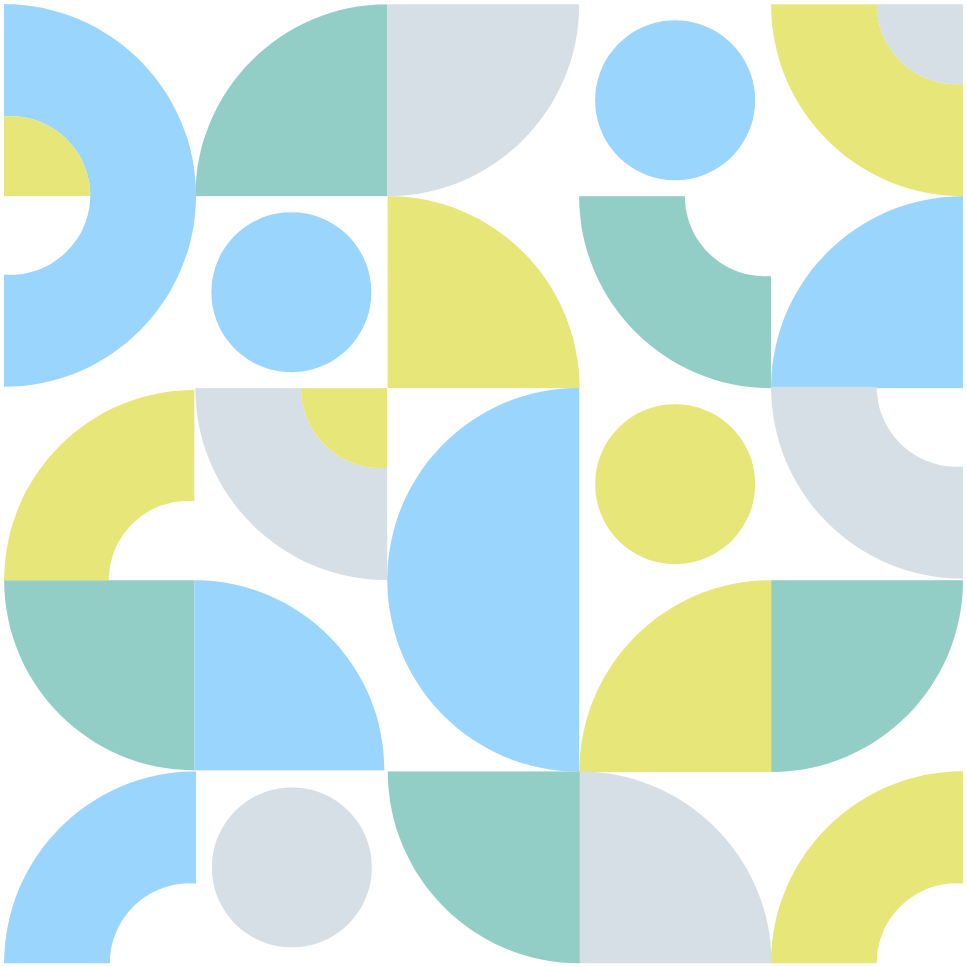
Bell Times & Transportation Options Assessment

Final Results

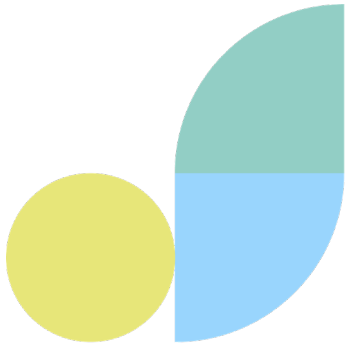
Rochester Public Schools

May 15, 2023



Project Overview

- Review transportation system efficiency and effectiveness, with a focus on the school bell schedule.
- Seek opportunities to adjust the elementary school bell schedule earlier with minimal impact on the secondary school start times.
- Provide recommendations focused on controlling and/or reducing the cost of transportation services and improving service quality for families.



Step 1 – Understand the Baseline

- Quantify cost-based *efficiency* and service level *effectiveness*:
  - One affects the other.
  - The goal should be to establish an optimal balance between them.
- Evaluate the implications of policy-based decisions:
  - Bell times, eligibility for service, etc.
  - The transportation solution is a constrained optimization problem.
- Establish context to enhance understanding:
  - Operational structures and norms affect the interpretation.

Relevant Operational Statistics

Yellow Bus Only	**Total**	**RegEd**	**SpEd**	**Notable Comments**
Routed Students	10,152	9,418	734	*Significant out-of-residence attendance*
Planned Daily Runs	632	445	187	*Does not include extensive use of Type III*
Transfer Runs	*205*	*205*	*0*	*Extensive use of a transfer system is a primary design response to systemic constraints*

Cost Calculations, the Process

- Follows a consistent activity-based costing methodology
- Facilitates calculation of cost indicators the same way every time, allowing for comparisons across hundreds of other districts
- Unlikely to match exactly with internal calculations
- The emphasis throughout is on the word ***indicator***

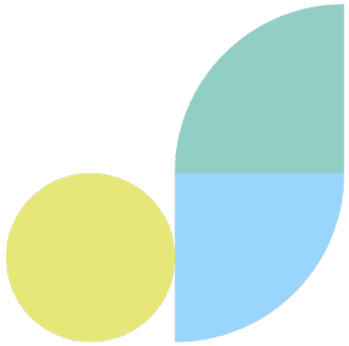
	A	B	C	D	E	F	G	H	I	J
1	**Rochester Public Schools**				**Allocation Statistics**					
2	*Transportation Cost Allocation*							**REG ED**	**SPED**	**VANS**
3	Based on Actual FY21-22 Expenditures						STUDENTS	92.77%	7.23%	0.00%
4							BUSES (Routes)	61.96%	26.51%	11.53%
5							RUNS	62.50%	26.26%	11.24%
6										
7	***Account Number***	***Description***	***Comments/Notes***	***Expenditures***	***Adjustments***	***Allocated Total***	***Allocation Type***	***REG ED***	***SPED***	***VANS***
8	01 E 005 760 000 (	-----	Utility Services-Electric	900		900.00	Buses	557.64	238.62	103.75
9	01 E 005 760 000 (	-----	Operating Leases or Rentals	0		-	Buses	-	-	-
10	01 E 005 760 000 (	-----	NonInst Tech Devices	0		-	Buses	-	-	-
11	01 E 005 760 000 (	-----	Pupil Transportation Vehicles	139,073		139,073.00	Buses	86,169.15	36,872.38	16,031.47
12	01 E 005 760 000 (	-----	Principal on Building Lease	53,041	$ (53,041.00)	-	Buses	-	-	-
13	01 E 005 760 000 (	-----	Interest on Building Lease	2,159	$ (2,159.00)	-	Buses	-	-	-
14	01 E 005 760 000	CARES-CRF from State	Contracts less than/equal $25K	0		-	Buses	-	-	-
15	01 E 005 760 000	CARES-CRF from State	Transportation Contracts	0		-	Buses	-	-	-
16	01 E 005 760 000	CARES-CRF from State	Supplies & Materials-Non Instr	0		-	Buses	-	-	-
17	01 E 005 760 000	CARES-CRF from State	Pupil Transportation Vehicles	0		-	Buses	-	-	-
18	01 E 005 760 000	Multi-District Integration/Des	Transportation Contracts	188,202		188,202.00	Buses	116,609.31	49,897.94	21,694.76
19	01 E 005 760 000	Foster Care Transportation	Transportation Contracts	52,402		52,402.00	Buses	32,468.10	13,893.33	6,040.58

