## Modal Shift in the Boulder Valley

## 1990 to 2018

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## City of Boulder

## Transportation Division

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## Table of Contents

EXECUTIVE SUMMARY .....  1
BACKGROUND .....
Modal Shift of All Trips .....
Modal Split of the Work Commute ..... IV
Mode Use ..... V
Trip Characteristics ..... VI
STUDY RESULTS ..... 1
Background .....  1
Modal Shift of All Trips ..... 2
Modal Split of the Work Commute ..... 9
Telecommuting ..... 13
Modal Split of University of Colorado Students ..... 15
Trip Characteristics ..... 17
Summary Characteristics of All Trips ..... 17
Trip Characteristics of the Work Commute ..... 18
Automobile Trip Characteristics ..... 20
Vehicle Miles Traveled per Capita ..... 21
Vehicle Occupancy ..... 22
Vehicle Ownership and Availability ..... 23
Transit Trip Characteristics ..... 24
Non-Vehicle Trip Characteristics: Walking and Biking ..... 27
Biking for Work, Errands and Recreation ..... 28
Trip Distance ..... 29
Trip Start Times ..... 30
Deliveries to the Home or Office ..... 31
Purpose of Travel ..... 32
APPENDIX A. NATIONAL TRAVEL DATA ..... 36
APPENDIX B. MODAL SPLIT BY TRIP AND RESPONDENT CHARACTERISTICS, 2018 ..... 39
APPENDIX C. TRANSPORTATION MARKET SEGMENTATION ..... 46
Key Characteristics of the Transportation Segments ..... 46
APPENDIX D. REFERENCES ..... 53
APPENDIX E. STUDY METHODOLOGY ..... 54
Study Design ..... 54
Selecting Survey Recipients ..... 55
Response Rates ..... 55
Analysis of Results ..... 57
Cleaning and Coding of Data ..... 57
Estimating Trip Length ..... 57
Data Entry, Weighting and Analysis ..... 59
Comparison of Hard Copy and App Travel Diary Respondents ..... 61
APPENDIX F. DATA COLLECTION MATERIALS ..... 63

## 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), multipleoccupancy 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)

[^0]Figure 1: Modal Split of All Trips, 1990-2018

| Travel Mode | Percent of Trips* |  |  |  |  |  |  |  |  |  |  |  | Change 1990 to 2018 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 2018 | 2015 | 2012 | 2009 | 2006 | 2003 | 2000 | 1998 | 1996 | 1994 | 1992 | 1990 |  |
| 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 |  |

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


[^1]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).

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

|  | Percent of Miles* |  |  |  |  |  |  |  |  |  |  |  | $\begin{array}{\|c} \hline \text { Change } \\ 1990 \text { to } \\ 2018 \\ \hline \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Mode | 2018 | 2015 | 2012 | 2009 | 2006 | 2003 | 2000 | 1998 | 1996 | 1994 | 1992 | 1990 |  |
| 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 |  |

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
100\%



## 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.

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

|  | Percent of Trips* |  |  |  |  |  |  |  |  |  |  |  | $\begin{gathered} \text { Change } \\ 1990 \text { to } \\ 2018 \\ \hline \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Travel Mode | 2018 | 2015 | 2012 | 2009 | 2006 | 2003 | 2000 | 1998 | 1996 | 1994 | 1992 | 1990 |  |
| 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 |  |

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.

[^2]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.

Figure 9: Modal Split of Miles for the Work Commute, 1990-2018

| Travel Mode | Percent of Work Commute Miles |  |  |  |  |  |  |  |  |  |  |  | Change 1990 to 2015 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 2018 | 2015 | 2012 | 2009 | 2006 | 2003 | 2000 | 1998 | 1996 | 1994 | 1992 | 1990 |  |
| 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 |  |

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 10: Percent of Work Commute Trips and Miles: Boulder Compared to the U.S., 1990-2018


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 ( $\mathrm{N}=35$ ). 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.

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

| Travel Mode | Location of Workplace |  |  |
| :--- | ---: | ---: | ---: |
|  | 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 12: Modal Split of Work Commute Trips for Boulder Valley Residents Who Work in Boulder, 1990-2018

|  | Percent of Work Commute Trips for BV Residents Who Work in Boulder |  |  |  |  |  |  |  |  |  |  |  | Change 1990 to 2015 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Travel Mode | 2018 | 2015 | 2012 | 2009 | 2006 | 2003 | 2000 | 1998 | 1996 | 1994 | 1992 | 1990 |  |
| 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 ( $\pm 4 \%$ ) 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) for work-related travel. How often, if ever, do you telecommute for work? (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.) | Percent of Respondents |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | 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 you completed the travel diary? | Percent of Respondents |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 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.

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

| 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? <br> (2009-2018 wording)* |  | Percent of Respondents Who Telecommuted on Diary Day |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 2018 |  | 2015 |  | 2012 |  | 2009 |  | 2006 | 2003 | 2000 |
| Yes, reduced about 2 drive-alone trips | Yes | 38.5\% | 49.7\% | 27.0\% | 45.0\% | 29.0\% | $\begin{array}{r} 45.1 \\ \% \end{array}$ | 26.2\% | 40.2\% | 45.0\% | 44.1\% | 44.3\% |
| Yes, reduced more than 2 drive-alone trips |  | 11.2\% |  | 28.0\% |  | 16.1\% |  | 13.9\% |  |  |  |  |
| 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 |

*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.

Figure 16: Percent of Teleworkers Who Made Any Trip Making a Work-Related Trip on the Travel Diary Day, 1996-2018


## 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.

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

| Travel Mode | Percent of Trips Made by CU Students |  |  |  |  |  |  |  |  |  |  |  | Change 1990 to 2018 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 2018 | 2015 | 2012 | 2009 | 2006 | 2003 | 2000 | 1998 | 1996 | 1994 | 1992 | 1990 |  |
| 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 |  |

No modes had statistically significantly differences between 1990 and 2018.
Modes with shifts that are statistically significant different between 2015 and 2018 are bolded.

[^3]Figure 18: Modal Split of School Commute Trips Made by CU Students, 1990-2018

| Travel Mode | Percent of School Commute Trips Made by CU Students |  |  |  |  |  |  |  |  |  |  |  | Change 1990 to 2018 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 2018 | 2015 | 2012 | 2009 | 2006 | 2003 | 2000 | 1998 | 1996 | 1994 | 1992 | 1990 |  |
| 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 |  |

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.

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

| Summary Travel Characteristics | Year |  |  |  |  |  |  |  |  |  |  |  | $\begin{gathered} \hline \text { Change } \\ 1990- \\ 2018 \\ \hline \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 2018 | 2015 | 2012 | 2009 | 2006 | 2003 | 2000 | 1998 | 1996 | 1994 | 1992 | 1990 |  |
| 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 |

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.

[^4]
## 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.

