REPORT

BOARD OF EDUCATION OF HOWARD COUNTY
MEETING AGENDA ITEM

TITLE: School Start Times: Decision Briefing **DATE:** January 13, 2021

PRESENTER(S): Brian Nevin, Director, Student Transportation Office
Tom Platt, Decision Support Group, LLC

Strategic Call To Action Alignment:
Operations and practices are responsive, transparent, fiscally responsible and accountable, with students at the heart of all decisions.

OVERVIEW:
On April 15, 2021, the Board of Education directed the Superintendent to review and evaluate the current student school start times and to prepare a recommendation of suggested new start times for submission to the Board of Education in December 2021.

On June 24, 2021, the Board of Education approved a contract for the consulting services of Decision Support Group, LLC to review, evaluate, and recommend revised school start times.

The intention of this decision briefing is to provide decision makers with the core issues addressed within the project and present summary recommendations.

RECOMMENDATION/FUTURE DIRECTION:
Based upon the summary recommendations, the Board of Education will make decisions regarding implementation of school start time changes.

SUBMITTED BY:

Brian Nevin
Director, Student Transportation Office

Bruce Gist
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APPROVAL/CONCURRENCE:

Michael J. Martirano, Ed.D.
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Decision Briefing

School Start Times and Transportation Costs

for the

Howard County
Public School System

January 2022

DECISION SUPPORT GROUP
BETTER DECISIONS FOR A COMPLEX WORLD

Table of Contents

<u>Note regarding a reader's approach to this document</u>:
The intention of this Decision Briefing is to provide decision makers with the information needed to assess the core issues addressed within the project. It summarizes a multi-month effort during which a large quantity of information was conveyed, analyzed, and discussed. In particular, the Summary of Analytical Results section is a brief distillation of a significant body of work that may require further discussion to gain a full understanding. If desired, the reader will garner sufficient context for the decisions required by beginning with the Introduction and Statement of Purpose and then skipping to the Summary of Results on page 16.

Introduction and Statement of Purpose

This Decision Briefing provides a synopsis of the objectives, process, and results for a project undertaken by Decision Support Group, LLC (DSG) in cooperation with the Board of Education, Superintendent, and staff of the Howard County Public School System (HCPSS). Work began in September and proceeded through December 2021. It addresses the entirety of the undertaking but is deliberately structured as an action-oriented tool to inform a decision-making process based on the analysis, and as constrained by the parameters incorporated via interim decisions reached at the conclusion of each of three analytical iterations.

Background for the Decision Process

From its inception the project was deliberately focused on advancing a body of work previously completed rather than beginning anew. Assessing the viability of school start time changes in support of advancing student achievement in the HCPSS began as early as 1997 and continued through 2017 with the completion of a comprehensive multi-phase project. Numerous school start and end time scenarios were analyzed, as was the community's interests and priorities.

The overarching objective throughout has been to explore the viability of beginning secondary school education later than the current 7:25 AM. The single most impactful barrier to proceeding was consistently identified as the additional transportation system costs that would be required. This project was therefore designed with a single purpose in mind: to deliberately and methodically work toward a single actionable recommendation that minimizes or eliminates transportation cost as a factor in the decision to proceed with school start time changes.

Goals and Objectives of the Project

The project was also placed on an aggressive timeline to support the decisions necessary for an actionable plan of implementation in advance of school startup in 2022. The history preceding, and purpose for, this project produced a set of three core objectives that have guided the work throughout:

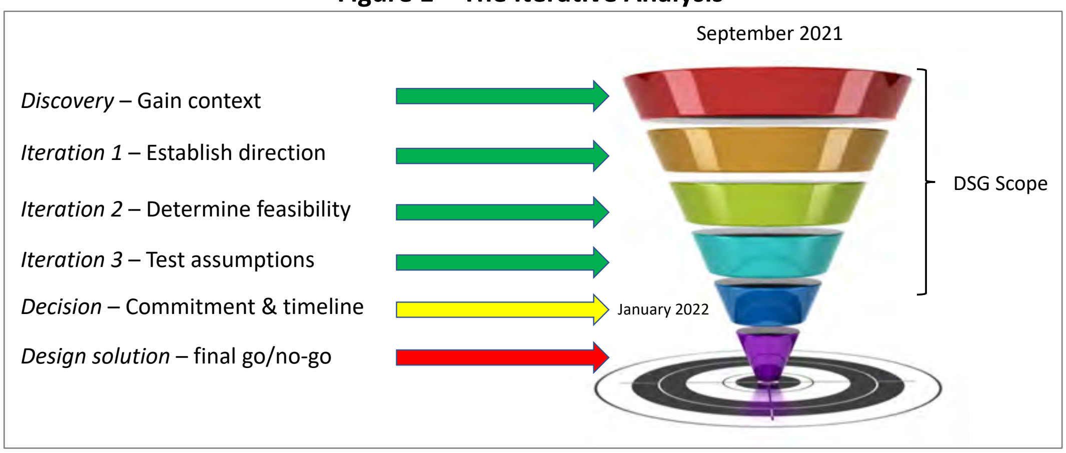
1. Achieve an actionable outcome whereby the School Board can vote on a single, thoroughly vetted, clearly understood, and achievable path forward by January 2022.
2. Work toward this objective through an analytical process whereby we identify parameters to be considered for change; broadly and then specifically consider the impact of each on the result; and increase our level of confidence with each successive iteration.

3. Focus primarily on those parameters which may have a substantial impact on efficiency of operations with an eye toward minimizing or eliminating transportation cost as a constraint in the School Board's final decision.

