Nonmotorized Transportation Pilot Program

Summary of 2007 - 2014
Bicycle and Pedestrian Counts and Surveys

January 2015

Prepared for:

GetAbout Columbia
City Hall
701 E. Broadway
Columbia, MO 65201
573.874.7250

Prepared by:

Alta Planning + Design
16141 Swingley Ridge Rd, Suite 300
St. Louis, MO 63017
636.537.5585

alta
PLANNING + DESIGN

TABLE OF CONTENTS

1 Executive Summary

This report presents bicycling and walking data gathered through counts and surveys in the City of Columbia as part of the Non-motorized Transportation Pilot Program (NTPP) since 2007. Pedestrian and cyclist counts took place at seven strategic locations during the second week of September (except for 2011 when counts and surveys were administered during the third week of September), measuring weekday activity during the afternoon peak period and weekend activity during the mid-day peak period. These counts have served as a benchmark for the NTPP project in Columbia, with counts taking place annually to track results from infrastructure and program improvements.

The NTPP is a federally funded project that allocated $25 million each to four communities in the U.S. to determine whether increased investments in programs and projects would result in more people walking and bicycling. Counts and surveys conducted using the National Bicycle and Pedestrian Documentation Project (NBPD) methodology[1] were a key element of this project. NBPD aims to establish a consistent national bicycle and pedestrian count and survey methodology and to generate a national database of count information. This information assists analyses and is used to describe correlations between bicycle and pedestrian activity and a range of factors from land use to demographics to facility-type.

MKT Nature and Fitness Trail

Usage Characteristics

The analytical approach for the count data changed beginning in 2012, as compared with that taken in previous reports, due to the large amount of data now available in Columbia. As pedestrian and bicycle volumes can vary as much as 30% or more on a daily basis at the same location (even on sequential days), the research suggests a more meaningful way to understand trends is to accumulate data over time. The current methodology is described in Section 4. Compared to the 2007 base year, highlights from the 2014 counts based on the 2012-2014 three- year average include:

- **Peak Hour Weekday Pedestrian Activity** – has increased by approximately 52%.
- **Peak Hour Weekend Pedestrian activity** – has increased by approximately 10%.
- **Peak Hour Weekday Bicycle activity** – has increased by approximately 105%.
- **Peak Hour Weekend Bicycle activity** – has increased by approximately 8%.

[1] *http://bikepeddocumentation.org/*

In 2014, locations in Columbia with the highest volumes of combined bicycle and pedestrian activity were:

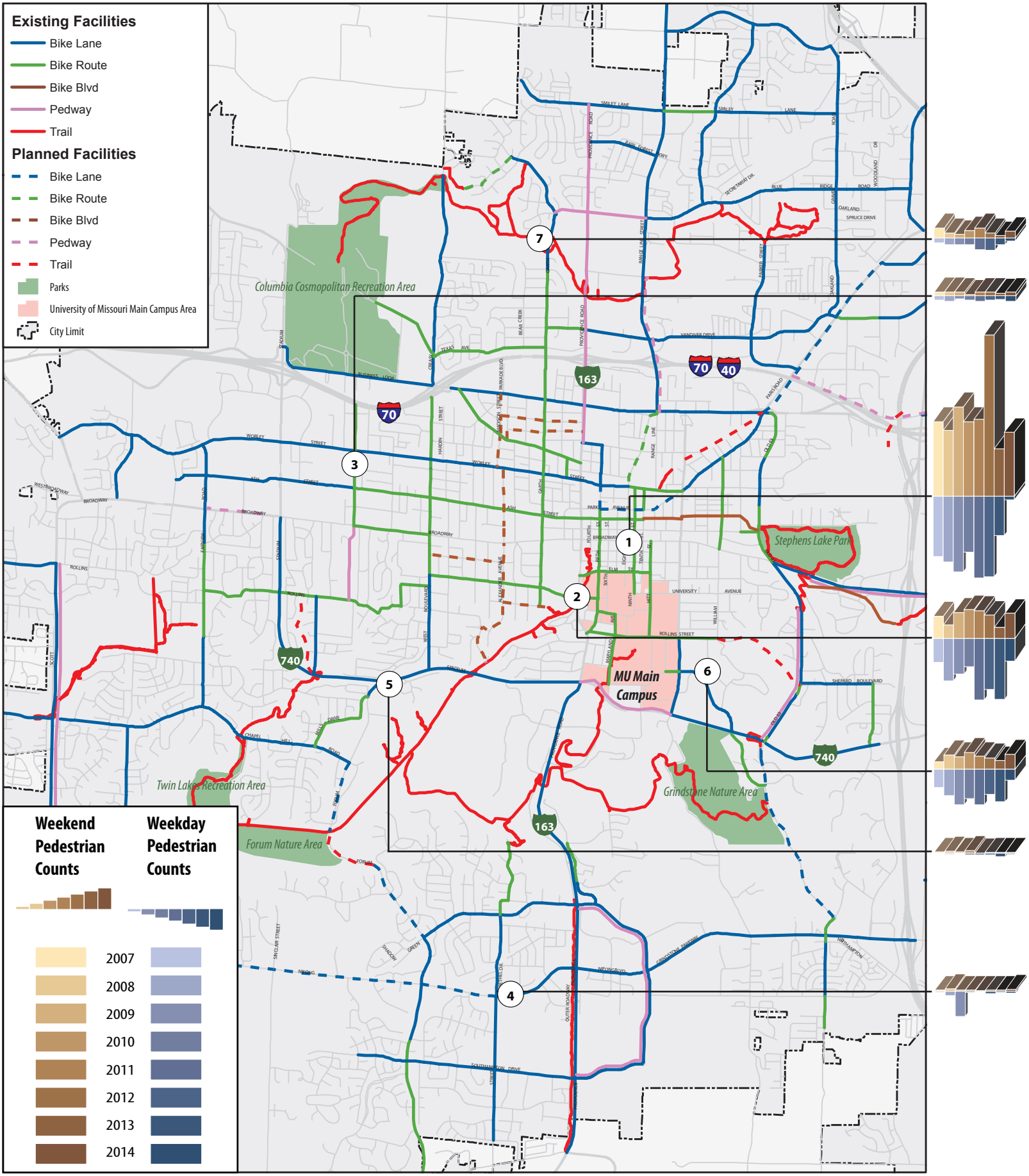
- Broadway between 8th & 9th (618 pedestrians/bicyclists over a 2-hour period on a weekday and a 2-hour period on a weekend day)
- MKT Trail and Stewart Rd (415 pedestrians/bicyclists over a 2-hour period on a weekday and a 2-hour period on a weekend day)
- Ashland Rd. & Burch Rd (218 pedestrians/bicyclists over a 2-hour period on a weekday and a 2-hour period on a weekend day)

A series of maps on pages 3 and 4 present the results of this count program over time. Weekend peak- hour volumes are presented above the x-axis while weekday volumes are presented below the axis. This technique of displaying the results clearly illustrates which locations experience more activity on weekends and which locations experience more activity on weekdays. The maps also illustrate the relative distribution of pedestrian and bicycle activity throughout Columbia. For example, walking is more prevalent near the University of Missouri campus, including at Broadway between 8th & 9th and the intersection of the MKT Trail and Stewart Rd. The intersection of the MKT Trail and Stewart Rd also has the highest bicycling activity.

User Characteristics

Baseline surveys conducted in 2007 compared to subsequent annual surveys through 2014 reveal that walking and bicycling Columbia for both recreational and transportation-related purposes have increased during the last eight years. Approximately 40-50% of surveyed pedestrians and 30-40% of surveyed bicyclists report that their trip was for transportation-related purposes (i.e., work, school, shopping or personal business).

Because of variables such as weather, the count and survey results can vary significantly from year to year. While these results indicate general trends in non-motorized transportation activity levels, it is valuable to measure shifts in transportation modes from multiple sources. Data collection should continue over time. This will increase the understanding changes in non-motorized transportation behavior.



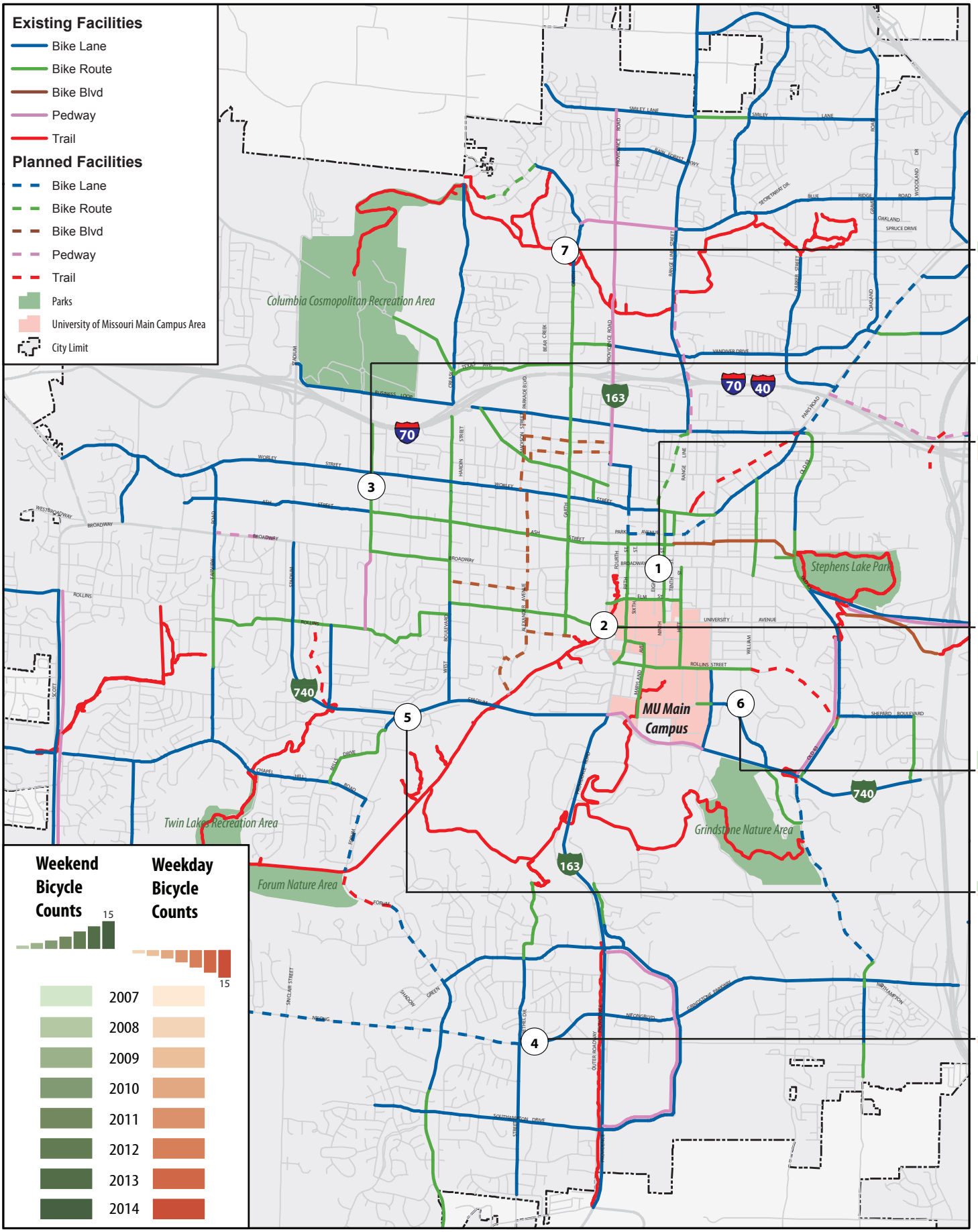
Pedestrian Peak Hour Count Volumes

GetAbout Columbia
Columbia, MO

0 0.5 1 Miles

alta PLANNING + DESIGN

Data obtained from the City of Columbia and Google Earth
Map created on January 07, 2015



Bicycle Peak Hour Count Volumes

GetAbout Columbia
Columbia, MO

0 0.5 1 Miles

alta PLANNING + DESIGN

Data obtained from the City of Columbia and Google Earth
Map created on January 07, 2015

2 Summary of NTPP Count/Survey Objectives

The count and survey effort began in 2007 with the start of the Non-motorized Transportation Pilot Program (NTPP). The count efforts have continued with the objective of identifying shifts in bicycling and walking behavior that occur during and after on-going infrastructure and program improvements. This report summarizes the 2014 count and survey data results.

Columbia's count data is also included in the National Bicycle & Pedestrian Documentation Project (NBPD). The NBPD is a joint national effort of the Institute of Transportation Engineers' (ITE) Pedestrian & Bicycle Council, and Alta Planning + Design. The NBPD provides consistent count and survey methodology and count dates, collects independently conducted count and survey data from across the nation, and analyzes the data to identify walking and bicycling trends and patterns.

The count and survey data provide a detailed understanding of travel patterns. Information about bicycling and walking, trip purpose, trip length, travel frequency, mode choice and seasonal behavior can help identify correlations and causations of travel behavior, leading to more informed modeling that allows transportation planners to make strategic investments. Additionally, surveyed opinions regarding route choice, desires for infrastructure improvements and demographic data can help to develop facilities and programs that properly respond to community needs and conditions.

3 Summary of Methodology

The NTPP count and survey methodology is based on the NBPD methodology, which was created with input from ITE, transportation professionals and best practices nationwide. The core of the NBPD methodology is:

- Consistent count days and times
- Consistent count and survey methods and materials
- Centralized data storage and analysis
- Open access for all research professionals and public agencies

NTPP methodology and materials were further customized for the unique needs of Columbia.

3.1 Number of Count Locations

The Volpe National Transportation Systems Center, which is part of the U.S. Department of Transportation's Research and Innovative Technology Administration, was tasked by the four NTPP communities and the Federal Highway Administration (FHWA) to advise on the evaluation of the program, assist with data collection, and coordinate evaluation methods across the communities. Working with the Volpe Center, Alta Planning + Design customized the NBPD methodology for the four NTPP communities. One of the first steps was to provide guidance on the number of count locations. Alta estimated that, at a minimum, one count should be conducted per 15,000 residents. This was considered a reasonable balance between obtaining representative counts throughout a community and budget limitations. For the City of Columbia, this equated to seven count locations.

3.2 Count Location Criteria

Criteria for count and survey locations followed the rigorous standards developed through the NTPP data collection and analysis program. The number and locations of counts and surveys conducted as part of the pilot program from 2007 through 2010 will continue to be used annually, post-implementation of pilot infrastructure projects and programs.

The criteria for selecting the NTPP project-related count locations include:

- Pedestrian and bicycle activity areas or corridors (downtowns, near schools, parks, etc.)
- Locations near proposed major bicycle/pedestrian improvements
- Representative locations in the urbanized area
- Key corridors that can be used to gauge the impacts of future improvements
- Locations where counts have been conducted historically
- Locations where bicycle and pedestrian collision numbers are high
- Locations where other agencies are conducting ongoing counts through a variety of means, including videotaping gaps and pinch points for bicycling and walking

In Columbia, seven intercept survey locations were identified to measure the impact of selected proposed NTPP projects. Survey locations were chosen based on where projects will ultimately be constructed and where potential users are likely to be traveling now. The same survey locations were used for the duration of the project. Table 1 lists these locations.

Table 1: NTPP Count and Survey Locations

#	Count Locations	Surveys
1	Broadway between 8th & 9th, south side	✓
2	MKT Trail and Stewart Rd.	✓
3	Clinkscales Rd.	✓
4	Nifong Blvd.	
5	S. Stadium Blvd & Forum Blvd.	✓
6	Ashland Rd. & Burch Dr.	✓
7	Bear Creek Trail	✓

3.3 Count Dates and Times

Following NBPD methodology, weekday counts occurred from 4-6 pm and weekend counts from 12-2 pm. Counts were performed on the following days:

Table 2: NTPP Count and Survey Dates

Year	Weekday	Weekend
2007	November 7 (Wednesday)	November 11 (Sunday)
2008	September 16 (Tuesday)	September 13 (Saturday)
2009	September 15 (Tuesday)	September 13 (Sunday)
2010	September 13 (Week of)	September 12 (Sunday)
2011	September 20 (Tuesday)	September 25 (Sunday)
2012	September 18 (Tuesday)	September 16 (Sunday)
2013	September 24 (Tuesday)	September 15 (Sunday)
2014	September 16 (Tuesday)	September 14 (Sunday)

3.4 Count Methodology/Materials

Counters were trained and given maps showing exact screen lines for counts. Counts were manually tallied with standardized forms (see **Appendix A: Figure A-1**). Screen lines are imaginary lines drawn across the right-of-way whereby any non-motorized traffic that crosses that line is noted. Counters recorded volumes of bicyclists and pedestrians, along with information on gender and the participation of children. Additionally, counts also included wrong-way riding and helmet use for bicyclists.

Counts were recorded in 15-minute increments. The peak hour value for each count period is calculated as the four consecutive 15-minute periods with the highest count volumes (i.e., this could be from 4:45-5:45).

4 Summary of Count Data

Tables referenced in this section can be found in Appendix A. Studies have shown that activity levels of bicyclists and pedestrians may vary as much as 30% or more on a daily basis at the same location (even on sequential days). To address this inherent variability in non-motorized activity, the results in this section present activity as a three-year rolling average, with each annual count calculated as the average of the current prior and subsequent year. For example, the 2010 count is the average of the 2009, 2010 and 2011 count. This method, which is used by the New York City Department of Transportation for its Commuter Cycling Indicator[2], tends to mitigate year-to-year variability, instead showing a smoother trend over time. For reference, actual count volumes recorded in each year are provided in Appendix A.

Count activity for pedestrians and bicyclists are also normalized to a base year, as shown in Figures 1 and 2 below. This visualization technique illustrates the percent change in activity (compared to the base year) over time. For example, the Figure 1 indicates that the 2010 recorded weekend pedestrian activity is approximately 130% of the baseline. The base year for the NTPP effort and initial year of this count effort was 2007. Thus, the 2007 annual count value is indexed to a value of 100. For subsequent years, a three-year average is used to smooth the inherent variability in the count values, as described above. For example, the 2010-2012 results in Figure 1 are the average of 2010, 2011, and 2012.

Figures 1 and 2 illustrate that the number of pedestrians and bicyclists counted during peak hours at the seven locations has generally been increasing on both weekdays and weekends. Pedestrian volumes are up 52% and 10% (weekday and weekend) while bicycle volumes are up 105% and 8% (weekday and weekend) over the base year of 2007.

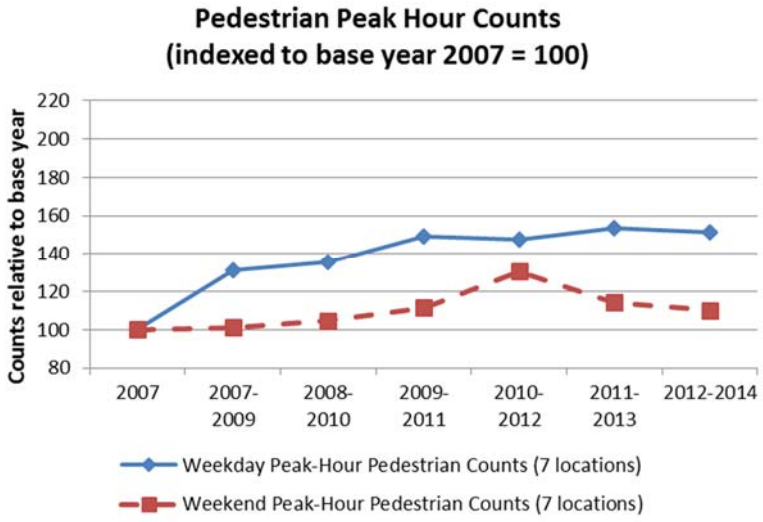


Figure 1: Pedestrian Peak Hour Count Volumes Relative to Base Year

[2] http://www.nyc.gov/html/dot/html/bicyclists/nycbicyclescrct.shtml

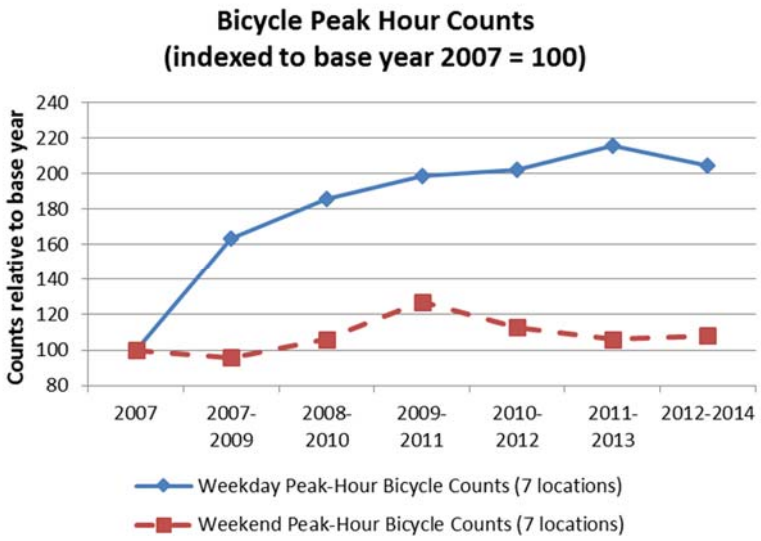


Figure 2: Bicycle Peak Hour Count Volumes Relative to Base Year

4.1 Pedestrian Count Data

Tables A-1 and A-2 show weekday and weekend pedestrian counts over time. The three-year rolling average of counts is used to smooth random variation in the counts from year to year. Figures 3 and 4, display weekday actual peak hour count volumes annual peak hour count volumes and three-year rolling average count volumes, respectively, at the seven locations. Figures 5 and 6 display the same information for weekend counts.

