Modal Shift in the Boulder Valley

1990 to 2018

January 2019



Prepared for the City of Boulder Transportation Division



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Executive Summary

Background

The 2018 Travel Diary Study is the twelfth replication of an effort that began in 1990 to assess the Boulder Valley residents' travel patterns and choices of transportation modes. The study is intended to support transportation planning by providing information on travel patterns and report to City staff and council members on the effectiveness of City programs aimed at reducing single-occupancy vehicle (SOV) travel.

The long trend line helps measure the City's progress in encouraging a shift away from SOV trips, which was a major objective in the 1989 Transportation Master Plan's (TMP). Later updates of the TMP specified the objective of reducing the SOV modal share to 25% of all trips by the year 2025, and most recently to 20% by 2035 in the 2014 TMP. In 1990, the first year of the travel diary study, 44% of all trips were made by driving alone. Achieving an SOV modal share of 20% by the year 2035 would mean a 24% shift in the proportion of SOV trips made from 1990 to 2035, or a 0.53% shift per year. The City of Boulder is currently preparing the 2019 TMP update.

Participants in the Travel Diary Studies were asked to keep a log or "diary" of their travel for one randomly assigned day during the middle of September. For every trip made during the 24 hour period, respondents record the origin and destination of the travel, the travel mode used, the time of day, the number of people in the vehicle (if applicable), and the distance traversed. A trip was defined as any "one-way travel from one point to another that takes you farther than one city block (about 200 yards) from the original location."

The study members were also asked to complete a survey regarding their household characteristics including a number of items related to travel, such as vehicles and bicycles present in the household, receipt of deliveries, work location, possession of bus passes, and membership in bike or car shares, and general socioeconomic demographic characteristics.

The 2018 Travel Diary Study results are based on just fewer than 900 Boulder Valley residents' records of their travel. With a sample size of close to 1,000 or more in each study year, the margin of error around the results is $\pm 1.3\%$ per year. Thus, for a difference to be statistically significant between years there must be a shift of at least 2.6% (1.3% around each study year).

Modal Shift of All Trips

"Modal split" or "modal share," is a method of dividing travel into all available transportation modes and determining the percent of trips made or miles traveled by each mode. For the Boulder Valley Travel Diary Study the transportation modes are classified as single-occupancy vehicle (SOV), multiple-occupancy vehicle (MOV), transit or highoccupancy vehicle, school bus, foot and bicycle. A comparison of the mode choices from 1990 to 2018 provides information on modal "shift," that is, the shift of trips or miles traveled from one mode to another. This "shift" is measured as the difference between 1990 to 2018 in the percent of trips or miles by each mode. The figure below shows the modal split of all trips made by respondents in every study year. Compared to 1990, significant shift in trips was observed in four categories:

- Single-Occupancy Vehicle, -7.5%
- Multiple-Occupancy Vehicle, -5.0%
- Bicycle, +7.9%
- Transit, +3.4%



The 2014 TMP includes the objective of achieving an SOV modal share of 20% by the year 2035; this would mean a 24% shift in the proportion of SOV trips made from 1990 to 2035, or an average annual shift of 0.54%, assuming equal progress throughout the forty-five year span. In the figure below, the 2014 TMP target is plotted with the observed shift. As can be seen, the observed modal shift has not quite kept pace with the 2014 TMP objective in recent years, with no significant change observed from 2012 to 2018.



Changes in Boulder citizens' travel behavior cannot be solely attributed to the City's interventions, as regional and national transportation trends also impact travel behavior. The most recent National Household Travel Survey was conducted in 2017 by the Federal Highway Administration.

- Nationwide, there was a 0.19% annual shift away from trips made via private vehicles (87.7% in 1990, 82.6% in 2017) over the last two decades. However, among Boulder Valley residents, there was an annual average decrease of 0.46% from 2000 to 2018.
- The proportion of trips made by transit changed slightly nationally, (1.8% in 1990; 2.5% in 2017) but this shift may be attributed to several changes in methodology in the 2017 sample (one of which was to include more urban households than in the past). In Boulder there was a 3.6% shift toward public transit in the same period (1.6% in 1990; 5.2% in 2018).
- Examining the modal split of miles traveled, nationally there was a 12% reduction in the miles traveled per person by private vehicle from 1990 to 2017 (which may also be influenced by the changes to the national sample methodology which included more urban and cell phone only households than past years) In Boulder there was an 12% shift *away* from miles traveled via private vehicles (88% in 1990, 76% in 2018).

• The proportion of miles traveled via transit stayed relatively flat nationwide, 2.1% in 1990 to 2.6% in 2017, while in Boulder the percent of miles traveled via transit increased, from 4.1% in 1990 to 10.7% in 2018.

Modal Split of the Work Commute

The figure below shows the percent of work commute trips made by respondents via SOV, bicycle and transit in every study year. Smaller changes were observed over the study period in multiple-occupancy vehicle trips (between 10% in 1990 and 5% in 2018) and pedestrian trips (between 11% in 1990 and 15% in 2018 of work commute trips). Compared to 1990, significant shift was observed in three categories in 2018:

- Single-Occupancy Vehicle, -32.3%
- Transit, +8.3%
- Bicycle, +23.1%

Bicycle trips showed a large increase in modal share from 2012 to 2015 and dropped slightly in 2018. Transit trips nudged upward in 2018, showing 8.3% increase from 1990 to 2018 and a 4.0% bump from 2015 to 2018. Over these years there was a corresponding decrease in SOV modal share. The large drop in SOV modal share, from 2012 to 2015, was more than maintained in 2018.



Use of a private vehicle for the work trips (SOV or MOV) has dropped slightly in the U.S. (-5.1% from 1990 to 2017) and more so, as measured in miles (-12%) but this change may be at least partly attributable to a change in methodology in NHTS sampling in 2017.

Mode Use

The proportion of people making at least one trip on the assigned travel day by each mode throughout the study period is shown below. Over the study period, the percent of participants making any trips by SOV or MOV has declined, while the proportion making any trips via transit or by bicycle has increased. However, the proportion of people with at least one SOV trip on the assigned day increased in 2018 and returned to a level last seen in 2009.



Trip Characteristics

The information recorded on the travel diary can be used to characterize the trip-making behavior of Boulder residents. In 2018:

- The average number of trips per day per person was 4.8.
- The average number of miles traveled per day per person was 21.7 miles.
- The percent of people who did not leave the house on assigned travel day was 7.9%
- The average estimated trip distance was 4.3 miles.
- The average estimated trip duration in was 19.8 minutes.

These trip characteristics have remained fairly stable over the study period.

Compared to national data, Boulder residents make shorter trips (4.3 miles for Boulder residents in 2018 compared to 10.7 miles in 2017 for U.S. residents).

The average work commute trip for Boulder residents in 2018 was 4.8 miles in distance and 20 minutes in duration. The average work commute for U.S. residents in 2017 was 11.5 miles and 27 minutes.

Study Results

Background

The Travel Diary Study is a periodic survey of Boulder Valley residents' travel patterns and mode selection. The baseline study was conducted in 1990 and has been re-implemented every two to three years since then. The study is designed to report to City staff and Council members on the effectiveness of City programs aimed at reducing single-occupancy vehicle (SOV) travel, and to provide information on travel patterns useful for future transportation planning.

The 2018 Travel Diary Study is the twelfth replication of the survey since the baseline study. This long trend line is useful in measuring the City's progress in mode shift away from SOV trips, as one of the original Transportation Master Plan's (TMP) major objectives was to shift "15% of all trips currently made by single-occupant autos to other forms of transportation, including ridesharing, transit, walking, and bicycling" by the year 2010. In 1990, the first year of the travel diary study, 44% of all trips were made by driving alone. The 1996 TMP modified the objective to a target of reducing the SOV modal share to only 25% of all trips by the year 2020 and the 2003 and 2008 update extended the target year to 2025. Reflecting the city's Sustainability Framework and Climate Commitment, the 2014 TMP established a more aggressive target of a 20% SOV mode share by 2035. This target is now the standard against which these study results are measure, however there will be an update to the TMP in 2019. Achieving an SOV modal share of 20% by the year 2035 would mean a 24% shift in the proportion of SOV trips made from 1990 to 2035, or a 0.54% shift per year.

Participants in the study were asked to keep a log or "diary" of their travel for one randomly assigned day during the third week of September (or a replacement week if necessary). For every trip made during the 24 hour period, they recorded the origin and destination of the travel, the travel mode used, the time of day, the number of people in the vehicle (if applicable), and the number of miles or blocks traversed during each trip. A trip was defined as any "one-way travel from one point to another that takes you farther than one city block (about 200 yards) from the original location."

The participants were also asked to complete a survey regarding their adult household members' typical primary modes of travel, locations of work/school, number of vehicles, and general socioeconomic information about the household and the study participant (see *Appendix F. Data Collection Materials* for copies of the survey materials).

The 2018 Travel Diary Study results are based on 869 Boulder Valley residents' records of their travel. Study results were statistically weighted so that demographics of respondents matched population demographics. Details about the methodology used to select individuals to participate in the study and how they recorded their travel can be found in *Appendix E. Study Methodology*.

With a sample size of 1,000 or more in each past study year, the margin of error around the results is $\pm 1.3\%$ per year. Thus, for a difference to be statistically significant between years there must be a shift of at least 2.6% (1.3% around each study year).

Modal Shift of All Trips

Transportation mode choice, referred to as "modal split" or "modal share," is a method of classifying all travel completed in a specified time into all available transportation modes. In this study "modal split" is reported two ways: the proportion of total trips and proportion of total miles by mode. The mode classifications are: single-occupancy vehicle (SOV), multiple-occupancy vehicle (MOV)¹, transit or high-occupancy vehicle, school bus, foot and bicycle. A comparison of the mode choices from 1990 to 2018 provides information on modal "shift," that is, the shift of trips or miles traveled from one mode to another. This "shift" was measured as the difference in the proportion of trips from 1990 to 2018 (change in percent). The modal split of trips as observed in the 2018 Travel Diary is shown in Figure 2 on the next page, while the modal shift of trips from 1990 to 2018 by Boulder Valley residents is presented in Figure 1.

Over the entire study period, the proportion of all trips made by driving alone has shifted 8%, about half of which occurred in the early 1990s. In 2018, SOV trips accounted for about 37% of all trips made by Boulder residents, down from about 44% in 1990 and similar to what had been observed in 2015. Transit trips have more than doubled over that same period, increasing from less than 2% in 1990 to about 5% in 2018. Large gains were observed in the proportion of trips made by bicycle over the previous 2 decades, from 9% in 1990 to 17% in 2018. Much of this gain has happened since 2000.

The proportion of trips made via MOV has remained fairly constant since 1990 until 2006. However, from 2006 to 2018 there was a 4% decrease in MOV trips. In 2018, 21% of all trips were made in personal vehicles with more than one person, down from 26% in 1990. Nearly a third of those MOV trips included at least one child in the vehicle, while just over two-thirds included only adults (see Figure 2 on the next page)

¹ A single-occupancy vehicle refers to an automobile, van, truck or motorcycle which has only one occupant; a multiple-occupancy vehicle is an automobile, truck or motorcycle with more than one occupant. (Truck and motorcycle trips make up a very small proportion of the trips made.)

	Percent of Trips*												
Travel Mode	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990	1990 to 2018
SOV	36.7%	36.1%	35.9%	37.1%	38.4%	39.0%	41.5%	40.4%	41.5%	40.5%	42.3%	44.2%	7.50%
MOV	21.3%	22.1%	19.6%	23.7%	25.0%	23.5%	23.8%	25.0%	25.6%	25.6%	25.7%	26.3%	5.00%
Transit	5.0%	3.7%	4.9%	5.4%	4.0%	4.6%	4.2%	4.1%	2.8%	2.9%	2.2%	1.6%	-3.40%
School Bus	0.0%	0.0%	0.6%	0.1%	0.1%	0.3%	0.7%	0.7%	0.5%	0.5%	0.7%	0.6%	0.60%
Bicycle	17.0%	20.3%	18.7%	15.9%	13.6%	14.0%	10.0%	8.2%	9.2%	11.3%	12.1%	9.1%	-8.20%
Foot	20.0%	17.7%	20.3%	17.9%	18.9%	18.6%	19.8%	21.4%	20.4%	19.2%	17.1%	18.2%	-2.00%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Number of Trips	4,094	5,767	4,835	5,505	6,081	6,380	6,791	5,987	6,454	6,723	6,681	7,355	

Figure 1: Modal Split of All Trips, 1990-2018

Modes with shifts that are statistically significantly different between 1990 and 2018 are shaded.

In recent years (2015 to 2018 or 2012 to 2018) changes have not been statistically significant.

* These estimates have a margin of error of $\pm 1.3\%$ using a 95% confidence interval.

Figure 2: Modal Split of All Trips, 2018



The 2014 TMP includes the objective of achieving an SOV modal share of 20% by the year 2035; this would mean a 24% shift in the proportion of SOV trips made from 1990 to 2035, or an average annual shift of 0.54%, assuming equal progress throughout the forty-five year span. In the figure below, the 2014 TMP target is plotted with the observed shift. As can be seen, the observed modal shift has not quite kept pace with the 2014 TMP objective in recent years, with no significant change observed from 2012 to 2018.



Figure 3: Percent of SOV Trips: Observed Versus Desired Shift, 1990-2018

Changes in Boulder citizens' travel behavior cannot be solely attributed to the City's interventions, as regional and national transportation trends also impact travel behavior. However, the national trends observed demonstrated only a slight reduction in "privately owned vehicle" (POV) use, which includes both SOVs and MOVs, between 1990 and 2009.² Figure 4 below compares the change observed in Boulder from 1990 to 2018 to that observed in the nation from 1990 to 2017. Nationwide, there was a 5.1% shift away from trips made via private vehicles (87.6% in 1990, 82.6% in 2017) over a 27 year period, which translates to an average annual decrease of 0.18%. However, among Boulder Valley residents, there was a 13% shift observed (70.5% in 1990, 57.7% in 2015) in POV use over a 28 year period, an average annual decrease of 0.46%.

The proportion of trips made on transit remained virtually unchanged nationally (1.8% in 1990; 2.5% in 2017), while in Boulder there was a 3.6% shift toward public transit (1.6% in 1990; 5.2% in 2018), representing an average annual increase of 0.13%.



Figure 4: Percent of All Trips: Boulder Compared to the U.S., 1990-2018

² Appendix A. National Travel Data contains additional detail on the comparisons made in Figure 4. These data come from the 1990 and 1995 Nationwide Personal Transportation Study and the 2001, 2009 and 2017 National Household Travel Study (NHTS).

Modal share estimates using miles traveled show larger shares for the motorized vehicles because these vehicles are used to traverse greater distances. From 1990 to 2012, there had been no significant change observed in the SOV share of miles traveled, with some mild variation from year to year. However, in 2015 there was a decrease in the number of miles traveled by SOV which was maintained in 2018. However, while MOV trips increased from 2012 to 2015 they dropped somewhat from 2015 to 2019.

There has been a shift of about 4% in the proportion of miles traveled by bicycles in the study period, increasing from 4.9% of miles in 1990 to 9.2% of miles in 2018. Likewise, the number of miles traveled by transit has also increased over the study period, about 6% from 1990 to 2018 (4.1% in 1990 to 10.5% in 2018).

					I	Percent	of Miles*						Change
Travel Mode	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990	1990 to 2018
SOV	41.6%	41.9%	49.6%	46.1%	46.9%	44.0%	49.1%	48.1%	45.2%	46.2%	48.0%	50.0%	-8.60%
MOV	35.2%	38.7%	30.5%	35.9%	36.3%	39.5%	35.9%	35.6%	41.3%	38.6%	37.3%	37.7%	-2.50%
Transit	10.5%	7.8%	6.6%	6.9%	5.7%	5.5%	6.5%	7.0%	5.7%	6.4%	6.2%	4.1%	6.40%
School Bus	0.0%	0.0%	0.5%	0.5%	0.1%	0.2%	0.4%	0.6%	0.2%	0.2%	0.5%	0.2%	-0.20%
Bicycle	9.2%	8.5%	9.3%	8.1%	7.2%	7.7%	4.7%	4.6%	4.3%	5.6%	5.4%	4.9%	4.30%
Foot	3.5%	3.1%	3.4%	2.5%	3.7%	3.0%	3.5%	4.1%	3.2%	2.9%	2.5%	3.0%	0.50%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Number of Miles	17,411	25,358	18,269	27,016	25,756	31,248	28,689	25,562	30,042	30,300	29,761	29,634	

Figure 5: Modal Split of All Miles, 1990-2018

Modes with shifts that are statistically significantly different between 1990 and 2018 are shaded.

Modes with shifts that are statistically significant different between 2015 and 2018 are bolded.

* These estimates have a margin of error of $\pm 1.3\%$ using a 95% confidence interval.

As with the modal split of trips, the reduction in SOV miles can be compared to the 2014 TMP objective (Figure 6), assuming that the objective of a 24% shift in the proportion of trips made by SOV can be translated as an objective of a 24% shift in the proportion of miles traveled by SOV. When miles are used as the unit of analysis, it can again be observed that the modal shift of miles has not yet met the TMP objective. There tends to be more variability in the proportion of miles traveled by different modes than there is in the proportion of trips.



Figure 6: Percent SOV Miles: Observed Versus Expected Shift, 1990-2018

Figure 7 shows a comparison of the percent of miles traveled in the nation between 1990 and 2009, and in Boulder Valley between 1990 and 2018, by mode. The proportion of miles traveled by private vehicles dropped in the U.S., from 88% of miles in 1990 to 76% in 2017, but part of this observed difference may be due to a sampling change in the 2017 study, which among other changes included more urban households than prior years. The Boulder trend was also a declining one, from 88% of miles in 1990 to 77% in 2018. The proportion of miles traveled via transit increased slightly nationwide, from 2.1% in 1990 to 2.6% in 2017, while in Boulder the percent of miles traveled via transit increased, from 4.1% in 1990 to 10.7% in 2018.



Figure 7: Percent of All Miles: Boulder Compared to the U.S., 1990-2018

Modal Split of the Work Commute

Trips made as part of the work commute were identified for special analysis, including trips directly between home and work and trips linked during the work commute.³ As not all respondents had a work commute, the data in the following tables are based on a smaller number of respondents and trips, are less stable from year to year and have a higher margin of error (about $\pm 4\%$).

The SOV modal share of work commute trips decreased from 1990 to 2018 by 32.3% (see Figure 8), with a large decrease from 2012 to 2018 of about 14%. The transit share has varied over the years but has shown a more stable upward trend since 2009; peaking at 12.3% of trips in 2018. The proportion of work commute trips made by bicycling, which has increased over the study period, had a large increase from 2012 to 2015 and a statistically insignificant decrease after that.

	Percent of Trips*												Change
Travel Mode	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990	1990 to 2018
SOV	34.3%	39.8%	48.5%	47.4%	52.7%	49.6%	57.7%	62.3%	64.8%	59.8%	60.2%	66.6%	-32.3%
MOV	4.9%	6.7%	5.7%	8.5%	10.7%	9.2%	7.6%	8.2%	10.8%	10.1%	9.8%	9.9%	-5.0%
Transit	12.3%	8.3%	10.1%	9.7%	5.1%	9.8%	8.7%	7.7%	3.9%	5.8%	6.1%	4.0%	8.3%
School Bus	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.1%	0.2%	0.0%	0.0%
Bicycle	33.7%	35.3%	26.5%	23.3%	20.5%	21.2%	15.6%	9.9%	12.3%	12.4%	14.1%	10.6%	23.1%
Foot	14.8%	10.0%	9.2%	11.1%	11.0%	10.3%	10.4%	11.8%	8.2%	11.8%	9.6%	8.9%	5.9%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Number of Trips	749	910	754	1,021	1,101	951	1,161	947	1,192	1,146	1,111	1,302	

Figure 8: Modal Split of Trips for the Work Commute, 1990-2018

Modes with shifts that are statistically significantly different between 1990 and 2018 are shaded. Modes with shifts that are statistically significant different between 2012 and 2018 are bolded.