Approach to the Work

The metaphor of a funnel is a simple means of visualizing the approach. Complexity in designing an efficient and effective student transportation system comes not from any single element of design but from the cumulative impact of multiple variables. Taking a single bus route as an example, connecting bus stops together into an efficient route path and scheduling the bus to arrive at a set time is a well understood process greatly eased by technology. Complexity arises instead in the incorporation of multiple derivative variables such as: How can the bus route best be linked to others? What is the most efficient placement of bus stops? What students and student groups should be allowed to access to the route? Establishing parameters for numerous variables and determining associated constraints on the analysis requires identifying the most impactful and then working through an iterative process whereby some are held constant while the effect of changing others is analyzed. Starting broadly and working through successive levels of detail was the resulting process, and is illustrated in Figure 1:

Figure 1 – The Iterative Analysis



This Decision Briefing is the final step in the DSG project. It is designed as a prompt for action and must be followed by an immediate effort to plan the actual operational solution. DSG's work could never hope to achieve 100% confidence in the result. That can only be achieved with the detailed operational planning and system design work that follows. The aim was to achieve a high enough confidence level to support a well-informed decision before committing to the implementation effort. The balance of this document provides that information.

Summary of the Analytical Results

We begin the decision process with a contextual discussion. Then, in analytical Iteration #1 we establish overall direction for a solution by examining the transportation system as it currently exists. Iteration #2 utilizes the cumulative findings and identification of key parameters to evaluate the feasibility of developing a zero-cost transportation solution. Iteration #3 tests the assumptions in a live routing environment and is the final lead-in to results and recommendations. DSG conferred with HCPSS leadership at each milestone and sought concurrence on key interim decisions before moving on with each subsequent step in the process.

Key Initial Findings

DSG focused its attention during the initial discovery phase of the project on ensuring our understanding of prior studies and on surveying School Board members and senior staff regarding their understanding of past work and priorities for the current project. Past efforts have analyzed and presented a broad range of potential options:

- The original effort in 1997 produced three preliminary models indicating the need for +0 to +80 additional vehicles.
- A subsequent 2013-2016 comprehensive five-stage process identified key stakeholder constraints and analyzed four models. The result was a further School Board motion to pursue start times with "nothing earlier than 8:15":
  - Subsequently, an additional analysis was conducted utilizing sophisticated mathematical modeling and analytical software.
  - This analysis produced further options indicating the need for +2 to +70 additional vehicles.
- Following this, additional guidance from the School Board indicated a desire for start times between 8:00 and 9:25; This followed a boundary realignment study in 2017. Six models were produced, and all indicated the need for +100 or more additional vehicles.

With this as background, DSG conducted a round of 14 discovery meetings with School Board members, senior staff, and Transportation Department leadership. Universally, these conversations indicated that:

1. There is no desire to re-analyze and/or repackage prior options or analyses.

2. There is a desire to consider new parameters focused on rethinking baseline assumptions regarding how transportation services are designed.

It is this last point that became the jumping-off point for the DSG analysis. Of note from the prior studies is the large range of potential transportation cost impacts as illustrated by the number of additional transportation vehicles required. This ranges from a low of +0, meaning no cost impact, to more than +100, indicating cost increase of $10 million or more. It is the range that matters and leads to the most important takeaway from the discovery phase: ***Transportation costs are derivative of policy decisions regarding the parameters under which the system is designed.*** Thus, by isolating on these parameters and following an iterative approach, the DSG approach was designed specifically to demonstrate the impact of these parameters in a manner that would promote a business-case approach to the decisions required.

Iteration #1 – Establish Direction

To begin it was necessary to investigate the transportation system as it is currently structured. This provides a twofold benefit to the process: First it provides the comparison baseline against which options are evaluated; Second it illuminates which parameters have the most impact on the solution and might best be manipulated in pursuit of the School Board's bell time objectives. The core visualization tool used throughout the project is an illustration of fleet deployment over the morning and afternoon transportation periods. The current fleet deployment is illustrated in Figures 2 and 3.

Figure 2

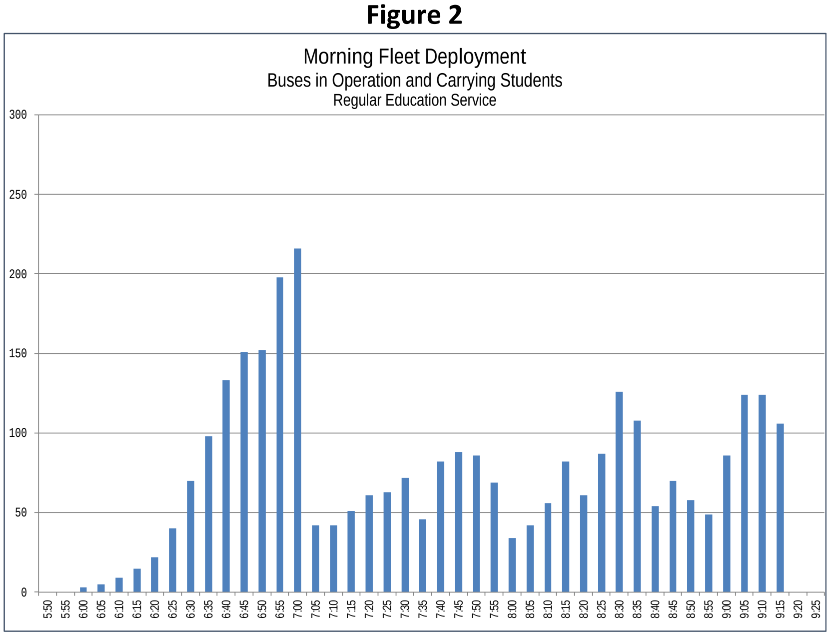
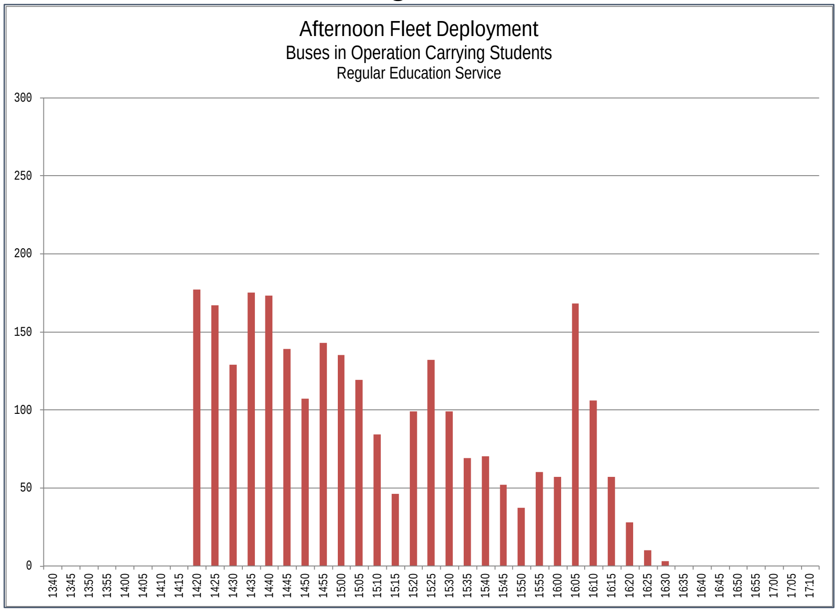