Baseline Indicators of Cost Efficiency

Yellow Bus Only	**Total**	**RegEd**	**SpEd**	**Notable Comments**
Transportation Expenditures as a Percent of District-Wide Budget	5.6%			*Outside of the expected range of 3-5%. 4.5% without Type III costs.*
Annual Cost per Transported Student	$1,531	$906	$6,783	*Reg/Sped difference is normal (5-10x).*
Annual Cost per Route Bus		$73,626	$110,756	*RegEd is within expectations; SpEd difference is due to monitors.*
Daily Cost per Route		$229	$312	*78% of transportation expenditures are for contractor payments.*

Initial Cost Takeaways

- This is an expensive transportation system:
  - We cannot understand why this is when only examining the cost statistics.
  - We suspect the results would be worse absent the transfer system.
- The extent, cost and management of Type III transportation (vans) is largely missed in this analysis:
  - Planning and use of this service is outside of the routing software.
  - Estimates from the cost allocation process indicate approximately $3.3m in total cost (20% of all expenditures) and $4,000 per student.



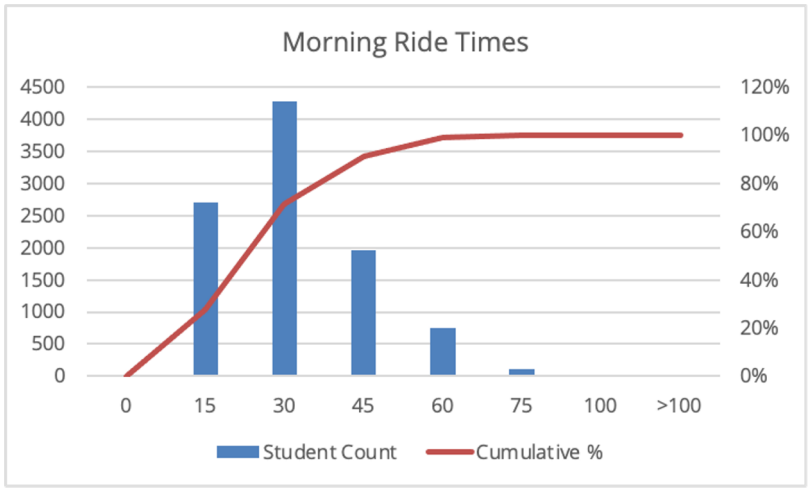
Transfers and Service Quality

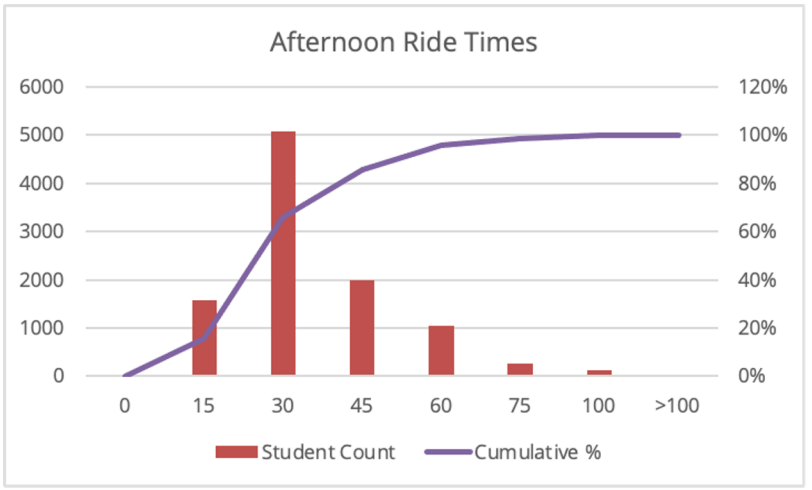
Type of Run	**Average Duration (minutes)**	**Average Capacity Use (Students)**	**Interpretive Comments**
Direct To/From School	35	39	*Students routed directly from home to school receive the highest service quality.*
To/From Home & Transfer Point	45	48	*Runs that pass through a transfer point to debark/embark some students are longer, but also have better use of capacity, thus lowering costs.*
To/From School & Transfer Point	55	52	*The 22% of runs that serve as shuttles from transfer points to schools in addition to completing a "normal" run are the longest, but also the most efficient.*

Program Placement and Service Quality

Type of Placement (Yellow Bus Only)	**Count of Students**	**Average Distance from School**	**Interpretive Comments**
In Residence	7,845	3.23	*Reflects local geography and student density. This is a fixed constraint on system design.*
Out of Residence	2,363	4.41	*Reflects policy-based and programmatic decisions.*
Comparison:	*23% of all students…*	*travel 36% further to school…*	*…and to a myriad of school destinations.*

