4MATIV

Prince George's County Public Schools Comprehensive Transportation Audit & Opportunity Analysis

January 2024

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Table of Contents

I. Executive Summary

PROJECT OVERVIEW

In September 2023, Prince George's County Public Schools (PGCPS) contracted 4MATIV Technologies (4MATIV) to conduct a Comprehensive Audit and Opportunity Analysis of PGCPS student transportation operations. The district estimated they were short as many as 200 drivers daily in order to provide adequate coverage to support the operation and get students to and from school on time. The daily "doubling up" and looping of routes to ensure all routes were covered with available drivers had resulted in chronic lateness. District transportation staff struggled daily to come up with patchwork solutions to address system performance, to pinpoint the extent of daily disruptions and changes, and to communicate in a timely manner to families and schools. Recruiting, hiring, and retaining enough drivers to fill the gap proved an additional enormous challenge, exacerbated by high rates of leave.

In light of all these challenges, the district sought a broad external review of its student transportation operations that evaluates the current system's efficiency, performance, equity, and holistic sustainability. Such an external review should produce recommendations for how PGCPS transportation services could be optimized and strategically differentiated to meet individual student needs.

This audit is intended to enable PGCPS leadership and stakeholders to develop an evidence-based understanding of the present student transportation system, leveraging both rigorous qualitative and quantitative analysis. Much deeper than a mere site visit or document review, and much richer than a straight statistical or geospatial evaluation, 4MATIV's mixed methods approach ensures that all audit conclusions and recommendations are grounded in authoritative evidence.

The Comprehensive Audit is oriented towards improvement and positioning PGCPS to take meaningful action. Commonly, reviews of school district transportation recommend system analysis as a follow up action; this audit integrates such rigorous evaluation in order to gather all relevant facts for consideration, pressure test assumptions, address likely questions, and prepare the district for swift and responsible action.

Throughout this Comprehensive Audit and Opportunity Analysis, prioritized recommendations for near-term and longer-term implementation are identified—thereby supporting PGCPS to undertake immediate steps to further stabilize and improve student transportation during the current school year while the community explores and plans solutions for subsequent years. Recommendations balance the need to make urgent and substantive progress for the students and families experiencing transportation challenges today with the acknowledgement that lasting change requires thoughtful strategic planning and continuous improvement over time.

Collaborative efforts with key stakeholders, including Transportation department staff members, school administrators, parents, and students were integral to this audit and to the subsequent implementation of recommended solutions.

The Comprehensive Audit and Opportunity Analysis is composed of ***seven main sections***:

II. *Executive Summary*: Synopsis of 4MATIV's approach and summary of key findings and recommendations.

III. *Landscape:* Summary of the Prince George's County Public School's system, state regulations and district policies in regard to the transportation system.

IV. *Service Configuration:* Synopsis of current PGCPS efficiency indicators such as service and utilization levels, route time and duration and bell time balance.

V. *Supply:* An overview of the district's assets, contracted services and modal mix.

VI. *Organizational Capabilities:* Outline of organizational capacities related to district leadership, management, communication, technology, strategic data use, and driver hiring and qualification.

VII. *System Performance:* An understanding of performance measures, including trip coverage, on-time status, vehicle tracking, and staff attendance.

VIII. *Resource Stewardship:* Synthesis of the PGCPS transportation system's cost framework and allocations, with financial analysis by key units (e.g., by student, vehicle, vehicle type, etc.).

Our hope is that this audit will serve as an instructive guide for the district and its community partners as Prince George's County Public Schools endeavors to provide comprehensively excellent student transportation service.

METHODOLOGY AND APPROACH

This Comprehensive Audit and Opportunity Analysis is designed to produce a holistic review of the current state of PGCPS student transportation operations, summarizing key facts and outlining recommendations for ongoing improvement. The team's methodology incorporated a combination of qualitative and quantitative research methods, including focus groups, structured interviews, on-site observation, artifact review, and extensive system data collection and analysis.

Site Visit

4MATIV conducted a site visit from October 16-17, 2023 in order to gain firsthand knowledge of the operational aspects of the PGCPS transportation system, assess infrastructure, and observe day-to-day activities. During the visit, 4MATIV team members toured district transportation facilities including bus terminals and maintenance areas, observed morning and afternoon pullout from various terminals, observed dispatch and phone bank operations, conducted group and individual interviews with key personnel at multiple levels of the operation, and gathered relevant artifacts. The full site visit itinerary is detailed in the Appendix.

Focus Groups and Interviews

Data collection involved a mix of in-person sessions during the two-day site visit and subsequent virtual interactions. Multiple focus groups and interviews were conducted to capture diverse perspectives from major stakeholder groups, including students, parents, school staff, central office personnel, and district leadership. These sessions were structured to encourage open discussions, allowing participants to share their experiences, concerns, and suggestions freely.

Data Gathering

In addition to the qualitative information described above, 4MATIV collected a broad set of quantitative data, including student-, school-, vehicle-, and route-level descriptive data, the district's own analysis of its costs and raw cost information, staffing records, and key operational data collected throughout the system. Data obtained through documentation was cross-referenced with on-site observations and interviews.

Data Synthesis and Analysis

4MATIV combined insights from diverse sources—interviews, focus groups, on-site observations, and comprehensive information gathering—to create a cohesive dataset. The assembled holistic data set provides a detailed understanding of the current PGCPS student transportation system, incorporating qualitative narratives and quantitative evidence to pinpoint areas for potential improvement. Employing qualitative and statistical analyses and leveraging its own proprietary modeling and other rigorous quantitative methods, 4MATIV uncovered insights, identified crucial areas of inefficiency that require attention, and proposed opportunities for strategic improvement in the near-term and long-term future.

KEY FINDINGS

- ***Trip Characteristics:*** As of October 2023, PGCPS operates 5,334 trips daily with 2,651 in the morning and 2,669 in the afternoon. Trips are bundled into 1,095 routes. Currently, 1,051 trips (20 percent) are not assigned to a vehicle, requiring daily problem solving to ensure full trip coverage among available drivers. Across PGCPS, the mean distance from a student's home address to their assigned school is 2.99 miles. The typical trip covers a distance of 17.2 miles, lasting an average duration of 61.8 minutes.

- ***Bell Times:*** The majority of morning trips are assigned to schools with bell times that start at 7:45 AM or earlier. The current distribution of trips by bell time is not well balanced nor aligned in the AM and PM. This misalignment and lack of balance results in inefficiency, with disproportionate needs during the first service tier, even if trips are optimally paired to maximize the number of trips that any one vehicle can complete.

- ***Service Levels:*** The average student's stop is located 0.24 miles from their home, even though district policy permits stop locations up to 1.5-2.0 miles from a student's home. This equates to an average stop distance policy utilization rate of just 12.2 percent. A third of transported students have an assigned bus stop located less than 0.10 miles from their home. Throughout grade spans, students on average travel approximately the same distance to their assigned bus stops despite the district policy design for stop distance to increase as students mature. Service for students with disabilities is not sufficiently or strategically differentiated, with every student receiving transportation as a related service assigned curb-to-curb transport.

- ***Walk Boundaries:*** Every day, the district transports thousands of students who live within the Board-designated walk boundary—more than twenty-two thousand students in SY23-24. As a proportion of the total transported student population, students residing within walk boundaries who nonetheless receive daily transportation account for 26 percent of all riders. Almost seven thousand students who live within one mile of their assigned school receive daily transportation, with the vast majority of these students (86 percent) in elementary grade levels.

- ***Modal and Vendor Mix:*** The district has a monolithic supply that is currently centered almost exclusively on the provision of yellow bus services. PGCPS is experimenting with the use of smaller vehicles and outsourced service providers but has not yet exploited this opportunity to its fullest. Similarly, some students currently already walk or bike to school, use public transit, or carpool with other families, but these modes are not strategically supported by PGCPS in a way that might meaningfully reduce the need for yellow bus service provision.

- ***Utilization:*** 41 percent of seats are unoccupied on the typical trip. The typical vehicle completes 5.28 trips per day. Opportunities exist across all vehicle types for enhanced seat and trip utilization.

- ***Staffing:*** Transportation is understaffed in its driver and bus aide ranks. The department also lacks analytical and technical capacity.

- ***Process Implementation:*** A formalized process for tracking ridership generally or recording student non-riders (chronic "no shows") does not exist. Limited management and attention to both pre-check procedures and on-time departure from terminals was observed over the course of yard visits. The observed practice for addressing "no call/no show" drivers appeared unreliable and likely to result in uncovering an issue too late in the schedule to maintain on-time performance. PGCPS Transportation staff cited extreme annual challenges related to receiving student data from the Enrollment and Special Education Departments far behind required deadlines.

- ***Communication:*** Families express that their biggest pain point is unsatisfactory responsiveness and communication, with extreme challenges getting through and getting useful information when they contact Transportation.

- ***Technology:*** Staff indicate that Transfinder has performance issues, frequently times out, and has limited reporting capabilities. Zonar tablets frequently do not function, lack connectivity, or drivers have difficulty signing on. GPS tracking using Zonar is functional 95 percent of the time, according to data provided by PGCPS staff. However, there is not an established procedure for ensuring accurate GPS tracking of trips in real-time. The Transfinder system is also unable to associate a vehicle with multiple trips at once, so when trips are doubled up (as they commonly are), they are unable to be tracked in the StopFinder app. The PGCPS team reports that the vendor is making progress addressing challenges. The Transfinder technical support team is a critical player in the upcoming migration of the district's student information system. The SIS and Transfinder routing systems have multiple critical points of integration that must function flawlessly. Adequate time must be allotted to test these integration points during the SIS transition.

- ***Strategic Data Use:*** The Transportation department does not have a developed system and practice for using data to set goals for performance management. While the Department reports that the data they need to manage performance exists and is available, they report that data is often difficult to access in a useful manner. Manual entry into spreadsheets and databases is common, resulting in data accuracy issues and delays. Interviewees frequently expressed skepticism about how members of other employee groups and teams were held accountable for results and communicated a lack of understanding of how their work impacted other colleagues or organizational workflows overall.

- ***Driver Hiring and Qualification:*** The process to hire and qualify drivers is long and inefficient, taking 10-16 weeks in many instances, resulting in a large percentage of drivers dropping out along the way. Candidates must pay up front for multiple steps in the process and make their own appointments to go to varying locations to complete key steps.

RECOMMENDATIONS AND OPPORTUNITIES

Recommendation 1. Align and Balance School Bell Times

To streamline operations and enhance efficiency, aligning and balancing bell times is needed.

If the district perfectly aligned bell times, keeping all other service details and student assignments unchanged, it would reduce the required number of vehicles to fully cover the district's current trips from 1,008 to 889. This substantial decrease of 119 vehicles would significantly reduce the current driver shortage and produce robust cost savings. At a current cost of $779.74 per vehicle per day, the district could save up to $92,000 per day and $16.9 million dollars annually through bell time optimization.

Recommendation 2. Strategically Differentiate Service Levels and Consolidate Stops

The district should strategically differentiate service levels by consolidating stops in a targeted and student-specific manner (for instance, with consideration of grade level, school program, accommodation status, neighborhood, etc.) in order to increase operational efficiency and personalize service.

Strategically increasing service levels would allow for the removal of 22 percent of stops across the system. As a result of the scenario modeling, overall average stop distances increase from 0.24 miles in the base state (October 2023 actual) to 0.46 miles in the post-optimization example. While average stop distances are roughly doubled, the typical student is nonetheless still traveling far less than the stated policy maximum of 1.5 miles for elementary students and 2.0 miles for middle and high school students. Students in grades PK-5 are simulated to travel 0.44 miles to their stop (29 percent policy utilization) while secondary students are simulated to travel 0.48 miles to their stop (24 percent policy utilization).

Despite modest increases in stop distances across the system in 4MATIV's simulation, significant efficiencies are achieved. In the post-simulation state, the district is modeled to operate 443 fewer trips (a reduction of 8.3 percent). Moreover, while there are more than one thousand unassigned trips in the base state, the optimization model assigns every student to a trip and every trip to a route, vehicle, and terminal. As a result of targeted stop consolidation and strategic differentiation of service levels, each trip has higher seat utilization, with 9 percent more students per trip, resulting in fewer trips and therefore fewer vehicles and drivers required. The post-optimization model results in a decrease of 69 vehicles. Using current FY24 costs, this reduction would save the district $9.8 million dollars annually.

While students with transportation accommodations are excluded from the simulation exercise because it would be difficult to systemically model appropriate adjustments to their service levels, there is ample opportunity to strategically differentiate service for these students. Personalizing mobility support is especially important when an Individualized Education Program (IEP) team determines that transportation is a related service for a student. Personalized mobility support is designed to align with accomplishing a learner's identified IEP goals, with an intention to provide access to the least restrictive

transportation environment, and with consideration of the learner's unique strengths and needs. A school system that is differentiating transportation service for students with disabilities provides a spectrum of mobility solutions. To facilitate the provision of more nuanced and personalized accommodations, PGCPS should provide clear guidance to IEP teams and a suggested protocol for reviewing and determining transportation accommodations. Such guidance should outline the spectrum of mobility options that could be provided and the purpose or benefit of each support.

Recommendation 3. Audit Walk Boundary Safety Zones

The district should implement a formalized approach to auditing system-level safety zones and student-level walk boundary exceptions in order to ensure a consistent and equitable exemption process, identify instances where it is reasonable to enforce standard transportation eligibility criteria, and pinpoint areas where strategic investments in pedestrian infrastructure and/or adjustments to service design could resolve perceived safety issues.

The more than 22,000 transported students who reside within their school's walk boundary are distributed across 178 schools, with 84 schools having more than 100 such student exceptions. These walk boundary exceptions come at an extraordinary cost to the district. Prince George's County Public Schools would save more than $40 million dollars annually if no walk boundary exceptions were granted. The district incurs a cost of more than $23 million dollars annually from transporting elementary students who reside within their school walk boundary and an additional $17 million dollars annually from transporting middle and high school students who reside within their school walk boundary.

Implementing a standardized annual process for auditing walk boundary exceptions and identified safety barriers would ensure a more systematic and evidence-based approach is taken and has the potential to enable the district to modeshift many students off of routed vehicles by addressing the root causes. PGCPS does not have a formal observation tool or standard operating procedure for evaluating safety barriers, nor formal guidance that defines the circumstances under which to conduct site observations. Additionally, there is no codified procedure for documenting safety concerns, entering existent barriers into the district's routing system for systemic implementation, or a clear process for reviewing exemptions before they are enacted to ensure consistency and equity. Furthermore, there is no schedule for periodically reviewing barriers and granted exemptions to determine whether the identified safety issue remains an active concern.

Separately, infrastructure upgrades—such as signals, crosswalks, speed humps, and speed limit adjustments—and the addition of strategically-placed crossing guards could greatly reduce walk boundary exceptions across the system. Likewise, PGCPS presently provides the same level of service for students who have an identified safety exception rather than providing transportation from a stop location that is just before a barrier. Identifying safe community stops that are as close to identified barriers as possible would maximize vehicle seat utilization and potentially enable the same vehicle to complete multiple trips in quick succession, thereby diminishing the cost impacts from walk boundary exceptions without requiring students to cross safety barriers.

Recommendation 4. Diversify Modal and Vendor Mix

PGCPS should build upon nascent efforts to diversify its modal mix by increasing the use of smaller vehicles for low-density trips, thereby diminishing the demand for CDL drivers.

4MATIV looked specifically at the large opportunity to use allowable non-CDL-required sedans and vans (from six (6) to ten (10) passenger capacity) in lieu of CDL-required school buses wherever possible where routing ridership on trips can at best be nine (9) students or less. Recruiting and hiring non-CDL drivers, procuring and operating these smaller passenger vehicles, and finding and managing qualified outsourced providers for a portion of the district's low-density trips would be far easier than serving these trips with scarce CDL drivers and the district's buses–and it would save the district a lot of money. Furthermore, having a mix of in-house and outsourced options in this category specifically would give the district flexibility to supplement its peak and most complex needs, and would create a dynamic of competition amongst vendors to maintain better service and pricing.

Recommendation 5. Expand Alternative Supply Options

PGCPS should enact an intentional strategy around promoting and supporting low-cost alternative modes of transportation for students within the district where such options make sense—delivering equivalent or better service.

While this report does not analyze in detail or project the impact of switching students from buses and vans to public transit, payment in-lieu, or parent carpools, we nonetheless believe there is a real opportunity for the district to be more intentional in its promotion of these modes and to perhaps launch some pilot programs in the coming year to explore the community's appetite for expanding such programs. We recommend a near term deep analytical dive into transit feasibility as it is clear a large number of students already use this mode daily, passes are free for students, and it could represent an easy way to make some shifts off yellow buses. A "walking school bus" program is a strategy we recommend in tandem with careful safety audits and crossing guard deployments to enhance safety and create more support around shifts to more walking within the walk zone, to overcome safety barriers, or to even expand walk zones. Carpool apps should be offered where parents are already driving in large numbers and parent car traffic has become a burden on school curbside operations or to local neighborhoods. Finally, parent payment in lieu of district-offered services, should be piloted first with the district's farthest flung specialty programs, where low density means an expensive sedan or minivan is a better option than a bus, but a monthly stipend to a family is a better option still.

Recommendation 6. Implement a Codified Opt-Out Practice

The district needs to implement a formalized process for recording ridership, daily student non-riders (chronic "no shows"), or intermittent riders. PGCPS should also actively promote an "opt-out" option and consider providing appropriate incentives.

Regular ridership audits and good systems for monitoring repeat "no show" riders are key to maintaining efficiency. Simply asking families to "opt-out" and making that a more prominent and promoted part of enrollment would capture more of these non-riders before they are ever routed, and immediately reap gains of fewer students to route at the beginning of each year. Families should be reminded that if they don't need a bus ride daily their opting-out saves the district money and allows those students that truly need the bus to have more reliable service. Observed intermittent riders might be offered a small regular stipend in lieu as an incentive to fully opt out, together with the option to ride from a community stop that might be outside the normal service level zone for their grade. Currently the district's default assumption is that all students who were routed the prior school year will be routed again the following school year, and on and on.

Changing the default assumption in the enrollment process and year-over-year to be that families will not receive transportation unless they affirmatively elect it, or "opt-in", is another way to better capture those families without a real need for transportation service. This approach could yield greater modeshifts than an opt-out approach; however, it can be fraught if the instructions are unclear (such as for families whose first language is not English), or if some families do not receive the communication. Additionally, unrouted families that request to be added back to routes within the first weeks of school could be disruptive. Nonetheless, an opt-in strategy can be executed successfully with a concerted, long-term communications strategy and deep community engagement.

Recommendation 7. Strengthen Organizational Capabilities Through Strategic Staffing

PGCPS needs to strengthen its data and analytic capacity by providing additional training and data support for routers and supervisors, while also hiring dedicated data analysts. On the driver side, the streamlining of administrative processes and the process of qualification and hiring is critical to maximize the conversion of recruits into qualified drivers.

The transportation team overall is in dire need of additional data and analytical capacity. In particular, the routing team needs technical training and professional development on data use, technology, and strategic routing methods. Supervisors and other staff also need more data fluency and support in the management of critical data systems and use of those systems to manage performance. To bolster general analytical and data capacity across the team, the district should hire two data analysts who can manage large data sets and the flow of data across multiple systems, calculate key performance indicators and present data in a way to support performance management and decision making. The district should also consider a re-alignment of roles between the routing team and supervisors that allows for more holistic relationship management and customer success assurance for schools that cuts across routing (and setting other "business rules" for service provision) and customer service, while operational performance management at the terminals and management of drivers could be more terminal-specific.

4MATIV recommends two areas of improvement on the administrative side of driver management that will help alleviate the current driver shortage and help maintain driver staffing levels going forward. First, 4MATIV recommends launching a taskforce to meticulously review extended leaves of absence

for drivers case-by-case with a cross-functional team of staff (including Legal, Special Education, Transportation, and other departments), to expeditiously bring these cases to resolution while ensuring adherence to collective bargaining agreements.

Second, 4MATIV recommends a set of adjustments to the current driver hiring and qualification process that in combination should reduce the time it takes for drivers to get through the process and provide more structured support and engagement to candidates to retain them through the process to completion. Some of our key process recommendations are as follows:

- Give candidates a checklist of step-by-step instructions and expected time duration for each stage of the hiring process until they can actually start working and get paid.
- Pay for and provide centralized, on-site provision of key steps in the qualification to reduce costs for candidates and remove the burden for candidates of making appointments and traveling to multiple different sites. These specific steps include MVR checks, fingerprinting, processing of background checks, DOT physicals, drug screens, and TB tests.
- Extend test prep and support services via office hours or additional structured tutoring to help candidates get through the theory exam for their CLP and throughout the CDL final exam process.
- Enrich the district's candidate tracker with alerts and mandatory weekly (or more frequent) touchpoints by staff to check in with candidates and guide them through the process.
- Offer incentive pay to get through the various steps in the process, notably passing the theory test and acquisition of the CLP.
- Consider mandating the temporary hire of all trainees as bus aides for the CDL training period.
- Limit trainers' time driving or prohibit the practice altogether so they can focus on driver candidate support, training, and general engagement with candidates.

To accomplish these process improvements, the district may need additional staffing capacity in the Human Resources department devoted exclusively to recruitment, retention and development for drivers and bus aides.

Recommendation 8. Adopt User-Centered Design to Enhance Customer Service

The district should design systems, tools, and processes based on the needs of students and families in order to enhance customer service, rebuild trust, and improve student transportation outcomes.

There is not currently a deep overriding focus on the needs and experiences of the primary "users" of the Transportation department's services—students and families. Instead, management and leadership are primarily concerned with execution of their responsibilities and seem to design processes with staff perspective in mind. Beyond service reliability issues, families expressed that their biggest pain point continues to be a lack of communication and extreme challenges getting through and getting useful information when they contact Transportation. Parents even expressed empathy about the challenges the district is confronting regarding finding driver coverage; they just want more proactive communication when there are substitute vehicles and accurate ETAs when vehicles are running late.

The department's lack of focus on student and parent user experience is not due to an absence of staff member service-orientation, but more indicative of the tools and systems that staff members have at their disposal. For example, the process for documenting "doubled" trips is not designed to meet student and parent needs and the practice of assigning buses to drivers for multiple years and permitting drivers to take home their vehicle keys prioritizes the preferences of drivers over the system's operational objectives. Centering the needs and experiences of students in decision-making and the design of departmental processes will improve customer service and is more likely to generate solutions that accomplish district priorities.

Recommendation 9. Streamline Technology, Providing Support & Accountability for Use

PGCPS has invested a great deal in hardware and software systems within the operation that can work well—albeit with some specific limitations—when properly configured, when infrastructure is adequate, and when users are trained, supported, and held accountable for using tools with fidelity. 4MATIV recommends evaluating some system changes for implementation in SY 25-26, but in the near term focusing on getting better use of the systems already in place to enhance service delivery.

The district's instance of Transfinder is workable but has some critical shortcomings that staff have cited. Zonar is a high-quality GPS hardware provider and their integration with Transfinder is proven and reliable. One of the most glaring gaps is the inability of Transfinder to understand and connect multiple trips to a vehicle when trips are "doubled up", which is unfortunately an everyday reality for the system as coverage remains strained. This specific challenge results in dispatch staff being unable to codify vehicle-trip assignments and parents on the StopFinder app being unable to track their vehicle. The district at a minimum needs to upgrade their instance of Transfinder to have access to the administrative view to see scheduled route information geospatially on a map next to actual vehicle location. This sort of functionality, as well as views for schools and real-time OTP monitoring is becoming "table stakes" in student transportation.

Zonar tablets allow for driver sign-on, and therefore dynamic vehicle-trip assignments, and navigation. These functions should be maintained, though the district should consider dropping the use of tablets for pre-trip and post-trip inspections because they're impracticable and cause other issues with the tablets, namely the repeated removal and plugging in of the units causes the charging ports to break down. Based on 4MATIV observations, pre-trip inspections might have better completion rates if PGCPS returns to a paper checklist and a basic attestation of daily completion from drivers. Drivers need more training as to the use of the tablets generally and the precise expectations for the daily sign-on protocols they're expected to execute.

Drivers should be incentivized for a high sign-on rate before each trip and terminal staff should monitor sign-ons in real time as their way to monitor compliance and OTP. Trainers and others should be out during AM and PM pullout providing tactical support and accountability. Terminal staff need more training in hardware and software support for tablets and they need capacity to diagnose broken tablets, order and install new ones. The phone bank, dispatch and terminal staff need training and defined protocols for how they are to monitor vehicle-trip assignments and be able to most readily

retrieve information about vehicle locations, sub vehicles, delays, and to pull other critical information from technology systems. Finally, the district needs to invest in server capacity, improved wifi, and cellular coverage at terminals, the shortcomings in which result in a number of challenges cited by terminal staff and drivers related to operation of both Transfinder and Zonar systems.

As a separate matter, the district's planned transition to a new student information system (SIS) poses substantial technical and operational risk with regard to the annual beginning of school year routing configuration. Timelines associated with this critical transition should also factor in testing and data validation across systems to ensure data flows are maintained.

Recommendation 10. Manage Performance and Enforce Accountability

PGCPS staff lack systematic methods of reviewing reliable performance data tied to defined key performance indicators (KPIs). The district should define key measures that are most tied to service that schools, students and families experience, and drive towards achieving them. The district also needs to instill accountability across the department and get top-level support for improving process compliance across other functional departments like Enrollment and Special Education, the lack of which currently produces many downstream challenges for transportation.

Limited management and attention to driver attendance, pre-check procedures, driver sign-on, and on-time departure from terminals was observed over the course of 4MATIV's yard visits. These are example operational systems where key data that are tied to "heartbeat" performance indicators are not recorded at all, are inadequate, or are disconnected from any systematic mode of measurement – and so cannot be used by management to improve performance. PGCPS needs to clearly define its key performance indicators and focus relentlessly on measurement and management around them.

Better systems and data will help enable more accountability, but leadership across the organization have to be willing to hold teams and managers accountable for performance. An example of where the district needs to demonstrate this sort of accountability with drivers and supervisors is in addressing the current practice that allows a driver to essentially "lock in" a specific vehicle for multiple years, resulting in changes to daily vehicles in operation simply to satisfy a driver preference. Another similar example is in codifying and making permanent those instances where improvised route coverage or "doubling up" of trips actually works.

An example of where support from top leadership is needed (and will be needed even more as recommended system design changes in this report are implemented) is in "holding the line" on service level changes and mode shifts where many vocal families or others might object. Exception processes must exist, but staff remarked that parents are adept at calling up the chain to get more accommodating service when they are not happy with what they have been offered. The transportation team needs support and assurances that this will not be the norm, and standardized protocols to ensure exceptions are granted in an equitable and evidence-based manner.

A final mission-critical example that cuts across departments is the oft-cited extreme annual challenges related to receiving student data from the Enrollment and Special Education Departments far behind required deadlines. This lateness represents a lack of system-wide accountability for timely registration, IEP review, decision making, and data transmission to Transportation, compounding the department's already difficult charge each year, and ultimately resulting in worse service for all families. The planned transition to a new SIS system—which is currently slated to require a one-month data freeze—adds another layer of complexity and increased risk, requiring increased discipline across the district in holding to (or even moving up) data transmission, registration, and IEP-review deadlines.

Recommendation 11. Ensure Reliable GPS Tracking is Linked to Assigned Trips

As a top priority KPI, the district should prioritize measuring the tracking accuracy of routes and trips in real time. PGCPS must ensure GPS data flows through to correct vehicle-trip assignments, and that accurate and timely vehicle location information is available to families and schools.

There is not an established procedure for ensuring daily vehicle-trip assignments are codified in Transfinder-Zonar or elsewhere that's readily retrievable by phone bank staff. This ultimately leads to the inability of parents to track their trips in the StopFinder app, phone bank agents' inability to get and relay accurate information to schools and families, a lot of wasted time and work by staff, and an inability to manage on-time performance effectively.

As explained in recommendation #9, some investment in existing systems, training, capacity, support, and accountability for use will help the team across functions. But nothing could be more important than driving data capture of GPS tied to assigned trips and routed students, and so this should be the district's first priority as it relates to performance management and improvement of data systems.

4MATIV recommends that the first-order series of KPIs to meet this charge should include [1] Percent of functioning GPS units and [2] Percent of trips properly associated with functioning GPS units in Transfinder or recorded electronically elsewhere. The trips recorded in Transfinder should accurately register AM and PM arrival events at schools while those recorded elsewhere may be documented via an improved stop-gap electronic system for capturing "doubled up" vehicle-trip assignments where Transfinder falls short.

Recommendation 12. Revise Operational Processes for Efficiency and Clarity

4MATIV recommends wholesale revision and redefinition of some key operational processes, tied to technology and data systems improvements recommended above, but also that which can be implemented to great effect irrespective of any changes in existing district technology systems. 4MATIV also recommends additional gap analyses to uncover other processes that may need revision and formal documentation.

Some notable processes (but not an exhaustive list) that we observed in the areas of terminal operations, communications, and routing are as follows:

- **Operational process:** Driver check-in monitoring for timely departure, attendance-taking, key control, and codifying and disseminating substitute driver and vehicle information.

- **Communications protocols:** Clear rules for when to communicate proactively with schools and families; scripts and templates for how to communicate in various situations; steps and expectations as to how to get accurate GPS information and trip assignments verified so only accurate information is communicated and future calls about the same vehicle-trip will be correctly configured.

- **Routing process:** Cleaning up of “dead stops” based on rider counts and no-show reports, annual “spring cleaning” of unused stops after the rollover and review of distances to stops for students passing specific grade thresholds or having IEP accommodations removed, zero-based trip pairing and yard assignments each year, and clear steps to evaluate co-mingling of students with accommodations and GenEd students on routes for additional efficiency.

Opportunity Analysis

Based on the comprehensive audit findings, 4MATIV has identified four primary opportunities to increase system efficiency and service quality. These opportunities are those that can be quantified in terms of measurable improvements to operations and costs. There are multiple other robust opportunities—such as enhancing customer service, implementing a strong performance management system, and ensuring reliable GPS vehicle tracking, among other recommendations delineated in this report—that will certainly translate to improved student transportation outcomes.

Opportunity	Operational Efficiency	Maximum Cost Savings
#1. Bell Time Alignment and Pairing	• Shift bell times later at enough schools to impact 300-400 trips • Eliminate up to 119 buses	$16.9 million annually
#2. Service Level Differentiation and Targeted Stop Consolidation	• Increase average stop distance from 0.24 miles to 0.46 miles • Remove 22 percent of stops • Eliminate up to 69 buses	$9.8 million annually
#3. Walk Zone Audits and Modeshifting	• Audit exceptions for 22,000 students residing in school walk boundaries • Eliminate up to 282 buses	$40 million annually
#4. Diversify Modal and Vendor Mix	• Switch more than 1,100 trips from buses to lower-cost vans or sedans	$13 million annually

The estimated cost savings in the table above are not additive, but rather each opportunity measures the theoretical possible savings from each respective strategy when executed in isolation on the current system. After executing on some measure of opportunities #1-3, for example, there will be far fewer candidate routes to switch from buses to lower-cost vans or sedans.

II. Landscape

SYSTEM OVERVIEW

Prince George's County Public Schools

Prince George's County Public Schools (PGCPS) is one of the nation's 20 largest school districts. PGCPS has 227 schools and centers, serves more than 125,000 students, and has nearly 22,000 employees. The school system serves a diverse student population from urban, suburban and rural communities located in the Washington, DC suburbs:

- *Race/Ethnicity:* 39.3 percent of students are Hispanic/Latino of any race, 0.37 percent are American Indian/Alaska Native, 2.7 percent are Asian, 52.2 percent are Black or African American, 0.2 percent are Native Hawaiian or Other Pacific Islander, 3.8 percent are White, and 1.3 percent are multiracial
- *English Learners:* 23.8 percent of students are English language learners
- *Free and Reduced Meals:* 60.1 percent of students are economically disadvantaged
- *Students With Disabilities:* 10.4 percent of students receive special education services

Department of Transportation (DoT)

The Director of the Department of Transportation and Central Garage (hereafter referred to as the Director of Transportation) reports to the Associate Superintendent for Supporting Services, who reports to the Chief Operating Officer. The Director of Transportation has five direct reports, including a Secretary, Systems Analyst, two Special Education Coordinators, and two other senior roles:

- Senior Transportation and Central Garage Supervisor: oversees the North and South Operations Support Teams (8 FTEs and 836 Drivers), the Routing Team (12 FTEs), and the Communication Center (16 FTEs)
- Central Garage Supervisor: oversees a Secretary, a Clerk Typist, and a Assistant Central Garage Supervisor who manages a Systems Network Control Clerk, a Clerk Typist, an Automotive IT Coordinator, a Warranty Parts Manager, an Automotive Trainer and four Foreman who manage Garages, Service Centers and Shops (152 FTEs)

As of October 2023, the Prince George's County Public Schools student transportation system transports 85,662 students, representing 68 percent of enrolled students.

- Over 4,200 students—accounting for five percent of all transported students—have a transportation accommodation requiring specialized transport such as a vehicle with a wheelchair lift, a harness, a transportation aide, curb-to-curb transport, etc.

- Older students account for a slightly disproportionate share of transported students. For instance, while students in grades PK-5 represent 45.2 percent of enrollment, they account for just 39.0 percent of transported students. By comparison, middle schoolers total 21.2 percent of enrolled students and 23.5 percent of transported students, while high schoolers constitute 30.4 percent of enrollment but 33.3 percent of the transported student population.
- The district operates 5,334 daily trips (2,651 in the AM, 2,669 in the PM, and 14 after school activity trips), which collectively account for 1,095 unique daily routes (a route is defined as a set of trips bundled together for a driver and vehicle to operate in a given day) in October 2023.
- To support this demand, the system currently utilizes a fleet of 809 active vehicles, 446 of which have a wheelchair lift and wheelchair securement positions. The fleet currently includes 442 additional vehicles - only a small percentage of which are leveraged currently as “active spares”.
- Just over 800 drivers perform the district’s routes daily—an estimated shortfall of 200 that would in theory be required to operate the current configuration of routes and schedules.
- PGCPS operates service out of thirteen terminals/bus lots: Bladensburg, Brandywine, Crossland, Douglass, Fairmont, Forestville, Friendly, Goddard, Greenbelt, Hanson, Laurel, Mullikin, and Surratsville. Though several trips originate from Brandywine, it primarily functions as a garage.
- The annual transportation budget for FY24 is $145.9M, allocated to cover maintenance, fuel, staffing, and other operational necessities.
- On average, the typical trip is 61.8 minutes in duration from the first student pick up to the last student drop off, covering 17.2 miles.
- Of the 227 PGCPS school buildings presently serving students, 217 received district routed transportation service.
- Across the district’s 227 schools, there are 21 unique morning (“AM”) bell times and 25 unique afternoon (“PM”) bell times to which transportation service must align.
- On average, the typical student resides 2.99 miles from their assigned school and their bus stop is located 0.24 miles from their home residence.

