INFRASTRUCTURE/ **NETWORK LINKS**

CYCLE LANES

Overview

A cycle lane is a legally reserved driving space for cyclists on the road, visually separating them from traffic. It is recommended when significant numbers of cyclists drive along a moderately busy road. Cycle lanes are a visible, fast and flexible solution on existing roads, needing only road markings. A cycle lane can be an alternative for a cycle track when space is lacking, but only when safety can be sufficiently guaranteed.

Background and Objectives

Function

Cycle lanes offer a secured and visible driving space on the road exclusively reserved for cyclists.

Scope

Cycle lanes are **recommended** along distributor roads with relatively low traffic intensity, but where motorized traffic is too fast to allow mixing cyclists with cars. A cycle lanes can be used as an alternative for a cycle track where space is lacking, at least if speed can be reduced to 50 km/h or less. On estate access roads, traffic volumes are in principle low and traffic is mixed; if, however, in reality traffic intensity is unusually high, a cycle lane may be advisable to ensure cyclists' safety.

Outside of built-up areas, cycle lanes can be considered as an alternative for cycle tracks on basic local network routes (not on main routes), but only at low traffic speeds (60 km/h or less) and relatively low intensities (2000 to 3000 pcu/day). At the very lowest intensities, cyclists can mix with traffic and no cycling facilities are needed, except possibly a suggestion lane.

Within built-up areas, cycle lanes are recommended for major routes (more than 2000 cyclists/day) on low-speed roads (up to 30 km/h). On basic network links, with fewer cyclists, mixing traffic should be preferred, possibly with an advisory cycle lane. On faster roads (up to 50 km/h), cycle tracks must be preferred. Only when these are quiet links of the basic network (less than 750 cyclists/day) in narrow streets (2x1 lanes) should cycle lanes be considered.

Cycle lanes outside and inside the built-up area (image source: P.Kroeze)

Implementation

Definition

A cycle lane is a part of the road exclusively reserved for cyclists. Cars are not allowed to drive or park on them. They are indicated by road markings on the carriageway.

Cycle lanes are popular medicine...

The cycle lane is probably the most popular solution for cycling infrastructure in STARTER CYCLING CITIES. It allows for a fast rollout of an extensive and visible cycling network in an existing street network.

- A cycle lane is easier, faster and less costly to put into place than a cycle track: only road markings and possibly surface colouring are needed (no road construction work).
- A cycle lane provides cyclists with a highly visible legally reserved space on the roadway: this sends a strong signal to all road users that cyclists are to be taken seriously.
- Because a cycle lane takes up less space than cycling tracks, it can be more widely applied in existing urban streets.

... but to be used with precaution

These very advantages, however, carry the risk of cycle lanes being **overused as a quick fix**.

The key difference with a cycle track is that the cyclist is **not physically protected or separated** from traffic. Dutch empirical research has concluded that on busy arterial roads, mixing cyclists with traffic may even be safer than putting in a cycle lane. A cycle lane may create a false sense of security and invite cars to speed up and pay less attention to the cyclist. This doubled the number of injurious accidents in the cases analysed[1].

The risk gets even worse when cycle lanes are **dangerously narrowed**. When space is limited, the designer may feel that putting in a narrow lane (below 1.5 m) is better than nothing, even on busy and fast roads. Again, this is more dangerous than no cycle lane at all. The narrow lane forces motorized traffic to drive too close to the cyclist. At the same time, it forces the cyclist to ride too close to the edge of the road or parked cars. Moreover, drivers will mistakenly think that cyclists have sufficient room, will pay less attention and drive faster. As a result, even a slight maneuver by the cyclist to avoid an obstacle is more likely to result in a collision and to cause serious injuries. Narrow cycle lanes should always be combined with speed reduction measures.

Design recommendations

A cycle lane is indicated by **road markings**, as defined by national regulations. They usually include the following.

- A **line marking,** usually on both sides, delimiting the cycle lane from the traffic lanes. In some countries the line is dashed, in others continuous (with stretches of interrupted line at car exits).
- A **bicycle symbol**, indicating the lane at least before and after each intersection. The symbol is preferably repeated at regular intervals (for instance 50 to 100 m in the built-up area, 500 to 750 m outside the built-up area).
- A safety **buffer zone** with markings between the cycle lane and the traffic lanes is recommended along roads with relatively intense and fast traffic (50 km/h).
- A **level surface.** If the lane's road surface is degraded (potholes) or contains sudden level differences (gullies, manhole covers, water drains), cyclists have the choice between damaging their bicycle and making a dangerous sudden swerving movement. Surface defaults should be corrected when putting in a lane. Road maintenance should give priority

[1] Veiligheidsaspecten van stedelijke fietspaden, A.G.Welleman, A.Dijkstra. SWOV rapport R-88-20. Leidschendam, SWOV, 1988 – quoted in: Design Manual for Bicycle Traffic, CROW-record 25, 2006.

to cycle lanes, since cyclists are much more vulnerable to degradations than motorized vehicles.