Student Ride Times





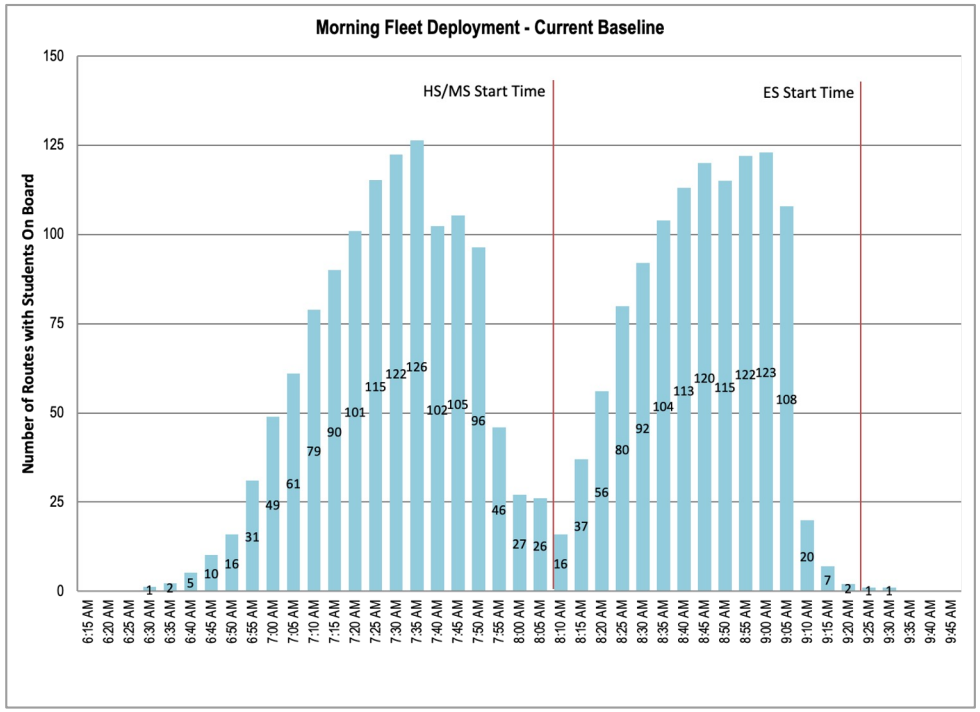
Initial Service Quality Takeaways

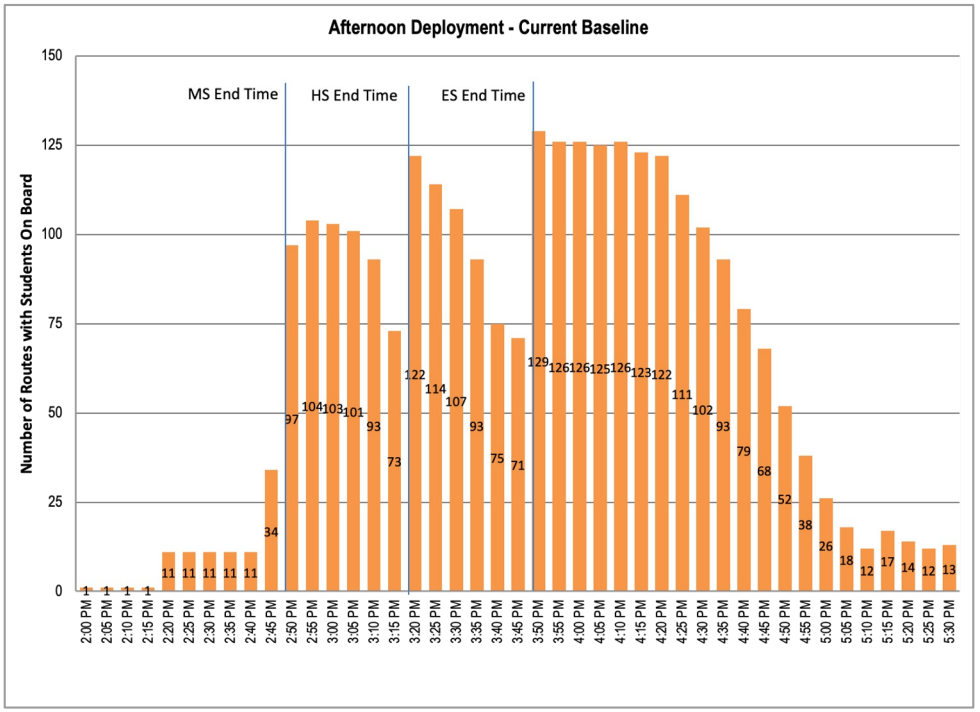
- This is a well planned system:
  - We are intrigued by the need for, and impact of, the transfer system.
  - We suspect it is a rational response to policy constraints, but don't yet know for certain based on the limitations of the analysis.
- The system, as designed, accomplishes industry-standard levels of seating capacity utilization.
- The system, as designed, accomplishes reasonable student ride times:
  - This is a notable result given the extensive use of the transfer system.
  - This is a notable result given geographic and eligibility policy constraints.

Impactful Policies

- Eligibility for transportation service:
  - The distance-based standards in use are typical.
  - Out-of-boundary options are a major constraint on efficiency and effectiveness.
- Bell times (current summary of school start and end times):
  - Elementary Schools - 9:25am - 3:50pm
    - LOD 6:25 (5:50 state minimum)
  - Middle Schools - 8:10am - 2:50pm
    - LOD 6:40 (6:26 state minimum)
  - High Schools - 8:10am - 3:20pm
    - LOD 7:10 (6:26 state minimum)

