# Tempe Bike Count Report 2015

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Tempe Bicycle Action Group Rev 2: 3/5/2017

## **1. Abstract**

In April the fifth annual city-wide bike count in Tempe was conducted as a way of understanding cycling habits and to identify routes and intersections that are problematic or dangerous. In total, 15,429 bicyclists were counted by 81 volunteers from a total of 53 different locations, with 15 locations counted for all 5 years from 2011 to 2015. Overall helmet use was 21%, wrong way riding was 17% and sidewalk riding was 38%. Helmet use and wrong way riding were fairly consistent between the four years of bike count data. Sidewalk riding percentage had more variability year-to-year. Helmet use was lower while wrong way and sidewalk riding were higher than values obtained for similar count data in Pima County, AZ (Tucson area).

## 2. Introduction

In 1974, the Planning Department of the City of Tempe released the comprehensive Tempe Bikeway Plan, the first plan of its kind in Arizona. The Bikeway Plan aimed to "encourage use of the bicycle for everyday transportation," among other goals, as a way to decrease automobile traffic, reduce the environmental impacts of transportation, and raise the quality of living in Tempe. Now, over forty years later, Tempe has more than 175 miles of bikeways [1], was recently promoted to the gold-level League of American Bicyclists 'Bicycle Friendly Community' [2] (first inducted 1997), and has the highest percentage of residents who bike to work, at 4.2%, in the county [1]. The City of Tempe has a long-standing commitment to encouraging bicycle and pedestrian travel [1], a goal shared by Tempe Bicycle Action Group (T.B.A.G.). T.B.A.G. is a non-profit 501(c)(3) organization dedicated to advancing the bicycle as a safe, efficient, and sustainable form of transportation [3]. Despite bicycling infrastructure progress, collision data is still high, at 1107 pedalcyclist collisions over the 5-year period from 2010 to 2014 [4], [5].

This is the 5<sup>th</sup> annual Tempe Bike Count Report [6]-[9]. On March 24<sup>th</sup>, 25<sup>th</sup> and 26<sup>th</sup>, 2015, 81 volunteers observed a total of 15,429 cyclists at 53 intersections during morning (7-9 am) and evening (4-6 pm) rush hours. The count of cyclists traveling through an imaginary cordon around the ASU-Tempe campus was 691 per hour in-bound in the morning and 1122 per hour out-bound in the afternoon. Besides a count, additional data was collected covering rider gender, helmet use, riding on the sidewalk, and riding on the wrong side of the street (against traffic). In addition to these data, our analysis considers vehicular traffic volume data by intersection made available by the City of Tempe [10]. The Tempe bike count method was modeled in part after a similar program by the Pima Association of Governments (PAG) [11]-[14]. Other recent reports on bicycle transportation include those from Maricopa Association of Governments [15], [16] and a Bike Network Connectivity Study for SRP [17].

## 3. Results

A summary of count data and attribute data is shown in Table 1. Count and attribute data are depicted geographically in Appendix A. Historical bike count data by location is tabulated in Appendix F. A detailed tabulation of results for 2015 is given in Appendix G. Raw data is available in reference [18].

	Total	#		Wrong			
Report	Count	locations	Recorders	way%	Sidewalk%	Helmet%	Female%
Tempe 2015	15,429	53	81	16.6%	37.7%	21.0%	24.2%
Tempe 2014	12,577	48	78	19.2%	41.8%	20.6%	24.7%
Tempe 2013	14,750	54	91	17.2%	40.6%	19.0%	26.1%
Tempe 2012	6,563	28	20	18.7%	45.8%	17.6%	29.8%
Tempe 2011	9,407	45	58	17.5%	31.8%	17.2%	24.8%
PAG 2014	18,426	107		2.9%	4.7%	47.2%	28.9%
PAG 2013	13,265	82		2.9%	6.0%	50.9%	28.0%
PAG 2012	12,211	86		3.2%	7.0%	54.6%	24.5%
PAG 2011	15,898	117		2.5%	5.9%	50.3%	26.8%

Table 1Summary of count data and attribute data [6]-[9], [11]-[14].

## a. Attribute Analysis

Attributes collected were wrong-way riding, riding on the sidewalk, wearing a helmet, and gender. The high incidences of cyclists riding against traffic, riding on the sidewalk and riding without a helmet are all matters of significant concern.

