

Bell Schedule Revision, Iteration #2

Goal

Revise iteration #1

- To use resources more efficiently using parameters as defined by transportation task force
- To move more elementary schools to later tiers.
- To separate combined high/middle school runs, with the exception of Woodson/Frost, and move those middle schools to the 3rd tier.
- Structure schedules to enhance cross serving possibilities within and between offices.

Process

After working intensively on iteration #1, the revision group recognized several potential alternatives to address the above goals. They tried different bell times and tiers where it appeared to be advantageous and then tested the individual solutions by combining runs into trips. That was done repeatedly, refining the times and tiers as necessary. The changes made include:

- Lee/Key, Edison/Twain, and Chantilly/Rocky Run were split
- 33 of the schools' bell times on iteration #1 were changed on iteration #2 –

○ Cedar Lane ES,	○ Herndon HS,	○ Riverside ES,
○ Chantilly HS,	○ Key MS ,	○ Rocky Run MS,
○ Cherry Run ES,	○ Kings Glen ES,	○ Rolling Valley ES,
○ Churchill Road ES,	○ Kings Park ES,	○ Springfield Estates ES,
○ Cunningham Park ES,	○ Madison HS,	○ Stone MS,
○ Fairfax Villa ES,	○ McLean HS,	○ Stratford Landing ES,
○ Falls Church HS,	○ Mt Eagle ES,	○ Stuart HS,
○ Floris ES,	○ Navy ES,	○ Twain MS,
○ Fox Mill ES,	○ Orange Hunt ES,	○ White Oaks ES,
○ Franconia ES,	○ Poe MS,	○ Willow Springs ES,
○ Glen Forest ES,	○ Ravensworth ES,	○ Woodley Hills ES.
- Pulley and Davis, combined with West Potomac and Marshall in the first iteration, were separated from the high schools and moved to the 1st tier, saving a substantial number of SE buses.

When changes to the bell times and tier assignments were completed, the trips were assembled with a goal of minimizing deadhead time and miles. That was accomplished through extensive cross serving both within and between operations offices (areas 1, 2, 3, and special education). These efforts yielded great benefits in increased efficiencies.

Results

Office	Iteration #2	Iteration #1	Actual 07-08
A1	269	297	261
A2	308	307	292
A3	317	353	304
SE	301+*	347	285
Total	1195	1304	1142

***Note:**

Different SE buses are configured differently – with more or fewer seats or wheelchair slots; some have lifts capable of handling extra-large wheelchairs and some do not. Some runs are very long, but some SE students can be on a bus for only a limited time. Some buses have air conditioning and others do not. Each SE student must be assigned to a SE bus based on the space, configuration, equipment, and run time needed.

When the runs and trips were assembled for these iteration, they were considered generically. The reality is that a significant number would not work and more SE buses than noted would be needed, simply to allow appropriate bus assignments. The actual “final” number of buses would be entirely based on the students and on the destinations to which they must be transported.

Costs

Estimated additional staffing and operating costs <i>plus cost increases</i>		
Year	Iteration #2	Iteration #1
1 Includes driver & attendant training for additional buses	\$4,672,255	\$14,558,277
2-5	\$4,274,072	\$13,316,991

Details for iteration #2 costs are available in Appendix A.

Iteration #2 Number of RUNS per Tier by Level							Iteration #2 Percentage of RUNS per Tier by Level						Iteration #1 Percentage of RUNS per Tier by Level					
AM	Tier 1		Tier 2		Tier 3		Tier 1		Tier 2		Tier 3		Tier 1		Tier 2		Tier 3	
ES	879		169		288	1336	66%		13%		22%	100%	76%		8%		17%	100%
MS				32	515	547				6%	94%	100%			13%	10%	77%	100%
SS			147			147			100%			100%			100%			100%
HS	42	65	642			749		9%	86%			100%		8%	92%			100%
PS					106	106					100%	100%					100%	100%
	921	65	958	32	909	2885												
PM																		
ES	869		170		285	1324	66%		13%		22%	100%	76%		8%		17%	100%
MS				31	514	545				6%	94%	100%			13%		77%	100%
SS			147			147			100%			100%			100%	10%		100%
HS	42	64	647			753		8%	86%			100%		8%	92%			100%
PS					98	98					100%	100%					100%	100%
	911	64	964	31	897	2867												
	1832	129	1922	63	1806	5752												

Iteration #2 Number of SCHOOLS per Tier by Level							Iteration #2 Percentage of SCHOOLS per Tier by Level						Iteration #1 Percentage of SCHOOLS per Tier by Level					
AM & PM	Tier 1		Tier 2		Tier 3		Tier 1		Tier 2		Tier 3		Tier 1		Tier 2		Tier 3	
ES	92		22		25	139	66%		16%		18%	100%	78%		9%		14%	100%
MS				1	23	24				4%	96%	100%			8%	8%	83%	100%
SS			3			3			100%			100%			100%			100%
HS	2	1	23			26	8%	4%	88%			100%		4%	96%			100%
PS					37	37					100%	100%					100%	100%
	94	1	48	1	85	229												
	188	2	96	2	170	458												

See Appendix C

Implications

Late run start times –

- HS late runs now typically begin 2 hours after HS closing time.
 - Iteration #1 - the late buses could return to the HSs in approximately one hour.
 - Iteration #2 – the late buses could return to the HSs in approximately 1.5 hours.
- MS late runs now typically begin 1.5 hours after MS closing time.
 - Iteration #1 - the late buses could return to the MSs in approximately one hour
 - Iteration #2 – the late buses could return to the MSs in approximately one hour.
- ES late runs now begin from one to two hours after ES closing time.
 - Iteration #1 – some late buses could arrive in 1.5 hours, depending upon the day of the week.
 - Iteration #2 - the late buses would arrive two to three hours after ES closing.

Preschool (PS) times – in order to avoid conflicts of PS runs with Monday PM runs, PSs were scheduled at the end of the third tier. This will create problems for principals in scheduling their staff.

Field trips – ES midday trips can now begin at 9:00 to 9:15 and return at 1:30. With a change in the bell schedule relationships and the extended AM start time schedules, the general FT window becomes 10:00 to 2:15 with a net loss of -0-.

SCHOOL BOARD TRANSPORTATION TASK FORCE

Executive Summary

The Transportation Task Force (TTF) was chartered by the Fairfax County School Board to offer community perspectives as input to the conduct of a transportation reengineering analysis, to provide a workable and practical bell schedule that would achieve later start times for high schools and to recommend changes to improve the services provided. The sixty-eight (68) people appointed to the TTF to do this work were drawn from every district in the county and from a number of countywide and community organizations, and represent a very broad cross-section of Fairfax County. The school system was well represented, with twenty-three (23) employees of the Fairfax County Public School System (FCPS) as members – five of whom are Principals. The TTF also included seven other Fairfax County government employees, as well as three FCPS high school students.

Approaching its task in two phases and working together in committees, subcommittees, and as a Committee of the Whole, the Task Force met dozens of times over its six-month working life. The members of the Task Force volunteered thousands of hours to gather, share, review and discuss thousands of pages of pertinent information. After carefully considering all of this information, the Task Force is proposing a number of changes to the services provided by the FCPS Transportation Department. These service parameters should improve service and, importantly, reduce system costs as well. These are (verbatim):

- *Retain the “Exception to Ride” program*

This program has no impact on the development of a revised bell schedule.

- *“Civil twilight” should be respected but not as an absolute barrier. Elementary school (ES) bus runs may start before civil twilight, but not more than ten days each academic year, and not by more than ten minutes even then.*
- Base school elementary students are neither picked up nor dropped off on the dark side of civil twilight.
- Some special program students are picked up at corner stops on the dark side.
- *ES students should not ride the bus to their within-boundary base-school for more than 45 minutes.*

This did not change in iteration #2. While this standard was met in all but 4 regular program runs, there were 159 SE runs that exceeded that limit

- *Middle school (MS) and high school (HS) students should have the same bus ride time limitations*

The revised bell schedule honors this recommendation.

- *MS and HS students should not ride the bus to their within-boundary base-school for more than 60 minutes*

This did not change in iteration #2. While this standard was met in all but 6 HS and 2 MS regular program runs, there were 64 HS, 15MS, and 59 Center SE runs that exceeded that limit

- *ES students should arrive no later than five minutes before school and no earlier than 25 minutes before school – a 5-25 minute arrival/drop off window – and are to be permitted to exit the bus and enter the school immediately upon arrival.*
- *HS and MS student arrival/drop off window is to be 10 – 25 minutes before school, with immediate entry.*

In iteration #2, we used this option to provide flexibility when a more efficient bell schedule solution for an individual school would not otherwise be possible or reasonable. This flexibility would be of great value to resolve operational problems during and after implementation of a new bell schedule or with the existing bell schedule.

For example, one bus of the seven going into a middle school must depart quickly to start a high school run. Rather than moving the bell schedule for the school 10 minutes earlier and affecting all of the runs and students, we ask the principal to allow us to pull the one bus into the school to release early and be on its way.

- *“Grandfathering” for school boundary changes may be permitted, but for not more than a single year following the changes.*
- *“Grandfathering” should not be used for non-boundary program changes.*

These recommendations do not impact development of a revised bell schedule.

- *Current home-to-school walking distances should not be changed.*

No changes were made to walking distances.

- *Transportation should optimize bus stop placements by making better use of the permissible walking distance, up to, but not exceeding one-half (1/2) mile for ES students,*

with the goal being to reduce the number of bus stops and improving transport efficiency and run length.

