Tempe Bike Count Report 2024

By Tempe Bicycle Action Group

Tempe Bicycle Action Group

Report date: 5/15/2024

1. Abstract

In the final week of March 2024, Tempe Bicycle Action Group conducted its 9th Bike Count, continuing on from its last count in 2018, in order to understand cycling habits, identify routes and intersections that are problematic or dangerous, and raise awareness for the issues cyclists in Tempe face. In total, 3,639 bicyclists were counted by 27 volunteers from a total of 16 different locations. Overall helmet use was 40%, wrong way riding was 14%, sidewalk riding was 35% and riders perceived to be female was 21%.

2. Introduction

Tempe Bicycle Action Group is pleased to present the 2024 Tempe Bike Count Report, marking a return to our valued tradition of documenting cycling activity within our community, which last took place in 2018[0]. The landscape of urban mobility has undergone significant changes since then, driven in large part by the global COVID-19 pandemic[1]. These include increased remote working and learning, the rise of micro-mobility devices such as e-scooters, raising awareness for mobility issues and updates to our city's street infrastructure.

The past few years have also witnessed a troubling increase in traffic fatalities and serious injuries, with Tempe experiencing 50 serious physical injury and fatality crashes last year, up from 37 in 2022[2]. This increase underscores the ongoing critical importance of Tempe's Vision Zero goals[3], which aim to reduce traffic fatalities to zero.

These developments reflect a broader shift in how urban spaces and mobility patterns are envisioned, where bicycles and micro-mobility devices play a pivotal role in fostering a resilient, accessible, and environmentally friendly transportation network. This year's bike count not only measures the pulse of current cycling activity across Tempe but also assesses how these shifts have influenced our community's transportation choices.

As we proceed with this report, we also recognize the evolving challenges and opportunities that lie ahead in enhancing Tempe's status as a gold-level League of American Bicyclists 'Bicycle Friendly Community'. Guided by the dedication of 27 volunteers who observed over 16 intersections, this report aims to provide insightful data that will continue to shape our city's commitment to safe, efficient, and sustainable transportation options for all residents.

3. Results

A summary of the count and attribute data is given in Table 1. Count and attribute data are depicted geographically in Appendix G. Raw data is available in reference [4].

Report	Total Count	Location Count	Recorders	Wrongway	Sidewalk	Helmet	Female
2024	3,639	16	27	14.1%	34.5%	40.3%	21.4%
2018	9,758	26	40	21.9%	46.2%	17.5%	25.8%
2017	10,779	44	40	20.4%	43.7%	18.2%	25.1%
2016	12,345	60	64	19.1%	40.3%	18.8%	23.4%
2015	15,429	53	81	16.6%	27.7%	21.0%	24.2%
2014	12,577	48	78	19.2%	41.8%	20.6%	24.7%
2013	14,750	54	91	17.2%	40.6%	19.0%	26.1%
2012	6,563	28	20	18.7%	45.8%	17.6%	29.8%
2011	9,407	45	58	17.5%	31.8%	17.2%	24.8%

Table 1 Summary of count data and attribute data [4]

a. Attribute Analysis

Attributes of cyclists were collected to record instances of wrong-way riding (going against traffic), riding on the sidewalk, riding with a helmet and perceived gender. The calculation of overall attribute percentages was weighed according to the total count for each location. Rates of wrong-way and sidewalk riding, as well as perceived female riders, are important indicators for the perceived safety of our roadways and are matters of significant concern to Tempe's cycling community.

Compared to past the 2018 bike count, 2024 saw a marked decrease in the instances of cyclist wrong-way and sidewalk riding (14.1% and 34.5%, vs 21.9% and 46.2%, respectively), a marked increase in riders wearing helmets (40.3% vs 17.5%) and a decrease in the number of perceived female riders (21.4% vs 25.8%).

Overall wrong way riding was 14.1%, which was counted for both on-street and on-sidewalk riding. This is substantially higher than that observed in the count by PAG of 3%[7]. The intersections with the highest fraction of wrong-way riding are shown in Figure 1. ARS §28-812 concerns applicability of traffic laws to bicycle riders. Riding on the wrong side is dangerous, as motorists often do not anticipate or look for wrong-way traffic. While some of the intersections with high wrong-way riding lack a dedicated bike lane in the problem direction, many, such as several along University Drive in the ASU area, do have bike lanes.

Overall sidewalk riding was 34.5%. This is substantially higher than that observed in the count by PAG of 5%. One intersection had greater than 70% sidewalk riding. The intersections with the highest fraction of sidewalk riding are shown in Figure 2. Tempe City Code sec. 7-52 concerns riding on sidewalks or bicycle lanes. Sidewalk riding can create a hazard for pedestrians and it can create conflicts between motorists and cyclists, as motorists often do not anticipate relatively fast-moving traffic on sidewalks. This is especially true when the sidewalk traffic is moving opposite of street traffic.

Overall helmet use was 40.3% across the 16 intersections observed in 2024. This statistic is notably lower in the Tempe count as compared with the PAG count from 2022 (69% of riders wearing helmets). The city of Tempe does not require helmets for adults in the city, although bicycle safety groups including TBAG, Arizona State University Health & Wellness, Bike Saviours and other groups encourage usage and will assist riders in acquiring helmets.

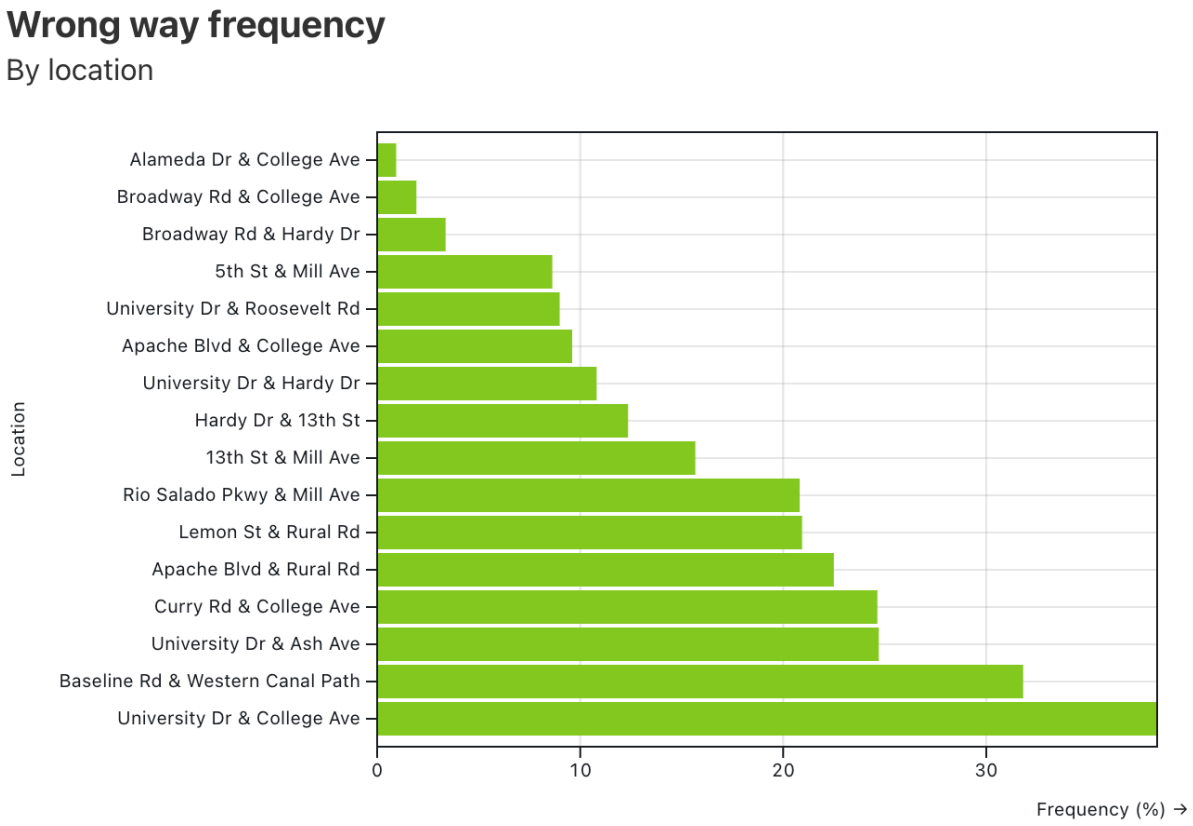


Figure 1 Locations by percentage of wrong-way riders, by intersection, directions combined.

