

**Montgomery County Public Schools**

**Bell Times—Analysis of Additional Options**

**January 2015**

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## Executive Summary

In October 2013, Montgomery County Public Schools (MCPS) superintendent of schools, Dr. Joshua P. Starr, presented to the Montgomery County Board of Education (Board) a recommendation to consider delaying high school start times by 50 minutes. The recommendation also started middle schools 10 minutes earlier and did not change the elementary start times but extended the elementary school day by 30 minutes to accommodate needed adjustments to the transportation plan. Further, the addition of 30 minutes to the elementary school day would enhance the time spent in school by adding time for art, music, physical education, or a foreign language and/or extending lunch and recess. The recommendation was based on the findings of the 2013 Bell Times Work Group that MCPS high school students would benefit from later start times.

During the months following the superintendent's recommendation, MCPS sought feedback from a broad range of stakeholders, including students, staff, parents, and other community members, through an extensive outreach effort including numerous community town hall meetings, surveys, an e-mail drop box, and other avenues of input. On June 17, 2014, the superintendent of schools presented a report to the Board that included a summary of the wide range of feedback and the costs of implementing this plan, including the additional transportation costs and the cost to extend the elementary school day by 30 minutes. A summary of the outreach efforts were included in the June 2014 *Superintendent's Proposal on Changing Bell Times: Review of Stakeholder Input and Analysis of Operational Impact*. The superintendent did not recommend that the Board proceed with this plan due to the high cost to implement it and the fiscal challenges that MCPS likely would be facing in Fiscal Year (FY) 2016 and FY 2017. The Board carefully considered the report and passed a resolution requesting that the superintendent review lower-cost options, not to exceed \$10 million, for changing the start times and identify the implications of these options. The Board also asked for information on what is referred to below as a "split" schedule—starting high schools at two times; an analysis of a similar Fairfax County Public Schools (FCPS) proposal and factors that made the FCPS proposal less costly than the MCPS proposal; and an updated review of available sleep research.

Each option presented in this report includes estimated costs and a brief summary of the implications of the changes. The options that were considered for this report include:

- Shift start times for all schools 20 minutes or 35 minutes later (retaining the current order and length of school day)
- Start elementary schools first (with variations for start times and length of school day)
- Modify the superintendent's October 2013 proposal to reduce costs
- "Split" the high school day into two start times (leaving unchanged elementary and middle school start times and length of school day)
- Leave bell times unchanged

## Introduction

The current bell times schedule for Montgomery County Public Schools (MCPS) was designed in 1993 and began as a cost savings measure that has been effective in managing the transportation needs of certain programs such as magnet programs, immersion programs, consortia, and other special programs that have been started since then. While it is the most cost effective option yet developed, the bell schedule created a 7:25 a.m. high school start time that was a topic of debate in Montgomery County in the late 1990s and then again over the past few years. The 7:25 a.m. start means that most high school students board buses by 6:45 a.m. While the start time may be considered problematic for high school students getting sufficient sleep, the school end time for high schools has been supported in the years since it was implemented, as many high school students use the after-school hours for employment, internships, caring for younger siblings, or after-school extracurricular activities. There is significant concern that high school end times after the current 2:10 p.m. dismissal would create some limitations on some of these responsibilities and interests.<sup>1</sup>

Adjustments to the MCPS bell times schedule were considered by the Montgomery County Board of Education (Board) in 1997–1999, and most recently in 2013–2014. Each time, the key concerns associated with suggested changes have been the impact on traditions that have developed about how high school students currently use after-school hours; the transportation costs associated with other potential schedules; and the impact of changing the schedule on elementary school and middle school students, their parents, MCPS staff, and the community.

The formula for transporting a large number of students in the most cost-effective manner possible is to reuse a bus fleet as many times as possible over the longest possible window of time, and still maintain acceptable start and end times for schools at all levels. Since 1993, and during intervening years of severe budget shortages, MCPS has refined this formula to create the safest, most cost-effective, and efficient transportation service possible for a school system that transports approximately 100,000 students daily.

While the formula is straightforward in concept, the logistical reality in MCPS is complex. The transportation structure in place since 1993 depends on four start times. The order of opening schools used by MCPS currently starts with high school, then middle school, then two separate opening times for elementary schools. Prior to 1993, MCPS elementary schools started at varying times, the earliest beginning at 8:00 a.m.<sup>2</sup> and the latest start at 9:25 a.m. The half-hour differential between the length of the day at high and middle schools (with a 6-hour and 45-minute day) and elementary schools (with a 6-hour and 15-minute day) is used during the morning rush hour to allow delays due to the volume of traffic.

Many parents who have participated in discussions about bell times expressed a preference for a school day that starts about 8:00 a.m. and ends at approximately 3:00 p.m. However, the cost of

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<sup>1</sup> A 2014 MCPS survey showed that 19 percent of high school students perceived a later start time would make it harder for them to pick up a sibling after school; 46 percent thought it would be harder to get a job after school; 49 percent thought it would be harder to participate in athletic practices or events; and 52 percent thought it would be harder to participate in after-school activities or clubs. MCPS, Superintendent's Proposal on Changing Bell Times: Review of Stakeholder Input and Analysis of Operational Impact, June 2014, p. 13.

<sup>2</sup> MCPS, Changing Bell Times: Report of the Bell Times Work Group, January 1998, p. 2.

opening all schools at the same time is not practical as it would nearly quadruple the existing MCPS transportation fleet and budget.