For the past several years, transportation has been consolidating bus stops whenever it is considered practicable and where it does not impact student safety. **See Appendix D.** While additional opportunities for consolidation do exist, we do not believe that they are sufficient in scope to have an appreciable impact on transportation resources. In addition, it is difficult to develop a new bell schedule based upon uncertain assumptions about changes to time required to complete existing bus runs. Should we make some overall assumptions about time savings based upon bus stop consolidations? If so, should we not also make assumptions about longer run times for high schools due to increased traffic later in the morning?

- *Transportation should optimize bus stop placements by making better use of the permissible walking distance, up to, but not exceeding three-quarters of mile for MS and HS students, with a goal of reducing the number of bus stops and improving transport efficiency and run length.*

See response above.

- *ES students should not ride with MS or HS students, except for current rare and unusual circumstances related to centralized pick-ups, such as TJHSST.*

We do not create bus runs with ES students riding with MS or HS students.

- *MS and HS students may ride the same bus at any time.*

We have secondary and combination HS/MS runs on both iterations.

- *Transportation should not be provided to a GT Center when the base school has a GT Center.*

The school board has already rejected this potential change to transportation services.

- *The use of centralized pickup locations should be expanded for all students attending non-mandatory out-of-boundary programs.*

Transportation has been creating centralized locations (either consolidated stops or placement of stops on through roads rather than neighborhood roads) whenever practicable and acceptable. This ongoing process began several years ago and has

proven to be beneficial. Critical elements of this transition are safety concerns and parental acceptability, so fast and wholesale changes of this nature are not realistic. The planned stop location and route must be assessed by the supervisor and, often, by the coordinator. It is not unusual to receive letters and petitions from parents listing additional concerns. Stops then have to be reassessed and the safety specialist from the Office of Safety and Security and other transportation staff must observe, assess, and report.

Changes save minutes of time on a run and occasionally make it possible to consolidate runs to reduce the total number into a school. Reducing a run does not reduce a bus, but it does make that bus available to assist with a run at another school. We are not certain that a great many additional opportunities exist for further consolidations without having an impact on student safety. Supervisors will continue their review and move toward central stops, as possible. **See appendix D.**

In addition, we believe that there are several larger-scale initiatives that offer possibilities that should be explored. These initiatives, such as Consortia and the “Cool Counties Initiative,” are beyond the purview of this Task Force. While we reviewed and discussed them in this report, we had neither the time nor the expertise to study them in the depth needed to support anything more than a recommendation to the School Board for further study.

Since the long term implications and impact of these initiatives are not known at this time, they cannot play a part in the development of a revised bell schedule.

Like the School Board, the Task Force believes that later start times would be beneficial for adolescents, particularly high school students. This, in turn, serves FCPS Strategic Goal 6.7 to provide, “a safe and healthful learning environment.” It also helps FCPS meet its Student Achievement Goals to ensure that students, “achieve their full academic potential in the core disciplines,” (1.1), and, “make healthy and safe choices” (2.8).

In Phase I, we developed five bell schedule alternatives that would provide these later start times. In Phase II, the TTF spent almost three months identifying the impacts of each of these alternatives on FCPS students, on FCPS employees and on the greater Fairfax community. These impacts – positive and negative (most impacts cut both ways) – informed our final decisions. As would be expected in any group, particularly one as large and intentionally diverse as the TTF, there was disagreement on the magnitude of the impacts, on whether an impact was positive or negative or both, and – most critically – as to whether the overall positive benefits of later start times outweighed the negative effects. Yet, after much discussion the Task Force determined that later HS and MS start times can be achieved in an acceptable way, and selected a bell schedule that does this.

The proposed bell schedule continues the current three-tier system. It begins with Elementary Schools (ES), follows with HS and ends with MS. ***To balance the tiers there are ES***

in each tier (ES would be split roughly 55%, 25% and 20% between tiers for balance today). **Transportation should put as many ES as possible in tiers 1 and 2, while keeping HS in tier 2. The proposed bell schedule to provide later start times for adolescents is:**

Tier	School	Start Times	End Times
1	Elementary	7:50 – 8:10	2:30 – 2:50
2	High	8:35 – 8:55	3:25 – 3:45
3	Middle	9:20 – 9:40	4:10 – 4:30

See the summary tables on page 2. Although we reduced the proportion of ESs on tier 1, we did not meet the 55/25/20 standard. Doing so would unbalance the tiers and cost additional resources.

Note that these start/end time windows are approximate and not rigid times. Again, the FCPS Transportation Department *should develop rolling bell schedules that start as many elementary schools as possible in Tier 1 and Tier 2, while balancing the tiers and starting high schools as close to the beginning of the tier 2 window so that they can end by 3:30 p.m., preferably even before. Elementary schools placed in the first tier should be those with the shortest routes and the fewest bus riders so as to minimize problems with civil twilight.*

Transportation honored the recommendation to try to place as many elementary schools as possible on the first and second tiers. Since the second tier is largely high schools, there is not great flexibility in adding too many elementary schools to that tier. In order to balance the resource requirements between tiers, transportation determined in the first bell schedule iteration that they needed to place about 75 percent of the elementary schools on the 1st tier. To reduce this percentage to about 55 percent would mean that about 22 elementary schools would have to be moved off of the first tier and placed on either the second or third tiers. The second iteration reduced the proportion of ESs on the 1st tier to 66%, with 13% on the 2nd tier, and 22% on the 3rd. Moving more from the 1st to the 2nd tier would create a significant imbalance in resources between the tiers and increase significantly the overall number of buses and drivers required.

We are not certain how or why TTF determined the percentage distribution of elementary schools by tier but are confident that their real intent was to maximize the numbers of the 1st and 2nd tiers. For this reason and because changing the percentages would increase the required numbers of buses, we would not recommend developing a bell schedule based upon the TTF percentages.

As regards rolling bell schedules, start times do roll through the twenty minute tier windows, as much as possible. There were adjustments made to some of the schedules between iteration #1 and iteration #2, when transportation determined that doing so would enhance efficiency.

APPENDIX A**Additional Bus Costs
Iteration #2**

Year 1

General Education Cost for One Bus		# of Buses	Cost
New driver for an additional bus-entry level pay	\$31,486		
Training for new driver (first year only)	\$6,955		
Operate the average general ed bus/year	<u>\$14,118</u>		
Total Staffing and Operating Cost	\$52,559	37	\$1,944,683
Special Education Cost for One Bus			
New driver for an additional bus - entry level pay	\$31,486		
New attendant for an additional bus – entry level pay	\$22,231		
Training for new driver (first year only)	\$6,955		
Training for new attendant (first year only)	\$1,848		
Operate the average general ed bus/year	<u>\$18,452</u>		
Total Staffing and Operating Cost	\$80,972	16	\$1,295,552
Lease/Purchase Cost			<u>\$1,432,020</u>
Total One Year Cost (not including cost increases)			\$4,672,255

Years 2 – 5

General Education Cost for One Bus		# of Buses	Cost
New driver for an additional bus-entry level pay	\$31,486		
Operate the average general ed bus/year	<u>\$14,118</u>		
Total Staffing and Operating Cost	\$45,604	37	\$1,687,348
Special Education Cost for One Bus			
New driver for an additional bus - entry level pay	\$31,486		
New attendant for an additional bus – entry level pay	\$22,231		
Operate the average general ed bus/year	<u>\$18,452</u>		
Total Staffing and Operating Cost	\$72,169	16	\$1,154,704
Lease/Purchase Cost			<u>\$1,432,020</u>
Total Cost/Year – Years 2 – 5 (not including cost increases)			\$4,274,072

APPENDIX B

RUNS BY LEVEL, BY TIER, BY START TIME Iteration #2 School Times - Earliest Pick Up, Latest Drop, TJ AM Transport Method							
Cluster	School		School Hours	Earliest Pickup	Latest Drop	How students are transported to TJ in AM*	* D-Direct S-Shuttle
4	Bucknell	E	7:50-2:25	7:22	2:59		
4	Fort Belvoir	E	7:50-2:25	7:20	2:53		
4	Groveton	E	7:50-2:25	7:26	2:50		
4	Hybla Valley	E	7:50-2:25	7:31	2:51		
3	Annandale Terrace	E	7:50-2:30	7:13	3:04		
3	Beech Tree	E	7:50-2:30	7:21	2:53		
4	Belle View	E	7:50-2:30	7:11	3:26		
3	Belvedere	E	7:50-2:30	7:12	3:14		
6	Bonnie Brae	E	7:50-2:30	7:18	2:57		
3	Bren Mar Park	E	7:50-2:30	7:22	2:59		
5	Bush Hill	E	7:50-2:30	7:16	3:11		
2	Camelot	E	7:50-2:30	7:19	3:03		
3	Canterbury Woods	E	7:50-2:30	7:05	3:24		
6	Cardinal Forest	E	7:50-2:30	7:15	3:03		
7	Centre Ridge	E	7:50-2:30	7:06	3:15		
7	Centreville Elem	E	7:50-2:30	7:25	2:56		
6	Cherry Run	E	7:50-2:30	7:57	4:15		
1	Clearview	E	7:50-2:30	7:14	3:13		
5	Clermont	E	7:50-2:30	7:16	3:04		
6	Clifton	E	7:50-2:30	7:04	3:25		
3	Columbia	E	7:50-2:30	6:55	3:30		
1	Colvin Run	E	7:50-2:30	7:02	3:26		
5	Crestwood	E	7:50-2:30	7:33	2:48		
8	Crossfield	E	7:50-2:30	7:17	3:06		
8	Cub Run	E	7:50-2:30	7:28	2:54		
2	Cunningham Park	E	7:50-2:30	8:01	4:07		
7	Daniels Run	E	7:50-2:30	7:00	3:07		
8	Deer Park	E	7:50-2:30	7:24	2:55		
8	Dogwood	E	7:50-2:30	7:21	3:00		
7	Eagle View	E	7:50-2:30	7:07	3:08		
6	Fairview	E	7:50-2:30	7:05	3:16		
8	Floris	E	7:50-2:30	7:20	3:01		
8	Forest Edge	E	7:50-2:30	6:51	3:18		
1	Forestville	E	7:50-2:30	7:08	3:11		
8	Fox Mill	E	7:50-2:30	8:01	4:08		
5	Franconia	E	7:50-2:30	7:14	4:09		
1	Franklin Sherman	E	7:50-2:30	7:14	3:10		
2	Freedom Hill	E	7:50-2:30	7:12	3:12		
3	Glen Forest	E	7:50-2:30	7:23	2:57		