The 20 intersections with the highest fraction of wrong-way riding are shown in Figure 1. In all, there were 13 intersections at which 25% or more of the cyclists observed were riding the wrong direction. 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.

Sidewalk riding had even higher percentages. Six intersections had greater than 90% sidewalk riding. The 20 intersections with the highest fraction of sidewalk riding are shown in Figure 2. In all, 37 intersections out of 53 had 25% or more of the cyclists riding on the sidewalk. 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 21%. This is substantially lower than that observed in the count by Pima Association of Government (PAG) of roughly 50% [14]. Wrong way riding was 17% and sidewalk riding was 38%, both substantially higher than the PAG count (3% and 5% respectively). Wrong-way riding was counted for both on-street and on-sidewalk riding. The calculation of overall attribute percentages was weighted according to the total count for each intersection/direction.



## Tempe Bike Count

Figure 1

Top 20 locations by percentage of wrong-way riders, by intersection (directions combined)

## Tempe Bike Count







#### b. Correlation Analysis

Both sidewalk riding and wrong way riding are positively correlated with vehicular traffic volume as shown in Figure 3 and Figure 4. That is, the higher the volume of vehicular traffic in a particular direction, the higher the incidence of both riding on the sidewalk and riding against traffic. These correlations indicate the need to recognize the effect of traffic volume on cyclist riding behavior.





Correlation between sidewalk riding % and vehicular traffic count (24 hour period), E/W and N/S directions separated.  $R^2 = 0.57$ .



Figure 4 Correlation between wrong way riding % and vehicular traffic count (24 hour period), E/W and N/S directions separated.  $R^2 = 0.46$ .

With regard to collision data analysis, the reader is referred to Tempe Bike Count Report 2014 [9], 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.





## 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. Six recording sessions (pairs of count sheets) were thrown out due to anomalies such as high numerical error count or significant missing data. Of the remaining

data, there were 14 transcription errors and 10 recording errors detected numerically, and subsequently corrected, out of 3616 data rows (where "row" is a 15-minute time block containing count and attribute data). 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 straight forward and simply involves checking the count sheets. Corrections to recording data errors can be estimated by inferring that either a bike count mark was missed or a false mark was applied to the attribute column. Most of the recording corrections applied here resulted in an increase of 1 count for the given time segment. As a result of these estimated corrections, the total bicycle count increased by 7. Based on the low percentage of errors for included sessions, the counting procedure appears to be sound. While the detection of errors may indicate problems in the data collection methodology, it does not imply the results are less accurate than comparable count data analysis results in other cities. The fact that error detection methods were applied to detect questionable data improves the final data analysis accuracy. In addition, some data fields indicated wrong way and/or sidewalk riding for intersection approaches where motor vehicles are not allowed and wrong way riding is not applicable. These were corrected by nulling the sidewalk and wrong way riding in the appropriate direction since these data contradict the intent of the statistic to represent bad behavior.

## 4. Recommendations

The City of Tempe has made great strides in developing the city as a bicycle-friendly community. This bike count indicates that there is still work to do to improve bicycle safety both in terms of infrastructure improvement (bicycle lanes and paths) and education. In particular, we recommend that the city look at bike lanes on routes that are popular with cyclists. Sidewalk riding is a concern relating to car-bike collisions, especially when the bike is going the wrong way on the sidewalk. T.B.A.G. continues to work with the city on plans to improve roads, to add bike lanes, and to work on educational and enforcement campaigns.

