
City of Boulder

DRIVE TIME 2016

Broadway • 28th Street • Foothills Parkway



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August 2017

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1.0 Background

Drive-time studies measuring the time it takes to get across town in Boulder during peak traffic hours (7:30am, 12:00 noon and 5:00 pm) have been performed since 1986. The purpose of these annual studies is to determine how congestion on these major arterials in Boulder is changing over time.

Historically, in even-numbered years, the north/south routes (Broadway, 28th Street, and recently Foothills Parkway) have been studied and in odd-numbered years, the east/west routes (Valmont Road, Arapahoe Avenue and mostly recently Pearl Street) have been studied (see Methodology section for exact routes). The frequency of travel time and delay studies in the City has been reduced in more recent years due to budgetary constraints. Previous north-south corridor travel time evaluations were performed in 2012, with the exception for the Broadway corridor as noted below.

Before 2004 these studies were performed by staff of the City of Boulder Audit and Evaluation Division. Since 2004, travel time data has been collected and evaluated by the Fox Tuttle Hernandez Transportation Group. Foothills Parkway was added to the data collection in 2006 as a third north-south corridor. In 2014, which was an east-west study year, the Broadway corridor was studied in substitute of Arapahoe Avenue due to construction on the Arapahoe Avenue corridor. Thus, the Broadway corridor has one more year of data than the other north-south corridors in this report.

This report focuses on the results from travel time studies performed in 2016 for the north-south routes of Broadway, 28th Street, and Foothills Parkway. Appendix I contains comparison summaries of drive time information by street and direction for all years when data was collected. Appendix II contains the results in detail for data collected in 2016. Older reports may be referenced for detailed results of past study years.

In 2004 and later, two changes in study methodologies were made: 1) use of GPS vs. hand-held stop watches, and 2) to abort a travel time run if there were conditions along the corridor that were considered atypical. This may include construction, lane closures, traffic accidents, or severe weather. The latter change in data collection methodology was made to provide a more direct evaluation of the performance of the corridor signal timing and operations during typical peak hour conditions. It is unknown if the pre-2004 studies included any travel time runs under these atypical conditions such that this would impact data comparisons between newer and older data, but direct comparisons between new data and previous study years should consider this. Additional discussion of the data collection methodology is provided in Section 5.0

Note: Prior to 2004, the north end of the travel time and delay study areas terminated at Violet Avenue along Broadway and at Kalmia Avenue along 28th Street. Data collected in 2004 and since has extended both of these corridors: north to Lee Hill Road along Broadway and north to Jay Road along 28th Street. Where comparisons are made to pre-2004 data in this report, only the original study area segments were included in the calculations to provide a consistent basis for comparison.

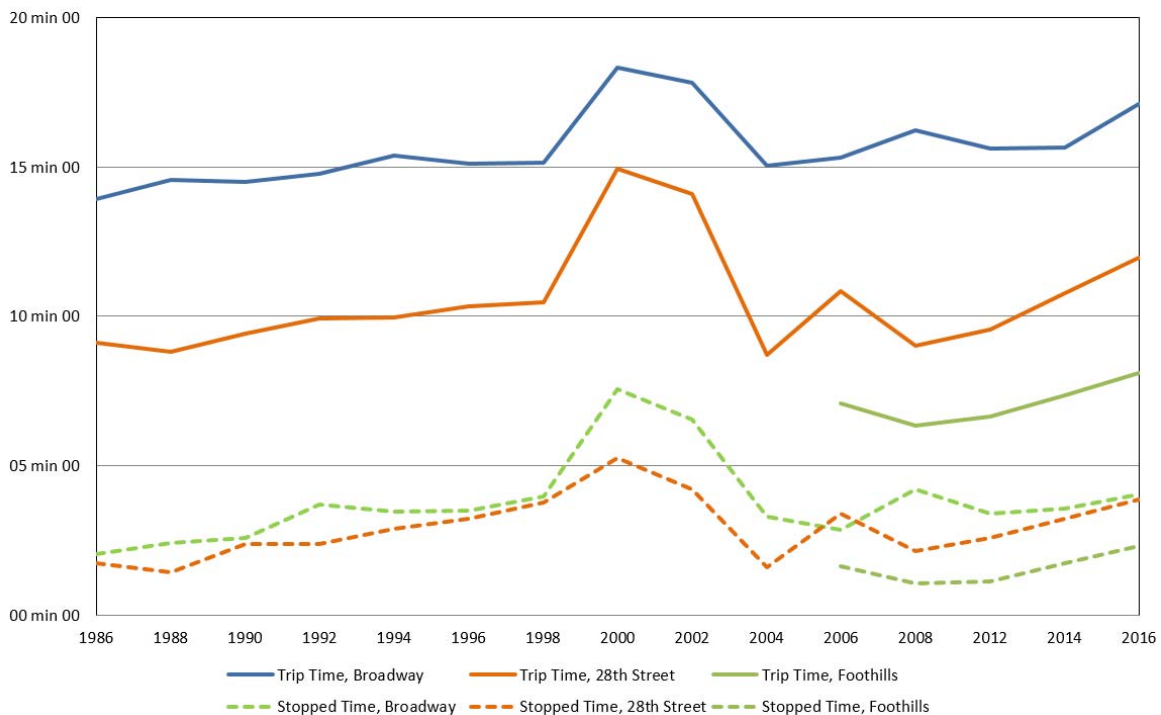
2.0 Comparison of Drive Time by Street

The average trip times and the average time spent stopped (or “stopped time”) on Broadway, 28th Street, and Foothills Parkway over all of the years studied are displayed in **Figure 1**. On both Broadway and 28th, total travel times and stopped times have increased steadily between 1986 and 1998, with a sharp increase between 1998 and 2000. After 2000, total trip times decreased steadily to a 12-year low-point in 2004. Recent data (2006 through 2012) shows similar rates of increase in travel and stopped times as pre-1998 data. **The 2016 data shows increased mean trip times and mean stopped times for all corridors studied with the highest values since 2002.**

In comparison to previous years, the variability in peak hour travel times have increased on all corridors with the 2016 studies. The mean, shortest and longest travel times are provided for 2016 data on Table II.1 in Appendix II. The greatest differences in travel time variability from the previous studies are as follows:

- **Broadway Southbound** from Lee Hill Road to Greenbriar Avenue: In 2014, the shortest and longest travel times were 13:04 and 19:21 (min:sec), respectively. In 2016, the shortest and longest travel times were 14:24 and 30:01.
- **28th Street Southbound** from Jay Road to Table Mesa Drive: In 2012, the shortest and longest travel times were 6:31 and 12:16, respectively. In 2016, the shortest and longest travel times were 9:57 and 25:11.
- **Foothills Parkway Southbound** from Diagonal Highway to South Boulder Road: In 2012, the shortest and longest travel times were 4:55 and 8:42, respectively. In 2016, the shortest and longest travel times were 4:52 and 23:18.

Figure 1. Comparison of Total Trip Time and Time Stopped 1986 to 2016



As discussed in previous reports, the Skunk Creek underpass project on Broadway and the Goose Creek underpass project on 28th Street may have contributed to the spike in 2000. The dip in 2004 could be due to a change in the study methodology which excluded travel time runs during atypical conditions (construction, lane closures, traffic accidents, severe weather). The reduction in travel times in 2004 may also have been partially attributable to corridor signal timing and roadway improvements, completion of the Broadway reconstruction project between University Avenue & Pine Street (both from decreases in construction-related delays and some diversion of traffic to other parallel corridors), and overall decrease in traffic volumes on these corridors than in previous years. In the early 2000's, the completion of improvements at the Iris intersection on 28th Street likely contributed to the decreased in travel times along this corridor.

Table 1, on the following page, shows the mean trip times, mean time spent stopped, and the mean percent of time spent stopped by year. Differences between each study year and the first year of data collection (1986 for Broadway and 28th Street, 2006 for Foothills) are also provided.

Table 1
Comparison of Broadway, 28th Street, and Foothills Parkway
Mean Total Trip Time, Mean Total Time Stopped, and Mean Percent of Time Stopped

Street	Year	Mean Total Trip Time		Mean Total Time Stopped		Mean % of Time Stopped	
		Trip Time	Difference from 1986	Time Stopped	Difference from 1986	Percent of Time Stopped	Difference from 1986
Broadway	1986	13 min 56 sec	n/a	02 min 02 sec	n/a	14%	n/a
	1988	14 min 33 sec	+ 00 min 37 sec	02 min 25 sec	+ 00 min 23 sec	16%	+ 2%
	1990	14 min 30 sec	+ 00 min 34 sec	02 min 35 sec	+ 00 min 33 sec	18%	+ 4%
	1992	14 min 47 sec	+ 00 min 51 sec	03 min 42 sec	+ 01 min 40 sec	24%	+ 10%
	1994	15 min 22 sec	+ 01 min 26 sec	03 min 28 sec	+ 01 min 26 sec	22%	+ 8%
	1996	15 min 06 sec	+ 01 min 10 sec	03 min 29 sec	+ 01 min 27 sec	23%	+ 9%
	1998	15 min 09 sec	+ 01 min 13 sec	03 min 57 sec	+ 01 min 55 sec	26%	+ 12%
	2000	18 min 20 sec	+ 04 min 24 sec	07 min 34 sec	+ 05 min 32 sec	38%	+ 24%
	2002	17 min 49 sec	+ 03 min 53 sec	06 min 33 sec	+ 04 min 31 sec	35%	+ 21%
	2004	15 min 01 sec	+ 01 min 05 sec	03 min 17 sec	+ 01 min 15 sec	21%	+ 7%
	2006	15 min 19 sec	+ 01 min 23 sec	02 min 50 sec	+ 00 min 48 sec	18%	+ 4%
	2008	16 min 14 sec	+ 02 min 18 sec	04 min 12 sec	+ 02 min 10 sec	25%	+ 11%
	2012	15 min 36 sec	+ 01 min 40 sec	03 min 24 sec	+ 01 min 22 sec	21%	+ 7%
	2014	15 min 38 sec	+ 01 min 42 sec	03 min 33 sec	+ 01 min 31 sec	22%	+ 8%
2016	17 min 06 sec	+ 03 min 10 sec	04 min 02 sec	+ 02 min 00 sec	22%	+ 8%	
28th Street	1986	09 min 07 sec	n/a	01 min 43 sec	n/a	18%	n/a
	1988	08 min 49 sec	- 00 min 18 sec	01 min 25 sec	- 00 min 18 sec	16%	- 2%
	1990	09 min 24 sec	+ 00 min 17 sec	02 min 22 sec	+ 00 min 39 sec	24%	+ 6%
	1992	09 min 55 sec	+ 00 min 48 sec	02 min 22 sec	+ 00 min 39 sec	23%	+ 5%
	1994	09 min 57 sec	+ 00 min 50 sec	02 min 52 sec	+ 01 min 09 sec	26%	+ 8%
	1996	10 min 19 sec	+ 01 min 12 sec	03 min 13 sec	+ 01 min 30 sec	30%	+ 12%
	1998	10 min 27 sec	+ 01 min 20 sec	03 min 46 sec	+ 02 min 03 sec	32%	+ 14%
	2000	14 min 56 sec	+ 05 min 49 sec	05 min 16 sec	+ 03 min 33 sec	32%	+ 14%
	2002	14 min 05 sec	+ 04 min 58 sec	04 min 13 sec	+ 02 min 30 sec	28%	+ 10%
	2004	08 min 42 sec	- 00 min 25 sec	01 min 35 sec	- 00 min 08 sec	16%	- 2%
	2006	10 min 51 sec	+ 01 min 44 sec	03 min 24 sec	+ 01 min 41 sec	29%	+ 11%
	2008	09 min 00 sec	- 00 min 07 sec	02 min 09 sec	+ 00 min 26 sec	22%	+ 4%
	2012	09 min 34 sec	- 00 min 27 sec	02 min 34 sec	+ 00 min 51 sec	25%	+ 7%
2016	11 min 58 sec	- 02 min 51 sec	03 min 52 sec	+ 02 min 09 sec	30%	+ 12%	
Foothills Pkwy	**** No data prior to 2006 ****						
	2006	07 min 04 sec	n/a	01 min 38 sec	n/a	20%	n/a
	2008	06 min 21 sec	- 00 min 43 sec	01 min 04 sec	- 00 min 34 sec	16%	- 4%
	2012	06 min 38 sec	- 00 min 26 sec	01 min 07 sec	- 00 min 31 sec	15%	+ 5%
	2016	08 min 06 sec	- 01 min 02 sec	02 min 19 sec	+ 00 min 41 sec	23%	+ 3%

Figure 2 and **Figure 3** show the percent change in mean total trip times and stopped times since 1986 for the Broadway and 28th Street corridors.

