Bicycle Count Data Summary
Working Paper #4

MAG Bicycles Count Project

Draft Report (REVISED)

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1.0 Purpose of Working Paper #4

The Maricopa Association of Governments (MAG) Bicycle Count Project is an 18-month effort focused on the development of a regional bicycle count strategy for the MAG region. Previous working papers for this project documented a best practices review of bicycle counting technologies (*Working Paper #2*) and a data collection approach and plan (*Working Paper #3*). The data collection plan included the siting of about 128 bicycle count stations across the region, with 44 stations assigned for continuous, automated counting over a two week period, and about 84 count stations assigned for peak period manual counting, including weekdays and weekend counts. Data collection occurred in the Fall 2013.

Working Paper #4 Bicycle Count Data Summary summarizes the results of this data collection effort, including both the automated and peak period manual counting. *Working Paper #4* also describes the processes used to prepare the automated bicycle count data for analysis, to calculate factors for extrapolating the peak period counts to daily counts, to develop sidewalk cycling factors from the manual counts for application to the automated count data, and to identify overall trends in the data.

The MAG Bicycles Count Project establishes the foundation for a comprehensive active transportation monitoring program, as well as, provides baseline bicycle volumes for comparison against future counts over time.

Section 2.0 of this working paper describes the process used to prepare and clean the data for analysis and the approach used to identify and replace invalid data. **Section 3.0** describes the procedure for calculating weekday and weekend peak period percentages and subsequently using those percentages to grow peak period manual bicycle counts into daily bicycle volume estimations. **Section 4.0** provides an analysis of the data, including findings related to weekend and weekday trends and facility classification.

Figure 1-1 displays locations of the 44 automated and 84 manual count stations across the MAG region, as well as existing bicycle facilities across the MAG region.

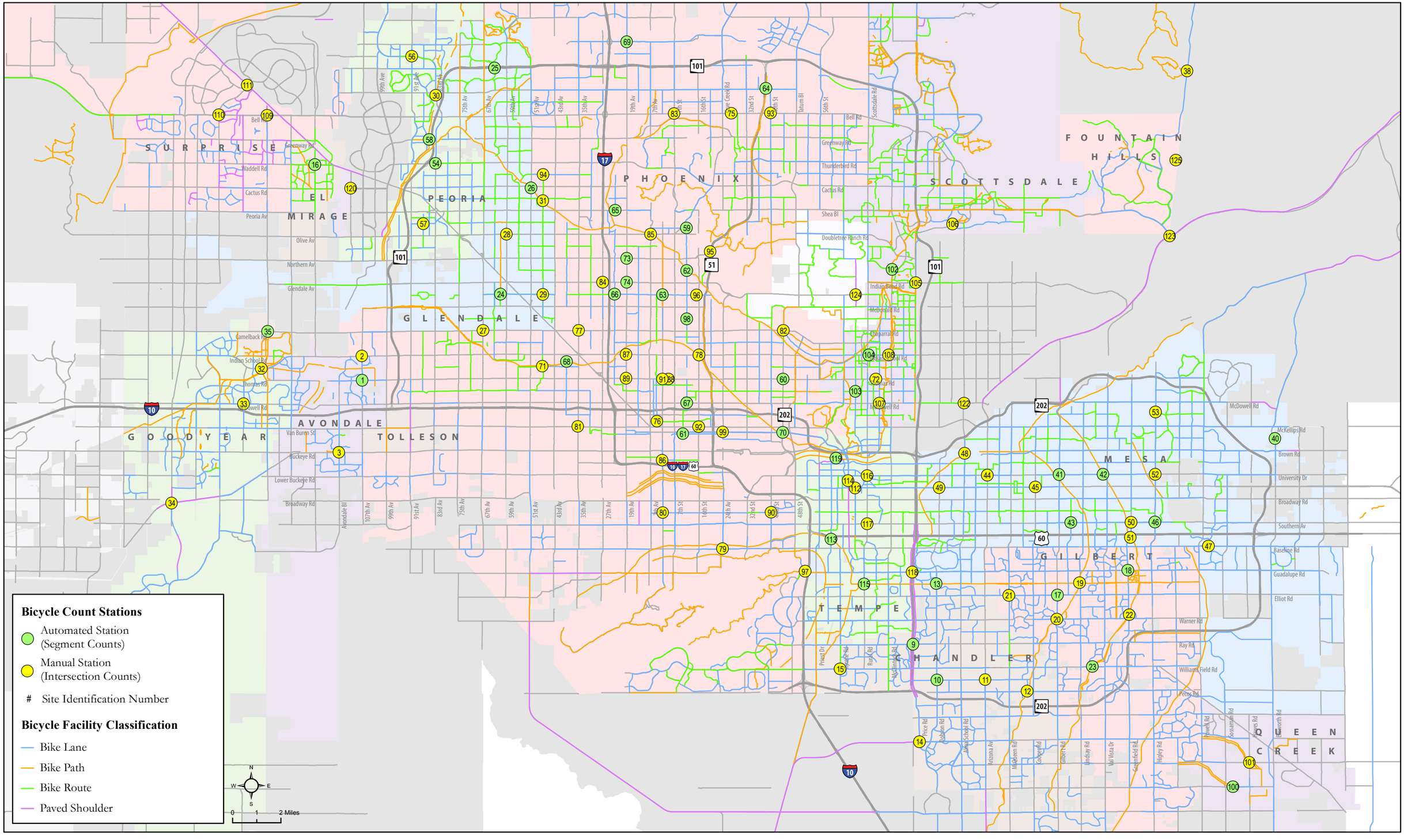
Appendix A contains two tables identifying the location, directions of travel (for automated sites), and Site IDs assigned IDs to both automated and manual count stations.

2.0 Automated Bicycle Count Data Cleaning

A data cleaning process was developed and applied to the automated bicycle count data in order to ensure overall bicycle count data validity and improve the reliability of the eventual data summaries. A three pronged approach was used to clean the automated bicycle count data: 1) identification of data anomalies and exclusion of irregular and unrealistic data, 2) estimation of data values to replace invalid data, and 3) the development and application of a sidewalk cycling factor to account for cyclists riding on the sidewalk who were not detected by the automated counters. Each of these processes is described in the sections that follow.

Figure 1-1: Automated and Manual Count Station Locations and IDs

CHEN RYAN



2.1 Identification of Data Anomalies

The project team reviewed the automated bicycle count data by day of week in Eco-Visio (Eco-Counter's data processing software) to identify anomalies that potentially indicated unreliable or inaccurate counts. These irregularities are believed to result from two circumstances:

1) The automated counter was installed or removed on the day in question, resulting in an incomplete day of data collection; or
2) The automated counting tube was pulled up from the ground, or partially disconnected, causing the counter to either completely stop counting or begin recording vehicles.

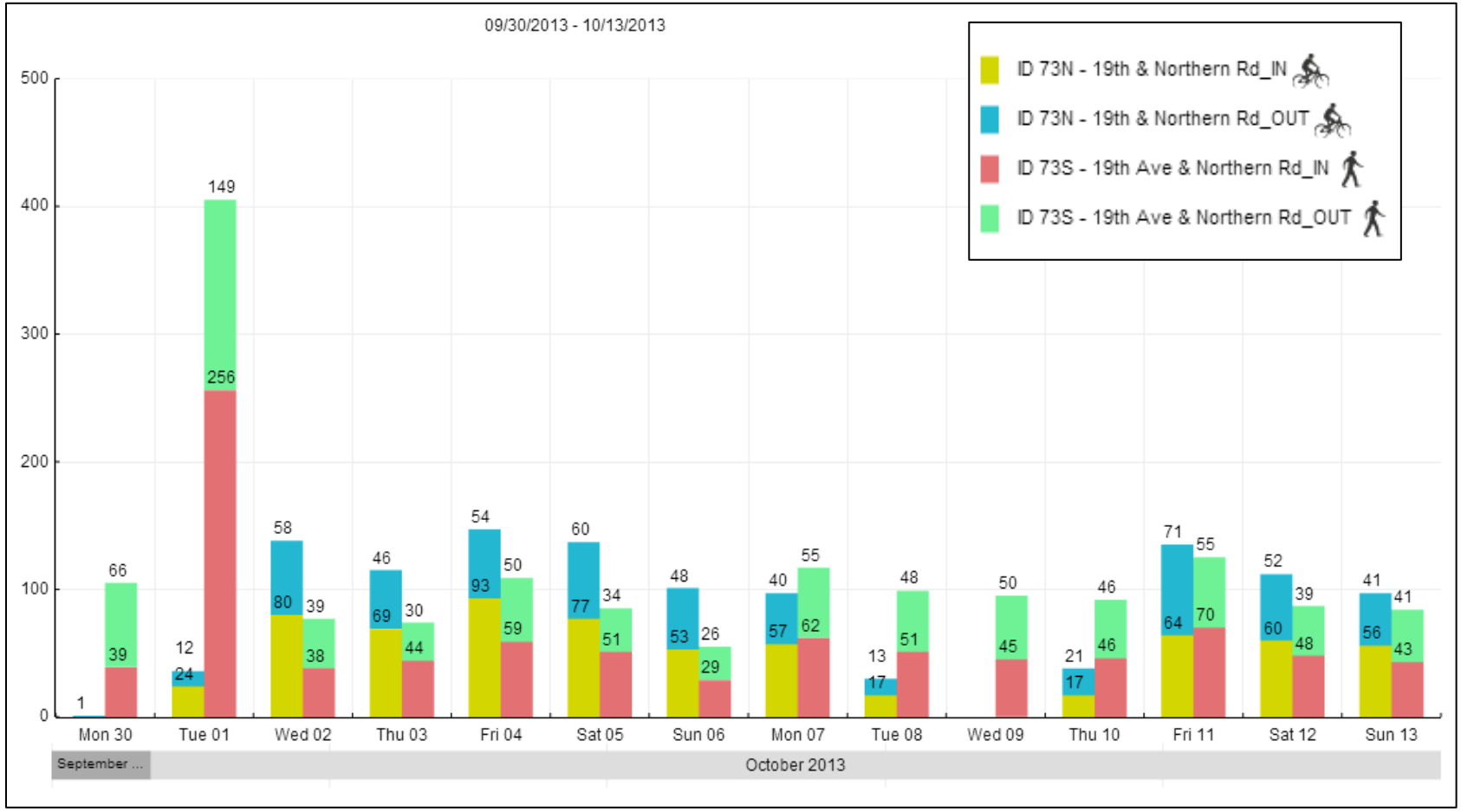
In response to these two circumstances the project team took the following data cleaning actions:

- Excluded the first and last days of bicycle counts from each of the 2-week count periods since those days were used for installing and uninstalling equipment and the data is known to be incomplete.
- Excluded data for the days that appear to have highly irregular machine-recorded counts and developed an estimated count to replace the missing data. The process used for estimating missing data is discussed in Section 2.2.
- Eliminated all data for seven specific sites where patterns were highly irregular and difficult to interpret over the entire count period (Site IDs 6, 9, 17, 23, 60, 70, and 103).
- Eliminated partial data associated with Site IDs 62 and 69 due to likely machine error in only one direction of travel.

Chart 2-1 displays an example of bicycle count data from Site ID 73, along Northern Road in the City of Phoenix south of the intersection of 19th Avenue and Northern Road, where four days of data were determined to be invalid and were therefore replaced with estimated bicycle counts.

The chart displays counts along both the north and south sides of Northern Road, with both eastbound and westbound travel recorded on each side of the street. Bicycle counts identified as occurring *with* the flow of traffic are designated as the "IN" direction, and counts recorded as *against* the direction of travel are designated as the "OUT" direction. For example, on Friday, October 4, 2013, there were 59 daily cyclists traveling eastbound along the south side of Northern Road, and there were 50 cyclists traveling westbound along the south side of Northern Road against the flow of traffic. Likewise, at this same location, there were 93 daily cyclists traveling westbound on the north side of Northern Road, and 54 daily cyclists traveling eastbound on the north side of Northern Road. In summary, this count station recorded a total of 256 daily cyclists on October 4, 2013. It should also be noted that this count station was one of two sites across the region where the counting tubes were laid across the sidewalk since there is no bike lane available along Northern Road and it is a 6-lane roadway. The project team felt there was only a small likelihood that cyclists would be traveling in the travel lane with vehicles, and would rather ride along the sidewalk.

Chart 2-1: Daily East-West Bicycle Counts along Northern Road south of the Intersection of 19th Avenue and Northern Road (Count Site ID 73)



Source: Chen Ryan Associates, May 2014

In addition to the installation and uninstall days (Monday 9/30th and Sunday 10/13th), the following dates were excluded from this count station's count period due to data anomalies:

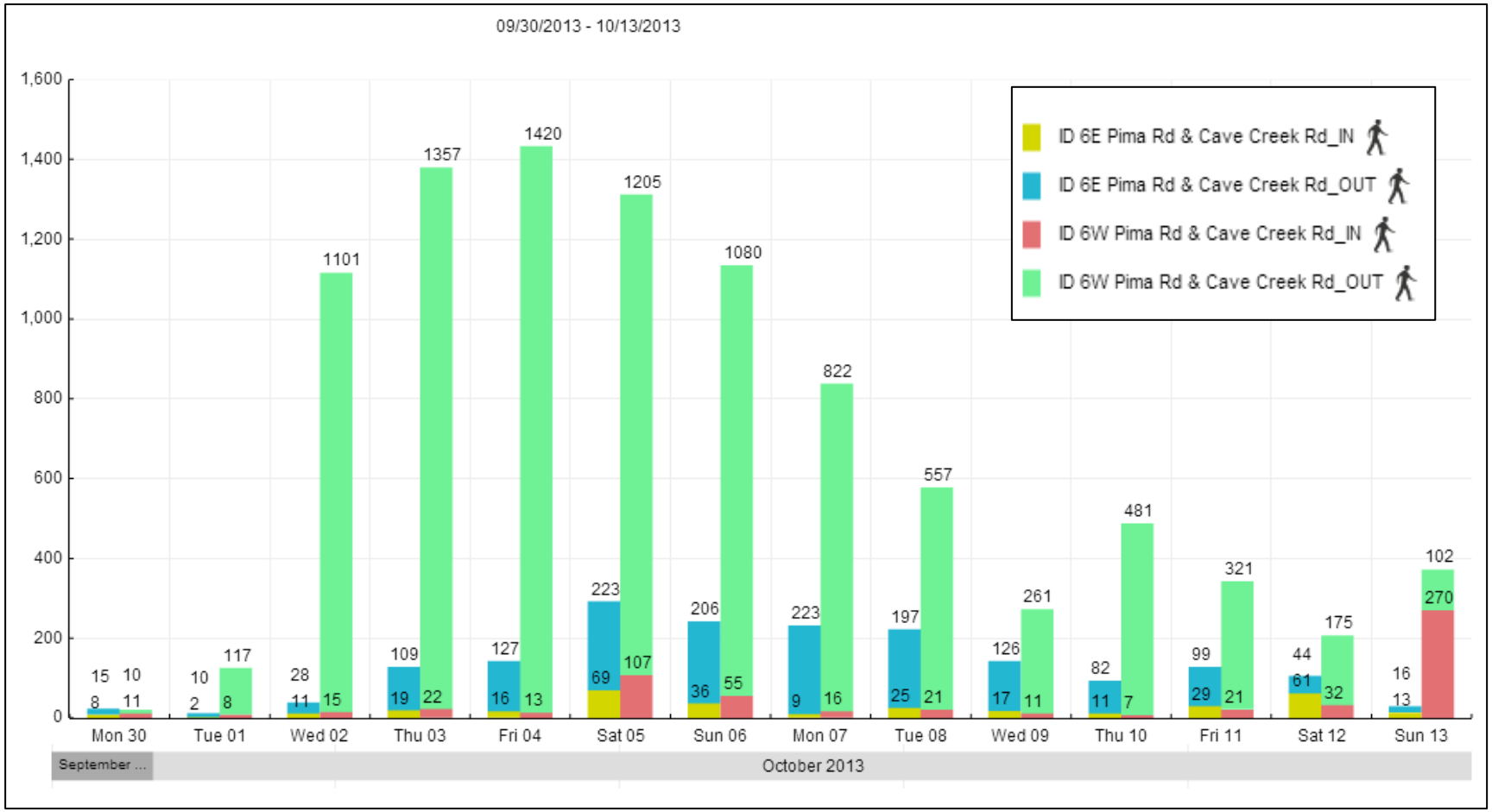
- Tuesday, 10/1
- Tuesday, 10/8
- Wednesday, 10/9
- Thursday, 10/10

Tuesday, 10/1 was excluded due to the relatively high volumes recorded along the south side of Northern Road, in both the eastbound and westbound directions of travel. Tuesday through Thursday (10/8 to 10/10) were excluded due to the low volumes along the north side of Northern Road in both the westbound and eastbound directions.

Chart 2-2 provides an example of one count station where the data set was thrown out in its entirety due to potentially unreliable results. The counts jumped from 125 southbound cyclists on Tuesday, October 1st (177 going against the direction of travel, and 8 going with the direction of travel) to 1,116 cyclists the following day on Wednesday October 2nd. The overall lack of consistency over the fourteen day data collection period at this count station led the project team to throw out the data as invalid.

Appendix B documents, for each automated count station, the days that were excluded from analysis (first and last day in all cases), count stations where the data was determined to be too irregular to be reported, and other days which were deemed as missing data and estimated using the median count values calculated using valid data collection days.

Chart 2-2: Daily North-South Bicycle Counts along Pima Road south of the Intersection of Pima Road and Cave Creek Road (Count Site ID 6)



Source: Chen Ryan Associates, May 2014

2.2 Estimating Excluded Volumes

The median daily bicycle volume was calculated for days when the machine count was determined to be invalid. The median volume was calculated using all valid days of counts for each respective count station. A total of 444 valid data collection days remained across the 37 count station, after excluding the seven sites which were completely dismissed, as well as the first and last count day from each count station. Moderate anomalies and outliers were identified for each of the count stations. In total, count estimates were developed for 67 of the 444 days, or 15% of total data collection days across the 37 count stations.

Table 2-1 shows the original bicycle count data collected along Northern Road at Site ID 73 (see Chart 2-1), the data collection days that were excluded indicated by shaded rows, and the median bicycle count value used to replace the excluded days of data.

Table 2-1: Example of Original Machine Recorded Bicycle Count Data and the Median Bicycle Count Values Used to Replace Invalid Data (Site ID 73)

Date	ID 73N IN (westbound)	ID 73N OUT (eastbound)	ID 73S IN (eastbound)	ID 73S OUT (westbound)
Tue, Oct 1, 2013[1]	24	12	256	149
Wed, Oct 2, 2013	80	58	58	39
Thu, Oct 3, 2013	69	46	46	30
Fri, Oct 4, 2013	93	54	54	50
Sat, Oct 5, 2013	77	60	60	34
Sun, Oct 6, 2013	53	48	48	26
Mon, Oct 7, 2013	57	40	40	55
Tue, Oct 8, 2013	17	13	51	48
Wed, Oct 9, 2013	0	0	45	50
Thu, Oct 10, 2013	17	21	46	46
Fri, Oct 11, 2013	64	71	70	55
Sat, Oct 12, 2013	60	52	48	39
Median Bicycle Count Value[2]	**66.5**	**53**	**49.5**	**39**

Source: Chen Ryan Associates, May 2014

Notes:

1. Shaded rows reflect data collection days deemed invalid and replaced with the median bicycle count value, which was calculated using all valid data collection days for this count station.
2. The median bicycle count value is calculated using only data collection days that were deemed valid and not excluded, which includes Wednesday, October 2nd through Monday, October 7th; Friday, October 11th and Saturday, October 12th.

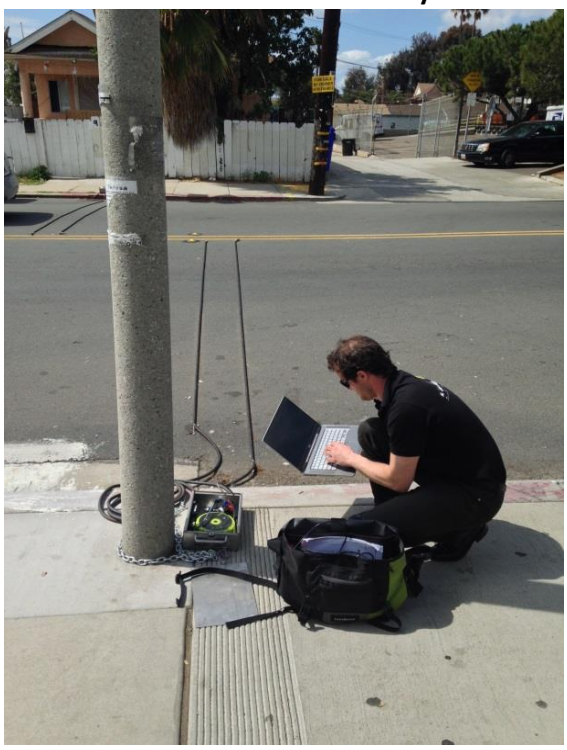
In addition to listing the days when machine counts were excluded due to unreliability, Appendix B also shows the median daily bicycle count value used to replace the invalid data.

2.3 Developing and Applying Sidewalk Factors

Casual observation indicates that a large number of cyclists in the MAG region ride along the sidewalk rather than along travel lanes or bike lanes. The project team therefore collected sidewalk cycling counts during the peak period manual counts to support the development of a "sidewalk cycling factor" which could then be applied to the automated bicycle count data where sidewalk cycling information was not collected.

The automated counters were generally installed stretching from the curb and gutter out into the vehicle travel lane or bike lane. This installation allows for cyclists riding along bike lanes, bike routes, and travel lanes with no bicycle facility to be counted, however, the tubes typically do not extend across sidewalks.

Image 2-1:
Installation of Pneumatic Tube Bicycle Counter in the Roadway



Source: *Chen Ryan Associates, 2014*

Image 2-1 displays a typical installation of the pneumatic tubes and count logger, and illustrates how the equipment is situated along the roadway rather than the sidewalk.

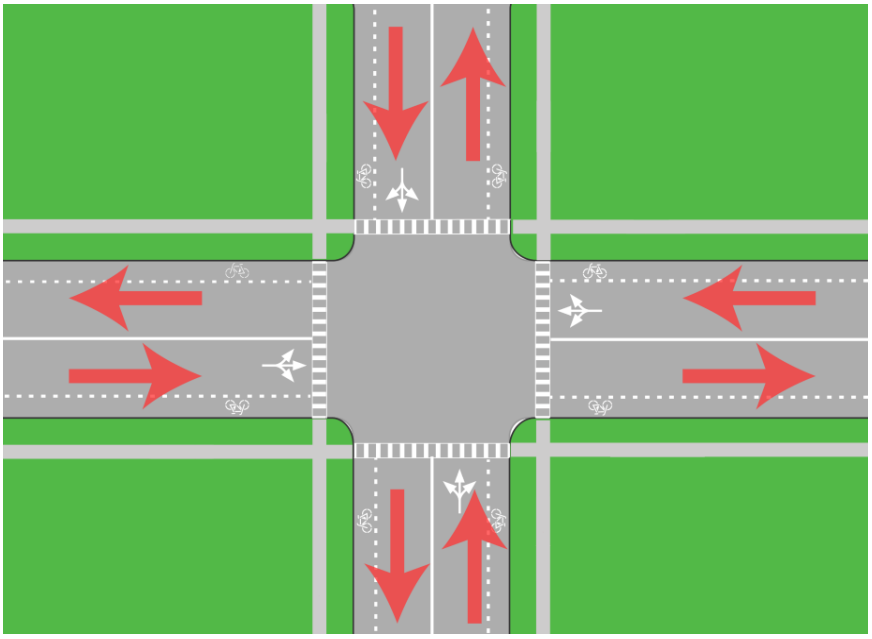
Sidewalk factors were developed using the manual peak period counts by measuring the number of cyclists observed riding on the sidewalk relative to those riding in the travel lane or bike lane. Rates of sidewalk cycling at each of the 84 manual count locations were calculated for the approach and departure movements along each intersection leg (eight possible movements at a typical 4-legged intersection).

Sidewalk factors were then applied to the count data collected from the automated count stations to account for the fact that the automated equipment does not capture sidewalk cycling. Sidewalk factors were not applied to automated count sites located on separated bike paths, locations without sidewalks, or to the two specific locations where the tubes were purposefully placed along the sidewalks (Site ID 73 and 74).

Image 2-2 illustrates the eight directions of travel for which manual peak period bicycle counts were collected and sidewalk cycling rates subsequently were assessed.

Rather than apply a single sidewalk cycling factor to all roadway types, the project team wanted to first understand the variation of sidewalk cycling rates across three roadway characteristics: 1) number of travel lanes, 2) presence of bike lane, and 3) presence of right-turn-only lane. These characteristics have been shown to influence the level of comfort cyclists experience along a roadway environment and therefore the decision to ride along the roadway or the sidewalk.

Image 2-2: Eight Movements for which Sidewalk Cycling Rates were Calculated



Source: *Chen Ryan Associates, 2014*

Each travel direction of each intersection leg was classified by number of travel lanes, presence of bike lane, and presence of a right-turn-only lane. Locations without a sidewalk, locations along off-street paths, and locations where the tubes were placed across the sidewalks (Sites ID 73 and 74) were excluded from this analysis.

The three roadway characteristics used to group roadways resulted in 12 roadway type categories. Each direction of travel for each intersection leg was grouped into one of these roadway type categories. A cumulative percentage of sidewalk cycling was then calculated for each roadway type category. **Tables 2-2** shows the resulting 12 roadway types, their respective number of sidewalk bicycle trips, total bicycle counts, and sidewalk cycling rate.

Despite some minor fluctuations, the findings generally support the assumption that sidewalk cycling rates are higher at locations *without* bicycle lanes and *with* right-turn-only lanes. As shown in the tables, sidewalk cycling rates range from a low of 29.7% of total cyclists at count sites along 2-lane roadways, with bike lanes and no right-turn-only lane, to a high of 94.0% of total cyclists along 6-lane roadways without bike lanes and with right-turn-only lanes.

These results support the expectation that a large portion of cyclists will choose to ride along the sidewalk when traveling in an environment characterized by high speed/high volume traffic and no supporting bicycle infrastructure. For the purposes of this report, the project team recommends using the more conservative sidewalk cycling rates associated with 2-lane roadways.

Table 2-2: Sidewalk Factors – 12 Roadway Types

Roadway Type ID Number	With Bike Lane	With Right Turn Only Lane	Number of Manual Count Stations	Sidewalk Bike Trips	Total Bike Trips	Sidewalk Cycling Percentage
2-Lane Roadway Sidewalk Factors						
1	No	No	52	123	388	**31.7%**
2	No	Yes	11	11	20	**55.0%**
3	Yes	No	53	199	669	**29.7%**
4	Yes	Yes	12	89	248	**35.9%**
4-Lane Roadway Sidewalk Factors						
5	No	No	89	460	514	**89.5%**
6	No	Yes	36	254	287	**88.5%**
7	Yes	No	59	247	437	**56.5%**
8	Yes	Yes	35	297	415	**71.6%**
6-Lane Roadway Sidewalk Factors						
9	No	No	71	662	738	**89.7%**
10	No	Yes	41	361	384	**94.0%**
11	Yes	No	41	128	272	**47.1%**
12	Yes	Yes	25	32	97	**33.0%**

Source: Chen Ryan Associates, May 2014

The automated count sites were then assigned a roadway category (by presence of bike lane and right-turn-only lane), and the appropriate sidewalk factor from Table 2-2 (for 2-lane roadways) was selected to be applied to the average daily bicycle volume to grow the machine-recorded counts in a manner that reflects the significant numbers of cyclists riding on sidewalks in Maricopa County.

Table 2-3 displays the automated bike count station and the sidewalk cycling factor applied to each station. Sidewalk factors may vary by direction at a station due to differing roadway characteristics.

Table 2-3: Sidewalk Cycling Factors Applied to Each Automated Count Site

Phase[1]	Site ID	Sidewalk Cycling Factor
Phase 1 Automated Count Stations *(Sept 30 – Oct 13)*	39	No sidewalk along roadway
	59	31.7%
	62	Bike Path
	63	29.7%
	64	Bike Path
	65	29.7% (SB only)
	66	29.7%
	69	29.7%
	73	Tubes on sidewalk[2]
	74	Tubes on sidewalk[2]
	98	29.7%
Phase 2 Automated Count Station *(Oct 14 – Oct 27)*	10	35.9% (NB), 29.7% (SB)
	61	29.7% (EB)
	67	29.7%
	102	Bike Path
	104	35.9% (WB), 29.7% (EB)
	113	Bike Path
	119	Bike Path
Phase 3 Automated Count Station *(Oct 28 – Nov 10)*	13	Bike Path
	18	29.7%
	40	35.9% (NB), 29.7% (SB)
	41	29.7%
	42	29.7%
	43	29.7%
	46	29.7% (NB), 35.9% (SB)
	100	Bike Path
	115	Bike Path
Phase 4 Automated Count Station *(Nov 11 - Nov 24)*	1	29.7%
	16	31.7%
	24	29.7%
	25	Bike Path
	26	Bike Path
	35	No sidewalk along roadway
	54	29.7%
	55	No sidewalk along roadway
	58	Bike Path
	68	Bike Path

Source: *Chen Ryan Associates, May 2014*

Notes:

1) As outlined in Working Paper #3, about twenty-two automated counting units were installed in the field for about two weeks at eleven count stations (two units required for each station). After a two-week data collection period was completed, the counting units were moved to a next set of count stations. Four phases of data collection were necessary to collect data at all forty-four count stations.

2) Tubes were placed across the sidewalk since these count stations were along 6-lane roadways with no bike lane.

As shown in Table 2.3, in some instances, a sidewalk factor was not assigned to a count station due to lack of sidewalk along the roadway, a lack of sidewalk since the count station was a bike path, or the count tubes were purposefully placed across the sidewalks instead of in the roadway.

3.0 Estimating Daily Bicycle Volumes From Manual Peak Period Counts

This section outlines an approach to growing the two-hour peak period manual bicycle counts into estimated daily bicycle volumes using peak period percentages established from the continuous automated count data. Weekday and weekend peak period percentages were calculated from the automated count sites, and then applied to the peak period manual count stations.

Manual counts were conducted during the weeks of 9/30/2013 to 10/7/2013 at a total of 84 sites. Of the 84 manual count sites, 56 were performed during the weekday evening peak period occurring Tuesday to Friday from 4:00PM – 6:00PM, with the remaining 28 counts performed during the weekend peak period, Saturdays from 10:00AM – 12:00PM.

3.1 Calculating Weekday and Weekend Peak Period Percentages

Continuous automated bicycle counts were conducted at 44 sites across Maricopa County over four, 14-day data collection phases in October and November 2013. The average weekday peak period percentage of total daily bicycle travel was calculated using data collected from 37 of 44 automated count sites. The number of cyclists detected during each weekday peak period at each site was summed then divided by the total number of cyclists recorded on those weekdays. This approach was then replicated to calculate each individual automated count site's weekend peak period percentage. These calculations resulted in 37 weekend and weekday peak period percentages.

Table 3-1 summarizes summary statistics for peak period percentages for the weekday and weekend peak periods associated with the 37 automated count stations.

Table 3-1: Summary Statistics for Peak Period Percentages Calculated from Automated Count Stations

Summary Statistic	Weekday Peak Period (4PM-6PM) Percentage of Total Daily Bicycle Travel	Weekend Peak Period (10AM – 12noon) Percentage of Total Daily Bicycle Travel
Mean	16.8%	17.8%
Median	16.5%	16.1%
Minimum Value	9.6%	8.3%
Maximum Value	28.6%	33.3%

Source: *Chen Ryan Associates, May 2014*

Chart 3-1 displays the distribution of weekday peak period percentages for all 37 count locations. With the exception of two outliers, 25% and 29%, the remaining 35 locations all fall within +/- 6% of the mean value of 16.79%.

Chart 3-2 shows the distribution of weekend peak period percentages for all 37 count locations. Compared to the weekday percentages, the weekend distribution is more irregular, however the mean and median values, 17.80% and 16.12%, respectively, are very consistent with the weekday mean of 16.79% and median of 16.49%.

Chart 3-1: Distribution of Weekday (4PM-6PM) Peak Period Percentages

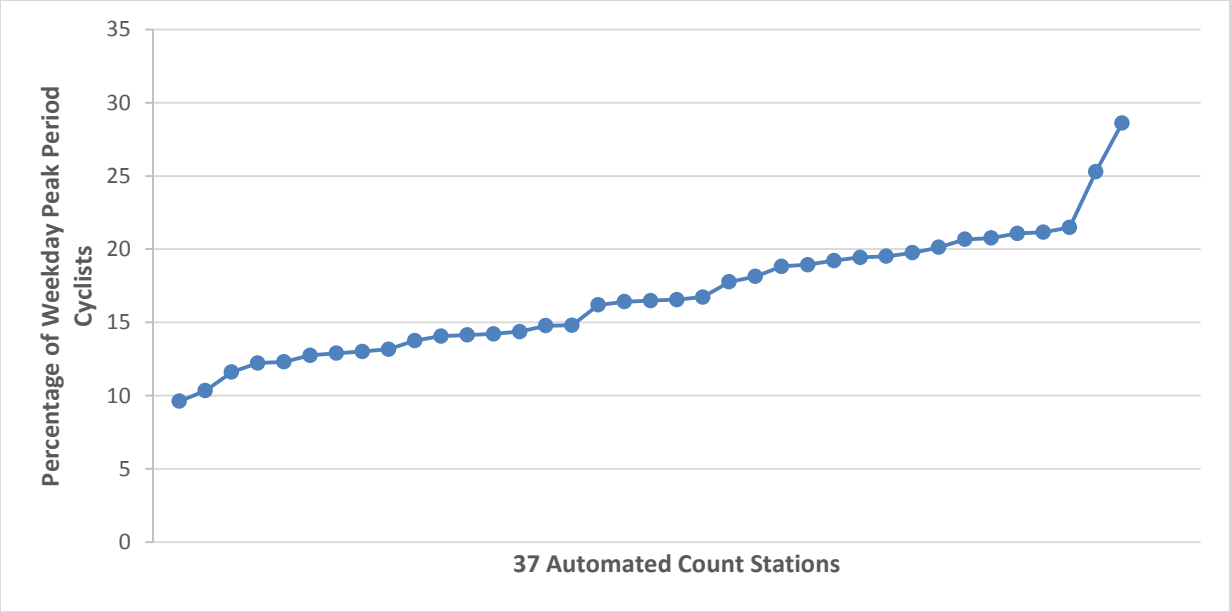
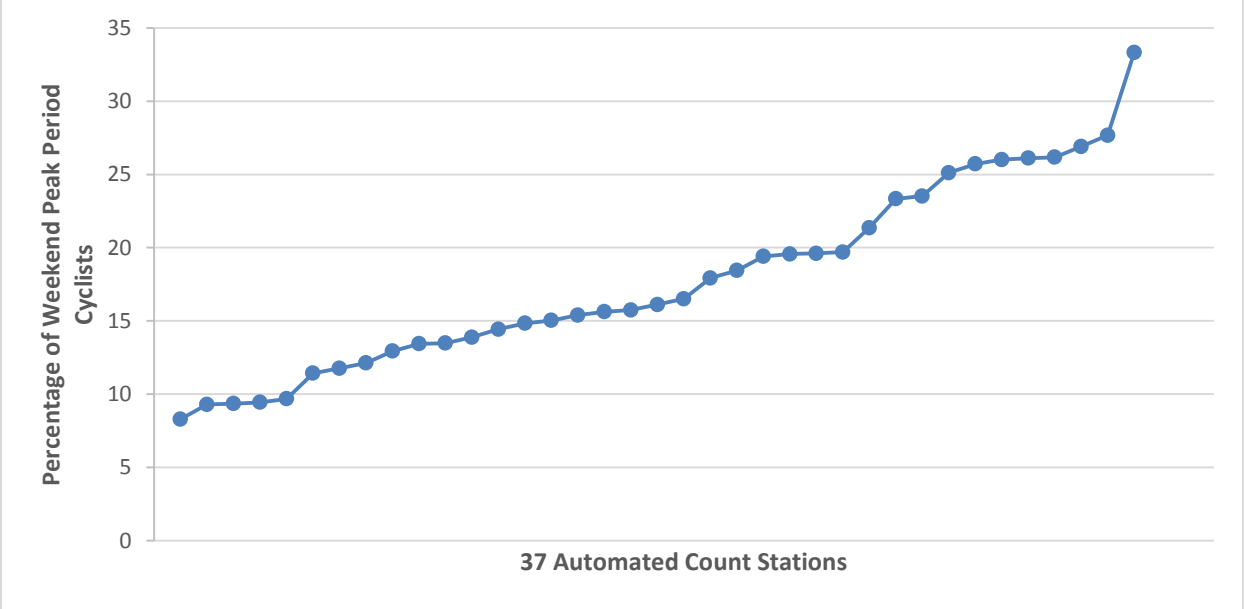


Chart 3-2: Distribution of Weekend (10AM – 12noon) Peak Period Percentages



Source: *Chen Ryan Associates, May 2014*

For comparison purposes, continuous automated bicycle count data collected over a six to twelve month period at 22 sites in San Diego County since February 2012 was assessed against the data from Maricopa County.

Table 3-2 compares the San Diego mean and median peak period percentages for weekdays and weekends with those observed in Maricopa County. Interestingly, the San Diego and Maricopa County weekday peak period percentages are very similar, with the mean and median for both regions falling between 16% and 17%. The weekend mean and median show slightly greater differences between Maricopa County and San Diego County, with 21.2% in San Diego and between 16% and 17% in Maricopa County. Overall, the San Diego to Maricopa County comparison helps to validate the peak period percentages identified in Maricopa County, and builds support for using them, along with peak period manual counts, to develop average daily weekday and weekend bicycle volumes.

Table 3-2: Comparing Regional Weekday and Weekend Peak Period Percentages (San Diego and Maricopa Counties)

	22 Sites in San Diego County	44 Sites in Maricopa County	Difference
Weekday Mean	16.5%	16.8%	0.3%
Weekday Median	16.2%	16.5%	0.3%
Weekend Mean	21.2%	17.8%	3.4%
Weekend Median	21.2%	16.1%	5.1%

Source: *Chen Ryan Associates, May 2014*

3.2 Developing and Applying a Daily Factor to the Peak Period Bicycle Counts

Daily bicycle count factors were derived from the automated count data, as described in Section 3.1, and applied to the manual peak period count using Equations 1 and 2, for the weekday and weekend peak periods, respectively. Solving for "x" in Equations 1 and 2 for each leg of each manual count station results in an average daily bicycle volume (ADB), for the weekday and weekend, respectively.

$$\textbf{\textit{Equation 1}}: \quad \frac{Weekday\ Manual\ Count\ Volume}{x} = \frac{16.8}{100}$$

$$\textbf{\textit{Equation 2}}: \quad \frac{Weekend\ Manual\ Count\ Volume}{x} = \frac{17.8}{100}$$

Table 3-3 displays the daily factor applied to each manual count station and the resulting daily bicycle volume estimate. There are a total of eight movements estimated reflecting the eight movements that were recorded during the peak period manual counts.

Table 3-3: Daily Factors Applied to Peak Period Manual Counts

Manual Count Station ID	Daily Factor	North Intersection Leg				East Intersection Leg				South Intersection Leg				West Intersection Leg			
		Going SB		Going NB		Going WB		Going EB		Going NB		Going SB		Going EB		Going WB	
		Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.
2	0.168	3	18	3	18	2	12	3	18	2	12	1	6	2	12	2	12
3	0.168	5	30	2	12	0	0	3	18	2	12	4	24	2	12	0	0
4	0.178	1	6	3	17	4	22	3	17	1	6	0	0	2	11	2	11
11	0.168	21	125	8	48	5	30	14	83	23	137	19	113	5	30	11	65
12	0.168	0	0	0	0	14	83	25	149	0	0	0	0	21	125	7	42
14	0.168	2	12	3	18	0	0	2	12	3	18	0	0	0	0	0	0
15	0.178	3	17	2	11	4	22	3	17	2	11	7	39	6	34	3	17
20	0.168	8	48	7	42	7	42	9	54	9	54	12	71	8	48	3	18
21	0.178	5	28	4	22	2	11	4	22	5	28	5	28	4	22	3	17
27	0.178	10	56	8	45	6	34	7	39	4	22	7	39	9	51	7	39
28	0.168	5	30	8	48	4	24	10	60	10	60	5	30	8	48	5	30
29	0.168	9	54	11	65	9	54	4	24	6	36	10	60	5	30	4	24
32	0.168	2	12	2	12	4	24	0	0	3	18	2	12	0	0	5	30
33	0.178	3	17	4	22	2	11	0	0	4	22	3	17	0	0	2	11
34	0.168	0	0	0	0	1	6	0	0	0	0	0	0	0	0	1	6
36	0.168	0	0	1	6	1	6	1	6	0	0	0	0	1	6	0	0
37	0.168	0	0	1	6	4	24	10	60	0	0	0	0	11	65	4	24
38	0.178	19	107	4	22	0	0	0	0	7	39	20	112	1	6	3	17
44	0.168	23	137	25	149	16	95	15	89	15	89	15	89	13	77	12	71
45	0.168	8	48	8	48	21	125	25	149	7	42	8	48	21	125	15	89
47	0.178	2	11	2	11	14	79	6	34	0	0	4	22	8	45	12	67
48	0.168	7	42	17	101	0	0	0	0	18	107	8	48	0	0	0	0
49	0.168	16	95	12	71	21	125	22	131	17	101	15	89	19	113	27	161
50	0.168	2	12	4	24	6	36	8	48	6	36	2	12	9	54	7	42
51	0.178	4	22	0	0	0	0	0	0	2	11	6	34	0	0	0	0
52	0.178	9	51	2	11	1	6	2	11	3	17	12	67	5	28	2	11
53	0.168	4	24	2	12	0	0	1	6	2	12	3	18	0	0	0	0
56	0.178	1	6	1	6	1	6	3	17	0	0	1	6	3	17	0	0
57	0.168	3	18	0	0	2	12	1	6	0	0	4	24	0	0	1	6
71	0.168	7	42	8	48	2	12	5	30	6	36	6	36	5	30	1	6
72	0.168	6	36	4	24	2	12	4	24	2	12	3	18	1	6	0	0

Table 3-3: Daily Factors Applied to Peak Period Manual Counts

Manual Count Station ID	Daily Factor	North Intersection Leg				East Intersection Leg				South Intersection Leg				West Intersection Leg			
		Going SB		Going NB		Going WB		Going EB		Going NB		Going SB		Going EB		Going WB	
		Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.
75	0.168	0	0	0	0	14	83	11	65	5	30	5	30	13	77	16	95
76	0.178	0	0	13	73	17	96	11	62	3	17	0	0	10	56	13	73
77	0.168	11	65	10	60	6	36	14	83	13	77	9	54	15	89	12	71
78	0.168	7	42	11	65	24	143	12	71	15	89	8	48	11	65	26	155
79	0.178	6	34	16	90	8	45	13	73	23	129	5	28	4	22	7	39
80	0.178	6	34	17	96	11	62	7	39	15	84	3	17	4	22	9	51
81	0.168	23	137	19	113	9	54	15	89	18	107	22	131	16	95	11	65
82	0.168	2	12	4	24	5	30	1	6	4	24	3	18	0	0	4	24
83	0.168	7	42	7	42	3	18	2	12	6	36	6	36	3	18	4	24
84	0.178	13	73	5	28	9	51	5	28	5	28	13	73	4	22	8	45
85	0.178	1	6	5	28	4	22	1	6	2	11	1	6	1	6	1	6
86	0.168	6	36	7	42	5	30	1	6	4	24	5	30	0	0	2	12
87	0.168	10	60	8	48	9	54	17	101	7	42	11	65	19	113	11	65
88	0.168	7	42	8	48	7	42	13	77	9	54	4	24	13	77	9	54
89	0.168	9	54	11	65	7	42	5	30	6	36	8	48	10	60	8	48
90	0.178	1	6	1	6	0	0	1	6	1	6	1	6	1	6	0	0
91	0.168	29	173	24	143	12	71	12	71	20	119	20	119	13	77	18	107
92	0.178	1	6	5	28	6	34	1	6	6	34	4	22	2	11	6	34
93	0.168	4	24	3	18	2	12	6	36	5	30	4	24	5	30	3	18
94	0.178	0	0	0	0	5	28	1	6	2	11	2	11	1	6	5	28
96	0.168	4	24	10	60	6	36	3	18	11	65	5	30	3	18	6	36
97	0.168	7	42	2	12	7	42	8	48	0	0	0	0	7	42	11	65
99	0.168	6	36	18	107	0	0	0	0	16	95	6	36	0	0	0	0
101	0.178	1	6	7	39	7	39	3	17	7	39	3	17	1	6	3	17
105	0.168	16	95	6	36	5	30	6	36	8	48	15	89	5	30	7	42
107	0.178	8	45	5	28	2	11	1	6	5	28	6	34	0	0	3	17
109	0.178	2	11	1	6	1	6	3	17	1	6	2	11	3	17	1	6
110	0.168	2	12	4	24	11	65	4	24	6	36	9	54	2	12	4	24
112	0.178	23	129	55	309	24	135	20	112	63	354	38	213	18	101	15	84
114	0.168	50	298	52	310	206	1226	74	440	59	351	61	363	60	357	192	1143
116	0.178	17	96	27	152	52	292	22	124	30	169	24	135	23	129	52	292

Table 3-3: Daily Factors Applied to Peak Period Manual Counts

Manual Count Station ID	Daily Factor	North Intersection Leg				East Intersection Leg				South Intersection Leg				West Intersection Leg			
		Going SB		Going NB		Going WB		Going EB		Going NB		Going SB		Going EB		Going WB	
		Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.	Peak Count	Daily Est.
117	0.168	27	161	25	149	16	95	32	190	24	143	22	131	24	143	18	107
118	0.168	6	36	3	18	3	18	6	36	5	30	4	24	6	36	5	30
120	0.168	0	0	0	0	0	0	0	0	2	12	0	0	1	6	2	12
121	0.178	1	6	0	0	4	22	3	17	3	17	3	17	4	22	6	34
123	0.168	1	6	1	6	0	0	0	0	1	6	0	0	0	0	1	6
124	0.168	10	60	15	89	1	6	0	0	16	95	9	54	1	6	1	6
126	0.168	3	18	0	0	0	0	0	0	0	0	2	12	0	0	0	0
127	0.168	0	0	0	0	0	0	1	6	0	0	0	0	1	6	0	0
128	0.178	3	17	2	11	0	0	0	0	2	11	3	17	0	0	0	0

Source: *Chen Ryan Associates, May 2014*

4.0 Bicycle Count Summaries

This section presents bicycle count data summaries after completion of the steps outlined in the preceding sections. Key data summaries include bicycle volumes by day of week and by hour of day. Daily and hourly bicycle counts are also summarized by facility type. The daily and hourly patterns inform trip purposes, in particular, utilitarian versus recreational cycling.

4.1 Bicycle Volumes by Day of Week

4.1.1 Automated Count Stations

Table 4-1 displays average daily weekday and weekend bicycle volumes for the automated count stations. The daily bicycle volumes are displayed for each direction of travel (east-west or north-south) and a sum of counts for both travel directions is provided. As mentioned in Section 2.1, automated count data for 7 count stations (Site IDs 6, 9, 17, 23, 60, 70, and 103) was eliminated due to irregularities in count data over the entire data collection period. **Figure 4-1** displays the 7 count stations where all data was determined to be invalid.

The lowest average weekday bicycle volume was associated with Site ID 39 along Gavilan Peak Parkway south of Pioneer Road in the unincorporated Maricopa County, with an average weekday daily bicycle volume of 28 cyclists. The maximum weekday volume was recorded at Site ID 1 along 107th Avenue south of Thomas Road in the City of Avondale, with approximately 488 average daily weekday cyclists.

The lowest average weekend daily volume was found at Site ID 35 along Camelback Road east of Litchfield Road in the City of Litchfield Park, with an average weekend daily volume of 19 cyclists. The highest average daily weekend volume was recorded at Site ID 119, along the Rio Salado Downstream Dam Bridge in the City of Tempe, with 859 average weekend daily cyclists.

The count station with the greatest difference between average daily weekday and weekend cyclists was found at Site ID 119, where on average, 379 more cyclists were recorded on weekends than weekdays. Conversely, the count station with the smallest difference between average daily weekday and weekend cyclists was Site ID 113 along the Western Canal Bike Path, west of Hardy Drive in the City of Tempe, with an average of only two more daily weekend cyclists than weekday cyclists.

Figure 4-1: Automated Count Sites Excluded Due to Invalid Data

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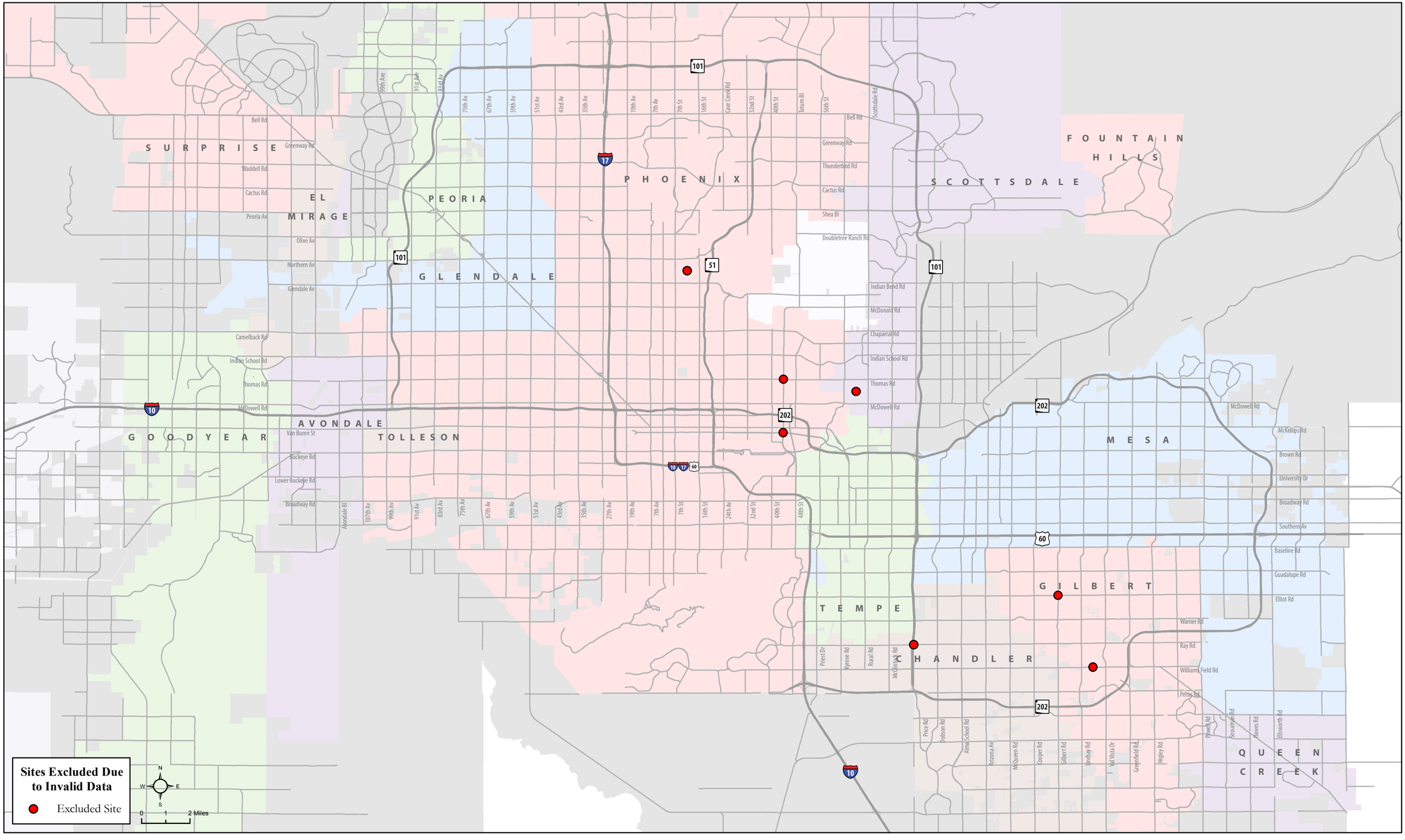

Table 4-1: Average Daily Bicycle Volumes Collected from the Automated Count Stations

Automated Count Station ID	Facility Type	Direction of Travel	Average Daily Bicycle Volume (Weekday)			Average Daily Bicycle Volume (Weekend)		
			NB / WB	SB / EB	Total	NB / WB	SB / EB	Total
1	Bike Lane	North-South	198	290	488	170	188	358
10	Bike Lane	North-South	80	55	136	73	72	145
13	Bike Path	East -West	94	86	179	148	153	301
16	No Facility	North-South	20	42	62	26	47	73
18	Bike Lane	East -West	35	78	113	40	124	165
24	No Facility	East -West	26	45	71	15	24	38
25	Bike Path	North-South	39	36	75	54	48	102
26	Bike Path	East -West	15	15	29	18	18	36
35	Bike Lane	East -West	12	24	36	6	13	19
39	Bike Lane	North-South	17	11	28	34	13	47
40	Bike Lane	North-South	161	82	242	90	57	147
41	Bike Lane	East -West	92	47	139	51	40	91
42	Bike Lane	East -West	41	135	176	26	71	97
43	Bike Lane	East -West	268	75	342	288	43	331
46	Bike Lane	North-South	71	84	155	47	77	124
54	Bike Lane	North-South	184	125	309	104	141	245
55	No Facility	East -West	56	22	78	11	16	27
58	Bike Path	North-South	112	115	227	96	106	203
59	No Facility	East -West	44	70	115	46	84	129
61	No Facility	East -West	n/a	40	40	n/a	29	29
63	Bike Lane	East -West	54	61	115	58	70	128
64	Bike Path	North-South	21	18	39	37	33	70
65	Bike Lane	North-South	20	29	50	11	15	26
66	Bike Lane	North-South	84	90	174	61	78	139
67	Bike Lane	North-South	56	62	117	52	54	106
68	Bike Path	East -West	21	19	40	13	8	21
69	Bike Path	East -West	64	41	105	66	32	99
73	No Facility	East -West	113	106	219	96	96	192
74	No Facility	East -West	124	147	271	110	131	241
98	Bike Lane	North-South	60	56	116	56	56	112
100	Bike Path	North-South	17	14	31	28	25	53
102	Bike Path	North-South	169	152	321	337	291	628
104	Bike Lane	East -West	84	62	146	105	66	170
113	Bike Path	East -West	44	43	87	43	45	89
115	Bike Path	East -West	151	171	323	260	258	518
119	Bike Path	North-South	223	257	480	422	437	859

Source: *Chen Ryan Associates, May 2014*

Table 4-2 summarizes average daily weekday and weekend automated count bicycle volumes by facility type. Categories of bicycle facility type include Bike Path, Bike Lane, or No Facility.

Table 4-2: Summary of Average Daily Weekday and Weekend Bicycle Volumes for Automated Count Sites by Facility Type

Site ID	Facility Type	Average Daily Weekday Volume	Average Daily Weekend Volume
13	Bike Path	179	301
25		75	102
26		29	36
58		227	203
64		39	70
68		40	21
69		105	99
100		31	53
102		321	628
113		87	89
115		323	518
119		480	859
1	Bike Lane	488	358
10		136	145
18		113	165
35		36	19
39		28	47
40		242	147
41		139	91
42		176	97
43		342	331
46		155	124
54		309	245
63		115	128
65		50	26
66		174	139
67		117	106
98		116	112
104		146	170
16	No Bike Facility	62	73
24		71	38
55		78	27
59		115	129
61		40	29
73		219	192
74		271	241

Source: *Chen Ryan Associates, May 2014*

The lowest average daily weekday bicycle volume recorded along Bike Paths was 29 cyclists at Site ID 26 (along the Thunderbird Paseo Canal Path, east of 51st Avenue in the City of Glendale), while the highest volume was 480 cyclists at Site ID 119, along the Rio Salado Downstream dam Bridge in the City of Tempe.

The lowest average daily weekend volume along Bike Paths was 21 cyclists at Site ID 68 along the Grand Canal Bike Path east of 39th Avenue in the City of Phoenix. The highest average daily weekend bicycle volume was at Site ID 119, along the Rio Salado Downstream Dam Bridge in the City of Tempe, with 859 average daily weekend cyclists.

The minimum average daily weekday volume along Bike Lanes was 28 cyclists at Site ID 39, along Gavilan Peak Parkway south of Pioneer Road in the unincorporated Maricopa County. The maximum average daily weekday bicycle volume was 488 cyclists at Site ID 1 (along 107th Avenue south of Thomas Road in the City of Avondale). The minimum average daily weekend bicycle volume along Bike Lanes was 19 cyclists at Site ID 35, along Camelback Road east of Litchfield Road in the City of Litchfield Park.

Automated count sites without bicycle facilities ranged from a minimum average daily weekday bicycle volume of 40 cyclists at Site ID 61 (along Jefferson Street west of 11th Avenue in the City of Phoenix), to a maximum of 271 cyclists at Site ID 74 (along Glendale Avenue west of 19th Avenue in the City of Phoenix).

Average daily weekend bicycle volumes at sites without bicycle facility varied from a minimum of 27 cyclists at Site ID 55 (along Happy Valley Parkway west of Agua Fria River in the City of Peoria), to a maximum of 241 cyclists at Site ID 74 (along Glendale Avenue west of 19th Avenue in the City of Phoenix).

Figure 4-2 displays the average daily weekday bicycle volumes, while **Figure 4-3** displays the average daily weekend bicycle volumes for both automated and manual count sites. Volumes are displayed for each location using graduated color line segments extending approximately one-mile from the count site unless the roadway ends.

Figure 4-2: Average Daily Weekday Bicycle Volumes for Automated and Manual Count Sites

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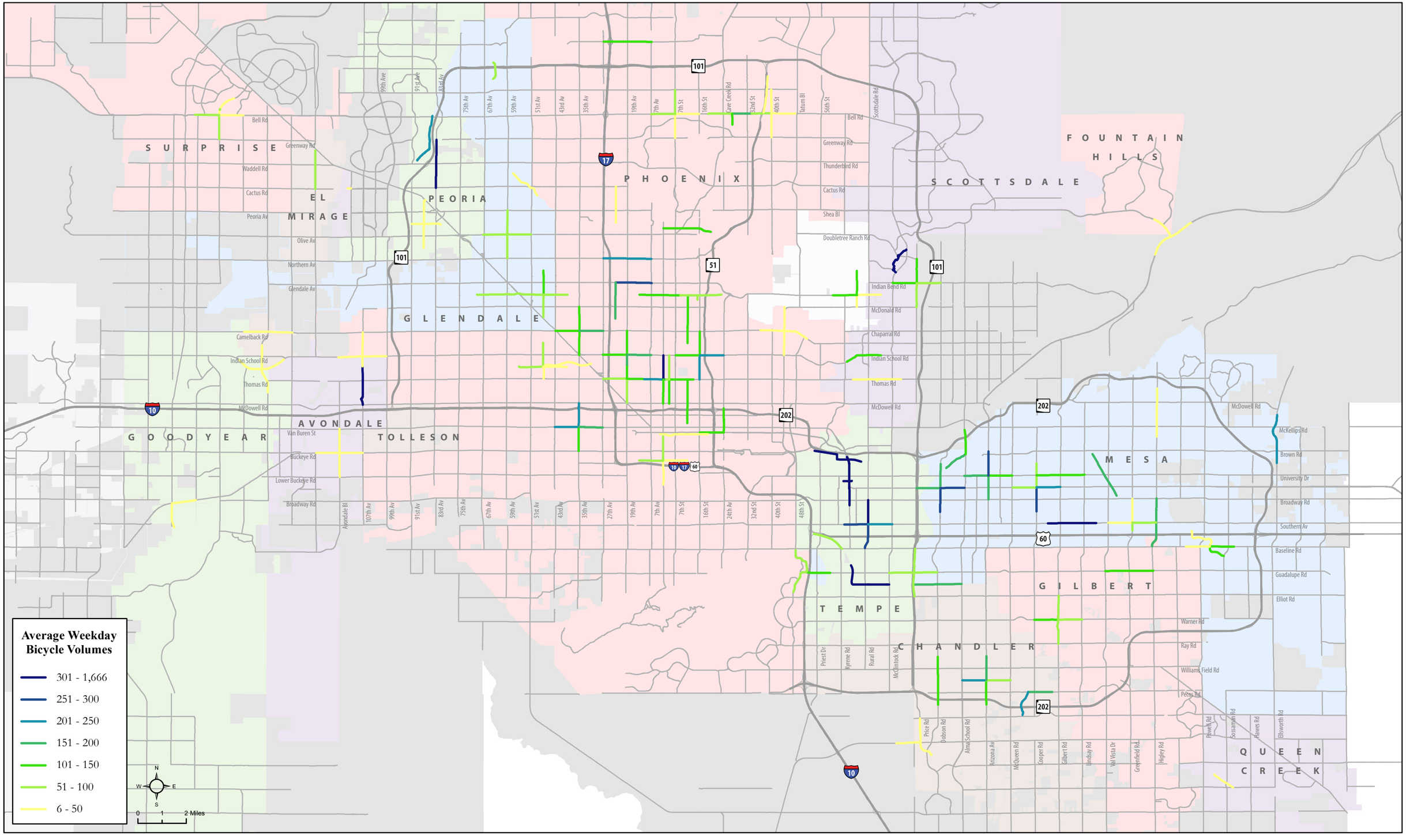
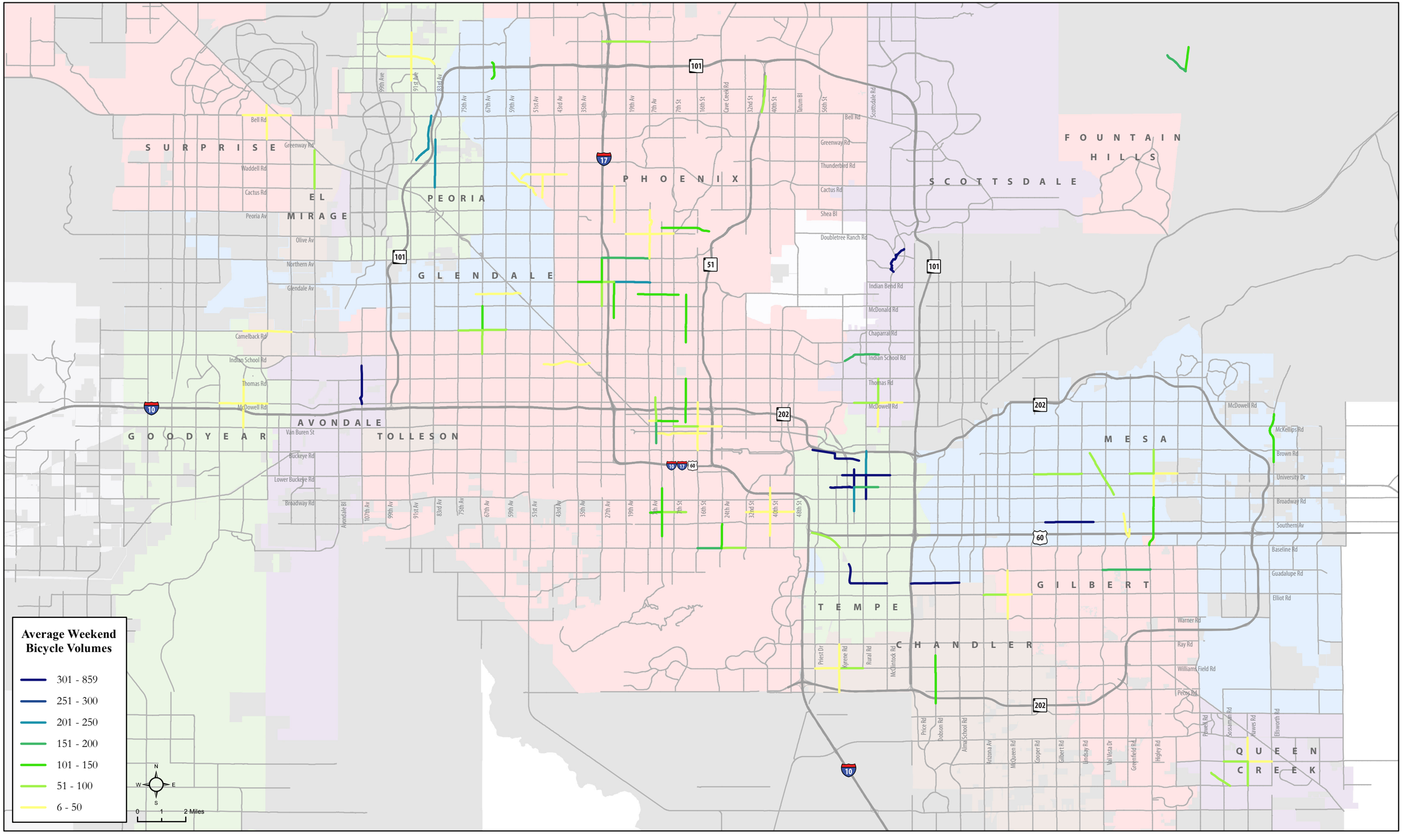


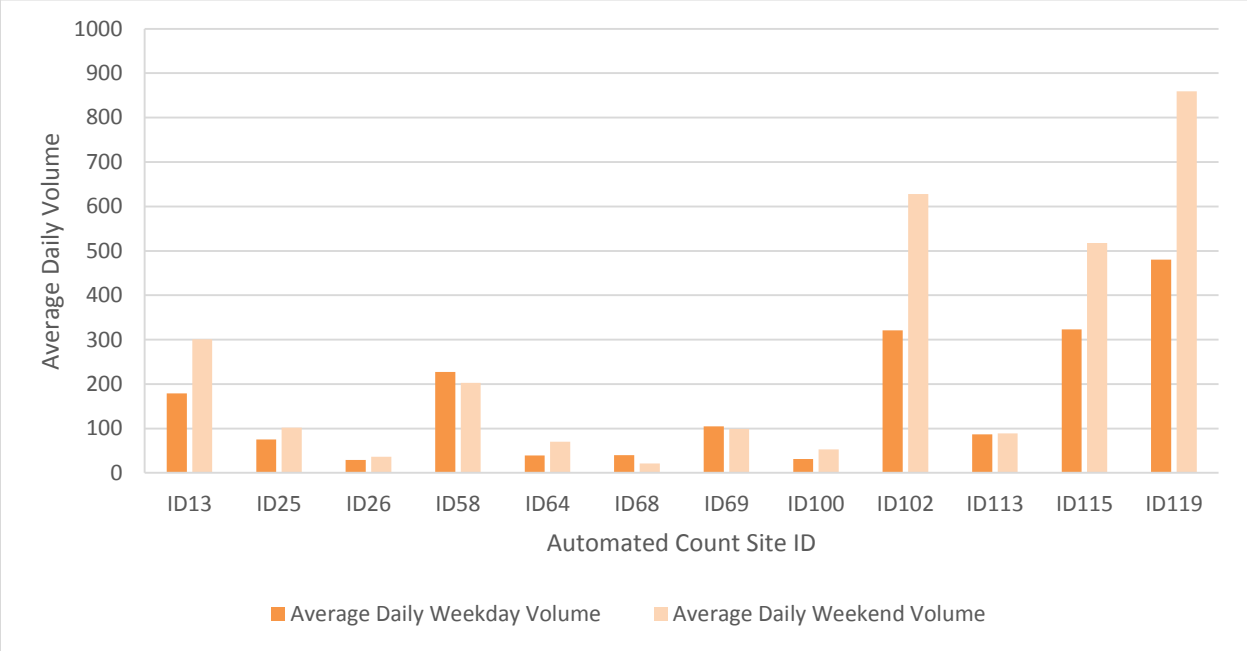
Figure 4-3: Average Daily Weekend Bicycle Volumes for Automated and Manual Count Sites

CHEN RYAN



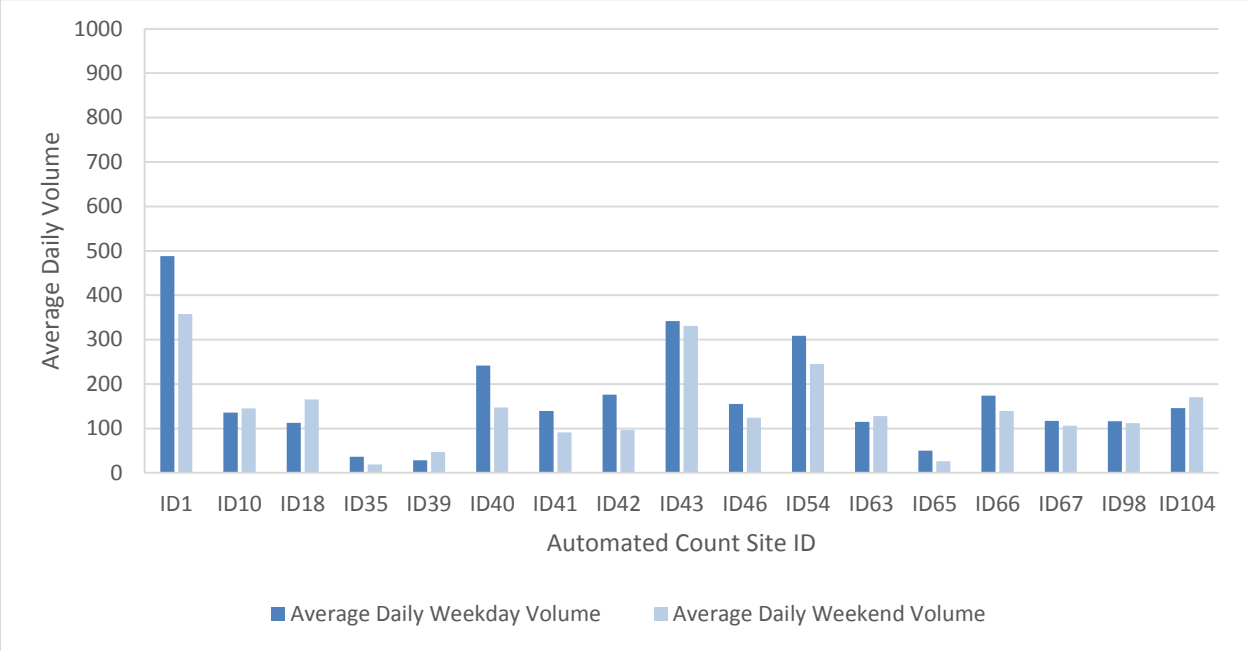
Charts 4-1 through **4-3** display average daily weekday and weekend bicycle volumes collected from the automated count stations by facility type for Bike Path, Bike Lane and No Facility sites, respectively.

