

M E M O R A N D U M



FINAL EVALUATION REPORT WITH RECOMMENDATIONS OIG-17-02

SUBJECT: Evaluation of WMATA's Rail
Fare Activities

DATE: November 10, 2016

FROM: OIG – Helen Lew /SI/

TO: GMGR – Paul Wiedefeld

The attached **Final Evaluation Report**, entitled *Evaluation of the Washington Metropolitan Area Transit Authority's (WMATA) Rail Fare Activities*, presents the results of our evaluation. The objective of the evaluation was to determine the effectiveness of WMATA's rail fare activities; specifically, how effective is WMATA in budgeting its rail revenue, setting a reasonable fare structure for rail, and managing fare evasion to meet its goals, objectives, and expectations.

Corrective actions proposed (resolution phase) and implemented (closure phase) by the affected Departments/Offices will be monitored and tracked through the OIG's Audit Accountability and Resolution Tracking System. Department policy requires that you develop a final corrective action plan (CAP) for our review within 30 days of the issuance of this report. The CAP should set forth specific action items and target completion dates necessary to implement final corrective actions on the findings and recommendations contained in this report.

We appreciate the cooperation and assistance extended by your staff during the evaluation. Should you or your staff have any questions, please contact Stephen Dingbaum, Assistant Inspector General for Audit, on (202) 962-██████, or me on (202) 962-██████.

Washington
Metropolitan Area
Transit Authority

Attachment

cc: CFO – D. Anosike
COO – J. Leader
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Evaluation of WMATA's Rail Fare Activities

Final Report



November 10, 2016

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ABBREVIATIONS AND ACRONYMS

ABBREVIATION	DESCRIPTION
CAP	Corrective Action Plan
CPI	Consumer Price Index
FY	Fiscal Year
MTPD	Metropolitan Transit Police Department
NEPP	New Electronic Payment Program
NGFP	Next Generation Fare Payment System
NCSG	National Center for Smart Growth Research and Education
OD-LURM	Origin-Destination Land Use Ridership Model
OIG	Office of Inspector General
OMBS	Office of Management and Budget Services
PLAN	Office of Planning
RESR	Office of Customer Research
SOGR	State of Good Repair
TCRP	Transit Cooperative Research Program
WMATA	Washington Metropolitan Area Transit Authority



Evaluation of WMATA's Rail Fare Activities

Executive Summary

Overall Results

In a dynamic and changing environment, the Washington Metropolitan Area Transit Authority (WMATA) made significant progress in advancing how it views and implements fare policy, moving from a rote approach of simply raising fares every two years towards a more strategic method to influence rider behavior and advance WMATA's objectives.

While WMATA's overall activities for budgeting rail revenue and setting a reasonable fare structure for rail are effective in helping the organization advance its goals and objectives, opportunities exist to enhance fare change processes, rail ridership and revenue forecasting, and rail fare evasion efforts. The Office of Inspector General (OIG) makes two recommendations to WMATA management to enhance its processes and improve the effectiveness of the agency's efforts.

Process Area Results

I. Fare Policy and Fare Changes

The Fare Policy Working Group made substantial progress in advancing how WMATA views and implements fare policy



In 2015, to respond to factors impacting WMATA's ridership and the transit market, a Fare Policy Working Group was formed to analyze and recommend changes to WMATA's fare structure, rates, and products. First, the Fare Policy Working Group evaluated WMATA's fare structure for alignment with WMATA's Fare Policy Principles. Then leveraging customer research, segmentation, and a new elasticity model, numerous fare proposals and concepts were evaluated. As a result of this work and other initiatives, the Metrorail SelectPass, University Pass pilots, and a station entry/exit "grace period" were approved as part of the Fiscal Year (FY) 2017 budget, and subsequently launched.

Several fare concepts that may help WMATA achieve its fare policy objectives are currently “on-hold”



Need for a continuous process to identify, develop, assess, and implement fare concepts and products

Every transit agency should address fare policy and structure issues to maintain, if not expand, their share of the traveler market. In recent years, transit agencies have faced both new challenges and new opportunities, including growing operating costs, dwindling subsidies, and the continuing dispersal of travel patterns.¹

Adopting continuous practices and strategies, to develop new fare products and periodically reassess promising fare concepts in the “pipeline,” can help meet these challenges, better satisfy customer requirements and increase market share.

II. Rail Ridership and Revenue Budgeting and Forecasting

WMATA faces challenges in accurately forecasting overall ridership levels, particularly on Metrorail



WMATA's econometric ridership and revenue model was generally adequate through 2012 in projecting overall ridership levels. However, beginning in 2013, rail ridership began to diverge from the model's predictions despite continued growth in employment and population. This appears to be due to the model's variables not accounting for all of the changes driving transit demand, such as declines in federal employment, increased telecommuting, alternative work schedules, changes in federal subsidies, system reliability concerns, and increases in multi-modal transit options. As WMATA budget and finance personnel are actively evaluating enhancements to the ridership/revenue forecasting model, OIG does not offer a specific recommendation in this area.

¹ 2003 Transit Cooperative Research Board Report 94 - Fare Policies, Structures and Technologies: Update

Qualitative (judgmental) Metrorail ridership and revenue forecasts are not documented and guided by written policies and procedures

WMATA now places less reliance on the results of the econometric model and more emphasis on qualitative techniques, relying on professional judgement, to forecast ridership and revenue trends. However, these techniques are not documented and guided by written policies and procedures and support for recent Metrorail forecasts (FY 2016 and FY 2017) is not maintained. Incomplete policies and procedures can reduce effectiveness in governing forecasting processes and limit the ability to transfer knowledge when change occurs.

Adequate processes exist to forecast rider response to specific fare changes

WMATA evaluates proposed fare changes using a fare model originally developed by a transit consulting firm. Elasticities (rider sensitivity to rate changes) used in fare change modeling are derived from an Origin-Destination Land Use Ridership Model (OD-LURM) developed in 2015 in partnership with the University of Maryland. While these models are frequently used to estimate demand for intercity train and airline travel, WMATA's adoption of an OD-LURM is one of the first developed for transit. These and other analytical tools allow staff to forecast the impacts of proposed fare changes to ridership and revenue with reasonable accuracy.

III. Customer Research

Customer research supports rail fare activities by providing insights on ridership behaviors, fare products, and market segmentation

WMATA's Office of Customer Research (RESR) performs quantitative and qualitative research to better understand customers, how issues impact them, and inform related fare decisions. The efforts of Customer Research in support of WMATA's rail fare activities, including analyzing areas such as market segmentation and ridership retention, and continuing to enhance customer research tools, should further support the organization and help inform rail fare decisions.

IV. Fare Systems

Plans to implement a Next Generation Fare Payment System were deferred to focus efforts on modernizing WMATA's current fare system

In April 2016, WMATA suspended plans to implement a next generation fare payment system to focus on modernizing its existing fare system and ensuring a state of good repair (SOGR). Fare system management estimates that a modernization and SOGR strategy can extend the systems life by approximately five years. Modernizing the existing system should support the continuation of a capable, reliable system. It may also reduce implementation risk, as modernizing allows for additional time to build on the experiences of other transit agencies currently implementing Next Generation Fare Payment (NGFP) systems.

