



**Bell Time Study**  
**Prepared for**  
**Fox Chapel Area School District**  
**Pittsburgh, PA.**

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## EXECUTIVE SUMMARY

### CURRENT BELL TIMES

Fox Chapel Area School District is considering moving from three bell time tiers to two tiers. Transfinder's Professional Services was contracted to develop proposed bell times. The following chart shows current bell times, number of runs, and the length of instructional day at each school.

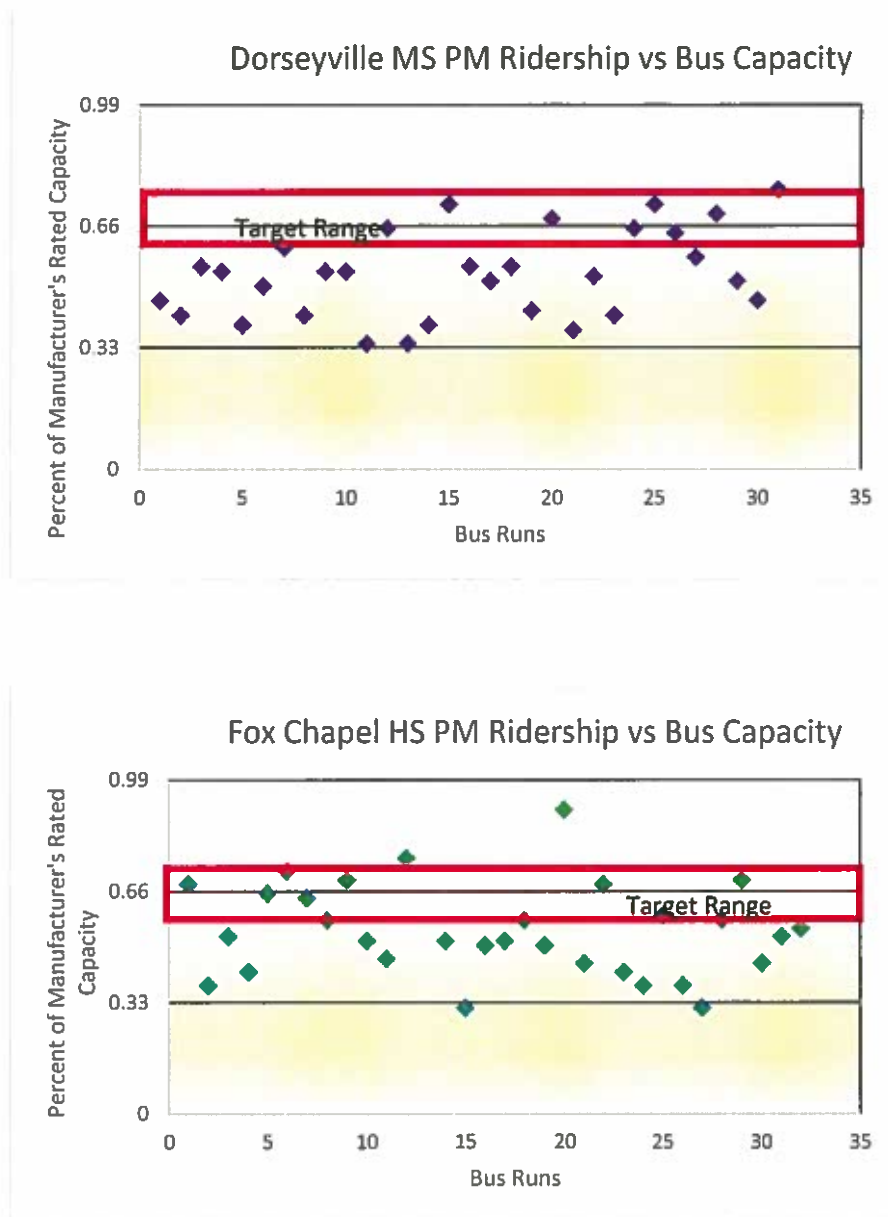
School	AM	PM	Length of Day	Number of Runs
HS	7:30	2:25	6:55	31
MS	8:20	3:05	6:45	31
Hartwood	8:20	2:50	6:30	
O'Hara	8:55	3:35	6:40	
Fairview	9:00	3:35	6:35	8
Kerr	9:00	3:40	6:40	9

### Key Performance Indicators (KPIs)

Key Performance Indicators (KPIs) are nationally recognized measurements of your current transportation operation. KPIs allow you to compare your operational performance year after year. They can also provide a comparison of your own performance in relation to other school districts of similar size, if that information is available. This report provides the baseline for you to use in further comparisons.

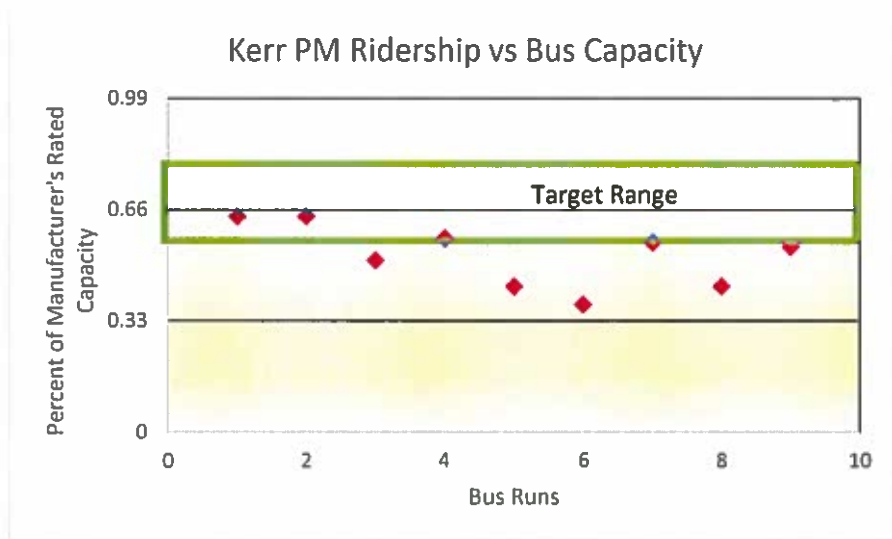
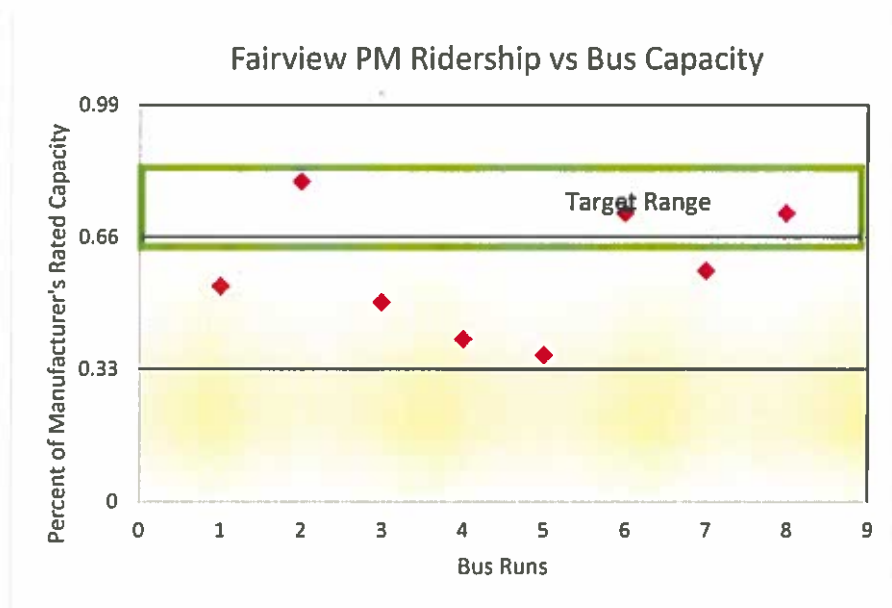
### Ridership KPI

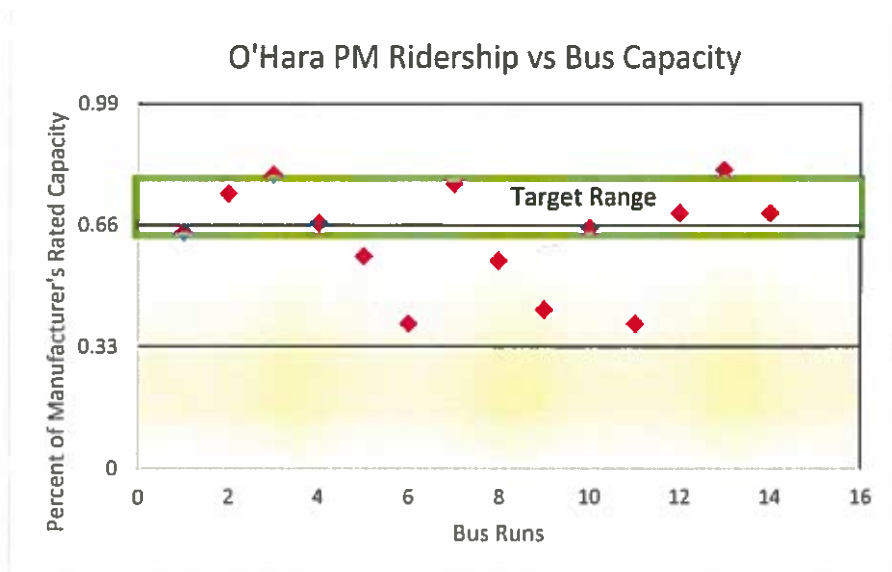
Ability to place additional students on the buses and student ride time form the basis for routing efficiency. The following charts show current utilization of individual buses by school based on manufacturer's rated capacity for each bus and the number of students riding the buses. Buses are shown on the horizontal axis and percent of rated capacity is shown on the vertical axis. The rated capacity places three students on every bus seat which is not possible for most buses. An acceptable range for secondary runs is between 60% and 70% of capacity for actual riders. Actual riders were estimated to be 85% of potential riders for all grades.



The previous chart shows there are unused seats on the buses which could allow significant reductions in the fleet through efficiency routing.

An acceptable efficiency range for elementary runs is between 60% and 80% of capacity for actual riders. Sixty-six percent of capacity is 2 riders per seat and 80% is approximately 3 riders per seat for ½ the bus and 2 riders per seat for the rest. The following charts show elementary ridership by bus.





The following chart shows current runs per school.

SCHOOL NAME	Potential Riders	Actual Riders	Current Runs
Fairview Elementary	353	300	8
Kerr Elementary	361	307	9
Hartwood Elementary	371	316	0*
O'Hara Elementary	675	574	14
TOTALS	1760	1497	31
*Dorseyville MS	886	753	31*
Fox Chapel HS	1252	1064	31
TOTALS	2138	1817	62

\*Currently combined

## PROPOSED BELL TIMES

### OPTION 1

This option moves secondary schools to the last tier of service. It considers a 60-minute gap between tiers of service. This option assumes that Hartwood Elementary would operate with the elementary bells in this model.

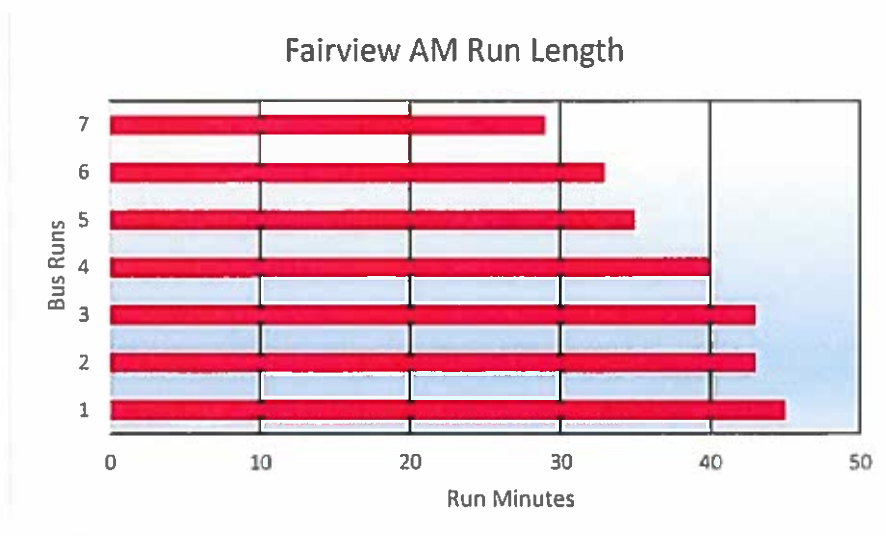
	AM	PM	Runs
Elem	7:40	2:10/2:15/2:20	37
HS	8:40	3:35	25
MS	8:40	3:25	31

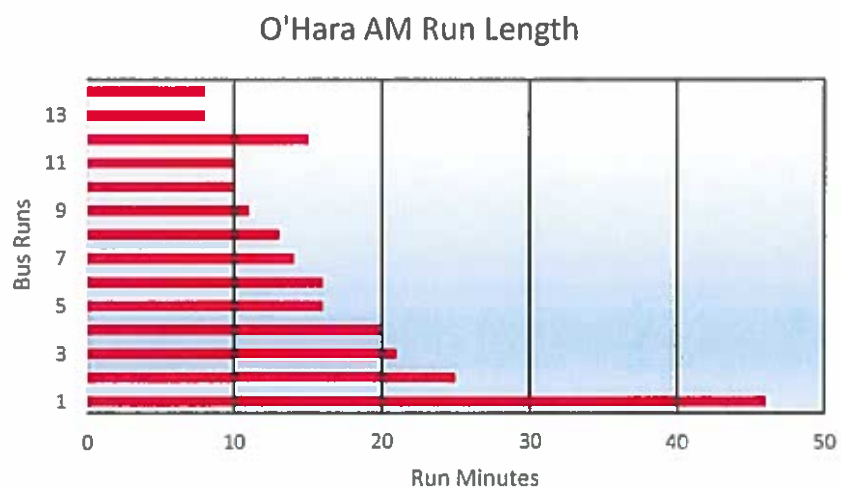
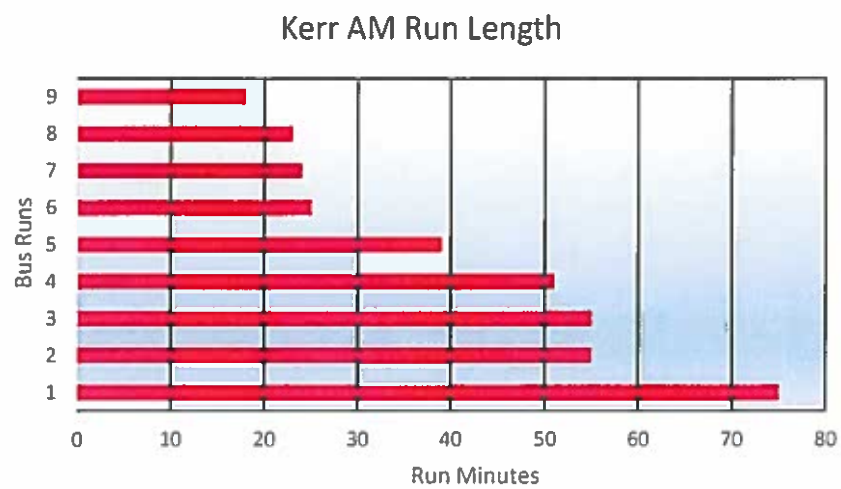
The following charts show both morning and afternoon run lengths compared with the bell times for the next tiers of service. The morning run lengths shown have 10 minutes added above the Routefinder Pro data to allow for dead time between runs.

