Bicycle and Pedestrian Counts in the San Gabriel Valley, Los Angeles County, California: Results from Automated Counts in 2013-2014

Herbie Huff, Madeline Brozen,
Norman Wong and Diana Benitez

UCLA Luskin School of Public Affairs
Lewis Center • Institute of Transportation Studies

Attribution

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Introduction

Where do people bike and walk? Where are there safety problems for pedestrians and cyclists? What is the effect of investments in bike lanes, crosswalks, and other improvements for people on foot and bicycles? These are just a few of the fundamental questions that are answered by bicycle and pedestrian count data. Although ~17% of all trips in the Los Angeles region[1] are made by foot or bike, and 40% of all roadway fatalities in Los Angeles County are people walking or riding bicycles,[2] historically, traffic monitoring has focused exclusively on cars.

Bicycle and pedestrian counts enable these modes to be considered on equal footing with driving, and enable robust understanding of costs, benefits, behavior, and more. In 2014, the Los Angeles County Department of Public Health (DPH) loaned counting devices to the cities of South El Monte, El Monte, San Gabriel, and Monterey Park to automatically count the levels of walking and cycling at selected locations. These four cities are among the five San Gabriel Valley cities who recently adopted the 2014 San Gabriel Valley Regional Bike Plan, which was funded by DPH. (The fifth city is Baldwin Park.) The resulting data provide an understanding of the number of people walking and cycling in these cities, and the distribution of that activity. These data are crucial in evaluating the effectiveness of walking and cycling infrastructure and safety investments in the San Gabriel Valley. In addition, conducting counts, collecting and sharing the data contributes to a growing body of bicycle and pedestrian count data in the Los Angeles region.

As the administering agency of the counting device lending program, DPH's interest in walking and cycling stems from the public health benefits of these active modes. These data can ultimately be used to better understand how bicycling and walking contribute to broader public health goals, such as reducing obesity and improving mental health outcomes. In addition, for the past 6 years, DPH has funded the development of several bicycle and pedestrian planning efforts. The Department seeks to better determine the effectiveness of the bicycling and walking infrastructure and programs they have helped to plan. Third, count volume data is increasingly becoming a requirement for grant funding applications. Therefore, DPH wants to assist cities in obtaining these data so that this requirement is not a barrier to receiving funds to improve walking and bicycling in communities around the County.

Another goal of the lending program is to contribute to the growing body of bicycle and pedestrian count data in Los Angeles County. Because counts represent data at the most micro- of scales, it can be challenging to assemble the larger data sets that are necessary to

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[1] Analysis of 2009 National Household Transportation Survey (NHTS) for the 6,700 households in the SCAG region, by the Southern California Association of Governments, http://www.scag.ca.gov/Documents/attach2.pdf, page 17. 17% of weekday trips in the SCAG region are by foot or bike; the proportion of trips taken by foot or bike is likely higher in the urbanized portions of the region, but NHTS sample sizes only allow for analysis at geographies of the MSA level or larger.

[2] Between 2008 and 2012, inclusive, 1098 crashes resulting in fatality involved a bicyclist or pedestrian; 2849 total fatal crashes occurred, giving 39% over this five year period. Source: Transportation Injury and Mapping System, http://tims.berkeley.edu/tools/query/summary.php

discern broader, generalizable patterns, such as those of crash risk or the effectiveness of various types of infrastructure improvements. The Los Angeles County Bike Count Data Clearinghouse at bikecounts.luskin.ucla.edu gathers and makes available a regional database of bicycle and pedestrian counts. All of the data discussed below have been entered into the Clearinghouse, and that database contains the most detailed version of the data, along with supporting metadata, e.g. descriptive information about the count locations and devices.

Methodology and Approach

The counters were placed at 19 locations: five in South El Monte, five in El Monte, four in San Gabriel and five in Monterey Park. In accordance with established standards,[3] DPH advised cities to select locations with the following criteria:

- Locations where counts were conducted in the past
- Locations where you expect to observe high bicycle volumes such as places with existing bicycle infrastructure
- Destinations that attract people: schools, major employment areas, high density residential areas, major transit stops
- Locations where new bicycle and pedestrian facilities are planned to be implemented in the future
- Locations with a history of bicycle or pedestrian collisions

Cities also referenced established guidance[4] that recommends counting at a minimum of 1 location per 15,000 residents of a jurisdiction. With populations and recommended minimums roughly as follows, these minimums were typically exceeded. El Monte: 116,000 people, 8 locations; South El Monte: 20,000 people, 2 locations; San Gabriel: 40,000 people, 3 locations; Monterey Park: 60,000 people, 4 locations.

The 19 locations in the San Gabriel Valley include most of the major thoroughfares of the four cities, and include locations adjacent to many of the major destinations in these cities, including East Los Angeles Community College, the San Gabriel River, and the Rio Hondo.

Automated Counter Technology

The bicycle counters are made by EcoCounter and are the TUBES model. Two pneumatic tubes are stretched across a roadway and affixed to the ground (see figure 1). High volume traffic streets present a problem to this type of automatic counter. High vehicle volumes or a

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[3] "Conducting Bicycle and Pedestrian Counts: A Manual for Jurisdictions in Los Angeles County and Beyond" available at bikecounts.luskin.ucla.edu

[4] In "Conducting Bicycle and Pedestrian Counts" above and also originally recommended by the National Bicycle and Pedestrian Documentation Project, a collaboration of the Institute of Transportation Engineers and Alta Planning+Design.

large percentage of heavy vehicle traffic can physically damage the tubes. When a desired location (e.g. a school or other destination) was on a busy street, the location was slightly modified so the tube counters would not be damaged and fail to provide accurate data.

The pedestrian counters are also made by EcoCounter and are the ECOPYRO model. The device is a small box that is affixed to a pole near the curb. It sends out an infrared beam and then counts whenever that beam is broken (see figure 2). There must be a solid, non-mirrored and non-glass surface across from where the box is mounted. This means that a pole to mount the pedestrian sensor cannot be located across from a mirrored facade, parking structure with open walls, or building windows. These technical specifications also constrain location selection.

