

LIGHT RAIL FARE EVASION

PROGRAM EVALUATION AND AUDIT



October 26, 2016

INTRODUCTION

Background

The METRO Blue Line, which opened in June 2004, offers light-rail service to 19 stations between downtown Minneapolis and Mall of America. The METRO Green Line, which opened in June 2014, offers light-rail service to 23 stations between downtown Minneapolis and the Union Depot in St. Paul.¹ Both light rail lines use barrier-free stations; however, passengers are required to have proof-of-payment within valid fare zones, both inside the train and on the platform. Metro Transit Police officers help ensure fare compliance by inspecting proof-of-payment as part of their regularly scheduled duties. Passengers without proof of valid fare can receive a warning or a citation with a \$180 fine.

METRO passengers can provide proof of valid fare in a number of ways. Each platform has at least two ticket vending machines from which to purchase tickets directly using cash, credit card, or stored value cards. Passengers transferring from a bus line can use their transfer ticket, as long as they are within a 2.5-hour window of purchase. Passengers can also “tag” Go-To Cards, Metropasses, U-Passes, and other electronic fare media at validating machines on each platform. Metro Transit Police officers use mobile phone validators (MPVs) to check for valid fare on electronic fare media, such as Go-To Cards. The METRO Blue Line has a free-fare zone between Terminal 1 and Terminal 2 at the Minneapolis – St. Paul International Airport.

The Program Evaluation and Audit (Audit) department periodically reviews fare evasion and compliance on the light rail system. In 2014 – three months after the opening of the METRO Green Line – a fare compliance audit found that fare evasion ranged from between 4.6% and 9% on the Green Line and from between 2.6% and 3.6% on the Blue Line.

This review of light rail fare compliance is consistent with the Thrive MSP 2040 stewardship outcome regarding “responsibly managing our region’s finite resources,” and associated principles of accountability (“providing clear, easily accessible information and deploying the Council’s authority”); and integration (“intentional combining of related activities to achieve more effective results, leveraging multiple policy tools to address complex regional challenges and opportunities.”)

Purpose

The purpose of this audit is to estimate the rates of fare evasion and compliance on the METRO Blue and Green lines. The secondary purpose was to analyze results by time and geography; and identify trends in fare evasion and compliance between the 2014 and 2016 audits.

Scope

¹ Green and Blue line light rail services share five common stations in downtown Minneapolis.

The scope for this audit is monitoring fare compliance and evasion for passengers required to show proof of payment on the Blue and Green Lines during the sample periods. Audit and consultant staff collected data in April and May of 2016.

Methodology

The Audit department contracted with Evaluation Café, LLC (consultant) to perform the 2016 fare compliance review of the METRO Blue and Green lines. The consultant replicated all material aspects of the 2014 audit methodology.

Probability Sampling

The consultant used the probability sampling method from the 2014 audit that employed stratified cluster sampling. Twenty-five round-trip departures (12 on the Green Line; 13 on the Blue Line) were randomly selected. These departures were selected to represent two for each of the following time strata on each line: Weekday AM Peak, Weekday Midday, Weekday PM Peak, Weekday Night, and Weekend. Additional sampling periods were selected for time strata that had larger variations of estimates in the 2014 report. Additionally, the consultant separated each line into five zones to gain a better understanding of fare compliance and evasion by different areas along the lines. (See Exhibit 1 and 2)

For each round-trip, the consultant randomly selected a light rail vehicle (LRV) and then a section of the LRV. Any passengers that stood or sat in the randomly selected section were surveyed. In total, the consultant and audit staff asked 915 passengers to show proof-of-payment.² After reviewing the data collected, the consultant analyzed 395 observations from the Blue Line and 520 from the Green Line. As in 2014, passengers who refused to show their proof-of-payment were not included in the analysis. Twenty passengers (2%) refused to show proof-of-payment – 9 on the Blue Line and 11 on the Green Line.

“Evasion” is defined as follows: (1) riding without any fare media; (2) riding with fare media more than 1 hour outside of the transfer period; (3) riding with electronic fare media that had expired or had never been activated; (4) riding with electronic fare media that had been reported stolen; (5) riding with fare media that is not valid on light rail, such as Super Saver Stored Value passes; and (6) riding with a Campus Zone pass outside of the allowed zone or on the Blue Line.

Passengers were given an additional one-hour grace period beyond the authorized 2.5-hour transfer period. This was in case the passenger boarded the train car during their transfer window, but only moved into the section being surveyed after the transfer period ended.

When surveying on the Blue Line, the consultant and audit staff observed which passengers boarded at the airport – but only checked the fares of passengers that continued on the line beyond the free-fare zone. Passengers that traveled only between Terminal 1 and Terminal 2 stations were not surveyed as payment is not required.

The consultant also looked at both the frequency of fare evasion in each zone by time period. The occurrences of passengers without proof of payment were adjusted by the estimated ridership for that time period. This adjustment allows a comparison of the likelihood of detecting fare evasion within a

² The consultant designed the methodology and conducted most of the data collection. Some Audit staff assisted with data collection. The consultant and Audit staff wore Metro Transit safety vests and used mobile phone validators (MPVs) to check the fare compliance of passengers displaying electronic fare media.

zone, however, the number of riders boarding within a zone is not accounted for. Zones with high ridership would tend to have greater frequency of fare evaders all things being equal.

