

NEWTON PUBLIC SCHOOLS

School Transportation Efficiency Study and Later High School Start Time Analysis

April 8, 2019

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STUDY OBJECTIVES

- 1. Determine the Cost Effectiveness and Efficiency of the Current Transportation Operation with Recommendations for Improvement**
- 2. Review Various Alternatives for a Later Start Time for the High Schools based upon the following goals:**
 - * Start the High Schools at 8:30 a.m.**
 - * Minimize any Elementary and Middle School Schedule Changes**
 - * Maintain the Current Length of School Day for K-8 schools and as proposed for the High Schools**
 - * Minimize Traffic Congestion at the District Schools During Drop Off and Pick Up Times**
 - * Minimize Student Time on Vehicles with Convenient Bus Stops**
 - * Be Cost Neutral**

DEFINITIONS

- **TIER TIME:** A tier is defined as that time which is available prior to the start of the earliest school, the time between the starting time of the earliest school and the starting time of the next earliest school and the time between the starting time of the second earliest and that of the third earliest school.
- **ROUTE TIME:** The time from the bus depot to the actual school drop off time (includes 6-7 minutes of disembarking time).
- **RIDE TIME:** The time from the time of the first student pick up to the last student drop off (either at school or at home).
- **DEAD HEAD TIME:** Time from the end of 1 route to the start of the next route in which there are no students.

SCHOOL TRANSPORTATION EFFICIENCY - FACTORS

- **Manual vs. computerized routing and scheduling**
- **The person who does the routing and scheduling determines the number of buses required.**
- **Student Riders: Scheduled vs. Actual Riders (Student Loading)**
- **Time available between school starting and ending times (Tiers)**
- **Distances and travel time between schools**
- **Population density, i.e. number of students per mile of bus travel**
- **Highway / road infrastructure and traffic patterns and congestion**
- **A.M. routes generally drive the number of buses required, as more students ride in the morning than in the afternoon due to after school activities**
- **Community expectations for quality of school transportation services**
- **74-78% Load/Capacity Ratio is considered efficient by industry standards**
- **A 100% Load/Capacity Ratio is not sustainable from year to year**

DEMOGRAPHICS

Population (2016): 89,045

Geographic Area: 18.2 Square Miles

Populations Density: 4700 Persons/Square Mile

Traffic Congestion (A.M. Drive Time): Extremely High

School Traffic Congestion (A.M & P.M.): Extremely High

Community Expectations: Very High

Distance between Middle Schools and High Schools: 1.5 miles (12-15 minutes)

Therefore, based upon the preceding, school transportation efficiency is determined by other than strictly student ridership, such as route time and distance, drive time traffic, as well as community expectations for high quality service.

Enrollment projections indicate a stable and slightly growing enrollment.

BUS FLEET UTILIZATION (Includes the 6 “Swing Space” Buses)

The District currently transports approximately 2,711 students, utilizing 34 - 77 passenger buses, with typical ridership from 52 to 77 students per bus depending on grade level.

Based upon these parameters, the District utilizes the following number of buses:

SCHOOLS	A.M.	P.M
HIGH SCHOOLS	22	17
MIDDLE SCHOOLS	20	24
ELEMENTARY SCHOOLS	26	19
BOSTON METCO (2 SHARED BUSES)	8	8
PRIVATE SCHOOLS	6	5

6 of the 34 In District Buses do Private School Routes.

COST EFFECTIVENESS

TRANSPORTATION BUDGETS vs. DISTRICT BUDGETS

NPS Operating Budget	FY15	FY16	FY17	FY18	FY19	FY20
Regular Transportation*	\$ 1,895,683	\$ 1,983,631	\$ 2,002,580	\$ 2,283,500	\$ 2,584,400	\$ 2,936,000
Special Education Transportation	\$ 3,476,195	\$ 3,546,776	\$ 4,215,907	\$ 4,128,681	\$ 4,685,572	\$ 5,247,676
Transportation Budgets	\$ 5,371,878	\$ 5,530,407	\$ 6,218,487	\$ 6,412,181	\$ 7,269,972	\$ 8,183,676
Total District Operating Budget	\$ 195,831,164	\$ 204,095,912	\$ 211,177,825	\$ 219,236,486	\$ 227,560,263	\$ 236,372,312
% Transportation/District	2.74%	2.71%	2.94%	2.92%	3.19%	3.46%

*Regular Transportation Budget include Bus Fee Offset and Private School Buses

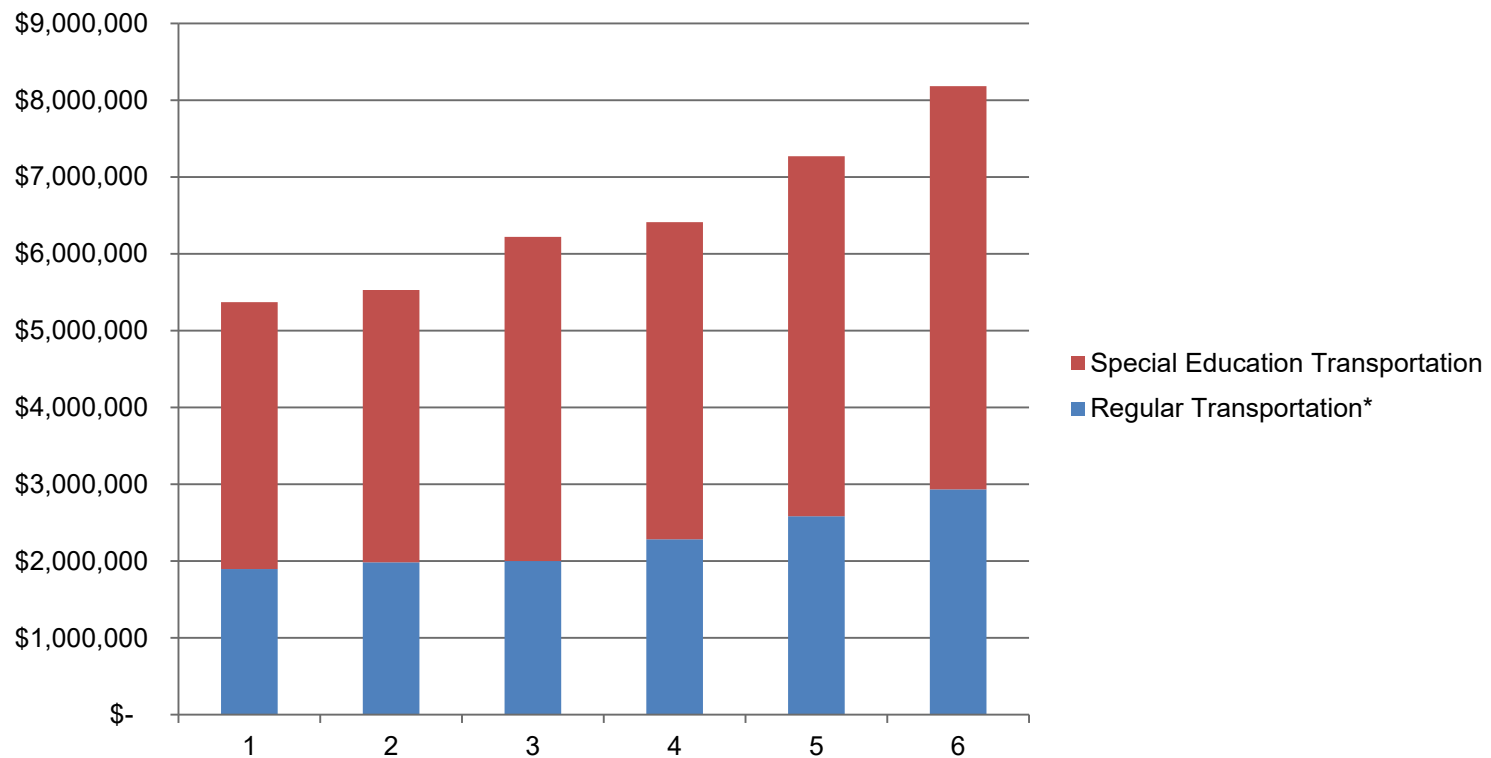
NPS Boston METCO Grant Budget	FY15	FY16	FY17	FY18	FY19	FY20
Boston METCO Transportation	\$ 801,975	\$ 829,600	\$ 868,920	\$ 941,000	\$ 970,200	N/A
Total Boston METCO Grant	\$ 2,093,671	\$ 2,410,876	\$ 2,505,348	\$ 2,507,466	\$ 2,662,508	N/A
% Transportation/METCO Grant	38%	34%	35%	38%	36%	N/A