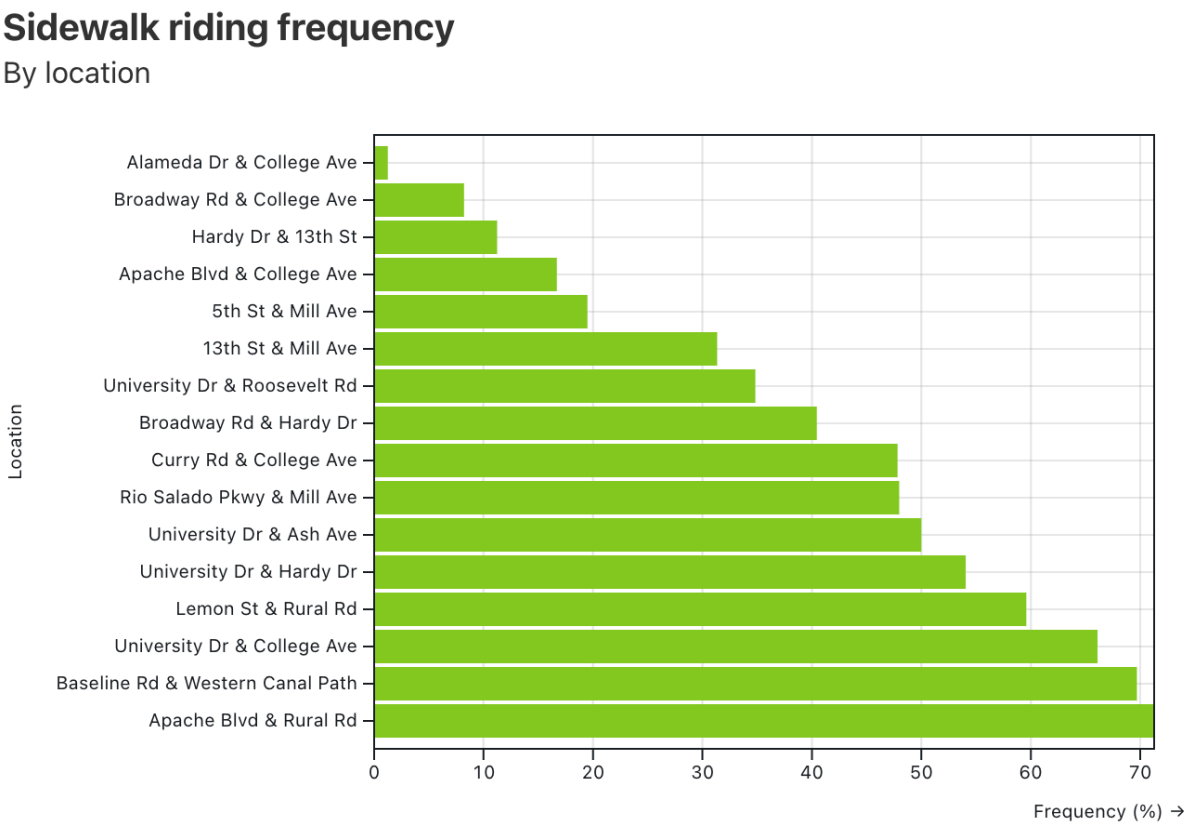
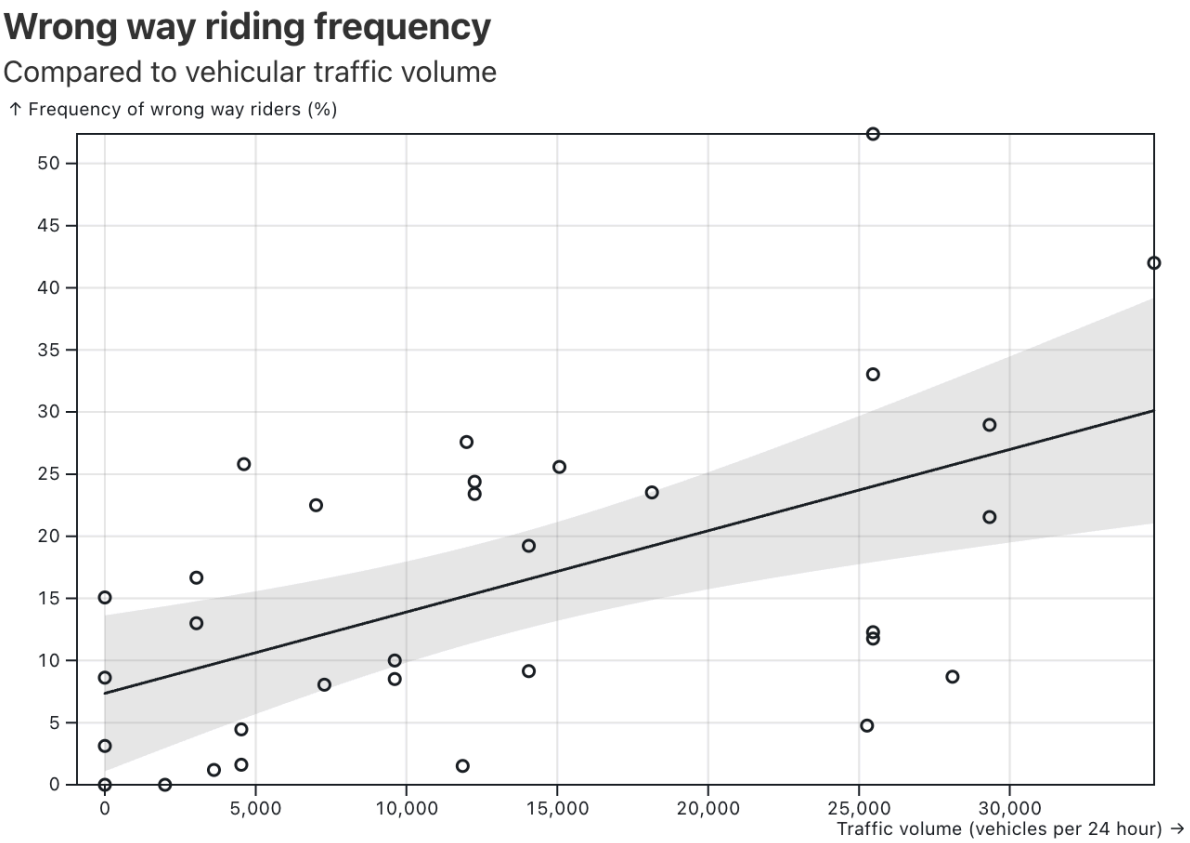


Figure 2 Locations by fraction of cyclists on sidewalk, by intersection, directions combined.

Volunteer observers recorded 21.4% female ridership overall. Ma & Dill [8] show that inexperienced riders as well as female riders regardless of experience are more likely to use infrastructure that “gives the appearance of safety.” This allows the ratio of female riders to be used as a proxy for perceived safety of infrastructure. Refer to Figure 5 which shows a downward trend correlation between frequency of perceived female riders and increased vehicular traffic volume.

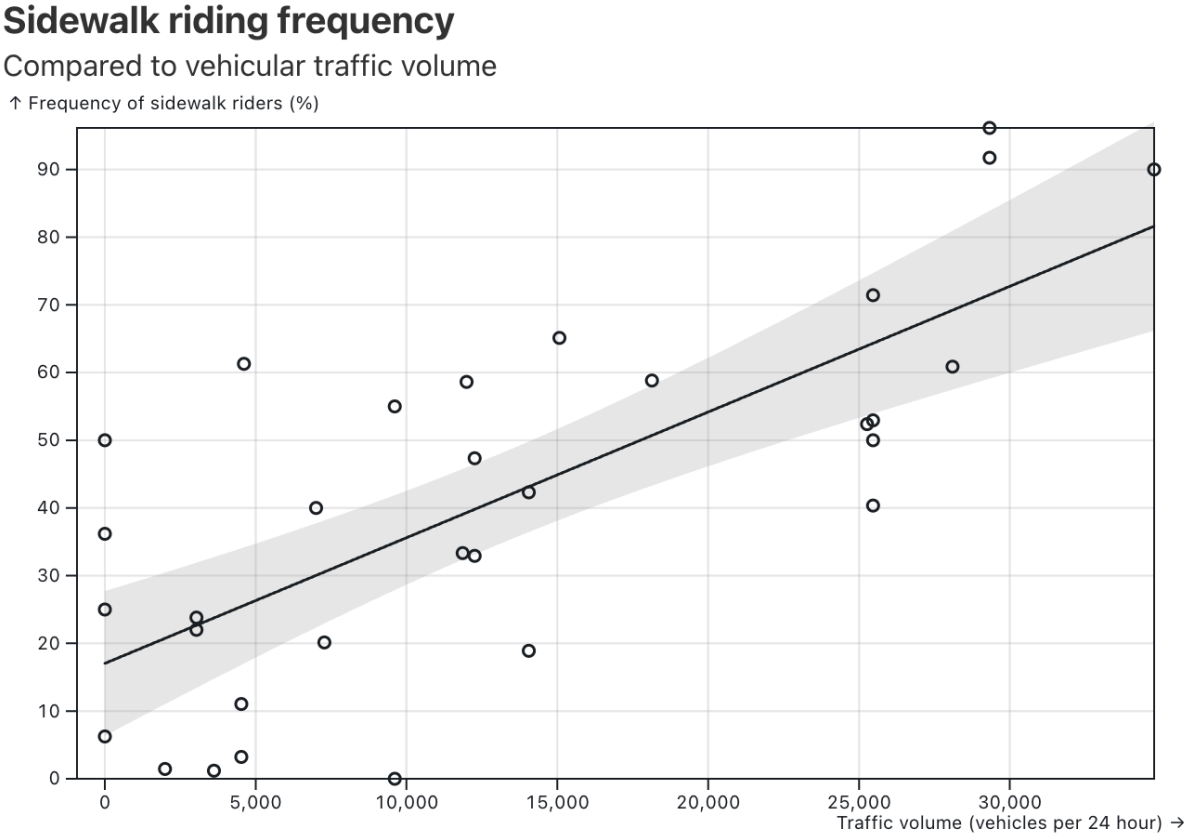
b. Correlation Analysis

Both wrong way riding and sidewalk riding are plotted vs. vehicular traffic volume, with each point representing a unique location and direction (N/S or E/W), in Figure 3 and Figure 4. Wrong way riding and sidewalk riding are positively correlated with vehicular traffic volume with high statistical significance, consistent with data from prior years. That is, the higher the volume of vehicular traffic in a particular direction, the higher the incidence of both riding against traffic and riding on the sidewalk. While other factors may be relevant, these correlations indicate the need to consider the possible effect of traffic volume on cyclist riding behavior.



Scatterplot of wrong way riding % vs. vehicular traffic count (24 hour period, data through 4/23/2022 and interpolated to intersections), E/W and N/S directions separated. Linear regression line and 95% confidence intervals are shown.

Figure 3



Scatterplot of sidewalk riding % vs. vehicular traffic count (24 hour period, data through 4/23/2022 and interpolated to intersections), E/W and N/S directions separated. Linear regression line and 95% confidence intervals are shown.

Figure 4

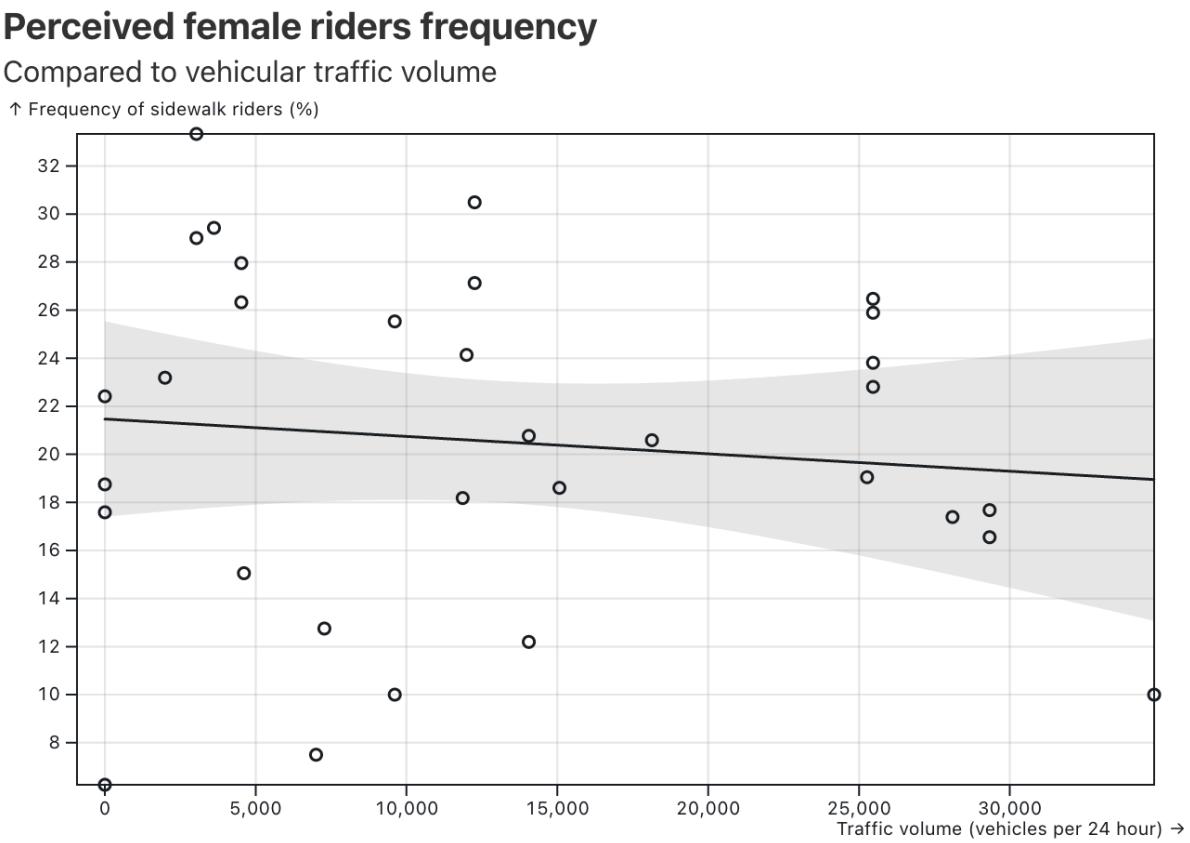


Figure 5

With regard to collision data analysis, the reader is referred to Tempe Bike Count Report 2014 [4], section 3b, Figure 5 and Appendix B of that report.