Limitations

Population

The fare evasion estimates in this report are only a snapshot in time, and are valid only for passengers that are required to show proof-of-payment. That population does not include children five years-old or younger, personal care attendants traveling with disabled passengers, nor passengers traveling only between Terminal 1 and Terminal 2 stations. Thus, it would be an overestimate to take the number of riders on either line and multiply it by the evasion rate to come up with the number of riders that evade. For example, when this report states that the evasion rate on the Blue Line is X percentage, that isn't the evasion rate for all passengers. Instead, it is the evasion rate for passengers that are required to show proof-of-payment. For these same reasons, we did not attempt to calculate revenue lost for this report.

Time frame

The consultant chose departure times that began at the start of AM Peak and the latest trips ended by 10:00 PM. Therefore, while the sampling method employed provides 95% confidence that estimated ranges represent the true evasion and compliance rates for the population – it is only for the population that rides between about 6:00 AM and 10:00 PM. The rates estimated in this audit cannot be said to explain the fare evasion and compliance of passengers that ride very late at night or early in the morning.

Identification

The consultant and audit staff did not request to see the identification of passengers traveling with discounted fares, or the identification of those riding with electronic passes that do not have identifying information already on them (such as U-Passes). In general, the consultant and audit staff only asked for proof-of-payment for children that appeared to be at least six years old. Therefore, this audit assumed that someone with a discounted fare had paid the correct fare, and that people carrying pre-paid passes were the authorized users.

Refusals

The consultant did not include refusals in the analysis of fare evasion or compliance. This issue can cause non-response bias, if the passengers that refuse are systematically different from the general population.

Seasonality

Sampling took place during four weeks in April and May. If the behavior of passengers is somehow different during this time, the fare compliance and evasion rates estimated may not accurately reflect those of other times. The 2014 audit sampled passengers during the fall. Sampling along the Green Line in this report occurred while classes were in session at the University of Minnesota in order to ensure that students are represented in the sample, thus, attempting to replicate the sampling conditions of the previous audit.

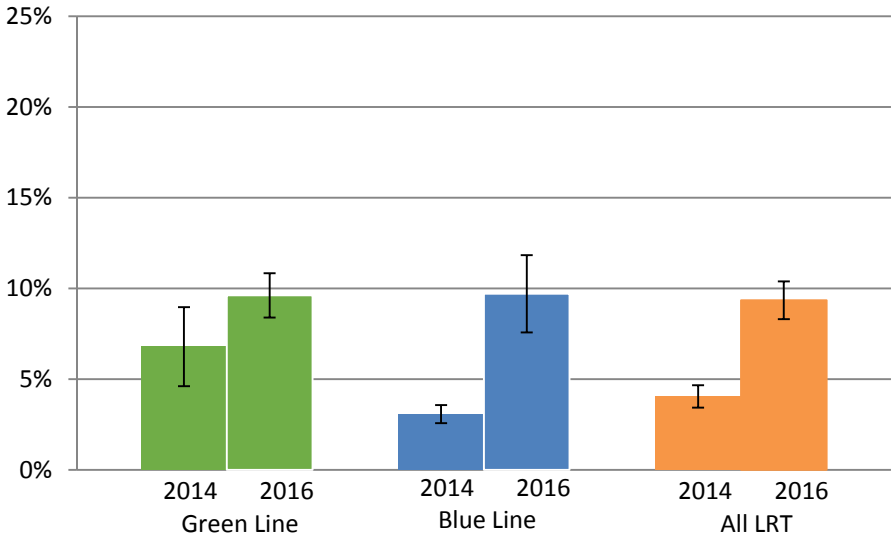
OBSERVATIONS

Overall Fare Evasion Rates

Across both LRT lines, fare evasion has increased since our 2014 audit. The overall estimated fare evasion rate for the light rail transit system is between 8.3% and 10.4%.³ In 2014, audit estimated a fare evasion rate between 3.4% and 4.7%. This overall increase is due primarily to an increase in observed fare evasion on the Blue Line.

- For the Blue Line, the estimated fare evasion rate is between 7.6% and 11.8%. This range is a statistically significant increase from 2014 when the estimated range of fare evasion was 2.6% to 3.6%.
- For the Green Line, the estimated fare evasion rate is between 8.4% and 10.8%. The fare evasion rate in 2014 ranged from 4.6% to 9.0%. The Green Line has a higher range of estimated fare evasion rate than in 2014, but the overlap of the range of estimates indicates that the true fare evasion rate may not have changed.
- Since the range of estimated fare evasion rates of the Blue Line and Green Line overlap, it indicates that the true fare evasion rates could be the same.