Weekday Pedestrian Peak Hour Volumes by Location

The weekday count figures reflect commuting and utilitarian trip making by foot and show a steady increase in pedestrian activity. The latest three-year average (2012-2014) shows a **54% increase over 2007**, citywide. The highest count locations are Broadway, MKT and Stewart, and Ashland & Burch.

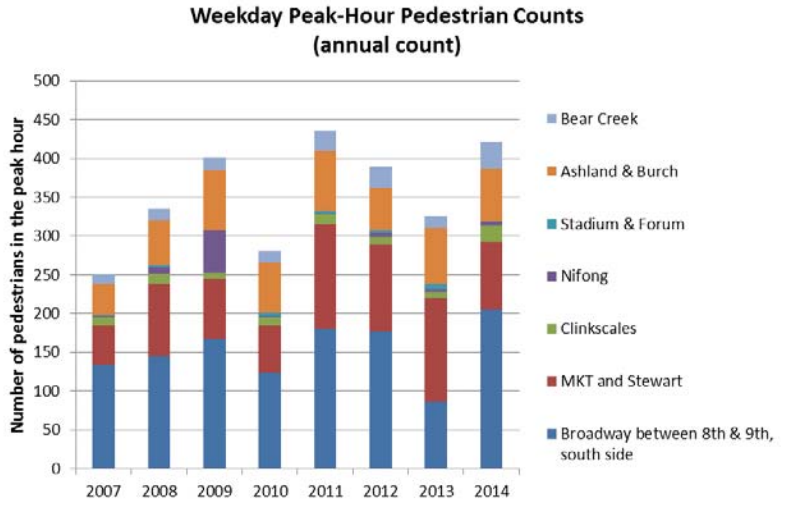


Figure 3: Weekday Pedestrian Peak Hour Count Volumes (Annual)

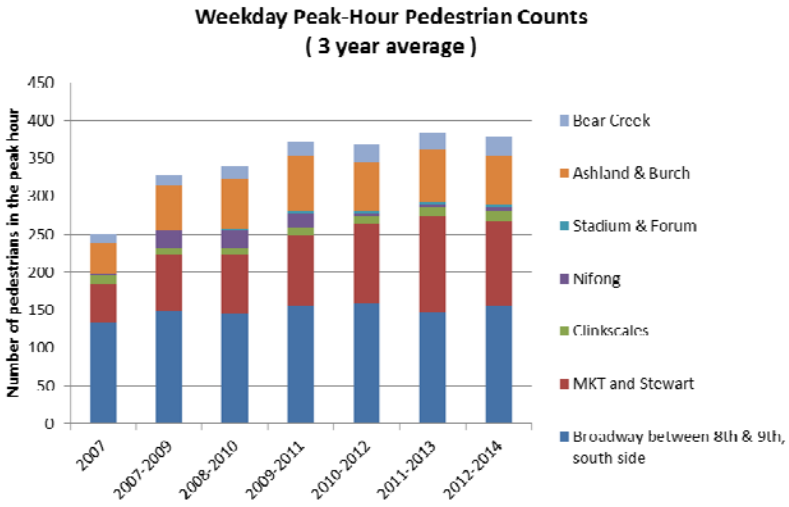


Figure 4: Weekday Pedestrian Peak-Hour Count Volumes (3-Year Average)

Weekend Pedestrian Peak Hour Volumes

Weekend pedestrian peak hour data indicate an increase in recreational walking trips. Figure 6 on the following page shows that peak hour pedestrian activity has been rising steadily, with the 2012-2014 three-year average showing a **14% increase over 2007**, citywide. The three highest pedestrian weekend count locations are Broadway, MKT and Stewart, and Ashland & Burch.

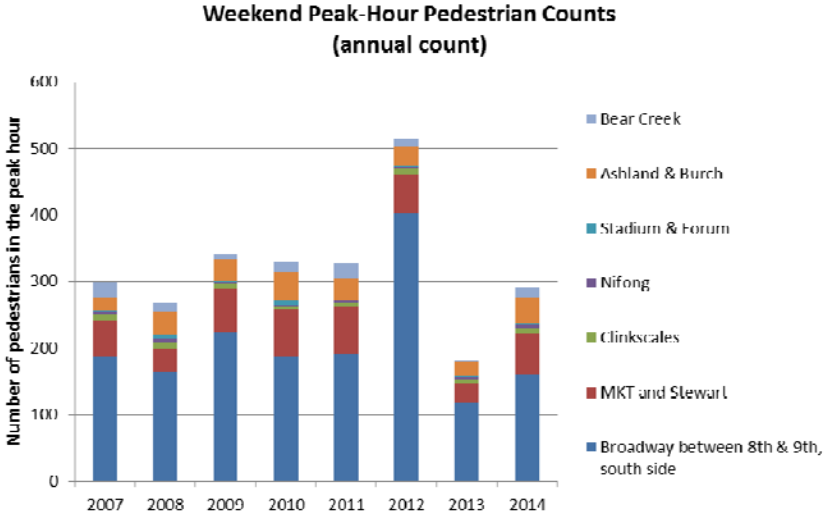


Figure 5: Weekdend Pedestrian Peak-Hour Count Volumes (Annual)

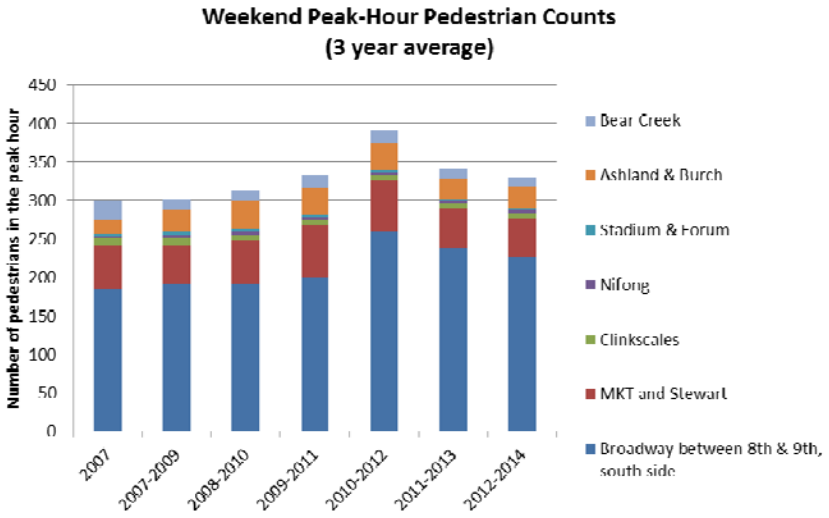


Figure 6: Weekdend Pedestrian Peak-Hour Count Volumes (3-Year Average)

4.2 Bicycle Count Data

Tables A-3 and A-4 show weekday and weekend bicycle counts over time. The three-year rolling average of counts is used to smooth random variation in the counts from year to year. Figures 7 through 10 show weekday and weekend count volumes at the seven locations. Figures 7 and 9 show annual count volumes, while Figures 8 and 10 show the three-year rolling average, similar to Figure 1 (but base year is not indexed to 100). Note that weather may have been a factor in the lower 2012 count volumes as compared to 2011.

Weekday Bicycle Peak Hour Volumes

Weekday peak-hour bicycle data likely indicate an increase in bicycling to and from work and school trips. As indicated in Figure 8, peak hour volumes **have increased by 105%** in the latest three-year average (2012-2014) over the 2007 base year. The highest count locations, MKT and Stewart followed by Ashland & Burch, have also experienced the largest increases in activity.

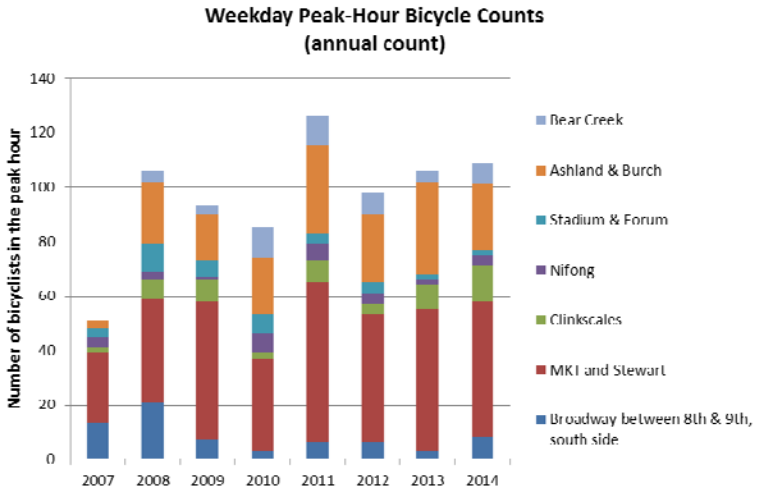


Figure 7: Weekday Bicycle Peak-Hour Count Volumes (Annual)

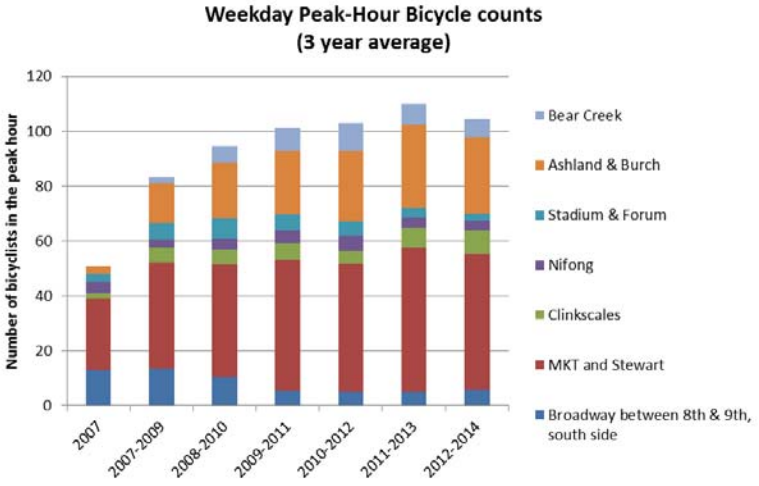


Figure 8: Weekday Bicycle Peak-Hour Count Volumes (3-Year Average)

Weekend Bicycle Peak Hour Volumes

Weekend peak-hour bicycle data show an increase in recreational bicycle trips on weekends, though count volumes seem to have peaked in 2009 and 2010. Peak hour volumes in latest three-year average (2012-2014) are **8% higher than the 2007 base year**. There were relatively few bicycles counted in 2008, likely due to weather. MKT and Stewart is the highest volume location and has seen the greatest increase in activity.

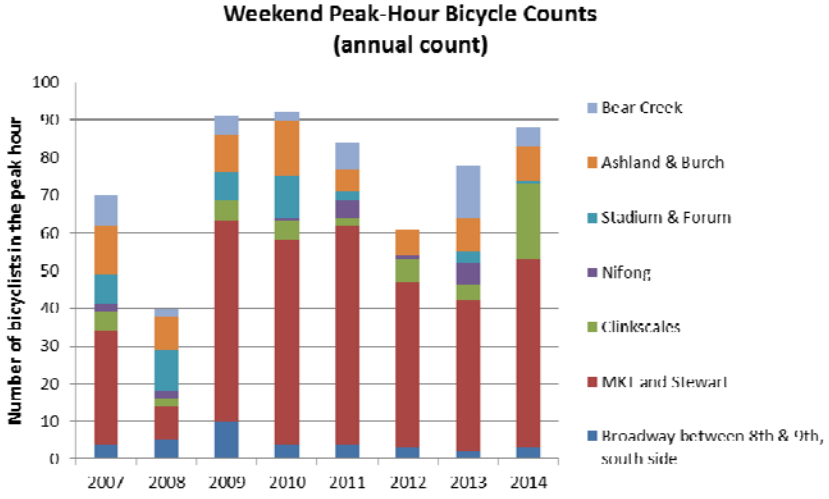


Figure 9: Weekend Bicycle Peak-Hour Count Volumes (Annual)

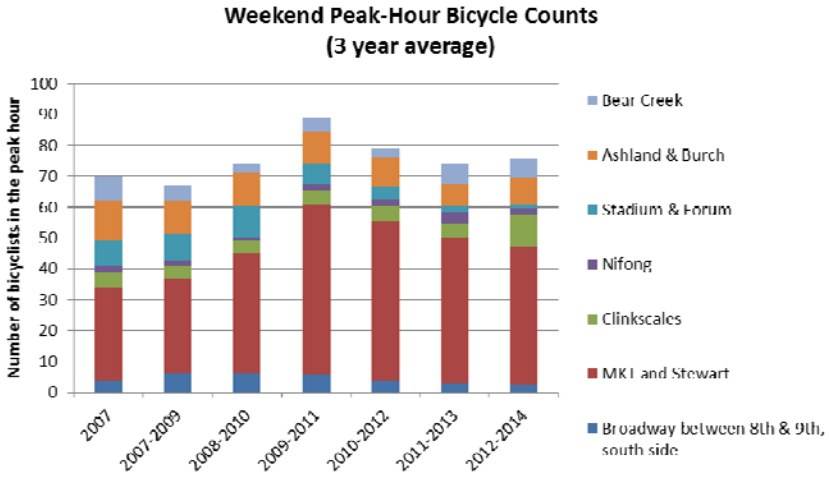


Figure 10: Weekend Bicycle Peak-Hour Count Volumes (3-Year Average)

4.3 Combined Count Results

A summary of 2007-2014 pedestrian and bicycle counts is provided in **Tables A-5, A-7, A-9, A-11, A-13, A-15, A-17 and A-19: Walking and Bicycling 2-Hour Count Volumes for Weekdays and Weekends**.

Key findings include:

1. Bicycling on weekdays is occurring throughout the city, with activity levels ranging from a low of two bicyclists over two hours (Stadium and Forum) to 89 bicyclists (MKT and Stuart), with an average of 23 bicyclists per location during the two-hour count period in 2014.
2. Walking on weekdays also occurs throughout the city, with an average of 95 pedestrians per location over the two–hour count period in 2014. Activity levels ranged from two people over two hours (Stadium & Forum) to 316 people (Broadway between 8th and 9th).
3. The busiest weekday locations in Columbia for combined walking/bicycling are (1) Broadway between 8th and 9th, (2) MKT Trail & Stewart Rd., and (3) Ashland Rd. & Burch Rd.
4. Walking and bicycling volumes were higher on weekdays (average of 119 bicycles and pedestrians per location) as compared with weekends (average of 89 bicycle and pedestrians per location) in 2014, though in other years weekend rates have been higher. In general, there is consistent bicycle and pedestrian activity on both weekends and weekdays.

Tables A-6, A-8, A-10, A-12, A-14, A-16, A-18 and A-20: Two-Hour Bicyclist and Pedestrian Volumes & Attributes provide a breakdown of bicyclist and pedestrian attributes for each of the count years, including gender, whether a person was a child (under 14) and whether bicyclists wore a helmet. Key findings include:

1. Over the seven count years, males made up from 58% to 77% of bicyclists, which is consistent with other surveys conducted around the country (Thunderhead Alliance, 2007). The highest percentage of female riders was recorded in 2010 (42%).
2. Based on visual observation, children 14 years or younger ranged from 3% to 8% of all counted bicyclists.
3. The number of bicyclists not wearing helmets decreased from 63% in 2007 to 47% in 2014. This marks the first year in which more than half of all bicyclists counted were wearing helmets.
4. The male-female split of pedestrians is relatively consistent from year to year, with just over 50% females, consistent with the city's population.
5. The number of 'children 14 years or younger' ranged from 4% to 7% of all pedestrians, depending on the year. According to the American Community Survey (2007-2009), children between the ages of 5 and 14 account for 10.2% of the population in Columbia. This indicates that proportionally, fewer children are walking or bicycling on average than adults at the seven count locations.

5 Design of Survey Questions

The survey questions developed for the NTPP and the City of Columbia were customized from the NBPD methodology by the four pilot communities and the Volpe National Transportation Systems Center. The surveys were designed to be conducted in the field as intercept surveys, to maximize the statistical validity of the results. The surveys were conducted at most of the count locations, during, immediately before or immediately after the count periods. Surveyors were trained to deliver interview questions and wore yellow jerseys and nametags to identify themselves.

Copies of the survey forms are included **(See Appendix B: Forms B-1 and B-2)**. Over 200 surveys were collected during each of the count periods between 2007 and 2013.

Results of the surveys are included in Appendix B. Key findings are discussed below:

5.1 Summary of 2007-2013 Survey Data

Trip Purpose

It is clear from Figures 11 and 12 that both pedestrian and bicycle facilities are being used for utilitarian and recreational trip making. **Approximately 40-50% of surveyed pedestrians and 30-40% of surveyed bicyclists report that their trip was for utilitarian purposes** (i.e., work, school, shopping or personal business).

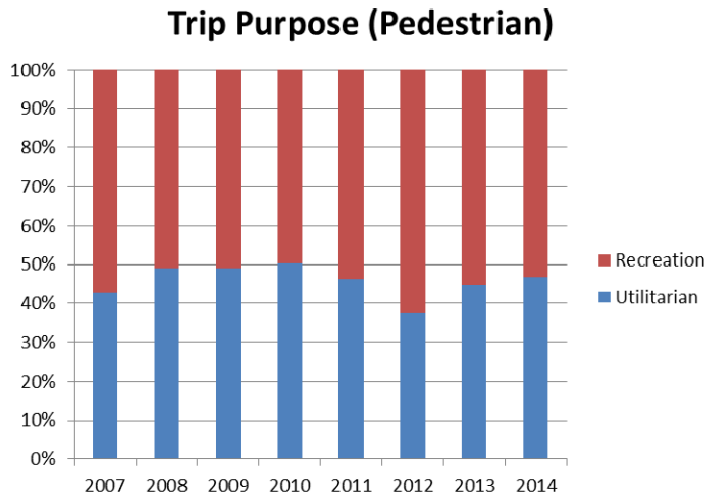


Figure 11: Trip Purpose (Pedestrian)

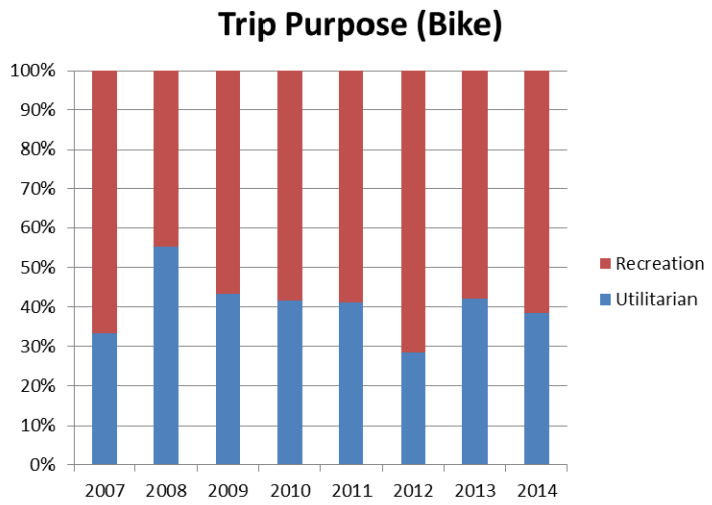


Figure 12: Trip Purpose (Bike)

Route Choice

As indicated in Figure 13 below, the top three reasons given by pedestrians for choosing their route are relatively consistent year to year, with **directness of the route, ease of access, and scenic qualities** each chosen by approximately 25% of respondents each year.

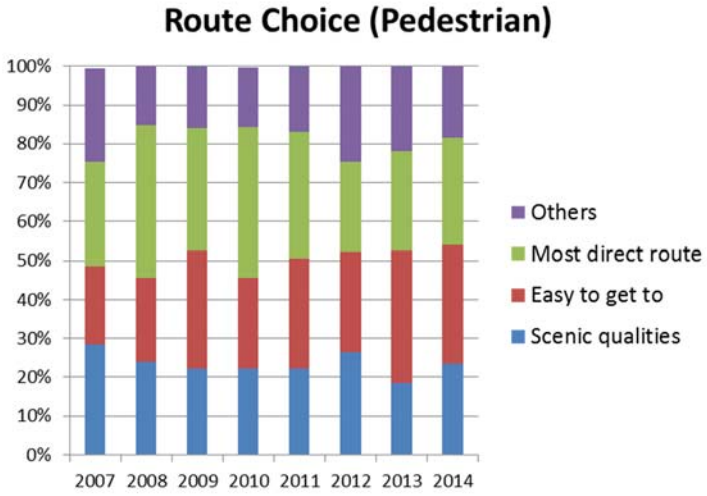


Figure 13: Reason for Route Choice (Pedestrian)

There are more considerations chosen by bicyclists (Figure 14), with **ease of access, scenic qualities and less traffic** consistently being the top responses, followed by separation from traffic and directness of the route.

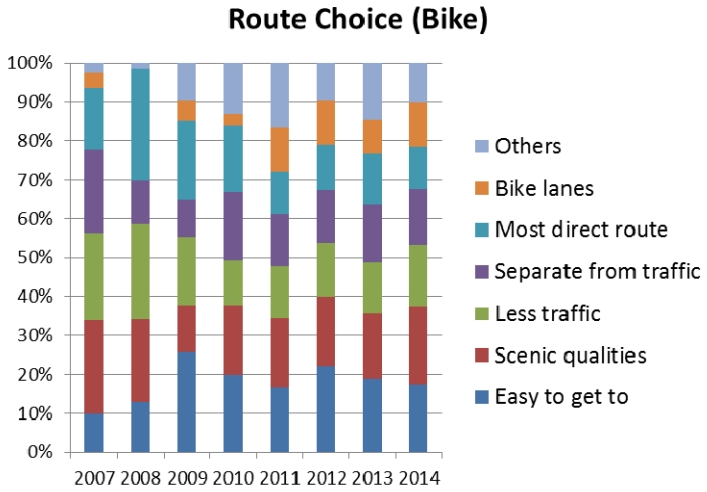


Figure 14: Reason for Route Choice (Bike)

Desired Community Improvements

Desired community improvements have been relatively consistent from year to year and are shown in Figure 15 below. For pedestrians, the top improvements are **more shade trees, drivers obeying traffic laws, wider sidewalks, better lighting, and better street crossings**.

