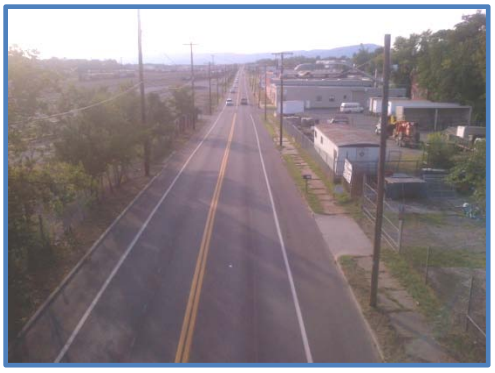
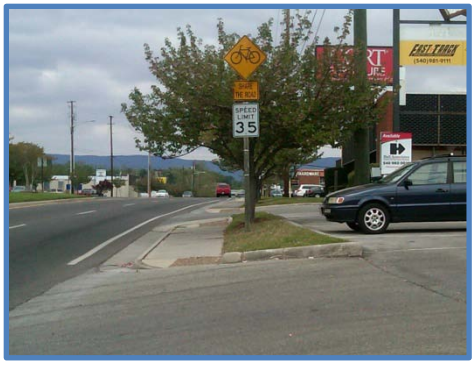
National Bicycle and Pedestrian Documentation Project

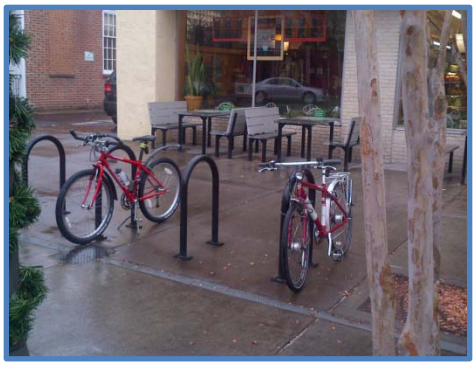
City of Roanoke, Virginia

2012

ROANOKE







Prepared by the REGIONAL commission

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1.0 NATIONAL BICYCLE & PEDESTRIAN DOCUMENTATION PROJECT (NBPD) OVERVIEW

The National Bicycle & Pedestrian Documentation Project (NBPD), initiated in 2004, is an effort led by Alta Planning + Design, in collaboration with the ITE Pedestrian & Bicycle Council to address the lack of useful data on walking and bicycling. The NBPD provides a standard and consistent methodology and conventions for the collection and analysis of bicycling or walking data across the United States.

The NBPD Fact Sheet and Status Report (February 2009) identifies four basic areas in which NBPD data could ultimately be used:

1. Transportation
2. Funding and Policy
3. Exposure
4. Related Research

Potential Transportation Uses

- Corridor and aggregate estimating models
- Estimates of transportation and other benefits
- Trip generation rates
- Traffic model modal inputs
- Quantitative multi-modal level of service methodology
- Trends in volumes
- Changes in volumes before and after project implementation
- Integration with existing traffic monitoring programs
- Integration with existing clean air and congestion management programs
- Determine capacity needs of non-motorized facilities

Potential Funding and Policy Uses

- Allocation of federal funding to bicycle/pedestrian modes
- Prioritization of local and regional projects
- Justification for accommodating bicycles/pedestrians in transportation projects (Complete Streets)
- Changes in traffic impact analysis and required/funded improvements
- Changes in definition of roadway level of service/capacity
- Priorities to develop different types of facilities, complete comprehensive network
- Research on Climate Change

Potential Exposure Uses

- Ability to develop exposure ‘rates’ so that high priority locations can be identified
- Related Research Uses

- Relationship between walking/bicycling and external factors (climate, demographics, land use, facility type, etc)
- Changes to zoning, urban design, and other local laws as appropriate

As of January 2009, NBPD counts have been conducted in about 93 different communities nationwide. Major NBPD findings to date include:

- Automated counters can accurately count bicycles and pedestrians in many locations, but need to be calibrated
- Multi-use paths can serve as primarily transportation facilities
- Multi-use paths generally attract much higher numbers of bicyclists and pedestrians than on-street facilities (sidewalks, streets)
- Even on multi-use paths with high recreational use, there are still much higher numbers of transportation-related trips than on-street
- Seasonal variations in use of multi-use paths are unique in different parts of the country
- Climate plays a significant role in the volumes on multi-use paths
- Visitor destinations have distinct use patterns
- Adjacent land use plays a large role in pedestrian peak periods and patterns of hourly use
- Trip purpose, length, and other survey data is highly sensitive to the survey location and survey method
- Most (44-63%) of pedestrian trips are transportation-related
- A significant number (25-37%) of bicycle trips are transportation related
- Unlike vehicles, there are few distinct peak hour patterns for pedestrians or bicycles
- Pedestrians have lower-than-average incomes, while bicyclists have higher-than-average incomes
- Employment density is a high indicator of pedestrian activity ($r = .976$) along with proximity to a multi-use pathway ($r = .879$).

The NBPD Fact Sheet and Status Report (February 2009) is provided in Appendix A.

2.0 CITY OF ROANOKE – 2012 NBPD OVERVIEW

The 2012 NBPD was the initial year of City of Roanoke participation in the NBPD. The City of Roanoke NBPD was a collaborative effort between the City of Roanoke and the Roanoke Valley Area Metropolitan Planning Organization. The overall goal of the 2012 Roanoke NBPD is to provide baseline cycling data for use in bicycle and pedestrian accommodations planning, funding, implementation, maintenance, and promotion by the City of Roanoke, RVAMPO, and other stakeholders. It is anticipated that the City of Roanoke NBPD will be conducted annually with possible participation by other RVAMPO localities in future years. City of Roanoke NBPD data will also be used as an annual performance measure for the RVAMPO, which became a Transportation Management Area (TMA) MPO following the 2010 decennial census (TMAs are MPOs with urbanized area populations greater than 200,000).

Annual NBPD data, along with data from the Regional Greenway and Trail User Count Program, will provide ongoing, consistent, accurate, and useful cycling and pedestrian data. Additionally, the National Transit Database (NTD) Survey, conducted on Valley Metro bus ridership every three (3) years, provides additional transit data. These data can also be used to supplement US Census ACS 'commuting (i.e., journey to work) data and in development of future Bicycle Friendly Community (BFC) applications.

2.1 Location

The City of Roanoke is an independent city located in the southwestern portion of Virginia. Roanoke is situated in the Roanoke Valley between the Blue Ridge and the Alleghany Highlands. The city of Roanoke is 168 miles southwest of Richmond, the state capital; 107 miles north of Greensboro, North Carolina; and 233 miles southwest of Washington, D.C. The city of Roanoke is the most populous locality (independent city or county) in Virginia west of Charlottesville and is the 'urban core' of the Roanoke Metropolitan Statistical Area (MSA), the Roanoke Urbanized Area, and the Roanoke Valley Area Metropolitan Planning Organization study area. Note: In Virginia, an 'independent city' is a separate municipal entity and not politically part of any surrounding or adjacent county.

2.2 Topography and Terrain

The topography of the City of Roanoke varies from rolling to mountainous with limited flatter terrain adjacent to the Roanoke River and tributaries. The elevation ranges from approximately 950 feet at the Roanoke Regional Airport to 1,700 feet atop Mill Mountain. The Roanoke River, flowing west to east, bisects the City while numerous railroad tracks, which generally follow the Roanoke River, also traverse the City. The Roanoke River and abundance of railroad tracks in the City necessitate a considerable number of bridges (98) while impacting cycling route options (i.e., bridge locations). Additionally, Interstate 581/US 220, which runs north/south, bisects the City and limits east/west route options in portions of the City.

2.3 Population - Density and Distribution

The City of Roanoke covers an area of 43 square miles and has a population of 97,032 (2010). Table 1 provides general population data for the City of Roanoke and related Census geographies. The median age was 38.6. Tables 2 and 3 provide population numbers by age cohorts. Additionally, Figure 2 provides a population pyramid for the City of Roanoke further illustrating the age structure of the City of Roanoke. As shown in Table 3, 21.6 percent of the population is 19 years of age or less, whereas 27.3 percent is 65 years of age or older.

Table 1
Demographic Overview

Geography	Total
City of Roanoke (2010)	97,035
Roanoke MSA Population (2010)	308,707
Roanoke Urbanized Area Population (2010)	210,111
City of Roanoke Area	43 square miles
City of Roanoke Population Density *	2,256

Source: US Census 2010. Roanoke MSA includes the cities of Roanoke and Salem, and the counties of Botetourt, Craig, Franklin, and Roanoke. * Persons per square mile.

Figure 1 shows population density (persons per square mile) by US Census block groups for the City of Roanoke. The average population density is 2,256 per square miles (Table 1). Population densities shown in Figure 1 are based on residential population numbers (i.e., where people live), not development density or land use. As such, population density varies considerably throughout the City with the highest population densities located in many traditional neighborhoods with lower densities in non-residential areas such as municipal parks (i.e., Mill Mountain), areas adjacent to the Roanoke River, Norfolk Southern railroad tracks and property, Valley View Mall and other large commercial centers, Roanoke Regional Airport, and other commercial/industrial areas.

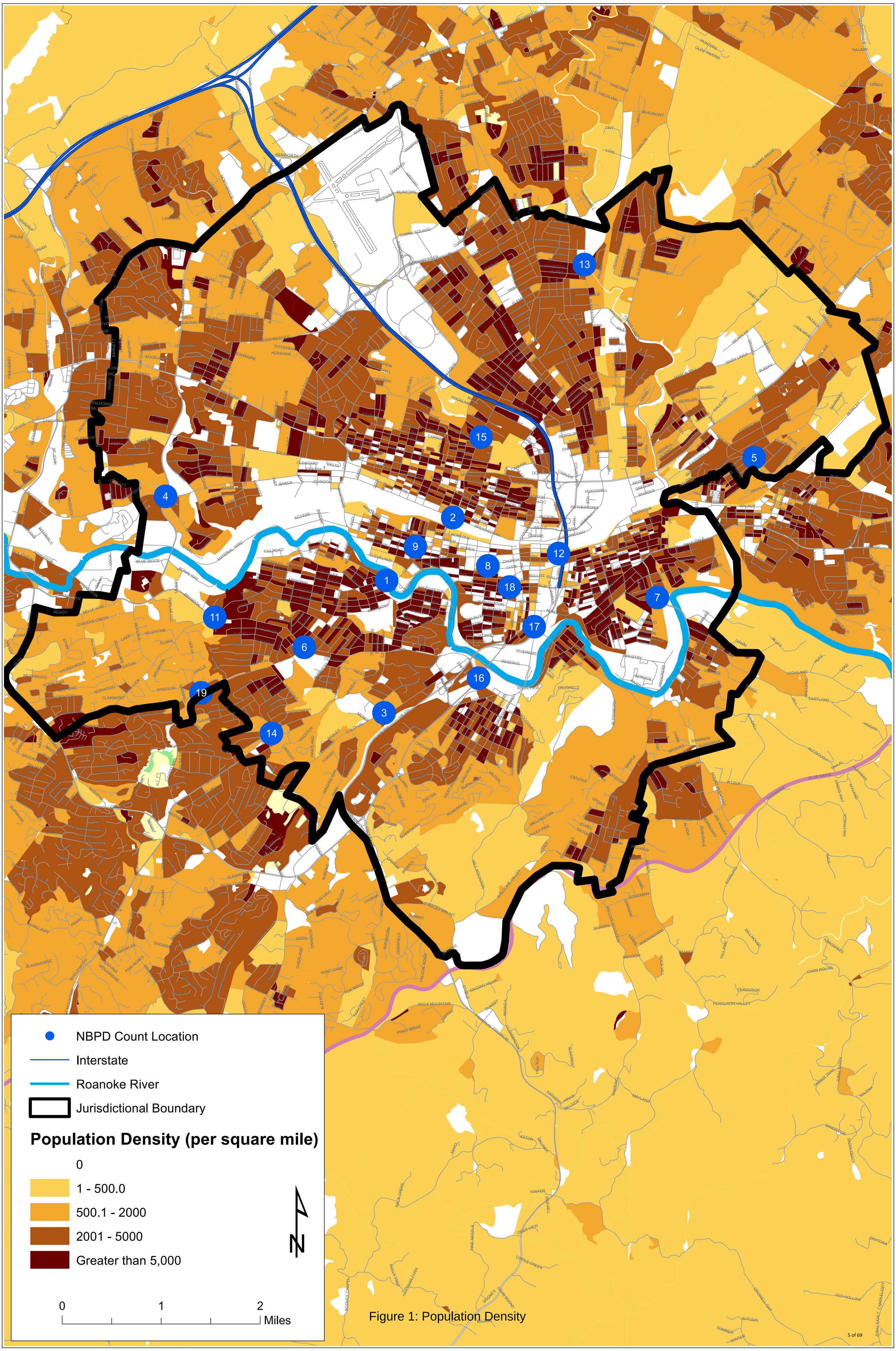


Figure 1: Population Density

Table 2
City of Roanoke - Population by Age Cohort

Age	Male	Female	Total	Percent Male	Percent Female
0 to 4	3,580	3,472	7,052	7.74	6.88
5 to 9	2,984	2,713	5,697	6.45	5.38
10 to 14	2,616	2,593	5,209	5.66	5.14
15 to 19	2,639	2,471	5,110	5.71	4.90
20 to 24	2,981	3,429	6,410	6.44	6.80
25 to 29	3,667	3,867	7,534	7.93	7.66
30 to 34	3,530	3,551	7,081	7.63	7.04
35 to 39	3,016	2,949	5,965	6.52	5.84
40 to 44	3,173	3,155	6,328	6.86	6.25
45 to 49	3,289	3,400	6,689	7.11	6.74
50 to 54	3,405	3,580	6,985	7.36	7.09
55 to 59	3,199	3,573	6,772	6.92	7.08
60 to 64	2,742	3,269	6,011	5.93	6.48
65 to 69	1,778	2,153	3,931	3.84	4.27
70 to 74	1,242	1,622	2,864	2.69	3.21
75 to 79	907	1,515	2,422	1.96	3.00
80 to 84	763	1,403	2,166	1.65	2.78
85 and Over	743	1,745	2,488	1.61	3.46
Total	46,254	50,460	96,714	100.00	100.00

Source: 2011 ACS

Table 3
City of Roanoke - Population by Combined Age Cohorts

Age Cohort	Total	Percent of Total Population
Age 0-19	16,115	21.6%
Age 20-49	24,273	32.5%
Age 50-64	13,943	18.7%
Age 65+	20,365	27.3%

Source: 2011 ACS

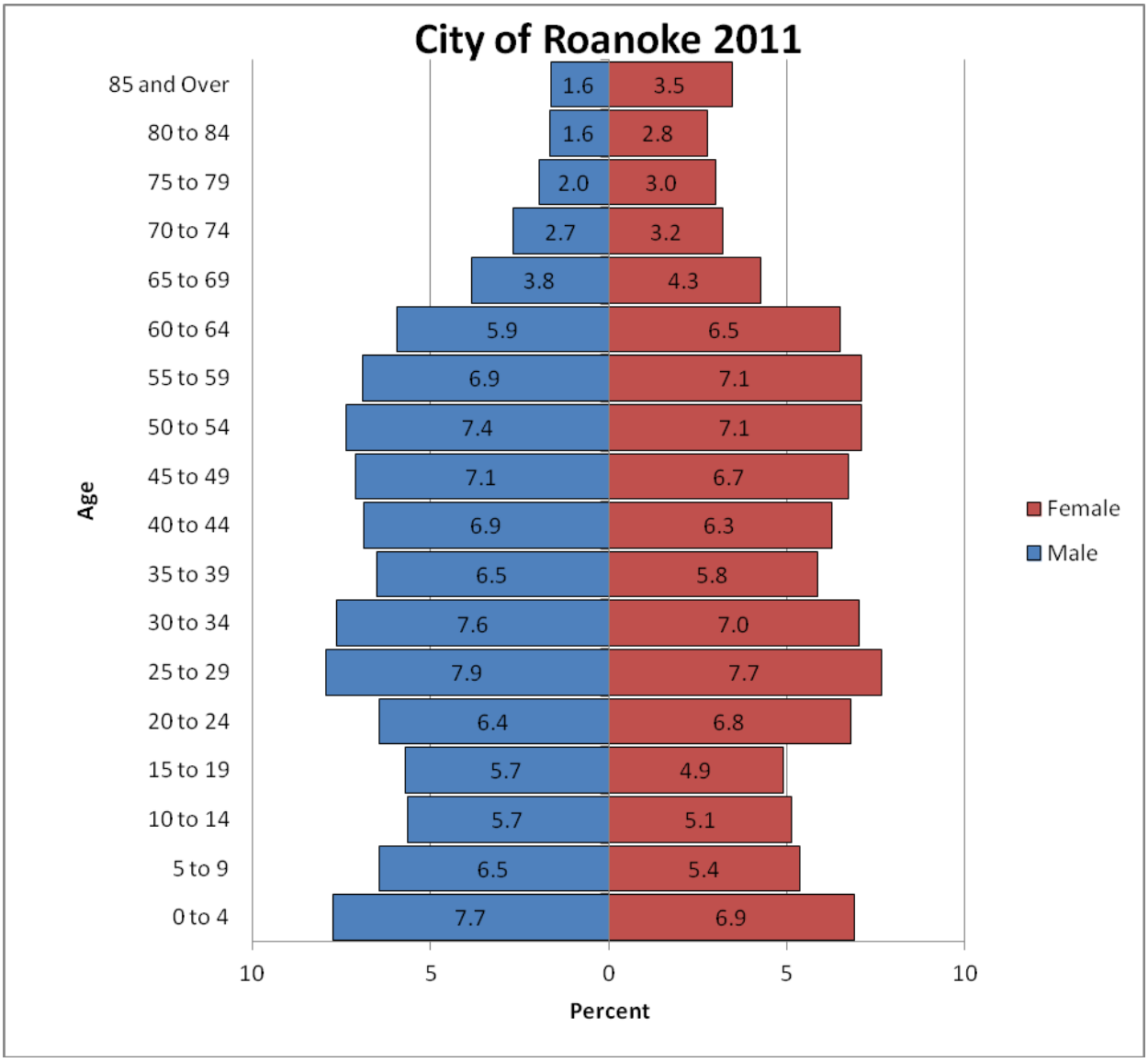


Figure 2: Population Pyramid. Source: RVARC using 2011 ACS data

2.4 Weather and Climate

The City of Roanoke's climate can be generally classified as humid-subtropical (Cfa) characterized by considerable seasonal variation in temperature with precipitation distributed throughout the year. Table 4 provides monthly climate summary data for the City of Roanoke. As noted in the monthly climate data, rainfall is distributed relatively evenly throughout the year without a pronounced 'rainy' or 'dry' season (i.e. precipitation is possible on any day of the year).