F1. Fare Evasion Rates 2014 and 2016

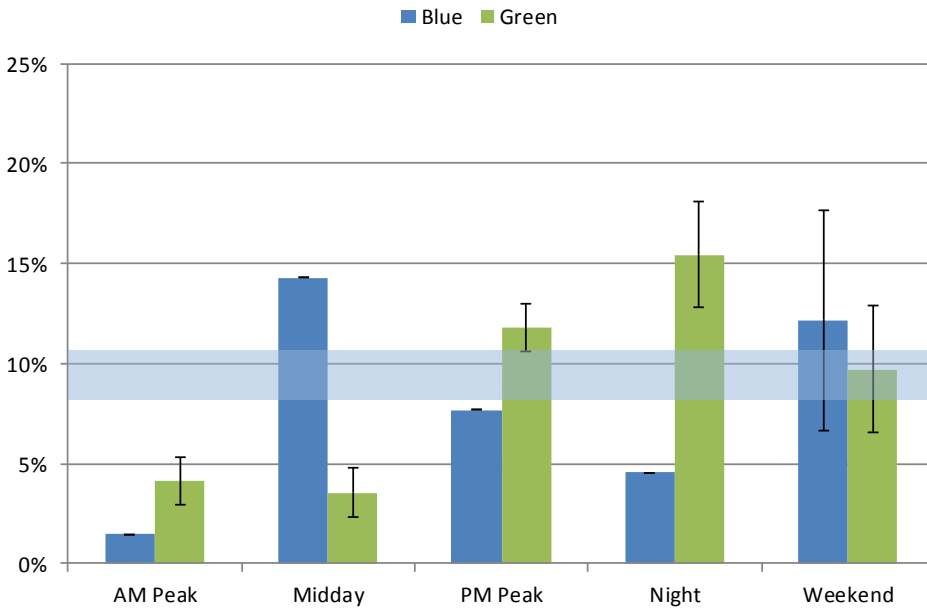


³ Using the stratified cluster sampling procedure described in the methodology section above, Audit estimated the fare evasion rates for METRO Blue and Green Lines. Using this particular methodology, Audit is 95% confident that the true mean rates fall somewhere within the ranges presented.

Fare Evasion by Time Strata

Fare evasion on the Blue and Green lines varies by time strata. For the Blue Line, evasion is highest at Midday and on the weekend, while on the Green Line evasion is highest at Night, PM Peak and Weekend. Conversely, evasion is lower on both lines during the AM Peak and lower on the Green Line at Midday and Blue Line at Night. Figure 2 presents a comparison of fare evasion by time for the Blue and Green Lines.

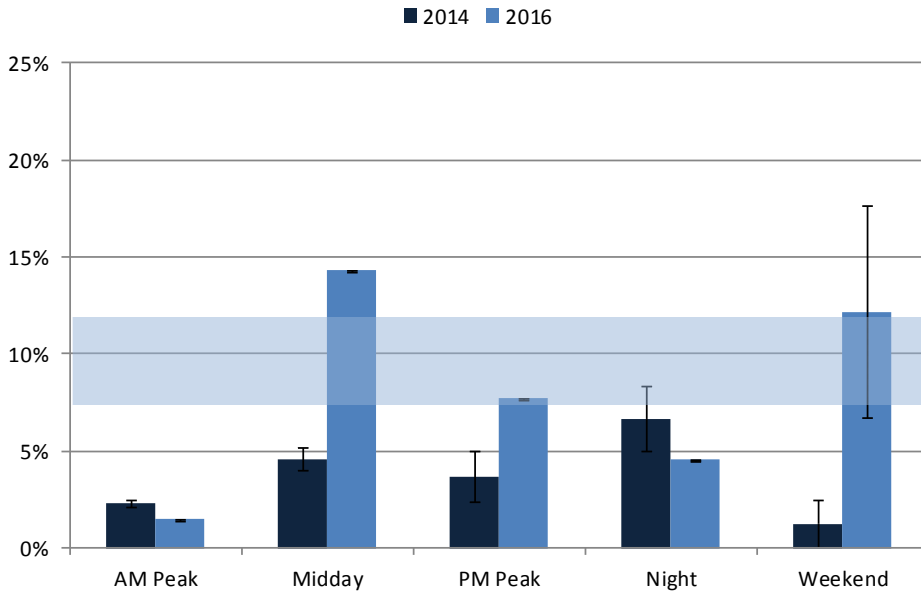
F2. Fare Evasion by Time Comparison



Note: The vertical scale stops at 25%. Shaded area is the range of estimated evasion for both Blue and Green lines. The bars show the mean estimates and the lines demonstrate the 95% confidence intervals.

Fare evasion has increased on the Blue Line during Midday, PM Peak, and Weekend times compared to 2014. AM Peak and Night services showed smaller, but statistically significant decreases in fare evasion. Figure 3 presents a comparison of fare evasion by time for the Blue Line in 2014 and 2016.