The plot in Figure 5 shows that the highest bicycle usage areas are adjacent to the ASU campus.

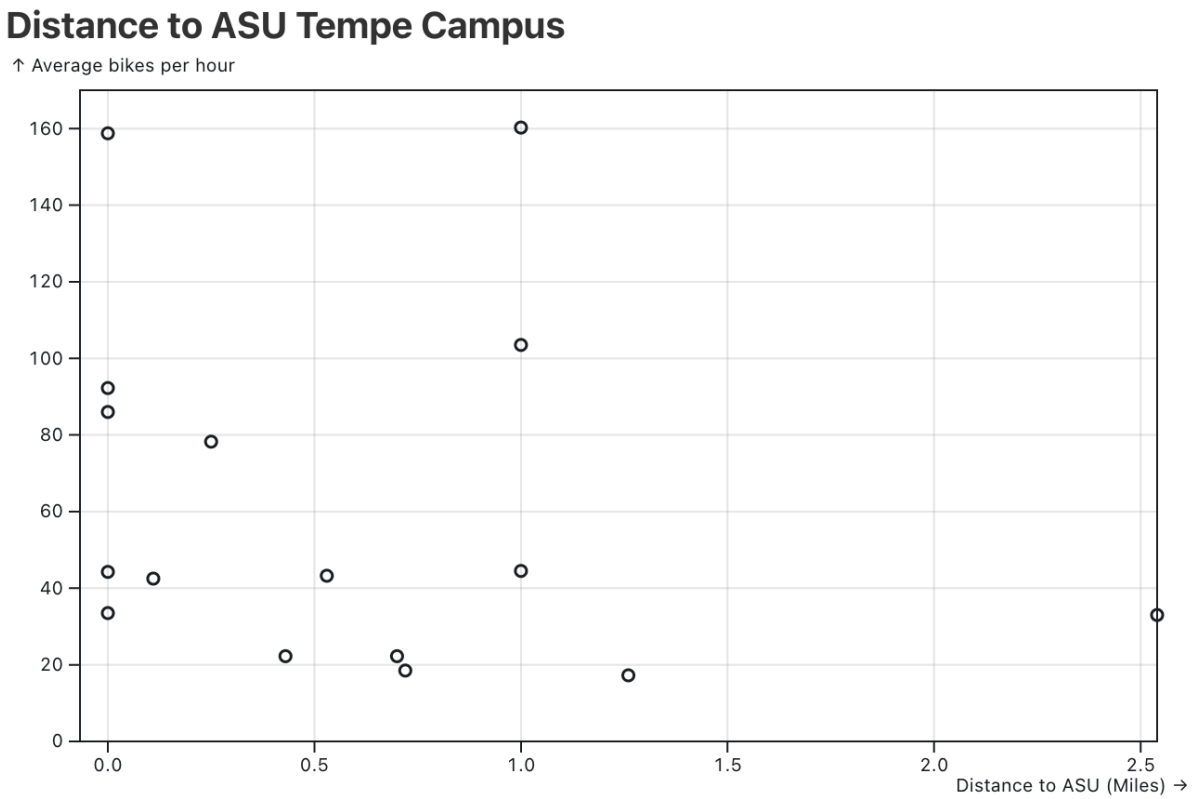


Figure 6

c. Error Detection

Error detection methods were applied to the collected data. The detailed procedure is provided in Appendix A. Errors were detected by visual inspection and numerically as attribute count exceeding the bike count for a specific time and direction. This year, 1 recording session exhibited 1 row where attribute counts were greater than the cyclist count. In that case, that row of data was thrown out. Out of 1536 data rows (where “row” is a 15-minute time bucket containing count and attribute data), this represents an error rate of <0.07%. This one error was a recording error, not a transcription error. A recording error occurs at the time of the count; a transcription error occurs when converting handwritten marks to numbers in a database. Corrections to transcriptions are straightforward and simply involve checking the count sheets. Corrections to recording data errors can sometimes be inferred as either a bike count mark missed or a false mark applied to the attribute column. Based on the low percentage of errors for included sessions, the counting procedure appears to be sound. With an error rate <1%, there does not appear to be a serious problem in the data collection methodology, at least as far as the error detection method used reveals. That error detection methods were applied to detect questionable data improves confidence in the data analysis.

4. Recommendations

As the City of Tempe works on the new edition of the Transportation Master Plan this year, there is a valuable opportunity to cement new practices, measures, goals, and recommendations that will shape the future of transportation in our city. The 2024 bike count highlights several key areas for improvement and focus.

The highest rates of bicycling continue to be concentrated around the Arizona State University (ASU) campus and the Urban Core. However, cyclists still face significant challenges negotiating major streets and traffic in this area. These routes, particularly those immediately surrounding the campus, would greatly benefit from the installation of protected bike lanes. Such infrastructure would ensure safer and more comfortable travel for cyclists, aligning with our vision of a city where everyone can walk, bike, or roll comfortably and safely to all necessary destinations.

Moreover, the city should prioritize reducing vehicle miles traveled (VMT) as a strategy to alleviate congestion and lower vehicle emissions. By promoting a multi-modal transportation network, Tempe can offer residents diverse and efficient ways to move around the city. Integrating public transit, cycling, walking, shared mobility options, and single-occupancy vehicles will address the needs of a growing population while making efficient use of limited space and resources.

Our vision is a Tempe where active transportation is the preferred choice for short trips, fostering health, sustainability, and community connection. To achieve this vision, the city should consider:

- Ensuring safe and comfortable travel for pedestrians, cyclists, and other non-motorized users.
- Connecting residential areas to key destinations through low-stress routes.
- Prioritizing neighborhood streets and collector roads for active transportation.
- Incorporating protected paths and crossings where necessary.
- Empowering residents to contribute to neighborhood improvements through quick, incremental small changes.
- Aiming to eliminate serious injuries and fatalities related to active transportation.

Continued investment in a multi-modal transportation network and higher density transit-oriented development (TOD) is essential for Tempe’s sustainable growth. A well-planned multi-modal network reduces traffic congestion, lowers emissions, and enhances accessibility and connectivity within the city. It ensures equitable access to essential services and opportunities for all residents, regardless of their location, socio-economic status, or abilities.

Economically, such a network can spur local business growth by increasing foot traffic and accessibility to commercial areas. Importantly, focusing on diverse transportation modes allows for greater flexibility and resilience in the face of future urban challenges, whether demographic changes, technological advancements, or environmental concerns. A robust multi-modal transportation network will position Tempe to adapt and thrive in a rapidly evolving urban landscape, ultimately enhancing the quality of life for all its residents.

By incorporating these recommendations, Tempe can continue its transformation into a city where both active transportation and public transit are integral to the daily lives of its residents, promoting a healthier, more sustainable, and connected community.

5. Limitations and future work

While the 2024 bike count provides valuable insights into cycling behaviors and trends within Tempe, several limitations should be acknowledged. The primary limitation is the focus on weekday counts, which may not fully capture the extent of recreational cycling or rides made for purposes other than commuting to work or class. To address this, we plan to add a counting day on the weekend in future counts. This addition will help us better understand and track recreational cycling and other non-commuting rides, providing a more comprehensive picture of cycling activity in Tempe.

Furthermore, the 2024 count did not include data on micromobility devices such as electric scooters, boosted boards, and other similar devices. Given the dramatic increase in the use of these devices in recent years, their exclusion represents a significant gap in our data. Micromobility devices share many of the same vulnerabilities as bicycles and contribute to the overall landscape of non-automotive road users. Future bike counts will include these devices to ensure a more inclusive understanding of all vulnerable road users.

By addressing these limitations, we aim to enhance the accuracy and inclusiveness of our data collection, thereby supporting more effective urban planning and safety initiatives. Expanding the scope of our counts to include weekends and micromobility devices will also encourage broader community participation, enriching the dataset and fostering greater community engagement in our efforts to improve transportation safety and sustainability.

6. References

[0] Tempe Bike Count Report, 2018, https://www.biketempe.org/wp-content/uploads/2019/05/Tempe_Bike_Count_Report_2018.pdf
[1] Li X, Farrukh M, Lee C, Khreis H, Sarda S, Sohrabi S, Zhang Z, Dadashova B. COVID-19 impacts on mobility, environment, and health of active transportation users. Cities. 2022 Dec;131:103886. doi: 10.1016/j.cities.2022.103886. Epub 2022 Aug 3. PMID: 35935595; PMCID: PMC9345890. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9345890/
[2] Photo-enforcement likely coming to Tempe this year, Ahwatukee Foothills News, https://www.ahwatukee.com/news/photo-enforcement-likely-coming-to-tempe-this-year/article_7b14e504-0bd0-11ef-9aa8-9b7b0ffb70c2.html
[3] A Vision for Safer Roads, City of Tempe, https://data.tempe.gov/apps/41b2302d057f49bfb3c0abb5fd6fa586/explore
[4] Tempe Bike Count Report, years 2011 to 2024, https://www.biketempe.org/bike-count-data/
[5] Raw data for 2024 Tempe Bike Count, https://github.com/biketempe/count-data
[6] Tempe Vehicular Traffic Count Data https://data.tempe.gov/maps/40ffc90766394604a11206e2369e74d9
[7] PAG Bike count data https://maps.pagregion.com/PAGBikePed/BikePedDataExplorer

[8] Ma, L. & Dill, J. (2017). Do people's perceptions of neighborhood bikeability match "reality?". The Journal of Transport and Land Use. (10)1, 1-18. DOI: http://dx.doi.org/10.5198/jtlu.2015.796.
[9] Interactive notebook with data and charts of bike count https://observablehq.com/@jketcham/tempe-bike-count-2024

7. Acknowledgements

The 2024 Tempe Bike Count was a collaborative effort involving a diverse team from across the bicycle-interest community. We extend our sincere gratitude to the volunteers who dedicated their time to collecting data and supporting various aspects of this project.

