Appendix A

Community Outreach

Community Meetings

The City of Phoenix and Lee Engineering conducted four public meetings related to the Phoenix Comprehensive Bicycle Master Plan. The community outreach strategy was to reach the City's diverse demographics, including transit-dependent groups, to engage bicyclists of all ages and abilities, as well as local Bicycle Advocacy groups.

The purpose of the public meetings was to:

- Provide introductory information about the City's current efforts to prepare its Bicycle Plan;
- Obtain input on bicycle-related transportation issues and priorities; and
- Obtain input on biking areas that may benefit from street or other infrastructure improvements.

Meeting Notification and Attendance

A water bill notice and meeting notification flyer were prepared as well as a media press release. Additionally, the meetings were posted on the City website and tweeted through the City of Phoenix Street Transportation Department (see Figure 1). Additional outreach methods included posting meeting information at bikearizona.com and direct outreach to bicycle clubs, advocacy groups, and businesses.

Figure 1 City of Phoenix Street Transportation Department Tweet

Notifications were facilitated as follows:

Media Press Release was sent to…

- Technical Advisory Committee (32 members)
- MAG Pedestrian/Bicycle Committee (23 members)

Media Press Release was sent to the following Village Planning Committees:

- Alhambra
- Central City
- Deer Valley
- Desert View
- Encanto
- Maryvale
- North Gateway
- North Mountain
- Paradise Valley
- Rio Vista
- South Mountain
- Ahwatukee Foothills
- Camelback East
- Estrella
- Laveen

Flyer notices were e-mailed or otherwise electronically distributed to:

- Technical Advisory Committee (32 members)
- Valley Metro
- MAG Pedestrian/Bicycle Committee (23 members)
- Bicycle Clubs and Advocacy Groups
    - Arizona Bicycle Club
    - Coalition of Arizona Bicyclists
    - Phoenix Metro Bike Club
    - Phoenix Spokes People
- Bicycle Shops and Businesses within the Cities of Phoenix, Glendale, Peoria, Cave Creek, Scottsdale, Tempe, Chandler, and Town of Guadalupe
    - AirPark Bicycles
    - Arizona Outback Adventures
    - Bicycle Cellar
    - Bicycle Depot of Arizona
    - Bicycle Exchange
    - Bicycle Haus
    - Bicycle Ranch
    - Bicycle Vibe
    - Bicycles of Phoenix
    - Bicycles of Scottsdale

- Bike Barn
- Bike Emporium
- Bike Zone
- Bob's Bike Shop
- Bob's Lock & Cycle
- Build-A-Bike
- Cactus Adventures
- Cactus Bike
- Curbside Cyclery
- DNA Cycles
- Domenics 2 Wheelers
- E-Tour Bikes
- Exhale Bikes Inc
- Faster
- Flat Tire Bike Shop
- Garage Bike Shop
- Global Bikes
- Golden Spoke Cyclery
- Gordy's Bicycles
- HoodRide Bicycles
- Hybikes
- Industry Bikes
- Javelina Cycles
- Kore Bike Industries
- Landis Cyclery
- Performance Bicycle
- Phoenix Bicycle Shop
- Phx Bikes
- Portapedal Bike
- Rage Cycles
- Roadrunner Bike Center
- Slippery Pig Bicycles
- SouthWest Bicycles
- Sun Cyclery Inc
- Sunday Cycles Bike Shop
- Tempe Bicycle
- Thrill Bikes
- Trailhead Bike Café
- Triple Sports
- Try Me Bicycle Shop

Flyer notices were distributed to the following community centers for posting:

- Goelet A. Beuf Community Center, 3435 W. Pinnacle Peak Road
- Devonshire Senior Center, 2802 E. Devonshire Avenue
- Desert West Community Center, 6501 W. Virginia Avenue
- Eastlake Park, 1549 E. Jefferson Street

Information Provided

The community meetings included a Prezi presentation about the background and purpose of the study, over arching goals, and next steps in the study, namely, to compile community input on the City's bicycle network, identifying gaps in the existing/current conditions, and developing alternatives for the future. As of November 13, 2013, the presentation was viewed more than 100 times.

Group discussion followed the presentation, giving participants a chance to provide general comments, ask questions, and discuss network qualities and concerns. Participants were asked to complete a survey and write down their comments on provided Comment cards. Information cards were also provide for participants to take home with contact information for the project team and URLs for the City, project Wikimap, and community meeting presentation.

Participants were then given time to look at maps of the city, highlight routes that need to be addressed, and identify existing barriers within the network. They also identified missing links. These maps provided input for the study network for data collection. Maps that depicted existing bicycle facility conditions and data for the 15 villages were available at each meeting. Participants at the four community meetings identified 196 unique routes and intersections on these maps.

October 22, 2013 – Districts 1 & 2

On October 22, 2013, the City of Phoenix and Lee Engineering conducted the first public meeting related to the Phoenix Comprehensive Bicycle Master Plan. The public meeting took place from 6 – 8 pm at the Goelet A C Beuf Community Center at 3435 West Pinnacle Peak Road, Phoenix, AZ 85027.

Input Received

During the meeting, City of Phoenix staff and other members of the project team were available to talk with attendees, listen to comments and concerns, and answer any questions. Through those discussions, comments and concerns included the following:

- Lack of parking at health care providers
- Lack of space for bicycles on transit
- Safety should be paramount
- Importance of bicycles having headlights, taillights or reflectors when ridden between dusk and dawn
- Operators or motorized vehicles cannot easily see bicycle riders, especially when the rider wears dark colored clothing
- Desire for CAP (Central Arizona Project) to be involved in Bicycle Master Plan and for adjacent property owhers to clear fences built on 10 feet of right-of-way to allow use by bicyclists.
- Importance of coordination with neighboring cities
- Compliment of green bike lanes on Grand Avenue
- Desire for bicycle push buttons at signalized intersections
- Desire for continuously paved canal paths
- Desire to retrofit all arterial streets with bike lanes during resurfacing
- Compliment of bike lane retrofit on Indian School Road
- Desire for bike lanes on 7th Street and 7th Avenue
- Request for HAWK at 21st Avenue and Camelback Road
- Request review and revision of contradicting laws and ordinances related to bicyclists
- There needs to be a traffic ordinance that all new tar overlays on every major arterial road shall or must include bicycle lanes (painted, buffered, etc…) in their implementation/construction.
- It is important to ensure that there is continuity of bike routes between Phoenix and adjacent cities.
- There be some planning focused on bike routes within two to three miles of public schools – K through 12 – so that children (ages 5 – 19) can ride and walk to school safely.
- Part of bike and pedestrian safety has to do with keeping pathways clear of branches – a job for city landscapers/arborists (tree pruning).
- Require bicycles that are ridden between dusk and dawn, to have headlights, taillights, and reflectors. Enforce a City ordinance by confiscating bikes, without lights, that are ridden after dark, until such time as the owner provides lights and reflectors and installs them on the bike.
- Recommend the "strobe light" type of headlight and tail light since a flashing light is more easily seen than a constant beam.

October 24, 2013 – Districts 3 & 4

On October 24, 2013, the City of Phoenix and Lee Engineering conducted the second public meeting related to the Phoenix Comprehensive Bicycle Master Plan. The public meeting took place from 6 – 8 pm at the Devonshire Senior Center at 2802 East Devonshire Avenue, Phoenix, AZ 85016.

Input Received

During the meeting, City of Phoenix staff and other members of the project team were available to talk with attendees, listen to comments and concerns, and answer any questions. Through those discussions, comments and concerns included the following:

- Educate drivers, police, and engineers
- Improve access to bike lanes, protected bike lanes, and canals

- Develop new funding mechanisms
- Require bike parking and showers at work places or partner with fitness centers
- De-silo City Hall to foster inter-departmental collaboration on planning and funding infrastructure
- Include transit department and fund and fill a position at Valley metro to focus on bike/ped interconnectivity
- Promote bike commuter tax incentives and workplace health and fitness campaigns
- Put road diet on Indian School Road from I-17 to Scottsdale Road
- Cyclists want to connect to destinations on major arterials safely
- Increase staff dedicated to bike/ped planning and add urban designers to streets department
- Develop and apply a "speed management plan"
- Develop an app to report information (crowd sourcing)
- Valley Metro should encourage bicyclists on buses and LRT.
- Install bike HAWK on 19th Avenue at Cave Creek Golf Course (South of Greenway Rd).
- Osborn's bike path needs to be extended to cross Central Avenue
- More and larger signs that state "Share the Road 3 Feet Minimum Distance is the Law"
- Discourage driving to encourage bicycling by having more bike paths that restrict traffic
- 3rd Street would be an excellent candidate for a bike path
- Canal paths are great but they need better crossings at the larger intersections

October 29, 2013 – Districts 5 & 7

On October 29, 2013, the City of Phoenix and Lee Engineering conducted the third public meeting related to the Phoenix Comprehensive Bicycle Master Plan. The public meeting took place from 6 – 8 pm at the Desert West Community Center at 6501 West Virginia Avenue, Phoenix, AZ 85035.

Input Received

During the meeting, City of Phoenix staff and other members of the project team were available to talk with attendees, listen to comments and concerns, and answer any questions.

Citizen input was largely gained from Mark Juetten who is not only an avid bicyclist (relies solely on transit and bicycle transportation), but has also been driving a bus in Phoenix for Veolia Transportation for about seven years. Mark drives different routes and as a result has a much wider perspective than most other bus drivers. Highlights of the conversation are as follows:

- Bicycle racks on buses are more likely to be more full in the summer months than in the winter due to the heat.
- Bike racks tend to be more full in the evening hours than during the daytime when visibility conditions are better for bicyclists.
- Newer buses have a three-bike rack. With a three-bike rack, operators rarely have to turn away bicyclists because the racks are full.
- It is up to the discretion of the individual bus operators on allowing transit patrons with bicycles to board the bus with their bikes when the racks are full.
- Mark reported that from his experience bike theft from the bus racks is rare. In his seven years of driving, he is aware of only two bicycles that were stolen from his bus. He urges bicyclists to lock the wheel to the frame when loading a bike onto the rack to minimize the chance for theft, and not to the rack. If locked to the bike rack and the lock will not open, the bus has to leave with the bike attached to it.
- Bus operators only count the bikes that are loaded onto a bus, and they do not count those bicyclists that are not able to be loaded onto a bus due to lack of space. We could contact Valley metro to see if the

operators can be asked to count those bikes that cannot board the bus due to lack of space to measure latent demand.

- There are occasionally data collectors on the bus who collect various pieces of information along the route including boardings and disembarkations. We should contact Valley Metro to see if these data collectors can log the number of bicyclists that are turned away at bus stops due to the lack of space, as well as identify the location *where* they are turned away to get a better measure of latent bicycle demand.
- LRT bike hooks cannot fit the 29 inch wheels and 29 CC wheels also are difficult to fit into the racks. The hook is reportedly designed to be too close to the tire. He would like to recommend these hooks to be changed.

October 30, 2013 – Districts 6 & 8

On October 30, 2013, the City of Phoenix and Lee Engineering conducted the fourth public meeting related to the Phoenix Comprehensive Bicycle Master Plan. The public meeting took place from 6 – 8 pm at the Eastlake Park Community Center at 1549 East Jefferson Street, Phoenix, AZ 85034.

Input Received

During the meeting, City of Phoenix staff and other members of the project team were available to talk with attendees, listen to comments and concerns, and answer any questions. Through those discussions, comments and concerns included the following:

- Drastically increase bike infrastructure
- Promote denser residential development
- For bridges over canals, use steel that will be sturdy and last for years
- Use a universal color scheme
- Connecting communities to schools and parks is most important.
- Safety for families is important.
- Completely separate bikes and cars.
- Provide kids with a park for biking (bmx).
- Safety is a big concern.
- Color would be helpful.
- Improve connections and safety at intersections
- Encourage: show local business benefit with cycling community. Key into local business, markets, and supporting community.
- Reach out to females, schools and (untapped resource) healthy communities.
- While bike lanes can be better than nothing, a bike lane on a street engineered for 60 MPH traffic is not a complete street.
- Implement city-wide greenways project aimed at slowing traffic on key through streets like 15th Ave, Campbell, etc…
- Complete the paved canal network and create safe crossings. The worst is 32nd St & Grand Canal, but that entire canal path needs signals.
- Enhance facilities with a cycle track on 44th Street between Salt River and LRT, bike/bus only lanes on Central/1st Ave through downtown.
- Work with streets department to significantly slow arterial traffic on most arterials
- For safety, do not allow right turn on red for vehicles.
- Move the stop line at each intersection with traffic signals back 1 ½ car lengths (establish bike boxes).
- Close down Central Avenue on Sundays to encourage families to ride.
- Buffered bike lanes.

- Make sure the language of the plan looks ahead and is extremely comprehensive.
- Bicycling and proper bicycling infrastructure is beneficial for the health of people – especially those who are low income and at risk for chronic disease. We must consider how this plan can reach not only avid bicyclists in good neighborhoods but also those in low income areas that cycle in order to survive everyday.
- More bicycle friendly paths and along major boulevards.
- Make it safe so there are minimal bicycle related injuries and accidents.
- Encourage more bicycling through incentives like register your bike (with police in case of theft) and receive Valley Metro pass discounts, etc…
- Add bike lanes on Osborn Road between 19th Avenue and 20th Street and also 3rd Street as an additional north/south corridor for cycling safely.
- The best way to get more people on their bikes is to make the streets friendlier to bikes and pedestrians, as in lanes and crossings.
- Build a BMX bike park in the City of Phoenix. Desert West Community Center is a desired location.

WikiMaps

In addition to the community meetings, the City used crowd-sourcing to gather comments about where people currently bike and dangerous or difficult spots. Toole Design Group developed and managed the interactive, web-based map (i.e. Wikimap) that allowed the public to provide input on specific locations and routes, and for this information to be directly integrated into a GIS database.

The Google base map showed the City of Phoenix jurisdictional boundary and existing bikeways. To learn where people currently bike, and places they would bike if the street or bikeway were improved, Wikimap users were able to add points and lines to identify problem intersections and routes, routes they currently ride, and places they go. Users could mark as many areas as they like, comment on others' routes and points, and upload photos to map points.

The Wikimap was open for input at http://wikimapping.net/wikimap/Phoenix-Bicycle-Master-Plan.html for two months from September 9, 2013 to November 10, 2013. The ability to upload photos to map points was enabled on October 4, 2013.

In total, 594 users input approximately 1,000 features to the Wikimap. Additionally, project team members added more than 200 problem intersections and routes identified at the community meetings and via email to City of Phoenix Street Transportation staff.

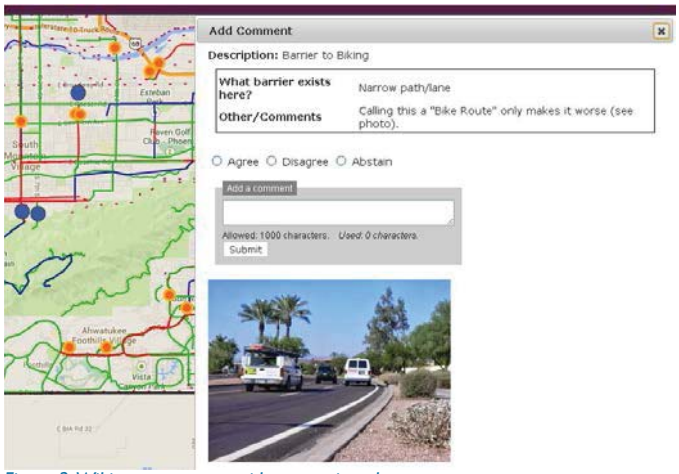


Figure 2 Wikimap comment with supporting photo

Overview of Comments

The main (most often cited) concerns for each category are provided below.

Route I'd Like to Ride

- Pave canal path
- Add bike lanes
- Make connections between off-road paths
- Make connections for bicyclists and pedestrians when there is a gap in street network
- Poor pavement conditions
- Add signalized crossing
- Provide physically separated bike lane
- Make connections to light rail

Figure 3 - Photo uploaded by Wikimap user with a request to add wayfinding signs

High Stress Routes

- Poor surface conditions
- Lack of paving along canals
- Heavy traffic
- Poor bike connectivity (gaps)
- Trail ends with no outlet
- Rude motorists
- No bike lane
- High speed traffic
- Canal crossings at arterials
- Lack of sidewalks
- Narrow sidewalks
- Paved path wet from sprinklers
- Narrow bike lanes
- Debris on roadway
- Conflicts with turning vehicles, particularly at dual rights
- Not enough space on road for motor vehicles to pass cyclists
- Lack of connection across freeways
- Intersection without traffic control
- Lack of striping on multiuse paths for exclusive bicycle use

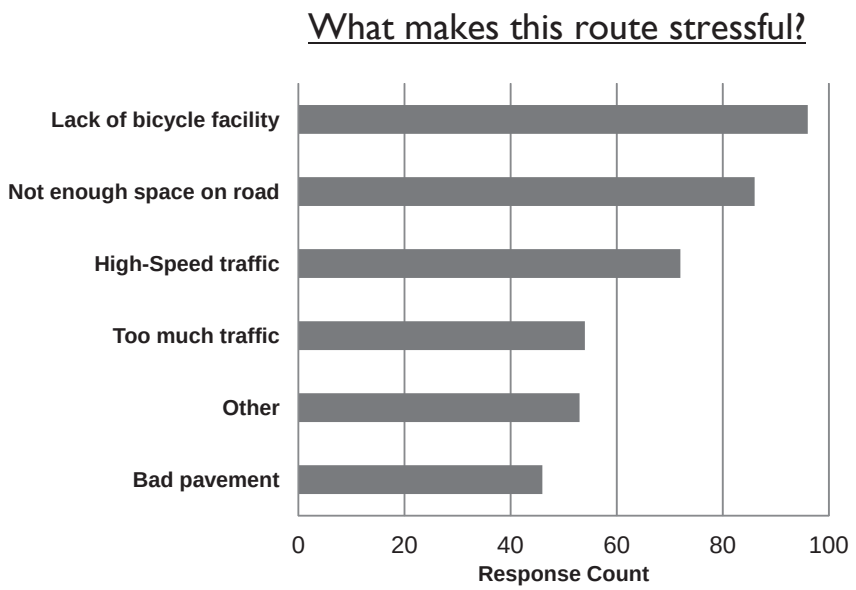


Figure 4 Wikimap user responses to "What makes this route stressful?"

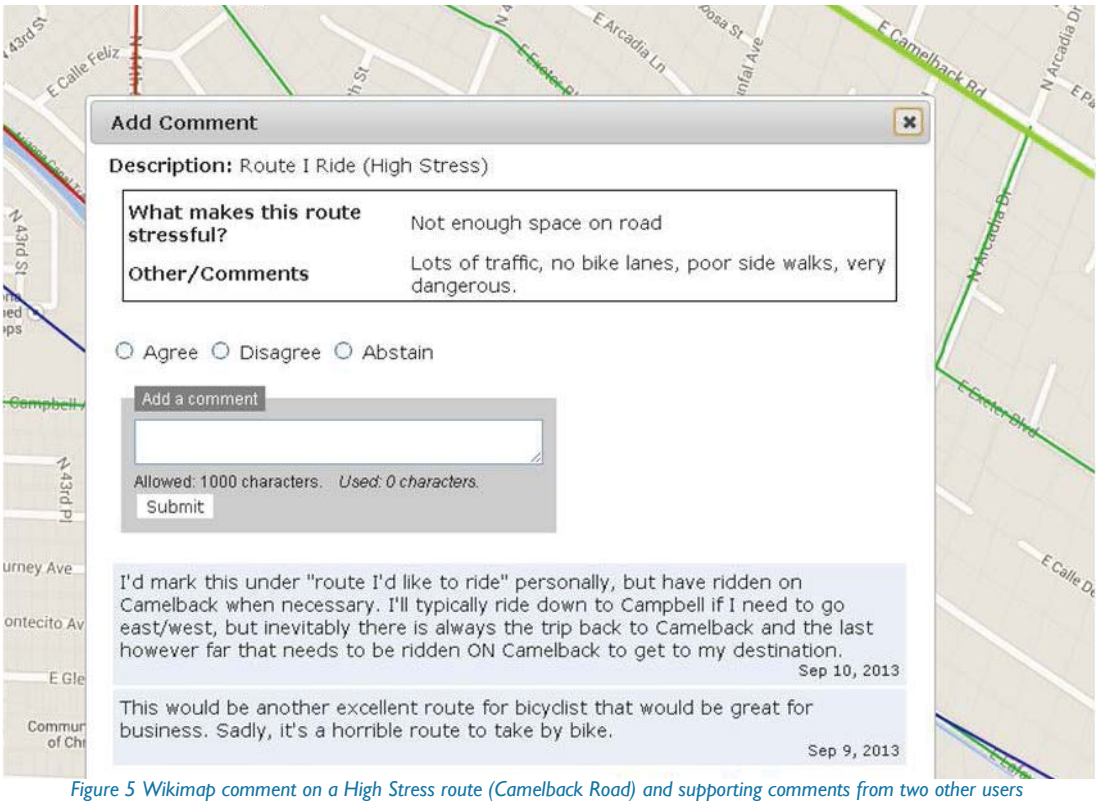


Figure 5 Wikimap comment on a High Stress route (Camelback Road) and supporting comments from two other users

Barriers

- Berm south of ASU West
- Freeways
- Canal crossings at arterials
- Intersection without traffic control
- Lack of bicycle detection
- Bike lanes do not continue through signalized intersections
- Crosswalk paint is thick and makes riding across very bumpy
- Poor lighting at night
- High speed, busy traffic
- Abandoned streets
- Gates on canal paths
- Trail ends
- Lack of signs to direct bicyclists (wayfinding)

What barrier exists here?

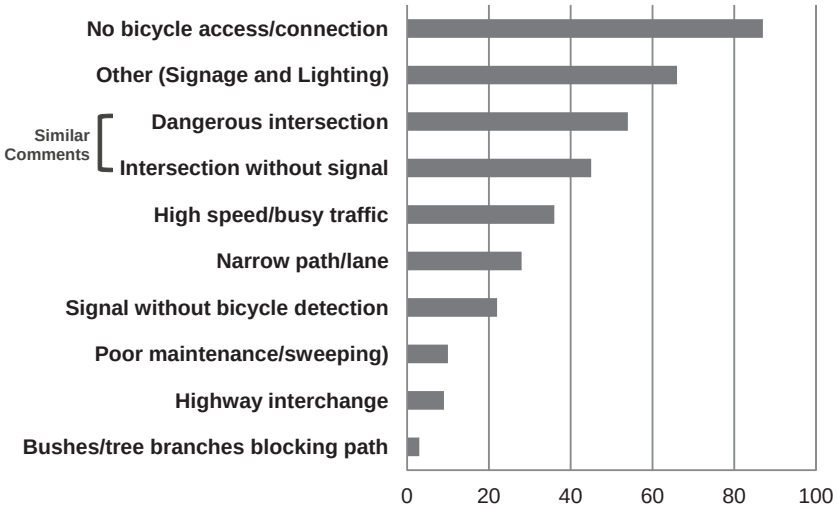


Figure 6 Wikimap user responses to "What barrier exists here?"

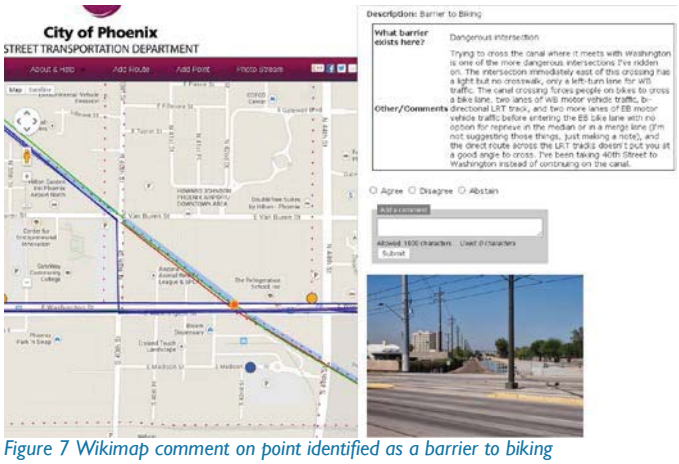


Figure 7 Wikimap comment on point identified as a barrier to biking

Low Stress Routes

- Canal paths
- Bike lanes
- Respectful motorists
- Close to light rail
- Separation from traffic
- Bike lanes through intersections
- Paved
- Low traffic volumes
- Grade separated crossings (bridges)
- Buffered bike lane

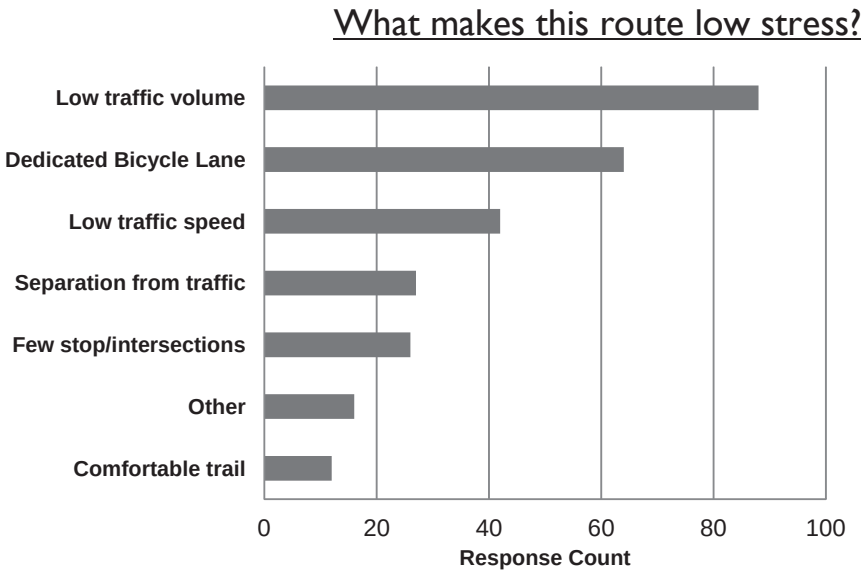


Figure 8 Wikimap user responses to "What makes this route low stress?"

Destinations

- Tempe Town Lake
- Grocery stores
- Dining
- Libraries
- Recreation centers
- Gyms
- Schools
- Light rail stations
- Sky Harbor Airport
- Entertainment
- Canals

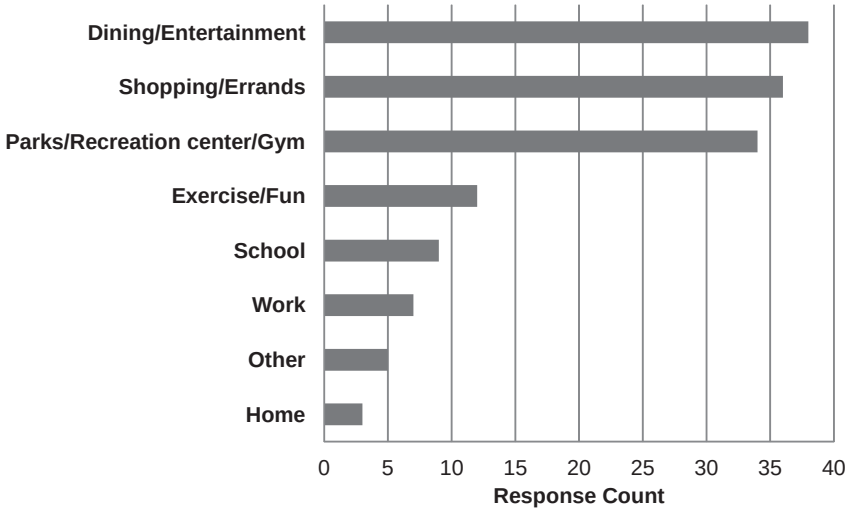


Figure 9 Wikimap user responses to "What destination is located here?"

