door boarding. Furthermore, about 60 percent of cash-paying customers indicated that all-door boarding made them want to purchase a TAP card.
- The addition of fare enforcement and ticket vending machines to a full implementation of all-door boarding would allay most customer concerns.

A survey of 1642 customers during four days of the All-Door Boarding (ADB) pilot test shows that the vast majority of customers (82 percent) support continuing all-door boarding. Customers were concerned by a lack of nearby ticket vending machines and fare enforcement, issues which could be addressed in a full implementation of all-door boarding.

Summary of Survey Questions and Responses			
1. How often do you ride the 720 line at this time of day?	5+ days/week: 69%		3-4 days/week: 15%
	1-2 days/week: 7%		1-3 days/month: 3%
	Rarely/Never: 6%		
2. Have you tried boarding through the middle or back doors of the 720 line?	Yes: 75%	Unsure: 1%	No: 23%
3. Do you think boarding the bus is easier, harder, or about the same with All-Door Boarding?	Easier: 75%	Harder: 5%	No Opinion / Same: 20%
4. Do you think the bus feels less crowded, more crowded, or about the same with All-Door Boarding?	Less: 24%	More: 28%	No Opinion / Same: 49%
5. Have you seen people boarding without tapping at the middle or back doors?	No: 40%	Yes: 52%	No Opinion: 8%
6. How much faster do you think passengers get on the bus with All-Door Boarding?	Much Faster: 66%	Somewhat Faster: 23%	No Opinion/ No Change: 11%
7. Do you think Metro should continue with All-Door Boarding after the test ends?	Yes: 82%	No: 7%	Neutral / No Opinion: 11%
8. What will you use to pay when you ride the bus today?	TAP or transfer: 85%		Cash or Tokens: 15%
9. If you paid cash, does All-Door Boarding make you want to purchase a TAP card?	Yes: 59%	No: 24%	Unsure: 17%

Support for All-Door Boarding Stems from Easier, Faster Boarding
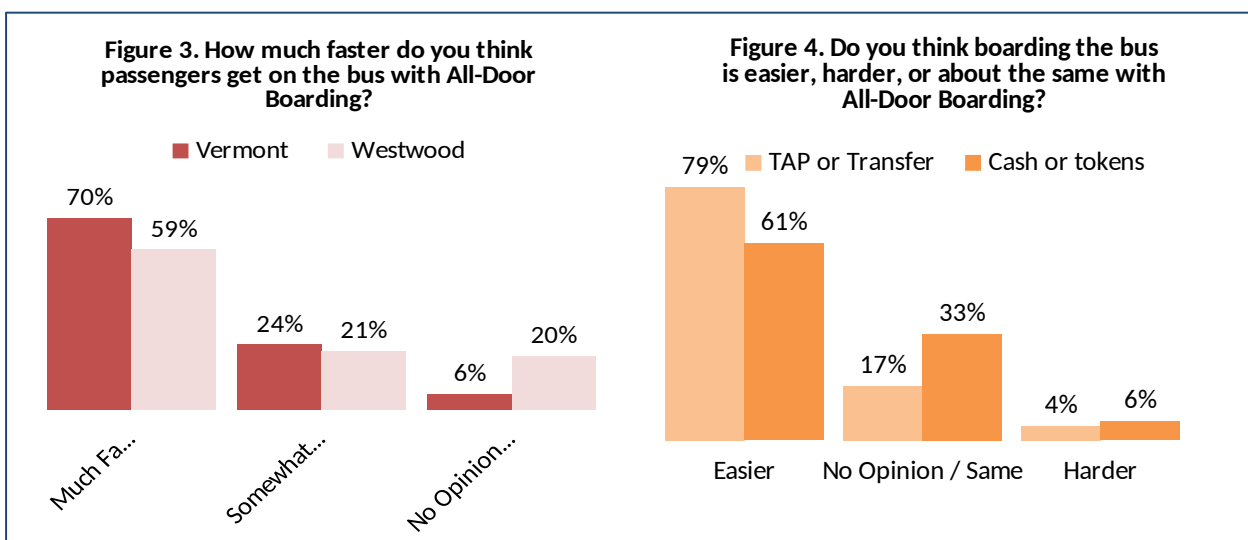
The vast majority of customers found boarding faster and easier with all-door boarding (see figures 1 and 2), but thought that the ADB could be improved with nearby ticket vending machines.

Figure 1. How much faster do you think passengers get on the bus with All-Door Boarding?

Much Fa... 66%
Somewhat... 23%
No Opinion... 11%

Figure 2. Do you think boarding the bus is easier, harder, or about the same with All-Door Boarding?