This weather variability likely negatively impacts the overall number of cyclists and cycling trip, as well as cycling consistency. Respondents to the 2009 RVAMPO Bicycle User Survey ranked

factors that discourage them from cycling more often. The most commonly cited factors included driver behavior, traffic volume, traffic speed, and weather (4th most common of 11 factors).On both 2012 NBPD count days the weather was seasonal with clear skies and temperatures in the mid 70's.

Table 4
Monthly Climate Summary
8/1/1948 to 4/30/2012

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	45.5	48.7	57.4	68	76.1	83.5	87	85.8	78.8	68.7	57.8	47.8	67.1
Average Min. Temperature (F)	27.3	29.1	36.1	44.9	53.4	61.4	65.7	64.6	57.3	46	37.1	29.6	46
Average Total Precipitation (in.)	2.84	2.99	3.55	3.27	3.85	3.61	3.83	3.85	3.6	3.18	3.02	3	40.59
Average Total Snow Fall (in.)	6	6.8	3.3	0.4	0	0	0	0	0	0	1.2	4	21.6
Average Snow Depth (in.)	1	1	0	0	0	0	0	0	0	0	0	0	0

Source: Southeast Regional Climate Center. Roanoke WSO Airport, Virginia (447285)

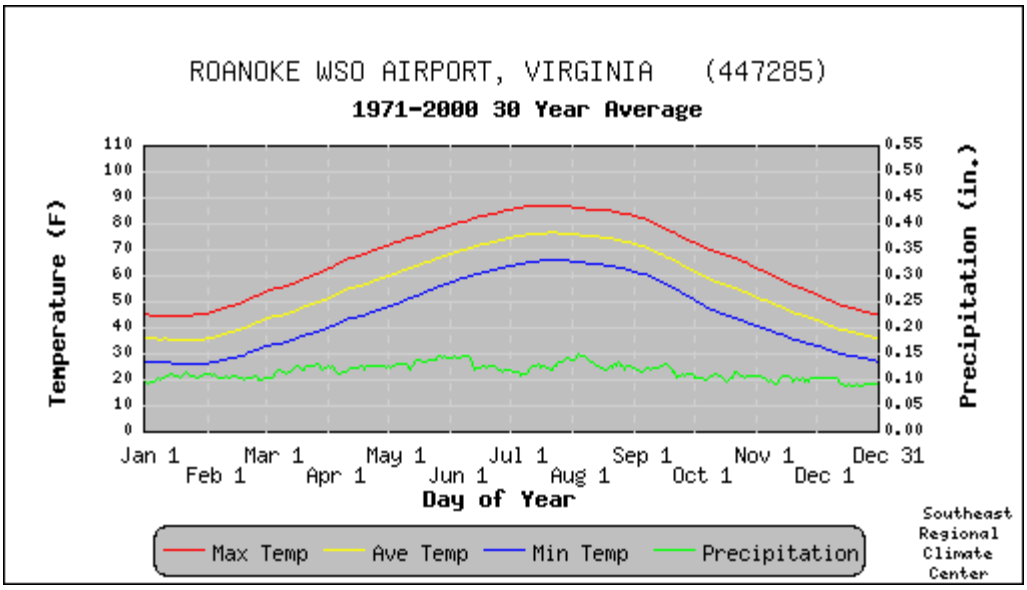


Figure 3: Temperature and Precipitation 1971-2000
Source: Southeast Regional Climate Center

2.5 Commuting Data

The US Census Bureau American Community Survey (ACS) provides commuting (journey to work) data for workers 16 years and over who were employed during the week prior to the ACS reference week and did not work at home. ACS 2011 1-year estimates for the City of Roanoke indicate a bicycle commuter rate of 0.1 percent, which is lower than the Virginia and National averages of 0.3 percent and 0.6 percent, respectively (Table 5). ACS 2007-2011 5-year estimates indicate a 0.3 percent bicycle commuter rate for the City of Roanoke. Additional ACS commuting data are provided in Appendix B.

ACS commuting data involves travel related solely to commuting and do not include leisure travel or other non-work trips. Although commutes may involve multiple transportation modes (for example, driving to a train station and then taking a train), or several modes in a given week (driving, cycling, transit) respondents are restricted to indicating the single travel mode used for the longest distance. While the ACS provides useful information about commuting patterns it does not provide a complete picture of cycling in the community. The ACS question related to means of transportation asked respondents in the workforce to reply to the following questions:

- At what location did this person work last week?
- How did this person usually get to work last week?
- How many people, including this person, usually rode to work in the car, truck or van last week?
- What time did this person usually leave home to go to work last week?
- How many minutes did it usually take this person to get from home to work last week?

Note: The 2010 decennial census does not include commuting data. After the 2000 Decennial Census, the Long Form of the decennial census was replaced by the American Community Survey, which is conducted every year.

Table 5
Commuting Data

Subject	United States		Virginia		Roanoke City	
	Total		Total		Total	
	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
Workers 16 years and over	138,269,979	+/-134,214	3,883,249	+/-20,139	43,394	+/-2,295
MEANS OF TRANSPORTATION TO WORK						
Car, truck, or van	86.1%	+/-0.1	87.2%	+/-0.4	89.6%	+/-2.9
Drove alone	76.4%	+/-0.1	78.1%	+/-0.5	80.8%	+/-3.3
Carpooled	9.7%	+/-0.1	9.2%	+/-0.3	8.8%	+/-2.5
In 2-person carpool	7.5%	+/-0.1	7.0%	+/-0.3	7.8%	+/-2.3
In 3-person carpool	1.3%	+/-0.1	1.4%	+/-0.1	1.0%	+/-0.8
In 4-or-more person carpool	0.9%	+/-0.1	0.7%	+/-0.1	0.0%	+/-0.4
Workers per car, truck, or van	1.07	+/-0.01	1.06	+/-0.01	1.05	+/-0.02
Public transportation (excluding taxicab)	5.0%	+/-0.1	4.5%	+/-0.2	3.3%	+/-1.4
Walked	2.8%	+/-0.1	2.3%	+/-0.2	1.7%	+/-1.2
Bicycle	0.6%	+/-0.1	0.3%	+/-0.1	0.1%	+/-0.1
Taxicab, motorcycle, or other means	1.2%	+/-0.1	1.0%	+/-0.1	1.9%	+/-1.5
Worked at home	4.3%	+/-0.1	4.6%	+/-0.2	3.5%	+/-1.9

Source: US Census 2011 American Community Survey 1-Year Estimates

2.6 Bicycle Friendly Community

In 2010 the League of American Bicyclists designated the City of Roanoke as a Bicycle Friendly Community at the Bronze level by becoming the fourth BFC in Virginia. Other BFCs include Arlington (Silver), Charlottesville (Silver), and Alexandria (Bronze) (Table 6). In 2012, the City of Roanoke was again designated as a BFC at the Bronze level. Additionally, five businesses in the City of Roanoke have been designated as a Bicycle Friendly Business (BFB) by the League of American Cyclists (Table 7).

Table 6
League of American Bicyclists
Bicycle Friendly Communities in Virginia

Community	BFB Level	Year Awarded
Alexandria	Bronze	2009
Arlington	Silver	2012
Charlottesville	Silver	2008
Roanoke	Bronze	2010

Source: League of American Bicyclists

Table 7
League of American Bicyclists
Bicycle Friendly Businesses – Roanoke, Virginia

Business	BFB Level	Year Awarded
Carilion Clinic Riverside	Bronze	2012
East Coasters Bike Shop*	Silver	2011
Roanoke Regional Partnership	Bronze	2012
Norfolk Southern	Honorable Mention	2012
Roanoke Valley - Alleghany Regional Commission	Bronze	2008
Sharebike.org	Bronze	2010

Source: League of American Bicyclists. * Located in Roanoke County

3.0 NBPD METHODOLOGY

The 2012 City of Roanoke NBPD generally followed the standard methodology outlined on the National Bicycle & Pedestrian Documentation Project website (bikepeddocumentation.org).

3.1 Counts Dates

NBPD methodology suggests counts be conducted over a two hour period on one weekday (Tuesday, Wednesday, or Thursday) and one weekend day during the week of September 10-16, 2012. City of Roanoke NBPD counts were conducted on the following dates/times:

- Thursday September 13, 2012 - 5:00 pm - 7:00 pm
- Saturday September 15, 2012 - 12:00 pm - 2:00 pm

Thursday was selected as the weekday count day to avoid dates with activities that would likely impact counts at several locations such (e.g. Blue Ridge Bicycle Club Tuesday Night Ride, annual Radical Reels Film Festival). Additionally, 'alternate' count dates were established in case of inclement weather on the official count days. The following dates were scheduled as alternate counts:

- Sunday September 16, 2012 - 5:00 pm - 7:00 pm
- Wednesday September 19, 2012 - 12:00 pm - 2:00 pm

3.2 Data Collectors

NBPD counts were conducted by a combination of local government and other 'staff' and volunteers. A total of 21 data collectors (i.e., counters) conducted bicycle and pedestrian counts over the two count dates. Of the 21 data collectors 12 were 'staff' with the remaining 'volunteer' data collectors being local cyclists, advocates, and citizens. Agencies providing 'staff' to assist with the NBPD include:

- City of Roanoke
- Roanoke Valley - Alleghany Regional Commission (RVARC)
- Roanoke Valley Area Metropolitan Planning Organization (RVAMPO)
- RIDE Solutions
- Roanoke Valley Greenway Commission
- Alta Planning and Design

Other entities that provided assistance in the NBPD include:

- Regional Bicycle Advisory Committee
- Blue Ridge Bicycle Club

Beyond coordination with the above referenced entities, a range of media and activities were utilized to recruit volunteer data collectors including flyers in local bicycle shops, outfitters, and related establishments; social media; and word of mouth. Based on responses from data collectors that participated in the NBPD more people indicated availability on the weekday (Thursday) count dates while fewer expressed availability on the weekend count dates.

3.3 Count Locations

NBPD methodology suggests at least 1 count location per every 15,000 people. Based on the City of Roanoke 2010 US Census population of 97,032 a minimum of 7 count locations were required to meet this criteria. Site selection was based on NBPD methodology with additional local input.

NBPD Count Location Criteria:

- Pedestrian and bicycle activity areas or corridors (downtowns, near schools, parks, etc.)
- Representative locations in urban, suburban, and rural locations
- Key corridors that can be used to gauge the impacts of future improvements
- Locations where counts have been conducted historically
- Locations where there are on-going counts being conducted by other agencies through a variety of means, including video taping
- Gaps and pinch points for bicyclists and pedestrians (potential improvement areas)
- Locations where bicycle and pedestrian collision numbers are high
- Select locations that meet as many of the criteria as possible.

Local considerations:

- Existing bicycle lanes (additional counts will be conducted on bicycle lanes)
- Locations in which two or more roads can be counted by one volunteer (i.e., intersections)
- Existing bicycle routes and greenway connections
- Known high use corridors
- Greenways
- Activity centers
- Downtown entry ways

Approximately 30 potential count locations were identified, mapped, and prioritized to be assigned to volunteer counters. Of the identified potential locations, counts were conducted at 19 locations with data being collected along 45 individual street segments and greenways. Table 8 provides a breakdown of the functional classification for each street segment on which counts were conducted.

Table 8
2012 NBPD Count
Roadway Function Classifications

Roadway Function Classification	Number	Percent
Arterial	12	27
Collector	20	44
Local	11	24
Shared Use Path/Greenway	2	4

Table 9 provides an overview of the 2012 NBPD count locations and individual streets on which counts were conducted. Table 10 and Figure 4 provide an overview of existing bicycle accommodations or facilities at each NBPD count location. Additionally, the RVARC Online Map shows additional bicycle accommodations throughout the City of Roanoke and RVAMPO study area (Figure 5).

NBPD counts were conducted at all current (September 2012) bicycle lanes, existing signed bicycle routes, and proposed signed bicycle routes. Counts were also conducted at on two shared use paths/greenways (Roanoke River Greenway and Lick Run Greenway. Note: Automated trail counters are in place on both greenways (Roanoke River and Lick Run) in close proximity to the NBPD count locations. NBPD two-hour counts will be used to estimate mode split between pedestrians and cyclist along the respective greenways.