Chart 4-1: Average Daily Bicycle Volumes for Weekdays & Weekends by Automated Count Sites along Bike Paths



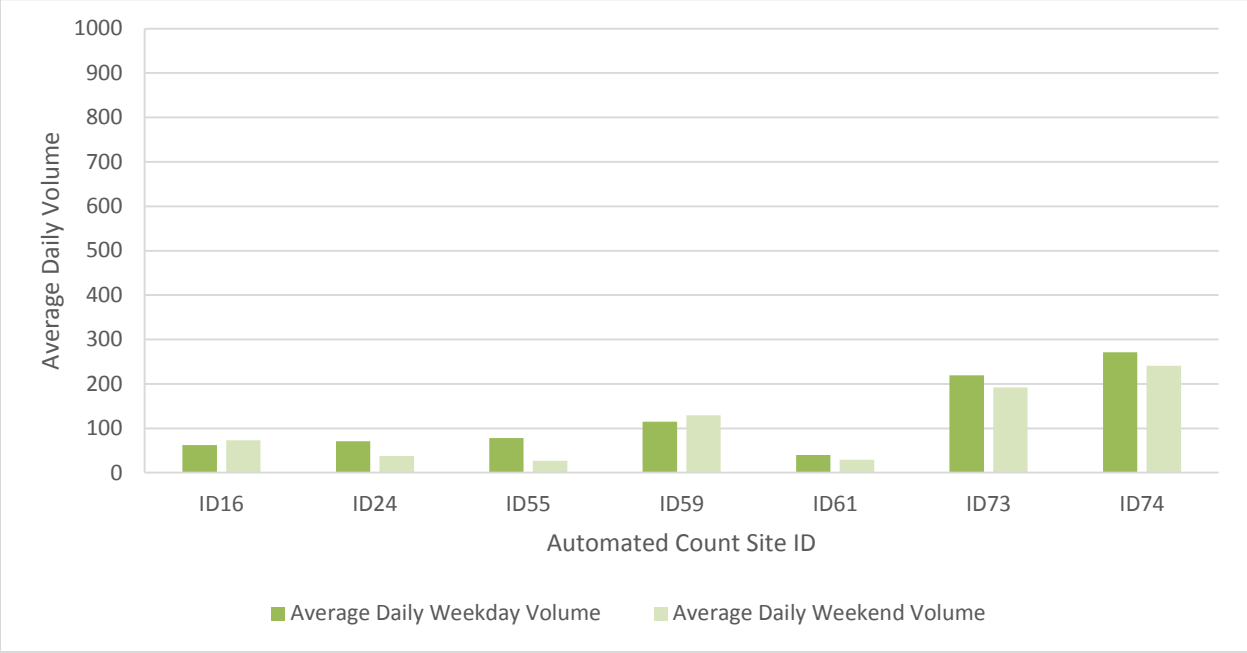
Source: *Chen Ryan Associates, May 2014*

Chart 4-2: Average Daily Bicycle Volumes for Weekdays & Weekends by Automated Count Sites along Bike Lanes



Source: *Chen Ryan Associates, May 2014*

Chart 4-3: Average Daily Bicycle Volumes for Weekdays & Weekends by Automated Count Sites without Bicycle Facility



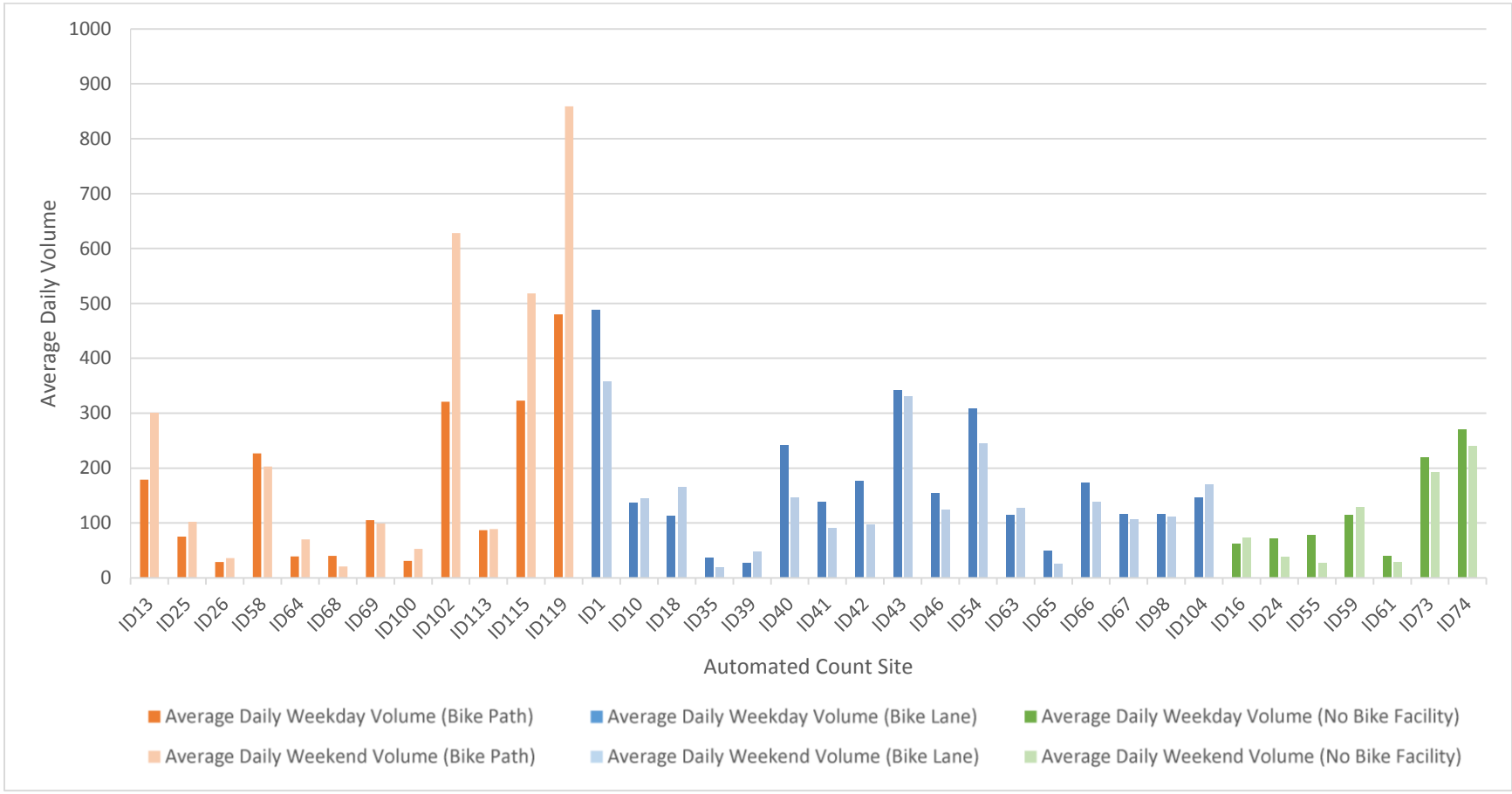
Source: *Chen Ryan Associates, May 2014*

As shown in Chart 4-1, in about eight of twelve total sites where counts were collected along bike paths, average daily *weekend* bicycle volumes were higher than average daily *weekday* bicycle volumes. Conversely, twelve of seventeen locations where automated counts were collected along bike lanes showed higher *weekday* versus *weekend* average daily bicycle volumes. For count stations with no facility locations, five of seven sites showed higher *weekday* versus *weekend* average daily bicycle volumes.

These findings reflect the fact that bike paths are used more frequently overall; and that for recreational cyclists, bike paths are the facility of choice since they offer a more comfortable environment for cycling. The findings also might indicate that utilitarian bicycle trips are more constrained in terms of facility type the cyclist uses, therefore bike lanes and roadways without facilities have higher rates of cycling on weekday, when the destination and route choice is less flexible.

Chart 4-4 provides a side-by-side comparison of average daily bicycle volumes for weekdays and weekends by facility type. Bike path volumes tend to be higher overall, followed by bicycle volumes on bike lanes, followed by roadways with no facility.

Chart 4-4: Average Daily Bicycle Volumes for Weekdays & Weekends by Facility Type



Source: *Chen Ryan Associates, May 2014*

4.1.2 Manual Counts

Table 4-3 displays estimated daily weekday bicycle volumes at manual count stations. These estimates were developed using the daily factors developed from the automated count data, as described in Section 3.2. **Table 4-4** displays estimated daily bicycle volumes at manual count stations for weekends.

As shown, estimated volumes are shown for each leg of the intersection. The volumes on each leg of the intersection were obtained by summing the two directions of travel along each intersection leg, or the approach/departure along each intersection leg. The total sum in the last column reflects the summation of all approaches/departures divided by two, to avoid counting double counting cyclists entering and exiting the intersection.

The estimated daily weekday volumes range from a minimum of 6 cyclists, observed at Site ID 34 (at the Cotton Lane & MC 85 intersection in the City of Goodyear), to a maximum of 2,244 cyclists at Site ID 114 (at the Mill Avenue and 10th Street intersection in the City of Tempe).

Estimated daily weekend volumes range from a minimum of 17 cyclists at site ID 90 (at the 40th Street and Roeser Road intersection in the City of Phoenix) to a maximum of 719 cyclists at Site ID 112 (at the College Avenue and Apache Boulevard intersection in the City of Tempe).

Table 4-3: Daily Weekday Bicycle Volume Estimates at Manual Count Stations

Manual Count Station ID	North Intersection Leg	South Intersection Leg	East Intersection Leg	West Intersection Leg	Total Daily Estimated Bicycle Volume at the Intersection
2	36	30	24	18	54
3	42	18	12	36	54
11	173	113	95	250	316
12	0	232	167	0	200
14	30	12	0	18	30
20	90	96	66	125	189
28	78	84	78	90	165
29	119	78	54	96	174
32	24	24	30	30	54
34	0	6	6	0	6
36	6	12	6	0	12
37	6	84	89	0	90
44	286	184	148	178	398
45	96	274	214	90	337
48	143	0	0	155	149
49	166	256	274	190	443
50	36	84	96	48	132
53	36	6	0	30	36
57	18	18	6	24	33
71	90	42	36	72	120
72	60	36	6	30	66
75	0	148	172	60	190
77	125	119	160	131	268
78	107	214	220	137	339
81	250	143	160	238	396
82	36	36	24	42	69
83	84	30	42	72	114
86	78	36	12	54	90
87	108	155	178	107	274
88	90	119	131	78	209
89	119	72	108	84	192
91	316	142	184	238	440
93	42	48	48	54	96
96	84	54	54	95	144
97	54	90	107	0	126
99	143	0	0	131	137
105	131	66	72	137	203
110	36	89	36	90	126
114	608	1666	1500	714	2244
117	310	285	250	274	560
118	54	54	66	54	114
120	0	0	18	12	15
123	12	0	6	6	12
124	149	6	12	149	158
126	18	0	0	12	15
127	0	6	6	0	6

Source: *Chen Ryan Associates, May 2014*

Table 4-4: Daily Weekend Bicycle Volume Estimates at Manual Count Stations

Manual Count Station ID	North Intersection Leg	South Intersection Leg	East Intersection Leg	West Intersection Leg	Total Daily Estimated Bicycle Volume at the Intersection
4	23	39	22	6	45
15	28	39	51	50	84
21	50	33	39	56	89
27	101	73	90	61	163
33	39	11	11	39	50
38	129	0	23	151	152
47	22	113	112	22	135
51	22	0	0	45	34
52	62	17	39	84	101
56	12	23	17	6	29
76	73	158	129	17	189
79	124	118	61	157	230
80	130	101	73	101	203
84	101	79	67	101	174
85	34	28	12	17	46
90	12	6	6	12	18
92	34	40	45	56	88
94	0	34	34	22	45
101	45	56	23	56	90
107	73	17	17	62	85
109	17	23	23	17	40
112	438	247	185	567	719
116	248	416	421	304	695
121	6	39	56	34	68
128	28	0	0	28	28

Source: *Chen Ryan Associates, May 2014*

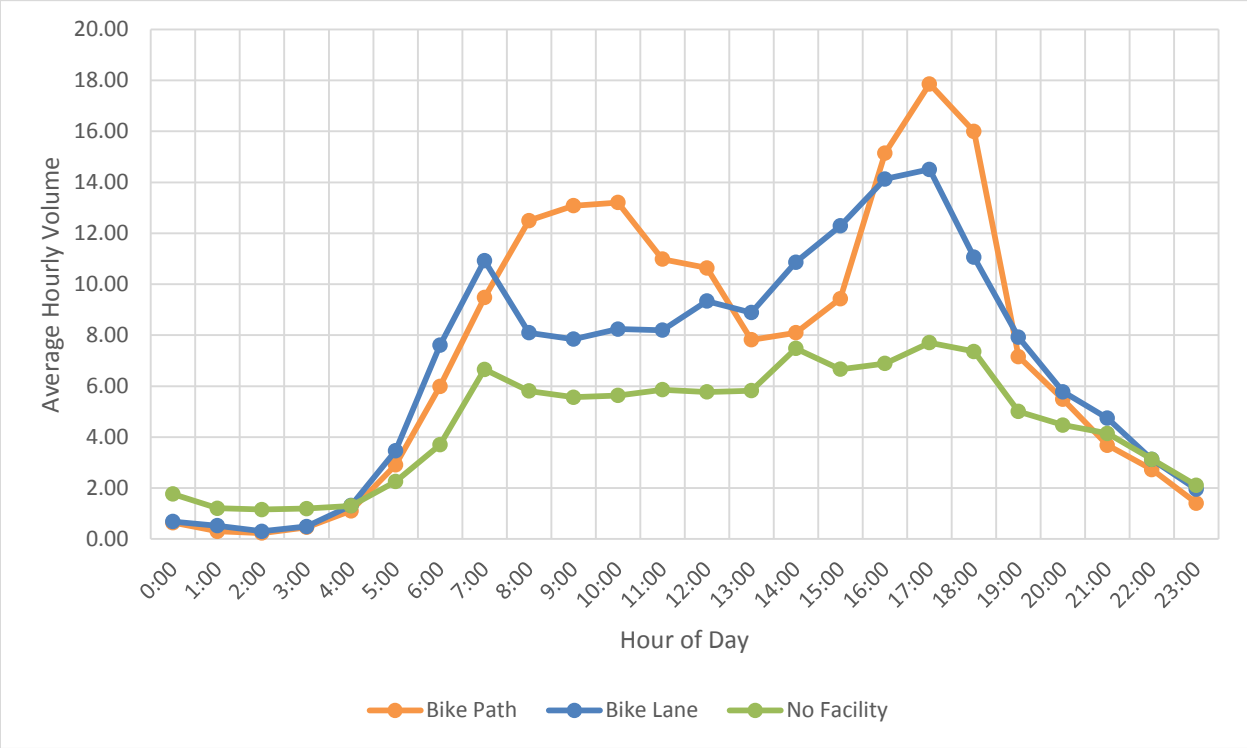
4.2 Using Temporal Patterns to Understand Bicycle Trip Purpose

Analyses of bicycle travel patterns by hour of day and day of week were performed to inform bicycle trip purpose. A broadly accepted concept underlying this analysis is that bicycle trips occurring during the AM and PM peak periods on weekdays are trips being made primarily for utilitarian purposes, such as work or school commute trips. Bicycle volumes observed on the weekends are more commonly associated with recreational trips.

4.2.1 Hour of Day Bicycle Travel

Chart 4-5 displays the average hourly weekday bicycle volumes by facility type for Bike Path, Bike Lane and No Facility as collected at automated count stations. Both morning and evening peaks are visible for each facility type. The two peaks are more prominent at count stations along Bike Paths and Bike Lanes as compared to roadways without bicycle facility, however peaking is still noticeable. Across each of the three facility types the highest average hourly weekday bicycle volume occurred between 5:00PM and 6PM, with 18 cyclists per hour.

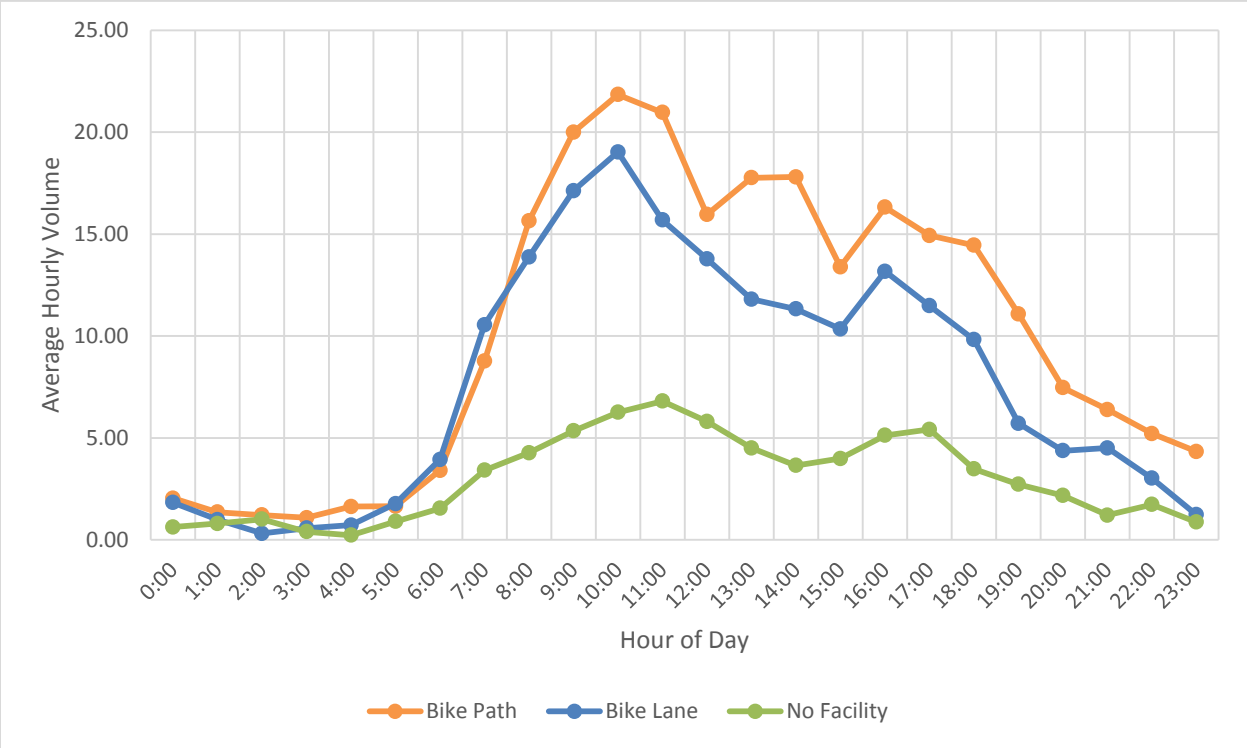
Chart 4-5: Average Hourly Weekday Bicycle Volumes by Facility Type



Source: *Chen Ryan Associates, May 2014*

Chart 4-6 displays the average hourly weekend bicycle volumes by facility type. A 10:00AM peak is visible for both Bike Paths and Bike Lanes, while roadways without bicycle facility experienced an 11:00AM weekend peak. An additional weekend peak also appears to occur along each of the three facility types around 4:00PM or 5:00PM.

Chart 4-6: Average Hourly Weekend Bicycle Volumes by Facility Type



Source: *Chen Ryan Associates, May 2014*

Appendix C contains charts displaying the average hourly weekend and weekday volumes for each individual automated count station.

4.2.2 Day of Week Bicycle Travel

Table 4-5 presents daily bicycle volumes for each day of the week for the automated count stations. The average daily bicycle volume by day of week ranged from a low of 155 on Wednesday to a high of 180 on Saturday. **Appendix D** displays charts of each site's average daily bicycle volume.

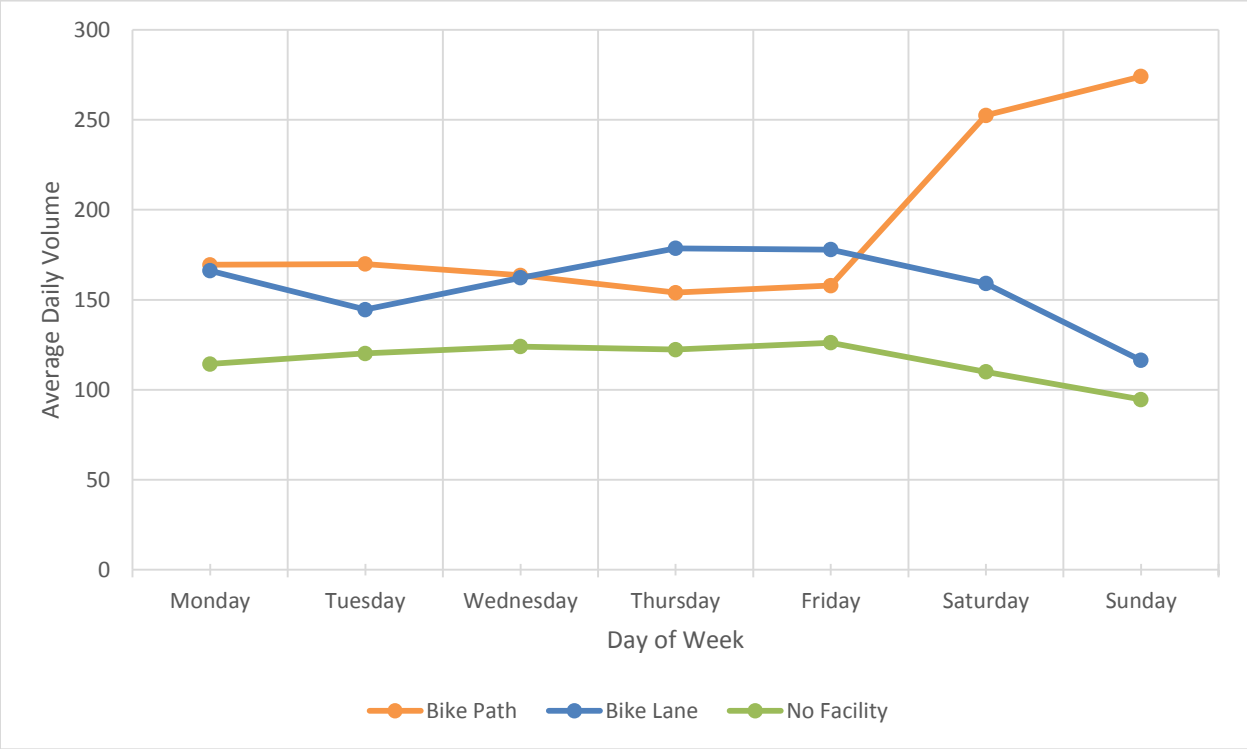
Chart 4-7 summarizes the automated count volumes by day of week by facility type to better understand trends in travel patterns along Bike Paths, Bike Lanes and roadways without bicycle facility. As shown, the highest activity day of the week for Bike Paths is Sunday, with over 274 average daily cyclists. The highest activity day of the week along Bike Lanes is Thursday, with 179 average daily cyclists (followed closely by Fridays at 178 average daily cyclists). For roadways without facilities, Fridays show the highest average daily cyclists, with 126 cyclists.

Table 4-5: Average Daily Bicycle Volumes by Day of Week (Automated Count Stations)

Phase	Site ID	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Phase 1 Sites	59	72	123	119	125	113	141	107
	39	29	39	19	28	24	49	43
	62	117	91	119	119	141	234	251
	63	108	136	110	98	117	117	148
	64	36	44	28	37	50	79	54
	65	42	55	51	44	52	32	15
	66	169	185	191	182	139	141	134
	69	225	69	90	92	110	98	100
	73	214	208	212	199	258	211	156
	74	236	264	264	285	287	242	239
	98	73	124	119	121	120	130	74
Phase 2 Sites	10	157	79	115	178	158	146	143
	61	37	41	39	34	46	29	30
	67	112	95	122	138	117	123	73
	102	331	329	301	318	332	615	655
	104	143	66	127	200	192	174	164
	113	72	103	98	67	84	94	79
	119	505	522	486	425	476	855	867
Phase 3 Sites	13	187	202	154	186	172	265	375
	18	159	87	105	112	124	142	209
	40	159	254	295	231	229	192	58
	41	114	123	159	167	117	110	54
	42	141	183	186	176	179	105	81
	43	376	255	365	391	341	357	277
	46	144	170	162	137	155	150	73
	100	54	30	27	24	32	54	52
	115	283	340	355	313	304	491	573
Phase 4 Sites	1	482	329	325	535	767	511	206
	16	73	44	86	66	48	72	74
	24	87	75	71	60	69	43	34
	25	92	80	85	81	48	104	99
	26	40	15	40	25	16	35	38
	35	40	31	33	50	30	25	13
	54	317	321	346	334	230	261	230
	55	81	86	77	87	62	32	22
	58	278	234	231	209	209	185	220
	68	38	48	39	43	30	18	25
Average		**157**	**148**	**155**	**160**	**161**	**180**	**163**

Source: *Chen Ryan Associates, May 2014*

Chart 4-7: Average Daily Bicycle Volumes by Day of Week and Facility Type



Source: *Chen Ryan Associates, May 2014*

4.2.3 Utilitarian and Recreational Trips

Based on the analyses throughout this section, there appears to be consistent use of all three facility categories, Bike Path, Bike Lanes, and roadways with No Facility, for both utilitarian and recreational trips. Each category displayed noticeable peaks in volumes during weekday mornings and evenings, potentially due to bicycle commuters going to and from work or school. Additionally, the 10:00AM weekend peak experienced by all sites is indicative of increased recreational bicycle trip making.

Generally, Bike Paths experienced greater average hourly volumes during weekdays and weekends than Bike Lanes or roadways without bike facility. This finding is potentially indicative of a general preference for Bike Paths for both utilitarian and recreational uses.

4.3 Sidewalk Cycling

Sidewalk cycling rates are a potential indicator of cyclist comfort or perception of cycling safety along a roadway. **Table 4-6** identifies the levels of sidewalk cycling observed at manual count stations for each individual intersection leg and an overall rate for the intersection. Manual count sites that that were located on separated bicycle facilities such as a Bike Path, or on a roadway without a sidewalk were not included in the table.

Table 4-6: Sidewalk Cycling Rates at Manual Count Stations by Intersection Leg and Intersection Total

Station ID	North Intersection Leg			South Intersection Leg			East Intersection Leg			West Intersection Leg			Total Intersection Sidewalk Cycling Rate
	Sidewalk Cyclists	Total Cyclists	Sidewalk %	Sidewalk Cyclists	Total Cyclists	Sidewalk %	Sidewalk Cyclists	Total Cyclists	Sidewalk %	Sidewalk Cyclists	Total Cyclists	Sidewalk %	
2	6	6	100%	3	3	100%	5	5	100%	4	4	100%	100%
3	1	7	14%	5	6	83%	3	3	100%	2	2	100%	61%
4	1	4	25%	1	1	100%	3	7	43%	3	4	75%	50%
11	24	29	83%	39	42	93%	16	19	84%	10	16	63%	84%
12							26	39	67%	15	28	54%	61%
14	1	5	20%	0	3	0%	1	2	50%	0	0	0%	20%
15	3	5	60%	6	9	67%	3	7	43%	4	9	44%	53%
20	14	15	93%	18	21	86%	11	16	69%	7	11	64%	79%
21	1	9	11%	3	10	30%	2	6	33%	3	7	43%	28%
27	18	18	100%	11	11	100%	13	13	100%	16	16	100%	100%
28	13	13	100%	15	15	100%	14	14	100%	13	13	100%	100%
29	11	20	55%	6	16	38%	8	13	62%	5	9	56%	52%
32	4	4	100%	5	5	100%	4	4	100%	5	5	100%	100%
33	1	7	14%	3	7	43%	0	2	0%	0	2	0%	22%
34	0	0	0%	0	0	0%	0	1	0%	0	1	0%	0%
36	0	1	0%	0	0	0%	0	2	0%	0	1	0%	0%
37	1	1	100%	0	0	0%	14	14	100%	15	15	100%	100%
38	6	23	26%	6	27	22%	0	0		0	4	0%	22%
44	37	48	77%	20	30	67%	17	31	55%	14	25	56%	66%
45	8	16	50%	12	15	80%	30	46	65%	21	36	58%	63%
47	2	4	50%	3	4	75%	4	20	20%	4	20	20%	27%
48	14	24	58%	7	26	27%	0	0		0	0		42%
49	22	28	79%	28	32	88%	32	43	74%	29	46	63%	74%
50	2	6	33%	4	8	50%	3	14	21%	6	16	38%	34%
51	1	4	25%	4	8	50%	0	0		0	0		42%
52	0	11	0%	2	15	13%	2	3	67%	4	7	57%	22%
53	0	6	0%	0	5	0%	0	1	0%				0%
56	2	2	100%	1	1	100%	4	4	100%	3	3	100%	100%
57	3	3	100%	4	4	100%	0	3	0%	0	1	0%	64%
71	15	15	100%	9	12	75%	7	7	100%	6	6	100%	93%
72	9	10	90%	5	5	100%	6	6	100%	1	1	100%	95%

Table 4-6: Sidewalk Cycling Rates at Manual Count Stations by Intersection Leg and Intersection Total

Station ID	North Intersection Leg			South Intersection Leg			East Intersection Leg			West Intersection Leg			Total Intersection Sidewalk Cycling Rate
	Sidewalk Cyclists	Total Cyclists	Sidewalk %	Sidewalk Cyclists	Total Cyclists	Sidewalk %	Sidewalk Cyclists	Total Cyclists	Sidewalk %	Sidewalk Cyclists	Total Cyclists	Sidewalk %	
75	0	0	0%	10	10	100%	25	25	100%	29	29	100%	100%
76	12	13	92%	3	3	100%	21	28	75%	19	23	83%	82%
77	19	21	90%	21	22	95%	20	20	100%	26	27	96%	96%
78	18	18	100%	23	23	100%	35	36	97%	36	37	97%	98%
79	10	22	45%	4	28	14%	7	21	33%	4	11	36%	30%
80	12	23	52%	10	18	56%	10	18	56%	10	13	77%	58%
81	42	42	100%	37	40	93%	24	24	100%	27	27	100%	98%
82	6	6	100%	7	7	100%	6	6	100%	4	4	100%	100%
83	14	14	100%	12	12	100%	5	5	100%	7	7	100%	100%
84	18	18	100%	18	18	100%	12	14	86%	9	12	75%	92%
85	6	6	100%	3	3	100%	5	5	100%	2	2	100%	100%
86	13	13	100%	9	9	100%	6	6	100%	2	2	100%	100%
87	18	18	100%	18	18	100%	26	26	100%	30	30	100%	100%
88	14	15	93%	12	13	92%	19	20	95%	21	22	95%	94%
89	19	20	95%	12	14	86%	11	12	92%	17	18	94%	92%
90	1	2	50%	1	2	50%	0	1	0%	1	1	100%	50%
91	53	53	100%	38	40	95%	23	24	96%	30	31	97%	97%
92	5	6	83%	10	10	100%	7	7	100%	6	8	75%	90%
93	5	7	71%	7	9	78%	8	8	100%	8	8	100%	88%
94				1	4	25%	3	6	50%	4	6	67%	50%
96	7	14	50%	11	16	69%	1	9	11%	2	9	22%	44%
97	3	9	33%				5	15	33%	6	18	33%	33%
99	23	24	96%	21	22	95%	0	0		0	0		96%
101	2	8	25%	5	10	50%	4	10	40%	0	4	0%	34%
105	20	22	91%	23	23	100%	11	11	100%	10	12	83%	94%
107	4	13	31%	5	11	45%	2	3	67%	2	3	67%	43%
109	3	3	100%	3	3	100%	4	4	100%	4	4	100%	100%
110	6	6	100%	14	15	93%	15	15	100%	5	6	83%	95%
112	19	78	24%	19	101	19%	17	44	39%	8	33	24%	25%
114	53	102	52%	69	120	58%	51	280	18%	24	252	10%	26%
116	42	44	95%	49	54	91%	70	74	95%	52	75	69%	86%

Table 4-6: Sidewalk Cycling Rates at Manual Count Stations by Intersection Leg and Intersection Total

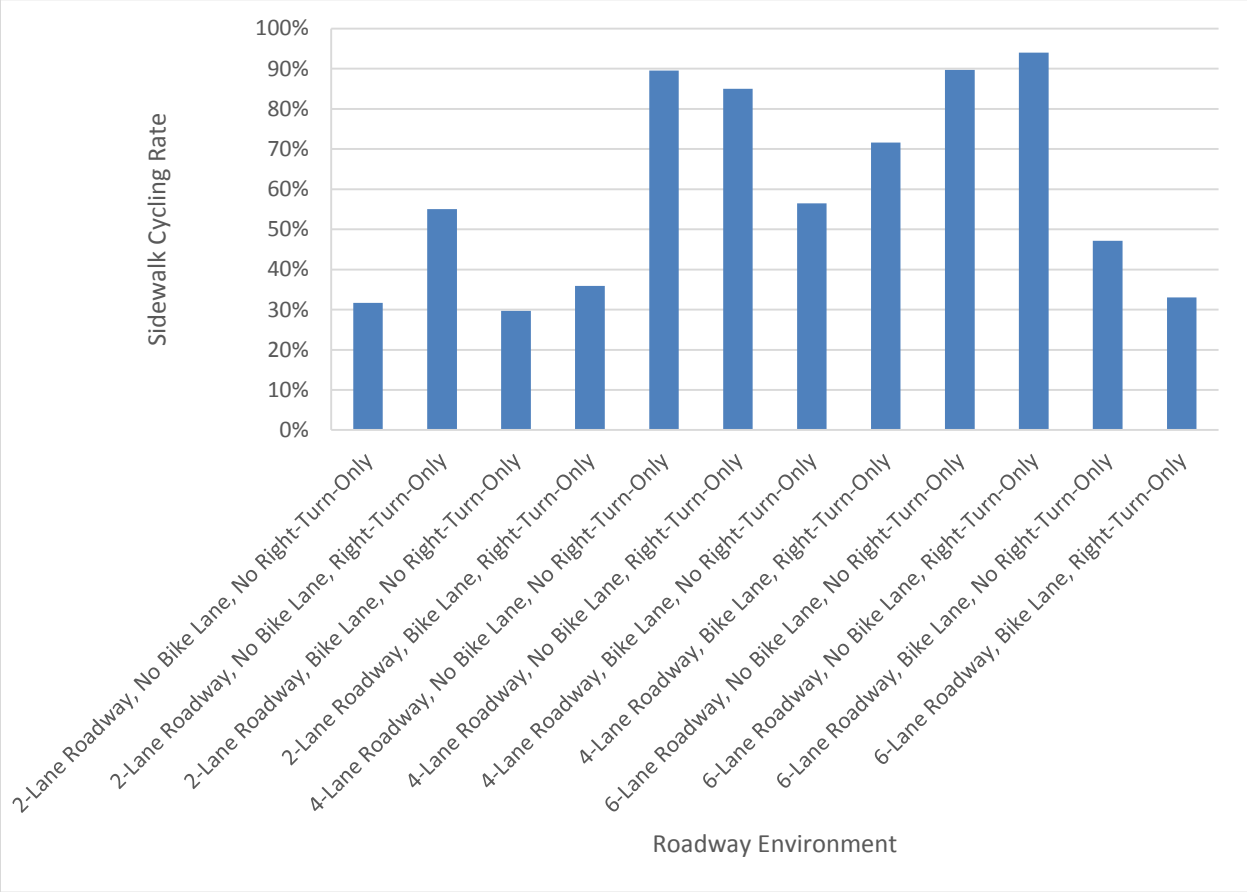
Station ID	North Intersection Leg			South Intersection Leg			East Intersection Leg			West Intersection Leg			Total Intersection Sidewalk Cycling Rate
	Sidewalk Cyclists	Total Cyclists	Sidewalk %	Sidewalk Cyclists	Total Cyclists	Sidewalk %	Sidewalk Cyclists	Total Cyclists	Sidewalk %	Sidewalk Cyclists	Total Cyclists	Sidewalk %	
117	52	52	100%	46	46	100%	41	48	85%	38	42	90%	94%
118	5	9	56%	4	9	44%	6	9	67%	9	11	82%	63%
120	0	0		2	2	100%	0	0	0%	2	3	67%	80%
121	0	1	0%	0	6	0%	1	7	14%	4	10	40%	21%
123	0	2	0%	0	1	0%	0	0		0	1	0%	0%
124	1	25	4%	2	25	8%	0	1	0%	0	2	0%	6%
126	3	3	100%	2	2	100%	0	0	0%	0	0	0%	100%
127	0	0	0%	0	0	0%	1	1	100%	1	1	100%	100%
128	4	5	80%	5	5	100%	0	0		0	0		90%

Source: *Chen Ryan Associates, May 2014*

Chart 4-8 displays the rates of sidewalk cycling associated with the twelve roadway types, as described in Section 2.3, which distinguishes intersection approaches by number of lanes, presence of a bike lane, and presence of a right-turn-only lane. The roadway environment showing the highest rate of sidewalk cycling (94.0%) was found along a 6-lane roadway without bike lanes and with a right-turn-only lane. Conversely, the lowest sidewalk cycling rate (29.7%) was found along a 2-lane roadway, with bike lanes and no right-turn-only lane.

As stated in Section 2.3, the results from the sidewalk cycling analysis support the expectation that a large portion of cyclists will choose to ride along the sidewalk when traveling in an environment characterized by high speed/high volume traffic and no supporting bicycle infrastructure.

Chart 4-8: Rates of Sidewalk Cycling by Roadway Environment



Source: *Chen Ryan Associates, May 2014*

4.4 Comparing Cycling in Maricopa County with other Regions

This section presents a brief comparison of cycling levels in Maricopa County with other cities or counties across the nation, including the City of Portland, the City of San Francisco, the City of Minneapolis and the County of San Diego. The intention of this section is to provide an order of magnitude understanding of how Maricopa County compares to other regions, some of which are considered cycling-prominent cities such as Portland and San Francisco.

Table 4.7 displays population density information and cycling level summaries for the five cities/counties. Total population, land area, population density, the three count sites with the highest average daily cycling volumes cited in various cycling count reports, and the three count sites with the lowest cycling volumes reported.

As shown, San Francisco has the highest population density at 25.74 persons per squares mile, and Maricopa County has the lowest population density, at 0.65 persons per square mile. Minneapolis reports the site with the highest average daily bicycle volume (7,370 cyclists), followed by Portland (4,105 cyclists), followed by Maricopa County (2,244 cyclists), then followed by San Francisco and San Diego at 1,365 cyclists and 754 cyclists, respectively.

These findings reflect the fact that Maricopa County, especially considering its population density, has noteworthy cycling levels that fall within the general order of magnitude of other major regions across the country.

Table 4-7: Comparing Maricopa County Average Daily Bicycle Volumes to Other US Regions

	Maricopa County	Minneapolis[1]	Portland[2]	San Diego[3]	San Francisco[4]
Population of Region or City[5]	3,817,117	382,578	583,776	3,095,313	805,235
Land Area of Region or City (sq. miles)	9,200.14	53.97	133.43	4,206.63	48.87
Population Density (persons/acre)	0.65	11.07	6.83	1.15	25.74
Three Sites with the Highest Average Daily Bicycle Volumes	**2,244** (Mill Ave & 10th St)	**7,370** (Washington Ave SE Bridge)	**4,105** (N Vancouver & Russell)	**754** (Harbor Drive Bike Path)	**1,365** (Market & Valencia)
	560 (Rural Rd & Southern Ave)	**4,330** (15th Ave, north of University)	**3,995** (Interstate/ Lloyd/ Oregon)	**599** (Coronado Bayshore Bkwy)	**1,337** (17th & Valencia)
	488 (107th Ave & Thomas Rd)	**4,110** (Midtown Greenway, west of Cedar Ave)	**3,600** (SE Harrison & Ladd)	**447** (Chula Vista Bayshore Bkwy)	**1,267** (5th & Market)
Three Sites with the Lowest Average Daily Bicycle Volumes	**6** (Cotton Lane & MC 85)	**170** (7th St N over I-94)	**45** (SW Hamilton & 45th)	**29** (Palm Ave, west of Sea Coast Dr)	**11** (San Bruno and Paul)
	6 (SR-85 & Martin Ave)	**260** (E 42nd St east of Minnehaha Ave)	**45** (N Willis & Woolsey)	**46** (Vista Village Dr, east of Indiana)	**12** (Ortega and 24th Ave)
	12 (7th St & Carefree Highway)	**260** (Glenwood Ave N west of Royalston)	**50** (SW Arnold & 35th)	**48** (30th Street, north of Upas St)	**30** (Sloat and 34th Ave)

Source: Chen Ryan Associates, May 2014

[1] Data obtained from the *2013 Minneapolis Bicyclists & Pedestrian Count Report*
[2] Data obtained from *2011 Portland Bicycle Counts Report*
[3] Data obtained from San Diego State University's Active Transportation Research (April, 2014)
[4] Data obtained from the *2013 SFMTA Bicycle Count Report*
[5] Data representative of 2010 U.S. Census

Appendix A
Automated and Manual Count Site Locations

Table A-1: Automated Count Stations by Local Jurisdiction

Count Site ID	Jurisdiction	Count Location	Count Direction	Intersection Leg
1	Avondale	107th Ave & Thomas Rd	NS	South
6	Carefree	Pima Rd & Cave Creek Rd	NS	North
10	Chandler	Dobson Rd & Frye Rd	NS	West
13	Chandler	Dobson Rd & Western Canal Bike Path	EW	West
9	Chandler	Price Rd & W Ray Rd	EW	North
16	El Mirage	El Mirage Rd & Thunderbird Rd	NS	West
23	Gilbert	Eastern Canal Trail & E Wiliams Field Rd	EW	North
17	Gilbert	Gilbert Rd & Elliott Rd	NS	North
18	Gilbert	Greenfield Rd & Guadalupe Rd	EW	East
26	Glendale	51st Ave & Thunderbird Paseo (Canal Path)	EW	South
24	Glendale	61st Ave & Maryland Ave	EW	East
25	Glendale	63rd Ave & Loop 101 Bike/Ped Bridge	NS	North
35	Litchfield Park	Litchfield Rd & Camelback Rd	EW	West
39	Maricopa County	Gavilan Peak Pkwy & Pioneer Rd	NS	West
43	Mesa	24th St & Southern Ave	EW	East
42	Mesa	Eastern Canal Bike Path & University Dr	EW	South
40	Mesa	Ellsworth Rd & McLellan Rd	NS	West
41	Mesa	Gilbert Rd & University Dr	EW	South
46	Mesa	Higley Rd & Southern Ave	NS	East
55	Peoria	115th Ave & Happy Valley Parkway	EW	South
54	Peoria	83rd Ave & Thunderbird Rd	NS	East
58	Peoria	New River Bike Path & Greenway Rd	NS	South
61	Phoenix	11th St & Jefferson St	EW	North
62	Phoenix	12th St & Arizona Canal Bike Path	EW	West
59	Phoenix	12th St & Hatcher Rd	EW	East
98	Phoenix	12th St & Missouri Ave	NS	South
67	Phoenix	12th St & McDowell Rd	NS	West
69	Phoenix	19th Ave & Deer Valley Rd	EW	South
74	Phoenix	19th Ave & Glendale Ave	EW	West
73	Phoenix	19th Ave & Northern Rd	EW	East
66	Phoenix	23rd Ave & Maryland Ave	NS	West
65	Phoenix	23rd Ave & Peoria Rd	NS	South
68	Phoenix	39th Ave & Grand Canal Bike Path	EW	South
60	Phoenix	44th St & Thomas Rd	NS	West
70	Phoenix	44th St & Washington St	EW	West

Table A-1: Automated Count Stations by Local Jurisdiction

Count Site ID	Jurisdiction	Count Location	Count Direction	Intersection Leg
64	Phoenix	Bike Path parallel to SR-51 & Union Hills Dr	NS	North
63	Phoenix	Central Ave & Maryland Ave	EW	West
100	Queen Creek	Sonoqui Wash Path & Chandler Heights Rd	NS	West
103	Scottsdale	68th St & Oak St	NS	South
102	Scottsdale	Indian Bend Wash Path north of McCormick Pkwy.	NS	North
104	Scottsdale	Scottsdale Road & Indian School Rd	EW	South
113	Tempe	Hardy Dr & Western Canal Bike Path	EW	North
119	Tempe	Rio Salado Downstream Dam Bridge	NS	East
115	Tempe	Rural Rd & Western Canal Bike Path	EW	West

Source: *Chen Ryan Associates, April 2014*

Table A-2: Manual Count Stations by Local Jurisdiction

Count Site ID	Jurisdiction	Count Location
121	Apache Junction	Winchester Rd & Old West Highway
3	Avondale	Avondale Blvd & Buckeye Rd
2	Avondale	107th Ave & Indian School Rd
4	Buckeye	7th St & Monroe Avenue
5	Carefree	N Tom Darlington Dr & E Cave Creek Rd
8	Cave Creek	N Cave Creek Rd & E New River Rd
7	Cave Creek	N Schoolhouse Rd & E Cave Creek Rd
11	Chandler	Arizona Ave & Frye Rd
12	Chandler	Chandler Paseo Trail & Pecos Rd
15	Chandler	Kyrene Rd & West Chandler Blvd
14	Chandler	Price Rd & Queen Creek Rd
126	Florence	Main Street & Butte Ave
125	Fort McDowell Yavapai Nation	El Pueblo Blvd & Grande Blvd
123	Fountain Hills	Beeline Highway & Shea Blvd
127	Gila Bend	SR-85 & Martin Ave
19	Gilbert	Consolidated Canal & Western Powerline
20	Gilbert	Gilbert Rd & Warner Rd
22	Gilbert	Greenfield Rd & Eastern Canal
21	Gilbert	McQueen Rd & Elliott
31	Glendale	47th Ave & Arizona Canal Bike Path
29	Glendale	47th Ave & Maryland Ave
27	Glendale	67th Ave & Camelback Rd
30	Glendale	83rd Ave & New River Bike Path
28	Glendale	59th Ave & Olive Ave
33	Goodyear	Bullard Ave & McDowell Rd
34	Goodyear	Cotton Lane & MC 85
32	Goodyear	Litchfield Road & Indian School Road
128	Maricopa	SR-347 & Union Pacific Railroad (South of W Maricopa-Casa Grande Hwy
37	Maricopa County	243rd Ave & Sun Valley Parkway
36	Maricopa County	7th St & Carefree Highway
38	Maricopa County	McDowell Mountain Rd & McDowell Mountain Park Dr
48	Mesa	Alma School Rd & Tempe Canal Bike Path
44	Mesa	Country Club Dr & University Dr
51	Mesa	Greenfield Rd & Eastern Canal 2
50	Mesa	Greenfield Rd & Southern Ave

Table A-2: Manual Count Stations by Local Jurisdiction

Count Site ID	Jurisdiction	Count Location
53	Mesa	Higley Rd & Hermosa Vista Dr
52	Mesa	Higley Rd & University Dr
49	Mesa	Dobson Rd & Main St
45	Mesa	Stapley Dr & Main St
47	Mesa	Superstition Springs Blvd & Baseline Rd
124	Paradise Valley	Mockingbird Lane & Lincoln Drive
57	Peoria	87th Ave & Mountain View Rd
56	Peoria	91st Ave & Lake Pleasant Pkwy (& adjacent path)
96	Phoenix	15th Ave & Maryland Ave
78	Phoenix	16th St & Indian School Rd
92	Phoenix	16th St & Van Buren St
87	Phoenix	19th Ave & Indian School Rd
89	Phoenix	19th Ave & Thomas Rd
79	Phoenix	24th St & Baseline Rd
99	Phoenix	24th St & Washington St
75	Phoenix	27th Ave & Bell Rd
84	Phoenix	27th Ave & Glendale Ave
77	Phoenix	35th Ave & Camelback Rd
81	Phoenix	35th Ave & Van Buren St
76	Phoenix	3rd Ave & Fillmore St
88	Phoenix	3rd Street &Thomas Rd
93	Phoenix	40th St & Bell Rd
90	Phoenix	40th St & Roeser Rd
82	Phoenix	44th St & Camelback Rd
71	Phoenix	47th Ave & Osborn Rd
94	Phoenix	47th Ave & Sweetwater Ave
97	Phoenix	48th St & Guadalupe Rd (S Pointe Pkwy & Guadalupe)
72	Phoenix	75th Ave & Thomas Rd
85	Phoenix	7th Ave & Dunlap Ave
83	Phoenix	7th St & Bell Rd
86	Phoenix	Central Ave & Mohave St
80	Phoenix	Central Ave & Roeser Rd
91	Phoenix	Central Ave & Thomas Rd
95	Phoenix	Northern Ave & Bike Path south of SR-51
101	Queen Creek	Hawes Rd & Ocotillo Rd

Table A-2: Manual Count Stations by Local Jurisdiction

Count Site ID	Jurisdiction	Count Location
122	Salt River Pima	Alma School Rd & McDowell
108	Scottsdale	Indian Bend Wash Path & Indian School Rd
107	Scottsdale	Miller Rd & McDowell Rd
105	Scottsdale	Pima Rd & Indian Bend Road
106	Scottsdale	Mountain View Rd & Via Linda
109	Surprise	Litchfield Rd & Bell Rd
110	Surprise	Reems Rd & Bell Rd
111	Surprise	Reems Rd & Grand Ave
112	Tempe	College Ave & Apache
114	Tempe	Mill Ave & 10th St
117	Tempe	Rural Rd & Southern
116	Tempe	Rural Rd & University Dr
118	Tempe	SR-101 & Guadalupe Rd
120	Youngtown	111 Ave & Youngtown Ave

Source: *Chen Ryan Associates, April 2014*

Appendix B
Data Exclusion

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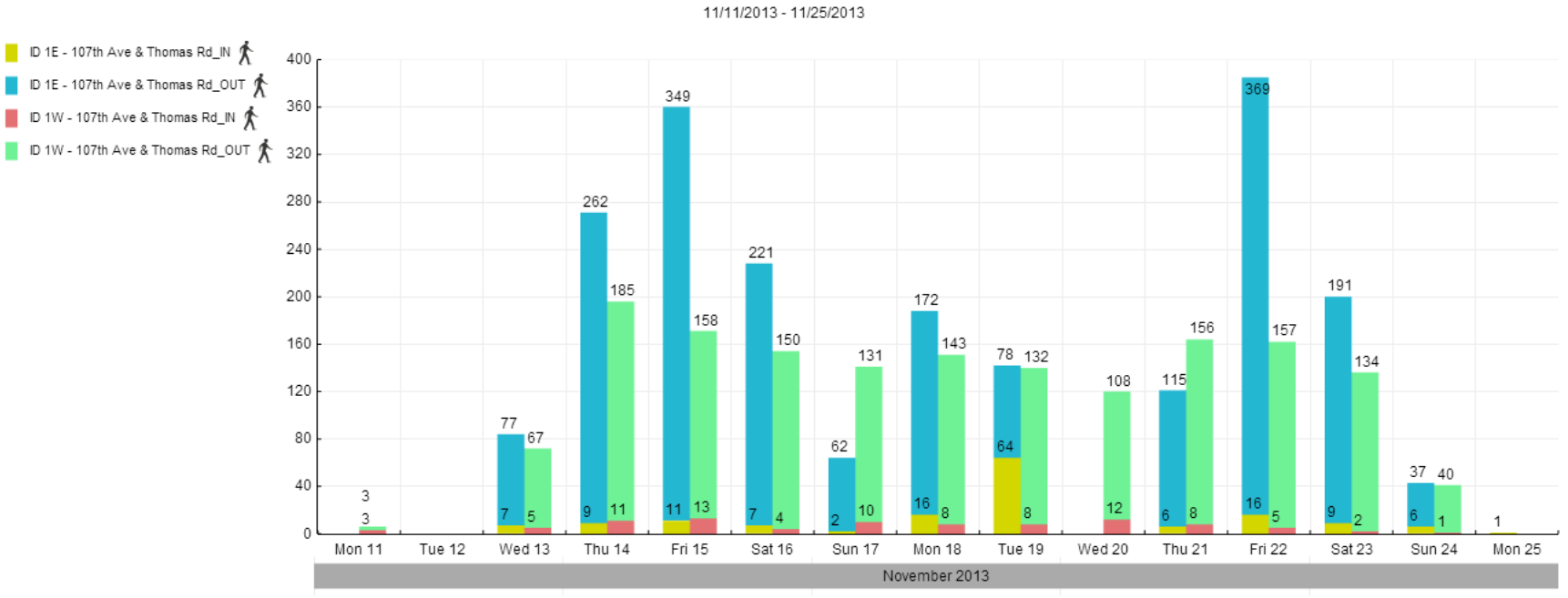
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Tuesday, 11/12/2013 Wednesday, 11/20/2013	ID 1E - 107th Ave & Thomas Rd_IN ID 1E - 107th Ave & Thomas Rd_OUT		Northbound	Southbound
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	162	180
Monday, 11/11/2013 Monday, 11/25/2013	All Counts	Weekend	NA	NA



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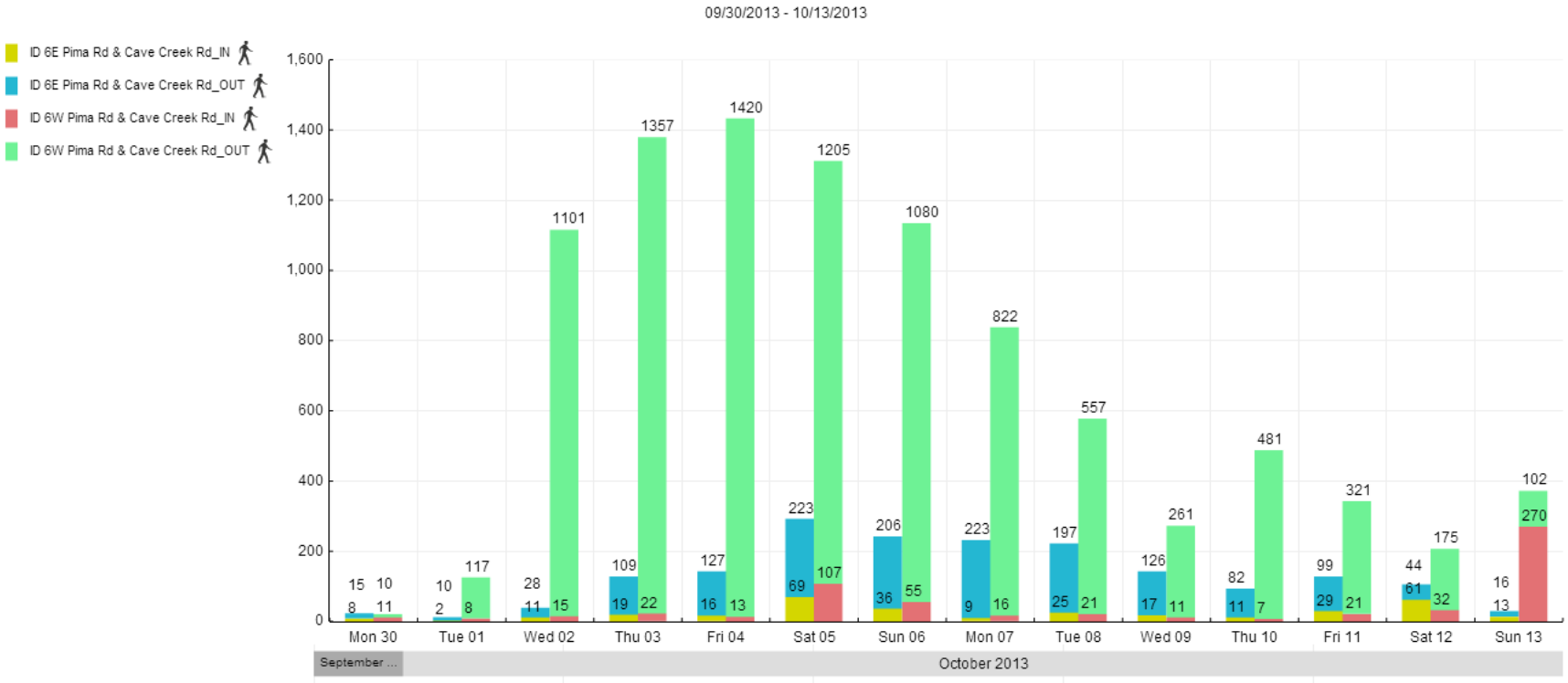
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
All Dates	All Counts	Weekend	NA	NA



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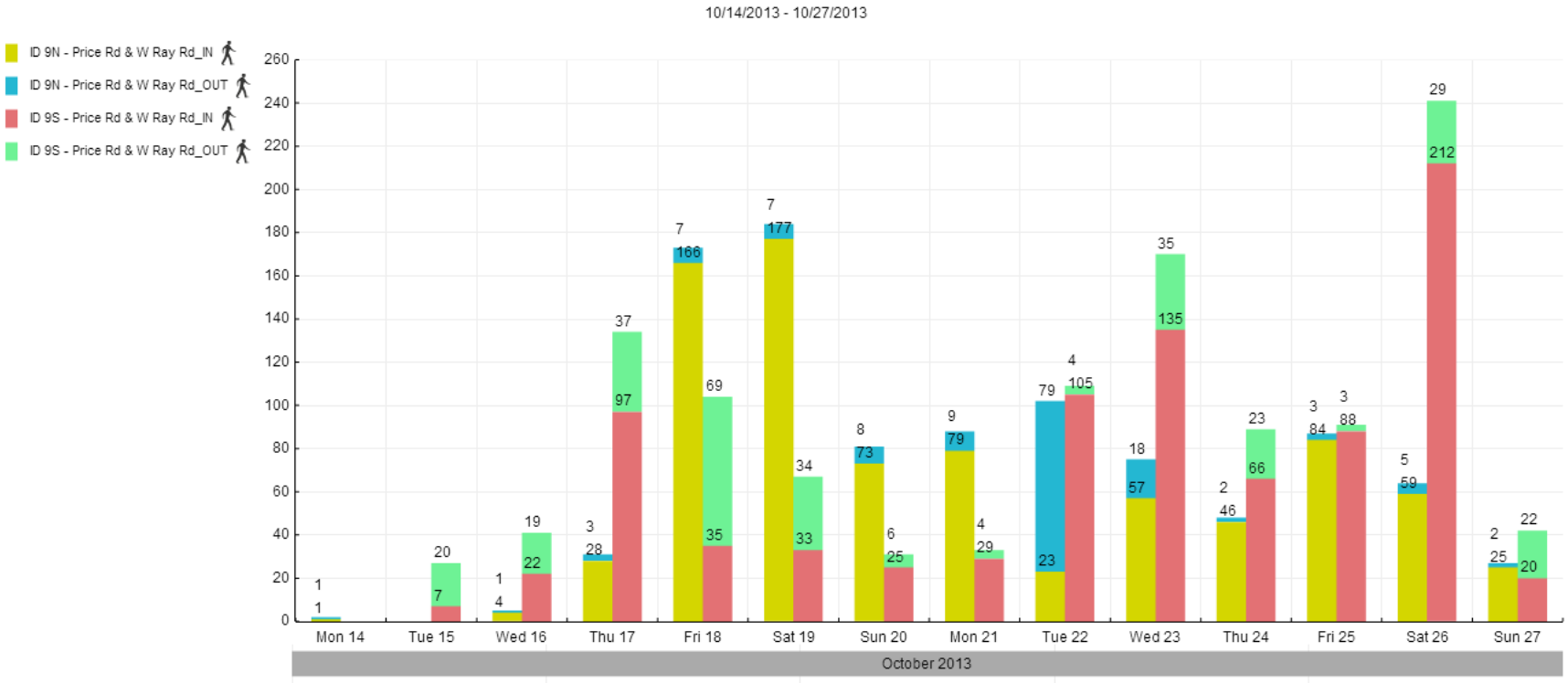
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
All Dates	All Counts	Weekend	NA	NA



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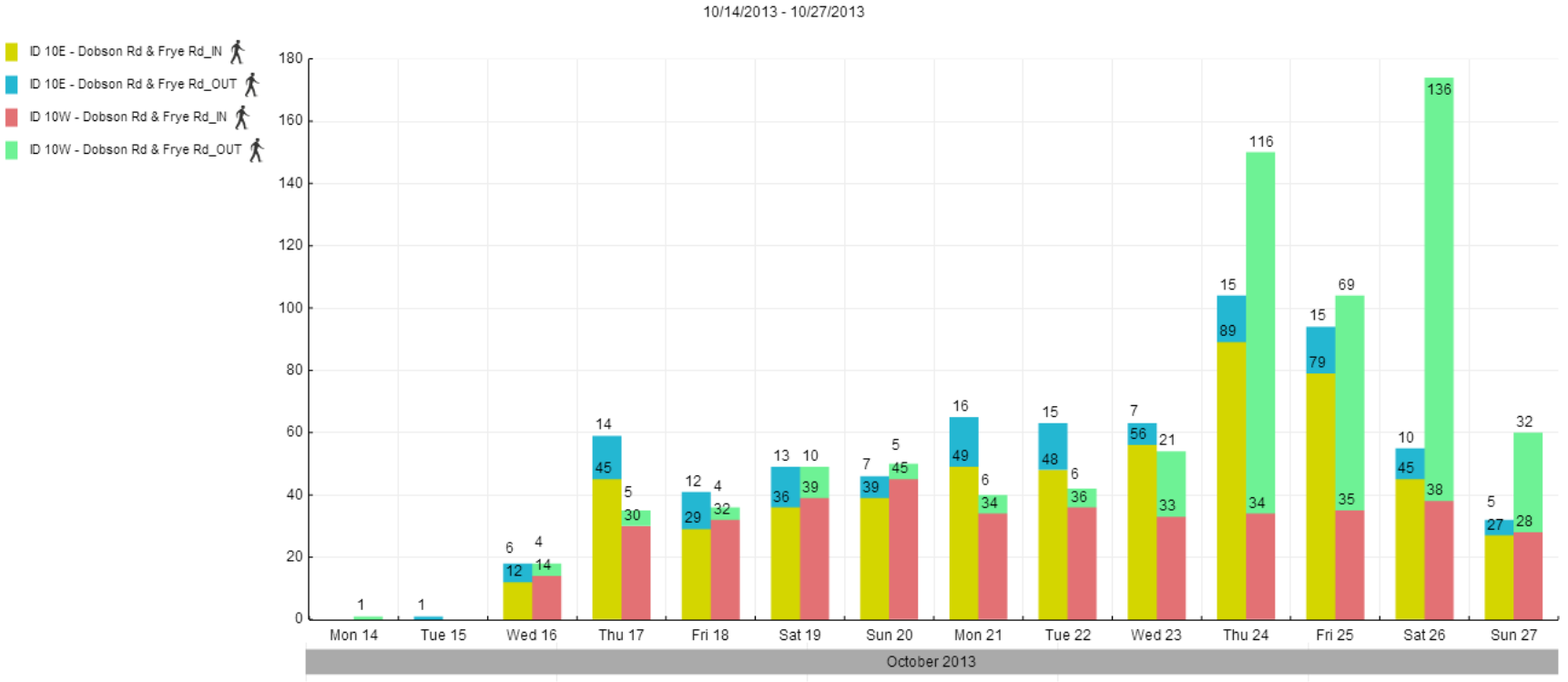
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Thursday, 10/24/2013 Friday, 10/25/2013 Saturday, 10/26/2013	ID 10W - Dobson Rd & Frye Rd_OUT		Northbound	Southbound
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	54	44
Monday, 10/14/2013 Sunday, 10/27/2013	All Counts	Weekend	46	52



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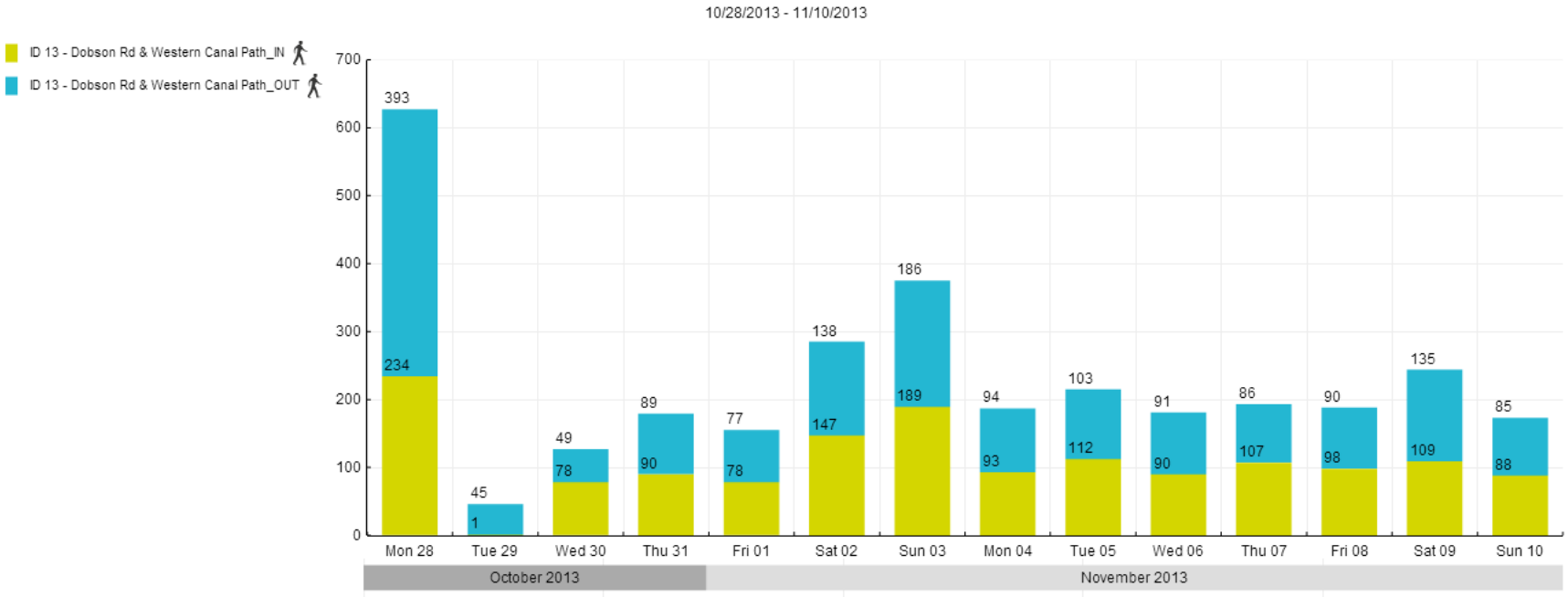
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Tuesday, 10/24/2013	All Counts		IN	OUT
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	93	90
Monday, 10/28/2013 Sunday, 11/10/2013	All Counts	Weekend	NA	NA



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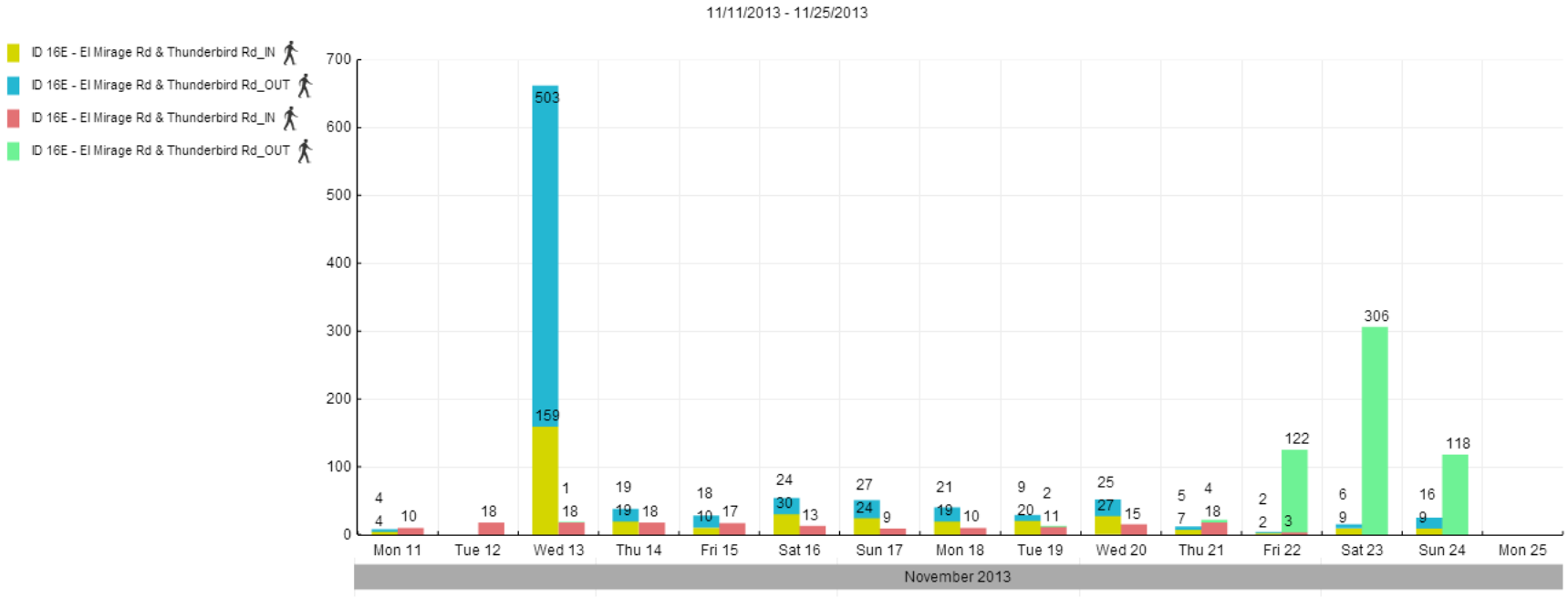
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Wednesday, 11/13/2013 Friday, 11/22/2013 Saturday, 11/23/2013 Sunday, 11/24/2013	ID 16E - El Mirage Rd & Thunderbird Rd_IN ID 16E - El Mirage Rd & Thunderbird Rd_IN ID 16E - El Mirage Rd & Thunderbird Rd_OUT		Northbound	Southbound
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	15.5	31
Monday, 11/11/2013 Monday, 11/25/2013	All Counts	Weekend	16.5	34



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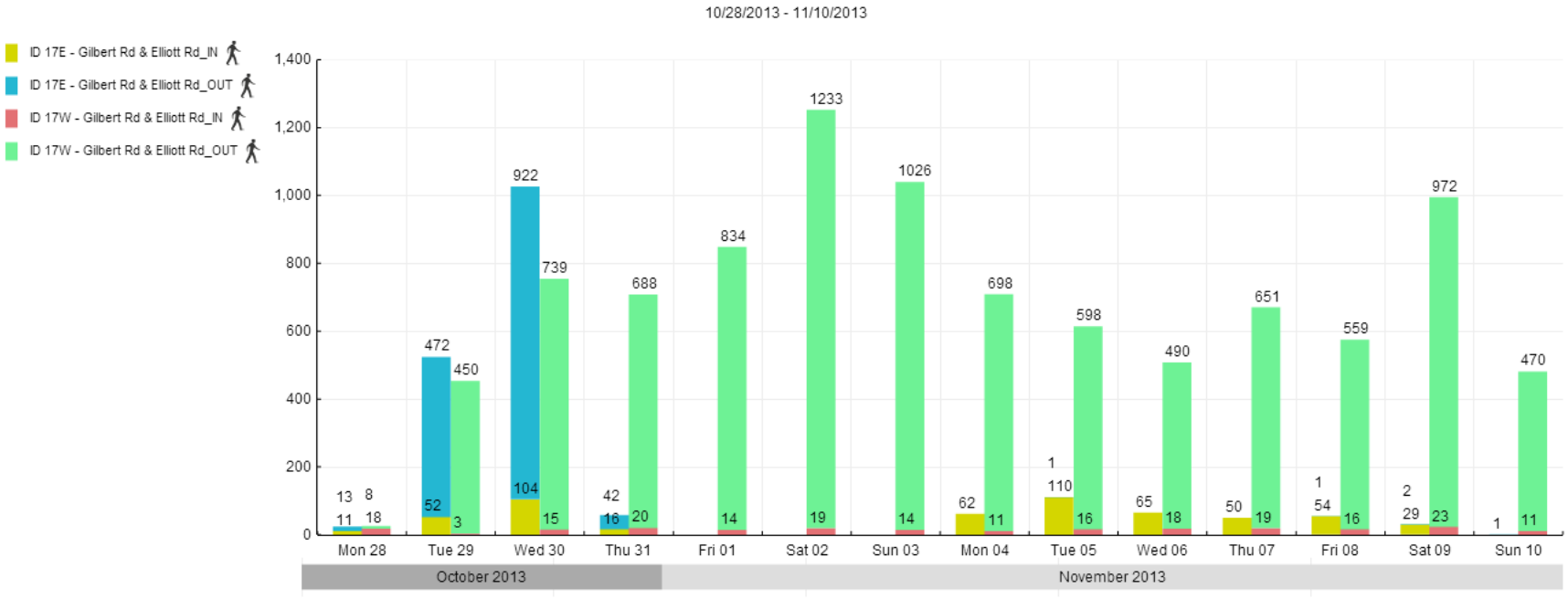
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
All Dates	All Counts	Weekend	NA	NA



