

Designing and Implementing a Temporary Regional Automated Bicycle Counting Program

MAG Bicycles Count Project

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Presentation Overview

- Project Purpose
- Bike Count Technology
- Count Station Siting Process
- Data Cleaning and Factoring
- Summary of Count Trends
- On-Going Data Collection and Planning Applications



Project Impetus & Purpose

- Initiated by Bike & Pedestrian Coordinator at Maricopa Association of Governments (MAG)
- MPO's response to dearth of cycling data
- Interest in on-going regional monitoring program to support improved planning for active travel

Count Technologies Considered

- Manual
- Video
- Continuous Counting (*Pneumatic Tubes/Inductive Loops*)

Total Data Collection Budget = \$42,000



Alternative Technology Combinations

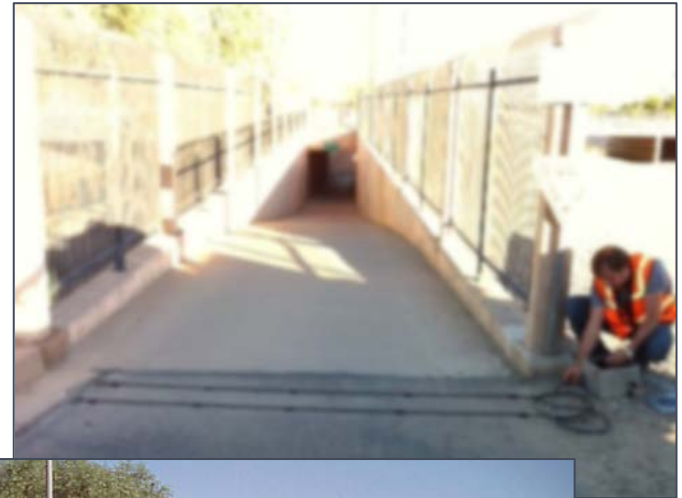
Options	Technology	Count Period	Number of Locations	Cost	TOTAL COST
#1	Manual Counts	Weekdays 5-7PM	84 sites	\$13,100	\$41,100
	Pneumatic Tubes	24-hour, continuous	22 units for 2 week each	\$28,000	
#2	Video	24-hour	30 sites	\$13,500	\$41,000
	Pneumatic Tubes	24-hour, continuous	25 units for 1 month each	\$27,500	
#3	Manual Counts	Weekdays 5-7PM	75 sites	\$11,100	\$39,100
	Video	24-hour	60 sites	\$28,000	

Proposed Number and Technology

Best mix of short and long counts for the cost

Technology	Count Period	Number of Locations	Cost	TOTAL
Manual Counts	56 Weekdays 4-6pm 28 Saturdays 10am-12noon	84 sites	\$13,100	\$41,100
Pneumatic Tubes <i>(Temporary Installation)</i>	24-hour, continuous	44 2-week counts (leased 22 units for 2 months)	\$28,000	

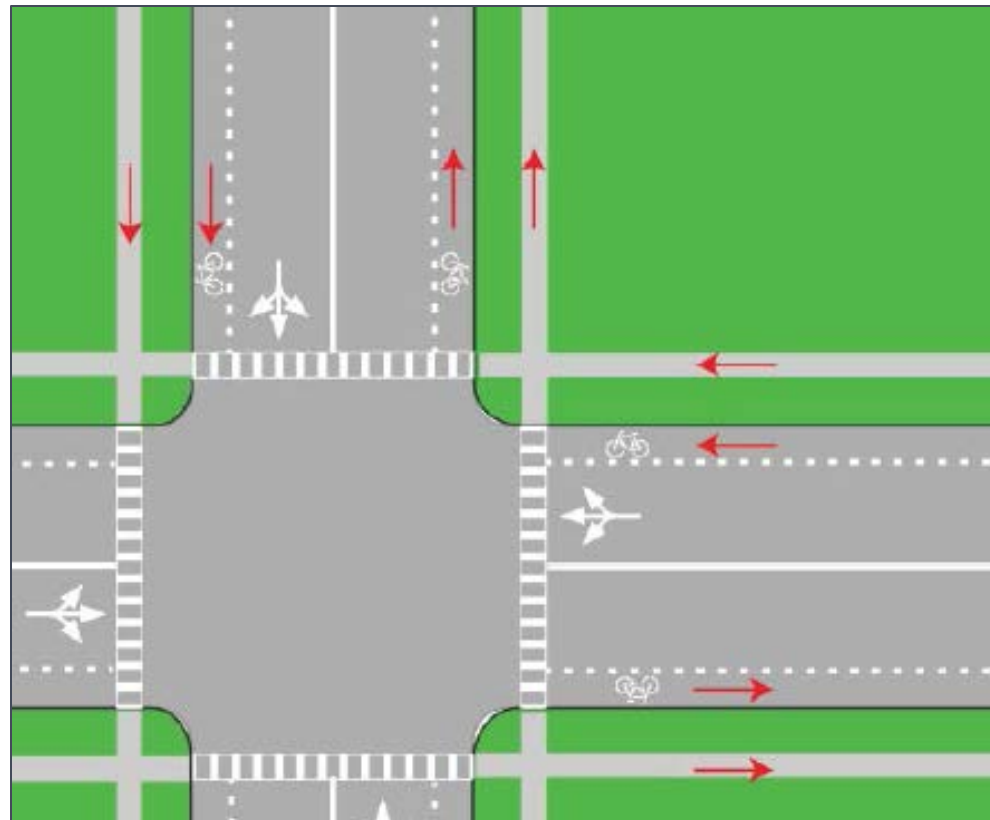
Temporary Pneumatic Tubes



Counted over eight 2-weeks periods in Oct and Nov 2013

Approach to Manual Counting

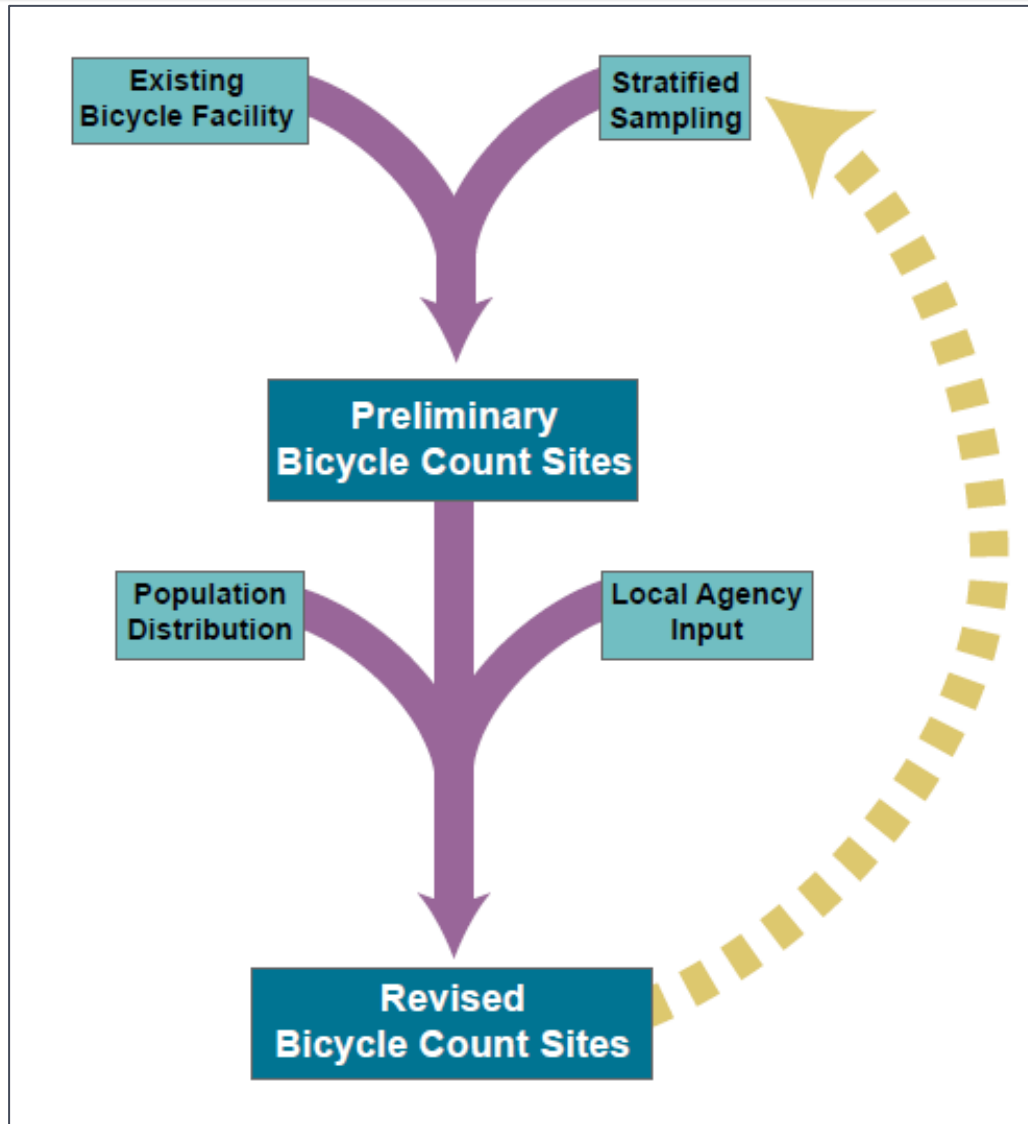
- 4 Movements Recorded at Every Intersection Approach
- Sidewalk & Travel Lane or Bike Lane