MCPS and neighboring school districts in Maryland and Virginia are aware of the emerging research describing the potential health and safety benefits of high school students getting more sleep which supports the body of research that has developed since the mid-1980s. Each school district comes to the issue of more sleep for teenagers with its own traditions, constraints, and priorities. In Montgomery County, tradition is for high schools to start first, then middle schools, with elementary schools starting last. Conversely, in Loudoun County, Virginia, the tradition is for most elementary schools to start at 7:50 a.m., followed by middle schools, then high schools starting at 8:55 or 9:00 a.m. In Fairfax County, Virginia, the tradition is for elementary schools to start throughout the morning at various times between 7:40 and 9:20 a.m., and a recently approved schedule, to go into effect in the 2015–2016 school year, will start middle schools at 7:30 a.m. before high schools that will start at 8:15 a.m. Anne Arundel County Public Schools is currently considering four options but has not taken any action at the time of this publication.<sup>3</sup>

In October 2013, Dr. Joshua P. Starr, MCPS superintendent of schools, presented to the Board a recommendation to consider delaying high school start times by leaving elementary start times unchanged and starting middle schools 10 minutes earlier. The proposal pushed back high school start times by 50 minutes and extended the elementary school day by 30 minutes to accommodate needed adjustments to the transportation plan and to enhance the time in school for elementary school students by adding time for art, music, physical education, a foreign language, and/or extending lunch and recess. The recommendation was based on the review of available research by the 2013 Bell Times Work Group and their findings that the current MCPS high school start time of 7:25 a.m. may negatively impact the ability of MCPS high school students to get sufficient sleep.

During the months following the superintendent’s October 2013 recommendation, MCPS sought feedback from a broad range of stakeholders, including students, staff, parents, and other community members through an extensive outreach effort that included surveys, town hall meetings, e-mail drop box, and other avenues for input. The public input process that followed the announcement of the superintendent’s recommendation revealed the following:

- While 78 percent of parents surveyed<sup>4</sup> supported the shift of high school start times, community forum participants expressed concern about the portion of the October 2013 proposal that called for making the elementary school day the same length as middle and high school days.
- Elementary school students and elementary school staff responded least favorably to the recommendation.
- Parents and middle school students who were impacted the least (a 10-minute adjustment) were most in favor of the recommendation.
- High school students and high school staff members were evenly divided in their support and opposition.

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<sup>3</sup> See Appendix A

<sup>4</sup> MCPS, *Superintendent’s Proposal on Changing Bell Times: Review of Stakeholder Input and Analysis of Operational Impact*, June 2014, p. 10.

On June 17, 2014, the MCPS Board considered the broad-based feedback to the October 2013 recommendation. In response to the mixed feedback and the significant costs of the recommendation, the Board passed a resolution requesting that the superintendent of schools review lower-cost options, not to exceed \$10 million, for changing the start times and identify the implications of these options. The Board raised additional issues by asking for more information on what is referred to below as the “split” schedule—starting high schools at two times; analysis of a similar Fairfax County Public Schools (FCPS) proposal and factors that made the FCPS proposal less costly than the MCPS recommendation; and an updated review of sleep research.

The report that follows describes five strategies for modifying bell times, all at costs not exceeding \$10 million. The strategies include:

- Shift start times for all schools 20 minutes or 35 minutes later (retaining the current order and length of school day)
- Start elementary schools first (with variations for start times and length of school day)
- Modify the superintendent’s recommendation from October 2013 to reduce costs
- “Split” the high school day into two start times (leaving unchanged elementary and middle school start times and length of school day)
- Leave bell times unchanged

## **The Balance**

In order to change bell times and still stay within the \$10 million limit put forward by the Board, balancing three factors of time becomes very important. The first factor is the bell time for any school and whether it is too early or too late. The second factor is the amount of time between the first and last bus trips in the mornings and first and last trips in the afternoons, discussed below as the transportation “window of operation.” The third is how these elements and the length of the school day interact with the hours of daylight.

Time is money, and this is particularly true of transportation costs. What is needed is a balance that starts schools at reasonable times while using buses and drivers efficiently. Lengthening the window of operation reduces the number of buses and drivers needed, maximizing the number of trips each bus can make daily, and generally saving money.<sup>5</sup> The current MCPS schedule allows for most buses to make four trips daily, referred to as a four-tier plan.

However, under a four-tier plan, there is a limit to the optimal length of the operational window. Lengthening the window too much causes some schools to start exceptionally early or late, interferes with the sleep/wake patterns of students, and pushes student pick-up and drop-off times

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<sup>5</sup> Each of the four tiers in the current MCPS bell time model requires essentially the same number of buses, about 600 regular routes in each tier. (Special and cross county routes also are equally divided with a buses doing either a high school and a first-tier elementary route or a middle school and a second tier elementary route.) In 1993 there were fewer routes needed at the high school tier and at the second elementary tier. Transportation dollars were saved by having these tiers with fewer bus needs at either end, and the transportation employee’s day was commensurately shortened to achieve savings when routes were not needed at those times. However, since 1993, with the addition of consortium schools (which significantly impact the first or high school tier) and other growth (added to the fourth tier or second elementary tier to accommodate new elementary schools and added students) and through constant analysis of “best places” to assign special program hours, the DOT has managed to achieve a best case scenario with exceptional balance in the number of buses serving each tier. Now however, with continually increasing demands, program and student population growth, and increased traffic, this balance is pushed to the limit.

to the limits of the hours around dawn and dusk, sometimes referred to as “civil twilight.”<sup>6</sup> Further lengthening the window unnecessarily increases costs with bus drivers sitting idly while waiting to start runs to their next school. To keep first-tier and last-tier schools from opening too early or too late, the window of operation could be shortened. Shortening the window requires routes to be shorter, reduces the number of stops each bus can make, and necessitates costly increases in the size of the fleet to allow for on-time arrivals. Squeezing four tiers of start times and end times between reasonable hours of civil twilight is made more difficult by the unequal lengths of MCPS school days—6 hours and 45 minute school days for middle and high schools, and 6 hours and 15 minutes for elementary schools.