Visualizing Bell Times - Fleet Deployment



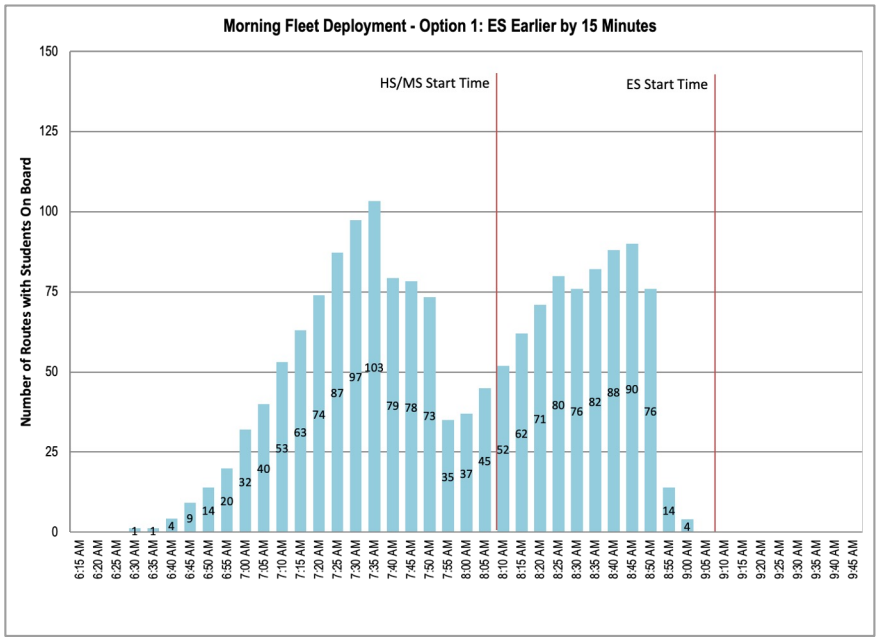


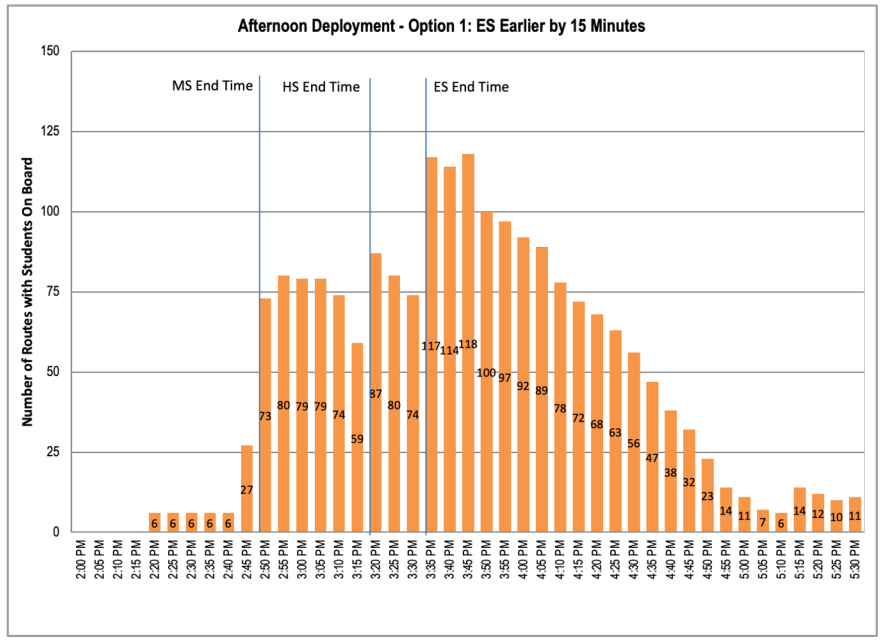
Step 2 – Approach to Evaluating Options

- Model the likely impacts of bell time changes:
  - This is the single most impactful way to influence efficiency.
  - Including allowable changes to the length-of-day greatly increases options.
- Consider the impact of other policy and operational changes:
  - Changing eligibility policies
    - Distance-based eligibility
    - Program-based eligibility
  - Routing strategies
    - Reevaluating the need for and use of Type III vehicles
    - Changes to routing (transfers, combination, express stops, etc.)

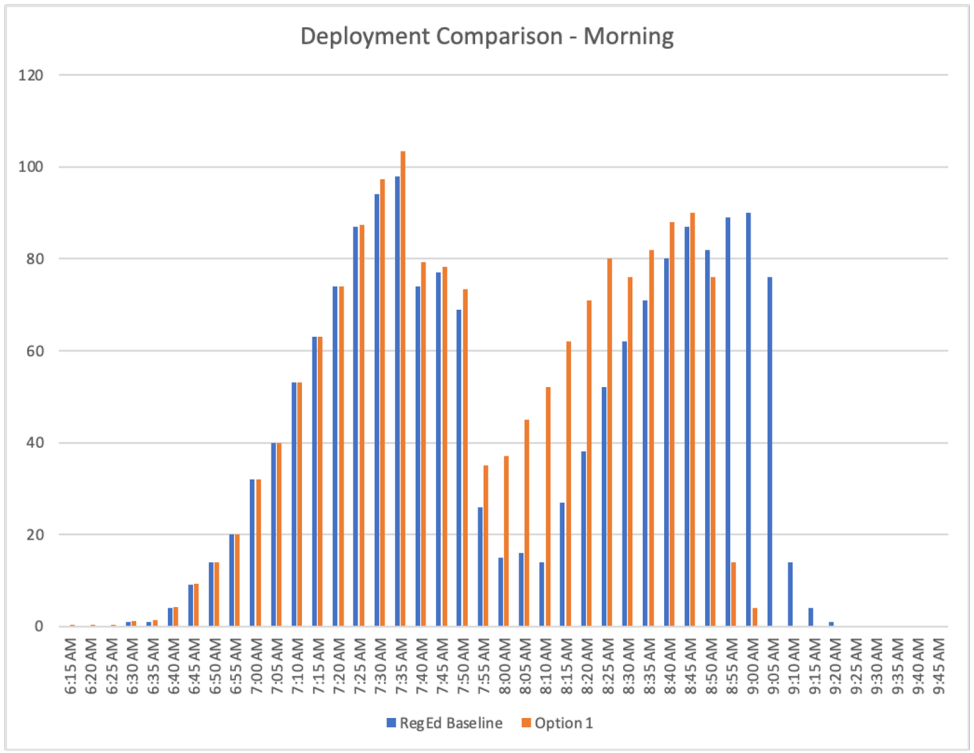
Option 1 - Illustrating Impacts

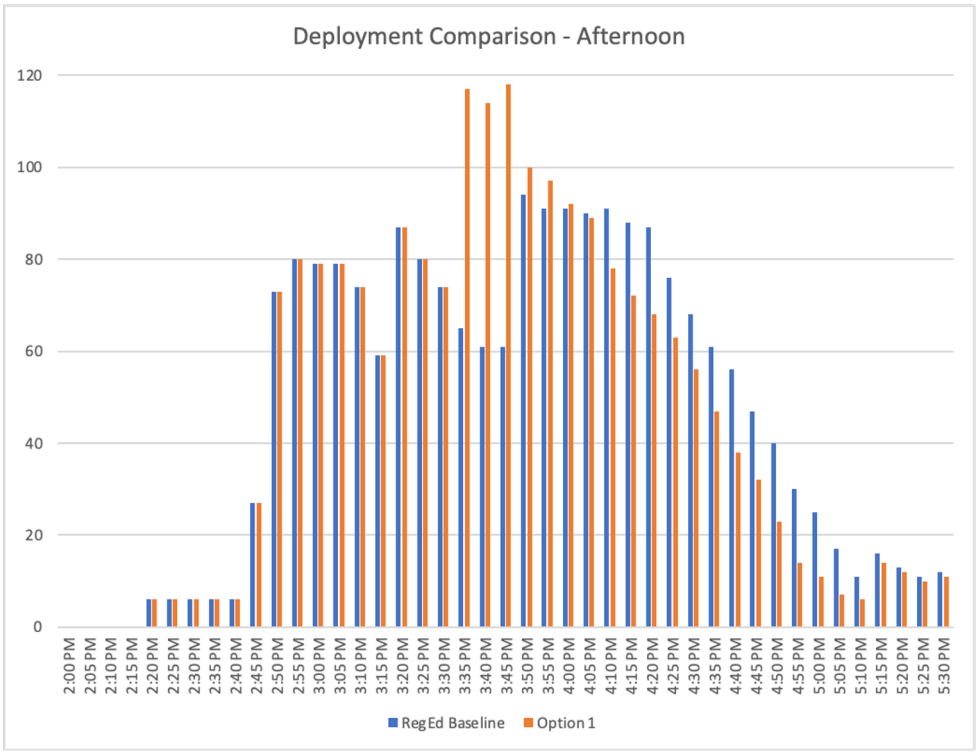
A simple example in which all elementary school start times are advanced by 15 minutes to 9:10
Illustrated for Regular Education only





