City of Phoenix

Mission Statement

To improve the quality of life in Phoenix through efficient delivery of outstanding public services.

Public Transit Department
Bus Scheduling Program

August 6, 2024

Report Highlights

Bus Scheduling Program Governance

Processes were in place for the bus scheduling program to ensure schedules and supporting activities were planned, implemented, and monitored.

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Executive Summary

Purpose

Our purpose was to evaluate the City of Phoenix Public Transit Department's governance of the bus scheduling program, including schedule planning, communication, and monitoring for the period October 1, 2023 through April 30, 2024.

Background

The Public Transit Department's (PTD) mission is to provide the greater metropolitan Phoenix area with reliable and innovative bus, light rail, and para-transit services. The department works in partnership with Valley Metro, the regional public transportation agency that provides coordinated transit services to riders in the metro area, and contracts with TransDev, Inc. (TransDev) and First Transit, Inc. (First Transit) to provide the fixed-route transit services.

As of April 2024, TransDev operates approximately 14.5 million annual revenue miles for Bus Rapid Transit (BRT) and local routes and approximately 650,000 annual revenue miles for commuter (RAPID) routes. First Transit operates approximately 6.5 million annual revenue miles for BRT and local, and approximately 80,000 revenue miles for RAPID service. In the calendar year 2023, PTD reported 16 million individuals boarding buses within Phoenix. Bus ridership includes local routes, commuter routes, and neighborhood circulators.

PTD relies on various technologies to develop and maintain the bus schedule program:

- HASTUS – provides bus schedule development and maintenance services. This information is updated quarterly to display current roadway construction and other events that impact routes.
- Clever – provides computer-aided dispatch (CAD) and automated vehicle location (AVL) services to manage the fleet by tracking and displaying vehicle location and schedule adherence. The system tracks bus on-time performance and collects data relative to bus operations, incidents, and accidents. PTD monitors vehicles using the Clever CAD/AVL system.
- General Transit Feed Specification (GTFS) – updates all other services, such as Google Maps and the Valley Metro app, with current bus route information.

Results in Brief

PTD implemented effective processes to govern the bus scheduling program through various planning and oversight activities.

To ensure that the bus schedules meet the public's needs, PTD relies on various planning activities performed by PTD staff, contractors, and other stakeholders. Multiple committees are tasked with identifying impacts on bus schedules, including

scheduled time, route changes, and feedback from customers or contractors. Through our interviews and review of documentation, we found PTD has established procedures to monitor the bus scheduling program through regular reviews of reports from the various systems and from information provided by the committees. In our review of a sample of reports, we noted changes to schedules were implemented based on PTD monitoring activities.

All North/South facilities routes in HASTUS matched the scheduling spreadsheet prepared by PTD without exception.

PTD exports HASTUS data to a spreadsheet outside the system to review and summarize route changes and total revenue miles. We selected the North/South Facilities to reconcile the most recent route changes prepared by PTD Scheduling to HASTUS routes to ensure all bus routes for the North/South facilities were accurate and that revenue miles in total aligned with contracted amounts. For the North/South facilities, PTD schedules 27 local and circulator routes and 6 RAPID routes. All routes in HASTUS matched the scheduling spreadsheet prepared by PTD. All revenue miles in HASTUS were accounted for with the Scheduling spreadsheet, and revenue miles in total annualized amounts were within contractual variances.

Procedures to validate the accuracy of Clever data can be improved through regular monitoring of data.

We observed a limited number of bus arrivals and departures from December 2023 through January 2024 along the I-17 Rapid route. We found anomalies in our sample, such as the departure time in Clever and the underlying GPS data did not match the time noted by the auditor when conducting a physical observation. Staff noted that data is not validated on a regular basis; rather, random checks are performed. Although our testing example was small compared to the number of data points in Clever, staff agreed that the potential pervasiveness of the error merits additional consideration for data monitoring to ensure accuracy.

Department Responses to Recommendations

Rec. #3.1: Conduct a regular review of the accuracy of Clever data to ensure the data support actual arrival and departure times.	
***Response*:** PTD will conduct regular reviews of Clever data via 1) In-person observations by planning and field operations staff 2) Use of the department's new transit data platform implemented in July 2024 to complement the existing Clever CAD/AVL system. The new platform, Swiftly, will allow staff to regularly analyze transit data points (i.e., timepoints) in Clever to ensure data efficacy. Data reports for on-time performance, vehicle runtimes, and route playback will be reviewed daily or monthly as needed.	***Target Date*:** 10/1/2024

1 – Planning and Monitoring

Background

PTD operates buses to provide public transit services within the Phoenix metro area. There are multiple factors to consider when ensuring that the bus schedule and service changes align with the public's needs and federal requirements. As the City continues to grow and demographics shift, PTD must adjust public transit services to accommodate the needs of the public, from daily commutes to special events such as the World Series, the Super Bowl, or the Final Four. In addition to these areas, PTD must consider the Federal Transit Administration Title VI Compliance, which provides that no member of the public should be disadvantaged based on disparity/discrimination and defines changes to service for low-income and other vulnerable members of the population. Currently, service changes are typically performed in April and October of a calendar year.