Figure 3

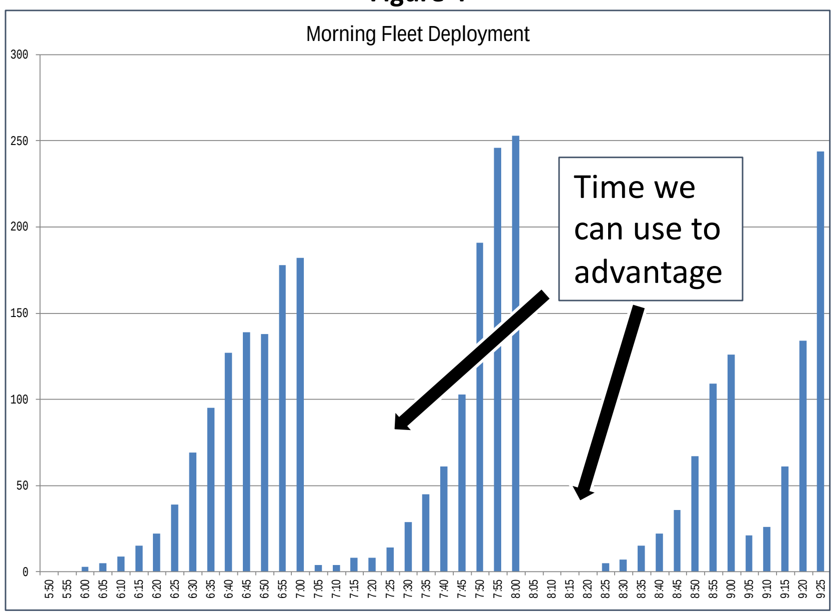


Observations critical to understanding the go-forward opportunities are:

- The visual displays the number of buses actively in operation and carrying students (the Y-axis) at five-minute intervals (the X-axis); In this display time spent moving without students (deadhead time) and time spent waiting between routes (layover time) are excluded.
- Only Regular Education service is displayed. Special Education services are easier to fit to a bell time model. Focusing on regular education services allows a more compact and definitive evaluation of alternatives.
- The current pandemic-adjusted system is displayed. More buses would be utilized in a "normal" year.
- There is a clear imbalance in peak deployment over each of the bell time tiers in the morning and the afternoon.
- There is a continuous operation of vehicles with students on board over the entire time range.
- There is 3 hours and 15 minutes of operational time in the morning, and 2 hours and 10 minutes in the afternoon (55 minutes less than in the morning).
- Peak deployment occurs at 7:00 AM with 218 units in the morning and at 2:20 PM and 177 units in the afternoon.

From here it is necessary to start breaking-down the specific parameters to be analyzed. The single most impactful parameter in deriving the cost of a transportation system are the school bell times themselves. The morning deployment pattern illustrates an opportunity to encourage efficiency regardless of the specific start times chosen. The drop off from the early peak, which is the time at which buses currently unload high school students, to the spreading-out of deployment over the rest of the morning period is a point of focus. Further analysis reveals a significant amount of layover time in the system. This is best illustrated by modeling conducted by DSG in which all schools were clustered together on specific start time tiers rather than the current spread. This is illustrated for the morning deployment in Figure 4.

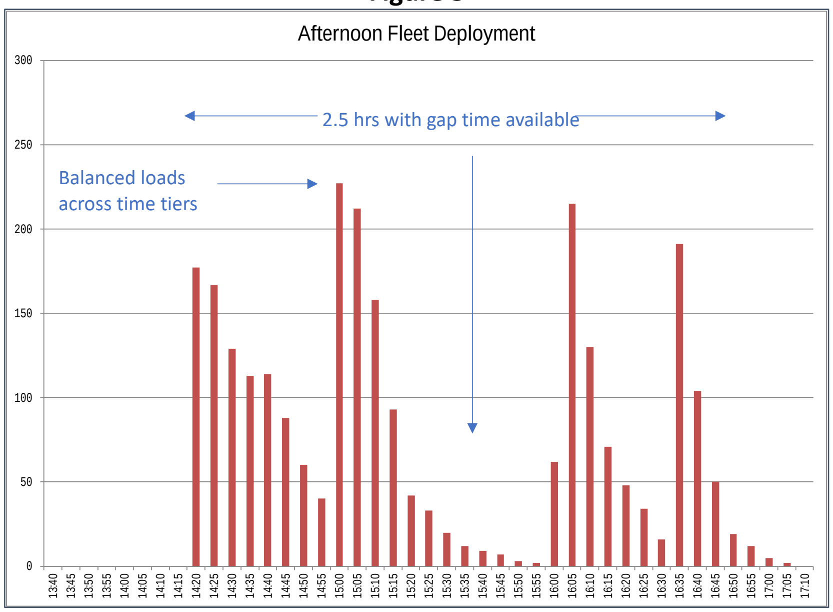
Figure 4



The school start times are illustrative and were not chosen with any particular objective in mind except to illustrate the potential of the first parameter chosen for consideration in the analysis. Here we see specific time gaps that better represent the lost opportunity inherent in the current layover time spread throughout the system. The potential, in essence, is to squeeze bell times closer together by establishing a limited set of allowable start times. This would gain progress toward the objective by eliminating some of the layover time.