Easier 75%
No Opinion / Same 20%
Harder 5%
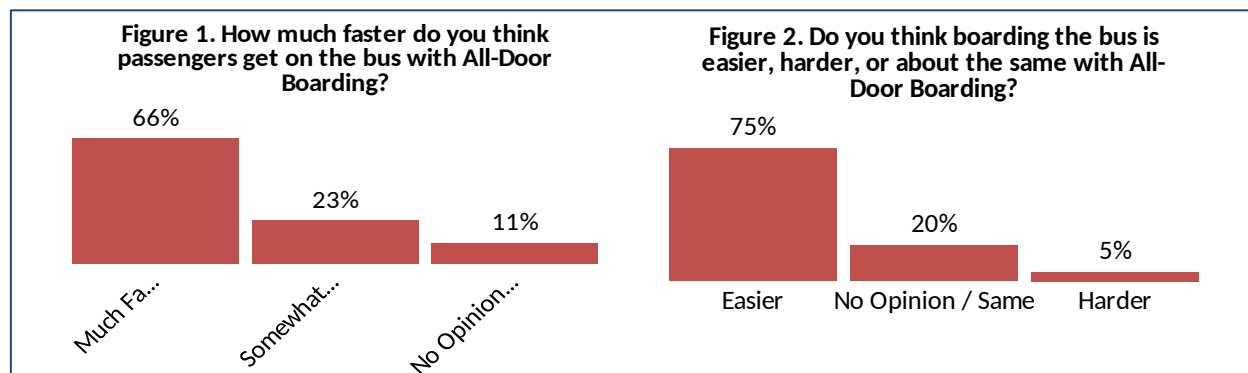
Metro can expect additional support for all-door boarding at Rapid stops where more customers have TAP cards and lines to board are longer. Customers at Wilshire and Vermont, where queues to board the bus are somewhat longer and a larger proportion of customers pay with TAP cards, were more likely to say that all-door boarding made passengers board the bus "much faster" (see Figure 3). Through comments on surveys, customers frequently requested that Metro install ticket vending machines near bus stops so that TAP cards could be purchased or reloaded.

Still, even those customers paying in cash found it easier to board the bus with all-door boarding. Of those paying cash, 61 percent found boarding easier (see Figure 4) and 79 percent found boarding "Much Faster" or "Somewhat Faster". Moreover, of those who did not have a TAP card or transfer, about sixty percent said they would consider purchasing a TAP card for the opportunity to make use of all-door boarding.

Vermont customers who paid cash were more likely than those at Westwood to state that all-door

Figure 3. How much faster do you think passengers get on the bus with All-Door Boarding?

■ Vermont ■ Westwood

Much Fa... : Vermont 70%, Westwood 59%
Somewhat... : Vermont 24%, Westwood 21%
No Opinion... : Vermont 6%, Westwood 20%

Figure 4. Do you think boarding the bus is easier, harder, or about the same with All-Door Boarding?

■ TAP or Transfer ■ Cash or tokens

Easier: TAP or Transfer 79%, Cash or tokens 61%
No Opinion / Same: TAP or Transfer 17%, Cash or tokens 33%
Harder: TAP or Transfer 4%, Cash or tokens 6%

boarding would make them consider buying a TAP card. This may be because of the availability of ticket vending machines nearby at Wilshire & Vermont station.

Most respondents (49 percent) felt that all-door boarding made no discernable impact on crowding, and the remaining responses were split on whether crowding had improved or worsened.

Opposition to All-Door Boarding Rooted in Concerns about Fare Evasion

A slight majority of customers, 52 percent, stated that they had seen others boarding without tapping at the middle or rear doors. This figure does not reflect an estimate of actual fare evasion, but rather the possible extent of fare evasion perceptions. For instance, it may be that several of these respondents witnessed the same individual boarding without paying, or that some individuals witnessed only one individual boarding without paying.

Opposition to all-door boarding appears to be rooted in these concerns about fare evasion, with customers opposed to all-door boarding more likely to say that they had seen some individuals boarding without paying. As a result, those who saw fare evasion were approximately five percentage points less likely to say they supported all-door boarding than those who did not, though most still supported continuing all-door boarding (see Figure 5). In general, those opposing all-door boarding were less likely to have tried boarding through the middle and rear doors and less likely to pay with a TAP card. As a result, some opposition may stem from a sense that customers paying at the front door are being treated unfairly compared to those who are able to board through the rear doors without paying. Because those opposing all-door boarding were less likely to be frequent riders, they may also be less likely to see benefits from boarding through all doors. Comments from customers opposed to all-door boarding—and even those who favor it—frequently echo these frustrations.