V. Rail Fare Evasion

Need for a comprehensive framework for assessing, managing, and combating Metrorail fare evasion

Transit agencies must develop appropriate responses to address fare evasion and related revenue losses and declines in rider confidence due to safety and security concerns. While there have been significant efforts by WMATA to address fare evasion, (i.e., customer care working group, the 2015 fare evasion pilot program, and the 2016 fare evasion enforcement initiative), that either directly or indirectly combat rail fare evasion, there does not appear to be a comprehensive framework to assess, manage, and combat rail fare evasion.



Transit Agency Survey Results

WMATA and its peer agencies face similar challenges and opportunities with respect to fare policy and related activities.

Our surveys confirmed that WMATA and its peer agencies face similar constraints in making changes to their fare structures, such as economic factors, available funding, political opposition, and public board reaction. To respond to these challenges and capitalize on market opportunities, WMATA and its peer agencies are performing deeper customer research and are actively considering ways to improve their fare structures and products based on a better understanding of customer wants and needs.

Of the 13 transit agencies invited to participate in the peer agency survey, 11 or 85 percent provided responses. We also surveyed WMATA's Board of Directors and Executive Management. Seven of 16 board members (44 percent) provided responses, and 5 of 11 executive managers (45 percent) responded. Survey highlights are incorporated throughout this report.²



Management's Response

We provided a draft of this report to the General Manager for review and comment on October 21, 2016. In the General Manager's November 4, 2016 response to the draft report, Management concurred with all of the findings and provided corrective action plans. The complete text of Management's response is included as Appendix B to this report.

² Survey design, questions, and analysis structure were adopted from Allison You, Brian D. Taylor, and John Gahbauer (2012) "Does Transit Mean Business? Reconciling academic, organizational, and political perspectives on Reforming Transit Fare Policies" Institute of Transportation Studies, UCLA Luskin School of Public Affairs

2016 Transit Agency Survey Highlights

Similar to WMATA, peer transit agency top goals include:

- 1) *Mobility and access for everyone;*
- 2) *Cost-effective, efficient service; and*
- 3) *Building regional connectivity.*

In practice, transit agency goals are often conflicting.

Initiatives such as expanding services builds regional connectivity but the cost of these initiatives can negatively impact cost-effective and efficient service.

Background

Rail fare activities support WMATA's strategic objectives

Rail fare activities support several WMATA goals including: exceeding customer expectations through quality service delivery, improving regional mobility, connecting communities, and ensuring financial stability.

Goals – in addition to prioritizing safety, security, and financial responsibility – most commonly identified by WMATA's board and executives include:

- Improving mobility and access for everyone;
- Building regional connectivity; and
- Providing an affordable transportation alternative.

2016 WMATA Board and Executive Rail Fare Survey

WMATA's complex rail fare structure is primarily focused on cost recovery and maintaining social equity

For much of its history, WMATA's fare policy objectives and related fare changes were primarily focused on cost recovery and maintaining social equity. WMATA's complex fare structure provides the opportunity for high social equity which the Board of Directors has historically favored over simplicity. In 2011, an internal analysis of WMATA's fare structure noted 44,376 potential fare combinations.³

When Metrorail opened in 1976, with service from Farragut North to Rhode Island Avenue, a flat fare of 55¢ during peak hours and 45¢ off-peak was manually collected by station attendants. When the second phase of Metrorail, the Blue Line from National Airport to Stadium-Armory, opened in July 1977, automatic fare collection was introduced.⁴ This allowed for the implementation of a time and distance based fare structure. Over the next four decades, rail fares were increased and adjusted, however, the overall time and distance based structure remains in place.

³ WMATA Finance & Administration Committee Information Item III-A, October 13, 2011, Metrorail and Metrobus Fare Structure Model

⁴ Greater Greater Washington, a brief history of Metrorail fare collection, July 8, 2011

2016 Transit Agency Survey Highlights

Some agency fare policies closely align with previously identified goals and, others appear to directly contradict them.

For example, many agencies seek to set fares as low as possible – which corresponds with improving mobility providing affordable transportation alternatives – and at the same time also set fares to cover budgetary shortfalls.

Put simply setting fares as low as possible and covering budgetary shortfalls are two very different things.

This underscores the difficulty of capturing multiple goals within a single fare policy.

WMATA's time and distance based fare structure is in contrast to the majority of heavy rail (subway) transit systems in North America, South America, and Africa that use a simple, flat rate fare structure. Flat rate structures, while simple and less costly to implement, generally result in lower farebox recovery rates than variable rate structures. Differentiated transit fares, which vary by mode, distance, and/or time of day are prevalent in cities in Europe and Asia and are designed to reflect differences in the marginal costs of service provided.

Transit agencies with a more variable fare structure generally have higher farebox recovery ratios over those that rely on a flat-rate model. In addition, variable rate policies can greatly increase the efficiency, efficacy, and equity of transit service. For example, short, off-peak trips tend to be relatively inexpensive to provide, while longer, peak-period trips are more expensive. Accordingly, varying fares to reflect these differences in costs can encourage passengers to consume more inexpensive-to-serve trips and increase the cost-effectiveness of transit service.⁵

The following table compares WMATA's rail fares to other large U.S. transit agencies:

Agency	City	Base Fare	Max Fare	Fare Type	Rail Farebox Recovery Ratio ⁶
Metropolitan Atlanta Rapid Transit Authority (MARTA)	Atlanta, GA	\$2.50	\$2.50	Flat	35%
Chicago Transit Authority (CTA)	Chicago, IL	\$2.25	\$2.25	Flat	53%
Southeastern Pennsylvania Transportation Authority (SEPTA)	Philadelphia, PA	\$1.80	\$2.25	Flat	55%
Massachusetts Bay Transportation Authority (MBTA)	Boston, MA	\$2.10	\$2.65	Flat	60%
Washington Metropolitan Area Transit Authority (WMATA)	Washington, DC	\$2.15	\$5.90	Variable	62%
Metropolitan Transit Authority (MTA)	New York City, NY	\$2.75	\$2.75	Flat	63%
Bay Area Rapid Transit District (BART)	San Francisco, CA	\$1.95	\$7.35	Variable	78%

⁵ Allison Yoh, Brian D. Taylor, and John Gahbauer, "Does Transit Mean Business? Reconciling academic, organizational, and political perspectives on Reforming Transit Fare Policies," UCLA Luskin School of Public Affairs, Institute of Transportation Studies, June 2012

⁶ National Transit Database (NTD) Transit Profiles: 2014 Top 50 Reporters, March 2016

2016 Transit Agency Survey Highlights

A majority of peer agency survey respondents feel rail fares are "about right"