Figure 2. Broadway Percent Change in Total Trip Times and Stopped Times from 1986

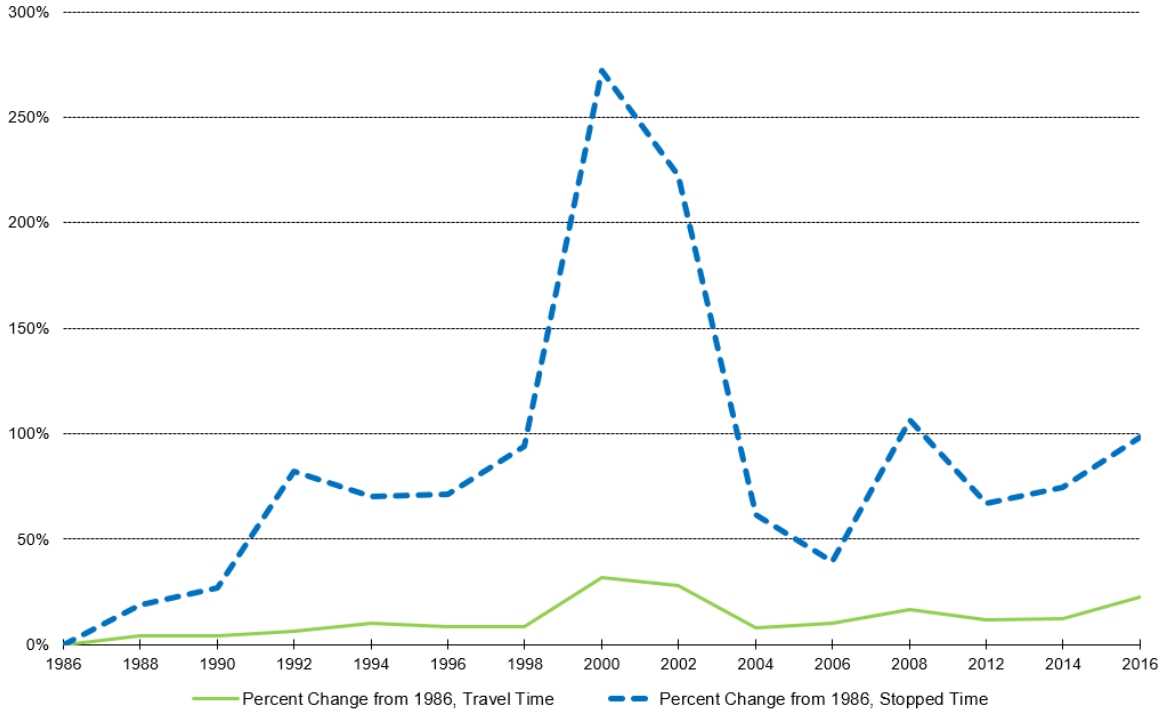
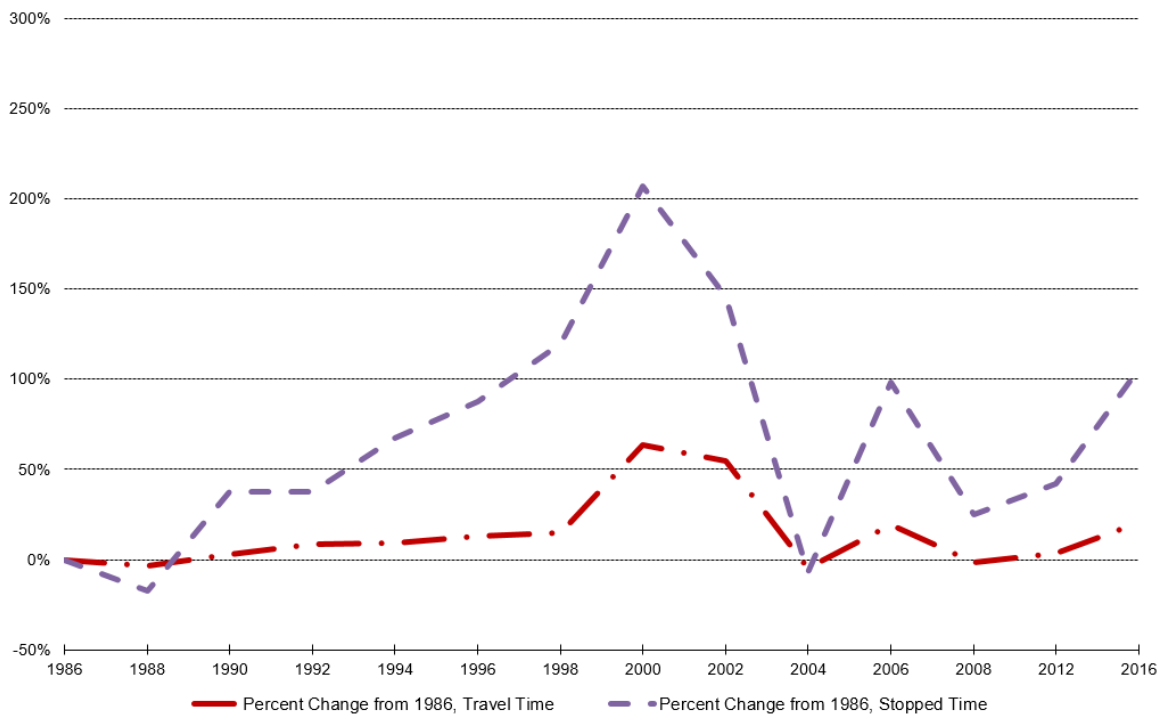


Figure 3. 28th Street Percent Change in Total Trip Times and Stopped Times from 1986



3.0 Comparison of Drive Times by Street and Direction

Mean trip time, time stopped, and percent of time stopped were examined for each street by direction. **Table 2** provides a summary of Mean Total Trip Time, Mean Total Stopped Time, and Mean % of Time Stopped for Broadway by direction. **Figure 4** and **Figure 5** (on the following page) provide an historic breakdown of mean travel times between nodes, to provide some sense of where the changes in travel time have occurred within the corridor over time. *Note: node data is only available for years in which the GPS data collection has been used (2004 to present).*

Table 2
Comparison of Broadway North and South
Mean Total Trip Time, Mean Total Time Stopped, and Mean Percent of Time Stopped

Street	Year	Mean Total Trip Time		Mean Total Time Stopped		Mean % of Time Stopped	
		Trip Time	Difference from 1986	Time Stopped	Difference from 1986	Percent of Time Stopped	Difference from 1986
Broadway North	1986	13 min 43 sec	n/a	01 min 46 sec	n/a	12%	n/a
	1988	15 min 24 sec	+ 01 min 41 sec	02 min 57 sec	+ 01 min 11 sec	18%	+ 6%
	1990	14 min 53 sec	+ 01 min 10 sec	02 min 50 sec	+ 01 min 04 sec	19%	+ 7%
	1992	15 min 20 sec	+ 01 min 37 sec	03 min 51 sec	+ 02 min 05 sec	23%	+ 11%
	1994	15 min 52 sec	+ 02 min 09 sec	03 min 46 sec	+ 02 min 00 sec	23%	+ 11%
	1996	15 min 39 sec	+ 01 min 56 sec	03 min 52 sec	+ 02 min 06 sec	24%	+ 12%
	1998	15 min 09 sec	+ 01 min 26 sec	04 min 02 sec	+ 02 min 16 sec	27%	+ 15%
	2000	18 min 29 sec	+ 04 min 46 sec	07 min 26 sec	+ 05 min 40 sec	37%	+ 25%
	2002	18 min 45 sec	+ 05 min 02 sec	07 min 02 sec	+ 05 min 16 sec	37%	+ 25%
	2004	15 min 51 sec	+ 02 min 08 sec	03 min 46 sec	+ 02 min 00 sec	23%	+ 11%
	2006	16 min 00 sec	+ 02 min 17 sec	03 min 06 sec	+ 01 min 20 sec	19%	+ 7%
	2008	17 min 08 sec	+ 03 min 25 sec	05 min 08 sec	+ 03 min 22 sec	28%	+ 16%
	2012	16 min 20 sec	+ 02 min 37 sec	04 min 03 sec	+ 02 min 17 sec	24%	+ 12%
2014	16 min 06 sec	+ 02 min 23 sec	03 min 45 sec	+ 01 min 59 sec	23%	+ 11%	
2016	17 min 05 sec	+ 03 min 22 sec	03 min 48 sec	+ 02 min 02 sec	22%	+ 10%	
Broadway South	1986	14 min 08 sec	n/a	02 min 19 sec	n/a	16%	n/a
	1988	13 min 42 sec	- 00 min 26 sec	01 min 54 sec	- 00 min 25 sec	14%	- 2%
	1990	14 min 08 sec	- 00 min 00 sec	02 min 20 sec	+ 00 min 01 sec	16%	- 0%
	1992	14 min 15 sec	+ 00 min 07 sec	03 min 33 sec	+ 01 min 14 sec	25%	+ 9%
	1994	14 min 52 sec	+ 00 min 44 sec	03 min 10 sec	+ 00 min 51 sec	21%	+ 5%
	1996	14 min 34 sec	+ 00 min 26 sec	03 min 05 sec	+ 00 min 46 sec	21%	+ 5%
	1998	15 min 10 sec	+ 01 min 02 sec	03 min 53 sec	+ 01 min 34 sec	25%	+ 9%
	2000	18 min 11 sec	+ 04 min 03 sec	07 min 43 sec	+ 05 min 24 sec	40%	+ 24%
	2002	16 min 59 sec	+ 02 min 51 sec	06 min 04 sec	+ 03 min 45 sec	34%	+ 18%
	2004	14 min 05 sec	- 00 min 03 sec	02 min 43 sec	+ 00 min 24 sec	19%	+ 3%
	2006	14 min 33 sec	+ 00 min 25 sec	02 min 32 sec	+ 00 min 13 sec	17%	+ 1%
	2008	15 min 19 sec	+ 01 min 11 sec	03 min 16 sec	+ 00 min 57 sec	21%	+ 5%
	2012	14 min 51 sec	+ 00 min 43 sec	02 min 46 sec	+ 00 min 27 sec	18%	+ 2%
2014	15 min 07 sec	+ 00 min 59 sec	03 min 19 sec	+ 01 min 00 sec	21%	+ 5%	
2016	17 min 08 sec	+ 03 min 00 sec	04 min 16 sec	+ 01 min 57 sec	23%	+ 7%	

Figure 4. Historic Travel Time from Previous Node, Broadway Northbound
(2016 data in Green, Previous Years in Grey)