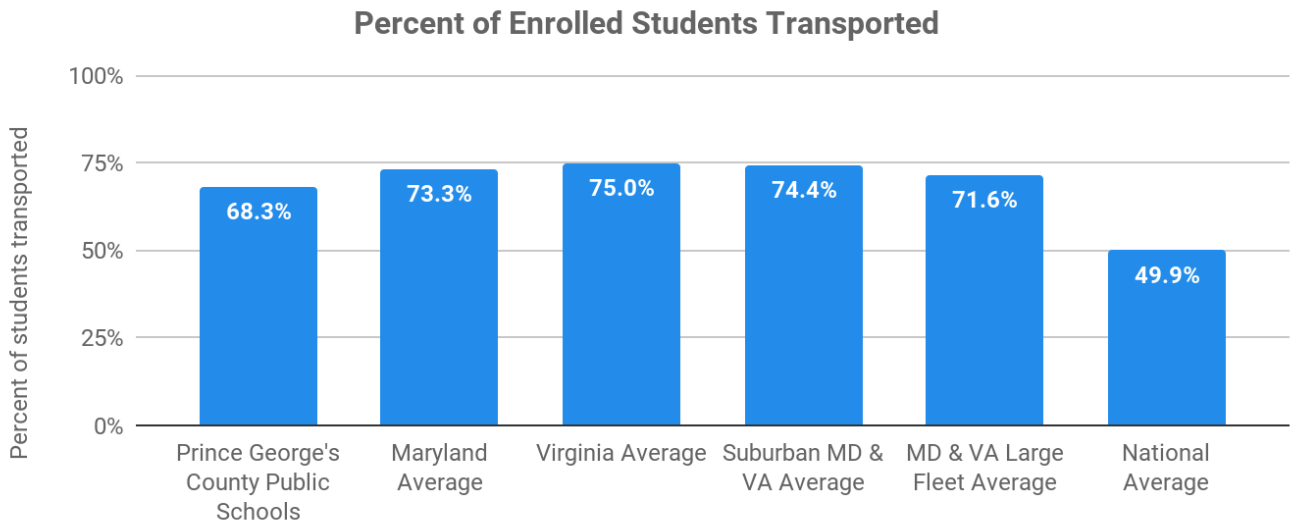
REGIONAL AND NATIONAL COMPARISONS

To contextualize the Prince George's County Public Schools system within regional and national context, 4MATIV synthesized information about student transportation system operations and costs for districts in Maryland, Virginia, and nationwide using publicly-available data sources and direct outreach. Data sources include reports from the National Center for Education Statistics (NCES)[1], US Bureau of Labor Statistics[2], Virginia DOE[3], Maryland DOE[4,5], School Bus Fleet[6], school district transportation department web pages, and direct outreach to school district transportation departments. Direct outreach was conducted via structured phone surveys with school district Directors of Transportation and Assistant Directors of Transportation in November 2023. Twenty-two of the 33 departments contacted across Maryland and Virginia participated in the phone survey.

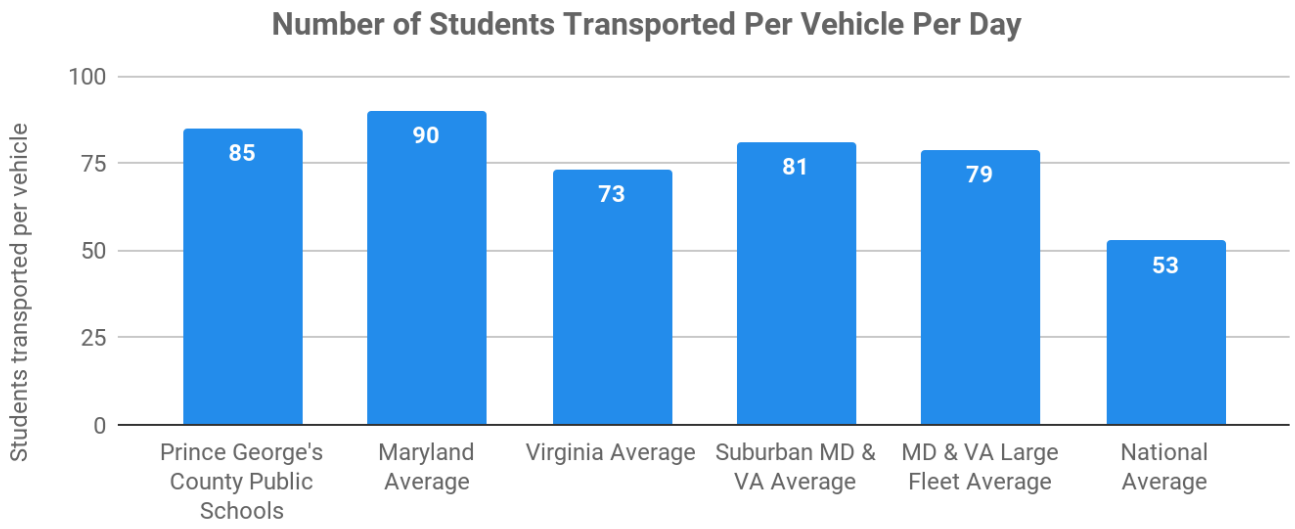
Notes	PGCPS	Maryland	Virginia	Suburban MD & VA	MD & VA Large Fleet	National Average
Percentage of enrolled students transported	68.3%	73.3%	75.0%	74.4%	71.6%	49.9%
Active fleet size	809	288	251	526	699	Not Avail
Average number of students transported per vehicle (across all trips)	85	90	73	81	79	53
Average number of routes per day per vehicle	2.71	2.74	1.94	2.23	1.98	Not Avail
Average number of students transported per vehicle round trip	31	33	36	34	36	Not Avail
Average roundtrip route length (miles)	91	86	117	86	89	Not Avail
Average number of miles per day per vehicle	130	106	78	85	74	68
Average percentage of buses operated in-house	100%	52%	97%	77%	84%	70%
Average percentage of buses outsourced	0%	48%	3%	23%	16%	30%
Starting hourly wages for drivers (in USD)	$21.13	$21.06	$20.34	$20.91	$21.15	$20.15

[1] *Table 203.20.Enrollment in public elementary and secondary schools, by region, state, and jurisdiction: Selected years, fall 1990 through fall 2023*. https://nces.ed.gov/programs/digest/d13/tables/dt13_203.20.asp
[2] *Occupational Employment and Wages, May 2022; 53-3051 Bus Drivers, School*.
https://www.schoolbusfleet.com/management/10188282/u-s-state-by-state-transportation-statistics-2021-22
[3] Virginia Department Of Education School Bus Crash Report 2021-2022.
https://www.doe.virginia.gov/programs-services/school-operations-support-services/pupil-transportation/
[4] *Discussion on School Bus Operations Report*. Ways and Means and Environment and Transportation Committees, 11/10/21.
[5] *FY 2022 End-of-Year Pupil Transportation Report*. Office of Pupil Transportation and Emergency Management, January 2023.
https://www.marylandpublicschools.org/about/Documents/DBS/Transportation/FY2022Transportation-End-of-Year-Report.pdf
[6] *U.S. State by State Transportation Statistics 2021-22*.
https://www.schoolbusfleet.com/management/10188282/u-s-state-by-state-transportation-statistics-2021-22

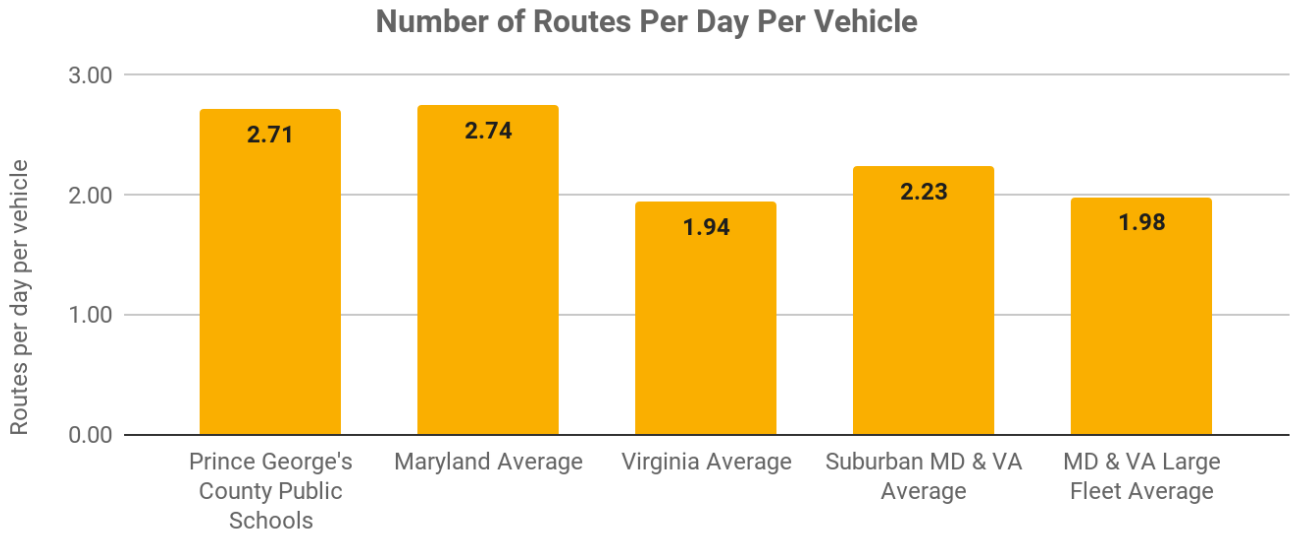
Across the nation, roughly half of enrolled students are assigned school transportation—a figure that has been declining steadily for decades as private parent transport has swelled. Private parent transport is the fastest growing means by which students across the U.S. get to school—at 54 percent of all student journeys as of the 2017 National Household Travel Survey. Prince George's County Public Schools presently transports approximately 68 percent of enrolled students, far above the national average, but slightly below the average for suburban school districts in Maryland and Virginia (74 percent) as well as the average for Maryland and Virginia school districts with large fleets (72 percent), defined as an active fleet of more than 300 routed daily vehicles.



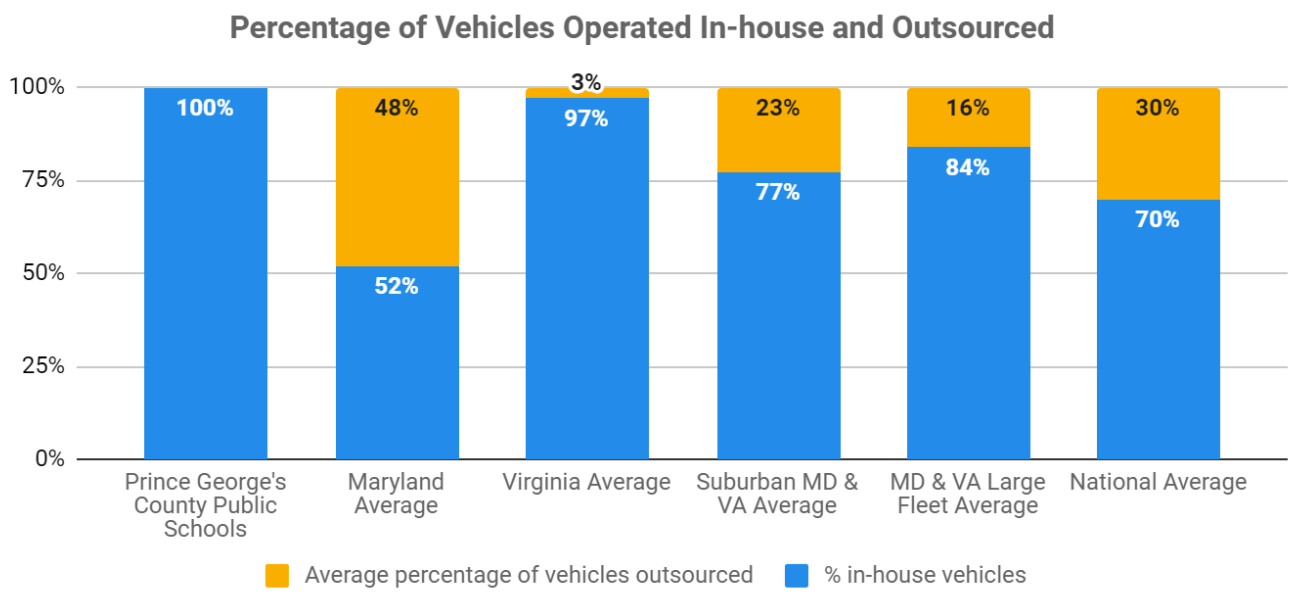
PGCPS transports 85 students per vehicle per day on average. This figure includes the daily total of riders assigned across all trips for a given vehicle. The PGCPS average is slightly below the Maryland state-wide average (90 students) but above the average for suburban and large fleet districts in Maryland and Virginia, which average 81 and 79 assigned riders respectively. Maryland and Virginia school districts transport more students per vehicle per day than the national average of 53 students.



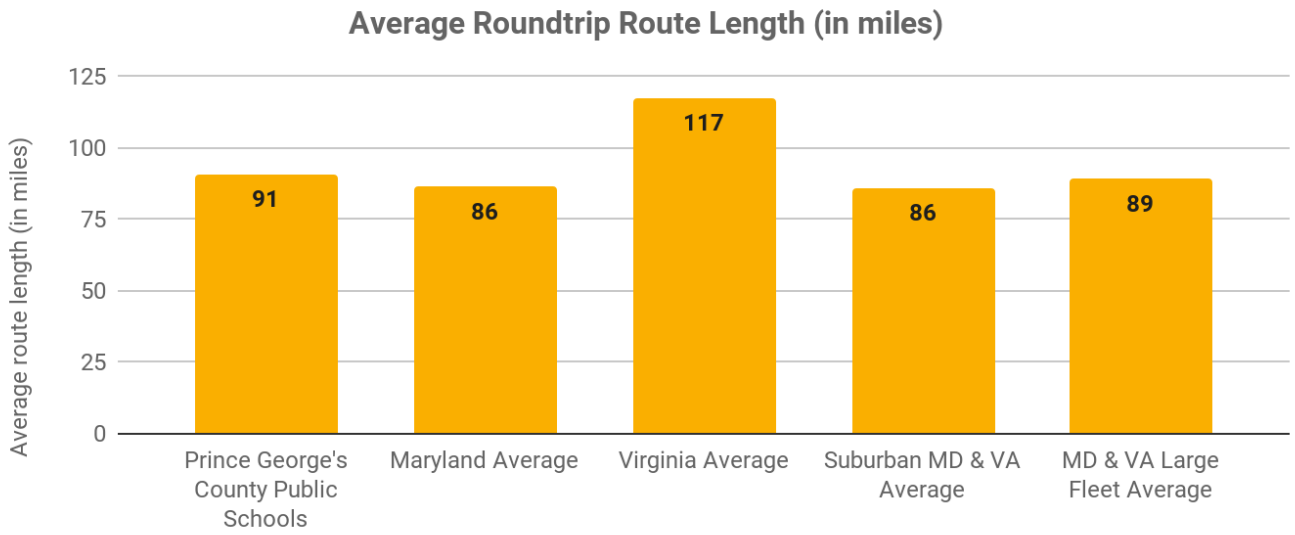
Prince George's vehicles complete approximately 2.71 round trips per day (5.28 one-way trips per day, including both AM and PM trips), which is above the 70th percentile among suburban and large fleet peers in Maryland and Virginia, which complete 2.23 and 1.98 routes per day. Taking these statistics together means that the average PGCPS bus trip transports 31 students—approximately two-thirds or 66 percent of the practically available capacity of the district's buses.

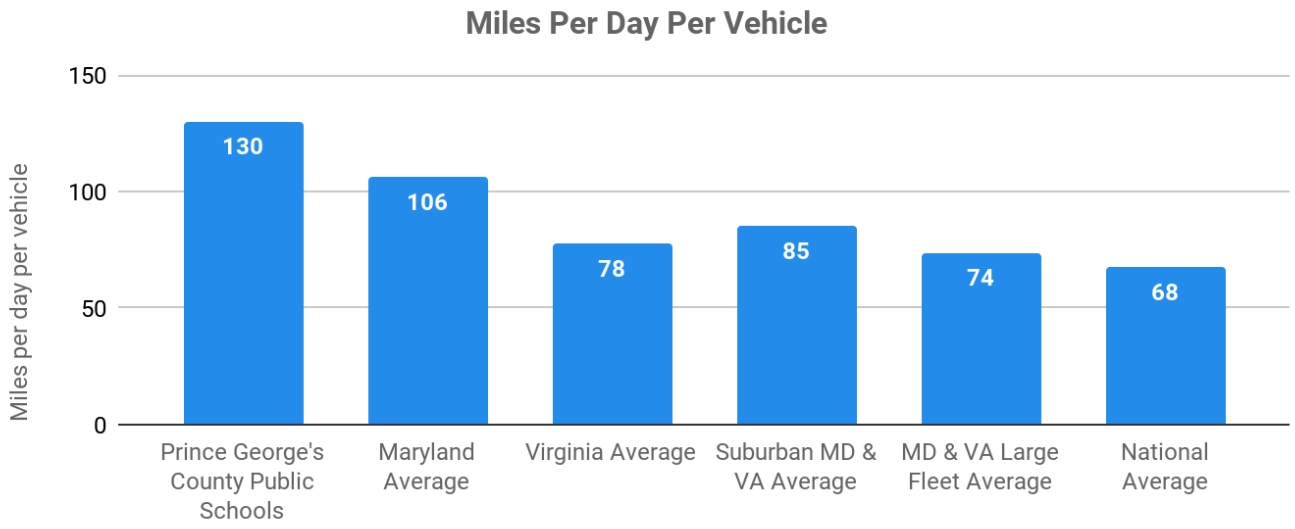


While PGCPS has recently started to outsource a few trips for specialized transport to a third-party operator, all bus service is operated in-house. Across Maryland, districts take a more varied approach, with just over half of buses operated in-house and half outsourced. However, 97 percent of buses are operated in-house in neighboring Virginia.

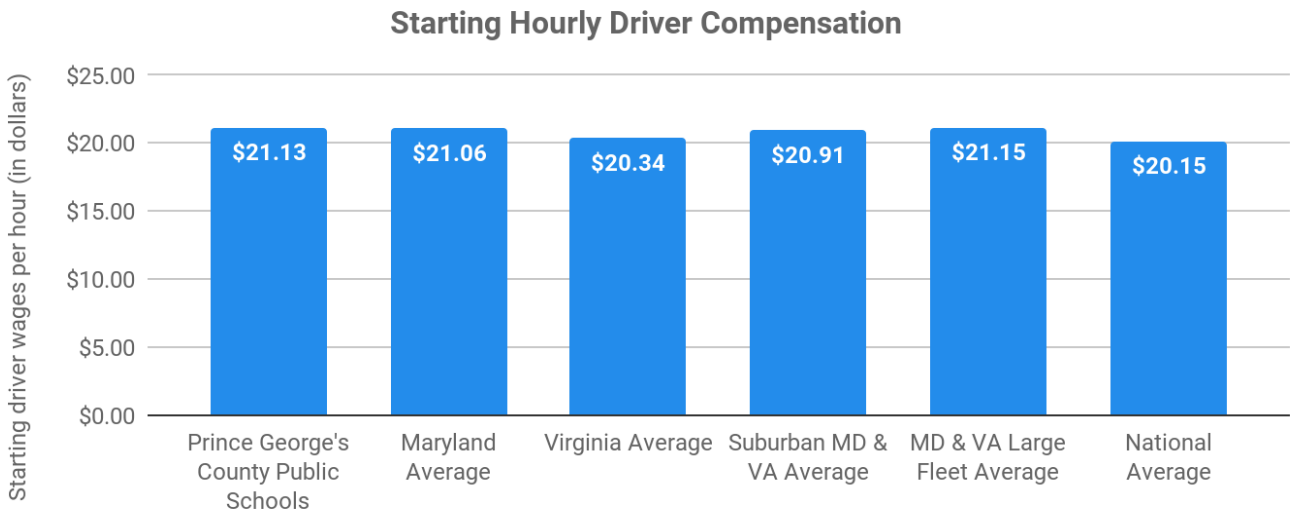


PGCPS routes average 91 miles roundtrip, fairly close to the averages of 86 miles for suburban Maryland and Virginia school districts and 89 miles for peer districts with large fleets. Prince George's County Public Schools vehicles average 130 miles per day, which is well above the national average of 68 miles per day as well as peer comparisons.





Minimum starting driver hourly salary in Prince George's County Public Schools is $21.13, which is competitive with neighboring districts, peer systems, and the national average. Employees without any bus driver experience are hired at Step 1 ($21.13). Such candidates are typically those who have gone through the district's training program and then hired as a permanent bus driver. When an applicant has applicable work experience, one step is awarded for each year of full-time/benefits-eligible related experience. Steps may also be awarded for each year of educational attainment above the minimum requirements set forth in the position description for positions which do not provide a separate pay grade for levels of educational attainment. As such, the maximum starting hourly salary for PGCPS bus drivers is $41.57.



STATE & FEDERAL REGULATIONS

In student transportation, the policy landscape established by state regulations concerning vehicle and driver requirements holds immense sway over how schools craft their approaches. Federal regulations establish some baseline definitions and required characteristics of school buses, but otherwise leave much to the states. Federal law does explicitly spell out requirements for transportation as a related service for students with special needs where defined in students' individualized education plans (IEPs) and for students experiencing homelessness via the McKinney-Vento Act.

The state determines how transportation is funded as part of the general formula and via additional allocations for students with disabilities, and the state also defines the basic obligation of each county in Maryland to transport all public school students in their jurisdiction, as well as students with disabilities. Maryland state law prohibits counties from charging families *for* transportation services, but does not prohibit districts from transporting students from non-public schools or otherwise beyond their basic obligations. Districts have the responsibility to transport students with disabilities to approved placements, whether they be public or private, and even outside the student's county of residence or outside the state.

It is also crucial to acknowledge the ongoing challenge of a nationwide shortage of drivers, labor market competition, other supply-side dynamics like the rising costs of inputs (e.g., fuel and parts), and broader market trends on the demand side for more personalized and tech-enabled service – all of which significantly influences system design options. These market dynamics add another layer of complexity regardless of the policy landscape. And they amplify the urgency for innovative solutions, compelling schools to rethink traditional approaches and to seek out alternative methods, mixed model strategies, innovations in scheduling, exploring technology-driven solutions, compensating parents directly for transporting their own students, providing public transit passes, or collaborating with new providers like transportation network companies ("TNCs") or taxi services to navigate this persistent issue while ensuring student safety and efficiency—and remaining in compliance with state law.

Maryland's school transportation regulatory landscape outlining allowable vehicle types and modes is by and large the most permissive jurisdiction in the surrounding area. The state has established pathways for school districts to allow non-school-bus vehicles, unlike in Virginia and DC, and services that operate sedans, minivans and 10-passenger vans for schools are now commonplace across Maryland districts. The law in Maryland is also silent on direct-to-parent payments, and there is evidence of other districts in Maryland (Baltimore) using payments to parents as part of their mix of mobility support to families.

Relevant definitions of allowable vehicle types for school transportation in Maryland are as follows[7]:

[7] https://marylandpublicschools.org/programs/Pages/Operations/Pupil-Transportation/SLR.aspx
https://mgaleg.maryland.gov/2024RS/Statute_Web/gtr/gtr.pdf
https://mgaleg.maryland.gov/mgawebsite/Laws/StatuteText?article=gtr&section=11-154&enactments=false
https://dsd.maryland.gov/regulations/Pages/11.19.01.01.aspx
Type II specs: https://dsd.maryland.gov/Pages/COMARSearch.aspx#k=11.19.03%23l=1033
Type I specs: https://dsd.maryland.gov/Pages/COMARSearch.aspx#k=11.19.02%23l=1033
http://mdrules.elaws.us/comar/13a.06.07.06

1. School Vehicle: A motor vehicle that is used regularly for the exclusive transportation of children, students, or teachers for educational purposes or in connection with a school activity, and is either a Type I (weighing over 15,000 lbs) or Type II (weighing less than or equal to 15,000 lbs) bus or a Head Start vehicle. School vehicles do not include privately owned vehicles while they are carrying members of the owner's household and not operated for compensation. School vehicles also do not include vehicles registered as Multipurpose (Class M) or passenger (Class A) vehicles if those vehicles have a capacity of less than or equal to 15 passengers (including the driver); meets insurance and seatbelt requirements; and children are allowed to get on end off the vehicle only at school or designated areas approved by the administration. Transportation statutes state that there must be at least 13 inches of seating space per passenger. With some exceptions, school vehicles may not be older than 12 years.

2. Multifunction School Activity Bus (MFSAB): An alternative school vehicle that meets school bus construction standards, but does not need certain key school bus features like a stop arm or flashing signal lights and do not need to be yellow in color. May not be used to transport students to and from home or school bus stops. These are commonly used for activity transportation and athletics, and can be operated by drivers without a commercial drivers license (CDL) such as a coach or other school staff.

3. Taxicabs: A motor vehicle for hire, (other than a vehicle operated, with the approval of the Public Service Commission, between fixed termini on regular schedules) designed to carry seven persons or fewer, including the driver, used for the purpose of accepting or soliciting for transportation members of the public for hire between such points, along the public streets, as the passengers may direct. Taxi services are commonly differentiated from other small vehicle services, primarily on the basis of more stringent public utilities commission (PUC) regulations to which they have been historically subject, such as national fingerprint-based background checks and more rigorous vehicle inspections.

4. Alternative School Vehicle: Vehicle other than a school bus, MFSAB, or taxicab. The local board of education must determine that it is necessary to use such vehicles, develop written policies and procedures governing their use, and specify the length of time that the approved use of the vehicles will remain in effect. Alternative school vehicles can carry up to 11 passengers including the driver, and must be less than 10,000 lbs. They are required to have certain markings, and defined equipment in the vehicle like first aid kits, seat belt cutters, and fire extinguishers. In terms of vehicle modifications, however, besides back-up alarms, alternative school vehicles are not required in Maryland to be otherwise physically modified from their regular passenger vehicle factory configurations.

The following tables summarize the current Maryland state regulations regarding transportation of students for each vehicle type, as of November 2023.

Equipment Regulations				
Regulation/Requirement Category	**School Vehicle**	**Multifunction School Activity Bus**	**Taxicab**	**Alternative School Vehicle**
Must meet Federal Motor Vehicle school bus Safety Standard regs	Yes	No	No	No
School bus crossing arm	No	No	No	No
Stop signal arm	Yes	No	No	No
Stop lights	Yes	No	No	No
Four-way flashing lights	Yes	No	No	No
Alternating flashing red signal lamps	Yes	No	No	No
Backup alarm	Yes	Yes	No	Yes
External markings or signage	School bus yellow body; black rub rails, seat line, and snow rails; "SCHOOL BUS" on front and rear of body; "EMERGENCY EXIT" above door; push-out windows both inside and outside vehicle; operating of Emergency Door/Exit Latch indicated by a black arrow indicating direction/release of exit on inside and outside; identification number on all four sides of vehicle; contractors' or private operators' names on both sides of the vehicle; (if applicable) name of local school system on both sides of vehicle	Name of school district, contractor, or other contact information on vehicle sides	Must be externally identifiable as a taxicab	Name of school district, contractor, or other contact information on vehicle sides
Reflective triangles or flares	Yes, three each of both triangles and flares	No	No	No
Chock blocks	No	No	No	No
Seat belts for passengers	No	No	Yes	Yes
Seat belt or webbing cutter	No	Yes	No	Yes
First aid kit	Yes	Yes	No	Yes
Bodily fluid spill kit	Yes	Yes	No	Yes
Emergency airway kit	No	No	No	No
Fire extinguisher	Yes, one 5-lb extinguisher	Yes	No	Yes
Heating requirements	Capable of maintaining minimum 50 F temp.	No	No	No
A/C requirements	No	No	No	No
Public address sound system	No	No	No	No
Interior camera notice	No	No	No	No
Other equipment notes	No	No	Rooftop dome light	No
Transport GenEd to/from school	Yes	No	No	Decided by local Board

Vehicle Usage				
Regulation/Requirement Category	**School Vehicle**	**Multifunction School Activity Bus**	**Taxicab**	**Alternative School Vehicle**
Can be used to transport SPED students to/from school	Yes	No	Yes	Depends on local board of education policy
Can be used to transport CTE students to/from school	Yes	No	No	Depends on local board of education policy
Can be used to transport MV students to/from school	Yes	No	No	Depends on local board of education policy
Can be used to transport foster students to/from school	Yes	No	No	Depends on local board of education policy
Can be used to transport charter students to/from school	Yes	No	No	Depends on local board of education policy
Other usage notes	No	No	Usage is not defined by student type	No
CDL required to operate Endorsements, if any, required	Yes, P and S endorsements	No	No	No, Class A or M vehicle license required

Vehicle Requirements				
Regulation/Requirement Category	**School Vehicle**	**Multifunction School Activity Bus**	**Taxicab**	**Alternative School Vehicle**
Physical exam to operate	Yes	No	Yes - Motor Vehicle Administration examination for school vehicle drivers	No - Maryland law states only that an alternative school vehicle driver must "be in good health"
Motor Vehicle Record (MVR) or driving abstract check	Yes	No	Yes	Yes - May not have more than two points
Drug and alcohol checks	Yes	No	Yes	Yes
Background checks	Yes	No	No	Yes
Fingerprints	Not mentioned in school vehicle driver qualifications, but is common practice among MD school districts	No	No	No
Other driver requirements	Annual physical; 8 hours of pre-service classroom instruction; 9 hours of pre-service behind the wheel instruction OR driver has held a CDL with P and S endorsements for 3 years and has received at least 3 hours of behind-the-wheel instruction; 6 hours of in-service instruction annually; in-service instruction on first aid and bridge and railroad grade crossing instruction every three years	No	Preservice and in-service instruction on disabling conditions, behavior management techniques, passenger safety restraints, emergency procedures, and other appropriate topics, unless a trained attendant accompanies the student	4 hours of pre-service classroom instruction and 1 hour of behind the wheel instruction; 2 hours of in-service training annually

DISTRICT POLICIES

Beyond the key state and federal regulations outlined in the prior section, local districts have flexibility to establish transportation eligibility rules, create attendance boundaries and walk zones, prescribe the modes by which transportation services are provided (including provision of public transit passes), set school bell schedules, and establish other service level parameters for their system—like a maximum allowable distance to a bus stop or maximum ride time. These district policies have enormous impact on what transportation efficiencies are possible and the extensiveness and expense of service provision.

Below are some key relevant district policies adopted by the Prince George's County Public Schools that impact its student transportation system[8]:

Administrative Procedure 3541 outlines the transportation eligibility criteria for students within the district. Under the policy, elementary school students residing within 1.5 miles of their assigned school and middle school and high school students residing within 2.0 miles of their assigned school are ineligible for school transportation services—effectively in a "walk zone". Moreover, the policy specifies that elementary students may be required by the district to travel distances of up to 1.5 miles from their home to their transportation stop, while middle and high school students may be required to travel distances of up to 2.0 miles from their home to their transportation stop.

Administrative Procedure 3541.1 outlines specific regulations for Pre-K and Kindergarten students, emphasizing safety measures. A parent or guardian must be present to escort the student on and off the school vehicle. If no parent or guardian is present at the stop for these young students at time of drop off, the driver is obliged to return them to their assigned school. Furthermore, Pre-K and Kindergarten students are required to wear neon safety vests while being transported.

Board Policy 0113 authorizes the CEO to create school boundaries and attendance areas to best utilize school facilities and assign students accordingly. In line with this policy, the district maintains guidelines for transfer students, defined as students attending schools outside of their school attendance area. The district is *not* required to provide transportation to transfer students and the student's caregiver must accept full responsibility for transportation for all approved transfer students. Likewise, if students are attending childcare or babysitters within the transportation service area, the district stipulates that to receive transportation, the student must meet eligibility criteria. If a childcare location falls outside the student's residence attendance area, transfer policy requirements must be met. Commercial childcare centers are allocated curb-to-curb stops where feasible, while students at private babysitters are assigned to the closest neighborhood stop along the route, demonstrating the district's effort to accommodate diverse circumstances while upholding transportation standards and safety protocols.

[8] https://www.pgcps.org/offices/ograc/board-policies

The Comprehensive School Boundary Initiative commenced in August 2020, aiming to help balance enrollment, identify potential school consolidations and establish boundaries for new and expanded schools set to open in SY 2022-2023 and SY 2024-2025.

Administrative Procedure 6192 outlines the application and approval process for students that wish to partake in Specialty Schools and programs. They have broader attendance boundaries, or are county-wide in and of themselves, establish a set of conditions that impact transportation system design possibilities and resultant efficiency. In this case, it is stated that it is the responsibility of transportation for an admitted student to a Specialty School or Program is the parent/caregivers.

III. Service Configuration

FINDINGS AND ANALYSIS

Bell Time Balance and Alignment

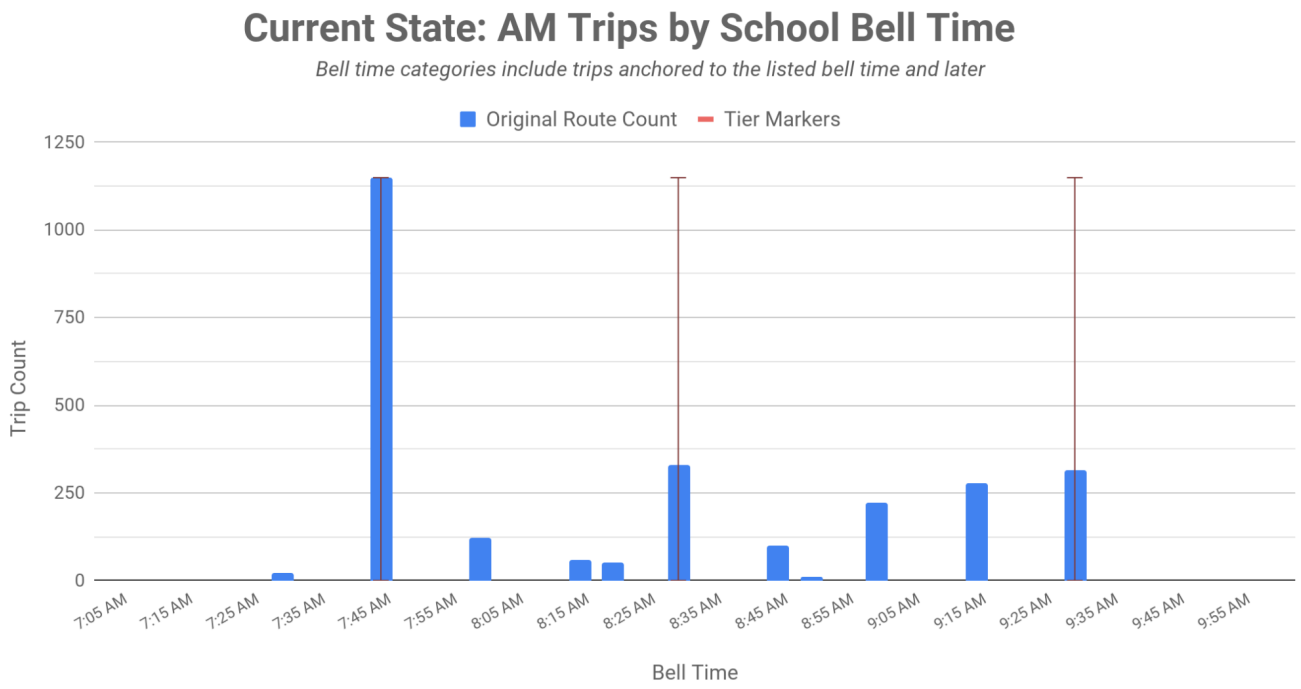
Aligning school bell times is a strategic approach that aims to coordinate the start and end times of schools across different time intervals called “tiers”. A common practice is to assign schools within a district by level to particular tiers—such as high schools in Tier 1, and elementary and middle schools to Tiers 2 and Tier 3. Tiers are typically spaced 45-60 minutes apart in order to allow for performance of a trip that fills a vehicle with students going to a specific school in the morning (or to drop them off in the afternoon), and then to also provide time for a vehicle to get from the end of one trip to the first stop of the next trip. This interval between the start of one trip and the beginning of the next during which there are no student riders is commonly referred to as “dead head”. A typical three-tiered bell schedule configuration with uniform school day lengths might look like the below example:

Example Bell Time Tiers		
Tier	**AM Tiers**	**PM Tiers**
Tier 1 - Middle Schools	7:30 AM	2:00 PM
Tier 2 - High Schools	8:30 AM	3:00 PM
Tier 3 - Elementary Schools	9:30 AM	4:00 PM

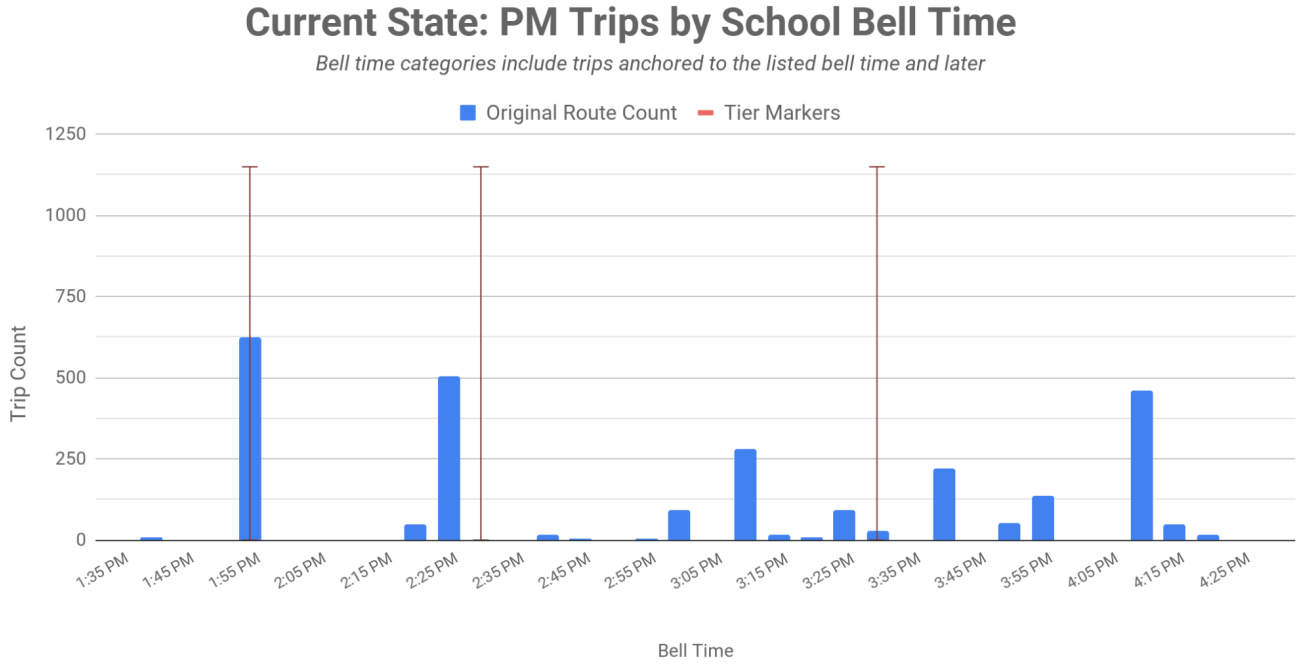
While a district may have other goals that inform bell times—related to staggering staff, starting different age groups at different times based on research related to sleep and student outcomes, or based on longstanding parent or staff preference—from a transportation perspective, well-aligned and spaced bell times allow for a synchronized schedule that maximizes efficiency and minimizes the number of required vehicles and drivers.