Figure 5. Support for ADB, Grouped by Whether Fare Evasion was Observed
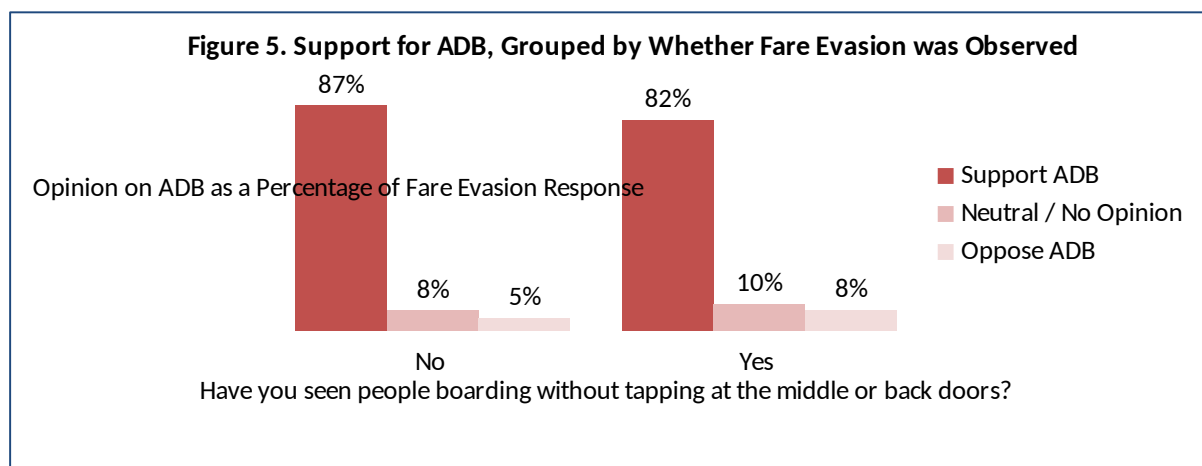
Notably, the opposition to all-door boarding was not necessarily based on direct observations of fare evasion: More than 30 percent of those opposed to all-door boarding did not report seeing fare evasion take place. Nor was it a matter of customers disappointed by the outcomes of the pilot project. A plurality of customers who disliked all-door boarding still found boarding to be easier (39% for "Easier" versus 22% for "Harder"). Similarly, a slight majority of those opposed found boarding "Much Faster" or "Somewhat Faster".

Frequency of Riding and Time-of-Day Affect Perceptions of All-Door Boarding

Customers who frequently ride the 720 Line were more likely to perceive benefits from all-door boarding than infrequent customers, largely because members of the former group are more likely to have a TAP card and to have tried boarding through the middle and rear doors. In this survey, we define 'frequent' customers as those who ride the 720 line at least 3 times per week at the location where they were surveyed.[9] Although infrequent customers were less likely to have an opinion on all-door boarding, most still supported the idea of continuing all-door boarding after the end of the pilot. Peak hour and non-peak hour riders provided largely similar responses to the survey, though peak hour riders showed slightly more support for all-door boarding.[10]

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[9] By this definition, "infrequent" customers may ride lines other than the 720 Line on a regular basis.
[10] Peak hour is 6 AM to 9 AM (exclusive of 9:00:00 AM) and 4 PM to 6 PM (exclusive of 6:00:00 PM). All other times are off-peak.

Attachment 5
Ridership Growth Assumptions

TAP and Cash Boardings

WEEKDAY					SATURDAY					SUNDAY			
LINE		EXISTING	% INC	NEW	LINE	EXISTING	% INC	NEW	LINE	EXISTING	% INC	NEW	
704		11,850	0.19%	11,873	704	8,908	0.29%	8,934	704	7,489	0.16%	7,501	
705		6,651	0.18%	6,663	705	-	0.00%	-	705	-	0.00%	-	
710		7,529	0.18%	7,543	710	4,600	0.20%	4,609	710	-	0.00%	-	
720		39,489	0.16%	39,552	720	26,838	0.14%	26,876	720	20,374	0.08%	20,390	
728		5,429	0.14%	5,437	728	-	0.00%	-	728	-	0.00%	-	
733		12,355	0.20%	12,380	733	9,936	0.18%	9,954	733	9,097	0.04%	9,101	
734		5,265	0.25%	5,278	734	-	0.00%	-	734	-	0.00%	-	
740		2,901	0.13%	2,905	740	2,195	0.07%	2,197	740	-	0.00%	-	
744		9,518	0.22%	9,539	744	3,831	0.14%	3,836	744	3,338	0.08%	3,341	
745		5,815	0.13%	5,823	745	4,238	0.05%	4,240	745	2,519	0.01%	2,519	
750		3,389	0.24%	3,397	750	-	0.00%	-	750	-	0.00%	-	
751		4,689	0.13%	4,695	751	-	0.00%	-	751	-	0.00%	-	
754		19,597	0.25%	19,646	754	14,398	0.36%	14,450	754	9,490	0.24%	9,513	
757		13,358	0.19%	13,383	757	-	0.00%	-	757	-	0.00%	-	
760		4,914	0.14%	4,921	760	2,922	0.06%	2,924	760	-	0.00%	-	
762		4,218	0.16%	4,225	762	-	0.00%	-	762	-	0.00%	-	
770		7,558	0.15%	7,569	770	4,123	0.08%	4,126	770	-	0.00%	-	
780		8,930	0.15%	8,943	780	-	0.00%	-	780	-	0.00%	-	
788		1,577	0.17%	1,580	788	-	0.00%	-	788	-	0.00%	-	
794		5,187	0.13%	5,194	794	-	0.00%	-	794	-	0.00%	-	
910		14,254	0.07%	14,264	910	5,891	0.05%	5,894	910	4,758	0.03%	4,759	
		194,473		194,808		87,880		88,039		57,065		57,124	
				0.17%				0.18%				0.10%	