³ See page 32 for a description of how trips were categorized. Using the trip classification scheme displayed in Figure 47: Types of Trips, the "home-based work" commute trips could be determined. Still, a small percentage of the work commute would not be accounted for when a work trip was "linked," that is, a trip where the person makes a stop on the way to or from work. For example, if the participant stopped at the post office on the way to work, the first trip would be classified as "home-based other" and the second trip would be categorized as "non-home based". Neither of these legs of the trip would be counted as the work commute. Similarly, if a participant drove to the Park-n-Ride, and then took a bus to work, neither trip would be classified as "home-based work;" the first would be coded as "home-based other" the second as "non-home based." To be sure trips were identified as part of the work commute, another code was created which allowed the trips to be distinguished as "linked". All the linked trips are included in the analysis of "work commute" trips.

Since 1990, a decrease has been observed in the proportion of miles traveled by driving alone for the work commute. With large decreases from 2012 to 2015 and again from 2015 to 2018. These miles have been exchanged largely with transit trips, many to Denver. The proportion of miles traveled by bicycle have also increased and tend to be for trips within Boulder.

The initial decreases observed in the proportion of work commute miles traveled via SOV, and the initial increases in transit miles may reflect the emphasis of GO Boulder's programs. At the time of GO Boulder's inception, a great deal of emphasis was placed on the work commute. The Eco-Pass program provided RTD bus passes to many employees in the Boulder Valley. More recently the Flatiron Flyer may be making the transit commute to Denver more attractive.

Over time additional emphases and programs were implemented to influence other mode uses. For example, the modal shift of miles traveled by bicycle for the work commutes has increased about 9% since 1990, with much of the change occurring between 2000 and 2003; and again from 2012 to 2015. This shift in bicycle travel (trip and miles) may be due to the addition of bike/pedestrian underpasses and the continued progress in completing the facilities of the Bicycle System Plan.

	Percent of Work Commute Miles												Change
Travel Mode	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990	1990 to 2015
SOV	45.6%	56.9%	69.7%	59.7%	66.6%	63.6%	68.8%	66.7%	71.5%	66.6%	64.5%	71.9%	-26.3%
MOV	4.8%	6.7%	10.9%	9.1%	10.3%	12.8%	6.3%	11.2%	11.9%	14.9%	10.1%	10.9%	-6.2%
Transit	33.6%	20.6%	8.7%	19.5%	11.8%	12.6%	17.4%	16.2%	11.2%	12.7%	16.5%	11.2%	22.4%
School Bus	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.6%	0.0%	0.0%
Bicycle	14.0%	14.6%	9.6%	10.6%	10.2%	10.0%	6.0%	4.4%	4.3%	4.6%	6.9%	4.7%	9.3%
Foot	2.1%	1.3%	1.1%	1.1%	1.2%	1.0%	1.5%	1.3%	1.0%	1.2%	1.4%	1.3%	0.8%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Number of Work Commute Miles	3,468	4,508	4,411	6,215	5,980	5,607	6,637	5,846	6,326	7,111	6,412	6,818	

Figure 9	: Modal	Split	of Miles	for the	Work	Commute,	1990-2018
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Modes with shifts that are statistically significantly different between 1990 and 2018 are shaded. Modes with shifts that are statistically significant different between 2015 and 2018 are bolded. Figure 10 compares the change in Boulder's modal split of the work commute to the national trends. Use of a private vehicle for the work trips has remained constant across the U.S., as measured in trips and miles, while Boulder has experienced a decline in work trips and miles traveled for the work commute made via private vehicles, although the proportion of miles traveled has shown some volatility. The trend line for the proportion of work trips and miles made via transit has been volatile in Boulder, but the overall trend for is an increasing one. Nationally, little change has been observed in transit use for work trips or miles.





Figure 11 displays the work commute trips made on the assigned travel study day by study participants' workplace location. Those who worked in Boulder were least likely to have used an SOV for any part of their work commute compared to those who worked in other cities. A greater proportion of the work commute trips made by Boulder Valley residents who worked in Boulder or in Denver were made via transit, indicating the high availability of service within Boulder and between Boulder and Denver, while transit use for the work commute for those who worked in other locations was much lower. Among travel diary study participants who worked in Boulder, about 10% of the trips made for the work commute were made using transit. This represents an increase transit use for the work commute since the study inception in 1990 (see Figure 12). Bicycle use for the work commute was very high among Boulder residents who worked in Boulder, with 4 in 10 work commute trips reported as being made by bicycling. This represented about a 10% gain since 2009. Caution should be used when considering the modal split of Denver work trips as few work commute trips captured on the diary day were made to Denver (N=35). While the response rate has decreased over the study years and fewer trips have been captured, these trips continue to be weighted to reflect the population and in Figure 12 we see that there has been a gradual trend toward more bike and walking commute trips in Boulder.

	Location of Workplace								
Travel Mode	Boulder	Denver	Other						
Single-Occupancy Vehicle	28.6%	30.2%	53.0%						
Multiple-Occupancy Vehicle	3.0%	4.4%	12.3%						
Transit	9.5%	35.7%	19.7%						
Bicycle	40.5%	8.7%	13.9%						
Foot	18.4%	21.0%	1.1%						
Total	100%	100%	100%						
Number of Work Commute Trips	528	35	127						

Figure 11: Modal Split of Work Commute Trips by Location of Workplace, 2018

0							,				,		
		Perc	ent of W	/ork Cor	nmute T	rips for	BV Resi	idents W	/ho Wor	k in Bou	lder		Change
Travel Mode	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990	1990 to 2015
SOV	28.6%	32.5%	40.2%	41.5%	48.9%	44.0%	55.0%	59.7%	61.8%	58.3%	59.5%	65.9%	-37.3%
MOV	3.0%	6.0%	3.5%	5.7%	8.6%	7.1%	7.6%	8.3%	10.0%	11.1%	9.6%	9.7%	-6.7%
Transit	9.5%	6.0%	11.5%	7.6%	3.5%	7.7%	5.4%	6.3%	2.8%	3.6%	3.7%	2.4%	7.1%
School Bus	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.2%	0.0%	0.0%	0.0%
Bicycle	40.5%	43.7%	33.3%	30.4%	26.6%	27.8%	21.6%	13.4%	16.0%	16.1%	16.0%	12.5%	28.0%
Foot	18.4%	11.9%	11.5%	14.8%	12.4%	13.4%	10.4%	11.9%	9.4%	10.7%	11.3%	9.6%	8.8%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Number of Work Commute Trips	528	705	575	648	758	646	786	647	874	856	810	1,048	

Modes with shifts that are statistically significantly different between 1990 and 2018 (\pm 4%) are shaded.

Modes with shifts that are statistically significant different between 2015 and 2018 (±4%) are bolded.

Telecommuting

Telecommuting was defined as follows: "Employees telecommute when they fulfill their job responsibilities at home by substituting telecommunications (computer, Internet/Web and/or telephone) for work-related travel." Respondents were asked whether they had telecommuted on the day assigned to them to record their travel. Since this question was first asked in 1996, in most years just over 10% of the respondents have said that they telecommuted on their assigned travel day (see Figure 14).

Figure 13: Teleworking Status 2009-2018

Employees telecommute when they fulfill their job responsibilities at home by substituting telecommunications (computer, Internet/Web and/or phone)	Percent of Respondents						
(Note: do not include times you take work home to do in the evenings, only times you work from home instead of traveling to a workplace.)	2018	2015	2012	2009			
Every work day (I always work from my home)	12.0%	12.0%	12.7%	7.9%			
3 to 4 times per week	4.2%	2.6%	3.1%	3.9%			
2 to 3 times per week	5.9%	7.3%	5.1%	5.6%			
Once or twice a month	15.5%	15.1%	8.9%	9.8%			
Occasionally	19.9%	15.7%	21.1%	17.2%			
Never	42.5%	47.3%	49.1%	55.7%			
Total	100%	100%	100%	100%			
Number of Respondents	573	934	748	837			

Figure 14: Telecommuting on Assigned Travel Day, 1996-2018

Did you telecommute on the day	Percent of Respondents										
you completed the travel diary?	2018	2015	2012	2009	2006	2003	2000	1998	1996		
Yes	12.6%	11.4%	10.8%	8.1%	12.0%	12.2%	10.4%	11.0%	13.6%		
No	87.4%	88.6%	89.2%	91.9%	88.0%	87.8%	89.6%	89.0%	86.4%		
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%		
Number of Respondents	563	930	742	829	882	890	1,160	1,010	1,056		

Of those who telecommuted, about half indicated that telecommuting reduced the number of SOV trips they made on the day they completed the travel diary.

Did working at home reduce the number of single-occupancy vehicle (drive alone) trips you made on the day you completed the travel diary compared to days you do not telecommute? (2009-2018 wording)*			Percent of Respondents Who Telecommuted on Diary Day 2018 2015 2012 2009 2006 201								ay	
		2018		2015		2012		200	9	2006	2003	2000
Yes, reduced about 2 drive-alone trips	Vaa	38.5%	10 70/	27.0%	45.00/	29.0%	45.1	26.2%	40.00/	45.00/	44 10/	11 20/
Yes, reduced more than 2 drive-alone trips	res	11.2%	49.7%	28.0%	45.0%	16.1%	%	13.9%	40.2%	45.0%	44.1%	44.3%
No, I made the same number of drive alone trips	No		50.3%		55.0%		54.9%		59.8%	55.0%	55.9%	55.7%
Total		100%		100%		100%			100%	100%	100%	100%
Number of Respondents			65	92		75			65	105	105	118

Figure 15: Did Telecommuting Replace Drive Alone Trips, 2000-2018

*2000-2006 question wording was "Did telecommuting reduce the number of single-occupancy vehicle trips you made on the day you completed the travel diary?"

Almost all respondents who reported teleworking on their assigned travel day and who made any trips on their assigned travel day made at least one work-related trip (Figure 16). Given that only about four in ten thought telecommuting replaced SOV trips, teleworking is not yet a full replacement of work day trips.





Modal Split of University of Colorado Students

In fall 2017 (the latest year for which data are available), 35,000 on-campus degreeseeking students were enrolled at CU-Boulder with 25,700 living in Boulder and 9,300 living outside Boulder. About 7,000 students, primarily freshmen, lived in 23 campus residence halls, while another approximately 1,500 live in a sorority or fraternity, and the remainder lived in residential units within the Valley. The transportation choices made by the students for all trips are displayed in Figure 17 and for the school commute in Figure 18 on the next page.⁴

The modal split for this group is traditionally quite different than the rest of Boulder's population due to the students' high use of alternate modes. In all years, SOVs were used for about 20% to 25% of all CU students' trips, and for 5% to 10% of the trips made to school. This low use may be attributed to the lower vehicle availability of students (in 2018, 0.79 vehicles per driver for CU students versus 0.92 vehicles per driver for non-students) and the scarcity and cost of parking on campus. It may also be due to the fact that some students must park more than a block from school, and thus recorded the purpose of the automobile portion of their trip as "change travel mode," and the walk from the car to school as "school" (see footnote 4 below).

In 1998, there was a large increase in the proportion of trips made by students via transit. This may be due to the introduction of the SKIP service, which directly serves the campus along Broadway.

				Perc	cent of 1	Frips Ma	de by C	U Stude	ents				Change
Travel Mode	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990	1990 to 2018
SOV	28.2%	21.1%	19.6%	22.9%	19.1%	26.0%	22.3%	21.0%	17.0%	19.8%	20.6%	24.8%	3.4%
MOV	17.0%	12.1%	9.6%	16.3%	17.0%	17.5%	13.3%	17.0%	19.2%	17.3%	19.3%	19.7%	-2.7%
Transit	8.9%	6.6%	10.3%	10.2%	10.8%	9.7%	10.1%	12.2%	6.2%	5.9%	4.7%	5.7%	3.2%
Bicycle	15.2%	34.5%	26.5%	22.9%	25.1%	15.5%	17.0%	11.3%	18.2%	19.2%	23.1%	17.6%	-2.4%
Foot	30.8%	25.7%	33.9%	27.7%	27.8%	31.4%	37.3%	38.5%	39.3%	37.8%	32.4%	34.2%	-3.4%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Number of Trips	699	1,230	1,168	1,140	1,072	1,747	1,696	1,400	1,379	1,572	1,734	1,901	

Figure 17: Modal Split of All Trips Made by CU Students, 1990-2018

No modes had statistically significantly differences between 1990 and 2018.

Modes with shifts that are statistically significant different between 2015 and 2018 are bolded.

⁴ Included in this table are trips for which the recorded purpose was "school". School trips were not linked as work commute trips were, so parts of the trip that were linked would not be included. For example, if a student walked 2 blocks to the bus, rode the bus for 1 mile, and then walked 3 blocks to school, only the last leg of that trip would be recorded as "school". The other two legs would be recorded as "change travel mode."

			Perce	ent of S	chool Co	ommute	Trips N	lade by	CU Stud	lents			Change
Travel Mode	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990	1990 to 2018
SOV	4.4%	6.8%	4.5%	11.0%	5.2%	13.0%	8.7%	12.6%	5.7%	7.9%	8.8%	10.1%	-5.7%
MOV	5.4%	0.0%	1.9%	7.3%	1.2%	1.2%	3.6%	5.1%	3.0%	3.0%	1.7%	3.2%	2.2%
Transit	18.1%	4.6%	16.8%	12.8%	19.9%	18.9%	10.4%	20.3%	8.0%	7.5%	8.5%	8.9%	9.2%
Bicycle	29.7%	52.5%	33.0%	35.3%	42.9%	22.8%	22.7%	15.4%	30.9%	25.9%	31.5%	24.2%	5.5%
Foot	42.4%	36.1%	43.8%	33.5%	30.8%	44.0%	54.6%	46.7%	52.4%	55.7%	49.5%	53.6%	-11.2%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Number of School Commute Trips	84	219	267	218	181	259	341	296	241	299	364	334	

Figure 18: Modal Split of School Commute Trips Made by CU Students, 1990-2018

Modes with shifts that are statistically significantly different between 1990 and 2018 are shaded. Modes with shifts that are statistically significant different between 2015 and 2018 are bolded.

Trip Characteristics

Summary Characteristics of All Trips

This section of the report explores the characteristics of the trips made by Boulder Valley residents. Figure 19, below, displays summary trip characteristics for all trips, regardless of mode of travel. These trip characteristics have remained fairly steady over the study period, although the average number of miles traveled per day decreased slightly from 1990 to 2018.

On average, respondents traveled about 22 miles per day and made about 5 trips during the 24-hour period assigned to them in 2018, with an average trip length of about 4 miles. While the average trip distance has not changed much since 1990, the average trip duration has increased about 5 minutes, from 14.4 minutes in 1990 to 19.4 minutes in 2018, possibly due to the changes in the proportion of trips being taken by various modes (e.g., traveling by bicycle usually takes longer than traveling the same distance by car). About 8% of respondents made no trips on their assigned travel day, an increase from the 4% who did so in 1990, but similar to what has been observed in recent years.

						Ye	ear						Change
Summary Travel Characteristics	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990	1990- 2018
Average number of trips per day per person	5.3	5.4	4.9	5.1	5.7	5.5	6.1	5.9	6.2	6.1	6.0	5.9	-0.6
Average number of miles per day per person	21.7	22.7	18.8	24.7	24.1	27.0	25.2	26.0	27.8	26.9	25.4	24.3	-2.6
Percent of people who did not leave the house on assigned travel day	7.9%	5.7%	5.7%	5.8%	5.4%	5.2%	4.7%	4.9%	5.2%	4.1%	4.6%	4.1%	3.8%
Average estimated trip length in miles ⁵	4.3	4.4	3.8	5.0	4.3	5.1	4.3	4.3	4.7	4.5	4.6	4.0	0.3
Average estimated trip time in minutes	19.4	19.6	15.8	17.0	16.0	15.4	13.5	11.4	13.3	11.8	14.9	14.4	5.0
Average miles per hour	13.6	13.8	13.8	15.7	15.7	16.0	15.4	15.5	15.2	15.9	15.7	15.1	-1.5

Figure 19: Summary Trip Characteristics, All Trips, 1990-2018

Characteristics with changes that are statistically significantly different between 1990 and 2018 are shaded. Characteristics with changes that are statistically significant different between 2015 and 2018 are bolded.

⁵ Travel Diary Study participants are asked to record the estimated distance in miles or blocks of every trip they make. Thus, trip distance is not measured objectively, but is determined by the respondents' self-report. See Appendix E. Study Methodology for a note on the adjustments made to these figures.

Trip Characteristics of the Work Commute

The travel characteristics of work commute trips are displayed in Figure 20. Figure 21 makes comparisons to the national commute. The average work commute for Boulder residents was 4.6 miles in 2018, while the average work commute duration was about 20 minutes. As with all trips, the work trips made by Boulder residents were shorter in length and duration than observed nationally.

						Ye	ear						Change
Summary Travel Characteristics	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990	1990- 2018
Average estimated trip length in miles	4.6	5.1	6.0	6.1	5.5	6.2	5.7	6.2	5.3	6.2	5.9	5.2	-0.4
Average estimated trip time in minutes	19.7	22.3	17.7	17.1	17.1	16.7	16.3	12.1	13.7	20.4	16.7	15.1	4.6
Average miles per hour	13.5	14.4	17.1	18.3	17.8	18.6	17.9	18.6	18.1	18.9	19.6	18.4	-5.1

Figure 20: Summary Work Commute Trip Characteristics, All Travel Modes, 1990-2018

Characteristics with changes that are statistically significantly different between 1990 and 2018 are shaded. Characteristics with changes that are statistically significant different between 2015 and 2018 are bolded.

Figure 21: Summary Work Commute Trip Characteristics, Boulder Compared to the U.S., 1990-2009/2015

			Boulder			U.S	S. (NHTS*)	
Summary Travel Characteristics	2018	2015	1990	Annual Percent Change	2017*	2009	1990	Annual Percent Change
Average estimated trip length in miles	4.6	5.1	5.2	-0.18%	11.46	11.79	10.65	0.56%
Average estimated trip time in minutes	19.7	22.3	15.1	2.31%	26.58	23.85	19.60	1.14%

* General commute patterns by mode of transportation.

 * 2017 NHTS sample was address-based and among other changes included more urban and cell phone only households than prior years.

A household travel survey that accompanied the diary asked respondents to identify where they worked if they were employed. In all years, about eight in ten employed respondents work in Boulder.

					Perc	ent of R	espond	ents				
Location of Workplace	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990
Boulder	78.5%	83.5%	80.6%	76.7%	73.2%	77.4%	62.9%	78.7%	81.7%	80.4%	81.5%	83.1%
Denver	4.5%	6.0%	6.3%	6.2%	6.3%	6.2%	5.4%	8.7%	8.3%	8.3%	1.0%	8.3%
Longmont	2.1%	2.0%	2.3%	3.4%	4.8%	3.8%	1.8%	2.5%	1.9%	1.8%	2.2%	1.2%
Broomfield	3.3%	1.9%	4.1%	2.5%	3.9%	2.4%	2.2%	1.3%	2.5%	2.3%	3.3%	1.3%
Louisville	2.4%	0.9%	0.8%	2.5%	3.0%	2.3%	2.0%	3.3%	2.2%	2.2%	0.5%	1.8%
Lafayette	1.9%	0.8%	0.8%	1.8%	1.6%	1.0%	1.0%	0.6%	0.6%	1.7%	2.1%	0.7%
Other location	7.3%	5.0%	5.1%	6.7%	7.1%	6.8%	24.6%	4.8%	2.9%	3.2%	9.5%	3.6%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Employed Respondents	538	799	710	787	897	911	1,182	839	895	942	973	1,109

Figure 22: Location of Respondent's Workplace, 1990-2018

Automobile Trip Characteristics

Figure 23 and Figure 24 summarize the trip characteristics for automobile trips. The proportion of respondents making at least one SOV trip on their assigned travel day has decreased from 65% in 1990 to 53% in 2018; the proportion making at least one MOV trip decreased from 48% in 1990 to 37% in 2018. On average, participants in the 2018 study made 1.8 SOV trips per day; those who made at least one SOV trip made 3.4 trips on average. The average number of carpool trips per respondent in 2018 was about 1. The average trip distance was about 5 miles for SOV trips and about 7 miles for MOV trips. The average trip duration in minutes was about 18 minutes for SOV trips, and about 18 minutes for MOV trips.