Obviously, the hours of daylight—especially during winter months—play a significant role in this discussion. Under the current bell schedule, many high school students and some middle school students meet buses before dawn. Many after-school activities keep students from arriving home before dusk. The challenge, therefore, is to find the right balance that incorporates these factors and does so within reasonable cost limitations. There is no easy or simple solution to meeting the demands of time without violating the demand to constrain costs. These factors of time and costs are presented in various models below.<sup>7</sup>

### Shift All Start Times Later

One of the central tensions described in the October 2013 report was the desire, on the one hand, for a later start to the high school day, and, on the other hand, an early end to the high school day, even if it meant an early start time. Some high school students have existing commitments to after-school jobs or internships and obligations to provide child care for younger siblings.<sup>8</sup> In response to these and other concerns presented in the feedback, two models were developed that shift the start of school for all students at all levels later by 20 and 35 minutes and retain the current order of opening (high schools first, followed by middle schools and elementary schools).

CURRENT SCHEDULE                      DAILY WINDOW OF OPERATION: 190 MINUTES

Level	Time	Length of Day
High School	7:25 a.m.–2:10 p.m.	6 hours, 45 minutes
Middle School	7:55 a.m.–2:40 p.m.	6 hours, 45 minutes
Elementary School Tier 1	8:50 a.m.–3:05 p.m.	6 hours, 15 minutes
Elementary School Tier 2	9:15 a.m.–3:30 p.m.	6 hours, 15 minutes

<sup>6</sup> The time around dawn and dusk at which twilight illumination is sufficient under clear weather conditions for objects to be clearly distinguished.

<sup>7</sup> Each minute of the morning and afternoon window of operation costs approximately \$130,000 in annual salary expenses for transportation employees (bus operators and attendants).

<sup>8</sup> A 2014 MCPS survey showed that 19 percent of high school students perceived a later start time would make it harder for them to pick up a sibling after school; 46 percent thought it would be harder to get a job after school; 49 percent thought it would be harder to participate in athletic practices or events; and 52 percent thought it would be harder to participate in after-school activities or clubs. MCPS, *Superintendent’s Proposal on Changing Bell Times: Review of Stakeholder Input and Analysis of Operational Impact*, June 2014, p. 13.

SHIFT START TIMES FOR ALL SCHOOLS LATER—MODEL 1 WITH A 20-MINUTE DELAY

COST: \$0/MINIMAL

DAILY WINDOW OF OPERATION: 190 MINUTES (NO CHANGE)

Level	Time	Length of Day
High School	7:45 a.m.–2:30 p.m.	6 hours, 45 minutes
Middle School	8:15 a.m.–3:00 p.m.	6 hours, 45 minutes
Elementary School Tier 1	9:10 a.m.–3:25 p.m.	6 hours, 15 minutes
Elementary School Tier 2	9:35 a.m.–3:50 p.m.	6 hours, 15 minutes

SHIFT START TIMES FOR ALL SCHOOLS LATER—MODEL 2 WITH A 35-MINUTE DELAY

COST: \$0/MINIMAL

DAILY WINDOW OF OPERATION: 190 MINUTES (NO CHANGE)

Level	Time	Length of Day
High School	8:00 a.m.–2:45 p.m.	6 hours, 45 minutes
Middle School	8:30 a.m.–3:15 p.m.	6 hours, 45 minutes
Elementary School Tier 1	9:25 a.m.–3:40 p.m.	6 hours, 15 minutes
Elementary School Tier 2	9:50 a.m.–4:05 p.m.	6 hours, 15 minutes

Perhaps the most desirable feature of the start school later models is that all levels are impacted equally and in an incremental fashion. An advisory group of elementary, middle, and high school principals expressed support for a 20 minute later shift for all levels. These models retain the desired feature, as expressed in feedback comments, of the 6 hours, 15 minute school day for elementary students and retains the order of opening so that older siblings who care for elementary-age siblings are able to get out of school before the elementary schools. This model responds to concerns that middle school students with sleep needs similar to high school students gain additional sleep time. Model 2 satisfies the concern among some that no schools start before 8:00 a.m.<sup>9</sup>

While elementary students’ sleep needs are discussed below, it is acknowledged that later elementary start times are not optimal, for a variety of reasons that include the following: parents needing to leave for work prior to the elementary school bus pick up may need additional child care in the morning, magnet and immersion school students with long bus rides will arrive home later, and students who eat breakfast at school will eat later.<sup>10</sup> The various start and end times proposed for elementary schools are a change from current operations but within the range of customary scheduling options utilized by neighboring school districts.

<sup>9</sup> The Maryland legislature recently passed legislation authorizing a study to consider requiring all public schools to start no earlier than 8:00 a.m. Should the 8:00 a.m. start time become law, this model would satisfy the requirement. The report of the group conducting the study is due for publication in December 2014.

<sup>10</sup> If the elementary community was to consider a 10-minute extension of the elementary school day, the elementary start times would only be 10 minutes later rather than 20 minutes under Model 1, and 25 minutes rather than 35 minutes in Model 2.

COMPARISON OF ELEMENTARY SCHOOL BELL TIMES

Level	Time	Length of Day
<b>HOWARD COUNTY PUBLIC SCHOOLS</b>		
Elementary School (varies)	8:15 a.m.–2:45 p.m. (earliest) 9:25 a.m.–3:55 p.m. (latest)	6 hours, 30 minutes
<b>BALTIMORE COUNTY PUBLIC SCHOOLS</b>		
Elementary School (varies)	8:40 a.m.–3:10 p.m. (earliest) 9:20 a.m.–3:50 p.m. (latest)	6 hours, 30 minutes
<b>FAIRFAX COUNTY PUBLIC SCHOOLS—TO TAKE EFFECT 2015–2016</b>		
Elementary School (varies) <sup>11</sup>	8:00 a.m.–2:45 p.m. (earliest) 9:20 a.m.–4:05 p.m. (latest)	6 hours, 45 minutes
<b>LOUDOUN COUNTY PUBLIC SCHOOLS</b>		
Elementary School <sup>12</sup>	7:50 a.m.–2:35 p.m.	6 hours, 45 minutes

