Transit Manages Reliability Well, but Could Further Improve Customer Experience

SEAN DEBLIECK
PETER HEINECCIUS
LEIGH MICHAEL
BEN THOMPSON

Executive Summary

King County Metro Transit has a high level of systemwide on-time performance despite increased traffic congestion. However, Transit's focus on addressing late arrivals may increase early departures. Buses that leave early appear the same to riders as cancellations, which are in fact uncommon. Gaps in the data Transit provides to third parties limits the utility of some of the most popular trip planning apps used by riders. Finally, it lacks key performance metrics necessary to manage small-scale capital projects designed to address speed and reliability issues. We make recommendations addressing these three areas.

Transit Manages Reliability Well, but Could Further Improve Customer Experience

REPORT HIGHLIGHTS

What We Found

Transit is very close to meeting its on-time performance (OTP) goals, but an emphasis on reducing late arrivals may mean that buses often depart too early. This can negatively affect customers, since missing a scheduled bus because it arrived too early is effectively the same as a canceled bus. Compared to the number of early departures, canceled buses are rare.[1]

Although best practices suggest transit agencies should provide data to third-party developers rather than building in-house trip planning tools, Transit maintains a legacy online tool that duplicates the function of applications that are more widely used by riders. In addition, there can be gaps in the data that Transit provides to these third-party developers, which compromises riders' experience of transit reliability. As Transit continues to invest in a tool that may be of marginal value, it also limits third-party accessibility to data that could improve the rider experience.

Transit funds small-scale capital projects that can create faster and more reliable bus service. However, Transit does not capture key performance metrics on how the projects impact speed and reliability, nor does it set a target number of projects to complete each year. If these metrics were in place, Transit could better manage projects, demonstrate impact, and build buy-in with local governments to make the projects even more successful.

What We Recommend

We recommend that Transit warn riders about early departures, improve the quality of real-time data transmitted to third-party software developers, and establish performance metrics for its portfolio of small-scale speed and reliability projects.

Why This Audit Is Important

Reliability of bus service is one of the most important considerations for both transit agencies and riders. Between 2013 and 2017, Transit spent more than $10 million on schedule adjustments to make arrival times more reliable by adding more than 100,000 hours to bus trips. For riders, this means that buses are more likely to arrive as scheduled, but the trip itself will be longer than it was in the past. In King County, regional traffic problems have increased the variability of trip lengths, making schedules more difficult to predict.

Real-time data and small-scale capital projects are two minor but important ways to mitigate the impact of congestion. Transit's fleet is equipped with GPS systems that transmit real-time data, which Transit uses to plan trips and estimate bus arrival times. Transit also works with local jurisdictions to implement small capital projects, such as signal timing and bus priority lanes.

Real-time data display in Seattle

---

[1] Our findings are based on an analysis of speed and reliability data from October 2017 through September 2018.

Transit Manages Reliability Well, but Could Further Improve Customer Experience

TABLE OF CONTENTS

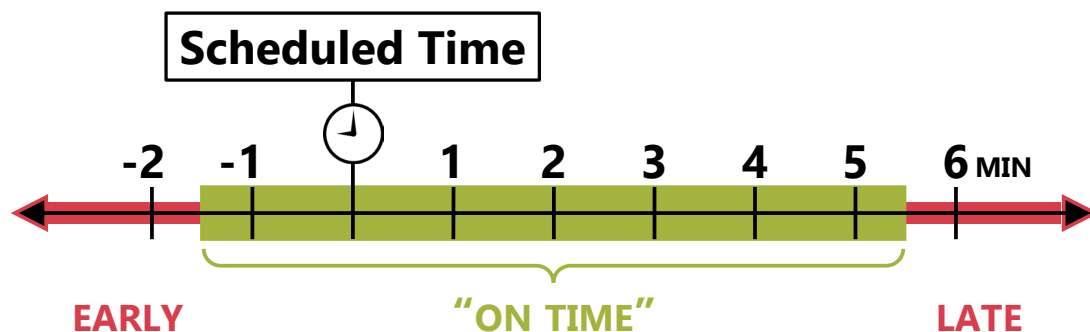# Reducing Late Arrivals May Increase Early Departures

SECTION
SUMMARY

Transit does well on a common performance measure for reliability, but its focus on late arrivals may deprioritize buses that leave too early. Even though traffic congestion makes it difficult, Transit is close to meeting its reliability targets systemwide. At the route level, Transit primarily focuses on buses that are too often late. Transit prioritizes late arrivals so that it knows which routes need time added to their schedules. However, the variability of traffic conditions means that adding time to schedules could make some buses arrive too early. From a rider perspective, an early departure can be the same as a canceled bus, even though actual cancellations are relatively rare. Riders might not know that they need to arrive before the scheduled departure time.