	-,											
Summary Travel Characteristics	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990
Average number of SOV trips per day per person	1.80	1.75	1.65	1.80	2.03	2.00	2.36	2.28	2.41	2.37	2.34	2.49
Percent of people making at least one SOV trip	53.4%	48.1%	49.5%	53.6%	56.8%	56.6%	62.8%	59.5%	60.2%	63.0%	60.0%	64.6%
Average number of SOV trips per day per person who made at least one SOV trip	3.37	3.64	3.34	3.36	3.57	3.52	3.76	3.83	4.00	3.77	3.90	3.85
Average estimated trip length in miles	4.8	5.2	5.3	6.1	5.2	5.7	5.0	5.1	5.1	5.2	5.2	4.6
Average estimated trip time in minutes	18.2	17.2	15.8	16.3	14.6	13.3	11.5	9.6	12.6	11.4	13.7	12.9
Average miles per hour of SOV trips	17.6	18.2	19.5	21.1	20.3	21.0	19.7	20.0	19.4	20.5	20.2	19.3

Figure 23: Summary Trip Characteristics, SOV Trips, 1990-2018

Characteristics with changes that are statistically significantly different between 1990 and 2018 are shaded. Characteristics with changes that are statistically significant different between 2015 and 2018 are bolded.

Figure 24: Summary Trip Characteristics, MOV Trips, 1990-2015

Summary Travel Characteristics	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990
Average number of MOV trips per day per person	1.10	1.11	0.94	1.14	1.40	1.26	1.38	1.44	1.52	1.49	1.44	1.52
Percent of people making at least one MOV trip	37.4%	35.9%	32.4%	38.6%	43.3%	40.6%	43.1%	43.7%	46.9%	47.1%	44.2%	47.5%
Average number of MOV trips per day per person who made at least one MOV trip	2.94	3.09	2.90	2.95	3.23	3.10	3.20	3.30	3.23	3.16	3.26	3.19
Average estimated trip length in miles	7.0	7.8	6.0	7.5	6.2	8.6	6.4	6.1	7.5	6.8	6.6	5.8
Average estimated trip time in minutes	17.5	19.9	18.1	17.6	16.4	18.4	14.5	9.8	13.4	12.3	17.1	16.0
Average miles per hour of MOV trips	19.9	20.2	19.6	21.0	20.9	21.4	20.1	19.9	19.9	20.3	19.2	18.5

Characteristics with changes that are statistically significantly different between 1990 and 2018 are shaded. Characteristics with changes that are statistically significant different between 2015 and 2018 are bolded.

Vehicle Miles Traveled per Capita

An estimate was created of per capita vehicle miles traveled (VMT) per adult Boulder Valley resident. This estimate includes miles traveled in a single-occupancy vehicle and in a multiple occupancy vehicle. (This means that some of the MOV miles are "double-counted" because the miles traveled are being assigned to all those in the vehicle.) There is some volatility in these estimates, because there is a certain amount of error around each of the estimates that goes into the calculation. However, the estimated number of vehicle miles traveled per capita has ranged from about 5,000 to 8,000 over the study period.

Calculating per capita VMT	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990
Average number of SOV trips per day per person	1.80	1.75	1.65	1.80	2.03	2.00	2.36	2.28	2.41	2.37	2.34	2.49
Average estimated SOV trip length in miles	4.8	5.2	5.3	6.1	5.2	5.7	5.0	5.1	5.1	5.2	5.2	4.6
Estimated SOV VMT per capita per day (average number of trips x average trip length)	8.64	9.10	8.75	10.98	10.56	11.40	11.80	11.63	12.29	12.32	12.17	11.45
Average number of MOV trips per day per person	1.10	1.11	0.94	1.14	1.40	1.26	1.38	1.44	1.52	1.49	1.44	1.52
Average estimated MOV trip length in miles	7.0	7.8	6.0	7.5	6.2	8.6	6.4	6.1	7.5	6.8	6.6	5.8
Estimated MOV VMT per capita per day (average number of trips x average trip length)	7.70	8.66	5.64	8.55	8.68	10.84	8.83	8.78	11.40	10.13	9.50	8.82
TOTAL VMT per capita per day (SOV VMT + MOV VMT)	16.34	17.76	14.39	19.53	19.24	22.24	20.63	20.41	23.69	22.46	21.67	20.27
TOTAL annual VMT per capita per day (assumes 48 weeks a year, 336 days)	5,490	5,967	4,833	6,562	6,463	7,471	6,932	6,858	7,960	7,545	7,282	6,811

Figure 25: Vehicle Miles Traveled per Capita, 1990-2018

Vehicle Occupancy

The average number of people in an automobile has not changed significantly from 1990 to 2018 (see Figure 26). The average vehicle occupancy for all automobile trips was about 1.5 persons; for MOV trips the average vehicle occupancy was about 2.5 persons. Just over 60% of all automobile trips were made with only one person in the vehicle.

					Perce	nt of To	tal Auto	Trips				
Number of Occupants	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990
1	63.4%	63.1%	64.6%	61.5%	61.2%	63.7%	63.7%	62.0%	61.7%	61.0%	62.3%	62.6%
2	25.3%	28.2%	26.9%	26.2%	27.9%	26.0%	25.6%	26.5%	27.4%	27.7%	26.4%	25.6%
3	6.4%	6.1%	5.7%	7.0%	6.6%	6.7%	6.7%	6.7%	7.1%	7.3%	6.6%	7.6%
4	4.0%	2.0%	2.1%	4.3%	3.1%	2.2%	3.2%	3.6%	3.2%	2.9%	3.4%	2.8%
5 or more	0.9%	0.6%	0.7%	1.0%	1.2%	1.4%	0.9%	1.2%	0.8%	1.1%	1.4%	1.3%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Average Vehicle Occupancy for all Automobiles	1.54	1.44	1.45	1.55	1.54	1.48	1.51	1.54	1.54	1.56	1.56	1.55
Average Vehicle Occupancy for Autos with at Least Two Passengers	2.49	2.33	2.35	2.49	2.44	2.44	2.45	2.47	2.42	2.43	2.48	2.47
Number of Trips	2,369	3,355	2,640	3,326	3,822	4,425	4,397	3,892	4,251	4,358	4,414	5,086

Figure 26: Vehicle Occupancy, 1990-2018

Vehicle Ownership and Availability

Households can be classified according to the ratio of the number of vehicles to eligible drivers. If the ratio is 1:1 or greater, this household can be considered to have "high vehicle availability".⁶ Persons in households with high vehicle availability tend to drive alone more often.

Vehicle availability and ownership for all study years are shown in Figure 27. The average number of bicycles per household is also displayed in the table. Vehicle availability has declined slightly since 1990, when the average was 1.0 vehicle for every household member aged 16 and over to 0.9 vehicles per household member aged 16 and older. The average number of motorized vehicles per household has also declined somewhat, from 1.83 vehicles per household in 1990 to 1.61 vehicles per household in 2018. Bicycles per household in 1992 (the 1990 household survey did not ask about bicycles) to 2.59 bicycles per household in 2018.

Vehicle and Bicycle Availability	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990
Average vehicle availability (per person in household 16 or older)	0.90	0.89	0.89	0.93	0.90	0.89	0.96	0.92	0.89	0.99	0.98	1.00
Average number of motorized vehicles per household	1.61	1.77	1.59	1.66	1.60	1.69	1.79	1.73	1.63	1.78	1.83	1.83
Average number of bicycles per household	2.59	2.78	2.48	2.26	2.19	2.21	2.09	2.04	2.00	2.00	1.98	not asked

Figure 27: Vehicle Availability, Vehicles per Household and Bicycles per Household, 1990-2018

⁶ Puget Sound Council of Governments: "Household Travel Surveys, 1985-1988 Puget Sound Region"; June 1990.

Transit Trip Characteristics

The characteristics of trips made on the assigned travel day via transit are shown in Figure 28. The proportion of people who made at least one trip on the bus increased from about 5% in 1990 to about 13% in 2018. The average bus trip was about 9 miles, a jump compared to 2000 to 2012. The estimated trip duration was 27 minutes.

Summary Travel Characteristics	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990
Average number of bus trips per day per person	0.25	0.19	0.22	0.26	0.21	0.24	0.25	0.25	0.17	0.17	0.13	0.09
Percent of people making at least one bus trip	12.8%	10.7%	11.0%	12.5%	9.2%	11.2%	11.5%	10.3%	8.6%	7.7%	6.0%	4.8%
Average number of bus trips per day per person who made at least one bus trip	1.98	1.80	2.02	2.06	2.29	2.12	2.18	2.44	1.96	2.18	2.10	1.85
Average estimated trip length in miles	8.8	9.5	5.5	6.5	6.2	6.4	6.6	7.2	9.7	10.1	13.2	10.4
Average estimated trip time in minutes	27.1	29.0	21.8	16.4	21.1	21.2	16.6	18.1	18.4	28.3	29.7	29.7
Average miles per hour of transit trips	15.6	15.3	13.5	15.6	15.6	15.5	14.9	17.1	17.9	18.1	24.5	18.9

Figure 28: Summary Trip Characteristics, Transit Trips, 1990-2018

Characteristics with changes that are statistically significantly different between 1990 and 2018 are shaded.

Eco-Pass Status

In previous implementations of the travel diary, study participants were asked whether they had an Eco-Pass, and what kind they held. Starting in 2009, participants were first asked if they were eligible to have an Eco-Pass. Just over half of respondents said they were eligible for an Eco-Pass (see Figure 29). However, 21% of those eligible for a pass in 2018 had not picked up their pass (see Figure 30).

Figure 29: Eco-Pass Eligibility, 2009-2018

Are you eligible to have an Eco-Pass, an annual pass that allows you unlimited bus rides? (Please check all that apply.)*	2018	2015	2012	2009
yes, through my employer	24.4%	21.8%	20.2%	17.6%
yes, through my neighborhood	13.2%	10.2%	11.4%	12.0%
yes, a CU Boulder student Buff One pass	15.8%	20.3%	20.2%	18.0%
yes, CU Boulder faculty/staff Buff One pass	4.5%	5.4%	5.2%	7.1%
yes, other pass	1.0%	0.9%	1.6%	1.7%
no, I am not eligible for an Eco-Pass	46.3%	45.2%	46.1%	47.6%
Number of Respondents	765	1,117	1,036	1,112

* Percents may add to more than 100% as respondents could give more than one answer.

Figure 30: Eco-Pass Pick-up Status, 2009-2015

Did you pick up a pass (or passes)?**	2018	2015	2012	2009
Yes	79.3%	88.2%	79.7%	82.8%
No	20.7%	11.8%	20.3%	17.2%
Total	100%	100%	100%	100%
Number of Respondents	412	620	561	588

** Only asked of those eligible for an Eco-Pass.

To compare Eco-Pass possession over time, those who were eligible for an Eco-Pass and reported that they had picked one up were considered to have an Eco-Pass. As shown in Figure 31, about 43% of study participants in 2018 held some kind of an Eco-Pass, a proportion that has been similar over the years. In 2015, about 17% of respondents had an Eco-Pass through their employer (including the University of Colorado faculty/staff BuffOne pass). About 8% held an Eco-Pass through their neighborhood.

Do you have an Eco-Pass?	2018	2015 [†]	2012 [†]	2009 [†]	2006	2003	2000	1998
no	57.4%	51.4%	56.9%	56.4%	61.9%	53.9%	60.7%	61.0%
yes, through employer	16.9%	15.9%	13.1%	12.4%	12.3%	12.6%	11.2%	10.2%
yes, through neighborhood	7.8%	7.0%	6.9%	8.1%	4.7%	2.6%	3.9%	3.5%
yes, a CU Boulder student BuffOne Pass	13.2%	19.8%	17.2%	15.4%	15.9%	23.2%	20.4%	21.2%
yes, a CU Boulder faculty/staff BuffOne pass	4.1%	5.3%	4.7%	6.5%	3.7%	4.6%	2.9%	4.2%
yes, other pass	0.6%	0.6%	1.2%	1.2%	1.4%	3.1%	0.9%	0.0%
Total	100%	100%	100%	100%	100%	100%	100%	100%
Number of Respondents	766	1122	1040	1118	1,154	1,278	1,191	1,035

Figure 31: Eco-Pass Status, 1998-2018

[†]This percent is an estimate, based on respondent's Eco-Pass eligibility and pick-up status. Since the question asked in 1998 through 2006 was changed in 2009, results may not be directly comparable.

Beginning in 2009, survey participants with an Eco-Pass were asked how often, on average, they used their Eco-Pass. About 8 in 10 of those with an Eco-Pass use it at least once a month.

Figure 32: Use of the Eco-Pass, 2009-2015

About how often, on average, do you use your Eco-Pass?**	2018	2015	2012	2009
More than once a week	32.6%	31.2%	33.0%	41.4%
About once a week	12.5%	11.1%	11.8%	15.4%
About once every two weeks	16.1%	16.8%	15.1%	10.2%
About once a month	19.2%	16.7%	17.8%	10.7%
Less often than once a month	19.6%	24.3%	22.3%	22.3%
Total	100%	100%	100%	100%
Number of Respondents	345	552	449	488

** Only asked of who have an Eco-Pass.

Bus ridership has been positively associated with having an Eco-Pass. Since 1998, between 3% and 6% of non-Eco-Pass holders made at least one bus trip compared to 18% to 26% of Eco-Pass holders (Figure 33).



Figure 33: Bus Ridership by Eco-Pass Status: Percent Who Made at Least One Trip on the Bus. 1998-2018
Non-Vehicle Trip Characteristics: Walking and Biking

In all study years about a third of respondents made at least one walking trip on their assigned travel day (see Figure 34). Walking trips have tended to be quite short in distance; the average trip length was 0.8 miles in 2018. The proportion of respondents making one or more trips by bicycle on their assigned travel day increased from 15% in 1990 to 27% in 2018 (see Figure 35). In 2018 the average distance of a bike trip was about 2 miles and took about 22 minutes to complete.

Summary Travel Characteristics	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990
Average number of pedestrian trips per day per person	1.03	0.90	0.92	0.86	0.99	0.98	1.15	1.21	1.21	1.11	0.97	1.04
Percent of people making at least one pedestrian trip	36.8%	34.3%	30.8%	33.0%	34.6%	34.8%	36.9%	39.1%	39.9%	36.9%	34.8%	33.0%
Average number of pedestrian trips per day per person who made at least one pedestrian trip	2.80	2.61	2.99	2.62	2.85	2.81	3.11	3.09	3.04	3.00	2.78	3.16
Average estimated pedestrian trip length in miles	0.8	0.8	0.7	0.7	0.9	0.9	0.7	0.8	0.7	0.7	0.7	0.7
Average estimated pedestrian trip time in minutes	19.4	17.4	13.2	14.9	17.3	13.6	14.8	15.3	15.1	15.1	13.6	14.4
Average miles per hour of pedestrian trips	3.5	3.3	3.7	3.2	3.6	3.9	2.8	3.5	3.3	3.6	3.4	3.3

Figure 34: Summary Trip Characteristics, Pedestrian Trips, 1990-2018

Figure 35: Summary Trip Characteristics, Bicycle Trips, 1990-2018

Summary Travel Characteristics	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990
Average number of bicycle trips per day per person	0.82	0.97	0.84	0.72	0.70	0.70	0.55	0.45	0.52	0.65	0.66	0.50
Percent of people making at least one bicycle trip	27.0%	32.7%	25.2%	23.9%	20.4%	23.2%	17.1%	15.0%	16.6%	19.8%	20.9%	15.2%
Average number of bicycle trips per day per person who made at least one bike trip	3.05	2.95	3.31	3.01	3.44	3.02	3.24	3.00	3.16	3.28	3.14	3.28
Average estimated bicycle trip length in miles	2.3	1.8	1.9	2.5	2.2	2.8	2.0	2.4	2.2	2.3	2.0	2.1
Average estimated bicycle trip time in minutes	22.4	23.5	14.6	18.3	16.3	16.9	15.4	13.6	14.3	9.5	14.1	15.1
Average miles per hour	8.0	7.7	7.8	8.1	8.1	8.8	8.2	8.7	8.4	8.4	7.7	8.2

Characteristics with changes that are statistically significantly different between 1990 and 2018 are shaded. Characteristics with changes that are statistically significant different between 2015 and 2018 are bolded.

Biking for Work, Errands and Recreation

Beginning in 2000, respondents have been asked about their bicycle use for work and for recreation. People surveyed were asked how many times each week, if at all, they biked to work. Additionally, they were asked the number of times per week they used a bike for recreational trips. In 2009, the question was changed to ask about three types of trips: commuting, shopping/meals/errands and fun or exercise. Nearly 6 in 10 respondents since 2009 have said they had not used a bike for some kind of trip at least once in the previous week (see Figure 38).

About 4 in 10 respondents in 2018 said they had used a bicycle at least once in the previous week to shop, get a meal or run errands; similar to past behavior. Likewise, about 4 in 10 respondents in 2018 reported having ridden a bicycle for fun or exercise at least once in the previous week. However, there was an increase the in proportion of respondents who reported riding a bicycle for the work commute. This increased from 35% in 2000 to about 40% in 2018.

In the last week, about how frequently	to	o shop, g or run e	jet a mea errands	al	for commuting				for fun or exercise				
have you ridden a bicycle:	2018	2015	2012	2009	2018	2015	2012	2009	2018	2015	2012	2009	
5 or more times	7.8%	8.7%	8.9%	8.3%	16.9%	23.5%	19.0%	17.3%	5.2%	4.5%	2.6%	4.3%	
3 to 4 times	8.9%	9.8%	10.9%	9.5%	10.8%	8.0%	7.8%	9.7%	9.1%	7.8%	11.5%	13.3%	
Once or twice	22.5%	19.7%	17.4%	21.0%	11.8%	7.7%	9.9%	9.3%	26.4%	28.8%	27.0%	23.6%	
Not at all	60.3%	61.8%	62.9%	61.2%	60.0%	60.7%	63.3%	63.7%	58.7%	58.9%	59.0%	58.8%	
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Number of Respondents	768	1,127	1,047	1,120	768	1,126	1,047	1,120	768	1,128	1,047	1,120	

Figure 36: Use of Bicycle in Previous Week for Shopping/Errands, Fun/Exercise and Commuting, 2009-2018

Figure 37: Bicycle Trips for Work and Recreation, 2000-2018

Number of Times per week a		Bicycl		Bicycle trips for recreation/fun or exercise/shop/meals/errands										
Bicycle was used	2018	2015	2012	2009	2006	2003	2000	2018	2015	2012	2009	2006	2003	2000
5 or more times	16.9%	23.5%	19.0%	17.3%	16.0%	18.5%	14.1%	11.2%	11.1%	10.5%	10.0%	6.9%	6.1%	6.7%
4 times or less	22.4%	15.7%	17.7%	19.0%	24.7%	22.1%	21.0%	41.9%	40.9%	43.5%	43.3%	53.6%	48.5%	50.4%
Not at all	60.0%	60.7%	63.3%	63.7%	59.3%	59.4%	64.9%	46.3%	48.3%	45.9%	46.7%	39.5%	45.5%	42.9%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Respondents	768	1,126	1,047	1,121	1,154	1,269	1,180	768	1,126	1,047	1,121	1,154	1,269	1,180

Ever use a bike to shop/run errands, fun/exercise, or commuting in the last week (2009-2018) or month (2000-2006)?	2018	2015	2012	2009	2006	2003	2000
Yes	58.8%	59.3%	58.0%	58.2%	65.0%	61.7%	61.9%
No	41.2%	40.7%	42.0%	41.8%	35.0%	38.3%	38.1%
Total	100%	100%	100%	100%	100%	100%	100%
Number of Respondents	763	1,126	1,047	1,121	1,154	1,269	1,180

Figure 38: Bicycle Trips in Previous Week or Month, 2000-2018

From 2000 to 2006, respondents were asked how many times each week, if at all, they biked to work and used a bike for recreational trips. In 2009 the question was changed to ask about three types of trips (commuting, shopping/meals/errands and fun or exercise) in the last month.

