Designing for All Ages & Abilities

Aaron Villere
Sr. Program Associate,
Designing Cities Initiative
NACTO

Feb 20, 2018
Who are we designing for?
Since the *Urban Bikeway Design Guide*

**UBDG, 1st Ed.**

**UBDG, 2nd Ed.**

Total PBL Mileage, NACTO Cities
Who are we designing for?
Who are we designing for?
Biking is ... ?
Safe Bikeways attract more riders

Aggregate data from Portland, New York City, Chicago, San Francisco, and Philadelphia
Who are we forgetting?

- Interested but concerned: 51–60%
- Not able or interested: 31–37%
- Strongly enthused: 1%

Who are the missing riders?
Who are our design users?

Photo: People for Bikes
NACTO’s
Designing for All & Ages & Abilities
All Ages & Abilities means ...

Safe
Photo: City of Austin

Attractive
Photo: City of Vancouver

Equitable
Photo: People for Bikes
Speed Increases Stress

- 20 mph: 10 passing events
- 25 mph: 10 passing events
- 30 mph: 10 passing events

1,000 ADT

Passing Events per 10 min Trip
Volume Increases Stress

- 1,000 ADT
- 2,000 ADT
- 3,000 ADT

Passing Events per 10min Trip

- 20mph
- 25mph
- 30mph

10 20 30 40 50
Speed & Volume Amplify Stress

Passing Events per 10min Trip

- 20mph
  - 1,000 ADT: 10
  - 2,000 ADT: 20
  - 3,000 ADT: 30

- 25mph
  - 1,000 ADT: 15
  - 2,000 ADT: 25
  - 3,000 ADT: 35

- 30mph
  - 1,000 ADT: 20
  - 2,000 ADT: 30
  - 3,000 ADT: 40
Streets change through the day
Selecting an AA&A Bike Facility

<table>
<thead>
<tr>
<th>Roadway Context</th>
<th>Target Motor Vehicle Speed&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Target Max. Motor Vehicle Volume (ADT)</th>
<th>Motor Vehicle Lanes</th>
<th>Key Operational Considerations</th>
<th>All Ages &amp; Abilities Bicycle Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any</td>
<td>Any</td>
<td>Any</td>
<td>Any of the following: high curbside activity, frequent buses, motor vehicle congestion, or turning conflicts&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Protected Bicycle Lane</td>
<td></td>
</tr>
<tr>
<td>&lt; 10 mph</td>
<td>Less relevant</td>
<td>No centerline, or single lane one-way</td>
<td>Pedestrians share the roadway</td>
<td>Shared Street</td>
<td></td>
</tr>
<tr>
<td>≤ 20 mph</td>
<td>≤ 1,000 – 2,000</td>
<td>≤ 500 – 1,500</td>
<td>&lt; 50 motor vehicles per hour in the peak direction at peak hour</td>
<td>Bicycle Boulevard</td>
<td></td>
</tr>
<tr>
<td>≤ 25 mph</td>
<td>≤ 1,500 – 3,000</td>
<td>Single lane, or single lane one-way</td>
<td>Low curbside activity, or low congestion pressure</td>
<td>Conventional or Buffered Bicycle Lane, or Protected Bicycle Lane</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≤ 3,000 – 6,000</td>
<td></td>
<td></td>
<td>Buffered or Protected Bicycle Lane</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Greater than 6,000</td>
<td>Multiple lanes per direction</td>
<td></td>
<td>Protected Bicycle Lane</td>
<td></td>
</tr>
<tr>
<td>≥ 6,000</td>
<td>≤ 1,500 – 3,000</td>
<td>Single lane, or single lane one-way</td>
<td>Low curbside activity, or low congestion pressure</td>
<td>Protected Bicycle Lane, or Reduce Speed</td>
<td></td>
</tr>
<tr>
<td>≥ 25 mph</td>
<td>≤ 6,000</td>
<td>Multiple lanes per direction</td>
<td></td>
<td>Protected Bicycle Lane, or Reduce to Single Lane &amp; Reduce Speed</td>
<td></td>
</tr>
<tr>
<td>≥ 26 mph</td>
<td>≥ 6,000</td>
<td>Any</td>
<td></td>
<td>Protected Bicycle Lane, or Bicycle Path</td>
<td></td>
</tr>
<tr>
<td>≥ 6,000</td>
<td>High-speed limited access roadways, natural corridors, or geographic edge conditions with limited conflicts</td>
<td>Any</td>
<td>High pedestrian volume</td>
<td>Bike Path with Separate Walkway or Protected Bicycle Lane</td>
<td></td>
</tr>
<tr>
<td>≥ 6,000</td>
<td>Any</td>
<td>Any</td>
<td>Low pedestrian volume</td>
<td>Shared-Use Path or Protected Bicycle Lane</td>
<td></td>
</tr>
</tbody>
</table>
## Contextual Guidance

<table>
<thead>
<tr>
<th>Roadway Context</th>
<th>All Ages &amp; Abilities Bicycle Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Target Motor Vehicle Speed</strong></td>
<td><strong>Target Max. Motor Vehicle Volume (ADT)</strong></td>
</tr>
<tr>
<td>&lt; 10 mph</td>
<td>Less relevant</td>
</tr>
<tr>
<td>≤ 20 mph</td>
<td>≤ 1,000 – 2,000</td>
</tr>
<tr>
<td>≤ 25 mph</td>
<td>≤ 500 – 1,500</td>
</tr>
<tr>
<td></td>
<td>≤ 1,500 – 3,000</td>
</tr>
<tr>
<td></td>
<td>≤ 3,000 – 6,000</td>
</tr>
<tr>
<td></td>
<td>Greater than 6,000</td>
</tr>
</tbody>
</table>
Low-Speed, Low-Volume Roadways Can Be Shared

