



road surface & lighting

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6.1 Purpose

A good road surface makes it possible for cyclists to ride safely and comfortably at the design speed. The quality of the road surface will determine whether or not an appropriate level of safety and comfort can be achieved. If the quality is poor, the facility will be under-utilised. Cyclists may choose to ride on the carriageway if the road surface of the cycle track is of poor quality, or they may even avoid certain routes. This also applies to the entry to a cycle track if it is not smooth.

6.2 Pavement types

Two types of road surface are briefly described below.

6.2.1 Asphalt/macadam

Asphalt or macadam are ideal materials for cycle routes because of their smooth texture and “good riding” qualities. They are also relatively cheap to maintain.

Sometimes a surface dressing treatment is applied to an asphalt or macadam pavement. This consists of applying a bituminous binder followed by a layer of single-sized chippings. Where this treatment is applied to cycle tracks, it is particularly important to ensure that excess chippings are brushed off or removed with a suction sweeper. The presence of loose chippings is a hazard for cyclists in two ways:

- it may cause a cyclist to skid,
- a cyclist may be struck by a loose stone.

6.2.2 Concrete

Concrete is also a good road surface material, provided that joints (shrinkage and expansion joints, construction joints) are carefully positioned. A concrete cycle track requires almost no main-tenance, and is not susceptible to damage from most tree roots at least in the medium term.

6.2.3 Costs

The extra expense of a more solid construction is often repaid with lower maintenance costs. A more solid construction also offers cyclists a guarantee of better quality.

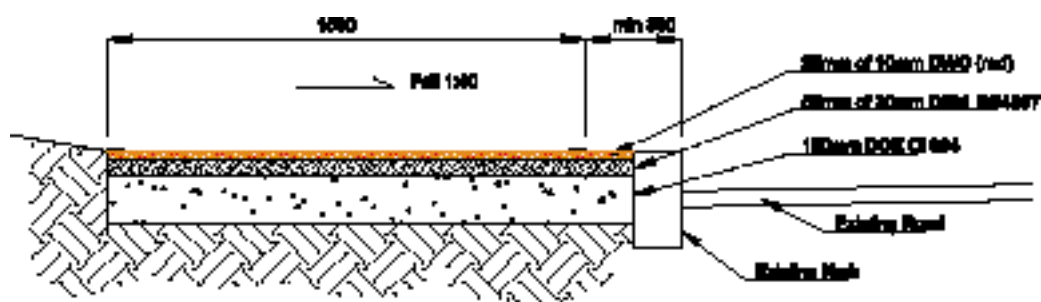
Construction and maintenance are usually paid from separate budget headings. This can lead to savings on construction costs without considering any future increase in maintenance costs. A good cycling policy must ensure that budgets for construction and maintenance are linked and jointly considered.

6.3 Maintenance

6.3.1 Typical construction cross section (fig 6.1)

The weight of cycle traffic does not necessitate laying deep foundations for cycle tracks, but there are other reasons for ensuring a solid foundation, such as:

- subjecting the cycle track foundation to heavy loads during construction. For example, laying asphalt or macadam using a paving machine is only possible if the foundations are capable of withstanding such a heavy load;
- allowing the foundations to be used by motorised traffic, such as at junctions and slip-roads. Also maintenance vehicles may



TYPICAL CROWN SECTION

need to use cycle tracks or there can be illegal use of cycle tracks by motorised traffic;

- guarding against frost and thaw damage;
- guarding against damage by settlement of the sub-grade (natural ground);
- guarding against the growth of tree roots and weeds.

To avoid extra maintenance, cycle tracks should not be constructed above cables and piping. Usually there is sufficient space for cables and pipes alongside cycle tracks.

6.3.2 Tree roots

Tree roots can badly damage the road surface of a cycle track. Condensation forming on the underside of bituminous pavements is conducive to root growth.

The following measures are possible to counteract this:

- lay a dense base course macadam under the cycle track. The foundation must be between 0.20 and 0.30m thick;

- place a foil root cover between the cycle track and the tree. The foil layer must extend to the ground water level and, if the ground water is not too deep, preferably even further. Eventually the roots will grow under or around the foil and the cycle track;
- saw off root growth above the foil layer growing in the direction of the cycle track;
- only plant species of trees the roots of which will not damage the cycle track.

The following species are well known for their damaging root growth underneath cycle tracks: poplar, willow, birch, acacia, coarse pine, sea buckhorn and silver leafed maple. Lime and ash trees are less likely to undermine a cycle track.

6.3.3 Road marking material

With certain types of cycling facilities it is essential that the marking material is of a high quality. Good quality markings on on-road cycle tracks will contribute to good traffic behaviour in relation to cycle tracks.

Thermoplastic

Thermoplastic material is recommended for use on cycle facilities. It remains visible and is less slippery even when wet, it keeps its colour and is not very susceptible to wearing.

Thermoplastic is an expensive material, but has the advantage of low maintenance costs.

Road paint

Road marking paint is less suitable. It has only moderate visibility, particularly in dark and wet weather. The paint layer also wears down quickly at busy junctions, and where traffic volumes are heavy.

White bricks

With a brick pavement white bricks can be laid as a road marking. Visibility is good and the maintenance costs are negligible.

Public safety is the primary factor when deciding the requirements for lighting. Road safety and orientation are next in order of importance. (See the remarks about public safety on park cycle routes in chapter four).

The following points should be taken into account:

Design speed

The design speed is directly proportional to the sight distance required. Lighting must make it possible to see a minimum distance of 20m to 40m.

Blinding

As cyclists may be blinded by oncoming motorised traffic, lighting strength should be high in order to equalise, as far as is possible, the strength of the vehicle headlamps and street lighting. This will help cyclists to avoid eye strain.

Strength of lighting

From the public safety point of view, street lighting should give enough light to enable traffic users to recognise people or objects on, or next to, the road at a reasonable distance. It is known that pedestrians feel unsafe when they cannot see the faces of other people from a distance of 4m. The recommendations are that:

- on routes with an important traffic function, an average horizontal light intensity (= the average amount of light which falls on the road surface) of seven lux should be created;
- on routes with a less important traffic function, an average horizontal light intensity of two to five lux should be achieved.

6.4 Lighting (fig 6.2)

The most important functions of lighting are to:

- illuminate all the road surface (road safety);
- illuminate obstacles and people on the cycle route, and ensure recognition at a minimum distance of 4m (public safety & road safety);
- indicate the direction of the route (road safety and orientation);
- give the cyclist a feeling of security (subjective public safety);
- help identify particular locations (orientation).

The amount of light which is reflected by the road surface determines the visibility of the surroundings, and depends, among other things on:

- the light intensity;
- the colour of light;
- the reflective properties of the road.

Uniformity of lighting

The level of light on a road surface under a street lamp should not differ much from the level of light in between two street lamps.

Any differences are determined by the:

- distance between the street lamps;
- heights of the street lamps;
- quality of the bulbs;
- quality of the optical system of the fittings.

A distance of 30m between street lamps is usually sufficient to ensure even lighting.

On major roads the lowest light intensity on the road surface should be at least 30% of the highest light intensity. On roads with a less important traffic function, a value of 15% to 20% should be sufficient.

Carriageway lighting

It should not be automatically assumed that an unlit cycle track, separated from the main carriageway, will receive sufficient light from the carriageway lights.

Separate lighting of a cycle track may be necessary when:

- the dividing verge is overgrown with vegetation;
- the cycle track is located at a distance from the carriageway;
- there are sudden bends or corners on an unlit cycle track;
- a cycle track diverges from the carriageway.



FIGURE 6.2 | UNIFORMITY OF LIGHTING