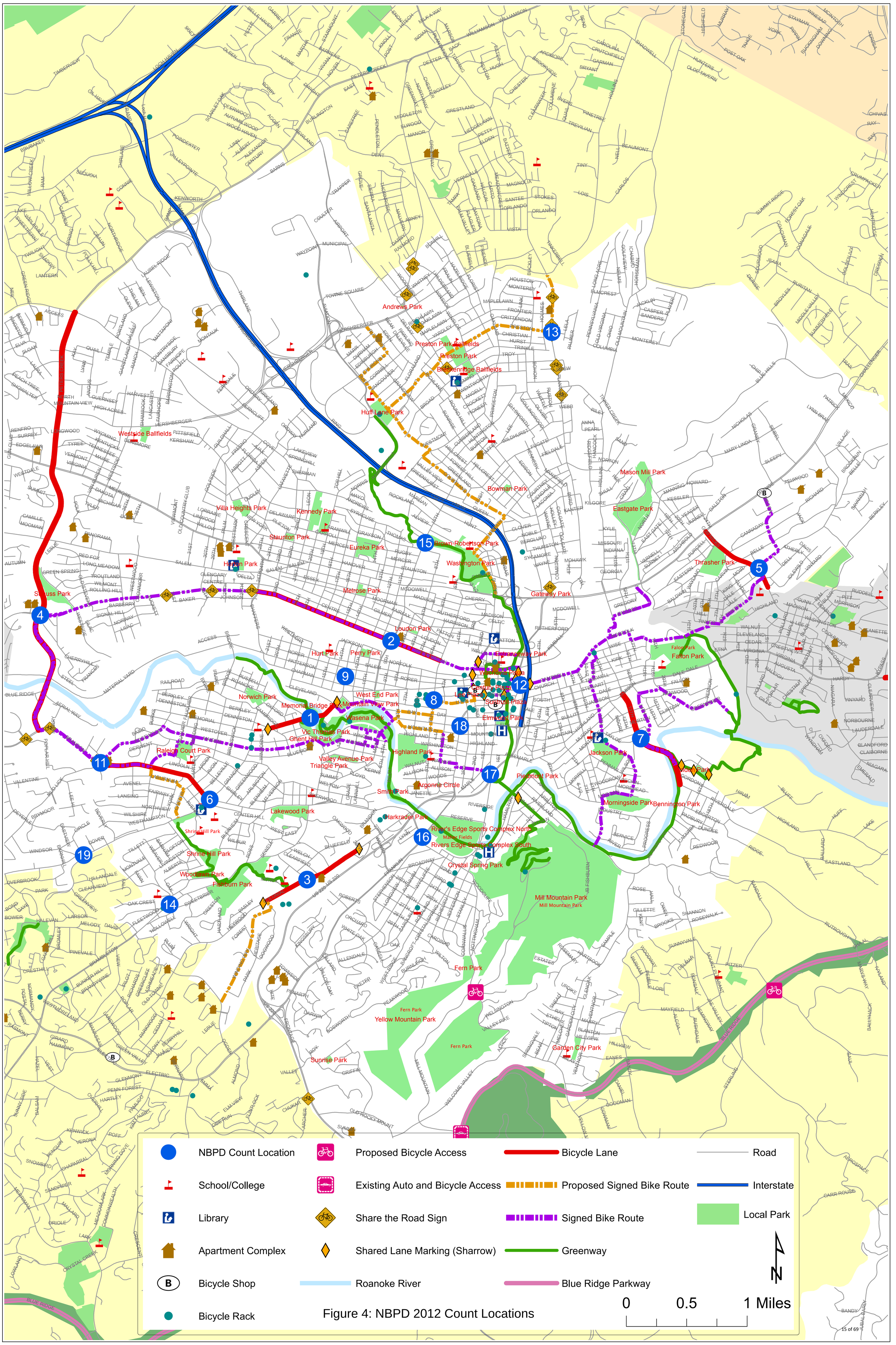


Figure 4: NBPD 2012 Count Locations

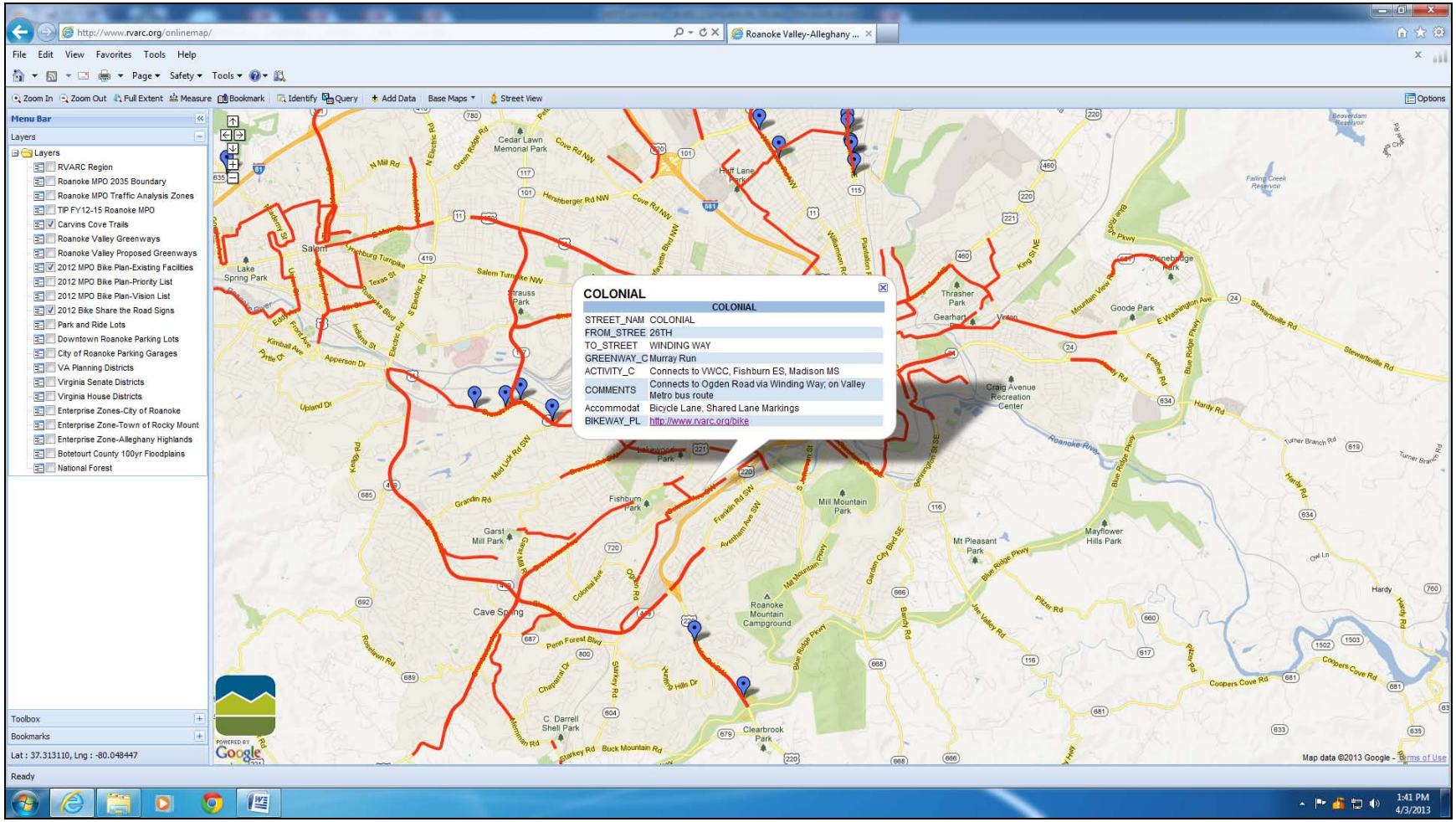


Figure 5: RVARC Online Map

Table 9
NBPD Count Locations and Streets

Count Location	Map Number	Street	Street	Street	Street	Bicycle Accommodation or Facility
Memorial Ave (bridge)	1	Memorial	Roanoke	Wasena	Roanoke River Greenway	Memorial - bicycle lane, Roanoke River Greenway - shared use path
Shenandoah Ave at 10th Street	2	Shenandoah	10th			Shenandoah - bicycle lane, signed bicycle route (proposed)
Colonial Ave at Overland Dr	3	Colonial	Overland			Colonial - bicycle lane, greenway connection; Overland – wider travel lane
Peters Creek Extension at Shenandoah Ave	4	Peters Creek Extension	Shenandoah			Peters Creek Extension - bicycle lane, signed bicycle route (proposed)
Gus Nicks Blvd at Vale Ave	5	Gus Nicks	Vale	King		Gus Nicks - bicycle lane, signed bicycle route (proposed)
Grandin Rd at Brandon Ave	6	Grandin	Brandon			Grandin - wider travel lane, urban shoulder; Brandon – wider travel lane
13th St/Bennington at Tayloe St	7	13th/Bennington	Tayloe			13th - bicycle lane, signed bicycle route; Tayloe - signed bicycle route
Luck Ave at 5th St	8	Luck	5th			Luck and 5th - wider travel lane, downtown gateway
Patterson Ave at 13th St	9	Patterson	13th			Patterson - wider travel lane
Ferdinand Ave at 10th St	10	Ferdinand	10th			signed bicycle route
Brandon Ave at Edgewood Dr	11	Brandon	Edgewood	Mud Lick		Brandon - signed bicycle route (proposed), Share the Road signage; urban shoulder; Edgewood – wider travel lane, signed bicycle route (proposed)
Campbell Ave at Williamson Rd	12	Campbell	Williamson			Campbell - wider travel lane, urban shoulder, signed bicycle route (proposed), sharrows

(continued)

Table 9
NBPD Count Locations and Streets (continued)

Count Location	Map Number	Street	Street	Street	Street	Bicycle Accommodation or Facility
Plantation Rd at Preston Ave	13	Plantation	Preston			Preston - wider travel lane, Share the Road signage, signed bicycle route (proposed)
Brambleton Ave at Spring Rd	14	Brambleton	Spring			Brambleton - wider travel lane
10th St at Syracuse at Lick Run Greenway	15	10th	Lick Run Greenway			Lick Run Greenway - shared use path; 10th proposed bicycle lane
Brandon Ave at Franklin Rd	16	Brandon	Franklin	McClannahan		Brandon - wider travel lane, urban shoulder
Walnut Ave and Jefferson St	17	Walnut	Jefferson			Walnut - greenway (on-road), wider travel lane, urban shoulder, sidewalk
Elm Ave at Franklin Rd	18	Elm	Franklin			shared roadway
Grandin Rd at Garst Mill Rd	19	Grandin	Garst Mill			shared roadway

Source: RVARC

3.4 Data Collection and Entry

Bicycle count data were collected for all streets at each of the 19 count locations using a modified Standard Bicycle Intersection Count Form (Appendix C). As bicycle counts were the primary focus of the City of Roanoke NBPD, pedestrian data were collected and totaled only at the location level, not for each individual street (i.e., each count location has more than one street). Bicycle and pedestrian data were conducted for the two greenway count locations using the Standard Screenline Count Form (Appendix C).

The following bicycling information was collected for each street segment using Standard Bicycle Intersection Count Form:

- number of cyclists
- time count recorded (15 minute increments)
- travel direction
- weather

Although cyclist/pedestrian 'surveys' were not conducted as part of the NBPD, the Standard Bicycle Intersection Count Form was modified to allow data collectors the option of recording additional information:

- cyclist gender
- helmet use
- pedestrians (by count location, not individual streets)

The following bicycling information was collected for each street segment using Standard Bicycle Intersection Count Form:

- number of cyclists
- number of pedestrians
- time count recorded (15 minute increments)
- cyclists/pedestrian gender
- weather

Beyond the standard NBPD forms, data collectors were also encouraged to record additional information or observations relevant to the counts on the data collection forms.

Following the official count dates, data collectors returned data collection forms to the Regional Commission where data were entered into the NBPD Data Spreadsheet and Extrapolation Worksheet for analysis.

4.0 DATA SUMMARY AND ANALYSIS

Data collected during the 2012 NBPD were compiled and analyzed based on a variety of factors. Data analysis included:

- cyclist counts by count location
- cyclist counts by individual streets
- pedestrian counts by count location
- pedestrian count rankings by location
- cyclist count rankings by individual streets
- bicycle counts by designated bicycle lane
- greenway counts
- greenway mode split – cyclist/pedestrian
- cyclist helmet use
- cyclists gender
- yearly use estimates by street

4.1 Bicycle and Pedestrian Count Summaries

During the two count periods a total of 696 cyclists and 1,188 pedestrians were counted at all locations. Table 10 provides bicycle counts (by location and street) and pedestrian counts by count location. Location 1 (Memorial Avenue) had the highest cyclists counts for any location on both counts dates, whereas Location 9 (Patterson Avenue) had the highest pedestrian counts. Additionally, Memorial Avenue had the highest bicycle count for any individual street on both count dates.

Table 11 shows pedestrian count rankings – highest to lowest - by count location (two day average). Table 12 and Table 13 show bicycle count rankings – highest to lowest – for all count locations and streets for each count date.

Table 10
NBPD 2012 Bicycle and Pedestrian Counts

Count Location Description:	Roadway Functional Classification	Thursday September 13, 2012 5:00 pm - 7:00 pm			Saturday September 15, 2012 12:00 pm - 2:00 pm		
		Bicycles by Street	Bicycles by Location	Pedestrians by Location	Bicycles by Street	Bicycles by Location	Pedestrians by Location
Loc. #1 (Memorial Ave)	arterial	97		40	54		33
Loc. #1 (Wasena Rd)	local	27			27		NA
Loc. #1 (Roanoke Ave)	local	0			1		NA
Loc. #1 (Roanoke River Greenway)	shared use path	51	175	6	62	144	7
Loc. #2 (10th)	collector	10			9		21
Loc. #2 (Shenandoah Ave)	collector	2	12	15	1	10	NA
Loc. #3 Colonial Ave)	collector	1			1		1
Loc. #3 (Overland Dr)	collector	2	3	2	0	1	NA
Loc. #4 (Peters Creek Ext)	arterial	1			No data	No data	No data
Loc. #4 (Shenandoah Ave)	collector	0	1	2	No data	No data	No data
Loc. #5 (Gus Nicks Blvd)	arterial	1			0		9
Loc. #5 (King St)	collector	0			5		NA
Loc. #5 (Vale/Dell)	local	0	1	0	0	5	NA
Loc. #6 (Grandin Rd)	collector	29			13		25
Loc. #6 (Brandon Ave)	arterial	16	45	79	7	20	NA
Loc. #7 (13th St)	collector	12			No data	No data	No data
Loc. #7 (Tayloe St)	local	9	21	16	No data	No data	No data
Loc. #8 (5th St)	local	8			6		36
Loc #8 (Luck)	local	10	18	47	3	9	NA
Loc. #9 (Patterson Ave)	collector	9			No data	No data	No data
Loc. #9 (13th St)	collector	11	20	185	No data	No data	No data
Loc. #10 (Ferdinand Ave)	local	14			No data	No data	No data
Loc. #10 (10th St)	collector	0	14	28	No data	No data	No data

Table 10
NBPD 2012 Bicycle and Pedestrian Counts (continued)

Count Location Description:	Roadway Functional Classification	Thursday September 13, 2012 5:00 pm - 7:00 pm			Saturday September 15, 2012 12:00 pm - 2:00 pm		
		Bicycles by Street	Bicycles by Location	Pedestrians by Location	Bicycles by Street	Bicycles by Location	Pedestrians by Location
Loc. #11 (Brandon Ave)	arterial	21			23		12
Loc. #11 (Edgewood St)	collector	1			10		NA
Loc. #11 (Mud Lick Rd)	collector	3	25	6	1	34	NA
Loc. #12 (Williamson Rd)	arterial	7			3		193
Loc. #12 (Campbell Ave)	collector	7	14	140	12	15	NA
Loc. #13 (Plantation Rd)	arterial	4			No data	No data	No data
Loc. #13 (Preston Ave)	local	1			No data	No data	No data
Loc. #13 (Columbia Ave)	local	0	5	14	No data	No data	No data
Loc. #14 (Brambleton Ave)	arterial	13			No data	No data	No data
Loc. #14 (Spring Rd)	local	8	21	6	No data	No data	No data
Loc. #15 (10th St)	arterial	8		84	No data	No data	No data
Loc. #15 (Syracuse Ave)	local	1			No data	No data	No data
Loc. #15 (Lick Run Greenway)	shared use path	4	13	39	No data	No data	No data
Loc. #16 (Brandon Ave)	arterial	2			3		11
Loc. #16 (Franklin Rd)	arterial	6			2		NA
Loc. #16 (McClanahan St)	collector	2	10	24	3	8	NA
Loc. #17 (Jefferson St)	collector	12			2		24
Loc. #17 (Walnut Ave)	collector	12	24	51	5	7	NA
Loc. #18 (Franklin Rd)	arterial	3			1		7
Loc. #18 (Elm Ave)	collector	5	8	23	1	2	NA
Loc. #19 (Grandin Rd)	collector	10			No data	No data	No data
Loc. #19 (Garst Mill Rd)	collector	1	11	2	No data	No data	No data
Totals		**441**	**441**	**809**	**255**	**255**	**379**

Source: 2012 NBPD

Table 11
Pedestrian Count Rankings by Count Location

Location	Pedestrian Count*	Count Location Map Number
Patterson Ave at 13th St	185	9
Campbell Ave at Williamson Rd	140	12
10th St at Syracuse, Lick Run Greenway	123	15
Grandin Rd at Brandon Ave	79	6
Walnut Ave and Jefferson	51	17
Memorial Ave (bridge)	46	1
Brandon Ave at Franklin Rd	24	16
Elm at Franklin	23	18
Ferdinand Ave at 10th St	16	10
Shenandoah Ave at 10th St	15	2
Plantation Rd at Preston Ave	14	13
Brandon Ave at Edgewood Dr and Mudlick Rd	6	11
Brambleton Ave at Spring Rd	6	14
Peters Creek Extension at Shenandoah Ave	2	4
Colonial Ave at Overland Dr	2	3
Grandin at Garst Mill	2	19
Gus Nicks Blvd at Vale Ave	0	5
Luck Ave at 5th St	0	8
13th St/Bennington at Tayloe St	0	7

Source: 2012 NBPD. * Two-day count average

Table 12
Bicycle Count Rankings by Street
Thursday September 13, 2012

Count Location and Street	Roadway Functional Classification	Bicycle Counts by Street
Loc. #1 (Memorial Ave)	arterial	97
Loc. #1 (Roanoke River Greenway)	shared use path	51
Loc. #6 (Grandin Rd)	collector	29
Loc. #1 (Wasena Rd)	local	27
Loc. #11 (Brandon Ave)	arterial	21
Loc. #6 (Brandon Ave)	arterial	16
Loc. #10 (Ferdinand Ave)	local	14
Loc. #14 (Brambleton Ave)	arterial	13
Loc. #7 (13th St)	collector	12
Loc. #17 (Jefferson St)	collector	12
Loc. #17 (Walnut Ave)	collector	12
Loc. #9 (13th St)	collector	11
Loc. #2 (10th)	collector	10
Loc. #19 (Grandin Rd)	collector	10
Loc #8 (Luck)	local	10
Loc. #9 (Patterson Ave)	collector	9
Loc. #7 (Tayloe St)	local	9
Loc. #15 (10th St)	arterial	8
Loc. #8 (5th St)	local	8
Loc. #14 (Spring Rd)	local	8
Loc. #12 (Williamson Rd)	arterial	7
Loc. #12 (Campbell Ave)	collector	7
Loc. #16 (Franklin Rd)	arterial	6
Loc. #18 (Elm Ave)	collector	5
Loc. #13 (Plantation Rd)	arterial	4
Loc. #15 (Lick Run Greenway)	shared use path	4
Loc. #18 (Franklin Rd)	arterial	3
Loc. #11 (Mud Lick Rd)	collector	3
Loc. #16 (Brandon Ave)	arterial	2
Loc. #2 (Shenandoah Ave)	collector	2
Loc. #3 (Overland Dr)	collector	2
Loc. #16 (McClanahan St)	collector	2
Loc. #4 (Peters Creek Ext)	arterial	1
Loc. #5 (Gus Nicks Blvd)	arterial	1
Loc. #3 Colonial Ave)	collector	1

Source: 2012 NBPD

(continued)

Table 12
Bicycle Count Rankings by Street
Thursday September 13, 2012 (continued)

Count Location and Street	Roadway Functional Classification	Bicycle Counts by Street
Loc. #11 (Edgewood St)	collector	1
Loc. #19 (Garst Mill Rd)	collector	1
Loc. #13 (Preston Ave)	local	1
Loc. #15 (Syracuse Ave)	local	1
Loc. #4 (Shenandoah Ave)	collector	0
Loc. #5 (King St)	collector	0
Loc. #10 (10th St)	collector	0
Loc. #1 (Roanoke Ave)	local	0
Loc. #5 (Vale/Dell)	local	0
Loc. #13 (Columbia Ave)	local	0