- Use both Peak Volume & Off-Peak Speed
- 20-25mph max Target Speed
- Manage high-end Speeds
- Reduce / Filter Volume
- Use Time of Day analyses for deliveries & stressors

Photo: NACTO
## Contextual Guidance

### Roadway Context

<table>
<thead>
<tr>
<th>Target Motor Vehicle Speed</th>
<th>Target Max. Motor Vehicle Volume (ADT)</th>
<th>Motor Vehicle Lanes</th>
<th>Key Operational Considerations</th>
<th>All Ages &amp; Abilities Bicycle Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 10 mph</td>
<td>Less relevant</td>
<td>No centerline, or single lane one-way</td>
<td>Pedestrians share the roadway</td>
<td>Shared Street</td>
</tr>
<tr>
<td>≤ 20 mph</td>
<td>≤ 1,000 – 2,000</td>
<td>Single lane, or single lane one-way</td>
<td>&lt; 50 motor vehicles per hour in the peak direction at peak hour</td>
<td>Bicycle Boulevard</td>
</tr>
<tr>
<td>≤ 25 mph</td>
<td>≤ 500 – 1,500</td>
<td>Single lane, or single lane one-way</td>
<td>Low curbside activity, or low congestion pressure</td>
<td>Conventional or Buffered Bicycle Lane, or Protected Bicycle Lane</td>
</tr>
<tr>
<td></td>
<td>≤ 1,500 – 3,000</td>
<td></td>
<td></td>
<td>Buffered or Protected Bicycle Lane</td>
</tr>
<tr>
<td></td>
<td>≤ 3,000 – 6,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Greater than 6,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Any</td>
<td>Multiple lanes per direction</td>
<td></td>
<td>Protected Bicycle Lane</td>
</tr>
</tbody>
</table>
• Set 95th Percentile below 25mph
• Reduce Motor Vehicle Volume
• Reduce Curbside Conflicts
• Address Intersection Conflicts
• Adjacent Traffic Decreases Comfort
## Contextual Guidance

### Roadway Context

<table>
<thead>
<tr>
<th>Target Motor Vehicle Speed</th>
<th>Target Max. Motor Vehicle Volume (ADT)</th>
<th>Motor Vehicle Lanes</th>
<th>Key Operational Considerations</th>
<th>All Ages &amp; Abilities Bicycle Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 10 mph</td>
<td>Less relevant</td>
<td>No centerline, or single lane one-way</td>
<td>Pedestrians share the roadway</td>
<td>Shared Street</td>
</tr>
<tr>
<td>≤ 20 mph</td>
<td>≤ 1,000 – 2,000</td>
<td>No centerline, or single lane one-way</td>
<td>&lt; 50 motor vehicles per hour in the peak direction at peak hour</td>
<td>Bicycle Boulevard</td>
</tr>
<tr>
<td>≤ 25 mph</td>
<td>≤ 500 – 1,500</td>
<td>Single lane each direction, or single lane one-way</td>
<td>Low curbside activity, or low congestion pressure</td>
<td>Buffered or Protected Bicycle Lane</td>
</tr>
<tr>
<td>≤ 1,500 – 3,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 3,000 – 6,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greater than 6,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any</td>
<td>Multiple lanes per direction</td>
<td></td>
<td></td>
<td>Protected Bicycle Lane</td>
</tr>
</tbody>
</table>
Separated Bikeways are Transformative

- Protect where 95th Percentile exceeds 25mph
- Carry protection through Intersections
- Reduce Curbside Conflicts
- Upgrade Separation as Stress Increases
- Minimize the number of travel lanes

Photo: Adam Coppola for People for Bikes
Three Levers to Change the Street

Design

Operation

Network
Three Levers to Change the Street

Design

- Flip the Bike Lane & Parking Lane
- 4-to-3 Road Diet / Repurpose Motor Vehicle Lane
Make incremental improvements
Make incremental improvements
Three Levers to Change the Street

- Low-Speed Signal Progression
- Turn Prohibition
- Phase Separation
Operate for Comfort

Photo: Seattle DOT
Three Levers to Change the Street

- Forced turns / Diversion
- Time-of-Day Regulations
- Large Vehicle Prohibitions
Change Network Role
Reduce Stress, Improve Comfort
Address Common Sources of Stress
Multiple Motor Vehicle Lanes
Address Common Sources of Stress
Motor Vehicle Congestion
Limit Conflicts at Intersections

Photo: Nathan Roseberry, CDOT
Limit Conflicts at Intersections

Photo: Nathan Roseberry, CDOT
Don’t Pit Bikes against Transit

Photo: Michael Pieracci
Give Each Mode Its Space

Photo: Adam Coppola for People for Bikes
Manage Curbside Interactions

Photo: Dongho Chang, SDOT
Make transformative investments

Photo: Waterfront Toronto
Make transformative investments

Photo: Waterfront Toronto
nacto.org/UBDG

Thanks!