"On-time performance" definition matches peers and practice

King County Transit measures reliability using on-time performance, and its use of this metric is consistent with peer transit agencies. This metric categorizes bus arrivals as either on time, early, or late. Transit considers buses arriving between 1.5 minutes early and 5.5 minutes late to be "on time" (see Exhibit A, below). Transit agencies across North America use on-time performance (OTP), and there is no universal standard for how early or late a bus can arrive and still be "on time." Some agencies use a narrower range of acceptable times, and some agencies use a wider range of times. The wider the range, the greater the number of trips that will appear to be "on time" for that agency. King County uses a range that is in line with recommended practices and is average among peer jurisdictions. Transit's range matches the range used by the national Transit Capacity and Quality of Service Manual, as well as eight of the 20 largest transit providers in the country.

EXHIBIT A: Transit considers buses arriving 1.5 minutes early to 5.5 minutes late to be "on time"

Source: King County Auditor's Office illustration of Transit's definition of on-time performance.

Transit does well on OTP in general

Transit is very close to achieving its target for systemwide on-time performance. Transit's target is for buses to arrive "on time" at least 80 percent of the time across the system.[2] This is an ambitious target for King County, as research suggests that 80 percent is achievable in smaller systems or in jurisdictions with many dedicated bus lanes. Nevertheless, over the past two years, Transit's OTP for all routes has averaged around 77 percent, ranging between 74 and 81 percent each month (see Exhibit B, below).

EXHIBIT B: Systemwide, Transit is consistently close to meeting its 80 percent on time target

80% OTP Target

2017   2018

Actual OTP

Source: King County Auditor's Office illustration of Transit's data for November 2016 to October 2018.

Heavy traffic means buses will be either early or late

Traffic congestion makes it difficult for Transit to avoid both early departures and late arrivals at the same time, reducing reliability for riders. As traffic congestion in the region worsens, the time it takes for a bus to run its route becomes more unpredictable. For example, a bus might only take 20 minutes to complete a trip on light-traffic days, but the same route might take 30 minutes or more on heavy-traffic days. This variability makes it difficult for Transit to schedule an arrival time that will work every day. For instance, if Transit pushes the scheduled time back so drivers will be on time during heavy-traffic days, it means that more buses will arrive too early on light-traffic days. In theory, bus drivers can delay at stops to prevent early departures, but in practice, this can obstruct traffic and frustrate the riders who are already on board. Given these constraints, transmitting real-time information to riders and investing in capital solutions become more important. These approaches to improving reliability are discussed later in this report.

---

[2] While it is difficult to make direct comparisons, other large transit agencies have roughly similar goals, ranging from 72 to 90 percent. King County does not appear to be an outlier in either its goals or its actual on-time performance.
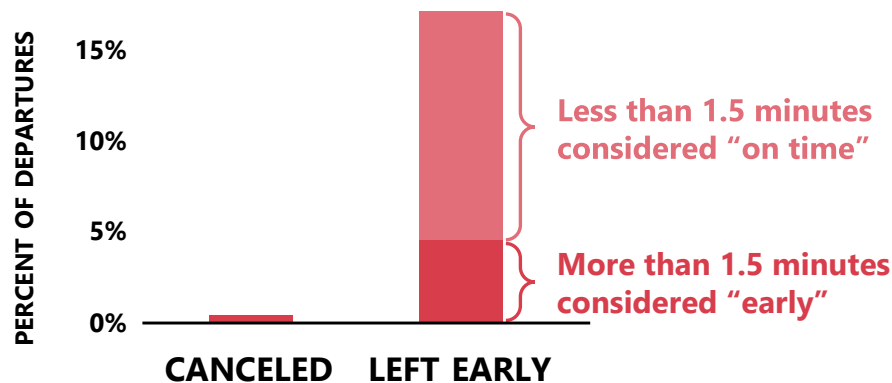
Leaving early worse than arriving late for riders

Transit's reliability metric for individual routes does not focus on early departures, which can be more disruptive to riders than late arrivals. In addition to its systemwide OTP target, Transit also measures how often each route arrives late. This information is useful for identifying routes where Transit needs to invest more time in the schedule. By focusing on late arrivals, however, Transit can deprioritize routes that often depart earlier than the scheduled time. From a rider perspective, an early bus can cause much longer wait times. For example, say a bus is supposed to arrive every 20 minutes. If a bus is too early, then a rider who arrived at the stop at the scheduled time might have to wait 20 minutes for the next bus to arrive, which would be worse than waiting 10 or 15 minutes for a late bus.

