

# Bell Time Study

## October 2021 - February 2022

**Benjamin Davis** • Routing Lead

**c e s o** • Rethink Possible

615 1st Avenue NE Suite 115 • Minneapolis, MN 55413

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# Introduction

Benjamin Davis

Started with CESO October 2021

Fridley: January 2021

Stillwater: December 2009 – October 2020

TIES: July 2004 – December 2009

First Student: October 1997 – July 2004



# Bell Time Study Process

Interview Stakeholders

Audit Current Configuration

Identify & Prioritize Desired Changes

Preliminary Routing to Identify Timing Conflicts

Present Options for Optimizing



# Bell Time Study Process

## Interview Stakeholders

### A. Meet with Austin District Leadership

1. Multiple meetings over the last several months.

### B. Meet with Bus Contractor Staff

1. Multiple phone calls, remote meetings, and 1 in-person meeting.

### C. Meet with Pacelli Catholic School Leadership

1. Met with Principal & Assistant Principal regarding possible changes by video conference 11/12/21.



# Bell Time Study Process

## Audit Current Configuration

### A. Understand how the current configuration works

1. How full/empty are the current buses?
2. How tightly timed is the system? Frequency of late arrival/departures?
3. How complicated is the current system for students/families/school and bus contracting staff?

### B. Identify inaccuracies in current data

1. Are the mapped boundaries in the transportation software accurate?
2. Is the address table from student data correct?



# Statistics/Demographics & General Information

## 133 Square Mile Area

### Regular Buildings Transported:

- Austin High School / Austin ALC (9-12)
- Pacelli Catholic School (K-12)
- Ellis Middle School (7-8)
- IJ Holton Intermediate School (5-6)
- Banfield Elementary (1-4)
- Neveln Elementary (1-4)
- Southgate Elementary (1-4)
- Sumner Elementary (1-4)
- Woodson Kindergarten Center (K)



# Statistics/Demographics & General Information

## 133 Square Mile Area

### Regular Buildings Transported:

- **Austin High School / Austin ALC (9-12)**
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- Banfield Elementary (1-4)
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- Southgate Elementary (1-4)
- Sumner Elementary (1-4)
- **Woodson Kindergarten Center (K)**



# Statistics/Demographics & General Information

## 5117 Students Total\*

	Enrolled	Eligible
Austin High School / Austin ALC (9-12)	1467	993
Pacelli Catholic School (K-12)	250	200
Ellis Middle School (7-8)	829	710
IJ Holton Intermediate School (5-6)	737	639
Banfield Elementary (1-4)	435	161
Neveln Elementary (1-4)	277	91
Southgate Elementary (1-4)	513	327
Sumner Elementary (1-4)	246	125
Woodson Kindergarten Center (K)	363	359

\*December 1, 2021





# Statistics/Demographics & General Information

**30% of eligible AM  
riders do not ride**

**5117 Students Total**

**3605 Eligible Riders**

**33% of eligible PM  
riders do not ride**

**2518 Scheduled Riders AM**

**2401 Scheduled Riders PM**

**1087 Eligible but do not ride**

**1204 Eligible but do not ride**

- 138 more than 50 minutes
- 62 more than 60 minutes
- 26 more than 70 minutes
- 8 more than 80 minutes

- 100 more than 50 minutes
- 46 more than 60 minutes
- 31 more than 70 minutes
- 18 more than 80 minutes