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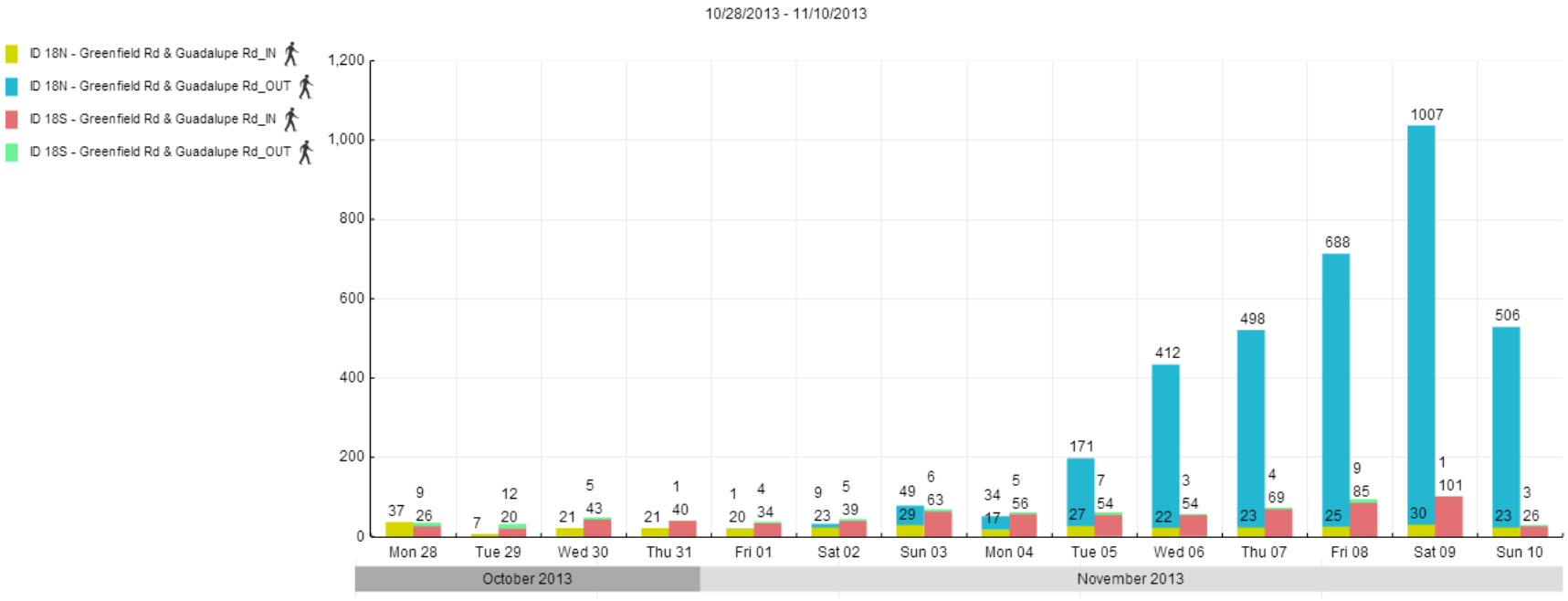
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Tuesday, 11/5/2013 Wednesday, 11/6/2013 Thursday, 11/7/2013 Friday, 11/8/2013 Saturday, 11/9/2013	ID 18N - Greenfield Rd & Guadalupe Rd_IN ID 18N - Greenfield Rd & Guadalupe Rd_OUT		Westbound	Eastbound
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	24	55
Monday, 10/28/2013 Sunday, 11/10/2013	All Counts	Weekend	28	102



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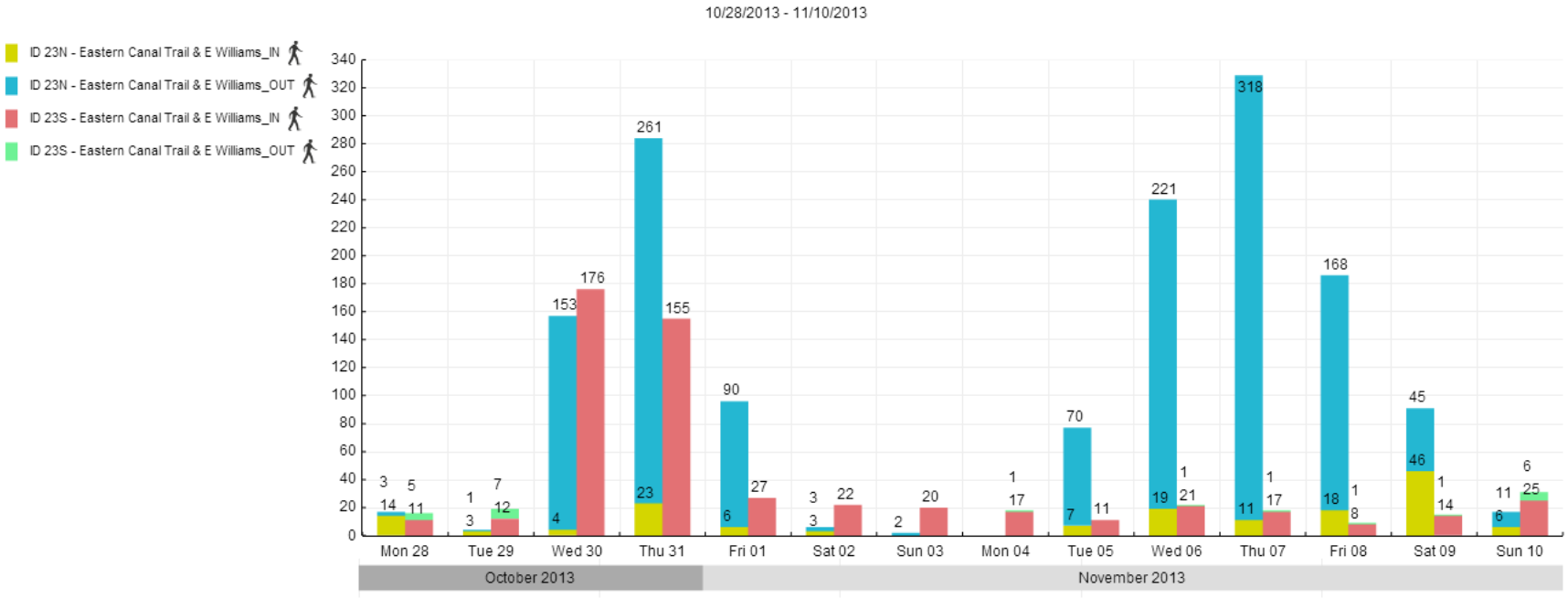
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
All Dates	All Counts	Weekend	NA	NA



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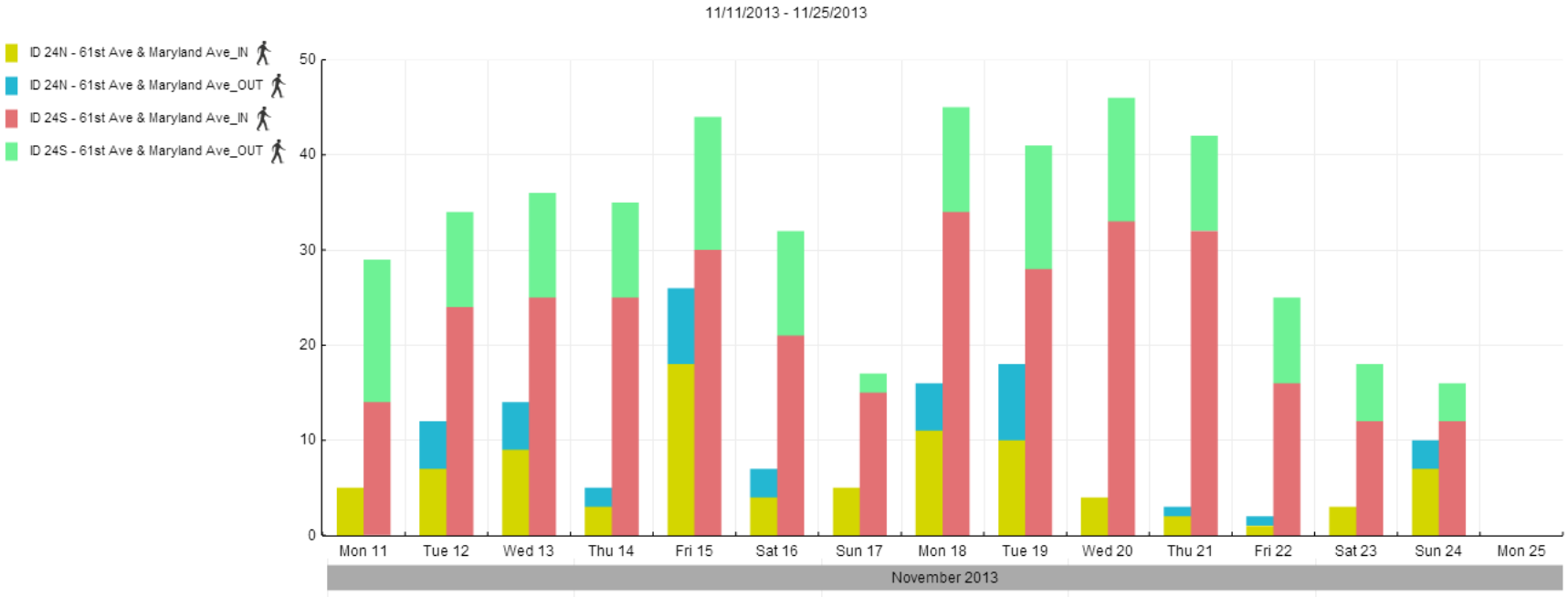
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
Monday, 11/11/2013 Monday, 11/25/2013	All Counts	Weekend	NA	NA



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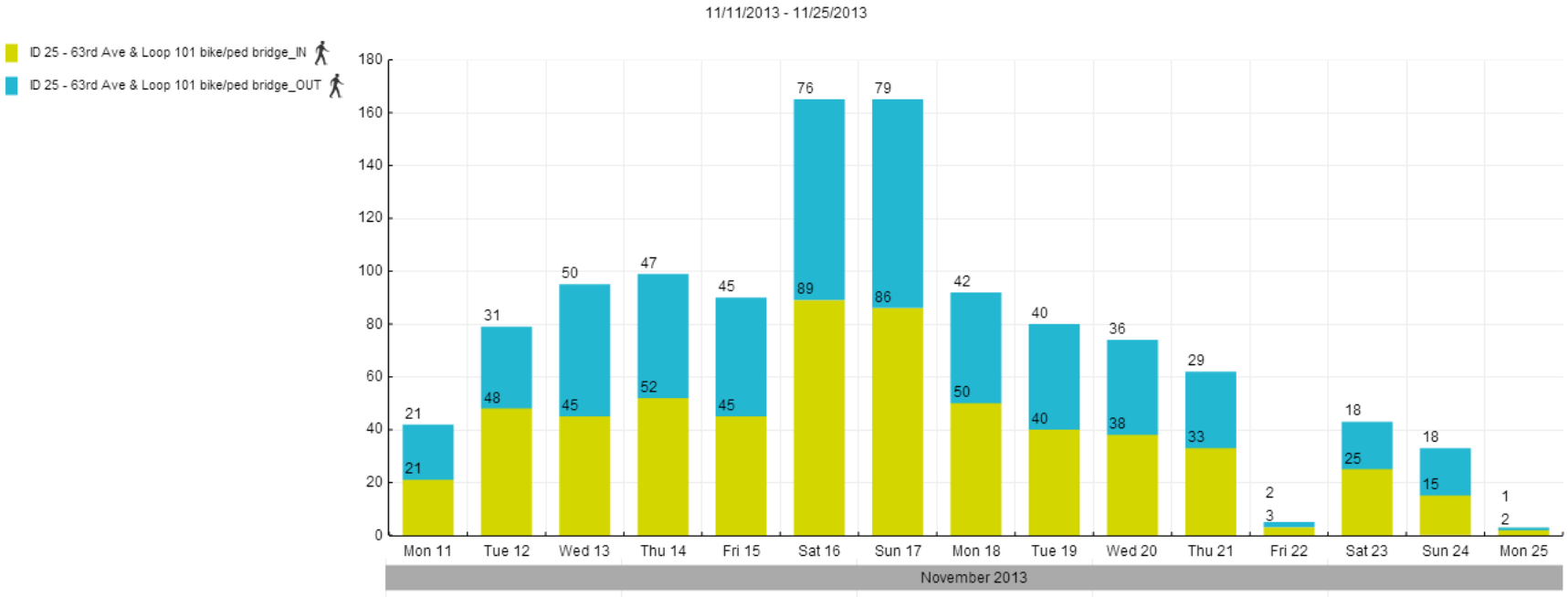
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Friday, 11/22/2013	All Counts		IN	OUT
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	45	40
Monday, 11/11/2013 Monday, 11/25/2013	All Counts	Weekend	NA	NA



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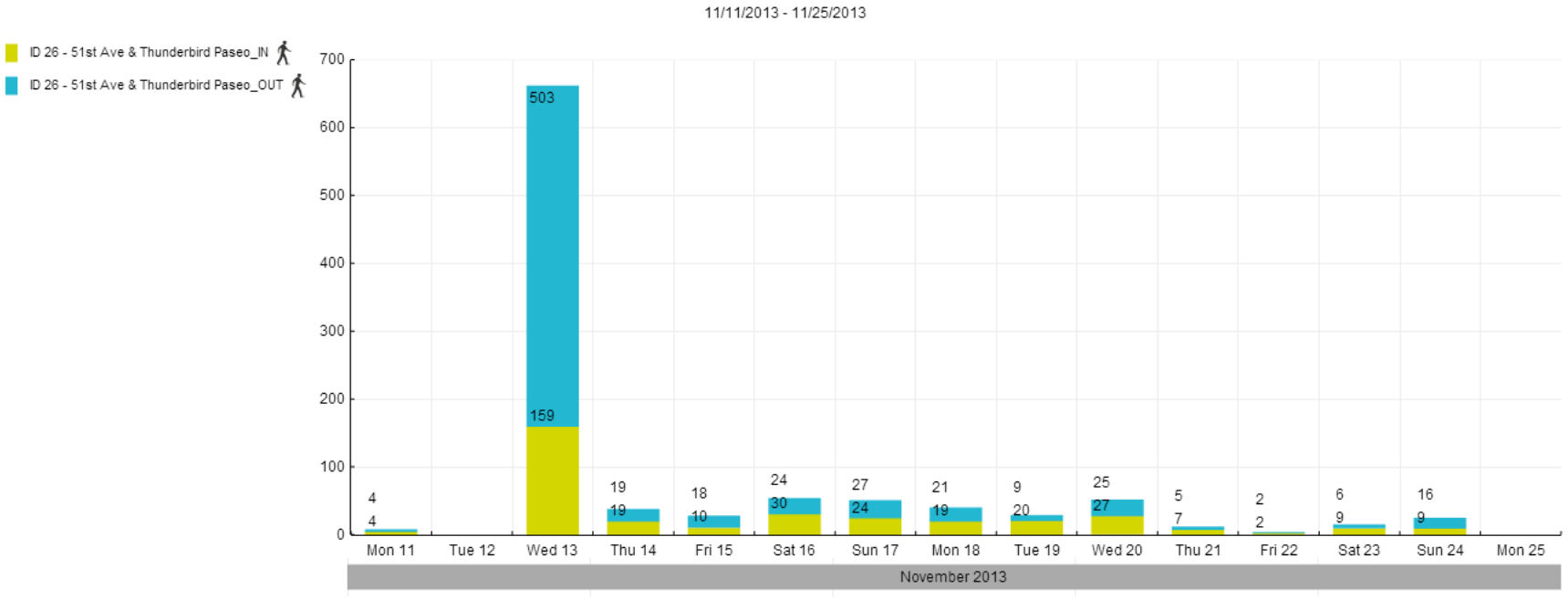
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Tuesday, 11/12/2013 Wednesday, 11/13/2013	All Counts		IN	OUT
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	16.8	17.5
Monday, 11/11/2013 Monday, 11/25/2013	All Counts	Weekend	NA	NA



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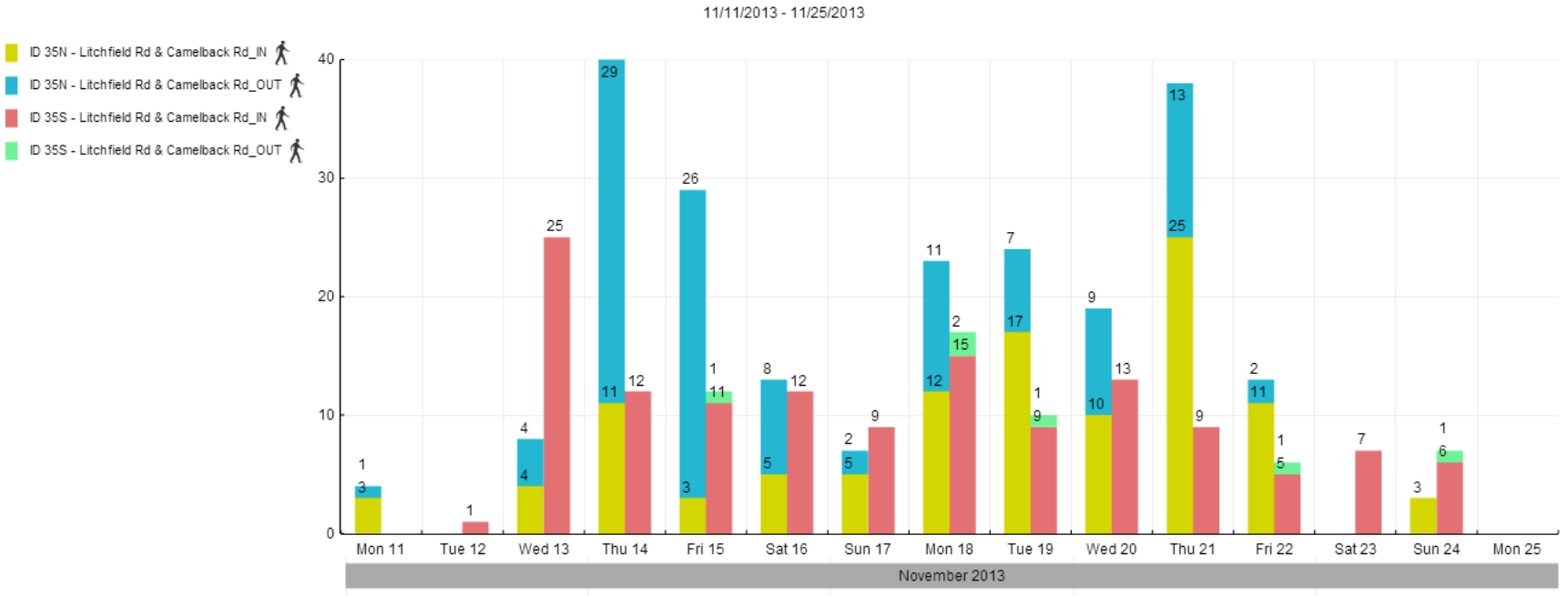
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Tuesday, 11/12/2013 Saturday, 11/23/2013	All Counts ID 35N - Litchfield Rd & Camelback Rd_IN ID 35N - Litchfield Rd & Camelback Rd_OUT		Westbound	Eastbound
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	11	22
Monday, 11/11/2013 Monday, 11/25/2013	All Counts	Weekend	5	13



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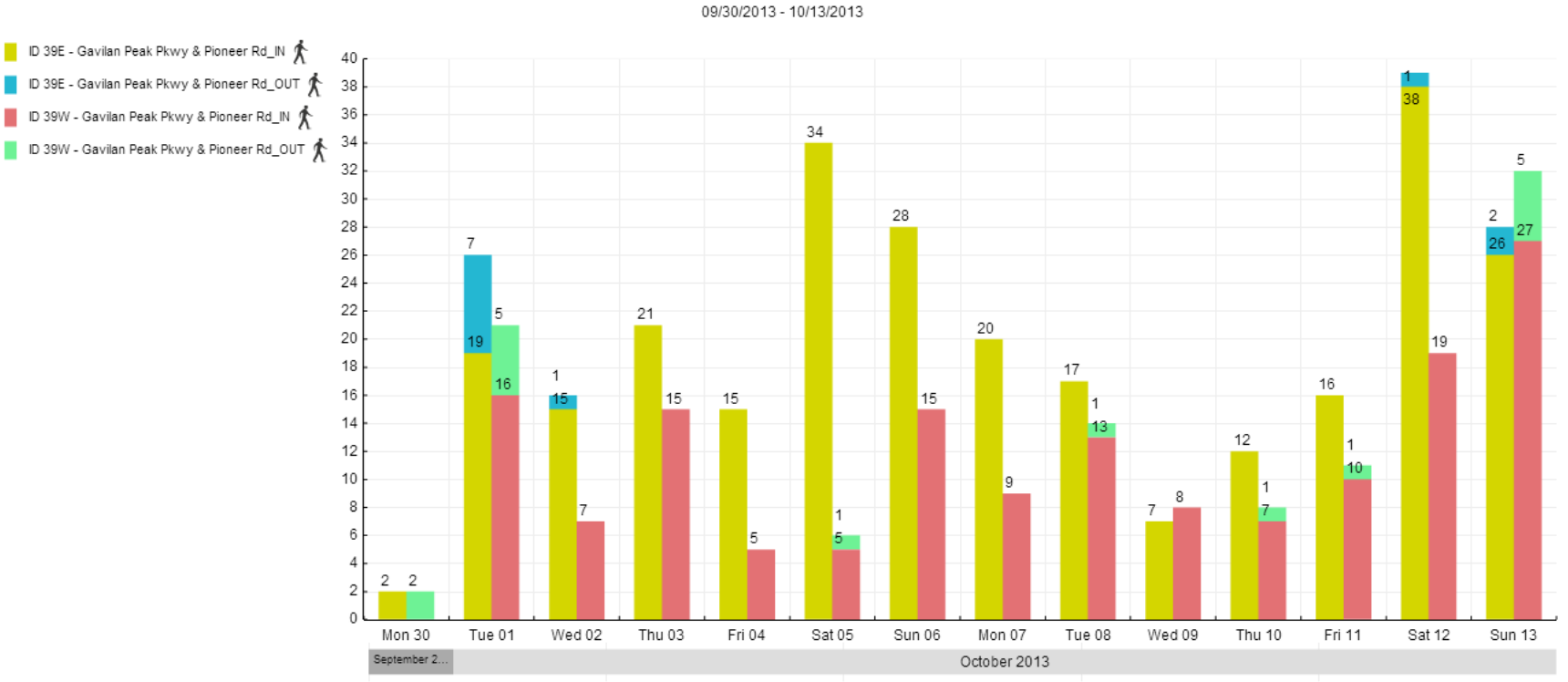
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
Monday, 9/30/2013 Sunday, 10/13/2013	All Counts	Weekend	NA	NA



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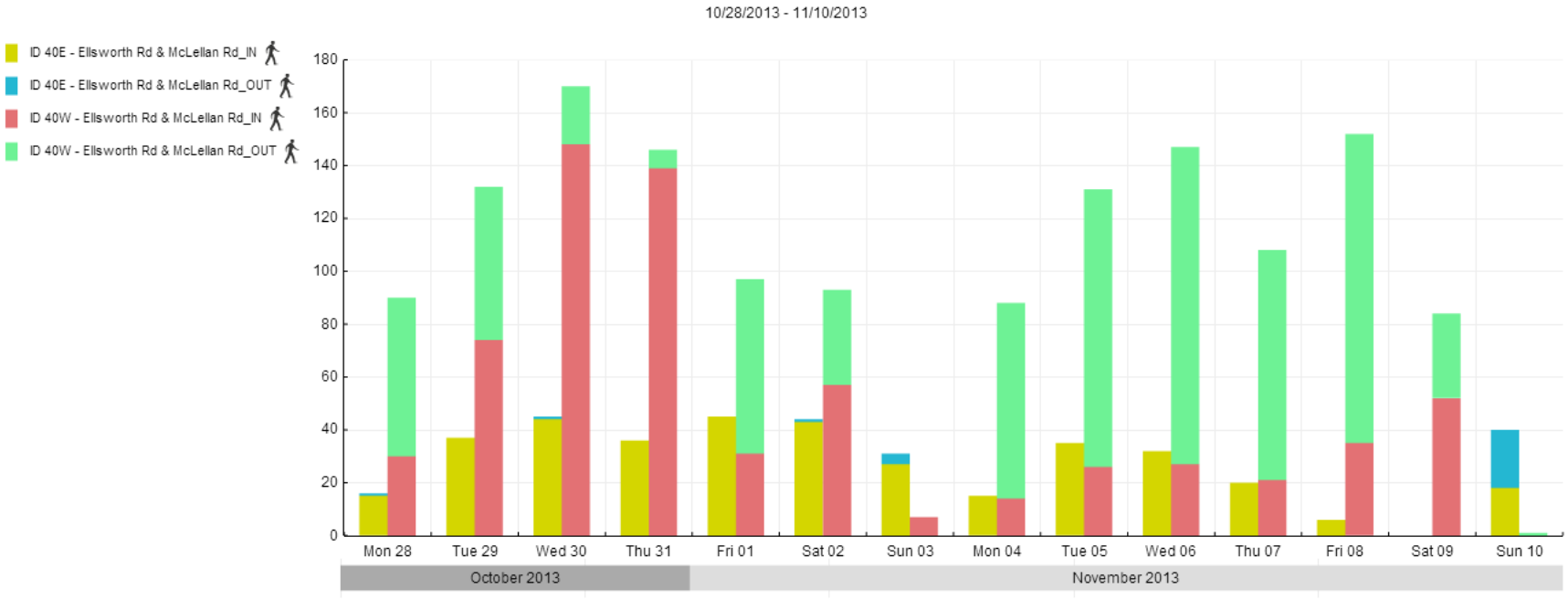
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Saturday, 11/9/2013	ID 40E - Ellsworth Rd & McLellan Rd_IN ID 40E - Ellsworth Rd & McLellan Rd_OUT		Northbound	Southbound
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
Monday, 10/28/2013 Sunday, 11/10/2013	All Counts	Weekend	67	52



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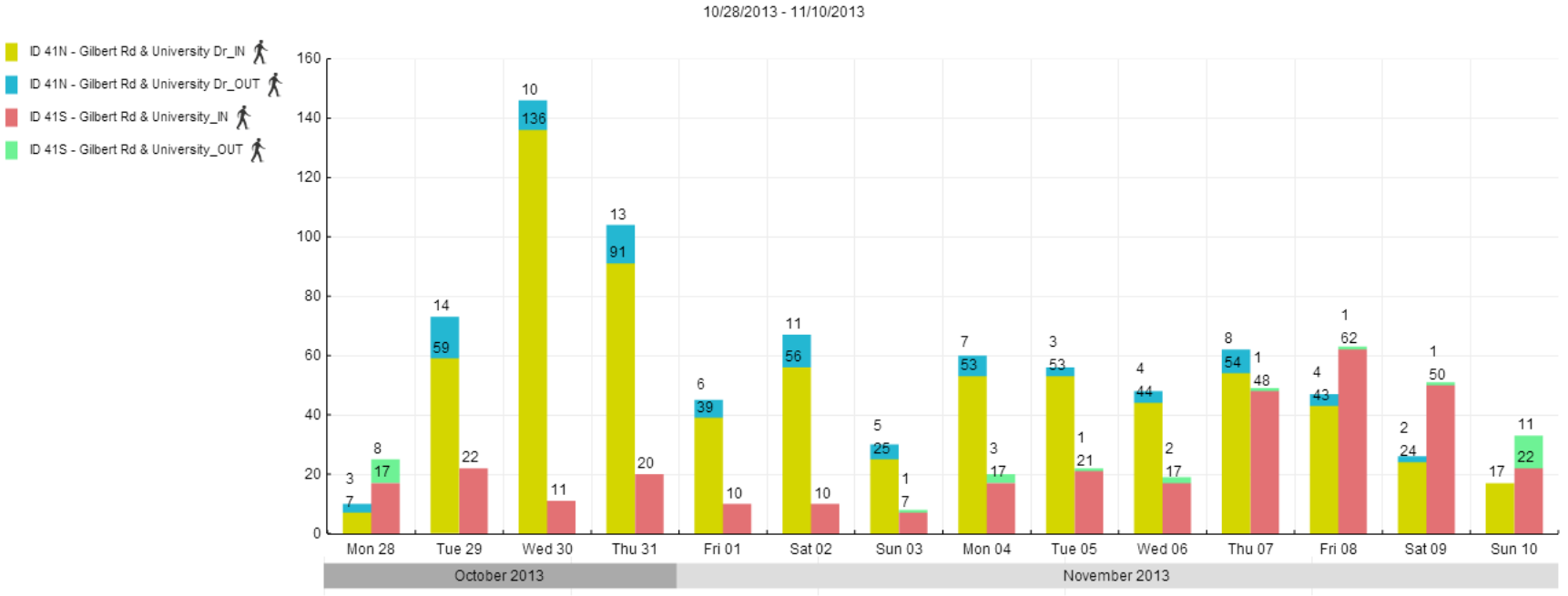
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
Monday, 10/28/2013 Sunday, 11/10/2013	All Counts	Weekend	NA	NA



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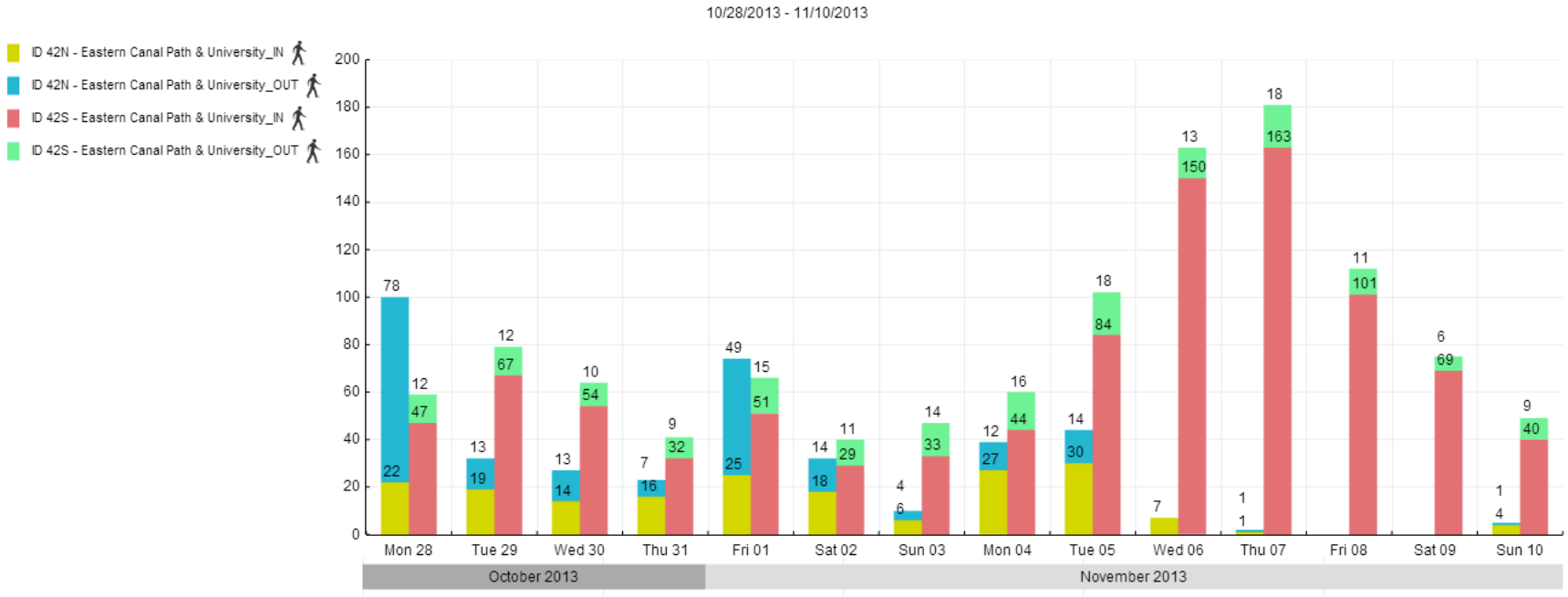
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Wednesday, 11/6/2013 Thursday, 11/7/2013 Friday, 11/8/2013 Saturday, 11/9/2013	All Counts		Westbound	Eastbound
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	31.5	60.5
Monday, 10/28/2013 Sunday, 11/10/2013	All Counts	Weekend	29	43



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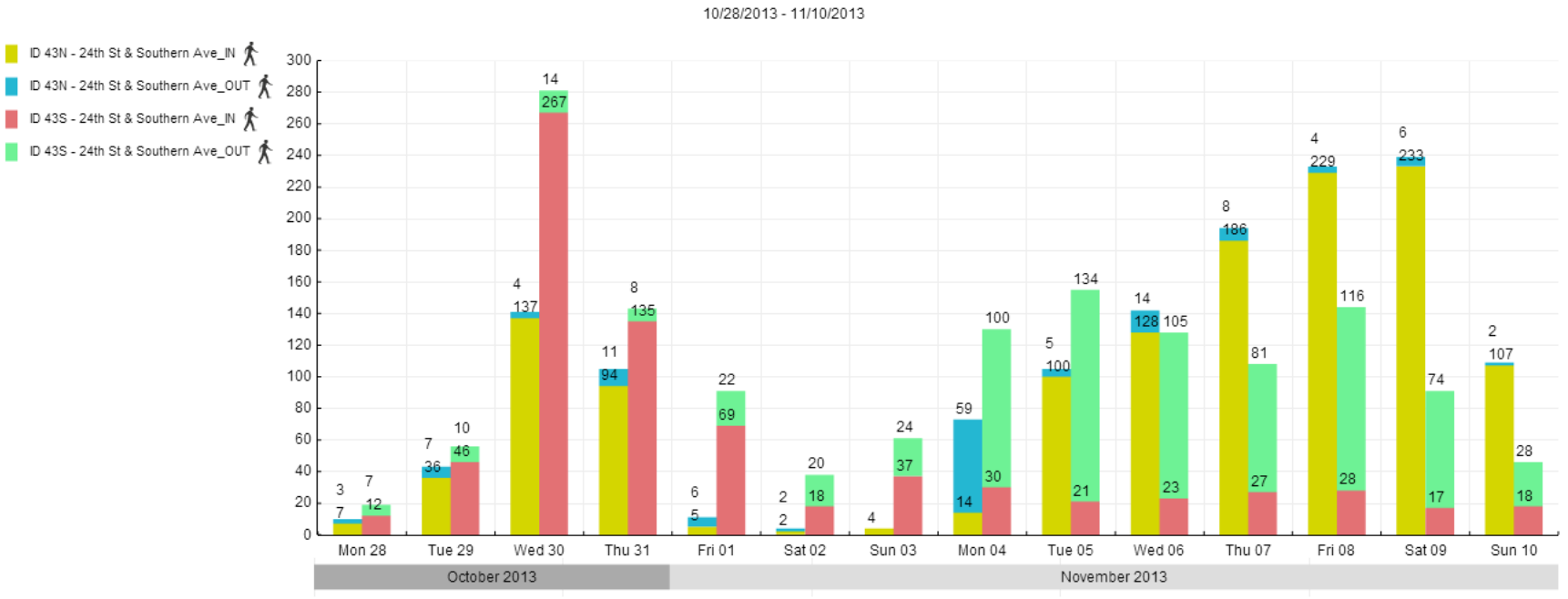
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Wednesday, 10/30/2013	ID 43S - 24th St & Southern Ave_IN ID 43S - 24th St & Southern Ave_OUT		Westbound	Eastbound
Saturday, 11/2/2013 Sunday, 11/3/2013 Monday, 11/4/2013	ID 43N - 24th St & Southern Ave_IN ID 43N - 24th St & Southern Ave_OUT			
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	228	36
Monday, 10/28/2013 Sunday, 11/10/2013	All Counts	Weekend	152	24



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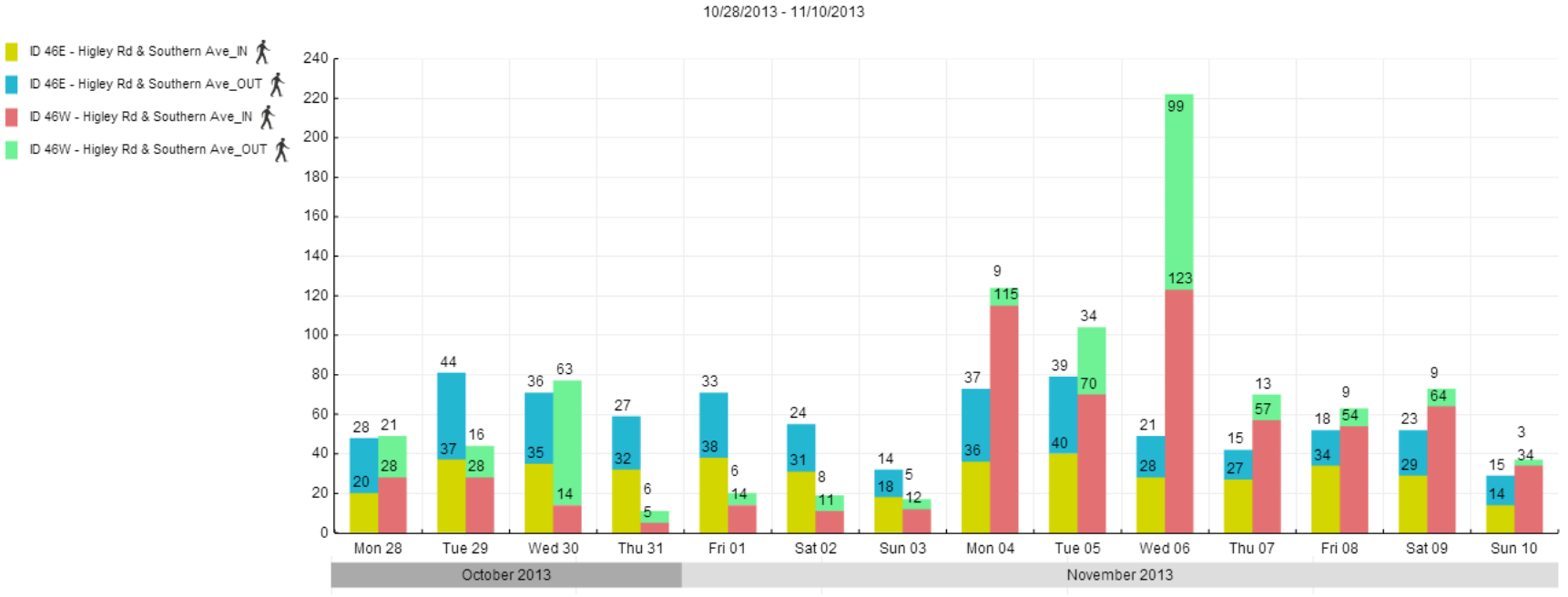
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Monday, 11/4/2013 Tuesday, 11/5/2013 Wednesday, 11/6/2013	ID 46W - Higley Rd & Southern Ave_IN ID 46W - Higley Rd & Southern Ave_OUT		Northbound	Southbound
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	44	51
Monday, 10/28/2013 Sunday, 11/10/2013	All Counts	Weekend	NA	NA



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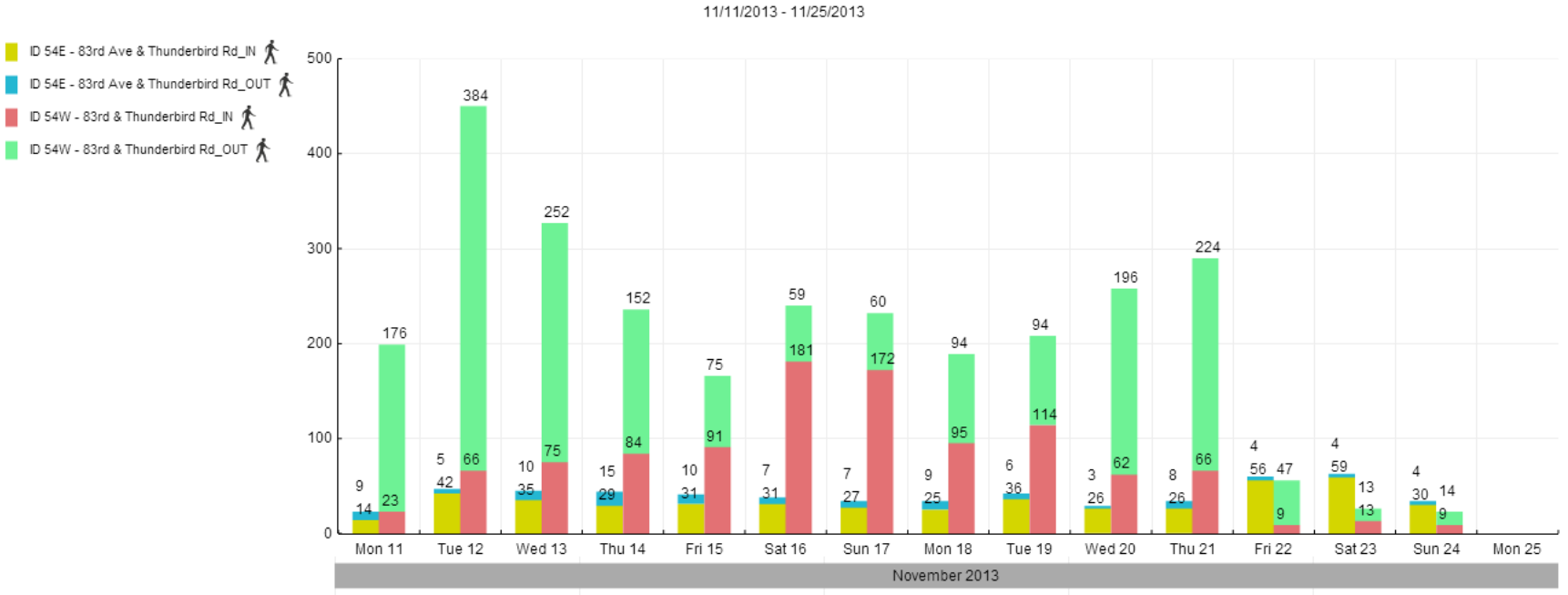
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Tuesday, 11/12/2013 Wednesday, 11/13/2013 Thursday, 11/21/2013	ID 54W - 83rd & Thunderbird Rd_IN ID 54W - 83rd & Thunderbird Rd_OUT		Northbound	Southbound
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	109.5	97.5
Monday, 11/11/2013 Monday, 11/25/2013	All Counts	Weekend	NA	NA



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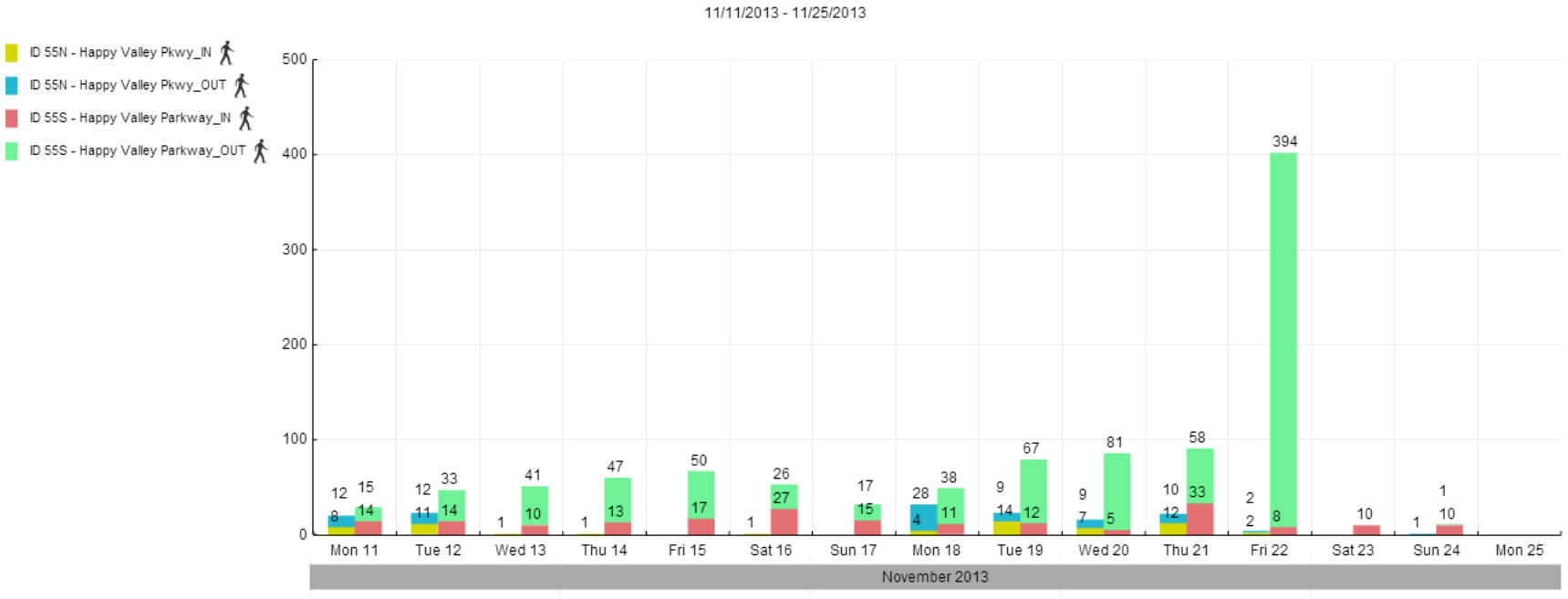
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Friday, 11/22/2013	ID 55S - Happy Valley Parkway_IN ID 55S - Happy Valley Parkway_OUT		Westbound	Eastbound
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	48	17
Monday, 11/11/2013 Monday, 11/25/2013	All Counts	Weekend	NA	NA



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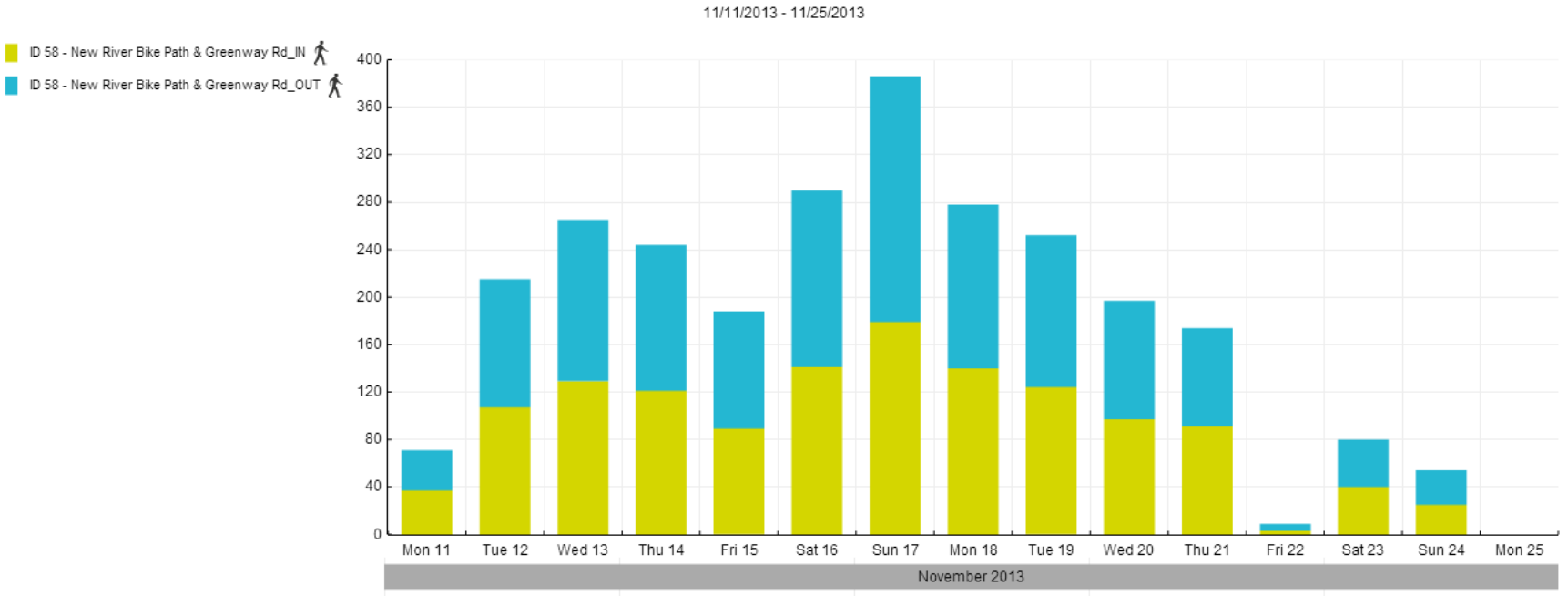
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Friday, 11/22/2013	All Counts		IN	OUT
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	114	115.5
Monday, 11/11/2013 Monday, 11/25/2013	All Counts	Weekend	NA	NA



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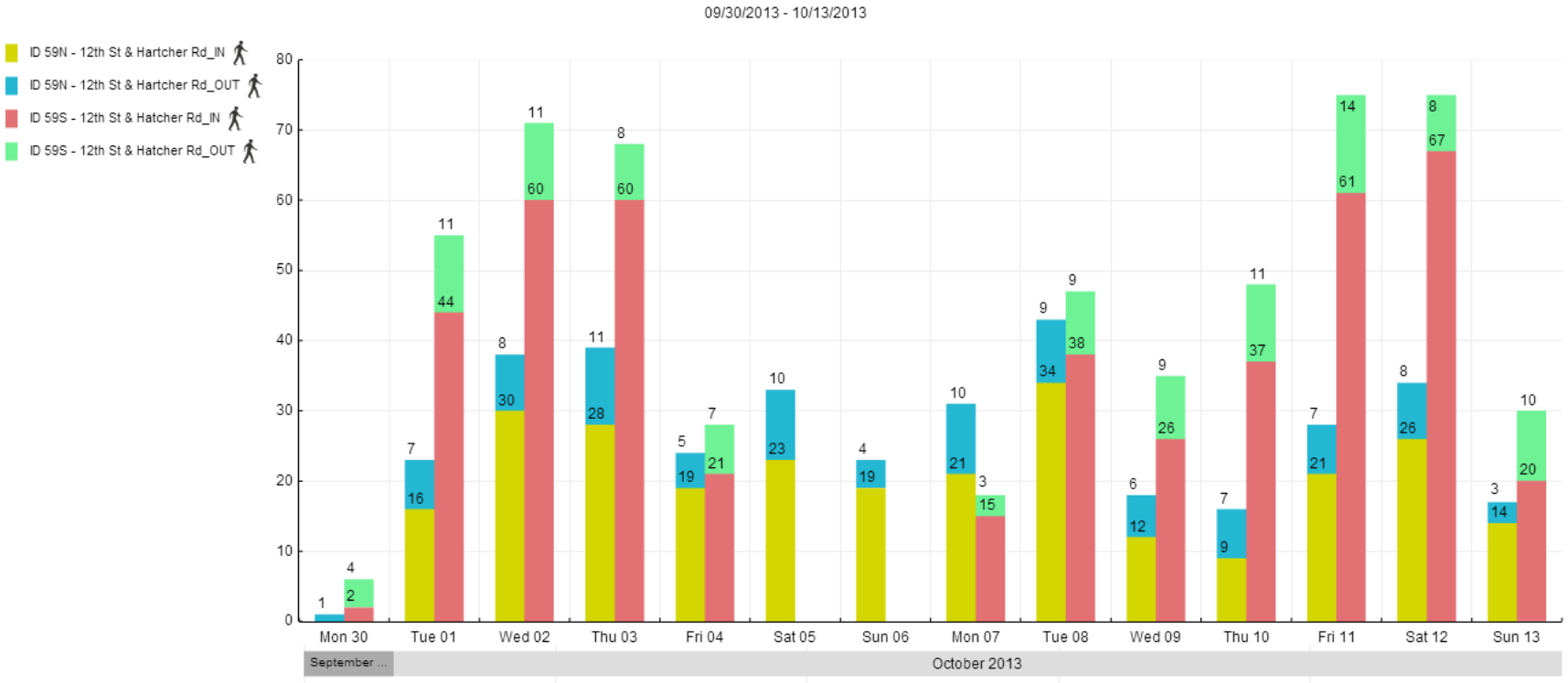
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Saturday, 10/5/2013 Sunday, 10/6/2013	ID 59S - 12th St & Hatcher Rd_IN ID 59S - 12th St & Hatcher Rd_OUT		Westbound	Eastbound
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
Monday, 9/30/2013 Sunday, 10/13/2013	All Counts	Weekend	32	51



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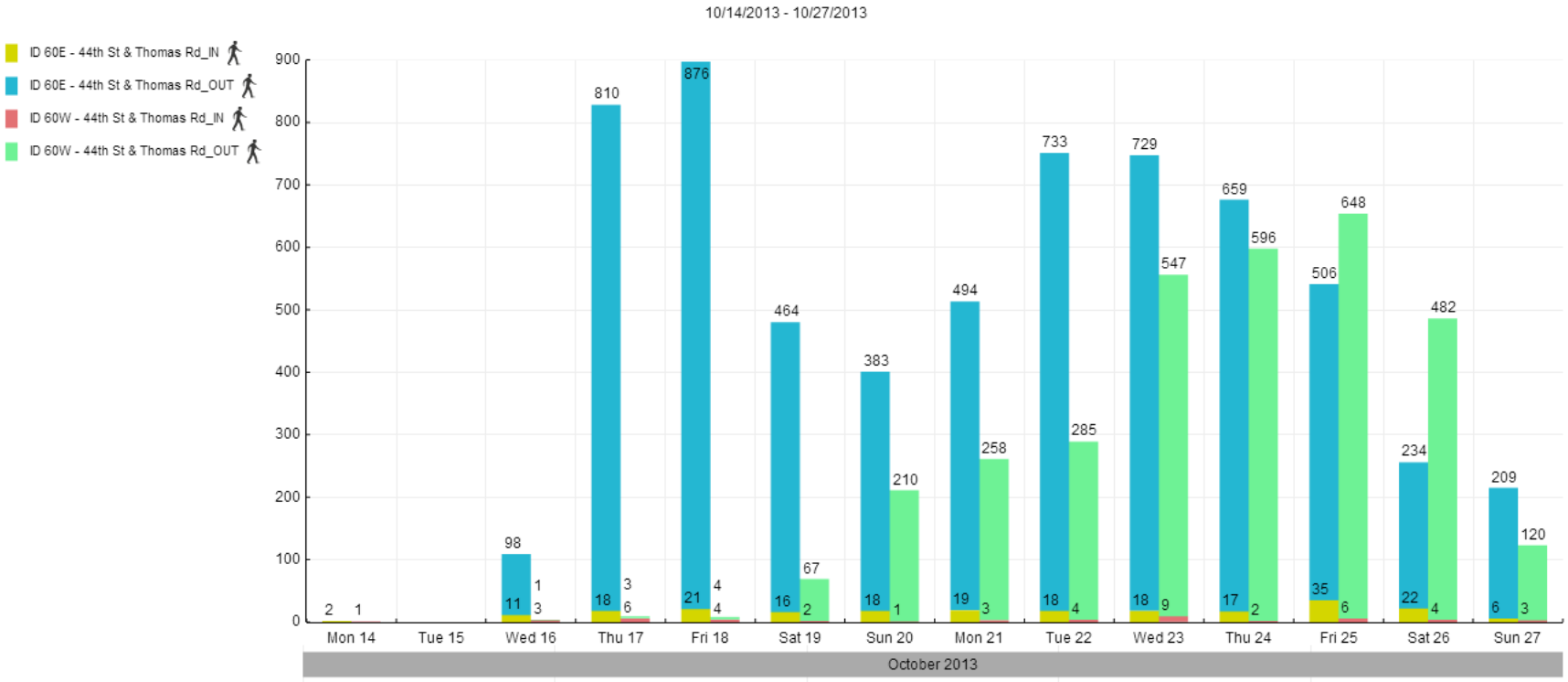
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
All Dates	All Counts	Weekend	NA	NA



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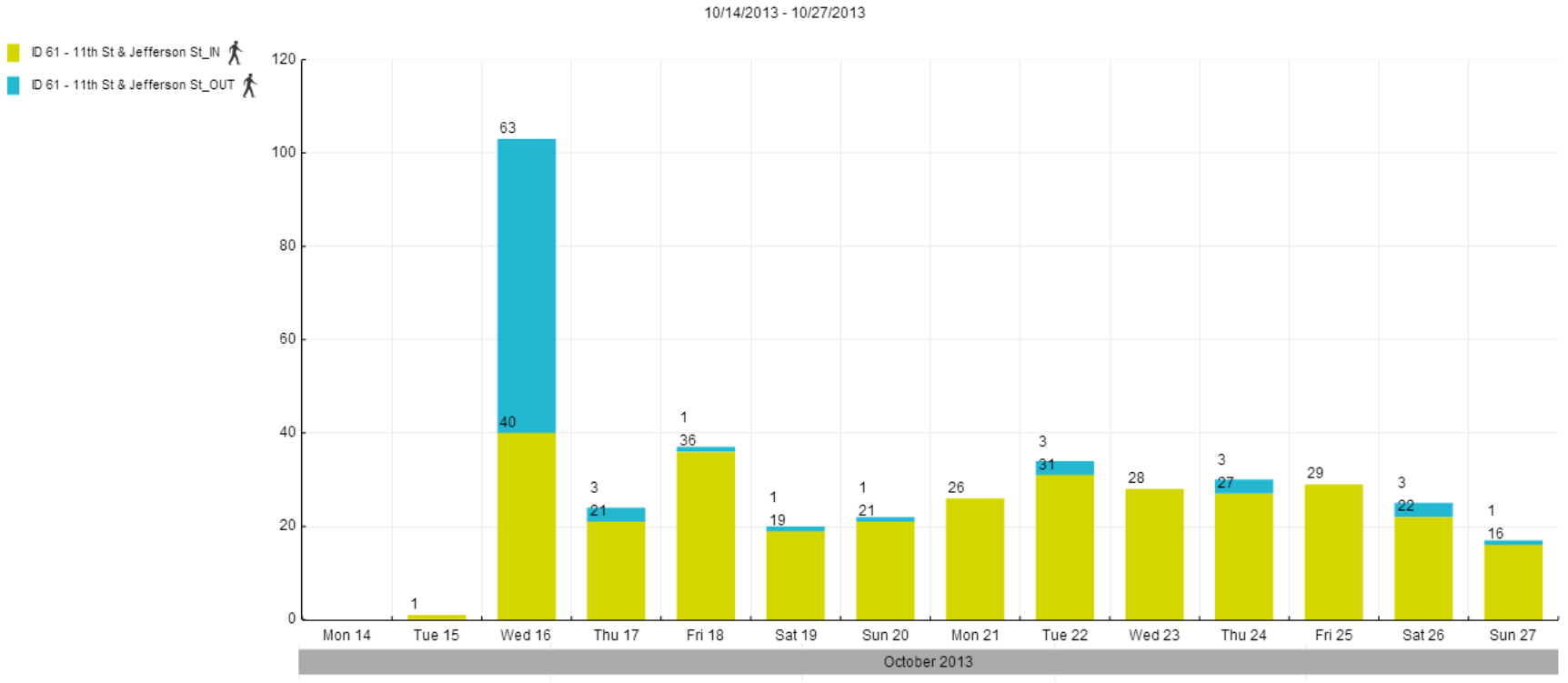
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Tuesday, 10/15/2013 Wednesday, 10/16/2013	All Counts		IN	OUT
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	27	1
Monday, 10/14/2013 Sunday, 10/27/2013	All Counts	Weekend	NA	NA



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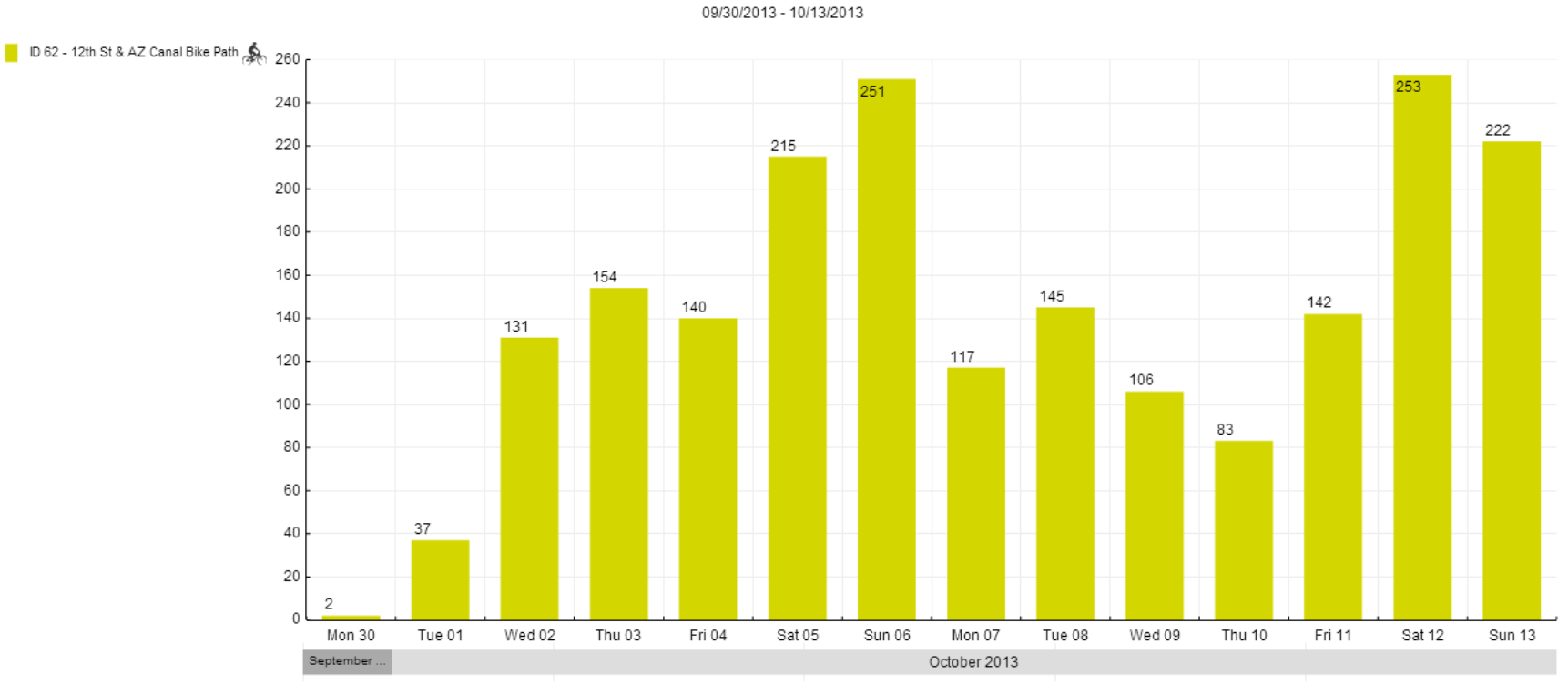
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
Monday, 9/30/2013 Sunday, 10/13/2013	All Counts	Weekend	NA	NA



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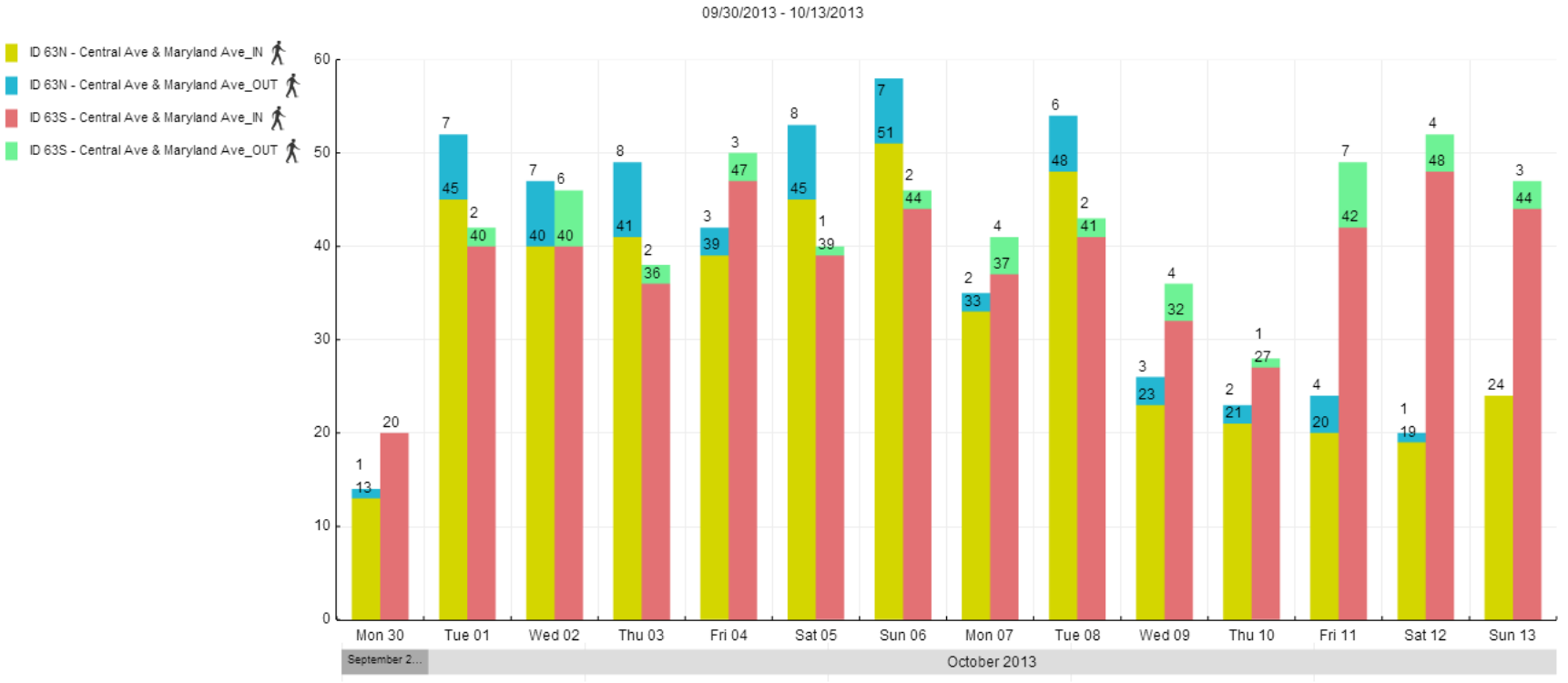
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
Monday, 9/30/2013 Sunday, 10/13/2013	All Counts	Weekend	NA	NA



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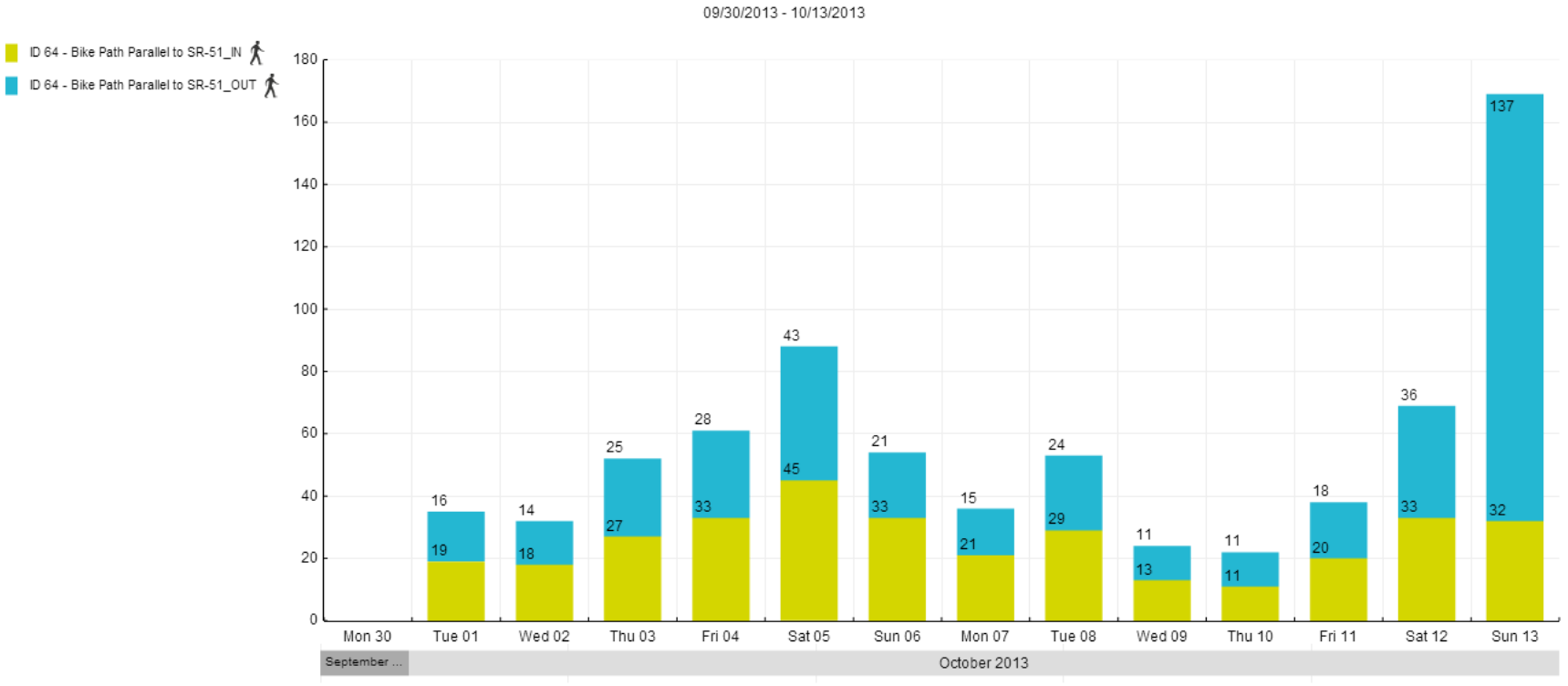
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
Monday, 9/30/2013 Sunday, 10/13/2013	All Counts	Weekend	NA	NA



