

Gradients

Accessibility

The Equality Act 2010 states it is unlawful to discriminate against anyone on the grounds of disability or age. These are known as protected characteristics. Service providers must make 'reasonable adjustments' to remove barriers to disabled people. Furthermore, the Council has a public sector equality duty to eliminate discrimination when exercising its statutory functions, which would include creating or adopting new highways.

Inclusive Mobility outlines how people with visible and/or hidden impairments should be provided for in the public realm.

Our *One City Plan* and our *Equality Charter* both seek to create a fairer, safer, accessible and inclusive city for all.

We therefore are obliged to make every effort to ensure that streets are safe and usable for all members of the public and hold the bar of 'reasonably practicable' at a high level, in accordance with legislation, and local and national policy and guidance.

Excessively steep gradients can render public spaces unusable, therefore preventing many sections of the community from being able to use them. The maximum design gradients would depend on the users of the streets.

Excessively shallow gradients result in poor drainage and problems with ponding, ice, and slipping.

Maximum gradients for pedestrians

Comfortable gradients for walking do not exceed 1 in 60 (0.17%).

Although gradients up to 1 in 20 (5%) over short lengths are generally considered acceptable for pedestrians and wheelchair users, gradients over 1 in 40 (2.5%) might be impassable for some manual wheelchair users. A gradient of 1 in 20 (5%) is defined as a ramp.

Where gradients are steeper than this, many wheelchair users would find this too difficult to negotiate, and could result in wheelchairs overbalancing.

To ensure accessibility for all pedestrians, we would therefore expect footways or shared surfaces to be no steeper longitudinally than 5% (1 in 20).

To cater for desire lines, shorter routes incorporating steps may be considered in addition to the more level routes.

Cyclists

Steep gradients discourage cycling and can cause safety issues, particularly cycling uphill and the effects of wobbling, and conflict with passing vehicles.

Local Transport Note (LTN) 1/20 makes specific recommendations about the maximum length for given gradients:

Table 1: Maximum length for gradients

Gradient	Desirable maximum length of gradient (m)
1 in 50 (2%)	150
1 in 40 (2.5%)	100
1 in 33 (3%)	80
1 in 30 (3.5%)	60
1 in 25 (4%)	50
1 in 22 (4.5%)	40
1 in 20 (5%)	30

Motorised Vehicles

For the reasons outlined above, we would expect any access road being put forward for adoption to be designed to have a long section no steeper than 1 in 20 (5%) gradient, and only relatively short sections of this, to allow for pedestrian and cycling use.

Whilst some vehicles can operate on steeper gradients, these will not be allowed if the road will be used by cyclists and / or pedestrians, so without more convenient and accessible alternative provision for these users, steeper gradients will not be agreed without a formal departure from standards process.

Pedestrian and / or cycle routes can be designed separately from carriageways with a different vertical alignment, and appropriate landing stages

and handrails where necessary. A level landing should be provided for every 500mm that the route rises, even where the gradient is within the maximum. However, pedestrian routes must be direct and convenient, and crossing points well considered. If there is a conflict between the two, priority should be given to ensuring that the pedestrian route is most direct and convenient.

The needs of waste operatives and collection points for waste are also a consideration. Bin stores and collection points should not be placed on gradients of more than 1:20 to allow refuse collectors to access the bins safely and mount them onto refuse collection vehicles.

Minimum gradients (for drainage)

Care must be taken to ensure that paved areas have a positive fall to allow for drainage to avoid ponding and ice. On a traditional design, this fall would be towards the gullies in the carriageway. Highway drainage cannot fall onto private land and vice versa.

Crossfalls

On footpaths, shared use streets, crossing locations and cycle paths, crossfall should be a maximum of 1 in 40 (2.5%). Any steeper than this can cause discomfort or can cause wheelchair users or pushchair users to drift to the edge of the carriageway. Crossfalls in the carriageway will need to be considered in conjunction with the long sections to ensure no ponding takes place.

Variable crossfalls can cause problems for wheelchair users and people who have a mobility impairment, so should be avoided wherever possible.

To ensure safe approach to junctions and acceptable visibility, for the final 10 m of the approach to a priority junction, the carriageway gradient of the minor road should be no more than 1 in 40 (2.5%).

Departures from standards

Given Bristol's topography, it is recognised that there may be occasions when accessible gradients cannot be achieved across the whole of the site. In such cases, developers will need to demonstrate robustly, to the satisfaction of the Highway Authority, that all avenues have been explored and that it is not feasible nor viable to carry out the appropriate mitigation to reduce short sections of gradients in excess of the maximum.

In such cases some flexibility may be applied, on a site by site basis. However, the following must be demonstrated to the satisfaction of the Highway Authority:

- All reasonable steps are taken to minimise discrimination against disabled and elderly people and those accompanied by children.
- The risks to public safety have been adequately assessed and minimised.
- Appropriate mitigation works are provided, including but not limited to passive vehicular protection (subject to appearance and accessibility); consideration of water run off and flooding impacts.



(Photo courtesy of Google Maps)