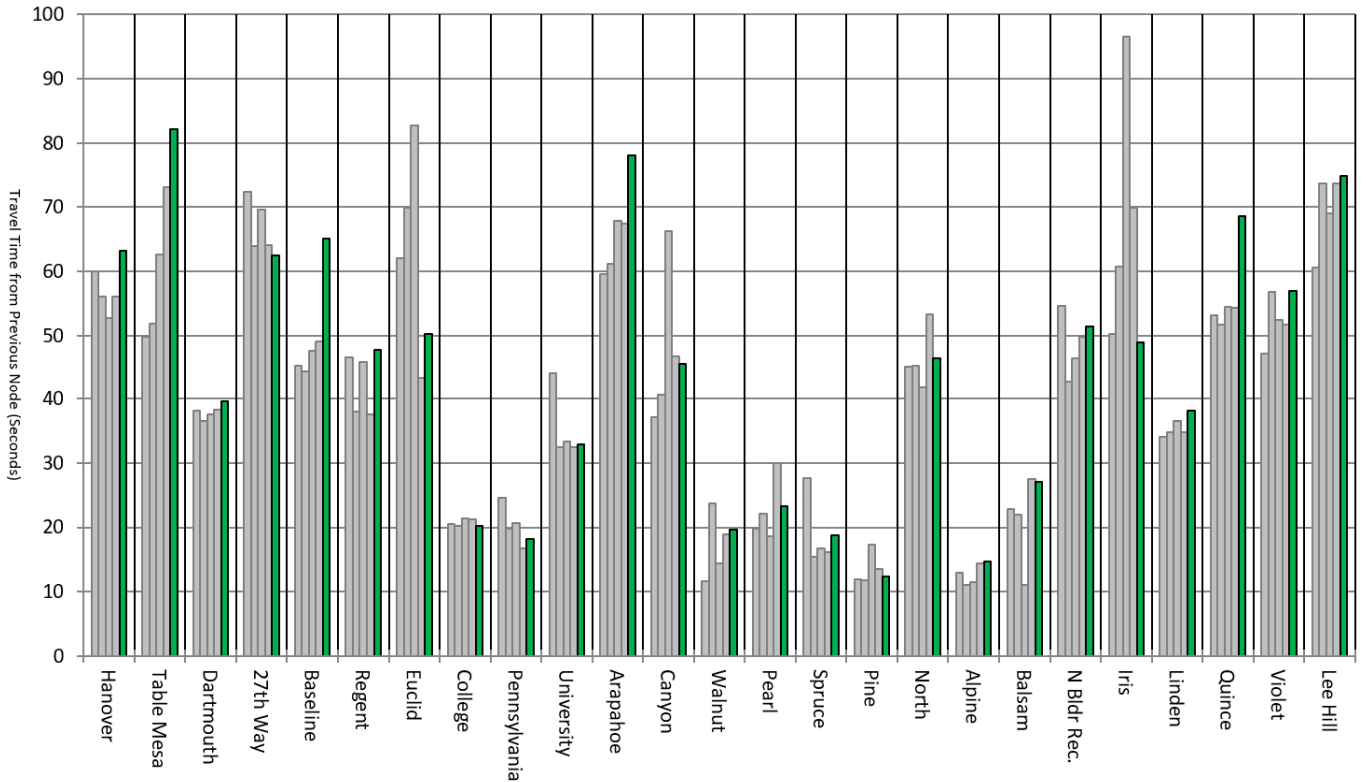


Figure 5. Historic Travel Time from Previous Node, Broadway Southbound
(2016 data in Green, Previous Years in Grey)

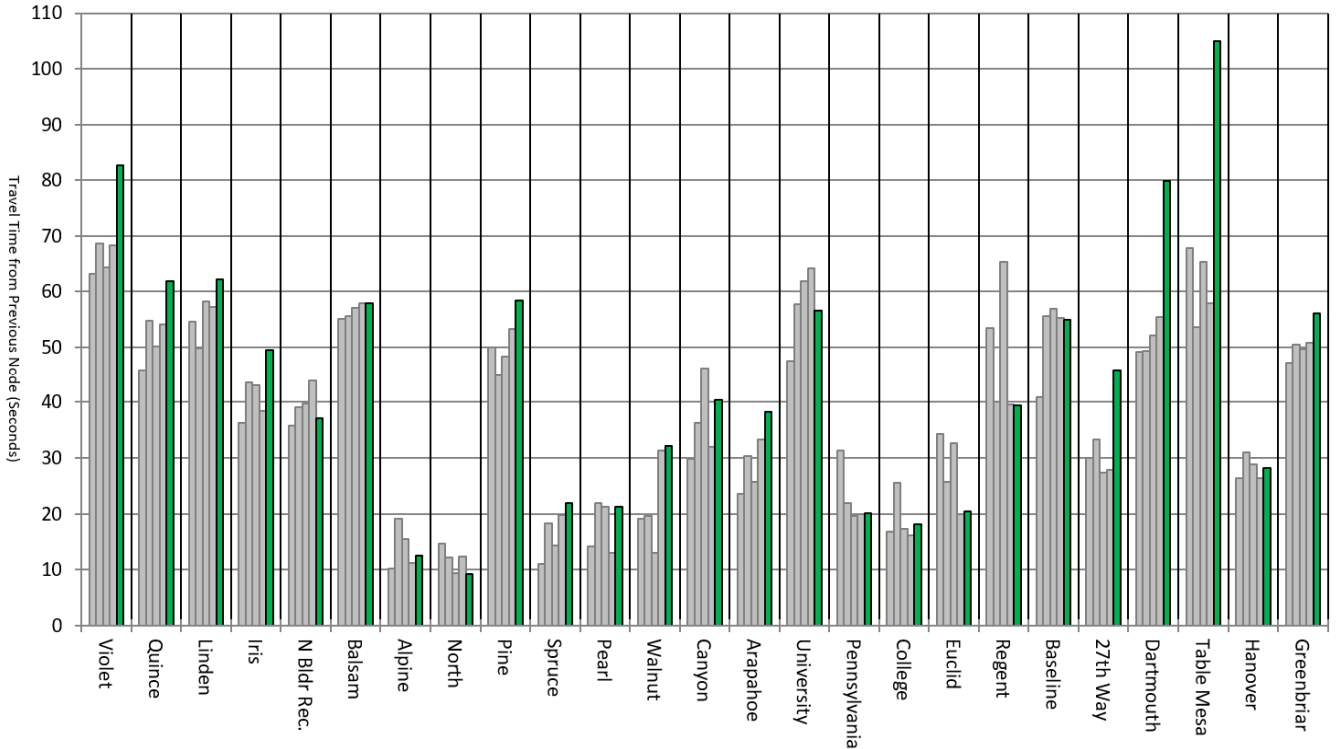


Table 3 provides a summary of Mean Total Trip Time, Mean Total Stopped Time, and Mean % of Time Stopped for 28th Street by direction. **Figure 6** and **Figure 7** (on the following page) provide an historic breakdown of mean travel times between nodes, to provide some sense of where the changes in travel time have occurred within the corridor over time. *Note: node data is only available for years in which the GPS data collection has been used (2004 to present).*

Table 3
Comparison of 28th Street North and South
Mean Total Trip Time, Mean Total Time Stopped, and Mean Percent of Time Stopped

Street	Year	Mean Total Trip Time		Mean Total Time Stopped		Mean % of Time Stopped	
		Trip Time	Difference from 1986	Time Stopped	Difference from 1986	Percent of Time Stopped	Difference from 1986
28th Street North	1986	08 min 51 sec	n/a	01 min 27 sec	n/a	16%	n/a
	1988	09 min 04 sec	+ 00 min 13 sec	01 min 31 sec	+ 00 min 04 sec	16%	- 0%
	1990	08 min 59 sec	+ 00 min 08 sec	01 min 58 sec	+ 00 min 31 sec	21%	+ 5%
	1992	09 min 42 sec	+ 00 min 51 sec	01 min 56 sec	+ 00 min 29 sec	20%	+ 4%
	1994	09 min 22 sec	+ 00 min 31 sec	02 min 32 sec	+ 01 min 05 sec	22%	+ 6%
	1996	10 min 00 sec	+ 01 min 09 sec	02 min 59 sec	+ 01 min 32 sec	28%	+ 12%
	1998	11 min 03 sec	+ 02 min 12 sec	04 min 24 sec	+ 02 min 57 sec	34%	+ 18%
	2000	15 min 10 sec	+ 06 min 19 sec	05 min 37 sec	+ 04 min 10 sec	34%	+ 18%
	2002	13 min 46 sec	+ 04 min 55 sec	03 min 58 sec	+ 02 min 31 sec	27%	+ 11%
	2004	08 min 21 sec	- 00 min 30 sec	01 min 21 sec	- 00 min 06 sec	15%	- 1%
	2006	10 min 36 sec	+ 01 min 45 sec	03 min 35 sec	+ 02 min 08 sec	31%	+ 15%
	2008	09 min 16 sec	+ 00 min 25 sec	02 min 17 sec	+ 00 min 50 sec	23%	+ 7%
	2012	09 min 53 sec	+ 01 min 02 sec	02 min 45 sec	+ 01 min 18 sec	26%	+ 10%
2016	11 min 41 sec	+ 02 min 50 sec	04 min 05 sec	+ 02 min 38 sec	33%	+ 17%	
28th Street South	1986	09 min 24 sec	n/a	01 min 58 sec	n/a	20%	n/a
	1988	08 min 33 sec	- 00 min 51 sec	01 min 19 sec	- 00 min 39 sec	15%	- 5%
	1990	09 min 50 sec	+ 00 min 26 sec	02 min 46 sec	+ 00 min 48 sec	26%	+ 6%
	1992	10 min 08 sec	+ 00 min 44 sec	02 min 48 sec	+ 00 min 50 sec	27%	+ 7%
	1994	10 min 33 sec	+ 01 min 09 sec	03 min 13 sec	+ 01 min 15 sec	29%	+ 9%
	1996	10 min 40 sec	+ 01 min 16 sec	03 min 26 sec	+ 01 min 28 sec	31%	+ 11%
	1998	09 min 51 sec	+ 00 min 27 sec	03 min 07 sec	+ 01 min 09 sec	30%	+ 10%
	2000	14 min 43 sec	+ 05 min 19 sec	04 min 54 sec	+ 02 min 56 sec	31%	+ 11%
	2002	14 min 26 sec	+ 05 min 02 sec	04 min 28 sec	+ 02 min 30 sec	28%	+ 8%
	2004	09 min 00 sec	- 00 min 24 sec	01 min 48 sec	- 00 min 10 sec	17%	- 3%
	2006	10 min 11 sec	+ 00 min 47 sec	03 min 06 sec	+ 01 min 08 sec	29%	+ 9%
	2008	08 min 43 sec	- 00 min 41 sec	02 min 00 sec	+ 00 min 02 sec	22%	+ 2%
	2012	09 min 15 sec	- 00 min 09 sec	02 min 23 sec	+ 00 min 25 sec	24%	+ 4%
2016	12 min 16 sec	+ 02 min 52 sec	03 min 39 sec	+ 01 min 41 sec	28%	+ 8%	

Figure 6. Historic Travel Time from Previous Node, **28th Street Northbound**
(2016 data in Green, Previous Years in Grey)