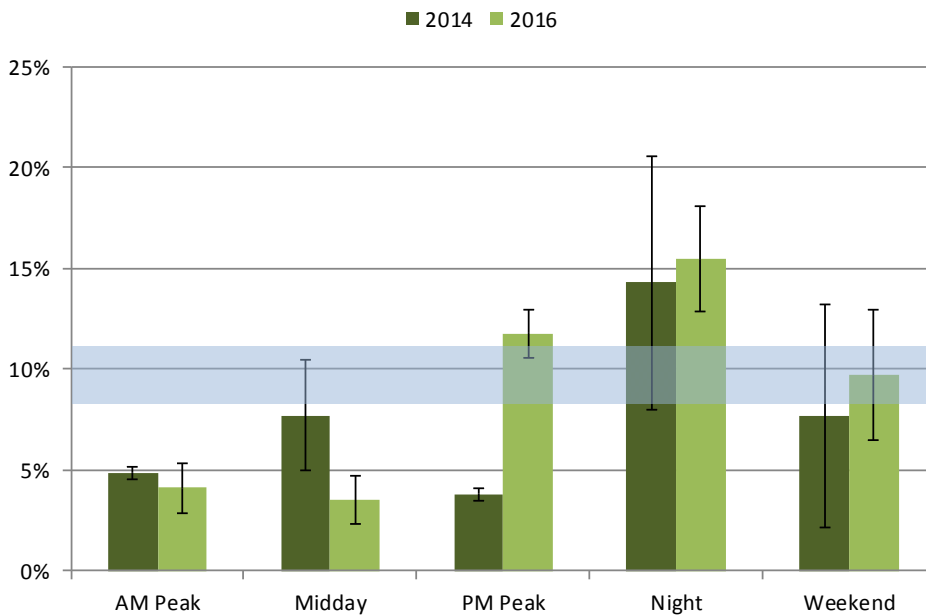
F3. Blue Line Fare Evasion by Time Comparison (2014 & 2016)



Note: The vertical scale stops at 25%. Shaded area is the range of estimated evasion for Blue Line in 2016. The bars show the mean estimates and the lines demonstrate the 95% confidence intervals.

On the Green Line, the estimated fare evasion rate has increased during the PM Peak service time since our 2014 audit. Conversely, midday service time experienced a statistically significant decrease in fare evasion. The other time strata did not have statistically significant changes in fare evasion. Figure 4 presents a comparison of fare evasion by time for the Green Line in 2014 and 2016.

F4. Green Line Fare Evasion by Time Comparison (2014 & 2016)

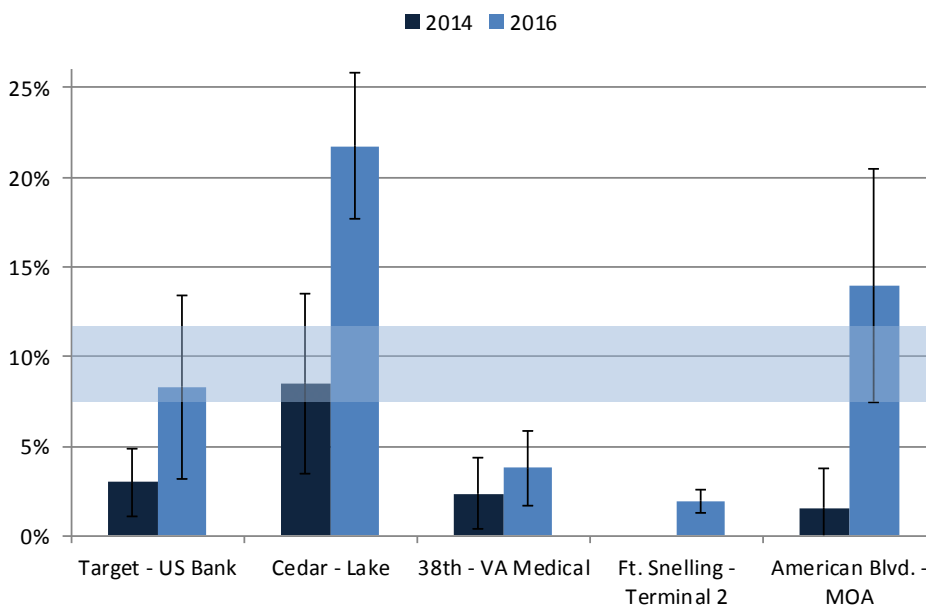


Note: The vertical scale stops at 25%. Shaded area is the range of estimated evasion for Green Line in 2016. The bars show the mean estimates and the lines demonstrate the 95% confidence intervals.

Evasion by Area

On the Blue Line, there are statistically significant increases in fare evasion in two areas— Cedar/Riverside to Lake ST. Midtown and American Blvd. to Mall of America. An increase in fare evasion also occurred from Ft. Snelling to the Terminal 2 Stations; however, this increase was small and fare evasion remains relatively low compared to other sections of the Blue Line.

F5. Blue Line Fare Evasion by Zone



Note: The vertical axis ends at 25%. Shaded area is the range of estimated evasion for Blue Line in 2016.

