Launching an Automated Bicycle and Pedestrian Data Collection Program in San Diego

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SAN DIEGO STATE UNIVERSITY

SANDAG

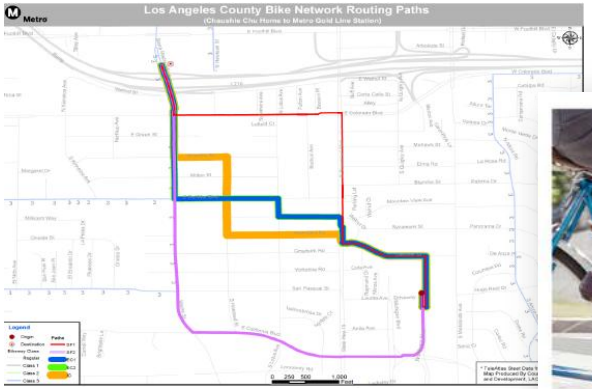
Presentation Overview

- Why Automated Counting?
- Technology Options
- Approach to Siting Count Stations
- Preliminary Look at Data and Applications

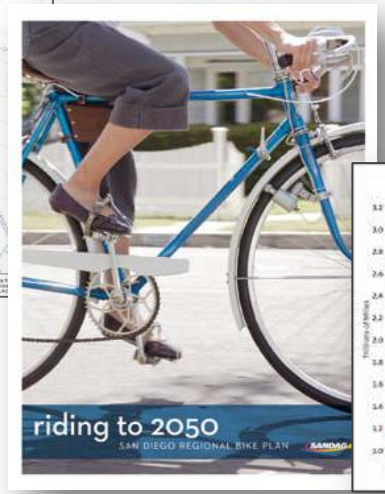
Why Continuous Automated Counting?

Measure ➡ ***Understand*** ➡ ***Realize Change***

Bike Model Validation



Long Range Planning



Active Travel & Health Monitoring

Infrastructure Project Evaluation

Why Continuous Automated Counting?

- We need permanent bike counts to calibrate model output, e.g.:
  - **Regional variation –** How do bicyclists respond in different areas of the County?
  - **Seasonal variation** – How does bicycling fluctuate during the year?
  - **Time-of-day variation** – How does bicycling fluctuate during the day?
  - **Before/after counts** – When we add a new bike facility, how do travelers respond?

Eco-Counter Technology

Zelt Logger & Inductive Loops

Zelt Logger & Pneumatic Tubes

Eco-Multi

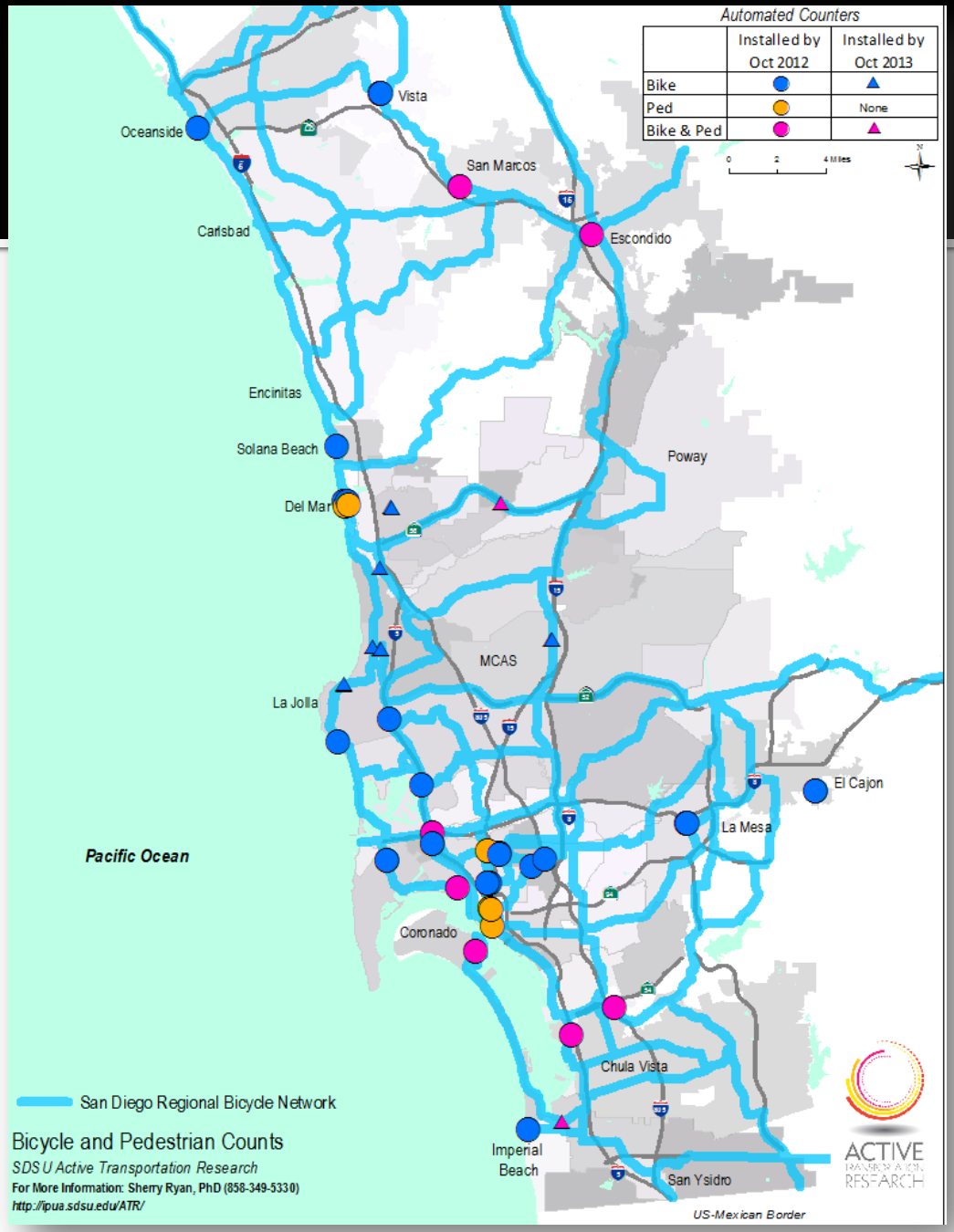
Recommended Count Location Siting Criteria

1. Locations with existing and planned unbuilt bicycle facility
2. Geographic distribution of count sites across region by city
3. Representative sample of locations in relation to population density, employment density, and median household income
4. Review and input from local agency staff and key stakeholders