### MORNING RUNS

#### FIRST TIER

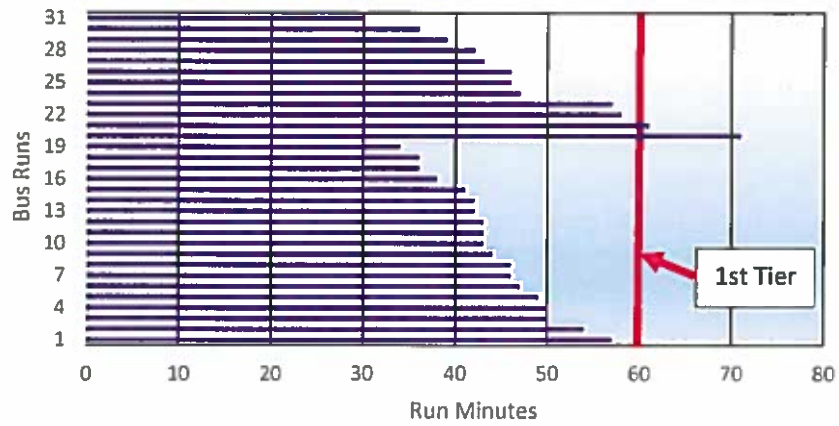
The first-tier morning runs are completed before the 2<sup>nd</sup> tier of service so there are no conflicts with the other bell schedules.



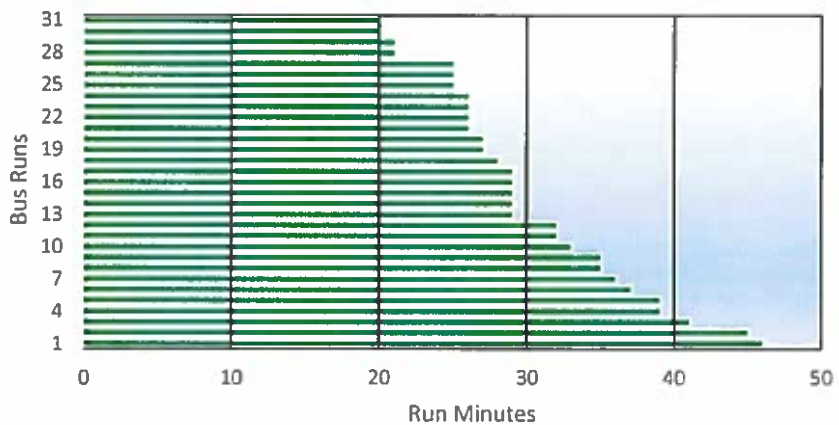


There is one secondary run that starts picking up students before the first tier of service completes. That run is shown on the following charts as passing the time for the next tier of service.

Dorseyville MS AM Run Length



Fox Chapel HS AM Run Length

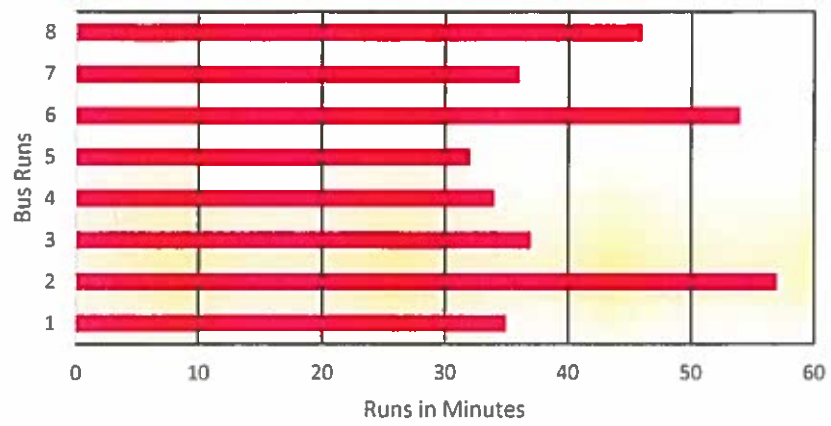


#### AFTERNOON RUNS

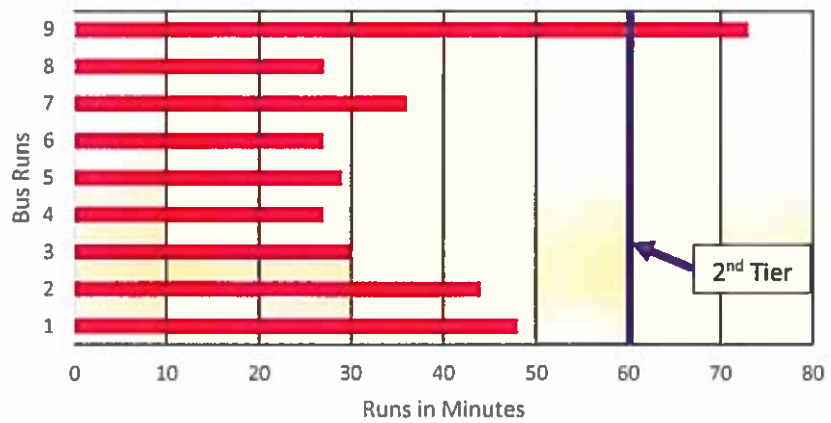
The afternoon runs have 17 minutes added to them for dead head and school loading. There is one elementary run in the afternoon that is too long to fit into the window between tiers and arrive at the second school on time.

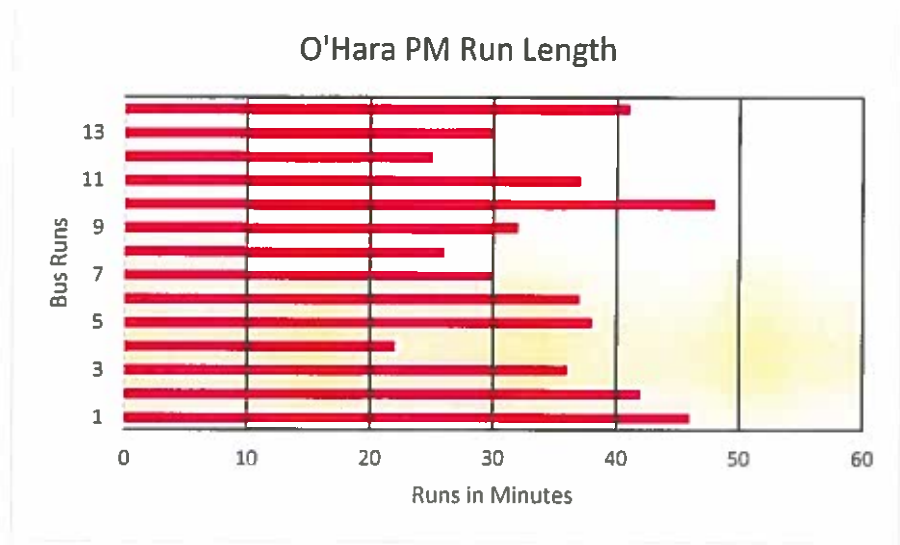


Fairview PM Run Length

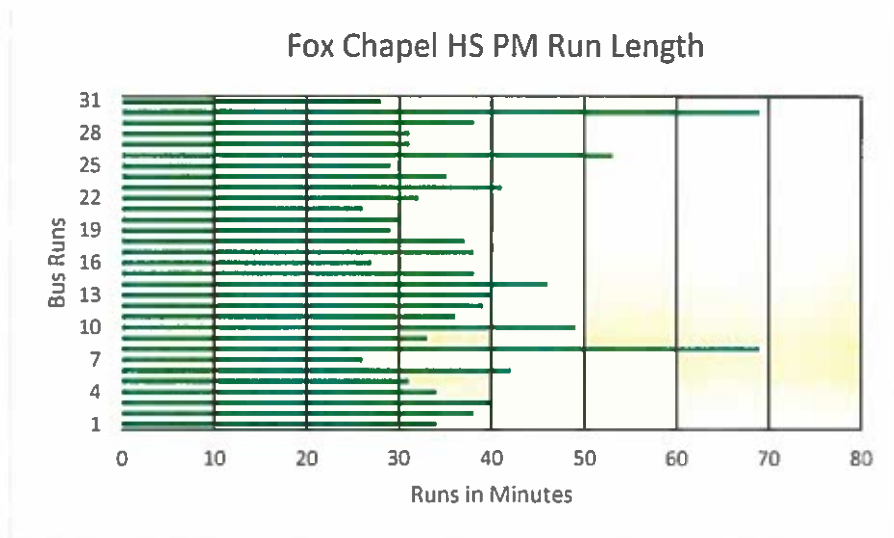
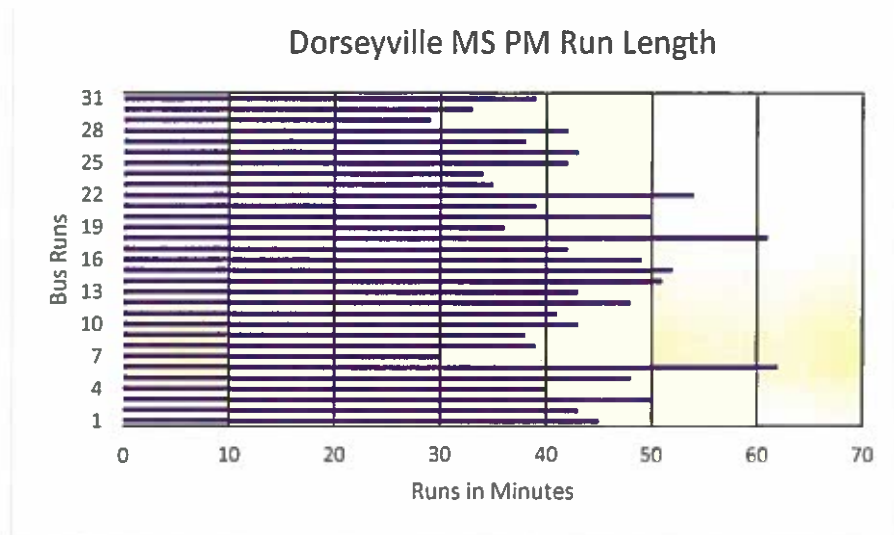


Kerr PM Run Length





The last tier in the afternoon has no conflicts with other bell times.



Option 1	Runs		Runs
Tier 1 Runs AM	37	Tier 1 Runs PM	37
Tier 2 Runs operating	1		
Total Buses Tier 1 AM	32	Total Buses Tier 1 PM	31
Tier 2 Runs AM	56	Tier 2 Runs PM	56
		Tier 1 Runs still operating	1
Total Buses Tier 2	56	Total Buses Tier 2	57
Current Buses	31	Current Buses	31
Expected Buses	56	Expected Buses	57
Delta	+25	Delta	+26

## OPTION 2

Option 2 has elementary schools in the second tier of service. This option splits Hartwood and middle school bus service like Option 1.

