

“MOTORCYCLING IN SCOTLAND”

JULY 2007

GUIDANCE FOR ROAD AUTHORITIES IN SCOTLAND

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1. INTRODUCTION

- 1.1 It is widely recognised that motorcycles, mopeds and scooters (powered two wheelers - PTWs) have a role to play in a national transport strategy.
- 1.2 In rural areas they can help reduce social exclusion by providing an affordable alternative to the car where public transport is not readily available, and where walking or cycling is impractical. In urban areas, switching from car use to motorcycle use has the potential to reduce vehicle emissions and congestion as well as minimising the land required for parking provision.
- 1.3 Since the publication of Travel choices for Scotland in 1998 and Scotland's Transport Future in 2004, the Scottish Executive have encouraged local authorities to take account of the contribution PTWs can make in delivering integrated transport policies.
- 1.4 The safety of motorcyclists is a significant issue and merits serious attention from the road safety perspective if increased use is not to be reflected in increased casualties. The motorcycle safety situation is due to a combination of factors that go beyond the rider and machine and are in large measure the result of nearly 30 years of a poor strategic approach to motorcycling safety and policy issues. To address this problem it is recommended that the special needs of motorcyclists are considered in transport strategies and plans. Details of some initiatives and measures, which can improve the safety of motorcyclists, are contained in Appendix A.

2. LEGISLATIVE FRAMEWORK

- 2.1 ‘Travel Choices for Scotland’ - The Scottish Integrated Transport White Paper issued in 1998, set out a framework for transport requirements and policy in Scotland. One consequence was that a forum was set up to consider the role motorcycling could play within an integrated transport system. The forum consists of members of the Scottish Executive, representatives of the motorcycle industry and user groups.
- 2.2 ‘Scotland’s Transport Future’ – The Transport White Paper built on the initial framework. In order to promote motorcycling as part of an integrated transport system the forum considered that it would be desirable to prepare guidance which would address the issues surrounding motorcycle usage and provide guidance for regional and local transport planners to ensure that appropriate provisions are made for motorcycle use in their transport plans.
- 2.3 This guidance recognises that many issues surrounding motorcycle use lie in areas that are reserved for action by Westminster and the DfT. This is necessary to maintain a uniform approach throughout the UK on appropriate matters. Other matters such as the Scottish road network and parking controls lie within the remit of the Scottish Executive.
- 2.4 The UK Government’s White Paper on the Future of Transport, “A New Deal for Transport: Better For Everyone” issued in July 1998, recognised that mopeds and motorcycles can provide an alternative means of transport for many trips and that they offer an affordable alternative to the car. The White Paper also acknowledged the potential benefits offered by motorcycling for the environment and for congestion. However, it recognised that these were dependant on a number of factors and that the role of motorcycling in an integrated transport policy raises some important issues.
- 2.5 The UK Government concluded that it required advice on these issues in England and Wales and it established the Advisory Group on Motorcycling (AGM). The AGM set up five Task Forces to examine vehicle safety and security, integration and traffic management, environmental and fiscal issues, statistics, and research.
- 2.6 This guidance considers the findings of the AGM and its Task Forces and assesses their relevance and applicability to Scotland.