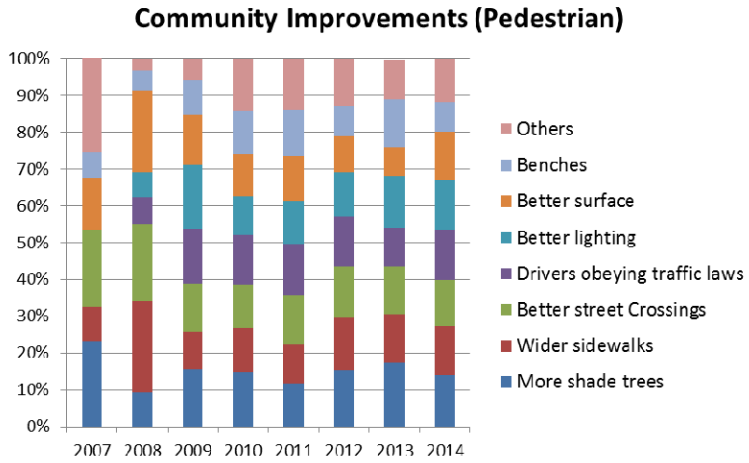


Figure 15: Desired Improvements in the Community (Pedestrian)

For bicyclists, top desired improvements are **bike lanes, drivers obeying traffic laws, better maintenance, off-street trails and wider shoulders**. These desired improvements are shown below in Figure 16.

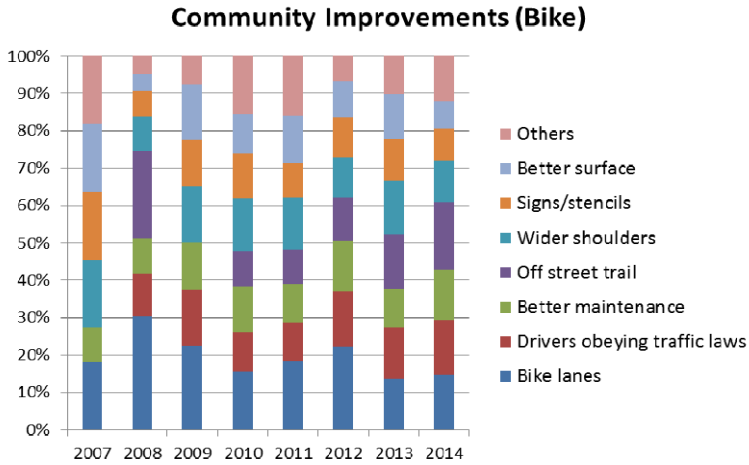


Figure 16: Desired Improvements in the Community (Bike)

Trip Frequency

Figures 17 and 18 illustrates the percentage of pedestrians and bicyclists that frequently travel on foot or by bicycle at the respective survey locations. **Approximately 40-55% of surveyed pedestrians and 40-60% of surveyed bicyclists travel at the survey locations either 11-20 times per month or daily.**

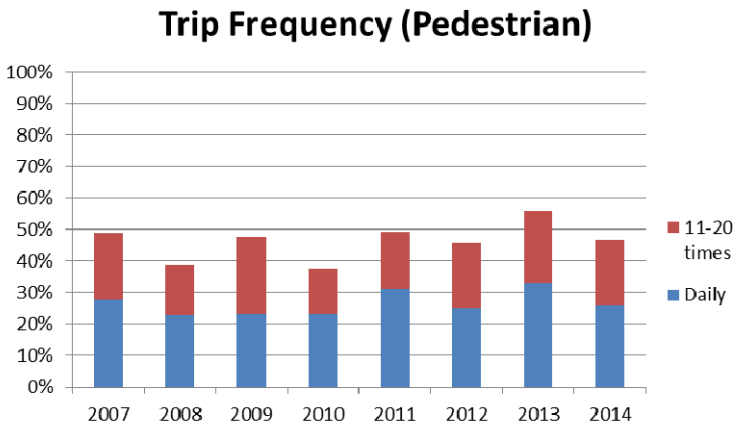


Figure 17: Trip Frequency (Pedestrian)

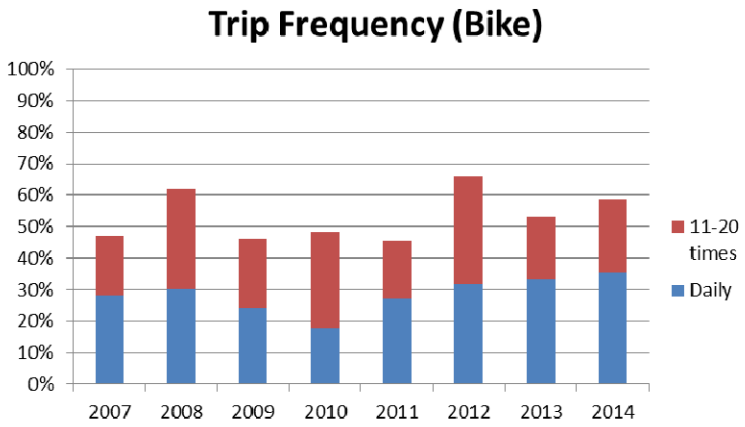


Figure 18: Trip Frequency (Bike)

Connections to Transit

While the percentage of users reporting that they are combining their trip with transit has varied by year, **approximately 2-5% of pedestrian and bicycle trips are reported to be combined with transit,** as shown below in Figures 19 and 20. It appears that the proportion of people including transit as part of their walking and bicycling trip may be increasing, though further information on transit use could better answer this question.

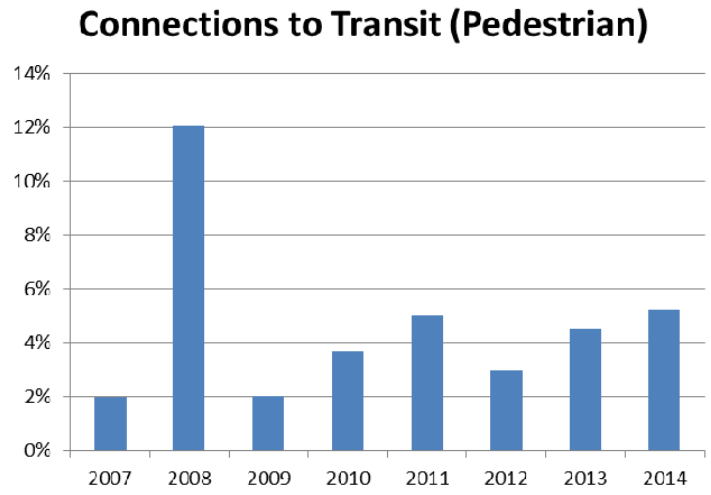


Figure 19: Trips Combined with Transit

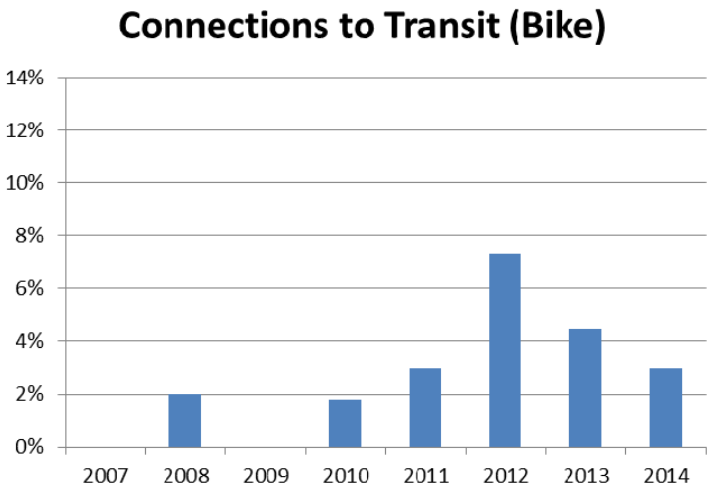


Figure 20: Trips Combined with Transit

6 Accuracy and Calibration of the Data

The seven count locations and 200+ surveys collected each year as part of the Columbia NTPP Count/Survey program provide an invaluable snapshot into walking and bicycling in the City of Columbia. This data also serves as a benchmark measurement for the NTPP program as the count and survey effort continues.

Appendix A: Count Data Tables and Forms

Table A-1

Weekday Peak-Hour Pedestrian Counts, 2007-2014

		Counts							
Location	**Streets**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
1	Broadway between 8th & 9th, south side	133	145	167	123	180	177	87	205
2	MKT and Stewart	52	93	78	62	135	112	133	87
3	Clinkscales	10	13	7	10	13	10	8	22
4	Nifong	2	9	55	2	1	5	3	4
5	Stadium & Forum	1	2	0	4	3	3	8	1
6	Ashland & Burch	40	58	78	64	78	55	72	68
7	Bear Creek	12	15	16	15	26	27	15	35
	Average count per location/ Average Percent Change	35.7	47.9	57.3	40.0	62.3	55.6	46.6	60.3

Table A-2

Weekend Peak-Hour Pedestrian Counts, 2007-2014

		Counts							
Location	**Streets**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
1	Broadway between 8th & 9th, south side	186	164	223	186	191	403	118	159
2	MKT and Stewart	56	34	65	72	70	58	28	63
3	Clinkscales	9	9	8	3	8	8	6	8
4	Nifong	3	7	3	3	2	3	3	5
5	Stadium & Forum	3	5	3	7	1	2	2	2
6	Ashland & Burch	18	36	31	42	32	28	21	37
7	Bear Creek	24	12	8	17	24	12	5	16
	Average count per location/ Average Percent Change	42.7	38.1	48.7	47.1	46.9	73.4	26.1	41.4

Table A-3
Weekday Peak-Hour Bicycle Counts and Percent Change, 2007-2014

		Counts							
Location	**Streets**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
1	Broadway between 8th & 9th, south side	13	21	7	3	6	6	3	8
2	MKT and Stewart	26	38	51	34	59	47	52	50
3	Clinkscales	2	7	8	2	8	4	9	13
4	Nifong	4	3	1	7	6	4	2	4
5	Stadium & Forum	3	10	6	7	4	4	2	2
6	Ashland & Burch	3	23	17	21	32	25	34	24
7	Bear Creek	0	4	3	11	11	8	4	8
	Average count per location/ Average Percent Change	7.3	15.1	13.3	12.1	18.0	14.0	15.1	15.6

Table A-4
Weekend Peak-Hour Bicycle Counts, 2007-2014

		Counts							
Location	**Streets**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
1	Broadway between 8th & 9th, south side	4	5	10	4	4	3	2	3
2	MKT and Stewart	30	9	53	54	58	44	40	50
3	Clinkscales	5	2	6	5	2	6	4	20
4	Nifong	2	2	0	1	5	1	6	0
5	Stadium & Forum	8	11	7	11	2	0	3	1
6	Ashland & Burch	13	9	10	15	6	7	9	9
7	Bear Creek	8	2	5	2	7	0	14	5
	Average count per location/ Average Percent Change	10.0	5.7	13.0	13.1	12.0	8.7	11.1	12.6

Table A-5
2007 Walking and Bicycling 2-Hour Count Volumes for Weekdays and Weekends

		Weekend (12-2pm)			Weekday (4-6pm)		
Loc #	**Streets**	**Bicyclists**	**Pedestrians**	**Total**	**Bicyclists**	**Pedestrians**	**Total**
1	Broadway between 8th & 9th, south side	6	305	311	22	244	266
2	MKT and Stewart	55	83	138	43	83	126
3	Clinkscales	7	10	17	3	14	17
4	Nifong	2	4	6	4	3	7
5	Stadium & Forum	11	3	14	5	2	7
6	Ashland & Burch	17	31	48	15	66	81
7	Bear Creek	12	37	49	0	15	15
	Average per location	15.7	67.6	83.3	13.1	61.0	74.1
	Total	110	473	583	92	427	519

Table A-6
2007 Two-Hour Bicyclist and Pedestrian Volumes & Attributes: Gender, Age and Helmet Use

		Bicyclists						Pedestrians			
Loc #	**Streets**	**Male**	**Female**	**Total**	**Children**	**No Helmet**	**Wrong Way**	**Male**	**Female**	**Total**	**Children**
1	Broadway between 8th & 9th, south side	19	9	28	0	24	5	247	302	549	36
2	MKT and Stewart	65	33	98	5	59	0	76	90	166	2
3	Clinkscales	8	2	10	1	7	6	13	11	24	7
4	Nifong	4	2	6	3	2	3	4	3	7	1
5	Stadium & Forum	12	4	16	0	5	0	4	1	5	1
6	Ashland & Burch	23	9	32	0	27	5	51	46	97	1
7	Bear Creek	5	7	12	0	3	0	21	31	52	0
	Total	136	66	202	9	127	19	416	484	900	48
	Percent	67.3%	32.7%	100.0%	4.5%	62.9%	9.4%	46.2%	53.8%	100.0%	5.3%

Table A-7
2008 Walking and Bicycling 2-Hour Count Volumes for Weekdays and Weekends

		Weekend (12-2pm)			Weekday (4-6pm)		
Loc #	**Streets**	**Bicyclists**	**Pedestrians**	**Total**	**Bicyclists**	**Pedestrians**	**Total**
1	Broadway between 8th & 9th, south side	7	249	256	31	266	297
2	MKT and Stewart	16	55	71	80	167	247
3	Clinkscales	2	11	13	12	21	33
4	Nifong	3	9	12	5	15	20
5	Stadium & Forum	16	8	24	17	2	19
6	Ashland & Burch	12	54	66	36	94	130
7	Bear Creek	2	18	20	6	24	30
	Average per location	8.3	57.7	66.0	26.7	84.1	110.9
	Total	58	404	462	187	589	776

Table A-8
2008 Two-Hour Bicyclist and Pedestrian Volumes & Attributes: Gender, Age and Helmet Use

		Bicyclists						Pedestrians			
Loc #	**Streets**	**Male**	**Female**	**Total**	**Children**	**No Helmet**	**Wrong Way**	**Male**	**Female**	**Total**	**Children**
1	Broadway between 8th & 9th, south side	32	6	38	0	26	5	197	318	515	45
2	MKT and Stewart	68	28	96	0	53	1	112	110	222	5
3	Clinkscales	13	1	14	5	10	4	18	14	32	11
4	Nifong	8	0	8	0	4	2	17	7	24	0
5	Stadium & Forum	24	9	33	2	6	0	4	6	10	0
6	Ashland & Burch	38	10	48	1	39	1	69	79	148	3
7	Bear Creek	6	2	8	0	6	0	23	19	42	2
	Total	189	56	245	8	144	13	440	553	993	66
	Percent	77.1%	22.9%	100.0%	3.3%	58.8%	5.3%	44.3%	55.7%	100.0%	6.6%

Table A-9

2009 Walking and Bicycling 2-Hour Count Volumes for Weekdays and Weekends

		Weekend (12-2pm)			Weekday (4-6pm)		
Loc #	**Streets**	**Bicyclists**	**Pedestrians**	**Total**	**Bicyclists**	**Pedestrians**	**Total**
1	Broadway between 8th & 9th, south side	14	388	402	9	319	328
2	MKT and Stewart	85	98	183	79	143	222
3	Clinkscales	7	9	16	10	11	21
4	Nifong	0	6	6	1	57	58
5	Stadium & Forum	11	4	15	8	0	8
6	Ashland & Burch	14	51	65	25	125	150
7	Bear Creek	5	9	14	3	29	32
	Average per location	19.4	80.7	100.1	19.3	97.7	117.0
	Total	136	565	701	135	684	819

Table A-10

2009 Two-Hour Bicyclist and Pedestrian Volumes & Attributes: Gender, Age and Helmet Use

		Bicyclists						Pedestrians			
Loc #	**Streets**	**Male**	**Female**	**Total**	**Children**	**No Helmet**	**Wrong Way**	**Male**	**Female**	**Total**	**Children**
1	Broadway between 8th & 9th, south side	16	7	23	0	17	8	309	398	707	82
2	MKT and Stewart	105	59	164	17	85	0	141	100	241	0
3	Clinkscales	13	4	17	5	4	3	9	11	20	5
4	Nifong	0	1	1	0	0	0	38	25	63	0
5	Stadium & Forum	14	5	19	0	4	0	2	2	4	0
6	Ashland & Burch	31	8	39	0	30	0	81	95	176	1
7	Bear Creek	4	4	8	0	4	0	17	21	38	1
	Total	183	88	271	22	144	11	597	652	1249	89
	Percent	67.5%	32.5%	100.0%	7.5%	53.1%	4.1%	47.8%	52.2%	100.0%	7.1%

Table A-11

2010 Walking and Bicycling 2-Hour Count Volumes for Weekdays and Weekends

		Weekend (12-2pm)			Weekday (4-6pm)		
Loc #	**Streets**	**Bicyclists**	**Pedestrians**	**Total**	**Bicyclists**	**Pedestrians**	**Total**
1	Broadway between 8th & 9th, south side	4	320	324	6	222	228
2	MKT and Stewart	94	106	200	51	103	154
3	Clinkscales	9	3	12	3	20	23
4	Nifong	1	6	7	11	2	13
5	Stadium & Forum	17	8	25	8	5	13
6	Ashland & Burch	22	73	95	15	113	128
7	Bear Creek	2	19	21	12	24	36
	Average per location	21.3	76.4	97.7	15.1	69.9	85.0
	Total	149	535	684	106	489	595

Table A-12

2010 Two-Hour Bicyclist and Pedestrian Volumes & Attributes: Gender, Age and Helmet Use

		Bicyclists						Pedestrians			
Loc #	**Streets**	**Male**	**Female**	**Total**	**Children**	**No Helmet**	**Wrong Way**	**Male**	**Female**	**Total**	**Children**
1	Broadway between 8th & 9th, south side	4	6	10	0	9	5	252	290	542	30
2	MKT and Stewart	97	48	145	3	52	0	103	106	209	2
3	Clinkscales	7	5	12	2	8	3	13	10	23	1
4	Nifong	4	8	12	0	0	0	6	2	8	0
5	Stadium & Forum	15	10	25	4	9	0	9	4	13	4
6	Ashland & Burch	16	21	37	0	54	41	99	87	186	4
7	Bear Creek	6	8	14	3	9	0	18	25	43	5
	Total	149	106	255	12	141	49	500	524	1024	46
	Percent	58.4%	41.6%	100.0%	4.5%	55.3%	19.2%	48.8%	51.2%	100.0%	4.5%

Table A-13
2011 Walking and Bicycling 2-Hour Count Volumes for Weekdays and Weekends

		Weekend (12-2pm)			Weekday (4-6pm)		
Loc #	**Streets**	**Bicyclists**	**Pedestrians**	**Total**	**Bicyclists**	**Pedestrians**	**Total**
1	Broadway between 8th & 9th, south side	7	334	341	8	331	339
2	MKT and Stewart	102	118	220	101	224	325
3	Clinkscales	2	14	16	9	19	28
4	Nifong	8	3	11	9	1	10
5	Stadium & Forum	2	1	3	5	5	10
6	Ashland & Burch	9	54	63	42	144	186
7	Bear Creek	11	34	45	14	33	47
	Average per location	20.1	79.7	99.9	26.9	108.1	135.0
	Total	141	558	699	188	757	945

Table A-14
2011 Two-Hour Bicyclist and Pedestrian Volumes & Attributes: Gender, Age and Helmet Use

		Bicyclists						Pedestrians			
Loc #	**Streets**	**Male**	**Female**	**Total**	**Children**	**No Helmet**	**Wrong Way**	**Male**	**Female**	**Total**	**Children**
1	Broadway between 8th & 9th, south side	7	8	15	0	11	13	291	374	665	57
2	MKT and Stewart	140	63	203	12	99	0	169	173	342	18
3	Clinkscales	9	2	11	8	9	4	13	20	33	3
4	Nifong	13	4	17	0	3	0	3	1	4	0
5	Stadium & Forum	3	4	7	1	3	0	2	4	6	0
6	Ashland & Burch	42	9	51	0	35	22	106	92	198	4
7	Bear Creek	14	11	25	1	9	0	26	41	67	0
	Total	228	101	329	22	169	39	610	705	1315	82
	Percent	69.3%	30.7%	100.0%	6.3%	51.4%	11.9%	46.4%	53.6%	100.0%	6.2%

Table A-15
2012 Walking and Bicycling 2-Hour Count Volumes for Weekdays and Weekends

		Weekend (12-2pm)			Weekday (4-6pm)		
Loc #	**Streets**	**Bicyclists**	**Pedestrians**	**Total**	**Bicyclists**	**Pedestrians**	**Total**
1	Broadway between 8th & 9th, south side	3	682	685	9	302	311
2	MKT and Stewart	81	102	183	81	184	265
3	Clinkscales	9	8	17	4	15	19
4	Nifong	2	3	5	5	5	10
5	Stadium & Forum	0	2	2	8	5	13
6	Ashland & Burch	10	45	55	46	100	146
7	Bear Creek	0	15	15	14	34	48
	Average per location	15.0	122.4	137.4	23.9	92.1	116.0
	Total	105	857	962	167	645	812

Table A-16
2012 Two-Hour Bicyclist and Pedestrian Volumes & Attributes: Gender, Age and Helmet Use