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

| Summary Travel Characteristics | Year |  |  |  |  |  |  |  |  |  |  |  | $\begin{gathered} \text { Change } \\ 1990- \\ 2018 \\ \hline \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 2018 | 2015 | 2012 | 2009 | 2006 | 2003 | 2000 | 1998 | 1996 | 1994 | 1992 | 1990 |  |
| 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 |

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. (NHTS*) |  |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| Summary Travel <br> Characteristics | $\mathbf{2 0 1 8}$ | $\mathbf{2 0 1 5}$ | $\mathbf{1 9 9 0}$ | Annual <br> Percent Change | $\mathbf{2 0 1 7 *}$ | $\mathbf{2 0 0 9}$ | 1990 | Annual <br> Percent Change |
| Average estimated <br> trip length in miles | 4.6 | 5.1 | 5.2 | $-0.18 \%$ | 11.46 | 11.79 | 10.65 | $0.56 \%$ |
| Average estimated <br> trip time in minutes | 19.7 | 22.3 | 15.1 | $2.31 \%$ | 26.58 | 23.85 | 19.60 | $1.14 \%$ |

[^5]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.

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

| Location of Workplace | Percent of Respondents |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 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 |

## 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.

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

| Summary Travel Characteristics | $\mathbf{2 0 1 8}$ | $\mathbf{2 0 1 5}$ | $\mathbf{2 0 1 2}$ | $\mathbf{2 0 0 9}$ | $\mathbf{2 0 0 6}$ | $\mathbf{2 0 0 3}$ | $\mathbf{2 0 0 0}$ | 1998 | 1996 | 1994 | 1992 | 1990 |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| Average number of SOV trips <br> 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 <br> at least one SOV trip | $\mathbf{5 3 . 4 \%}$ | $\mathbf{4 8 . 1 \%}$ | $\mathbf{4 9 . 5 \%}$ | $53.6 \%$ | $56.8 \%$ | $56.6 \%$ | $62.8 \%$ | $59.5 \%$ | $60.2 \%$ | $63.0 \%$ | $60.0 \%$ | $64.6 \%$ |
| Average number of SOV trips per day per <br> 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 |

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 | $\mathbf{2 0 1 8}$ | $\mathbf{2 0 1 5}$ | $\mathbf{2 0 1 2}$ | $\mathbf{2 0 0 9}$ | $\mathbf{2 0 0 6}$ | $\mathbf{2 0 0 3}$ | $\mathbf{2 0 0 0}$ | $\mathbf{1 9 9 8}$ | $\mathbf{1 9 9 6}$ | $\mathbf{1 9 9 4}$ | $\mathbf{1 9 9 2}$ | $\mathbf{1 9 9 0}$ |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| Average number of MOV trips <br> 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 <br> 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 <br> 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.

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

| Calculating per capita VMT | $\mathbf{2 0 1 8}$ | $\mathbf{2 0 1 5}$ | $\mathbf{2 0 1 2}$ | $\mathbf{2 0 0 9}$ | $\mathbf{2 0 0 6}$ | $\mathbf{2 0 0 3}$ | $\mathbf{2 0 0 0}$ | 1998 | 1996 | 1994 | 1992 | 1990 |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| Average number of SOV trips <br> 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 <br> (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 <br> 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 <br> (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 <br> (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 <br> (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 |

## 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.

Figure 26: Vehicle Occupancy, 1990-2018

| Number of Occupants | Percent of Total Auto Trips |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 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 |

## 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 has increased somewhat over the study period, from 1.98 bicycles per household in 1992 (the 1990 household survey did not ask about bicycles) to 2.59 bicycles per household in 2018.

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

| Vehicle and Bicycle Availability | $\mathbf{2 0 1 8}$ | $\mathbf{2 0 1 5}$ | $\mathbf{2 0 1 2}$ | $\mathbf{2 0 0 9}$ | $\mathbf{2 0 0 6}$ | $\mathbf{2 0 0 3}$ | $\mathbf{2 0 0 0}$ | 1998 | 1996 | 1994 | 1992 | 1990 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Average vehicle availability <br> (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 <br> 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 <br> 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 <br> asked |

[^6]
## 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.

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

| Summary Travel Characteristics | $\mathbf{2 0 1 8}$ | $\mathbf{2 0 1 5}$ | $\mathbf{2 0 1 2}$ | $\mathbf{2 0 0 9}$ | $\mathbf{2 0 0 6}$ | $\mathbf{2 0 0 3}$ | $\mathbf{2 0 0 0}$ | $\mathbf{1 9 9 8}$ | $\mathbf{1 9 9 6}$ | 1994 | 1992 | 1990 |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| Average number of bus trips <br> 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 <br> a 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 <br> 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 |

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 | $\mathbf{2 0 1 5}$ | $\mathbf{2 0 1 2}$ | 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 aske |  |  |  |  |

** 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.

Figure 31: Eco-Pass Status, 1998-2018

| Do you have an Eco-Pass? | $\mathbf{2 0 1 8}$ | $\mathbf{2 0 1 5}^{\dagger}$ | $\mathbf{2 0 1 2}^{\dagger}$ | $\mathbf{2 0 0 9}^{\dagger}$ | 2006 | 2003 | 2000 | 1998 |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | :---: |
| no | $\mathbf{5 7 . 4 \%}$ | $\mathbf{5 1 . 4 \%}$ | $56.9 \%$ | $56.4 \%$ | $61.9 \%$ | $\mathbf{5 3 . 9 \%}$ | $60.7 \%$ | $61.0 \%$ |
| 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 |

'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?** | $\mathbf{2 0 1 8}$ | $\mathbf{2 0 1 5}$ | $\mathbf{2 0 1 2}$ | 2009 |
| :--- | ---: | ---: | ---: | ---: |
| More than once a week | $32.6 \%$ | $31.2 \%$ | $\mathbf{3 3 . 0} \%$ | $\mathbf{4 1 . 4 \%}$ |
| 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.

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

| Summary Travel Characteristics | 2018 | $\mathbf{2 0 1 5}$ | $\mathbf{2 0 1 2}$ | $\mathbf{2 0 0 9}$ | $\mathbf{2 0 0 6}$ | $\mathbf{2 0 0 3}$ | $\mathbf{2 0 0 0}$ | 1998 | 1996 | 1994 | 1992 | 1990 |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| Average number of pedestrian trips <br> 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 <br> 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 <br> per day per person who made at <br> 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 <br> 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 <br> 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 <br> 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 35: Summary Trip Characteristics, Bicycle Trips, 1990-2018

| Summary Travel Characteristics | 2018 | $\mathbf{2 0 1 5}$ | $\mathbf{2 0 1 2}$ | $\mathbf{2 0 0 9}$ | $\mathbf{2 0 0 6}$ | $\mathbf{2 0 0 3}$ | $\mathbf{2 0 0 0}$ | 1998 | 1996 | 1994 | 1992 | 1990 |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| Average number of bicycle trips per <br> 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 <br> one bicycle trip | $\mathbf{2 7 . 0 \%}$ | $\mathbf{3 2 . 7 \%}$ | $25.2 \%$ | $23.9 \%$ | $20.4 \%$ | $23.2 \%$ | $17.1 \%$ | $15.0 \%$ | $16.6 \%$ | $19.8 \%$ | $20.9 \%$ | $15.2 \%$ |
| Average number of bicycle trips per <br> day per person who made at least <br> 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 <br> 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 <br> 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.