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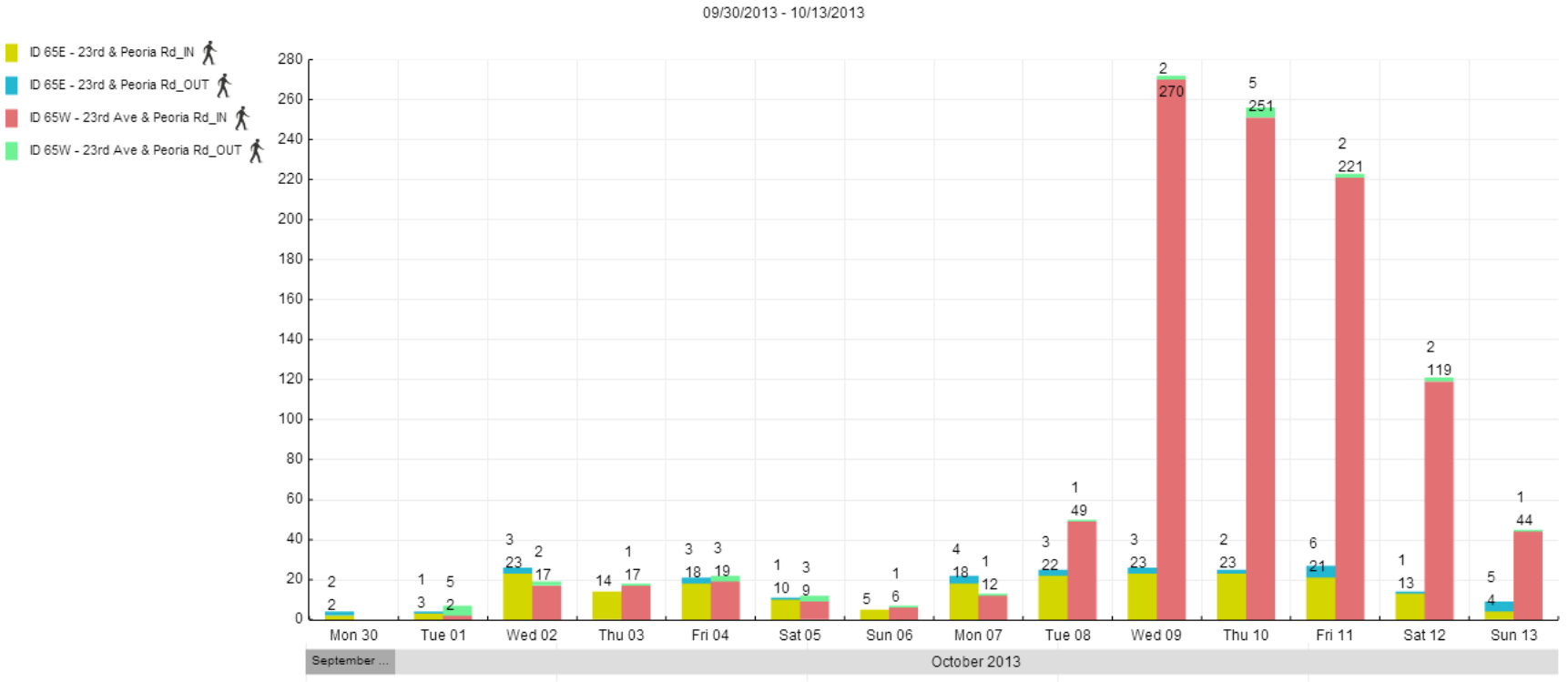
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Wednesday, 10/9/2013 Thursday, 10/10/2013 Friday, 10/11/2013 Saturday, 10/12/2013	ID 65W - 23rd & Peoria Rd_IN ID 65W - 23rd & Peoria Rd_OUT		Northbound	Southbound
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	22.5	17.5
Monday, 9/30/2013 Sunday, 10/13/2013	All Counts	Weekend	14.5	15.5



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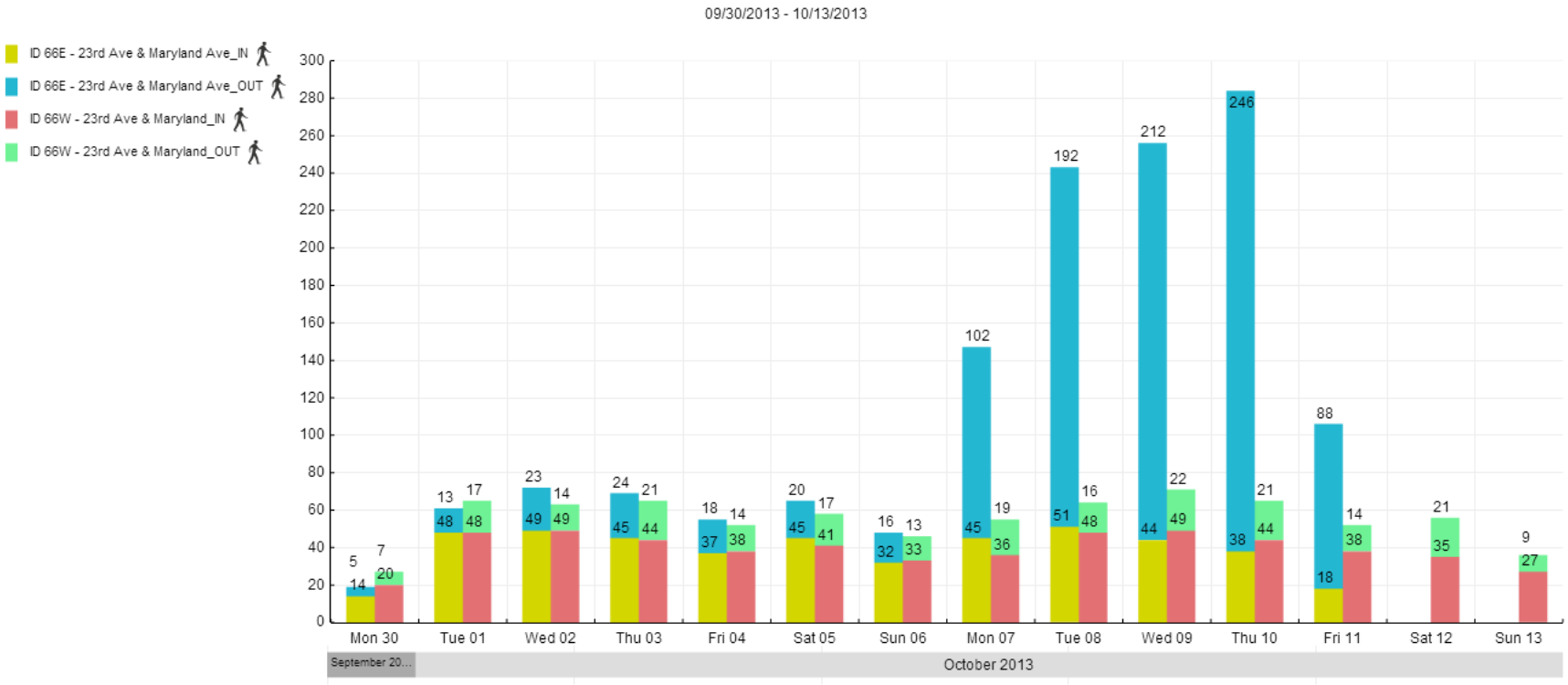
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Monday, 10/7/2013 Tuesday, 10/8/2013 Wednesday, 10/9/2013 Thursday, 10/10/2013 Friday, 10/11/2013 Saturday, 10/12/2013	ID 66E - 23rd Ave & Maryland Ave_OUT		Northbound	Southbound
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	64	63
Monday, 9/30/2013 Sunday, 10/13/2013	All Counts	Weekend	45	54



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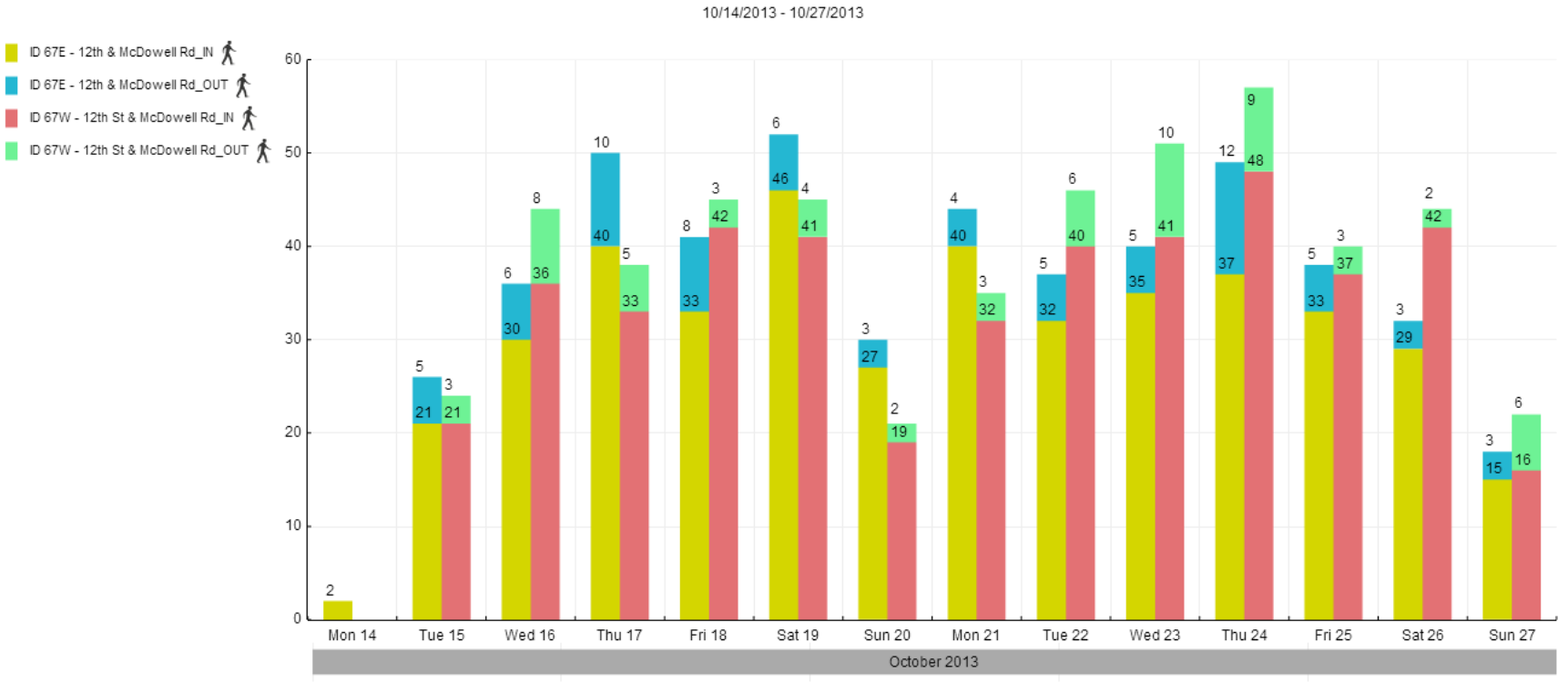
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
Monday, 10/14/2013 Sunday, 10/27/2013	All Counts	Weekend	NA	NA



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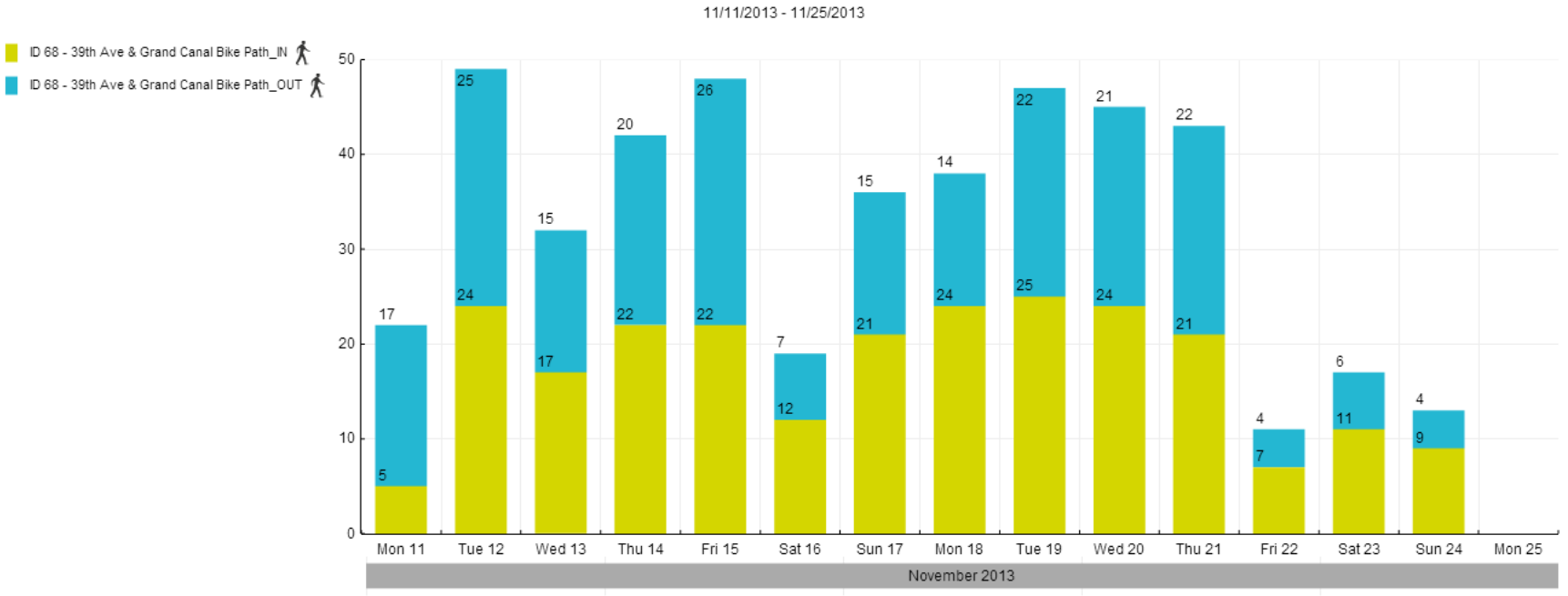
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
Monday, 11/11/2013 Monday, 11/25/2013	All Counts	Weekend	NA	NA



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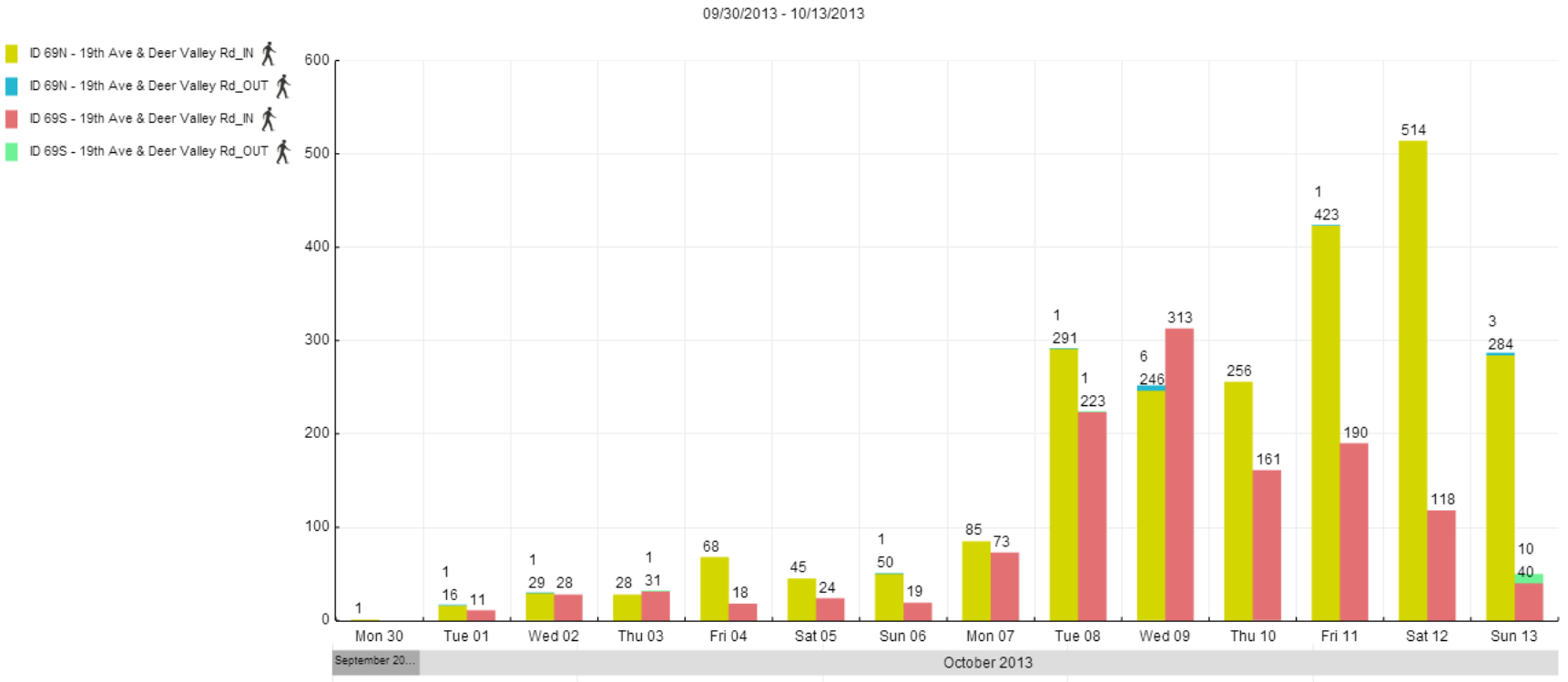
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Tuesday, 10/8/2013 Wednesday, 10/9/2013 Thursday, 10/10/2013 Friday, 10/11/2013 Saturday, 10/12/2013	All Counts		Westbound	Eastbound
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	45	24
Monday, 9/30/2013 Sunday, 10/13/2013	All Counts	Weekend	45	24



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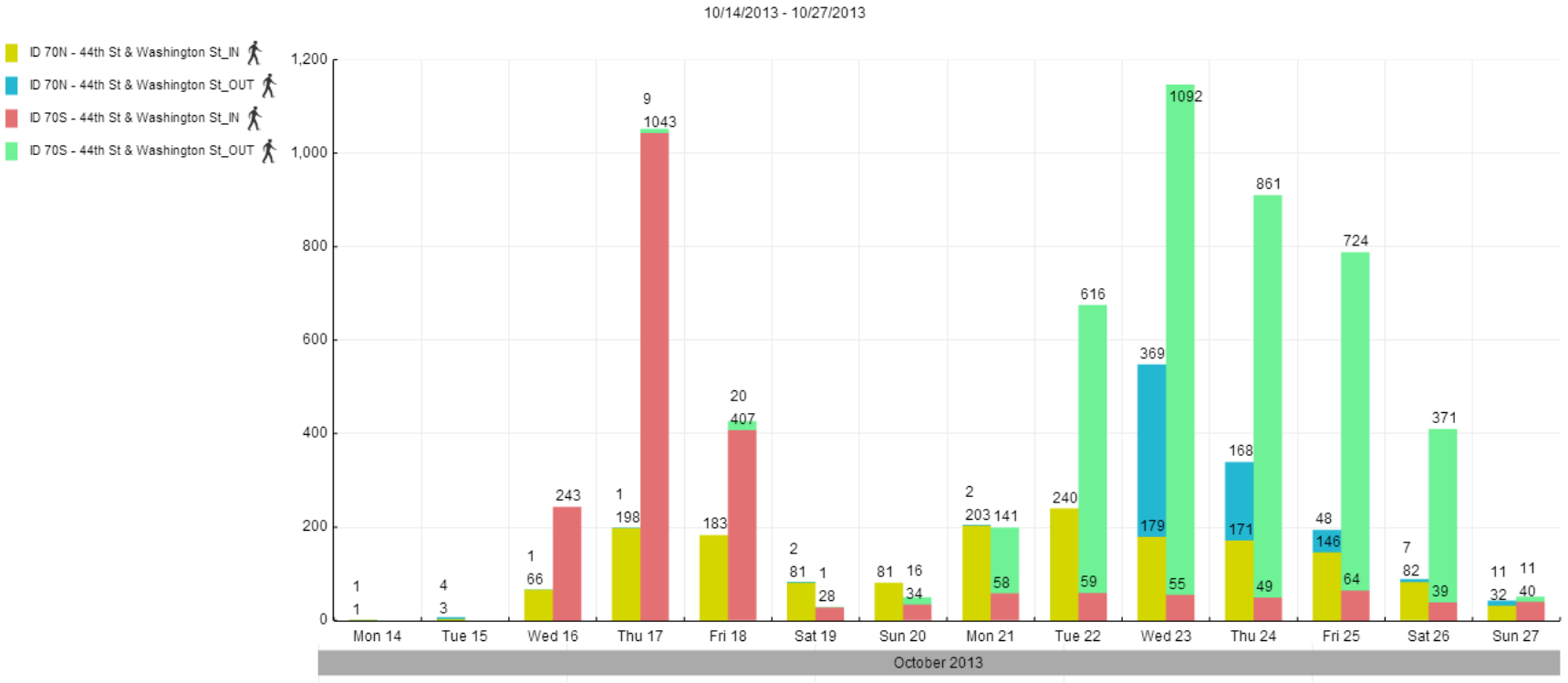
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
All Dates	All Counts	Weekend	NA	NA



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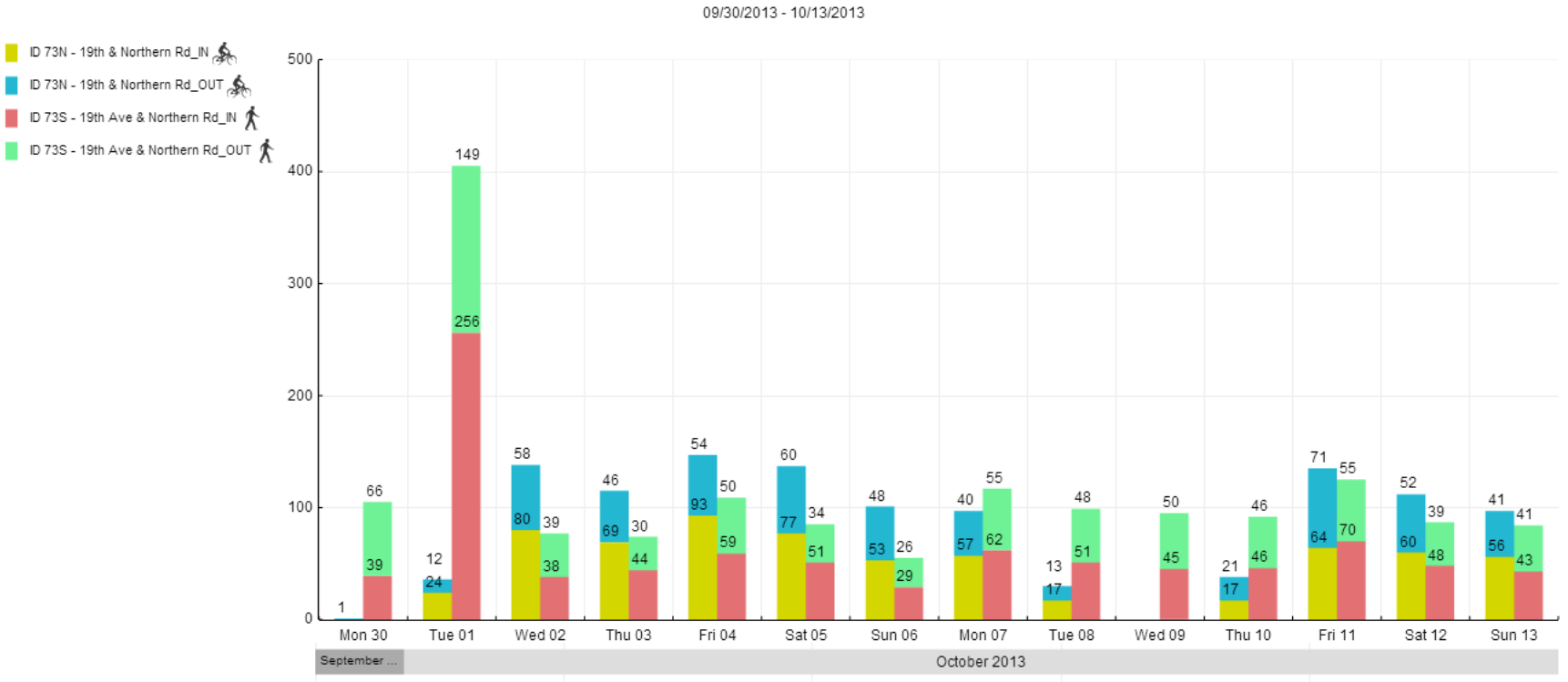
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Tuesday, 10/1/2013 Tuesday, 10/8/2013 Wednesday, 10/9/2013 Thursday, 10/10/2013	All Counts		Westbound	Eastbound
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	105.5	102.5
Monday, 9/30/2013 Sunday, 10/13/2013	All Counts	Weekend	NA	NA



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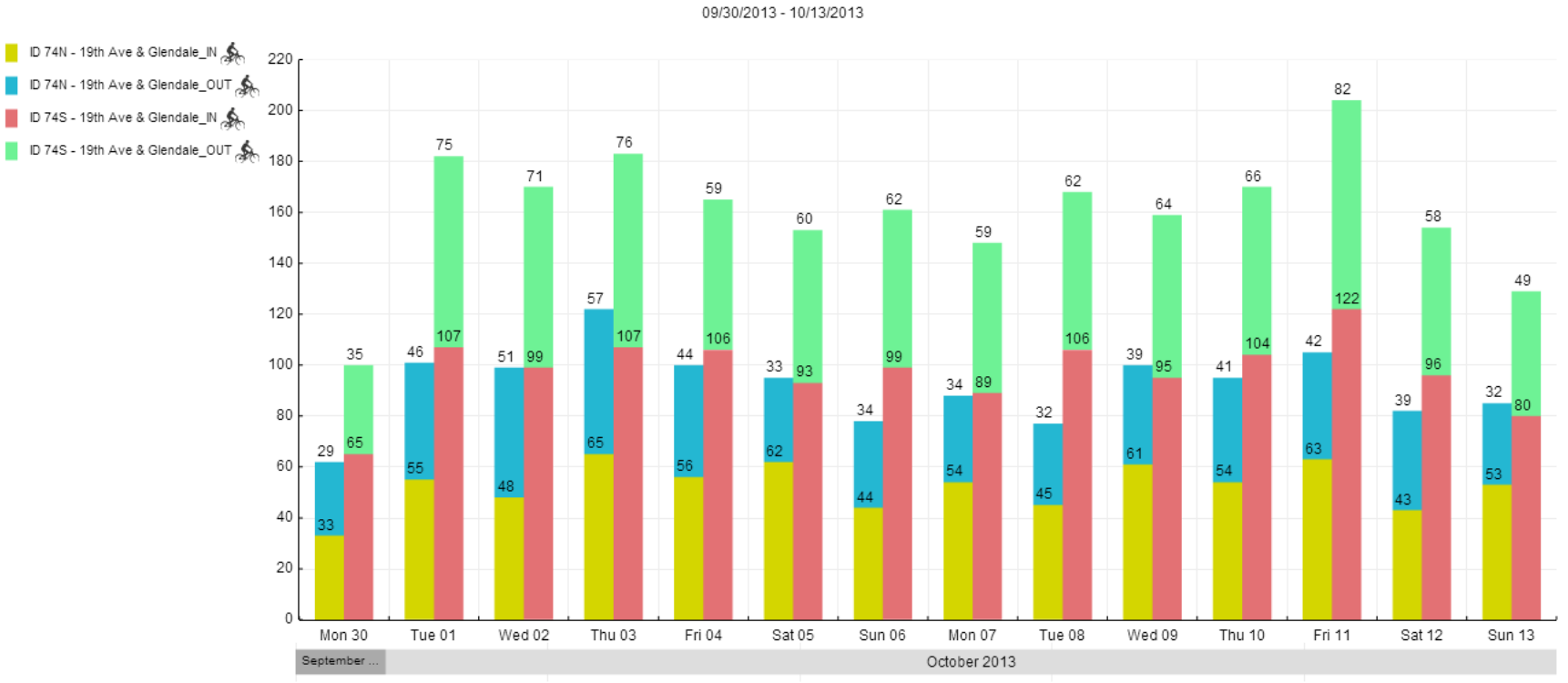
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
Monday, 9/30/2013 Sunday, 10/13/2013	All Counts	Weekend	NA	NA



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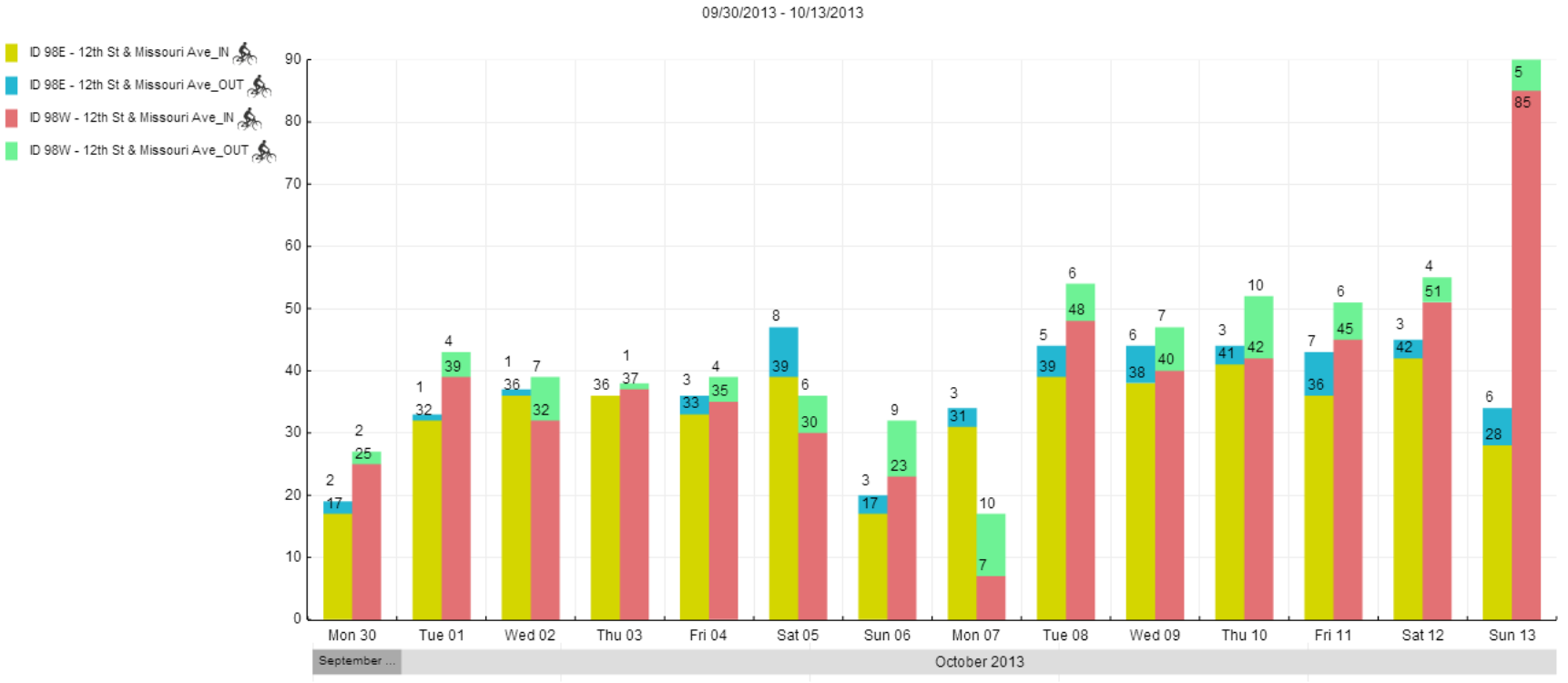
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
Monday, 9/30/2013 Sunday, 10/13/2013	All Counts	Weekend	NA	NA



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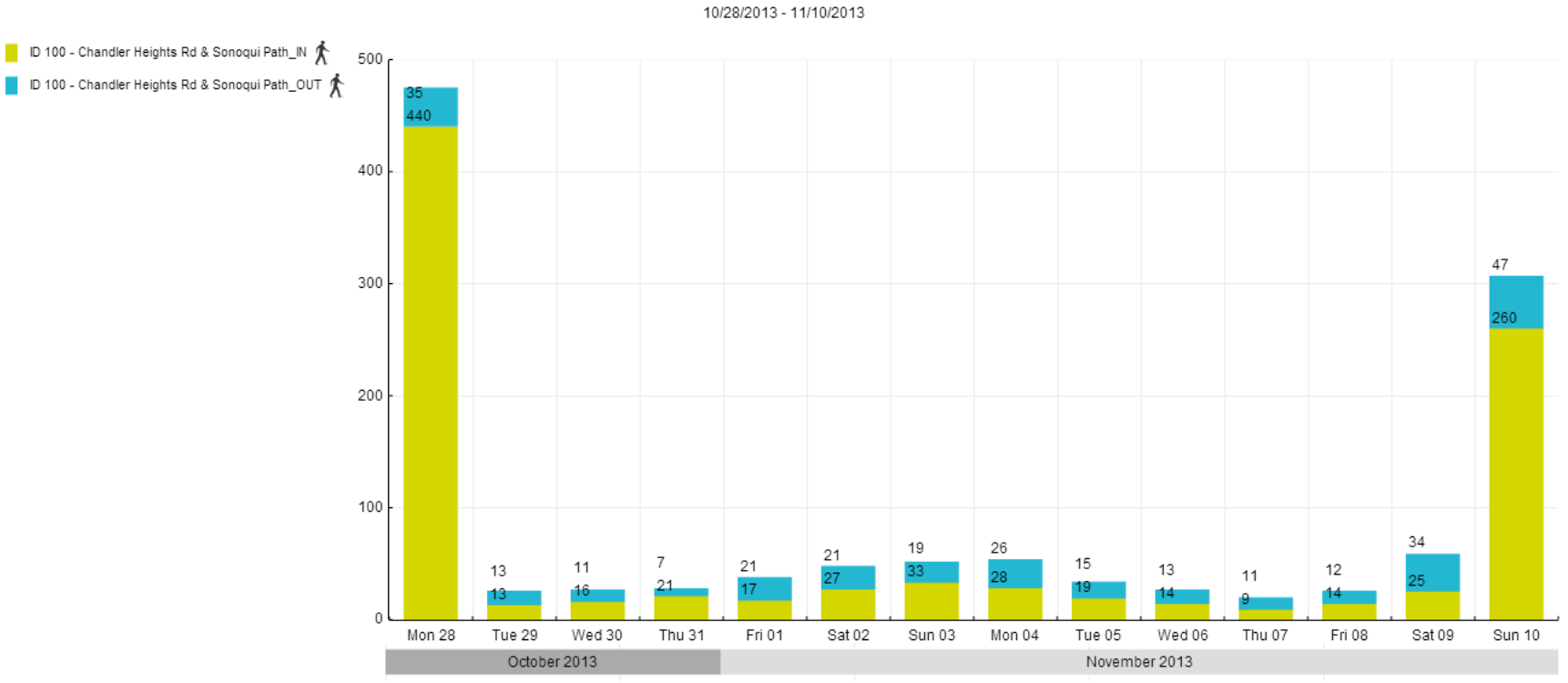
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
Monday, 10/28/2013 Sunday, 11/10/2013	All Counts	Weekend	NA	NA



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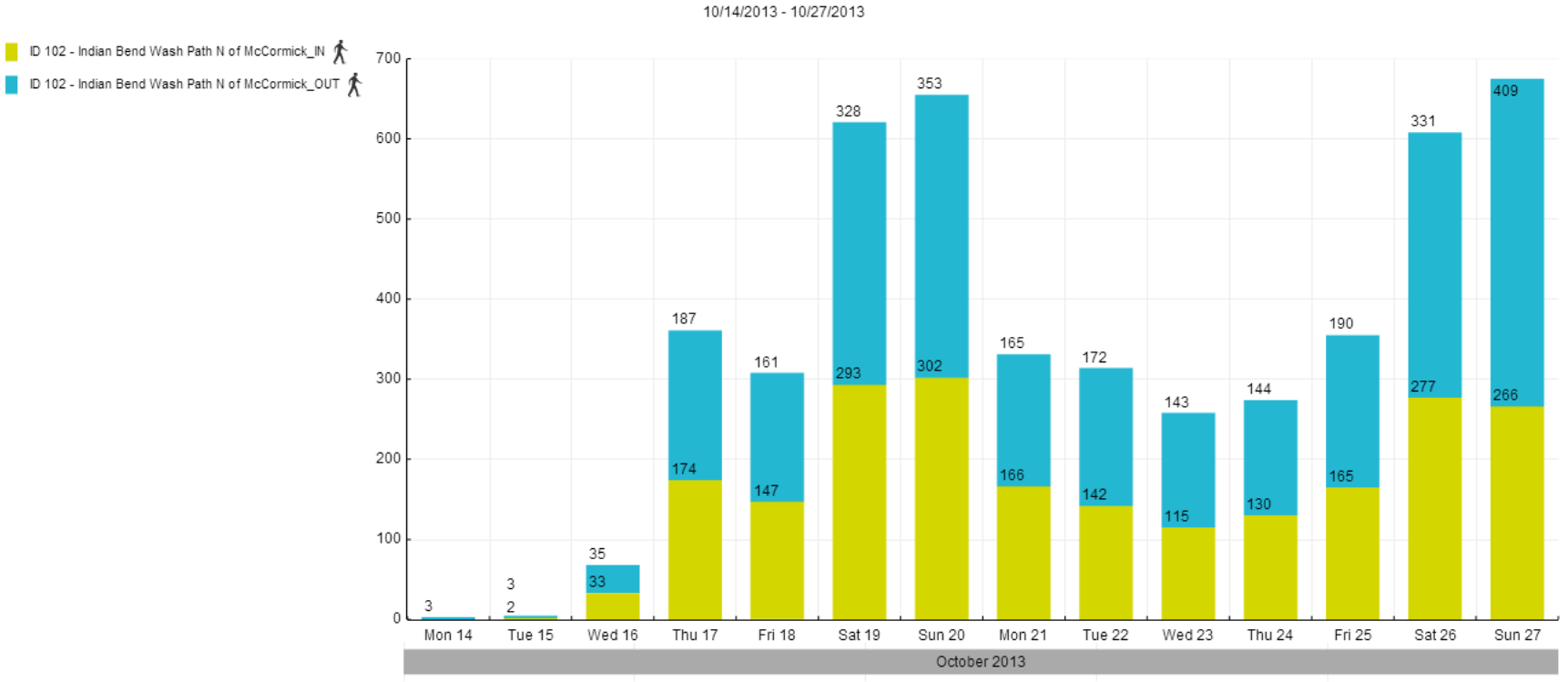
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Tuesday, 10/15/2013 Wednesday, 10/16/2013	All Counts		IN	OUT
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	165	172
Monday, 10/14/2013 Sunday, 10/27/2013	All Counts	Weekend	NA	NA



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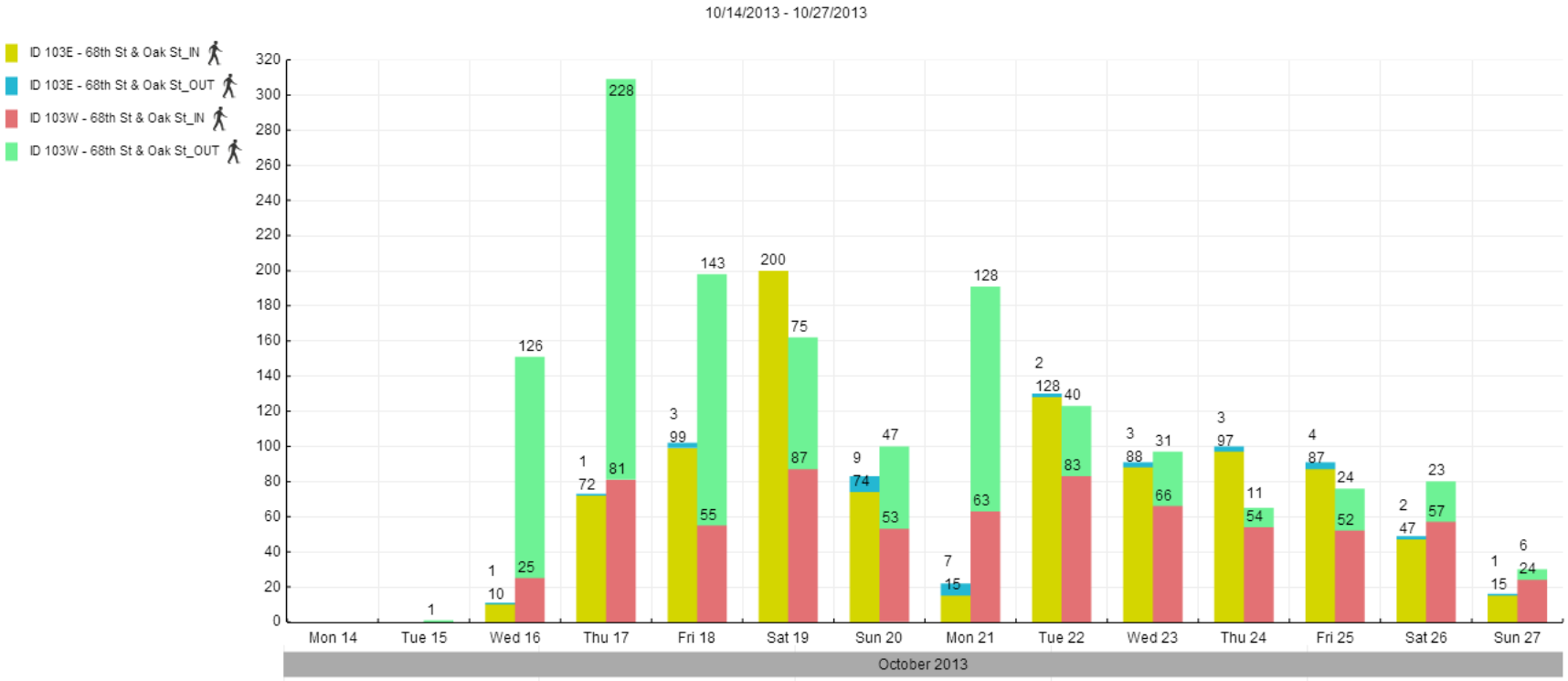
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
All Dates	All Counts	Weekend	NA	NA



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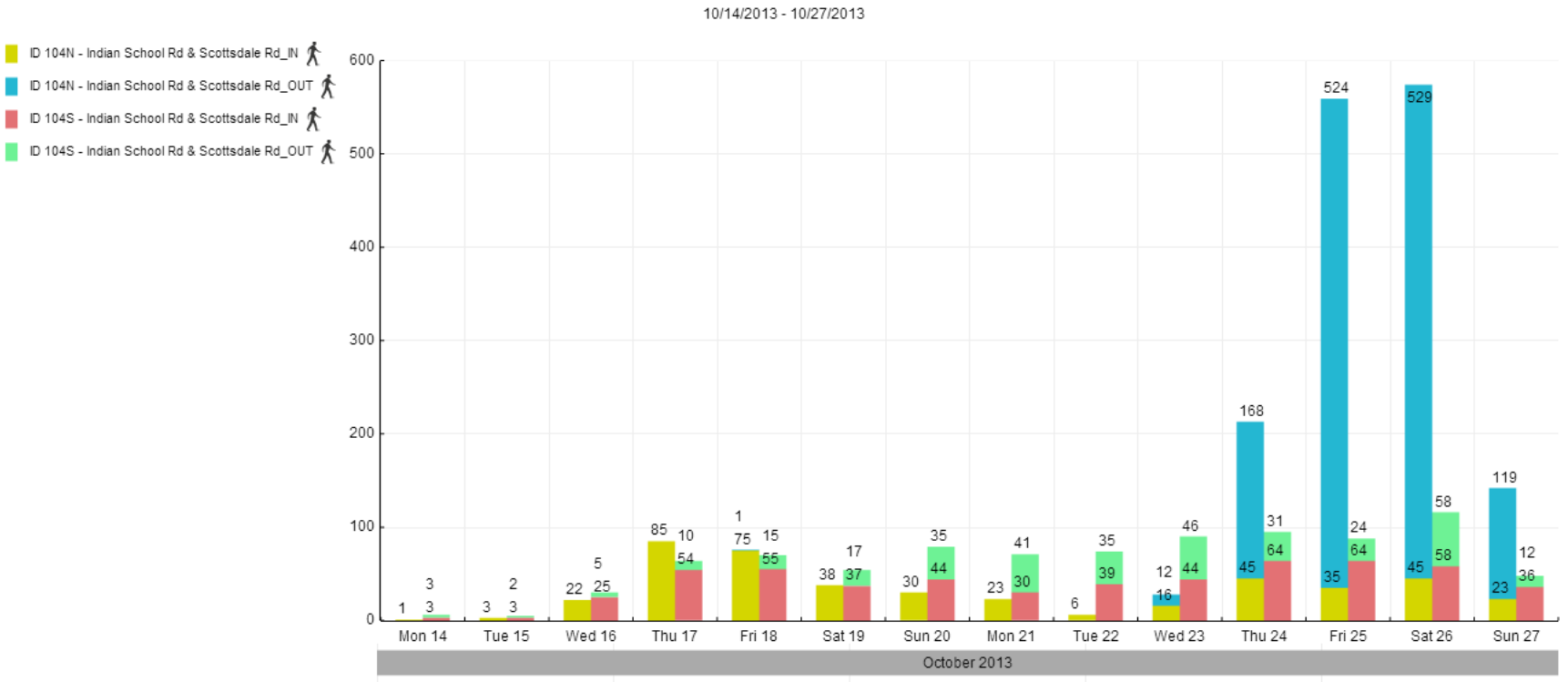
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Thursday, 10/24/2013 Friday, 10/25/2013 Saturday, 10/26/2013	ID 104N - Indian School Rd & Scottsdale Rd_IN ID 104N - Indian School Rd & Scottsdale Rd_OUT		Westbound	Eastbound
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	54	54
Monday, 10/14/2013 Sunday, 10/27/2013	All Counts	Weekend	65	44



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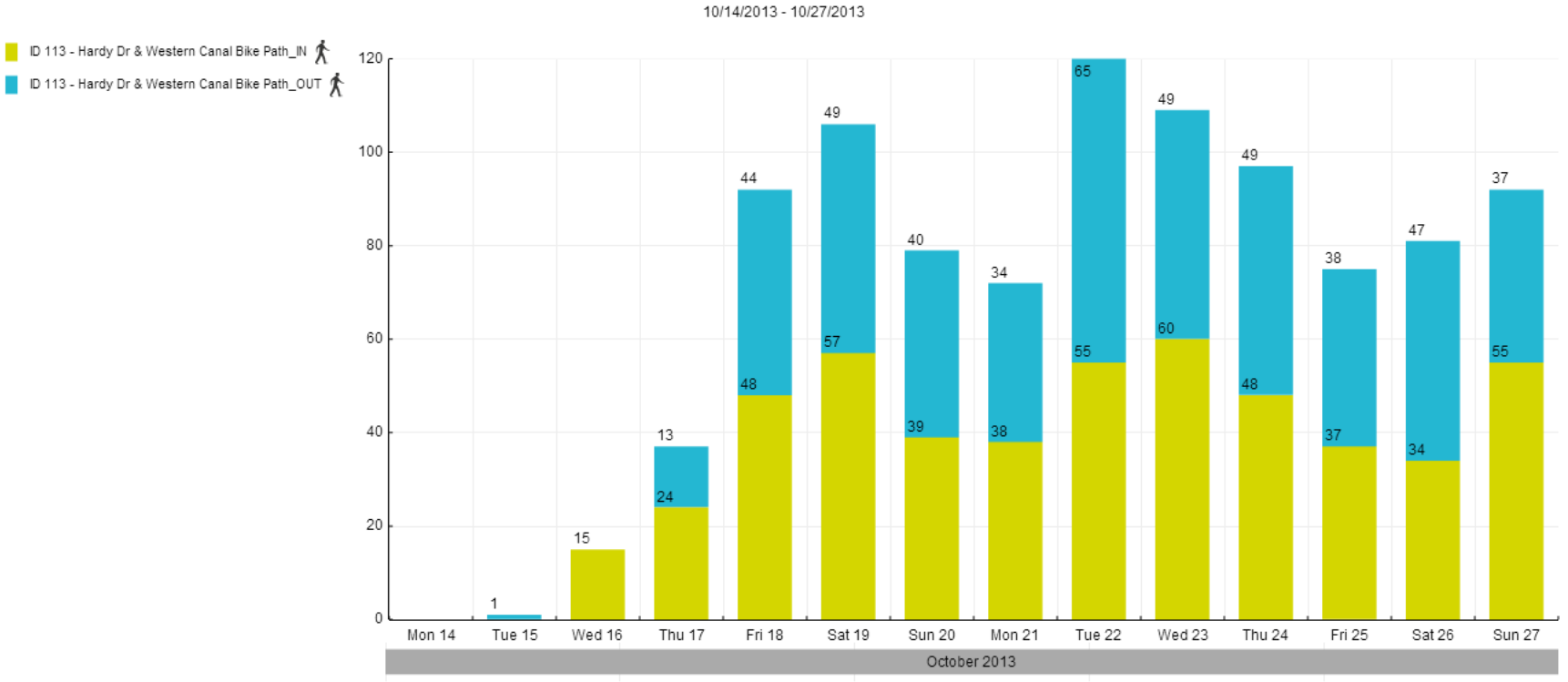
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Tuesday, 10/15/2013 Wednesday, 10/16/2013	All Counts		IN	OUT
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	43.5	45.5
Monday, 10/14/2013 Sunday, 10/27/2013	All Counts	Weekend	NA	NA



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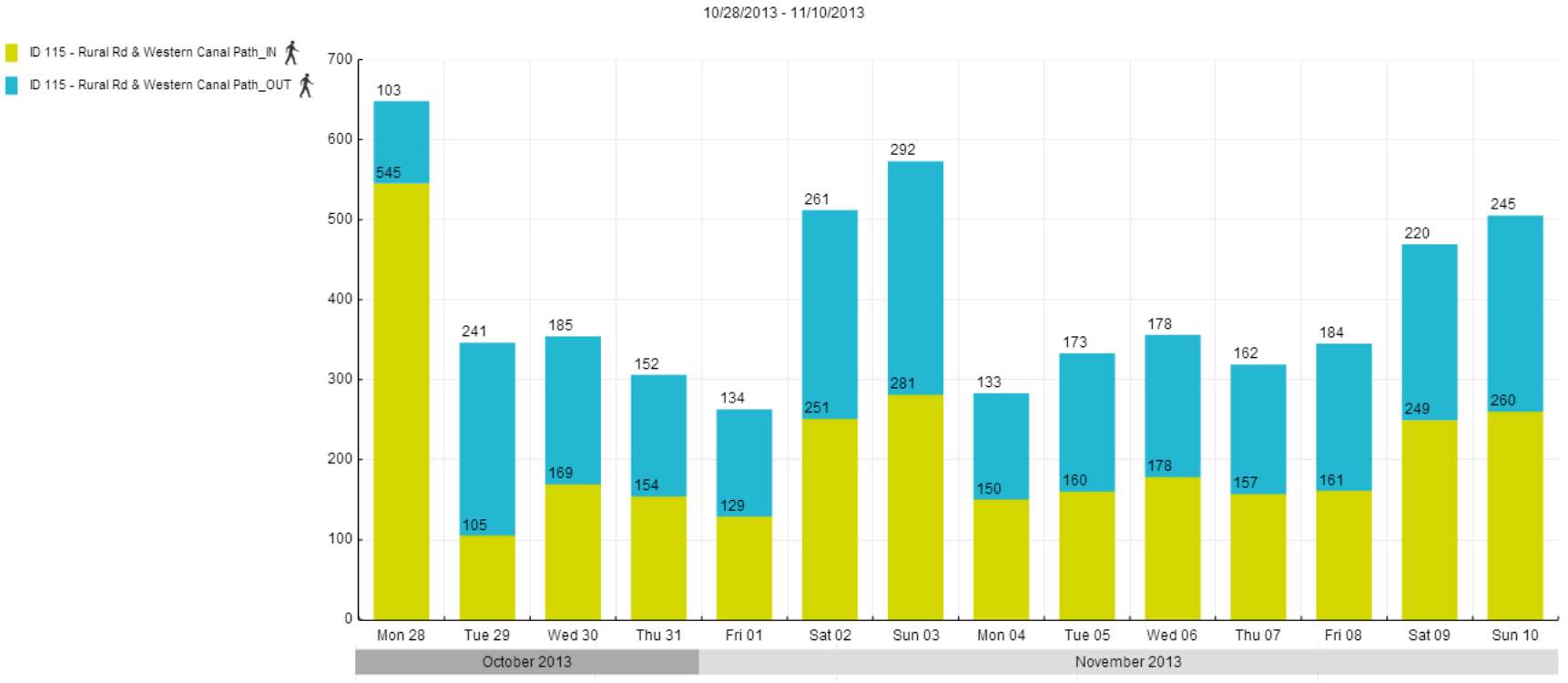
Count Estimation Date(s)	Count ID/Direction	Median Values to Replace Exclusions		
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	NA	NA
Monday, 10/28/2013 Sunday, 11/10/2013	All Counts	Weekend	NA	NA



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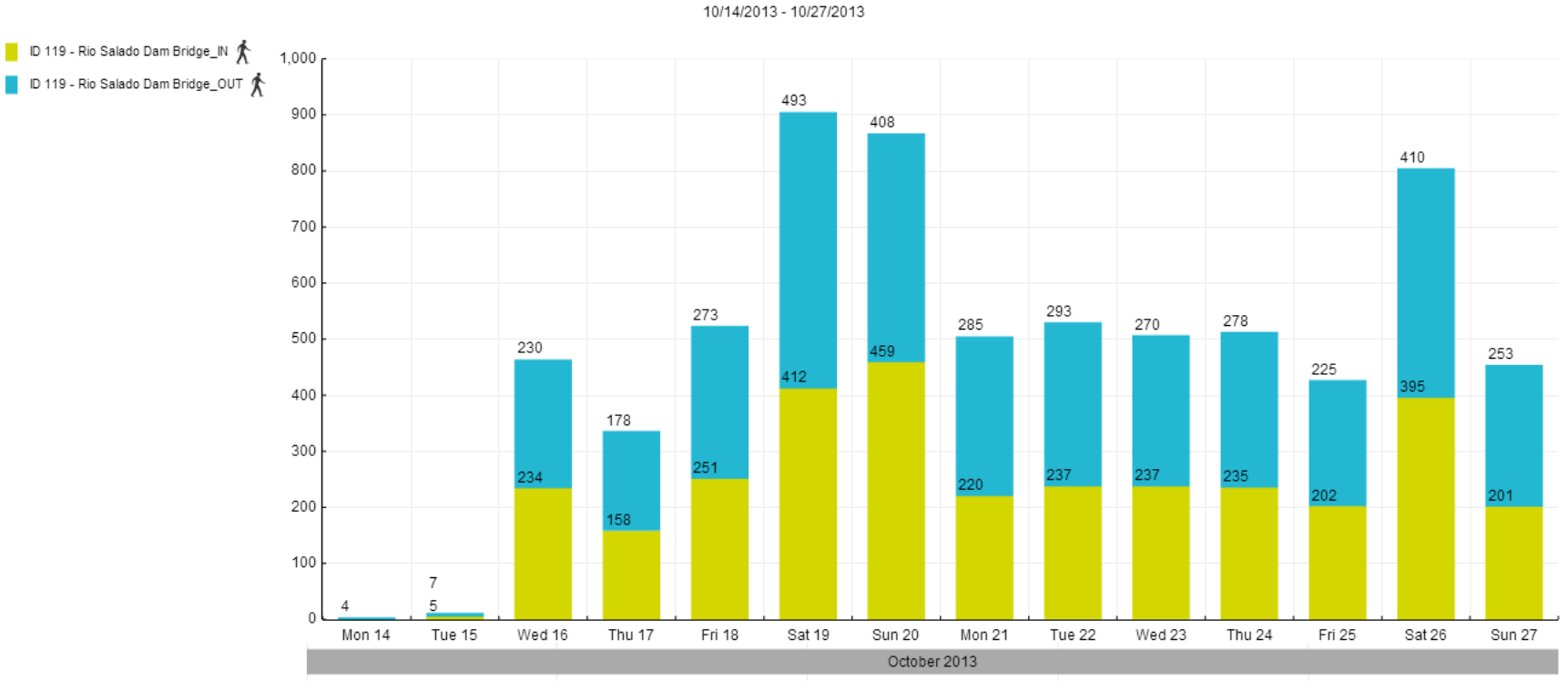
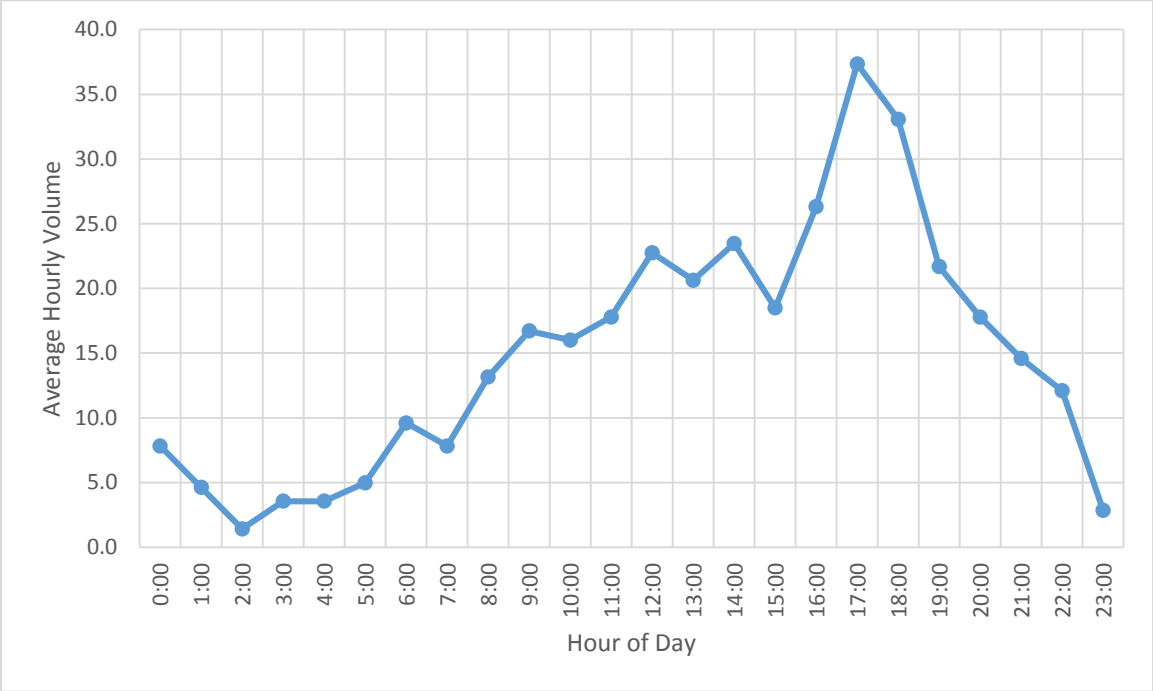
Count Estimation Date(s)	**Count ID/Direction**	**Median Values to Replace Exclusions**		
Tuesday, 10/15/2013	All Counts		IN	OUT
Count Exclusion Date(s)	**Count ID/Direction**	Weekday	235	273
Monday, 10/14/2013 Sunday, 10/27/2013	All Counts	Weekend	NA	NA



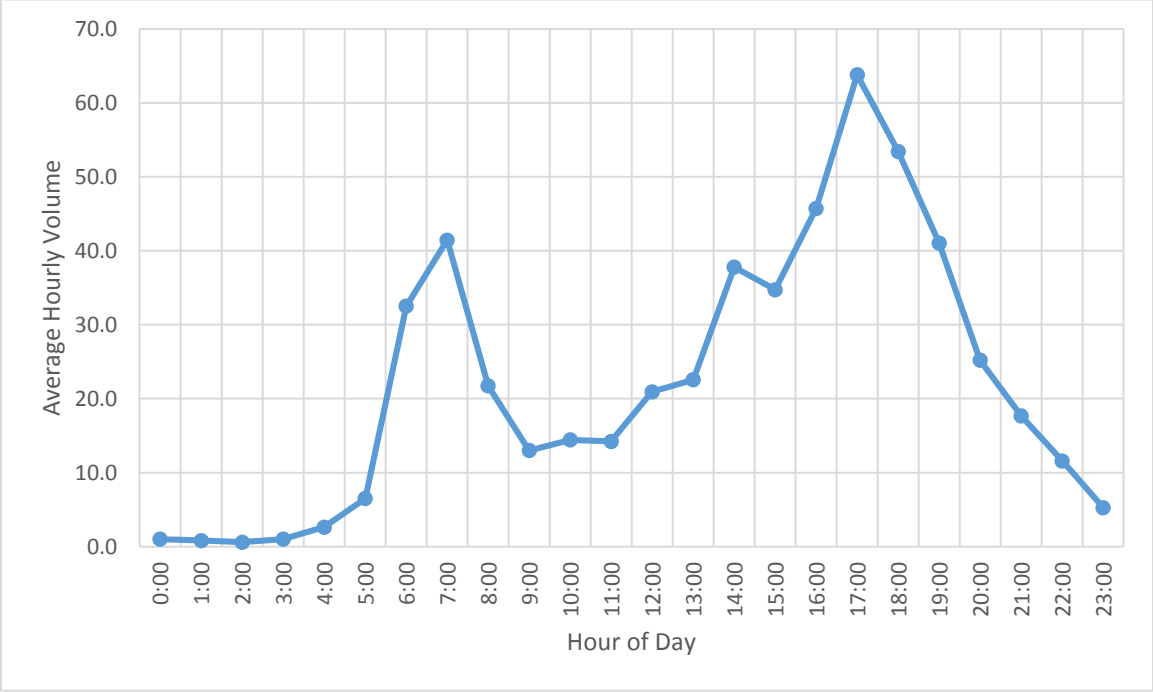
Appendix C
Weekend & Weekday Average Hourly Volumes for Automated Count Sites

Chart C-1: Average Hourly Weekend Bicycle Counts along 107th Avenue (North-South) south of the Intersection of 107th Avenue and Thomas Road – Site ID#1 with Bicycle Lane



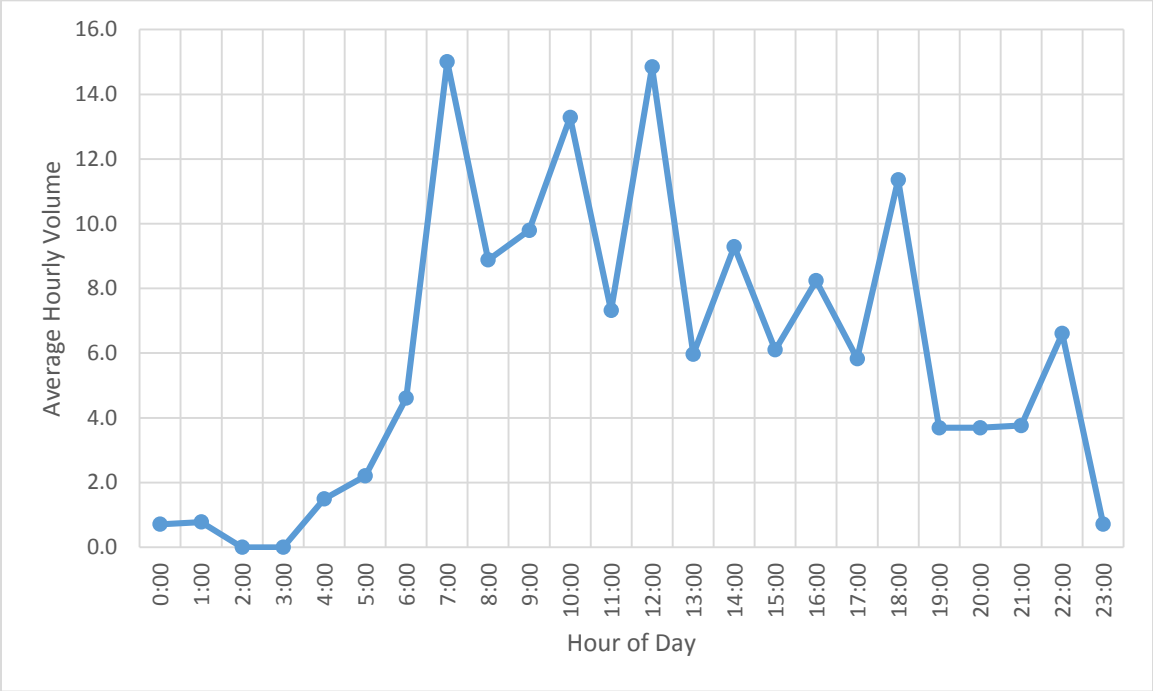
Source: *Chen Ryan Associates, April 2014*

Chart C-2: Average Hourly Weekday Bicycle Counts along 107th Avenue (North-South) south of the Intersection of 107th Avenue and Thomas Road – Site ID#1 with Bicycle Lane



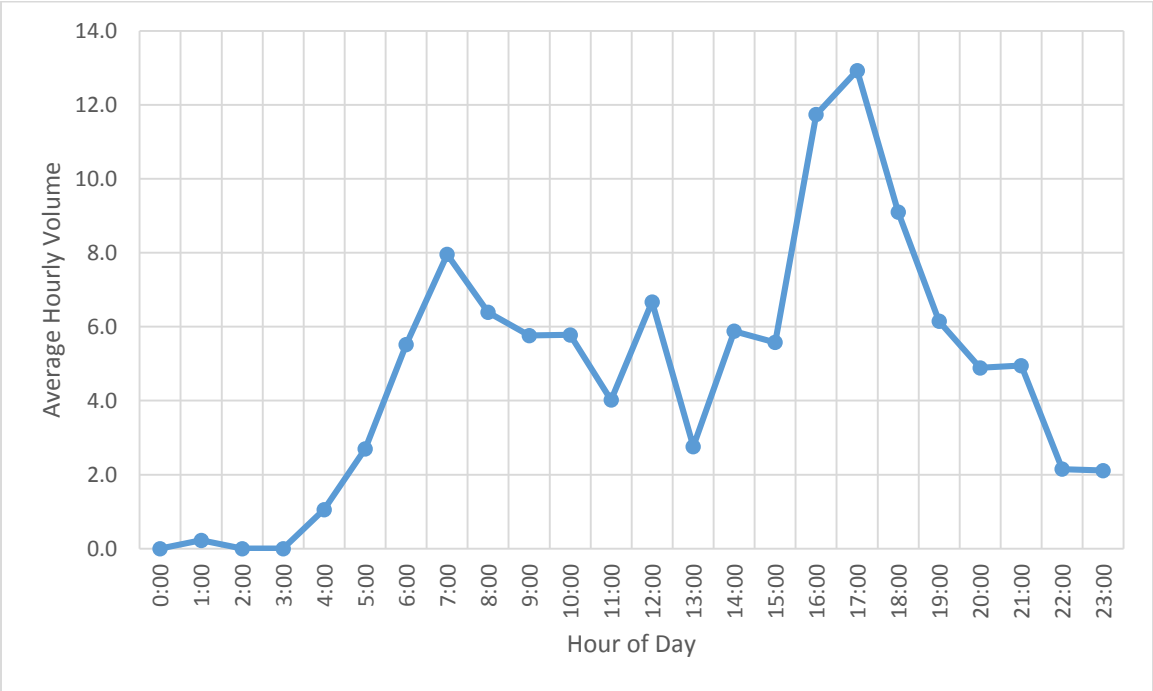
Source: *Chen Ryan Associates, April 2014*

Chart C-3: Average Hourly Weekend Bicycle Counts along Dobson Road (North-South) north of the Intersection of Dobson Road & Frye Road – Site ID#10 with Bicycle Lane



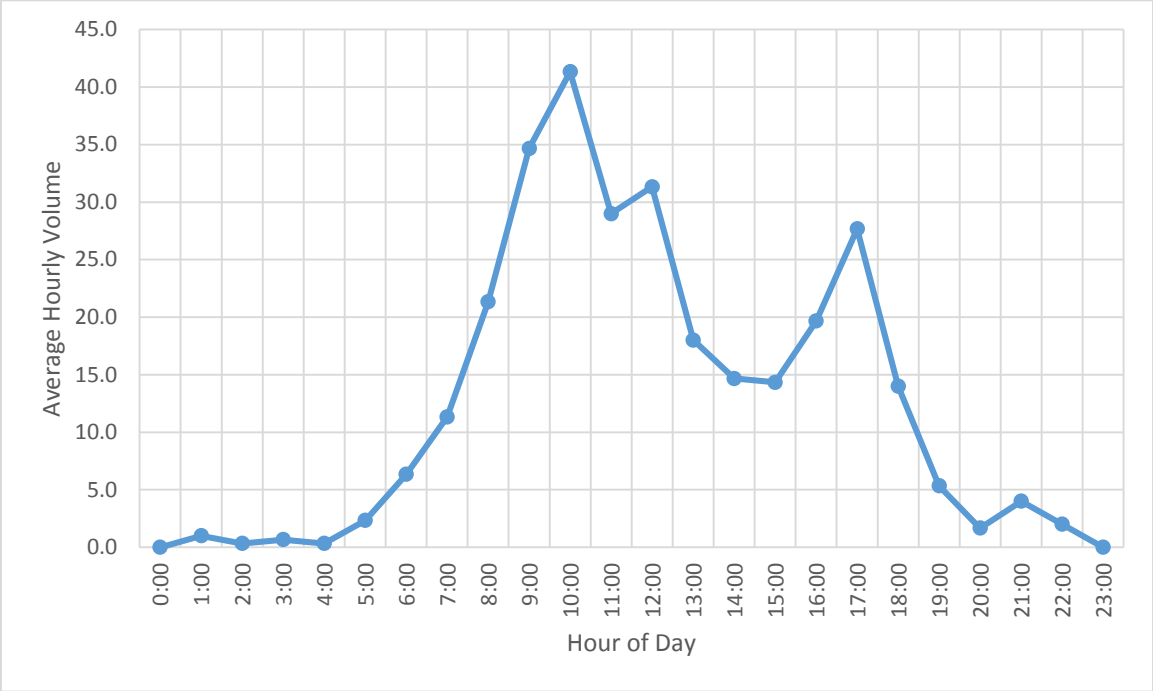
Source: *Chen Ryan Associates, April 2014*

Chart C-4: Average Hourly Weekday Bicycle Counts along Dobson Road (North-South) north of the Intersection of Dobson Road & Frye Road – Site ID#10 with Bicycle Lane



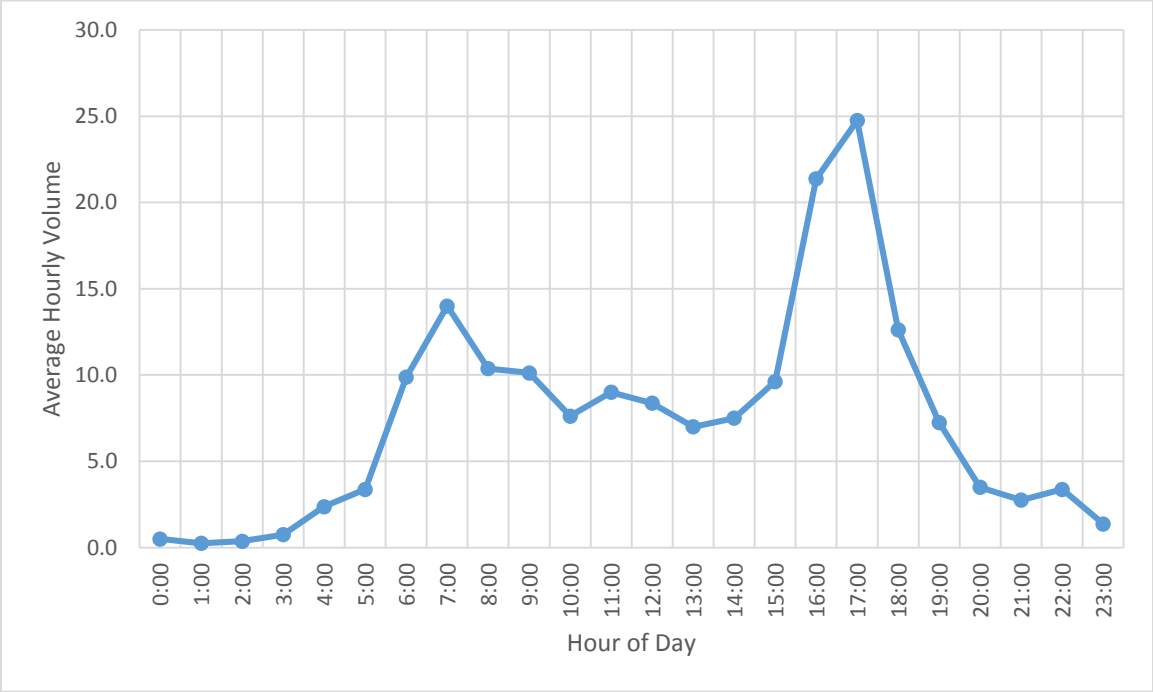
Source: *Chen Ryan Associates, April 2014*