Count Location Siting Criteria

1. *Presence of existing and planned unbuilt bicycle facility*

2. *Locations representative of the majority of cities*



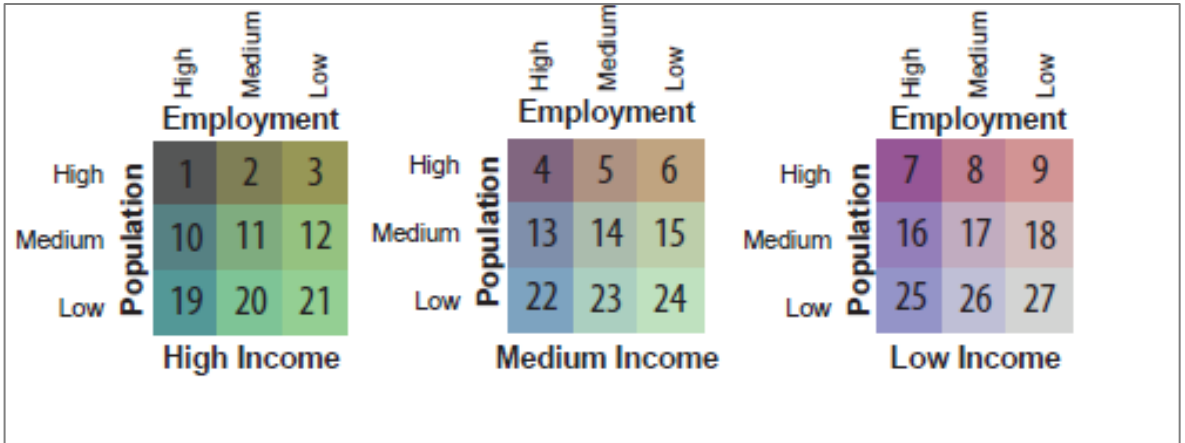
Count Location Siting Criteria

3. *Locations representative of the region*

Census Data Inputs to Sampling Strata (by Census Block Group)

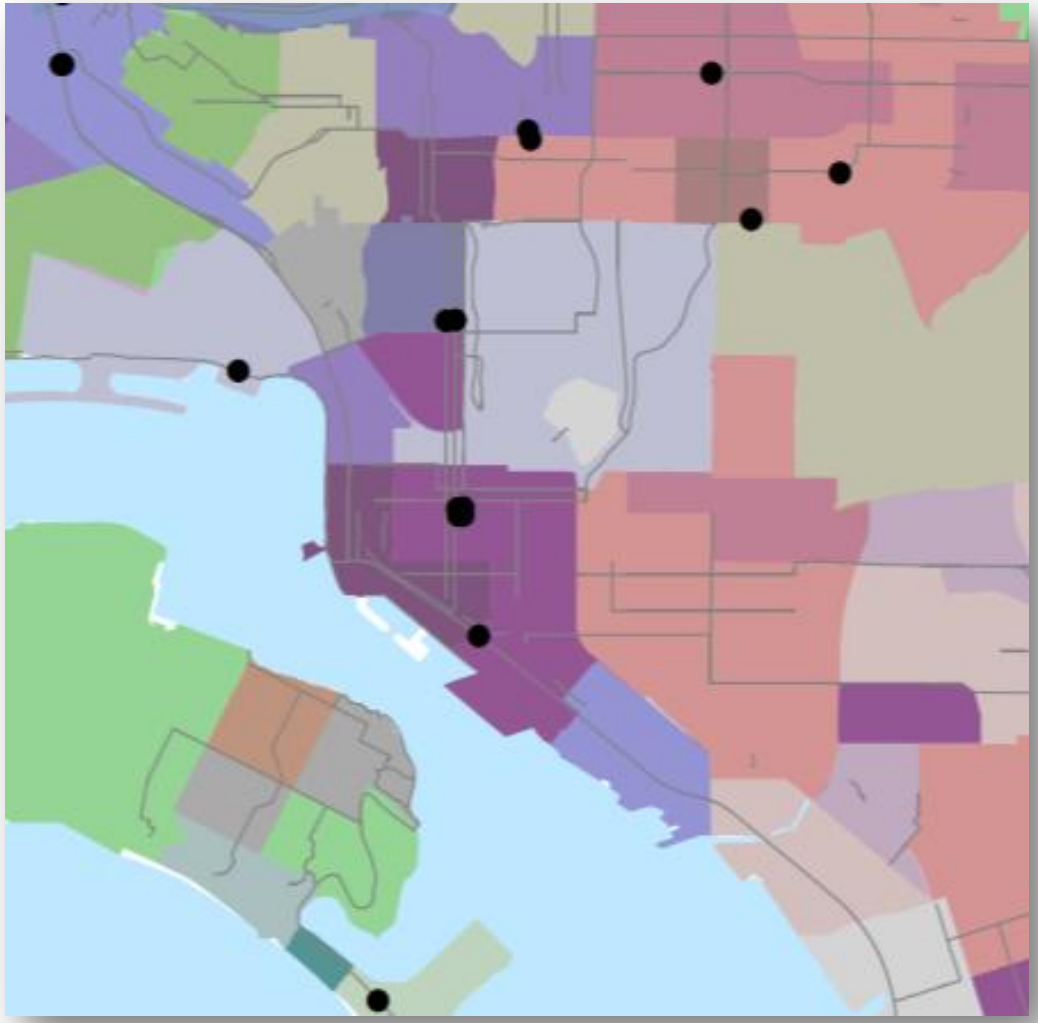
Category	Range	Breaks	Standard Deviation Range
Population Density			
High	1	Greater than 11.2 persons per acre	+0.5 and above
Medium	2	5.05 – 11.2 persons per acre	-0.5 and +0.5
Low	3	Less than 5.05 persons per acre	Below -0.5
Employment Density			
High	1	Greater than 5.56 jobs per acre	+0.5 and above
Medium	2	1.59 – 5.56 jobs per acre	0 and +0.5
Low	3	Less than 1.59 jobs per acre	Below 0 (below mean)
Median Income			
High	1	Greater than $59,558	+0.5 and above
Medium	2	$35,863 - $59,558	-0.5 and +0.5
Low	3	Less than $35,863	Below -0.5