2	Graham Road	E	7:50-2:30	7:32	2:46		
1	Great Falls	E	7:50-2:30	7:06	3:11		
7	Greenbriar West	E	7:50-2:30	7:02	3:34		
4	Gunston	E	7:50-2:30	7:11	3:22		
1	Haycock	E	7:50-2:30	7:00	3:23		
4	Hayfield Elem	E	7:50-2:30	7:04	3:24		
1	Herndon ES	E	7:50-2:30	7:14	3:11		
6	Hunt Valley	E	7:50-2:30	7:07	3:14		
4	Island Creek	E	7:50-2:30	7:15	3:05		
6	Keene Mill	E	7:50-2:30	7:03	3:19		
8	Lake Ann	E	7:50-2:30	7:15	3:09		
7	Lees Corner	E	7:50-2:30	7:17	3:01		
2	Lemon Road	E	7:50-2:30	7:15	3:02		
3	Little Run	E	7:50-2:30	7:26	2:53		
5	Lynbrook	E	7:50-2:30	7:24	2:46		
2	Marshall Elem	E	7:50-2:30	7:10	3:10		
8	McNair	E	7:50-2:30	7:15	3:01		
3	North Springfield	E	7:50-2:30	7:31	3:01		
7	Oak Hill	E	7:50-2:30	6:53	3:24		
3	Olde Creek	E	7:50-2:30	7:11	3:19		
6	Orange Hunt	E	7:50-2:30	7:47	3:43		
7	Poplar Tree	E	7:50-2:30	7:12	3:11		
7	Providence	E	7:50-2:30	6:56	3:26		
5	Rose Hill	E	7:50-2:30	7:06	3:17		
6	Sangster	E	7:50-2:30	7:01	3:25		
5	Saratoga	E	7:50-2:30	7:01	3:14		
2	Shrevewood	E	7:50-2:30	7:20	3:06		
5	Silverbrook	E	7:50-2:30	7:19	3:00		
3	Sleepy Hollow	E	7:50-2:30	7:07	3:00		
1	Spring Hill	E	7:50-2:30	7:04	3:13		
2	Stenwood	E	7:50-2:30	7:13	3:18		
8	Sunrise Valley	E	7:50-2:30	6:52	3:23		
8	Terrasat	E	7:50-2:30	7:04	3:09		
1	Timber Lane	E	7:50-2:30	7:24	2:54		
7	Union Mill	E	7:50-2:30	7:22	3:05		
2	Vienna	E	7:50-2:30	7:16	3:05		
8	Virginia Run	E	7:50-2:30	7:14	3:05		
3	Wakefield Forest	E	7:50-2:30	7:15	3:05		
8	Waples Mill	E	7:50-2:30	7:14	3:11		
6	West Springfield ES	E	7:50-2:30	7:32	2:50		
6	White Oaks	E	7:50-2:30	7:35	3:57		
2	Wolf Trap	E	7:50-2:30	6:56	3:23		
2	Woodburn	E	7:50-2:30	7:21	3:03		
1	Hutchison	E	7:55-2:30	7:18	3:20		
8	London Towne	E	7:55-2:30	7:23	2:54		
5	Mount Eagle	E	7:55-2:30	7:21	2:55		
2	Pine Spring	E	7:55-2:30	7:31	2:56		
2	Westlawn	E	7:55-2:30	7:26	2:57		
3	Braddock	E	8:00-2:40	7:19	3:16		
7	Colin Powell	E	8:00-2:40	7:25	3:15		
2	Flint Hill	E	8:00-2:40	7:14	3:23		

4	Lorton Station	E	8:05-2:45	7:16	3:30		
4	Washington Mill	E	8:05-2:45	7:41	3:13		
3	Weyanoke	E	8:05-2:45	7:13	3:27		
4	Hollin Meadows	E	8:10-2:45	7:37	3:09		
4	Mount Vernon Woods	E	8:10-2:45	7:32	3:12		
4	Woodlawn	E	8:10-2:45	7:35	3:22		
4	Fort Hunt	E	8:10-2:50	7:47	3:23		
5	Cameron	E	8:10-2:45	7:01	3:58		
5	Newington Forest	E	8:35-3:15	7:55	3:55		
3	Parklawn	E	8:35-3:15	8:09	3:40		
4	Waynewood	E	8:35-3:15	8:04	3:57		
1	Aldrin	E	8:40-3:20	7:44	3:58		
1	Armstrong	E	8:40-3:20	7:47	4:20		
1	Chesterbrook	E	8:40-3:20	8:06	3:58		
1	Churchhill	E	8:40-3:20	7:45	4:04		
2	Fairhill	E	8:40-3:20	8:11	3:48		
1	Kent Garden	E	8:40-3:20	8:11	3:50		
2	Louise Archer	E	8:40-3:20	7:26	4:32		
8	Navy	E	8:40-3:20	8:00	3:57		
6	Rolling Valley	E	8:40-3:20	7:45	3:59		
2	Westbriar	E	8:40-3:20	8:08	3:56		
2	Westgate	E	8:40-3:20	7:43	2:16		
5	Forestdale	E	9:30-4:10	9:02	4:13		
4	Woodley Hills	E	9:30-4:10	8:49	4:52		
5	Halley	E	9:40-4:15	8:48	5:29		
3	Baileys	E	9:40-4:20	8:35	5:25		
7	Brookfield	E	9:40-4:20	9:18	4:40		
7	Bull Run	E	9:40-4:20	8:47	5:19		
1	Dranesville	E	9:40-4:20	9:06	4:47		
7	Fairfax Villa	E	9:40-4:20	8:59	5:02		
5	Garfield	E	9:40-4:20	8:55	4:54		
7	Greenbriar East	E	9:40-4:20	8:59	5:05		
8	Hunter Woods	E	9:40-4:20	8:39	5:23		
6	Kings Glen	E	9:40-4:20	8:48	4:10		
6	Kings Park	E	9:40-4:20	8:52	5:06		
4	Lane	E	9:40-4:20	9:05	4:55		
6	Laurel Ridge	E	9:40-4:20	9:14	4:45		
3	Mantua	E	9:40-4:20	8:50	5:12		
8	Mosby Woods	E	9:40-4:20	8:42	5:10		
6	Oak View	E	9:40-4:20	8:58	5:07		
8	Oakton Elementary	E	9:40-4:20	9:04	4:58		
3	Ravensworth	E	9:40-4:20	9:12	4:47		
4	Riverside	E	9:40-4:20	8:49	4:52		
5	Springfield Estates	E	9:40-4:20	8:58	5:06		
4	Stratford Landing	E	9:40-4:20	8:32	5:20		
6	Terra Centre	E	9:40-4:20	9:09	4:56		
7	Willow Springs	E	9:40-4:20	8:34	5:21		
2	Davis	C	7:20-2:00	6:06	3:12		
4	Pulley	C	7:20-2:00	6:18	3:17		
5	Key Center	C	8:00-2:00	6:33	3:31		