**Longest ride time 90 minutes**

**Longest ride time 113 minutes**



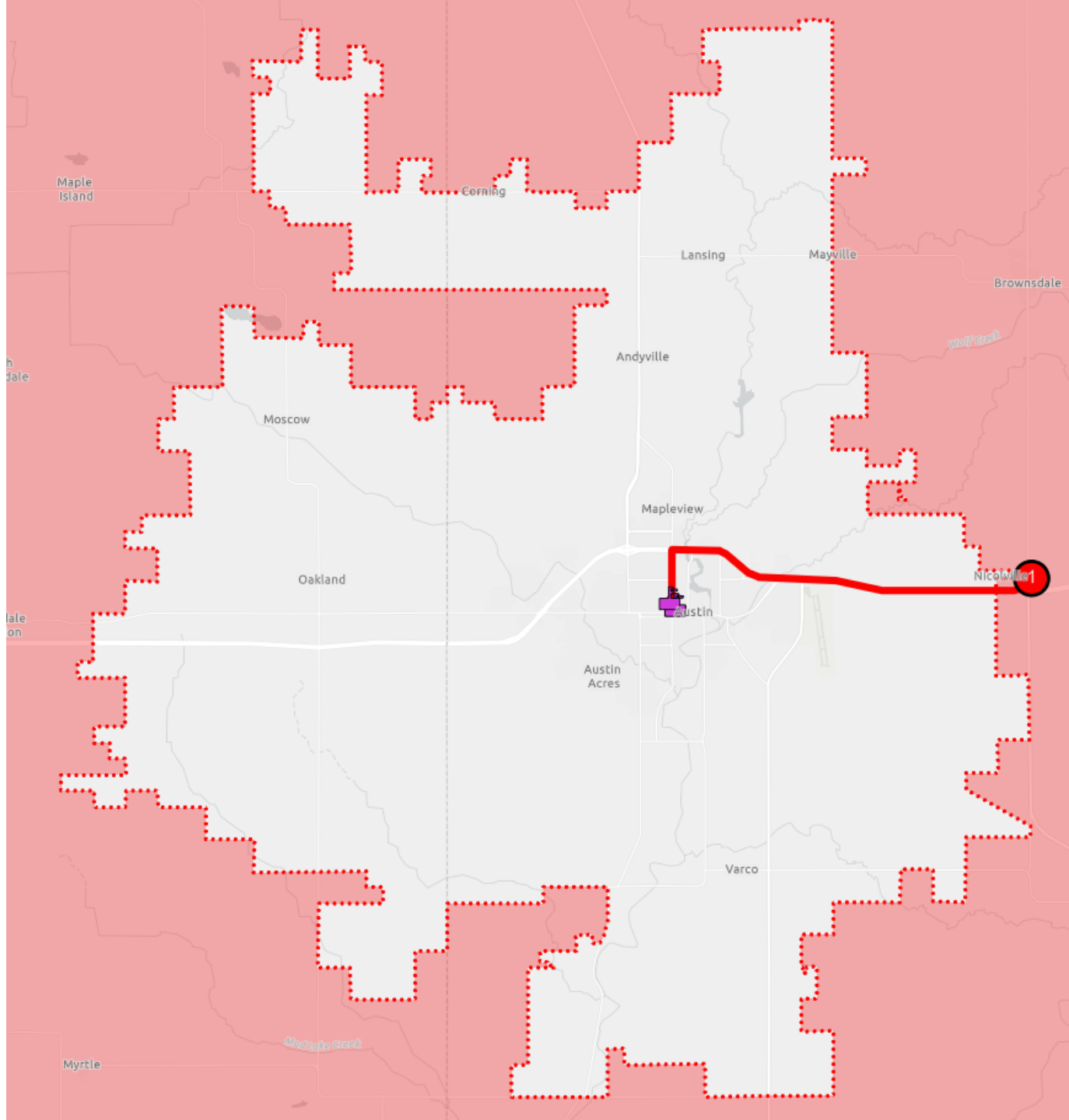
# Statistics/Demographics & General Information

## 5117 Students Total\*

	Enrolled	Eligible	Actual	
Austin High School / Austin ALC (9-12)	1467	993	569/554	57%
Pacelli Catholic School (K-12)	250	200	69/66	35%
Ellis Middle School (7-8)	829	710	535/398	75%
IJ Holton Intermediate School (5-6)	737	639	516/510	81%
Banfield Elementary (1-4)	435	161	124/105	77%
Neveln Elementary (1-4)	277	91	55/53	60%
Southgate Elementary (1-4)	513	327	211/229	70%
Sumner Elementary (1-4)	246	125	91/107	86%
Woodson Kindergarten Center (K)	363	359	308/284	86%