- *Customer acceptance of fare increases*
- *Fares are inflation based*
- *Discounts for seniors, disabled, and students*
- *In-line with other agencies*
- *Fares are distance based*

Other respondents indicated fares are "too high"

- *Parking adds to costs*

And some stated fares are "too low"

- *Substantial discounts for certain rider categories.*

As the primary source of non-subsidy revenue (approximately 68 percent), Metrorail faces several ridership challenges

Historically, WMATA experienced gains in rail ridership as the region's population and economy grew. During the December 2007 – June 2009 recession, the Washington economy initially performed relatively well, and Metrorail ridership also held up well compared to many other transit agencies, which experienced substantial ridership losses. However, from 2010 through 2015, rail ridership declined by five percent. In October 2015, WMATA prepared a presentation to the Finance and Administration Committee to provide historical context and recent trend data on ridership for all transit types with a focus on Metrorail. The presentation outlined several challenges facing Metrorail including:⁷

- External and market changes – e.g., increased telecommuting, more trip options (bike, car-sharing services).
- Pricing concerns – reduction in federal transit benefits, low gas prices, relatively high daily cost of longer park and ride trips.
- Concerns by customers over service quality and reliability.
- Although new commercial and residential development around Metrorail stations remains strong, the number of customers using the system remains flat and fewer trips are taken.

Responding to these conditions, WMATA's General Manager and Board of Directors announced there would be no fare increases included in the 2017 proposed budget.⁸

WMATA board members and executives share varying insights about the cost of Metrorail. Many feel fares are "about right", citing the costs of car ownership, frustration of congestion, discounts for seniors, disabled and students, and the balance between farebox recovery and ridership.

Others believe fares are "too high" considering fares at other systems, costs for long-distance commuters, and service declines.


2016 WMATA Board and Executive Rail Fare Survey

⁷ WMATA Finance & Administration Committee Information Item IV-B October 8, 2015 FY 2017 Budget: Ridership and Revenue

⁸ WMATA FY 2017 Proposed Operating and Capital Budgets

WMATA historically linked biennial fare increases to changes in the consumer price index

Two Board of Directors resolutions guide fare policy decisions. The first (Resolution 2007-47) provides a general guideline for regular, predictable fare increases and states that beginning in FY 2011 fare changes should occur on a biennial basis and be linked to changes in the consumer price index. The second (Resolution 2010-66) provides seven 'fare policy principles' to guide the General Manager and Board of Directors in considering any fare changes.

 Metro's Fare Policy Principles (#2010-66)	
<ul style="list-style-type: none">• Ensure and enhance customer satisfaction• Establish a mechanism to allow customers to determine their fares easily	Quality Service
<ul style="list-style-type: none">• Optimize the use of existing capacity• Establish equitable fares and ensure compliance with federal regulations	Regional Mobility
<ul style="list-style-type: none">• Facilitate movement between modes and operators throughout the region• Encourage the use of cost-effective media• Generate adequate revenue while maximizing ridership	Financial Stability

WMATA's most recent system-wide fare increases were implemented in FY 2015 and included a \$.05 (2.3 percent) increase in the base rail fare and a \$.15 (2.6 percent) increase in the maximum rail fare. Parking fares were also increased \$.10 (2 to 3 percent). Even with these increases along with increased bus fares and other small adjustments, total revenue fell short of projections due to a decline in ridership from the forecasted level.⁹

⁹ WMATA Finance & Administration Committee Information Item IV-B October 8, 2015 FY 2017 Budget: Ridership and Revenue

New strategies are being piloted to increase ridership and revenue without a broad-based fare increase

WMATA's strategic and financial planning teams periodically evaluate and recommend changes to WMATA's fare structure and rates. Suggestions for changes and modifications to the fare structure, rates, and products (passes, etc.) are also received from customers, the Board of Directors, jurisdictions, and other WMATA personnel. Strategies currently being piloted to increase ridership and revenue without a broad-based fare increase include changes to make Metrorail passes more attractive and implementation of University Pass programs providing unlimited ride products to local university students.¹⁰



¹⁰ WMATA FY 2017 Proposed Budget, effective July 1, 2016

2016 Transit Agency Survey Highlights

Agencies in our survey reported that budgetary needs, public reaction, and cost recovery are the main drivers considered when changing fares.

Only one factor identified might be characterized as strategic – losing/gaining riders to/from automobile use and this ranked lower in importance.

Other factors, including budgetary needs, public reaction, and fare levels at other agencies – are reactive, and not strategic, in character.

Evaluation Results

WMATA made significant progress in advancing how it views and implements fare policy from a rote approach of simply raising fares every two years towards a more strategic method to influence rider behavior and advance WMATA's objectives.

While WMATA's overall activities for budgeting rail revenue and setting a reasonable fare structure for rail are effective in helping the organization advance its goals and objectives; opportunities exist to enhance fare change processes, rail ridership and revenue forecasting, and rail fare evasion efforts.

The main drivers WMATA board members and executives consider when changing fares are:

- Budgetary needs
- Board/elected official reaction
- Public reaction and
- Subsidy availability

2016 WMATA Board and Executive Rail Fare Survey

I. Fare Policy and Fare Change Processes

The Fare Policy Working Group made substantial progress in advancing how WMATA views and implements fare policy

In 2015, a Fare Policy Working Group was formed to analyze and recommend changes to WMATA's fare structure, rates, and products. This cross-functional team¹¹ discussed and prioritized fare policy goals, evaluated fare concepts and developed fare proposals for Executive Management and Board of Directors consideration.

The Fare Policy Working Group identified the priority objective of a fundamental change in fare policy (as opposed to an adjustment matching Consumer Price Index (CPI)) is to create a stable source of

¹¹ The cross-functional team, facilitated by the Office of Planning (PLAN), consisted of representatives from the Offices of the Chief Financial Officer, Treasurer, Management and Budgeting Services, External Relations, Marketing and Advertising, Customer Research, Government Relations, Equal Employment Opportunity, Chief Operating Officer – New Electronic Payment Programs, Parking, Department of Bus Services and Bus Planning, and the General Counsel's office

2016 Transit Agency Survey Highlights

Agencies in our survey are considering ways to improve their fare structures:

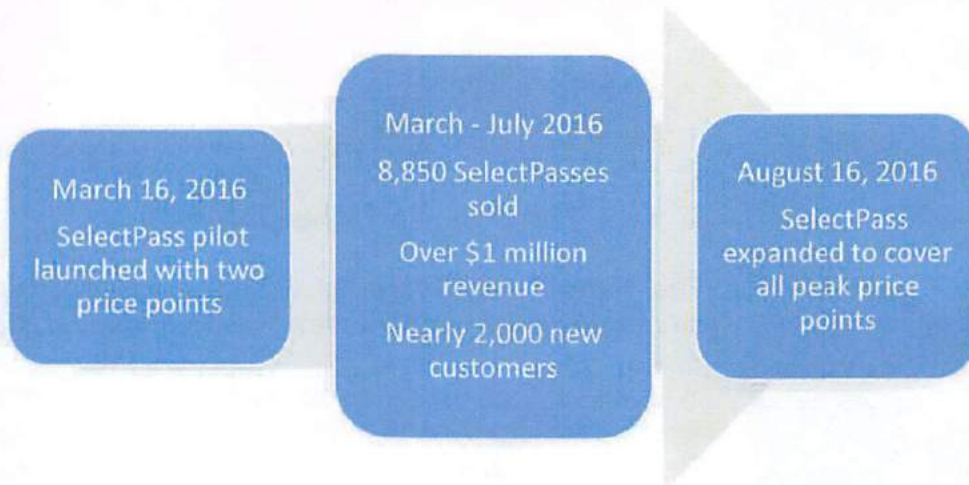
- Pass products
- Need based discounts
- Technology upgrades
- Equalize fares for premium services
- Fare simplification

revenues. This objective was followed closely by a desire to grow and retain ridership. Other evaluation concepts reflect other Fare Policy Principles, including jurisdictional and demographic equity, customer impacts, optimization of system usage across modes and time periods, and the administrative costs of implementation.¹²

The Fare Policy Working Group began by evaluating WMATA's fare structure for alignment with WMATA's Fare Policy Principles. Then leveraging customer research, segmentation, and a new elasticity model, the Fare Policy Working Group discussed and evaluated numerous fare proposals and concepts to address declining ridership and better align WMATA's rail fare structure and products with the Fare Policy Principles.

The Fare Policy Working Group achieved its objectives – and as a result of their work and other initiatives, the Metrorail SelectPass and University Pass pilots, and a station entry/exit “grace period” were approved as part of the FY 2017 budget, and subsequently launched.

Updated information on the SelectPass pilot follows:



As of July 2016, the SelectPass pilot exceeded its sales goals, and customer feedback has been generally positive with customers noting that it is a “great value”, is “super easy” and a recurring theme of “I don’t have to worry....”

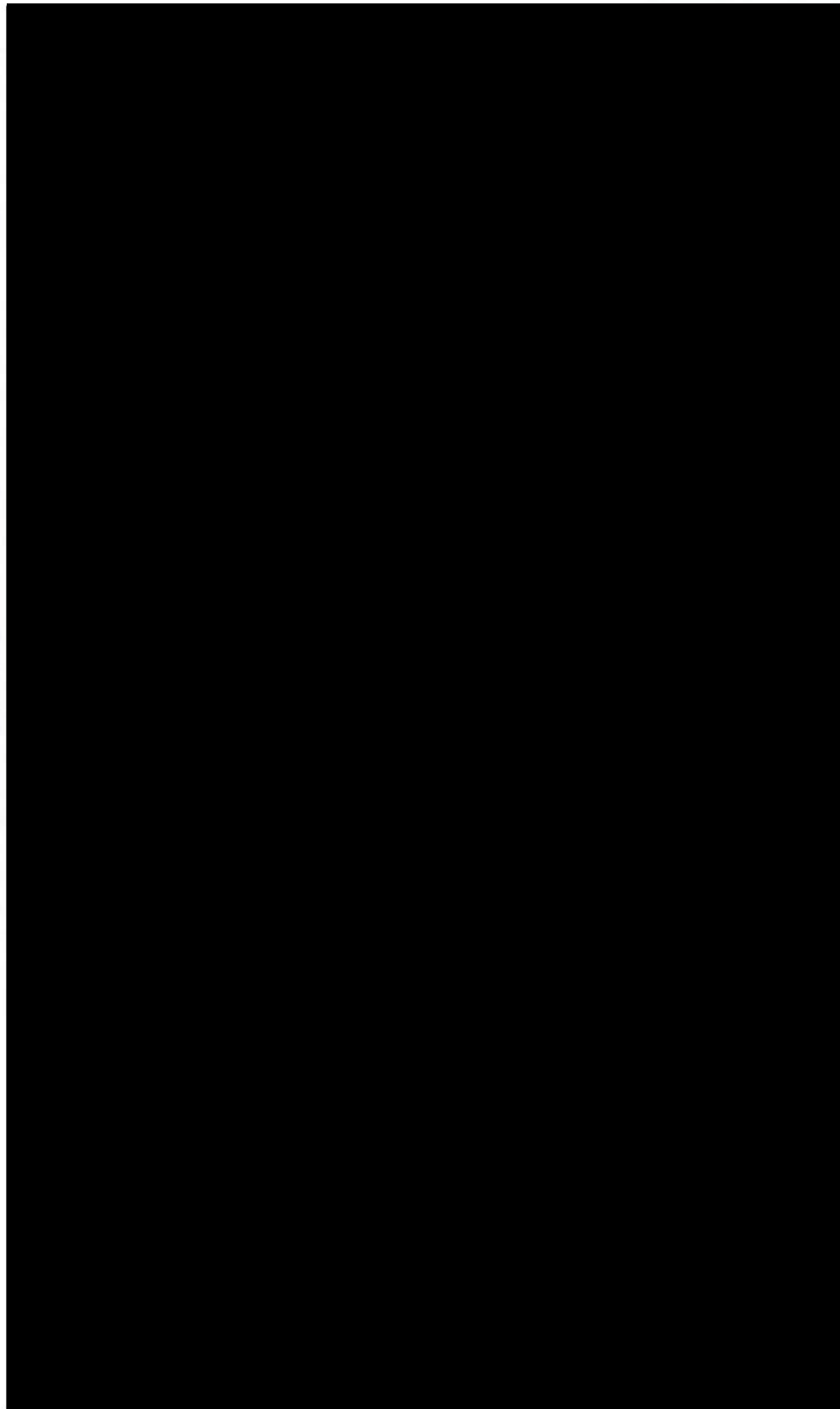
¹² 2015 WMATA Fare Policy Working Group Minutes

2016 Transit Agency
Survey Highlights

*Agencies surveyed
face constraints in
making changes to
their fare structures:*

- *Demographic and economic factors*
- *Available funding*
- *Public and Board reaction*
- *Political opposition*
- *Legislative mandates*
- *Title VI (disparate impact) concerns*

Several fare concepts that may help WMATA achieve its fare policy objectives are currently "on-hold"



**2016 Transit Agency
Survey Highlights**

A majority of agencies surveyed made changes to fare rates and fare products/passes within the last year.

Fare structure changes (i.e., a move from flat to variable rate structures) occur less frequently.

Need for a continuous process to identify, develop, assess, and implement fare concepts and products

WMATA periodically considers changes to its fare structure and fare products in reaction to external and internal factors. The 2015 review by the Fare Policy Working Group was initiated and coordinated by the Office of Planning (PLAN) to respond to decreased ridership due to a culmination of factors, including transit market changes, pricing concerns, and declines in service quality and reliability. In 2011, WMATA's fare structure was analyzed in response to customer concerns about complexity and to prepare for a new fare system.