Definition of 27 Sampling Strata



Count Location Siting Criteria

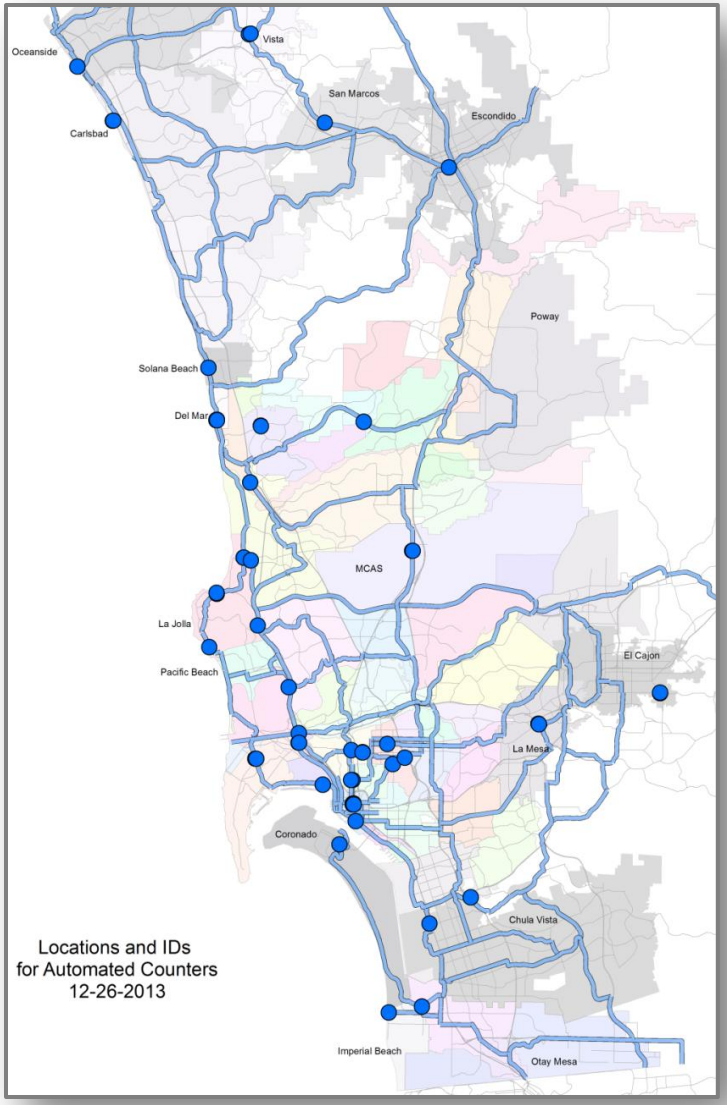
3. Locations representative of the region



Count Location Siting Criteria

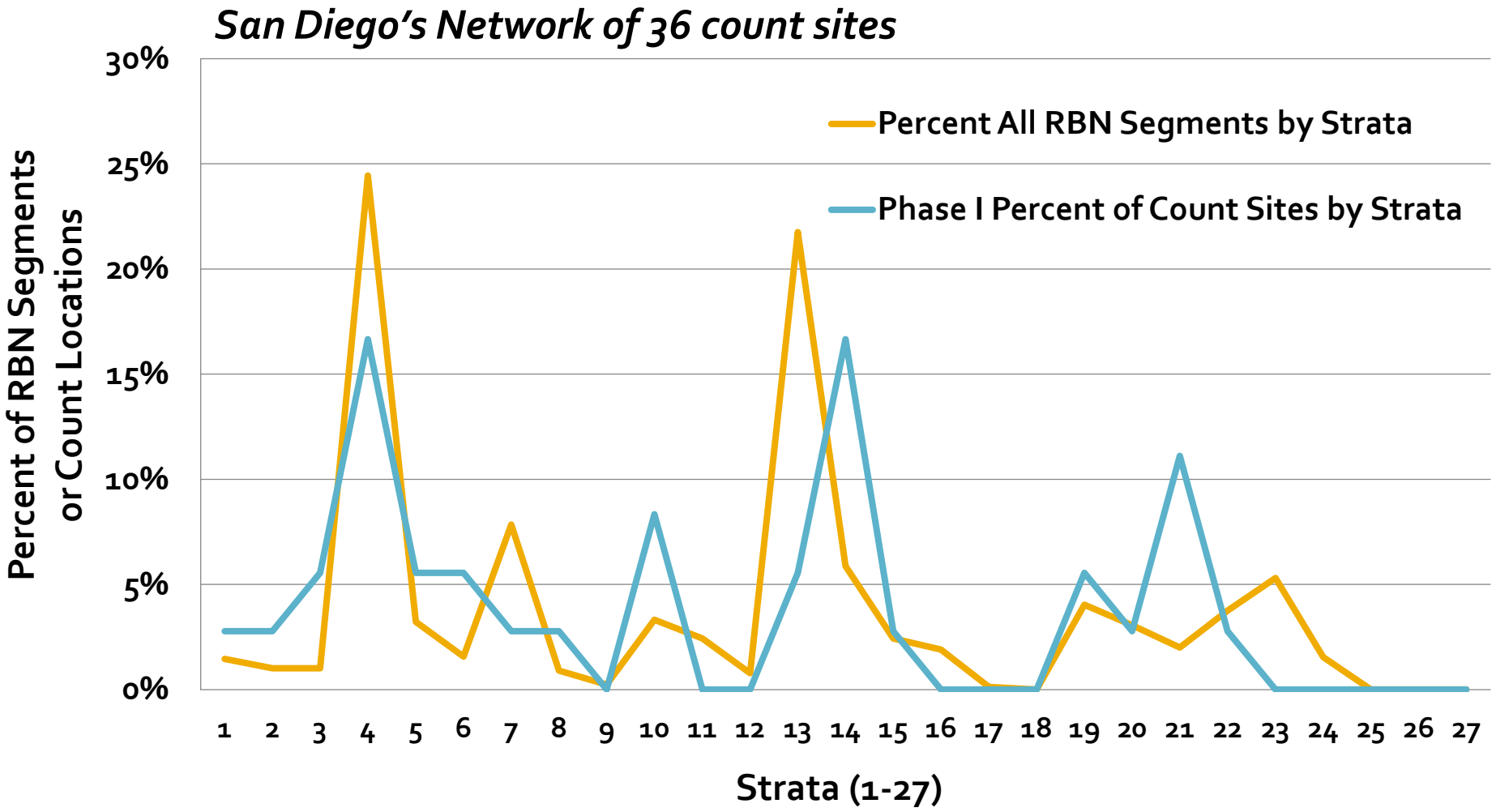
3. Locations representative of the San Diego regional bicycle network

- 54 units in 36 TOTAL SITES
  - 23 Bike Only - *Class II or III*
  - 9 Bike & Ped - *Class I*
  - 4 Pedestrian Only - *Urban*