Community Outreach Results

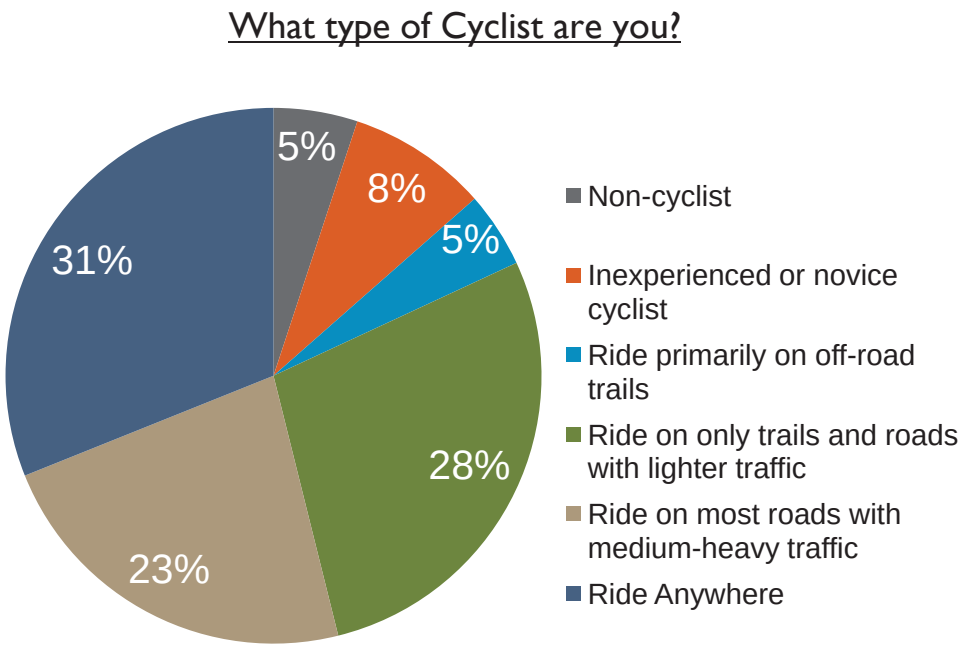


Figure 10 Survey Results - What type of Cyclist are you?

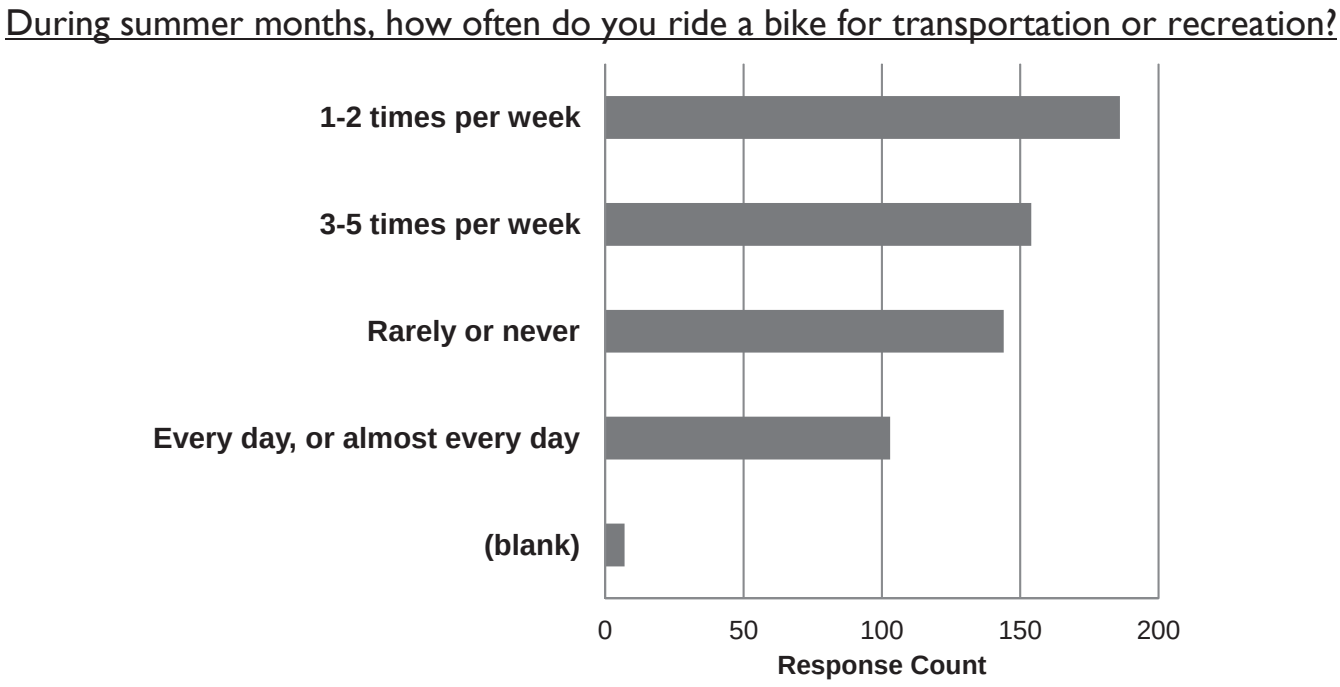


Figure 11 Survey Results - During summer months, how often do you ride a bike for transportation or recreation?

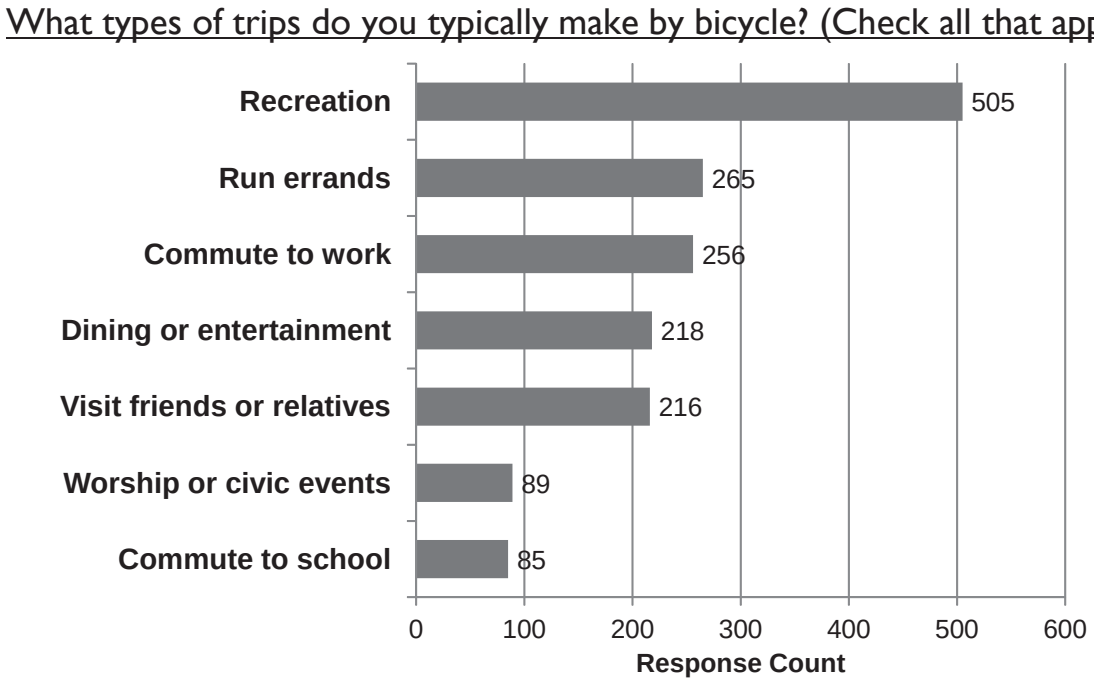


Figure 12 Survey Results - What types of trips do you typically make by bicycle? (Check all that apply.)

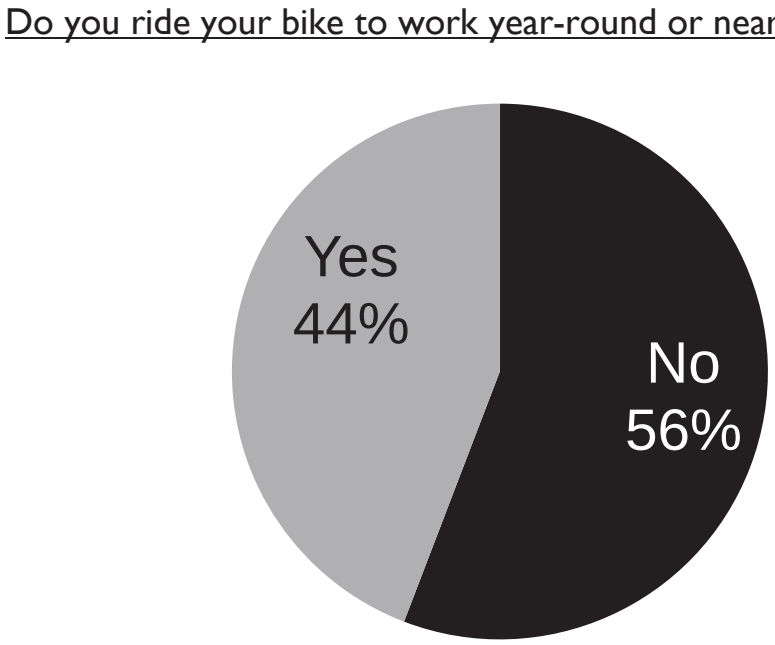


Figure 13 Survey Results - Do you ride your bike to work year-round or nearly year-round?

What is your home zip code?

Council District	Number of Responses
1	20
2	32
3	43
4	75
5	12
6	59
7	49
8	89

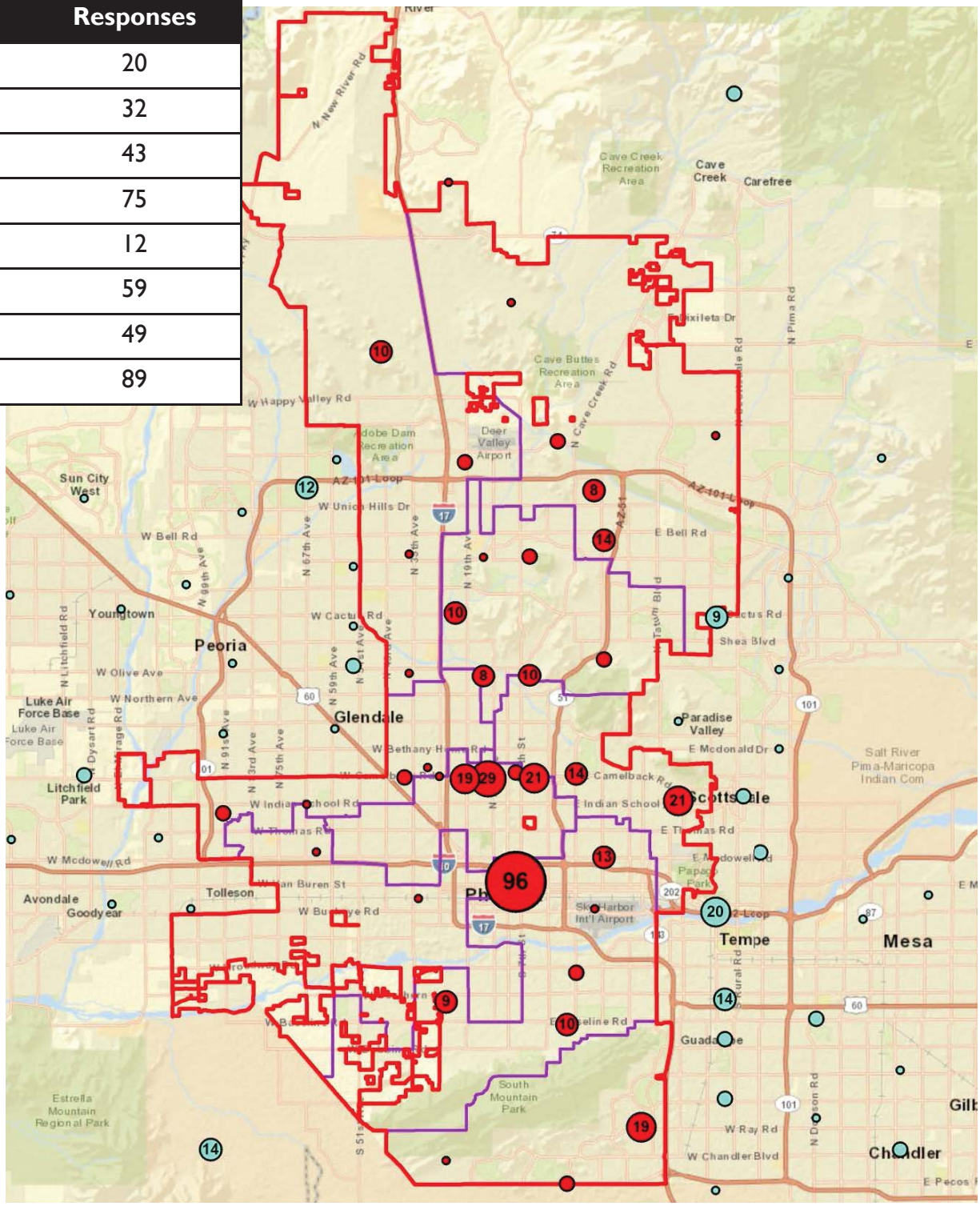


Figure 14 Survey Results - What is your home zip code?

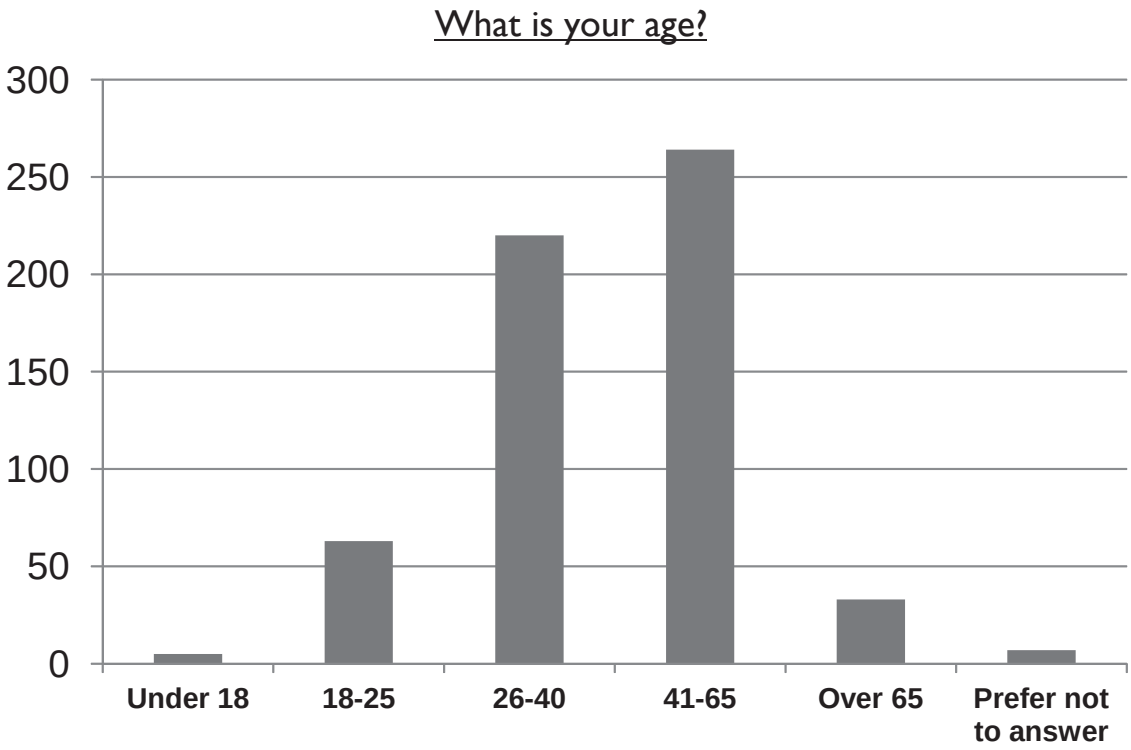


Figure 15 Survey Results - What is your age?

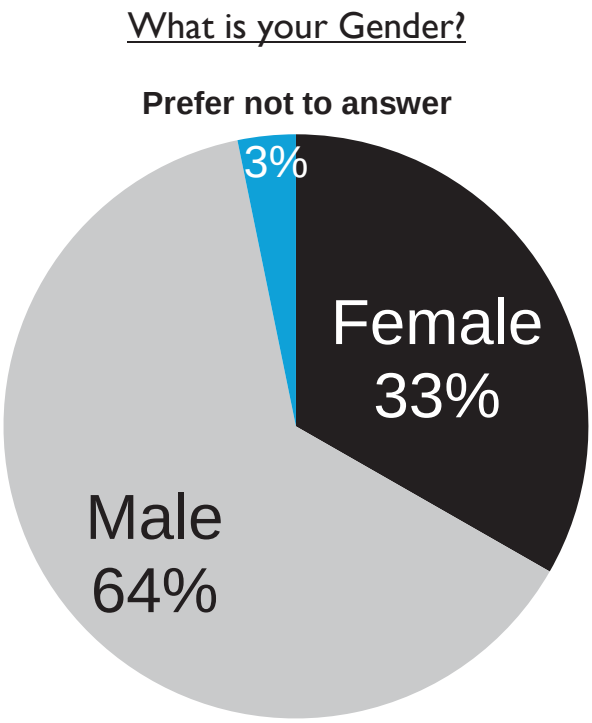
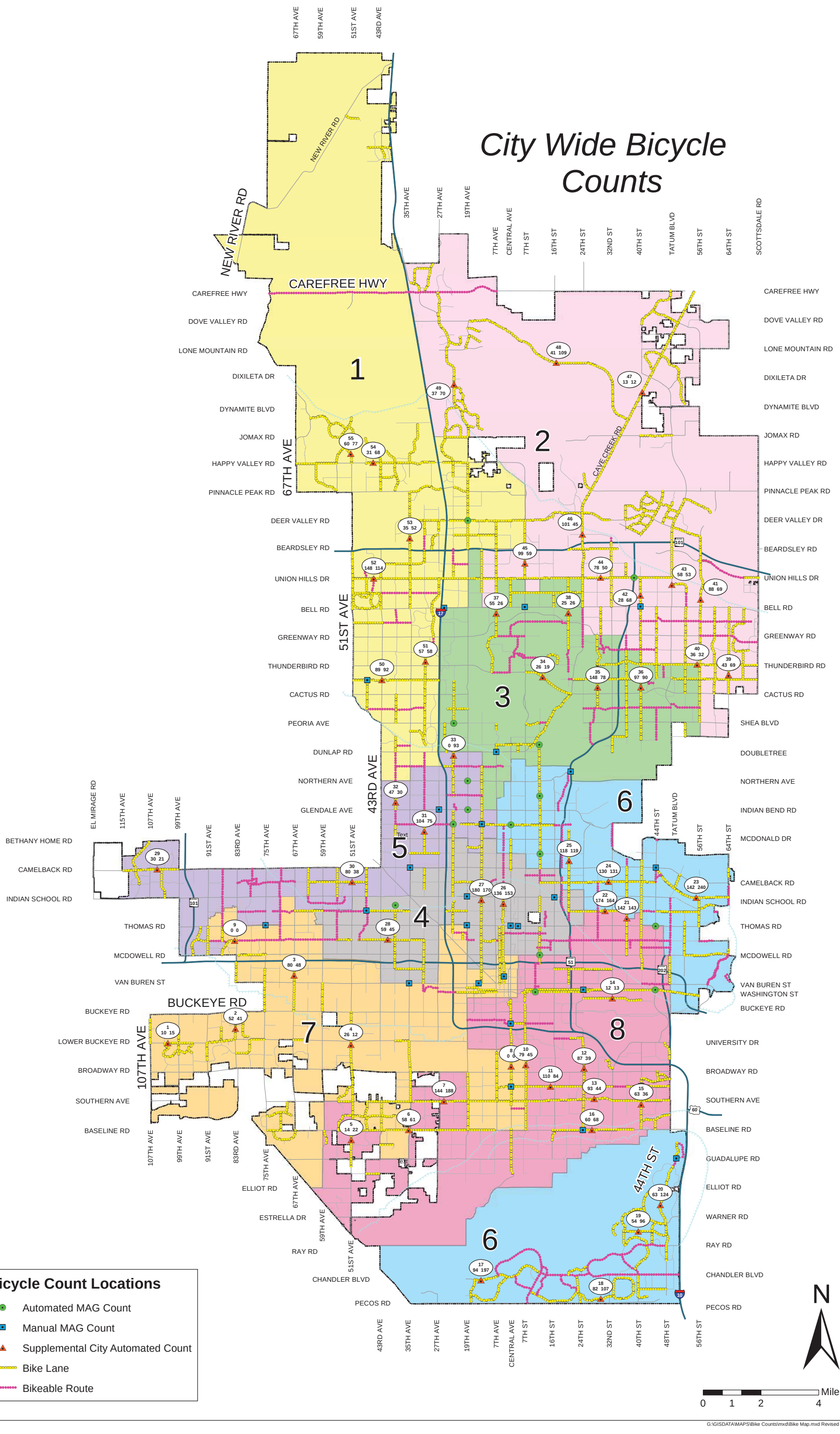


Figure 16 Survey Results - What is your gender?

Appendix B

Bicycle Counts

City Wide Bicycle Counts



G:\GISDATA\MAPS\Bike Counts\mxd\Bike Map.mxd Revised 12/26/2013

City of Phoenix Bicycle Counts

					Bike Count					
					Eastbound or Northbound		Westbound or Southbound		Total (Both Directions)	
#	District	Street	Location	Direction	Wkday Avg	Wkend Avg	Wkday Avg	Wkend Avg	Wkday Avg	Wkend Avg
1	7	Lower Buckeye Road	East of 102nd Avenue	East/West	4	8	6	7	10	15
2	7	83rd Avenue	North of Hilton Avenue	North/South	11	14	41	27	52	41
3	7	67th Avenue	North of Filmore Street	North/South	40	24	133	128	173	152
4	7	51st Avenue	North of S.Williams Street	North/South	Recount		13	6		
5	7	51st Avenue	North of Ian Drive	North/South	Recount		7	11		
6	7	Baseline Road	West of S.35th Drive	East/West	30	18	28	43	58	61
7	7	Southern Avenue	East of 25th Lane	East/West	40	25	104	63	144	88
8	7	Central Avenue	South of Southgate Avenue	East/West	Recount		148	109		
9	7	Encanto Blvd	West of 83rd Drive	East/West	225	191	127	135	352	326
10	7 & 8	7th Street	North of Jones Street	North/South	52	27	27	18	79	45
11	8	Roeser Road	West of S.14th Way	East/West	77	57	33	27	110	84
12	8	S.24th Street	North of Wood Street	North/South	53	14	34	25	87	39
13	8	Southern Avenue	West of S.27th Street	East/West	39	18	54	26	93	44
14	8	Air Lane	East of S.32nd Street	East/West	7	7	5	6	12	13
15	8	S.40th Street	South of E. Nancy Lane	North/South	30	14	33	22	63	36
16	8	Baseline Road	West of S.27th Street	East/West	30	44	30	24	60	68
17	6	Chandler Blvd	West of S.14th Avenue	East/West	51	122	43	75	94	197
18	6	E. Liberty Lane	East of S.29th Way	East/West	39	61	43	46	82	107
19	6	E.Knox Road	West of S.40th Street	East/West	24	35	30	61	54	96
20	6	S.48th Street	North of Kiowa Street	North/South	29	56	34	68	63	124
21	6 & 8	N.36th Street	South of Earl Drive	North/South						
22	6 & 8	E. Osborne Road	West of 30th Street	East/West	76	69	98	95	174	164
23	6	E. Lafayette Blvd	West of 54th Place	East/West	75	136	67	104	142	240
24	6	E. Cambell Avenue	East of 31st Place	East/West	84	70	46	61	130	131
25	6	N.20th Street	South of Colter Street	North/South	54	62	64	57	118	119
26	4	N. 3rd Avenue	South of Clarendon Avenue	North/South	54	65	82	88	136	153
27	4	N. 15th Avenue	South of Fairmount Avenue	North/South	82	88	98	82	180	170
28	4	W. Encanto Blvd	West of 41st Avenue	East/West	34	31	25	14	59	45

					Bike Count					
					Eastbound or Northbound		Westbound or Southbound		Total (Both Directions)	
#	District	Street	Location	Direction	Wkday Avg	Wkend Avg	Wkday Avg	Wkend Avg	Wkday Avg	Wkend Avg
29	5	Camelback Road	West of 105th Avenue	East/West	20	12	10	9	30	21
30	5	W. Campbell Avenue	West of 51st Avenue	East/West	53	26	27	12	80	38
31	5	N. 31st Avenue	South of W. Rose Lane	East/West	21	19	83	56	104	75
32	5	N. 39th Avenue	South of Myrtle Avenue	North/South	20	17	27	13	47	30
33	5	N. 23rd Avenue	North of Townley Avenue	North/South	110	23	162	70	272	93
34	3	E. Thunderbird Road	West of N.Pointe Golf Club Drive	East/West	10	7	16	12	26	19
35	3	N. 28th Street	South of E. Corrine Drive	North/South	40	26	108	52	148	78
36	3	N. 40th Street	North of E. Charter Oak Road	North/South	71	60	26	30	97	90
37	3	N. 7th Avenue	North of W. Aire Libre Avenue	North/South	25	14	30	12	55	26
38	3	N. 20th Street	South of W. Aire Libre Avenue	North/South	15	15	10	11	25	26
39	2	N. 64th Street	North of E. Eugie Terrace	North/South	17	33	26	36	43	69
40	2 & 3	E. Thunderbird Road	East of N.55th Street	East/West	14	14	22	18	36	32
41	2	N. 56th Street	North of Campo Bello Drive	North/South	63	43	25	26	88	69
42	2	N. 40th Street	South of Helena Drive	North/South	14	40	14	28	28	68
43	2	N. Tatum Blvd	North of Robert E. Lee Street	North/South	15	23	43	30	58	53
44	2	N. Union Hills Drive	East of N.29th Street	East/West	43	27	35	23	78	50
45	2	N. 7th Street	North of E. Utopia Road	North/South	53	31	46	28	99	59
46	2	N. Cave Creek	North of E. Rose Garden Lane	North/South	78	29	23	16	101	45
47	2	Cave Creek Road	South of E. Peak View Road	North/South	9	9	4	3	13	12
48	2	E. Sonoran Desert Drive/Dove Valley Road	E. 1600 Blk Sonoran Desert Drive/Dove Valley Road	East/West						
49	2	North Valley Parkway	South of W. Morning Vista Lane	North/South						
50	1	W. Sweetwater Avenue	East of W. 43rd Avenue	East/West	21	28	68	64	89	92
51	1	N. 31st Avenue	South of Dailey Street	North/South	21	26	36	32	57	58
52	1	W. Union Hills Drive	East of N.45th Avenue	East/West	Recount		74	57		

					Bike Count					
					Eastbound or Northbound		Westbound or Southbound		Total (Both Directions)	
#	District	Street	Location	Direction	Wkday Avg	Wkend Avg	Wkday Avg	Wkend Avg	Wkday Avg	Wkend Avg
53	1	N. 35th Avenue	North of W. Irma Lane	North/South	10	19	25	33	35	52
54	1	W. Happy Valley Road	East of N.45th Avenue	East/West						
55	1	N. Stetson Valley Pkwy/ N. 51st Avenue	North of W. Range Mule Drive	North/South						

*** Notes**

1. Bike Counts must be performed in a marked bike lane

2. GPS coordinates shall be given

3. Bike Counts must be performed on both sides of the street

4. Bike Counts must be 5 day counts

5. Bike Count period must extend over the weekend

Bicycle Count Data Summary
Working Paper #4
Excerpt: 4.0 Bicycle Count Summaries

MAG Bicycles Count Project

Draft Report

April 23, 2014

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4.0 Bicycle Count Summaries

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

4.1 Bicycle Volumes by Day of Week

4.1.1 Automated Count Stations

Table 4-1 displays average daily weekday and weekend bicycle volumes for the automated count stations. The daily bicycle volumes are displayed for each direction of travel (east-west or north-south) and a sum of counts for both travel directions is provided.