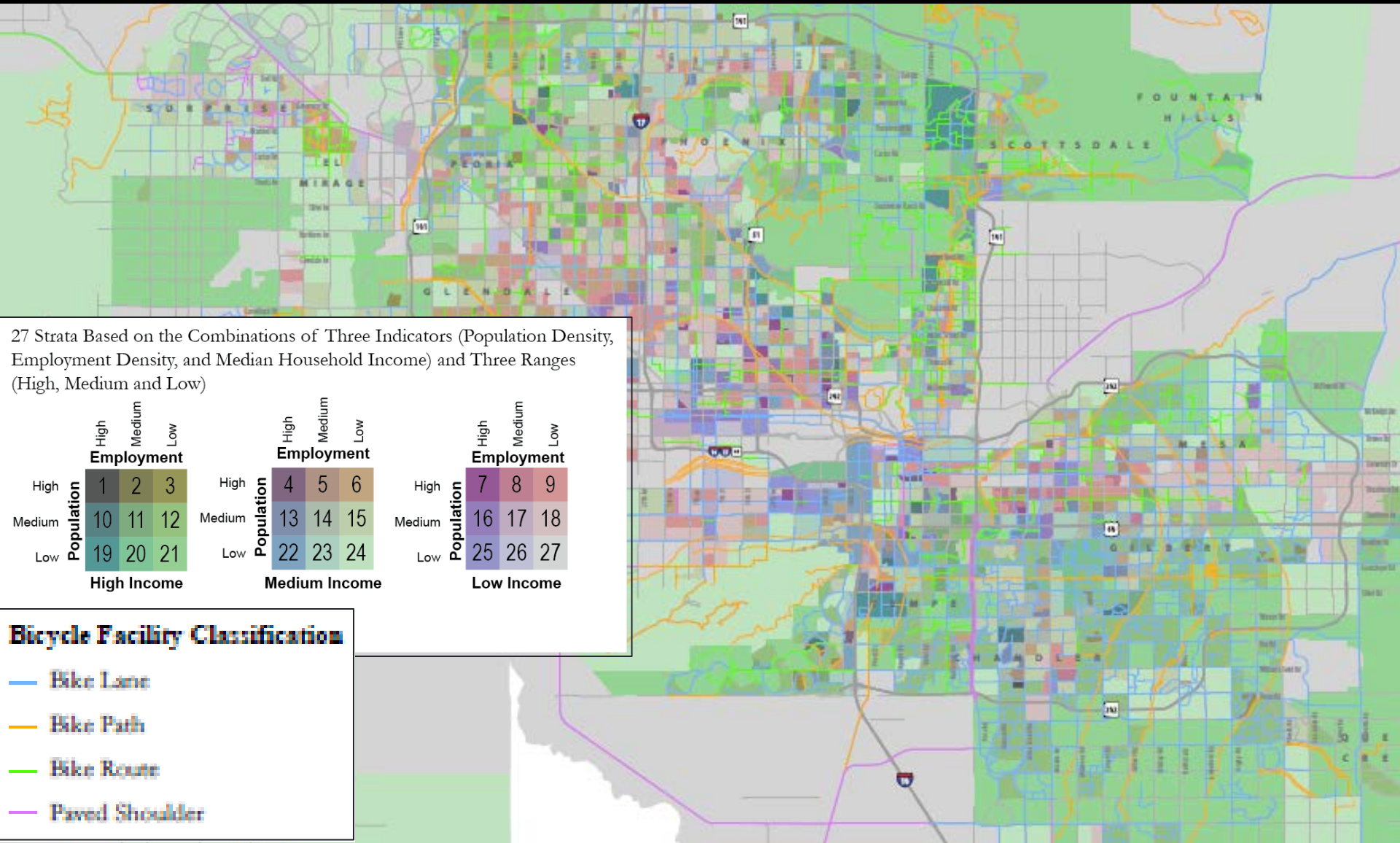
Count Station Siting Criteria

- **Strong geographic coverage** of MAG region along the existing bicycle network
- Number of count sites per jurisdiction reflects **population distribution**
- Bicycle and Pedestrian **Committee input** on ideal locations
- Sample of count sites is **representative** of population density, employment density and income along the region's network of bike facility

Count Site Selection Process



Existing Bike Facility and Sampling Strata



27 Strata Based on the Combinations of Three Indicators (Population Density, Employment Density, and Median Household Income) and Three Ranges (High, Medium and Low)