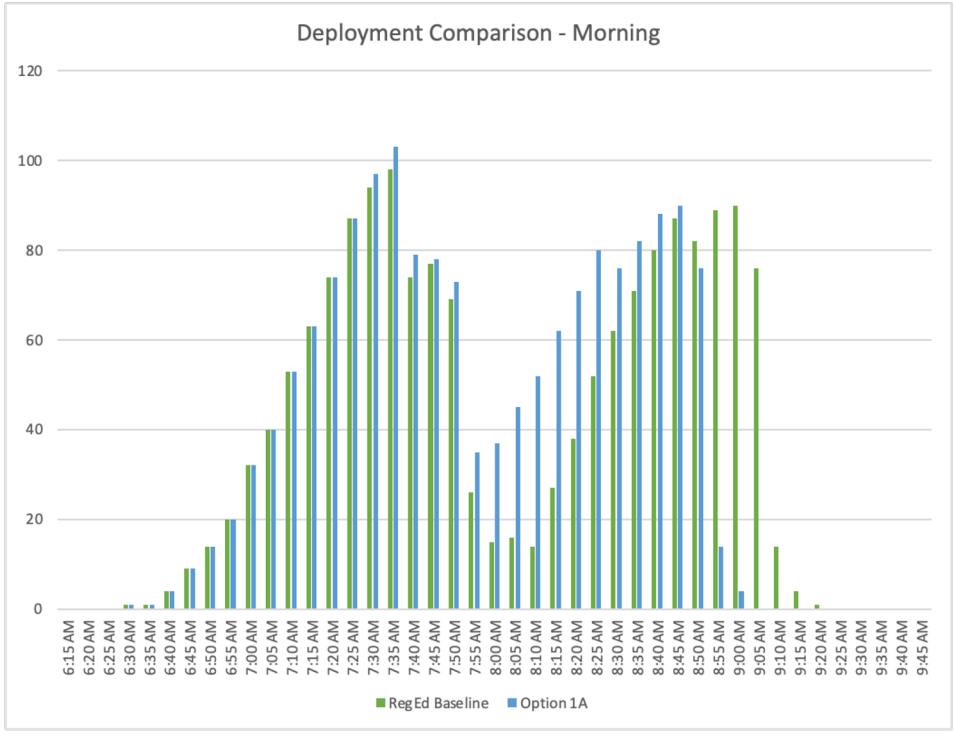
Option 1 - Comparison to Baseline

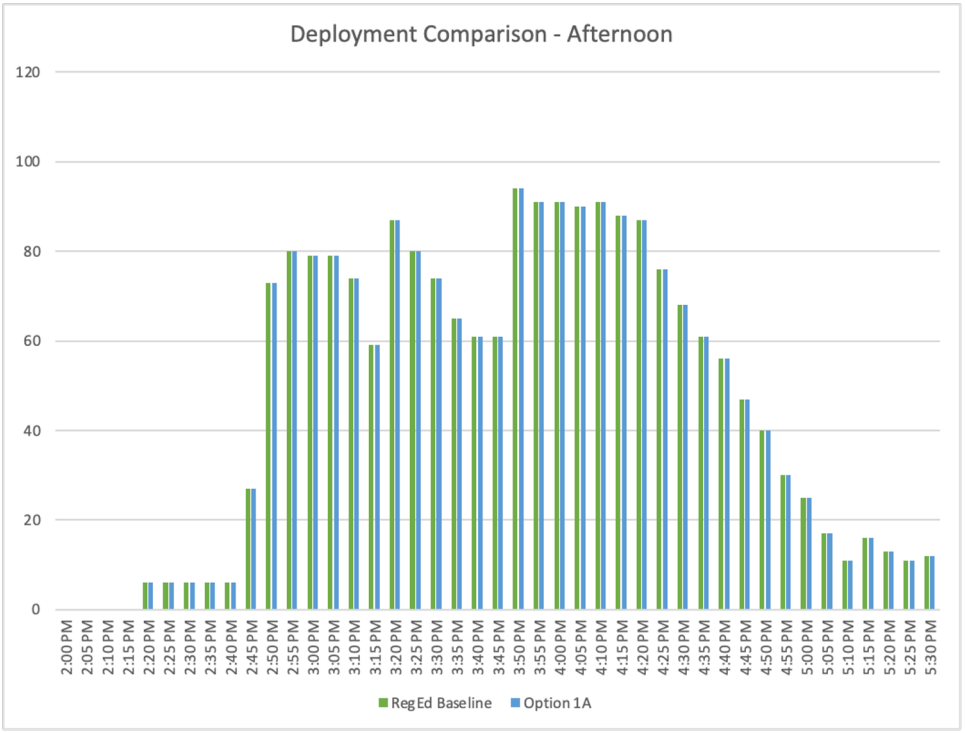




Option 1A

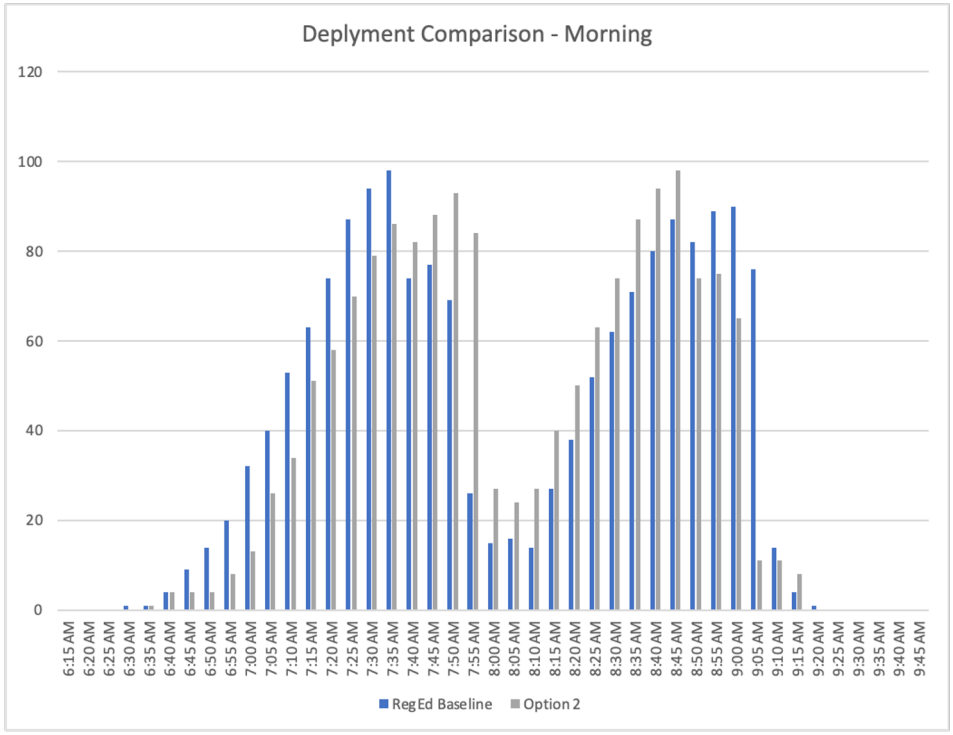
All elementary school start times are advanced by 15 minutes to 9:10.