## 5. References

- [1] Tempe Transportation Master Plan (Jan 2015), http://www.tempe.gov/home/showdocument?id=30317.
- [2] Tempe, AZ Bicycle Friendly Community. The League of American Bicyclists, Fall, 2015. http://www.bikeleague.org/sites/default/files/bfareportcards/BFC\_Fall\_2015\_ReportCard\_Tempe\_A Z.pdf
- [3] Tempe Bicycle Action Group (T.B.A.G.), <u>www.biketempe.org</u>.
- [4] Tempe Traffic Collisions. Arizona Bike Law, Dec 11, 2015. <u>http://azbikelaw.org/tempe-traffic-collisions/</u>.
- [5] ADOT traffic collision database, <u>http://azbikelaw.org/blog/adot-traffic-collision-database/</u> <u>http://azbikelaw.org/blog/arizona-crash-facts-2013/</u>
- [6] 2011 Tempe Bike Count Report, <u>http://www.biketempe.org/wp-content/uploads/2011/12/Tempe-Bike-Count-2011-Final-Report1.pdf</u>.
- [7] Tempe Bike Count Report 2012, <u>http://www.biketempe.org/wp-content/uploads/2013/01/Tempe\_Bike\_Count\_Report\_2012.pdf</u>.
- [8] Tempe Bike Count Report 2013, <u>http://www.biketempe.org/wp-content/uploads/2014/04/Tempe\_Bike\_Count\_Report\_2013.pdf</u>.
- [9] Tempe Bike Count Report 2014, http://www.biketempe.org/dls/Tempe\_Bike\_Count\_Report\_2014.pdf
- [10] Traffic count data from the City of Tempe. <u>http://www.tempe.gov/city-hall/public-works/transportation/traffic-counts-</u>.
- [11] 2011 Regional Bicycle/Pedestrian Count Summary, http://www.pagnet.org/documents/bicycle/2011RegionalBicycleCountReport.pdf.

- [12] 2012 Regional Bicycle and Pedestrian Count Summary Report, http://www.pagnet.org/documents/bicycle/2012RegionalBicycleCountReport.pdf.
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- [14] 2014 Regional Bicycle and Pedestrian Count Summary Report, http://www.pagnet.org/documents/bicycle/2014RegionalBicyclePedestrianCountReport.pdf.
- [15] MAG Bicycles Count: Final Report and Implementation Plan, https://www.azmag.gov/Documents/BaP\_2014-08-21\_FINAL-MAG-Bicycle-Count-Data-Summary-Report.pdf
- [16] MAG Bicycle Count Data Summary Presentation, https://www.azmag.gov/Documents/BaP\_2014-05-21\_MAG-Bicycle-Count-Data-Summary-Presentation.pdf.
- [17] Bike Network Connectivity Study for SRP Service Area, http://www.public.asu.edu/~mikekuby/BikeNetworkConnectivity/.
- [18] Raw data for Tempe Bike Count: <u>https://github.com/biketempe/DataAnalysis</u>.

## Acknowledgements

Tempe Bike Count 2015 was a concerted effort by a diverse team representing a wide cross-section of the bicycle-interest community. Many thanks go out to the volunteers who contributed their time to recording data and other areas of this effort.

Bike count coordinator:

• Scott Walters, T.B.A.G.

Other bike count contributors:

• Jenn Guzy, T.B.A.G.

Count recorders:

• 81 count volunteers

## **REVISION HISTORY**

Revision	Description	Date
1	Initial	3/24/2015
2	Correction to data for LocID 102,113,115,116,129,133,146 & Fig 1,2,6,7, Tab 1,	3/5/2017
	App A,B, F relating to algorithm for handling duplicate counts . "15 locations	
	counted for all 4 years" was 21. Cordon out-bound 1122 was 549. Ignore wrong	
	way and sidewalk riding for intersection approaches where motor vehicles are	
	not allowed and wrong way riding is not applicable.	



## **Appendix A Geographical Presentation of Statistics**

Figure A1. Total Bicycle Count per Hour



Figure A2. Percent of Wrong Way Riders



Figure A3. Percent of Riders Using Sidewalk



Figure A4. Percent of Riders Wearing Helmets

## Appendix B Methodology

Locations and times for collecting data were selected based on the following characteristics:

- a. High anticipated bicycle count
- b. Intersections
- c. Recent or planned infrastructure improvements
- d. High incidence of bicycle collisions
- e. Establishment of cordon around (traffic in and out of) ASU
- f. Coverage of a representative sample of the City of Tempe
- g. Practicality of volunteer participation
- h. Historical count location
- i. 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: Rio Salado Pkwy

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:

- a. accidental double-counting in the attribute column
- b. accidental uncounted data in the count column

- c. improper procedure followed
- d. 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 bike count per hour vs. time of day

Traffic count was obtained from City of Tempe data [10][14]. 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.

