Best Practices for Collecting Counts and Risk Evaluation for Bicyclists and Pedestrians

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Overview

• Background
  • Traffic Safety
  • Traffic Monitoring

• Estimating Pedestrian and Bicycle Miles Traveled

• Bicycle Volume Estimation

Risk Exposure Analysis

• Next Steps
Traffic Safety
Individual Risk

Risk = Crashes per Vehicle

SAFETY IN NUMBERS!
Individual Bicyclist Risk

Collision per Bicyclist

Average Annual Daily Bicyclists (AADB) passing through the intersection

Danger Zone

Safety Zone

100,000 AADT
50,000 AADT
10,000 AADT
Traffic Monitoring Programs
Permanent Counters
Short Duration Counters
AADT and VMT

Sum (AADT X Segment Length) over network to compute Vehicle Miles Traveled (VMT)
Can we apply these methods to biking and walking?
AADB: Annual Average Daily Bicyclists

AADT for bicyclists!
Permanent Counters in 2012

- Bicycle Counter
Permanent Counters in Spring 2015

- Bicycle Counter
- Bicycle and Pedestrian Counter
Short Duration Counts

2012 Washington State Bicycle and Pedestrian Documentation Project

Annual Sept/Oct, volunteer manual counts, morning and evening peak hours
Estimating Pedestrian and Bicycle Miles Traveled (PMT/BMT) in Washington State
Pedestrian/Bicycle Volume Estimates

- Travel Surveys
- Sample-based approach
- Aggregate demand model

BMT/PMT
National Household Survey Method

- “Back of the envelope” method
- Uses research from Pucher et al.
- NHTS and Census Data
- Puget Sound Regional Travel Survey
AADB/ AADP × Road Segment Length = Sample Based BMT/PMT

Aggregate Demand Model = Aggregate Demand BMT/PMT
Sample-based Method

\[ \text{PMT \& BMT} = \text{Road or path length per group} \times \frac{\text{AADB}}{\text{AADP}} \times \frac{1}{365 \text{ days/year}} \times \text{per day} \]
4 Regions X 2 Urbanity Levels X 2 Road Types = 16 Groups
Aggregate Demand Model

AADB and AADP associated with...

– Facility type:
  • Local and collector roads
  • Arterial roads and highways
  • Trail
– Bridge
– Population density
– Percent of population aged 18 to 54
– Percent of population with a four-year degree
BMT Methods Comparison Across Studies

- King County, Washington: NHTS
- NHTS for WI
- NHTS for WA
- PSRC Survey
- Twin Cities Count Based - Daytime only

Survey Method

- WA Puget & E Plains: Counts for Urban
- King Cnty, WA: Puget Counts
- King Cnty, WA: Puget Counts, Trails Separate
- King Cnty, WA: Cnty Counts
- King Cnty, WA: Cnty Counts, Trails Separate
- King Cnty, WA: Aggregate Demand Model

Count-Based Method
# Conclusions

<table>
<thead>
<tr>
<th>Approach</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample-based</strong></td>
<td>Data are at the facility level.</td>
<td>- Data tend to be biased towards high count locations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- It is harder to sample pedestrian locations.</td>
</tr>
<tr>
<td><strong>Aggregate demand model</strong></td>
<td>More accurate estimate of PMT and BMT. Especially useful for pedestrian travel.</td>
<td>Difficult to do at the state level.</td>
</tr>
<tr>
<td><strong>Travel survey</strong></td>
<td>Expanding existing dataset is easier than creating new dataset.</td>
<td>Data are not at the facility level.</td>
</tr>
</tbody>
</table>
Bicycle Volume Estimation
Risk Exposure Analysis
Moscow, Idaho
Observed Count Points

Network-wide Volume Estimation

Estimated Bike Volumes
- Very Low
- Low
- Moderate
- High
- Very High
Scenario Planning
### Third Street Bicycle Volumes Existing and Forecasted

<table>
<thead>
<tr>
<th>Intersection Cross Street</th>
<th>Existing Conditions (AADB)</th>
<th>Proposed Scenario (AADB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roosevelt Street</td>
<td>24</td>
<td>226</td>
</tr>
<tr>
<td>Cleveland Street</td>
<td>28</td>
<td>230</td>
</tr>
<tr>
<td>Grant Street</td>
<td>32</td>
<td>230</td>
</tr>
<tr>
<td>Blaine Street</td>
<td>44</td>
<td>253</td>
</tr>
<tr>
<td>Hayes Street</td>
<td>89</td>
<td>239</td>
</tr>
<tr>
<td>Monroe Street</td>
<td>127</td>
<td>255</td>
</tr>
<tr>
<td>Howard Street</td>
<td>146</td>
<td>255</td>
</tr>
</tbody>
</table>

- Increase of about 150 bicyclists per day.
- Increase of about 200 bicyclists per day.
Scenarios
S1: Existing Conditions
S2: Proposed Improvements
Estimated Bicycle Volumes

Scenario 1 (Existing)

Scenario 2 (Proposed)
Right Hook Exposure
## Exposure at Intersections

<table>
<thead>
<tr>
<th>Dangerous Situation</th>
<th>Risk Exposure Condition</th>
<th>Scenario 1: Existing Conditions (AADB)</th>
<th>Scenario 2: w/Proposed Improvements (AADB)</th>
<th>Change (AADB)</th>
<th>Percent Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous crossing</td>
<td>Cross street vehicles: &gt; 8,000 vehicles per day, &gt; 50 mph, &gt; 10% heavy vehicle</td>
<td>33,297</td>
<td>31,595</td>
<td>-1,702</td>
<td>-5%</td>
</tr>
<tr>
<td>Oncoming cross</td>
<td>Oncoming left turning vehicles: &gt; 2,000 vehicles per day</td>
<td>45,577</td>
<td>42,516</td>
<td>-3,061</td>
<td>-7%</td>
</tr>
<tr>
<td>Right hook</td>
<td>Right turning vehicles: &gt; 2,000 vehicles per day</td>
<td>51,603</td>
<td>47,737</td>
<td>-3,866</td>
<td>-7%</td>
</tr>
<tr>
<td>Left sneak</td>
<td>Adjacent vehicles: &gt; 8,000 vehicles per day</td>
<td>9,015</td>
<td>8,798</td>
<td>-217</td>
<td>-2%</td>
</tr>
</tbody>
</table>
Next steps:

Improve volume estimation method through:
- Better spatial distribution of count locations
- Better short duration adjustment factors

Improve risk exposure method through:
- Comparison of exposure and crash data
Guidebook for Counting
(Exposure Data Collection)
Future Research

1. Gather data and create factors
2. Evaluate when and how long to count.
3. Evaluate spatial extent of factors applicability.
4. Guidebook for Communities
Discussion & Questions

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