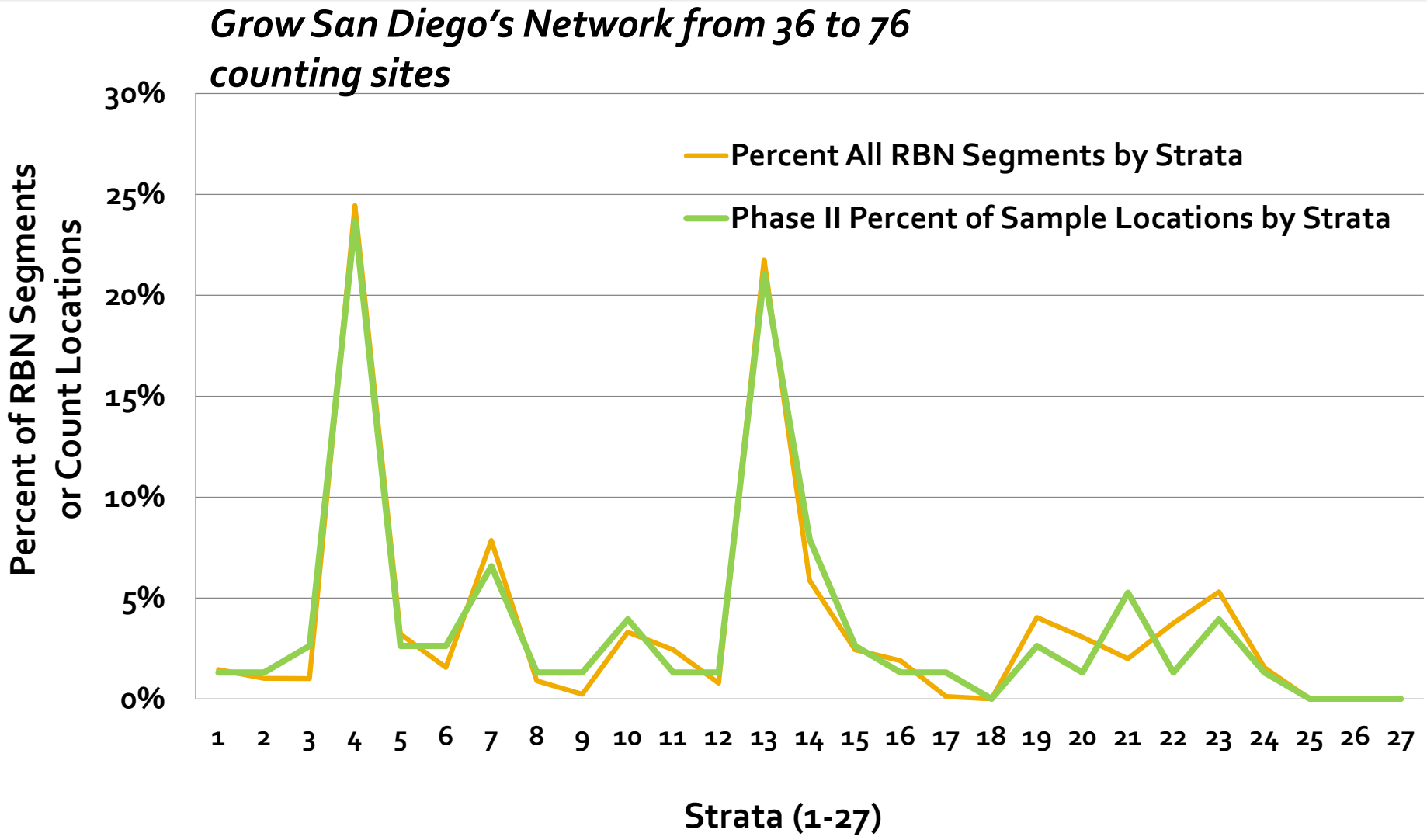


Count Location Siting Criteria

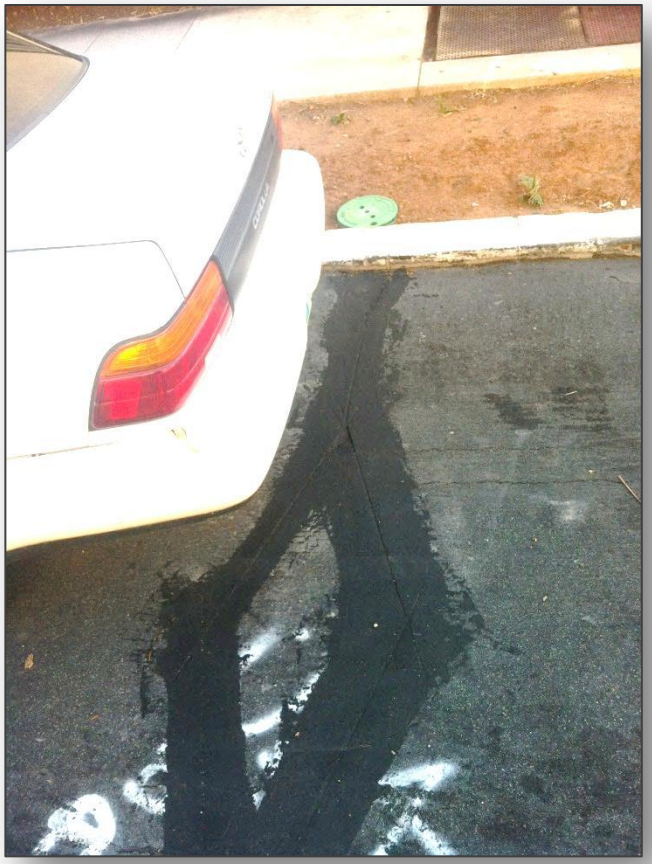
3. Locations representative of the San Diego region