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

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

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

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

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

Source: *Chen Ryan Associates, April 2014*

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

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

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

Source: *Chen Ryan Associates, 2014*

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

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

The minimum average daily weekday volume along Bike Lanes was 28 cyclists at Site ID 39, along Gavilan Peak Parkway south of Pioneer Road in the unincorporated Maricopa County. The maximum average daily weekday bicycle volume was 488 cyclists at Site ID 1 (along 10th avenue south of Thomas Road in the City of Avondale). The minimum average daily weekend bicycle volume along Bike Lanes was 19 cyclists at Site ID 35, along Camelback Road east of Litchfield Road in the City of Litchfield Park.

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

Average daily weekend bicycle volumes at sites without bicycle facility varied from a minimum of 27 cyclists at Site ID 55 (along Happy Valley Parkway west of Agua Fria River in the City of Peoria), to a maximum of 241 cyclists at Site ID 74 (along Camelback Road east of Litchfield Road in the City of Litchfield Park).

Figure 4-1 displays the average daily weekday bicycle volumes, while **Figure 4-2** displays the average daily weekend bicycle volumes for both automated and manual count sites.

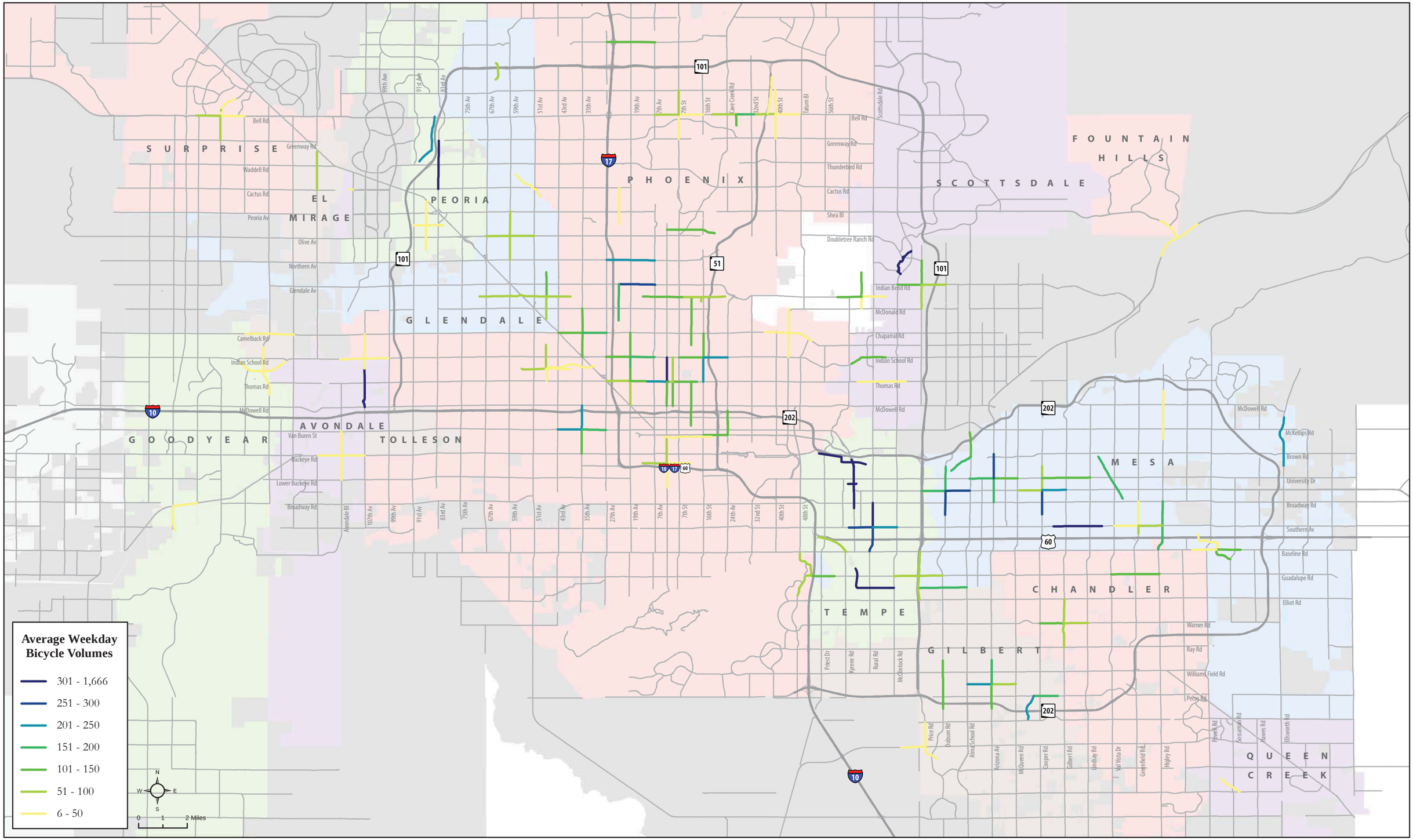

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Figure 4-1
Average Daily Weekday Bicycle Volumes for Automated and Manual Count Sites

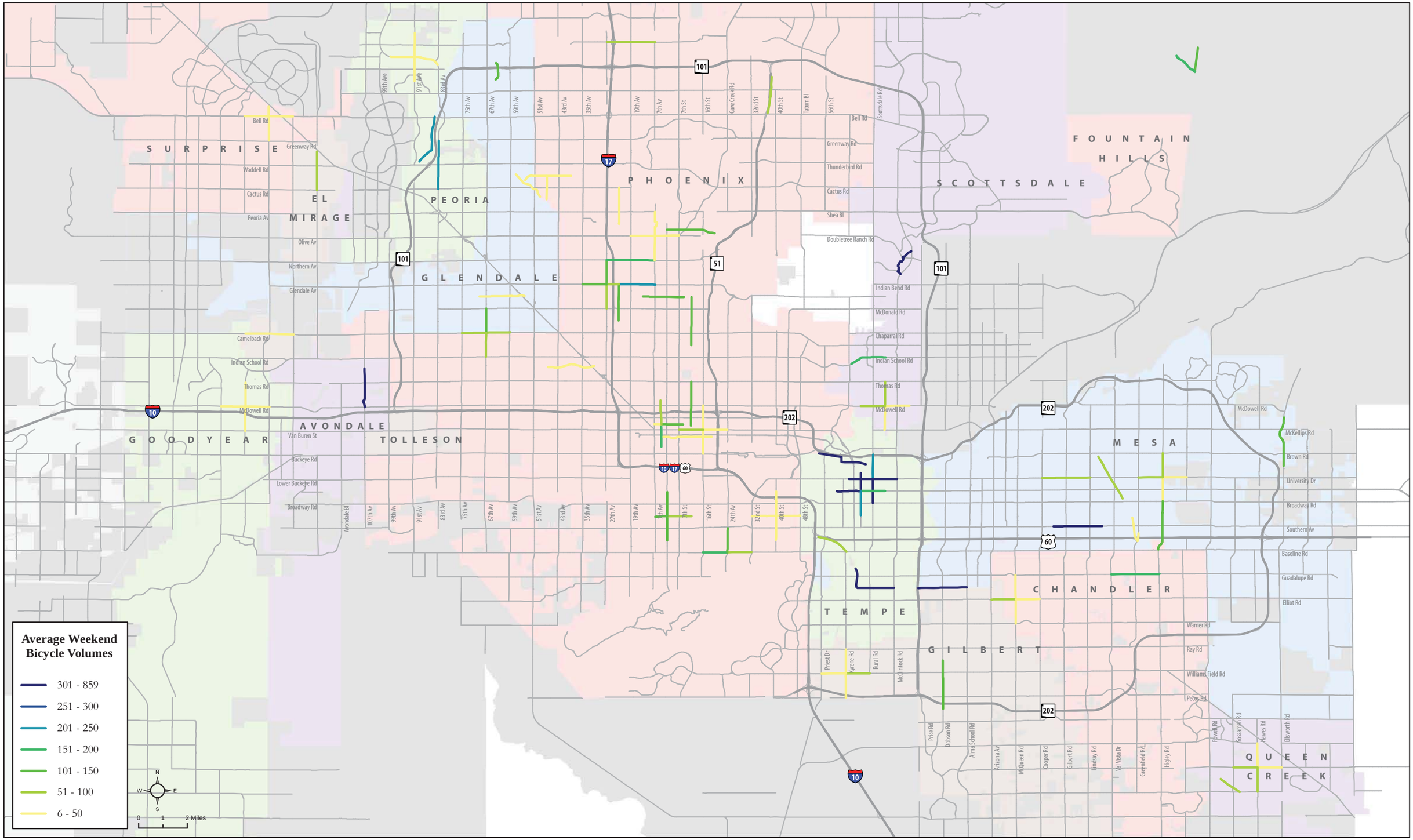

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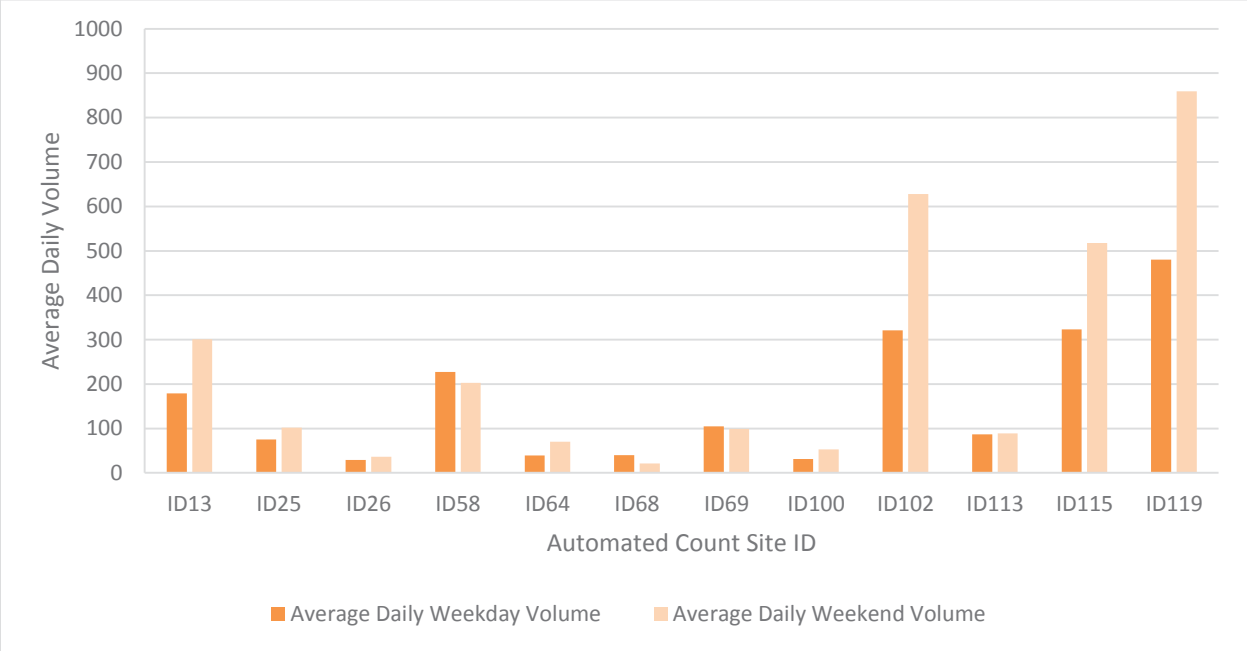
Figure 4-2
Average Daily Weekend Bicycle Volumes for Automated and Manual Count Sites

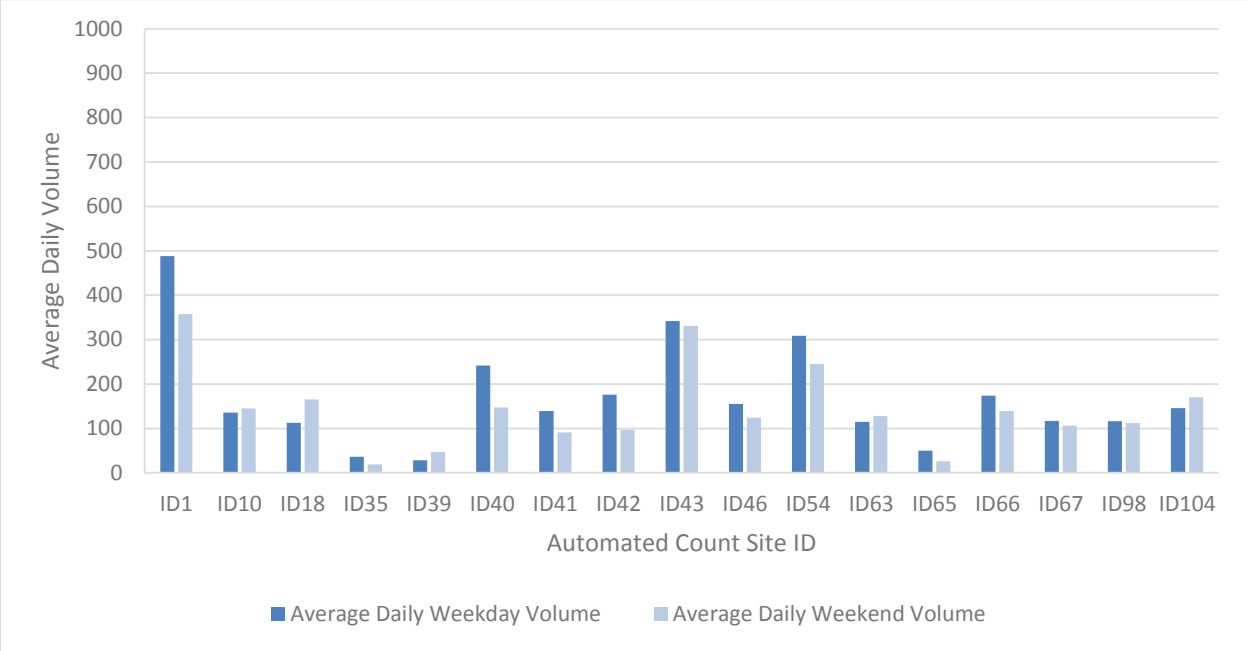
Charts 4-1 through **4-3** display average daily weekday and weekend bicycle volumes collected from the automated count stations by facility type for Bike Path, Bike Lane and No Facility sites, respectively.

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



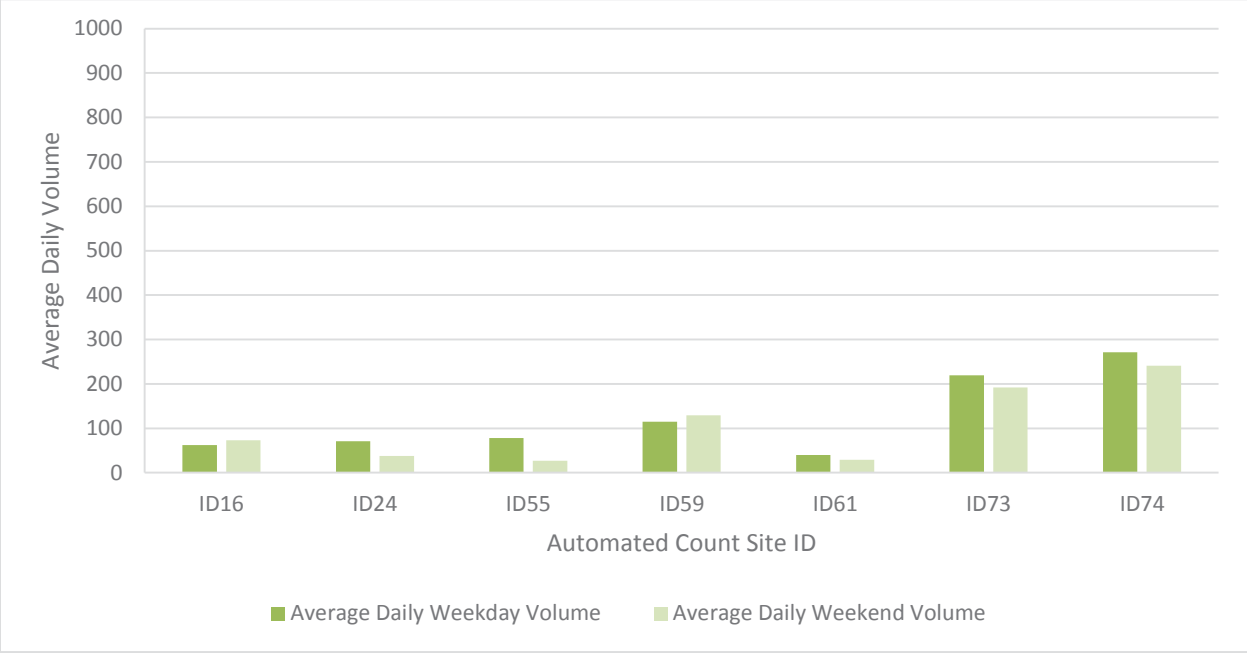
Source: *Chen Ryan Associates, April 2014*

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



Source: *Chen Ryan Associates, April 2014*

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



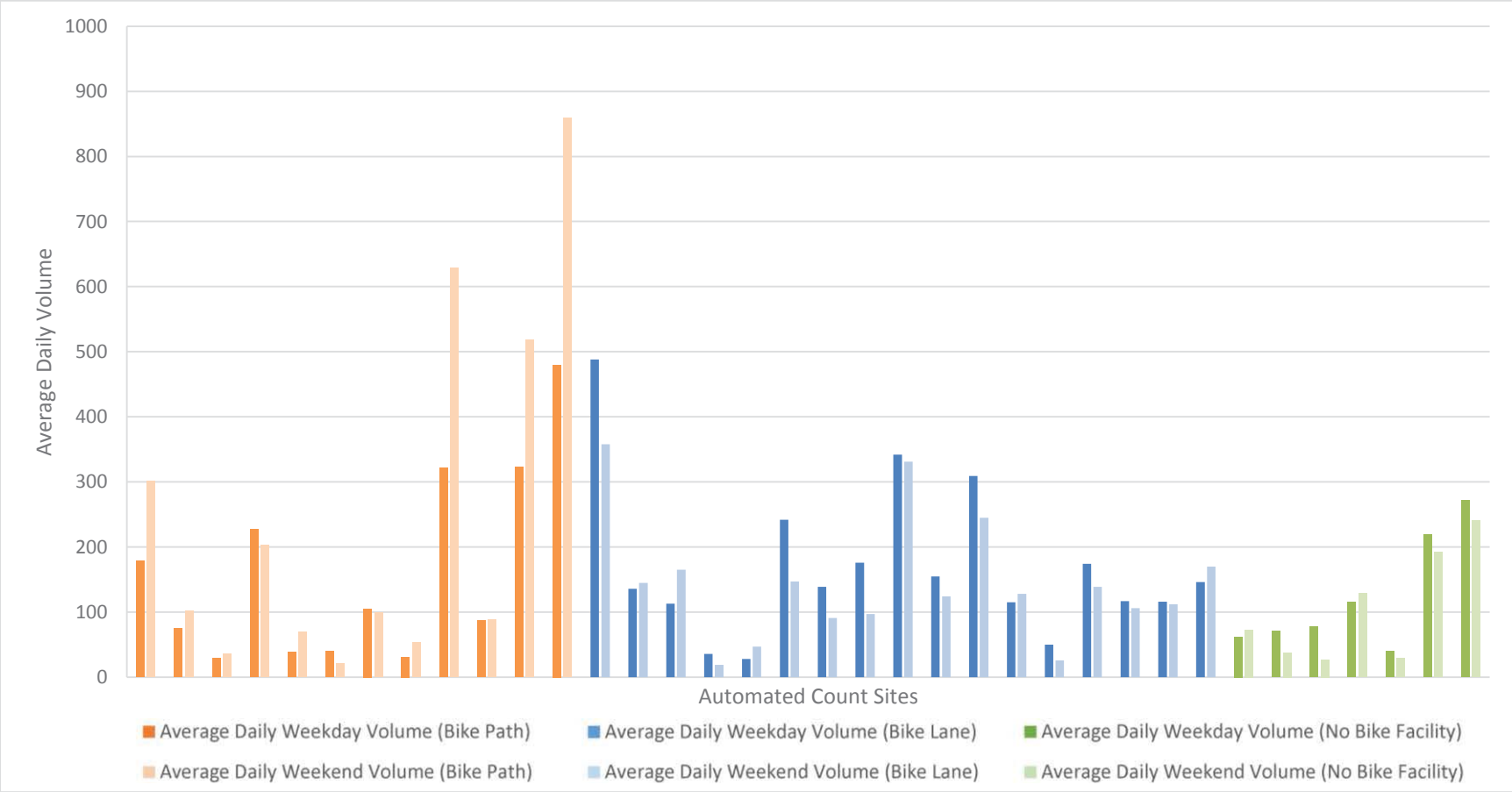
Source: *Chen Ryan Associates, April 2014*

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

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

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

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



Source: *Chen Ryan Associates, April 2014*

4.1.2 Manual Counts

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

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

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

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

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

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

Source: *Chen Ryan Associates, April 2014*

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

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

Source: *Chen Ryan Associates, April 2014*

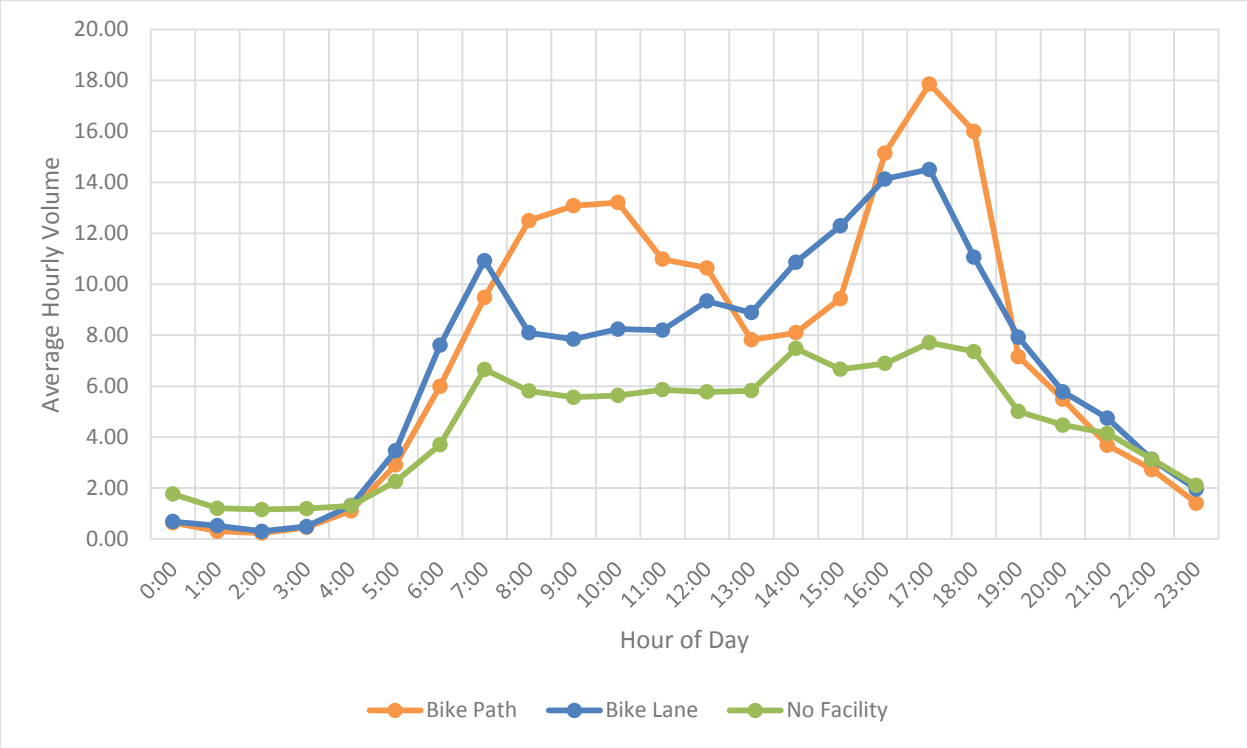
4.2 Using Temporal Patterns to Understand Bicycle Trip Purpose

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

4.2.1 Hour of Day Bicycle Travel

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

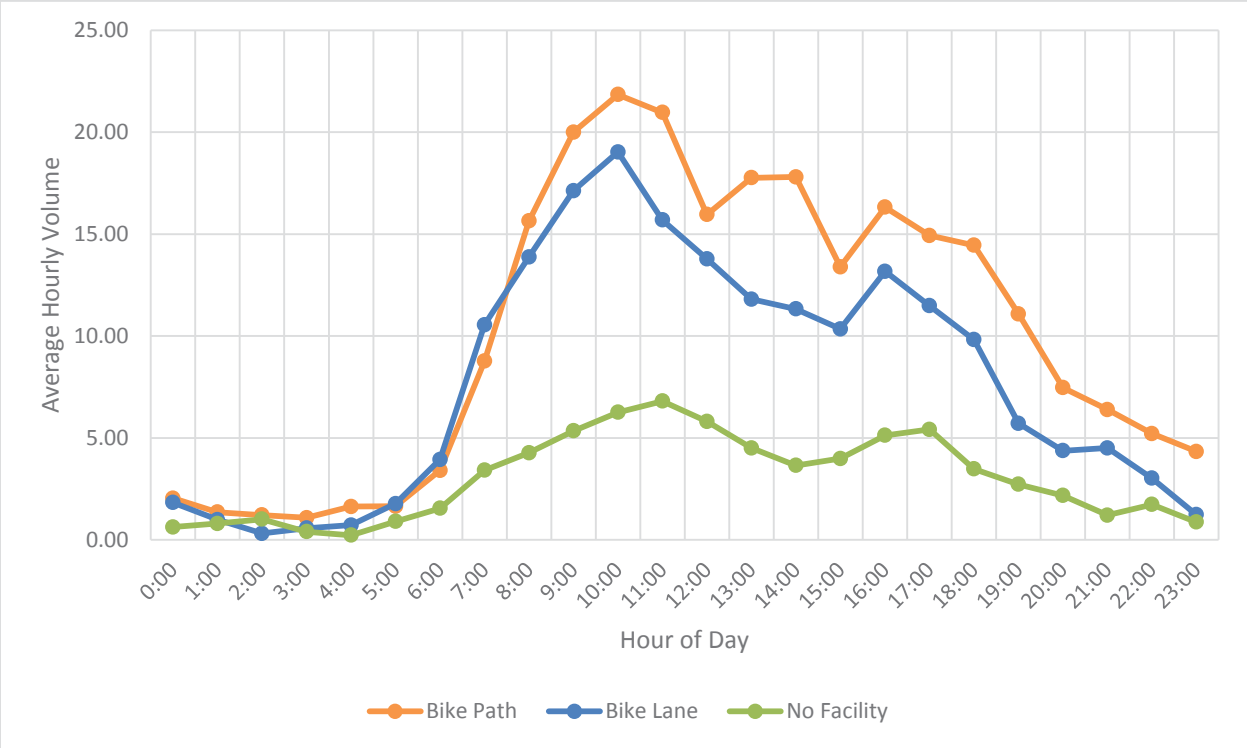
Chart 4-5: Average Hourly Weekday Bicycle Volumes by Facility Type