When bell times are synchronized, vehicles can efficiently operate multiple trips in succession. For instance, a vehicle might serve a middle school, followed by a high school, and then an elementary school for three trips each morning, and then the same corresponding trips in reverse each afternoon—for a total of six daily trips. Optimizing how these trips are bundled to form a route should minimize unproductive drive time, maximize time to be used for picking up students, and also minimize idle time of vehicles and drivers between trips.

This report summarizes the current state and distribution of Prince George’s County Public Schools vehicle trips by bell times and the system’s level of balance or alignment as represented by the count of scheduled vehicle trips by AM and PM bell times.



The majority of morning trips are assigned to schools with bell times that start at 7:45 AM or earlier, while afternoon trips are predominantly assigned to bell times that occur at 1:55 PM and 2:25 PM. The current distribution of trips by bell time are not well balanced nor aligned in the AM and PM. This misalignment and lack of balance results in inefficiency, with disproportionate needs during the first service tier, even if trips are optimally paired to maximize the trips that any one vehicle can complete.



As of October 2023, PGCPS operates 5,334 trips daily with 2,651 in the morning and 2,669 in the afternoon. Late after school trips and midday trips have been excluded from this analysis as they do not impact the required vehicle count to serve the system. **Currently, 1,051 trips (20 percent) are not assigned to a vehicle.** For the purposes of the analysis of bell time alignment, all 5,320 trips are considered, including those currently unassigned, as this encompassing figure is the best indicator of the true current demand and trips that need daily coverage.

In the graphs above, vertical red lines indicate a set of illustrative cutoffs that are used to label trips according to a three tier model to which the district may wish to align and balance, versus the district's reality of a much broader array of individual school bell times. If the district were to define service tiers in this manner, the distribution of trips by bell time currently falls disproportionately within Tier 1. Approximately half (50 percent in the morning and 45 percent in the afternoon) of all trips are assigned to schools with bell times of 7:45 AM or earlier in the morning and 1:55 PM or earlier in the afternoon.

In early October 2023, there were 190 open routes, lacking assigned vehicles and drivers. This discrepancy between the large number of trips assigned to the first service tier and the smaller gap in uncovered service arises due to the stacking of multiple trips for the 7:45 bell time. The district has been creative and built in some efficiency in order to spread out this Tier 1 peak by scheduling many morning trips to drop off students well before the 7:45 AM bell time so that some buses can complete multiple trips before 7:45 AM. Of the 1,123 trips assigned to a school with a 7:45 AM bell time, 531 trips (47 percent) are scheduled to arrive more than 20 minutes before the bell, 288 trips (26 percent) are scheduled to arrive at 7:00 AM or earlier, and interestingly, 71 are scheduled to arrive after 7:45 AM.

This is a perfectly fine strategy in the morning if schools are willing to accommodate early drop-off and it's also not a hardship to families, but in the afternoon it presents different challenges as early pickups that cut short students' instructional days are not possible, late pick-ups after the PM bell are more challenging for school staff and families to accommodate, bump up against after school programming and sports, and in general PM trips tend to run longer due to traffic and extended loading times at schools.

Opportunity #1: Bell Time Alignment and Pairing

Implementing a strategically balanced and aligned bell time schedule across school tiers holds the potential to significantly enhance transportation efficiency, reducing unpaired trips while optimizing the utilization of buses and drivers within the district. This will in turn lead to a decrease in the need of drivers and vehicles by approximately 119—cutting the current shortage by more than half without any modification to current service levels.

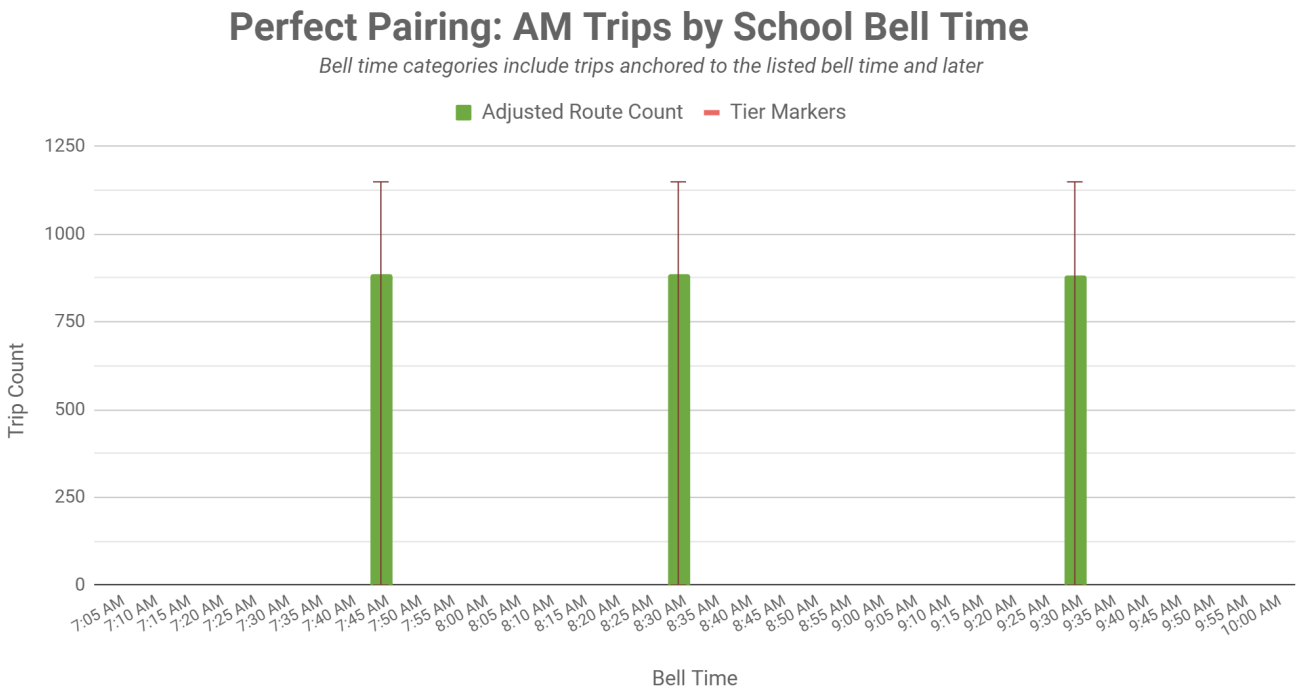
Given the district currently operates 2,651 trips in the morning, a perfect *balance* of bell times would spread out peak demand and require 884 trips per tier in the morning. Based on the current afternoon trip count of 2,669, perfect balance of bell times in the afternoon would require 889 trips per tier. This

would be the optimal vehicle count no matter where the district chose to define its tiers—but in any case would require adequate space between tiers and efficient trip pairings to achieve the ideal.

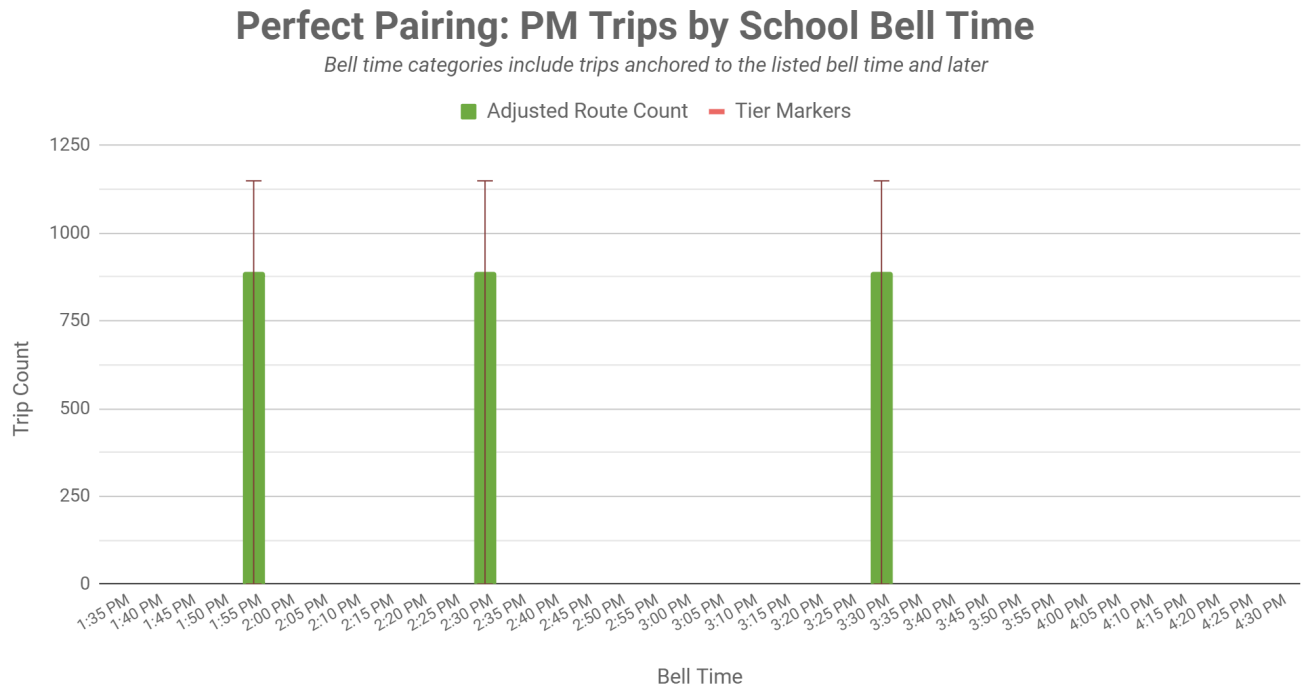
To accomplish optimal balance, 432 Tier 1 trips in the morning would need to move to Tiers 2 and 3, with 39 additional trips in Tier 2 and 393 additional trips in Tier 3. Likewise in the afternoon, 312 trips would need to move from Tier 1 to Tiers 2 and 3, with 260 additional Tier 2 trips and 50 additional Tier 3 trips.

Perfect *alignment* of bell times onto neat tiers as shown in the table (including an allowance for times earlier than the Tier 1 bell time of 7:45 AM and later than the Tier 3 afternoon bell time of 4:00 PM) would also create uniform spacing between candidate trip pairs to allow for more optimal pairings.

AM	Initial Alignment	Perfect Balance and Alignment		AM Targets
Tier	**Initial Trip Count**	**Adjusted Trip Count**	**Tier Shifts Needed**	**AM Bell Times**
1	1,316	884	**-432**	7:45 AM or earlier
2	845	884	**+39**	8:30 AM
3	490	883	**+393**	9:30 AM or later
Total	**2,651 trips**	**2,651 trips**	**864 shifts**	



PM	Initial Alignment	Perfect Balance and Alignment		PM Targets
Tier	Initial Trip Count	Adjusted Trip Count	Tier Shifts Needed	PM Bell Times
1	1,201	889	-312	1:55 PM or earlier
2	629	889	+260	2:30 PM
3	839	889	+50	3:30 PM or later
Total	**2,669 trips**	**2,669 trips**	**622 shifts**	



As a result of the district stacking multiple Tier 1 trips to the same vehicle, based on current average trip utilization per vehicle (5.28 trips per day), it is estimated the PGCPS would need closer to 1,008 vehicles to cover the 1,316 AM Tier 1 trips.

To streamline operations and enhance efficiency, balancing bell times is needed. If the district perfectly aligns bell times, it would reduce the required number of vehicles to cover the district's current trips from 1,008 to 889. This substantial decrease of 119 vehicles would significantly reduce the current driver shortage and would produce robust cost savings. At a current cost of $779.74 per vehicle per day, the district could save $92,000 per day and $16.9 million dollars annually through bell time optimization. (Note that cost analysis is based on the weighted average vehicle cost per day; vehicle costs vary significantly by programming, vehicle type, mileage, and other idiosyncratic factors.) This reduction not only translates to financial savings but also signifies a strategic approach to resource allocation, ensuring vehicles are utilized more effectively in meeting student transportation needs.

Service Levels

One key indicator of a school transportation system's efficiency are the service levels, or how far students must travel to reach their assigned vehicle stop. Increasing home-to-stop distances enables routes to limit ride time duration and mileage due to making fewer stops and taking less winding paths, thereby facilitating greater seat utilization and diminished vehicle needs.

All school districts establish policies that outline guidance for locating and assigning student stops, commonly referred to as "stop distance" or "walk-to-stop" policies. These policies may be more accommodating than the state regulatory mandates in some instances, as desired and prescribed by the local school board. The state of Maryland does not have intra-district or inter-district open enrollment policies, which allows for students to be transferred to traditional public schools outside and inside their district. Prince George's County Public Schools outlines its policy in Administrative Procedure 3541. This policy is designed to establish reasonable home-to-stop distances for students, stipulating that stops may be located up to 1.5 miles away for elementary students, while middle and high school students may reside up to 2.0 miles from their assigned bus stops.

Assuming that published policies are indicative of community standards, overall high utilization of the policy distance limits is reflective of efficient routing. Low average utilization within a student transportation system sets off a chain reaction of inefficiencies across multiple operational facets. Shorter home-to-stop distances result in vehicles making more stops than necessary. Consequently, this significantly increases the time vehicles take to pick up students and drop them off at their assigned school. More vehicles and drivers are needed to cover these lengthened routes, intensifying operational costs and further straining the existing shortage of bus drivers. Moreover, these inefficiencies place a burden on transportation infrastructure, heightening fuel consumption, increasing maintenance costs, and increasing the overall complexity of the system. The greater the complexity within the system, the more failure points are produced, which diminish service reliability. The environmental impact of these elongated routes and heightened vehicle usage can be substantial, contributing to greater carbon emissions and a larger ecological footprint. Additionally, the prolonged rides resulting from inefficient routes can detrimentally impact student well-being, leading to fatigue, reduced engagement in school activities, and potentially affecting academic performance.

For PGCPS, the average student's stop is located 0.24 miles from their home, which is the equivalent of the typical student traveling five blocks to their bus stop, and represents an average policy utilization rate of just 12.2 percent.

- For students in grades PK-5, average stop distance is 0.21 miles and average policy utilization is 13 percent.
- Students in grades 6-8 travel 0.26 miles to their stop on average and have an average policy utilization of 11 percent.
- High school students travel 0.28 miles to their stop on average and have an average policy utilization of 12 percent.

Throughout grade spans, students travel approximately the same distance to their assigned bus stops despite the district policy design for stop distance to increase as students mature. As noted in the table below, average home-to-stop distance in miles and average policy utilization remains fairly constant throughout grade levels.

Stop Distance: Policy Utilization By Grade Span					
Grade Span	**Number of Students**	**Percent of Population**	**Average Utilization**	**Average Stop Distance (Miles)**	**Policy Limit (Miles)**
PK-5	32,922	40.64%	12.99%	0.21	1.5
6-8	19,859	24.51%	11.10%	0.26	2.0
9-12	28,228	34.85%	12.04%	0.28	2.0
Total	**81,009**	**100.00%**	**12.19%**	**0.24**	**N/A**

Notes: Students with a grade of "S," or special education, and students receiving curb-to-curb service are excluded from stop distance utilization calculations by grade span.

Stop Distance: Policy Utilization by Programming					
Programming	**Number of Students**	**Percent of Population**	**Average Distance Stop (miles)**	**Average Utilization**	**Median Utilization**
In-Boundary	68,804	84.9%	0.22	11.6%	8.45%
Speciality	12,223	15.1%	0.32	15.4%	11.18%
Total	**81,027**	**100%**	**0.24**	**12.2%**	**8.8%**

Notes: Students receiving curb-to-curb service are excluded from stop distance utilization calculations.

Inclusive of all transported students, 33.6 percent of students in the morning and 33.8 percent of students in the afternoon have a stop distance of 0.1 miles or less. A total of 62.2 percent of transported students in the morning and 62.3 percent of students in the afternoon have a stop distance of 0.2 miles or less.

When students with transportation accommodations are excluded from consideration, **31.3 percent of transported students have an assigned bus stop located less than 0.10 miles from their home.** A large percentage, 71.6 percent, have stops located within 0.25 miles or less of their home residence. This is notable, as the district's policy sets a limit of 1.5 to 2.0 miles for bus stop distances relative to a student's home residence.

Stop Distance Distribution Analysis (All Students)				
Stop Distance	**AM Transported Students**	**Percent of AM Transported Students**	**PM Transported Students**	**Percent of PM Transported Students**
Up to 0.1 miles	28,700	33.6%	28,867	33.8%
0.1 to 0.2 miles	24,441	28.6%	24,301	28.5%
0.2 to 0.3 miles	14,563	17.1%	14,601	17.1%
0.3 to 0.4 miles	7,570	8.9%	7,514	8.8%
0.4 to 0.5 miles	3,676	4.3%	3,693	4.3%
0.5 to 0.6 miles	1,869	2.2%	1,828	2.1%
0.6 to 0.7 miles	1,081	1.3%	1,031	1.2%
0.7 to 0.8 miles	739	0.9%	723	0.8%
0.8 to 0.9 miles	368	0.4%	371	0.4%
0.9 to 1 miles	269	0.3%	276	0.3%
1 to 2 miles	761	0.9%	820	1.0%
2 to 5 miles	418	0.5%	436	0.5%
5+ miles	309	0.4%	312	0.4%
Unknown	563	0.7%	560	0.7%
Total	**85,327**	**100.0%**	**85,333**	**100.0%**

Stop Distance: Policy Utilization By Grade (excl. Accommodations)					
Grade	**Number of Students**	**Proportion <=0.1 miles**	**Proportion <=0.2 miles**	**Proportion <=0.25 miles**	**Proportion <=0.50 miles**
P	2,078	40.1%	67.7%	77.2%	94.3%
K	4,811	36.1%	66.1%	74.9%	94.7%
1	5,038	36.9%	66.7%	76.1%	94.7%
2	5,382	34.8%	65.7%	75.5%	94.2%
3	5,110	34.6%	65.9%	75.3%	94.2%
4	5,271	35.1%	65.8%	75.3%	94.0%
5	5,232	35.7%	65.6%	75.0%	94.2%
6	6,284	30.5%	60.8%	71.2%	92.9%
7	6,723	29.3%	60.0%	71.0%	92.5%
8	6,852	30.4%	60.1%	71.1%	92.7%
9	9,446	27.5%	57.7%	68.2%	91.6%
10	7,267	27.6%	56.9%	67.8%	91.3%
11	6,047	26.9%	55.1%	66.9%	91.7%
12	5,468	25.4%	54.4%	65.5%	91.0%
S	18	77.8%	88.9%	100.0%	100.0%
Total	**81,027**	**31.3%**	**61.2%**	**71.6%**	**92.9%**

Note: "P" represents Pre-Kindergarten and "S" represents Special Education. Students with "curb-to-curb" service and students with an "Unknown" stop distance are excluded from all utilization calculations.

Calculating the policy utilization percentage enables a school system to understand the extent to which it is currently leveraging its service level allowance. For instance, if the typical PGCPS elementary student traveled 1.5 miles to their stop, the district would have a policy utilization of 100 percent for elementary students. Whereas if the typical PGCPS elementary student traveled 0.75 miles to their stop, the district would have a policy utilization of 50 percent for elementary students. While there will always be variability due to differing student contexts, understanding that some students will travel farther and others will travel shorter distances based on their unique circumstances, if policy targets are well-established, systems should aim to have an average policy utilization of 50 percent or greater.

The data for PGCPS shows that, on average, the typical student's stop distance is 12.2 percent of the policy threshold, which roughly translates to a distance of five city blocks, or 0.24 miles. Among the various grades, Grade 2 has the highest average stop distance utilization at 13.3 percent, while Grade 6—exempting students with disabilities in grade "S"—has the lowest stop distance policy utilization rate at 11.0 percent. The difference in average policy utilization across grade levels is within a narrow range of two percentage points (roughly, 11-13 percent).

Utilization By Grade

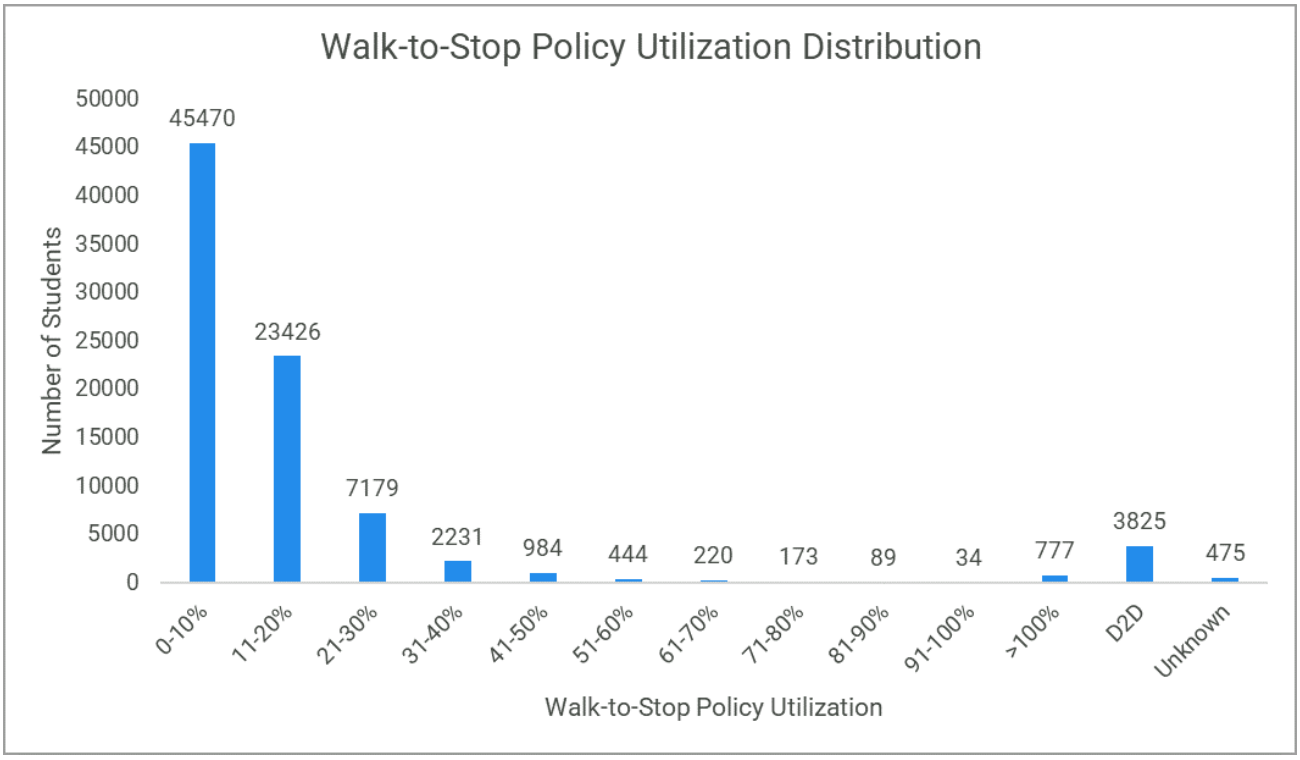
Grade	Number of Students	Average Utilization	Median Utilization
P	2,078	12.1%	8.6%
K	4,811	12.8%	9.4%
1	5,038	12.7%	9.1%
2	5,382	13.3%	9.4%
3	5,110	13.2%	9.5%
4	5,271	13.0%	9.2%
5	5,232	13.2%	9.3%
6	6,284	11.0%	8.1%
7	6,723	11.2%	8.1%
8	6,852	11.1%	8.0%
9	9,446	11.8%	8.5%
10	7,267	12.1%	8.5%
11	6,047	12.0%	9.0%
12	5,468	12.4%	9.1%
S	18	3.7%	1.0%
Total	**81,027**	**12.2%**	**8.8%**

Note: "Curb-to-Curb" students and students with an "Unknown" stop distance are excluded from analysis.

Most students travel far shorter distances to their assigned stop than the average distance of 0.24 miles. The median student travels 0.17 miles, which equates to a median policy utilization rate of 8.8 percent. The lower median indicates that a relatively small outlier group of students have a longer stop distance, skewing the overall average upwards.

Stop Distance By Policy Utilization Thresholds			
Policy Utilization	**Number of Students**	**Average Utilization**	**Median Utilization**
0-25%	73,569	9.0%	7.9%
26-50%	5,721	32.9%	31.0%
51-75%	733	59.1%	58.0%
76-100%	227	82.1%	80.6%
>100%	777	100.0%	100.0%
Curb-to-Curb	3,825	N/A	N/A
Unknown	475	N/A	N/A
Total	**85,327**	**12.2%**	**8.8%**

By pinpointing where stop distance utilization rates fall notably below the median, transportation planners can tailor adjustments. This might include revisiting bus stop placements, reassessing the density of stops per trip, or implementing targeted initiatives to locate more stops in accordance with the district stop distance targets.



The gap between the planned district policy and its execution by the Transportation department is where the core issue lies. Adjusting service levels to more closely align with the district policy isn't just about meeting policy goals; it's a fundamental step in addressing the disparity between planned intentions and actual execution, and a crucial component to resolving the current driver shortage. The

current misalignment with policy guidelines and scheduling best practices creates practical roadblocks, causing longer than anticipated route durations and a heightened demand for more vehicles and drivers, significantly straining resources.

Aligning the route planning process more closely with the district's stop distance policy—for instance, with senior route schedulers reviewing stop locations and average stop distances by trip to ensure strong adherence with design objectives—is essential. By designing bus stop placements to better match policy guidelines, the transportation department can better optimize resource allocation and streamline operations. Ultimately, strategically adjusting service levels will create a more sustainable, efficient, and student-centric transportation system.

Opportunity #2: Service Level Differentiation & Targeted Stop Consolidation

To illustrate the potential efficiency opportunity from strategically differentiating student stop distances (service levels) according to common factors such as grade level, accommodation status, and school programming, 4MATIV designed a comprehensive scenario model based on specific parameters and conditions that were approved by PGCPS.

For students in elementary grade levels, the maximum possible stop distance was 0.5 miles for students attending an in-boundary program and one mile for students enrolled in a specialty program. At the secondary level, students attending an in-boundary program could have a stop located up to one mile from their home residence while students attending a specialty program could be assigned to a stop up to two miles away. Students with transportation accommodations for specialized vehicles, equipment, aides, or curb-to-curb service kept their current stop and vehicle assignments in the analysis. The simulation sought to extend stop distances as minimally as possible even within these parameters, seeking to model the smallest increase needed to achieve vehicle and driver efficiencies. Only existing stops were considered within the model; a conservative approach that assumes only vetted and active stop locations can be assumed as reasonable options.

Stop Distance Maximums by Grade and Programming		
Grade Span	**In-Boundary**	**Specialty / Out of Boundary**
Grade PK-5	0.5 miles	1.0 miles
Grade 6-12	1.0 miles	2.0 miles

In addition to the stop distance thresholds listed above, the model integrated considerations for how early and late students could be dropped off or picked up relative to their school bell schedule. Simulations also ensured that trips were of acceptable durations and did not require exceptionally early morning pick up times. Notably, all of these constraints are more stringent than how service is currently operating: there are many instances in which students are picked up before 5:50 AM, have journeys that exceed these duration limits, or have more expansive school pick up and drop off windows.

Design Consideration	Model Parameter
Earliest student AM dropoff	45 minutes before bell for HS students with AM bells between 7:40-7:50 AM; 30 minutes before AM bell for all other students
Latest student AM dropoff	10 minutes before bell
Latest PM vehicle arrival	20 minutes after dismissal
Maximum trip duration	50 minutes for in-boundary; 80 minutes for speciality
Earliest AM student pickup time	5:50 AM

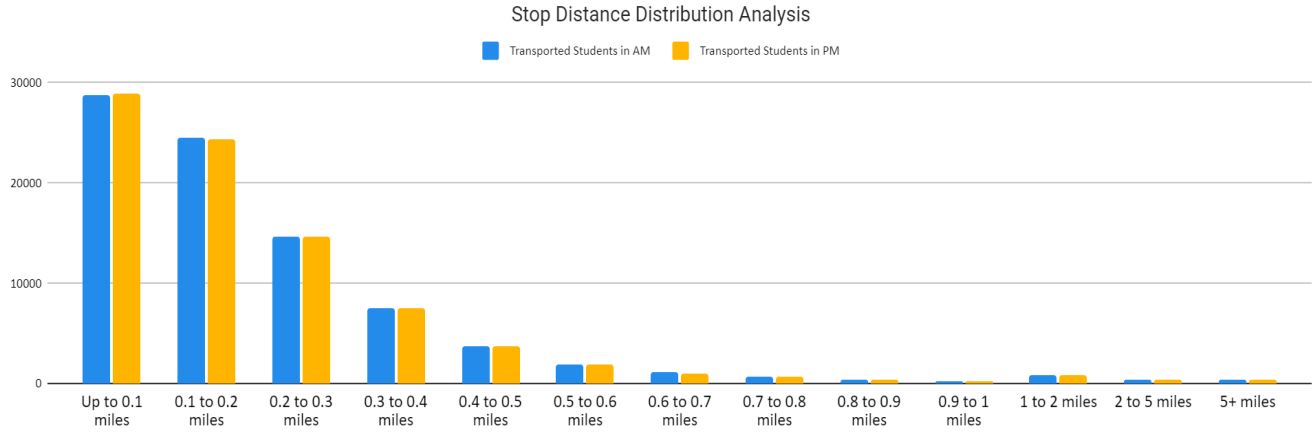
Within the simulation, all students retain their assigned home residence, school, transportation accommodations, and other identifying information as indicated in the district-provided October 2023 data set. The only student details that change for impacted students as a result of the optimization simulation are stop assignments and trip assignments. Trips are only assigned to vehicles with adequate practical capacity, required equipment, and a matching type description (e.g., "Ortho", "FAB", "Regular").

Strategically increasing stop distances would allow for the removal of 22 percent of stops across the system: 23 percent of AM stops (2,718 stops) and 21 percent of PM stops (2,519 stops), leaving 9,230 stops remaining in the AM and 9,470 stops in the PM. Stop consolidation and load balancing help increase vehicle utilization, which results in vehicle reductions.

Optimization Simulation: Stop Distances (in miles) by Grade						
Grade	AM Transported Students	AM Optimized Average Stop Distance	PM Transported Students	PM Optimized Average Stop Distance	Optimized Average Stop Distance	Base State Average Stop Distance
P	2,136	0.29	2,130	0.30	0.29	0.19
K	4,863	0.30	4,860	0.31	0.30	0.21
1	5,093	0.31	5,095	0.31	0.31	0.20
2	5,434	0.59	5,455	0.57	0.58	0.23
3	5,159	0.59	5,171	0.57	0.58	0.22
4	5,316	0.61	5,318	0.58	0.60	0.21
5	5,290	0.31	5,295	0.32	0.31	0.22
6	6,362	0.34	6,343	0.33	0.34	0.25
7	6,764	0.33	6,757	0.33	0.33	0.25
8	6,902	0.31	6,894	0.30	0.30	0.26
9	9,513	0.62	9,496	0.60	0.61	0.28
10	7,307	0.60	7,317	0.58	0.59	0.29
11	6,105	0.61	6,115	0.59	0.60	0.27
12	5,495	0.59	5,498	0.57	0.58	0.29
S	3,586	0.07	3,587	0.08	0.08	0.08
Total	**85,327**	**0.47**	**85,333**	**0.46**	**0.46**	**0.24**

As a result of the scenario modeling, overall average stop distances increase from 0.24 miles in the base state (October 2023 actual) to 0.46 miles in the post-optimization example. While average stop distances are roughly doubled, the typical student is nonetheless still traveling far less than the stated policy maximum of 1.5 miles for elementary students and 2.0 miles for middle and high school students. Students in grades PK-5 are simulated to travel 0.44 miles to their stop (29 percent policy utilization) while secondary students are simulated to travel 0.48 miles to their stop (24 percent policy utilization).

Following the illustrative optimization simulation, approximately fourteen percent of students still travel a tenth of a mile or less to their assigned stop, compared to a third of students currently. Currently, only eight percent of students are assigned to stop 0.5 miles or greater from their home. In the illustrative scenario, just 35 percent of students are assigned to a stop located more than a half mile from their home residence.



Optimization Simulation: Stop Distance Distribution Analysis				
Stop Distance	**AM Transported Students**	**Percent of AM Transported Students**	**PM Transported Students**	**Percent of PM Transported Students**
Up to 0.1 miles	11,670	13.7%	12,768	15.0%
0.1 to 0.2 miles	10,560	12.4%	11,395	13.4%
0.2 to 0.3 miles	10,955	12.8%	11,196	13.1%
0.3 to 0.4 miles	10,525	12.3%	10,197	12.0%
0.4 to 0.5 miles	11,027	12.9%	10,671	12.5%
0.5 to 0.6 miles	4,751	5.6%	4,632	5.4%
0.6 to 0.7 miles	5,495	6.4%	5,225	6.1%
0.7 to 0.8 miles	5,753	6.7%	5,355	6.3%
0.8 to 0.9 miles	6,450	7.6%	6,052	7.1%
0.9 to 1 miles	7,402	8.7%	6,946	8.1%
1 to 2 miles	253	0.3%	354	0.4%
2 to 5 miles	264	0.3%	313	0.4%
5+ miles	222	0.3%	229	0.3%
Total	**85,327**	**100.0%**	**85,333**	**100.0%**

Despite modest increases in stop distances across the system, significant efficiencies are achieved. In the base data set, PGCPS operates 5,334 daily trips while **in the post-simulation state, the district is modeled to operate 4,891 daily trips for a total reduction of 443 trips (8.3 percent).** Moreover, while there are more than one thousand unassigned trips in the base state, **there are no unassigned trips in the optimization model, which assigns every student to a trip and every trip to a route, vehicle, and terminal.**

Number of Trips			
Trip Type	**Current State**	**Post-Simulation**	**Change**
AM Trips	2,651	2,408	-243
PM Trips	2,669	2,469	-200
PM Extra Trips	14	14	0
Total Trips	**5,334**	**4,891**	**-443**

Trip duration and mileage are fairly consistent. Presently, the average PGCPS student trip lasts 62 minutes in duration and covers 17 miles. Post-simulation, the typical student trip lasts 65 minutes in duration and covers 18 miles. However, as a result of stop consolidation, each trip has higher seat utilization, resulting in fewer trips required and therefore fewer vehicles and drivers required. Currently, 32.1 students are assigned to each trip, whereas the scenario analysis results in 35 students assigned to each trip, a change of 2.9 students (9 percent increase in students per trip).