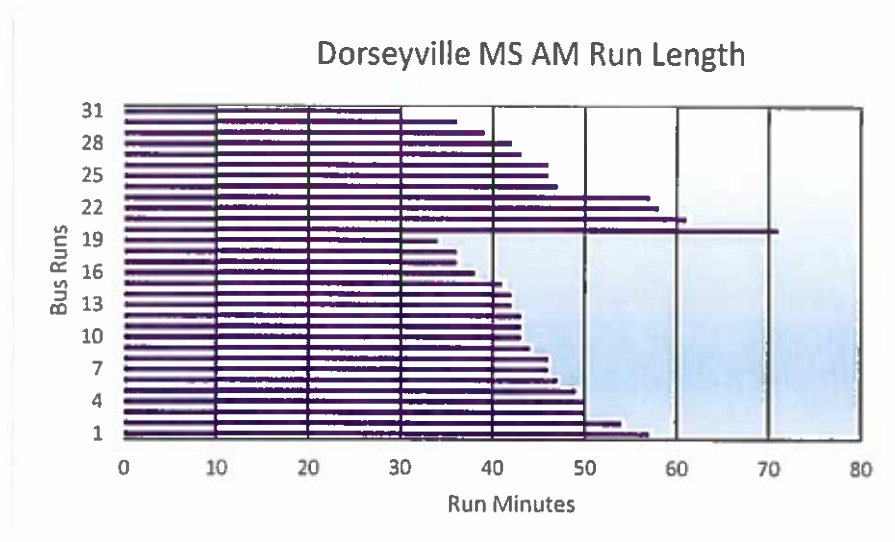
	AM	PM	Runs
HS	7:40	2:35	31
MS	7:40	2:25	25
Elem	8:40	3:10/3:15/3:20	37

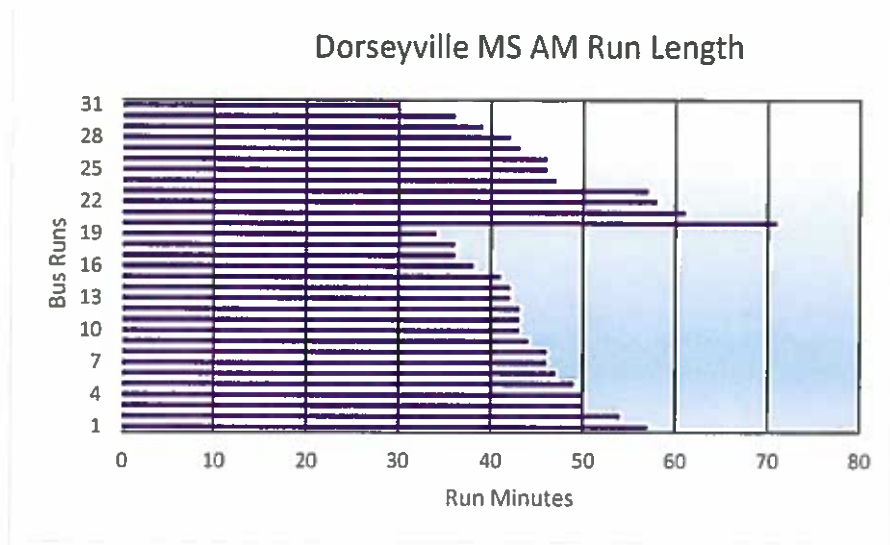
The following charts show both morning and afternoon run lengths compared with the bell times for the next tiers of service. The morning run lengths shown have 10 minutes added above the Routefinder Pro data to allow for dead time between runs.

### MORNING RUNS

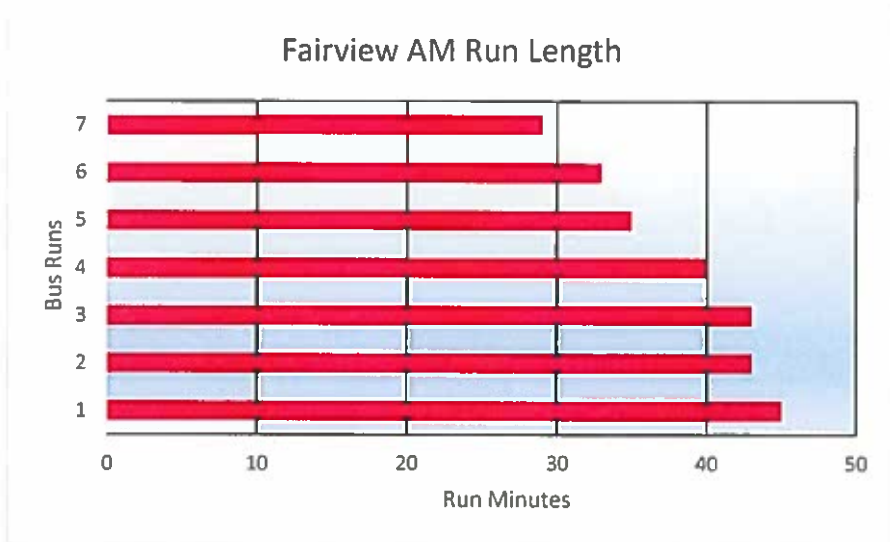
#### FIRST TIER

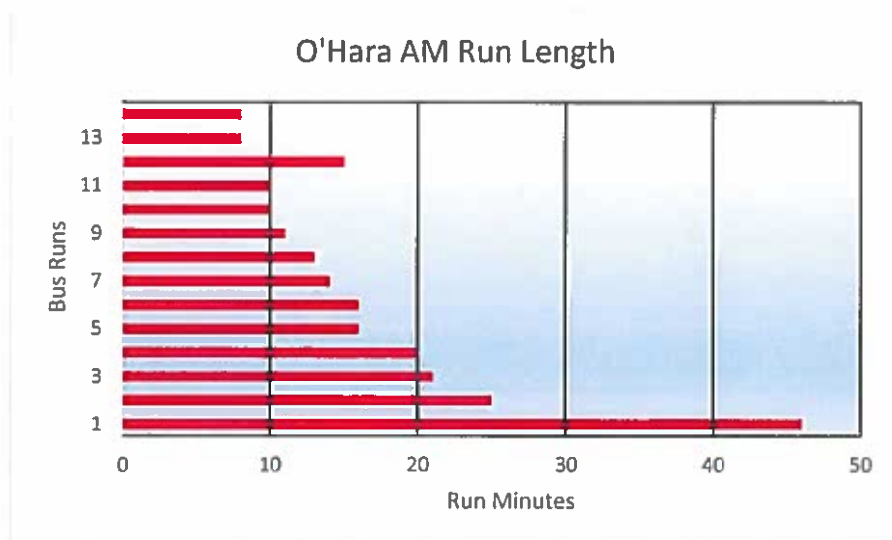
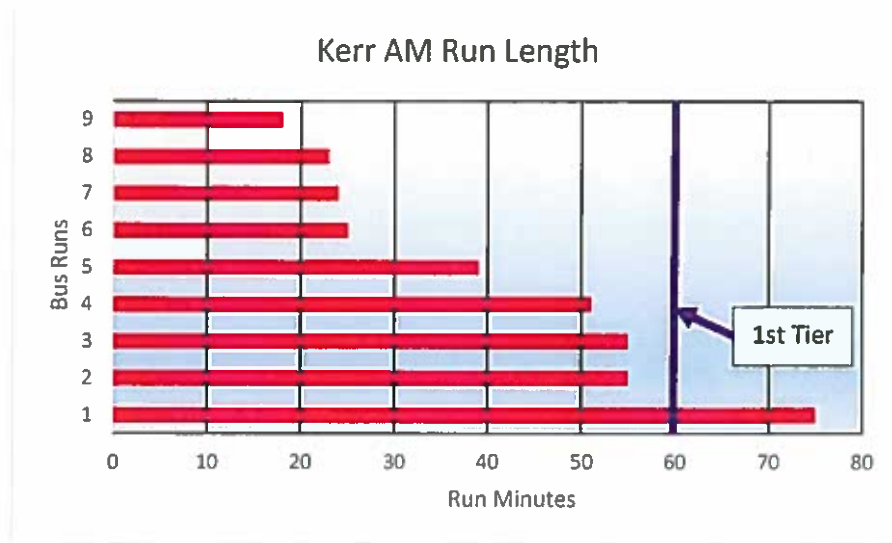
The first-tier morning runs are completed before the 2<sup>nd</sup> tier of service so there are no conflicts with the other bell schedules.





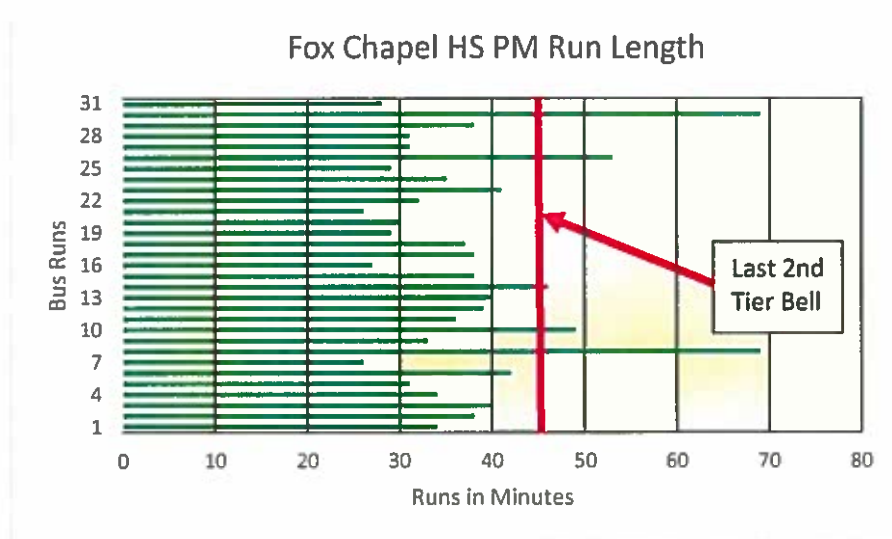
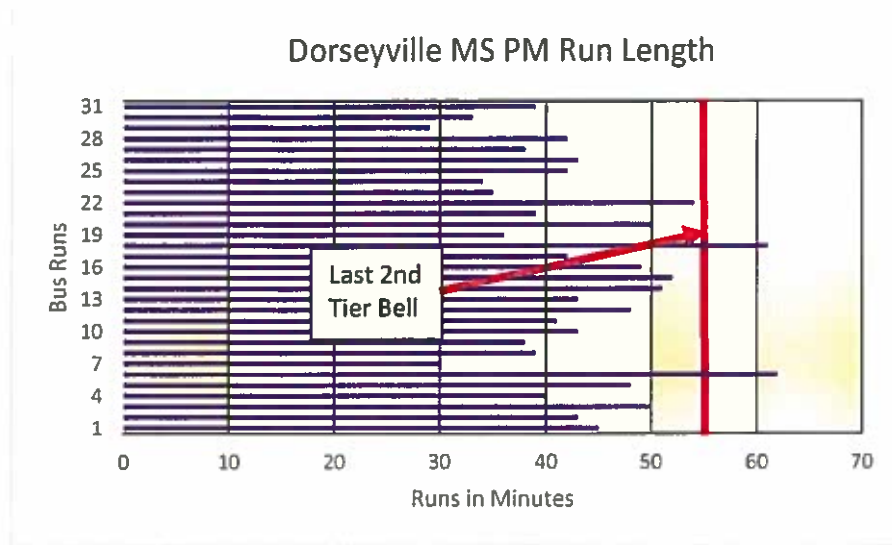
There are three secondary runs that start picking up students before the first tier of service completes. Those runs are shown on the following charts as passing the time for the next tier of service.





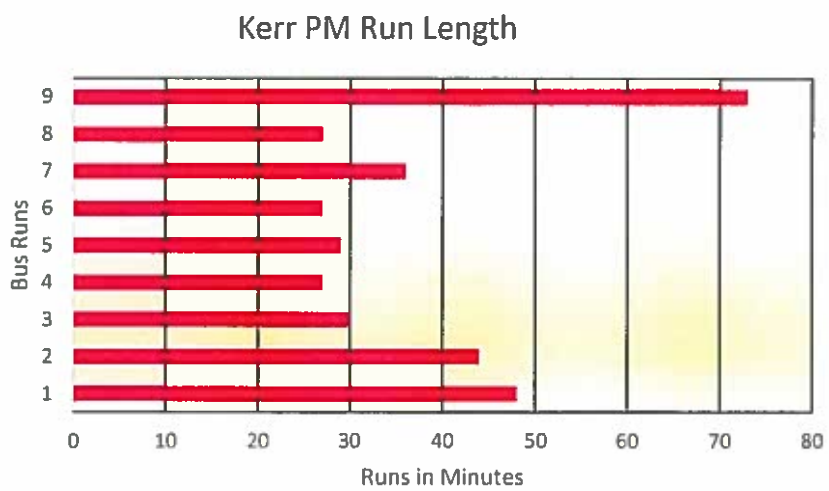
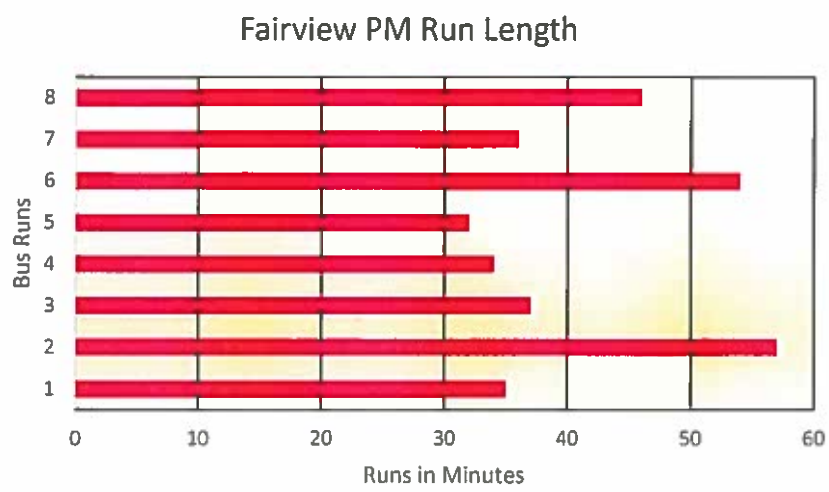
## AFTERNOON RUNS

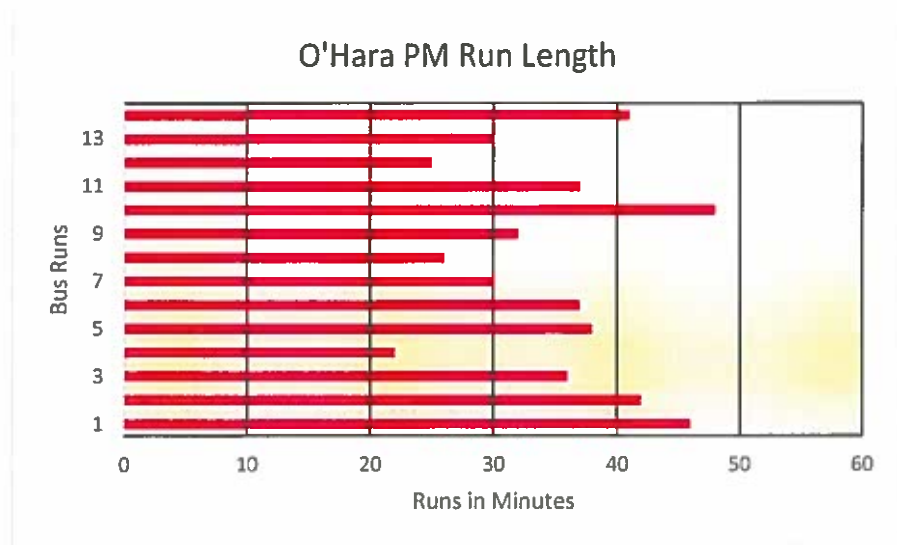
Some elementary runs in the afternoon are too long to fit into the 60-minute window between tiers and arrive at the second school on time. These runs are still delivering students when the second-tier bells ring which adds additional buses to the fleet. The afternoon runs have 17 minutes added to them for dead head and school loading.