Every transit agency must address fare policy and structure issues to maintain, if not expand, their share of the traveler market. In recent years, transit agencies have faced both new challenges and new opportunities, including growing operating costs, dwindling subsidies, and the continuing dispersal of travel patterns.¹⁴

Adopting continuous practices and strategies to develop new fare products and periodically reassess promising fare concepts in the "pipeline" can help WMATA better satisfy customer requirements and increase market share.

For most of its history, WMATA experienced gains in rail ridership as the region's population and economy grew. During this time, assumptions that public transit use will grow along with increased environmental awareness, intolerance of road congestion, and unwillingness to endure the higher and higher costs of driving also remained valid. Therefore, it appears that a continuous process to identify, evaluate, and implement innovative fare ideas and concepts was not a business necessity.

An unstructured, periodic approach to fare structure and fare product development can result in lost opportunities to understand and proactively respond to customer needs and wants, the competitive environment, and the nature of the market; ultimately resulting in lost market share and declines in revenue, ridership, and relevance.

¹⁴ 2003 Transit Cooperative Research Board Report 94 - Fare Policies, Structures and Technologies: Update

2016 Transit Agency Survey Highlights

Several agencies surveyed experienced declines in ridership over the last several years.

However, a majority are projecting increased ridership over the next several years

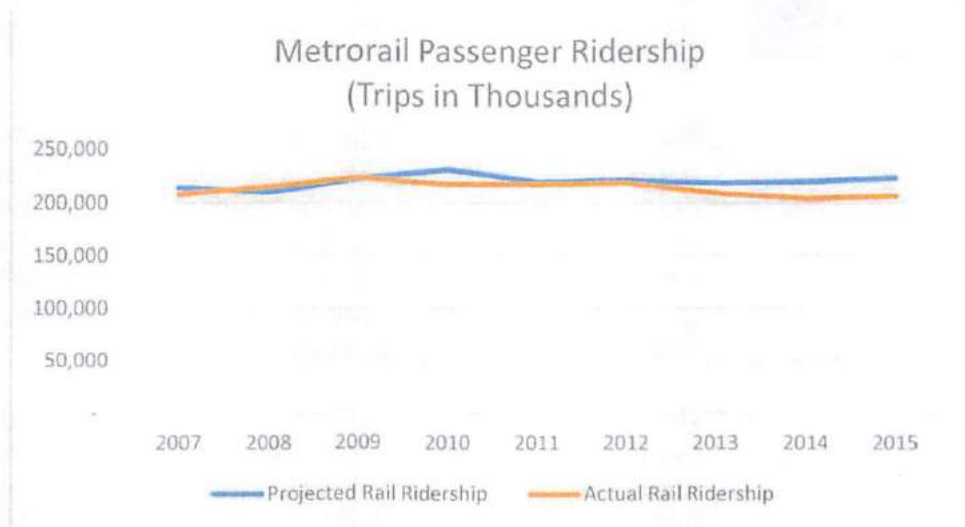
II. Rail Ridership and Revenue Budgeting and Forecasting

WMATA faces challenges in accurately forecasting overall ridership levels, particularly on Metrorail

WMATA's Office of Management and Budget Services (OMBS) prepares annual forecasts of rail ridership and revenue to inform operational budgeting and jurisdictional subsidy planning. These forecasts are derived from an econometric linear regression model, which uses economic data from a variety of sources, including projections from Moody's Analytics for key inputs and an assessment of current and future economic conditions. Other indicators for forecasting ridership trends include population and employment expectations. The model was most recently updated in 2010.

WMATA's econometric ridership and revenue model was generally adequate through 2012 in projecting overall ridership levels. However, beginning in 2013, rail ridership began to diverge from the model's predictions despite continued growth in employment and population. This appears to be due to the model's variables not accounting for all of the changes driving transit demand, such as declines in federal employment, increased telecommuting, alternative work schedules, changes in federal subsidies, system reliability concerns, and increases in multi-modal transit options.

The following chart shows projected vs. actual ridership for FY 2006 – FY 2015.¹⁵



¹⁵ WMATA FY 2006 – FY 2017 Budgets



Transit Cooperative Research Program (TCRP) Synthesis 66 Fixed-Route Transit Ridership Forecasting and Service Planning Methods notes that consistent with WMATA's experience, roughly two-thirds of transit agencies surveyed were partially or not satisfied with their forecasting methods. Quality and availability of input data and accuracy of the forecasts were cited as the most pressing concerns.¹⁷

Qualitative (judgmental) Metrorail ridership and revenue forecasts are not guided by written policies and procedures



WMATA now places less reliance on the results of the econometric model and more emphasis on qualitative techniques relying on professional judgement to forecast ridership and revenue trends. However, during our evaluation we found these techniques are not documented and guided by written policies and procedures, and support for recent Metrorail revenue forecasts (FY 2016 and FY 2017) is not maintained.

Metrorail represents a significant portion (approximately 68 percent) of non-subsidy revenue. As such, methodologies and techniques for preparing Metrorail revenue forecasts should be documented and guided by appropriate policies and standard operating procedures. Incomplete policies and procedures can reduce effectiveness in governing forecasting processes and limit the ability to transfer knowledge when change occurs.

Recommendation 1: Review and update standard operating procedures to include coverage of Metrorail revenue forecasting methodologies and requirements to maintain documentation supporting forecast results. *(Low Risk)*¹⁸ *(Chief Financial Officer)*

¹⁶ "Plans to Update Ridership Model" provided by the Director of PLAN and Director of OMBS, dated July 2016 .

¹⁷ Transit Cooperative Research Program (TCRP) Synthesis 66 Fixed-Route Transit Ridership Forecasting and Service Planning Methods - 2006

¹⁸ See page 29 for explanation of potential risk categories

Adequate processes exist to forecast rider response to specific fare changes

To evaluate proposed fare changes, PLAN performs retrospective analysis using a fare model originally developed by a transit consulting firm. Proposed fare adjustments are applied retrospectively to various inputs, including 2014 ridership data, 2012 customer survey demographics, and elasticities (rider sensitivity to rate changes) to estimate the ridership and revenue impacts of proposed fare changes. These and other analytical tools allow staff to forecast the impacts of proposed fare changes to ridership and revenue with reasonable accuracy.

The fare elasticities used in PLAN's fare change modeling are derived from an OD-LURM, developed in 2015 in partnership with the University of Maryland's National Center for Smart Growth Research and Education (NCSG).¹⁹ An OD-LURM uses information on rail ridership between origin/destination station pairs, service levels, characteristics of station area environments, and the cost of travel to identify factors, including transit fares, that influence rail transit ridership. While OD-LURMs are frequently used to estimate demand for intercity train and airline travel, WMATA's adoption of an OD-LURM is one of the first developed for transit.