Source: *Chen Ryan Associates, April 2014*

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

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



Source: *Chen Ryan Associates, April 2014*

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

4.2.2 Day of Week Bicycle Travel

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

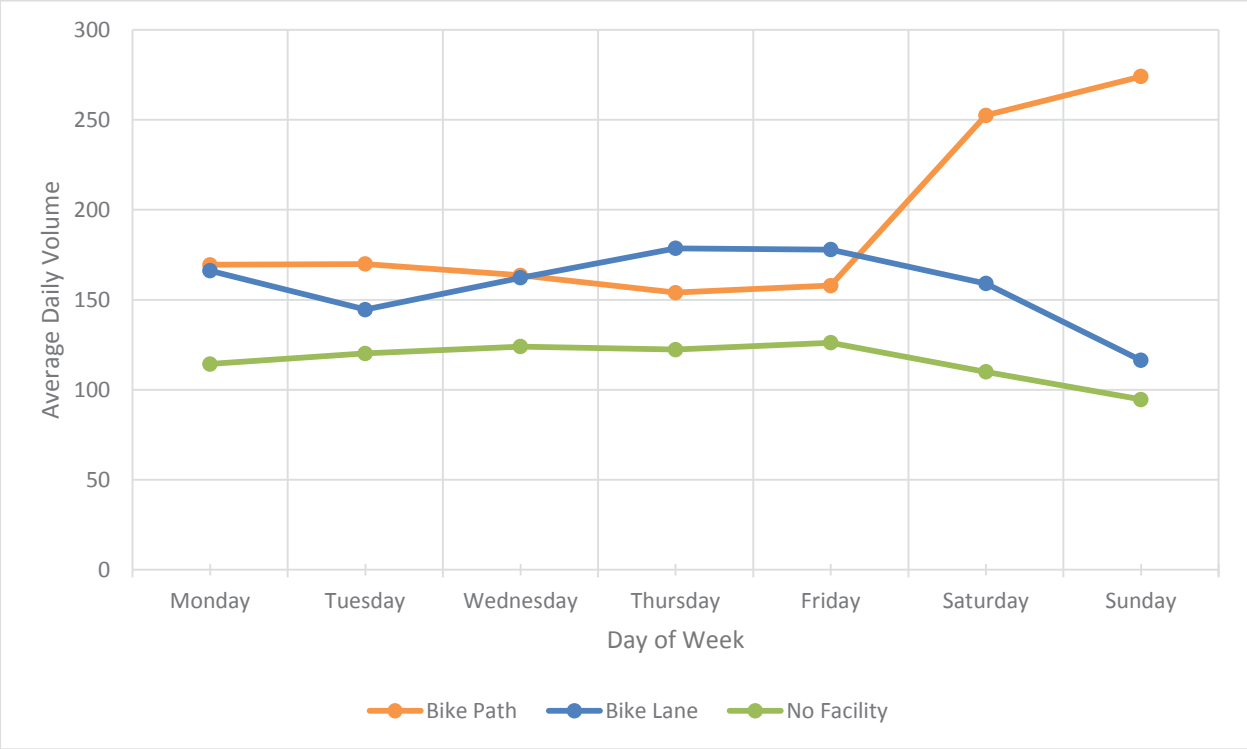
Chart 4-7 summarizes the automated count volumes by day of week by facility type to better understand trends in travel patterns along Bike Paths, Bike Lanes and roadways without bicycle facility. As shown, the highest activity day of the week for Bike Paths is Sunday, with over 274 average daily cyclists.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

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

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

Source: *Chen Ryan Associates, April 2014*

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



Source: *Chen Ryan Associates, April 2014*

4.2.3 Utilitarian and Recreational Trips

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

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

4.3 Sidewalk Cycling

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

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

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

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

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

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

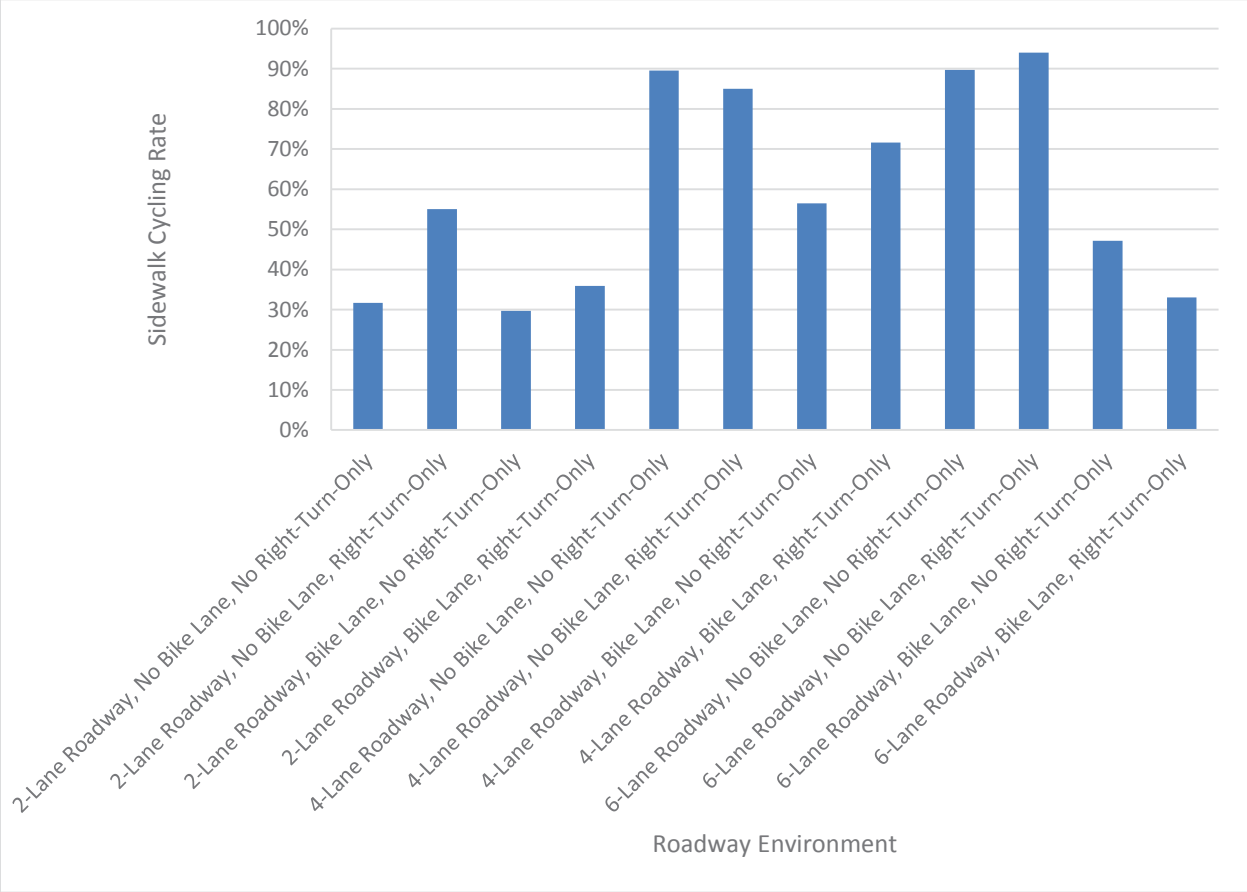
Station ID	North Intersection Leg			South Intersection Leg			East Intersection Leg			West Intersection Leg			Total Intersection Sidewalk Cycling Rate
	Sidewalk Cyclists	Total Cyclists	Sidewalk %	Sidewalk Cyclists	Total Cyclists	Sidewalk %	Sidewalk Cyclists	Total Cyclists	Sidewalk %	Sidewalk Cyclists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

Source: *Chen Ryan Associates, April 2014*

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

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

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



Source: *Chen Ryan Associates, April 2014*

4.4 Comparing Cycling in Maricopa County with other Regions

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

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

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

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

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

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

Source: Chen Ryan Associates, April 2014

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

2014 MAG Bicycles Count Project **Counter Installation Locations**

Count ID	Jurisdiction	Count Location	Count Direction	Installation Instructions	Tubing	Installation Date	Download Data & Uninstall	Setting Rational
62	Phoenix	12th St & Arizona Canal Bike Path	Canal	North side of Canal Bike Path, West of 12th	Mini	9/30/2013	10/13/2013	off-street
74N	Phoenix	19th Ave & Glendale	EW	On Glendale, west of 19th (minis on sidewalks, no street)	2 X Mini	9/30/2013	10/13/2013	off-street
74S						9/30/2013	10/13/2013	off-street
73N	Phoenix	19th Ave & Northern Rd	EW	On Northern, west of 19th (minis on sidewalks, no street)	2 X Mini	9/30/2013	10/13/2013	off-street
73S						9/30/2013	10/13/2013	off-street
64	Phoenix	Bike Path parallel to SR-51 & Union Hills Dr	NS	Northwest leg of bridge	Mini	9/30/2013	10/13/2013	off-street
59N	Phoenix	12th St & Hatcher Rd	EW	On Hatcher, west of 12th	2 X 20'	9/30/2013	10/13/2013	older counter
59S	Phoenix					9/30/2013	10/13/2013	older counter
98E	Phoenix	12th St & Missouri Ave	NS	On 12th, south of Missouri	2 X 20'	9/30/2013	10/13/2013	older counter
98W	Phoenix					9/30/2013	10/13/2013	older counter
69N	Phoenix	19th Ave & Deer Valley Rd	EW	On Deer Valley, west of 19th	2 X 20'	9/30/2013	10/13/2013	older counter
69S	Phoenix					9/30/2013	10/13/2013	older counter
66E	Phoenix	23rd Ave & Maryland Ave	NS	On 23rd, south of Maryland	2 X 20'	9/30/2013	10/13/2013	older counter
66W	Phoenix					9/30/2013	10/13/2013	older counter
65E	Phoenix	23rd Ave & Peoria Rd	NS	On 23rd, north of Peoria	2 X 20'	9/30/2013	10/13/2013	older counter
65W	Phoenix					9/30/2013	10/13/2013	older counter
63N	Phoenix	Central Ave & Maryland Ave	EW	On Maryland, west of Central	2 X 20'	9/30/2013	10/13/2013	older counter
63S	Phoenix					9/30/2013	10/13/2013	new counter
61	Phoenix	11th St & Jefferson St (o/w)	EW	On Jefferson, west of 11th (one counter in bikelane on northside of Jefferson)	1 X 20'	10/14/2013	10/26/2013	older counter
67E	Phoenix	12th St and McDowell Rd	NS	On 12th, north of McDowell	2 X 20'	10/14/2013	10/26/2013	older counter
67W	Phoenix					10/14/2013	10/26/2013	older counter
60E	Phoenix	44th St & Thomas Rd	NS	On 44th, north of Thomas	2 X 20'	10/14/2013	10/26/2013	older counter
60W	Phoenix					10/14/2013	10/26/2013	older counter
70N	Phoenix	44th St & Washington St	EW	On Washington, east of 44th	2 X 20'	10/14/2013	10/26/2013	older counter
70S	Phoenix					10/14/2013	10/26/2013	older counter
9N	Chandler	Price Rd & W Ray Rd	EW	On Ray, east of Price	2 X 20'	10/14/2013	10/26/2013	new counter
9S	Chandler					10/14/2013	10/26/2013	new counter
68	Phoenix	39th Ave & Grand Canal Bike Path	Canal	On south side of canal, east of 39th	Mini	11/11/2013	11/24/2013	off-street

2014 MAG Bicycles Count Project **Manual Count Locations**

Count ID	Jurisdiction	Count Location	Method	Count Direction
71	Phoenix	47th Ave & Osborn Rd	Manual	
72	Phoenix	75th Ave & Thomas Rd	Manual	
75	Phoenix	27th Ave & Bell Rd	Manual	
76	Phoenix	3rd Ave & Fillmore St	Manual	
77	Phoenix	35th Ave & Camelback Rd	Manual	
78	Phoenix	16th St and Indian School Rd	Manual	
79	Phoenix	24th St & Baseline Rd	Manual	
80	Phoenix	Central Ave & Roeser Rd	Manual	
81	Phoenix	35th Ave and Van Buren St	Manual	
82	Phoenix	44th St & Camelback Rd	Manual	
83	Phoenix	7th St & Bell Rd	Manual	
84	Phoenix	27th Ave & Glendale Ave	Manual	
85	Phoenix	7th Ave & Dunlap Ave	Manual	
86	Phoenix	Central Ave & Mohave St	Manual	
87	Phoenix	19th Ave & Indian School Rd	Manual	
88	Phoenix	3rd Street and Thomas Rd	Manual	
89	Phoenix	19th Ave and Thomas Rd	Manual	
90	Phoenix	40th St & Roeser Rd	Manual	
91	Phoenix	Central Ave & Thomas Rd	Manual	
92	Phoenix	16th St and Van Buren St	Manual	
93	Phoenix	40th St & Bell Rd	Manual	
94	Phoenix	47th Ave & Sweetwater Ave	Manual	
95	Phoenix	Northern Ave & Bike Path south of SR-51	Manual	
96	Phoenix	15th Ave & Maryland Ave	Manual	
97	Phoenix	48th St and Guadalupe Rd	Manual	EW
99	Phoenix	24th St & Washington St	Manual	

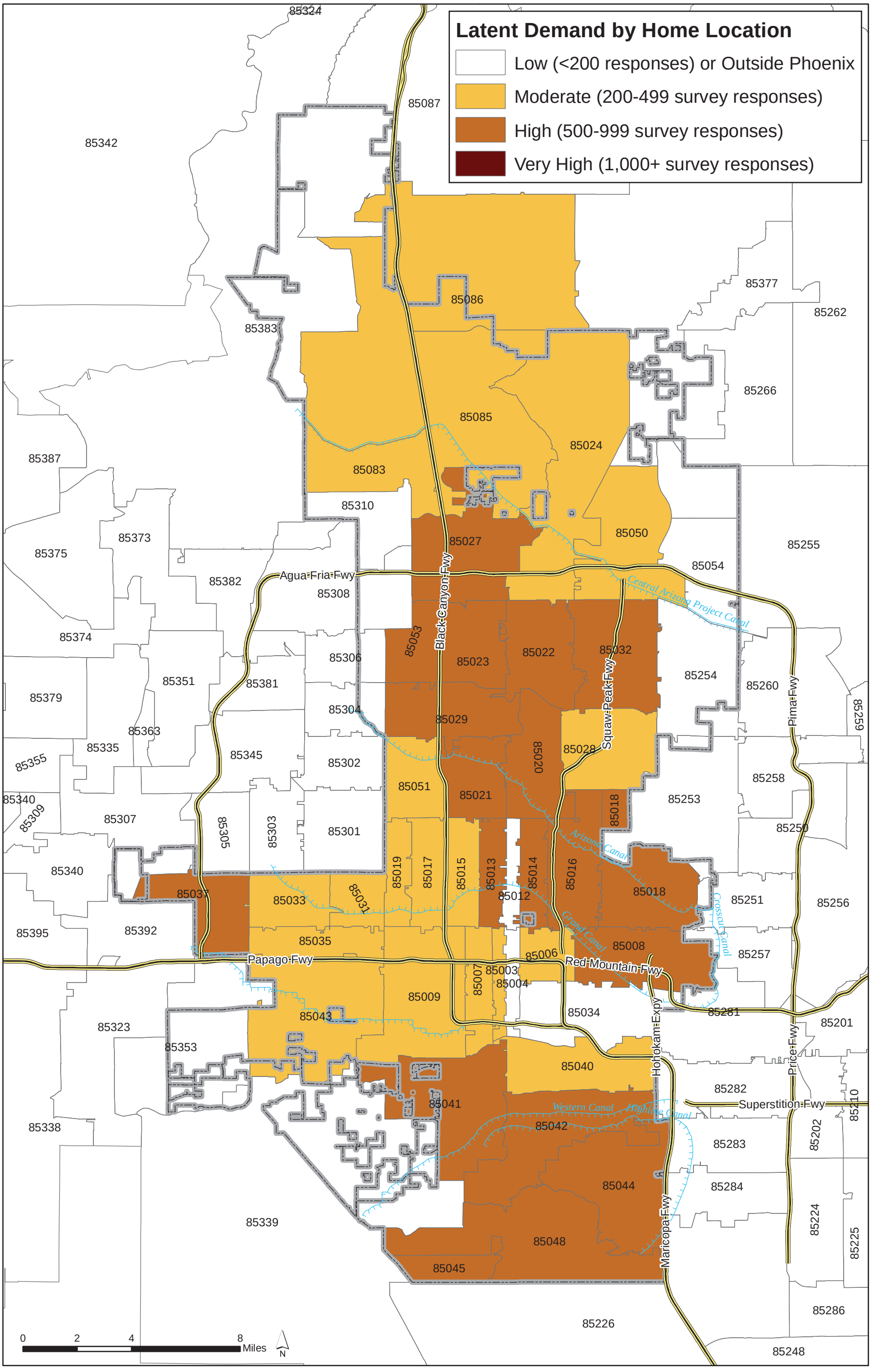
Appendix C

Maricopa County Trip Reduction

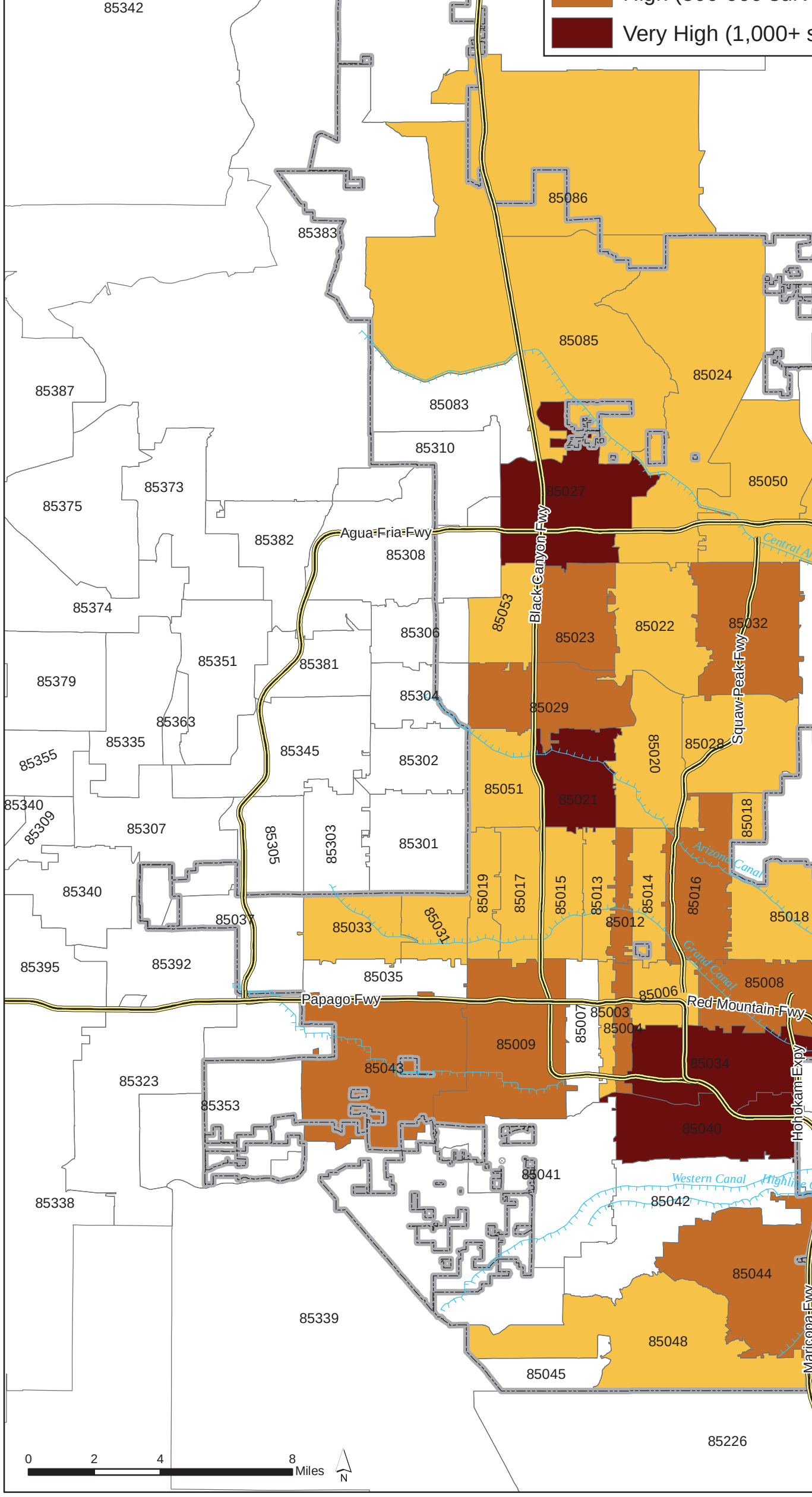
Latent Demand Maps

1a - Commute Trip Origins
Latent Demand by Home ZIP Code

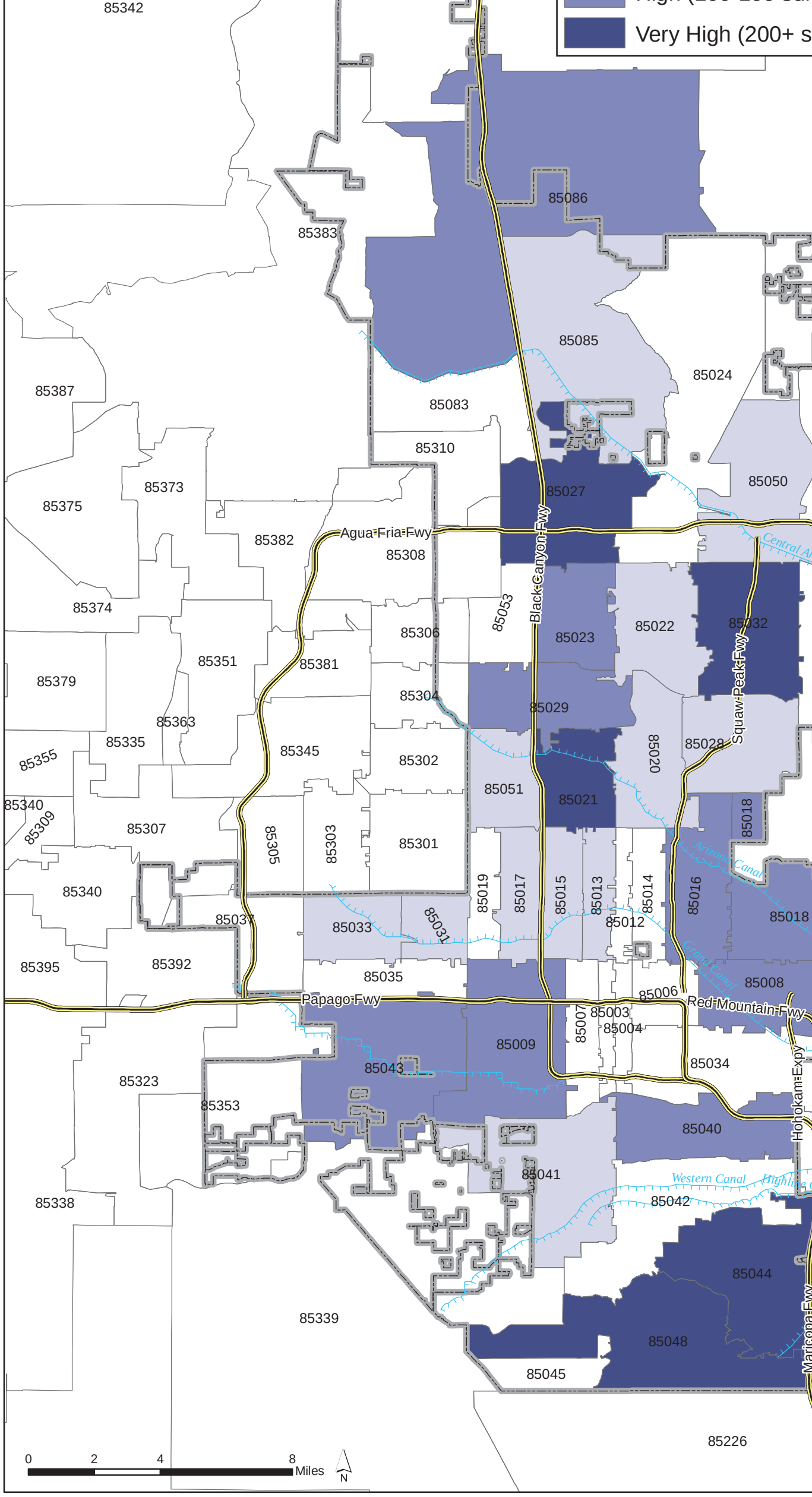
Data shows the number of employees by home ZIP Code who do not bicycle to work but are interested in bicycling to work.



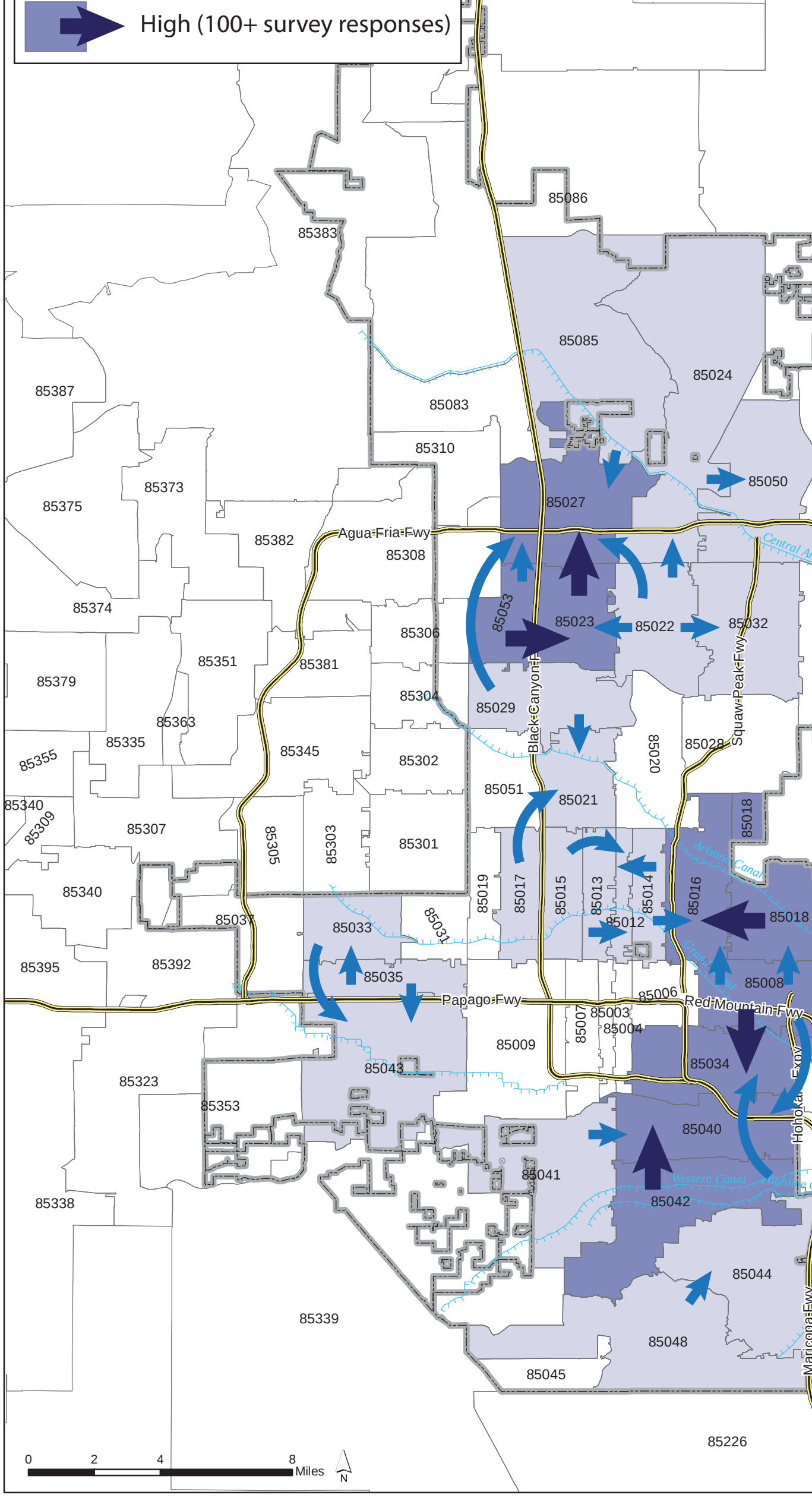
Source: The Maricopa County Air Quality Department Trip Reduction Program (TRP) 2012 Survey.
Note: Only businesses in Maricopa County with 50 or more employees were surveyed.



