Effects on Motor Vehicle Behavior of Color and Width of Bicycle Facilities at Signalized Intersections

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Summary

Research was undertaken in Christchurch, New Zealand to investigate motor vehicle behavior near bicycle facilities at signalized intersections. Motorists not keeping clear of such facilities may limit their usefulness and safety for bicyclists. The main research objective was to assess motorists’ avoidance of colored facilities in comparison to uncolored ones. The research also investigated if wide combined bicycle and traffic lanes encourage drivers to queue side-by-side, thereby encroaching into bicyclist spaces.

The rate of encroachment decreased significantly before coloring ASLs. Changes at ASBs were less conclusive on a site-by-site basis.

Typical Intersection Bicycle Facility

Study Aims

Research was undertaken in Christchurch, New Zealand (NZ) to investigate road user behavior near bicycle facilities at signalized intersections. The main objectives of the research were:

1. Assess bicyclists and drivers’ compliance with colored bicycle facilities in comparison to uncolored ones.
2. Assess the effect of combined bicycle and traffic lane width on vehicle positioning with respect to bicycle areas - do wide traffic lanes encourage drivers to queue side-by-side, thereby encroaching into bicyclist spaces?
3. Determine the relevance of the research outcomes for bicycling design standards.

Study Location: Christchurch, New Zealand

Facts:
- New Zealand’s second largest city (pop. 380,000)
- 7% of Commuters cycle to work
- Extensive Bicycle Network
- On-road bike lanes
- Off-road bicycle paths
- Specific intersection facilities

Note: in NZ, vehicles drive or ride on the left-hand side of the road.

Results: Coloring Facilities - Before/After Sites

<table>
<thead>
<tr>
<th>Type of Facility</th>
<th>Before</th>
<th>After</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Stop Line (ASL)</td>
<td>40.3%</td>
<td>47.3%</td>
<td>7.0%</td>
</tr>
<tr>
<td>Advanced Stop Box (ASB)</td>
<td>11.9%</td>
<td>13.3%</td>
<td>1.4%</td>
</tr>
</tbody>
</table>

The rate of encroachment decreased significantly after coloring ASLs. Changes at ASBs were less conclusive on a site-by-site basis.

Results: Effect of Bicycle Facility Width

<table>
<thead>
<tr>
<th>Type of Facility</th>
<th>Narrow</th>
<th>Wide</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Stop Lines</td>
<td>33.8%</td>
<td>37.5%</td>
<td>3.7%</td>
</tr>
<tr>
<td>Advanced Stop Boxes</td>
<td>26.6%</td>
<td>20.2%</td>
<td>-6.4%</td>
</tr>
</tbody>
</table>

Encroachments at wider sites were consistently 15-20% higher, compared with narrow sites.

Key Recommendations

- Road agencies should continue coloring new and existing bicycle facilities at signalized intersections.
- All other things being equal, preference should be given to coloring existing ASL sites before ASB sites.
- All other things being equal, preference should be given to coloring existing sites with wider approaches before narrower ones, given the likely encroachment problems already at the former.
- At intersections, adjacent traffic and bicycle lane combinations greater than 5.0 m (16½ ft) should be avoided.

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