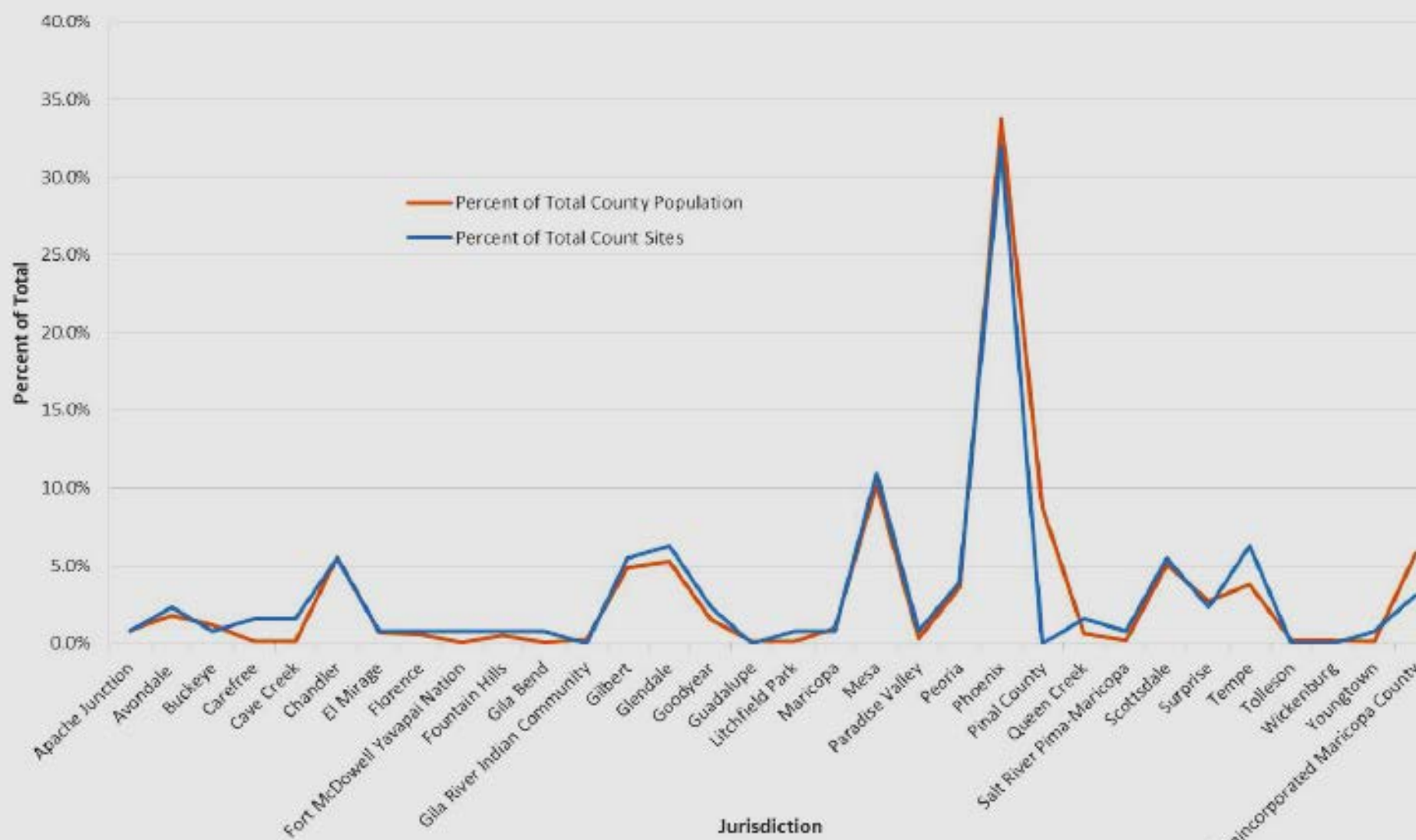
	High	Medium	Low		High	Medium	Low		High	Medium	Low
	Employment				Employment				Employment		
High	1	2	3	High	4	5	6	High	7	8	9
Medium	10	11	12	Medium	13	14	15	Medium	16	17	18
Low	19	20	21	Low	22	23	24	Low	25	26	27
	High Income				Medium Income				Low Income		

Bicycle Facility Classification

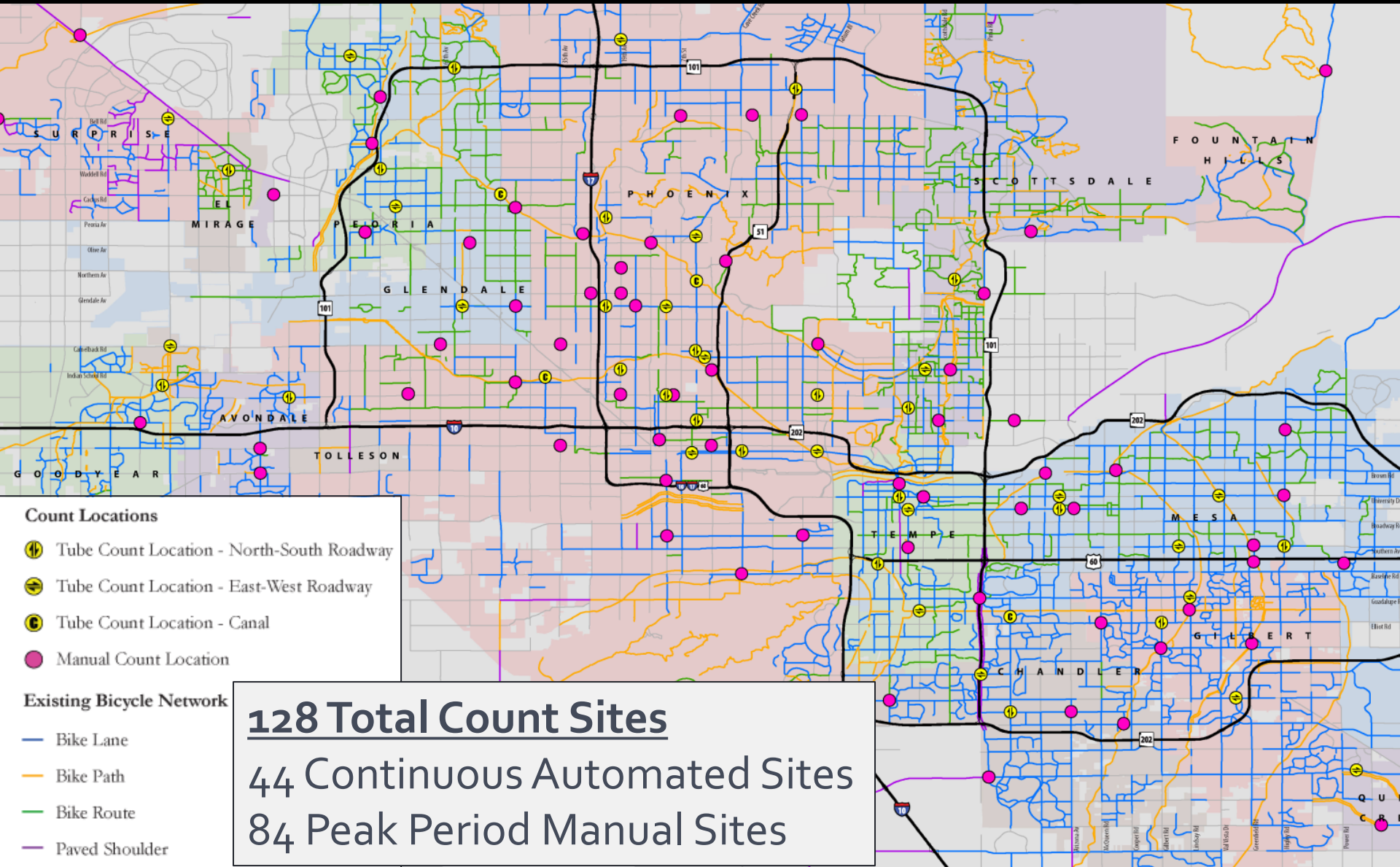
- Bike Lane
- Bike Path
- Bike Route
- Paved Shoulder

City Population and Number of Count Sites

Percent of Total



Final Bike Count Locations



Count Locations

- Tube Count Location - North-South Roadway
- Tube Count Location - East-West Roadway
- Tube Count Location - Canal
- Manual Count Location