Trip Distance

In Figure 39, trip distances are exhibited by mode of travel. For motorized vehicle trips, private vehicle and transit trips distances tend to be either of middle distance, between one and two-and-a-half miles, or over a longer length (20 or more miles). These "peaks" are even more evident for bus trips than for drive alone or carpool trips. Bike and walk trips, on the other hand, tend to be much shorter, especially for walking trips.

Figure 39: Trip Distance by Mode of Travel, 2018



Trip Start Times

Trip start and end times were recorded by respondents as they kept track of their travel throughout their assigned travel day. The graph in Figure 40 shows when travel activity took place. Most travel occurred between 6:00 am and 8:00 pm, with a large spike during the afternoon commute time (about 4:00 pm to 6:00 pm), and smaller peaks for the morning commute time and the noontime lunch hour.



Figure 40: Time When Trip Began, 2018

Deliveries to the Home or Office

Beginning in 1998, study participants were asked about certain behaviors which might replace trips. They were asked whether they had any goods or services delivered to their work or home and whether they had telecommuted on their assigned travel day (see page 13 for information on telecommuting).

About 8% of respondents in 1998 had received at least one delivery on their assigned travel day, and about 11% received a delivery in 2018 (see Figure 41). A smaller proportion of respondents who had received a delivery in 2018 felt that the delivery took the place of a drive alone a trip compared to previous years (see Figure 42).

Percent of Respondents Who Received Any Deliveries On Their Assigned Travel Day	2018	2015	2012	2009	2006	2003	2000	1998
No, did not receive deliveries	89.1%	90.4%	93.7%	94.9%	93.6%	93.8%	94.6%	92.1%
Yes, received deliveries	10.9%	9.6%	6.3%	5.1%	6.4%	6.2%	5.4%	7.9%
Total	100%	100%	100%	100%	100%	100%	100%	100%
Number of respondents	762	1,109	1,036	1,107	1,130	1,262	1,150	1,008

Figure 41: Deliveries Received by Respondents, 1998-2018

Figure 42: Did Deliveries Replace Any Drive Alone Trips, 2000-2018

Did the delivery substitute for a travel trip you might have made to seek the good or service?**	2018	2015	2012	2009	2006	2003	2000
Yes	22.1%	51.0%	36.4%	46.3%	41.8%	43.7%	44.2%
No	77.9%	49.0%	63.6%	53.7%	58.2%	56.3%	55.8%
Total	100%	100%	100%	100%	100%	100%	100%
Number of respondents	84	104	67	54	72	81	97

**Question only asked of those who had received deliveries.

Purpose of Travel

In addition to recording information about the time of day and mode of transportation used for each trip, respondents were also asked to document the purpose of each trip they made. Figure 43 (below) and Figure 44 (on the next page) show the reasons for travel by trips made and by miles traveled, respectively. Patterns of trip purpose were fairly similar over the entire study period. Aside from the "go home" trips (about a third of all trips and miles) and work-related trips (14% of trips and 13% of miles in 2018), recreational trips account for one of the largest proportion of trip purposes; 17% of trips and 21% of miles in 2018. Shopping accounted for about 11% of trips and 6% of miles.

Trip	Purpose	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990
Go H	ome	34.2%	35.0%	34.7%	33.7%	33.1%	33.3%	33.7%	32.0%	31.6%	32.8%	32.3%	33.6%
~	All	13.3%	14.3%	13.8%	13.9%	13.9%	13.2%	13.1%	13.1%	15.5%	14.4%	14.1%	15.1%
Vorl	Work Commute	7.7%	8.8%	9.2%	8.6%	8.5%	9.2%	9.0%	8.8%	-	-	-	-
	Other Work/ Business	5.6%	5.5%	4.6%	5.3%	5.4%	4.0%	4.1%	4.3%	-	-	-	-
Socia	al/Recreation	17.0%	16.4%	13.4%	16.2%	14.8%	16.2%	12.9%	14.4%	13.9%	13.5%	12.6%	12.3%
Shop	ping	11.1%	9.6%	11.1%	10.3%	11.5%	10.8%	11.0%	10.2%	11.3%	10.6%	11.7%	11.0%
Perso	onal Business	6.5%	7.3%	6.3%	6.5%	8.6%	8.1%	8.7%	9.5%	10.1%	9.4%	11.1%	11.9%
Scho	ol	3.0%	4.7%	6.3%	4.6%	3.8%	5.5%	5.5%	6.0%	4.6%	5.4%	6.5%	5.6%
Eat a	Meal	4.7%	5.6%	7.1%	6.3%	5.4%	5.0%	5.3%	5.9%	6.1%	3.5%	5.4%	4.6%
Drive	a Passenger	3.8%	3.5%	4.8%	3.9%	4.7%	4.5%	5.0%	4.7%	4.3%	4.4%	3.8%	4.0%
Chan	ge Travel Mode	6.3%	3.1%	2.5%	4.2%	3.5%	3.1%	4.8%	4.2%	2.7%	5.4%	2.0%	1.7%
Othe	r	0.1%	0.4%	0.0%	0.4%	0.7%	0.2%	0.0%	0.1%	0.0%	0.5%	0.6%	0.1%
Total		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Num	ber of trips	4,088	5,762	4,831	5,496	6,076	6,373	6,773	5,981	6,446	6,711	6,672	7,350
Figur	e 44: Purpose of Trips	Miles, 1	990-201	18									
Trip	Purpose	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990

Figure 43: Purpose of Trips, 1990-2018

<u> </u>		1											
Trip	Purpose	2018	2015	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990
Go H	ome	36.6%	35.7%	35.4%	34.3%	35.5%	30.3%	32.5%	31.7%	32.1%	32.7%	33.8%	34.3%
~	All	12.4%	16.4%	18.6%	15.6%	15.6%	15.6%	18.3%	18.10%	16.6%	19.2%	18.1%	18.1%
Vorl	Work Commute	8.5%	10.0%	14.9%	10.7%	11.1%	11.0%	11.8%	10.5%	-	-	-	-
	Other Work/ Business	3.9%	6.4%	3.7%	4.9%	4.5%	3.80%	7.3%	7.6%	-	-	-	-
Socia	al/Recreation	20.7%	19.9%	15.0%	21.4%	15.2%	25.8%	16.4%	18.3%	18.6%	17.9%	18.1%	16.8%
Shop	ping	6.1%	6.3%	8.4%	6.9%	8.5%	7.0%	8.7%	6.6%	7.0%	5.7%	7.3%	7.8%
Perso	onal Business	7.4%	6.8%	5.7%	6.3%	7.6%	7.5%	6.9%	7.5%	10.2%	7.9%	8.4%	11.1%
Scho	ol	1.0%	1.3%	3.4%	1.6%	2.6%	2.8%	1.8%	2.8%	1.6%	2.4%	3.1%	2.5%
Eat a	Meal	3.1%	4.5%	4.0%	3.1%	4.2%	2.8%	3.4%	3.3%	3.6%	5.9%	3.4%	2.7%
Drive	a Passenger	4.3%	5.0%	6.6%	5.4%	5.5%	4.7%	5.6%	5.8%	6.2%	4.8%	3.8%	3.8%
Chan	ige Travel Mode	8.2%	3.7%	2.7%	5.0%	4.2%	3.4%	6.4%	5.9%	4.2%	3.1%	3.4%	3.0%
Othe	r	0.1%	0.4%	0.0%	0.4%	1.1%	0.1%	0.0%	0.1%	0.0%	0.4%	0.5%	0.1%
Total		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Num	ber of trips	17,405	25,303	18,251	26,983	25,742	31,195	28,657	25,538	30,033	30,282	29,710	29,587

Trip purpose by travel mode is shown in Figure 45, while Figure 46, which is similar to Figure 45, displays the modal split of trips by the trip purpose. The types of trips most likely to have been made by driving alone in 2018 were work-related trips and shopping trips. The trips most likely to be made by transit were "change travel mode," school and work. Social/recreation trips and the work commute and school commute were a popular choice for traveling by bicycle.

	Percent of Trips by Travel Mode										
Trip Purpose	Single- Occupancy Vehicle	Multiple- Occupancy Vehicle	Transit	Bicycle	Foot						
go home	36.9%	34.3%	16.2%	0.0%	38.1%						
shopping	16.1%	12.6%	0.5%	0.0%	5.1%						
social/recreation	14.3%	22.3%	4.2%	0.0%	14.4%						
personal business	8.4%	5.0%	1.1%	0.0%	6.6%						
work or work commute	8.4%	1.7%	11.9%	0.0%	16.3%						
other work/business	7.5%	1.2%	5.9%	0.0%	6.5%						
eat a meal	3.5%	9.3%	1.6%	0.0%	2.9%						
drive a passenger	2.5%	12.3%	0.0%	0.0%	0.3%						
change travel mode	1.3%	0.6%	50.0%	100.0%	3.8%						
school	1.0%	0.6%	8.6%	0.0%	5.9%						
other	0.2%	0.1%	0.0%	0.0%	0.0%						
Total	100%	100%	100%	100%	100%						
Number of trips	1,501	913	223	755	882						

Figure 45: Purpose of Trips by Travel Mode, 2018

Figure 46: Modal Split of All Trips by Trip Purpose, 2018

	Percent of Trips by Trip Purpose												
Modal Split of All Trips	go home	personal business	shopping	School	work or work commute	other work/business	social/ recreation	change travel mode	drive a passenger	eat a meal			
SOV	39.6%	47.4%	53.2%	12.7%	40.2%	30.9%	7.4%	24.4%	26.8%	76.4%			
MOV with adults	12.4%	12.1%	19.2%	3.7%	3.0%	17.2%	1.7%	18.0%	25.1%	0.0%			
MOV with children	9.0%	4.1%	4.9%	0.6%	1.6%	10.8%	0.4%	51.7%	16.9%	23.6%			
Transit	2.4%	0.9%	0.2%	14.6%	7.8%	1.3%	40.1%	0.0%	1.7%	0.0%			
Bicycle	18.9%	17.0%	7.8%	33.4%	35.8%	14.4%	10.3%	1.5%	10.5%	0.0%			
Foot	17.8%	18.5%	14.7%	35.0%	11.6%	25.4%	39.9%	4.3%	19.0%	0.0%			
Tatal	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
IOTAI	1398	267	455	121	315	693	257	154	193	3			

Traditional transportation planning has often focused on origins and destinations of trips, particularly those based at home or work, to study trends regarding trip purpose. Thus trips have often been classified in more aggregated categories of purpose depicting "homebased work" trips, "home-based other" trips and "non-home" trips. The following figure describes the classification scheme.⁷

Figure 47: Types of Trips



Boulder residents' trips were categorized using this model. The proportion of trips made with origins and destinations of "home-work", "home-other" and "non-home" was similar for all study years. A majority of trips were made between respondents' homes and a destination other than work. Three in ten trips neither began nor ended at home. About 12% of trips were direct travel between work and home.

Figure 48: Types of Trips Made, 2018



⁷ This coding scheme was taken from the Puget Sound Council of Governments Travel Study, 1985. Some small alterations were made to the scheme.

The typology of trips by travel mode used is presented in Figure 49, while Figure 50 shows the modal split of all trips by the trip type category. Among all modes, home-other trips were the most common, except for the transit trips, which were often non-home based (likely due to the use of another mode to get to or from the bus). Home-work trips were the type most likely to have been made via SOV or bicycle, while walking was a bit higher for home-other and non-home trips.

	Percent of Trips by Travel Mode												
_Trip Type	Single- Occupancy Vehicle	Multiple- Occupancy Vehicle	Transit	Bicycle	Foot								
Home-based Other	60.4%	72.1%	18.9%	52.4%	61.7%								
Home-based Work	13.2%	1.8%	17.0%	28.8%	7.1%								
Non-home Based	26.3%	26.0%	64.1%	18.9%	31.3%								
Total	100%	100%	100%	100%	100%								
Number of trips	1,500	871	206	695	819								

Figure 49: Type of Trips by Mode of Trip, 2018

Figure 50: Modal Split of All Trips by Type of Trip, 2018

	Pe	Percent of Trips by Type of Trip								
Modal Split of All Trips	Home-based Other	Home-based Work	Non-home Based							
SOV	37.1%	39.1%	34.6%							
MOV with adults	14.4%	2.1%	13.4%							
MOV with children	11.3%	1.0%	6.4%							
Transit	1.6%	6.9%	11.6%							
Bicycle	14.9%	39.4%	11.5%							
Foot	20.7%	11.4%	22.4%							
Total	100%	100%	100%							
Number of trips	2,443	507	1,142							

Appendix A. National Travel Data

This appendix contains data from other sources about travel behavior in the nation as whole, to which the travel behavior of Boulder Valley residents can be compared. The data sources included are the National Household Transportation Survey and the U.S. Census.

The National Household Transportation Survey (NHTS, formerly the National Personal Transportation Study (NPTS)), commissioned by the U.S. Department of Transportation, is a study of the travel patterns of the nation as a whole using a diary methodology similar to the one used in this research project.

The NHTS was conducted previously in 2001, 2009 and 2017 and the NPTS in 1995, 1990, 1983, 1977 and 1969. Comparisons are made in this report between the 1990 NPTS and the 2017 NHTS to the Boulder Travel Diary Study of 1990 and 2018 so that the time periods between the national study and the Boulder study largely overlap. This way, comparisons can be made between temporal trends and point-in-time observations, to understand how Boulder's travel patterns may differ from those seen nationally.

In general, Boulder Valley residents made somewhat more trips per day compared to the U.S. population. The average trip distance of Boulder Valley residents was less than half of that observed among residents in the nation as a whole. Work commute distances were much shorter for Boulder residents compared to U.S. residents, but the duration of the work commute was only somewhat shorter. The number of personal vehicles per household decreased among Boulder residents from 1.83 in 1990 to 1.61 in 2018, while it increased slightly among U.S. residents.

		Boulder					U.S. NHTS/NPTS*				
Characteristic	2018	2009	2000	1996	1990	2017*	2009	2001	1995	1990	
Average number of trips	4.9	5.1	6.1	6.2	5.9	3.37	3.79	3.74	4.30	3.76	
Average trip distance, all trips	4.3	5.0	4.3	4.7	4.0	10.70	9.75	10.04	9.13	9.47	
Average work-related trip distance	4.7	6.1	5.7	5.3	5.2	11.46	11.79	12.11	11.63	10.65	
Average work-related trip duration	19.7	17.1	16.3	13.7	15.1	26.58	23.85	23.32	20.65	19.60	
Personal vehicles per household	1.61	1.66	1.79	1.63	1.83	1.88^	1.86	1.89	1.78	1.77	

Figure 51: Household and Travel Characteristics, Boulder Compared to the U.S.

*Daily trip rates and person miles of travel per person, general commute patterns by mode of transportation and major travel indicators. *2017 NHTS sample was address-based and among other changes included more urban and cell phone only households than prior years. This and other methods changes in the data series are outlined in the 2017 NHTS report.

^ 1.98 Personal vehicles per household in the West

Over the period of 1990 to 2018, the proportion of trips made by Boulder Valley residents in a private vehicle have decreased from 70.5% to 57.7%, an average annual decrease of 0.46%. In the U.S. as a whole, the decline was from 87.7% in 1990 to 82.6% in 2017, an average annual decrease of 0.19%.

			Во		U.S. NHTS/NPTS*				
Travel Mode	2018		2009		1990		2017*	2009	1990
SOV	36.7%	E7 70/	37.1%	60.99/	44.2%	70 59/	00.60/	02 /0/	07 70/
MOV	21.0%	57.7%	23.7%	00.0%	26.3%	10.5%	02.0 /0	03.4 /0	01.170
Public Transportation/ Transit	5.2	2%	5.4%		1.6%		2.5%	1.9%	1.8%
Walk	20.	2%	17.	9%	18.2%		10.5%	10.4%	7.2%
School Bus	0.0%	10.00/	0.1%	10.00/	0.6%	0.00/	4 40/	4.00/	2.20/
Bike	16.9%	10.9%	15.9%	10.0%	9.1%	9.9%	4.4%	4.2%	3.3%
Total	10	0%	10	0%	100%		100%	100%	100%

Figure 52: Modal Split of All Trips, Boulder Compared to the U.S.

*Percent of person trips by mode of transportation.

*2017 NHTS sample was address-based and among other changes included more urban and cell phone only households than prior years.

The proportion of miles traveled by private vehicle was similar in Boulder and the nation was similar about 88% in 1990 and about 76% in 2017/2018 (see Figure 53).

Miles traveled by public transit was higher among Boulder residents compared to national residents in 1990, and increased significantly in Boulder over the time period, while remaining relatively stable in the nation.

Figure 53: Modal Split of All Miles, Boulder Compared to the U.S.

			Во		U.S. NHTS/NPTS*				
Travel Mode	2018		2009		1990		2017*	2009	1990
SOV	41.7%	76 60/	46.1%	02.00/	50.0%	07 70/	76 / 0/	00 20/	00 / 0/
MOV	34.9%	70.0%	35.9%	02.0%	37.7%	07.770	70.47	00.3 /0	00.4 %
Public Transportation/Transit	10.	7%	6.9%		4.1%		2.6%	1.5%	2.1%
Walk	3.5%		2.5%		3.0%				
School Bus	0.0%	12.6%	0.5%	11.1%	0.2%	8.1%	21.0%	10.2%	9.5%
Bike	9.1%		8.1%		4.9%				
Total	10	0%	10	100%		100%		100%	100%

* Distribution of daily person miles of travel per person by mode of transportation.

*2017 NHTS sample was address-based and among other changes included more urban and cell phone only households than prior years.

A large decrease in the proportion of work commute trips made by personal vehicle was observed among Boulder Valley residents; from 76.5% in 1990 to 39.3% in 2018, representing an average annual decrease of 1.33%. However, in the U.S., from 1990 to 2017, the proportion of work commute trips made by personal vehicle remained steady.

			Во	ulder		U.	S. NHTS/NPT	S*	
Travel Mode	20	18	20	09	1990		2017*	2009	1990
SOV	34.3%	20.20/	47.4%	FE 00/	66.6%	76 50/	97 50/	00 40/	07.00/
MOV	5.0%	39.3%	8.5%	55.9%	9.9%	70.5%	07.570	09.4 /0	07.0%
Public Transportation/Transit		12.7%	9.7%		4.0%		6.9%	5.1%	5.3%
Walk		15.0%		11.1%	8.9%		2.9%	2.8%	4.0%
Bike/Other		33.1%	23.3%		10.6%		2.7%	2.7%	2.9%
Total		100%		100%		100%	100%	100%	100%

Figure 54: Modal Split of Work Commute Trips, Boulder Compared to the U.S.