Date:   Location ID#:     Hour   Approach   Check for every cyclist:     Hour   Approach   Concretion ID#:     All   Direction   Check for every cyclist:     Instruction   NB   COUNT     Instruction   SB   COUNT     Instruction   NB   COUNT     Instruction   SB   COUNT     Instruction   NB   COUNT     Instruction etc.   NB   Instruction etc.	Vame:			Count	Sheet	page #:	
Image: Memory of the conduction	Dat	 0	Location ID#:	Inter	section of stre	ets:	
Hour       Approach         AM       NB       COUNT         NB       NB       COUNT         NB       NB       NB         NB       NB       NB </th <th></th> <th></th> <th>Check for every cyclist:</th> <th>Also check all that</th> <th>apply:</th> <th></th> <th></th>			Check for every cyclist:	Also check all that	apply:		
All       FM       Direction       COUNT         :0       SB       NB	Hour	Approach			Wearing	Wrond Wav	
Image: Signature state st	AM	M Direction	COUNT	FEMALE	HELMET	Riding	<b>Riding on Sidewalk</b>
Observations/ Notes:		NB					
EB WB NB BB BB BB WB WB NB NB NB NB NB NB NB NB NB N	ö	0 SB					
WB     15   SB     16   SB     16   SB     17   WB     18   NB     19   NB     130   SB     145   EB     145   SB     145   SB     145   SB     146   NB     147   SB     148   NB     149   SB     149   SB     149   SB     140   NB     141   SB     142   SB     144   SB     145   SB     146   NB     147   SB     148   NB     149   SB     144   SB     145   SB     146   NB     147   SB     148   NB     149   NB     149   SB     149		8					
:15 SB :16 SB EB WB NB NB SB SB SB SB SB SB SB SB SB SB SB SB SB		WB					
:15 EB EB WB NB SB :30 SB SB :45 EB WB NB NB NB NB NB NB NB NB NB Construction etc.		NB					
EB NB NB NB SB SB SB SB SB SB SB SB SB S	7.	5 SB					
WB     INB     INB <th></th> <th>8</th> <td></td> <td></td> <td></td> <td></td> <td></td>		8					
Image: NB   SB     :30   SB     EB   WB     WB   NB     :45   SB     :46   SB     :47   SB     :48   SB     :49   SB     :46   SB     :47   SB     :48   SB     :49   SB     :48   SB     :49   SB     :40		WB					
:30 SB EB WB NB NB SB :45 EB EB WB WB Construction etc.		NB					
EB WB WB	ü	0 SB					
WB     145   NB     145   SB     145   SB     145   EB     WB   NB     WB   NB     Observations/ Notes:     Construction etc.		8					
:45 SB :45 EB EB WB Observations/ Notes: Construction etc.		WB					
:45 SB EB WB Observations/ Notes: Construction etc.		NB					
EB WB Observations/ Notes: Construction etc.	4	SB					
WB Observations/ Notes: Construction etc.		8					
Observations/ Notes: Construction etc.		WB					
Construction etc.	Obse	rvations/ Notes:					
Return all completed sheets to the Spinelli's Volunteer Apprecia mail to Tempe Bicycle Action Group, PO Box 1884, Tempe, AZ 8	0	construction etc.	Return all completed sheets to the Spinell's Volunteer Apprecimal to Tempe Bicycle Action Group, PO Box 1884, Tempe, AZ	:iation Party, Bicycle Cella 2.85280. Thank you for y	r (200 E 5th St #105, our participation! 20'	, Tempe), Boulders on B 15 versions 1.	sroadw ay's hostess desk or

## Appendix C - Bike Count Form

## **Appendix D - Bike Count Instructions**

## 1. Count Form Structure.

- a. 1 hr: each form tracks 1 full hr of activity, broken into 15 minute increments.
- b. Total # of Cyclists recorded in "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) please record hr in far left column
  - d. Total Hrs (bottom left) = total amount of time you were able to stay & count that location (i.e. 1.5 hrs or 2hrs)
  - e. 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.
  - AM Rush hour: 7-9am
  - 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 <u>not</u> recorded
  - c. Intervals the data is recorded in 15 minute intervals.
- 6. **Priority 2:** Record Attributes

once you've marked the cyclists (or pedestrian) then break out the attributes a well as you can.

## 7. Cyclist Attributes: \*\* Default = Male without Helmet \*\*

- a. Approach Direction (NB, EB, WB, SB)
- b. **Gender:** Male is assumed \* Mark if cyclist 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. Mopeds and e-bikes operating under peddle power are included in the count

#### Notes:

 Count sheets with pre-filled shift (location, hour, am/pm, intersection, location id) and counter's name were given to most new counters (those attending a training session), starting 2015.