Source: 2012 NBPD

Table 13
Bicycle Count Rankings by Street
Saturday September 15, 2012

Count Location and Street	Roadway Functional Classification	Bicycle Counts by Street
Loc. #1 (Roanoke River Greenway)	shared use path	62
Loc. #1 (Memorial Ave)	arterial	54
Loc. #1 (Wasena Rd)	local	27
Loc. #11 (Brandon Ave)	arterial	23
Loc. #6 (Grandin Rd)	collector	13
Loc. #12 (Campbell Ave)	collector	12
Loc. #11 (Edgewood St)	collector	10
Loc. #2 (10th)	collector	9
Loc. #6 (Brandon Ave)	arterial	7
Loc. #8 (5th St)	local	6
Loc. #17 (Walnut Ave)	collector	5
Loc. #5 (King St)	collector	5
Loc #8 (Luck)	local	3
Loc. #12 (Williamson Rd)	arterial	3
Loc. #16 (Brandon Ave)	arterial	3
Loc. #16 (McClanahan St)	collector	3
Loc. #17 (Jefferson St)	collector	2
Loc. #16 (Franklin Rd)	arterial	2
Loc. #18 (Elm Ave)	collector	1
Loc. #18 (Franklin Rd)	arterial	1
Loc. #11 (Mud Lick Rd)	collector	1
Loc. #2 (Shenandoah Ave)	collector	1
Loc. #3 Colonial Ave)	collector	1
Loc. #1 (Roanoke Ave)	local	1
Loc. #3 (Overland Dr)	collector	0
Loc. #5 (Gus Nicks Blvd)	arterial	0
Loc. #5 (Vale/Dell)	local	0
Loc. #10 (Ferdinand Ave)	local	No data
Loc. #14 (Brambleton Ave)	arterial	No data
Loc. #7 (13th St)	collector	No data
Loc. #9 (13th St)	collector	No data
Loc. #19 (Grandin Rd)	collector	No data
Loc. #9 (Patterson Ave)	collector	No data
Loc. #7 (Tayloe St)	local	No data

Source: NBPD 2012

(continued)

Table 13
Bicycle Count Rankings by Street
Saturday September 15, 2012 (continued)

Count Location and Street	Roadway Functional Classification	Bicycle Counts by Street
Loc. #15 (10th St)	arterial	No data
Loc. #14 (Spring Rd)	local	No data
Loc. #13 (Plantation Rd)	arterial	No data
Loc. #15 (Lick Run Greenway)	shared use path	No data
Loc. #4 (Peters Creek Ext)	arterial	No data
Loc. #19 (Garst Mill Rd)	collector	No data
Loc. #13 (Preston Ave)	local	No data
Loc. #15 (Syracuse Ave)	local	No data
Loc. #4 (Shenandoah Ave)	collector	No data
Loc. #10 (10th St)	collector	No data
Loc. #13 (Columbia Ave)	local	No data

Source: 2012 NBPD

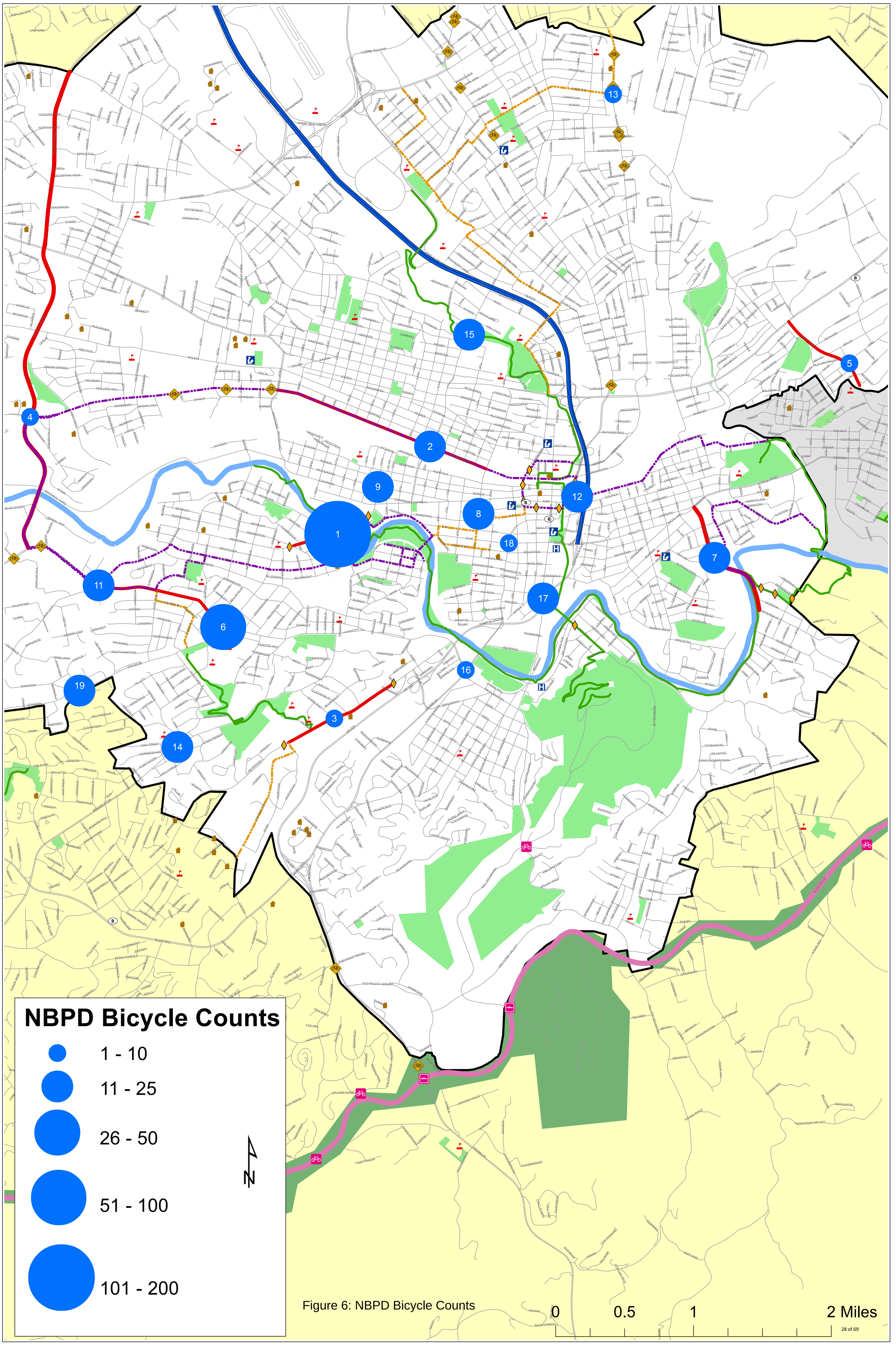


Figure 6: NBPD Bicycle Counts

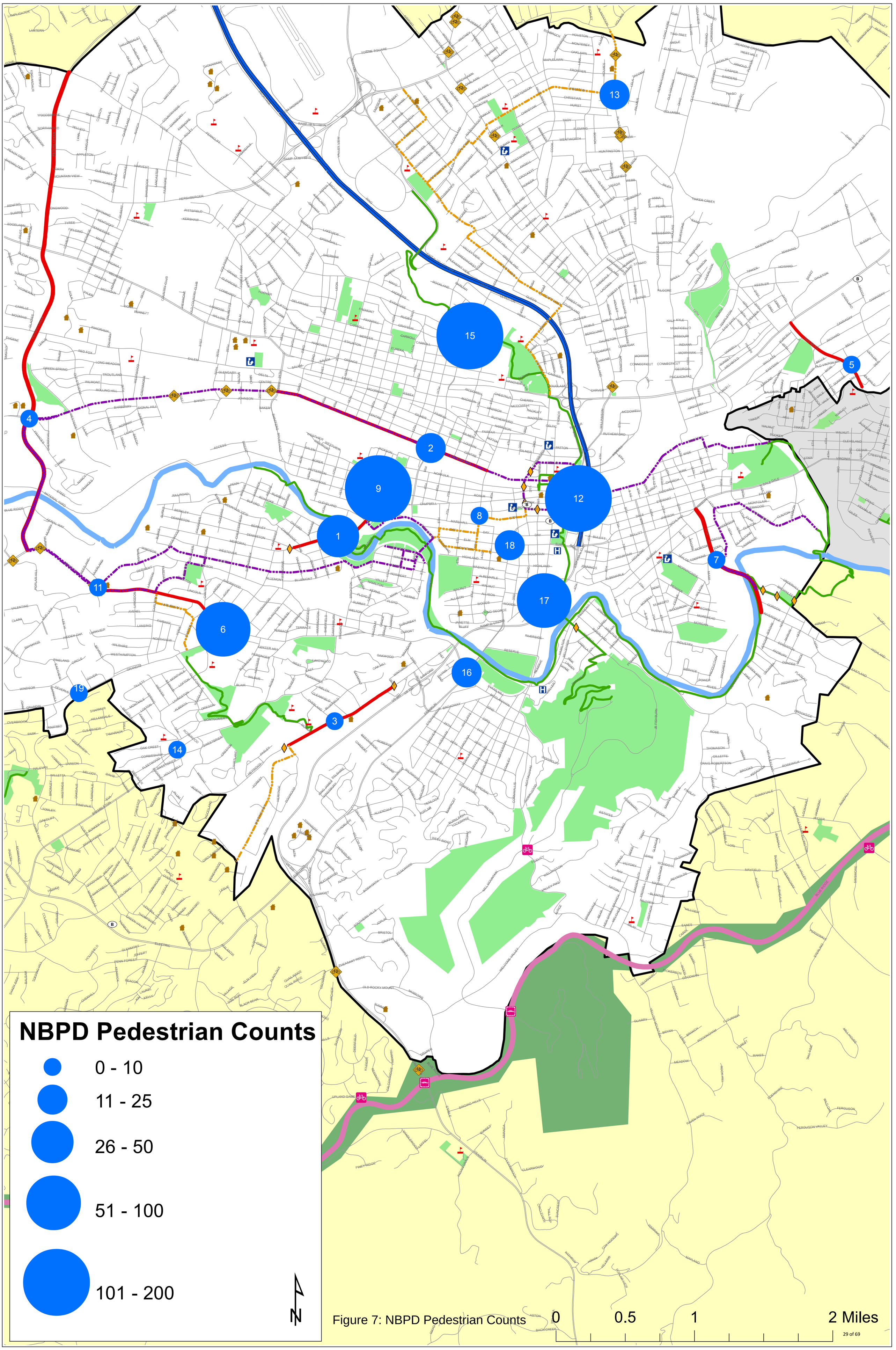


Figure 7: NBPD Pedestrian Counts

4.2 On-Street Bicycle Accommodations

As noted in Table 9 existing bicycle facilities and/or accommodations vary considerably between count locations. Common bicycle accommodations in the City of Roanoke include:

- shared roadways
- wide travel lanes
- designated bicycle lanes
- signed bicycle routes
- signage and pavement markings

As previously referenced the RVARC Online Map (Figure 5) shows all existing on-street cycling accommodations, greenways, and trails in the Roanoke Valley Area MPO 2040 study area.

4.2.1 Shared Roadways

Shared roadways are streets with no specific bicycle accommodations on which motorists and cyclists operate within the same shared space (i.e., usable pavement). Shared roadways are the most common 'accommodation' available to cyclists in the City of Roanoke (and most localities in the US). Shared roadways may be higher traffic arterials, collectors, or low traffic neighborhood streets. Additionally, shared roadways may have geometrics that serve as de facto bicycle accommodations such as a wider travel lane or paved/urban shoulder. Shared roadways may also be part of a designated bicycle route with associated signage and wayfinding information. Counts were conducted on several shared roadway sections including Plantation Road, Franklin Road, portions of Brandon Avenue, and Grandin Road.

4.2.2 Bicycle Lanes

Currently, the City of Roanoke has designated bicycle lanes on sections of seven (7) different roadways (Figure 4). All designated bicycle lanes in the City of Roanoke are on roadways classified as 'arterials' or 'collectors.' NBPD counts were conducted on all designated bicycle lanes in the City of Roanoke (Table 14). As previously noted, the Memorial Avenue count location (Location 1) had the highest combined (bicycles and pedestrians) count totals of all locations. Additionally, individual streets at this location – Memorial Avenue and Wasena Road – had the highest counts of all streets on which counts were conducted. Accommodations along this section of Memorial Avenue include a designated bike lane and sidewalks on both sides of the street installed by the City of Roanoke as part of a 'road diet' along the Memorial Avenue corridor in 2002. Several factors likely contribute to higher counts include the Memorial Avenue bridge being one of a limited number of Roanoke River crossings available to cyclists in the area and the Roanoke River Greenway utilizes the Memorial Street bridge to cross the river. Brandon Avenue and 13th Street had the next highest counts of all bicycle lane locations.

Table 14
Bicycle Counts along Designated Bicycle Lanes

Street	Roadway Classification	Speed Limit	Thursday September 13	Saturday September 15
Loc. #1 (Memorial Ave)	arterial	25	97	54
Loc. #11 (Brandon Ave)*	arterial	30	21	23
Loc. #6 (Brandon Ave)*	arterial	30	16	7
Loc. #9 (13th St)	collector	25	11	No data
Loc. #2 (Shenandoah Ave)	collector	30	2	1
Loc. #4 (Peters Creek Ext)	arterial	40	1	No data
Loc. #5 (Gus Nicks Blvd)	arterial	35	1	0
Loc. #3 Colonial Ave)	collector	30	1	1

Source: RVARC. * Bicycle lanes were installed in January 2013 after the September 2012 NBPD

4.2.3 Signed Bicycle Routes

The City of Roanoke is currently developing commuting and recreational bicycle routes to connect area greenways, schools, neighborhoods, activity centers and destinations, and other bicycle accommodations (Figure 4). These routes generally utilize neighborhood streets or similar lower traffic shared roadway corridors. Counts were conducted at locations along several current and planned signed bicycle routes.

4.3 Cyclists Gender

Volunteer data collectors were given the option of recording cyclists gender. Cyclist gender was recorded at each count location with totals number for all streets at each of the respective count locations combined to calculate the gender split at each location. As shown in Table 15 the two day average gender split was 83 percent male to 17 percent female. Female percentages were considerably higher on the Saturday (23%) versus the Thursday (12%) count. By comparison, 29 percent of 2009 Bicycle User Survey respondent were female. NBPD counts suggest a greater number of women engaging in recreational cycling on the weekends compared to more 'utilitarian' cycling. Males composed a higher percentage of the cyclists on both count days and a considerably higher percentage on the Thursday count suggesting a greater likelihood of cycling for 'utilitarian' purposes.

Table 15
Cyclists Gender

Cyclists Gender	Thursday September 13 Percent	Saturday September 15 Percent	Two Day Average Percent
female	12.3	23.0	17.0
male	87.7	77.0	83.0

4.4 Helmet Use

Volunteer data collectors were given the option of recording helmet use among cyclists. Cyclist helmet use was recorded collectively by count location (helmet use was not recorded for each individual street). As shown in Table 16 the two day average shows a 65 percent helmet use rate among cyclists with slightly higher helmet use on Thursday versus Saturday.

Table 16
Cyclists Helmet Use

Helmet Use	Thursday September 13 Helmet Use Percent	Saturday September 15 Helmet Use Percent	Two Day Average Percent
Cyclists with helmet	67.9	59.4	65.0
Cyclist without helmet	32.1	40.6	35.0

4.5 Greenway (Shared Use Path) Counts

4.5.1 NBPD Greenway Counts

NBPD counts were conducted along two (2) greenways in the Roanoke Valley Greenway network – Roanoke River Greenway (at Memorial Street Bridge) and Lick Run Greenway (at 10th Street). The following NBPD greenway use data were collected using the Standard Screenline Count Forms (Appendix C):

- total user counts
- user gender
- bike/ped mode split

4.5.2 Greenway Use Gender Split

Table 17 and Table 18 provide an overview of NBPD greenway user counts by gender for both count dates. Men represented a higher percent of greenway users at both locations on both count dates. As with on-street count locations women composed a greater percentage of pedestrians than cyclists at these greenway count locations. Also consistent with on-street counts, women composed a greater percentage of pedestrians and cyclists on the weekend (Saturday) NBPD count compared to the weekday (Thursday) count.

4.5.3 Greenway Use Mode Split

NBPD two-hour greenway count data were used to estimate mode split and gender split along these and other greenways. Table 19 provides an overview of NBPD greenway user counts by mode (bicycle vs. pedestrian). Although both greenways are paved, 10 feet wide, shared use paths, each had completely opposite mode split percentages during the NBPD counts. The mode split on the Roanoke River Greenway was greater than 89 percent cyclists on both count dates, whereas the mode split on the Lick Run Greenway was 90 percent pedestrian on the one count date on which data was collected.

Given this variation in mode split between the respective greenways, additional counts will be needed on all greenways in the Roanoke Valley Greenway network to determine mode split with a greater degree of confidence.

Table 17
NBPD Greenway Counts
Thursday September 13

Greenway	Bicycle				Pedestrian				Total Counts	Total User Percentage	
	Female	Percent Female	Male	Percent Male	Female	Percent Female	Male	Percent Male		Female	Male
Roanoke River	11	21.6	40	78.4	3	50	3	50	57	24.6	75.4
Lick Run	0	0	4	100	15	38.5	24	61.5	43	34.9	65.1

Source: NBPD

Table 18
NBPD Greenway Counts
Saturday September 15

Greenway	Bicycle				Pedestrian				Total Counts	Total User Percentage	
	Female	Percent Female	Male	Percent Male	Female	Percent Female	Male	Percent Male		Female	Male
Roanoke River	20	32.3	42	67.8	4	57.1	3	42.9	69	34.8	65.2
Lick Run	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data

Source: NBPD

Table 19
NBPD Greenway User Mode Split

Greenway	Date	Bicycles	Pedestrians	Total	Percent Bicycle	Percent Pedestrian
Roanoke River	9/13/2013	51	6	57	89.5	10.5
	9/15/2013	62	7	69	89.9	10.1
Lick Run	9/13/2013	4	39	43	9.3	90.7
	9/15/2013	No Data	No Data	No Data	No Data	No Data

4.5.4 Automated Greenway Counts

Beyond the 2012 NBPD counts, automated trail counters are in place on area greenways and trails as part of the Regional Greenway and Trail User Count Program. Initiated in 2010, the Regional Greenway and Trail User Count Program uses TRAFx infrared counters to collect use data on area greenways in localities composing the Roanoke Valley Greenway Commission (City of Roanoke, City of Salem, Roanoke County, and Town of Vinton). Currently, automated counters are in place at 8 locations on 6 separate greenways and other trails.