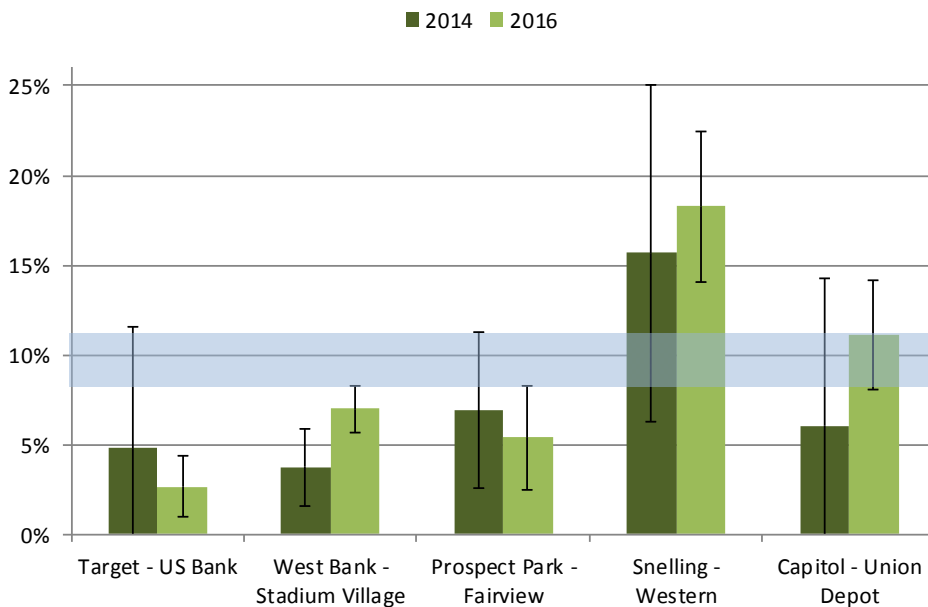
Consultant and audit staff observed fare evasion on the Blue Line most frequently in downtown Minneapolis during the weekend. The adjacent zone of the midtown area of Minneapolis had the next most frequent encounters with fare evaders at various times. The zone within the city of Bloomington had a relatively high occurrence of fare evasion on the weekend. The times and zones with the highest evasion rates; and those with no observed evasion are shown in Table 1.

T1. Blue Line Fare Evasion by Time and Zone

Highest Evasion			No Evasion	
Rank	Time	Location	Time	Location
1	Weekend	Target Field to US Bank Stadium	AM Peak	American Blvd to MOA
2	PM Peak	Cedar-Riverside to Lake St	AM Peak	Ft Snelling to Terminal 2
3	Weekend	Cedar-Riverside to Lake St	AM Peak	38th Street to VA Medical
4	Midday	Cedar-Riverside to Lake St	AM Peak	Cedar-Riverside to Lake St
5	Weekend	American Blvd to MOA	Midday	Ft Snelling to Terminal 2
			PM Peak	American Blvd to MOA
			PM Peak	38th Street to VA Medical
			Night	American Blvd to MOA
			Night	Ft Snelling to Terminal 2
			Night	Cedar-Riverside to Lake St
			Weekend	Ft Snelling to Terminal 2

On the Green Line, fare evasion is highest between Snelling and Western Avenues, estimated to be between 14 and 22 percent. The estimated fare evasion rate ranges were relatively large in 2014, so in most cases, there is overlap in the ranges between 2014 and 2016, as well as across station zones. Figure 6 shows the evasion rates among the five zones along the Green Line in 2014 and 2016.

F6. Green Line Fare Evasion by Zone



Note: The vertical axis ends at 25%. Shaded area is the range of estimated evasion for Green Line in 2016.

Consultant and audit staff were most likely to encounter fare evaders between Western and Snelling Avenues at night, during the PM peak, and over the weekend. In addition, the area between Union Station and the Capitol / Rice Station in Downtown St. Paul was another area where high evasion audit

and consultant staff encountered fare evaders. Despite high overall evasion at Western and Snelling, there was no evasion found through sampling at these stations during the AM Peak or Midday. We also found no fare evaders during four of five time periods between Fairview and Prospect Park Stations and three of five time periods at the stations in downtown Minneapolis.

T2. Green Line Fare Evasion by Time and Zone

Highest Evasion			No Evasion	
Rank	Time	Location	Time	Location
1	Night	Western to Snelling	AM Peak	Western to Snelling
2	PM Peak	Western to Snelling	AM Peak	Fairview to Prospect Park
3	Weekend	Western to Snelling	AM Peak	Target Field to US Bank Stadium
4	Weekend	Union Station to Capitol/Rice	Midday	Western to Snelling
			Midday	Fairview to Prospect Park
			Midday	Target Field to US Bank Stadium
			Night	Fairview to Prospect Park
			Night	Target Field to US Bank Stadium
			Weekend	Fairview to Prospect Park
			Weekend	Stadium Village to West Bank

Peer Agency Comparisons

Fare evasion in an accepted risk for any rail transit system that uses a “proof-of-payment” system like Metro Transit’s Light Rail system. Methodologies for measuring fare evasion frequently differ, but there is precedence for similarly structured rail transit systems to have comparable fare evasion rates. Audit found examples from peer transit agencies in the U.S., Canada, and Australia with fare evasion rates from about 5% to about 15%. As we reported in 2014, and others have reported in the past, even systems that have built barriers to entry continue face the problem of fare evasion, as passengers can hop over turnstiles or evade paying in other ways. The very high cost of purchasing, installing, and maintaining barriers may not be worth the return in revenue, especially if the since continues to face fare evasion.⁴