* This is not mode used on travel day it is the distribution of workers by usual commute mode (percent of workers).

*2017 NHTS sample was address-based and among other changes included more urban and cell phone only households than prior years.

Likewise, in examining the number of miles traveled for the work commute, an average annual decrease of 1.18% was observed among Boulder Valley residents from 1990 to 2009, while the proportion of miles traveled for the work commute by personal vehicle remained relatively steady from in the same time frame among the U.S. as a whole.

Figure 55: Modal Split of Work Commute Miles, Boulder Compared to the U.S.

			Во	ulder	NHTS/NPTS				
Travel Mode	20	18	2009		1990		2017*	2009	1990
SOV	45.0%	40 70/	59.7%	60.00/	71.9%	00.00/	01.00/	04.09/	04 50/
MOV	4.7%	49.7%	9.1%	00.0%	10.9%	02.0%	91.270	94.9%	94.5%
Public Transportation/ Transit		33.1%		19.5%		11.2%	5.8%	4.2%	2.6%
Walk	2.1%	16.00/	1.1%	11 70/	1.3%	6.0%	2.00/	0.00/	2.00/
Bike	13.9%	10.0%	10.6%	11.770	4.7%	0.0%	3.0%	0.9%	2.9%
Total		100%		100%		100%	100%	100%	100%

^{*}Distribution of daily person miles of travel per person by mode of transportation and trip purpose (calculated from miles traveled to work) *2017 NHTS sample was address-based and among other changes included more urban and cell phone only households than prior years.

Appendix B. Modal Split by Trip and Respondent Characteristics, 2018

This section contains breakdowns of modal split of all trips, and modal split of work commute trips by respondent characteristics. It also displays the percent of respondents making at least one trip by each mode on the assigned travel day by respondent characteristics. Figure 56 below displays the proportions of survey participants in each of the categories displayed on the following pages. Where differences between subgroups are statistically significant, the cells are shaded.

Survey Respondent Characte	ristic	Percent of Respondents
Sex of Respondent	Male	49%
·	Female	51%
Age of Respondent	16-34	53%
	35-54	27%
	55+	20%
CU Student Status	CU student	81%
	Not a student	19%
Tenure	Owner-Occupied	46%
	Renter-Occupied	54%
Type of Housing Unit Attached housing unit		54%
	Single family, detached	46%
Children in Household	No children	72%
	Have children	28%
Vehicles to Driver Ratio	Less than 1 vehicle per driver	30%
	1 or more vehicles per driver	70%
Bikes in household	Yes, at least one bike	87%
	No bikes	13%
Eco-Pass Status	No, don't have	40%
	Yes, have Eco-Pass	60%
Type of Day	Weekend	25%
	weekday	75%

Figure 56: Respondent Characteristics

	Sex of Respondent		Age	of Respon	dent	CU Student?	
Modal Split of All Trips	male	female	16-34	35-54	55+	NOT a student	CU student
Single-Occupancy Vehicle	30.9%	41.2%	30.7%	34.2%	52.5%	38.0%	28.2%
Multiple-Occupancy Vehicle with Adults Only	9.7%	15.0%	11.2%	9.7%	19.3%	12.7%	11.4%
Multiple-Occupancy Vehicle with Children	8.0%	10.1%	6.8%	18.3%	3.3%	9.9%	5.6%
Bus (Transit), including School Bus	6.5%	3.5%	7.0%	3.2%	2.4%	4.1%	8.9%
Bicycle	22.6%	11.6%	20.1%	18.4%	6.7%	17.3%	15.2%
Foot	22.3%	18.6%	24.3%	16.3%	15.9%	18.1%	30.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	N=1,813	N=1,921	N=1,982	N=989	N=770	N=3,044	N=699

Figure 57: Modal Split of All Trips by Respondent Characteristics, part 1

Figure 58: Modal Split of All Trips by Respondent Characteristics, part 2

	Have C	hildren?	Tenure	Status	Type of Ho	using Unit
Modal Split of All Trips	No children	Have children	Owner- Occupied	Renter- Occupied	Attached (Multi-Family Housing)	Detached (Single- Family)
Single-Occupancy Vehicle	42.3%	28.3%	42.8%	30.2%	31.9%	41.2%
Multiple-Occupancy Vehicle with Adults Only	15.8%	3.6%	13.2%	11.6%	11.1%	13.8%
Multiple-Occupancy Vehicle with Children	2.5%	33.1%	14.2%	4.6%	5.1%	13.8%
Bus (Transit), including School Bus	4.8%	3.7%	2.7%	7.1%	6.3%	3.5%
Bicycle	14.8%	15.2%	14.5%	19.1%	20.3%	12.9%
Foot	19.8%	16.1%	12.6%	27.4%	25.2%	14.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
IUldi	N=1,995	N=748	N=1,753	N=1,974	N=2,019	N=1,717

	Ratio of Auto	os to Drivers	HH own any bikes?		
Modal Split of All Trips	Less than 1 vehicle per driver	1 or more vehicles per driver	Yes	No	
Single-Occupancy Vehicle	22.8%	41.9%	35.7%	38.8%	
Multiple-Occupancy Vehicle with Adults Only	14.3%	11.6%	12.2%	13.8%	
Multiple-Occupancy Vehicle with Children	10.0%	8.8%	9.7%	5.4%	
Bus (Transit), including School Bus	8.7%	3.4%	4.1%	11.3%	
Bicycle	19.9%	15.4%	19.3%	1.4%	
Foot	24.2%	19.0%	19.1%	29.4%	
Tatal	100.0%	100.0%	100.0%	100.0%	
	N=1,121	N=2,597	N=3,242	N=481	

Figure 59: Modal Split of All Trips by Respondent Characteristics, part 3

Figure 60: Modal Split of All Trips by Respondent Characteristics, part 4

	Have an E	Eco-Pass?	Day of the Week			
Modal Split of All Trips	No, don't have	Yes, have Eco-Pass	weekend	weekday		
Single-Occupancy Vehicle	42.5%	31.5%	31.4%	38.9%		
Multiple-Occupancy Vehicle with Adults Only	14.6%	11.1%	19.0%	9.9%		
Multiple-Occupancy Vehicle with Children	11.0%	7.6%	16.9%	5.3%		
Bus (Transit), including School Bus	1.8%	7.4%	1.0%	6.5%		
Bicycle	14.1%	18.7%	15.5%	17.4%		
Foot	16.0%	23.7%	16.2%	22.0%		
Total	100.0%	100.0%	100.0%	100.0%		
	N=1,543	N=2,237	N=1,038	N=2,812		

	Sex of Respondent		Age	of Respon	dent	CU Student?		
Modal Split of Work Commute Trips	male	female	16-34	35-54	55+	NOT a student	CU student	
Single-Occupancy Vehicle	18.2%	54.1%	24.3%	42.9%	61.4%	36.6%	10.9%	
Multiple-Occupancy Vehicle with Adults Only	2.8%	1.9%	2.4%	2.9%	0.7%	2.2%	3.8%	
Multiple-Occupancy Vehicle with Children	2.6%	1.8%	0.0%	7.4%	2.3%	2.6%	0.0%	
Bus (Transit), including School Bus	17.2%	5.8%	13.8%	11.0%	9.0%	11.5%	19.1%	
Bicycle	44.5%	20.6%	40.9%	26.7%	14.9%	35.3%	28.7%	
Foot	14.7%	15.9%	18.5%	9.2%	11.8%	11.7%	37.5%	
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
	N=406	N=292	N=436	N=198	N=63	N=603	N=95	

Figure 61: Modal Split of Work Commute Trips by Respondent Characteristics, part 1

Figure 62: Modal Split of Work Commute Trips by Respondent Characteristics, part 2

	Have C	hildren?	Tenure	Status	Type of Housing Unit		
Modal Split of Work Commute Trips	No children	Have children	Owner- Occupied	Renter- Occupied	Attached (Multi-Family Housing)	Detached (Single- Family)	
Single-Occupancy Vehicle	41.9%	35.6%	45.8%	25.4%	26.1%	47.5%	
Multiple-Occupancy Vehicle with Adults Only	3.1%	2.0%	0.2%	3.7%	3.5%	0.2%	
Multiple-Occupancy Vehicle with Children	0.5%	11.5%	5.6%	0.4%	0.1%	6.8%	
Bus (Transit), including School Bus	10.1%	12.0%	10.5%	13.8%	13.3%	11.0%	
Bicycle	29.6%	27.0%	28.8%	37.9%	38.6%	25.9%	
Foot	14.8%	11.9%	9.1%	18.8%	18.4%	8.6%	
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
IUldi	N=276	N=127	N=257	N=440	N=469	N=230	

	Ratio of Aut	os to Drivers	HH own any bikes?		
Modal Split of Work Commute Trips	Less than 1 vehicle per driver	1 or more vehicles per driver	Yes	No	
Single-Occupancy Vehicle	19.9%	38.3%	32.9%	36.2%	
Multiple-Occupancy Vehicle with Adults Only	5.2%	1.3%	2.0%	5.8%	
Multiple-Occupancy Vehicle with Children	0.0%	3.2%	2.4%	1.3%	
Bus (Transit), including School Bus	18.8%	10.2%	11.9%	18.1%	
Bicycle	32.5%	35.0%	37.9%	3.3%	
Foot	23.6%	12.0%	12.8%	35.4%	
Tatal	100.0%	100.0%	100.0%	100.0%	
	N=200	N=492	N=628	N=69	

Figure 63: Modal Split of Work Commute Trips by Respondent Characteristics, part 3

Figure 64: Modal Split of Work Commute Trips by Respondent Characteristics, part 4

	Have an Eco-Pass?		Day of t	he Week
Modal Split of Work Commute Trips	No, don't have	Yes, have Eco-Pass	weekend	weekday
Single-Occupancy Vehicle	42.4%	28.8%	16.3%	35.1%
Multiple-Occupancy Vehicle with Adults Only	3.5%	1.9%	0.0%	2.5%
Multiple-Occupancy Vehicle with Children	1.3%	2.6%	0.0%	2.0%
Bus (Transit), including School Bus	8.3%	14.7%	0.0%	13.8%
Bicycle	36.2%	33.4%	77.7%	30.5%
Foot	8.3%	18.4%	5.9%	16.2%
Tatal	100.0%	100.0%	100.0%	100.0%
10(8)	N=203	N=504	N=38	N=663

	Sex of Re	Sex of Respondent Age of Respondent		CU Student?			
Travel Mode	male	female	16-34	35-54	55+	NOT a student	CU student
Single-Occupancy Vehicle	48.9%	57.4%	48.6%	55.7%	58.8%	54.3%	46.3%
Multiple-Occupancy Vehicle with Adults Only	22.1%	35.1%	26.0%	30.5%	32.6%	29.5%	24.9%
Multiple-Occupancy Vehicle with Children	14.2%	16.0%	11.6%	31.5%	4.8%	16.1%	10.0%
Bus (Transit), including School Bus	15.7%	9.8%	18.9%	8.7%	5.0%	10.7%	24.2%
Bicycle	35.3%	20.4%	35.2%	29.8%	10.1%	27.4%	29.8%
Foot	38.0%	37.7%	46.7%	32.0%	26.1%	33.5%	60.0%
Number	N=387	N=384	N=392	N=197	N=185	N=643	N=131

Figure 65: Percent of Respondents Making at Least One Trip Using Each Mode by Respondent Characteristics, part 1

Note: Numbers in each cell represent the proportion of respondents who made at least ONE trip by that mode

	Have CI	nildren?	Tenure	Status	Type of Housing Unit		
Travel Mode	No children	Have children	Population in Owner- Occupied Home	Population in Renter- Occupied Home	Attached (Multi-Family Housing)	Detached (Single- Family)	
Single-Occupancy Vehicle	54.8%	52.6%	59.2%	47.8%	49.9%	57.2%	
Multiple-Occupancy Vehicle with Adults Only	29.8%	30.2%	32.2%	25.0%	23.4%	35.0%	
Multiple-Occupancy Vehicle with Children	3.9%	61.6%	21.8%	8.9%	9.1%	22.4%	
Bus (Transit), including School Bus	11.6%	10.3%	7.1%	19.0%	16.6%	8.9%	
Bicycle	22.7%	24.9%	22.0%	34.1%	33.2%	21.9%	
Foot	35.2%	32.5%	24.8%	51.1%	45.4%	29.5%	
Number	N=423	N=143	N=375	N=390	N=418	N=350	

Note: Numbers in each cell represent the proportion of respondents who made at least ONE trip by that mode

	Ratio of Auto	os to Drivers	HH own a	ny bikes?
Travel Mode	Less than 1 vehicle per driver	1 or more vehicles per driver	Yes	No
Single-Occupancy Vehicle	34.3%	62.5%	53.1%	55.0%
Multiple-Occupancy Vehicle with Adults Only	31.8%	27.4%	29.4%	25.9%
Multiple-Occupancy Vehicle with Children	16.2%	14.9%	16.4%	8.9%
Bus (Transit), including School Bus	21.6%	9.2%	11.2%	24.7%
Bicycle	31.0%	26.3%	32.4%	3.4%
Foot	41.4%	37.2%	38.6%	36.4%
Number	N=245	N=518	N=654	N=109

Figure 67: Percent of Respondents Making at Least One Trip Using Each Mode by Respondent Characteristics, part 3

Note: Numbers in each cell represent the proportion of respondents who made at least ONE trip by that mode

Figure 68: Percent of Respondents Making at Least One Trip Using Each Mode by Respondent Characteristics, part 4

	Have an E	Eco-Pass?	Day of the Week	
Travel Mode	No, don't have	Yes, have Eco-Pass	weekend	weekday
Single-Occupancy Vehicle	54.1%	51.5%	42.3%	59.2%
Multiple-Occupancy Vehicle with Adults Only	29.3%	28.4%	34.2%	27.0%
Multiple-Occupancy Vehicle with Children	15.0%	14.8%	19.8%	11.5%
Bus (Transit), including School Bus	4.6%	20.2%	2.1%	18.2%
Bicycle	23.0%	31.5%	21.2%	29.8%
Foot	27.5%	46.6%	27.2%	41.5%
Number	N=354	N=430	N=239	N=553

Note: Numbers in each cell represent the proportion of respondents who made at least ONE trip by that mode

Appendix C. Transportation Market Segmentation

In order to better understand the types of "markets" in respect to Boulder residents' transportation mode choices, the 2018 travel diary dataset was analyzed using an analysis technique referred to as cluster analysis or market segmentation. This analysis sorted respondents into the "clusters," that is, groups in which respondents' responses were most similar to other respondents within the same group and different from respondents' responses in other groups. A brief description of the analysis procedure can be found in *Appendix E. Study Methodology*. For this analysis, the variables used were the percent of trips made on the Travel Diary day by each of five modes: drive alone (single-occupancy vehicle), carpool (multiple-occupancy vehicle), bus (transit and school bus), bicycle and walk. Five groups emerged, with the preponderance of trips being made by each of the five modes in each of the five groups. A sixth group was formed of those study participants who had not left the house on their assigned travel day. These six groups were:



Figure 69: Percent of Respondents in Each Transportation Segment

Key Characteristics of the Transportation Segments

The key characteristics of the six transportation segments are shown in the table on the following page. Detailed tables showing selected survey results by transportation segment are presented on the pages following.

Segment	Percent of Population	Average Percent of Trips Made Via Each Mode	Other Characteristics
mostly drive alone	25%	SOV, 90% MOV, 7% Bus, 0% Bike, 1% Foot, 2%	 Highest proportion of households with one or more vehicles per driver (83%). Among the highest proportion of female members (66%). Along with those who didn't leave the house they were the least likely to have an Eco-Pass (40% had an Eco-Pass) Lowest proportion of employed people who worked in Boulder (65%). Highest proportion living in a detached home (58%)
mostly carpool	17%	SOV, 7% MOV, 83% Bus, 1% Bike, 2% Foot, 7%	 Highest proportion of households that included children (50%) Close to highest living in a detached home (56%)
mostly bike	19%	SOV, 9% MOV, 5% Bus, 3% Bike, 74% Foot, 9%	 Highest proportion of households that owned a bicycle (99%). The most likely to have ridden a bicycle in the last week for commuting (87%), for shopping/errands (82%), or for fun or exercise (75%). Highest proportion of male members (63%). Highest proportion of employed people who worked in Boulder (85%). Lowest proportion of members aged 55+ (8%).
mostly walk	14%	SOV, 4% MOV, 6% Bus, 16% Bike, 3% Foot, 71%	 Highest proportion of members with an Eco-Pass (71%). Among the most likely to have less than one vehicle per drive (46%). Among the youngest; 66% were age 18-34. Highest proportion of CU students (30%). Highest proportion with annual household incomes less than \$50,000 (33%).
mixed mode	17%	SOV, 42% MOV, 18% Bus, 6% Bike, 9% Foot, 26%	 A high proportion of members with an Eco-Pass (68%). Among the highest proportion of CU students (21%). Among the youngest; 57% were age 18-34.
did not leave house	8%	No trips made	 Least likely to be employed (48% were not employed). Least likely to have an Eco-pass (38%), but most likely to use their Eco-Pass, if they had one; 62% one or more times a week Of those employed, 27% said they telecommuted every day for work Among the most likely to have less than one vehicle per drive (50%). Highest proportion of members aged 55+ (45%). Among the highest proportion of people with annual household incomes less than \$50,000 (30%). Least likely to have a bike in their household (66% had one).