Assigned Riders per Trip			
Trip Type	**Current State**	**Post-Simulation**	**Change**
AM	32.2	35.4	3.2
PM	32.0	34.6	2.6
Total	**32.1**	**35.0**	**2.9**

In the current state (data from October 2023), PGCPS operates 809 vehicles with 1,065 uncovered trips and 190 open routes. A fully-staff scenario—in which trips and routes are unchanged, but the district has enough drivers to cover service—would require approximately 1,000 active vehicles (1,008 drivers based on the average number of trips per vehicle of 5.28). Given that the simulation example assigns all trips, the most apropos comparison is to a fully-staff current state. In comparing these two scenarios, **the post-optimization model results in a decrease of 69 vehicles. Using current FY24 costs, this reduction would save the district $9.8 million dollars annually.**

Number of Trips				
Vehicles & Trips	**Current State**	**Fully-Staffed Current State**	**Post-Simulation**	**Change in Fully Staffed Scenarios**
Unassigned Trips	1,065	14	14	0
Total Vehicles	1,251	1,251	1,251	0
Spare Vehicles	442	243	312	+69
Active Vehicles	**809**	**1,008**	**939**	**-69**

While students with transportation accommodations are excluded from the simulation exercise because it would be difficult to systemically model appropriate adjustments to their service levels, there is ample opportunity to strategically differentiate service for these students. **A school system that is differentiating transportation service for students with disabilities provides a spectrum of mobility solutions.**

Personalizing mobility support is especially important when an Individualized Education Program (IEP) team determines that transportation is a related service for a student. When tailoring transportation service for students with disabilities, it is crucial that educator teams align service with accomplishing the learner's identified IEP goals and with consideration of their unique strengths and needs. Progressively fostering independence and ensuring access to the least restrictive environment is likewise an important lens through which to design mobility solutions. For instance, IEP teams might determine that a student could be successful with a stop located at the closest, safest corner to their home rather than relying on curb-to-curb transport from their residence. Transportation accommodations should be meaningfully reviewed each year during annual IEP meetings to ensure that the plan in place is the best fit for a student's current and long-term goals.

Too often, transportation accommodations are conceptualized as binary choices: a student receives highly accommodating (and potentially, isolating) curb-to-curb transportation or the student is routed and provided service in the exact same manner as every other general education student. This is largely due to a lack of understanding of all the ways that student mobility support can be tailored. **To facilitate the provision of more nuanced and personalized accommodations, PGCPS should provide clear guidance to IEP teams and a suggested protocol for reviewing and determining transportation accommodations. Such guidance should outline the spectrum of mobility options that could be provided and the purpose or benefit of each support.**

Walk Zone Audit

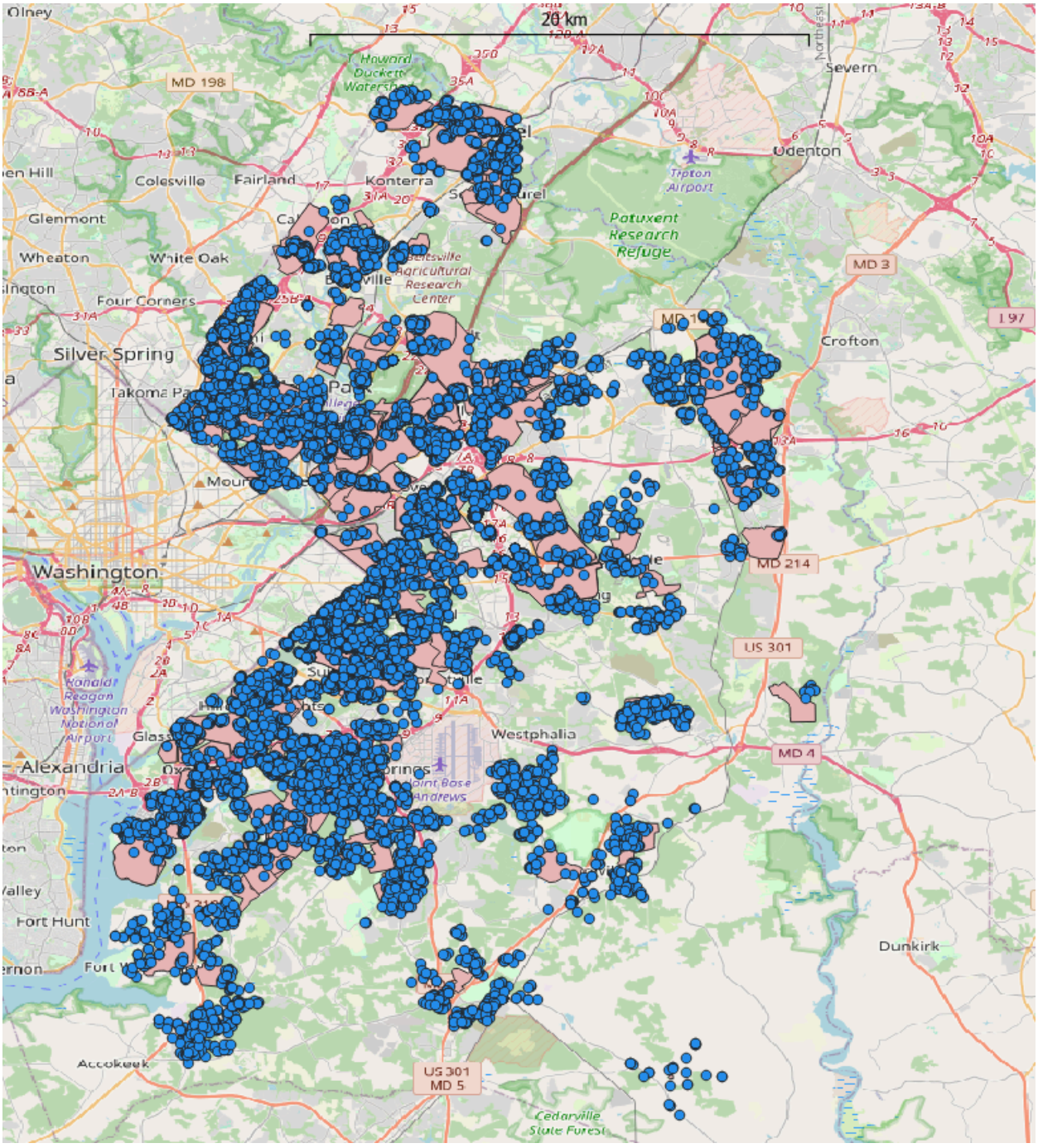
Prince George's County Public School *Administrative Procedure 3541* outlines the transportation eligibility criteria for students within the district. Under the policy, elementary school students residing within 1.5 miles of their assigned school and middle school and high school students residing within 2.0 miles of their assigned school are ineligible for school transportation services. However, **every day the district transports thousands of students who live within the Board-designated walk boundary—more than twenty-two thousand students in SY23-24. As a proportion of the total transported student population, students residing within walk boundaries who nonetheless receive daily transportation account for 26 percent of all riders.**

Almost thirteen thousand elementary students live within 1.5 miles of their assigned school and receive transportation service while more than nine thousand secondary students live within 2.0 miles of their school and receive transportation, totaling 22,341 students. As seen in the table below, approximately two-thousand students per grade level in grades K-8 live within designated walk boundaries and receive district transportation, with somewhat fewer Pre-Kindergarten and high school students who live within their school's walk boundary receiving transportation service. Students with transportation

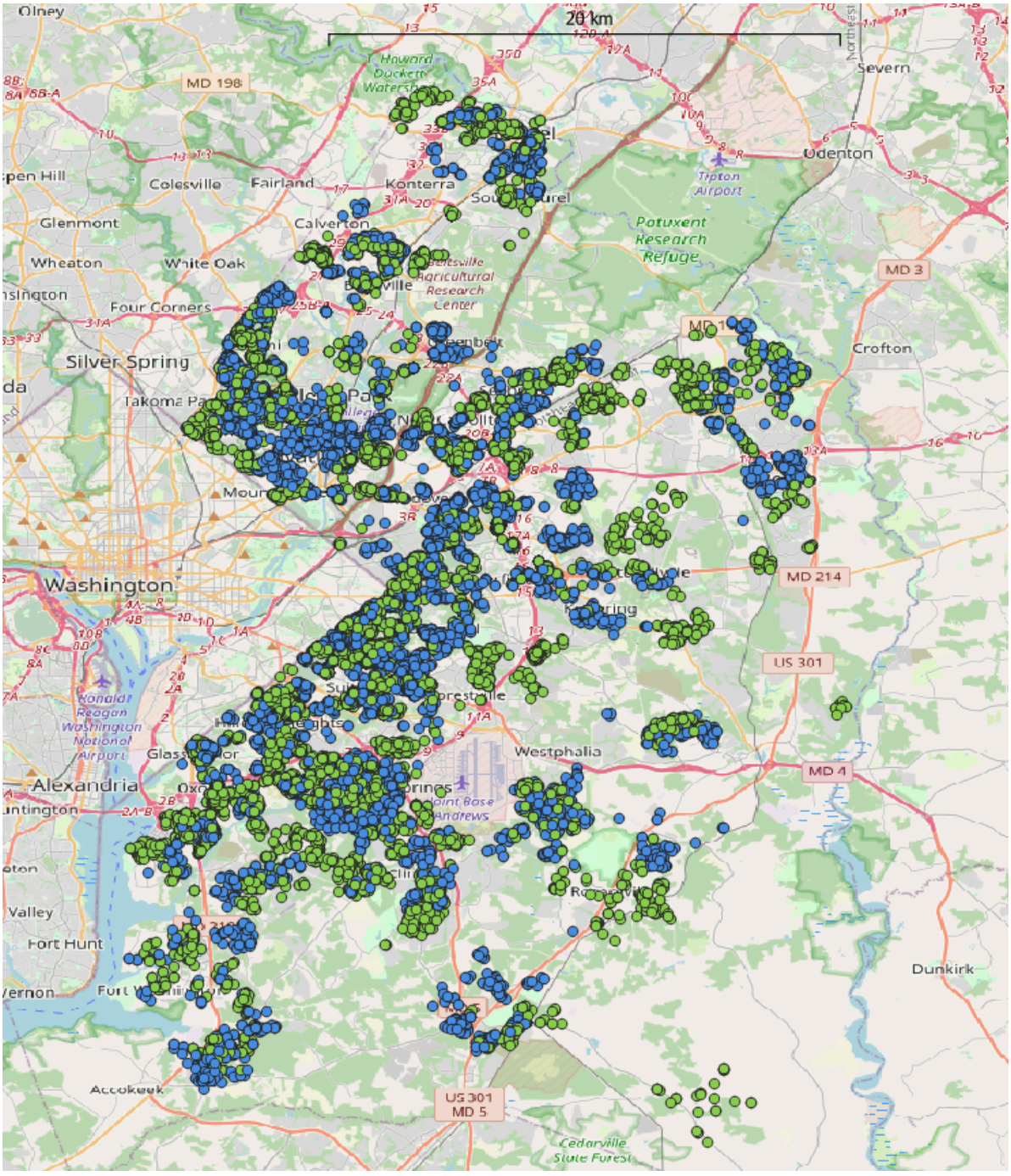
accommodations are excluded from consideration in walk boundary analysis. With consideration to distance, 6,668 students who live within one mile of their assigned school receive daily transportation, with the vast majority of these students (86 percent) in elementary grade levels.

Student Walk Boundary Exceptions Grade Level and Distance							
Grade	**0-0.50 miles**	**0.51-1.00 miles**	**1.01-1.25 miles**	**1.26-1.50 miles**	**1.51-1.75 miles**	**1.76-2.00 miles**	**Total**
P	62	308	227	193			**790**
S	N<5	N<5	N<5	N<5			**3**
K	147	703	570	525			**1,945**
1	145	800	580	495			**2,020**
2	161	761	626	534			**2,082**
3	153	759	559	518			**1,989**
4	152	706	643	546			**2,047**
5	152	727	583	512			**1,974**
6	26	285	283	353	520	551	**2,018**
7	12	204	236	379	521	591	**1,943**
8	14	229	224	339	525	535	**1,866**
9	N<5	56	77	217	356	532	**1,242**
10	6	45	62	173	309	397	**992**
11	N<5	23	41	130	242	293	**733**
12	N<5	19	36	115	210	314	**697**
Total	**1,043**	**5,625**	**4,747**	**5,030**	**2,683**	**3,213**	**22,341**
PK-5	974	4,764	3,788	3,324	0	0	12,850
6 to 12	69	861	959	1,706	2,683	3,213	9,491

As seen in the maps below, transported students with walk boundary exceptions reside all over the county. District-maintained "safety zones" are depicted in red, and each transported student living within their school's walk boundary is depicted as a blue dot. Safety zones define areas around each school wherein the PGCPS School Boundary team has determined that it is safe for students to travel to school without district-provided transportation. These zones are more conservative deviations from the published walk boundaries (i.e., 1.5 miles for elementary students and 2.0 miles for middle and high school students).



To convey how walk boundary exemptions by grade span are geospatially distributed across the county, the map below depicts transported elementary students living within their school walk boundary in green and transported secondary students living within their school walk boundary in blue. This map also removes the safety zone shape files in order to make the student exceptions more visually apparent. While there are some areas that only depict students of either gradespan, this clustering predominantly is a function of school location (i.e., neighborhoods with an elementary school but no high school).



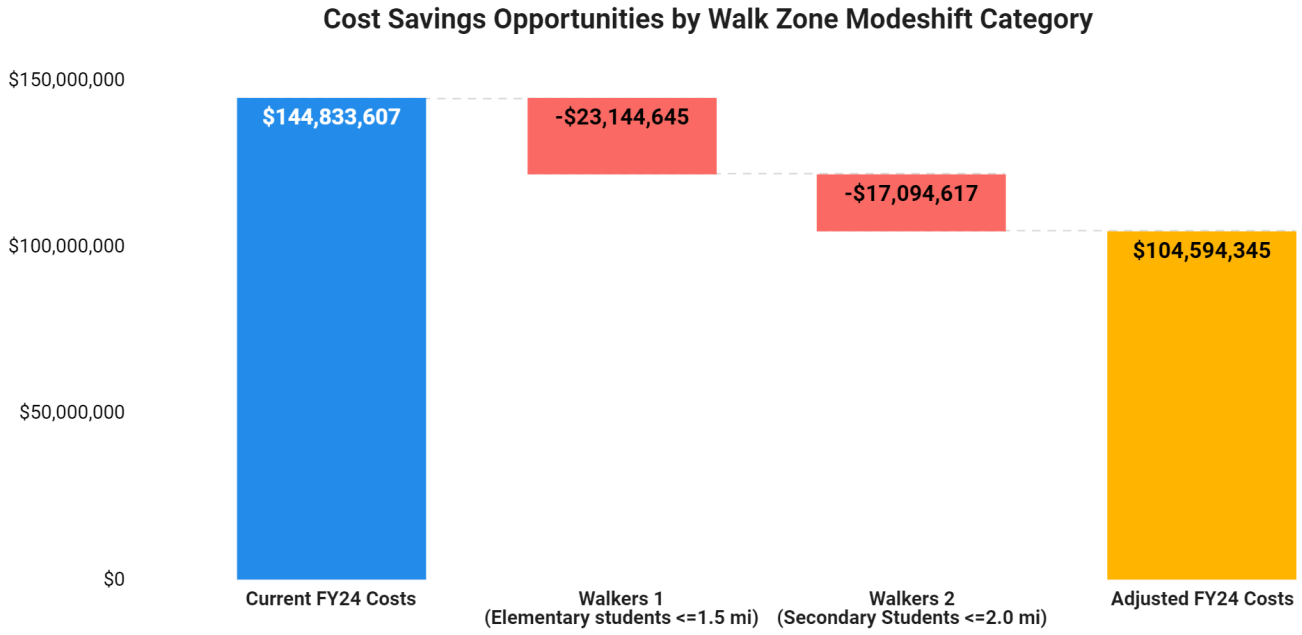
Opportunity #3: Walk Zone Audits and Modeshifting

The more than twenty-two thousand students who receive daily transportation despite residing within the Board-designated walk boundary represent a sizable proportion of transported students (26 percent of all assigned riders) and an opportunity for further investigation and auditing. The table below includes the 38 schools with 200 or more identified modeshift candidates, listing the number of

students whose home residence is within the designated walk boundary for their assigned school. **178 schools have modeshift candidate students, and 84 schools have more than 100 such students.**

School Name	Elementary	Secondary	Total Candidates
Beltsville Academy	433	245	678
Sonia Sotomayor Middle School @ Adelphi	0	636	636
Hyattsville Middle School	0	570	570
William W Hall Academy	322	168	490
Adelphi Elementary	467	0	467
Nicholas Orem Middle School	0	456	456
Drew-Freeman Middle School	0	429	429
Rogers Heights Elementary	354	61	415
Carole Highlands Elementary	358	0	358
Bladensburg High School	0	357	357
Kenmoor Middle School	0	349	349
Northwestern High School	0	338	338
Laurel Elementary	317	0	317
Calverton Elementary	316	0	316
Oaklands Elementary	302	0	302
Laurel High School	0	298	298
Walker Mill Middle School	0	289	289
Catherine T Reed Elementary	284	0	284
Langley Park-Mccormick Elementary	279	0	279
Thurgood Marshall Middle School	0	272	272
Suitland High School	0	268	268
Glenridge Elementary	202	65	267
Potomac High School	0	266	266
William Paca Elementary	266	0	266
Scotchtown Hills Elementary	262	0	262
Templeton Elementary @ Kenmoor Middle	262	0	262
Parkdale High School	0	249	249
Francis Scott Key Elementary	248	0	248
University Park Elementary	244	0	244
Dwight D Eisenhower Middle School	0	239	239
Oxon Hill High School	0	232	232
Accokeek Academy	101	130	231
Charles Flowers High School	0	224	224
James McHenry Elementary	212	0	212
Flintstone Elementary	203	0	203
Thomas Johnson Middle School	0	201	201
Crossland High School	0	200	200
Allenwood Elementary	200	0	200

These exceptions come at an extraordinary cost to the district. Prince George's County Public Schools would save more than $40 million dollars annually if no walk boundary exceptions were granted. The district incurs a cost of more than $23 million dollars annually from transporting elementary students who reside within their school walk boundary and an additional $17 million dollars annually from transporting middle and high school students who reside within their school walk boundary.



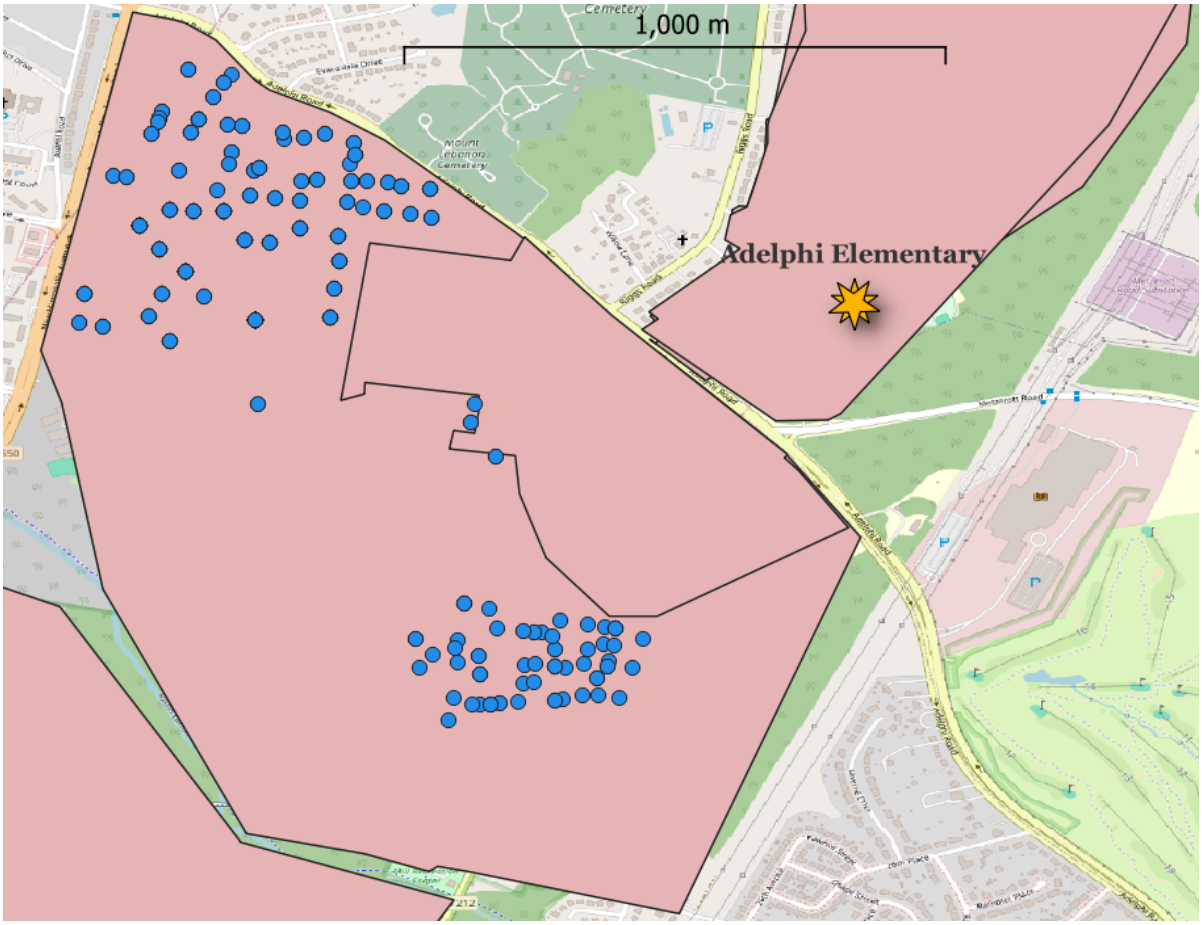
In reviewing past analyses conducted by district staff members, this pattern has been evident for at least five years. As reported by district staff, a PGCPS transportation staff member at some point in time identified a perceived safety barrier and granted exceptions to the published transportation eligibility criteria. DOT staff members will periodically go to sites to evaluate safety when requested by a parent or school staff member. DOT staff members report that they observe traffic flow, inspect public infrastructure, and identify traffic calming pedestrian safety measures (e.g., sidewalks, signage, signals crosswalks, speed humps, islands and dividers, etc.). However, **there is not a formal observation tool or standard operating procedure for conducting safety barrier evaluations, nor formal guidance for under what circumstances to conduct such an observation. Additionally, there is no codified procedure for documenting safety concerns, entering existent barriers into the district's routing system for systemic implementation, or a clear process for reviewing exemptions before they are enacted to ensure consistency and equity.** Furthermore, there is no schedule for periodically reviewing barriers and granted exemptions to determine whether the safety issue identified previously—likely several years ago based on anecdotal staff member reports—remains an active concern.

Implementing a standardized annual process for auditing walk boundary exceptions and identified safety barriers would ensure a more systematic and evidence-based approach is taken and has the potential to enable the district to modeshift many students off of routed vehicles by addressing the root causes. The only action the district currently takes when a safety barrier is identified by a DOT staff member is to provide transportation; no other strategies are deployed for expanding access and ameliorating the issues that impact perceived student pedestrian safety.

Solutions are necessarily context-specific and vary in terms of complexity and cost to implement. Several case studies are delineated below to illustrate the potential insights and benefits to be gained

by reviewing walk boundary exceptions. The district-provided shape file for safety zones consists of a single map layer that includes all safety zones for the entire system. These case studies are necessarily incomplete as they do not take into consideration on-the-ground knowledge of the area and are not guided by detailed review, and as such should not be interpreted as implementation guidance. Rather, the case studies demonstrate the magnitude of the opportunity and a general framework that could be applied by the district when auditing walk boundary exemptions.

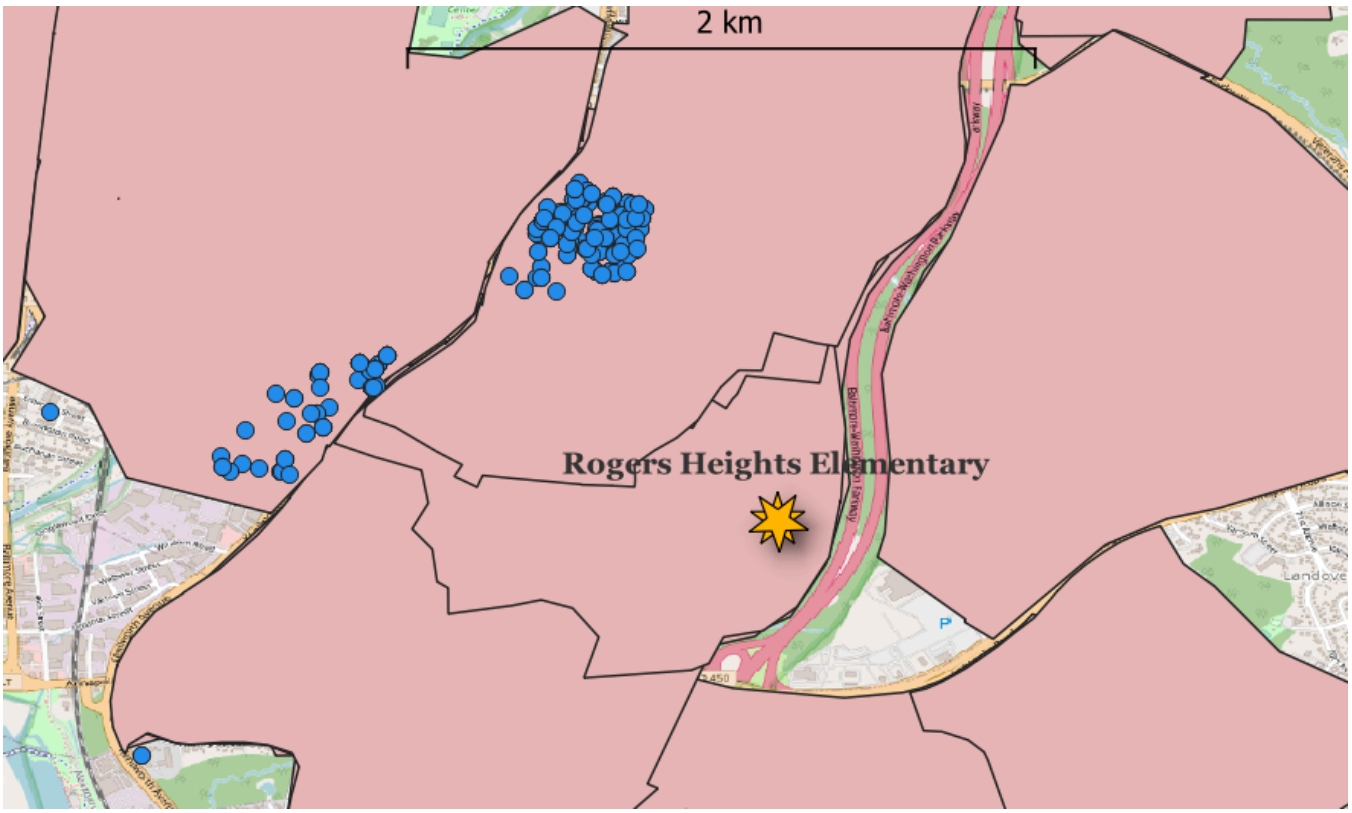
For example, as seen in the map below, there are 467 students who attend Adelphi Elementary who reside within 1.5 miles of the school. The modified safety zone for Adelphi Elementary is represented by the red area that encompasses the school, located in the upper right quadrant of the map. The red safety zones depicted in the center and lower left quadrant of the map are for other PGCPS schools. All 467 modeshift candidates reside on the other side of Adelphi Road, a five-lane road with three lanes on the school-side and two lanes in the other direction separated by a raised median.



The cost of transporting these students is approximately $275,000 annually, requiring twelve trips. Infrastructure upgrades—such as signals, crosswalks, speed humps, and speed limit adjustments—and the addition of crossing guards could eliminate or greatly reduce the walk boundary exceptions at this school. Likewise, identifying a safe community stop that is as close to the identified barrier as possible would enable the district to maximize seat utilization and have the same vehicle complete multiple trips

in quick succession, thereby diminishing the cost impacts without requiring students to cross the road barrier. Presently, PGCPS provides the same level of service for students who have an identified safety exception rather than providing transportation from a stop location that is just before a barrier.

Rogers Heights Elementary School is located in an area with multiple identified safety barriers. As seen in the map below, there are 415 students who attend Rogers Heights Elementary School who reside within the official walk boundary for the school. The modified safety zone is represented by the red area that encompasses the school, located in the center of the map. The other red safety zones depicted on the map are for other PGCPS schools. The primary safety barriers appear to be Kenilworth Avenue and Riverdale Road, both of which are multi-lane roads separated by a raised median. Though there is some evidence of pedestrian infrastructure, such as a few striped crosswalks, traffic signals, signage requiring reduced speed limits for the school zone, and sidewalks along many streets. The cost of transporting these students is approximately $230,000 annually, requiring ten trips. Further infrastructure upgrades (such as additional signals, crosswalks, speed humps, and speed limit adjustments), the addition of strategically-located crossing guards, and implementation of safe community stops could greatly reduce the walk boundary exceptions and maximize vehicle utilization at this school.



It is important that walk audits are conducted by staff members with local field knowledge, guided by a codified tool and process to ensure that walk boundary exceptions are implemented in an evidence-based and equitable manner.

Route Distance and Duration

Examining route distance and duration within school districts holds substantial significance due to its impact on key stakeholders—notably students, families and drivers. Efficiency aside, the daily experience of students, families and drivers—namely how early they have to get up each day, how arduous and lengthy their ride is, and when their day actually ends—needs to be carefully considered. From an efficiency standpoint, longer trips may be necessary to provide service to far-flung communities that need to get to school or to provide more county-wide choice, and allowing for longer trips also allows for each vehicle to pick up more students and leverage its full capacity. On the other hand, longer trip distances mean more fuel and vehicle maintenance expense, and higher driver labor costs. Longer individual trips also make it harder to have vehicles complete multiple trips for multiple schools each day.

Across PGCPS, the mean distance from a student's home address to their assigned school is 2.99 miles. A clear correlation exists between students' grade levels and the average home-to-school distance, with a progressive increase from an average of 1.83 miles for first graders to 4.25 miles for 11th and 12th graders, excluding Special Education students who have an average home-to-school distance of 5.60 miles. The average home-to-school distance for Pre-Kindergarten students (2.25 miles) is also an outlier, surpassing other elementary grade levels.

Average Home-to-School Distance (in miles) by Grade

Grade	All Students	Average Home-School Distance
P	3,764	2.25
K	8,456	1.84
1	8,805	1.83
2	9,200	2.00
3	8,567	2.02
4	8,985	2.04
5	8,911	2.09
6	8,785	3.05
7	8,893	3.22
8	8,987	3.32
9	12,846	3.90
10	9,829	3.98
11	8,143	4.25
12	7,305	4.25
S	4,001	5.60
Total	**125,483**	**2.99**

The typical trip covers a distance of 17.2 miles, lasting an average of 61.8 minutes. These trips originate from 13 terminals. Trips originating from Surrattsville terminal have the longest average duration (92.8 minutes), whereas trips departing from Bladensburg are the briefest on average (43.1 minutes). With regard to mileage, trips departing from Bladensburg cover just 10.3 miles on average,

while the typical trip originating from Surratsville covers 29.8 miles. Note that Brandywine terminal is primarily used for training, and as such has just five assigned trips, while the other twelve lots have between 209 (Crossland) to 531 (Fairmont) assigned daily trips.

Trips by Terminal				
Terminal/Lot Number	**Terminal/Lot Name**	**Number of Trips**	**Average Duration (minutes)**	**Average Distance (miles)**
6	Fairmont	531	48.2	11.6
9	Bladensburg	384	43.1	10.3
12	Crossland	209	71.3	22.0
15	Forestville	336	57.3	15.6
18	Goddard	377	53.1	13.5
21	Greenbelt	438	51.7	13.9
24	Hanson	325	51.2	14.5
27	Laurel	296	55.4	14.5
30	Mullikin	395	68.7	18.1
33	Surrattsville	326	92.8	29.8
36	Douglass	418	83.5	26.4
39	Friendly	229	88.5	26.5
51	Brandywine	5	51.2	13.9
Unknown	Unassigned Trips	1,051	--	--
Unknown	PM Extra Trips	14	--	--
Total		**5,334**	**61.8**	**17.2**

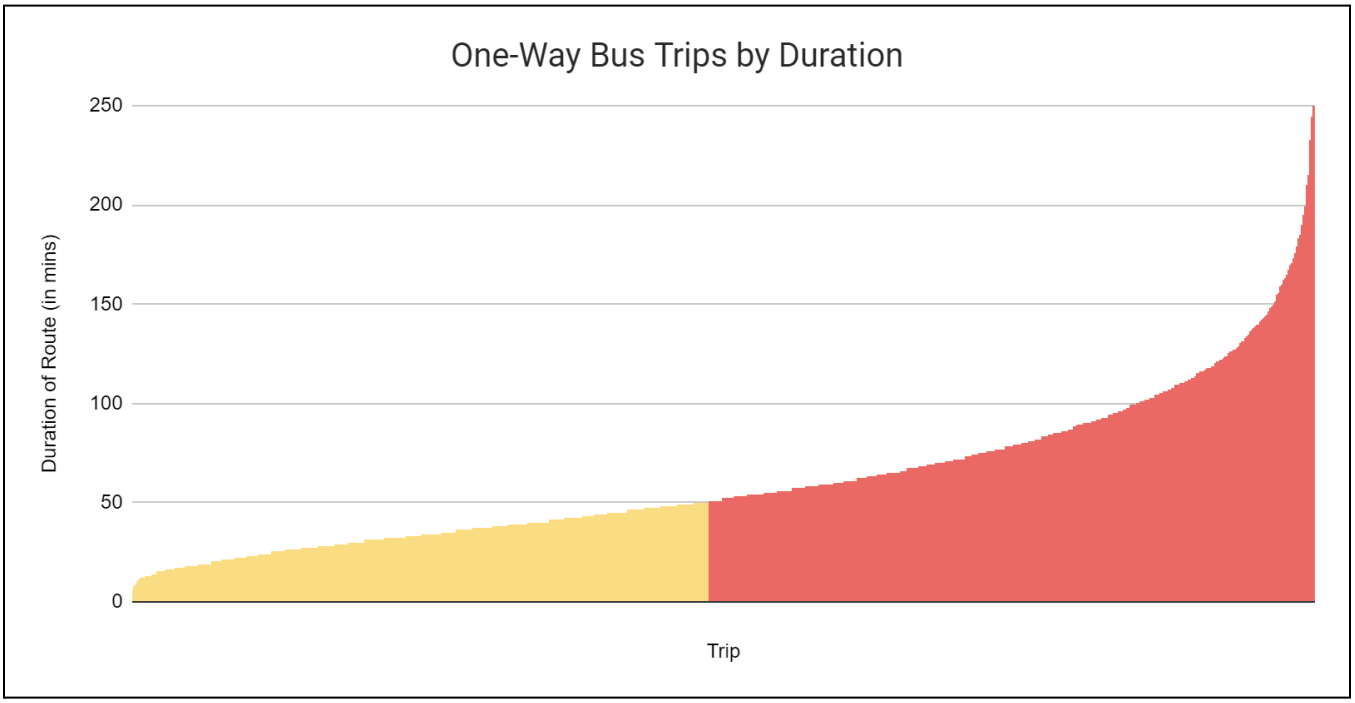
Below are the district's own ride time maximum guidelines for PGCPS routed trips from its "PGCPS Standard Operating Procedure (SOP) Transportation Routing" document.

COMPREHENSIVE	SPECIALTY PROGRAM & NON PUBLIC *	SPECIAL ED	FAB/FCA
50 minutes	90 minutes	60 minutes	90-120 minutes

Without a more detailed analysis of current trip duration, it appears that on average, the district is making the most of the allowable time allotted to run their trips, and so simply running trips longer is likely not a viable primary strategy to enhance utilization per trip (as is addressed in the next section), although some route lengthening may be in order. Shortening longer trips will certainly be necessary to enhance the number of trips per vehicle and to stack trips across multiple bell tiers (as addressed in the previous section on bell time alignment).