Changes in Fare Evasion

For the purposes of this audit, we did not conduct a full evaluation of potential causes for changes in fare evasion; however, key actions by the Metro Transit Police could have had effects on evasion in both 2014 and 2016. The substantial increases in fare evasion on the Blue Line may be the result of the publicity surrounding the change of fare enforcement policy by Metro Transit Police during the spring of 2016. The policy announced was that all first-time fare evaders would be issued warnings. The second

4 Metropolitan Council, Program Evaluation and Audit, Light Rail Fare Compliance, St. Paul, MN 55101, April 2015. Transit Cooperative Research Program. “Report 10: Fare Policies, Structures, and Technologies.” National Academies Press. Washington, D.C. 1996. Progressive Railroading. “L.A. Metro to test turnstile-gate waters at four subway stations.” http://www.progressiverailroading.com/passenger_rail/news/LA-Metro-to-test-turnstile-gate-waters-at-four-subway-stations--21115. August 4, 2009. The Transport Politic. “Are Turnstiles Worth Their Cost?” <http://www.thetransportpolitic.com/2009/08/17/are-turnstiles-worth-their-cost/>. August 17, 2009. Linder, Michael. “Metro Fare Jumpers Explain Why and How They Evade Tickets in L.A.” LA Weekly. <http://www.laweekly.com/news/metro-fare-jumpers-explain-why-and-how-they-evade-tickets-in-la-video-5128290>. October 8, 2014.

incident of fare evasion bring a citation with a fine of \$180. This policy change could have made some riders more willing to risk riding without proof of payment knowing that a warning would be issued, rather than a citation.

Conversely, fare evasion in 2014 on the Blue Line may have been suppressed by fare enforcement actions that year. As police staffing was increased in preparation for the opening of the Green Line in June, 2014, fare enforcement patrols increased on the Blue Line. The greater frequency of fare enforcement activity earlier in 2014 may have reduced riders' willingness to ride without proof of payment into the summer and fall of 2014. Fare evasion on the Green Line is more consistent between 2014 and 2016, potentially due to Metro Transit Police limited enforcement to educational warnings for approximately the first six months of revenue operations.

According to Metro Transit Police officials, on-board fare enforcement for light rail overall has increased from 2014 to 2016. In 2014, Police checked about 1.4 million riders for valid fares. Through September of 2016, Police have checked almost 1.6 million riders for valid fares, which sets a pace for more than 2 million fare checks through all of 2016—a 49% increase. Police use various strategies to target areas along both the Blue and Green Line. For instance, police target special events when a large number of riders are boarding in a short period. In addition, police identify areas of focused enforcement based on time of day and ridership along each line.

MTPD Fare Compliance Audit Work

In February 2016, the MTPD Internal Affairs & Inspections Unit (IAU) conducted an internal audit to evaluate department and officer performance for fare compliance activities. The IAU reviewed a two-week period of LRT officer log sheets, selected a sample of 12 out of 94 (13%) fare evasion checks to review, and conducted the evaluation by reviewing LRV video and officer log sheets. This audit evaluated log sheet time accuracy, the use of fare tools (fare validators) by officers, completeness of fare compliance checks, count accuracy and equity of checks throughout the LRV. According to IAU manager, the department plans to complete additional fare compliance audits in the future.

CONCLUSIONS

Overall, the estimated fare evasion rate for the Metro Transit light rail system has increased from between 3.4% and 4.7% in 2014, to between 8.3% and 10.4% in 2016. More specifically, fare evasion on the Blue Line has increased during Midday, PM Peak, and Weekend service times. Geographically, fare evasion has increased significantly since the 2014 audit in the Cedar-Riverside to Lake Street zone and in the American Boulevard to Mall of America zone. On the Green Line, the range of fare evasion estimates indicates that the true fare evasion rate may not have changed. However, we did find a clear, statistically significant increase in fare evasion during the PM Peak on the Green Line. This audit did not fully evaluate potential causes for changes in fare evasion; nor evaluate Metro Transit Police Fare Compliance Procedures. However, it should be noted that the results of this audit and the 2014 audit were likely affected by Metro Transit Police department actions. Increased enforcement around the time of the 2014 audit likely resulted in lower fare evasion; while publicity surrounding Metro Transit Police policy changes concerning fare enforcement in 2016 may have resulted in higher fare evasion.

RECOMMENDATIONS

Program Evaluation and Audit recommendations are categorized according to the level of risk they pose for the Council. The categories are:

- **Essential** – Steps must be taken to avoid the emergence of critical risks to the Council or to add great value to the Council and its programs. Essential recommendations are tracked through the Audit Database and status is reported twice annually to the Council’s Audit Committee.
- **Significant** – Adds value to programs or initiatives of the Council, but is not necessary to avoid major control risks or other critical risk exposures. Significant recommendations are also tracked with status reports to the Council’s Audit Committee.
- **Considerations** – Recommendation would be beneficial, but may be subject to being set aside in favor of higher priority activities for the Council, or may require collaboration with another program area or division. Considerations are not tracked or reported. Their implementation is solely at the hands of management.
- **Verbal Recommendation** – An issue was found that bears mentioning, but is not sufficient to constitute a control risk or other repercussions to warrant inclusion in the written report. Verbal recommendations are documented in the file, but are not tracked or reported regularly.