The Instructional Length of Day is increased to 6:40 for all ES.

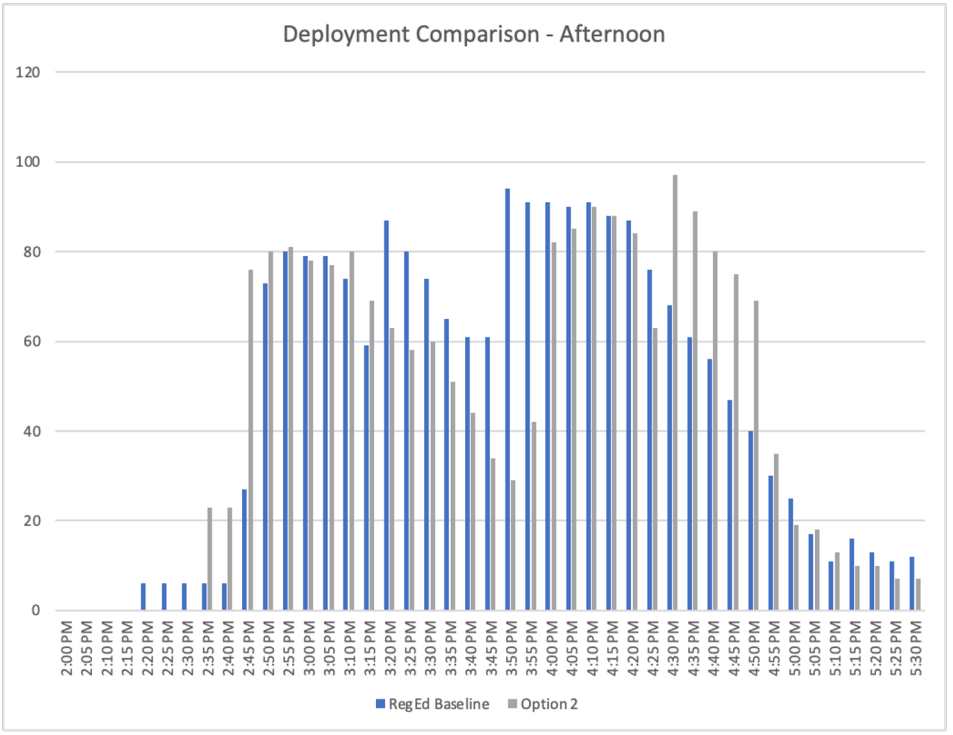




Option 2

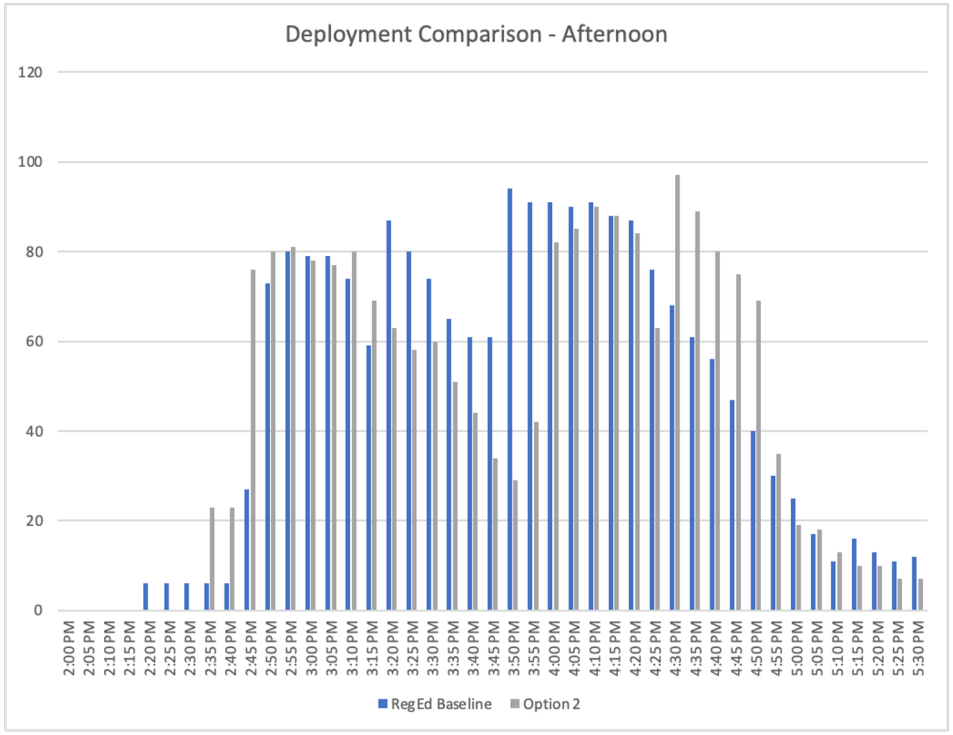
Swap the HS/MS Start Times and the ES Start Times.
Keep all Instructional Lengths of Day as they are.