## Appendix E – Additional Graphs











## Appendix F – Historical Bike Count Data

			2011	2012	2013	2014	2015
Loc	Location or	Location or	Total	Total	Total	Total	Total
ID	Intersection: E/W	Intersection: N/S	per hr				
101	Washington/Curry	Mill Ave	35		45	29	48
102	Rio Salado Pkwy	Mill Ave	47		68	64	60
103	Rio Salado Pkwy	Rural Rd	48	44	70	61	57
104	Rio Salado Pkwy	McClintock Dr	39	19	21	30	26
105	Rio Salado Pkwy	Hardy Dr	8		19		
106	5th St	Mill Ave	118	91	111	101	112
107	5th St	Forest Ave	48		67		
108	5th St	Farmer Ave			79	78	107
109	5th St	Hardy Dr		32	59		
110	5th St	Priest Dr	18		17	20	20
111	10th St	Mill Ave		138	136	113	124
112	Superstition Fwy	College Ave	33	28	38	28	36
113	13th St	Mill Ave	49	32	56	53	58
114	13th St	Hardy Dr			50	40	43
115	University Dr	College Ave	452	174	220	216	310
116	University Dr	Dorsey Ln	66		62	73	88
117	University Dr	Rural Rd	116	181	143	145	197
118	University Dr	Mill Ave	93	117	123	141	154
119	University Dr	Ash Ave	88	61	95	96	92
120	University Dr	Roosevelt St	46	51	55	53	68
121	University Dr	Hardy Dr	62	35	47	57	36
122	McKellips Rd	Greenbelt Path	42	41	43	44	47
123	Western Canal	Rural Rd		45	62	41	40
124	Western Canal	McClintock Dr			38	38	38
125	Western Canal	Lakeshore Dr	86	43	55		
126	Baseline Rd	Western Canal	25		38	37	25
127	Elliot Rd	McClintock Dr	10		13		
128	Alameda Dr	McClintock Dr	22		24	18	31
129	Alameda Dr	Rural Rd			60	64	50
130	Alameda Dr	Country Club Wy	12		21		
131	Apache Blvd	Rural Rd		191	146	180	184
132	Apache Blvd	S Dorsey Ln	38		64	66	66
133	Apache Blvd	College Ave		233	164	243	220
134	Apache Blvd	Paseo Del Saber	121	102	182		233
135	Lemon St	Rural Rd	151		149	168	177
136	Spence St	Rural Rd	92	135	170		
137	Broadway Rd	Priest Dr	16		23		17
138	Broadway Rd	Rural Rd		65	93	72	73
139	Broadway Rd	College Ave	105		135	150	152
140	Southern Ave	Priest Dr	19		27		
141	Southern Ave	College Ave		70	62	66	72
142	Southern Ave	Rural Rd			33	43	41
143	Southern Ave	Hardy Dr	25	23	24	31	22
144	Southern Ave	Mill Ave	48	48	41	40	38
145	Alameda Dr	Mill Ave	30	24	21	22	20

146	Broadway Rd	Mill Ave		37	36	27	34
147	Baseline Rd	Mill Ave	17		27	16	21
148	Guadalupe Rd	Kyrene Rd			27		
149	Guadalupe Rd	Country Club Wy	12		18		
150	Guadalupe Rd	Lakeshore Dr	23		23		
151	University Dr	Forest Ave	130	90	128		
152	Tempe Lake S.	TCA Bridge		36	43	18	47
153	Apache Blvd	McAllister Ave					
154	Terrace Rd	Rural Rd			195		
155	University Dr	McClintock Dr			56	67	68
156	Crosscut Canal	Mill Ave				36	18
157	Curry Rd	College Ave				27	27
158	Washington St	Priest Dr					33
159	Broadway Rd	McClintock Dr				32	41
160	Broadway Rd	Hardy Dr				24	20
161	University Dr	Price Rd				25	28
162	Broadway Rd	Roosevelt St				20	20
163	University Dr	Farmer Ave				60	64
164	Southern Ave	McClintock Dr				34	29
165	University Dr	Priest Dr				26	21
166	8th St	Dorsey Ln					56
167	Town Lake Path S	Priest Dr					17