Riders might mistake early departures for cancellations

Seventeen percent of buses left their stop before the scheduled time, possibly leading riders to believe their bus had been canceled. However, cancellations are, in fact, relatively uncommon. Transit has worked to reduce the number of service cancellations, and it estimates it cancels less than 0.5 percent of trips. It is more likely that what riders experience as cancellations are actually early departures. Transit considers buses that leave less than 1.5 minutes early to still be "on time." Even excluding these "on time" buses, around five percent of departures left more than 1.5 minutes before the scheduled time (see Exhibit C, below).[3] Although buses are permitted to depart before the scheduled departure time, Transit does not communicate this fact to riders.

EXHIBIT C: Buses leave before the scheduled time more often than Transit cancels trips, but riders have the same experience

Source: King County Auditor's Office analysis of Transit data for October 2017 to September 2018.

Recommendation 1

Transit should communicate to riders that buses may leave before the scheduled departure time.

---

[3] These percentages do not include the route's final stop or estimated time stops, where operators are allowed to depart early. Estimated time stops occur near the end of routes, since there are fewer people seeking to board the bus.

Improving Real-Time Data for Riders

SECTION
SUMMARY

Transit maintains a trip planning application and provides real-time data to third-party developers, creating redundancies and raising costs. The way that Transit customers seek out and receive bus arrival and departure information is changing. Keeping pace with these changes will likely improve customer satisfaction and ridership. The U.S. Department of Transportation recommends transit agencies release real-time data to allow the market to develop trip-planning applications, rather than building and managing them in-house. However, Transit relies on a legacy in-house application first developed over 15 years ago that may not meet the needs of its riders, resulting in unnecessary costs. In addition, Transit does not provide information about canceled buses to developers, limiting the functionality of widely used applications like OneBusAway. Instead, Transit provides cancellation and service disruption information through its online service alerts, which may be of limited utility to Transit customers.

Legacy trip planner is used, but may not be relevant

Transit continues to invest in its online trip planning tool despite declining use, potentially increasing the agency's costs. Transit's primary means to connect riders with real-time information is a desktop and mobile trip planning website. Transit published the first version of its trip planning website in 2001. Although riders use Transit's website thousands of times each day, there is no evidence that Transit has formally assessed the efficacy of the tool since 2015. Transit's most recent rider surveys showed that use of the tool was dropping (falling from 80 percent of riders in 2012 to 53 percent of riders in 2015), and that fewer than half of respondents were satisfied with the availability of information.[4] The number of visits to Transit's website dropped by more than 25 percent between 2013 and 2017.

According to Transit, applications that provide real-time information have the potential to increase transit ridership and customer satisfaction, but to do so an agency needs to understand how customers are using real-time information. In the absence of evidence of a recent cost-benefit analysis, Transit may be continuing to upgrade and maintain a redundant application that does not meet the needs of its riders. This could incur unnecessary direct costs to the agency, as well as the opportunity cost of staff not putting effort into activities that provide more utility to customers.

---

[4] At the time this report was written, the results of Transit's 2017 Rider/Non-Rider survey were not yet available. The 2016 Rider Survey does not include questions about Transit's website usage, which is why we used data from the 2015 survey.

Alternatives to Transit's trip planner are available

Transit's online trip planner is redundant with more popular third-party alternatives that may provide a better user experience. There are multiple free trip planning tools available, including Google Maps and Bing Maps, which use real-time information from Transit. Since people can estimate travel times and plan their trips using these free applications, there seems to be less of a business case for Transit to continue to maintain its own trip planning website. The U.S. Department of Transportation recently reported that, given the complexities and costs of keeping up with evolving real-time information technologies, agencies should release their data and allow the market to provide applications rather than building and managing them in-house.

Recommendation 2

Transit should conduct an evaluation of the costs and benefits of maintaining its online trip planner and determine whether to continue offering this application given the prevalence of free, third-party alternatives.