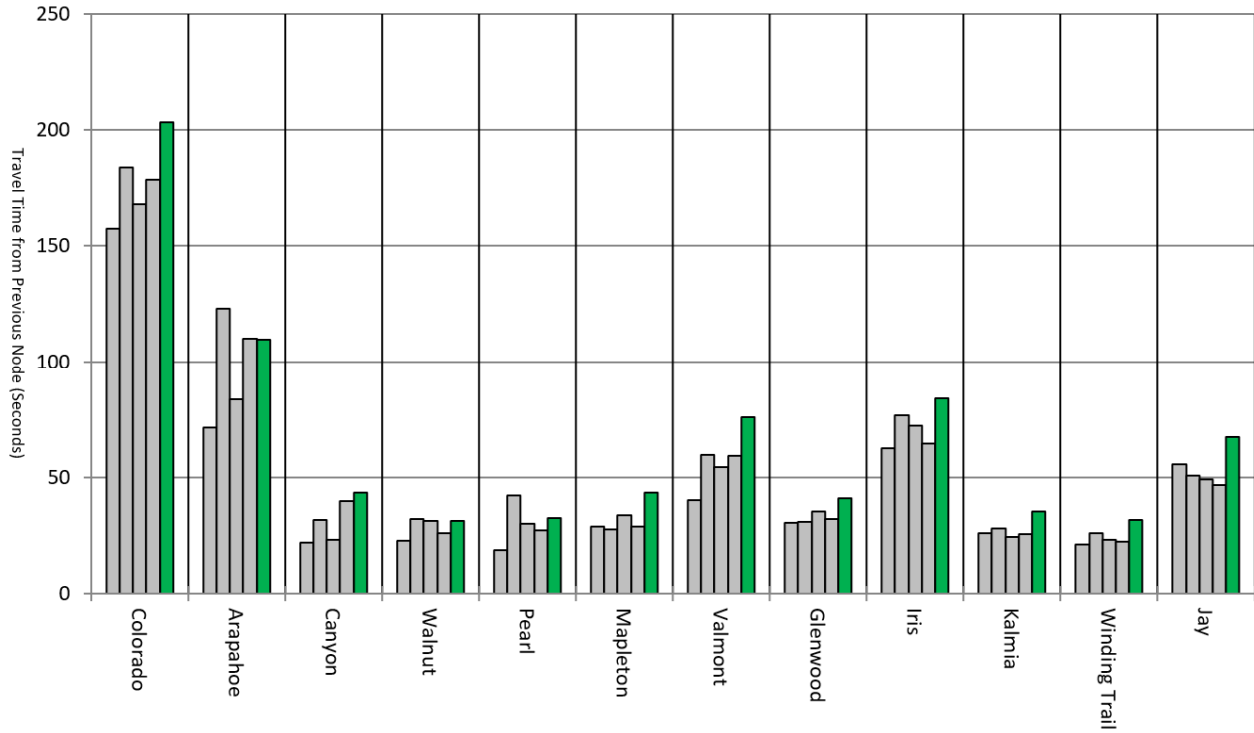
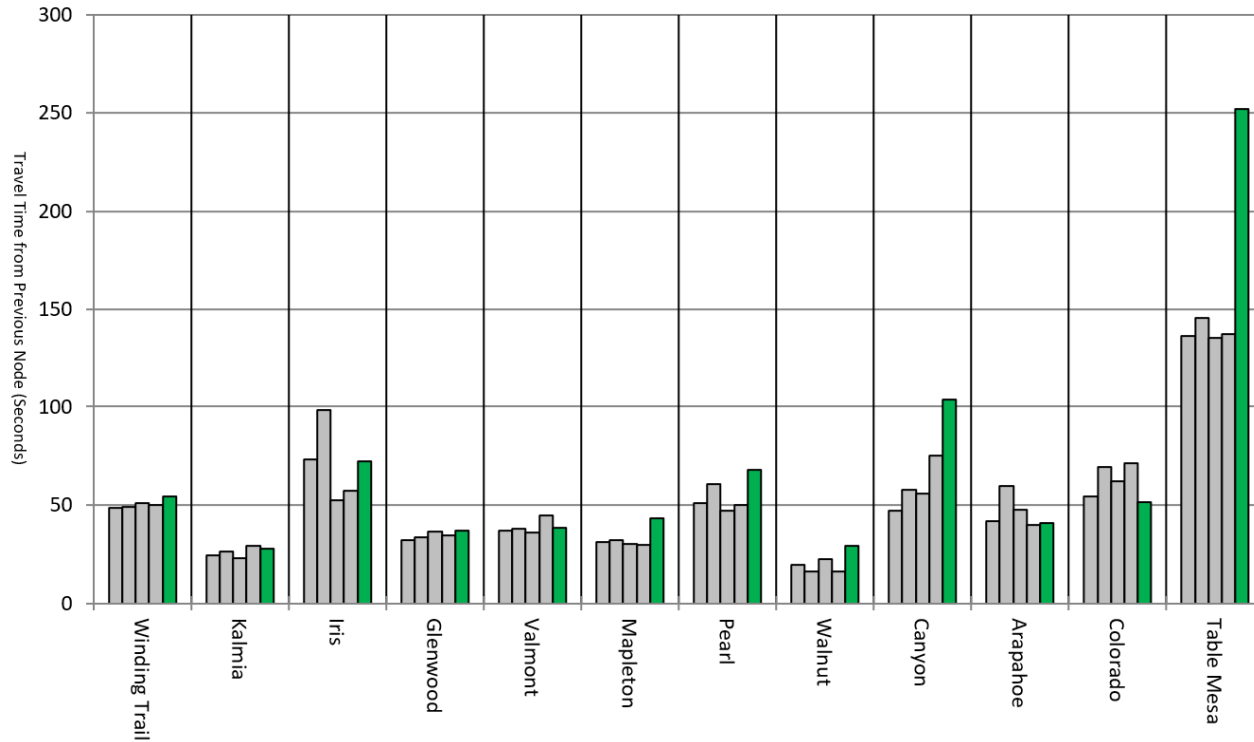


Figure 7. Historic Travel Time from Previous Node, **28th Street Southbound**
(2016 data in Green, Previous Years in Grey)



The 2016 data for the Foothills Parkway corridor is summarized in **Table 4**, below, with comparisons to 2006 (the first year that the Foothills Parkway corridor was studied). **Figure 8** and **Figure 9** provide an historic breakdown of mean travel times between nodes, to provide some sense of where the changes in travel time have occurred within the corridor data years.

Table 4
Comparison of Foothills Pkwy North and South
Mean Total Trip Time, Mean Total Time Stopped, and Mean Percent of Time Stopped

Street	Year	Mean Total Trip Time		Mean Total Time Stopped		Mean % of Time Stopped	
		Trip Time	Difference from 1986	Time Stopped	Difference from 1986	Percent of Time Stopped	Difference from 1986
Foothills North	**** No data prior to 2006 ****						
	2006	06 min 24 sec	n/a	01 min 10 sec	n/a	17%	n/a
	2008	06 min 15 sec	- 00 min 09 sec	01 min 10 sec	- 00 min 00 sec	17%	- 0%
	2012	06 min 31 sec	+ 00 min 07 sec	01 min 13 sec	+ 00 min 03 sec	17%	- 0%
	2016	07 min 41 sec	+ 01 min 17 sec	01 min 59 sec	+ 00 min 49 sec	23%	+ 6%
Foothills South	**** No data prior to 2006 ****						
	2006	07 min 45 sec	n/a	02 min 07 sec	n/a	23%	n/a
	2008	06 min 28 sec	- 01 min 17 sec	00 min 59 sec	- 01 min 08 sec	14%	- 9%
	2012	06 min 45 sec	- 01 min 00 sec	01 min 01 sec	- 01 min 06 sec	14%	- 9%
	2016	08 min 38 sec	+ 00 min 53 sec	02 min 45 sec	+ 00 min 38 sec	22%	- 1%

Figure 8. Historic Travel Time from Previous Node, Foothills Northbound
(2016 data in Green, Previous Years in Grey)

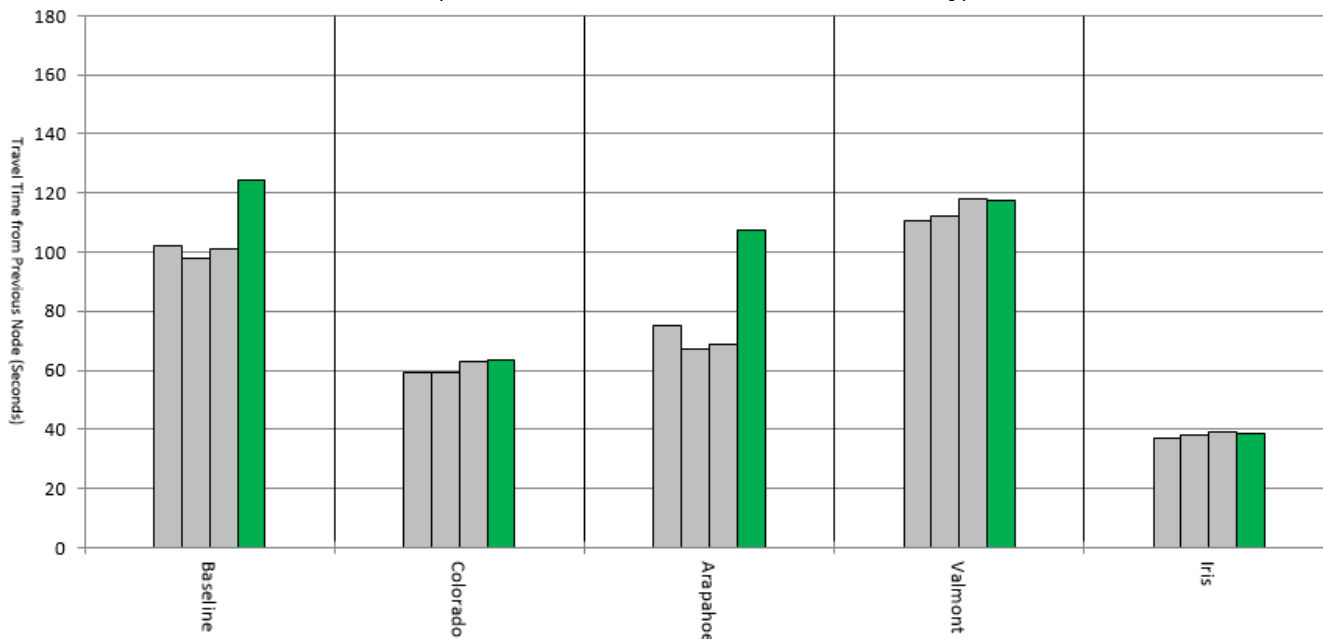
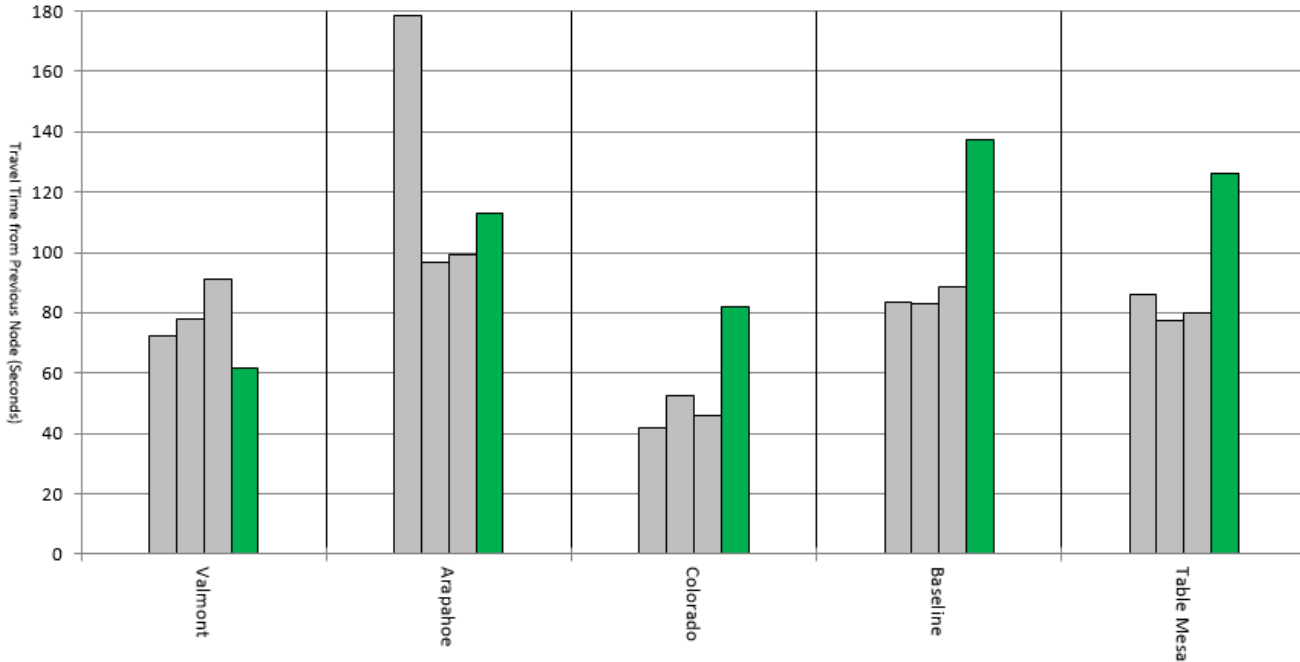