Definitional Notes

Note that all the locations are "mid-block" locations rather than intersection locations. This is again a function of the equipment, which counts bicycle or pedestrian traffic on a specific side of the street. At each location, a total of four devices were installed: one bicycle counter on each side of the street, and one pedestrian counter on each sidewalk.

Also note that throughout this report, "pedestrian" volumes refer to the totals tallied by the ECOPYRO devices, and "bicyclist" volumes refer to the totals tallied by the tube counters. This nomenclature is one of convenience, as technically ECOPYRO counters also count bicyclists on the sidewalk, and the tubes do not count bicyclists on the sidewalk, only counting bicyclists who ride in the street. Manual count data in Los Angeles County show that sidewalk bicycling can vary from nearly 0% of bicyclists to over 50% of bicyclists. Thus, bicyclist volumes should be considered to be an underestimate and pedestrian volumes should be considered an overestimate. It is possible to estimate true modal flows using manual counts of sidewalk bicycling, but the necessary manual counts do not exist for the majority of locations at which DPH-loaned devices were installed.

Figure 1: Bicycle tube counter


Figure 2: Pedestrian counter

San Gabriel Valley Count Locations

The maps below displays the physical locations of the automatic counters in the San Gabriel Valley cities. For display purposes, the four cities are broken into two maps; San Gabriel and Monterey Park together, and South El Monte and El Monte, in the second set.