Applications rely on Transit's real-time data

Popular third-party applications rely on Transit's real-time information, but there can be gaps in the data Transit transmits, which compromises the rider experience. Transit is the only source of the data that applications use to give an accurate estimate of when a bus is likely to arrive at a particular stop. Two popular third-party applications are Google Maps, the most widely used navigation application in the United States, and OneBusAway. OneBusAway is one of the most popular applications in the Puget Sound region and has about 360,000 active users per month, which represents more than 50 percent of Transit's average monthly riders. When real-time data is not available, these applications display arrival times based on Transit schedules.

Gaps in Transit's real-time data

We observed gaps in Transit's transmission of real-time information. For example, there were periods of time in October 2018, sometimes lasting several hours during peak commuting times, where all real-time information for buses was not available. Transit indicated that it sometimes schedules hour-long server updates that could interrupt real-time data transmissions. In addition, Transit does not provide information to third parties about cancellations, such as when a bus breaks down or an operator is not available to run the route. However, Transit does make this information available to its own trip planning application. Without this real-time data, third-party applications display Transit's scheduled arrival time, which effectively provides an arrival time for a nonexistent bus. Transit is in the process of updating its data systems to align them with other agencies and improve data quality.

Recent research indicates that third-party applications provide tangible benefits for riders and agencies, such as decreasing the actual time that riders wait at bus stops, increasing customer satisfaction, and increasing ridership. However, these benefits are dependent on Transit providing accurate bus information. When widely-used applications do not have accurate Transit data, the rider experience suffers as a result.
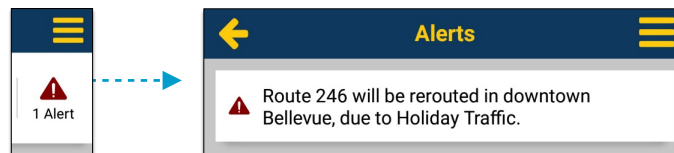
Recommendation 3

Transit should coordinate with major third-party application developers to ensure that real-time service data distributed to third parties is timely, accurate, and complete.

Information about service disruptions is hard to find

Transit's method of providing information about service issues is outdated and cumbersome for passengers to access. Customers using Transit's trip planner tool are required to engage in a multi-step process to access service alerts (see Exhibit D, below). To access a service alert about a particular route, the user must click through several webpages, download a PDF, and decipher industry jargon that may not be understood by riders. In addition, in Transit's trip planner, service advisory information is only available on the desktop version. Rider surveys report that smartphone use is increasing each year; in 2015, nearly 62 percent of smartphone owners reported using their phone to access bus information, and this figure has likely increased in the past four years. In light of increasing smartphone use, the absence of service advisories on the mobile version of Transit's website represents a significant service gap.

Transit's 2012 Benefits Realization Report, for the Transit Customer System Information project, highlighted a primary goal of Transit's website: to provide customers with "modernized, timely, and accurate information which can be easily accessed." The current method of disseminating service advisory information may not adequately address this goal. According to the most recent rider survey, information about service delays posted on the Transit website was one of the agency's lowest-rated service elements.

EXHIBIT D: Service advisories are hard to find when using Transit's trip planner tool

Mobile Website: Generic alert, but no link to specifics

> ⚠ There is a service advisory for one or more routes in this itinerary. Please consult Service Advisories for more information.

Mobile App: High-level info, but no link to details

Desktop Website: Must first find relevant advisory in long list, then download a complicated PDF

Source: King County Auditor's Office summary of information from Transit resources.

Recommendation 4

Transit should review and update the service advisory data it provides on its website to ensure that riders can easily access the information that they need.

Key Metrics Needed for Low-Cost Capital Solutions

SECTION SUMMARY

Transit funds a number of low-cost capital projects, but needs key performance measures to maximize their impact on speed and reliability. Since 2014, Transit has implemented about 66 small capital projects to improve the speed and reliability of its buses, such as signal timing and bus lanes. However, Transit has not consistently collected metrics that demonstrate the link of these smaller projects to speed and reliability, as well as targets that can ensure that the right amount is getting done each year. The risk of not having this type of framework is when the department or staff are faced with competing priorities, projects that could have a large impact on speed and reliability might not get done.

Key performance metrics are lacking

Transit's hot spot program shows potential, but lacks key performance measures to ensure success. Transit's hot spot improvement program is a group of low-cost capital projects which address speed and reliability. Between 2014 and 2017, Transit spent about $1.3 million on 66 hot spot projects including expanding bus lanes and changing traffic lights. At the end of 2018, Transit reported 12 additional projects completed and 16 projects in progress. Transit tracks basic input and output information about the hot spot projects, such as where a project takes place, what was done, how much it cost, and which routes were impacted. Transit can also estimate the number of riders impacted by the projects, showing that the most recently completed projects in 2018 may have impacted over 100,000 daily riders. However, as detailed in the following paragraphs, Transit still lacks impact data and a target for the number of projects it plans to complete each year.