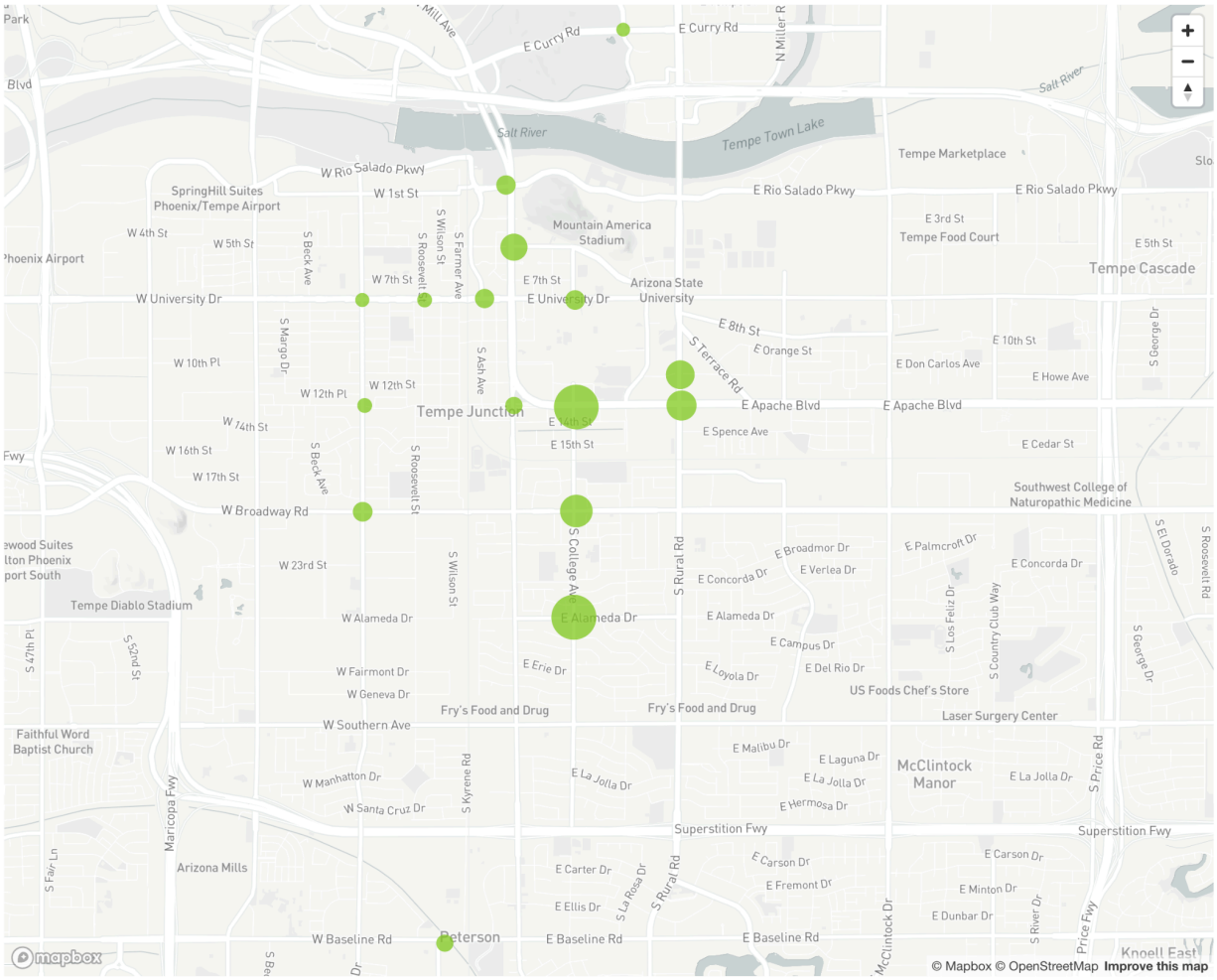
Bike count coordinator: Jack Ketcham
Bike count principal investigator: Jack Ketcham
Bike count contributors: Stevie Milne, Jeff Caslake
Bike count recorders: 27 volunteers