**Start Elementary Schools First**

Prior to 1993, MCPS elementary schools started at varying times, the earliest beginning at 8:00 a.m. and the latest start at 9:25 a.m. The length of elementary school days varied from 6 hours to 6 hours, 10 minutes. One strategy for starting high schools later than the current 7:25 a.m. is to reverse the order of opening and return some elementary schools to start times closer to 8:00 a.m. as has been done in the past. Each model presented below starts elementary schools at two different times but shifts those start times to 8:00 a.m. or earlier. The following four models start elementary schools first, and Models 3 and 4 include modest adjustments to the length of the elementary and middle school days:

CURRENT SCHEDULE

DAILY WINDOW OF OPERATION: 190 MINUTES

Level	Time	Length of Day
High School	7:25 a.m.–2:10 p.m.	6 hours, 45 minutes
Middle School	7:55 a.m.–2:40 p.m.	6 hours, 45 minutes
Elementary School Tier 1	8:50 a.m.–3:05 p.m.	6 hours, 15 minutes
Elementary School Tier 2	9:15 a.m.–3:30 p.m.	6 hours, 15 minutes

<sup>11</sup> Variable start times are used by FCPS to maximize efficiency within geographic regions where traffic patterns vary. MCPS made a decision in 1993 to value the benefits of a standardized bell schedule over the marginal benefits of varied start times and believes public resistance to very early and very late elementary schools would be problematic for MCPS based on elementary parents' and staff members' input.

<sup>12</sup> These start times represent the majority of Loudoun County elementary schools. There are three exceptions (two starting at 8:15 and one at 8:00 a.m.).

ELEMENTARY FIRST MODEL 1

COST: \$2.6 M

DAILY WINDOW OF OPERATION: 210 MINUTES<sup>13</sup>

Level	Time	Length of Day
Elementary School Tier 1	7:35 a.m.–1:50 p.m.	6 hours, 15 minutes
Elementary School Tier 2	8:00 a.m.–2:15 p.m.	6 hours, 15 minutes
High School	8:45 a.m.–3:30 p.m.	6 hours, 45 minutes
Middle School	9:15 a.m.–4:00 p.m.	6 hours, 45 minutes

ELEMENTARY FIRST MODEL 2

COST: \$5.2 M

DAILY WINDOW OF OPERATION: 230 MINUTES<sup>14</sup>

Level	Time	Length of Day
Elementary School Tier 1	8:00 a.m.–2:15 p.m.	6 hours, 15 minutes
Elementary School Tier 2	8:25 a.m.–2:40 p.m.	6 hours, 15 minutes
High School	9:10 a.m.–3:55 p.m.	6 hours, 45 minutes
Middle School	9:40 a.m.–4:25 p.m.	6 hours, 45 minutes

ELEMENTARY FIRST MODEL 3

COST: \$4.55 M

DAILY WINDOW OF OPERATION: 225 MINUTES<sup>15</sup>

Level	Time	Length of Day
Elementary School Tier 1	7:45 a.m.–2:05 p.m.	6 hours, 20 minutes
Elementary School Tier 2	8:15 a.m.–2:35 p.m.	6 hours, 20 minutes
High School	8:50 a.m.–3:35 p.m.	6 hours, 45 minutes
Middle School	9:30 a.m.–4:05 p.m.	6 hours, 35 minutes

ELEMENTARY FIRST MODEL 4

COST: \$3.9 M

DAILY WINDOW OF OPERATION: 220 MINUTES<sup>16</sup>

Level	Time	Length of Day
Elementary School Tier 1	7:45 a.m.–2:10 p.m.	6 hours, 25 minutes
Elementary School Tier 2	8:15 a.m.–2:40 p.m.	6 hours, 25 minutes
High School	8:50 a.m.–3:35 p.m.	6 hours, 45 minutes
Middle School	9:30 a.m.–4:05 p.m.	6 hours, 35 minutes

Some members of an advisory group of elementary, middle, and high school principals were receptive to the elementary schools first strategy, suggesting that the early elementary school start time may provide additional planning opportunities for staff and would assist working parents by eliminating the need for morning day care. Starting elementary schools first benefits children who rely on school breakfast programs for their first meals of the day. Further, starting elementary

<sup>13</sup>Requires each transportation employee to receive 20 minutes of additional pay per day but requires no additional routes or buses.

<sup>14</sup>Requires each transportation employee to receive 40 minutes of additional pay per day but requires no additional routes or buses.

<sup>15</sup>Requires each transportation employee to receive 35 minutes of additional pay per day but requires no additional routes or buses.

<sup>16</sup>Requires each transportation employee to receive 30 minutes of additional pay per day but requires no additional routes or buses.

schools first compresses the morning window of operation as short as possible in Models 1 and 2, while still keeping the elementary school day to 6 hours and 15 minutes.<sup>17</sup> The MCPS elementary school day is among the shortest in Maryland,<sup>18</sup> and public comments demonstrated that there is a portion of the MCPS elementary school community that prefers to keep it that way.

The later start time for middle and high schools better aligns with adolescent sleep cycles, and this later high school start time does not come at the expense of middle school students, whose sleep needs are similar. A later middle school dismissal addresses a concern expressed by some that middle school students without afternoon supervision can and do get into trouble.<sup>19</sup>

Starting elementary schools first responds to comments from elementary school parents responding to the October 2013 recommendation that expressed support for elementary school schedules that allowed the following:

- Dismiss school early enough to allow elementary students to play outside during afternoon daylight hours (daylight availability after school also factored in comments about walking home from school or getting off the bus before dark); early dismissal times also were desirable for family time, homework completion, and the ability to participate in after-school extracurricular activities (e.g., private lessons, language school, or religious classes).
- Eliminate the need for *both* before *and* after-school day care (e.g., start school early enough for working parents to drop off students on the way to work); several commenters reported that after-school child care was easier to arrange than before-school child care, and early start times were more compatible with the needs of working parents than later start times. However, eliminating or reducing the need for before-school child care may be offset by an increase in after-school child care costs if the elementary school day ends in the early afternoon.
- Do not significantly extend the elementary school day.