Hot spot projects have potential to improve reliability

The number of people who experience a better bus ride because of these investments makes these projects appear promising, and Transit plans to improve data showing the impact on speed and reliability. Transit does not consistently track the impact of these projects on speed and reliability. Transit told us that while not every hot spot project will have a direct impact on speed, it will be tracking and reporting on these projects for 2018 and onward. For example, Transit estimated positive travel time savings on one of the 12 projects it completed in 2018, showing a savings of 43 seconds. While seemingly small, this type of savings has a much larger impact as it affects multiple routes, hundreds of buses, and thousands of riders. Using a very conservative estimate of the value of riders' time, this project (which cost $5,000 to implement) could be worth $9,000 per week. Estimated impact data like this is critical for understanding the value of the investment and for making decisions about continuing or expanding this type of program.

Transit also lacks targets for the portfolio itself, which limits Transit's ability to hold the program accountable. Staff that work on the hot spot program also work on other projects that could take priority over hot spot projects. For example, the group that oversees the hot spot improvement program also manages several large-scale corridor projects. Staff told us that the hot spot projects, though small in dollar value, require considerable work with local jurisdictions, and even simple projects can take many months to complete. For example, one project to change signage near an out-of-use railway crossing took more than one year to complete because it involved getting permissions from multiple jurisdictions. Since Transit does not have targets for the number of projects that it expects to complete in a given budget cycle, projects similar to this one could fall to a lower priority and never get done, even though the result could have a large impact on buses that use that crossing. Output targets provide clear direction to those charged with implementing the projects, and help management hold them accountable.

Recommendation 5

Transit should establish and report key performance indicators for the hot spot program, including output targets and outcome measures.

Ending notes

Although this report contains recommendations for Transit to make improvements to its speed and reliability efforts, our audit process also identified several instances where Transit's practices deserve commendation. As noted in the first section of the report, Transit achieves strong on-time performance rates that are above expectations for a system of its size and complexity. Transit is also transparent about its speed and reliability efforts, most recently in its October report to the King County Council where it clearly noted the limitations of using service hours to improve the OTP metric, the adverse impact of adding service hours to schedules, and what it will take to improve travel times for the benefit of customers and the County.

On-time performance appears to be similar across the system. We conducted an equity analysis at the census block group level where we analyzed wait times at all stops outside of the downtown core. We wanted to see if there was a link between reliability and the demographic characteristics of a neighborhood. Our analysis included income level, English-language proficiency, race, and ethnicity. We did not find differences in average wait times based on the demographics of the people that live within walking distance of a stop. This analysis would not have been possible if not for Transit's collection and management of data detailing the millions of instances when buses arrive at stops.

Another notable area is Transit's work with local jurisdictions on small-scale speed and reliability projects, such as signal timing and bus lanes. The fact that Transit has staff working with local jurisdictions on speed and reliability issues is positive; not all the peer transit agencies around the country that we spoke to allocate resources to conduct this type of work, despite the fact that interagency coordination is critical for making changes to the right-of-way. We independently selected a sample of traffic

engineers and officials from five local jurisdictions, and while some said that there is more that Transit can do to identify and resolve issues, all expressed high levels of satisfaction with the work currently underway. This type of positive feedback demonstrates that Transit is creating the social capital necessary to get these projects done.

Transit's management and staff show a high-interest level in ensuring that schedules are accurate and trips run on time. This tone from the top is essential as Transit continues to address the challenges of regional growth.

Executive Response

King County

Dow Constantine
King County Executive
401 Fifth Avenue, Suite 800
Seattle, WA 98104-1818
206-263-9600 Fax 206-296-0194
TTY Relay: 711
www.kingcounty.gov

February 4, 2019

Kymber Waltmunson
King County Auditor
Room 1033
C O U R T H O U S E

Dear Ms. Waltmunson:

Thank you for the opportunity to review and comment on the proposed final report on Metro's Service Reliability. I want to especially acknowledge the collaborative approach used by the Audit staff throughout this process. The Audit team was consistently clear about timelines, specific in their questions, thoughtful in their communications and requests, and transparent and upfront as they were developing their conclusions and moving toward final recommendations. Throughout the process, the audit team gave Metro staff an opportunity to react and give feedback that clearly helped inform their final recommendations. With this approach, the Auditor's office has earned Metro's full concurrence on all five of their recommendations.