REVISION HISTORY

Revision	Description	Date
1	Initial	5/15/2024

Appendix A - Geographical Presentation of Statistics

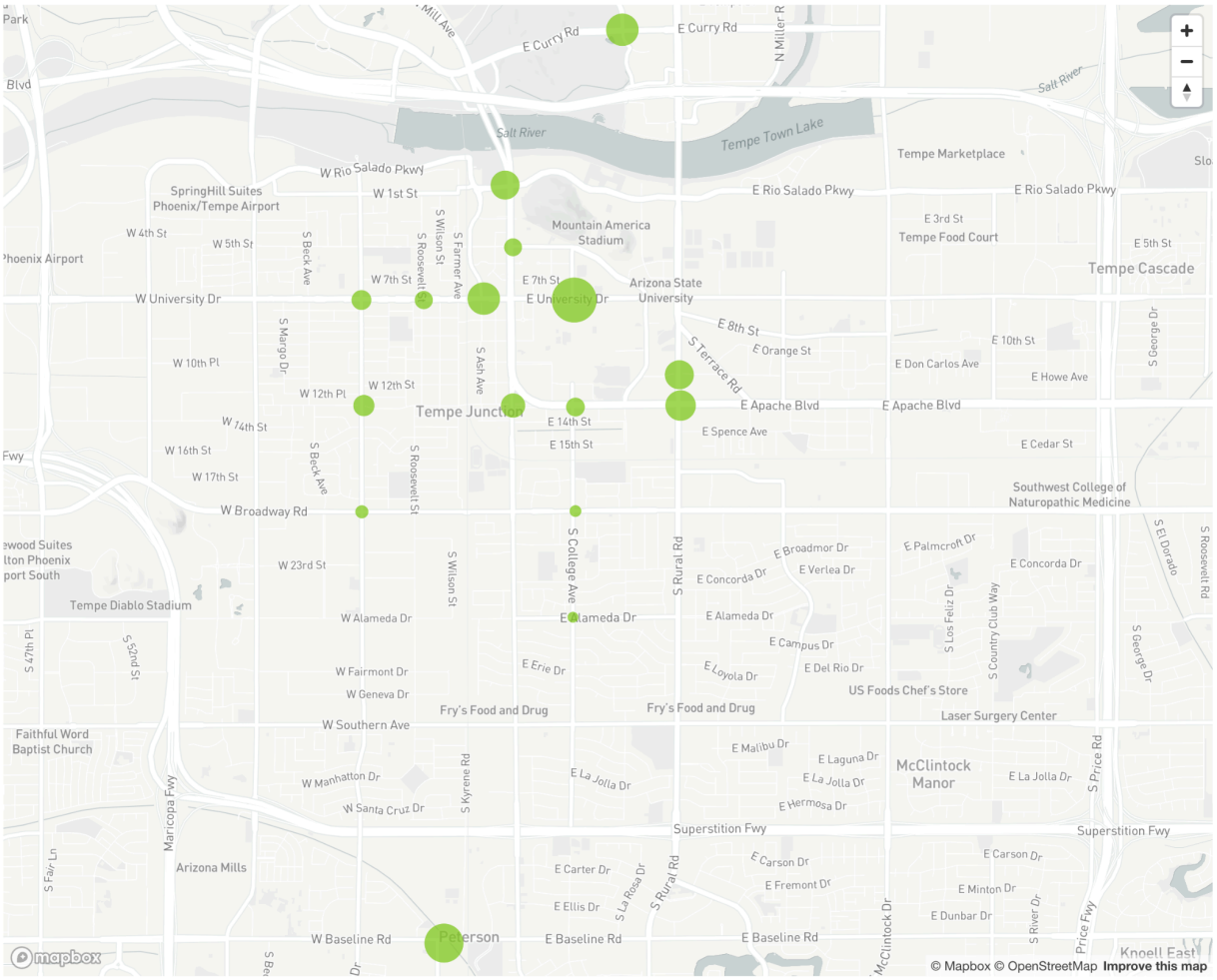
Cyclists per hour - Total



Scale - number of riders

Figure A1 Total cyclists count per hour

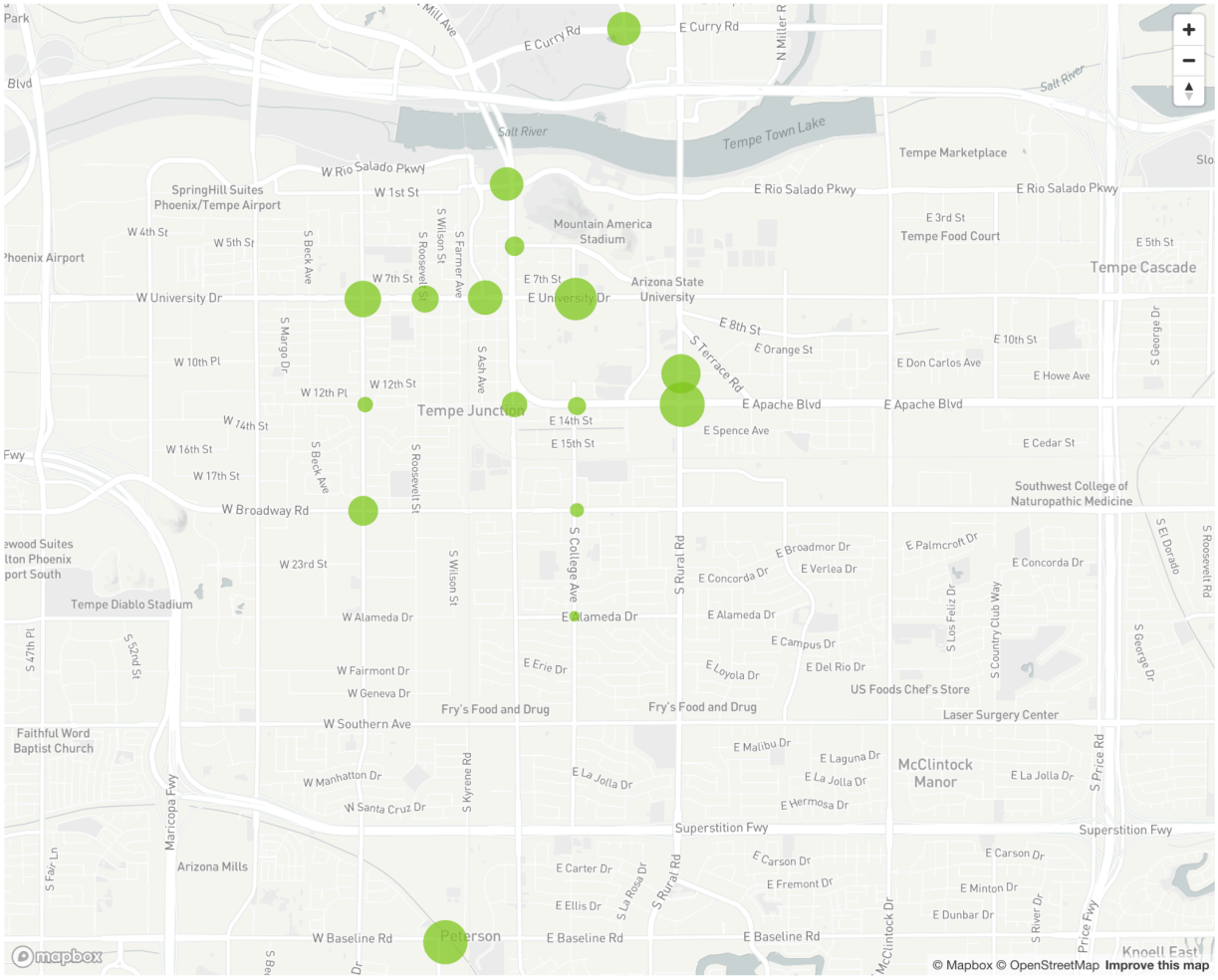
Frequency of Cyclists Riding wrong way



Scale - number of riders

Figure A2 Frequency of wrong way riders

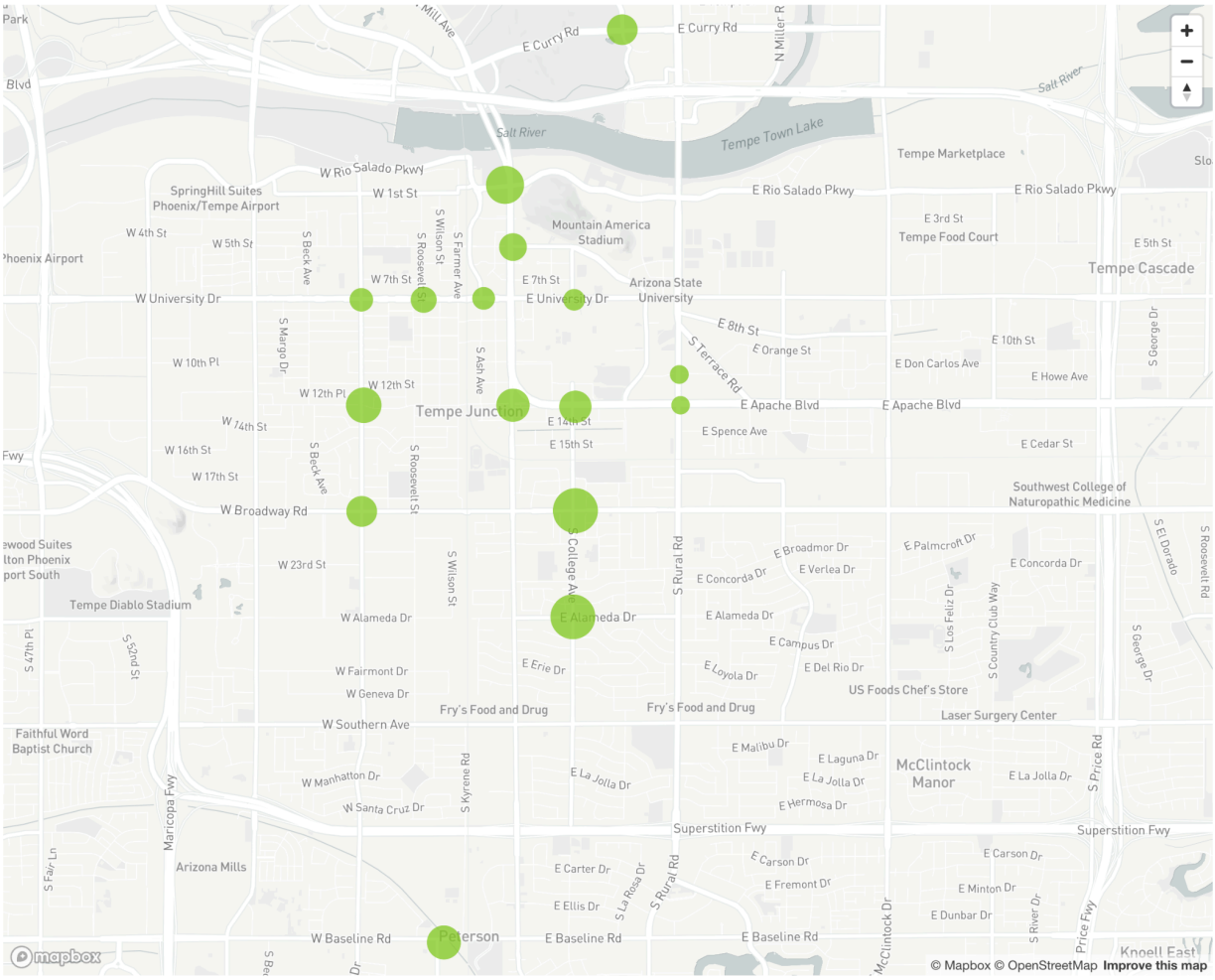
Frequency of Cyclists Riding on sidewalk



Scale - number of riders

Figure A3 Frequency of sidewalk riders

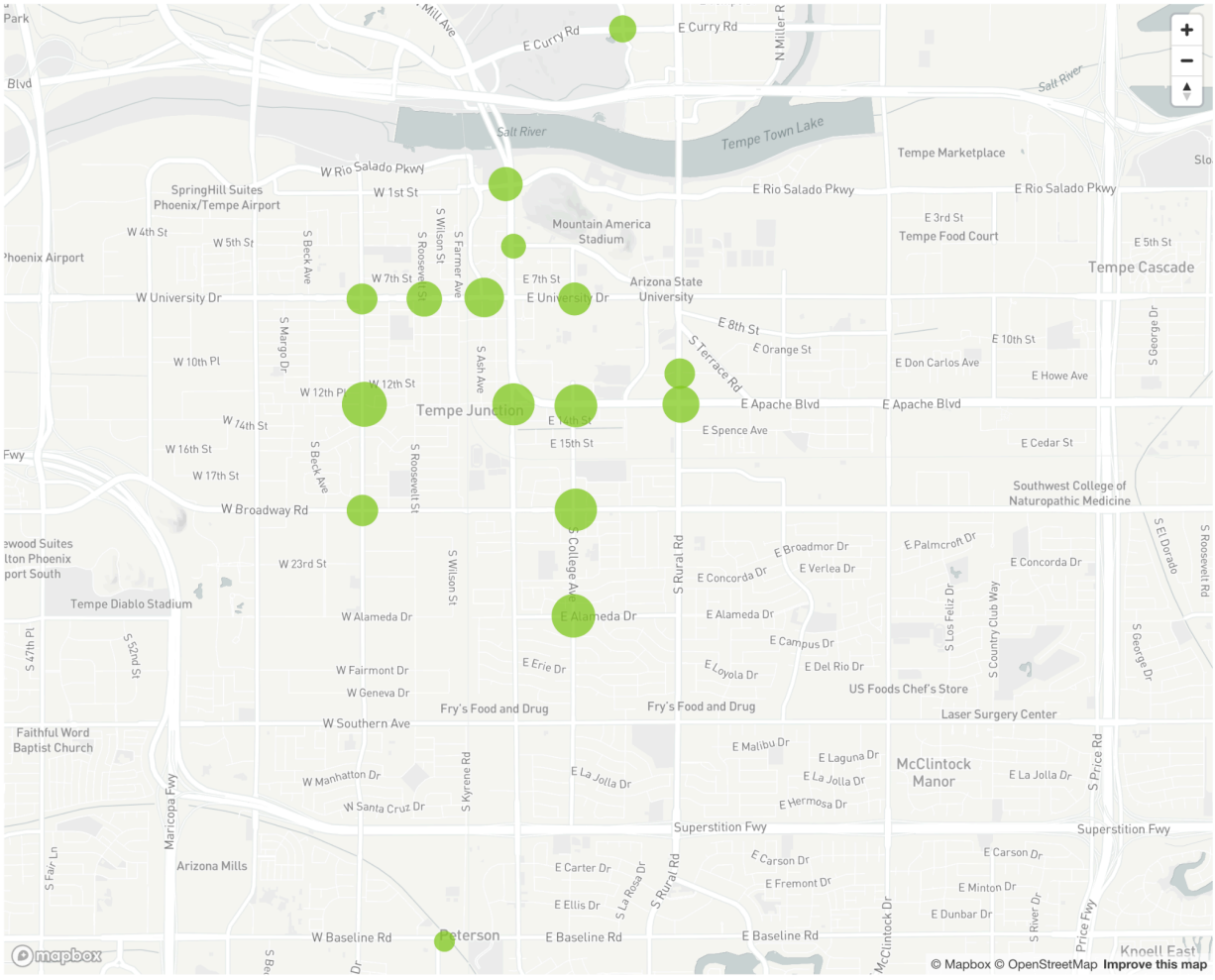
Frequency of Cyclists Wearing helmets



Scale - number of riders

Figure A4 Frequency of cyclists wearing helmets

Frequency of Cyclists Perceived female



Scale - number of riders

Figure A5 Frequency of perceived female cyclists

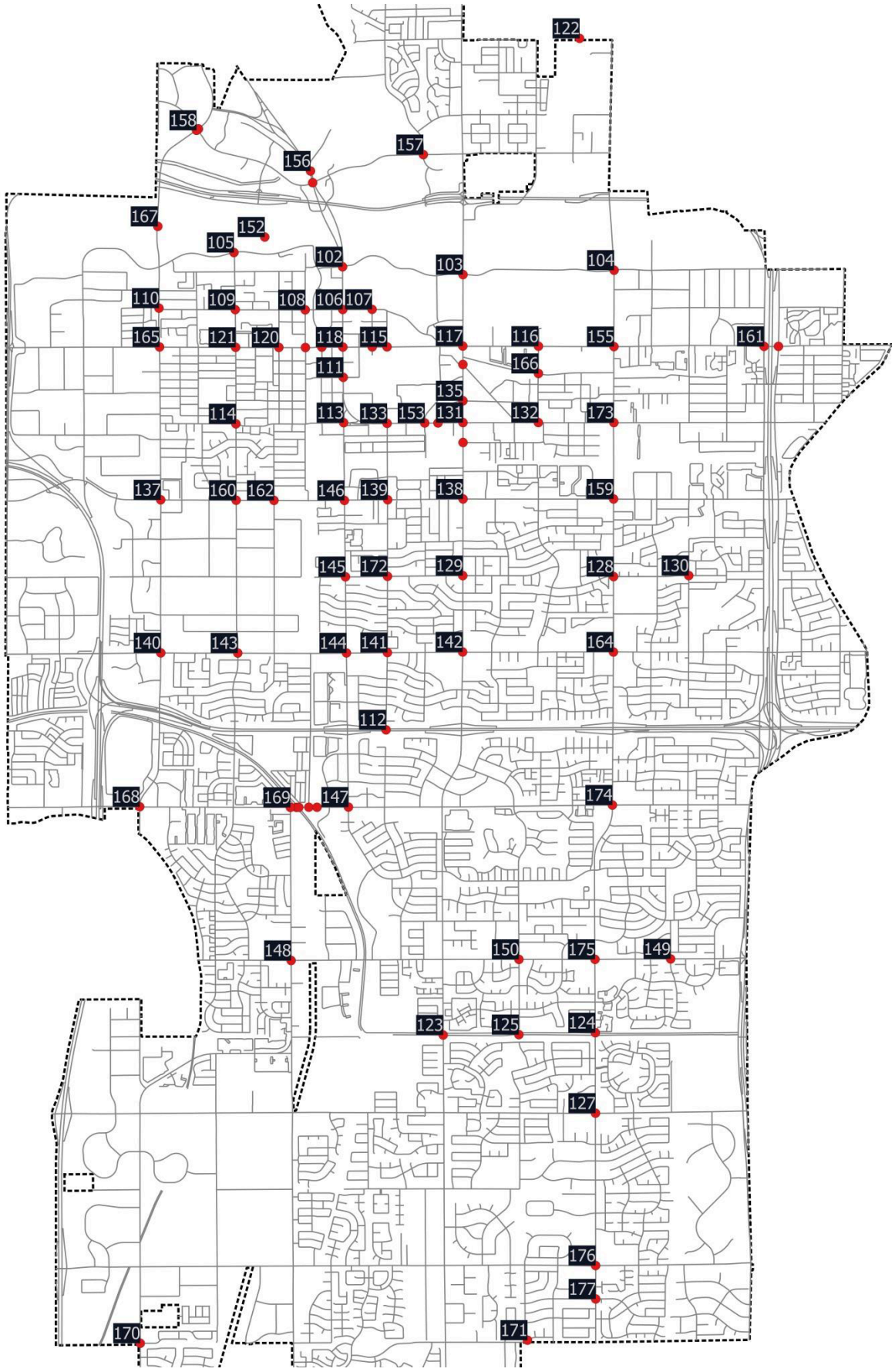


Figure A6 Location IDs (all ever counted exc. 178; some number flags omitted for clarity)

Appendix B - Methodology

Locations and times for collecting data were selected based on the following characteristics (not in order of priority):

- High anticipated bicycle count
- Intersections
- Recent or planned infrastructure improvements
- High incidence of bicycle collisions
- Establishment of cordon around (traffic in and out of) ASU
- Coverage of a representative sample of the City of Tempe
- Practicality of volunteer participation
- Historical count location
- Stakeholder recommendations (e.g., City of Tempe)

The total number of intersections in the initial plan was capped at about 50, but was limited practically by volunteer participation.