Figure 70: Key Characteristics of the Transportation Segments

Percent of Trips Made by:	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
SOV	90%	7%	42%	9%	4%	0%	33%
MOV	7%	83%	18%	5%	6%	0%	21%
Bus	0%	1%	6%	3%	16%	0%	4%
Bike	1%	2%	9%	74%	3%	0%	17%
Foot	2%	7%	26%	9%	71%	0%	18%

Figure 71: Percent of Trips Made on Assigned Travel Day by Transportation Segment

Figure 72: Frequency of Bike Use for Shopping, Meals and Errands by Transportation Segment

How frequently in last week ridden a bicycle to shop, get a meal or run errands?	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
5 or more times	2%	5%	2%	21%	13%	1%	8%
3 to 4 times	3%	3%	10%	23%	2%	16%	9%
Once or twice	22%	21%	19%	35%	19%	8%	22%
Not at all	73%	71%	69%	18%	64%	75%	60%
Total	100%	100%	100%	100%	100%	100%	100%

Figure 73: Frequency of Bike Use for Commuting by Transportation Segment

How frequently in last week ridden a bicycle for commuting?	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
5 or more times	1%	8%	10%	55%	18%	1%	17%
3 to 4 times	2%	11%	14%	18%	9%	15%	11%
Once or twice	14%	12%	12%	12%	13%	1%	12%
Not at all	82%	69%	65%	13%	59%	83%	60%
Total	100%	100%	100%	100%	100%	100%	100%

Figure 74: Frequency of Bike Use for Fun or Exercise by Transportation Segment

How frequently in last week ridden a bicycle for fun or exercise?	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
5 or more times	2%	0%	1%	17%	8%	1%	5%
3 to 4 times	5%	10%	13%	13%	2%	16%	9%
Once or twice	24%	23%	26%	43%	24%	4%	26%
Not at all	69%	67%	60%	25%	66%	79%	59%
Total	100%	100%	100%	100%	100%	100%	100%

Are you employed?	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
No	30%	29%	17%	14%	22%	48%	25%
Yes, part-time	27%	16%	23%	15%	35%	19%	22%
Yes, full-time	43%	54%	60%	71%	44%	33%	53%
Total	100%	100%	100%	100%	100%	100%	100%

Figure 75: Employment Status by Transportation Segment

Figure 76: City of Employment by Transportation Segment

City where respondent works	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
Boulder	65%	66%	74%	85%	82%	44%	73%
Other	35%	34%	26%	15%	18%	56%	27%
Total	100%	100%	100%	100%	100%	100%	100%

Figure 77: Frequency of Telecommuting by Transportation Segment

How often, if ever, do you telecommute for work? (Among those who are employed.)	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
Every work day (I always work from my home)	14%	17%	7%	9%	13%	27%	12%
3 to 4 times per week	2%	5%	6%	3%	5%	8%	4%
2 to 3 times per week	6%	1%	13%	9%	2%	0%	6%
Once or twice a month	10%	16%	17%	22%	9%	23%	16%
Occasionally	23%	23%	15%	22%	24%	2%	20%
Never	45%	38%	42%	37%	47%	41%	41%
Total	100%	100%	100%	100%	100%	100%	100%

Figure 78: Telecommuting Status on Assigned Travel Day by Transportation Segment

Telecommuted on the day of the survey? (Among those who are employed and at least occasionally telework.)	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
No	72%	84%	93%	85%	63%	36%	78%
Yes	28%	16%	7%	15%	37%	64%	22%
Total	100%	100%	100%	100%	100%	100%	100%

Receive any goods or services by delivery?	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
No	95%	92%	86%	85%	85%	86%	89%
Yes	5%	8%	14%	15%	15%	14%	11%
Total	100%	100%	100%	100%	100%	100%	100%

Figure 79: Receipt of Goods or Services via Delivery by Transportation Segment

Figure 80: Substitution of Travel by Deliveries by Transportation Segment

Did deliveries substitute for travel?	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
No	62%	78%	63%	88%	98%	63%	78%
Yes	38%	22%	37%	12%	2%	37%	22%
Total	100%	100%	100%	100%	100%	100%	100%

Figure 81: Eco-Pass Status by Transportation Segment

Eco-Pass status	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
No, don't have an Eco-Pass	60%	48%	32%	40%	29%	62%	45%
Yes, have an Eco-Pass	40%	52%	68%	60%	71%	38%	55%
Total	100%	100%	100%	100%	100%	100%	100%

Figure 82: Frequency of Use of Eco-Pass by Transportation Segment

Number of times use Eco-pass	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
more than once a week	23%	35%	19%	19%	60%	58%	33%
about once a week	3%	18%	12%	15%	16%	0%	12%
about once every two weeks	13%	15%	17%	18%	14%	30%	16%
about once a month	28%	12%	32%	24%	5%	2%	19%
less than once a month	32%	20%	20%	24%	6%	10%	19%
Total	23%	35%	19%	19%	60%	58%	33%

Ratio of Autos to Drivers	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
Less than 1 vehicle per driver	17%	38%	22%	38%	46%	50%	32%
1 or more vehicles per driver	83%	62%	78%	62%	54%	50%	68%
Total	100%	100%	100%	100%	100%	100%	100%

Figure 83: Ratio of Autos to Drivers by Transportation Segment

Figure 84: Household Bicycle Ownership by Transportation Segment

Household own any bicycles?	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
Yes	82%	86%	92%	99%	75%	66%	86%
No	18%	14%	8%	1%	25%	34%	14%
Total	100%	100%	100%	100%	100%	100%	100%

Figure 85: Sex of Respondent by Transportation Segment

Sex of Respondent	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
Male	34%	50%	53%	63%	56%	53%	50%
Female	66%	50%	47%	37%	44%	47%	50%
Total	100%	100%	100%	100%	100%	100%	100%

Figure 86: Age of Respondent by Transportation Segment

Age of Respondent	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
18-34	35%	46%	57%	61%	66%	42%	51%
35-54	25%	32%	27%	31%	18%	12%	26%
55+	40%	22%	16%	8%	16%	45%	23%
Total	100%	100%	100%	100%	100%	100%	100%

Figure 87: CU Student Status by Transportation Segment

CU Student Status	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
NOT a student	92%	85%	79%	86%	70%	78%	83%
CU student	8%	15%	21%	14%	30%	22%	17%
Total	100%	100%	100%	100%	100%	100%	100%

Tenure	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
Rent	35%	42%	58%	57%	78%	49%	52%
Own	65%	58%	42%	43%	22%	51%	48%
Total	100%	100%	100%	100%	100%	100%	100%

Figure 88: Housing Tenure by Transportation Segment

Figure 89: Type of Housing Unit by Transportation Segment

Type of Housing Unit	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
Attached (Multi-Family)	42%	42%	56%	63%	76%	54%	54%
Detached (Single-Family)	58%	56%	43%	37%	24%	43%	45%
Total	100%	100%	100%	100%	100%	100%	100%

Figure 90: Annual Household Income by Transportation Segment

	mostly	mostly	mixed	mostly	mostly	did not leave	
Annual Household Income	drive alone	carpool	mode	bike	walk	house	OVERALL
Less than \$10,000	5%	0%	5%	8%	10%	9%	6%
\$10,000 to \$19,999	5%	10%	1%	2%	0%	3%	4%
\$20,000 to \$29,999	11%	1%	4%	1%	8%	4%	5%
\$30,000 to \$39,999	3%	6%	8%	9%	6%	6%	6%
\$40,000 to \$49,999	3%	4%	4%	3%	9%	8%	5%
\$50,000 to \$74,999	16%	10%	21%	12%	18%	27%	16%
\$75,000 to \$99,999	12%	13%	8%	14%	18%	10%	13%
\$100,00 to \$149,999	21%	25%	20%	15%	18%	17%	20%
\$150,000 or more	21%	31%	26%	37%	12%	15%	25%
Total	100%	100%	100%	100%	100%	100%	100%

Figure 91: Presence of Children in Household by Transportation Segment

Presence of Children in Household?	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
No children	88%	50%	63%	73%	87%	91%	74%
Have children	12%	50%	37%	27%	13%	9%	26%
Total	100%	100%	100%	100%	100%	100%	100%

Figure 92: Day of Assigned Travel by Transportation Segment

Day of the Week	mostly drive alone	mostly carpool	mixed mode	mostly bike	mostly walk	did not leave house	OVERALL
Weekend	24%	54%	23%	19%	10%	57%	28%
Weekday	76%	46%	77%	81%	90%	43%	72%
Total	100%	100%	100%	100%	100%	100%	100%

Appendix D. References

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Appendix E. Study Methodology

The 2018 travel diary study used similar materials to that used in the previous implementations of the study (1990, 1992, 1994, 1996, 1998, 2000, 2003, 2006, 2009, 2012 and 2015). However, in 2015 and 2018, a new data collection methodology was employed: a travel diary app that could be downloaded by survey recipients and used to record trips made during the day.

Study Design

The Travel Diary Study is designed to capture all trips made during a 24-hour period by a random selection of adults within households in the Boulder Valley. Each selected household is assigned a specific day on which to complete the travel diary. The study is always scheduled to take place during the third week of September, as that week has historically had mild weather allowing people to use all modes of transportation.

The traditional data collection methodology for the Travel Diary Study is to send a study packet with the materials needed to complete in the study accompanied by instructions on how to participate to 7,000 randomly selected households within the Boulder Valley. For households in which more than one adult resides, an adult is randomly selected for the study by requesting that the adult who most recently had a birthday (regardless of year of birth) complete the study.

In 2015, the City of Boulder invested in a developing a new app to simplify tracking for participants and improve accuracy of route data. They contracted with DVMobile to create a travel diary app for both Android smartphones and Apple iPhones. The study design in 2015 was modified to be able to test the use of this app for the study. The design in 2018 retained use of the app, but simplified the options offered to respondents.

In 2018, two samples of households were randomly chosen:

- 1) The traditional Travel Diary: 7,000 households were assigned travel days in the third week of September. A packet with a cover letter explaining the purpose of the study, the diary and household survey and instructions for the study were mailed to the household several days before their assigned travel day. A postcard notification was mailed a week before the packet.
- 2) App Travel Diary: 3,500 households were mailed a letter explaining the purpose of the study and inviting them to visit a website (uniquely developed for this survey effort) to download the Travel Diary app in order to participate in the study. They were told if they did not want to use the app, or did not have the kind of phone on which an app could be used, they could instead download and print copies of the traditional Travel Diary materials from the same website.

Copies of the various travel diary study materials can be found in Appendix F. Data Collection Materials.

Selecting Survey Recipients

A total of 10,500 households within the Boulder Valley were invited to participate in the travel study, as described above. This number was selected based on the number of people desired to eventually participate, factoring for the probable non-response and drop-out rates of households. The goal was to obtain about 1,000 completed travel diaries.

All households located in the Boulder Valley boundaries, defined as zip codes 80301, 80302, 80303, 80304 and 80305 were eligible for the survey. Because local governments generally do not have inclusive lists of all the residences in the jurisdiction (tax assessor and utility billing databases often omit rental units), lists from the United States Postal Service (USPS) Delivery Sequence File (DSF), updated every three months, usually provide the best representation of all households in a specific geographic location. NRC used the DSF data to select the sample of households. Selected addresses were processed for certification and verification using CASS™/NCOA software that relies on the USPS National Directory information to verify and standardize the address elements and assign each a complete, nine-digit zip code where possible.

Response Rates

Figure 93 displays the response rates for the 2018 study. If the undeliverable addresses are eliminated from the sample, about 10,014 households were contacted to participate in the study. Of these, 869 returned a usable travel diary and/or household survey, representing 9% of everyone contacted.

However, response rates varied greatly by the type of invitation received. Among those who were mailed the traditional hard copy travel diary, a 12% response was obtained, slightly lower than observed in past years (see Figure 94).

Among those who were mailed only a letter with instructions on how to go online and download the travel diary app, the response rate was 1.4% (2 of 47 downloaded a paper version and 45 used the app).

Figure 93: Response Rate for the 2015 Travel Diary Study

		Returned with		Retu Tr			
Type of Mailings	Number of Recipients	Undeliverable Address	Eligible to Participate	Hard Copy	Арр	Total	Response Rate
"Traditional" Hard Copy Travel Diary	7,000	358	6,642	822	0	822	12.4%
Invitation to Travel Diary App	3,500	128	3,372	2	45	47	1.4%
Total	10,500	486	10,014	824	45	869	8.7%

Figure 94: Comparison of Response Rates Across Study Years

Response Rates	2018	2015*	2012	2009	2006	2003	2000	1998	1996	1994	1992	1990*
Percent agreeing to participate (returning the postcard)	N/A**	N/A**	N/A**	N/A**	N/A**	N/A**	30%	27%	29%	30%	32%	36%
Percent of those who agreed to participate who completed a travel diary	N/A**	N/A**	N/A**	N/A**	N/A**	N/A**	64%	72%	67%	64%	64%	70%
Percent of entire sample who completed a travel diary (overall and traditional sample)	9%	11%										
	12%	16%	15%	15%	18%	18%	19%	6 19%	18%	20%	20%	25%

*Note: 1990 response rates are for households only, and do not include the response rates of students in group quarters (dormitories and Greek houses). Response rates among these groups are much lower than among those in households, and thus 1990 response rates are probably inflated compared to the other years. In 2015, the response rate for the entire sample was 11%, but for the recipients who were surveyed in the same was as recipients were from 2003 to 2012, the response rate was 16%.

**Not applicable starting in 2003.

Analysis of Results

Cleaning and Coding of Data

Once received, the diaries were prepared for the analysis. Every diary was examined to ensure that it was filled out correctly with accurate trip descriptions. A very common mistake in all study years was to count round trips as one trip rather than two. For ease in keypunch the diary data were transferred to coding sheets, disregarding origin and destination data which would not be used for this report. Three other variables were coded at this time: 1) the type of trip made (HW, HO or NH), 2) if the trip was a "link" in the work commute, and 3) if the trip had both origin and destination outside the Valley boundaries (see *Appendix F. Data Collection Materials*). In 1996, a few changes were made to the survey instruments. It was felt that respondents were not using the "truck" category correctly in previous study years, and quite often trips recorded as having been made in a truck were changed to automobile, because staff believed respondents were using the truck category to record trips made in their sports utility vehicle or pick-up truck. Thus, to reduce the number of this type of error, the categories for "travel method" on the recording form were changed as follows:

1990-1994	1996-2009
1 car (driver)	1 car or light truck (driver)
2 car (passenger)	2 car or light truck (passenger)
3 bus (transit)	3 bus (transit)
4 school bus	4 school bus
5 motorcycle	6 motorcycle
6 taxi (passenger)	7 taxi (passenger)
7 truck (driver)	5 large truck
8 truck (passenger)	
9 bicycle	8 bicycle
10 walk only	9 walk only
11 other	10 other

As in years' past, the instructions explained that the truck category was to be used for large commercial trucks, although more even more explanation was added in 1996 (see *Appendix F. Data Collection Materials* for a copy of all the travel diary materials).

Estimating Trip Length

An important element in travel studies such as this one is the length of the trips. Early in the study's history, elaborate and expensive geocoding schemes were most often used by coding origins and destinations by Census tract or transportation zone and inputting these codes into a complex database which calculates mileage. In the 1990 Diary Study, after researching previous studies and discerning the difficulties and large expense associated with database systems, the research staff devised a geocoding scheme which was more attractive in price as well as accuracy.⁸ On the diary document the participants were asked

⁸ When coding origins and destinations into Census tracts or transportation zones, there is an ambiguous amount of error associated with the amount of area a zone encompasses. For example, if one Census tract is 5 square miles, and a bordering tract is 3 square miles, a trip from

to estimate how many miles each trip had taken them. At baseline (1990), uncertain of how accurate people are at estimating miles traveled, the research staff geocoded a random subset of 400 trips, 300 in motorized vehicles and 50 on bike and foot each. The geocoding was performed with rulers and Boulder Valley maps, where the staff member literally measured the journey by hand. A rule of thumb derived from transportation planning was used to save the effort of deciphering which path the participant made to a various destination: multiplying the distance calculated between locations as the crow flies by 1.5. This formula was believed to work fairly accurately 90% of the time.⁹

The geocoded miles were then correlated with the miles estimated by the participants. The estimates were found to be extremely accurate;¹⁰ on average the people overestimated the trips by only .12 miles or 17% of the trip distance. To correct for this overestimation, data extracted from the regression equation was used to reduce the estimates.¹¹ The adjusted estimates were used for all analyses using trip length. The same statistical adjustments were made in subsequent years.

Prior to 2000, when trip distance was missing, it was estimated, when possible, by study staff using the same hand geocoding methodology described above. Beginning in 2000, however, the internet-based program "MapQuest" (<u>www.mapquest.com/directions</u>) was used to estimate trip distances, replaced by Google Maps (maps.google.com) in 2009.

one zone to the other may range from less than 1 mile to 8 miles. A database would produce the same estimate of miles for both circumstances

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¹⁰ Simple Correlation of 0.9, p < .001.

¹¹ Equation used to adjust motorized vehicles: adjusted miles = (.88 x estimated miles) + .20

Equation used to adjust non-motorized vehicles: adjusted miles = (.86 x estimated miles) + .10

Data Entry, Weighting and Analysis

The data from the travel diary coding sheets and household travel surveys were data entered into electronic datasets using a key and verify methodology. This means that the data were entered twice and the two datasets compared. Where there were discrepancies, the results were compared to the hard copy survey and keyed correctly. These plain-text datasets were then imported into SPSS®, a statistical software package, for analysis.

Using the assigned unique identifier, the household travel survey responses were matched with the travel diary information. Two types of datasets were created: a trip-level dataset, where every record in the dataset represented a single trip, and a person-level dataset, where every record in the dataset represented a single person.

Due to the differences in travel behavior by various socioedemographic groups, the participants' responses were statistically weighted. Using the data from the Census, the results were adjusted to give more weight to the travel of those who were under represented in the sample. Figure 95 below displays the sociodemographic profile of the 2018 study participants using unweighted and weighted data compared to the Census data for comparison.

Characteristic	Population Profile*	Unweighted Data	Weighted Data
Day of Week			
Sunday	14%	13%	14%
Monday	14%	13%	14%
Tuesday	14%	14%	14%
Wednesday	14%	18%	14%
Thursday	14%	15%	14%
Friday	14%	15%	14%
Saturday	14%	13%	14%
Gender by Age	•		
Female 16-34	22%	10%	24%
Female 35-54	14%	17%	13%
Female 55+	12%	36%	13%
Male 16-34	27%	7%	27%
Male 35-54	14%	9%	13%
Male 55+	11%	22%	10%
Housing Type		· · · · · · · · · · · · · · · · · · ·	
Attached	54%	45%	55%
Detached	46%	55%	45%
Housing Tenure		· · · · · · · · · · · · · · · · · · ·	
Owner	48%	73%	48%
Renter	52%	27%	52%

Figure 95: Comparison of 2018 Weighted and Unweighted Data to Census Population Estimates

* 2010 Census and ACS 5-year estimates

For the most part, simple descriptive statistics (e.g., averages and frequencies) are reported in the body of the report. Crosstabulations and crossbreak analyses (e.g, chi-square and anova) are shown in *Appendix B. Modal Split by Trip and Respondent Characteristics*. In that appendix, differences between subgroups were considered "statistically significant" if the p-value from the statistical test was less than 0.05; that is, that there was a less than 5% probability that differences observed were due to chance alone.

A market segmentation analysis was performed on the data. The results of this analysis are shown in *Appendix C. Transportation Market Segmentation*. The statistical technique most commonly used to derive segments from survey data is cluster analysis. The analysis itself sorts cases (respondents) into the "clusters," that is, groups in which cases are most similar to other cases within the same group and different from cases in other groups.

The SPSS procedure "K-Means Cluster Analysis" was used to perform this analysis. The algorithm employed by this procedure allows larger datasets to be analyzed into "clusters." Clusters are formed by comparing responses to a set of selected variables. The procedure seeks patterns of response that are shared by a number of individuals and that are distinct from other groups of individuals. These groups are the clusters. This procedure uses continuous (numeric) variables. For this analysis, the variables used were the percent of trips made by the respondent on the assigned travel day by each mode: percent of trips made by driving alone, percent of trips made by carpooling, percent of trips made by transit, percent of trips made by bicycling, and percent of trips made by walking.

Comparison of Hard Copy and App Travel Diary Respondents

While response rates were lower for those invited to use the travel diary app for the study, it is also of interest to see if there were differences in the demographic and travel characteristics of those completing the hard copy or app version of the travel diary.

The tables below examine the demographic characteristics of the population in households completing the travel diary study. (Students in dormitories were only given the app option, so they could not be included in the hard copy version and are thus excluded from these analyses.)

Age ranges were pretty similar, with slightly more young female respondents to the app. There were proportionally more renters using the app than had completed the paper survey (see Figure 96).

	Hard Copy Only	App Only
Female 18-34	9.4%	17.8%
Female 35-54	16.7%	13.3%
Female 55+	36.0%	33.3%
Male 18-34	6.9%	6.7%
Male 35-54	8.5%	13.3%
Male 55+	22.4%	15.6%
Own	73.1%	64.4%
Rent	26.9%	35.6%

Figure 96: Comparison of Unweighted Demographic Characteristics of 2018 Respondents by Invitation Type

The modal split of all trips and of work commute trips was examined on the weighted dataset by the version of the travel diary study in whic6h the respondent had participated. As can be seen in Figure 97 below, those who completed the app version of the study were less likely to drive alone and more likely to bicycle than were those who completed the hard copy version of the study. However, this did not greatly influence the overall results, as the hard copy portion of the study accounted for about 94% of trips.