Below is an ordered plot of all the district's trips by duration. The graph shows a cut-off at 50 minutes—before which trips have some reasonable capacity to be lengthened in order to be better

utilized and could fit within a system of bell tiers with 60-minute spacing (allowing for 10 minutes of deadhead). About half of trips, however, would need to be shortened (unless it is the first trip in the AM or last trip in the PM) and trips at the far right of the distribution may need significant shortening or may simply be infeasible to schedule as one of three tiers.



The total trip counts across the morning and the afternoon are fairly evenly distributed with 49.7 percent occurring in the morning and 51.3 percent occurring in the evening. Of those trips, 4,269 (80 percent) are currently assigned to vehicles by PGCPS to create routes. These routes operate out of a specific terminal and have an assigned vehicle.

Number of Trips	
AM Trips	2,651
PM Trips	2,669
PM Extra Trips	14
Total Trips	**5,334**

An overview of the different terminals (also commonly referred to as bus lots), displays the total and active vehicle counts, total trips, assigned trips, and unassigned trips. Fairmont stands out with the highest total vehicle count of 138, out of which 83 vehicles are actively in service. It also records the most trips at 696, with 531 trips assigned and 165 trips unassigned. The dataset reveals considerable variation across terminals in terms of vehicle and trip activity levels. Note that a few vehicles are listed as based out of the Beltsville, Marlboro, and Brandywine garages, though only one vehicle kept at the Brandywine garage is actually active and assigned student trips. Additionally, the district operates 14 trips for after school activities (“PM Extra Trips”) that do not have a terminal or vehicle assigned.

Vehicles by Terminal						
Terminal/Lot Number	**Terminal/Lot Name**	**Number of Total Vehicles**	**Number of Active Vehicles**	**Number of Total Trips**	**Number of Assigned Trips**	**Number of Unassigned Trips**
6	Fairmont	138	83	696	531	165
9	Bladensburg	83	54	528	384	144
12	Crossland	77	48	260	209	51
15	Forestville	91	65	379	336	43
18	Goddard	83	61	428	377	51
21	Greenbelt	101	68	550	438	112
22	Beltsville*	7	0	0	0	0
24	Hanson	78	55	332	325	7
27	Laurel	89	57	448	296	152
30	Mullikin	126	86	512	395	117
33	Surrattsville	113	77	378	326	52
36	Douglass	152	94	500	418	82
39	Friendly	100	60	304	229	75
42	Marlboro*	6	0	0	0	0
51	Brandywine*	6	1	5	5	0
Unknown	(PM Extra Trips)		Unknown	14	0	14
Total		**1,251**	**809**	**5,334**	**4,269**	**1,065**

There is diversity in route volumes across various terminals as seen in the table below, ranging from a single route assigned to a vehicle kept at the Brandywine garage to 120 routes assigned to vehicles kept at the Fairmont bus lot. The number of routes—conceived as a package of trips assigned to the same vehicle and driver—is a good proxy in the current configuration for the baseline number of active drivers and vehicles needed to operate effectively, not including additional drivers and vehicles needed as backups or spares. A commonplace industry spare ratio for vehicles and stand-by or backup ratio for drivers is 10 percent.

Routes by Terminal		
Terminal/Lot Number	**Terminal/Lot Name**	**Number of Routes**
6	Fairmont	120
9	Bladensburg	85
12	Crossland	65
15	Forestville	80
18	Goddard	76
21	Greenbelt	104
24	Hanson	63
27	Laurel	90
30	Mullikin	117
33	Surrattsville	96
36	Douglass	119
39	Friendly	79
51	Brandywine	1
Total		**1,095**

Vehicle Seat and Trip Utilization

4MATIV's standard analysis of system efficiency includes two key measures of utilization: *seat utilization* and *trip utilization*. Both measure how well vehicles and scarce drivers are being utilized.

Seat utilization looks at each scheduled trip and measures how many seats are filled on the vehicle relative to the capacity of each vehicle. There are two ways to measure seat utilization:

- *Manufactured Utilization* is based on routed ridership relative to the manufacturer's listed vehicle capacity. For example, a typical Type C full-sized bus has a manufactured capacity of 71 or 72 passengers. This assumes, however, that three students are seated in each bench (with one bench in the back typically holding 1 or 2 students near to the emergency door).
- *Practical Utilization* considers that most students (especially older ones) are comfortable or can only feasibly sit in pairs of two on a regular sized bench. 4MATIV's measure of practical utilization assumes a reduction of vehicle capacity by twenty (20 percent) for any vehicle with a manufactured capacity greater than twelve in order to account for students who require more space. For vans and sedans, seating positions are assumed to be able to all be filled (less the space for the driver, and accounting for case-based prohibitions of students under 12 or potentially all students from sitting in front seats and often reserving seat capacity for bus aides). By this measure, 100 percent practical utilization means actually filling a vehicle to 80% of its stated manufactured capacity.

Trip utilization measures the number of trips that a vehicle is able to perform each day. Dividing the total trip utilization by two (because total trip utilization counts both AM and PM trips) reveals the average number of trips that vehicles perform on average each morning or afternoon. Ignoring midday trips, after school runs and field trips, in a well aligned three tier system, systems should strive for three trips each morning and three trips each afternoon for a total of six trips per day.

The below table shows the actual manufactured capacity and practical loading guidelines that the PGCPS routing team uses.[9] With the exception of the elementary school routing target for the district's largest buses (64 passengers), all of PGCPS's routing targets are below 4MATIV's recommended 80% practical utilization benchmark.

Bus Capacity	4MATIV Benchmark Target	Elementary School Routing Target	Middle School Routing Target	High School Routing Target
64	51	55	45	42
34	27	18	18	18
34 WC	27	18	18	18
43 WC Lift	34	20 & 1 WC	20 & 1 WC	20 & 1 WC
33 WC Lift	26	18 & 3 WC	18 & 3 WC	18 & 3 WC

Vehicle Type	Number of Active Vehicles	Average Practical Utilization	Average Manufactured Utilization	Average Trips Per Vehicle
Regular	481	79.3%	63.2%	6.45
Ortho	272	31.5%	24.8%	3.64
SPED	56	22.8%	18.0%	3.11
Total	**809**	**59.3%**	**47.2%**	**5.28**

The above table shows PGCPS's active vehicle counts by vehicle program type, practical utilization, manufactured utilization, and average trips per vehicle. **59.3 percent of seats are occupied on the typical vehicle trip based on practical utilization assumptions and the typical vehicle completed 5.28 trips per day.** Regular/Comprehensive vehicles, constituting the largest portion of the fleet at 481 vehicles, exhibit higher average practical utilization (79.3 percent) compared to Ortho and SPED vehicles. Regular/Comprehensive vehicles also display a notably higher number of average trips per vehicle (6.45) compared to other vehicle categories.

In contrast, Ortho vehicles, totaling 272, demonstrate a lower average practical utilization (31.5 percent) and manufactured utilization (24.8 percent) alongside an average of 3.64 trips per vehicle. Similarly, SPED vehicles, comprising 56 in number, depict the lowest practical utilization (22.8 percent) and manufactured utilization (18.0 percent) among the categories, with an average of 3.11 trips per vehicle. Students with accommodations and curb-to-curb accommodations comprise the majority of riders on these vehicles and trips, which commonly diminishes demonstrated seat and trip utilization, owing to more circuitous journeys and/or greater student loading time requirements.

[9] "PGCPS Standard Operating Procedure (SOP) Transportation Routing" document

In terms of optimal trip assignments and pairing, DOT staff indicated that trips are not repaired from year-to-year, as was previous practice, with the former routing system Trapeze suggesting optimal trip pairings. Instead, trip assignments and pairings carry over from the prior year. Similarly, route assignments to terminals are not systematically reevaluated based on the locations of terminals relative to the location of routes.

Across all vehicle types there exists opportunity for enhanced seat and trip utilization. Regular vehicles are utilized for a high number of average daily trips—so that indicates that they're stacked well. But within those stacks, there remains a large opportunity to increase loads. Ortho and SPED vehicles are transporting more students with specialized needs that attend schools farther away from their home addresses. They also carry most students that require curb-to-curb pickups and so have fewer opportunities to extend student distances to stops. But nonetheless, both Ortho and SPED vehicles have extremely low seat and trip utilization–by 4MATIV's guideposts and relative to the district's own internal targets for good routing–and so likely opportunities for significant improvement.

Importantly, this analysis has only considered planned utilization. Actual utilization involves measurement of actual student ridership on vehicles, which can vary from day-to-day based on incidental attendance (e.g., one-off student absences due to sickness or circumstance) based on real and persistent variable demand (e.g., weekly parental custody rotations, after school activities, or student employment schedules) that can be different by day, by week, or seasonal. Systematic monitoring and understanding of actual ridership will expose even more opportunities to enhance utilization by "overbooking" routes. Simply removing students that never ride and any empty or "dead" stops from routed trips will create significant additive "mode shifts" that will enable greater efficiency. And occasional riders can be offered less accommodating community/hub stops or asked or incentivized to opt-out of transportation altogether and voluntarily remove themselves from the planned rolls. Finally, where capturing affirmative "opt out" preference becomes difficult, the district could also explore a more assertive "opt in" policy, wherein identified students with observed sporadic ridership or who meet other criteria could be asked to affirmatively "opt in" before they will be considered for transportation. 4MATIV understood PGCPS's current practice to be to route all students on PGCPS transportation from year to year without requiring an affirmative "opt in" and without also pursuing "opt outs" in an intentional manner. With the exception of on special education routes, actual ridership and usage was not systematically or regularly monitored.

RECOMMENDATIONS

Recommendation 1. Align and Balance School Bell Times

To streamline operations and enhance efficiency, aligning and balancing bell times is needed.

If the district perfectly aligns bell times, keeping all other service details and student assignments unchanged, it would reduce the required number of vehicles to fully cover the district's current trips from 1,008 to 889. This substantial decrease of 119 vehicles would significantly reduce the current driver shortage and produce robust cost savings. At a current cost of $779.74 per vehicle per day, the district could save up to $92,000 per day and $16.9 million dollars annually through bell time optimization.

Recommendation 2. Strategically Differentiate Service Levels and Consolidate Stops

The district should strategically differentiate service levels by consolidating stops in a targeted and student-specific manner (for instance, with consideration of grade level, school program, accommodation status, neighborhood, etc.) in order to increase operational efficiency and personalize service.

Strategically increasing service levels would allow for the removal of 22 percent of stops across the system. As a result of the scenario modeling, overall average stop distances increase from 0.24 miles in the base state (October 2023 actual) to 0.46 miles in the post-optimization example. While average stop distances are roughly doubled, the typical student is nonetheless still traveling far less than the stated policy maximum of 1.5 miles for elementary students and 2.0 miles for middle and high school students. Students in grades PK-5 are simulated to travel 0.44 miles to their stop (29 percent policy utilization) while secondary students are simulated to travel 0.48 miles to their stop (24 percent policy utilization).

Despite modest increases in stop distances across the system in 4MATIV's simulation, significant efficiencies are achieved. In the post-simulation state, the district is modeled to operate 443 fewer trips (a reduction of 8.3 percent). Moreover, while there are more than one thousand unassigned trips in the base state, the optimization model assigns every student to a trip and every trip to a route, vehicle, and terminal. As a result of targeted stop consolidation and strategic differentiation of service levels, each trip has higher seat utilization, with 9 percent more students per trip, resulting in fewer trips and therefore fewer vehicles and drivers required. The post-optimization model results in a decrease of 69 vehicles. Using current FY24 costs, this reduction would save the district $9.8 million dollars annually.

While students with transportation accommodations are excluded from the simulation exercise because it would be difficult to systemically model appropriate adjustments to their service levels, there is ample opportunity to strategically differentiate service for these students. Personalizing mobility support is especially important when an Individualized Education Program (IEP) team determines that transportation is a related service for a student. Personalized mobility support is designed to align with accomplishing a learner's identified IEP goals, with an intention to provide access to the least restrictive

transportation environment, and with consideration of the learner's unique strengths and needs. A school system that is differentiating transportation service for students with disabilities provides a spectrum of mobility solutions. To facilitate the provision of more nuanced and personalized accommodations, PGCPS should provide clear guidance to IEP teams and a suggested protocol for reviewing and determining transportation accommodations. Such guidance should outline the spectrum of mobility options that could be provided and the purpose or benefit of each support.

Recommendation 3. Audit Walk Boundary Safety Zones

The district should implement a formalized approach to auditing system-level safety zones and student-level walk boundary exceptions in order to ensure a consistent and equitable exemption process, identify instances where it is reasonable to enforce standard transportation eligibility criteria, and pinpoint areas where strategic investments in pedestrian infrastructure and/or adjustments to service design could resolve perceived safety issues.

The more than 22,000 transported students who reside within their school's walk boundary are distributed across 178 schools, with 84 schools having more than 100 such student exceptions. These walk boundary exceptions come at an extraordinary cost to the district. Prince George's County Public Schools would save more than $40 million dollars annually if no walk boundary exceptions were granted. The district incurs a cost of more than $23 million dollars annually from transporting elementary students who reside within their school walk boundary and an additional $17 million dollars annually from transporting middle and high school students who reside within their school walk boundary.

Implementing a standardized annual process for auditing walk boundary exceptions and identified safety barriers would ensure a more systematic and evidence-based approach is taken and has the potential to enable the district to modeshift many students off of routed vehicles by addressing the root causes. PGCPS does not have a formal observation tool or standard operating procedure for evaluating safety barriers, nor formal guidance that defines the circumstances under which to conduct site observations. Additionally, there is no codified procedure for documenting safety concerns, entering existent barriers into the district's routing system for systemic implementation, or a clear process for reviewing exemptions before they are enacted to ensure consistency and equity. Furthermore, there is no schedule for periodically reviewing barriers and granted exemptions to determine whether the identified safety issue remains an active concern.

Separately, infrastructure upgrades—such as signals, crosswalks, speed humps, and speed limit adjustments—and the addition of strategically-placed crossing guards could greatly reduce walk boundary exceptions across the system. Likewise, PGCPS presently provides the same level of service for students who have an identified safety exception rather than providing transportation from a stop location that is just before a barrier. Identifying safe community stops that are as close to identified barriers as possible would maximize vehicle seat utilization and potentially enable the same vehicle to complete multiple trips in quick succession, thereby diminishing the cost impacts from walk boundary exceptions without requiring students to cross safety barriers.

IV. Supply

FINDINGS AND ANALYSIS

Vendor Options

Generally speaking, having a set of diverse vendor options that can be deployed to supplement peak needs (e.g., field trips and athletics) or students with specific mobility needs that are hardest for a district to accommodate (e.g., long distances or low density demand for niche programs, intensive equipment, highly variable schedules, on-demand needs), is a best practice. The need for third-party vendor carriers has become particularly crucial during the current environment of driver and vehicle shortages across the country.

Third-party vendors can have economies of scale that a district's in-house operation cannot by virtue of their providing services to other districts or to service transportation needs beyond K-12 education (e.g., non-emergency medical transportation, or retail charter transportation). New transportation network company (TNC) operators like HopSkipDrive or taxi companies also leverage part-time independent contractor drivers that can adapt more flexibly to accommodate variable needs and so reduce fixed costs. These companies also often deploy more sophisticated technologies to track vehicles, monitor via video and audio recording, and even monitor vehicle movement and score driver behavior in real time that can greatly enhance safety. Properly qualified, with proper oversight on the part of the district, and strategically deployed in an efficient manner, these outsourced vendor options can fill key gaps and be an indispensable part of a safe, sustainable and adaptive student mobility system.

PGCPS currently has a contract with one third-party vendor, EverDriven. EverDriven has contracts with over 500 school districts nationwide servicing 22,000 individual students in SY 2022-2023. They subcontract and manage fleets and subcontracted individual owner-drivers of vans, sedans and other alternative school vehicles with a focus on services to McKinney-Vento and foster care students and students with disabilities. There are several other national third-party vendors that operate in the area of PGCPS, such as HopSkipDrive, Zum, and First Student that manage a mix of options—including full-sized buses. The area is also home to many small private taxi, van, and school bus companies.

Another vendor option that districts, charter schools and regional systems across the U.S. leverage are brokerages (such as 4MATIV, Collaborative Student Transportation, and Transpar) that sub-contract and manage third party vendors. Brokerages can help reduce the complexity of multi-vendor and multi-modal management and create a single point of accountability for a district with complex needs.

Fleet Assets

Prince George's County Public Schools operates a fleet of 1,251 vehicles, with 809 in active daily service. The bulk of these are Regular/Comprehensive Vehicles, or full-sized Type C yellow school buses. PGCPS's vehicles accommodate 61 to 70 manufactured seat positions, with a practical capacity of 49 to 56 students at a time. Among these, 481, or 59.7 percent, are actively used for student transportation.

Number of Vehicles	
Total ALL Vehicles	1,251
Active Vehicles	809
Spare Vehicles	442
Total Wheelchair Vehicles	446

There are 371 Ortho Vehicles, of which 272, or 73.3 percent, are active. These specialized vehicles have lower capacity than the full-sized Regular/Comprehensive vehicles and are wheelchair accessible and equipped with harnesses and a lift. They feature between 11 and 34 manufactured seating capacity, practically accommodating 9 to 27 students at a time.

PGCPS has allocated 75 vehicles specifically for transporting special education students. Among these, 56, or 74.7 percent, are currently active. All of these vehicles are manufactured with 43 seating positions, though their practical capacity is 34 students by 4MATIV's measure.

Vehicles by Type				
Manufactured Capacity	**Practical Capacity**	**Total Vehicles**	**Active Vehicles**	**Wheelchair/Harness Vehicles**
Fuel Transport Vehicle				
AA		1		
Ortho Vehicles				
11	9	22	1	22
33	26	300	254	300
34	27	49	17	49
Regular/Comprehensive Vehicles				
61	49	4		
64	51	799	481	
70	56	1		
SPED Vehicles				
43	34	75	56	75
Aveg. Manufactured Capacity	**Avg. Practical Capacity**	**Total All Vehicles**	**Total Active**	**Total Wheelchair**
45	36	1,251	809	446

Modal Mix

Irrespective of a district's mix of in-house versus outsourced services for transportation, in every context there also exists a de facto and a theoretical "optimal" mix of different modes by which students get to school every day. Construed broadly, the various modes that we know PGCPS are using daily to get to and from school include the following:

- District-provided bus
- Outsourced vans/sedans/alternative vehicles
- Private parent transport
- Pooled (voluntary) parent transport (carpools)
- Public transport buses
- Walking / biking ("active transport")

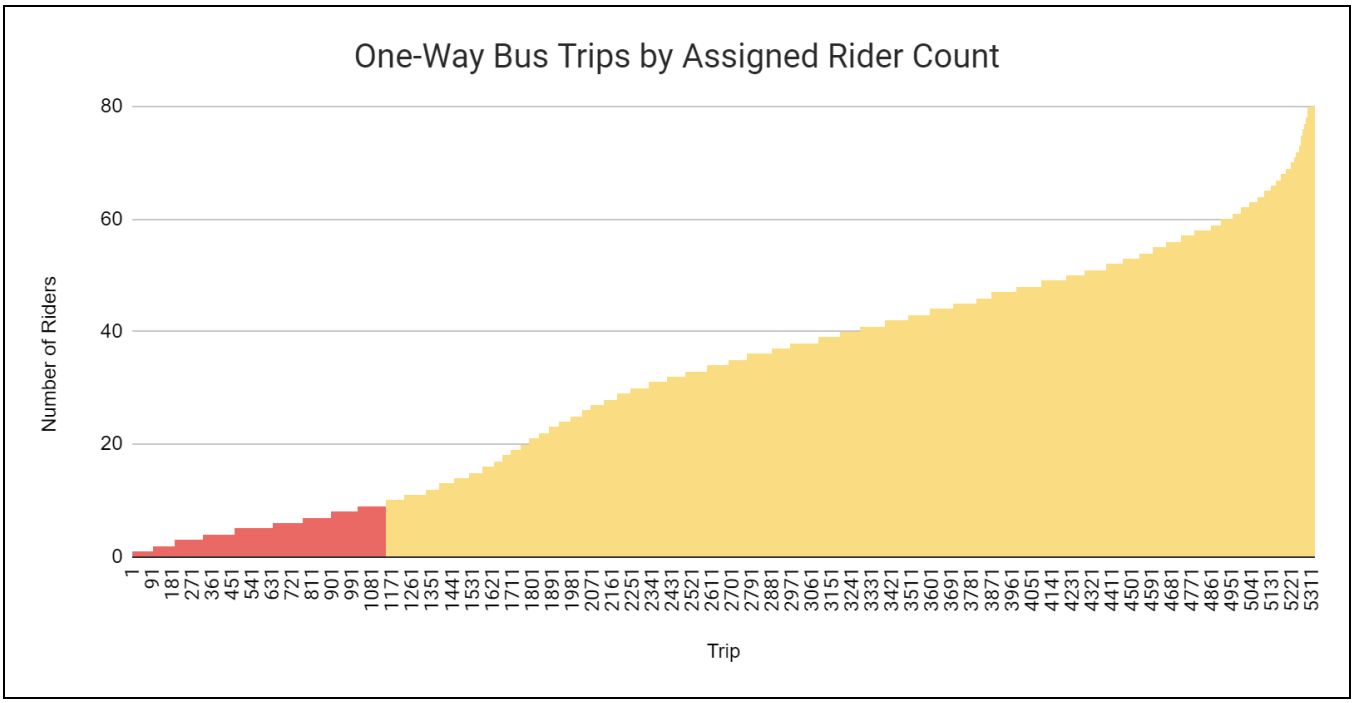
Students may also leverage different modes from day to day depending on their needs and origins / destinations before and after school. We analyzed the opportunities for more students to walk or bike to school in a previous section. We will also discuss alternative modes in a later subsection. First we consider the mix of buses versus the potential for smaller vans and sedans.

Opportunity #4: Diversify Vehicle Mix

Considering first those students the district is currently transporting on its own school buses and looking at routed ridership, **there exists an enormous opportunity to potentially switch more than 1,100 vehicle trips from buses to lower-cost vans or sedans.**

In Maryland, regular passenger vehicles are allowed to do home-to-school transport for all students if the drivers and vehicles meet some basic requirements (as delineated in the policy landscape section). Passenger sedans and vans up to ten (10) passengers including the driver do not require a CDL license to operate and have lower operating and maintenance costs than diesel buses.

The graphic below shows the district's current routed trips, sorted by routed passenger load. The area in red depicts 1,139 routes that have fewer than nine (9) riders and that therefore could be served by either in-house or outsourced passenger vans or sedans. 4MATIV recommends performing this simple analysis of where non-CDL vans or sedans could be leveraged in lieu of school buses every year *after* the district establishes its planned mix of walkers and riders, and has also optimized its stop locations, aligned/balanced its bell tiers, and optimized its trip pairings.



4MATIV's cost analysis of the district's current system shows a cost per vehicle trip of $155.76. The identified trips above serving fewer than nine (9) students average five (5) students routed per trip, resulting in an average cost per student-trip of $31.20.

4MATIV's experience and prior models across the country of average cost per student trip using a mix of in-house or outsourced sedan and van services like Everdriven and others finds a typical cost per student-trip of $25.00 is eminently achievable if such services are well managed. This presumes the district could find and deploy the right-sized mix of in-house and outsourced non-CDL sedans and vans to serve the current routed configuration (i.e. using ten (10) passenger vans for student loads of six (6) to nine (9), regular passenger mini-vans for loads of three (3) to six (6), and sedans for loads of one (1) to three (3) riders).

A cost of $25.00 per student-trip relative to the current $31.20 for these low-density trips would be a savings of $6.20 per student trip—representing savings of $12.40 per affected student per day. Considering the student population of approximately 5,800 students on these trips, modeling savings over the course of 183 school days would produce **annual savings to the district of over $13.2 million dollars.**

Alternative Modes

Popularly in the student transportation industry today, use of vans or sedans is referred to as "alternative student transportation". Walking and biking used to be far more commonplace, but now those "active modes" are significantly on the wane and so are more commonly considered "alternative", with private parent transportation (typically solo) is the fastest growing and most prevalent mode.

4MATIV's view of "alternative modes" includes all the possible modes of student transport outside of the traditional yellow bus, and we analyze all the possible ways districts can support and leverage these modes insofar as they are allowed by law and can be leveraged safely and in a cost effective manner.

This analysis does not go into detail as to the magnitude of cost savings possible with promotion of or shifting students to the following "alternative modes", but we nonetheless recommend that PGCPS explore each as a potential part of a future more diverse and intentional modal mix.

- **Walking school bus**[10] refers to programs that aim to support and encourage more active transport with the engagement of active school staff that accompany students along a planned walking route to school. It can be used as an alternative in some cases to a crossing guard or walk zone community stop to address safety barriers that might narrow a school's walk zone, or it can be used to expand walk zones and walking as a viable mode or to simply provide an additional layer of safety and a positive wellness initiative for students already walking or expected to walk to school.
- **Coordinated or tech-enabled carpools:** PGCPS expresses in a recent school board presentation that "parents are encouraged to carpool, when possible." Beyond whatever form this encouragement may take, recognizing the growing share of parents driving their own students to school and the environmental and logistical burdens this causes at school locations, it behooves the district to do more to encourage carpooling and to invest in practical and technological strategies to coordinate it. 4MATIV recommends schools engage with their parent community to identify who might be already driving and to gauge broader interest in carpooling. Schools can play a helpful role in mapping parent locations using a simple tool like google maps and connecting parents that might live near to one another and facilitating a connection that might turn into an enduring carpooling arrangement. The district can also do so more systematically across schools.

  Tech platforms like GoKid and CarpoolToSchool offer an app that parents can buy on their own or that the district could buy on behalf of their parents that helps them to find each other, arrange carpools voluntarily amongst each other, and even consent to sharing drivers license, insurance information and GPS tracking locations with one another.
- **Public transport buses ("TheBus")** are a mode already in use by a large but unknown number of PGCPS middle and high school students, and students may utilize the service for free with a

[10] http://www.walkingschoolbus.org/

student ID. At a minimum this is a mode that should be promoted and encouraged. But as with walking, PGCPS should analyze systematically where public transit journeys for their middle and high school students might actually be leveraged as students' primary daily means of getting to and from school. Where students live in proximity to bus stops and bus routes run near to their destination schools on schedules that coincide acceptably with school schedules, public transit bus service can arguably be better than school bus service across many measures including safety (where public buses are well lit and always monitored by cameras and tracked on GPS–although reasonable people could debate student safety in the well-lit and monitored presence of both responsible and perhaps less responsible or even dangerous adults *versus* the not well-lit and often unmonitored presence of their responsible and sometimes less responsible peers on a school bus.). Transit buses that run frequently throughout the day and are close to students' origins and desired destinations can provide tremendous benefit of providing back-up service if students miss the first bus and also enabling them to flexibly attend before and after school programs or use the system to get to alternative destinations like jobs that the school bus system cannot accommodate.

- **Parent payments/stipends or reimbursements in lieu of district-provided transportation** is a mode PGCPS uses currently in limited circumstances with some special education students in line with the federal standard mileage reimbursement rate. Since COVID, in light of severe driver shortages, and as education savings accounts (ESAs) are starting to grow in use across the country, more districts are now implementing various schemes to pay parents on a pro-active or reimbursement basis for transporting their own students. 4MATIV recommends that after optimizing for the bus versus van/sedan vehicle mix, that PGCPS explore an option of offering the most expensive and farthest out students that the district transports a monthly payment in lieu of provided service. A van- or sedan-routed service typically costs on the order of $40-60 per student per day or more, or $800-1,200 per month per student. By comparison, a generous stipend of far less could adequately subsidize a parent's private costs, and even allow a family to lease or buy their own vehicle, buy gas, use public transit, buy a carpooling app, hire occasional Uber or Lyft rides, or do all of the preceding things in whatever measure they see fit and provide tremendous knock-on benefits to a family.

Service Differentiation

Service differentiation is a way of strategically allocating the appropriate mode and level of transportation services to students based on needs and strategic priorities. Differentiation not only allows for more efficient use of resources, but can also be leveraged to help ensure equity across the district's transportation system.

Conceptually, service differentiation includes the following elements:

- **Strengthen Core:** Building an intentionally differentiated transportation system starts with ensuring there is strong core service (typically routed buses and vans) that meets the mobility needs of most students.
- **Assess:** To assess the strength of service, a school division should set clear goals for important student transportation performance measures, such as on-time performance, seat utilization, trip utilization, driver attendance, ridership, and parent/student satisfaction.
- **Contextualize:** Consider your unique students and community to determine what options are available (e.g., public transit, rideshare, caregivers with private vehicles). This analysis of assets and gaps will guide the development of a range of mobility options that can be strategically deployed with increasing customization based on demonstrated student need.
- **Differentiate:** Provide more individualized solutions and leverage multiple modes based on demonstrated need and context. Leveraging multiple modes and adopting varied schedule design approaches can be especially effective for ensuring access to after school and weekend learning opportunities.
- **Evaluate:** Align your transportation evaluation plan with the level of differentiation. The more customized the transportation support, the more frequently it should be evaluated for implementation fidelity and impact.

PGCPS has enormous opportunities to strategically differentiate its system to right size the required number of vehicles and drivers needed to serve all students, broadening the mix of modes used as described throughout this section, while actually improving options and service reliability across the board and ensuring the most accommodating and responsive service gets reliably delivered to the district's most vulnerable students. This report addresses some opportunities to strategically differentiate as the district explores lengthening the distance that some students travel to bus stops; another key area of opportunity that is not examined at length in this report is strategic differentiation of service provision for students with special needs. For example, whereas at present the most common accommodation provided is a "curb-to-curb" yellow bus stop, some students might only need (or might be able to progress over time toward) a corner bus stop that could be closer to their home address than their peers in similar grades and academic programs, but would still allow for more efficient routing than a curb-to-curb stop and would therefore allow for more efficient routing.

RECOMMENDATIONS

Recommendation 4. Diversify Modal and Vendor Mix

PGCPS should build upon nascent efforts to diversify its modal mix by increasing the use of smaller vehicles for low-density trips, thereby diminishing the demand for CDL drivers.

4MATIV looked specifically at the large opportunity to use allowable non-CDL-required sedans and vans (from six (6) to ten (10) passenger capacity) in lieu of CDL-required school buses wherever possible where routing ridership on trips can at best be nine (9) students or less. Recruiting and hiring non-CDL drivers, procuring and operating these smaller passenger vehicles, and finding and managing qualified outsourced providers for a portion of the district's low-density trips would be far easier than serving these trips with scarce CDL drivers and the district's buses–and it would save the district a lot of money. Furthermore, having a mix of in-house and outsourced options in this category specifically would give the district flexibility to supplement its peak and most complex needs, and would create a dynamic of competition amongst vendors to maintain better service and pricing.

Recommendation 5. Expand Alternative Supply Options

PGCPS should enact an intentional strategy around promoting and supporting low-cost alternative modes of transportation for students within the district where such options make sense-delivering equivalent or better service

While this report does not analyze in detail or project the impact of switching students from buses and vans to public transit, payment in-lieu, or parent carpools, we nonetheless believe there is a real opportunity for the district to be more intentional in its promotion of these modes and to perhaps launch some pilot programs in the coming year to explore the community's appetite for expanding such programs. We recommend a near term deep analytical dive into transit feasibility as it is clear a large number of students already use this mode daily, passes are free for students, and it could represent an easy way to make some shifts off yellow buses. A "walking school bus" program is a strategy we recommend in tandem with careful safety audits, and crossing guard deployments to enhance safety and create more support around shifts to more walking within the walk zone, to overcome safety barriers, or to even expand walk zones. Carpool apps should be offered where parents are already driving in large numbers and parent car traffic has become a burden on school curbside operations or to local neighborhoods. Finally, parent payment in lieu of district-offered services, should be piloted first with the district's farthest flung specialty programs, where low density means an expensive sedan or minivan is a better option than a bus, but a monthly stipend to a family is a better option still.

Recommendation 6. Implement a Codified Opt-Out Practice

The district needs to implement a formalized process for recording ridership, daily student non-riders (chronic "no shows") or intermittent riders. PGCPS should also actively promote an "opt-out" option and consider providing appropriate incentives.

Regular ridership audits and good systems for monitoring repeat “no show” riders is key to maintaining efficiency. Simply asking families to “opt-out” and making that a more prominent and promoted part of enrollment would capture more of these non-riders before they’re ever routed, and immediately reap gains of fewer students to route at the beginning of each year. Families should be reminded that if they don’t need a bus ride daily their opting-out saves the district money and allows those students that truly need the bus to have more reliable service. Observed intermittent riders might be offered a small regular stipend in lieu as an incentive to fully opt out, together with the option to ride from a community stop that might be outside the normal service level zone for their grade. Currently the district’s default assumption is that all students who were routed in one year will be routed again the following year, and on and on.

Changing the default assumption in the enrollment process and year-over-year to be that families will not receive transportation unless they affirmatively elect it, or “opt-in”, is another way to better capture those families without a real need for transportation service. This approach could yield greater modeshifts than an opt-out approach; however, it can be fraught if the instructions are unclear (such as for families whose first language is not english), or if some families do not receive the communication. Additionally, unrouted families that request to be added back to routes within the first weeks of school could be disruptive. Nonetheless, an opt-in strategy can be executed successfully with a concerted, long-term communications strategy and deep community engagement.

V. Organizational Capabilities

FINDINGS AND ANALYSIS

Leadership and Management

Staffing

- **The Transportation Department is understaffed.** There are 177 open routes as of December 2023, reflecting a sizable gap between the number of daily active drivers required and the current system configuration, which includes 1,095 routes.
- Despite concerted efforts to hire for open positions, especially large vacancies for drivers and attendances, as of December 2023, there are multiple vacant strategic positions within the Department, including the position of Senior Transportation and Central Garage Supervisor.
- **The routing team needs technical training and professional development on data use, technology, and strategic routing methods.** Most team members have valuable practical experience so they understand the operation well, but there is room for growth in the sophistication by which they undertake their critical work.
- **The transportation team overall is in dire need of additional data and analytical capacity.** This is connected to information technology and the ability to transmit, clean, and validate the constantly moving and large data sets across systems, but then also analytical capacity to analyze performance data across the system and support management with its use to drive performance.

User-Centered Focus

- **There is not a deep overriding focus on the needs and experiences of the primary "users" of the Transportation department's services—students and families.** Instead, management and leadership are primarily concerned with execution of their responsibilities and seem to design processes with staff perspective in mind.
- **The department's lack of focus on student and parent user experience is not due to an absence of staff member service-orientation, but more indicative of the tools and systems that staff members have at their disposal.** For example, Phone Bank and Dispatch staff members, expressed a desire to see the user interface for the StopFinder app in order to understand what parents experience when trying to monitor their student's ride.
- **The practice of assigning buses to drivers for multiple years and permitting them to keep the vehicle keys prioritizes the preferences of drivers over the system's operational objectives.** The way buses are assigned via the driver bid to a driver for a five-year period and how drivers are able to take keys home each night is an extremely driver-centric practice that creates

convenience and comfort for them, but results in requiring a substitute vehicle every time a driver is absent, thereby inhibiting communication, complicating GPS tracking, burdening staff, and causing confusion at pickup for families. Keeping keys at terminals would also give terminal staff another way to quickly see whether drivers have reported for duty for the day and to visually inspect their fitness for duty before driving.

- **The process for documenting "doubled" trips is not designed to meet student and parent needs.** Terminal staff fill out electronic and paper forms to record day-of trip "doubles" (assignments for the more than one thousand unassigned trips that must be made daily based on limited driver availability). Terminal staff complete a "double sheet" by 6:30am in the morning and by 12:30pm in the afternoon. These Word documents are then sent to Phone Bank and Dispatch staff for reference. However, Terminal staff are often still trying to cover all runs by those deadlines. In the morning, many students are scheduled to be picked up before 6:30AM, so the "double sheets" are received too late to be of use for parents who contact the Phone Bank. Conversely, in the afternoon, Terminal staff alternately may not even know that a driver is unavailable at 12:30pm, which is up to an hour before many afternoon trips are scheduled to depart. Hence, "double sheets" are necessarily incomplete and often immediately outdated. The process is designed to produce documentation of day-of assignments, but there is not a meaningful design emphasis on how this process impacts students and parents. Trip assignments can be quite dynamic, changing at the start of or during the course of a shift as needed. While the Terminal staff may have the information they need to ensure coverage to the best of their ability, the information is not captured in a manner that flows to Phone Bank staff so they can see accurate information in ViewFinder, or to parents so they can track vehicle location in the StopFinder app.