Existing Bicycle Network

- Bike Lane
- Bike Path
- Bike Route
- Paved Shoulder

128 Total Count Sites
44 Continuous Automated Sites
84 Peak Period Manual Sites

Data Cleaning and Factoring

❖ Automated Counting

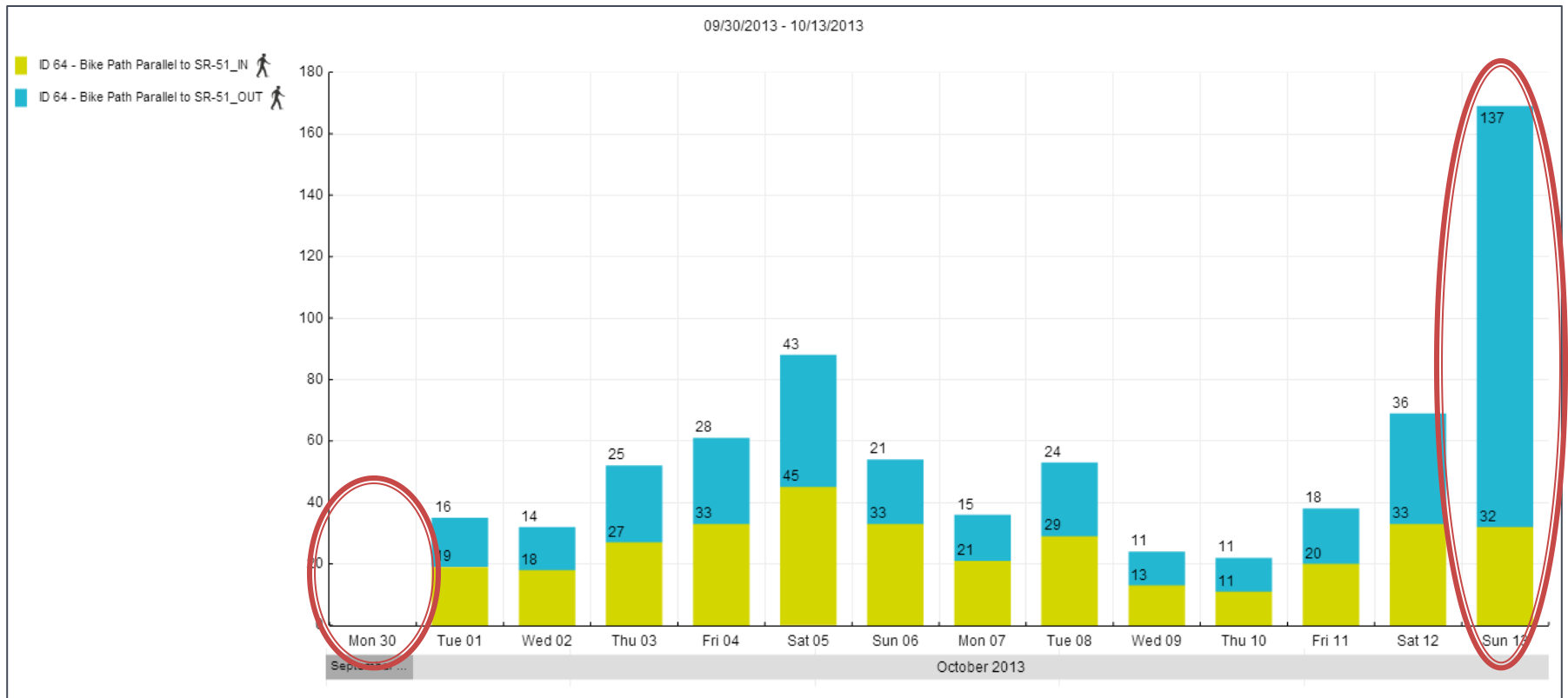
- Data Cleaning
 - Review and identify anomalies in automated data
 - Replace anomalous data with median of “good” data
- Expand continuous count data using sidewalk factors

❖ Manual Counts

- Expand to average daily bike volume using peak period percentages from automated counters