(Growth percentages adapted from the ADB TIGER Grant Proposal)

TAP Only Boardings

LINE		EXISTING	% INC	NEW		LINE	EXISTING	% INC	NEW		LINE	EXISTING	% INC	NEW
		WEEKDAY					**SATURDAY**					**SUNDAY**		
704		11,850	0.38%	11,895		704	8,908	0.58%	8,960		704	7,489	0.32%	7,513
705		6,651	0.36%	6,675		705	-	0.00%	-		705	-	0.00%	-
710		7,529	0.36%	7,556		710	4,600	0.40%	4,618		710	-	0.00%	-
720		39,489	0.32%	39,615		720	26,838	0.28%	26,913		720	20,374	0.16%	20,407
728		5,429	0.28%	5,444		728	-	0.00%	-		728	-	0.00%	-
733		12,355	0.40%	12,404		733	9,936	0.36%	9,972		733	9,097	0.08%	9,104
734		5,265	0.50%	5,291		734	-	0.00%	-		734	-	0.00%	-
740		2,901	0.26%	2,909		740	2,195	0.14%	2,198		740	-	0.00%	-
744		9,518	0.44%	9,560		744	3,831	0.28%	3,842		744	3,338	0.16%	3,343
745		5,815	0.26%	5,830		745	4,238	0.10%	4,242		745	2,519	0.02%	2,520
750		3,389	0.48%	3,405		750	-	0.00%	-		750	-	0.00%	-
751		4,689	0.26%	4,701		751	-	0.00%	-		751	-	0.00%	-
754		19,597	0.50%	19,695		754	14,398	0.72%	14,502		754	9,490	0.48%	9,536
757		13,358	0.38%	13,409		757	-	0.00%	-		757	-	0.00%	-
760		4,914	0.28%	4,928		760	2,922	0.12%	2,926		760	-	0.00%	-
762		4,218	0.32%	4,231		762	-	0.00%	-		762	-	0.00%	-
770		7,558	0.30%	7,581		770	4,123	0.16%	4,130		770	-	0.00%	-
780		8,930	0.30%	8,957		780	-	0.00%	-		780	-	0.00%	-
788		1,577	0.34%	1,582		788	-	0.00%	-		788	-	0.00%	-
794		5,187	0.26%	5,200		794	-	0.00%	-		794	-	0.00%	-
910		14,254	0.14%	14,274		910	5,891	0.10%	5,897		910	4,758	0.06%	4,761
		194,473		**195,144**			**87,880**		**88,199**			**57,065**		**57,183**
				0.34%					0.36%					0.21%

Attachment 6
Off-Board Fare Payment and All-Door Boarding: Comparison of Debriefing Results

An important component of the evaluation was to gain valuable feedback from employees supporting the pilot test. TAP "Blue Shirts", Line 720 Operators, and Vehicle Operations Supervisors were all debriefed following the conclusion of the pilot project. The feedback was provided in the following areas:

- Dwell time savings
- Fare evasion
- Customer experience
- Safety
- Other comments

The tables below summarize the comments received.

Table 1. Dwell Time

Topic	Summary	Blue Shirts	Operators	Supervisors	Customer Survey
Did you observe shorter dwell times?	Yes. Customers are boarding faster because of All-Door Boarding.	• Yes. Buses move quickly, and patrons board faster.	• Yes. Noticeably shorter, especially when a lot of people are boarding	• Yes. Customers were able to board faster, especially when 10 or more were at a stop. Less than a minute was typically spent boarding.	• 89 Percent found boarding "Much" or "Somewhat" Faster.
What could be done to encourage more customers to board through middle and rear doors?	Most customers will board through rear doors without being told, but additional advertising and announcements would be useful.	• Customers used middle and rear doors without needing to be told.	• Operators could make announcements on intercom • Information by middle and rear doors.	• Advertise All-Door Boarding on board the bus. • Signs at bus stops in more languages.	•

For ADB to be beneficial, how many passengers do you think need to be boarding the bus at one time?	All-Door Boarding is most effective when 10 or more passengers are waiting to board. Customers would like ADB in more locations.	• Vermont always has customers, so it is good for All-Door Boarding.	• Vermont always has at least 10 passengers waiting, so ADB should be there all day. • At stops with fewer passengers boarding, there's no real benefit.	• All-Door Boarding should be at all stops on 720.	• In comments, customers suggested bringing ADB to other 720 stops along the Purple Line, Universal City, or all Rapid lines.
Other comments on dwell time		• Without ADB, multiple waves of customers arrive while a bus is stopped, which slows boarding.			