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

| In the last week, about how frequently | to shop, get a meal or run errands |  |  |  | for commuting |  |  |  | for fun or exercise |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 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 37: Bicycle Trips for Work and Recreation, 2000-2018

| Number of Times per week a | Bicycle trips for work (commuting) |  |  |  |  |  |  | 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 |

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

| 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 |

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 $6: 00 \mathrm{pm}$ ), and smaller peaks for the morning commute time and the noontime lunch hour.

Figure 40: Time When Trip Began, 2018


Trip start time

## 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).

Figure 41: Deliveries Received by Respondents, 1998-2018

| 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 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 |

[^7]
## 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.

Figure 43: Purpose of Trips, 1990-2018

| Trip Purpose |  | 2018 | 2015 | 2012 | 2009 | 2006 | 2003 | 2000 | 1998 | 1996 | 1994 | 1992 | 1990 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Go Home |  | 34.2\% | 35.0\% | 34.7\% | 33.7\% | 33.1\% | 33.3\% | 33.7\% | 32.0\% | 31.6\% | 32.8\% | 32.3\% | 33.6\% |
| $\begin{aligned} & \text { Y ̀̀ } \\ & \stackrel{y}{3} \end{aligned}$ | 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\% |
|  | 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\% |  |  |  |  |
| Social/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\% |
| Shopping |  | 11.1\% | 9.6\% | 11.1\% | 10.3\% | 11.5\% | 10.8\% | 11.0\% | 10.2\% | 11.3\% | 10.6\% | 11.7\% | 11.0\% |
| Personal 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\% |
| School |  | 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\% |
| Change 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\% |
| Other |  | 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\% |
| Number 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 |

Figure 44: Purpose of Trips Miles, 1990-2018

| Trip Purpose |  | 2018 | 2015 | 2012 | 2009 | 2006 | 2003 | 2000 | 1998 | 1996 | 1994 | 1992 | 1990 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Go Home |  | 36.6\% | 35.7\% | 35.4\% | 34.3\% | 35.5\% | 30.3\% | 32.5\% | 31.7\% | 32.1\% | 32.7\% | 33.8\% | 34.3\% |
| $\begin{aligned} & \text { Y } \\ & \stackrel{y}{3} \end{aligned}$ | 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\% |
|  | 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\% |  |  |  |  |
| Social/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\% |
| Shopping |  | 6.1\% | 6.3\% | 8.4\% | 6.9\% | 8.5\% | 7.0\% | 8.7\% | 6.6\% | 7.0\% | 5.7\% | 7.3\% | 7.8\% |
| Personal 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\% |
| School |  | 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\% |
| Change 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\% |
| Other |  | 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\% |
| Number 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.

Figure 45: Purpose of Trips by Travel Mode, 2018

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

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

| Modal Split of All Trips | Percent of Trips by Trip Purpose |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\begin{aligned} & \text { © } \\ & \text { 응 } \\ & \text { 응 } \end{aligned}$ |  | 응 응 - |  |  |  |  |  |  |  |
| 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\% |
| Total | 100\% | 100\% | 100\% | 100\% | 100\% | 100\% | 100\% | 100\% | 100\% | 100\% |
|  | 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


[^8]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.

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

|  | Percent of Trips by Travel Mode |  |  |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: |
|  | Single- <br> Occupancy <br> Vehicle | Multiple- <br> Occupancy <br> Vehicle | Transit | Bicycle | Foot |
|  | $60.4 \%$ | $72.1 \%$ | $18.9 \%$ | $52.4 \%$ | $61.7 \%$ |
| 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 50: Modal Split of All Trips by Type of Trip, 2018

| Modal Split of All Trips | Percent of Trips by Type of Trip |  |  |
| :--- | ---: | ---: | ---: |
|  | Home-based Other | Home-based Work | Non-home Based |
|  | $37.1 \%$ | $39.1 \%$ | $34.6 \%$ |
| 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.

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

|  | 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 | $1.88{ }^{\wedge}$ | 1.86 | 1.89 | 1.78 | 1.77 |

*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 $0.19 \%$.

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

| Travel Mode | Boulder |  |  |  |  |  | U.S. NHTS/NPTS* |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 2018 |  | 2009 |  | 1990 |  | 2017* | 2009 | 1990 |
| SOV | 36.7\% | 57.7\% | 37.1\% | 60.8\% | 44.2\% | 70.5\% | 82.6\% | 83.4\% | 87.7\% |
| MOV | 21.0\% |  | 23.7\% |  | 26.3\% |  |  |  |  |
| Public Transportation/ Transit | 5.2\% |  | 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\% | 16.9\% | 0.1\% | 16.0\% | 0.6\% | 9.9\% | 4.4\% | 4.2\% | 3.3\% |
| Bike | 16.9\% |  | 15.9\% |  | 9.1\% |  |  |  |  |
| Total | 100\% |  | 100\% |  | 100\% |  | 100\% | 100\% | 100\% |

*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.

| Travel Mode | Boulder |  |  |  |  |  | U.S. NHTS/NPTS* |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 2018 |  | 2009 |  | 1990 |  | 2017* | 2009 | 1990 |
| SOV | 41.7\% | 76.6\% | 46.1\% | 82.0\% | 50.0\% | 87.7\% | 76.4\% | 88.3\% | 88.4\% |
| MOV | 34.9\% |  | 35.9\% |  | 37.7\% |  |  |  |  |
| Public Transportation/Transit | 10.7\% |  | 6.9\% |  | 4.1\% |  | 2.6\% | 1.5\% | 2.1\% |
| Walk | 3.5\% | 12.6\% | 2.5\% | 11.1\% | 3.0\% | 8.1\% | 21.0\% | 10.2\% | 9.5\% |
| School Bus | 0.0\% |  | 0.5\% |  | 0.2\% |  |  |  |  |
| Bike | 9.1\% |  | 8.1\% |  | 4.9\% |  |  |  |  |
| Total | 100\% |  | 100\% |  | 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.

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

| Travel Mode | Boulder |  |  |  |  |  | U.S. NHTS/NPTS* |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 2018 |  | 2009 |  | 1990 |  | 2017* | 2009 | 1990 |
| SOV | 34.3\% | 39.3\% | 47.4\% | 55.9\% | 66.6\% | 76.5\% | 87.5\% | 89.4\% | 87.8\% |
| MOV | 5.0\% |  | 8.5\% |  | 9.9\% |  |  |  |  |
| 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\% |

* 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.

| Travel Mode | Boulder |  |  |  |  |  | NHTS/NPTS |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 2018 |  | 2009 |  | 1990 |  | 2017* | 2009 | 1990 |
| SOV | 45.0\% | 49.7\% | 59.7\% | 688\% | 71.9\% | 828\% | 91.2\% | 94.9\% | \% |
| MOV | 4.7\% | 49.7\% | 9.1\% | \% | 10.9\% | \% | \% | \% | \% |
| Public Transportation/ Transit |  | 33.1\% |  | 19.5\% |  | 11.2\% | 5.8\% | 4.2\% | 2.6\% |
| Walk | 2.1\% | 16.0\% | 1.1\% | 11.7\% | 1.3\% | 60\% | \% | \% | ) |
| Bike | 13.9\% |  | 10.6\% | \% | 4.7\% | .0\% | \% | \% | \% |
| 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.