This, however, is more complicated in the afternoon. The shorter PM operational time is caused by two factors: Differing lengths of instructional day between elementary schools and middle/high schools; and a difference in the amount of time before school start where students are dropped early at high schools (25 minutes) compared with all other schools (10 minutes). In the afternoon there is a uniform 7 minutes from dismissal before buses depart all schools. Eliminating the difference in instructional day length and/or the drop-off time difference may assist in making a coordinated bell time approach work, as illustrated in Figure 5.

Figure 5



The final factor, which is not readily apparent in these illustrations, but that may also have a substantial impact on efficiency, is the way students are assigned to routes. Standard practice in the industry, as in HCPSS, is to plan bus loads based on all eligible students rather than students actually riding. An analysis of ridership counts for October 2020 indicates that on average system wide 70% of eligible students are riding. Thus, planned bus loads could be substantially reduced and, therefore, the number of bus routes required also reduced if the system were able to be structured based on actual ridership.

Three initial decisions were therefore presented for consideration at the conclusion of this first iteration:

1. Assume bell time coordination for middle and elementary schools;
2. Incorporate a common 6:45 length of instructional day across all grade levels; and
3. Implement a policy requiring "opt-in" transportation for eligible students.

The first and third of these were included as parameters in Iteration #2. The second was also included for consideration. However, because of broad implications and complexities associated with this parameter, it was only to be used if it was not possible to demonstrate feasibility without using it. We concluded that it would always be possible to incorporate this as a parameter during detailed implementation planning regardless of whether it was needed for this analysis.

Iteration #2 – Determine Feasibility

With the results and decisions from iteration #1 as the starting point, DSG proceeded to conduct a more granular assessment of feasibility. Understanding that this would still be a provisional analysis with results more theoretical than actual, the approach nevertheless recognizes that:

- A more granular approach facilitates better understanding and increases confidence in the chosen direction and the final result.
- More granularity also requires more assumptions be inserted at this interim stage.
- We were seeking a balance between effort and accuracy at each step in the process.
- Drilling-down sequentially with a checkpoint at each stage is what ultimately gets to a single, definitive, and final recommendation.

At this stage of the work, we also recognized that if we were successful in identifying feasible solutions, we would necessarily be removing most of the slack existing in the current transportation system, and that we would need to be aware of the operational implications: Less slack equates to fewer options when the unexpected happens (e.g., COVID-induced driver shortages). However, throughout the project DSG emphasized that change requires compromise and prioritization. Ultimately the effort in this iteration was to begin the process of identifying which parameters and objectives are most important to the leadership of HCPSS.

Specifically, the analytical objectives for this iteration were to:

1. Calculate comparative operational statistics from the baseline dataset.
2. Identify representative geographic areas to sample.
3. Construct sample "stand-alone system" area subsets (clusters).
4. Incorporate feasible changes based on Iteration 1 decisions, and new assumptions for Iteration 2:

5. Alter school and associated bus route start times to support the bell time objectives.
6. Make tactical and targeted changes to bus loads and running times only as supported by data and experience, and only if necessary to support objectives.
7. Incorporate the potential for revised routing techniques where appropriate, and only to the degree necessary to support objectives.
8. Retain a conservative analytical stance throughout the work to increase confidence in the results.

Ultimately, we were able to calculate and compare operational statistics between and among three sample areas and the current system to further gauge the feasibility of the approach. Tables 1 and 2 summarize the starting point for the three sample areas selected.

Table 1

Factor	Rural West	Central Core	Route 1 Corridor
Goal	Test for most difficult geography	Test in area of low relative transportation demand	Test in "average" targeted area
Density & Time	Low density, long rides	High density, short rides	Average for total system
Transportation Demand	High relative to enrollment	Low relative to enrollment	Average for total system
Schools Included	Capture most of this geographic area	Identify cluster in close proximity to each other	Target a system-wide average grouping
Loads	Achieve balance between grade levels	Achieve balance between grade levels	Achieve balance between grade levels
Student Representation	Highest possible given geography	Non-specific, but likely to be low	Highest possible % of total system demand

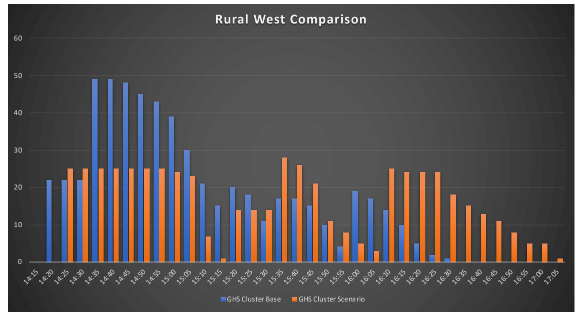
Table 2

Statistic	System Total	Rural West	Urban Core	Route 1 Corridor
Name	RegEd Service	Glenelg Cluster	Oakland Mills Cluster	Hammond Cluster
Start times	7:25-9:25 Range: 2 hour 0 min	7:25-9:20 Range: 1 hour 55 min	7:25-9:00 Range: 1 hour 35 min	7:25-9:25 Range: 2 hour 0 min
Dismissal times	2:10-3:55 Range: 1 hour 45 min	2:10-3:50 Range 1 hour 40 min	2:10-3:30 Range: 1 hour 20 min	2:10-3:55 Range: 1 hour 45 min
Bus Runs	871	92	40	151
Buses	255	49*	15*	24*
Students Planned	39,728	3,262	1,668	3,976
Actual % (approx.)	68%	81% (63% HS/MS PM)	81% (70% HS/MS PM)	50% (50% HS/MS PM)

* Not actual counts – based on peak deployment as a surrogate since these clusters do not currently exist as contained subsystems.

“Rural West” Results:

- Established relatively equal loads of eligible students by grade level (HS, MS, ES); adjusted tier placement as necessary to equalize tier loads.
- Provided for logical geographic sequencing to minimize deadhead times.
- Tested Iteration 1 decisions for time tier grouping and opt-in.
- Also tested a primary iteration 2 parameter: combination runs for co-located campuses
- Three balanced tiers were achieved by applying targeted offsets and combination routing for selected MS/ES groupings.