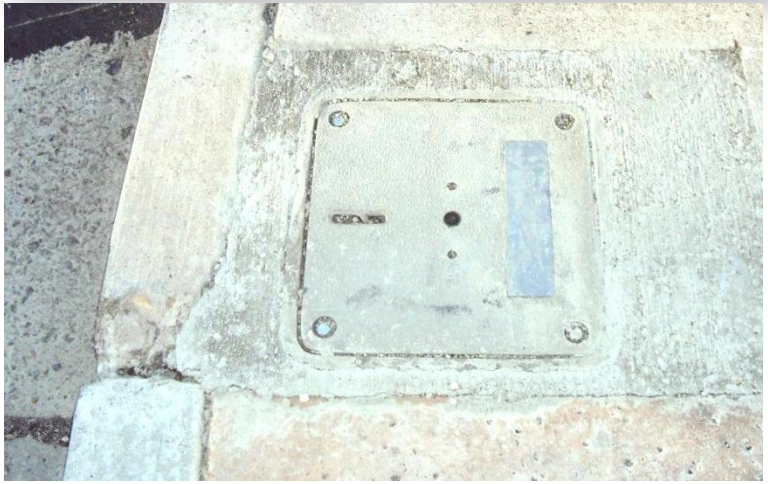
Selectively Expand Network to 76 Sites



Zelt with Inductive Loop along Class III Bike Route

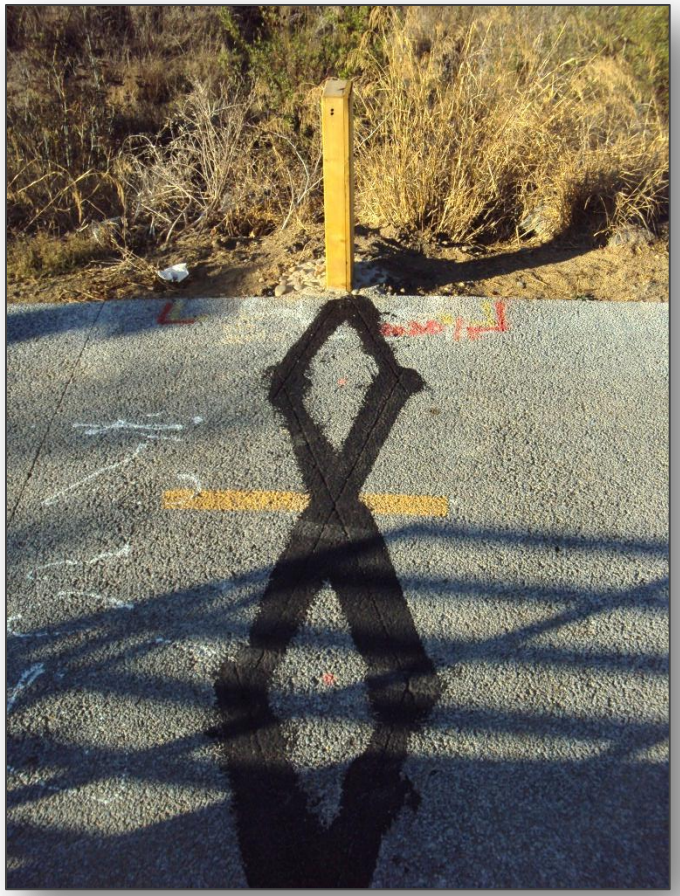


Zelt with Inductive Loop along Class II Bike Lane



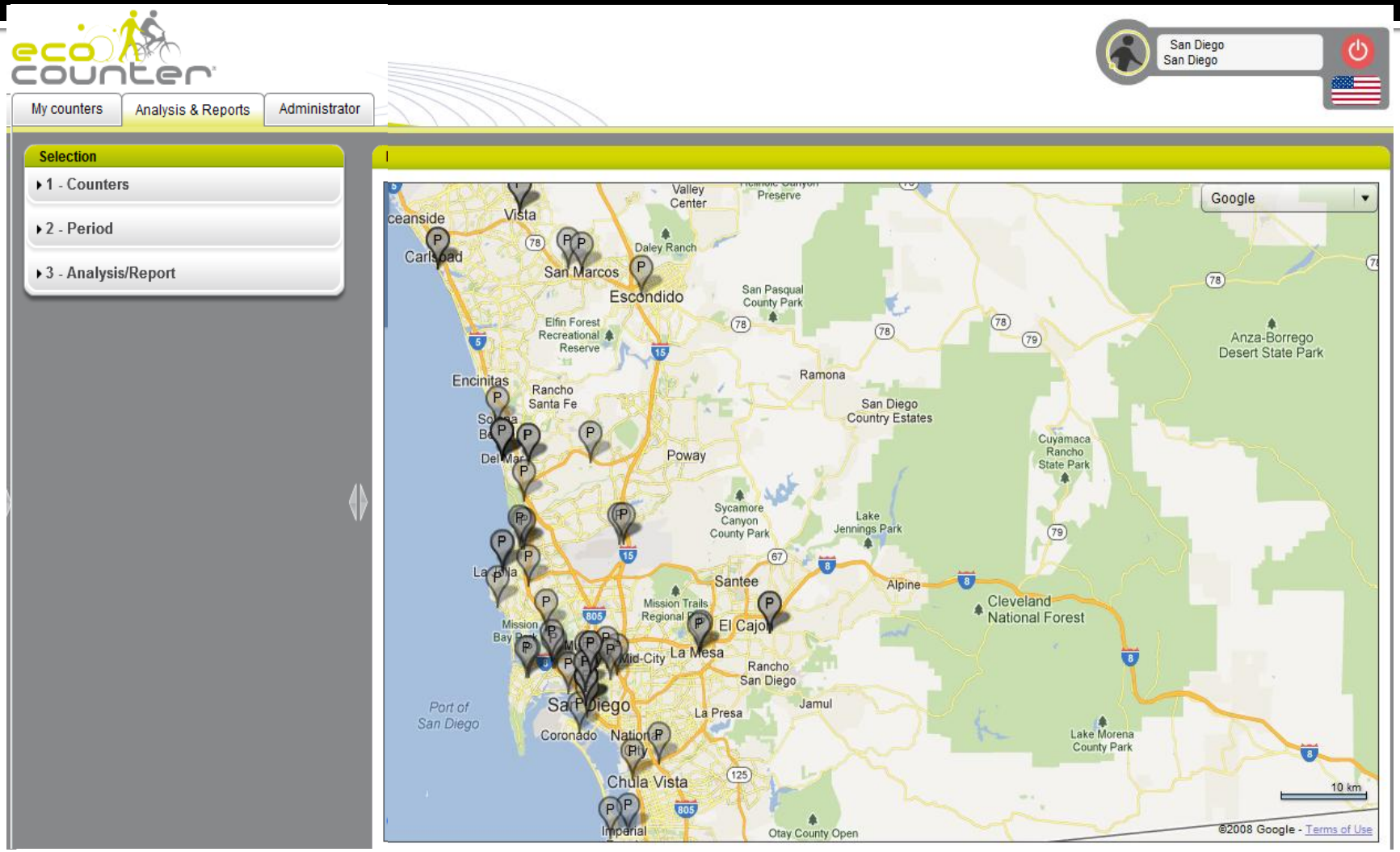
Zelt with Inductive Loop along Class I Bike Path