Table 2. Fare Evasion Comments

Topic	Summary	Blue Shirts	Operators	Supervisors	Customer Survey
How often were passengers boarding through the rear doors without tapping?	Estimates of fare evasion vary widely between Blue Shirts and supervisors, and between the two ADB test locations.	• Half of passengers paid, others did not • When Blue Shirts were at the validators, everyone tapped • Some people won't pay even when watched by Blue Shirts.		• Average 10 per week at Vermont test stop • Average 10 per day at Westwood test stop • About 85% of customers were regulars at Westwood, and these people paid.	• Just over 50 percent reported seeing fare evasion.

Topic	Summary	Blue Shirts	Operators	Supervisors	Customer Survey
Why do you think these people tapping weren't when boarding through rear doors?	While fare evasion is committed both by passengers in a rush and those who do so deliberately, Blue Shirts and Supervisors seem to agree that most fare evaders do so purposefully.	• Patrons will do what is convenient for them and faster — that may mean exiting through the emergency exit at a subway station, boarding through the door closest to them rather than an emptier part of the vehicle, or rushing past the TAP validator to catch the bus.		• Evaders are not primarily the people who are rushing to board. Generally, they are walking onto the bus with others.	

Topic	Summary	Blue Shirts	Operators	Supervisors	Customer Survey
Customer Concerns About Fare Evasion	Customers are concerned about whether the operator knows they tapped. Additionally, customers are concerned about fare evaders benefitting from all-door boarding more than customers who are boarding and paying through the front door. Customers perceive a great deal of fare evasion, even if they do not see it directly.	• Customers who paid were concerned that the driver wouldn't know who paid and who didn't. • People who paid their fare in the front were irritated that they didn't find a seat when those who didn't pay and boarded through the middle and rear doors did find a seat.	• Customers don't tell the operators about fare evasion	• Customers complained about fare evasion every day. Primarily at Westwood, less so at Vermont. • Patrons' awareness of fare enforcement will change behaviors • "How do they know if I tapped?" and "What about those people who didn't TAP?" are constant questions from customers	• In comments, customers reported frustration at the amount of fare evasion.
Did concerns about fare evasion change over time?	Blue Shirts and Operators have different opinions on whether perceptions of fare evasion changed over time.	• Fare evasion was pretty consistent through the project, except if a Blue Shirt was right next to the validators.		• Concerns seemed to drop off over time.	•

Topic	Summary	Blue Shirts	Operators	Supervisors	Customer Survey
Did presence of a security guard at Wilshire & Westwood change fare evasion behavior?	Blue Shirts and Operators felt as though the presence of an officer (or Metro personnel generally) changed customer behavior for the better, while Supervisors did not.	• Seeing a Metro employee, especially with a vest, reminded some patrons to pay.	• Presence of sheriff's deputy changes patron's behavior.	• There will be no effect of a security guard unless guard notices someone and makes an example out of them as a warning for others. • Wilshire & Vermont needs more security than Westwood.	•
Other comments on fare evasion:			• Like Orange Line, ADB makes operations easier. • Paying customers have a harder time finding seats.	• What happens when a 40' local bus needs to be used on a Rapid Line, but the bus isn't outfitted with mobile validators? • VOs have concerns about securing TVMs on the street, especially if the TVMs will have significant amounts of cash.	•

Topic	Summary	Blue Shirts	Operators	Supervisors	Customer Survey
On fare enforcement:	Each debriefing group provided guidance on how to improve fare enforcement alongside all-door boarding implementation. Customers are eager to see more fare enforcement alongside all-door boarding.	• Some patrons pretend to tap at the stand-alone validators (SAVs) but don't actually do so. • Some fare evaders say to fare inspectors they have value but "forgot" to tap.	• ADB licenses riding for free. • Less interaction with customers helps to avoid fare disputes, which can lead to assaults on operators. • Fare gates at stations may be encouraging more fare evaders to use the bus.	• It seems as though there would be plenty of time for Deputy Sheriffs to sweep the bus for fare evaders between stops on Rapid lines. • Fare enforcement officers should have ticket printing machines so they can issue tickets immediately. • Customer skepticism at "honor system" and belief by some that all-door boarding means a free ride.	• Customers are eager to see more fare enforcement alongside all-door boarding.

Topic	Summary	Blue Shirts	Operators	Supervisors	Customer Survey
On Proof-of-Payment:	Supervisors and operators are divided over whether TAP cards should be required for Rapid lines for the sake of proof-of-payment.	• No form of proof of payment with ADB makes fare enforcement difficult.	• Support for the idea of ADB on all Rapids for TAP customers only with inspections and off-board payments.	• VOs do not appear enamored with the idea of requiring customers on Rapid buses to use TAP cards if TAP cards are not readily available at TVMs or other locations on the West Side.	• One customer expressed skepticism that all-door boarding could work without a fare paid zone outside the bus.