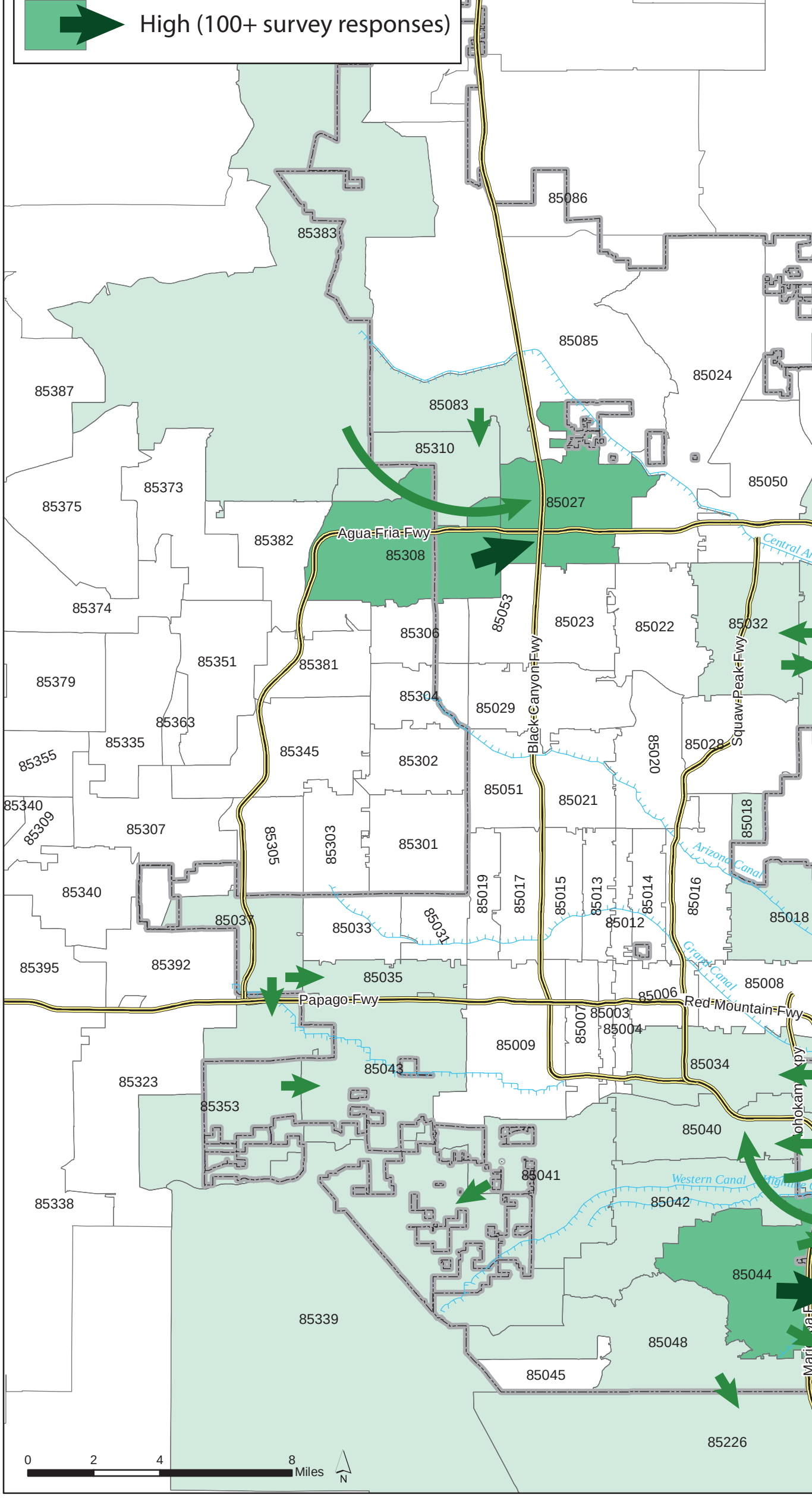
Source: The Maricopa County Air Quality Department Trip Reduction Program (TRP) 2012 Surve
Note: Only businesses in Maricopa County with 50 or more employees were surveyed.



Source: The Maricopa County Air Quality Department Trip Reduction Program (TRP) 2012 Surve
Note: Only businesses in Maricopa County with 50 or more employees were surveyed.



Source: The Maricopa County Air Quality Department Trip Reduction Program (TRP) 2012 Surve
Note: Only businesses in Maricopa County with 50 or more employees were surveyed.



Source: The Maricopa County Air Quality Department Trip Reduction Program (TRP) 2012 Surve
Note: Only businesses in Maricopa County with 50 or more employees were surveyed.

Appendix D

Detailed Assessment of Existing Policies, Practices and Procedures for Traffic Control and Bicycle Facility Design

Appendix D: Detailed Assessment of Existing Policies, Practices and Procedures for Traffic Control and Bicycle Facility Design

Introduction

The following tables provide a detailed assessment of existing Phoenix policies, practices, and procedures for traffic control and bicycle facility design with respect to the standards and guidelines published by AASHTO, MUTCD, and NACTO. The tables below reference relevant sections for each document reviewed, including specific existing text and headings, and provide a related assessment in the "Comment" column.

City of Phoenix (2002). Phoenix General Plan – Bicycling Element

Section	**Existing Text or Heading**	**Comment**
Goal 1: Policy 1-J	*Design and construct all bicycle paths and lanes in accordance with American Association of State Highway and Transportation Officials (AASHTO) guidelines.*	Consider adding additional resources and softening language to allow for flexibility in design and engineering judgment. Bicycle facilities designs should reference guidance from AASHTO, MUTCD, NACTO, and allow for flexibility in design to test new innovations based on engineering judgment.

City of Phoenix (2009). City of Phoenix Street Planning and Design Guidelines. Chapter 10 – Bikeways

Section	Existing Text or Heading	Comment
10.1.1. Philosophy	Introduction	Add the following to the bulleted list: • Reinforce that bicycling is an equitable and viable form of transportation • Provide opportunities for active transportation to improve health and quality of life
10.1.2 Components	N/A	GENERAL COMMENT--Define each facility type in a bulleted list.
	On-street bike lanes are always one-way.	Consideration should be given to two-way cycle tracks and contra-flow bicycle facilities.
	Bike routes may include shared streets, bike lanes, shared-use paths or multiuse trails, in any combination.	Add cycle tracks, bicycle boulevards, etc. Should allow for flexibility in design.
	Bike routes may include shared streets, bike lanes, shared-use paths or multiuse trails, in any combination. Routes may be designated by signing or by placement on a map. Bikeways can be any combination of shared-streets, bike lanes, bike routes, shared-use paths or multi-use trails, and can be designated by signing, mapping, or consistent public use.	Same sentence twice.
	Multi-use trails are made from stabilized, decomposed granite.	Include other materials that may be used for multi-use trails, such as asphalt or concrete.
10.1.3 Documents and References	N/A	GENERAL COMMENT--Include general discussion about flexibility in design and engineering judgment. Add references to NACTO, bike plans from neighboring jurisdictions, state bike and pedestrian plan, and PROWAG. Update references from 1999 AASHTO to 2012 AASHTO throughout.
10.2.1 Location	*Providing facilities for both on- and off-street types of bikeways is not always practical but is to be encouraged, as that will accommodate the widest possible range of users, purposes, and trip destinations.*	Adjust language to reflect a more context sensitive approach, e.g., bicycle facilities should always be investigated for feasibility and appropriate facility types for the context and condition of the roadway…
10.2.2 Facility Selection: On-Street	*Bike Lanes are the most desirable facility for any street with a classification of minor collector or higher.*	Consider adjusting language to indicate preference for protected or separated bicycle facilities, such as shared-use paths, buffered bicycle lanes, and cycle tracks.

Section	Existing Text or Heading	Comment
	Parkways, major arterials, minor arterials, major collectors, minor collectors, and certain special neighborhood and rural streets have standard cross-sections that include bicycle lanes. Bike lanes would, therefore, be included on these streets whenever they are built or reconstructed as long as parking along single family homes can be accommodated along collector or neighborhood streets. These cross sections are given in the City of Phoenix Supplement to MAG Uniform Standard Specifications.	Cross sections in the City of Phoenix Supplement to the MAG Uniform Standard Specifications do not provide typical widths. Provide reference to the document where the typical widths are provided.
	For streets that are needed to provide a connection for local or regional bikeway systems, but where a full cross-section with bicycle lanes cannot be accommodated, the following measures should be considered: (Listed starting with the most desirable.) • *Edge line stripe with bike route signs* • *Bike route signs with no edge stripe*	Recommended shoulder width for an edge line striping should be a minimum 4 ft to accommodate bicyclists; however 5 ft is the typical operating space of a bicyclist. Including shared lane markings as a possible measure to consider where bike lanes cannot be provided
10.2.3 Facility Selection: Off-street	• *Ten (10) or twelve (12} foot path/trail, well separated from streets, and in a natural setting* • *Ten (10) or twelve (12) foot path/trail, set off from the street by at least eight (8) feet of landscaping for arterials and five (5) feet for collectors* • *Ten (10) or twelve (12) foot path/trail protected from the street*	Width of two-way: 8 ft min (typically 10 ft to 14 ft+) Separation from road: For high speed facility, preferred width > 5 ft; If greater separation cannot be provided, a crashworthy barrier should be considered. For lower speed facility, 5 ft min. separation or provide a physical barrier (does not need to be crashworthy) for < 5 ft.
10.3.3 On-Street Bike Lanes	*Streets such as arterials, collectors, and certain neighborhood streets have cross-sections that include bicycle lanes. These cross-sections are in the City of Phoenix Supplement to MAG Uniform Standard Specifications.*	Cross sections in the City of Phoenix Supplement to the MAG Uniform Standard Specifications do not provide typical widths. Provide reference to the document where the typical widths are provided.
	In rural areas, a paved shoulder can serve the function of a bike lane, in which case it should have a minimum of five (5) feet of paving.	Where a bypass lane is provided, the minimum width of a shoulder that may serve as a bike lane can be decreased to 4 ft.
	A bicycle lane can also be delineated with striping between an area for parallel parking and a traffic lane. In this case, the bicycle lane should be at least five (5) feet. Parking should not be allowed in marked bicycle lanes. Raised pavement markers or curbing should not be used to delineate bike lanes.	Add a note that wider bike lanes should be considered in areas of on-street parking with high parking turnover.
10.3.4 Shared-Use Paths/Multi-Use Trails	N/A	GENERAL COMMENT--Update shared-use path recommendations to include guidance from 2012 AASHTO Bike Guide with an emphasis on engineering judgment and flexibility in design.

Section	Existing Text or Heading	Comment
	City of Phoenix Standard Details for shared-use paths/multi-use trails are found in City of Phoenix Supplement to MAG Uniform Standard Specifications, section 429 and details P1130 and P1131	Details show 10 ft cross section with 2 ft shoulders on either side. Consider providing additional information from 2012 AASHTO Bike guide and lowering the minimum to 8 ft based on engineering judgment.
	Minimum design speed of 20 mph.	Design speeds should be determined based on engineering judgment. Typical design speeds are 18 mph for relatively flat trails.
	Width of eight (8) feet where paths can be paired so each can have one-way travel.	Clarify meaning.
	Where needed, fences or railings for paths or bikeways should be 54 inches in height and be flared at the ends.	Add minimum and preferred rail heights. Per 2012 AASHTO Bike Guide, the minimum safety rail height is 42 inches (pg. 5-7), but there may be some locations where a 48 inch rail should be considered to prevent a bicyclist from falling over the railing during a crash (pg. 5-27). Rub rail height of 36 inches high (6 to 8 inches wide) recommended (pg. 5-27)
1 0.4.1 Signs and Markings	*In urban areas, pavement markings will be placed at about 1/4 mile intervals.*	Update spacing recommendations to include engineering judgment, context and character of roadway; ranges between 100' - 1000'. Should provide pavement symbols immediately after intersections. Pavement symbols should be placed in bike lanes to the left of right turn lanes on the intersection approach.
	Where a bike lane continues past the left side of a right-turn-only lane, bike symbols should be placed in that continuation. On leaving an intersection, the lane stripe should start at the crosswalk or where the crosswalk would be. Approaching an intersection the stripe should be dropped about 50 feet before the intersection, unless the elimination of the bike lane will allow for a second approach lane where it will be dropped about 200 feet in advance.	Needs clarification. Update based on 2012 AASHTO Bike guide and MUTCD. Change the word “past” to “on” in the first sentence for clarification. If no separate right turn lane exists, bike lanes should be extended to the intersection radius point, stop line or marked crosswalk (if one exists) on the intersection approach.

City of Phoenix (2011). Traffic Operations Handbook. Chapter 5 – Pedestrians and Bicyclists

Section	Existing Text or Heading	Comment
Bicycle Facilities Background	*Anyone riding a bike with wheels greater than 16 inches is a bicyclist and can ride on the sidewalk or in the street regardless of age, experience, or ability.*	Consider adding emphasis that bicyclists are not required to ride in the street.
Bicycle Facilities Discussion	*Level terrain and local weather provide an ideal environment for bikers. Bicycle operator capabilities vary widely, ranging from young children riding to school, to recreational riders, ranging up to experienced adult riders properly equipped (mirrors, lights, helmets, special clothing) to ride with traffic. Recent estimates indicate nearly one-half million adults own likes in the Valley, with 23 percent riding bikes regularly. Experienced bicyclists prefer to ride in the street with vehicles, and are normally equipped to do so. They ride at higher speeds and for longer distances, and by riding in the street, are accepting responsibility for remaining prepared to react to vehicular traffic. They are not well suited to sidewalks, particularly where numerous driveways and significant numbers of pedestrians exist. The majority of bicyclists are children or recreational bicyclists who typically do not have the experience or equipment to share arterial streets with higher speed motorized traffic. From a safety standpoint, it is advisable that these less experienced riders use sidewalks, local streets or separate bicycle paths instead of arterial streets. To encourage more experienced cyclists to use the street instead of sidewalks, traffic officials should design, install and maintain contiguous bicycle facilities as part of their regular operations.*	Add a discussion about how to encourage more diverse types of people to ride bicycles; in general bicycle facilities should be designed for riders of all ages and abilities. Separated, protected bicycle facilities on higher volume and speed roadways should be provided where feasible. Bicycle boulevards, shared-use paths, buffered bicycle lanes, and cycle tracks are some facility types that can help encourage higher bicycle use by more types of people.
	There are four types of facilities (bikeways) for bikers, each with different designs and characteristics:	Consider opening this up for more flexibility. Shared lane markings, bicycle boulevards, and cycle tracks could be incorporated into this language.
	2. On-street Bicycle Lanes: Bikeways created by designating a portion of street (using pavement markings and signs) for preferential or exclusive use by bicyclists. Per the 2009 MUTCD, bike lane signs are optional.	Add that bike lane signs should be considered and used based on engineering judgment.

Section	Existing Text or Heading	Comment
	Bicycle Routes: Bikeways designated by guide signing only which merely indicates a trailblazed route, which is a shared facility either on-street (shared with cars) or on the sidewalk (shared with pedestrians). Per the 2009 MUTCD, shared lane markings should be used in areas between marked bike lanes to maintain connectivity and	Incomplete statement (word missing at the end of description)? This section is confusing. It says "by guide signs only" then mentions shared lane markings. A street with a bicycle lane can also be considered a bicycle route. This description needs to be rephrased.
	4. Bikeable Streets: Streets which connect with higher level bikeway facilities and have proven to be acceptable for bicycle travel and are designated on a bikeable street map for biker convenience. Bikeable streets are intended only as a guide and are gnerally low volume local and collector streets which connect bike lanes or signed bike paths/routes.	Spelling error. This designation could include bicycle boulevards with pavement markings and signs.
<u>Bicycle Facilities</u> Procedure: Bike Lanes	*Bike lanes are the highest category of bicycle facility, where bicyclists are the preferred, and usually exclusive, user.*	Consider rephrasing. Protected, separated facilities like cycle tracks and buffered bicycle lanes are the highest form of bicycle accommodations for users of all ages and abilities.
	On-street bike lanes may be used where a minimum of 3 feet width (excluding gutter) can be obtained. Where practical, it is desirable to provide 6.0 feet (including gutter).	Typical rideable surface not including the gutter pan should be 5 ft as a desirable minimum. Engineering judgment should be used to allow for 4' in constrained situations.
	This lane will normally be marked with an 8 inch white line with white bicycle stencils placed at two to four per mile per direction.	Replace "two to four per mile per direction" with "based on engineering judgment." A more in depth discussion of symbol spacing should be based on the 2012 AASHTO Bike Guide and MUTCD recommendations.
	Bike lanes are normally signed with the black and white R3-17 BIKE LANE sign two per mile per direction. The R3-17bP BIKE LANE ENDS sign is normally used where the painted lane terminates or where the lane does not reappear for more than a ½ mile. Per the 2009 MUTCD, the use of bike lane signs is optional, but City of Phoenix shall install the signs to provide clear guidance to motorists and bicyclists	Revise to include more details from 2012 AASHTO Bike Guide and MUTCD on spacing and placement.
	Per ARS 28-815, establishment of a bike lane automatically prohibits parking or even stopping in the lane by motorized vehicles. However, to be sensitive to the needs of residents along commuter routes on collector/local streets, consideration may be given to declaring the bike lane in effect for only part of the day and imposing parking restrictions only during commute periods (7:00 a.m. - 6:00 p.m. Monday thru Friday).	There needs to be consideration for the available space for parking and the type of roadways (not limited to the collector/local classifications). Depending on the cross section, speeds, contexts and adjacent land uses, this may be feasible based on engineering judgment.

Section	Existing Text or Heading	Comment
	Experience has shown that even when a 5.5-feet wide bike lane is not available on-street, wide outside lanes (12' - 14') help bikers.	Not consistent. Revise with a consistent minimum width and express emphasis on engineering judgment. A 12-foot lane is not comfortable for bicyclists to share with motorists. A 14 ft lane can typically be shared. Change "bikers" to "bicyclists".
Bicycle Facilities Procedure: Bike Routes	*Designated bike routes are shared facilities. Designated bike routes are signed using the D11-1 BIKE ROUTE guide sign. They are normally placed within 100 to 300 feet beyond a major street intersection and are spaced at intervals of two to four per mile (per direction). Additional guide signs with directional arrows may be helpful when the route changes direction.*	Replace "two to four per mile per direction" with "based on engineering judgment." A more in depth discussion of spacing should be based on the 2012 AASHTO Bike Guide and MUTCD recommendations.
Bicycle Facilities Procedure: Share-use Paths	*Paved path widths of 8 to 10-feet are normally desirable, with one-way routes being 5 to 6-feet wide. Paths greater than 10-feet are acceptable where high volumes or unusual geometries exist, but may have the undesirable effect of encouraging use by motorized traffic.*	Width of two-way: 8 ft min (typically 10 ft to 14 ft+ widths are desirable for new facilities) Separation from road: For high speed facilities, preferred separation width > 5'; If greater separation cannot be provided, use of a crashworthy barrier should be considered. For lower speeds, 5' min. separation or provide a physical barrier (does not need to be crashworthy) for < 5'
	When separate off street "shared-use" paths are designated specifically to allow use by bicyclists, BIKE ROUTE (D11-1) signs should be sparingly used.	Revise based on 2012 AASHTO Bike Guide and MUTCD spacing recommendations.
Bicycle Racks	N/A	GENERAL COMMENT--Include long term parking recommendations such as bike lockers at transit hubs.
	10. Minimum required clearance from the curb face to the bike rack should be two and a half (2.5) feet except for bike racks attached to parking meters.	Revise per best practice. See 2012 AASHTO Bike Guide and APBP Bike Parking Guide, or Boston bicycle parking guidelines from Boston Bikes and in the Complete Streets design guidelines.
	11. Minimum unobstructed pedestrian clearance is required on all city streets. The unobstructed pedestrian clearance should be at least three (3) feet. The unobstructed distance shall be measured from the bike rack in a 360-degree arc around the rack.	Is this for every rack? Need to clarify.
	12. Minimum clearance from a pedestrian curb ramp should be twenty (20) feet from the near side of the crosswalk to the bike rack.	Revise per best practice. See 2012 AASHTO Bike Guide and APBP Bike Parking Guidelines.

Section	Existing Text or Heading	Comment
	13. Minimum clearance from street furniture to the edge of the bike rack envelope should be five (5) feet. Street furniture shall include, but not be limited to, benches, trash receptacles, mailboxes, permanent outdoor seating areas, etc.	
	14. Minimum clearance from bus shelters, fire hydrants, and signal control cabinets should be fifteen (15) feet.	
	15. Minimum clearance from utility vaults, manholes, power poles, permanent planters, etc. shall be five (5) feet.	

City of Phoenix (additions and revisions in 1997 and 2003). *City of Phoenix Zoning Code (Canal Design Guidelines).*

Section	Existing Text or Heading	Comment
All	N/A	GENERAL COMMENT--Consider adding bicyclists, including families bicycling, to the graphics throughout the guidelines.
2.1. Physical Access	*2.1.a.5 Where canal access points exist (cul-de-sac, alleys, streets, and utility rights-of-way), adjacent development should provide landscaping on the development's property. (see Figure 3) (P) +8 *14 2.1.a.6 Public pedestrian bridges across the canal are encouraged to link neighborhoods, commercial, recreational, and public uses. (C) +8*	Revise to indicate that bridges are for use by bicyclists and pedestrians.
2.7. Urban Area/Canalscape Treatment - Design Continuity.	*Rationale (3.7.1-3.7.6): An urban area is an area which generates high levels of activity and has a strong pedestrian emphasis. Urban area land uses along the canal banks would include retail, restaurants, offices, resort/hotel, cultural facilities, and high density residential. The canal right-of-way should take on the characteristics of a highly developed urban paseo. Building design should help accommodate outdoor spaces for the pedestrian adjacent to the canals in an urban area. One of the goals in urban areas is to line the canal with activities that are of interest to the canal bunk users. +8 *14*	Consider discussing bicycle access including path systems, short and long term parking, wayfinding, etc.
2.8. Suburban Area/Canalscape Treatment – Design Continuity.	N/A	GENERAL COMMENT--Consider discussing bicycle access including path systems, short and long term parking, wayfinding, etc.

Perez, J. (2012). Bicycle Minimum Green Times at Signalized Intersections.

Section	Existing Text or Heading	Comment
N/A	N/A	Formulas and methodology comply with the 2012 AASHTO Bike Guide. The statement "*Because a bicyclist rarely travels over 25 mph, I recommend that only the 25 mph lines be used*" is confusing. Bicyclists can and do ride on roads with speed limits over 25 miles per hour; therefore calculations for conditions with motor vehicle speeds over 25 mph are relevant. The memo does not include information on clearance and extension times based on Rolling Bicycle Crossing Time or on bicycle detection. These are the two remaining signal considerations (in addition to bicycle minimum green time using standing bicycle crossing time) to provide accommodation for bicyclists.

Perez, J. (2012). Bicycle Acceleration at Signalized Intersections.

Section	Existing Text or Heading	Comment
N/A	N/A	GENERAL COMMENT--Update to reference 2012 AASHTO Bike Guide.

Perez, J. (2013). Bicycle Detection at Traffic Signals, Perez, J. (2011). Bicycle Detection at Traffic Signals.

Section	Existing Text or Heading	Comment
N/A	N/A	GENERAL COMMENT--Update to reference information on bicycle detection methods from the 2012 AASHTO Bike Guide.
Introduction; last sentence	*Other technologies are in-ground pucks, and the standard push button.*	Consider adding flexibility to explore other technologies such as magnometers and radar detection. As technology progresses and innovations are being developed, consideration should be given to piloting and testing new detection methods for all modes of transportation.

City of Phoenix (2007). Traffic Barricade Manual.

Section	Existing Text or Heading	Comment
N/A	N/A	GENERAL COMMENT--Similar to the chapter and section, "Accommodating Pedestrians and Worker Safety" and "Pedestrian safety and service considerations", consider adding to or creating a similar chapter or section on accommodating bicycles and bicycle safety and service considerations.
N/A	N/A	GENERAL COMMENT--Include temporary signing and striping recommendations for bicycles including "SHARE THE ROAD" and "MAY USE FULL LANE" MUTCD Signs.

Appendix E

Prioritization Methodology

Prioritization Methodology

The Phoenix Bicycle Master Plan includes a prioritized list of over 375 projects. The prioritization methodology used for the Plan is based on the *10-Step Method for Prioritizing Pedestrian and Bicycle Improvement Locations Along Existing Roads* developed through Project 07-17 of the National Cooperative Highway Research Program (NCHRP) of the Transportation Research Board (TRB). The City of Phoenix served as pilot agency for the *10-Step Method*, which is based on findings from a national survey, literature review, and agency interviews.

The adopted methodology was designed to reflect the Vision and Goals established for the Plan and was accomplished in three iterations (Figure 1):

- Iteration 1 Develop map of relative demand for bicycling across the City and use the map as a basis for identifying bicycle corridors.
- Iteration 2: Prioritize bicycle corridors based on demand and connectivity; separate corridors into three tiers.
- Iteration 3: Identify specific improvement projects and then prioritize these improvements along the bicycle corridors, focusing on the highest tier corridors.

Figure 1: Iterative Approach to Using the Bicycle Corridor/Project Prioritization Methodology

Additional details regarding each iteration are provided below, including selected *factors* and *variables*. Factors are categories used in the prioritization process to express community/agency values and group variables with similar characteristics. Variables are characteristics of roadways, households, neighborhood areas, and other features that can be measured.

Iteration 1 – Demand Heat Map

For Iteration 1, a *heat map* was developed using a Geographic Information System (GIS) to show relative levels of existing and potential bicycle demand across the City (See Appendix A for map). Members of the Technical Advisory Committee then used this map to identify corridors connecting locations with the highest existing and potential demand. This process supports the Plan vision, which calls for "a well-connected infrastructure network [that] will link people and places" within 20 years.

