

**THIS PRINT COVERS CALENDAR ITEM NO. :** \_\_\_\_\_

**SAN FRANCISCO  
MUNICIPAL TRANSPORTATION AGENCY**

**DIVISION:** Finance and Information Technology

**BRIEF DESCRIPTION:**

This informational calendar item summarizes the findings of the San Francisco Municipal Transportation Agency (SFMTA) Proof of Payment (POP) Study.

**SUMMARY:**

- A minimum of 9.5 percent of those surveyed SFMTA customers did not have valid POP. Assuming that these customers did not pay the appropriate fare, the SFMTA could be losing an estimated \$19 million annually in uncaptured revenue.
- This overall rate varies greatly by route/line and time of day. The rate on the light rail system, where the SFMTA historically has concentrated fare enforcement efforts, is approximately half that of the remainder of the system (5 percent versus 10 percent). This variance illustrates the impact of the existing POP program.
- The percentage of customers who were tracked entering through the back door without valid POP is significantly than the systemwide average (55 percent versus 9.5 percent). Notwithstanding the revenue impacts of back-door boarding, an immediate shift to front-door boarding could result in longer times at stops and slower travel times.
- Current TFI deployment does not always align with times and locations when customers do not have valid POP.
- TransLink® will necessitate changes to transit fare inspection and implementation of an effective POP program.

**ENCLOSURES:**

1. Proof of Payment Study

**APPROVALS:**

**DATE**

DIRECTOR OF DIVISION

PREPARING ITEM \_\_\_\_\_

\_\_\_\_\_

FINANCE \_\_\_\_\_

\_\_\_\_\_

EXECUTIVE DIRECTOR/CEO \_\_\_\_\_

\_\_\_\_\_

SECRETARY \_\_\_\_\_

\_\_\_\_\_

ASSIGNED SFMTAB CALENDAR DATE: \_\_\_\_\_

## **PURPOSE**

The purpose of this Proof of Payment (POP) Study is (a) to determine the magnitude of invalid POP use through a statistically-significant survey, (b) to quantify the financial impact, (c) to identify practices of SFMTA's existing POP fare inspection program, and (d) to assist in deployment of Transit Fare Inspectors (TFIs) for systemwide POP enforcement.

## **GOAL**

Increasing the percentage of customers with valid POP will help increase SFMTA fare revenues, which helps pay for the cost of providing transportation services in San Francisco. It will also result in a better customer experience, as many fare-paying customers do not believe that the SFMTA is doing enough to ensure everyone else is paying their fare. It will also help increase the SFMTA's farebox recovery ratio (the percentage of operating costs covered by fare revenues), currently estimated at 26 percent for Fiscal Year 2008-2009.

These goals are in accordance with the SFMTA Strategic Plan, specifically:

Goal 4 – Financial Capacity: To ensure financial stability and effective resource utilization.

Objective 4.1: Increase revenue by 20 percent or more by 2012 by improving collections and identifying new sources

Objective 4.2: Ensure efficient and effective use of resources.

## **DESCRIPTION**

There is a widespread perception that many of SFMTA's transit customers do not pay their fare to ride the system. This perception has a negative impact on the SFMTA, reducing public confidence in the system and making it more difficult to increase public funding and implement new initiatives for service improvements. While the vast majority of the public pays the appropriate cash fare, those who do not pay frustrate other customers and reduce the financial resources available to operate a comprehensive and reliable transit system. Fare revenue – budgeted for approximately \$170 million in Fiscal Year 2009-2010 – helps pay for the operating costs of providing a high level of service on a transit system that averages about 700,000 weekday boardings.

Ensuring that the SFMTA not only collects the appropriate fare revenue from its customers but also does so efficiently and quickly is essential to Muni's speed and operational reliability. On average, nearly 70 customers board any given Muni bus each hour – more than any other large transit system in the nation. Reducing the time spent collecting cash fares or verifying passes and transfers/fare receipts not only makes trips faster but also reduces the number of vehicles required to provide the same level of service. Ultimately, this can reduce operating costs or allow Muni to provide more service with the same resources.

Given these considerations, the SFMTA conducted this study to investigate fare payment patterns on Muni as it looks to expand its existing POP enforcement program. All customers must retain a transfer/fare receipt, pass or other form of POP whenever riding a Muni vehicle or within a fare-paid zone of a light rail station. Currently, Transit Fare Inspectors (TFIs) enforce fare regulations on the light rail system and are beginning limited enforcement on the remainder of the transit network. While increasing revenues to sustain transit's level of service is desirable, the program's primary focus is to foster a culture of fare compliance and public respect for the system.

Although many stakeholders have observed POP issues anecdotally, this study made no prior assumptions about how, where and when customers lacked valid POP. To support an objective and comprehensive analysis of fare payment patterns, SFMTA TFIs, Finance and Planning staff, City Hall Fellows, and interns rode more than 1,100 vehicle runs and surveyed over 41,000 customers on nearly every bus route and rail line, excluding cable cars, during different times of the day and on all days of the week.

The attachment contains the full report with a detailed analysis of the study findings. The following table (continued onto the next page) summarizes the major findings:

### **Fare Payment Major Findings**

<b>Invalid POP Rate</b>	<b>Description</b>
Overall Invalid POP Rate	A minimum of 9.5% of SFMTA customers do not have valid POP.
By Route	On the light rail system, where TFIs have been enforcing fares for about a decade, the rate is slightly under 5%. The rate on the rest of the system is slightly higher than 10%, with some individual bus routes exceeding 15%.
Back Door Boarding	Of the 857 individuals the survey team tracked entering through the back door, 55% had invalid POP. Notwithstanding the revenue impacts of back-door boarding, an immediate shift to front-door boarding could result in longer times at stops and slower travel times. Muni's hourly bus boarding rate is already the highest in the nation.
Time of Day	The invalid POP rate increases as the day progresses from about 6% during the morning peak to over 14% during the evenings.
Vehicle Loads	The number of customers on a vehicle does not significantly influence the invalid POP rate.
Impacts of Fare Changes	The July 1, 2009, fare increase does not appear to have impacted significantly the invalid POP rate.
Peer Systems	Direct comparisons may not be appropriate because transit systems do not use consistent methodologies to calculate the invalid POP rate. Unlike the SFMTA, most other systems only require POP on rail lines, not on buses. To SFMTA's knowledge, other transit systems have not conducted a similar study as this one.

### Common Types of Invalid POP

Common Types of Invalid POP	Amount of customers with invalid POP
No Transfer/Fare Receipt or Pass	Approximately 5% of surveyed customers had no transfer/fare receipt, pass or any other form of proof-of-payment.
Invalid Transfers/Fare Receipts	About 2.5% of surveyed customers used an expired or illegally-altered transfer/fare receipt, most often during the afternoon and evening hours.
Misused Discount Passes	Approximately 8% of customers using a Senior Pass and 3% of customers using Youth Pass were adults between 18 and 64 years old and not entitled to a discount fare.
Invalid Regional Transit Connection (RTC) Card	Approximately 6% of customers with disabilities used their RTC card improperly, most often by not purchasing a monthly sticker.
Counterfeit Passes	The survey team detected roughly 1 counterfeit pass per 400 legitimate Adult Fast Passes – or approximately 1 out of 1,000 customers surveyed.
Fare Underpayment	The survey team was not always able to identify customers who paid less than the required fare but still obtained a valid transfer/fare receipt and those who illegally acquired a second-hand valid transfer/fare receipt. After accounting for fare underpayment, the actual systemwide invalid POP rate is higher than 9.5%.

### Financial Impacts

Financial Impacts	Description
Uncaptured Revenue	Estimated uncaptured revenue resulting from customers not having valid POP totals approximately \$19 million, assuming that customers without valid POP did not pay the appropriate fare.

### POP and Enforcement Issues

POP and Enforcement Issues	Description
TFI Schedules	On a typical day, non-enforcement activities may comprise over 40% of a TFI's paid time.
TFI Staffing	TFI staffing peaks in the mid-morning and early afternoon, but the highest invalid POP rates occur later in the day.
Safety and Security	Safety and security issues can sometimes impact TFI abilities to enforce fare regulations.

### TransLink®

TransLink	Description
Changes in Customer Use of Fare Media	TransLink® could decrease the misuse of discount passes, the sale of counterfeit passes and the use of invalid transfers/fare receipts. However, customers may not tag their TransLink® cards which will result in the SFMTA being unable to capture the appropriate fare revenue or verify pass validity.
Changes to Fare Enforcement Procedures	TFIs will no longer be able to inspect passes visually, but must instead take longer to check each TransLink® card electronically

TransLink	Description
	using a handheld device. This may give customers an opportunity to tag the card reader or to exit at the next stop before TFIs can check their fare. Furthermore, there could be more disputes between customers and TFIs, as customers will not be able to tell when their cards expire because current plans do not call for TransLink® fare media to have printed expiration times.
Financial Impacts	Although TransLink® may reduce the misuse of existing types of fare media, customers may find new ways to avoid paying the appropriate fare using TransLink®.

## **ALTERNATIVES CONSIDERED**

The SFMTA is in the process of expanding the proof-of-payment program systemwide. Historically, TFIs have focused fare enforcement efforts on the light rail system and since July 2009, have begun limited enforcement on buses.

The primary alternative would be to continue to direct fare enforcement resources towards the light rail system. As the POP study has indicated, however, the percentage of customers without valid POP is twice as high on buses and F Market & Wharves historic streetcar system, which comprises approximately three-quarters of total transit ridership.

## **FUNDING IMPACT**

SFMTA's amended FY 2009-2010 budget forecasts transit fare revenue of approximately \$170 million. Bus, streetcar and light rail revenue comprises approximately \$157 million of this amount, while cable car cash fares account for the remainder. In the unlikely scenario that every bus, light rail and streetcar customer had valid POP, the SFMTA might be able to capture about \$19 million annually. This does not imply that the SFMTA could collect all of this revenue even with full POP enforcement systemwide. For example, some customers may not decide to make a trip by transit if they have to pay. Other customers will continue to avoid paying in hopes that avoid encountering a TFI. A reduction in the invalid POP rate by half to approximately 5 percent could yield an additional \$9 to \$10 million annually.

Currently, SFMTA's POP program consists of 46 full-time TFIs, eight supervisors and support staff. The projected program expenses for FY 2008-2009 totals \$5.0 million. Under the Board-approved fiscal year 2009-2010 operating budget, the number of full-time TFI positions is increasing to 60 for a total program expense of \$6.5 million.

## **OTHER APPROVALS RECEIVED OR STILL REQUIRED**

The SFMTA has begun the process of expanding POP enforcement from Muni Metro light rail vehicles to buses and the F Market & Wharves historic streetcar line. On July 29, 2009, TFIs began limited enforcement on selected bus routes. Given the differences between buses and light rail vehicles and the fact that the bus network is more dispersed than the six light rail lines, transitioning to full systemwide POP enforcement may require different enforcement policies and procedures. The following list provides examples of major POP-related issues that the SFMTA is working to resolve:



Issues	Next Steps
TFI Staffing Levels	Determine appropriate staffing levels to expand system coverage within budget constraints.
Strategic TFI Deployment	Determine how to deploy TFIs effectively and efficiently to reduce the percentage of customers without valid POP, while ensuring that all customers expect that a TFI might check their fare regardless of where and when they ride Muni.
Public Education	Determine how to communicate POP policies visually and verbally to ensure that SFMTA's diverse customer base understands the requirement to have valid POP while being on a Muni vehicle or in a fare-paid zone.
TFI and Operator Training	Determine how operators and TFIs should interact on vehicles to minimize vehicle delays and ensure that SFMTA employees understand their proper roles and responsibilities relating to fare enforcement.
Back-Door Boarding	Determine whether to permit back-door boarding on buses and the F Market & Wharves streetcar with consideration of the impacts on revenue collection and vehicle travel times.
Fare Media	Determine whether there should be any changes to existing fare media that customers commonly are misusing.
Securing Customer Identification	Determine how to increase the percentage of customers who provide valid identification upon request from a TFI either to verify the proper use of discount fare media or to issue a citation.
Safety and Security	Determine how to enhance safety and security for customers, operators and TFIs. Develop fare enforcement procedures that specifically address safety and security issues on buses as well as on crowded vehicles.
TransLink®	Determine how to modify fare inspection techniques and procedures given the changes in fare payment introduced by TransLink®.
Inspection Speed	Determine how to inspect fares rapidly to minimize impacts on vehicle operations, particularly as the verification of TransLink® fare media takes longer than visual inspection of existing passes and transfers/fare receipts.

The City Attorney does not need to review this document they are informational items only.

## RECOMMENDATION

This item is presented for the SFMTA Board of Directors' information. Following up on the findings identified in the POP study, SFMTA staff is developing recommendations for modifications and improvements to the POP program. SFMTA's Security and Enforcement Division will be providing a complementary board presentation discussing strategies and next steps for the POP program as the SFMTA transitions towards systemwide POP enforcement.

## **Proof-of-Payment Study Buses, Light Rail Vehicles and Streetcars**

San Francisco Municipal Transportation Agency

Finance and Information Technology Division



*Image of customers boarding through the rear door of a Muni bus*



## Acknowledgements

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This Proof-of-Payment Study required the collaboration and support of many individuals in multiple SFMTA divisions, including Security & Enforcement, Planning and Finance & Information Technology. In particular, the Transit Fare Inspectors and members of the SFPD were extremely helpful in conducting the survey.

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## Executive Summary

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In San Francisco, the Muni public transit system is an essential component of the multimodal transportation network operated by the San Francisco Municipal Transportation Agency (SFMTA). As a city with a “Transit First” policy since 1973, San Francisco has promoted transit and other alternatives to the automobile in an effort to enhance mobility and preserve the quality of life in the nation’s second most-densely populated major city. Approximately 50 percent of San Franciscans use a sustainable form of transportation – transit, bicycling, or walking – for their journey to work, higher than all but a handful of cities in the United States.

As essential as Muni is to San Franciscans, there is a widespread perception that many of its customers do not pay their fare to ride the system. This perception has a negative impact on the SFMTA, reducing public confidence in the system and making it more difficult to increase public funding and implement new initiatives for service improvements. While the vast majority pays the appropriate cash fare, those who do not pay frustrate other customers and reduce the financial resources available to operate a comprehensive and reliable transit system. Fare revenue – budgeted for approximately \$170 million in fiscal year 2009-2010 – helps pay for the operating costs of providing a high level of service on a transit system that averages about 700,000 weekday boardings.

Ensuring that the SFMTA not only collects the appropriate fare revenue from its customers but also does so efficiently and quickly is essential to Muni’s speed and operational reliability. On average, nearly 70 customers board any given SFMTA bus each hour – more than any other large transit system in the nation. Reducing the time spent collecting cash fares or verifying passes and transfers/fare receipts not only makes trips faster but also reduces the number of vehicles required to provide the same level of service. Ultimately, this can reduce operating costs or allow Muni to provide more service with the same resources.

Given these considerations, the SFMTA conducted this Proof-of-Payment (POP) Study to investigate fare payment patterns on Muni as it looks to expand its existing POP enforcement program. All customers must retain a transfer/fare receipt, pass or other form of POP whenever riding a Muni vehicle or within a fare-paid zone of a Muni Metro light rail station. Currently, Transit Fare Inspectors (TFIs) enforce fare regulations on Muni Metro and are beginning limited enforcement on the remainder of the system. While increasing revenues to sustain transit’s level of service is desirable, the program’s primary focus is to foster a culture of fare compliance and public respect for the system.

The goals of the POP Study include:

- To determine the magnitude of invalid POP use through a statistically-significant survey
- Quantify the financial impact to the agency

- To identify practices of SFMTA's existing POP fare inspection program
- To assist in deployment of Transit Fare Inspectors (TFIs) for systemwide POP enforcement

Although many stakeholders have observed POP issues anecdotally, this study made no prior assumptions about how, where and when customers lacked valid POP. To support an objective and comprehensive analysis of fare payment patterns, SFMTA TFIs, Finance and Planning staff, City Hall Fellows, and interns rode more than 1,100 vehicle runs and surveyed over 41,000 customers on nearly every bus and streetcar route (but not cable cars) during different times of the day and on all days of the week.

The remainder of this Executive Summary highlights major study findings, illustrates the different types of invalid POP, and provides maps of the magnitude of POP issues by route and location. The full report and appendix contain more detailed explanations and analysis.

**Figure 1: Major POP Study Findings**

<b>Invalid POP Rate</b>	<b>Description</b>
Overall Invalid POP Rate	A minimum of 9.5% of SFMTA customers do not have valid POP.
By Route	On the Muni Metro light rail system, where TFIs have been enforcing fares for about a decade, the rate is slightly under 5%. The rate on the rest of the system is slightly higher than 10%, with some individual bus routes exceeding 15%.
Back Door Boarding	Of the 857 individuals the survey team tracked entering through the back door, 55% had invalid POP. Notwithstanding the revenue impacts of back-door boarding, an immediate shift to front-door boarding could result in longer times at stops and slower travel times. On average, nearly 70 customers board any given SFMTA bus each hour – more than any other large transit system in the nation.
Time of Day	The invalid POP rate increases as the day progresses from about 6% during the morning peak to over 14% during the evenings.
Vehicle Loads	The number of customers on a vehicle does not significantly influence the invalid POP rate.
Impacts of Fare Changes	The July 1, 2009, fare increase does not appear to have impacted significantly the invalid POP rate.
Peer Systems	Direct comparisons may not be appropriate because transit systems do not use consistent methodologies to calculate the invalid POP rate. Unlike the SFMTA, most other systems only require POP on rail lines, not on buses. To SFMTA's knowledge, other transit systems have not conducted a similar study as this one.

Common Types of Invalid POP	Amount of customers with invalid POP
No Transfer/Fare Receipt or Pass	Approximately 5% of surveyed customers had no transfer/fare receipt, pass or any other form of proof-of-payment.
Invalid Transfers/Fare Receipts	About 2.5% of surveyed customers used an expired or illegally-altered transfer/fare receipt, most often during the afternoon and evening hours.
Misused Discount Passes	Approximately 8% of customers using a Senior Pass and 3% of customers using Youth Pass were adults between 18 and 64 years old and not entitled to a discount fare.
Invalid Regional Transit Connection (RTC) Card	Approximately 6% of customers with disabilities used their RTC card improperly, most often by not purchasing a monthly sticker.
Counterfeit Passes	The survey team detected roughly 1 counterfeit pass per 400 legitimate Adult Fast Passes – or approximately 1 out of 1,000 customers surveyed.
Fare Underpayment	The survey team was not always able to identify customers who paid less than the required fare but still obtained a valid transfer/fare receipt and those who illegally acquired a second-hand valid transfer/fare receipt. After accounting for fare underpayment, the actual systemwide invalid POP rate is higher than 9.5%.

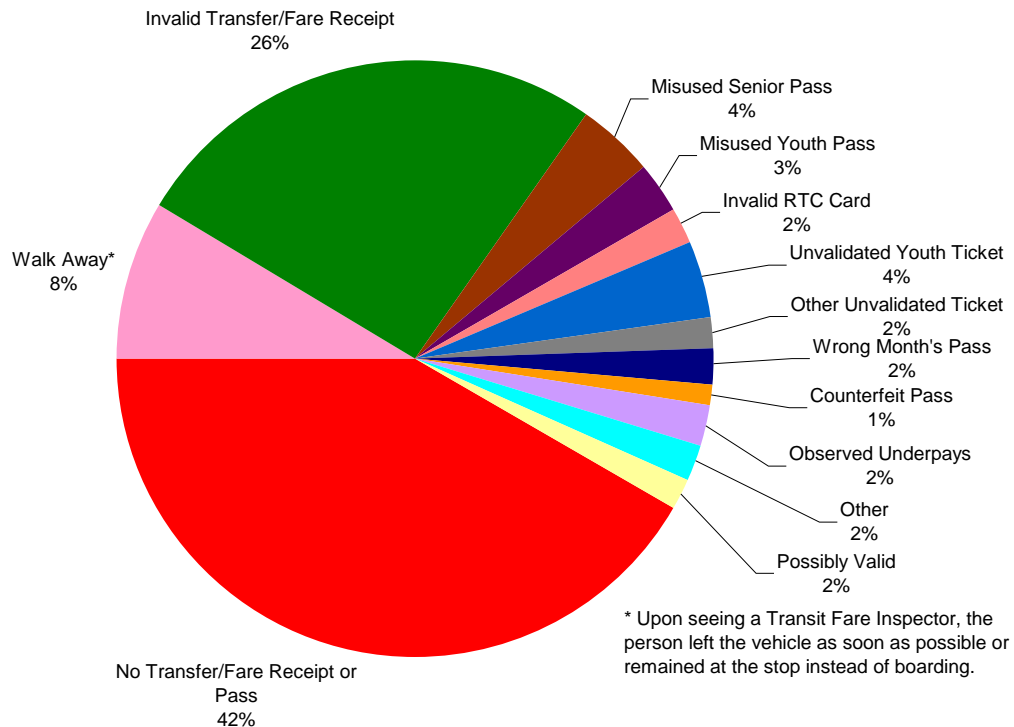
Financial Impacts	Description
Uncaptured Revenue	Estimated uncaptured revenue resulting from customers not having valid POP totals approximately \$19 million.

POP and Enforcement Issues	Description
TFI Schedules	On a typical day, non-enforcement activities may comprise over 40% of a TFI's paid time.
TFI Staffing	TFI staffing peaks in the mid-morning and early afternoon, but the highest invalid POP rates occur later in the day.
Safety and Security	Safety and security issues can sometimes impact TFI abilities to enforce fare regulations.

TransLink	Description
Changes in Customer Use of Fare Media	TransLink® could decrease the misuse of discount passes, the sale of counterfeit passes and the use of invalid transfers/fare receipts. However, customers may not tag their TransLink® cards which will result in the SFMTA being unable to capture the appropriate fare revenue or verify pass validity.
Changes to Fare Enforcement Procedures	TFIs will no longer be able to inspect passes visually, but must instead take longer to check each TransLink® card electronically using a handheld device. This may give

TransLink	Description
	customers an opportunity to tag the card reader or to exit at the next stop before TFIs can check their fare. Furthermore, there could be more disputes between customers and TFIs, as customers will not be able to tell when their cards expire because current plans do not call for TransLink® fare media to have printed expiration times.
Financial Impacts	Although TransLink® may reduce the misuse of existing types of fare media, customers may find new ways to avoid paying the appropriate fare using TransLink®.

Figure 2: Types of Invalid POP

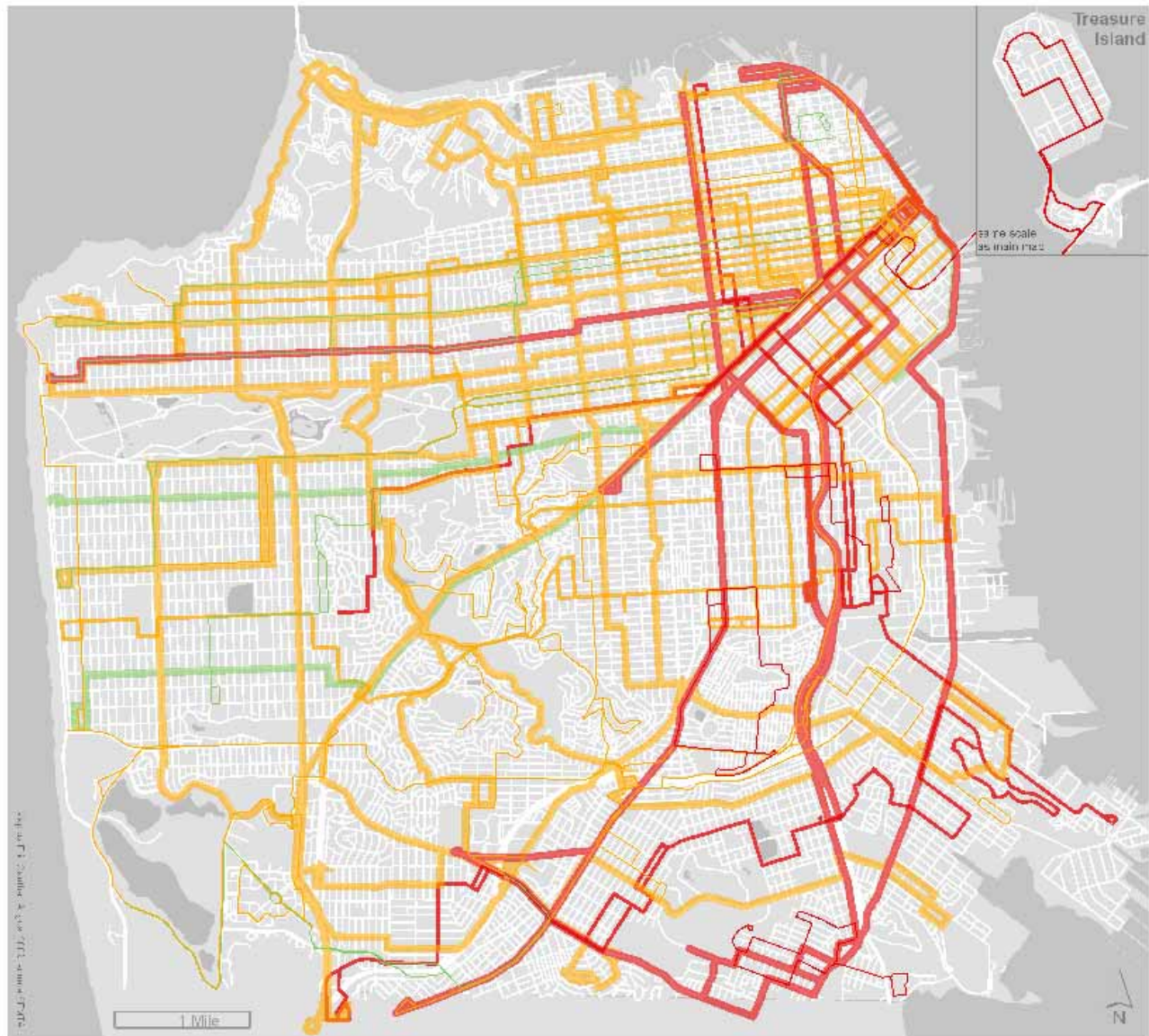


Type of Invalid POP	Description
No Transfer/Fare Receipt or Pass (42%)	Customer had no form of fare media
Walk Away (8%)	Customer left the vehicle or did not board after seeing the survey team, presumably without valid fare media
Invalid Transfers/Fare Receipts (26%)	Transfer/Fare Receipt had expired, was altered, or was illegally obtained
Misused Senior Pass (4%)	Customer using a Senior Pass was not 65 years old or older



Type of Invalid POP	Description
Misused Youth Pass (3%)	Customer using a Youth Pass was not 17 years old or younger
Unvalidated Youth Ticket (4%)	Youth customer did not properly exchange a single-ride Youth Ticket for a Transfer/Fare Receipt
Other Unvalidated Ticket (2%)	Customer did not properly exchange one of the following tickets for a Transfer/Fare Receipt: (a) One-ride ticket from an adult ticket book (b) a free Ferry/Muni transfer (c) a free Daly City BART/Muni transfer (d) a BART/Bus transfer along with a discounted cash fare
Invalid Regional Transit Connection (RTC) (Card for Persons with Disabilities) (2%)	RTC Card: (a) Was not used by the person to whom it was issued (b) Had Expired, or (c) Did not have a monthly sticker attached
Wrong Month's Pass (2%)	Customer displayed a pass either before or after its period of validity
Counterfeit passes (1%)	Customer used a counterfeit pass
Observed Underpays (2%)	Customer paid less than the appropriate cash fare
Other (2%)	Does not fall into the above categories
Possibly Valid (2%)	Unable to determine validity of POP

Figure 3: Map of Invalid POP Rates by Route



### Invalid POP Rate by Transit Route

Invalid POP per 100 customers	Weekday boardings		
	> 10,000	5,000 - 10,000	< 5,000
> 10	Dark Red	Medium Red	Light Red
3 - 10	Yellow	Yellow	Yellow
< 3	Green	Green	Green

Figure 3: Map of Invalid POP Rates by Route

*This map of San Francisco has individual Muni routes colored based on the invalid POP rate determined during the survey. The following table indicates the invalid POP rate by route used to color the map.*

Route	Invalid POP Rate
F Market & Wharves	11%
J Church	6%
K Ingleside	4%
L Taraval	2%
M Ocean View	4%
N Judah	3%
T Third	15%
1 California	4%
1AX California A Exp 1BX California B Exp	2%
2 Clement 3 Jackson 4 Sutter	5%
5 Fulton	11%
6 Parnassus 7 Haight 71 Haight-Noriega 71L Haight-Noriega Ltd	9%
9 San Bruno	18%
9X Bayshore Exp 9AX Bayshore A Exp 9BX Bayshore B Exp	15%
10 Townsend	4%
12 Folsom-Pacific	5%
14 Mission 14 Mission Ltd	21%
14X Mission Exp	10%
16AX Noriega A Exp 16BX Noriega B Exp	3%
17 Parkmerced	6%
18 46 <sup>th</sup> Ave	6%
19 Polk	15%
21 Hayes	7%
22 Fillmore	9%
23 Monterey	6%
24 Divisadero	8%
27 Bryant	10%
28 19 <sup>th</sup> Av 28L 19 <sup>th</sup> Av Ltd	9%
29 Sunset	9%
30 Stockton	8%
30X Marina Exp	6%

Route	Invalid POP Rate
31 Balboa	15%
31AX Balboa A Exp	0%
31BX Balboa B Exp	
33 Stanyan	7%
35 Eureka	4%
36 Teresita	3%
37 Corbett	5%
38 Geary	10%
38 Geary Ltd	
38AX Geary A Exp	1%
38BX Geary B Exp	
39 Coit	3%
41 Union	4%*
43 Masonic	7%
44 O'Shaughnessy	9%
45 Union-Stockton	6%
47 Van Ness	9%
48 Quintara-24 <sup>th</sup> St	9%
49 Van Ness/Mission	13%
52 Excelsior	13%
53 Southern Heights	54%
54 Felton	13%
56 Rutland	22%
66 Quintara	4%
67 Bernal Heights	12%
71 Haight-Noriega	9%
71L Haight-Noriega Ltd	
88 BART Shuttle	0%
108 Treasure Island	21%

Figure 4: Map of Invalid POP Observations by Location

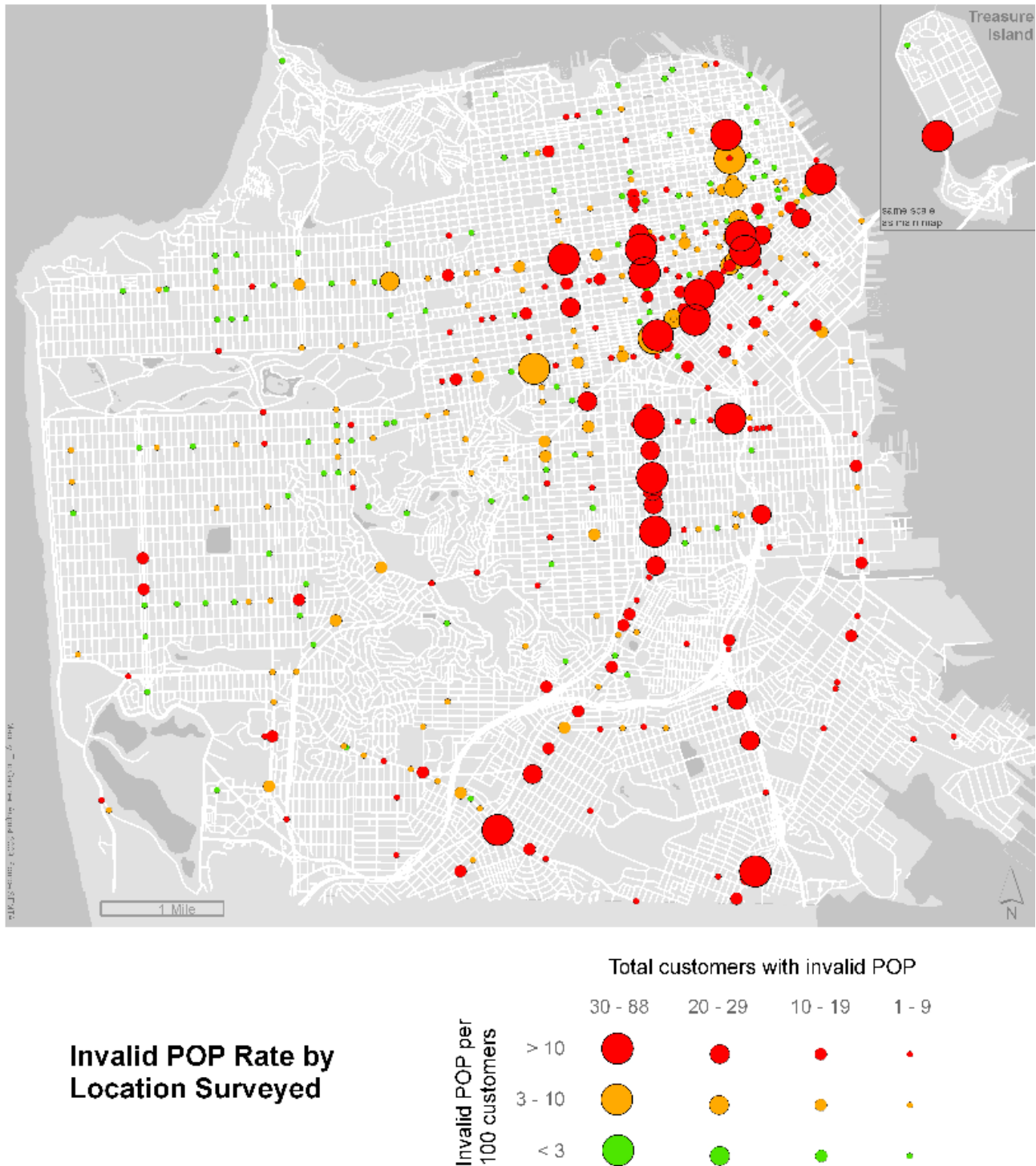


Figure 4: Map of Invalid POP Observations by Location

*This map of San Francisco has individual survey observation points colored and sized based on the invalid POP rate (as noted in Figure 15) and absolute number of customers observed without valid POP determined during the survey. The following table indicates these survey observation points, the*

*absolute number of customers observed without valid POP, the total number of customers observed and the corresponding invalid POP rate:*