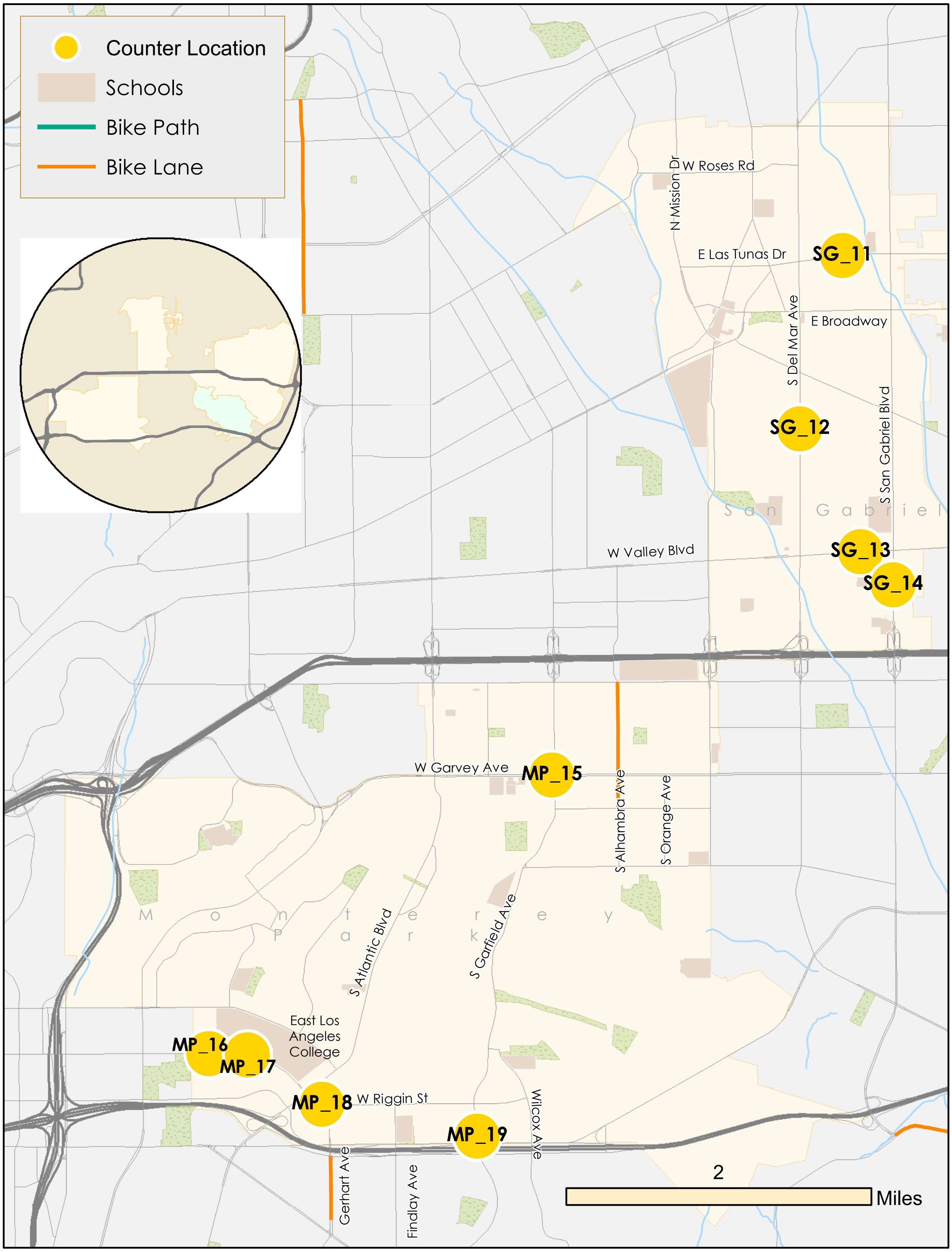

Figure 3 Map of count locations in Monterey Park and San Gabriel

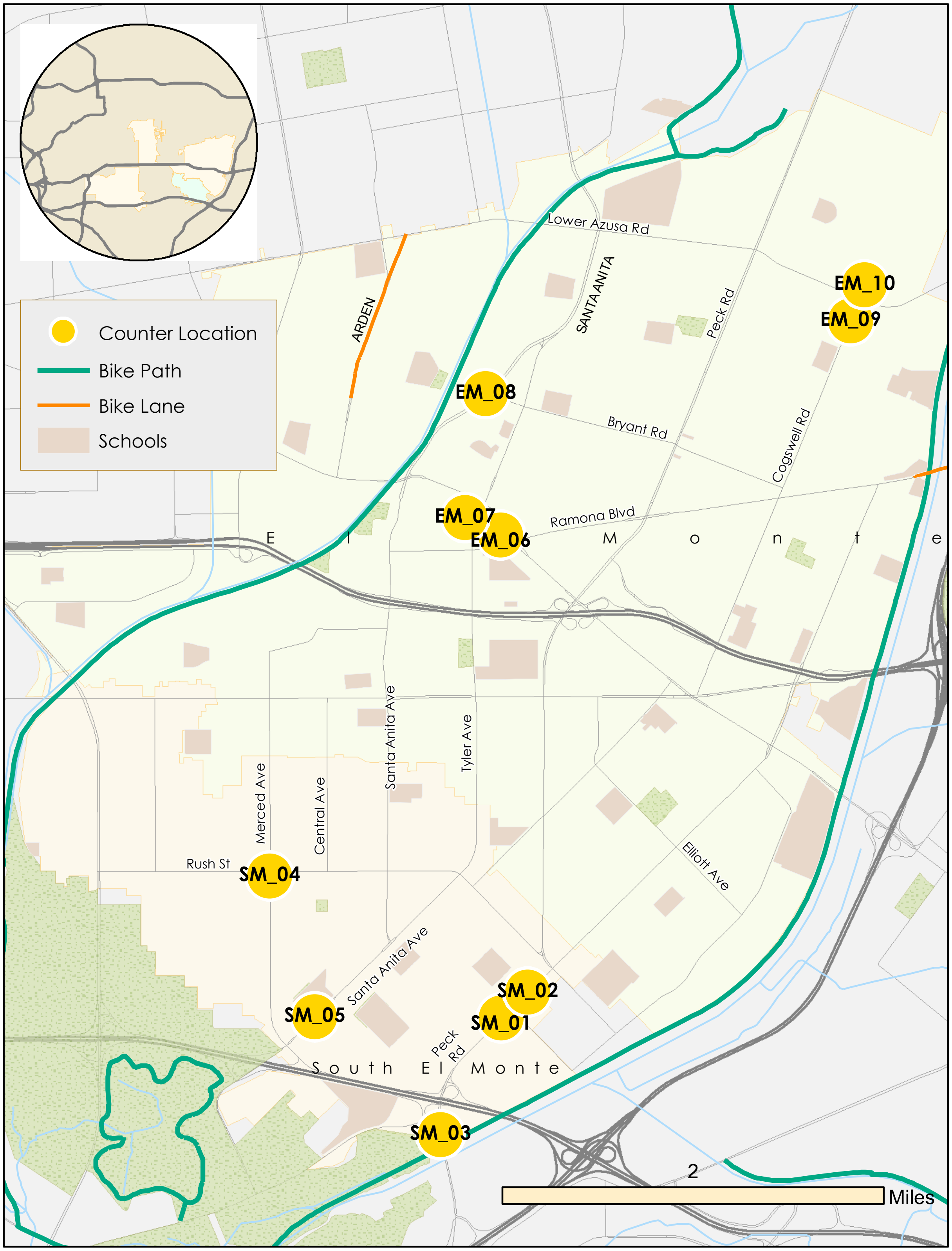

Figure 4 Map of count locations in South El Monte and El Monte

The table below describes the specific locations of each counter and the context in which they were installed.

ID	City	Street 1	Street 2	Street 3	Bikeway Type	Specific Land Use
SM_01	South El Monte	Thienes Ave	Durfee Ave	Fruitvale Ave	none	
SM_02	South El Monte	Durfee Ave	Thienes Ave	Rush St	none	
SM_03	South El Monte	Peck Road	Durfee Ave	Rooks Rd	none	
SM_04	South El Monte	Merced Ave	Rush St	Hayward Way	none	
SM_05	South El Monte	Santa Anita Ave	Fawcett Ave	Central Ave	none	School, Park
EM_06	El Monte	Valley Mall	Center Ave	Tyler Ave	none	
EM_07	El Monte	Tyler Ave	Valley Mall	Valley Blvd	none	
EM_08	El Monte	Santa Anita Ave	Valley Blvd	Bryant Rd	Bike Lane	
EM_09	El Monte	Cogswell Rd	Ranchito St	Lower Azusa Rd	none	
EM_10	El Monte	Cogswell Rd	Lower Azusa Rd	Roseglen St	none	
SG_11	San Gabriel	E Las Tunas Rd	Country Club Dr	S California St	none	Park
SG_12	San Gabriel	S Del Mar Ave	W Fairview Ave	E Central Ave	none	
SG_13	San Gabriel	E Valley Blvd	Walnut St	Lafeyette St	none	
SG_14	San Gabriel	S San Gabriel Blvd	Valley Blvd	Dewey Ave	none	
MP_15	Monterey Park	E Garvey Ave	N Baltimore Ave	N Lincoln Ave	none	
MP_16	Monterey Park	Avenida Cesar Chavez	Woods Ave	Bleakwood Ave	none	
MP_17	Monterey Park	Avenida Cesar Chavez	Westcott Ave	Schoolside Ave	none	University
MP_18	Monterey Park	Avenida Cesar Chavez	Hillview Ave	S Gerhart Ave	none	
MP_19	Monterey Park	S Garfield Ave	W Fernfield Dr	W Pomona Blvd	none	

Table 1: Counter location and context

Count dates and times

The counters were installed over the following time periods:

San Gabriel	April 7 - 22
South El Monte	February 7 - March 8
El Monte	March 4 - 31
Monterey Park	April 25 - May 13

Note that because bicyclist and pedestrian activity does vary seasonally, the choice of when to count during the calendar year impacts the volumes observed. These counts generally took place during the school year, and significant school traffic is included in the totals. The weather in February-May is mild and favorable to walking and bicycling, although there may have been some rain in these months. Counts in El Monte likely include a March spring recess from schools and universities, resulting in lower volumes during this period.