Automated trail counters are in place on the Roanoke River Greenway and Lick Run Greenway in close proximity to two NBPD count locations. Figures 8-13 provide the following data from the automated greenway counts for the Roanoke River Greenway (at Wiley Drive) and Lick Run Greenway (at 10th Street):

- daily averages for 'official' NBPD count week (week of September 10-16, 2012)
- hourly averages for 'official' NBPD count days - September 13 and September 15, 2012

Note: Additional automated counts (periodic and continuous) are available for other greenways and trails in the region for dates ranging from 2010 to present.

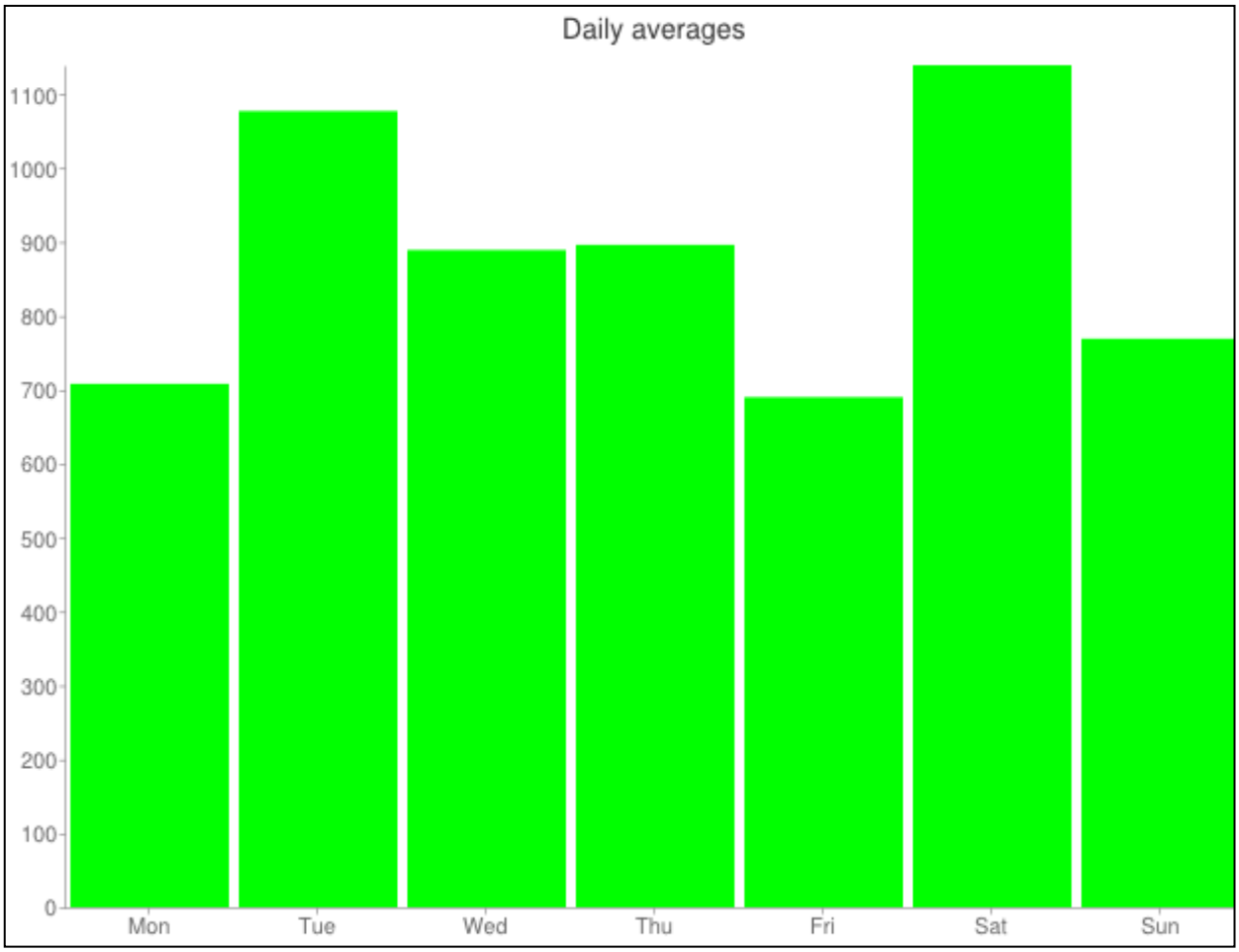


Figure 8: Roanoke River Greenway (at Rivers Edge Sport Complex/Wiley Drive), Daily Averages (2012-09-10 to 2012-09-16)

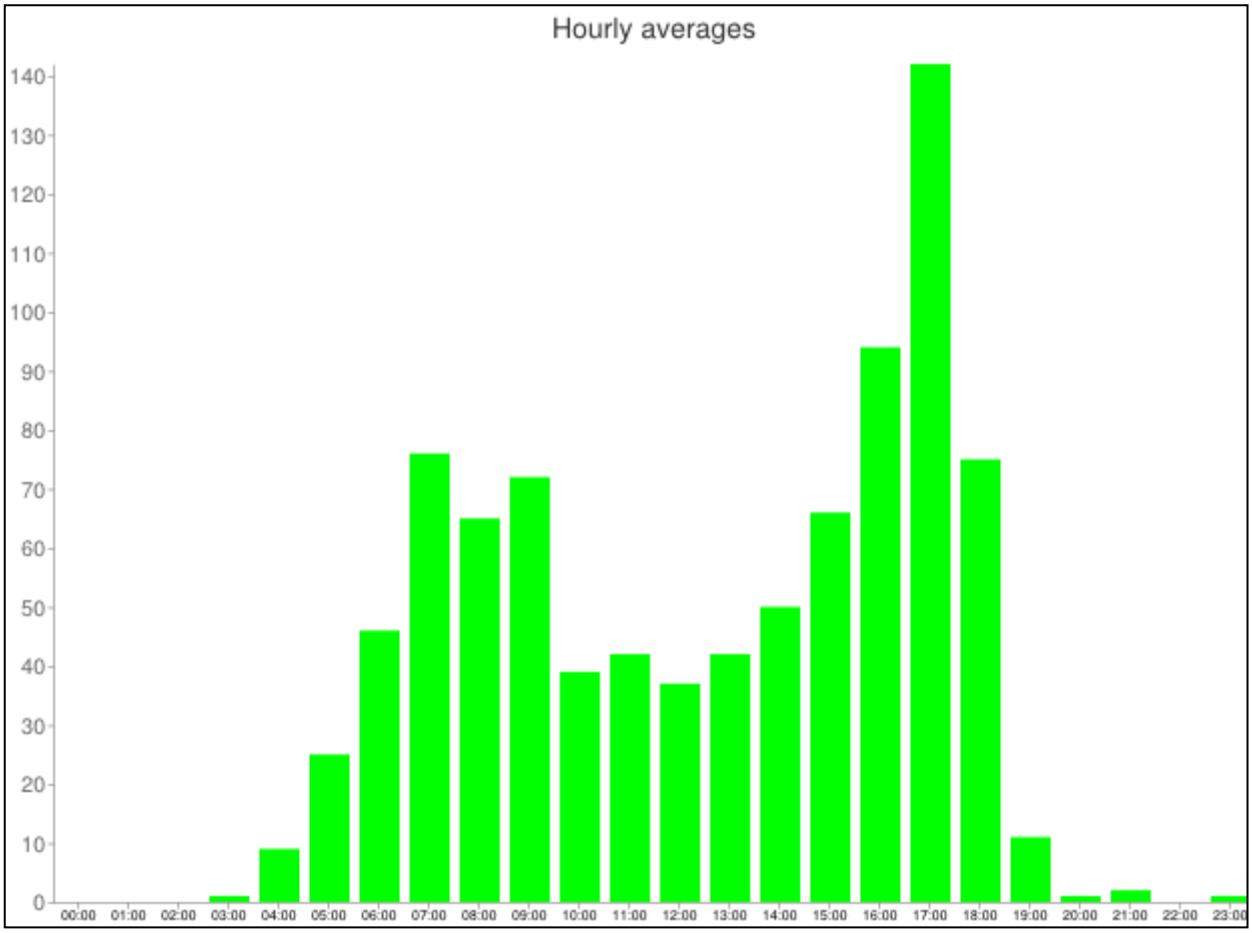


Figure 9: Roanoke River Greenway (at Rivers Edge Sport Complex/Wiley Drive), Hourly Averages (2012-09-13)

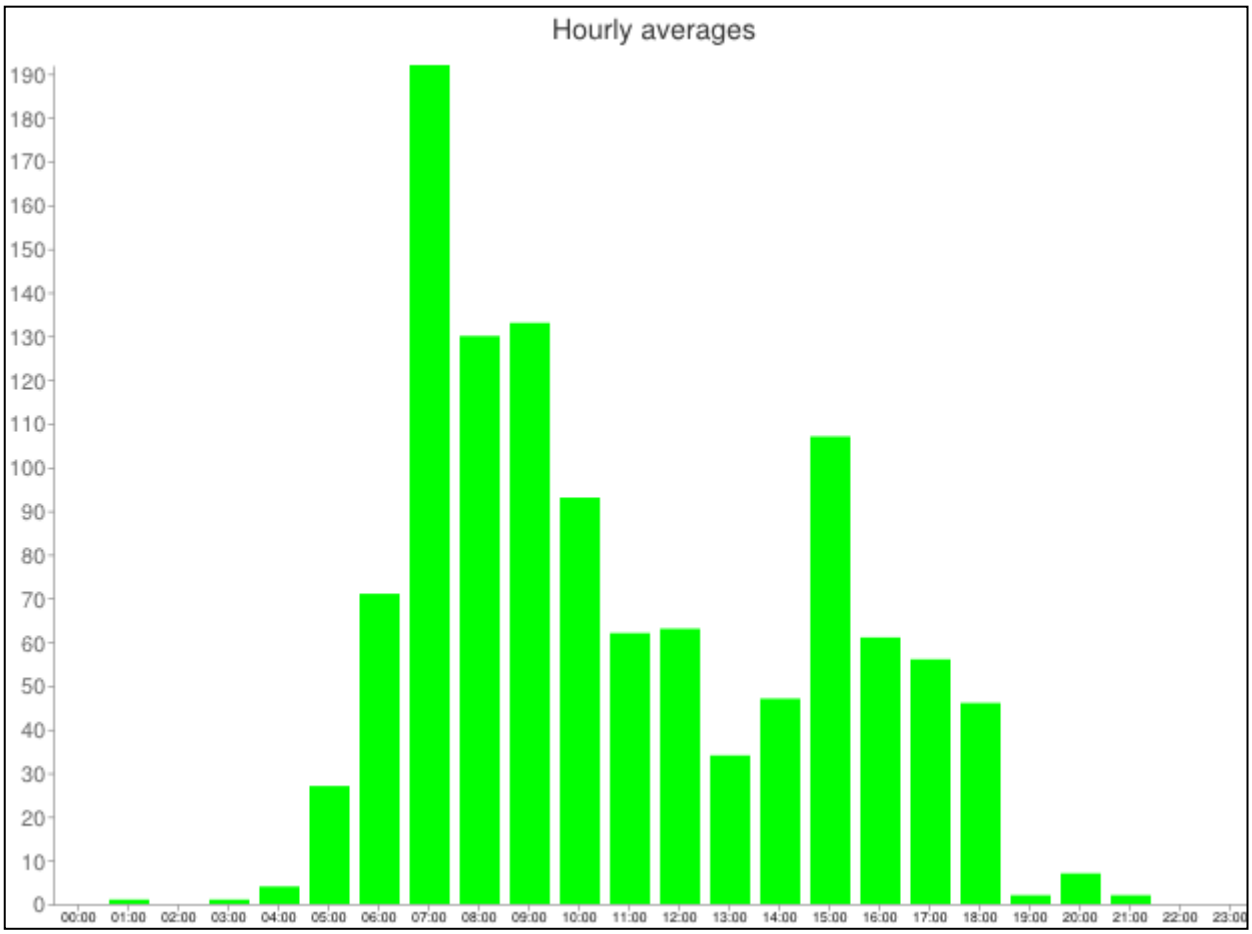


Figure 10: Roanoke River Greenway (at Rivers Edge Sport Complex/Wiley Drive), Hourly Averages (2012-09-15)

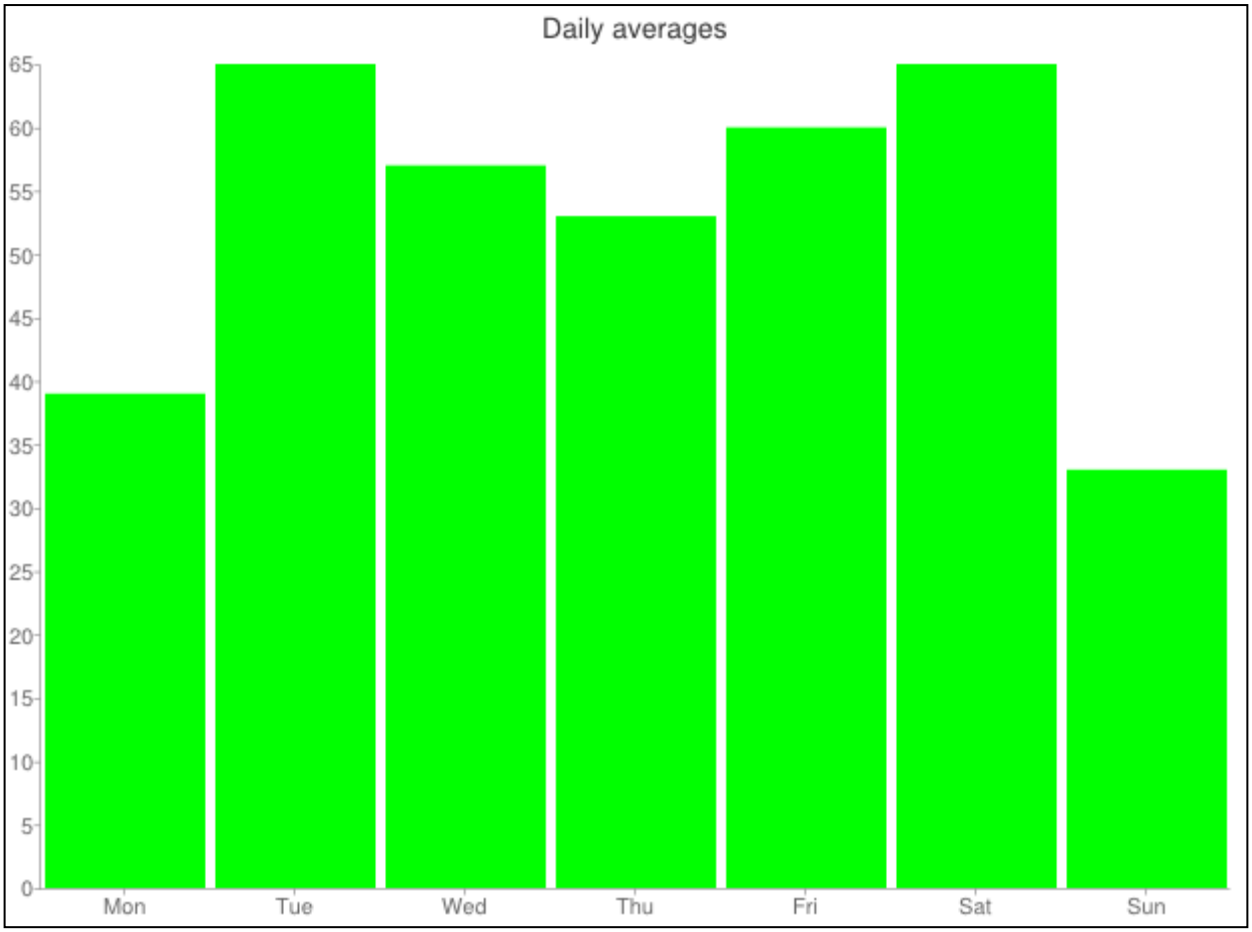


Figure 11: Lick Run Greenway (at 10th Street), Days of the week (2012-09-10 to 2012-09-16)