Figure 07 Comparison	Collit of All Trino	and Mark Commute	Tring hy Traval Diary Varaian
	SOUL OF ALL LUDS		THING DV TRAVELUIARV VERSION
i igui c o/. oompunioon			

		All Trips		Work Commute Trips			
Travel Mode	Hard Copy	Арр	Overall	Hard Copy	Арр	Overall	
Single-Occupancy Vehicle	37.3%	27.9%	36.7%	35.5%	17.7%	34.3%	
Multiple-Occupancy Vehicle	21.1%	19.6%	21.0%	4.0%	17.1%	5.0%	
Transit	5.1%	6.0%	5.2%	13.2%	6.1%	12.7%	
Bicycle	17.2%	13.7%	16.9%	32.9%	35.4%	33.1%	
Foot	19.4%	32.7%	20.2%	14.3%	23.7%	15.0%	
Total	100%	100%	100%	100%	100%	100%	
Number of Trips	3921	260	4181	724	55	779	

A comparison was also made of the employment characteristics of respondents with the weighted data set. The proportion of respondents that were employed in 2018 compared to previous years was similar, as was the workplace location.

Employment Characteristics	2018	2015	2012	2009	2006	2003
No, not employed	24.9%	24.6%	28.2%	27.0%	22.7%	28.6%
Yes, employed part-time	22.5%	19.4%	20.6%	22.5%	23.2%	25.4%
Yes, employed full-time	52.6%	55.9%	51.2%	50.6%	54.0%	46.0%
Boulder	78.6%	83.5%	80.6%	76.7%	73.2%	77.4%
Denver	4.5%	6.0%	6.3%	6.2%	6.3%	6.2%
Longmont	2.1%	2.0%	2.3%	3.4%	4.8%	3.8%
Broomfield	3.3%	1.9%	4.1%	2.5%	3.9%	2.4%
Louisville	2.4%	0.9%	0.8%	2.5%	3.0%	2.3%
Lafayette	1.8%	0.8%	0.8%	1.8%	1.6%	1.0%
Other location	7.3%	5.0%	5.1%	6.7%	7.1%	6.8%

Figure 98: Comparison of Weighted Employment Characteristics over Time

Respondents with workplaces in all locations showed a decrease in the proportion of work commute trips made by driving alone and an increase in the proportion of work commute trips made by bicycling. Transit trips made a big gain since 2012 among those who worked in Denver or other locations, but this is a fairly small sample. (See Figure 99 below and Figure 12 on page 12.)

Figure 99: Comparison of Weighted Modal Split or Work Commute by Work Location over Time

	Location of Workplace								
	Boulder			Denver			Other		
Travel Mode	2018	2015	2012	2018	2015	2012	2018	2015	2012
Single-Occupancy Vehicle	28.6%	32.5%	40.2%	30.1%	57.0%	66.7%	53.0%	68.6%	83.7%
Multiple-Occupancy Vehicle	3.0%	6.0%	3.5%	4.5%	6.4%	7.1%	12.2%	13.0%	10.4%
Transit	9.9%	5.9%	11.5%	35.7%	26.7%	13.1%	20.2%	14.8%	3.4%
Bicycle	39.8%	43.7%	33.3%	9.1%	3.8%	6.0%	13.5%	3.0%	2.5%
Foot	18.7%	11.9%	11.5%	20.6%	6.1%	7.0%	1.1%	0.6%	0.0%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Work Commute Trips	550	705	574	37	51	45	134	108	94
Appendix F. Data Collection Materials

This appendix contains the instruments and materials used for the data collection of the 2018 Travel Diary Study. Included are:

- Pre-notification postcard
- Diary packet cover letter to Boulder Valley residents
- Travel Diary instructions
- Travel Diary card
- Travel Diary Overflow sheet
- Household Survey
- Travel Diary invitation to the app version of the study

Dear Boulder Valley Resident:

Travel is something we all do and it can be challenging at times. I am inviting a member of your household to log your travel on a simple diary for a single day the week of September 10, 2018. These travel diaries show how Boulder residents travel and help us plan to better meet your transportation needs.

This travel diary survey is conducted every few years by a professional research firm and is the major tool to help the city better understand existing travel patterns. The results will be used in the current Transportation Master Plan update and to improve our community.

Your household was chosen at random and your participation will be completely confidential. We are only mailing the diaries to a small number of Boulder Valley residents, so your participation is extremely important and greatly appreciated.

Your diary packet will arrive in about a week at which time you'll receive your assigned tracking day.

Many thanks in advance for your help.

Sincerely,

Suzanne Jones, Mayor

Dear Boulder Valley Resident:

Travel is something we all do and it can be challenging at times. I am inviting a member of your household to log your travel on a simple diary for a single day the week of September 10, 2018. These travel diaries show how Boulder residents travel and help us plan to better meet your transportation needs.

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Suzanne Jones, Mayor



City of Boulder City Council

Mayor Suzanne Jones

Mayor Pro Tem Aaron Brockett

Council Members: Cynthia Carlisle, Jill Adler Grano, Liza Morzel, Mirabai Nagle, Sam Weaver, Bob Yates, Mary Young

September 2018

Dear Boulder Valley Resident:

We all travel and transportation has been an important concern in the Boulder Valley for many years. The City works to accommodate your travel needs and we all benefit from needed improvements to the transportation system. To meet identified travel needs, we've built and repaired roads, bicycle and pedestrian paths, and added bus routes in Boulder. Periodically we turn to our residents to get updated travel information to understand current travel patterns and further improve your travel experience. This survey is the primary data source for understanding the travel patterns of Boulder Valley residents.

Now you can help! I am inviting a member of your household to be a part of a small group of Boulder Valley residents who will keep a simple log of their travel on *Monday, September 10, 2018*. Basically, the travel diary will show how you get where you're going and how long it takes you to get there. This research is being conducted by a professional research firm that chose your household at random and your participation will be completely confidential.

Because we want to know what the travel circumstances are for all of Boulder Valley, we need a representative sample of residents in our community. That's why it's so important that the person in your household who completes the travel diary be a household member who is in town on that day, is age 16 or older and who most recently had a birthday. Year of birth is not to be considered.

If that person (the one who's at least 16 and most recently had a birthday) is willing to help with this simple but very important project, he or she should complete the enclosed household survey, read the enclosed instructions and complete the travel diary on **Monday, September 10.**

Please complete the survey and log your travel using the materials in this packet. Completed surveys and travel diaries should be mailed to National Research Center, Inc. (the company conducting the study) using the enclosed postage-paid envelope. If you have questions, call Erin at 303-444-7863 and she'll be happy to talk with you.

Thank you very much! The log is easy to complete and will be helpful to our community.

Sincerely,

Suzanne Jones, Mayor



2018 Travel Diary Study **INSTRUCTIONS**

Please review the materials briefly before continuing to read the instructions. If any materials are missing, please call Erin of National Research Center, Inc. at 303-444-7863, and materials will be mailed to you. This packet contains:

Cover letter & these instructions □ Household Travel Survey

Travel Diary

□ Travel Diary overflow sheet

□ Postage paid return envelope

COMPLETE THE TRAVEL DIARY ON YOUR ASSIGNED DAY

- Complete the travel diary on MONDAY, SEPTEMBER 10, 2018, regardless of the weather or the number and type of activities planned for that day.
- Take the Travel Diary with you on your assigned day. It is the $8\frac{1}{2}$ x $11^{"}$ card included in this packet.
- If you will be out of town or forgot to complete the diary on assigned day, you may complete the diary on the same day of the next week (Monday, September 17).
- Report every trip segment you make that is longer than a city block:
 - Whether you are a passenger, driver or pedestrian.
 - Whether it is recreational (e.g. going for a run) or has a specific destination.
- Start the diary after 12:01 am (right after midnight) and continue until 12:00 midnight on your assigned day.
- Do not change your travel behavior because you are keeping this diary.

WHAT IS A "TRIP SEGMENT"?

- A trip segment is all or part of a one-way journey.
- **Round-trips count as two trip segments.** If you drive to the grocery store and back, record two trip segments on your diary. The purpose of the first is "shopping," the second is "return home."
- In addition to round trips, you may need to record one journey as more than one trip segment if:
- You make multiple stops. For example, if you walk your child to school, then catch the bus outside the school to the grocery store, and then return home, stopping to pick up a prescription at the drugstore, this would count as four trip segments with the following destinations: the school, the grocery store, the drugstore and then home.
- You change travel method (not including bus transfers). For instance, if you walk more than one block to a bus stop to take the bus to work, count the bus stop as the first destination and the purpose of that trip segment as "change travel mode". The next trip segment destination is work and the purpose is "work commute."
- You pick up or drop off a passenger. This should be treated as at least two trip segment s. The purpose of the first trip segment is "drive passenger."
- If you are on a recreational or exercise loop (walk, run or bike ride) then your "destination" is the half-way point and you record two trip segments. The purpose of the first is "social/recreation," the second is "return home."

QUICK TIPS

- For your destination, you may use an address, nearest intersection or commonly recognized buildings, stores or other specific and unique locations (e.g. "McGuckin Hardware", or "Table Mesa Park and Ride")
- Keep good estimates of the start and end times. Use the times you started and ended travel and don't include the time you spend at the destination. For example, if you go to the store, don't count the time you are in the store. When you arrived is the end of the first trip and when you left the store is the start of the second trip.
- If using a car or light truck for your trip, don't forget to mark if you were a passenger or driver and fill in the number of adults (include yourself, those 16 or older with drivers licenses and those over age 18) and the number of children in the vehicle.
- To **record mileage**, use a vehicle odometer if possible at the beginning and end of each trip. If you wish, you can \geq record the number of blocks instead of miles if it is easier, but PLEASE write in "blocks" on your form, so we don't mistake it for miles.

HOW DO I DESCRIBE	HOW DO I DESCRIBE THE TRIP TYPE?							
Go Home	Travel from some location other than your workplace to your usual place of residence.							
Work Commute	Travel to or from your workplace.							
Other Work/ Business	Travel done for work, to someplace other than the workplace. (E.g., sales calls, trips to purchase office supplies for work.)							
Personal Business	Travel which is made to obtain services, not products. (E.g. bank, post office, doctor, auto repair.)							
Shopping	Travel to shop or to purchase products.							
School	Travel <u>by a student</u> to college or school.							
	Travel to school by a teacher or other school employee is a work commute trip.							
	If you are driving a student to school, the trip should be classified as "drive a passenger."							
Social/ Recreation	Travel when no business is transacted. (E.g., parties, participatory sports, cultural or athletic events, church activities, visits to friends.)							
Eat a Meal	Examples include going to a restaurant, going to a friend's house for dinner, or home from work for lunch. Stops for snacks or refreshments should be classified as "social/recreation".							
Drive a Passenger	Use this category for trips or stops to pick up or deliver someone to a specific location. (E.g., taking a friend to the store, picking up a child from school.)							
Change Travel Mode	If you drive your car, walk more than one block, or ride your bike to catch the bus, this is a "change travel mode" trip. However, if you transfer from one bus to another, it should not be included in this category because you traveled in buses without changing travel modes. (Be sure to record all the routes you used to make the trip.)							
Other	Travel that does not seem to fit in the categories listed should be put in the "other" category. Please list what the trip purpose was in the blank provided. Also, if you have a question as to where to put a certain trip because you can't decide between two categories, list it in the "other" category.							

SPECIAL CIRCUMSTANCES

What if you <u>don't go anywhere</u> during the day assigned to you? On the travel diary, fill out your name, address and the assigned diary date, check the box to indicate that you made no trips. Please continue on the Household Survey. It is important that we get an accurate picture of travel patterns within Boulder, including the number of people who make no trips.

What if you have more than 9 trip segments during the day assigned to you? The Travel Diary has space to record up to 9 trip segments. If you have more than 9 trip segments on your assigned day, please use the overflow sheet. If you have more than the 21 trip segments than can be recorded on the Diary and overflow sheet, call Athena and she will record your trips over the phone or send you more overflow sheets, or make a copy of the overflow sheet and use that.

What if you work a job that requires frequent travel on the day assigned to you? If you work a job that requires you to make many trips during the 24-hour period (e.g., cab driver, pizza delivery driver, sales person), please call National Research Center. Athena will give you special instructions for completing your Travel Diary.

The **EXAMPLE OF A COMPLETED TRAVEL DIARY** on the following page, gives a detailed example that may help you in completing your form.

If you have ANY questions, please contact Erin at National Research Center, Inc. at 303-444-7863 Thank you very much for your participation in this study.

EXAMPLE OF A COMPLETED PAPER TRAVEL DIARY

In the first half of her day, Jane Smith drove from her home at 3523 N. 16th Street to work at CU, first dropping her 9 year old daughter at University Hill Elementary School.

At noon, Jane walked to the Hill for lunch (5 blocks from the building on campus where she works).

The Travel Diary example shows how Jane's form would be completed. Please note the following:

- 1. Jane's travel to work with her daughter is counted as **two** trips; the first is with her daughter to the elementary school -- this trip is designated as "drive a passenger"; the second is from the school to work.
- 2. Although Jane is going to a "school" (CU), it is for the purpose of work, and is designated as a "work commute" trip.
- 3. Jane records her trip (walking) to lunch as well as her trip from lunch back to work (two trips). Her trip back to the school is recorded as "work commute", because she is returning to her workplace, although she did not come straight from home.

	2018 Travel Diar	/											
Record the location at	Please record all of your trips, whether you are a passenger, driver, or pedestrian. The information on the first row is included only as an example. Please refer to the instructions if you are not sure how to record your trip.												
which you are beginning your travel for the day. If it is your home (the same address as in the information box), you	Name: Jane Smith Address: 3523 N. 16th Street City/State/Zip: Boulder, CO 80302 DIARY DATE: 9/10/12 Starting POINT ADDRESS Street Address: Street Address: SAME City/State/Zip: Nearest Cross Streets: 16th	I did not leave the house today: I If using motor vehicle, list odometer reading: at beginning of day: 79645 at end of day: 79661											
may just write	DESTINTION trip (address building or trip start time trip end time	est. trip vehicle (inc. yourself)											
"SAME" however be sure to include the Nearest Cross Streets.	Image: street Image: s	travel method miles children adults 2. car or light truck (driver)											
Please remember to fill in the date of the day you complete the travel diary!	2 CU - Old Main 2 CU - Old Main 3 T:55 4 T:55 4 T:55 5 MM 8 T:55 7 Social/recreation 8 T:55	10. other:											
Don't include the amount of time you were at the destination.	The Hill (Abo's) 12:10 PM 1. so home 2. personal business 3 sollege 4. school 13th treet PM 7. social/recreation 8. eat a meal 9. drive passenger 10.change travel mod	10. other: 1 1. car or light truck (driver) 2. car or light truck (passenger) 3. bus/transit (route(s): 4. school bus 4. school bus 5. large commercial truck 6. motorcycle 7. trai (passenger) 8. bicycle 9. walk 10. other: 10. other:											
	4 CU - Old Main 1. go home 2. personal business 4 12:55 PM 1:05 PM 3. shopping 4. school 5. work commute 6. other work/business 9. drive passenger 10. change travel mod 11. other: 11. other: 11. other 10. change travel mod	1. car or light truck (driver) 2. car or light truck (passenger) 3. bus/transit (routes): 4. school bus 5. bis/cycle 9. bicycle 9. bicycle 10. other:											
	You were light	can also select that you a passenger in a car or truck, if appropriate.											

EXAMPLE OF A COMPLETED TRAVEL DIARY, Page 1

(example continued on reverse side)

In the second part of Jane's day, she finished work and picked up her daughter and drove home.

She jogged for two miles in her neighborhood before dinner.

When dinner was over, Jane and her family rode their bikes to the Willow Springs Shopping Center for ice cream.

On the example form, note the following:

- 1. After work, Jane's trip to pick up her daughter (even though the daughter is not in the car) is designated as a trip to "drive a passenger".
- 2. Jane counts her jog in the neighborhood as **two** trips, even though she made no stops between leaving home and returning home. "Jogging" and "running" are considered "walking" for the purposes of this travel diary.
- 3. When the family rides their bikes to the shopping center for an ice cream, this is a "snack" and is designated as "social/recreation" rather than eating a meal.

tuin	DESTINATION	trin start	time	trip and	ima				act trip	number of	people in
#	(address, building or nearest cross streets)	hour min	am/nm	hour min	am/nm	tri	numose	travel method	miles	children	adults
5	Uni. Hills School Broadway &	<u>5:05</u>	PM	<u>5:15</u>	PM	1. go home 3. shopping 5. work commute 7. social/recreation 9. drive passenger 11. other:	2. personal business 4. school 6. other work/business 8. eat a meal 10.change travel mode	1. car or light truck (driver) 2. car or light truck (passenger) 3. bus/transit (route(s): 4. school bus 5. large commercial truck 6. motorcycle 7. taxi (passenger) 8. bicycle 9. walk 10. other:	1	0	1
6	<u>Home</u> &	<u>5:20</u>	PM	<u>5:35</u>	PM	1. go home 3. shopping 5. work commute 7. social/recreation 9. drive passenger 11. other:	2. personal business 4. school 6. other work/business 8. eat a meal 10.change travel mode	Car or light truck (driver) 2. car or light truck (passenger) 3. bus/transit (route(s): 4. school bus 5. large commercial truck 6. motorcycle 7. taxi (passenger) 8. bicycle 9. walk 10. other:	4	1	ĭ
7	Orchard &	<u>5:50</u>	PM	<u>6:05</u>	PM	1. gc home 3. shopping 5. work commute 5. social/recreation 9. drive passenger 11. other:	2. personal business 4. school 6. other work/business 8. eat a meal 10.change travel mode	1. car or light truck (driver) 2. car or light truck (passenger) 3. bus/transit (route(s): 4. school bus 5. large commercial truck 6. motorcycle 7. texi (passenger) 8. bicycle 9. walk 10. other:	1		
8	&	<u>6:05</u>	PM	<u>6:20</u>	PM	go home <u>3: stropping</u> 5. work commute 7. social/recreation 9. drive passenger 11. other:	2. personal business 4. school 6. other work/business 8. eat a meal 10.change travel mode	1. car or light truck (driver) 2. car or light truck (passenger) 3. bus/transit (route(s): 4. school bus 5. large commercial truck 6. motorcycle 7. texi (passenger) 8. bicycle 9. walk 10. other:	1		
9	<u>Willow Springs</u> <u>Shopping Center</u> <u>Iris</u> & 28th	<u>7:15</u>	PM	<u>7:40</u>	AM	1. go home 3. shopping 5. work commute 7. social/recreation 9. drive passenger 11. other:	2. personal business 4. school 6. other work/business 8. eat a meal 10.change travel mode	1. car or light truck (driver) 2. car or light truck (passenger) 3. bus/transit (route(s): 4. school bus 5. large commercial truck 6. molorcycle 7. taxi (passenger) 8. bicycle 9. walk 10. other:	10 blocks		
10	<u>Home</u> &	<u>8:05</u>	PM	<u>8:30</u>	PM	1. go home 3. shopping 5. work commute 7. social/recreation 9. drive passenger 11. other:	2. personal business 4. school 6. other work/business 8. eat a meal 10.change travel mode	1. car or light truck (driver) 2. car or light truck (passenger) 3. bus/transit (route(s): 4. school bus 5. large commercial truck 6. motorcycle 7. taxi (passenger) 8. bicycle 9. walk 10. other:	10 blocks		

EXAMPLE OF A COMPLETED TRAVEL DIARY, Page 2

If you have ANY questions, please contact Erin at National Research Center, Inc. at 303-444-7863 Thank you very much for your participation in this study.