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
3rd St & 20th St	10	86	12%
3rd St & 22nd St	2	42	5%
3rd St & 26th St	4	15	27%
3rd St & Hudson	14	39	36%
3rd St & Marin	14	69	20%
3rd St & Mariposa	7	33	21%
3rd St & Mission Rock	2	31	6%
3rd St & Oakdale	6	20	30%
3rd St & Palou	9	82	11%
3rd St & Williams	7	27	26%
4th St & Howard	7	22	32%
4th St & King	14	245	6%
4th St & Mission	17	135	13%
4th St & Townsend	10	99	10%
5th St & Howard	8	72	11%
8th St & Townsend	7	37	19%
9th Av & Judah	9	259	3%
9th Av & Kirkham	4	51	8%
9th Av & Lawton	2	73	3%
9th Av & Lincoln Way	3	67	4%
11th St & Division	6	27	22%
11th St & Folsom	11	40	28%
11th St & Howard	0	8	0%
13th St & Gateview	0	15	0%
14th St & Sanchez	0	6	0%
15th Av & Ulloa	1	36	3%
16th Av & Noriega	0	19	0%
16th St & Harrison	1	35	3%
16th St & Valencia	6	43	14%
16th St & Vermont	4	49	8%
17th St & De Haro	5	55	9%
17th St & Kansas	6	46	13%
18th St & Sanchez	0	30	0%
18th St & Storrie	2	37	5%
19th Av & Eucalyptus	3	64	5%
19th Av & Holloway	19	258	7%
19th Av & Junipero Serra	8	27	30%
19th Av & Lincoln Way	18	213	8%

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
19th Av & Noriega	6	144	4%
19th Av & Quintara	3	129	2%
19th Av & Sloat	9	156	6%
20th St & Castro	1	21	5%
23rd St & Utah	1	13	8%
24th St & Bryant	0	15	0%
24th St & Harrison	2	20	10%
26th St & Rhode Island St	3	12	25%
46th Av & Lawton	1	26	4%
46th Av & Wawona	1	15	7%
655 John Muir Drive	1	22	5%
7th Av & Lawton	2	19	11%
Arballo & Pinto	0	9	0%
Ashbury & Clayton	2	20	10%
Av of the Palms & California Av	44	235	19%
Bacon & Girard	1	13	8%
Balboa & 21st Av	0	14	0%
Balboa & 23rd Av	0	26	0%
Balboa & 25th Av	0	23	0%
Balboa Park BART	17	267	6%
Bayshore & Arleta	2	2	100%
Bayshore & Cortland	22	94	23%
Bayshore & Leland	12	47	26%
Bayshore & Sunnysdale	16	61	26%
Beach & Divisadero	0	64	0%
Beach & Powell	1	24	4%
Beach & Stockton	5	40	13%
Bemis & Roanoke	0	4	0%
Broad & Plymouth	7	26	27%
Bryant & 4th St	6	26	23%
Bryant & 6th St	11	234	5%
Bryant & 7th St	3	29	10%
Bryant & 8th St	3	47	6%
Bryant & 16th St	6	59	10%
California & 22nd Av	1	43	2%
California & 25th Av	0	19	0%
California & Arguello	1	55	2%
California & Battery	3	67	4%
California & Fillmore	3	60	5%
California & Laurel	2	16	13%
California & Masonic	0	16	0%

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
California & Park Presidio	0	64	0%
California & Presidio	1	65	2%
Carl & Cole	4	100	4%
Carl & Stanyan	3	89	3%
Castro & 14th St	4	42	10%
Castro & 18th St	17	295	6%
Castro & 19th St	0	43	0%
Castro & 20th St	7	52	13%
Castro & 24th St	9	83	11%
Castro & 26th St	0	10	0%
Castro & Duboce	2	29	7%
Chestnut & Buchanan	3	24	13%
Chestnut & Gough	2	69	3%
Chestnut & Laguna	7	57	12%
Church & 14th St	7	99	7%
Church & 16th St	10	197	5%
Church & 18th St	11	213	5%
Church & 22nd St	0	19	0%
Church & 24th St	14	154	9%
Church & 30th St	5	90	6%
Church & Duboce	6	323	2%
Church & Liberty	4	31	13%
City College	18	120	15%
Clarendon & Panorama	0	13	0%
Clay & Franklin	1	38	3%
Clay & Kearny	1	52	2%
Clay & Mason	0	31	0%
Clay & Montgomery	0	26	0%
Clay & Polk	1	23	4%
Clement & 25th Av	0	5	0%
Coit Tower	0	19	0%
Columbus & Jackson	0	4	0%
Columbus & North Point	0	3	0%
Corbett & Clayton	2	79	3%
Corbett & Romain	0	10	0%
Cortland & Folsom	2	13	15%
Cortland & Prospect	3	43	7%
Crescent & Agnon	0	13	0%
Davis & Pine	3	296	1%
Diamond Heights & Duncan	9	14	64%
Diamond Heights Blvd &	1	11	9%



<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
Diamond			
Divisadero & Eddy	1	30	3%
Drumm & California	0	52	0%
Duboce & Noe	4	157	3%
Earl & Kirkwood	7	18	39%
Eddy & Buchanan	5	35	14%
Eddy & Gough	2	28	7%
Eddy & Laguna	12	72	17%
Eddy & Larkin	12	61	20%
Eddy & Pierce	1	6	17%
Eureka & 21st St	0	5	0%
Evans & 3rd St	8	15	53%
Ferry Building	10	47	21%
Fillmore & Eddy	14	126	11%
Fillmore & Hayes	6	138	4%
Fillmore & Jackson	0	25	0%
Fillmore & McAllister	31	193	16%
Fillmore & Oak	1	26	4%
Folsom & 2nd St	2	43	5%
Folsom & 5th St	0	54	0%
Folsom & 7th Av	5	39	13%
Folsom & 16th St	5	80	6%
Folsom & 24th St	8	44	18%
Folsom & 25th St	0	24	0%
Folsom & 4th St	2	18	11%
Forest Hill Station	18	524	3%
Fulton & 6th Av	4	64	6%
Fulton & 25th Av	9	52	17%
Fulton & Clayton	4	20	20%
Fulton & Park Presidio	2	48	4%
Geary & 3rd Av	0	19	0%
Geary & 6th Av	10	209	5%
Geary & 9th Av	0	43	0%
Geary & 17th Av	0	14	0%
Geary & 20th Av	2	19	11%
Geary & 25th Av	1	29	3%
Geary & 32nd Av	0	43	0%
Geary & 33rd Av	2	50	4%
Geary & 38th Av	0	26	0%
Geary & Arguello	22	264	8%
Geary & Baker	8	42	19%

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
Geary & Collins	11	68	16%
Geary & Divisadero	15	184	8%
Geary & Fillmore	52	445	12%
Geary & Fillmore	11	51	22%
Geary & Laguna	10	192	5%
Geary & Leavenworth	10	101	10%
Geary & Masonic	10	160	6%
Geary & Park Presidio	20	278	7%
Geary & Polk	6	45	13%
Geary & Powell	14	190	7%
Geary & Presidio	8	115	7%
Geary & Spruce	8	139	6%
Geary & Stockton	42	183	23%
Geary & Van Ness	44	497	9%
Geneva & Cayuga	7	94	7%
Geneva & Delano	0	42	0%
Geneva & Howth	2	32	6%
Geneva & Moscow	4	29	14%
Geneva & Naples	10	50	20%
Geneva & Santos	9	61	15%
Glen Park BART	18	129	14%
Golden Gate Bridge	0	14	0%
Haight & Baker	0	37	0%
Haight & Clayton	14	90	16%
Haight & Cole	12	77	16%
Haight & Divisadero	35	400	9%
Haight & Fillmore	26	426	6%
Haight & Laguna	1	7	14%
Haight & Masonic	21	371	6%
Haight & Octavia	11	112	10%
Haight & Pierce	8	68	12%
Harrison & 2nd St	3	19	16%
Harrison & 4th St	2	70	3%
Harrison & 5th St	9	69	13%
Harrison & 6th St	12	104	12%
Harrison & 8th St	28	184	15%
Hayes & Buchanan	9	52	17%
Hayes & Divisadero	3	73	4%
Hayes & Franklin	0	25	0%
Howard & 3rd St	4	63	6%
Hyde & Clay	5	37	14%

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
Irving & 2nd Av	3	149	2%
Irving & 7th Av	2	18	11%
Irving & 9th Av	1	100	1%
Irving & Arguello	0	29	0%
John Muir & Skyline	2	15	13%
Judah & 7th Av	1	60	2%
Judah & 19th Av	1	9	11%
Judah & 23rd Av	1	27	4%
Judah & 29th Av	1	36	3%
Judah & 34th Av	5	52	10%
Judah & 46th Av	3	87	3%
Judah & Funston	1	65	2%
Judah & Sunset	0	24	0%
Kansas & 23rd St	21	113	19%
Kearny & Bush	12	69	17%
Kearny & Sutter	1	44	2%
Lawton & 7th Av	4	49	8%
Lawton & 9th Av	0	28	0%
Lawton & 11th Av	0	1	0%
Market & 1st St	13	77	17%
Market & 3rd St	36	424	8%
Market & 4th St	82	533	15%
Market & 5th St	34	384	9%
Market & 6th St	28	298	9%
Market & 7th St	34	324	10%
Market & 8th St	21	216	10%
Market & 9th St	22	269	8%
Market & 11th St	79	412	19%
Market & Castro	21	595	4%
Market & Church	36	480	8%
Market & Cyril Magnin	14	139	10%
Market & Drumm	7	97	7%
Market & Fremont	1	42	2%
Market & Fremont	3	40	8%
Market & Gough	4	36	11%
Market & Hayes	9	91	10%
Market & Hyde	11	43	26%
Market & Kearny	9	179	5%
Market & Larkin	3	34	9%
Market & Main	12	129	9%
Market & Montgomery	9	109	8%

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
Market & Powell	26	348	7%
Market & Powell	1	42	2%
Market & Steuart	31	61	51%
Market & Stockton	14	48	29%
Market & Van Ness	108	1929	6%
Masonic & Oak	2	43	5%
McAllister & Broderick	1	51	2%
McAllister & Central	3	23	13%
McAllister & Divisadero	12	130	9%
McAllister & Gough	1	27	4%
McAllister & Hyde	22	195	11%
McAllister & Lyon	9	40	23%
Mission & 1st St	46	173	27%
Mission & 5th St	2	82	2%
Mission & 8th St	45	135	33%
Mission & 11th St	14	63	22%
Mission & 15th St	16	86	19%
Mission & 16th St	82	458	18%
Mission & 16th St	16	189	8%
Mission & 18th St	21	186	11%
Mission & 20th St	33	160	21%
Mission & 21st St	25	156	16%
Mission & 22nd St	25	131	19%
Mission & 24th St	111	609	18%
Mission & 29th St	5	32	16%
Mission & 30th St	17	87	20%
Mission & Bosworth	4	58	7%
Mission & Cesar Chavez	22	113	19%
Mission & Cortland	12	59	20%
Mission & Excelsior	22	176	13%
Mission & Geneva	38	351	11%
Mission & Guttenberg	6	87	7%
Mission & Lowell	12	59	20%
Mission & Persia	19	72	26%
Mission & Precita	6	26	23%
Mission & Randall	3	34	9%
Mission & Richland	15	51	29%
Mission & Silver	11	172	6%
Mission & South Van Ness	3	20	15%
Mission & Trumbull	10	82	12%
Monterey & Foerster	1	40	3%

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
Noriega & 26th Av	1	18	6%
Noriega & 46th Av	0	7	0%
Oak & Franklin	0	25	0%
Oakdale & Griffith	3	6	50%
Ocean & Fairfield	0	2	0%
Ocean & Jules	3	69	4%
Ocean & Lee	3	31	10%
Ocean & Miramar	7	38	18%
Ocean & Victoria	1	33	3%
O'Farrell & Hyde	3	37	8%
O'Farrell & Jones	9	92	10%
O'Farrell & Mason	1	16	6%
O'Farrell & Van Ness	23	157	15%
O'Shaughnessy & Portola	3	36	8%
Pacific & Columbus	0	26	0%
Page & Octavia	2	36	6%
Parnassus & 4th Av	1	15	7%
Persia & Prague	8	26	31%
Phelan & Judson	3	37	8%
Pine & Sansome	0	26	0%
Plymouth & Grafton	3	28	11%
Polk & Sacramento	2	100	2%
Polk & Sutter	4	41	10%
Portola & Burnett	1	3	33%
Post & Gough	0	29	0%
Post & Hyde	0	25	0%
Post & Larkin	6	53	11%
Post & Leavenworth	1	15	7%
Post & Polk	12	65	18%
Post & Powell	2	44	5%
Post & Taylor	7	62	11%
Post & Van Ness	2	59	3%
Potrero & 16th St	92	272	34%
Potrero & 23rd St	1	15	7%
Potrero & 24th St	14	207	7%
Rhode Island St & 17th St	2	11	18%
Rutland & Visitacion	3	26	12%
Sacramento & Battery	1	19	5%
Sacramento & Fillmore	5	57	9%
Sacramento & Grant	3	51	6%
Sacramento & Jones	1	30	3%

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
Sacramento & Laguna	1	29	3%
Sacramento & Leavenworth	0	54	0%
Sacramento & Mason	1	17	6%
Sacramento & Powell	12	125	10%
Sacramento & Sansome	4	127	3%
San Bruno & Arleta	40	324	12%
San Bruno & Bacon	39	191	20%
San Bruno & Bayshore	6	30	20%
San Bruno & Mansell	9	41	22%
San Bruno & Silver	24	203	12%
Sansome & California	0	11	0%
Sansome & Washington	0	11	0%
Santiago & 14th Av	0	18	0%
Silver & Cambridge	4	22	18%
Silver & Congdon	2	18	11%
Silver & Gambier	6	91	7%
Silver & Merrill	8	60	13%
Silver & Princeton	2	36	6%
Skyline & Sloat	2	13	15%
St Francis Circle	6	199	3%
Stockton & Broadway	1	35	3%
Stockton & Clay	17	199	9%
Stockton & Columbus	45	354	13%
Stockton & Jackson	2	37	5%
Stockton & Pacific	40	477	8%
Stockton & Sacramento	33	434	8%
Stockton & Sutter	30	408	7%
Stonestown	27	274	10%
Sunset & Ocean	2	74	3%
Sunset & Quintara	18	155	12%
Sunset & Santiago	13	59	22%
Sunset & Vicente	0	17	0%
Sutter & Fillmore	4	59	7%
Sutter & Leavenworth	1	56	2%
Sutter & Mason	2	46	4%
Sutter & Powell	0	29	0%
Sutter & Sansome	8	194	4%
Sutter & Taylor	2	74	3%
Taraval & 15th Av	10	21	48%
Taraval & 19th Av	5	128	4%
Taraval & 22nd Av	1	15	7%

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
Taraval & 24th Av	1	46	2%
Taraval & 28th Av	0	46	0%
Taraval & 32nd Av	0	18	0%
Taraval & Sunset	0	55	0%
Teresita & Reposa	0	10	0%
The Embarcadero & Bay	1	97	1%
The Embarcadero & Green	3	89	3%
The Embarcadero & Harrison	1	22	5%
The Embarcadero & Washington	8	72	11%
Turk & Arguello	0	20	0%
Turk & Hyde	8	63	13%
Turk & Jones	2	34	6%
Turk & Leavenworth	0	12	0%
Turk & Mason	4	22	18%
Turk & Masonic	6	112	5%
Turk & Parker	0	53	0%
Union & Columbus	23	404	6%
Union & Divisadero	0	1	0%
Union & Fillmore	10	71	14%
Union & Laguna	0	10	0%
Union & Leavenworth	0	21	0%
Union & Montgomery	0	11	0%
Union & Pierce	1	73	1%
Union & Steiner	1	22	5%
Union & Taylor	3	77	4%
Van Ness & California	6	32	19%
Van Ness & Chestnut	8	120	7%
Van Ness & Clay	11	144	8%
Van Ness & Eddy	44	195	23%
Van Ness & Golden Gate	0	29	0%
Van Ness & Grove	0	72	0%
Van Ness & Jackson	3	52	6%
Van Ness & McAllister	19	162	12%
Van Ness & O'Farrell	3	32	9%
Van Ness & Pacific	0	14	0%
Van Ness & Sacramento	14	117	12%
Van Ness & Sutter	28	213	13%
Van Ness & Turk	2	26	8%
Van Ness & Union	10	91	11%
Vermont & 17th St	4	6	67%
Vermont & 18th St	0	2	0%

<b>Observed Stops</b>	Customers with Invalid POP	Total Customers Observed	Invalid POP Rate
Warren & Devonshire	0	16	0%
West Portal & 14th Av	3	111	3%
West Portal Station	17	361	5%
Woodside & Portola	0	6	0%



## 1. Introduction

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The San Francisco Municipal Transportation Agency (SFMTA) Proof-of-Payment (POP) Study investigates fare payment patterns on the Muni public transit system. Fare revenue helps pay for the operating costs of providing transit service on a system that averages about 700,000 weekday boardings. Comprising over 20 percent of SFMTA's operating budget, fare revenue is projected to total approximately \$170 million this fiscal year.

Because customers directly use and benefit from public transit service, they are expected to pay their fare just as a patron of any business would pay for a product or service. Fare revenue helps provide the financial resources available to sustain Muni transit services. An efficient fare collection system reduces the time required to board customers at stops, speeding service and making transit more attractive. Faster trips also reduce operating costs because fewer vehicles are needed to provide the same level of service or allow Muni to provide more service with the same resources.

San Franciscans have different perceptions about fare payment on Muni. The SFMTA made no prior assumptions about how, where and when customers lacked valid POP. To support an objective and comprehensive analysis of fare payment patterns, SFMTA Transit Fare Inspectors (TFIs), Finance and Planning staff, City Hall Fellows, and interns rode more than 1,100 vehicle runs and surveyed over 41,000 customers on nearly every bus and streetcar route during different times of the day and on all days of the week. The team did not survey cable cars, a unique transportation mode that is the subject of other SFMTA management efforts. The large number of bus and light rail observations allows SFMTA to draw conclusions with a high degree of statistical confidence. With this quantity of data, this study offers substantiated insights into the extent of the POP issue and provides a basis for expanding SFMTA's existing POP fare enforcement program from Muni Metro light rail lines to all routes in the system.

The survey took place between April 30 and July 23, 2009. The survey team completed nearly 95 percent of the survey prior to the fare changes on July 1, 2009, in order to provide a baseline statistical data. The remaining observations took place several weeks after new fares took effect in order to measure system-level impacts of the fare change on POP patterns. Based on the follow-up survey, the fare change does not appear to have substantially changed fare payment patterns.

Overall, this POP Study found that approximately 9.5 percent of SFMTA riders were unable to produce a valid pass, transfer/fare receipt, TransLink® card or other form of proof-of-payment upon request from a TFI. The actual percentage of customers without valid POP may be higher because the survey team did not always observe whether customers with a valid transfer/fare receipt had paid the full fare.<sup>1</sup> This rate is highly variable by route, time of day and location.

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<sup>1</sup> In most cases, the survey team boarded a vehicle after people were already on board and thus could not determine how much those with a valid transfer/fare receipt had paid. In cases where the survey team was able

Currently, Transit TFIs fully enforce fare regulations on Muni Metro and are beginning limited enforcement on the remainder of the system. Fewer than 5 percent of customers did not have valid proof of payment on Muni Metro, less than half the rate of the rest of the system. The estimated systemwide financial impact totals \$19 million annually.

In addition to gathering quantitative data, surveyors also made qualitative observations about the POP program as they accompanied TFIs on their assignments. For example, TFIs had difficulty citing fare violators on Muni Metro trains who refused to provide identification. On buses, several riders became combative even after being told they were not being cited.

The remainder of this report will elaborate on these generalized findings. The SFMTA will use both the quantitative data and qualitative observations to determine how to expand and improve its POP program.

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to observe customers deposit cash into the farebox, some of them received a transfer/fare receipt when they had not paid the full fare.

## 2. Methodology

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The SFMTA investigated the following items on a systemwide level, as well as by route, location, and time of day:

- The invalid POP rate
- The types of valid fare media customers use
- How people avoid paying the appropriate transit fare
- The deployment of TFIs and how their presence impacts fare payment

The study builds upon a previous effort to estimate fare payment patterns on Muni. In 2006, the SFMTA retained David Binder Research to survey approximately 6,000 customers to determine whether they possessed valid POP. Overall, that study found that 10.5 percent of riders surveyed could not present valid POP when asked by a team of four surveyors accompanied by two plainclothes police officers. Approximately 52 percent presented a monthly pass, 35 percent showed a transfer/fare receipt and the remainder had some other form of valid POP.

SFMTA could draw only limited conclusions about the 2006 study for several reasons. First, the majority of surveying concentrated on a handful of routes representing just one-quarter of Muni's ridership. With relatively small sample sizes on most routes, SFMTA could not determine whether customers had valid POP accurately or precisely at the route level. Secondly, it reported limited location and time of day information about fare payment patterns. In addition, no observations took place on weekends. Finally, the study did not collect detailed information on how customers avoided paying the appropriate transit fare.

Based on this prior experience, SFMTA staff developed a sampling plan and survey techniques that would provide more detailed and more statistically significant information about fare payment patterns at the systemwide level by route, location and time of day.

### 2.1. Sampling Plan

In a survey, sampling provides an estimation of an actual value. A larger sample size provides greater precision as measured by margin of error and confidence level. A  $\pm 5$  percent margin of error at a 95 percent confidence level means that if the survey were to be conducted 100 times, the reported result would be within  $\pm 5$  percent of the actual result in 95 of those 100 times.

**Figure 5: Statistical Margin of Error for Samples Collected**

Invalid POP Rate	Margin of Error
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	(at a 95% confidence level)
By Time Period	$\pm 1.3\%$ or better
By Route	Majority of Routes $\pm 2.5\%$ All but 5 routes $\pm 5\%$
By Vehicle Occupancy	$\pm 0.9\%$ or better
Systemwide	$\pm 0.3\%$

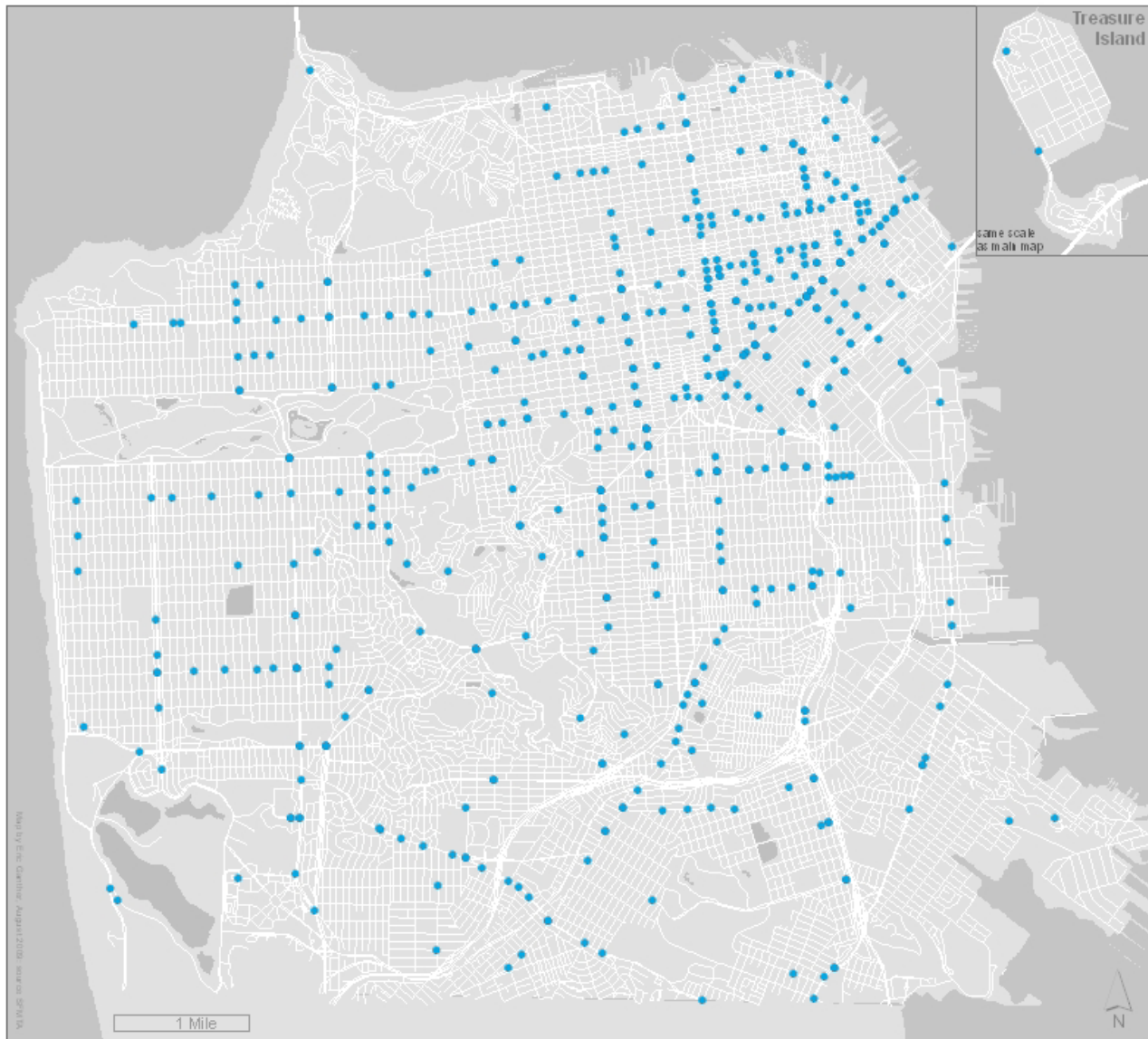
When developing the sampling plan, the SFMTA originally aimed to collect enough samples to determine the systemwide invalid POP rate at a  $\pm 3$  percent margin of error at a 95 percent confidence level. The SFMTA wanted to estimate more specific POP rates by time of day, route and vehicle occupancy within a  $\pm 5$  percent margin of error. With over 41,000 samples collected, the survey team substantially exceeded these goals as illustrated in Figure 5.

Determining an accurate system-level invalid POP rate also required collecting a representative sample from all time periods and routes and from locations throughout San Francisco. The survey team collected at least 2,500 samples per time period (representing a margin of error of  $\pm 1.3$  percent or less). The team also made multiple observations on nearly every bus and streetcar route.<sup>2</sup> The team made sufficient customer surveys (typically 200 to 1,000 or more per local route) to ensure a margin of error of  $\pm 5$  percent or less on all but five routes. Finally, the team collected samples on buses and trains with different levels of occupancy ranging from heavily-loaded vehicles to less crowded ones (resulting in a margin of error of  $\pm 0.9$  percent or less).

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<sup>2</sup> The survey team did not observe 76 Marin Headlands, 80X Gateway Express, 81X Caltrain Express, 82X Levi Plaza Express, 90 Owl or 91 Owl special services or the 20 Columbus, 26 Valencia, 74X Culture Bus and 89 Laguna Honda buses, which will be discontinued in December 2009. The team did survey the 4 Sutter, 7 Haight and 53 Southern Heights buses since all or portions of these soon-to-be-discontinued routes will be covered by other routes after the December 2009 service changes.

Figure 6: Map of Locations Surveyed



*This map contains points indicating the locations surveyed throughout the City of San Francisco. The following locations are pinpointed on the map in Figure 6: Map of Locations Surveyed.*

3rd St & 20th St  
 3rd St & 22nd St  
 3rd St & 26th St  
 3rd St & Hudson

*This map contains points indicating the locations surveyed throughout the City of San Francisco. The following locations are pinpointed on the map in Figure 6: Map of Locations Surveyed.*

3rd St & Marin  
3rd St & Mariposa  
3rd St & Mission Rock  
3rd St & Oakdale  
3rd St & Palou  
3rd St & Williams  
4th St & Howard  
4th St & King  
4th St & Mission  
4th St & Townsend  
5th St & Howard  
8th St & Townsend  
9th Av & Judah  
9th Av & Kirkham  
9th Av & Lawton  
9th Av & Lincoln Way  
11th St & Division  
11th St & Folsom  
11th St & Howard  
13th St & Gateview  
14th St & Sanchez  
15th Av & Ulloa  
16th Av & Noriega  
16th St & Harrison  
16th St & Valencia  
16th St & Vermont  
17th St & De Haro  
17th St & Kansas  
18th St & Sanchez  
18th St & Storrie  
19th Av & Eucalyptus  
19th Av & Holloway  
19th Av & Junipero Serra  
19th Av & Lincoln Way  
19th Av & Noriega  
19th Av & Quintara  
19th Av & Sloat  
20th St & Castro  
23rd St & Utah

*This map contains points indicating the locations surveyed throughout the City of San Francisco. The following locations are pinpointed on the map in Figure 6: Map of Locations Surveyed.*

24th St & Bryant  
24th St & Harrison  
26th St & Rhode Island St  
46th Av & Lawton  
46th Av & Wawona  
655 John Muir Drive  
7th Av & Lawton  
Arballo & Pinto  
Ashbury & Clayton  
Av of the Palms & California Av  
Bacon & Girard  
Balboa & 21st Av  
Balboa & 23rd Av  
Balboa & 25th Av  
Balboa Park BART  
Bayshore & Arleta  
Bayshore & Cortland  
Bayshore & Leland  
Bayshore & Sunnydale  
Beach & Divisadero  
Beach & Powell  
Beach & Stockton  
Bemis & Roanoke  
Broad & Plymouth  
Bryant & 4th St  
Bryant & 6th St  
Bryant & 7th St  
Bryant & 8th St  
Bryant & 16th St  
California & 22nd Av  
California & 25th Av  
California & Arguello  
California & Battery  
California & Fillmore  
California & Laurel  
California & Masonic  
California & Park Presidio  
California & Presidio  
Carl & Cole

*This map contains points indicating the locations surveyed throughout the City of San Francisco. The following locations are pinpointed on the map in Figure 6: Map of Locations Surveyed.*

Carl & Stanyan  
Castro & 14th St  
Castro & 18th St  
Castro & 19th St  
Castro & 20th St  
Castro & 24th St  
Castro & 26th St  
Castro & Duboce  
Chestnut & Buchanan  
Chestnut & Gough  
Chestnut & Laguna  
Church & 14th St  
Church & 16th St  
Church & 18th St  
Church & 22nd St  
Church & 24th St  
Church & 30th St  
Church & Duboce  
Church & Liberty  
City College  
Clarendon & Panorama  
Clay & Franklin  
Clay & Kearny  
Clay & Mason  
Clay & Montgomery  
Clay & Polk  
Clement & 25th Av  
Coit Tower  
Columbus & Jackson  
Columbus & North Point  
Corbett & Clayton  
Corbett & Romain  
Cortland & Folsom  
Cortland & Prospect  
Crescent & Agnon  
Davis & Pine  
Diamond Heights & Duncan  
Diamond Heights Blvd &  
Diamond



*This map contains points indicating the locations surveyed throughout the City of San Francisco. The following locations are pinpointed on the map in Figure 6: Map of Locations Surveyed.*

Divisadero & Eddy  
Drumm & California  
Duboce & Noe  
Earl & Kirkwood  
Eddy & Buchanan  
Eddy & Gough  
Eddy & Laguna  
Eddy & Larkin  
Eddy & Pierce  
Eureka & 21st St  
Evans & 3rd St  
Ferry Building  
Fillmore & Eddy  
Fillmore & Hayes  
Fillmore & Jackson  
Fillmore & McAllister  
Fillmore & Oak  
Folsom & 2nd St  
Folsom & 5th St  
Folsom & 7th Av  
Folsom & 16th St  
Folsom & 24th St  
Folsom & 25th St  
Folsom & 4th St  
Forest Hill Station  
Fulton & 6th Av  
Fulton & 25th Av  
Fulton & Clayton  
Fulton & Park Presidio  
Geary & 3rd Av  
Geary & 6th Av  
Geary & 9th Av  
Geary & 17th Av  
Geary & 20th Av  
Geary & 25th Av  
Geary & 32nd Av  
Geary & 33rd Av  
Geary & 38th Av  
Geary & Arguello

*This map contains points indicating the locations surveyed throughout the City of San Francisco. The following locations are pinpointed on the map in Figure 6: Map of Locations Surveyed.*

Geary & Baker  
Geary & Collins  
Geary & Divisadero  
Geary & Fillmore  
Geary & Fillmore  
Geary & Laguna  
Geary & Leavenworth  
Geary & Masonic  
Geary & Park Presidio  
Geary & Polk  
Geary & Powell  
Geary & Presidio  
Geary & Spruce  
Geary & Stockton  
Geary & Van Ness  
Geneva & Cayuga  
Geneva & Delano  
Geneva & Howth  
Geneva & Moscow  
Geneva & Naples  
Geneva & Santos  
Glen Park BART  
Golden Gate Bridge  
Haight & Baker  
Haight & Clayton  
Haight & Cole  
Haight & Divisadero  
Haight & Fillmore  
Haight & Laguna  
Haight & Masonic  
Haight & Octavia  
Haight & Pierce  
Harrison & 2nd St  
Harrison & 4th St  
Harrison & 5th St  
Harrison & 6th St  
Harrison & 8th St  
Hayes & Buchanan  
Hayes & Divisadero

*This map contains points indicating the locations surveyed throughout the City of San Francisco. The following locations are pinpointed on the map in Figure 6: Map of Locations Surveyed.*

Hayes & Franklin  
Howard & 3rd St  
Hyde & Clay  
Irving & 2nd Av  
Irving & 7th Av  
Irving & 9th Av  
Irving & Arguello  
John Muir & Skyline  
Judah & 7th Av  
Judah & 19th Av  
Judah & 23rd Av  
Judah & 29th Av  
Judah & 34th Av  
Judah & 46th Av  
Judah & Funston  
Judah & Sunset  
Kansas & 23rd St  
Kearny & Bush  
Kearny & Sutter  
Lawton & 7th Av  
Lawton & 9th Av  
Lawton & 11th Av  
Market & 1st St  
Market & 3rd St  
Market & 4th St  
Market & 5th St  
Market & 6th St  
Market & 7th St  
Market & 8th St  
Market & 9th St  
Market & 11th St  
Market & Castro  
Market & Church  
Market & Cyril Magnin  
Market & Drumm  
Market & Fremont  
Market & Fremont  
Market & Gough  
Market & Hayes