We reviewed applicable policies and procedures, interviewed staff, and reviewed documentation to determine whether controls were in place to ensure:

- The public's needs and ridership for transit services were considered when creating schedules.
- Schedule information was accurately transmitted to the buses or other technology sources (e.g., signage displays).
- Schedule information was communicated to the public.
- PTD monitored schedules to implement changes when necessary.

Results

Planning activities helped ensure bus schedules met the public's needs.

To ensure the bus schedules meet the public's needs, PTD relies on various planning tasks performed by PTD staff, contractors, and other stakeholders. Some of the key tasks include various committee meetings and rider surveys. We reviewed supporting documentation to determine if meetings were held and if surveys were conducted to plan for the public's scheduling needs.

Three key committees in the bus scheduling process are the Service Scheduling Committee (SSC), the Citizen Transportation Commission (CTC), and the Service Planning Work Group (SPWG).

- **SSC** – The committee's purpose is to discuss safety-related conditions of bus operators and scheduling conditions such as running times, layovers, and other scheduling processes. Meetings are held on an as-needed basis, with a requirement of at least four meetings within a 12-month period. The committee is represented by the labor union and each contractor. Valley Metro also attends committee meetings to summarize meeting notes and ensure the contents are communicated to the City. We obtained evidence from PTD for the January,

February, and April 2024 SSC meetings and noted procedures were in place to document and track issues identified and their resolutions.

- **CTC** – The commission represents various facets of the community and oversees the Transit-2050 plan. The CTC meets monthly to address transit needs and make recommendations. These meetings are open to the public. We obtained evidence from PTD for the June 2023 CTC meetings and noted the October 2023 bus schedule changes were presented to the committee for review.
- **SPWG** – The committee's purpose is to strategize and plan for various events or changes that could impact schedules. Meetings are held monthly and include various stakeholders from PTD and Valley Metro. We obtained evidence of the meetings held from January through June 2024 and noted meetings were held each month and various scheduling items were addressed, including service changes, ridership reports, route maps, and special events (i.e., Final Four).
- **Rider Survey** - Annually, a rider survey is conducted to identify information about transit passengers, how they use transit in the region, and identify changes in trip characteristics and ridership. The survey is also used to meet the Federal Title - VI requirements. In the 2023 survey, over 19,000 individuals participated in the survey and identified various rider information, including gender, ethnicity, income, disability, types of rider routes, and reasons for trips.

Through these committees and the data obtained from the annual survey, PTD gathers information and implements strategies to plan bus schedules that meet the public's needs.

Bus schedule information was communicated to the public.

We reviewed the various communication methods used to communicate bus schedule information to the public and found schedule information available online and through a mobile application. Additionally, riders can obtain schedule information by texting codes posted at bus stops to receive instant bus schedules and route information, or they can obtain schedule information by calling or emailing Valley Metro. During our testing of routes noted in Observation 3, we found that the published schedules aligned with information displayed at the bus stop, bus displays, and the Valley Metro app.

PTD actively monitored the interaction between contractors, labor unions, and Valley Metro with respect to scheduling issues that arose in the SSC meetings.

PTD staff do not participate in the SSC meetings, as noted in the collective bargaining agreement between PTD's contractors and their respective workforce, in order to maintain the proper relationship between contractors and Valley Metro. However, PTD has a vested interest in the scheduling decisions, so the meeting contents between the labor union, Valley Metro, and each contractor are monitored by PTD. We obtained a synopsis of the meetings held between January 2024 through April 2024. Scheduling issues were identified and discussed during these meetings. Valley Metro summarized the discussions, documented them on a spreadsheet, and shared them with PTD.

PTD makes final decisions on scheduling changes, and the contractors must apply the route changes in accordance with each contract. To determine if PTD had procedures in place to address the identified issues, we reviewed the meeting summaries, noted delays identified by the committee for Route 50, and confirmed that PTD revised the schedule during the April 2024 run changes to address the delays. PTD's response appeared to address the committee's concerns in a timely manner.

Processes were in place to perform quarterly schedule updates. About 10% of the time, PTD required manual intervention.

The HASTUS, Clever Device, and GTFS applications are critical in the bus scheduling process and communication of the bus schedules, which are planned for a three-month period (quarterly). The HASTUS application displays bus schedules in blocks. Schedule and route updates are downloaded to the buses via the Clever Device interface. The bus operator relies on the bus schedule received via the Clever Device. PTD staff noted that approximately 10% of the buses need to be manually updated with the bus schedule information; that is, the Clever Device interface does not communicate the bus schedule to the bus, which then requires a manual update by staff.