Figure 56: Respondent Characteristics

| Survey Respondent Characteristic | 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 57: Modal Split of All Trips by Respondent Characteristics, part 1

| Modal Split of All Trips | Sex of Respondent |  | Age of Respondent |  | CU Student? |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | male | female | $\mathbf{1 6 - 3 4}$ | $\mathbf{3 5 - 5 4}$ | $\mathbf{5 5 +}$ | NOT a <br> student | CU <br> student |
|  | $30.9 \%$ | $41.2 \%$ | $30.7 \%$ | $34.2 \%$ | $52.5 \%$ | $38.0 \%$ | $28.2 \%$ |
| 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 | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ |

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

|  | Have Children? |  | Tenure Status |  | Type of Housing Unit |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | No children | Have children | Owner- <br> Occupied | Renter- <br> Occupied | Attached <br> (Multi-Family <br> Housing) | Detached <br> (Single- <br> Family) |
| Single-Occupancy <br> Vehicle | $42.3 \%$ | $28.3 \%$ | $42.8 \%$ | $30.2 \%$ | $31.9 \%$ | $41.2 \%$ |
| Multiple-Occupancy <br> Vehicle with Adults Only | $15.8 \%$ | $3.6 \%$ | $13.2 \%$ | $11.6 \%$ | $11.1 \%$ | $13.8 \%$ |
| Multiple-Occupancy <br> Vehicle with Children | $2.5 \%$ | $33.1 \%$ | $14.2 \%$ | $4.6 \%$ | $5.1 \%$ | $13.8 \%$ |
| Bus (Transit), including <br> 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 | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ |
|  | $N=1,995$ | $N=748$ | $N=1,753$ | $N=1,974$ | $N=2,019$ | $N=1,717$ |

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

| Modal Split of All Trips | Ratio of Autos to Drivers |  | HH own any bikes? |  |
| :---: | :---: | :---: | :---: | :---: |
|  | 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\% |
| Total | 100.0\% | 100.0\% | 100.0\% | 100.0\% |
|  | $N=1,121$ | $N=2,597$ | $N=3,242$ | $N=481$ |

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

| Modal Split of All Trips | Have an Eco-Pass? |  | Day of the Week |  |
| :--- | :---: | :---: | :---: | :---: |
|  | No, don't have | Yes, <br> 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 | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ |
|  | $N=1,543$ | $N=2,237$ | $N=1,038$ | $N=2,812$ |

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

|  | Sex of <br> Respondent |  | Age of Respondent |  |  | CU Student? |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | male | female | $\mathbf{1 6 - 3 4}$ | $\mathbf{3 5 - 5 4}$ | $\mathbf{5 5 +}$ | NOT a <br> student | CU <br> student |
|  | $18.2 \%$ | $54.1 \%$ | $24.3 \%$ | $42.9 \%$ | $61.4 \%$ | $36.6 \%$ | $10.9 \%$ |
| 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 | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ |

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

|  | Have Children? |  | Tenure Status |  | Type of Housing Unit |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | No children | Have children | Owner- <br> Occupied | Renter- <br> Occupied | Attached <br> (Multi-Family <br> Housing) | Detached <br> (Single- <br> Family) |
| Single-Occupancy Vehicle | $41.9 \%$ | $35.6 \%$ | $45.8 \%$ | $25.4 \%$ | $26.1 \%$ | $47.5 \%$ |
| Multiple-Occupancy <br> Vehicle with Adults Only | $3.1 \%$ | $2.0 \%$ | $0.2 \%$ | $3.7 \%$ | $3.5 \%$ | $0.2 \%$ |
| Multiple-Occupancy <br> Vehicle with Children | $0.5 \%$ | $11.5 \%$ | $5.6 \%$ | $0.4 \%$ | $0.1 \%$ | $6.8 \%$ |
| Bus (Transit), including <br> 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 | $14.8 \%$ | $11.9 \%$ | $9.1 \%$ | $18.8 \%$ | $18.4 \%$ | $8.6 \%$ |
| }{} | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ |
|  | $N=276$ | $N=127$ | $N=257$ | $N=440$ | $N=469$ | $N=230$ |

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

| Modal Split of Work Commute Trips | Ratio of Autos to Drivers |  | HH own any bikes? |  |
| :--- | :---: | :---: | :---: | :---: |
|  | Less than 1 <br> vehicle per <br> driver | 1 or more <br> vehicles per <br> 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 | $23.6 \%$ | $12.0 \%$ | $12.8 \%$ | $35.4 \%$ |
| Total | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ |

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

| Modal Split of Work Commute Trips | Have an Eco-Pass? |  | Day of the Week |  |
| :--- | :---: | :---: | :---: | :---: |
|  | No, don't have | Yes, <br> 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 | $8.3 \%$ | $18.4 \%$ | $5.9 \%$ | $16.2 \%$ |
| Total | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ | $100.0 \%$ |

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

| Travel Mode | Sex of Respondent |  | Age of Respondent |  | CU Student? |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | male | female | $\mathbf{1 6 - 3 4}$ | $\mathbf{3 5 - 5 4}$ | $\mathbf{5 5 +}$ | NOT a <br> student | CU <br> student |
|  | $48.9 \%$ | $57.4 \%$ | $48.6 \%$ | $55.7 \%$ | $58.8 \%$ | $54.3 \%$ | $46.3 \%$ |
| 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 | $N=387$ | $N=384$ | $N=392$ | $N=197$ | $N=185$ | $N=643$ | $N=131$ |

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

Figure 66: Percent of Respondents Making at Least One Trip Using Each Mode by Respondent Characteristics, part 2

|  | Have Children? |  | Tenure Status |  | Type of Housing Unit |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: |
|  |  |  | Population in <br> Owner- <br> Occupied <br> Home | Population in <br> Renter- <br> Occupied <br> Home | Attached <br> (Multi-Family <br> Housing) | Detached <br> (Single- <br> Family) |
| Travel Mode | No children | Have children |  |  |  |  |

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

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

| Travel Mode | Ratio of Autos to Drivers |  | HH own any bikes? |  |
| :--- | :---: | :---: | :---: | :---: |
|  | Less than 1 <br> vehicle per driver | 1 or more <br> vehicles per <br> 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 | $N=245$ | $N=518$ | $N=654$ | $N=109$ |

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

| Travel Mode | Have an Eco-Pass? |  | Day of the Week |  |
| :--- | :---: | :---: | :---: | :---: |
|  | No, don't have | Yes, <br> have Eco-Pass | weekend | weekday |
|  | $54.1 \%$ | $51.5 \%$ | $42.3 \%$ | $59.2 \%$ |
| 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.