The last tier in the afternoon has no conflicts with other bell times.







Option 2	Runs		Runs
Tier 1 Runs AM	56	Tier 1 Runs PM	56
Tier 2 Runs operating	1		
Total Buses Tier 1 AM	57	Total Buses Tier 1 PM	56
Tier 2 Runs AM	37	Tier 2 Runs PM	37
		Tier 1 Runs still operating	6
Total Buses Tier 2	37	Total Buses Tier 2	43
Current Buses	31	Current Buses	31
Expected Buses	57	Expected Buses	56
Delta	+26	Delta	+25

### OPTION 3

This option moves secondary schools to the last tier of service. It considers a 45-minute gap between tiers of service. This option assumes that Hartwood Elementary would operate with the elementary bells.

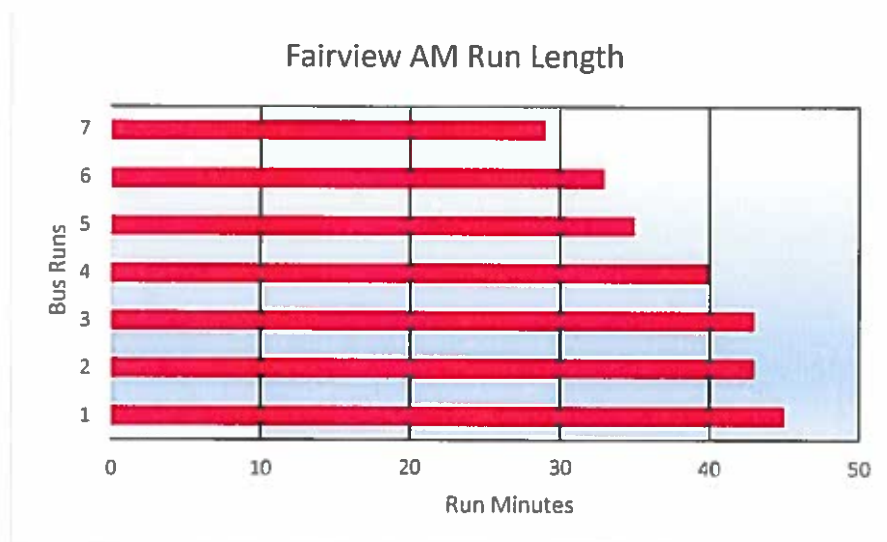
	AM	PM	Runs
Elem	7:50	2:20/2:25/2:30	37
HS	8:35	3:30	31
MS	8:35	3:20	25

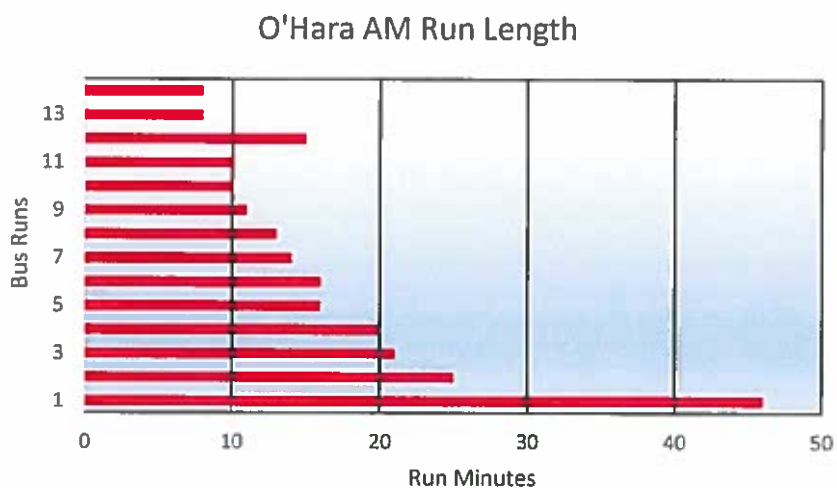
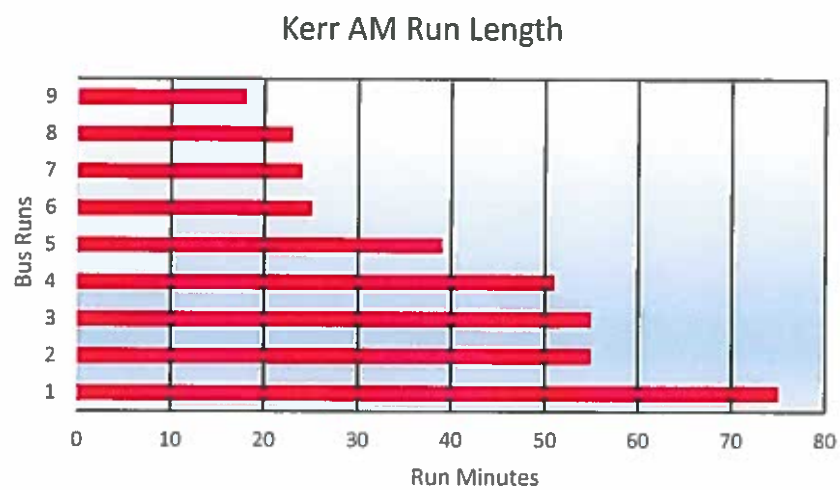
The following charts show both morning and afternoon run lengths compared with the bell times for the next tiers of service. The morning run length shown has 10 minutes added to it above the Routefinder Pro data in the district to allow for dead time between runs.

#### MORNING RUNS

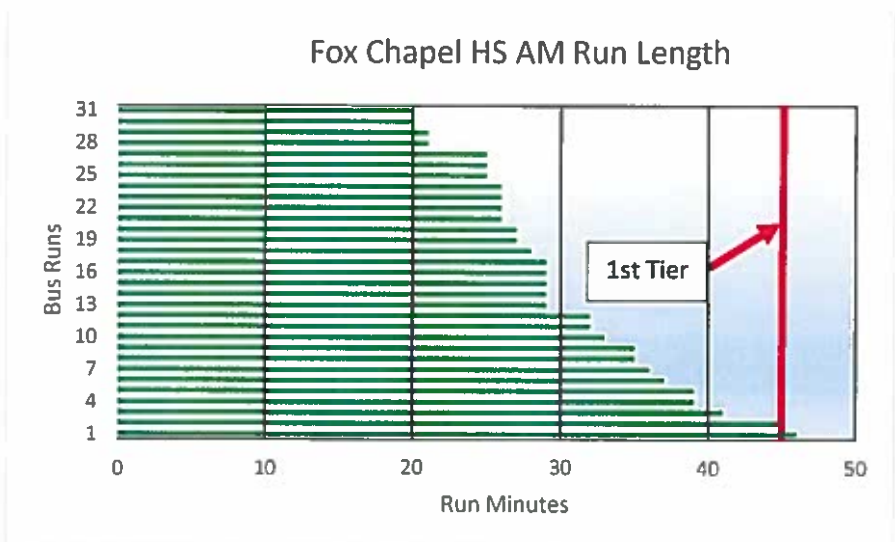
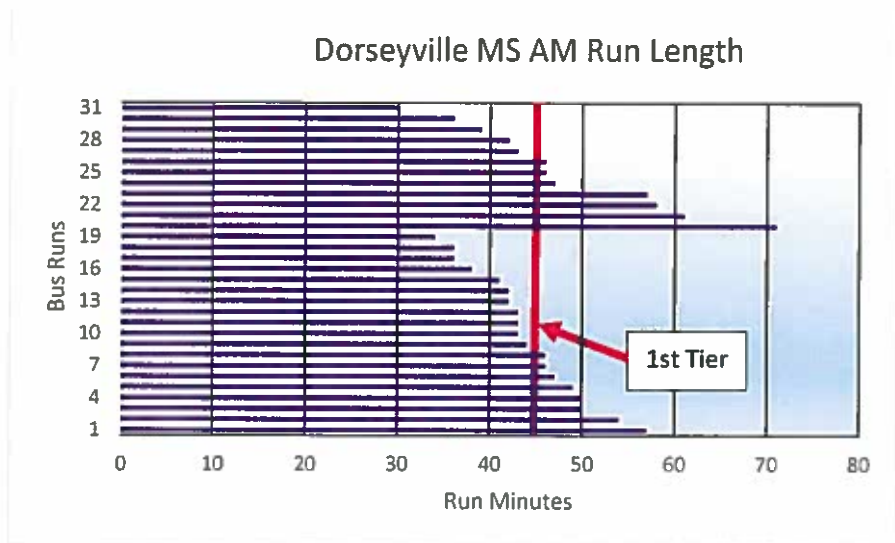
##### FIRST TIER

The first-tier morning runs are completed before the 2<sup>nd</sup> tier of service so there are no conflicts with the other bell schedules.



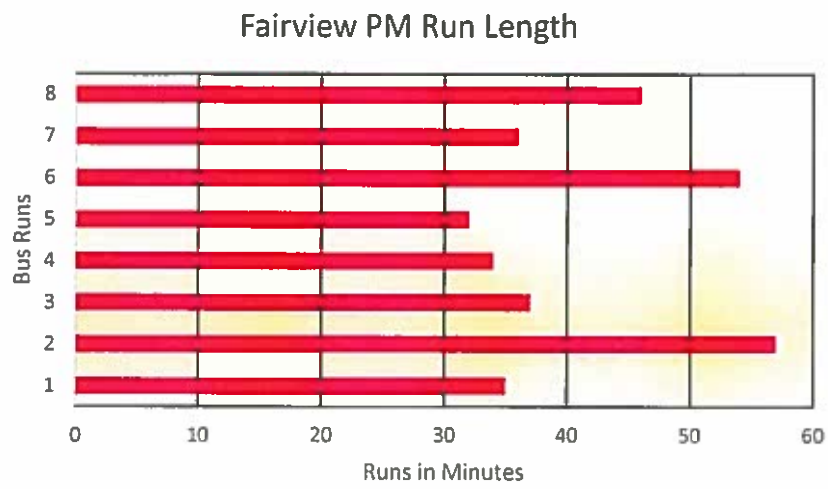


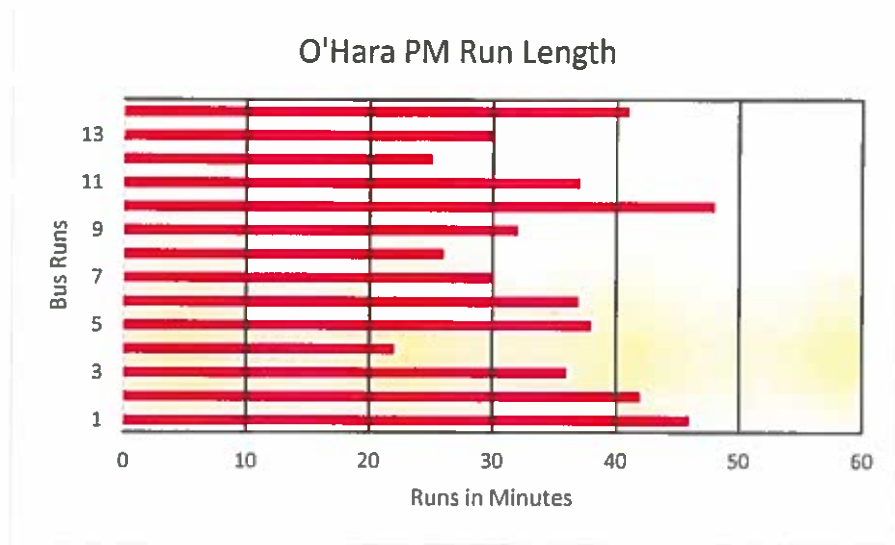
There are six secondary runs that start picking up students before the first tier of service completes. Those runs are shown on the following charts as passing the time for the next tier of service.