*This map contains points indicating the locations surveyed throughout the City of San Francisco. The following locations are pinpointed on the map in Figure 6: Map of Locations Surveyed.*

Market & Hyde  
Market & Kearny  
Market & Larkin  
Market & Main  
Market & Montgomery  
Market & Powell  
Market & Powell  
Market & Steuart  
Market & Stockton  
Market & Van Ness  
Masonic & Oak  
McAllister & Broderick  
McAllister & Central  
McAllister & Divisadero  
McAllister & Gough  
McAllister & Hyde  
McAllister & Lyon  
Mission & 1st St  
Mission & 5th St  
Mission & 8th St  
Mission & 11th St  
Mission & 15th St  
Mission & 16th St  
Mission & 16th St  
Mission & 18th St  
Mission & 20th St  
Mission & 21st St  
Mission & 22nd St  
Mission & 24th St  
Mission & 29th St  
Mission & 30th St  
Mission & Bosworth  
Mission & Cesar Chavez  
Mission & Cortland  
Mission & Excelsior  
Mission & Geneva  
Mission & Guttenberg  
Mission & Lowell  
Mission & Persia

*This map contains points indicating the locations surveyed throughout the City of San Francisco. The following locations are pinpointed on the map in Figure 6: Map of Locations Surveyed.*

Mission & Precita  
Mission & Randall  
Mission & Richland  
Mission & Silver  
Mission & South Van Ness  
Mission & Trumbull  
Monterey & Foerster  
Noriega & 26th Av  
Noriega & 46th Av  
Oak & Franklin  
Oakdale & Griffith  
Ocean & Fairfield  
Ocean & Jules  
Ocean & Lee  
Ocean & Miramar  
Ocean & Victoria  
O'Farrell & Hyde  
O'Farrell & Jones  
O'Farrell & Mason  
O'Farrell & Van Ness  
O'Shaughnessy & Portola  
Pacific & Columbus  
Page & Octavia  
Parnassus & 4th Av  
Persia & Prague  
Phelan & Judson  
Pine & Sansome  
Plymouth & Grafton  
Polk & Sacramento  
Polk & Sutter  
Portola & Burnett  
Post & Gough  
Post & Hyde  
Post & Larkin  
Post & Leavenworth  
Post & Polk  
Post & Powell  
Post & Taylor  
Post & Van Ness

*This map contains points indicating the locations surveyed throughout the City of San Francisco. The following locations are pinpointed on the map in Figure 6: Map of Locations Surveyed.*

Potrero & 16th St  
Potrero & 23rd St  
Potrero & 24th St  
Rhode Island St & 17th St  
Rutland & Visitacion  
Sacramento & Battery  
Sacramento & Fillmore  
Sacramento & Grant  
Sacramento & Jones  
Sacramento & Laguna  
Sacramento & Leavenworth  
Sacramento & Mason  
Sacramento & Powell  
Sacramento & Sansome  
San Bruno & Arleta  
San Bruno & Bacon  
San Bruno & Bayshore  
San Bruno & Mansell  
San Bruno & Silver  
Sansome & California  
Sansome & Washington  
Santiago & 14th Av  
Silver & Cambridge  
Silver & Congdon  
Silver & Gambier  
Silver & Merrill  
Silver & Princeton  
Skyline & Sloat  
St Francis Circle  
Stockton & Broadway  
Stockton & Clay  
Stockton & Columbus  
Stockton & Jackson  
Stockton & Pacific  
Stockton & Sacramento  
Stockton & Sutter  
Stonestown  
Sunset & Ocean  
Sunset & Quintara

*This map contains points indicating the locations surveyed throughout the City of San Francisco. The following locations are pinpointed on the map in Figure 6: Map of Locations Surveyed.*

Sunset & Santiago  
Sunset & Vicente  
Sutter & Fillmore  
Sutter & Leavenworth  
Sutter & Mason  
Sutter & Powell  
Sutter & Sansome  
Sutter & Taylor  
Taraval & 15th Av  
Taraval & 19th Av  
Taraval & 22nd Av  
Taraval & 24th Av  
Taraval & 28th Av  
Taraval & 32nd Av  
Taraval & Sunset  
Teresita & Reposa  
The Embarcadero & Bay  
The Embarcadero & Green  
The Embarcadero & Harrison  
The Embarcadero & Washington  
Turk & Arguello  
Turk & Hyde  
Turk & Jones  
Turk & Leavenworth  
Turk & Mason  
Turk & Masonic  
Turk & Parker  
Union & Columbus  
Union & Divisadero  
Union & Fillmore  
Union & Laguna  
Union & Leavenworth  
Union & Montgomery  
Union & Pierce  
Union & Steiner  
Union & Taylor  
Van Ness & California  
Van Ness & Chestnut  
Van Ness & Clay

*This map contains points indicating the locations surveyed throughout the City of San Francisco. The following locations are pinpointed on the map in Figure 6: Map of Locations Surveyed.*

Van Ness & Eddy  
 Van Ness & Golden Gate  
 Van Ness & Grove  
 Van Ness & Jackson  
 Van Ness & McAllister  
 Van Ness & O'Farrell  
 Van Ness & Pacific  
 Van Ness & Sacramento  
 Van Ness & Sutter  
 Van Ness & Turk  
 Van Ness & Union  
 Vermont & 17th St  
 Vermont & 18th St  
 Warren & Devonshire  
 West Portal & 14th Av  
 West Portal Station  
 Woodside & Portola

To obtain the final system-level results, the SFMTA also weighted raw data by both time period and route – making adjustments to ensure that the samples represented the actual proportional distribution of ridership by time period and route. The invalid POP rate was 9.2 percent and 9.5 percent when weighted by route ridership and time of day, respectively, compared to an unweighted rate of 9.6 percent. Based on this data, the SFMTA believes that percentage of customers who do not possess a valid transfer/fare receipt or pass is approximately 9.5 percent, although the actual invalid POP rate is likely to be slightly higher after accounting for customers who illegally acquired a second-hand valid transfer/fare receipt and those who underpaid but still obtained a valid transfer/fare receipt and those. Customers who underpaid typically deposited a few coins into the farebox or paid the discount fare when they were not eligible.

## **2.2. Survey Technique**

The presence of TFIs can modify customer behavior by motivating some riders to pay the appropriate fare when they otherwise might not have done so. The survey team devised strategies aimed to minimize these behavioral changes during their fare inspections. While waiting for a vehicle at the boarding location, the team remained as inconspicuous as possible by



attempting to stay out of sight and appearing intent not to board. When the vehicle arrived, the survey team entered after all customers had boarded and alighted. As the vehicle started moving toward the next stop, one half of the team (one surveyor and one TFI) began surveying all customers in front while the other half began surveying the rear. TFIs asked customers to provide their pass or transfer/fare receipt and announced their findings verbally to surveyors who recorded the information.

Although this “spot check” survey technique accurately captured the type of fare media that customers used, it had two limitations. First, because the survey team typically entered a vehicle after people had already boarded, it could not determine whether customers with a valid transfer/fare receipt had paid the appropriate fare. As a result, invalid POP rates are likely to be higher than 9.5 percent. Second, the survey team could not observe which and how many customers had entered through the rear door; as a result, the surveyors could not determine the whether rear-door boarders had valid POP.

To address both of these concerns, the survey team supplemented “spot check” fare inspections by riding a vehicle for multiple stops for some of the observations. During a “ride along”, TFIs attempted to remain as inconspicuous as possible by sitting down or standing in the middle accordion section on articulated vehicles. Through this modified survey technique, the team was able to detect when customers “underpaid” and still obtained a transfer/fare receipt.<sup>3</sup> The team was also able to determine which and how many customers who entered through the back door had valid fare media.

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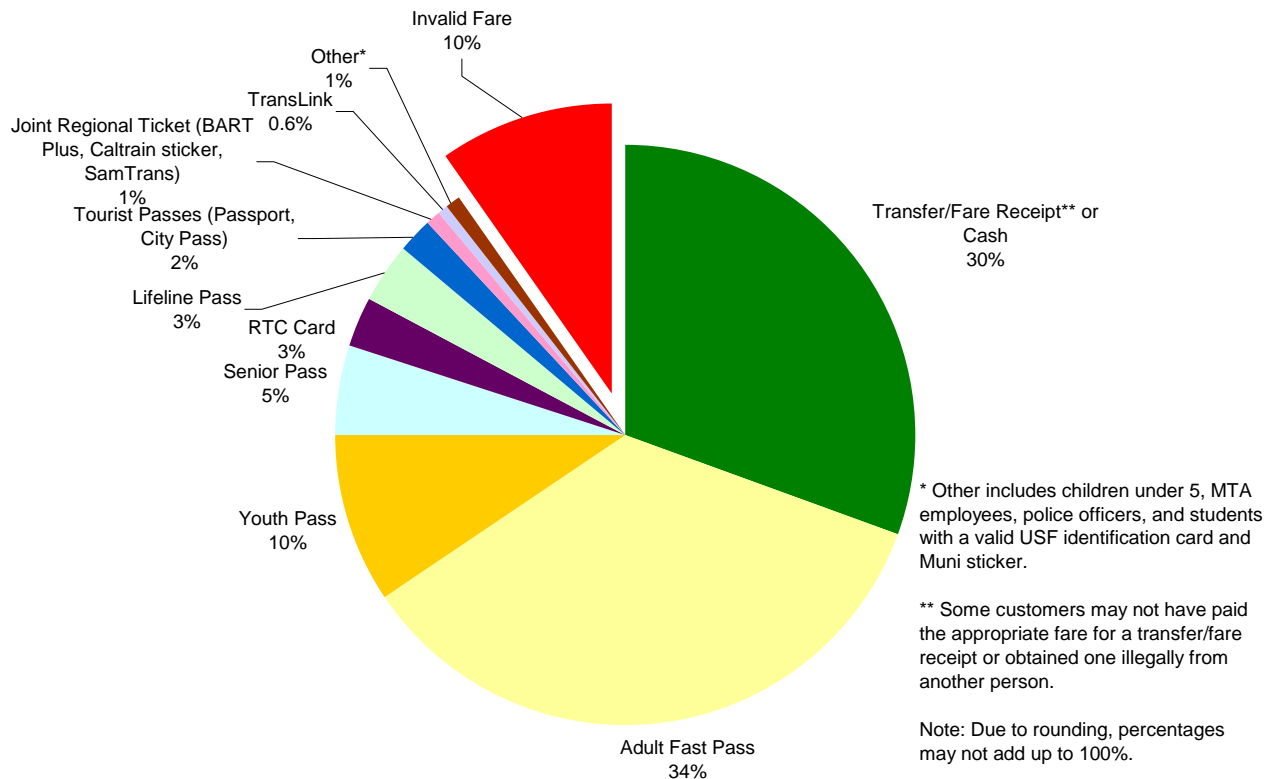
<sup>3</sup> SFMTA fareboxes display the amount deposited and beep after collecting a full adult fare. When the survey team did not hear a beep after an adult had boarded, it checked the farebox to confirm whether an underpayment had occurred. Wherever possible, the team also observed how much seniors, persons with disabilities and youths had deposited into the farebox to determine whether they had paid the appropriate discount fare.

### 3. Data Findings

#### 3.1. Fare Payment Trends

San Francisco Traffic Code Sections 7.2 and 7.3 (see Appendix) require that customers possess valid POP onboard any Muni vehicle or within the fare-paid area of a Metro station. Fare payment options include depositing cash into fareboxes onboard vehicles or at Metro station faregates and receiving a transfer/fare receipt, purchasing monthly passes, or using the regional TransLink® card. Discount fare options are also provided for seniors, persons with disabilities, youths and people who meet low-income eligibility requirements.

Figure 7: How Muni Customers Pay Transit Fares



Type of Fare Payment	Percentage of Total Ridership
Transfer/Fare Receipt** or Cash	30.7%
Adult Fast Pass	34.8%
Youth Pass	9.5%

Type of Fare Payment	Percentage of Total Ridership
Senior Pass	5.0%
RTC Card	2.8%
Lifeline Pass	3.3%
Tourist Passes (Passport, City Pass)	2.1%
Joint Regional Ticket (BART Plus, Caltrain sticker, SamTrans)	0.8%
TransLink	0.6%
Other*	0.9%
Invalid Fare	9.6%

\* Other includes children under 5, MTA employees, police officers, and students with a valid USF identification card and Muni sticker.

\*\* Some customers may not have paid the appropriate fare for a transfer/fare receipt or obtained one illegally from another person.

Note: Due to rounding, percentages may not add up to 100%.

#### ○ Pre-paid Fare Media

Approximately 60 percent of surveyed customers possessed a pre-paid pass, ticket, or smart card. Valid pre-paid fare media includes:

- Monthly Pass – 56 percent (Adult Fast Pass – 34 percent, Youth Pass – 10 percent, Senior Pass – 5 percent, Muni sticker attached to a valid Regional Transit Connection (RTC) card for persons with qualifying disabilities – 3 percent, and Lifeline Pass for qualifying low-income individuals – 3 percent)
- Joint Regional Ticket – 1 percent (BART Plus Half-Monthly Pass, Caltrain Monthly Pass with valid Muni Sticker, or SamTrans Monthly Pass with valid Muni sticker)
- Tourist Passes – 2 percent (1-day, 3-day and 7-day unlimited ride Passports; One-day unlimited-ride tickets sold aboard cable cars; and City Passes valid on Muni and for admission at selected museums)
- TransLink® – 0.6 percent. (Regional smart card valid on multiple transit systems which is currently in its “soft launch” phase on Muni. Customers can load an Adult Fast Pass or cash value onto the card.)

#### ○ Transfers/Fare Receipts

Approximately 30 percent of surveyed customers presented a valid transfer/fare receipt, which generally indicates that they paid a cash fare at some point during their journey. Operators issue transfers/fare receipts that allow customers to complete their journeys on an unlimited number of

vehicles between 90 minutes and two hours, although surveyors observed that operators often distribute transfers/fare receipts that are valid for more than two hours.

Operators also issue transfers/fare receipts to customers who surrender a valid ticket. These tickets include a Youth Fare ticket from a 15-ride ticket booklet, an Adult ticket from a 10-ride ticket booklet, a BART/Bus transfer along with an applicable discounted cash fare, a free Ferry/Muni transfer, or a free Daly City BART/Muni transfer for a travel on the 28 19<sup>th</sup> Avenue and 54 Felton bus routes only.

### 3.2. Invalid POP Trends

Overall, approximately 9.5 percent of surveyed riders could not produce a valid pass, transfer/fare receipt, TransLink® card or other form of proof-of-payment upon request from a TFI.

This rate varies by type of service. Approximately 5 percent of all Muni Metro system customers and 3.5 percent on the J Church, K Ingleside, L Taraval, M Ocean View and N Judah customers did not have valid POP. This relatively low rate may reflect the fact that TFIs have enforced proof-of-payment on Muni Metro for about a decade. In contrast, the rate is approximately 10.5 percent on buses and the F Market & Wharves historic streetcars, on which limited proof-of-payment enforcement began after the survey was completed.

Figure 8: SFMTA Invalid POP Rates

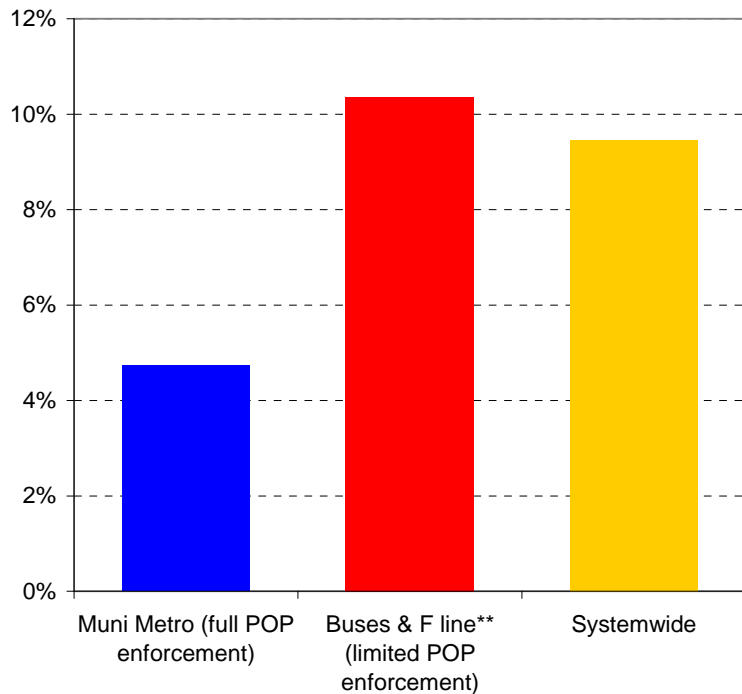


Figure 8: SFMTA Invalid POP Rates

SFMTA Invalid POP Rates	Invalid POP
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	Rate
Muni Metro (full POP enforcement)	4.7%
Buses & F line** (limited POP enforcement)	10.3%
Systemwide	9.4%

Like the SFMTA, many other North American transit providers utilize POP fare enforcement. Typically, fare enforcement only occurs on “open” light rail or commuter rail lines where customers purchase tickets at station vending machines and enter platforms without passing through faregates. In the Bay Area, Caltrain and the Santa Clara Valley Transportation Authority (VTA) light rail also employ POP. “Closed” rail systems with faregates, such as the Bay Area Rapid Transit (BART) or New York City Subway, require tickets to enter (and in some cases, exit) and do not hire fare inspectors to enforce POP.

Bus proof-of-payment systems are rare.<sup>4</sup> The one major exception is the Société de transport de Montréal, which implemented full proof-of-payment enforcement on the entire bus and subway network on September 1, 2009. Generally, bus customers board through the front door, display or swipe a pass, tag a smart card, or deposit cash into the bus farebox. The operator verifies that the customer pays the appropriate fare.

In 2002, the Transportation Research Board in Washington, D.C., completed a study that investigated POP systems in a handful of large transit systems in the United States, Canada, and Europe. While the study found that the invalid POP rate for most of the systems sampled typically ranged from 1 to 6 percent,<sup>5</sup> direct comparisons are not applicable. First, these rates almost exclusively applied to rail routes with POP enforcement and do not include buses. Secondly, the surveyed transit systems did not use consistent methodologies in their calculations.<sup>6</sup> Impacts of July 2009 Fare Increase

On July 1, 2009, the SFMTA increased transit fares to help offset lower General Fund support, the elimination of State Transit Assistance and other reductions in revenue. The cash fare changed from \$1.50 to \$2.00 for adults and from 50¢ to 75¢ for youths, senior citizens, and persons with disabilities. Unlimited-ride monthly passes increased from \$45 to \$55 for adults and from \$10 to \$15 for youths, senior citizens, and persons with disabilities.

The survey team conducted several follow-up fare checks approximately three weeks after the fare increase took effect to determine how the fare change might have impacted customer

<sup>4</sup> In the United States and Canada, a few transit systems have implemented POP on a limited number of bus routes. Customers paying cash fares can purchase a ticket at vending machines located at each stop. These routes include the Orange Line in Los Angeles, the Bx12 “Select Bus Service” in New York City, and VIVA bus rapid transit in suburban Toronto. OC Transpo in Ottawa also permits customers with a pass or transfer/fare receipt to enter through the rear door of articulated buses, but ticket vending machines are not available at stops.

<sup>5</sup> Transit Cooperative Research Program Report 80: A Toolkit for Self-Service, Barrier-Free Fare Collection (Multisystems, Inc., Mundle & Associates, Inc., and Parsons Transportation Group, Inc.), Transportation Research Board-National Research Council, 2002)

<sup>6</sup> For example, the Los Angeles County Metropolitan Transportation Authority previously reported an invalid POP rate of 0.5% but a subsequent audit revealed a rate of 6%.

behavior. During this follow-up, the team surveyed over 2,500 customers on 21 routes at different times on weekdays, from 7 a.m. through 10 p.m. The invalid POP rate after the fare increase was slightly higher than before (by 0.5 percentage points) on the same routes during the same time periods. However, because the follow-up survey collected one-sixteenth the number of base survey samples, it is less precise. Based on the relative closeness of the invalid POP rates in the base and follow-up survey, it is likely that the July 2009 fare change had minor, if any, impacts on whether or not customers paid their fare.

○ How Customers Avoid Paying the Appropriate Fare

Figure 9 shows a breakdown of how customers avoid paying the appropriate fare. Figure 10 provides a brief description of the types of invalid POP that the survey team encountered (please see the Appendix for a more detailed discussion along with samples of invalid fare media). Based on the survey data:

- Approximately 50 percent of customers without valid POP either showed nothing (no transfer/fare receipt or pass) or presumably had nothing because they “walked away” (left the vehicle as soon as possible or remained at the stop instead of boarding).
- Approximately 26 percent had an expired, illegally altered or illegally obtained transfer/fare receipt.
- Approximately 7 percent were adults with a discount Youth or Senior Pass who were ineligible to use one.
- The remaining 17 percent had invalid POP for a variety of other reasons.

Figure 9: Breakdown of Types Invalid POP

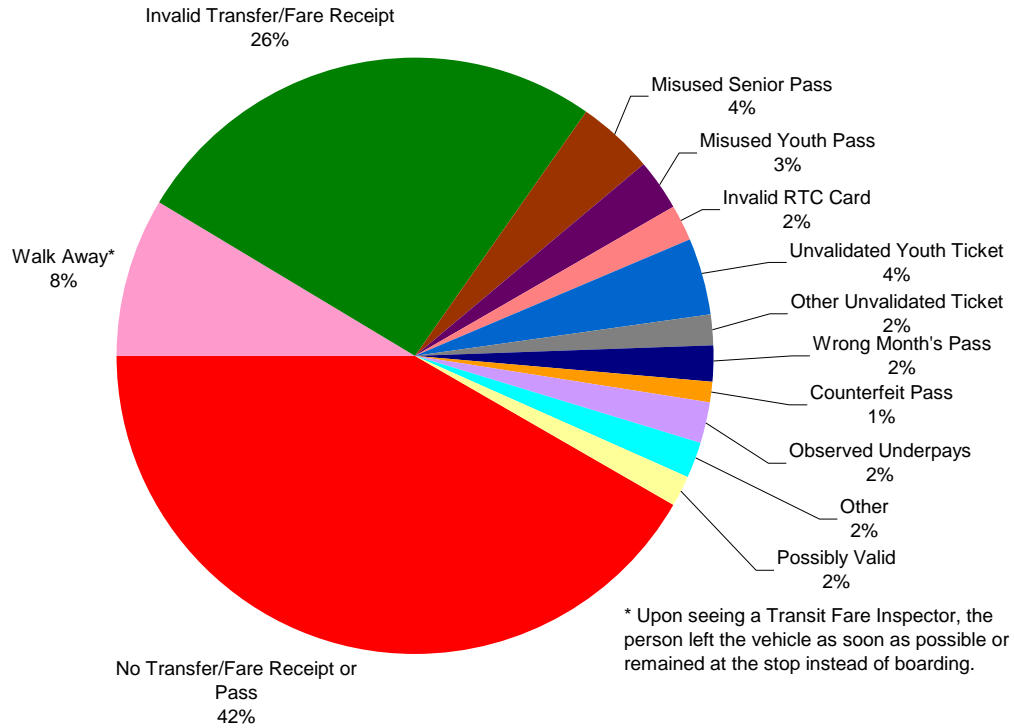


Figure 10: Descriptions of Types of Invalid POP

Type of Invalid POP	Description
No Transfer/Fare Receipt or Pass (42%)	Customer had no form of fare media
Walk Away (8%)	Customer left the vehicle or did not board after seeing the survey team, presumably without valid fare media
Invalid Transfers/Fare Receipts (26%)	Transfer/Fare Receipt had expired, was altered, or was illegally obtained
Misused Senior Pass (4%)	Customer using a Senior Pass was not 65 years old or older
Misused Youth Pass (3%)	Customer using a Youth Pass was not 17 years old or younger
Unvalidated Youth Ticket (4%)	Youth customer did not properly exchange a single-ride Youth Ticket for a Transfer/Fare Receipt
Other Unvalidated Ticket (2%)	Customer did not properly exchange one of the following tickets for a Transfer/Fare Receipt: (a) One-ride ticket from an adult ticket book (b) a free Ferry/Muni transfer (c) a free Daly City BART/Muni transfer (d) a BART/Bus transfer along with a discounted cash fare
Invalid Regional Transit Connection (RTC) Card for Persons with Disabilities (2%)	RTC Card: (a) Was not used by the person to whom it was issued (b) Had Expired, or (c) Did not have a monthly sticker attached

Type of Invalid POP	Description
Wrong Month's Pass (2%)	Customer displayed a pass either before or after its period of validity
Counterfeit passes (1%)	Customer used a counterfeit pass
Observed Underpays (2%)	Customer paid less than the appropriate cash fare
Other (2%)	Does not fall into the above categories
Possibly Valid (2%)	Unable to determine validity of POP

### 3.3. Back-Door Boarding

Currently, the SFMTA permits back-door boarding on Muni Metro light rail routes. This practice was officially introduced in conjunction with the introduction of proof-of-payment enforcement about a decade ago. This approach allowed the SFMTA to redeploy operators whose primary function had been to collect fares in the rear car of two-car light rail trains. Back-door boarding on light rail vehicles also sped up travel times by shortening the time that customers spent boarding at stops.

San Francisco Traffic Code Section 7.2.101(c) prohibits back-door boarding on buses and the F Market & Wharves historic streetcars, except under limited conditions such as when a TFI is positioned outside the back door and is checking for valid fares. The back doors of Muni buses feature prominent decals reading, "Stop – Enter Through Front Door Only." To SFMTA customers, however, the back-door boarding policy may appear to be ambiguous. TransLink® card readers are installed adjacent to back door exits, perhaps creating the perception that customers may enter through the rear door.



Figure 11: Examples of Back-Door Boarding

(shows images of customers boarding buses through the back door)



*Top Left: Customers enter a relatively uncrowded 38 Geary bus during the morning rush hour*

*Top Right: Customers walk past a decal saying "Stop – Enter Through Front Door Only."*

*Bottom: Customers queuing to enter the*

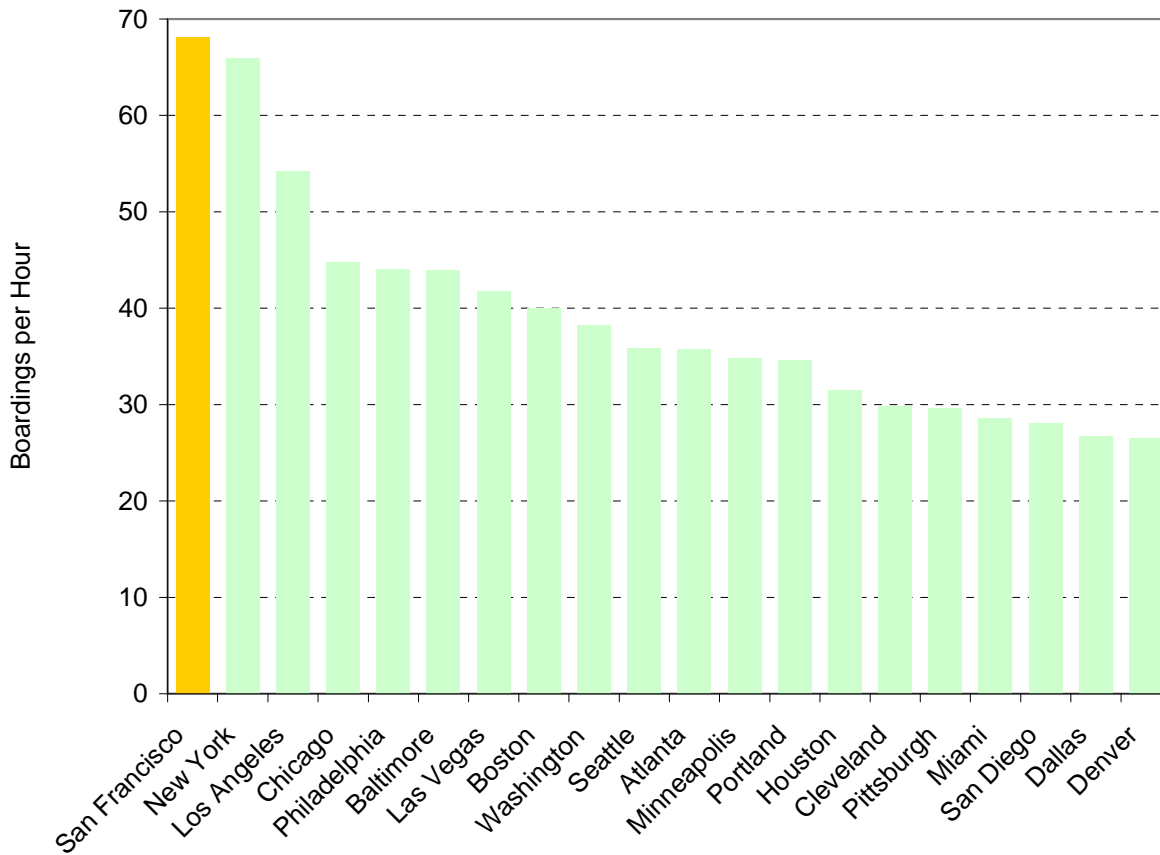
Despite official regulations, back-door boarding on buses is commonplace on heavily-loaded vehicles at busy stops and sometimes even on lower-ridership vehicles at stops with only a few customers. While some SFMTA operators appear to sanction this practice by motioning or telling customers to enter through the rear when the front of the bus is crowded, surveyors observed that customers often board the rear door on their own volition.

Of the 857 people that the survey team specifically observed boarding the back door and tracked, the invalid POP rate was 55 percent - more than five times higher than the systemwide rate.

Although statutorily prohibited, the culture of back-door boarding has become ingrained over many years, exacerbated by the installation of TransLink® card readers at the back door and by

mixed messages from different operators. Notwithstanding the revenue impacts of this practice, an immediate shift to exclusive front-door boarding could result in longer times at stops and slower travel times, particularly given Muni's high ridership. As indicated in Figure 12, nearly 70 customers board any given SFMTA bus each hour – more than any other large transit system in the United States, including New York City Transit.<sup>7</sup> Increasing system delays could result in additional operating costs because more vehicles would need to be scheduled to provide the same level of service frequency.

Figure 12: Comparative Hourly Bus Boarding Rates



Source: National Transit Database (2007).  
 Hourly Bus Boarding rate calculated by dividing unlinked passenger trips by vehicle revenue hours.  
 Includes electric trolley buses and motor buses.

Figure 12: Comparative Hourly Bus Boarding Rates

Transit System	Boardings per Hour
San Francisco	68.1
New York	66.0

<sup>7</sup> Source: National Transit Database (2007). Hourly Bus Boarding rate calculated by dividing unlinked passenger trips by vehicle revenue hours for trolley bus and motor bus transit modes.

Transit System	Boardings per Hour
Los Angeles	54.2
Chicago	44.7
Philadelphia	44.0
Baltimore	43.9
Las Vegas	41.7
Boston	40.0
Washington	38.2
Seattle	35.8
Atlanta	35.8
Minneapolis	34.8
Portland	34.6
Houston	31.5
Cleveland	29.8
Pittsburgh	29.6
Miami	28.6
San Diego	28.1
Dallas	26.8
Denver	26.5

Since April 2008, TFIs have also been stationed at selected bus stops to facilitate rear door boarding. They have allowed customers with pre-paid fare media to enter through the rear door, while directing those who need to pay a cash fare to enter the front door. While this process may assist in reducing loading times and increase fare revenue collected on that particular vehicle, it is not conducive to identifying violations and issuing citations accordingly. Since July 29, 2009, TFIs have been riding select bus routes and writing citations when customers writing citations for misusing passes, displaying counterfeit passes, or refusing to pay the appropriate fare after being warned to do so.

### 3.4. Fare Payment by Time of Day

As indicated in Figure 13, the use of valid fare media varies widely by time of day. During the morning peak, for example, the plurality of customers uses an Adult Fast Pass. During the rest of the day, a greater percentage of customers pay cash or show a valid transfer/fare receipt. Seniors using a discounted monthly pass tend to ride more often during the midday period and relatively seldom during the evening. In contrast, seniors using a monthly pass ride more often during the midday. Proportionally, youths ride most often during the morning (before 9 a.m.) and the afternoon (2 p.m. to 7 p.m.).

Figure 13: Type of Fare Media Used by Time Period

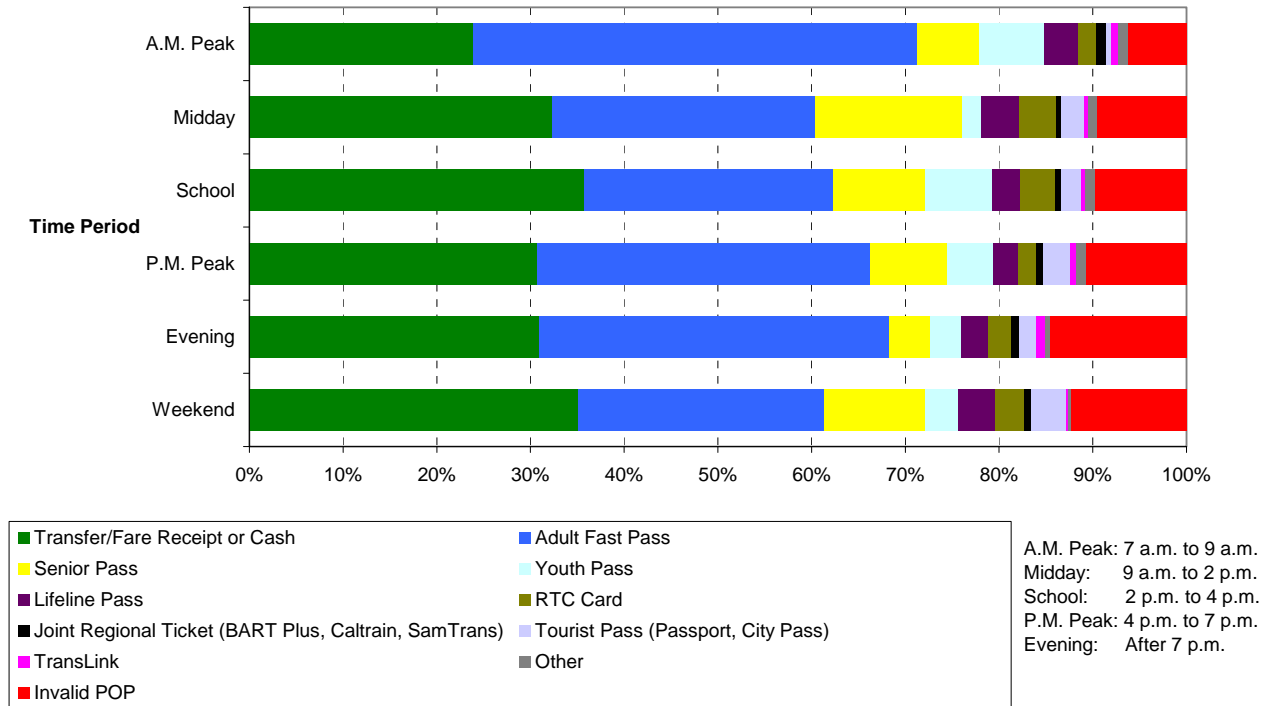


Figure 13: Type of Fare Media Used by Time Period

	A.M. Peak	Midday	School	P.M. Peak	Evening	Weekend
Transfer/Fare Receipt or Cash	23.8%	32.4%	35.8%	30.7%	30.9%	35.1%
Adult Fast Pass	47.5%	28.0%	26.6%	35.8%	37.4%	26.3%
Senior Pass	6.6%	15.8%	9.8%	8.2%	4.3%	10.8%
Youth Pass	7.0%	2.0%	7.1%	5.0%	3.3%	3.5%
Lifeline Pass	3.6%	4.1%	3.0%	2.6%	3.0%	4.0%
RTC Card	2.0%	3.9%	3.8%	1.9%	2.4%	3.1%
Joint Regional Ticket (BART Plus, Caltrain, SamTrans)	1.0%	0.6%	0.6%	0.8%	0.8%	0.7%
Tourist Pass (Passport, City Pass)	0.6%	2.4%	2.1%	2.9%	1.9%	3.7%
TransLink	0.8%	0.4%	0.5%	0.6%	0.9%	0.3%
Other	1.0%	1.0%	1.0%	1.0%	0.5%	0.3%
Invalid POP	6.2%	9.5%	9.8%	10.5%	14.5%	12.3%
Total Valid	93.8%	90.5%	90.2%	89.5%	85.5%	87.7%

Time periods are defined as follows:

A.M. Peak: 7 a.m. to 9 a.m.