Eco-Multi along Class I Bike Path



Eco-Multi along Class I Bike Path

Automated Web-Based Data Upload



Eco-Visio Web-based Software

Data Downloads and Summaries in Eco-Visio

Time Intervals

- Annual
- Monthly
- Weekly
- Daily
- Hourly
- 15-minutes

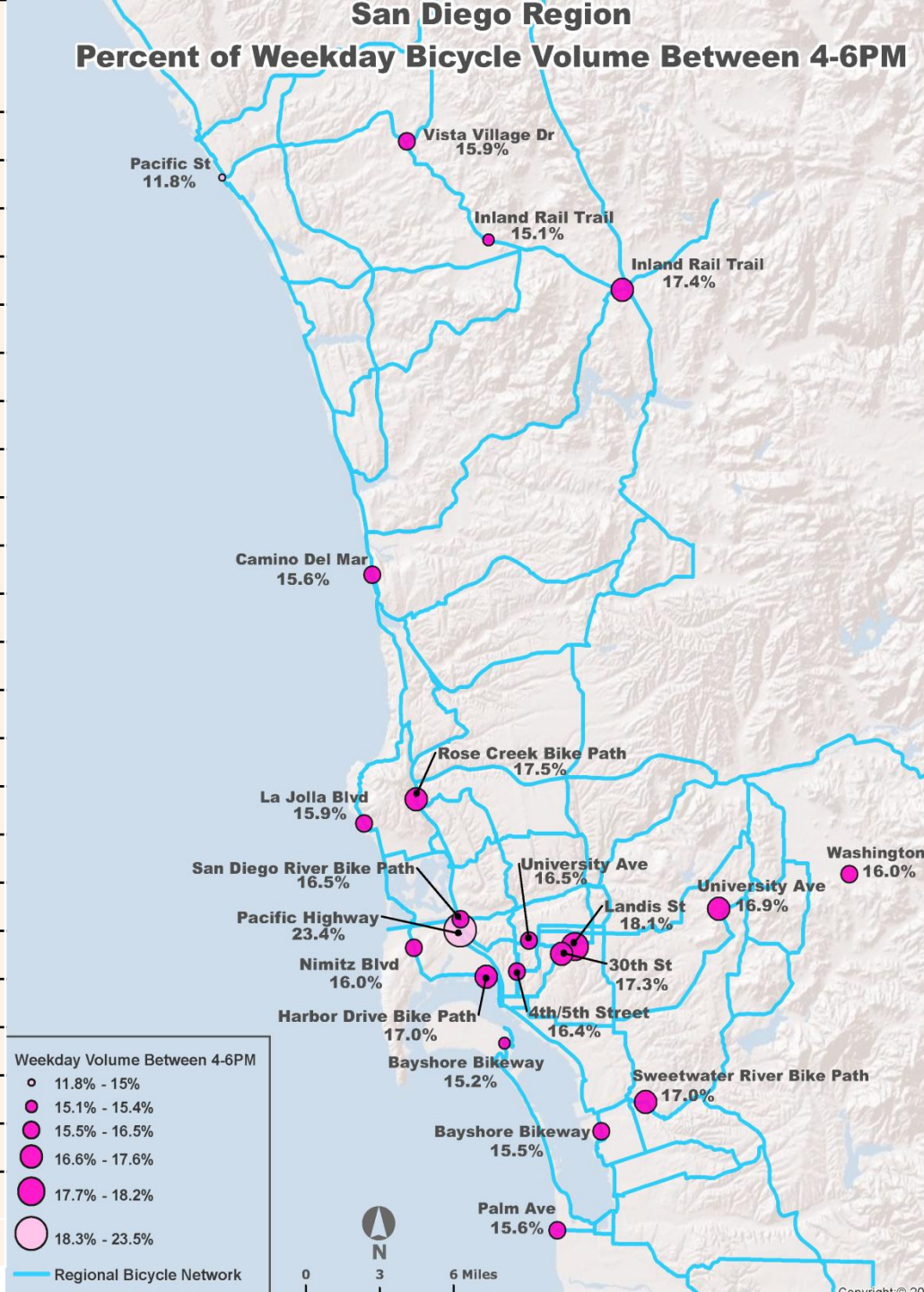
Formats

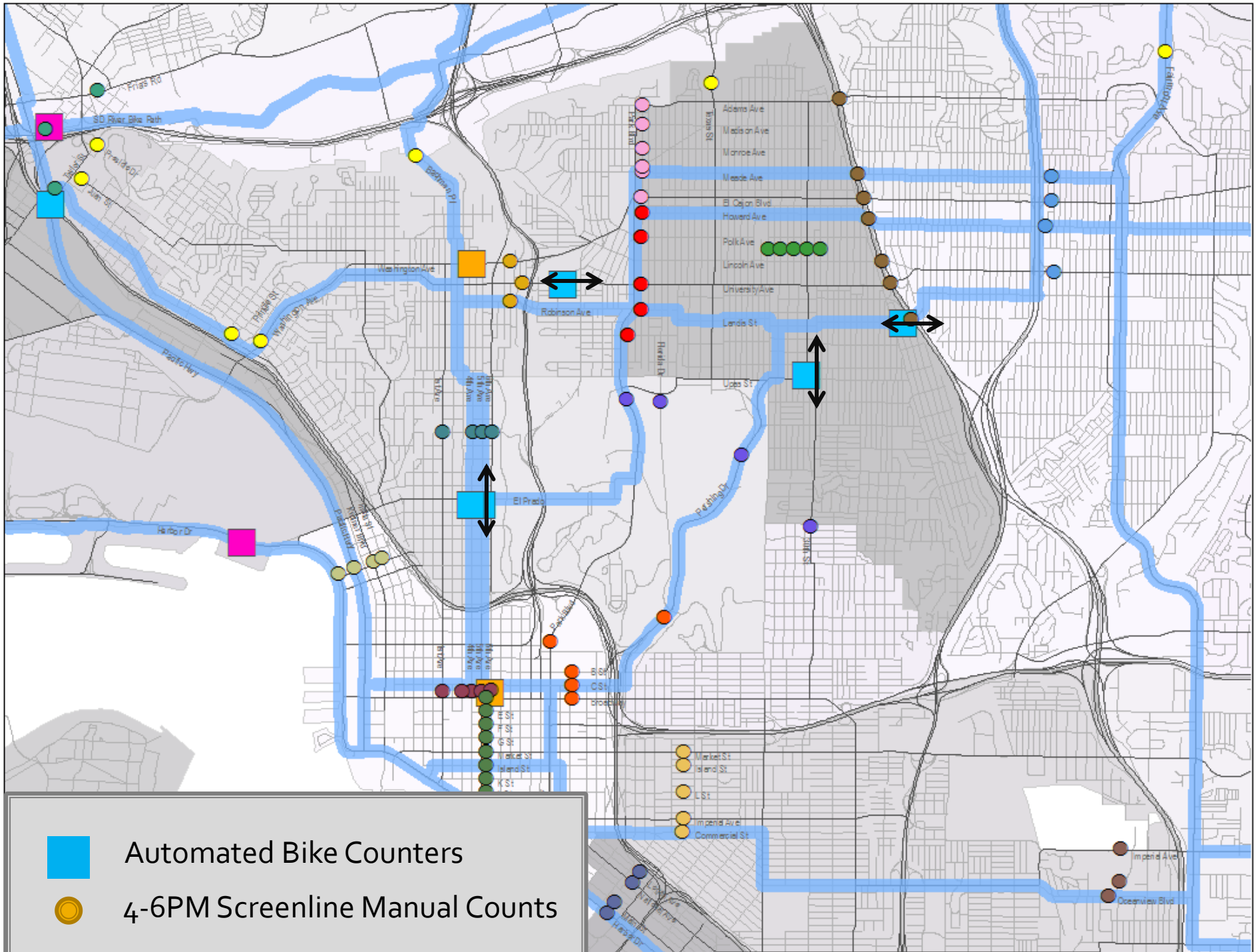
- Excel Spreadsheets
- Ready-made Charts
- Averages
- Word and PDF Reports