- Strikingly **coloured paving**, for higher visibility, is generally recommended, most often red (NL), sometimes blue (DK) or green (F). Colouring is, however, not generally applied. In the UK, for instance, systematic use of coloring is officially discouraged: the coloring is felt to be visually too intrusive, compromising urban design quality while also adding to the maintenance cost. Moreover, coloring is felt to be more effective when it is restricted to conflict areas, such as advanced stop lines, priority crossings at side roads, contra-flow lanes etc.[2] In any case, it is crucial to define and apply a consistent policy, to create a clear situation for all road users.

A **minimum width of 1.5 m** is recommended (markings excluded). Each marking line is 0.10 to 0.15 m wide.

- A cyclist and his vehicle take up about 0.75 m of space. But a cyclist driving along a kerb needs at least 0.9 m, taking into account zigzagging and a safe distance from obstacles. A width of 1.5 m increases the safety margin and makes driving comfortable and less stressful. It also allows for slightly wider trailers, occasional overtaking and side-by-side riding, for instance parents accompanying children to school.
- A width between 2 m and 2.5 m increases comfort and safety.
- At less than 1.5 m, the cyclist will need to leave the lane and drive on the carriageway to overtake, ride side-by-side or avoid an obstacle. Narrow lanes should only be considered on low-speed roads.
- The cycle lane should be larger on uphill stretches: because of the larger effort, the cyclist will zigzag more strongly.

Cycle lanes along parked cars

Ideally, a cycle lane should not be combined with a parking lane or parking bays: **opening car doors** are a serious safety hazard for cyclists. The cyclist may hit the door or try to avoid this by making a sudden swerving movement onto the carriageway, risking to be hit by a car coming from behind.

When a parking lane needs to be combined with a cycle lane, it is recommended to add a **critical reaction strip** (0.5 to 0.7 m wide) to the parking lane as a buffer space, reducing the risks of hitting an open door or evasive maneuvers. To ensure correct use, the paving of the strip should be different from the parking lane and from the cycle lane. Such a strip takes up additional space, but it can also be used for drainage. A strip of reverse parking bays at an angle avoids the risk of opening doors for cyclists, and increases the number of parking spaces on a length of road. Cars should park in reverse, to have a better view of cyclists when they drive off.

As an alternative, the space needed for a cycle lane with a reaction strip may be used to put in a **cycle track** between the parking lane and the pavement. To save more space, they cycle lane may be on part of the pavement[3].

Cycle lane, at a safe distance from parked and driving cars (image source: D. Dufour)

[2] Department for Transport UK – 2004: *Policy, Planning and Design for Walking and Cycling.* Department for Transport – LTN 1/04
[3] See fact sheets on CYCLE TRACKS and CYCLING AND PEDESTRIANS

Cycle lanes and traffic safety

Often, **busy arterial roads** are the most direct routes, especially going into the city centre. This makes them also natural main links in the cycling network. In principle, such links require cycle tracks. In many cases, however, space is lacking and cycle lanes are often considered as a pragmatic, but inherently risky alternative.

- The safest and most cycle-friendly option is to **revise the road lay-out**, for instance by taking out a traffic lane or a parking lane to create more room for cycle lanes or tracks.
- If this is not feasible, all efforts should be taken to **minimize the risk**: reducing speed to 50 km/h, making the cycle lane as wide as possible, creating a buffer zone with markings, reducing traffic intensity (by reorganizing traffic routes).
- As a last resort, if safety cannot be sufficiently guaranteed, it is advisable to abandon the route and create an **alternative cycling route**, although this may be less direct. This should be a high quality route; otherwise cyclists will tend to use the busier road anyway.

A cycle lane can be used in a **one-way street with contra-flow cycling**, in both directions if space is available or in the contra-flow direction only (the other direction being mixed traffic or indicated by an advisory lane).[4]

Advisory cycle lanes

As an alternative for a cycle lane, an **advisory lane**[5] can be put in. Technically and legally an advisory lane is not a cycle lane at all. A part of the carriageway is marked as a suggested space for cyclists, without being exclusively reserved for their use. Motorized traffic can and must drive on the suggestion lane so as not to drive in the middle of the road. Cars can also park on them if parking on the carriageway is allowed.

Basically, a suggestion lane is simply a design option to draw attention to the presence of cyclists and to visually narrow the carriageway. It is meant to **influence drivers' behaviour**: they expect to meet cyclists and more easily respect their presence.

An advisory lane should only be used for basic cycling network links (not main routes) and on estate access roads. It is used for two main purposes.