		Bicyclists						Pedestrians			
Loc #	**Streets**	**Male**	**Female**	**Total**	**Children**	**No Helmet**	**Wrong Way**	**Male**	**Female**	**Total**	**Children**
1	Broadway between 8th & 9th, south side	11	1	12	0	12	8	430	554	984	81
2	MKT and Stewart	111	51	162	9	72	0	148	138	286	4
3	Clinkscales	10	3	13	1	10	2	9	14	23	15
4	Nifong	6	1	7	0	4	0	6	2	8	2
5	Stadium & Forum	7	1	8	0	2	0	4	3	7	0
6	Ashland & Burch	41	15	56	0	42	6	83	62	145	0
7	Bear Creek	11	3	14	0	8	0	21	28	49	5
	Total	197	75	272	10	150	16	701	801	1,502	107
	Percent	72.4%	27.6%	100.0%	3.7%	55.1%	5.9%	46.7%	53.3%	100.0%	7.1%

Table A-17

2013 Walking and Bicycling 2-Hour Count Volumes for Weekdays and Weekends

		Weekend (12-2pm)			Weekday (4-6pm)		
Loc #	**Streets**	**Bicyclists**	**Pedestrians**	**Total**	**Bicyclists**	**Pedestrians**	**Total**
1	Broadway between 8th & 9th, south side	2	221	223	4	127	131
2	MKT and Stewart	60	54	114	88	198	286
3	Clinkscales	6	6	12	14	13	27
4	Nifong	6	5	11	4	3	7
5	Stadium & Forum	3	3	6	2	8	10
6	Ashland & Burch	15	33	48	48	118	166
7	Bear Creek	16	7	23	5	20	25
	Average per location	15.4	47.0	62.4	23.6	69.6	93.1
	Total	108	329	437	165	487	652

Table A-18

2013 Two-Hour Bicyclist and Pedestrian Volumes & Attributes: Gender, Age and Helmet Use

		Bicyclists						Pedestrians			
Loc #	**Streets**	**Male**	**Female**	**Total**	**Children**	**No Helmet**	**Wrong Way**	**Male**	**Female**	**Total**	**Children**
1	Broadway between 8th & 9th, south side	4	2	6	0	6	6	153	195	348	29
2	MKT and Stewart	108	40	148	3	59	0	124	128	252	4
3	Clinkscales	15	5	20	1	11	0	13	6	19	3
4	Nifong	8	2	10	4	2	0	5	3	8	0
5	Stadium & Forum	3	2	5	1	3	2	9	2	11	0
6	Ashland & Burch	49	14	63	0	52	49	88	63	151	0
7	Bear Creek	12	9	21	2	13	0	17	10	27	0
	Total	199	74	273	11	146	57	409	407	816	36
	Percent	72.9%	27.1%	100.0%	4.0%	53.5%	20.9%	50.1%	49.9%	100.0%	4.4%

Table A-19
2014 Walking and Bicycling 2-Hour Count Volumes for Weekdays and Weekends

		Weekend (12-2pm)			Weekday (4-6pm)		
Loc #	**Streets**	**Bicyclists**	**Pedestrians**	**Total**	**Bicyclists**	**Pedestrians**	**Total**
1	Broadway between 8th & 9th, south side	3	288	291	11	316	327
2	MKT and Stewart	73	107	180	89	146	235
3	Clinkscales	21	12	33	17	32	49
4	Nifong	0	5	5	6	4	10
5	Stadium & Forum	2	2	4	2	2	4
6	Ashland & Burch	14	64	78	31	118	149
7	Bear Creek	9	21	30	8	49	57
	Average per location	17.4	71.3	88.7	23.4	95.3	118.7
	Total	122	499	621	164	667	831

Table A-18
2014 Two-Hour Bicyclist and Pedestrian Volumes & Attributes: Gender, Age and Helmet Use

		Bicyclists						Pedestrians			
Loc #	**Streets**	**Male**	**Female**	**Total**	**Children**	**No Helmet**	**Wrong Way**	**Male**	**Female**	**Total**	**Children**
1	Broadway between 8th & 9th, south side	11	3	14	0	10	6	265	339	604	24
2	MKT and Stewart	117	45	162	9	67	0	133	120	253	5
3	Clinkscales	24	14	38	7	19	13	18	26	44	12
4	Nifong	4	2	6	0	0	0	3	6	8	0
5	Stadium & Forum	3	1	4	0	1	1	0	4	4	0
6	Ashland & Burch	32	13	45	0	28	16	102	80	182	2
7	Bear Creek	8	9	17	5	12	0	18	52	70	8
	Total	199	87	286	21	137	36	539	627	1166	51
	Percent	69.6%	30.4%	100.0%	7.3%	47%	12.6%	46.2%	53.8%	100.0%	4.4%

Figure A-1

NTPP Count Form

STANDARDIZED COUNT FORM

Name: _____ Location: _____# _____
Date: _____ Time Period: _____ Weather Conditions: _____

Instructions: Please fill in your name, count location, date, time period, and weather conditions (fair, rainy, very cold). Count all bicyclists and pedestrians crossing your screen line under the male or female categories: the no helmet and wrong way categories are in addition to the male/female categories for bicycles; child category is in addition to male/female for pedestrians.

Time Period	Bicycles		Child	No Helmets	Wrong Way	Pedestrians		Child
	Male	*Female*				*Male*	*Female*	
00-:15								
:15-:30								
:30-:45								
:45-1:00								
1:00-1:15								
1:15-1:30								
1:30-1:45								
1:45-2:00								
Total								

Appendix B: Survey Charts and Materials

2014 Pedestrian Survey Results

Trip Purpose: A considerable number of pedestrian trips are reported to be transportation-related (i.e., work, school, shopping/errands, personal business). Over time, approximately 40-50% of surveyed pedestrians report that their trip was for utilitarian purposes (i.e., work, school, shopping or personal business).

Walking Frequency: In 2007, the average walking frequency was 14 days/month, with 28% of the respondents walking daily. The 2014 survey results were similar, with an average walking frequency of over 14 days/month as well, yet with only 26% of the respondents walking daily. The number of people reporting this was their first time walking increased from 4% is 2007 to 5% in 2014.

Alternative Mode for this Trip: In 2007, 36% of respondents indicated they would have driven if they were not able to walk, while 12% would have bicycled, 3% would have carpooled, and 6% would have taken transit. In 2014, 49% of respondents reported they would have driven if they were unable to walk, while 13% would have bicycled, 7% would have carpooled, and 10% would have taken transit. A lower percentage of respondents reported that they would not have made this trip (43% in 2007 as compared to 17% in 2014). Instead, 2014 survey respondents indicated a greater likelihood of utilizing alternate modes such as bicycling, carpooling or taking transit.

Improvement Preference: Respondents selected a number of desired pedestrian improvements for both their route and their community in general, including more shade trees, better street crossings, better lighting, more sidewalks, better surface, wider sidewalks, benches, and drivers obeying traffic laws.

Walking Trips that Included Transit: The number of people reporting that their walking trip included transit increased from 2% in 2007 to 5% in 2014.

Reasons for Route Choice: In both 2007 and 2014, respondents reported that directness of the route, scenic qualities and accessibility/proximity were the top reasons they selected their route. A flat route and less traffic were other top responses.

Ethnicity: The ethnic breakdown appeared roughly equivalent to the ethnicity of the city in 2007. The 2014 survey had a greater percentage of non-Caucasian respondents as compared to the population.