Chart C-5: Average Hourly Weekend Bicycle Counts along the Western Canal Bike Path (East-West) west of Dobson Road – Site ID#13 with Bike Path



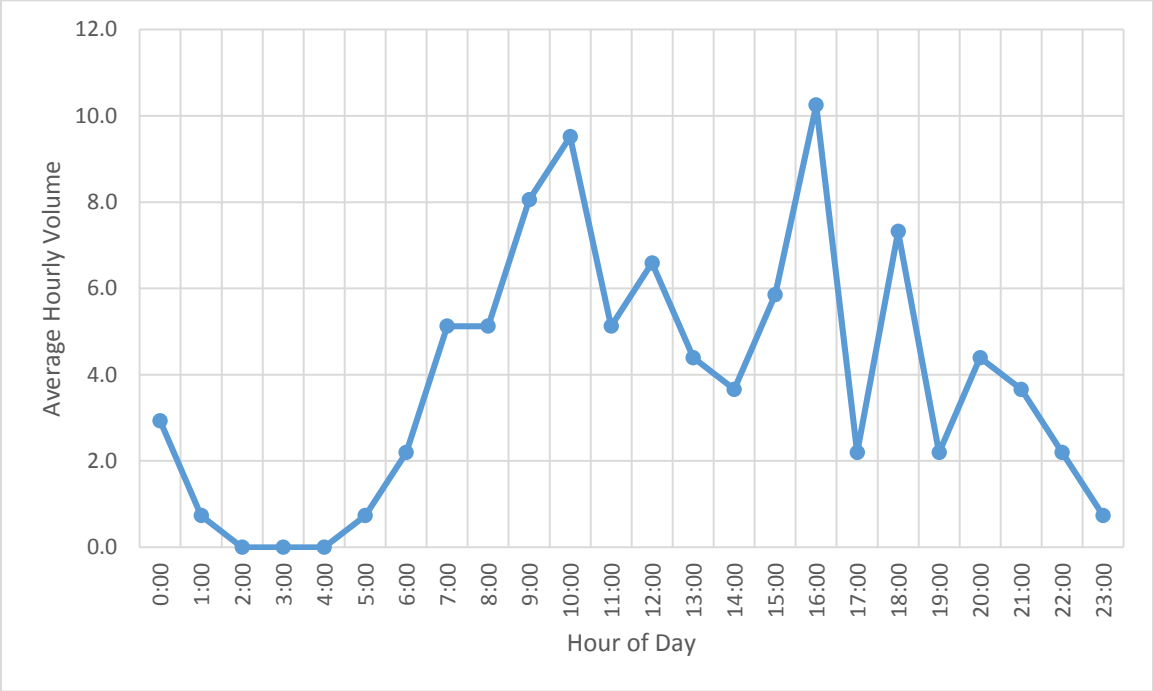
Source: *Chen Ryan Associates, April 2014*

Chart C-6: Average Hourly Weekday Bicycle Counts along the Western Canal Bike Path (East-West) west of Dobson Road – Site ID#13 with Bike Path



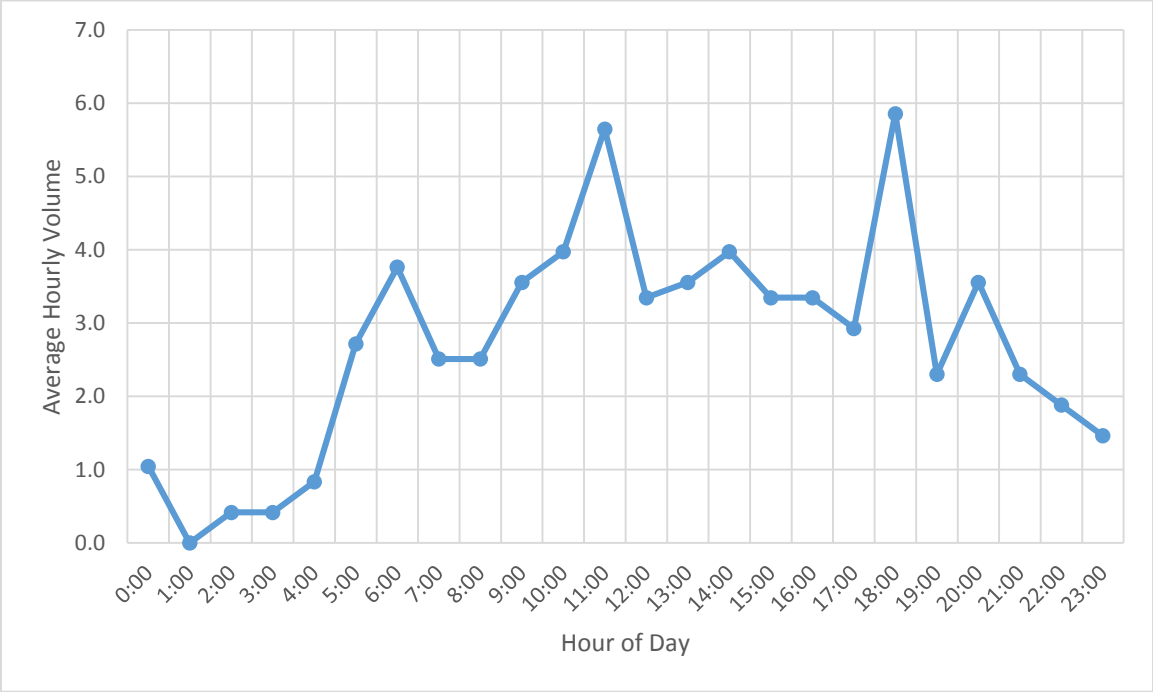
Source: *Chen Ryan Associates, April 2014*

Chart C-7: Average Hourly Weekend Bicycle Counts along El Mirage Road (North-South) south of the intersection of El Mirage Road & Thunderbird Road – Site ID#16 without Bicycle Facility



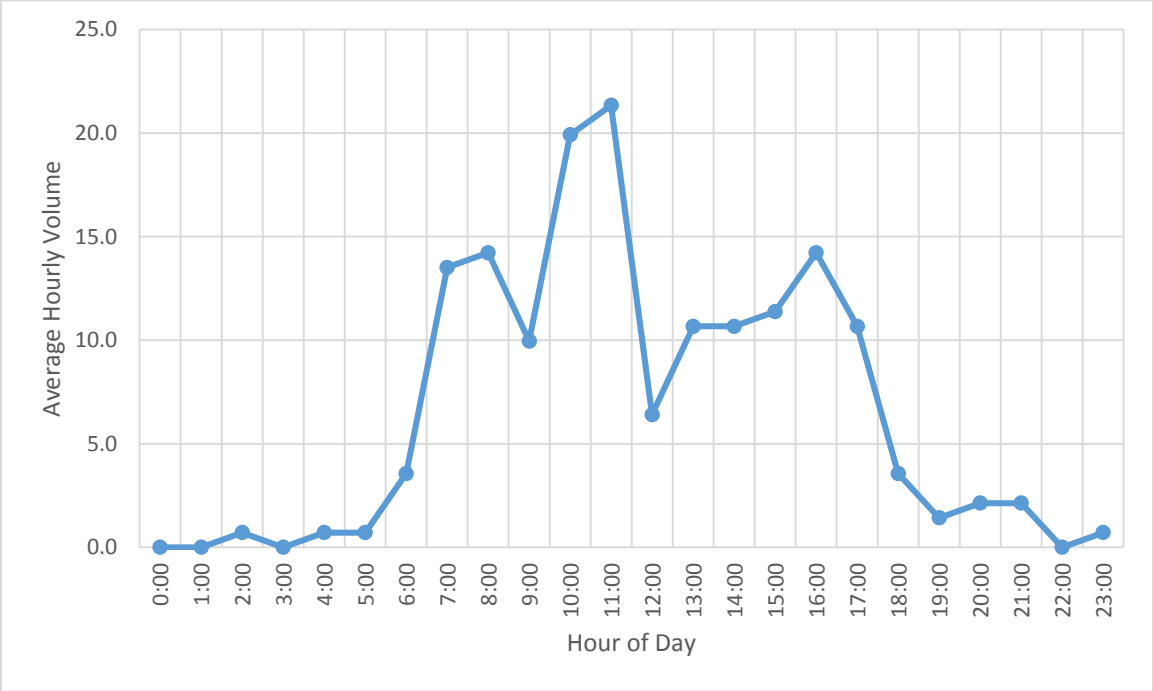
Source: *Chen Ryan Associates, April 2014*

Chart C-8: Average Hourly Weekday Bicycle Counts along El Mirage Road (North-South) south of the intersection of El Mirage Road & Thunderbird Road – Site ID#16 without Bicycle Facility



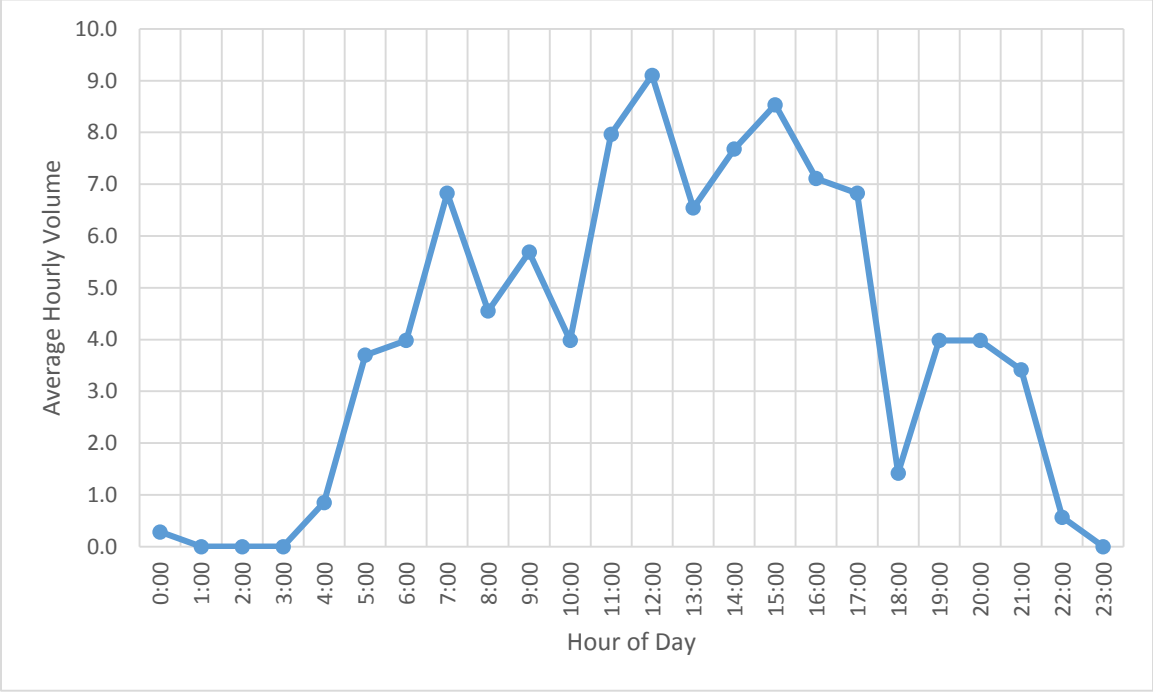
Source: *Chen Ryan Associates, April 2014*

Chart C-9: Average Hourly Weekend Bicycle Counts along Guadalupe Road (East-West) west of the Intersection of Greenfield Road & Guadalupe Road – Site ID#18 with Bicycle Lane



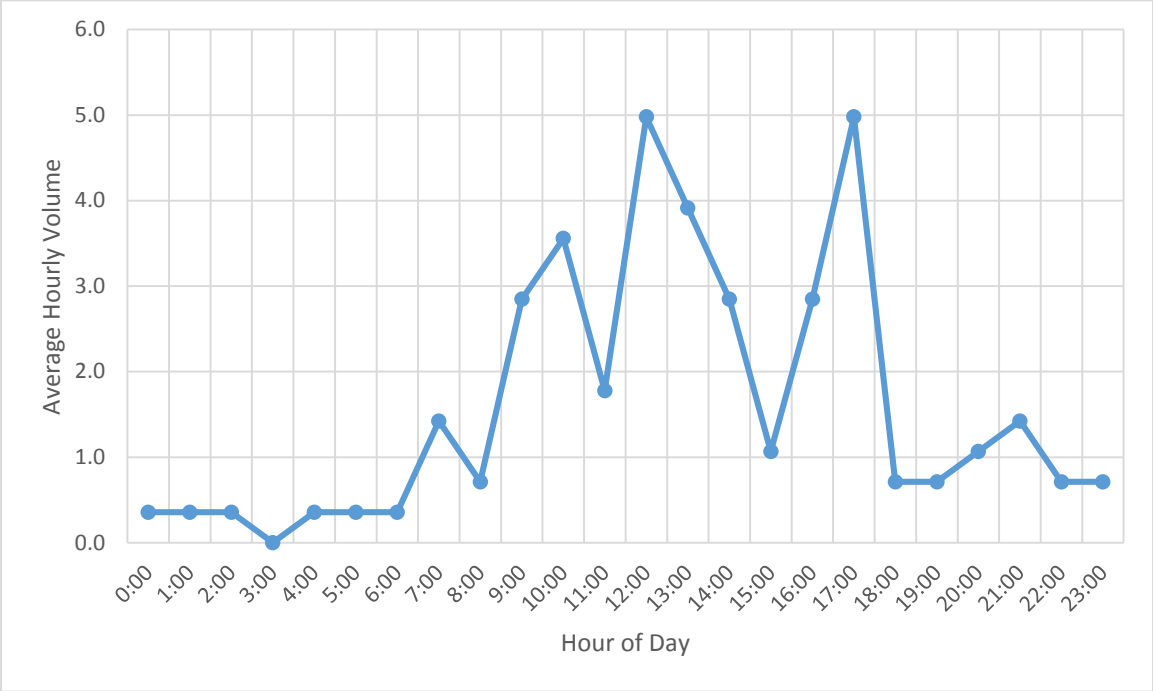
Source: *Chen Ryan Associates, April 2014*

Chart C-10: Average Hourly Weekday Bicycle Counts along Guadalupe Road (East-West) west of the Intersection of Greenfield Road & Guadalupe Road – Site ID#18 with Bicycle Lane



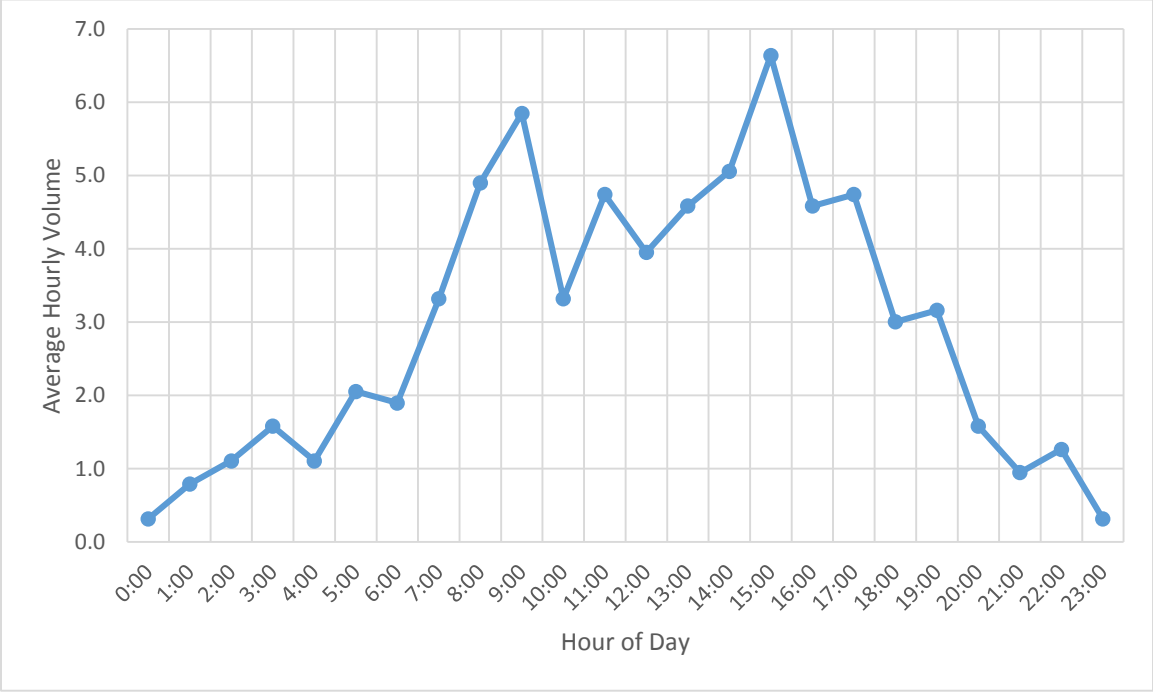
Source: *Chen Ryan Associates, April 2014*

Chart C-11: Average Hourly Weekend Bicycle Counts along Maryland Avenue (East-West) west of the Intersection of 61st Avenue & Maryland Avenue – Site ID#24 with Bicycle Lane



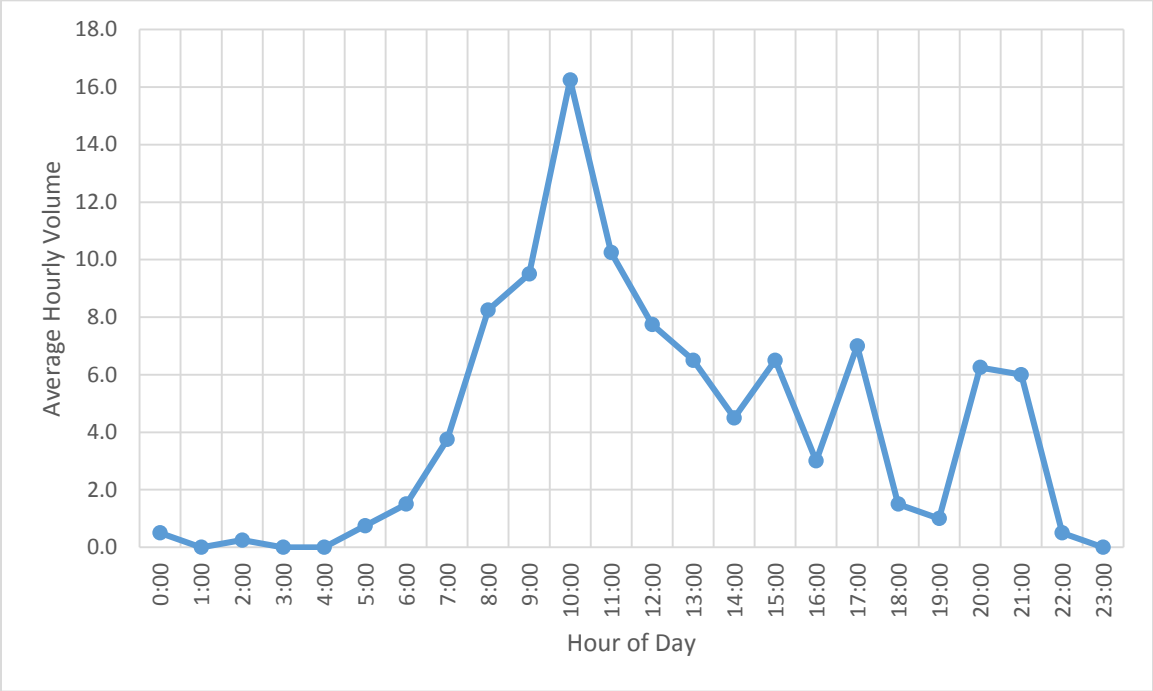
Source: *Chen Ryan Associates, April 2014*

Chart C-12: Average Hourly Weekday Bicycle Counts along Maryland Avenue (East-West) west of the Intersection of 61st Avenue & Maryland Avenue – Site ID#24 with Bicycle Lane



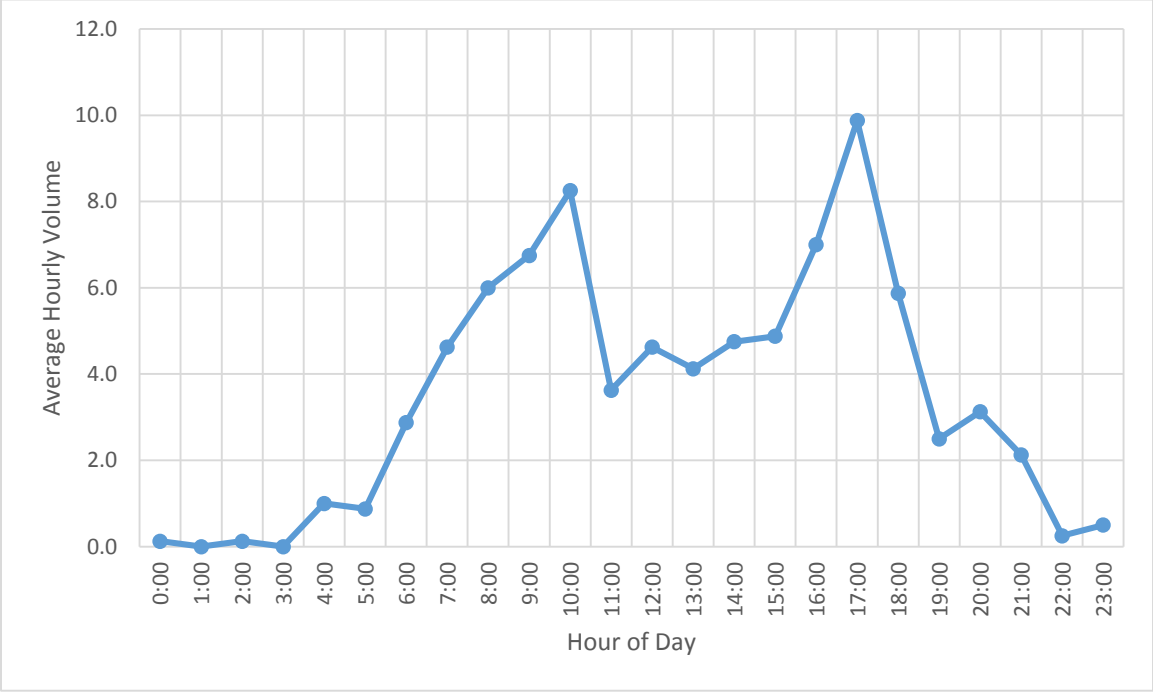
Source: *Chen Ryan Associates, April 2014*

Chart C-13: Average Hourly Weekend Bicycle Counts along the 63rd Avenue Bicycle & Pedestrian Bridge over the Loop 101 (North-South) – Site ID#25 with Bicycle Path



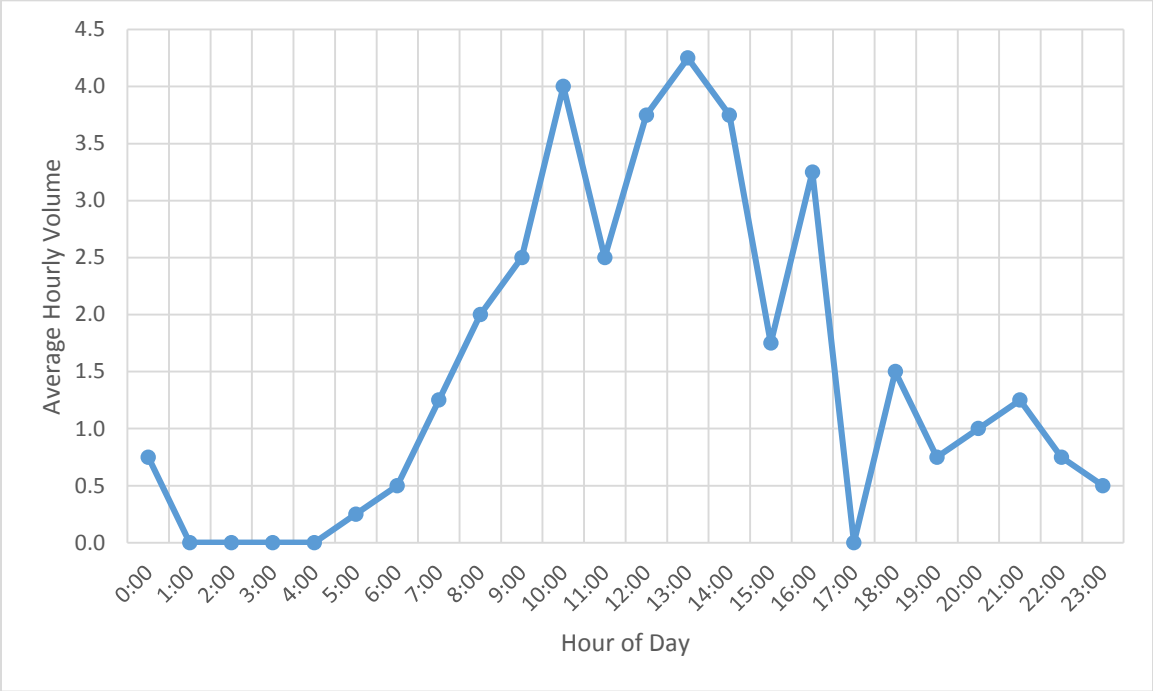
Source: *Chen Ryan Associates, April 2014*

Chart C-14: Average Hourly Weekday Bicycle Counts along the 63rd Avenue Bicycle & Pedestrian Bridge over the Loop 101 (North-South) – Site ID#25 with Bicycle Path



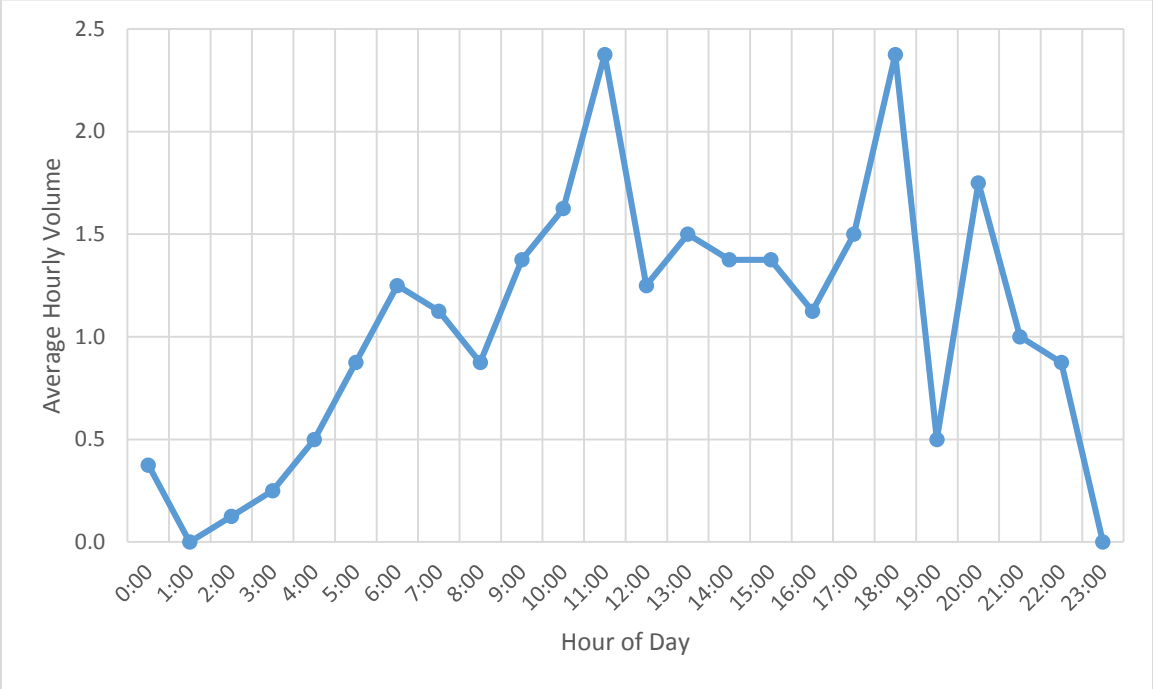
Source: *Chen Ryan Associates, April 2014*

Chart C-15: Average Hourly Weekend Bicycle Counts along the South Side of the Arizona Canal Bike Path (East-West) east of 51st – Site ID#26 with Bicycle Path



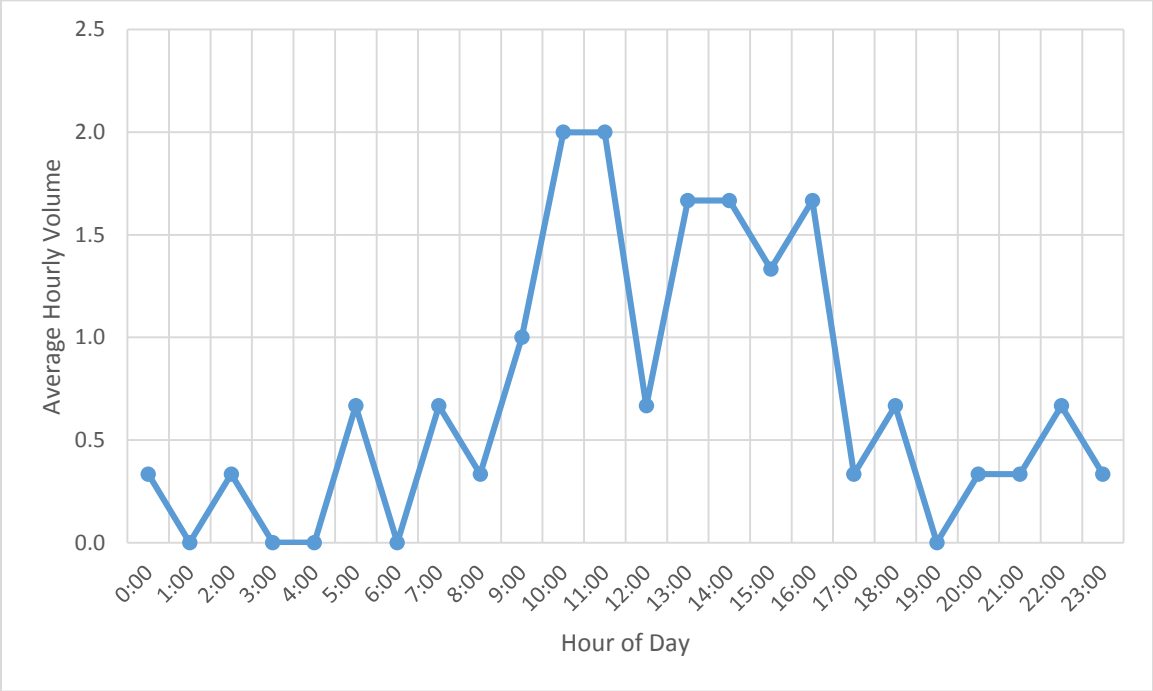
Source: *Chen Ryan Associates, April 2014*

Chart C-16: Average Hourly Weekday Bicycle Counts along the South Side of the Arizona Canal Bike Path (East-West) east of 51st – Site ID#26 with Bicycle Path



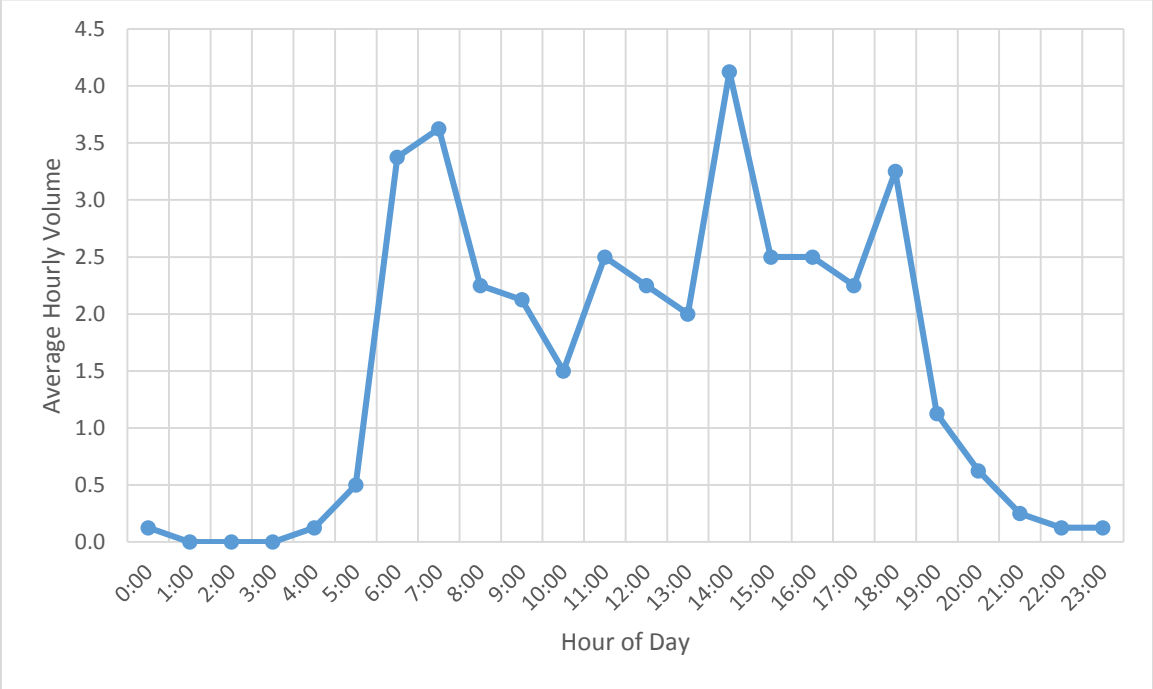
Source: *Chen Ryan Associates, April 2014*

Chart C-17: Average Hourly Weekend Bicycle Counts along Camelback Road (East-West) east of the Intersection of Litchfield Road & Camelback Road – Site ID#35 with Bicycle Lane



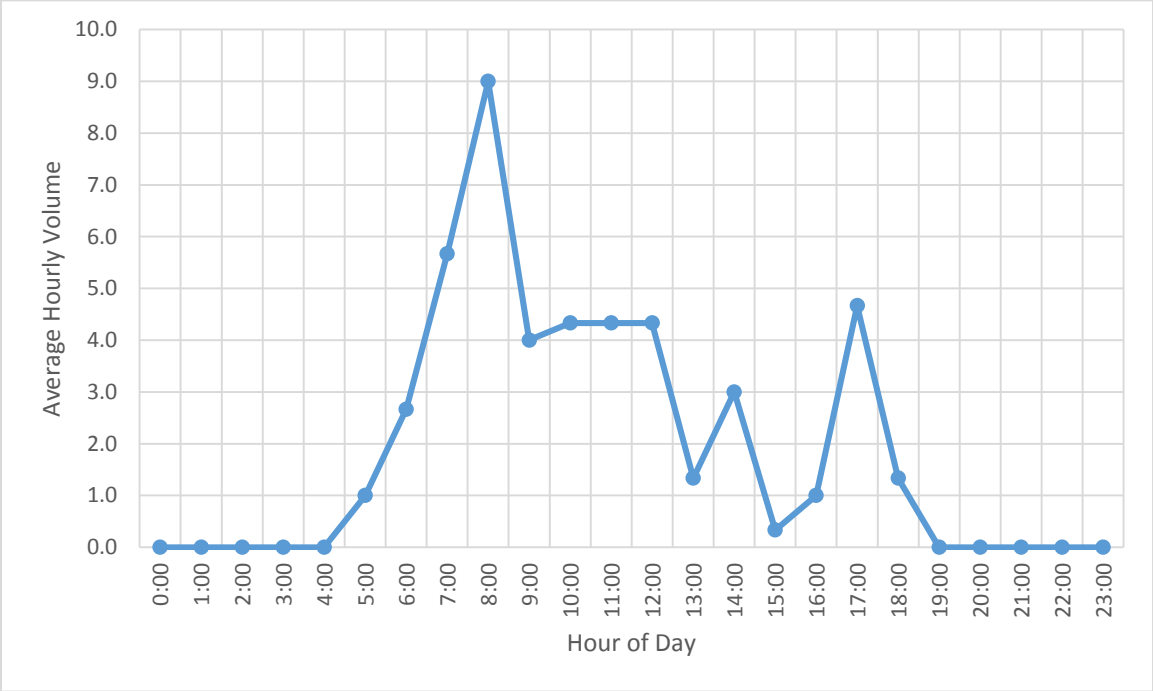
Source: *Chen Ryan Associates, April 2014*

Chart C-18: Average Hourly Weekday Bicycle Counts along Camelback Road (East-West) east of the Intersection of Litchfield Road & Camelback Road – Site ID#35 with Bicycle Lane



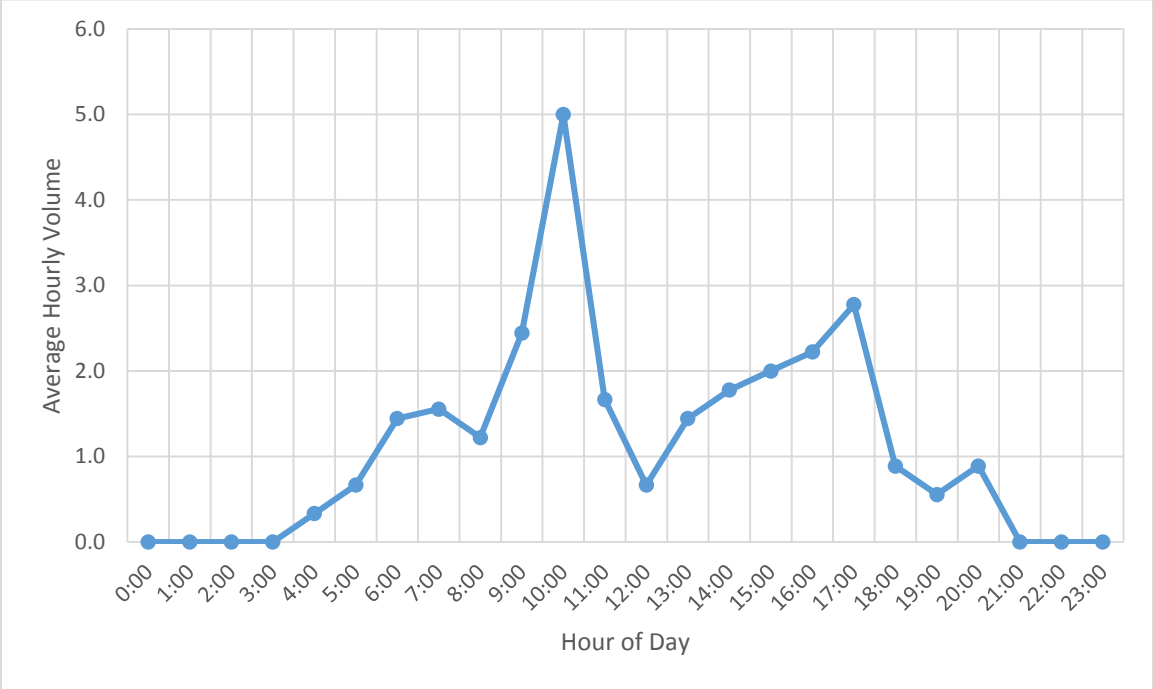
Source: *Chen Ryan Associates, April 2014*

Chart C-19: Average Hourly Weekend Bicycle Counts along Gavilan Peak Parkway (North-South) south of the Intersection of Gavilan Peak Parkway & Pioneer Road – Site ID#39 with Bicycle Lane



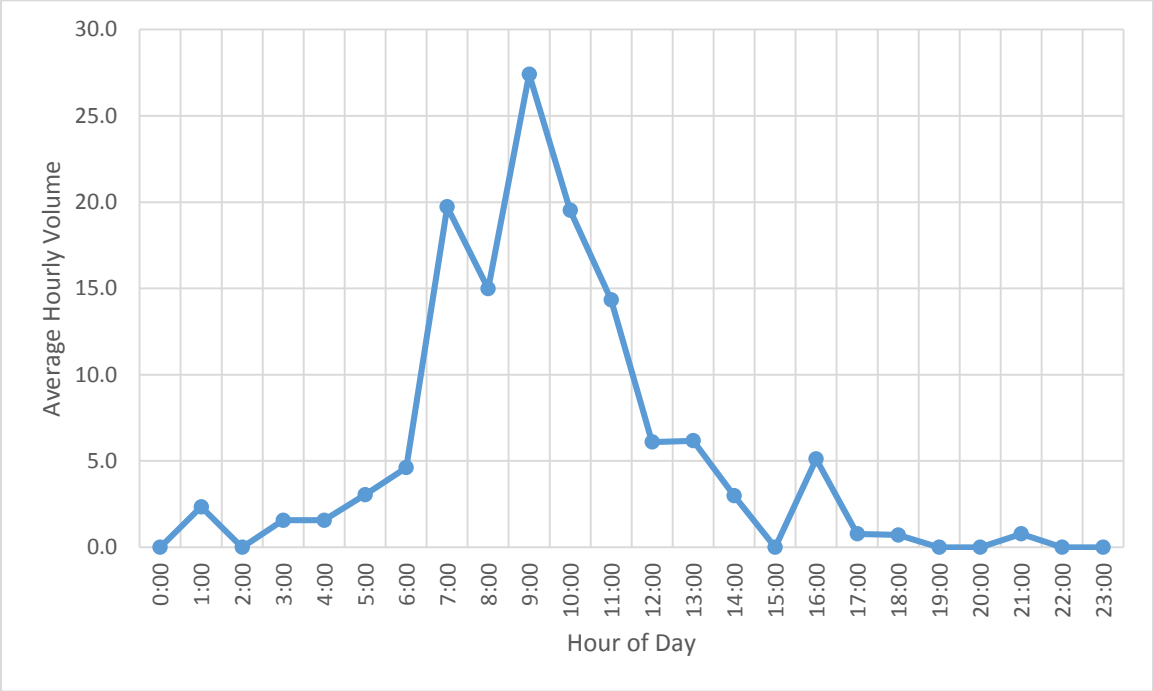
Source: *Chen Ryan Associates, April 2014*

Chart C-20: Average Hourly Weekday Bicycle Counts along Gavilan Peak Parkway (North-South) south of the Intersection of Gavilan Peak Parkway & Pioneer Road – Site ID#39 with Bicycle Lane



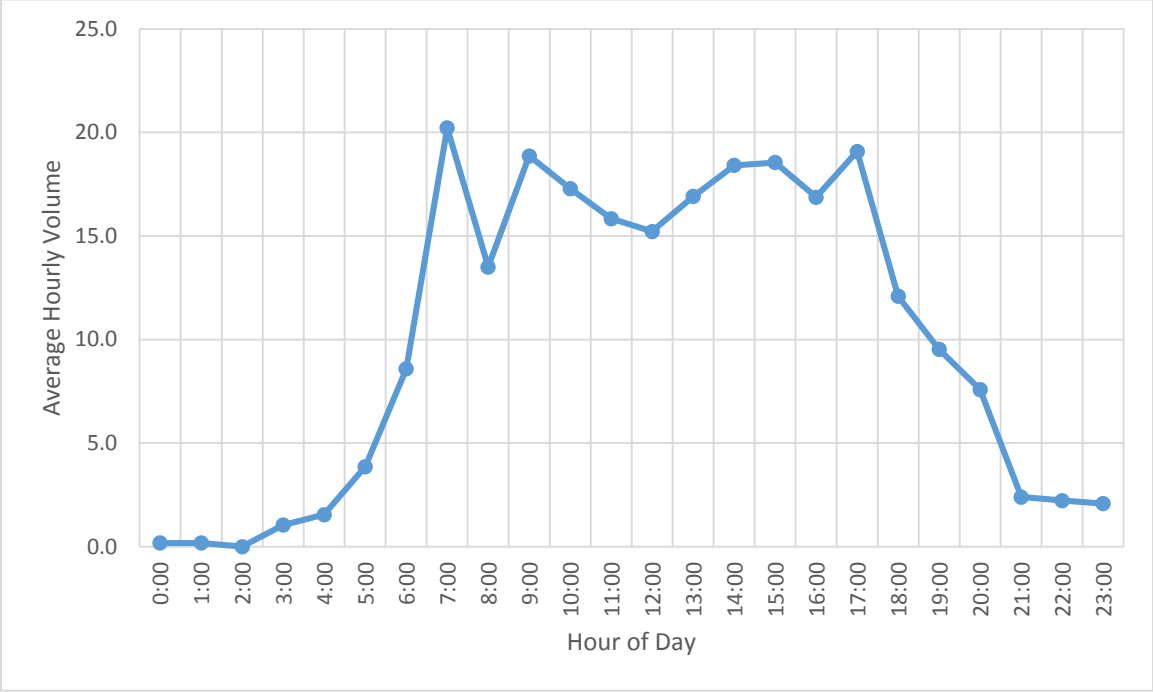
Source: *Chen Ryan Associates, April 2014*

Chart C-21: Average Hourly Weekend Bicycle Counts along Ellsworth Road (North-South) south of the Intersection of Ellsworth Road & McLellan Road – Site ID#40 with Bicycle Lane



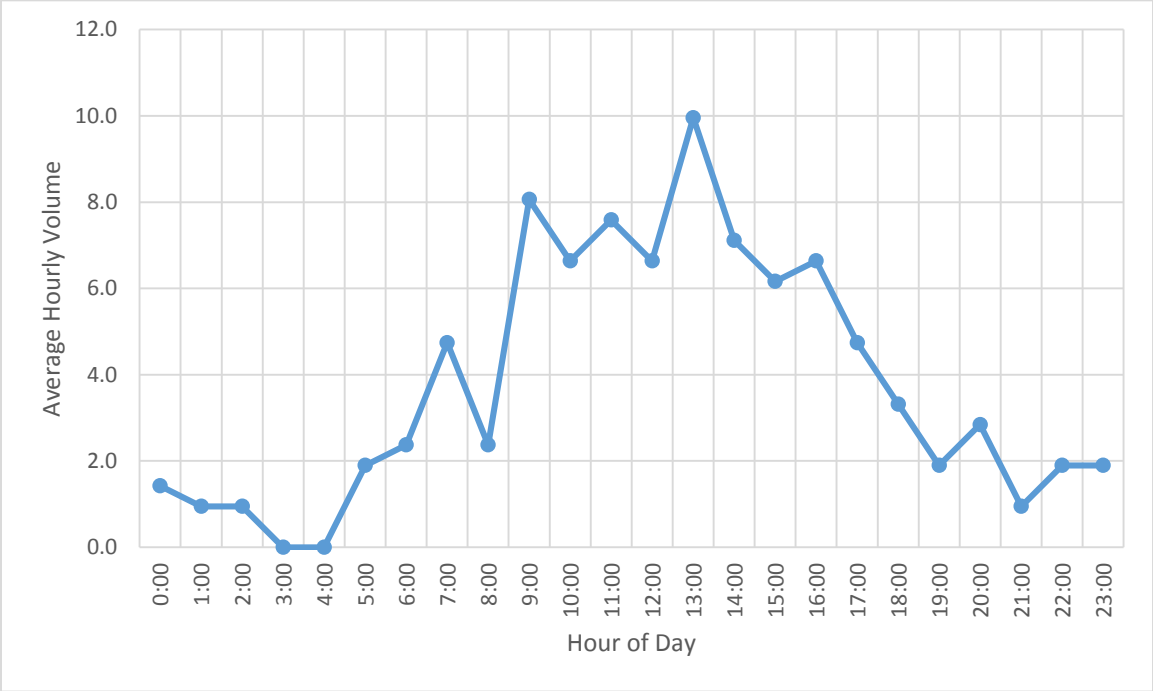
Source: *Chen Ryan Associates, April 2014*

Chart C-22: Average Hourly Weekday Bicycle Counts along Ellsworth Road (North-South) south of the Intersection of Ellsworth Road & McLellan Road – Site ID#40 with Bicycle Lane



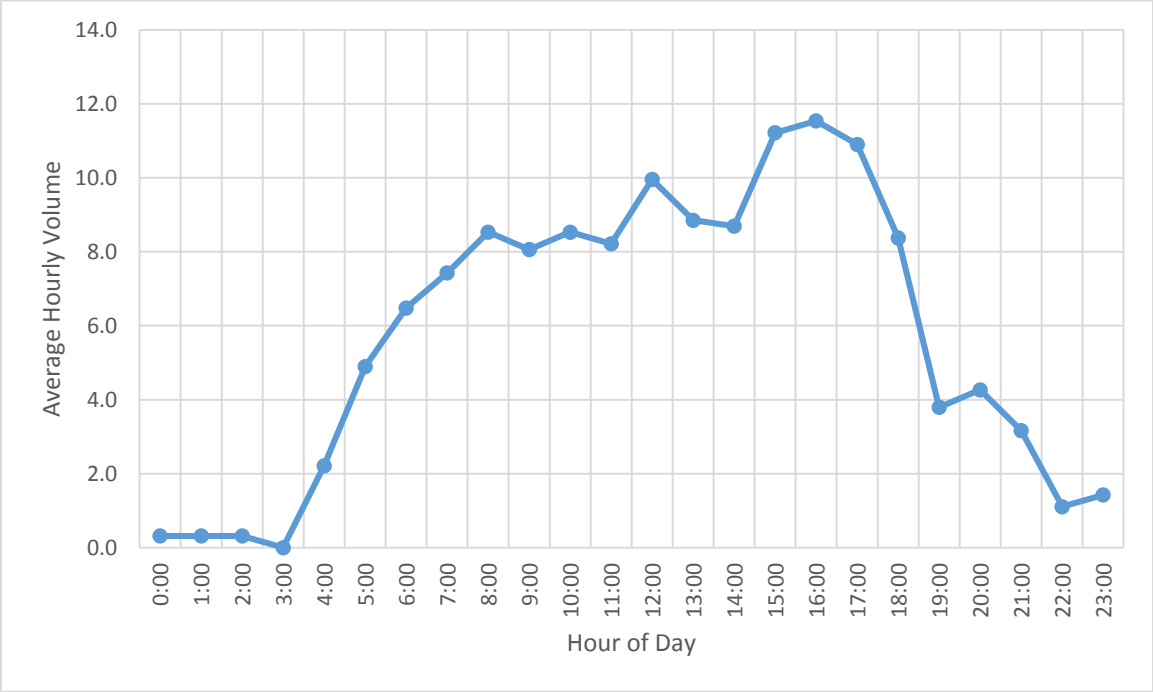
Source: *Chen Ryan Associates, April 2014*

Chart C-23: Average Hourly Weekend Bicycle Counts along University Drive (East-West) east of the Intersection of Gilbert Road & University Drive – Site ID#41 with Bicycle Lane



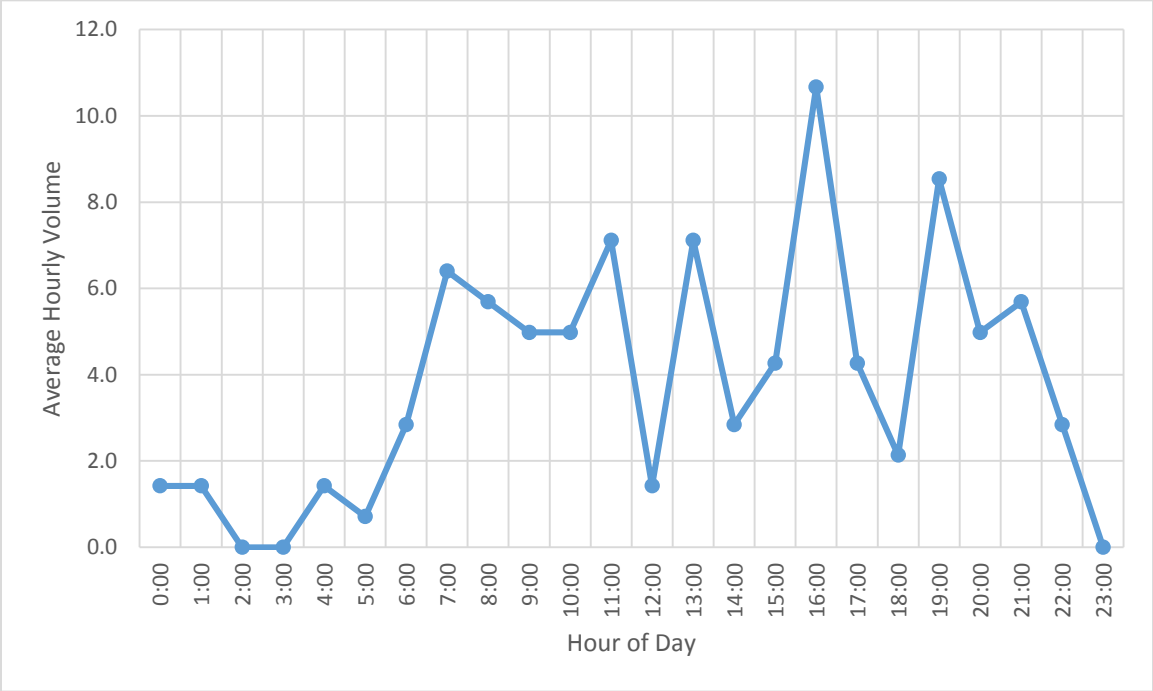
Source: *Chen Ryan Associates, April 2014*

Chart C-24: Average Hourly Weekday Bicycle Counts along University Drive (East-West) east of the Intersection of Gilbert Road & University Drive – Site ID#41 with Bicycle Lane



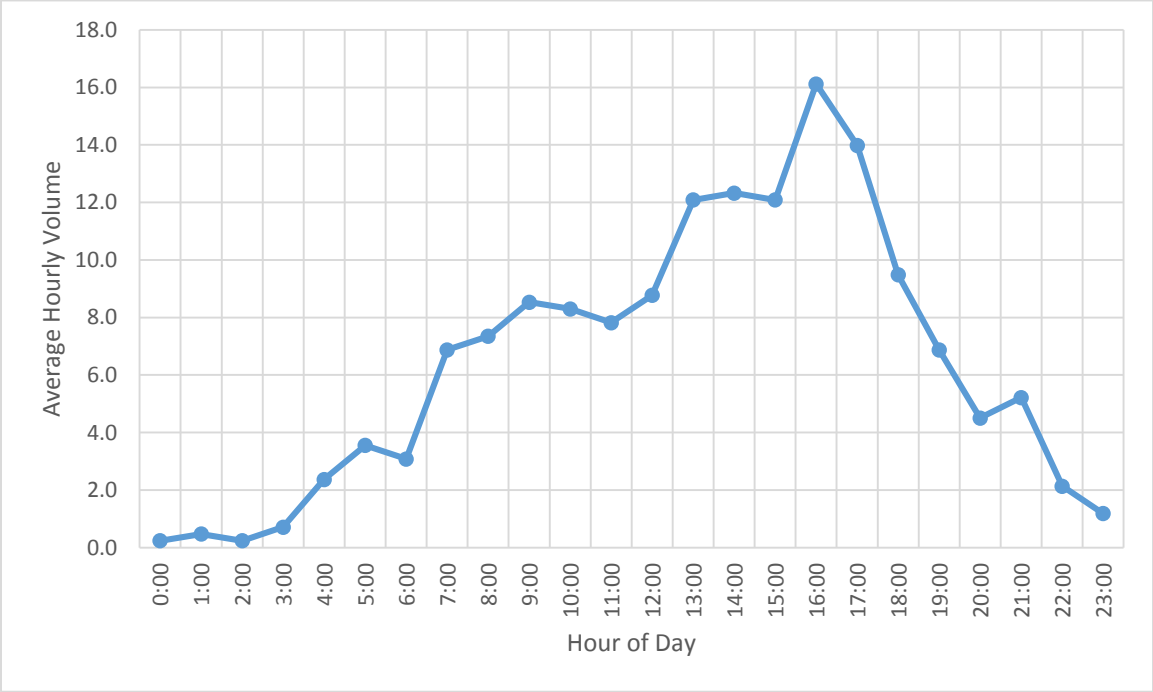
Source: *Chen Ryan Associates, April 2014*

Chart C-25: Average Hourly Weekend Bicycle Counts along University Drive (East-West) near the Eastern Canal Bike Path – Site ID#42 with Bike Path



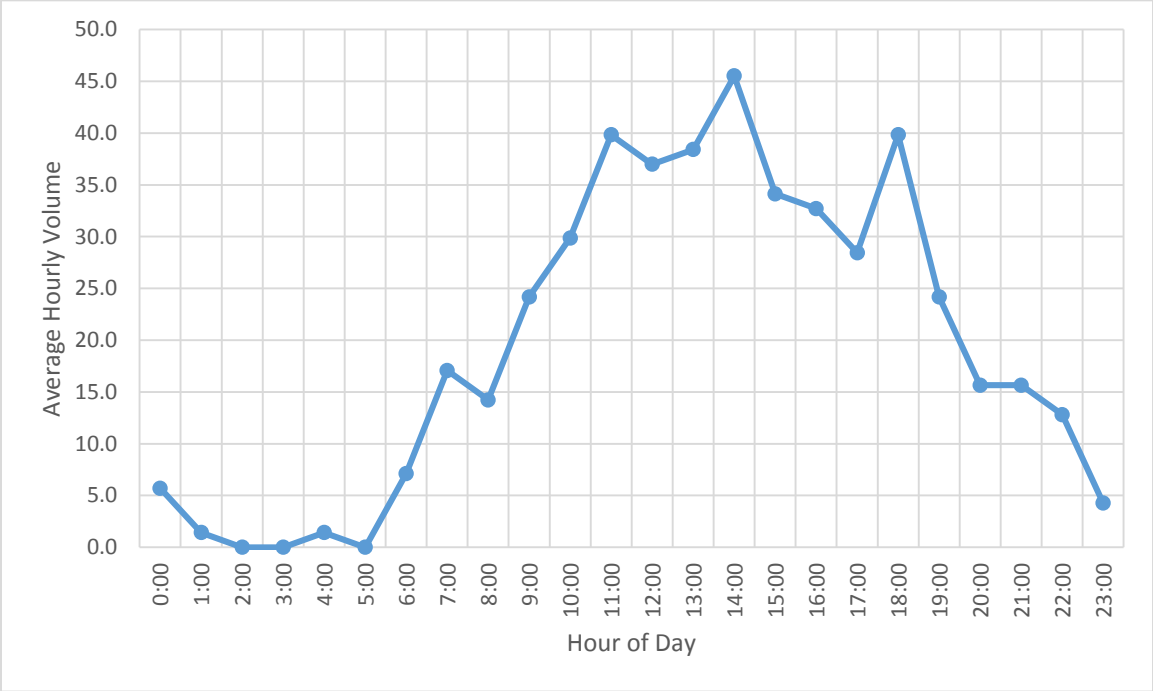
Source: *Chen Ryan Associates, April 2014*

Chart C-26: Average Hourly Weekday Bicycle Counts along University Drive (East-West) near the Eastern Canal Bike Path – Site ID#42 with Bike Path



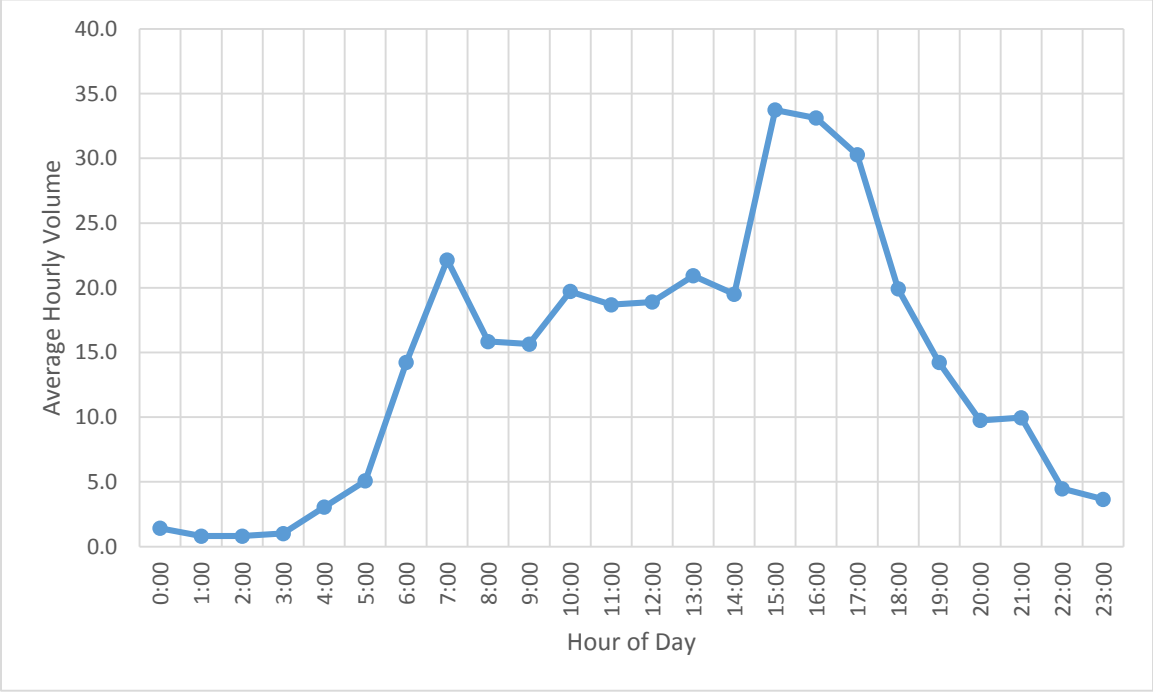
Source: *Chen Ryan Associates, April 2014*

Chart C-27: Average Hourly Weekend Bicycle Counts along Southern Avenue (East-West) west of the Intersection of 24th Street & Southern Avenue – Site ID#43 with Bicycle Lane



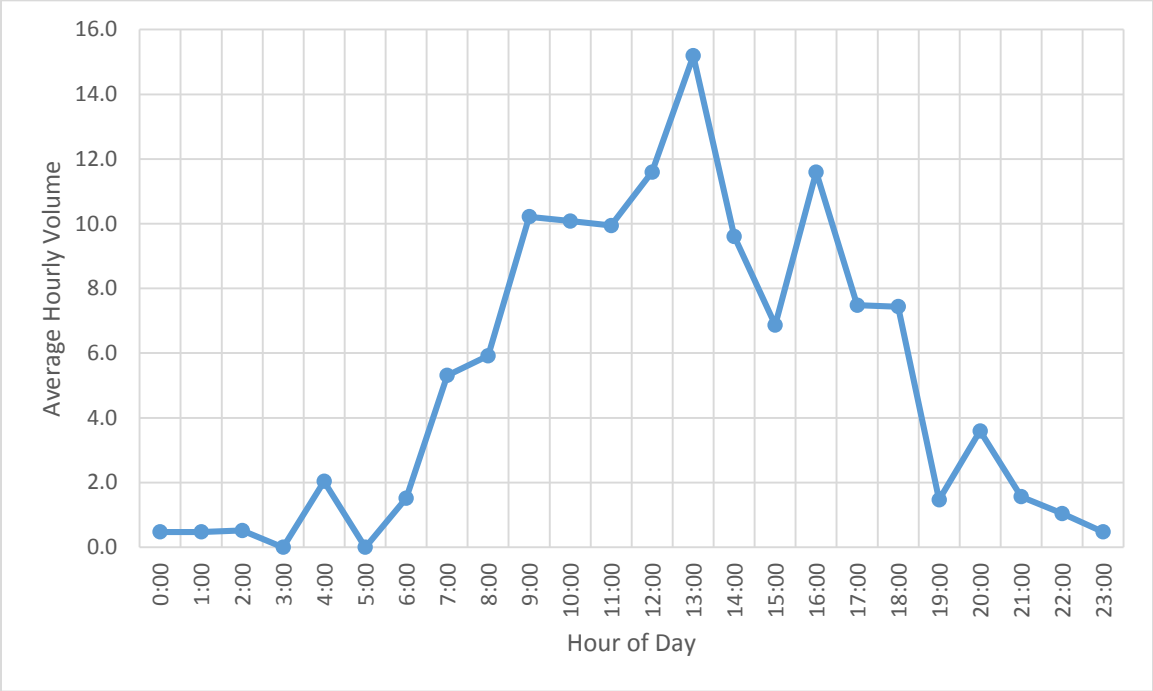
Source: *Chen Ryan Associates, April 2014*

Chart C-28: Average Hourly Weekday Bicycle Counts along Southern Avenue (East-West) west of the Intersection of 24th Street & Southern Avenue – Site ID#43 with Bicycle Lane



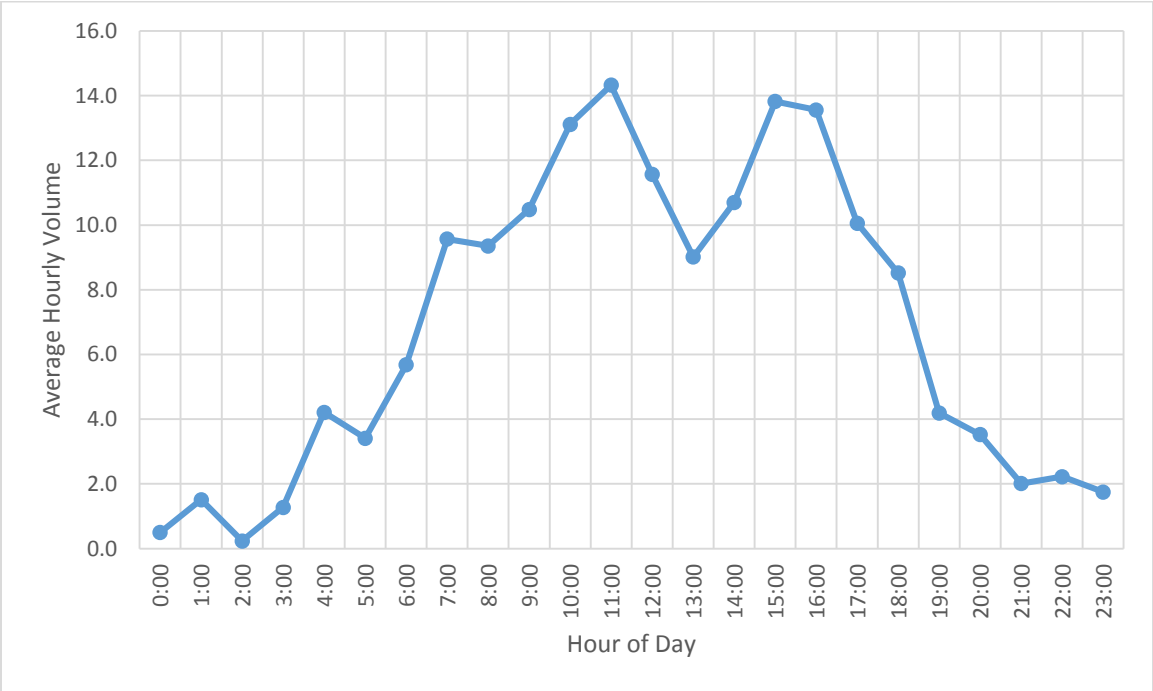
Source: *Chen Ryan Associates, April 2014*

Chart C-29: Average Hourly Weekend Bicycle Counts along Higley Road (North-South) north of the Intersection of Higley Road & Southern Avenue – Site ID#46 with Bicycle Lane



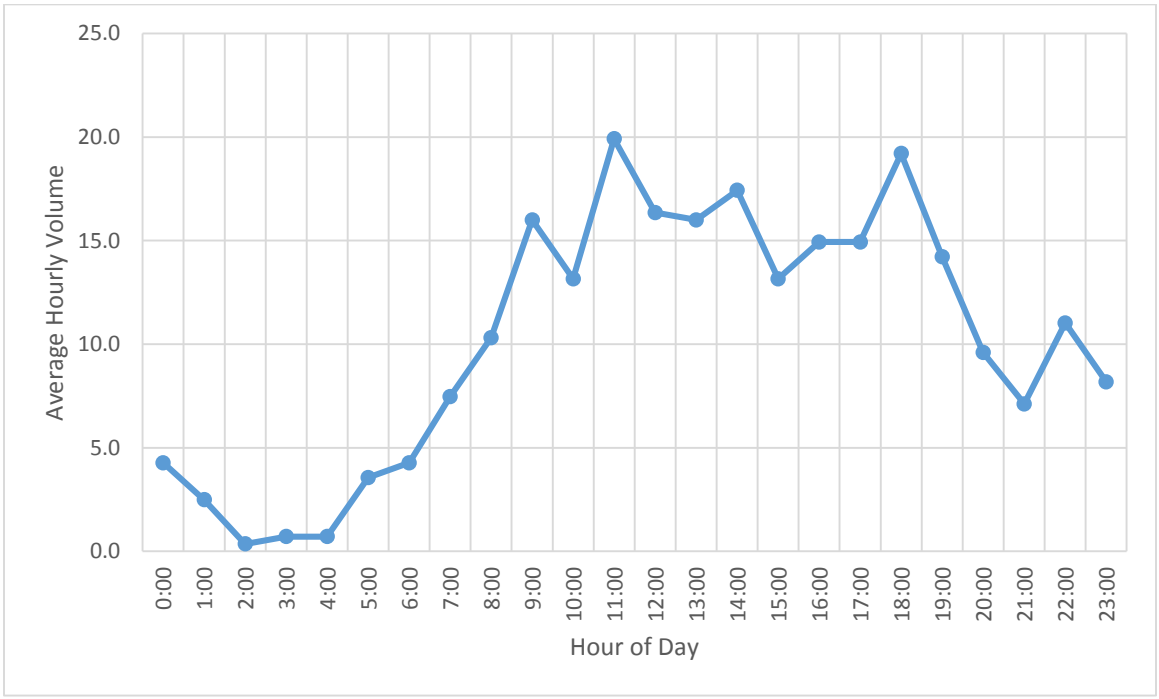
Source: *Chen Ryan Associates, April 2014*

Chart C-30: Average Hourly Weekday Bicycle Counts along Higley Road (North-South) north of the Intersection of Higley Road & Southern Avenue – Site ID#46 with Bicycle Lane



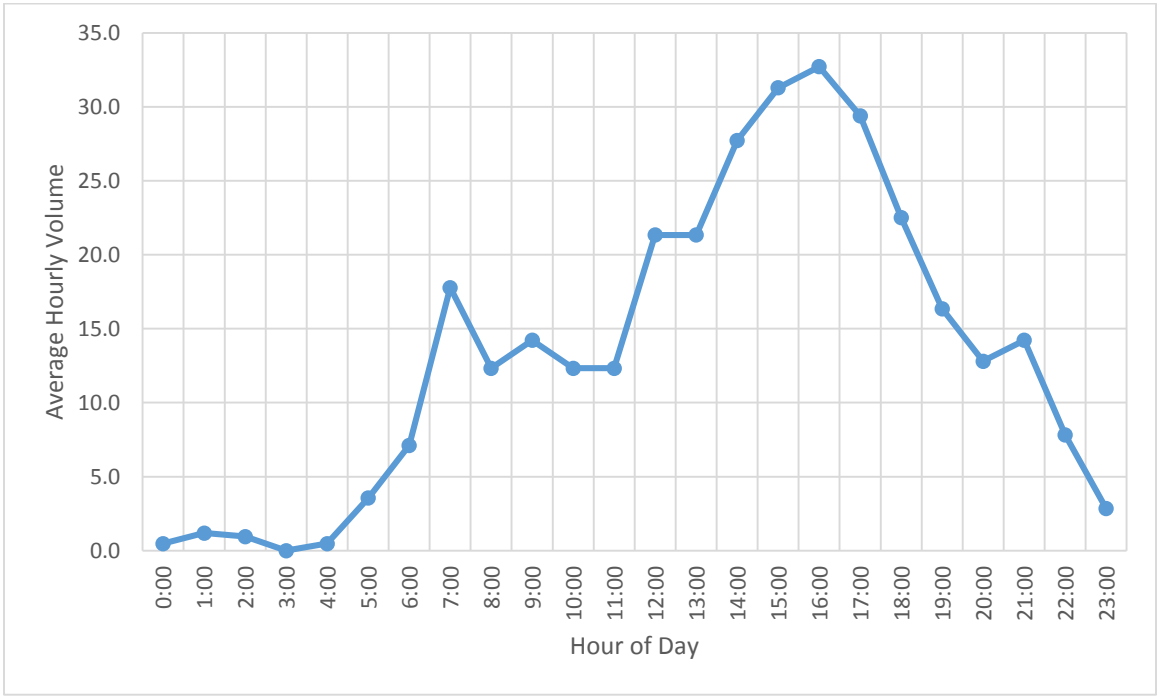
Source: *Chen Ryan Associates, April 2014*