The heat map was created using one factor, Demand. The Demand factor included variables affecting existing and potential demand, including locations, such as schools and parks, that have the potential to attract bicycle riders if safe and comfortable bicycling conditions are provided. The Demand factor also included input from members of the public collected through an online interactive map, or *Wikimap*, regarding where they currently ride or would like to ride. Wikimap input was included under Demand in Iteration 1, because locations where members of the public said they rode or would like to ride were regarded as indicative of demand.

A complete list of factors, variables, and data sources used in Iteration 1 is provided in Table 1.

Table 1. Iteration 1 Factors and Variables

Factor	Variable	Source
Demand	Schools	City of Phoenix
	Bus Stops	City of Phoenix
	City Facilities (e.g. libraries, municipal offices, etc.)	City of Phoenix
	Community Centers	City of Phoenix
	Light Rail Stops	Valley Metro
	Park and Rides	Valley Metro
	Parks	City of Phoenix
	Existing Bikeways	City of Phoenix
	Wikimap Routes	Wikimap
	Wikimap Destinations	Wikimap
	% of Households in Poverty	U.S. Census Bureau
	% of Population under 18	U.S. Census Bureau
	% Households with No Vehicle	U.S. Census Bureau
	Population Density	City of Phoenix

Iteration 2 - Corridor Prioritization

Based on the heat map created in Iteration I, the Technical Advisory Committee and Ad Hoc Task Force identified 37 corridors connecting locations with the highest existing and potential bicycle demand in the City. In Iteration 2, these corridors were ranked and divided into three tiers—Tier I, Tier II, and Tier III. A table showing the rank and tier of each corridor is provided in Appendix B.

The corridors were ranked using three factors, Stakeholder Input, Connectivity, and Demand.

- **Stakeholder Input** included data collected through the online Wikimap and input from the Ad Hoc Task force and Technical Advisory Committee.
- **Connectivity** included variables meant to capture the degree to which improvements along a given corridor might enhance the connectivity of Phoenix's bicycle network by connecting to existing bicycle facilities or other identified corridors.
- **Demand** included variables representing existing or potential bicycle demand along each corridor, including all of the Demand variables used in Iteration 1 (except the Wikimap variables which were incorporated as Stakeholder Input) and one additional variable, Bicycle Trip Origin and Destination Zip Codes, from the Maricopa County Trip Reduction Survey. For Iteration 2, locations with the potential to attract bicycle demand (Attractors) were consolidated into two classes, Tier I and Tier II. Tier 1 Attractors were counted for each corridor if they were within 1 mile of the corridor. Tier 2 Attractors were counted for each corridor if they were within ¼ mile of the corridor or, in the case of bus stops, on the corridor itself.

The final corridor ranking was influenced by the weights assigned to each factor by the Ad Hoc Task Force. Weights are numbers used to indicate the relative importance of factors. A complete list of factors, factor weights, variables, and data sources used in Iteration 2 is provided in Table 2.

Table 2. Iteration 2 Factors and Variables

Factor	Factor Weight	Variable	Source
Connectivity	10	Number of times corridor intersects other corridors	N/A
		Number times corridor intersects bicycle facilities	N/A
		Presence of existing bicycle facilities	City of Phoenix
Demand	7	Tier 1 attractors (light rail stops, colleges/universities) within 1 mile of the corridor	Valley Metro Google Maps
		Tier II attractors (schools, city facilities, community centers, park and rides, parks) within ¼ mile of the corridor. Also includes bus stops directly on the corridor	City of Phoenix Valley Metro
		Land Use (commercial and high-density housing)	City of Phoenix
		Population Density	City of Phoenix
		% Households in Poverty	U.S. Census Bureau
		% Households with No Vehicle	U.S. Census Bureau
		% of Population under 18	U.S. Census Bureau
		Bicycle Trip Origin and Destination Zip Codes from the Maricopa County Trip Reduction Survey	MAG
Stakeholder Input	3	Wikimap Destinations (included public meeting input and transit center surveys)	Wikimap
		Wikimap Routes (included public meeting input)	Wikimap
		Ad Hoc Task Force input	Ad Hoc Task Force
		Technical Advisory Committee input	TAC

Iteration 3 - Project Prioritization

Discrete projects to eliminate bicycle network gaps and barriers were identified along each of the identified corridors. Projects were identified by driving each corridor or using other data to establish the desired bikeway facilities and connections along the corridors. In Iteration 3, these projects were ranked within each of the corridor tiers.

The project rankings were developed based on six factors—Connectivity, Safety, Existing Conditions, Constraints, Demand, and Equity.

- **Connectivity** included variables to represent whether the proposed projects might address an identified bicycle network barrier or connect to an existing bikeway.
- **Safety** included bicycle crashes within 300 feet of the proposed project as a way of assessing whether the project location might have the potential to improve safety. At the request of the Ad Hoc Task Force, this factor also included the percent of population under 18 to include the importance of children.
- **Existing Conditions** included variables to represent the posted speed limit and street classification of the road where each of the proposed projects is located.
- **Constraints** included variables for the order of magnitude cost for each project and whether or not it could be done within available right-of-way.
- **Demand** included variables meant to represent existing or potential bicycle demand near each project location. As in Iteration 2, attractors were classified in two tiers. Each tier was handled the same way as in Iteration 2, except that bike share stations were added as a Tier II location (these locations were not

available during Iteration 1), and schools were reclassified as Tier 1 based on a request from the Ad Hoc Task Force.

- **Equity** included variables to represent degree to which a proposed project might benefit lower income communities. These variables were included under the Demand factor in Iteration 2, where they were intended to represent potential bicycle demand along a corridor.

After consideration by the Ad Hoc Task Force, the factors used in Iteration 3 were not weighted, meaning each factor had equal influence over the final ranking. A complete list of the factors, variables, and data sources used in Iteration 3 is provided in Table 3.

Table 3. Iteration 3 Factors and Variables

Factor	Variable	Source
Connectivity	Bicycling Barriers	Wikimap
	Existing Bikeways	City of Phoenix
Safety	Bicycle Crashes	MAG
	% of Population under 18	U.S. Census Bureau
Existing Conditions	Posted Speed Limit	City of Phoenix
	Street Classification	City of Phoenix
Constraints	Order of Magnitude Cost	Lee Engineering
	Available Rights of Way	City of Phoenix
Demand	Tier 1 Attractors (light rail stops, colleges/universities, schools)	Valley Metro Google Maps
	Tier II Attractors (bus stops, bikeshare stations, city facilities, community centers, park-and-rides, parks)	City of Phoenix Valley Metro
	Population Density	City of Phoenix
	Land Use (commercial and high-density housing)	Maricopa County
Equity	% Households in Poverty	U.S. Census Bureau
	% Households with No Vehicle	U.S. Census Bureau

Conclusion

The result of Iteration 3 was three lists of ranked projects organized by tier (I, II, and III). The Tier 1 list will be used to identify and prioritize projects for inclusion in the Capital Improvement Program (CIP). The prioritized list of Tier I projects is provided in Appendix G. These projects will also be designated in the Phoenix Bicycle Master Plan as part of the initial phase of implementation. Projects associated with Tier II and Tier III corridors will be addressed in phases 2 and 3 of Plan implementation, although projects may be implemented earlier based on opportunity or other circumstances. The prioritized roster of Tier II projects is provided in Appendix H. The prioritized roster of Tier III projects is provided in Appendix I.

Appendix F

Planning Level Unit Cost Estimates

PLANNING LEVEL COST ESTIMATES

6-lane Road Diet (3-1-2 to 2-1-2 with bike lanes)/mile	$200,000/mile (rounded) = $184,800 + $15,000 Layout cost
4-lane Road Diet (2-2 to 2-1-2 with bike lanes)/mile	$121,000/mile (rounded) = $110,880 + $10,000 Layout costs
Bike Lanes (retrofit w/ obliteration and restripe)/mile	$10,000 per mile + 70 cents per liner foot (water blasting), $7 per linear foot (microseal)
Lane Line Obliteration (microseal)	$7/ft
Lane Line Obliteration (water blasting)	$0.70/ft
New Bike Lanes (no existing pavement markings)/mile	$10,000
Extend Bike lanes to intersection at signal & reduce one add/drop lane	$15,000
Extend bike lanes to intersection at signal & reduce both add/drop lanes	$10,000
10' Multi-use path ($10 per sq ft at 10 ft wide)/mile	$528,000
PHB / Bike HAWK	$85,000
Convert PHB (HAWK) to Bike HAWK	$5,000
Bicycle Detection at traffic signal (2 approaches)	$5,000
RRFB at refuge island (4 RRFB units)	$22,000
RRFB w/o refuge island (2 RRFB units)	$12,000
Center Refuge Island for Bicyclists	$50,000
Crosswalk with TRAIL CROSSING signs	$5,000
Ped / Bike Bridge over I-17 at Grand Canal	$8,000,000
Extend bike lane lines to signalized intersection	$500
Shoulder paving for bike lanes ($5 per Sq Ft, and 4 ft min width) (per mile)	$105,600
Reconstruct median (per mile)	$350,000
Green Bike Lanes with SLMs (per mile)	$120,000
SLM & BIKE ROUTE signs (20 signs per mile)	$5,500
Wayfinding signs at crossings	$1,000

Appendix G

Tier I Corridor Projects

City of Phoenix Comprehensive Bicycle Master Plan
Tier I Corridor Projects

TIER I	*SHORT TERM (5 YEARS)*
82.88	TOTAL CORRIDOR MILES (NOT INCLUDING WASHES/CANALS)
39%	OF EXISTING TOTAL CORRIDOR MILES THAT DO NOT HAVE BIKE FACILITIES
31.96	PROJECT MILES (TO COMPLETE BIKE FACILITY GAPS)
29	SEGMENT PROJECTS (INCLUDING INTERSECTIONS WITHIN OR AT SEGMENT TERMINUS)
50	INTERSECTION IMPROVEMENT PROJECTS (WHERE BIKE LANES EXIST)
$4,031,050	DOLLARS TO MAKE THE CONNECTIONS (PLANNING LEVEL IN-HOUSE COST ESTIMATE)
$126,114	AVERAGE DOLLARS PER MILE
$4,031,050	**SUBTOTAL**

1. 3rd Street from Steele Indian School Park (Indian School Road) to Buckeye Road

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
Steele Indian School Park	Roosevelt St	None	Bike Lanes	Road Diet & add Bicycle Detection at Indian School Rd	$320,000
Roosevelt St	Fillmore St	None	Bike Facilities	Road Diet	$50,000
Fillmore St	Washington St	None	Bike Facilities	Road Diet	$100,000
Washington St	Lincoln St	None	Bike Facilities	Road Diet	$100,000
Lincoln St	Buckeye Rd	None	Shared Lane Markings		$2,000

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
None	-	-	-

2. 24th Street from Van Buren Street to Baseline Road

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
Van Buren St	Sky Harbor Cir	None	Bike Lanes	Road Diet north of Madison / Median narrowing south of Madison / RR Crossing improvement	$338,000
Sky Harbor Cir	I -10	None	Bike Lanes	Reconstruct or remove a portion of median / Crosses ADOT ROW	$350,000
I-10	Magnolia St	None	Bike Lanes	Remove median / Crosses ADOT ROW	$112,000
Magnolia St	Baseline Rd	Bike Lanes	None		$0

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
Broadway Rd	No Bike Lanes for SB	Extend Bike Lanes to intersection	$500
Roeser Rd	Bike Lanes	Extend Bike Lanes to intersection	$500
Southern Ave	Bike Lanes	Extend Bike Lanes to intersection	$500
Fremont Rd	No Bike Lanes NB	Extend NB Bike Lanes to intersection and add dashed line markings for SB right turn	$500
Baseline Rd	No Bike Lanes	Extend Bike Lanes to intersection	$500

3. Central Ave from Mountain View Road to South Mountain Park

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
Mountain View Rd	Ruth Ave	None	Bike Route & SLMs		$5,000
Ruth Ave	Bethany Home Rd	None	Bike Route & SLMs		$15,000
Bethany Home Rd	Camelback Rd	Bike Lanes	None		$0
Camelback Rd	Buchanan St	None	Shared Lane Markings and Green Bike Lane	Supplemental signs - Includes NB 1st Ave from Portland to Buchanan St	$710,400
Buchanan St	Lynne Ln	Bike Lanes	None	Includes NB 1st Ave from Buchanan St to Hadley St. Crosses I-17 (ADOT ROW)	$0
Lynne Ln	Western Canal	None	Bike Lanes	Road Diet (2-1-2 to 2-1-1)	$123,000
Western Canal	Mineral Rd	Bike Lanes	None		$0
Mineral Rd	Phoenix South Mountain Park	None	Shared Lane Markings, Wayfinding Signs, Paved Trail	Park access via Mineral Rd, 2nd Pl, Summerside Rd, 5th St, Mineral Rd to 7th St	$170,000

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
Lincoln St	Bike Lane	None	$0
Buckeye Rd	No bike lane	Extend Bike Lanes to intersection	$500
Mohave St	No bike lane	Extend Bike Lanes to intersection	$500
I-17	No bike lane	Extend Bike Lanes to intersection (ADOT Signal / ROW)	$500
Broadway Rd	No bike lane	Extend Bike Lanes to intersection	$500
Roeser Rd	No bike lane	Extend Bike Lanes to intersection	$500
Southern Ave	No bike lane	Extend Bike Lanes to intersection	$500
Baseline Rd	No bike lane	Extend Bike Lanes to intersection	$500
South Mountain Ave	No bike lane	Extend Bike Lanes to intersection	$500
Dobbins Rd	No bike lane	Extend Bike Lanes to intersection	$500

4. 20th Street from Grand Canal Trail to Glendale Avenue

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
Grand Canal Trail	Mitchell Dr	None	Bike Lanes	Accommodate on-street parking	$3,000
Mitchell Dr	Bethany Home Rd	Bike Lanes	None		$0
Bethany Home Rd	Glendale Ave	None	Shared Lane Markings / Bike Lanes	Improve diverter at Bethany Home Rd. On-street route with SLMs from Bethany Home to Claremont. Paved trail from Claremont to Maryland. Use Maryland to cross Arizona Canal. Signed bike route with SLMs for 20th St / Maryland to Glendale.	$70,000

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
Indian School	No Bike Lanes	Extend Bike Lanes to intersection by eliminating one add/drop lane at signal & add Bicycle Detection	$20,000
Campbell Ave	No Bike Lanes	Extend Bike Lanes to intersection by eliminating both add/drop lanes at signal	$10,000
Highland Ave	No Bike Lanes NB	Extend NB Bike Lane to intersection and add dashed line for SB right turn lane	$500
Camelback Rd	No Bike Lanes	Extend SB Bike Lane to intersection by eliminating one add/drop lane at signal and provide through NB bike lane	$15,000
Missouri Ave	No Bike Lanes	Extend SB Bike Lane to intersection and provide one NB right turn lane with combined bike lane	$1,000

5. Osborn Road from I-17 to 40th Street

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
I-17	19th Ave	Bike Lanes	Detour to/from proposed Grand Canal Overpass over I-17 (Grand Canal project) using I-17 frontage	I-17 frontage road needs shared use path (sidewalk) and/or bike lane improvements. Provide 8 ft sidewalk along east side of I-17 frontage road	$62,000
19th Ave	20th St	None	Bike Lanes	Road Diet (19th Ave to 7th Ave & 7th St to 20th St 2-2 to 1-1-1, 7th Ave to 7th St 2-1-2 to 2-1-1) & add Bicycle Detecton at Central Ave	$470,000
20th St	36th St	Bike Lanes	None		$0
36th St	40th St	None	Bike Route with SLMs		$6,000

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
24th St	No Bike Lanes	Extend Bike Lanes to intersection by eliminating one add/drop lane at signal	$15,000
28th St	No Bike Lanes	Extend Bike Lanes to intersection	$500
32nd St	No Bike Lanes	Extend Bike Lanes to intersection by eliminating one add/drop lane at signal & add Bicycle Detection	$20,000
36th St	No Bike Lanes	Extend Bike Lanes to intersection & add EB Bicycle Detection	$3,000

6. 12th Street from Cave Creek Road to Washington Street

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
Cave Creek Rd	12th St	None	Bike Lanes	Connect 12th St to Cave Creek via Mountain View Rd	$1,000
Mountain View Rd	Sunnyslope Ln	None	Bike Lanes		$3,000
Sunnyslope Ln	Camelback Rd	Bike Lanes	None		$0
Camelback Rd	Indian School Rd	None	Bike Lanes	Road Diet (2-1-2 to 1-1-2) Camelback to Campbell and 2-2- to 111 from Campbell to Indian School Rd & Wayfinding to Grand Canal trail	$140,000
Indian School Rd	Osborn Road	Bike Lanes	None		$0
Osborn Road	Thomas Rd	None	Bike Lanes & Signed Route with SLMs	Sidewalk improvements on Thomas to Bike HAWK at Thomas/Evergreen. Signed bike route with SLMs on Evergreen St and Randolph Rd to bike lanes on Osborn Rd	$135,600
Thomas Rd	Moreland St	Bike Lanes	None		$0
Moreland St	Monroe	None	Bike Lanes	Detour utilizing 11th St between Moreland and Monroe (Recently completed project)	$0
Monroe	Washington Street	None	Bike Lanes	Recently completed project	$0

6. 12th Street from Cave Creek Road to Washington Street

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
Dunlap Ave	No Bike Lanes	Extend Bike Lanes to intersection by eliminating one add/drop lane at signal	$15,000
Butler Dr	No Bike Lanes	Extend Bike Lanes to intersection by eliminating both add/drop lanes at signal	$10,000
Northern Ave	No Bike Lanes	Extend Bike Lanes to intersection by eliminating one add/drop lane & add Bicycle Detection, Wayfinding to Arizona Canal	$21,000
Glendale Ave	No Bike Lanes	Extend Bike Lanes to intersection by eliminating one add/drop lane at signal, Wayfinding to Arizona Canal	$16,000
Maryland Ave	No Bike Lanes	Extend Bike Lanes to intersection by eliminating both add/drop lanes at signal	$10,000
Bethany Home Rd	No Bike Lanes	Extend Bike Lanes to intersection by eliminating one add/drop lane at signal	$15,000
Missouri Ave	No Bike Lanes	Extend Bike Lanes to intersection by eliminating both add/drop lanes at signal	$10,000
McDowell Rd	No Bike Lanes	Extend SB Bike Lane to intersection and provide NB right turn lane with combined Bike Lane	$500
Washington St	Bike Lanes	Add Bicycle Detection	$5,000

7. 15th Ave from Dunlap Avenue to Jefferson Street

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
Dunlap Ave	Lawrence Ln	Bike Lanes	None		$0
Lawrence Ln	Butler Dr	Shared Lane Markings & Green Bike Lane	None	Recently installed	$0
Butler Dr	Van Buren St	Bike Lanes	None		$0
Van Buren St	Jefferson St	None	Bike Lanes	Road Diet: Convert from 2-2 into 1-1-1	$36,300

7. 15th Ave from Dunlap Avenue to Jefferson Street

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
Dunlap Ave	No Bike Lanes	Extend SB Bike Lane to signal & provide NB Bicycle Detection and trail connection	$8,500
Northern Ave	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
Glendale Ave	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
Maryland Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
Bethany Home Rd	No Bike Lanes	Extend Bike Lanes to intersection by eliminating one add/drop lane at signal & add Bicycle Detection	$20,000
Missouri Ave	No Bike Lanes	Extend Bike Lanes to intersection by eliminating both add/drop lanes at signal	$10,000
Camelback Rd	No Bike Lanes	Extend Bike Lanes to intersection by eliminating one add/drop lane at signal & add Bicycle Detection	$20,000
Campbell Ave	No Bike Lanes	Extend Bike Lanes to intersection by eliminating both add/drop lanes at signal	$10,000
Indian School Rd	No Bike Lanes	Extend Bike Lanes to intersection by eliminating one add/drop lane at signal & add Bicycle Detection	$20,000
Osborn Rd	No Bike Lanes	Extend Bike Lanes to intersection by eliminating both add/drop lanes at signal	$10,000
Thomas Rd	No Bike Lanes	Extend Bike Lanes to intersection by eliminating one add/drop lane at signal & add Bicycle Detection	$20,000
Encanto Blvd	No Bike Lanes	Extend Bike Lanes to intersection by eliminating both add/drop lanes at signal	$10,000
McDowell Rd	No Bike Lanes	Extend Bike Lanes to intersection by eliminating one add/drop lane at signal & add Bicycle Detection	$20,000
Roosevelt St	No Bike Lanes	Extend Bike Lanes to intersection by eliminating both add/drop lanes at signal	$10,000

8a. Washington Street from 27th Avenue to 56th Street

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
27th Ave	19th Ave	None	Bike Lane	Adams St alignment, crosses I-17, Road Diet (4 to 3 lanes)	$121,000
19th Ave	7th Ave	Bike Lane	None	Adams St alignment west of 15th Avenue	$0
7th Ave	7th St	None	Bike Lane	Road Diet / Green Line &Shared Lane Markings from 1st St to 1st Ave; bike box at 7th St intersection	$110,000
7th St	56th St	Bike Lane	None		$0

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
44th Street	No bike lanes	Extend bike lanes to intersection	$500

8b. Jefferson Street from 27th Avenue to 26th Street

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
27th Ave	22nd Ave	Bike Route	Bike Lane	Accommodate on-street parking; Road Diet across I-17 (remove 1 lane for 900 feet)	$6,000
22nd Ave	20th Ave	Bike Lane	None		$0
20th Ave	19th Ave	None	Bike Lane	Reconstruction or Road Diet	$50,000
19th Ave	18th Ave	None	Bike Lane	Stripe Bike Lane	$11,000
18th Ave	7th Ave	Bike Lane	None		$0
7th Ave	5th St	None	Bike Lane with door zone buffer at on-street parking areas. Green Line with SLM's from 1st Ave to 1st St	Road Diet	$45,000
5th St	26th St	Bike Lane	None		$0

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
17th Ave	No Bike Lane	Extend Bike Lane to intersection	$250
16th Ave	No Bike Lane	Extend Bike Lane to intersection	$250
15th Ave	No Bike Lane	Extend Bike Lane to intersection	$250

9. ReInventPHX Gateway Bicycle Infrastructure and Intersection Projects

Segments

Roadway	End Point 1	End Point 2	Proposed	Comments	Cost Estimate
24th St	Van Buren St	Washington St	Cycle Track		
32nd St	SR 202	Washington St	Bike Lanes		
38th St	Van Buren St	Washington St	Bike Lanes	38th St in this area does not currently exist	
40th St	SR 202	Washington St	Bike Lanes		
44th St	SR 202	Washington St	Bike Lanes		
Van Buren St	I 10	SR 143	Bike Lanes		

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
None	-	-	-

10. ReInventPHX Eastlake Bicycle Infrastructure and Intersection Projects

Segments

Roadway	End Point 1	End Point 2	Proposed	Comments	Cost Estimate
3rd St / 5th St	I 10	Jefferson St	Bike Lanes		
11th St	Moreland St	Van Buren St	Bike Lanes	Completed with recent project	$0
12th St	Van Buren St	Jefferson St	Bike Lanes		
16th St	I 10	Jacob St	Bike Lanes or Cycle Track	2-1-2 with bike lanes	
20th St	Roosevelt St	Van Buren St	Bike Lanes		
Van Buren St	3rd St	I 10	Bike Lanes	1-1 with bike lanes and on-street parking on both sides	

Bike Priority - Intersection Improvements

Road 1	Road 2	Proposed	Cost Estimate
7th St	Roosevelt St		
11th St	Van Buren St		
16th St	Roosevelt St	WB Bike Box; green lane to indicate the restart of bike lanes on the NB and SB far sides of intersection; EB SLMs; SB green dashed bike lane striping at right turn lane conflict area	
16th St	McKinley St		
16th St	Van Buren St	EB and WB Bike Boxes; green lane to indicate the restart of the bike lanes on the NB and SB far sides of intersection	
20th St	Roosevelt St		
20th St	Van Buren St		

Appendix H

Tier II Corridor Projects

City of Phoenix Comprehensive Bicycle Master Plan
Tier II Corridor Projects

TIER II	*MEDIUM TERM*
76.84	TOTAL CORRIDOR MILES (NOT INCLUDING WASHES/CANALS)
43%	OF EXISTING TOTAL CORRIDOR MILES THAT DO NOT HAVE BIKE FACILITIES
33.42	PROJECT MILES (TO COMPLETE BIKE FACILITY GAPS)
29	SEGMENT PROJECTS (INCLUDING INTERSECTIONS WITHIN OR AT SEGMENT TERMINUS)
69	INTERSECTION IMPROVEMENT PROJECTS (WHERE BIKE LANES EXIST)
$4,692,500	DOLLARS TO MAKE THE CONNECTIONS (PLANNING LEVEL IN-HOUSE COST ESTIMATE)
$140,413	AVERAGE DOLLARS PER MILE
21.43	MILES OF WASHES/CANALS
39	IMPROVEMENT PROJECTS AT WASH/CANAL CROSSINGS
$9,315,250	DOLLARS TO OVERCOME BARRIERS* (PLANNING LEVEL IN-HOUSE COST ESTIMATE)
	**Includes $8,000,000 estimate to construct bridge over I-17 at the Grand Canal*
$9,320,000	DOLLARS TO PAVE GRAND CANAL TRAIL
$23,327,750	**SUBTOTAL**

11. Maryland Ave from 43th Avenue to 22nd Street

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
43rd Ave	I 17	None	Bike Lanes	Street retrofit, accommodate on-street parking / add Bcycle Detection at 47th Ave, 35th Ave & 27th Ave	$105,000
I 17	23rd Ave	None	Bike Lanes	Accommodate on-street parking	$2,300
23rd Ave	21st Ave	None	Multi-use Path	Provide paved concrete path through Washington Park	$164,000
21st Ave	18th St / SR 51	Bike Lanes	None		$0
18th Pl / SR 51	20th St	Bike Lanes	None		$0
20th St	22nd St	None	Signed Route with SLMs		$1,100

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
I 17	Pedestrian/Bike Bridge	Wayfinding Signs	$1,000
19th Ave	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
15th Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
7th Ave	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
Central Ave	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
7th St	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
12th St	No Bike Lanes	Extend Bike Lanes to intersection	$500
16th St	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
SR 51	Underpass	Wayfinding Signs	$1,000

12a. 3rd Avenue from Arizona Canal to Jefferson Street

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
Arizona Canal	Roma Ave	None	Shared Lane Markings / Paved Trail	Detour at Missouri using 4th Ave and Marshall Ave. Bike HAWKs at Northern Ave, Glendale Ave, and Bethany Home Rd.	$350,000
Roma Ave	Thomas Rd	Bike Lane	Sidewalk Trail Along North Side of Thomas Road	SB Detour to 5th Avenue via Thomas Rd sidewalk	$27,500
Thomas Rd	Van Buren St	Bike Lane	None	One-Way NB	$0
Van Buren St	Jefferson St	None	Bike Lanes	One-Way NB, accommodate on-street parking/loading. Remove one travel lane or parking lane	$36,300

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
Indian School Rd	No Bike Lane	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
Clarendon Ave	No Bike Lane	Extend Bike Lanes to intersection	$500
Osborn Rd	No Bike Lane	Eliminate N/S right turn lanes and add bike lanes	$4,000
Earll Dr	No Bike Lane	Extend Bike Lanes to intersection	$500
Thomas Rd	No Bike Lane SB	Extend Bike Lane to intersection & add NB Bicycle Detection	$2,750
Van Buren St	No Bike Lane	Extend Bike Lanes to intersection & add Bicycle Detection	$3,000