This audit focused on Metro's service reliability. The Audit team looked at Metro's actual reliability data and associated performance metrics. The audit also focused on how Metro communicated about service reliability and service disruption issues with its customers. Finally, the audit looked at one of Metro's capital programs, the "Hot Spot Improvements" program that looks to improve transit speed and reliability through small capital improvements.

Metro is especially proud that in an audit about Metro's service reliability the Audit team clearly found that:

- "King County Metro Transit has a high level of systemwide on-time performance despite increased traffic congestion."
- Service "Cancellations are relatively uncommon. Transit has worked to reduce the number of service cancellations, and it estimates it cancels less than 0.5 percent of trips."
- There was no variation in service reliability based on the demographics of the people that live in each neighborhood served by Metro.

*King County is an Equal Opportunity/Affirmative Action Employer
and complies with the Americans with Disabilitites Act*

Kymber Waltmunson
February 4, 2019
Page 2

Here is a brief overview of the Audit's five recommendations and how Metro is responding:

Recommendation 1: Transit should communicate to riders that buses may leave before the scheduled departure time.

Metro's response: Metro concurs. There are a host of resources where Metro's customers can access "real-time information" that inform customers of potential lateness or earliness. In 2019 Metro will review our current communications efforts and identify if there are other places where we can better communicate that our bus service sometimes may run a minute or two early.

Recommendation 2: Transit should conduct an evaluation of the costs and benefits of maintaining its online trip planner and determine whether to continue offering this application given the prevalence of free, third-party alternatives.

Metro's response: Metro concurs. In 2019, Metro will hire an independent consultant to evaluate and make recommendations about the current state of the industry for trip planning, Metro's current practice, and potential future courses of action. This work is targeted to be complete by the end of the third quarter of 2019.

Recommendation 3: Transit should coordinate with major third-party application developers to ensure that real-time service data distributed to third parties is timely, accurate, and complete.

Metro's response: Metro concurs. Metro is currently improving our real-time service data via a substantial information technology project scheduled to be complete in 2019, and this improved data will be available to third parties.

Recommendation 4: Transit should review and update the service advisory data it provides on its website to ensure that riders can easily access the information that they need.

Metro's response: Metro concurs. As mentioned in recommendation 3, Metro is currently improving our real-time service data via a substantial information technology project scheduled to be complete in 2019. This capital project addresses this recommendation through the implementation of a consolidated Transit Messaging tool providing service alerts in multiple formats (web, text, email, tweet, etc.).

Recommendation 5: Transit should establish and report key performance indicators for the "Hot Spot Program", including output targets and outcome measures.

Metro's response: Metro concurs. We also see the value in developing meaningful outcome measures, scalable to the size and type of project, to inform our decision-making and encourage local jurisdiction cooperation and assistance. The first report of performance will be according to a report format and cadence established in July 2019 with the first report issued no later than the end of this year.

Kymber Waltmunson
February 4, 2019
Page 3

Another thank you to the Audit team for collaborative and transparent approach to this audit. If you have any questions regarding our audit response, please contact Jonathon Bez, Logistics Manager, King County Metro, at 206-477-5791 or jonathon.bez@kingcounty.gov.

Sincerely,

Dow Constantine
King County Executive

Enclosure

cc: Casey Sixkiller, Chief Operating Officer, King County Executive Office (KCEO)
        Rachel Smith, Chief of Staff, KCEO
        Dwight Dively, Director, Office of Performance, Strategy and Budget
        Rob Gannon, General Manager, Metro Transit Department
        John Resha, Assistant General Manager, Metro Transit Department

Recommendation 1

Transit should communicate to riders that buses may leave before the scheduled departure time.

Agency Response	
Concurrence	**Concur**
Implementation date	n/a
Responsible agency	King County Metro, Mobility Division, Customer Communication and Services

Comment   King County Metro is committed to communicating real-time travel information to our riders, with the understanding that, by its nature, "real time" departure prediction cannot be guaranteed to be 100% perfect, due to many variables which can impact it. We currently have several ways that we tell riders that buses may leave before – or later than – the scheduled departure time. These are listed below. As a result of a substantial information technology project scheduled for 2019, we are in the process of improving our real-time information which will, in turn, enhance our customer communications. In 2019, we also will review our current communications efforts and identify if there are other places where we can better communicate that our bus service sometimes may run a minute or two early.