## Appendix G Data Summary North-South Direction

		Location or		AM	PM						Loc		
Loc	Location or	Intersection:	Total	per	per		Wrong			Traffic	to	Lane	
ID	Intersection: E/W	N/S	per hr	hr	hr	Helmet%	way%	Sidewalk%	Female%	Dir	ASU	in Dir	Dir
101	Washington/Curry	Mill Ave	33	25	40	73%	12%	22%	0.16	9628	0.6	1	NS
102	Rio Salado Pkwy	Mill Ave	44	33	56	57%	7%	14%	0.11	14670	0	1	NS
103	Rio Salado Pkwy	Rural Rd	35		35	12%	33%	99%	0.2	51380	0	0	NS
104	Rio Salado Pkwy	McClintock Dr	15	8	23	16%	30%	92%	0.15	39025	1	0	NS
106	5th St	Mill Ave	51	40	63	32%	11%	13%	0.2	14670	0	1	NS
108	5th St	Farmer Ave	16	21	11	14%	2%	3%	0.13		0.25	0	NS
110	5th St	Priest Dr	16		16	26%	32%	32%	0.03	28310	1.24	1	NS
111	10th St	Mill Ave	45	30	60	31%	16%	47%	0.25	26392	0	0	NS
112	Superstition Fwy	College Ave	36	32	40	66%	0%	0%	0.27	1774	2	1	NS
113	13th St	Mill Ave	23	14	32	28%	24%	51%	0.19	26392	0	1	NS
114	13th St	Hardy Dr	19	19	19	32%	11%	8%	0.3	9690	0.72	1	NS
115	University Dr	College Ave	174		174	6%	10%	18%	0.26	5044	0	1	NS
116	University Dr	Dorsey Ln	8	7	9	18%	44%	75%	0.3		0.5	1	NS
117	University Dr	Rural Rd	50	31	69	8%	33%	97%	0.27	51380	0	0	NS
118	University Dr	Mill Ave	70	44	96	22%	22%	41%	0.19	26392	0	1	NS
119	University Dr	Ash Ave	27	23	30	20%	13%	29%	0.23		0.11	1	NS
120	University Dr	Roosevelt St	12	13	11	13%	30%	32%	0.15		0.43	1	NS
121	University Dr	Hardy Dr	17	17	17	31%	16%	46%	0.19	9690	0.72	1	NS
122	McKellips Rd	Greenbelt Path	39	27	51	45%	0%	0%	0.15	0	2.2	1	NS
123	Western Canal	Rural Rd	8	7	10	44%	22%	66%	0.22	29395	4	0	NS
124	Western Canal	McClintock Dr	7	7	7	48%	19%	67%	0.37	30170	5	1	NS
126	Baseline Rd	Western Canal	8	11	5	60%	0%	0%	0.2		2.9	1	NS
128	Alameda Dr	McClintock Dr	13	5	21	14%	18%	94%	0.12	27807	2	0	NS
129	Alameda Dr	Rural Rd	32	32		16%	13%	92%	0.17	35740	1	0	NS
131	Apache Blvd	Rural Rd	101	87	115	9%	23%	96%	0.19	44120	0	0	NS
132	Apache Blvd	S Dorsey Ln	9	6	12	6%	17%	43%	0.17		0.5	0	NS
133	Apache Blvd	College Ave	157	138	176	23%	2%	8%	0.3	4997	0	1	NS
		Paseo Del											
134	Apache Blvd	Saber	108	79	138	5%	0%	0%	0.34		0	1	NS
135	Lemon St	Rural Rd	73	60	87	6%	37%	29%	0.26	37510	0	0	NS