Statistic	Baseline	Scenario
Start Times	7:25-9:20	7:30-9:30
Dismissal Times	2:10-3:50	2:15-4:00
Bus Runs	92	77
Buses	49	28
Students	3,262	Approx. 3,000

- Peak deployment is down significantly from the baseline thus adding efficiency, but the start time range increases, which is the opposite of the objective and precludes a later HS start.
- That said, the total number of runs required is down by 19%, indicating further opportunity

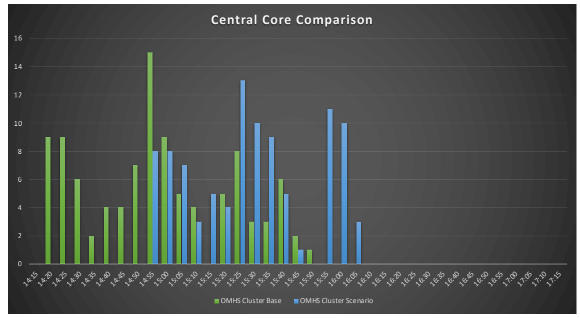
Result summary: This modeling saved runs/buses (adding efficiency) but does not achieve the bell time objective.

Iteration 3 strategy: By “giving-back” efficiency, we may be able to gain the time compression necessary to achieve the bell time goals.

“Central Core” Results:

- Squeezed bell time range further than current, which are already tighter than system wide.
- Utilized Iteration 1 decisions to free-up capacity.
- Utilized combination runs only where it makes sense to do so (OMHS & OMMS, and only for late HS runs).
- Achieved desired results, holding other adjustment parameters in reserve for future use, as needed.

- Start time compression is more clearly achievable in the urban core.
- Tier 3 could be compressed earlier, and the entire system shifted "right" (i.e., for an 8:30 HS start).



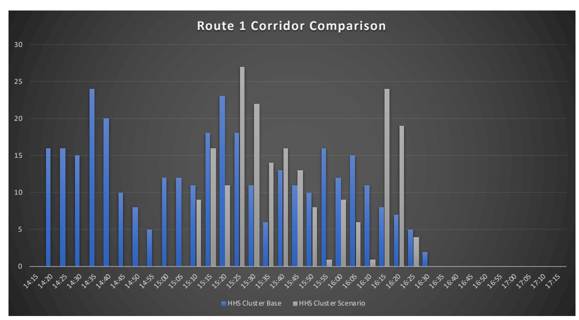
Statistic	Baseline	Scenario
Start Times	7:25-9:00	8:00-9:15
Dismissal Times	2:10-3:30	2:45-3:45
Bus Runs	40	35
Buses	15	13
Students	1,668	Approx. 1,500

Result summary: School Board goals are demonstrably achievable in this example, with bonus efficiency gains.

Iteration 3 strategy: Utilize efficiency gains above what is needed in the central core to offset other more challenging geographic areas or account for assumptions that prove false in the analysis.

"Route 1 Corridor" Results:

- Restore Covid adjustments to ensure comparability against a normal baseline.
- Utilized clustering of start times and re-positioning of schools across three highly compressed tiers.
- This was enabled by currently existing logistical factors, namely short routes.



Statistic	Baseline	Scenario
Start Times	7:25-9:00	8:30-9:20
Dismissal Times	2:10-3:55	3:00-4:05
Bus Runs	151	151
Buses	24	27
Students	3,976	3,976

Result summary: Presents an example of where it is possible to retain all current routes and just re-balance tiers by moving start times.

Iteration 3 strategy: Retains other parameters for further application (e.g., combination runs at co-located campuses) to enable efficiencies that can be re-purposed in more difficult areas.

This iteration provided the first substantive indication that the overarching objective to compress the range of school start times and achieve a later high school start time is achievable at minimal additional transportation cost. However, it was also clear that achieving this result will require additional decisions and modification of transportation planning parameters including:

- Customization of the routing approach to include combination routing of students from multiple grade levels and different schools on common bus routes when campuses are co-located or near each other.
- The placement of MS/ES start times across all time tiers based on local circumstances, and hence a loss of consistency across the school system.
- The ability to tactically adjust start times plus or minus 10-15 minutes from the tier center point to make specific situations work.
- Removal of as much slack as possible from the existing transportation system, increasing operational risks.

With a positive response from staff to these additional considerations, these results provided sufficient evidence of feasibility to justify proceeding with Iteration 3.

Iteration #3 – Stress Test Assumptions

The results thus far were strongly indicative of feasibility but were not conclusive. The goal of Iteration #3 was therefore to further ratchet-up the intensity and granularity of the analysis to stress test the assumptions and strategies used in the prior iteration. This was accomplished by:

- Identifying a new (4th) sample area to best represent the entire system.
- Isolating on this area in a planning "sandbox" within the *VersatransRP* transportation route planning software utilized by the department.
- Utilizing prior decisions and techniques to reconstruct actual bus routes and bus trips for the sample area.
- Extracting the data to present and compare results utilizing techniques common to all three iterations.

Based on the results, the goal was to raise the level of confidence in the feasibility of meeting the School Board's school start time objectives, and then pivot to and document key implementation tasks and challenges.

For the first time in the project the DSG team was working within the actual routing software and utilizing the existing routes and schedules in the modeling. This facilitated actual route pairings and the creation of system-verified feasible bus trips. So, for this iteration we introduce bus counts as a definitive measure of transportation system costs. We also modify the presentation of fleet deployment to overlay actual drive time on top of loaded time to indicate how these buses are utilized and to show this level of comparison.