Midday: 9 a.m. to 2 p.m.

School: 2 p.m. to 4 p.m.

P.M. Peak: 4 p.m. to 7 p.m.

Evening: After 7 p.m.

Figure 14: Invalid POP by Time of Day

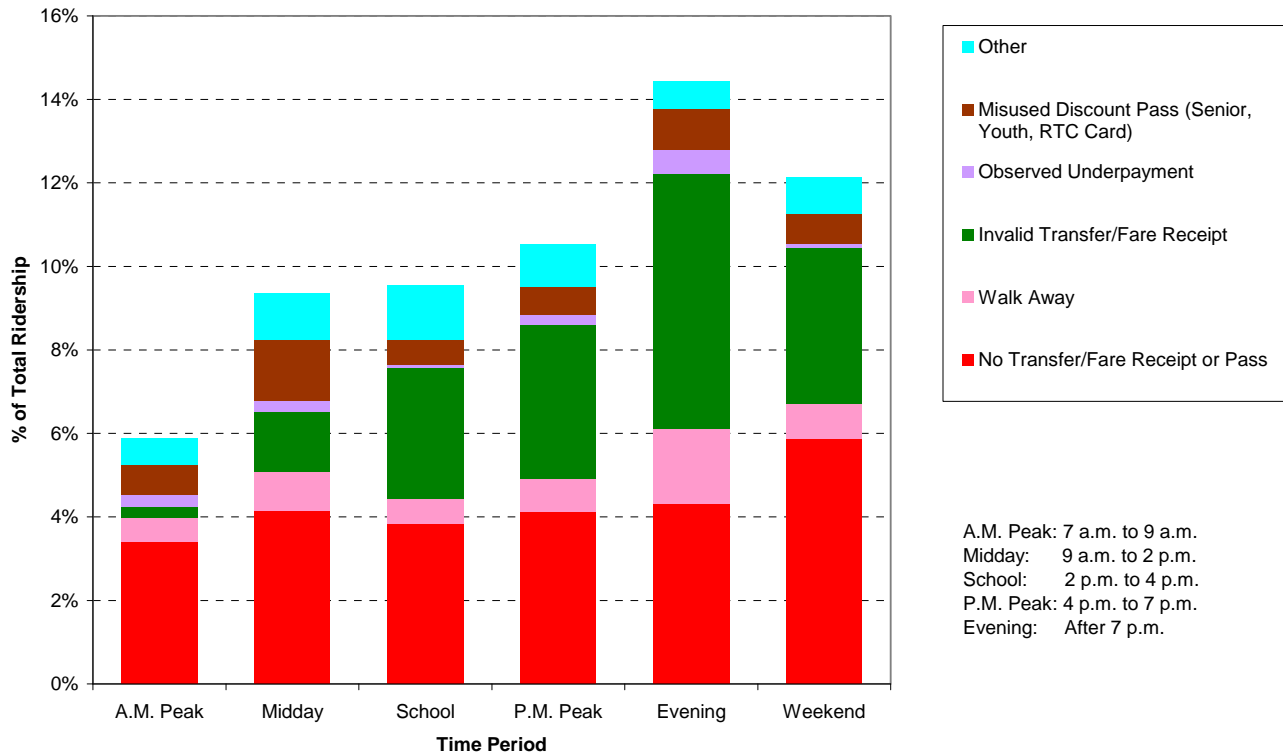


Figure 14: Invalid POP by Time of Day

	A.M. Peak	Midday	School	P.M. Peak	Evening	Weekend
No Transfer/Fare Receipt or Pass	3.3%	4.2%	3.8%	4.0%	4.3%	5.9%
Walk Away	0.6%	0.9%	0.6%	0.8%	1.8%	0.8%
Invalid Transfer/Fare Receipt	0.3%	1.4%	3.1%	3.7%	6.1%	3.7%
Misused Discount Pass (Senior, Youth, RTC Card)	0.7%	1.5%	0.6%	0.6%	1.0%	0.7%
Observed Underpayment	0.3%	0.3%	0.1%	0.2%	0.6%	0.1%
Other	0.7%	1.1%	1.3%	1.0%	0.7%	0.9%
Total Invalid POP	6.2%	9.5%	9.8%	10.5%	14.5%	12.3%

Time periods are defined as follows:

A.M. Peak: 7 a.m. to 9 a.m.

Midday: 9 a.m. to 2 p.m.

School: 2 p.m. to 4 p.m.

P.M. Peak: 4 p.m. to 7 p.m.

Evening: After 7 p.m.

On weekdays, the invalid POP rate increases as the day progresses from about 6 percent during the morning peak to over 14 percent during the evenings (see Figure 14). A couple of factors may explain this trend. First, morning peak ridership tends to be more commuter-oriented compared to the rest of the day. Many of these commuters purchase monthly Adult Fast Passes.

Second, the percentage of invalid transfers rises substantially later in the day. It appears that many customers are paying once early in the day and then attempting to use a transfer/fare receipt as an unlimited-ride day pass. Finally, the percentage of customers who had no transfer/fare receipt or pass (or presumably had nothing because they “walked away”) also increases later in the day.

The survey team also noted POP issues on weekends. Although the team observed over 2,600 customers on weekends, it could not survey individual routes to the same degree of precision as on weekdays due to resource limitations and time constraints. Nonetheless, the team collected enough samples to conclude that the weekend invalid POP rate on surveyed routes is approximately 12 percent<sup>8</sup> - about two percentage points higher than the weekday systemwide average.

### **3.5. Fare Payment by Route**

In addition to varying by time of day, the invalid POP rate also differs by route. Figure 15 shows the invalid POP rate for each route or set of routes.<sup>9</sup> Because there is some error associated with sampling, the rate is likely to be within the range denoted by the bar at a 95 percent confidence level. For example, in the survey 15 percent of customers riding the T Third line had invalid POP. If the survey were to be conducted 100 times, the invalid POP rate would fall somewhere between 13 percent and 18 percent for 95 out of those 100 times.

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<sup>8</sup> The appendix contains specific data and a qualitative assessment of POP issues for each route.

<sup>9</sup> In the table, some routes are grouped together because they have common characteristics.

Figure 15: Invalid POP Rate by Route

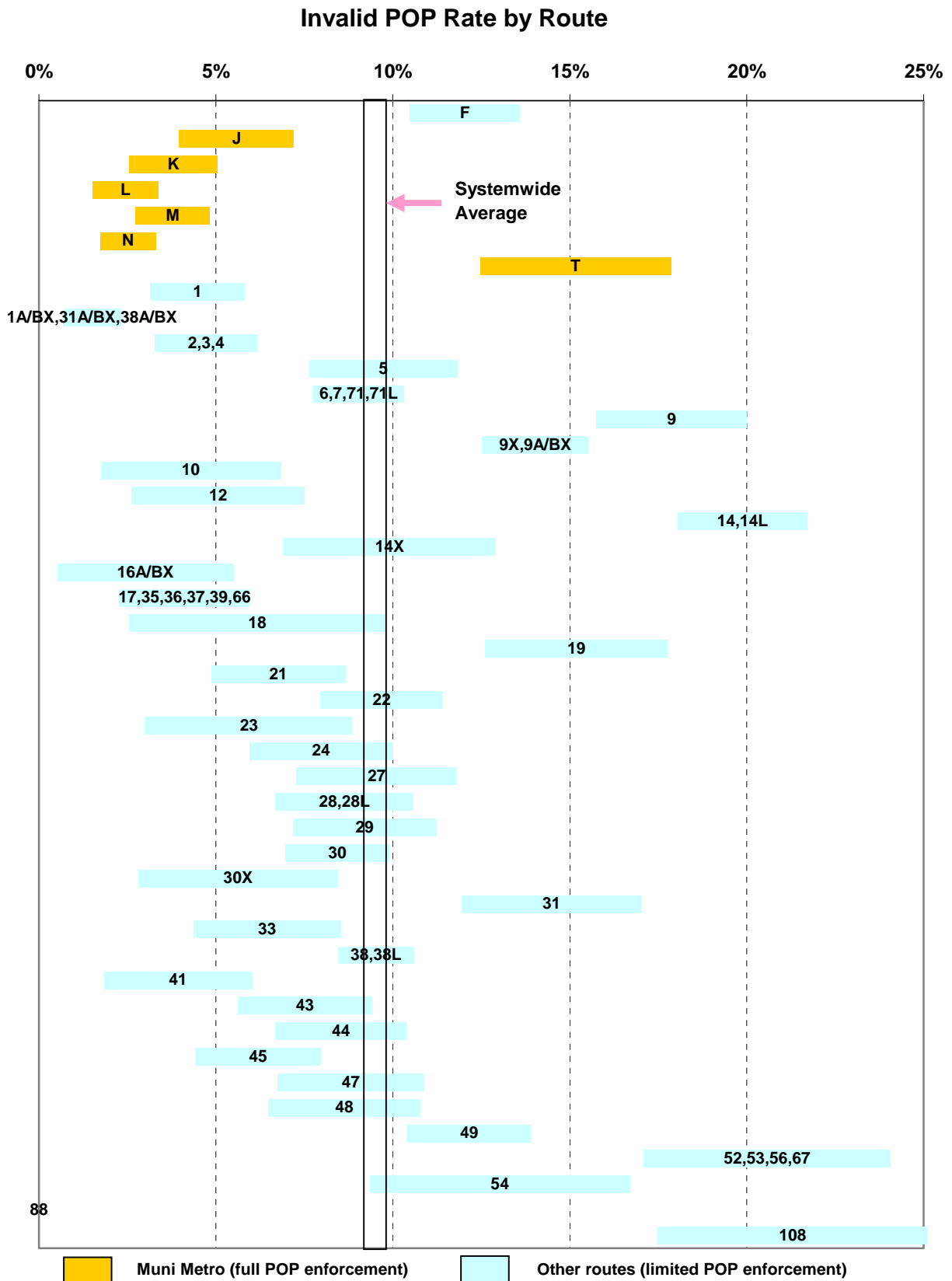


Figure 15: Invalid POP by Route

Route	Observed Invalid POP Rate	Low End Invalid POP Rate*	High End Invalid POP Rate*
F	12%	10%	14%
J*	6%	4%	7%
K*	4%	3%	5%
L*	2%	2%	3%
M*	4%	3%	5%
N*	3%	2%	3%
T*	15%	12%	18%
1	4%	3%	6%
1A/BX,31A/BX,38A/BX	1%	1%	2%
2,3,4	5%	3%	6%
5	10%	8%	12%
6,7,71,71L	9%	8%	10%
9	18%	16%	20%
9X,9A/BX	14%	13%	16%
10	4%	2%	7%
12	5%	3%	8%
14,14L	20%	18%	22%
14X	10%	7%	13%
16A/BX	3%	1%	5%
17,35,36,37,39,66	4%	2%	6%
18	6%	3%	10%
19	15%	13%	18%
21	7%	5%	9%
22	10%	8%	11%
23	6%	3%	9%
24	8%	6%	10%
27	10%	7%	12%
28,28L	9%	7%	11%
29	9%	7%	11%
30	8%	7%	10%
30X	6%	3%	8%
31	14%	12%	17%
33	6%	4%	9%
38,38L	10%	8%	11%
41	4%	2%	6%
43	8%	6%	9%
44	9%	7%	10%
45	6%	4%	8%
47	9%	7%	11%



Route	Observed Invalid POP Rate	Low End Invalid POP Rate*	High End Invalid POP Rate*
48	9%	6%	11%
49	12%	10%	14%
52,53,56,67	21%	17%	24%
54	13%	9%	17%
88	0%	0%	0%
108	21%	17%	25%

\*Low End Invalid POP Rate = Observed Invalid POP Rate – Margin of Error at a 95% confidence level

\*\* Low End Invalid POP Rate = Observed Invalid POP Rate + Margin of Error at a 95% confidence level

Figure 16: Map of Invalid POP Rate by Route

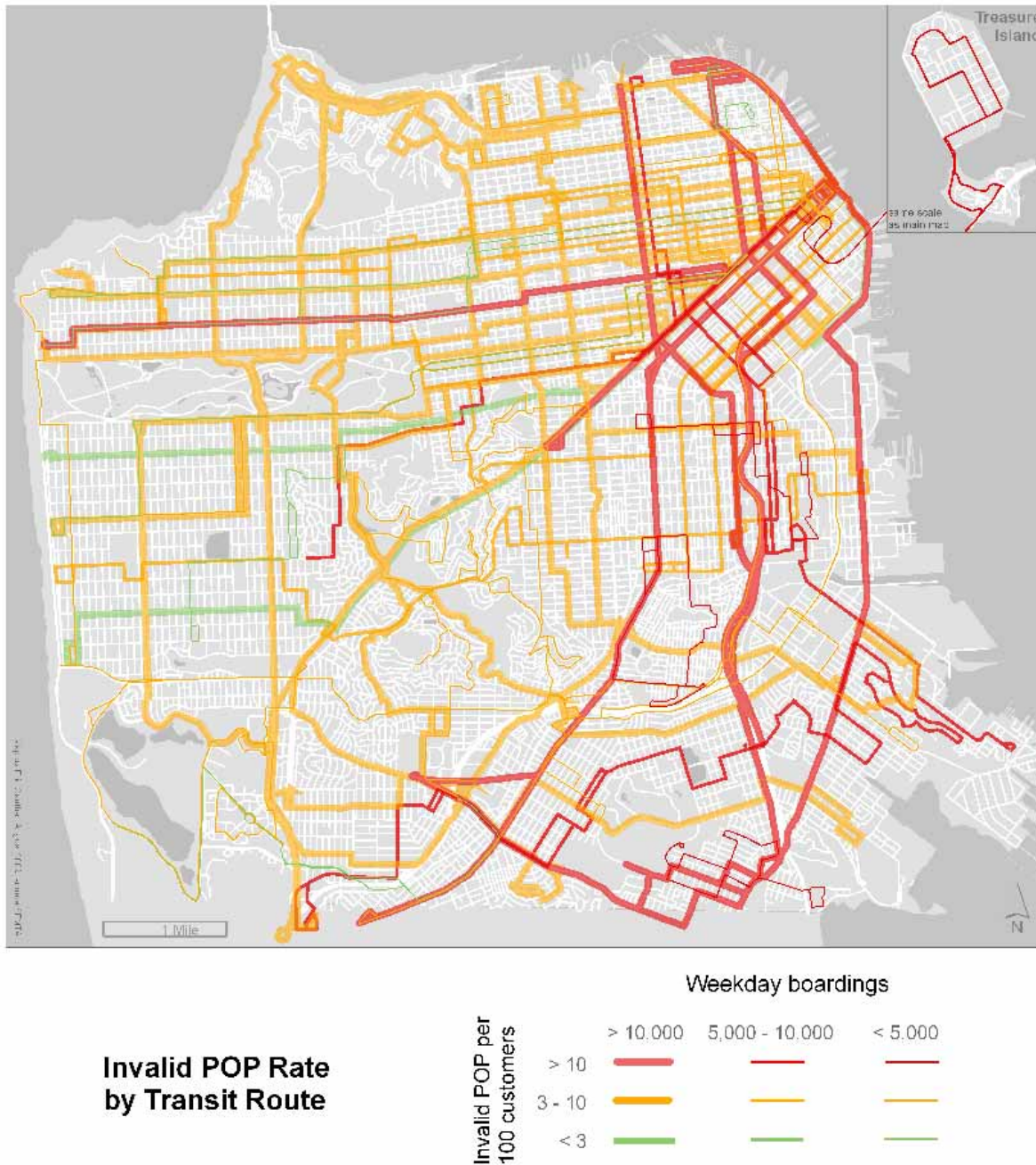


Figure 16: Map of Invalid POP Rate by Route

*This map of San Francisco has individual Muni routes colored based on the invalid POP rate determined during the survey.*

Route	Invalid POP Rate
F Market & Wharves	11%
J Church	6%

Route	Invalid POP Rate
K Ingleside	4%
L Taraval	2%
M Ocean View	4%
N Judah	3%
T Third	15%
1 California	4%
1AX California A Exp 1BX California B Exp	2%
2 Clement 3 Jackson 4 Sutter	5%
5 Fulton	11%
6 Parnassus 7 Haight 71 Haight-Noriega 71L Haight-Noriega Ltd	9%
9 San Bruno	18%
9X Bayshore Exp 9AX Bayshore A Exp 9BX Bayshore B Exp	15%
10 Townsend	4%
12 Folsom-Pacific	5%
14 Mission 14 Mission Ltd	21%
14X Mission Exp	10%
16AX Noriega A Exp 16BX Noriega B Exp	3%
17 Parkmerced	6%
18 46 <sup>th</sup> Ave	6%
19 Polk	15%
21 Hayes	7%
22 Fillmore	9%
23 Monterey	6%
24 Divisadero	8%
27 Bryant	10%
28 19 <sup>th</sup> Av 28L 19 <sup>th</sup> Av Ltd	9%
29 Sunset	9%
30 Stockton	8%
30X Marina Exp	6%
31 Balboa	15%
31AX Balboa A Exp 31BX Balboa B Exp	0%
33 Stanyan	7%

Route	Invalid POP Rate
35 Eureka	4%
36 Teresita	3%
37 Corbett	5%
38 Geary 38 Geary Ltd	10%
38AX Geary A Exp 38BX Geary B Exp	1%
39 Coit	3%
41 Union	4%*
43 Masonic	7%
44 O'Shaughnessy	9%
45 Union-Stockton	6%
47 Van Ness	9%
48 Quintara-24 <sup>th</sup> St	9%
49 Van Ness/Mission	13%
52 Excelsior	13%
53 Southern Heights	54%
54 Felton	13%
56 Rutland	22%
66 Quintara	4%
67 Bernal Heights	12%
71 Haight-Noriega 71L Haight-Noriega Ltd	9%
88 BART Shuttle	0%
108 Treasure Island	21%

Figure 15: Invalid POP by Route

Route	Observed Invalid POP Rate	Low End Invalid POP Rate*	High End Invalid POP Rate*
F	12%	10%	14%
J*	6%	4%	7%
K*	4%	3%	5%
L*	2%	2%	3%
M*	4%	3%	5%
N*	3%	2%	3%
T*	15%	12%	18%
1	4%	3%	6%
1A/BX,31A/BX,38A/BX	1%	1%	2%
2,3,4	5%	3%	6%

Route	Observed Invalid POP Rate	Low End Invalid POP Rate*	High End Invalid POP Rate*
5	10%	8%	12%
6,7,71,71L	9%	8%	10%
9	18%	16%	20%
9X,9A/BX	14%	13%	16%
10	4%	2%	7%
12	5%	3%	8%
14,14L	20%	18%	22%
14X	10%	7%	13%
16A/BX	3%	1%	5%
17,35,36,37,39,66	4%	2%	6%
18	6%	3%	10%
19	15%	13%	18%
21	7%	5%	9%
22	10%	8%	11%
23	6%	3%	9%
24	8%	6%	10%
27	10%	7%	12%
28,28L	9%	7%	11%
29	9%	7%	11%
30	8%	7%	10%
30X	6%	3%	8%
31	14%	12%	17%
33	6%	4%	9%
38,38L	10%	8%	11%
41	4%	2%	6%
43	8%	6%	9%
44	9%	7%	10%
45	6%	4%	8%
47	9%	7%	11%
48	9%	6%	11%
49	12%	10%	14%
52,53,56,67	21%	17%	24%
54	13%	9%	17%
88	0%	0%	0%
108	21%	17%	25%

\*Low End Invalid POP Rate = Observed Invalid POP Rate – Margin of Error at a 95% confidence level

\*\* Low End Invalid POP Rate = Observed Invalid POP Rate + Margin of Error at a 95% confidence level

Figure 16 shows a map of San Francisco with different routes colored by their estimated invalid POP rate. The thickness of the line reflects the average weekday ridership.

Figure 17: Map of Invalid POP Rate by Location Surveyed

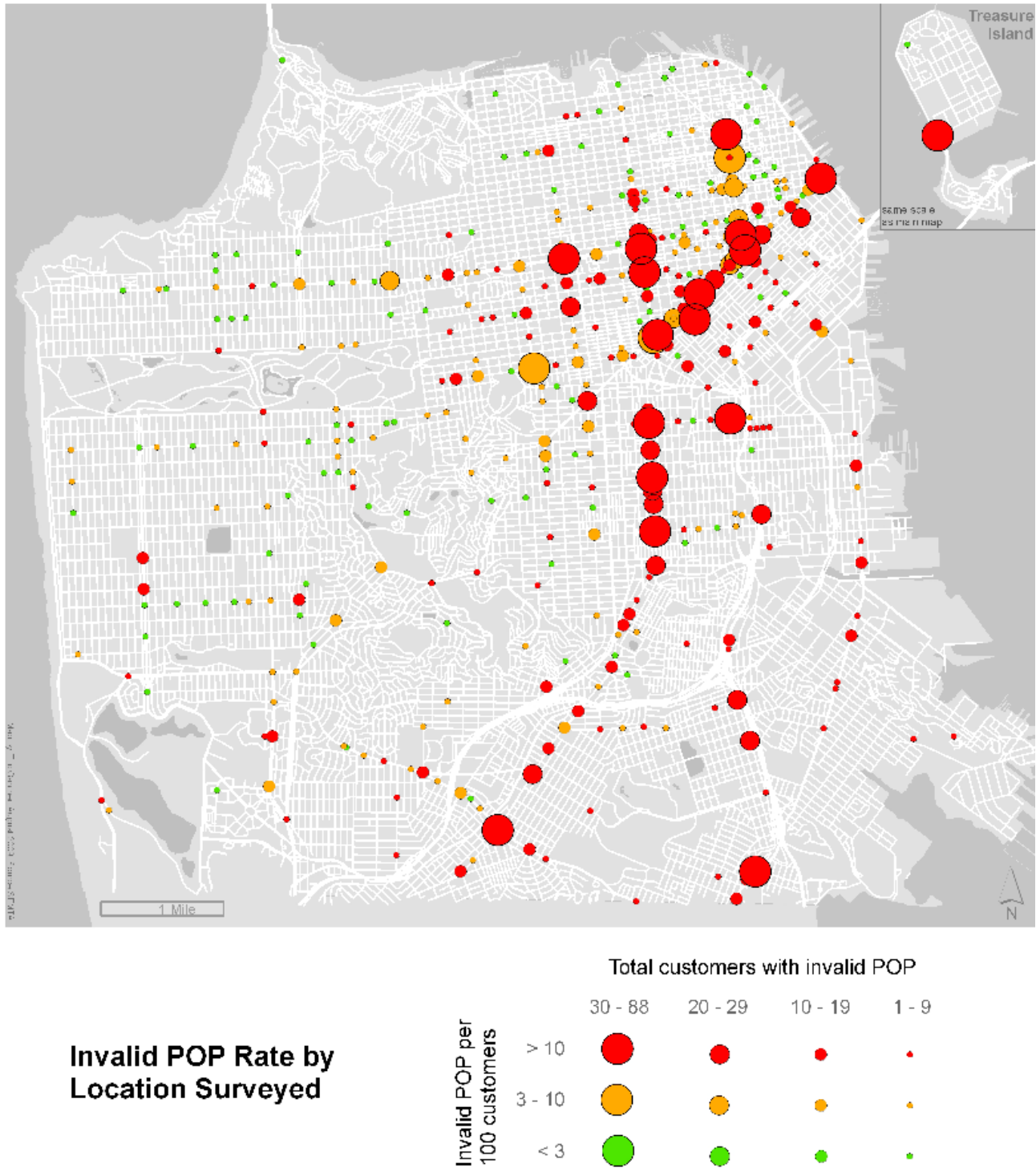


Figure 17: Map of Invalid POP Rate by Location Surveyed

*This map of San Francisco has individual survey observation points colored and sized based on the invalid POP rate (as noted in Figure 15) and absolute number of customers observed without valid POP determined during the survey. The following table indicates these survey observation points, the absolute number of customers observed without valid POP, the total number of customers observed and the corresponding invalid POP rate:*

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
3rd St & 20th St	10	86	12%
3rd St & 22nd St	2	42	5%
3rd St & 26th St	4	15	27%
3rd St & Hudson	14	39	36%
3rd St & Marin	14	69	20%
3rd St & Mariposa	7	33	21%
3rd St & Mission Rock	2	31	6%
3rd St & Oakdale	6	20	30%
3rd St & Palou	9	82	11%
3rd St & Williams	7	27	26%
4th St & Howard	7	22	32%
4th St & King	14	245	6%
4th St & Mission	17	135	13%
4th St & Townsend	10	99	10%
5th St & Howard	8	72	11%
8th St & Townsend	7	37	19%
9th Av & Judah	9	259	3%
9th Av & Kirkham	4	51	8%
9th Av & Lawton	2	73	3%
9th Av & Lincoln Way	3	67	4%
11th St & Division	6	27	22%
11th St & Folsom	11	40	28%
11th St & Howard	0	8	0%
13th St & Gateview	0	15	0%
14th St & Sanchez	0	6	0%
15th Av & Ulloa	1	36	3%
16th Av & Noriega	0	19	0%
16th St & Harrison	1	35	3%
16th St & Valencia	6	43	14%
16th St & Vermont	4	49	8%
17th St & De Haro	5	55	9%
17th St & Kansas	6	46	13%
18th St & Sanchez	0	30	0%
18th St & Storrie	2	37	5%
19th Av & Eucalyptus	3	64	5%

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
19th Av & Holloway	19	258	7%
19th Av & Junipero Serra	8	27	30%
19th Av & Lincoln Way	18	213	8%
19th Av & Noriega	6	144	4%
19th Av & Quintara	3	129	2%
19th Av & Sloat	9	156	6%
20th St & Castro	1	21	5%
23rd St & Utah	1	13	8%
24th St & Bryant	0	15	0%
24th St & Harrison	2	20	10%
26th St & Rhode Island St	3	12	25%
46th Av & Lawton	1	26	4%
46th Av & Wawona	1	15	7%
655 John Muir Drive	1	22	5%
7th Av & Lawton	2	19	11%
Arballo & Pinto	0	9	0%
Ashbury & Clayton	2	20	10%
Av of the Palms & California Av	44	235	19%
Bacon & Girard	1	13	8%
Balboa & 21st Av	0	14	0%
Balboa & 23rd Av	0	26	0%
Balboa & 25th Av	0	23	0%
Balboa Park BART	17	267	6%
Bayshore & Arleta	2	2	100%
Bayshore & Cortland	22	94	23%
Bayshore & Leland	12	47	26%
Bayshore & Sunnydale	16	61	26%
Beach & Divisadero	0	64	0%
Beach & Powell	1	24	4%
Beach & Stockton	5	40	13%
Bemis & Roanoke	0	4	0%
Broad & Plymouth	7	26	27%
Bryant & 4th St	6	26	23%
Bryant & 6th St	11	234	5%
Bryant & 7th St	3	29	10%
Bryant & 8th St	3	47	6%
Bryant & 16th St	6	59	10%
California & 22nd Av	1	43	2%
California & 25th Av	0	19	0%
California & Arguello	1	55	2%
California & Battery	3	67	4%



<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
California & Fillmore	3	60	5%
California & Laurel	2	16	13%
California & Masonic	0	16	0%
California & Park Presidio	0	64	0%
California & Presidio	1	65	2%
Carl & Cole	4	100	4%
Carl & Stanyan	3	89	3%
Castro & 14th St	4	42	10%
Castro & 18th St	17	295	6%
Castro & 19th St	0	43	0%
Castro & 20th St	7	52	13%
Castro & 24th St	9	83	11%
Castro & 26th St	0	10	0%
Castro & Duboce	2	29	7%
Chestnut & Buchanan	3	24	13%
Chestnut & Gough	2	69	3%
Chestnut & Laguna	7	57	12%
Church & 14th St	7	99	7%
Church & 16th St	10	197	5%
Church & 18th St	11	213	5%
Church & 22nd St	0	19	0%
Church & 24th St	14	154	9%
Church & 30th St	5	90	6%
Church & Duboce	6	323	2%
Church & Liberty	4	31	13%
City College	18	120	15%
Clarendon & Panorama	0	13	0%
Clay & Franklin	1	38	3%
Clay & Kearny	1	52	2%
Clay & Mason	0	31	0%
Clay & Montgomery	0	26	0%
Clay & Polk	1	23	4%
Clement & 25th Av	0	5	0%
Coit Tower	0	19	0%
Columbus & Jackson	0	4	0%
Columbus & North Point	0	3	0%
Corbett & Clayton	2	79	3%
Corbett & Romain	0	10	0%
Cortland & Folsom	2	13	15%
Cortland & Prospect	3	43	7%
Crescent & Agnon	0	13	0%

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
Davis & Pine	3	296	1%
Diamond Heights & Duncan	9	14	64%
Diamond Heights Blvd & Diamond	1	11	9%
Divisadero & Eddy	1	30	3%
Drumm & California	0	52	0%
Duboce & Noe	4	157	3%
Earl & Kirkwood	7	18	39%
Eddy & Buchanan	5	35	14%
Eddy & Gough	2	28	7%
Eddy & Laguna	12	72	17%
Eddy & Larkin	12	61	20%
Eddy & Pierce	1	6	17%
Eureka & 21st St	0	5	0%
Evans & 3rd St	8	15	53%
Ferry Building	10	47	21%
Fillmore & Eddy	14	126	11%
Fillmore & Hayes	6	138	4%
Fillmore & Jackson	0	25	0%
Fillmore & McAllister	31	193	16%
Fillmore & Oak	1	26	4%
Folsom & 2nd St	2	43	5%
Folsom & 5th St	0	54	0%
Folsom & 7th Av	5	39	13%
Folsom & 16th St	5	80	6%
Folsom & 24th St	8	44	18%
Folsom & 25th St	0	24	0%
Folsom & 4th St	2	18	11%
Forest Hill Station	18	524	3%
Fulton & 6th Av	4	64	6%
Fulton & 25th Av	9	52	17%
Fulton & Clayton	4	20	20%
Fulton & Park Presidio	2	48	4%
Geary & 3rd Av	0	19	0%
Geary & 6th Av	10	209	5%
Geary & 9th Av	0	43	0%
Geary & 17th Av	0	14	0%
Geary & 20th Av	2	19	11%
Geary & 25th Av	1	29	3%
Geary & 32nd Av	0	43	0%
Geary & 33rd Av	2	50	4%

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
Geary & 38th Av	0	26	0%
Geary & Arguello	22	264	8%
Geary & Baker	8	42	19%
Geary & Collins	11	68	16%
Geary & Divisadero	15	184	8%
Geary & Fillmore	52	445	12%
Geary & Fillmore	11	51	22%
Geary & Laguna	10	192	5%
Geary & Leavenworth	10	101	10%
Geary & Masonic	10	160	6%
Geary & Park Presidio	20	278	7%
Geary & Polk	6	45	13%
Geary & Powell	14	190	7%
Geary & Presidio	8	115	7%
Geary & Spruce	8	139	6%
Geary & Stockton	42	183	23%
Geary & Van Ness	44	497	9%
Geneva & Cayuga	7	94	7%
Geneva & Delano	0	42	0%
Geneva & Howth	2	32	6%
Geneva & Moscow	4	29	14%
Geneva & Naples	10	50	20%
Geneva & Santos	9	61	15%
Glen Park BART	18	129	14%
Golden Gate Bridge	0	14	0%
Haight & Baker	0	37	0%
Haight & Clayton	14	90	16%
Haight & Cole	12	77	16%
Haight & Divisadero	35	400	9%
Haight & Fillmore	26	426	6%
Haight & Laguna	1	7	14%
Haight & Masonic	21	371	6%
Haight & Octavia	11	112	10%
Haight & Pierce	8	68	12%
Harrison & 2nd St	3	19	16%
Harrison & 4th St	2	70	3%
Harrison & 5th St	9	69	13%
Harrison & 6th St	12	104	12%
Harrison & 8th St	28	184	15%
Hayes & Buchanan	9	52	17%
Hayes & Divisadero	3	73	4%