Pedestrian Survey Data Charts

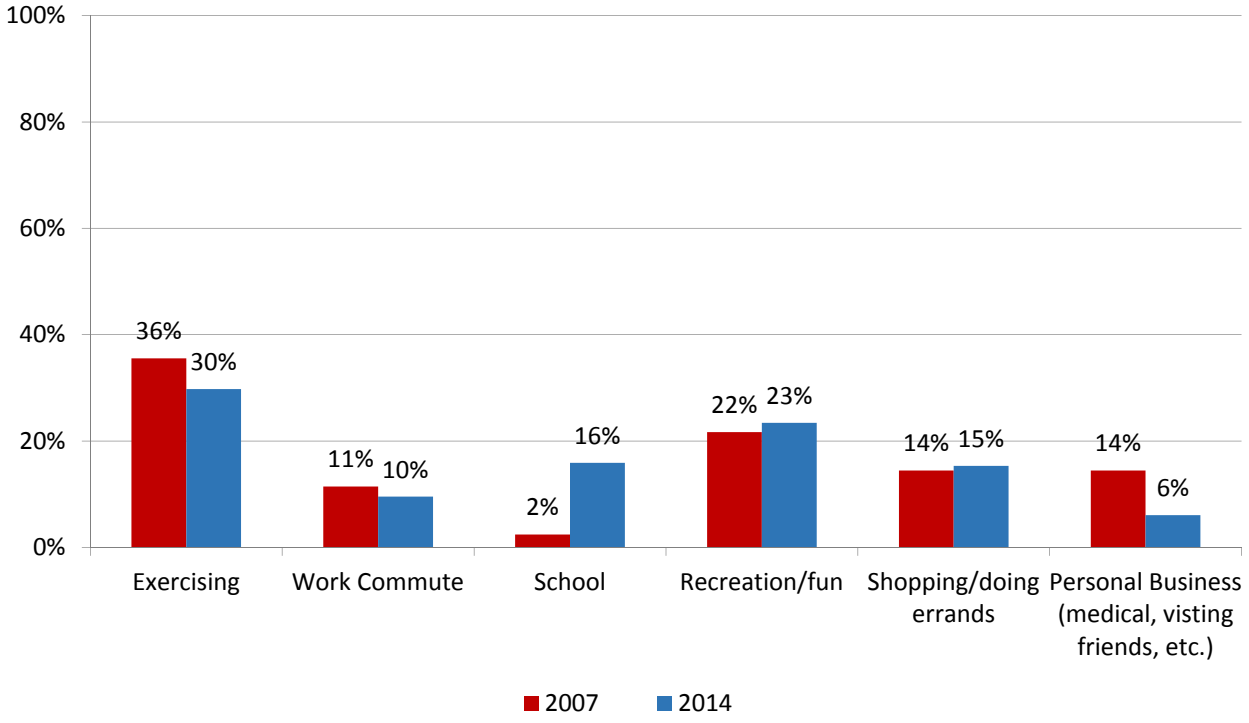


Figure B.1-1 Pedestrian Trip Purpose

Question 2

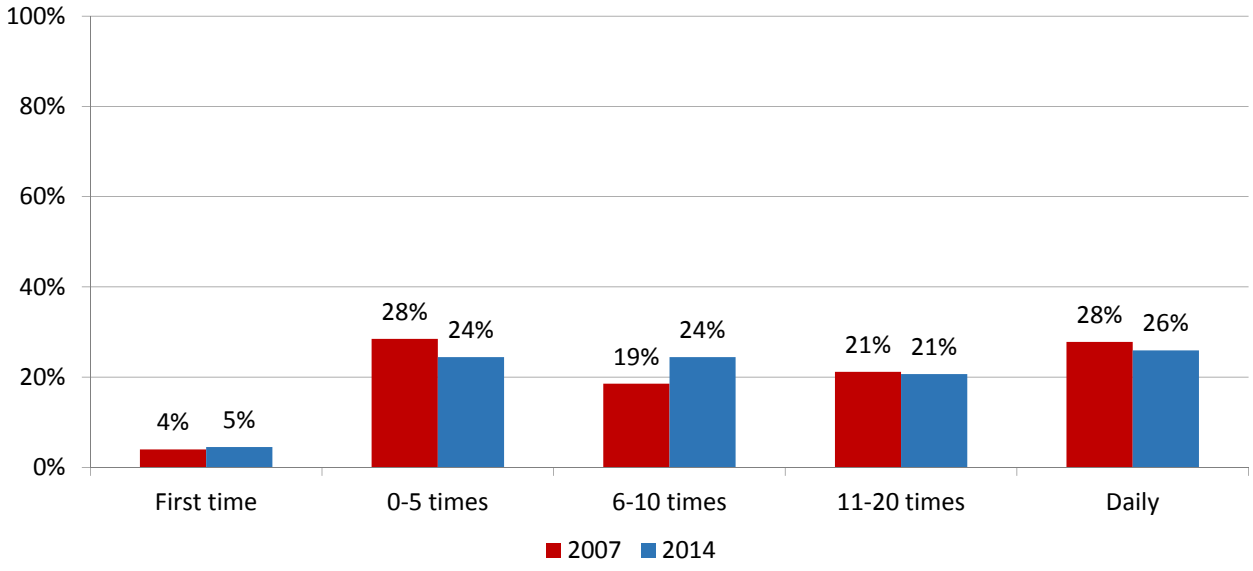


Figure B.1-2 Pedestrian Walking Frequency

Question 3

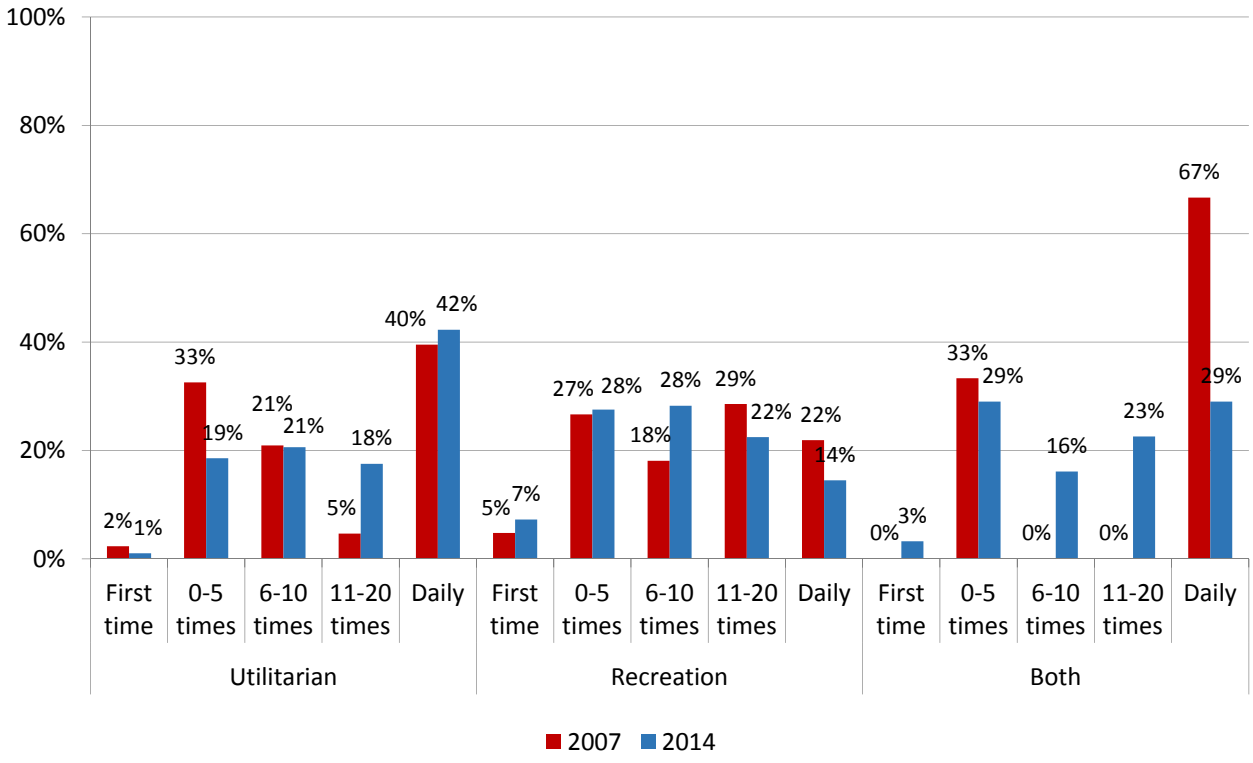


Figure B.1-3 Pedestrian Walking Frequency by Trip Purpose

Question 2 and 3

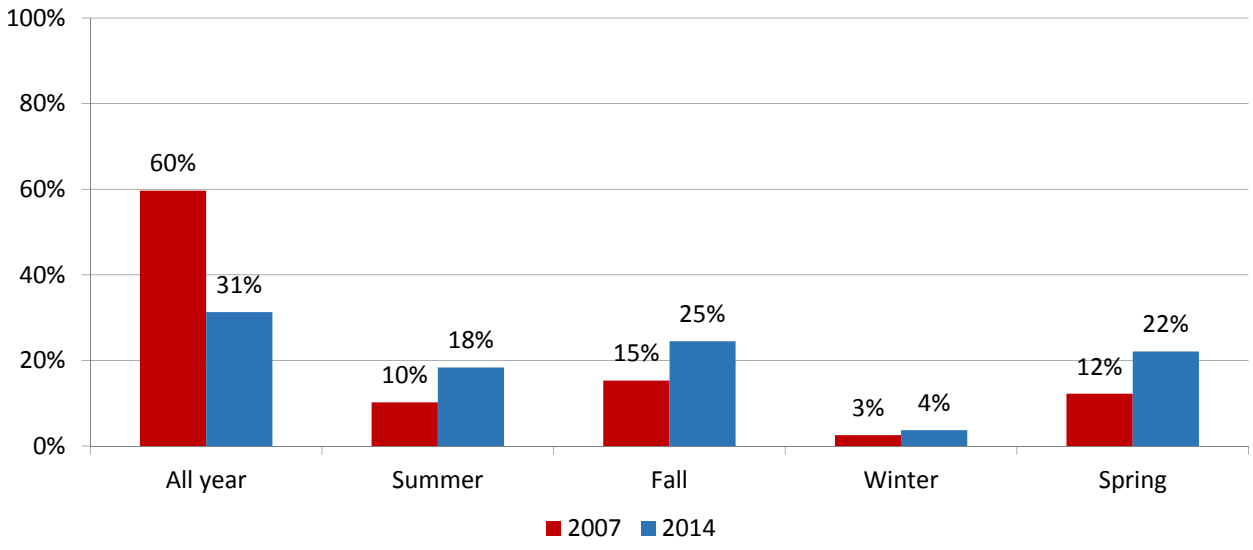


Figure B.1-4 Seasons in Which People Walk

Question 4

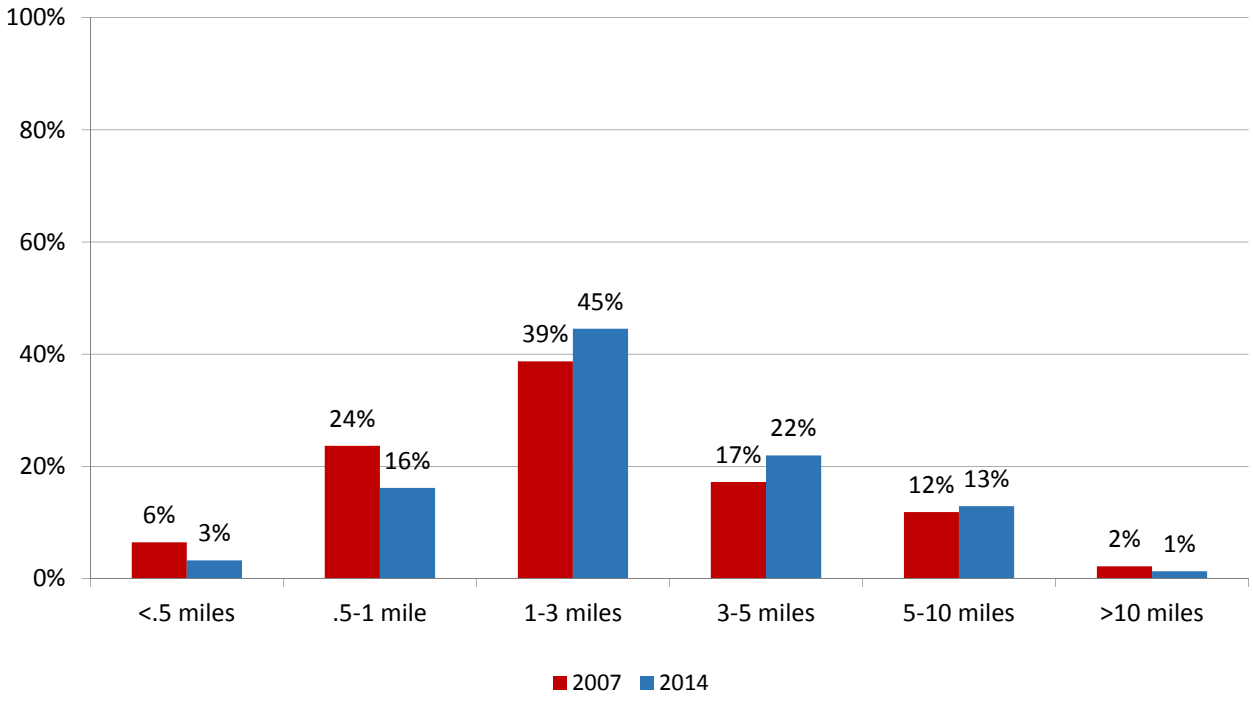


Figure B.1-5 Distance of Pedestrian Trips

Question 5

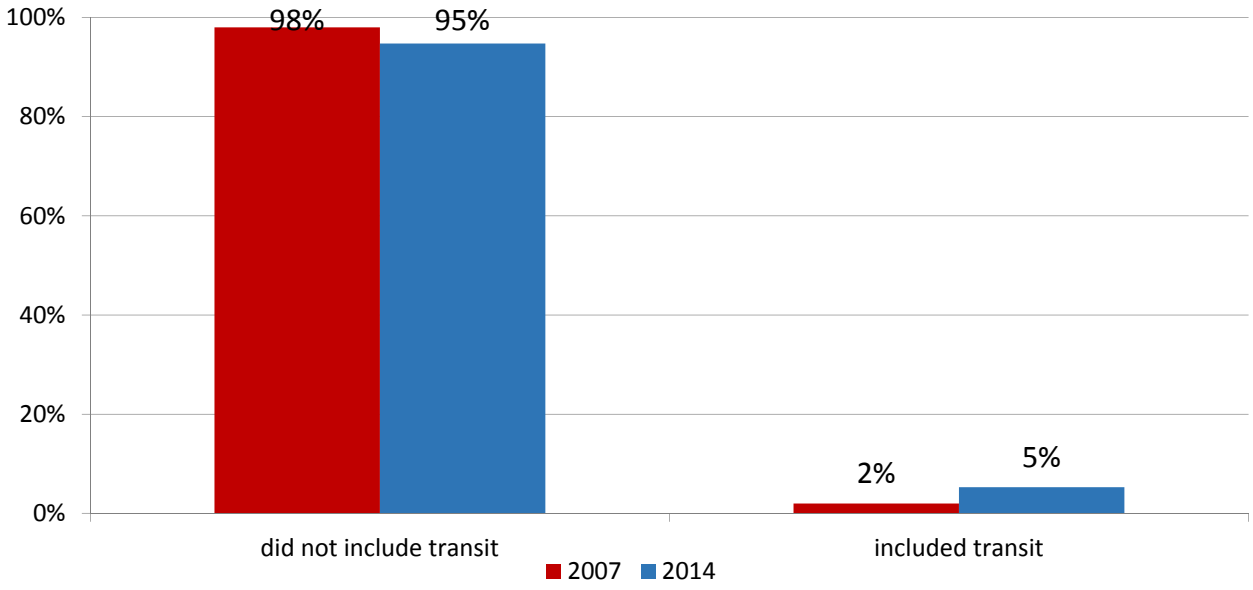


Figure B.1-6 Walking Trips that Included Transit

Question 6

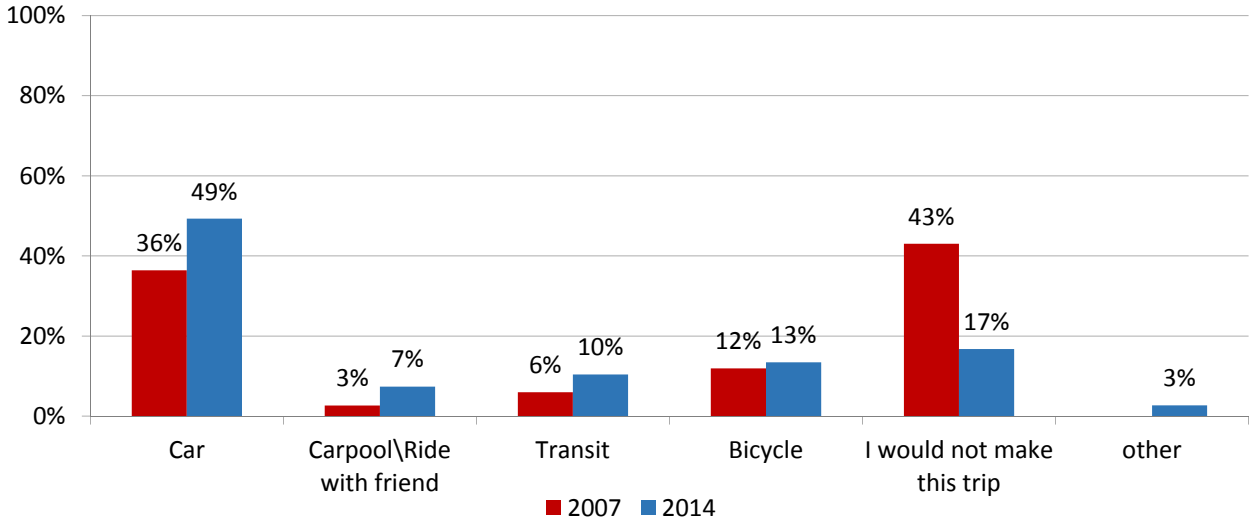


Figure B.1-7 Alternate Mode to Walking

Question 7

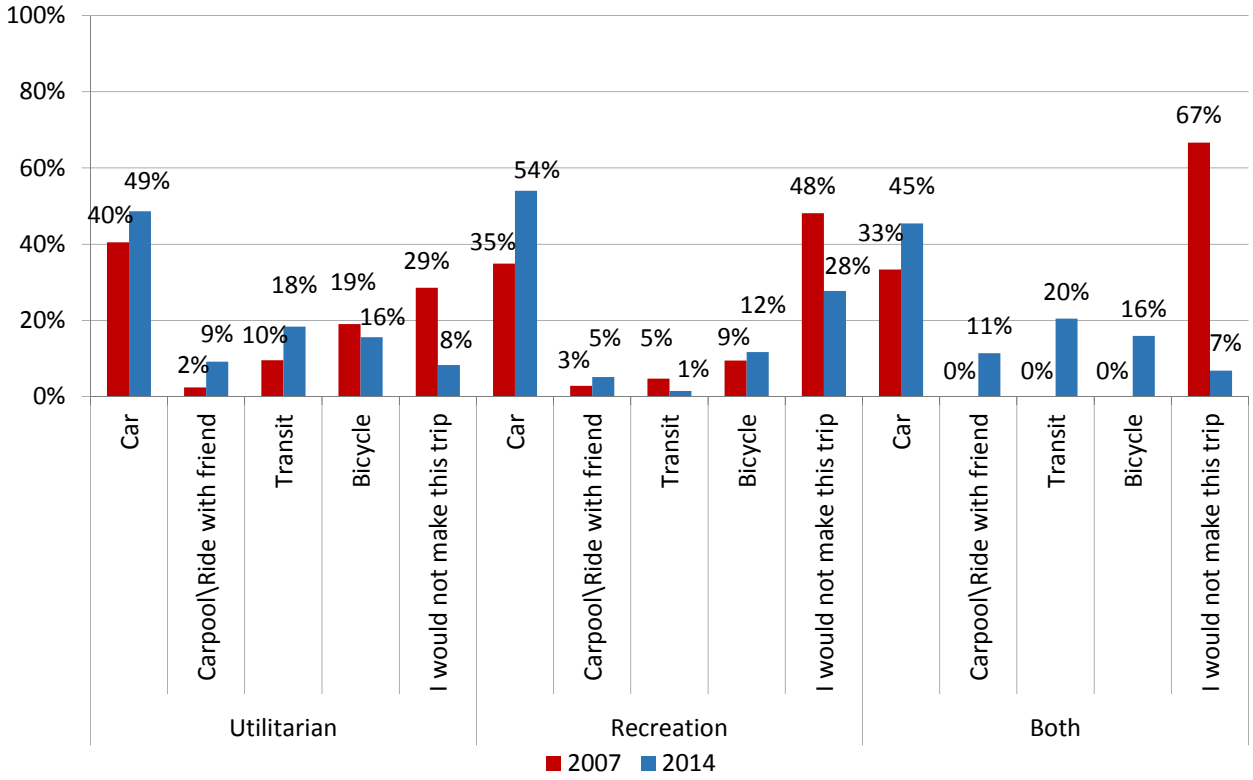


Figure B.1-8 Alternate Mode to Walking by Trip Purpose

Question 2 and 7

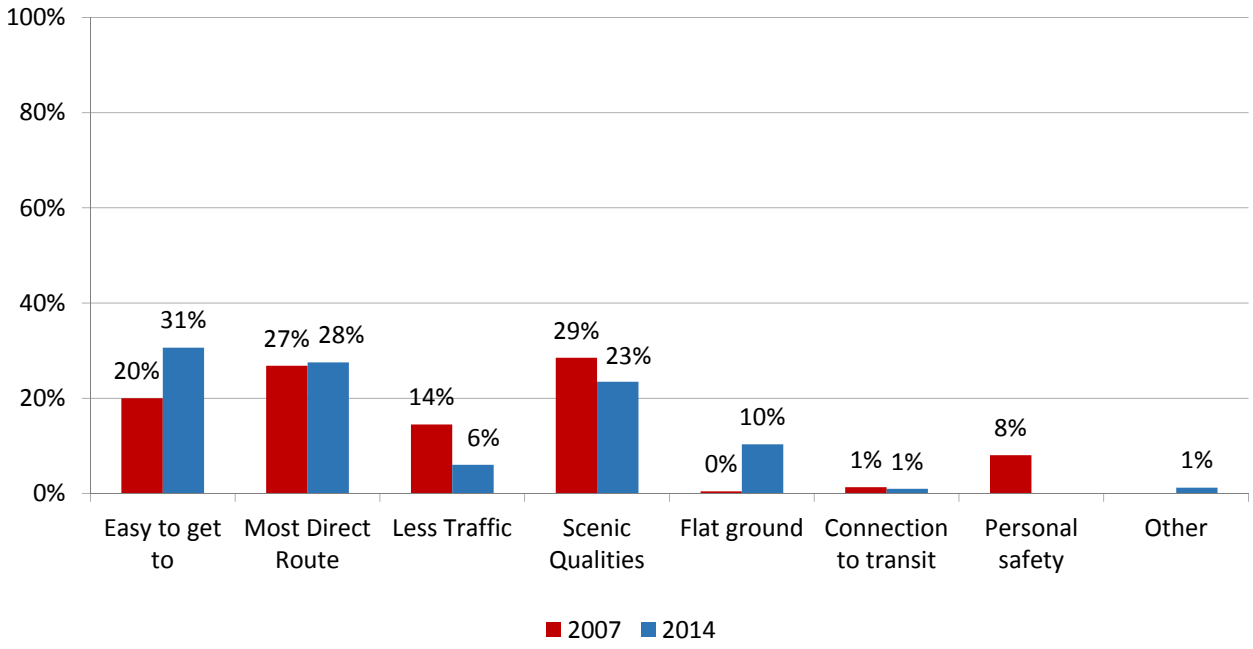


Figure B.1-9 Pedestrian Reasons for Route Choice

Question 8

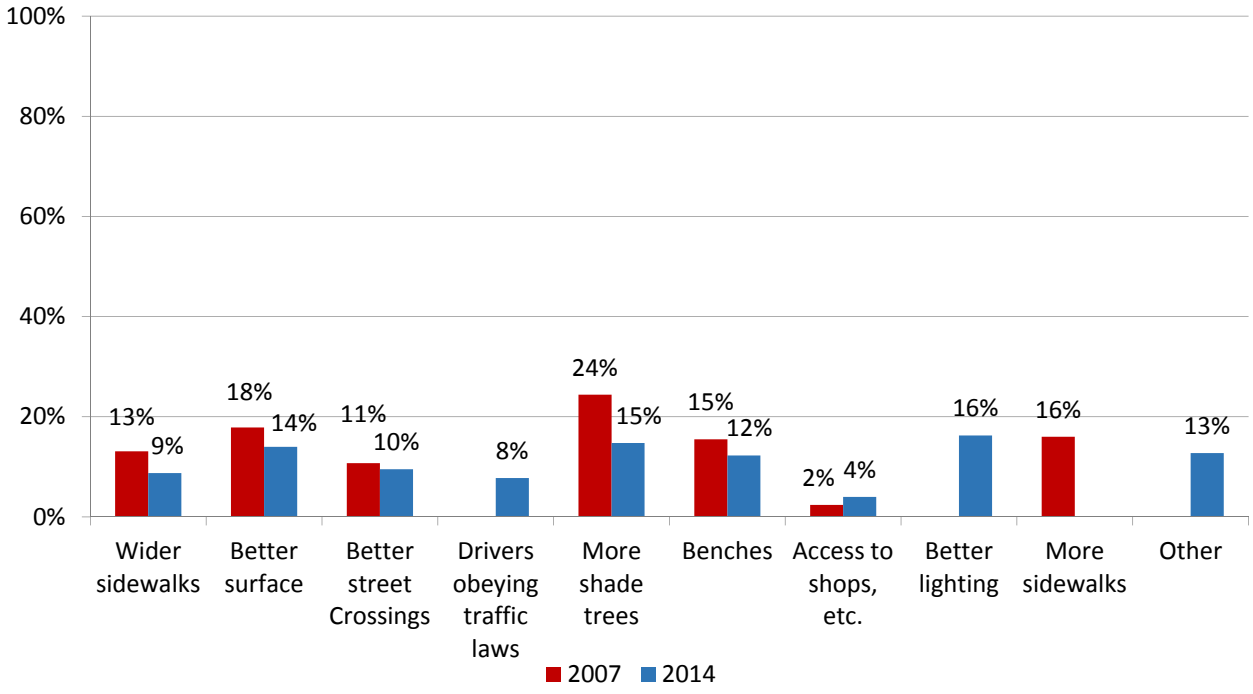


Figure B.1-10 Pedestrians Stated Preference for Improvements along Their Route

Question 9

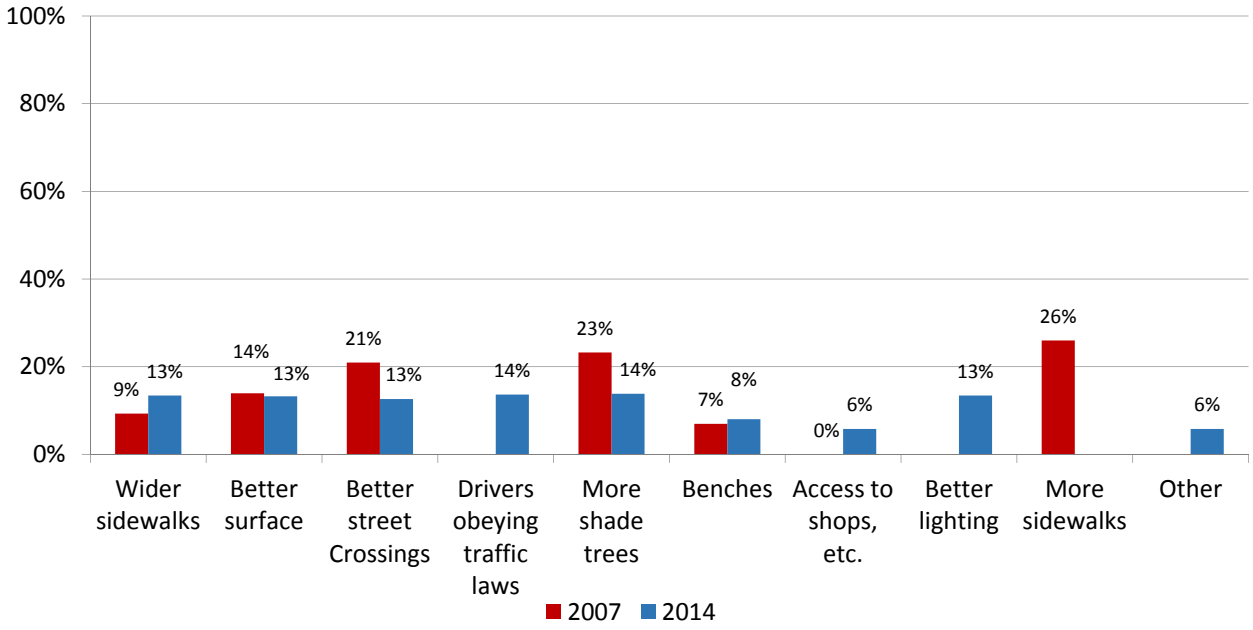


Figure B.1-11 Pedestrian Stated Preference for General Improvements

Question 10

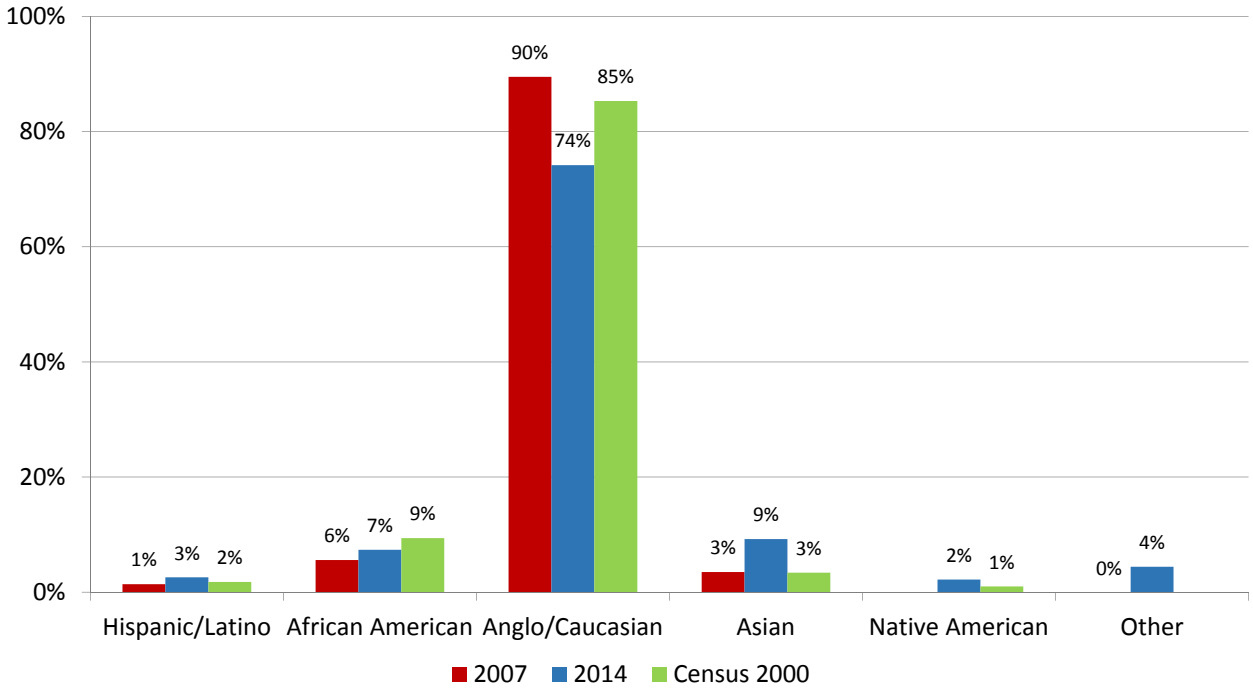


Figure B.1-11 Pedestrian Ethnicity

Question 11

Form B-1

Pedestrian Survey Data Form

Columbia NTPP: Pedestrian Survey

This survey will provide valuable information on bicycling behavior and preferences. It will take about two minutes to complete.

1. What is your home zip code? _____

2. What best describes the purpose of this walking trip?

☐ Exercise (a) ☐ Work commute (b) ☐ School (c)
☐ Recreation/fun (d) ☐ Shopping/doing errands (e) ☐ Personal business (medical, visiting friends, etc.)(f)

3. In the past month (30 days), about how often have you walked here?

☐ First time (a) ☐ 0 – 5 times (b) ☐ 6 – 10 times (c) ☐ 11 – 20 times (d) ☐ Daily (e)

4. When do you walk? (check all that apply)

☐ Summer (b) ☐ Fall (c) ☐ Winter (d) ☐ Spring (e)

5. What is the length of this trip? _____ **(blocks) OR** _____ **(miles)**

How long will it take you to complete this walking trip? _____(hours/min)

Where did you begin the trip: _____ Address, intersection, or landmark?

6. Will any part of this current trip be taken on public transit (bus or train)?

☐ Yes (a) ☐ No (b)

7. If you were not walking for this trip, how would you be traveling?

☐ Car (a) ☐ Ride with friend or family (b) ☐ Transit (bus or train) (c) ☐ Bicycle (d)
☐ I would not make this trip (e) ☐ other (f)

8. Why are you using this route and not a different route to your destination? (check all that apply)

☐ Easy to get to (a) ☐ Most direct route to my destination (b) ☐ Less traffic (c) ☐ Scenic qualities (d)
☐ Flat ground (e) ☐ Connection to transit (bus or train) (f)

9. What would you like to see improved <u>along this route</u> in general? (check all that apply)

☐ Wider sidewalks (a) ☐ Better surface (b) ☐ Better street crossings (c) ☐ Drivers obeying traffic Laws (d)
☐ More shade trees (e) ☐ Benches (f) ☐ Access to shops, etc. (g) ☐ Better lighting (h)
☐ Other _____ (i)

10. What would you like to see improved <u>in the community</u> in general? (check all that apply)

☐ Wider sidewalks (a) ☐ Better surface (b) ☐ Better street crossings (c) ☐ Drivers obeying traffic Laws (d)
☐ More shade trees (e) ☐ Benches (f) ☐ Access to shops, etc. (g) ☐ Better lighting (h)
☐ Other _____ (i)

11. What ethnic group do you belong to? (check all that apply)

☐ Hispanic/Latino (a) ☐ African American (b) ☐ Anglo/Caucasian (d) ☐ Asian (c)
☐ Native American (e) ☐ Hmong (f) ☐ Somali (g) ☐ Other (h): _____

12. What is your age? ☐ **under 18 years** (a) ☐ **18 - 40** (b) ☐ **41 - 60** (c) ☐ **61 and over** (d)

13. What is your gender? ☐ **Male** (a) ☐ **Female** (b)

----------Office use only below this line----------

Location: _____ Date: _____ Time: _____

Surveyor: _____ Weather: _____

2014 Bicycle Survey Results

Trip Purpose: A considerable number of bicycle trips are reported to be transportation-related (i.e., work, school, shopping/errands, personal business). Over time, approximately 30-40% of surveyed bicyclists report that their trip was for utilitarian purposes (i.e., work, school, shopping or personal business).

Frequency: In 2007, the average bicycling frequency was 14 days/month, with 28% of the respondents bicycling daily. In 2014, the average bicycling frequency was 16 days/month, with 35% of the respondents bicycling daily.

Alternative Mode for this Trip: In 2007, if respondents were not able to bicycle, 17% would have driven, 17% would have walked and 67% would not have made this trip. In 2014, 38% reported they would have driven, 29% would have walked, 6% would have taken transit and 27% would not have made this trip.

Improvement Preference: In 2007, respondents identified bicycle lanes, less traffic, better street crossings and wider shoulders as their top four (4) improvements. In addition to these items, better maintenance, drivers obeying traffic laws and better surface were frequent responses in 2014.