Here are the places where we currently report both scheduled and predicted (late/or possibility of "early") to Metro customers:
•   Printed and online timetables for applicable routes indicate when a departure time is an estimated time
•   Metro Trip Planner's Next Departures feature provide real-time updates that include predicted departure times both prior to and later than the scheduled time
•   Metro Trip Planner's Tracker feature provides real-time updates that include predicted departure times both prior to and later than the scheduled time
•   Metro's Text for Departures tool provides real-time updates for customers with smart devices and texting capabilities that include predicted departure times both prior to and later than the scheduled time
•   Responses to relevant queries via 206-553-3000
•   "Real time" information signs at applicable bus stops, primarily Rapid Ride that include predicted departure times both prior to and later than the scheduled time
•   Informational text in applicable Service Advisories posted on Metro's website
•   Informational text in applicable Transit Alerts sent to subscribing customers, including recommendations that customer arrive
at their bus stop a few minutes prior to the scheduled departure time of their service
•   Schedule and Real Time data in the General Transit Feed Specification (GTFS) and GTFS-Realtime formats made available to external 3rd party developers/consumers

Recommendation 2

Transit should conduct an evaluation of the costs and benefits of maintaining its online trip planner and determine whether to continue offering this application given the prevalence of free, third-party alternatives.

Agency Response	
Concurrence	**Concur**
Implementation date	2019
Responsible agency	**King County Metro, Mobility Division, Customer Communication and Services**
Comment	Metro has a business requirement to have a highly capable trip planning tool for customer service staff in our Call Center. We also maintain a proprietary customer-facing, online trip planner. In 2019, we will hire an independent consultant to evaluate and make recommendations about the current state of the industry for trip planning, Metro's current practice, and potential future courses of action. This work is targeted to be complete by the end of the third quarter of 2019.

Recommendation 3

Transit should coordinate with major third-party application developers to ensure that real-time service data distributed to third parties is timely, accurate, and complete.

Agency Response	
Concurrence	**Concur**
Implementation date	2019
Responsible agency	**King County Metro, Mobility Division, Customer Communication and Services**
Comment	Metro is committed to providing timely, accurate, and completely real-time service data to third parties. Third-party application developers can currently download our service data in the General Transit Feed Specification (GTFS) format, and we coordinate with them as requested. We are currently improving our real-time service data via a substantial information technology project scheduled to be complete in 2019, and this improved data will be available to third parties. Metro is limited in what we can ask third-party vendors to do with this data. Prior attempts to reach third party application developers have seen tepid results because of the limited response from these developers. Nonetheless, Metro's has maintained an ongoing commitment to enhance the information we share in our external "real time" data to improve what is available to 3rd party apps.

Recommendation 4

Transit should review and update the service advisory data it provides on its website to ensure that riders can easily access the information that they need.

Agency Response	
Concurrence	**Concur**
Implementation date	December 2019
Responsible agency	**King County Metro, Mobility Division, Customer Communication and Services**
Comment	King County Metro is making significant investments to improve the quality of real-time service information that our customers receive via the "Real Time Improvements" capital project. This capital project addresses this recommendation through the implementation of a consolidated Transit Messaging tool. The new messaging tool will simplify the provision of service alerts in multiple formats (web, text, email, tweet, etc.) and will populate the GTFS-Realtime feed with the alerts as well as update departure data points based on created messages (cancellations and stop closures). The project will convert the internal trip planner tools to accept the GTFS-Realtime feed including service alerts. This will provide an increased level of consistency between internal and externally available data. This is expected to be complete by July 2019. We also are committed to exploring how we can better understand how our customers would like to access this information. Depending on resources and capacity, this may include additional customer surveys.

Recommendation 5

Transit should establish and report key performance indicators for the hot spot program, including output targets and outcome measures.

Agency Response	
Concurrence	**Concur**
Implementation date	Key performance indicators and targets will be established by July 1, 2019, along with cadence for reporting. The first report of performance will be according to the cadence established and not later than end of 2019.
Responsible agency	**King County Metro, Capital Division, Capital Planning and Portfolio Management**

Comment   We appreciate the audit's acknowledgement of the potential value of the Hot Spot Improvements program aimed at improving transit speed and reliability. We concur with the Auditor's findings also see the value in developing meaningful outcome measures, scalable to the size and type of project, to inform our decision-making and encourage local jursidiction cooperation and assistance in implementing hot spot improvements.