The cordon for ASU was defined as follows:

- West border: Mill Ave
- South border: Apache Blvd
- East border: Rural Rd
- North border: University Dr

The time periods 7-9am and 4-6pm were chosen to be consistent with prior years and to include the morning and afternoon peak time periods while also allowing volunteers to participate with minimal interference with their normal work schedules. Tuesday, Wednesday and Thursday were selected to be consistent with prior years' counts, and are anticipated to be the highest volume days of the week and roughly equivalent to each other. Volunteers were allowed to select, at will, any one of the three days for data collection. The data collection worksheet consisted of 15 minute bins.

The set of instructions conveyed to recorders is shown in Appendix D. Training sessions were held and made available to all recorders.

Bicycle count data was collected for each of the directions (typically 4) of each intersection. For analysis, two statistics reported are a) the sum of all directions; and b) the sum of the two opposite direction counts, e.g., E/W = sum of east, west.

Total count per hour is calculated as the sum of the A.M. and P.M. sessions (4 hours total) divided 4, or if data is available only for A.M. or P.M., then the total for 2 hours is divided by 2. In the unusual event of duplicate valid counts, the counts are averaged so that total count per hour is consistent. Note that because of the difference between AM and PM count averages as shown in Figure B1, averages reported that consist of only AM or only PM are potentially skewed. This should be taken into account when comparing data between years.
Error detection methods were applied to the collected data. For each cyclist observed, instructions required that one notation be recorded in the count column, with attribute data recorded in addition in each respective column as applicable. Therefore, for a given 15 minute

bin, if the sum of notations for any one attribute exceeds the count column total, an error has occurred. Possible causes for errors include:

- accidental double-counting in the attribute column
- accidental uncounted data in the count column
- improper procedure followed
- data translation error from hand-written sheets to database

Time of day for the manual count was consistent with prior Tempe counts. It is intended to capture the peak morning and afternoon “rush hour” bicycle traffic, while accommodating work schedules of prospective volunteers. Average bike count per hour vs. time of day, as shown in Figure B1, peaked for the AM counts at the end of the morning shift (8:45 to 9:00 am). For the PM counts, relative peaks occurred for the 4:15-4:30 and 5:45-6:00PM segments. PM counts were higher than AM, on average. Since these are averages over all locations, it is possible that some areas exhibited peak ridership at other times. The data was likely influenced by class schedule at ASU.

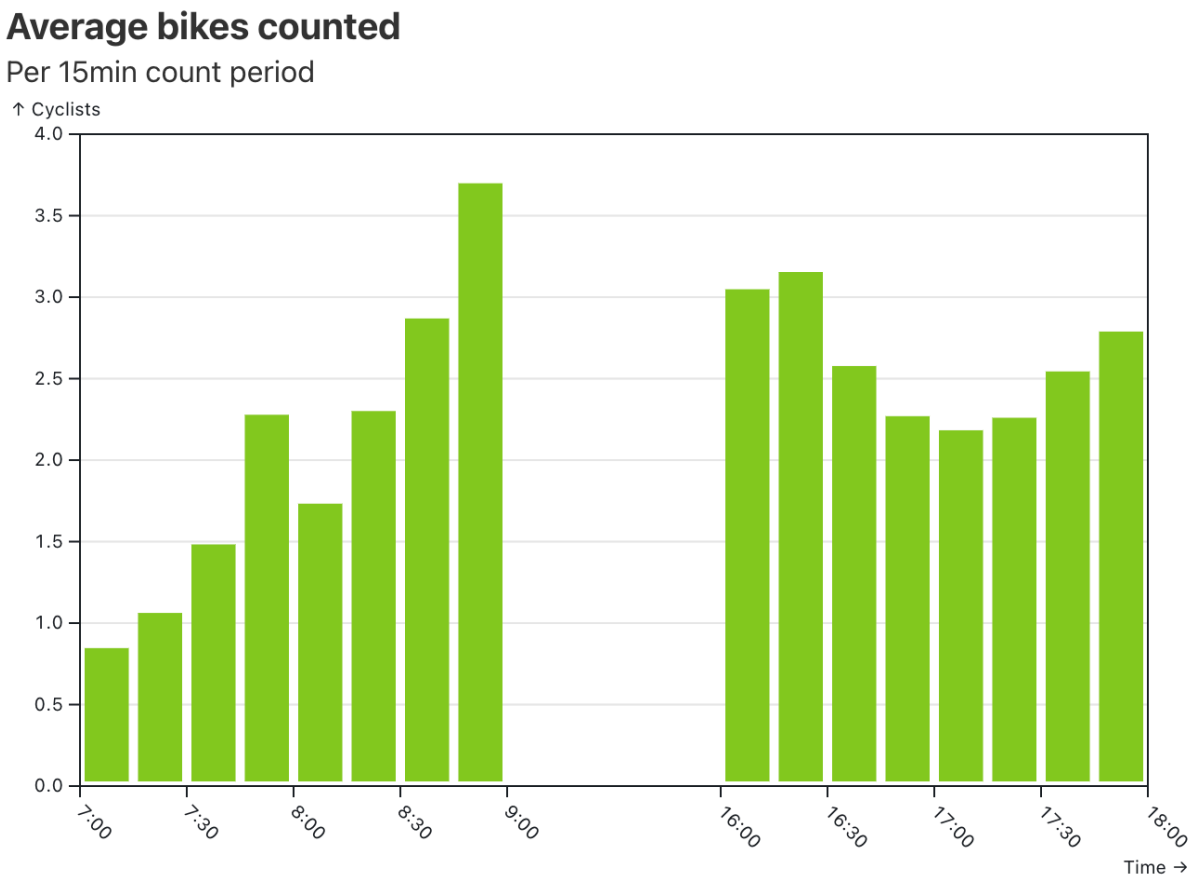


Figure B1 Average bikes counted per 15 min. period

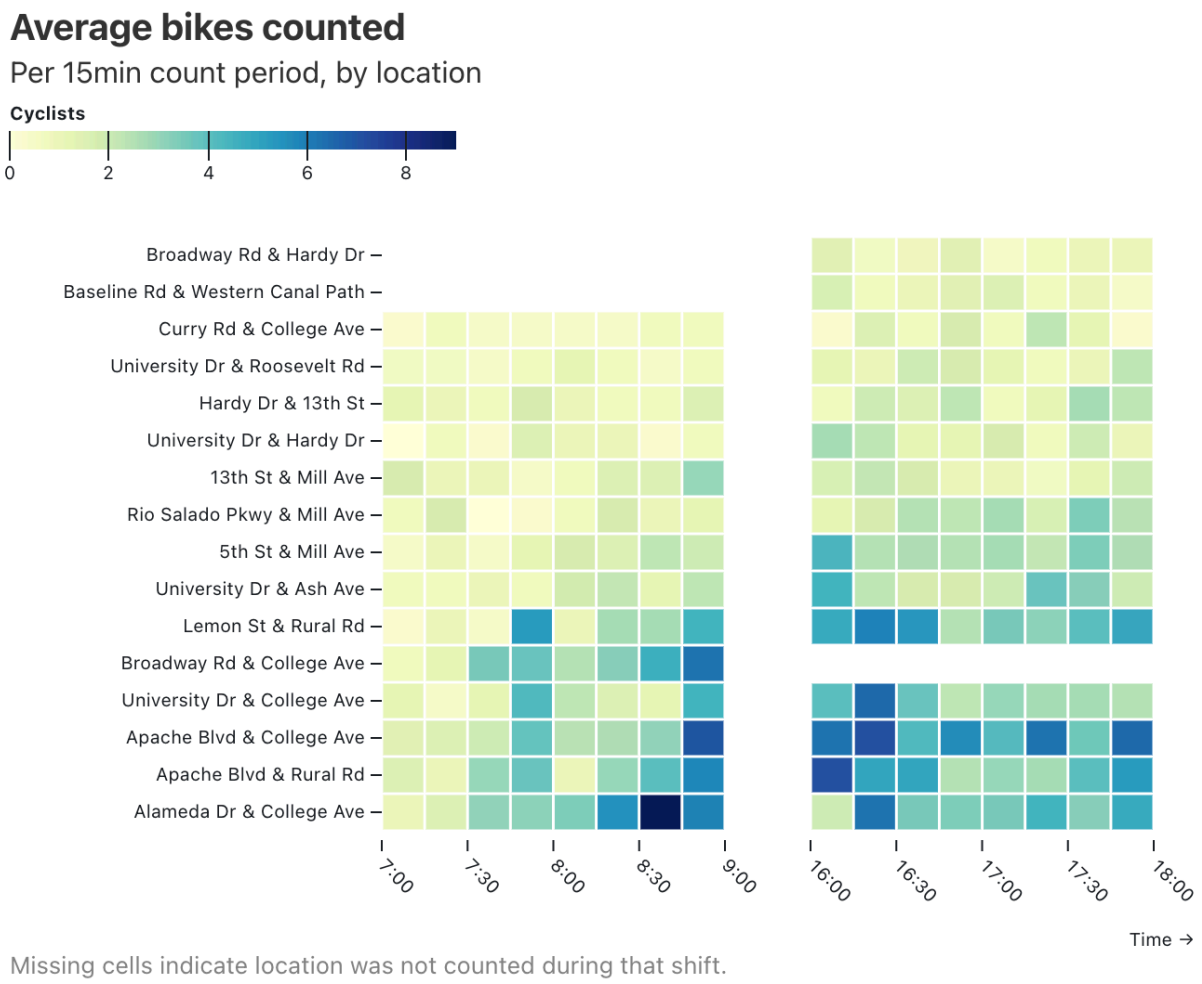


Figure B2 Average bikes count per 15 min. period, per location

Traffic count was obtained from City of Tempe data [6]. This data represents vehicular traffic flow over a 24-hour period in the two opposite directions (e.g., east and west, or north and south). The locations are generally not at intersections. Vehicular data has been collected over a number of years, but the locations change somewhat from year to year. The following method was used to interpret vehicular traffic data for the purpose of this study:

- The most recent data for each sampling location was used.
- For the two sides of a given intersection/direction (east/west or north/south), the larger of the two values was used. If data was available for only one side, that value was used.