- **Similarly, there is not an established procedure for ensuring accurate GPS tracking of trips in real-time, which impedes the ability of parents and students to monitor the status of their bus and erodes the ability to manage performance across the system.**

Accountability and Performance Management

- **Limited management and attention to both pre-check procedures on-time departure from terminals was observed over the course of yard visits.** There were no staff members positioned at the gate to track and encourage timely departures. It was not evident that a staff member was tracking (manually or electronically) on-time departures versus scheduled departures from Terminal lots. Likewise, consistent and comprehensive pre-check procedures were not observed in lots (e.g., testing stop arms). Notably, paper pre-check forms are only required to be submitted once per week and then scanned pre-check forms are reviewed by supervisors on a monthly basis. This lagged review is unlikely to capture deviations from actual practice and the paper format makes trend analysis at the driver, terminal, or system level impossible. Driver trainers are ostensibly responsible for assisting with pre-check monitoring, though many trainers are currently driving to support with coverage, which frequently leaves this important safety function unfilled.

- **There is not an established procedure for monitoring to ensure that vehicle GPS is powered on and linked to the appropriate trip before a vehicle leaves the Terminal lot.** If a driver signs into their tablet, district management contends that the bus engine number/vehicle assigned to the driver would be current and accurately reflected in ViewFinder (with the exception of any merged trips that the driver may be running simultaneously rather than synchronously). While some drivers were observed logging into their tablet in order to utilize the turn-by-turn directions, terminal management noted that use of the tablets is optional and that terminal staff does not check to ensure that vehicle-trip assignments are accurate and GPS devices are operational before drivers depart the lot.

- **The observed practice for addressing driver "no call/no shows" appeared unreliable and likely to result in uncovering an issue too late in the schedule to maintain on-time performance.** Drivers are asked to notify dispatch if they are late coming into the yard, but if they do not, trainers or other staff may only uncover a trip that has not yet departed until it's far too late. Indeed, multiple terminal staff members reported thatIf they assume a bus is on time unless they receive a call from a school or from the driver. Often parents or even schools calling to ask about the status of a trip is the first indication dispatch has that a vehicle may have never left due to a driver no call/no show. At this point the trip may be so late that families give up and find other means to get to school, or they may simply go inside and stop waiting and looking–thereby missing any backup or late bus that may come through.

- Roughly half of drivers had signed in on paper attendance logs before departing the lot, though all drivers should be required to do so before starting their shift. When asked, terminal staff reported that they "eyeballed" every driver and that drivers accurately record attendance by the end of their shift.

- **PGCPS transportation staff cited extreme annual challenges related to receiving student data from the Enrollment and Special Education Departments far behind required deadlines. This lateness represents a lack of system-wide accountability for timely registration, IEP review, decision making, and data transmission to Transportation, compounding the department's already difficult charge.** Additionally, registrars are not full-year employees, so there is a "dead period" in the summer when registrars clock off and data piles up, only to be provided as a last-minute deluge to the Transportation team right before the driver bid and after the bulk of routing is otherwise finished. Given the historically late receipt of student data for routing, the district's planned migration to a new student information system poses an acute risk.

Process Improvement

- **The district has implemented a complex system for requesting periodic vehicle location information from drivers due to the dearth of accurate vehicle-trip tracking. These time- and staff-intensive workarounds have limited effectiveness, however, due to lack of driver responsiveness, leading to duplication of effort and extended call wait times for families.** During observations of the Phone Bank and Dispatch, drivers did not consistently answer calls from the radio room, which were being conducted on behalf of families seeking information

about the status of their student's bus. Consequently, Phone Bank/Dispatch staff frequently called the Terminal and asked bus lot staff to call drivers to request a status update. Drivers answered these calls in all observed instances. Then, bus lot staff relayed information to the radio room, which updated Phone Bank staff, who then communicated to callers. Terminal staff concurred with Phone Bank and Dispatch staff that drivers are typically less responsive to radio room contacts. Multiple parents (and Terminal staff) reported a growing volume of parents calling bus lots directly to request bus status information in an effort to expedite the process.

- Moreover, there are inadequate systems for capturing performance issues so they can be aggregated, analyzed, and acted upon. For example, there is no way for a Phone Bank staff member to report that a bus skipped a stop.

- **A formalized process for recording student non-riders (chronic "no shows") does not exist.** The district will not remove a student from their bus assignment or clear a dead stop unless a parent communicates in writing that they are opting out of transportation for the rest of the year. Presently, the district does not implement a formalized process for requesting families to opt-out or opt-in to Transportation on an annual or semi-annual basis. An opt-out code does exist (code 60), though registrars are not trained to ask or directed to broaden transportation opt-outs in order to conserve resources. Instead, a driver may notice that a student does not ride and may start skipping the stop, but the rider and stop will not be removed from the routing system. This prevents stop and trip consolidation, which would help condense trips across the system and curtail the current driver shortage.

Communication

- Phone Bank staff members were observed to be productive, respectful, and solution-oriented. However, their inability to provide useful information regarding vehicle statuses greatly hindered their ability to resolve caller needs.

- **Families expressed that their biggest pain point continues to be a lack of communication and extreme challenges getting through and getting useful information when they contact Transportation.** Parents and caregivers experience long wait times, are sometimes dropped, or give up after waiting for extended periods. Families even expressed empathy about the challenges the district is confronting regarding finding driver coverage; they just want more proactive communication when there are substitute vehicles and accurate ETAs when vehicles are running late.

- An additional issue is that the Phone Bank does not open or take calls until 6:00 AM, which is after the time that some students need to be at their bus stop. So staff starting their workday at 6:00 AM are already behind–unable to alert the families with earliest pickups of any vehicles running late or of any changes.

- This fall, the Transportation Department started implementing a new process in which a driver is expected to contact Dispatch if they are running more than 15 minutes or more behind schedule. Then, Dispatch will send out messages via SchoolMessenger to notify families. While

a step in the right direction, messages do not provide more nuanced ETA information based on actual GPS tracking and messages are not differentiated based on a student's placement within a trip (e.g., understanding that students later in a trip may have even lengthier delays).

- Information coming through from the terminals on double sheets or through email or chat screens is inconsistent, with no established style guides or protocols for standardizing communication. Additionally, the means by which Phone Bank staff consume and then manually re-enter this information back into other systems creates a hodgepodge of inadequate communication. Every staffer has their own system and style of requesting info from the radio room and transmitting it out.

- Trip ETAs most often come from the radio room, as Phone Bank staff typically do not know which bus is performing a trip (interviewees estimated that tracking is accurately assigned 25 percent of the time), and so cannot track service via GPS. In fact, Phone Bank staff reported that the change that would have the greatest positive impact on their ability to serve callers would be having accurate vehicle-trip assignments to facilitate accurate StopFinder and Zonar tracking.

- The current process for determining a vehicle's status as articulated by Dispatch staff is as follows: a Phone Bank staffer sends a chat message to Dispatch ("radio room") to request information. Dispatch will next radio the driver. If the driver doesn't answer the call after several minutes, Dispatch will check the Zonar tracking. GPS is perceived as being largely unreliable, so staff prefer to call drivers first before opening Zonar. Calls to the terminal (bus lot) can confirm assigned bus numbers, whereupon the Phone Bank staff can track using Zonar, but agents have no way of viewing the scheduled route next to a vehicle location on the Zonar map.

- While Oracle has the ability to integrate with most student information systems, the Phone Bank devices do not automatically identify which student(s) a caller is associated with or other details about a student, such as their school or route. Instead, Phone Bank staff take information from the chat and from calls with families and write details (such as bus route number, school name, home address, etc.) on paper.

Technology Systems

- In general, PGCPS transportation lacks connected systems to keep track of routed/planned information while being able to consume and communicate in real time what is actually happening in the operation, and then have reliable places to track and log incidents or exceptions that may require follow up.

- **This lack of connected systems means lots of manual data entry, inconsistency, and staff that end up working harder than necessary to perform basic tasks, and their ability to deliver in an accurate and timely manner is severely compromised.**

- Many of the systems being used are paper-based (e.g., double sheets, accident logs, attendance logs, student no-show tracking), which further challenges accuracy and timely transmission, and means systematic analysis of key processes and metrics is nearly impossible.

- The district's enterprise system as it's currently configured, Transfinder, has no administrative view for users to see planned routes versus actual GPS information on a map or grid view. Viewfinder tool only shows the static schedule information. **Staff indicate that Transfinder has many performance issues, frequently times out, and has limited reporting capabilities.**

- Terminal staff cites that limited cell phone connectivity at several bus lots inhibits communication and also makes tablet use (critical for driver sign-on, pre-trip inspections, vehicle substitutions, and turn-by-turn navigation) impossible.

- **Zonar tablets frequently do not function, lack connectivity, or drivers have difficulty signing on.** There is inadequate capacity at the terminals to support and maintain the various hardware and software issues that drivers encounter in the lots. Trainers are able to provide some support when walking the lots daily, but many drivers have already given up and simply don't try. Common issues with the tablets include the charging port breaking from repeated removals of the tablets and plugging them back in which is required for pre-trip inspection. Pre-trip inspection with tablets is onerous and many vehicle placements are challenging to hit with the size and shape of the tablets.

- **GPS tracking using Zonar is functional 95 percent of the time, according to data provided by PGCPS staff. However, staff estimated that less than 30 percent of drivers were logging into their tablets, meaning 70 percent of routes did not have an affirmative vehicle assignment associated with a scheduled trip.**

- StopFinder is the parent app that works with the Transfinder routing system, pulling GPS data from Zonar. Parents report that the app frequently does not provide accurate information even if they're able to log in. The StopFinder app requires that a scheduled trip is associated with the physical vehicle and GPS unit performing it—and so a driver not logging into their tablet means the app will not work. Driver absenteeism and the daily ad hoc covering and doubling up of routes means that terminal or dispatch staff also cannot easily update the system if a driver cannot or forgets.

- **The Transfinder system is unable to associate a vehicle with multiple trips at once, so when trips are doubled up (as they commonly are), they are unable to be tracked in the StopFinder app.** The PGCPS team is invested in the Transfinder system and has reported that the vendor is making progress addressing challenges. Another contributing factor to the perception that the parent app is ineffectual is that parents need to first sign up for an account with the parent portal SchoolMax. Without that account properly set up, they cannot properly register for or use StopFinder and they are never invited to do so. Staff indicated that fewer than 20 percent of all transported parents had actually downloaded the StopFinder app. Relatedly, Phone Bank staff cannot update the email address for families in the student information system in order to support families in setting up their SchoolMax account. Invites that parents receive at the beginning of the year for SchoolMax (to whatever email is in the student information system) are only good for a week, requiring parents to request a new invite.

- The district is not using tablets currently for student tracking, but have explored a pilot for ESY service. Such a pilot would be ineffectual unless the district resolves the other issues cited here around tablet use, tablet maintenance, and wireless connectivity. Transfinder would also need to resolve the above-cited issue of associating vehicles with multiple routes that have been doubled up

Strategic Data Use

Organizational Strategy

- There is evidence of strategic planning at the district level, which has focused on one annual strategy and one annual output-oriented goal for Transportation over the past two academic years. The SY22-23 goal was to "launch the Transportation Resolution System for families to communicate questions and concerns" with the aim to "expedite assisting parents and constituents with transportation concerns" and impact the district's goal to to decrease student chronic absenteeism rates by 20 percent.

- The SY23-24 strategy ("Innovative Transportation") is identified in the November 2023 district strategic plan strategy tracker as, "significant investment in pioneering transportation solutions to enhance the school commute for students. This will include the utilization of vans, collaboration with community partners, and the exploration of rideshare alternatives, all aimed at providing efficient, safe, and convenient travel options for students to and from school." The stated objective is, "to support parents and students with more transportation options to reduce wait and arrival times." The strategy is intended to support the district's goal to decrease student chronic absenteeism rates by 20 percent.

- There is evidence of implementation efforts for both annual goals: an online TRS does exist and Transportation is pursuing two alternative transportation options related to the current SY23-24 strategy: use of vans to transport students and contracting with third party operators to provide. Specifically, Transportation has purchased fifteen Sprinter vans, is in the process of creating a new non-CDL driver position to operate vans in-house, and has entered into a contractual agreement with EverDriven to outsource van transportation.

Target and Goal Setting

- **The Transportation department does not have a developed system and practice for using data to set goals for performance management.** Few, if any, targets exist for Terminals, employee groups, or the department overall. Targets that do exist are not established through data analysis.

- While there is a general awareness of key measures (such as on-time performance, open routes, and staffing needs), the Department has not articulated ambitious but achievable incremental goals for continuous progress.

- Senior leadership in Transportation and Operations acknowledge that this is an area of organizational capability that requires improvement. Clear goals that guide day-to-day management decisions and medium- and long-term decision-making are missing. For instance, members of the Department could not convey a specific target for foundational metrics such as on-time performance, vehicle utilization, accurate GPS capture, or cost per student.

Quality and Access to Data

- **While the Department reports that the data they need to manage performance exists and is available, they report that data is often difficult to access in a useful manner.** Although some data is housed centrally, data generally resides in silos or in staff member-maintained spreadsheets, and is therefore difficult to assemble. Cited examples include on-time arrivals, live vehicle tracking, and payroll information.

- Overall, limited data access is granted to a few individuals, but most data inaccessible, particularly to external users. Data often exists in multiple systems and misaligned formats or levels of granularity, making it time-consuming and challenging for management staff to synthesize or merge data.

- Senior management report that they have concerns about data accuracy on a daily occurrence. Available data is sometimes inaccurate, and inconsistent data from different sources often provide different answers for the same question. One of the most pressing examples of this challenge pertains to having accurate vehicle tracking for each trip with appropriate vehicle-trip assignment.

- **Manual entry into spreadsheets and databases is common, resulting in data accuracy issues and delays.** For instance, while the district has instituted digital tracking of accident data, and there is typically day-of entry of basic details into district data systems, there still exists a data entry backlog of several months for accident case reviews (back to April 2023 in October 2023), which reduces the timeliness and reliability of data. The internal process followed whenever there is an accident or property damage is illustrative of these process weaknesses (duplicative manual entry, use of siloed databases, data sharing without clarity on expectations for action). First, a staff member enters the accident report in a computer system, which automatically generates an email that is sent to a long list of staff members who are supposed to receive notification for every incident. The staffer then records the accident in a hardcopy book log, records the accident in a spreadsheet they maintain, and then updates the list of preventable accidents as required. There were 57 accidents during the first seven weeks of the school year, and this recording process was followed every time. Other paper-based, manually entered data include “doubles” sheets for recording coverage of unassigned trips, accident logs, student no shows, and driver attendance.

Program Management and Monitoring Performance with Data

- **The Transportation department does not have an established model or habit related to continuous improvement.** There is not a codified or evident practice for problem definition, root

cause analysis, intervention, and progress monitoring. While some data monitoring is conducted, the inquiry process and expected action planning requirements are unclear.

- The Transportation department does not currently have an established practice of using outcomes to measure and monitor organizational performance. In instances where performance data is tracked, such as open routes by week, there is not a clear target for incremental improvement over a period of time.

- The district has designed a process with input from MSDE for determining if compensatory services are warranted based on frequent late bus arrivals that prevent a student with disabilities from receiving a free appropriate public education (FAPE). There are monthly meetings between members of the Transportation and Special Education departments to review late bus arrivals based on a Google Form that a designated point of contact at each school is responsible for completing daily. The "Late Bus Form" was developed as a workaround for tracking on-time performance for specialized transportation routes given that the automatically-generated bus arrival performance report is inaccurate owing to out-of-date vehicle assignments. On a quarterly cadence, the cross-functional team identifies trips that have been more than fifteen minutes late on ten or more occasions. An impact meeting is then held for any students on those trips to determine what compensatory services they may be entitled to receive. While the teams report reviewing data to identify and respond to student-specific issues, staff do not have an established process for examining and responding to system level trends.

Accountability and Decision-Making

- Members of Transportation management and leadership consistently identified accountability and data-informed decision making as areas of growth. One senior leader lamented that, "we are in a crisis mode where it is difficult to manage performance as we are just trying to survive. We need a structural fix to make it work."

- **Interviewees frequently expressed skepticism about how members of other employee groups and teams were held accountable for results and communicated a lack of understanding of how their work impacted other colleagues or organizational workflows overall.** One significant example entails widespread lack of adherence to the planned timeline for data gathering and routing for the start of each school year.

- Nonetheless, members of management communicated that despite the deficits the team is confronting, that Transportation staff work to make real-time improvements and find efficiency where possible. Interviewees gave the example of drivers on a daily basis using their judgment to make adjustments and Terminal staff making daily choices on how to cover routes. Management leaders acknowledge that the next step is to establish a process for identifying those daily adjustments that work (e.g., a day-of merging of two trips due to a driver coverage gap that still arrives on-time) and codifying them into the practice.

- External stakeholders (such as members of the public, parents/caregivers, and Board members) have little understanding of what performance management processes exist within the Department. However, DOT leaders did express a desire to produce a public data dashboard that would convey core measures of performance to the public, such as on-time performance, accident data, and open routes.

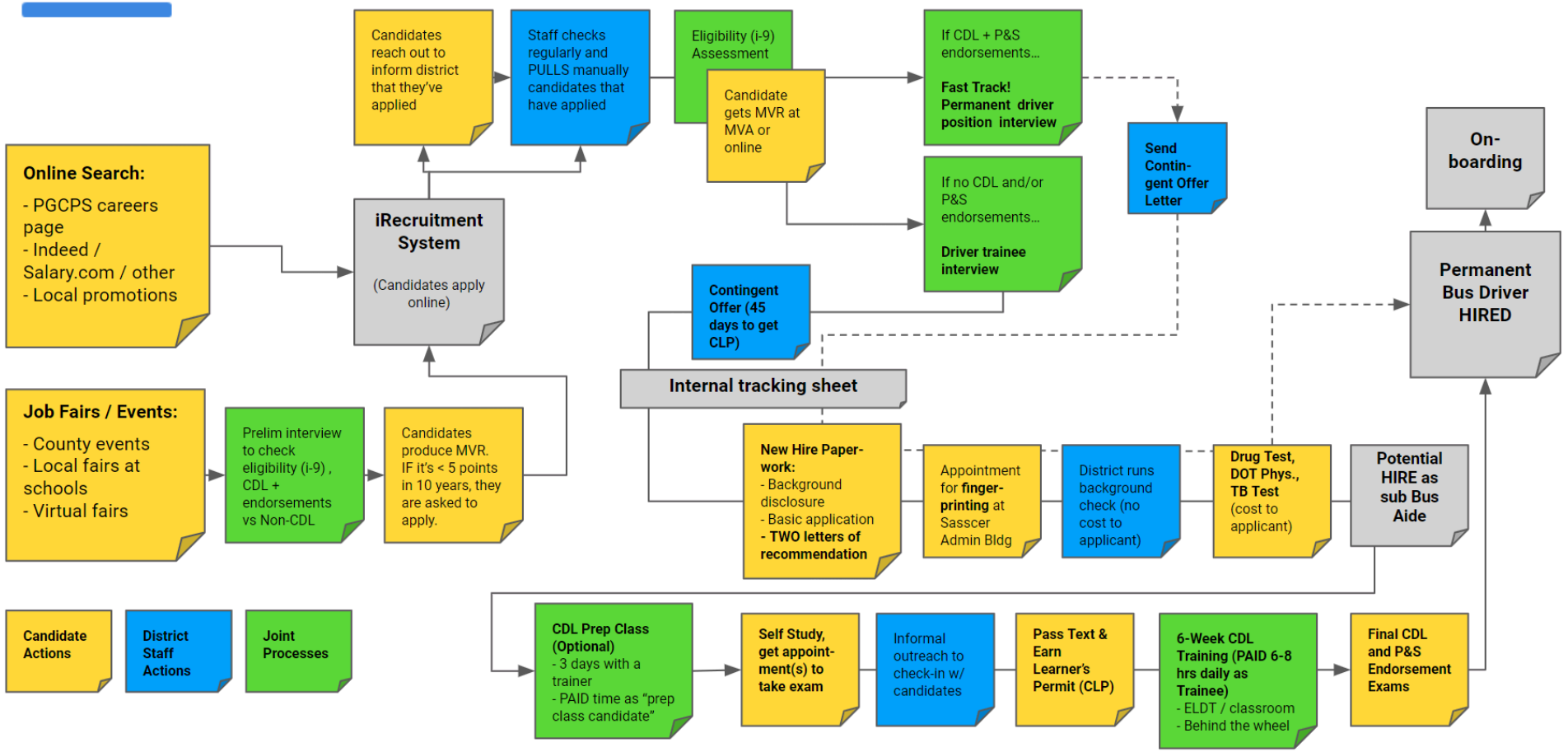
Driver Hiring & Qualification

- PGCPS has done well to keep driver wages competitive with its neighbors, and appears to undertake reasonably robust recruiting efforts. A cursory internet search reveals stories in local media, job postings on multiple online job boards, and information about job fairs for open driver roles within the district. This level of recruitment is on the high-performing end of districts that we have seen and with whom we have worked. We do however note that somewhat unique as compared to many regions of the country, PGCPS is proximate to a large number of very large districts with large systems of their own and a massive public transit system (WMATA) that present fierce competition for drivers and so require creativity in terms of ongoing marketing and recruiting efforts and will put continuous upward pressure on driver wages and the need to offer meaningful and noteworthy incentives.

- There may be more wage correction that is needed in the school bus driver market more broadly to make the role more competitive and there are other things that drivers value like pathways and connection to the mission of school districts that can enhance recruiting. But one key challenging area that we chose to focus on in this analysis for PGCPS is the process of hiring and qualification. Irrespective of how well districts recruit and how well they retain drivers, our experience shows that a huge number of good candidates (over 90 percent) simply drop out during the process of qualification after applying. Therefore we believe that one of the best and lowest cost ways districts can enhance their inflow of drivers is to focus on streamlining the qualification and hiring process to support and retain more of the candidates they initially attract.

- A process flow diagram on the page that follows reconstructs PGCPS's current driver hiring and qualification process based on 4MATIV's interviews with district staff.

Driver Hiring & Qualification Process



In-depth discussion with PGCPS staff and analysis of the above process flow diagram reveals several key bottlenecks where the process can be delayed and where candidates may drop off. It also suggests opportunities to adjust the process and to invest in candidate support at various stages to further improve candidate retention. **Staff interviewed indicated that it can take as much as three (3) months to get a candidate without a CDL through the whole process. A candidate with a CDL may take as much as one (1) month before they can actually start driving for the district.**

- **Step 1:** Candidates may learn about and attend a job fair or read about PGCPS driving role opportunities via an online search.
- **Step 2:** All candidates apply online to the district's iRecruitment system.
- **Step 3:** District staff check and pull candidate applications from the iRecruitment
- **Step 4:** Candidates are screened for basic eligibility and asked to produce an MVR (driving record report) for which they have to pay and get themselves at a Maryland MVA location or via an online service. If they meet basic requirements, they are scheduled for an online interview.
    - Staff are not automatically notified in any way when new candidates have applied. And staff report that sometimes candidates call after several days to alert the team to the fact that their application is ready to review.
    - Staff report that while it sometimes happens quickly, simply getting from an online application (Step 2) through to getting an interview (Step 5) *can take 1-4 weeks.*
- **Step 5**: Online interview. If the candidate already has a CDL and P&S endorsements, they move on to the "fast track" and receive a contingent offer letter for a permanent driver role. If a candidate does not have a CDL or all of the required endorsements, they enter the training track and receive a contingent offer letter as a candidate trainee. Candidate trainees are given 45 days from the date of their contingent letter to pass their theory test to obtain their learner's permit (CLP).
    - Upon issue of a contingent offer letter, candidates are entered into an internal candidate tracker in order to monitor their progress through the remaining processes.

    Steps 1-5 duration: 1-4 weeks
- **Step 6:** New hire paperwork. All candidates receive a basic application, including detailed background disclosures and instructions to produce two letters of recommendation from prior employers.
    - Drivers take paperwork home and are asked to return it in completed form along with letters of recommendations as soon as possible. Staff indicates this can take from 1-3 weeks. Some take longer and some candidates drop off at this stage.

    Step 6 duration: 1-3 weeks

- **Step 7:** Fingerprinting and running background checks, drug test appointments and processing of drug test results, DOT physicals and TB tests are each separate steps that require the applicant to go to make their own appointments, go to different physical locations, submit to tests, and then await results.
    - The district pays for fingerprinting and background checks and takes fingerprints with appointments at the district's own Sasscer building.
    - Drug testing, DOT physicals and TB tests all entail costs that applicants bear upfront.
    - Staff indicate that it can take several days to a week to get an invite to make a fingerprinting appointment, another several days to get background check results, and then also separately multiple days for candidates to get around to getting various required tests and the DOT physical, depending on the candidate.

      Step 7 duration: 1-3 weeks
    - [Fast Track] At the conclusion of step 7, drivers with current CDLs and P&S endorsements are hired and can begin the on-boarding process immediately.
    - [Slow Track] Candidate trainees can be hired as paid substitute bus aides while they enter into the (mostly) unpaid pre-CDL training portion of the process.
- **Step 8:** Once each month the district offers an optional but paid CDL theory prep class that lasts three days with a district trainer.
- **Step 9:** Candidates study on their own, make their own appointments, pay associated fees, and take their CDL theory exam at a Maryland MVA location to get their learner's permit (CLP).
    - Beyond the CDL prep course, the district may have only limited and scattered outreach to candidates. There is no systematic method of candidate case-management or support to help candidates over the testing finish line.
    - Many candidates have to take the test multiple times, many never pass and drop off at this stage. Staff indicate this step—including studying and passing the theory test—takes even some determined candidates up to six (6) weeks. Candidates pay an upfront fee each time they take the CLP exam.

      Step 9 duration: 1-6 weeks
- **Step 10:** After passing their theory exam and obtaining their learner's permit (CLP), they get hired as a paid trainee and start a 6-week classroom (ELDT) and practical behind-the-wheel training. Upon completion of training they take the final written and hands-on tests.
    - Staff indicate that it can take up to two (2) weeks for a trainee to start their formal CDL course after obtaining their CLP.

- Final written tests for the CDL and P&S endorsements are challenging and candidates often drop out after repeated failures.
- While reimbursed after hire, candidates pay upfront for all CDL-related tests.

Step 10 duration: 6-8 weeks

- **Step 11**: Final hiring and on-boarding process!

Considering all the above steps and expected time to complete the whole process, it's clear how even a fast-tracked candidate with a CDL and proper endorsements can take three (3) weeks to one (1) month to get hired in the best case. Even those that are highly motivated but do not have a CDL might at best hope to get through the whole process in 10-16 weeks, but for various reasons throughout the process it could take even longer. Candidates without a paying job may be highly likely to drop out along the way if they find other work or find the process frustrating and lacking in support, or if they cannot cover upfront costs. After a contingent offer letter, even candidates that are determined but that have taken more than 45 days to get through the process may have to start over, unless they've taken up a role in the interim as a bus aide.

RECOMMENDATIONS

Recommendation 7. Strengthen Organizational Capabilities Through Strategic Staffing

PGCPS needs to strengthen its data and analytic capacity by providing additional training and data support for routers and supervisors, while also hiring dedicated data analysts. On the driver side, the streamlining of administrative processes and the process of qualification and hiring is critical to maximize the conversion of recruits into qualified drivers.

The transportation team overall is in dire need of additional data and analytical capacity. In particular, the routing team needs technical training and professional development on data use, technology, and strategic routing methods. Supervisors and other staff also need more data fluency and support in the management of critical data systems and use of those systems to manage performance. To bolster general analytical and data capacity across the team, the district should hire two data analysts who can manage large data sets and the flow of data across multiple systems, calculate key performance indicators and present data in a way to support performance management and decision making. The district should also consider a re-alignment of roles between the routing team and supervisors that allows for more holistic relationship management and customer success assurance for schools that cuts across routing (and setting other "business rules" for service provision) and customer service; while operational performance management at the terminals and management of drivers could be more terminal-specific.

4MATIV recommends two areas of improvement on the administrative side of driver management that will help alleviate the current driver shortage and also help maintain driver staffing levels going forward. First, 4MATIV recommends launching a taskforce to meticulously review extended leaves of absence for drivers case-by-case with a cross-functional team of staff (including Legal, Special Education, Transportation, and other departments), to expeditiously bring these cases to resolution while ensuring adherence to collective bargaining agreements.

Second, 4MATIV recommends a set of adjustments to the current driver hiring and qualification process that in combination should reduce the time it takes for drivers to get through the process and provide more structured support and engagement to candidates to retain them through the process to completion. Some of our key process recommendations are as follows:

- Give candidates a checklist of step-by-step instructions and expected time duration for each stage of the hiring process until they can actually start working and get paid.
- Pay for and provide centralized, on-site provision of key steps in the qualification to reduce upfront costs for candidates, and remove the burden for candidates of making appointments and traveling to multiple different sites. These specific steps include MVR checks, fingerprinting, processing of background checks, DOT physicals, drug screens, and TB tests.
- Extend test prep and support services via office hours or additional structured tutoring to help candidates get through the theory exam for their CLP and throughout the CDL final exam process.

- Enrich the district's candidate tracker with alerts and mandatory weekly (or more frequent) touchpoints by staff to check in with candidates and guide them through the process.
- Offer incentive pay to get through the various steps in the process, notably passing the theory test and acquisition of the CLP.
- Consider mandating the temporary hire of all trainees as bus aides for the CDL training period.
- Limit trainers' time driving or prohibit the practice altogether so they can focus on driver candidate support, training, and general engagement with candidates.

To accomplish these process improvements, the district may need additional staffing capacity in the Human Resources department devoted exclusively to recruitment, retention and development for drivers and bus aides.

Recommendation 8. Adopt User-Centered Design to Enhance Customer Service

The district should design systems, tools, and processes based on the needs of students and families in order to enhance customer service, rebuild trust, and improve student transportation outcomes.

There is not currently a deep overriding focus on the needs and experiences of the primary "users" of the Transportation department's services—students and families. Instead, management and leadership are primarily concerned with execution of their responsibilities and seem to design processes with staff perspective in mind. Beyond service reliability issues, families expressed that their biggest pain point continues to be a lack of communication and extreme challenges getting through and getting useful information when they contact Transportation. Parents even expressed empathy about the challenges the district is confronting regarding finding driver coverage; they just want more proactive communication when there are substitute vehicles and accurate ETAs when vehicles are running late.

The department's lack of focus on student and parent user experience is not due to an absence of staff member service-orientation, but more indicative of the tools and systems that staff members have at their disposal. For example, the process for documenting "doubled" trips is not designed to meet student and parent needs and the practice of assigning buses to drivers for multiple years and permitting drivers to take home their vehicle keys prioritizes the preferences of drivers over the system's operational objectives. Centering the needs and experiences of students in decision-making and the design of departmental processes will improve customer service and is more likely to generate solutions that accomplish district priorities.

Recommendation 9. Streamline Technology, Providing Support & Accountability for Use

PGCPS has invested a great deal in hardware and software systems within the operation that can work well—albeit with some specific limitations—when properly configured, when infrastructure is adequate, and when users are trained, supported, and held accountable for using tools with fidelity. 4MATIV recommends evaluating some system changes for implementation in SY 25-26, but in the near term focusing on getting better use of the systems already in place to enhance service delivery.

The district's instance of Transfinder is workable but has some critical shortcomings that staff have cited. Zonar is a high-quality GPS hardware provider and their integration with Transfinder is proven and reliable. One of the most glaring gaps is the inability of Transfinder to understand and connect multiple trips to a vehicle when trips are "doubled up", which is unfortunately an everyday reality for the system as coverage remains strained. This specific challenge results in dispatch staff being unable to codify vehicle-trip assignments and parents on the StopFinder app being unable to track their vehicle. The district at a minimum needs to upgrade their instance of Transfinder to have access to the administrative view to see scheduled route information geospatially on a map next to actual vehicle location. This sort of functionality, as well as views for schools and real-time OTP monitoring is becoming "table stakes" in student transportation.

Zonar tablets allow for driver sign-on, and therefore dynamic vehicle-trip assignments, and navigation. These functions should be maintained, though the district should consider dropping the use of tablets for pre-trip and post-trip inspections because they're impracticable and cause other issues with the tablets, namely the repeated removal and plugging in of the units causes the charging ports to break down. Based on 4MATIV observations, pre-trip inspections might have better completion rates if PGCPS returns to a paper checklist and a basic attestation of daily completion from drivers. Drivers need more training as to the use of the tablets generally and the precise expectations for the daily sign-on protocols they're expected to execute.

Drivers should be incentivized for a high sign-on rate before each trip and terminal staff should monitor sign-ons in real time as their way to monitor compliance and OTP. Trainers and others should be out during AM and PM pullout providing tactical support and accountability. Terminal staff need more training in hardware and software support for tablets and they need capacity to diagnose broken tablets, order and install new ones. The phone bank, dispatch and terminal staff need training and defined protocols for how they are to monitor vehicle-trip assignments and be able to most readily retrieve information about vehicle locations, sub vehicles, delays, and to pull other critical information from technology systems. Finally, the district needs to invest in server capacity, improved wifi, and cellular coverage at terminals, the shortcomings in which result in a number of challenges cited by terminal staff and drivers related to operation of both Transfinder and Zonar systems.

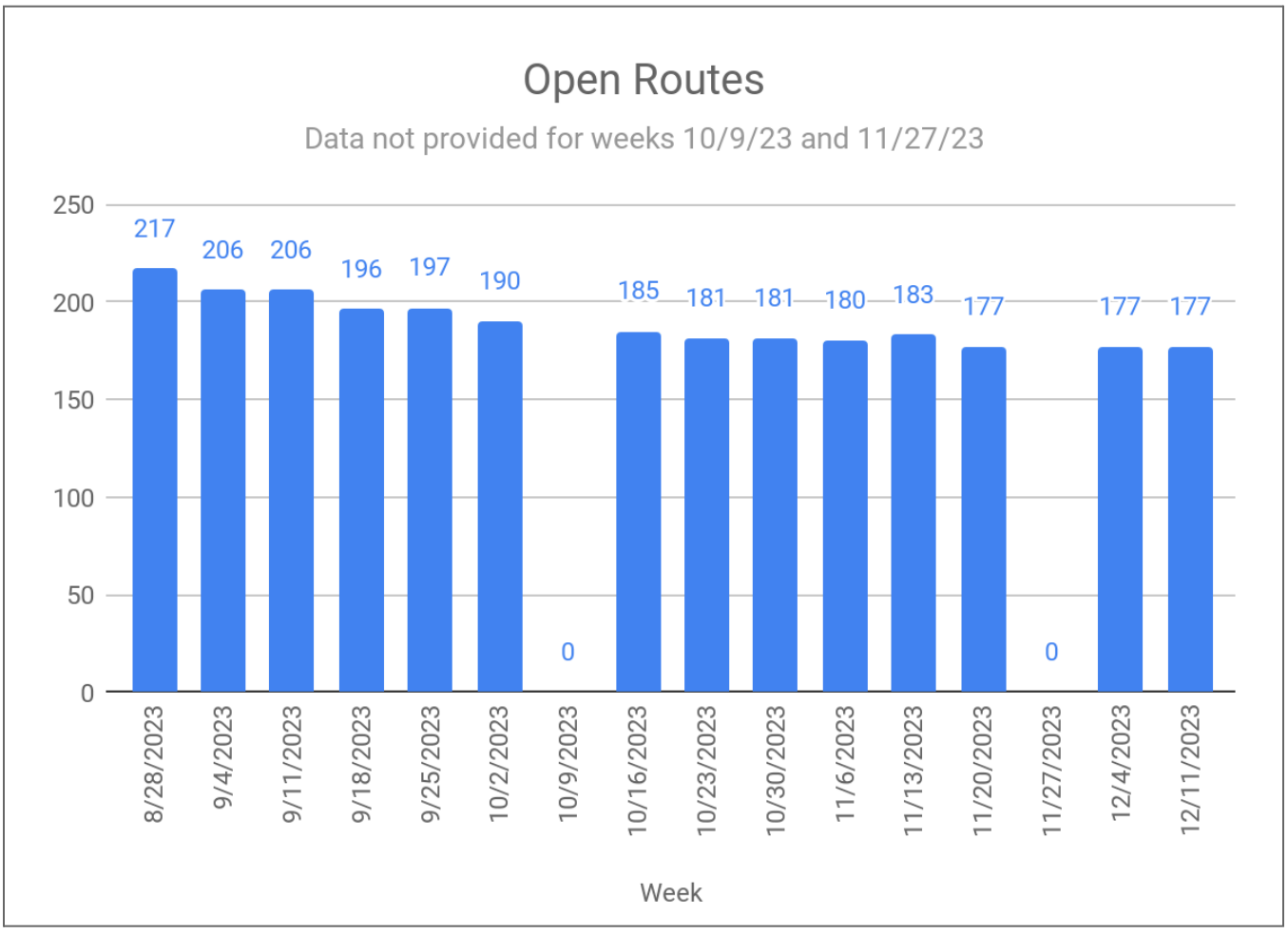
As a separate matter, the district's planned transition to a new student information system (SIS) poses substantial technical and operational risk with regard to the annual beginning of school year routing configuration. Timelines associated with this critical transition should also factor in testing and data validation across systems to ensure data flows are maintained.