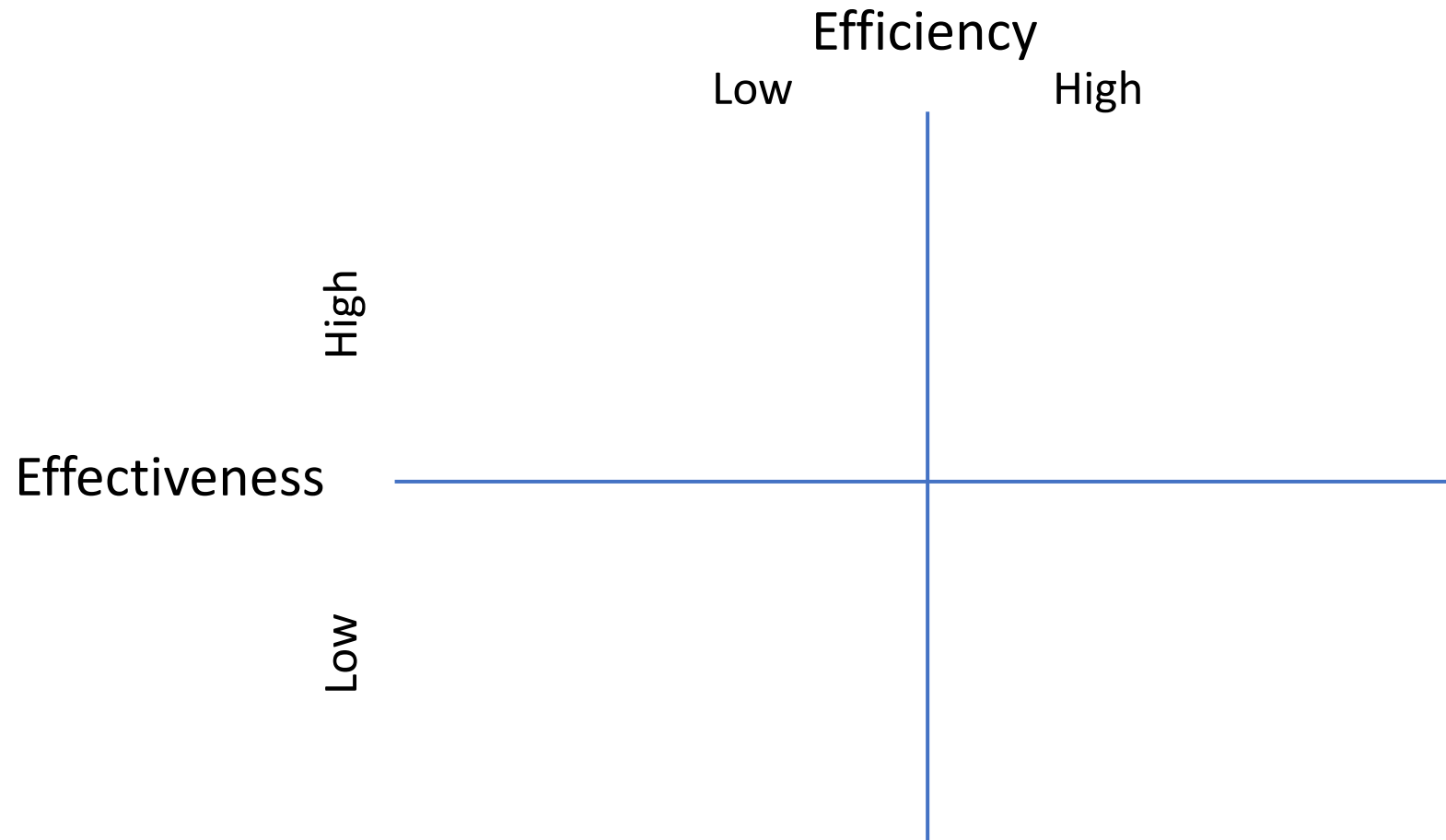
\*December 1, 2021





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# Audit Current Configuration



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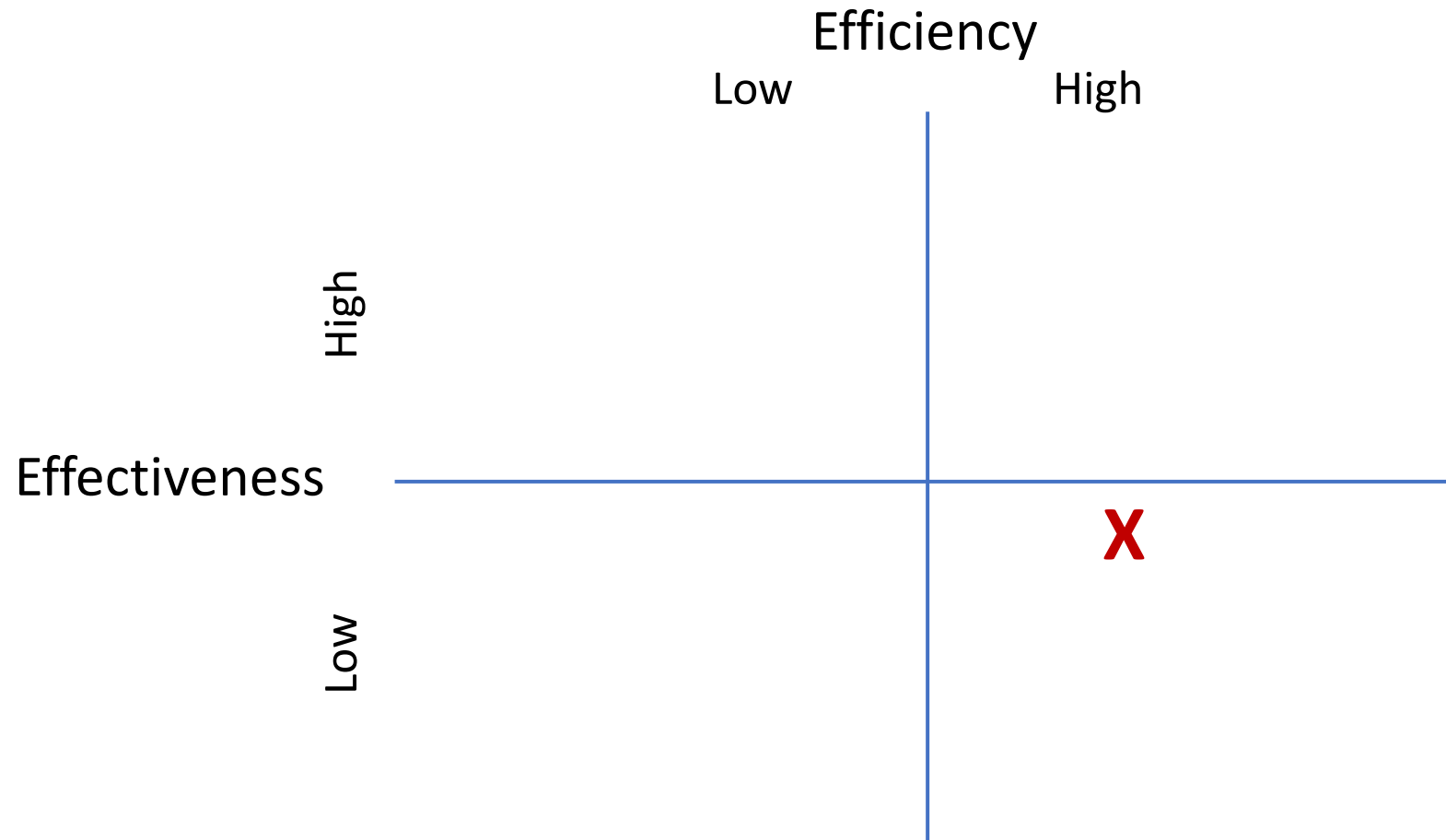
# Audit Current Configuration