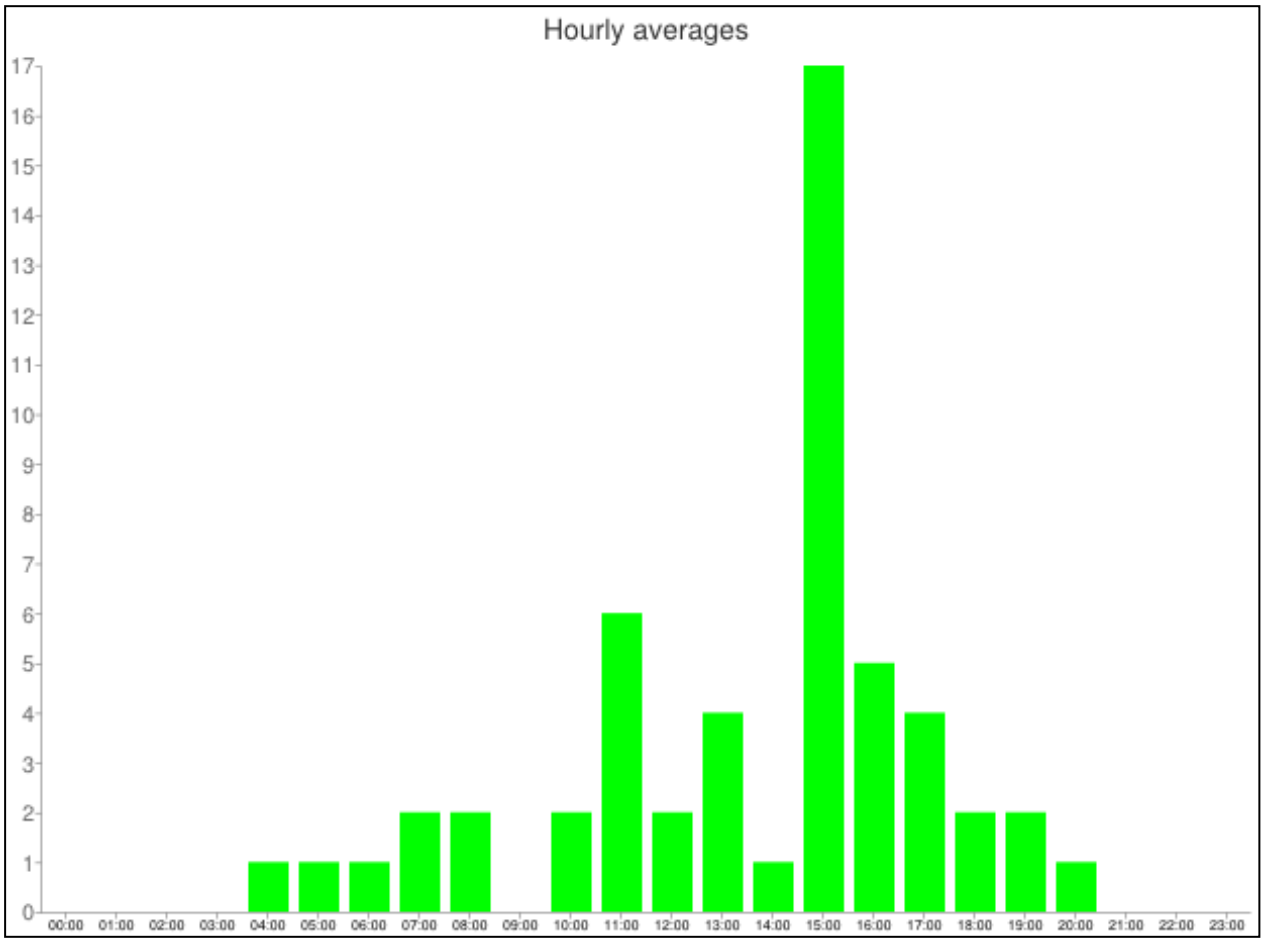


Figure 12: Lick Run Greenway (at 10th Street), Hourly Averages (2012-09-13)

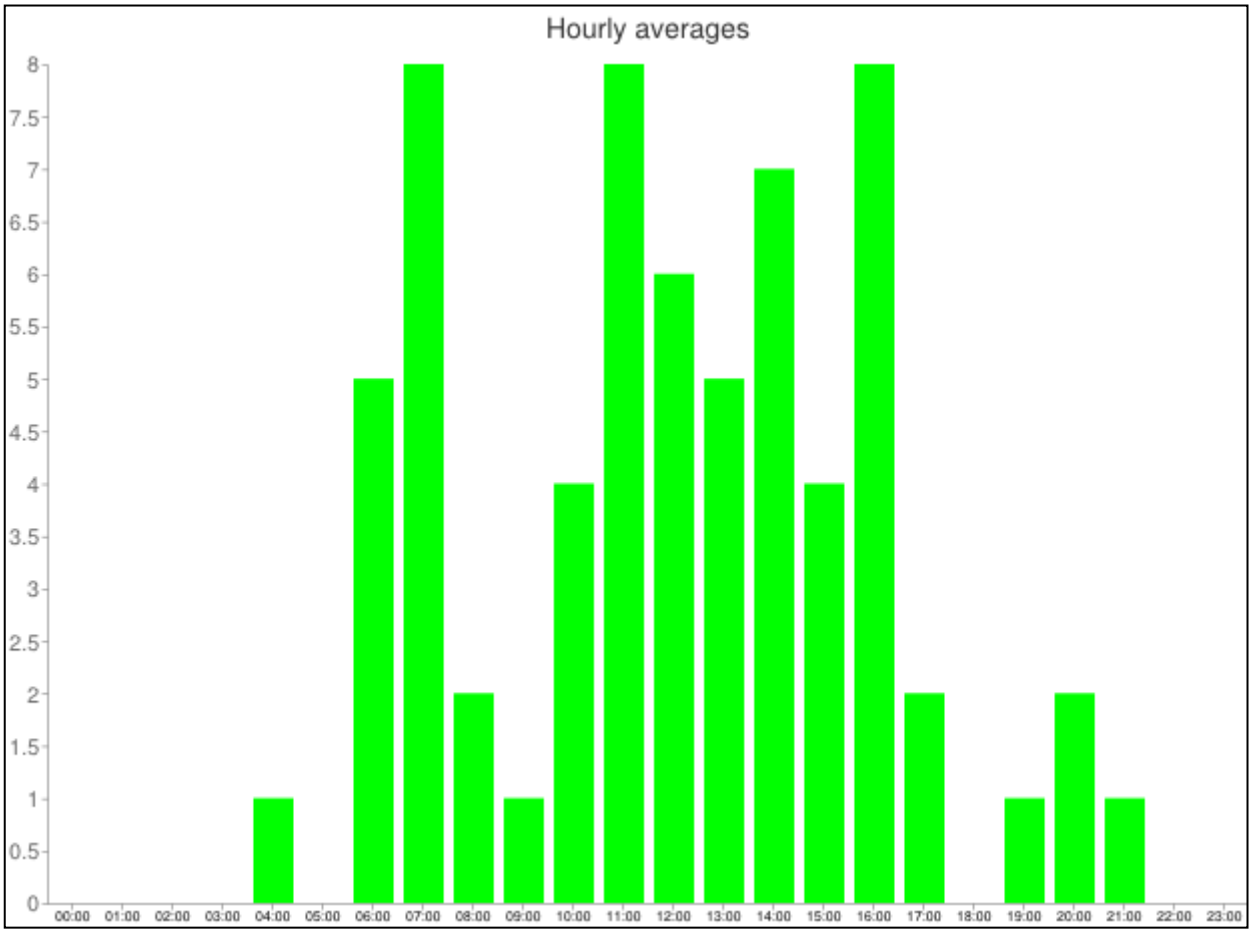


Figure 13: Lick Run Greenway (at 10th Street), Hourly Averages (2012-09-15)

5.0 ADJUSTMENT FACTORS

Adjustment factors allow for the expansion or extrapolation of bicycle and pedestrian counts into estimates of weekly, monthly or annual bicycle and pedestrian volumes for a given count location. Adjustment factors are designed to extrapolate daily, monthly, and annual users based on counts conducted during any period of a day, month, or year. The adjustment factors were developed based on NBPD data from around the country. An overview of the NBPD Count Adjustment Factors methodology is provided in Appendix D.

Using the Extrapolation Spreadsheet available on the NBPD Project website, counts can be entered to extrapolate daily, monthly, and annual users. Extrapolation Spreadsheet Inputs include:

- Count Date - Bicycle and pedestrian activity is more common on certain days of the week and during certain months of the year. The count date allows the spreadsheet to consider the day of the week and month of the year of the count.

- Count Time - Bicycle and pedestrian activity tends to vary by time of day, with certain peak periods seeing relatively more activity.

- Type - The factors currently are designed to be used for locations in or along (a) multi-use pathways (PATH) and (b) higher density pedestrian and entertainment areas (PED). If the bicycle or pedestrian count was performed on a multi-use pathway, select PATH. Otherwise select PED.

- Climate Zone - Seasonal bicycle and pedestrian activity varies depending on the local climate. For example, winter is a relatively higher season for non-motorized activity in the desert environment of the Southwest as compared to the cold winters of the Northeast. Choose which of the three climate options best describes the local environment where the count was performed.

- Two Hour Count Volume - The factors used in this worksheet are for combined bicyclist and pedestrian volumes and can be used for either mode.

A sample Extrapolation Factor Spreadsheet entry is provided in Figure 13.

Using the Extrapolation Factor Spreadsheet available on the NBPD Project website two hour NBPD bicycle counts were entered to extrapolate daily, monthly, and annual users for all count location streets (Table 20). These estimates may be utilized for evaluation of bicycle and pedestrian facilities, policies and programs, to evaluate the impacts of specific improvement

projects or to measure progress towards a municipality or agency goal, and for grant applications to fund non-motorized transportation projects.

	Inputs - Green cells require your attention.				
	Input your two-hour count total	23			
	Count date	9/13/2012			
	Count time: Enter first hour of two hour count period	5:00 PM			
	Type: Path or PED District	PED District			
	Climate Zone: Long Winter Short Summer, Moderate Climate, or Very Hot Summer Mild Winter	Moderate Climate			
Multiplier Value	**Outputs - Orange cells are the daily, weekly, monthly and annual estimates.**				
1.05	2 hour period multiplied by 1.05	24.15			
14%	Your two hour count extrapolated to an estimated daily figure. See Table 1 for adjustment factors used.	173	**Daily Activity (Thursday)**		
12%	Your daily estimate extrapolated to a weekly estimate. See Table 2 for the adjustment factor used.	1,438	**Weekly Activity**		
4.29	Your weekly estimate multiplied by the number of weeks in the count month (# of days in month/7).	6,161	**Monthly Activity (September)**		
8%	Your monthly estimate extrapolated to an annual figure. See Table 3 for the adjustment factor used.	77,009	**Annual Activity**		

Figure 14: Sample Adjustment Factor Worksheet

Table 20
Two Day Count Average and Adjustment Factors

Count Location Description:	Roadway Functional Classification	Thursday September 13 Bicycles by street	Saturday September 15 Bicycles by street	Two Day Count Average Bicycles by street	Adjustment Factor Yearly Estimate Bicycles by street
Loc. #1 (Memorial Ave)	arterial	97	54	75.5	216,677
Loc. #1 (Wasena Rd)	local	27	27	27	78,992
Loc. #1 (Roanoke Ave)	local	0	1	0.5	1,435
Loc. #1 (Roanoke River Greenway)	shared use path	51	62	56.5	162,149
Loc. #2 (10th)	collector	10	9	9.5	27,264
Loc. #2 (Shenandoah Ave)	collector	2	1	1.5	4,305
Loc. #3 Colonial Ave)	collector	1	1	1	2,870
Loc. #3 (Overland Dr)	collector	2	0	1	2,870
Loc. #4 (Peters Creek Ext)	arterial	1	No data collected	1	2,870
Loc. #4 (Shenandoah Ave)	collector	0	No data collected	0	-
Loc. #5 (Gus Nicks Blvd)	arterial	1	0	0.5	1,435
Loc. #5 (King St)	collector	0	5	2.5	7,175
Loc. #5 (Vale/Dell)	local	0	0	0	-
Loc. #6 (Grandin Rd)	collector	29	13	21	60,268
Loc. #6 (Brandon Ave)	arterial	16	7	11.5	33,004

(Continued)

Table 20
Two Day Count Average and Adjustment Factors (continued)

Count Location Description:	Roadway Functional Classification	Thursday September 13 Bicycles by street	Saturday September 15 Bicycles by street	Two Day Count Average Bicycles by street	Adjustment Factor Yearly Estimate Bicycles by street
Loc. #7 (13th St)	collector	12	No data collected	12	34,439
Loc. #7 (Tayloe St)	local	9	No data collected	9	25,829
Loc. #8 (5th St)	local	8	6	7	20,089
Loc #8 (Luck)	local	10	3	6.5	18,654
Loc. #9 (Patterson Ave)	collector	9	No data collected	9	25,829
Loc. #9 (13th St)	collector	11	No data collected	11	31,569
Loc. #10 (Ferdinand Ave)	local	14	No data collected	14	40,179
Loc. #10 (10th St)	collector	0	No data collected	0	-
Loc. #11 (Brandon Ave)	arterial	21	23	22	63,168
Loc. #11 (Edgewood St)	collector	1	10	5.5	15,784
Loc. #11 (Mud Lick Rd)	collector	3	1	2	5,740
Loc. #12 (Williamson Rd)	arterial	7	3	5	14,349
Loc. #12 (Campbell Ave)	collector	7	12	9.5	27,264
Loc. #13 (Plantation Rd)	arterial	4	No data collected	4	11,480
Loc. #13 (Preston Ave)	local	1	No data collected	1	2,870
Loc. #13 (Columbia Ave)	local	0	No data collected	0	-

(Continued)

Table 20
Two Day Count Average and Adjustment Factors (continued)

Count Location Description:	Roadway Functional Classification	Thursday September 13 Bicycles by street	Saturday September 15 Bicycles by street	Two Day Count Average Bicycles by street	Adjustment Factor Yearly Estimate Bicycles by street
Loc. #14 (Brambleton Ave)	arterial	13	No data collected	13	37,309
Loc. #14 (Spring Rd)	local	8	No data collected	8	22,959
Loc. #15 (10th St)	arterial	8	No data collected	8	22,959
Loc. #15 (Syracuse Ave)	local	1	No data collected	1	2,870
Loc. #15 (Lick Run Greenway)	shared use path	4	No data collected	4	11,480
Loc. #16 (Brandon Ave)	arterial	2	3	2.5	7,175
Loc. #16 (Franklin Rd)	arterial	6	2	4	11,480
Loc. #16 (McClanahan St)	collector	2	3	2.5	7,175
Loc. #17 (Jefferson St)	collector	12	2	7	20,089
Loc. #17 (Walnut Ave)	collector	12	5	8.5	24,394
Loc. #18 (Franklin Rd)	arterial	3	1	2	5,740
Loc. #18 (Elm Ave)	collector	5	1	3	8,610
Loc. #19 (Grandin Rd)	collector	10	No data collected	10	28,699
Loc. #19 (Garst Mill Rd)	collector	1	No data collected	1	2,870

Source: NBPD data using Alta Planning/NBPD Adjustment Factors (Extrapolation Workbook)

6.0 NEXT STEPS AND LESSONS LEARNED

It is anticipated that the NBPD project will be conducted annually each fall as a component of the RVAMPO bicycle, pedestrian, and greenway planning program. While the initial (2012) NBPD counts provided useful bicycle and pedestrian use data, review of the initial effort yields many ways in which the 2013 count can be improved in terms of data collected and efficiency, accuracy, and consistency in NBPD data collection and analysis.

The Official National Count/Survey days for 2013 are during the week of September 9, 2013. Potential count dates for the 2013

- Tuesday, September 10 - Thursday, September 12
- Saturday, September 14 - Sunday, September 15

The following items and actions will be incorporated to improve the 2013 NBPD count.

- Establish official 2013 NBPD count dates earlier in the year to avoid conflict with other events
- Ensure greater geographic distribution of count locations (i.e., all quadrants of the city)
- Modify standard count forms to facilitate data collection and consistency
- Conduct pedestrian counts for individual streets (not just count locations) using standard screenline count forms
- Develop more robust volunteer data collector training to ensure consistency in data
- Increase the number of volunteer data collectors to ensure data is collected on two count days for all locations
- Develop customized data entry forms for more efficient data entry and analysis
- Better incorporate/integrate automated greenway counts from the Regional Greenway and Trail Users Count Program into future NBPD

Additional bicycle, pedestrian, and greenway information are available at www.rvarc.org/bike.

Appendix A

National Bicycle and Pedestrian Documentation Project (NBPD)
Fact Sheet and Status Report

NATIONAL BICYCLE & PEDESTRIAN DOCUMENTATION PROJECT

FACT SHEET AND STATUS REPORT

February 2009

What is the National Bicycle & Pedestrian Documentation Project (NBPD)?

The National Bicycle & Pedestrian Documentation Project (NBPD) is an effort led by Alta Planning + Design, in collaboration with the ITE Pedestrian & Bicycle Council, in response to the lack of useful data on walking and bicycling. While other modes such as motor vehicles have established conventions to collect and use data (such as trip generation for traffic modeling), the lack of consistent data for the walking/bicycling modes has made it difficult to justify funding, justify the allocation of capacity and right-of-way, develop exposure rates, among other issues.

The concept for the NBPD is very simple:

1. Provide materials and directions to agencies to conduct counts and surveys in a consistent manner
2. Provide standard count dates and times
3. Provide a location where this information can be sent
4. Make this information available to the public

The count and survey materials and methods have been evolving as more groups and researchers learn about the program, and determine their own unique needs for the information.

How would the NBPD Data be Used?

It is anticipated that the NBPD data could ultimately be used in four (4) basic areas:

(1) Transportation
(2) Funding and Policy
(3) Exposure
(4) Related Research

<u>Potential Transportation Uses</u>

1. Corridor and aggregate estimating models
2. Estimates of transportation and other benefits
3. Trip generation rates
4. Traffic model modal inputs
5. Quantitative multi-modal level of service methodology
6. Trends in volumes
7. Changes in volumes before and after project implementation
8. Integration with existing traffic monitoring programs
9. Integration with existing clean air and congestion management programs
10. Determine capacity needs of non-motorized facilities

Potential Funding and Policy Uses

1. Allocation of federal funding to bicycle/pedestrian modes
2. Prioritization of local and regional projects
3. Justification for accommodating bicycles/pedestrians in transportation projects (Complete Streets)
4. Changes in traffic impact analysis and required/funded improvements
5. Changes in definition of roadway level of service/capacity
6. Priorities to develop different types of facilities, complete comprehensive network
7. Research on Climate Change

Potential Exposure Uses

1. Ability to develop exposure 'rates' so that high priority locations can be identified

Related Research Uses

1. Relationship between walking/bicycling and external factors (climate, demographics, land use, facility type, etc)
2. Changes to zoning, urban design, and other local laws as appropriate

What is the History of the NBPD?