Table 3 and Figure 9 summarize the characteristics of the current system and the baseline starting point for the sample area chosen for analysis. Key observations include:

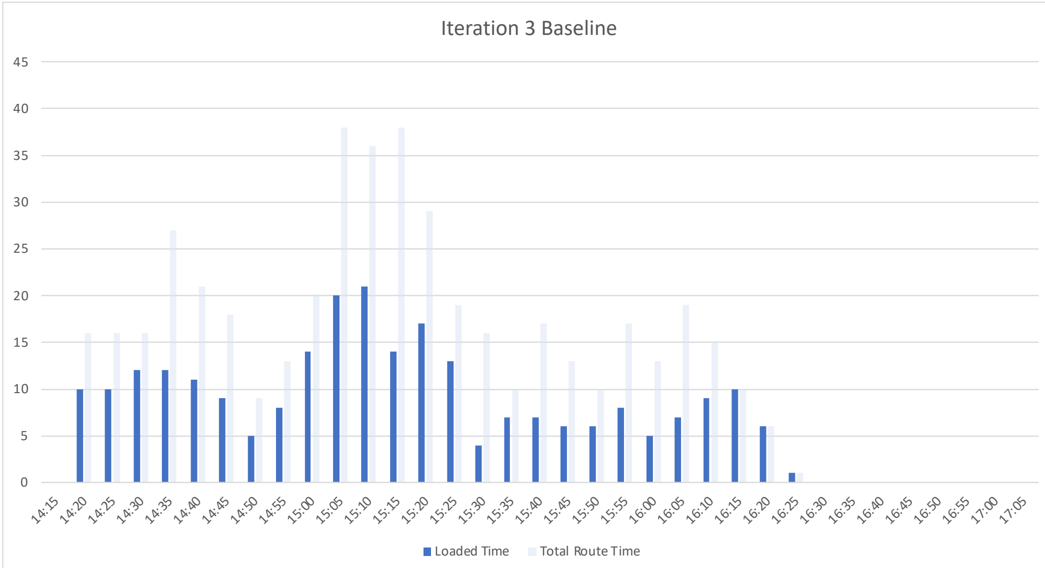
- The sample area bell time range matches the current system-wide range.
- 13% of schools, bus routes, and students are represented in the sample.
- 38 buses would be required to operate this as a stand-alone system.
- The high variance between loaded and total peak deployment speaks to DSG's lack of local knowledge:
    - DSG was not as adept at making best run linkages as local experts would be.
    - The result is higher deadhead (unloaded time) than would likely be included in the final result.

Table 3

Statistic	System Total	Sample Area
Name	RegEd Service	Hammond Region
Schools	77	10
Start times	7:25-9:25 Range: 2 hour 0 min	7:25-9:25 Range: 2 hour 0 min
Dismissal times	2:10-3:55 Range: 1 hour 45 min	2:10-3:55 Range: 1 hour 45 min
Bus Runs	871	115
Buses	255^	38*
Students Planned	39,728	5,036

^ Actual counts without adjustment (reflects current year Covid driver shortage adjustments)
* Actual counts based on adjusted baseline to remove driver shortage adjustments and assigning all runs to new trips in the software.

Figure 9



The DSG team then proceeded to create two different bell time scenarios. Two proved necessary because the first (Iteration 3A) did not provide the desired results. This provided a cautionary indication that achieving the overall objectives will not be straight forward, will not be easy, and will require an intensive and detailed planning effort. Key observations from Iteration 3A include:

- An 8:30 HS start time was achieved, although this also required a 9:45 start time on the third tier.
- An imbalance in Tier 3 could be mitigated using apparent slack time between tier 2 and tier 3.
- 42 buses would be required, however, to operate this system, a 10% increase over the baseline (before any further mitigation efforts).
- The Iteration 3A modeling exercise continues to demonstrate the feasibility of the approach, but also emphasizes the importance of detailed, iterative planning to get to a final structure.
- Also of note is that it would be possible to shift this entire structure back 30 minutes to an 8:00 high school start time if 9:45 as a latest start and/or the latest afternoon dismissal is not desirable.

Of most interest in Iteration 3A is a first demonstration of how school start time changes might look in a substantial subset of the system and in comparison to the current baseline since this sample area is very representative of the system as a whole. This resulted is illustrated in Table 4.

Table 4

School	Baseline		Iteration 3A	
Hammond HS	7:25	2:10	8:30	3:15
Hammond MS	8:05	2:50	9:15	4:00
Lake Elkhorn MS	8:00	2:45	9:45	4:30
Patuxent Valley MS	7:40	2:25	9:45	4:30
Thomas Viaduct MS	8:10	2:55	9:45	4:30
Bollman Bridge ES	8:35	3:05	9:15	3:45
Forest Ridge ES	9:15	3:45	9:15	3:45
Guilford ES	9:25	3:55	9:15	3:45
Hammond ES	9:00	3:30	8:30	3:00
Hanover Hills ES	8:50	3:20	8:30	3:00

The goal in the final analysis, titled Iteration 3B, was to present one final option that builds upon the results in 3A but brings the bus count, and hence cost, in line with the baseline. This would be a final expression of feasibility and most illustrative of the overall possibilities. Figures 10 and 11 display an overlay of the morning and afternoon fleet deployment for the sample area in its baseline configuration and as revised in 3B.