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
Hayes & Franklin	0	25	0%
Howard & 3rd St	4	63	6%
Hyde & Clay	5	37	14%
Irving & 2nd Av	3	149	2%
Irving & 7th Av	2	18	11%
Irving & 9th Av	1	100	1%
Irving & Arguello	0	29	0%
John Muir & Skyline	2	15	13%
Judah & 7th Av	1	60	2%
Judah & 19th Av	1	9	11%
Judah & 23rd Av	1	27	4%
Judah & 29th Av	1	36	3%
Judah & 34th Av	5	52	10%
Judah & 46th Av	3	87	3%
Judah & Funston	1	65	2%
Judah & Sunset	0	24	0%
Kansas & 23rd St	21	113	19%
Kearny & Bush	12	69	17%
Kearny & Sutter	1	44	2%
Lawton & 7th Av	4	49	8%
Lawton & 9th Av	0	28	0%
Lawton & 11th Av	0	1	0%
Market & 1st St	13	77	17%
Market & 3rd St	36	424	8%
Market & 4th St	82	533	15%
Market & 5th St	34	384	9%
Market & 6th St	28	298	9%
Market & 7th St	34	324	10%
Market & 8th St	21	216	10%
Market & 9th St	22	269	8%
Market & 11th St	79	412	19%
Market & Castro	21	595	4%
Market & Church	36	480	8%
Market & Cyril Magnin	14	139	10%
Market & Drumm	7	97	7%
Market & Fremont	1	42	2%
Market & Fremont	3	40	8%
Market & Gough	4	36	11%
Market & Hayes	9	91	10%
Market & Hyde	11	43	26%
Market & Kearny	9	179	5%

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
Market & Larkin	3	34	9%
Market & Main	12	129	9%
Market & Montgomery	9	109	8%
Market & Powell	26	348	7%
Market & Powell	1	42	2%
Market & Steuart	31	61	51%
Market & Stockton	14	48	29%
Market & Van Ness	108	1929	6%
Masonic & Oak	2	43	5%
McAllister & Broderick	1	51	2%
McAllister & Central	3	23	13%
McAllister & Divisadero	12	130	9%
McAllister & Gough	1	27	4%
McAllister & Hyde	22	195	11%
McAllister & Lyon	9	40	23%
Mission & 1st St	46	173	27%
Mission & 5th St	2	82	2%
Mission & 8th St	45	135	33%
Mission & 11th St	14	63	22%
Mission & 15th St	16	86	19%
Mission & 16th St	82	458	18%
Mission & 16th St	16	189	8%
Mission & 18th St	21	186	11%
Mission & 20th St	33	160	21%
Mission & 21st St	25	156	16%
Mission & 22nd St	25	131	19%
Mission & 24th St	111	609	18%
Mission & 29th St	5	32	16%
Mission & 30th St	17	87	20%
Mission & Bosworth	4	58	7%
Mission & Cesar Chavez	22	113	19%
Mission & Cortland	12	59	20%
Mission & Excelsior	22	176	13%
Mission & Geneva	38	351	11%
Mission & Guttenberg	6	87	7%
Mission & Lowell	12	59	20%
Mission & Persia	19	72	26%
Mission & Precita	6	26	23%
Mission & Randall	3	34	9%
Mission & Richland	15	51	29%
Mission & Silver	11	172	6%

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
Mission & South Van Ness	3	20	15%
Mission & Trumbull	10	82	12%
Monterey & Foerster	1	40	3%
Noriega & 26th Av	1	18	6%
Noriega & 46th Av	0	7	0%
Oak & Franklin	0	25	0%
Oakdale & Griffith	3	6	50%
Ocean & Fairfield	0	2	0%
Ocean & Jules	3	69	4%
Ocean & Lee	3	31	10%
Ocean & Miramar	7	38	18%
Ocean & Victoria	1	33	3%
O'Farrell & Hyde	3	37	8%
O'Farrell & Jones	9	92	10%
O'Farrell & Mason	1	16	6%
O'Farrell & Van Ness	23	157	15%
O'Shaughnessy & Portola	3	36	8%
Pacific & Columbus	0	26	0%
Page & Octavia	2	36	6%
Parnassus & 4th Av	1	15	7%
Persia & Prague	8	26	31%
Phelan & Judson	3	37	8%
Pine & Sansome	0	26	0%
Plymouth & Grafton	3	28	11%
Polk & Sacramento	2	100	2%
Polk & Sutter	4	41	10%
Portola & Burnett	1	3	33%
Post & Gough	0	29	0%
Post & Hyde	0	25	0%
Post & Larkin	6	53	11%
Post & Leavenworth	1	15	7%
Post & Polk	12	65	18%
Post & Powell	2	44	5%
Post & Taylor	7	62	11%
Post & Van Ness	2	59	3%
Potrero & 16th St	92	272	34%
Potrero & 23rd St	1	15	7%
Potrero & 24th St	14	207	7%
Rhode Island St & 17th St	2	11	18%
Rutland & Visitacion	3	26	12%
Sacramento & Battery	1	19	5%

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
Sacramento & Fillmore	5	57	9%
Sacramento & Grant	3	51	6%
Sacramento & Jones	1	30	3%
Sacramento & Laguna	1	29	3%
Sacramento & Leavenworth	0	54	0%
Sacramento & Mason	1	17	6%
Sacramento & Powell	12	125	10%
Sacramento & Sansome	4	127	3%
San Bruno & Arleta	40	324	12%
San Bruno & Bacon	39	191	20%
San Bruno & Bayshore	6	30	20%
San Bruno & Mansell	9	41	22%
San Bruno & Silver	24	203	12%
Sansome & California	0	11	0%
Sansome & Washington	0	11	0%
Santiago & 14th Av	0	18	0%
Silver & Cambridge	4	22	18%
Silver & Congdon	2	18	11%
Silver & Gambier	6	91	7%
Silver & Merrill	8	60	13%
Silver & Princeton	2	36	6%
Skyline & Sloat	2	13	15%
St Francis Circle	6	199	3%
Stockton & Broadway	1	35	3%
Stockton & Clay	17	199	9%
Stockton & Columbus	45	354	13%
Stockton & Jackson	2	37	5%
Stockton & Pacific	40	477	8%
Stockton & Sacramento	33	434	8%
Stockton & Sutter	30	408	7%
Stonestown	27	274	10%
Sunset & Ocean	2	74	3%
Sunset & Quintara	18	155	12%
Sunset & Santiago	13	59	22%
Sunset & Vicente	0	17	0%
Sutter & Fillmore	4	59	7%
Sutter & Leavenworth	1	56	2%
Sutter & Mason	2	46	4%
Sutter & Powell	0	29	0%
Sutter & Sansome	8	194	4%
Sutter & Taylor	2	74	3%

<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
Taraval & 15th Av	10	21	48%
Taraval & 19th Av	5	128	4%
Taraval & 22nd Av	1	15	7%
Taraval & 24th Av	1	46	2%
Taraval & 28th Av	0	46	0%
Taraval & 32nd Av	0	18	0%
Taraval & Sunset	0	55	0%
Teresita & Reposa	0	10	0%
The Embarcadero & Bay	1	97	1%
The Embarcadero & Green	3	89	3%
The Embarcadero & Harrison	1	22	5%
The Embarcadero & Washington	8	72	11%
Turk & Arguello	0	20	0%
Turk & Hyde	8	63	13%
Turk & Jones	2	34	6%
Turk & Leavenworth	0	12	0%
Turk & Mason	4	22	18%
Turk & Masonic	6	112	5%
Turk & Parker	0	53	0%
Union & Columbus	23	404	6%
Union & Divisadero	0	1	0%
Union & Fillmore	10	71	14%
Union & Laguna	0	10	0%
Union & Leavenworth	0	21	0%
Union & Montgomery	0	11	0%
Union & Pierce	1	73	1%
Union & Steiner	1	22	5%
Union & Taylor	3	77	4%
Van Ness & California	6	32	19%
Van Ness & Chestnut	8	120	7%
Van Ness & Clay	11	144	8%
Van Ness & Eddy	44	195	23%
Van Ness & Golden Gate	0	29	0%
Van Ness & Grove	0	72	0%
Van Ness & Jackson	3	52	6%
Van Ness & McAllister	19	162	12%
Van Ness & O'Farrell	3	32	9%
Van Ness & Pacific	0	14	0%
Van Ness & Sacramento	14	117	12%
Van Ness & Sutter	28	213	13%
Van Ness & Turk	2	26	8%



<b>Observed Stops</b>	<b>Customers with Invalid POP</b>	<b>Total Customers Observed</b>	<b>Invalid POP Rate</b>
Van Ness & Union	10	91	11%
Vermont & 17th St	4	6	67%
Vermont & 18th St	0	2	0%
Warren & Devonshire	0	16	0%
West Portal & 14th Av	3	111	3%
West Portal Station	17	361	5%
Woodside & Portola	0	6	0%

Figure 17 shows a map highlighting POP issues associated with each location the survey team observed. The color of the circles indicates the invalid POP rate. The size of the circles indicates the number of customers without valid POP. In some cases, particularly at high ridership stops, the survey team boarded at the same location multiple times.

One must exercise caution when interpreting this map: The dots do not indicate the invalid POP rate and magnitude for customers boarding at the specific location, but instead provide a general representation of conditions around the location. Specifically, they reflect what the survey team observed on the vehicle after boarding at the location. This may include customers that had boarded earlier and were already on the vehicle, or in some cases later, if the survey team conducted a “ride along” (see section 2.2 Survey Technique).

### 3.6. Fare Payment by Vehicle Occupancy

There is a common perception that very crowded vehicles make it easier for customers to board without paying the appropriate fare – typically through the back door. As indicated in Figure 18, however, the invalid POP rate on vehicles with very heavy loads<sup>10</sup> is only slightly higher (by approximately one percentage point) than on less-crowded vehicles. Time of day, route and location are more significant factors in determining the invalid POP rate.

While the percentage of customers without valid POP is similar regardless of vehicle occupancy, the absolute number of customers without valid POP is on average higher on more crowded vehicles because they have more customers (both with and without valid POP) overall.

<sup>10</sup> In this report, a “very heavy load” is defined as the ridership on a vehicle is equivalent to 125% or more of the seats available. For example, on a 41-seat standard trolley bus, 10 customers would be standing.

Figure 18: Invalid POP Rate by Vehicle Occupancy

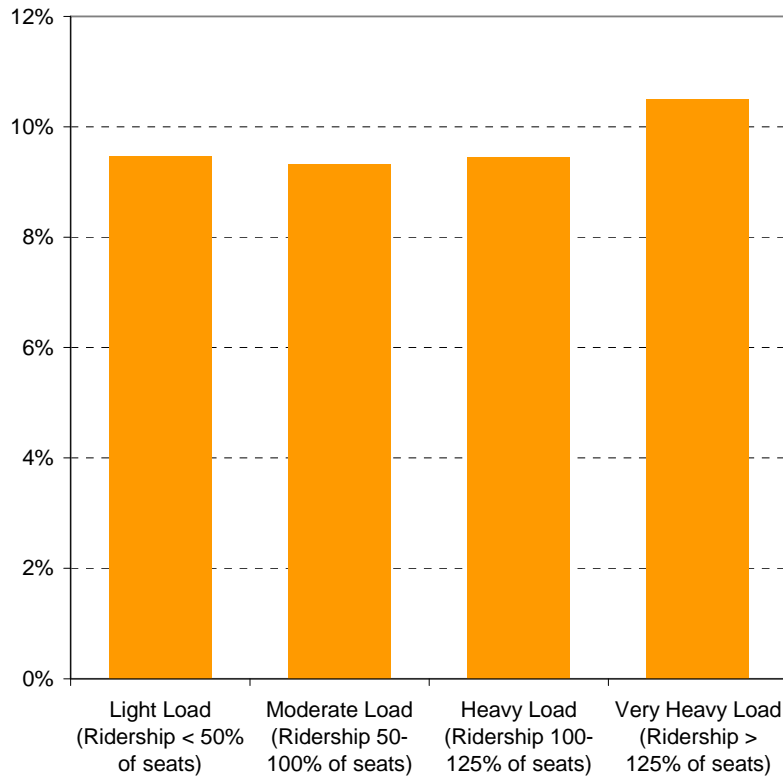


Figure 18: Invalid POP Rate by Vehicle Occupancy

Ridership Load	Invalid POP Rate
Light Load (Ridership < 50% of seats)	9.2%
Moderate Load (Ridership 50-100% of seats)	9.3%
Heavy Load (Ridership 100-125% of seats)	9.5%
Very Heavy Load (Ridership > 125% of seats)	10.5%

### 3.7. Likelihood of Encountering POP Issues

Anecdotally, the survey team noted that customer and operators' perceptions about fare compliance shifted once the invalid POP rate approached the systemwide average (about 10 people per 100 surveyed). Many customers and operators expressed a general concern that a "large" number of people were not paying their fare. Furthermore, while citing even a single customer for failure to display valid POP might pose difficulties, TFIs perceived that safety and security issues rose significantly when violations exceeded this level.

To provide more insight into this perception issue, this study calculated the likelihood of encountering POP issues. This measure answers the question, “What are the chances that one will find major POP issues when boarding any given bus, streetcar or light rail vehicle?” This question might also be stated as: “What are the chances that a TFI will be able to write multiple citations when boarding any given Muni vehicle?”

On average, the survey team observed slightly less than 10 fare violations for every 100 people it surveyed – but not every vehicle the team boarded had this invalid POP rate. Figure 19 and Figure 20 illustrate the chances of a vehicle exceeding this rate in red. The charts show lower proportions of customers with invalid POP in orange (3 to 10 violations per 100) and green (fewer than 3 violations per 100). The survey team noted anecdotally that customers and operators perceived there were few problems and expressed little concern about POP issues when the number of violations was 3 or fewer per 100 people surveyed.

There is approximately a 35 percent chance that one will board a random Muni vehicle where more than 10 customers out of every 100 surveyed do not have valid POP. When broken down by time period, route and vehicle loads:

- The chances are lower on fully-enforced POP lines (Muni Metro) (15%) than on limited-enforced forced routes (buses and the F-Market & Wharves line) (39%)
- The chances are lower during weekday morning rush hours (20%) than during weekday evenings (52%)
- The chances differ substantially on the system’s busiest bus routes: 1 California (7%); 6 Parnassus, 7 Haight, 71/71L Haight-Noriega (35%); 9X/9AX/9BX Bayshore Express (68%); 14/14L Mission (89%); 30 Stockton (27%); 38/38L Geary (44%); and 49 Van Ness/Mission (65%)
- The chances are lower on the J Church, K Ingleside, L Taraval, M Ocean View and N Judah routes (12% or less) than on the T Third route (72%)
- The chances are similar regardless of vehicle loads (32% to 37%)

Figure 19: Likelihood of Encountering POP Issues - Overall

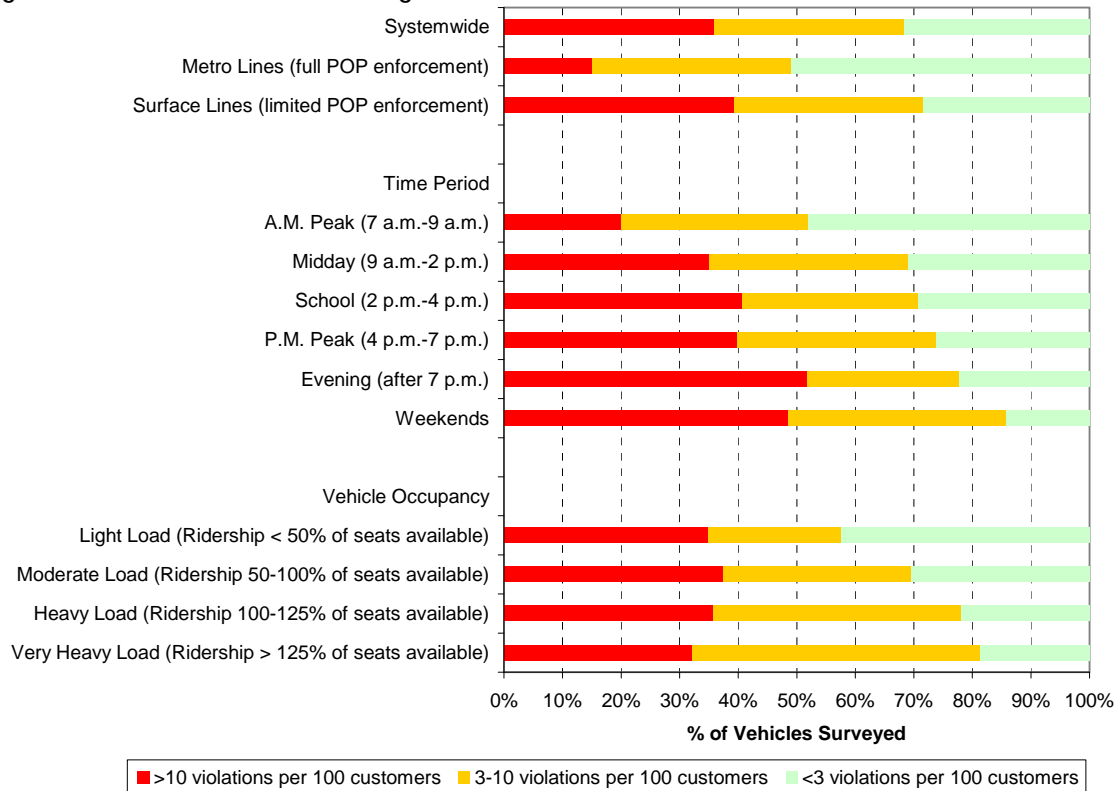


Figure 19: Likelihood of Encountering POP Issues - Overall

Service Type	<3 violations per 100 customers	3-10 violations per 100 customers	>10 violations per 100 customers
<b>Systemwide</b>	32%	32%	36%
Metro Lines (full POP enforcement)	51%	34%	15%
Surface Lines (limited POP enforcement)	28%	32%	39%
<b>Time Period</b>			
A.M. Peak (7 a.m.-9 a.m.)	48%	32%	20%
Midday (9 a.m.-2 p.m.)	31%	34%	35%
School (2 p.m.-4 p.m.)	29%	30%	41%
P.M. Peak (4 p.m.-7 p.m.)	26%	34%	40%
Evening (after 7 p.m.)	22%	26%	52%
Weekends	14%	37%	49%
<b>Vehicle Occupancy</b>			
Light Load (Ridership < 50% of seats)	42%	23%	35%
Moderate Load (Ridership 50-100% of seats)	31%	32%	37%
Heavy Load (Ridership 100-125% of seats)	22%	42%	36%
Very Heavy Load (Ridership > 125% of seats)	19%	49%	32%

Figure 20: Likelihood of Encountering POP Issues – By Route

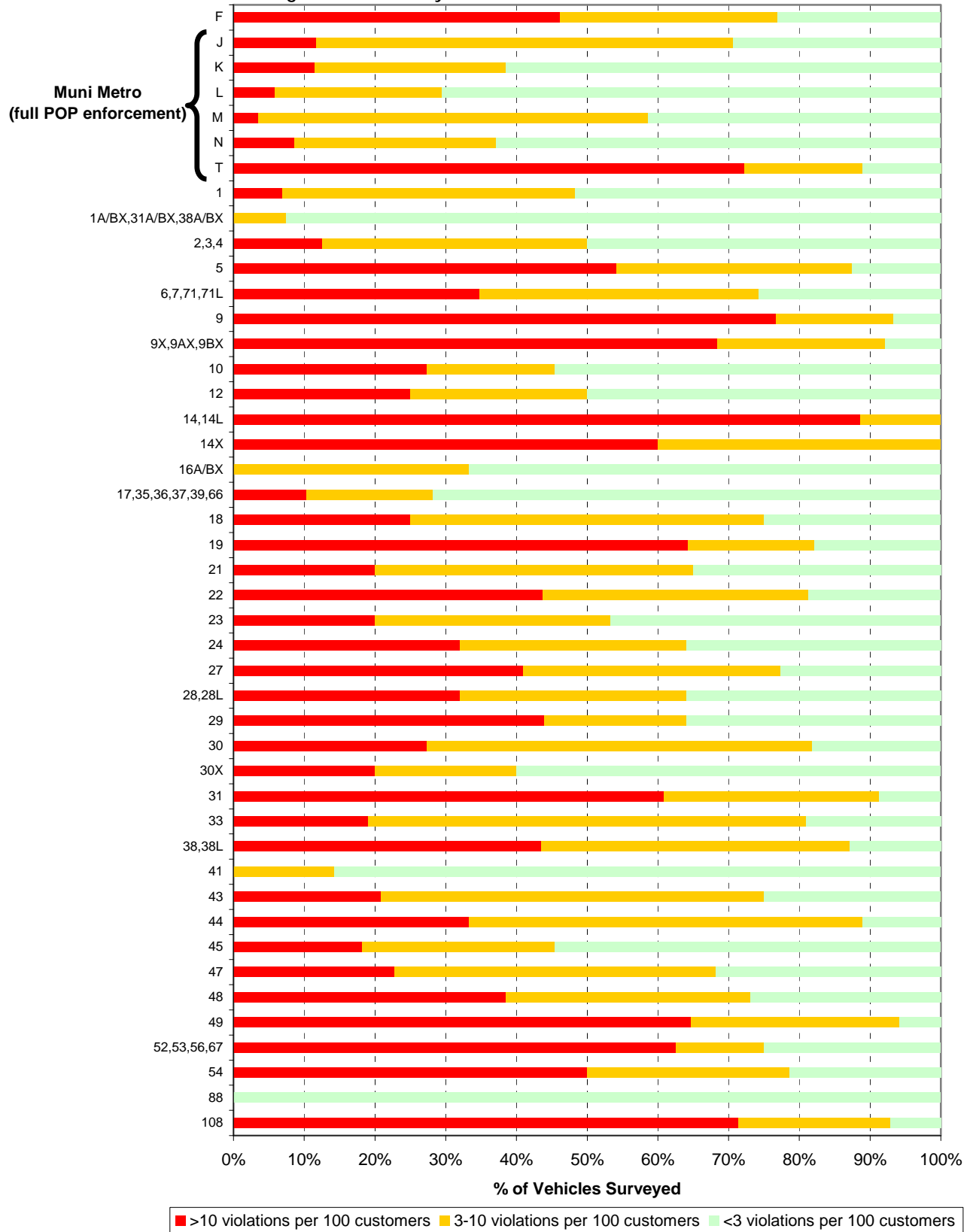


Figure 20: Likelihood of Encountering POP Issues – By Route

Route	<3 violations per 100 customers	3-10 violations per 100 customers	>10 violations per 100 customers
F	23%	31%	46%
J*	29%	59%	12%
K*	62%	27%	12%
L*	71%	24%	6%
M*	41%	55%	3%
N*	63%	29%	9%
T*	11%	17%	72%
1	52%	41%	7%
1A/BX,31A/BX,38A/BX	93%	7%	0%
2,3,4	50%	38%	13%
5	13%	33%	54%
6,7,71,71L	26%	39%	35%
9	7%	17%	77%
9X,9AX,9BX	8%	24%	68%
10	55%	18%	27%
12	50%	25%	25%
14,14L	0%	11%	89%
14X	0%	40%	60%
16A/BX	67%	33%	0%
17,35,36,37,39,66	72%	18%	10%
18	25%	50%	25%
19	18%	18%	64%
21	35%	45%	20%
22	19%	38%	44%
23	47%	33%	20%
24	36%	32%	32%
27	23%	36%	41%
28,28L	36%	32%	32%
29	36%	20%	44%
30	18%	55%	27%
30X	60%	20%	20%
31	9%	30%	61%
33	19%	62%	19%
38,38L	13%	44%	44%
41	86%	14%	0%
43	25%	54%	21%
44	11%	56%	33%
45	55%	27%	18%
47	32%	45%	23%
48	27%	35%	38%

Route	<3 violations per 100 customers	3-10 violations per 100 customers	>10 violations per 100 customers
49	6%	29%	65%
52,53,56,67	25%	13%	63%
54	21%	29%	50%
88	100%	0%	0%
108	7%	21%	71%

\* Muni Metro (full POP enforcement)

### 3.8. Uncaptured Revenue Estimates

SFMTA's amended FY 2009-2010 budget forecasts transit fare revenue of approximately \$170 million. Bus, streetcar and light rail revenue comprises approximately \$157 million of this amount, while cable car cash fares account for the remainder. In the unlikely scenario that every bus, light rail and streetcar customer had valid POP, the SFMTA might be able to capture about \$19 million annually based on the calculation detailed in Figure 21. This does not imply that the SFMTA could collect all of this revenue even with full POP enforcement systemwide. For example, some customers may not decide to make a trip by transit if they have to pay. Other customers will continue to avoid paying in hopes that avoid encountering a TFI.

A reduction in the invalid POP rate by half to approximately 5 percent could yield an additional \$9 to \$10 million annually.

Figure 21: Estimated Uncaptured Revenue

Major Types of Fare Violations with methodology used to estimated uncaptured revenues	Uncaptured Revenue*
<b>No Ticket, Transfer or Pass, Invalid Transfers/Fare Receipts, Walk Away, or Unvalidated Youth Tickets (used on a School Field Trip)</b> Of customers without a pre-paid pass, 80% paid cash and displayed a transfer/fare receipt while the remaining 20% lacked any form of proof of payment, showed an invalid transfer/fare receipt, walked away upon seeing a TFI, or displayed an unvalidated youth ticket as part of a school group. Assumption: These customers would have paid the applicable cash fare, and therefore total cash fare revenues would increase proportionately.	\$15.2 million
<b>Misused Senior Pass</b> 8% of patrons surveyed with a Senior pass were ineligible to use one. Assumption: 8% of Senior pass users would purchase an Adult Fast Pass, resulting in an additional \$40 in revenue per month per pass.	\$1.0 million
<b>Misused Youth Pass</b> 3% of patrons surveyed with a Youth pass were ineligible to use one. Assumption: 3% of Youth pass users would purchase an Adult Fast Pass, resulting in an additional \$40 in revenue per month per pass.	\$0.3 million

Major Types of Fare Violations with methodology used to estimated uncaptured revenues	Uncaptured Revenue*
<b>Unvalidated Youth Ticket (Used Individually)</b> The number of surveyed customers who did not exchange a single-ride Youth Ticket for a transfer/fare receipt (but used it as if it were an unlimited-ride Youth Pass) was equivalent to about 2% of total Youth Passes observed. Assumption: These Youth Ticket users would instead use a Youth Pass, resulting in \$15 in revenue per month per pass.	\$0.1 million
<b>Invalid Regional Transit Connection (RTC) Card</b> 6% of surveyed customers with RTC cards used them improperly, typically because they were using the card as a pass without a monthly sticker. Assumption: These customers would purchase a \$15 monthly sticker	\$0.1 million
<b>Counterfeit Pass</b> Surveyors identified approximately 0.25% of the Adult Fast Passes as counterfeit. Assumption: These customers might have purchased an Adult Fast Pass, but more likely would have purchased a \$30 Lifeline Pass.	\$0.1 million
<b>Wrong Month's Pass</b> 0.3% of customers displayed passes that valid for the previous or following month. Assumption: Half of these customers did not purchase a pass for the current month.	\$0.1 million
<b>Underpayment</b> The survey team observed that 0.8% of customers with a valid transfer/fare receipt did not pay the appropriate fare – but this underpayment rate is probably higher because the team usually could not verify how much a customer had paid. Assumptions: (a) Ineligible adults paid the discount youth or senior cash fare at the same rate at which they misused the Youth and Senior Pass. (b) In addition, 3% of cash customers paid only half the appropriate fare.	\$2.0 million
<b>Misused Passports</b> Surveyors observed that approximately 5% of customers with 1-day, 3-day and 7-day Visitor Passports did not properly use them. Assumption: Half of these customers fraudulently misused these Passports, while the other half were tourists who were confused about how to scratch the passes properly.	\$0.3 million
<b>Total</b>	\$19.2 million

\* Estimated uncaptured revenue is based on fare rates effective July 1, 2009.



## 4. Fare Enforcement Issues

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### 4.1. Transit Fare Inspector Staffing and Schedules

Currently, the SFMTA employs 46 full-time TFIs along with eight supervisors. Working in teams of two or three, inspectors are responsible for fare enforcement on the six light rail lines and issuing citations to customers without valid POP. To reduce boarding times, they check fares at some busy bus stops and allow customers with valid POP to enter through the rear door. TFIs also check fares of customers attending Giants baseball games, the Bay to Breakers, Pride Parade, Stern Grove concerts, the Outside Lands Festival and other special events. There, they typically ask customers without valid POP – many of whom are visitors or infrequent users unfamiliar with the Muni system – to pay rather than issuing citations.

In July 2009, TFIs also began limited enforcement on selected bus lines, issuing citations when customers are misusing passes or refusing to pay after being warned.<sup>11</sup>

#### ○ Daily Activities

During a typical 8½ hour shift, TFIs engage in one of following major activities in addition to checking fares:

- Office Work – Office work includes team briefing and paperwork (for example, tabulating customer contact statistics, filing incident reports, and processing citations)
- Walking to/from Office – TFIs travel between Van Ness Station and the office at least twice per day, and possibly four times if they elect to eat lunch in the office. The station is approximately a ten-minute walk from the office.
- Paid Breaks – Inspectors receive two paid 15-minute breaks taken at their discretion.
- Travel to/from Assignment – At the beginning of each shift, supervisors assign inspectors a station or route segment to enforce. Although TFIs may check fares while traveling to or from their assignment, they generally take the most direct route and do not get on and off to check customers on multiple vehicles.
- Restroom Breaks – TFIs may take a restroom break whenever necessary. While inspectors know restroom locations near the Muni Metro rail lines, they are less familiar with facilities adjacent to bus routes.
- Unpaid 30-minute Lunch Break – Many TFIs eat lunch near their assignment location, but some return to the office for lunch. If they are working far away from the office,

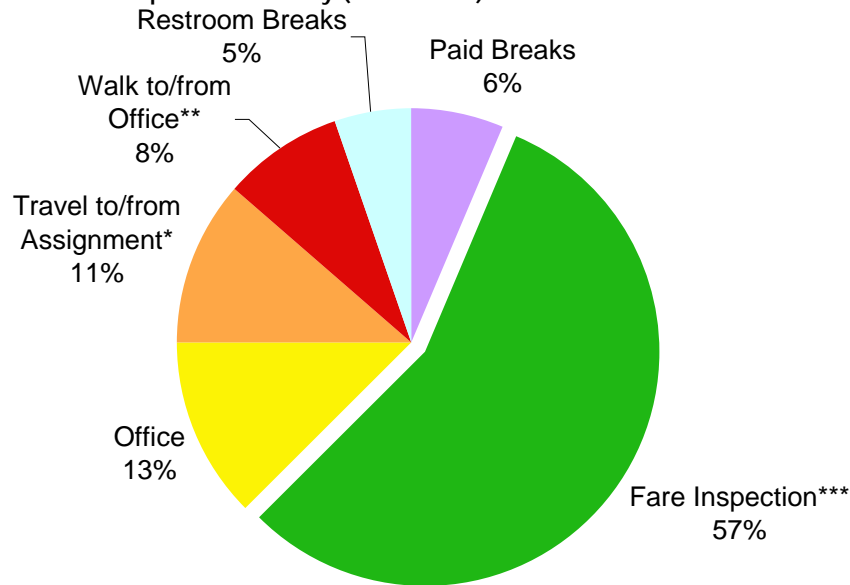
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<sup>11</sup> The Appendix contains additional examples of TFI responsibilities.

returning for lunch increases the time spent traveling to and from one's assignment and walking to and from the office while reducing the time spent inspecting fares and issuing citations.

Figure 22 shows how TFIs might spend a sample workday.<sup>12</sup> Fare Inspection time does not necessarily imply that inspectors are issuing citations. They may be assigned to AT&T Ballpark (usually for five hours per baseball game) or checking fares of customers entering through the rear door of buses. In addition, TFIs often assist customers and SFMTA operating personnel when there are service disruptions.

Figure 22: Composition of a Sample TFI Workday (Paid Hours)



Estimated time represents a sample day, but the time spent for each activity can vary from day to day. Time excludes 30-minute unpaid lunch break.

\* - Transit Fare Inspectors may check fares while traveling to/from assignment, but generally take the most direct route and do not get on and off to check customers on multiple vehicles.

\*\* - Assumes that a Transit Fare Inspector returns to the office for lunch.

\*\*\* - May include time where Transit Fare Inspectors are not issuing citations (such as when checking tickets as customers board through the back door of buses or after baseball games)

Figure 22: Composition of a Sample TFI Workday (Paid Hours)

Activity	% of Paid Time
Paid Breaks	6%
Office	13%
Travel to/from Assignment*	11%
Walk to/from Office**	8%
Restroom Breaks	5%
Fare Inspection***	57%

<sup>12</sup> The exact time devoted to each activity can vary from day to day.

Estimated time represents a sample day, but the time spent for each activity can vary from day to day. Time excludes 30-minute unpaid lunch break.

- \* - Transit Fare Inspectors may check fares while traveling to/from assignment, but generally take the most direct route and do not get on and off to check customers on multiple vehicles.
- \*\* - Assumes that a Transit Fare Inspector returns to the office for lunch.
- \*\*\* - May include time where Transit Fare Inspectors are not issuing citations (such as when checking tickets as customers board through the back door of buses or after baseball games)

## ○ Shifts

Currently, a TFI works one of three shifts, five days per week. Each shift lasts 8½ hours, which includes a 30-minute unpaid lunch break. Figure 23 illustrates how many inspectors are working during each shift.

Figure 23: TFI Staffing Levels by Shift

Shift	Hours	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Day	5:30 a.m.-2 p.m.	0	14	14	14	14	14	0
Mid	10 a.m.-6:30 p.m.	8	8	16	16	16	8	8
Swing	2:30 p.m.-11 p.m.	8	8	16	16	16	8	8

Typically, inspection stops 1 to 1½ hours prior to the end of a shift. This gives inspectors time to take their last 15-minute break, travel from their assignment to Van Ness Station, walk back to the office and complete their office work. For the Mid shift, for example, this results in inspection effectively ending between 5 p.m. and 5:30 p.m. during the height of the afternoon rush hour.

Inspection staffing levels peak between 10 a.m. and 1 p.m. and between 3 p.m. and 5:30 p.m. on Tuesday, Wednesday and Thursday, when all Day and Mid-shift inspectors are on duty. Monday and Friday inspection staffing levels are about 25 percent lower between 10:30 a.m. and 1 p.m. and 50 percent lower between 3 p.m. and 5 p.m. than on Tuesday, Wednesday and Thursday.<sup>13</sup>

Ballgames further reduce the staffing available for the rest of the system. Prior to the start of a game, TFIs help control crowds and direct customers off trains towards the stadium. After the game, they check fares as customers are entering either end of the 2<sup>nd</sup> & King Station and direct those without POP back towards the Muni ticket counters at the stadium so they can purchase tickets without receiving a citation. Typically, several hundred out of a thousand or more customers do not have valid POP.