Research about optimal school start times for elementary students or sleep/wake patterns in healthy elementary-aged children is extremely limited. Available studies say that elementary students need between 10 and 11 hours of sleep per night, and for younger children, parents play an integral role in the child's sleep-wake cycle through enforced bedtimes.<sup>20</sup> What determines that bell times are "too early" or "too late" for students between the ages of 5 and 11 or what constitutes the optimal length of the elementary school day is not documented in available research literature.<sup>21</sup>

While this model might be most responsive to available sleep science about adolescents, concern was expressed about elementary school students waiting at bus stops in the early morning and the lack of after-school supervision for those elementary-age children currently cared for by older

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<sup>17</sup> The October 2013 proposal shortened that window an additional 10 minutes, but required lengthening the elementary school day. The afternoon window of operation often is not the same as the morning window of operation. Under the current schedule, *end* times for the various school levels are about 30 minutes apart. It is not possible, however, for schools to consistently *start* and *end* 30 minutes apart because the elementary school day is not the same length as the middle and high school days.

<sup>18</sup> MCPS, Report of the 2013 Bell Times Work Group: Sleep Needs of Students, Scheduling Practices, and Options for Consideration, September 2013.

<sup>19</sup> Law enforcement reports a spike in juvenile crime on weekdays between the hours of 2 and 4 p.m. Source: Federal Bureau of Investigations statistics reported in Changing Bell Times: Report of the Bell Times Work Group, MCPS, January 1998, Attachment A, P.16.

<sup>20</sup> See Appendix D: Hanover Report, p. 30.

<sup>21</sup> See Appendix D: Hanover Report, p. 14

siblings who would get home from school later under this model. The later high school release time complicates high school students’ after-school activities. Further, the later start for middle school students raises the concern that students without sufficient morning supervision may have difficulty getting ready for school, making the bus, or getting to school on their own.

The middle school bell times in the October 2013 recommendation (7:45 a.m.) represented a 10-minute adjustment for students in Grades 6, 7, and 8. The feedback gathered during the period that followed the publication of the October 2013 recommendation suggested that middle school students, parents, and staff were receptive to that recommendation, in part, because the changes were modest and because parents and students anticipated benefiting from the later high school schedule in future years.

Significant changes to middle school start times are associated with the strategy of starting elementary schools first as it would put the middle school start times last. Starting middle schools last would represent a substantial difference in the middle school day (for both students and staff) and would require further input and development to address issues such as before-school breakfast programs and after-school extracurricular activities, which could possibly require shifting some before the start of the school day.

## Modify October 2013 Recommendation

In response to concerns about costs of the October 2013 recommendation and the length of the elementary school day, the October 2013 recommendation was modified to reduce costs and reduce the extension to the elementary school to no more than 10 minutes. The current schedule, the original October 2013 recommendation, and the two modified models follow:

### CURRENT SCHEDULE

DAILY WINDOW OF OPERATION: 190 MINUTES

Level	Time	Length of Day
High School	7:25 a.m.–2:10 p.m.	6 hours, 45 minutes
Middle School	7:55 a.m.–2:40 p.m.	6 hours, 45 minutes
Elementary School Tier 1	8:50 a.m.–3:05 p.m.	6 hours, 15 minutes
Elementary School Tier 2	9:15 a.m.–3:30 p.m.	6 hours, 15 minutes

### SUPERINTENDENT’S ORIGINAL OCTOBER 2013 RECOMMENDED SCHEDULE

COST: APPROXIMATELY \$21 M

DAILY WINDOW OF OPERATION: 180 MINUTES<sup>22</sup>

Level	Time	Length of Day
Middle School	7:45 a.m.–2:30 p.m.	6 hours, 45 minutes
High School	8:15 a.m.–3:00 p.m.	6 hours, 45 minutes
Elementary School Tier 1	8:50 a.m.–3:35 p.m.	6 hours, 45 minutes
Elementary School Tier 2	9:15 a.m.–4:00 p.m.	6 hours, 45 minutes

<sup>22</sup> Requires each transportation employee to receive 10 minutes less pay per day but required 190 additional routes or buses at an estimated cost of \$13 M per year including the savings from reducing transportation staff daily hours.

SUPERINTENDENT’S RECOMMENDED SCHEDULE—MODIFIED MODEL 1

COST: \$5.2 M

DAILY WINDOW OF OPERATION: 230 MINUTES<sup>23</sup>

Level	Time	Length of Day
Middle School	7:35 a.m.–2:20 p.m.	6 hours, 45 minutes
High School	8:15 a.m.–3:00 p.m.	6 hours, 45 minutes
Elementary School Tier 1	9:20 a.m.–3:35 p.m.	6 hours, 15 minutes
Elementary School Tier 2	9:45 a.m.–4:00 p.m.	6 hours, 15 minutes

SUPERINTENDENT’S RECOMMENDED SCHEDULE—MODIFIED MODEL 2

COST: \$5.85 M

DAILY WINDOW OF OPERATION: 235 MINUTES<sup>24</sup>

Level	Time	Length of Day
Middle School	7:30 a.m.–2:00 p.m.	6 hours, 30 minutes
Elementary School Tier 1	8:00 a.m.–2:25 p.m.	6 hours, 25 minutes
High School	8:45 a.m.–3:30 p.m.	6 hours, 45 minutes
Elementary School Tier 2	9:30 a.m.–3:55 p.m.	6 hours, 25 minutes

Modified Model 1 retains the 8:15 a.m. start time for high schools that was considered desirable by 78 percent of parents and the order of opening proposed in the October 2013 recommendation. Under Model 1, the length of the elementary school day reverts to the current 6 hours and 15 minutes in response to concerns expressed by elementary school parents and staff.<sup>25</sup>

The middle school day is 20 minutes earlier than the current school day under Modified Model 1, and the 7:30 a.m. middle school start time in Modified Model 2 is 25 minutes earlier than the current start time. Modified Model 2 requires modest adjustments to the length of the middle school and elementary school days. It works from a transportation perspective. However, the 8:45 a.m. high school start time interjected between the first and second tier elementary start times raises concerns about scheduling in-service training and other administrative meetings of elementary staff across the district and staff who split assignments between two schools (often on different schedules).