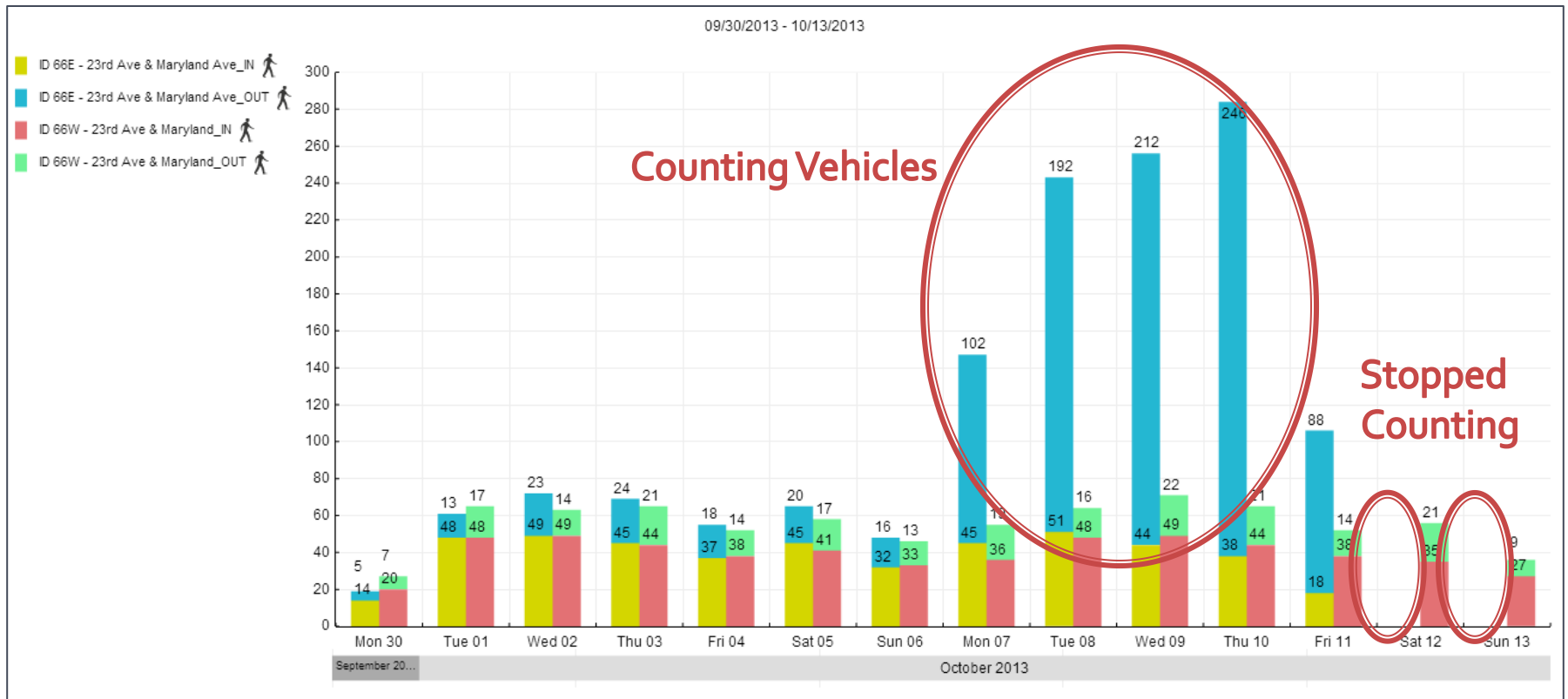
Data Cleaning Process

Days where count units were moved

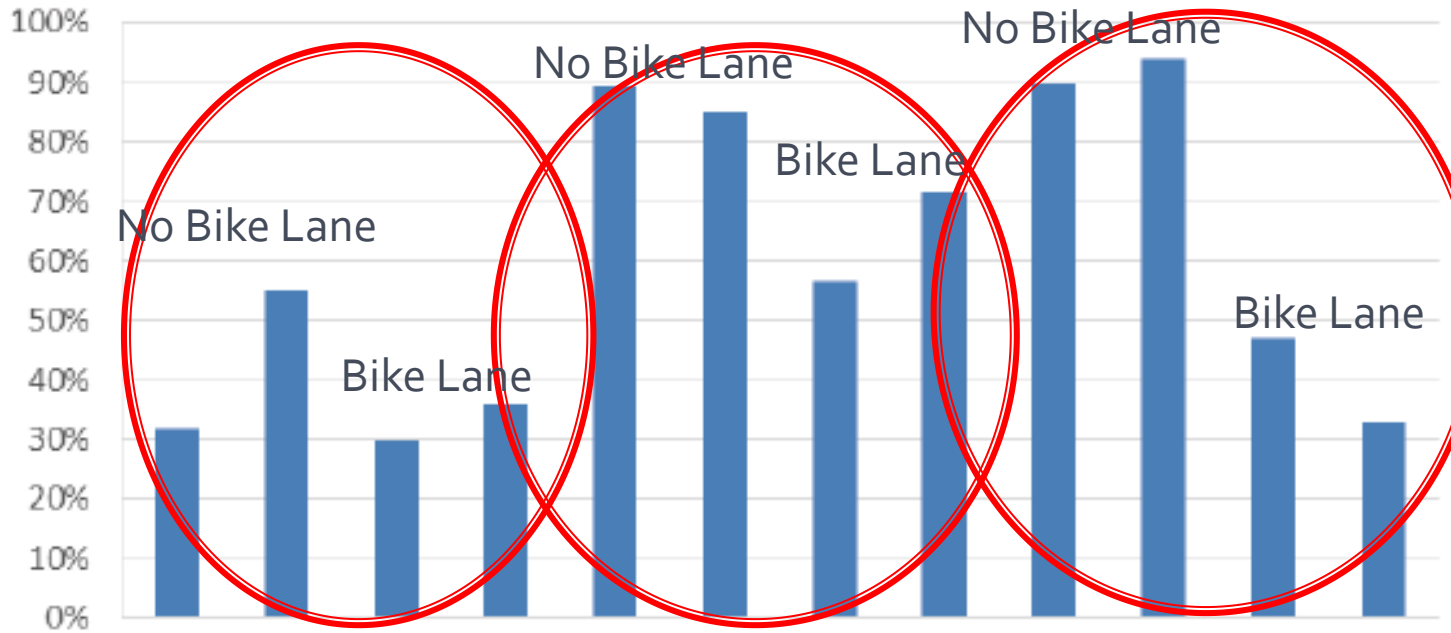


Data Cleaning Process

Count Tube Pulled Up – Causing counter to begin counting vehicles or stop counting completely



Percent Sidewalk Cycling



2-Lane

4-Lane

6-Lane

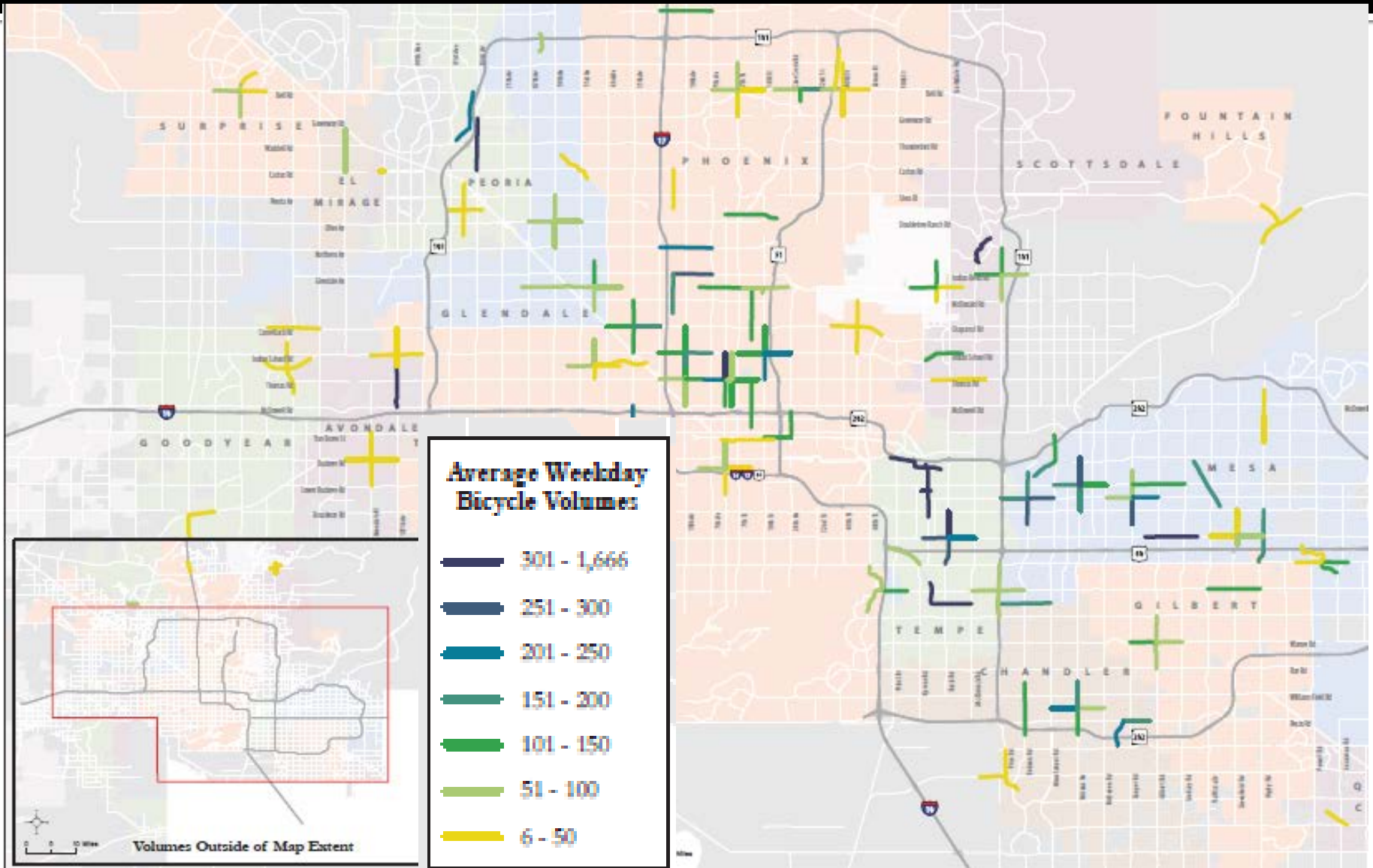
Expanded Peak Period Manual Counts into Daily Bicycle Volumes

- Calculate percentage of cyclists recorded during **weekday and weekend peak periods** from **automated count sites**.
- Peak period percentages were compared to results from **San Diego County**