Over these periods, data was recorded every 15 minutes, 24 hours a day, for the duration of installation. The counters do fail for various reasons: the pneumatic tubes can be damaged by vehicles, the ECOPYRO boxes can be tampered with or obstructed, and other reasons. Ideally, someone should look at the data every day, identify problems as they happen, fix them, and keep records of when counters are reset. This was not always the case, and as a result, researchers at UCLA determined the date ranges for which the data are valid by inspecting the data and looking for unusual spikes or drops in the numbers of pedestrians or cyclists. The Appendix shows each counter location, the tubes or sensors located there, and the data windows that were assumed to be valid.

Findings

The maps and tables below show the average daily volumes of bicyclists and pedestrians respectively at each location counted in the San Gabriel Valley cities. We include the standard deviation around the average as an indicator of the variation in daily bicycling or walking[5].

[5] If we assume that daily walking and bicycling are distributed normally on a bell curve, there is a 95% chance that the true daily average falls in the range stated on these maps. The assumption of normality is supported by features of the data set, such as means and medians that are nearly equal to one another. When counters were producing valid data for a longer period of time, and when sheer volumes are higher, these 95% intervals tend to be smaller. We make note of these intervals to underscore that bicycling and walking vary, generally more than auto traffic. This is why it is important to count for an extended period of time and to examine the variation in the data. Also note: we treat the daily sums as a random variable and do not account for underlying systematic variations such as those due to day-of-week, month-of-year, or weather. In general, the counting periods are not long enough to examine those factors.