One factor contributing to the middle school student, parent, and staff support for the original October 2013 recommendation was the incremental, 10-minute adjustment from the current schedule. The 25-minute earlier shift in Modified Model 2 may raise concerns about the sleep needs for middle school students. Further, the early dismissal of middle schools creates the potential for more unsupervised time after school.

<sup>23</sup> Requires each transportation employee to receive 40 minutes of additional pay per day but requires no additional routes or buses.

<sup>24</sup> Requires each transportation employee to receive 45 minutes of additional pay per day but requires no additional routes or buses.

<sup>25</sup> While the original October proposal left elementary school start times unchanged by extending the day 30 minutes, the 6 hours, 15 minutes elementary school day in the revised model requires delaying the elementary school start times by 30 minutes.

Some of the feedback gathered during the public input phase to the October 2013 recommendation included concerns that the later elementary start times did not take advantage of the early morning period of time when younger students likely were alert and ready to learn. Late elementary start times also mean a late breakfast for those students receiving breakfast at school. This has the potential to impact more than 17,000 students.

## “Split” the High School Day

Board members requested more information about the possibility of a “split” high school day that allowed for two start times, leaving unchanged elementary and middle school start times and length of school day.

CURRENT SCHEDULE

DAILY WINDOW OF OPERATION: 190 MINUTES

Level	Time	Length of Day
High School	7:25 a.m.–2:10 p.m.	6 hours, 45 minutes
Middle School	7:55 a.m.–2:40 p.m.	6 hours, 45 minutes
Elementary School Tier 1	8:50 a.m.–3:05 p.m.	6 hours, 15 minutes
Elementary School Tier 2	9:15 a.m.–3:30 p.m.	6 hours, 15 minutes

SPLIT HIGH SCHOOL DAY

COST: TO BE DETERMINED

DAILY WINDOW OF OPERATION: 190 MINUTES<sup>26</sup>

Level	Time	Length of Day
1 <sup>st</sup> Period High School Start	7:25 a.m.–2:10 p.m.	6 hours, 45 minutes
3 <sup>rd</sup> Period High School Start No Transportation Provided	9:05 a.m.–3:50 p.m.	6 hours, 45 minutes
Middle School	7:55 a.m.–2:40 p.m.	6 hours, 45 minutes
Elementary School Tier 1	8:50 a.m.–3:05 p.m.	6 hours, 15 minutes
Elementary School Tier 2	9:15 a.m.–3:30 p.m.	6 hours, 15 minutes

While two high school start times may appear to give high school students start time options, those options come at significant costs to course offerings, availability of teachers for individual student assistance, in addition to concerns about staffing, athletic programs, and equity. There are significant equity concerns with this option because transportation would be provided only one time—namely, at the early hour so students with less means or no personal transportation will still have to arrive at the earlier time. Students who have their own means and transportation will have an easier time getting to school if they elect the later start time. Some of the challenges to implementing a split high school day follow:

- *Students will have fewer opportunities to seek teacher assistance outside of class. High school teachers often make themselves available for individual student assistance before*

<sup>26</sup> No transportation is provided for the second high school start time under this option; therefore, no transportation costs are shown. Costs for school staffing and other supporting elements to be determined.

school, after school, or during their lunch hours. This works well when students and teachers have a common lunch period, for those teachers who voluntarily give up their lunch hours. But for those students who are in class during teacher lunch periods, before- or after-school teacher availability becomes very important. Under the proposed split model, staggered student and teacher start and end times create the likelihood that there will be no time before/after school or during lunch that a student may be able to obtain assistance from a particular teacher.

- *Course offerings will be reduced.* “Singleton” courses are those offered only once a day, typically specialty elective courses or Advanced Placement (AP) courses. The number of times a high school course is offered during the day is driven by the number of students who want or need to take each course, and when there are not enough students to schedule a course, the course is not offered at the school. When creating a master high school schedule, high schools strategically spread out singletons across the seven periods so that students desiring one or more singletons have greater chances of being able to fit them into their schedules. With some students starting school later than others, the scheduling of singletons would be limited to classes in the middle of the day to ensure each student who wants to take a course can. With fewer periods to schedule classes that are offered only once during a day, course availability for students, especially juniors and seniors, will be reduced, and students may not have the ability to schedule desired or needed singleton classes.
- *This may not be an option for International Baccalaureate (IB) and magnet programs.* Singleton courses are common in these programs.
- *Increased staffing may be required for some courses.* Students in special self-contained programs including Multidisciplinary Educational Training and Support (METs) and special education are scheduled in a small group for the majority of the school day. If some students in the program choose to start later while others start earlier, the program will need to be double staffed to ensure there is appropriate staffing throughout the day. Because these are very low ratios (sometimes as low as 6 students to 1 teacher and 2 paraeducators), there could be time when there are only 1 or 2 students.

The split schedule raises several challenges related to the athletic program, which include the following:

- Start times for many sports—tennis, baseball, softball, cross country, and golf would need to remain the same (3:30 p.m.) due to daylight constraints. This option would cause late shift students to miss an inordinate amount of classroom instruction.
- Coaches assume multiple roles in the school building, including serving as academic mentors to student athletes. This role involves time at lunch and before and after school to allow for coaches to meet with student athletes and teachers. Also, many coaches supervise a study hall and/or academic intervention programs for student athletes. This support would be difficult to implement under the “split” model because the schedules of coaches would not be in concert with the schedules for some/many student athletes.
- The “split” schedule would impact the availability of facilities for practices and contests—both indoor and outdoor. Swimming pools, non-MCPS fields and facilities, golf courses,

and park facilities often are used by community members during evening hours. Schools would have a much more difficult time procuring these types of public facilities if the start time for practices is moved to a later time. The later that practices start and end, the greater the potential for conflict with community groups.

## **Leave Bell Times Unchanged**

Another possible choice for the Board to consider is to leave bell times unchanged and provide other options for students. For example, some modifications could include making abbreviated school schedules more readily available to high school students.

