Bicycle Facilities

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TYPES OF CYCLISTS

[Flowchart diagram]

1. Start
2. Did you cycle any time in the past 12 months for commuting or leisure?
   - No: No / don’t know → Non-cyclist
   - Yes: Did you cycle in the past month for commuting?
     - Yes: Would you consider cycling again in the next month?
       - Yes: Regular cyclist
       - No / don’t know
     - No: End
3. Do you have any interest in cycling any time in the next 12 months?
   - No / don’t know: End
   - Yes / yes, if...
4. Potential cyclist

[Table: Increasing Level of Comfort for People Bicycling on City of Bend Roadways]

- **LTS 4**: Typically requires interaction with higher speed traffic.
- **LTS 3**: Bike lane or shoulder on a busy street, but no other protection from traffic.
- **LTS 2**: Comfortably separated from traffic; crossings are straightforward and easy for most adults.
- **LTS 1**: Separation may be complete (paths, trails) or routes are on a neighborhood street.

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Adopted as Best Practice by the Oregon Department of Transportation in 2018
<table>
<thead>
<tr>
<th>Trip purpose</th>
<th>Motivations</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neighbourhood trips</td>
<td>Accessing local facilities and services or visiting family and friends. May include children playing in local parks or with friends in residential streets.</td>
<td>These cycle trips are more likely to take place where traffic volume and speed is minimised and segregated facilities are provided as an alternative to heavily trafficked roads.</td>
</tr>
<tr>
<td>Commuting to work or education (college/university)</td>
<td>To reach a destination quickly and easily with the minimum delay and without losing momentum from average speeds of 20-32kph.</td>
<td>Experienced commuters will favour the most direct route, even if this is highly trafficked. Less experienced commuters will prefer a low traffic route provided it does not introduce significant delay.</td>
</tr>
<tr>
<td>School (primary/secondary)</td>
<td>Accessing school from home and meeting friends on route. Perceived and actual safety and route attractiveness are the principal concerns of children and their parents. Children will be motivated to cycle if it is perceived to be enjoyable and this is reflected in the actual experience.</td>
<td>Children may require segregated and direct routes from residential areas to schools. Child cyclists should be anticipated in all residential areas and on most leisure cycling routes. Design should account for personal security and road safety.</td>
</tr>
</tbody>
</table>

**Day trips/fitness**
- Cycling for the sake of cycling – usually for enjoyment or health and for not longer than one day. Users will sacrifice time and distance benefits in favour of attractive routes with minimal traffic. Wide, traffic-free or low-trafficked routes to places of interest are required. Rest stops should be accommodated.

**Touring**
- Long-distance cycling to new places and for freedom of movement. Will involve overnight accommodation and camping. This user will seek the most interesting routes with attractive destinations. Depending on the level of expertise, physically challenging routes may be sought.

**Sports**
- To be physically challenged, to maintain or improve fitness and/or for exhilaration. Sports cyclists will look for on-road, fast and hilly routes to cycle on. They are unlikely to require any dedicated cycling infrastructure.
## Core Design Principles

<table>
<thead>
<tr>
<th>Coherent</th>
<th>Direct</th>
<th>Safe</th>
<th>Comfortable</th>
<th>Attractive</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Coherent" /></td>
<td><img src="image2.png" alt="Direct" /></td>
<td><img src="image3.png" alt="Safe" /></td>
<td><img src="image4.png" alt="Comfortable" /></td>
<td><img src="image5.png" alt="Attractive" /></td>
</tr>
</tbody>
</table>

### Do
- Cycle networks should be planned and designed to allow people to reach their day to day destinations easily, along routes that connect, are simple to navigate and are of a consistently high quality.
- Cycle routes should be at least as direct – and preferably more direct – than those available for private motor vehicles.
- Not only must cycle infrastructure be safe, it should also be perceived to be safe so that more people feel able to cycle.
- Comfortable conditions for cycling require routes with good quality, well-maintained smooth surfaces, adequate width for the volume of users, minimal stopping and starting and avoiding steep gradients.
- Cycle infrastructure should help to deliver public spaces that are well designed and finished in attractive materials and be places that people want to spend time using.

### Don’t
- Neither cyclists or pedestrians benefit from unintuitive arrangements that put cyclists in unexpected places away from the carriageway.
- This track requires cyclists to give way at each side road. Routes involving extra distance or lots of stopping and starting will result in some cyclists choosing to ride on the main carriageway instead because it is faster and more direct, even if less safe.
- Space for cycling is important but a narrow advisory cycle lane next to a narrow general traffic lane and guard rail at a busy junction is not an acceptable offer for cyclists.
- Uncomfortable transitions between on-and off carriageway facilities are best avoided, particularly at locations where conflict with other road users is more likely.
- Sometimes well-intentioned signs and markings for cycling are not only difficult and uncomfortable to use, but are also unattractive additions to the street scape.
### TYPES OF FACILITIES