3. POLICY

- 3.1 The Scottish Executive has a role in achieving successful transport objectives. Attainment of these objectives will require legislation and investment, as well as the Executive's influence in guiding planning policy, standard setting, demand management and joint working.
- 3.2 Scotland's Transport Future; the Transport White Paper issued in June 2004 set out proposals for a Scottish Transport Agency (Transport Scotland) and Regional Transport Partnerships. Together these bodies play a key role in the strategies required for the planning and delivery of transport objectives. The publication of the National Transport Strategy in December 2006 is fundamental to the delivery of these objectives. It should cover all modes in a balanced way and provide a framework within which councils and the 7 Regional Transport Partnerships develop their own plans.
- 3.3 Motorcycles and PTWs are part of the transport mix on all roads. The proportion varies considerably, with the highest levels of PTW use generally being found in larger urban areas. Relatively little attention has previously been given to any special needs of motorcyclists despite the fact that numbers have been increasing over recent years.
- 3.4 As increasing numbers of motorists are switching to the motorcycle option. Local policy and planning should be encouraged to look more closely at how safety, access and security issues can be addressed to reduce motorcyclists vulnerability. Transport strategies have a key role to play in addressing these issues and motorcycles should figure in all transport strategies as a legitimate, beneficial (compared to cars) transport mode in local policy.
- 3.5 In particular transport strategies and plans should consider:
- Raising the awareness of motorcycles as a beneficial transport mode;
 - Recognising the benefits of motorcycle use, tied to specific local land use and transport planning issues;
 - Recognising the wide spectrum covered by the term motorcycle (or Powered Two Wheeler);
 - Encompassing frank examination of the drawbacks to motorcycling – the most obvious being safety, include serious data-led analysis of the local situation and include the kernels of positive action to address other drawbacks including security, noise and vehicle pollution concerns;
 - Committing local authorities to giving specific undertakings to include identified best practice in their operational procedures;
 - Considering the role of motorcycling in helping reduce congestion, emissions, and in transport policies.
- 3.6 Transport strategies should refer to the role that motorcycles can play and should contain strategies to reduce their accident involvement rate. These strategies should cover both engineering and non-engineering activities.
- 3.7 Consultation with riders is essential to ensure that strategies and initiatives meet the need of the users and road authorities may find it useful to establish a Motorcycle Forum. Consultation at local level can involve motorcycle forums where practicable, or within broader forums of stakeholders of other transport modes.

- 3.8 In addition to inclusion within Transport Strategies, motorcycles also have a role to play in travel plans produced by employers and adult or late-teen educational establishments to reduce the amount of traffic they generate. Local authorities should play a role in the promotion of travel plans and include best practice in relation to provision for motorcycles.

4 THE SCOTTISH ROAD NETWORK

- 4.1 The Scottish Executive, through Transport Scotland, ensures that the trunk road network is managed and maintained to appropriate standards. Day-to-day work involves among other things the inspection, maintenance and repair of the road surface, bridges, drains and lighting together with the grass cutting, road sweeping and salting and snow clearing required to ensure that traffic can continue to flow safely.
- 4.2 The statutory responsibility for the network of local roads and bridges lies with individual local authorities. Councils are therefore responsible for the management, maintenance and improvement of all public roads in their areas, which do not form part of the trunk road network.
- 4.3 Road defects are of considerable concern to motorcyclists and cyclists and whereas motorists may experience discomfort or in severe case damage to their vehicles, motorcyclists encountering the same defect may experience “loss of control” with potentially very serious consequences. Similarly, poor design of roads and their infrastructure can pose increased risk to motorcyclists. It is imperative that laid down design criteria are fully complied with for the benefit of all road users.
- 4.4 In appreciation of these facts the Highways Agency in England approached the Institute of Highway Incorporated Engineers (IHIE) with a view to producing guidelines aimed at reducing rider vulnerability and improving safety through engineering and integration.
- 4.5 These guidelines, which are equally applicable to Scottish roads, constitute best practice. Their adoption will represent a major step towards integrating motorcycles into transport policy. Key areas for consideration are summarised in Appendix B.
- 4.6 Other areas for consideration include:
- A review of the impact of transport planning on road safety.
 - The provision of secure parking.
 - Incorporation of motorcycles within local transport strategies.
 - Motorcycle access to bus lanes and advance stop lines.
- 4.7 In particular transport strategies should be evaluated according to their potential for casualty reduction across all modes, including motorcycling.
- 4.8 In order to reduce rider vulnerability it is essential that motorcycles are included in transport strategies so that roads departments and local authorities can implement measures which take the needs of motorcyclists into consideration.
- 4.9 Although the issue of motorcycle access to bus lanes and advanced stop lines has been contentious a number of existing schemes or trials suggests that “vulnerable” road users such as cyclists and motorcyclists can use such facilities without disadvantaging the other.
- 4.10 The DfT’s present advice on bus lanes, “TAL 2/07 The Use of Bus lanes by Motorcycles ” encourages a more objective assessment than the previous advice LTN 1/97 "Keeping Buses Moving" which recommended that motorcycles should not