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

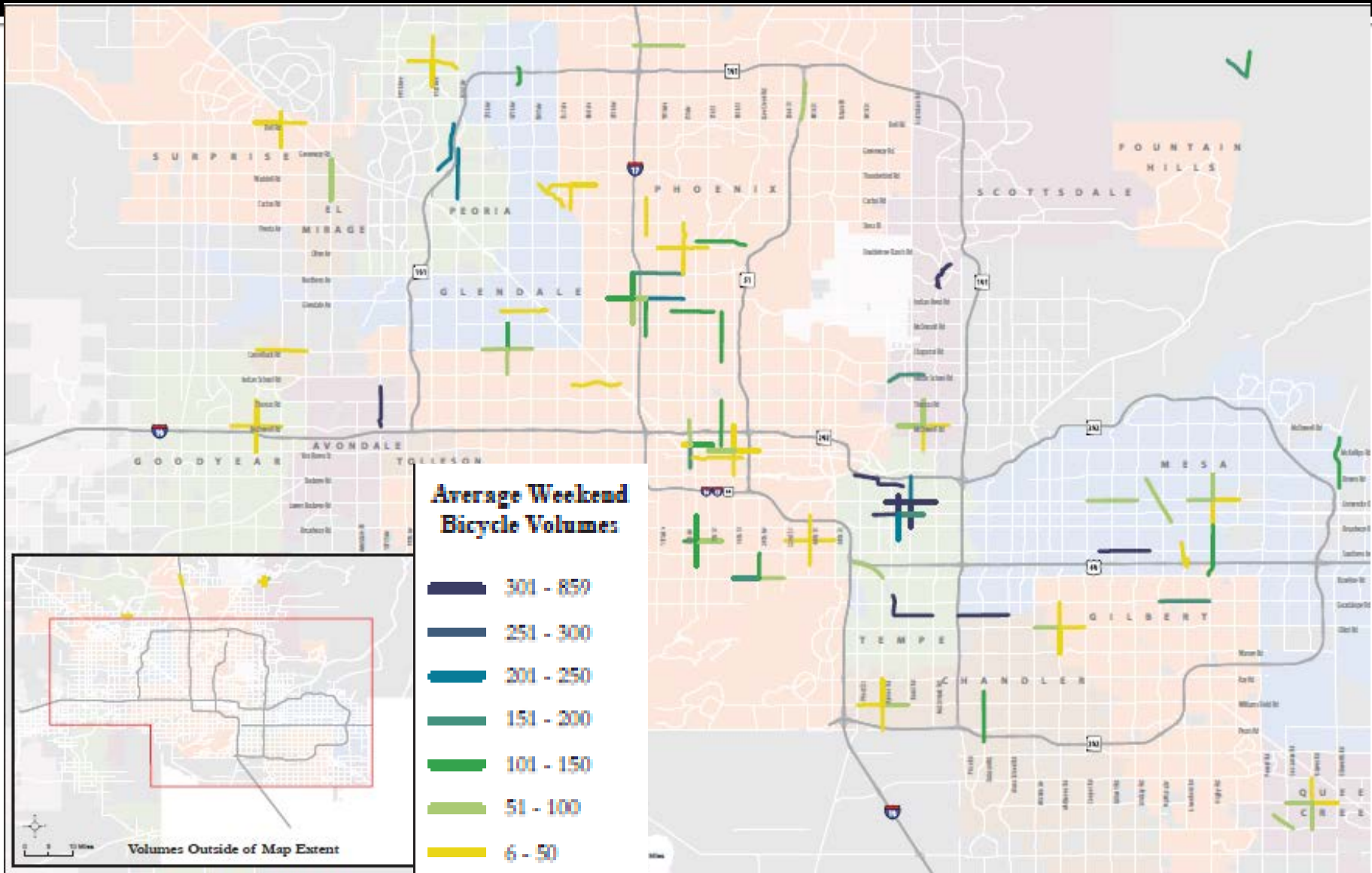
Data Summary

Average Daily Weekday Bicycle Volume

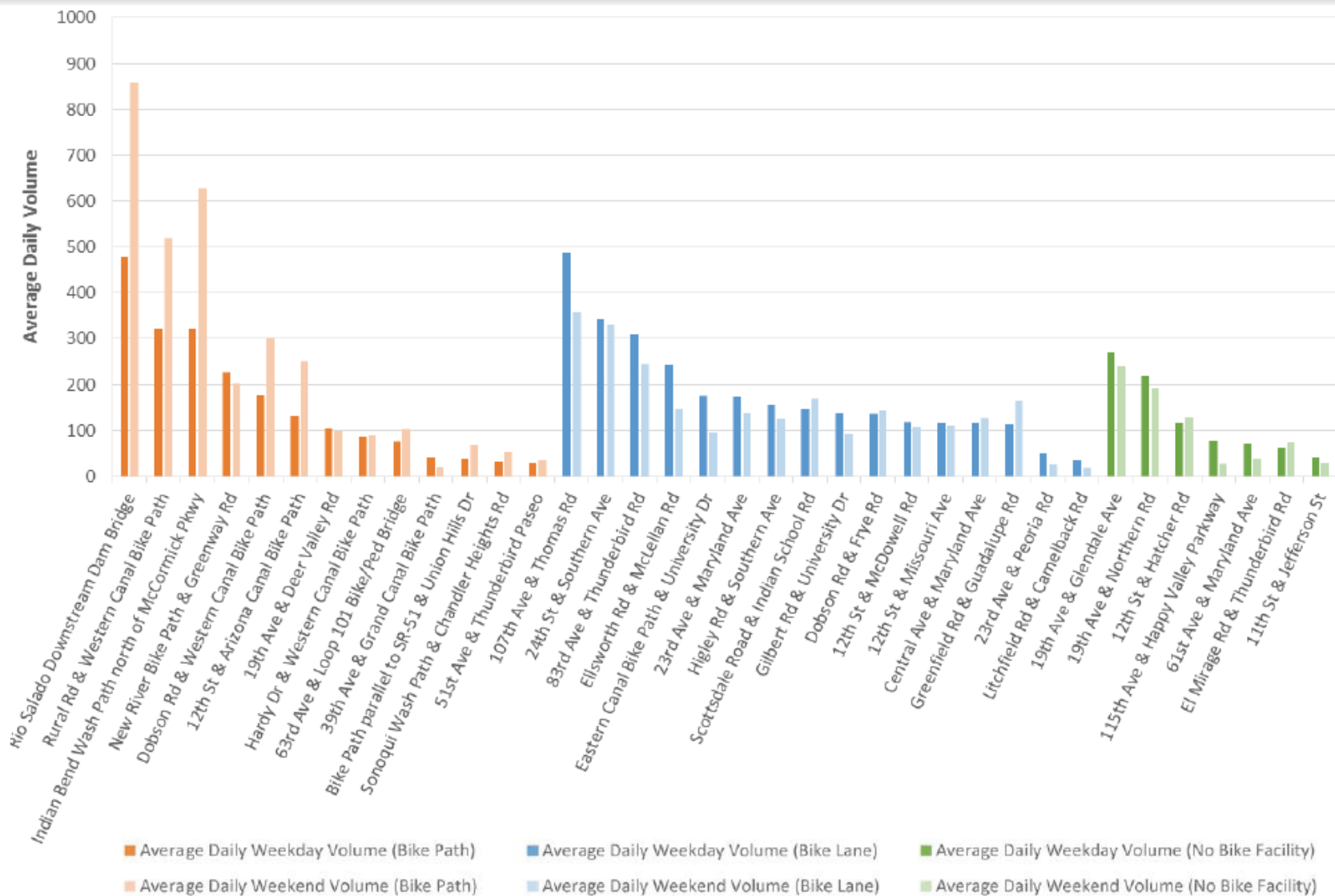