Figure 9. Historic Travel Time from Previous Node, Foothills Southbound
(2016 data in Green, Previous Years in Grey)



4.0 “Worst” Lights

Each year, the data collected in the Drive Time study are used to determine the ten most frequently stopped-at traffic signals in a given year. These results are categorized into a “ten worst” lights list (worst lights by chance of hitting the red traffic light). Appendix II displays the complete list along with lists of the “ten best” lights.

As shown in **Table 5** below, a red light was experienced at Canyon Boulevard during 93% of the southbound travel time runs on 28th Street. This was the “worst” light with respect to chances of hitting a red light.

Table 5 - "Worst" Lights 2016

Worst Lights by Chance of Hitting the Traffic Light	
Intersection, Direction	Mean Chance in 2016
Canyon Blvd. & 28th Street, Southbound	93%
Colorado Avenue & 28th Street, Northbound	87%
Valmont Road & Foothills Parkway, Northbound	87%
Arapahoe Avenue & Foothills Parkway, Northbound	80%
Iris Avenue & 28th Street, Southbound	80%
Arapahoe Avenue & Broadway, Northbound	80%
Baseline Road & Foothills Parkway, Northbound	80%
Arapahoe Avenue & 28th Street, Northbound	73%
Pearl Street & 28th Street, Southbound	73%
Table Mesa Drive & Broadway, Northbound	73%

5.0 Methodology

A similar methodology is used every year for the drive time studies, although the routes alternate from north/south to east/west. In 2004, a new data collection methodology was adopted which utilizes a hand-held GPS device, a laptop computer, and TS-PP Draft (now called "Tru-Traffic") software to record the travel time and delay data. This replaced the manual stop-watch method previously used by City staff from 1986 to 2003. Both the old and new methods involve one person who operates the vehicle and performs the data collection simultaneously. In contrast to the old method, however, the new GPS/laptop method does not require any effort on the part of the driver once the study has begun. In 2016, a GPS tracking application was utilized to collect time, position and speed data for importing into the Tru-Traffic software.

GPS coordinates for each traffic signal were mapped into Tru-Traffic software prior to beginning travel time runs for the new year. Since there is an inherent margin of error in the GPS locations, several mapping runs were performed along each of the corridors to provide the most accurate locations possible. Even so, there is generally a margin of error of approximately 15 feet in all calculations (less than the length of a typical vehicle). Over many runs, the significance of these positional errors are diminished.

In 2016, 30 total runs were performed on each of the three study corridors per year, with one corridor being studied in both directions during a signal outing (15 runs per direction per corridor per year). Trips are made at 7:30 am, 12:00 noon, and 5:00 pm to correspond with peak traffic periods. During an outing, a trip is made in one direction and then back in the opposite direction on the same corridor. Prior to 2006, 60 runs were performed on each corridor per year. Standard deviation calculations indicate that the reduced number of runs has not affected annual result tabulations.

Previous to 2004, it is believed that travel time runs were collected by the City of Boulder on each corridor regardless of roadway construction, traffic accidents, severe weather, and all other factors. Travel time runs were not aborted under any of these conditions. Since 2004, this practice has been changed. Now, travel time runs are aborted if there are any uncommon conditions that would cause delays typically not experienced along the corridor. This change was made to provide a more useful evaluation of the corridor signal system and operations under the conditions it is designed to operate. Lane closures, construction, accidents, icy/snowy conditions, etc. are special circumstances which significantly affect traffic flow. Incorporating atypical conditions into the data set limits the ability for comparison from year to year with measurable variability between results unrelated to typical travel conditions. It is unknown if the historic (older City-performed) studies included any travel time runs under these atypical conditions such that this would impact data comparisons between newer and older data, but direct comparisons between new data and previous study years should consider this. To provide some context to the frequency of these occurrences, in recent years there have been two to three travel time runs per year (out of 90 total across three corridors) that were aborted due to atypical conditions experienced in the field and travel time runs are rescheduled if significant snow is in the forecast.

Routes

The endpoints of the study corridors are as follows:

- **Broadway:** Greenbriar Blvd. on the north and Lee Hill Road on the north. Prior to 2004, the north end of the timing runs terminated at Violet Avenue. For this reason, the data from Violet Avenue to Lee Hill Road is excluded where historical comparisons for current vs. pre-2004 data are made.
- **28th Street:** Table Mesa on the south to Jay Road on the north. The data from Kalmia Avenue to Jay Road is not included in historical comparisons since this section was only recently added in 2004.
- **Foothills Parkway:** South Boulder Road on the south to Iris / Diagonal on the north.

Figure 10 provides a map showing the three north-south corridor study limits and signalized intersections. **Figure 11** also illustrates the corridor traffic signals.

Figure 10. North-South Corridor Study Limits Map

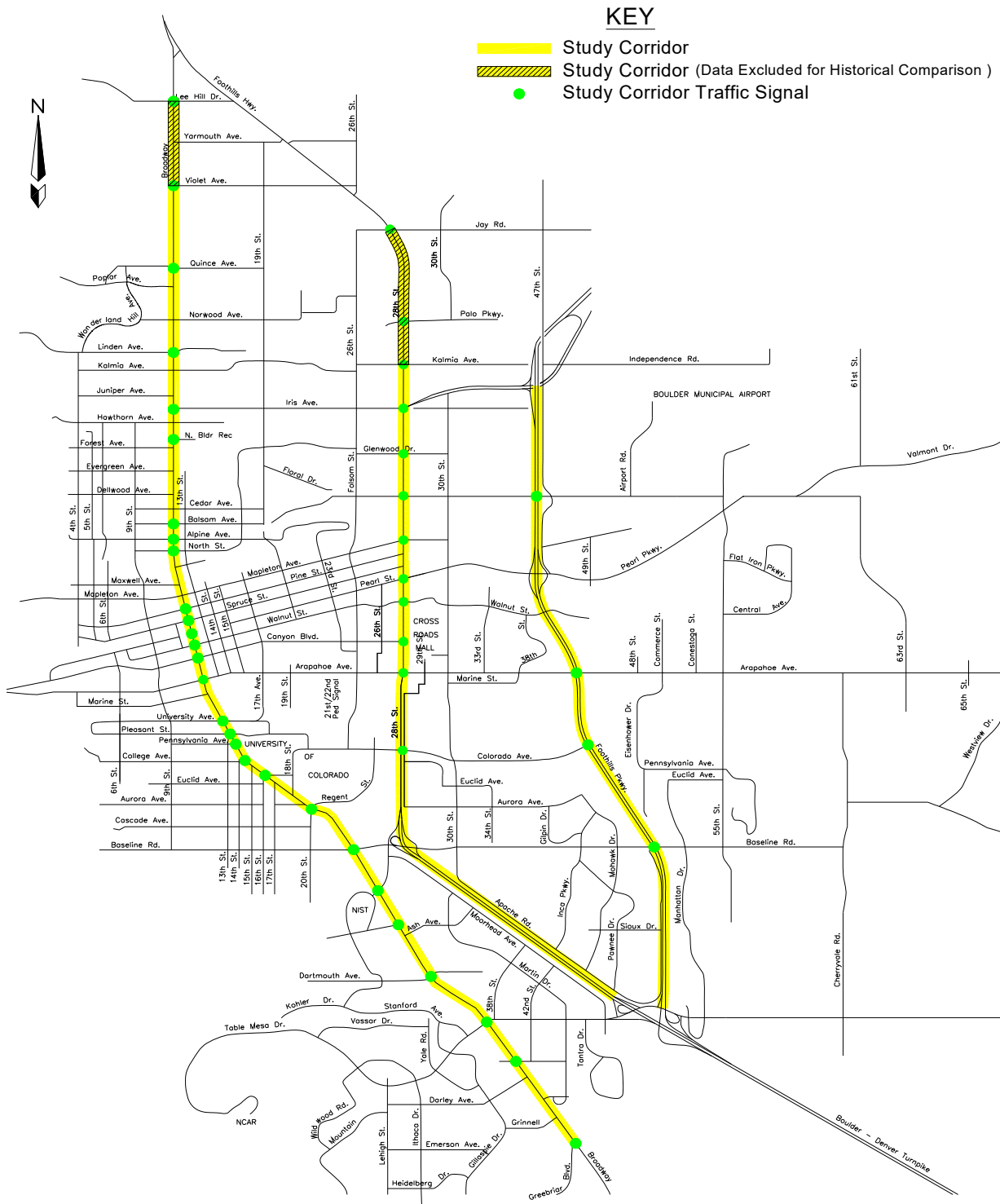
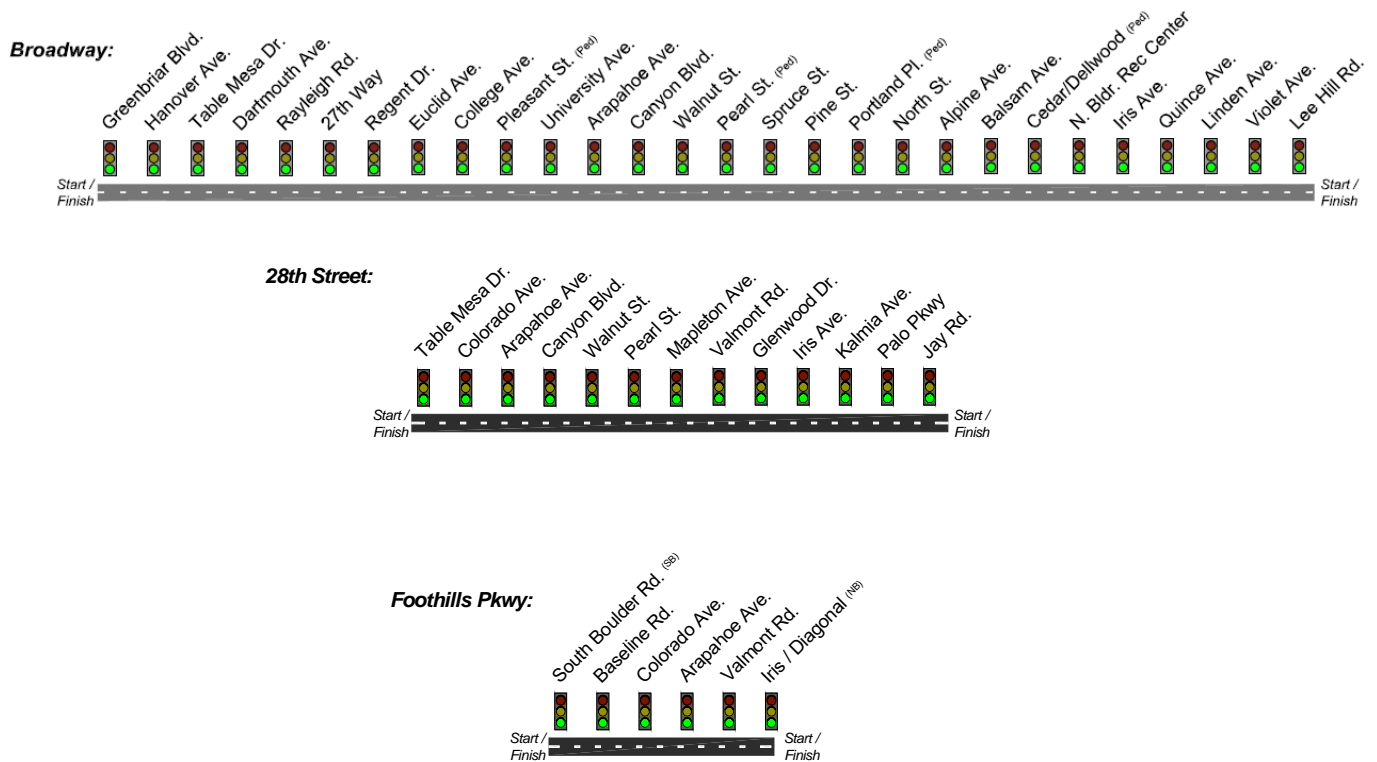