Data Applications

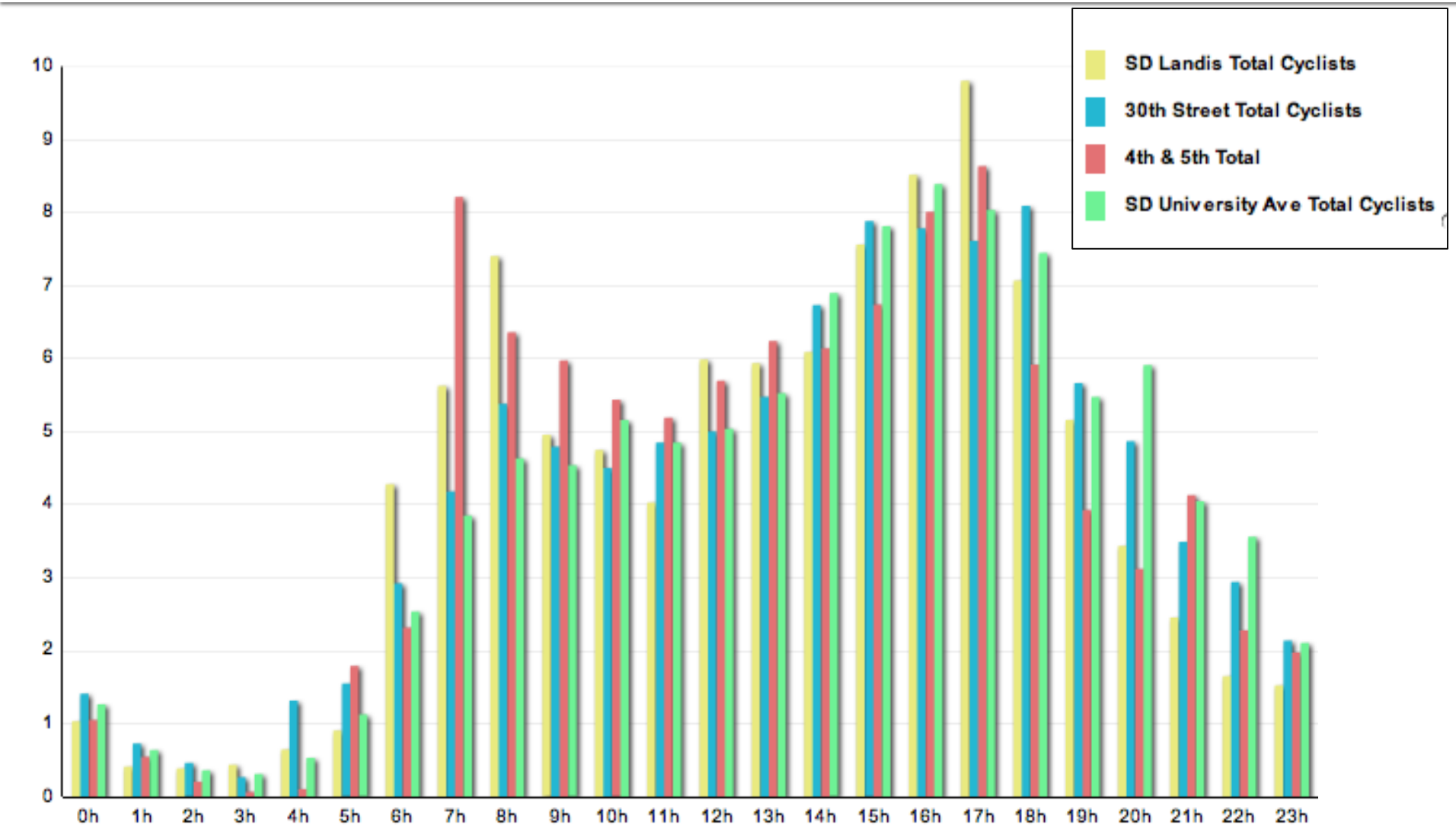
- Understanding Order of Magnitude of Cycling Demands
- Bicycle Model Validation
- Temporal Patterns
  - *Month of Year*
  - *Day of Week*
  - *Hour of Day*
- Usage by Facility Types
- Before – After Studies
- Improved Measures of Health, Air Quality and Safety

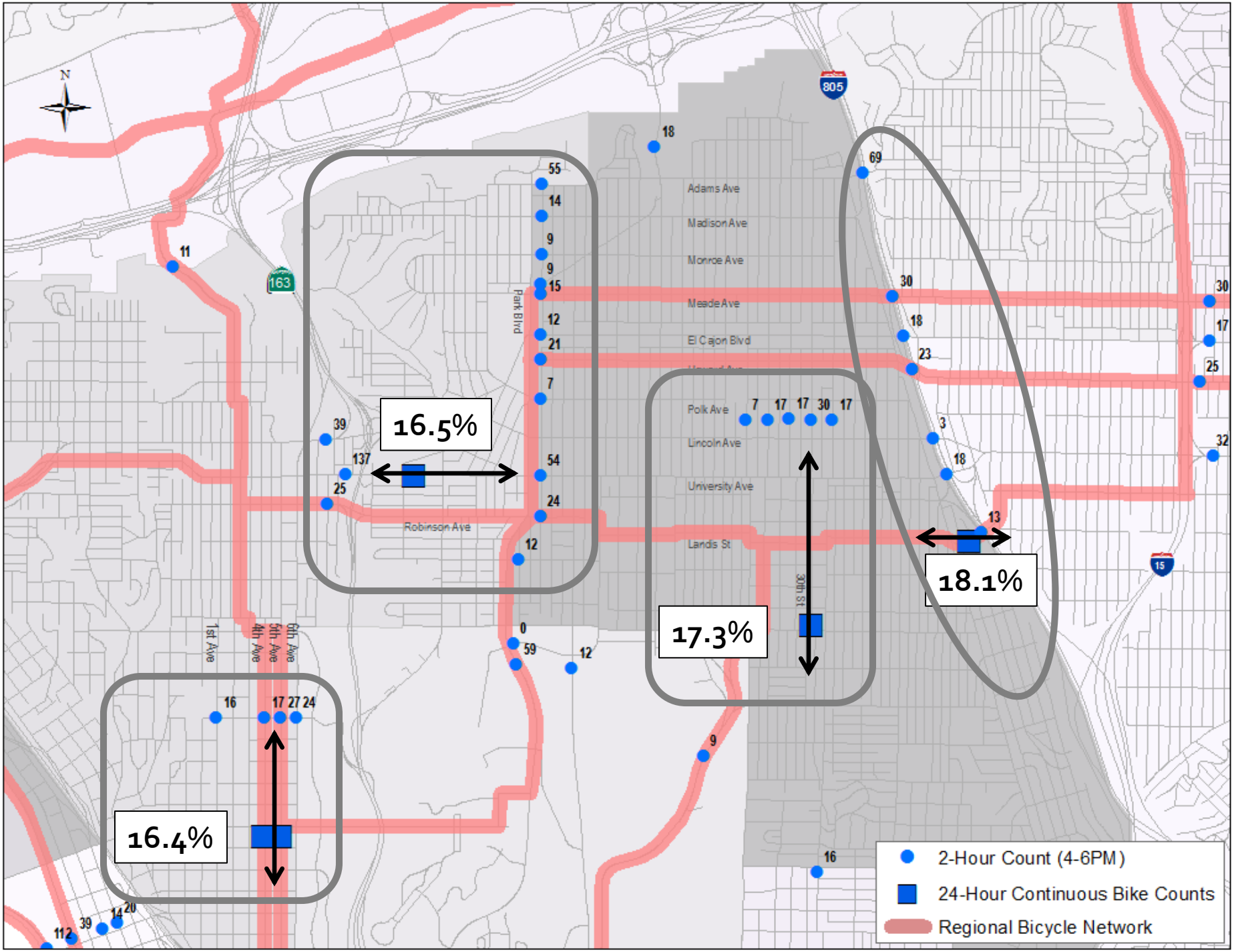
Percent of Total Weekday Bicycle Volumes Between 4PM and 6PM	
Pacific Highway (San Diego)	23.4%
Landis St (San Diego)	18.1%
Rose Creek Bike Path (San Diego)	17.5%
Inland Rail Trail (Escondido)	17.4%
30th Street (San Diego)	17.3%
Harbor Drive Bike Path (San Diego)	17.0%
Sweetwater River Bike Path (National City)	16.9%
University Avenue (La Mesa)	16.9%
San Diego River Bike Path (San Diego)	16.5%
University Ave (San Diego)	16.5%
4th/5th Ave (San Diego)	16.4%
Washington Avenue (El Cajon)	16.0%
Nimitz Boulevard (San Diego)	16.0%
Highway 101 (Solana Beach)	16.0%
La Jolla Blvd (San Diego)	15.9%
Vista Village Drive (Vista)	15.9%
Camino Del Mar (Del Mar)	15.6%
Palm Avenue (Imperial Beach)	15.6%
Bayshore Bikeway (Chula Vista)	15.5%
Bayshore Bikeway (Coronado)	15.2%
Inland Rail Trail (San Marcos)	15.1%
Pacific Street (Oceanside)	11.8%
Standard Deviation	1.9%
Mean	16.5%