2	Kilmer Center	C	8:00-2:00	6:20	3:20		
3	Jefferson	H	8:30-3:50	6:07	6:02		
3	Annandale	H	8:32-3:25	7:48	4:09	D	
7	Centreville HS	H	8:35-3:25	7:49	4:29	D	
7	Chantilly	H	8:35-3:25	7:59	3:51	D	
5	Edison	H	8:35-3:25	7:16	5:04	D	
7	Fairfax	H	8:35-3:25	7:18	4:31	D	
4	Hayfield SEC	S	8:35-3:25	7:43	4:14	D	
6	Robinson	S	8:35-3:25	7:32	4:35	D	
6	West Springfield HS	H	8:35-3:25	7:42	4:19	D	
8	Westfield	H	8:35-3:25	7:38	4:18	D	
2	Falls Church	H	8:40-3:30	8:06	4:07	S	
1	Herndon HS	H	8:40-3:30	7:58	4:13	S	
2	Madison	H	8:40-3:30	7:48	4:22	S	
1	McLean	H	8:45-3:35	7:52	4:34	S	
3	Stuart	H	8:45-3:35	8:00	4:06	D	
5	Lee High	H	8:50-3:40	7:56	4:25	D	
8	Oakton HS	H	8:50-3:40	7:57	4:31	S	
9	South Lakes	H	8:50-3:40	7:41	4:49	S	
4	Quander	C	8:55-3:35	7:53	4:34		
2	Cedar Lane Center	H	8:55-3:45	7:00	4:54		
6	Lake Braddock S	S	8:55-3:45	7:29	5:14	D	
1	Langley	H	8:55-3:45	7:48	4:55	S	
2	Marshall	H	8:55-3:45	8:07	4:37	S	
4	Mount Vernon	H	8:55-3:45	8:02	4:39	D	
5	South County HS	H	8:55-3:45	7:32	5:07	D	
4	West Potomac	H	8:55-3:45	7:49	4:49	D	
3	Woodson	H	8:55-3:45	7:55	4:55	D	
3	Frost	M	9:10-4:00	7:55	4:55		
3	Glasgow	M	9:20-4:10	8:48	5:06		
8	Carson	M	9:40-4:30	8:48	5:22		
1	Cooper	M	9:40-4:30	8:27	5:53		
7	Franklin	M	9:40-4:30	8:43	5:25		
1	Herndon MS	M	9:40-4:30	8:56	5:33		
3	Holmes	M	9:40-4:30	9:03	5:05		
8	Hughes	M	9:40-4:30	8:42	5:38		
6	Irving	M	9:40-4:30	8:59	5:12		
2	Jackson	M	9:40-4:30	8:38	5:25		
5	Key MS	M	9:40-4:30	8:43	5:27		
2	Kilmer	M	9:40-4:30	8:57	5:42		
7	Lanier	M	9:40-4:30	8:36	5:34		
7	Liberty	M	9:40-4:30	8:35	5:36		
1	Longfellow	M	9:40-4:30	8:42	5:31		
3	Poe Middle	M	9:40-4:30	8:49	5:19		
7	Rocky Run	M	9:40-4:30	8:37	5:42		
4	Sandburg	M	9:40-4:30	8:54	5:15		
5	South County MS	M	9:40-4:30	8:31	5:49		
8	Stone	M	9:40-4:30	8:50	5:40		
2	Thoreau	M	9:40-4:30	8:43	5:24		
5	Twain	M	9:40-4:30	8:40	5:32		

4	Whitman	M	9:40-4:30	9:06	5:07		
S	Aldrin ES <i>ps/pac</i>	P	9:40-4:20	8:41	5:20		
S	Belvedere ES <i>ps/pac</i>	P	9:40-4:20	8:44	5:03		
S	Bucknell ES <i>ps</i>	P	9:40-4:20	8:56	5:27		
S	Centreville ES <i>pac</i>	P	9:40-4:20	8:56	5:06		
S	Cherry Run ES <i>ps/pac</i>	P	9:40-4:20	8:36	5:19		
S	Clearview ES <i>ps/pac</i>	P	9:40-4:20	8:08	5:56		
S	Columbia ES <i>ps</i>	P	9:40-4:20	9:01	5:31		
S	Colvin Run ES <i>ps</i>	P	9:40-4:20	9:04	4:40		
S	Cub Run ES <i>ps/pac</i>	P	9:40-4:20	8:45	5:43		
S	Deer Park ES <i>pac</i>	P	9:40-4:20	8:18	5:45		
S	Eagle View ES <i>ps</i>	P	9:40-4:20	8:43	4:59		
S	Forest Edge ES <i>ps</i>	P	9:40-4:20	8:55	5:55		
S	Fort Belvoir ES <i>ps</i>	P	9:40-4:20	9:13	4:55		
S	Franklin Sherman ES <i>ps/pac</i>	P	9:40-4:20	8:54	5:21		
S	Freedom Hill ES <i>ps</i>	P	9:40-4:20	9:02	5:11		
S	Halley ES <i>ps/pac</i>	P	9:40-4:20	8:31	5:34		
S	Island Creek ES <i>ps/pac</i>	P	9:40-4:20	8:30	5:31		
S	Keene Mill ES <i>ps</i>	P	9:40-4:20	8:54	5:11		
S	Kings Park ES <i>ps/pac</i>	P	9:40-4:20	8:38	5:04		
S	Lemon Road ES <i>ps</i>	P	9:40-4:20	9:07	4:34		
S	Little Run ES <i>ps/pac</i>	P	9:40-4:20	9:07	5:45		
S	London Towne ES <i>ps</i>	P	9:40-4:20	8:40	5:19		
S	Lynbrook ES <i>pac</i>	P	9:40-4:20	9:09	4:59		
S	Mount Vernon Woods ES <i>ps</i>	P	9:40-4:20	9:03	5:30		
S	North Springfield ES <i>ps/pac</i>	P	9:40-4:20	8:48	5:39		
S	Oak Hill ES <i>ps/pac</i>	P	9:40-4:20	8:47	5:10		
S	Parklawn ES <i>pac</i>	P	9:40-4:20	8:29	5:32		
S	Pine Springs ES <i>ps/pac</i>	P	9:40-4:20	8:57	5:17		
S	Rose Hill ES <i>ps/pac</i>	P	9:40-4:20	8:27	5:22		
S	Stenwood ES <i>ps</i>	P	9:40-4:20	9:01	5:37		
S	Timber Lane ES <i>ps</i>	P	9:40-4:20	8:49	5:09		
S	Vienna ES <i>ps</i>	P	9:40-4:20	8:49	5:05		
S	Waples Mill ES <i>ps/pac</i>	P	9:40-4:20	8:30	5:13		
S	West Springfield ES <i>ps</i>	P	9:40-4:20	9:10	5:01		
		E	Elementary				
		H	High				
		S	Secondary				
		M	Middle				
		C	Center				
		P	Preschool				

Appendix C

ROUTES BY LEVEL BY TIER
Iteration #2

Cluster	School		School Hours	Reg AM Runs	Reg PM Runs	SE AM Runs	SE PM Runs	AM ES Runs	AM MS Runs	AM SS Runs	AM HS Runs	AM PS/PAC	PM ES Runs	PM MS Runs	PM SS Runs	PM HS Runs	PM PS/PAC
2	Davis Ctr	H	7:20-2:00	0	0	23	23										
4	Pulley Ctr	H	7:20-2:00	0	0	19	19				42					42	
4	Bucknell ES	E	7:50-2:25	1	1	0	0										
4	Fort Belvoir ES	E	7:50-2:25	24	24	2	3										
4	Groveton ES	E	7:50-2:25	7	7	0	0										
4	Hybla Valley ES	E	7:50-2:25	7	6	1	1										
3	Annandale Terrace ES	E	7:50-2:30	5	5	1	1										
3	Beech Tree ES	E	7:50-2:30	6	6	2	2										
4	Belle View ES	E	7:50-2:30	5	4	7	6										
3	Belvedere ES	E	7:50-2:30	12	12	0	0										
6	Bonnie Brae ES	E	7:50-2:30	11	11	1	1										
3	Bren Mar Park ES	E	7:50-2:30	3	3	4	4										
5	Bush Hill ES	E	7:50-2:30	4	4	7	7										
2	Camelot ES	E	7:50-2:30	6	6	17	12										
3	Canterbury Woods ES	E	7:50-2:30	8	8	9	9										
6	Cardinal Forest ES	E	7:50-2:30	5	5	1	1										
7	Centre Ridge ES	E	7:50-2:30	12	12	1	1										
7	Centreville ES	E	7:50-2:30	10	10	0	0										
1	Clearview ES	E	7:50-2:30	6	6	0	0										
6	Clifton ES	E	7:50-2:30	13	13	0	0										
3	Columbia ES	E	7:50-2:30	5	5	0	0										
1	Colvin Run ES	E	7:50-2:30	15	15	0	0										
5	Crestwood ES	E	7:50-2:30	1	1	0	1										
8	Crossfield ES	E	7:50-2:30	14	14	2	2										
8	Cub Run ES	E	7:50-2:30	5	5	1	1										
7	Daniels Run ES	E	7:50-2:30	10	10	1	1										
8	Deer Park ES	E	7:50-2:30	6	6	1	1										
8	Dogwood ES	E	7:50-2:30	3	3	1	1										

7	Eagle View ES	E	7:50-2:30	7	7	4	3										
6	Fairview ES	E	7:50-2:30	9	9	5	6										
8	Forest Edge ES	E	7:50-2:30	13	13	0	0										
1	Forestville ES	E	7:50-2:30	11	11	0	0										
1	Franklin Sherman ES	E	7:50-2:30	6	6	0	0										
2	Freedom Hill ES	E	7:50-2:30	7	7	4	3										
2	Glen Forest ES	E	7:50-2:30	14	14	1	1										
2	Graham Road ES	E	7:50-2:30	1	1	0	0										
1	Great Falls ES	E	7:50-2:30	11	11	1	1										
7	Greenbriar West ES	E	7:50-2:30	11	11	1	1										
4	Gunston ES	E	7:50-2:30	10	10	2	2										
1	Haycock ES	E	7:50-2:30	16	16	1	1										
4	Hayfield ES	E	7:50-2:30	8	8	1	0										
1	Herndon ES	E	7:50-2:30	8	8	1	1										
6	Hunt Valley ES	E	7:50-2:30	6	6	2	2										
4	Island Creek ES	E	7:50-2:30	6	6	0	0										
6	Keene Mill ES	E	7:50-2:30	10	10	3	3										
8	Lake Anne ES	E	7:50-2:30	3	3	2	1										
7	Lees Corner ES	E	7:50-2:30	7	7	5	5										
2	Lemon Road ES	E	7:50-2:30	3	3	0	0										
3	Little Run ES	E	7:50-2:30	5	5	0	0										
5	Lynbrook ES	E	7:50-2:30	4	4	4	4										
2	Marshall Road ES	E	7:50-2:30	7	7	7	7										
8	McNair ES	E	7:50-2:30	11	11	0	0										
3	North Springfield ES	E	7:50-2:30	3	3	1	1										
7	Oak Hill ES	E	7:50-2:30	8	8	0	0										
3	Olde Creek ES	E	7:50-2:30	4	4	6	6										
7	Poplar Tree ES	E	7:50-2:30	10	10	5	5										
7	Providence ES	E	7:50-2:30	10	10	0	0										
5	Rose Hill ES	E	7:50-2:30	6	6	0	0										
6	Sangster ES	E	7:50-2:30	12	12	2	2										
5	Saratoga ES	E	7:50-2:30	10	10	1	1										
2	Shrevewood ES	E	7:50-2:30	6	6	4	4										
5	Silverbrook ES	E	7:50-2:30	16	16	1	2										
3	Sleepy Hollow ES	E	7:50-2:30	7	6	2	2										
1	Spring Hill ES	E	7:50-2:30	11	11	0	0										