Figure 70: Key Characteristics of the Transportation Segments

| Segment | Percent of Population | Average Percent of Trips Made Via Each Mode | Other Characteristics |
| :---: | :---: | :---: | :---: |
| mostly drive <br> alone | 25\% | SOV, 90\% <br> MOV, 7\% <br> Bus, 0\% <br> Bike, 1\% <br> Foot, 2\% | - Highest proportion of households with one or more vehicles per driver ( $83 \%$ ). <br> - Among the highest proportion of female members ( $66 \%$ ). <br> - Along with those who didn't leave the house they were the least likely to have an Eco-Pass (40\% had an Eco-Pass) <br> - Lowest proportion of employed people who worked in Boulder (65\%). <br> - Highest proportion living in a detached home (58\%) |
| mostly carpool | 17\% | SOV, 7\% <br> MOV, 83\% <br> Bus, 1\% <br> Bike, $2 \%$ <br> Foot, 7\% | - Highest proportion of households that included children (50\%) <br> - 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\%). <br> - The most likely to have ridden a bicycle in the last week for commuting ( $87 \%$ ), for shopping/errands ( $82 \%$ ), or for fun or exercise ( $75 \%$ ). <br> - Highest proportion of male members (63\%). <br> - Highest proportion of employed people who worked in Boulder (85\%). <br> - Lowest proportion of members aged 55+ (8\%). |
| mostly walk | 14\% | SOV, 4\% <br> MOV, $6 \%$ <br> Bus, 16\% <br> Bike, 3\% <br> Foot, 71\% | - Highest proportion of members with an Eco-Pass (71\%). <br> - Among the most likely to have less than one vehicle per drive (46\%). <br> - Among the youngest; $66 \%$ were age 18-34. <br> - Highest proportion of CU students (30\%). <br> - Highest proportion with annual household incomes less than $\$ 50,000(33 \%)$. |
| mixed <br> mode | 17\% | SOV, 42\% <br> MOV, 18\% <br> Bus, 6\% <br> Bike, 9\% <br> Foot, 26\% | - A high proportion of members with an Eco-Pass (68\%). <br> - Among the highest proportion of CU students ( $21 \%$ ). <br> - 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). <br> - 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 <br> - Of those employed, $27 \%$ said they telecommuted every day for work <br> - Among the most likely to have less than one vehicle per drive ( $50 \%$ ). <br> - Highest proportion of members aged 55+ (45\%). <br> - Among the highest proportion of people with annual household incomes less than \$50,000 (30\%). <br> - Least likely to have a bike in their household ( $66 \%$ had one). |

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

| Percent of Trips Made by: | mostly <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 72: Frequency of Bike Use for Shopping, Meals and Errands by Transportation Segment

| How frequently in last week <br> ridden a bicycle to shop, get <br> a meal or run errands? | mostly <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 <br> ridden a bicycle for <br> commuting? | mostly <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 <br> ridden a bicycle for fun or <br> exercise? | mostly <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ |

Figure 75: Employment Status by Transportation Segment

| Are you employed? | mostly <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 76: City of Employment by Transportation Segment

| City where respondent <br> works | mostly <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 <br> telecommute for work? <br> (Among those who are <br> employed.) | mostly <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> house | OVERALL |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Every work day (l always work <br> 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 <br> the survey? <br> (Among those who are <br> employed and at least <br> occasionally telework.) | mostly <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> house | OVERALL |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| No | $72 \%$ | $84 \%$ | $93 \%$ | $85 \%$ | $63 \%$ | $36 \%$ | $78 \%$ |
| Yes | $28 \%$ | $16 \%$ | $7 \%$ | $15 \%$ | $37 \%$ | $64 \%$ | $22 \%$ |
| Total | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ |

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

| Receive any goods or <br> services by delivery? | mostly <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 80: Substitution of Travel by Deliveries by Transportation Segment

| Did deliveries substitute for <br> travel? | mostly <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 <br> Eco-pass | mostly <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 | $23 \%$ | $35 \%$ | $19 \%$ | $19 \%$ | $60 \%$ | $58 \%$ | $33 \%$ |

Figure 83: Ratio of Autos to Drivers by Transportation Segment

| Ratio of Autos to Drivers | mostly <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 84: Household Bicycle Ownership by Transportation Segment

| Household own any <br> bicycles? | mostly <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> house | OVERALL |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| NOT a student | $92 \%$ | $85 \%$ | $79 \%$ | $86 \%$ | $70 \%$ | $78 \%$ | $83 \%$ |
| CU student | $8 \%$ | $15 \%$ | $21 \%$ | $14 \%$ | $30 \%$ | $22 \%$ | $17 \%$ |
| Total | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ |

Figure 88: Housing Tenure by Transportation Segment

| Tenure | mostly <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 89: Type of Housing Unit by Transportation Segment

| Type of Housing Unit | mostly <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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

| Annual Household Income | mostly <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 <br> in Household? | mostly <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 <br> drive alone | mostly <br> carpool | mixed <br> mode | mostly <br> bike | mostly <br> walk | did not <br> leave <br> 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 ${ }^{\text {TM }} / \mathrm{NCOA}^{2}$ 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

| Type of Mailings | Number of Recipients | Returned with Undeliverable Address | Eligible to Participate | Returned a Usable Travel Diary |  |  | Response <br> Rate |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Hard Copy | App | Total |  |
| "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) | $9 \%$ $12 \%$ | $11 \%$ $16 \%$ | 15\% | 15\% | 18\% | 18\% | 19\% | 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

[^9]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" (www.mapquest.com/directions) was used to estimate trip distances, replaced by Google Maps (maps.google.com) in 2009.

[^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 $\operatorname{SPSS®\text {,astatisticalsoftwarepackage,foranalysis.}}$

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.

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

| 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\% |

* 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).

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

|  | 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 | $26.9 \%$ | $35.6 \%$ |

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 97: Comparison of 2018 Modal Split of All Trips and Work Commute Trips by Travel Diary Version

| Travel Mode | All Trips |  |  | Work Commute Trips |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Hard Copy | App | Overall | Hard Copy | App | 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.