12b. 5th Avenue from Thomas Road to Washington Street

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
Thomas Rd	Van Buren St	Bike Lane	None	One-Way SB	$0
Van Buren St	Washington St	None	Bike Lanes	One-Way SB. Road Diet to remove 1 travel lane or parking lane	$27,000

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
McDowell Rd	No Bike Lane	Extend bike lane to intersection / Eliminate right turn only lane / add SB Bicycle Detection	$4,500
I-10	No Bike Lane	Shared right turn lane and bike lane	$1,000
Roosevelt St	No Bike Lane	Convert SB right turn lane into bike lane	$1,000
Van Buren St	No Bike Lane	Extend Bike Lane to intersection / Shift SB travel lanes /add SB Bicycle Detection	$7,500

13. Encanto Boulevard / Oak Street from 19th Avenue to 52nd Street

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
19th Ave	17th Ave	None	Bike Lanes	Encanto Blvd Road Diet & add Bicycle Detection at 19th Ave	$51,400
17th Ave	7th Ave	Bike Lanes	None	Encanto Blvd	$0
7th Ave	Central Ave	None	Shared Lane Markings	Encanto Blvd; Improve crossing through 1st Ave diverter & add Bicycle Detecton at Central Ave	$13,000
Central Ave	3rd St	Discontinuous	Shared Lane Markings via Hoover Ave	RRFB at 3rd St & Oak	$14,000
3rd St	16th St	None	Shared Lane Markings	Modify 7th St HAWK to Bike HAWK	$12,000
16th St	24th St	Bike Route	Bike Lanes	Accommodate on-street parking & Wayfinding signs at SR 51 bridge & add Bicycle Detection at 16th St and 24th St	$58,000
24th St	32nd St	Bike Lanes	None		$0
32nd St	47th Pl / Cross-cut Canal	Bike Route	Bike Lanes	Accommodate on-street parking & add Bicycle Detection at 32nd St, 36th St, 40th & 44th St	$113,000
48th St	52nd St	None	Bike Lanes		$23,000
52nd St	56th St	None	Bike Lanes	Paved Shoulders & add bicycle detection at 52nd St	$71,000

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
15th Ave	No Bike Lanes	Extend bike lanes to intersections & add Bicycle Detection	$5,500

14. 7th Avenue from Coral Gables Drive to Deer Valley Road

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
Coral Gables Dr	Melinda Ln	Bike Lanes	None		$0
Melinda Ln	Deer Valley Rd	None	Bike Lanes	Ad Bicycle Detection at Deer Valley Dr	$6,400

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
Greenway Pkwy	No Bike Lanes	Extend Bike Lanes to intersection / Road Diet to remove SB right turn lane & add Bicycle Detection	$7,000
Bell Rd	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
Grovers Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
Union Hills Dr	No Bike Lanes	Extend Bike Lanes to intersection	$500
Beardsley Rd (SR 101)	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$10,500
Rose Garden Ln	No Bike Lanes	Extend Bike Lanes to intersection	$500

15. Grand Canal from 75th Avenue to East City Limits (SR 202)

Intersections

Cross Street	Existing Crossing	Proposed	Comments	Cost Estimate
Grand Canal Trail	*Not Paved*	*10' Concrete Shared Use Path*	*75th Avenue to Center Parkway*	$9,320,000
75th Ave	Signalized Intersection	Utilize existing signal for crossing	Enhance Crosswalk markings, Improve Intersection Corners	$11,750
67th Ave	None	Hybrid Beacon / Bike HAWK		$85,000
Indian School Rd (6400 W)	None	Hybrid Beacon / Bike HAWK		$85,000
59th Ave	None	Route bicyclists to existing Hybrid Beacon at 59th Ave/Clarendon Ave	Widen west sidewalk / convert to Bike HAWK / Wayfinding signs	$10,500
55th Ave	None	Install ladder crosswalk and TRAIL CROSSING signs		$5,000
51st Ave	None	Route bicyclists south to signalized intersection of 51st Ave/Osborn Rd	widen sidewalks on both sides of 51st Ave & Wayfinding	$11,000
47th Ave	None	Install ladder crosswalk and TRAIL CROSSING signs		$5,000
43rd Ave	None	Hybrid Beacon / Bike HAWK		$85,000
35th Ave	None	Hybrid Beacon / Bike HAWK		$85,000
Grand Avenue	None	Hybrid Beacon / Bike HAWK or Signal	BNSF railroad crossing, upgrade surface treatment	$100,000
27th Ave	None	Hybrid Beacon / Bike HAWK		$85,000
I 17	None	Overpass	Complete connections to Osborn Rd when overpass is constructed	$8,000,000
Indian School Rd (2250 W)	None	Re-route bicyclists north and east to signalized intersection of 23rd Ave/Indian School Rd (or Hybrid Beacon / Bike HAWK)	Enhance crosswalk markings, widen sidewalks, provide wayfinding signs	$26,500
19th Ave	None	Hybrid Beacon / Bike HAWK		$85,000
15th Ave	None	Rectangular Rapid Flashing Beacon (RRFB)		$12,000
7th Ave	None	Hybrid Beacon / Bike HAWK		$85,000

15. Grand Canal from 75th Avenue to East City Limits (SR 202)

Intersections

Cross Street	Existing Crossing	Proposed	Comments	Cost Estimate
Central Ave	Signalized Intersection	None	Wayfinding signs / LRT Crossing	$1,000
7th St	None	Route bicyclists to signalized intersection of 7th St/Central High School	Widen sidewalks, provide wayfinding signs, provide north leg crosswalk at signal and PPB's	$14,000
12th St	None	Rectangular Rapid Flashing Beacon (RRFB)		$12,000
Longview Ave	None	Install ladder crosswalk and TRAIL CROSSING signs		$5,000
Indian School Rd (1550 E)	None	Hybrid Beacon / Bike HAWK	Option: Route bicyclist east to signalized intersection of 16th St/Indian School, widen sidewalks, provide wayfinding signs	$85,000
16th St	None	Hybrid Beacon / Bike HAWK	Option: Route bicyclist north to signalized intersection of 16th St/Indian School, widen sidewalks, provide wayfinding signs	$85,000
Osborn Rd	None	Rectangular Rapid Flashing Beacon (RRFB)		$12,000
20th St	None	Rectangular Rapid Flashing Beacon (RRFB)		$12,000
Thomas Rd	None	Route bicyclists west to signalized intersection of 22nd St/Thomas Rd	Enhance crosswalk markings, widen sidewalks, provide wayfinding signs	$13,500
24th St	None	Hybrid Beacon / Bike HAWK		$85,000
Oak St	None	Install ladder crosswalk and TRAIL CROSSING signs		$5,000
McDowell Rd	None	Hybrid Beacon / Bike HAWK		$85,000
32nd St	None	Hybrid Beacon / Bike HAWK	Resurface 32nd St bridge deck at crossing	$95,000
Van Buren St	Signalized Intersection	None	Wayfinding signs	$1,000
Washington St	None	Route bicyclists east to signalized crosswalk at 4250 E	Upgrade crosswalk to ladder type, provide wayfinding signs. LRT Crossing	$5,000

15. Grand Canal from 75th Avenue to East City Limits (SR 202)

Intersections

Cross Street	Existing Crossing	Proposed	Comments	Cost Estimate
44th St	Refuge Island	Rectangular Rapid Flashing Beacon (RRFB)		$12,000
SR 143	Underpass	None	Railroad track crossing west of SR 143 (2 tracks)	$0
48th St	None	Install ladder crosswalk and TRAIL CROSSING signs		$5,000
SR 202	Underpass	None		$0

16. Ray Road from Chandler Boulevard to I-10

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
Chandler Blvd	Ranch Cir S	Edge Line Stripe & Bike Route signs	Bike Lanes	Reconstruction to narrow median	$900,000
Ranch Cir S	I 10	None	Bike Lanes	Reconstruction to narrow median	$400,000

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
None	-	-	-

17. Missouri Ave from 43rd Avenue to 24th Street

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
43rd Ave	35th Ave	None	Bike Lanes	Accommodate on-street parking & add Bicycle Detection at 35th Ave	$34,500
35th Ave	27th Ave	Bike Lanes	None	Bicycle Detection at 27th Ave	$5,000
27th Ave	23rd Ave	Detour	Bike Lanes	Detour to bridge at I 17/Maryland via 23rd Ave and 27th Ave. Road Diet and bike lanes required on 27th Ave between Maryland and Missouri / Wayfinding signs.	$202,000
23rd Ave	19th Ave	None	Bike Lanes		$23,500
19th Ave	24th St	None	Bike Lanes	Road Diet (2-2 to 1-1-1 with bike Lanes) + Bicycle Detection at 19th Ave	$490,000

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
none	-	-	-

18. 48th Street from Baseline Road to Pecos Park

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
Baseline Rd	Arizona Grand Pkwy / Pointe Pkwy	None	Bike Route	Private Road	$0
Arizona Grand Pkwy / Pointe Pkwy	Pointe Pkwy	Bike Lanes	None	Private Road	$0
Pointe Pkwy	Piedmont Rd	Shared Lane Markings	None	SLMs Recently installed	$0
Piedmont Rd	Chandler Blvd	Bike Lanes	None		$0
Chandler Blvd	50th St	None	Bike Lanes	Road Retrofit & add Bicycle Detection at Chandler Blvd	$85,000
50th St	Pecos Park	Bike Lanes	None		$0

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
Elliot Rd	No Bike Lanes	Extend Bike Lanes to intersection	$500
Warner Rd	No Bike Lanes	Extend Bike Lanes to intersection	$500
Knox Rd	No Bike Lanes	Extend Bike Lanes to intersection	$500
Thistle Landing Dr	No Bike Lanes	Extend Bike Lanes to intersection	$500

19. Indian Bend Wash from SR 51 to East City Limits (Mountain View Rd)

Intersections

Cross Streets	Existing Crossing	Proposed	Comments	Cost Estimate
Thunderbird Rd	Underpass	Wayfinding Signs		$1,000
36th St	Crosswalk	Wayfinding Signs		$1,000
40th St	Underpass	Wayfinding Signs		$1,000
Cactus Rd	Underpass	Wayfinding Signs		$1,000
Tatum Blvd	Underpass	Wayfinding Signs		$1,000
Shea Blvd	Underpass	Wayfinding Signs		$1,000

20. 40th Street from Shea Boulevard to Union Hills Drive

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
Shea Blvd	Union Hills Dr	Bike Lanes	None		$0

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
Shea Blvd	No Bike Lanes	Extend Bike Lanes to intersection, eliminate dual SB right and have combined bike lane and SB through lane	$10,000
Cholla St	No Bike Lanes	Extend Bike Lanes to intersection	$500
Cactus Rd	No Bike Lanes	Extend Bike Lanes to intersection	$500
Sweetwater Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
Thunderbird Rd	No Bike Lanes	Provide missing NB segment of bike lane S of Thunderbird Rd	$1,000
Acoma Dr	No Bike Lanes	Extend Bike Lanes to intersection	$500
Greenway Rd	Bike Lanes NB only	Convert SB right turn lane to bike lane	$3,000
Bell Rd	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
Grovers Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
Union Hills Dr	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500

21. Union Hills Drive from 51st Avenue to Tatum Boulevard

Segments

Road 1	Road 2	Existing	Proposed	Comments	L
51st Ave	27th Ave	Bike Lanes	None		$0
27th Ave	23rd Ave	None	Bike Lanes	I-17 Interchange, explore alternatives with ADOT	$500,000
23rd Ave	Tatum Blvd	Bike Lanes	None		$0

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	
51st Ave	No Bike Lanes	Extend WB Bike Lanes to intersection	$250
47th Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
43rd Ave	No Bike Lanes	Convert EB Right Turn Lane to Bike Lane and extend WB Bike Lanes to intersection	$1,000
39th Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
35th Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
19th Ave	No Bike Lane WB	Extend WB Bike Lane to intersection; extend EB Bike Lane to 100' of right turn pocket and add dashed lines	$500
15th Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
7th Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
Central Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
7th St	No Bike Lane EB	Extend EB Bike Lane to intersection	$250
12th St	No Bike Lanes	Extend Bike Lanes to intersection	$500
16th St	No Bike Lanes	Extend Bike Lanes to intersection	$500
North CanyoHigh School / 1	No Bike Lane EB	Extend EB Bike Lane to intersection	$250
20th St	No Bike Lanes	Extend Bike Lanes to intersection	$500
Cave Creek Rd	No Bike Lanes	Extend Bike Lanes to intersection	$500
28th St	No Bike Lanes	Extend Bike Lanes to intersection	$500
32nd St	No Bike Lane EB	Extend EB bike lane to intersection / extend WB Bike Lane to 100' of right turn pocket and add dashed lines	$750
34th St	No Bike Lanes	Extend Bike Lanes to intersection	$500
40th St	No Bike Lanes	Extend Bike Lanes to intersection	$500
Tatum Blvd	No Bike Lanes	No recommended improvements	$0

22. 19th Avenue from Jomax Road to Thunderbird Road

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
Jomax Rd / North Valley Pkwy	Desert Hollow Dr	None	Utilize multi-use path for interim	Future developer widening will provide on-street bike lanes	$0
Desert Hollow Dr	Beardsley Rd / SR 101	Bike Lanes	None		$0
Beardsley Rd / SR 101	Thunderbird Rd	None	Bike Lane	Road Diet Thunderbird to Grandview 2-1-3 to 2-1-2, Grandview to 700 ft N of Bell Rd, and 2-1-3 to 2-1-2 to 400 feet south of Union Hills, and 3-1-3 to 2-1-3 to SR-101	$800,000

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
Rose Garden Ln	No Bike Lanes	Extend Bike Lanes to intersection	$500
Deer Valley Rd	No Bike Lanes	Extend Bike Lanes to intersection	$500
Williams Dr	No Bike Lane NB	Extend NB Bike Lane to intersection	$250
Pinnacle Peak Rd	No Bike Lanes	Extend Bike Lanes to intersection	$500
Happy Valley Rd	Bike Lanes	Provide dashed Bike Lane lines for SB right turn	$500

23. Sweetwater Avenue from 20th Street to Scottsdale Road

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
20th St	Cave Creek Rd	Bike Route	Bike Lanes		$1,500
Cave Creek Rd	42nd St	Bike Lanes	None		$0
42nd St	Paradise Village Pkwy	None	Shared Lane Markings	42nd St to Windrose to Paradise Village Pkwy West/North/East along north side of mall to Sweetwater Ave & add Bicycle Detection at Windrose Dr & Tatum Blvd	$16,500
Paradise Village Pkwy	Scottsdale Rd	Bike Lanes	None		$0

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
Cave Creek Rd	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
32nd St	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
40th St	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
56th St	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
64th St	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500

Appendix I

Tier III Corridor Projects

City of Phoenix Comprehensive Bicycle Master Plan
Tier III Corridor Projects

TIER III	*LONG TERM*
111.74	TOTAL CORRIDOR MILES (NOT INCLUDING WASHES/CANALS)
49%	OF EXISTING TOTAL CORRIDOR MILES THAT DO NOT HAVE BIKE FACILITIES
54.84	PROJECT MILES (TO COMPLETE BIKE FACILITY GAPS)
39	SEGMENT PROJECTS (INCLUDING INTERSECTIONS WITHIN OR AT SEGMENT TERMINUS)
69	INTERSECTION IMPROVEMENT PROJECTS (WHERE BIKE LANES EXIST)
$9,198,101	DOLLARS TO MAKE THE CONNECTIONS (PLANNING LEVEL IN-HOUSE COST ESTIMATE)
$167,714	AVERAGE DOLLARS PER MILE
58.37	MILES OF WASHES/CANALS
56	IMPROVEMENT PROJECTS AT WASH/CANAL CROSSINGS
$1,600,000	DOLLARS TO OVERCOME BARRIERS (PLANNING LEVEL IN-HOUSE COST ESTIMATE)
$14,550,000	DOLLARS TO PAVE ARIZONA, HIGHLINE, WESTERN, AND CAP CANAL TRAILS
$25,348,101	**SUBTOTAL**

24. 32nd Street from Rose Garden Lane (CAP Canal) to Puget Avenue

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
Rose Garden Ln (CAP Canal)	Beardsley Rd	None	Bike Lanes	Roadway Retrofit	$72,500
Beardsley Rd	Hartford Ave	Bike Lanes	None		$0
Hartford Ave	Mountain View	None	Bike Lanes	Road Diet (Current Project)	$0
Mountain View	Puget Ave	Bikes Lanes	None		$0

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	
Grovers Ave	No Bike Lane SB	Extend SB Bike Lane to intersection	$250
Michigan Ave	No Bike Lane SB	Extend SB Bike Lane to intersection	$250
Union Hills Dr	No Bike Lane SB	Extend SB Bike Lane to intersection	$250
Utopia Rd	No Bike Lanes	Extend Bike Lanes to intersection	$500

25. Cave Creek Wash from Arizona Canal to 7th St

$91,000

6

Intersections				
Cross Streets	Existing Crossing	Proposed	Comments	Cost Estimate
Peoria Ave	Underpass	Wayfinding Signs		$1,000
Cactus Rd	Underpass	Wayfinding Signs		$1,000
Thunderbird Rd	Underpass	Wayfinding Signs		$1,000
19th Ave	None	Hybrid Beacon / Bike HAWK	650 ft south of Greenway Rd + Wayfinding signs	$86,000
7th Ave	Underpass	Wayfinding Signs		$1,000
7th St	Underpass	Wayfinding Signs		$1,000

26. Roeser Road from 19th Avenue to 48th Street

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
19th Ave	11th Ave	Bike Route	Bike Lanes / Shared Lane Markings	19th Ave to 17th Ave bike lanes with on-street parking; 17th Ave to 11th Ave SLMs	$155,000
11th Ave	7th Ave	None	Shared Lane Markings	Detour to Atlanta Ave; 7th Ave from Atlanta Ave to Roeser Rd two-way cycle track on west side on street. Includes 40 ft trail connection at Roeser and 11th Ave.	$11,100
7th Ave	32nd St	Bike Lanes	None		$0
32nd St	36th St	Bike Route	Bike Lanes	Half-street Improvements along 0.5 miles of Esteban Park	$245,000
36th St	48th St	Bike Lanes	None		$0

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
Central Ave	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
7th St	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
16th St	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
24th St	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500
40th St	No Bike Lane EB	Extend Bike Lane to intersection & add Bicycle Detection	$5,250

27. Baseline Road from 75th Avenue to 48th Street

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
75th Ave	71st Ave	Bike Lanes	None		$0
71st Ave	63rd Ave	EB Bike Lane and WB Shoulder	Add WB Bike Lane	Roadway Retrofit / utilize shoulder for bike lane (portions not in Phoenix)	$73,200
63rd Ave	55th Ave	None	Bike Lanes	Pave Shoulder or wait for developer widening (Portions may not be in Phoenix)	$71,250
55th Ave	7th Ave	Bike Lanes	None		$0
7th Ave	14th St	None	Bike Lanes	Roadway Retrofit (7th Av to 7th St), Reconstruct to narrow median (7th St to 14th St)	$463,500
14th St	38th Pl	Bike Lanes	None		$0
38th Pl	48th St	None	Bike Lanes	Roadway Reconstruction to remove/narrow median or Road Diet to remove WB lane	$450,000

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
67th Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
51st Ave	No Bike Lane WB	Extend WB Bike Lane to intersection	$250
47th Avenue	No Bike Lanes	Extend Bike Lanes to intersection	$500
43rd Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
41st Ave	Bike Lanes	Provide dashed bike lines for right turn EB	$250
39th Ave	No Bike Lane WB	Extend WB Bike Lane to intersection	$250
35th Ave	No Bike Lane WB	Extend WB Bike Lane to intersection	$250
27th Ave	No Bike Lane WB	Extend WB Bike Lane to intersection	$250
19th Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
16th St	No Bike Lanes	Extend Bike Lanes to intersection	$500
20th St	No Bike Lane EB	Extend WB Bike Lane to intersection	$250
24th St	No Bike Lanes	Extend Bike Lanes to intersection	$500
32nd St	No Bike Lanes	Extend Bike Lanes to intersection	$500

28. Arizona Canal from 51st Avenue to east city limits (60th St)

Intersections

Cross Streets	Existing Crossing	Proposed	Comments	Cost Estimate
Ari ona Canal Trail	*Not Paved*	*10' Concrete Shared Use Path*	*th Street to 0th Street*	*50 000*
51st Ave	Underpass	Wayfinding Signs	borders City of Glendale	$1,000
43rd Ave	Underpass	Wayfinding Signs		$1,000
35th Ave	Underpass	Wayfinding Signs		$1,000
29th Ave	Underpass	Wayfinding Signs		$1,000
I 17	Underpass	None		$0
25th Ave	Ladder Crosswalk	Wayfinding Signs		$1,000
19th Ave	Underpass	Wayfinding Signs		$1,000
7th Ave	Underpass	Wayfinding Signs		$1,000
Dunlap Ave	Underpass	Wayfinding Signs		$1,000
Central Ave	Underpass	Wayfinding Signs		$1,000
7th St	Underpass	Wayfinding Signs		$1,000
Northern Ave	Underpass	Wayfinding Signs		$1,000
12th St	Underpass	Wayfinding Signs		$1,000
16th St	Underpass	Wayfinding Signs		$1,000
Glendale Ave	Underpass	Wayfinding Signs		$1,000
SR 51	Underpass	None		$0
Maryland Ave	None	Install ladder crosswalk TRAIL CROSSING and wayfinding signs		$5,000
24th St	Underpass	Wayfinding Signs		$1,000
32nd St	Signalized Intersection	Wayfinding Signs		$1,000
40th St	None	Route bicyclists south to signalized intersection of 40th St / Camelback Rd	Widen sidewalk, provide wayfinding signs	$10,000
Camelback Rd	None	Route bicyclists west to signalized intersection of 40th St / Camelback Rd	Widen sidewalk, provide wayfinding signs	$10,000
44th St	None	Hybrid Beacon / Bike HAWK	Wayfinding signs	$86,000
48th St/Arcadia Drive	None	Install ladder crosswalk, TRAIL CROSSING and wayfinding signs		$5,000
56th St	Signalized Intersection	Wayfinding signs		$1,000

29. Highline Canal from Dobbins Road to Arizona Grand Parkway

Intersections

Cross Streets	Existing Crossing	Proposed	Comments	Cost Estimate
i hline Canal Trail	*Paved As halt*	*10' Concrete Shared Use Path*	*o ins oad to Chandler oulevard*	*700 000*
South Mountain Ave (500 W)	None	Provide on-street bike lanes along South Mountain Ave to 7th Ave and south on 7th Ave to Dobbins Road	Provide for on-street parking. Use SLMs as alternate	$25,000
Central Ave	ladder crosswalk	Install Refuge Island and RRFB	Include RRFB in mdian island	$72,000
7th St	ladder crosswalk	None		$0
16th St	ladder crosswalk	None		$0
20th St	ladder crosswalk	None		$0
24th St	ladder crosswalk	None		$0
32nd St	None	Install ladder crosswalk and TRAIL CROSSING SIGNS		$5,000
Baseline Rd (4300 E)	No Crossing	Provide multi-use trail along S side of Baseline Rd	Provide Wayfinding signs (west half of trail)	$65,000
Baseline Rd (4100E)	No Crossing	Provide multi-use trail along S side of Baseline Rd	Provide Wayfinding signs (east half of trail)	$65,000
46th St	None (3-way STOP)	N/A	Private Street	N/A
48th St	None (4-way STOP)	N/A	Private Street	N/A
Arizona Grand Pkwy	None	N/A	Private Street	N/A

30. Southern Avenue from 75th Avenue to 48th Street

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
75th Ave	55th Ave	None	Bike Lanes	Portions not in Phoenix	$420,000
55th Ave	51st Ave	Bike Lanes	None		$0
51st Ave	47th Ave	None	Bike Lanes	Stripe existing shoulder	$60,000
47th Ave	43rd Ave	Bike Lane EB	Bike Lane WB	Roadway retrofie, portions not in Phoenix	$42,000
43rd Ave	37th Ln	None	Bike Lanes	Reconstruction, portions not in Phoenix	$71,500
37th Ln	48th St	Bike Lanes	None		$0

30. Southern Avenue from 75th Avenue to 48th Street

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
35th Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
19th Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
15th Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
7th Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
Central Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
7th St	No Bike Lanes	Extend Bike Lanes to intersection	$500
16th St	No Bike Lanes	Extend Bike Lanes to intersection	$500
20th St	No Bike Lanes	Extend Bike Lanes to intersection	$500
24th St	No Bike Lanes	Extend Bike Lanes to intersection	$500
32nd St	No Bike Lanes	Extend Bike Lanes to intersection	$500
40th St	No Bike Lanes	Extend Bike Lanes to intersection	$500
44th St	No EB Bike Lane	Extend EB Bike Lane to intersection	$250

31. Chandler Boulevard from 19th Avenue to I-10

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
19th Ave	18th Ave	None	None	Residential	$0
18th Ave	Desert Foothills Pkwy	Bike Lanes	None		$0
Desert Foothills Pkwy	26th St	Bike Route with edge line stripe	Bike Lanes	Reconstruct to narrow median	$553,000
26th St	I-10	None	Bike Lanes	Reconstruct to narrow median	$1,145,000

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
Desert Foothills Pkwy	No Bike Lanes	Extend Bike Lanes to intersection	$500

32. Dobbins Road from 51st Avenue to 20th Street

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
51st Ave	43rd Ave	None	Bike Lanes	Utilize available shoulder for Bike Lanes / Roadway Retrofit (portions not in Phoenix)	$79,000
43rd Ave	40th dr	Bike Lane WB only	Add EB Bike Lane	Utilize existing shoulder to retrofit EB Bike Lane	$44,000
40th Dr	35th Glen	None	Bike Lanes	Provide 6 ft wide full depth asphalt for bike lane	$115,000
35th Glen	33rd Ave	Bike Lane EB	Bike Lane WB	Roadway Retrofit	$43,000
33rd Ave	Central Ave	None	Bike Lanes	Utilize available shoulder for Bike Lanes	$760,000
Central Ave	8th Street	None	Bike Lanes	Roadway retrofit to add bike lanes	$62,000
8th Street	16th Street	Bike Lanes	None		$0
16th Street	19th Street	None	Bike Lanes	Add Pavement for bike lanes	$67,500
19th Street	20th Street	Bike Lane WB only	Bike Lane EB	Add Pavement for bike lanes (south and east sides only)	$48,000

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
None	-	-	-

33. Western Canal from 27th Avenue to 48th Street

Intersections

Cross Streets	Existing Crossing	Proposed	Comments	Cost Estimate
estern Canal Trail	*Not Paved*	*10' Concrete Shared Use Path*	*51st Avenue to ast City i its*	*10 000*
27th Ave	None	Install ladder crosswalk and TRAIL CROSSING signs		$5,000
25th Ave	None	Install ladder crosswalk and TRAIL CROSSING signs		$5,000
24th Ave	None	Install ladder crosswalk and TRAIL CROSSING signs		$5,000
19th Ave	None	Install ladder crosswalk and TRAIL CROSSING signs		$5,000
Dobbins Rd	None	Install ladder crosswalk and TRAIL CROSSING signs		$5,000
South Mountain Ave	None	Install ladder crosswalk and TRAIL CROSSING signs		$5,000
7th Ave	None	Install ladder crosswalk and TRAIL CROSSING signs		$5,000
Baseline Rd (400 W)	None	Install Hybrid Beacon / Bike HAWK		$85,000
Central Ave	None	Install Hybrid Beacon / Bike HAWK		$85,000
Jesse OwenPkwy	None	Install ladder crosswalk and TRAIL CROSSING signs		$5,000
7th St	None	Install Hybrid Beacon / Bike HAWK		$85,000
10th St	None	Install ladder crosswalk and TRAIL CROSSING signs		$5,000
16th St	None	Install Hybrid Beacon / Bike HAWK		$85,000
24th St	None	Install Hybrid Beacon / Bike HAWK		$85,000
32nd St	None	Install RRFB (two double-sided units)		$12,000
40th St	None	Install Hybrid Beacon / Bike HAWK		$85,000
48th St	None	Install Hybrid Beacon / Bike HAWK		$85,000