- As an **addition to a mixed traffic situation**, in order to make cyclists' presence more felt, especially when traffic intensities are relatively high. The suggestion lane can also mark the transition from a cycle track or lane to a mixed traffic situation.
- As an **alternative in narrow streets**, where space for a cycle track or lane is not available, or when the space is needed for loading and unloading. Sometimes, a suggestion lane is used on short sections of a cycle lane, in places where the road narrows.

Here are some **typical applications**. Although they are mostly used in the tight urban streets of the built-up area, they are also applied on quiet country roads outside the built-up area.

- An advisory lane can be used **on both sides of quiet two-way roads or streets**, leaving a central traffic path in the middle, without a centre line marking. Cars drive on the suggestion lanes, and overtake cyclists in the central traffic path.
- An advisory lane is often used in narrow **one-way streets**, with the traffic flow or in the opposite direction, to attract attention to contra-flow cycling[6].
- An advisory lane can also be designed as a **closed surface comfort zone** in streets with cobblestones.

As to design principles, **various combinations of line markings, symbol markings and coloring** are being used. Practices have gone through an evolution.

- Originally, it was felt that the **visual impact** should be as strong as possible, for maximum visibility and safety for cyclists. Line markings were used (distinct from cycle lane markings) and the same width as a cycle lane (1.5 m to 2 m). Others used colored paving

[4] See fact sheet CONTRAFLOW CYCLING
[5] Also known as non-compulsory lane or suggestion lane, Angebotsstreifen, bande de suggestion, suggestiestrook
[6] See fact sheet on CONTRAFLOW CYCLING

(identical or distinct from cycle lane coloring). Still others preferred line markings and paving combined, possibly with painted bicycle symbols added.

- However, such an advisory lane **strongly resembles a cycle lane**, with only minor differences to make the legal distinction. Experience has shown that this tends to cause **confusion** in the minds of all users, cyclists included, as to the legal rights and obligations. This in turns creates risks through misunderstandings over right of way, and raises liability issues. It is also argued that this approach devalues the regular cycle lane.
- Currently, the trend is to **differentiate** advisory lanes as clearly as possible from cycle lanes. Markings are for instance limited to a **string of symbols**, such as bicycle logos or chevrons. These should be provided at regular intervals for visual continuity (approx. 50 m). The intended psychological impact is still there, and the novelty of the markings in itself can attract attention. They also serve to alert crossing pedestrians to the presence of cyclists in local streets without pedestrian crossings.

Advisory lane and contra-flow advisory lane (image source: D. Dufour)

Considerations

Strengths

Visible and flexible reserved space for cyclists

- A cycle lane is a legally reserved comfort zone, increasing visibility, safety and ease.
- A cycle lane is flexible for the cyclist, who can cross the road at any point (as opposed to a physically separated cycle track).
- A cycle lane allows cyclists to bypass queuing motorized traffic (more easily than in a mixed-traffic situation).

Low-cost and flexible infrastructure solution on existing roads

- A cycle lane is easy, fast and not costly to implement and maintain (only road markings).
- A cycle lane needs less space than a cycle track, and can be more widely applied on urban streets where there is no room for a cycle track.

Weaknesses

The risks of a flexible solution

- Due to its pragmatic advantages, designers may have recourse to cycle lanes in situations that call for a cycle track, or reduce the width below the safe minimum when space is scarce.
- Cycle lanes may be put in where it is easy to do so and simply stop at difficult and dangerous intersections, leaving cyclists stranded. This compromises the continuity and the safety of the route, and makes black spots even more hazardous.

- Since there is no physical separation, a cycle lane easily attracts illegal parking, loading and unloading. This is especially the case if the width is over 2 m. In the busiest urban areas, this calls for strict and intensive police controls.
- Debris (such as shattered glass) easily accumulates on cycle lanes, due to the wind sweeping effect of passing motor vehicles or because they were quickly swept aside after a collision. This increases the risk of punctures and accidents. Road sweeping should pay special attention to cycle lanes.

A false sense of security in starter cities

- A cycle lane often gives motorists the impression they no longer need to pay attention to cyclists. As a result, they overtake too fast and too close to the cyclists and are not prepared for evasive maneuvers. The risk is larger in STARTER CYCLING CITIES, where drivers have limited experience with cyclists' driving behavior and are mostly not cyclists themselves. If the carriageway is widened to create a cycle lane, traffic speed may even increase.
- When the road gets narrow, motorized vehicles may encroach upon the traffic lane, especially when overall levels of cycling are low.

Alternative options

- TRAFFIC CALMING if space is lacking and conditions can be changes.
- CYCLE STREET for main routes in quiet residential areas
- CYCLE TRACK for busier roads
- CONTRAFLOW CYCLING in one-way streets
- BUS LANES on bus routes