Efficiency: The ratio of the useful work performed in a process to the total energy expended

Effectiveness: The degree to which something is successful in producing a desired result



# Audit Current Configuration



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# Audit Current Configuration

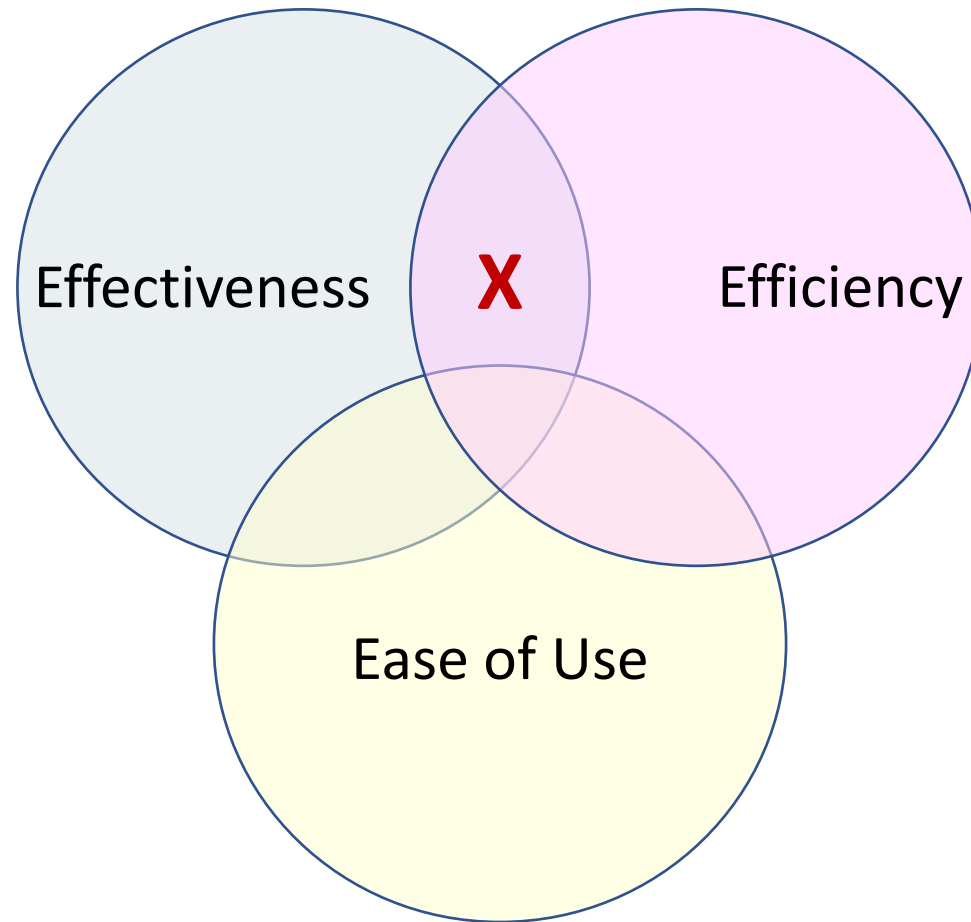
Efficiency: The ratio of the useful work performed in a process to the total energy expended

Effectiveness: The degree to which something is successful in producing a desired result

Ease of Use: The usability of a product or service. How natural it is to operate or navigate something.