Figure 98: Comparison of Weighted Employment Characteristics over Time

| Employment Characteristics | $\mathbf{2 0 1 8}$ | $\mathbf{2 0 1 5}$ | $\mathbf{2 0 1 2}$ | $\mathbf{2 0 0 9}$ | $\mathbf{2 0 0 6}$ | $\mathbf{2 0 0 3}$ |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: |
| 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 | $7.3 \%$ | $5.0 \%$ | $5.1 \%$ | $6.7 \%$ | $7.1 \%$ | $6.8 \%$ |

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 |  |  |  |
|  | $\mathbf{2 0 1 8}$ | $\mathbf{2 0 1 5}$ | $\mathbf{2 0 1 2}$ | $\mathbf{2 0 1 8}$ | $\mathbf{2 0 1 5}$ | $\mathbf{2 0 1 2}$ | $\mathbf{2 0 1 8}$ | $\mathbf{2 0 1 5}$ | $\mathbf{2 0 1 2}$ |  |
| Travel Mode | $28.6 \%$ | $32.5 \%$ | $40.2 \%$ | $30.1 \%$ | $57.0 \%$ | $66.7 \%$ | $53.0 \%$ | $68.6 \%$ | $83.7 \%$ |  |
| Single-Occupancy Vehicle | $3.0 \%$ | $6.0 \%$ | $3.5 \%$ | $4.5 \%$ | $6.4 \%$ | $7.1 \%$ | $12.2 \%$ | $13.0 \%$ | $10.4 \%$ |  |
| Multiple-Occupancy Vehicle | $9.9 \%$ | $5.9 \%$ | $11.5 \%$ | $35.7 \%$ | $26.7 \%$ | $13.1 \%$ | $20.2 \%$ | $14.8 \%$ | $3.4 \%$ |  |
| Transit | $39.8 \%$ | $43.7 \%$ | $33.3 \%$ | $9.1 \%$ | $3.8 \%$ | $6.0 \%$ | $13.5 \%$ | $3.0 \%$ | $2.5 \%$ |  |
| Bicycle | $18.7 \%$ | $11.9 \%$ | $11.5 \%$ | $20.6 \%$ | $6.1 \%$ | $7.0 \%$ | $1.1 \%$ | $0.6 \%$ | $0.0 \%$ |  |
| Foot | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ | $100 \%$ |  |
| Total | 550 | 705 | 574 | 37 | 51 | 45 | 134 | 108 | 94 |  |
| Number of Work Commute Trips |  |  |  |  |  |  |  |  |  |  |

## 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.


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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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.


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 $\mathbf{1 6}$ 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,


## 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:
$\square$ Cover letter \& these instructionsTravel Diary
$\square$ Travel Diary overflow sheet
$\square$ Household Travel Survey
$\square$ 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 $81 / 2^{\prime \prime} \times 11^{\prime \prime}$ 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 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 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/ <br> Business | Travel done for work, to someplace other than the workplace. (E.g., sales calls, trips to purchase <br> office supplies for work.) |
| Personal Business | Travel which is made to obtain services, not products. (E.g. bank, post office, doctor, auto <br> repair.) |
| Shopping | Travel to shop or to purchase products. |
| School | Travel by a student to college or school. <br> Travel to school by a teacher or other school employee is a work commute trip. <br> 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 <br> 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 <br> 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., <br> taking a friend to the store, picking up a child from school.) |
| Change Travel | If you drive your car, walk more than one block, or ride your bike to catch the bus, this is a <br> "change travel mode" trip. However, if you transfer from one bus to another, it should not be <br> included in this category because you traveled in buses without changing travel modes. (Be sure <br> 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. <br> Please list what the trip purpose was in the blank provided. Also, if you have a question as to <br> where to put a certain trip because you can't decide between two categories, list it in the <br> "other" category. |

## SPECIAL CIRCUMSTANCES

What if you don't go anywhere 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.

## EXAMPLE OF A COMPLETED TRAVEL DIARY, Page 1



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.

EXAMPLE OF A COMPLETED TRAVEL DIARY, Page 2

| $\begin{gathered} \text { trip } \\ \# \end{gathered}$ | DESTINATION (address, building or nearest cross streets) | trip start time |  | trip end time |  | trip purpose |  | travel method | est. trip miles | number of people in vehicle (inc. yourself) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | hour:min | am/pm | hour:min | $\mathrm{am} / \mathrm{pm}$ |  |  | children |  | adults |
| 5 | Uni. Hills School <br> Broadway <br>  <br> 16th Street | 5:05 | PM | 5:15 | PM | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10. change travel mode |  | 1 car or light truck (driverp2. car or light truck (passenger)  <br> 3. bus/transit (route(s):  <br> 4. school bus 5. large commercial truck <br> 6. motorcycle 7. taxi (passenger) <br> 8. bicycle 9. walk <br> 10. other:  | 1 | 0 | 1 |
| 6 | $\qquad$ | 5:20 | PM | 5:35 | PM | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode | 1 car or light truck (drivers)2. car or light truck (passenger)  <br> 3. bus/transit (route(s):  <br> 4. school bus 5. large commercial truck <br> 6. motorcycle 7. taxi (passenger) <br> 8. bicycle 9. walk <br> 10. other:  | 4 | 1 | 1 |
| 7 | Orchard <br> 19th Street | 5:50 | PM | 6:05 | PM | 1. go home <br> 3. shopping <br> 5. work commute <br> 7 social/recreation <br> 9. drive passenger <br> 11. other: $\qquad$ | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode | 1. car or light truck (driver) <br> 2. car or light truck (passenger) <br> 3. bus/transit (route(s): $\qquad$ <br> 4. school bus <br> 5. large commercial truck <br> 6. motorcycle <br> 7. (passenger) <br> 8. bicycle <br> 9. walk <br> 10. other: $\qquad$ | 1 |  |  |
| 8 | $\qquad$ | 6:05 | PM | 6:20 | PM | 1. go home <br> 3. shoppling <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10. change travel mode | 1. car or light truck (driver) <br> 2. car or light truck (passenger) <br> 3. bus/transit (route(s): <br> 4. school bus 5. large commercial truck <br> 6. motorcycle <br> 7.texifassenger) <br> 8. bicycle <br> 9. walk <br> 10. other: | 1 |  |  |
| 9 | Willow Springs <br> Shopping Center <br> Iris <br>  | 7:15 | PM | 7:40 | AM | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10. change travel mode | 1. car or light truck (driver) <br> 2. car or light truck (passenger) <br> 3. bus/transit (route(s):  <br> 4. school bus 5. large commercial truck <br> 6. motorcycle 7. taxi (passenger) <br> 8. bicycle  <br> 10. other: 9. walk  | 10 <br> blocks |  |  |
| 10 | Home $\qquad$ \& | 8:05 | PM | 8:30 | PM | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10. change travel mode | 1. car or light truck (driver) <br> 2. car or light truck (passenger) <br> 3. bus/transit (route(s):  <br> 4. school bus 5. large commercial truck <br> 6. motorcycle 7. taxi (passenger) <br> 8. bicycle  <br> 10. other: 9. walk  | 10 blocks |  |  |

## 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 |  |
| $:$ |  |
| CityIStatelZip |  |
| $:$ |  |
| DIARY DATE: |  |
|  |  |
|  |  |

## STARTING POINT ADDRESS

## Street Address:

City/StatelZip:
Nearest Cross Streets: $\qquad$ \&

I did not leave the house today:

If using motor vehicle, list odometer reading: at beginning of day: at end of day:


| $\begin{array}{c\|} \hline \text { Trip } \\ \text { segment } \\ \# \\ \hline \end{array}$ | DESTINATION (address, building or nearest cross streets) | trip segment start time |  | trip segment end time |  | trip segment purpose |  | travel method | $\begin{aligned} & \text { est. trip } \\ & \text { segment } \\ & \text { miles } \end{aligned}$ | number of people in vehicle (inc. yourself) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | hour:min | amlpm | hour:min | am/pm |  |  | children |  | adults |
| 4 | \& | __: |  | __: |  | 1. go home <br> 3. shopping <br> 5. work cormute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode |  | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/rail/transit (route(s): $\qquad$ <br> 4. school bus 5. large commercial truck <br> 6. motorcycle/scooter <br> 7 .Lyft, Uber, Taxi <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: |  |  |  |
| 5 | \& | __:__ |  | __ _ |  | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: $\rightarrow$ $\qquad$ | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/rail/transit (route(s): $\qquad$ <br> 4. school bus 5. large commercial truck <br> 6. motorcycle/scooter 7 .Lyft, Uber, Taxi <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: $\rightarrow$ $\qquad$ |  |  |  |
| 6 | \& | _ : _ |  | __ _ |  | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: $\rightarrow$ $\qquad$ | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/rail/transit (route(s): $\qquad$ <br> 4. school bus 5. large commercial truck <br> 6. motorcycle/scooter 7.Lyft, Uber, Taxi <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: $\rightarrow$ $\qquad$ |  |  |  |
| 7 | \& | __:_ |  | __ _ |  | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: $\rightarrow$ $\qquad$ | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/rail/transit (route(s): $\qquad$ <br> 4. school bus 5. large commercial truck <br> 6. motorcycle/scooter <br> 7 .Lyft, Uber, Taxi <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: $\rightarrow$ $\qquad$ |  |  |  |
| 8 | \& | __:_ |  | __:_ |  | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: $\rightarrow$ $\qquad$ | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/rail/transit (route(s): $\qquad$ <br> 4. school bus 5. large commercial truck <br> 6. motorcycle/scooter 7.Lyft, Uber, Taxi <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: $\rightarrow$ $\qquad$ |  |  |  |
| 9 | \& | _ : __ |  | __:_ |  | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: $\rightarrow$ | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/rail/transit (route(s): $\qquad$ <br> 4. school bus <br> 5. large commercial truck <br> 6. motorcycle/scooter <br> 7 .Lyft, Uber, Taxi <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: $\rightarrow$ |  |  |  |

2018 Overflow Sheet

| Trip segment \# | DESTINATION (address, building or nearest cross streets) | trip segment start time |  | trip segment end time |  | trip segment purpose |  | travel method | est. trip segment miles | number of people in vehicle (incl. yourself) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | hour:min | am/pm | hour:min | am/pm |  |  | children |  | adults |
| 10 | \& | -: |  | : _- |  | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: $\rightarrow$ | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode |  | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/transit/rail (route(s): $\qquad$ <br> 4. school bus <br> 5. large commercial truck <br> 6. motorcycle/scooter <br> 7. Lyft, Uber, taxi <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: $\rightarrow$ |  |  |  |
| 11 | \& | _: _ |  | : __ |  | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: $\rightarrow$ $\qquad$ | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/transit/rail (route(s): $\qquad$ <br> 4. school bus <br> 5. large commercial truck <br> 6. motorcycle/scooter <br> 7. Lyft, Uber, taxi <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: $\rightarrow$ |  |  |  |
| 12 | \& | -: |  | : __ |  | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: $\rightarrow$ | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/transit/rail (route(s): $\qquad$ <br> 4. school bus <br> 5. large commercial truck <br> 6. motorcycle/scooter <br> 7. Lyft, Uber, taxi <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: $\rightarrow$ |  |  |  |
| 13 | \& | _: _ |  | - - |  | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/transit/rail (route(s): $\qquad$ <br> 4. school bus <br> 5. large commercial truck <br> 6. motorcycle/scooter <br> 7. Lyft, Uber, taxi <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: |  |  |  |
| 14 | \& | _: |  | - - |  | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: $\rightarrow$ $\qquad$ | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/transit/rail (route(s): $\qquad$ <br> 4. school bus <br> 5. large commercial truck <br> 6. motorcycle/scooter <br> 7. Lyft, Uber, taxi <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: $\rightarrow$ |  |  |  |
| 15 | \& | _ : _ |  | — : _ |  | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: $\rightarrow$ | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/transit/rail (route(s): $\qquad$ <br> 4. school bus <br> 5. large commercial truck <br> 6. motorcycle/scooter <br> 7. taxi (passenger) <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: $\rightarrow$ |  |  |  |


| Trip segment \# | DESTINATION (address, building or nearest cross streets) | trip segment start time |  | trip segment end time |  | trip segment purpose |  | travel method | est. trip segment miles | number of people in vehicle (incl. yourself) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | hour:min | am/pm | hour:min | am/pm |  |  | children |  | adults |
| 16 | \& | : - |  | : - |  | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: $\rightarrow$ $\qquad$ | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode |  | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/transit/rail (route(s): $\qquad$ <br> 4. school bus <br> 5. large commercial truck <br> 6. motorcycle/scooter <br> 7. Lyft, Uber, taxi <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: $\rightarrow$ $\qquad$ |  |  |  |
| 17 | \& | : |  | : _- |  | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: $\rightarrow$ | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/transit/rail (route(s): $\qquad$ <br> 4. school bus <br> 5. large commercial truck <br> 6. motorcycle/scooter <br> 7. Lytt, Uber, taxi <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: $\rightarrow$ |  |  |  |
| 18 | \& | _: |  | : _- |  | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: $\rightarrow$ | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/transit/rail (route(s): $\qquad$ <br> 4. school bus <br> 5. large commercial truck <br> 6. motorcycle/scooter <br> 7. Lyft, Uber, taxi <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: $\rightarrow$ |  |  |  |
| 19 | $\&$ | _: |  | _: _ |  | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: $\rightarrow$ | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/transit/rail (route(s): $\qquad$ <br> 4. school bus 5. large commercial truck <br> 6. motorcycle/scooter <br> 7. Lyft, Uber, taxi <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: $\rightarrow$ |  |  |  |
| 20 | \& | _: |  | —:_ |  | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: $\rightarrow$ | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/transit/rail (route(s): $\qquad$ <br> 4. school bus 5. large commercial truck <br> 6. motorcycle/scooter <br> 7. Lytt, Uber, taxi <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: $\rightarrow$ |  |  |  |
| 21 | $\&$ | _: _ |  | _ : _ |  | 1. go home <br> 3. shopping <br> 5. work commute <br> 7. social/recreation <br> 9. drive passenger <br> 11. other: $\rightarrow$ | 2. personal business <br> 4. school <br> 6. other work/business <br> 8. eat a meal <br> 10.change travel mode | 1. car, light truck, SUV or vanpool (driver) <br> 2. car, light truck, SUV or vanpool (passenger) <br> 3. bus/transit/rail (route(s): $\qquad$ <br> 4. school bus <br> 5. large commercial truck <br> 6. motorcycle/scooter <br> 7. Lyft, Uber, taxi <br> 8. bicycle/B-cycle <br> 9. walk <br> 10. other: $\rightarrow$ |  |  |  |