NPS Operating Budget Plus METCO Grant	FY15	FY16	FY17	FY18	FY19	FY20
Regular, Special Education, and METCO	\$ 6,173,853	\$ 6,360,007	\$ 7,087,407	\$ 7,353,181	\$ 8,240,172	N/A
Total NPS Budget and METCO GRANT	\$ 197,924,835	\$ 206,506,788	\$ 213,683,173	\$ 221,743,952	\$ 230,222,771	N/A
% Transportation/District	3.12%	3.08%	3.32%	3.32%	3.58%	N/A

FINDING: For Districts with similar demographics, a transportation budget of 5% or less of the total district budget is considered cost effective by current industry standards.

COST EFFECTIVENESS (CONT.)

- **Specialized transportation has been and continues to be the fastest growing segment of school transportation services:**



ROUTING EFFICIENCIES

COMMENDATION: The Transportation Director is highly knowledgeable of the District transportation operation, requirements, as well as community expectations. All data was readily available and answers to questions and explanations were provided. NPS does an excellent job in managing the transportation operation within the quality constraints required.

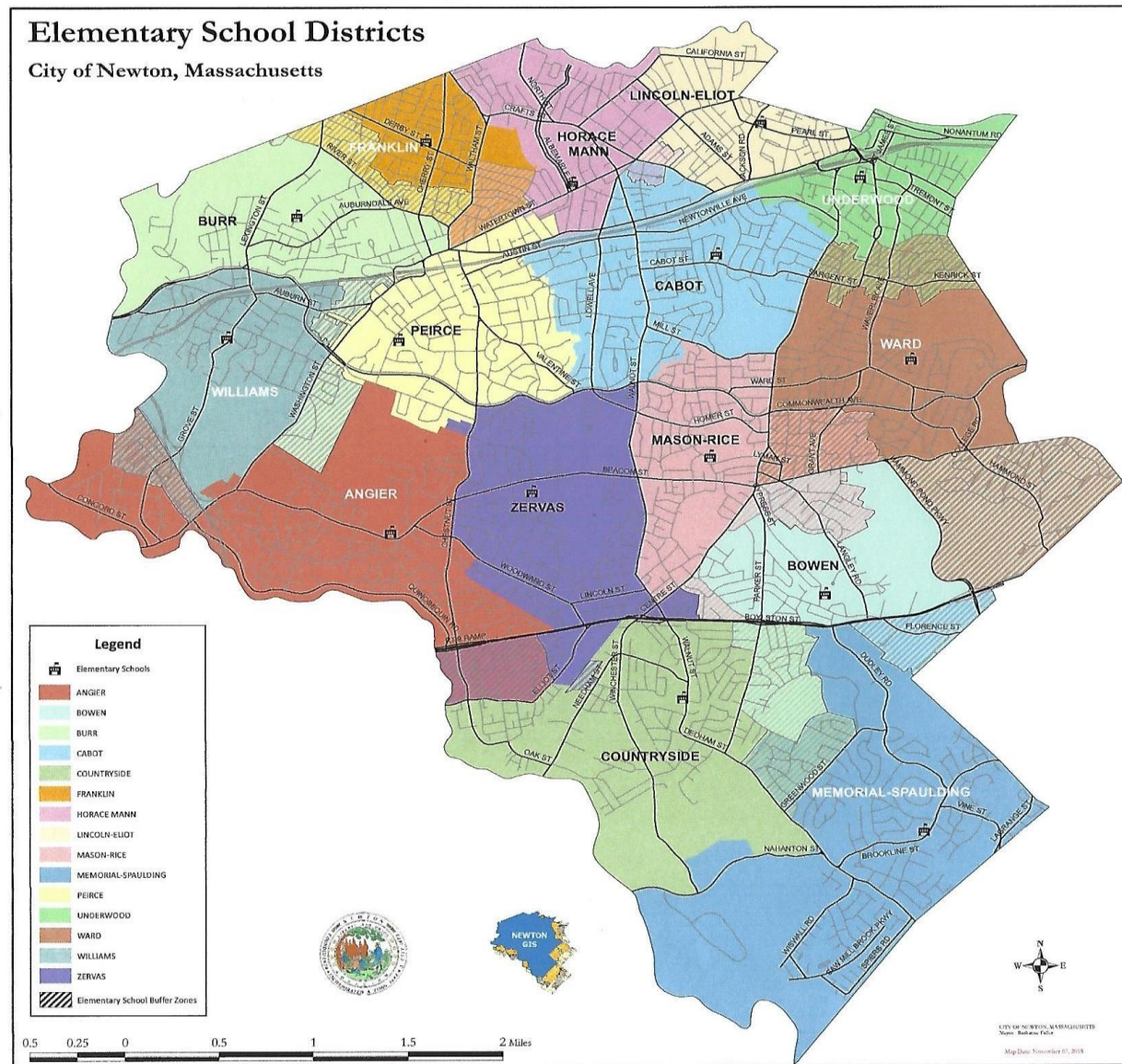
FINDING: High traffic at drive times (7:15-8:45 a.m.), combined with high school traffic congestion at both student drop off and pick up times are problematic for increased routing efficiencies.

FINDING: Several schools do not have separate school bus and parent pick up and drop off areas. It is therefore problematic for buses to quickly load and unload students.

RECOMMENDATION: Segregate school bus from special education van and from parent pick up and drop off areas.

Of the six (6) buses designated for the private schools, six (6) of them are only available for the third tier in the morning and none are available in the afternoon for the District schools transportation.

ELEMENTARY DISTRICTS MAP



CURRENT ROUTE INFORMATION

A.M. HIGH SCHOOLS ROUTES

Based upon the route data provided, the District utilizes 22 buses to perform 22 high school routes.