# Audit Current Configuration



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# Bell Time Study Process

## Identify & Prioritize Desired Changes

### From District Leaders

Route for all eligible students

Preserve length of day at all district buildings, extend it to match secondary schools at IJ Holton Intermediate

Limit ride time for all students

Eliminate/Reduce transfers as much as possible

Limit elementary bell time difference as much as possible

Limit grade level spread per bus as much as possible

Limit the spread between bell times as much as possible

### From Bus Contractor

Limit number of buses needed to transport all eligible students to 24

Preserve a balance of use for vehicles (by age) for in town and out of town routes

Shorten rides to reduce student conduct issues

Reduce traffic congestion in school areas at arrival & dismissal times



# Bell Time Study Process

Preliminary Routing to Identify Timing Conflicts

**3605 students to transport**

		# of Buses (45 pass)	# of Buses (50 pass)	# of Buses (55 pass)	# of Buses (60 pass)	# of Buses (65 pass)
	<b>Students Per Tier</b>	<b>80.11</b>	<b>72.10</b>	<b>65.55</b>	<b>60.08</b>	<b>55.46</b>
<b>Two Tiers</b>	1802.5	40.06	36.05	32.77	30.04	27.73
<b>2.5 Tiers</b>	<b>1442</b>	32.04	28.84	26.22	<b>24.03</b>	<b>22.18</b>
<b>Three Tiers</b>	<b>1202</b>	26.70	<b>24.03</b>	<b>21.85</b>	<b>20.03</b>	<b>18.49</b>
<b>3.5 Tiers</b>	<b>1030</b>	<b>22.89</b>	<b>20.60</b>	<b>18.73</b>	<b>17.17</b>	<b>15.85</b>
<b>Four Tiers</b>	<b>901</b>	<b>20.03</b>	<b>18.025</b>	<b>16.39</b>	<b>15.02</b>	<b>13.87</b>



# Bell Time Study Process

Preliminary Routing to Identify Timing Conflicts

## Minimum Number of Buses per Tier

	School Trans Pop	Total in Tier	Minimum # Buses	
IJ Holton Inermed	639		12	
Southgate	327		5	22
Banfield	161		3	
Neveln	91	1218	2	
HS/ALC	993		18	
Pacelli Catholic	200	1193	4	22
Ellis Middle	710		13	
Sumner	125		3	22
Woodson	359	1194	6	