## 2018 Travel Diary Study <br> HOUSEHOLD TRAVEL SURVEY

Please complete the following survey regarding your household and return it with your Travel Diary in the enclosed postagepaid envelope. The survey should take only a few minutes. It is important because it will help research staff to gauge how 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 kept in 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.)
```
\square \text { no } \rightarrow \quad \text { Go to question \#3}
\square \text { yes } \rightarrow \text { From how many different sources} did you receive deliveries?
\(\square\) sources
```

2. Did the delivery or deliveries substitute for a travel trip you might have made to seek the good or service?
```
\square \mp@code { n o }
\square \mp@code { y e s }
```

3. In the last week, about how frequently have you ridden a bicycle:

| To Shop, Get |  |  |
| :--- | :--- | :--- |
| a Meal or |  |  |
| Run Errands | For Commuting | For Fun or Exercise |
| $\square 5$ or more times | $\square 5$ or more times | $\square 5$ or more times |
| $\square 3$ to 4 times | $\square 3$ to 4 times | $\square 3$ to 4 times |
| $\square$ Once or twice | $\square$ Once or twice | $\square$ Once or twice |
| $\square$ Not at all | $\square$ Not at all | $\square$ Not at all |

4. Are you eligible to have an Eco-Pass, an annual pass that allows you unlimited bus rides?
(Please check all that apply.)
$\square$ yes, through my employer
yes, through my neighborhood
yes, a CU Boulder student Buff One pass
yes, CU Boulder faculty/staff Buff One pass
yes, other pass:
$\square$ no, I am not eligible for an Eco-Pass $\rightarrow$ go to \#7
5. Did you pick up an Eco-Pass or Buff One pass (or passes)?
```
\squareyes
no }->\mathrm{ go to question #7
```

6. About how often, on average, do you use your Eco-Pass?
$\square$ more than once a week
$\square$ about once a week
$\square$ about once every two weeks
$\square$ about once a month
$\square$ less often than once a month
7. Are you employed?
$\square$ no $\rightarrow$ Go to question \#13
$\square$ yes, part-time
$\square$ yes, full-time
8. Please indicate the city in or nearest to your primary work place.

9. Please write in the address, building and/or nearest cross streets of your primary work place.

Building or address: $\qquad$
Nearest cross
streets:
\& $\qquad$
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? (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.)
$\square$ Every work day (I always work from my home)
$\square 3$ to 4 times per week
$\square 2$ to 3 times per week
$\square$ Once or twice a month
$\square$ Occasionally
$\square$ Never
11. Did you telecommute on the day you completed the travel diary?
$\square$ no $\rightarrow$ Go to question \#13
$\square$ yes
12. Did working at home reduce the number of singleoccupancy vehicle (drive alone) trips you made on the day you completed the travel diary compared to days you do not telecommute?
$\square$ no, I made the same number of drive alone trips
$\square$ yes, reduced about 2 drive-alone trips
$\square$ yes, reduced more than 2 drive-alone trips

## HOUSEHOLD INFORMATION

13. How many passenger vehicles does your household own or normally have use of?


Motorcycles/ scooters
14. How many usable bicycles does your household have?

$\square$| Regular |
| :--- |
| bicycles |$\quad \square$| Electric-assisted |
| :--- |
| bicycles |

15. About how much was the TOTAL 2017 income before taxes for your household as a whole? In the total, please include income before taxes as well as money from all sources for all persons living in your household. (For example, include everyone's income from self-employment, gifts, interest on savings, social security, AFDC, the value of food stamps received, pension or disability benefits, child support, as well as wages, tips and salary.)
```
Less than $10,000
\square $10,000 to $19,999
\square $20,000 to $29,999
\square $30,000 to $39,999
\square $40,000 to $49,999
$50,000 to $74,999
$75,000 to $99,999
$100,000 to $149,999
$150,000 or more
```

16. Please check the one choice below which best describes the kind of residence in which you live.
$\square$ a detached single family homea duplex or triplexan apartment
$\square$ a condominium or townhousea mobile home
group quarters (e.g., dormitory, nursing home) $\rightarrow$ go to question \#20
$\square$ other:
17. Do you rent or own your residence?
$\square$ rent $\square$ own
18. Please record the number of household members in each of the following age categories. (Please remember to include yourself.)

Number in
Age category household
0 to 6 years
7 to 14 years
15 to 17 years
18 to 24 years
$\qquad$

25 to 34 years
35 to 44 years
45 to 54 years
55 to 64 years
65 or older
19. Are any of the household members students at the University of Colorado, Boulder campus?

## $\square$ no

$\square$ yes $\rightarrow$ How many are: full-time part time students


## INDIVIDUAL INFORMATION

20. Are you a member of Boulder B-cycle or any other bike share program?
$\square$ no
$\square$ yes
21. Are you a member of any care share program (e.g., eGoCarShare, Zipcar, car2go)?
$\square$ no
$\square$ yes
22. How many years have you lived in Boulder?
(Please write " 0 " if less than 6 months.)

23. Are you a student at the University of Colorado, Boulder campus?
$\square$ no
$\square$ yes
24. What is your gender?
$\square$ male $\square$ female
25. Which category contains your age?
$\square 16$ to 24 years old
25 to 34 years old
35 to 44 years old
$\square 55$ to 54 years old
$\square 5$ to 64 years old
$\square 65$ years or older
26. How much education have you completed?
```
\square to }11\mathrm{ years of school
\square \mp@code { h i g h ~ s c h o o l }
\square \text { some college or associate's degree}
bachelor's degree
\squaregraduate/professional degree
```

27. If you drive, what is the year, make and model of the vehicle you usually drive?

Year: $\qquad$
Make: $\qquad$
Model: $\qquad$

Please email RutschR@bouldercolorado.gov if you would like to receive a summary of the results, once the study is complete.

Thank you very much for taking the time to complete this survey. Please return this with your travel diary in the postage-paid envelope provided.

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 $\mathbf{2 4}$-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 $\mathbf{1 6}$ 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.


Suzanne Jones, Mayor

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Suzanne Jones, Mayor


[^0]:    ${ }^{1}$ 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.)

[^1]:    ${ }^{2}$ 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).

[^2]:    ${ }^{3}$ 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 "nonhome 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.

[^3]:    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."

[^4]:    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.

[^5]:    *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.

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

[^7]:    **Question only asked of those who had received deliveries.

[^8]:    7 This coding scheme was taken from the Puget Sound Council of Governments Travel Study, 1985. Some small alterations were made to the scheme.

[^9]:    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

[^10]:    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
    9 Chuck Green, DRCOG
    10 Simple Correlation of 0.9, p<.001.
    11 Equation used to adjust motorized vehicles: adjusted miles $=(.88 \times$ estimated miles $)+.20$
    Equation used to adjust non-motorized vehicles: adjusted miles $=(.86 \times$ estimated miles $)+.10$