The average route time is approximately 24.5 minutes plus 10-12 minutes dead head time.

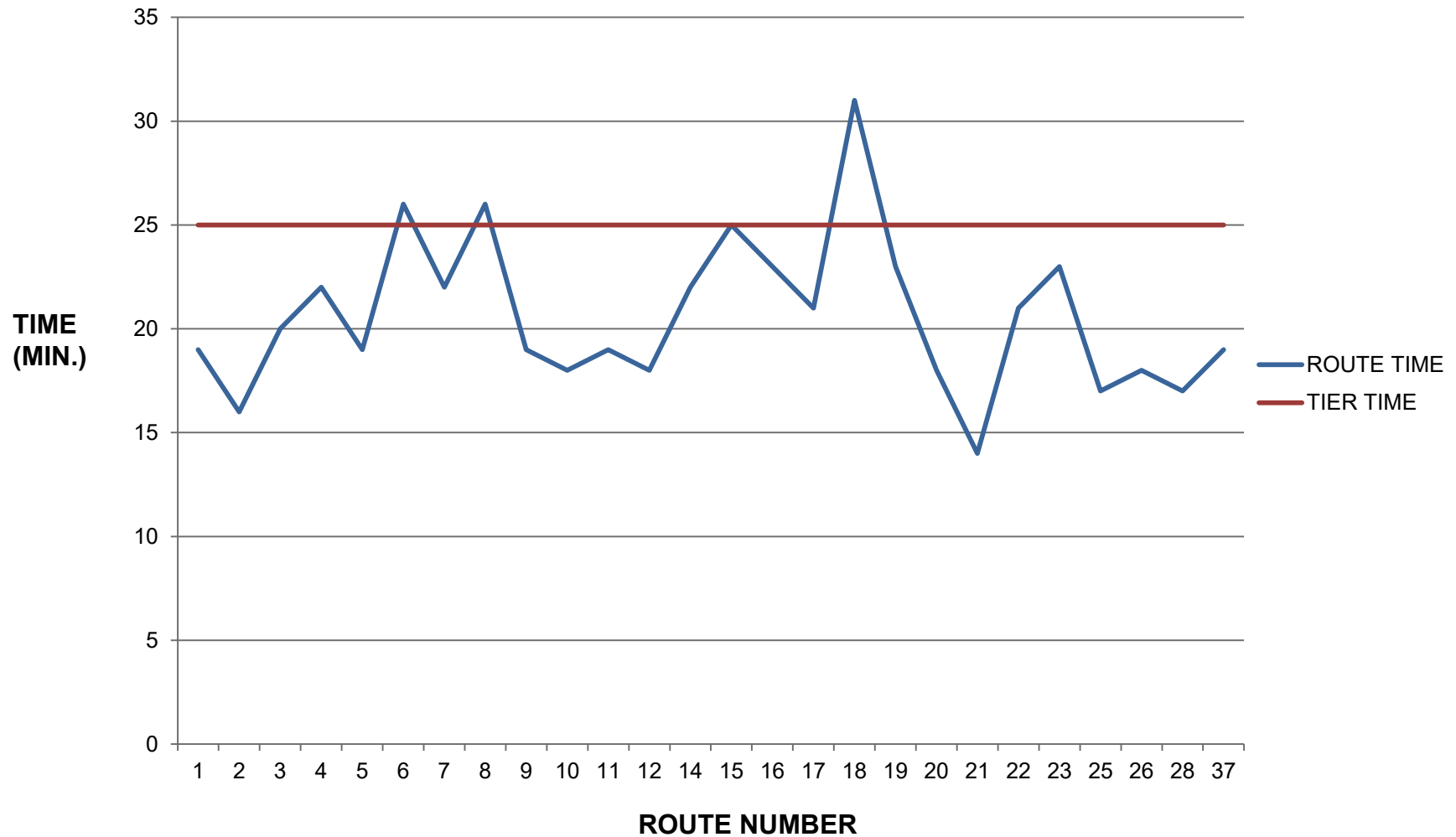
The average scheduled student load is 52 students and the actual student load is 43 students.

Therefore, routing efficiency is based upon available time as opposed to student loading.

The average student load/capacity is 81.5%. A student load /capacity ratio of 75-78% is considered relatively efficient by current industry standards.

HIGH SCHOOLS

ROUTE TIME ANALYSIS



CURRENT ROUTE INFORMATION (CONT.)

A.M. MIDDLE SCHOOLS ROUTES

Based upon the route data provided, the District utilizes 20 buses to perform 25 middle school routes.

The average route time is approximately 27 minutes plus 10-12 minutes dead head time.

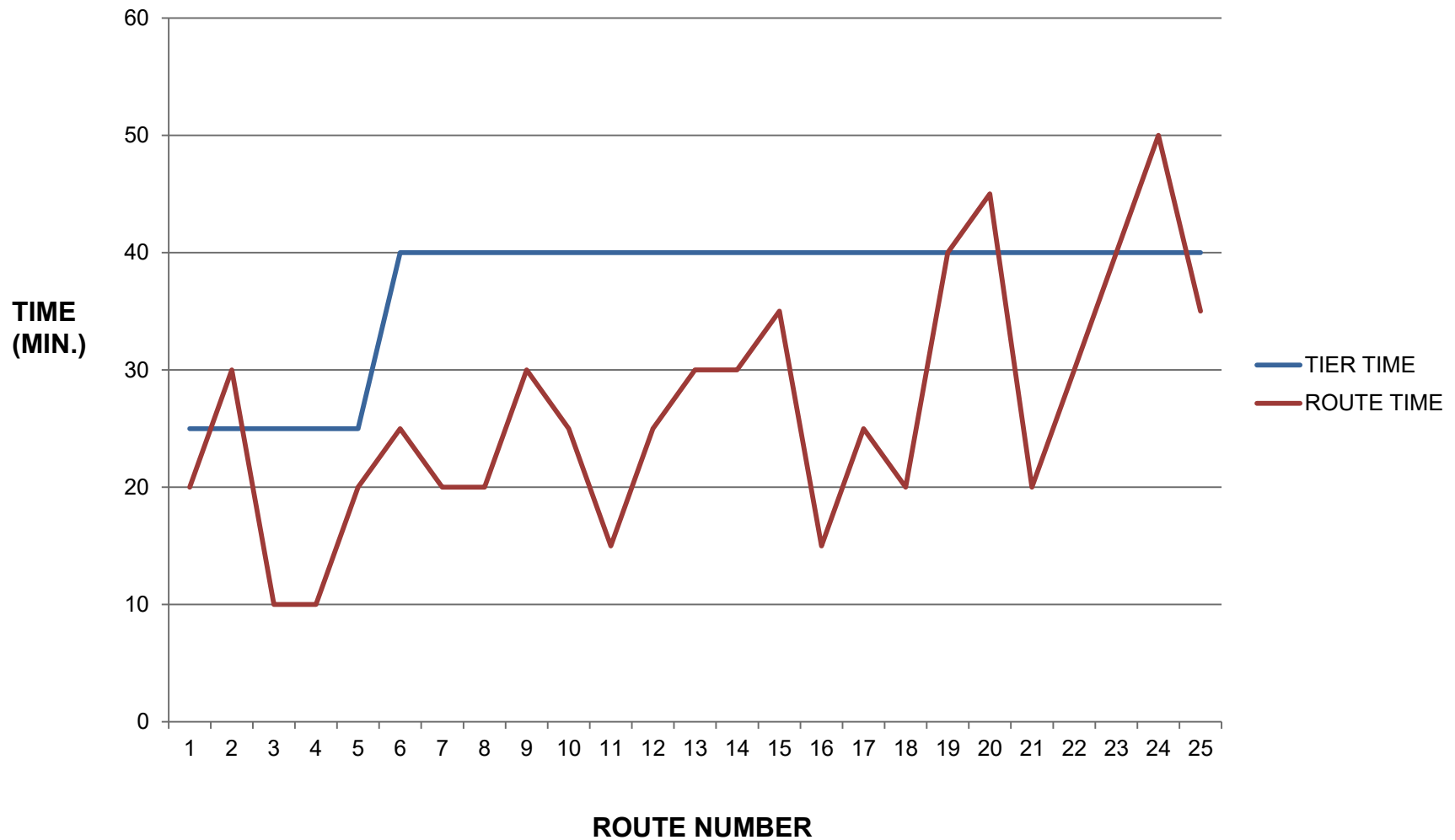
The average scheduled student load is 50 students and the actual student load is 40 students.