137	Broadway Rd	Priest Dr	10	10	10	30%	35%	60%	0.2	24403	1.75	1	NS
138	Broadway Rd	Rural Rd	50	40	61	12%	27%	97%	0.26	44120	0.5	0	NS
139	Broadway Rd	College Ave	139	131	148	38%	3%	5%	0.26	4997	0.5	1	NS
141	Southern Ave	College Ave	53	45	61	48%	5%	12%	0.27	4442	1.5	1	NS
142	Southern Ave	Rural Rd	21	19	23	23%	23%	99%	0.07	40059	1.5	0	NS
143	Southern Ave	Hardy Dr	12	10	15	48%	2%	33%	0.23	13469	2.22	1	NS
144	Southern Ave	Mill Ave	18	14	23	16%	42%	89%	0.3	34482	1.5	1	NS
145	Alameda Dr	Mill Ave	12	12	12	19%	19%	62%	0.32	26912	1	1	NS
146	Broadway Rd	Mill Ave	20	18	22	14%	32%	66%	0.18	26912	0.5	1	NS
147	Baseline Rd	Mill Ave	8	3	14	15%	24%	88%	0.24	24224	2.5	1	NS
152	Tempe Lake S.	TCA Bridge	10	10		60%	0%	0%	0.15	0	0.8	1	NS
155	University Dr	McClintock Dr	18	16	20	21%	27%	94%	0.14	36366	1	1	NS
156	Crosscut Canal	Mill Ave	11	10	12	77%	0%	0%	0.09	14670	0.7	1	NS
157	Curry Rd	College Ave	18	20	17	66%	7%	15%	0.16	5499	1.1	1	NS
158	Washington St	Priest Dr	13	11	14	54%	18%	58%	0.08	23678	1.5	1	NS
159	Broadway Rd	McClintock Dr	23	15	30	4%	29%	93%	0.14	31175	1.5	0	NS
160	Broadway Rd	Hardy Dr	13	12	14	47%	10%	35%	0.25	13469	1.3	1	NS
161	University Dr	Price Rd	9	8	11	0%	30%	97%	0.19	8101	2	0	NS
162	Broadway Rd	Roosevelt St	12	8	17	40%	17%	27%	0.27	5329	1.1	1	NS
163	University Dr	Farmer Ave	12	13	10	4%	15%	22%	0.28		0.2	1	NS
164	Southern Ave	McClintock Dr	12	10	15	22%	27%	92%	0.2	39001	2.5	0	NS
165	University Dr	Priest Dr	12	11	13	21%	25%	58%	0.06	28310	1.2	1	NS
166	8th St	Dorsey Ln	24	10	38	8%	17%	46%	0.19		0.5	1	NS
167	Town Lake Path S	Priest Dr	9	5	14	46%	14%	70%	0.19	41943	2	0	NS