Appendix C - Bike Count Form

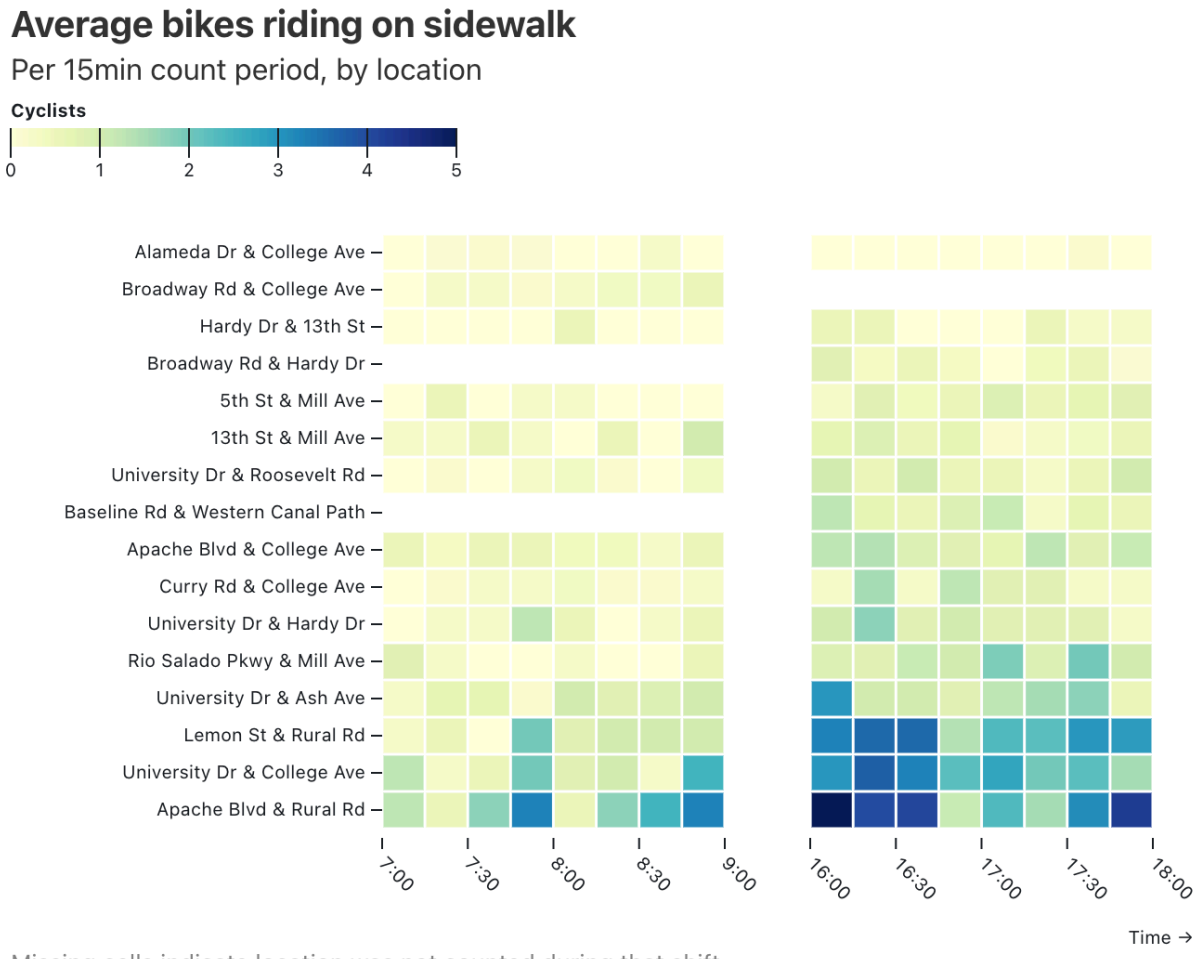
Name:		Count Sheet			Page #:	
Date:		Location ID#: Intersection of streets:				
		Check for every cyclist:	Also check all that apply:			
Hour AM PM	Approach Direction	COUNT	Feminine presentation FEMALE	Wearing HELMET	Wrong Way Riding	Riding on Sidewalk
:00	NB					
	SB					
	EB					
	WB					
:15	NB					
	SB					
	EB					
	WB					
:30	NB					
	SB					
	EB					
	WB					
:45	NB					
	SB					
	EB					
	WB					
Observations/ Notes:						

Return all completed sheets at: the volunteer celebration at Boulders on Broadway on Mar. 28 at 6:30pm, or Bicycle Cellar (200 E 5th St #105, Tempe), or Boulders on Broadway's hostess desk, or mail to Tempe Bicycle Action Group, PO Box 1884, Tempe, AZ 85280. Thank you for your participation! 2024 version 1

Appendix D - Bike Count Instructions

1. **Count Form Structure.**
    a. Each form tracks 1 full hour of activity, broken into 15 minute increments.
    b. Total # of Cyclists recorded in the “Count” Column. Attributes broken out in following columns.
2. **Fill In:** - Important please include the following info on each tracking sheet.
    a. Your Name (cell#)
    b. Location ID# & Location (Intersection) – this info was sent to you in your volunteer confirmation email.
    c. Hour (i.e. 4-5pm) – Record hour in far left column
    d. Page # (example: 1 of 2 – etc.)
3. **Count Shifts** (2 hr) – you will need at least 2 count sheets per shift. Busier locations may require more sheets. Extra count sheets will be available.
    a. AM Rush hour: 7-9am
    b. PM Rush hour: 4-6pm
4. **Priority 1**: Count (Bikes)
5. **Columns “Count” =** Total # Cyclists
    a. Approach Direction (NB, SB, EB, WB): Record the approach direction(northbound, southbound –etc.)
    b. Note: turn direction is not recorded
    c. Intervals – the data is recorded in 15 minute intervals.
6. **Priority 2:** Record Attributes
   Once you’ve marked the cyclists, mark out the attributes as well as you can.
7. **Cyclist Attributes:**
    a. **Approach Direction** (NB, EB, WB, SB)
    b. **Gender:** (Male is assumed) * Mark if cyclist perceived as female
    c. **Helmet** (No Helmet is assumed) - Mark if the cyclist is wearing a Helmet
    d. **Wrong-Way Riding** - cycling against traffic
    e. **Sidewalk Riding** – does not include quick transitions at intersections or parking lots etc.
8. **Special cases**
    a. If there are multiple riders on a bike (tandem, child carrier or trailer, riding on BMX pegs, etc), each person gets counted
    b. E-bikes are included in the count

Appendix E - Additional Graphs



Missing cells indicate location was not counted during that shift.

Appendix F - Historical Bike Count Data

LocID	LocEW	LocNS	TotPerHr 2011	TotPerHr 2012	TotPerHr 2013	TotPerHr 2014	TotPerHr 2015	TotPerHr 2016	TotPerHr 2017	TotPer Hr2018	TotPer Hr2024
101	Washington/Curry	Mill Ave	35	NA	45	29	48.25	23.5	NA	NA	NA
102	Rio Salado Pkwy	Mill Ave	46.5	NA	68.25	63.625	59.5	57.75	43	NA	43.25
103	Rio Salado Pkwy	Rural Rd	48	43.5	70.25	61	57	54.25	58.5	36.5	NA
104	Rio Salado Pkwy	McClintock Dr	38.5	19	21	30	26.25	24.75	21.25	14.25	NA
105	Rio Salado Pkwy	Hardy Dr	8.25	NA	18.75	NA	NA	18	11.75	NA	NA
106	5th St	Mill Ave	117.5	91	110.75	101.25	111.75	93	95.25	80	78.25
107	5th St	Forest Ave	47.5	NA	67	NA	NA	NA	NA	NA	NA
108	5th St	Farmer Ave	NA	NA	79	78	107.25	64	NA	NA	NA
109	5th St	Hardy Dr	NA	31.5	59.25	NA	NA	57.5	43.5	NA	NA
110	5th St	Priest Dr	18	NA	16.5	20	20	13	NA	NA	NA
111	10th St	Mill Ave	NA	137.75	135.5	112.5	123.75	75.5	96.75	110	NA
112	Superstition Fwy	College Ave	32.5	27.75	38.25	28	35.75	NA	NA	NA	NA
113	13th St	Mill Ave	49	31.5	56	52.625	58.125	33.5	52.5	58.75	33.5
114	13th St	Hardy Dr	NA	NA	50.25	40	42.5	45	39.25	NA	22.25
115	University Dr	College Ave	452	173.5	220	216.25	309.5	242.25	224.5	224.5	44.25
116	University Dr	Dorsey Ln	65.5	NA	61.75	72.75	87.875	69.25	52.5	NA	NA
117	University Dr	Rural Rd	116	181	143	145.25	197.25	187.25	137	162.5	NA
118	University Dr	Mill Ave	93.25	116.75	123.38	141.25	153.75	154.5	143.25	60	NA
119	University Dr	Ash Ave	87.5	60.5	95.25	95.5	91.75	65.5	83	72	42.5
120	University Dr	Roosevelt St	45.5	50.5	54.5	53	67.5	81	69.25	59.75	22.25
121	University Dr	Hardy Dr	62	35	46.5	56.5	36	50.25	48	92.75	18.5
122	McKellips Rd	Greenbelt Path	42	40.5	42.75	44.25	46.5	39.25	NA	NA	NA
123	Western Canal	Rural Rd	NA	44.5	61.5	40.5	40.25	32.5	NA	37	NA
124	Western Canal	McClintock Dr	NA	NA	37.75	37.75	38	33	NA	35.5	NA
125	Western Canal	Lakeshore Dr	86	42.5	54.5	NA	NA	NA	44.25	NA	NA
126	Baseline Rd	Western Canal	24.5	NA	37.75	37.25	24.5	NA	NA	NA	33
127	Elliot Rd	McClintock Dr	9.5	NA	13.25	NA	NA	12.75	NA	NA	NA
128	Alameda Dr	McClintock Dr	22	NA	24	17.5	31.25	26.5	22	NA	NA
129	Alameda Dr	Rural Rd	NA	NA	59.75	63.875	50	71	45.25	NA	NA
130	Alameda Dr	Country Club Wy	11.5	NA	20.5	NA	NA	9.5	8	NA	NA
131	Apache Blvd	Rural Rd	NA	190.5	145.75	180	184	263.5	163.75	150.75	92.25
132	Apache Blvd	S Dorsey Ln	38	NA	64	66	65.75	NA	74.5	NA	NA
133	Apache Blvd	College Ave	NA	233	163.75	243	220.25	218.5	238.25	190.75	158.75
134	Apache Blvd	Paseo Del Saber	121	102	181.5	NA	232.75	207.5	248.25	213.5	NA
135	Lemon St	Rural Rd	151	NA	149.25	168.25	177.12	175.5	140.5	174.5	86
136	Spence St	Rural Rd	92	134.5	169.5	NA	NA	NA	157.5	139.5	NA
137	Broadway Rd	Priest Dr	16	NA	22.5	NA	17	NA	13	NA	NA
138	Broadway Rd	Rural Rd	NA	65.25	93	71.75	73	58	43.5	50.25	NA