normally be permitted to use them. The onus is on the Local Authority to weigh up the benefits and disbenefits of permitting use. Engineers and planners should take into consideration the safety benefits for motorcyclists by permitting access, considering the possible negative impact on other vulnerable road users particularly pedestrians and cyclists, impact on bus journey time reliability, the potential for modal shift if motorcycling is seen as a more convenient form of transport and the reduction in congestion for other traffic on routes currently used by motorcyclists. The arguments about other vehicles using bus lanes revolve around the reduction in benefits for buses. This is not an issue with motorcycles. But there has been a longstanding concern about conflicts with cyclists and to lesser extent pedestrians. For cyclists the concern stems from the differential rate of travel of cyclists and motorcyclists, given the increased traffic flow in an uncongested bus lane, and the visibility of cyclists compared with buses, giving rise to a perception of greater risk and a less attractive cycling environment. For pedestrians, evaluating the differential rate of travel and the awareness of motorcycles in bus lanes generate perceived safety concerns.

- 4.11 A number of authorities in England have allowed motorcycles into bus lanes. To date there has been no evidence of increased accidents to substantiate the perceived higher risks of allowing PTWs into bus lanes either where motorcycle use is allowed or in Transport for London (TfL) or DfT trials. Furthermore, there are potential safety benefits to motorcyclists (a reduction in motorcycle accidents of between 0% and 31% in DfL trials) if they are able to use bus lanes rather than filter through traffic queueing alongside the bus lane. Motorcyclists contend that they are more visible to pedestrians when using bus lanes than when filtering through stationary or slow moving traffic.
- 4.12 In areas where cyclist and pedestrian safety is not an issue, such as the priority bus lane on the A90, motorcycle access should be considered.
- 4.13 The provision of advance stop lines (ASLs) for cyclists at signal junctions is now widespread. Motorcycle representatives have sought to allow the shared use of ASLs by motorcyclists. However this has raised concerns. The DfT therefore have commissioned research to look at the effects of allowing motorcyclists to use ASLs at a number of trial sites. While conflict between pedal cycles and motorcycles was not identified as a problem, the trials highlighted a number of design issues regarding the shared use of ASLs, especially the provision of separate filter lanes for PTWs. The UK Government, in the Motorcycling Strategy, has committed itself to carrying out further trials.
- 4.14 There is a gap in the advice available to roads engineers about the particular requirements for providing safety for motorcyclists on the road network. While it is true that in most areas of road construction will generally cover motorcycles, there are some particular needs for PTWs that need to be taken into account. For example: not placing steel manhole covers where motorcycles are likely to be cornering sharply, and not locating road humps where motorcyclists are likely to be cornering or where such placement is likely to cause conflict with oncoming vehicles.

5 CONGESTION AND MOTORCYCLE PARKING

5.1 DfT research into the consequences of increased motorcycle use on traffic congestion on urban roads and the associated environmental and safety effects provided useful data. The study established that:

- There were benefits for those who switched from other modes to motorcycling;
- Where public transport use was relatively low, and transfers to motorcycle use come mostly from cars, overall levels of congestion reduced;
- Where public transport use is high most of the transfers are likely to come from public transport, leading to no overall reduction in congestion. (Though secondary modal shift effects e.g. if changes to capacity on public transport released by transfers to PTW use would draw some people out of their cars hereby reducing congestion, was not considered);
- The overall environmental impact of a switch to motorcycling was minimal for any realistic level of transfer; and
- Without additional safety measures, a transfer to motorcycles would be likely to increase casualties.

The study concluded that further work would be needed to ensure that the conclusions were robust. For example the AGM noted that in London, increased levels of motorcycling have not led to a pro rata increase in motorcycle casualties as some had expected.

5.2 Security of motorcycles at journey's end is an important policy consideration, given the relative ease with which motorcycles can be stolen. The absence of convenient and secure parking and clothing lockers can be a severe deterrent to motorcycle use. Often all that is needed is an area that is in clear view and equipped with some fixed rail or other solid device to which the motorcycle can be locked. Advice on parking issues was contained in TAL2/2002 and the 2001 Transport (Scotland) Act was amended to include the provision of secure motorcycle parking.