Figure 11. Corridor Traffic Signals



Weighting

In 1992, 1993, and 2004 not all the scheduled drive time trips for the year were completed. In 1992 there was a major construction project on Broadway which if included in the study would unfairly bias the results for 1992. In 1993, misunderstandings with research assistants resulted in missed trips. In 2004, budget constraints resulted in no data collected for the first four months of the year. Thus, to compensate for the missing data, the results were weighted statistically.

The data in these years were weighted by street driven, direction of trip, and start time so that there were an equal number of trips in each direction on each street for each time of day across all the years. This counterbalances the effect these variables may have on the average trip time.

Appendix I: Drive Time Comparison for All North-South Years

Table I-1	Comparison of Drive Time by Street across All Years
Table I-2	Comparison of Drive Time by Street and Direction across All Years
Table I-3	Mean Time Stopped at Four Boulder Intersections
Table I-4	Probability of Being Stopped at Four Boulder Intersections

**Table I-1
Comparison of Drive Time by Street Across all Years**

Street	Year	Distance	Mean Total Trip Time	Mean Speed (mph)	Total Stops Possible at Signals	Mean Number of Stops	Mean Total Time Stopped	Mean Percent of Time Stopped	Number of Trips	
Broadway	1986	6.0 miles	13 min 56 sec	26.2	22	6.4	02 min 02 sec	14%	54	
	1988	6.0 miles	14 min 33 sec	25.3	22	6.1	02 min 25 sec	16%	41	
	1990	6.0 miles	14 min 30 sec	25.1	22	5.9	02 min 35 sec	18%	57	
	1992	6.0 miles	14 min 47 sec	25.0	22	6.5	03 min 42 sec	24%	47	
	1994	6.0 miles	15 min 22 sec	23.7	22	6.7	03 min 28 sec	22%	57	
	1996	6.0 miles	15 min 06 sec	24.2	23	6.9	03 min 29 sec	23%	59	
	1998	6.0 miles	15 min 09 sec	24.0	23	7.1	03 min 57 sec	26%	61	
	2000	6.0 miles	18 min 20 sec	21.4	23	10.2	07 min 34 sec	38%	59	
	2002	6.0 miles	17 min 49 sec	28.1	24	8.6	06 min 33 sec	35%	60	
	2004	6.2 miles	15 min 01 sec	25.1	25	7.6	03 min 17 sec	21%	28	
	2006	6.2 miles	15 min 19 sec	24.9	25	7.1	02 min 50 sec	18%	28	
	2008	6.2 miles	16 min 14 sec	26.2	25	7.5	04 min 12 sec	25%	30	
	2012	6.2 miles	15 min 36 sec	26.1	26*	7.5	03 min 24 sec	21%	30	
	2014	6.2 miles	15 min 38 sec	26.2	26*	7.1	03 min 33 sec	22%	29	
2016	6.2 miles	17 min 06 sec	25.6	26*	8.7	04 min 02 sec	22%	30		
28th Street	1986	4.0 miles	09 min 07 sec	26.9	8	3.8	01 min 43 sec	18%	56	
	1988	4.0 miles	08 min 49 sec	27.7	8	3.0	01 min 25 sec	16%	40	
	1990	4.0 miles	09 min 24 sec	26.2	8	3.4	02 min 22 sec	24%	57	
	1992	4.0 miles	09 min 55 sec	25.0	8	3.5	02 min 22 sec	23%	47	
	1994	4.0 miles	09 min 57 sec	24.7	8	3.7	02 min 52 sec	26%	57	
	1996	4.0 miles	10 min 19 sec	24.0	8	4.2	03 min 13 sec	30%	59	
	1998	4.0 miles	10 min 27 sec	24.0	8	4.2	03 min 46 sec	32%	61	
	2000	4.0 miles	14 min 56 sec	17.6	9	5.1	05 min 16 sec	32%	59	
	2002	4.0 miles	14 min 05 sec	23.9	9	4.0	04 min 13 sec	28%	60	
	2004	4.4 miles	08 min 42 sec	28.5	10	2.8	01 min 35 sec	17%	19	
	2006	4.4 miles	10 min 25 sec	26.8	10	4.9	03 min 28 sec	28%	36	
	2008	4.4 miles	09 min 00 sec	29.9	10	3.7	02 min 09 sec	22%	30	
	2012	4.4 miles	09 min 34 sec	28.8	10	4.6	02 min 34 sec	25%	30	
2016	4.4 miles	11 min 58 sec	26.1	10	5.2	03 min 52 sec	30%	30		
Foothills Pkwy	**** No data prior to 2006 ****									
	2006	3.5 miles	07 min 29 sec	35.1	5	2.4	01 min 38 sec	20%	30	
	2008	3.5 miles	06 min 21 sec	36.2	5	2.0	01 min 04 sec	16%	30	
	2012	3.5 miles	06 min 28 sec	35.4	5	2.2	01 min 07 sec	15%	30	
	2016	3.5 miles	08 min 06 sec	33.5	5	3.5	02 min 19 sec	23%	30	

* Additional signals (potential stops) at 18th (NB and SB), 17th (NB & SB), and Euclid (NB only) were added in 2012 with the completion of the Broadway (Euclid to 18th) transportation improvements project.

Table I-2a
Comparison of Drive Time by Street and Direction Across all Years

Street	Year	Distance	Mean Total Trip Time	Mean Speed (mph)	Total Stops Possible at Signals	Mean Number of Stops	Mean Total Time Stopped	Mean Percent of Time Stopped	Number of Trips
Broadway North	1986	6.0 miles	13 min 43 sec	26.6	22	5.5	01 min 46 sec	12%	27
	1988	6.0 miles	15 min 24 sec	24.0	2	6.6	02 min 57 sec	18%	19
	1990	6.0 miles	14 min 53 sec	24.5	22	6.0	02 min 50 sec	19%	30
	1992	6.0 miles	15 min 20 sec	24.1	22	6.2	03 min 51 sec	23%	28
	1994	6.0 miles	15 min 52 sec	23.0	22	7.1	03 min 46 sec	23%	30
	1996	6.0 miles	15 min 39 sec	23.4	23	7.1	03 min 52 sec	24%	29
	1998	6.0 miles	15 min 09 sec	24.0	23	7.0	04 min 02 sec	27%	33
	2000	6.0 miles	18 min 29 sec	20.8	24	10.0	07 min 26 sec	37%	31
	2002	6.0 miles	18 min 45 sec	26.8	24	9.2	07 min 02 sec	37%	30
	2004	6.2 miles	15 min 51 sec	24.2	24	8.8	03 min 46 sec	23%	15
	2006	6.2 miles	16 min 00 sec	24.8	24	8.2	03 min 06 sec	18%	15
	2008	6.2 miles	17 min 08 sec	25.7	24	8.3	05 min 08 sec	28%	15
	2012	6.2 miles	16 min 20 sec	25.4	26	8.1	04 min 03 sec	24%	15
	2014	6.2 miles	16 min 06 sec	25.9	26	7.4	03 min 45 sec	23%	15
2016	6.2 miles	17 min 05 sec	25.2	26	8.6	03 min 48 sec	22%	15	
Broadway South	1986	6.0 miles	14 min 08 sec	25.8	22	7.3	02 min 19 sec	16%	27
	1988	6.0 miles	13 min 42 sec	26.5	22	5.6	01 min 54 sec	14%	22
	1990	6.0 miles	14 min 08 sec	25.7	22	5.7	02 min 20 sec	16%	27
	1992	6.0 miles	14 min 15 sec	25.9	22	6.8	03 min 33 sec	25%	19
	1994	6.0 miles	14 min 52 sec	24.5	23	6.3	03 min 10 sec	21%	27
	1996	6.0 miles	14 min 34 sec	24.9	24	6.7	03 min 05 sec	21%	30
	1998	6.0 miles	15 min 10 sec	24.1	24	7.3	03 min 53 sec	25%	28
	2000	6.0 miles	18 min 11 sec	22.0	24	10.4	07 min 43 sec	40%	28
	2002	6.0 miles	16 min 59 sec	29.3	24	7.6	06 min 04 sec	34%	30
	2004	6.2 miles	14 min 05 sec	26.1	25	6.2	02 min 43 sec	19%	13
	2006	6.2 miles	14 min 33 sec	25.0	25	5.8	02 min 32 sec	17%	13
	2008	6.2 miles	15 min 19 sec	26.7	25	6.5	03 min 16 sec	21%	15
	2012	6.2 miles	14 min 51 sec	26.7	26	7.0	02 min 46 sec	18%	15
	2014	6.2 miles	12:115:07 AM	26.5	26	6.9	03 min 19 sec	21%	14
2016	6.2 miles	17 min 08 sec	25.9	26	8.8	04 min 16 sec	23%	15	

