Parking Lane Width in a Complete Streets Environment

Paul Krueger
• How to allocate space in complete streets?
• How do you prioritize space?
• What’s the harm in reducing the parking lane width?
Definitions

Curb Parking

Floating Parking

Parking Distance
• Does the parking lane width affect a vehicle’s parking distance?

• Is there different parking behaviour in curb and floating parking lanes?

• What is an appropriate parking lane width?
### Recommended Parking Lane Width Adjacent to Bike Lanes

<table>
<thead>
<tr>
<th>Organization</th>
<th>Document</th>
<th>Recommended Parking Width (m)</th>
<th>Minimum Parking Width (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AASHTO</td>
<td>Guide for the Planning, Design, and Operation of Bicycle Facilities</td>
<td>2.4</td>
<td>2.1</td>
</tr>
<tr>
<td>NCHRP</td>
<td>Recommended Bicycle Lane Widths for Various Roadway Characteristics</td>
<td>2.43 or 2.14 with a buffer</td>
<td>N/A</td>
</tr>
<tr>
<td>NACTO</td>
<td>Urban Streets Design Guide</td>
<td>2.14 to 2.74</td>
<td>N/A</td>
</tr>
<tr>
<td>ITE</td>
<td>Designing Walkable Urban Thoroughfares</td>
<td>2.43</td>
<td>2.14</td>
</tr>
<tr>
<td>City of Boston</td>
<td>Boston Complete Streets Guidelines</td>
<td>N/A</td>
<td>2.14</td>
</tr>
</tbody>
</table>
Data Collection

- Vehicle type
- Parking lane width
- Bike lane width
- Buffer width

Curb Parking Lanes (200 vehicles)
Floating Parking Lanes (120 vehicles)
Changing the parking lane width by 10 cm, changes the actual parking distance by 1.5 cm.

\[ y = 0.15x - 0.12 \]
Effect of Parking Lane Width (2 of 3)

Changing the parking lane width by 10 cm, changes the actual parking distance by 1.5 cm

\[ y = 0.15x - 0.12 \]

Changing the parking lane width by 10 cm, changes the actual parking distance by 6.5 cm

\[ y = 0.65x - 1.45 \]
Effect of Parking Lane Width (3 of 3)

\[ y = 0.23x - 0.21 \]

\[ y = 0.55x - 1.40 \]
## Curb Parking Lanes

<table>
<thead>
<tr>
<th>Lane Width (m)</th>
<th>Encroachment into Bike Lane / Buffer (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Body of Vehicle*</td>
</tr>
<tr>
<td>2.5</td>
<td>- 0.34</td>
</tr>
<tr>
<td>2.4</td>
<td>- 0.27</td>
</tr>
<tr>
<td>2.3</td>
<td>- 0.19</td>
</tr>
<tr>
<td>2.2</td>
<td>- 0.11</td>
</tr>
<tr>
<td>2.1</td>
<td>-0.03</td>
</tr>
</tbody>
</table>

* Assuming a 1.8 m vehicle width

- For each 10 cm reduction in parking lane width:
  - Vehicles move 2.3 cm closer to the curb
  - 2.3 cm of space can be gained

+7.7 cm
### Floating Parking Lanes

#### Lane Width (m) vs. Encroachment into Bike Lane / Buffer (m)

<table>
<thead>
<tr>
<th>Lane Width (m)</th>
<th>Encroachment into Bike Lane / Buffer (m)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Body of Vehicle</td>
<td>Open Door (1 m)</td>
</tr>
<tr>
<td>2.5</td>
<td>0.03</td>
<td>1.03</td>
</tr>
<tr>
<td>2.4</td>
<td>0.08</td>
<td>1.08</td>
</tr>
<tr>
<td>2.3</td>
<td>0.14</td>
<td>1.14</td>
</tr>
<tr>
<td>2.2</td>
<td>0.19</td>
<td>1.19</td>
</tr>
<tr>
<td>2.1</td>
<td>0.25</td>
<td>1.25</td>
</tr>
</tbody>
</table>

+ 5.5 cm

- For each 10 cm reduction in parking lane width:
  - Vehicles move 5.5 cm closer to the curb
  - 4.5 cm of space can be gained
Effect of a Curb

Paul Krueger
Effect of a Curb (1 of 2)

\[ y = 0.10x - 0.11 \]

\[ y = 0.55x - 1.40 \]

Lateral Parking Distance (m)

Parking Lane Width (m)

- Curb 15th
- Floating 15th
### Effect of a Curb (2 of 2)

<table>
<thead>
<tr>
<th>Lane Width (m)</th>
<th>Effect of a Curb (m)</th>
<th>Difference of 15&lt;sup&gt;th&lt;/sup&gt; Percentile Lateral Parking Distance of Curb Parking Lanes and Floating Parking Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
<td>0.17</td>
<td>+4.5 cm</td>
</tr>
<tr>
<td>2.4</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>2.3</td>
<td>0.26</td>
<td></td>
</tr>
<tr>
<td>2.2</td>
<td>0.31</td>
<td></td>
</tr>
</tbody>
</table>
Example Streets

HOMER STREET
1000 - 1300 BLOCKS

VEHICLE TRAVEL LANE  BIKE LANE  PARKING LANE  SIDEWALK

Door Zone: 1

85th percentile
Example Streets

YUKON STREET
2100 / 2200 BLOCKS

Vehicle Travel Lane: 1.50 m
Bike Lane: 1.29 m
Buffer: 0.60 m
Parking Lane: 2.30 m
Sidewalk: 0.31 m

85th percentile

Door Zone: 1 m
RICHARDS STREET
900 / 1000 BLOCK

15th percentile: -0.14

Door Zone: 1 m

2.30

1.70

0.70

PARKING LANE  BUFFER  BIKE LANE  SIDEWALK
Example Streets

UNION STREET
200 BLOCK

15th percentile: -0.03

Door Zone: 1 m

0.80

2.50

2.50

2.27

PARKING LANE
BUFFER
BIKE LANE
SIDEWALK
Findings & Recommendations

- All elements of a street are a system – design them together
- Design for human behaviour
- By reducing two 2.5 m parking lanes to 2.2 m, **14 – 20 cm is gained** for people cycling
- By adding a concrete curb to a 2.2 m floating parking lane **31 cm is gained** for people cycling
- Parking lane widths can likely be 2.2 (but adapt other street elements appropriately)