VI. System Performance

FINDINGS AND ANALYSIS

Route Coverage

The data provided illustrates the number of open routes on a weekly basis from August to December 2023. Open routes are those that do not have an assigned driver and vehicle, and therefore are re-assigned to other active drivers as needed to provide coverage. Over the period of sixteen weeks, the number of open routes decreased from 217 to 177, a reduction of 40 routes. Starting at 217 routes in late August, there was a gradual decline to 196 open routes in mid-September. After October 16, which recorded 185 open routes, there was a slight further reduction, fluctuating between 181 and 177 open routes until late November and thereafter remaining stable at 177 open routes. Data on open routes was not available for the weeks of October 9 and November 27.

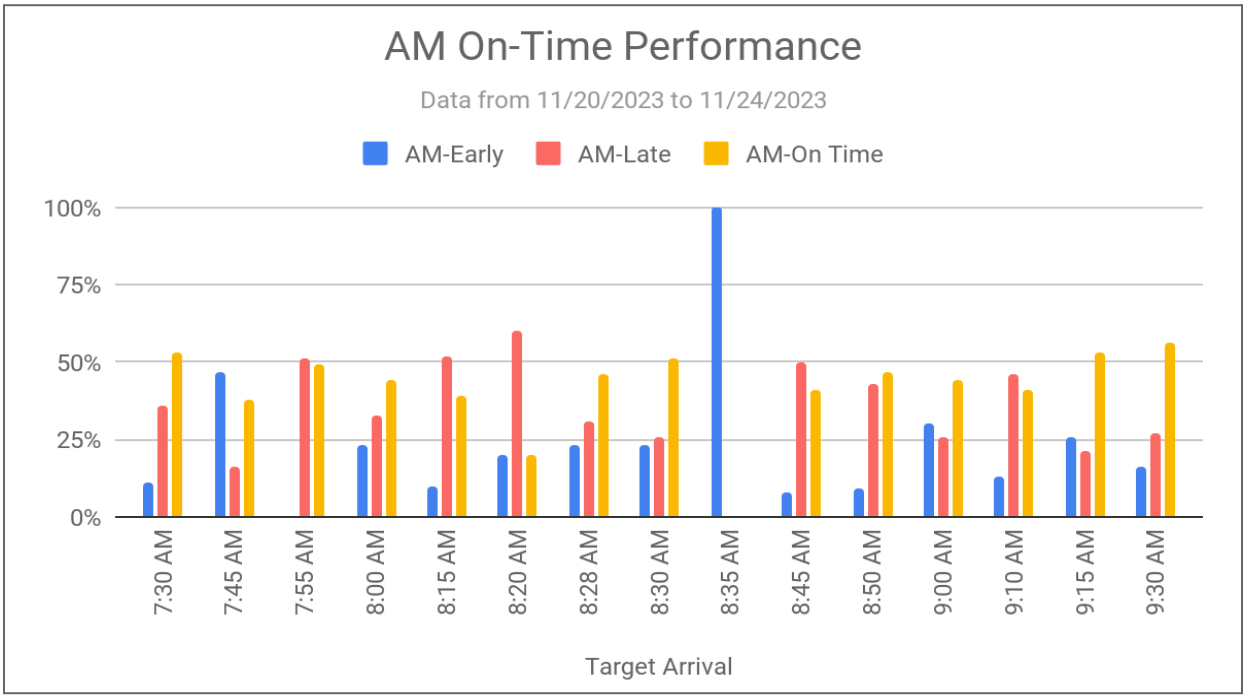


On-Time Status

District-provided arrival and departure time datasets provide a detailed breakdown of timeliness patterns in the morning and afternoon. Each dataset categorizes morning school arrivals (AM) and afternoon departures (PM) into early, late, and on-time. Designations are in relation to scheduled anchor times rather than scheduled bell times. Anchor times are scheduled prior to a school bell time in the morning (AM) and after a bell time in the afternoon (PM). A morning arrival is considered early if the trip arrives at school thirty (30) minutes or more prior to the anchor time. A trip is considered on-time if it arrives within thirty (30) minutes prior to the anchor time, and it is late if it arrives after the anchor time. The same logic applies to afternoon departures; a trip is considered early if it departs thirty (30) minutes or more before the anchor time. It is on-time if it departs within thirty (30) minutes prior to the anchor time, and it is late if it departs after the anchor time.

For instance, a trip assigned to arrive at a school with a 7:45 AM bell time may have a scheduled arrival/anchor time of 7:15 AM. If the trip arrives thirty (30) minutes before the 7:15 AM anchor time (6:45 AM or earlier), it is considered an early arrival. If that same trip arrives between 6:45 AM and 7:15 AM, it would be considered on-time. If the trip arrives after 7:15 AM it is considered late.

Overall, 46 percent of morning trips arrive on time, 28 percent arrive early, and 26 percent arrive late. In the afternoon, 38 percent of trips depart on time, 16 percent depart early, and 46 percent depart late. In morning arrivals, there is diversity in punctuality across various time slots. For instance, the 7:45 AM time slot reflects a considerable volume of arrivals (1,346 trips), with nearly half of trips (47 percent) arriving early, and a balanced percentage of on-time (38 percent) and late (16 percent) arrivals. Meanwhile, all trips for the 8:35 AM time slot arrived early, although with a smaller trip count (5 trips).

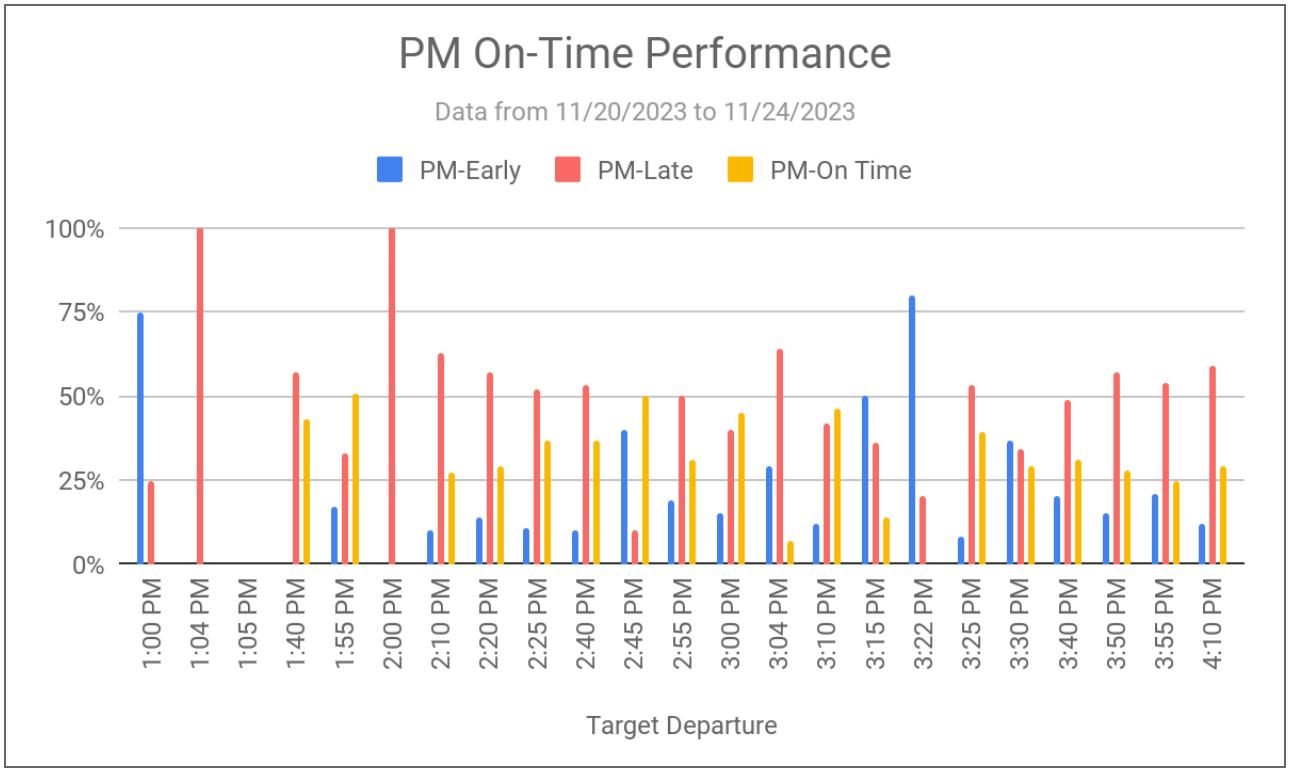


Note: Trips are considered early if they arrive 30 minutes prior to the scheduled arrival time. For instance, a trip with a scheduled arrival time of 7:30 AM would be considered early if the vehicle arrives before 7:00 AM.

AM Trip On-Time Performance							
Target Arrival	AM Early	AM Late	AM On-Time	Grand Total	AM Early (Percent)	AM Late (Percent)	AM On-Time (Percent)
7:30 AM	26	87	130	243	11%	36%	**53%**
7:45 AM	626	213	507	1,346	47%	16%	**38%**
7:55 AM	0	21	20	41	0%	51%	**49%**
8:00 AM	39	56	76	171	23%	33%	**44%**
8:15 AM	6	32	24	62	10%	52%	**39%**
8:20 AM	2	6	2	10	20%	60%	**20%**
8:28 AM	3	4	6	13	23%	31%	**46%**
8:30 AM	118	130	259	507	23%	26%	**51%**
8:35 AM	5	0	0	5	100%	0%	**0%**
8:45 AM	11	67	55	133	8%	50%	**41%**
8:50 AM	10	46	50	106	9%	43%	**47%**
9:00 AM	103	88	153	344	30%	26%	**44%**
9:10 AM	14	50	45	109	13%	46%	**41%**
9:15 AM	104	83	213	400	26%	21%	**53%**
9:30 AM	103	173	357	633	16%	27%	**56%**
AM Total	**1,170**	**1,056**	**1,897**	**4,123**	**28%**	**26%**	**46%**

Transitioning to afternoon departures, departure patterns demonstrate distinct characteristics. For example, the 2:25 PM time slot, which comprises 979 trips, illustrates a significant percentage of late departures (52 percent) compared to early (11 percent) or on-time (37 percent) departures. Contrastingly, the 3:22 PM slot indicates a high percentage of early departures (80 percent) across the 10 assigned trips.

Across both morning and afternoon datasets, when examining daily data, some time slots exhibit consistency in on-time performance from day-to-day, such as 8:00 AM (44 percent) and 3:00 PM (45 percent). However, other slots show varied trends, shifting substantially from one day to the next, emphasizing the need for focused analysis to understand factors influencing punctuality or delays within specific time slots.



Note: PM trips are considered early if they depart 30 minutes before the scheduled departure time. For instance, a trip with a scheduled afternoon departure time of 1:30 PM would be considered early if the vehicle departs before 1:00 PM.

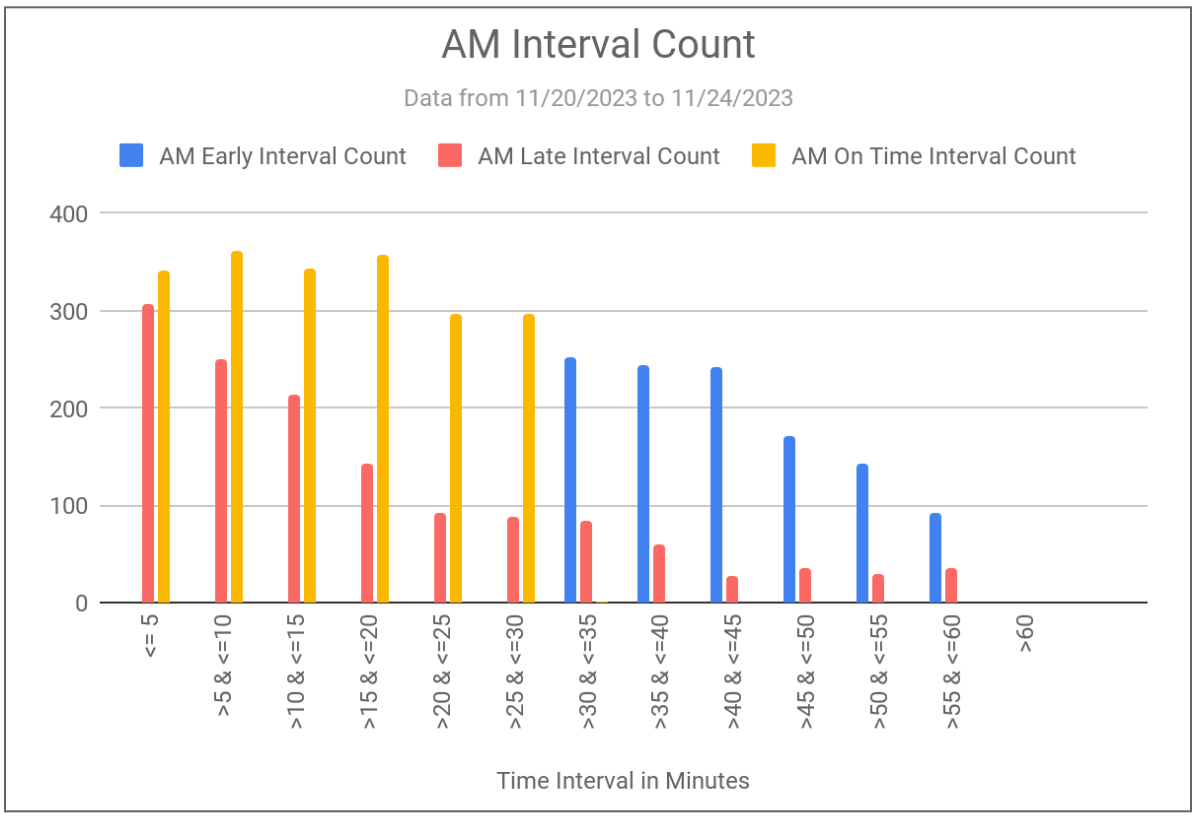
The dataset also showcases percentages of early, late, and on-time intervals for both morning and afternoon trips across specific time intervals. On average, a late morning trip arrives 17 minutes after the anchor time and on-time morning trips arrive ten minutes before the anchor. Early morning trips however, typically arrive 39 minutes before the anchor—a substantial deviation from schedule.

PM Trip On-Time Performance							
Target Departure	PM Early	PM Late	PM On-Time	Grand Total	PM Early (Percent)	PM Late (Percent)	PM On-Time (Percent)
1:00 PM	3	1	0	4	75%	25%	**0%**
1:04 PM	0	2	0	2	0%	100%	**0%**
1:40 PM	0	4	3	7	0%	57%	**43%**
1:55 PM	168	328	508	1,004	17%	33%	**51%**
2:00 PM	0	2	0	2	0%	100%	**0%**
2:10 PM	5	33	14	52	10%	63%	**27%**
2:20 PM	2	8	4	14	14%	57%	**29%**
2:25 PM	107	505	367	979	11%	52%	**37%**
2:40 PM	6	31	22	59	10%	53%	**37%**
2:45 PM	12	3	15	30	40%	10%	**50%**
2:55 PM	3	8	5	16	19%	50%	**31%**
3:00 PM	14	36	41	91	15%	40%	**45%**
3:04 PM	4	9	1	14	29%	64%	**7%**
3:10 PM	58	200	222	480	12%	42%	**46%**
3:15 PM	29	21	8	58	50%	36%	**14%**
3:22 PM	8	2	0	10	80%	20%	**0%**
3:25 PM	18	122	90	230	8%	53%	**39%**
3:30 PM	34	31	26	91	37%	34%	**29%**
3:40 PM	94	232	146	472	20%	49%	**31%**
3:50 PM	8	31	15	54	15%	57%	**28%**
3:55 PM	74	190	87	351	21%	54%	**25%**
4:10 PM	54	272	132	458	12%	59%	**29%**
PM Total	**701**	**2,071**	**1,706**	**4,478**	**16%**	**46%**	**38%**

In the morning, 306 late trips arrived within five minutes after anchor time. However, 274 AM trips arrived more than 30 minutes after the anchor time. Because a morning trip must arrive more than 30 minutes ahead of its anchor time in order to be considered early, the only trips counted as “early” arrive 30 minutes before the anchor time, with several arriving up to an hour early. There is a fairly even distribution of morning arrivals within the 30-minute “on-time” window preceding the morning anchor time, with similar numbers of morning trips arriving 25 to 30 minutes before the anchor time (341 trips) as arriving within five minutes in advance of the anchor (297 trips).

In the afternoon, 316 trips departed within five minutes after anchor time. However, 443 trips departed more than 30 minutes late, representing approximately ten percent of all afternoon departures. While there was a flat distribution of arrivals across the AM on-time window, there is a precipitous decline in on-time afternoon departures at greater time intervals. For example, while 393 trips departed within five minutes ahead of the anchor, just 173 departed 25 to 30 minutes ahead of schedule.

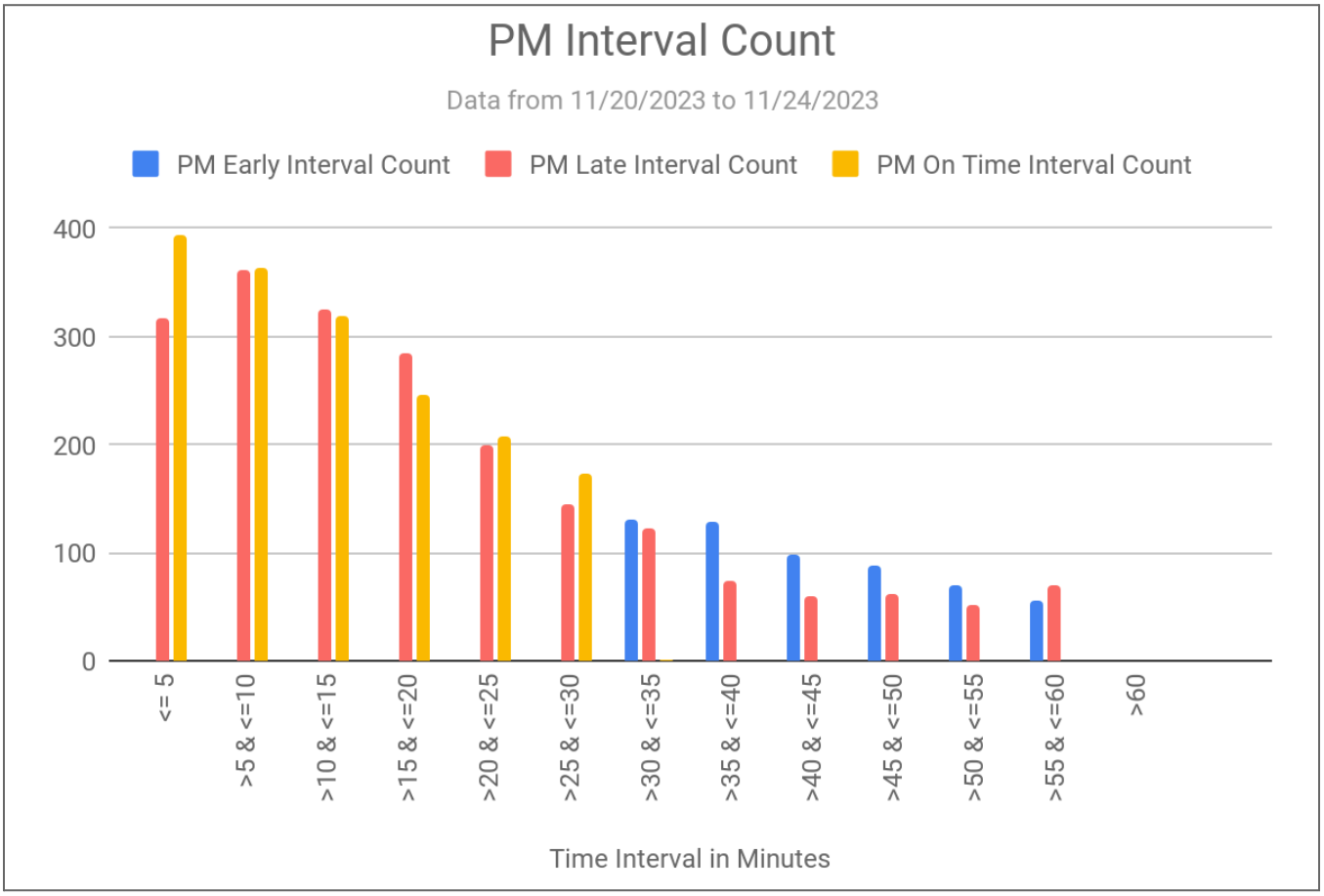
Late Trips by Time Interval				
Time Interval (in minutes)	**AM Late Interval Count**	**Percent of All AM Trips**	**PM Late Interval Count**	**Percent of All PM Trips**
<=5	306	22%	316	15%
>5 & <=10	251	18%	362	17%
>10 & <=15	214	16%	326	16%
>15 & <=20	143	10%	284	14%
>20 & <=25	93	7%	200	10%
>25 & <=30	88	6%	144	7%
>30 & <=35	85	6%	122	6%
>35 & <=40	59	4%	75	4%
>40 & <=45	28	2%	61	3%
>45 & <=50	36	3%	63	3%
>50 & <=55	30	2%	52	3%
>55 & <=60	36	3%	70	3%
>60	0	0%	0	0%
All Late Trips	**1,369**	**100%**	**2,075**	**100%**



Note: Trips are considered early if they arrive 30 minutes prior to the scheduled arrival time. For instance, a trip with a scheduled arrival time of 7:30 AM would be considered early if the vehicle arrives before 7:00 AM.

Likewise, more than 300 afternoon trips arrive between 10 and 15 minutes after the scheduled anchor time. Twenty-two percent of morning trips and 23 percent of afternoon trips arrived between 30 to 35 minutes early.

This comprehensive breakdown underscores the shift in arrival patterns between morning and afternoon time intervals. It suggests that trips are often arriving 30 or more minutes early to the destination in both the morning and afternoon. It emphasizes the importance of analyzing time segments to optimize punctuality, indicating a tendency for longer time intervals to reflect a shift from late arrivals to early arrivals in both morning and afternoon schedules.

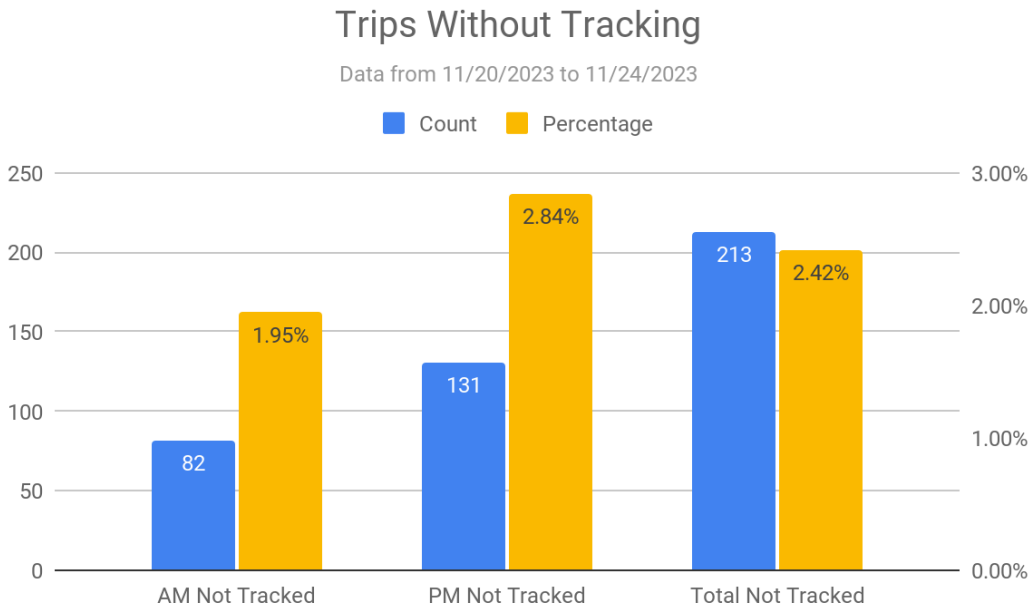


Note: Trips are considered early if they arrive 30 minutes prior to the scheduled arrival time. For instance, a trip with a scheduled arrival time of 1:30 PM would be considered early if the vehicle arrives before 1:00 PM.

Vehicle Tracking

The provided dataset from November 20–24, 2023 offers an overview of vehicle tracking categorized between morning (AM) and afternoon (PM) sessions. A total of 8,814 trips are included in the data set. Of the total trips, 82 trips (1.95 percent) were classified as "AM Not Tracked," while 131 trips (2.84 percent) fell under the "PM Not Tracked" category. Collectively, the sum of both categories resulted in a total of 213 trips (2.42 percent) being classified as "Not Tracked" by district GPS systems.

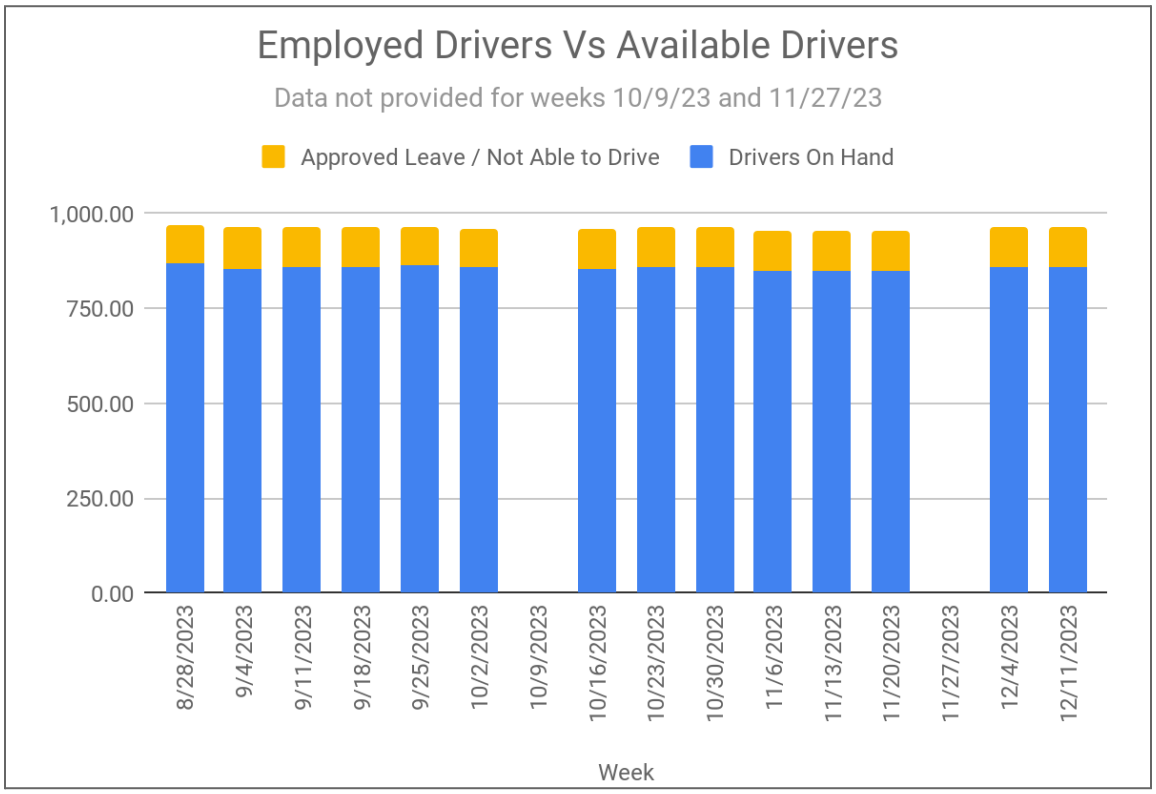
This data underscores a relatively low proportion of instances where tracking information was unavailable, constituting 2.42 percent of the overall count. While both morning and afternoon sessions displayed discrepancies, the percentages suggest a slightly higher discrepancy rate in the afternoon trips compared to the morning. This highlights the slight need for attention and potential improvement in tracking mechanisms, particularly during the afternoon period, to ensure comprehensive data capture in tracking systems.



Importantly, this data reflects vehicle tracking but not an accurate vehicle-trip linkage. Data do not indicate whether the correct vehicle ID was recorded for accurate display within public-facing vehicle monitoring tools such as the “StopFinder” app and the StopFinder geo alerts. Overwhelmingly, all stakeholders—DOT staff, school-based staff, students, and caregivers—report experiencing inaccurate or non-functioning GPS capture on a recurrent basis. These data reveal that the primary issue is not the GPS unit themselves, which appear to be operational roughly 95 percent of the time, but in updating trip-vehicle assignments to ensure that tracking is associated with the appropriate vehicle.

Staff Attendance

The dataset provided by PGCPS offers insights into the staffing scenario concerning available drivers and those on approved leave or unable to drive within the specified timeline. Starting on August 28, 2023, the count of available drivers fluctuated between 850 and 870, while the number on leave or unable to drive varied from 100 to 108. Notably, staff attendance data for the weeks of October 9 and November 27 are missing, causing interruptions in the trend analysis.



Despite the missing data, the observed pattern shows fluctuations in the count of available drivers while the number of staff on leave or unable to drive remained relatively stable between 100 and 108. These consistent figures may suggest a regular proportion of staff facing temporary constraints or being on approved leave. Transportation staff members indicated that many of these drivers were on approved extended leaves of absence.

Staffing Snapshot			
Week	**Open Routes**	**Drivers On Hand**	**Approved Leave**
8/28/2023	217	867	100
9/4/2023	206	854	108
9/11/2023	206	861	102
9/18/2023	196	860	103
9/25/2023	197	862	100
10/2/2023	190	858	103
10/9/2023	No data	No data	No data
10/16/2023	185	856	105
10/23/2023	181	860	105
10/30/2023	181	861	104
11/6/2023	180	850	104
11/13/2023	183	851	104
11/20/2023	177	848	107
11/27/2023	No data	No data	No data
12/4/2023	177	861	103
12/11/2023	177	859	103

RECOMMENDATIONS

Recommendation 10. Manage Performance and Enforce Accountability

PGCPS staff lack systematic methods of reviewing reliable performance data tied to defined key performance indicators (KPIs). The district should define key measures that are most tied to service that schools, students and families experience, and drive towards achieving them. The district also needs to instill accountability across the department and get top-level support for improving process compliance across other functional departments like Enrollment and Special Education, the lack of which currently produces many downstream challenges for transportation.

Limited management and attention to driver attendance, pre-check procedures, driver sign-on, and on-time departure from terminals was observed over the course of 4MATIV's yard visits. These are example operational systems where key data that are tied to "heartbeat" performance indicators are not recorded at all, are inadequate, or are disconnected from any systematic mode of measurement – and so cannot be used by management to improve performance. PGCPS needs to clearly define its key performance indicators and focus relentlessly on measurement and management around them.

Better systems and data will help enable more accountability, but leadership across the organization have to be willing to hold teams and managers accountable for performance. An example of where the district needs to demonstrate this sort of accountability with drivers and supervisors is in addressing the current practice that allows a driver to essentially "lock in" a specific vehicle for multiple years, resulting in changes to daily vehicles in operation simply to satisfy a driver preference. Another similar example is in codifying and making permanent those instances where improvised route coverage or "doubling up" of trips actually works.

An example of where support from top leadership is needed (and will be needed even more as recommended system design changes in this report are implemented) is in "holding the line" on service level changes and mode shifts where many vocal families or others might object. Exception processes must exist, but staff remarked that parents are adept at calling up the chain to get more accommodating service when they are not happy with what they have been offered. The transportation team needs support and assurances that this will not be the norm, and standardized protocols to ensure exceptions are granted in an equitable and evidence-based manner.

A final mission-critical example that cuts across departments is the oft-cited extreme annual challenges related to receiving student data from the Enrollment and Special Education Departments far behind required deadlines. This lateness represents a lack of system-wide accountability for timely registration, IEP review, decision making, and data transmission to Transportation, compounding the department's already difficult charge each year, and ultimately resulting in worse service for all families. The planned transition to a new SIS system—which is currently slated to require a one-month data freeze—adds another layer of complexity and increased risk, requiring increased discipline across the district in holding to (or even moving up) data transmission, registration, and IEP-review deadlines.

Recommendation 11. Ensure Reliable GPS Tracking is Linked to Assigned Trips

As a top priority KPI, the district should prioritize measuring the tracking accuracy of routes and trips in real time. PGCPS must ensure GPS data flows through to correct vehicle-trip assignments, and that accurate and timely vehicle location information is available to families and schools.

There is not an established procedure for ensuring daily vehicle-trip assignments are codified in Transfinder-Zonar or elsewhere that's readily retrievable by phone bank staff. This ultimately leads to the inability of parents to track their trips in the StopFinder app, phone bank agents' inability to get and relay accurate information to schools and families, a lot of wasted time and work by staff, and an inability to manage on-time performance effectively.

As explained in recommendation #9, some investment in existing systems, training, capacity, support, and accountability for use will help the team across functions. But nothing could be more important than driving data capture of GPS tied to assigned trips and routed students, and so this should be the district's first priority as it relates to performance management and improvement of data systems.

4MATIV recommends that the first-order series of KPIs to meet this charge should include [1] Percent of functioning GPS units and [2] Percent of trips properly associated with functioning GPS units in Transfinder or recorded electronically elsewhere. The trips recorded in Transfinder should accurately register AM and PM arrival events at schools while those recorded elsewhere may be documented via an improved stop-gap electronic system for capturing "doubled up" vehicle-trip assignments where Transfinder falls short.

Recommendation 12. Revise Operational Processes for Efficiency and Clarity

4MATIV recommends wholesale revision and redefinition of some key operational processes, tied to technology and data systems improvements recommended above, but also that which can be implemented to great effect irrespective of any changes in existing district technology systems. 4MATIV also recommends additional gap analyses to uncover other processes that may need revision and formal documentation.

Some notable processes (but not an exhaustive list) that we observed in the areas of terminal operations, communications, and routing are as follows:

- **Operational process:** Driver check-in monitoring for timely departure, attendance-taking, key control, and codifying and disseminating substitute driver and vehicle information.
- **Communications protocols:** Clear rules for when to communicate proactively with schools and families; scripts and templates for how to communicate in various situations; steps and expectations as to how to get accurate GPS information and trip assignments verified so only accurate information is communicated and future calls about the same vehicle-trip will be correctly configured.

- **Routing process:** Cleaning up of “dead stops” based on rider counts and no-show reports, annual “spring cleaning” of unused stops after the rollover and review of distances to stops for students passing specific grade thresholds or having IEP accommodations removed, zero-based trip pairing and yard assignments each year, and clear steps to evaluate co-mingling of students with accommodations and GenEd students on routes for additional efficiency.

VII. Resource Stewardship

FINDINGS AND ANALYSIS

The FY24 transportation budget for Prince George's County Public Schools is over $145 million dollars, with allocations delineated across three major categories: $28 million for overhead, administrative, and capital costs, $40 million for mileage-related variable costs, and $76 million designated for wages.

PGCPS FY24 Budget and Allocations	
FY24 Budget	$145,901,607
Overhead, Admin, and Capital Cost Allocation	$28,612,514
Mileage Allocation	$40,076,859
Wage Allocation	$76,144,234

4MATIV performed a further cost allocation analysis in order to better understand how costs are distributed throughout the operation. An all-in cost analysis reveals an average daily cost per student of $9.34 and an annualized cost per student of $1,703.22.