Bicycling Trips that Included Transit: The number of people reporting their bicycling trip included transit increased from 0% in 2007 to 3% in 2013.

Reasons for Route Choice: While there were some differences in the relative percentages between 2007 and 2014, four factors received the most responses in both years: scenic qualities, separation from traffic, less traffic and access. Route directness, flat ground and bike lanes were other common responses in 2014.

Ethnicity: The ethnic breakdown appeared roughly equivalent to the ethnicity of the city in both survey years. The 2014 survey had a greater percentage of non-Caucasian respondents as compared to the population.

Bicycling Survey Data Charts

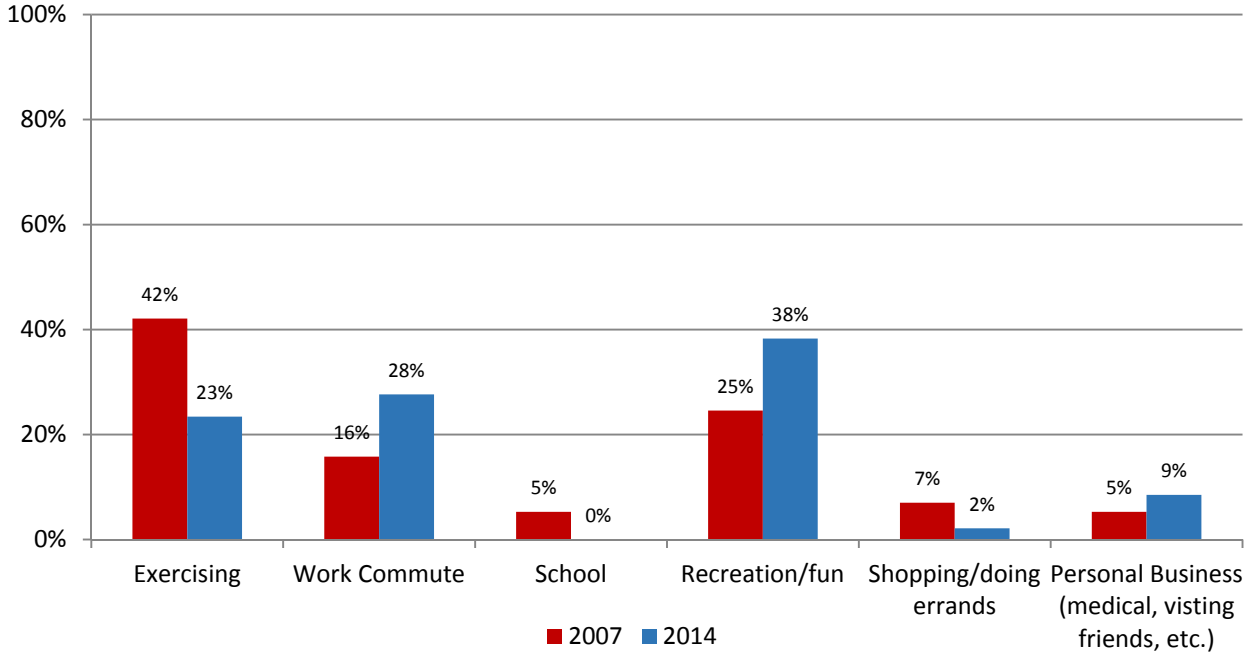


Figure B.2-1 Bicycling Trip Purpose
Question 2

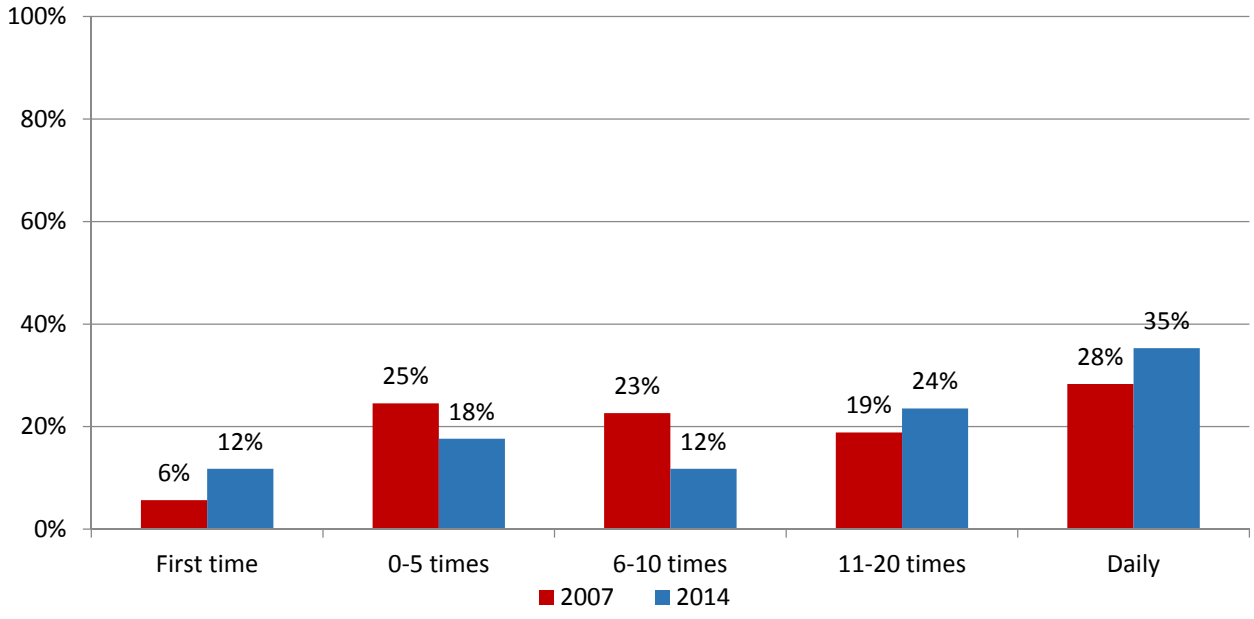


Figure B.2-2 Bicyclist Riding Frequency
Question 3

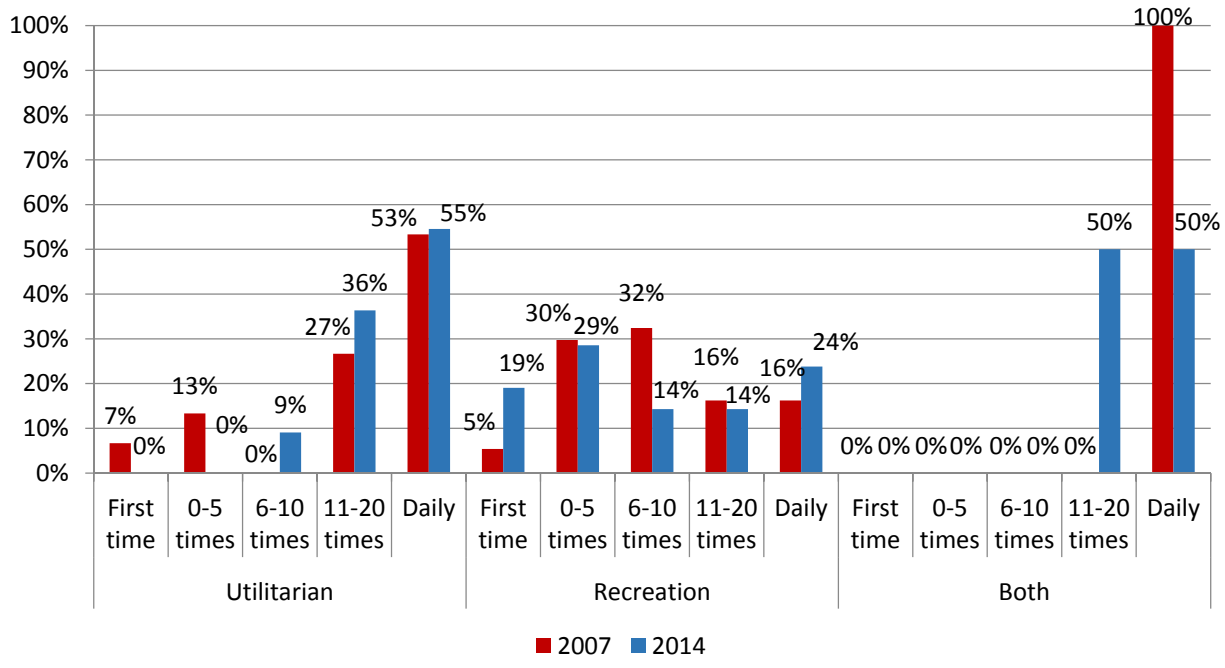


Figure B.2-3 Bicyclist Riding Frequency by Trip Purpose in One Month

Questions 2 and 3

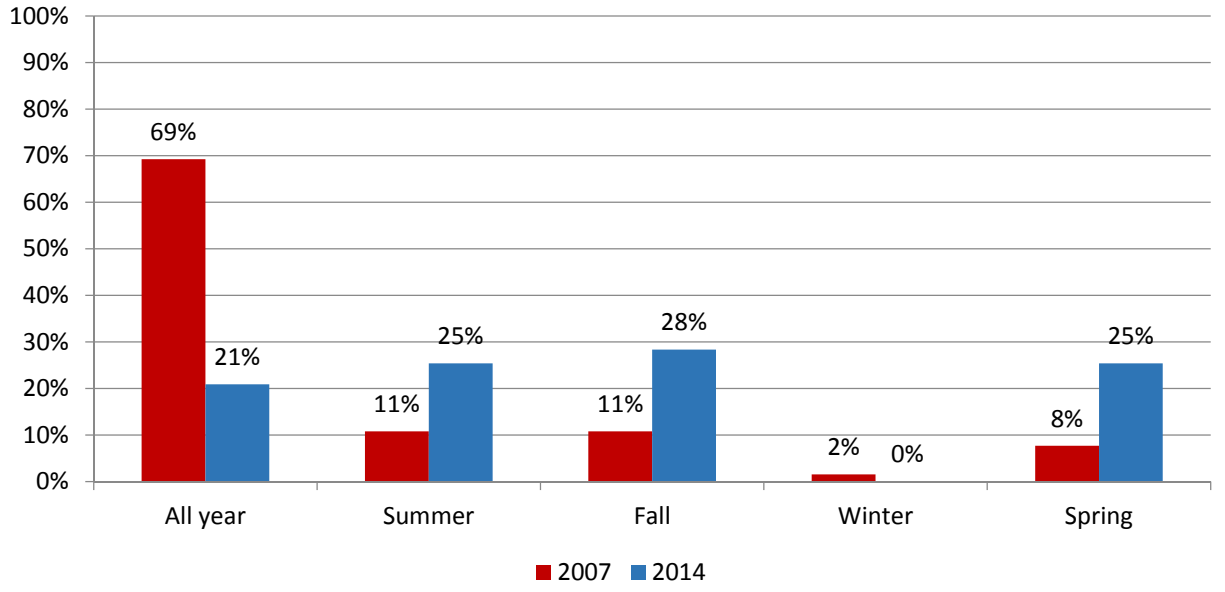


Figure B.2-4 Seasons in Which People Bicycle

Question 4

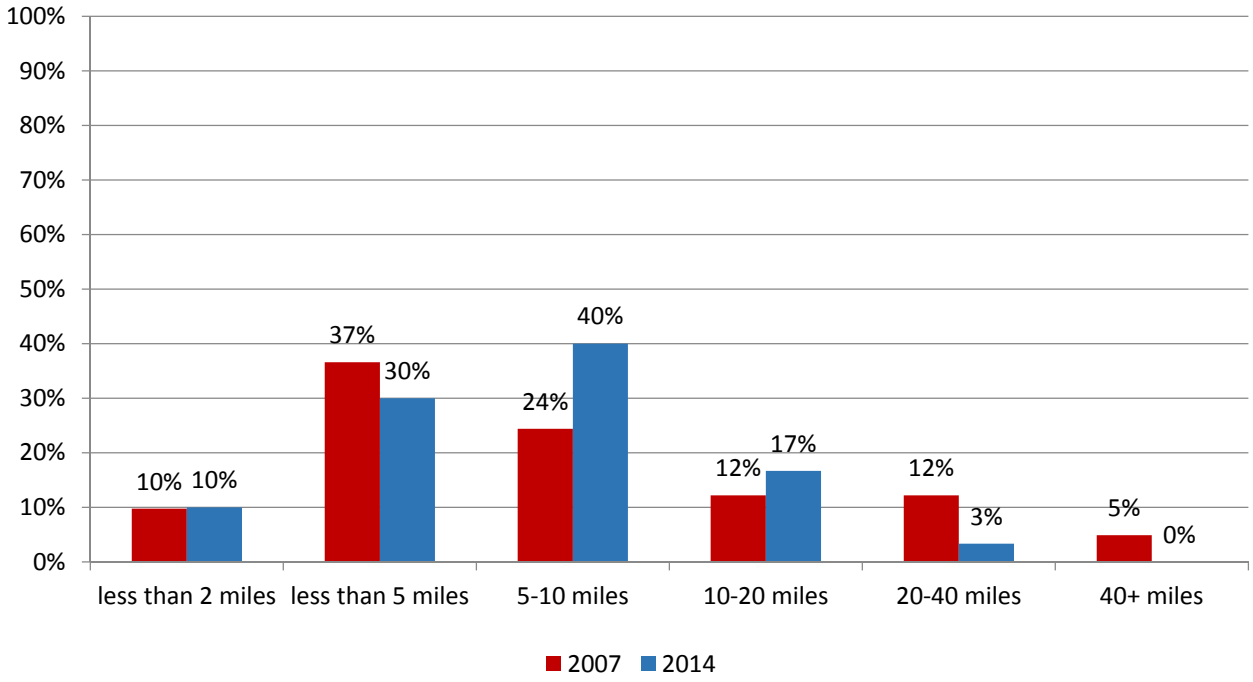


Figure B.2-5 Distance of Bicycling Trips

Question 5

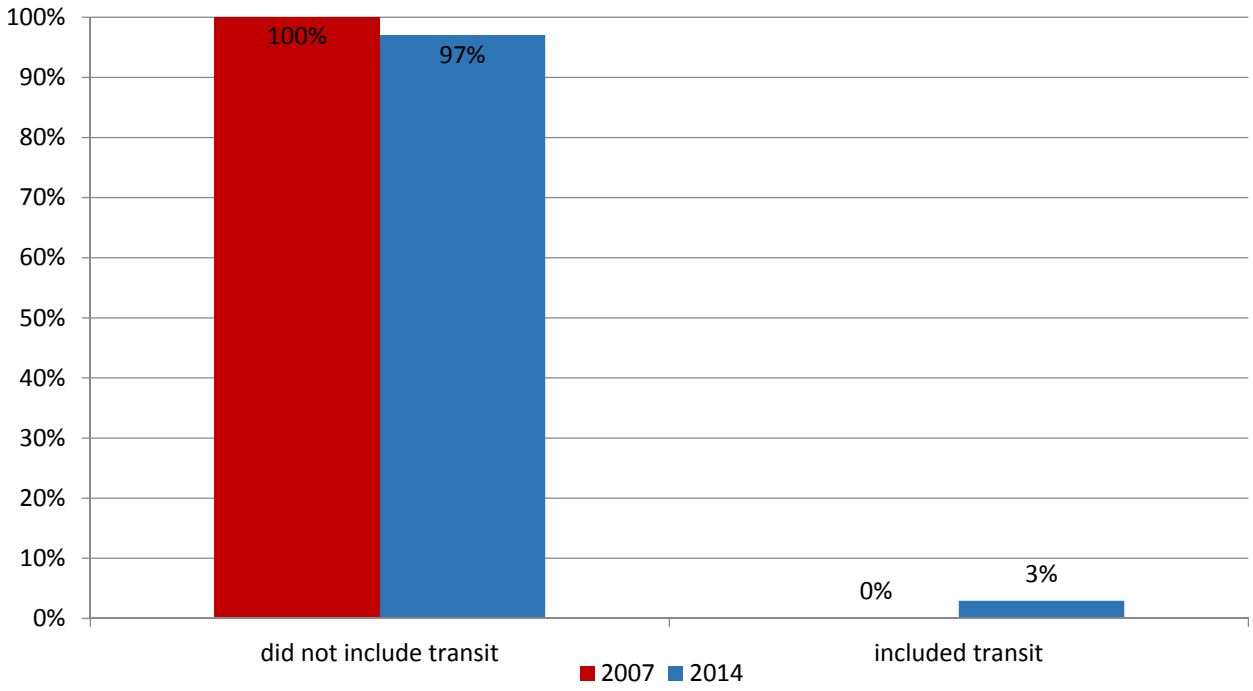


Figure B.2-6 Bicycling Trips that Included Transit

Question 6

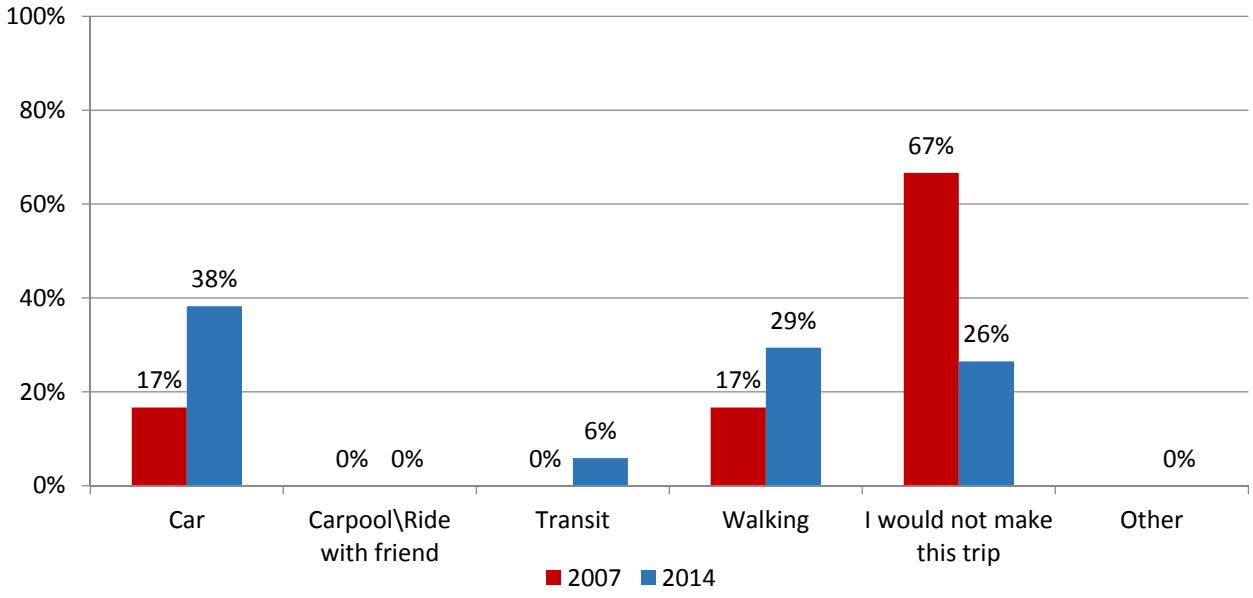


Figure B.2-7 Alternate Mode to Bicycling

Question 7

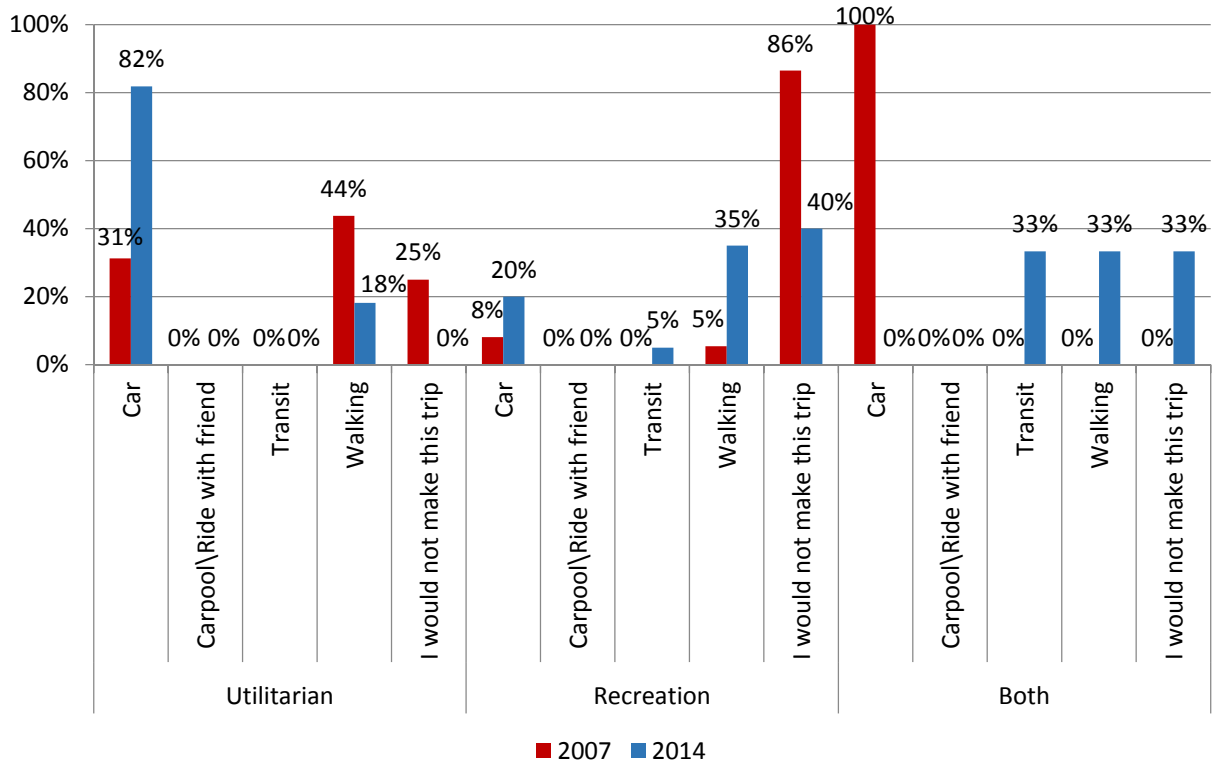


Figure B.2-8 Alternate Mode to Bicycling by Trip Purpose

Question 2 and 7

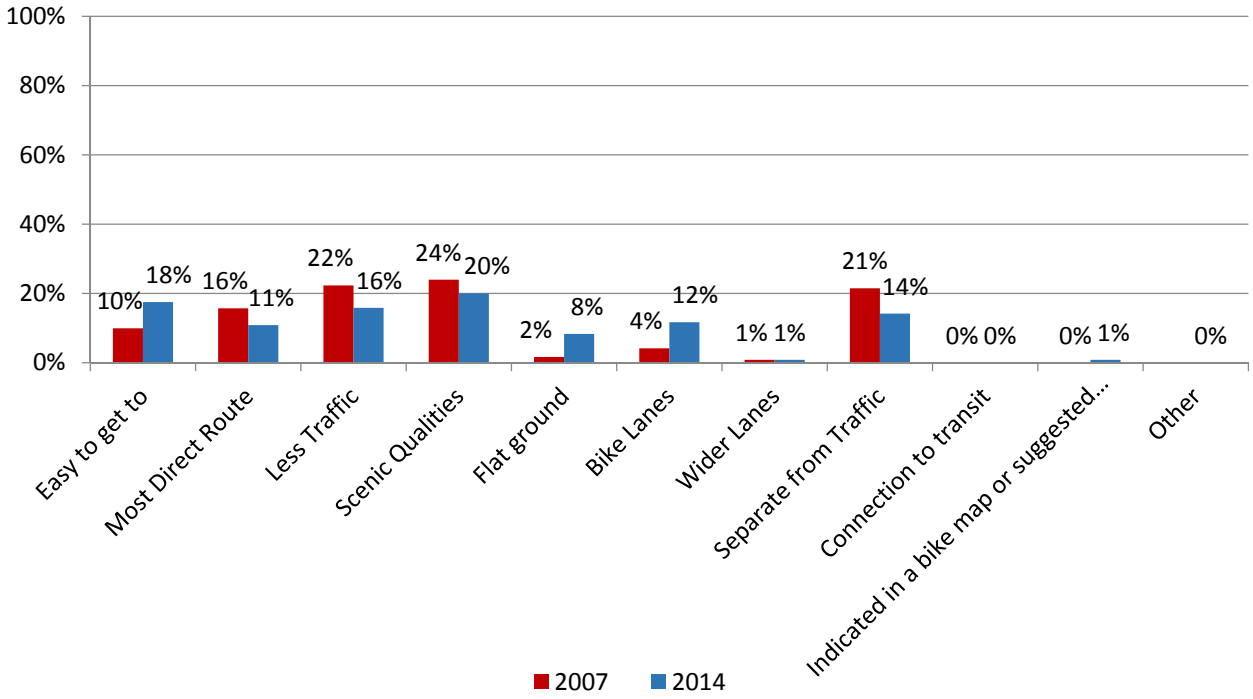


Figure B.2-9 Bicycling Route Choice

Question 8

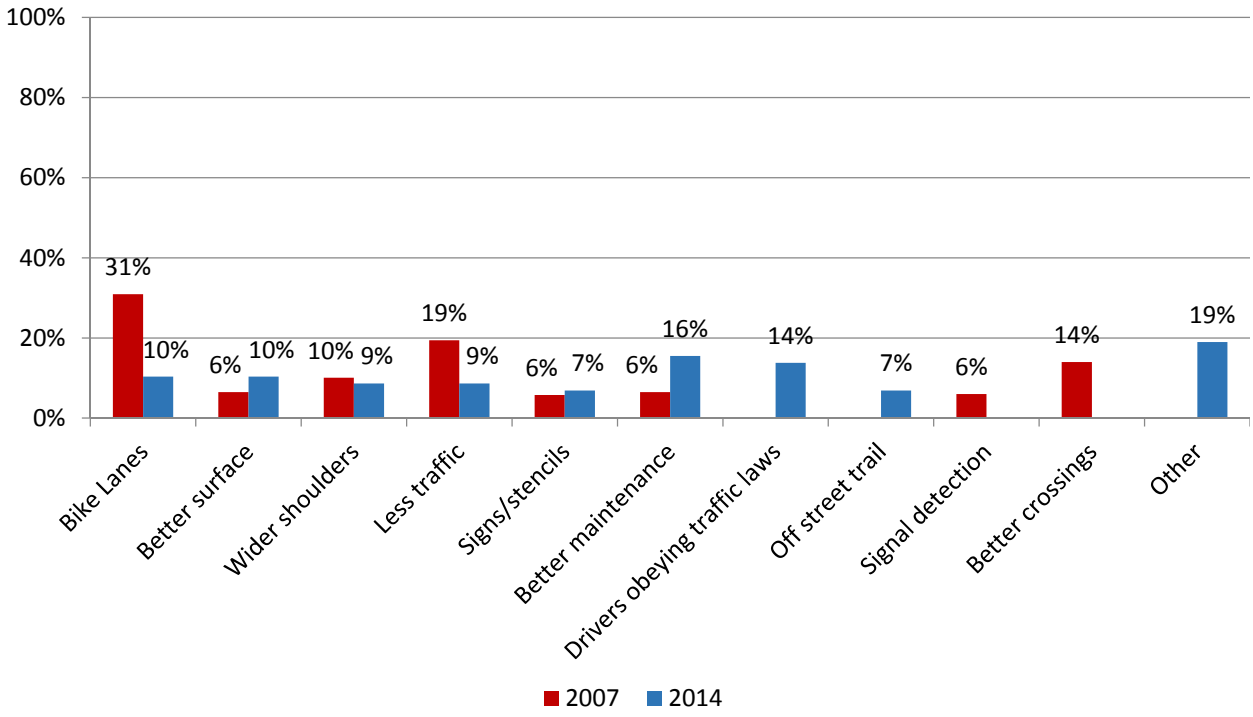


Figure B.2-10 Bicyclists Preference for Improvements along Their Route

Question 9

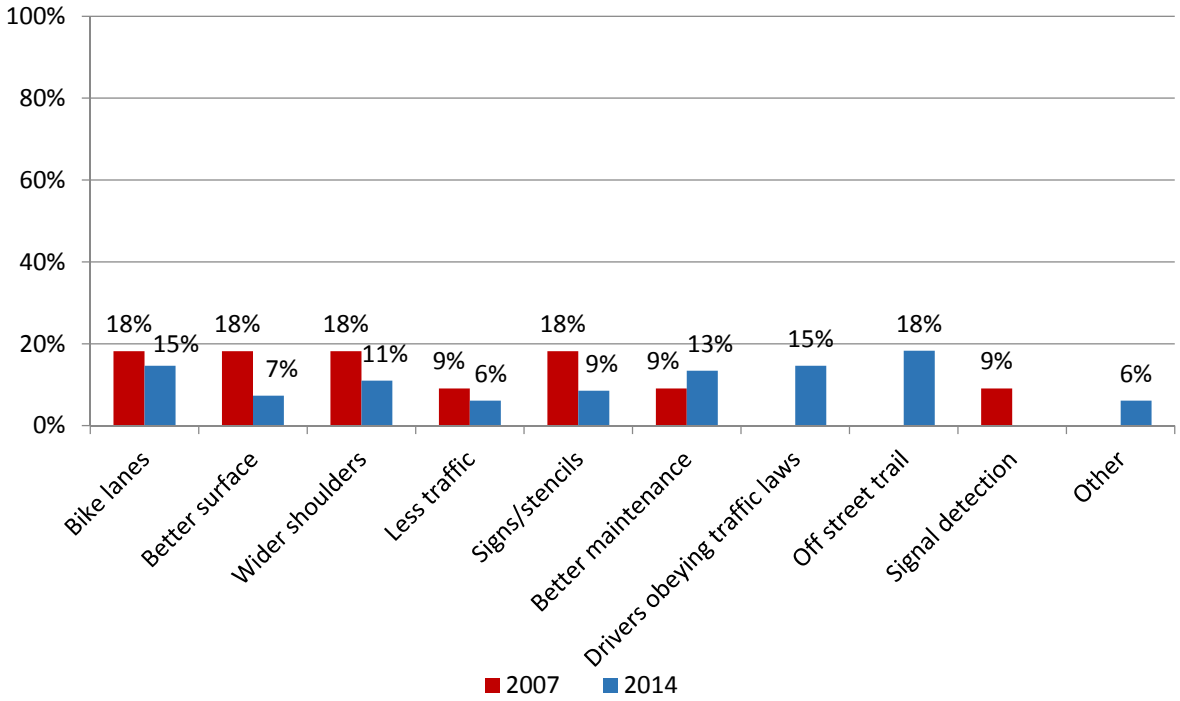


Figure B.2-11 Bicyclists Preferences for General Community Improvements

Question 10

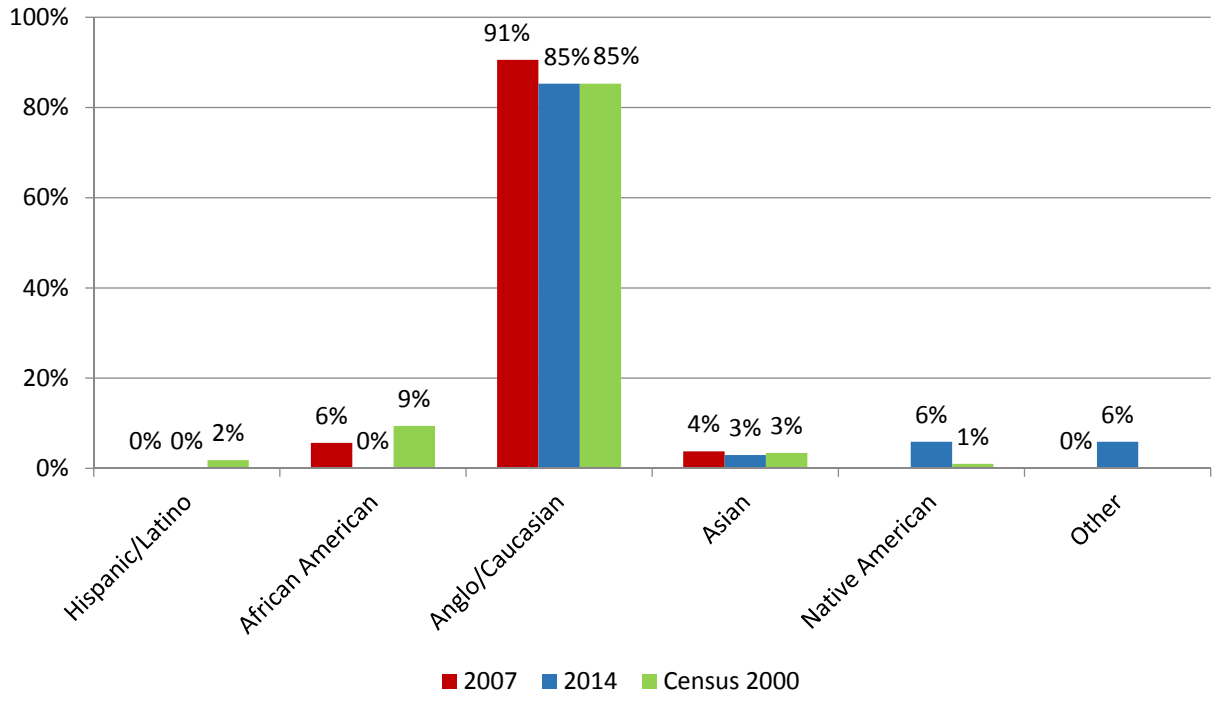


Figure B.2-11 Ethnicity of Bicyclists

Question 11

Form B-2

Bicyclist Survey Data Form

Columbia NTPP: Bicyclist Survey

This survey will provide valuable information on bicycling behavior and preferences. It will take about two minutes to complete.

1. What is your home zip code? _____

2. What best describes the purpose for this bicycle trip?

☐ Exercising (a) ☐ Work commute (b) ☐ School (c)
☐ Recreation/fun (d) ☐ Shopping/doing errands (e) ☐ Personal business (medical, visiting friends, etc.) (f)

3. In the past month (30 days), about how often have you ridden a bicycle here?

☐ First time (a) ☐ 0 – 5 times (b) ☐ 6 – 10 times (c) ☐ 11 – 20 times (d) ☐ Daily (e)

4. When do you bicycle? (check all that apply)

☐ Summer (b) ☐ Fall (c) ☐ Winter (d) ☐ Spring (e)

5. What is the length of this trip? _____ **(blocks) OR** _____ **(miles)**

How long will it take you to complete this bicycle trip? _____(hours/minutes)

Where did you begin the trip: _____ Address, intersection, or landmark?

6. Will any part of this current trip be taken on public transit (bus or train)?

☐ Yes (a) ☐ No (b)

7. If you were not biking for this trip, how would you be traveling?

☐ Car (a) ☐ Get ride from friend/family (b) ☐ Transit (bus or train) (c) ☐ Walking (d)
☐ I would not make this trip (e) ☐ Other _____ (f)

8. Why are you using this route and not a different route to your destination? (check all that apply)

☐ Easy to get to (a) ☐ Most direct route to my destination (b) ☐ Less traffic (c) ☐ Scenic qualities (d)
☐ Flat ground (e) ☐ Bike lanes (f) ☐ Wider lanes (g) ☐ Separated from traffic (h)
☐ Connection to transit (i) ☐ Indicated on a bike map or suggested to me (j)

9. What would you like to see improved <u>along this route</u> in general? (check all that apply)

☐ Painted bike lanes on the street (a) ☐ Better surface (b) ☐ Wider shoulders (c) ☐ Less traffic (d)
☐ Signs/stencils on the road to identify bicycle use (e) ☐ Better maintenance (sweeping, pothole repair, etc) (f)
☐ Drivers obeying traffic laws (g) ☐ Off-street trail (h) ☐ Other_____ (i)

10. What would you like to see improved <u>in the community</u> in general? (check all that apply)

☐ Painted bike lanes on the street (a) ☐ Better surface (b) ☐ Wider shoulders (c) ☐ Less traffic (d)
☐ Signs/stencils on the road to identify bicycle use (e) ☐ Better maintenance (sweeping, pothole repair, etc) (f)
☐ Drivers obeying traffic laws (g) ☐ Off-street trail (h) ☐ Other_____ (i)

11. What ethnic group do you belong to? ***(check all that apply)***

☐ Hispanic/Latino (a) ☐ African American (b) ☐ Anglo/Caucasian (d) ☐ Asian (c)
☐ Native American (e) ☐ Hmong (f) ☐ Somali (g) ☐ Other (h): _____

12. What is your age? ☐ **under 18 years** (a) ☐ **18 - 40** (b) ☐ **41 - 60** (c) ☐ **61 and over** (d)

13. What is your gender? ☐ **Male** (a) ☐ **Female** (b)

----------Office use only below this line----------

Location: _____ Date: _____ Time: _____

Surveyor: _____ Weather: _____

Appendix C: Pedestrian and Bicycle Demand Models

The following models provide an overview of the demand and benefits of bicycling and walking in Columbia. It is estimated that current levels of bicycling and walking replace 4,044 and 33,204 daily vehicle trips, respectively, which reduces CO_2 emissions by a combined 9,388,254 lbs per year.

The models used for the Non-motorized Transportation Pilot Project study incorporate information from existing publications, the U.S. Census American Community Survey (ACS) and NTPP survey results for Columbia. All data assumptions and sources are noted in the tables. Variables used in the NTPP pedestrian and bicycle demand models include commuting patterns of working adults and predicted travel behaviors of area college students and school children. The annual counts are not used in this model. The primary model inputs are described below:

- **Work Commute Trips** - Population data for the existing labor force over 16 years of age (including the number of workers and percentage of pedestrian and bicycle commuters) were obtained from the ACS estimate for Columbia.