2	Stenwood ES	E	7:50-2:30	6	6	0	0										
8	Sunrise Valley ES	E	7:50-2:30	13	13	3	3										
8	Terraset ES	E	7:50-2:30	7	7	1	1										
1	Timber Lane ES	E	7:50-2:30	6	6	0	0										
7	Union Mill ES	E	7:50-2:30	7	7	2	2										
2	Vienna ES	E	7:50-2:30	2	2	2	2										
8	Virginia Run ES	E	7:50-2:30	11	11	1	1										
3	Wakefield Forest ES	E	7:50-2:30	6	6	2	2										
8	Waples Mill ES	E	7:50-2:30	14	14	3	3										
6	West Springfield ES	E	7:50-2:30	3	3	0	0										
2	Wolftrap ES	E	7:50-2:30	6	6	0	1										
2	Woodburn ES	E	7:50-2:30	7	7	0	0										
5	Halley ES	E	7:55-2:30	9	9	0	0										
1	Hutchison ES	E	7:55-2:30	4	4	1	1										
8	London Towne ES	E	7:55-2:30	5	5	1	0										
2	Pine Springs ES	E	7:55-2:30	4	4	0	0										
2	Westlawn ES	E	7:55-2:30	4	4	0	0										
5	Key Ctr	E	8:00-2:00	0	0	22	22										
2	Kilmer Ctr	E	8:00-2:00	0	0	15	15										
3	Braddock ES	E	8:00-2:40	3	3	0	0										
7	Colin Powell ES	E	8:00-2:40	10	10	1	1										
2	Flint Hill ES	E	8:00-2:40	7	7	1	1										
4	Lorton Station ES	E	8:05-2:45	17	17	0	0										
4	Washington Mill ES	E	8:05-2:45	7	7	4	4										
3	Weyanoke ES	E	8:05-2:45	7	7	2	2										
5	Cameron ES	E	8:10-2:45	7	7	0	0										
4	Hollin Meadows ES	E	8:10-2:45	3	3	3	2										
4	Mount Vernon Woods ES	E	8:10-2:45	2	2	0	0										
4	Woodlawn ES	E	8:10-2:45	6	6	2	2										
4	Fort Hunt ES	E	8:10-2:50	4	4	0	0										
				688	685	233	226	879			42		869			42	
3	TJHSST		8:30-3:50	65	64	0	0				65					64	
5	Mount Eagle ES	E	8:35-3:05	1	1	0	0										
4	Newington Forest ES	E	8:35-3:15	7	7	0	0										

6	Orange Hunt ES	E	8:35-3:15	5	5	0	0										
3	Parklawn ES	E	8:35-3:15	8	8	0	0										
4	Waynewood ES	E	8:35-3:15	4	4	0	0										
6	White Oaks ES	E	8:35-3:15	11	11	0	0										
1	Aldrin ES	E	8:40-3:20	9	9	0	0										
1	Armstrong ES	E	8:40-3:20	11	11	4	4										
6	Cherry Run ES	E	8:40-3:20	2	2	0	0										
1	Chesterbrook ES	E	8:40-3:20	9	9	0	0										
1	Churchill Road ES	E	8:40-3:20	8	8	2	3										
2	Cunningham Park ES	E	8:40-3:20	1	1	2	2										
2	Fairhill ES/Ctr	E	8:40-3:20	8	8	1	1										
8	Floris ES	E	8:40-3:20	11	11	1	1										
8	Fox Mill ES	E	8:40-3:20	6	6	1	1										
1	Kent Gardens ES	E	8:40-3:20	9	9	0	0										
2	Louise Archer ES	E	8:40-3:20	13	13	0	0										
8	Navy ES	E	8:40-3:20	12	12	1	1										
6	Rolling Valley ES	E	8:40-3:20	7	7	0	0										
2	Westbriar ES	E	8:40-3:20	6	6	0	0										
2	Westgate ES	E	8:40-3:20	2	2	0	0										
5	Franconia ES	E	8:55-3:35	7	7	0	0	169							170		
2	Cedar Lane Ctr	H	8:35-3:05	0	0	14	14										
7	Centreville HS	H	8:35-3:25	22	27	6	6										
7	Chantilly HS	H	8:35-3:25	25	25	11	12										
5	Edison HS	H	8:35-3:25	27	26	1	0										
7	Fairfax HS	H	8:35-3:25	33	34	3	3										
3	Stuart HS	H	8:35-3:25	23	25	1	1										
6	West Springfield HS	H	8:35-3:25	17	17	3	3										
8	Westfield HS	H	8:35-3:25	45	45	3	3										
2	Falls Church HS	H	8:40-3:30	17	17	8	8										
1	Herndon HS	H	8:40-3:30	21	21	2	2										
3	Annandale HS	H	8:45-3:35	28	29	5	6										
2	Madison HS	H	8:45-3:35	15	15	6	6										
1	McLean HS	H	8:45-3:35	15	15	1	1										
5	Lee HS	H	8:50-3:40	26	26	4	2										
8	Oakton HS	H	8:50-3:40	26	26	1	1										
8	South Lakes HS	H	8:50-3:40	20	20	6	6										

1	Langley HS	H	8:55-3:45	22	22	6	6										
2	Marshall HS	H	8:55-3:45	14	14	0	0										
4	Mount Vernon HS	H	8:55-3:45	31	31	6	6										
4	Quander Road Ctr	H	8:55-3:45	0	0	12	12										
5	South County HS	H	8:55-3:45	24	24	3	3										
4	West Potomac HS	H	8:55-3:45	24	24	0	0										
3	Woodson HS	H	8:55-3:45	32	30	33	33			642						647	
5	Hayfield SS	S	8:35-3:25	38	38	0	0										
6	Lake Braddock SS	S	8:55-3:45	45	45	3	3										
6	Robinson SS	S	8:35-3:25	53	53	8	8			147						147	
				800	806	158	158	169		147	642		170		147	647	
3	Frost MS	M	9:10-4:00	0	0	0	0	0						0			
4	Woodley Hills ES	E	9:30-4:10	12	12	0	0										
4	Stratford Landing ES	E	9:30-4:30	6	6	4	3										
3	Baileys ES	E	9:40-4:20	6	6	3	3										
7	Brookfield ES	E	9:40-4:20	6	6	0	0										
7	Bull Run ES	E	9:40-4:20	16	16	3	3										
5	Clermont ES	E	9:40-4:20	4	4	1	1										
1	Dranesville ES	E	9:40-4:20	7	7	3	3										
7	Fairfax Villa ES	E	9:40-4:20	4	4	2	2										
5	Forestdale ES	E	9:40-4:20	7	7	4	2										
5	Garfield ES	E	9:40-4:20	6	6	0	0										
7	Greenbriar East ES	E	9:40-4:20	6	6	3	3										
8	Hunters Woods ES	E	9:40-4:20	21	21	2	2										
6	Kings Glen ES	E	9:40-4:20	8	9	1	1										
6	Kings Park ES	E	9:40-4:20	10	11	0	0										
4	Lane ES	E	9:40-4:20	8	8	3	3										
6	Laurel Ridge ES	E	9:40-4:20	5	5	7	7										
3	Mantua ES	E	9:40-4:20	12	12	11	11										
8	Mosby Woods ES	E	9:40-4:20	10	10	1	1										
6	Oak View ES	E	9:40-4:20	11	11	0	0										
8	Oakton ES	E	9:40-4:20	9	9	3	3										
3	Ravensworth ES	E	9:40-4:20	5	4	0	0										
4	Riverside ES	E	9:40-4:20	11	11	0	0										