The National Bicycle & Pedestrian Documentation project (NBPD) was initiated by Alta Planning + Design in 2004, as a result of the lack of consistent bicycling or walking data to determine trends, estimate activity, and other uses. Alta developed a Program Description, Training Guidelines, and Count/Survey Forms and made them available to the public. Alta also requested and received count and survey data conducted prior to the NBPD, or from agencies who did not use the NBPD methods. Alta has invested approximately 500 hours of pro bono time into the NBPD to date.

Alta has been able to use the data collected so far to:

a. Identify monthly use patterns on multi use paths in some parts of the country
b. Identify day-to-day patterns in volumes in different settings
c. Identify hourly patterns in use and peak hour patterns
d. Establish a good base of data on trip purpose, trip length, and replaced vehicle trips
e. Identify trends in bicyclist/pedestrian volumes at the same locations over a number of years
f. Identify automatic count technology calibration factors
g. Develop an Aggregate Bicycle and Pedestrian Demand and Benefits Model

In 2006, Caltrans selected the NBPD as the foundation of a 2.5 year research study in San Diego County called 'Seamless Travel'. This study included over 80 manual count locations, 500+ surveys, and 5 automatic count locations, along with extensive analysis of background factors through GIS.

In 2006, the Volpe National Transportation Systems Center (FHWA) selected the NBPD as one of several evaluation systems to document changes in walking and bicycling for the Non-motorized Transportation Pilot Project in four communities (Marin County, CA, Columbia, MO, Sheboygan, WI, and Minneapolis, MN. Counts and surveys were done in 2007 and subsequently to track the trends in activity, especially near new projects funded by the NTPP program.

The NBPD was presented at major conferences (such as ITE, TRB, ProWalkProBike) continuously between 2004 and 2009.

With no direct financial support, Alta has been collecting and analyzing count and survey data within its abilities. In late 2008, Alta brought together some interested people (including Jennifer Dill, Shawn Turner, David Ragland) to discuss how best to expand the NBPD effort.

In 2009, ITE increased its commitment to the NBPD and assigned staff (Jina Mahmoudi) to help collect and review the data. An ITE Bicycle/Pedestrian Trip Generation Working Group was formed in January 2009, focusing on how ITE can develop trip generation and other data that would be of use to its members.

Rails-to-Trails Conservancy also convened a Working Group in February 2009 focusing on a wide range of issues including getting the NBPD methodology into the next re-authorization.

An inventory of the data as of January 2009 showed approximately 310 counts in about 93 different communities nationwide.

How is the NBPD Different than other Demand or Suitability Methods?

A fundamental objective of the NBPD is to develop methods similar to other modes, all of which rely on quantifiable measures (such as delay). The lack of quantifiable methodologies for the non-motorized modes is a likely reason the modes are often under-funded and an afterthought in policy decision-making. The National Bicycle & Pedestrian Program (NBPDP) is designed to address the deficiency in accurate data on walking and bicycling rates, patterns, and relationships. Unlike other transportation modes that have consistent data collection and methods that result on tools such as trip generation analysis, bicycle/walk data collection is inconsistent and/or incomplete, resulting in a lack of understanding of the existing and potential role and benefits from these modes.

The Guidebook on Methods to Estimate Non-Motorized Travel (U.S. Department of Transportation, Federal Highway Administration, Publication N. FHWA-RD-165, July 1999) states that "further development of modeling techniques and data sources are needed to better integrate bicycle and pedestrian travel into mainstream transportation models and planning activities (Vol. 1, Section 4)."

While existing methodologies that use bicyclist or pedestrian perceptions of comfort (level of service, suitability) and other tools help assess conditions, or measure latent demand, the lack of quantifiable supporting data or testing on accuracy makes them less useful as estimating tools. No estimating tool exists today for the non-motorized mode that has been independently evaluated and tested.

What are some of the Major Findings to Date?

Research findings to date include:

1. Automated counters can accurately count bicycles and pedestrians in many locations, but need to be calibrated
2. Multi-use paths can serve as primarily transportation facilities
3. Multi-use paths generally attract much higher numbers of bicyclists and pedestrians than on-street facilities (sidewalks, streets)
4. Even on multi-use paths with high recreational use, there are still much higher numbers of transportation-related trips than on-street

5. Seasonal variations in use of multi-use paths are unique in different parts of the country
6. Climate plays a significant role in the volumes on multi-use paths
7. Visitor destinations have distinct use patterns
8. Adjacent land use plays a large role in pedestrian peak periods and patterns of hourly use
9. Trip purpose, length, and other survey data is highly sensitive to the survey location and survey method
10. Most (44-63%) of pedestrian trips are transportation-related
11. A significant number (25-37%) of bicycle trips are transportation related
12. Unlike vehicles, there are few distinct peak hour patterns for pedestrians or bicycles
13. Pedestrians have lower-than-average incomes, while bicyclists have higher-than-average incomes
14. Employment density is a high indicator of pedestrian activity ($r = .976$) along with proximity to a multi-use pathway ($r = .879$).

How Does the NBPD Relate to the NHTS and Other Efforts and Methods?

Measuring bicycle or pedestrian activity can be broken into four basic types:

1. Household based trips (person trips)
2. Land use based trips (trip generation)
3. Screenline or similar (activity levels)
4. Intercept surveys

The National Household Travel Survey (NHTS) uses travel diaries and interviews to provide a national average (with some regional data available) household person trip generation. This source provides invaluable input on home-based mode split, trip purpose, trip length, and other information.

ITE has begun to ask agencies to count bicycles and pedestrians at specific land uses so that trip generation information can be developed, but this effort is still being developed and refined at this time.

The NBPD count effort conducts screen line and crosswalk counts to measure activity levels at the same location over time. It also allows for some associative research between variables such as demographics, facility, land use, and others and activity volumes.

The NBPD survey effort, based on intercept surveys, provides a complimentary effort to the NHTS. While not as extensive as the NHTS, intercept surveys ask randomly selected people for their trip purpose, length, and other information while they are in the middle of making those trips. This may help provide a better understanding of linked trips than travel diaries.

All four of these efforts, together, will provide enough information to move the non-motorized field forward.

Where would the data go and how would it be accessed?

Count and survey data has been sent to Alta Planning + Design since 2004. In 2009, all data is also being sent to ITE for review. One of the underlying goals of the NBPD is to store the data and make it accessible to the public in a non-proprietary manner. It is likely that some of the data used for things like trip generation and transportation modeling, where data quality must be monitored, may be kept by a group such as ITE. The basic count and survey data would best be kept in some publicly-accessible location such as PBIC or similar web site. The data would be used for a variety of research purposes including methods and

tools that would be usable by the same agencies who sent in the information. Localized information could also be developed for those communities.

Who is Working on This?

Numerous agencies and groups have expressed interest in working on the NBPD. This includes:

Michael Jones, Jennifer Donlon, Matt Berkow: Alta Planning + Design

Jina Mahmoudi, Institute of Transportation Engineers (ITE) Pedestrian & Bicycle Council

Shawn Turner, Texas Transportation Institute, TRB Pedestrian Subcommittee

Jennifer Dill, Portland State University, TRB Bicycle Subcommittee

Thomas Gotschi, Rails-to-Trails Conservancy

David Ragland, UC Berkeley Traffic Safety Center

Several working groups have formed focusing on different aspects of the research.

ITE Working Group: trip generation, data reporting, count/survey guidance to members

RTC Working Group: Federal legislation, research funding

Priority of Needed Actions and Decisions

Resources are need before the NBPD can become a reality. Some immediate needs include:

1. Project Objectives: determining the ultimate uses for the data, so that current count and survey methods and materials produce the needed information
2. Quality control of existing data, including contacting agencies who have sent in information, revising data base
3. Modify surveys and count forms as needed
4. Purchase and install at least 20 automatic counters around the country
5. Develop, produce, and promote a 'Walk-Bike Monitoring Guide'

Appendix B

US Census American Community Survey (ACS)
2011 1-Year Estimates
Commuting Data

Subject	United States		Virginia		Roanoke City	
	Total		Total		Total	
	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
Workers 16 years and over	138,269,979	+/-134,214	3,883,249	+/-20,139	43,394	+/-2,295
MEANS OF TRANSPORTATION TO WORK						
Car, truck, or van	86.1%	+/-0.1	87.2%	+/-0.4	89.6%	+/-2.9
Drove alone	76.4%	+/-0.1	78.1%	+/-0.5	80.8%	+/-3.3
Carpooled	9.7%	+/-0.1	9.2%	+/-0.3	8.8%	+/-2.5
In 2-person carpool	7.5%	+/-0.1	7.0%	+/-0.3	7.8%	+/-2.3
In 3-person carpool	1.3%	+/-0.1	1.4%	+/-0.1	1.0%	+/-0.8
In 4-or-more person carpool	0.9%	+/-0.1	0.7%	+/-0.1	0.0%	+/-0.4
Workers per car, truck, or van	1.07	+/-0.01	1.06	+/-0.01	1.05	+/-0.02
Public transportation (excluding taxicab)	5.0%	+/-0.1	4.5%	+/-0.2	3.3%	+/-1.4
Walked	2.8%	+/-0.1	2.3%	+/-0.2	1.7%	+/-1.2
Bicycle	0.6%	+/-0.1	0.3%	+/-0.1	0.1%	+/-0.1
Taxicab, motorcycle, or other means	1.2%	+/-0.1	1.0%	+/-0.1	1.9%	+/-1.5
Worked at home	4.3%	+/-0.1	4.6%	+/-0.2	3.5%	+/-1.9
PLACE OF WORK						
Worked in state of residence	96.2%	+/-0.1	90.9%	+/-0.3	99.5%	+/-0.5
Worked in county of residence	72.4%	+/-0.1	48.6%	+/-0.4	63.6%	+/-3.9
Worked outside county of residence	23.7%	+/-0.1	42.3%	+/-0.4	35.8%	+/-3.9
Worked outside state of residence	3.8%	+/-0.1	9.1%	+/-0.3	0.5%	+/-0.5
Living in a place	74.3%	+/-0.1	69.7%	+/-0.3	100.0%	+/-0.4
Worked in place of residence	31.5%	+/-0.1	22.9%	+/-0.3	63.6%	+/-3.9
Worked outside place of residence	42.8%	+/-0.1	46.8%	+/-0.3	36.4%	+/-3.9
Not living in a place	25.7%	+/-0.1	30.3%	+/-0.3	0.0%	+/-0.4

Subject	United States		Virginia		Roanoke City	
	Total		Total		Total	
	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
TIME LEAVING HOME TO GO TO WORK						
12:00 a.m. to 4:59 a.m.	4.3%	+/-0.1	4.1%	+/-0.2	2.7%	+/-1.4
5:00 a.m. to 5:29 a.m.	3.7%	+/-0.1	3.9%	+/-0.2	1.4%	+/-0.8
5:30 a.m. to 5:59 a.m.	4.8%	+/-0.1	4.9%	+/-0.2	3.6%	+/-1.2
6:00 a.m. to 6:29 a.m.	8.7%	+/-0.1	9.4%	+/-0.3	6.8%	+/-2.2
6:30 a.m. to 6:59 a.m.	9.9%	+/-0.1	10.5%	+/-0.3	12.3%	+/-3.2
7:00 a.m. to 7:29 a.m.	14.8%	+/-0.1	13.5%	+/-0.3	13.3%	+/-3.0
7:30 a.m. to 7:59 a.m.	12.8%	+/-0.1	12.9%	+/-0.3	16.2%	+/-3.1
8:00 a.m. to 8:29 a.m.	11.2%	+/-0.1	12.0%	+/-0.3	9.0%	+/-2.4
8:30 a.m. to 8:59 a.m.	5.5%	+/-0.1	6.2%	+/-0.2	4.9%	+/-1.7
9:00 a.m. to 11:59 p.m.	24.4%	+/-0.1	22.5%	+/-0.4	29.8%	+/-3.6
TRAVEL TIME TO WORK						
Less than 10 minutes	13.4%	+/-0.1	10.2%	+/-0.3	13.0%	+/-2.4
10 to 14 minutes	14.3%	+/-0.1	13.0%	+/-0.3	21.8%	+/-3.5
15 to 19 minutes	15.5%	+/-0.1	15.7%	+/-0.3	26.5%	+/-4.1
20 to 24 minutes	14.8%	+/-0.1	14.5%	+/-0.3	18.4%	+/-3.2
25 to 29 minutes	6.1%	+/-0.1	6.2%	+/-0.3	3.6%	+/-1.3
30 to 34 minutes	13.7%	+/-0.1	14.3%	+/-0.4	10.2%	+/-2.6
35 to 44 minutes	6.4%	+/-0.1	7.0%	+/-0.3	1.9%	+/-1.0
45 to 59 minutes	7.5%	+/-0.1	9.1%	+/-0.3	2.3%	+/-1.2
60 or more minutes	8.1%	+/-0.1	10.0%	+/-0.3	2.4%	+/-1.2
Mean travel time to work (minutes)	25.5	+/-0.1	27.7	+/-0.2	18.8	+/-1.3

Subject	United States		Virginia		Roanoke City	
	Total		Total		Total	
	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
VEHICLES AVAILABLE						
Workers 16 years and over in households	136,854,798	+/-132,944	3,817,384	+/-19,687	43,209	+/-2,322
No vehicle available	4.5%	+/-0.1	2.6%	+/-0.2	6.0%	+/-2.4
1 vehicle available	21.7%	+/-0.1	19.1%	+/-0.4	26.5%	+/-4.3
2 vehicles available	42.3%	+/-0.1	41.5%	+/-0.5	44.5%	+/-5.4
3 or more vehicles available	31.5%	+/-0.1	36.8%	+/-0.6	23.0%	+/-4.6
PERCENT IMPUTED						
Means of transportation to work	5.6%	(X)	5.3%	(X)	9.8%	(X)
Private vehicle occupancy	6.7%	(X)	6.7%	(X)	12.1%	(X)
Place of work	7.8%	(X)	7.7%	(X)	12.2%	(X)
Time leaving home to go to work	13.0%	(X)	11.6%	(X)	16.8%	(X)
Travel time to work	9.6%	(X)	8.6%	(X)	13.7%	(X)
Vehicles available	1.1%	(X)	1.0%	(X)	3.8%	(X)

Appendix C

NBPD Standard Bicycle Intersection Count Forms
Standard Screenline Count Forms

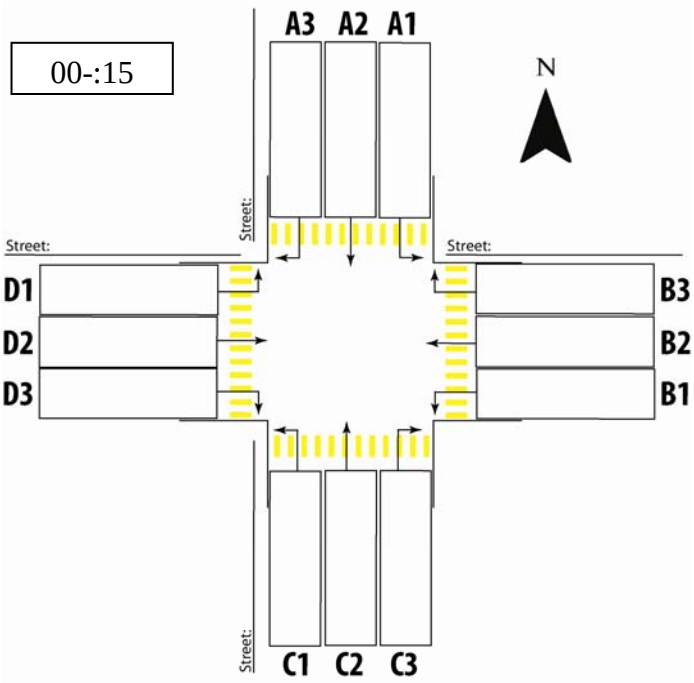
STANDARD BICYCLE INTERSECTION COUNT FORM