Therefore, routing efficiency is based upon available time as opposed to student loading.

The average student load/capacity is 80.2%. A student load /capacity ratio of 75-78% is considered relatively efficient by current industry standards.

MIDDLE SCHOOLS

ROUTE TIME ANALYSIS



CURRENT ROUTE INFORMATION (CONT.)

A.M. ELEMENTARY SCHOOLS ROUTES

Based upon the route data provided, the District utilizes 26 buses to perform 26 elementary school routes.

The average route time is approximately 22 minutes plus 10-12 minutes dead head time.

The average scheduled student load is 50 students and the actual student load is 27 students.

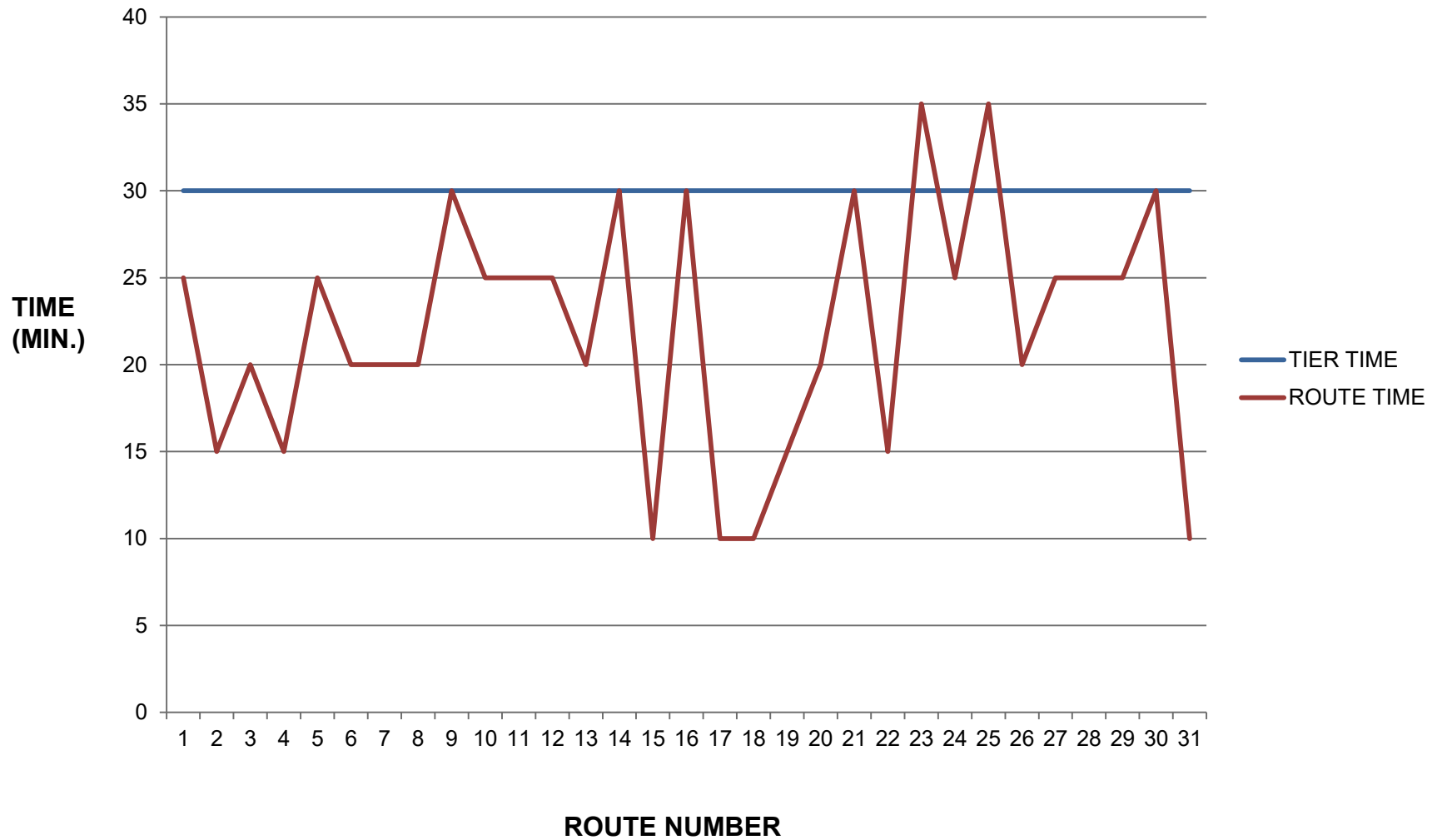
Therefore, routing efficiency is based upon available time as opposed to student loading.

The average student load/capacity is 53.25 %. A student load /capacity ratio of 75-78% is considered relatively efficient by current industry standards.

However, given the other than student loading factors, the Elementary Routes are as efficient as practical.

ELEMENTARY SCHOOLS

ROUTE TIME ANALYSIS



CURRENT ROUTE INFORMATION (CONT.)

A.M. BOSTON METCO ROUTES

The District currently utilizes 8 buses for the Boston METCO routes, which transport 434 Boston students:

- **Four Buses for the Elementary Routes for 209 Students (15 Schools)**
- **Two Buses for the Middle School Routes for 83 students (4 Schools)**
- **Two Buses for the High School Routes for 142 students. (2 Schools)**

The average route time is approximately 1 hour 22 minutes and the average student load is 54 scheduled and approximately 42 actually riding.

The average student load/capacity is 65.5 %. A student load /capacity ratio of 75-78% is considered relatively efficient by current industry standards.

Therefore, routing efficiency is based upon student time on vehicle, as opposed to student loading. Given the other than student loading factors, the Boston METCO Routes are as efficient as practical.

ROUTE TIME and LOADING SUMMARY

- FINDING:** For all schools, with the exception Boston METCO , the route times are generally less than the available tier time. However afternoon route times are much tighter than in the morning.
- FINDING:** For all schools, both the scheduled and actual student loads are less than the bus capacities.