Table I-2b
Comparison of Drive Time by Street and Direction Across all Years

Street	Year	Distance	Mean Total Trip Time	Mean Speed (mph)	Total Stops Possible at Signals	Mean Number of Stops	Mean Total Time Stopped	Mean Percent of Time Stopped	Number of Trips
28th Street North	1986	4.0 miles	08 min 51 sec	27.5	8	3.7	01 min 27 sec	16%	28
	1988	4.0 miles	09 min 04 sec	27.0	8	3.3	01 min 31 sec	16%	23
	1990	4.0 miles	08 min 59 sec	27.1	8	2.9	01 min 58 sec	21%	27
	1992	4.0 miles	09 min 42 sec	25.6	8	3.3	01 min 56 sec	20%	20
	1994	4.0 miles	09 min 22 sec	26.1	8	3.1	02 min 32 sec	22%	26
	1996	4.0 miles	10 min 00 sec	25.0	8	4.1	02 min 59 sec	28%	31
	1998	4.0 miles	11 min 03 sec	23.8	8	4.2	04 min 24 sec	34%	26
	2000	4.0 miles	15 min 10 sec	17.2	9	5.3	05 min 16 sec	34%	27
	2002	4.0 miles	13 min 46 sec	26.8	9	3.7	03 min 58 sec	27%	30
	2004	4.4 miles	08 min 21 sec	32.4	10	2.3	01 min 21 sec	15%	9
	2006	4.4 miles	10 min 36 sec	27.2	10	5.1	03 min 35 sec	31%	20
	2008	4.4 miles	09 min 16 sec	29.8	10	4.1	02 min 17 sec	23%	15
	2012	4.4 miles	09 min 53 sec	29.2	10	4.7	02 min 45 sec	26%	15
2016	4.4 miles	11 min 41 sec	26.6	10	5.3	04 min 05 sec	33%	15	
28th Street South	1986	4.0 miles	09 min 24 sec	26.2	8	3.8	01 min 58 sec	20%	28
	1988	4.0 miles	08 min 33 sec	28.3	8	2.6	01 min 19 sec	15%	17
	1990	4.0 miles	09 min 50 sec	25.4	8	3.8	02 min 46 sec	26%	30
	1992	4.0 miles	10 min 08 sec	24.5	8	3.7	02 min 48 sec	27%	27
	1994	4.0 miles	10 min 33 sec	23.4	8	4.4	03 min 13 sec	29%	31
	1996	4.0 miles	10 min 40 sec	23.1	8	4.4	03 min 26 sec	31%	28
	1998	4.0 miles	09 min 51 sec	25.0	8	4.1	03 min 07 sec	30%	35
	2000	4.0 miles	14 min 43 sec	18.1	9	4.9	05 min 14 sec	31%	32
	2002	4.0 miles	14 min 26 sec	28.2	9	4.4	04 min 28 sec	28%	30
	2004	4.4 miles	09 min 00 sec	25.1	10	3.2	01 min 48 sec	17%	11
	2006	4.4 miles	10 min 11 sec	26.2	10	4.7	03 min 06 sec	29%	16
	2008	4.4 miles	08 min 43 sec	30.0	10	3.3	03 min 06 sec	29%	15
	2012	4.4 miles	09 min 15 sec	28.5	10	4.5	02 min 23 sec	24%	15
2016	4.4 miles	12 min 16 sec	25.6	10	5.2	03 min 39 sec	28%	15	

Table I-2c
Comparison of Drive Time by Street and Direction Across all Years

Street	Year	Distance	Mean Total Trip Time	Mean Speed (mph)	Total Stops Possible at Signals	Mean Number of Stops	Mean Total Time Stopped	Mean Percent of Time Stopped	Number of Trips
Foothills North	**** No data prior to 2006 ****								
	2006	3.5 miles	06 min 24 sec	37.1	5	1.9	01 min 10 sec	17%	15
	2008	3.5 miles	06 min 15 sec	37.5	5	1.8	01 min 10 sec	17%	15
	2012	3.5 miles	06 min 31 sec	36.3	5	1.9	01 min 13 sec	17%	15
	2016	3.5 miles	07 min 41 sec	33.8	5	3.5	01 min 59 sec	23%	15
Foothills South	**** No data prior to 2006 ****								
	2006	3.5 miles	07 min 45 sec	33.1	5	2.9	02 min 07 sec	23%	15
	2008	3.5 miles	06 min 28 sec	35.0	5	2.3	00 min 59 sec	15%	15
	2012	3.5 miles	06 min 45 sec	34.5	5	2.4	01 min 01 sec	14%	15
	2016	3.5 miles	08 min 38 sec	33.1	5	3.5	02 min 45 sec	22%	15

**Table I-3
Mean Time Stopped at Four Boulder Intersections**

Intersection	Direction	Mean Time Spent Stopped at Intersection (seconds)																											
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2010	2012	2014	2016	Mean
Broadway and Arapahoe	East		45		41		45		34		41		40		75		37		35		54		26		47		36		43
	West		44		38		46		46		36		36		61		37		34		35		39		36		33		41
	North	7		27		35		56		22		32		47		54		74		38		29		52		38	50	48	39
	South	31		20		21		18		34		43		42		55		69		41		45		35		49	34	40	39
Broadway and Balsam	East		28		23		31		25		29		30		31		33		32		39		42		37				32
	West		30		30		32		30		29		36		34		30		31		41		36		36				33
	North	12		22		28		26		27		28		29		31		51		33		19		0		28	24	30	26
	South	13		11		31		26		28		22		28		29		64		23		17		29		15	38	25	26
28th Street and Arapahoe	East		38		54		43		51		39		52		66		46		43		58		62		58		71		51
	West		61		64		62		66		48		48		64		49		47		40		49		53		27		54
	North	27		27		37		38		50		38		52		51		65		50		84		70		77		67	51
	South	38		36		65		71		56		58		61		61		59		29		50		38		31		46	50
28th Street and Valmont	East		39		50		40		30		41		34		59		39		37		48		79		38		23		45
	West		41		54		39		64		42		47		56		41		40		55		74		60		30		51
	North	20		21		37		47		43		43		72		71		56		38		47		33		58		75	45
	South	26		26		37		39		34		36		47		47		53		37		44		39		40		18	39

**Table I-4
Probability of Being Stopped at Four Boulder Intersections**

Intersection	Direction	Chance of Stopping at the Intersection (percent)																											
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2010	2012	2016	2016	Mean
Broadway and Arapahoe	East		90%		81%		82%		87%		82%		97%		62%		45%		43%		76%		50%		53%		86%		71%
	West		77%		86%		77%		56%		70%		88%		93%		42%		41%		67%		93%		73%		67%		72%
	North	15%		42%		13%		54%		27%		59%		61%		66%		77%		80%		80%		67%		80%	62%	80%	55%
	South	26%		36%		37%		47%		33%		60%		61%		88%		76%		15%		23%		20%		27%	20%	40%	42%
Broadway and Balsam	East		77%		76%		65%		38%		76%		79%		68%		28%		27%		85%		63%		80%				64%
	West		81%		93%		79%		71%		83%		75%		80%		28%		26%		88%		93%		67%				72%
	North	26%		26%		33%		36%		33%		31%		30%		36%		27%		33%		40%		0%		53%	23%	53%	31%
	South	41%		9%		41%		42%		56%		50%		50%		28%		23%		62%		38%		40%		60%	53%	47%	42%
28th Street and Arapahoe	East		33%		52%		68%		73%		71%		68%		69%		43%		41%		72%		88%		73%		50%		63%
	West		18%		48%		58%		78%		64%		48%		38%		43%		40%		50%		53%		53%		100%		49%
	North	75%		61%		81%		75%		65%		71%		77%		86%		70%		33%		80%		40%		67%		73%	68%
	South	93%		82%		67%		67%		77%		75%		77%		67%		56%		53%		63%		47%		47%		40%	67%
28th Street and Valmont	East		68%		81%		84%		100%		88%		83%		71%		25%		24%		54%		50%		47%		33%		65%
	West		90%		81%		82%		64%		72%		75%		57%		32%		31%		65%		53%		60%		60%		64%
	North	61%		22%		44%		40%		54%		58%		65%		81%		86%		40%		55%		60%		47%		40%	55%
	South	89%		71%		67%		63%		74%		50%		54%		86%		83%		13%		19%		13%		33%		27%	55%

Appendix II: Drive Time 2016

Table II.1	Time Traveled on North-South Corridors, 2016
Table II.2	Stops on North-South Corridors, 2016
Table II.3	Time Stopped on North-South Corridors, 2016
Table II.4	Drive Time by Time of Day, 2016
Table II.5	Ten Worst Intersections by Chances of Being Stopped, 2016
Table II.6	Ten Worst Intersections by Length of Stop, 2016
Table II.7	Ten Best Intersections by Chances of Being Stopped, 2016
Table II.8	Ten Best Intersections by Length of Stop, 2016
Table II.9	Drive Time and Speed between Intersections, 2016 (Broadway North)
Table II.10	Drive Time and Speed between Intersections, 2016 (Broadway South)
Table II.11	Drive Time and Speed between Intersections, 2016 (28 th Street North)
Table II.12	Drive Time and Speed between Intersections, 2016 (28 th Street South)
Table II.13	Drive Time and Speed between Intersections, 2016 (Foothills North)
Table II.14	Drive Time and Speed between Intersections, 2016 (Foothills South)

Table II.1: Time Traveled on North-South Corridors, 2016					
	Mean Total Trip Time	Shortest Trip Time	Longest Trip Time	Trip Distance (miles)	Average Speed (mph)
Broadway					
North	18 min 26 sec	14 min 39 sec	23 min 22 sec	6.2	25.2
South	18 min 30 sec	14 min 24 sec	30 min 01 sec	6.2	25.9
28th Street					
North	13 min 20 sec	09 min 31 sec	25 min 38 sec	4.2	26.5
South	13 min 38 sec	09 min 57 sec	25 min 11 sec	4.2	25.6
Foothills					
North	07 min 41 sec	05 min 25 sec	11 min 54 sec	3.5	33.8
South	08 min 38 sec	04 min 52 sec	23 min 18 sec	3.5	33.1

Note: For Broadway and 28th Street, the above data is for the full corridor length to include the Lee Hill Drive and Winding Trail/Jay Road intersections, respectively. Where historical comparisons are made elsewhere in this study, the shorter corridor lengths were used for direct comparison.

Table II.2: Stops on North-South Corridors, 2016					
	Mean Number of Stops	Fewest Stops	Most Stops	Mean Chance of Stopping	Number of Trips
Broadway					
North	8.6	5	18	34%	15
South	8.8	4	18	35%	15
28th Street					
North	5.3	2	11	44%	15
South	5.2	2	9	43%	15
Foothills					
North	3.5	1	7	69%	15
South	3.5	0	8	69%	15

Table II.3: Time Stopped on North-South Corridors, 2016

	Mean Percent of Time Stopped	Mean Total Time Stopped	Shortest Time Stopped	Longest Time Stopped
Broadway North South	21% 22%	04 min 00 sec 04 min 28 sec	02 min 11 sec 01 min 37 sec	07 min 34 sec 15 min 25 sec
28th Street North South	33% 28%	04 min 05 sec 03 min 39 sec	01 min 33 sec 00 min 54 sec	09 min 51 sec 08 min 55 sec
Foothills North South	23% 22%	01 min 59 sec 02 min 45 sec	00 min 41 sec 00 min 00 sec	05 min 46 sec 15 min 39 sec

Table II.4: Drive Time by Time of Day, 2016

	Mean Total Trip Time	Mean Number of Stops	Mean Time Stopped
Broadway North			
7:30 AM	17 min 53 sec	6.3	03 min 27 sec
12:00 Noon	17 min 15 sec	7.8	03 min 47 sec
5:00 PM	19 min 48 sec	11.2	04 min 50 sec
Broadway South			
7:30 AM	17 min 33 sec	8.6	03 min 30 sec
12:00 Noon	15 min 23 sec	6.0	02 min 21 sec
5:00 PM	22 min 36 sec	11.8	07 min 34 sec
28th Street North			
7:30 AM	10 min 49 sec	3.2	02 min 25 sec
12:00 Noon	13 min 19 sec	5.2	04 min 38 sec
5:00 PM	15 min 51 sec	7.4	06 min 16 sec
28th Street South			
7:30 AM	09 min 37 sec	3.8	01 min 40 sec
12:00 Noon	11 min 46 sec	5.0	02 min 58 sec
5:00 PM	19 min 30 sec	6.8	06 min 21 sec
Foothills North			
7:30 AM	08 min 16 sec	3.4	02 min 28 sec
12:00 Noon	06 min 14 sec	2.8	01 min 06 sec
5:00 PM	08 min 40 sec	4.2	02 min 27 sec
Foothills South			
7:30 AM	05 min 53 sec	2.4	00 min 48 sec
12:00 Noon	06 min 02 sec	1.8	00 min 52 sec
5:00 PM	14 min 40 sec	6.5	07 min 05 sec

Table II.5: Ten Worst Intersections by Chances of Being Stopped, 2016

Intersection	Direction	Chances of Being Stopped
Canyon Blvd. & 28th St	Southbound	87%
Colorado Ave & 28th St	Northbound	80%
Valmont Rd & Foothills Pkwy	Northbound	80%
Arapahoe Ave & Foothills Pkwy	Northbound	80%
Iris Ave & 28th St	Southbound	80%
Arapahoe Ave & Broadway	Northbound	73%
Baseline Rd & Foothills Pkwy	Northbound	67%
Arapahoe Ave & 28th St	Northbound	67%
Pearl St & 28th St	Southbound	67%
Table Mesa Dr & Broadway	Northbound	67%

Note: For Broadway and 28th Street, the above data is for the full corridor length to include the Lee Hill Drive and Winding Trail/Jay Road intersections, respectively. Where historical comparisons are made elsewhere in this study, the shorter corridor lengths were used for direct comparison.