## East-West Direction

		Location or	Total	AM	PM						Loc		
Loc	Location or	Intersection:	per	per	per		Wrong			Traffic	to	Lane	
ID	Intersection: E/W	N/S	hr	hr	hr	Helmet%	way%	Sidewalk%	Female%	Dir	ASU	in Dir	Dir
101	Washington/Curry	Mill Ave	16	12	20	62%	10%	17%	0.19	14035	0.6	1	EW
102	Rio Salado Pkwy	Mill Ave	16	7	24	37%	13%	50%	0.16	14634	0	1	EW
103	Rio Salado Pkwy	Rural Rd	23		23	44%	22%	76%	0.31	14634	0	1	EW
104	Rio Salado Pkwy	McClintock Dr	11	15	7	55%	27%	55%	0.11	20597	1	1	EW
106	5th St	Mill Ave	61	61	61	21%	5%	8%	0.28	6739	0	1	EW
108	5th St	Farmer Ave	92	80	103	8%	5%	8%	0.21	3508	0.25	1	EW
110	5th St	Priest Dr	5		5	11%	11%	11%	0	3747	1.24	1	EW
111	10th St	Mill Ave	79	71	87	11%	4%	8%	0.36		0	1	EW
112	Superstition Fwy	College Ave									2	0	EW
113	13th St	Mill Ave	35	19	52	22%	23%	16%	0.25	3917	0	1	EW
114	13th St	Hardy Dr	24	17	31	18%	15%	3%	0.44	3917	0.72	1	EW
115	University Dr	College Ave	136		136	6%	31%	40%	0.21	26482	0	1	EW
116	University Dr	Dorsey Ln	80	62	99	9%	30%	59%	0.31	30015	0.5	1	EW
117	University Dr	Rural Rd	147	103	192	8%	37%	60%	0.28	30015	0	1	EW
118	University Dr	Mill Ave	84	59	109	10%	33%	46%	0.22	27003	0	1	EW
119	University Dr	Ash Ave	65	49	82	16%	21%	26%	0.22	27003	0.11	1	EW
120	University Dr	Roosevelt St	56	52	60	11%	18%	31%	0.2	27003	0.43	1	EW
121	University Dr	Hardy Dr	19	14	25	12%	21%	36%	0.21	27003	0.72	1	EW
122	McKellips Rd	Greenbelt Path	8	2	14	3%	35%	84%	0	14788	2.2	1	EW
123	Western Canal	Rural Rd	32	29	36	59%	0%	0%	0.28		4	1	EW
124	Western Canal	McClintock Dr	31	24	39	58%	0%	0%	0.33		5	1	EW
126	Baseline Rd	Western Canal	17	14	20	25%	28%	94%	0.25	24094	2.9	0	EW
128	Alameda Dr	McClintock Dr	19	20	17	64%	1%	11%	0.2		2	1	EW
129	Alameda Dr	Rural Rd	19	19		49%	0%	22%	0.3	1841	1	1	EW
131	Apache Blvd	Rural Rd	83	73	94	12%	27%	50%	0.29	22165	0	1	EW
132	Apache Blvd	S Dorsey Ln	57	54	61	21%	16%	32%	0.18	18699	0.5	1	EW
133	Apache Blvd	College Ave	64	63	65	13%	22%	33%	0.33	22165	0	1	EW
		Paseo Del											
134	Apache Blvd	Saber	125	121	128	8%	0%	0%	0.29	22165	0	1	EW
135	Lemon St	Rural Rd	104	73	135	6%	16%	32%	0.3		0	1	EW
137	Broadway Rd	Priest Dr	7	5	10	14%	39%	93%	0.25	37476	1.75	0	EW
138	Broadway Rd	Rural Rd	23	20	26	10%	41%	97%	0.25	30063	0.5	0	EW
139	Broadway Rd	College Ave	13	12	15	12%	12%	48%	0.29	29614	0.5	0	EW
141	Southern Ave	College Ave	20	16	24	21%	18%	95%	0.14	35372	1.5	0	EW
142	Southern Ave	Rural Rd	21	9	32	18%	24%	93%	0.17	35372	1.5	0	EW

143	Southern Ave	Hardy Dr	10	7	13	21%	13%	87%	0.18	28429	2.22	0	EW
144	Southern Ave	Mill Ave	20	15	25	15%	31%	93%	0.2	35372	1.5	0	EW
145	Alameda Dr	Mill Ave	9	7	11	44%	6%	9%	0.24	1841	1	1	EW
146	Broadway Rd	Mill Ave	14	9	20	11%	21%	93%	0.25	31585	0.5	0	EW
147	Baseline Rd	Mill Ave	12	14	11	29%	20%	96%	0.24	22102	2.5	0	EW
152	Tempe Lake S.	TCA Bridge	42	25	59	47%	0%	0%	0.16	0	0.8	1	EW
155	University Dr	McClintock Dr	50	45	56	15%	18%	77%	0.34	30015	1	1	EW
156	Crosscut Canal	Mill Ave	7	6	8	74%	0%	59%	0.15	0	0.7	1	EW
157	Curry Rd	College Ave	9	8	10	42%	17%	36%	0.11	15990	1.1	1	EW
158	Washington St	Priest Dr	21	17	25	52%	22%	40%	0.08	14565	1.5	1	EW
159	Broadway Rd	McClintock Dr	19	18	20	3%	33%	100%	0.24	32138	1.5	0	EW
160	Broadway Rd	Hardy Dr	7	5	9	7%	41%	100%	0.15	31585	1.3	0	EW
161	University Dr	Price Rd	19	17	22	29%	13%	71%	0.14	29056	2	1	EW
162	Broadway Rd	Roosevelt St	8	6	11	3%	24%	97%	0.27	31585	1.1	0	EW
163	University Dr	Farmer Ave	52	43	62	13%	19%	32%	0.2	27003	0.2	1	EW
164	Southern Ave	McClintock Dr	17	14	20	12%	40%	97%	0.22	28316	2.5	0	EW
165	University Dr	Priest Dr	9	5	13	43%	20%	43%	0.06	28413	1.2	1	EW
166	8th St	Dorsey Ln	32	9	56	6%	10%	10%	0.23		0.5	1	EW
167	Town Lake Path S	Priest Dr	8	11	5	74%	6%	74%	0.29		2	1	EW