- **School Commute Trips** - ACS data was combined with data from the National Center for Safe Routes to School's *How Children Get to School: School Travel Patterns from 1969 to 2009* (2010), which found that approximately 12 percent of school children walk to and from school every day while approximately 2 percent of school children bike to and from school each day.
- **College Commute Trips** – The number of people enrolled in undergraduate college, graduate or professional school was obtained from ACS data. The report assumes that college students walk and bike at the same rate as the working population. Data from the Federal Highway Administration indicate that this is a conservative estimate; nationally, 60 % of college students walk to school.
- **Transit Linked Trips** – Transit trips typically begin and end with a walking trip. The estimated number of walking trips linked with transit is derived from the working age population that commutes via public transit according to ACS data.
- **Utilitarian (non work or school) Trips** - The 2001 National Household Transportation Survey found that commute trips (including work and school trips) comprise only approximately a third of total trips; trips for shopping, recreation and socializing are a significantly greater proportion of total trips. Data from the NTPP surveys were used to estimate the ratio of utilitarian trips that are not for work or school as compared to work commute trips. This ratio was used to develop an estimate of utilitarian trips based on the work commute trip estimate calculated above.
- **Recreational/Discretionary Trips** – Similar to the above, NTPP survey data were used to estimate the ratio of recreational/discretionary trips to work commute trips. This ratio was used to develop an estimate of recreational/discretionary trips based on the work commute trip estimate calculated above.
- **Total Estimated Daily Bike or Walk Trips** – Calculated as the sum of the types of trips described above.

Table C-1
Pedestrian Demand Model Results

		Input	Calculated Totals	Source(s)
Work Commute Trips				
a. 2013 Population		113,216		American Community Survey 2011-2013
b. 2013 Employed Persons		58,472		American Community Survey 2011-2013
c. 2013 Pedestrian Commute Share		6.0%		American Community Survey 2011-2013
d. 2013 Pedestrian Commuters	commuters x2 = trips	3,526	7,052	
School Commute Trips				
e. 2013 Population, Ages 6-14		10,523		American Community Survey 2011-2013
f. 2013 Est. Pedestrian Commute Share		12%		National Center for Safe Routes to School, 2011
g. 2013 Pedestrian School Commuters	commuters x2 = trips	1,263	2,526	
College Commute Trips				
h. 2013 College Population		30,707		American Community Survey 2011-2013
i. 2013 Pedestrian Commute Share		6.0%		Identical to c.
j.2013 Pedestrian College Commuters	commuters x2 = trips	1,852	3,703	
Transit-Linked Trips				
k. Average daily transit trips	commuters x2 = trips	611	1,222	American Community Survey 2011-2013
Utilitarian (non work or school) Trips				
l. percent of work walk trips		255%		Columbia NTPP Counts and Surveys*
m. estimated utility walkers			17,982	
Recreational/Discretionary Trips				
n. ratio of recreation/discretionary trips to work trips		671%		Columbia NTPP Counts and Surveys*
o. estimated rec/disc walkers			47,317	
p. Total Estimated Daily Walking Trips			79,801	
q. Average One-Way Travel Length (Miles)				
q1. Adults/College Students		1		Columbia NTPP Counts and Surveys
q2. School Children		0.25		Alice Tibbets MN assumptions of "walk zone"
r. Replaced vehicle trips				Columbia NTPP Counts and Surveys
r1. Utilitarian/work/school/personal		49%		
r2. Recreational/discretionary		54%		
s. Reduced Daily Vehicle Trips			40,870	
t. Reduced Daily Vehicle Miles			39,942	Columbia NTPP Counts and Surveys

* Based on the average of 2012-2014 survey results

Table C-2
Bicycle Demand Model Results

		Input	Calculated Totals	Source(s)
Work Commute Trips				
a. 2013 Population		113,216		American Community Survey 2011-2013
b. 2013 Employed Persons		58,472		American Community Survey 2011-2013
c. 2013 Bicycle Commute Share		1.6%		American Community Survey 2011-2013
d. 2013 Bicycle Commuters	commuters x2 = trips	924	1,848	
School Commute Trips				
e. 2013 Population, Ages 6-14		10,523		American Community Survey 2011-2013
f. 2013 Est. Bicycle Commute Share		2%		National Center Safe Routes to School, 2011
g. 2013 Bicycle School Commuters	commuters x2 = trips	210	420	
College Commute Trips				
h. 2013 College Population		30,707		American Community Survey 2011-2013
i. 2013 Bicycle Commute Share		1.6%		Identical to c.
j. 2013 Bicycle College Commuters	commuters x2 = trips	491	982	
Utilitarian (non work or school) Trips				
k. percent of work bicycle trips		79%		Columbia NTPP Counts and Surveys*
l. estimated bicycle utility trips			1,460	
Recreational/Discretionary Trips				
m. ratio of recreational/discretionary trips to work trips		358%		Columbia NTPP Counts and Surveys*
n. estimated bicycle rec/disc trips			6,616	
o. Total Estimated Daily Bicycle Trips			11,326	
p. Average One-Way Travel Length (Miles)				Columbia NTPP Counts and Surveys
p1. Adults/College Students		2.5		
p2. School Children		0.5		
q. Replaced vehicle trips				Columbia NTPP Counts and Surveys
q1. Utilitarian/work/school/personal		82%		
q2. Recreational/discretionary		20%		
r. Reduced Daily Vehicle Trips			5,176	
s. Reduced Daily Vehicle Miles			12,249	Columbia NTPP Counts and Surveys

* Based on the average of 2012-2014 survey results

Air Quality Benefits

The expected number of walking and biking trips in Columbia can be directly translated into reduced vehicle trips, as the current rates of walking and bicycling represent both residents and visitors using alternatives to driving. This number can be used to determine approximate reduction in vehicle miles traveled (VMT), which has the direct effect of reducing vehicular emissions. The number of reduced vehicle trips, VMT and the ensuing vehicle emissions reduction were estimated from the results of the demand models described above. The following tables illustrate the results of the vehicle trips, miles reduction and air quality benefits for pedestrian and bicycle trips, respectively.