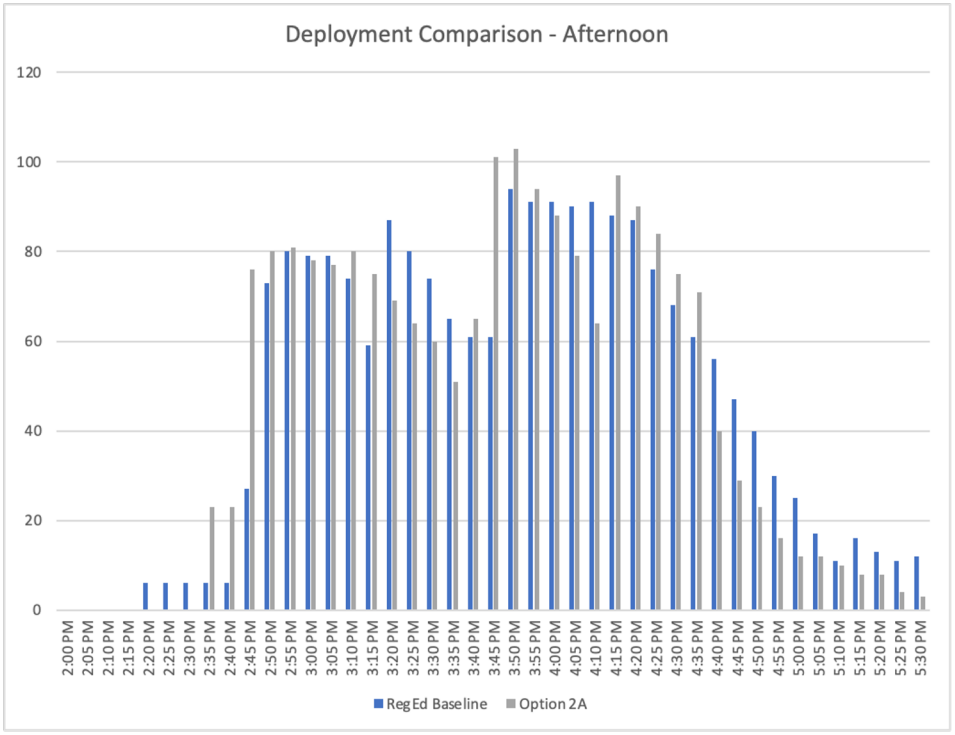




Option 2A

Swap the HS/MS Start Times and the ES Start Times.
Shorten HS/MS Instructional Lengths of Day by 15 minutes.





Option 3

Create a Three-Tier System, with start times at 7:30, 8:15, and 9:00.
Set a common Instructional Length of Day of 6:40.

- Cannot be modeled the same way as previous options:
  - Recognizes the limitations of the high-level modeling technique we used.
  - Implementation would require a systemic change to the architecture of the routes.
  - Achieving high confidence in accuracy would require rerouting the entire system, which was not possible in this scope of work.
- Our best estimate of the likely impact:
  - Roughly 50% of current runs could be completed in this structure based on the analysis of run length.
  - Roughly 67% of the current peak deployment would be required on each tier (⅔ of total going from 2 to 3 tiers).
  - Therefore, approximately 131 vehicles would be required (an increase of 33) *without concurrent changes to program-based eligibility policies.*

Initial Bell Time Options Takeaways

- It is unlikely that new efficiencies can be gained absent other policy changes:
  - Attendance-based eligibility policies and instructional lengths of day drive the current system requirements and the system design response.
  - The core system is well planned to optimize performance relative to those requirements.
  - The reliance on Type III vehicles is a wildcard that requires further study.
- Several achievable bell time options exist to pursue an earlier ES start time:
  - Most require a corresponding adjustment to the length of the instructional day
  - Some can be achieved with a neutral impact on cost

Options Summary - The Path Forward

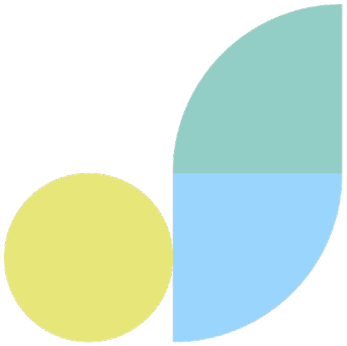
1. Determine Policy Priorities:
    - Change impactful educational programs?
    - Change transportation eligibility to those programs?
    - Accept transportation efficiency and effectiveness compromises?
2. Optimize the transportation system based on policy priorities:
    - Make cost-neutral changes to accomplish some bell time objectives.
        - Beware the “slow erosion” as evidenced by growth in Type III use.
    - Systemically reengineer the transportation system and optimize it to the revised policy priorities.

Final Bell Time Configuration Analysis

- Following a review of the preliminary results on 03.29.2023, CESO was asked to assess the feasibility of this bell time structure for SY 2023-24:
  - Elementary Schools: 8:10 AM to 2:30 PM (6:20 instructional time)
  - Middle Schools: 9:05 AM to 3:45 PM (6:40 instructional time)
  - High Schools: 8:50 AM to 3:30 PM (6:40 instructional time)
- In addition, CESO was asked to evaluate the likely impacts of changes to attendance policies that would establish a two-zone (North/South) division for eligibility to district-wide options, with three schools in each zone for SY 2024-25.