# Bell Time Study Process

Present Options for Optimizing

## Scenario 1 – Plan A

### HS in Tier 1

HS/ALC/Pacelli – 7:15a to 2:15p

### IJ Holton in Tier 2

IJ Holton – 8:10a to 3:10p

Banfield – 8:20a to 2:50p

Neveln – 8:20a to 2:50p

Southgate – 8:20a to 2:50p

### Ellis in Tier 3

Ellis – 9:05a to 4:05p

Sumner – 9:15a to 3:45p

Woodson – 9:25a to 3:25p

## Scenario 1 – Plan B

### HS in Tier 1

HS/ALC/Pacelli – 7:15a to 2:15p

### Ellis in Tier 2

Ellis – 8:10a to 3:10p

Sumner – 8:20a to 2:50p

Woodson – 8:30a to 2:30p

### IJ Holton in Tier 3

IJ Holton – 9:05a to 4:05p

Banfield – 9:15a to 3:45p

Neveln – 9:15a to 3:45p

Southgate – 9:15a to 3:45p



# Bell Time Study Process

Present Options for Optimizing

## Scenario 2 – Plan A

### IJ Holton in Tier 1

IJ Holton – 7:15a to 2:15p

Banfield – 7:25a to 1:55p

Neveln – 7:25a to 1:55p

Southgate – 7:25a to 1:55p

### HS in Tier 2

HS/ALC/Pacelli – 8:10a to 3:10p

### Ellis in Tier 3

Ellis – 9:05a to 4:05p

Sumner – 9:15a to 3:45p

Woodson – 9:25a to 3:25p

## Scenario 2 – Plan B

### Ellis in Tier 1

Ellis – 7:15a to 2:15p

Sumner – 7:25a to 1:55p

Woodson – 7:35a to 1:35p

### HS in Tier 2

HS/ALC/Pacelli – 8:10a to 3:10p

### IJ Holton in Tier 3

IJ Holton – 9:05a to 4:05p

Banfield – 9:15a to 3:45p

Neveln – 9:15a to 3:45p

Southgate – 9:15a to 3:45p



# Bell Time Study Process

## Present Options for Optimizing

### Scenario 1 – Plan A

#### HS in Tier 1

HS/ALC/Pacelli – 7:15a to 2:15p

#### IJ Holton in Tier 2

IJ Holton – 8:10a to 3:10p

Banfield – 8:20a to 2:50p

Neveln – 8:20a to 2:50p

Southgate – 8:20a to 2:50p

#### Ellis in Tier 3

Ellis – 9:05a to 4:05p

Sumner – 9:15a to 3:45p

Woodson – 9:25a to 3:25p

### Scenario 1 – Plan B

#### HS in Tier 1

HS/ALC/Pacelli – 7:15a to 2:15p

#### Ellis in Tier 2

Ellis – 8:10a to 3:10p

Sumner – 8:20a to 2:50p

Woodson – 8:30a to 2:30p

#### IJ Holton in Tier 3

IJ Holton – 9:05a to 4:05p

Banfield – 9:15a to 3:45p

Neveln – 9:15a to 3:45p

Southgate – 9:15a to 3:45p

### Scenario 2 – Plan A

#### IJ Holton in Tier 1

IJ Holton – 7:15a to 2:15p

Banfield – 7:25a to 1:55p

Neveln – 7:25a to 1:55p

Southgate – 7:25a to 1:55p

#### HS in Tier 2

HS/ALC/Pacelli – 8:10a to 3:10p

#### Ellis in Tier 3

Ellis – 9:05a to 4:05p

Sumner – 9:15a to 3:45p

Woodson – 9:25a to 3:25p

### Scenario 2 – Plan B

#### Ellis in Tier 1

Ellis – 7:15a to 2:15p

Sumner – 7:25a to 1:55p

Woodson – 7:35a to 1:35p

#### HS in Tier 2

HS/ALC/Pacelli – 8:10a to 3:10p

#### IJ Holton in Tier 3

IJ Holton – 9:05a to 4:05p

Banfield – 9:15a to 3:45p

Neveln – 9:15a to 3:45p

Southgate – 9:15a to 3:45p



# Bell Time Study Process

Present Options for Optimizing

## Scenario 3

### All Elem & Woodson in Tier 1

Banfield – 7:00a to 1:30p  
Neveln – 7:00a to 1:30p  
Southgate – 7:00a to 1:30p  
Sumner – 7:00a to 1:30p  
Woodson – 7:20a to 1:10p

### HS in Tier 2

HS/ALC/Pacelli – 8:05a to 3:05p

### Ellis & IJ in Tier 3

Ellis – 9:05a to 4:05p  
IJ Holton – 9:05a to 4:05p

## Scenario 4

### All Elem & Woodson in Tier 1

Banfield – 7:10a to 1:40p  
Neveln – 7:10a to 1:40p  
Southgate – 7:10a to 1:40p  
Sumner – 7:10a to 1:40p  
Woodson – 7:30a to 1:20p

### HS in Tier 2

HS/ALC/Pacelli – 8:10a to 3:10p

### Ellis & IJ in Tier 3

Ellis – 9:10a to 4:10p  
IJ Holton – 9:10a to 4:10p



# Statistics/Demographics & General Information

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Woodson Kindergarten Center (K)	363	359	308/284	86%

\*December 1, 2021





# Statistics/Demographics & General Information

## 5117 Students Total\*

	Enrolled	Eligible	Actual
Austin High School / Austin ALC (9-12)	1467	993	75% 745
Pacelli Catholic School (K-12)	250	200	50% 100
Ellis Middle School (7-8)	829	710	90% 639
IJ Holton Intermediate School (5-6)	737	639	90% 575
Banfield Elementary (1-4)	435	161	90% 145
Neveln Elementary (1-4)	277	91	90% 82
Southgate Elementary (1-4)	513	327	90% 294
Sumner Elementary (1-4)	246	125	90% 112
Woodson Kindergarten Center (K)	363	359	90% 323

\*December 1, 2021



# Bell Time Study Process

Present Options for Optimizing

## Scenarios 3 & 4

## Population

### All Elem & Woodson in Tier 1

	Eligible	Actual	%	Est %	Est Actual	
Banfield –	161	124	77%	90%	145	
Neveln –	91	55	60%	90%	82	19 Buses minimum
Southgate –	327	229	70%	90%	294	
Sumner –	125	107	86%	90%	112	
Woodson –	359	308	86%	90%	323	
HS/ALC –	993	569	57%	75%	745	19 Buses minimum
Pacelli –	200	69	35%	50%	100	
Ellis –	710	535	75%	90%	639	22 Buses minimum
IJ Holton –	639	516	81%	90%	575	