NCSG's analysis of ridership on Metrorail found the long-run fare elasticity of demand is approximately -0.50, which suggests a 10 percent increase in fares results in a 5 percent decrease in ridership, and vice versa. This estimate represents long-run elasticity, defined as changes in ridership that take place over a five-to-seven year period. Long-run elasticities tend to be larger than short-run elasticities because over a longer period, travelers can respond to changes in fares in multiple ways, such as buying a car, changing jobs, or moving to a new neighborhood. Other important findings include:

- Estimates of fare elasticity vary little between peak and off peak periods.
- Elasticities are high for short distance trips (-1.02), mid-range for middle distance trips (-0.36), and low for long distances (-0.12).
- Riders with subsidized fares have higher elasticities.
- Full-fare riders with a transfer on both ends of a Metrorail trip have lower elasticities.

¹⁹ OD-LURM for Fare Policy Analysis for the Washington Metropolitan Area Transit Authority, National Center for Smart Growth Research and Education, University of Maryland, September 2015



NCSG's results suggest an increase in fares, especially for long distance trips, would increase fare revenues. Riders that travel long distances during peak periods have "inelastic" demands. Therefore, the increase in fares will more than offset the decrease in trips.

Although NCSG concluded that their results in general are robust and consistent with expectations, they also outlined several considerable "cautions" about their estimates:

- One of very few attempts to estimate transit fare elasticities using an OD-LURM, and the first to do so for the Washington Metrorail system;
- Data properties (use of passenger survey vs. fare system data) for key variables led to a relatively wide range of estimates, especially for some sub-groups of riders and trips; and
- Difficulties integrating fare system data with passenger survey data limited the ability to analyze fare elasticities for specific demographic populations.

Areas of additional research recommended by NCSG to further validate rider elasticity estimates include an exploration of variations by time of day and rider type, and testing the effects of a change in fare structure on ridership and revenues over time.

III. Customer Research

Customer research supports rail fare activities by providing insights on ridership behaviors, fare products, and market segmentation

In 2011, the Office of Customer Research (RESR) was established; and is a unit within WMATA's Customer Service, Communications and Marketing department. The group serves as an advisor to WMATA staff seeking quantitative and qualitative research to better understand our customers, how issues impact them, and inform related decisions. Currently, RESR is staffed with a Director and two Research Analysts.

RESR uses a wide-range of research methods and tactics to assist WMATA in identifying the appropriate means to answer key business questions, including quantitative and qualitative research services, multi-method data collection options, and questionnaire design.

RESR supports rail fare activities by providing customer research on ridership behaviors, fare products, and market segmentation. They also perform rail passenger surveys, required by the Federal Transit Administration, which provide information on rider origin/destinations, rail ridership patterns and customer demographics that help to determine transit subsidy allocations.

In 2015, to help inform rail policy and product decisions, RESR contracted out a market segmentation and fare product study to identify various market segments of WMATA users and to gauge, among other things, interest in potential pass products. Six market segments were identified. Customer interest in monthly pass products by segment follows:

Market Segment	% of Sample	% Interested in Monthly Pass Product
Frequent Commuter	6%	75%
Frequent Commuter Plus ²⁰	16%	76%
Occasional Commuter	6%	57%
Occasional Commuter Plus	10%	54%
Frequent Non-work Rider	12%	36%
Infrequent Non-work Rider	50%	26%

²⁰ "Plus" commuters also use Metrorail for non-work trips at least once per week

2016 Transit Agency Survey Highlights

Recent customer research efforts at WMATA's peer agencies include:

- Segmentation studies
- Customer behavioral research
- Outreach to former riders
- Surveys to develop and inform marketing strategies
- Surveys to develop strategies to increase off-peak ridership
- Surveys to inform system effectiveness and efficiency

In 2015, RESR also conducted a Ridership Retention survey to understand ridership behaviors and identify key drivers behind declines in Metrorail ridership. The survey indicated that the primary factors for riding less are: service reliability (63 percent); poor service quality for price paid (44 percent); and general preference for alternative modes (59 percent).

In October 2015, RESR introduced Amplify, a customer panel that allows WMATA to engage with customers, transit advocates, and experts in an ongoing digital forum. This is facilitated by a structured environment of online surveys, polls, and discussion forums that helps inform WMATA's responses to issues impacting users of the system.

The challenges and opportunities for public transit providers have never been greater. Customer segmentation and other research techniques can generate insights and guide strategies. We recognize the efforts of RESR in support of WMATA's initiatives; such as building on its foundation and analyzing areas such as market segmentation and ridership retention. Continuing to enhance customer research tools, including mobile applications and the Amplify panel, will support the organization and help inform rail fare decisions and activities.



2016 Transit Agency Survey Highlights

Fare payment technologies used by the agencies in our survey are all over 4 years old with 44 percent over 10 years old.

75 percent of the agencies surveyed use digital systems and 25 percent rely on analog systems.

Similar to WMATA, all of the agencies systems are fare media based.

IV. Fare Systems

Plans to implement a Next Generation Fare Payment System were deferred to focus efforts on modernizing WMATA's current fare system

Fare payment technologies for public transit have evolved from paper tickets and tokens to magnetic stripe cards, smart cards, and mobile devices. These NGFP systems can include payment media issued by both the transit agency, as well as, organizations outside the transit agency. A major innovation is the movement toward non-proprietary payment systems, meaning systems that use open interfaces and standardized devices.²¹

According to WMATA Fare System Management, WMATA's current fare system, NextFare 5, is in need of repair or replacement. The central computer system used to manage fare collection is at the end of its useful life and components critical to the operating functions of the fare collection system including circuit boards and mechanical parts have been in service for 20 – 30 years and represent technology from decades past.²²

Common drivers to update a fare payment system include fare payment simplification, making traveling on public transit easier, reducing operational and maintenance costs, and minimizing cash collection activities. *The Transit Cooperative Research Program's February 2015 Report 177 Preliminary Strategic Analysis of Next Generation Fare Payment Systems for Public Transportation* notes NGFP systems leverage technology and promise to yield a number of valuable benefits to riders and transit agencies, which can improve the customer experience, streamline transit system operation, and integrate transit more effectively within the broader context of mobility management.

In 2010, WMATA issued a competitive procurement to design, build, install, operate and maintain a next generation fare payment system – the New Electronic Payment Program (NEPP). This system would be a multiagency, standards and accounts based open payment system. Key advantages of NEPP and other NGFP systems are:

- System-wide interoperability and compatibility between devices from different manufacturers;
- Integration across multiple agencies, through acceptance of common payment media;

²¹ The Transit Cooperative Research Program's (TCRP) February 2015 Report 177 Preliminary Strategic Analysis of Next Generation Fare Payment Systems, for Public Transportation

²² Internal WMATA NEPP report

2016 Transit Agency
Survey Highlights

Some agencies reported their fare systems limit the ability to offer innovative fare products and integrate fares between modes.

One agency is in the early planning stage for a NGFP which they believe will be account based.