Each ballgame usually requires a minimum of six TFIs at least 1 hour before the game and up to 1 hour after the game at the 2<sup>nd</sup> & King Station. Therefore, if a game begins at 7:05 p.m. on a Monday, there is one team of two inspectors to patrol the entire system after 6 p.m.

<sup>13</sup> On Monday, half of the Mid- and Swing-shift teams has a regular day off (in addition to Sunday). On Friday, the other half of the Mid- and Swing-shift team has a regular day off (in addition to Saturday).

○ Deployment Schedules

Currently, full POP enforcement takes place on the Muni Metro system, which comprises slightly less than one-quarter of SFMTA's ridership. If the SFMTA were to maintain the same inspection rate of its customers, expanding full POP enforcement to the remainder of the system would require roughly a 300 percent increase in TFI staffing. For fiscal year 2009-2010, the SFMTA has budgeted operating funds for a 30 percent increase - from 46 to 60 TFIs. Limited resources will require the SFMTA to develop TFIs deployment schedules that balance two goals:

- Ensuring that all customers expect that a TFI might check their fare, regardless of where and when they ride Muni
- Increasing the percentage of customers with valid POP on routes and times where there are currently significant POP issues

Figure 24 compares weekday TFI staffing levels and the invalid POP rate by hour. Figure 24: Weekday TFI Staffing vs. Invalid POP Rate by Time of Day

Time	Invalid POP Rate on an average weekday	Transit Fare Inspectors (Tues, Wed, Thurs)	Transit Fare Inspectors (Mon, Fri)	Transit Fare Inspectors (Mon, Fri with 7:05 pm ballgame)
7:00 AM	5%	14	14	14
8:00 AM	7%	14	14	14
9:00 AM	9%	14	14	14
10:00 AM	9%	14	14	14
11:00 AM	10%	30	22	22
12:00 PM	9%	30	22	22
1:00 PM	10%	30	22	22
2:00 PM	10%	16	8	8
3:00 PM	10%	32	16	16
4:00 PM	11%	32	16	16
5:00 PM	9%	32	16	16
6:00 PM	13%	16	8	2
7:00 PM	14%	16	8	2
8:00 PM	16%	16	8	2
9:00 PM	13%	16	8	2

Figure 25 compares staffing levels with the estimated number of customers with invalid POP by hour. These figures illustrate the following:

- Generally, the percentage of customers with invalid POP increases throughout the day.

- The estimated number of customers with invalid POP peaks from 1 pm to 7 pm.<sup>14</sup>

The current distribution of TFI staffing resources does not reflect either the rate or the number of customers with invalid POP. For example:

- The invalid POP rate during the evening (after 7 p.m.) is twice that of the morning rush hour (before 9 a.m.). On Tuesday, Wednesday and Thursday, TFI staffing is about the same during both periods. On Monday and Friday, TFI staffing is 43 percent lower during the evening than during the morning rush hour (8 versus 14 TFIs). On Mondays and Fridays with 7:05 p.m. ballgames, TFI staffing away from the ballpark is 86 percent lower (2 versus 14 TFIs).
- The estimated number of customers per hour with invalid POP is about twice as high during the afternoon (1 p.m. to 7 p.m.) than during the late morning (10 a.m. to 1 p.m.). On Tuesday, Wednesday and Thursday, TFI staffing is comparable during both periods and then declines by half by 5:30 p.m. as Mid-shift TFIs return to the office to complete paperwork. On Monday and Friday, TFI staffing is 27 percent lower during the afternoon than during the late morning (16 versus 22 TFIs). Between 5:30 p.m. and 7 p.m., staffing is 64 percent lower than during the late morning (8 versus 22 TFIs) even though there are significantly more customers with invalid POP riding the system.

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<sup>14</sup> Estimated number of invalid POP customers calculated by multiplying the invalid POP rate per hour by the ridership per hour

Figure 24: Weekday TFI Staffing vs. Invalid POP Rate by Time of Day

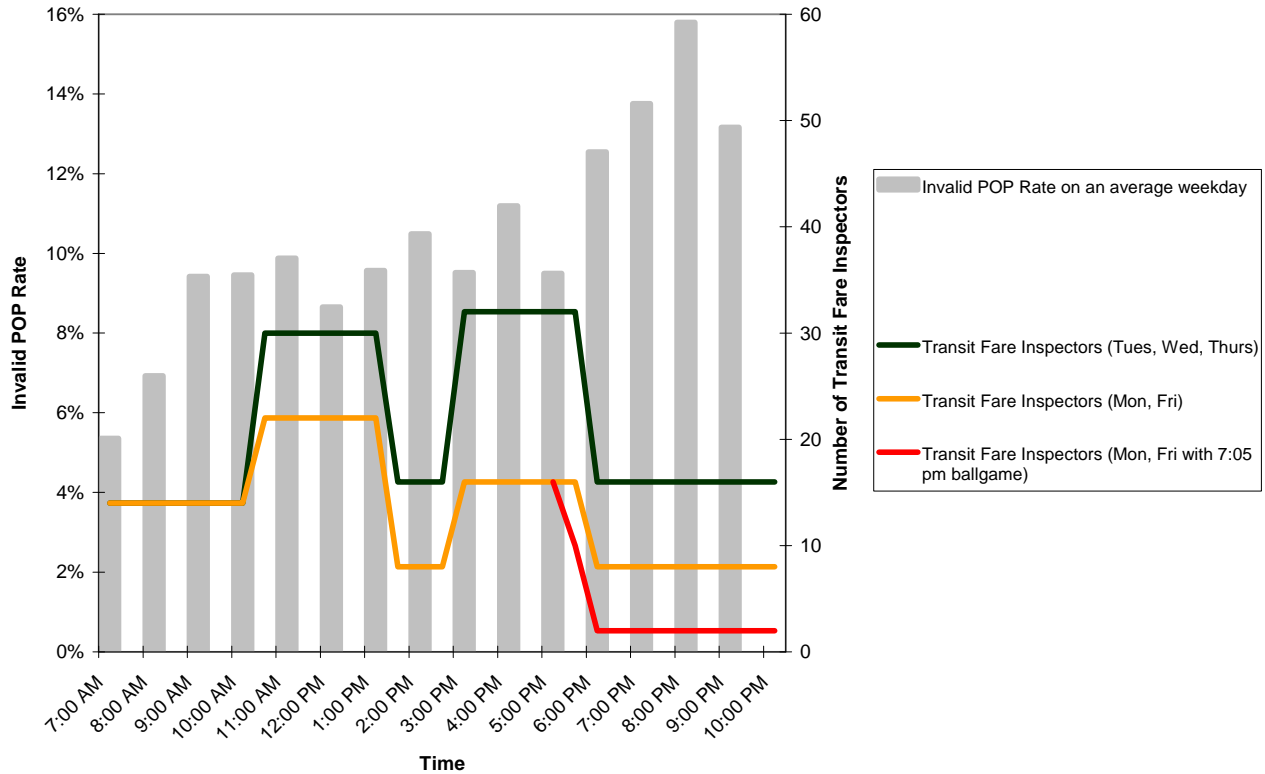


Figure 24: Weekday TFI Staffing vs. Invalid POP Rate by Time of Day

Time	Invalid POP Rate on an average weekday	Transit Fare Inspectors (Tues, Wed, Thurs)	Transit Fare Inspectors (Mon, Fri)	Transit Fare Inspectors (Mon, Fri with 7:05 pm ballgame)
7:00 AM	5%	14	14	14
8:00 AM	7%	14	14	14
9:00 AM	9%	14	14	14
10:00 AM	9%	14	14	14
11:00 AM	10%	30	22	22
12:00 PM	9%	30	22	22
1:00 PM	10%	30	22	22
2:00 PM	10%	16	8	8
3:00 PM	10%	32	16	16
4:00 PM	11%	32	16	16
5:00 PM	9%	32	16	16
6:00 PM	13%	16	8	2
7:00 PM	14%	16	8	2
8:00 PM	16%	16	8	2
9:00 PM	13%	16	8	2

Figure 25: Weekday TFI Staffing and Estimated Customers with Invalid POP by Time of Day

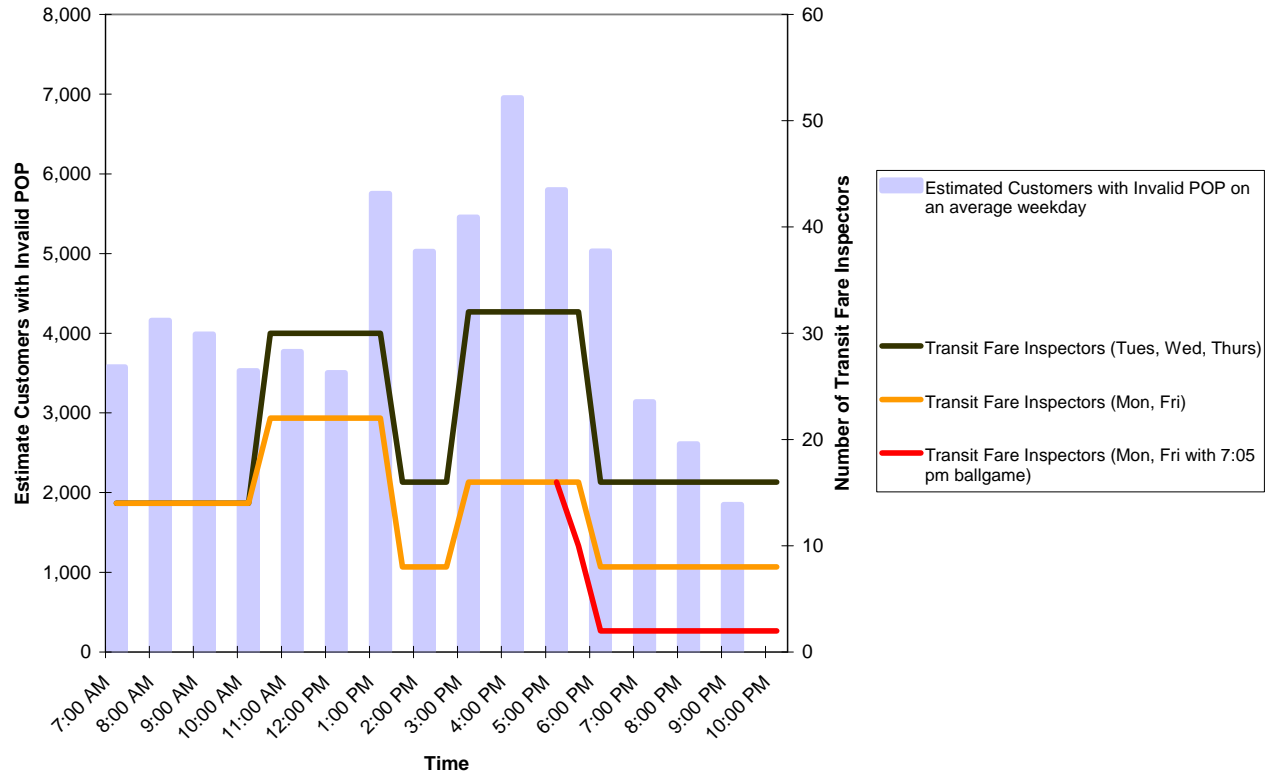


Figure 25: Weekday TFI Staffing and Estimated Customers with Invalid POP by Time of Day

Time	Estimated Customers with Invalid POP on an average weekday	Transit Fare Inspectors (Tues, Wed, Thurs)	Transit Fare Inspectors (Mon, Fri)	Transit Fare Inspectors (Mon, Fri with 7:05 pm ballgame)
7:00 AM	3,575	14	14	14
8:00 AM	4,160	14	14	14
9:00 AM	3,987	14	14	14
10:00 AM	3,527	14	14	14
11:00 AM	3,768	30	22	22
12:00 PM	3,503	30	22	22
1:00 PM	5,752	30	22	22
2:00 PM	5,026	16	8	8
3:00 PM	5,453	32	16	16
4:00 PM	6,953	32	16	16
5:00 PM	5,798	32	16	16
6:00 PM	5,029	16	8	2
7:00 PM	3,138	16	8	2
8:00 PM	2,611	16	8	2
9:00 PM	1,850	16	8	2

## 4.2. Safety and Security Issues

The SFTMA considers safety and security to be top concerns for its customers and employees. During the course of the survey, the team noted a connection between fare enforcement and security. Often, customers who posed security concerns for operators and other customers also did not have valid fare media.

### ○ Operators

Although the vast majority of customers abide by regulations when riding Muni, some may present safety and security issues. Many operators commented that they do not feel comfortable enforcing fare regulations on some routes and at certain times. They expressed concern about confronting patrons for fear of being assaulted, and therefore several of them admitted to issuing transfers when a customer had not paid the appropriate fare or allowing people to board with expired passes and transfers/fare receipts. Many operators encounter the same customers regularly and are afraid of being targeted later if there is a confrontation regarding fares. As a result, many operators expressed gratitude to the survey team for TFI presence, both to enforce fare regulations and to encourage an orderly environment.

### ○ San Francisco Police Department (SFPD)

Since 2001, SFMTA and SFPD have coordinated on a Bus Inspection Program designed to “improve public safety on Muni” by having officers conduct inspections on board vehicles. Under the SFPD Field Operations Bureau General Order (see Appendix):

- Each officer on car patrol shall make two inspections per shift.
- Each officer on foot patrol shall make four inspections per shift.
- Recruit officers, with Field Training Officers, shall be assigned for one full tour of duty, per phase, to exclusively ride Muni within their district.
- Each sergeant in a Patrol Division field assignment shall make two inspections per shift.
- It is expected that officers will travel on the bus for approximately five blocks per inspection.

Of the more than 1,100 vehicle runs observed over three months, the survey team saw three police officers (both on-duty and off-duty).



The survey team observed that security issues frequently arose outside between the regular MRT shift between 7 a.m. to 3 p.m. Furthermore, surveyors observed that many TFIs were reluctant to call for police assistance due to past experience with lengthy response times. Nearly 95 percent of the survey was conducted before July 1<sup>st</sup>, prior to the establishment of a new Memorandum of Understanding (MOU) between the SFMTA and SFPD to clarify policing responsibilities for the transit system.

The purpose of the MOU between the SFMTA and SFPD is “to ensure a regular presence of sworn police officers” on Muni vehicles and other SFMTA property. Under the MOU, a senior ranking member of the SFPD heads the SFMTA Security and Enforcement Division. The SFPD also assigns twelve police officers and one supervising sergeant to the Muni Response Team (MRT), a squad that is responsible for patrolling the transit system. In relation to fare enforcement, “The MRT shall provide law enforcement services to support the SFMTA's public safety and policing priorities, including the SFMTA's proof of payment ("POP") program. The MRT shall respond to POP deployment requests, as needed, throughout the Public Transit System.”<sup>15</sup>

In addition, the MOU defined the parameters for a revised Bus Inspection Program:

“Officers assigned to the SFPD Field Operations Bureau will be responsible for conducting SFMTA vehicle inspections and patrols in and around SFMTA Muni Metro stations and in the vicinity of other SFMTA facilities. The SFPD Field Operations Bureau will be responsible for implementation of a revised Bus Inspection Plan ("BIP") that incorporates deployment of resources consistent with crime analysis which identifies specific crime patterns. The SFPD Field Operations Bureau, in consultation with the Security and Enforcement Director, SFMTA COO, and SFMTA CSO, will also coordinate effective deployment of SFPD resources resulting from community complaints and operator concerns. The SFPD Field Operations Bureau will be responsible for maintaining statistics for citywide bus inspections and bus inspections in each respective police district. SFPD district stations will be responsible for conducting plainclothes enforcement operations on specific SFMTA bus lines as deemed necessary by the District Commanding Officer, with input from the Security and Enforcement Director.”<sup>16</sup>

○ Transit Fare Inspectors

The surveyors noted that the TFIs are generally the only non-operator presence available that customers look to for assistance. Among other duties, a TFI:

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<sup>15</sup> Article IV, Section 4.8 of the Memorandum of Understanding between the San Francisco Municipal Transportation Agency and the San Francisco Police Department

<sup>16</sup> Section 4.15,

- “Reports safety hazards, potential problems, and violations of law observed during the course of duty, to appropriate authority; requests assistance when necessary.”
- “Assists other Muni and City personnel, and sworn law enforcement officers in the event of accidents, emergencies, and other incidents requiring response.”

Although TFIs have enforcement responsibilities and go through some training required of law enforcement officers, they are not sworn police officers. TFIs do not carry firearms, batons, mace, handcuffs, or any other weapons or defense tools. TFIs do wear a protective vest.

As illustrated in Figure 26 and Figure 27, a survey of other transit systems with proof-of-payment systems indicates that fare inspectors elsewhere have a variety of duties.<sup>17</sup> In many cases, inspectors are employees without any specific law enforcement duties. In other cases, transit agencies contract with police to provide fare enforcement. In some cities such as Dallas, Baltimore, Sacramento, police who are agency employees also perform fare enforcement responsibilities.

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<sup>17</sup> Transit Cooperative Research Program Report 80: A Toolkit for Self-Service, Barrier-Free Fare Collection (Multisystems, Inc., Mundle & Associates, Inc., and Parsons Transportation Group, Inc.), Transportation Research Board-National Research Council, 2002)

Figure 26: Inspection Personnel Characteristics

Transit Agency	Inspection Personnel	Uniformed or Plainclothes	Other Duties	Other Staff
Bi-State (St. Louis)	Contract Security Contract Police	Uniformed	Security (10-15%)	Fixed post security, Police officers
Calgary Transit	Agency Staff	Both	NA	NA
DART (Dallas)	Agency Police	Uniformed	Security	Supervisors Agents Maintenance
GO Transit (Toronto)	Agency Police	Uniformed	Security and law enforcement (25%)	Ticket seller
HKL (Helsinki)	Agency Staff	Uniformed	Customer service (5%)	Security
LACMTA (Los Angeles)	City Police County Sheriff	Uniformed	Security and law enforcement	NA
MTA (Baltimore)	Agency Police	Uniformed	Security and law enforcement (50%)	NA
Muni (San Francisco)	Agency Staff	Uniformed	NA	Station agents Supervisors
NFTA (Buffalo)	Agency Staff	Uniformed	Cust. service (10%) Psgr counts (1%)	Maintenance staff
NJ Transit (New Jersey)	Agency Staff	Uniformed	Customer service	Operations Staff NJ Transit Police
OC Transpo (Ottawa)	Agency Staff	Uniformed	None	Security Transit supervisor
RTD (Denver)	Agency Staff	Uniformed	Passenger counts (~2%)	Contract security Supervisors Other staff
RTD (Sacramento)	Agency Staff Agency Police Local Police	Both	NA	Contract security
San Diego Trolley	Agency Staff	Uniformed	Monitor parking and cite violators	Station security and volunteer ambassadors
SCRRA (Los Angeles)	Agency Staff L.A. County Sheriff (contract)	Uniformed	Security (Sheriffs); Conductors inspect 10% of time	Ambassadors assigned stations on rotating basis
SCVTA (San Jose)	Agency Staff	Uniformed	None	Contract security
Sound Transit (Seattle)	Conductors (contract)	Uniformed	Operations and safety duties	Agency security
Tri-Met (Portland)	Agency Staff Contract Police	Uniformed	Security and law enforcement, with inspection (80%)	Private security at some stations; supervisors
Tri-Rail (Miami)	Contract Security	Uniformed	Security	Security zone patrols
TTC (Toronto)	Agency Staff	Uniformed	None	Station collector
VRE (Washington)	Conductors	Uniformed	NA	None

Figure 26: Inspection Personnel Characteristics

Transit Agency	Inspection Personnel	Uniformed or Plainclothes	Other Duties	Other Staff
Bi-State (St. Louis)	Contract Security Contract Police	Uniformed	Security (10-15%)	Fixed post security, Police Officers
Calgary Transit	Agency Staff	Both	NA	NA
DART (Dallas)	Agency Police	Uniformed	Security	Supervisors Agents Maintenance
GO Transit (Toronto)	Agency Police	Uniformed	Security and law enforcement (25%)	Ticket seller
HKL (Helsinki)	Agency Staff	Uniformed	Customer service (5%)	Security
LACMTA (Los Angeles)	City Police County Sheriff	Uniformed	Security and law enforcement	NA
MTA (Baltimore)	Agency Police	Uniformed	Security and law enforcement (50%)	NA
Muni (San Francisco)	Agency Staff	Uniformed	NA	Station agents Supervisors
NFTA (Buffalo)	Agency Staff	Uniformed	Cust. Service (10%) Psg counts (1%)	Maintenance staff
NJ Transit (New Jersey)	Agency Staff	Uniformed	Customer service	Operations staff NJ Transit police
OC Transpo (Ottawa)	Agency Staff	Uniformed	None	Security Transit supervisor
RTD (Denver)	Agency Staff Agency Police	Uniformed	Passenger counts (~2%)	Contract security Supervisors Other staff
RTD (Sacramento)	Agency Staff Agency Police Local Police	Both	NA	Contract security
San Diego Trolley	Agency Staff	Uniformed	Monitor parking and cite violators	Station security and volunteer ambassadors
SCRRA (Los Angeles)	Agency Staff L.A. County	Uniformed	Security (Sheriffs);	Ambassadors assigned stations on

Transit Agency	Inspection Personnel	Uniformed or Plainclothes	Other Duties	Other Staff
	Sheriff (contract)		Conductors inspect 10% of time	rotating basis
SCVTA (San Jose)	Agency Staff	Uniformed	None	Contract security
Sound Transit (Seattle)	Conductors (contract)	Uniformed	Operations and safety duties	Agency security
Tri-Met (Portland)	Agency Staff Contract Police	Uniformed	Security and law enforcement, with inspection (80%)	Private security at some stations; supervisors
Tri-Rail (Miami)	Contract Security	Uniformed	Security	Security zone patrols
TTC (Toronto)	Agency Staff	Uniformed	None	Station collector
VRE (Washington)	Conductors	Uniformed	NA	None

Figure 27: Enforcement Characteristics – Inspector Staffing and Duties

Table B-8: Enforcement Characteristics—Inspector Staffing and Duties

Agency Name	Staffing		Field Attire		Ancillary Duties					
	In-House	Contracted	Police	Uniforms	Plainclothes	Security	Law Enforcement	Customer Service	Passenger Counts	Other
ATC (Bologna, Italy)	X		No		X					
Bi-State (St. Louis, MO)		X	Yes	X		X				
Calgary Transit	X		No	X	X					
DART (Dallas, TX)	X		Yes	X		X				
Denver RTD	X		No	X					X	
Go Transit (Toronto, ON)	X		Yes	X		X	X			
HKL (Helsinki, Finland)	X		No	X				X		
LTD (Eugene, OR)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LACMTA		X	Yes	X		X	X			
Maryland MTA	X		Yes	X		X	X			
New Jersey Transit	X		No	X				X		
NFTA (Buffalo, NY)	X		No	X				X	X	
The Bus (Oahu, HI)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
OC Transpo (Ottawa, ON)	X		No	X						
Sacramento RT	X		(a)	X	X					
San Diego Trolley	X		No	X		X				
San Francisco Muni	X		No	X		X				
Santa Clara VTA	X		No	X						
SEMIACS (Nice, France)	X		Yes	X		NR	NR	NR	NR	NR
Sound Transit (Seattle, WA)		X	No	X						X
SCRRA Metrolink (Los Angeles, CA)	X	X	(a)	X		X		X	X	X
TTC (Toronto, ON)	X		No	X						
TPG (Geneva, Switzerland)	X		No	X		NR	NR	NR	NR	NR
Tri-Met (Portland, OR)	X	X	(b)	X		X	X			
Tri-Rail (Pompano Beach, FL)		X	No	X		X				
Virginia Railway Express	X		No	X						X

NR - Not reported

N/A - Not applicable

(a) Inspection performed by agency staff and agency police; police provide support for inspectors.

(b) Local contracted police/sheriff

**Notes:**

- Inspections at Sound Transit, Metrolink and Virginia Railway Express are performed by conductors. Conductors have additional operations and safety related duties.
- Metrolink security provided by contracted sheriff's deputies.

Figure 27: Enforcement Characteristics – Inspector Staffing and Duties

Agency Name	Staffing: In-House	Staffing: Contracted	Staffing: Police	Field Attire: Uniforms	Field Attire: Plainclothes	Ancillary Duties: Security	Ancillary Duties: Law Enforcement	Ancillary Duties: Customer Service	Ancillary Duties: Passenger Counts	Ancillary Duties: Other
ATC (Bologna, Italy)	X		No		X					
Bi-State (St. Louis)		X	Yes	X		X				
Calgary Transit	X		No	X	X					
DART (Dallas, TX)	X		Yes	X		X				
Denver RTD	X		No	X					X	
GO Transit (Toronto)	X		Yes	X		X	X			
HKL (Helsinki, Finland)	X		No	X				X		
LTD (Eugene, OR)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LACMTA (Los Angeles)		X	Yes	X		X	X			

## San Francisco Municipal Transportation Agency

Agency Name	Staffing: In-House	Staffing: Con-tracted	Staffing: Police	Field Attire: Uniforms	Field Attire Plain-clothes	Ancillary Duties: Security	Ancillary Duties: Law Enforcement	Ancillary Duties: Customer Service	Ancillary Duties: Passenger Counts	Ancillary Duties: Other
Maryland MTA (Baltimore)	X		Yes	X		X	X			
New Jersey Transit	X		No	X				X		
NFTA (Buffalo, NY)	X		No	X				X	X	
The Bus (Oahu, HI)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
OC Transpo (Ottawa, ON)	X		No	X						
Sacramento RT	X		(a)	X	X					
San Diego Trolley	X		No	X		X				
San Francisco Muni	X		No	X		X				
Santa Clara VTA	X		No	X						
SEMIACS (Nice, France)	X		Yes	X		NR	NR	NR	NR	NR
Sound Transit (Seattle, WA)		X	No	X						X
SCRRA Metrolink (Los Angeles, CA)	X	X	(a)	X		X		X	X	X
TTC (Toronto, ON)	X		No	X						
TPG (Geneva, Switzerland)	X		No	X		NR	NR	NR	NR	NR
Tri-Met (Portland, OR)	X	X	(b)	X		X	X			
Tri-Rail (Pompano Beach, FL)		X	No	X		X				
Virginia Railway Express	X		No	X						X

NR – Not reported

N/A Not applicable

(a) Inspection performed by agency staff and agency police; police provide support for inspectors

(b) Local contracted police/sheriff

Notes:

- Inspections at Sound Transit, Metrolink and Virginia Railway Express are performed by conductors. Conductors have additional operations and safety related duties.
- Metrolink security provided by contracted sheriff's deputies.

The very nature of fare enforcement introduces the possibility of a confrontation with customers. For example, some customers do not want to display proof of payment even if they have it, while others do not have valid proof of payment and become combative. Surveyors observed that people often do not wish to show identification to verify age when using a Senior or Youth Pass or to facilitate the writing of a citation. Some customers encourage violators to resist TFI requests. These situations can pose a threat to the safety of the TFI and inhibit their ability to enforce fare regulations.

Some customers can become aggressive. For example, the survey team observed one occasion in which a customer verbally harassed a TFI because of his ethnicity. The TFI established a safe distance between himself and the customer and defused the situation through polite disengagement. The customer exited the vehicle at the next stop. TFIs also face the threat of assault. During the survey period, a man assaulted a TFI at the 2nd & King station during a Giants game. The TFI had refused to allow the customer's wife to enter the station without valid POP.

Under their current status, TFIs have limited abilities when confronted by security or fare enforcement issues:

- TFIs are not currently authorized to detain unruly or disruptive customers although they were required to complete training and certification to do so. With their limited abilities, some TFIs are able to handle these difficult situations successfully. Out of the dozens of security incidents the survey team encountered, it noted one instance in which a team of police officers happened to be nearby to assist a TFI in removing an unruly patron from the bus.
- Because they are not sworn peace officers, TFIs expressed that they may have difficulty issuing citations to a person who refuses to give identification. Prior to the decriminalization of fare evasion regulations on January 1, 2008, TFIs could verify identification by calling the Department of Motor Vehicles law enforcement line. Currently, TFIs must accept whatever information a person tells them.
- When requesting police assistance, TFIs must radio SFMTA Central Control except in critical emergencies when they are allowed to phone police directly. Central Control's priorities and the majority of radio traffic concern bus and rail operations, resulting in lengthy response times to TFI requests. In addition, TFI communications with Central Control can sometimes be impeded in the subway.



As a result, some TFIs feel unsafe enforcing fare regulations at some locations during certain times of the day. In many cases, these locations and times correspond to those with POP issues. Ensuring the safety of TFIs (as well as operators) benefits SFMTA employees and the general public and makes the POP program more effective.

The survey team also observed some specific safety and security issues related to fare enforcement on buses and crowded vehicles, as summarized in Figure 28.

Figure 28: Fare Enforcement Safety and Security Issues Specific to Buses and Crowded Vehicles

<b>Issues Specific to Buses</b>	<b>Description</b>
Citation Writing	On the Muni Metro system, TFIs currently write citations at stations or on a light rail vehicle as it moves between stops. Due to the physical and operational differences between trains and buses, writing a citation on a bus may not always be physically possible since a bus is not confined to tracks and moves less predictably than a light rail vehicle. Exiting a bus at a random stop to write a citation introduces potential safety and security issues.
Inspection Speed	On heavily-loaded articulated buses, a team of two TFIs must move quickly to inspect all of the customers before reaching next stop.
Standing	Currently, TFIs stand on platforms or light rail vehicles during their shift and are not allowed to sit. Due to the different movements of a bus, however, standing can be more physically demanding on a bus than on a platform or light rail vehicle. Standing on the bus also draws attention to their presence for those outside of the vehicle.

<b>Issues Specific to Crowded Vehicles</b>	<b>Description</b>
General Security	Based on survey observations, there is a 35% chance on a very crowded vehicle (ridership is 25% higher than seats available) that a TFI will find more than 1 fare violator per 10 checked. Once there is a critical mass of customers without valid POP, surveyors noted that the vehicle appeared to lose order and the environment became difficult to manage with a potential escalation of danger.
Communication	TFIs were not always able to communicate with each other on crowded vehicles.
Line of Sight	TFIs were often unable to see their partner, making it difficult for a TFI to evaluate the situation and determine if the partner required assistance.
Identifying Potential Safety Threats	Some TFIs felt uncomfortable on crowded vehicles. They expressed concern that it would be difficult to identify and retreat from a threat with sufficient distance, or alternately to identify and defuse a threat from a safe distance.

### **4.3. Inspection Techniques**

TFLs employ various techniques to check fares. Under current procedures, TFLs inspect every person within a vehicle or a location for proof of payment. This ensures non-discrimination and promotes maximum number of inspections. Despite practicing this policy, the survey team observed customer concerns over perceived equity issues during fare inspections because they felt targeted when this was not the case. Although the survey took place throughout the entire transit system, on multiple occasions customers accused the team of discrimination and targeting specific communities.

A quick inspection rate enables TFLs to sweep through the vehicle without delaying the operator, inconveniencing customers, or allowing customers to exit the vehicle before being checked. Passes designed for visual inspection facilitate this process. Surveyors observed that TFLs could quickly verify monthly passes and transfers/fare receipts. Translink® cards, however, require machine verification and took longer to inspect.

Figure 29: Inspection Techniques

Inspection Technique	Description	Operational Impacts
Spot Check	TFIs board and ride along until a sweep of the bus is complete. This may take one to a few stops.	Minimal
Ride Along	Inspectors ride on a vehicle for multiple stops, inspecting fares as customers board.	Minimal
Blitz	Two teams (four or more TFIs) stop the vehicle and check all customers.	TFIs may be able to conduct a blitz in less than a minute, but may take longer if customers must search for their POP or if inspectors cannot quickly inspect fare media. TransLink® will lengthen inspection time, increasing the operational impacts of a blitz.
Off-Vehicle Inspection	TFIs inspect fare media as customers leave the bus and enter the public sidewalk.	No direct operational impacts; however, some customers may not wish to present POP once off the vehicle or when hurrying to their destination or to another connecting transit vehicle.

#### 4.4. Operator Involvement

Surveyors noted that operator interaction and support facilitated successful fare inspections. Most operators cooperated with TFIs and expressed gratitude to the survey team for their presence. Many stated that it was not possible for them to verify fares, particularly when there were many back-door boardings or on routes where many people did not pay their fare.

Nevertheless, the survey team noted the following concerns:

- Fare Verification – Because TFIs cannot be on all vehicles at all times, operators have the responsibility to look at a customer's fare media and issue transfers/fare receipts to those who pay cash. SFMTA instructs its operators to request once that customers pay their fare if they neglect to do so when boarding. The survey team observed that some operators did not look at customers as they were boarding. These operators remained focused elsewhere and therefore presumably did not verify whether a customer had paid the appropriate fare or displayed a valid pass.
- Operator and TFI Responsibilities – Because operators are supposed to check fares when customers board, a few of them questioned why TFIs appeared to be rechecking fares. Some customers were also displeased because a TFI had requested that they display their proof-of-payment again after they had already shown it to the operator. In multiple cases, surveyors noted that these re-checks revealed that a customer's pass

or transfer/fare receipt was invalid. In fact, each person that the survey team had detected was using a counterfeit pass had successfully shown their pass to the operator or entered through the back door.

- Transfer/Fare Receipt Issuance - While it is each customer's responsibility to possess valid proof-of-payment onboard any Muni vehicle or in a fare paid zone of a Muni Metro station, not everyone possessed a transfer/fare receipt after paying the appropriate fare or surrendering to the operator a valid interagency transfer or a single-ride youth or adult ticket. In addition, some customers also displayed operator-issued transfer/fare receipts that were valid for more than two hours.
- On-Time Performance – Some operators expressed concern about meeting SFMTA's voter-approved 85 percent on-time performance goal, one that requires balance with fare enforcement efforts. In some instances, such as potentially allowing for all-door boarding, fare inspections can assist in meeting on-time performance goals. In other instances, having additional activity and personnel on the bus will require implementing inspection techniques that minimize vehicle delay and customer inconvenience.
- Broken Fareboxes – The survey team encountered broken fareboxes on approximately 2.3 percent of the vehicle runs it observed. Extrapolated to the entire system, broken fareboxes may be resulting in \$1.9 million in uncaptured revenue annually.<sup>18</sup> Currently, the SFMTA is in the process of upgrading all fareboxes as age has increased mechanical defects.