# Bell Time Study Process

Present Options for Optimizing

## Scenarios 3 & 4

## Population

All Elem & Woodson in Tier 1	AM Arrive	AM Bell	PM Bell	PM Depart
Banfield –	6:55-7a	7:10a	1:40p	1:50p
Neveln –	6:55-7a	7:10a	1:40p	1:50p
Southgate –	6:55-7a	7:10a	1:40p	1:50p
Sumner –	6:55-7a	7:10a	1:40p	1:50p
Woodson –	7:15-7:20a	7:30a	1:20p	1:30p
HS/ALC –	7:55-8a	8:10a	3:10p	3:20p
Pacelli –	7:55-8a	8:10a	3:10p	3:20p
Ellis –	8:55-9a	9:10a	4:10p	4:20p
IJ Holton –	8:55-9a	9:10a	4:10p	4:20p



# Bell Time Study Process

**\*Any Change to a  
Single Time  
Will Result in Changes to  
All Times**

Present Options for Optimizing  
**Scenario 5**

## **All Elem & Woodson in Tier 1**

Banfield – 7:15a to 1:45p

Neveln – 7:15a to 1:45p

Southgate – 7:15a to 1:45p

Sumner – 7:15a to 1:45p

Woodson – 7:25a to 1:15p

## **HS in Tier 2**

HS/ALC/Pacelli – 8:10a to 3:10p

## **Ellis & IJ in Tier 3**

Ellis – 9:10a to 4:10p

IJ Holton – 9:10a to 4:10p



# Bell Time Study Process

**\*Any Change to a  
Single Time  
Will Result in Changes to  
All Times**

Present Options for Optimizing

**Scenario 5**

**Times**

All Elem & Woodson in Tier 1

AM Arrive AM Bell PM Bell PM Depart

Banfield –	7a-7:05a	7:15a	1:45p	1:55p
Neveln –	7a-7:05a	7:15a	1:45p	1:55p
Southgate –	7a-7:05a	7:15a	1:45p	1:55p
Sumner –	7a-7:05a	7:15a	1:45p	1:55p
Woodson –	7:10-7:15a	7:25a	1:15p	1:25p
HS/ALC –	7:55-8a	8:10a	3:10p	3:20p
Pacelli –	7:55-8a	8:10a	3:10p	3:20p
Ellis –	8:55-9a	9:10a	4:10p	4:20p
IJ Holton –	8:55-9a	9:10a	4:10p	4:20p



# Bell Time Study Process

**\*Any Change to a Single Time Will Result in Changes to All Times** What if we shorten the length of day at secondary schools?

## Scenario 6A

## Times

All Elem & Woodson in Tier 1

AM Arrive AM Bell PM Bell PM Depart

Banfield –	7a-7:05a	7:15a	1:45p	1:55p
Neveln –	7a-7:05a	7:15a	1:45p	1:55p
Southgate –	7a-7:05a	7:15a	1:45p	1:55p
Sumner –	7a-7:05a	7:15a	1:45p	1:55p
Woodson –	7:10-7:15a	7:25a	1:15p	1:25p
HS/ALC –	8a-8:05a	8:15a	2:45p	2:55p
Pacelli –	8a-8:05a	8:15a	2:45p	2:55p
Ellis –	9a-9:05a	9:15a	3:45p	3:55p
IJ Holton –	9a-9:05a	9:15a	3:45p	3:55p



# Bell Time Study Process

**\*Any Change to a Single Time** What if we shorten the length of day at secondary schools?

**Will Result in Changes to**

**All Times**

### Scenario 6B

### Times

All Elem & Woodson in Tier 1

AM Arrive AM Bell PM Bell PM Depart

Banfield –	7:05-7:10a	7:20a	1:50p	2:00p
Neveln –	7:05-7:10a	7:20a	1:50p	2:00p
Southgate –	7:05-7:10a	7:20a	1:50p	2:00p
Sumner –	7:05-7:10a	7:20a	1:50p	2:00p
Woodson –	7:15-7:20a	7:30a	1:20p	1:30p
HS/ALC –	8:05-8:10a	8:20a	2:50p	3:00p
Pacelli –	8:05-8:10a	8:20a	2:50p	3:00p
Ellis –	9:05-9:10a	9:20a	3:50p	4:00p
IJ Holton –	9:05-9:10a	9:20a	3:50p	4:00p