Table 3. Customer Experience Comments

Topic	Summary	Blue Shirts	Operators	Supervisors	Customer Survey
Were any customers confused about how All-Door Boarding works?	Customers were confused about how, when and where to tap. There were concerns that some customers might try to board the bus through the rear doors at other locations, but only scattered reports of this actually happening.	• Confusion on when to tap: some tap when they get on and when they get off as well		• A few customers avoided using the SAVs after the first week after fears of being double charged. Though this issue was fixed and some customers were told of this, many continued to board through the front. • Many people asked how or where to tap • Customers thought the pilot was also on other lines like the 20, and tried to board through the back there as well.	• One customer mentioned that customers tried to board through all-doors at other stops.
Were there any cash-paying customers frustrated that they still had to board through the front door when TAP customers could board through the front, middle and rear?	Cash-paying customers were frustrated that they could not board through the rear doors, and that seats were more likely to be taken by others with all-door boarding.	• Yes, cash-paying customers were frustrated. They asked for TVMs in convenient locations so that they could buy a TAP card or ticket and board through the rear.	• Paying customers had a harder time finding seats compared to those who boarded through the rear.	• Surprising to see customers tap and board at and then move to the front to take seats, ones that cash paying customers and seniors could also have a chance to grab sometimes.	• This appeared to be a source of frustration for customers in comments provided on surveys.

Topic	Summary	Blue Shirts	Operators	Supervisors	Customer Survey
Did the bus feel more or less crowded? Did customers sense the speed improvement?	Customers did not sense much improvement, if at all, but found it easier to decide whether to board a full bus at the stop or to wait for the next bus.	• Customers like ADB, because it seems that buses leave faster. Even if the customer doesn't arrive at their destination any faster, the perception of speed benefits Metro.		• Many customers would TAP and wait for the next bus, hoping it would be less full. • Customers had better visibility of the number of seats available on an arriving bus	• Customers were divided on whether ADB affected crowding, with most saying that it made no difference, and equal numbers saying that it made crowding worse or better.
Other comments on: fare payment	Customers wanted additional TAP purchasing options.	• Patron suggested putting validators on the doors • More cash paying customers at Westwood who had to board through front. • Confusion with transfers		• People ask about loading TAP cards at Westwood, where no TVMs are nearby. • VOs note: Customers will tap for a Rapid or Silver Line bus, but then catch a local bus if it arrives first.	• In comments, many customers mentioned wanting additional ticket vending machines near bus stops, and especially those stops with all-door boarding.

Topic	Summary	Blue Shirts	Operators	Supervisors	Customer Survey
On pilot as a whole	Customers liked all-door boarding, and were disappointed or confused to see the program end.	• Confusion about why the pilot stopped • Wanted the program to continue • Made patrons happy, moved the line along quickly	• People were still trying to come in through the back doors after the pilot ended.	• Customers (including regular ones) would like All-Door Boarding to continue, and were sad the pilot project was ending. • Customer confusion over different vehicles used, especially when local vehicles were used for the Rapid line.	• Customers were glad to see Metro testing new ideas, and generally liked the all-door boarding pilot.
On experiences of seniors and customers with a disability	Blue Shirts and Operators provided mixed feedback on how all-door boarding affecting seniors and passengers with disabilities.	• Some seniors seem to like ADB because it's easier to board and get off, and because they previously had trouble finding seats in the back. • Other seniors and persons with disabilities find that seats designated for them are taken by other patrons who won't give up their seat.	• Wheelchair users: People entering from the back are taking up spaces vacated for wheelchair users. Still have cash paying customers too, seniors in the front who need seats.		• The survey did not ask customers about their age, so no conclusions can be drawn about the experience of seniors. • A customer with a disability mentioned optimism that all-door boarding would leave more seats available at the front so that he or she would be able to sit without asking an able-bodied person to move.

Table 4. Safety Comments

Topic	Summary	Blue Shirts	Operators	Supervisors	Customer Survey
Did you see any conflicts between passengers because of All-Door Boarding? For example, did you see pushing, shoving, or verbal harassment?	While the flows of customers entering and exiting the bus would often conflict, generally there were few confrontations between passengers.	• Conflicts between patrons exiting and entering, so verbal altercations would sometimes occur • It may be that the Blue Shirts absorbed some of the comments about service and fares that would have otherwise been directed at operators. Blue Shirts did hear some disputes between customers and operators.	• Patrons were catching on to ADB with little confrontations being observed • Some confrontations with regular patrons boarding then taking accessible from seniors and people with disabilities • Customers are less likely to force their way onto a bus given the frequency of the 720 Wilshire Rapid	• Conflicts between passengers rushing in and out can arise • Some passengers on the bus would not move out of the way to let passengers exit and enter. • Some people wait in their seats until the bus comes to a full stop before exiting, which makes it difficult to exit bus	• In survey comments, customers mention that there is some pushing from behind as customers board through the rear doors.