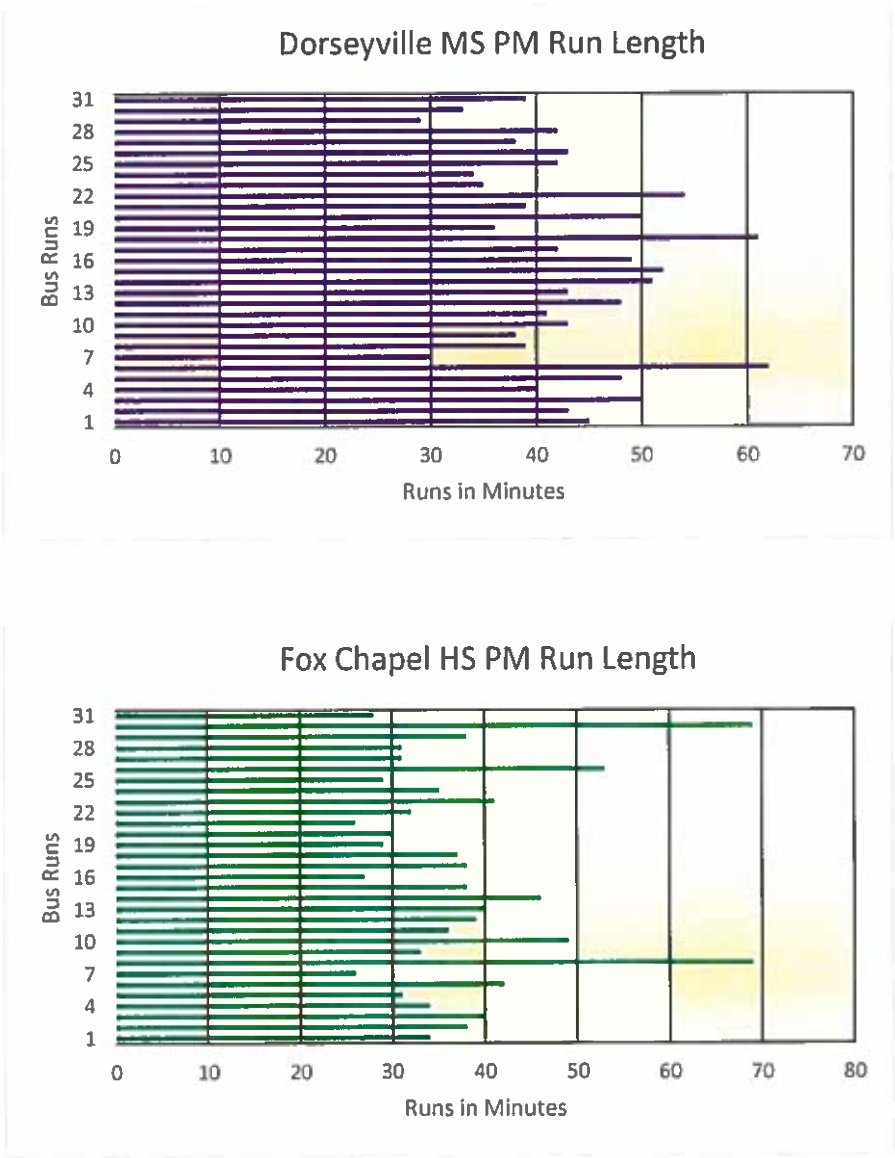
#### AFTERNOON RUNS

There is one elementary run in the afternoon that is too long to fit into the window between tiers and arrive at the second school on time. The afternoon runs have 17 minutes added to them for dead head and school loading.





The last tier in the afternoon has no conflicts with other bell times.





Option 3	Runs		Runs
Tier 1 Runs AM	37	Tier 1 Runs PM	37
Tier 2 Runs operating	6		
Total Buses Tier 1 AM	43	Total Buses Tier 1 PM	37
Tier 2 Runs AM	56	Tier 2 Runs PM	56
		Tier 1 Runs still operating	1
Total Buses Tier 2	56	Total Buses Tier 2	57
Current Buses	31	Current Buses	31
Expected Buses	56	Expected Buses	57
Delta	+25	Delta	+26

#### OPTION 4

This option splits secondary schools between tiers of service. It considers a 45-minute gap between tiers of service. This option assumes that Hartwood Elementary would operate with the middle school.

SCHOOL NAME	Potential Riders	Actual Riders	Current Runs
Fairview Elementary	353	300	8
Kerr Elementary	361	307	9
Hartwood Elementary	0*	0*	0*
O'Hara Elementary	675	574	14
TOTALS	1760	1409	31
Dorseyville MS	1257*	1068*	31*
Fox Chapel HS	1252	1064	31
TOTALS	2509	1695	62

\*Combined

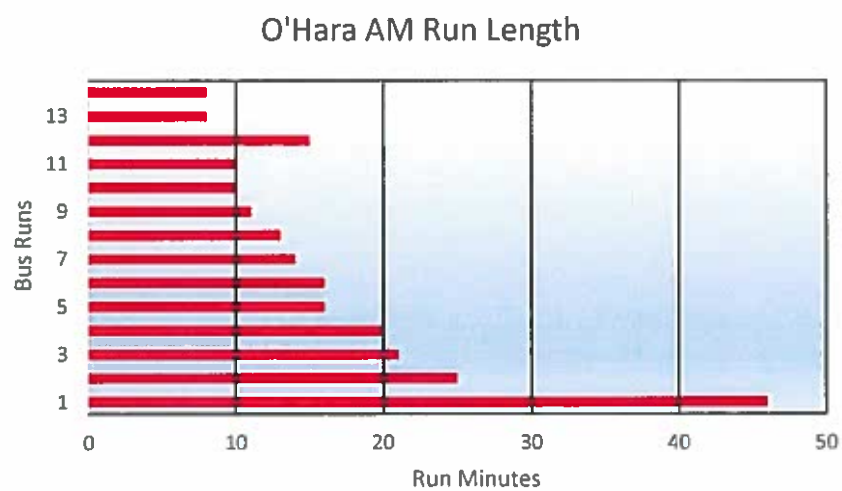
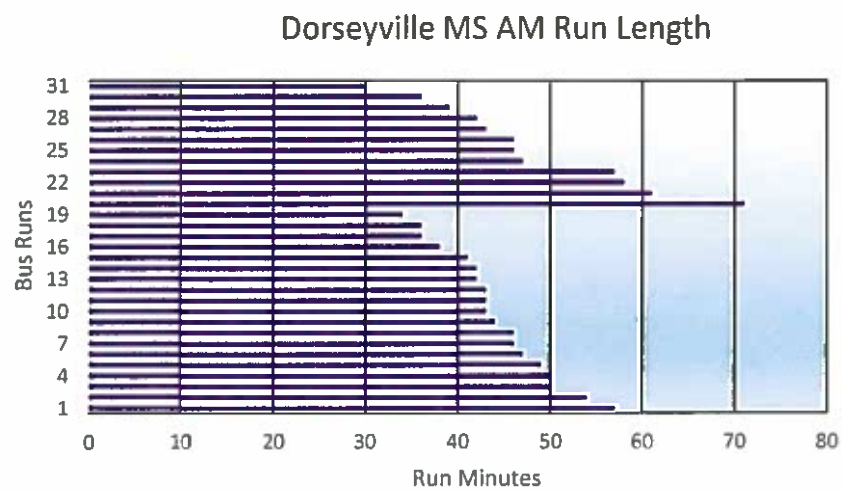
	AM	PM	Runs
MS	7:50	2:35	31
Hartwood	7:50	2:20	0
O'Hara	7:50	2:30	14
HS	8:35	3:30	31
Kerr	8:35	3:10	9
Fairview	8:35	3:10	8

The following charts show both morning and afternoon run lengths compared with the bell times for the next tiers of service. The morning run length shown has 10 minutes added to it above the Routefinder Pro data to allow for dead time between runs.

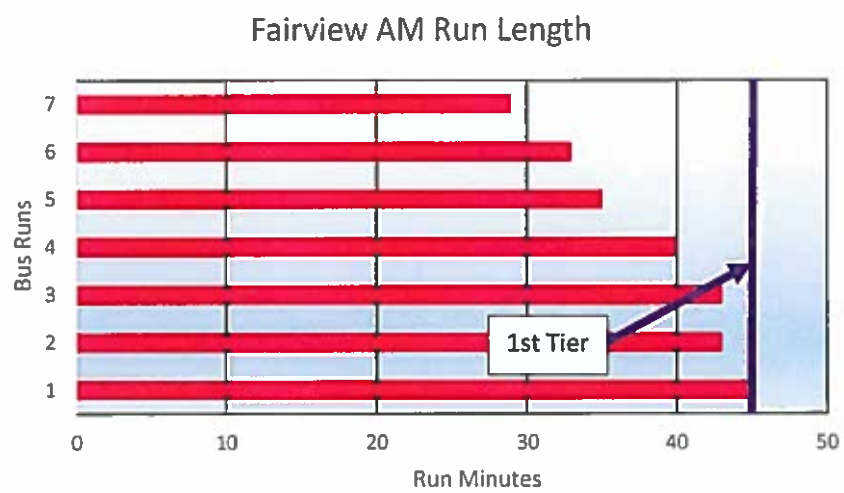
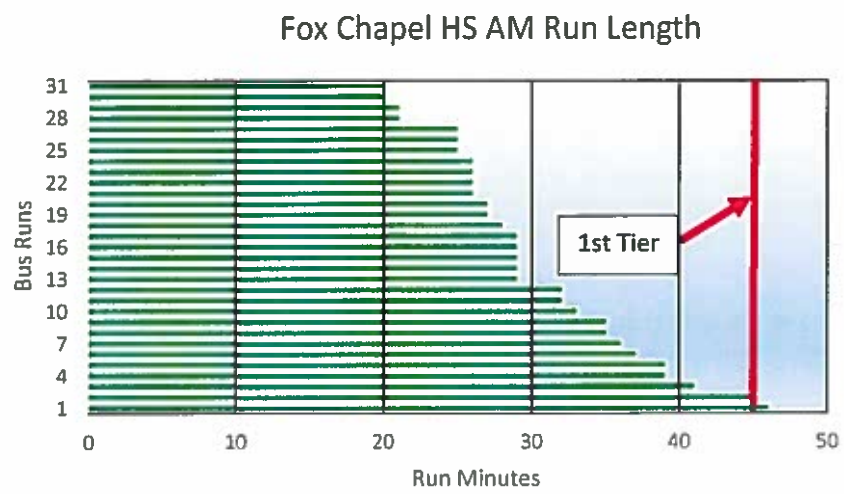
#### MORNING RUNS

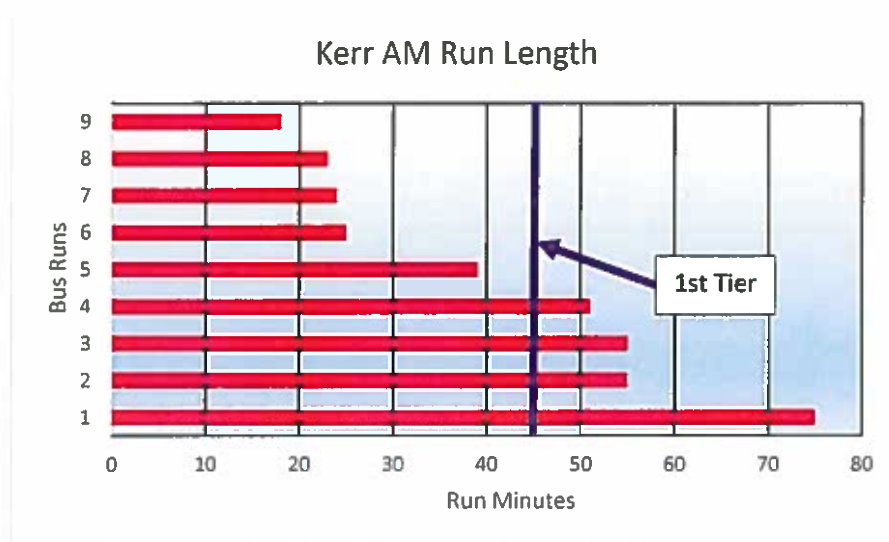
##### FIRST TIER

The first-tier morning runs are completed before the 2<sup>nd</sup> tier of service so there are no conflicts with the other bell schedules.



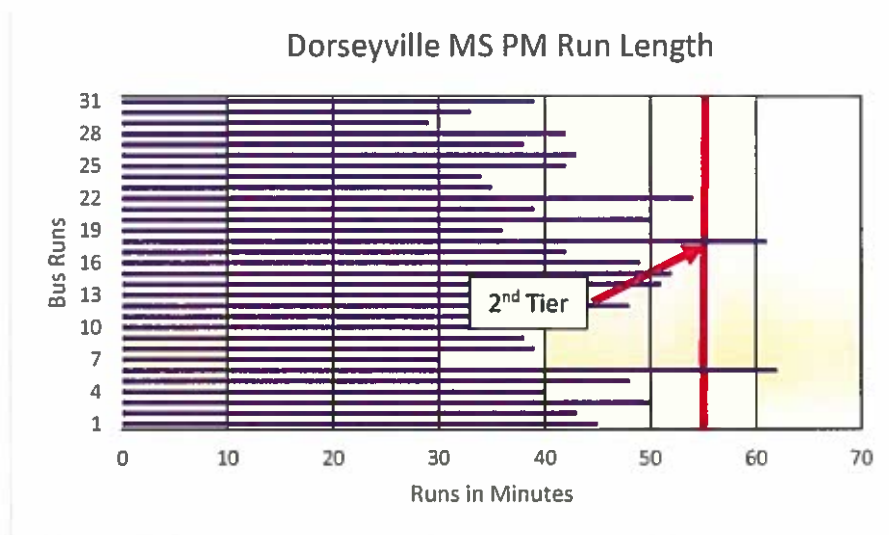
There is one secondary run that starts picking up students before the first tier of service completes. That run is shown on the following charts as passing the time for the next tier of service.