34. Cave Creek Road from 7th Street / Dunlap Road to Carefree Highway

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
7th St / Dunlap Rd	8th St	None	None	Detour route to use Hatcher Rd WB	$1,000
8th St	Cactus Rd	Bike Lanes	None		$0
Cactus Rd	Bell Rd	Bike Lanes	Buffered Bike Lanes	Road Diet	$622,000
Bell Rd	Carefree Hwy	Bike Lanes	None	northernmost half mile is not in Phoenix city limits	$0

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
Hatcher Rd	No Bike Lanes	Extend Bike Lanes to intersection	$500
Mountain View Rd	No Bike Lanes	Extend Bike Lanes to intersection	$500
Peoria Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
Cactus Rd / Thunderbird Rd	No Bike Lanes	Provide one right turn lane with combined Bike Lane (NB) / Road Diet (SB)	$1,000
Sweetwater Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
Sharon Dr	No Bike Lanes	Extend Bike Lanes to intersection	$500
Greenway Rd	No SB Bike Lane	Extend SB Bike Lane to intersection	$250
Greenway Pkwy	No Bike Lanes	Extend Bike Lanes to intersection	$500
Grandview Rd	No Bike Lanes	Extend Bike Lanes to intersection	$500
Bell Rd	No Bike Lanes	Extend Bike Lanes to intersection (SB) / Provide Bike Lane to left of NB right turn lane	$1,000
Grovers Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
Union Hills Dr	No Bike Lanes	Extend Bike Lanes to intersection	$500
Beardsley Rd	No Bike Lanes	Extend Bike Lanes to intersection	$500
Rose Garden Ln	No Bike Lanes	Extend Bike Lanes to intersection	$500
Deer Valley Rd	No SB Bike Lane	Road Retrofit (SB) / Provide SB Bike Lane	$250
Mountain Gate Pass	No Bike Lanes	Extend Bike Lanes to intersection	$500
Desert Peak Pkwy	No SB Bike Lane	Extend SB Bike Lane to intersection	$250
Desert Willow E / W Pkwy	No Bike Lanes	Extend Bike Lanes to intersection	$500
Lone Mountain Rd	No Bike Lane NB	Convert NB right turn lane to Bike Lane	$1,000

35. Broadway Road from 99th Avenue to 48th Street

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
99th Ave	75th Ave	None	Bike Lanes	Roadway retrofit for 1 miles, add asphalt for new shoulders for 2 miles. Portions outside of city limits	$650,000
75th Ave	69th Dr	Striped Shoulders	Bike Lanes	Some street retrofit required. Portions outside of city limits	$48,000
69th Dr	63rd Ave	None	Bike Lanes	Roadway retrofit / add shoulder for Bike Lanes & provide Bicycle Detection at 67th Ave. Portions outside of city limits	$220,000
63rd Ave	59th Ave	None	Bike Lanes	Road Diet, portions outside of city limits	$62,000
59th Ave	51st Ave	None	Bike Lanes	Roadway retrofit / Utilize available shoulder for Bike Lanes / Add pavement for shoulder east of 59th Ave	$147,000
51st Ave	19th Ave	None	Bike Lanes	Reconstruction (Current Project will include bike lanes)	$0
19th Ave	7th St	None	Bike Lanes	Reconstruction (Current Reconstruction Project will not include bike lanes, roadway retrofit to provide bike lanes)	$404,000
7th St	48th St	None	Bike Lanes	Road Diet	$1,000,000

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
None	-	-	-

36. Deer Valley Road from 35th Avenue to 56th Street

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
35th Ave	Sport Complex (2500 E)	Bike Lanes	None		$0
Cave Creek Sport Complex (2500 E. Deer Valley)	Black Mountain Pkwy	None	Bike Lanes	Pave shoulder or wait for future development. Provide Bicycle Detection at Black Mountain Pkwy	$410,000
Black Mountain Pkwy	40th St	Bike Lanes	None		$0
40th St	Tatum Blvd	None	Bike Lanes	Pave south shoulder or wait for future development. Eliminate dual EB right turn lanes at Tatum Blvd.	$170,000
Tatum Blvd	56th Street	Bike Lanes	None		$0

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
31st Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
27th Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
I 17	No WB Bike Lanes	Stripe WB Bike Lane through interchange (ADOT)	$5,000
23rd Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
19th Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
18th Ave	No EB Bike Lanes	Extend EB Bike Lane to intersection	$250
7th Ave	No Bike Lanes	Extend Bike Lanes to intersection	$500
7th St	No Bike Lanes	Extend Bike Lanes to intersection	$500
16th St	No Bike Lanes	Extend Bike Lanes to intersection	$500
22nd St	No Bike Lanes	Extend Bike Lanes to intersection	$500
Cave Creek Rd	No Bike Lanes	Roadway retrofit, remove dual EB right turn lanes, extend WB bike lane to intersection	$2,000

37. Encanto Boulevard from 95th Avenue to 31st Avenue

Segments

Road 1	Road 2	Existing	Proposed	Comments	Cost Estimate
95th Ave	91st Ave	Bike Lanes	None		$0
91st Ave	87th Ave	None	Bike Lanes	Provide on-street parking & add Bicycle Detection at 91st Ave	$26,000
87th Ave	86th Dr	None	Bike Lanes	Roadway Retrofit	$11,300
86th Dr	83rd Ave	Bike Lanes	None		$0
83rd Ave	75th Ave	None	Bike Lanes	Road Diet (2-1-2 to 2-1-1) & add Bicyle Detection at 83rd Ave	$165,000
75th Ave	55th Ave	None	Bike Lanes	Roadway Retrofit, accommodate on-street parking. Add Bicycle Detection at 75th, 67th Ave & 59th Aves	$131,500
55th Ave	51st Ave	Bike Lanes	None		$0
51st Ave	49th Ave	None	Shared Lane Markings	Detour via Vernon Ave. Add EB Bicycle Detection at 51st Ave	$1,500
49th Ave	31st Ave	Bike Lanes	None		$0

Signalized Intersections with Existing Bike Lanes

Intersection	Existing	Proposed	Cost Estimate
51st Ave	No Bike Lanes EB	Roadway Retrofit / add sidewalk on E side of 51st Ave to Vernon. Add EB Bicycle Detection at 51st Ave	$4,500
43th Ave	No Bike Lanes	Roadway Retrofit / extend bike lanes to intersection. Add EB Bicycle Detection at 51st Ave	$6,000
35th Ave	No Bike Lanes	Extend Bike Lanes to intersection & add Bicycle Detection	$5,500

38. 44th Street from Sky Harbor Airport East Economy Lot to University Drive

Segments

Road 1	Road 2	Existing	Proposed	Cost Estimate
East Economy Lot, Sky Harbor Airport	University Dr	None	Two-way cycle track along west side of 44th street utilizing existing 44th Street bridge over the Salt River. Two-way cycle track will need to be constructed on west side of 44th street north of University for 2,100 feet. Pedestrian and bicycle crosswalk improvements at 44th Street / University. New bike entrance will be needed from cycle track into East Economy Parking Lot with access to Sky Train. Provide secure bike parking at East Economy Parking Lot.	$350,000

39. CAP Canal from west City limits (6700 W) to Scottsdale Road

Intersections

Cross Streets	Existing Crossing	Proposed	Comments	Cost Estimate
CAP Canal Trail	Not Paved	10' Concrete Shared Use Path	West City Limits to East City Limits	*0 000*
I-17	Overpass (south side)	None		$0
Norterra Pkwy	None	Install Refuge Island and RRFB & Wayfinding Signs		$62,000
North Valley Pkwy	Underpass (south side)	None		$0
Happy Valley Rd	None	Install Hybrid Beacon / Bike HAWK	Wayfinding signs	$86,000
7th St	None	Install Hybrid Beacon / Bike HAWK	Wayfinding signs	$86,000
Deer Valley Rd	None	Install Hybrid Beacon / Bike HAWK	Wayfinding signs. Explore grade separated crossing	$86,000
Cave Creek Rd	None	Install Hybrid Beacon / Bike HAWK	Wayfinding signs. Explore grade separated crossing with future bridge over the CAP	$86,000
SR 101	Underpass	None	ADOT	$0
SR 51	Underpass	None	ADOT	$0
Tatum Blvd	None	Install Hybrid Beacon / Bike HAWK	Wayfinding signs	$86,000
56th St	Underpass	None		$0
Scottsdale Rd	Signalized Intersection	None	City of Scottsdale	$0

Appendix J

Draft City Ordinance to Preclude Bicyclists from Riding Against Traffic On Sidewalks

City of Phoenix

To: Gary Clovis, Sergeant
Traffic Bureau Headquarters

Date: January 24, 2012

From: Walter Olsen, 4479
Traffic Bureau Headquarters

Subject: AMEND CITY ORDINANCES DEALING WITH THE OPERATION OF BICYCLES

PURPOSE:

The purpose of this memorandum is to suggest a committee be formed to draft a city ordinance that would preclude bicyclists from riding against traffic on sidewalks inside the city of Phoenix. I believe if this ordinance were to pass, we could thru media campaigns, warnings by officers and later enforcement significantly reduce bicycle related crashes in the city of Phoenix.

DISCUSSION:

In the course of doing enforcement and investigating traffic collisions, we have identified a significant problem as it relates to the operation of bicycles within our community. A common bicycle related collision we encounter is a cyclist riding against traffic on the sidewalk and colliding with a motor vehicle exiting a private drive or making a right turn from a collector street.

Drivers of motor vehicles are looking in the direction of on-coming traffic as they exit a driveway or turn right from an intersecting street. Bicyclists traveling against the flow of traffic often believe the driver has seen them. The bicyclist will pull out in front of the right turning vehicle and thus they collide.

Currently Arizona traffic laws only govern the movement of bicycles when they are riding in the street. There are no state statutes or city ordinances that prohibit bicyclists from riding the wrong way on sidewalks. There are laws that require bicycles riding in the street do so with the normal flow and direction of traffic.

Our neighboring city of Tempe (a college town) has for many years dealt with a high volume of bicyclists. In order to reduce bicycle related crashes they passed an ordinance that prohibits bicyclists from riding the wrong way on sidewalks. As a resident of Tempe (and as a driver) I have some expectation that bicycle riders are far less likely to be riding against traffic.

Bicycle enthusiasts and bike groups have an obvious interest in bicycle safety; they want cars and bicycles to share the road safely. Bicycle safety advocates strongly recommend bicyclists ride with traffic. We have heard from bicycle groups they would not oppose an ordinance prohibiting bicycle riders from riding the wrong way on sidewalks.

According to Phoenix Street Transportation Engineer and Safety Specialist Kerry Wilcoxon the problem of "wrong way cyclists" is either the first or second leading cause of bicycle collisions in our community. He indicated the timing for such an ordinance may be now as the City is working hard to find solutions to reduce bicycle crashes.

I believe it would be in the Community's best interest to prohibit wrong way bicycle riding on sidewalks that are adjacent to streets with speed limits above 25 mph. If this ordinance were to pass, we would be regulating bicycles generally outside of residential areas, on main arterial roadways.

RECOMMENDATION:

I recommend a committee be formed with members from Street Transportation, Police (Traffic) and the City's Legal Department in hopes of establishing an ordinance to preclude wrong way bicycling on city sidewalks. If the committee drafts a proposed ordinance it could then be presented to the City's Public Safety, Veterans, Transparency and Ethics Subcommittee.

I am also suggesting this group discuss adding language to the City ordinances that places responsibility on the drivers of motor vehicles to yield to *bicyclists travelling lawfully on sidewalks*.

See attachment "A" for a suggested first draft of this ordinance. Please forward this memo through the chain-of-command for consideration.

Attachment A

Phoenix City Ordinance Sec 36-111
Speed limit and direction of travel on a sidewalk

A. No person shall ride, operate or use a wheeled conveyance, to include but not limited to bicycle, unicycle, skateboard, cart, wagon, wheelchair, or mobility device whether human, gas or electric powered on a sidewalk in a willful or wanton disregard for the safety of persons or property or at speed greater than 15 mph.

B. [On or adjacent to any street or highway with a speed limit greater than 25 mph,] no person shall ride or operate a bicycle or wheeled conveyance in any direction except that permitted by vehicular traffic on the same side of the roadway where the sidewalk or bicycle lane exists; provided, that bicycles or wheeled conveyance may proceed either way where signs or pavement markings on the sidewalk, bikeway or bicycle lane appear designating two-way traffic.

Phoenix City Ordinance Sec. 36-110
Yielding right-of-way

A. The operator of a bicycle emerging from an alley, driveway, or building shall, upon approaching a sidewalk or the sidewalk area extending across such alley, driveway, or building exit, yield the right-of-way to all pedestrians approaching on said sidewalk or sidewalk area, and upon entering the roadway shall yield the right-of-way to all vehicles approaching on said roadway

B. No person shall drive a vehicle upon or across a sidewalk except to enter or leave the roadway and only after giving the right-of-way to all bicycles or pedestrians lawfully upon the sidewalk.

Italics indicates suggested language to add to the City Ordinances

Appendix K

Bicycle Parking

Bicycle Parking at Destinations

Bicycle parking is an important component of a multi-modal transportation system. More people are likely to bicycle if they are confident they will find convenient, secure, and weather-protected parking areas at their destination. Convenient, well-designed bicycle parking enables bicyclists to secure their bicycles and discourages locking bicycles to trees, fences, and other undesignated locations. Adding bicycle parking is also an opportunity to integrate public art into streetscapes, develop a brand for the Phoenix bicycling program, and engage the business community in bicycling.

General Guidelines

- Bicycle parking should be located to prevent encroachment into the pedestrian traveled way and prevent damage to vegetation and street furniture.
- Bicycle parking should be conveniently placed within close proximity of entrances to businesses, transit stops, multi-family dwellings, parks, schools, libraries and other community facilities.
- Unless located at a transit station or other high demand destination, generally one or two racks at multiple locations along a block face is preferred to grouping all bike racks at one location.
- Bicycle racks should be covered wherever possible to prevent damage from the sun and rain, and to prevent bicycle seats from deteriorating (from ultra violet rays) or getting too hot. This can often be achieved through strategic placement, such as placing racks under an existing storefront awning or eave.
- Bicycle parking should be designed to accommodate the full range of bicycle types, including cargo bikes, bikes with trailers, bikes with a trailer bike, bikes with built-in child or cargo holders, tandems, and adult and child tricycles.
- In areas with high bicycle parking demand, limited space behind the curb, and limited private bike parking, in-street corrals or other high capacity bike rack designs should be considered.

Recommended Facilities

Bicycle parking may be provided in a variety of forms depending on whether it is for short-term or long-term use (e.g., a brief shopping stop or an all-day event).

Short Term Parking

Bicycle racks are an inexpensive and effective way to provide short-term bicycle parking. The preferred bicycle rack design is the Inverted-U, due to its versatility, level of security and small footprint. Inverted U racks can be installed individually or as part of a series. Hitch style racks may also be appropriate in locations where there is insufficient space for inverted U-racks.

Covered or uncovered bicycle racks are appropriate for short term parking needs at retail stores, restaurants, recreation centers, parks, libraries and similar locations. Covered bicycle racks are recommended at transit stations, universities, colleges, and elementary, middle and high schools, because students, teachers and staff often stay for longer periods of time. At all locations it is important to plan for both employee and visitor bicycle parking.

Long-Term Parking

On-demand lockers, standard rental lockers or bike-lids are recommended at locations where long-term bicycle parking is needed in lightly supervised locations such as park-and-ride lots, commuter rail stations, office complexes, and industrial parks. Bike lids are covered racks that provide protection from the weather, but are easier to install and move if needed.

Secure indoor parking is needed in apartment buildings and other multi-family, residential housing types, including senior housing and retirement centers. Garden apartments and campus-style complexes that have limited public access can meet residents' needs by providing covered medium security bike parking in convenient locations for regular use, and indoor storage areas for long-term storage.

Showers, changing rooms, and secure storage facilities

People choose to travel by bike because it is fun and a good source of exercise. To make their trips more comfortable, bicyclists often choose to wear athletic clothing and work up a sweat, while their plain clothes are stowed in a backpack, basket or pannier. If their final destination does not have a place where they can clean up and change, they may opt to drive instead. One method employers use to encourage bicycle commuting is installing showers and locker rooms in their buildings. Some establishments have partnered with nearby gyms to allow their employees and customers access to the showering facilities, at a reduced or subsidized cost. Phoenix can show its support by installing showers and changing rooms in their civic buildings for employees to use.

Bicyclists often have additional gear that needs to be stored safely when they arrive at their destination. This can include helmets, lights, bells, baskets/panniers, etc. Usually these items are vulnerable to theft or damage even if the bike is secured to a rack. To ease the concerns of the bicyclist, it can be helpful to offer lockers or other secure locations for bicyclists to store their gear. One low-cost alternative is allowing customers to store their gear behind a store counter, or with a coat check. If bicyclists know that their gear is safe, it makes the choice to bike an easier one.

Recommendations

- The City of Phoenix should review and potentially expand the existing rack request program operated by the Street Transportation Department.
- The City of Phoenix should partner with business improvement districts such as the Downtown Phoenix Partnership to provide bicycle racks in commercial areas.
- The City of Phoenix should prioritize funding for bicycle rack installation along Tier I corridors during the initial phase of bicycle plan implementation, Tier II corridors during the second phase of bicycle plan implementation, and Tier III corridors during the third phase of bicycle plan implementation.
- The City of Phoenix should consider initiating an interagency program to evaluate, replace and add bike parking at all City-owned public facilities.
- The City of Phoenix should consider amending zoning and subdivision codes to require redevelopment and new development to provide appropriate types, quantities and locations of bicycle parking as part of development approval. See Sample Bicycle Parking Guidelines below.
- The City of Phoenix bicycle program web page should provide a map of bicycle parking locations in downtown Phoenix, a way for bicyclists to indicate where bicycle parking is needed, and information on how to request a bicycle rack.
- If the City of Phoenix Street Transportation Department converts single-space parking meters to pay-stations, old parking meter posts should be modified to function as bicycle racks where feasible and appropriate.
- The City of Phoenix should establish a process to evaluate locations and facility types for long-term bicycle parking, and develop branding.
- The bicycle parking standards provided in the Phoenix Traffic Operations Handbook should be updated to:
    - Accommodate cargo bikes, bikes with trailers, bikes with a trailer bike, bikes with built-in child or cargo holders, tandems, and adult and child tricycles.
    - Provide specifications for in-street bicycle corrals and long-term bicycle parking, such as bike lockers.
    - Specify that, with the exception of racks attached to parking meters, racks located perpendicular to the curb should be a minimum 3-feet from the back of the curb and racks located parallel to the curb should be a minimum of 2 feet from the back to the curb per AASHTO. Professional judgment should be exercised in areas where the sidewalk is narrow.
    - Specify that the minimum clearance between a crosswalk and a bike rack is 5 feet.
    - Specify that the minimum clearance between a bike rack and street furniture is 3 feet.
    - Specify that the minimum clearance between utility vaults, manholes, power poles, permanent planters, etc. shall be 3 feet.
    - Specify that the minimum clearance between bus shelters, fire hydrants, and signal control cabinets should be 5 feet.
    - Specify desirable spacing between racks.

- Specify spacing between bicycle racks and walls per the 2012 AASHTO Bicycle Design Guide. For U-racks placed perpendicular to a wall, AASHTO recommends a minimum of 4 feet, assuming access is needed from both sides. For U racks placed parallel to a wall, AASHTO recommends a minimum of 3 feet between the wall and the rack.

Sample Bicycle Parking Guidelines

The following sample guidelines provide guidance and direction for new regulations in the City of Phoenix zoning and subdivision codes that govern new development, redevelopment or major renovations. These sample guidelines are intended to facilitate adequate and secure short and long-term bicycle parking for residents, workers in office and commercial buildings and students and staff in institutional buildings. They can also serve as a template for those building owners who would like to retrofit existing residential or commercial properties with new or added bike parking facilities.

The proposed guidelines presented below are provided as a model for the City of Phoenix. Sections include: Why Bike Parking, Definitions, Requirements, Equipment and Installation Design.

Why Bike Parking?

The provision of parking facilities directly encourages people to use their bicycles as a means of transportation. More people are likely to bicycle if they are confident that they will find convenient, secure, and weather-protected parking areas at their destination. The following Bicycle Parking Requirements are applicable for accommodating bicycles in all buildings and development types in Phoenix.

These requirements also set standards for bicycle parking at public facilities, bike-share stations and shower and changing facilities.

Definitions

Secure/Covered Facilities: Bicycle parking areas that protect the entire bicycle, its components and accessories against theft and against inclement weather, including wind-driven rain. Examples include but are not limited to: indoor bike room, indoor storage area, bike lockers, indoor or outdoor bike valet parking with weather protective cover and siding, areas with security camera linked to live viewers, and/or key access-covered cages with weather-protective siding.

Outdoor/Covered Facilities: Bicycle parking areas that provide some protection against inclement weather and may have added theft security. Covers include but are not limited to a building projection, an awning or tented roof. Siding is not required. Racks associated with covers will allow the user to lock the bicycle frame and one wheel while the bicycle is supported in a stable position.

Outdoor/Open facilities: Bicycle parking areas that permit the locking of the bicycle frame and one wheel to a bicycle rack and which supports the bicycle in a stable position without damage to wheels, frame or components. Cover and/or security enhancements are not provided.

Bicycle parking space: The number of bicycles that can be accommodated by the bicycle racks or facility, as defined by the user's manual for the rack or facility referenced. For the remainder of this document, guidelines refer to spaces, or number of bicycles for which the facility is designed to accommodate.

Requirements

The following are minimum requirements according to building type. Exceeding these minimum requirements is encouraged but not required.

Three-Five Unit Residential Buildings:

- One Secure/Covered bicycle parking space per unit located in an easily accessed basement storage area or adjacent / attached garage or shed.
- Shower / changing facilities as included in each residential unit.

Appendix K – Bicycle Parking

Multi-Unit Residential (6 or more units) Buildings:

- One Secure/Covered bicycle parking space per unit located in an easily accessed dedicated storage area.
- One Outdoor/Covered or Outdoor/Open parking space per five units with a minimum of 2 Outdoor/Covered or Outdoor/Open spaces per building.
- Shower / changing facilities as included in each residential unit.

Office, Commercial and Industrial Buildings:

- One Secure/Covered parking space per worker for 10% of the planned part- and full-time worker occupancy (or 0.3 parking spaces per 1,000 square feet of development), but no fewer than 4 Secure/Covered parking spaces per building.
- One Outdoor/Covered or Outdoor/Open parking space for patrons and visitors for 2.5% of estimated daily building users but no fewer than 4 Outdoor/Covered or Outdoor/Open spaces per building.
- Provide at least one shower / changing facility for any building with 100 or more planned part- and full-time workers (or over 40,000 square feet of development) and one additional shower / changing facility per every 200 planned workers (or 80,000 square feet of development), thereafter. Shower / changing facility requirements may be met by providing the equivalent of free access to on-site health club shower facilities where the health club can be accessed without going outside.

Retail Buildings:

- One Secure/Covered bike parking space per worker for 10% of the planned part- and full-time worker occupancy (or 0.3 spaces for 1,000 square feet of development) but no fewer than 2 Secure/Covered parking spaces per building.
- One Outdoor/Covered or Outdoor/Open parking space for patrons and visitors per 5,000 square feet, but no less than 2 Outdoor/Covered or Outdoor/Open spaces per building.
- Provide at least one shower / changing facility for any development with 100 or more planned part- and full-time workers (or over 40,000 square feet of development) and one additional shower / changing facility per every 200 planned workers (or 80,000 square feet of development), thereafter. Shower / changing facility requirements may be met by providing the equivalent of free access to on-site health club shower facilities where the health club can be accessed without going outside of buildings.

Institutional Building and Campus Dormitory Buildings:

- One Secure/Covered parking space per student and staff for 15% of the planned part- and full-time campus wide occupancy (or 0.5 parking spaces per 1,000 square feet of development), but no fewer than 4 Secure/Covered parking spaces per building.
- One Outdoor/Covered or Outdoor/Open parking space for patrons and visitors for 5% of estimated daily building users but no fewer than 4 Outdoor/Covered or Outdoor/Open spaces per building.
- Provide at least one shower / changing facility for any campus building with 100 or more planned part- and full-time students and staff (or over 40,000 square feet of development) and one additional shower / changing facility per every 200 planned students and staff (or 80,000 square feet of development), thereafter. Shower / changing facility requirements may be met by providing the equivalent of free access to on-site health club or gym shower facilities where the health club or gym can be accessed without going outside.
- One Secure/Covered parking space per every two beds in a Dormitory building where such parking spaces may not be counted in the campus wide total.

Mixed- Use Buildings:

- Provide parking and shower facilities proportional to the mix of uses using the above requirements.
- Shared facilities may be provided for non-residential uses mixed within a single building or for non-residential uses within a single development that is under 50,000 square feet. Specific requirements for unique uses such as senior or assisted living facilities, movie theaters, sports arenas or conference venues will be determined on a case-by-case basis. Special provisions such as bicycle valet parking for single events such as concerts should be encouraged.

Bike Parking Equipment and Installation Design

1. Acceptable bike rack designs must have a two point support system for easy access and locking of frame and wheels. The designs must present no sharp edges to pedestrians or bicyclists.
2. Developers are encouraged, but not required to use either an inverted-U style rack or an artistic style rack to match City of Phoenix preferred designs.
3. All racks and other fixtures must be securely affixed to the ground or a building.
4. Areas used for bicycle parking should be secure, well-maintained, well-lighted and easily accessible to bicycle riders.
5. No bicycle parking areas should impede sidewalk or pedestrian traffic. Designs that do not provide two-point supports for bicycles may create unfit sidewalk conditions. Poor rack designs may allow bicycles to fall over easily and become damaged, or encroach into the pedestrian right-of-way. Older "school" or "dish" racks are not functional and do not provide full support. Single post designs with sharp edges can also be problematic to pedestrians, especially those with visual disabilities. Racks with one point of contact, like hitch racks need to be in-ground mounted. Examples of recommended racks include: inverted U, hitch rack, upside down U rack, and multiple bike racks.
6. Retail establishments shall have Outdoor/Covered or Outdoor/Open facilities within 50 feet of the primary entrance(s).
7. Racks must be 4-5 feet away from hydrants and other street furniture.
8. No bicycle parking shall be located farther from the entrance of a building than the closest automobile parking space (including accessible parking spaces).
9. Prominently placed signs should be within 50 feet of parking and immediately visible. Signs must direct users to all secure/covered or outdoor/covered facilities that are not immediately visible from the street.
10. All bicycle parking shall be separated by a physical barrier/parallel to curb or sufficient distance from car parking and vehicular traffic to protect parked bicycles from damage.
11. Accessible, Indoor and Secure Accessible bike parking encourages daily use with well-maintained and well-lit easy access for riders.
12. Converting on-street car parking to in-street bike corrals can accommodate up to eight bicycles, and encourage people to use their bikes for shopping and running errands-not just commuting.