CURRENT SCHOOL SCHEDULES

Based on the Longest School Day

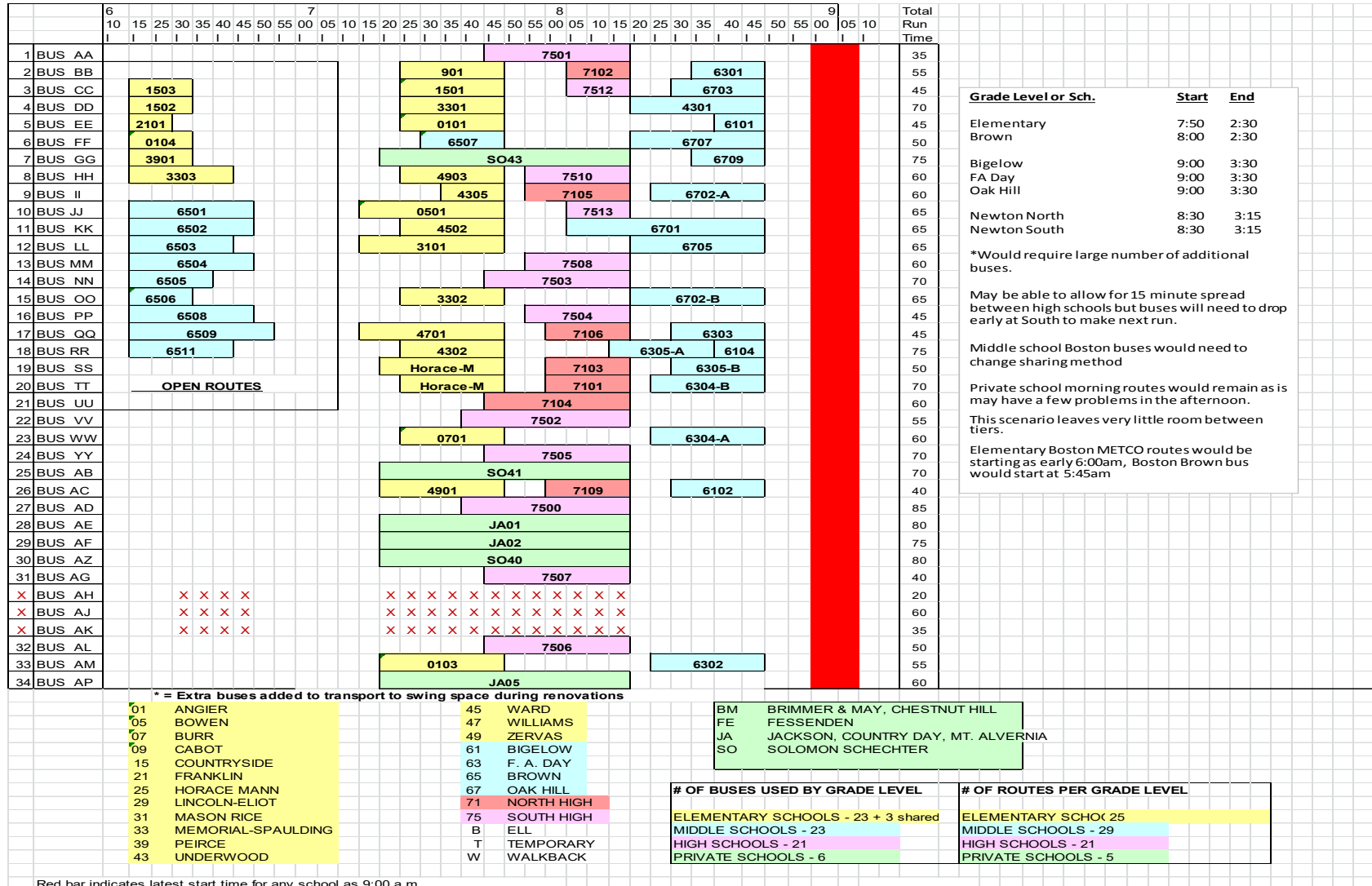
SCHOOL	START	END	SCHOOL DAY	A.M. TIER	P.M. TIER
NEWTON SOUTH	7:40	3:20	7'40"	45	45
NEWTON NORTH	7:50	3:20	7'30"	45	45
OAK HILL MIDDLE SCHOOL	8:00	2:30	6'30"	10	30
DAY MIDDLE SCHOOL	8:05	2:35	6'30"	15	25
BIGELOW MIDDLE SCHOOL	8:15	2:45	6'30"	25	15
BROWN MIDDLE SCHOOL	8:30	3:00	6'30"	40	20
ELEMENTARY SCHOOLS	8:20	3:00	6'40"	30	20

EARLIEST DROP OFF TIME	SCHED. ARRIVAL TIME	LATEST BUS DEPARTURE
7:15	3:30	3:40
7:15	3:30	3:40
7:40	2:30	2:40
7:45	2:35	2:45
8:05	2:45	2:55
8:20	3:00	3:10
8:20	3:00	3:10

Relatively small amount of time

OPTION-Not Feasible

8:30am Scenario - NPS MORNINGS BARCHART 2020-2021



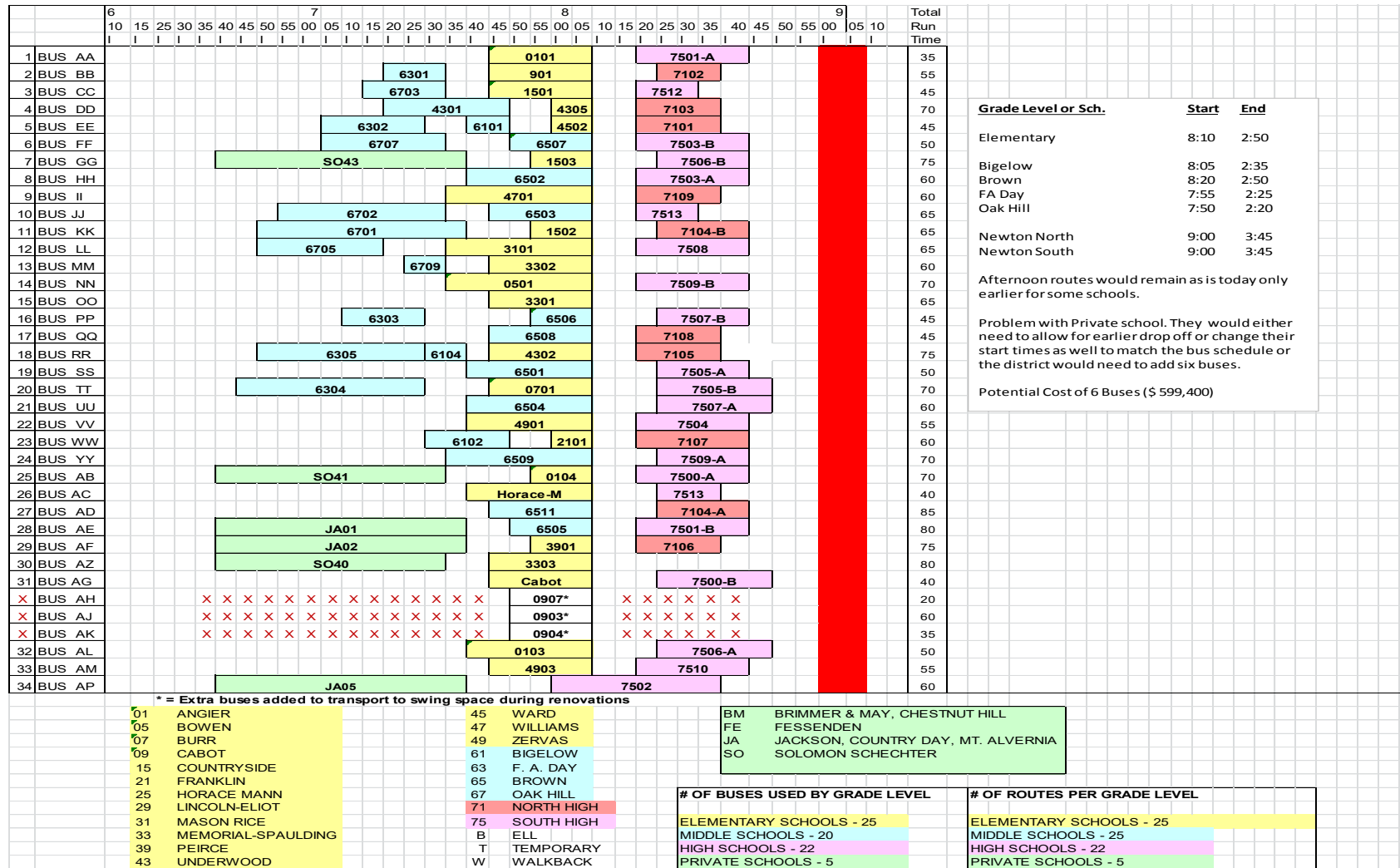
Red bar indicates latest start time for any school as 9:00 a.m.