Data Summary

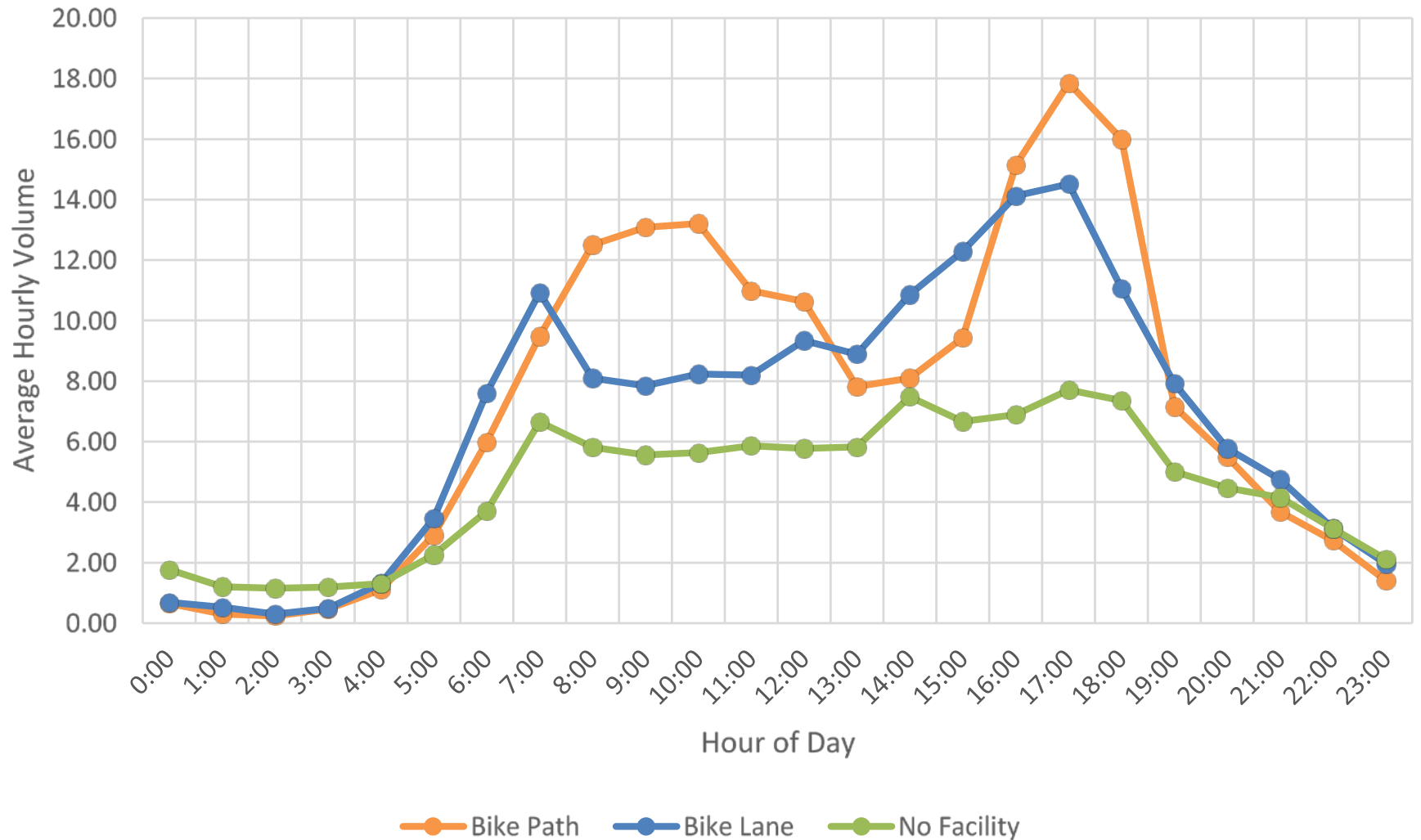
Average Daily Weekend Bicycle Volume



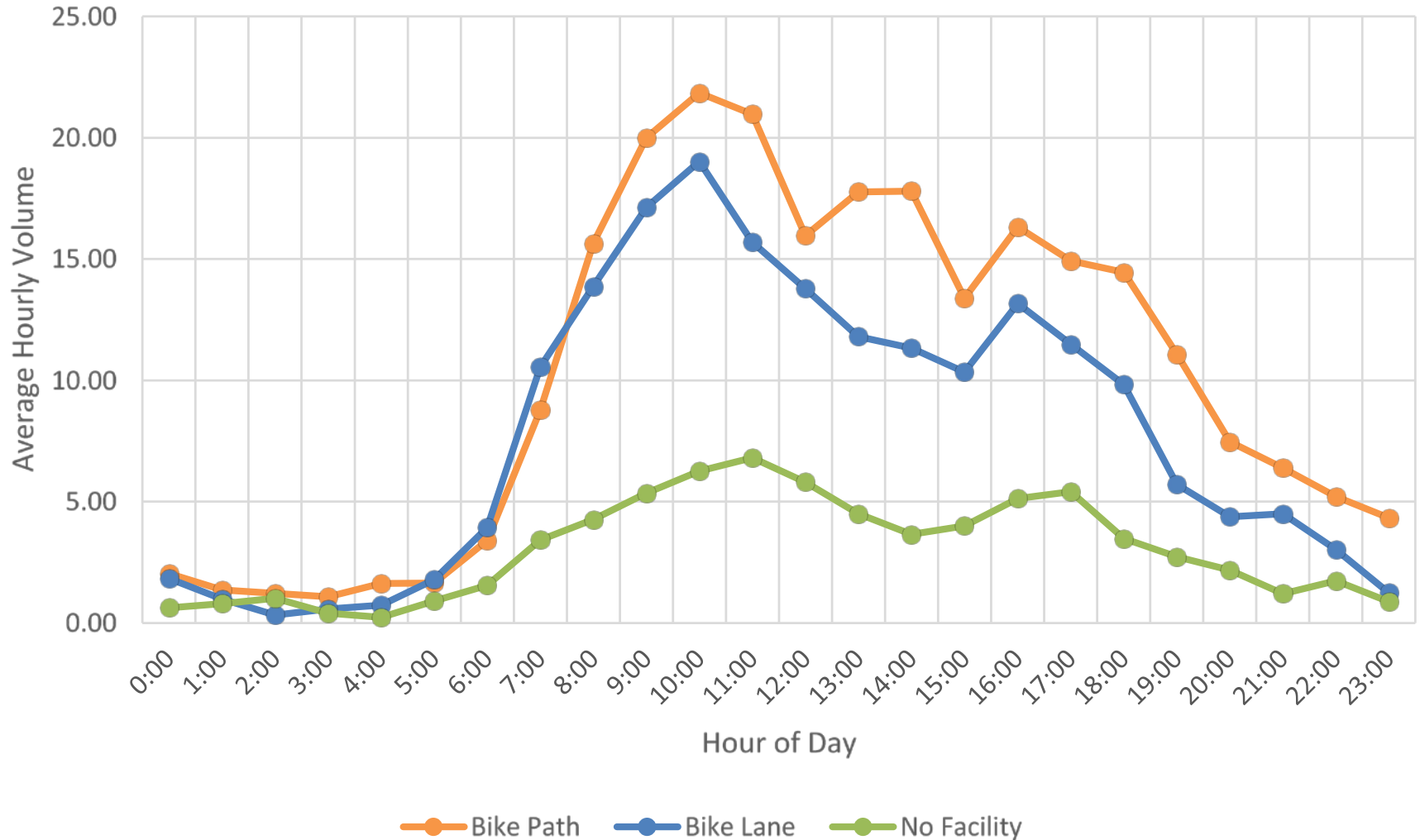
Avg Daily Weekday Bike Volume by Facility Type