5	Springfield Estates ES	E	9:40-4:20	15	15	0	0										
6	Terra Centre ES	E	9:40-4:20	5	5	5	4										
7	Willow Springs ES	E	9:40-4:20	20	20	2	2	288					285				
3	Glasgow MS	M	9:20-4:10	27	27	0	0										
8	Stone MS	M	9:30-4:30	12	12	1	1										
6	Burke Ctr	M	9:40-4:30	0	0	17	17										
8	Carson MS	M	9:40-4:30	31	31	0	0										
1	Cooper MS	M	9:40-4:30	20	20	2	2										
7	Franklin MS	M	9:40-4:30	24	24	4	3										
1	Herndon MS	M	9:40-4:30	20	20	3	3										
3	Holmes MS	M	9:40-4:30	16	16	6	6										
8	Hughes MS	M	9:40-4:30	22	22	2	2										
6	Irving MS	M	9:40-4:30	19	19	1	1										
2	Jackson MS	M	9:40-4:30	22	22	0	0										
5	Key MS	M	9:40-4:30	20	20	0	0										
2	Kilmer MS	M	9:40-4:30	27	27	6	6										
7	Lanier MS	M	9:40-4:30	23	23	3	3										
7	Liberty MS	M	9:40-4:30	23	23	4	4										
1	Longfellow MS	M	9:40-4:30	20	20	1	1										
3	Poe MS	M	9:40-4:30	23	23	5	5										
7	Rocky Run MS	M	9:40-4:30	20	20	0	0										
4	Sandburg MS	M	9:40-4:30	22	22	3	3										
5	South County MS	M	9:40-4:30	9	9	1	1										
2	Thoreau MS	M	9:40-4:30	13	13	3	3										
5	Twain MS	M	9:40-4:30	17	17	0	0										
4	Whitman MS	M	9:40-4:30	23	23	0	0	515					514				
1	Aldrin ES <i>ps/pac</i>	P	9:40-4:20			5	4										
3	Belvedere ES <i>ps/pac</i>	P	9:40-4:20			4	4										
4	Bucknell ES <i>ps</i>	P	9:40-4:20			2	2										
7	Centreville ES <i>pac</i>	P	9:40-4:20			2	2										
6	Cherry Run ES <i>ps/pac</i>	P	9:40-4:20			5	5										
1	Clearview ES <i>ps/pac</i>	P	9:40-4:20			5	5										
3	Columbia ES <i>ps</i>	P	9:40-4:20			2	2										
1	Colvin Run ES <i>ps</i>	P	9:40-4:20			2	2										
8	Cub Run ES <i>ps/pac</i>	P	9:40-4:20			4	3										
8	Deer Park ES <i>pac</i>	P	9:40-4:20			4	3										

7	Eagle View ES <i>ps</i>	P	9:40-4:20			2	2																
7	Fairfax Villa ES <i>ps</i>	P	9:40-4:20			2	2																
8	Forest Edge ES <i>ps</i>	P	9:40-4:20			2	2																
4	Fort Belvoir ES <i>ps</i>	P	9:40-4:20			1	1																
1	Franklin Sherman ES <i>ps/pac</i>	P	9:40-4:20			3	2																
2	Freedom Hill ES <i>ps</i>	P	9:40-4:20			3	3																
5	Halley ES <i>ps/pac</i>	P	9:40-4:20			5	4																
4	Island Creek ES <i>ps/pac</i>	P	9:40-4:20			4	4																
6	Keene Mill ES <i>ps</i>	P	9:40-4:20			3	2																
6	Kings Park ES <i>ps/pac</i>	P	9:40-4:20			2	2																
2	Lemon Road ES <i>ps</i>	P	9:40-4:20			1	1																
3	Little Run ES <i>ps/pac</i>	P	9:40-4:20			3	2																
8	London Towne ES <i>ps</i>	P	9:40-4:20			2	2																
5	Lynbrook ES <i>pac</i>	P	9:40-4:20			4	2																
8	McNair ES <i>ps</i>	P	9:40-4:20			2	2																
4	Mount Vernon Woods ES <i>ps</i>	P	9:40-4:20			3	3																
3	North Springfield ES <i>ps/pac</i>	P	9:40-4:20			4	4																
7	Oak Hill ES <i>ps/pac</i>	P	9:40-4:20			1	1																
3	Parklawn ES <i>pac</i>	P	9:40-4:20			3	3																
2	Pine Springs ES <i>ps/pac</i>	P	9:40-4:20			3	2																
3	Ravensworth ES <i>ps</i>	P	9:40-4:20			1	1																
5	Rose Hill ES <i>ps/pac</i>	P	9:40-4:20			5	5																
2	Stenwood ES <i>ps</i>	P	9:40-4:20			1	1																
1	Timber Lane ES <i>ps</i>	P	9:40-4:20			3	3																
2	Vienna ES <i>ps</i>	P	9:40-4:20			2	3																
8	Waples Mill ES <i>ps/pac</i>	P	9:40-4:20			4	5																
6	West Springfield ES <i>ps</i>	P	9:40-4:20			2	2																
												106											98
				683	684	226	213	288	515				106	285	514				98				

Number of Runs per Tier by Level							Percentage of Runs per Tier by Level					
AM	Tier 1		Tier 2		Tier 3		Tier 1		Tier 2		Tier 3	
ES	879		169		288	1336	66%		13%		22%	100%
MS				0	515	515				0%	100%	100%
SS			147			147			100%			100%
HS	42	65	642			749		9%	86%			100%
PS					106	106					100%	100%
	921	65	958	0	909	2853						
PM												
ES	869		170		285	1324	66%		13%		22%	100%
MS				0	514	514				0%	100%	100%
SS			147			147			100%			100%
HS	42	64	647			753		8%	86%			100%
PS					98	98					100%	100%
	911	64	964	0	897	2836						
	1832	129	1922	0	1806	5689						

Number of Schools per Tier by Level							Percentage of Schools per Tier by Level					
AM & PM	Tier 1		Tier 2		Tier 3		Tier 1		Tier 2		Tier 3	
ES	92		22		25	139	66%		16%		18%	100%
MS				1	23	24				4%	96%	100%
SS			3			3			100%			100%
HS	2	1	23			26	8%	4%	88%			100%
PS					37	37					100%	100%
	94	1	48	1	85	229						
	188	2	96	2	170	458						

APPENDIX D

Stops Consolidated
07-08

<u>School</u>	<u>Stop eliminated</u>	<u>Consolidated to</u>		
Edison HS& Twain MS	Glendale & Blaine	Blaine & Huntington		
Mount Eagle	Entire Bus 1 route	made into walkers		
Bush Hill Elem	High Meadow & Langton			
	High Meadow & Knights Ridge			
Edison HS& Twain MS	Upland & Habersham			
Newington Forest	Newington Forest Av & Treasure Tree Ct	walkers		
	Newington Forest Av & Willowdale Ct	walkers		
	Newington Forest Av & Parkdale Ct	walkers		
Lorton Station	Lorton Station Blvd & Stonegarden	walkers		
	Lorton Station Blvd & Lee Masey Dr	walkers		
Ft. Belvoir	Hudson Rd & Shenandoah Rd	Shenandoah Rd & York Rd		
White Oaks	Cherry Run Elementary			
Spfld Estates	Pratt St & Ambler St	Bush Hill ES		
	Westchester St & Lane Dr	Bush Hill ES		
	Westchester St & Barbmor Ct	Bush Hill ES		
	Old Rolling Rd & Anne Ly La	Bush Hill ES		
	Inter Parcel Rd & Silver Lake Bv	Lane ES		
	Kingstowne Commons Dr & Roudsby La	Lane ES		
	Burgundy Rd & Tremont Dr	Cameron ES		
	Burgundy Rd & Chapin Av	Cameron ES		
	Upland Woods Dr & Upland Dr	Clermont ES		
	Cabin John Rd & Channing Rd	Lynbrook ES		
	Backlick Rd & Edgerton La	Lynbrook ES		
	Grace St & Amelia St	Crestwood ES		
	Devereux Circle Dr & Larochelle Dr	Devereux Circle Dr & Devereux Ct		
	Peverill Dr & Picot Rd	Rose Hill ES		

Spfld Estates	Wilton Rd & Oakland Dr	Sharon Chapel Rd & Lebanon Rd		
	Broadmoor St & Glamis Dr	Hayfield ES		
	Hayfield Rd & Luton Pl	Hayfield ES		
	Broadmoor St & Welch Ct	Hayfield ES		
	Clames Dr & Higham St	Franconia ES		
	Morning View La & Thomas Grant Dr	Island Creek ES		
	Morning View La & Rolling Creek Wy	Island Creek ES		
	Burgundy Rd & Quaker La	Cameron ES		
	Franconia Rd & Ridge View Dr	Clermont ES		
	Middlesex & Mendota	Crestwood ES		
Lee/Key/ Saratoga	Mulberry Botton & Richfield Rd	Mulberry Botton & Chancellor Way		
Woodlawn	Central Park Dr @ Central Park Dr	Central Park Dr @ Scarborough Sq (northbound)		
	Central Park Dr @ Longworthe Sq	Central Park Dr @ Grammercy Cir (northbound)		
	Lawrence St @ Imperial St	Lawrence St @ Steadman St		
	Lawrence St @ Hammond St	Lawrence St @ Pinelake Ct (across from St.Annes Ct)		
	Lawrence St @ Kidd St	Lawrence St @ Pinelake Ct (across from St.Annes Ct)		
	Lakepark Dr @ Birchlake Ct	Lakepark Dr @ Cedarlake Ct		
	Lakepark Dr @ Amblewood Rd	Lakepark Dr @ Cedarlake Ct		
	Wyres St @ Glyn St	Wyres St @ Claremont Woods Dr		
	Gage Rd @ Glyn St	Gage Rd @ Ingersol Rd		
	Frye Rd @ Steadman St (northbound)	Lawrence St @ Steadman St		
	Frye Rd @ Steadman St (southbound)	Steadman St @ Fitzroy St		
	Welford St @ Caledonia St	Steadman St @ Fitzroy St		
	Noel St @ Steadman St	Steadman St @ Fitzroy St		
	8500 Skyview Dr/Skyview Apts	Skyview Dr @ Manor Dr		
	Frye Rd @ Manor Dr	Skyview Dr @ Manor Dr		
Keene Mill ES	Rivington Rd & Brixton St	Greenview La & Brixton St		
W Springfield	Bardu Av & Jansen Dr	Bardu Av & Bardu Ct		
Orange Hunt	Rockefeller La & Hamor La	stop/bus removed		
	Arley Dr & Hanks Pl	stop/bus removed		
	Arley Dr & Freshaire Dr	stop/bus removed		
	Arley Dr & Sontag Wy	stop/bus removed		