OPTION NOT FEASIBLE (8:30 HS Start Time) IMPACT

	<u>CURRENT TIMES</u>			<u>REVISED TIMES</u>		
<u>School Level</u>	<u>Start</u>	<u>End</u>	<u>Day</u>	<u>Start</u>	<u>End</u>	<u>Day</u>
• Elementary	8:20	3:00	6'40"	7:50	2:30	6'40"
• Brown	8:30	3:00	6'30"	8:00	2:30	6'30"
• Bigelow	8:15	2:45	6'30"	9:00	3:30	6'30"
• FA Day	8:05	2:35	6'30"	9:00	3:30	6'30"
• Oak Hill	8:00	2:30	6'30"	9:00	3:30	6'30"
• Newton North	7:50	3:20	7'30"	8:30	3:15	6'45"
• Newton South	7:40	3:20	7'40"	8:30	3:15	6'45"
•	Would require 15 additional buses (\$ 1,498,500)					
•	Afternoon Middle School METCO buses would need to change sharing method.					
•	Private school morning routes would not change, but there may be a slight scheduling problem in the afternoon.					
•	This option leaves very little time between tiers for future changes.					
•	Elementary Boston METCO routes would be starting as early as 6:00 a.m. and Boston METCO Brown MS bus would start at 5:45 a.m.					

FEASIBLE OPTION 1

Scenario ONE - NPS MORNINGS BARCHARTS 2020-2021



Grade Level or Sch.	Start	End
Elementary	8:10	2:50
Bigelow	8:05	2:35
Brown	8:20	2:50
FA Day	7:55	2:25
Oak Hill	7:50	2:20
Newton North	9:00	3:45
Newton South	9:00	3:45
Afternoon routes would remain as is today only earlier for some schools.		
Problem with Private school. They would either need to allow for earlier drop off or change their start times as well to match the bus schedule or the district would need to add six buses.		
Potential Cost of 6 Buses (\$ 599,400)		