Chart C-31: Average Hourly Weekend Bicycle Counts along 83rd Avenue (North-South) south of the Intersection of 83rd Avenue & Thunderbird Road – Site ID#54 with Bicycle Lane



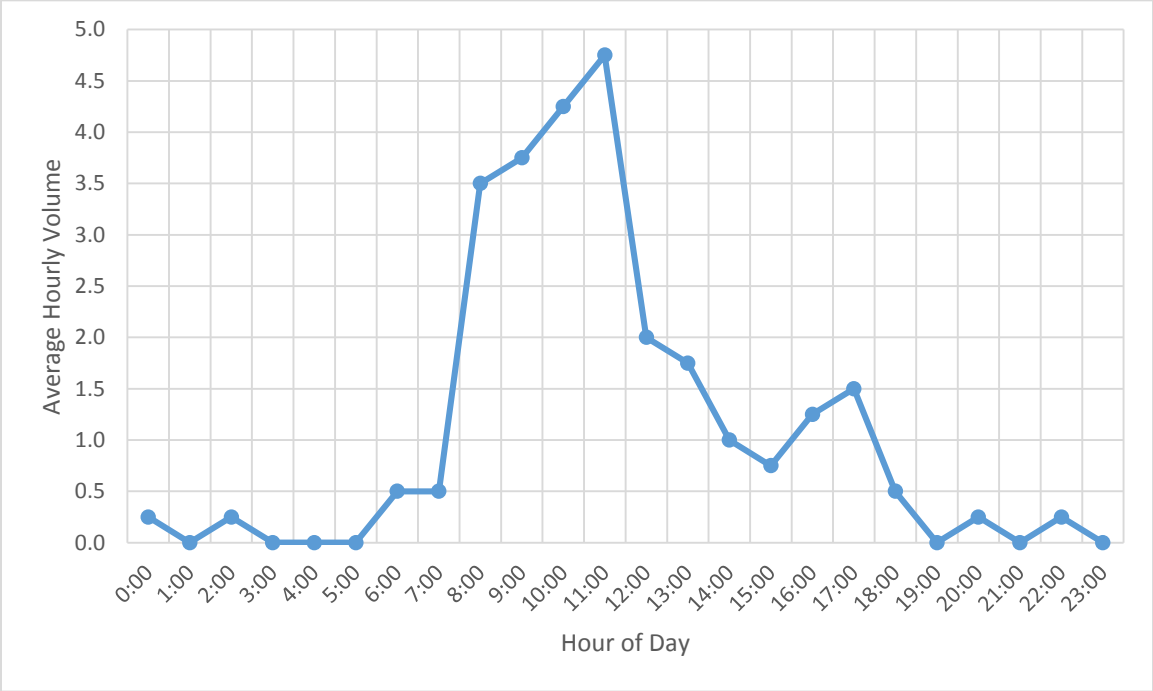
Source: *Chen Ryan Associates, April 2014*

Chart C-32: Average Hourly Weekday Bicycle Counts along 83rd Avenue (North-South) south of the Intersection of 83rd Avenue & Thunderbird Road – Site ID#54 with Bicycle Lane



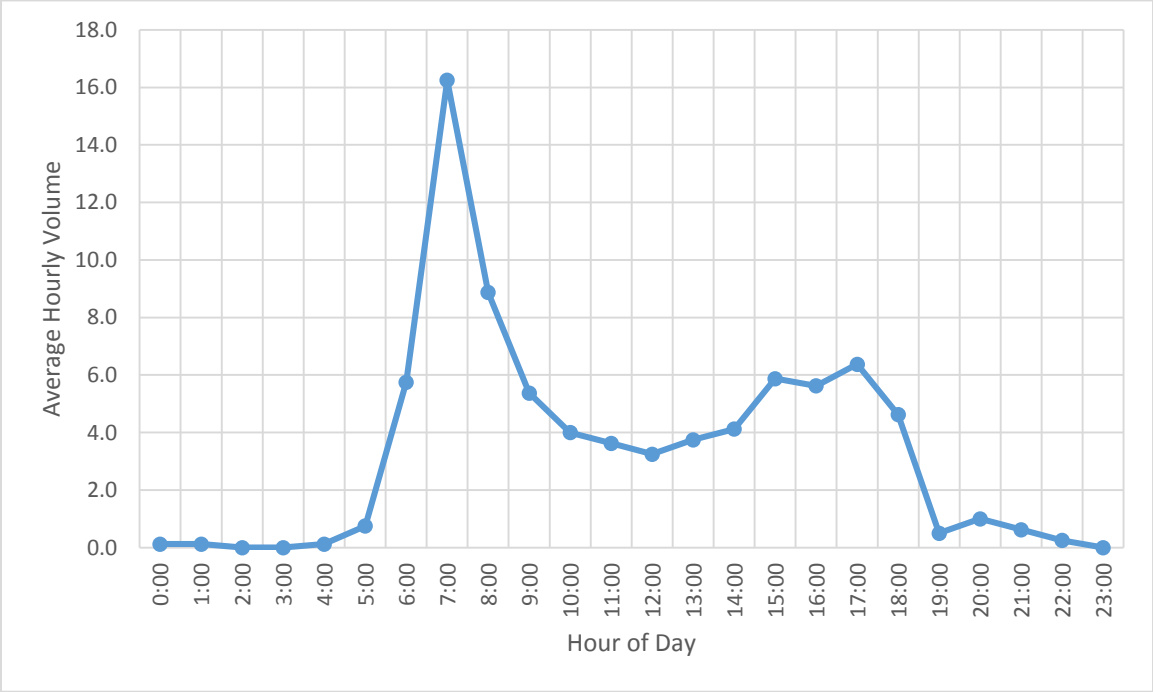
Source: *Chen Ryan Associates, April 2014*

Chart C-33: Average Hourly Weekend Bicycle Counts along Happy Valley Parkway (East-West) east of the Intersection of 115th Avenue & Happy Valley Parkway – Site ID#55 without Bicycle Facility



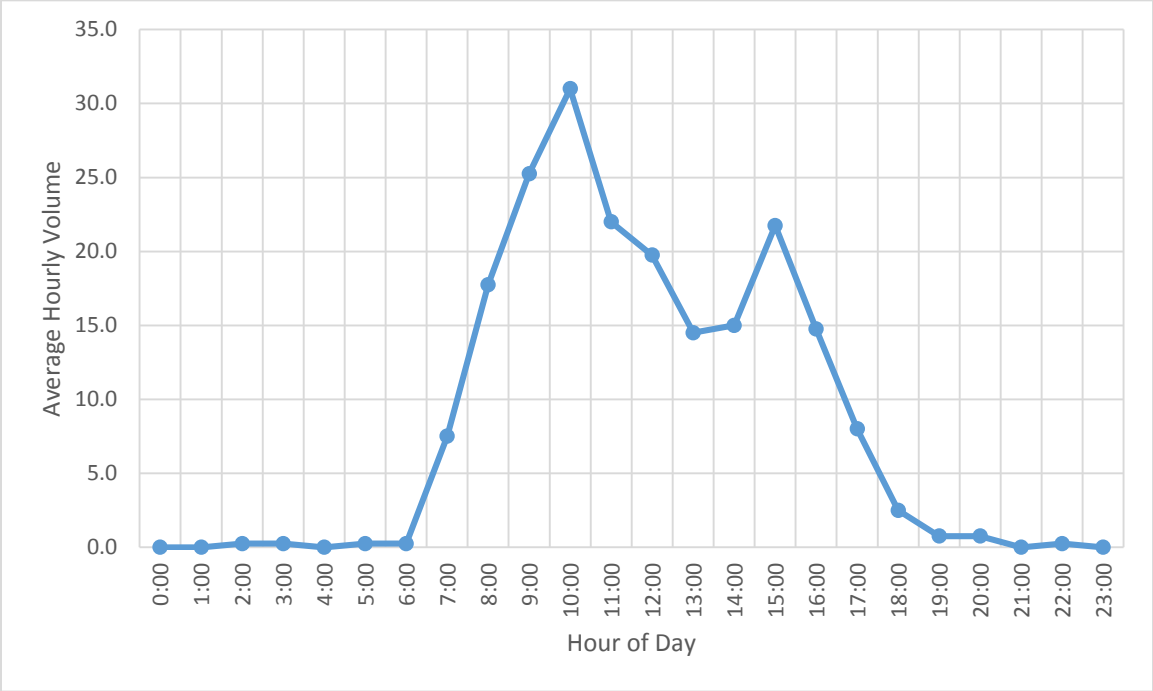
Source: *Chen Ryan Associates, April 2014*

Chart C-34: Average Hourly Weekday Bicycle Counts along Happy Valley Parkway (East-West) east of the Intersection of 115th Avenue & Happy Valley Parkway – Site ID#55 without Bicycle Facility



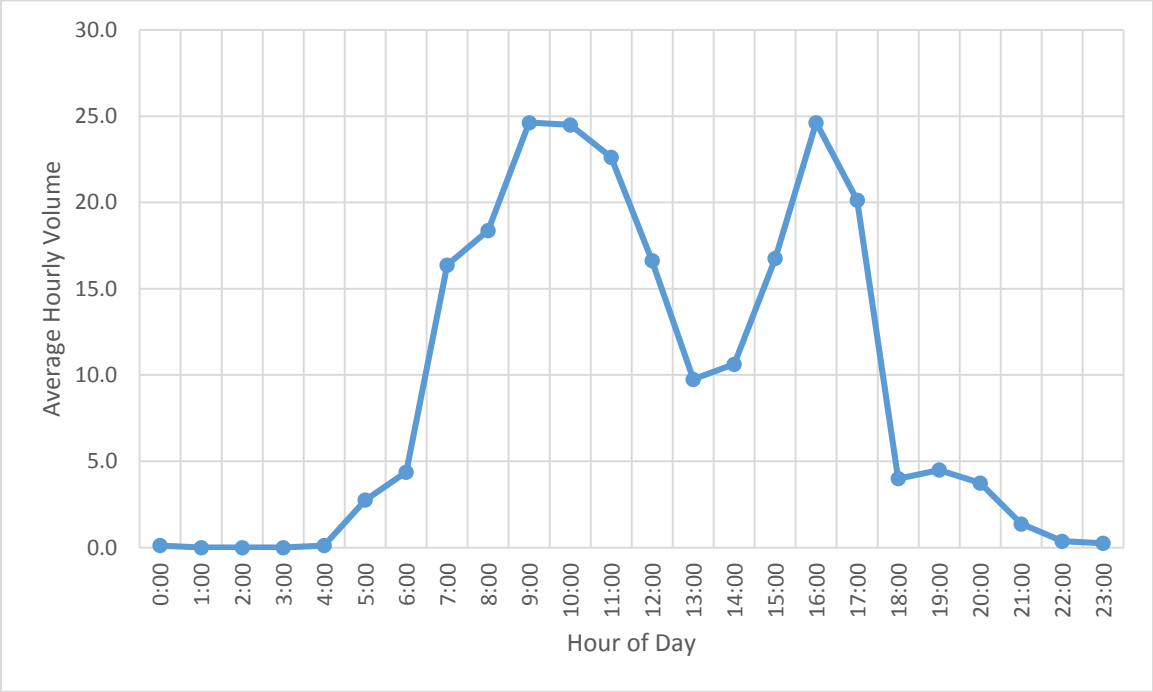
Source: *Chen Ryan Associates, April 2014*

Chart C-35: Average Hourly Weekday Bicycle Counts along the New River Bike Path Bridge (North-South) east of the Intersection of 91st Avenue & Greenway Road – Site ID#58 with Bike Path



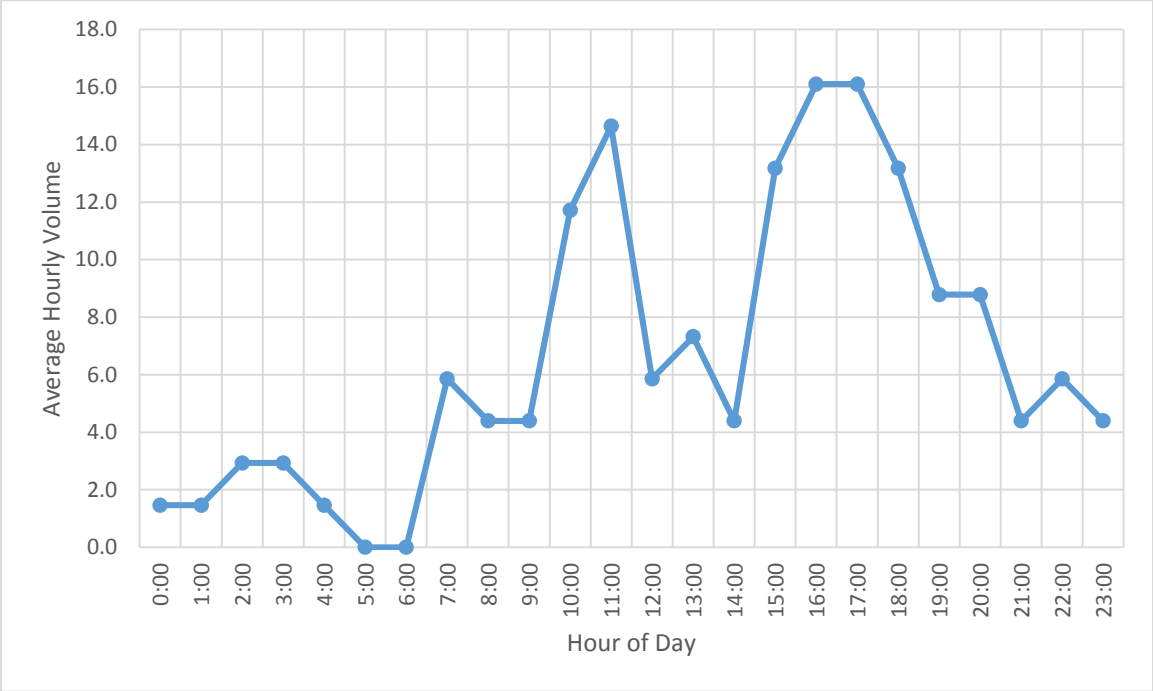
Source: *Chen Ryan Associates, April 2014*

Chart C-36: Average Hourly Weekend Bicycle Counts along the New River Bike Path Bridge (North-South) east of the Intersection of 91st Avenue & Greenway Road – Site ID#58 with Bike Path



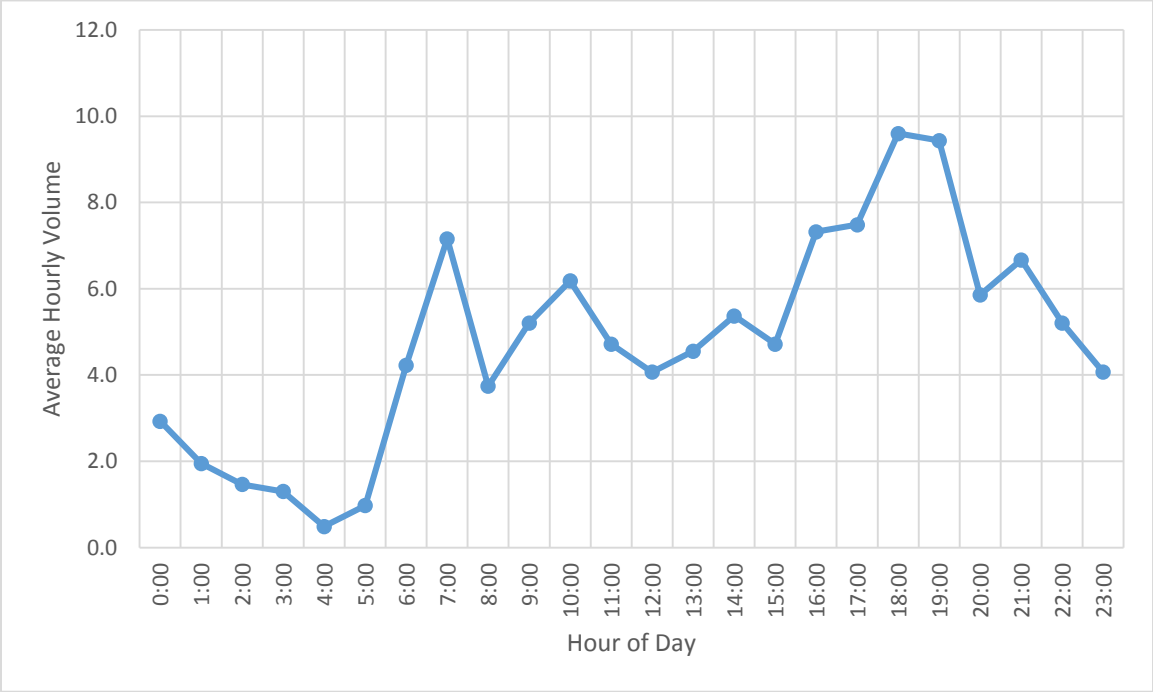
Source: *Chen Ryan Associates, April 2014*

Chart C-37: Average Hourly Weekday Bicycle Counts along Hatcher Road (East-West) west of the Intersection of 12th Street & Hatcher Road – Site ID#59 without Bicycle Facility



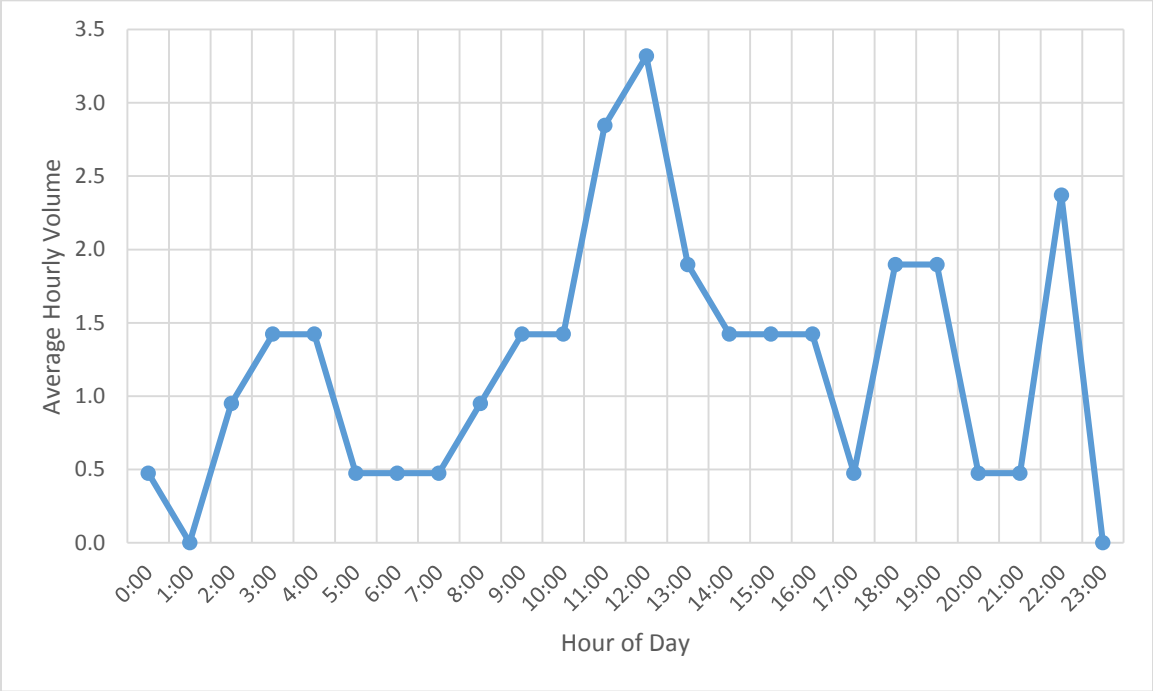
Source: *Chen Ryan Associates, April 2014*

Chart C-38: Average Hourly Weekend Bicycle Counts along Hatcher Road (East-West) west of the Intersection of 12th Street & Hatcher Road – Site ID#59 without Bicycle Facility



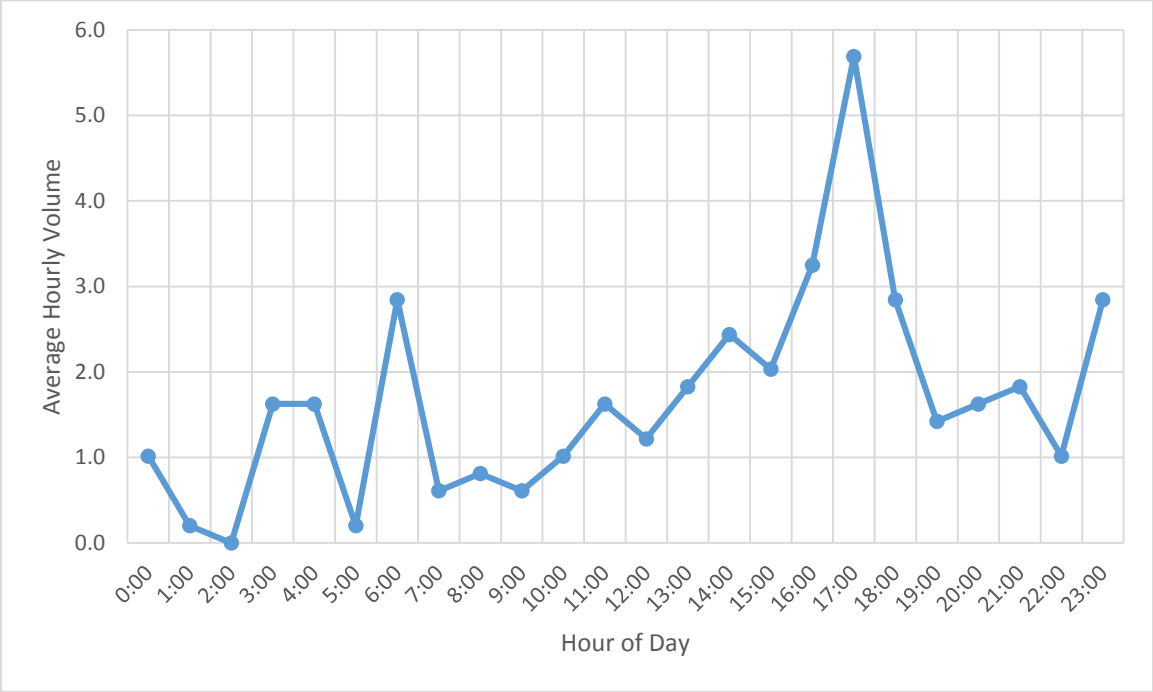
Source: *Chen Ryan Associates, April 2014*

Chart C-39: Average Hourly Weekend Bicycle Counts along Jefferson Street (East-West) west of the Intersection of 11th Street & Jefferson Street – Site ID#61 with Bicycle Lane



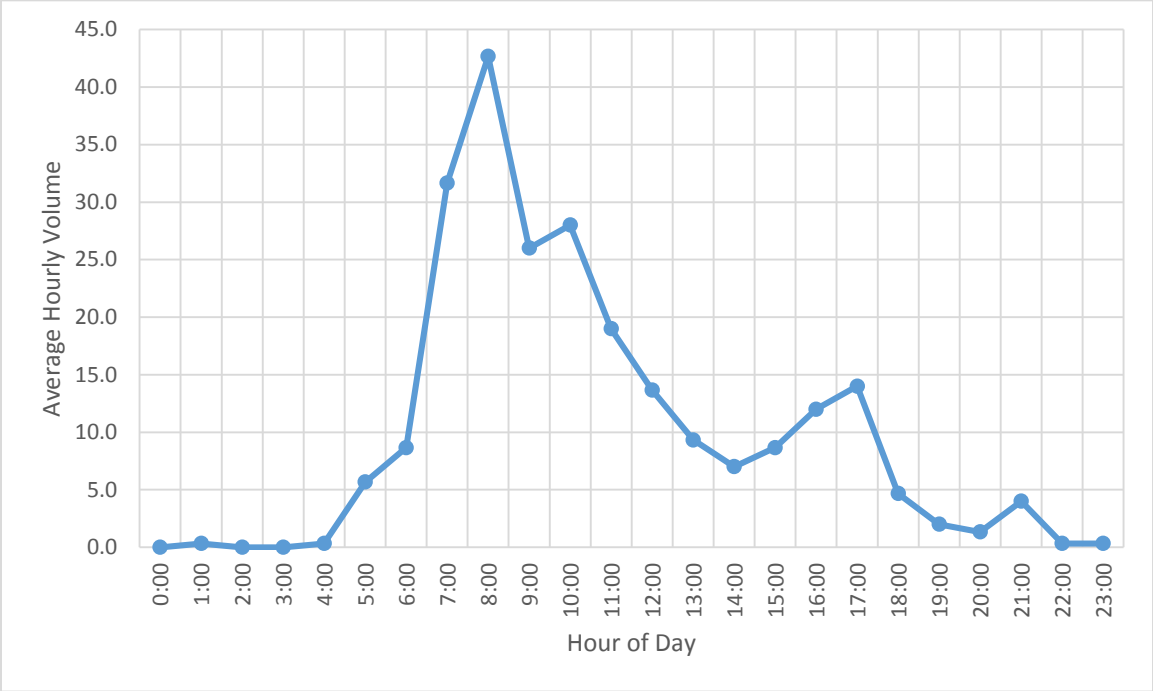
Source: *Chen Ryan Associates, April 2014*

Chart C-40: Average Hourly Weekday Bicycle Counts along Jefferson Street (East-West) west of the Intersection of 11th Street & Jefferson Street – Site ID#61 with Bicycle Lane



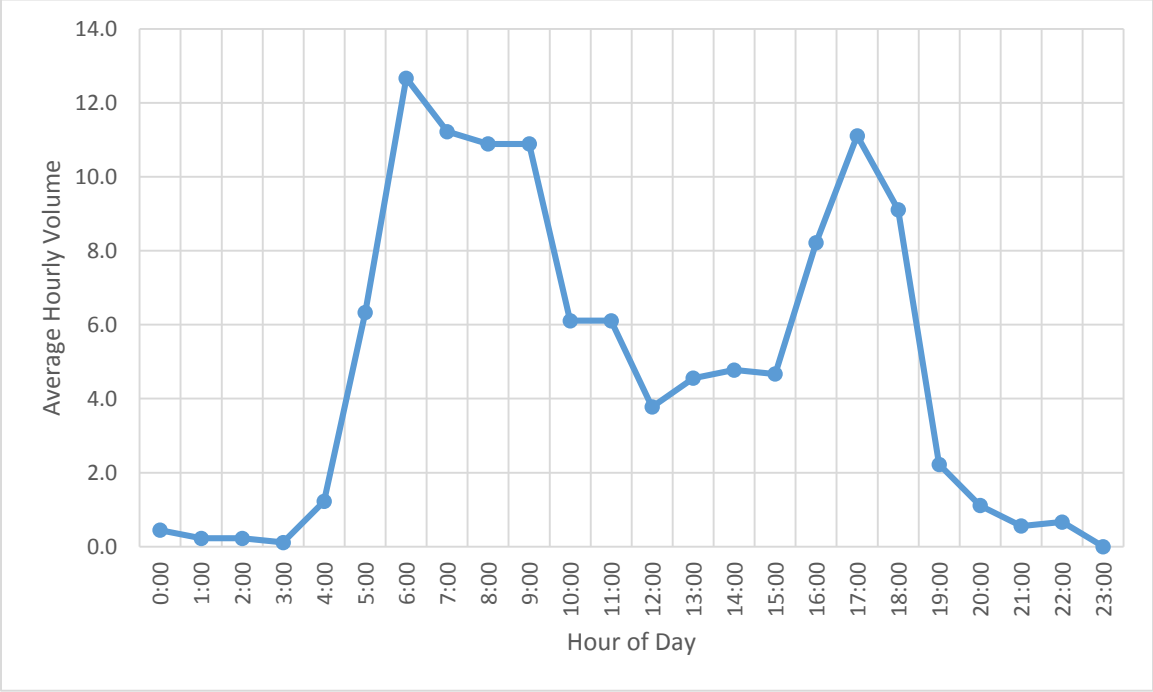
Source: *Chen Ryan Associates, April 2014*

Chart C-41: Average Hourly Weekend Bicycle Counts along the north side of the Arizona Canal Bike Path (North-South) west of 12th Street – Site ID#62 with Bike Path



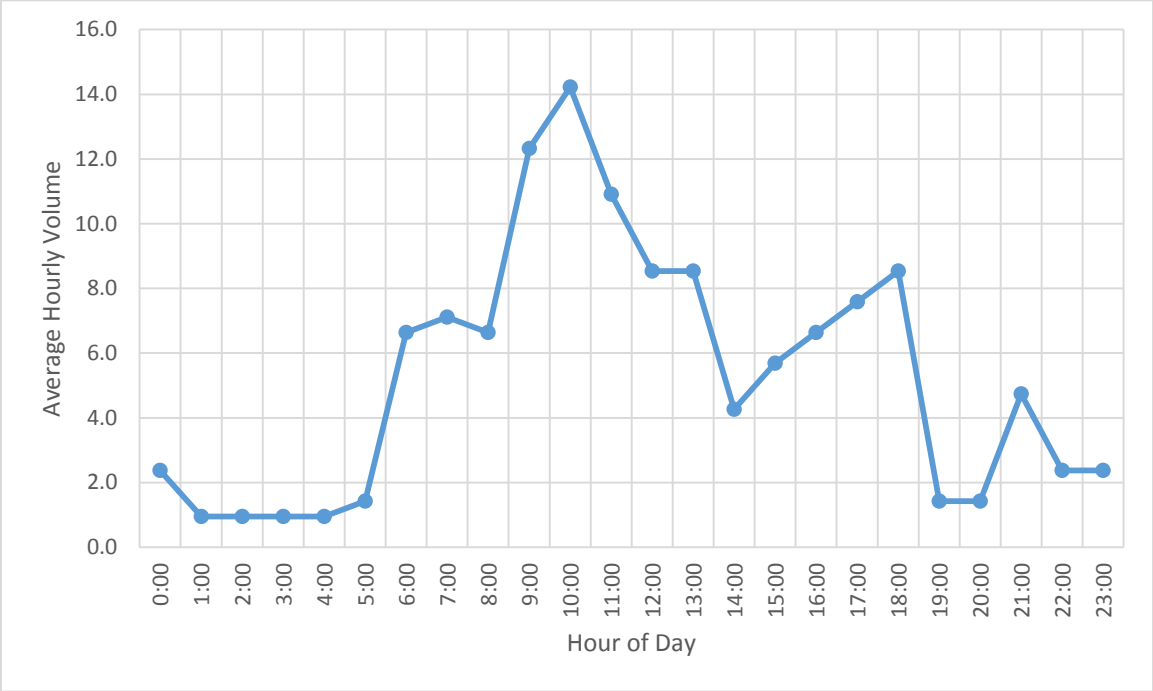
Source: *Chen Ryan Associates, April 2014*

Chart C-42: Average Hourly Weekday Bicycle Counts along the north side of the Arizona Canal Bike Path (North-South) west of 12th Street – Site ID#62 with Bike Path



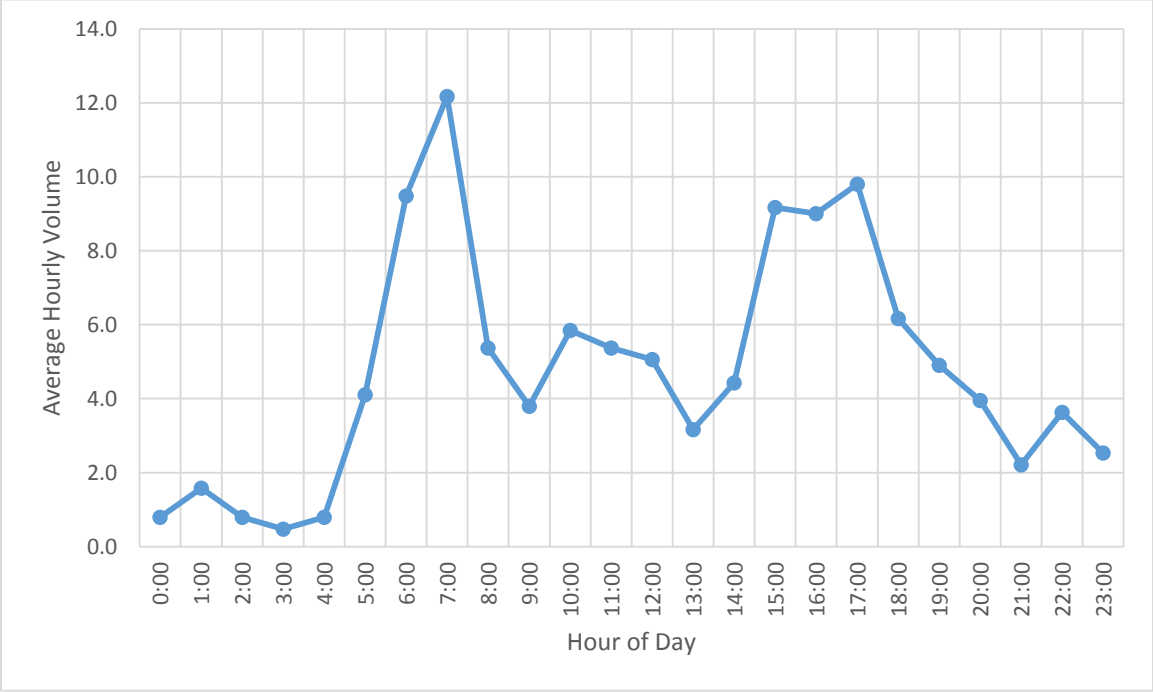
Source: *Chen Ryan Associates, April 2014*

Chart C-43: Average Hourly Weekend Bicycle Counts along Maryland Avenue (East-West) west of the Intersection of Central Avenue & Maryland Avenue – Site ID#63 with Bicycle Lane



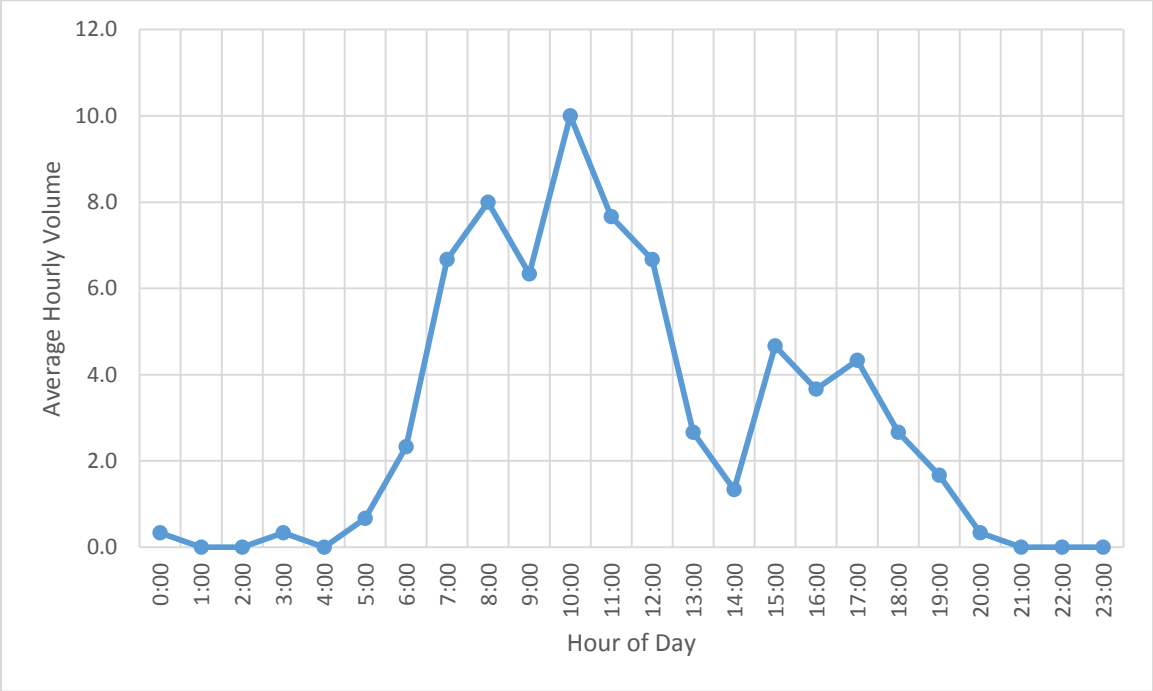
Source: *Chen Ryan Associates, April 2014*

Chart C-44: Average Hourly Weekday Bicycle Counts along Maryland Avenue (East-West) west of the Intersection of Central Avenue & Maryland Avenue – Site ID#63 with Bicycle Lane



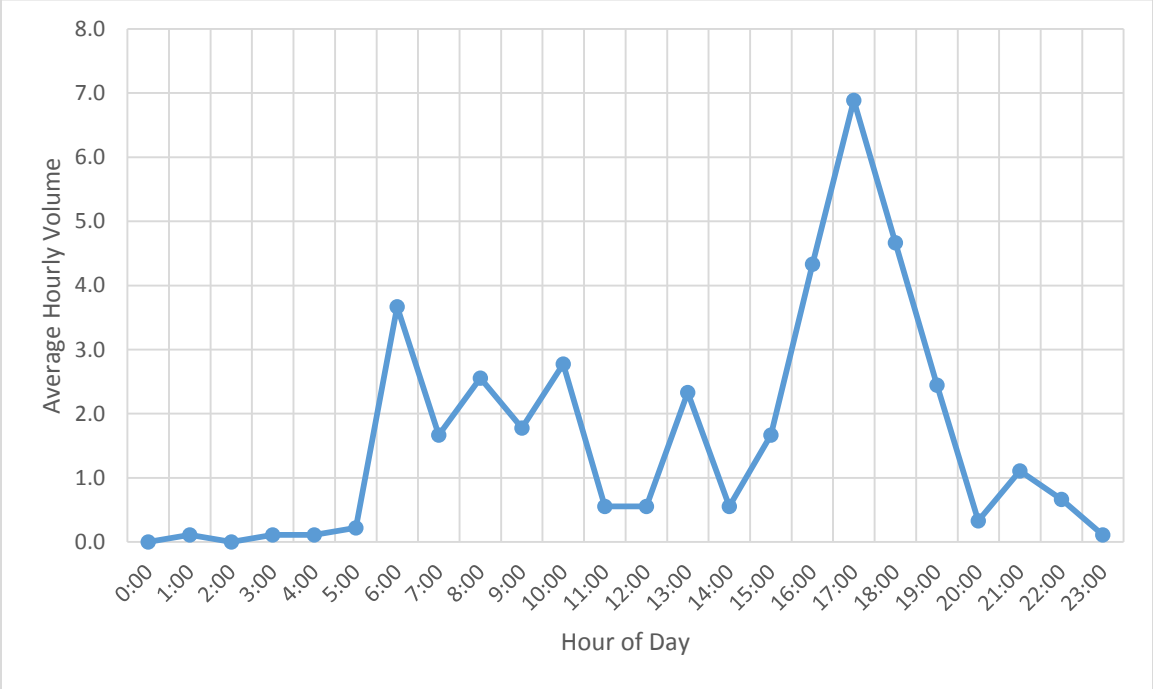
Source: *Chen Ryan Associates, April 2014*

Chart C-45: Average Hourly Weekend Bicycle Counts along the Bike Path Parallel to SR-51 (North-South) on the Bridge Crossing Union Hills Drive – Site ID#64 with Bike Path



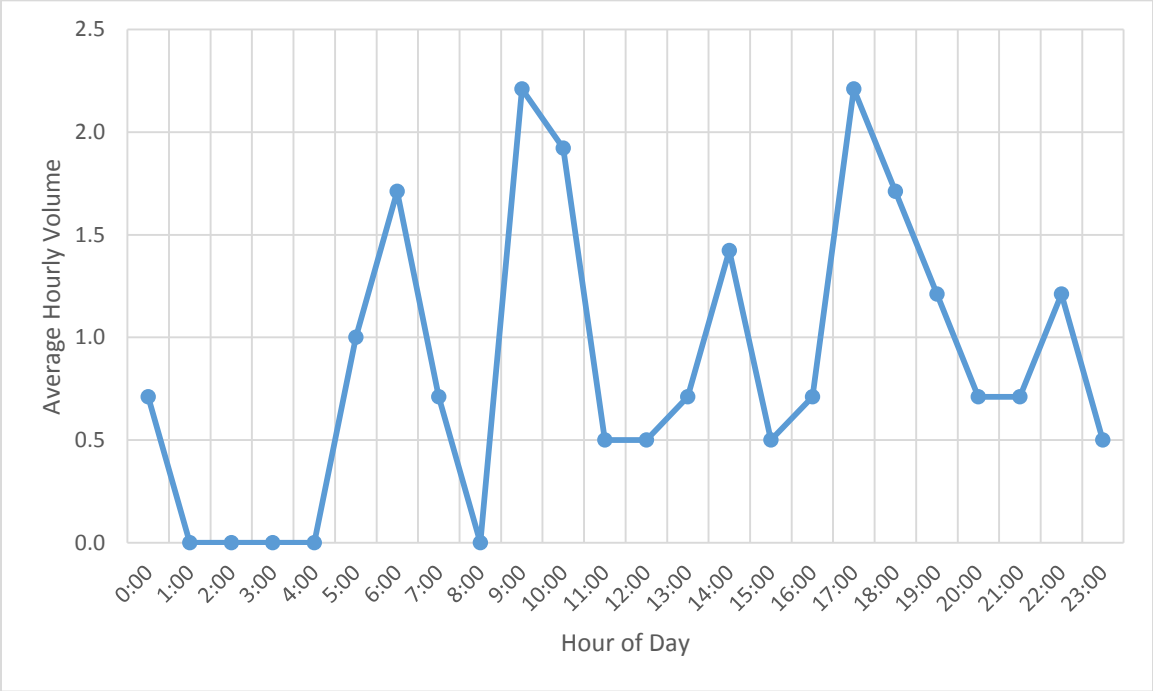
Source: *Chen Ryan Associates, April 2014*

Chart C-46: Average Hourly Weekday Bicycle Counts along the Bike Path Parallel to SR-51 (North-South) on the Bridge Crossing Union Hills Drive – Site ID#64 with Bike Path



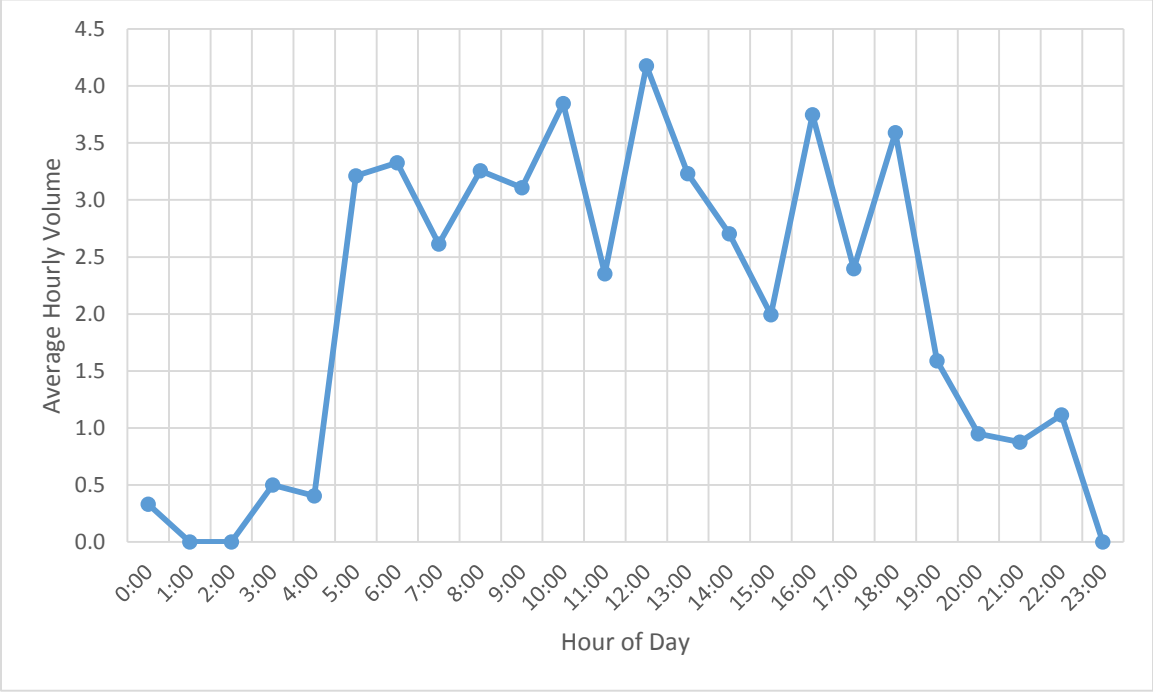
Source: *Chen Ryan Associates, April 2014*

Chart C-47: Average Hourly Weekend Bicycle Counts along 23rd Avenue (North-South) north of the Intersection of 23rd Avenue & Peoria Road – Site ID#65 with Bicycle Lane



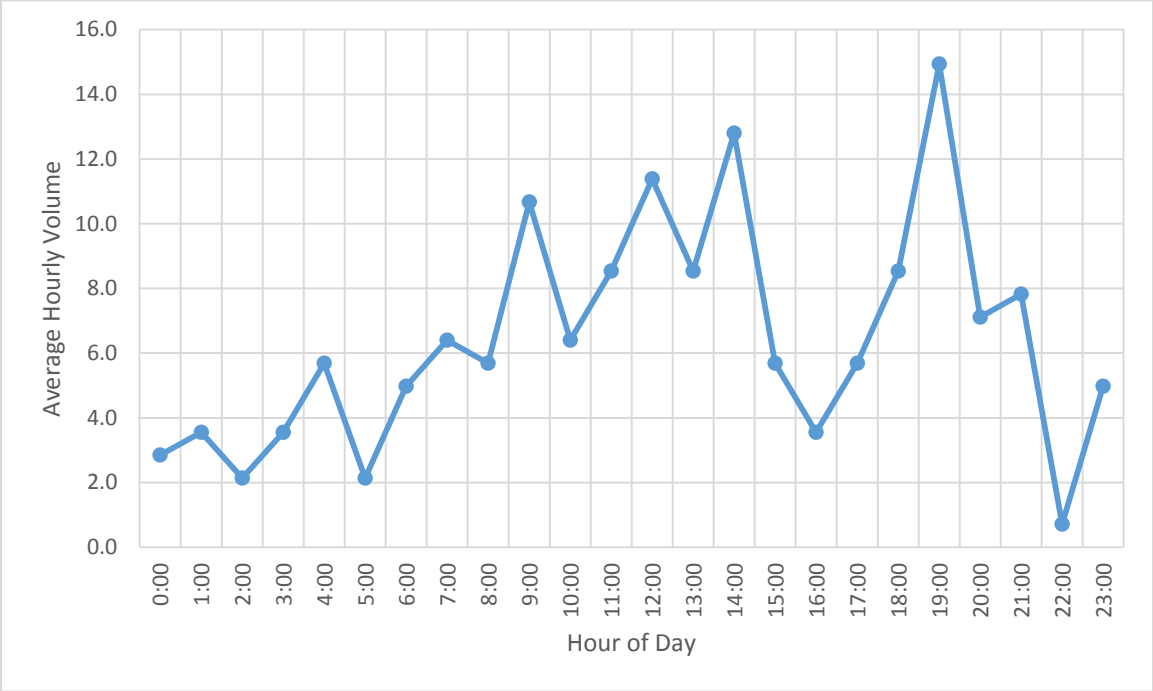
Source: *Chen Ryan Associates, April 2014*

Chart C-48: Average Hourly Weekday Bicycle Counts along 23rd Avenue (North-South) north of the Intersection of 23rd Avenue & Peoria Road – Site ID#65 with Bicycle Lane



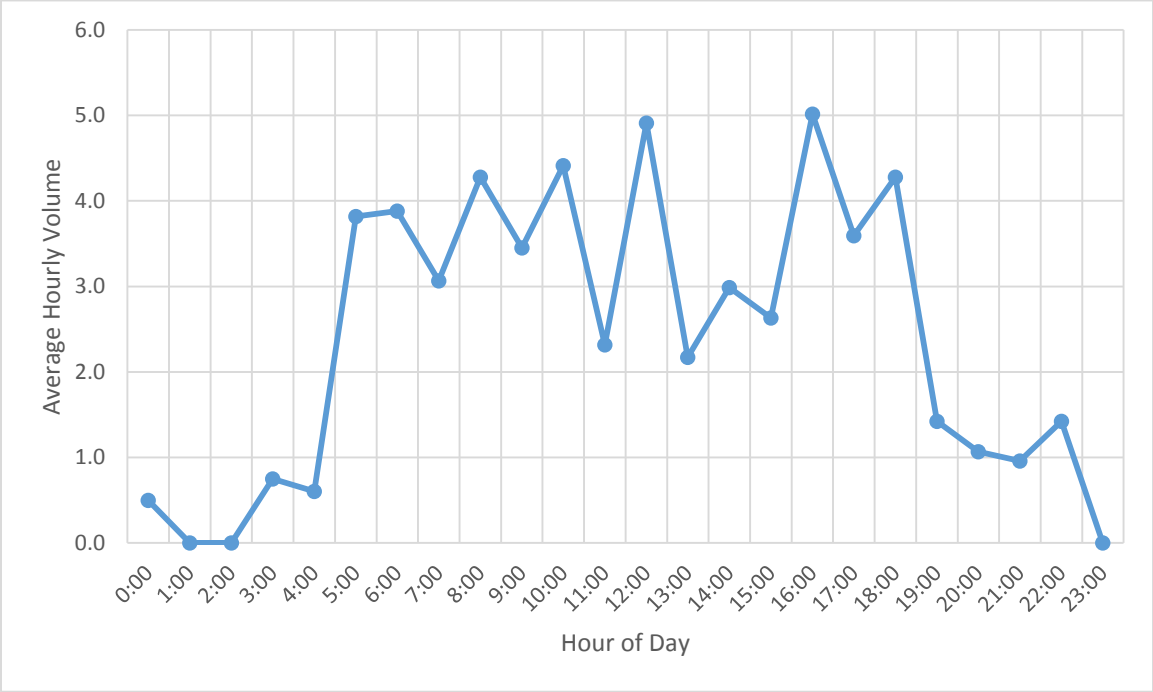
Source: *Chen Ryan Associates, April 2014*

Chart C-49: Average Hourly Weekend Bicycle Counts along 23rd Avenue (North-South) south of the Intersection of 23rd Avenue & Maryland Avenue – Site ID#66 with Bicycle Lanes



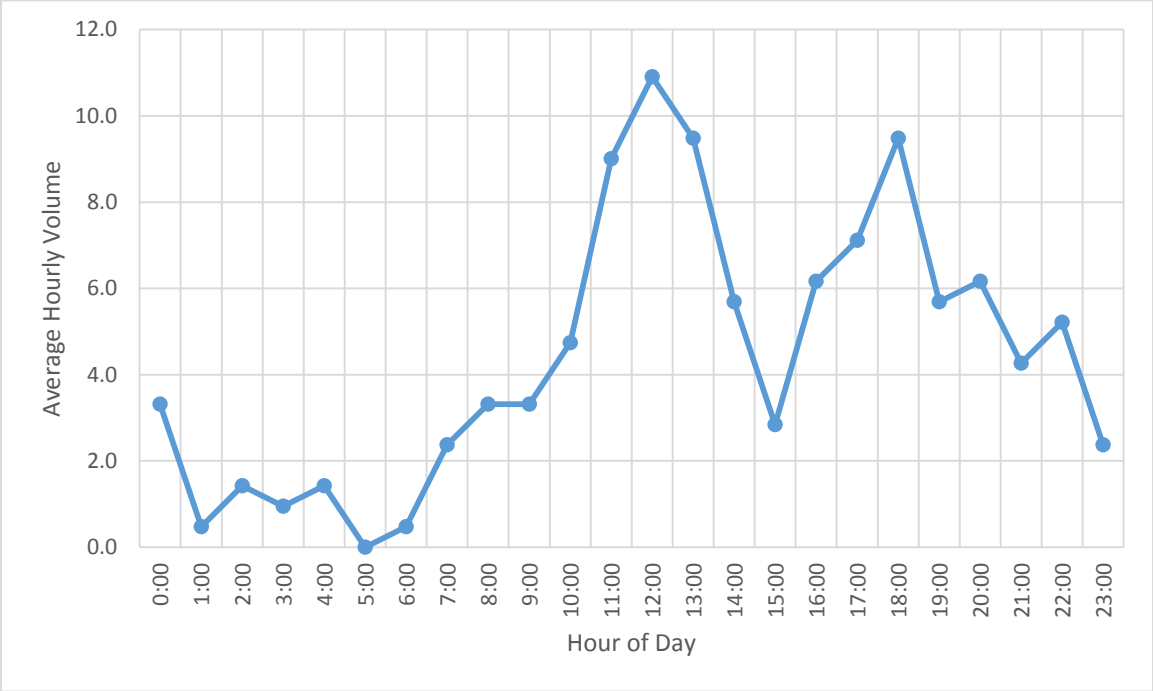
Source: *Chen Ryan Associates, April 2014*

Chart C-50: Average Hourly Weekday Bicycle Counts along 23rd Avenue (North-South) south of the Intersection of 23rd Avenue & Maryland Avenue – Site ID#66 with Bicycle Lanes



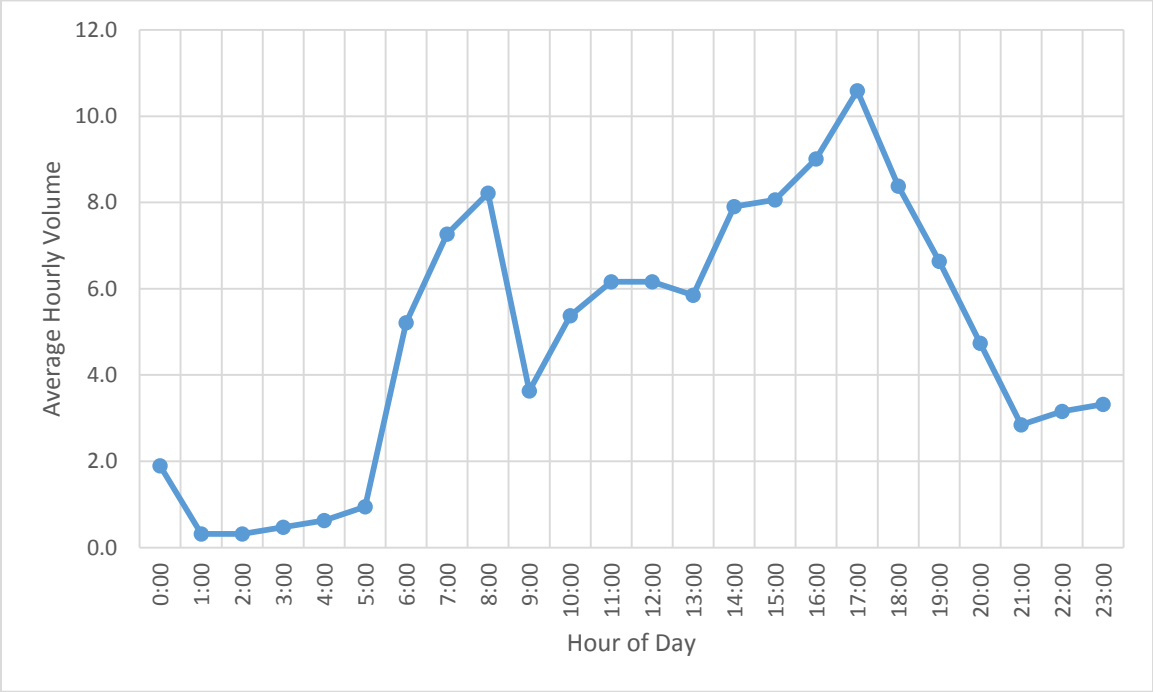
Source: *Chen Ryan Associates, April 2014*

Chart C-51 Average Hourly Weekend Bicycle Counts along 12th Street (North-South) south of the Intersection of 12th Street & McDowell Road – Site ID#67 with Bicycle Lanes



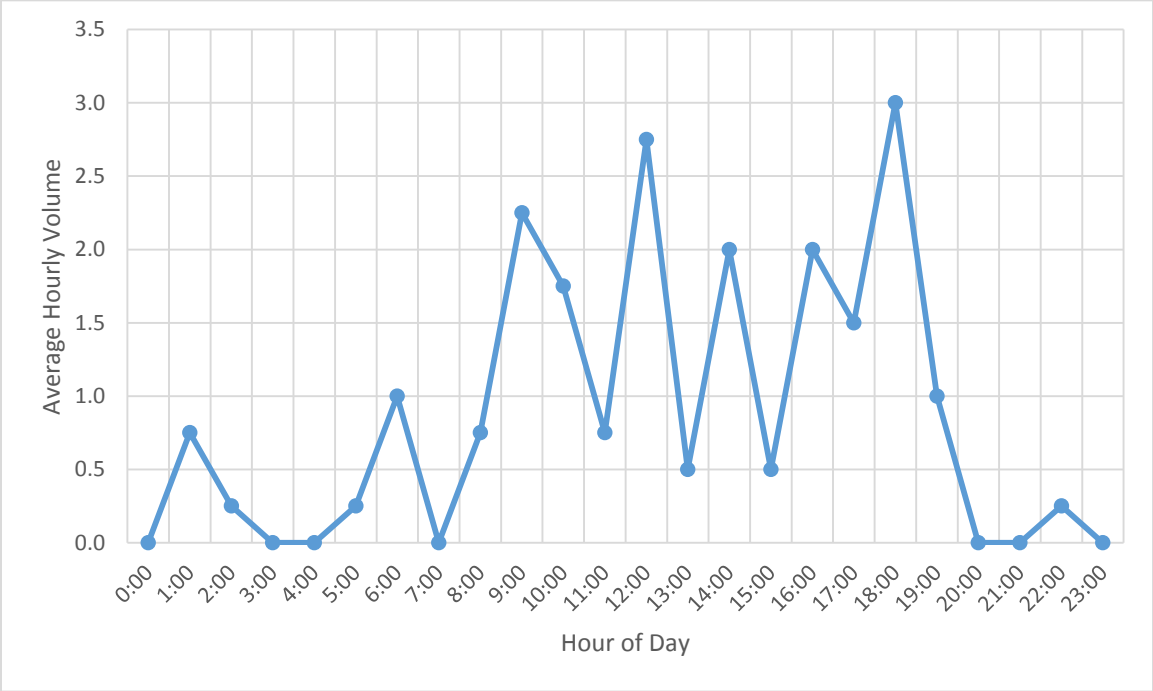
Source: *Chen Ryan Associates, April 2014*

Chart C-52 Average Hourly Weekday Bicycle Counts along 12th Street (North-South) south of the Intersection of 12th Street & McDowell Road – Site ID#67 with Bicycle Lanes



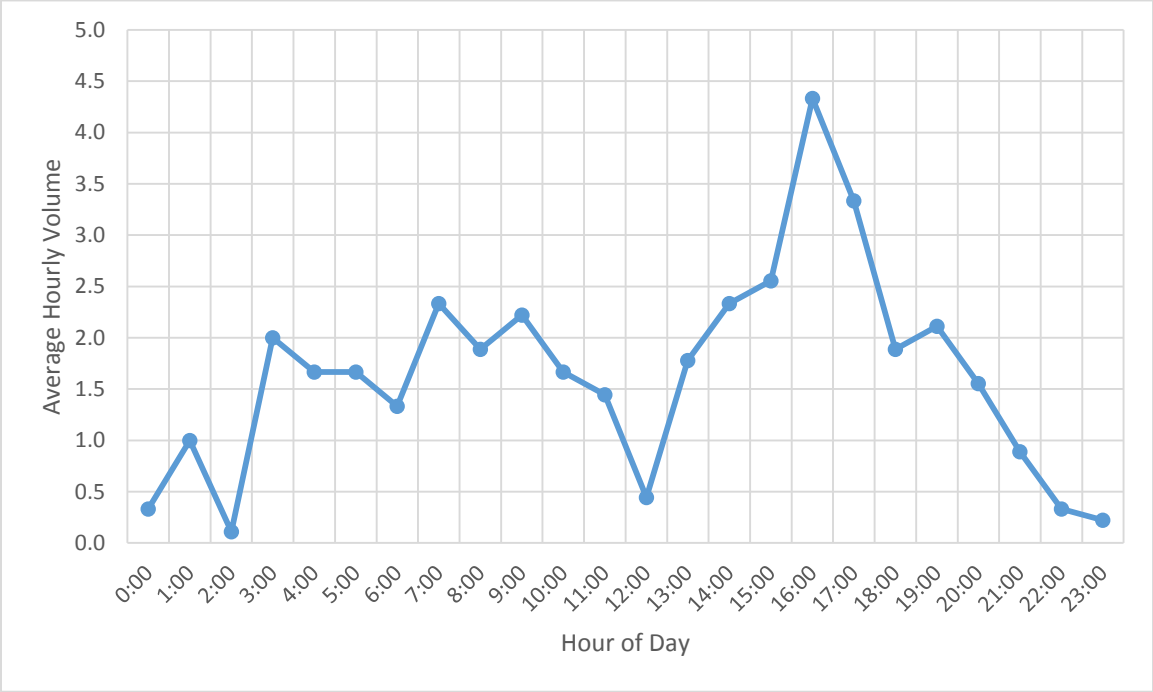
Source: *Chen Ryan Associates, April 2014*

Chart C-53 Average Hourly Weekend Bicycle Counts along the Grand Canal Bike Path (East-West) east of 39th Street – Site ID#68 with Bike Path



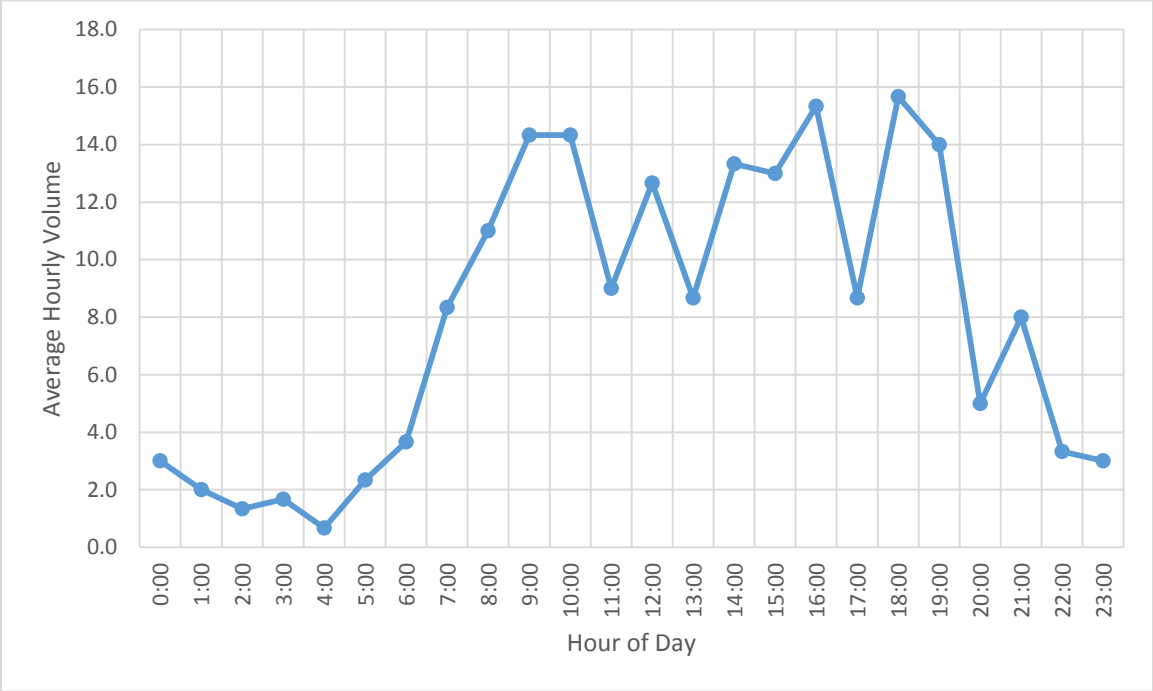
Source: *Chen Ryan Associates, April 2014*

Chart C-54 Average Hourly Weekday Bicycle Counts along the Grand Canal Bike Path (East-West) east of 39th Street – Site ID#68 with Bike Path



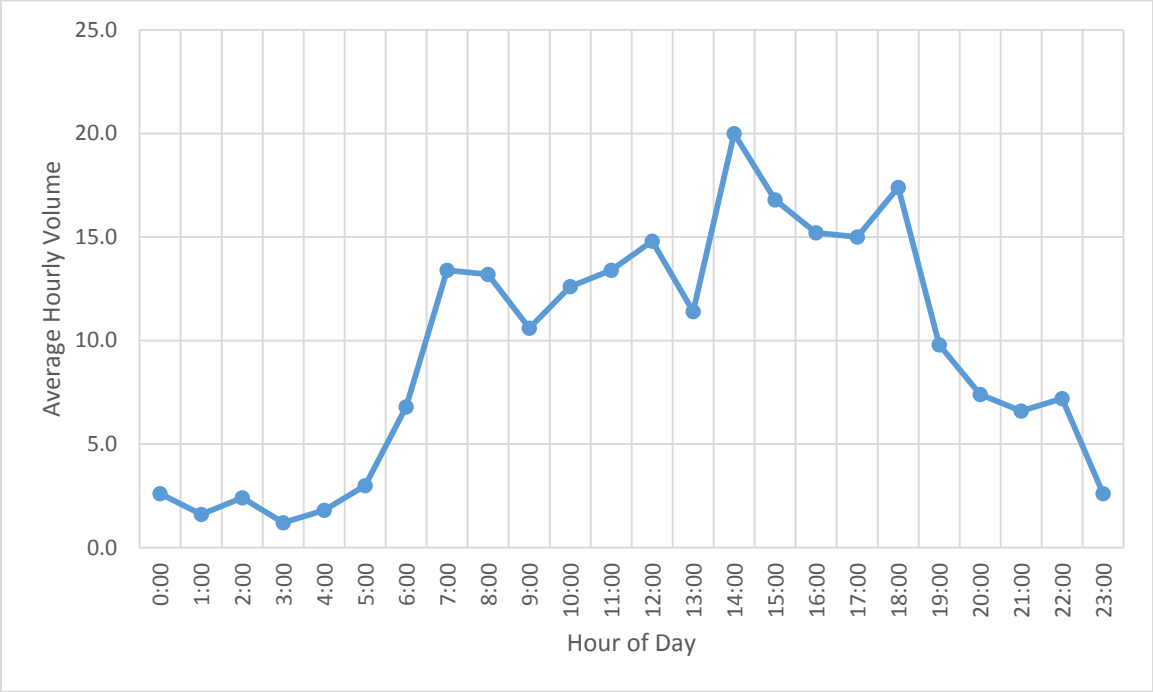
Source: *Chen Ryan Associates, April 2014*

Chart C-55 Average Hourly Weekend Bicycle Counts along Northern Road (East-West) west of the Intersection of 19th Avenue & Northern Road – Site ID#73 without Bicycle Facility



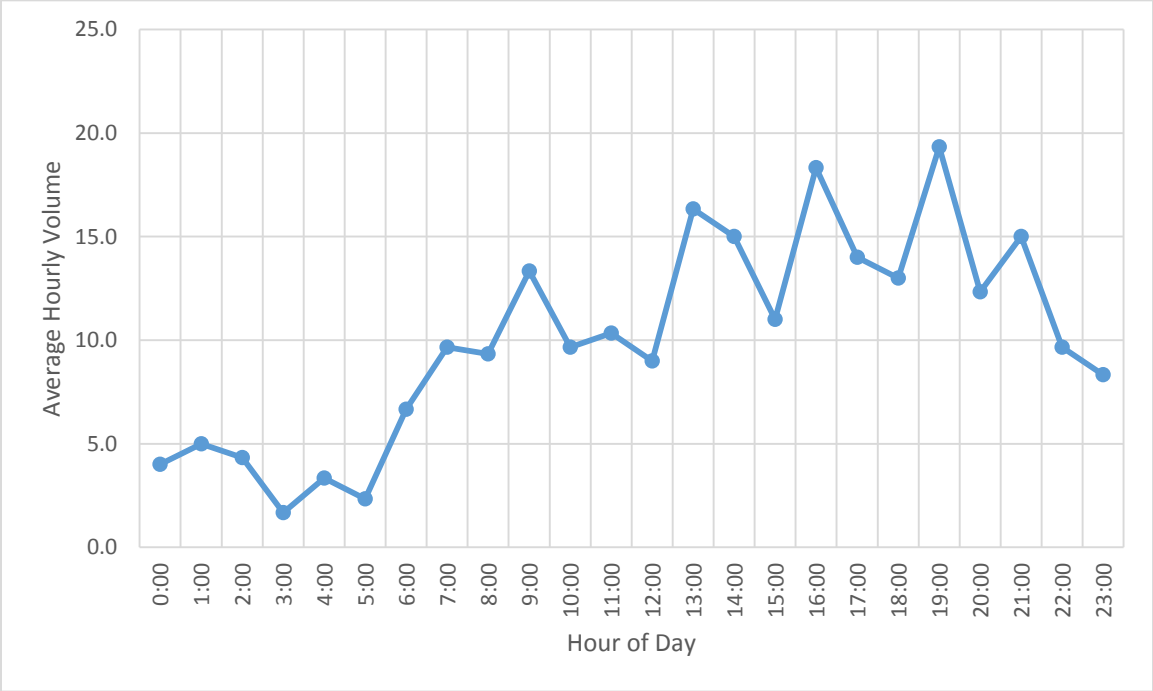
Source: *Chen Ryan Associates, April 2014*

Chart C-56 Average Hourly Weekday Bicycle Counts along Northern Road (East-West) west of the Intersection of 19th Avenue & Northern Road – Site ID#73 without Bicycle Facility