#### 4.5. Public Education

Customers must retain proof-of-payment whenever riding any Muni vehicle or within the paid area of a station. All SFMTA monthly passes and transfers/fare receipts contain a printed statement informing the user that the pass or transfer/fare receipt serves as proof-of-payment. SFMTA monthly passes state that the "Pass must be surrendered for inspection upon request." Transfers/fare receipts state that the "Passenger is required to retain this transfer as proof of payment while in a paid area or on board any Municipal Railway vehicle" and "Keep this Transfer/Fare Receipt as proof of payment."

Despite these written statements, many Muni customers remain unaware of the proof-of-payment policy. Surveyors observed that this generally occurs because of three reasons:

- A customer did not know that transfers/fare receipts serve as POP. On certain commuter routes serving the Financial District in particular, many customers paying cash do not take a transfer/fare receipt if they do not need to actually transfer.

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<sup>18</sup> 2.3% of the \$1.4 million in transit cash revenues budgeted for FY 2009-2010

- A customer did not know that they must retain POP when riding a bus, especially since there are no signage or voice announcements conveying the policy.
- Seniors and youths did not present valid identification. Although the front of Senior and Youth Passes state “Proper ID required,” many customers either did not have proper identification or did not present it, particularly on buses.

#### **4.6. Language and Cultural Barriers**

Surveyors observed that language and cultural barriers could create difficulties. The most common language issues arose from TFI encounters with Cantonese or Mandarin speakers, and to a lesser extent, with Spanish speakers. While many TFIs (and surveyors) could explain to customers in Spanish why they did not have valid POP, few were able to do so in Cantonese. TFIs are equipped with a translation card with a limited number of phrases, but the surveyors noted that TFIs did not use these cards in practice because they believed the cards needed more pertinent vocabulary and phrases.

Surveyors noted that the inability to speak Cantonese or Mandarin was a particular issue when checking identification for age verification when customers were using a Senior Pass. Nevertheless, most people who were improperly using a Senior Pass knowingly did so regardless of their English-speaking ability. For example, some customers would have identification but refuse to show it, or cover the birthdate on their ID card.

In order to use Youth and Senior passes, customers must display proper identification upon request. Some customers, including those were using the passes properly, appeared to be reluctant to show identification. In immigrant communities, this might be due to concerns regarding citizenship status and uncertainty over the jurisdiction of TFIs. A pictorial card that illustrates the need to furnish proper ID when using an age-restricted pass might help reduce communication difficulties.

In addition to genuine language barriers, a few customers appeared to know sufficient English to communicate with TFIs. However, they continued to use languages other than English. In one instance, a German-speaking customer on the 38 Geary during the morning rush hour did not have valid POP. While his actions appeared to be responsive to communications in English with the TFI and surveyor, he continued to speak only German. In this particular case, both the inspector and surveyor knew sufficient German to let him know that he needed to pay an appropriate fare. Still, he refused to pay.

Because San Francisco has a diverse population, it is important to approach transit fare inspection and enforcement with culturally-sensitive and equitable practices.

## 5. Translink®

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In partnership with the SFMTA and other Bay Area transit providers, the Metropolitan Transportation Commission has been working to develop TransLink®, a regional “smart card” for fare payment. Customers can currently use TransLink® on Muni (except for cable cars), AC Transit, BART and Golden Gate Transit and will eventually become valid on all transit systems throughout the region. On Muni, customers can currently load an Adult Fast Pass onto the card, which functions identically to the existing paper pass but is not yet valid on cable cars. Alternatively, customers can add cash value; upon tagging a card reader upon vehicle entry, the reader deducts the proper fare and automatically loads a transfer. Figure 30 summarizes some potential fare enforcement and financial impacts of TransLink®.

### ○ Changes to Fare Collection Procedures

By September 2010, SFMTA plans to replace paper Adult Fast Passes with TransLink®. Other passes will subsequently migrate to TransLink®. In conjunction with this change, the SFMTA is also replacing all faregates and installing new ticket vending machines in Muni Metro stations. Initially, the faregates will come equipped with a magnetic stripe reader to process passes that TransLink® will not yet have replaced. Current plans call for the faregates subsequently to discontinue acceptance of magnetic stripe fare media and for the vending machines to issue limited-use smart cards to cash-paying customers for entry into the subway.

SFMTA is also upgrading existing fareboxes on buses, light rail vehicles and historic streetcars to improve their reliability. The fareboxes will retain their current functionality, but the project will involve replacement of internal parts. TransLink® customers will continue to tag card reading devices located adjacent to the vehicle doors. In the immediate future, the SFMTA is not planning to replace operator-issued paper transfers on buses or on light rail vehicles at surface stops.

### ○ Changes to Fare Collection Enforcement

The migration to TransLink® will also impact SFMTA fare enforcement. In general, TransLink® could reduce misuse of various passes. Seniors and youths must furnish proof of age in order to receive a special TransLink® card where customers can load a Senior or Youth Pass – although adults illegally still could use someone else’s Senior or Youth TransLink® card. TransLink® card readers will also reject expired or otherwise invalid transfers/fare receipts.

TransLink® will also change TFI procedures. Currently, TFIs inspect paper passes visually, sometimes from a distance without needing to directly contact with a customer. With TransLink®, a TFI must tap the card to a handheld device, a process that takes a couple of

seconds each time and requires a TFI to approach individual customers to obtain the card. On crowded vehicles, surveyors observed that TFIs had more difficulties checking a TransLink® card than visually inspecting passes. This POP study required TFIs to verify each TransLink® card with their handheld device unless physically impossible, but in normal practice TFIs sometimes allow customers to pass by flashing their TransLink® card.

SFMTA's fare policy requires customers to be able to display proof-of-payment valid for the duration of their trip. Unlike current fare media, neither the TransLink® card nor off-the-shelf limited-use smart cards currently under consideration for cash-paying customers would have printed expiration times. This could lead to disputes between customers and TFIs, as customers will not be able to tell when their cards expire.

○ Tagging

During the survey, approximately 0.6 percent of customers used a TransLink® card. Despite this small percentage, the survey team observed multiple instances of customers misusing TransLink® – primarily by not tagging card readers. Customers must tag in order to ensure that SFMTA receives fare revenue for the ride taken or that the pass or transfer/fare receipt stored on the card is valid.

Typically, customers did not tag because (a) they had no cash value loaded on the card, (b) they had cash value on the card but did not want the card reader to deduct the appropriate fare for the ride, or (c) they had a monthly pass but believed they only needed to display the card just as they flash an Adult Fast Pass to the operator. The survey team observed a couple sharing a single TransLink® card. After the one with the card flashed it to the TFI, the customer attempted to pass it to the other person. The TFI then verified that the card had no value.

TransLink® also presents the opportunity for customers to tag at the last minute to avoid a citation. The survey team observed a man on a light rail vehicle sat adjacent to the TransLink® card reader without tagging. When he saw the TFI, he then tagged the reader.

**Figure 30: Potential TransLink® Impacts**

<b>Pass and Transfer/Fare Receipt Use</b>	<b>Description</b>
Senior and Youth Pass Misuse	TransLink® could decrease the misuse of discount passes. Seniors and youths must furnish proof of age in order to receive a special TransLink® card where customers can load a Senior or Youth Pass.
Counterfeit Pass Use	Current counterfeit passes are incapable of interfacing with TransLink® card readers. However, as with any software-based system, there may be security issues with TransLink®.

<b>Pass and Transfer/Fare Receipt Use</b>	<b>Description</b>
Invalid RTC Card Use	TransLink® could decrease invalid RTC card occurrences, which primarily consist of cards with no affixed monthly sticker. The card reader rejects cards that customers have not loaded either an RTC monthly pass or sufficient cash value.
Invalid Ticket Use	TransLink® will replace various commonly misused tickets that customers currently must surrender to the operator in exchange for a transfer/fare receipt (e.g., a single-ride Youth or Adult Ticket, a Ferry/Muni transfer, and a Bus/BART transfer).
Invalid Transfers/Fare Receipts	TransLink® automatically ensures that a customer receives exactly 90 minutes of travel time when paying for a single ride using cash value stored on the card. The card reader rejects expired transfers.

<b>Fare Enforcement</b>	<b>Description</b>
Tagging	The SFMTA cannot capture the appropriate fare revenue or verify pass validity unless TransLink® card holders tag card readers. The survey team observed multiple cases of TransLink® users not tagging or tagging only after seeing a TFI.
Longer Fare Verification Time	Verifying TransLink® requires TFIs to tag the card on a handheld reader. Surveyors observed that this takes longer than the current visual inspection of paper passes, giving customers an opportunity to tag the card reader or to exit at the next stop before TFIs can check their fare. Inspection techniques may require modification in order to minimize vehicle delays and customer inconvenience.
Printing on Limited Use Smart Cards	The SFMTA requires customers to be able to display proof-of-payment valid for the duration of their trip. Neither the TransLink® nor limited-use smart cards have printed expiration times. This could lead to disputes between customers and TFIs, as customers will not be able to tell when their cards expire.
Variable Cash Fare Payment Policies	Variable cash fare payment policies based on travel directionality and boarding location will require public outreach efforts to educate customers about having the proper POP. Current plans call for cash-paying customers to use limited-use smart cards to enter Muni Metro subway faregates. On buses or on light rail vehicles at surface stops, the SFMTA plans to continue paper transfers/fare receipts.



Financial Impacts	Description
Reduction in Misused Fare Products	The SFMTA may be able to capture additional revenue by reducing the misuse of fare products (refer to Pass and Transfer/Fare Receipt Use above).
Card Reader Reliability	If card readers do not function, fare enforcement cannot take place and customers will be able to board for free. TransLink® card readers systemwide have been averaging a failure rate of 5% to 10% <sup>19</sup> . This compares to an observed farebox failure rate of approximately 3% and an invalid POP rate of approximately 9.5%.

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<sup>19</sup> Failure rate based survey from November 2008 to March 2009 conducted by consultant Kimley Horn.

## 6. Summary and Next Steps

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Based on its systemwide POP survey of over 41,000 customers, the SFMTA identified the following trends:

- A minimum of 9.5 percent of SFMTA customers do not pay the appropriate transit fare, reducing fare revenues by an estimated \$19 million annually.
- There are multiple ways that customers lack valid POP. Most commonly, they do not have any fare media, show an expired or otherwise invalid transfer/fare receipt, or misuse Senior or Youth Passes. The survey team detected approximately 1 counterfeit pass per 1,000 customers. An undetermined percentage of customers had a valid transfer/fare receipt but obtained it illegally from someone else or paid less than the required fare.
- The percentage of customers without valid POP varies greatly by route and time of day. On the Muni Metro light rail system, where TFIs have been enforcing POP for about a decade, the percentage is approximately 5 percent - half that of the rest of the system where there is limited enforcement.
- Over half of customers boarding through the back door of buses did not have valid POP.
- Current TFI deployment does not correspond with the locations and times of demonstrated POP issues. TFI staffing peaks in the mid-morning and early afternoon, but the highest invalid POP rates occur later.
- Safety and security issues can sometimes impact TFI abilities to enforce fare regulations.

The SFMTA has begun the process of expanding POP enforcement from Muni Metro light rail vehicles to buses and the F Market & Wharves historic streetcar. On July 29, 2009, TFIs began limited enforcement on selected bus lines, issuing citations to customers presenting counterfeit passes or misusing discounted Senior and Youth passes. Given the differences between buses and light rail vehicles and the fact that the bus network is more dispersed than the six light rail lines, transitioning to full systemwide POP enforcement may require different enforcement policies and procedures. Figure 31 provides examples of issues to consider.

**Figure 31: Example Issues for Systemwide POP Enforcement**

Issues	Next Steps
TFI Staffing Levels	Determine appropriate staffing levels to expand system coverage within budget constraints.
Strategic TFI Deployment	Determine how to deploy TFIs effectively and efficiently to reduce the percentage of customers without valid POP, while ensuring that all customers expect that a TFI might check their fare regardless of where and when they ride Muni.
Public Education	Determine how to communicate POP policies visually and verbally to ensure that SFMTA's diverse customer base understands the requirement to have valid POP while being on a Muni vehicle or in a fare-paid zone.
TFI and Operator Training	Determine how operators and TFIs should interact on vehicles to minimize vehicle delays and ensure that SFMTA employees understand their proper roles and responsibilities relating to fare enforcement.
Back-Door Boarding	Determine whether to permit back-door boarding on buses and the F Market & Wharves streetcar with consideration of the impacts on revenue collection and vehicle travel times.
Fare Media	Determine whether there should be any changes to existing fare media that customers commonly are misusing.
Securing Customer Identification	Determine how to increase the percentage of customers who provide valid identification upon request from a TFI either to verify the proper use of discount fare media or to issue a citation.
Safety and Security	Determine how to enhance safety and security for customers, operators and TFIs. Develop fare enforcement procedures that specifically address safety and security issues on buses as well as on crowded vehicles.
TransLink®	Determine how to modify fare inspection techniques and procedures given the changes in fare payment introduced by TransLink®.
Inspection Speed	Determine how to inspect fares rapidly to minimize impacts on vehicle operations, particularly as the verification of TransLink® fare media takes longer than visual inspection of existing passes and transfers/fare receipts.

The next steps will require SFMTA to determine these various policies through internal and external consultation. By increasing the percentage of Muni customers who pay their fare, SFMTA desires not only to boost fare revenues but also to increase public respect for the system. With these goals in mind, the SFMTA looks forward to working with its stakeholders to expand POP enforcement systemwide.

## 7. Appendix

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### 7.1. Types of Invalid POP

- No Transfer/Fare Receipt or Pass

Most commonly, customers without valid POP lacked any type of ticket, transfer or pass. Typically, they simply boarded a vehicle without paying, often through the rear door but sometimes through the front door after asking the operator for a free “courtesy” ride. The survey team also considered customers who paid only after seeing TFIs to have no transfer/fare receipt or pass.

When questioned about their lack of proof-of-payment, many people stated they had paid but did not collect a transfer/fare receipt. Although SFMTA’s fare policy requires customers to always take a transfer/fare receipt for proof-of-payment even if they are not transferring to another Muni vehicle, surveyors observed that not everyone is aware of this policy. This particularly appeared to be the case for a large percentage of customers on commuter routes serving the Financial District. Surveyors noted that many customers indeed paid a cash fare but did not collect a transfer, although they also witnessed people on these routes entering through the rear door on crowded vehicles without paying.

While not having proof-of-payment for any reason technically could be considered a violation of fare regulations, the survey team attempted to determine actual fare violations on a case-by-case basis. Therefore, surveyors and TFIs used their professional judgment to distinguish between those they believed genuinely paid and those who had not paid. When possible, the survey team asked the operator to verify customer explanations.

- Walk Away

Although TFIs attempted to remain inconspicuous until they began checking fares, some customers noticed them and “walked away” to avoid contact. Typically, if they were beginning to board, they would turn away and wait for the next vehicle. If they were already on board, they would exit the vehicle as quickly as possible. Often, they would appear to be sitting on the bus and then, upon sight of the TFIs, stand up and head for the exit. The survey team presumed that “walkaways” did not have valid proof of payment.

○ Invalid Transfers/Fare Receipts

Transfers/fare receipts are issued when a cash or token coupon fare is paid. These strips of paper function as transfers as well as proof-of-payment. They are not needed with passes, such as monthly passes, that are displayed but not surrendered to the operator. By Muni policy, transfers/fare receipts are valid for at least 90 minutes and no more than 2 hours, although it is common practice for operators to hand out transfers that are valid for additional time. Although SFMTA informational materials instruct customers to always take a transfer/fare receipt for proof-of-payment, not everyone does so because they do not need to transfer.

Invalid transfers/fare receipts are the second most common form of fare invalid POP. Typically, customers had transfers/fare receipts that expired either before boarding or while they were riding. Less commonly, customers showed “late night” transfers that technically expire at the end of the service day but were presented long before the late evening hours. Although the survey team noticed some operators issuing “late night” transfers early, it is likely that at least some of these transfers were obtained illegally by individuals early in the day who then sold them at a discounted price to customers. Some customers were presenting “late night” transfers as early as 7:45 a.m.

The number of invalid transfers/fare receipts grows substantially as the day progresses. It appears that many people are paying once and then using a transfer/fare receipt as an unlimited-ride day pass. Although some customers seemed genuinely surprised when told their transfers had expired, many seemed aware that they were using an expired transfer. They would often fold or cover the transfer date or time so that the operator could not see it in full. In some cases, they would tape together a transfer/fare receipt - with the top part from a transfer/fare receipt from earlier in the day and the bottom part from a prior day.

Figure 32: Examples of Invalid Taped Transfers/Fare Receipts

(shows images of transfers that were taped together and therefore are invalid)



#### ○ Misused Senior Pass

Only customers age 65 and over may use a monthly Senior Pass. As indicated on the pass, proper identification is required upon request. However, sales outlets do not verify identification when passes are purchased, allowing adults under 65 years old to purchase a Senior Pass for a senior citizen they know but also enabling them to buy a Senior Pass for themselves.

When it appeared that a customer using a Senior Pass might be younger than 65 years old, TFIs would request identification for age verification. Approximately 8 percent of people presenting a Senior Pass were not eligible to use one. This rate may be higher because the survey team was not always able to check identification on heavily-crowded vehicles or verify age when customers refused to show identification.

Figure 33: Examples of Misused Senior Passes

(shows image of sixteen Senior monthly passes)



*Sixteen Senior Passes confiscated from a 59 year-old woman, representing \$560 in uncaptured revenue for the SFMTA*

o Misused Youth Pass

Only customers 17 years old and younger may use a monthly Youth Pass. As with Senior Passes, customers must also produce proper identification upon request when using the pass but not when purchasing one. TFIs were able to confirm that about 3 percent of people presenting a Youth Pass were not eligible to use one.

○ Unvalidated Youth Ticket

The SFMTA sells paper ticket booklets that can be used as a youth fare instead of cash. Individual youths may use these, or they may be purchased for use on a school or youth group field trip. Youth customers are required to surrender a ticket to the operator when boarding in exchange for a transfer/fare receipt.

Surveyors observed that many youth ticket holders do not surrender the ticket to the operator and instead repeatedly use it as an unlimited-ride pass. Some of the youth tickets have been in circulation for many years as indicated by outdated typset. Multiple tickets were crinkled after being used many times. In some instances, youths were observed using the cover of the booklet alone as a flash pass. Some youth ticket holders commented to the surveyors that some operators did not want to take the youth ticket and instead waved them on.

Figure 34: Examples of Misused Youth Tickets

(shows images of two Youth Tickets that appear to have been used multiple times)



*Single-ride Youth Tickets not exchanged for a transfer/fare receipt and used*

○ Other Unvalidated Tickets

The survey team also observed multiple cases in which other tickets that not been properly exchanged for transfers/fare receipts. In some cases, customers noted that operators had allowed them to board without collecting the tickets. These tickets include: (a) adult one-ride ticket from an adult ticket book, (b) a free Ferry-to-Muni or a Muni-to-Ferry transfer for Golden Gate Ferry and Alameda-Oakland Ferry customers, (c) a free Daly City BART-to-Muni or Muni-to-Daly City BART valid on the 28 19<sup>th</sup> Avenue and 54 Felton bus routes, and (d) a BART-to-Bus or Bus-to-BART transfer along with a discounted \$1.75 cash fare.



### Invalid Regional Transit Connection (RTC) Card

RTC cards entitle Bay Area residents with disabilities to a discounted fare on participating transit systems. Each card displays the name and a photo of the eligible recipient as well as an expiration date. Due to the nature of one's disability, some cards never expire. On Muni, the RTC card enables persons to either (a) pay the discount fare and obtain a transfer/fare receipt or (b) purchase a discounted monthly sticker that must be affixed to the card.

Proper use of RTC cards requires that: (1) the cardholder must be the individual identified on the card, (2) the card must be used prior to the expiration date, and (3) either the customer must deposit appropriate discount fare in exchange for a transfer/fare receipt, or the card must have a valid monthly sticker. Most often, a customer flashed an RTC card without a sticker to the operator without paying the appropriate discount fare. Less commonly, the card itself had expired. Approximately 6 percent of RTC card holders surveyed used them improperly.

#### ○ Wrong Month's Pass

Some customers displayed a pass from the wrong month's pass. Muni passes are valid for the calendar month indicated. Customers may not use passes before the month indicated, but in practice are allowed to use passes during the first three days of the following month. Half-monthly BART Plus Passes are valid either for the 1<sup>st</sup> until the 15<sup>th</sup> day of the month ("A" pass) or for the 16<sup>th</sup> day until the end of the month ("B" pass). While there is a five-day grace period to use any remaining stored value on BART, there is no grace period on Muni. There is also no grace period for customers with Muni stickers attached to Caltrain or SamTrans passes.

#### ○ Counterfeit Pass

Counterfeit passes are designed to resemble a legitimate pass, but do not have a functional magnetic stripe on the back and therefore cannot be used to enter a Muni subway station through the faregates. At subway stations, customers would flash the counterfeit pass to the station agent and then enter through the emergency exit gate. On buses and at light rail surface stops, they would flash the pass to the operator or enter through one of the rear doors. People would typically keep counterfeit passes in a wallet behind a plastic shield, making them more difficult to distinguish from legitimate passes.

The team observed three main types of counterfeit passes: ones constructed from assembled parts of previous legitimate passes, ones that appear to be photocopied from real passes on a one-time or small-scale basis, and ones printed from machines on a consistent and larger scale basis. Two different counterfeit pass "manufacturers" appear to be selling printed passes on the street.

The survey team successfully detected 1 counterfeit pass out of roughly every 400 legitimate Adult Fast Passes – or approximately 1 out 1,000 customers surveyed. Half of the counterfeit

pass use occurred on two routes, the 14 Mission and 49 Van Ness-Mission. The rate could be higher because many counterfeit passes may have escaped detection.

Figure 35: Examples of Counterfeit Passes

(shows images of four counterfeit Adult Fast Passes)



○ Observed Underpays

In cases where the survey team was able to observe customers deposit cash into the farebox, some of them received a transfer/fare receipt when they had not paid the full fare. Some would deposit a few coins into the farebox or pay the discount fare when they were not eligible. While the total observed “underpays” amounted to approximately 0.8 percent of customers who displayed a valid transfer/fare receipt, the underpayment rate may be significantly higher because of the limitations of the survey methodology. In most cases, the survey team entered a vehicle after people were already on board and thus could not determine whether customers who presented a valid transfer/fare receipt had paid the appropriate fare.

○ Misused TransLink® cards

TransLink® is the San Francisco Bay Area’s “smart card” that will eventually become valid on all transit systems throughout the region. On Muni, customers can currently load an Adult Fast Pass onto the card. Alternatively, they can add cash value; upon tagging a card reader upon vehicle entry, the reader deducts the proper fare and automatically loads a transfer.

Surveyors observed that some TransLink® card users did not tag card readers because (a) they had no cash value loaded on the card, (b) they had cash value on the card but did not want the card reader to deduct the appropriate fare for the ride, or (c) they had a monthly pass but believed they only needed to display the card just as they flash an Adult Fast Pass to the

operator. Surveyors considered the first two cases as invalid POP because the SFMTA does not receive revenue for the ride taken.

# o Misused Passports

Prior to boarding, customers with a 1-day, 3-day and 7-day Visitor Passports must scratch off one, three, or seven consecutive days in which they plan to use the pass. Surveyors observed that approximately 5 percent of passes were not properly validated. Examples of improper use include: (a) not scratching any days, allowing one to reuse the passport perpetually, (b) scratching off more days than allowed, or (c) using an expired passport. In some cases, misuse resulted from tourists who did not appear to know how to scratch off the appropriate days on the pass. In other cases, local residents and some tourists appeared to be aware they were using the pass improperly.

Figure 36: Misused Passport Example



Misused 7-Day Passport  
scratched for 12 days

## **7.2. Pre-Paid and Transfer/Fare Receipt Usage by Route**

By reducing cash handling with vehicle fareboxes and the daily distribution of transfers/fare receipts, encouraging the use of pre-paid fare media can reduce operational costs. Nevertheless, the ability to pay cash and receive a transfer/fare receipt provides an option for customers who ride infrequently or who cannot afford the upfront costs of a pass. The following chart indicates that the relative usage of pre-paid fare media and transfers/fare receipts varies significantly by route, with peak-hour commuter-oriented routes having the highest share of customers using passes.

Figure 37: How Muni Customers Pay by Route

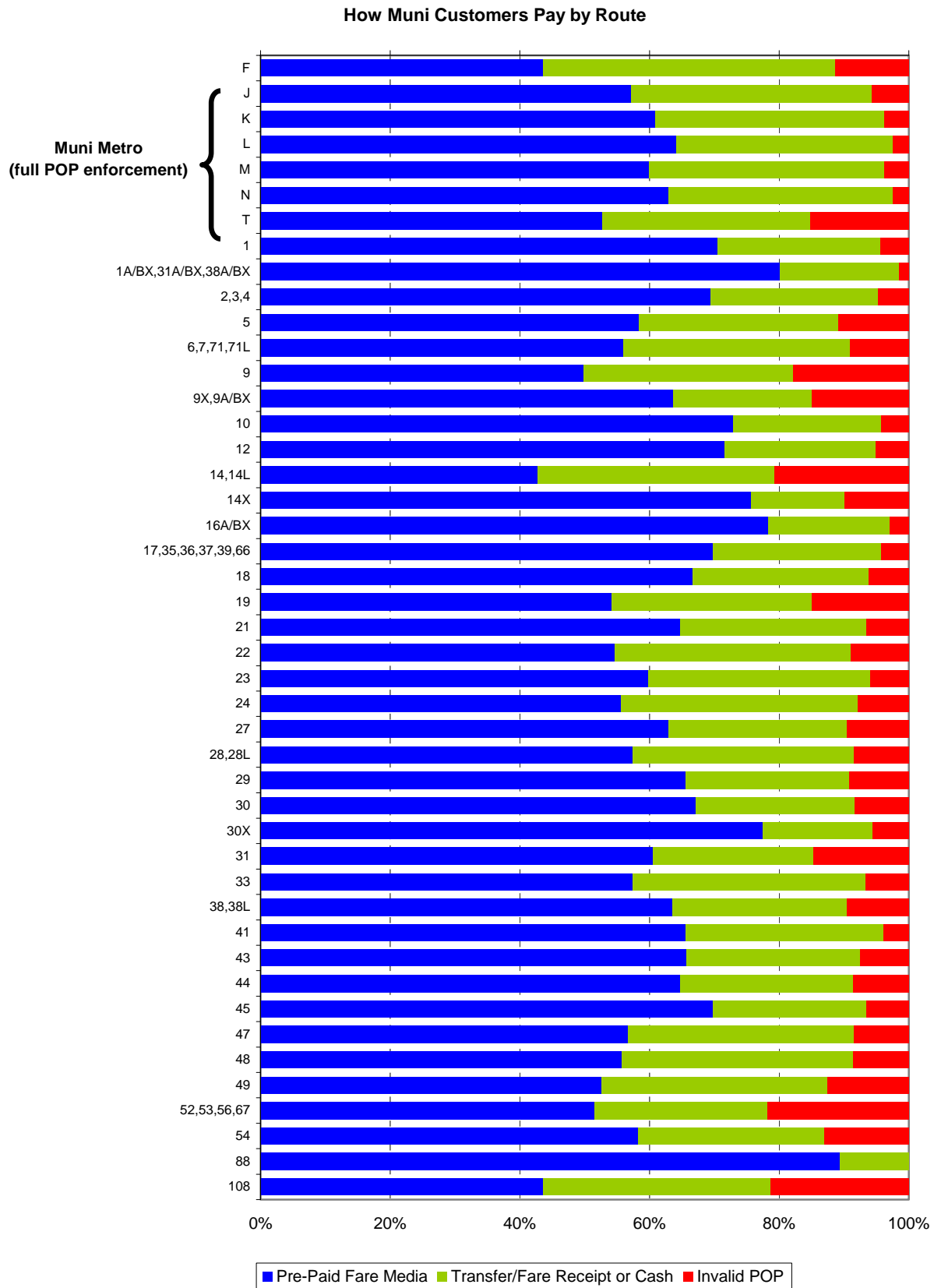


Figure 37: How Muni Customers Pay by Route

Route	Pre-Paid Fare Media	Transfer/Fare Receipt or Cash	Invalid POP
F	44%	45%	11%
J*	57%	37%	6%
K*	61%	35%	4%
L*	64%	33%	2%
M*	60%	36%	4%
N*	63%	35%	3%
T*	53%	32%	15%
1	70%	25%	4%
1A/BX,31A/BX,38A/BX	80%	18%	1%
2,3,4	69%	26%	5%
5	58%	31%	11%
6,7,71,71L	56%	35%	9%
9	50%	32%	18%
9X,9A/BX	64%	21%	15%
10	73%	23%	4%
12	72%	23%	5%
14,14L	43%	36%	21%
14X	76%	14%	10%
16A/BX	78%	19%	3%
17,35,36,37,39,66	70%	26%	4%
18	67%	27%	6%
19	54%	31%	15%
21	65%	29%	7%
22	55%	36%	9%
23	60%	34%	6%
24	56%	37%	8%
27	63%	27%	10%
28,28L	57%	34%	8%
29	66%	25%	9%
30	67%	24%	8%
30X	77%	17%	6%
31	61%	25%	15%
33	57%	36%	7%
38,38L	63%	27%	10%
41	66%	30%	4%
43	66%	27%	7%
44	65%	27%	9%
45	70%	24%	6%
47	57%	35%	9%
48	56%	36%	9%
49	53%	35%	13%

Route	Pre-Paid Fare Media	Transfer/Fare Receipt or Cash	Invalid POP
52,53,56,67	52%	27%	22%
54	58%	29%	13%
88	89%	11%	0%
108	44%	35%	21%

\* Muni Metro (full POP enforcement)

### 7.3. Detailed Observational Findings by Route

Figure 38: POP Observations by Route

Route	Invalid POP Rate	Observations: Customers	Observations: Vehicle Runs	Observational Findings
F Market & Wharves	11%	1,707	35	<ul style="list-style-type: none"> <li>Some cash customers, particularly tourists, are unaware they must collect a transfer/fare receipt or use unlimited-ride Passports improperly.</li> <li>Some customers with invalid POP ride the F line to avoid TFIs at underground Muni Metro stations.</li> <li>Rear-door boarding occurs at many stops along Market St. and the Embarcadero, particularly when historic streetcars have high ridership.</li> <li>Some customers travel on the F line for only a few blocks, and therefore do not believe they need to pay.</li> </ul>
J Church	6%	780	17	<ul style="list-style-type: none"> <li>POP issues on Church St. between 24<sup>th</sup> St. and Market.</li> </ul>
K Ingleside	4%	870	26	<ul style="list-style-type: none"> <li>POP issues on Ocean Av between Jules and City College</li> </ul>
L Taraval	2%	1,023	34	<ul style="list-style-type: none"> <li>Minimal systemic POP issues</li> </ul>
M Ocean View	4%	1,216	29	<ul style="list-style-type: none"> <li>POP issues around Stonestown, San Francisco State University and along Randolph St and Broad St</li> </ul>
N Judah	3%	1,469	34	<ul style="list-style-type: none"> <li>POP issues at surface stops west of Church &amp; Duboce, but the percentage of customers with invalid POP is relatively small.</li> </ul>

Route	Invalid POP Rate	Observations: Customers	Observations: Vehicle Runs	Observational Findings
T Third	15%	666	18	<ul style="list-style-type: none"> <li>• POP issues along Third St south of Caltrain</li> <li>• Many customers left vehicle after seeing TFIs.</li> </ul>
1 California	4%	975	29	<ul style="list-style-type: none"> <li>• Some cash customers are unaware they must collect a transfer/fare receipt.</li> </ul>
1AX California A Exp 1BX California B Exp	2%	338	9	<ul style="list-style-type: none"> <li>• Minimal systemic POP issues on the 1AX</li> <li>• On the 1BX, some non-POP occurs during the morning rush hour on California St between Arguello &amp; Fillmore when buses are full and the operator opens the back door.</li> </ul>
2 Clement 3 Jackson 4 Sutter	5%	783	24	<ul style="list-style-type: none"> <li>• Some cash customers are unaware they must collect a transfer/fare receipt.</li> <li>• Fare violations occur during the morning rush hour when buses are full and the operator opens the back door</li> <li>• <i>Note - Effective December 2009, the 4 Sutter will be discontinued but the 2 Clement will continue to provide service along nearly the entire portion of the route.</i></li> </ul>
5 Fulton	11%	849	23	<ul style="list-style-type: none"> <li>• POP issues between Fulton &amp; Masonic to McAllister &amp; Van Ness, particularly in the eastbound direction</li> <li>• Back-door boardings occur on Market Street at Stockton and Powell Streets in the westbound direction as well as on McAllister between Divisadero and Van Ness in the eastbound direction.</li> </ul>
6 Parnassus 7 Haight 71 Haight-Noriega 71L Haight-Noriega Ltd	9%	1,945	66	<ul style="list-style-type: none"> <li>• On Haight St., POP issues are minimal during the morning rush hour but intensify during the late afternoon and early evening.</li> <li>• <i>Note - Effective December 2009, the 7 Haight will be discontinued but the 71 Haight-Noriega and 71L Haight-Noriega Ltd will continue to provide service along the entire route.</i></li> </ul>



Route	Invalid POP Rate	Observations: Customers	Observations: Vehicle Runs	Observational Findings
9 San Bruno	18%	1,241	30	<ul style="list-style-type: none"> <li>• POP issues along the entire route</li> <li>• Back-door boarding prevalent along Market Street, 11<sup>th</sup> Street, Potrero Avenue and San Bruno Avenue.</li> <li>• Many customers traveling to San Francisco General Hospital ask operators for “courtesy” rides</li> </ul>
9X Bayshore Exp 9AX Bayshore A Exp 9BX Bayshore B Exp	15%	2,122	37	<ul style="list-style-type: none"> <li>• POP issues along the entire route.</li> <li>• Back-door boarding prevalent along Stockton and 4<sup>th</sup> Streets in the southbound direction, and along San Bruno Avenue and at 4<sup>th</sup> Street and Market in the northbound direction.</li> <li>• <i>Note - Effective December 2009, the 9X, 9AX and 9BX will be renamed to the 8X, 8AX and 8BX respectively.</i></li> </ul>
10 Townsend	4%	233	10	<ul style="list-style-type: none"> <li>• Some cash customers are unaware they must collect a transfer/fare receipt, particularly those traveling between Caltrain and the Financial District.</li> <li>• <i>Note - Effective December 2009, the 10 Townsend will extend to San Francisco General Hospital via Potrero Hill, replacing a portion of the 53 Southern Heights.</i></li> </ul>
12 Folsom-Pacific	5%	296	12	<ul style="list-style-type: none"> <li>• Some POP issues in the westbound direction along Pacific St. at Stockton, particularly relating to the misuse of Senior and Youth Passes.</li> <li>• Relatively low invalid POP rate in comparison to other routes parallel to Folsom (9, 14, 14L).</li> </ul>