Orange Hunt	Sontag Wy & Hayload Ct	stop/bus removed		
	Sontag Wy & Applecross La	stop/bus removed		
	Applecross La & Spur Rd	stop/bus removed		
-	<u>Stops Reinstated</u>	<u>Consolidated to</u>	<u>Changed to</u>	<u>Reason</u>
Spfld Estates	Rose Hill Dr & Apple Tree Dr	Rose Hill ES	Changed to Rose Hill Dr & May Dr	GT No Crossing Guard
	Hayfield Rd & Les Dorsen Lp	Lane ES	Hayfield Rd & Les Dorsen Lp	GT AM & PM Does not coincide
	Morning View La & Morning View Ct	Island Creek ES	Morning View La & Morning View Ct	GT AM hours
	Hastings & Julian St	Crestwood ES	Hastings & Julian St	GT PM hours
Crestwood	Cumberland Av & Dinwiddie St	Walkers/Crestwood	Cumberland Av & Dinwiddie St	per Dean Tistadt
Cameron	Mount Eagle Dr & Montebello		Mount Eagle Dr & Montebello	community stated it unsafe, coordinator & above requested reinstatement
Bush Hill	Crown Royal & High Meadow		Crown Royal & High Meadow	bus maneuverability
Lorton Station	Lorton Station Blvd & Stonegarden	walkers	Lorton Station Blvd & Stonegarden	unsafe to cross bridge
	Lorton Station Blvd & Lee Masey Dr	walkers	Lorton Station Blvd & Lee Masey Dr	unsafe to cross bridge
Westfield	Mustang Drive & West Ox Road			
Virginia Run	Norris Court & Tony's Place			
	Reduced several stops on Chandley Farms Circle to consolidate			
Bull Run	Reduced the amount of GT stops (going to Bull Run) in the walking boundaries to Virginia Run – moved all to Virginia Run			
	Hidden Canyon Road & Surrey House Way			
	Store House Drive & Sutler Store Court			
	Did not get to move due to new GT policy – Kamputa Drive & Flagler Drive			
	Did not get to move due to new GT policy - Cranoke Street & Latshaw Road			
	Did not get to move due to new GT policy – Billingsgate Lane & Wycombe			

	Street			
	Did not get to move due to new GT policy – Gothwaite Drive & Maidstone Court			
	Did not get to move due to new GT policy – Paddington Lane & Haymarket Lane			
	Did not get to move due to new GT policy – Sun Meadow Court & Sully Station Drive			
	Did not get to move due to new GT policy – Kimanna Drive & Algretus Drive			
	Did not get to move due to new GT policy – Lock Drive & Crenshaw Drive			
	Did not get to move due to new GT policy – Sully Station Drive & Woodford Drive			
Chantilly	Ellicott Drive & Ellicott Court			
	Valley Country Drive & Woodward Court			
Rocky Run	Middle Ridge Drive & Middleton Lane			
Union Mill Elementary	Ellicott Drive & Ellicott Court			
	Ellicott Drive & Fankford Circle			
	Northbourne Drive & Darrington Way			
	Valley Country Drive & Woodward Court			
	Cabells Mill Drive & Indian Rock Road			
	Cabells Mill Drive & Jarrett Court			
Brookfield	Chantilly Road & Spring Run Court			
	Chantilly Road & Weeping Willow Court			
	Chantilly Road & Winter Harbor Court			
	Chantilly Road & Dawn Valley Court			
	Mill Heights Drive & Mill Heights Court			
Poplar Tree	Lewis Woods Court & Sutton Oaks Drive			
	Sutton Oaks Drive & Post Oak Court			
	Point Pleasant Drive & Hazelnut Court			
	Star Flower Drive & Over Ridge Court			
	Star Flower Drive & Star Flower Court			
	Star Flower Drive & Sun Orchard Drive			
	Star Flower Drive & Quiet Stream Court			

	4863 Autumn Glory Way			
Fairfax	Forest Dr and Crescent Dr			
	Plantation Pw and Antietam Ave			
	Plantation Pw and Confederate La			
	5909 Pocol Dr			
	6008 Pocol Dr			
	6009 Pocol Dr			
	6019 Pocol Dr			
	4115 Orchard Dr			
	Shirley Gate Rd and Peep Toad Ct			
	Willowmeade Dr and Sebastian Dr			
	Brentwood Farms Rd & Hollow Tree La			
	Valley Road and Highland Place			
	Otter Run Rd and Springstone Dr			
	Ofaly Rd & Meath Dr			
	Popes Head Rd ad Beech Ridge Dr			
	Forest Dr and Crescent Dr			
Annandale	6536 Renwood Lane to Renwood Lane & Parkedge Lane			
	4609 Brookside Drive to Brookside Dr & Vale Ct.			
Bren Mar Park	Bostwick Dr. & Columbia Rd. to Bostwick Dr & Montgomery St			
	Bostwick Dr. & Dalton to Anders terrace & Cather Rd			
Columbia Elem	Conwell Drive @ 3 rd Fire Lane to Conwell Dr & 1st Fire Lane			
Braddock Elem	4713 Ravensworth Road to Ravensworth Rd & Carmine St			
	5110/5111 Philip Road to Braddock Road & Philip Road			
Holmes	6448 Elmdale Road to Elmdale Road & Emory Street			
	Spring Valley Dr. & Tunlaw St.to Spring Valley Dr. & Birch Lane			
	Watkins Trail & Cathcart to Watkins and Mason Ridge			
Mantua	Mantua: GT stop consolidation: student will walk to base school; removed			

	Monticello Dr. & Linda La.			
	Mantua ESL last year for grandfathered student, stop removed: Starr Jordan La. & Stark Rd.			
Ravensworth	Ravensworth ES stop removal out of boundary AUT student graduated; removed Ravensworth Rd. & Ingle Pl.			
	Wakefield Forest ES stop removals in the walking area:			
	Wakefield Dr. & Elizabeth La.			
	4102 Wakefield Dr.			
Olde Creek	4028 Olley La.			
Canterbury Woods	Canterbury Woods GT: stop consolidations to base schools:			
	Newcastle Dr. & Terrell St. student graduated therefore stop removed. (Braddock ES area)			
North Springfield	These 3 stops below remain due to students not walking at the same time as base students. (North Springfield ES area)			
	Heming Av. & Queensberry Av			
	Heming Av. & Hogarth St.			
	Ferndale St. & Atlee Pl.			
Wakefield Forest	These 4 stops will be consolidated to the existing stop at Wakefield Forest ES.			
	Elizabeth La. & Old Hickory Rd.			
	Ann Fitzhugh Dr. & Charles Hawkins Wy.			
	Wakefield Dr. & Norfolk Av.			
	Wakefield Dr. & Battailles Ct.			
Olde Creek	These 3 stops remain due to students not walking at the same time as base students. (Olde Creek area)			
	Weirich Rd. & Pickstone Dr.			
	Pickett Rd. & Old Creek Dr.			
	Pickett Rd. & Athens Rd.			
Ravensworth	These stops remain due to students not walking at the same time as base students. (Ravensworth ES area)			

	Inverchapel Rd. & Bullock La.			
	Inverchapel Rd. & Drayton La.			
	Queensberry Av. & Foote La.			
	Queensberry Av. & Hatteras La.			
	Queensberry Av. & Sedgwick La.			
Annandale Terrace	These 3 stops remain due to students not walking at the same time as base students. (Annandale Terrace ES area)			
	Medford Dr. & Davian Dr.			
	Medford Dr. & Rawlins Rd.			
	Medford Dr. & McWhorter Pl.			
	Old		New	
McLean	Chesterbrook ES-			
	Colleen La & Meric Rd		Loch Raven and Colleen	
	1705 Great Falls St		Northwest side of Great Falls St & Sea Cliff Rd	
	1719 Great Falls St			
	1710 Great Falls St		Southeast side of Great Falls St & Sea Cliff Rd	
	1732 Great Falls St			
	6614 Chesterfield Av.		Youngblood and Ivy Hill Dr	
	6620 Chesterfield Av.			
	6622 Chesterfield Av.			
	1818 Chesterfield Pl.			
	1820 Chesterfield Pl.			
Herndon	Powells Tavern @ Stone Mountain			
	Ferndale @ Barton Oaks			
Langley	Brian Jac La. & Kelso Rd.		Not noted	
	926 Rolling Holly Dr.		Not noted	
Langley/Cooper	Jay Smith St. & Galpin Ct.		Not noted	
	Crayton Rd. & Crayton Ct.		Not noted	
	Clinch Rd. & Timber Knolls Ct.		Not noted	
	1024 Cup Leaf Holly Ct.		Not noted	