2018 Travel Diary

Please record all of your trip segments, whether you are a passenger, driver, cyclist, or pedestrian. The information on the first row is included only as an example. Please refer to the instructions if you are not sure how to record your trips.										
Name: Address : City/State/Zip :	STARTING POINT ADDRESS Street Address: City/State/Zip: Nearest Cross Streets:	I did not leave the house today:								
DIARY DATE:	-	at end of day:								

Trip segment	DESTINATION (address, building or	trip segment start time		trip segn end tin	nent ne	trip segment			est. trip segment	number of vehicle (inc	people in . yourself)
#	nearest cross streets)	hour:min	am/pm	hour:min	am/pm	purpose		travel method	miles	children	adults
example	<u>Foothill Elementary</u> <u>Broadway</u> & <u>Grape</u>	<u>7:13</u>	AM	<u>7:22</u>	AM	1. go home 2. perso 3. shopping 4. school 5. work commute 6. other 7. social/recreation 8. eat a 9. drive passenger 10.chang 11. other: →	onal business ol ol work/business meal nge travel mode	1. car, light truck, SUV or vanpool (driver) 2. car, light truck, SUV or vanpool (passenger) 3. bus/rail/transit (route(s): 4. school bus 5. large commercial truck 6. motorcycle/scooter 7 .Lyft, Uber, Taxi 8. bicycle/B-cycle 9. walk 10. other: →	3 miles	1	1
1	&	:		:		1. go home 2. perso 3. shopping 4. school 5. work commute 6. other 7. social/recreation 8. eat a 9. drive passenger 10.changer 11. other: →	onal business ol r work/business r meal nge travel mode	1. car, light truck, SUV or vanpool (driver) 2. car, light truck, SUV or vanpool (passenger) 3. bus/rail/transit (route(s): 4. school bus 5. large commercial truck 6. motorcycle/scooter 7 .Lyft, Uber, Taxi 8. bicycle/B-cycle 9. walk 10. other: →			
2	&	:		:		1. go home 2. perso 3. shopping 4. school 5. work commute 6. other 7. social/recreation 8. eat a 9. drive passenger 10.changer 11. other: →	onal business ol r work/business r meal nge travel mode	1. car, light truck, SUV or vanpool (driver) 2. car, light truck, SUV or vanpool (passenger) 3. bus/rail/transit (route(s): 4. school bus 5. large commercial truck 6. motorcycle/scooter 7 .Lyft, Uber, Taxi 8. bicycle/B-cycle 9. walk 10. other: →			
3	&	:		:		1. go home 2. perso 3. shopping 4. school 5. work commute 6. other 7. social/recreation 8. eat a 9. drive passenger 10.chang 11. other: →	onal business ol r work/business meal nge travel mode	1. car, light truck, SUV or vanpool (driver) 2. car, light truck, SUV or vanpool (passenger) 3. bus/rail/transit (route(s): 4. school bus 5. large commercial truck 6. motorcycle/scooter 7 .Lyft, Uber, Taxi 8. bicycle/B-cycle 9. walk 10. other: →			

Trip	DESTINATION	trip segr	nent	trip segn	nent				est. trip	number of	people in
segment	(address, building or	start ti	me	end tin	ne ,	tri	p segment		segment	vehicle (inc	. yourself)
#	nearest cross streets)	hour:min	am/pm	hour:min	am/pm	4	purpose	travel method	miles	children	adults
						1. go nome 3. shopping	2. personal business	1. car, light truck, SUV or vanpool (driver)			
						5. shopping	4. school 6. other work/husiness	2. cal, light fluck, SOV of varipool (passenger)			
	0					7. cosicl/represention		4 school bus 5 Jargo commorcial truck			
4	&	:		:			8. eat à meai	6 motorcycle/scooter 7 Lyft Llber Tavi			
						9. drive passenger	TU.change travel mode	8 bicycle/B-cycle 9 walk			
						11. other:		10. other:			
						1. go home	2. personal business	1. car, light truck, SUV or vanpool (driver)			
						3. shopping	4. school	2. car, light truck, SUV or vanpool (passenger)			
						5. work commute	6. other work/business	3. bus/rail/transit (route(s):			
5	&	:		;		7. social/recreation	8. eat a meal	4. school bus 5. large commercial truck			
						9. drive passenger	10.change travel mode	6. motorcycle/scooter 7. Lyft, Uber, Taxi			
						11 other >		8. bicycle/B-cycle 9. walk			
						1. go home	2. personal business	1. car, light truck, SUV or vanpool (driver)			
						3. Shupping	4. SUIUUI	2. car, light truck, SUV or vanpool (passenger)			
,						5. Work commute	6. Other Work/Dusiness	3. bus/rall/transit (route(s):			
6	&	÷		:		7. social/recreation	8. eat a meai	4. SCHOOLDUS 5. Idige commercial linck			
						9. drive passenger	10.change travel mode	8 hicycle/B-cycle 9 walk			
						11. other: \rightarrow		10. other: \rightarrow			
						1. go home	2. personal business	1. car, light truck, SUV or vanpool (driver)			
						3. shopping	4. school	2. car, light truck, SUV or vanpool (passenger)			
						5. work commute	6. other work/business	3. bus/rail/transit (route(s):			
7	&	:		:		7. social/recreation	8. eat a meal	4. school bus5. large commercial truck			
						9. drive passenger	10.change travel mode	6. motorcycle/scooter 7. Lyft, Uber, Taxi			
						11 other >		8. bicycle/B-cycle 9. walk			
						1. go home	2. personal business	1. car, light truck, SUV or vanpool (driver)			
						3. snopping	4. SCN00I	2. car, light truck, SUV or vanpool (passenger)			
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8	&	÷		:			8. eat a mear	4. school bus 5. large commercial fluck			
						9. drive passenger	TU.change travel mode	8 hicycle/B-cycle 9 walk			
						11. other: \rightarrow		10. other: →			
						1. go home	2. personal business	1. car, light truck, SUV or vanpool (driver)			
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						5. work commute	6. other work/business	3. bus/rail/transit (route(s):			
9	&	:		:		7. social/recreation	8. eat a meal	4. school bus5. large commercial truck			
						9. drive passenger	10.change travel mode	6. motorcycle/scooter 7. Lyft, Uber, Taxi			
						11 others		8. bicycle/B-cycle 9. walk			
						II. Other: →		10. otner: →			

2018 Overflow Sheet

Trip	DESTINATION	trip seg	gment	trip seg	gment				est. trip	number of	f people in
segment	(address, building or	start f	time	end t	ime	trip segment			segment	vehicle (inc	cl. yourself)
#	nearest cross streets)	hour:min	am/pm	hour:min	am/pm		purpose	travel method	miles	children	adults
						1. go home	2. personal business	1. car, light truck, SUV or vanpool (driver)			
						3. shopping	4. school	2. car, light truck, SUV or vanpool (passenger)			
						5. work commute	6. other work/business	3. bus/transit/rail (route(s):			
10	&	:		:		7. social/recreation	8. eat a meal	4. school bus 5. large commercial truck			
						9. drive passenger	10.change travel mode	6. motorcycle/scooter 7. Lyft, Uber, taxi			
						11 others >		8. bicycle/B-cycle 9. walk			
						TT. Other. →		10. other: →			
						1. go home	2. personal business	1. car, light truck, SUV or vanpool (driver)			
						shopping	4. school	2. car, light truck, SUV or vanpool (passenger)			
						5. work commute	6. other work/business	3. bus/transit/rail (route(s):			
11	&	:		:		7. social/recreation	8. eat a meal	4. school bus 5. large commercial truck			
						9. drive passenger	10.change travel mode	6. motorcycle/scooter 7. Lyft, Uber, taxi			
						44 11 5	5	8. bicycle/B-cycle 9. walk			
						11. other: \rightarrow		10. other: →			
						1. go home	2. personal business	1. car, light truck, SUV or vanpool (driver)			
						shopping	4. school	2. car, light truck, SUV or vanpool (passenger)			
						5. work commute	6. other work/business	3. bus/transit/rail (route(s):			
12	&	:		:		7. social/recreation	8. eat a meal	4. school bus 5. large commercial truck			
						9. drive passenger	10.change travel mode	6. motorcycle/scooter 7. Lyft, Uber, taxi			
							0	8. bicycle/B-cycle 9. walk			
						11. otner: →		10. other: →			
						1. go home	2. personal business	1. car, light truck, SUV or vanpool (driver)			
						shopping	4. school	2. car, light truck, SUV or vanpool (passenger)			
						5. work commute	6. other work/business	3. bus/transit/rail (route(s):			
13	&	:		:		7. social/recreation	8. eat a meal	4. school bus 5. large commercial truck			
						9. drive passenger	10.change travel mode	6. motorcycle/scooter 7. Lyft, Uber, taxi			
							·	8. bicycle/B-cycle 9. walk			
						11. other:		10. other:			
						1. go home	2. personal business	1. car, light truck, SUV or vanpool (driver)			
						shopping	4. school	2. car, light truck, SUV or vanpool (passenger)			
						5. work commute	6. other work/business	3. bus/transit/rail (route(s):			
14	&	:		:		7. social/recreation	8. eat a meal	4. school bus 5. large commercial truck			
						9. drive passenger	10.change travel mode	6. motorcycle/scooter 7. Lyft, Uber, taxi			
						11 other >		8. bicycle/B-cycle 9. walk			
						TT. Other. →		10. other: →			
						1. go home	2. personal business	1. car, light truck, SUV or vanpool (driver)			
						3. shopping	4. school	2. car, light truck, SUV or vanpool (passenger)			
						5. work commute	6. other work/business	3. bus/transit/rail (route(s):			
15	&	:	-	:		7. social/recreation	8. eat a meal	4. school bus 5. large commercial truck			
						9. drive passenger	10.change travel mode	6. motorcycle/scooter 7. taxi (passenger)			
							-	8. DICYCIE/B-CYCIE 9. Walk			
						II. U(IIEI. →		10. otner: →			

Trip	DESTINATION	trip seg	ment	trip seg	gment				est. trip	number of	people in
segment	(address, building or	start t	ime	end t	ime	trip segment			segment	vehicle (inc	I. yourself)
#	nearest cross streets)	hour:min	am/pm	hour:min	am/pm	pi	urpose	travel method	miles	children	adults
16	&	:		:		 go home shopping work commute social/recreation drive passenger other: → 	 2. personal business 4. school 6. other work/business 8. eat a meal 10.change travel mode 	 car, light truck, SUV or vanpool (driver) car, light truck, SUV or vanpool (passenger) bus/transit/rail (route(s): school bus large commercial truck motorcycle/scooter Lyft, Uber, taxi bicycle/B-cycle walk other: → 			
17	&	:		:		 go home shopping work commute social/recreation drive passenger other: → 	 2. personal business 4. school 6. other work/business 8. eat a meal 10.change travel mode 	 car, light truck, SUV or vanpool (driver) car, light truck, SUV or vanpool (passenger) bus/transit/rail (route(s): school bus large commercial truck motorcycle/scooter Lyft, Uber, taxi bicycle/B-cycle walk other: → 			
18	&	:		:		 go home shopping work commute social/recreation drive passenger other: → 	 2. personal business 4. school 6. other work/business 8. eat a meal 10.change travel mode 	 car, light truck, SUV or vanpool (driver) car, light truck, SUV or vanpool (passenger) bus/transit/rail (route(s): school bus large commercial truck motorcycle/scooter Lyft, Uber, taxi bicycle/B-cycle walk other: → 			
19	&	:		:		 go home shopping work commute social/recreation drive passenger other: → 	 2. personal business 4. school 6. other work/business 8. eat a meal 10.change travel mode 	 car, light truck, SUV or vanpool (driver) car, light truck, SUV or vanpool (passenger) bus/transit/rail (route(s): school bus large commercial truck motorcycle/scooter Lyft, Uber, taxi bicycle/B-cycle walk other: → 			
20	&	:		:		 go home shopping work commute social/recreation drive passenger other: → 	 2. personal business 4. school 6. other work/business 8. eat a meal 10.change travel mode 	 car, light truck, SUV or vanpool (driver) car, light truck, SUV or vanpool (passenger) bus/transit/rail (route(s): school bus large commercial truck motorcycle/scooter Lyft, Uber, taxi bicycle/B-cycle walk other: → 			
21	&	:		:		 go home shopping work commute social/recreation drive passenger other: → 	 2. personal business 4. school 6. other work/business 8. eat a meal 10.change travel mode 	 car, light truck, SUV or vanpool (driver) car, light truck, SUV or vanpool (passenger) bus/transit/rail (route(s): school bus large commercial truck motorcycle/scooter Lyft, Uber, taxi bicycle/B-cycle walk other: → 			

c/o National Research Center, Inc. 2955 Valmont Rd., Suite 300 Boulder, CO 80301-1360 303-444-7863	Diary Study RAVEL SURVEY									
Please complete the following survey regarding your household and return it with your Travel Diary in the enclosed post paid envelope. The survey should take only a few minutes. It is important because it will help research staff to gauge he representative the people who participate in the diary study are in relation to Boulder Valley residents as a whole. It also provides additional information on the travel patterns of Boulder Valley residents. Your answers to this survey will be ke strict confidence and only used in the aggregate. Thank you for your time and help.										
 GENERAL TRAVEL INFORMATION 1. On the day you completed the travel diary, did you have any goods or services delivered to your work or home, such as a meal (pizza, etc.), groceries, haircuts or other goods and services? (Please include deliveries for items you ordered by phone, through a mail order catalogue, or by Internet.) no → Go to question #3 yes → From how many different sources did you receive deliveries? sources 	 7. Are you employed? no → Go to question #13 yes, part-time yes, full-time 8. Please indicate the city in or nearest to your primary work place. Boulder Louisville Denver Longmont Broomfield Lafayette I work from my home Other city, specify: 									
 2. Did the delivery or deliveries substitute for a travel trip you might have made to seek the good or service? no yes 3. In the last week, about how frequently have you ridden a bicycle: 	 9. Please write in the address, building and/or nearest cross streets of your primary work place. Building or address: Nearest cross streets: & 									
To Shop, Geta Meal orRun ErrandsFor Commuting \Box 5 or more times \Box 5 or more times \Box 3 to 4 times \Box 0nce or twice \Box Not at all \Box Not at all4. Are you eligible to have an Eco-Pass, an annual pass that allows you unlimited bus rides?(Please check all that apply.) \Box yes, through my employer \Box yes, through my neighborhood \Box yes, cU Boulder faculty/staff Buff One pass \Box yes, other pass: \Box yes, other pass: \Box no, 1 am not eligible for an Eco-Pass \rightarrow go to #7	 10. Employees telecommute when they fulfill their job responsibilities at home by substituting telecommunications (computer, Internet/Web and/or phone) for work-related travel. How often, if ever, do you telecommute for work? (<i>Note: do not include times you take work home to do in the evenings, only times you work from home instead of traveling to a workplace.</i>) Every work day (I always work from my home) 3 to 4 times per week Once or twice a month Occasionally Never 11. Did you telecommute on the day you completed the travel diary? 									
 5. Did you pick up an Eco-Pass or Buff One pass (or passes)? yes no → go to question #7 6. About how often, on average, do you use your Eco-Pass? more than once a week about once a week about once every two weeks about once a month less often than once a month 	 □ no → Go to question #13 □ yes 12. Did working at home reduce the number of single-occupancy vehicle (drive alone) trips you made on the day you completed the travel diary compared to days you do not telecommute? □ no, I made the same number of drive alone trips □ yes, reduced about 2 drive-alone trips □ yes, reduced more than 2 drive-alone trips 									

HOUSEHOLD INFORMATION	
13. How many passenger vehicles does your household own or	19. Are any of the household members students at the
normally have use of?	University of Colorado, Boulder campus?
and light trucks	□ no □ yes → How many are: full-time part time
Ũ	students students
14. How many usable bicycles does your household have?	
Regular Electric-assisted	
	INDIVIDUAL INFORMATION
15. About how much was the TOTAL 2017 income before taxes	20. Are you a member of Boulder B-cycle or any other bike
for your household as a whole? In the total, please include	share program?
income before taxes as well as money from all sources for all	🗅 no 🕞 yes
everyone's income from self-employment gifts interest on	21. Are you a member of any care share program
savings, social security, AFDC, the value of food stamps	(e.g., eGoCarShare, Zipcar, car2go)?
received, pension or disability benefits, child support, as well	🗖 no 🗖 yes
as wages, tips and salary.)	22. How many years have you lived in Boulder?
Less than \$10,000	(Please write "0" if less than 6 months.)
$\square $10,000 \text{ to } $19,999$	Years
□ \$20,000 to \$29,999	22 Are you a student at the University of Colorado, Boulder
□ \$40,000 to \$49,999	campus?
\$50,000 to \$74,999	no ves
□ \$75,000 to \$99,999	24. What is your gondor?
□ \$100,000 to \$149,999	24. What is your gender?
16. Please check the one choice below which best describes	25. Which category contains your age?
the kind of residence in which you live.	□ 16 to 24 years old
a detached single family home	$\square 35 \text{ to } 44 \text{ years old}$
a apartment	45 to 54 years old
a condominium or townhouse	55 to 64 years old
a mobile home	65 years or older
group quarters (e.g., dormitory, nursing home)	26. How much education have you completed?
other:	0 to 11 years of school
	high school
17. Do you rent or own your residence?	Some college or associate's degree □ bachelor's degree
l rent l own	graduate/professional degree
18. Please record the number of household members in each	27. If you drive what is the year make and model of the
of the following age categories. (Please remember to	vehicle vou usually drive?
include yourself.)	
Age category household	Year:
0 to 6 years	Make:
7 to 14 years	Model:
15 to 17 years	
18 to 24 years	Please email RutschR@bouldercolorado.gov if you would like to receive
25 to 34 years	a summary of the results, once the study is complete.
35 to 44 years	Thank you very much for taking the time to
45 to 54 years	complete this survey. Please return this with your
55 to 64 years	travel diary in the postage-paid envelope provided.
65 or older	



City of Boulder City Council

Mayor Suzanne Jones

Mayor Pro Tem Aaron Brockett

Council Members: Cynthia Carlisle, Jill Adler Grano, Liza Morzel, Mirabai Nagle, Sam Weaver, Bob Yates, Mary Young

September 2018

Dear Boulder Valley Resident:

We all travel and transportation has been an important concern in the Boulder Valley for many years. The City works to accommodate your travel needs and we all benefit from needed improvements to the transportation system. To meet identified travel needs, we've built and repaired roads, bicycle and pedestrian paths, and added bus routes in Boulder. Periodically we turn to our residents to get updated travel information to understand current travel patterns and further improve your travel experience. This survey is the primary data source for understanding the travel patterns of Boulder Valley residents.

Now you can help! I am inviting a member of your household to be a part of a small group of Boulder Valley residents who will use a **smartphone app to log your travel for one 24-hour period**. Basically, the app will record how you get where you're going and how long it takes you to get there. This research is being conducted by a professional research firm which chose your household at random and your participation will be completely confidential.

Download the app at: www.nrc-survey.com

Because we want to know what the travel circumstances are for all of Boulder Valley, we need a representative sample of residents in our community. That's why it's so important that the person in your household who participates in this travel study be a household member who is in town on that day, is age 16 or older, uses a smartphone and who most recently had a birthday. Year of birth is not to be considered.

If that person (the one who's at least 16 and most recently had a birthday) is willing to help with this simple but very important project, he or she should go to **www.nrc-survey.com** to download an app to complete the survey questions and log their travel (instructions to do this are included with this letter). If no one in the household uses a smartphone or tablet, you can download a paper version here at the same website, or call Erin at 303-444-7863 and she'll be happy to mail a paper version to you.

Thank you very much! Your participation will be helpful to our community.

Sincerely,

Suzanne Jones, Mayor

Dear Boulder Valley Resident:

Just a reminder — if you haven't already downloaded the app to your smartphone to log your trips, you can still do so. Go to:

www.nrc-survey.com

(If you don't have a smartphone, or don't want to download the app, you can also download and print materials from that website to participate by paper.)

Travel is something we all do and it can be challenging at times. These travel logs show how Boulder residents travel and help us plan to better meet your transportation needs. The results will be used in the current Transportation Master Plan update and to improve our community.

Your household was chosen at random and your participation will be completely confidential.

Many thanks in advance for your help.

Sincerely,

Suzanne Jones, Mayor

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