Audit has two recommendations for Metro Transit and MTPD, both of which support the Thrive MSP Outcome of Stewardship and the principles of collaboration and accountability.

1. **(Significant) Metro Transit and the Metro Transit Police Department should implement a statistically valid, on-going tool to continually monitor fare evasion rates.** This tool could be used to develop a baseline for expected fare evasion in an environment where each individual receives one warning before a fare evasion ticket is issued.

***Management Response:** The Metro Transit Police Department (MTPD) would be very interested and willing to work with the staff of Program Evaluation and Audit, as the subject matter experts, to develop and implement a statistically valid monitoring tool. However, it has long been recognized by Program Evaluation and Audit leadership as well as the MTPD that the presence of uniformed police officers engaged in fare inspections or audit functions drives the compliance rate up on the vehicles, platforms, and events being monitored. For this reason Program Evaluation and Audit has not considered observations reported by MTPD to be statistically valid, hence, our need for their guidance on this recommendation.*

If the presence of uniformed MTPD drives compliance up, it is worth consideration what the fare evasion rate would be if staffing for LRT patrol was increased as it has in other areas. MTPD has and continues to evaluate the expansion of services via employment of civilian fare checkers as well as increasing the sworn police staff assigned to LRT as a supplement to the police effort.

Staff Responsible:

- MTPD and Program Evaluation and Audit Staff

Time Table: On-going

2. **(Significant) Metro Transit and the Metro Transit Police Department should continue to review—and when deemed necessary—revise the current fare enforcement strategy, incorporating data from their monitoring tool including when and where fare evasion checks take place.**

Management Response: *The MTPD continually reviews and evaluates our fare inspection and fare enforcement strategies to maximize the effects of our efforts by tracking which stations experience high boarding numbers and tracking where fare evasion is likely to occur. MTPD has experimented with plain clothes fare enforcement teams and the expanded use of non sworn community service officers.*

We also evaluated and modified our policy and enforcement strategies to ensure that our enforcement practices are unbiased and do not inadvertently target particular neighborhoods or have a disparate effect on minorities or financially disadvantaged communities.

If the Program Evaluation and Audit staff can assist us in developing and implementing a tool to monitor fare evasion rates, we would enthusiastically use that data to evaluate our strategies providing that those efforts are consistent with our commitment to provide fair and unbiased service throughout the system.

It should be noted, however, that fare inspection is only one of the responsibilities of the officers assigned to light rail patrol. They also respond to calls for service, provide emergency response when appropriate, and engage in crime suppression, counter-terrorism, community outreach, pedestrian and bicycle safety efforts, and homeless outreach. Therefore, our fare inspection efforts are often targeted to locations where there has been a significant incidence of crime or at locations that may hold symbolic significance and may become targets of terrorism.