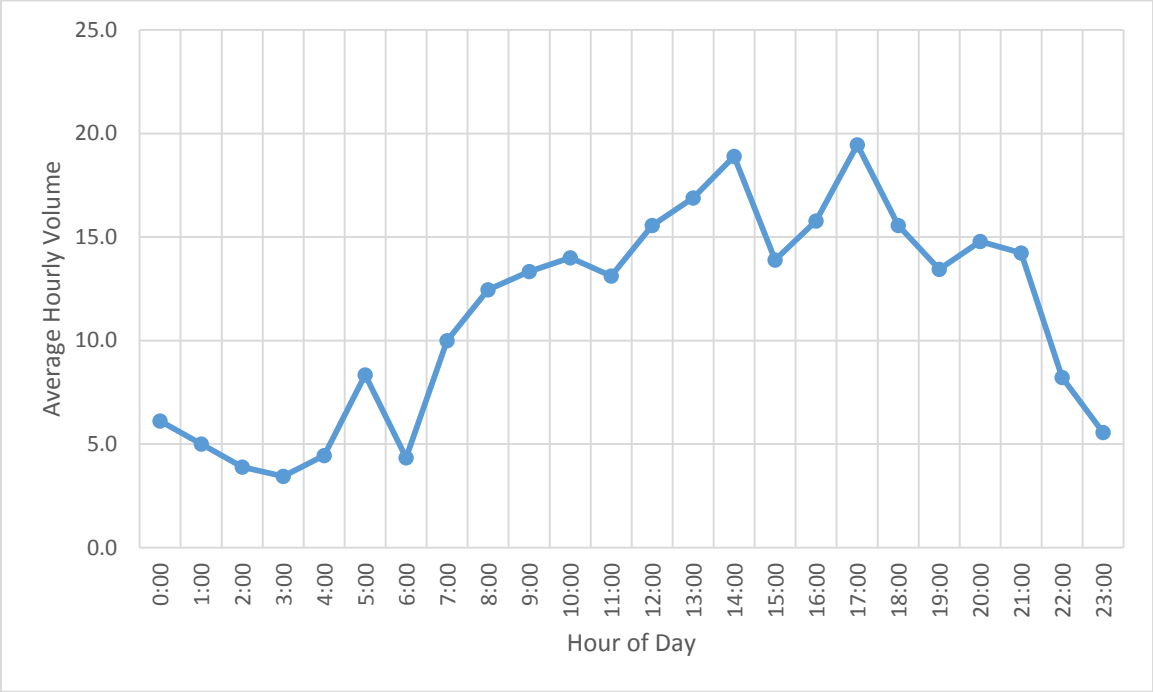
Source: *Chen Ryan Associates, April 2014*

Chart C-57 Average Hourly Weekend Bicycle Counts along Glendale Avenue (East-West) west of the Intersection of 19th Avenue & Glendale Avenue – Site ID#74 without Bicycle Facility



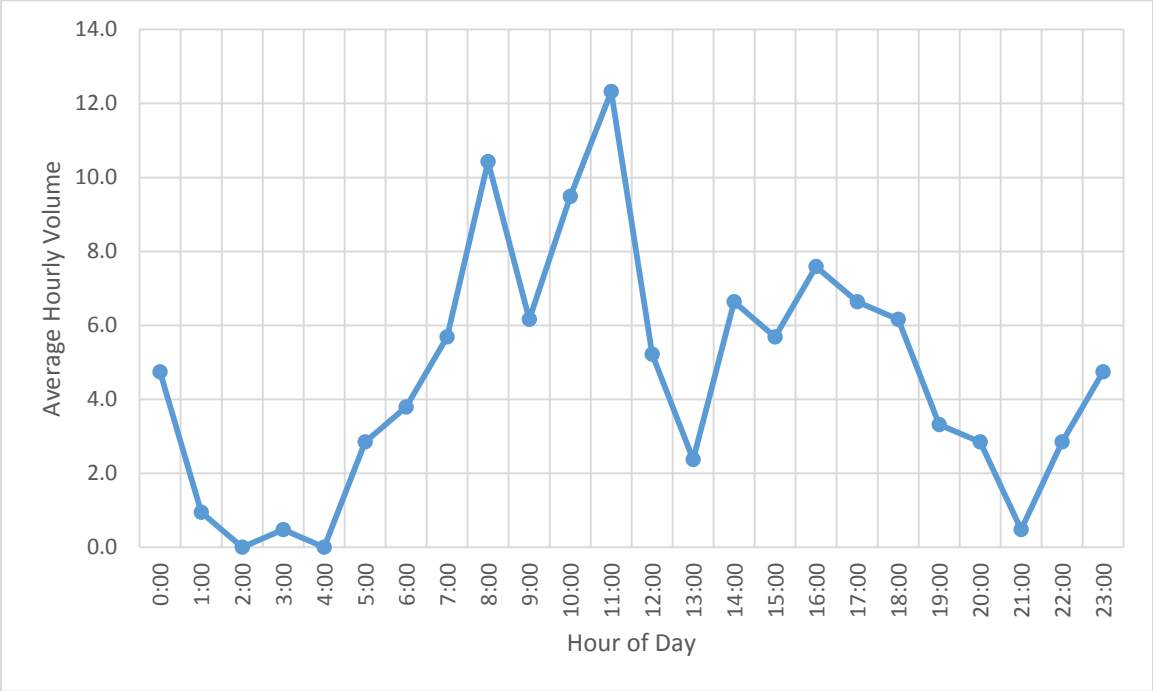
Source: *Chen Ryan Associates, April 2014*

Chart C-58 Average Hourly Weekday Bicycle Counts along Glendale Avenue (East-West) west of the Intersection of 19th Avenue & Glendale Avenue – Site ID#74 without Bicycle Facility



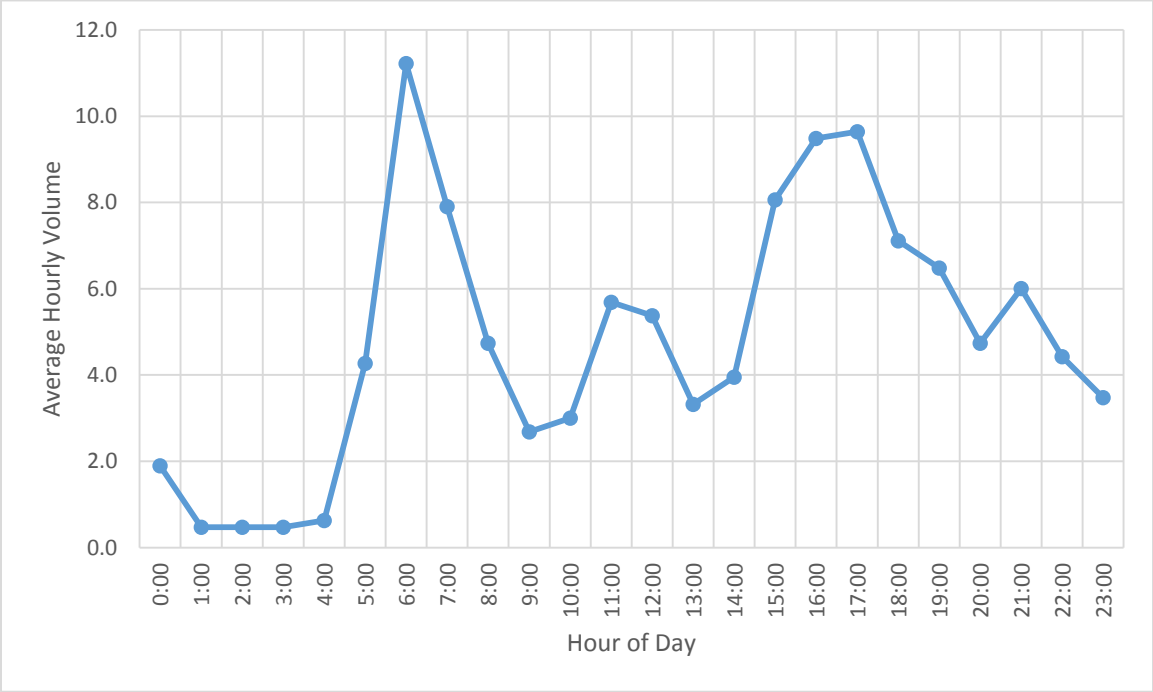
Source: *Chen Ryan Associates, April 2014*

Chart C-59 Average Hourly Weekend Bicycle Counts along 12th Street (East-West) south of the Intersection of 12th Street & Missouri Avenue – Site ID#98 with Bicycle Lane



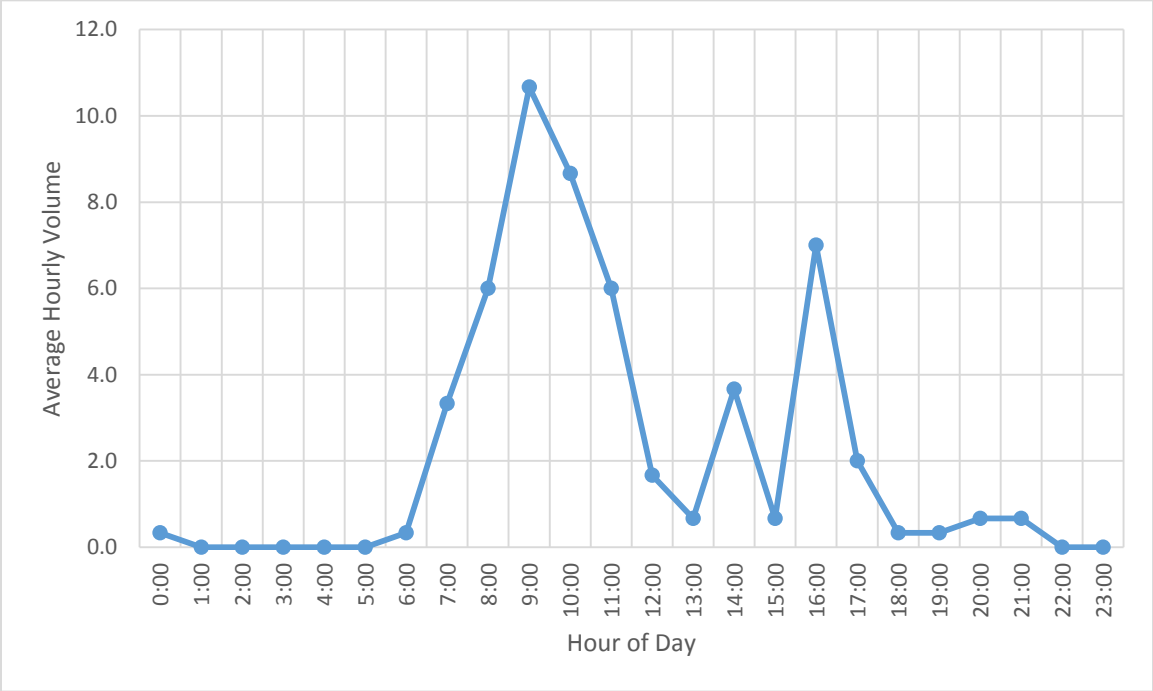
Source: *Chen Ryan Associates, April 2014*

Chart C-60 Average Hourly Weekday Bicycle Counts along 12th Street (East-West) south of the Intersection of 12th Street & Missouri Avenue – Site ID#98 with Bicycle Lane



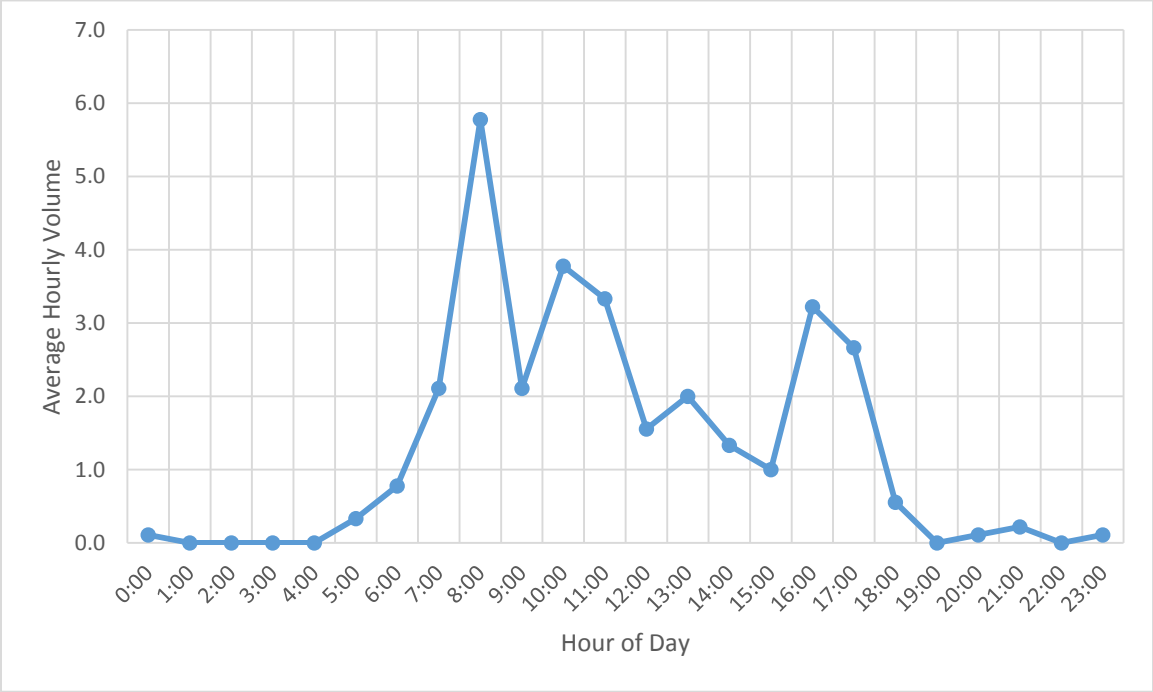
Source: *Chen Ryan Associates, April 2014*

Chart C-61 Average Hourly Weekend Bicycle Counts along Sonoqui Wash Path (North-South) south of the Chandler Heights Road – Site ID#100 with Bike Path



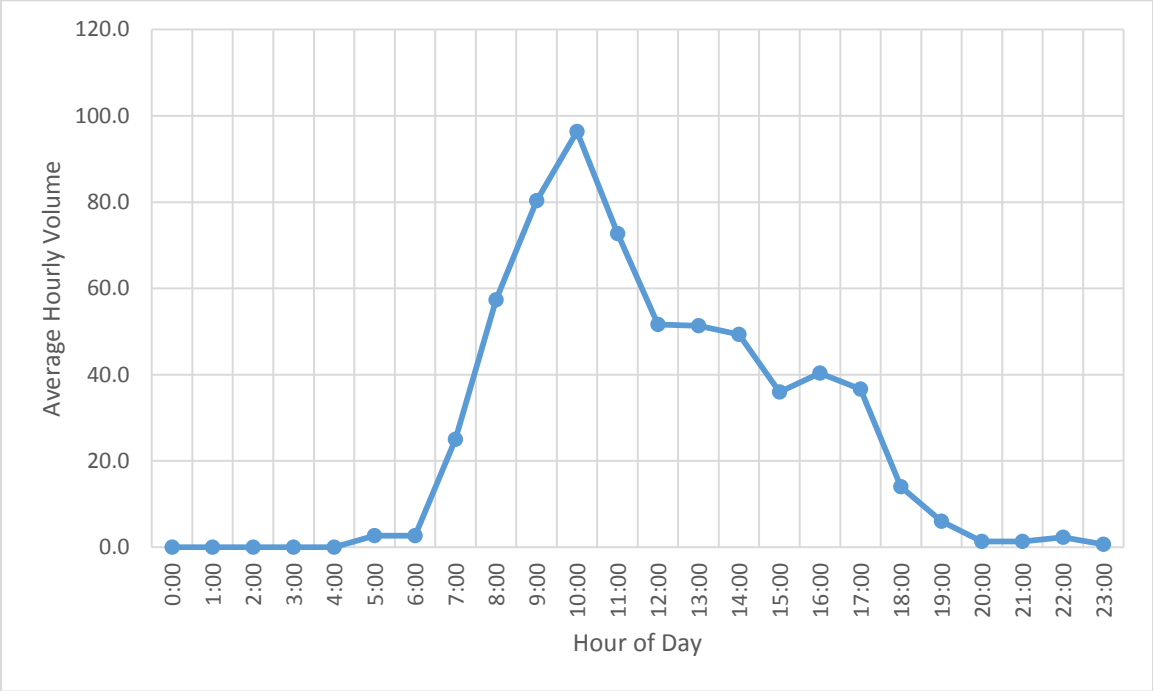
Source: *Chen Ryan Associates, April 2014*

Chart C-62 Average Hourly Weekday Bicycle Counts along Sonoqui Wash Path (North-South) south of the Chandler Heights Road – Site ID#100 with Bike Path



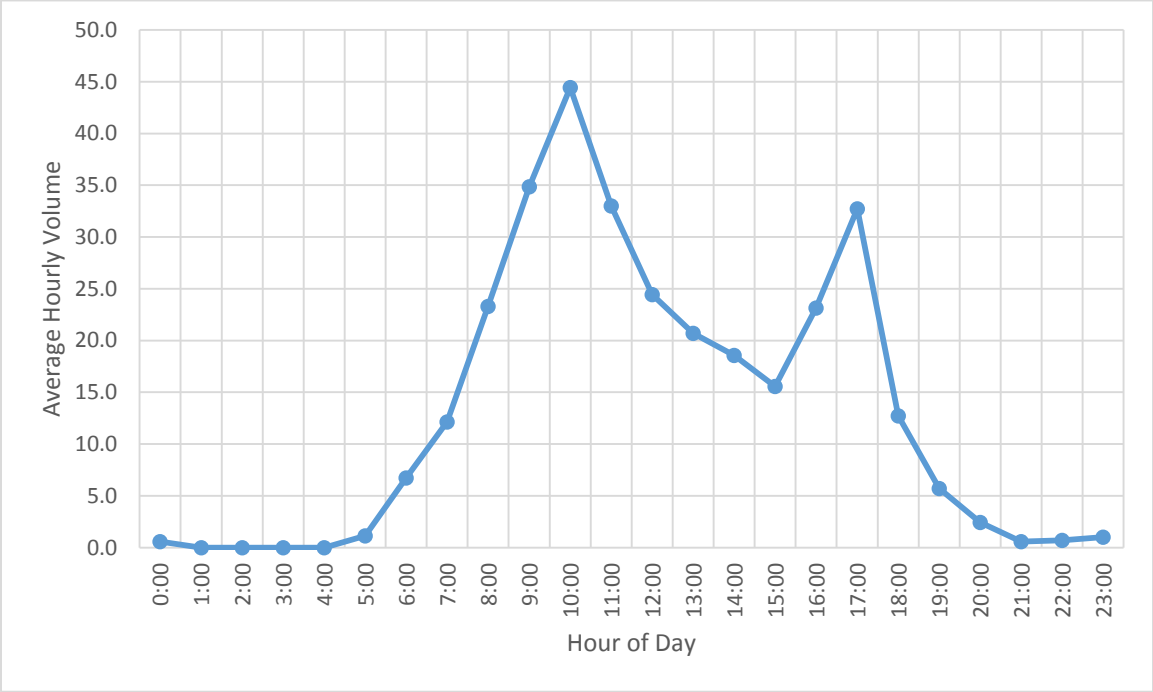
Source: *Chen Ryan Associates, April 2014*

Chart C-63 Average Hourly Weekend Bicycle Counts along Indian Bend Wash Path (North-South) east of McCormick Parkway – Site ID#102 with Bike Path



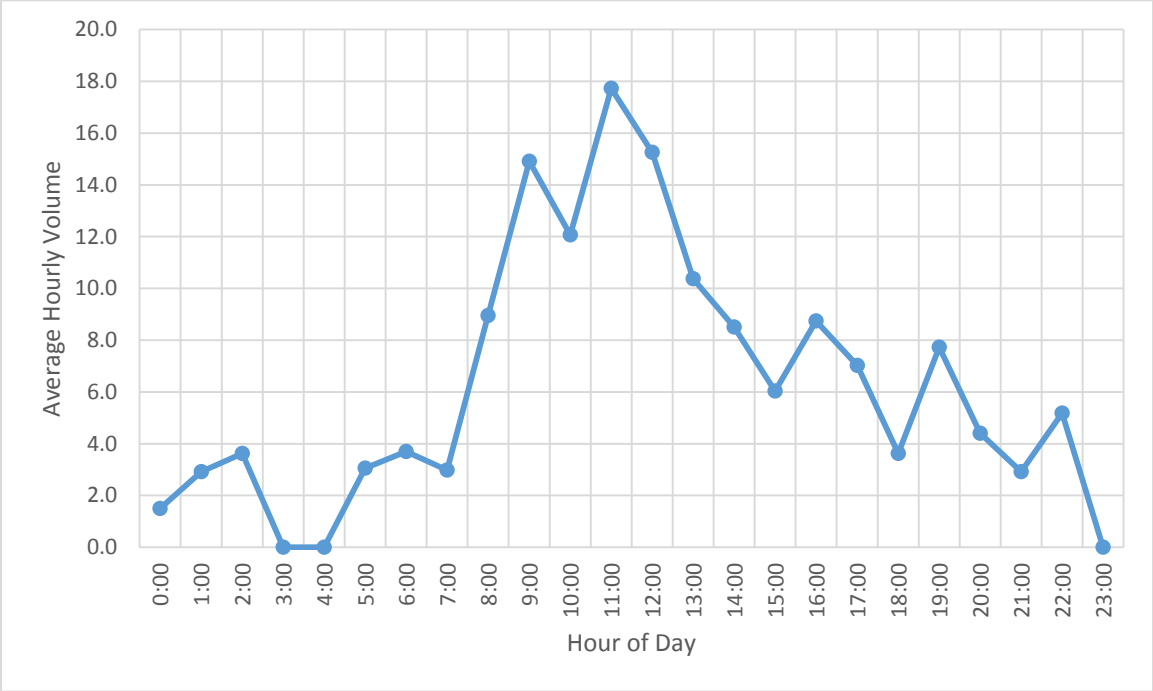
Source: *Chen Ryan Associates, April 2014*

Chart C-64 Average Hourly Weekday Bicycle Counts along Indian Bend Wash Path (North-South) east of McCormick Parkway – Site ID#102 with Bike Path



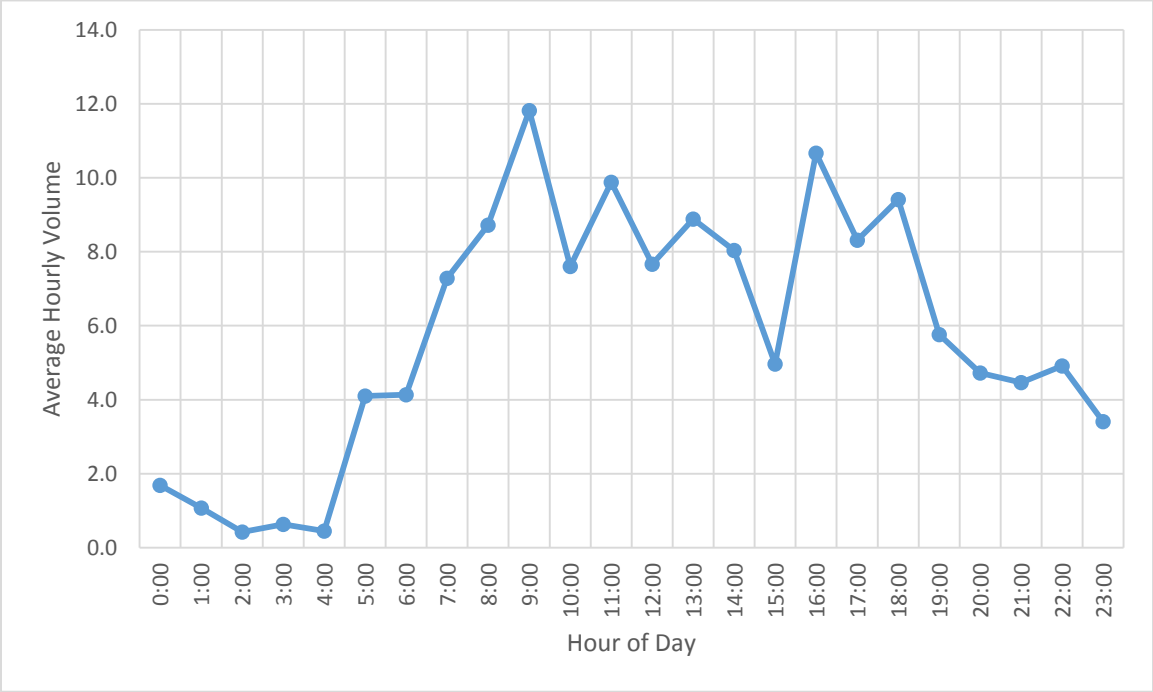
Source: *Chen Ryan Associates, April 2014*

Chart C-65 Average Hourly Weekend Bicycle Counts along Indian School Road (East-West) east of the Intersection of Scottsdale Road & Indian School Road – Site ID#104 with Bicycle Lane



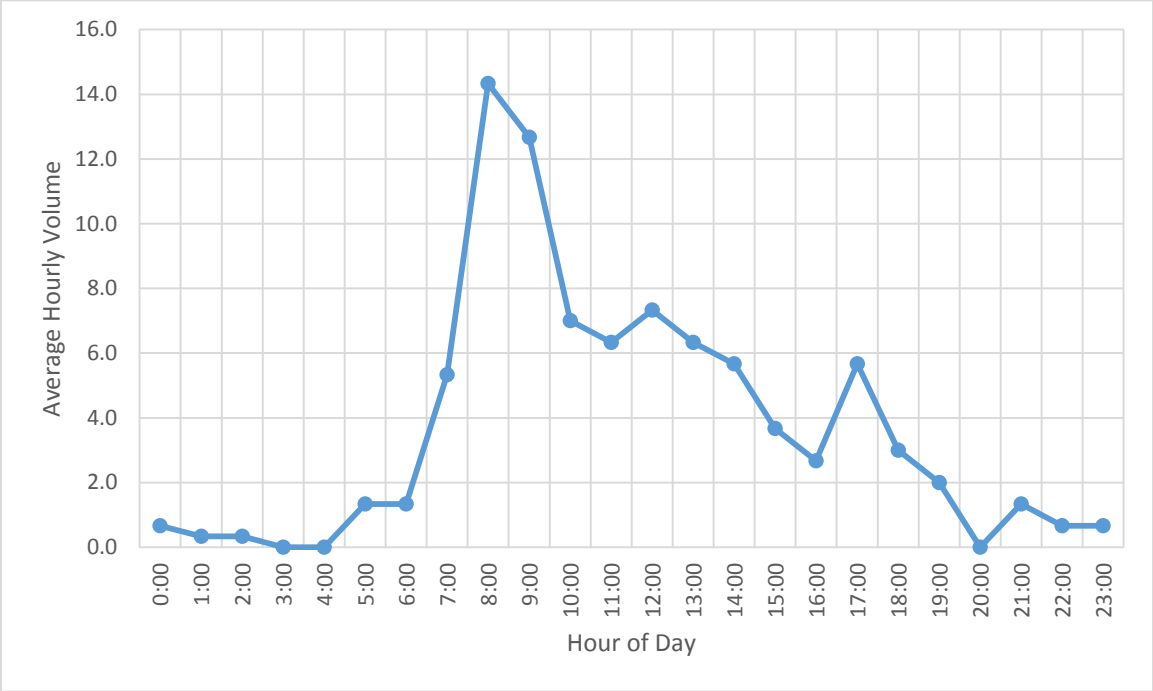
Source: *Chen Ryan Associates, April 2014*

Chart C-66 Average Hourly Weekday Bicycle Counts along Indian School Road (East-West) east of the Intersection of Scottsdale Road & Indian School Road – Site ID#104 with Bicycle Lane



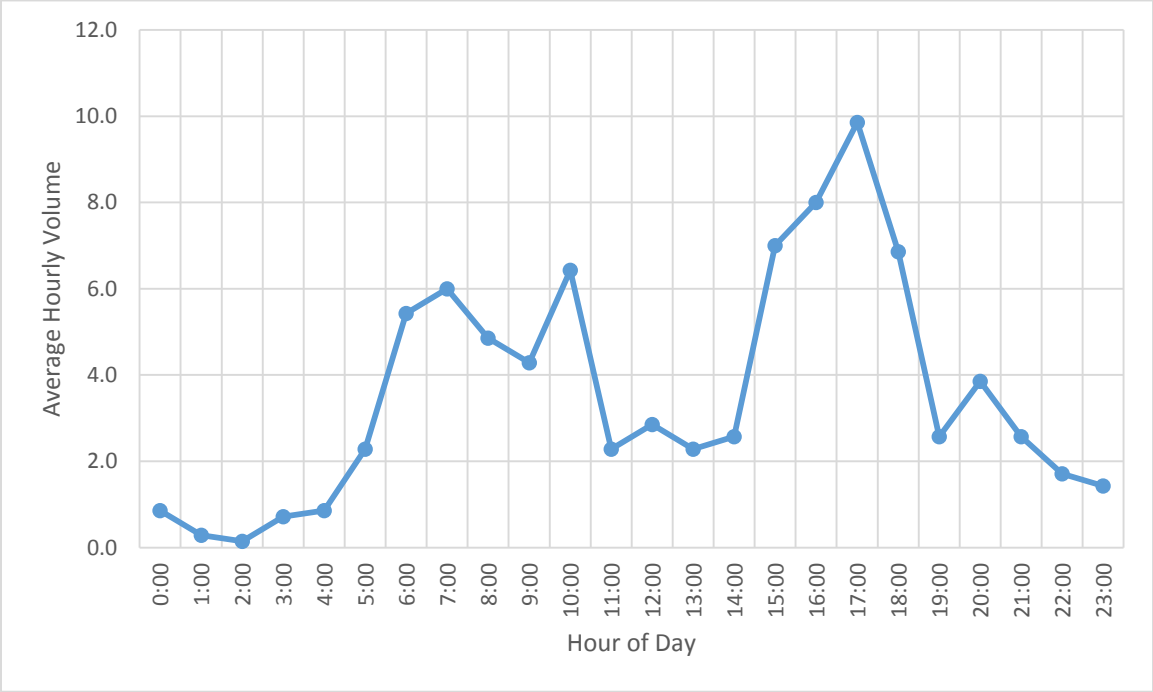
Source: *Chen Ryan Associates, April 2014*

Chart C-67 Average Hourly Weekend Bicycle Counts along the North Side of the Western Canal Bike Path (East-West) west of Hardy Drive – Site ID#113 with Bike Path



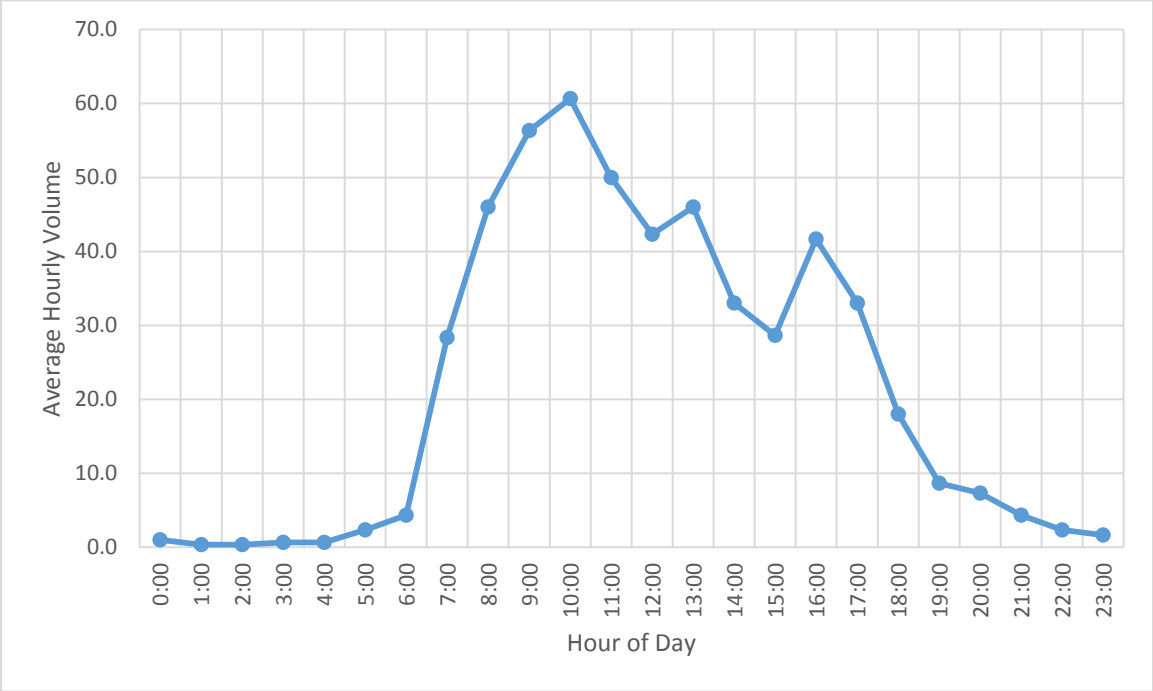
Source: *Chen Ryan Associates, April 2014*

Chart C-68 Average Hourly Weekday Bicycle Counts along the North Side of the Western Canal Bike Path (East-West) west of Hardy Drive – Site ID#113 with Bike Path



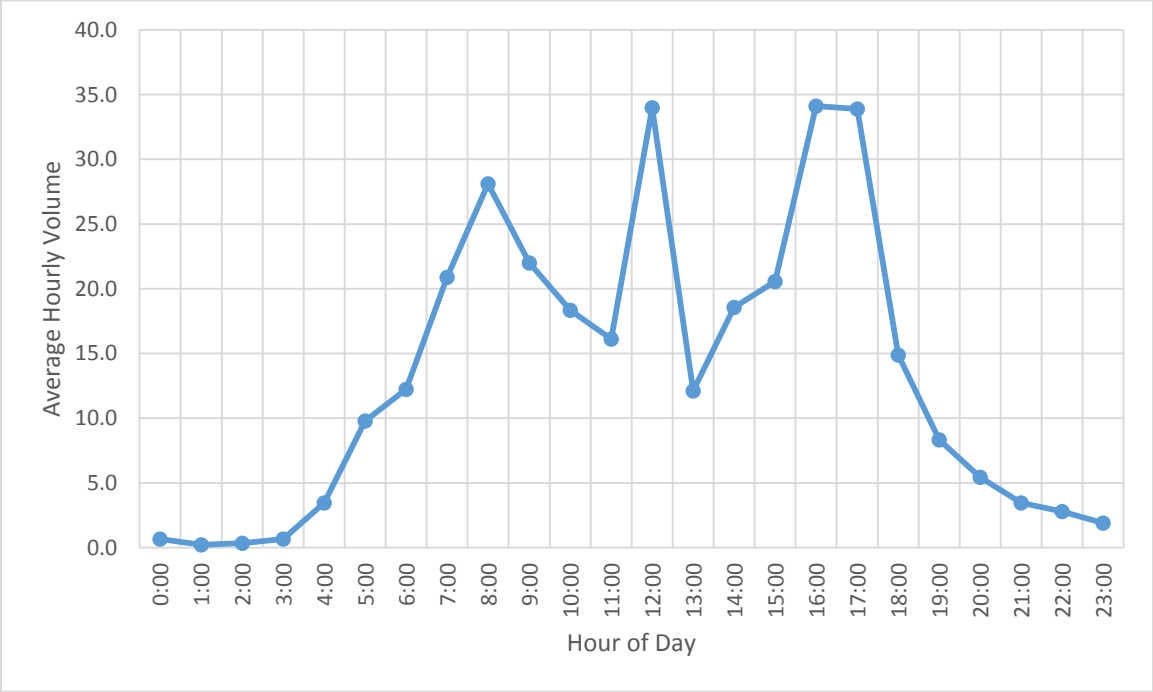
Source: *Chen Ryan Associates, April 2014*

Chart C-69 Average Hourly Weekend Bicycle Counts along the South Side of the Western Canal Bike Path (East-West) west of Rural Road – Site ID#115 with Bike Path



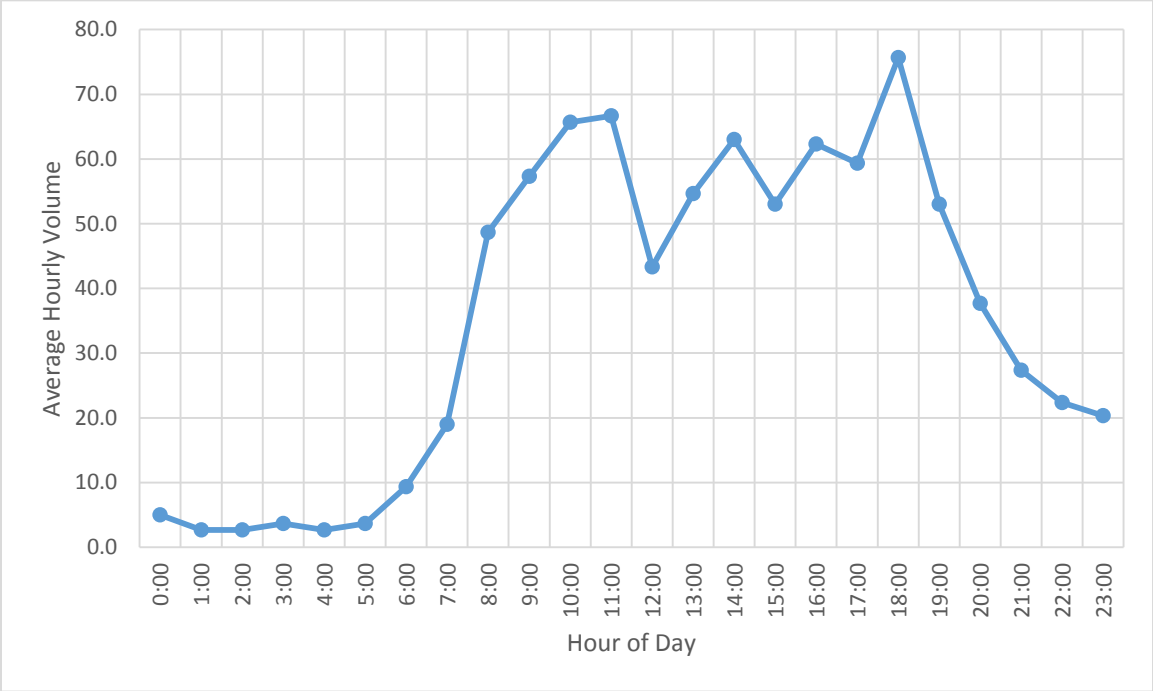
Source: *Chen Ryan Associates, April 2014*

Chart C-70 Average Hourly Weekday Bicycle Counts along the South Side of the Western Canal Bike Path (East-West) west of Rural Road – Site ID#115 with Bike Path



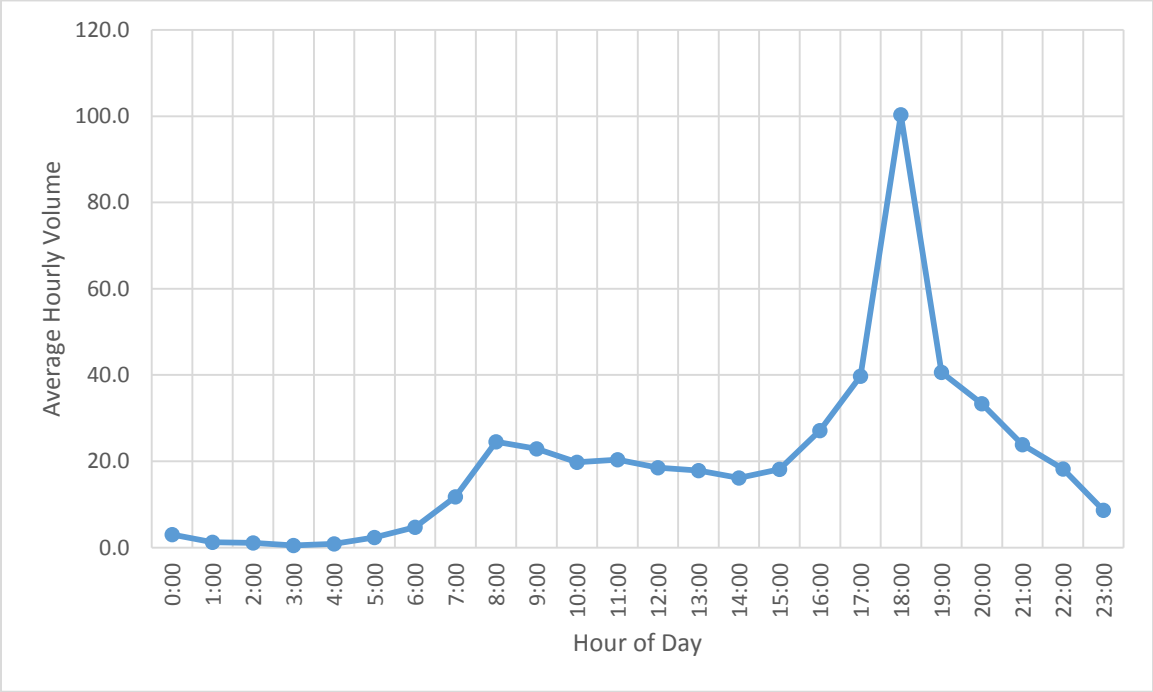
Source: *Chen Ryan Associates, April 2014*

Chart C-71 Average Hourly Weekend Bicycle Counts along the Rio Salado Downstream Dam Bridge (North-South) north of Rio Salado Parkway, west of Lakeside Drive – Site ID#119 with Bike Path



Source: *Chen Ryan Associates, April 2014*

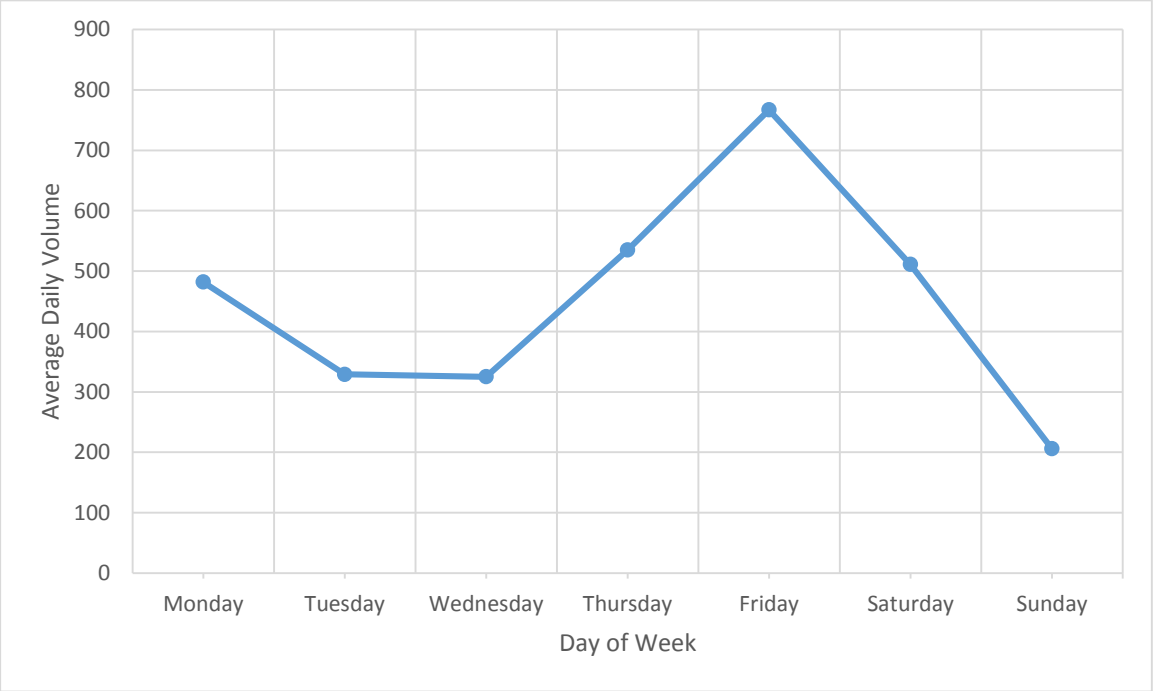
Chart C-72 Average Hourly Weekday Bicycle Counts along the Rio Salado Downstream Dam Bridge (North-South) north of Rio Salado Parkway, west of Lakeside Drive – Site ID#119 with Bike Path



Source: *Chen Ryan Associates, April 2014*

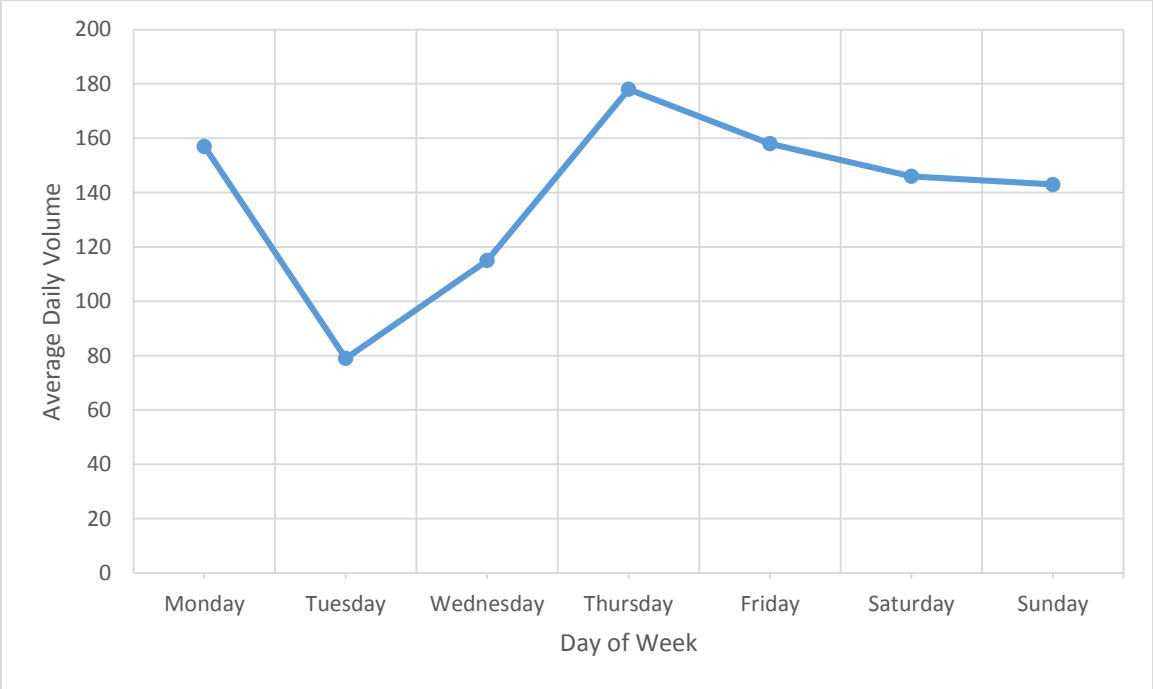
Appendix D
Average Daily Bicycle Volumes by Day of Week for Automated Count Sites

Chart D-1: Average Volume by Day of Week along 107th Avenue (North-South) south of the Intersection of 107th Avenue and Thomas Road – Site ID#1 with Bicycle Lane



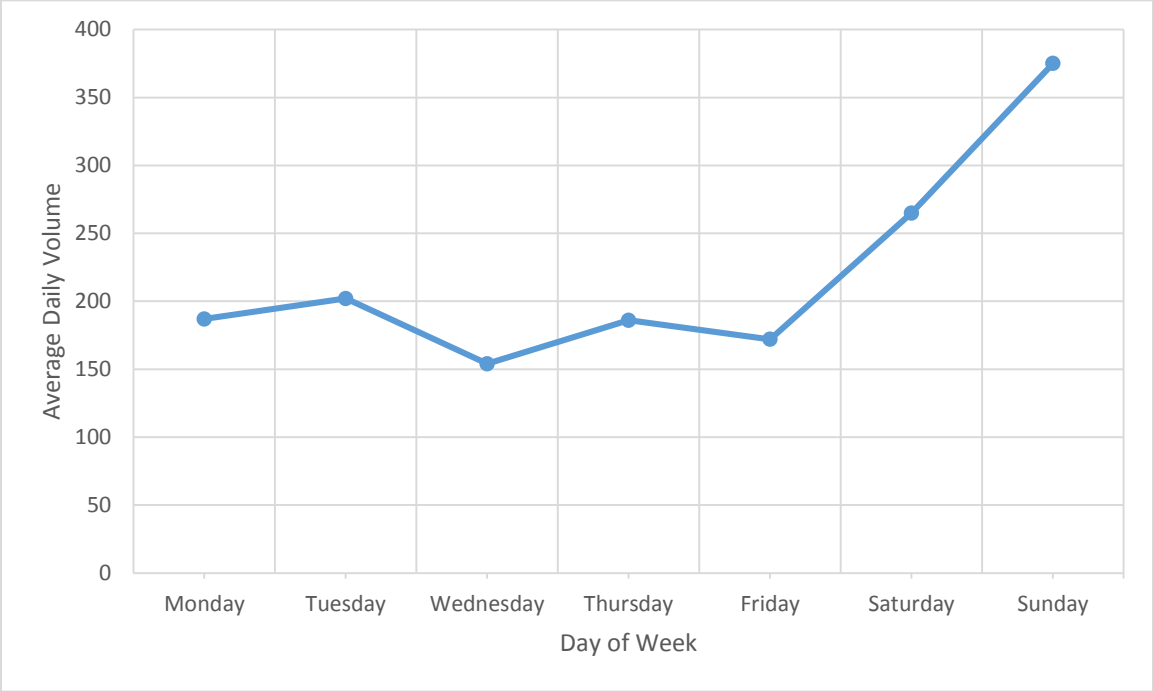
Source: *Chen Ryan Associates, April 2014*

Chart D-2: Average Volume by Day of Week along Dobson Road (North-South) north of the Intersection of Dobson Road & Frye Road – Site ID#10 with Bicycle Lane



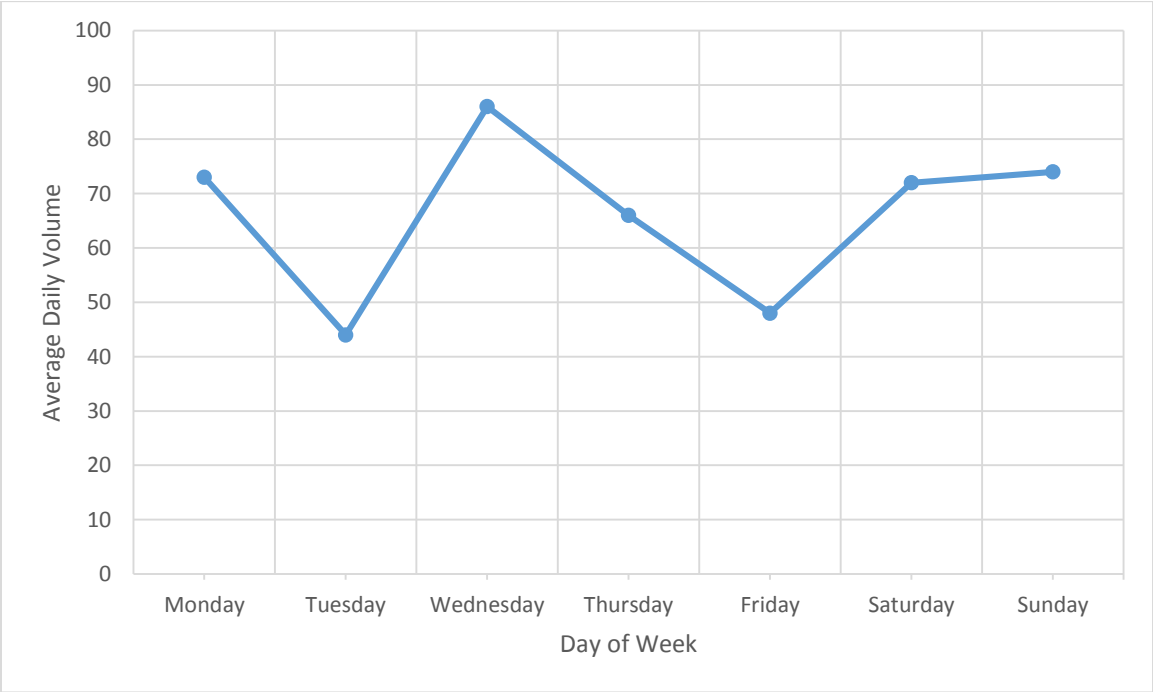
Source: *Chen Ryan Associates, April 2014*

Chart D-3: Average Volume by Day of Week along the Western Canal Bike Path (East-West) west of Dobson Road – Site ID#13 with Bike Path



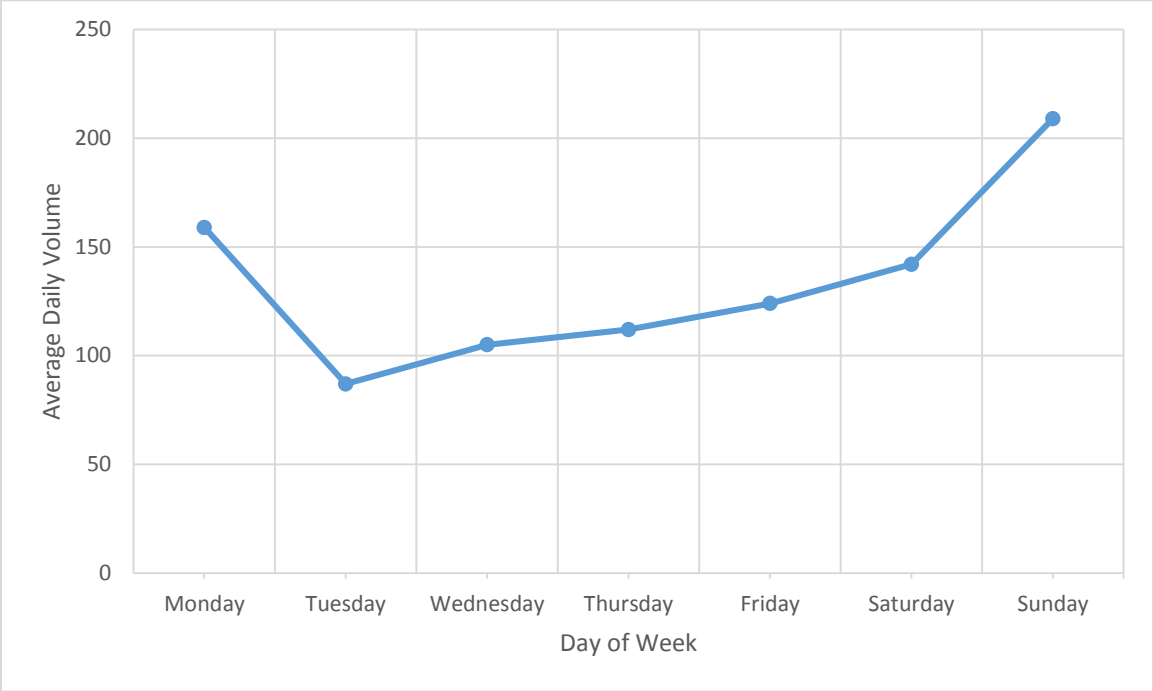
Source: *Chen Ryan Associates, April 2014*

Chart D-4: Average Volume by Day of Week along El Mirage Road (North-South) south of the intersection of El Mirage Road & Thunderbird Road – Site ID#16 without Bicycle Facility



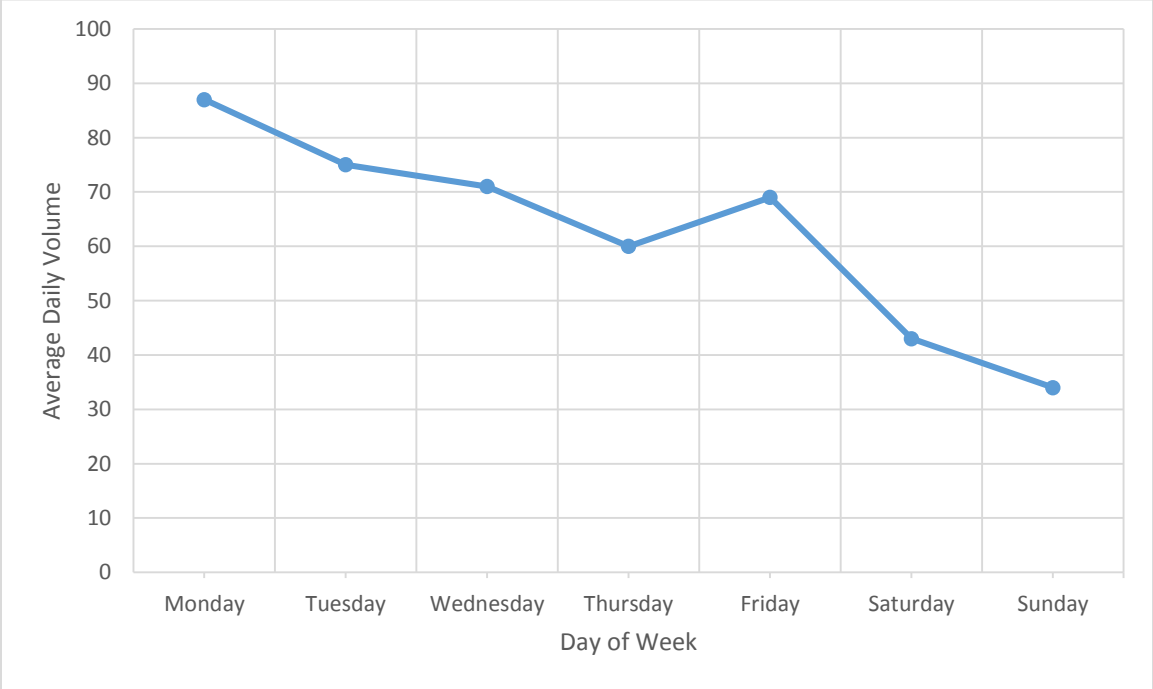
Source: *Chen Ryan Associates, April 2014*

Chart D-5: Average Volume by Day of Week along Guadalupe Road (East-West) west of the Intersection of Greenfield Road & Guadalupe Road – Site ID#18 with Bicycle Lane



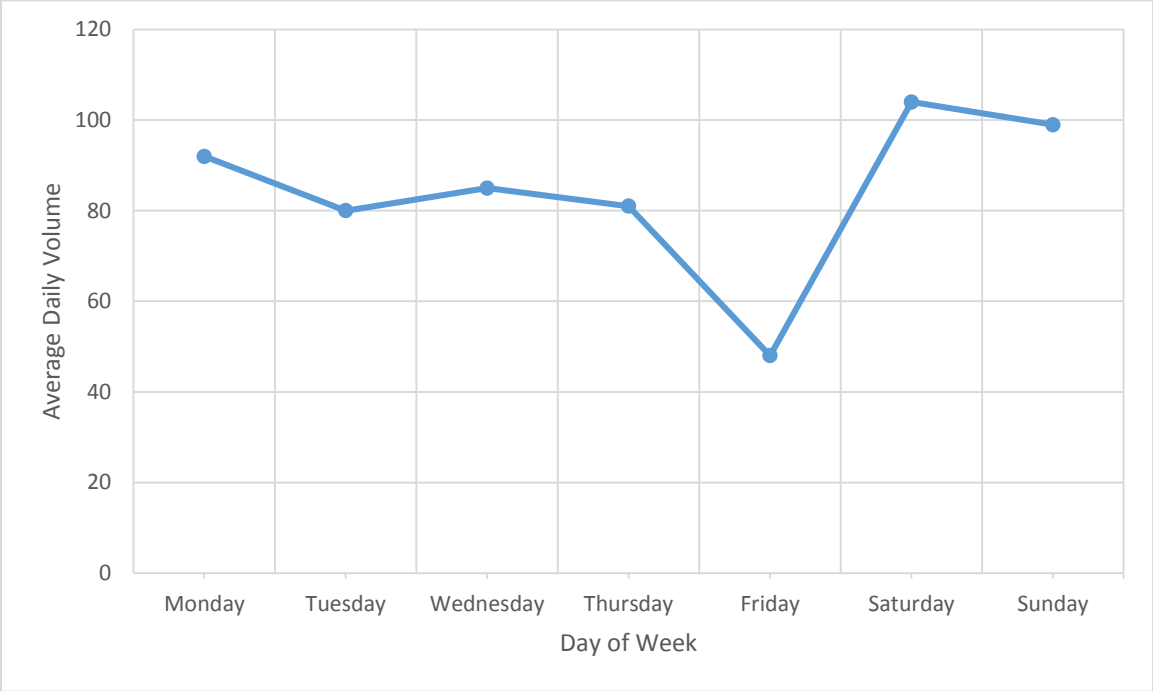
Source: *Chen Ryan Associates, April 2014*

Chart D-6: Average Volume by Day of Week along Maryland Avenue (East-West) west of the Intersection of 61st Avenue & Maryland Avenue – Site ID#24 with Bicycle Lane



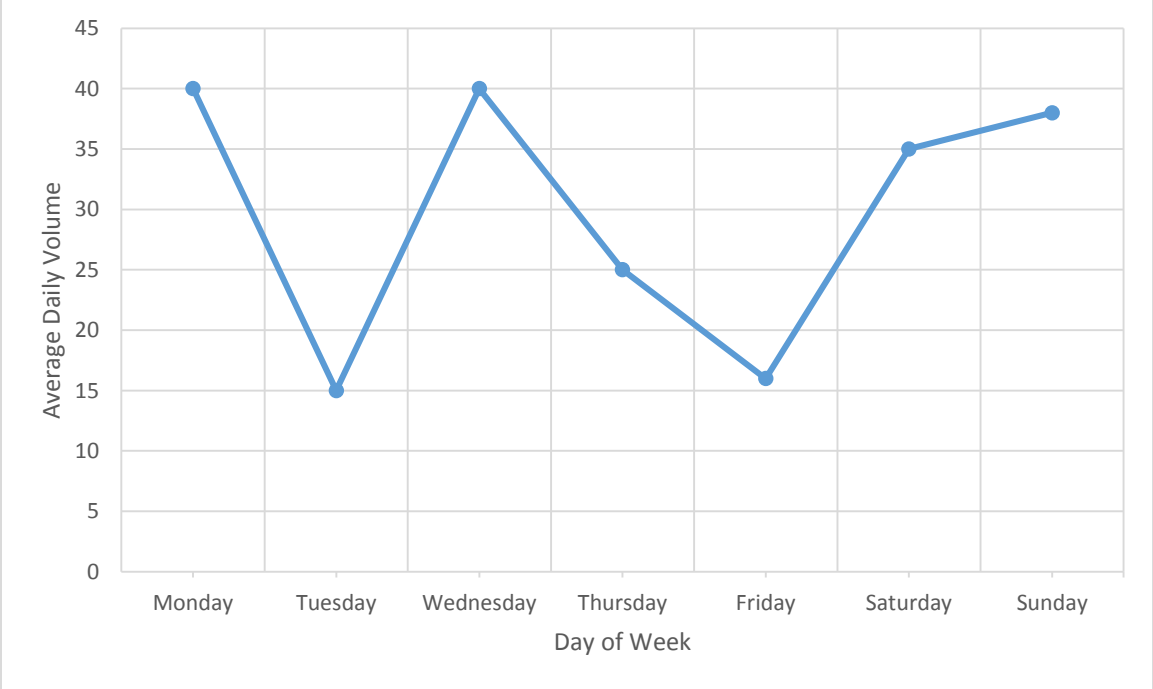
Source: *Chen Ryan Associates, April 2014*

Chart D-7: Average Volume by Day of Week along the 63rd Avenue Bicycle & Pedestrian Bridge over the Loop 101 (North-South) – Site ID#25 with Bicycle Path



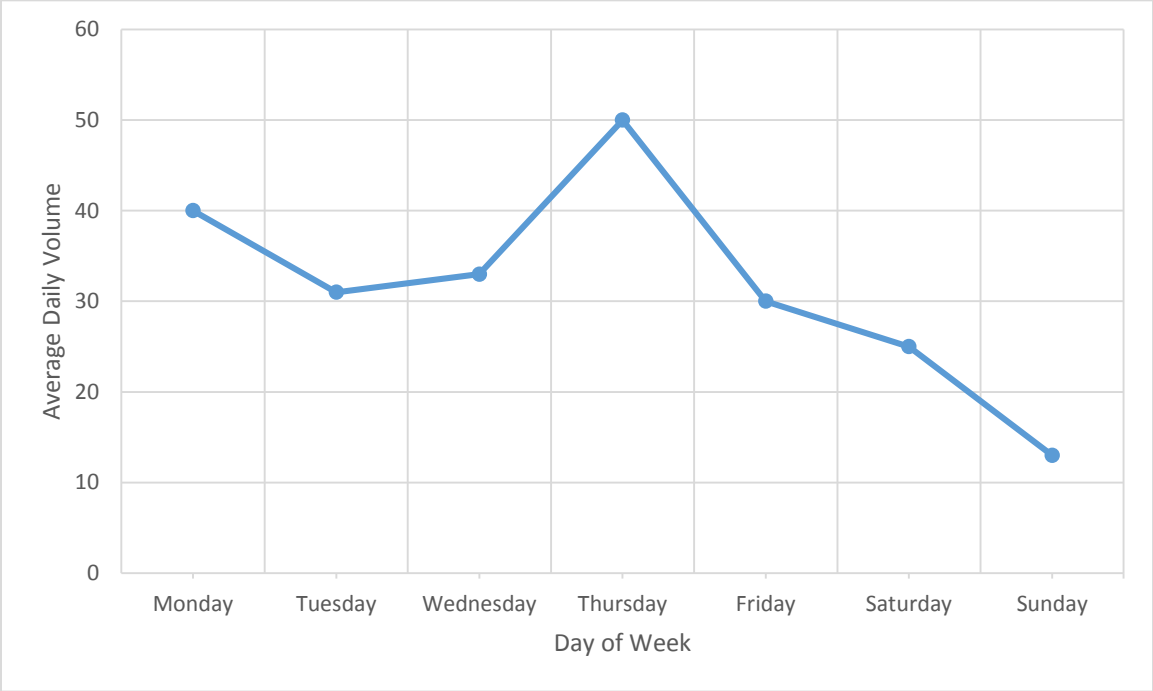
Source: *Chen Ryan Associates, April 2014*

Chart D-8: Average Volume by Day of Week along the South Side of the Arizona Canal Bike Path (East-West) east of 51st – Site ID#26 with Bicycle Path



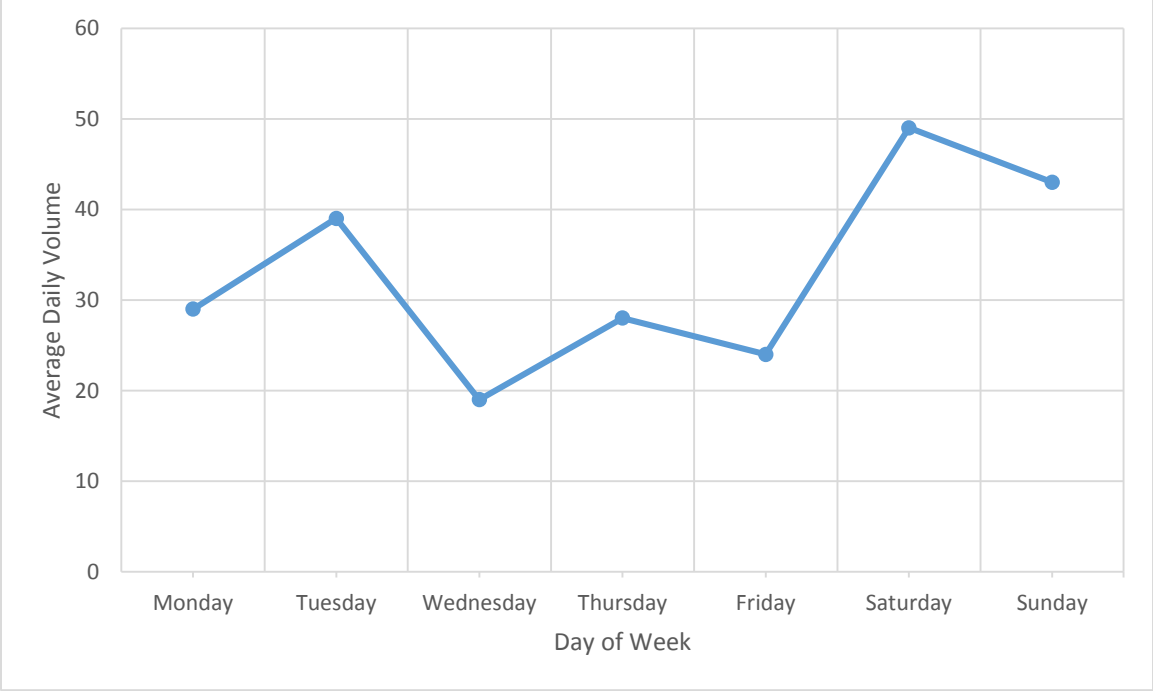
Source: *Chen Ryan Associates, April 2014*

Chart D-9: Average Volume by Day of Week along Camelback Road (East-West) east of the Intersection of Litchfield Road & Camelback Road – Site ID#35 with Bicycle Lane



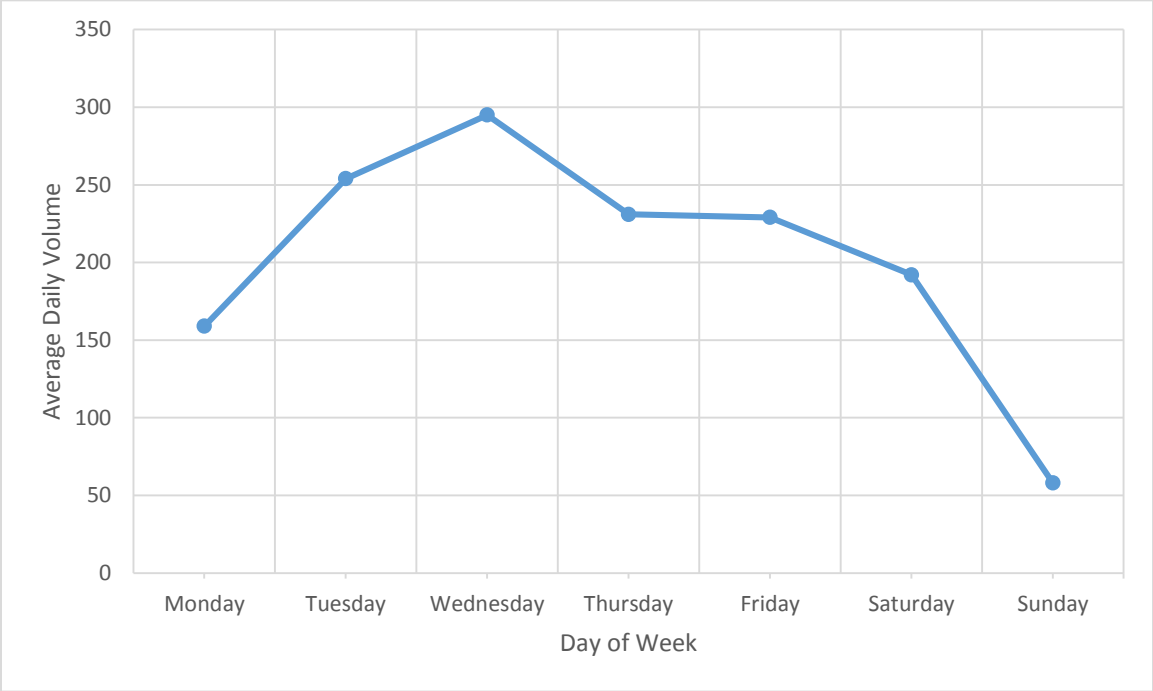
Source: *Chen Ryan Associates, April 2014*

Chart D-10: Average Volume by Day of Week along Gavilan Peak Parkway (North-South) south of the Intersection of Gavilan Peak Parkway & Pioneer Road – Site ID#39 with Bicycle Lane