- Ability to procure equipment from multiple vendors;
- Less costly centralized system updates;
- Permits the use of a number of fare media options;
- Eases partnering across transit agencies, other transportation operators, and non-transportation organizations;
- Enhances ability to provide incentives and promotions; and
- Transit agency can "outsource" fare collection.

In 2014, WMATA awarded a contract to design, develop, test and deploy the NEPP system. The first phases of the project included an 18 month pilot of NEPP technology to test and validate system functionality. Several highlights and lessons learned from the pilot, which concluded in May 2015, follow:²³

- Only 400 of the 3,000 customer participants recruited actively used the system, which was less than planned;
- Generally, the technology met expectations;
- New fare gate hardware will need expansive customer and employee education campaigns; and
- Participants felt WMATA is moving in the right direction with the program.

Following the results of the NEPP pilot, WMATA found itself at a cross road. The organization could continue the NEPP program projected to fully deploy in 2021 with budgeted program costs of \$294 million (including contractor and internal WMATA costs), or pursue an alternative SOGR strategy which proposed investments in the current NextFare 5 fare system with a future option to migrate to NextFare 7, a standards-based, open payments fare system.

In April 2016, WMATA decided to cancel NEPP and redirect funding to modernize the existing fare system. This decision was based on the public's response to the NEPP pilot. Cost, reliability, and ease of customer transition were also factors in the decision to stay with the current fare system.

Modernizing WMATA's current fare system should result in a capable, reliable system aligned with service reliability and fiscal responsibility objectives. Deferring implementation of a standards-based, open payment fare systems may also reduce implementation risk, as it allows for additional time to build on the experiences of other transit agencies currently implementing these systems.

²³ WMATA Customer Service and Operations Committee Board Information IV-A, July 9, 2015; NEPP Pilot Results

2016 Transit Agency Survey Highlights

Approximately 2/3 of the agencies in our survey estimate losses from fare evasion.

This can increase their ability to quantify associated revenue losses and measure the effectiveness of mitigation and enforcement efforts.



V. Rail Fare Evasion

Need for a comprehensive framework for assessing, managing, and combating Metrorail fare evasion

Historically, fare evasion has been a problem in transit systems, especially large systems like WMATA. Fare evasion results in lost revenue; and, potential lost ridership as it erodes the customer's confidence in the system due to safety concerns. While fare evasion does not seem serious in comparison to other kinds of crime that can happen on transit – assaults, robberies, etc. the “broken window” theory of policing suggested that it can open a door for more serious threats through advertising a lack of security on the part of the transit system.²⁴

While there have been efforts by WMATA to address fare evasion, (i.e., customer care working group, the 2015 fare evasion pilot program, and the 2016 fare evasion enforcement initiative), that either directly or indirectly combat rail fare evasion, rail fare evasion rates have not been quantified and there does not appear to be a comprehensive framework to assess, manage, and combat rail fare evasion.

Fare evasion efforts span across disciplines and require a multi-pronged approach. For example, the New York City Transit Authority developed a comprehensive framework for assessing, managing and combating subway fare evasion including the use of silent observers and stratified random sampling techniques to estimate losses due to fare evasions, enforcement measures, and consideration of fare evasion in the design of its automated fare collection system.²⁵

²⁴ Mackechnie, Christopher, About.com, Fare Evasion, The Problem of Free Rides on Transit, Updated November 22, 2015

²⁵ Alla V. Reddy, Jacqueline Kuhls, and Alex Lu, TRB Paper Manuscript #11-2016: Measuring and Controlling Subway Fare Evasion: Improving Safety and Security at New York City Transit Authority

At WMATA, the history of fare evasion efforts has been mixed, and is complicated by varying jurisdictional legal frameworks. For example, the District of Columbia classifies fare evasion as a criminal offense with a \$300 maximum fine, while Maryland and Virginia classify fare evasion as a civil offense with fines ranging from \$10 – \$100.

In 2014, WMATA established a Customer Care Working Group comprised of a multi-departmental task force to determine how to transform Metro's culture into one that values customer satisfaction and puts a premium on service delivery that meets or exceeds the customer's expectations. In 2015, as part of a collaborative effort, Metro Transit Police (MTPD) and Bus and Rail Operations initiated a fare enforcement program and launched a 90-day fare enforcement pilot program that included:²⁶

- Deploying uniformed police officers on certain bus routes and key rail station gate areas to enforce fare collection;
- A two week Fare Enforcement Campaign – customer awareness and community outreach, during which warning notices were issued; and
- Enforcement actions based on data points including bus routes and rail stations fare evasion rates, frequency of employee assaults and volume of customer complaints.

For the period, February 2015 – January 2016, which included the fare evasion pilot time period, the MTPD made nearly 700 additional fare evasion contacts, when compared to the same time period of the previous year.²⁷

In May 2016, as noted on the Customer Accountability Report, MTPD is planning to increase the number and visibility of law enforcement personnel in stations and on buses. They will:

- Implement 'power hour' deployments surging the number of officers on duty at selected times and focus on areas identified through crime analysis and "hot spots";
- Initiate a fare evasion detail to provide fare enforcement in areas identified by employees, riders and recovered closed circuit television images. (Uniformed officers during morning and afternoon rush hours); and
- Convene a focus group to begin a patrol shift reconfiguration to provide better coverage and more visibility in rail and bus during peak hours.

²⁶ WMATA PowerPoint Presentation: Improving Safety & Customer Service through Fare Enforcement, March 28, 2015

²⁷ Statistical information provided by MTPD, dated March 11, 2016

In addition, WMATA has begun using a multi-pronged approach in addressing fare evasion on select buses/lines;²⁸ however, the focus on rail fare evasion has mostly been through enforcement. Assessing fare evasion rates on Metrorail proves to be challenging as compared to Metrobus which has limited access points and technology and operators that facilitate measurement of Metrobus fare evasion rates.

Faced with differing environments, organizations respond differently. The New York City Transit Authority developed and implemented a comprehensive framework to assess, manage, and combat fare evasion resulting in decreases in fare evasion rates, crime, and increased rider confidence. Elements of comprehensive frameworks for assessing, managing, and combating fare evasion include:²⁹

- Convening a cross-functional task force;
- Developing a fare evasion estimation methodology;
- Fare evasion enforcement;
- Considering fare evasion when designing/updating automated fare collection systems;
- Target hardening initiatives at vulnerabilities; and
- Public education campaigns.

WMATA faced with differing circumstances mainly focused rail fare evasion efforts on police enforcement. A comprehensive framework to assess, manage and combat fare evasion would help WMATA to:

- Quantify the revenue losses associated with fare evasion,
- Assess related risks, and
- Measure the effectiveness of mitigation and enforcement efforts.

²⁸ A cross-functional team was established to address Metrobus fare evasion issues. Due to the data technology and the on-boarding process – there are capabilities to account for non-payment of fares on Metrobus. This data can be further synthesized to identify the high occurrences of fare evasion for improved deployment of resources both in operations and policing; and can result in reduced issues/assaults/fare evasion and increased revenue.