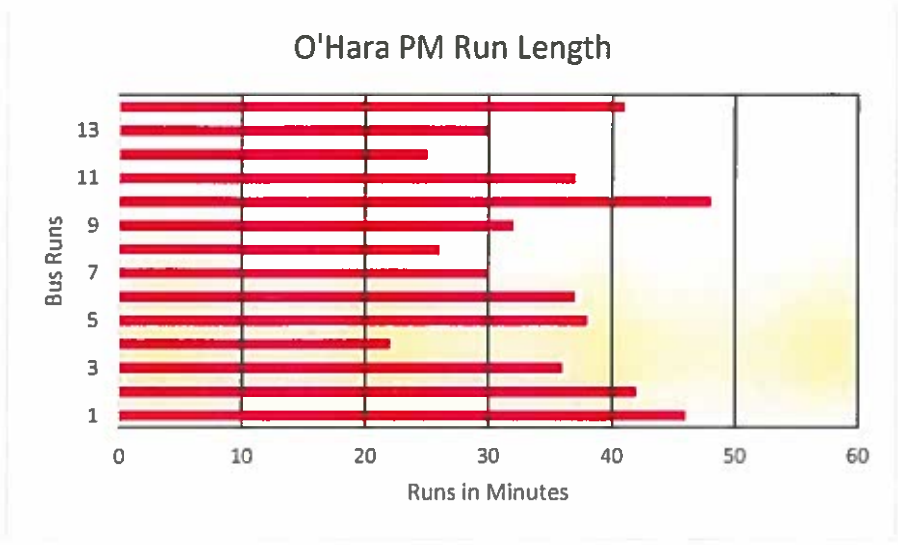




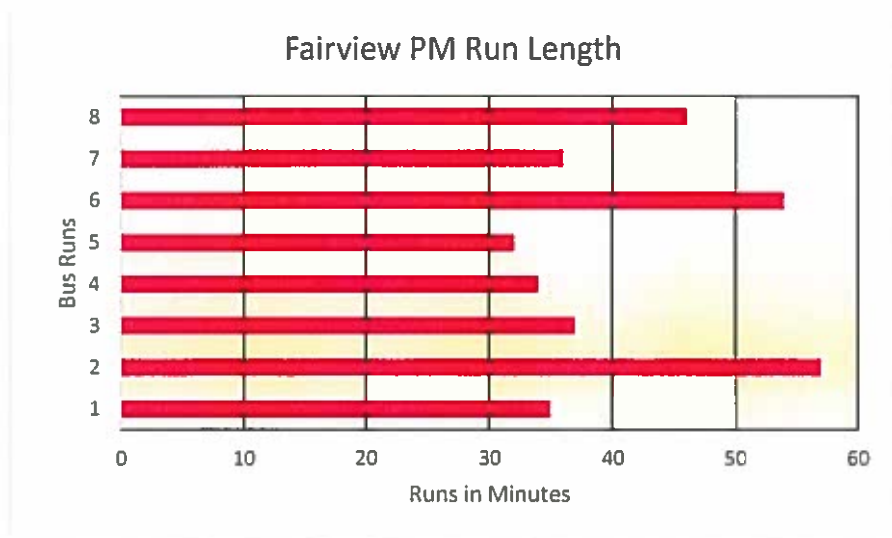
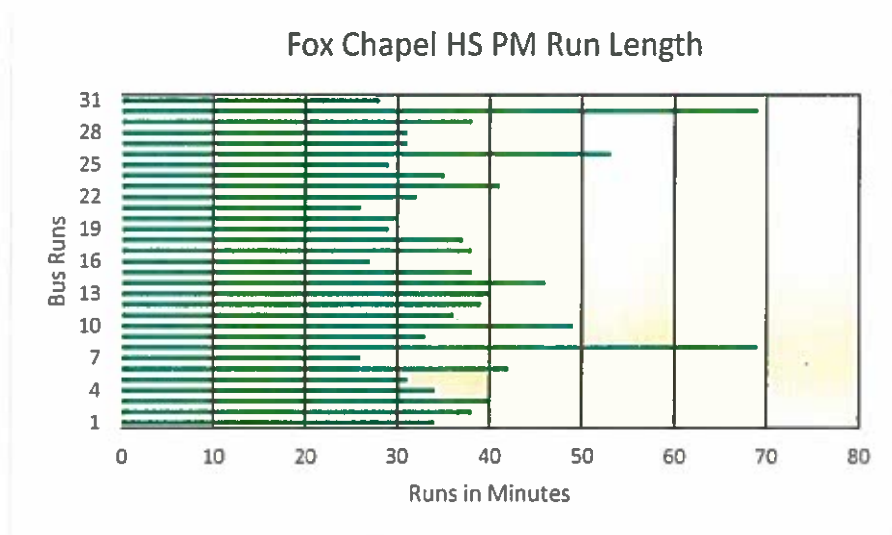
#### AFTERNOON RUNS

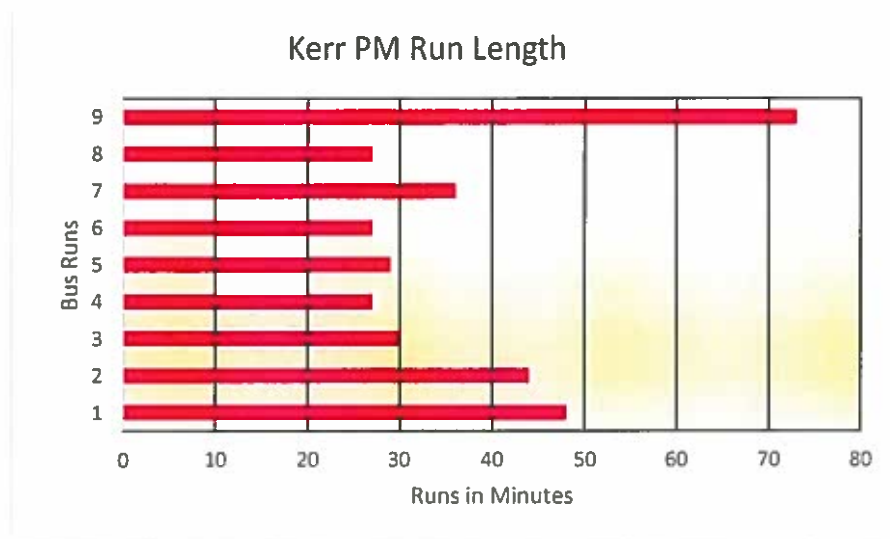
There are two elementary runs in the afternoon that are too long to fit into the window between tiers and arrive at the second school on time. The afternoon runs have 17 minutes added to them for dead head and school loading.





The last tier in the afternoon has no conflicts with other bell times.





Option 4	Runs		Runs
Tier 1 Runs AM	45	Tier 1 Runs PM	45
Tier 2 Runs operating	4		
Total Buses Tier 1 AM	49	Total Buses Tier 1 PM	45
Tier 2 Runs AM	48	Tier 2 Runs PM	48
		Tier 1 Runs still operating	2
Total Buses Tier 2	48	Total Buses Tier 2	50
Current Buses	31	Current Buses	31
Expected Buses	49	Expected Buses	50
Delta	+18	Delta	+19



## OPTION 5

This option maintains the current 3 tiers of service. It considers a 45-minute gap between tiers of service. This option assumes that Hartwood Elementary would operate with the middle school.

SCHOOL NAME	Potential Riders	Actual Riders	Current Runs
Fairview Elementary	353	300	8
Kerr Elementary	361	307	9
O'Hara Elementary	675	574	14
TOTALS	1760	1409	31
Dorseyville MS	1257*	1068*	31*
*Hartwood Elementary			
TOTALS	1257	1068	31
Fox Chapel HS	1252	1064	31
TOTALS	1252	1064	31

\*Combined with MS

	AM	PM	Runs
Fairview	7:50	2:30	8
Kerr	7:50	2:30	9
O'Hara	7:50	2:30	14
MS*	8:35	3:30	31
Hartwood	8:35	3:30	0
HS	9:20	4:20	31

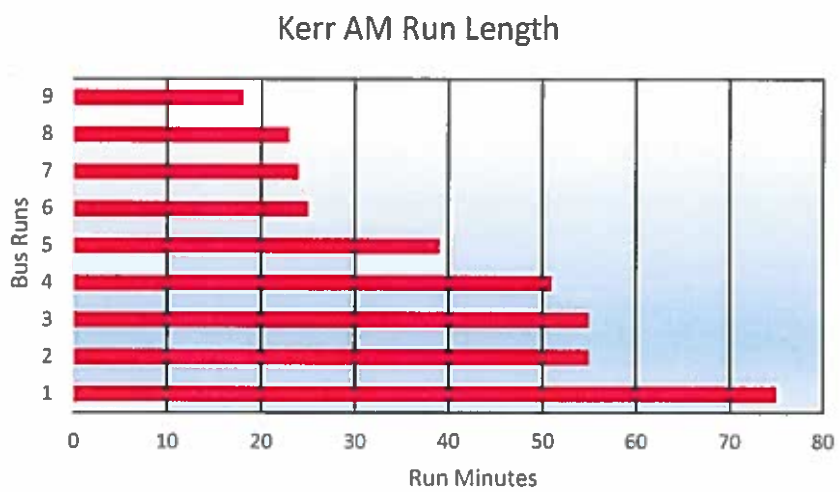
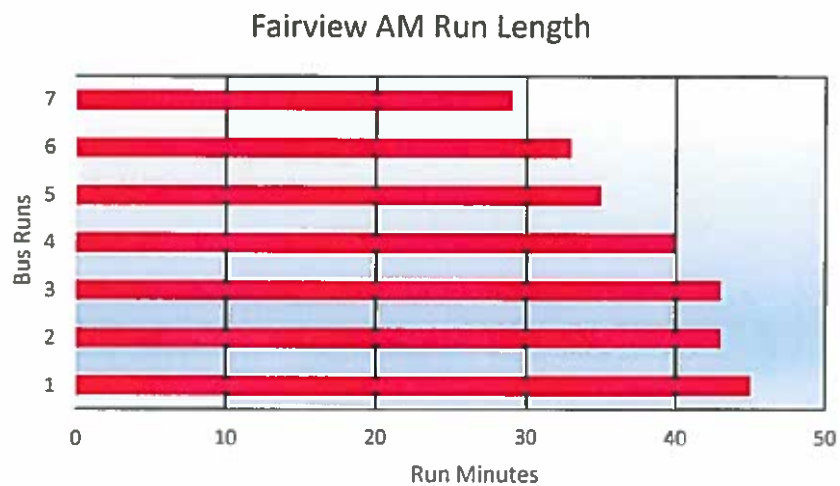
Combined \*

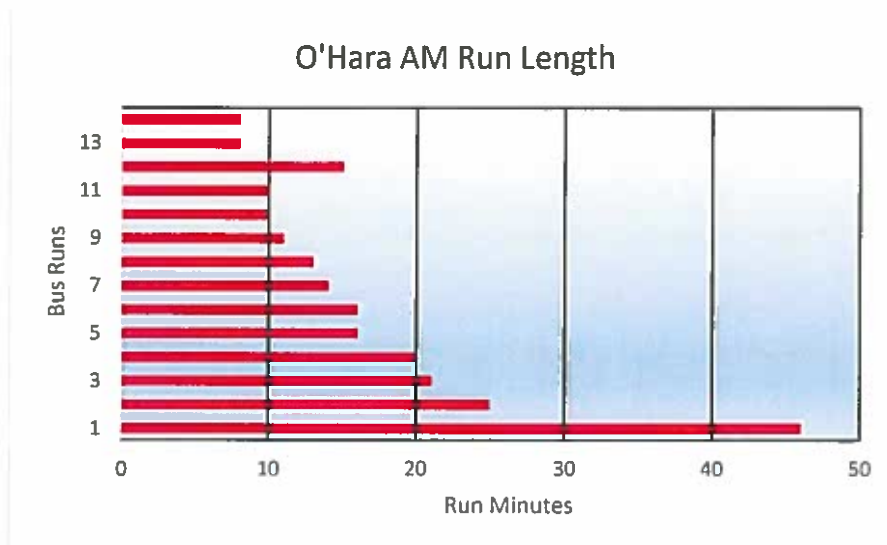
The following charts show both morning and afternoon run lengths compared with the bell times for the next tiers of service. The morning run length shown has 10 minutes added to it above the Routefinder Pro data in the district to allow for dead time between runs.

## MORNING RUNS

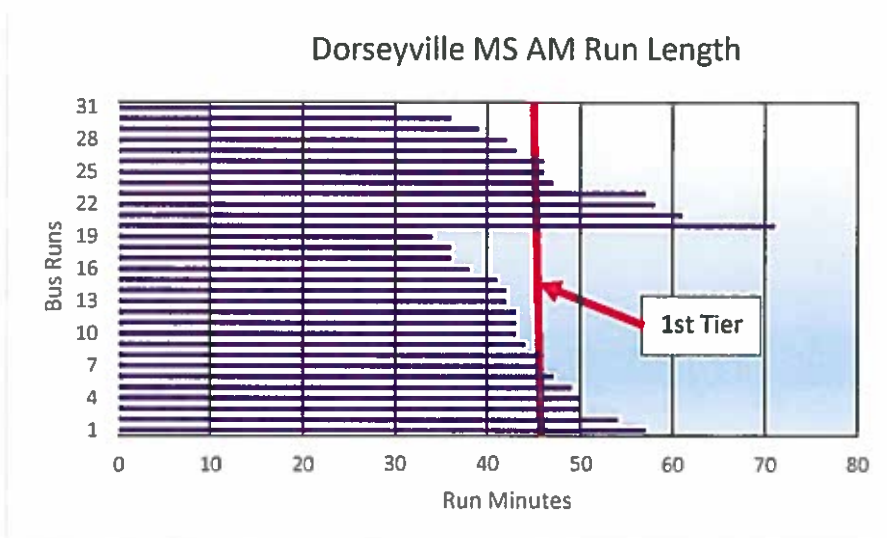
### FIRST TIER

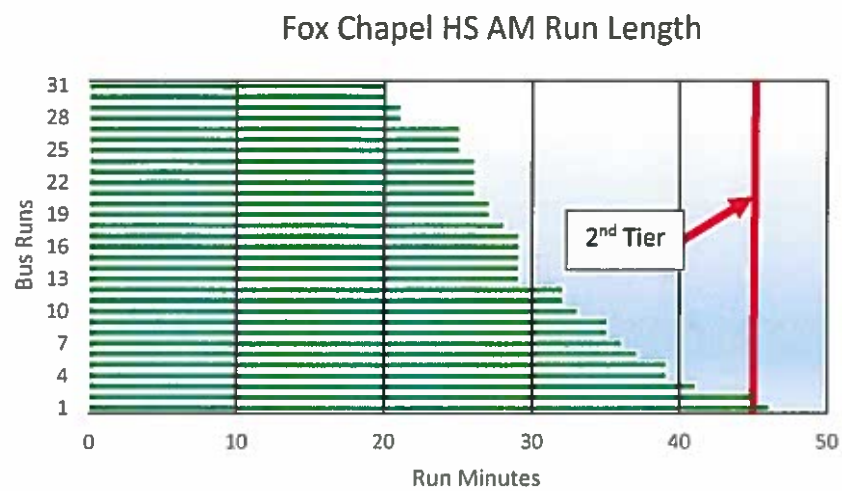
The first-tier morning runs are completed before the 2<sup>nd</sup> tier of service so there are no conflicts with the other bell schedules.