Avg Hourly Weekday Bike Volume by Facility Type



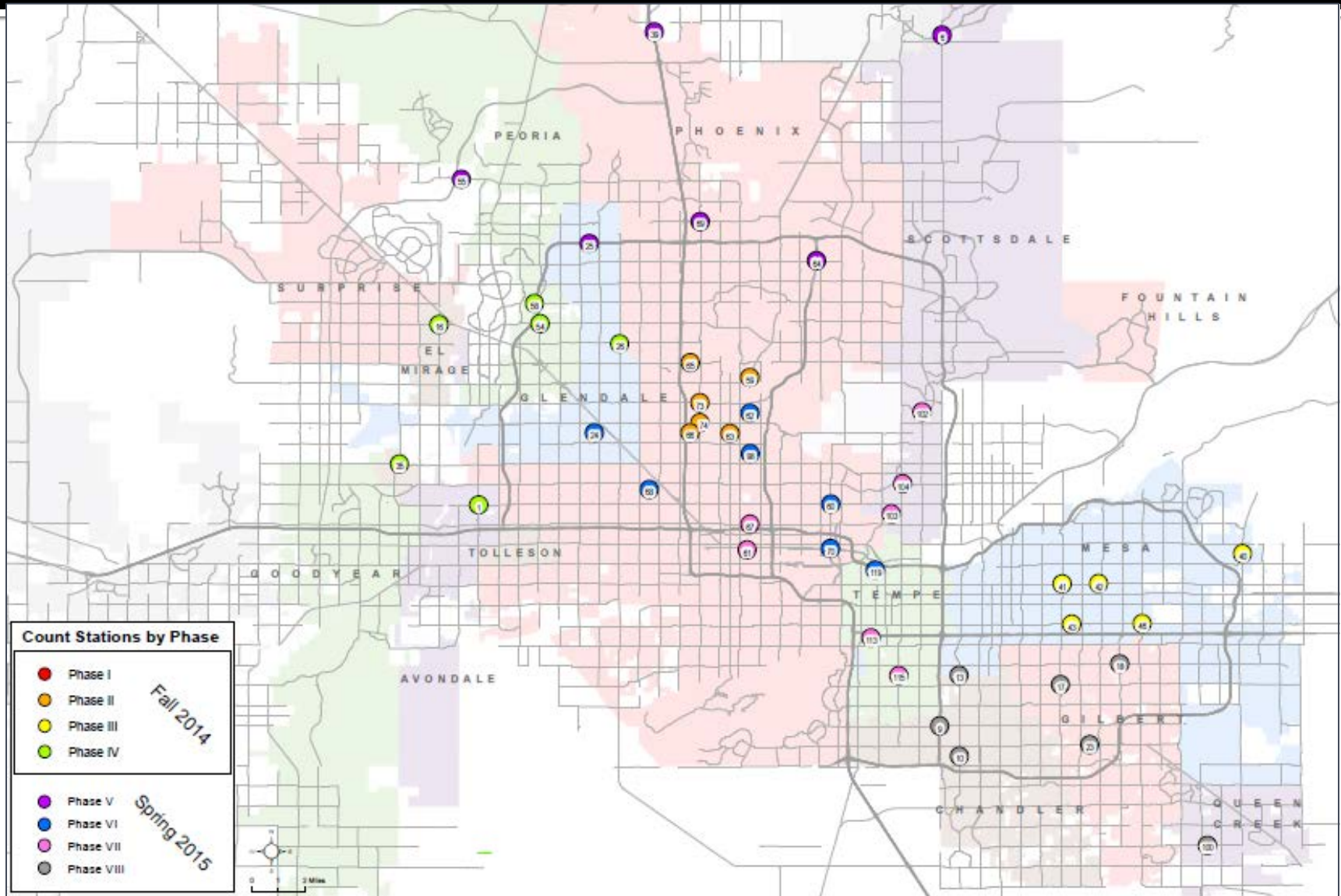
Avg Hourly Weekend Bike Volume by Facility Type



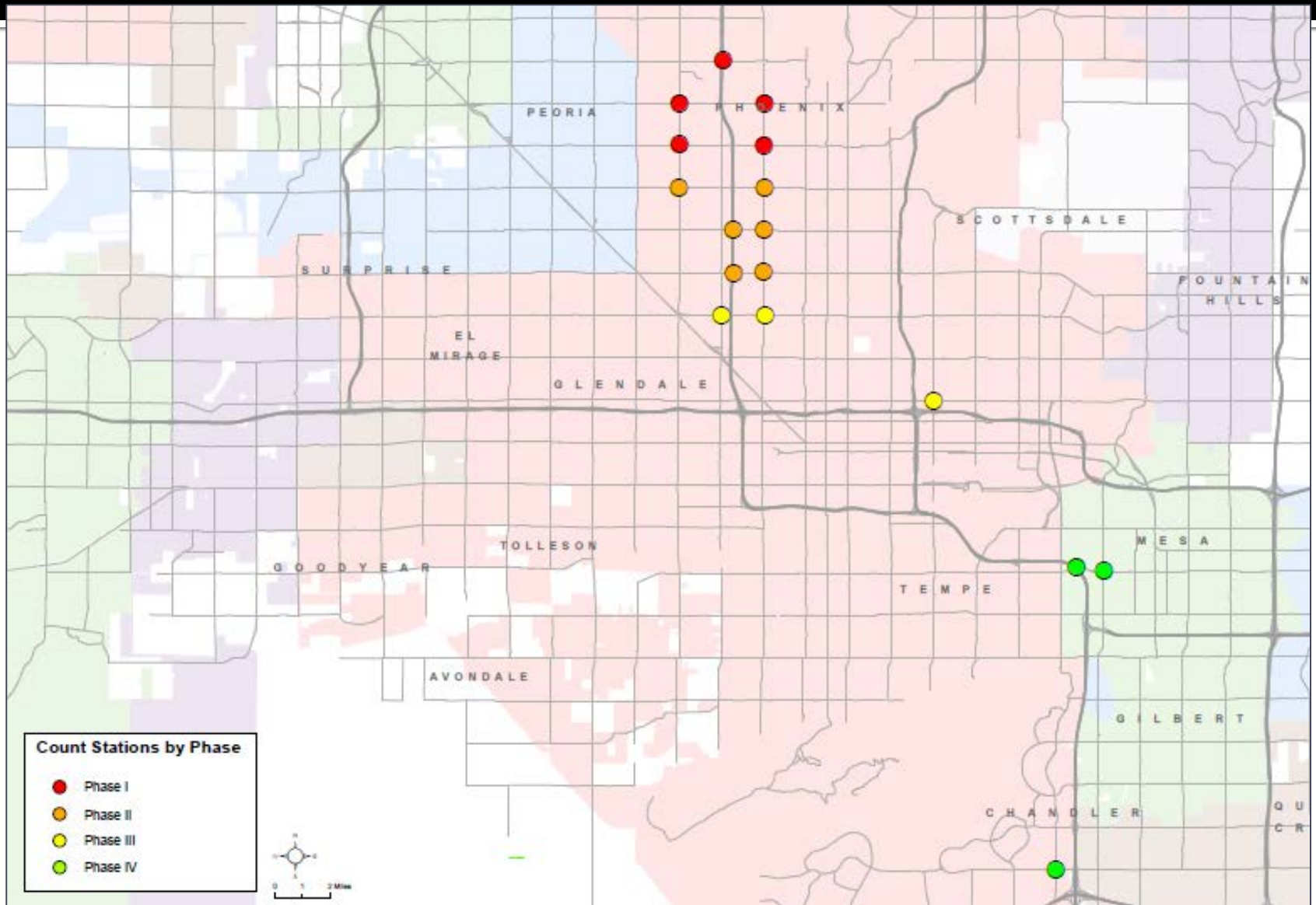
Planning Applications

- MAG purchased 13 temporary pneumatic tube counters and launched yearly counts at stations assigned under this project
- Trends over time for policy/project evaluation
- Project-focused before/after data collection

Fall 2014 / Spring 2015 Counting



I-10/I-17 Corridor Study



Future Research

- Estimate daily bicycle volumes along all segments
- Improved measures of safety – bicycle & pedestrian risk (collisions / volume)
- Facility-based emissions reduction from vehicle trips avoided (intercepting cyclists at count stations)
- Facility-based health benefits from minutes of cycling (intercepting cyclists at count stations)

- Thank You -

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MAG Bicycles Count Project

http://www.azmag.gov/Documents/BaP_2014-08-21_FINAL-MAG-Bicycle-Count-Data-Summary-Report.pdf