²⁹ Alla V. Reddy, Jacqueline Kuhls, and Alex Lu, TRB Paper Manuscript #11-2016: Measuring and Controlling Subway Fare Evasion: Improving Safety and Security at New York City Transit Authority.

Recommendation 2: Develop and implement a comprehensive framework to assess, manage, and combat rail fare evasion. (*Medium Risk*) (*Chief Financial Officer, Chief Operating Officer*)



Consolidated List of Recommendations

We recommend the General Manager/Chief Executive Officer

1. Review and update standard operating procedures to include coverage of current Metrorail revenue forecasting methodologies and requirements to maintain documentation supporting forecast results. (*Low Risk*)³⁰ (*Chief Financial Officer*)
2. Develop and implement a comprehensive framework to assess, manage and combat rail fare evasion. (*Medium Risk*) (*Chief Operating Officer*)

ADMINISTRATIVE MATTERS

Corrective actions proposed (resolution phase) and implemented (closure phase) by the affected Departments/Offices will be monitored and tracked through the OIG's Audit Accountability and Resolution Tracking System. Department policy requires that you develop a final corrective action plan (CAP) for our review within 30 days of the issuance of this report. The CAP should set forth specific action items and target completion dates necessary to implement final corrective actions on the findings and recommendations contained in this report.

³⁰ There are three potential risk ratings:

High – exception is material to accomplishing organization objectives, corrective action by appropriate Senior Management is required. Resolution would help avoid loss of material assets, reputation, critical financial information or ability to comply with critical laws, policies or procedures;

Medium – exception may be material to accomplishing organization objectives. Corrective action is required and the results are reported to management quarterly. Resolution would help avoid negative impact on the unit's assets, financial information, or ability to comply with important laws, policies, or procedures;

Low – exception has a minor impact on the accomplishment of organization objectives but may result in inefficient operations. Resolution would help improve controls and avoid inefficient operations within the unit.

OBJECTIVE, SCOPE AND METHODOLOGY

OBJECTIVE:

Our overall objective was to determine the effectiveness of WMATA's Rail Fare activities. Specifically, how effective is WMATA in budgeting its rail revenue, setting a reasonable fare structure for rail, and managing fare evasion to meet its goals, objectives, and expectations.

SCOPE:

The scope of the evaluation included rail fare activities from July 2014 through January 2016; and where appropriate, we reviewed current information, and information prior to the study.

METHODOLOGY:

To accomplish these objectives, the evaluation team focused its efforts on the following areas:

- Fare policy and fare change processes designed to align rail fares with policy and strategic objectives;
- Rail ridership and revenue modeling and forecasting processes that inform annual operating budgets and fare analysis;
- Customer research that informs and supports fare policy and fare product decisions and activities;
- Fare systems and organizational structures designed to support fare policy initiatives and improve the customer experience;
- Rail fare evasion mitigation efforts to reduce revenue losses and potential lost ridership due to safety and security concerns.

Over the course of the evaluation, the team gathered and reviewed documents to gain an understanding of the evaluation topic. We interviewed various stakeholders across the organizations focusing on the primary stakeholders – WMATA's PLAN and OMBS. We also conducted interviews to better understand the processes of the other focus areas including RESR, MTPD, Rail and Bus Operations and the Office of the Treasurer.

We requested and evaluated various internal documents, including the results of the 2015 Fare Policy Working Group meetings. In addition, we reviewed numerous external research papers and articles.

To gain additional knowledge on rail fare policies and activities, we surveyed peer transit agencies and WMATA's Board of Directors and Executive Management. The surveys were facilitated by WMATA's Customer Research team using QuestionPro, an online survey tool. The OIG observed the download of survey results to ensure the integrity of the information obtained through the survey, and then reviewed, compiled, and incorporated survey results.

Surveys were sent to finance and planning professionals representing the following 13 transit agencies:

	System	Transit agency	City/Area served
1.	New York City Subway	New York City Transit Authority (affiliate of the Metropolitan Transit Authority (MTA))	New York City
	Staten Island Railway	Staten Island Railway (subsidiary of the Metropolitan Transit Authority (MTA))	Staten Island (New York City)
2.	Washington Metro	Washington Metropolitan Area Transit Authority	Washington, D.C.
3.	Chicago 'L'	Chicago Transit Authority	Chicago
4.	MBTA (Subway)	Massachusetts Bay Transportation Authority	Boston
5.	Bay Area Rapid Transit (BART)	Bay Area Rapid Transit District	San Francisco Bay Area
6.	SEPTA	Southeastern Pennsylvania Transportation Authority	Philadelphia
8.	MARTA rail system	Metropolitan Atlanta Rapid Transit Authority	Atlanta
9.	Metro Rail	Los Angeles County Metropolitan Transportation Authority	Los Angeles
10.	Metrorail	Miami-Dade Transit	Miami
11.	Baltimore Metro Subway	Maryland Transit Administration	Baltimore
12.	RTA Rapid Transit	Greater Cleveland Regional Transit Authority	Cleveland
13.	GO Transit Union Pearson Express	Metrolinx Toronto	Toronto and Hamilton (Ontario Canada)

Of the 13 transit agencies invited to participate in the survey, 11 or 85 percent provided responses. We also surveyed WMATA's Board of Directors and Executive Management. Seven of 16 board members (44 percent) provided responses; and 5 of 11 executives (45 percent) responded.

We conducted our evaluation in compliance with the Council of the Inspectors General on Integrity and Efficiency's *Quality Standards for Inspection and Evaluation*. Those standards require that we plan and perform the evaluation to obtain sufficient and appropriate evidence to provide a reasonable basis for our conclusions based on our evaluation objective.

We held an Exit Conference on September 7, 2016, to discuss the results of the evaluation with management officials.

M E M O R A N D U M



SUBJECT: Response to OIG Evaluation Report No.17-02 – Rail Fare Activities DATE: November 4, 2016

FROM: CFO – Dennis Anosike

THRU: GM/CEO – Paul J. Wiedefeld

TO: OIG – Helen Lew

[Handwritten signatures]

The following represents the Chief Financial Officer and Chief Operating Officer's Corrective Action Plan (CAP) in response to OIG's Evaluation of WMATA's.

OIG Recommendation 1

Review and update standard operating procedures to include coverage of current Metrorail revenue forecasting methodologies and requirements to maintain documentation supporting forecast results.

Management's Response:

Management accepts this recommendation. OCFO will provide a plan to review and update the standard operating procedures to include coverage of current Metrorail revenue forecasting methodologies and requirements to maintain documentation supporting forecast results by December 9, 2016.

OIG Recommendation 2

Develop and implement a comprehensive framework to assess, manage and combat rail fare evasion.

Management's Response:

Management accepts this recommendation. The Fair Fare Collection initiative, currently under development, will enhance fare enforcement to ensure all riders are contributing their fair share to the operations of Metro. OCFO and COO will provide the plan and implementation schedule by January 6, 2017.

cc: COO – Joe Leader