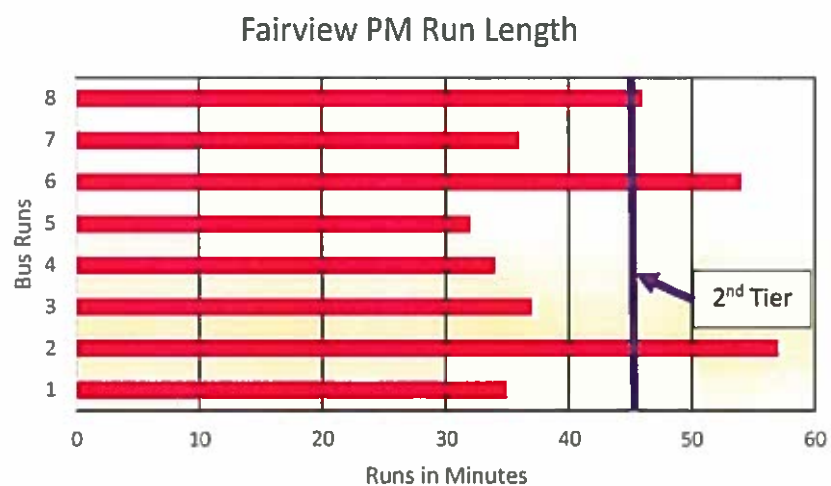
There is one secondary run that starts picking up students before the first tier of service completes. That run is shown on the following charts as passing the time for the next tier of service.

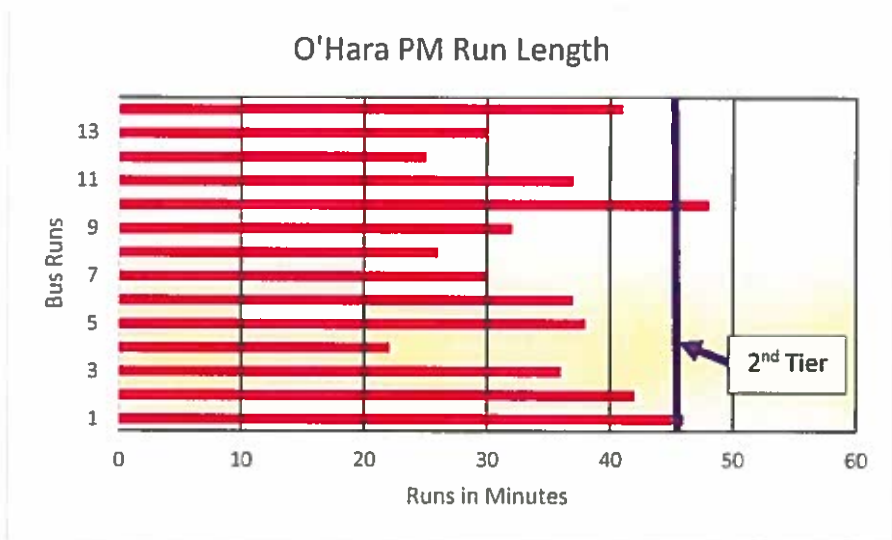
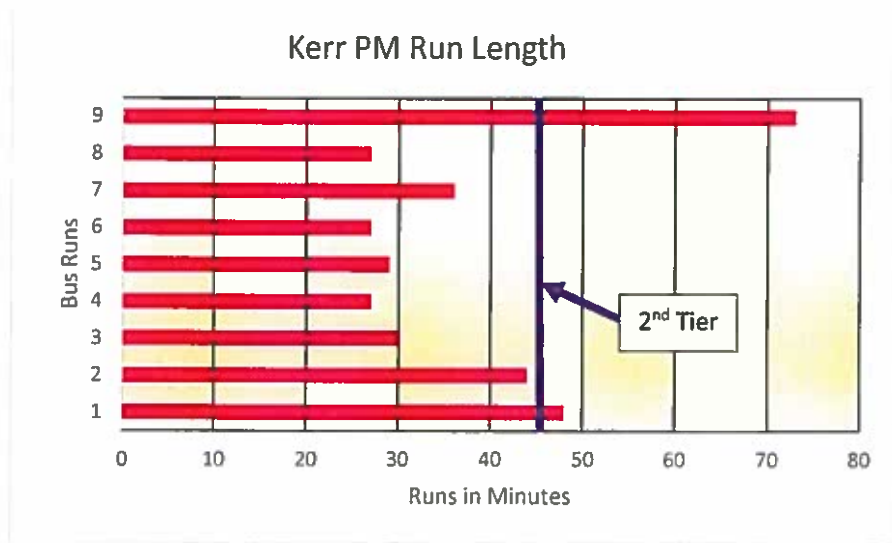




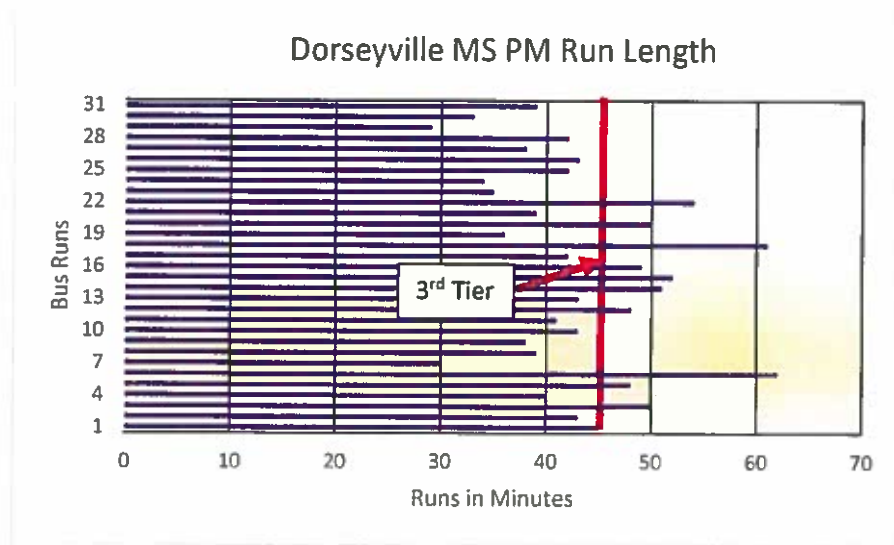
## AFTERNOON RUNS

There are three elementary runs in the afternoon that are too long to fit into the window between tiers and arrive at the second school on time. The afternoon runs have 17 minutes added to them for dead head and school loading.

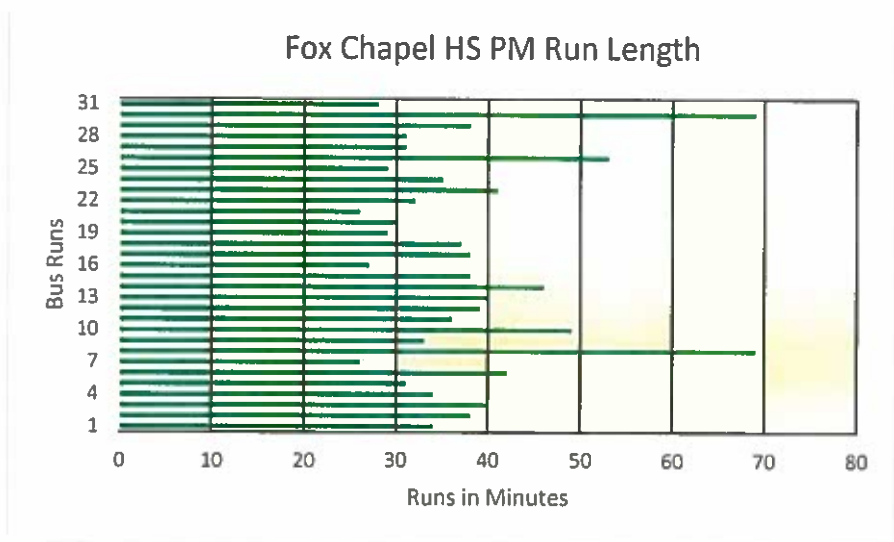




The middle school tier has 5 runs that will not fit into the gap between bells and arrive at the high school on time.



The last tier in the afternoon has no conflicts with other bell times.



Option 5	Runs		Runs
Tier 1 Runs AM	31	Tier 1 Runs PM	31
Tier 2 Runs operating	6		
Total Runs Tier 1 AM	37	Total Runs Tier 1 PM	31
Tier 2 Runs AM	31	Tier 2 Runs PM	31
Tier 3 Runs operating	0	Tier 1 Runs still operating	3
Total Runs Tier 2	31	Total Runs Tier 2	34
Tier 3 Runs AM	31	Tier 3 Runs PM	31
		Tier 2 Runs still operating	5
Total Runs Tier 3	31	Total Runs Tier 3	36
Current Buses	31	Current Buses	31
Expected Buses	37	Expected Buses	36
Delta	+6	Delta	+5

## OPTION 6

This option maintains the current 3 tiers of service. It considers a 45-minute gap between tiers of service. This option assumes that Hartwood Elementary would operate with the elementary schools.

SCHOOL NAME	Potential Riders	Actual Riders	Current Runs
Fairview Elementary	353	300	8
Hartwood Elementary	371	316	6
Kerr Elementary	361	307	9
O'Hara Elementary	675	574	14
TOTALS	1760	1409	37
Dorseyville MS	886	753	25
TOTALS	886	753	25
Fox Chapel HS	1252	1064	31
TOTALS	1252	1064	31

	AM	PM	Runs
Fairview	7:50	2:30	8
Hartwood	7:50	2:20	6
Kerr	7:50	2:30	9
O'Hara	7:50	2:30	14
MS	8:35	3:20	25
HS	9:20	4:15	31

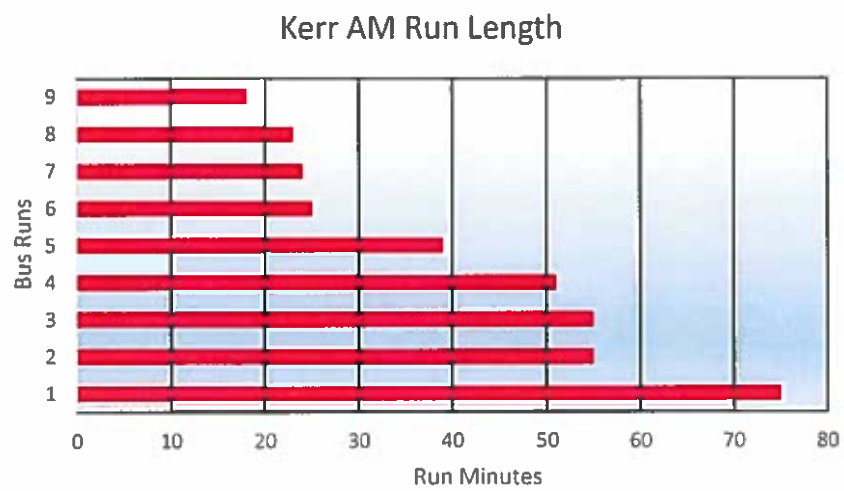
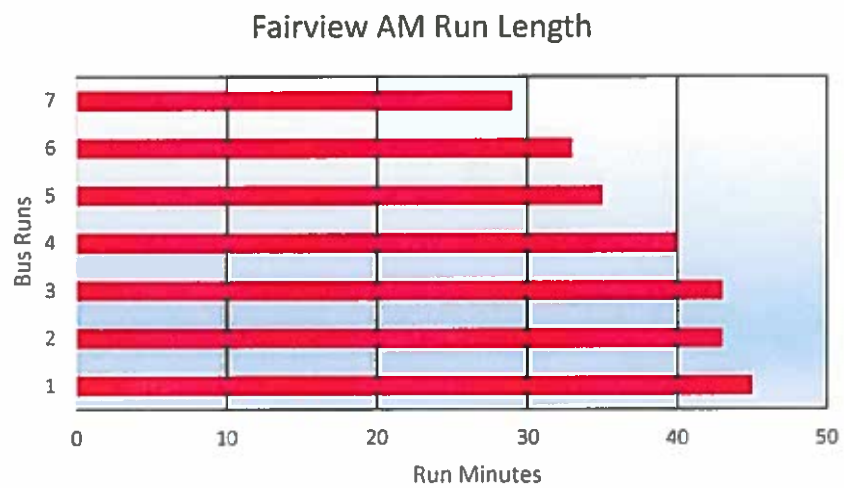
The following charts show both morning and afternoon run lengths compared with the bell times for the next tiers of service. The morning run length shown has 10 minutes added to it above the Routefinder Pro data in the district to allow for dead time between runs.