**USER DIMENSIONS**

<table>
<thead>
<tr>
<th>Type</th>
<th>Width (mm)</th>
<th>Length (mm)</th>
<th>Min. turning circle (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Outer radius</td>
</tr>
<tr>
<td>Conventional bicycle</td>
<td>700</td>
<td>1800</td>
<td>1650</td>
</tr>
<tr>
<td>Tandem</td>
<td>700</td>
<td>2400</td>
<td>3150</td>
</tr>
<tr>
<td>Bicycle and trailer</td>
<td>800</td>
<td>2700</td>
<td>2650</td>
</tr>
<tr>
<td>Cargo trike</td>
<td>1200</td>
<td>2600</td>
<td>2300</td>
</tr>
</tbody>
</table>
## TYPES OF FACILITIES

### Bike Lanes

<table>
<thead>
<tr>
<th>Speed Limit (mph)</th>
<th>Motor Traffic Flow (pcu/24 hour)</th>
<th>Protected Space for Cycling</th>
<th>Cycle Lane (mandatory/advisory)</th>
<th>Mixed Traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>0</td>
<td>Fully Kerbed Cycle Track</td>
<td>Light Segregation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6000+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>0</td>
<td>Fully Kerbed Cycle Track</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4000</td>
<td>Stepped Cycle Track</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6000+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Any</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50+</td>
<td>Any</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. If the 85th percentile speed is more than 10% above the speed limit the next highest speed limit should be applied.
2. The recommended provision assumes that the peak hour motor traffic flow is no more than 10% of the 24 hour flow.
3. In rural areas achieving speeds of 20mph may be difficult, and so shared routes with speeds of up to 30mph will be generally acceptable with motor vehicle flows of up to 1,000 pcu per day.
TYPES OF FACILITIES

Bike Lanes

Fully kerbed cycle tracks
Stepped cycle tracks
TYPES OF FACILITIES

Bike Lanes

BUS STOPS
Two-way cycle tracks

**Opportunities**
Where buildings, active uses and side roads are entirely or largely on only one side

Where side road access may be reconfigured to take place largely on one side

Arterial roads such as wide dual carriageways with infrequent crossings

**Challenges**
Can be unintuitive and generate risks associated with motorists and pedestrians

Potential safety concerns at side roads and accesses

Complex transitions from one way, with-flow to two-way cycle provision

Connectivity for cyclists to and from the track can be difficult to manage

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**Types of Facilities**

**Bike Lanes**

Fully kerbed cycle tracks

Stepped cycle tracks
TYPES OF FACILITIES

**Bike Lanes**

- Light segregation
- Pop-up bike lane
- Quick-build street design
TYPES OF FACILITIES

Bike Lanes

Cycle lanes
TYPES OF FACILITIES

Bike Lanes

Mixed traffic streets
TYPES OF FACILITIES

Bike Lanes

cycling and pedestrians
TYPES OF FACILITIES

Bike Lanes

Cycle lanes between other traffic lanes
TYPES OF FACILITIES

Bike Lanes

Off road cycle paths
TYPES OF FACILITIES

Intersections

Protected Signalised intersection
TYPES OF FACILITIES

Intersections

Signal prioritised
TYPES OF FACILITIES

Intersections

Unsignalized intersections
TYPES OF FACILITIES

Intersections

Midblock crossing
TYPES OF FACILITIES

Intersections

Roundabouts
TYPES OF FACILITIES

Cycle parking

Short stay parking
TYPES OF FACILITIES

Cycle parking

Long stay parking
TYPES OF FACILITIES

Signs and markings
TYPES OF FACILITIES

Micro-mobility

Public transport integration
Five Levels of Vehicle Autonomy

**Level 0**
No automation: the driver is in control of the vehicle all times.

**Level 1**
Driver assistance: the vehicle can assist the driver or take control of either the vehicle’s speed, through cruise control, or its lane position, through lane guidance.

**Level 2**
Occasional self-driving: the vehicle can take control of both the vehicle’s speed and lane position in some situations, for example on limited-access freeways.

**Level 3**
Limited self-driving: the vehicle is in full control in some situations, monitors the road and traffic, and will inform the driver when he or she must take control.

**Level 4**
Full self-driving under certain conditions: the vehicle is in full control for the entire trip in these conditions, such as urban ride-sharing.

**Level 5**
Full self-driving under all conditions: the vehicle can operate without a human driver or occupants.

Source: SAE & NHTSA

RESPONSES TO THE TECHNOLOGICAL SHIFT

New technologies

Automation, sensing and connectivity
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New technologies

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San Francisco’s entry to Smart City Challenge (SFMTA)
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New technologies

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Singapore’s AV Vision
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New technologies

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New technologies

Automation, sensing and connectivity
New ideas

New technologies

Automation, sensing and connectivity
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New technologies

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New technologies

Automation, sensing and connectivity
Thank you