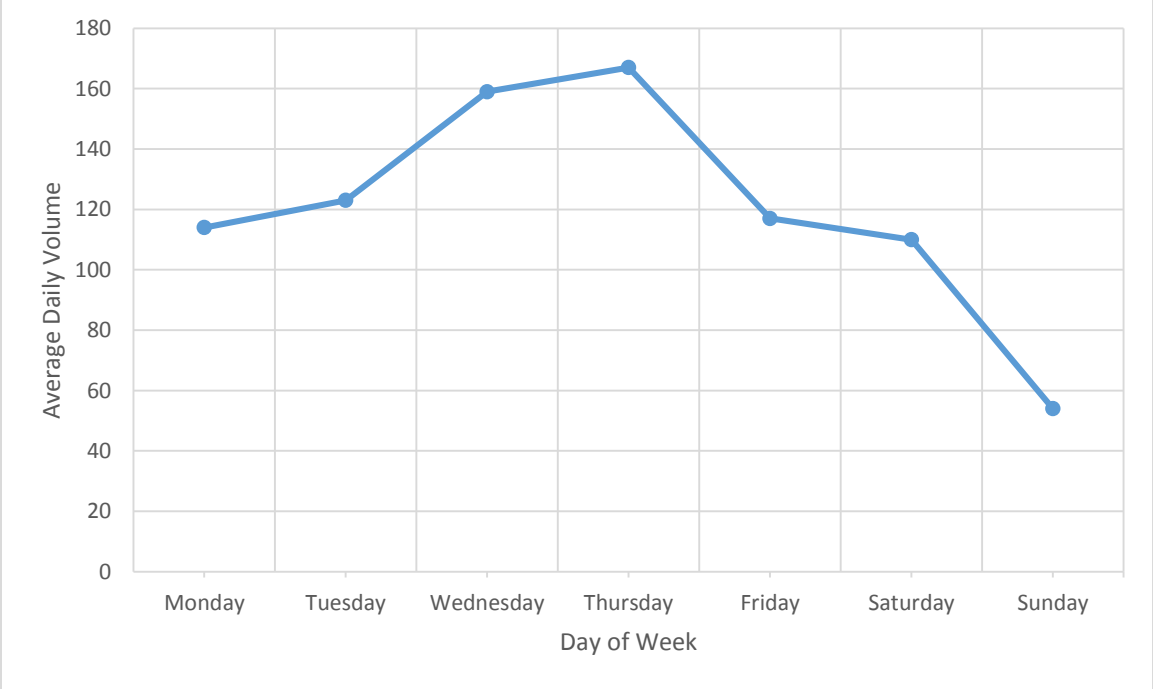
Source: *Chen Ryan Associates, April 2014*

Chart D-11: Average Volume by Day of Week along Ellsworth Road (North-South) south of the Intersection of Ellsworth Road & McLellan Road – Site ID#40 with Bicycle Lane



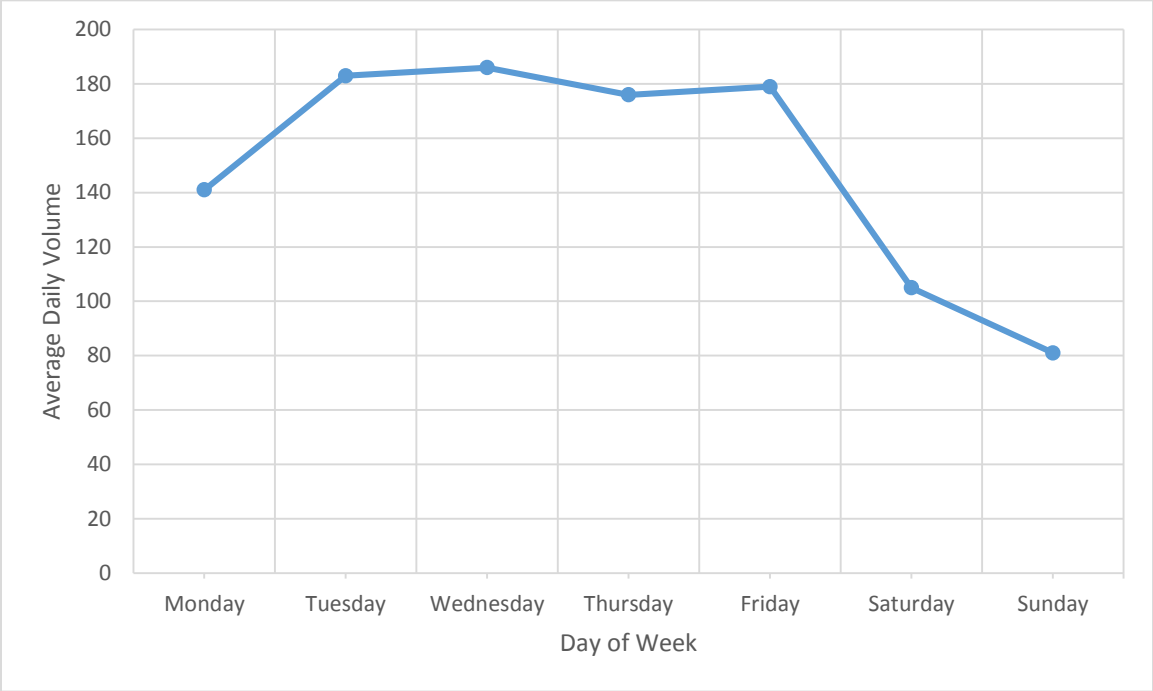
Source: *Chen Ryan Associates, April 2014*

Chart D-12: Average Volume by Day of Week along University Drive (East-West) east of the Intersection of Gilbert Road & University Drive – Site ID#41 with Bicycle Lane



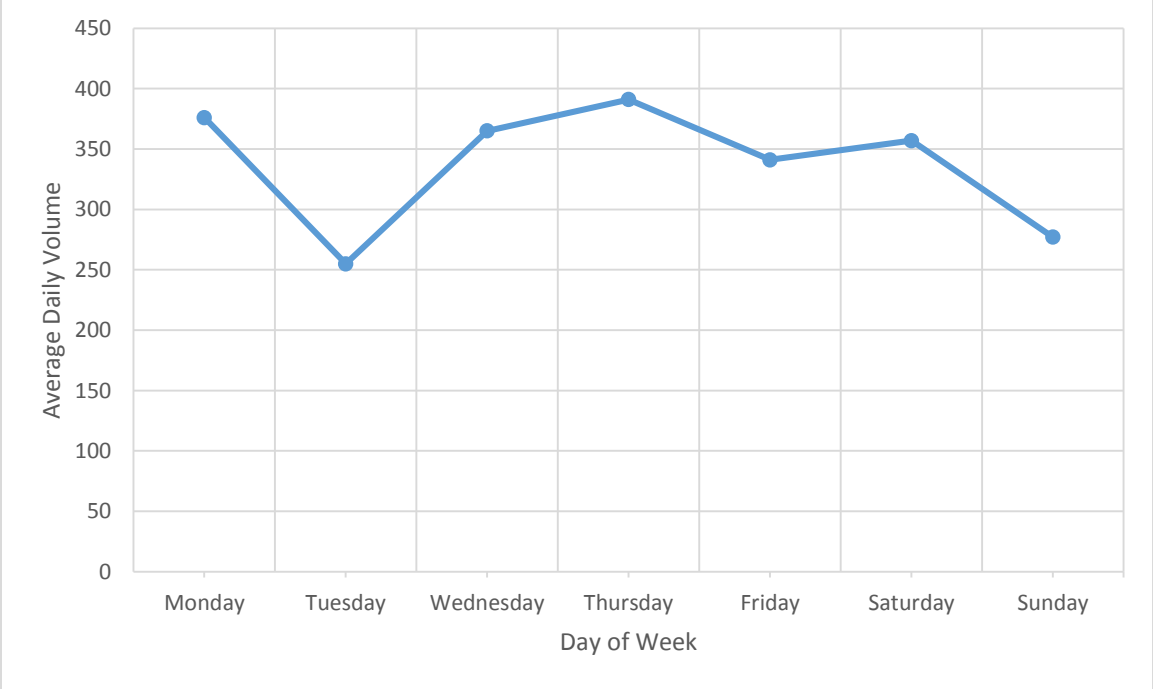
Source: *Chen Ryan Associates, April 2014*

Chart D-13: Average Volume by Day of Week along University Drive (East-West) near the Eastern Canal Bike Path – Site ID#42 with Bike Path



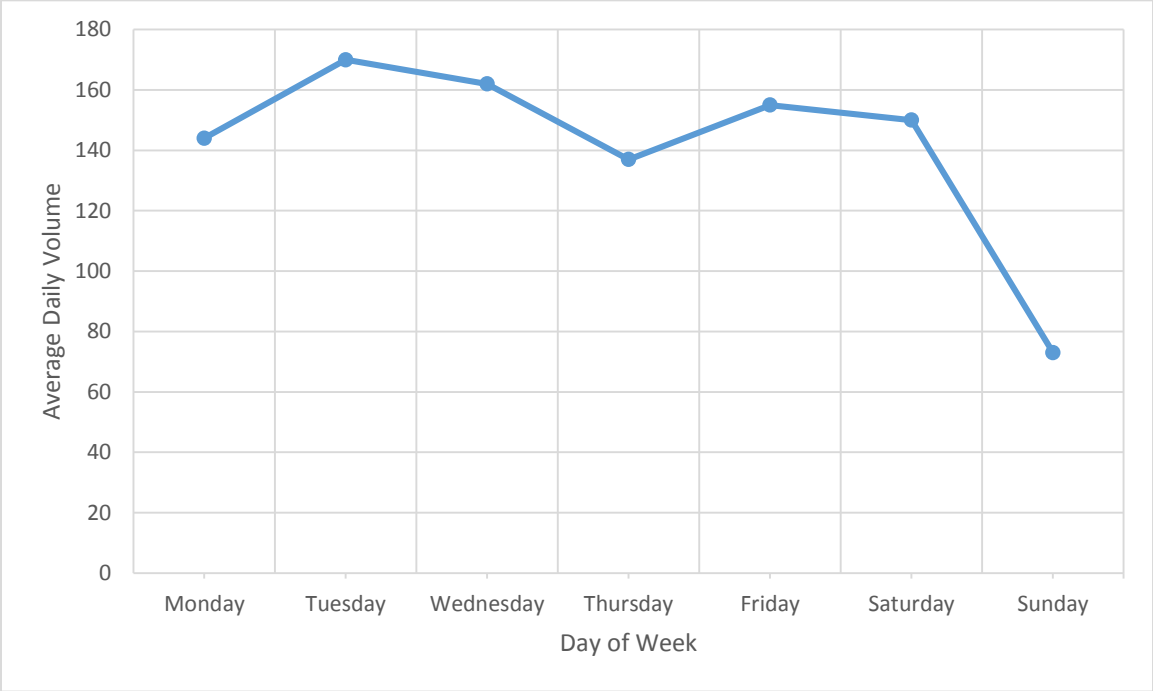
Source: *Chen Ryan Associates, April 2014*

Chart D-14: Average Volume by Day of Week along Southern Avenue (East-West) west of the Intersection of 24th Street & Southern Avenue – Site ID#43 with Bicycle Lane



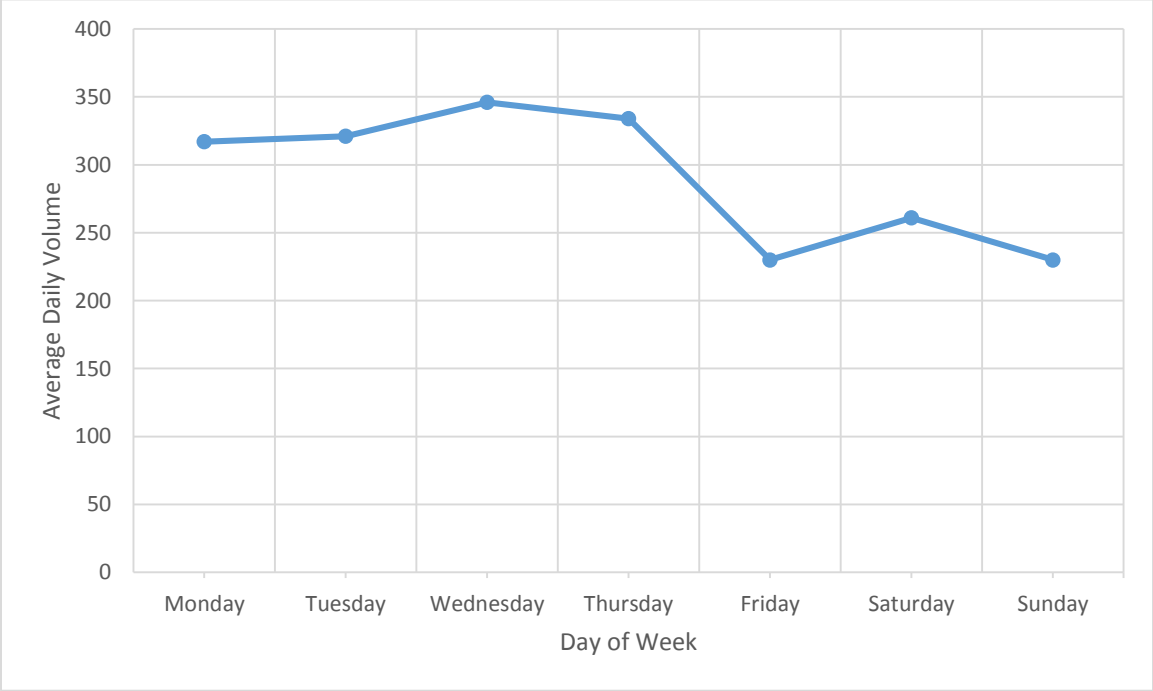
Source: *Chen Ryan Associates, April 2014*

Chart D-15: Average Volume by Day of Week along Higley Road (North-South) north of the Intersection of Higley Road & Southern Avenue – Site ID#46 with Bicycle Lane



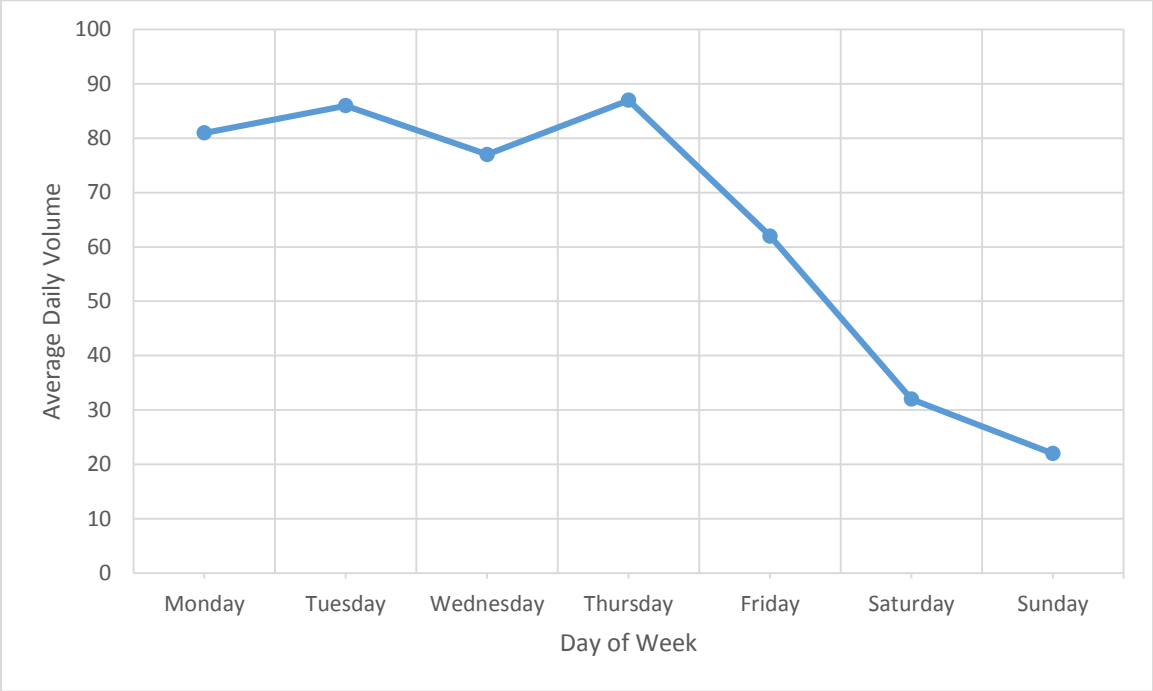
Source: *Chen Ryan Associates, April 2014*

Chart D-16: Average Volume by Day of Week along 83rd Avenue (North-South) south of the Intersection of 83rd Avenue & Thunderbird Road – Site ID#54 with Bicycle Lane



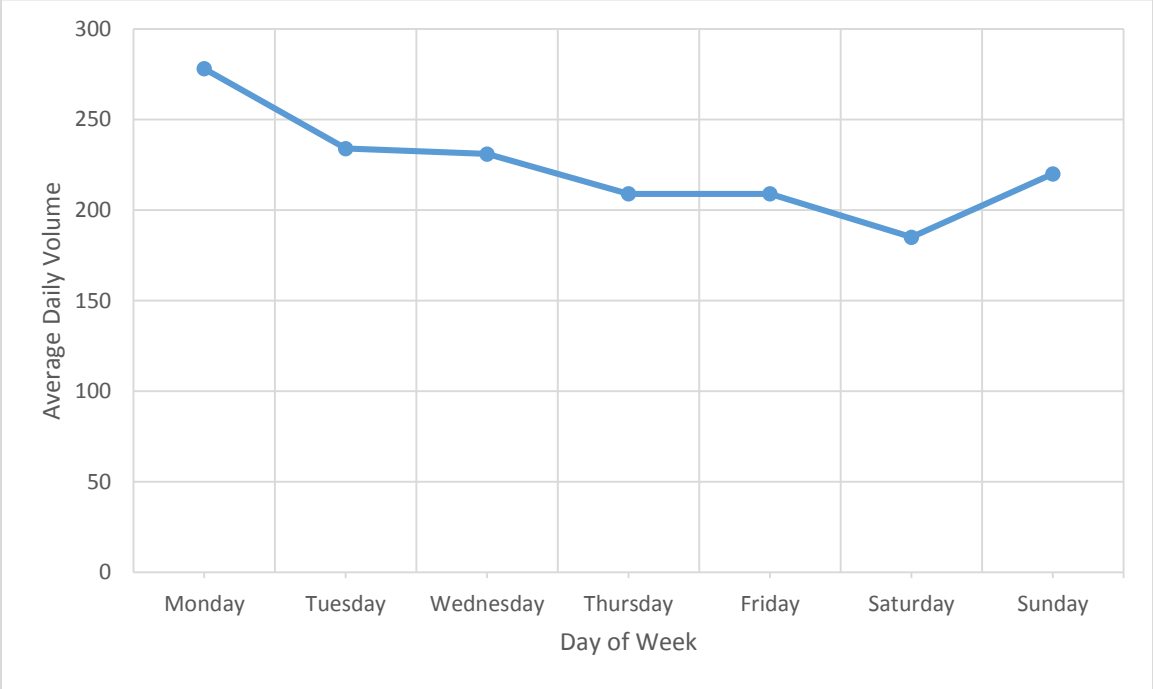
Source: *Chen Ryan Associates, April 2014*

Chart D-17: Average Volume by Day of Week along Happy Valley Parkway (East-West) east of the Intersection of 115th Avenue & Happy Valley Parkway – Site ID#55 without Bicycle Facility



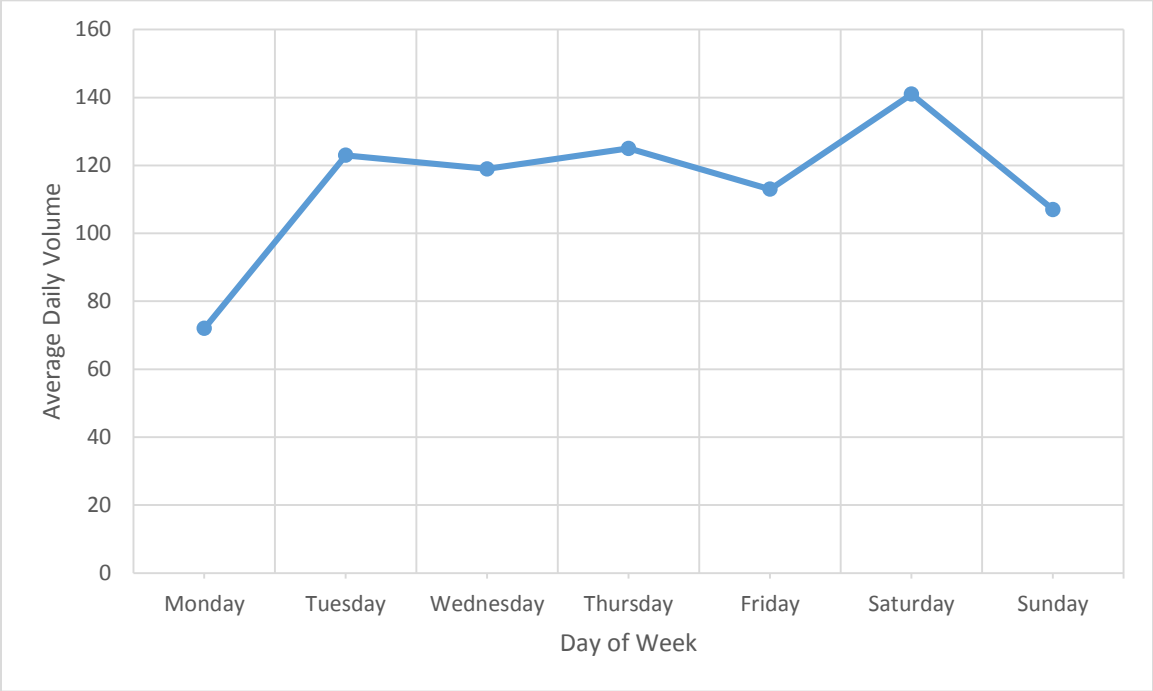
Source: *Chen Ryan Associates, April 2014*

Chart D-18: Average Volume by Day of Week along the New River Bike Path Bridge (North-South) east of the Intersection of 91st Avenue & Greenway Road – Site ID#58 with Bike Path



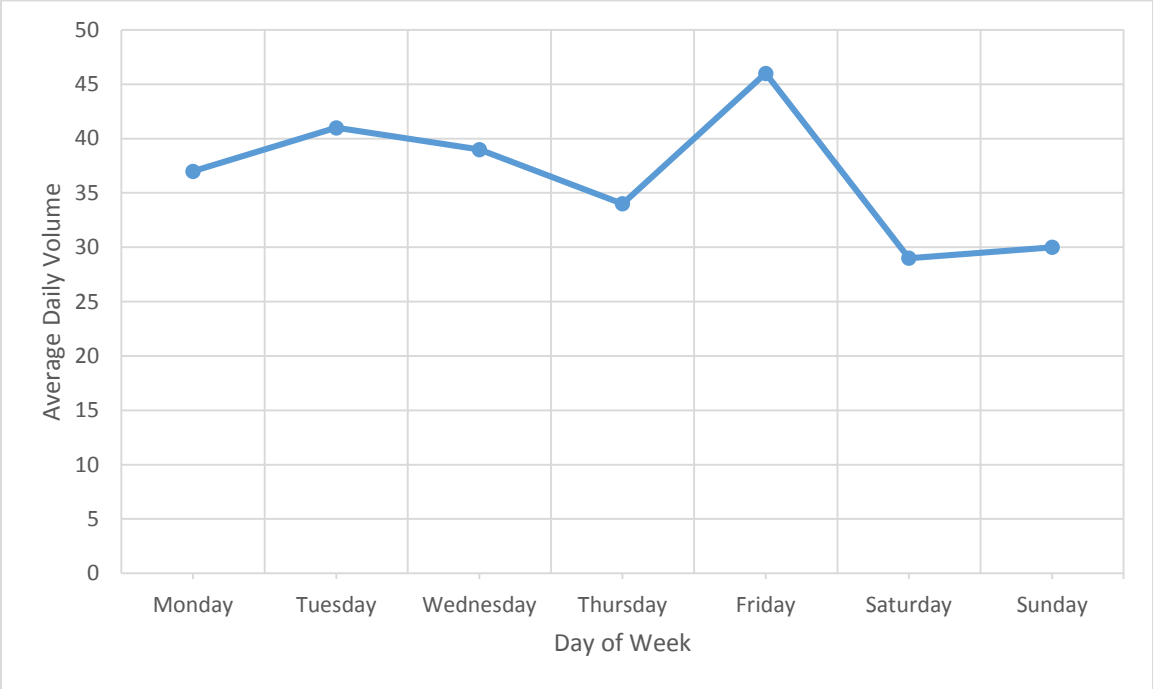
Source: *Chen Ryan Associates, April 2014*

Chart D-19: Average Volume by Day of Week along Hatcher Road (East-West) west of the Intersection of 12th Street & Hatcher Road – Site ID#59 without Bicycle Facility



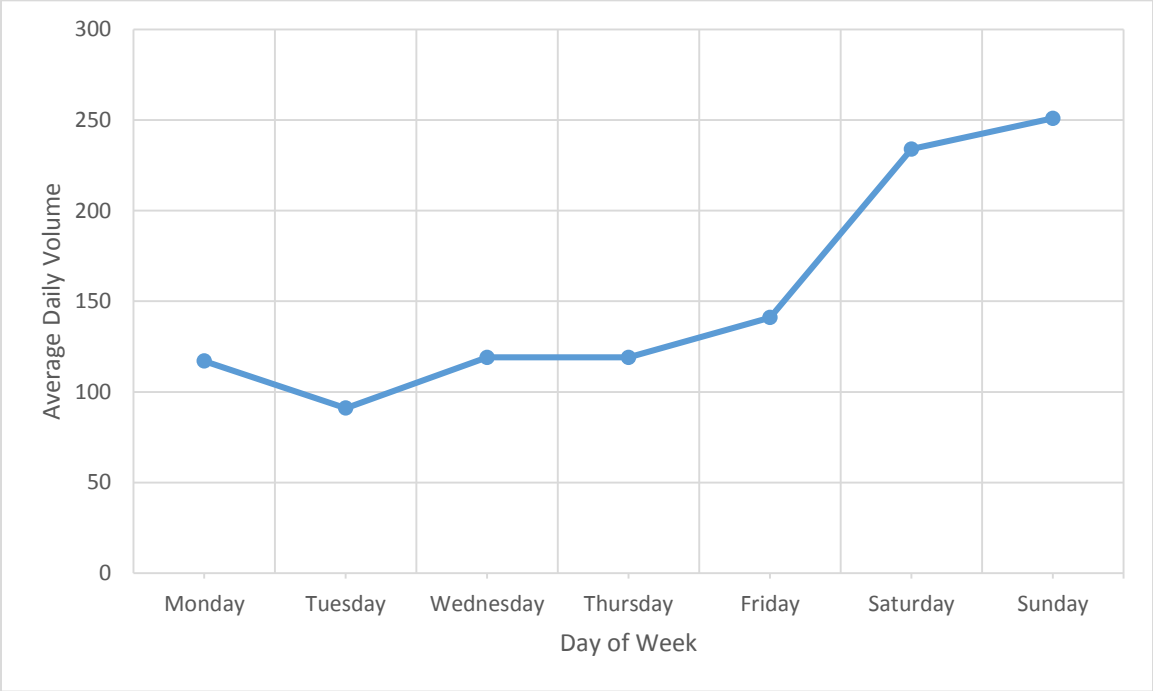
Source: *Chen Ryan Associates, April 2014*

Chart D-20: Average Volume by Day of Week along Jefferson Street (East-West) west of the Intersection of 11th Street & Jefferson Street – Site ID#61 with Bicycle Lane



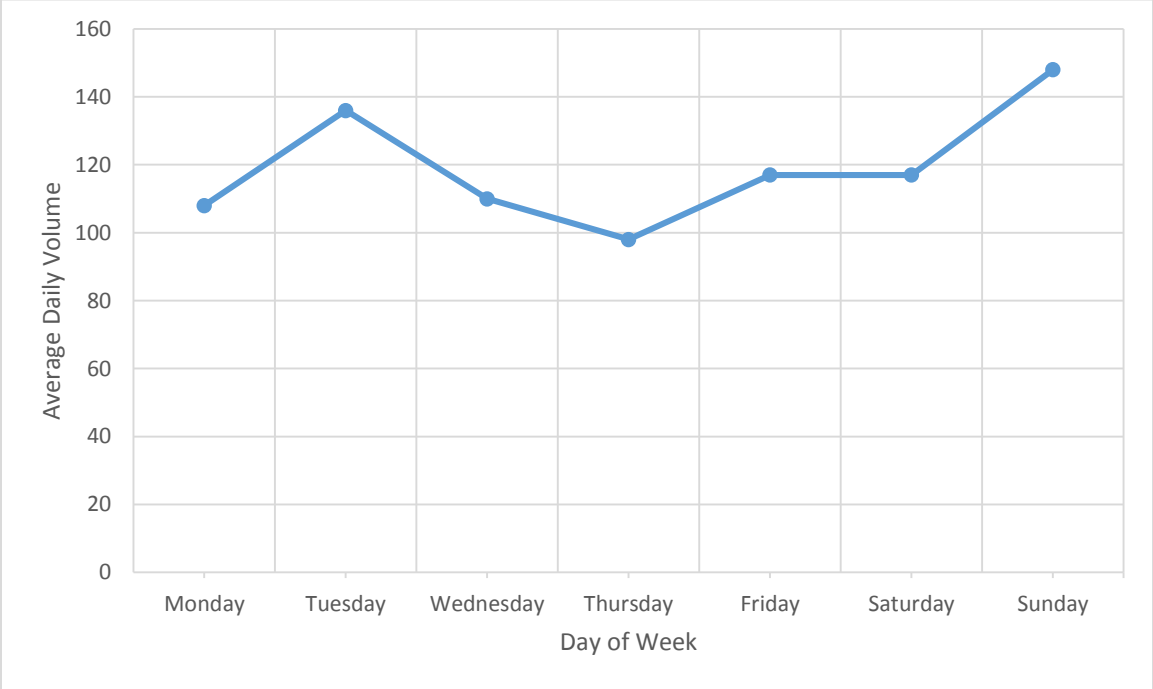
Source: *Chen Ryan Associates, April 2014*

Chart D-21: Average Volume by Day of Week along the north side of the Arizona Canal Bike Path (North-South) west of 12th Street – Site ID#62 with Bike Path



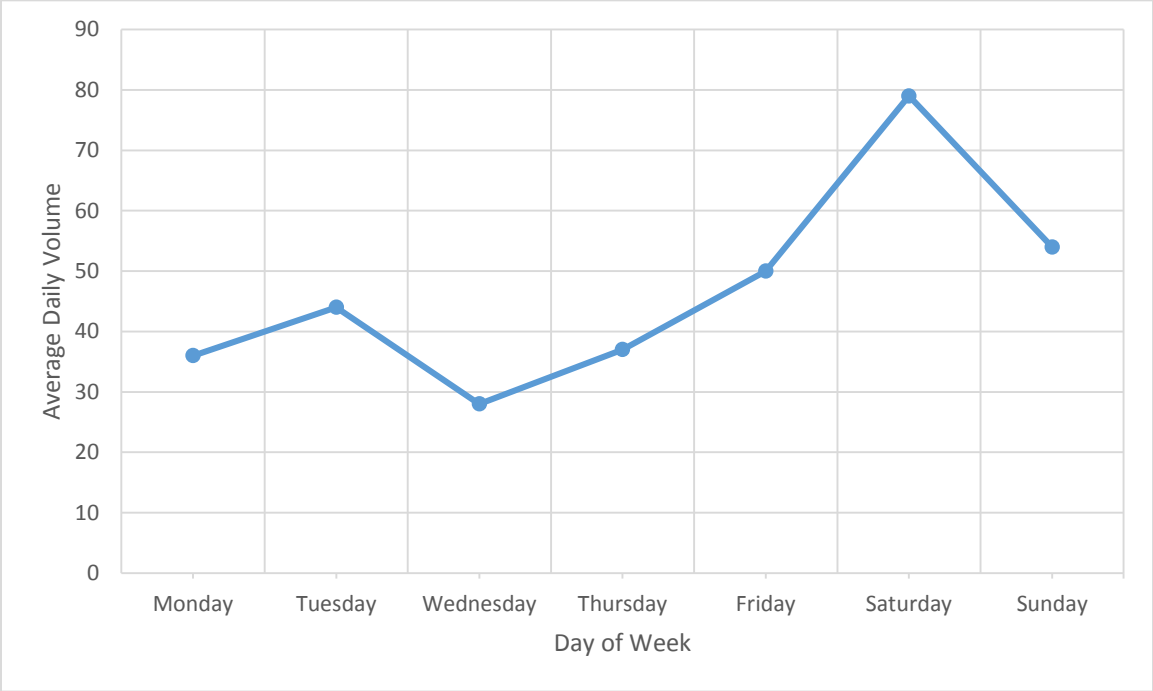
Source: *Chen Ryan Associates, April 2014*

Chart D-22: Average Volume by Day of Week along Maryland Avenue (East-West) west of the Intersection of Central Avenue & Maryland Avenue – Site ID#63 with Bicycle Lane



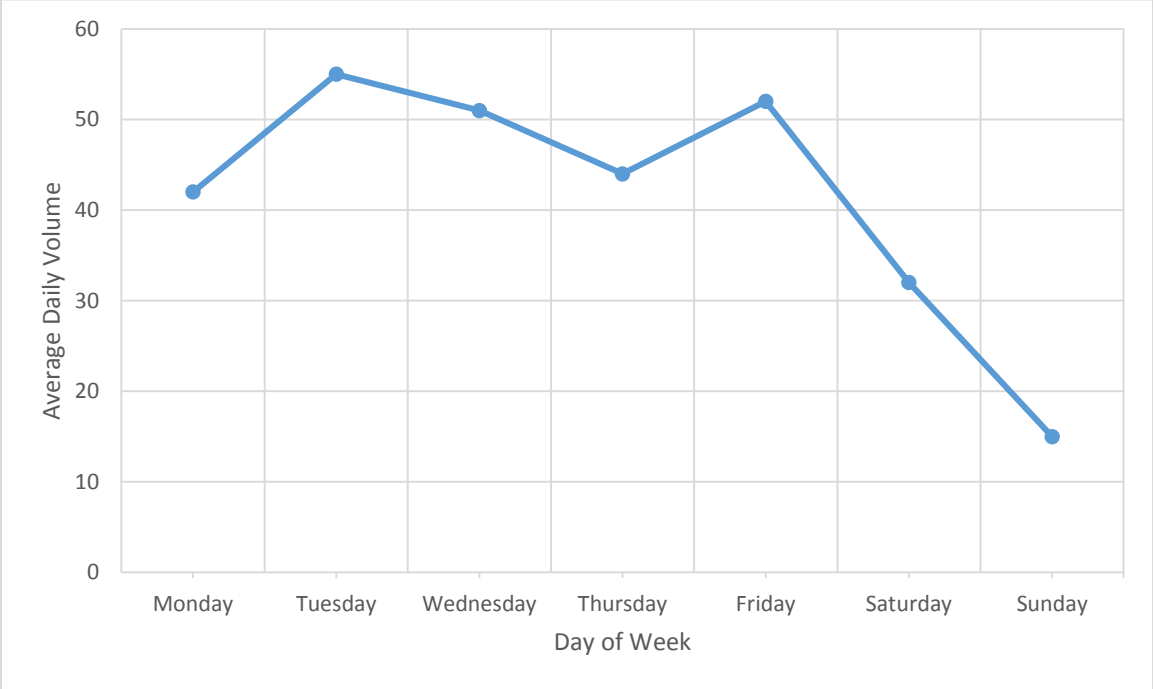
Source: *Chen Ryan Associates, April 2014*

Chart D-23: Average Volume by Day of Week along the Bike Path Parallel to SR-51 (North-South) on the Bridge Crossing Union Hills Drive – Site ID#64 with Bike Path



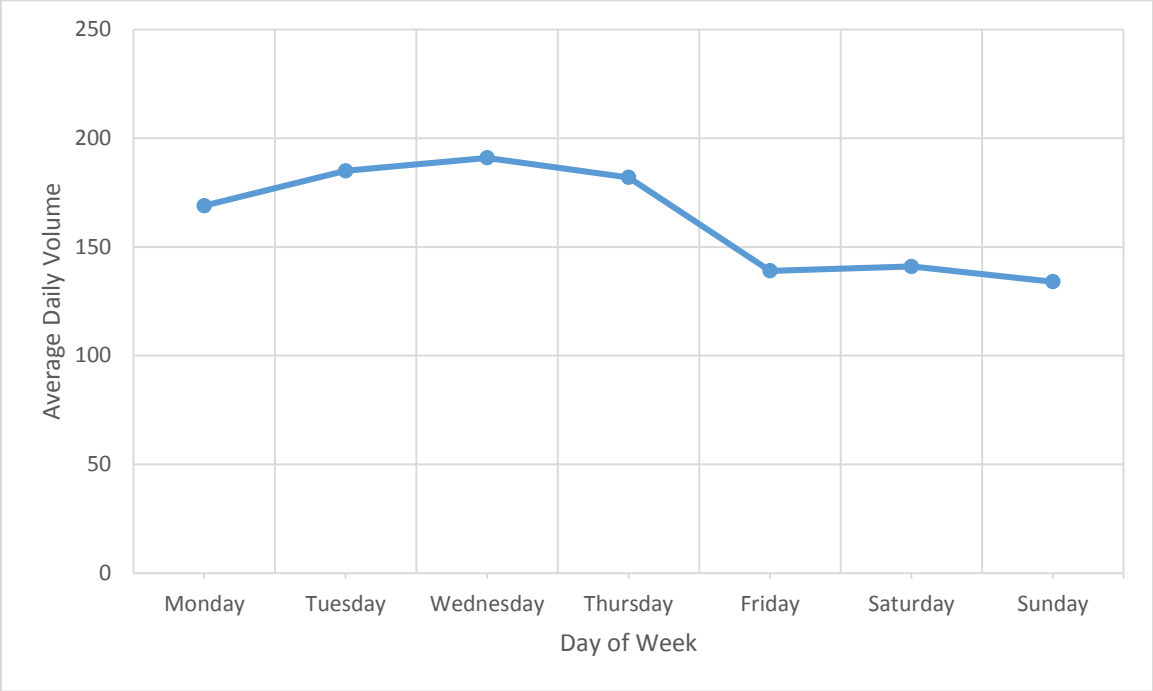
Source: *Chen Ryan Associates, April 2014*

Chart D-24: Average Volume by Day of Week along 23rd Avenue (North-South) north of the Intersection of 23rd Avenue & Peoria Road – Site ID#65 with Bicycle Lane



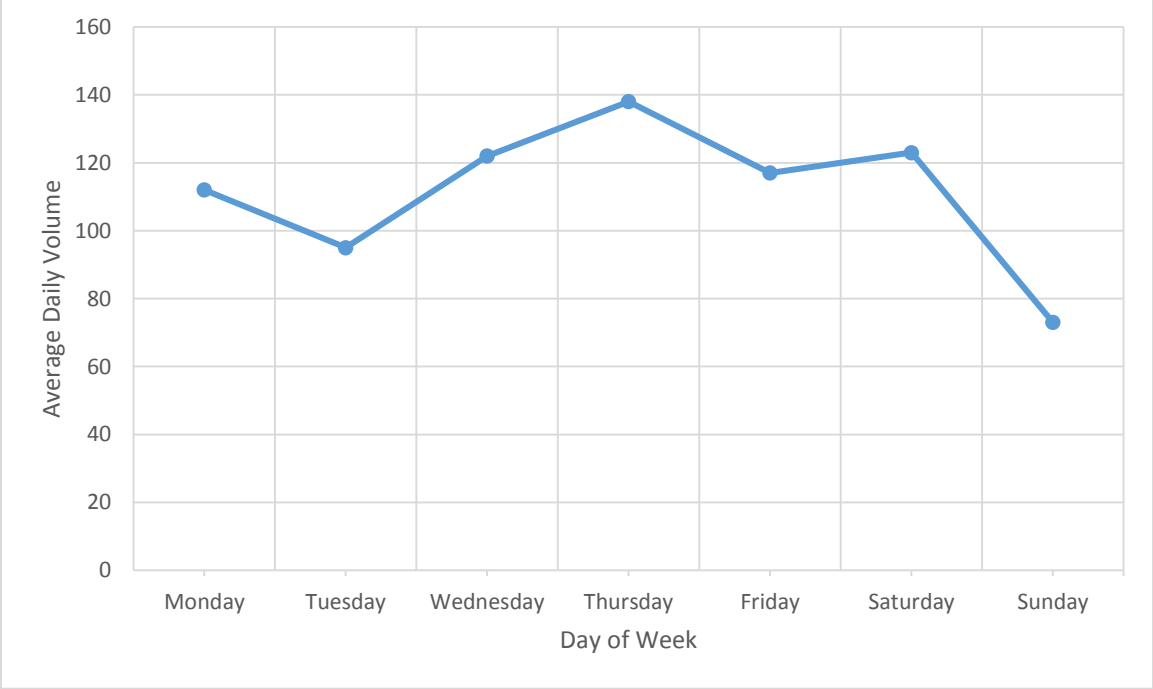
Source: *Chen Ryan Associates, April 2014*

Chart D-25: Average Volume by Day of Week along 23rd Avenue (North-South) south of the Intersection of 23rd Avenue & Maryland Avenue – Site ID#66 with Bicycle Lanes



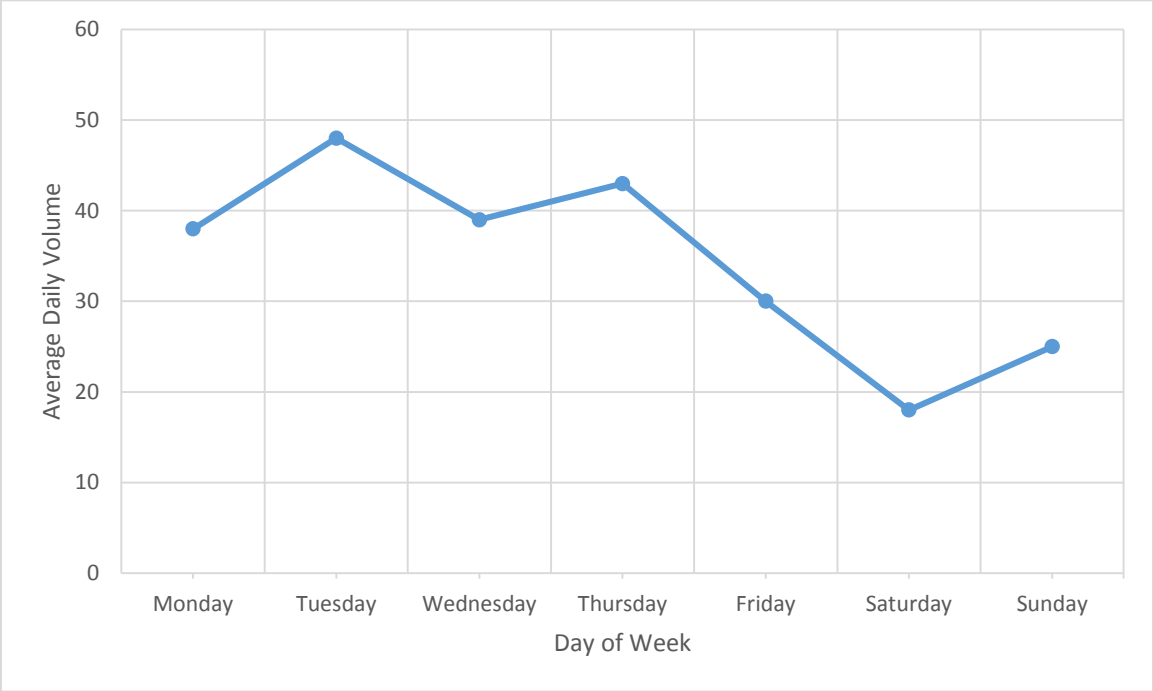
Source: *Chen Ryan Associates, April 2014*

Chart D-26: Average Volume by Day of Week along 12th Street (North-South) south of the Intersection of 12th Street & McDowell Road – Site ID#67 with Bicycle Lanes



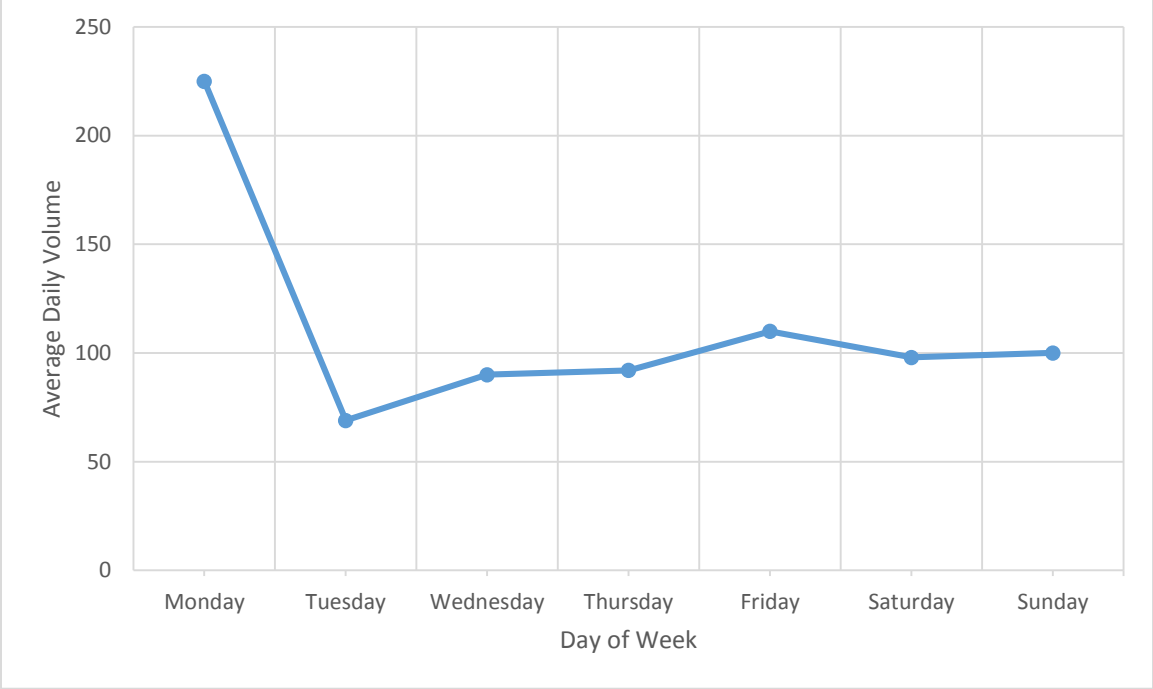
Source: *Chen Ryan Associates, April 2014*

Chart D-27: Average Volume by Day of Week along the Grand Canal Bike Path (East-West) east of 39th Street – Site ID#68 with Bike Path



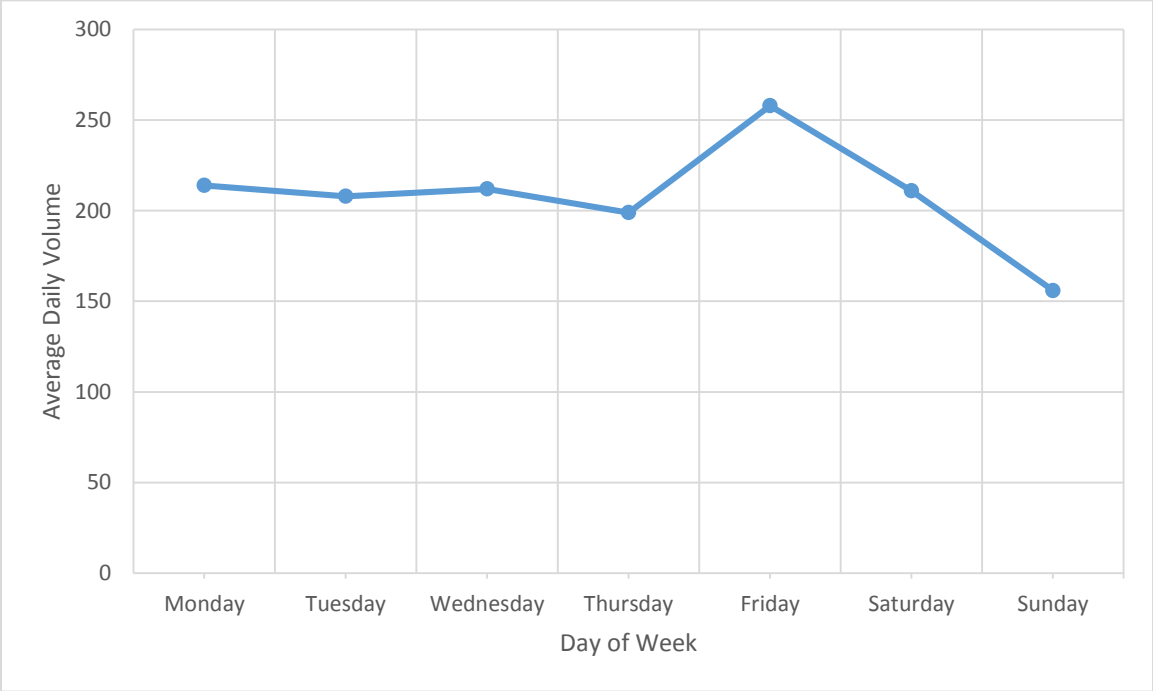
Source: *Chen Ryan Associates, April 2014*

Chart D-28: Average Volume by Day of Week along Deer Valley Road (East-West) east of the Intersection of 19th Street & Deer Valley Road – Site ID#69 with Bicycle Lane



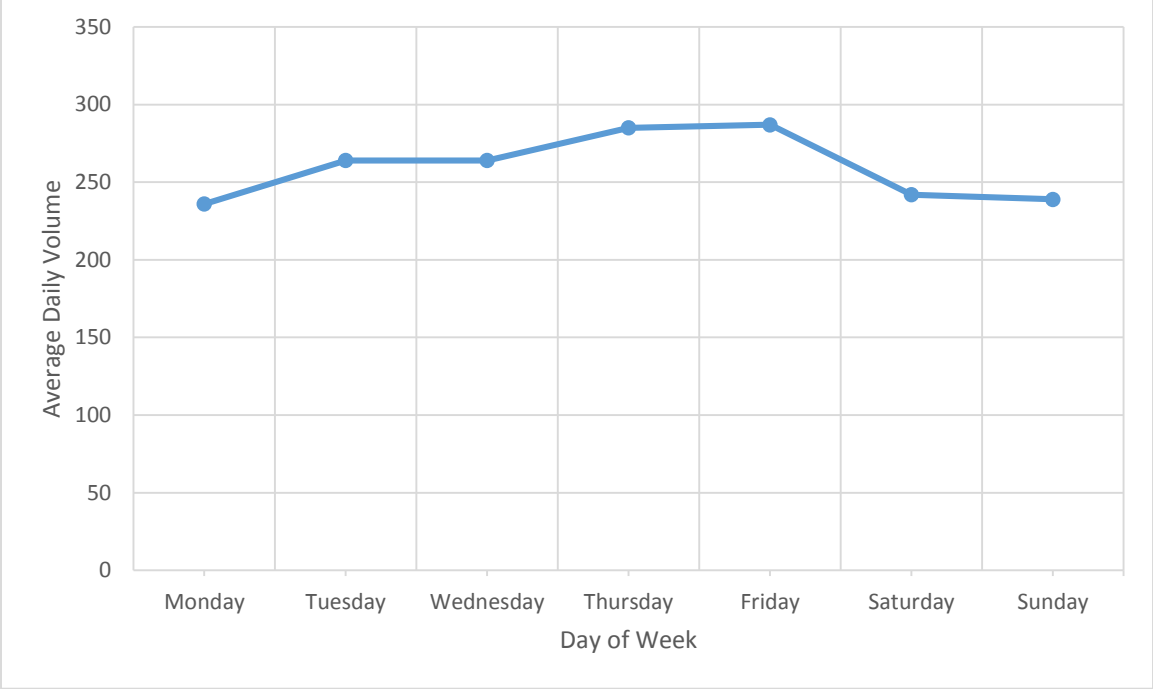
Source: *Chen Ryan Associates, April 2014*

Chart D-29: Average Volume by Day of Week along Northern Road (East-West) west of the Intersection of 19th Avenue & Northern Road – Site ID#73 without Bicycle Facility



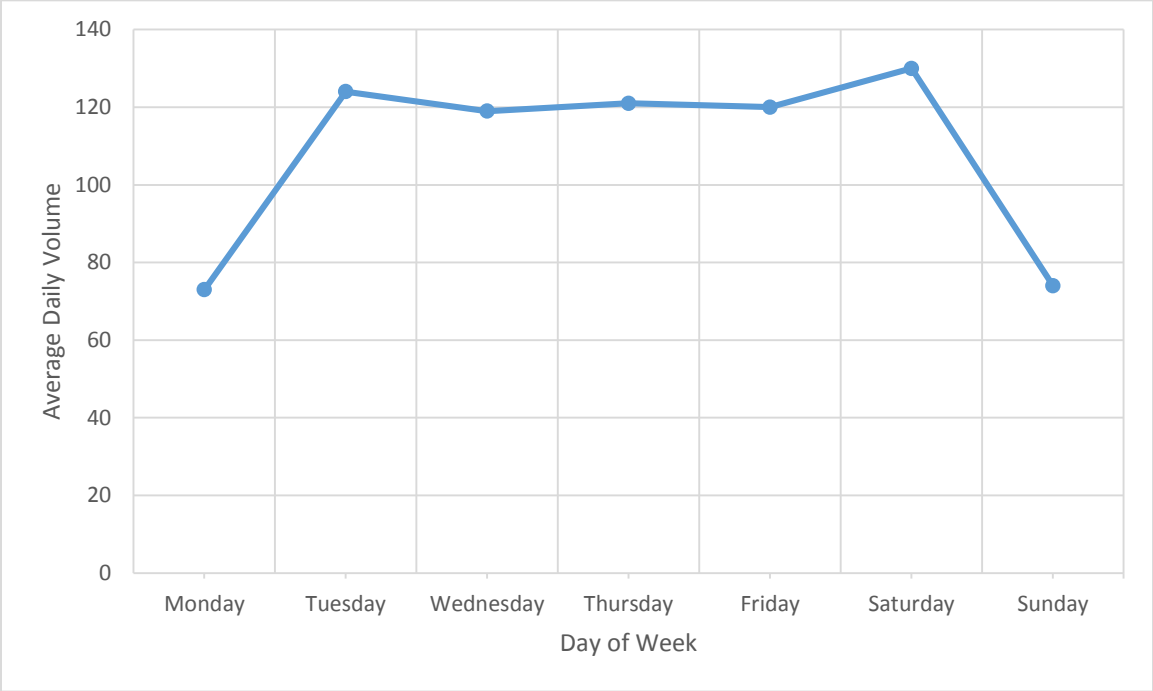
Source: *Chen Ryan Associates, April 2014*

Chart D-30: Average Volume by Day of Week along Glendale Avenue (East-West) west of the Intersection of 19th Avenue & Glendale Avenue – Site ID#74 without Bicycle Facility



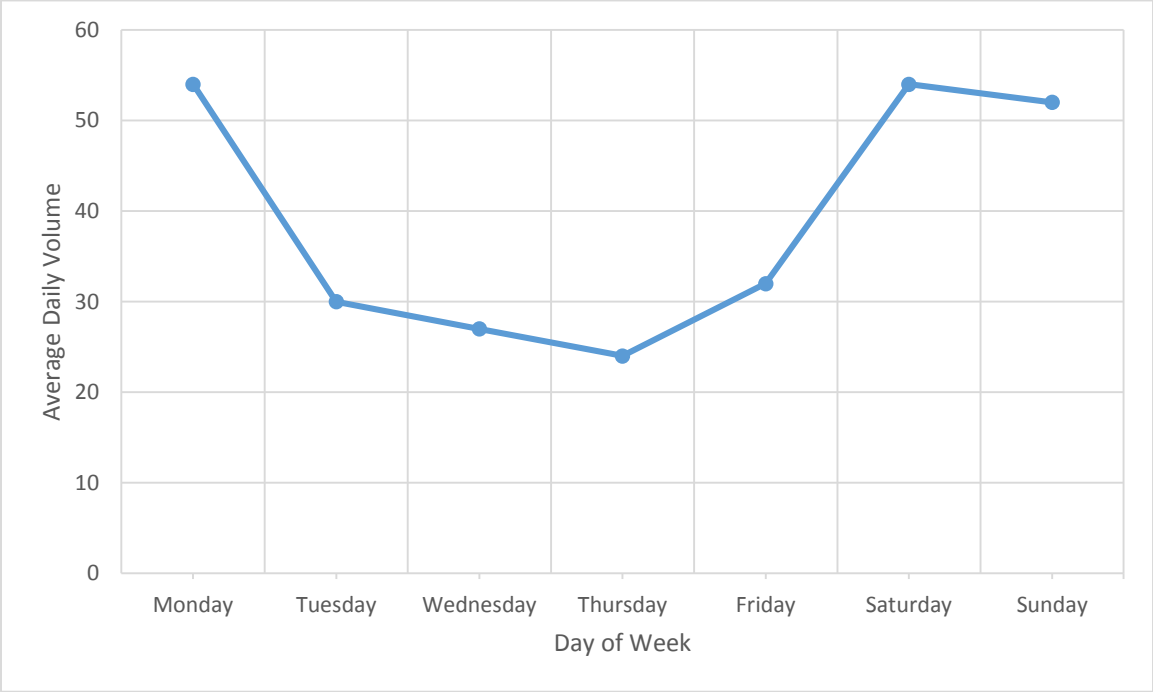
Source: *Chen Ryan Associates, April 2014*

Chart D-31: Average Volume by Day of Week along 12th Street (East-West) south of the Intersection of 12th Street & Missouri Avenue – Site ID#98 with Bicycle Lane



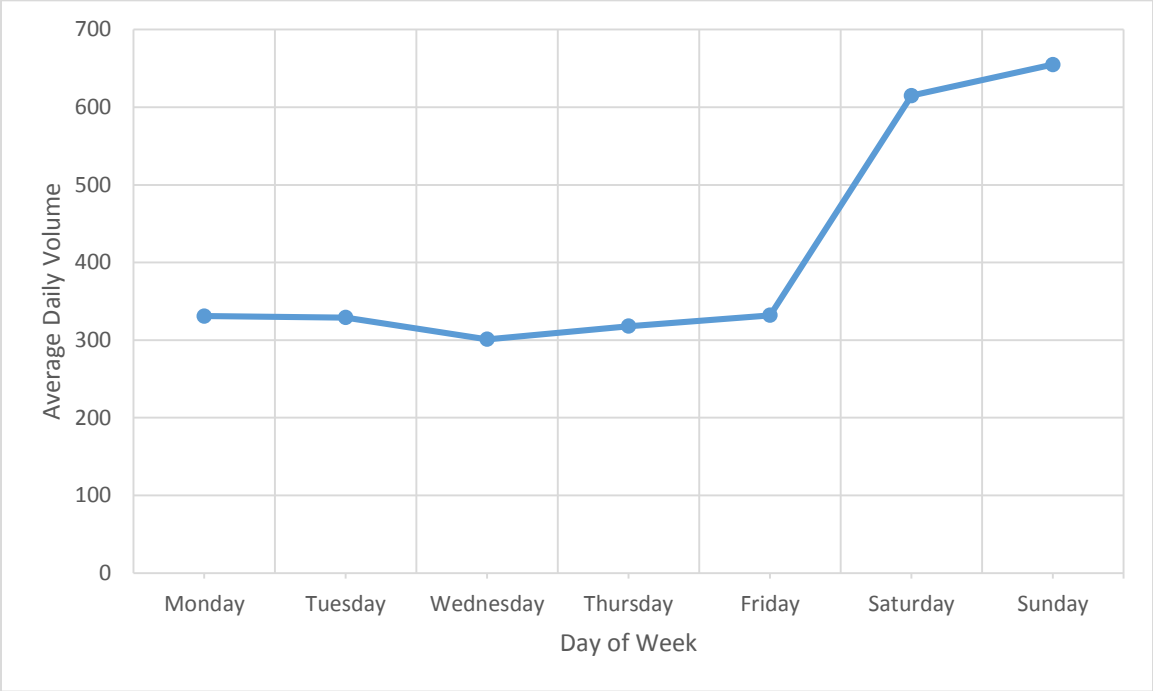
Source: *Chen Ryan Associates, April 2014*

Chart D-32: Average Volume by Day of Week along Sonoqui Wash Path (North-South) south of the Chandler Heights Road – Site ID#100 with Bike Path



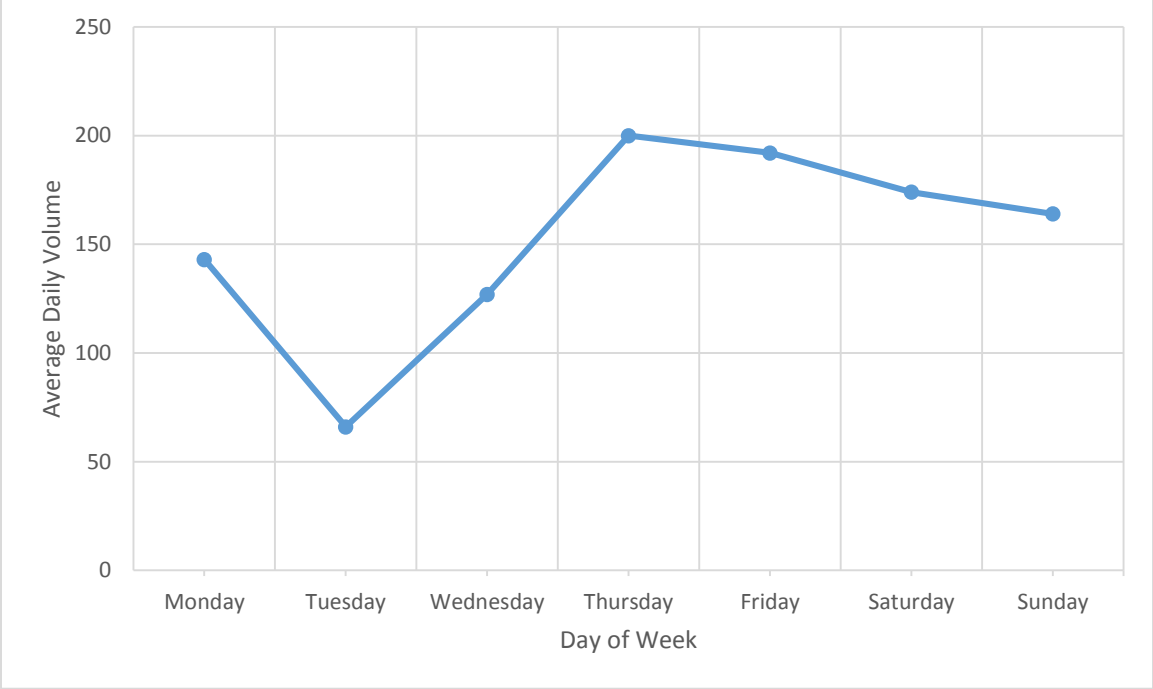
Source: *Chen Ryan Associates, April 2014*

Chart D-33: Average Volume by Day of Week along Indian Bend Wash Path (North-South) east of McCormick Parkway – Site ID#102 with Bike Path



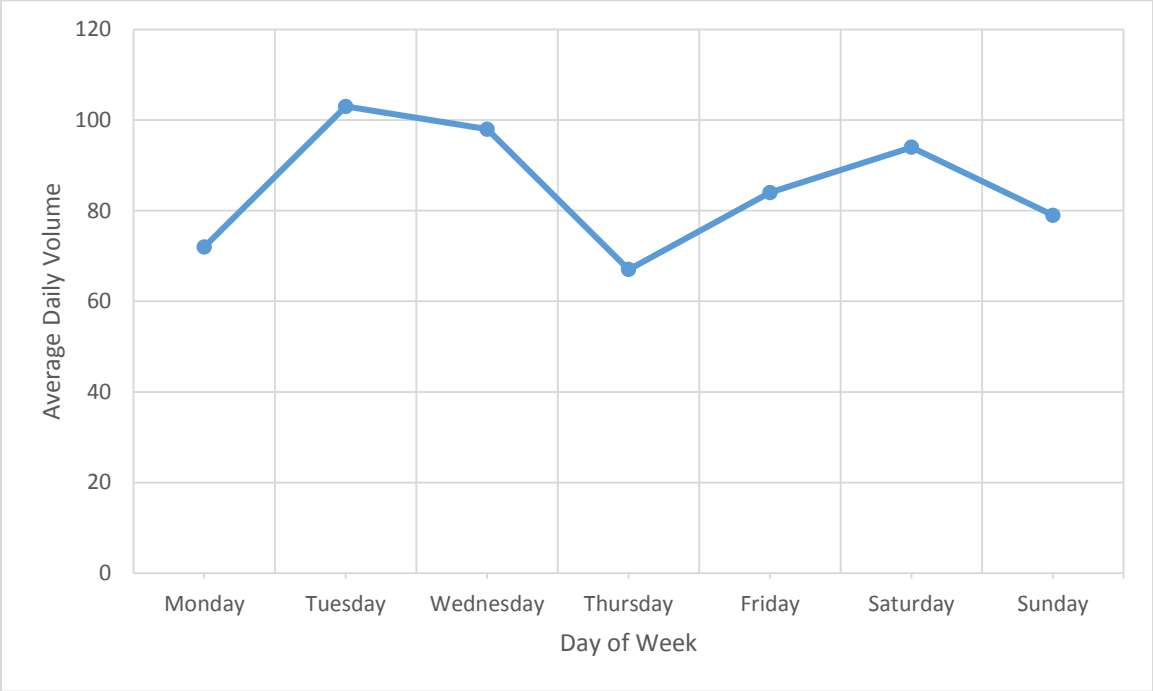
Source: *Chen Ryan Associates, April 2014*

Chart D-34: Average Volume by Day of Week along Indian School Road (East-West) east of the Intersection of Scottsdale Road & Indian School Road – Site ID#104 with Bicycle Lane



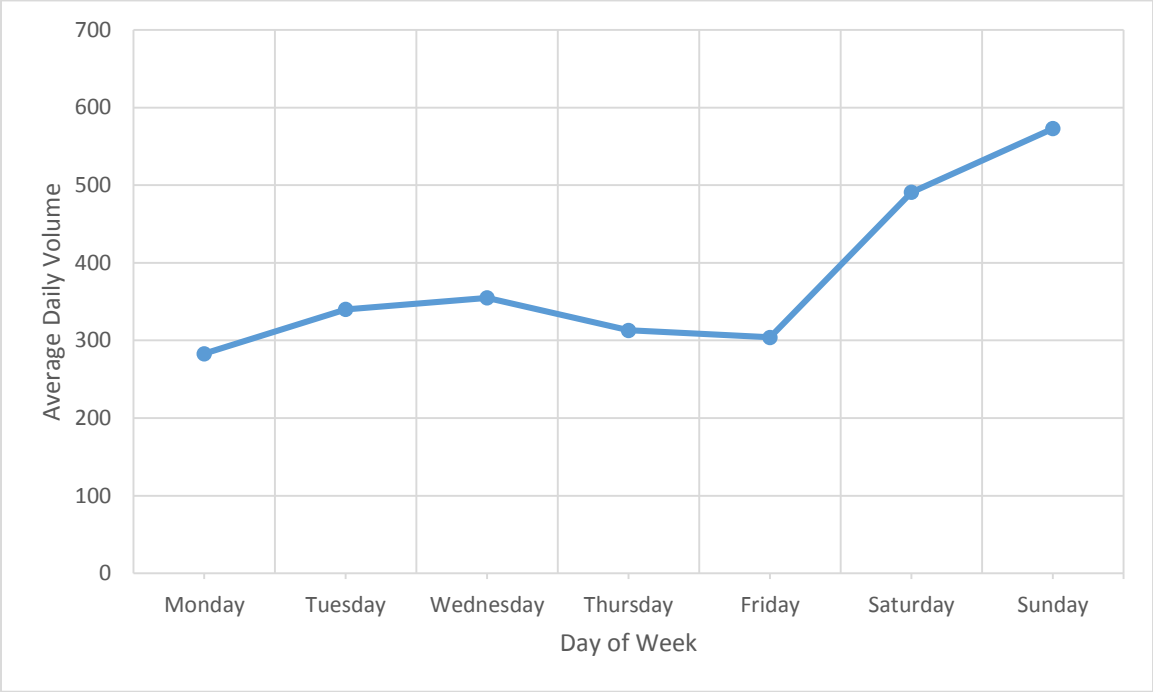
Source: *Chen Ryan Associates, April 2014*

Chart D-35: Average Volume by Day of Week along the North Side of the Western Canal Bike Path (East-West) west of Hardy Drive – Site ID#113 with Bike Path



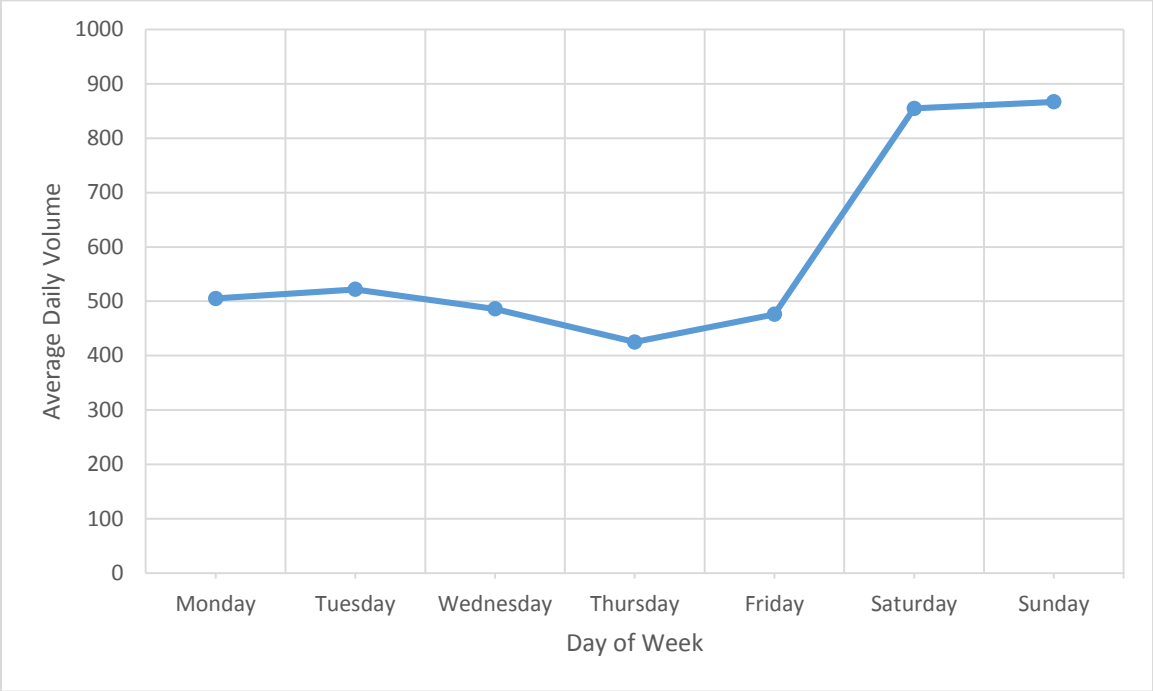
Source: *Chen Ryan Associates, April 2014*

Chart D-36: Average Volume by Day of Week along the South Side of the Western Canal Bike Path (East-West) west of Rural Road – Site ID#115 with Bike Path



Source: *Chen Ryan Associates, April 2014*

Chart D-37: Average Volume by Day of Week along the Rio Salado Downstream Dam Bridge (North-South) north of Rio Salado Parkway, west of Lakeside Drive – Site ID#119 with Bike Path



Source: *Chen Ryan Associates, April 2014*