# Bell Time Study Process

**\*Any Change to a Single Time** What if we shorten the length of day at secondary schools?

**Will Result in Changes to**

**All Times**

## Scenario 6C

## Times

All Elem & Woodson in Tier 1

AM Arrive AM Bell PM Bell PM Depart

Banfield –	7:10-7:15a	7:25a	1:55p	2:05p
Neveln –	7:10-7:15a	7:25a	1:55p	2:05p
Southgate –	7:10-7:15a	7:25a	1:55p	2:05p
Sumner –	7:10-7:15a	7:25a	1:55p	2:05p
Woodson –	7:20-7:25a	7:35a	1:25p	1:35p
HS/ALC –	8:10-8:15a	8:25a	2:55p	3:05p
Pacelli –	8:10-8:15a	8:25a	2:55p	3:05p
Ellis –	9:10-9:15a	9:25a	3:55p	4:05p
IJ Holton –	9:10-9:15a	9:25a	3:55p	4:05p





# Bell Time Study Process

## Identify & Prioritize Desired Changes

### From District Leaders

Route for all eligible students

Preserve length of day at all district buildings, extend it to match secondary schools at IJ Holton Intermediate

Limit ride time for all students

Eliminate/Reduce transfers as much as possible

Limit elementary bell time difference as much as possible

Limit grade level spread per bus as much as possible

Limit the spread between bell times as much as possible

### From Bus Contractor

Limit number of buses needed to transport all eligible students to 24

Preserve a balance of use for vehicles (by age) for in town and out of town routes

Shorten rides to reduce student conduct issues

Reduce traffic congestion in school areas at arrival & dismissal times



# Scenarios

Scenario 5A	Elementary Woodson HS/Pacelli/ALC/CLC IJ Holton/Ellis/Oakland Ed	7a-7:05a Arrive 7:10a-7:15a Arrive 7:55a-8a Arrive 8:55a-9a Arrive	7:15a Start 7:25a Start 8:10a Start 9:10a Start	1:45p End 1:15p End 3:10p End 4:10p End	1:55p Depart 1:25p Depart 3:20p Depart 4:20p Depart
Scenario 5B	Elementary Woodson HS/Pacelli/ALC/CLC IJ Holton/Ellis/Oakland Ed	7:05a-7:10a Arrive 7:15a-7:20a Arrive 8a-8:05a Arrive 9a-9:05a Arrive	7:20a Start 7:30a Start 8:15a Start 9:15a Start	1:50p End 1:20p End 3:15p End 4:15p End	2:00p Depart 1:30p Depart 3:25p Depart 4:25p Depart
Scenario 5C	Elementary Woodson HS/Pacelli/ALC/CLC IJ Holton/Ellis/Oakland Ed	7:10a-7:15a Arrive 7:20a-7:25a Arrive 8:05a-8:10a Arrive 9:05a-9:10a Arrive	7:25a Start 7:35a Start 8:20a Start 9:20a Start	1:55p End 1:25p End 3:20p End 4:20p End	2:05p Depart 1:35p Depart 3:30p Depart 4:30p Depart
Scenario 6A	Elementary Woodson HS/Pacelli/ALC/CLC IJ Holton/Ellis/Oakland Ed	7a-7:05a Arrive 7:10a-7:15a Arrive 8a-8:05a Arrive 9a-9:05a Arrive	7:15a Start 7:25a Start 8:15a Start 9:15a Start	1:45p End 1:15p End 2:45p End 3:45p End	1:55p Depart 1:25p Depart 2:55p Depart 3:55p Depart
Scenario 6B	Elementary Woodson HS/Pacelli/ALC/CLC IJ Holton/Ellis/Oakland Ed	7:05a-7:10a Arrive 7:15a-7:20a Arrive 8:05a-8:10a Arrive 9:05a-9:10a Arrive	7:20a Start 7:30a Start 8:20a Start 9:20a Start	1:50p End 1:20p End 2:50p End 3:50p End	2:00p Depart 1:30p Depart 3:00p Depart 4:00p Depart
Scenario 6C	Elementary Woodson HS/Pacelli/ALC/CLC IJ Holton/Ellis/Oakland Ed	7:10a-7:15a Arrive 7:20a-7:25a Arrive 8:10a-8:15a Arrive 9:10a-9:15a Arrive	7:25a Start 7:35a Start 8:25a Start 9:25a Start	1:55p End 1:25p End 2:55p End 3:55p End	2:05p Depart 1:35p Depart 3:05p Depart 4:05p Depart

All Scenario 5 options preserve the current length of day at all buildings. It extends the length of day at IJ Holton to 7 hours.

CLC and Oakland Ed are placed within tiers. Actual length of instructional day would remain unchanged, unless programs decide to extend operational day. Actual times within tiers TBD.

All Scenario 6 options set the length of day at all buildings to 6.5 hours. This would reduce instructional time at secondary buildings.

Current length of day at Oakland Ed is 6 hours 40 minutes (6.67 hours).



# Bell Time Study

## October 2021 - February 2022

**Benjamin Davis** • Routing Lead

**c e s o** • Rethink Possible

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main 612 213 2892 • [theceso.com](http://theceso.com)



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