Table C-3
Air Quality Benefits from Pedestrian Trips

Variable	Value	Source
Reduced Hydrocarbons (pounds/weekday)	120	Daily mileage reduction multiplied by 1.36 grams per reduced mile
Reduced PM10 (pounds/weekday)	0	Daily mileage reduction multiplied by 0.0052 grams per reduced mile
Reduced PM2.5 (pounds/weekday)	0	Daily mileage reduction multiplied by 0.0049 grams per reduced mile
Reduced NOX (pounds/weekday)	84	Daily mileage reduction multiplied by 0.95 grams per reduced mile
Reduced CO (pounds/weekday)	1,092	Daily mileage reduction multiplied by 12.4 grams per reduced mile
Reduced C02 (pounds/weekday)	32,493	Daily mileage reduction multiplied by 369 grams per reduced mile
Reduced Hydrocarbons (pounds/year)	31,256	Yearly mileage reduction multiplied by 1.36 grams per reduced mile
Reduced PM10 (pounds/year)	120	Yearly mileage reduction multiplied by 0.0052 grams per reduced mile
Reduced PM2.5 (pounds/year)	113	Yearly mileage reduction multiplied by 0.0049 grams per reduced mile
Reduced NOX (pounds/year)	21,834	Yearly mileage reduction multiplied by 0.95 grams per reduced mile
Reduced CO (pounds/year)	284,985	Yearly mileage reduction multiplied by 12.4 grams per reduced mile
Reduced C02 (pounds/year)	8,480,613	Yearly mileage reduction multiplied by 369 grams per reduced mile

* Annual benefits are calculated by multiplying the daily benefits by 261, the number of weekdays in a typical year.

Table C-4
Air Quality Benefits from Bicycle Trips

Variable	Value	Source
Reduced Hydrocarbons (pounds/weekday)	37	Daily mileage reduction multiplied by 1.36 grams per reduced mile
Reduced PM10 (pounds/weekday)	0	Daily mileage reduction multiplied by 0.0052 grams per reduced mile
Reduced PM2.5 (pounds/weekday)	0	Daily mileage reduction multiplied by 0.0049 grams per reduced mile
Reduced NOX (pounds/weekday)	26	Daily mileage reduction multiplied by 0.95 grams per reduced mile
Reduced CO (pounds/weekday)	335	Daily mileage reduction multiplied by 12.4 grams per reduced mile
Reduced C02 (pounds/weekday)	9,965	Daily mileage reduction multiplied by 369 grams per reduced mile
Reduced Hydrocarbons (pounds/year)	9,586	Yearly mileage reduction multiplied by 1.36 grams per reduced mile
Reduced PM10 (pounds/year)	37	Yearly mileage reduction multiplied by 0.0052 grams per reduced mile
Reduced PM2.5 (pounds/year)	35	Yearly mileage reduction multiplied by 0.0049 grams per reduced mile
Reduced NOX (pounds/year)	6,696	Yearly mileage reduction multiplied by 0.95 grams per reduced mile
Reduced CO (pounds/year)	87,400	Yearly mileage reduction multiplied by 12.4 grams per reduced mile
Reduced C02 (pounds/year)	2,600,849	Yearly mileage reduction multiplied by 369 grams per reduced mile

* Annual benefits are calculated by multiplying the daily benefits by 261, the number of weekdays in a typical year.

Emissions rates are from EPA report 420-F-05-022 "Emission Facts: Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks." 2005.

Appendix D: Maps and Photos of Count and Survey Locations

Location 1: Broadway between 8th and 9th Streets

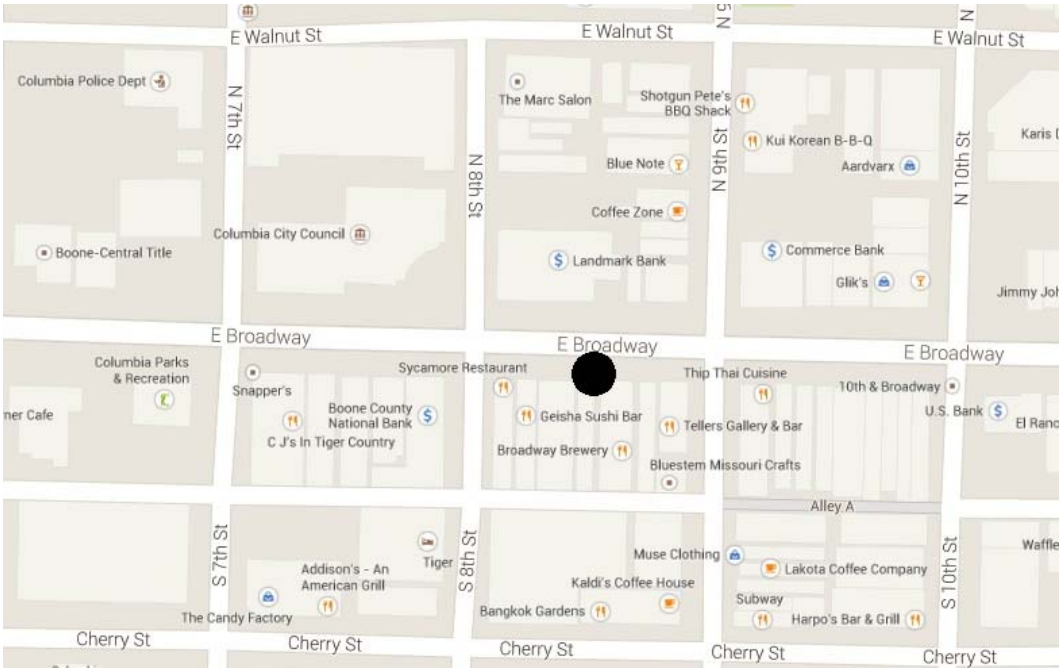


Figure D-1: Map of Location 1

Figure D-2: Photograph of Location 1

Location 2: MKT Trailhead

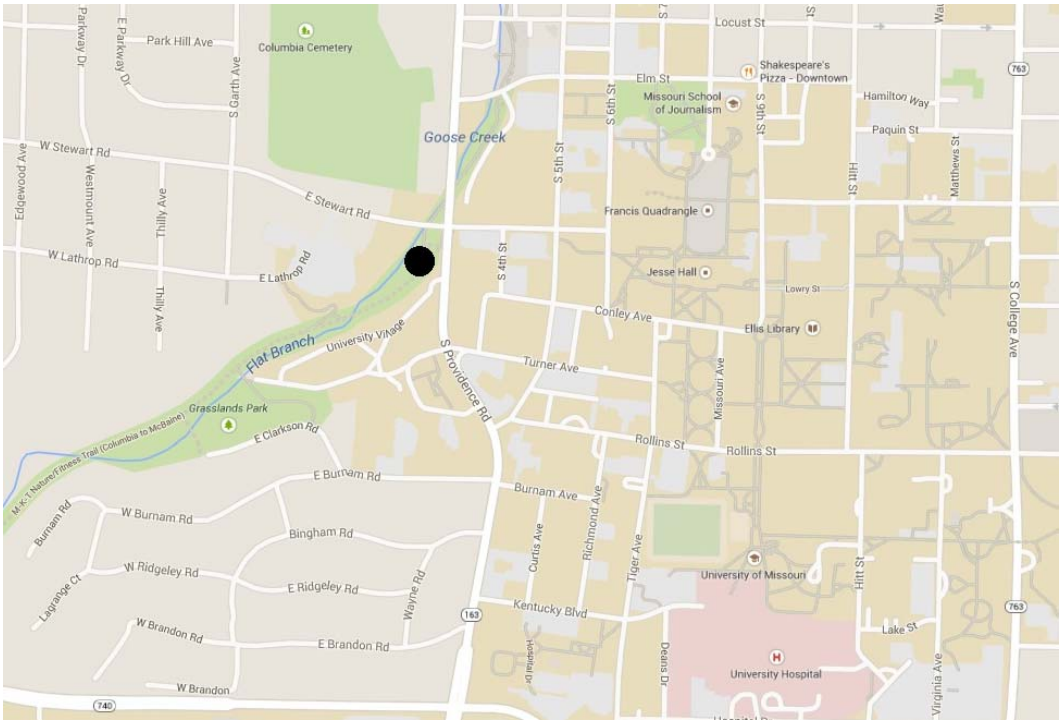


Figure D-3: Map of Location 2

Figure D-4: Photograph of Location 2

Location 3: Clinkscales

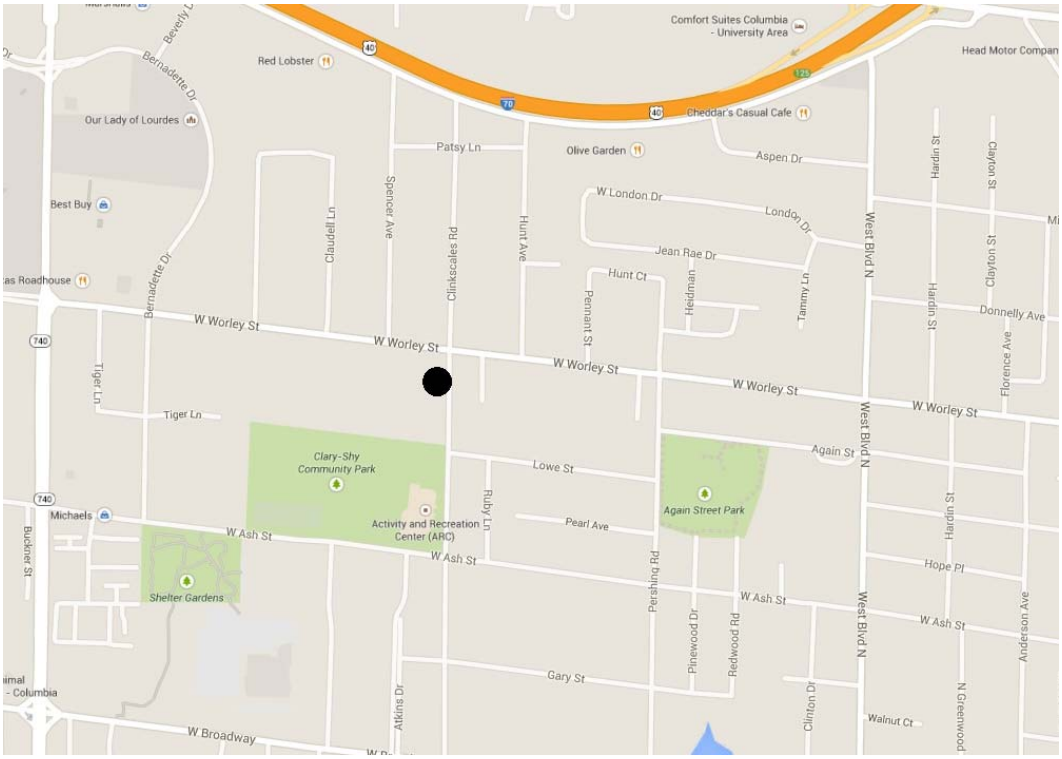


Figure D-5: Map of Location 3

Figure D-6: Photograph of Location 3

Location 4: Nifong

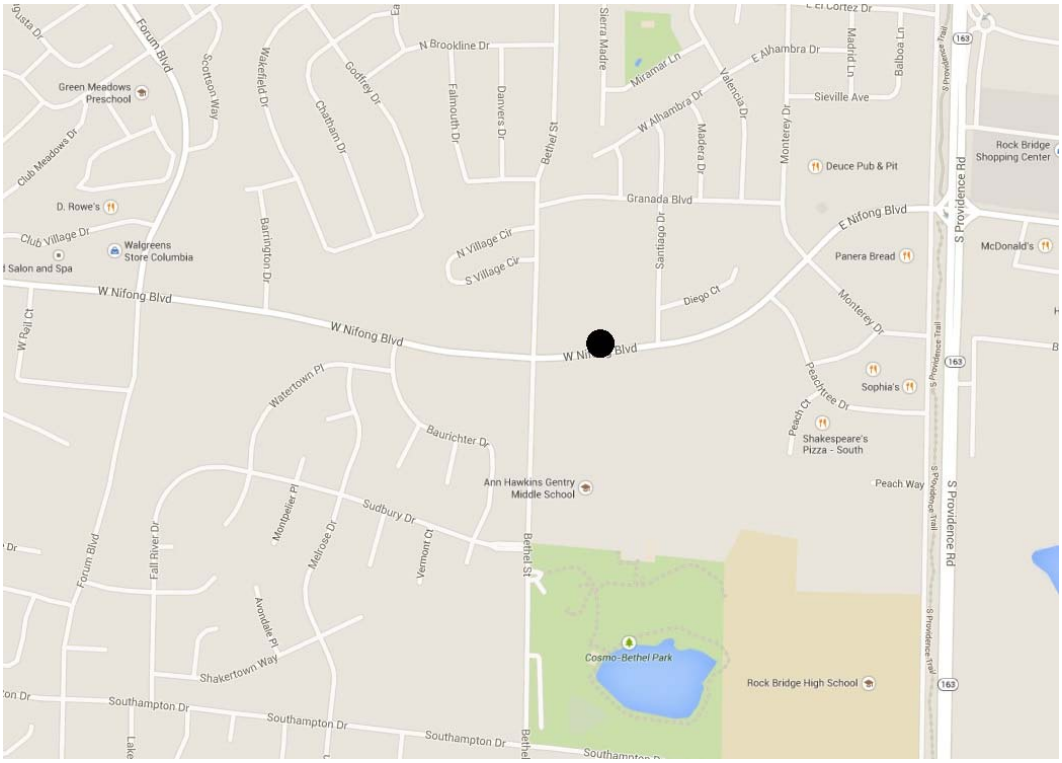


Figure D-7: Map of Location 4

Figure D-8: Photograph of Location 4

Location 5: Stadium-Forum Connector

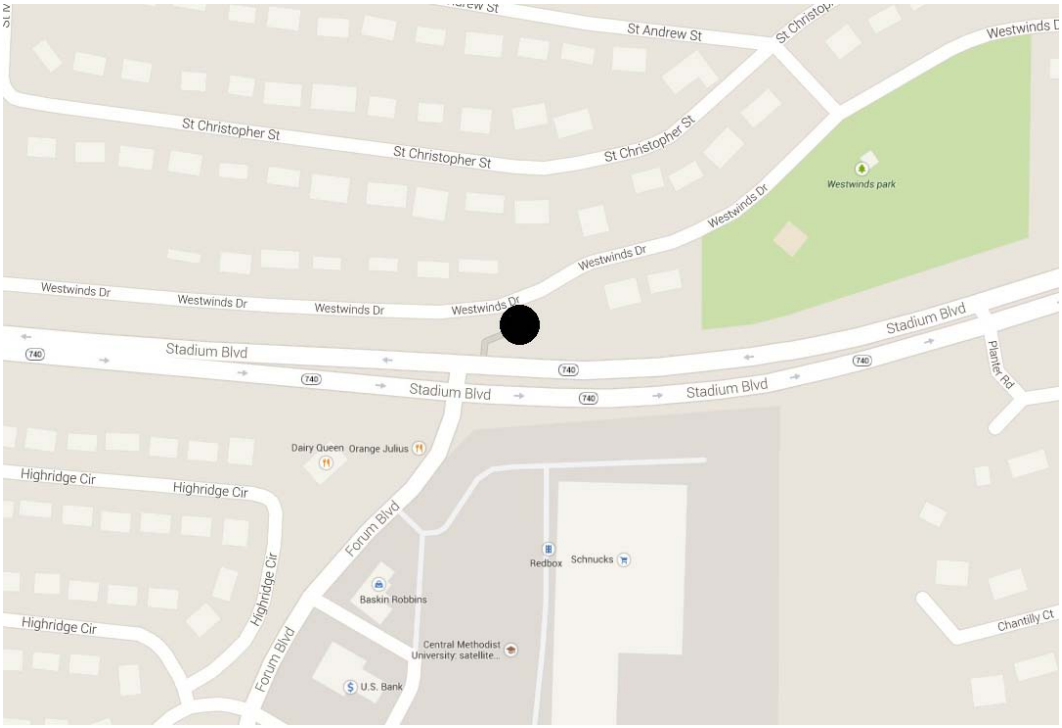


Figure D-9: Map of Location 5

Figure D-10: Photograph of Location 5

Location 6: Ashland Rd at Burch

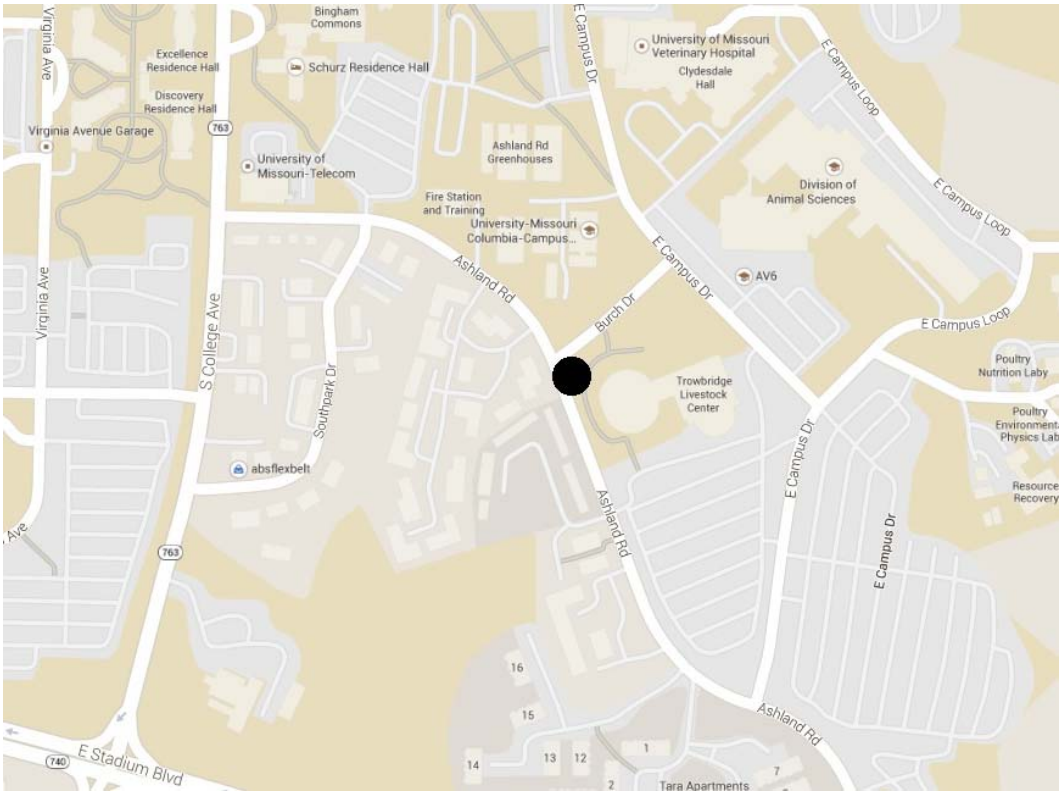


Figure D-11: Map of Location 6

Figure D-12: Photograph of Location 6

Location 7: Bear Creek Trail

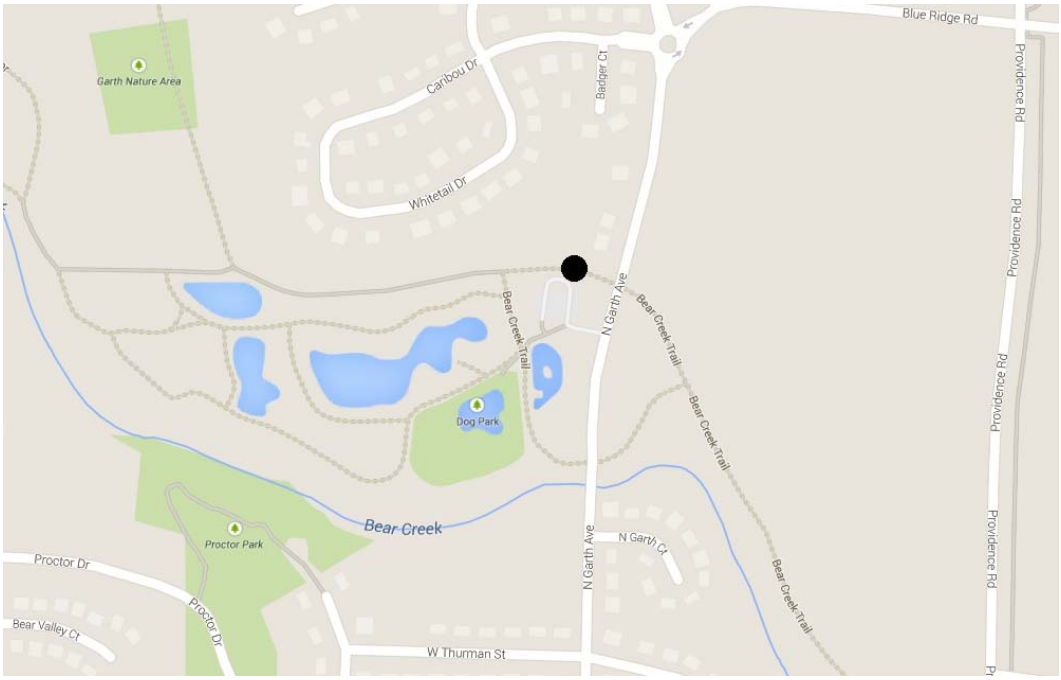


Figure D-13: Map of Location 7

Figure D-14: Photograph of Location 7