Staff Responsible: *MTPD Staff*

Time Table: *On-going*

**Metropolitan Council
Program Evaluation & Audit
Light Rail Fare evasion and non-Compliance Review**

Exhibit 1: Blue Line Geographic Zones

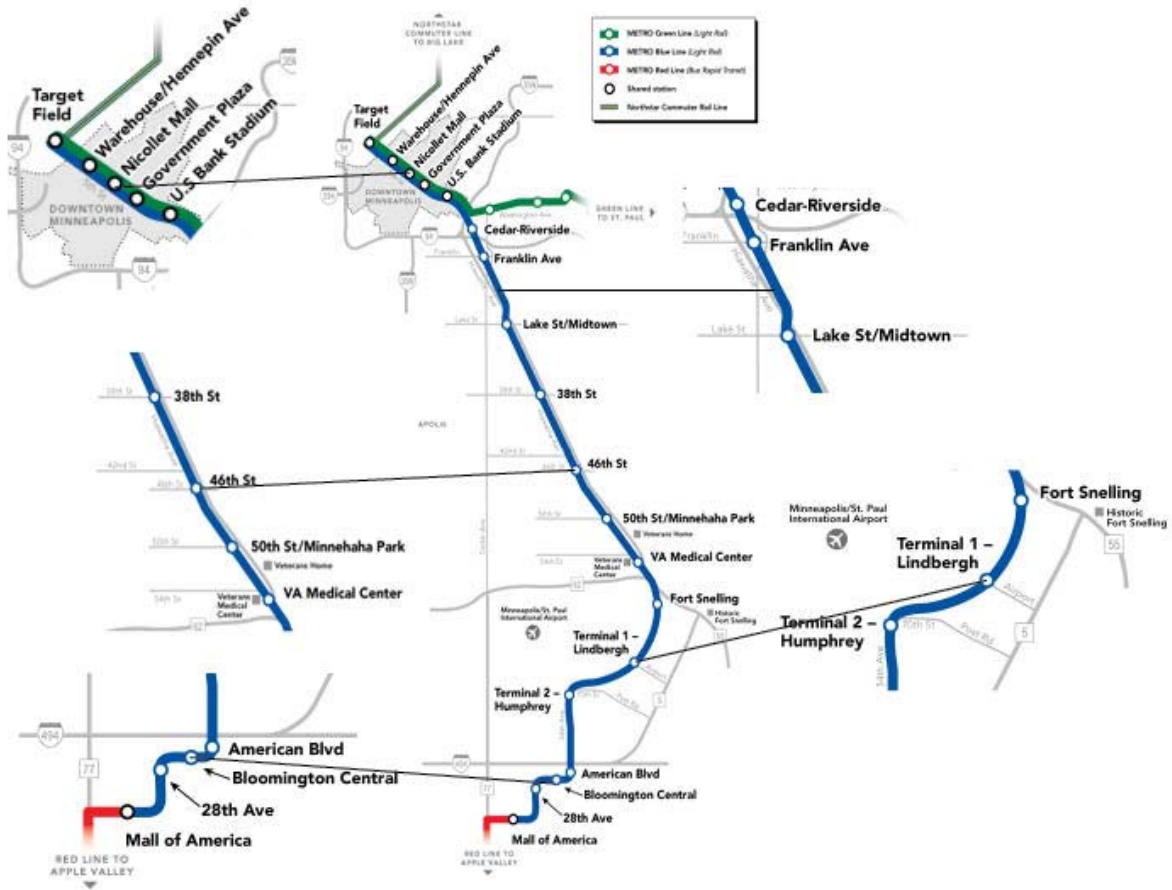


Exhibit 2: Green Line Geographic Zones

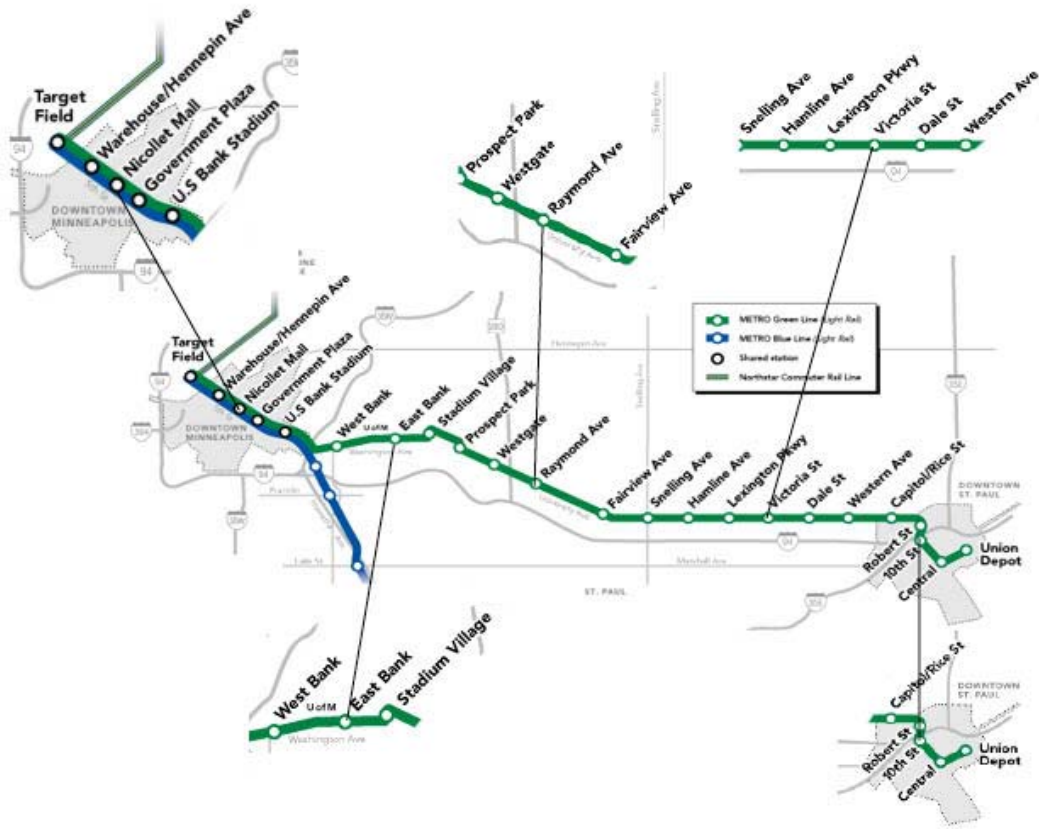


Exhibit 3 – Consultant Contact Information

Brian Hanninen, Principal
 Consultant
 Evaluation Cafe LLC
 102 Sandy Creek Court
 Cary, NC 27519
<http://www.evalcafe.org>



390 Robert Street North
St Paul, MN 55101-1805

651.602.1000
TTY 651.291.0904
public.info@metc.state.mn.us
metrotransit.org