FY24 Cost Per Student			
Total FY24 Budget Allocation	**Total Students Transported**	**Cost Per Student Per Year**	**Cost Per Student Per Day**
$145,901,607	85,662	$1,703.22	$9.34

Compared to 2021-2022 data of 40 large districts from the Council of Great City Schools[11], PGCPS's cost per student would be 38% above the median of $1,234 per student. Costs across the spectrum have increased in the last two years, but this is another indicator that operational savings are possible.

[11] Managing for Results 2023: Results from Fiscal Year 2021-2022. Council of Great City Schools. https://www.cgcs.org/cms/lib/DC00001581/Centricity/domain/35/publication%20docs/Managing%20for%20Results%202023.pdf

FY24 Student Cost Per Terminal		
Terminal/Lot Number	**Trips Per Day**	**Cost Per Student-Trip**
Fairmont	531	$3.23
Bladensburg	384	$3.21
Crossland	209	$7.66
Forestville	336	$5.12
Goddard	377	$3.87
Greenbelt	438	$4.13
Hanson	325	$4.27
Laurel	296	$6.07
Mullikin	395	$5.07
Surrattsville	326	$6.67
Douglass	418	$4.82
Friendly	229	$8.60
Unassigned	1,051	$3.61
Total/Weighted Average	**5,320**	**$5.70**

The table above allocates costs by vehicle trip across all the district's terminals. The cost per student-trip is the cost for an individual student to travel one-way. While the average cost per one-way student trip is $5.70, the cost per student-trip by terminal varies from a high of $8.60 per student-trip based on the 229 trips originating from the Friendly terminal to a low of $3.21 per student-trip for the 384 trips originating from the Bladensburg terminal. These variations are a function of the differing vehicle types, seat and trip utilization, and student trip complexities (such as mileage and accommodation needs, beyond other factors). Note that there are also five trips that originate from the Brandywine garage.

The comprehensive breakdown of trip details by terminal represented in the following table offers insight into the operational performance of each terminal. Each terminal demonstrates unique characteristics in terms of trip count, route count, trip duration, trip mileage, average number of students per trip, and the cumulative total of transported students. For instance, Terminal 6 (Fairmont) registers 531 trips across 87 routes. The typical trip originating from Fairmont Terminal lasts 48 minutes in duration and includes 32 students. Meanwhile, Terminal 12 (Crossland) operates 209 trips spanning 49 routes with the average trip lasting 73 minutes and transporting 29 students.

Summary Numbers Per Terminal						
Terminal/Lot Number	**Number of Trips**	**Number of Routes**	**Average Trip Duration (Min)**	**Average Trip Miles**	**Students Per Trip**	**Total AM + PM Student-Trips**
6	531	87	48	11	35	18,368
9	384	56	43	10	34	13,083
12	209	49	73	23	29	5,977
15	336	66	58	16	29	9,853
18	377	62	53	13	33	12,330
21	438	78	52	14	29	12,795
24	325	56	50	14	32	10,414
27	296	58	59	16	26	7,585
30	395	89	71	19	32	12,564
33	326	79	92	30	31	10,096
36	418	95	84	26	37	15,298
39	229	64	95	29	29	6,596
51	5	1	51	14	6	28
Unassigned	1,051	255	58	15	34	35,673
Total	**5,320**	**1,095**	**62**	**251**	**32**	**170,660**

This detailed breakdown reveals variances in operational scale and efficiency across terminals. Terminals like 21 (Greenbelt) and 36 (Douglass) exhibit higher trip counts (438 and 418, respectively), indicating a larger volume of transportation activities. There are a total of 1,051 unassigned trips (not including 14 after school trips) in the dataset that as such do not have a terminal or vehicle assignment.

Taking the same dataset and reviewing the proportional contributions by terminal offers insight into day-to-day terminal operations, highlighting the proportional distribution of trips, routes, mileage, riders, and active vehicles attributed to each terminal. Terminals such as 6, 21, and 36 exhibit higher percentages across multiple categories, indicating significant concentrations of the district's fleet operations, including trip volume, route coverage, total trip time, and miles covered. The "Unassigned" category notably presents higher percentages across several metrics, signifying a substantial portion of the system's activities are not specifically attributed to designated terminals. These trips are presumed

to be “doubled” and reassigned to other vehicles, though the exact allocation varies from day-to-day and is not formally captured.

Summary Percentages Per Terminal						
Terminal/Lot Number	**Percent of Trips**	**Percent of Routes**	**Percent of Total Trip Time**	**Percent of Total Trip Miles**	**Percent of Total Student-Trips**	**Percent of Vehicle Count**
6	10.0%	7.9%	7.7%	4.4%	10.8%	8.2%
9	7.2%	5.1%	5.0%	3.9%	7.7%	5.3%
12	3.9%	4.5%	4.7%	9.1%	3.5%	4.7%
15	6.3%	6.0%	6.0%	6.4%	5.8%	6.4%
18	7.1%	5.7%	6.1%	5.3%	7.2%	6.0%
21	8.2%	7.1%	6.9%	5.5%	7.5%	6.7%
24	6.1%	5.1%	5.0%	5.6%	6.1%	5.4%
27	5.6%	5.3%	5.3%	6.4%	4.4%	5.6%
30	7.4%	8.1%	8.5%	7.7%	7.4%	8.5%
33	6.1%	7.2%	9.2%	11.9%	5.9%	7.6%
36	7.9%	8.7%	10.7%	10.5%	9.0%	9.3%
39	4.3%	5.8%	6.6%	11.6%	3.9%	5.9%
Unassigned	19.7%	23.3%	18.4%	6.1%	20.9%	20.3%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Analyzing FY24 cost allocations per terminal against vehicle counts provides valuable insights into the financial aspects of each terminal's operation. Terminals 30, 33, and 36 exhibit the highest total FY24 allocations, reflecting the significant financial investment attributed to their operations, ranging from $11.6 to $13.5 million annually. Despite varying vehicle counts, terminals 12 and 39 demonstrate notably higher annual costs per vehicle (more than $170,000) and have the highest average costs per trip per year (more than $40,000). Thus, these terminals also have the highest average cost per student-trip at $7.66 (terminal 12) and $8.60 (terminal 39). Terminal 9 has the lowest cost per trip per year and cost per student-trip, though not the lowest cost per vehicle per year, indicating higher seat and trip utilization compared to other terminals. The "Missing" category indicates substantial allocation without an attributed terminal based on the 1,051 trips without an assigned terminal and vehicle. The weighted average for these cost allocations across terminals presents a comprehensive overview, indicating an average cost per vehicle per year of $149,913, a cost per trip per year of $29,747, a cost per student per year of $1,703.22, and a cost per student-trip of $5.70.

FY24 Cost Allocations Per Terminal By Vehicle Count				
Terminal/Lot Number	**Total FY24 Allocation**	**Cost Per Vehicle Per Year**	**Cost Per Trip Per Year**	**Cost Per Student-Trip**
6	$10,865,342	$130,908	$20,462	$3.23
9	$7,696,259	$142,523	$20,042	$3.21
12	$8,373,910	$174,456	$40,067	$7.66
15	$9,228,737	$141,981	$27,466	$5.12
18	$8,734,818	$143,194	$23,169	$3.87
21	$9,660,408	$142,065	$22,056	$4.13
24	$8,128,928	$147,799	$25,012	$4.27
27	$8,422,308	$147,760	$28,454	$6.07
30	$11,655,956	$135,534	$29,509	$5.07
33	$12,318,244	$159,977	$37,786	$6.67
36	$13,503,101	$143,650	$32,304	$4.82
39	$10,379,102	$172,985	$45,324	$8.60
Missing	$23,553,801	$114,339	$22,411	$3.61
Weighted Average	**$10,236,586**	**$149,913**	**$29,747**	**$5.70**

The next few datasets provide a comprehensive analysis of transportation operations categorized by vehicle type, shedding light on trip metrics, cost allocations, and proportional contributions to the overall transportation system. The breakdown of counts by vehicle type demonstrates the varying degrees of utilization and efficiency across different vehicles.

19.8 percent of trips and 23.8 percent of routes are not assigned to a vehicle. Most service is completed by Type-C Buses. When including unassigned trips with unassigned vehicle types in analysis, Type-C Buses complete 58.3 percent of trips and 44.6 percent of routes. The typical Type-C Bus has 40.4 assigned riders. Overall, Type-C Buses cover 31.2 percent of trip miles and transport 73.5 percent of total riders. Conversely, the Type-A and Type-B Bus Wheelchair categories account for smaller percentages of vehicles (5.5%-26.7%), trips (3.3%-18.6%), routes (5.3%-26.2%), and riders (0.8%-4.8%), and transporting fewer riders per vehicle (7.7-8.2) on average.

Type-C Buses cover the majority of trips and their associated cost allocations per vehicle, trip, and student per day are comparatively lower than other categories, indicating higher operational efficiency and cost-effectiveness. Unsurprisingly, Type-B Bus Wheelchairs have higher costs per vehicle and trip compared to other types, largely due to specific operational requirements and lower trip volume.

Summary Counts By Vehicle Type							
Vehicle Type	**Number of Trips**	**Number of Routes**	**Average Trip Duration (Minutes)**	**Average Trip Mileage**	**Total Student-Trips**	**Vehicle Count**	**Average Number of Riders**
Type-A Bus Wheelchair	989	289	84	28	8,125	271	8.2
Type-B Bus Wheelchair	174	58	89	30	1,346	56	7.7
Type-C Bus	3,104	492	54	14	125,514	481	40.4
Van Wheelchair	2	1	130	114	2	1	N<5
Unassigned	1,051	255	0	58	35,673	206	33.9
Total/Weighted Avg.	**5,320**	**1,095**	**50**	**26**	**170,660**	**1,015**	**32.1**

Summary Percentages Per Vehicle Type					
Vehicle Type	**Percentage of Trips**	**Percentage of Routes**	**Percentage of Trip Miles**	**Percentage of Total Riders**	**Percentage of Vehicles**
Type-A Bus Wheelchair	18.6%	26.2%	20.4%	4.8%	26.7%
Type-B Bus Wheelchair	3.3%	5.3%	3.8%	0.8%	5.5%
Type-C Bus	58.3%	44.6%	31.2%	73.5%	47.4%
Van Wheelchair	0.0%	0.1%	0.2%	N<5	0.1%
Unassigned	19.8%	23.8%	44.4%	20.9%	20.3%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

FY24 Cost Allocations By Vehicle Type			
Vehicle Type	**Annual Cost Based on Routes**	**Annual Cost Per Vehicle**	**Annual Cost Per Trip**
Type-A Bus Wheelchair	$38,225,491	$141,053	$38,651
Type-B Bus Wheelchair	$7,671,552	$136,992	$44,089
Type-C Bus	$65,075,922	$135,293	$20,965
Van Wheelchair	$132,268	$132,268	$66,134
Unassigned	$33,728,374	$163,730	$32,092
Weighted Average	**$47,589,350**	**$149,913**	**$29,747**

Shifting focus to vehicle capacity and utilization reveals varying levels of efficiency across different vehicle types. Type-C Buses stand out with the highest practical utilization at 79.3 percent and high manufactured utilization of 63.2 percent. Conversely, Type-A and Type-B Bus Wheelchairs exhibit lower utilization rates. The typical trip has 59.3% of seats filled using practical seating capacity assumptions.

All Vehicle Capacity & Utilization				
Vehicle Type	**Manufactured Capacity**	**Manufactured Utilization**	**Practical Capacity**	**Practical Utilization**
Type-A Bus Wheelchair	33	24.9%	26	31.6%
Type-B Bus Wheelchair	43	18.0%	34	22.8%
Type-C Bus	64	63.2%	51	79.3%
Van Wheelchair	11	9.1%	9	11.1%
Unassigned	72*		58*	
Weighted Average	**52**	**47.2%**	**41**	**59.3%**

The estimated weighted utilization cost for FY24 presents an analysis per terminal/lot based on manufactured, practical, and goal utilizations. Most terminals demonstrate practical utilization rates below the goal utilization of 80 percent. Terminal 21 shows the most substantial potential for increased efficiency, with a current practical utilization of just 54.2 percent.

Analyzing the estimated cost changes, there's a consistent trend across terminals showcasing potential savings through improved utilization. The average weighted practical utilization stands at 52.7 percent, notably lower than the target practical utilization of 80 percent. This highlights an overarching opportunity for the entire transportation network to optimize utilization further, potentially leading to substantial cost savings across terminals. Terminals such as 12, 15, 21, 33, and 39 exhibit notable potential for cost reduction, with estimated saved costs exceeding $30,000 per vehicle per year. Even the terminals with the least modeled cost savings, such as 6 and 9, would still net almost $20,000 in savings per vehicle per year if the practical seat utilization target of 80 percent were met.

FY24 Estimated Weighted Utilization Cost						
Terminal/Lot Number	**Manufactured Utilization**	**Practical Utilization**	**Goal Practical Utilization**	**Current Cost per Vehicle per Year**	**Optimized Cost per Vehicle per Year**	**Savings per Vehicle per Year**
6	51.8%	65.1%	80.0%	$130,908	$111,376	-$19,531
9	52.6%	66.1%	80.0%	$142,523	$122,656	-$19,868
12	48.4%	60.9%	80.0%	$174,456	$141,118	-$33,339
15	46.8%	58.8%	80.0%	$141,981	$111,852	-$30,128
18	48.8%	61.4%	80.0%	$143,194	$116,502	-$26,691
21	43.1%	54.2%	80.0%	$142,065	$105,369	-$36,695
24	49.4%	62.1%	80.0%	$147,799	$121,358	-$26,441
27	49.5%	62.2%	80.0%	$147,760	$121,399	-$26,360
30	46.7%	58.8%	80.0%	$135,534	$106,774	-$28,760
33	46.4%	58.3%	80.0%	$159,977	$125,246	-$34,731
36	52.2%	65.6%	80.0%	$143,650	$122,907	-$20,743
39	48.3%	60.7%	80.0%	$172,985	$139,616	-$33,369
Weighted Avg.	**42.0%**	**52.7%**	**80.0%**	**$149,913**	**$121,710**	**-$28,203**

Overall, this data emphasizes the importance of increasing practical seat utilization by ensuring each trip serves more students, as this directly impacts cost efficiencies. There's considerable potential for cost savings by improving vehicle utilization. To do so, the district will need to consolidate stops to optimize stops and vehicle paths and seek to also increase or at least maintain trip utilization.

In addition to the financial analysis conducted by 4MATIV, the district provided several workbooks with their own analyses of transportation costs by program, as listed in the table below. This table represents a subset of financial analysis provided by PGCPS that summarized "Student Cost Per Program". 4MATIV did not produce these calculations and cannot verify the methodology or numbers. Notably, PGCPS's own allocation does not include administrative, overhead, or capital costs and so appear lower on average than 4MATIV's all-in allocation.

FY24 Student Cost Per Program (PGCPS Provided)			
Program Name	**Number of Students**	**Cost Per Student Per Day**	**Cost Per Student Per Year**
Comprehensive Transportation	67,437	$5.12	$932.05
College Ready	474	$18.27	$3,325.66
Contextual Learning Environment	7,732	$12.76	$2,321.58
Technology	2,055	$8.20	$1,491.72
Health and Hospitality	152	$9.87	$1,796.03
Special Education	3,285	$37.75	$6,869.60
Non Public Transportation	100	$129.18	$23,510.02
Pre-K	431	$15.90	$2,893.56
Vocational	223	$17.56	$3,195.64
ESOL	599	$7.48	$1,362.20
504	23	$20.17	$3,670.90
Baccalaureate	2,010	$3.37	$613.82

Interviews with PGCPS leadership and an examination of financial reports and data reveal effective practices in resource allocation and budgeting for student transportation. Staff members affirm the existence of regular, well-understood financial planning processes, with student transportation budgeting priorities aligning with the district's educational strategy. The formal budgeting process ranks initiatives in terms of relative importance to guide funding allocation decisions. The annual budget planning for student transportation builds on the previous year's expenditures, with intentional increments by category based on anticipated cost increases. Although transportation department budget requests require evidence-based justification, impact estimates for budget adjustments related to transportation are not consistently completed. Additionally, while the overall district funding strategy is consistent and stable, interviewees note a lack of flexibility to respond rapidly to resource changes. On a more routine basis, PGCPS conducts monthly expenditure reviews to ensure fiscal prudence and accountability.

Interviewees acknowledge that departments across the district are rarely held accountable for outcomes related to expenditures. Financial reviews are somewhat connected to transportation department outcomes, influencing budgeting decisions by senior leadership. However, evaluations often focus on contracts and third-party services rather than performance outputs and outcomes from internal district operations.

PGCPS staff members interviewed reported significant progress in adopting a systemic approach to long-term planning. The implementation of a lease-purchase program has enabled the district to establish a regular vehicle replacement schedule, aligning with the state's twelve-year bus replacement cycle. With adequate funding, the district aims to replace approximately one hundred buses annually, ensuring a well-defined and proactive approach to vehicle replacement. However, concerning multi-year financial planning for fleet electrification, staff recognize the need to further develop a financial and operational plan for progressive electrification, integrating substantial expenditures for both vehicles and required infrastructure. Senior leadership expresses an intention to establish a viable electrification cost model aligned with their financial capabilities while advancing goals toward electrification and environmental sustainability.

VIII. Appendix

DATA ASSUMPTIONS

Below is a list of data assumptions used to produce the base data set for the purposes of this audit:

1. All geocoding was completed on Oct 27, 2023. All distances were calculated using Google API on Oct 30, 2023.

2. A total of 227 schools are included in the provided student data. Out of the 227 total schools with assigned students, only 217 schools have routed students receiving transportation.

3. The number of total trips (5,334) includes 5,320 trips with at least one assigned student and 14 additional trips that have zero assigned students which are scheduled for transport related to after school activities.

4. The first three letters of the "Trip Name" are considered as the Route Number, resulting in the identification of a total of 1,096 routes.

5. Home-to-school distance was calculated based on the geocoded latitude and longitude of the school and the final home latitude and longitude locations.

6. AM stop distance was calculated based on geocoded latitude and longitude of the home pick up location and the pick up stop from the provided trip stop latitude and longitude locations.

7. PM stop distance was calculated based on geocoded latitude and longitude of the home drop off location and the drop off stop from the provided trip stop latitude and longitude locations.

8. In trip and vehicle analysis, terminals are assigned by the district. For a few cases, there are multiple terminals assigned to the same vehicle for different trips. The final assignment of terminals to vehicles is as per vehicle data:

Vehicle in route data	Terminal in route data	Vehicle in vehicle data	Terminal in vehicle data
9052	36, 39	9052	**39**
3093	36	3093	**39**
7076	33, 39	7076	**33**
7044	33	7044	**24**
6182	9	6182	**21**
216	18	216	**51**
1056	36, 39	1056	**39**

9. The client verified the accuracy of the base data set in November 2023.

Bell Time Analysis:

Below is a list of data assumptions for the bell time alignment and pairing analysis:

- Tiers are defined as 7.45 AM or earlier (Tier 1), up to 8:30 (Tier 2), beyond 8:30 AM (Tier 3)
- Cost savings estimates are produced using the relevant cost per trip based on weighted average costs by route given existing budget estimates
    - Single tiered route = $389.87/leg
    - Double tiered route = $194.94/leg
    - Triple tiered route = $129.96/leg
- All analyses assume perfect pairing between tiers (i.e., any tier 1 route can be paired with any tier 2 route and any tier 3 route)
- Assumes buses may be used for AM or PM only for per leg cost
- Tiers are right inclusive (i.e., a dismissal on the line between tier 1 and 2 will be set to tier 2)
- Dismissal graph buckets are including and above the time listed on the bucket, but strictly less than the value above it
- Only transported students are considered.

Walk Audit Modeshift Analysis:

Below is a list of data assumptions for the walk boundary adherence modeshift analysis:

- The modeshift analysis is performed utilizing the walk boundaries. Walk boundaries are defined based on provided shape files and Board definition of 1.5 miles for elementary students and 2.0 miles for middle and high school students.
- Tiers are defined as 7.45 AM or earlier (Tier 1), up to 8:30 (Tier 2), beyond 8:30 AM (Tier 3).
- In rare instances with cross-school routing, for the purposes of calculating savings resulting from trip reduction, the trip count is de-duplicated by counting trips only for the school with the most assigned riders. Only 216 schools have trips after deduplication.
- Only AM Transported students and respective trips are used for creating this analysis.
- Students with a grade level of “S - Special Ed” are considered with elementary students for walk boundary analysis, assuming a 1.5 mile maximum walk boundary. However, such students are only included if they do not have an identified transportation accommodation.
- Students with transportation accommodations, including students with Curb-to-Curb service, are excluded from the modeshift analysis.

Service Level Analysis:

Below is a list of data assumptions for the service level analysis:

- Students receiving Curb-to-Curb service and those with "Unknown" stop distances (resulting from an unidentified stop and/or home address) are excluded for utilization calculations.
- The service level analysis is performance utilizing the Board-defined stop distance maximums of 1.5 miles for elementary students and 2.0 miles for middle and high school students.
- Utilization rates represent the proportion of the maximum possible stop distance that a given student or student group uses on average based on home-to-stop distances.

- Route duration was calculated based on the provided start and end times for a trip/route.

Modal Mix Analysis:

Below is a list of data assumptions for the modal mix analysis:

- AM/PM legs of routes are considered separately.
- Route information and student counts mirror those gathered for the bell time analysis.
- Counts are strictly student counts only and are not reflective of specialized seating types (e.g., WC or Harness)

System Performance Analysis:

Below is a list of data assumptions for the system performance analysis:

- Information provided is a snapshot in time of individual statuses for each week. Dates have been adjusted to align with Monday of each week.
- On-Time: On-time data was not provided for the weeks of 10/9/23 and 11/27/23.
- Data for the weeks of 8/7/23 to week 8/22/23 occur before the start of the SY 2023-2024 school year and have recorded values of zero for open routes, drivers on hand, and approved leave/not able to drive. Consequently, these weeks have been omitted from analysis.
- Open Routes represent the number of routes without an assigned driver that week.
- Drivers On Hand represent the total number of employed drivers who are not on approved leave.
- Approved Leave/Not Able to Drive represents the total number of employed drivers that are not available to drive that week due to being out on an approved leave such as medical leave, disability, administrative leave, and paid time off or they are unable to drive due to an unforeseen circumstance such as a family emergency.
- Trips are considered early if they arrive 30 minutes prior to the scheduled arrival time. For instance, a trip with a scheduled arrival time of 7:30 AM would be considered early if the vehicle arrives before 7:00 AM.
- Vehicle Tracking performance was determined using the on-time status data provided. Trips without a listed actual arrival were assumed to be a tracking failure.

Financial Analysis:

Below is a list of data assumptions for the financial analysis:

- The provided FY24 Budget was used as the basis for the expected yearly costs under the current configuration.
- Days in session used to calculate the analysis was 183 days, which includes 180 students days plus 3 inclement weather make-up days.
- Budget costs were divided into 3 distinct buckets:
    - Overhead/admin/capital: Fixed costs from the current business practices and assets, including vehicle replacement.

- Mileage: Costs related to the amount of driving that is being done, mostly fuel and maintenance costs.
- Wage: The costs of the staff needed to run all of the transportation operations.

- The costs per terminal were allocated uniformly based on the % of trips that were handled by each lot.
- The costs per vehicle were allocated uniformly based on the % of routes that each vehicle type handled.

VISIT ITINERARY

Sunday, October 15th 5:00 PM - 8:00 PM

5:00 PM - 8:00 PM *4MATIV team evening arrival and preparation at hotel*

Monday, October 16th 8:00 AM - 4:30 PM

8:00 AM - 8:30 AM *4MATIV prep in meeting room on-site (30 Min)*
6311 Randolph Rd, Camp Springs, MD 20746

- **8:30 AM - 9:30 AM** **Observation of Phone Bank and Dispatch (60 Min)**
  6311 Randolph Rd, Camp Springs, MD 20746
  - Observe GPS tracking, system use, AWS/phone system interactions
  - Observe call handling, data entry, triage, escalation procedures
  - Sit with staff to pull key reports, and data

9:30 AM - 9:45 AM *Break/Buffer (15 Min)*

- **9:45 AM - 10:45 AM** **Meet with members of Phone Bank and Dispatch Teams (60 Min)**
  6311 Randolph Rd, Camp Springs, MD 20746

10:45 AM - 11:15 AM *Break/Buffer (30 Min) - Carl Arrives*

- **11:15 AM - 12:00 PM** **Meet with Routing Team (45 Min)**
  6311 Randolph Rd, Camp Springs, MD 20746

12:00 PM - 12:30 PM *Travel to Yard (30 Min)*

- **12:30 PM - 2:00 PM** **Yard Observation #1 (Fairmont)**
  1901 S Club Dr, Hyattsville, MD 20785
  - Observe preparations for pull-out, driver sign-in, planned driver & vehicle substitutions process, systems data entry, tracking, comms
  - Observe pull-out, OTP monitoring and data recording, managing call-outs, emergency back-up procedures; data & artifact gathering
  - Walk-around facility: walk-through of facility, fleet storage, and shop

2:00 PM - 2:30 PM *Transport to Prince George's County PS HQ (30 Min)*

- **2:30 PM - 3:30 PM** **Meet with IT/Data Team (60 Min)**
  6311 Randolph Rd, Camp Springs, MD 20746

- **3:30 PM - 4:30 PM** **Meet with the Director of Transportation (60 Min)**
  6311 Randolph Rd, Camp Springs, MD 20746

4:30 PM *End of Day*

Tuesday, October 17th 5:30 AM - 3:30 PM

- **5:30 AM - 7:00 AM** **Yard Observation #2 (Surrattsville)**
  9920 Brandywine Rd, Clinton MD 20735
  - Observe preparations for pull-out, driver sign-in, planned driver & vehicle substitutions process, systems data entry, tracking, comms
  - Observe pull-out, OTP monitoring and data recording, managing call-outs, emergency back-up procedures; data & artifact gathering
  - Walk-around facility: walk-through of facility, fleet storage, and shop

7:00 AM - 8:00 AM *Transport to Prince George's County PS HQ + Set Up (60 Min)*

- **8:00 AM - 9:00 AM** **Meet with Payroll Team (60 Min)**
  6311 Randolph Rd, Camp Springs, MD 20746

9:00 AM - 9:30 AM *Break/Buffer (30 Min)*

- **9:30 AM - 10:30 AM** **Meet with Special Education Team (60 Min)**
  6311 Randolph Rd, Camp Springs, MD 20746

10:30 AM - 11:00 AM *Break/Buffer (30 Min)*

- **11:00 AM - 11:45 AM** **Meet with Terminal Managers/Foremen (45 Min)**
  6311 Randolph Rd, Camp Springs, MD 20746

11:45 AM - 12:00 PM *Break/Buffer (15 Min)*

- **12:00 PM - 1:00 PM** **Lunch with Supervisors/Leadership Team (60 Min)**
  6311 Randolph Rd, Camp Springs, MD 20746

1:00 PM - 1:30 PM *Break/Buffer (30 Min)*

- **1:30 PM - 2:30 PM** **4MATIV flexible work time (60 Min)**
  6311 Randolph Rd, Camp Springs, MD 20746
  - Conduct additional interviews, answer key questions
  - Secure remaining data/systems access
  - Team processing of site visit information gathered

- **2:30 PM - 3:30 PM** **Meet with District Senior Leadership (60 Min)**
  Sasscer Administration Building
  14201 School Lane, Upper Marlboro, MD 20772, Room - TBD

3:30 PM *Departure*

LIST OF INTERVIEWS

Date	Participants
10/16/2026	In-person Interviews and observations • Phone Bank • Dispatch • Routing and Scheduling • Fairmont Terminal Staff • Information Technology (IT) and Data • Director of Transportation
10/17/2023	In-person Interviews and observations • Surrattsville Terminal Staff • Payroll • Special Education • Transportation Terminal Managers • Transportation Supervisors • Senior Leadership Team members
10/25/2023	Technical Discussion with PGCPS Analysts
11/06/2023	Student Focus Group
11/08/2023	Parent/Caregiver Focus Group
11/14/2023	Transportation and Human Resources
11/20/2023	Student Data and Pupil Boundary Teams
11/27/2023	PGCPS Parent and Community Advisory Council member interviews
11/29/2023	PGCPS Parent and Community Advisory Council member interviews: Special Education
11/30/2023	Walk Zone Pedestrian Safety Meeting

ARTIFACTS REVIEWED

Below is a list of all artifacts received and reviewed for the purposes of this audit:

1. SY23/24 Pay Table 500 for Transportation Services (July 1, 2023 - June 30, 2024)
2. Task Force on Bus Transportation Report from CEO and COO prepared Feb 03 2020
3. Where to target efforts at increasing the number of neighborhood elementary and K-8 school students who can walk to school in Prince George's County, Maryland (Rhianna McCarter)
4. Transportation Task Force Update 030520 prepared 022820
5. PGCPS Standard Operating Procedures (SOP) Transportation Routing
6. Memo: Scheduling Impact Meetings Due to Late Bus Arrivals SY-2024, 9.21.23
7. Dept. of Transportation Late Arrival Log (Responses) - SY24 - Q1
8. School-Based Transportation POC AM_PM Cuties
9. Board Policy 7101 - Pedestrian Safety Plans
10. 2022-09-27 SECAC Transportation Presentation PGCPS-SY24
11. Transportation Handbook Operating Procedures SY23-24
12. 2023-2024 Approved School Calendar
13. SY23-24 REG Boundary
14. Walk Zones
15. Administrative Procedure 3534
16. Administrative Procedure 3534.1
17. Administrative Procedure 6192
18. Staffing Negotiated Agreement
19. PGCPS Transportation Organization Chart FY24
20. State of Maryland Annotated Code
21. Operations: T26 Strategic Plan Strategy Tracker
22. LOT 06 Fairmont SPED
23. LOT 09 Bladensburg REG
24. LOT 09 Bladensburg SPED
25. LOT 12 Crossland REG
26. LOT 12 Crossland SPED
27. LOT 15 Forestville REG
28. LOT 15 Forestville SPED
29. LOT 18 Goddard REG Runsheet
30. LOT 18 Goddard SPED Runsheet
31. LOT 21 REG RUNSHEETS
32. LOT 24 John Hanson REG Runsheet
33. LOT 24 John Hanson SPED Runsheet
34. LOT 27 Laurel REG Runsheet
35. LOT 27 Laurel Runsheet SPED
36. LOT 30 Mullikin REG Runsheet
37. LOT 30 Mullikin SPED Runsheet
38. LOT 33 SURRATTSVILLE REG

39. LOT 33 SURRATTSVILLE SPED
40. BLADENSBURG BUS LOT DOUBLES SHEET PM 10-27-23
41. BLADENSBURG BUS LOT DOUBLES SHEET AM 10-26-23
42. BLADENSBURG BUS LOT DOUBLES SHEET AM 10-27-23
43. BLADENSBURG BUS LOT DOUBLES SHEET PM 10-23-23
44. BLADENSBURG BUS LOT DOUBLES SHEET PM 10-24-23
45. BLADENSBURG BUS LOT DOUBLES SHEET PM 10-25-23
46. BLADENSBURG BUS LOT DOUBLES SHEET PM 10-26-23
47. BLADENSBURG BUS LOT DOUBLES SHEET AM 10-24-23
48. BLADENSBURG BUS LOT DOUBLES SHEET AM 10-25-23
49. BLADENSBURG BUS LOT DOUBLES SHEET AM 10-23-23
50. CROSSLAND DOUBLE SHEET AM 10-23-23
51. CROSSLAND BUS LOT DBL SHEET AM 10-27-23
52. CROSSLAND BUS LOT DBL SHEET PM 10-23-23
53. CROSSLAND BUS LOT DBL SHEET PM 10-25-23
54. CROSSLAND BUS LOT DBL SHEET PM 10-26-23
55. CROSSLAND BUS LOT DBL SHEET PM 10-27-23
56. CROSSLAND BUS LOT DBL SHEET AM 10-24-23
57. CROSSLAND BUS LOT DBL SHEET AM 10-25-23
58. CROSSLAND BUS LOT DBL SHEET AM 10-26-23
59. DOUGLASS PM 10-27-23 DOUBLE SHEET
60. Douglass pm Double sheet 10-23-23
61. Douglass BLANK DOUBLE RUN SHEET AM 10-24-23
62. DOUGLASS 1-24-24 PM
63. Douglass 10-25-23 AM DOUBLE RUN SHEET
64. DOUGLASS 10-25-23 PM DOUBLE
65. DOUGLASS PM 10-26-23 DOUBLE
66. Douglass AM DOUBLE RUN SHEET 10-23-23
67. Douglass AM 10-27-23 DOUBLE RUN SHEET
68. Douglass AM 10-26-23 DOUBLE RUN SHEET
69. FAIRMONT PM 10-27-23
70. FAIRMONT PM 10-23-23
71. FAIRMONT PM 10-24-23
72. FAIRMONT PM 10-25-23
73. FAIRMONT PM 10-26-23
74. FAIRMONT AM 10-24-23
75. FAIRMONT AM 10-25-23
76. FAIRMONT AM 10-26-23
77. FAIRMONT AM 10-27-23
78. FAIRMONT AM 10-23-23
79. FORESTVILLE PM 10-26-23
80. FORESTVILLE PM 10-23-23

81. FORESTVILLE PM 10-24-23
82. FORESTVILLE PM 10-25-23
83. FORESTVILLE AM 10-25-23
84. FORESTVILLE AM 10-26-23
85. FORESTVILLE AM 10-27-23
86. FORESTVILLE AM 10-24-23
87. FORESTVILLE AM 10-23-23
88. FRIENDLY PM 10-27-23
89. FRIENDLY AM 10-24-23
90. FRIENDLY AM 10-26-23
91. FRIENDLY AM 10-27-23
92. FRIENDLY PM 10-23-23
93. FRIENDLY PM 10-25-23
94. FRIENDLY AM 10-25-23
95. FRIENDLY PM 10-24-23
96. FRIENDLY PM 10-26-23
97. FRIENDLY AM 10-23-23
98. Goddards Double 10-25 AM
99. Goddard 10_23 AM
100. Goddard 10_23 PM
101. Goddard 10_24 AM
102. Goddard 10_24 PM
103. Goddard AM 10_26
104. Goddard PM 10_27
105. Goddard's Double 10-25 PM
106. Greenbelt 21 10-27-23 PM
107. Greenbelt 10-25-23 PM
108. Greenbelt 10-26-23 AM
109. Greenbelt 10-27-23 AM
110. Greenbelt 10-24-23 PM
111. Greenbelt 10-25-23 AM
112. Greenbelt 10-24-23 AM
113. Greenbelt 10-23-23 PM
114. HANSON 10-24-23 PM
115. HANSON 10-25-23 AM
116. HANSON 10-26-23 AM
117. HANSON 10-26-23 PM
118. HANSON 10-27-23 PM
119. HANSON 10-23-23 AM
120. HANSON 10-23-23 PM
121. HANSON 10-24-23 AM
122. HANSON 10-25-23 PM

123. HANSON 10-27-23 AM
124. LAUREL 10-27-23 PM
125. LAUREL 10-23-23 AM
126. LAUREL 10-23-23 PM
127. LAUREL 10-24-23 AM
128. LAUREL 10-24-23 PM
129. LAUREL 10-25-23 AM
130. LAUREL 10-25-23 PM
131. LAUREL 10-26-23 AM
132. LAUREL 10-26-23 PM
133. LAUREL 10-27-23 AM
134. SURRATTSVILLE 10-27-23PM
135. SURRATTSVILLE 10-26-23 PM
136. SURRATTSVILLE 10-27-23 AM
137. SURRATTSVILLE 10-25-23 PM
138. SURRATTSVILLE 10-26-23 AM
139. SURRATTSVILLE 10-25-23 AM
140. SURRATTSVILLE 10-24-23 AM
141. SURRATTSVILLE 10-24-23 PM
142. SURRATTSVILLE 10-23-23 PM
143. SURRATTSVILLE 10-23-23 AM

About 4MATIV

4MATIV (www.4mativ.org) provides comprehensive and tech-enabled transportation management and consultative solutions for schools, districts, and others in education. We are building the interconnected, multimodal student mobility systems of the future. Our vision is that all students have equitable access to individualized learning opportunities - and along the way we can help save schools money, enhance compliance and safety, remove the headaches of transportation management, and create environmentally sustainable systems.

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