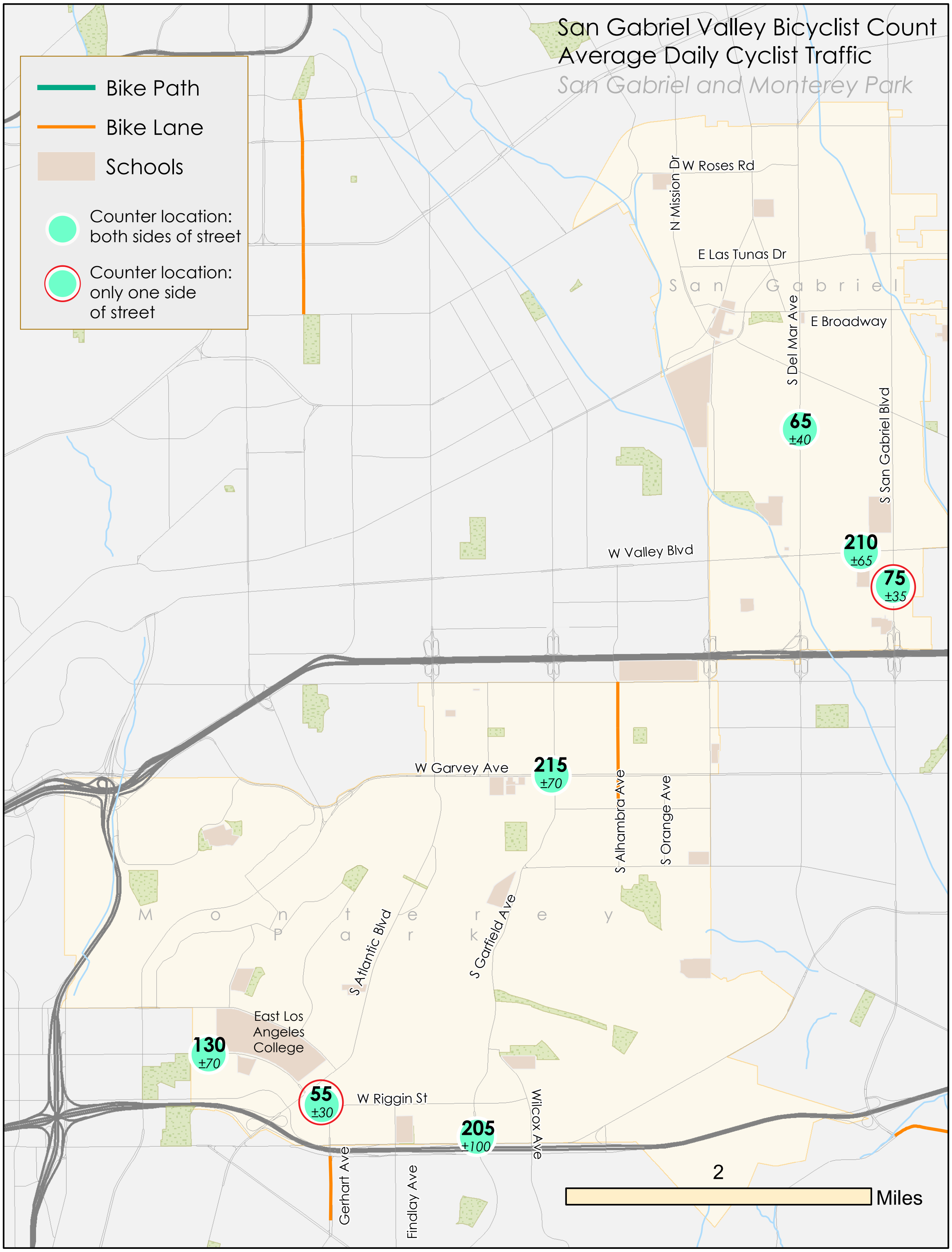

Figure 5 Average Daily Cyclist Volumes in San Gabriel and Monterey Park

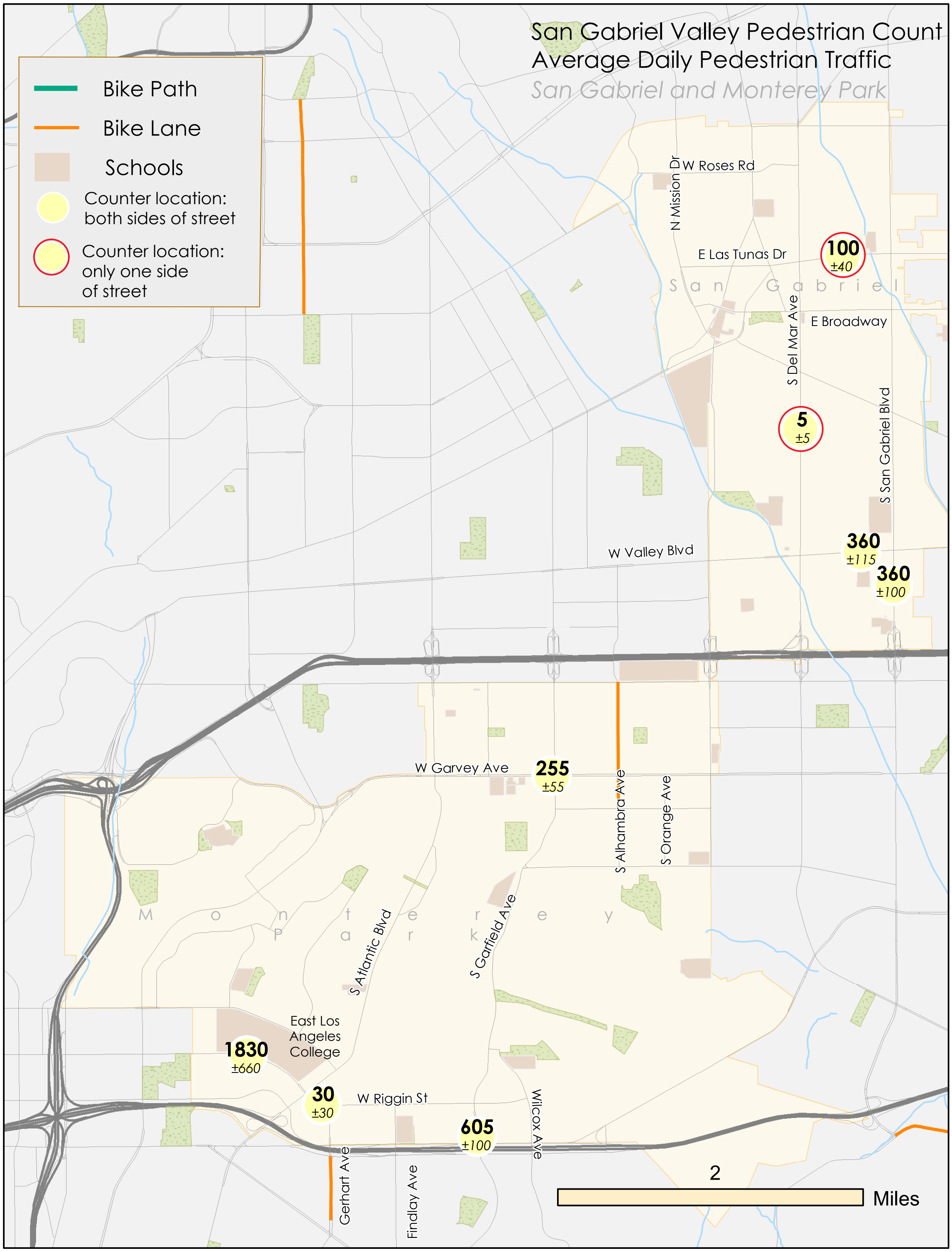

Figure 6 Average Daily Pedestrian Volumes in San Gabriel and Monterey Park

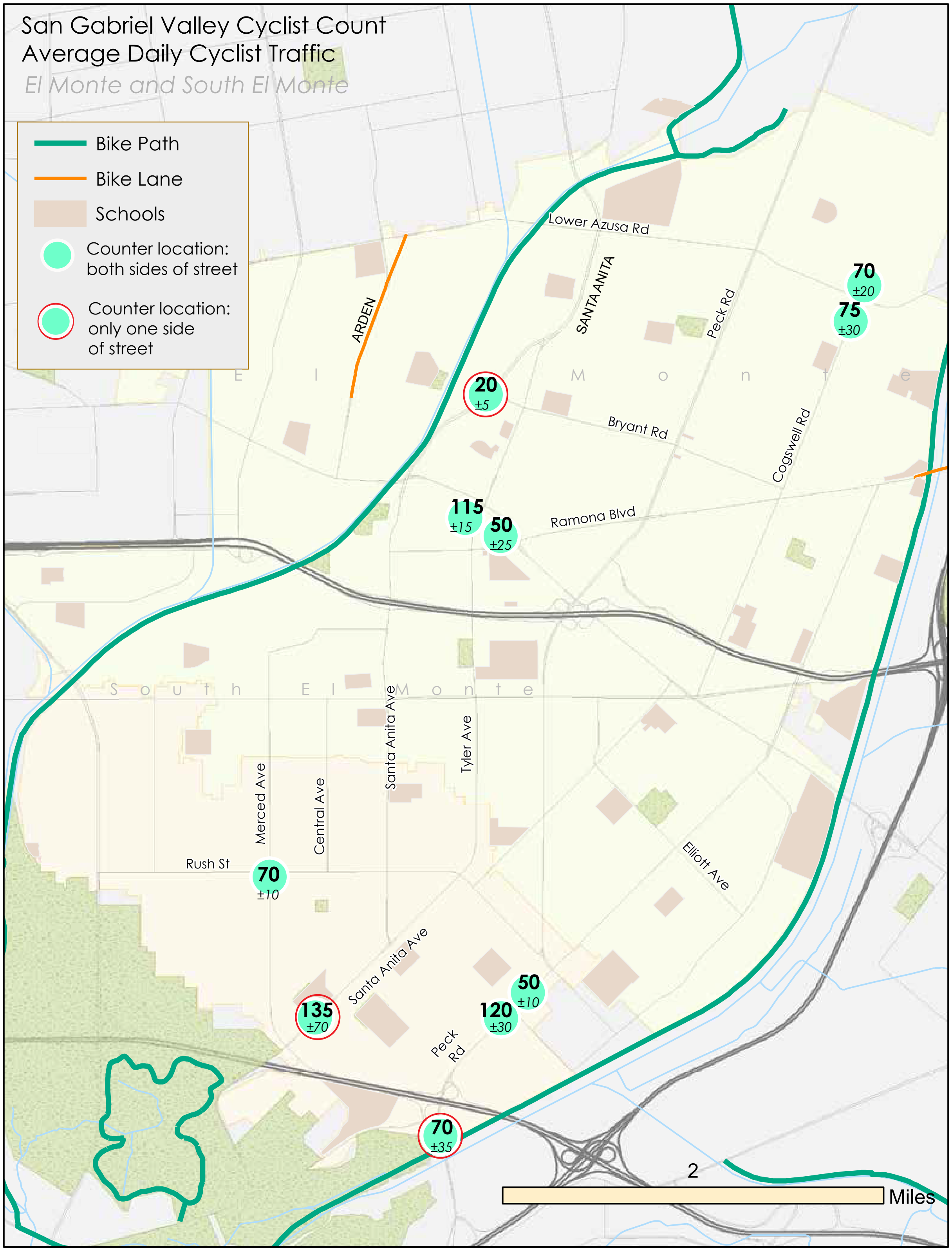

Figure 7 Average Daily Cyclist Volumes in El Monte and South El Monte

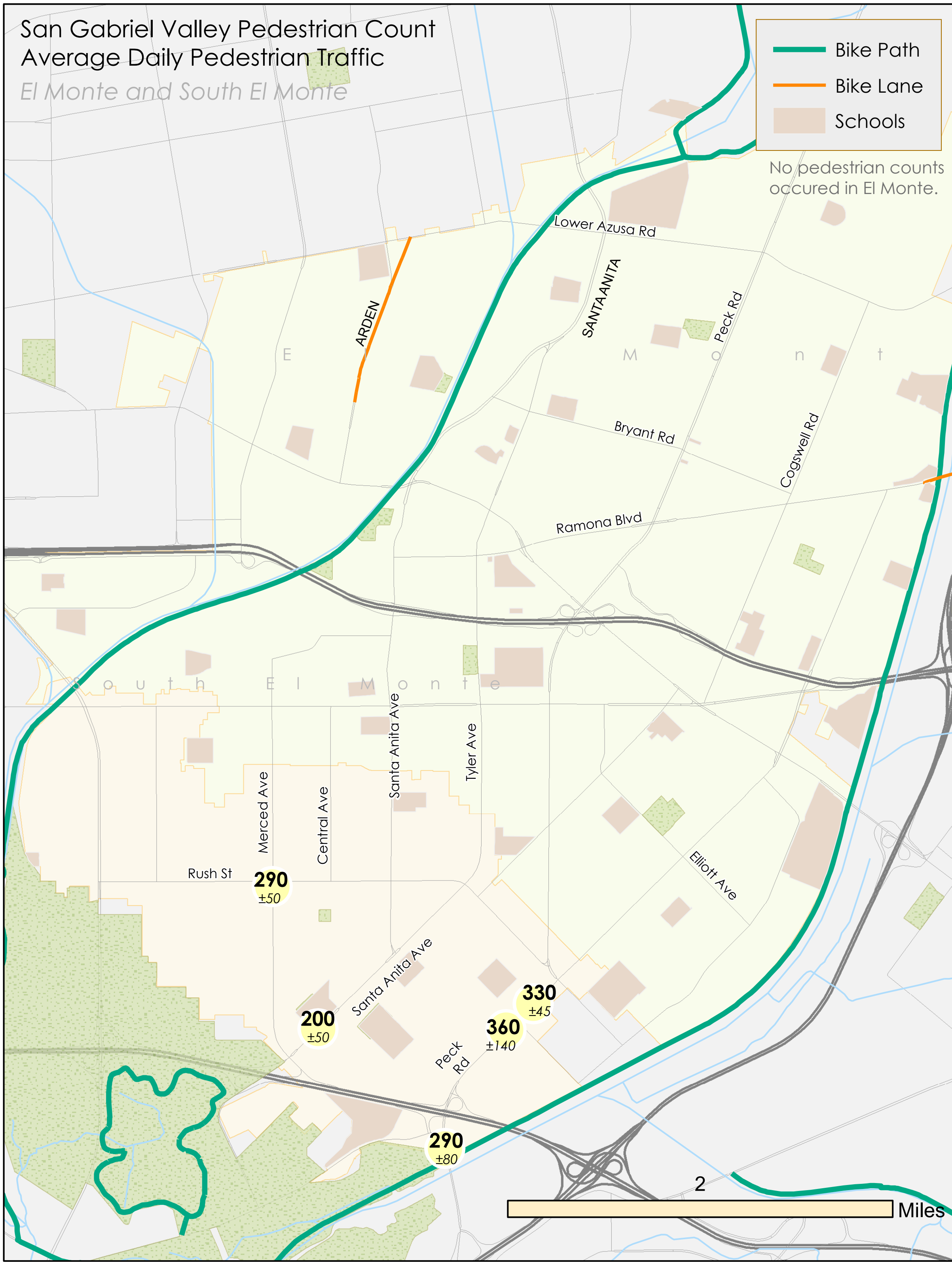

Figure 8 Average Daily Pedestrian Volumes in El Monte and South El Monte

ID	City	Bikeway Type	Specific Land Use	Bike ADT	Std. Dev in Bike ADT	Ped ADT	Std. Dev in Ped ADT
SM_01	South El Monte	none		120	±30	360	±140
SM_02	South El Monte	none		50	±10	330	±45
SM_03	South El Monte	none		70	±35	290	±80
SM_04	South El Monte	none		70	±10	290	±50
SM_05	South El Monte	none	School, Park	135*	±70	200	±50
EM_06	El Monte	none		50*	±25		
EM_07	El Monte	none		115	±15		
EM_08	El Monte	Bike Lane		20*	±5		
EM_09	El Monte	none		75	±30		
EM_10	El Monte	none		70	±20		
SG_11	San Gabriel	none	Park	no data[6]	no data	100*	±40
SG_12	San Gabriel	none		65	±40	5*	±5
SG_13	San Gabriel	none		210	±65	360	±115
SG_14	San Gabriel	none		75*	±35	360	±100
MP_15	Monterey Park	none		215	±70	255*	±55
MP_16	Monterey Park	none	University	130	±70	no data[7]	no data
MP_17	Monterey Park	none	University	no data[8]	no data	1830	±660
MP_18	Monterey Park	none		55*	±30	30	±30
MP_19	Monterey Park	none		205	±100	605	±100

Table 2: Average daily volumes

*At these locations, only one of the two counters produced valid data. Thus, these volumes are roughly half what they might be if both counters had worked. In the maps below, these are shown as "Counter Location: only one side."