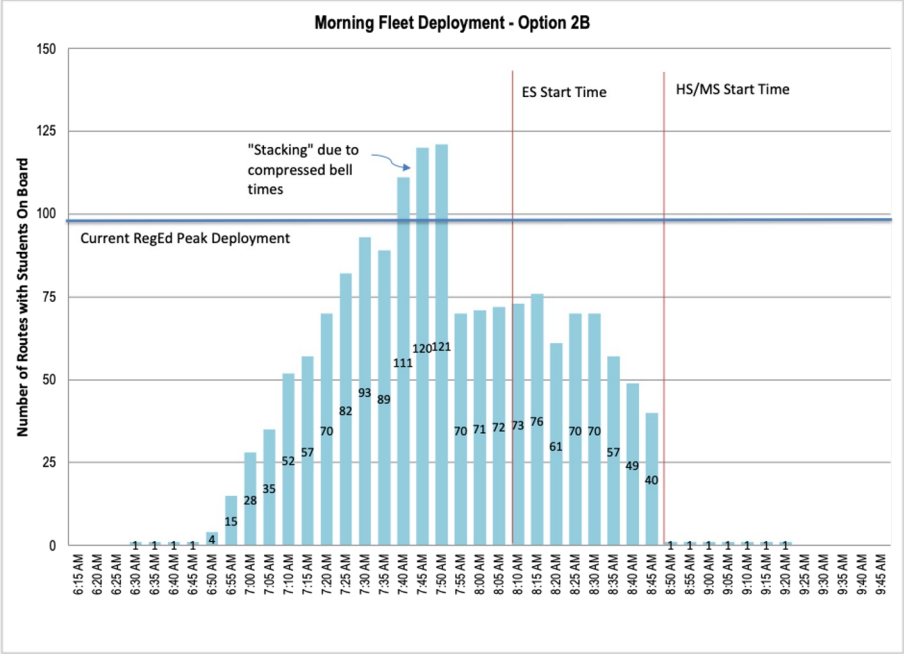
Setup of Selected Bell Time Option

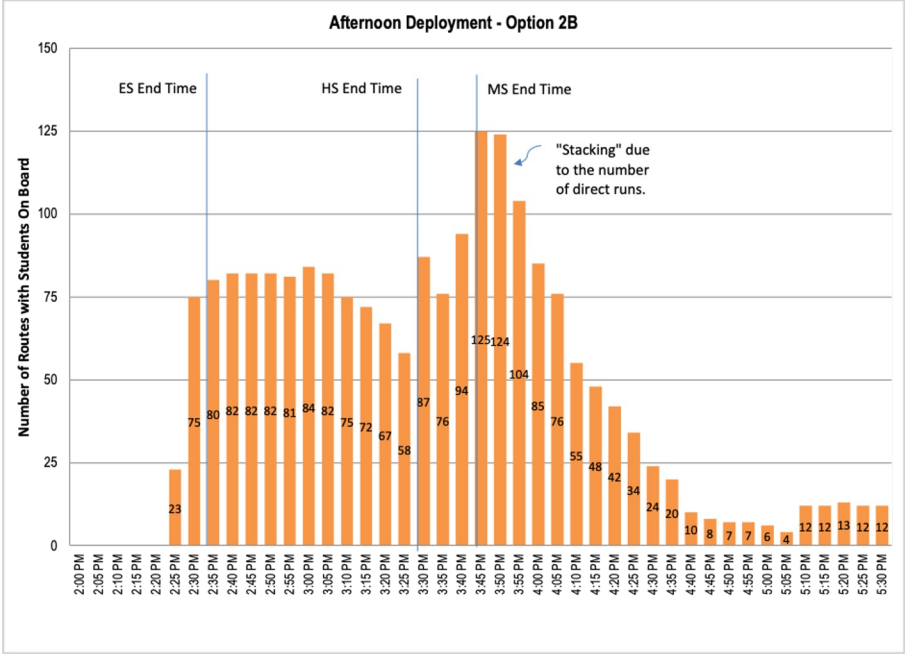
- The ask extends the the results presented as Option 2A:
  - Swaps the position of elementary and secondary school start times.
  - Incorporates an additional shortening to the length of the high school instructional day, more than as than suggested in Option 2A.
  - We now call this Option 2B.
- Initial observational assessment of likely operational impacts:
  - Creates a 15 minute offset to HS/MS start and end times, facilitating an expansion of combination routing to the afternoon transportation panel.
  - Utilizes all of the remaining slack time between morning tiers that is apparent in Option 2, and begun to be utilized in Option 2A by compressing morning start times further.



Option 2B - Illustrating Initial Impacts

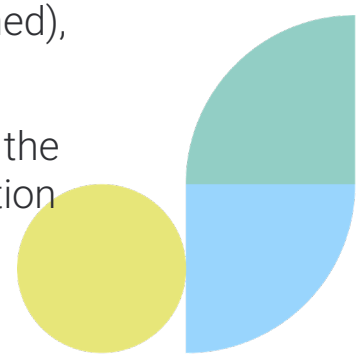
Displays revised bell times and deployment peak differences from current baseline
Illustrated for Regular Education only





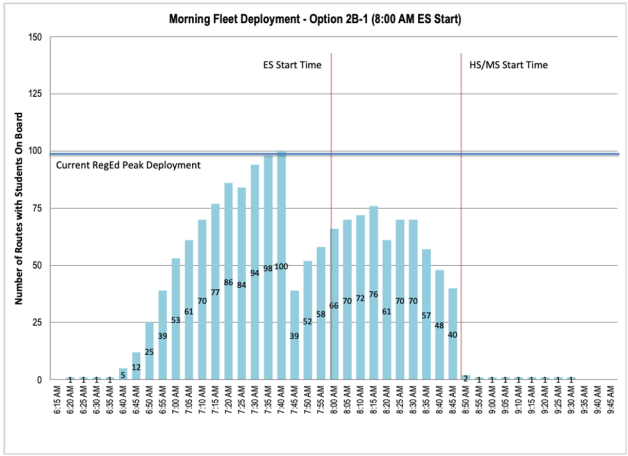
Making Option 2B Cost Neutral

- The morning start time compression causes a “stacking effect” that requires mitigation:
  - The impact is limited to a 15 minute span of time in which the longer HS runs need to begin operation before all of the ES runs have completed their drop-off.
  - This can be mitigated with a judicious further 5-10 minute change to start times.
- The afternoon “stacking” has a different cause and solution:
  - Roughly one-third of morning HS & MS runs are currently shared (combined), but very few are in the afternoon.
  - The modeling approach is limited and does not change this dynamic, but the new 15 minute offset in the afternoon can accommodate more combination runs, most likely reducing the total number of runs required.



Conclusions - Bell Time Option 2B

1. The desired option is achievable at neutral cost:
   - Will require small additional start time changes, such as:
     - Change elementary start time to 8:00 versus 8:10 (as illustrated) or ES to 8:05 and HS to 8:55
     - Assumes expanded use of afternoon combination runs
2. CESO urges caution on the timing of implementation:
   - Logistical planning to confirm conclusions and build revised route network will be substantial.
   - Impacts to family and community schedules and routines will be substantial and will require a robust communications plan.



Commentary on the 2-Zone DWO Plan

- CESO is unable to analyze this option at a level of detail and accuracy that would provide a high confidence in the results:
  - This plan requires detailed modeling of new DWO bus runs based on the desired geographic division to enable an accurate assessment.
  - This level of analysis is outside the scope of this project.
- CESO is, however, able to estimate the likely impact in a general sense:
  - DWO bus runs are inherently longer and yield less capacity utilization than runs servicing students attending their home schools.
  - By limiting the allowable distance traveled, the RPS is likely to realize gains to efficiency, and a lower total number of runs (and vehicles) required.