Abbreviated schedules are currently an option for high school students and are used for a variety of reasons, including allowing students to leave early for internships or jobs and accommodating students who require a shorter schedule for medical or other reasons. For example, at one MCPS high school, more than 100 students have been granted abbreviated schedules during the 2014–2015 school year to participate in Career and Technology Education (CTE) internships such as child development.

Abbreviated schedules are typically not possible for students in IB or magnet programs because of course scheduling constraints, nor are they typically approved for freshmen or sophomores before they have had the opportunity to obtain sufficient credits to complete high school graduation requirements within four years. Transportation is not provided for students arriving late or departing early, making abbreviated schedules viable only for students who can provide their own transportation. Further, the availability and procedures for obtaining an abbreviated schedule are not widely known among parents/students, so the number of students seeking such schedules is limited.

Another strategy that could allow high school students to start later is to expand the use of online courses. MCPS currently offers few online courses, and most students using online courses to obtain credit are registered with other course providers, such as universities or other vendors.

Emerging best practices show that not all students can successfully complete online courses independently. One reason some students struggle with independent online courses is lack of student maturity. More success has been demonstrated with a hybrid model that includes periodic check-ins providing in-person teacher supervision, but hybrid models would have potential for additional cost implications. Another difficulty is that online versions of introductory courses can leave students ill-prepared for subsequent courses if all core material is not covered or addressed in a manner compatible with upper level courses. Therefore, online courses tend to be most appropriate for elective credit or to accommodate specialized student interests in subjects that will not have a direct bearing on subsequent courses, another reason they are typically not taken by freshmen and sophomores. Inequity is a concern for students without convenient access to computers and Internet access. As with abbreviated schedules, transportation is not provided for students arriving late or departing early.

## Fairfax County Public Schools Proposal

On October 23, 2014, the Fairfax County, Virginia Board of Education approved a revised bell time schedule to take effect in the 2015–2016 school year, as follows:

### FAIRFAX COUNTY PUBLIC SCHOOLS REVISED SCHEDULE—EFFECTIVE 2015–2016

Level	Time	Length of Day
Middle School	7:30 a.m.–2:15 p.m.	6 hours, 45 minutes
High School (varies)	8:00 a.m.–2:45 p.m. (earliest) 8:10 a.m.–2:55 p.m. (latest)	6 hours, 45 minutes
Elementary School (varies) <sup>27</sup>	8:00 a.m.–2:45 p.m. (earliest) 9:20 a.m.–4:05 p.m. (latest)	6 hours, 45 minutes

As described above, the formula for transporting a large number of students in the most cost-effective manner possible is to reuse a bus fleet as many times as possible over the longest possible window of time, and still maintain acceptable start and end times for schools at all levels. Since 1993, and during intervening years of severe budget shortages, MCPS has refined their formula to create the safest, most cost-effective, and efficient transportation service possible for a school system that transports 100,000 students daily. Costs increase when the window of operation is reduced.

Under both the 2015–2016 FCPS revised schedule and the MCPS October 2013 recommendation, middle schools open first, followed by high schools. The morning window of operation for FCPS was reduced by 10 minutes from two hours to one hour, 50 minutes. One of the key differences between MCPS and FCPS operations was that the current MCPS morning window of operation (one hour, 50 minutes) was already shorter than the current FCPS window, and the MCPS October 2013 recommendation shortened it by an additional 20 minutes.

MCPS CURRENT		MCPS 2013 RECOMMENDATION
Earliest a.m.	7:25 a.m. (high school)	7:45 a.m. (middle school)
Latest a.m.	9:15 a.m. (elementary tier 2)	9:15 a.m. (elementary tier 2)
A.M. Window of Operation	1 hour, 50 minutes	1 hour, 30 minutes

FCPS CURRENT		FCPS 2015–2016
Earliest a.m.	7:20 a.m. (high school)	7:30 a.m. (middle school)
Latest a.m.	9:20 a.m. (elementary)	9:20 a.m. (elementary)
A.M. Window of Operation	2 hours	1 hour 50 minutes

In MCPS, the October 2013 recommendation met with some elementary school parent and staff resistance to extending the elementary day to 6 hours and 45 minutes (30 additional minutes daily). In FCPS, the revised schedule to take effect in 2015–2016 is a five-minute adjustment from the 2014–2015 elementary school schedule (from 6 hours, 40 minutes to 6 hours, 45 minutes).

<sup>27</sup> Variable start times are used by FCPS to maximize efficiency within geographic regions where traffic patterns vary.

Other differences in the two school districts, described below, impact the cost and public reception to proposals that are nearly identical. The FCPS plan to take effect in the 2015–2016 school year is estimated to cost an additional \$4.9 million and increase their fleet by 47 buses. The costs of the MCPS options presented in this report that increase the windows of operation incur additional costs because they require additional hours for transportation employees, but do not require additional buses.

#### *Longest Routes/Greatest Demand on Buses*

- In FCPS, putting middle school before high school gives *more* time for FCPS to complete the longest trip of the morning first.<sup>28</sup> First trips are able to start earlier because there are no preceding school drop offs restricting the time drivers may begin picking up students.
- In MCPS, the October 2013 proposal to put middle school before high school gave MCPS *less* time to complete the longest trip of the morning (high school), creating a greater need for additional school buses because the high school runs were sandwiched between the middle school and first tier elementary runs.
- For MCPS to maintain a similar savings, high schools would have to continue to start before middle schools without a preceding school to restrict when drivers may begin picking up students or provide additional time to complete high school runs within the schedule.

#### *Earliest Start Time*

For MCPS, the 7:45 a.m. middle school start time in the October 2013 recommendation was a 10-minute adjustment for students in Grades 6, 7, and 8. For FCPS, the new 7:30 a.m. start time will be an adjustment of between 5 minutes later to 35 minutes earlier, depending on the school, as FCPS middle schools currently start between 7:25 or 8:05 a.m. for Grades 7 and 8 (Grade 6 in FCPS is in elementary school in all cases but one).