5.3 Secure parking facilities should therefore be provided at transport interchanges and at journey's end to mitigate the likelihood of theft and minimise "unofficial" parking. In a recent study on motorcycles and congestion and the factors that can affect modal shift it was found that the time spent walking from the parking location to the final destination is only valued negatively when there are no specific security measures available at the parking location. If security measures are provided then the walking time of up to five minutes has not been found to impact on the facility.

5.4 The demand for motorcycle parking may be high at and around educational establishments and work places, within or surrounding shopping and entertainment/leisure areas, at transport interchanges, or within residential areas lacking private parking opportunities.

5.5 In terms of convenience, flexibility in use and security considerations, motorcycles are often more similar to bicycles than cars. Consequently, the behaviour and requirements of motorcyclists often follow the cycle-parking model. Inadequate provision will lead to exploitation of inappropriate opportunities and can result in obstruction or hazard to others. This is not to say that marginal areas, especially those already utilised by riders,

cannot be formalised by relative low cost actions to protect parked machines and other road users.

- 5.6 Parking occupancy and duration can only be reliably assessed by manual surveys, but consultation with users can help to resolve issues and produce more suitable facilities.
- 5.7 There is little in the way of established standards, but those local authorities that have specified figures commonly recommend motorcycle parking levels of around 20% of car capacity.
- 5.8 Traffic Advisory Leaflet (TAL) 2/02 links journey purposes with length of stay. In addition to indicating likely uses, it is also possible to suggest other attributes of motorcycle parking that might vary with length of stay. For short visits close proximity to destination will be a key feature. For longer visits, while proximity remains important, security features such as anchor points, regular monitoring and limited opportunity for theft by van become more important.
- 5.9 While more sophisticated security systems with moving parts or locking mechanisms are generally more expensive to provide and maintain, the temptation to offset these costs by charging is difficult to implement successfully. Ticket based pay and display systems do not work well with motorcycles as there is nowhere to secure the ticket, while meter based systems can alert thieves to the likely time at which a rider will return to their machine.
- 5.10 Good practice in motorcycle parking can be summarised as “Near and Clear, Secure and safe to use and Useful”:
 - Near – Motorcycle users will naturally look for parking opportunities close to their destination because the relatively small-size and flexibility of the motorcycle allows easy progress through traffic and the exploitation of marginal parking opportunities without causing obstruction. (consideration of carrying of protective clothing and helmets will also mitigate against more remote parking);
 - Clear – While the first consideration is especially true of very short stops, any difficulty in finding a suitable formal parking area will tend to negate the natural advantages of motorcycle use, if riders looking to park for any length of time are to use formal facilities, they need to be able to find them;
 - Secure – Physical security measures will be a strong attraction for most riders needing to park for more than a few minutes. Casual users, motorcycle-tourists, etc. unfamiliar with an area are likely to find the prospect of secure parking very attractive. Physical security need not be difficult or expensive to provide, and inclusion of fixed robust features such as rails, hoops or posts designed to provide a simple locking-point for securing motorcycles is often all that is required;
 - Safe to use – Personal safety considerations when using a parking area start with the surface on which the machine has to be manoeuvred, mounted/dismounted, which should be level (Slopes greater than 5% can cause reduced stability of parked machines) and be on suitable hard-standing. (Motorcycle side and centre stands can exert considerable loads, 100psi would not be unusual for larger machines). Secondary security feature such as lighting, seclusion, whether the scheme is

covered by CCTV and the amount of passing pedestrians traffic all need to be considered when planning a facility. Where motorcycle-parking facilities are provided on the carriageway, sufficient space and visibility must be present to allow manoeuvring without significant risk of coming into conflict with other traffic; and.

- Useful – where possible, in new developments where parking is provided, lockers and changing facilities should be provided for cyclists and motorcyclists. PTW parking should also be provided as close to the building access points as possible.

5.11 The Scottish Executive encourages the provision of adequate secure motorcycle parking, particularly in congested urban areas, in line with the guidelines contained in TAL 2/02.