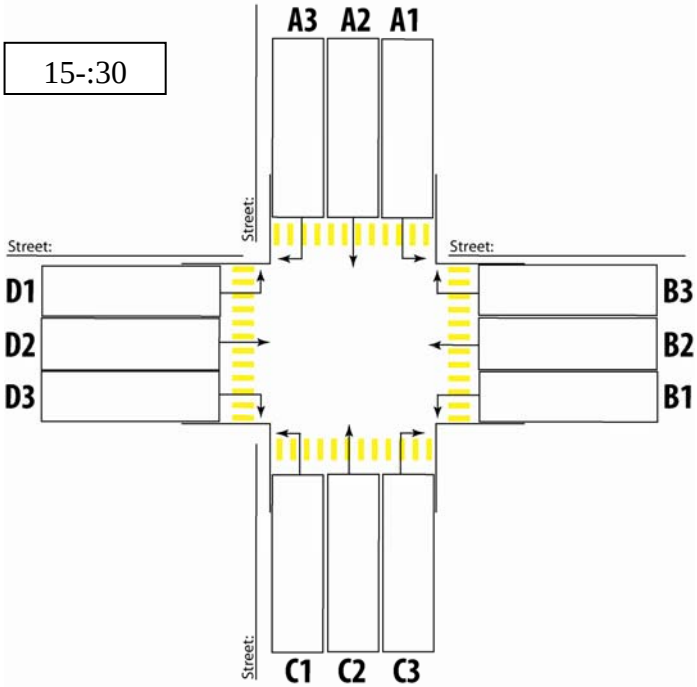
Name: _____ Location: _____

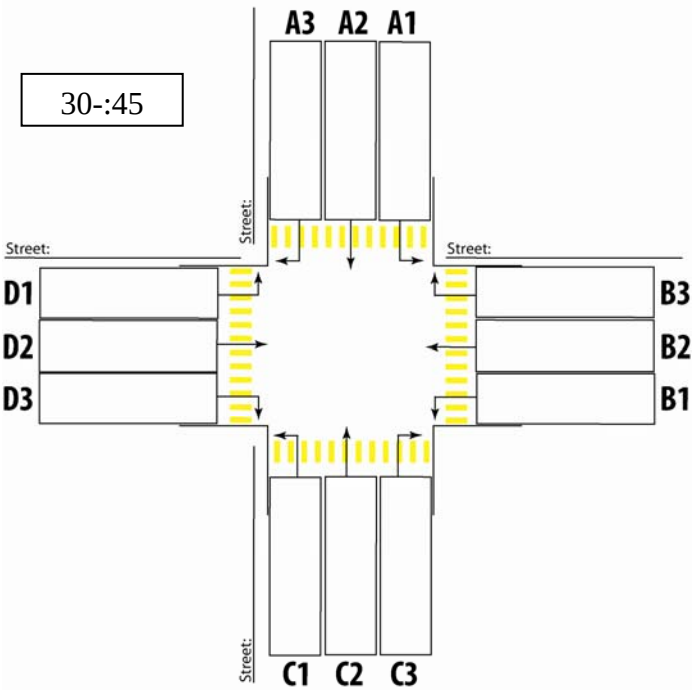
Date: _____ Start Time: _____ End Time: _____
Weather: _____

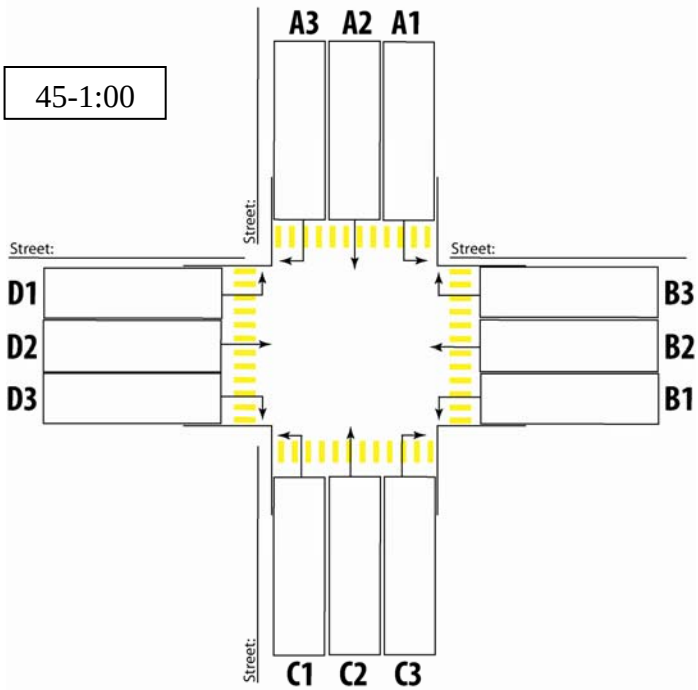
Please fill in your name, count location, date, time period, and weather conditions (fair, rainy, very cold). Count all bicyclists crossing through the intersection under the appropriate categories.

- Count for two hours in 15-minute increments.
- Count bicyclists who ride on the sidewalk.
- Count the number of people on the bicycle, not the number of bicycles.
- Use one intersection graphic per 15-minute interval.

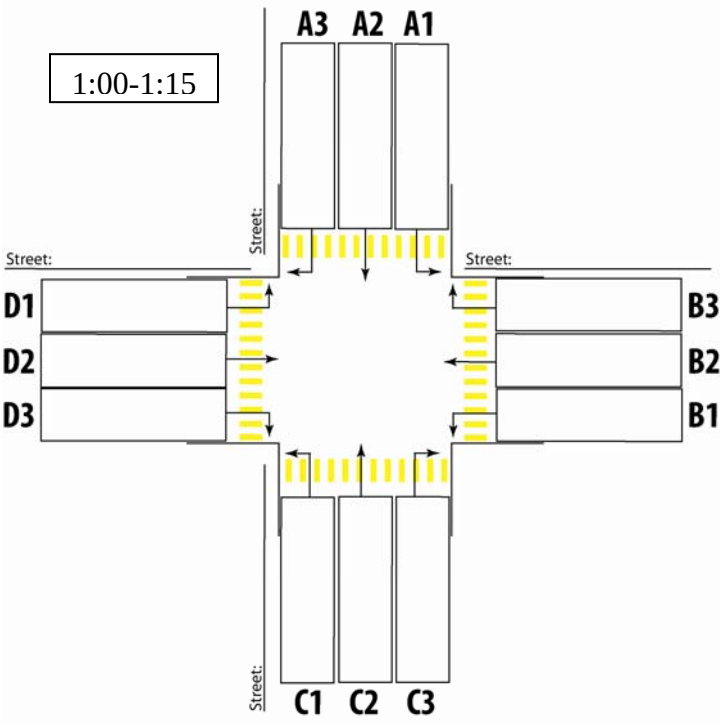




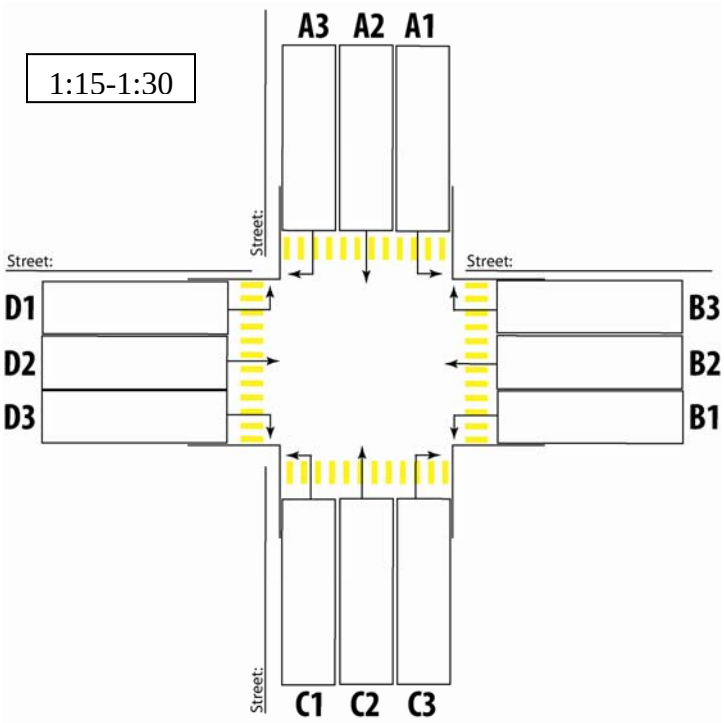




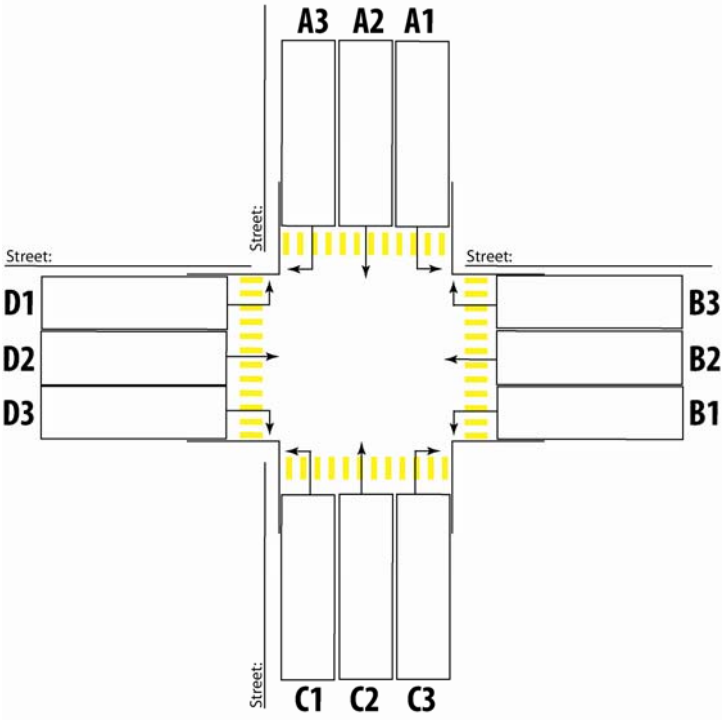
1:00-1:15



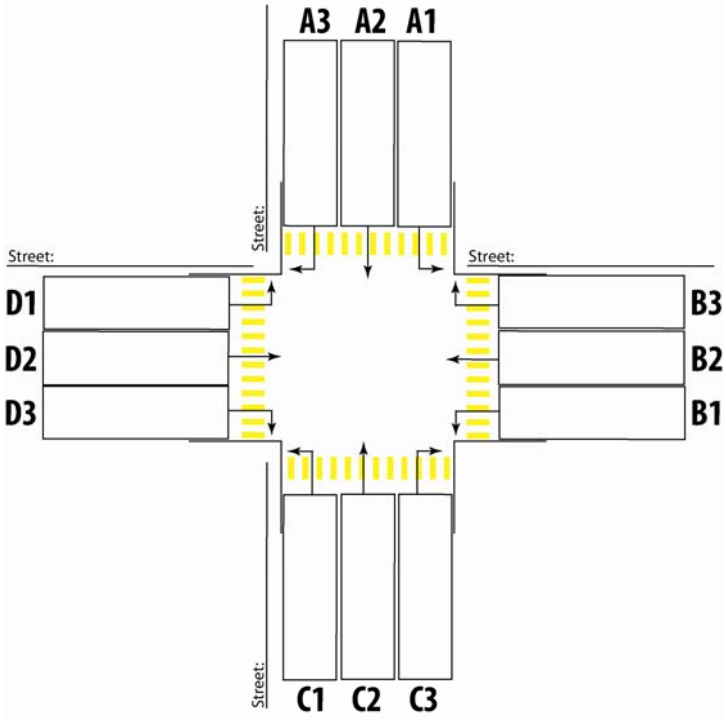
1:15-1:30



1:30-1:45



1:45-2:00



Notes:

STANDARD SCREENLINE COUNT FORM

Name: _____ Location: _____

Date: _____ Start Time: _____ End Time: _____

Weather: _____

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 appropriate categories.

- Count for two hours in 15 minute increments.
- Count bicyclists who ride on the sidewalk.
- Count the number of people on the bicycle, not the number of bicycles.
- Pedestrians include people in wheelchairs or others using assistive devices, children in strollers, etc.
- People using equipment such as skateboards or rollerblades should be included in the "Other" category.

	Bicycles		**Pedestrians**		**Others**
	Female	**Male**	**Female**	**Male**	
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 D

NBPD Adjustment Factor Methodology

NATIONAL BICYCLE & PEDESTRIAN DOCUMENTATION PROJECT

Count Adjustment Factors

March 2009

While more year-long automatic count data is needed from different parts of the county, especially for pedestrians and on-street bicyclists, enough data now exists to allow us to adjust counts done almost any period on multi-use paths and pedestrian districts to an annual figure.

All percentages in the following tables represent the percentage of the total period (day, week, or month).

How to Use This Data

The factors in the following tables are designed to extrapolate daily, monthly, and annual users based on counts done during any period of a day, month, or year. The factors currently are designed to be used by (a) multi-use pathways (PATH) and (b) higher density pedestrian and entertainment areas (PED).

How Many Counts Can it Be Based On?

Given the variability of bicycle and pedestrian activity, we strongly encourage that all estimates be based on the average of at least two (2) and preferably three (3) counts during the same time period and week, especially for lower volume areas. For example, counts could be done from 2-4pm on consecutive weekdays (Tuesday – Thursday) during the same week, or, in consecutive weeks. Weekday counts should always be done Tuesday through Thursday, and never on a holiday. Weekend counts can be done on either day.

Bicyclists versus Pedestrians

The factors used in these formulas are for combined bicyclist and pedestrian volumes. Once you have calculated your total daily, monthly, or annual volume, you can simply multiple the total by the percent breakdown between bikes and pedestrians based on your original count information.

Start with the Hour Count

Once you have collected your count information and developed an average weekday and weekend count volume for bicyclists and/or pedestrians, pick any one (1) hour period from either of those days.

<u>Adjustment Factor</u>

Your next step is to multiply those counts by 1.05.

Sample #1

Average 1 hour weekday count: 236 bikes/peds x 1.05 = 248

Average 1 hour weekend day count: 540 bikes/peds x 1.05 = 567

This adjustment factor is done to reflect the bicyclists/pedestrians who use the facility between 11pm and 6am, or, about 5% of the average daily total. The count formulas are all based on total counts between 6am and 10pm, since many available counts only cover those periods. If you are certain your facility gets virtually no use between those hours, you can forgo this step.

Calculate Daily Weekday and Weekend Daily Total

Identify the weekday and weekend hour your counts are from in Table 1 below. Be sure to use the PATH column for all multi-use paths, and the PED column for all higher density pedestrian areas with some entertainment uses such as restaurants. Be sure to select the correct time of year (April-September, or, October-March) as well.

Sample #2: done in June on a multiuse path (weekday = 4-5pm, weekend day = 12-1pm):

Adjusted weekday hourly count = 248/.07 = 3,542 daily users

Adjusted weekend day hourly count = 567/.1= 5,670 daily users

Calculating Average Weekly Volumes

We need to adjust these figures based on the day of the week. See table 2 below. Find the day of the week your counts were done, and factor them by that percent. If you did multiple counts on different days of the week, then take the average of those factors.

Sample #3: counts were done on a Tuesday and a Saturday.

Adjusted weekday count = 3,542/.13 = 27,246 average weekly users

Adjusted weekend count = 5,670/.18 = 31,500

Add these two figures together, and divide by 2: 27,246+31,500=58,746/2 = 29,373 people

The average weekly volumes for that month are 29,373 people.

Convert to Monthly Volumes

To convert from average weekly volumes to an average monthly volume, multiply the average weekly volume by the average number of weeks in a month (4.33 weeks).

Sample #4: 29,373 x 4.33 = 127,282 people.

This is the average monthly volume for the month the counts were conducted.

Convert to Annual Totals

To convert from the average monthly volume for the month the counts were taken into an annual total, divide the average monthly figure by the factor from Table 3 for the month the counts were conducted. Use the general climate zones described. Some climate zone types are not included.

Sample #5: counts were done in June in a moderate climate zone.

Average monthly volumes = 127,282/.08 = 1,591,037 people.

Based on these sample figures, it is estimated that almost 1.6 million people use the pathway annually.

Average Monthly and Daily Figures

To identify the average monthly and daily figures, simply divide the annual figure by 12 (for month) or by 365 (for daily figures).

Monthly average = 1,591,037/12 = 132,586 people

Daily Average = 1,591,037/365 = 4,359 people

Table 1

Hourly Adjustment Factors

Multi-use paths and pedestrian entertainment areas by season

	April - September 6am - 9pm			
	---- PATH------		-----PED-----	
	wkdy	wkend	wkdy	wkend
0600	2%	1%	1%	1%
0700	4%	3%	2%	1%
0800	7%	6%	4%	3%
0900	9%	9%	5%	3%
1000	9%	9%	6%	5%
1100	9%	11%	7%	6%
1200	8%	10%	9%	7%
1300	7%	9%	9%	7%
1400	7%	8%	8%	9%
1500	7%	8%	8%	9%
1600	7%	7%	7%	9%
1700	7%	6%	7%	8%
1800	7%	5%	7%	8%
1900	5%	4%	7%	8%
2000	4%	3%	7%	8%
2100	2%	2%	6%	8%

	October - March 6am - 9pm			
	---- PATH------		-----PED-----	
	wkdy	wkend	wkdy	wkend
0600	2%	0%	1%	0%
0700	4%	2%	2%	1%
0800	6%	6%	3%	2%
0900	7%	10%	5%	4%
1000	9%	10%	6%	5%
1100	9%	11%	8%	8%
1200	9%	11%	9%	10%
1300	9%	10%	10%	13%
1400	9%	10%	9%	11%
1500	8%	10%	8%	8%
1600	8%	8%	7%	7%
1700	7%	5%	6%	6%
1800	6%	3%	7%	6%
1900	4%	2%	7%	6%
2000	2%	1%	6%	6%
2100	2%	1%	5%	5%

Table 2

Daily Adjustment Factors

Note: Holidays use weekend rates.

MON	14%
TUES	13%
WED	12%
THURS	12%
FRI	14%
SAT	18%
SUN	18%

Table 3

Monthly Adjustment Factors by Climate Area

	Climate Region		
Month	Long Winter Short summer	Moderate Climate	Very hot summer Mild winter
JAN	3%	7%	10%
FEB	3%	7%	12%
MAR	7%	8%	10%
APR	11%	8%	9%
MAY	11%	8%	8%
JUN	12%	8%	8%
JUL	13%	12%	7%
AUG	14%	16%	7%
SEP	11%	8%	6%
OCT	6%	6%	7%
NOV	6%	6%	8%
DEC	3%	6%	8%