[6] Tube failure at SG_11 resulted in no valid data being collected.
[7] Pyro failure at MP_22 resulted in no valid data being collected.
[8] Tube failure at MP_23 resulted in no valid data being collected.

Daily pedestrian volumes in South El Monte all lie within a fairly narrow range, 200-360 per day. This may reflect the spatial proximity of the sites. For reference, the range of daily pedestrian volumes seen in other cities that used DPH's devices is a low of 30 per day and a high of over 3,000 per day.

Daily bicycle volumes in South El Monte and El Monte range from low to moderate volumes. Several locations that are adjacent to one another have dissimilar volumes. Possible explanations for this include sidewalk bicycling and the importance of highly specific origins, destinations, and routing choices. It is notable that locations with river access do *not* have higher volumes. In other cities that counted, Cudahy and Carson, locations with river access consistently had the highest bicycle traffic of all the locations counted in those cities. The fact that we do not observe this in the San Gabriel Valley suggests a few things. First, in the future, SGV cities should choose more locations with river path access and also consider counting on the paths themselves. Second, this may reflect that the rivers in the San Gabriel Valley are less popular and less well traveled than the Los Angeles River, which runs through Cudahy and Carson. Santa Anita Ave. in South El Monte had the highest average daily bicyclists with 135 per day, perhaps reflecting the presence of several schools. For reference, the range of daily bicyclist volumes seen in other DPH grantee cities that used the devices is a low of 20 per day and a high of 240 per day.

Pedestrian volumes in Monterey Park and San Gabriel reflect the importance of East Los Angeles College (ELAC), which had by far the highest volumes observed in the San Gabriel Valley. Volumes on Garfield Ave are also notably high, over 600 pedestrians per day. The remaining sites ranged from very low volumes on Del Mar Ave. to moderately high volumes on Garvey Ave., San Gabriel Blvd., and Valley Blvd. Again, for reference, the range of daily pedestrian volumes seen in other cities that used the devices is a low of 30 per day and a high of over 3,000 per day.

Bicycle volumes at ELAC were more comparable with bicycle volumes at other sites in the region. Again, Garvey Ave., San Gabriel Blvd., and Valley Blvd. stand out for their high bicyclist volumes. The daily bicyclists at these sites were among the highest seen in any of the cities that used counting devices. For reference, the range of daily bicyclist volumes seen in other cities that used the devices is a low of 20 per day and a high of 240 per day.

Conclusion and Next Steps

These counts should inform better decision-making by these four San Gabriel Valley cities. Count volumes are relevant to decisions about maintenance priorities, capital improvement priorities, and execution of education and encouragement programs, among others. The exact use of the data depends upon processes and resources specific to each city with which we are not intimately familiar, but we can still state some examples for illustrative purposes.

Each city decides which streets to prioritize for repaving, and should raise the priority of streets with a lot of bicycle traffic. Each city decides how to address traffic safety problems on its streets, and should analyze bicycle and pedestrian volumes alongside historical crashes for these modes to identify areas of high crash risk, and prioritize these. Each city could reference bicycle and pedestrian count data when allocating parks improvements funds. In general, these counts give the cities the power to implement improvements where they will serve the greatest number of bicyclists or pedestrians.

These counts easily dispel the myth that ‘nobody’ walks or rides bikes. They underscore the relevance of many best practices in planning for a sustainable, healthy transportation system. With hundreds of people walking at biking on many of the streets counted in the San Gabriel Valley, the importance of safe, hospitable street design for walking and bicycling cannot be denied. These counts lend support to reduction or removal of minimum parking requirements, since these regulations penalize people who walk and bike and subsidize those who drive. Finally, the very high volumes near ELACC underscore the importance of partnering with schools on any effort related to active transportation.

These cities should continue to count as they change and with the implementation of the regional Bicycle Master Plan. Counts demonstrate the value of those improvements. Future bicycle and pedestrian counts will enable the cities to conduct before-and-after analyses of new infrastructure improvements. As the cities better understands the cost-effectiveness of these investments, they can be considered on equal footing with any other transportation system investment. To best preserve the cities’ ability to understand trends over time, the cities should generally count at the same locations. The exception is that several of the locations chosen for this initial count are immediately adjacent to one another. Consolidate those locations in order to enable greater coverage and variety of sites. The cities might also consider expanding the count program to include additional locations. The cities should continue to contribute to the Clearinghouse at bikecounts.luskin.ucla.edu and thus to do its part in advancing greater knowledge for better biking and walking policy. Finally, simply having the count data positions these cities to make the case for grant funds for bicycle and pedestrian improvements.

Appendix

This table contains detailed information about each counter location, the tubes or sensors located there, and the data windows that were assumed to be valid. The pyro counters provide pedestrian volumes while the tubes provide cyclist volumes.