During our testing of routes noted in Observation 3, we found that the published schedules aligned with information displayed at the bus stop, bus displays, and the Valley Metro app.

The customer assistance form was a reliable medium for riders to communicate bus schedule complaints, suggestions, and requests for service.

Riders can report customer service issues related to scheduling through the customer assistance form (CAF), accessed via the Valley Metro website. Contractor staff are responsible for responding to the customer assistance forms. PTD staff monitors the forms submitted to identify the requests and resolutions. This information is incorporated into the next service change.

We tested the process by submitting a sample request through the CAF, and a representative reached out within 24 hours. Additionally, we obtained a list of CAF requests related to scheduling for October 2023 through April 2024. We noted 29 schedule-related CAFs for Phoenix routes during this period, which included incidents, suggestions, and requests for service. We found that all items had a documented action or resolution.

Procedures were in place to monitor bus schedule delays.

The success of the bus program relies on the buses completing the routes within the designated schedule. As drivers experience delays, information is communicated to the Operations Control Center. PTD staff noted that this information is compiled into monthly reports to identify route delays. We obtained copies of the January through March 2024 delay reports, which identified schedule delays by bus and route and noted the reasons for the delay. PTD staff indicated the reports are used to evaluate routes and to identify potential schedule changes.

Recommendations

None

2 – Revenue Miles

Background

A revenue mile is defined as the distance a vehicle is available to the public while carrying passengers. Revenue miles exclude times when the vehicle is traveling deadhead miles (leaving or returning to the yard, or changing routes), providing charter service, or performing maintenance testing.

PTD defines the revenue mile totals by route for planning public transportation services. Each contractor bids on services they will provide based on the number of revenue miles that PTD has calculated for the quarter. The total number of revenue miles is known and published in the contract at the time of the agreement, but it changes with the City's needs, so it is not a set number but rather becomes a range.

The HASTUS software uses GIS maps to tie each stop together in a route. The revenue miles are automatically calculated on each route after subtracting the pull in/out and deadhead miles. Each route is created from these maps, and the miles of each route are plotted into a summary based on the number of buses serving on the route on a given day. PTD exports HASTUS data to a spreadsheet outside the system to review and summarize route changes and total revenue miles.

We obtained route and distance data directly from HASTUS data exports and tested the data against PTD's scheduling spreadsheets to ensure bus routes are scheduled accurately and that revenue miles align with the contracted amounts.

Results

All North/South facilities routes in HASTUS matched the PTD scheduling spreadsheet.

PTD exports HASTUS data to a spreadsheet outside the system to review and summarize route changes and total revenue miles. We selected the North/South Facilities to reconcile the most recent route changes prepared by PTD Scheduling to HASTUS to ensure all bus routes for the North/South facilities were accurate and that revenue miles aligned with contracted amounts.

For the North/South facilities, PTD schedules 27 local and circulator routes and 6 RAPID routes. All routes in HASTUS matched the PTD scheduling spreadsheet. Per the contract, there were 14,583,740 total base annualized revenue miles for the local and circulator routes and 665,572 miles for the RAPID routes. The Phoenix area routes are subject to many changes, and route revenue miles change. In the most recent bid (April 2024), two changes occurred to routes #50 and #154 that modified the revenue miles from the last quarter. Explanations for the changes appeared reasonable and documented in the spreadsheet. Total annualized revenue miles in HASTUS were appropriately adjusted for the April 2024 bid to 14,288,540 and 532,948 revenue miles, respectively.

The contract states that revenue miles can vary by plus or minus 10% over the contract term. For local routes, the April 2024 figure was -2.02%. However, the RAPID routes varied by -19.9%. In July 2020, PTD executed a contract change order with the contractor to use COVID-19 assistance when revenue miles were reduced as a result of the pandemic. Accordingly, the reimbursement structure provided up to a reduction of -60% in revenue miles. Therefore, the -19.9% difference between annualized revenue miles for RAPID is still within contractual limits. All revenue miles in HASTUS are accounted for with the Scheduling spreadsheet, and revenue miles in total annualized amounts are within ranges specified in the contract.

Recommendations

None

3 – Technology

Background

PTD relies on various technologies to develop and maintain the bus schedule program:

- HASTUS – provides bus schedule development and maintenance services. This information is updated quarterly so it displays current roadway construction and other events that impact routes.
- Clever – provides computer-aided dispatch (CAD) and automated vehicle location (AVL) services to manage the fleet by tracking and displaying vehicle location and schedule adherence. The system tracks bus on-time performance and collects data relative to bus operations, incidents, and accidents. PTD monitors vehicles using the Clever CAD/AVL system.
- General Transit Feed Specification (GTFS) – updates all other services, such as Google Maps and the Valley Metro app, with current bus route information.