Appendix A

Strategies for improving the safety of Motorcyclists

1. Motorcyclists represent a large proportion of road casualties in relation to their numbers. While motorcycle accident rates in proportion to rider numbers and distance travelled have reduced considerably over the last decade, significant increases in rider numbers mean that absolute numbers of *fatal and serious* casualties have increased. Measures introduced over the years such as compulsory basic training have made a positive difference, but it is clear that if casualties are to be reduced, further measures need to be taken. Part of the problem could be the failure to consider motorcycles adequately in transport planning and strategies, and address the needs of motorcyclists.
2. Widespread adoption of policies aimed at improving pedestrian and cyclist safety has reduced casualties for these modes significantly. With motorcycle use increasing (more than 80% since 1995) similar consideration of this mode of transport should be taken into account.
3. Exclusion of motorcycles from planning and strategies tends to reinforce the perception that motorcycles are not part of the transport mix and are only “the preserve of rebels”. Inclusion of motorcycles in planning and strategies can lessen this perception and help show the positive benefits this mode has to offer.
4. The promotion of motorcycles as beneficial in helping reduce congestion, emissions and land use in our congested urban areas can increase the use of this mode for commuting. From a motorcyclists perspective this has two significant benefits. Firstly an increased presence of motorcycles on the road increases the expectation among other road users of the likelihood of encountering motorcycles, reducing instances of motorists looking but failing to see motorcyclists, a common feature of urban collisions. The second benefit that increased commuter use has is in raising the motorcyclists experience of dealing with varied weather and traffic conditions and combating the perpetual learner syndrome that is common among riders who use their bikes solely for leisure purposes.
5. To encourage motorcycle use as a means of commuting as opposed to a single car occupancy, the appropriate infrastructure and safety initiatives need to be considered. Motorcycle theft is a significant disincentive to potential users who would otherwise consider using their bikes. Secure parking facilities for motorcycles reduces this concern as well as reducing the burden on the police that such theft represents. Measures such as allowing motorcycles to use bus lanes have proved to increase the visibility of motorcyclists and lessen their risk of collisions by up to 30%, without increasing the risks to cyclists.
6. While casualty numbers have reflected the increased motorcycle usage since 1995, it does not follow that this need always be the case. Within the Congestion

Charging Zone in London PTW use has increased by 20% since the introduction of the charge, while casualty numbers have decreased by 30%. Although the reasons for this reduction in casualties, despite increased usage, are not totally clear, investigation into PTW accidents within built up areas indicates that accidents tend to be the fault of other motorists. On this basis it would not be unreasonable to suggest that there is an increased awareness of cyclists and PTWs by other motorists due to increased numbers choosing these modes of transport both within the Congestion Charging Zone and throughout Greater London. Another factor, which is believed to have contributed to this reduction of casualties among motorcyclists, was the launch of BikeSafe London in April 2003.

7. On non-built up roads, accidents tend to be mostly the fault of motorcyclists, resulting from a “loss of control” on the part of the motorcyclist, typically involve “sports bikes” and occur on single carriageways with 60mph speed limits. Adoption of the IHIE Guidelines for Motorcycling by road authorities can help mitigate the effects of such accidents and reduce their probability of occurring.
8. Road design and layout is crucial to the needs of motorcycles. Many motorcycle accidents occur either at junctions or because the design of the highway obscures visibility of motorcycles. Poor maintenance and repair of roads can lead to potholes and inconsistencies in the road surface which present major hazards to PTW users. Careful consideration needs to be given to design, sight-lines, road maintenance and the location of street furniture. The IHIE motorcycling guidelines provide best practice for road design and maintenance.
9. In order to address the principal causes of accidents in built up and non-built up areas road safety campaigns should consider sustained awareness campaigns in which motorcyclists are targeted to better negotiate junctions, bends and carry out overtaking manoeuvres. An element of this campaign should also encourage the development of these vital skills through “additional or advanced training”.
10. If motorcyclist accidents are to be reduced significantly, then the role of other motorists in many collisions also needs to be addressed. Education programme and campaigns aimed at increasing drivers' awareness of motorcycles can have a significant impact and should be carried out in parallel with campaigns targeting motorcyclists. These campaigns need to take a multi-agency approach, with input from road user groups, the police and The Local Authority Road Safety Officers Association (LARSOA) amongst others.
11. LARSOA is the main “clearing house” for local authority educational and publicity measures and it is recommended that the appropriate LARSOA adviser be consulted before initiating any new measures, to ensure cohesive and effective approaches, while avoiding duplication.