Red bar indicates HS start time, buses should drop at least 10 minutes earlier

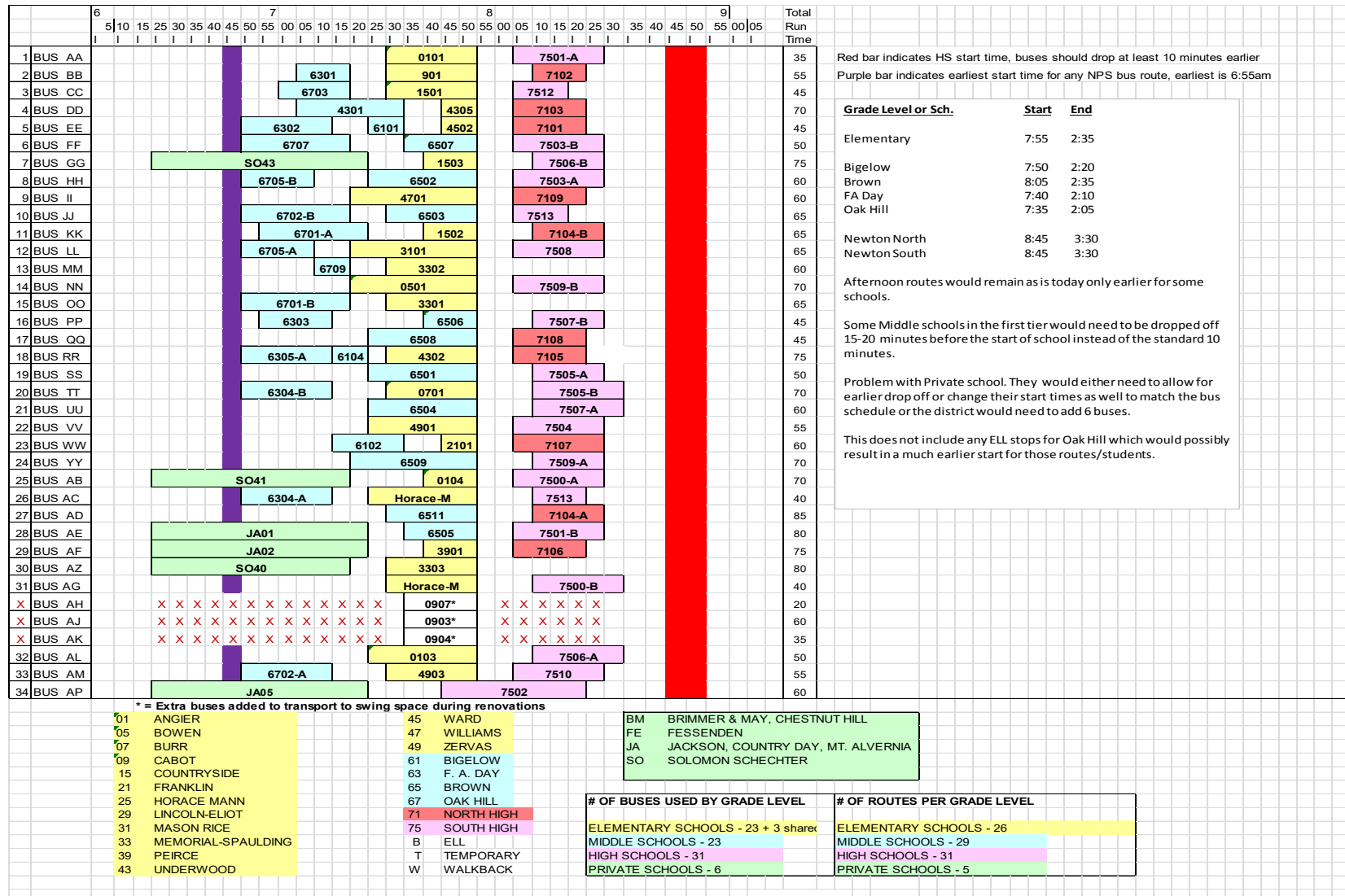
FEASIBLE OPTION 1 IMPACT

CURRENT TIMES				REVISED TIMES		
<u>School Level</u>	<u>Start</u>	<u>End</u>	<u>Day</u>	<u>Start</u>	<u>End</u>	<u>Day</u>
Elementary	8:20	3:00	6'40"	8:10	2:50	6'40"
Bigelow	8:15	2:45	6'30"	8:05	2:35	6'30"
Brown	8:30	3:00	6'30"	8:20	2:50	6'30"
FA Day	8:05	2:35	6'30"	7:55	2:25	6'30"
Oak Hill	8:00	2:30	6'30"	7:50	2:20	6'30"
Newton North	7:50	3:20	7'30"	9:00	3:45	6'45"
Newton South	7:40	3:20	7'40"	9:00	3:45	6'45"

- **Afternoon routes would remain as is today only earlier for some schools.**
- **Problem with Private school. They would either need to allow for earlier drop off or change their start times as well to match the bus schedule or the District would need to add 6 buses (\$ 599,400).**

FEASIBLE OPTION 2

Scenario TWO - NPS MORNINGS BARCHARTS 2020-2021



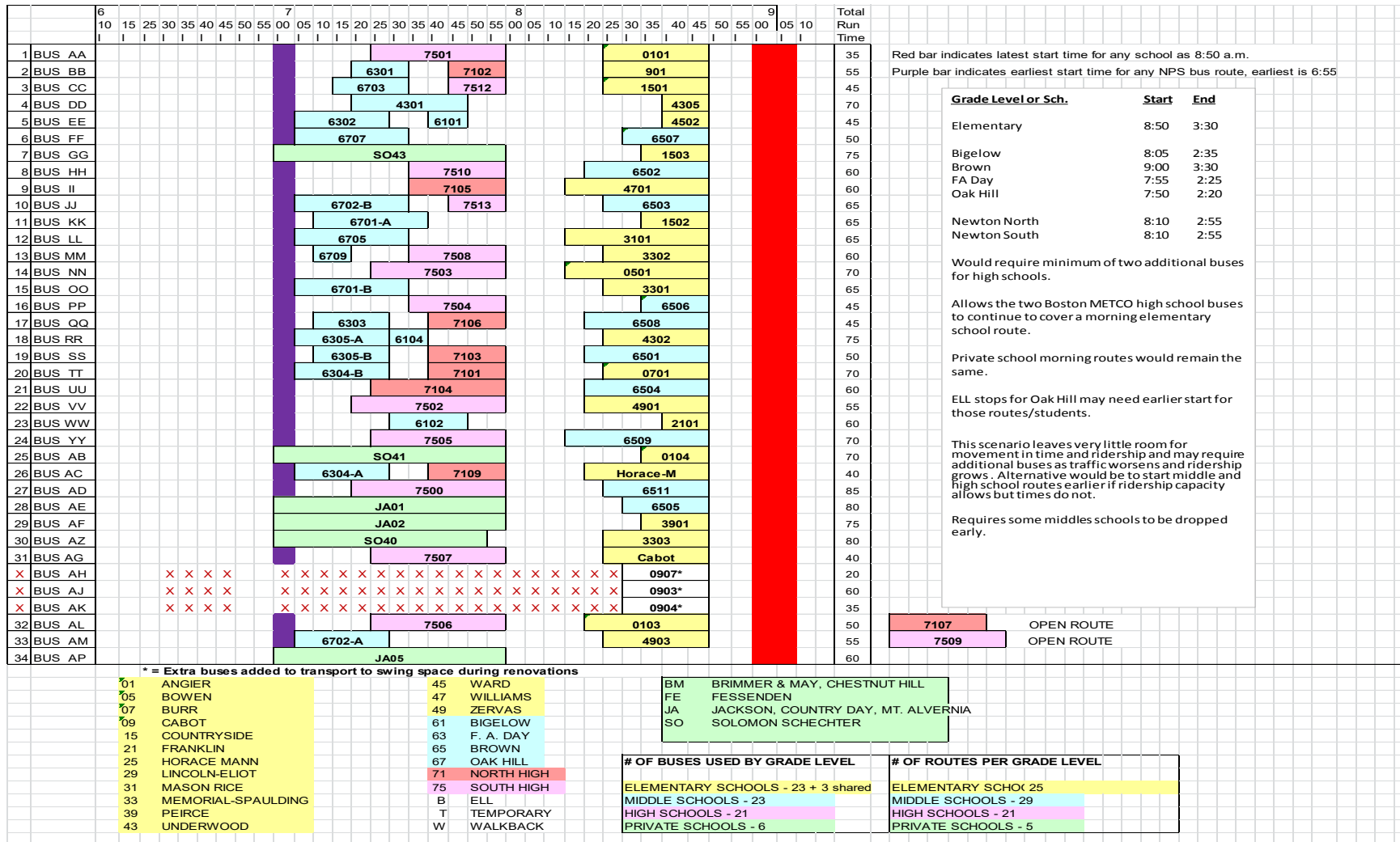
FEASIBLE OPTION 2 IMPACT

	<u>CURRENT TIMES</u>			<u>REVISED TIMES</u>		
<u>School Level</u>	<u>Start</u>	<u>End</u>	<u>Day</u>	<u>Start</u>	<u>End</u>	<u>Day</u>
• Elementary	8:20	3:00	6'40"	7:55	2:35	6'40"
• Bigelow	8:15	2:45	6'30"	7:50	2:20	6'30"
• Brown	8:30	3:00	6'30"	8:05	2:35	6'30"
• FA Day	8:05	2:35	6'30"	7:40	2:10	6'30"
• Oak Hill	8:00	2:30	6'30"	7:35	2:05	6'30"
• Newton North	7:50	3:20	7'30"	8:45	3:30	6'45"
• Newton South	7:40	3:20	7'40"	8:45	3:30	6'45"