We interviewed staff and reviewed system reports to understand how the systems are used in the bus scheduling program. Additionally, we evaluated procedures to ensure the accuracy of the system data.

Results

Procedures to validate the accuracy of Clever data can be improved through regular monitoring of data.

We tested the accuracy of Clever arrival and departure data by observing actual arrival and departure times on several commutes between downtown Phoenix from North Phoenix to ensure Clever data was representative of actual arrival and departure times.

We tested a limited sample of route arrivals and departures and found anomalies in our sample, such as the departure time in Clever and the underlying GPS data did not match the time noted by the auditor when conducting a physical observation.

We interviewed PTD staff to identify the procedures for validating the accuracy of the data in Clever. Staff noted that data is not validated on a regular basis; rather, random checks are performed. Although our testing example was small compared to the number of data points in Clever, staff agreed that the potential pervasiveness of the error merits additional consideration for data monitoring to ensure accuracy.

Administrative access was granted to appropriate individuals.

We identified 256 user accounts, including nine employees with administrative access. Administrative access allows staff to modify the application. All nine administrators were active employees and members of the PTD Business Applications team. No exceptions noted.

PTD requires a security access form (SAF) to set up access for HASTUS users. This form contains the individual's name, ID, provisioning information, and requested access levels. We judgmentally selected a sample of 14 SAFs – representative of various roles to confirm the user access was authorized. The results are as follows:

- 8 SAF forms passed with no issues.
- 5 SAF forms did not show access to HASTUS was requested.
- 1 SAF form could not be provided.

When PTD initially implemented HASTUS implementation, some users who already had documented access to other PTD systems also received HASTUS permissions without needing to file an additional Security Access Form (SAF). When documentation is not maintained properly, there is a risk that users may be set up with greater access than the least privileged access required by *City IT Standard S1.3 - Identity Management*.

Procedures were in place to update systems with scheduling updates.

The HASTUS, Clever Device, and GTFS applications are critical to the bus scheduling process and for communicating bus schedules, which are planned for a three-month period (quarterly). The HASTUS application displays bus schedules in blocks; schedule and route updates are downloaded to the buses via the Clever Device interface. The bus operator relies on the bus schedule received via the Clever Device. When schedule updates are required, usually quarterly, we noted PTD staff have documented procedures in place to process the updates. PTD staff noted that approximately 10% of the buses need to be manually updated with the bus schedule information when the download is unsuccessful.

We observed 16 instances of bus pick-up or drop-off to determine if the times aligned with the implemented schedules. Overall, found that the bus schedule information displayed on the bus, signage, and the Valley Metro app was consistent with route information. We noted the signage information, and the Valley Metro app would reflect the approximate arrival time, and the app would show if the bus was delayed.

Recommendation

3.1 Conduct a regular review of the accuracy of Clever data to ensure the data support actual arrival and departure times.

Scope, Methods, and Standards

Scope

We evaluated the bus scheduling program in effect from October 2023 through April 2024.

The internal control components and underlying principles that are significant to the audit objectives are:

- Monitoring Activities
    - Management should establish and operate monitoring activities to monitor the internal control system and evaluate the results.
    - Management should remediate identified internal control deficiencies on a timely basis.
- Control Activities
    - Management should design the entity's information system and related control activities to achieve objectives and respond to risks.
- Control Environment
    - The oversight body should oversee the entity's internal control system.
- Risk Assessment
    - Management should identify, analyze, and respond to risks related to achieving the defined objectives.

Methods

We used the following methods to complete this audit:

- We interviewed PTD management and staff.
- We reviewed PTD bus scheduling policies and procedures.
- We reconciled revenue mile scheduling changes to the system of record.
- We tested user access level permissions to the system of record.
- We reviewed the accuracy of the Clever GPS arrival/departure times.
- We tested bus schedule communication across certain platforms/mediums.
- We reviewed processes for monitoring specialty events.

Unless otherwise stated in the report, all sampling in this audit was conducted using a judgmental methodology to maximize efficiency based on auditor knowledge of the population being tested. As such, sample results cannot be extrapolated to the entire population and are limited to a discussion of only those items reviewed.

Data Reliability

We assessed the reliability of the HASTUS and Clever data by (1) performing electronic testing, (2) reviewing existing information about the data and the system that produced them, and (3) interviewing agency officials knowledgeable about the data. We determined that the HASTUS data was sufficiently reliable for the purposes of this audit. Our testing raised some concerns regarding the Clever data, resulting in recommendation #3.1.

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. Any deficiencies in internal controls deemed to be insignificant to the audit objectives but that warranted the attention of those charged with governance were delivered in a separate memo. We are independent per the generally accepted government auditing requirements for internal auditors.