#### *Latest End Time*

For MCPS, the 4:00 end time for Tier 2 elementary schools in the MCPS October 2013 recommendation was 30 minutes later than the current schedule but still 5 minutes earlier than the latest end time for FCPS elementary schools.

## **Research Update**

An independent review of available research literature was requested to examine the sleep needs of elementary school students, with a particular interest in the pattern of waking and falling asleep associated with time of day and the relationship between sleep and various elementary student

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<sup>28</sup> FCPS and MCPS have about the same number of high schools. However, FCPS middle schools are comprised of Grades 7 and 8, with one exception that has Grades 6 through 8. FCPS has fewer middle schools than high schools making the middle school areas larger and routes longer. From a route design and scheduling perspective, this means that FCPS middle school routes take longer than their high school routes and are FCPS' longest bus runs of the day. Conversely, MCPS has many fewer high schools than middle schools (26—including the Thomas Edison High School of Technology—compared to 38), making the high school routes the longest MCPS routes of the day. So while the FCPS bell schedule, like the MCPS October 2013 proposal, starts middle schools before high schools, this impacts each school district differently.

outcomes. The independent review by Hanover Research also updated available sleep research on adolescents (middle and high school students) presented in earlier MCPS bell time reports.

Some elementary parents and staff responding to the October 2013 recommendation expressed concern that the research presented in support of later high school start times focused only on the sleep needs of adolescents (particularly high school students) and not on elementary students. An independent review of the research showed that there was little available comparable research on elementary students. While the independent reviewers were able to locate findings on how much sleep elementary students need and how sleep deprivation affects functioning, there was not a comparable body of research on the circadian rhythms of elementary students.

The findings on elementary school students were as follows:

- *Sleep/wake patterns:* Information about sleep/wake patterns in healthy elementary-aged children is extremely limited. For younger children, parents often play an integral role in the child's sleep-wake cycle through enforced bedtimes. While children younger than 6 years of age typically require daytime naps as well as a long nighttime session, sleep typically becomes consolidated into a single nighttime session when children reach the age of 6 or 7. A finding that preadolescents are found to have early morning preferences, as compared to older children, is based on a study of Grade 6 girls that showed more mature girls favored later hours while less mature girls favored earlier hours.
- *Duration:* Elementary school students (ages 5 to 12 years) require 10 to 11 hours of sleep per night. Students' activities, in addition to enforced bedtimes mentioned above, also affect the amount and quality of sleep. For example, increasing academic demands from school, sports and extracurricular commitments, and use of television, computers, and other devices can disrupt sleep and cause students to go to bed later.
- *Deprivation:* The limited studies that are available indicate that a lack of sleep has a negative impact on elementary-aged children. The cognitive performance of young children is adversely affected by reductions in sleep. Additionally, long-term physical health measures of children, such as obesity rates, were found to be associated with inadequate amounts of sleep.

The Hanover Report also reexamined the available research literature on high school start times. Hanover looked at research released since 2013 and confirmed the key findings of the earlier report that there are health and safety benefits associated with later high school start times. However, Hanover concluded that there is no conclusive evidence that demonstrates that later high school start times result in improved academic achievement for students. The updated review of the literature reiterates that in the teenage population, getting enough sleep helps increase important brain functions vital to the learning process and contributes to lower automobile crash rates, lower rates of obesity, and decreased incidences of depression.

## **Conclusion**

The purpose of this report was to describe potential strategies to adjust the MCPS bell times schedule within the cost parameters set by the Board. All of the strategies described above were considered to meet the objective of starting high schools later to allow high school students more

time to sleep. The options and discussion included provide a range of possibilities that are cost effective and provide the potential opportunity for increasing sleep for high school students.

Almost every strategy impacts the elementary school and middle school schedules, either by moving start times earlier or later, or by changing the times when elementary and middle school students can participate in accelerated courses at middle and high schools, respectively. The various start and end times proposed for elementary schools are a change from current operations but within the range of customary scheduling options utilized by neighboring school districts.

The issue of changing bell times remains a complex one. While the available research indicates there are benefits of a later start time for high school students, implementing such a change presents challenges. Each option included in this report includes myriad advantages and disadvantages for students, staff, and parents that need to be weighed and considered.

# Appendices

## Appendix A

### Options for Anne Arundel County

The Anne Arundel County Public Schools School Start Times Task Force developed four bell schedule options that were presented to the Anne Arundel County Board of Education in October 2014. These options were then disseminated to the public for feedback and further discussion:

- **Option A: High schools begin at 8:30 a.m.;** middle schools begin at 9:30 a.m. and elementary schools begin between 7:50 and 9:15 a.m.
- **Option B: High schools begin at 9:15 a.m.;** middle schools begin between 8:20 and 8:30 a.m. (with one middle school beginning at 9:00 a.m.); and elementary schools begin between 7:40 and 9:15 a.m.
- **Option C: All schools shift 30 minutes later** than current start times.
- **Option D: All schools shift 30 minutes later** than current start times **with a late-start hybrid learning option** for some high school students.

## Appendix B

### Cost Implications for Bell Times Modification Strategies

Strategy	Model	Cost
CURRENT BELL SCHEDULE		
	+ 20 MINUTES	COST NEUTRAL
	+ 35 MINUTES	COST NEUTRAL
ELEMENTARY FIRST		
	MODEL 1	\$2.6 M
	MODEL 2	\$5.2 M
	MODEL 3	\$4.55 M
	MODEL 4	\$3.9 M
SUPERINTENDENT’S PROPOSED SCHEDULE MODIFIED		
	MODEL 1	\$5.2 M
	MODEL 2	\$5.85 M
“SPLIT” HIGH SCHOOL SCHEDULE		
		COST TO BE DETERMINED

## **Appendix C**

### **Executive Summary: Study of Safe and Healthy School Hours for Maryland Public Schools**

## **Appendix D**

### **School Start Times, Sleep, and Student Outcomes**