Cooper	Balls Hill Rd. & Benjamin St.		Not noted	
	12125 Holly Knoll Ct.		Not noted	
	Lancia Dr. & Lancia Ct.		Not noted	
Forestville	Silver Beech Rd. & Syrup Mill Rd.		Not noted	
	Syrup Mill Rd. & Taja Ct.		Not noted	
	12116 Holly Knolls Dr.		Not noted	
	Ridge Dr. & Anna Maria Ct.		Not noted	
	Fallen Holly Ct. & Arden Holly Ct.		Not noted	
	Great Passage Bv. & Great Point Ct.		Not noted	
	Great Passage Bv. & Treeview Ct.		Not noted	
Spring Hill	Swinks Mill Rd. & Carlton Pl.		Not noted	
Churchill Rd	Dominion Reserve Dr. & Glenhaven Dr.		Not noted	
	Centrillion Dr. & Alvermar Ridge Dr.		Not noted	
	Centrillion Dr. & Westmont LA.		Not noted	
	Saigon Rd. & Saigon Cl.		Not noted	
	Summit Rd. & Chelsea Rd.		Not noted	
Freedom Hill	Wolftrap Rd. & Wolftrap Vale Ct.		Not noted	
	Lord Fairfax Rd. & Majestic Knolls Ct.		Not noted	
	Silentree Dr. & Goldentree Wy.		Not noted	
	Silentree Dr. & Forestree Ct.		Not noted	
Chesterbrook	Coleen La & Meric Rd		Not noted	
Kent Gardens	Chesterfield Av & Chesterfield Pl –		Not noted	
	Residential stop at 6613 Ivy Hill Dr		Not noted	
Carson	V Lane at Lance La		Not noted	
	Mill Heights Ct & Mill Heights Dr		Not noted	
	Charles Stewart Dr & Ox Hill Rd		Not noted	
	Turberville La & Turbevill Ct		Not noted	
	Hannahs Pond La & Still Pond La		Not noted	
	Heritage Farm La & Dower House Dr		Not noted	
	Asturian Court at Franklin Corner La		Not noted	

APPENDIX E

SB QUESTIONS re 1st ITERATION

Center

1. *The TTF had a recommendation that we have around 55% of the elementary schools in the first tier and that where possible we try to put those schools that had the shortest bus rides in that tier. It appears as though you have many more elementary schools in the first tier (possibly as many as 75%). Why did you make this adjustment? How did this help improve efficiencies, safety, or cost? To come to a true cost of and feasibility of the TTF recommendation I had hoped to see a bell schedule that (with noted exceptions) mirrored their recommendation.*

We do have a larger number in the first tier.

- The first and second tiers are balanced.
- The HSs and MSs can't start at those times.
- Buses don't leave the high schools until 10 minutes after the last bell, which at the earliest would be 3:35, to as late a departure as 3:55 for the later high schools.
- Those buses with long high school runs can't get to the latest last bell MS by 4:30, much less the earliest at 4:10. So those drivers will drive only 2 tiers. Those buses will be available for high school late runs at a time preferred by the schools.

Our second iteration separates Lee/Key, Chantilly/Rocky Run, and Edison/Twain, with the MSs placed on the third tier, adding 68 MS buses to that tier and reducing the second tier by 33 runs.

2. *The bell schedule presented seems to use a fairly rigid tiered system and does not use a rolling bell schedule to help maximize efficiencies. The TTF recommended tiers but at the same time recommended the use of rolling bells (like we have now in our elementary schools) to maximize flexibility. Why didn't we do that? Will it be utilized in the final report/bell schedule? Do you believe we could save costs (buses used) by implementing a rolling bus schedule for the next iteration? If not, why not?*

In essence, the TTF defined the parameters within which we "roll" schedules to 20 minutes per tier. We used that time and varied the schedules on each tier based on functionality. We can look at rolling them beyond the 20 minute variations if the board will define for us what the limits are. Effectively, if we roll beyond the 20 minute tiers, you're simply opening up the tiers established by the TTF to, for example, 7:40 to 8:20, and telling us to use start times within those limits.

Our current bell schedule, which is the ultimate in rolling schedules, reached that point after years of adjustments – tweaking schedules in five minute increments in order to resolve problems with arrival times. It would be impossible to create a usable schedule like that from scratch. If we ever get that tight with a new configuration, it will only be after we have the opportunity to see how runs flow and what traffic does with our configuration changes.

3. *How many bus stops were consolidated as you revised the runs?*

We didn't consolidate any during the BS revision. That is an ongoing process that began a couple of years ago and will continue in the next several years. Each consolidation must be carefully studied from the perspective of safety and effectiveness. Dealing with parental objections extends the process even further.

4. *Do you have a preliminary cost estimate on the bell schedule you have presented today?*

That information is on the updated copy of the report that you received in July.

5. *What is the timeline for developing and presenting the next iteration?*

Iteration #2 was scheduled to be given to the School Board by the middle of August.

Gibson

3. *On the proposed bell schedules:*

a. *What do the abbreviations mean? I am pretty sure PS is preschool, H is high school, E is elementary school, M is middle school, and S is secondary school. But what is F?*

We are unable to find this abbreviation.

b. *If I am reading the chart correctly, the chart proposes to open McNair ES for grades K-6 at 7:50, but open the school for preschoolers nearly 2 hours later, at 9:40. Do we do this anywhere now? How might this impact families with children in both pre-school and grades K-6? Are there any other schools where the proposed bell schedules are this divergent for different groups of students?*

Yes, but not that big a spread. It's affecting roughly 50% of the schools now but by less elapsed time. The separations now are 30 minutes for most and 60 minutes for a few.

c. *Please comment on the approximate start times for the longest high school bus routes under the proposal. In other words, does opening school an hour later translate into an hour more sleep for these students? If not, what is the approximate gain in sleep time for the average high school student under this draft?*

I don't believe there's any high school with a starting time less than 65 minutes later than it is now. When you add the fact that we now drop off high schools 20 to 35 minutes prior to their opening bell, and that we will no longer be able to do that because the buses will be doing their elementary runs at that time, they should be staying home at least an hour later than they do now with some/many having 90 minutes more. If they went to bed at the same time they do now, they could sleep later and total out to more sleep time. We do note, however, that we cannot now assess the changes that will occur in many high school bus run times with the increase in traffic that occurs later in the morning.

d. *Did you succeed in keeping all the Title I schools off the 3d tier? If not, which Title I schools are on Tier 3?*

No. Garfield, Baileys, and Brookfield are on the third tier.

Kory

Will the 2nd iteration have more of a 'rolling bell' than the first iteration?

The original intent of this project was to reengineer transportation; to disentangle the Gordian knot of bell schedules to relieve the pressure that was creating serious problems within transportation. Tightening up the schedule by using the rolling feature would be counterproductive and would return us to our starting place.

Instead, the early release option was used to provide that flexibility. Execution of a complete revision of the bell schedule structure will be highly problematic. Locking the schedule any tighter than it will be with three 20 minute tier windows would commit us to an situation that could not be improved throughout one entire school year. Allowing time to maneuver the schedules that simply aren't working would allow changes, if necessary, once the school year begins.

Will you expand the ES delivery/drop off window up to 25 min as the TTF has recommended?

As I stated in the SB meeting, we will use that for individual runs when doing so would allow us to place a school at an otherwise unmanageable time.

Will you move the ALC's to tier 3 instead of placing some ES there?

No. With the ALCs on the first tier, we can make the runs very long without negatively impacting anything else. The students go home in the midday, not at the end of the day, which would be problematic. If they go in on the third tier, we would have to add buses to shorten the runs enough to make them manageable or we would have to start the runs on the second tier.

How many buses would need to be replaced and/or purchased next year if we do not change the bell schedule?

We have \$2.2M, funding for approximately 95 buses. That is what we will order in FY '09. We hope to do the same in 2010.

At the TTF meetings, you and Linda stated that the cost of earlier start times would be about \$20 million, which included the cost of needed transportation changes to bring the service up to our standards. Recently the figure for later start times was \$15. Does this mean that implementing some of the recommendations of the TTF has saved money (some TTF recommendations were the same as SB parameters)?

The most valuable – rolling schedules and flexible drop-off times – would be very important to tighten the schedule in the years following the initiation of a complete change.

I think that the value of working from scratch in the assignment of individual schools' schedules has enabled us to realize some efficiencies in the use of our buses across the operations window. While the existing bell schedule is the result of many years of iterations, many of the school schedules we wanted to alter for enhanced efficiency couldn't be touched because of the schedule's structural rigidity. As a result of their co-location, the group members have been better able to develop solutions that cross boundaries to enhance efficiency.

Attach a cost to each parameter used in the first iteration (60 min ride limit, 5--10 min ES arrival/delivery window).

See above

Can you recommend any cost savings we can implement in the 09-10 school year?

I don't know if cost savings are possible except through enhanced efficiency, with the reduction of deadhead miles. I don't know if bus reductions would be possible, but that will be done, as it has in the past, if reasonable and possible. I am confident that we can take some pressure off drivers in some parts of the county. We will look at combination schools closely. We might separate schools now bussed together or we may combine others. As a result of the group members' heightened sensitivity to the placement of our resources and demands, we can use buses more effectively, cross boundary.

Would placing the secondary schools on the 1st tier reduce costs?

I don't know. As it wouldn't be consistent with the SB directives, we didn't consider that possibility.

How many runs were split? Do you intend to keep those split runs in the 2nd iteration?

Only a handful of overly long runs were split. We seek the optimal solution but there would never be enough time to try all possible variables of time, distance, and load.

Does the first iteration meet our service standards?

Both iterations meet the service standards articulated by the TTF.

Will costs increase if we grandfather students into Laurel Hill and Coppermine? Is that factored into the first iteration?

Iterations were based on the schools and runs we had in 07-08. I have no idea what will happen with Laurel Hill and Coppermine. That will depend on boundaries and schedule placement. Typically, grandfathering does have an additional cost. We would note, however, that at almost any point in time we have some grandfathering taking place. By the time we open these two schools, the grandfathering impact associated with last year's boundary study will begin to diminish.