Table II.6: Ten Worst Intersections by Length of Stop, 2016

Intersection	Direction	Mean Length of Stop
Colorado Ave & Foothills Pkwy	Southbound	02 min 20 sec
27th Way & Broadway	Southbound	01 min 17 sec
Valmont Rd & 28th St	Northbound	01 min 15 sec
Table Mesa Dr & Broadway	Southbound	01 min 12 sec
Iris Ave & 28th St	Northbound	01 min 11 sec
Mapleton Ave & 28th St	Northbound	01 min 10 sec
Arapahoe Ave & 28th St	Northbound	01 min 07 sec
Canyon Ave & 28th St	Southbound	01 min 01 sec
Arapahoe Ave & Foothills Pkwy	Northbound	00 min 59 sec
Canyon Blvd & 28th St	Northbound	00 min 57 sec

Note: For Broadway and 28th Street, the above data is for the full corridor length to include the Lee Hill Drive and Winding Trail/Jay Road intersections, respectively. Where historical comparisons are made elsewhere in this study, the shorter corridor lengths were used for direct comparison.

Table II.7: Ten Best Intersections by Chances of Being Stopped, 2016

Intersection	Direction	Chances of Being Stopped
Pennsylvania Ave & Broadway	Northbound	0%
North St & Broadway	Southbound	0%
Pennsylvania Ave & Broadway	Southbound	0%
Hanover Ave & Broadway	Southbound	0%
North Boulder Rec & Broadway	Southbound	7%
College Ave & Broadway	Southbound	7%
Alpine Ave & Broadway	Southbound	7%
Kalmia Ave & 28th Street	Southbound	7%
Glenwood Dr & 28th Street	Northbound	7%
Kalmia Ave & 28th Street	Northbound	7%

Note: For Broadway and 28th Street, the above data is for the full corridor length to include the Lee Hill Drive and Winding Trail/Jay Road intersections, respectively. Where historical comparisons are made elsewhere in this study, the shorter corridor lengths were used for direct comparison.

Table II.8: Ten Best Intersections by Length of Stop, 2016

Intersection	Direction	Mean Length of Stop
Pennsylvania Ave & Broadway	Northbound	00 min 00 sec
North Street & Broadway	Southbound	00 min 00 sec
Pennsylvania Ave & Broadway	Southbound	00 min 00 sec
Hanover Ave & Broadway	Southbound	00 min 00 sec
Regent Drive & Broadway	Southbound	00 min 08 sec
North St & Broadway	Northbound	00 min 08 sec
Winding Trail & 28th Street	Southbound	00 min 09 sec
North Boulder Rec & Broadway	Northbound	00 min 10 sec
Linden Ave & Broadway	Southbound	00 min 10 sec
Linden Ave & Broadway	Northbound	00 min 13 sec

Note: For Broadway and 28th Street, the above data is for the full corridor length to include the Lee Hill Drive and Winding Trail/Jay Road intersections, respectively. Where historical comparisons are made elsewhere in this study, the shorter corridor lengths were used for direct comparison.

Table II.9: Drive Time and Speed Between Intersections, 2016

Street	Intersection	Mean Speed From Previous Intersections (mph)	Mean Time from Previous Intersection
Broadway North	Greenbriar Boulevard	n/a	n/a
	Hanover Avenue	34.9	01 min 03 sec
	Table Mesa Drive	15.9	01 min 22 sec
	Dartmouth Avenue	39.1	00 min 40 sec
	27th Way	35.8	01 min 03 sec
	Baseline Road	23.3	01 min 05 sec
	Regent Drive	29.5	00 min 48 sec
	Euclid Avenue	22.9	00 min 50 sec
	College Avenue	30.3	00 min 20 sec
	Pennsylvania Avenue	27.3	00 min 18 sec
	University Avenue	22.1	00 min 33 sec
	Arapahoe Avenue	15.8	01 min 18 sec
	Canyon Boulevard	15.1	00 min 46 sec
	Walnut Street	20.6	00 min 20 sec
	Pearl Street	17.9	00 min 23 sec
	Spruce Street	20.6	00 min 19 sec
	Pine Street	25.9	00 min 12 sec
	North Street	26.5	00 min 46 sec
	Alpine Avenue	23.0	00 min 15 sec
	Balsam Avenue	17.9	00 min 27 sec
	North Boulder Rec.	27.0	00 min 51 sec
Iris Avenue	25.1	00 min 49 sec	
Linden Avenue	30.5	00 min 38 sec	
Quince Avenue	28.3	01 min 09 sec	
Violet Avenue	29.5	00 min 57 sec	
Lee Hill Road	25.3	01 min 15 sec	

Note: For Broadway and 28th Street, the above data is for the full corridor length to include the Lee Hill Drive and Winding Trail/Jay Road intersections, respectively. Where historical comparisons are made elsewhere in this study, the shorter corridor lengths were used for direct comparison.

Table II.10: Drive Time and Speed Between Intersections, 2016

Street	Intersection	Mean Speed From Previous Intersections (mph)	Mean Time from Previous Intersection
Broadway South	Lee Hill Road	n/a	n/a
	Violet Avenue	22.6	01 min 23 sec
	Quince Avenue	27.8	01 min 02 sec
	Linden Avenue	29.6	01 min 02 sec
	Iris Avenue	26.6	00 min 50 sec
	North Boulder Rec.	29.6	00 min 37 sec
	Balsam Avenue	24.9	00 min 58 sec
	Alpine Avenue	27.9	00 min 13 sec
	North Street	29.0	00 min 09 sec
	Pine Street	22.6	00 min 58 sec
	Spruce Street	17.6	00 min 22 sec
	Pearl Street	18.3	00 min 21 sec
	Walnut Street	14.9	00 min 32 sec
	Canyon Boulevard	11.1	00 min 40 sec
	Arapahoe Avenue	19.4	00 min 38 sec
	University Avenue	19.5	00 min 57 sec
	Pennsylvania Avenue	26.5	00 min 20 sec
	College Avenue	27.5	00 min 18 sec
	Euclid Avenue	31.7	00 min 20 sec
	Regent Drive	28.9	00 min 39 sec
	Baseline Road	26.9	00 min 55 sec
27th Way	32.3	00 min 46 sec	
Dartmouth Avenue	34.6	01 min 20 sec	
Table Mesa Drive	22.5	01 min 45 sec	
Hanover Avenue	37.0	00 min 28 sec	
Greenbriar Boulevard	39.3	00 min 56 sec	

Note: For Broadway and 28th Street, the above data is for the full corridor length to include the Lee Hill Drive and Winding Trail/Jay Road intersections, respectively. Where historical comparisons are made elsewhere in this study, the shorter corridor lengths were used for direct comparison.

Table II.11: Drive Time and Speed Between Intersections, 2016			
Street	Intersection	Mean Speed From Previous Intersections (mph)	Mean Time from Previous Intersection
28th Street North	Table Mesa Drive	n/a	n/a
	Colorado Avenue	38.0	03 min 23 sec
	Arapahoe Avenue	18.8	01 min 50 sec
	Canyon Boulevard	24.8	00 min 44 sec
	Walnut Street	29.0	00 min 31 sec
	Pearl Street	19.9	00 min 33 sec
	Mapleton Avenue	23.7	00 min 43 sec
	Valmont Road	21.1	01 min 16 sec
	Glenwood Drive	27.3	00 min 41 sec
	Iris Avenue	14.7	01 min 24 sec
	Kalmia Avenue	31.6	00 min 35 sec
	Winding Trail Drive	33.2	00 min 32 sec
	Jay Road	34.8	01 min 07 sec

Note: For Broadway and 28th Street, the above data is for the full corridor length to include the Lee Hill Drive and Winding Trail/Jay Road intersections, respectively. Where historical comparisons are made elsewhere in this study, the shorter corridor lengths were used for direct comparison.

Table II.12: Drive Time and Speed Between Intersections, 2016			
Street	Intersection	Mean Speed From Previous Intersections (mph)	Mean Time from Previous Intersection
28th Street South	Jay Road	n/a	n/a
	Winding Trail Drive	36.0	00 min 54 sec
	Kalmia Avenue	34.1	00 min 28 sec
	Iris Avenue	15.2	01 min 12 sec
	Glenwood Drive	25.6	00 min 37 sec
	Valmont Road	26.4	00 min 38 sec
	Mapleton Avenue	24.0	00 min 43 sec
	Pearl Street	16.2	01 min 08 sec
	Walnut Street	24.4	00 min 29 sec
	Canyon Boulevard	11.1	01 min 43 sec
	Arapahoe Avenue	21.6	00 min 41 sec
	Colorado Avenue	32.4	00 min 52 sec
	Table Mesa Drive	40.5	04 min 12 sec

Note: For Broadway and 28th Street, the above data is for the full corridor length to include the Lee Hill Drive and Winding Trail/Jay Road intersections, respectively. Where historical comparisons are made elsewhere in this study, the shorter corridor lengths were used for direct comparison.

Table II.13: Drive Time and Speed Between Intersections, 2016

Street	Intersection	Mean Speed From Previous Intersections (mph)	Mean Time from Previous Intersection
Foothills Parkway North	Table Mesa Drive	n/a	n/a
	Baseline Drive	29.6	02 min 05 sec
	Colorado Avenue	40.3	01 min 04 sec
	Arapahoe Avenue	22.2	01 min 47 sec
	Valmont Road	32.9	01 min 57 sec
	Iris Avenue	45.4	00 min 38 sec

Note: For Broadway and 28th Street, the above data is for the full corridor length to include the Lee Hill Drive and Winding Trail/Jay Road intersections, respectively. Where historical comparisons are made elsewhere in this study, the shorter corridor lengths were used for direct comparison.

Table II.14: Drive Time and Speed Between Intersections, 2016

Street	Intersection	Mean Speed From Previous Intersections (mph)	Mean Time from Previous Intersection
Foothills Parkway South	Iris Avenue	n/a	n/a
	Valmont Road	32.3	01 min 01 sec
	Arapahoe Avenue	35.7	01 min 53 sec
	Colorado Avenue	32.2	01 min 22 sec
	Baseline Drive	26.8	02 min 17 sec
	Table Mesa Drive	37.6	02 min 06 sec

Note: For Broadway and 28th Street, the above data is for the full corridor length to include the Lee Hill Drive and Winding Trail/Jay Road intersections, respectively. Where historical comparisons are made elsewhere in this study, the shorter corridor lengths were used for direct comparison.