Topic	Summary	Blue Shirts	Operators	Supervisors	Customer Survey
Did operators seem to close the middle and back doors at the appropriate times?	Operators may need additional assistance when closing doors with all-door boarding, either through better mirrors, cameras, AVA announcements, intercom announcements, door chimes, or staff helping at the stop.	• Doors were closed on patrons more so in the beginning of the pilot • Because the operator can't see the back door and patrons can't hear the operator say "Door closing" (if the operator even says this). The VOs had to help coordinate door closing. • Door chimes could help to alert patrons that the door is closing	• Can't see the back doors because it's so packed in the front. Cameras allow operators to see the area inside the doors, but not so well out of the door. • Wants automated voice to tell when the doors are closing or a buzzer sound, like the train • Microphones help the bus operators tell passengers when doors are closing, but these microphones don't always work.	• Rubber strips prevent doors closing on passengers, which reduces potential for injuries • Mirrors can be used by operators to see back doors. Need an additional mirror angled out. • Consider some sidewalk signage and a line on the sidewalk to tell bus driver to close doors when no more passengers are inside the line. • Could program AVA to announce that doors are closing • Operators were told to check outermost mirror before closing, but not all do so.	• In the customer survey, there were no comments about operators closing the middle and back doors at the wrong time. • The survey also did not ask any safety-related questions.

Topic	Summary	Blue Shirts	Operators	Supervisors	Customer Survey
Other safety comments		• Buses don't always pull up right next to the curb, which is dangerous for people with disabilities and seniors	• People already sneak onto the bus through the back doors, so allowing all-door boarding doesn't create any additional security risk for the bus or customers.	• There were issues with passengers rushing across the street and up the sidewalk to catch the bus, banging on the door to get on	• Some customers found all-door boarding safer because it minimized the chance that passengers would trip while moving to the rear of the bus (because of narrow aisles, other passengers, and bumps while the vehicle is moving).

Table 5. Operations Comments

Topic	Summary	Blue Shirts	Operators	Supervisors
How does the presence of supervisors affect All-Door Boarding operations?	Supervisors were useful for advising operators when it was safe to close the rear doors of the bus, but supervisors will be less necessary when validators are no longer on the curb and buses must berth at specific locations.		• Helpers, whether they are Blue Shirts or Supervisors, were useful for knowing when it was safe to close the bus doors. • The presence of Metro staff also helped to encourage passengers to follow the program.	• Because stopping at certain locations won't be necessary when mobile validators are on the vehicle, less supervision will be necessary. • Supervisors only managed bunching at the two locations, and the operators tried to be on their best behavior at those locations. As a result, it's hard to judge. • Still, some operators (especially those behind schedule) didn't want to wait when asked by supervisors. • If one bus was late, usually the rest would be as well, and there was less that a supervisor could do.

Topic	Summary	Blue Shirts	Operators	Supervisors
How quickly did operators adjust to All-Door Boarding?	Generally, operators appreciated the faster loading that came as a result of all-door boarding. Not all operators adjusted, however, with some refusing to open the rear doors, others bunching.	• Some operators didn't care about ADB and wouldn't open doors, but overall operators were in support of ADB because it's faster and more convenient.	• Operators adjusted quickly because it helps to load quickly and go more efficiently.	• Some Division 1 and 7 operators wouldn't read running board notes carefully, would start free running time too early, and wouldn't necessarily bring the right vehicles.
Other operations comments		• Validators should use a color scheme to catch the customer's attention. Currently, they don't stand out. • Two validators needed, one for each side of the doors		• Having longer zones will allow ADB to happen more effectively. Supervisors recommend doubling or tripling the size of the bus zone to allow two sixty-foot buses to berth at once. • Should create an indicator for buses to show them where to berth. • Should identify queuing locations for passengers.

Fare Equity Analysis
Methodology & Results

All Door Boarding
Initial Implementation and Proposed Program
January 2016

Service Planning and Scheduling
Civil Rights Programs Compliance

Contents

1. PROPOSAL OVERVIEW

Metro is proposing to increase operating speeds and reduce rider travel time through the introduction of all door boarding on the Metro Silver Line and the Metro Rapid bus network. Operator supervision of fare payment is not possible for rear door boarding passengers. Therefore, a proof of payment method must be employed in conjunction with on vehicle fare enforcement by dedicated fare inspection teams.

Three methods for proof of payment have been considered: (1) provision of added equipment at the farebox to vend a receipt to cash paying customers, (2) requiring a TAP card for fare payment, and (3) upgrading TAP software to permit adding value to a TAP card on the bus (referred to as "Topping Off". The added equipment would add capital acquisition and ongoing maintenance expenses, and require passengers paying with cash to continue boarding through the front door. The added expense would still require fare inspections, and the added front door boardings by passengers paying with cash would reduce the travel time benefits of the program. Requiring a TAP card for fare payment would permit fare inspections without added expense beyond the cost of the inspection teams, and would permit all door boarding by all passengers. The downside of this approach is that a required TAP card would exclude passengers without a TAP card from boarding buses on lines with all door boarding. The third approach permits issuing a TAP card to passengers who would otherwise be paying their fare in cash, but would slightly reduce the benefit of all door boarding because those without TAP cards would have to board through the front door to get one although for subsequent boardings they would have one and only would need to board through the front door if they needed to add value to it.