12. The police are also concerned about motorcycle related collisions and are developing their own strategies to reduce casualties. This includes standardisation across the country of the motorcycling skills assessment course Bikesafe. In Scotland all eight police forces and other agencies including riders organisations have been involved in the Bikesafe Scotland initiative launched in the year 2000.
13. The Scottish Executive Transport Research Planning Group (TRPG) conducted an evaluation of the scheme. Their report concluded that participants were significantly less likely to experience “loss of control” (the most common precipitating factor in fatal accidents where the motorcyclist was judged to be primarily responsible). Improved hazard perception and defensive riding had also taken place and resulted in most riders riding below the speed limit in built-up areas. The report had some concerns that after participation some riders were riding faster on roads in non-built up areas, though there was no indication that the increased speed was necessarily inappropriate and was mitigated by improved control, some of the police forces had made changes to the programme to focus more on riding attitudes as a result.
14. Participants to the scheme were attracted by the fact that Bikesafe Scotland was free and run by the police. They saw the improved relationship between the police and the motorcycling community as being very positive. The TRPG report noted that a lack of resources was a problem, with some forces being forced to scale back on the scheme, and recommended that development of the scheme would depend on dedicated resources being made available. There is scope for local authorities to provide support for this worthwhile scheme and backing has already been provided within the Northern Constabulary area.
15. Some police forces, in liaison with local authorities, are conducting Rider Improvement Courses for motorcyclists. These courses can apply to motorcyclists seen to be riding badly when no offence has been committed, and offered as an alternative to prosecution when an offence is committed. These courses also have the benefit of attracting riders who are most at risk and would not otherwise consider participating in safety courses.
16. Perth and Kinross Council have initiated a Bike Plus scheme for newly qualified motorcycle riders. This scheme provides additional training for novice riders who due to their lack of experience are at increased risk. The course is designed to increase hazard perception, improve motorcycle control skills at low and high speed as well as on motorways and at night or in poor weather.
17. Local Authorities should consider initiating Bike Plus schemes.

18. Although motorcycle safety is a concern, full introduction and continuation of the safety schemes detailed in this Appendix, coupled with appropriate safety campaigns, will ensure that further improvements to motorcycle casualty rates can take place. A failure to adopt these measures risks placing motorcycles at the margins of policy with continued unacceptable accident rates.
19. It is clear that both rural and urban areas, motorcycle casualties are caused by a variety of factors that revolve around engineering and planning, coupled with behaviour, skills and attitudes between motorcyclists and other road users. Compared to car users, motorcyclists are particularly vulnerable mainly due to the relative exposure to the external environment.
20. Appropriate action should take the form of an extensive package of measures that integrate to form an overall motorcycle strategy with clear targets not only for casualty reduction, but also for implementation of measures, which reduce vulnerability and change attitudes.
21. Measures should as far as possible be taken in partnership with motorcycling stakeholders, including the motorcycle industry and users.
22. In order to provide sufficient funding for safety campaigns and initiatives, as well as improving public acceptance of safety cameras, consideration should be given to obtaining funding for these measures from safety camera partnerships.
23. Diesel spillage as well as being of considerable concern to motorcyclists may be a contributing factor in a small but significant number of accidents. Local authorities should ensure that existing legislation is adequately enforced with the aim of ensuring minimum spillage for safety and environmental reasons.