Statement of Compliance, Scope, Objective & Methodology

Statement of Compliance with Government Auditing Standards

We conducted this performance audit in accordance with Generally Accepted Government Auditing Standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Scope of Work on Internal Controls

We assessed internal controls relevant to the audit objectives. This included review of selected policies, plans, processes, and reports. We also conducted interviews with Transit staff.

Scope

The audit examined Transit's on-time performance and reliability data for fixed-route service from October 2017 through September 2018.

Objectives

- To what extent does Transit accurately and effectively measure reliability of its service?
- To what extent does Transit accurately and effectively communicate its service reliability to its riders and other stakeholders?
- To what extent has Transit taken steps to identify and implement improvements to transit reliability?

Methodology

To address the audit objectives, we analyzed Transit performance and operational data and interviewed local transportation agencies, peer jurisdictions, transit experts, and Transit staff. Our quantitative analysis included a review of the reliability of automated vehicle location (AVL) data, an independent analysis of Transit's on time performance, and a stop-based analysis of equity. We reviewed Transit's financial and operational performance data, publications, online tools, and website. For qualitative analysis, we conducted semi-structured interviews with transportation department staff from the cities of Bellevue, Covington, Seattle, Shoreline, and Woodinville, and other large North American transit agencies including Houston, New York City, and Washington, D.C. We also met with Transit staff from several units, a nationally recognized transit expert, and the creators of OneBusAway.

List of Recommendations & Implementation Schedule

Recommendation 1

Transit should communicate to riders that buses may leave before the scheduled departure time.

IMPLEMENTATION DATE: NA

ESTIMATE OF IMPACT: Communicating to riders that buses may leave before the scheduled departure time can help customers plan their trips more effectively and reduce perceptions that buses are canceled when they are actually running faster than scheduled.

Recommendation 2

Transit should conduct an evaluation of the costs and benefits of maintaining its online trip planner and determine whether to continue offering this application given the prevalence of free, third-party alternatives.

IMPLEMENTATION DATE: 2019

ESTIMATE OF IMPACT: Conducting a cost-benefit analysis of the online trip planner will help management identify redundancies and cut costs. Such an exercise may result in the identification of further opportunities for Transit to add value to its customers.

Recommendation 3

Transit should coordinate with major third-party application developers to ensure that real-time service data distributed to third parties is timely, accurate, and complete.

IMPLEMENTATION DATE: 2019

ESTIMATE OF IMPACT: Coordinating with major third-party application developers can ultimately result in better information being communicated to riders and higher satisfaction with Transit's services.

Recommendation 4

Transit should review and update the service advisory data it provides on its website to ensure that riders can easily access the information that they need.
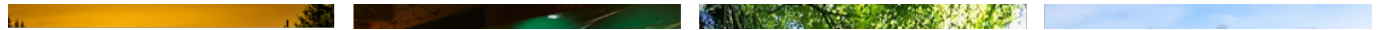
IMPLEMENTATION DATE: December 2019

ESTIMATE OF IMPACT: Reviewing and updating service advisory data will result in higher-quality information being provided to riders, and higher satisfaction with Transit's services.

Recommendation 5

Transit should establish and report key performance indicators for the hot spot program, including output targets and outcome measures.

IMPLEMENTATION DATE: Key performance indicators and targets by July 1, 2019; first performance report before 12/31/2019

ESTIMATE OF IMPACT: Having key performance indicators for the hot spot program will allow Transit to adequately oversee this portfolio of projects and incentivize local jurisdictions to participate in future projects. Although these projects are relatively small, they can result in outsize improvements to speed and reliability of the system.

KING COUNTY AUDITOR'S OFFICE

Advancing Performance & Accountability

KYMBER WALTMUNSON, KING COUNTY AUDITOR

MISSION   Promote improved performance, accountability, and transparency in King County
                 government through objective and independent audits and studies.

VALUES   INDEPENDENCE - CREDIBILITY - IMPACT

ABOUT US   The King County Auditor's Office was created by charter in 1969 as an independent
                 agency within the legislative branch of county government. The office conducts
                 oversight of county government through independent audits, capital projects
                 oversight, and other studies. The results of this work are presented to the
                 Metropolitan King County Council and are communicated to the King County
                 Executive and the public. The King County Auditor's Office performs its work in
                 accordance with Government Auditing Standards.

AUDIT   This audit product conforms to the GAGAS standards for
                 independence, objectivity, and quality.