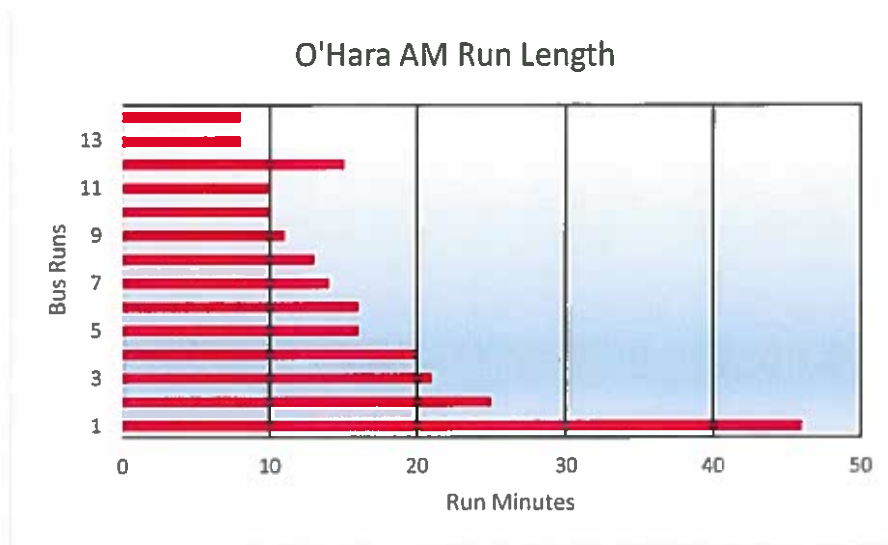
## MORNING RUNS

### FIRST TIER

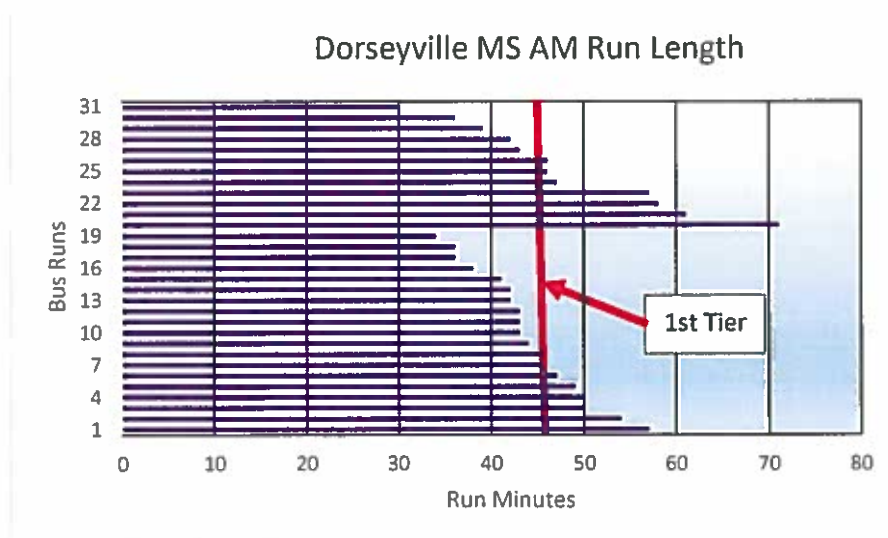
The first-tier morning runs are completed before the 2<sup>nd</sup> tier of service so there are no conflicts with the other bell schedules.

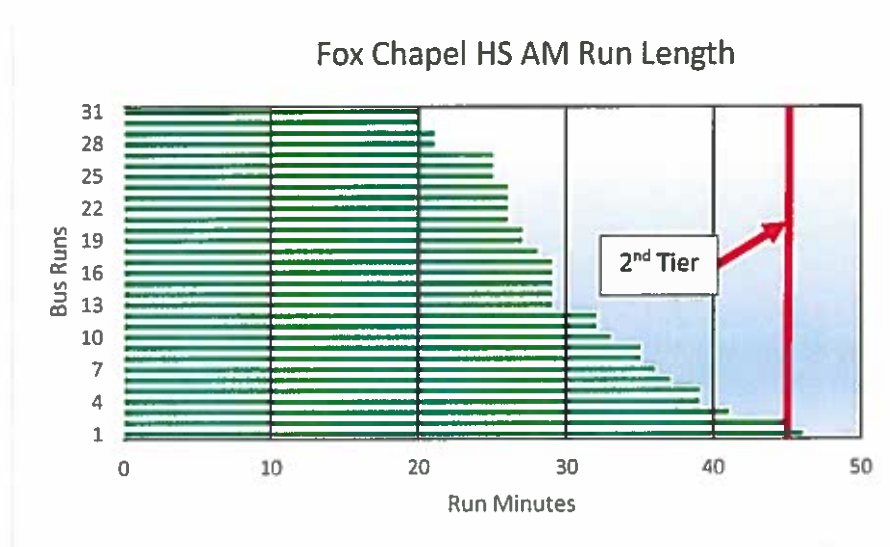






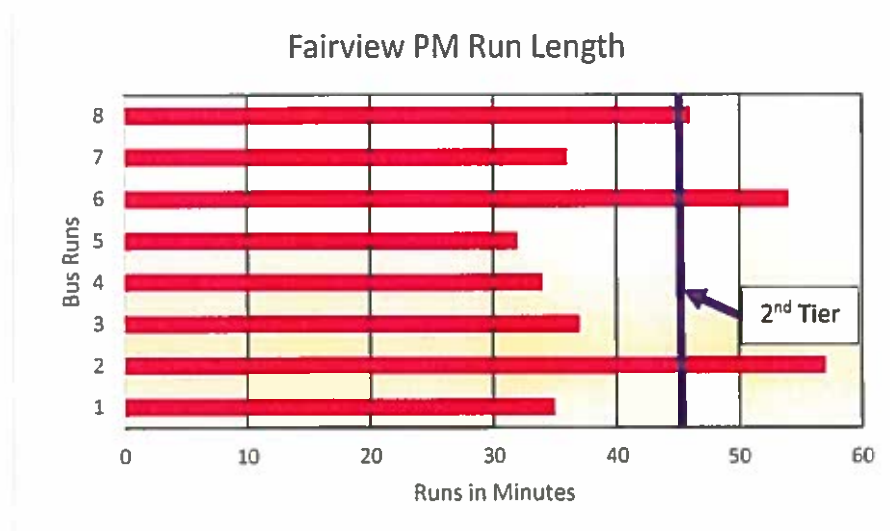
There is one secondary run that starts picking up students before the first tier of service completes. That run is shown on the following charts as passing the time for the next tier of service.

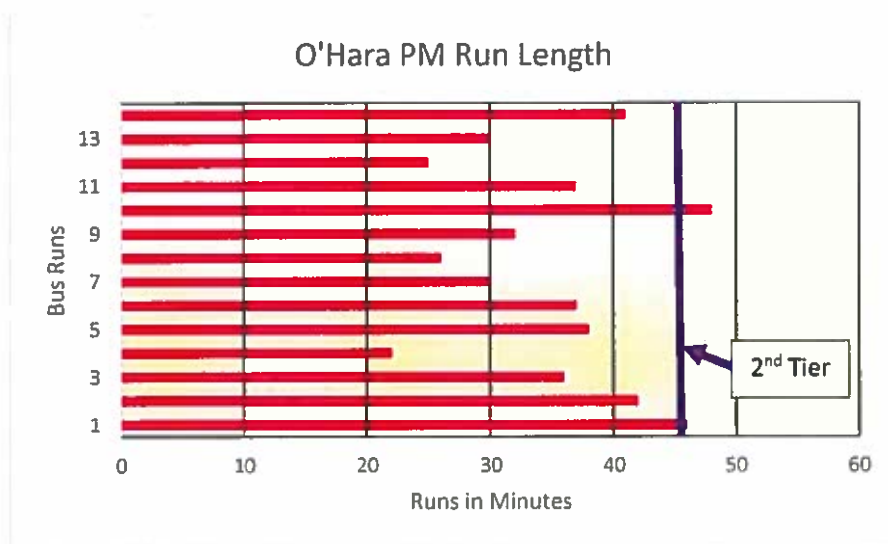
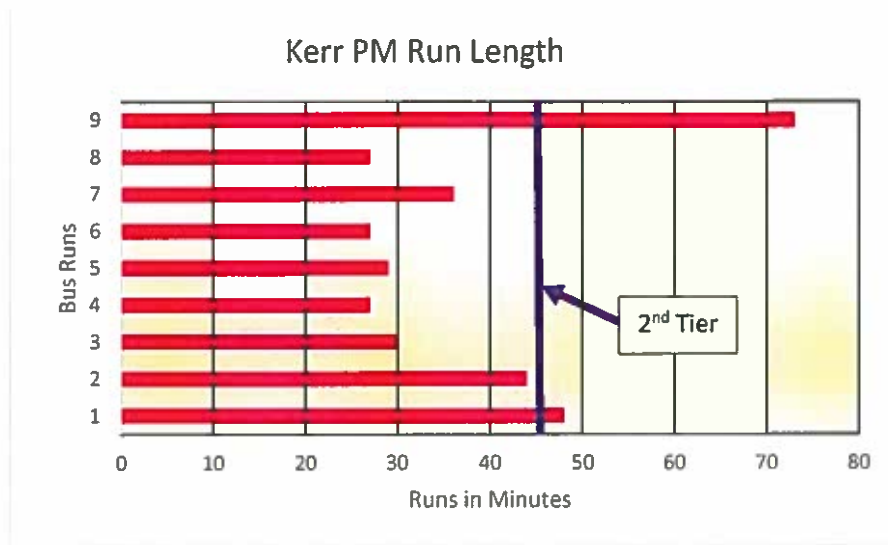




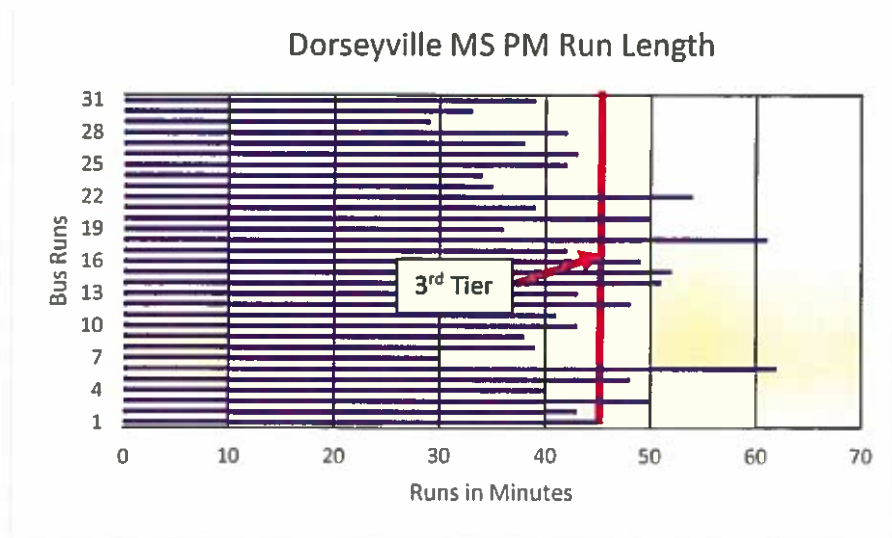
## AFTERNOON RUNS

There are three elementary runs in the afternoon that are too long to fit into the window between tiers and arrive at the second school on time. The afternoon runs have 17 minutes added to them for dead head and school loading.

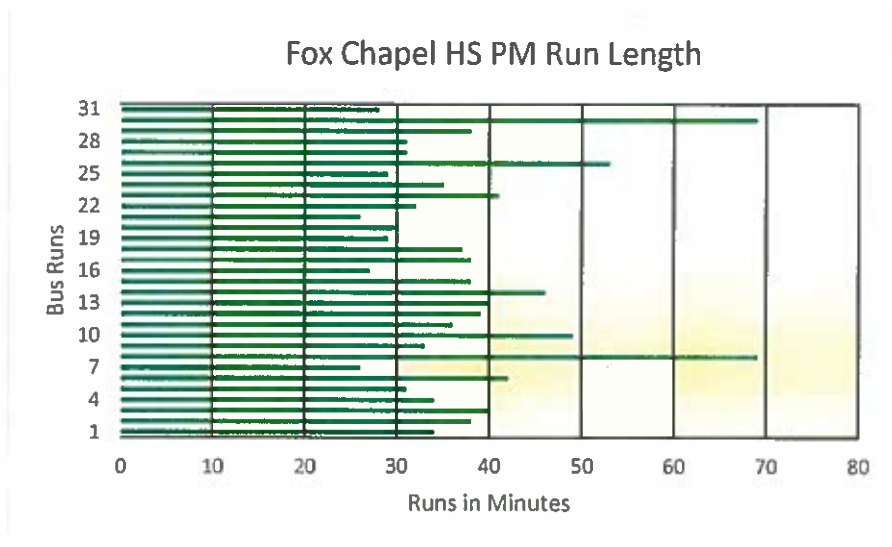




There are six middle school runs that are too long to fit into the time between bells.



The last tier in the afternoon has no conflicts with other bell times.



Option 6	Runs		Runs
Tier 1 Runs AM	37	Tier 1 Runs PM	37
Tier 2 Runs operating	6		
Total Runs Tier 1 AM	43	Total Runs Tier 1 PM	37
Tier 2 Runs AM	25	Tier 2 Runs PM	25
Tier 3 Runs operating	0	Tier 1 Runs still operating	3
Total Runs Tier 2	25	Total Runs Tier 2	28
Tier 3 Runs AM	31	Tier 3 Runs PM	31
		Tier 2 Runs still operating	6
Total Runs Tier 3	31	Total Runs Tier 3	37
Current Buses	31	Current Buses	31
Expected Buses	43	Expected Buses	37
Delta	+12	Delta	+6

## SUMMARY

The project did not include routing for efficiency. Therefore, the charts in the report reflect current runs. **Option 1** bell schedule moves secondary students to the last tier of service with 60 minutes between morning times. It increases the number of buses needed by 26 from the current year.

**Option 2** bell schedule moves elementary schools to the secondary tier. It maintains 60 minutes between tiers of service. It also increases the number of buses needed by 26 from the current year.

**Option 3** again has secondary in the second tier but only has 45 minutes between tiers. The chart indicates that it would increase the fleet by 26 buses like the other options. Like the other charts, it has every bus arrive and depart at virtually the same time.

**Option 4** secondary schools are split in this option with 45 minutes between tiers. This option will increase the bus fleet by 19.

**Option 5** this option maintains the current 3 tier system with 45 minutes between tiers. This option has high school arriving after 9:00 in the morning and dismissing after 4:00 in the afternoon. If all buses arrive and depart schools on time, it will increase the bus fleet by 6 buses.

**Option 6** this option is exactly like option 5 except that Hartwood is on the elementary tier of service. It will require an increase of 12 buses.

It should be noted in all the models that additional reductions in fleet demands could occur if students are dropped off early in the mornings and/or picked up later than school bell times in the afternoons.

This report does not consider the joint partnerships between private, parochial and school district routes which could add significant additional buses to the fleet.