Figure 10

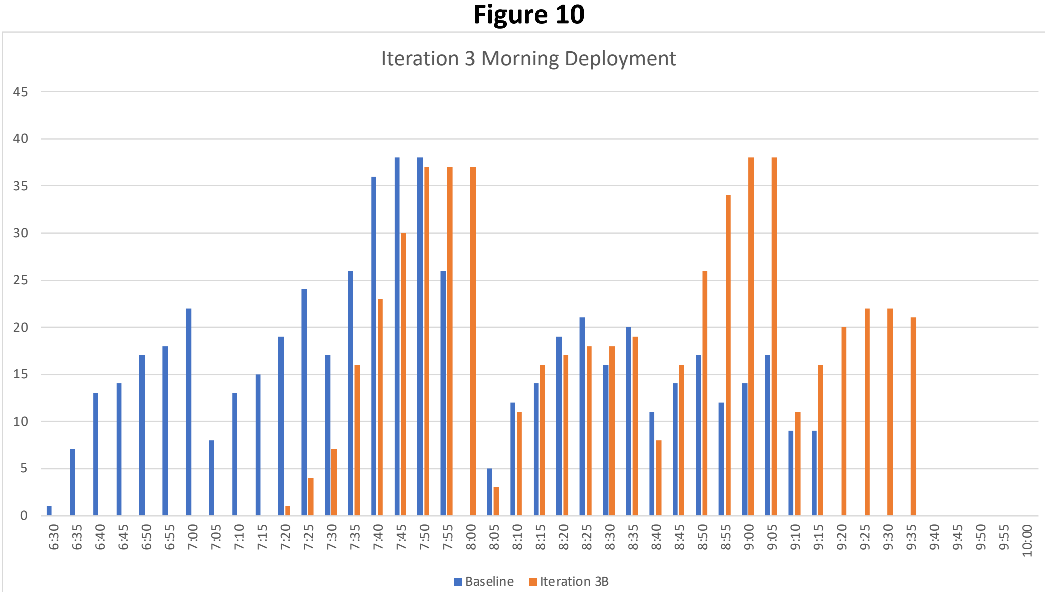
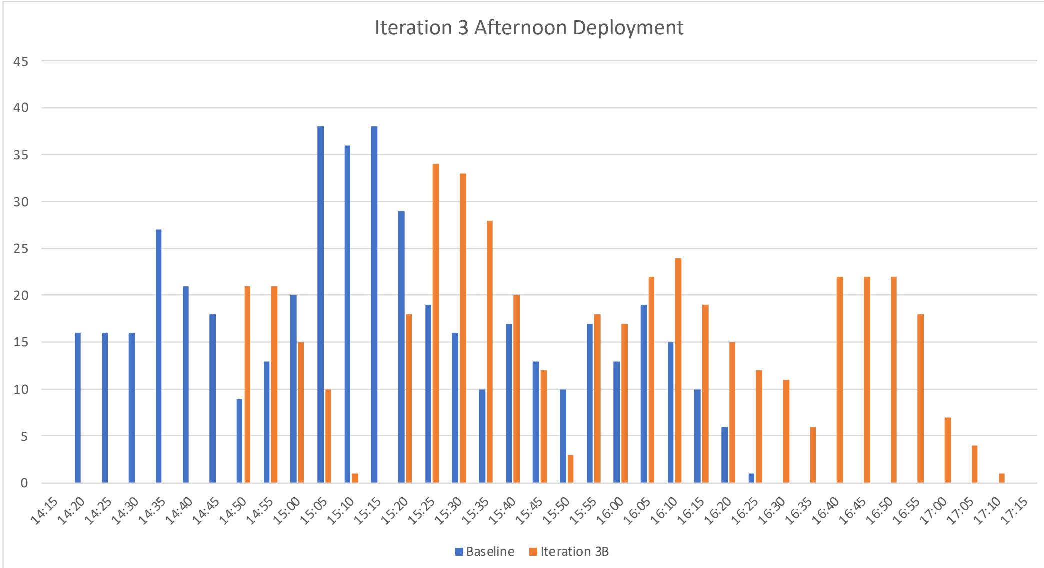


Figure 11



Key observations from Iteration 3B include:

- Demonstrates one mitigation strategy for the shortcomings in 3A, but not the only feasible one.
- Includes additional bell time changes from 3A.
- As with 3A, still does not require any tactical route changes.
- 37 buses would be required (one less than the DSG-calculated baseline), but this may still be more than a well-planned baseline.
- This ultimately demonstrates, however, the feasibility of the objectives but also:
    - The tactical planning work required system wide.
    - The policy compromises that will be required.

Summary of Results

The iterative analytical process provided several key conclusions:

1. The overarching objectives to a) achieve a later high school start time by b) compressing the earliest and latest school start time into a narrower range, and c) with a minimal or zero impact on transportation costs is feasible but with certain caveats:
    - While presented with a high level of confidence, it cannot be fully assured without the detailed planning that must follow and in

which details will need to be assessed and further tradeoffs determined.

- The final impact on transportation costs will always be derivative, and final decisions reached during the detailed planning process will necessarily be the final determinant.

2. Should the basic formulation of the solution adhere to the core structure presented in this project, however, any additional transportation system costs are likely to be one-time, non-recurring expenditures for elements such as technology upgrades and transition planning.
3. Proceeding with implementation, regardless of its details, must ultimately be a policy decision and compromises will be required. Achieving the overall start time goals cannot be achieved without changes to other aspects of current policy such as limiting bell time flexibility and allowing alterations to transportation service parameters.
4. Conveying a thorough understanding to each stakeholder group in HCPSS of the complexities and compromises involved will be an educational and communications challenge that must be considered as part of the transition and implementation planning.
5. Much additional work is required to carry the core conclusion of feasibility reached in this project forward to operational success. For example:
    - The final sample deployments illustrated in Figures 10 and 11 do not reflect the maximum possible efficiency or effectiveness that might be achieved. Local planning and local experts can likely improve on the solution.
    - The sample deployments only address a representative part of the system. The actual solution will require customization and different compromises will be required in each geographic area of the County.

Decision Framework

Summary Recommendations

Given the overall conclusion of feasibility for the achievement of the start time goals and objectives, the following core recommendations are offered for consideration:

1. Proceed with system-wide bell time changes that:
    - Set all high school start times as late as 8:30 AM, but no earlier than 8:00 AM.
    - Sets middle and elementary school start times on any of three coordinated time tiers, with specific placements of individual schools on each tier as required to support efficient and effective transportation planning.
    - Establish the center point for the earliest (first) time tier at the high school start time, and the latest (third) time tier at either 9:45 AM (if an 8:30 first tier) or 9:15 AM (if an 8:00 first tier).
2. Seek to eliminate any transportation cost implications associated with the change in start times through policy changes that enable specific transportation planning flexibility. These include, in order of priority:
    - Tactical flexibility to adjust specific school start times +/- 10 minutes on either side of the tier center point.
    - Permitting the use of combination routing in which different school populations and mixed grade levels are transported on common bus routes (including common distance-based eligibility parameters for effected schools).
    - Imposing a layered transportation eligibility whereby students eligible by distance must also actively request (i.e., opt-in) to the transportation service.
    - Allowing tactical use of bus stop consolidation to shorten bus routes where required to meet available time parameters.
3. Given the complexities involved with the transition from a conclusion of feasibility to an actionable operational solution, target implementation for the start of school in 2023 rather than 2022. The following considerations are provided for the proper evaluation of this recommendation:
    - The recommended changes would constitute a significant policy shift for the HCPSS. A successful implementation is critical to long-

term acceptance of the changes by all stakeholder groups. An aggressive implementation timeline would greatly increase the probability of missteps.