LocID	LocEW	LocNS	TotPerHr 2011	TotPerHr 2012	TotPerHr 2013	TotPerHr 2014	TotPerHr 2015	TotPerHr 2016	TotPerHr 2017	TotPer Hr2018	TotPer Hr2024
139	Broadway Rd	College Ave	104.5	NA	134.75	150	152.25	134.5	153.75	135.25	103.5
140	Southern Ave	Priest Dr	18.5	NA	26.5	NA	NA	14.75	14.75	NA	NA
141	Southern Ave	College Ave	NA	69.5	61.5	65.75	72.25	53.75	76	NA	NA
142	Southern Ave	Rural Rd	NA	NA	32.5	43.25	41	51.5	18.5	NA	NA
143	Southern Ave	Hardy Dr	24.5	23	24	31	21.75	27.5	28	19.75	NA
144	Southern Ave	Mill Ave	47.5	47.5	40.5	40	38.25	35.25	32.25	28	NA
145	Alameda Dr	Mill Ave	29.5	23.5	21	22.25	20.25	13	18.25	13.25	NA
146	Broadway Rd	Mill Ave	NA	36.5	36.25	27	34	33.25	NA	NA	NA
147	Baseline Rd	Mill Ave	17	NA	27	16	20.5	NA	NA	NA	NA
148	Guadalupe Rd	Kyrene Rd	NA	NA	27	NA	NA	NA	NA	NA	NA
149	Guadalupe Rd	Country Club Wy	12	NA	17.75	NA	NA	NA	11.5	NA	NA
150	Guadalupe Rd	Lakeshore Dr	23	NA	22.75	NA	NA	NA	NA	NA	NA
151	University Dr	Forest Ave	129.5	90.25	127.5	NA	NA	NA	NA	126.25	NA
152	Tempe Lake S.	TCA Bridge	NA	36	42.5	18	46.75	27.75	NA	NA	NA
153	Apache Blvd	McAllister Ave	NA	NA	NA	NA	NA	NA	NA	NA	NA
154	Terrace Rd	Rural Rd	NA	NA	194.5	NA	NA	123.5	210.5	158.5	NA
155	University Dr	McClintock Dr	NA	NA	56	67.25	68	34	NA	NA	NA
156	Crosscut Canal	Mill Ave	NA	NA	NA	35.5	17.75	NA	NA	NA	NA
157	Curry Rd	College Ave	NA	NA	NA	26.75	27.25	13	NA	NA	17.25
158	Washington St	Priest Dr	NA	NA	NA	NA	33.25	30.5	NA	NA	NA
159	Broadway Rd	McClintock Dr	NA	NA	NA	32	41.25	31.5	21.5	42	NA
160	Broadway Rd	Hardy Dr	NA	NA	NA	23.75	19.5	29	23.5	NA	44.5
161	University Dr	Price Rd	NA	NA	NA	24.5	28.25	NA	NA	NA	NA
162	Broadway Rd	Roosevelt St	NA	NA	NA	20	20.25	22	NA	NA	NA
163	University Dr	Farmer Ave	NA	NA	NA	59.75	63.5	79.25	NA	NA	NA
164	Southern Ave	McClintock Dr	NA	NA	NA	33.75	29.25	32.25	26.5	NA	NA
165	University Dr	Priest Dr	NA	NA	NA	26.25	20.75	40.5	NA	NA	NA
166	8th St	Dorsey Ln	NA	NA	NA	NA	56	60	NA	NA	NA
167	Town Lake Path S	Priest Dr	NA	NA	NA	NA	17	NA	NA	NA	NA
168	Baseline Rd	Priest Dr	NA	NA	NA	NA	NA	NA	NA	NA	NA
169	Baseline Rd	Kyrene Rd	NA	NA	NA	NA	NA	13	NA	NA	NA
170	Knox Rd	Priest Dr	NA	NA	NA	NA	NA	4	NA	NA	NA
171	Knox Rd	Lakeshore Dr	NA	NA	NA	NA	NA	4.5	NA	NA	NA
172	Alameda Dr	College Ave	NA	NA	NA	NA	NA	74.25	NA	NA	160.25
173	Apache Blvd	McClintock Dr	NA	NA	NA	NA	NA	75	72.25	NA	NA
174	Baseline Rd	McClintock Dr	NA	NA	NA	NA	NA	14.5	18.25	NA	NA
175	Guadalupe Rd	McClintock Dr	NA	NA	NA	NA	NA	14	14.125	NA	NA
176	Warner Rd	McClintock Dr	NA	NA	NA	NA	NA	12	NA	NA	NA
177	La Vieve Ln	McClintock Dr	NA	NA	NA	NA	NA	7	NA	NA	NA

Appendix G - Data Summary

Intersection	Loc. ID	Dist. ASU (mi)	Total Per Hour	Helmet %	Wrongway %	Sidewalk %	Perceived Female %
Rio Salado Pkwy & Mill Ave	102	0.53	43.25	53.2%	20.8%	48.0%	20.2%
5th St & Mill Ave	106	0.25	78.25	33.5%	8.6%	19.5%	12.5%
13th St & Mill Ave	113	0	33.5	44.0%	15.7%	31.3%	26.9%
Hardy Dr & 13th St	114	0.7	22.25	48.3%	12.4%	11.2%	29.2%
University Dr & College Ave	115	0	44.25	22.0%	38.4%	66.1%	19.2%
University Dr & Ash Ave	119	0.11	42.5	24.1%	24.7%	50.0%	24.7%
University Dr & Roosevelt Rd	120	0.43	22.25	30.3%	9.0%	34.8%	21.3%
University Dr & Hardy Dr	121	0.72	18.5	25.7%	10.8%	54.1%	17.6%
Baseline Rd & Western Canal Path	126	2.54	33	45.5%	31.8%	69.7%	9.1%
Apache Blvd & Rural Rd	131	0	92.25	16.0%	22.5%	71.3%	22.5%
Apache Blvd & College Ave	133	0	158.75	42.2%	9.6%	16.7%	27.4%
Lemon St & Rural Rd	135	0	86	16.6%	20.9%	59.6%	17.2%
Broadway Rd & College Ave	139	1	103.5	66.2%	1.9%	8.2%	27.1%
Curry Rd & College Ave	157	1.26	17.25	39.1%	24.6%	47.8%	14.5%
Broadway Rd & Hardy Dr	160	1	44.5	39.3%	3.4%	40.4%	18.0%
Alameda Dr & College Ave	172	1	160.25	66.0%	0.9%	1.2%	28.1%

Table G1 All Directions

Intersection	Loc. ID	Dist. ASU (mi)	Total Per Hour	Helmet %	Wrongway %	Sidewalk %	Perceived Female %
Rio Salado Pkwy & Mill Ave	102	0.53	32.5	60.0%	19.2%	42.3%	20.8%
5th St & Mill Ave	106	0.25	41	38.4%	9.1%	18.9%	12.2%
13th St & Mill Ave	113	0	8.5	47.1%	23.5%	58.8%	20.6%
Hardy Dr & 13th St	114	0.7	11.75	46.8%	8.5%	0.0%	25.5%
University Dr & College Ave	115	0	23.25	24.7%	25.8%	61.3%	15.1%
University Dr & Ash Ave	119	0.11	14.5	22.4%	8.6%	50.0%	22.4%
University Dr & Roosevelt Rd	120	0.43	8	50.0%	3.1%	25.0%	18.8%
University Dr & Hardy Dr	121	0.72	10	22.5%	10.0%	55.0%	10.0%
Baseline Rd & Western Canal Path	126	2.54	8	75.0%	0.0%	6.3%	6.3%
Apache Blvd & Rural Rd	131	0	45.25	17.1%	21.5%	96.1%	17.7%
Apache Blvd & College Ave	133	0	117.75	46.5%	4.5%	11.0%	26.3%
Lemon St & Rural Rd	135	0	36.25	10.3%	29.0%	91.7%	16.6%
Broadway Rd & College Ave	139	1	93	69.4%	1.6%	3.2%	28.0%
Curry Rd & College Ave	157	1.26	10	42.5%	22.5%	40.0%	7.5%
Broadway Rd & Hardy Dr	160	1	33	47.0%	1.5%	33.3%	18.2%
Alameda Dr & College Ave	172	1	125.75	68.4%	1.2%	1.2%	29.4%

Table G2 North-South Directions

Intersection	Loc. ID	Dist. ASU (mi)	Total Per Hour	Helmet %	Wrongway %	Sidewalk %	Perceived Female %
Rio Salado Pkwy & Mill Ave	102	0.53	10.75	32.6%	25.6%	65.1%	18.6%
5th St & Mill Ave	106	0.25	37.25	28.2%	8.1%	20.1%	12.8%
13th St & Mill Ave	113	0	25	43.0%	13.0%	22.0%	29.0%
Hardy Dr & 13th St	114	0.7	10.5	50.0%	16.7%	23.8%	33.3%
University Dr & College Ave	115	0	21	19.0%	52.4%	71.4%	23.8%
University Dr & Ash Ave	119	0.11	28	25.0%	33.0%	50.0%	25.9%
University Dr & Roosevelt Rd	120	0.43	14.25	19.3%	12.3%	40.4%	22.8%
University Dr & Hardy Dr	121	0.72	8.5	29.4%	11.8%	52.9%	26.5%
Baseline Rd & Western Canal Path	126	2.54	25	36.0%	42.0%	90.0%	10.0%
Apache Blvd & Rural Rd	131	0	47	14.9%	23.4%	47.3%	27.1%
Apache Blvd & College Ave	133	0	41	29.9%	24.4%	32.9%	30.5%
Lemon St & Rural Rd	135	0	49.75	21.1%	15.1%	36.2%	17.6%
Broadway Rd & College Ave	139	1	10.5	38.1%	4.8%	52.4%	19.0%
Curry Rd & College Ave	157	1.26	7.25	34.5%	27.6%	58.6%	24.1%
Broadway Rd & Hardy Dr	160	1	11.5	17.4%	8.7%	60.9%	17.4%
Alameda Dr & College Ave	172	1	34.5	57.2%	0.0%	1.4%	23.2%

Table G3 East-West Directions

Appendix H - Climate Data

Date	PRCP	TMAX	TMIN	Station Name
3/29/2011	0	86	48	TEMPE ASU, AZ US
3/30/2011	0	87	49	TEMPE ASU, AZ US
3/31/2011	0	92	53	TEMPE ASU, AZ US
4/3/2012	0	79	41	TEMPE ASU, AZ US
4/4/2012	0	85	44	TEMPE ASU, AZ US
4/5/2012	0	88	51	TEMPE ASU, AZ US
3/26/2013	0	88	54	TEMPE ASU, AZ US
3/27/2013	0	85	50	TEMPE ASU, AZ US
3/28/2013	0	86	51	TEMPE ASU, AZ US
3/25/2014	0	88	48	TEMPE ASU, AZ US
3/26/2014	0	81	49	TEMPE ASU, AZ US
3/27/2014	0	76	46	TEMPE ASU, AZ US
3/24/2015	0	86	48	TEMPE ASU, AZ US
3/25/2015	0	87	51	TEMPE ASU, AZ US
3/26/2015	0	89	54	TEMPE ASU, AZ US
3/29/2016	0	77	54	TEMPE ASU, AZ US
3/30/2016	0	69	47	TEMPE ASU, AZ US
3/31/2016	0	74	41	TEMPE ASU, AZ US
3/28/2017	0	79	57	PHOENIX AIRPORT, AZ US
3/29/2017	0	84	47	TEMPE ASU, AZ US
3/30/2017	0	89	45	TEMPE ASU, AZ US
4/10/2018	0	97	77	TEMPE ASU, AZ US
4/11/2018	0	98	76	TEMPE ASU, AZ US
4/12/2018	0	87	66	PHOENIX AIRPORT, AZ US
3/26/2024	0	73	55	TEMPE ASU, AZ US
3/27/2024	0	77	51	TEMPE ASU, AZ US
3/28/2024	0	82	46	TEMPE ASU, AZ US

Weather data from NWS NOWData
https://www.weather.gov/climateservices/nowdatafaq
Note: Station “Phoenix Airport” used due to missing data