Appendix B

Summary of IHIE Guidelines for Motorcycling

Surface Grip and Consistency

Motorcycles have a much greater need for a consistent and high level of grip from the road surface than twin-track vehicles, especially on wet surfaces and in areas requiring braking and steering. Riders adopt an angle of lean to negotiate a corner that is related to speed and curvature – changes in grip can destabilise the machine in this situation. Any deviation from a consistently level surface can seriously impair the motorcycle's road-holding ability, increasing the risk of a crash. Unpredictable changes in the road environment that calls for rapid deceleration or braking while cornering can cause the motorcycle to “sit-up” and take a tangential line away from the bend.

Design Points

The recognition and understanding of the dynamics of motorcycle behaviour, when considered during planning and maintenance of roads, can play a significant role in lessening the risk to motorcyclists.

To reduce sudden variations in steering or braking requirements and minimise the consequences of any loss of control the following points should be considered:

- Consistent horizontal alignment to minimise changes in steering angle;
- Whenever possible position pedestrian and cycle crossings away from bends to allow motorcycles to brake and stop in a straight line and improve driver and rider sight lines;
- Ensure consistent skid resistance properties, particularly on bends;
- Terminate anti-skid surfacing on straight sections of road;
- Avoid using different surfaces, for example granite setts, to emphasise a change of circumstances at turning points such as junctions and mini roundabouts;
- Thermoplastic markings rarely have the same skid resistance properties as the surrounding road. Arrows and destination markings on roundabouts or bends are of concern to riders. Consistent and informative advance warning and direction signs should minimise the need for such surface signing. Careful consideration should be given to large areas of hatching;
- Specifications for and positioning of in-road and roadside furniture, including impact characteristics when struck by a fallen or sliding body. The principal should be to minimise the number of obstacles;
- Gentle changes in vertical alignment, both to minimise potential loss of tyre adhesion and optimise drainage;
- Allow for higher eye level of riders when positioning street furniture or planting vegetation, especially at junctions;
- Use battered kerbing as standard in rural areas to minimise potential injury to a sliding body;

- When redesigning existing road layouts consider the position and level of utility covers, especially on bends and within braking areas. Avoid forcing riders to over-run them whenever possible;
- Use of safety barriers and protection of support posts. The UK Highways Agency has issued an Interim Advice Note on Road Restraint Systems (IAN 44/02) in preparation for a new performance based standard, which will bring UK safety barrier guidance in line with European standards;
- The desirability of a “clear zone” on the outside of bends on higher speed rural roads – whenever possible position warning signs in advance of bends or as far as practicable from the carriageway;
- Consistent signing along a route, where the severity of the hazard is proportionate to the level of signing, so rider and driver expectations are met. If the road can “deceive”, warnings are required;
- The role that probable future levels of maintenance may have on continued safety should be considered, particularly if design features require higher levels of maintenance than the road is realistically going to receive;
- Those authorities introducing LRT systems must give careful consideration to the destabilising effect that the rails can have on motorcycles and cycles.

Priority Junctions and Roundabouts

Measures to optimise sight lines are very important at priority junctions and roundabouts. A high proportion of crashes between motorcycles and cars in urban situations are due to emerging drivers failing to see the oncoming motorcycle. This potential problem can be mitigated with steeper entry angles and narrower entry widths – which as well as improving visibility for the driver has the effect of reducing entry speed. A balance will need to be struck between capacity and safety.

Highway Maintenance

The role of the maintenance engineer is critical to motorcycle safety, perhaps more than for any other mode:

- In providing a consistent road surface;
- In keeping roads clear of contamination and debris;
- In maintaining visibility, especially at bends and junctions;
- In ensuring best practice in maintaining road signs, road studs and markings;
- In implementing maintenance policies that focus on preventative action;
- In designing winter maintenance regimes that keep the needs of riders in mind;
- In ensuring that road works are safe for all users.

A good quality surface makes for a safer, more pleasant experience for most road users; it is an essential requirement for motorcyclists. Factors affecting motorcyclists include: skid resistance, surface contamination and debris, drainage gullies, road markings and road studs all of which should be considered from the motorcyclist’s viewpoint.