A limitation of the third method of fare payment is that riders who are paying their fare with tokens would not be able to ride a service that permits all door boarding because the token would not be converted into value on a TAP card. This fare equity evaluation will determine whether customers who would otherwise want to pay their fare with tokens on lines permitting all door boarding are significantly more minority than other bus riders (Disparate Impact), and/or whether token using customers on these lines are significantly more likely to have poverty level household incomes than other bus riders (Disproportionate Burden).

2. METHODOLOGICAL APPROACH

A Title VI Fare Equity Evaluation is presented herein in accordance with the requirements of Federal Transit Administration Circular 4702.1B. The evaluation assesses whether or not there are adverse disparate impacts on minority passengers and/or disproportionate burdens on low income riders arising from the proposed exclusion of cash fare paying riders from lines permitting all door boarding. The analysis compares the minority and poverty characteristics of the group of Silver Line and Rapid line riders with the characteristics of all Metro bus riders.

The primary data source for this analysis was the Spring 2015 Customer Satisfaction Survey. The survey determined minority status and poverty status of participants. This is the first such survey to provide poverty status as prior surveys did not inquire about household size and grouped respondents by income ranges. While line level data varied in significance and was not usable for this evaluation, data for groups of lines was consistently more significant and used for this evaluation.

Step By Step Methodology

Data for number of minority and total riders was derived from the survey for the group of Silver and Rapid lines combined as well as all bus lines combined. Riders paying with tokens were identified and their minority populations and total populations within each group were also identified.

	All Riders		Token Only		All	Token
	Minority	Total	Minority	Total	Minority %	Minority %
Silver + Rapid	2469	3048	51	65	81.0%	78.0%
All Bus	12592	15384	364	421	81.9%	86.4%

Table 1
Minority Ridership Shares for Analysis Groups

Similarly, data for poverty and total riders was obtained from the survey for each of the analysis groups. Riders paying with tokens were also identified and the results are shown in Table 2.

	All Riders		Token Only		All	Token
	Poverty	Total	Poverty	Total	Poverty %	Poverty %
Silver + Rapid	1313	3048	36	65	43.1%	54.8%
All Bus	6948	15384	271	421	45.2%	64.3%

Table 2
Poverty Ridership Shares for Analysis Groups

Finally, the minority and poverty shares of riders for the proposed program were compared with the comparable values for the Metro bus system to determine whether significant impacts would result from either program.

3. RESULTS

The Board of Directors has adopted thresholds for determining when disparate impacts and/or disproportionate burdens result from a proposed action.

A disparate impact occurs when the absolute difference between the minority share of impacted riders and the minority share of similarly situated riders not directly impacted exceeds 5%, and/or the relative difference between the minority share of impacted riders and the minority share of similarly situated riders not directly impacted exceeds 35%.

A disproportionate burden occurs when the absolute difference between the poverty share of impacted riders and the poverty share of similarly situated riders not directly impacted exceeds 5%, and/or the relative difference between the poverty share of impacted riders and the poverty share of similarly situated riders not directly impacted exceeds 35%.

The minority comparisons for the proposed program with the bus system are shown in Table 3.

MINORITY SHARES	Silver & Rapid Lines	Bus System
Token Users	78.0%	
All Riders	81.0%	81.9%
ABSOLUTE DIFFERENCE	Silver & Rapid Lines	
Token Users	-3.8%	
All Riders	-0.8%	
RELATIVE DIFFERENCE	Silver & Rapid Lines	
Token Users	-4.7%	
All Riders	-1.0%	

Table 3
Minority Share Comparison for Analysis Groups

The poverty comparisons for the proposed program with the bus system are shown in Table 4.

POVERTY SHARES	Silver & Rapid Lines	Bus System
Token Users	54.8%	
All Riders	43.1%	45.2%

ABSOLUTE DIFFERENCE	Silver & Rapid Lines
Token Users	9.7%
All Riders	-2.1%

RELATIVE DIFFERENCE	Silver & Rapid Lines
Token Users	21.4%
All Riders	-4.6%

Table 4
Poverty Share Comparison for Analysis Groups

There are no differences exceeding the Board adopted thresholds for the minority shares of either token users or other riders of the services proposed to be included in the all door boarding program and all bus riders. Thus, the all door boarding program, as proposed, will not have a Disparate Impact on minority riders.

The poverty share for token users on the services proposed for inclusion in the all door boarding program differs from the poverty share of all bus riders by an amount exceeding the Board adopted absolute difference threshold. Because this group is adversely affected by the proposed program, and significantly poorer than other bus riders, this constitutes a Disproportionate Burden on poverty riders using tokens on the proposed program services. There are no significant differences between the poverty shares of non-token user riders of the proposed program services and all bus riders so poverty level non-token users are not burdened.

In summary, the proposed initial implementation of the all door boarding program will result in a Disproportionate Burden on token users on the proposed program services because they are adversely impacted (tokens will not be accepted for fare payment on these services), and significantly poorer than other bus riders. This impact will be mitigated at such time as TAP cards replace tokens as a means of providing transportation benefits to social service program clients (who are the primary recipient of tokens) which is already being pursued.