Route	Invalid POP Rate	Observations: Customers	Observations: Vehicle Runs	Observational Findings
14 Mission 14 Mission Ltd	21%	2,048	44	<ul style="list-style-type: none"> <li>• POP issues along the entire route.</li> <li>• Back-door boarding prevalent at major transfer points and between 16<sup>th</sup> St. and 30<sup>th</sup> St.</li> <li>• Half of the counterfeit pass use as identified by the survey team occurred in the Mission and Van Ness corridors (14 Mission and 49 Van Ness/Mission).</li> </ul>
14X Mission Exp	10%	333	4	<ul style="list-style-type: none"> <li>• POP issues along the entire route, potentially exacerbated by heavy customer loads and back-door boarding.</li> </ul>
16AX Noriega A Exp 16BX Noriega B Exp	3%	166	6	<ul style="list-style-type: none"> <li>• Minimal systemic POP issues</li> <li>• <i>Note: Effective December 2009, the 16AX and 16BX will be combined into one route.</i></li> </ul>
17 Parkmerced	6%	70	6	<ul style="list-style-type: none"> <li>• Minimal systemic POP issues</li> </ul>
18 46 <sup>th</sup> Ave	6%	162	8	<ul style="list-style-type: none"> <li>• Minimal systemic POP issues</li> </ul>
19 Polk	15%	714	24	<ul style="list-style-type: none"> <li>• POP issues along the entire route south of California Street.</li> <li>• Operators noted safety concerns when requesting fare from customers.</li> </ul>
21 Hayes	7%	689	20	<ul style="list-style-type: none"> <li>• Some POP issues occur during the morning rush hour when buses are full and the operator opens the back door.</li> <li>• Most POP issues occur during the afternoon hours, particularly in the reverse-peak direction.</li> </ul>
22 Fillmore	9%	1,294	31	<ul style="list-style-type: none"> <li>• POP issues between Fillmore &amp; Geary and 3<sup>rd</sup> &amp; 20<sup>th</sup> Streets</li> <li>• Back door boarding common along Fillmore and 16<sup>th</sup> Streets, particularly at the 16<sup>th</sup> &amp; Mission stop.</li> </ul>
23 Monterey	6%	236	14	<ul style="list-style-type: none"> <li>• POP issues along Palou St. east of Third St.</li> </ul>
24 Divisadero	8%	712	24	<ul style="list-style-type: none"> <li>• POP issues east of Mission St.</li> </ul>

Route	Invalid POP Rate	Observations: Customers	Observations: Vehicle Runs	Observational Findings
27 Bryant	10%	597	21	<ul style="list-style-type: none"> <li>• POP issues between 5<sup>th</sup> &amp; Harrison and Leavenworth &amp; Bush</li> <li>• Some back-door boarding occurs at 5<sup>th</sup> &amp; Market</li> </ul>
28 19 <sup>th</sup> Av 28L 19 <sup>th</sup> Av Ltd	9%	886	24	<ul style="list-style-type: none"> <li>• Many Daly City BART-to-Muni and Muni-to-Daly City BART transfers had not been properly exchanged for a transfer/fare receipt</li> <li>• Some back-door boarding at the San Francisco State, Stonestown, and Park Presidio &amp; Geary stops.</li> </ul>
29 Sunset	9%	750	25	<ul style="list-style-type: none"> <li>• POP issues around Balboa Park BART and Mission St.</li> </ul>
30 Stockton	8%	1,580	32	<ul style="list-style-type: none"> <li>• POP issues along Stockton Street on heavily-crowded trolley buses.</li> <li>• Back-door boarding prevalent along Stockton Street and on 3<sup>rd</sup> Street and 4<sup>th</sup> Street at Market Street. Although many customers entering through the back door had valid passes and transfers, some entered without proof of payment.</li> </ul>
30X Marina Exp	6%*	231	5	<ul style="list-style-type: none"> <li>• Many cash customers are unaware they must collect a transfer/fare receipt.</li> <li>• POP issues occur during the morning rush hour on Chestnut St between Laguna and Van Ness when buses are full and the operator opens the back door.</li> </ul> <p>* - Due to logistical constraints, it was not possible to determine whether everyone without a transfer/fare receipt had paid. This figure may overestimate the number of customers with invalid POP.</p>

Route	Invalid POP Rate	Observations: Customers	Observations: Vehicle Runs	Observational Findings
31 Balboa	15%	746	22	<ul style="list-style-type: none"> <li>• POP issues between Turk &amp; Divisadero and Market &amp; Stockton.</li> <li>• Some back-door boardings occur on Market Street at Stockton and Powell Streets in the westbound direction.</li> </ul>
31AX Balboa A Exp 31BX Balboa B Exp	0%	170	7	<ul style="list-style-type: none"> <li>• Minimal systemic POP issues</li> </ul>
33 Stanyan	7%	550	21	<ul style="list-style-type: none"> <li>• POP issues concentrated between 18<sup>th</sup> &amp; Castro and 16<sup>th</sup> &amp; Potrero</li> </ul>
35 Eureka	4%	56	6	<ul style="list-style-type: none"> <li>• Minimal systemic POP issues</li> </ul>
36 Teresita	3%	66	5	<ul style="list-style-type: none"> <li>• Minimal systemic POP issues</li> </ul>
37 Corbett	5%	133	8	<ul style="list-style-type: none"> <li>• Minimal systemic POP issues</li> </ul>
38 Geary 38 Geary Ltd	10%	3,008	61	<ul style="list-style-type: none"> <li>• Back-door boarding prevalent at major stops along the entire route.</li> <li>• Particularly during the rush hours, many customers with cash entered through the back doors to avoid paying the fare.</li> <li>• POP issues occur in both directions during all hours, but increase during the afternoon hours.</li> </ul>
38AX Geary A Exp 38BX Geary B Exp	1%	226	11	<ul style="list-style-type: none"> <li>• Minimal systemic POP issues</li> </ul>
39 Coit	3%	63	4	<ul style="list-style-type: none"> <li>• Minimal systemic POP issues</li> </ul>
41 Union	4%*	305	14	<ul style="list-style-type: none"> <li>• Many cash customers are unaware they needed to collect transfers</li> <li>• POP issues along Stockton Street on heavily-crowded trolley buses.</li> </ul> <p>* - Due to logistical constraints, it was not possible to determine whether everyone without a transfer/fare receipt had paid. This figure may overestimate the number of customers with invalid POP.</p>

Route	Invalid POP Rate	Observations: Customers	Observations: Vehicle Runs	Observational Findings
43 Masonic	7%	722	24	<ul style="list-style-type: none"> <li>• POP issues around the Balboa Park BART station and around Haight St.</li> </ul>
44 O'Shaughnessy	9%	820	26	<ul style="list-style-type: none"> <li>• POP issues east of the Glen Park BART station.</li> <li>• Back-door boarding prevalent at Mission &amp; Silver.</li> </ul>
45 Union-Stockton	6%	772	22	<ul style="list-style-type: none"> <li>• POP issues along Stockton Street on heavily-crowded trolley buses.</li> <li>• Back-door boarding prevalent along Stockton Street and on 3<sup>rd</sup> Street and 4<sup>th</sup> Street at Market Street. Although many customers entering through the back door had valid passes and transfers, some entered without proof of payment.</li> </ul>
47 Van Ness	9%	728	22	<ul style="list-style-type: none"> <li>• POP issues along Van Ness Av.</li> <li>• Back-door boarding prevalent at major stops along Van Ness Av.</li> </ul>
48 Quintara-24 <sup>th</sup> St	9%	614	21	<ul style="list-style-type: none"> <li>• POP issues on east of Castro St.</li> <li>• Minimal systemic POP issues on the rush-hour route extension along Quintara St.</li> </ul>
49 Van Ness/Mission	13%	1,360	33	<ul style="list-style-type: none"> <li>• POP issues south of Polk &amp; California.</li> <li>• Back-door boarding prevalent at major transfer points and along Mission Street between 16<sup>th</sup> St. and 30<sup>th</sup> St.</li> <li>• Half of the counterfeit pass use as identified by the survey team occurred in the Mission and Van Ness corridors (14 Mission and 49 Van Ness/Mission).</li> </ul>
52 Excelsior	13%	225	9	<ul style="list-style-type: none"> <li>• POP issues and back door boardings occur at Forest Hill Station, Glen Park BART and Excelsior &amp; Mission.</li> </ul>

Route	Invalid POP Rate	Observations: Customers	Observations: Vehicle Runs	Observational Findings
53 Southern Heights	54%	102	6	<ul style="list-style-type: none"> <li>• POP issues along the eastern side of Potrero Hill.</li> <li>• Operators noted safety concerns when requesting fare from customers.</li> <li>• Some operators are issuing transfers/fare receipts when customers are not paying the appropriate fare in order to avoid confrontations.</li> <li>• Note: <i>Effective December 2009, the 53 Southern Heights will be discontinued. The 10 Townsend will replace the portion of the 53 along the eastern portion of Potrero Hill.</i></li> </ul>
54 Felton	13%	307	14	<ul style="list-style-type: none"> <li>• POP issues along the entire route, but particularly east of Balboa Park BART.</li> <li>• Operators noted safety concerns when requesting fare from customers.</li> </ul>
56 Rutland	22%*	36	3	<ul style="list-style-type: none"> <li>• Although ridership is low on this route, a large percentage of customers did not have valid POP.</li> </ul> <p>* - Because of the small sample size, the actual invalid POP rate may vary significantly from survey observations.</p>
66 Quintara	4%	57	7	<ul style="list-style-type: none"> <li>• Minimal systemic POP issues</li> </ul>
67 Bernal Heights	12%	132	6	<ul style="list-style-type: none"> <li>• POP issues in the afternoon heading toward Bernal Heights.</li> </ul>
71 Haight-Noriega 71L Haight-Noriega Ltd				<ul style="list-style-type: none"> <li>• (see #6)</li> </ul>
88 BART Shuttle	0%	94	3	<ul style="list-style-type: none"> <li>• Minimal systemic POP issues. As the survey team observed just three buses, it may not have detected POP issues.</li> </ul>
108 Treasure Island	21%	399	13	<ul style="list-style-type: none"> <li>• POP issues along the entire route</li> <li>• Many customers are flashing Job Corps badges to operators, which are not valid fare media.</li> <li>• Many customers are underpaying.</li> </ul>

Route	Invalid POP Rate	Observations: Customers	Observations: Vehicle Runs	Observational Findings
<b>Base Survey Sub-Total</b>	<b>9.2%**</b>	<b>38,672</b>	<b>1,089</b>	<b>Includes surveys conducted prior to the July 1, 2009 fare increase.</b> ** Weighted average (adjusted to ensure that the samples represented the actual proportional distribution of ridership by route). Unweighted average is 9.6%
Mid-July Follow-Up Survey	12.6%	2,567	52	<ul style="list-style-type: none"> <li>In mid-July, the survey team conducted follow-up observations on the following routes: F Market &amp; Wharves, T Third, 5 Fulton, 6 Parnassus, 9 San Bruno, 9X Bayshore Express, 14 Mission, 19 Polk, 21 Hayes, 22 Fillmore, 23 Monterey, 30 Stockton, 31 Balboa, 38/38L Geary, 43 Masonic, 44 O'Shaughnessy, 45 Union-Stockton, 49 Van Ness-Mission, 54 Felton, and 71 Haight-Noriega</li> <li>Invalid POP rates for comparative routes and times before and after the July 1, 2009 survey were within 0.5 percentage points of each other (12.1% before versus 12.6% after). However, the sample size for the observations taken after July 1 is significantly smaller (and therefore less precise) than those before. Based on this data, the fare increase probably had minor if any impact on the invalid POP rate.</li> </ul>
<b>Grand Total</b>	<b>9.2%**</b>	<b>41,239</b>	<b>1,141</b>	<b>Includes all surveys conducted, both before and after the July 1, 2009 fare increase.</b> ** Weighted average (adjusted to ensure that the samples represented the actual proportional distribution of ridership by route). Unweighted average is 9.7%
<p>* Vehicle runs exclude those that the survey team did not observe because: (a) the vehicle was too full to accommodate additional customers, or (b) the farebox was not in operation. The survey team did not observe 76 Marin Headlands, 80X Gateway Express, 81X Caltrain Express, 82X Levi Plaza Express, 90 Owl or 91 Owl special services or the 20 Columbus, 26 Valencia, 74X Culture Bus and 89 Laguna Honda buses, which will be discontinued in December 2009.</p>				





#### 7.4. Detailed POP Observations by Time of Day and Vehicle Occupancy

Figure 39: POP Observations by Time of Day

Route	Hours	Invalid POP Rate	Margin of Error*	Observations: Customers	Observations: Vehicle Runs
A.M. Peak	7 a.m.-10 a.m.	6.3%	±0.5%	9,056	250
Midday	10 a.m.-2 p.m.	9.5%	±0.7%	7,655	230
School	2 p.m.-4 p.m.	9.8%	±0.7%	7,170	206
P.M. Peak	4 p.m.-7 p.m.	10.5%	±0.6%	9,249	252
Evening	After 7 p.m.	14.5%	±1.3%	2,923	85
Weekend	All day	12.3%	±1.3%	2,619	66
Base Survey Sub-Total**		9.5%* **	±0.3%	38,672**	1,089**

\* Margin of error at a 95% confidence level.

\*\* Base survey only from April 30-June 30, 2009. Excludes the 2,567 customers and 52 vehicle runs sampled after the July 1, 2009 fare increase.

\*\*\* Weighted average (adjusted to ensure that the samples represented the actual proportional distribution of ridership by time of day). Unweighted average is 9.6%

Figure 40: POP Observations by Vehicle Occupancy

Vehicle Occupancy	Ridership Threshold	Invalid POP Rate	Margin of Error*	Observations: Customers	Observations: Vehicle Runs
Light Load	Ridership < 50% of seats	9.2%	±0.8%	5,008	318
Moderate Load	Ridership 50-100% of seats	9.3%	±0.5%	15,939	477
Heavy Load	Ridership 100-125% of seats	9.5%	±0.5%	13,064	235
Very Heavy Load	Ridership > 125% of seats	10.5%	±0.9%	4,661	59
Base Survey Sub-Total**		9.5%***	±0.3%	38,672**	1,089**

\* Margin of error at a 95% confidence level.

\*\* Base survey only from April 30-June 30, 2009. Excludes the 2,567 customers and 52 vehicle runs sampled after the July 1, 2009 fare increase.

\*\*\* Weighted average (adjusted to ensure that the samples represented the actual proportional distribution of ridership by time of day). Unweighted average is 9.6%

## 7.5. Statistical Formulas

SFMTA used standard statistical methods to calculate the weighted systemwide invalid POP rate.

Invalid POP rate (weighted by ridership) =

$$\sum_{All\ routes} \frac{\#surveyed\_customers\_with\_invalid\_POP}{\#total\_surveyed\_customers} * \frac{route\_ridership}{system\_ridership}$$

*(Image shows the formula used to calculate the invalid POP rate:*

*For every route, the number of surveyed customers with invalid POP / the total number of surveyed customers \* route ridership / system ridership)*

Invalid POP rate (weighted by time of day) =

$$\sum_{All\ routes} \frac{\#surveyed\_customers\_with\_invalid\_POP}{\#total\_surveyed\_customers} * \frac{time\_of\_day\_ridership}{daily\_ridership}$$

*(Image shows the formula used to calculate the invalid POP rate:*

*For every route, the number of surveyed customers with invalid POP / the total number of surveyed customers \* the ridership for that time period of the day / total daily ridership)*

Reported invalid POP rates have a 95 percent confidence interval and varying margins of error, depending on route and time of day. The following formula provides the margin of error:

Margin of error =  $\pm 1.96 * \text{standard error} * \text{finite population correct}$

$$= \pm 1.96 * \sqrt{\frac{p(1-p)}{n}} * \sqrt{\frac{N-n}{N-1}}$$

*(Image shows the formula used to calculate the margin of error: :*

*Plus or Minus 1.96 \* square root of (p \* (1 - p)/n) \* square root of ((N-n)/(N-1))*

where p = invalid proof-of-payment rate

n = total sampled customers (by route or by time of day, as appropriate)

N = total ridership (by route or by time of day, as appropriate)

A 95 percent confidence interval is 1.96 standard deviations from the mean.

## 7.6. Previous Fare Survey: David Binder Research, 2006

To: MUNI

From: David Binder Research

Date: June 13, 2006

Re: MUNI fare survey: final results



David Binder Research

44 Page Street, Suite 404 • San Francisco, California 94102  
800-905-7330 • 415-621-7655 • F: 415-621-7663 • db-research.com

The following tables show results from the MUNI fare survey, which took place between April 4th and May 11th, 2006. The data is weighted by time of day and type of route to more accurately reflect the overall ridership of the MUNI system. Weights are based on a NTD Monitoring Excel Spreadsheet provided to David Binder Research by Susan Chelone in the MUNI Schedules Department. A total of 5,986 data points were collected on busses and metro lines during surveying. 1,705 data points were collected on platforms at the downtown metro stations. A single MUNI rider is considered a data point.

Data was collected by four surveyors who were accompanied by two plainclothes police officers.

On busses and metro lines, surveyors in plain clothes boarded a vehicle and asked for proof of payment from all riders in one stop, before riders could exit the vehicle to evade surveyors. Anyone who refused to show proof was marked as a refusal and was then considered to have evaded the fare.

Data was collected on platforms of downtown metro stations by four surveyors accompanied by two plainclothes officers. For those stations with primary and secondary station agent booths with separate stairwells, two surveyors were stationed on the platform at the bottom of the stairs at the primary ticket booth, and two were stationed at the bottom of stairs at the secondary booth.

All riders coming into the station and down the stairwells were asked to present their proof of payment, and anyone who refused to show proof was counted as having an invalid fair.

### Method of payment for those with valid proof of payment

Proof of Payment Type	%
Monthly Fast Pass	58.2
Weekly Pass	0.4
Passport	1.3
Transfer	38.7
Free	1.3
<b>Total</b>	<b>100%</b>

**Proof of payment for all riders, including those without valid proof: % of all respondents**

<b>Proof of Payment</b>	<b>% Valid</b>	<b>% Invalid</b>
Monthly Fast Pass	52.1	.1
Weekly Pass	.4	0
Passport	1.2	0
Transfer	34.6	1
Free	1.2	--
No Proof of payment	--	7.1
Language barrier	--	.5
Refused	--	1.7
<b>Total</b>	<b>89.5%</b>	<b>10.5%</b>

**Type: % valid and % invalid by type of route**

<b>Route type</b>	<b>N</b>	<b>% Valid</b>	<b>% Invalid</b>
Radial bus lines	2,257	88.7	11.3
Cross town bus lines	968	88.0	12.0
Local lines	80	88.8	11.2
Metro lines	2,581	93.1	6.9
<b>Total</b>	<b>5,886</b>	<b>89.5%</b>	<b>10.5%</b>

## Percentage Valid by Route

Line	N	% Valid	% Invalid/ No Proof
1	214	91.6	8.4
2	55	92.8	7.2
3	82	94.8	5.2
5	55	92.7	7.3
9	291	88.9	11.1
14	274	85.4	14.6
15	145	77.0	23.0
22	164	81.6	18.4
24	81	90.9	9.1
27*	36	91.6	8.4
28	75	83.4	16.6
29	57	98.2	1.8
30	163	89.2	10.8
33*	52	100.0	0.0
37*	22	95.6	4.4
38	844	91.7	8.3
43	83	91.6	8.4
44	195	93.3	6.7
45	65	92.3	7.7
47	84	92.9	7.1
48*	45	93.3	6.7
49	132	82.6	17.4
54	58	86.2	13.8
71*	33	93.9	6.1
F	198	95.4	4.6
J	176	85.8	14.2
K	156	99.3	0.7
L	272	96.4	3.6
M	497	90.1	9.9
N	1,282	93.2	6.8
<b>Total</b>	<b>5,886</b>	<b>89.5%</b>	<b>10.5%</b>

*\*Indicates small sample size*

**J,K,L, M, and N: Underground and Street Level Stops**

<b>Route type</b>	<b>N</b>	<b>% Valid</b>	<b>% Invalid</b>
Underground	942	96.5	3.5
Street Level	1,639	90.5	9.5
<b>Total</b>	<b>2,581</b>	<b>92.9%</b>	<b>7.5%</b>

**Peak and Off-peak Hours**

<b>Route type</b>	<b>N</b>	<b>% Valid</b>	<b>% Invalid</b>
Peak	2,129	91.5	8.5
Off-peak	3,767	88.4	11.6
<b>Total</b>	<b>5,896</b>	<b>89.5%</b>	<b>10.5%</b>

**Art Buses: Front and Rear**

	<b>N</b>	<b>% Valid</b>	<b>% Invalid</b>
Front	1,157	91.1	8.9
Rear	1,493	86.7	13.3
<b>Total</b>	<b>2,650</b>	<b>88.5%</b>	<b>11.5%</b>

**Metro: First Car and Second Car**

	<b>N</b>	<b>% Valid</b>	<b>% Invalid</b>
First Car	881	91.5	8.5
Second Car	759	91.5	8.5
<b>Total</b>	<b>1,640</b>	<b>92.9</b>	<b>7.1</b>

The following tables represent data for the platforms on the downtown metro stations. Data for the platforms was collected primarily during off-peak hours. When possible data was collected when the primary ticket booth was manned and the secondary booth was not. In the Embarcadero, Powell Street Stations, and Van Ness Stations, it was not possible to collect data for unmanned and manned booths, as both booths were in view of each other, and there was a single stairwell going down to the platform or there were ticket agents in both booths.

**Metro Stations: Platform Data**

<b>Station</b>	<b>N</b>	<b>% Valid</b>	<b>% Invalid</b>
Embarcadero	222	89.2	10.8
Montgomery	445	88.3	11.7
Powell	304	89.5	10.5
Civic Center	480	85.3	14.7
Van Ness	251	87.4	12.6

**Metro Stations: Manned and Unmanned Station Agent Booths**

<b>Station</b>	<b>N</b>	<b>% Valid</b>	<b>% Invalid</b>
<b>Embarcadero</b>	222	89.2	10.8
<b>Montgomery</b>	445	88.3	11.7
Primary-manned	296	92.2	7.8
Secondary-unmanned	149	81.2	18.8
<b>Powell</b>	304	89.5	10.5
<b>Civic Center</b>	480	85.3	14.7
Primary-manned	318	87.1	12.9
Secondary-unmanned	162	81.8	18.2
<b>Van Ness</b>	251	87.4	12.6

## **7.7. San Francisco Traffic Code: Relevant Transit Violations**

### **SEC. 7.2.101. FARE EVASION REGULATIONS.**

(a) For any passenger or other person in or about any public transit station (including an outdoor high-level boarding platform or station operated by the Bay Area Rapid Transit District), streetcar, cable car, motor coach, trolley coach or other public transit vehicle to evade any fare collection system or proof of payment program instituted by the Municipal Transportation Agency.

(b) For any person to board or ride a streetcar, motor coach, trolley coach without prior or concurrent payment of fare.

(c) For any person to board a streetcar, motor coach, trolley coach through the rear exit except: (i) when a representative of the transit system is present at such exit for the collection of fares or transfers or the inspection for proof of payment; (ii) when the streetcar, motor coach, trolley coach or other transit vehicle is operating at a station or boarding platform where fares are collected prior to boarding the transit vehicle; (iii) when necessary for access by persons with disabilities on wayside boarding platforms; or (iv) when the streetcar, motor coach, or trolley coach is operating on a transit line or in a Proof of Payment Zone.

(d) To fail to display a valid fare receipt or transit pass at the request of any authorized representative of the transit system or duly authorized peace officer while on a transit vehicle or in a Proof of Payment Zone.

(e) To misuse any transfer, pass, ticket, or token with the intent to evade the payment of any fare.

(f) To knowingly use or attempt to use any illegally printed, duplicated, or otherwise reproduced token, card, transfer or other item for entry onto any transit vehicle or into any transit station with the intent of evading payment of a fare.

(g) For any unauthorized person to use a discount ticket or fail to present, upon request from a system fare inspector, acceptable proof of eligibility to use a discount ticket. (127)

(Amended by Ord. 287-08, File No. 081340, App. 12/5/2008)

### **SEC. 7.2.102. PASSENGER CONDUCT REGULATIONS.**

For any passenger or other person in or about any public transit station (including an outdoor high-level boarding platform or station operated by the Bay Area Rapid Transit District), streetcar, cable car, motor coach, trolley coach or other public transit vehicle to commit any of the acts described below:

(a) Playing sound equipment on or in a system facility or vehicle;

(b) Smoking, eating, or drinking in or on a system facility or vehicle in those areas where those activities are prohibited ;



- (c) Expecting upon or within a system facility or vehicle;
- (d) Willfully disturbing others on or in a system facility or vehicle by engaging in boisterous or unruly behavior;
- (e) Carrying an explosive or acid, flammable liquid, or toxic or hazardous material in a system facility or vehicle;
- (f) Urinating or defecating in a system facility or vehicle, except in a lavatory. However, this paragraph shall not apply to a person who cannot comply with this paragraph as a result of a disability, age, or a medical condition;
- (g) Willfully blocking the free movement of another person in a system facility or vehicle.
- (h) Skateboarding, roller skating, bicycle riding, or roller balding in a system facility, vehicle, or parking structure. This restriction does not apply to an activity that is necessary for utilization of the transit facility by a bicyclist, including, but not limited to, an activity that is necessary for parking a bicycle or transporting a bicycle aboard a transit vehicle as permitted by the Municipal Transportation Agency. (128)

(Amended by Ord. 287-08, File No. 081340, App. 12/5/2008)

#### **SEC. 7.2.103. CONVERSING WITH OPERATING PERSONNEL PROHIBITED.**

For any person to engage any operator of any streetcar, cable car, bus or trolley coach in conversation, except for the purpose of procuring necessary information. (128.5)

(Amended by Ord. 287-08, File No. 081340, App. 12/5/2008)

#### **SEC. 7.3. MISDEMEANORS.**

Except as may be authorized in Division II of this Code, the following actions are prohibited, and each and every violation of the prohibitions listed in this Subsection 7.3 shall be a misdemeanor; provided however, that, the charge may be reduced to an infraction in discretion of the Court, or the citation issued may be issued for the violation as an infraction in the discretion of the issuing officer.

(Amended by Ord. 287-08, File No. 081340, App. 12/5/2008)

##### **SEC. 7.3.1. OTHER FARE EVASION AND PASSENGER CONDUCT REGULATIONS.**

For any passenger or other person in or about any public transit station (including an outdoor high-level boarding platform or station operated by the Bay Area Rapid Transit District), or public transit vehicle to commit any of the acts described below:

- (a) Knowingly providing false identification to a peace officer, fare inspector or other representative of the transit system when engaged in the enforcement of City or state laws regarding fare collection, fare evasion, passenger conduct or proof of payment of fare;
- (b) Interfering with the turnstile or fare register;
- (c) Meddling with the trolley pole or rope attached thereto;

- (d) Meddling with tracks, switches, turnouts, or any other transit system structures or facilities;
- (e) Entering upon the roadbed, tracks, structures or other portions of transit system property or facilities not open to passengers or the public;
- (f) Obstructing any person or persons in charge of any transit station or facility or public transit vehicle in the performance of that person's duties, or otherwise interfering with the operation of the public transit vehicle;
- (g) Sounding any bell, alarm or other warning device, without authorization;
- (h) Printing, duplicating or otherwise reproducing any token, card, transfer or other item used for entry onto any transit vehicle or into a transit station without the express permission of the Municipal Transportation Agency. (128.2)

(Amended by Ord. 287-08, File No. 081340, App. 12/5/2008)

## 7.8. Transit Fare Inspector Job Description



Department of Human Resources

Transit Fare Inspector (#9132 )

**\$25.41-\$30.90 Hourly / \$4,405.00-\$5,356.00 Monthly /  
\$64,272.00 Yearly**

**\$52,858.00-**



[Email Me when a Job Opens for the above position\(s\)](#)

### Definition

Under general supervision, performs a variety of duties related to the enforcement of fare policies of the Municipal Railway (MUNI) Proof of Payment Program, and to the enforcement of other applicable civil and administrative codes, and MUNI regulations and policies.

### Distinguishing Features

Positions in this job code enforce the fare policies of the Proof of Payment fare system on the MUNI Metro and other MUNI lines, plus other applicable regulations, ordinances and policies related to MUNI operations. Incumbents are distinguished from class 8121 Fare Inspections Supervisor/ Investigator, Municipal Railway, by their lower level of responsibilities and decision-making.

### Supervision Exercised

None

### Examples of Important and Essential Duties

According to Civil Service Commission Rule 9, the duties specified below are representative of the range of duties assigned to this job code and are not intended to be an inclusive list.

1. Inspects public transit passengers for appropriate fare onboard moving vehicles, on station platforms and within transit stations and facilities.
2. Issues citations to passengers without valid passes, tickets or transfers; and for violations of applicable sections of proof of payment policy, as required by proof of payment program regulations; checks and verifies passenger identification documents; explains citation and appeal process to persons receiving citations.
3. Enforces all regulations, ordinances and policies related to Municipal Railway operations, within transit stations, vehicles and facilities.
4. Gathers/tabulates information on passengers inspected and cited; numbers of passengers, and other relevant data; fills out forms and writes basic daily reports regarding citations, unusual incidents, and other activities.
5. Appears in court to present evidence and testimony as required.

6. Reports safety hazards, potential problems, and violations of law observed during the course of duty, to appropriate authority; requests assistance when necessary.
7. Assists other MUNI and City personnel, and sworn law enforcement officers in the event of accidents, emergencies, and other incidents requiring response.
8. Provides general information and assistance, when requested, to public transit passengers and members of the public.
9. Operates communications and electronic equipment, such as two-way radios, and other office equipment, including computer terminals.

### Knowledge, Skills and Abilities

Knowledge of: the methods/techniques related to enforcement of applicable rules, regulations, ordinances, policies and procedures.

Ability to: accurately observe situations and exercise sound judgment to determine appropriate action, and to assess various options of how to handle a situation or whether there is a need for intervention or securing assistance; learn how to operate communications/electronic equipment and related codes and formats; drive a vehicle.

Skills to: deal tactfully and courteously with the general public and others, function effectively under stress, maintain a professional manner in a variety of situations; speak clearly, concisely and in an easily understandable manner with other employees, transit passengers and the general public, using appropriate terminology, to interpret applicable codes, ordinances and policies, and to listen with understanding and comprehension; prepare clear and concise written reports and other documents, and to read and comprehend applicable codes, ordinances and policies; perform basic math computations.

### Experience and Training

1. Three years full time experience working with the public, which must have included providing information and assistance, and working with applicable policies and regulations.

Desirable Qualifications: high school diploma /GED/state equivalency certificate.

### License or Certificate

Possession of a valid driver's license

Special Requirements:

The work of job code 9132 is performed on MUNI buses, trains and station platforms, which may involve lifting, bending, and climbing stairs. The nature of work requires incumbents to: work varying hours and/or shifts, including weekends, evenings and holidays; work in a variety of conditions, including inclement weather and exposure to the elements; operate a variety of communications and electronic equipment; work for long periods of time standing or walking, including on moving transit vehicles, uneven terrain, and unstable surfaces, etc.; run short distances; wear designated attire while on duty as required.

## Disaster Service Workers

All City and County of San Francisco employees are designated Disaster Service Workers through state and local law (California Government Code Section 3100-3109). Employment with the City requires the affirmation of a loyalty oath to this effect. Employees are required to complete all Disaster Service Worker-related training as assigned, and to return to work as ordered in the event of an emergency.

## **7.9. Bus Inspection Program Work Order, 2001**

The following procedures shall be followed when conducting bus inspections:

1. Each officer assigned to a radio car in a Patrol Division field assignment shall make two inspections per shift (e.g., a two-person radio car would inspect four buses).
2. Each officer assigned to a foot beat in a Patrol Division field assignment shall make: four inspections per shift.
3. Recruit officers, with Field Training Officers, shall be assigned for one full tour of duty, per phase, to exclusively ride Muni Transit within their district. Officers so assigned shall perform a BIP for every line traveled.
4. Each sergeant in a Patrol Division field assignment shall make two inspections per shift.
5. Bus inspections are "10-8" assignments.
6. The officer shall: broadcast a "903" to Dispatch when boarding a bus, state the Municipal Railway line#, the bus #, and direction of travel (inbound or outbound); and, when exiting the bus, inform Dispatch that they are "clear" of the "903."
7. While the bus is in transit, the officer will complete: a Muni contact slip including the driver's name and cap #. The officer shall inspect the bus for irregularities and take appropriate enforcement action for any violation.
8. It is expected that officers will be travelling on the bus for approximately five blocks on each visit.
9. If working with a radio car partner, the officer will exit the bus and rejoin his/her partner, who has followed the bus while in transit. If an officer is working alone, the officer can return to his/her vehicle by bus or walk the distance.
10. At the end of their shift, officers shall turn in all contact slips and unit CAD histories.
11. Any officer failing to comply with the minimums of this order as outlined in #1, #2, #3 shall prepare a memorandum to their commanding officer, prior to end of watch, as to why they were unable to meet the minimum standards of this order.
12. Units shall maintain their own contact slips for potential future audit.
13. Sergeants are to maintain constant radio contact with field units and review unit history printouts to ensure compliance. If necessary, sergeants shall direct officers to bus lines that experience more policing needs, determine most suitable times and prevent priority assignments from accumulating. Lieutenants are to ensure that each officer assigned to the field has completed two bus inspections during the tour of duty and review Muni contact slips for accuracy.

14. Commanding officers shall compile BIP statistics on the BIP Statistics Form and forward them to the Commanding Officer of the Crime Prevention Company each Monday morning, The Commanding Officer of CPC shall ensure that these statistics are distributed at the monthly Muni policing meeting.