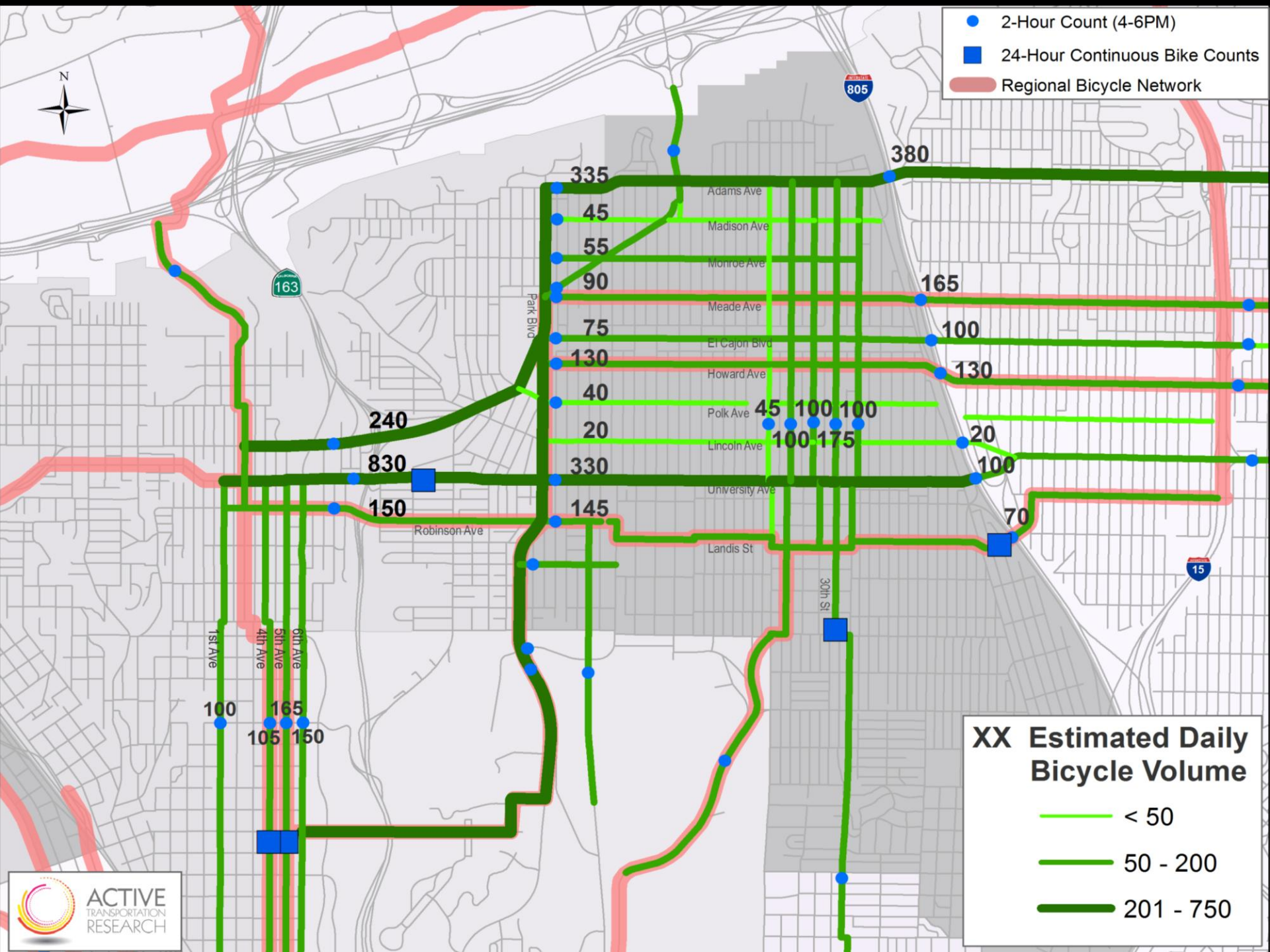



Automated Bike Counters
4-6PM Screenline Manual Counts

Average Percent of Daily Volume by Hour




N
805
163
15
Adams Ave
Madison Ave
Monroe Ave
Meade Ave
El Cajon Blvd
Polk Ave
Lincoln Ave
University Ave
Landis St
Robinson Ave
Park Blvd
30th St
1st Ave
4th Ave
5th Ave
6th Ave
16.5%
17.3%
18.1%
16.4%
2-Hour Count (4-6PM)
24-Hour Continuous Bike Counts
Regional Bicycle Network


2-Hour Count (4-6PM)
24-Hour Continuous Bike Counts
Regional Bicycle Network
N
805
163
15
380
335
45
55
90
75
130
40
20
330
145
240
830
150
165
100
130
45
100
100
100
175
20
100
70
Adams Ave
Madison Ave
Monroe Ave
Meade Ave
El Cajon Blvd
Howard Ave
Polk Ave
Lincoln Ave
University Ave
Landis St
Robinson Ave
Park Blvd
30th St
1st Ave
4th Ave
5th Ave
6th Ave
100
165
105
150
XX Estimated Daily Bicycle Volume
< 50
50 - 200
201 - 750
ACTIVE TRANSPORTATION RESEARCH

Improved Air Quality, Safety, Health Assessments

- **Air Quality – (VMT/emissions avoided via cycling)**
  - *Determine rate of bike trips replacing car trips and average bike trip length*
  - *Average bike trip length in miles x Average daily bike volumes (VMT avoided)*
- **Safety – (cycling exposure rates)**
  - *Bicycle collisions ÷ Average daily bike volumes*
- **Health – (minutes of moderate physical activity per day)**
  - *Average bike trip length in minutes x Average daily bike volumes*

Next Steps

- Secure funding for system sustainability and expansion
- Structure regional data access
- Integrate data into mainstream planning and evaluation
- Develop research agenda using data