Surface Contamination and Debris

The consequences of loss of grip are usually more severe for motorcyclists. Loose grit and gravel are a major concern for the rider and routine highway maintenance should be planned to reduce the amount of debris left on the highway. To counter this:

- Engineers should give more consideration to finished surface dressing sites to reduce the hazard caused by excess material in the days after work has been completed;
- Storage of gravel at the roadside, which could spill onto the carriageway, should be avoided;
- Under the code of practice for maintenance management it is recommended that surface inspections are carried out regularly. The opportunity should be used to locate areas of unused carriageway where loose material accumulates and identify these areas for priority sweeping;
- The spillage of diesel, oil and other similar substances on the roads is of great concern to the motorcyclist. Even the use of absorbent granules to remove these spills can be a hazard. At sites where this is a regular problem consider warning signs;
- Loose chipping warning signs need to be prominent, with consideration being given to yellow backing boards or high visibility signs.

Visibility

“Looked but failed to see” is a common contributing factor in accidents involving motorcycles and other vehicles. This can become a problem at sites, particularly junctions where planted areas or hedges are overgrown. This can be countered by an improved maintenance regime or modifying the type of planting.

Road Markings and Road Studs

The use of road markings needs to be carefully assessed with regard to the motorcyclist. The position and skid resistance value of edge lining, rumble strips, large arrows and hatched centre line marking can catch out the unwary particularly in the wet. Laying new markings on top of old can exacerbate this problem as can the practice of blacking out redundant markings. Where possible old markings should be burned or planed off.

Many different types of road studs are now available. Newer types are more visible and may be more suited to routes well used by motorcyclists, due to the lower level of illumination provided by motorcycle headlamps and the fact that the lean of a motorcycle negotiating a bend can take the headlight beam away from the hazard.

Rutting

Badly rutted surfaces cause particular problems in wet conditions because, in addition to rapid change in level, they retain water and increase the risk of aquaplaning. Use warning signs as an interim measure pending performance of a programmed maintenance scheme.

Potholes

Potholes can be one of the most dangerous hazards for motorcyclists and cyclists. Adequate inspection and repair regimes should deal with the vast majority but the public should also be encouraged to report defects. An efficient reporting regime can be beneficial. Reactive maintenance can be reduced by a switch to planned maintenance that caters for the higher vulnerability of motorcycles and their riders as resources permit.

Re-texturing

The various techniques of surface roughening such as grooving which are used to give a texture or improve drainage, must be carefully considered and when used require adequate signage to give the motorcyclist ample warning of this hazard.

Highway Drainage

Inadequate or compromised highway drainage creates wet patches and water pools causing slippery surfaces and increases the risk of aquaplaning. This can be a problem where non-highway water runs across the highway often as a result of blocked gullies or inadequate drainage schemes. Such areas should be noted for remedial action and gullies should be inspected and cleaned regularly.

Lighting

At night consistent road lighting is essential to enable any standing water, potholes or uneven utility covers to be seen in time to take evasive action. Therefore roads departments need a thorough and timely inspection and repair regime for road lighting.

Service Covers

One of the most regular problems encountered by motorcyclists is that of service covers. Designers and maintenance engineers should take every opportunity to reassess the use of steel service covers in the carriageway and, where re-location is impossible, consider replacement with high skid resistance covers. This is particularly important where covers lie on the riding line during a change of direction. The British and European standard on this topic is currently under review with the intention of including a requirement for skid resistance. This does not preclude retro-fitting improved surfaces to covers that can't be moved and utility companies should be encouraged to fit "skid proof" types during renewal of apparatus.

Road Works

The positioning and construction of temporary road signs can create a hazard for motorcyclists when negotiating roadworks, while poorly constructed re-instatement, temporary or otherwise, can pose severe stability problems to riders, especially at low speed. Areas of substandard road lighting can pose an even greater risk during road works. Missing or defective lighting should be repaired prior to commencing work.

Traffic Calming Schemes

Certain types of traffic calming features, for instance horizontal build-outs, vertical humps, speed tables and the use of block paving or stone setts can cause a variety of problems for riders, including difficult level and wheel path changes. Careful consideration to the design and location of traffic calming measures is required if they are not to be counter-productive. In addition effective and well maintained lighting is essential especially at vertical features such as road humps and plateau.