Loc ID	Tube/ Sensor ID	Valid data range	Mean	Median	Std Dev	Tube/Pyro sum	Tube / Pyro Std Dev
SM_01	Tube 1	2/7 14:30- 2/24 13:45	**32.7**	**34**	**7.2**	121	27
	Tube 2	2/6 11:00 - 2/10 23:45 & 2/15 0:00 - 2/21 23:45	**88.1**	**91**	**26.5**		
	Pyro 1	2/7 2:45 - 3/8 18:00	**147.6**	**130**	**117.9**	359	137
	Pyro 2	2/6 15:30 - 3/8 18:15	**211.8**	**241**	**69.3**		
SM_02	Tube 3	2/13 15:45 - 2/18 13:45 & 2/21 0:00 - 2/24 15:45	**71.7**	**77**	**33.2**	72	33
	Tube 4	No data remaining					
	Pyro 3	2/7 15:45- 2/24 15:30	**171.2**	**170**	**21.4**	331	45
	Pyro 4	2/6 16:00 - 2/24 15:30	**160**	**175**	**39.5**		
SM_03	Tube 5	2/14 0:00 - 2/24 16:00	**22.1**	**23**	**6.5**	48	13
	Tube 6	2/14 0:00 - 2/24 16:15	**26.3**	**28.5**	**11.2**		
	Pyro 5	2/8 15:00 - 2/24 15:45	**67.5**	**33.5**	**77.5**	289	84
	Pyro 6	2/13 16:00 - 2/24 16:00	**221.6**	**208**	**31**		
SM_04	Tube 7	2/13 14:15 - 2/24 14:15	**33.2**	**33**	**7.5**	51	9
	Tube 8	2/13 14:30 - 2/24 16:00	**18.2**	**18**	**4.8**		
	Pyro 7	2/13 14:00 - 2/24 14:00	**163.2**	**174**	**43**	286	51
	Pryo 8	2/13 14:30 - 2/24 14:00	**122.4**	**129**	**26.6**		
SM_05	Tube 9	2/7 16:30 - 2/12 23:45	**135.6**	**127**	**68.7**	136	69
	Tube 10	No data remaining					
	Pyro 9	2/7 17:30 - 2/24 13:30	**85.9**	**85.5**	**19.1**	201	47
	Pyro 10	2/7 17:15 - 2/24 13:45	**115.1**	**109.5**	**43**		
EM_06	Tube 5	No data remaining				48	26
	Tube 9	3/4 9:30 - 3/29 18:45	**48.3**	**37**	**26**		
EM_07	Tube 3	3/4 8:00 - 3/31 7:30	**55.4**	**53.5**	**11.6**	115	15
	Tube 4	3/4 8:45 - 3/8 8:45	**59.8**	**62**	**9.1**		
EM_08	Tube 6	3/4 10:00 - 3/9 0:00	**20.8**	**18.5**	**6.3**	21	6
	Tube 7	No data remaining					
EM_09	Tube 8	3/4 12:45 - 3/23 17:00	**30.7**	**30**	**8.4**	76	29
	Tube 11	3/4 11:45 - 3/28 0:00	**45.2**	**36**	**28.2**		
EM_10	Tube 10	3/4 10:00 - 3/10 12:30	**51.2**	**49**	**20**	70	21
	Tube 12	3/4 11:45 - 3/31 11:00	**19.1**	**18.5**	**5.4**		

Loc ID	Tube/ Sensor ID	Valid data range	Mean	Median	Std Dev	Tube/ Pyro sum	Tube / Pyro Std Dev
SG_11	Tube 7	No data remaining					
	Tube 10	No data remaining					
	Pyro 5	No data remaining				98	39
	Pyro 9	4/7 12:00 - 4/22 10:00	**97.9**	**96.5**	**39.2**		
SG_12	Tube 9	4/7 12:00 - 4/11 11:45.	**36.8**	**20**	**34.9**	67	38
	Tube 5	4/7 12:30 - 4/15 19:15	**30.1**	**27.5**	**15.8**		
	Pyro 3	4/7 13:00 - 4/22 10:45	**4.8**	**3**	**4.8**	5	5
	Pyro 10	No data remaining					
SG_13	Tube 8	4/7 12:45 - 4/12 17:45	**69**	**80**	**29.9**	209	64
	Tube 6	4/7 14:00 - 4/14 12:15	**139.5**	**148**	**56.2**		
	Pyro 8	4/7 13:15 - 4/21 15:30	**57.4**	**55.5**	**14.1**	357	116
	Pyro 7	4/7 1:15 - 4/21 23:30	**299.9**	**301**	**115.4**		
SG_14	Tube 3	No data remaining				76	33
	Tube 4	4/15 8:00 - 4/22 11:00	**76.4**	**66**	**33.1**		
	Pyro 4	4/7 14:30 - 4/21 18:00	**141.7**	**140**	**33.3**	360	102
	Pyro 6	4/7 14:45 - 4/22 10:00	**218.4**	**194.5**	**96.1**		
MP_15	Tube 6	4/24 13:00 - 5/13 10:45	**139.9**	**113**	**64.6**	214	71
	Tube 9	4/24 1:45 - 5/13 10:45 (interval 4/27 15:45 removed)	**74.2**	**70**	**29.7**		
	Pyro 3	4/25 0:00 - 4/28 0:00 & 5/7 0:00 - 5/11 0:00	**255.7**	**281**	**54.4**	256	54
	Pyro 6	No data remaining					
MP_16	Tube 5	4/25 8:45 - 5/2 0:00 & 5/6 0:00 - 5/13 11:45	**111.1**	**105**	**68.3**	131	69
	Tube 10	4/25 9:00 - 5/13 11:45	**19.7**	**21**	**7.8**		
MP_17	Pyro 4	4/25 9:45 - 5/13 11:45	**92.7**	**99.5**	**49.5**	1830	662
	Pyro 10	4/25 9:15 - 5/13 12:15	**1737.5**	**1413.5**	**660.2**		
MP_18	Tube 3	4/25 10:00 - 5/13 11:15	**37.2**	**24.5**	**30.4**	54	31
	Tube 8	4/25 9:45 - 5/8 11:15	**16.6**	**15**	**8.1**		
	Pyro 8	4/25 10:00 - 5/13 11:15	**31.8**	**22.5**	**31.6**	32	32
	Pyro 9	No data remaining					
MP_19	Tube 4	4/28 10:00 - 4/29 17:00 & 4/30 9:15 - 5/3 15:00	**19.3**	**14.5**	**13**	205	102
	Tube 7	4/28 9:30 - 5/13 11:45	**185.3**	**153**	**100.7**		
	Pyro 5	4/28 10:00 - 5/13 12:15	**599.7**	**593**	**100.2**	606	100
	Pyro 7	4/28 9:00 - 5/13 11:15 (interval 4/29 9:45 removed)	**5.9**	**4**	**7.4**		