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

Sherry Ryan, PhD – School of Public Affairs, City Planning
3-27-14
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)

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

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

San Diego’s Network of 36 count sites

- Percent All RBN Segments by Strata
- Phase I Percent of Count Sites by Strata
Selectively Expand Network to 76 Sites

Grow San Diego’s Network from 36 to 76 counting sites

Percent of RBN Segments or Count Locations

Strata (1-27)

- Percent All RBN Segments by Strata
- Phase II Percent of Sample Locations by Strata
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
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

<table>
<thead>
<tr>
<th>Location</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacific Highway (San Diego)</td>
<td>23.4%</td>
</tr>
<tr>
<td>Landis St (San Diego)</td>
<td>18.1%</td>
</tr>
<tr>
<td>Rose Creek Bike Path (San Diego)</td>
<td>17.5%</td>
</tr>
<tr>
<td>Inland Rail Trail (Escondido)</td>
<td>17.4%</td>
</tr>
<tr>
<td>30th Street (San Diego)</td>
<td>17.3%</td>
</tr>
<tr>
<td>Harbor Drive Bike Path (San Diego)</td>
<td>17.0%</td>
</tr>
<tr>
<td>Sweetwater River Bike Path (National City)</td>
<td>16.9%</td>
</tr>
<tr>
<td>University Avenue (La Mesa)</td>
<td>16.9%</td>
</tr>
<tr>
<td>San Diego River Bike Path (San Diego)</td>
<td>16.5%</td>
</tr>
<tr>
<td>University Ave (San Diego)</td>
<td>16.5%</td>
</tr>
<tr>
<td>4th/5th Ave (San Diego)</td>
<td>16.4%</td>
</tr>
<tr>
<td>Washington Avenue (El Cajon)</td>
<td>16.0%</td>
</tr>
<tr>
<td>Nimitz Boulevard (San Diego)</td>
<td>16.0%</td>
</tr>
<tr>
<td>Highway 101 (Solana Beach)</td>
<td>16.0%</td>
</tr>
<tr>
<td>La Jolla Blvd (San Diego)</td>
<td>15.9%</td>
</tr>
<tr>
<td>Vista Village Drive (Vista)</td>
<td>15.9%</td>
</tr>
<tr>
<td>Camino Del Mar (Del Mar)</td>
<td>15.6%</td>
</tr>
<tr>
<td>Palm Avenue (Imperial Beach)</td>
<td>15.6%</td>
</tr>
<tr>
<td>Bayshore Bikeway (Chula Vista)</td>
<td>15.5%</td>
</tr>
<tr>
<td>Bayshore Bikeway (Coronado)</td>
<td>15.2%</td>
</tr>
<tr>
<td>Inland Rail Trail (San Marcos)</td>
<td>15.1%</td>
</tr>
<tr>
<td>Pacific Street (Oceanside)</td>
<td>11.8%</td>
</tr>
</tbody>
</table>

**Standard Deviation**: 1.9%

**Mean**: 16.5%
Automated Counters in Close Proximity to Manual Counts

- Automated Bike Counters
- 4-6PM Screenline Manual Counts
Average Percent of Daily Volume by Hour

- SD Landis Total Cyclists
- 30th Street Total Cyclists
- 4th & 5th Total
- SD University Ave Total Cyclists
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 $\times$ Average daily bike volumes (VMT avoided)

- **Safety** – (cycling exposure rates)
  - Bicycle collisions $\div$ Average daily bike volumes

- **Health** – (minutes of moderate physical activity per day)
  - Average bike trip length in minutes $\times$ 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