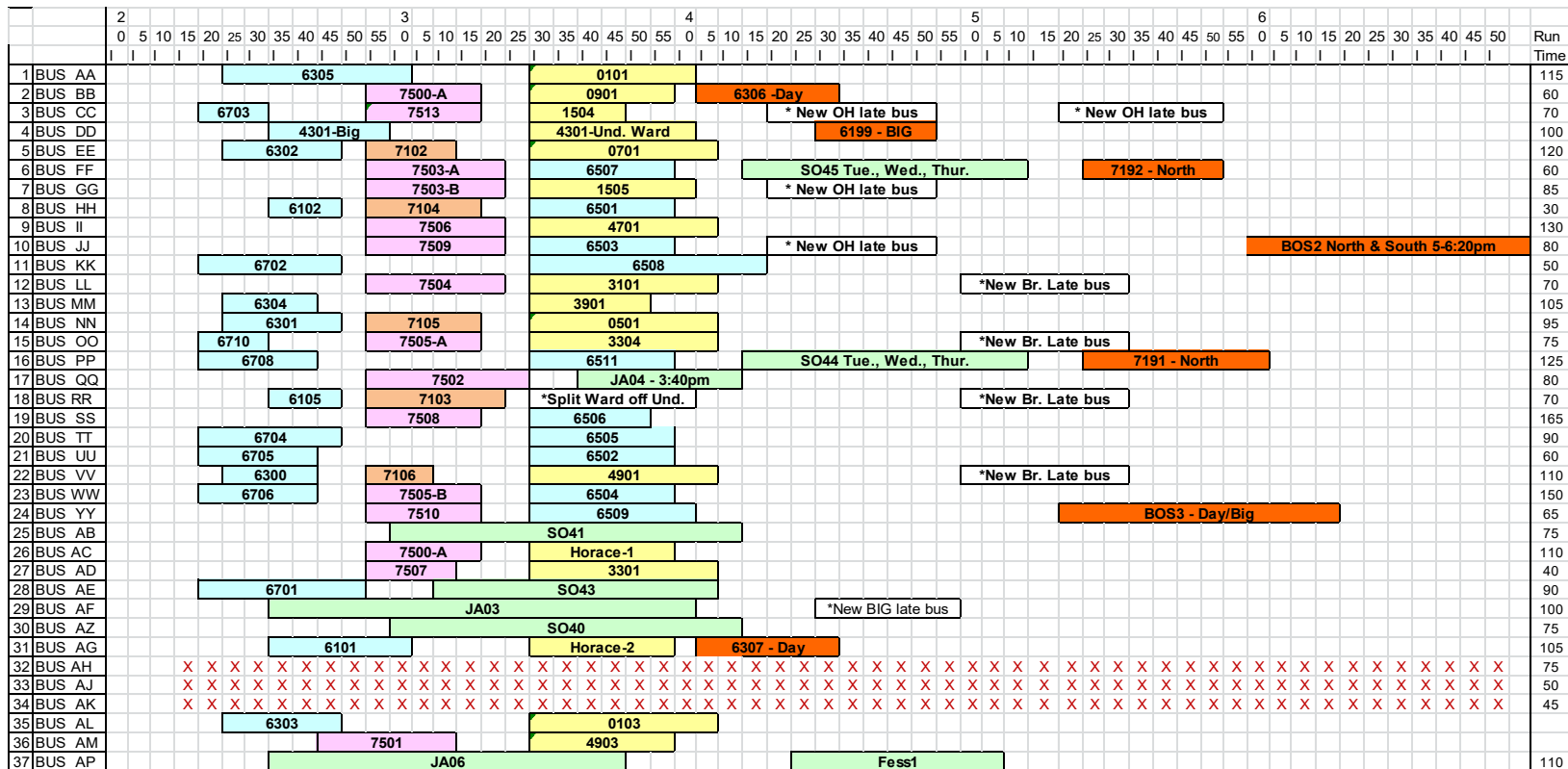
- Afternoon routes would remain as is today only earlier for some schools.
- Some Middle School in the first tier would need to be dropped off 15-20 minutes before the start of school instead of the standard 10 minutes.
- Problem with Private school. They would either need to allow for earlier drop off or change their start times as well to match the bus schedule or the District would need to add 6 buses (\$ 599,400).
- This Option does not include any ELL stops for Oak Hill which would possibly result in much earlier start times for those routes/students.

FEASIBLE OPTION 3 AM

Scenario Three - NPS MORNINGS BARCHARTS 2020-2021



PM BARChart FOR FEASIBLE OPTION 3 2020-2021



* = Extra buses added to transport to swing space during renovations

01	ANGIER
05	BOWEN
07	BURR
09	CABOT
15	COUNTRYSIDE
21	FRANKLIN
25	HORACE MANN
29	LINCOLN-ELIOT
31	MASON RICE
33	MEMORIAL-SPAULDING
39	PEIRCE
43	UNDERWOOD

45	WARD	
47	WILLIAMS	
49	ZERVAS	
61	BIGELOW	
63	F. A. DAY	
65	BROWN	
67	OAK HILL	
71	NORTH HIGH	
75	SOUTH HIGH	
B	ELL	
T	TEMPORARY	
W	WALKBACK	

BM	BRIMMER & MAY, CHESTNUT HILL
FE	FESSENDEN
JA	JACKSON, COUNTRY DAY, MT. ALVERNIA
SO	SOLOMON SCHECHTER

OF BUSES USED BY GRADE LEVEL
ELEMENTARY SCHOOLS - 18
MIDDLE SCHOOLS - 20
HIGH SCHOOLS - 14
PRIVATE SCHOOLS - 6

OF ROUTES PER GRADE LEVEL
ELEMENTARY SCHOOLS - 31 WITH K RUNS
MIDDLE SCHOOLS - 24
HIGH SCHOOLS - 16
PRIVATE SCHOOLS - 6

FEASIBLE OPTION 3 IMPACT

	<u>CURRENT TIMES</u>			<u>REVISED TIMES</u>		
• <u>School Level</u>	<u>Start</u>	<u>End</u>	<u>Day</u>	<u>Start</u>	<u>End</u>	<u>Day</u>
• Elementary	8:20	3:00	6'40"	8:50	3:30	6'40"
• Bigelow	8:15	2:45	6'30"	8:05	2:35	6'30"
• Brown	8:30	3:00	6'30"	9:00	3:30	6'30"
• FA Day	8:05	2:35	6'30"	7:55	2:25	6'30"
• Oak Hill	8:00	2:30	6'30"	7:50	2:20	6'30"
• Newton North	7:50	3:20	7'30"	8:10	2:55	6'45"
• Newton South	7:40	3:20	7'40"	8:10	2:55	6'45"

FEASIBLE OPTION 3 IMPACT

- **Would require 2 additional High School Buses (\$ 199,800)**
- **Requires some middle schools to be dropped off early in the morning.**
- **Allows 2 Boston METCO buses to continue to cover a morning elementary route.**
- **Private school afternoon routes would remain the same.**
- **ELL stops for Oak Hill may need an earlier start time for those routes/students.**
- **This Option leaves very little room for movement in route time and ridership and may require additional buses as traffic worsens and ridership grows. Alternative would be to start the middle and high school routes earlier if ridership capacity allows and times do not.**
- **Very little time between tiers 2 & 3. Could run late for some elementary school afternoon pick ups, but would arrive by PM departure time.**
- **With the elimination of the Mid Day Kindergarten routes, we may be able to add late buses for the secondary schools for a better sense of equity and could have shorter routes and less sharing between schools.**

CONCLUSION

- **There are both community and school trade offs to each of the options presented**
- **It is important to engage your community as well as all of your stakeholders on these options**
- **Every community is different and Newton is unique in many ways:**
 - **Number and location of your schools**
 - **Traffic congestion**
 - **Community expectations for service quality**

QUESTIONS

DISCUSSION