- A 2023 implementation timeline would facilitate coordination with the redistricting required in support of the new high school opening scheduled for the same time.
- A 2023 implementation timeline would allow detailed planning to begin immediately, and to arrive at a definitive go/no-go decision with all details and costs understood by Fall 2022 in support of the FY2024 budgeting cycle.
- A 2023 implementation timeline would facilitate a concurrent implementation of any other transportation system changes currently under consideration or projected.

Sequential and Interdependent Decisions

The recommendations above build upon each other in a logical and interdependent flow. Should the School Board decide not to proceed with start time changes (recommendation 1) than recommendation 2 and 3 are moot. This point becomes the framework for the decision process described below. In these concluding sections to this document we break-out, for ease of evaluation and discussion, each of the sequential and interdependent decisions that will be required to proceed with implementation.

Decision 1 – Realign School Start and End Times

Background: The core conclusion resulting from this project is that, with a high degree of confidence, it is feasible to adjust the range of school start times in support of three objectives:

1. High school start times no earlier than 8:00 AM;
2. Compression of all start times to ensure reasonable associated dismissal times; and
3. Achieving this with minimal transportation cost impacts.

This final result follows many years of exploration. While the conclusion is not 100% definitive, nor does it specify the precise start and end times for all schools in the HCPSS, it does provide a definitive path forward and achieves the project objectives of eliminating transportation cost as a barrier to implementation.

Decision Required: A decision to proceed with implementation planning is required. The implication of a positive decision would be to initiate a comprehensive and detailed exercise that will consume a significant amount of time and staff resources, the result of which would be the definitive details and costs of the change. In turn, these would facilitate a final go/no-go decision based on those results. A negative decision would forgo the need for any further action, including on any of the related decisions that result from this project.

Decision Authority and Timeline: The Board of Education is the policy-setting authority for the Howard County Public School System and must be vested with this significant policy decision. The timing is critical given the extensive detailed planning effort required. DSG recommends strongly against attempting implementation for the 2022/23 school year unless a decision to proceed is reached not later than January 31, 2022.

Actions to Follow this Decision:

1. No further action is required unless a decision to proceed is reached.
2. If the decision is to proceed with implementation:
   a. Establish detailed transportation planning parameters via additional policy considerations as described in Decision 2.
   b. Based on the results of Decision 2 and other considerations, determine a timeline for implementation as described in Decision 3.
3. Schedule further discussion and a final go/no-go decision point to coincide with completion of the detailed implementation planning exercise.

Decision 2 – Enable Required Transportation Policies

Background: Implicit in the conclusion of feasibility are the inclusion of modified transportation system operating parameters. Each of these will require changes to documented School Board policies and/or Regulations. Providing for flexibility in the design and structure of the transportation system is the critical component enabling the conclusion of feasibility with a minimal or zero transportation cost impact. While a decision to proceed with implementation can be exclusive of concurrent transportation parameter changes, the likely result would be substantially higher transportation costs as indicated in prior studies completed for the HCPSS.

Decision Required: A decision to permit the modification of transportation system operating parameters in accordance with the recommendations of this project is required. The degree to which the various parameters will impact the actual extent of change in the system will be dependent on the results of the detailed implementation planning effort. However, a decision at this point that enables these to change, with specificity to follow, is the critical first step toward achieving a no-cost solution to the desired school start time objectives.

Decision Authority and Timeline: The School Board is the policy authority. However, when it comes to operational details and the application of logistical strategies it is often advantageous to draft policy language that is directional as to intent, regulatory language that is specific as to the interpretation of that intent, and procedural language that contains the technical specificity for how the policy objectives will be implemented. The School Board must simply approve the directional intent as an interrelated and supporting decision to its decision to proceed with the start time changes. The specific content, form, and format of the associated documentation will evolve as part of the planning and should be incorporated within the final go/no-go decision point prior to implementation.

Actions to Follow this Decision:

1. Proceed with detailed transportation planning utilizing the priority ordered parameters identified in this project.
2. Once the relative scale and scope of the required changes begins to be understood during the planning process, draft associated policy, regulatory, and procedural documentation.
3. Present required policy and regulation changes for approval by the School Board either as available or as part of the final decision to proceed.

Decision 3 – Determine Implementation Timeline

Background: There is risk inherent in any decision to change. There is also a natural desire to avoid change because of the uncertainty and risk of the unknown. Mitigating these truths will be a critical success factor, and points to the importance of the implementation planning process. Given the scale and scope of change being contemplated as well as the embedded expectations within the culture of the HCPSS, DSG is recommending a cautious and methodical timeline that would target implementation to coincide with school start in 2023. However, it remains feasible to implement the school start time changes in time for school start in 2022 if the decision to proceed is reached quickly.

Decision Required: A binary decision to target implementation for either 2022 or 2023 is required. Neither timeline binds the HCPSS to actual implementation. This would be determined at a future final go/no-go point based on the detailed planning exercise. The timeline decision instead defines the nature of the implementation planning and approval process. The tasking required in the planning process will be the same regardless of the decision, but the time allowed and hence the attention to detail permitted will be different.

Decision Authority and Timeline: Given the scale and gravity of its implications, it must be the School Board as the governing authority that makes this decision. However, DSG further recommends that the School Board closely consider the recommendations of the Superintendent in arriving at its decision. The importance of the implementation timeline demands that the decision be reached in concurrence with those for Decision 1 and 2.

Actions to Follow this Decision:

1. Detailed implementation planning should commence immediately, regardless of the implementation timeline selected.
2. Actual implementation should only proceed following a final go/no-go decision point that is informed by the implementation planning process.